IBM Application Performance Analyzer for z/OS

User's Guide

Version 11 Release 1

SC11-7745-02

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Note: Before using this information and the product it supports, be sure to read the general information under Appendix E, "Notices," on page 859.

This edition applies to IBM Application Performance Analyzer for z/OS Version 11 Release 1 (5697-Q03) as modified by PTFs listed in "About this document" on page xvii and to any subsequent releases until otherwise indicated in new editions. Make sure you are using the correct edition for the level of Application Performance Analyzer.

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About this document

This document describes IBM® Application Performance Analyzer for z/OS®, Version 11 Release 1 plus the following PTFs:

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4 April 2011	None	PM34327
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For the latest Application Performance Analyzer PTF information, see http://www.ibm.com/software/awdtools/apa/support/.

Appendix A contains information about IBM Web sites that can help you answer questions and solve problems.

IBM Application Performance Analyzer is an application program performance measurement tool for use on z/OS systems. This document describes how to use Application Performance Analyzer to measure the performance of z/OS applications.

If you need to install Application Performance Analyzer, refer to the *Application Performance Analyzer Program Directory* for installation instructions.

Documentation conventions

The following table describes typographical conventions used throughout this document:

Convention	Explanation
boldface	Indicates a command or keyword that you should type exactly as shown.
italics	Indicates a variable for which you should substitute an appropriate value.
`monotype`	Indicates literal input and output.
Ctrl + D	Indicates two or more keys pressed simultaneously.
[ ]	Brackets surround and optional value.
|	Vertical bars separate alternative values from which you must make a selection.
...	Ellipsis indicates that the preceding element can be repeated.

Summary of changes

Changes introduced with IBM Application Performance Analyzer V11.1

- A Windows GUI plugin for Eclipse is provided to integrate with CICS Explorer. The plugin encompasses the observation request and reporting functions, including the display of detail windows, module information and source program mapping.
- Version checking is added between the GUI plugin and the Listener started task. This feature will notify the GUI user when a new version of the GUI is available and will check for incompatibility between the GUI and the Application Performance Analyzer z/OS components.
- Support is provided for a shared source program mapping dataset list, called the Common Data Store. This optional feature allows you to maintain a common list of source program mapping data sets that is accessible to all users of Application Performance Analyzer. It is maintained through the new A05 ISPF panel and the Mapping Repository GUI screens. The new configuration option CDS is provided to enable the Common Data Store and a new security rule is provided to permit update access to the shared source program mapping dataset list. The Common Data Store must be enabled to allow source program mapping through the GUI plug-in.
- C/C++ source mapping is enhanced to reduce the time stamp interval and to provide the ability to load source and then map it to the module, ignoring the time stamp. (the inverse of usual C/C++).
- IMS multiple address space support is enhanced to group the measurement of all selected MPP regions in the Observation List under a single parent observation for an IMS subsystem. Support for IMSPlex is added which allows a user to specify the IMSPlex group name instead of a single IMS subsystem name when requesting measurement of an IMS transaction. IMS multiple address space support is extended to the GUI plug-in.
- A new ADABAS data extractor activates a measurement option in which detailed information about Software AG's ADABAS calls is collected during the measurement. ADABAS calls are reported in C*nn* and W*nn* reports, and E*nn* reports for CICS. The new configuration option ADABAS is provided to enable access to the ADABAS data extractor.
- A new NATURAL data extractor activates a measurement option in which detailed information about Software AG's Natural calls is collected during the measurement. Natural calls are reported in the new C10 CPU Usage by Natural Program report. The new configuration option 'NATURAL is provided to enable access to the NATURAL data extractor.
- A new CICS+ data extractor activates a CICS measurement intercept that counts the precise number of CICS transactions during the measurement interval. The exact service time and CPU time recorded for each transaction is displayed in the new E12 CICS CPU/Service Time by Transaction report. The new CICSI configuration option is provided to enable the CICS+ data extractor, and a new security rule is provided to permit use of the CICS+ data extractor.
- Two new CICS reports are added to report mean and total service times by CICS user. There are reports E10 CICS Mean Service Time by User and E11 CICS Total Service Time by User.

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- Two new Java reports are added to report heap usage, and CPU usage by thread. These are reports J02 Java Heap Usage Timeline and J03 Java CPU Usage by Thread.
- The Variance Report feature is enhanced by providing three new variance reports highlighting the main difference between each of the CICS, DB2 and IMS summary reports. Up to 20 measurements can be selected for variance reporting, providing the ability to evaluate the performance of specific jobs over an extended time period. The new reports are V02 CICS Variance Summary, V03 DB2 Variance Summary and V04 IMS Variance Summary.
- The DB2 CPU/service time reports are enhanced to allow the developer to display the percentage used in place of the mean fields.
- DB2 buffer pool statistics are now displayed in the DB2 report detail window for reports F10 to F12 and F15 to F19.
- The S01 Measurement Profile report is enhanced to include a new client enclave consumption section for DB2 parallel queries, and to report zAAP on zIIP as zAAP.
- The S09 Measurement Analysis report is enhanced to include a recommendation to the developer that a VSAM reorganization be done when CI and CA splits are present.
- The I01 IMS Measurement Profile report is enhanced to include DLI Call statistics.
- The sample file name can now be customized to include system variables and three new Application Performance Analyzer variables.
- A new Data Extractor Module Resolution user exit is provided that enables you to attribute program execution to MVS modules or USS executable files that typically would be reported as unresolved (NOSYMB) by Application Performance Analyzer.
- Support for large block sizes greater than 262K is provided.
- Support for Java virtual machine V5 is provided in 64-bit.
- Support for Java virtual machine V6 is provided in both 31-bit and 64-bit.
- Support for measuring Java jobs running in Websphere V7 is provided.
- Support for 64-bit XPLink is provided.
- Currency support for IBM DB2 V10.1, Java 1.4.2 SR13, and IBM z/OS R1.12 is provided.

Chapter 1. Using Application Performance Analyzer/ISPF

Application Performance Analyzer/ISPF is the main interface to Application Performance Analyzer. It is used for submitting new observation requests, and for navigating the Performance Analysis Reports generated from observation requests. This chapter describes the Application Performance Analyzer/ISPF environment in general, how to submit observation requests, and how to navigate the reports.

Almost all panels in Application Performance Analyzer/ISPF are implemented as interactive reports. The first screen displayed when entering Application Performance Analyzer, "Observation Session List" follows the same rules and conventions as the Performance Analysis Reports.

For information about ...	See ...
Commands used to navigate ISPF reports.	"ISPF reports: navigation and control"
Application Performance Analyzer's main entry panel: the observation session list.	"R02 - Observation session list" on page 8
Accessing and using the performance reports menu.	"R01 - Application Performance Analyzer performance reports menu" on page 13

ISPF reports: navigation and control

You navigate and control Application Performance Analyzer/ISPF reports using two types of commands:

- Primary commands - commands that you type on the command line
- Line commands - commands that you type directly in input fields in the body of the report

Scrolling

The vertical and horizontal scrolling commands you are familiar with from using most ISPF applications are applicable when viewing Application Performance Analyzer reports. Use UP and DOWN (PF7 and PF8) to scroll towards the top and the bottom of the report. You can scroll Maximum, Half, a specific number of lines and by cursor position.

Similarly, use LEFT and RIGHT (PF10 and PF11) to scroll the report horizontally.

Report headings

Many reports present information in a tabular format in rows and columns. The table begins with one or more heading lines, which contain title fields for each of the columns. These heading lines will "lock" to the top of the report viewing area and the vertical scrolling commands will affect only the data lines.

Action (menu) bar

Report navigation primary commands can be displayed by selecting "Navigate" on the action bar menu or can be typed directly on the command line. The action bar menu can be removed from the display by entering the PREF command, and de-selecting the "Action Bar Visible" option.

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```
File View Navigate Help
 ------------------------------------------------------------------------------
```

Retaining open reports

Once you have opened and viewed reports, they can be retained for later viewing. Application Performance Analyzer provides this feature so that multiple reports (from multiple observation requests, if desired) can be readily available for viewing without re-generating the reports. You can navigate through all the open reports using the WIN and JUMP (PF4) commands. Reports are retained when you exit them using the CANCEL (PF12) command.

Displaying HELP

For information about the report currently being displayed, position the cursor in the body of the report (not on an input field), and press PF1. Pressing PF1 on an input field will display specific information about that field.

Primary commands for report navigation

The following is a list of the commands used to navigate reports and explanations for using them:

WIN You can use the WIN (WINdow) command to display a selection list of open reports in a pop-up panel. From that panel, you can make a selection to jump to the selected report. The main Observation Session List panel will be the report listed at the top of the selection list, so you can use WIN to quickly get back to this panel rather than navigating through all your open reports.

JUMP (PF4)
You can use the JUMP command, or the PF4 key, to jump to another open report. Each time you issue a JUMP request, Application Performance Analyzer will skip to the next open report, on a rotating basis.

END (PF3)
Use the END command, or the PF3 key, to return to the display of the previous report — the one from which the current report was launched. The END command will close (delete) the current report. Entering END from the Report Selection Menu will exit the Application Performance Analyzer Performance Reporting Facility.

CANCEL (PF12)
Use the CANCEL command, or the PF12 key, to return to the display of the previous report — the one from which the current report was launched. The CANCEL command will leave the current report open. You can return to it any time using the JUMP or WIN command. Entering CANCEL from the Report Selection Menu will exit the Application Performance Analyzer Performance Reporting Facility.

REPORT CODE
Once you have selected an observation session, you can enter a three character report code, even if you are not in the report menu. You can be viewing one report, and can immediately open an additional report by typing its code.

UP (PF7)
Use the UP command, or press PF7, to scroll vertically towards the top of the report.

DOWN (PF8)
Use the DOWN command, or press PF8, to scroll vertically towards the bottom of the report.

LEFT (PF10)
Use the LEFT command, or press PF10, to scroll the report horizontally to the left.

RIGHT (PF11)
Use the RIGHT command, or press PF11, to scroll the report horizontally to the right.

FIND The FIND command (abbreviation "F" can be used) finds all occurrences of a text string. It is similar to an ISPF FIND command, but does not have all the features. All occurrences of the target text string will be highlighted. To remove the highlights, enter the RESET command.

RESET
The RESET command removes the highlights set by the FIND command.

PREF Use this to set preferences for General Display Settings. Put a slash "/" beside an option to select it. The available options are:

1. Action bar visible on panels
2. Use 3270 graphic characters
3. Show long descriptions on multiple lines
4. Suppress use of special +/- character

CONNECT
Only available on the R02 Observation Session List screen. If your installation has multiple Application Performance Analyzer instances running, you can change which one your ISPF session is connected to by typing CONNECT followed by the Application Performance Analyzer identifier. You can use the VER command to view which Application Performance Analyzer instances are currently running on the same z/OS image that you are logged in to.

VERSION
Only available on the R02 Observation Session List screen. Type VERSION or VER and a list of the Application Performance Analyzer started tasks will be displayed, along with their version numbers, and when they were started.

SETUP
Use the SETUP command to filter information and select options for reports. This command is useful for reducing the size of reports by removing information that is not critical. The options available using the SETUP command vary by report. You can get more details from the report descriptions.

HIDE Only available on the R02 Observation Session List screen. Type HIDE to remove the list of commonly used Application Performance Analyzer primary commands from view.

SHOW
Only available on the R02 Observation Session List screen. Type SHOW to redisplay the list of commonly used Application Performance Analyzer primary commands at the top of the screen.

IMPORT
Only available in the R02 Observation Session List screen. Use the IMPORT

command to load a sample file. This can be a native Application Performance Analyzer sample file or one that has been previously exported using the EXP command and in TSO XMIT format. The IMPORT command displays a pop-up window to enter the fully qualified data set name of the native sample file or TSO XMIT file, and to indicate if that original file is to be deleted after import. A new request description can be optionally entered.

During IMPORT, Application Performance Analyzer creates a new observation, assigns a new request number and if provided on the IMPORT pop-up window, adds the description to the imported observation. If indicated, Application Performance Analyzer will delete the original file. The date and time of the imported request is set to the current date and time and the expiry date is recalculated based on the rules of the importing system.

Line commands for report navigation

You enter a line command directly in an input field in the body of a report. The line commands are usually typed directly over the text of the field, such as a column heading, or a data field in the report. Input fields where you can enter line commands are always underlined.

Many of Application Performance Analyzer's performance analysis reports contain input fields on which you can enter various line commands. Generally, you can enter line commands on quantified detail lines on the field under the "Name" heading.

The allowable line commands vary depending on the type of detail line. But, in all cases by entering "/" you can request the display of a Context Menu, which will present a list of the allowable line commands for that input field. The generally available line commands are summarized here, followed by details about each command.

- / Display context menu
- ? Display context help information
- + Expand
- ++ Show additional details (or just press the Enter key as a shortcut)
- – Collapse
- SV Sort by value
- SN Sort by name

"/" Context menu

Enter a slash "/" to display a context menu in a pop-up panel. The context menu lists the line commands that are available for that field. In addition, you are able to select the line command function directly from the context menu.

A sample context menu is shown below:

```
Enter S to select a function from this menu.  The line
command (Yellow) can also be entered on the main panel.

Sel  To Perform the Following                LineCmd

 _ display context help information          ?
 _ show additional details about this line   ++
 _ expand to reveal next level entries       +
 _ collapse to hide next level entries       -
 _ sort next level entries by value          SV
 _ sort next level entries by name           SN
```

"?" HELP

For context help information about the field, or report line, enter a question mark "?". Alternatively, you can press the PF1 key with the cursor positioned on the input field.

"+" Expand

Enter a plus sign "+" on a report detail line to expand the report to reveal additional detail lines which are at the next hierarchical level under the selected line. This offers a means of breaking down one quantified item into greater detail.

For example, consider the following line item which quantifies CPU time in System/OS Services:

```
SYSTEM     System/OS Services       44.30 ============================
```

Type a plus sign in the name field – SYSTEM:

```
±YSTEM     System/OS Services       44.30 ============================
```

Press the ENTER key and the item will be expanded as illustrated here:

```
SYSTEM     System/OS Services       44.30 ============================
→ SVC        SVC Routines           42.14 ========================
→ MVS        MVS System             2.06 ==
→ NUCLEUS    Nucleus Modules         0.06
→ IMS        IMS Subsystem           0.03
```

The plus sign (+) entered on the Name heading field will fully expand the entire report to show the full hierarchy of detail.

The plus sign (+) entered on the Description heading will expand the width of the description field. The plus sign (+) entered on the heading for the scale (histogram) will 'zoom in' the scale.

You can also use this line command in the "+n" format , where "n" is the number of levels to expand. On the Description heading, this allows you to expand the width of the description field by a specific number of characters, for example "+12" will widen the field by 12 characters.

"++" Additional details

Enter "++" on a report detail line to display detailed information about the selected item. A pop-up panel will appear in which this information is displayed. The nature of the information displayed in these pop-up panels varies widely depending on the type of item selected.

Note: As a shortcut, you can also simply press the Enter key on an item, it will be treated as if you had entered "++".

As an example, consider the I/O Analysis by DDNAME report:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
D02: DASD Usage Time by DDNAME (0723/TSTJOB01)               Row 00001 of 00003
Command ===> _____________________________________________ Scroll ===> CSR

DDName>Cyl   Volume>Unit        Percent of Time * 10.00%  ±1.6%
                                    *....1....2....3....4....5....6....7....8..
VSAM1-02       BKNSM2          31.16 ================
OUTFILE        BKNSM2           1.16 ==
INFILE         BKNSM1           0.05
```

Additional detail about the DDNAME VASM1-02, for example, can be displayed by typing ++ (or just pressing Enter) in that field:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
D02: DASD Usage Time by DDNAME (0723/TSTJOB01)               Row 00001 of 00003
Command ===> _____________________________________________ Scroll ===> CSR

DDName>Cyl   Volume>Unit        Percent of Time * 10.00%  ±1.6%
                                    *....1....2....3....4....5....6....7....8..
++AM1-02       BKNSM2          31.16 ================
OUTFILE        BKNSM2           1.16 ==
INFILE         BKNSM1           0.05
```

A pop-up panel with detailed information will appear. (This pop-up panel is scrollable, more information is available by scrolling down with PF8):

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------+
|                                                          More:    +     |
| +--------------- The following report line was selected --------------+  |
| | VSAM1-02      BKNSM2          31.16 ================              |  |
| +-------------------------------------------------------------------+  |
|                                                                         |
| Calculation Details                                                     |
|    The 31.16% quantification represents 1,174 measurements              |
|    of DASD I/O unit activity for the DDNAME VSAM1-02 from               |
|    a total of 3767 overall measurements. This is the                    |
|    percentage of the measured run time I/O                              |
|    was observed for this dataset.                                       |
|                                                                         |
|                                                                         |
| VSAM file VSAM1(2) OPENed at 9:36:17.72 Wednesday Mar 24 2004           |
|                                                                         |
|    DDNAME               VSAM1                                           |
|    Open Intent          KEY,DIR,OUT                                     |
|    Dataset Name         USER1.DATA.TESTPF.DAT                           |
|    Storage Class        BKNSMS                                          |
|    Device Type          3390                                            |
|    % Free Bytes in CI   10%                      Initial       Last     |
|    Volume Serial        BKNSM2   CI Splits        0             0       |
|    CI Size              8,192    CA Splits        0             0       |
|    Record Size (LRECL)  80       Logical Records  1             3,641   |
|    Number of Extents    1        Deleted Records  0             1       |
|    SHAREOPTIONS         (1 3)    Insrted Records  0             0       |
|    Organization         KSDS     Retrved Records  0             1       |
|    CIs per CA           78       Updated Records  0             0       |
|    Free CIs per CA      11       Byter Free Space 1,908,736     1,622,016 |
|    Free Bytes per CI    819      Number of EXCPs  Z             Z,ZZZ   |
|    % Free CIs in CA     15%                                             |
|    Strings              1                                               |
|    DATA Buffers         0                                               |
|    INDEX Buffers        0                                               |
|                                                                         |
| Index Component of VSAM1(2)                                             |
|                                                                         |
+-------------------------------------------------------------------------+
```

"–" Collapse

Enter a minus sign "–" on a report detail line to collapse (hide) all items under the selected line which are at the next hierarchical level of detail.

The minus sign entered on the Name heading field will collapse the entire report so that only items in the first level of the hierarchy are visible.

The minus sign entered on the Description heading will reduce the width of the description field.

The minus sign entered on the heading for the scale (histogram) will "zoom out" the scale.

"SV" Sort by Value

Enter "SV" to sort detail lines by value. When this is entered on a detail line, detail lines under the selected line – at the next hierarchical level – will be sorted by value. Entering the "SV" command repeatedly will toggle between sorting in descending and ascending values.

Enter "SV" on the 'Name' heading field to sort the first level items by value.

"SN" Sort by Name

Enter "SN" to sort detail lines by name. When this is entered on a detail line, detail lines under the selected line — at the next hierarchical level — will be sorted by name.

Entering the “SN” command repeatedly will toggle between sorting in descending and ascending names. Enter “SN” on the "Name" heading field to sort the first level items by name.

Note: The line commands listed above are not a comprehensive list of all that are available in the various reports. See the documentation for each report, or enter a “/” to get a context menu in any input field in any report.

R02 - Observation session list

When you start Application Performance Analyzer/ISPF, the Observation Session List panel is displayed. A list of commonly used primary commands is displayed at the top of the screen to assist those users new to Application Performance Analyzer. Once you become familiar with the Observation Session List, these commands can be hidden from view by entering the HIDE primary command. They can be redisplayed by entering the SHOW primary command.

This panel displays a scrollable list of all the observation session requests, whether they are complete, active, or pending. The list is usually filtered by the owner ID, so each user would only see their own requests. The list can also be filtered by Job Name. The SETUP command is used to specify how the list is to be filtered.

Note: Although it is not started from the Report Selection Menu, the Observation Session List panel is implemented as a report, and, therefore, follows the same conventions as the Performance Analysis Reports panels.

A sample Observation Session List panel is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R02: Observation Session List (CAZ0)                          Row 00078 of 00810
Command ===> ____________________________________________ Scroll ===> CSR

 NEW     To define a new measurement
 TNEW    To define a threshold measurement
 CONNECT To connect to another instance of the measurement task
 VERSION To display version information for all instances
 IMPORT  To IMPORT a previously Exported sample file
 HIDE    To remove these commands from the display (recommended)
 /        On top of any ReqNum to get a list of the line commands

Reqnum  Owned By  Description     Job Name  Date/Time        Samples  Status

 1871    USER1                   CICS22A   Jan-3  18:12         100  Ended
 1870    USER1                   CICS22A   Jan-3  18:11         100  Ended
 1869    USER1                   USER2     Jan-3  18:11       3,450  Cancel
 1868    USER2                   USER1     Jan-3  18:10      10,000  Ended
 1867 +  USER1    repeat m-step a CICS22A   Jan-3  18:07         100  STEPS
 1866    USER1                   USER1     Jan-3  18:08      10,000  Ended
 1865 +  USER1    repeat m-step a PFTEST11  Jan-3  17:55         100  STEPS
 1864    USER1                   USER1     Jan-3  17:56      10,000  Ended
 1863 +  USER1    repeat m-step a PFTEST11  Jan-3  17:54         100  STEPS
 1862    USER1                   USER1     Jan-3  17:54      10,000  Ended
 1842    USER1                   USER1     Jan-3  17:52      10,000  Ended
 1803 +  USER1    repeat m-step a PFTEST11  Jan-3  17:51         100  STEPS
 1802    USER1    batch interface USER1     Jan-3  17:46       5,000  Ended
 1801    USER1                   CICS22A   Jan-3  17:45         100  Cancel
 1800    USER1    RT#2 (open/clos PFTEST02  Jan-3  17:46      17,070  Cancel
 1799    USER1                   CICS22A   Jan-3  17:30         100  Ended
 1798    USER1                   CICS22A   Jan-3  17:30           1  Stoppd
```

This panel is used to initiate a new observation request, by using the "NEW" primary command, or the "NEW" line command (described in the next section). The"NEW" primary command and the "NEW" line command both cause the Schedule New Measurement panels to be displayed. For Threshold Monitor requests, use the "TNEW" primary command. For more information about Threshold Monitor requests, see "Using the TNEW command" on page 40.

This panel is also used to access the Reports menu, by entering the "R" line command on the request number for which you want to generate Performance Reports. The "NEW" and "R" commands are the most commonly used commands on this panel, and provide access to the primary functions of Application Performance Analyzer: submitting Observation Requests, and generating Performance Reports for a completed Observation Request.

Input fields

The inputs fields on this report are the ReqNum title field, and all the request number detail lines under it. The request number detail line input is described below in the section "Description of detail lines."

You can type the following line commands directly on to the ReqNum title field:

- "?" Display context help information
- "+" Expand to reveal next level entries for all observations
- "-" Collapse to hide next level entries for all observations
- "SR" Sort report detail lines by Request Number
- "SJ" Sort report detail lines by Job Name
- "SD" Sort report detail lines by date/time
- "SW" Sort lines by expiry days warning (only when expiry days warning is enabled)
- "SK" Sort lines with no delete date (only when expiry days warning is enabled)

Description of detail lines

Each detail line shows the following information about the observation session:

Request Number

This is the unique four digit request number assigned to identify the observation session. This is also an input field which accepts line commands. Type the line command directly on top of the request number. If the request number has a "+" beside it, this indicates that there are subsequent entries underneath this one. The line commands accepted in the Request Number field are as follows:

"/" Display context menu.

"?" Display context help information.

"++" Show additional details about this request in a pop-up window. As with all reports, you can also press the Enter key instead.

"+" Expand to reveal next level entries. This is used for multi-step, repeat schedule, USS, threshold and collateral DB2 requests. When there is next level entries available, a "+" will appear beside the request number.

"-" Collapse to hide next level entries.

"D" Delete the request.

"R" Display performance analysis reports menu for this request, or start Realtime Monitor if request is currently active. When entered for parent

observations of multi-step, repeat schedule, USS and threshold measurements, this will expand to reveal next level entries.

"S" Select Reports or Realtime Monitor. When entered for parent observations of multi-step, repeat schedule, USS and threshold measurements, this will expand to reveal next level entries.

"T" Tag up to 20 measurements at one time. Tagged measurements are used for variance reporting and CICS multiple address space reporting. For variance reporting, use the "T" line command together with the "V" line command, which you use to indicate the base measurement and launch variance reporting. For CICS multiple address space reporting, use the "T" line command together with the "R" line command, which you use to launch reporting for one of the CICS regions. In addition to the standard CICS reports, the specific CICS multiple address space reports are generated.

Note: Tagged measurements remain tagged only for the duration of the session.

"TR" Create a new request to be Triggered when this request starts. This can only be used on a request that is in SCHED status.

"V" Launch performance analysis reporting in a mode that enables access to variance reports. Use the "V" line command to compare a measurement previously tagged with a "T" line command. The measurement selected by the "V" line command is the base measurement in variance reports.

Note:
The report menu will be displayed in response to the "V" line command.

CAN Cancel the request (request must be active).

KEEP Keep this request until it is manually deleted. This overrides the auto delete feature.

MOD Modify the request (request must not have started yet).

NEW Create new observation request with the same attributes as this request.

The NEW line command will display the Schedule New Measurement panel with the input fields pre-filled with entries from the request on which "NEW" was typed. If you want an empty Schedule New Measurement panel, use the "NEW" primary command.

SUB Create a new observation request with the same attributes as this request and submit it immediately. You use "SUB" instead of the "NEW" line command when you do not need to view or change any of the fields in the original request.

EXP Export the sample file for this request to a file in XMIT format.

The request numbers can be displayed in different colors. Parent observations inherit the color of the most critical child. Expand the parent to see the color of the individual child observations. The colors that can be displayed are as follows:

Turquoise
The default color having no specific meaning

White Indicates this observation has been 'tagged'.

Yellow
When the expiry days warning feature is enabled, indicates this observation will be automatically deleted in two or more days. Use the SW

line command on the ReqNum heading to sort these observations by delete date. Use the KEEP command to prevent this request from being automatically deleted. Users with administrator authority will see the yellow for all users' observations. All other users will see the yellow for their own observations only.

Green When the expiry days warning feature is enabled, indicates this observation has no delete date or is marked 'Do not Delete'. Use the SK line command on the ReqNum heading to sort all these similar observations to the top of the list. Users with administrator authority will see the green for all users' observations. All other users will see the green for their own observations only.

Red When the expiry days warning feature is enabled, indicates this observation will be automatically deleted within 24 hours. Use the SW line command on the ReqNum heading to sort these observations to the top of the list. Use the KEEP command to prevent this request from being automatically deleted. Users with administrator authority will see the red for all users' observations. All other users will see the red for their own observations only.

Owned By

This is the User ID of the "owner" of the request (the TSO ID of the user who created the request).

Description

This is the descriptive name of the observation session that was entered (optionally) when the request was made.

Job Name

This is the name of the job (or Started Task or TSO ID) that was measured.

Date/Time

This indicates the date and time of the completion of the measurement. If the measurement is not yet complete, the date and time when the request was made is shown.

Samples

If the session has a status of Ended or Active this is the number of observation samples done. If the observation session has not yet started (a status of "Sched" or "Future") then this shows the number of observation samples requested. This field changes color depending on the status.

Status

This shows the status of the observation session:

- **Active** means the session is currently taking place.
- **Cancel** means the request was cancelled using the "CAN" line command.
- **Ended** means the session has completed.
- **Ended+** means the session has completed, but this request will repeat if the target job runs again. This happens when the "Times to repeat measurement" field is specified, and the specified interval has not yet passed. Once the specified interval passes, the status will change to "Ended."
- **Failed** means the request failed to complete normally, and did not create a valid sample file.

- **REPEAT** means that this is a repeating schedule request. The requests under this entry can be displayed by using the "+" line command to expand to the next level.
- **Sched** means the session has been scheduled but measurement has not yet been started.
- **STEPS** means that this is a multi-step request. The requests under this entry can be displayed by using the "+" line command to expand to the next level.
- **Stoppd** means the request was stopped for some reason, usually a CPU Usage control issue, look at report S01 and check for the CPU Usage Status field. It will be present if the request was stopped due to CPU Usage controls. You can also use the "++" (or Enter key) line command directly on the request number field, and a reason will be shown in the detail window.
- **Tagged** means that this measurement has been tagged (with the "T" line command) for use in variance reports or CICS multiple address space reports.
- **Thresh** means that this is a Threshold Monitor request. The request under this entry can be displayed by using the "+" line command to expand to the next level.
- **Trig** means this request will be triggered when the corresponding scheduled request starts.
- **USS** means that this is a USS environment measurement. A separate measurement file is created for each spawned address space. Enter the "+" line command to expand this item to see each completed measurement.
- **MultJb** means that this is a multiple job request, created by entering a jobname with wildcards specified. The measurements under this entry can be displayed by using the "+" line command to expand to the next level.
- **IMS** means that this is an IMS Multiple Address Space (MASS) request. Enter the "+" line command to expand this item to view the individual IMS MPP region observations.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| General                                                                       |
|    Request Number      1946                                                   |
|    Request Description No Description entered                                 |
|    Request Status      Ended                                                  |
|    Owner Id            USER1                                                  |
|    Time of Request     Wednesday Jan 26 2005 11:01:57.13                      |
|    Session Start Time  Wednesday Jan 26 2005 11:01:57.29                      |
|    Session End Time    Wednesday Jan 26 2005 11:02:57.50                      |
|    Session Duration    1 minutes, 0.21 seconds                                |
|    Session Delete Date Do not Delete                                          |
|                                                                               |
| Measurement Criteria                                                          |
|    Select by Job Name  CICS22A                                                |
|    Select by Sys Name  X235                                                   |
|    Sample Interval     6000 microseconds                                      |
|    Duration            60 seconds                                             |
|                                                                               |
| Measurement Information                                                       |
|    Sample File DSN     0.USER1.R1946.CICS22A.SF                               |
|    Samples Requested   10,000                                                 |
|    Samples Done        10,000                                                 |
|    ASID                OO5A                                                   |
|                                                                               |
| Data Extractors                                                               |
|    CICS                Selected                                               |
|    IMS                 Not Selected                                           |
|    IMS+                Not Selected                                           |
|    DB2                 Selected                                               |
|    DB2+                Selected                                               |
|    MQSeries            Not Selected                                           |
|                                                                               |
+-------------------------------------------------------------------------------+
```

R01 - Application Performance Analyzer performance reports menu

This panel is displayed as a result of entering the “R” line command to a line in the Observation Session List panel. It enables you to display Performance Analysis Reports for the selection observation session.

There are two distinct areas on this screen. The first, at the top of the screen, shows you a list of report categories. One of these categories is always highlighted (selected). The area at the lower half of the panel lists the available reports belonging to the highlighted (selected) category.

You can change the report category and hence change the list of available reports, by selecting a category by entering “S” beside the category, or by simply entering the single character code on the command line. You can then select a report from the lower portion of the screen.

As a shortcut, you can select a report directly by entering its three-character code on the command line. Note that if you are selecting by report code, it is not necessary to select the category to which the report belongs first, you can enter any three-character report code regardless of which category is currently highlighted. As a shortcut, you can also enter a report code on the command line while viewing a report, and that report will be opened, so it is not necessary to return to the report menu.

The most recently selected category persists from one session to the next.

This example shows the screen with DB2® Measurement as the currently selected category, note that if reports do not apply to the selected measurement, they category will be displayed in red, and will not be selectable.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R01: Performance Reports (1910/TSTJOB01)                    Row 00001 of 00008
Command ===> _____________________________________________ Scroll ===> CSR

  Select a category from       _ A Admin/Miscellaneous  _ I IMS Measurement
  the list ot the right        _ S Statistics/Storage   _ E CICS Measurement
  to view the available         _ C CPU Usage/Analysis   _ F DB2 Measurement
  reports in the selection      _ D DASD I/O Analysis    _ Q MQ Measurement
  list below.                   _ W CPU WAIT Analysis    _ G Coupling Facility
                                _ H HFS Analysis         _ J Java Measurement
                                _ V Variance Reports     _ X Multi Address Space

________________________________________________________________________________

Enter S to make a selection or enter the report code on the command line

  _ F01 DB2 Measurement Profile          _ F11 DB2 SQL CPU/Svc Time by Stmt
  _ F02 DB2 SQL Activity Timeline        _ F12 DB2 SQL CPU/Svc Time by Plan
  _ F03 DB2 SQL Activity by DBRM         _ F13 DB2 SQL Threads Analysis
  _ F04 DB2 SQL Activity by Statement    _ F14 DB2 CPU by Plan/Stored Proc
  _ F05 DB2 SQL Activity by Plan         _ F15 DB2 SQL CPU/Svc Time by Rq Loc
  _ F06 DB2 SQL Statement Attributes     _ F16 DB2 SQL CPU/Svc Time by Enclav
  _ F07 DB2 SQL Wait Time by DBRM        _ F17 DB2 SQL CPU/Svc Time by Corrid
  _ F08 DB2 SQL Wait Time by Statement   _ F18 DB2 SQL CPU/Svc Time by Wkstn
  _ F09 DB2 SQL Wait Time by Plan        _ F19 DB2 SQL CPU/Svc Time by EndUsr
  _ F10 DB2 SQL CPU/Svc Time by DBRM
```

The individual reports are described in the chapter Chapter 3, “Performance analysis reports,” on page 43.

Chapter 2. Entering observation requests

This section describes how to enter Observation Requests (measurements).

For information about ...	See ...
Initiating a new observation request	"Using the NEW command"
Entering job information	"Panel 1 – Job Information" on page 17
Specifying data extractors (CICS®, DB2, IMS™, MQSeries®, Java) or entering additional load libraries to search	"Panel 2 – Options" on page 22
Entering multi-step measurements	"Panel 3 – Multi-steps" on page 26
Selecting active jobs from a list	"Panel 4 – Active Jobs" on page 28
Specifying CICS or IMS transacations or DB2 stored procedures or user-defined functions	"Panel 5 – Subsystems" on page 29
Specifying Sysplex systems	"Panel 6 – Sysplex" on page 33
Entering a recurring future scheduled measurement	"Panel 7 – Schedule" on page 34
Additional options related to how the measurement is to be handled	"Panel 8 – Sched Options" on page 37

Entering an observation request

Using the NEW command

New observation requests are initiated from the Application Performance Analyzer Observation Session List panel (this is the panel where Application Performance Analyzer starts). You can use either the "NEW" primary command by entering it on the command line, or use the "NEW" line command by entering it on the request number field of an existing request. The "NEW" primary command will display the Schedule New Measurement panels with blank input fields. The "NEW" line command will display the Schedule New Measurement panels with the input fields pre-filled based on the existing request on which you typed the "NEW" command.

A sample Observation Session List panel with the "NEW" line command entered on the third request in the list is shown below.

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```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R02: Observation Session List (0)
Command ===> _____________________________________________ Scroll ===> CSR

Reqnum  Owned By  Description     Job Name  Date/Time        Samples  Status

 0200    USER1   CICS test 2      CICS22A   May-30 14:15       5,000  Ended
 0199    USER1   VSAM TEST        PFTEST03  May-29 18:11       3,000  Ended
 NEW8    USER1   VSAM TEST        PFTEST03  May-29 18:11       2,998  Ended
 0197    USER1                    PFTEST03  May-29 18:10       4,349  Ended
 0196    USER1                    PFTEST03  May-29 18:07       3,801  Ended
 0195    USER1   Loop with open/c PFTEST02  May-28 18:08      20,000  Ended
 0194    USER1   Loop with open/c PFTEST02  May-24 17:55      20,000  Ended
 0193    USER1   Loop with open/c PFTEST02  May-24 17:56       5,000  Ended
 0192    USER1                    USER1PF1  May-22 17:54       3,019  Ended
 0191    USER1                    USER1PF1  May-22 17:54      10,000  Ended
 0190    USER1   Loop with open/c PFTEST02  May-22 17:52      20,000  Ended
 0189    USER1   Loop with open/c PFTEST02  May-20 17:51      20,000  Ended
 0188    USER1   Loop with open/c PFTEST02  May-9  17:46      20,000  Ended
 0187    USER1   PF05             CICS22A   May-6  17:45      10,000  Ended
 0186    USER1                    CICS22B   May-5  17:46      10,000  Ended
 0183    USER1   1000/60          ARAOSHOW  Apr-30 17:30       1,000  Ended
```

Using the MOD line command

If you need to modify an existing measurement request, you can use the “MOD” line command. This only applies to measurements that are still pending, you cannot modify a request that is in progress or Ended. The “MOD” process uses exactly the same panels as the NEW process, so all the information in this chapter applies to “MOD” as well as “NEW”.

The “MOD” command can be used to modify future schedule requests, even if some of the generated future requests have run already.

Schedule New Measurement panels

After you have entered the “NEW” line command or “NEW” primary command, the Schedule New Measurement panel group is displayed.

The screens in the Schedule New Measurement dialog are divided into two sections. The top section is fixed and lists the available input panels. The current panel is highlighted. Each panel name is preceded by a symbol indicating if data has been entered to the panel. The symbol appears in green (green light) if data has been entered and is error free. A yellow or red light appears if there are warnings or errors in the data. The lower section of the screen is the input panel. It begins with an identifying heading.

Panel navigation

There are two methods you can use to JUMP from panel to panel:

- Type the panel number on the command line and press ENTER.
- Type a slash, immediately followed by the panel number in the first two positions of any input field.

These can be done in a single operation in combination with entry of input to the current panel. For example, you can enter input to Panel 1, place the cursor on the command line, type 2 and press ENTER. The entry to the Panel 1 input fields will be accepted and Panel 2 will appear. The same applies in this example if you type /2 in one of the data input fields. You must, of course, enter this on a field to which you are not specifying other input.

In some cases, automatic panel navigation occurs, for example, entering a jobname pattern will automatically take you to panel 4 to select from a list of active jobs based on that pattern.

Submitting the request

If you have entered enough data for a complete request to be submitted, "Input more data or ENTER to submit" will be displayed in the panel heading line. Pressing the ENTER key again will submit the request, unless you navigate to another panel to continue entering data.

There is a final confirmation prompt displayed before the request actually gets submitted. If you want to turn off this final confirmation prompt, use the SETUP command while you are in the R03 Schedule New Measurement dialog.

Primary commands

panel number
Enter a single-digit panel number to jump to that panel.

SUBMIT
Use SUBMIT to submit the request immediately and return control to the R02 panel.

JCL Use JCL to display the JCL and control statements that could be used to request the equivalent measurement request as a batch job using CAZBATCH.

SETUP options

Use the SETUP command to specify various options affecting this dialog:

Prompt for confirmation before submitting ...
By default, this option is selected. Indicate if the final confirmation prompt is to appear or is to be suppressed.

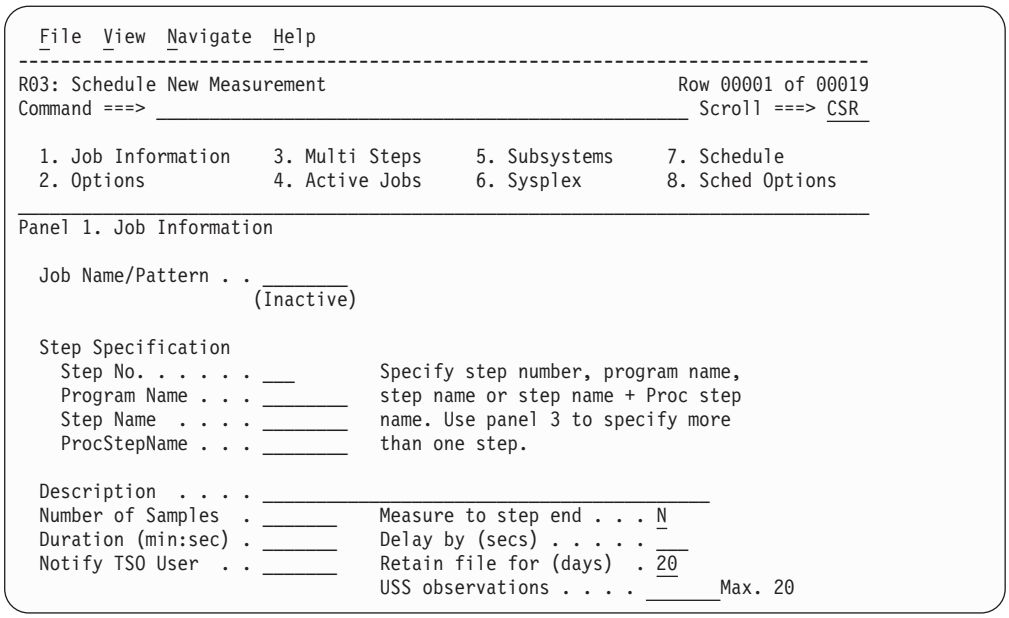
Prompt for confirmation before returning ...
By default, this option is selected. Normally a warning message will appear when the END command (or PF3) is issued after data has been input. This is to warn that the input data will be discarded. Unselect this option to suppress the warning.

Translate CICS trancode ...
By default, this option is selected. CICS transaction codes entered to Panel 5 will be translated to uppercase. Deselect this option to suppress this translation of lowercase characters.

Suppress warning flags ...
By default, this option is not selected. Select to suppress display of the yellow warning symbols that appear to the left of input fields indicating a warning condition.

Panel 1 – Job Information

The R03 Schedule New Measurement dialog always starts with panel 1 (Job Information) selected, it is shown here:



The panel shown above was invoked with a NEW primary command, so input fields are mostly blank.

Panel 1 – input fields

Job Name/Pattern

This field is mandatory. It cannot be blank. Specify the name of the job, started task, or TSO region to be measured.

Searching for active jobs (*)

You can specify a job name pattern; for example, a job name prefix followed by an asterisk (*), a job name suffix preceded by an asterisk, or an asterisk by itself. The asterisk indicates that the region to be measured is currently active. A list of active jobs whose names match the wildcard pattern will be displayed in panel 4, where one or more can be selected for measurement.

Creating multi-job measurements (%)

You can specify wildcards in order to generate measurements for multiple jobs in one request. To sample multiple jobs in one request, use a percent (%) as a wild card character anywhere in the job name. Multiple percent characters may be used in the job name, such as @(#) 11 1.1@(#)B% to sample any jobs with A and B in the job name separated by 0 to many characters. Panel 4 can be used to display the currently active jobs that will be sampled.

A job name pattern is only permitted in NEW or MOD requests. It is not valid for Threshold or Trigger requests. You can not specify a jobname pattern of "%". If a pattern is present in the jobname, then the request will automatically be set to only select active jobs.

The multiple job feature only works with jobs that are active. It does not wait for jobs to start. You can schedule a multiple job request to start at a future date and time by using panel 7 Schedule, but only one future event is permitted. The jobs that are active at the scheduled date and time (and matching the wildcard criteria) will be measured.

The maximum number of jobs that can be measured from a multi-job request is defined during the installation of Application Performance Analyzer. When this limit is exceeded, Application Performance Analyzer stops creating measurements for this request and the status of the request is displayed as 'Stoppd'. The measurements that executed (within the limit) are accessible for report viewing under the request. To increase the limit, contact your system programmer.

Obtaining DB2 DDF Data

To obtain DDF data, you must measure the DB2 DDF address space (xxxxDIST) with the DB2+ extractor turned on. You have the option of limiting the scope of a DDF measurement by specifying filtering criteria in Panel 5 Subsystems. DDF measurements may be filtered by Correlation Id, End User Id and/or Workstation Id. For more information on measuring DDF activity, refer to "Measuring DDF activity" on page 356.

Measuring a specific DB2 stored procedure or user-defined function (-)

To measure a specific DB2 stored procedure or user-defined function, use a dash (-) as the first and only character in the Jobname/Pattern field. The information identifying the DB2 stored procedure or user-defined function must be entered on Panel 5. Subsystems. This feature is only available when the WLM Intercept is activated during Application Performance Analyzer installation, and you are given appropriate security access to it. Contact your system programmer for access if necessary. When measuring a specific DB2 stored procedure or user-defined function, the following measurement options are not applicable and will result in an error if used: Step specification/Multi Steps, Measure to step end, Delay by, Active Jobs, CICS and IMS selection criteria, Schedule and Schedule Options.

Measuring a specific IMS transaction across multiple MPP regions

To measure a specific IMS transaction that executes in multiple MPP regions, you must enter a dash (-) as the first and only character in the Jobname/Pattern field. The IMS transaction name and the IMS subsystem name or IMSPLEX group name must be entered on Panel 5 Subsystems. You must also select the MPP regions you want to monitor in Panel 4. Active Jobs. This feature is only available when the IMS Intercept is activated during Application Performance Analyzer installation, and you are given appropriate security access to it. Contact your system programmer for access if necessary. When measuring a specific IMS transaction across multiple MPP regions, the following measurement options are not applicable and are ignored if used: Step specification/Multi Steps, Measure to step end, Delay by, Schedule and Schedule Options.

Active/Inactive indicator

When a NEW command is entered, Application Performance Analyzer checks for and displays the current status of the job, started task, or TSO region immediately below the jobname. When it is detected as active, 'Active' is displayed, otherwise, 'Inactive' is displayed. It is only necessary to use Panel 8 Sched Options if you wish to change the observation status from that detected by Application Performance Analyzer.

When more than one active job is selected for measurement in Panel 4, the phrase '(Active - Multiple Jobs Selected)' is displayed below the Jobname. In this case, the name listed is the first job selected in Panel 4. You must use Panel 4 to view or change the jobs that are selected for measurement.

System name

This field appears only if the Application Performance Analyzer you are connected to is configured as a member in a SYSPLEX group. Specify the name of the system on which the measured job is to run (or is currently running). Specify an asterisk (*) in this field to indicate that the job could run on any of the systems in the group.

You can also select panel 6 to display a full list of available system names from which you can make a selection.

Step Specification Field Group

Step specification is not applicable when measuring specific DB2 stored procedures or user-defined functions.

The job step to be measured is specified by a group of four fields (Step Number, Step Program, Step Name, ProcStepName). To identify the step, you can specify one of the following:

- Step Number by itself
- Step Program by itself
- Step Name by itself
- Step Name and ProcStepName

If you leave all of these fields blank, the first job step is assumed. You cannot specify any of these fields when you are specifying measurement of a job that is currently active.

To schedule the measurement of multiple steps in the same job, select panel 3.

Step No.

If Step No. is specified, the other three step fields (Step Program, Step Name, and ProcStepName) must be left blank.

Step No. specifies the numeric step number.

For a NEW measurement, you may enter an asterisk (*) in this field to measure all steps in the job.

For a threshold (TNEW) measurement, you may enter an asterisk (*) in this field to measure all steps in the job that meet the threshold criteria entered in the Criteria panel.

Step Program

If Step Program is specified, the other three step fields (Step No., Step Name, and ProcStepName) must be left blank. Program Step specifies the name of the program coded in the PGM= parameter of the EXEC statement for the step you want to measure.

Step Name

If Step Name is specified, then Step Number, and Step Program must be left blank. You can specify Step Name by itself or in combination with ProcStepName.

Step Name specifies the symbol coded in the name field of an EXEC PGM = statement or an EXEC PROC = statement. In the

event that the ProcStep name field is also supplied, this field always identifies the symbol coded in an EXEC PROC = statement.

In the event that the ProcStep name field is left blank, and Step Name matches an EXEC PROC = statement, the first step within that proc will be measured.

If the step to be measured is not within a proc, then Step Name specifies the symbol coded in the name field of an EXEC PGM = statement, and ProcStepName must not be specified.

ProcStepName

If ProcStepName is specified, then input must also be supplied in the Step Name field.

ProcStepName specifies the symbol coded in the name field of an EXEC PGM = statement that is part of a PROC.

Description

Enter a description for this observation request. This field is optional unless the option has been set during installation requiring a minimum description of 8 characters.

Number of Samples

Specify the number of times execution of the measured jobstep is to be sampled. Samples are taken in equal intervals. The sampling frequency is determined by dividing the number of samples by the specified measurement duration. If configured during installation, a default value will be displayed in this field for NEW and TNEW requests. An installation default value is used if you do not supply input in this field.

Note: This field is not used when sampling a DB2 DDF address space with the DB2+ extractor turned on, it will be ignored. In the case of DDF measurement, each SQL call is intercepted for the requested duration, no sampling takes place. The number of samples will always be converted to approximately one per second.

Measure to step end

This field is not applicable when measuring specific DB2 stored procedures or user-defined functions.

Specify 'Y' in this field to indicate that the measurement is to continue to the end of the step even if the specified number of samples has been recorded. Measurement will continue at the sampling rate calculated based on the specified duration and number of samples.

Duration (min:sec)

Specify the duration of the measurement. You can specify the value in seconds or in minutes and seconds. To specify the duration in minutes and seconds, separate the minutes value from the seconds value using a colon. If configured during installation, a default value will be displayed in this field for NEW and TNEW requests. An installation default value is used if you do not supply input in this field. Examples:

- 135 specifies 135 seconds
- 2:15 specifies 2 minutes and 15 seconds
- 2: specifies 2 minutes

The measurement will proceed for the specified time and the sampling rate will be established at a frequency that would perform the full number of samples for the specified duration.

The measurement will terminate before the duration ends if the job step ends first.

Delay by (secs)
This field is not applicable when measuring specific DB2 stored procedures or user-defined functions.

Specify a delay time, in seconds, to occur before initiation of the measurement. The delay will occur starting at the time execution of the job step begins. This cannot be specified for measurement of a job that is currently active.

Notify TSO User
Specify a TSO user ID to be notified upon completion of the measurement. Enter blanks in this field for no completion notification.

Retain file for (days)
Specify the number of days after completion of the measurement for which the measurement file is to be retained. The file and all information about the measurement will be deleted after this period. Enter blanks or zero in this field for no automatic deletion of the measurement data.

USS observations
Specify the maximum number of spawned address spaces or substeps to measure for a USS observation, up to the maximum defined in the system configuration. The same sampling frequency will be used for each spawned address space or substep. Sampling overhead can be high if several spawned address spaces are running simultaneously.

When this field is specified, the collection of measurements will be grouped under a USS master record on the Observation List panel.

Note: When you are deciding what values to enter in the Number of Samples and Duration fields, consider that Application Performance Analyzer does not have unlimited resources to store and report measurement data. Data spaces are used for collecting and reporting data. Extremely large amounts of measurement data can cause Application Performance Analyzer to fail in either the data collection or reporting process. Data space requirements for measurement data vary widely depending on the type of job or region being measured, data extractors selected, etc.

Panel 2 – Options

Panel 2 is used to enter extended measurement options (“Data Extractors”), and also to specify additional load libraries or HFS directories to be searched for external symbol information.

Enter a slash “/” beside each of the data extractors required for the measurement. The data extractors are used to measure additional information about CICS, DB2, IMS, Java, MQSERIES, Adabas and Natural. When the CICS or IMS data extractor is specified, further transaction information can be specified in panel 5.

Panel 2 is show here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                          Row 00001 of 00027
Command ===> ____________________________________________ Scroll ===> CSR

o 1. Job Information    3. Multi Steps     5. Subsystems     7. Schedule
  2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
________________________________________________________________________________
Panel 2. Measurement Options

  Data Extractors. /''to select extended measurement options:
    CICS  CICS information            CICS+ CICS service/CPU time
    DB2   SQL call information        DB2+  SQL service/CPU time/counts
    CDB2  Collateral DB2 activity     DB2V  SQL Variables
    IMS   DLI call information        IMS+  DLI service/CPU time/counts
    Java  Java information            MQ    MQSeries call information
    Ada   Adabas call information     Nat   Natural information


 Specify up to 10 load libraries, or up to 440 bytes of HFS directories, to
 search for external symbol information.  The load libraries apply only to
 sampled modules that are fetched from dynamically allocated load libraries.
 The directories apply only to sampled HFS programs that do not have absolute
 path names.  Enter multiple directories separated by at least one space.

        _ Specify L for load libraries, D for directories
     1  ____________________________________________
     2  ____________________________________________
     3  ____________________________________________
     4  ____________________________________________
     5  ____________________________________________
     6  ____________________________________________
     7  ____________________________________________
     8  ____________________________________________
```

If your installation has configured Application Performance Analyzer to display the maximum number of trace entries for DB2+ and IMS+, two additional input fields are displayed in Panel 2 as shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                          Row 00001 of 00027
Command ===> ____________________________________________ Scroll ===> CSR

o 1. Job Information    3. Multi Steps     5. Subsystems     7. Schedule
  2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
________________________________________________________________________________
Panel 2. Measurement Options                Input more data or ENTER to submit

  Data Extractors. /''to select extended measurement options:
_   CICS  CICS information          _  CICS+ CICS service/CPU time
/   DB2   SQL call information      /  DB2+  SQL service/CPU time/counts
_   CDB2  Collateral DB2 activity   _  DB2V  SQL Variables
/   IMS   DLI call information      /  IMS+  DLI service/CPU time/counts
_   Java  Java information          _  MQ    MQSeries call information
_   Ada   Adabas call information   _  Nat   Natural information



50__   DB2+   Maximum number of trace entries in thousands
60__   IMS+   Maximum number of trace entries in thousands

 Specify up to 10 load libraries, or up to 440 bytes of HFS directories, to
 search for external symbol information.  The load libraries apply only to
 sampled modules that are fetched from dynamically allocated load libraries.
 The directories apply only to sampled HFS programs that do not have absolute
 path names.  Enter multiple directories separated by at least one space.

        _ Specify L for load libraries, D for directories
    1   ____________________________________________
    2   ____________________________________________
    3   ____________________________________________
    4   ____________________________________________
    5   ____________________________________________
    6   ____________________________________________
    7   ____________________________________________
    8   ____________________________________________
    9   ____________________________________________
   10   ____________________________________________
```

Panel 2 input fields

Data Extractors

Using a slash, select any of CICS, CICS+, CDB2, DB2, DB2+, DB2V, IMS, IMS+, MQ, Java, Adabas or Natural. This tells Application Performance Analyzer to measure additional data about CICS, DB2, IMS, MQSeries, Java, Adabas, Natural. When DB2+ is selected, DB2 is also included automatically. When IMS+ is selected, IMS is also included automatically. When either CDB2 or DB2V is selected, DB2 and DB2+ are also included automatically.

DB2+ and IMS+ are used to collect additional data about DB2 and IMS respectively, allowing exact call counts, service times, and CPU times to be measured and reported. DB2+ also ensures that SQL text reported is accurate, without DB2+ turned on, it is possible for the SQL text to be incorrect.

Note: Running Application Performance Analyzer measurements with the DB2+ or IMS+ data extractor turned on causes each DB2 or IMS call to be intercepted to collect additional data. This might have a small impact on the performance of the target address space. You should be careful when using these features with other products that also

intercept DB2 or IMS calls because unpredictable results might occur. Your installer might have chosen to limit access to this feature.

DB2V is used to turn on the DB2 variable extractor during the measurement. DB2V is a DB2 measurement option that will extract SQL variable names for sampled SQL calls. The variable names will then be substituted in place of the *:H* place holders when the SQL text is displayed.

CDB2 is used to turn on the collateral DB2 extractor during measurement. When the CDB2 data extractor is selected, Application Performance Analyzer measures DB2 activity in stored procedures and user-defined functions that are invoked as a result of this observation request. In the R02 Observation List, the collateral DB2 measurements are created separately and are grouped under this observation request. When CDB2 is specified, the DB2 and DB2+ options are automatically included.

Note: Running Application Performance Analyzer measurements with the CDB2 data extractor turned on causes each DB2 call and WLM call to be intercepted to collect additional data. This can have a small impact on the performance of the target address space. Your installer may have chosen to limit access to this feature. This feature is only available when the WLM Intercept is activated during Application Performance Analyzer installation, and you are given appropriate security access to it. Contact your system programmer for access if necessary.

The MQ data extractor provides the ability to observe/sample and report on MQSeries interface calls (both dynamic and static) in Batch, IMS and CICS application programs. This extractor is not used to measure the MQ address space itself. For more information on measuring MQ calls, refer to "Overview of MQSeries data extractor" on page 427.

CICS+ is used to collect additional data about CICS transactions, allowing exact transaction counts, service times and CPU times to be measured and reported. Your installer might have chosen to limit access to this data extractor.

If your installation has enabled Adabas in Application Performance Analyzer, you will see the Adabas extractor. If you select the Adabas extractor, data about Adabas calls is collected. There are no special Adabas reports. Adabas calls are reported under the ADABAS category in several reports. The C08 CPU Usage Referred Attribution report can also be used to see the Attribution offset for Adabas calls and to source map the program.

If your installation has enabled Natural in Application Performance Analyzer, you will see the Natural extractor. If you select the Natural extractor, data about Natural programs is collected and reported in the C10 CPU Usage by Natural Program.

Maximum number of trace entries (DB2+ and IMS+)

These fields are displayed only when your installation has configured Application Performance Analyzer to display them. Otherwise, your installation default is used.

For DB2+, enter the value (in thousands) to limit the number of DB2+ SQL call interceptions for which full details will be written to the sample file. Collecting full details on every interception allows the F02 Timeline report to report exact times for all SQL calls. The F02 report will be truncated at

the number of calls specified in this field. The DB2+ data extractor continues to collect the data it requires for the other reports for the duration of the measurement. The value is entered in thousands of calls to be recorded and cannot exceed the default value specified for DB2IMaxTraceSize during Application Performance Analyzer installation. The default value is displayed in this field for NEW observation requests.

For IMS+, enter the value (in thousands) to limit the number of IMS+ DLI call interceptions for which full details will be written to the sample file. Collecting full details on every interception allows the I02 and I03 Timeline reports to report exact times for all DLI calls and IMS transactions. The I02 and I03 reports will be truncated at the number of calls specified in this field. The IMS+ data extractor continues to collect the data it requires for the other reports for the duration of the measurement. The value is entered in thousands of calls to be recorded and cannot exceed the default value specified for IMSIMaxTraceSize during Application Performance Analyzer installation. The default value is displayed in this field for NEW observation requests.

Specify L for load libraries, D for directories
Specify either L or D to indicate whether Application Performance Analyzer is to search load libraries or directories.

Libraries
Specify up to 10 load libraries to be searched by Application Performance Analyzer for external symbol information. These are applicable only when sampled modules are fetched from dynamically allocated load libraries. See "Specifying additional libraries" for more information.

Directories
Specify up to 440 bytes of HFS directory path names to be searched by Application Performance Analyzer, each separated by one or more spaces. These are applicable only when sampled HFS programs have relative path names.

Specifying additional libraries

It is sometimes necessary to specify additional libraries for Application Performance Analyzer to use to resolve sampled addresses to CSECT plus offset, instead of load module plus offset.

When one program issues a LOAD or LINK macro to fetch other load modules, they are typically loaded from STEPLIB or JOBLIB or a LINKLIST library. In this case Application Performance Analyzer will find them automatically during sampling.

However, the LOAD macro can be coded to reference a DCB for which a load library was OPENed. The library might have been allocated to a temporary DDNAME and after the LOAD is done, the DCB is closed and the DDNAME released. In this situation, Application Performance Analyzer has no way of determining what load library the module came from. Hence, it is unable to get CSECT (EBE) information. This would prevent such modules from being source mapped.

Panel 3 – Multi-steps

This panel is not applicable when measuring specific DB2 stored procedures or user-defined functions.

Panel 3 is used to specify that multiple job steps are to be measured. You can specify up to 20 steps, using the same specification rules described for single step measurements entered on panel 1. For more information, see "Panel 3 input fields."

Panel 3 is shown here. In this example, three steps have been selected by StepName.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                                 Row 00001 of 00021
Command ===> ____________________________________________________ Scroll ===> CSR

o 1. Job Information    3. Multi Steps     5. Subsystems     7. Schedule
o 2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
________________________________________________________________________________
Panel 3. Measure Multiple Steps

Enter data here to measure multiple steps. Separate measurement files will
be produced for each step. '*' in the first StepNo selects all steps.


StepNo Program   StepName  ProcStep      StepNo Program   StepName  ProcStep
 ____  ________  IDC01___  ________       ____  ________  PGM0003_  ________
 ____  ________  PGM0005_  ________       ____  ________  ________  ________
 ____  ________  ________  ________       ____  ________  ________  ________
 ____  ________  ________  ________       ____  ________  ________  ________
 ____  ________  ________  ________       ____  ________  ________  ________
 ____  ________  ________  ________       ____  ________  ________  ________
 ____  ________  ________  ________       ____  ________  ________  ________
 ____  ________  ________  ________       ____  ________  ________  ________
 ____  ________  ________  ________       ____  ________  ________  ________
 ____  ________  ________  ________       ____  ________  ________  ________
```

Panel 3 input fields

Each step specification has a group of four fields. These four fields follow exactly the same rules as the step fields in panel 1.

Step Specification Field Group

The job step to be measured is specified by a group of four fields (Step Number, Step Program, Step Name, ProcStepName). To identify the step, you can specify one of the following:

- Step Number by itself
- Step Program by itself
- Step Name by itself
- Step Name and ProcStepName

Step No.

If Step No. is specified, the other three step fields (Step Program, Step Name, and ProcStepName) must be left blank.

Step No. specifies the numeric step number. Specify an asterisk (*) in the first Step No. field to indicate that all steps in the job are to be measured.

Step Program

If Step Program is specified, the other three step fields (Step No., Step Name, and ProcStepName) must be left blank.

Program Step specifies the name of the program coded in the PGM = parameter of the EXEC statement for the step you want to measure.

Step Name

If Step Name is specified, then Step Number, and Step Program must be left blank. You can specify Step Name by itself or in combination with ProcStepName.

Step Name specifies the symbol coded in the name field of an EXEC PGM = statement or an EXEC PROC = statement. In the event that the ProcStep name field is also supplied, this field always identifies the symbol coded in an EXEC PROC = statement.

In the event that the ProcStep name field is left blank, and Step Name matches an EXEC PROC = statement, the first step within that proc will be measured.

If the step to be measured is not within a PROC, then Step Name specifies the symbol coded in the name field of an EXEC PGM = statement, and ProcStepName must not be specified.

ProcStepName

If ProcStepName is specified, then input must also be supplied in the Step Name field.

ProcStepName specifies the symbol coded in the name field of an EXEC PGM = statement that is part of a PROC.

Panel 4 – Active Jobs

Panel 4 is used to select active jobs from a list. You can enter a Prefix to limit the jobs listed. If you enter a Pattern in the Job name/Pattern field in panel 1, this will be entered as the Prefix in panel 4. This is an input field, you can change the prefix while in panel 4.

Panel 4 is shown here. In this example the prefix entered is "C*".

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                                Row 00001 of 00019
Command ===> ____________________________________________ Scroll ===> CSR

o 1. Job Information  o 3. Multi Steps     5. Subsystems     7. Schedule
o 2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
________________________________________________________________________________
Panel 4. Active Jobs

 Enter S to select an active job step to be measured.    Prefix . . C*__________

     JobName   Type  JobId     StepName   ASIDX   System     CPU%     SIO
     CATALOG   STC   N/A       CATALOG    0020    X235       0.00     0.00
     CICS22A   STC   STC01159  CICS22A    00AB    X235       2.18     0.00
     CICS22C   STC   STC03379  CICS22C    0190    X235       1.98     0.00
     CICS31A   STC   STC03246  CICS31A    00B5    X235       2.58     0.00
     CICS32A   STC   STC02104  CICS32A    0115    X235       2.58     0.00
     CONSOLE   STC   N/A       CONSOLE    0009    X235       0.00     0.00
     CSQ6MSTR  STC   STC00454  CSQ6MSTR   0032    X235       5.95     0.00
```

Enter "S" beside the active job(s) you want to measure. You can select multiple active jobs to be measured simultaneously. The maximum number of jobs that can be selected is defined during the installation of Application Performance Analyzer. This feature is used to measure multiple active jobs at the same time, and is typically used for CICS and IMS multiple address space support.

When multiple jobs are selected, the selected jobs are listed in the lower half of the panel in Selected Jobs List. You add jobs to the Selected Jobs List by entering 'S' beside the active jobs in the upper half of the panel. Enter 'D' beside the active job in the lower half of the panel to remove jobs from the Selected Jobs List. When you return to Panel 1, the first job selected is displayed in the Jobname//Pattern field, and '(Active - Multiple Jobs Selected)' is displayed below the Jobname to indicate that multiple jobs are selected. Multiple jobs can be selected only in NEW requests, and are not valid for Threshold or Trigger requests.

Panel 4 is shown here with multiple CICS regions selected for measurement simultaneously.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                                 Row 00001 of 00011
Command ===> ____________________________________________ Scroll ===> CSR

o 1. Job Information    3. Multi Steps     5. Subsystems     7. Schedule
  2. Options          o 4. Active Jobs     6. Sysplex        8. Sched Options
________________________________________________________________________________
Panel 4. Active Jobs                        Input more data or ENTER to submit

 Enter S to select an active job step to be measured.    Prefix . . CICS*_______

     JobName   Type  JobId     StepName   Procstep   ASIDX   System     CPU%     SIO
  _  CICS31A   STC   STC02977  CICS31A    CICS    01AC    X235       1.08     0.00
  _  CICS32A   STC   STC02278  CICS32A    CICS    0167    X235       1.08     0.00
  _  CICS32B   STC   STC02122  CICS32B    CICS    0151    X235       0.72     0.00
  _  CICS41A   STC   STC02300  CICS41A    CICS    016E    X235       1.44     0.00

 Selected Jobs List
 Enter D to remove an active job from the list.

     JobName   System
  _  CICS32A   X235
  _  CICS32B   X235
```

Panel 5 – Subsystems

Use this panel to specify information about the measurement of a CICS region, IMS selection parameters, specific DB2 stored procedures or user-defined functions, or DDF filtering criteria. CICS, IMS, DB2 and DDF information are all mutually exclusive. The available fields on panel 5 differ when a dash (-) is entered in the Jobname field in panel 1. In this case, Application Performance Analyzer displays fields on this panel that are specific to DB2 stored procedures and user-defined functions, and IMS transactions that execute across multiple IMS regions.

For CICS, you can specify the CICS tran codes and terminals for which CICS measurement information is to be recorded. Limiting the CICS transactions and terminals you are interested in can have a significant impact on the resources consumed by the measurement process.

For IMS, when you are measuring one MPP or IFP region, you can specify a transaction, program name, and user ID to limit the measurement information. When you are measuring an IMS transaction that executes across multiple MPP regions, you specify the IMS subsystem name or IMSPlex group name, and the IMS transaction name.

For specific DB2 stored procedures or user-defined functions, you specify the DB2 susbsystem name, either a P or F, the schema name and the stored procedure or user-defined function name.

For DDF measurements, you may filter the measurements by specifying the Correlation Id, End User Id and/or Workstation Id you are interested in.

A sample panel 5 for CICS, an IMS region and DDF is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                                 Row 00001 of 00025
Command ===> ____________________________________________________ Scroll ===> CSR

o 1. Job Information    3. Multi Steps     5. Subsystems     7. Schedule
  2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
________________________________________________________________________________
Panel 5. Subsystems Measurement Criteria

 Specify up to 16 CICS trancodes for which measurement data is to be
 recorded.

   01 *___  02 ____  03 ____  04 ____  05 ____  06 ____  07 ____  08 ____
   09 ____  10 ____  11 ____  12 ____  13 ____  14 ____  15 ____  16 ____

 Include CICS system transaction in measurement(Y/N): N

 Wildcard character *'' can be specified at the end of a partial name.
 *'' by itself specifies all transactions of terminals.

 Specify up to 8 CICS terminal IDs for which measurement data is to be recorded.

   01 *___  02 ____  03 ____  04 ____  05 ____  06 ____  07 ____  08 ____

  Include CICS non-terminal transactions in measurement(Y/N): Y

  Enter IMS/TM selection parameters:

      Transaction ________     Program Name ________    User ID ________

Specify filter criteria for DDF observation. Wildcards are accepted.

   Correlation Id  _____________         or   _ '/' for null (binary zero)
   End User Id     ____________________  or   _ '/' for null (binary zero)
   Workstation Id  ____________________  or   _ '/' for null (binary zero)
```

A sample panel 5 where you can enter information about a specific DB2 stored procedure or an IMS transaction and IMS subsystem or IMSPlex group is shown here. This panel is displayed only when a dash (-) is entered in the Job Name/Pattern field in Panel 1.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                                 Row 00001 of 00010
Command ===> ____________________________________________________ Scroll ===> CSR

o 1. Job Information    3. Multi Steps     5. Subsystems     7. Schedule
  2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
________________________________________________________________________________
Panel 5. Subsystems Measurement Criteria

Enter DB2 stored procedure or user-defined function parameters:

 DB2 Subsystem ______  Specify P for procedure or F for function  _
 Schema ____________________________________________________________________
   Name ____________________________________________________________________

Enter IMS/TM selection parameters:
 IMS Subsystem Id  ____  or IMSPLEX Group Name ________
 Transaction __________
```

Panel 5 input fields

CICS Trancode

Specify a CICS transaction name or pattern. This identifies CICS transactions to be included in the measurement. You can also specify a partial name terminated by an asterisk (*) to indicate a wildcard pattern. You can specify up to 16 names/patterns. Specify an asterisk (*) by itself to measure all transactions.

Include CICS System Txns

Specify Y or N to indicate if the measurement is to include data on CICS system transactions. (Normally set to No).

CICS Terminal ID

Specify a CICS terminal ID name or pattern. This identifies CICS terminals to be included in the measurement. You can also specify a partial name terminated by an asterisk (*) to indicate a wildcard pattern. You can specify up to eight names/patterns. Specify an asterisk (*) by itself to measure all terminals.

Include CICS non-terminal transaction

Specify Y or N to indicate if the measurement is to include data on CICS non-terminal transactions.

IMS Transaction

Specify an IMS transaction id or pattern. This identifies IMS transactions to be included in the measurement when measuring an IMS/MPP or IMS/IFP region. You can also specify a partial name terminated by an asterisk (*) to indicate a wildcard pattern.

Any values in Transaction Id, Program Name and User ID are ANDed together to determine if a transaction should be included in the measurement.

IMS Program

Specify an IMS program name or pattern. This identifies IMS programs to be included in the measurement when measuring an IMS/MPP or IMS/IFP region. You can also specify a partial name terminated by an asterisk (*) to indicate a wildcard pattern.

Any values in Transaction Id, Program Name and User ID are ANDed together to determine if a transaction should be included in the measurement.

IMS User ID

Specify a userid or pattern. This identifies that transactions initiated by the userid are to be included in the measurement when measuring an IMS/MPP or IMS/IFP region. You can also specify a partial name terminated by an asterisk (*) to indicate a wildcard pattern. Any values in Transaction Id, Program Name and User ID are ANDed together to determine if a transaction should be included in the measurement.

Note: When limiting the observation to specific IMS transactions, programs or users in an MPP or IFP region, Application Performance Analyzer samples only when the transactions are running. The observation continues to run for the requested duration.

Correlation Id

Specify a DB2 correlation id or pattern. This identifies a DB2 correlation id to be included in the measurement when measuring a DDF address space.

A correlation id of null (binary zero) may be specified by entering a '/' in the selection field next to the Correlation Id field. You may also specify a wildcard pattern using an asterisk (*) or a percent sign (%). An asterisk is used to indicate one or more characters that can appear in place of the asterisk. It can be used as a prefix or a suffix, or both. Alternatively, a percent sign is used to indicate any single character, and can appear any number of times. Any values in Correlation Id, End User Id, and Workstation Id are ANDed together to determine if an SQL request is included in the measurement.

End User Id
Specify an end user id or pattern. This identifies an end user id to be included in the measurement when measuring a DDF address space. An end user id of null (binary zero) may be specified by entering a '/' in the selection field next to the End User Id field. You may also specify a wildcard pattern using an asterisk (*) or a percent sign (%). An asterisk is used to indicate one or more characters that can appear in place of the asterisk. It can be used as a prefix or a suffix, or both. Alternatively, a percent sign is used to indicate any single character, and can appear any number of times. Any values in Correlation Id, End User Id, and Workstation Id are ANDed together to determine if an SQL request should be included in the measurement.

Workstation Id
Specify a workstation id or pattern. This identifies a workstation id to be included in the measurement when measuring a DDF address space. A workstation id of null (binary zero) may be specified by entering a '/' in the selection field next to the Workstation Id field. You may also specify a wildcard pattern using an asterisk (*) or a percent sign (%). An asterisk is used to indicate one or more characters that can appear in place of the asterisk. It can be used as a prefix or a suffix, or both. Alternatively, a percent sign is used to indicate any single character, and can appear any number of times. Any values in Correlation Id, End User Id, and Workstation Id are ANDed together to determine if an SQL request should be included in the measurement.

DB2 Subsystem
This field is displayed only when a dash (-) is entered in the Job Name/Pattern field in Panel 1. Specify a DB2 subsystem. This identifies the DB2 subsystem that will be used to run the stored procedure or user-defined function.

Specify procedure or function
This field is displayed only when a dash (-) is entered in the Job Name/Pattern field in Panel 1. Identify this request as a stored procedure or user-defined function. Enter P for stored procedure or F for a user-defined function.

Schema
This field is displayed only when a dash (-) is entered in the Job Name/Pattern field in Panel 1. Specify the schema name for this stored procedure or user-defined function. You can specify a schema name pattern; for example, a schema name prefix followed by an asterisk (*) or an asterisk by itself. Application Performance Analyzer will measure the first DB2 stored procedure or user-defined function executed by the DB2 subsystem that matches that schema name pattern and name concatenation. If a single asterisk is coded in both schema and name,

Application Performance Analyzer will measure the first stored procedure or user-defined function executed by the DB2 subsystem.

Name This field is displayed only when a dash (-) is entered in the Job Name/Pattern field in panel 1. Specify the name of the stored procedure or user-defined function. You can specify a name pattern; for example, a name prefix followed by an asterisk (*) or an asterisk by itself. Application Performance Analyzer will measure the first DB2 stored procedure or user-defined function executed by the DB2 subsystem that matches that schema name and name pattern concatenation. If a single asterisk is coded in both schema and name, Application Performance Analyzer will measure the first stored procedure or user-defined function executed by the DB2 subsystem.

IMS Subsystem Id
This field is displayed only when a dash (-) is entered in the Job Name/Pattern field in panel 1 to indicate an IMS MASS request. Specify an IMS subsystem. This identifies the IMS subsystem in which the IMS transaction you are measuring runs.

IMSPLEX Group Name
This field is displayed only when a dash (-) is entered in the Job Name/Pattern field in panel 1 to indicate an IMS MASS request. Specify the IMSPlex XCF group name. This identifies the IMSPlex where the IMS transaction will run. Either the CSL group name, which is defined by the IMSPLEX parameter in the DFSCGxxx member of the IMS proclib, prefixed by the characters "CSL", or the IMS Shared Queues group name, which is defined by the SQGROUP parameter in the DFSSQxxx member of the IMS proclib, can be specified. These parameters can also be found in the DFSDFxxx member of the IMS proclib. IMS Subsystem ID and IMSPLEX Group Name are mutually exclusive.

Transaction
This field is displayed only when a dash (-) is entered in the Job Name/Pattern field in panel 1 to indicate an IMS MASS request. Specify an IMS transaction code. This identifies the IMS transaction to be included in the measurement. All active MPP regions that are eligible to process the transaction code on the specified IMS subsystem are returned on panel 4.

Panel 6 – Sysplex

This panel is used to select a target Sysplex system from a list. You can also choose ALL systems, in which case the target job will be measured on the first system to run it. You cannot select ALL for active jobs. Selecting ALL is the same as entering an asterisk (*) in the System Name field on panel 1.

A sample panel 6 is shown here.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                                 Row 00001 of 00010
Command ===> ____________________________________________ Scroll ===> CSR

o 1. Job Information    3. Multi Steps     5. Subsystems     7. Schedule
  2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
________________________________________________________________________________
Panel 6. Sysplex

 Target System.   'S' to select one option from the list (scrollable):
      _  ALL   All Sysplex members eligible
      _  SYSA
      _  SYSB
      _  SYSE
      _  XS02
      _  XS03
      _  XS05
```

Panel 7 – Schedule

This panel is not applicable when measuring specific DB2 stored procedures or user-defined functions.

This panel is used to generate a schedule for repetitions of future measurements. A maximum of 105 future scheduled measurement entries is allowed.

The panel is shown here before any future schedule data has been entered:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                                 Row 00001 of 00015
Command ===> ____________________________________________ Scroll ===> CSR

o 1. Job Information  o 3. Multi Steps   o 5. Subsystems     7. Schedule
o 2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
________________________________________________________________________________
Panel 7. Schedule
 Date/time of first in sequence         Measurement repetitions
  Date (yy mm dd) . __ __ __             Repeat  . . __ times
  Time (hh mm)  . . __ __                After . . . __ days  ___ minutes

 Use this panel to specify a schedule for repetitions of the measurement.
 Input the above fields and press ENTER to generate dates and times for
 each of the measurements. These dates/times will be shown below in a
 scrollable table which you can add to by repeating this input process.
```

Using this panel to create a future schedule is explained in the example below. Note that there are also important fields on panel 8 related to future schedules.

Example of creating a Future Schedule

If a user wanted to measure a job every Wednesday night at 8:00 pm, and every Friday night at 11:00 pm, for 10 weeks, starting on Wednesday Dec. 8, 2004, it would be set up like this:

1. Enter the first Wednesday date in the Date (yy mm dd) field: 04 12 08.
2. Enter 10 in the Repeat __ times field.
3. Enter 20:00 in the Time (hh mm) field.
4. Enter 7 in the After __ days field. (To indicate that is repeats each 7 days).

   The screen would look like this:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
R03: Schedule New Measurement                                 Row 00001 of 00015
Command ===> _____________________________________________ Scroll ===> CSR

o 1. Job Information  o 3. Multi Steps   o 5. Subsystems     7. Schedule
o 2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
_______________________________________________________________________________
Panel 7. Schedule
 Date/time of first in sequence         Measurement repetitions
  Date (yy mm dd) . 04 12 08             Repeat  . . 10 times
  Time (hh mm)  . . 20 00                After . . . 7_ days ___ minutes

 Use this panel to specify a schedule for repetitions of the measurement.
 Input the above fields and press ENTER to generate dates and times for
 each of the measurements. These dates/times will be shown below in a
 scrollable table which you can add to by repeating this input process.
```

Then press Enter to generate the schedule, it will appear at the bottom of the panel like this:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
R03: Schedule New Measurement                                 Row 00001 of 00015
Command ===> _____________________________________________ Scroll ===> CSR

o 1. Job Information  o 3. Multi Steps   o 5. Subsystems   o 7. Schedule
o 2. Options            4. Active Jobs     6. Sysplex        8. Sched Options
_______________________________________________________________________________
Panel 7. Schedule
 Date/time of first in sequence         Measurement repetitions
  Date (yy mm dd) . __ __ __             Repeat  . . __ times
  Time (hh mm)  . . __ __                After . . . __ days ___ minutes

 Measurement Schedule  (/ for line command list, UP/DOWN to scroll)
   SeqN   Date/Time              Status
   0001   Wed Dec-08-04 20:00    Pending ADD
   0002   Wed Dec-15-04 20:00    Pending ADD
   0003   Wed Dec-22-04 20:00    Pending ADD
   0004   Wed Dec-29-04 20:00    Pending ADD
   0005   Wed Jan-05-05 20:00    Pending ADD
   0006   Wed Jan-12-05 20:00    Pending ADD
   0007   Wed Jan-19-05 20:00    Pending ADD
   0008   Wed Jan-26-05 20:00    Pending ADD
   0009   Wed Feb-02-05 20:00    Pending ADD
   0010   Wed Feb-09-05 20:00    Pending ADD
   ********** End of Schedule *********
```

Now enter similar data for the Friday night schedule like this:

5. Enter the first Friday date in the Date (yy mm dd) field: 04 12 10.
6. Enter 10 in the Repeat __ times field.
7. Enter 23:00 in the Time (hh mm) field.
8. Enter 7 in the After __ days field. (To indicate that is repeats each 7 days).

Press Enter and your Friday dates will appear with the Wednesday dates already generated like this:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
R03: Schedule New Measurement                                  Row 00001 of 00015
Command ===> _____________________________________________ Scroll ===> CSR

o 1. Job Information  o 3. Multi Steps   o 5. Subsystems   o 7. Schedule
o 2. Options            4. Active Jobs     6. Sysplex       8. Sched Options
________________________________________________________________________________
Panel 7. Schedule
 Date/time of first in sequence         Measurement repetitions
  Date (yy mm dd) . __ __ __             Repeat  . . __ times
  Time (hh mm)  . . __ __                After . . . __ days ___ minutes

 Measurement Schedule  (/ for line command list, UP/DOWN to scroll)
   SeqN   Date/Time              Status
   0001   Wed Dec-08-04 20:00    Pending ADD
   0002   Fri Dec-10-04 23:00    Pending ADD
   0003   Wed Dec-15-04 20:00    Pending ADD
   0004   Fri Dec-17-04 23:00    Pending ADD
   0005   Wed Dec-22-04 20:00    Pending ADD
   0006   Fri Dec-24-04 23:00    Pending ADD
   0007   Wed Dec-29-04 20:00    Pending ADD
   0008   Fri Dec-31-04 23:00    Pending ADD
   0009   Wed Jan-05-05 20:00    Pending ADD
   0010   Fri Jan-07-05 23:00    Pending ADD
   0011   Wed Jan-12-05 20:00    Pending ADD
   0012   Fri Jan-14-05 23:00    Pending ADD
   0013   Wed Jan-19-05 20:00    Pending ADD
   0014   Fri Jan-21-05 23:00    Pending ADD
   0015   Wed Jan-26-05 20:00    Pending ADD
   0016   Fri Jan-28-05 23:00    Pending ADD
   0017   Wed Feb-02-05 20:00    Pending ADD
   0018   Fri Feb-04-05 23:00    Pending ADD
   0019   Wed Feb-09-05 20:00    Pending ADD
   0020   Fri Feb-11-05 23:00    Pending ADD
   ********** End of Schedule *********
```

Your schedule dates have now all been generated. Also see panel 8 below for additional data regarding future schedules.

Note: If you are entering a multiple job request (using the % wildcard in the job name field), then you can only set one date and time. No repetitions are allowed.

Panel 7 input fields

First Schedule Date

Specify a starting date for a new sequence of recurring schedule date/time entries.

Schedule Repeat Count

Specify a repeat count. This is the number of measurement recurrences to be generated and added to the schedule. The maximum value that can be entered in this field is 99. Application Performance Analyzer will accept a schedule with up to 105 repeats.

To generate a schedule with more than 99 repeats, you must generate two schedules for the same request. After generating the repeats for the first schedule, remain in Panel 7 and generate another schedule for the remaining repeats.

First Schedule Time

Specify a starting time for a new sequence of recurring schedule date/time entries.

Interval in Days
Specify the interval, in days, between each measurement recurrence to be added to the schedule.

Interval in Minutes
Specify the interval, in minutes, between each measurement recurrence to be added to the schedule.

Panel 8 – Sched Options

This panel is not applicable when measuring specific DB2 stored procedures or user-defined functions.

The available fields on panel 8 vary depending on whether "Y" or "N" is entered in the Measure active job (Y/N) field, and whether or not a future schedule has been entered on panel 7.

No Future Schedule and Active YES
When there is no future schedule, and "Y" is entered in the Measure active job (Y/N) field, then no additional fields will appear on panel 8. In this case, specifying "Y" here is an alternative to selecting an active job from a list in panel 4. If you use this method to specify that a job is active, then the jobname entered in panel 1 must be currently active, otherwise the request will fail.

An example of panel 8 for a single occurrence of an active job (i.e., with no future schedule) is shown here:

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
R03: Schedule New Measurement                              Row 00001 of 00004
Command ===> _____________________________________________ Scroll ===> PAGE

o 1. Job Information    3. Multi Steps     5. Subsystems  7. Schedule
  2. Options            4. Active Jobs     6. Sysplex     8. Sched Options


_______________________________________________________________________________
Panel 8. Schedule Options

Specify if the job is active and is to be measured immediately (Y) or if
IBM APA for z/OS is to wait for the job to be submitted (N):

Measure active job (Y/N) . . . . Y
```

No Future Schedule and Active NO
When there is no future schedule, and "N" is entered in the Measure active job (Y/N) field, then the field Times to Repeat and Within interval (minutes, days or weeks) will appear.

An example of panel 8 for a single occurrence of an inactive job (i.e., with no future schedule) is shown here:

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
R03: Schedule New Measurement                              Row 00001 of 00011
Command ===> _____________________________________________ Scroll ===> CSR

o 1. Job Information    3. Multi Steps     5. Subsystems  7. Schedule
  2. Options            4. Active Jobs     6. Sysplex     8. Sched Options
_______________________________________________________________________________
Panel 8. Schedule Options

Specify if the job is active and is to be measured immediately (Y) or if
IBM APA for z/OS is to wait for the job to be submitted (N):

Measure active job (Y/N) . . . . N

  Times to repeat measurement . __     If the job runs more than once
                                       within the specified interval.

  Within interval (minutes)  . . ___   Maximum 999 minutes.
  or within interval (days)  . . ___   Maximum 22 days.
  or within interval (weeks) . . ___   Maximum 3 weeks.
```

Future Schedule and Active YES

When entering a future schedule request, selecting "Y" for active means that the job is expected to be active when the measurement takes place. The fields Number of times to retry and Retry interval (minutes) will appear.

An example of panel 8 for an active job with a future schedule is shown here:

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
R03: Schedule New Measurement                              Row 00001 of 00007
Command ===> _____________________________________________ Scroll ===> PAGE
o 1. Job Information    3. Multi Steps     5. Subsystems  o7. Schedule
  2. Options            4. Active Jobs     6. Sysplex     o8. Sched Options
_______________________________________________________________________________
Panel 8. Schedule Options                    Input more data or ENTER to submit

Specify if the job to be measured will be active when the scheduling occurs
(e.g. a CICS region) or pending (a batch job).

Job will be active (Y/N) . . . . Y

  Number of times to retry . . . __    Indicate retry action if job is not
  Retry interval (minutes) . . . __    active at the time of scheduling.
```

Future Schedule and Active NO

When entering a future schedule request, selecting "N" for not active means that the request will wait for the job to start. In this case three additional fields will appear: Expire after (minutes), Times to repeat measurement, and Within interval (minutes).

An example of panel 8 for an inactive job with a future schedule is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
R03: Schedule New Measurement                              Row 00001 of 00010
Command ===> _____________________________________________ Scroll ===> CSR
o 1. Job Information    3. Multi Steps     5. Subsystems o 7. Schedule
  2. Options            4. Active Jobs     6. Sysplex      8. Sched Options
_______________________________________________________________________________
Panel 8. Schedule Options

Specify if the job to be measured will be active when the scheduling occurs
(e.g. a CICS region) or pending (a batch job).

Job will be active (Y/N) . . . . N

  Expire after (minutes) . . .  ____    Number of minutes from schedule time
                                        to wait for job to be submitted.

  Times to repeat measurement . __      If the job runs more than once
  Within interval (minutes) . . ___     within the specified interval.
```

Panel 8 input fields

Job Active (Y/N)

Specify Y to indicate the job is active and the measurement is to begin immediately. Specify N to indicate that the job is pending (a batch job) and Application Performance Analyzer is to wait for its execution.

If you have specified a recurring schedule for the measurement, then this field indicates the expected status of the job at the time the measurement is scheduled.

Expire after

This applies to a schedule of recurring measurements for a job that is not expected to be active at scheduling time (a batch job). It specifies the length of the interval during which Application Performance Analyzer is to check for the job before expiring the schedule item. Specify the length of the interval in minutes.

Times to Repeat

This applies to measurement of a job that is not active (pending). Specify the number of times the measurement is to be repeated if the job is rerun during the specified interval. Use this to ensure that a good measurement is captured in the event the job is cancelled or abends and is then rerun.

Within Interval

This applies to measurement of a job that is not active (pending). Specify the interval the Application Performance Analyzer started task is to check for reruns of the job. Use this to ensure that a good measurement is captured in the event the job is cancelled or abends and is then rerun.

In the case of a single occurrence of a batch job, use this when the exact time the job will be executed is unknown or varies. Measurements that have a future schedule associated with the job will accommodate an interval of up to 999 minutes only. Measurements for a single occurrence of a job (i.e., no future schedule) will accommodate an interval of either 999 minutes, 22 days or 3 weeks.

Times to Retry

This applies to a schedule of recurring measurements for a job that is expected to be active at the time the measurement is scheduled. Indicate the number of times Application Performance Analyzer is to check again for the job in the event that it was not active. The 'Retry Interval' field specifies the interval between retries.

Retry Interval
This applies to a schedule of recurring measurements for a job that is expected to be active at the time the measurement is scheduled. It specifies an action to be taken if the job is not active at the schedule time. Indicate the interval between each check for the job being active. The 'Number of Times to Retry' field specifies how many times the retry is to occur.

Entering a Threshold Monitor request

Note: It is important that you are already familiar with the preceding information in this chapter before using the Threshold Monitor feature. The Threshold Monitor request process uses most of the panels described in the previous sections, and the information is not repeated here.

Threshold measurements cannot be created for measuring specific DB2 stored procedures or user-defined functions

Using the TNEW command

The TNEW primary command is used to enter a new Observation Request, which will start only when specified threshold criteria have been satisfied for the target job-step or job-steps.

The criteria are:

- CPU Time
- Elapsed Time
- EXCP Count

Setting Threshold Requirements panels

The Set Threshold Requirements panel group is very similar to the standard Schedule New Measurement panel group. To measure all steps in the job that meet the threshold criteria you must enter an asterisk (*) in the Step No field of Panel 1 – Job Information. Multi-Step and Schedule information is not used for Threshold Monitor requests, so these panels are not available. Panel 3 - Criteria is specific to Threshold Monitor request. After entering the standard data to describe the measurement request, you must enter the Threshold Criteria.

Panel 3 - Criteria

After entering the data to describe the measurement request, you use the Criteria panel to specify the Threshold Criteria which will trigger the measurement to run. The panel 3 Criteria panel is shown here.

In this example, when CPU time exceeds 30 seconds, and EXCP count exceeds 20000, the measurement will be triggered.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
R03: Set Threshold Requirements                          Row 00001 of 00005
Command ===> _____________________________________________ Scroll ===> CSR
o 1. Job Information  o 3. Criteria       o 5. Subsystems
  2. Options            4. Active Jobs       6. Sysplex
_______________________________________________________________________________
Panel 3. Threshold Criteria

Enter Threshold Criteria

      CPU Time Exceeds (min:sec) . .  . 30
      Elapsed Time Exceeds (min:sec)  .
      EXCP Count Exceeds . . . . . . . 20000

If you enter more than one threshold criteria field, then all the
criteria must be met for the measurement to be triggered.
```

Panel 3 input fields

CPU Time Exceeds

Enter the threshold amount of CPU time, if the target job-step exceeds this amount of CPU time, the measurement will be triggered.

You can specify the value in seconds or in minutes and seconds. To specify the threshold CPU time in minutes and seconds, separate the minutes value from the seconds value using a colon.

Examples:

- *135* specifies 135 seconds
- *2:15* specifies 2 minutes and 15 seconds
- *2:* specifies 2 minutes

Elapsed Time Exceeds

Enter the threshold amount of Elapsed time, if the target job-step exceeds this amount of Elapsed time, the measurement will be triggered.

You can specify the value in seconds or in minutes and seconds. To specify the threshold Elapsed time in minutes and seconds, separate the minutes value from the seconds value using a colon.

Examples:

- *135* specifies 135 seconds
- *2:15* specifies 2 minutes and 15 seconds
- *2:* specifies 2 minutes

EXCP Count Exceeds

Enter the threshold EXCP count. If the target job-step exceeds this EXCP count, the measurement will be triggered.

Note: : If you enter more than one threshold criteria field, then all the criteria must be met for the measurement to be triggered.

Entering a Trigger request

Note: It is important to be familiar with the preceding information in this chapter before using the Trigger feature. The Trigger request process uses most of the panels described in the previous sections and the information is not repeated here.

Overview

The trigger request feature is used to allow the start of one scheduled measurement to trigger an additional measurement (called the Trigger measurement). For example, you might want to have the beginning of a batch job step measurement also initiate a measurement of a particular CICS region. The original scheduled measurement request must be entered first, then the trigger measurement can be entered.

The trigger measurement cannot measure a specific DB2 stored procedure or user-defined function.

Using the TR line command

The original scheduled measurement request is identified by entering the TR line command on it in the R02 Observation Session List panel. This displays the panels for entering the measurement request information for the trigger request.

The Set Trigger Requirements panel group is very similar to the standard Schedule New Measurement panel group. The differences are that Multi-Step and Schedule information is not used for Trigger requests, so these panels are not available. For information on panels used to specify Trigger requests, refer to the preceding sections in this chapter.

Chapter 3. Performance analysis reports

This section describes the Performance Analysis Reports. Some basic concepts are covered, and the base reports (those not pertaining to a data extractor) are described.

For Performance Analysis Reports pertaining to a specific data extractor (CICS, IMS, DB2, etc.), refer to the chapter for the specific data extractor.

For information about ...	See ...
General concepts required for interpreting these reports	"Performance analysis basics" on page 44
Report categories and codes	"Report categories and codes" on page 47
S01 Measurement profile	"S01 - Measurement profile" on page 50
S02 Load module attributes	"S02 - Load module attributes" on page 61
S03 Load module summary	"S03 - Load module summary" on page 63
S04 TCB summary	"S04 - TCB summary" on page 65
S05 Memory usage timeline	"S05 - Memory usage timeline" on page 67
S06 Data space usage timeline	"S06 - Data space usage timeline" on page 69
S07 TCB execution summary	"S07 - TCB execution summary" on page 70
S08 Processor utilization summary	"S08 - Processor utilization summary" on page 72
S09 Measurement analysis	"S09 - Measurement analysis" on page 74
C01 CPU usage by category	"C01 - CPU usage by category" on page 75
C02 CPU usage by module	"C02 - CPU usage by module" on page 83
C03 CPU usage by code slice	"C03 - CPU usage by code slice" on page 86
C04 CPU usage timeline	"C04 - CPU usage timeline" on page 90
C05 CPU Usage by task/category	"C05 - CPU usage by task/category" on page 92
C06 CPU Usage by task/module	"C06 - CPU usage by task/module" on page 99
C07 CPU usage by procedure	"C07 - CPU usage by procedure" on page 103
C08 CPU usage referred attribution	"C08 - CPU usage referred attribution" on page 107
C09 CPU Usage by PSW/object code	"C09 - CPU usage by PSW/object code" on page 112
C10 CPU Usage by Natural Program	"C10 - CPU Usage by Natural Program" on page 114
W01 WAIT time by task/category	"W01 - WAIT time by task/category" on page 117
W02 WAIT time by module	"W02 - WAIT time by task/module" on page 122
W03 WAIT time referred attribution	"W03 - WAIT time referred attribution" on page 126

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For information about ...	See ...
W04 WAIT time by task ENQ/RESERVE	"W04 - WAIT time by task ENQ/RESERVE" on page 129
W05 WAIT time by tape DDNAME	"W05 - WAIT time by tape DDNAME" on page 132
D01 DASD usage by device	"D01 - DASD usage by device" on page 134
D02 DASD usage by DDNAME	"D02 - DASD usage by DDNAME" on page 136
D03 DASD usage by data set	"D03 - DASD usage by data set" on page 139
D04 data set attributes	"D04 - Data set attributes" on page 141
D05 DASD EXCP summary	"D05 - DASD EXCP summary" on page 143
D06 DASD VSAM statistics	"D06 - DASD VSAM statistics" on page 146
D07 DASD activity timeline	"D07 - DASD activity timeline" on page 148
D08 DASD I/O wait time	"D08 - DASD I/O wait time" on page 151
D09 VSAM buffer pool usage	"D09 - VSAM buffer pool usage" on page 156
G01 Coupling facility summary	"G01 - Coupling facility summary" on page 157
G02 Coupling facility mean times	"G02 - Coupling facility mean times" on page 159
G03 Coupling facility total times	"G03 - Coupling facility total times" on page 160
V01 Measurement variance summary	"V01 - Measurement variance summary" on page 161
V02 CICS variance summary	"V02 - CICS variance summary" on page 164
V03 DB2 variance summary	"V03 - DB2 variance summary" on page 167
V04 IMS variance summary	"V04 - IMS variance summary" on page 171

Performance analysis basics

Some of the concepts that you need to understand in order to effectively interpret the Application Performance Analyzer performance analysis reports are explained here.

Sampling and system states

During an Application Performance Analyzer observation session, activity in the target address space is sampled at the frequency and for the duration which was specified when the session was requested. Each observation results in data being recorded which describes an observed System State. The essence of the analysis reports is the aggregation of System States and attribution of these aggregates to various System Objects. For example, CPU Executing is a type of System State and a Load Module is a type of System Object; a report might quantify observations of CPU Executing and attribute these quantities to various Load Modules. By mapping observed system states to system objects, the analysis reports provide a meaningful picture of how resources are consumed.

Types of system states

Each observation, or "sample," interrupts and momentarily "freezes" system activity in the target address space. Information about the state of the interrupted process (or, often, in the case of a multi-CPU system, processes) is recorded. System states that can be observed are:

- CPU Executing
- CPU Waiting
- Queued

It is important to understand that an observation session measures activity in a single address space. When we refer to system states like "CPU Waiting" or "CPU Unavailable" these states are with respect to the target address space only.

CPU Executing
A CPU was executing machine instructions for the task when the observation was made. Information about where (in what program) execution was taking place is captured. Application Performance Analyzer also determines, and records, whether execution was in Linear or Parallel mode. Linear mode refers to a state in which one, and only one, task was executing instructions. Parallel mode refers to a state in which more than one task was executing concurrently. Parallel mode occurs when two or more CPUs were executing instructions for the target address space at the same time.

CPU Waiting
A task was in a wait state. The task was waiting for an event (such as completion of an I/O operation) to occur.

Queued
The "Queued" state refers to a task (TCB) that was observed as dispatchable but was not executing instructions because no CPU was available. A measurement showing a high percentage of queued observations could imply an overall shortage of CPU resources. This would also occur in an address space in which the number of dispatchable tasks exceeds the number of physical CPUs.

Unavailability of memory can also cause the Queued state.

System objects

System Objects are objects to which quantified observations of systems states can be attributed. The following are the basic system objects:

- Load Modules
- TCBs
- DD Names
- DASD Volumes
- SVCs
- MQSeries Queue Names

Quantities expressed as percentages

The performance analysis reports express most quantified data as percentages. In most cases, absolute values (for example, actual number of observations in which execution was in DB2 services) would not, by themselves, be particularly meaningful. This is because the total number of samples chosen for an observation session is somewhat arbitrary. The percentage of activity attributed to a system

object, on the other hand, provides a much better measure of the impact of that system object on performance. Furthermore, when expressed as percentages, quantification is likely to remain roughly equal if the sampling frequency and duration parameters are varied.

In order to effectively interpret the performance analysis reports it is important that you understand how these percentages are computed. The formulae vary depending upon what type of system activity is reported.

CPU Time Percentage
The percentage expresses the ratio of attributed CPU to the total CPU time observed. This is computed by dividing the number of attributed "CPU EXECUTING" observations by the total number of "CPU EXECUTING" observations and multiplying that number by 100.

Note that observations of CPU Waiting and CPU Unavailable are excluded from the calculation. The objective is to report the relative demand placed on CPU resources by system objects.

I/O Activity Percentage of Time
The percentage reported for I/O activity expresses the ratio of time attributed I/O operations were active to the total observation session elapsed time. Consider an example in which 10,000 observations were made during a 60 second interval. Suppose during 1,500 of these observations, I/O was found to be active for a file with DDNAME=SYSIN. 15 percent would be reported as the I/O activity percentage of time attributed to SYSIN.

Parallel Activity
Application Performance Analyzer will report information about parallel activity. Examples of parallel activity are:

I/O activity concurrent CPU execution is observed.

Concurrent I/O activity is observed for multiple devices.

Concurrent CPU execution is observed. This is only possible on a system with multiple CPUs (a multiprocessor).

Margin of error

A margin of error value is displayed in various reports. The value is expressed as a percentage and represents a 95 percent confidence interval. What this means is that in 95 percent of cases (19 out of 20 times) a repetition of the same measurement will produce results within +/- the indicated number of percentage points. This value is based entirely on the size of a sample population and reflects only the statistical error that can be expected from the sample size. It does not take into account any effects caused by biased sample collection.

Color coding of graphs

Application Performance Analyzer makes extensive use of bar graphs to illustrate resource usage. The graphs are color coded as follows:

Table 1. Color coding of graphs

Graph Color	Purpose
Green	CPU active
Yellow	CPU wait
White	Resources (memory, dataspace)

Table 1. Color coding of graphs (continued)

Graph Color	Purpose
Red	DASD I/O
Blue	Service time

Note: Report titles indicate each report's purpose. Color coding is included for emphasis, but color is not required to interpret information.

Report categories and codes

Application Performance Analyzer reports are each assigned a three-character code consisting of a one-letter prefix followed by a two-digit number. The prefix indicates which category the report belongs to, and the number is a sequence number within that category.

When you are viewing a report, you can enter another report's three-character code on the command line and that report will also open.

The categories and reports are listed here:

Table 2. Report categories and prefixes

Prefix	Category	Reports
A	Admin/Miscellaneous	A01 Source Program Mapping A02 Request Printed Reports A03 Java Source Mapping A04 Source Mapping Dataset List A05 Source Mapping Common List
S	Statistics/Storage	S01 Measurement Profile S02 Load Module Attributes S03 Load Module Summary S04 TCB Summary S05 Memory Usage Timeline S06 Data Space Usage Timeline S07 TCB Execution Summary S08 Processor Utilization Summary S09 Measurement Analysis
C	CPU usage analysis	C01 CPU Usage by Category C02 CPU Usage by Module C03 CPU Usage by Code Slice C04 CPU Usage by Timeline C05 CPU Usage Task/Category C06 CPU Usage Task/Module C07 CPU Usage by Procedure C08 CPU Usage Referred Attribution C09 CPU Usage by PSW/Object Code C10 CPU Usage by Natural Program

Table 2. Report categories and prefixes (continued)

Prefix	Category	Reports
D	DASD I/O analysis	D01 DASD Usage by Device D02 DASD Usage by DDName D03 DASD Usage by data set D04 data set Attributes D05 DASD EXCP Summary D06 DASD VSAM Statistics D07 DASD Activity Timeline D08 DASD I/O Wait Time D09 VSAM Buffer Pool Usage
G	Coupling facility	G01 Coupling Facility Summary G02 Coupling Facility Mean Times G03 Coupling Facility Total Times
W	CPU WAIT analysis	W01 Wait Time by Category W02 Wait Time by Module W03 Wait Time Referred Attribution W04 Wait Time by task ENQ/RESERVE W05 Wait Time by Tape DDNAME
I	IMS measurement	I01 IMS Measurement Profile I02 IMS DL/I DL/I Call Timeline I03 IMS Transaction Timeline I04 IMS Txn Activity Timeline I05 IMS CPU Usage by PSB I06 IMS CPU Usage by Transaction I07 IMS CPU Usage by DL/I Call I08 IMS WAIT Time by PSB I09 IMS WAIT Time by Transaction I10 IMS WAIT Time by DL/I Call I11 IMS DL/I Activity by PSB I12 IMS DL/I Activity by Txn I13 IMS DL/I Activity by DL/I Call I14 IMS PSB/PCB Attributes I15 IMS DL/I Call Attributes I16 IMS Transaction Service Times I17 IMS Transaction DL/I Counts I18 IMS CPU/Svc Time by DL/I Call I19 IMS CPU/Svc Time by PSB I20 IMS CPU/Svc Time by Txn I21 IMS CPU/Svc Time by PCB

Table 2. Report categories and prefixes (continued)

Prefix	Category	Reports
E	CICS measurement	E01 CICS Session Statistics E02 CICS CPU and Use Counts by Pgm E03 CICS CPU Usage by Txn E04 CICS Mean Service Time by Txn E05 CICS Total Service Time by Txn E06 CICS Service Time by Task ID E07 CICS Wait by Txn E08 CICS mean service time by terminal ID E09 CICS total service time by terminal ID E10 CICS Mean Service Time by user ID E11 CICS Total Service Time by user ID E12 CICS CPU/Service Time by Txn
X	CICS multiple address space measurement	X01 CICS Mean Service Time by Txn X02 CICS Total Service Time by Txn X03 CICS Mean Service Time by Term X04 CICS Total Service Time by Term
F	DB2 measurement	F01 DB2 Measurement Profile F02 DB2 SQL Activity Timeline F03 DB2 SQL Activity by DBRM F04 DB2 SQL Activity by Statement F05 DB2 SQL Activity by Plan F06 DB2 SQL Statement Attributes F07 DB2 SQL Wait Time by DBRM F08 DB2 SQL Wait Time by Statement F09 DB2 SQL Wait Time by Plan F10 DB2 SQL CPU/Svc Time by DBRM F11 DB2 SQL CPU/Svc Time by Stmt F12 DB2 SQL CPU/Svc Time by Plan F13 DB2 SQL Threads Analysis F14 DB2 CPU Usage by Plan/Proc F15 DB2 SQL CPU/Svc Time by Rq Loc F16 DB2 SQL CPU/Svc Time by Enclave F17 DB2 SQL CPU/Svc Time by Corrid F18 DB2 SQL CPU/Svc Time by Wkstn F19 DB2 SQL CPU/Svc Time by EndUsr

Table 2. Report categories and prefixes (continued)

Prefix	Category	Reports
Q	MQSeries measurement	Q01 MQSeries Activity Summary Q02 MQSeries CPU Usage by Queue Q03 MQSeries CPU Usage by Request Q04 MQSeries CPU Usage by Txn Q05 MQSeries Serv Time by Queue Q06 MQSeries Serv Time by Request Q07 MQSeries Serv Time by Txn Q08 MQSeries Wait Time by Queue Q09 MQSeries Wait Time by Request Q10 MQSeries Wait Time by Txn
J	Java Measurement	J01 Java summary and attributes J02 Java Heap usage timeline J03 Java CPU usage by thread J04 Java CPU usage by package J05 Java CPU usage by class J06 Java CPU usage by method J07 Java CPU usage by call path J09 Java service time by package J10 Java service time by class J11 Java service time by method J12 Java service time by call path J14 Java wait time by package J15 Java wait time by class J16 Java wait time by method J17 Java wait time by call path
V	Variance reports	V01 Measurement Variance Summary V02 CICS Variance Summary V03 DB2 Variance Summary V04 IMS Variance Summary
H	HFS Analysis	H01 HFS Service Time by Path Name H02 HFS Service Time by Device H03 HFS File Activity H04 HFS File Attributes H05 HFS Device Activity H06 HFS Device Attributes H07 HFS Activity Timeline H08 HFS Wait Time by Path Name H09 HFS Wait Time by Device H10 HFS Service Time by Request H11 HFS Wait Time by Request

S01 - Measurement profile

Usage

Use this report to see a general overview of the measurement. This is a good report to examine first when analyzing a measurement. It provides an at-a-glance summary of various aspects of the measurement data and helps you choose which other reports to concentrate on. The first section of this report consists of a series of

mini performance graphs illustrating various types of activity that was measured. This is followed by a section that reports measurement values.

Performance graphs

These are histograms quantifying measurement data. To the right of each graph, report codes of reports that show related and more detailed information are displayed. You can display the report by skipping the cursor to one of these fields and by pressing the ENTER key.

Overall CPU activity

This graph is omitted for DDF measurements.

Under heading	This is displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph. This number is sometimes slightly smaller than the total number of samples. Only those samples in which any TCBs existed are included in this count. Non-TCB samples can occur very early in a job step when the system is still initializing the step.
CPU Active	The number of samples the CPU was actively processing one or more TCBs. This value represents the percentage of time CPU activity was occurring in the address space.
WAIT	The number of samples all TCBs were in a WAIT.
Queued	The number of samples no CPU activity was taking place because no resources (CPU or memory) were available to service the address space. At least one TCB was dispatchable and not in a WAIT.

CPU usage distribution

This graph is omitted for DDF measurements.

Under Heading	This is Displayed
CPU Active	The number of observations of CPU active TCBs. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph. This value is different from the “samples” value reported in the “Overall CPU Activity” graph because multiple concurrent CPU active TCBs (multiple CPUs executing concurrently) are counted separately here. This quantification represents the overall consumption of CPU time.
Application	The number of observations of CPU active TCBs while executing in application modules.
System	The number of observations of CPU active TCBs while executing in system modules.
DB2 SQL	The number of observations of CPU active TCBs while servicing SQL requests.
Data Mgmt	The number of observations of CPU active TCBs while servicing data management requests.

Under Heading	This is Displayed
Unresolved	The number of observations of CPU active TCBs while executing in addresses that could not be resolved to module names.
IMS DLI Call	The number of observations of CPU active TCBs while servicing IMS DLI requests.

Most CPU active modules

This graph is omitted for DDF measurements.

Under Heading	This is Displayed
CPU Active	The number of observations of CPU active TCBs. This number represents 100% of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph. This value is different from the 'samples' value reported in the 'Overall CPU Activity' graph because multiple concurrent CPU active TCBs (multiple CPUs executing concurrently) are counted separately here. This quantification represents the overall consumption of CPU time.
Module	Five lines appear showing the five most CPU active load modules. The number of CPU active observations for each of these modules and its percentage of the total number of CPU active observations is shown.

Most CPU active CSECTs

This graph is omitted for DDF measurements.

Under Heading	This is Displayed
CPU Active	The number of observations of CPU active TCBs. This number represents 100% of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph. This value is different from the 'samples' value reported in the 'Overall CPU Activity' graph because multiple concurrent CPU active TCBs (multiple CPUs executing concurrently) are counted separately here. This quantification represents the overall consumption of CPU time.
CSECT	Five lines appear showing the five most CPU active CSECTs (control sections) and their corresponding module names. The number of CPU active observations for each of these CSECTs and its percentage of the total number of CPU active observations is shown.

CPU modes

This graph is omitted for DDF measurements.

Under Heading	This is Displayed
CPU Active	The number of observations of CPU active TCBs. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph. This value is different from the "samples" value reported in the "Overall CPU Activity" graph because multiple concurrent CPU active TCBs (multiple CPUs executing concurrently) are counted separately here. This quantification represents the overall consumption of CPU time.
Supv Mode	The number of observations of CPU active TCBs while the system was in supervisor (privileged) mode (usually system routines).
Prob Mode	The number of observations of CPU active TCBs while the system was in problem state. Applications normally execute in problem state.
In SVC	The number of observations of CPU active TCBs while the system was executing in an SVC (supervisor call) routine.
AMODE 24	The number of observations of CPU active TCBs while the system was in 24 bit addressing mode.
AMODE 31	The number of observations of CPU active TCBs while the system was in 31 bit addressing mode.
AMODE 64	The number of observations of CPU active TCBs while the system was in 64 bit addressing mode.
User Key	The number of observations of CPU active TCBs while the system was in user storage key (key 8).
System Key	The number of observations of CPU active TCBs while the system was in a system storage protection key.

Most active IMS PSBs

This graph is shown only if IMS measurement data was recorded. It shows the most active IMS PSBs. Up to five IMS PSBs are reported.

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
IMS PSB Name	An IMS PSB name is shown and the number of samples in which processing of DLI calls under this PSB was observed. The percentage and the graph represent the proportion of the overall measurement time during which DLI calls were being serviced under this PSB.
Most Active DLI Calls	This graph is shown only if IMS measurement data was recorded. It shows the most active IMS DLI calls. Up to five DLI calls are reported.

Most active DLI calls

This graph is shown only if IMS measurement data was recorded. It shows the most active IMS DLI calls. Up to five DLI calls are reported.

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
DLI Call	A DLI call identified by three fields: a unique sequence number assigned to the DLI call; its DLI function code; and its PCB name. The percentage and the graph represent the proportion of samples in which processing of this DLI call was observed. The percentage and the graph represent the proportion of the overall measurement time during which all executions of this DLI call were being serviced.

Most active DB2 plans

This graph is shown only if DB2 measurement data was recorded. It shows the most active DB2 plan names. Up to five DB2 plans are reported.

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data and is used as the divisor to compute the percentages shown for each Package or DBRM.
DB2 Package or DBRM Name	The number of samples SQL servicing was occurring against SQL statements defined in the indicated Package or DBRM.

Most active packages/DBRMs

This graph is shown only if DB2 measurement data was recorded. It shows the most active DB2 Packages/DBRMs. Up to 5 DB2 Package names or DBRM names are reported. A DBRM name is shown instead of a Package name in the event the DBRM was bound directly to the Plan instead of to a Package.

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data and is used as the divisor to compute the percentages shown for each Package or DBRM.
DB2 Package or DBRM Name	The number of samples SQL servicing was occurring against SQL statements defined in the indicated Package or DBRM.

Most active SQL statements

This graph is shown only if DB2 measurement data was recorded. It shows the most active DB2 SQL statements. Up to five SQL statements are reported.

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data and is used as the divisor to compute the percentages shown for each SQL statement.
DBRM: Statement SQL Function	The number of samples SQL servicing was occurring for the indicated SQL statement. The DBRM name, the statement number and the type of SQL statement are shown.

Measurement values

This section of the report shows various values relating to the measurement. These appear under the following categories:

- Request parameters
- Measurement environment
- Measurement statistics
- CPU consumption

Request parameters

These values were established when the measurement was requested.

Under Heading	This is Displayed
Request number	The unique four-digit identifier assigned to the measurement.
Description	A description specified when the measurement was requested.
Sample File DSN	The data set name of the measurement file.
Retention	The date upon which the measurement file is to be deleted by Application Performance Analyzer.
Data extractors	The specified data extractors (DB2, CICS, etc.)
IMS Subsystem Id	The specified IMS subsystem Id. This field displays for IMS multiple address space requests only.
IMS Tran Code	The specified IMS transaction code. This field displays for IMS multiple address space requests and IMS single region requests.
IMS Program Name	The specified IMS program name. This field displays for IMS single region requests only.
IMS User Id	The specified IMS user Id. This field displays for IMS single region requests only.
Specific DB2 Parms	A 'P' is displayed when the request was specified for a DB2 Stored Procedure. An 'F' is displayed when the request was specified for a DB2 user-defined function. This field displays for DB2 multiple address space requests only.
DB2 Subsystem	The DB2 subsystem Id that was specified for the stored procedure or user-defined function. This field displays for DB2 multiple address space requests only.
Schema	The schema name that was specified for the stored procedure or user-defined function. This field displays for DB2 multiple address space requests only.
Name	The name that was specified for the stored procedure or user-defined function. This field displays for DB2 multiple address space requests only.
Time of request	The time of day the request was made.

Under Heading	This is Displayed
Requesting user	The TSO user ID of the user that requested the measurement.
Date of request	The date upon which the request was made.
Job name	The name of the job that was specified to be measured.
Step name/number	The step name or step number that was specified to be measured, if applicable.
Step program	The name of the step program that was specified to be measured, if applicable.
Number of samples	The number of samples specified.
Duration	The specified measurement duration.
Active/pending	Indicates whether the measurement request specified an active job (an immediate measurement) or one that was to run later when execution of the job step is detected.
Proc step name	The procedure step name, if specified.
Delay time	The number of seconds specified for which the start of the measurement was to be delayed from the start of the job step.

Measurement environment

Values relating to the environment in which the measurement took place are reported here.

Under Heading	This is Displayed
Job name	The name of the measured job.
Job number	The job number of the measured job assigned by JES.
Step name	The name of the measured step.
ASID	The ASID (address space ID) of the measured job.
DB2 attach type	The type of DB2 attachment, if DB2 data recorded.
Region size <16MB	The region size in the 24 bit address range.
Region size >16mb	The region size above the 24 bit address range.
Step program	The name of the measurement step program (specified in the EXEC JCL statement).
Region type	The type of region (Batch, TSO, IMS, CICS, etc.) measured.
System ID	The system identifier of the system on which the measurement took place.
SMFID	The SMF ID assigned to the system on which the measurement took place.
O/S Level	The operating system and level.
APA vers.	The version of Application Performance Analyzer that performed the measurement.
Nbr of CPUs	The number of CPUs in the system on which the measurement took place.
CPU rate factor	The factor used to determine CPU performance.
MIPS per CPU	The speed, in machine instructions per second, of one CPU. This is derived using the CPU rate factor.
CPU model	The CPU model number.
CPU version	The CPU version.

Under Heading	This is Displayed
SUs per second	The number of service units per CPU second.

Measurement statistics

Under Heading	This is Displayed
Start time	The time at which the measurement was initiated.
End time	The time at which the measurement ended.
Start date	The date upon which the measurement was initiated.
End date	The date upon which the measurement ended.
Total samples	The total number of samples taken during the measurement.
Sampling rate	The overall sampling rate expressed in samples per second.
CPU/WAIT samples	The number of samples in which CPU activity was observed or all TCBs were in wait state. Excluded from this count are samples in which no CPU activity was observed and one or more TCBs were dispatchable.
TCB samples	The number of samples in which TCBs existed. This number might be slightly smaller than the total number of samples. This occurs when some samples were taken at the beginning of a job step before the step initialization had completed.
Overall CPU	The average system CPU utilization percentage during the measurement period. It is obtained from the field CCVUTILP, which is the system CPU utilization as viewed by the System Resource Manager (SRM). Thus, it is the CPU utilization for this z/OS image.
Duration	The duration of the measurement in minutes and seconds.
Report dataspace	The size of the dataspace used to load the sample file and create indexes for reporting. This field is reported in megabytes.
Sample dataspace	The size of the dataspace used to record measurement data while sampling. This is the total uncompressed size reported in megabytes.
Meas significance	The ratio of the number of CPU/WAIT samples to the number of TCB samples. This is a measure of the quality of the measurement data. A low value indicates that CPU resources were unavailable to service the job step.
CPU queued samples	The number of samples in which no activity was occurring in the address space due to the unavailability of CPU resources.
Pages in	The number of page-in operations that occurred during the measurement interval.
Pages out	The number of page-out operations that occurred during the measurement interval.
EXCPs	The number of EXCPs processed during the measurement interval.

CPU consumption

This section is omitted for DDF measurements.

Under Heading	This is Displayed
CPU active samples	The number of samples in which CPU activity (one or more CPUs) was observed.
CPU active time	The percentage of the measurement interval CPU activity was observed.
CPU wait samples	The number of samples in which all TCBs were in wait state.
CPU wait time	The percentage of the measurement interval all TCBs were in wait state.
CPU time TCB	The number of CPU seconds consumed in TCB mode during the measurement interval.
CPU time SRB	The number of CPU seconds consumed in SRB mode during the measurement interval. This does not include any SRB time consumed by the Application Performance Analyzer measurement task.
Service units	The number of service units based on the CPU TCB and CPU SRB consumption.
Measurement SRB	The number of CPU seconds in SRB mode consumed by the Application Performance Analyzer measurement task in the measured address space.

zAAP CPU consumption

This section is displayed when zAAP time has been recorded. This is also displayed for zAAP on zIIP time, which will be labeled as zAAP time.

Under Heading	This is Displayed
zAAP CPU time	The number of CPU seconds consumed on zAAP processors during the measurement interval.
Task Time on CP	The number of CPU seconds consumed on a standard processor for non-zAAP eligible work.
Normalized Time	The zAAP CPU time displayed as a normalized CPU time.
zAAP Time on CP	The number of CPU seconds consumed on a standard processor for zAAP eligible work.
Norm. Factor	The normalization factor is used to express zAAP CPU time in the time a regular CP would have used for the same work. Multiply the zAAP CPU time by this number, then divide by 256.

DDF CPU consumption

This section is shown for DDF measurements only.

Under Heading	This is Displayed
Task CPU time	The number of seconds of CPU time used by the enclave SRB dispatchable unit for all measured DDF SQL calls.
Enclave CPU time	The number of seconds of CPU time used by all dispatchable units in an enclave for all measured DDF SQL calls.

Under Heading	This is Displayed
zIIP time	The number of seconds of zIIP time used by all measured DDF SQL calls.
zIIP on CP time	The number of seconds of CPU time on a standard processor for zIIP-eligible work used by all measured DDF SQL calls.

Client enclave consumption

This section is shown for DB2 parallel queries only.

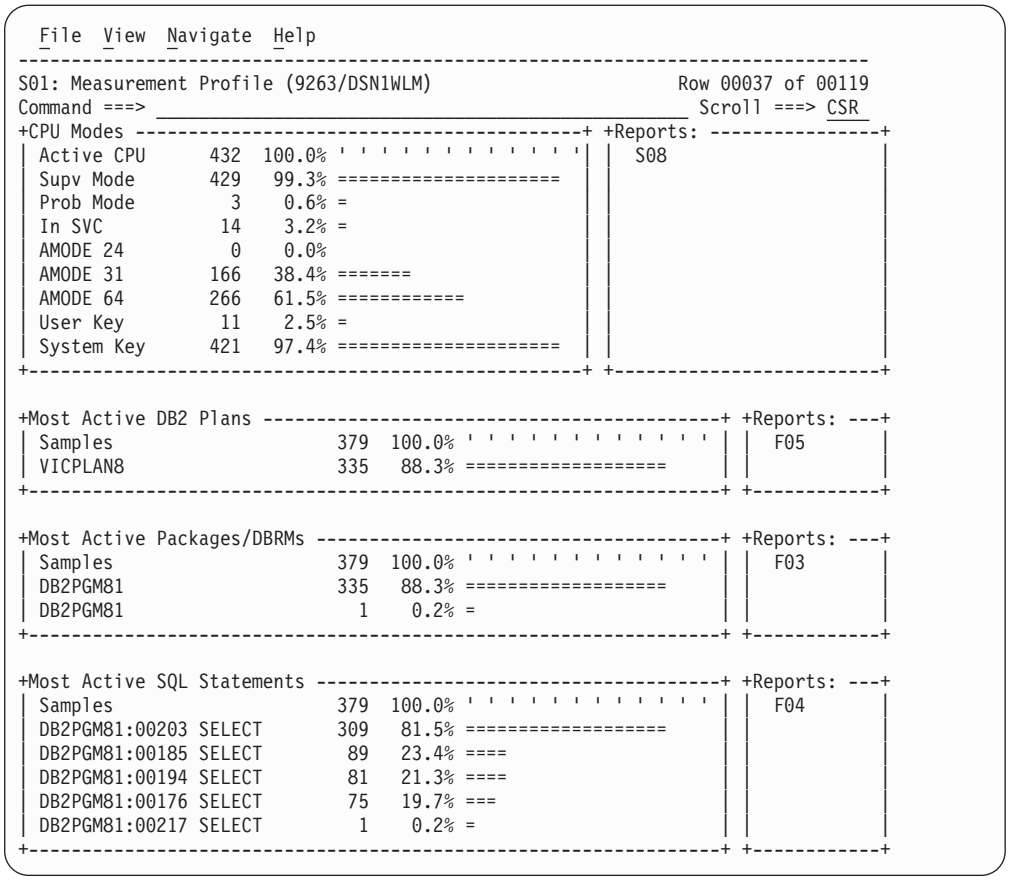
Under Heading	This is Displayed
Client SRB time	The number of seconds of CPU time used by the enclave SRB dispatchable unit for all measured DB2 parallel queries.
Total TCB time	The sum of CPU time in seconds used by client SRB enclaves and TCB CPU time.

Sample reports

A sample report is shown here, it is divided into three segments as it is scrolled down.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
S01: Measurement Profile (9263/DSN1WLM)                      Row 00001 of 00119
Command ===> _____________________________________________ Scroll ===> CSR

+Overall CPU Activity -------------------------------+ +Reports: ---------------+
| Samples         379  100.0% ' ' ' ' ' ' ' ' ' ' ' ' | |  C01  C02  C03  C05    |
| CPU Active      341   89.9% ================       | |  C07  W01  W02         |
| WAIT              4    1.0% =                      | |                        |
| Queued           34    8.9% =                      | |                        |
+---------------------------------------------------+ +------------------------+

+CPU Usage Distribution ------------------------------+ +Reports: ---------------+
| CPU Active      432  100.0% ' ' ' ' ' ' ' ' ' ' ' ' | |  C01  C05  C08  W01    |
| Application       3    0.6% =                      | |                        |
| System          130   30.0% ======                 | |                        |
| DB2 SQL         299   69.2% =============          | |                        |
| Data Mgmt         0    0.0%                        | |                        |
| Unresolved        0    0.0%                        | |                        |
| IMS DLI Call      0    0.0%                        | |                        |
+---------------------------------------------------+ +------------------------+

+Most CPU Active Modules-----------------------------+ +Reports: ---------------+
| CPU Active      432  100.0% ' ' ' ' ' ' ' ' ' ' ' ' | |  C02                   |
| DSNIDM          154   35.6% =======                | |                        |
| CAZ00681         82   18.9% ===                    | |                        |
| DSNXGRDS         58   13.4% ==                     | |                        |
| DSNK2DM          34    7.8% =                      | |                        |
| DSNBBM           21    4.8% =                      | |                        |
| +---------------------------------------------------+ +------------------------+

+Most CPU Active CSECTs-----------------------------------------+ +Reports: ---+
| CPU Active                 432  100.0% ' ' ' ' ' ' ' ' ' ' ' ' | | C02        |
| DSNISFX2 in DSNIDM         147   34.0% ======                 | |            |
| CAZ00681                    82   18.9% ===                    | |            |
| CAZ00670                    18    4.1% =                      | |            |
| DSNXRSFN in DSNXGRDS        15    3.4% =                      | |            |
| DSNB1GET in DSNBBM          15    3.4% =                      | |            |
| +-------------------------------------------------------------+ +------------+
```

Scrolling down, sample report S01 continued:



Scrolling down, sample report S01 continued:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
S01: Measurement Profile (9263/DSN1WLM)                      Row 00069 of 00119
Command ===> _____________________________________________ Scroll ===> CSR
+Request parameters-----------------------------------------------------------+
| Request number     9263                                                     |
| Description        v8 db2+                                                  |
| Sample file DSN    BNPF.SST.AVP03.R9263.RUNPGM81.SF                         |
| Retention          Mon Jan-14-2008                                          |
| Data Extractors    DB2,DB2+                                                 |
|---------------------------------------------------------------------------|
| Requesting user    AVP03            | Nbr of samples    100                 |
| Time of request    14:25:50         | Duration          1 sec               |
| Date of request    Wed Jul-18-2007  | Active/pending    Pending             |
| Job name           DSN1WLM          | Proc step name    n/a                 |
| Step name/number   n/a              | Delay time        none                |
| Step program       n/a              |                                       |
+---------------------------------------------------------------------------+

+Measurement environment------------------------------------------------------+
| Job name           DSN1WLM          | Region size <16MB  6,208K             |
| Job number         JOB02411         | Region size >16MB  32,768K            |
| Step name          DB21             | Step program       DB2PGM8            |
| Proc step name                      | Region type        Batch              |
| ASID               36               | DB2 Attach type    RRSAF              |
|---------------------------------------------------------------------------|
| System ID          X235             | IBM APA Version    2.400A             |
| SMFID              X235             |                                       |
| O/S level          z/OS 01.08.00    |                                       |
|---------------------------------------------------------------------------|
| Nbr of CPUs        3                | CPU model          2096               |
| CPU rate factor    7,321            | CPU version        00                 |
| MIPS per CPU       45               | SUs per second     2185.4             |
+---------------------------------------------------------------------------+
```

Scrolling down, sample report S01 continued:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
S01: Measurement Profile (9263/DSN1WLM)                      Row 00100 of 00119
Command ===> _____________________________________________ Scroll ===> CSR
+Measurement statistics-------------------------------------------------------+
| Start time         14:26:01          | Start date         Wed Jul-18-2007  |
| End time           14:26:05          | End date           Wed Jul-18-2007  |
|---------------------------------------------------------------------------|
| Total samples      381               | Duration           3.87 sec         |
| Sampling rate      98.44 per sec     | Report dataspace   0.16MB           |
| CPU/WAIT samples   345               | Sample dataspace   1.63MB           |
| TCB samples        379               | Meas significance  91.02%           |
| Overall CPU        64.49%            | CPU queued samples 34               |
|---------------------------------------------------------------------------|
| Pages in           0                 | EXCPs              34               |
| Pages out          0                 |                                     |
+---------------------------------------------------------------------------+

+CPU consumption--------------------------------------------------------------+
| CPU active samples 341               | CPU time TCB       4.98 sec         |
| CPU active time    89.97%            | CPU time SRB       0.02 sec         |
| CPU WAIT samples   4                 | Service Units      10,927           |
| CPU WAIT time      1.05%             | Measurement SRB    0.35 sec         |
+---------------------------------------------------------------------------+
```

S02 - Load module attributes

This report lists information about each of the load modules for which activity was measured during the observation session. Various attributes of each of the modules are reported.

You can specify SETUP options (use the SETUP command) to exclude the following information from the report:

- ESD (External Symbol Dictionary) information.
- Modules loaded in PLPA.
- Modules loaded in the NUCLEUS.

A sample screen is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
S02: Load Module Attributes - 0327/TSTJOB1                   Row 00001 of 01699
Command ===> ____________________________________________ Scroll ===> CSR

SORT by name enter: SN, by load address: SA, by size: SS, by loadlib: SL
Information reported for 153 load modules. (SETUP has excluded 105 modules).

Module Information for ISFMAIN
   Load Address     08B74D90 to 08B75FFF
   Module Size      4,720
   Attributes       REUS,RENT,APFLIB
   Module Location  JPA
   Loadlib DDNAME   -LNKLST-
   Load Library     ISF.SISFLOAD

ESD Information for ISFMAIN
   External  Offset  Length  Start Addr  End Addr
   ISFMAIN   000000    4714   08B74D90   08B75FF9


Module Information for ISFVTBL
   Load Address     08D6E480 to 08EDDFFF
   Module Size      1,506,176
   Attributes       REUS,RENT,APFLIB
   Module Location  JPA
```

You can place your cursor on the SORT field and enter any of the following four sort codes to re-sort the report:

- SN By Name
- SA By Load Address
- SS By Size
- SL By Loadlib

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:

```
  File  View  Navigate  Help
_ +-------------------------------------------------------------------+ ------------
S | Options for Load Module Attributes                                | 001 of 00957
C |                                                                   | 11 ===> CSR
  | Enter "/" to select an option                                     |
S |     _  Omit display of ESD information                            | ib: SL
I |     _  Omit Nucleus modules from report                           |
  |     _  Omit PLPA modules from report                              |
M |     _  Omit repeating modules from report                         |
  |                                                                   |
  |                                                                   |
  |                                                                   |
  |                                                                   |
E |                                                                   |
  +-------------------------------------------------------------------+
```

Use these options to trim down your report by omitting information that you are not interested in. You can omit ESD information, Nucleus modules, PLPA Modules, or modules that have been reloaded at a new address but have the same name and size.

S03 - Load module summary

This report lists the load modules for which activity was measured during the observation session. For further details about a particular module, enter the "++" line command.

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
S03: Load Module Summary (2133/TSTJOB1)                     Row 00001 of 00124
Command ===> ____________________________________________ Scroll ===> PAGE

Module     Locn  Address  Count   Size(bytes)  Attributes  DDName   Load Library
CEEBINIT   JPA   0000B088    1        61,304   RU RN       -VLF-
CEEPLPKA   PLPA  043C3000    1     1,967,824                        CEE.SCEELPA
COFMMTGR   NUC   012D2D10    1           752
COFMSCHK   PLPA  03D0B3D8    1         3,112                        SYS1.LPALIB
CSVEXPR    PLPA  0296C000    1        31,448                        SYS1.LPALIB
CSVGETMD   NUC   010FF180    1        17,544
CSVLLSCH   NUC   010DAE40    1         1,848
CSVLLTCH   NUC   010D82E0    1         8,232
CSVSYNCH   NUC   012F8CA0    1         1,936
CSVXLOAD   NUC   012FD0C0    1         2,448
CTXRSMGR   NUC   0130BF68    1         9,024
IAXGT      NUC   016B7370    1         7,512
IAXPI      NUC   017378D8    1         2,976
IAXPN      NUC   0173E958    1         3,752
IAXPQ      NUC   01744310    1         7,168
IAXPS      NUC   00FFE3F0    1         6,224
IAXVF      NUC   017C4AD0    1        14,320
```

Detail line descriptions

Each line reports values under the following headings:

- Module
- Locn
- Address
- Count
- Size(bytes)
- Attributes
- DDName
- Load Library

Module
This is the module name.

Location
This is the location where the module was loaded — JPA, PLPA, or NUCLEUS. JPA is displayed in green. All other locations are displayed in red.

Address
This is the address where the module was loaded. If it is below the line, it is displayed in yellow, above the line addresses are displayed in green.

Count
The number of unique instances of the load module observed at the indicated address. This value exceeds 1 if the module was loaded, deleted and then loaded again. A high value could indicate the module was loaded (and deleted) excessively and could be causing a performance problem.

Size This is the size of the module in bytes.

Attributes
This is the attributes of the module – RU=reusable, RN=reentrant, APF=APF-authorized.

DDName
This is the DDName of the load library from which the module was loaded.

Load Library
This is the data set name of the load library from which the module was loaded.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized here:

on objects

Cmd	When Applied To Object	Action
?	Load Module	Display context help information.
++	Load Module	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	Load Module	Display context help information.
SN	Module	Sort report by module name.
SS	Module	Sort report by module size.
SA	Module	Sort report by module load address.
SL	Module	Sort report by module load library

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|                                                                               |
| Module Information for IGG0191A                                               |
|    Load Address     00D89000 to 00D8CE7F                                      |
|    Module Size      16,000                                                    |
|    Attributes       NOREUS,NORENT                                             |
|    Module Location  PLPA                                                      |
|    Program Group    MVS System                                                |
|    Subgroup         MVS Services                                              |
|    Function         Data Management services                                  |
|                                                                               |
| ESD Information for IGG0191A                                                  |
|    External  Offset  Length  Start Addr  End Addr                             |
|    IGG0191A  000000    2292   00D89000   00D898F3                             |
|    IGG0196I  0008F8     932   00D898F8   00D89C9B                             |
|    IGG0196A  000CA0    1186   00D89CA0   00D8A141                             |
|    IGG0196Q  001148    1984   00D8A148   00D8A907                             |
|    IGG0191N  001908    2700   00D8A908   00D8B393                             |
|    IGG0191Y  002398     668   00D8B398   00D8B633                             |
|    IGG0191B  002638    3254   00D8B638   00D8C2ED                             |
|    IGG0196B  0032F0    1040   00D8C2F0   00D8C6FF                             |
|    IGG0191I  003700    1352   00D8C700   00D8CC47                             |
|    IGG0193I  003C58     564   00D8CC48   00D8CE7B                             |
|                                                                               |
+-------------------------------------------------------------------------------+
```

S04 - TCB summary

Overview

A list of all TCBs (Tasks) which were active at any time during the observation session is reported. The list is arranged in hierarchical sequence with ATTACHed subtasks indented relative to the parent tasks that performed the ATTACH functions.

A sample TCB Summary report is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
S04: TCB Summary (0756/TSTJOB1)                              Row 00001 of 00005
Command ===> _____________________________________________ Scroll ===> CSR

TCB_Name                        Address  Samples  CPU Active  CPU WAIT  Queued

IEAVAR00-002                      8FE0A8        0
> IEAVTSDT-003                    8FFE88        0
> IEESB605-004                    8FFBF8        0
  > IEFIIC-005                    8FB7F0        0
    > LPFRAYV4-001                8FB330     3996      75.75%     8.23%  16.01%
```

Detail line descriptions

Each line reports values under the following headings.

- TCB Name
- Address
- Samples
- CPU Active
- CPU WAIT
- Queued

TCB Name
This is the name of the program associated with the task; the one specified to the ATTACH function. An index value is also appended to the name. This is a sequence number that Application Performance Analyzer assigned to each unique TCB that it observed. The value is useful for distinguishing between more than one TCB with the same name (same program ATTACHed).

For CICS measurements that have the CICS data extractor selected, the TCB mode will be displayed for CICS TCBs. This will immediately follow the TCB name.

Address
This is the address of the TCB. Only 6 hexadecimal digits are shown as TCBs always reside below the 16MB line.

Samples
This is the number of samples in which the TCB was observed.

CPU Active
This is the number of samples in which the CPU was active (instruction execution was in progress) in this TCB.

CPU WAIT
This is the number of samples in which the Task was waiting.

Queued
This is the number of samples in which the TCB was observed in Queued status; it was ready to execute but no CPU was available.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	TCB Name	Display context help information.
++	TCB Name	Show additional details.
C01	TCB Name	Display C01 report subset.
C02	TCB Name	Display C02 report subset.
C03	TCB Name	Display C03 report subset.

This report does not have any line commands on headings.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ----------------- |
| |     > LPFRAYV4-001              8FB330     3996      75.75%     8.23% 1 |
| +------------------------------------------------------------------------- |
|                                                                               |
|                                                                               |
| TCB Information for LPFRAYV4-001                                              |
|                                                                               |
|    Nbr of Samples         3996                                                |
|    Active CPU Samples     3027   ======================                       |
|    WAIT Samples            329   ==                                           |
|    Queued CPU Samples      640   =====                                        |
|                                                                               |
|    Session CPU Time      17.778 seconds                                       |
|    Accumulated CPU Time  17.778 seconds                                       |
|    Task ATTACHed by      IEFIIC-005                                           |
|    Time to ATTACH        *UNKNOWN*                                            |
|                                                                               |
+-------------------------------------------------------------------------------+
```

S05 - Memory usage timeline

Overview

This timeline analysis breaks the observation session duration into a number of (approximately) fixed-length, chronological time intervals. Each line represents one of these intervals. By default, 15 intervals are reported, each representing approximately the same number of samples. This illustrates any progressive resource usage trends. The value under the heading Storage quantify the number of Page Frames, which were allocated to the address space during the interval.

A sample Memory Usage Timeline report is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
S05: Memory Usage Timeline (0644/TSTJOB1)                    Row 00001 of 00015
Command ===> _____________________________________________ Scroll ===> CSR

SEQN    Seconds  Storage <----1380K-----------------------------------2530K-->
                         *....+....+....+....+....+....+....+....+....+....+....*
0001      0.069    1548K  =======
0002      0.205    1660K  ============
0003      0.256    2040K  ===========================
0004      0.180    2040K  ===========================
0005      0.184    2040K  ===========================
0006      0.209    2104K  ================================
0007      0.201    2144K  ==================================
0008      0.205    2188K  ======================================
0009      0.205    2280K  ========================================
0010      0.209    2380K  ============================================
0011      0.227    2404K  =============================================
0012      0.201    2432K  ==============================================
0013      0.193    2408K  =============================================
0014      0.214    2176K  ================================
0015      0.111    1556K  ======
```

Detail line descriptions

Each line reports values under the following headings:

- SEQN
- Seconds
- Storage

SEQN This is the sequence number of the interval. Intervals are numbered 0001, 0002, etc.

Seconds
This is the duration of the interval in seconds.

Storage
This is the amount of central storage allocated to the address space. In other words, Real Storage (or "Page Frames"). This is an effective measurement of the address space's demand on central storage. The value is expressed in units of kilobytes (1024 bytes). Each line shows the maximum value observed during the particular interval. These page frames include paged-in storage for conventional allocations (for example, obtained by GETMAIN) as well as Dataspaces and Hiperspaces.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

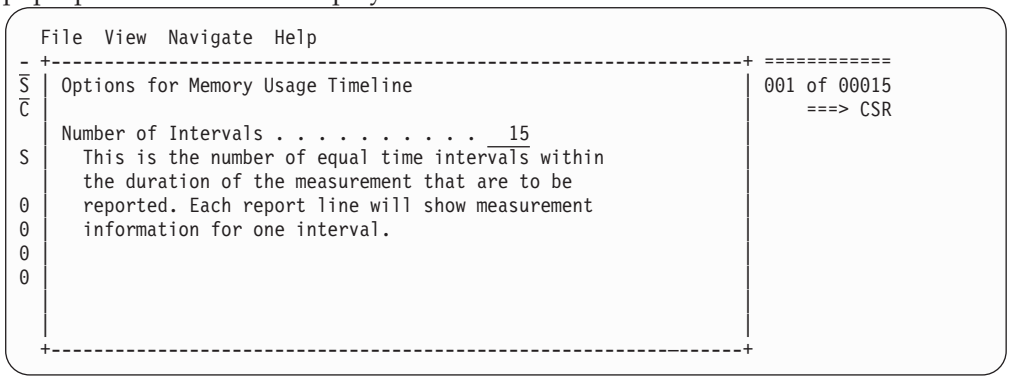
on objects

Cmd	When Applied To Object	Action
?	SEQN (sampling interval)	Display context help information.
++	SEQN (sampling interval)	Show additional details.
C01	SEQN (sampling interval)	Display C01 report subset.
C02	SEQN (sampling interval)	Display C02 report subset.
C03	SEQN (sampling interval)	Display C03 report subset.

This report does not have any line commands on headings.

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:



Number of Intervals
Use this option to change the number of equal time intervals that are reported.

S06 - Data space usage timeline

Overview

This timeline analysis breaks the observation session duration into a number of (approximately) fixed-length, chronological time intervals. Each line represents one of these intervals. By default, 15 intervals are reported, each representing approximately the same number of samples. This illustrates any progressive resource allocation trends. The values under the heading Storage quantify the amount of virtual storage allocated to the address space for private data spaces during the interval.

A sample of the Data Space Usage Timeline report is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
S06: Data Space Usage Timeline (0656/TSTJOB1)                Row 00001 of 00015
Command ===> _____________________________________________ Scroll ===> CSR

SEQN    Seconds  Storage <-------0K-----------------------------------345520K-->
                         *....+....+....+....+....+....+....+....+....+....+....*
0001     10.314  245572K  ========================================
0002      9.106  343232K  ==========================================================
0003      8.657  245572K  ========================================
0004      9.146  343444K  ==========================================================
0005      9.140  245572K  ==========================================================
0006      9.083  245572K  ==========================================================
0007      8.806  245572K  ========================================
0008      7.417  245572K  ========================================
0009      6.975  245572K  ========================================
0010      6.743  245572K  ========================================
0011      6.465  245572K  ========================================
0012      6.447  245572K  ========================================
0013      6.462  245572K  ========================================
0014      6.418  245572K  ========================================
0015      6.514  245572K  ========================================
```

Detail line descriptions

Each line represents reports values under the following headings.

- SEQN
- Seconds
- Storage

SEQN This is the sequence number of the interval. Intervals are numbered 0001, 0002, etc.

Seconds
This is the duration of the interval in seconds.

Storage
This is the amount of virtual storage allocated to the address space for user-key Data Spaces. The value is expressed in units of kilobytes (1024 bytes). Each line shows the maximum value observed during the particular interval.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

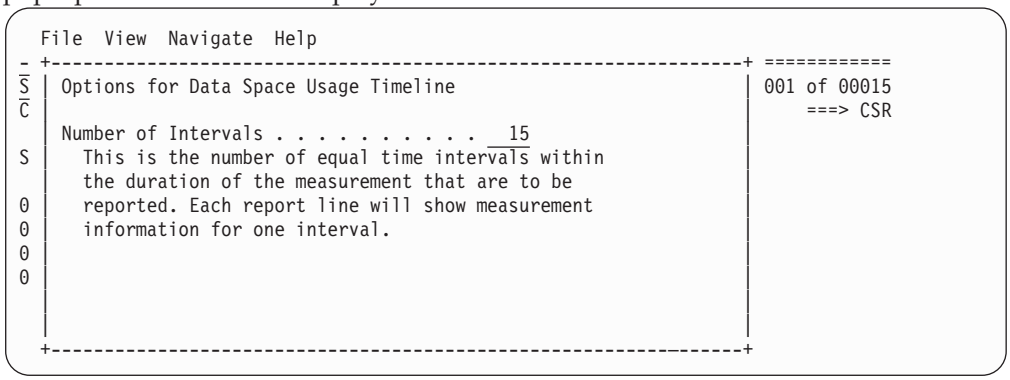
on objects

Cmd	When Applied To Object	Action
?	SEQN (sampling interval)	Display context help information.
++	SEQN (sampling interval)	Show additional details.
C01	SEQN (sampling interval)	Display C01 report subset.
C02	SEQN (sampling interval)	Display C02 report subset.
C03	SEQN (sampling interval)	Display C03 report subset.

This report does not have any line commands on headings.

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:



Number of Intervals

Use this option to change the number of equal time intervals that are reported.

S07 - TCB execution summary

Overview

A list of all TCBs (Tasks) which were active at any time during the observation session is reported. The list is arranged in hierarchical sequence with ATTACHed subtasks indented relative to the parent tasks that performed the ATTACH functions.

A sample screen is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
S07: TCB Execution Summary (0656/TSTJOB1)                    Row 00001 of 00019
Command ===> _____________________________________________ Scroll ===> CSR

                              --- CPU Time ---
TCB_Name                     Measured TCBTotal <-- Measurement Interval --->

IEAVAR00-001                  0.0 Sec  2.3 Sec   System TCB - Not Measured
> IEAVTSDT-002                0.0 Sec  0.0 Sec   System TCB - Not Measured
> IEESB605-003                0.0 Sec  1.2 Sec   System TCB - Not Measured
  > IKJEFT01-004              0.0 Sec  0.3 Sec   ==========================
    > IKJEFT02-005            0.0 Sec  0.4 Sec   ==========================
      > IKJEFT09-006          0.0 Sec  0.0 Sec   ==========================
        > ISPF-007            0.9 Sec 32.3 Sec   ==========================
          > ISPTASK-008       0.0 Sec  8.5 Sec   ==========================
          > ISPTASK-009       8.2 Sec 21.0 Sec   ==========================
            > EX-010          0.1 Sec  0.3 Sec   ============
              > ALTLIB-015    0.0 Sec  0.0 Sec              =
              > FREE-016      0.0 Sec  0.0 Sec                =
              > CALL-011      0.1 Sec  0.2 Sec   ==========
              > PMSEL-12      3.9 Sec 42.3 Sec   ==========
            > EXEC-013        0.1 Sec  0.8 Sec   =
            > CALL-014        0.0 Sec  0.2 Sec   =
            > ALLOC-017       0.1 Sec  0.1 Sec                =
            > ALLOC-018       0.1 Sec  0.1 Sec                =
            > ALLOC-019       0.1 Sec  0.1 Sec                 =
```

Detail line descriptions

Each line represents reports values under the following headings:

- TCB Name
- CPU Time – Measured
- CPU Time – TCBTotal
- Measurement Interval

TCB Name

This is the name of the program associated with the task; the one specified to the ATTACH function. An index value is also appended to the name. This is a sequence number that Application Performance Analyzer assigned to each unique TCB that it observed. The value is useful for distinguishing between more than one TCB with the same name (same program ATTACHed).

For CICS measurements that have the CICS data extractor selected, the TCB mode will be displayed for CICS TCBs. This will immediately follow the TCB name.

CPU Time – Measured

This reports the amount of CPU time used by the Task for the duration of the observation session. This is accurate to within the span of two sample intervals.

CPU Time – TCBTotal

This reports the amount of accumulated CPU time used by the Task since the Task was started up to the time of the end of the observation session. This is accurate to within one sample interval.

Measurement Interval

A graph is plotted here showing the span of time within the observation session interval the Task was active.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	TCB Name	Display context help information.
++	TCB Name	Show additional details.
C01	TCB Name	Display C01 report subset.
C02	TCB Name	Display C02 report subset.
C03	TCB Name	Display C03 report subset.

S08 - Processor utilization summary

Usage

Use this report to see a breakdown of CPU states observed during the measurement.

Quantification

Each detail line reports the number of active CPU samples for an indicated CPU state. This is also expressed as a percentage of the total number of active CPU samples.

The CPU states are not all mutually exclusive. Overlaps in the counts reported in different detail lines will occur.

Under Heading	This is Displayed
Storage key n	The number of active CPU samples in the indicated storage protect key. A value of 8 indicates user (application) key. Other values usually indicate execution is in a system routine.
Problem state	The number of active CPU samples in problem state. This is the usual state for application programs.
Supervisor state	The number of active CPU samples in supervisor state. This mode allows execution of privileged instructions. This typically indicates execution in an operating system routine.
Execution in SVC	The number of active CPU samples while executing in SVC (Supervisor Call) modules.
Execution in real mode	The number of active CPU samples in real mode. There are no normal operating conditions under which this mode can occur. The value should always be zero indicating execution in virtual mode.
Primary-space mode	The number of active CPU samples in which the ASC (Address-Space Control) bits indicate execution in primary-space mode.
Access-register mode	The number of active CPU samples in which the ASC (Address-Space Control) bits indicate execution in Access-register (AR) mode.

Under Heading	This is Displayed
Secondary-space mode	The number of active CPU samples in which the ASC (Address-Space Control) bits indicate execution in secondary-space mode.
Home-space mode	The number of active CPU samples in which the ASC (Address-Space Control) bits indicate execution in home-space mode.
Execution on processor n	The number of active CPU samples in which instructions were being executed by the indicated processor. Processors in a multi-CPU system are numbered 0,1,2,3 ... etc. Specialty processors such as zAAP are identified to the right of the processor percentage.
In private storage ABOVE	The number of active CPU samples in which instructions were located in private storage above the 16MB boundary.
In private storage BELOW	The number of active CPU samples in which instructions were located in private storage below the 16MB boundary.
In common storage ABOVE	The number of active CPU samples in which instructions were located in common storage above the 16MB boundary.
In common storage BELOW	The number of active CPU samples in which instructions were located in common storage below the 16MB boundary.
Execution in AMODE 24	The number of active CPU samples in which instructions were being executed in AMODE 24.
Execution in AMODE 31	The number of active CPU samples in which instructions were being executed in AMODE 31.
Execution in AMODE 64	The number of active CPU samples in which instructions were being executed in AMODE 64.

Sample reports

A sample report is shown here.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
S08: Processor Utilitization Summary (0652/TSTJOB1)          Row 00001 of 00031
Command ===> _____________________________________________ Scroll ===> CSR

Processor states for 6879 CPU usage measurements

                                  Nbr of
   Processor State                Samples  Percentage

   Storage key 0                    2,884      41.92%
   Storage key 1                      347       5.04%
   Storage key 5                      193       2.80%
   Storage key 7                        4       0.05%
   Storage key 8                    3,451      50.16%

   Problem state                    3,357      48.80%
   Supervisor state                 3,522      51.19%

   Execution in SVC                 3,501      50.89%

   Execution in real-mode               0       0.00%

   Primary-space mode               6,879     100.00%
   Access-register mode                 0       0.00%
   Secondary-sapce mode                 0       0.00%
   Home-space mode                      0       0.00%

   Execution on processor 0         3,660      53.20%
   Execution on processor 1         3,219      46.79%

   In private storage               1,366      19.85%
   In private storage BELOW           120       1.74%
   In common storage                2,837      41.24%
   In common storage BELOW          2,556      37.15%

   Execution in AMODE 24                0         0.00%
   Execution in AMODE 31                1       100.00%
   Execution in AMODE 64                0         0.00%
```

S09 - Measurement analysis

Usage

This report presents various textual statements, each representing an observation made about some aspect of execution of the measured job. The purpose of each of these observations is to provide a synoptic analysis of an area of resource usage and, in some cases, suggest where some performance improvement opportunities might exist.

It is important that you analyze these observations in the context of how you would expect the measured job to perform. Some of the statements in this report might draw your attention to aspects of resource consumption that is perfectly normal for the job. For example, high CPU consumption might be noted in a certain module in a situation where you would actually expect high CPU usage in that module.

Sample reports

A sample report is shown here.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
S09: Measurement Analysis (9458/TSTJOB1)                    Row 00001 of 00031
Command ===> ____________________________________________ Scroll ===> CSR

 This report presents various textual statements pertaining to specific
 aspects of application performance observed during the measurement
 session. Each statement identifies areas of activity and resource
 consumption or causes of execution delay and suggests areas where
 performance improvement opportunties might exist.

 +------------------------------------------------------------------------+
 | 1. Small CPU sample size                                               |
 | This measurement recorded a relatively small number of active CPU      |
 | observations. Some figures shown in CPU usage reports may have a high  |
 | margin of error. Keep this in mind when analyzing these reports.       |
 +------------------------------------------------------------------------+

 +------------------------------------------------------------------------+
 | 2. System CPU overhead                                                 |
 | A high percentage of CPU activity was observed in system service       |
 | routines. This indicates high system overhead. The level of system     |
 | overhead might be normal for the type of job being measured or it might|
 | be an indication of a performance problem.                             |
 |                                                                        |
 | See reports:   C01 C02                                                 |
 +------------------------------------------------------------------------+
```

C01 - CPU usage by category

Overview

This report analyzes measured CPU consumption. It attributes CPU consumption to the following general categories:

- APPLCN – Application Code
- SYSTEM – System/OS Services
- DB2SQL – SQL Processing
- DATAMG – Data Management (DASD) Requests
- IMSDLI – IMS DL/I call processing
- ADABAS – Adabas requests

In addition, any execution measured at locations for which no load module name could be determined is attributed to a category:

- NOSYMB – No Module Name Found

A sample report is shown below. When the report is first displayed, only the top level of the hierarchy is visible. To expand any of these categories to show the next hierarchical level, you can type the “+” line command on the detail line. You can also enter the “+” line command on the Name heading to expand the entire report to show all detail lines in all hierarchical levels.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C01: CPU Usage by Category (0638/TSTJOB01)                  Row 00001 of 00004
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description           Percent of CPU time * 10.00%  ±1.8%
                                       *....1....2....3....4....5....6....7....8
APPLCN       Application Code     54.36 ==========================
SYSTEM       System/OS Services   44.30 ====================
DATAMG       Data Mgmt Processing  1.03 =
NOSYMB       No Module Name        0.29
```

Detail line descriptions

Each line represents a System Object – an object to which measured activity is attributed. These lines are arranged hierarchically. You can expand a line (using the "+" line command) to reveal a breakdown into subordinate objects. Each type of object shown in this report is described here:

Category

Category is the top level in the hierarchy. CPU consumption is categorized as APPLCN, SYSTEM, DB2SQL, DATAMG, IMSDLI, ADABAS or NOSYMB.

DPA Group

Within a category – usually the SYSTEM category – load modules can be further arranged into Descriptive Program Attribution (DPA) groups. These are functional groups like: IMS, DB2, MVS™, SVC, etc.

By entering a '+' on the SYSTEM category line:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C01: CPU Usage by Category (0638/TSTJOB01)                  Row 00001 of 00004
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description           Percent of CPU time * 10.00%  ±1.8%
                                       *....1....2....3....4....5....6....7....8
APPLCN       Application Code     54.36 ==========================
+YSTEM       System/OS Services   44.30 ====================
DATAMG       Data Mgmt Processing  1.03 =
NOSYMB       No Module Name        0.29
```

The list of objects in this category is expanded to the next level of the hierarchy to include DPA groups:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C01: CPU Usage by Category (0638/TSTJOB01)                  Row 00001 of 00009
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description           Percent of CPU time * 10.00%  ±1.8%
                                       *....1....2....3....4....5....6....7....8
APPLCN       Application Code     54.36 ==========================
SYSTEM       System/OS Services   44.30 ====================
→ SVC          SVC Routines       42.14 ====================
→ MVS          MVS System         2.06 ==
→ NUCLEUS      Nucleus Modules     0.06
→ IMS          IMS Subsystem       0.03

DATAMG       Data Mgmt Processing  1.03 ==
NOSYMB       No Module Name        0.29
```

Note: Using the SETUP primary command, you can specify aggregation of modules into Group or Subgroup. Subgroup offers a more granular, less inclusive categorization than Group.

In this sample screen Subgroup has been selected in SETUP, note that the SVC group has now been replaced with SVC subgroups (a subgroup for each SVC type.)

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
C01: CPU Usage by Category (0638/TSTJOB01)                  Row 00001 of 00012
Command ===> ____________________________________________________ Scroll ===> CSR

Name         Description           Percent of CPU time * 10.00%  ±1.8%
                                       *....1....2....3....4....5....6....7....8
APPLCN       Application Code     54.36 ============================
SYSTEM       System/OS Services   44.30 ======================
→ SVCTYPE1     Type 1 System SVC  18.94 ========
→ SVCTYPE3     Type 3 System SVC  10.38 =====
→ SVCTYPE4     Type 4 System SVC   8.72 ====
→ SVCTYPE2     Type 2 System SVC   4.09 ===
→ MVS           MVS System          2.06 =
→ NUCLEUS       Nucleus Modules     0.06
→ IMS           IMS Subsystem       0.03

DATAMG       Data Mgmt Processing  1.03 =
NOSYMB       No Module Name        0.29
```

Name Column

The symbolic name of the Group/Subgroup appears under this heading.

Description Column

A Group/Subgroup description appears under this heading.

CPU Percent Column

The aggregation of activity measured under the named Group/Subgroup appears under this heading as a percentage of CPU time.

Load Module

A load module line appears under a Group/Subgroup line, under a Category line, or under an SVC line.

For example, to see the load modules under the Group/Subgroup line CICS, enter + on the CICS object:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
C01: CPU Usage by Category (0621/TSTJOB01)                   Row 00001 of 00014
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description           Percent of CPU time * 10.00%  ±3.8%
                                      *....1....2....3....4....5....6....7....8
SYSTEM    System/OS Services     93.67 ========================================
→ +ICS       CICS Services       47.43 ====================
→ SVCTYPE1   Type 1 System SVC   22.43 =========
→ MVS        MVS System           5.42 ===
→ NUCLEUS    Nucleus Modules      5.27 ===
→ SVCTYPE2   Type 2 System SVC    5.12 ===
→ LEBASE     LE Base Modules      3.61 ==
→ USERSVC    User/Vendor SVC      1.95 =
→ DB2        DB2 Services         1.95 =
→ SM         Storage Manager      0.30
→ LECOBOL    LE COBOL component M 0.15

NOSYMB       No Module Name       6.02 ===
APPLCN       Application Code     0.30
```

The CICS Group has now been expanded to show load modules in the next hierarchical level:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
C01: CPU Usage by Category (0621/TSTJOB01)                   Row 00001 of 00014
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description           Percent of CPU time * 10.00%  +1.8%
                                      *....1....2....3....4....5....6....7....8
SYSTEM       System/OS Services   93.67 ========================================
→ CICS         CICS Services      47.43 ========================
  → DFHSIP      CICS Services     22.89 ===========
  → DFHAPLI     CICS Services      3.46 ==
  → DFHPGDM     PG domain - intia  3.46 ==
  → DFHFCVS     File access VSAM r 2.86 =
  → DFHZCB      VTAM working set m 2.86 =
  → DFHAIP      CICS Services      2.40 =
  → DFHMNDML    CICS Services      1.35 =
  → DFHMCX      BMS fast path modu 1.35 =
  → DFHZCP      Terminal managemen 1.05 =
  → DFHFCFR     File control file  0.90
  → DFHAPSM     AP domain - transa 0.75
```

Name Column

The load module name appears under this heading.

Description Column

If a DPA functional description is found for the module name, it is reported under this heading. Otherwise “Application Program” is displayed.

CPU Percent Column

The measured CPU execution for this Load Module appears under this heading.

CSECT (Control Section)

These lines can appear as subordinate, breakdown items under a load module line. If Application Performance Analyzer was able to find ESD (External Symbol Dictionary) information, during the measurement process, for a load module, these items will appear under the load module and the measured activity will be attributed to them.

Name Column
The CSECT name appears under this heading.

Description Column
This will display "CSECT in xxxxxxxx" where xxxxxxxx is the name of the load module to which the CSECT belongs.

SVC (Supervisor Call)
This line shows attribution of measured activity during execution of an MVS Supervisor Call.

Name Column
"SVC" followed by a 3-digit decimal SVC number (000 to 255) appears under this heading. For example — 'SVC120'.

Description Column
A description of the SVC service, or the name of the macro which invokes the SVC appears under this heading. For example: "GETMAIN/FREEMAIN."

SQL Statement
This item attributes measured activity to a DB2 SQL statement.

Name Column
A sequence number is assigned by Application Performance Analyzer to each unique SQL statement observed during the measurement. This sequence number is shown in the name field. It is possible for some sequences numbers to be missing (sequence gaps) from the report. This will occur if a sequence number was assigned to SQL statements but no CPU activity was measured for these statements.

Description Column
The name of the program that issued the SQL request followed by the precompiler statement number (enclosed in parentheses) is shown here. This is followed by the SQL function (e.g. SELECT, INSERT, COMMIT).

DL/I Call
This item attributes measured activity to an IMS DL/I call.

Name Column
A sequence number is assigned to each unique DL/I call statement observed during the measurement. This sequence number is shown in the name field.

Description Column
The DL/I function code appears followed by the PCB name followed by the relative PCB number in parentheses. The location of the call, in *csect+offset* format, follows.

Adabas Call
This item attributes measured activity to an Adabas call.

Name Column
A sequence number is assigned to each unique Adabas call statement observed during the measurement. This sequence number is shown in the name field.

Description Column
The name of the program that issued the Adabas request and the

offset within the program, followed by the Adabas command code that was issued, is displayed in this field.

Unresolved Address

This item attributes measurement activity to a range of addresses for which a corresponding load module name could not be determined.

Name Column

Activity observed in a 4096 (4K) byte range of addresses is reported in an Unresolved Address line. This range is expressed in the format “HHHHHxxx” where HHHHH are the 5 high order hexadecimal digits of the address. For example: '08915xxx' means the range from 08915000 to 08915FFF.

Description Column

“Unresolved Address” appears under this heading.

Subset reports

This report can generate subset reports for any detail line. By entering a report code on a detail line, a pop-up subset report is displayed for this item. The item selected is scaled to 100 percent. The available subset reports are listed below in “Line commands, on objects.”

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a “/” on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call.	Display context help information.
++	Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call.	Show additional details.
+	Category, Load Module, SVC, SQL command, DLI call, Adabas call.	Expand to reveal next level.
–	Category, Load Module, SVC, SQL command, DLI call, Adabas call.	Collapse to hide next level.
SV	SV Category, SVC, SQL command, DLI call, Adabas call.	Sort next level by value.
SN	Category, SVC, SQL command, DLI call, Adabas call.	Sort next level by name.
M	Load Module, CSECT.	Display load module information.
P	Load Module, CSECT, SQL command, DLI call, Adabas call.	Display source program mapping.
C01	Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call.	Display C01 report subset.
C02	Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call.	Display C02 report subset.

Cmd	When Applied To Object	Action
C03	Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call.	Display C03 report subset.
C08	Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call.	Display C08 report subset.
C09	Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call.	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

SETUP options

The following SETUP options can be selected with the SETUP primary command:

Reporting by Group / SubGroup
This option allows you to aggregate modules into Group or SubGroup. SubGroup offers a more granular, less inclusive categorization than Group. For example, when reporting by Group, all SVCs would be reported under the "SVC" Group. When reporting by SubGroup, SVCs would be reported under SubGroups such as SVCTYPE1, SVCTYPE2, etc.

Show the DB2SQL category
This shows activity attributed to DB2 SQL statements. If it is not selected, the activity will instead be included in the appropriate system modules in the SYSTEM category. This is not available for CICS measurements.

Show the DATAMG category
This shows activity attributed to data management functions, which include basic access functions such as READ and WRITE. Processing of OPEN and CLOSE functions is not included in this category. If it is not selected, the activity will instead be included in the appropriate system modules in the SYSTEM category.

Show the IMSDLI category
This shows activity attributed to IMS DLI calls. If it is not selected, the activity will instead be included in the appropriate system modules in the SYSTEM category.

Show the ADABAS category
When the Adabas extractor is on, this shows activity attributed to Adabas

requests. If it is not selected, the activity is included in the appropriate system modules in the SYSTEM category.

Minimum CPU percentage
You can set this option to eliminate modules where the CPU percentage is below a certain threshold.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                 More:     +   |
| +--------------- The following report line was selected ---------------+      |
| | > SVCTYPE1  Type 1 System SVC     4.78 00                           |      |
| +-------------------------------------------------------------------+      |
|                                                                               |
| Calculation Details                                                           |
|    CPU measurements                          139                              |
|    Grouped under                             Type 1 System SVC                |
|    Total CPU measurements                    2,906                            |
|    Percent in category                       4.78%                            |
|                                                                               |
|                                                                               |
| Processor states for the CPU usage measurements                               |
|                                                                               |
|                                    Nbr of                                     |
|    Processor State                 Samples  Percentage                        |
|                                                                               |
|    Storage key 0                       111      79.85%                        |
|    Storage key 6                         5       3.59%                        |
|    Storage key 8                        23      16.54%                        |
|                                                                               |
|    Problem state                         1       0.71%                        |
|    Supervisor state                    138      99.28%                        |
|                                                                               |
|    Execution in SVC                    139     100.00%                        |
|                                                                               |
|    Execution in real-mode                0       0.00%                        |
|                                                                               |
|    Primary-space mode                  139     100.00%                        |
|    Access-register mode                  0       0.00%                        |
|    Secondary-space mode                  0       0.00%                        |
|    Home-space mode                       0       0.00%                        |
|                                                                               |
|    Execution on processor 0             80      57.55%                        |
|    Execution on processor 1             59      42.44%                        |
|                                                                               |
|    In private storage ABOVE              1       0.71%                        |
|    In private storage BELOW              0       0.00%                        |
|    In common storage ABOVE              82      58.99%                        |
|    In common storage BELOW              56      40.28%                        |
|                                                                               |
|    Execution in AMODE 24                 0       0.00%                        |
|    Execution in AMODE 31               139     100.00%                        |
|    Execution in AMODE 64                 0       0.00%                        |
|                                                                               |
+-------------------------------------------------------------------------------+
```

C02 - CPU usage by module

Overview

This report analyzes measured CPU consumption. It attributes CPU consumption to load modules.

In addition, any execution measured at locations for which no load module name could be determined is attributed to hexadecimal address ranges.

A sample report as it is initially displayed, with no expansion, is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
C02: CPU Usage by Module (0656/TSTJOB01)                    Row 00001 of 00207
Command ===> _____________________________________________ Scroll ===> CSR

Name      Description        Percent of CPU time * 10.00%  ±1.1%
                                 *....1....2....3....4....5....6....7....8
ISRSUPC   Application Progr 39.34 ====================
C0020     Application Progr 14.57 =======
IGG0193B  QSAM/BSAM Process  3.57 ==
IGDDCFSR  Storage Managemen  3.25 ==
ISPMAIN   Application Progr  2.66 =
C0325     Application Progr  2.47 =
ISPSUBS   Application Progr  2.44 =
C0200     Application Progr  2.16 =
IOSVSSCQ  Nucleus Routine    1.99 =
IAXPQ     Nucleus Routine    1.94 =
IAXVF     Nucleus Routine    1.83 =
IAXVP     Nucleus Routine    1.58 =
IEAVESVC  Supervisor Contro  1.56 =
IECVEXCP  Execute channel p  1.48 =
C0399     Application Progr  1.38 =
C0310     Application Progr  0.92
```

Detail line descriptions

Each line represents a System Object – an object to which measured activity is attributed. These lines are arranged hierarchically. You can expand a line (using the "+" line command) to reveal a breakdown into subordinate objects. Each type of object shown in this report is described here:

Load Module

Name Column the load module name appears under this heading.

Description Column
If a DPA functional description is found for the module name, it is reported under this heading. Otherwise "Application Program" is displayed.

CSECT (Control Section)
These lines can appear as subordinate, breakdown items under a load module line. If Application Performance Analyzer was able to find ESD (External Symbol Dictionary) information, during the measurement process, for a load module, these items will appear under the load module and the measured activity will be attributed to them.

A sample report with the second hierarchical level (CSECT) displayed is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C02: CPU Usage by Module (0656/TSTJOB01)                    Row 00005 of 00220
Command ===> _____________________________________________ Scroll ===> CSR

Name      Description        Percent of CPU time * 2.50%  ±1.1%
                                *....1....2....3....4....5....6....7....8....9
ISPMAIN   Application Progr  2.66 =====
→ ISPMBP    CSECT in ISPMAI  1.26 ===
→ ISPMBX    CSECT in ISPMAI  0.52 =
→ ISPMOB    CSECT in ISPMAI  0.37 =
→ ISPMBW    CSECT in ISPMAI  0.32 =
→ ISPMUL    CSECT in ISPMAI  0.07
→ ISPMRO    CSECT in ISPMAI  0.05
→ ISPMCO    CSECT in ISPMAI  0.01
→ ISPMTB    CSECT in ISPMAI  0.01
→ ISPMUX    CSECT in ISPMAI  0.01
→ ISPMBY    CSECT in ISPMAI  0.01

C0325  Application Progr     2.47 =====
→ C0325  CSECT in C03        2.47 =====

ISPSUBS   Application Progr  2.44 =====
C0200  Application Progr     2.16 ====
```

Name Column
The CSECT name appears under this heading.

Description Column
This will display “CSECT in xxxxxxxx” where xxxxxxxx is the name of the load module to which the CSECT belongs.

Unresolved Address
This item attributes measurement activity to a range of addresses for which a corresponding load module name could not be determined.

Name Column
Activity observed in a 4096 (4K) byte range of addresses is reported in an Unresolved Address line. This range is expressed in the format “HHHHHxxx” where HHHHH are the 5 high order hexadecimal digits of the address. For example: '08915xxx' means the range from 08915000 to 08915FFF.

Description Column
“Unresolved Address” appears under this heading.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a “/” on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Load Module, CSECT, Unresolved Address	Display context help information.
++	Load Module, CSECT, Unresolved Address	Show additional details.
+	Load Module	Expand to reveal next level.
–	Load Module	Collapse to hide next level.
M	Load Module, CSECT	Display load module information.

Cmd	When Applied To Object	Action
P	Load Module, CSECT	Display source program mapping.
C09	Load Module, CSECT, Unresolved Address	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-----------------------------------------------------------------------------+
|                                                                More:     +    |
| +--------------- The following report line was selected ---------------+    |
| | IDA019L1  Virtual I/O (VIO) 16.53 OOOOOOOO                            |    |
| +-----------------------------------------------------------------------+    |
|                                                                              |
| Calculation Details                                                          |
|    CPU measurements                          215                             |
|    In load module                            IDA019L1                        |
|    Total CPU measurements                    1,300                           |
|    Percent in category                       16.53%                          |
|                                                                              |
|                                                                              |
| Processor states for the CPU usage measurements                              |
|                                                                              |
|                                      Nbr of                                  |
|    Processor State                   Samples  Percentage                     |
|                                                                              |
|    Storage key 8                         215     100.00%                     |
|                                                                              |
|    Problem state                         215     100.00%                     |
|    Supervisor state                        0       0.00%                     |
|                                                                              |
|    Execution in SVC                        0       0.00%                     |
|                                                                              |
|    Execution in real-mode                  0       0.00%                     |
|                                                                              |
|    Primary-space mode                    215     100.00%                     |
|    Access-register mode                    0       0.00%                     |
|    Secondary-space mode                    0       0.00%                     |
|    Home-space mode                         0       0.00%                     |
|                                                                              |
|    Execution on processor 0              118      54.88%                     |
|    Execution on processor 1               97      45.11%                     |
|                                                                              |
|    In private storage ABOVE                0       0.00%                     |
|    In private storage BELOW                0       0.00%                     |
|    In common storage ABOVE               215     100.00%                     |
|    In common storage BELOW                 0       0.00%                     |
|                                                                              |
|    Execution in AMODE 24                   0       0.00%                     |
|    Execution in AMODE 31                 215     100.00%                     |
|    Execution in AMODE 64                   0       0.00%                     |
|                                                                              |
+-----------------------------------------------------------------------------+
```

SETUP options

The following SETUP option can be selected with the SETUP primary command:

Minimum CPU percentage
: You can set this option to eliminate modules where the CPU percentage is below a certain threshold.

C03 - CPU usage by code slice

Overview

This report attributes CPU usage to Code Slices. A code slice is a range of storage addresses containing executable object code. You can use this report to pinpoint the exact locations of hot spots – segments of code where CPU consumption is particularly high. You can use SETUP to adjust the resolution of the report by varying the size of the code slice.

Two types of detail line are shown:

- Code Slice
- Code Address

Initially, only the Code slice lines are visible. You can expand a Code Slice line (using the "+" line command) to reveal its subordinate Code Address lines. Initially, report lines are arranged in descending sequence by CPU activity. The most active items appear at the top. You can also sort by address by entering the "SA" line command either on the Address title field or on one of the first level report line address fields.

A sample report, as it is initially displayed, is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C03: CPU Usage by Code Slice (0656/TSTJOB01)                 Row 00001 of 01127
Command ===> ____________________________________________________ Scroll ===> CSR

Address   Size  Location           Percent of CPU time * 10.00%  ±1.1%
                                   *....1....2....3....4....5....6....7....8..
00D0B1F0    64  ASMFPSRH+0A80  20.90 ===========
08A45CC0    64  C0020+1CC0      3.50 ==
00D0D000    64  ASMFRDLN+0080   3.23 ==
00D0F480    64  ASMFRDLN+2500   3.09 ==
08A45300    64  C0020+1300      2.21 =
```

If you wanted to expand, for example, the third line, enter the "+" line command:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C03: CPU Usage by Code Slice (0656/TSTJOB01)                 Row 00001 of 01127
Command ===> ____________________________________________________ Scroll ===> CSR

Address   Size  Location           Percent of CPU time * 10.00%  ±1.1%
                                   *....1....2....3....4....5....6....7....8..
00D0B1F0    64  ASMFPSRH+0A80  20.90 ===========
08A45CC0    64  C0020+1CC0      3.50 ==
+0D0D000    64  ASMFRDLN+0080   3.23 ==
00D0F480    64  ASMFRDLN+2500   3.09 ==
08A45300    64  C0020+1300      2.21 =
```

The subordinate Code Address lines would then be displayed:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C03: CPU Usage by Code Slice (0656/TSTJOB01)                 Row 00001 of 01131
Command ===> ____________________________________________________ Scroll ===> CSR

Address   Size  Location           Percent of CPU time * 10.00%  ±1.1%
                                   *....1....2....3....4....5....6....7....8..
00D0B1F0    64  ASMFPSRH+0A80  20.90 ===========
08A45CC0    64  C0020+1CC0      3.50 ==
00D0D000    64  ASMFRDLN+0080   3.23 ==
→ 00D0D000      ASMFRDLN+0080   2.30 =
→ 00D0D026      ASMFRDLN+00A6   0.51
→ 00D0D036      ASMFRDLN+00B6   0.42

00D0F480    64  ASMFRDLN+2500   3.09 ==
```

Remember, you can also expand an entire report by typing "+" on the first heading, in this report it would be the Address heading.

Detail line descriptions

Code Slice

This line represents a block (or "slice") of contiguous bytes of object code for which CPU execution is quantified. The number of times CPU execution was observed within this block is expressed as a percentage of the total number of CPU execution observations.

The hexadecimal address of the beginning of the slice is shown under the Address heading. The size of the slice, in bytes, is shown under the Size heading. If possible, the address of the beginning of the slice is expressed in the form CSECT+offset, or Module+offset, under the Location heading.

Source program mapping can be accessed from this line by entering a "p" line command.

Code Address

These lines are displayed as subordinate lines under the appropriate Code Slice line and show individual addresses at which execution was observed. The number of times execution was observed at such an address is expressed as a percentage of the total number of CPU execution observations.

Source program mapping can be accessed from this line by entering a "p" line command.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to view a pop-up menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Code Slice, Code Address	Display context help information.
++	Code Slice, Code Address	Show additional details.
+	Code Slice	Expand to reveal next level.
–	Code Slice	Collapse to hide next level.
SV	Code Slice	Sort next level by value.
SA	Code Slice	Sort next level by address.
M	Code Slice	Display load module information.
P	Code Slice, Code Address	Display source program mapping.
C09	Code Slice, Code Address	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Address, Size, Percent CPU	Display context help information.
+	Address	Expand to reveal all entries.
+	Percent CPU	Zoom in scale.
–	Address	Collapse to show only first level.
–	Percent CPU	Zoom out scale.

Cmd	When Applied To Object	Action
SV	Address	Sort next level by value.
SA	Address	Sort next level by address.

SETUP options

The following SETUP options can be selected with the SETUP primary command:

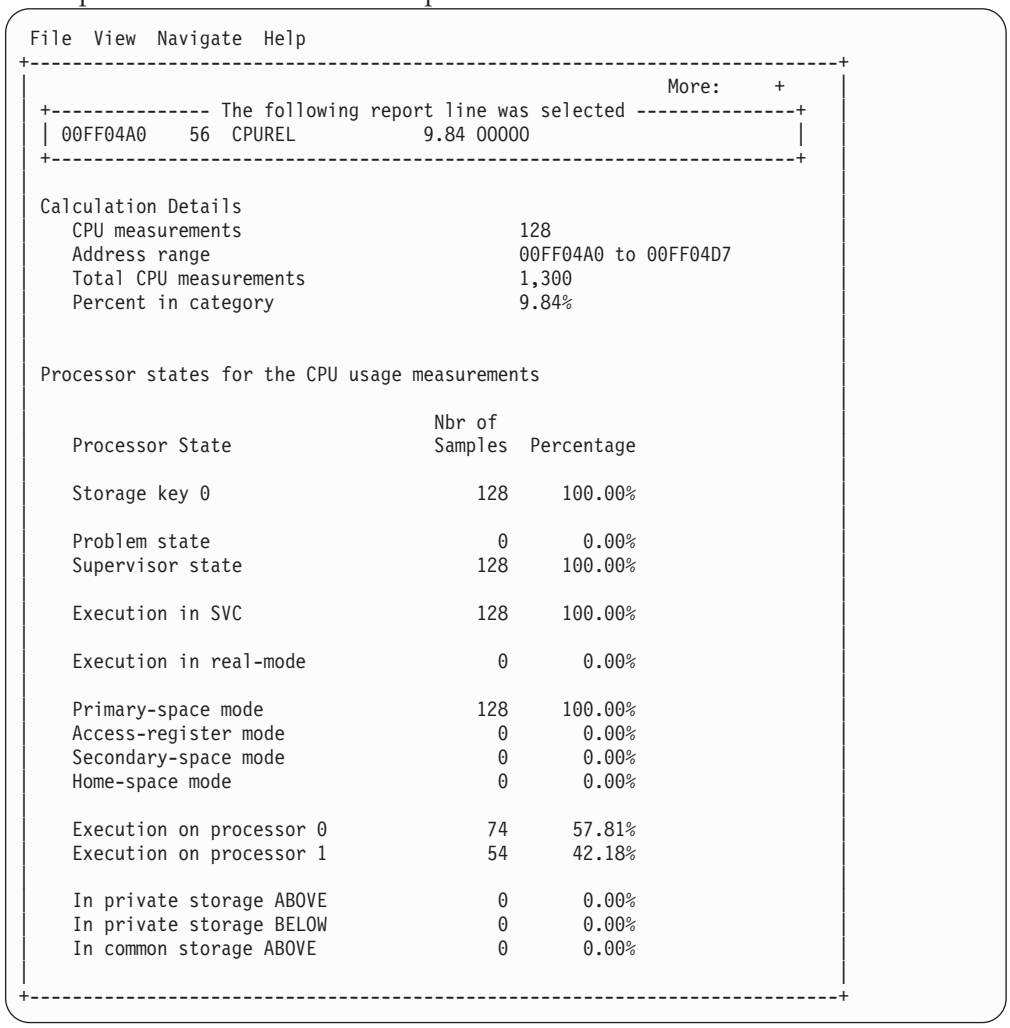
Code slice size
Use this to adjust the size of the Code Slice to be reported.

Minimum CPU percentage
You can set this option to eliminate Code Slice entries from the report, where the CPU percentage is below a certain threshold.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:



C04 - CPU usage timeline

Overview

This timeline analysis breaks the observation session duration into a number of (approximately) fixed-length, chronological time intervals. Each line represents one of these intervals. By default, 15 intervals are reported, each representing approximately the same number of samples. This illustrates any progressive CPU usage trends, such as blocks of intensive consumption or long periods of waits. The percentage value and the graph quantify CPU usage for an interval. The percentage is derived by dividing the number of samples CPU activity was observed by the number of samples in the interval. This, effectively, is the percentage of time the CPU was executing instructions.

A sample CPU Usage Timeline report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
C04: CPU Usage Timeline (0656/TSTJOB01)                      Row 00001 of 00015
Command ===> ____________________________________________ Scroll ===> CSR

SEQN    Seconds  Sig    Percent of Interval * 10.00%  ±1.1%
                         *....1....2....3....4....5....6....7....8....9....*
0001     10.324  69% 19.08 ========
0002      9.114  64% 49.55 ======================
0003      8.667  70% 70.82 ==================================
0004      9.153  83% 43.65 ====================
0005      9.161  77% 39.36 =================
0006      9.094  70% 35.46 ===============
0007      8.791  75% 41.95 ==================
0008      7.424  89% 12.18 =====
0009      6.988  76% 63.63 ============================
0010      6.741  71% 64.83 ============================
0011      6.475  75% 70.12 ==============================
0012      6.467  73% 68.43 ============================
0013      6.465  71% 67.03 ============================
0014      6.422  75% 70.42 ==============================
0015      6.446  72% 64.60 ============================
```

Detail line descriptions

Each line represents reports values under the following headings:

- SEQN
- Seconds
- Sig

SEQN This is the sequence number of the interval. Intervals are numbered 0001, 0002, etc. You can create a subset of report C01, C02, or C03 from this line by entering the report code as a line command. A pop-up window of the report will be displayed, and the subset of data used for the report will be the samples from this interval.

Seconds
This is the duration of the interval in seconds.

Sig This quantifies the significance of the measurement for the interval. This is the percentage of samples in the interval the address space was not Queued – either CPU consumption or WAIT state was observed.

Subset reports

This report can generate subset reports for any detail line. By entering a report code on a detail line, a pop-up subset report is displayed for this item. The item selected is scaled to 100 percent. The available subset reports are listed below in "Line commands, on objects."

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

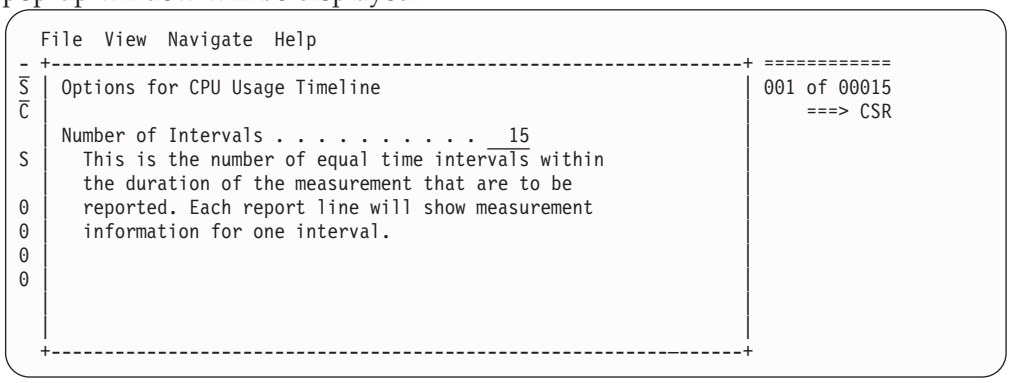
on objects

Cmd	When Applied To Object	Action
?	SEQN (sampling interval)	Display context help information.
++	SEQN (sampling interval)	Show additional details.
C01	SEQN (sampling interval)	Display C01 report subset.
C02	SEQN (sampling interval)	Display C02 report subset.
C03	SEQN (sampling interval)	Display C03 report subset.
C09	SEQN (sampling interval)	Display C09 report subset.

This report does not have any line commands on headings.

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:

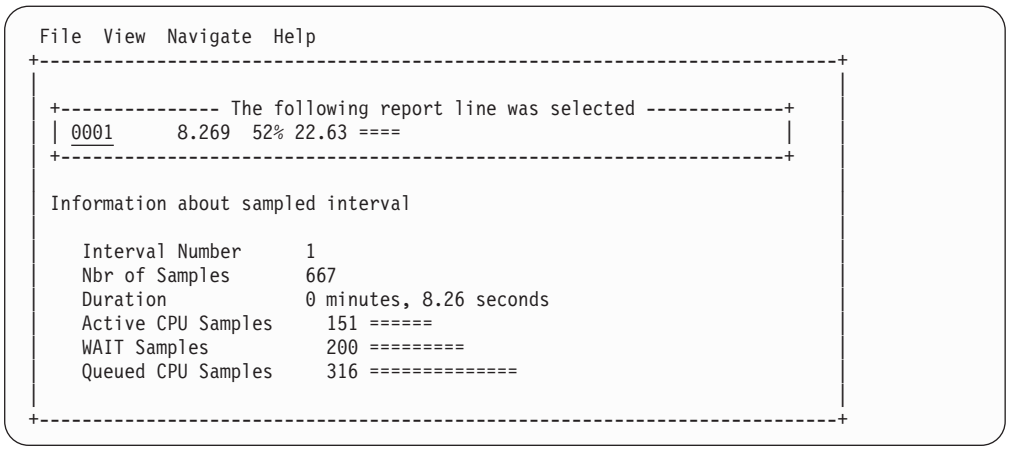


Number of Intervals
Use this option to change the number of equal time intervals that are reported.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:



C05 - CPU usage by task/category

Overview

This report analyzes measured CPU consumption. It shows, for each Task (TCB), the percentage of the total CPU time measured in that Task. Under each task, this information is shown under the following general categories:

APPLCN
Application Code

SYSTEM
System/OS Services

DATAMG
Data Management (DASD) Requests

DB2SQL
SQL Processing

IMSDLI
IMS DL/I Calls

IMSDLI
IMS DL/I Calls

ADABAS
Adabas requests

In addition, any activity observed at locations for which no load module name could be determined is attributed to a category:

NOSYMB
No Module Name Found

A sample report is shown below. When the report is first displayed, only the top level of the hierarchy (Tasks) is visible. Often there will only be one task, however this example has many. To expand a task to show the next hierarchical level, you can type the "+" line command on the detail line. You can also enter the "+" line command on the Name heading to expand the entire report to show all detail lines in all hierarchical levels.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C05: CPU Usage by Task/Category (0711/TSTJOB01)              Row 00001 of 00041
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description         Percent of CPU time * 10.00%  ±3.8%%
                                      *....1....2....3....4....5....6....7....8.
DFHKETCB-007 TCB=008DAD90       52.19  =========================
DFHKETCB-001 TCB=008DA6B8       32.07  ================
DFHKETCB-012 TCB=008C2068       13.16  ======
DFHKETCB-008 TCB=008DAA68        2.57  =
IEAVAR00-002 TCB=008FE0A8        0.00
IEAVTSDT-003 TCB=008FFE88        0.00
DFSPAT00-024 TCB=008BC210        0.00
DFSPAT00-025 TCB=008B9E88        0.00
DFHSIP-005   TCB=008F69F8        0.00
DFSPAT00-026 TCB=008B9CD8        0.00
DFHKETCB-009 TCB=008C2E88        0.00
DFSPAT00-027 TCB=008B9A30        0.00
DFHKETCB-011 TCB=008C2750        0.00
DFSPAT00-028 TCB=008B9788        0.00
CSQCSERV-014 TCB=008BDE88        0.00
DFSPAT00-029 TCB=008B94E0        0.00
CSQCSERV-016 TCB=008BDA60        0.00
```

Detail line descriptions

Each line represents a System Object – an object to which CPU time is attributed. These lines are arranged hierarchically. You can expand a line (using the "+" line command) to reveal a breakdown into subordinate objects. Each type of object shown in this report is described here:

Task This is the highest level object in the report. Each active Task is reported. The percentage of the total measured CPU time which was measured in this Task is reported. A SETUP option is available which specifies that all Tasks – including inactive tasks – are to be displayed.

Name Column
The name of the program specified in the ATTACH macro that started the task as well as the TCB index number is shown.

Description Column
The TCB address is shown. For CICS measurements that have the CICS data extractor selected, the TCB mode is displayed for CICS TCBs. This immediately follows the TCB address.

Category
Activity within a Task is categorized as APPLCN, SYSTEM, DATAMG, DB2SQL, IMSDLI, ADABAS or NOSYMB.

DPA Group
Within a category – usually the SYSTEM category – load modules can be further arranged into Descriptive Program Attribution (DPA) groups. These are functional groups like: IMS, DB2, MVS, SVC, etc. By entering a "+" on the SYSTEM category line:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C05: CPU Usage by Task/Category (0711/TSTJOB01)              Row 00001 of 00045
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description         Percent of CPU time * 10.00%  ±3.8%
                                      *....1....2....3....4....5....6....7....8.
DFHKETCB-007 TCB=008DAD90       52.19  ==========================
→ +YSTEM       System/OS Servic 52.19  ==========================
→ APPLCN       Application Code  0.00
→ DATAMG       Data Mgmt Proces  0.00
```

The list of objects in this category is expanded to the next level of the hierarchy to include DPA groups:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C05: CPU Usage by Task/Category (0711/TSTJOB01)              Row 00001 of 00048
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description         Percent of CPU time * 10.00%  ±3.8%
                                      *....1....2....3....4....5....6....7....8.
DFHKETCB-007 TCB=008DAD90       52.19  ==========================
→ SYSTEM       System/OS Servic 52.19  ==========================
  → SVC          SVC Routines   51.13  ==========================
  → CICS         CICS Subsystem  0.60
  → MVS          MVS System     0.45
→ APPLCN       Application Code  0.00
→ DATAMG       Data Mgmt Proces  0.00
```

Note: Note Using the SETUP primary command, you can specify aggregation of modules into Group or Subgroup. Subgroup offers a more granular, less inclusive categorization than Group.

In this sample screen Subgroup has been selected in SETUP, note that the SVC group has now been replaced with SVC subgroups (a subgroup for each SVC type.)

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C05: CPU Usage by Task/Category (0711/TSTJOB01)              Row 00001 of 00014
COmmand ===> _____________________________________________ Scroll ===> CSR

Name         Description         Percent of CPU time * 10.00%  ±3.8%
                                      *....1....2....3....4....5....6....7....8.
DFHKETCB-007 TCB=008DAD90       52.19  ==========================
→ SYSTEM       System/OS Servic 52.19  ==========================
  → SVCTYPE1     Type 1 System  24.81  ============
  → SVCTYPE2     Type 2 System  14.22  =======
  → SVCTYPE4     Type 4 System   7.11  ===
  → SVCTYPE3     Type 3 System   4.99  ==
  → CICS        CICS Subsystem   0.60
  → MVS          MVS System     0.45
→ APPLCN       Application Code  0.00
→ DATAMG       Data Mgmt Proces  0.00
```

Name Column

The symbolic name of the Group/Subgroup appears under this heading.

Description Column

A Group/Subgroup description appears under this heading.

Load Module

A load module line appears under a Group/Subgroup line, under a Category line, or under an SVC line.

For example, to see the load modules under the Group/Subgroup line MVS, enter "+" on the MVS object:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C05: CPU Usage by Task/Category (0711/TSTJOB01)              Row 00001 of 00014
COmmand ===> _____________________________________________ Scroll ===> CSR

Name         Description         Percent of CPU time * 10.00%  ±3.8%
                                      *....1....2....3....4....5....6....7....8.
DFHKETCB-007 TCB=008DAD90       52.19  ==========================
→ SYSTEM       System/OS Servic 52.19  ==========================
  → SVCTYPE1     Type 1 System  24.81  ============
  → SVCTYPE2     Type 2 System  14.22  ======
  → SVCTYPE4     Type 4 System   7.11  ===
  → SVCTYPE3     Type 3 System   4.99  ==
  → CICS         CICS Services   0.60
  → +VS          MVS Services    0.45
→ APPLCN       Application Code  0.00
→ DATAMG       Data Mgmt Proces  0.00
```

The MVS Group has now been expanded to show load modules in the next hierarchical level:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C05: CPU Usage by Task/Category (0711/TSTJOB01)              Row 00001 of 00016
COmmand ===> _____________________________________________ Scroll ===> CSR

Name         Description         Percent of CPU time * 10.00%  ±3.8%
                                      *....1....2....3....4....5....6....7....8.
DFHKETCB-007 TCB=008DAD90       52.19  ==========================
→ SYSTEM       System/OS Servic 52.19  ==========================
  → SVCTYPE1     Type 1 System  24.81  ============
  → SVCTYPE2     Type 2 System  14.22  ======
  → SVCTYPE4     Type 4 System   7.11  ===
  → SVCTYPE3     Type 3 System   4.99  ==
  → CICS         CICS Services   0.60
  → +VS          MVS Services    0.45
    → IGG0CLA0     Data Managem  0.30
    → IGVVSM31     Virtual Stor  0.15
```

Name Column

The load module name appears under this heading.

Description Column

If a DPA functional description is found for the module name, it is reported under this heading. Otherwise "Application Program" is displayed.

CSECT (Control Section)

These lines can appear as subordinate, breakdown items under a load module line. If Application Performance Analyzer was able to find ESD (External Symbol Dictionary) information, during the measurement process, for a load module, these items will appear under the load module and the measured activity will be attributed to them.

Name Column

The CSECT name appears under this heading.

Description Column
This will display "CSECT in xxxxxxxx" where xxxxxxxx is the name of the load module to which the CSECT belongs.

Source program mapping can be accessed from this line by entering a "p" line command.

SVC (Supervisor Call)
This line shows attribution of measured activity during execution of an MVS Supervisor Call.

Name Column
"SVC" followed by a 3-digit decimal SVC number (000 to 255) appears under this heading. For example, "SVC120."

Description Column
A description of the SVC service, or the name of the macro which invokes the SVC appears under this heading. For example: "GETMAIN/FREEMAIN."

DDNAME
These lines appear under the DATAMG category and indicate the DDNAME of a file to which CPU usage is attributed. The quantification indicates CPU time consumed in data management routines.

Data Management Request
These lines appear under DDNAME lines and show a further breakdown of CPU usage for the DDNAME to the specific I/O request statements.

SQL Statement
This item attributes measured activity to a DB2 SQL statement.

Name Column
A sequence number is assigned to each unique SQL statement observed during the measurement. This sequence number is shown in the name field. It is possible for some sequence numbers to be missing (sequence gaps) from the report. This will occur if a sequence number was assigned to SQL statements but no CPU activity was measured for these statements.

Description Column
The name of the program that issued the SQL request followed by the precompiler statement number (enclosed in parentheses) is shown here. This is followed by the SQL function (e.g. SELECT, INSERT, COMMIT).

DL/I Call
This item attributes measured activity to an IMS DL/I call.

Name Column
A sequence number is assigned to each unique DL/I call statement observed during the measurement. This sequence number is shown in the name field.

Description Column
The DL/I function code appears followed by the PCB name followed by the relative PCB number in parentheses. The location of the call. in *csect+offset* format, follows.

Adabas Call
This item attributes measured activity to an Adabas call.

Name Column
A sequence number is assigned to each unique Adabas call statement observed during the measurement. This sequence number is shown in the name field.

Description Column
The name of the program that issued the Adabas request and the offset within the program, followed by the Adabas command code that was issued, is displayed in this field.

Unresolved Address
This item attributes measurement activity to a range of addresses for which a corresponding load module name could not be determined.

Name Column
Activity observed in a 4096 (4K) byte range of addresses is reported in an Unresolved Address line. This range is expressed in the format "HHHHHxxx" where HHHHH are the 5 high order hexadecimal digits of the address. For example: "08915xxx" means the range from 08915000 to 08915FFF.

Description Column
"Unresolved Address" appears under this heading.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Task, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call	Display context help information.
++	Task, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call	Show additional details.
+	Task, Category, Load Module, SVC SQL command, DLI call, Adabas call	Expand to reveal next level.
–	Task, Category, Load Module, SVC SQL command, DLI call, Adabas call	Collapse to hide next level.
SV	Task, Category, SVC, SQL command, DLI call, Adabas call	Sort next level by value.
SN	Task, Category, SVC, SQL command, DLI call, Adabas call	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	Load Module, CSECT, SQL command, DLI call, Adabas call	Display source program mapping.
C09	Category, Load Module, SVC, CSECT, SQL command, Unresolved Address, DLI call, Adabas call	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

SETUP options

The following SETUP options can be selected with the SETUP primary command:

Reporting by Group / SubGroup
This option allows you to aggregate modules into Group or SubGroup. SubGroup offers a more granular, less inclusive categorization than Group. For example, when reporting by Group, all SVCs would be reported under the "SVC" Group. When reporting by SubGroup, SVCs would be reported under SubGroups such as SVCTYPE1, SVCTYPE2, etc.

Include inactive tasks
You can choose to include or eliminate inactive tasks from the report. An inactive task is one for which there were no observations of CPU consumption.

Show the DB2SQL category
You can choose to show the DB2SQL category in which CPU time attributed to SQL processing is shown.

Show the DATAMG category
This shows activity attributed to data management functions, which include basic access functions such as READ and WRITE. Processing of OPEN and CLOSE functions is not included in this category. If it is not selected, the activity will instead be included in the appropriate system modules in the SYSTEM category.

Show the IMSDLI category
This shows activity attributed to IMS DLI calls. If it is not selected, the activity will instead be included in the appropriate system modules in the SYSTEM category.

Show the ADABAS category
This shows activity attributed to Adabas requests. If it is not selected, the activity will instead be included in the appropriate system modules in the SYSTEM category.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                  More:     +  |
|  +--------------- The following report line was selected ---------------+     |
|  |   > CAZ00080     Application Pr  4.73 OO                            |     |
|  +---------------------------------------------------------------------+     |
|                                                                               |
|  Calculation Details                                                          |
|     CPU measurements                          34                              |
|     In load module                            CAZ00080                        |
|     Total CPU measurements                    718                             |
|     Percent in category                       4.73%                           |
|                                                                               |
|                                                                               |
|  Processor states for the CPU usage measurements                              |
|                                                                               |
|                                      Nbr of                                   |
|     Processor State                  Samples  Percentage                      |
|                                                                               |
|     Storage key 0                         34     100.00%                      |
|                                                                               |
|     Problem state                          0       0.00%                      |
|     Supervisor state                      34     100.00%                      |
|                                                                               |
|     Execution in SVC                       0       0.00%                      |
|                                                                               |
|     Execution in real-mode                 0       0.00%                      |
|                                                                               |
|     Primary-space mode                    34     100.00%                      |
|     Access-register mode                   0       0.00%                      |
|     Secondary-space mode                   0       0.00%                      |
|     Home-space mode                        0       0.00%                      |
|                                                                               |
|     Execution on processor 0              10      29.41%                      |
|     Execution on processor 1              24      70.58%                      |
|                                                                               |
|     In private storage ABOVE              34     100.00%                      |
|     In private storage BELOW               0       0.00%                      |
|     In common storage ABOVE                0       0.00%                      |
|     In common storage BELOW                0       0.00%                      |
|                                                                               |
|     Execution in AMODE 24                  0       0.00%                      |
|     Execution in AMODE 31                 34     100.00%                      |
|     Execution in AMODE 64                  0       0.00%                      |
|                                                                               |
+-------------------------------------------------------------------------------+
```

C06 - CPU usage by task/module

Overview

This report analyzes measured CPU consumption. It shows, for each Task (TCB), the percentage of the total CPU time measured in that Task. Under each task, a further breakdown of CPU consumption is shown by load modules.

In addition, any execution measured at locations for which no load module name could be determined is attributed to hexadecimal address ranges.

Detail line descriptions

Each line represents a System Object, an object to which measured activity is attributed. These lines are arranged hierarchically. You can expand a line (using the "+" line command) to reveal a breakdown into subordinate objects. Each type of object shown in this report is described here:

Task This is the highest level object in the report. Each active Task is reported.

The percentage of the total measured CPU time which was measured in this Task is reported. A SETUP option is available which specifies that all Tasks - including inactive tasks - are to be displayed.

Name Column
The name of the program specified in the ATTACH macro that started the task as well as the TCB index number is shown.

Description Column
The TCB address is shown. For CICS measurements that have the CICS data extractor selected, the TCB mode is displayed for CICS TCBs. This immediately follows the TCB address.

Load Module

Name Column
The load module name appears under this heading.

Description Column
If a DPA functional description is found for the module name, it is reported under this heading. Otherwise "Application Program" is displayed.

CSECT (Control Section)
These lines can appear as subordinate, breakdown items under a load module line. If Application Performance Analyzer was able to find ESD (External Symbol Dictionary) information, during the measurement process, for a load module, these items will appear under the load module and the measured activity will be attributed to them.

Name Column
The CSECT name appears under this heading.

Description Column
This will display "CSECT in xxxxxxxx" where xxxxxxxx is the name of the load module to which the CSECT belongs.

Unresolved Address
This item attributes measurement activity to a range of addresses for which a corresponding load module name could not be determined.

Name Column
Activity observed in a 4096 (4K) byte range of addresses is reported in an Unresolved Address line. This range is expressed in the format "HHHHHxxx" where HHHHH are the 5 high order hexadecimal digits of the address. For example: "08915xxx" means the range from 08915000 to 08915FFF.

Description Column
"Unresolved Address" appears under this heading.

Sample reports

A sample report is shown below. When the report is first displayed, only the top level of the hierarchy (Tasks) is visible. Often there will only be one task, however this example has many. To expand a task to show the next hierarchical level, you can type the "+" line command on the detail line. You can also enter the "+" line command on the Name heading to expand the entire report to show all detail lines in all hierarchical levels.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
C06: CPU Usage by Task/Module (0711/TSTJOB01)                Row 00001 of 00021
Command ===> ____________________________________________________ Scroll ===> CSR

Name         Description         Percent of CPU time * 10.00%  ±2.3%%
                                      *....1....2....3....4....5....6....7....8.
PMSEL-012    TCB=008B8318       46.65  ======================
ISPTASK-008  TCB=008B8D90       11.87  ======
PMSEL-021    TCB=008B8318       11.18  ======
ISPF-007     TCB=008E1190       10.70  =====
EXEC-017     TCB=008B8A50        5.13  ===
EX-018       TCB=008B8A50        3.21  ==
CALL-014     TCB=008A0B50        2.51  =
CALL-011     TCB=008A0130        1.92  =
CALL-020     TCB=008A0130        1.76  =
EX-010       TCB=008B8B48        1.28  =
EXEC-013     TCB=008A0E68        1.07  =
ALTLIB-019   TCB=008A00F0        0.96
ALTLIB-015   TCB=008A00F0        0.90
FREE-016     TCB=008A00F0        0.80
IEAVAR00-001 TCB=008FE0A8        0.00
IEAVTSDT-002 TCB=008FFE88        0.00
IEESB605-003 TCB=008FFBF8        0.00
```

Here is a sample with the first task fully expanded: Line commands:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
C06: CPU Usage by Task/Module (0694/TSTJOB01)                Row 00001 of 01111
Command ===> ____________________________________________________ Scroll ===> CSR

Name         Description         Percent of CPU time * 10.00%  ±2.3%%
                                      *....1....2....3....4....5....6....7....8.
PMSEL-012 TCB=008B8318          46.65  ======================
→ C0200     Application Prog     9.84  ====
  → C0200     CSECT in C0        9.84  ====
→ C0020     Application Prog     7.86  ==
  → C0020     CSECT in C0        7.86  ==
→ BKNCESUP    Application Prog   2.88  =
  → BKNCESUP    CSECT in BKNCE   2.35  =
  → BKNSTFMT    CSECT in BKNCE   0.53
→ IGDDCFSR    Storage manageme   2.30  =
→ IAXVF       Nucleus Routrine   2.08  =
  → IARVFRMN    Real storage m   2.08  =
→ C0010     Application Prog     1.65  =
  → C0010     CSECT in C0        1.65  =
→ IAXVP       Nucleus Routine    1.33  =
  → IARVPGTI    Real storage m   1.33  =
→ IGWLHHLS    DFSMS              0.96
  → IGWLHRLS    DFSMS            0.32
  → IGWLHAJB    DFSMS            0.16
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Task, Load Module, CSECT, Unresolved Address	Display context help information.
++	Task, Load Module, CSECT, Unresolved Address	Show additional details.

Cmd	When Applied To Object	Action
+	Task, Load Module	Expand to reveal next level.
–	Task, Load Module	Collapse to hide next level.
SV	Task	Sort next level by value.
SN	Task, Category	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	Load Module, CSECT	Display source program mapping.
C09	Load Module, CSECT, Unresolved Address	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent CPU	Zoom out scale.
SV	Name, Description, Percent CPU	Sort next level by value.
SN	Name, Description, Percent CPU	Sort next level by name.

SETUP options

The following SETUP option can be selected with the SETUP primary command:

Include inactive tasks
You can choose to include or eliminate inactive tasks from the report. An inactive task is one for which there were no observations of CPU consumption.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------+
|                                                          More:     +    |
| +--------------- The following report line was selected ---------------+ |
| |   > CAZ00080     Application Pr  4.73 OO                            | |
| +-------------------------------------------------------------------+ |
|                                                                         |
| Calculation Details                                                     |
|    CPU measurements                          34                         |
|    In load module                            CAZ00080                   |
|    Total CPU measurements                    718                        |
|    Percent in category                       4.73%                      |
|                                                                         |
|                                                                         |
| Processor states for the CPU usage measurements                         |
|                                                                         |
|                                      Nbr of                             |
|    Processor State                   Samples  Percentage                |
|                                                                         |
|    Storage key 0                          34     100.00%                |
|                                                                         |
|    Problem state                           0       0.00%                |
|    Supervisor state                       34     100.00%                |
|                                                                         |
|    Execution in SVC                        0       0.00%                |
|                                                                         |
|    Execution in real-mode                  0       0.00%                |
|                                                                         |
|    Primary-space mode                     34     100.00%                |
|    Access-register mode                    0       0.00%                |
|    Secondary-space mode                    0       0.00%                |
|    Home-space mode                         0       0.00%                |
|                                                                         |
|    Execution on processor 0               10      29.41%                |
|    Execution on processor 1               24      70.58%                |
|                                                                         |
|    In private storage ABOVE               34     100.00%                |
|    In private storage BELOW                0       0.00%                |
|    In common storage ABOVE                 0       0.00%                |
|    In common storage BELOW                 0       0.00%                |
|                                                                         |
|    Execution in AMODE 24                   0       0.00%                |
|    Execution in AMODE 31                  34     100.00%                |
|    Execution in AMODE 64                   0       0.00%                |
|                                                                         |
+-------------------------------------------------------------------------+
```

C07 - CPU usage by procedure

Usage

Use this report to see quantification of CPU usage at the source program procedure level.

Quantification

Each report line quantifies CPU usage as a percentage. Each percentage represents the ratio of CPU consumption observed for the reported item to the total CPU consumption measured in the address space.

Detail line hierarchy

C07 displays detail lines at a single level. Up to four types of detail lines are reported.

```
Level 1  Source Procedure
Level 1  Source Procedure
Level 1  Source Procedure
```

```
...
Level 1  APPLCN Category
Level 1  SYSTEM Category
Level 1  NOSYMB Category
```

Detail line descriptions

Source procedure detail line

This identifies a source program procedure and quantifies CPU usage attributed to the procedure. The source procedure detail lines are displayed only when the source program or programs are mapped and loaded. There are two ways to map and load the source program. You can use the A01 panel, or you can open any other Application Performance Analyzer report that supports the 'P' line command and use the 'P' line command to map and load the source before opening the C07 report. When the source is mapped and loaded, the source procedure details lines are displayed and the source can be viewed using the 'P' line command. See Chapter 10, "Source program mapping," on page 569 for more details.

Under Heading	This is Displayed
Program	The name of the CSECT in the module containing the source procedure.
Procedure Name	The name of the source procedure.
Percent of CPU Time	The percentage of CPU time consumed during execution in the source procedure.

APPLCN Category detail line

Any execution measured in application programs that could not be associated with a source program procedure is quantified in this detail line. No further breakdown of this category is reported. Use report C01 to see further details.

SYSTEM Category detail line

Any execution measured in system programs that could not be associated with a source program procedure is quantified in this detail line. No further breakdown of this category is reported. Use report C01 to see further details.

NOSYMB Category detail line

Any execution measured at addresses that could not be associated with a load module is quantified in this detail line. No further breakdown of this category is reported. Use report C01 to see further details.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
C07: CPU Usage by Procedure (0757/TSTJOB01)                  Row 00001 of 00009
Command ===> ____________________________________________________ Scroll ===> CSR

Program   Procedure Name            Percent of CPU time * 10.00%  ±2.5%
                                       *....1....2....3....4....5....6....7....8
LPFRAYV4  B300-PROCESS-ACCTS      32.86 ================
LPFRAYV4  A200-CALCULATE-RTE      16.60 =======
LPFRAYV4  A100-CALCULATE-MTX      11.22 =====
LPFRAYV4  B300-EXIT                0.53
LPFRAYV4  A200-EXIT                0.46
LPFRAYV4  A100-EXIT                0.06

SYSTEM    System/OS Services      37.45 ==================
APPLCN    No Procedure Mapped      0.79
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Program, Category	Display context help information.
++	Program, Category	Show additional details.
M	Program	Display load module information.
P	Program	Display source program mapping.
C09	Program, Category	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Program, Procedure Name, Percent CPU	Display context help information.
+	Procedure name	Expand field size.
+	Percent CPU	Zoom in scale.
–	Procedure name	Reduce field size.
–	Percent CPU	Zoom out scale.
SV	Program, Procedure Name, Percent CPU	Sort next level by value.
SN	Program, Procedure Name, Percent CPU	Sort next level by name.

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:

```
+-------------------------------------------------------------------+
| Options for CPU Analysis by Procedure                             |
|                                                                   |
| Enter "/" to select an option                                     |
|   /  Omit procedures for which no CPU activity was                |
|      measured. Unselect to report all procedure                   |
|      names.                                                       |
|                                                                   |
+-------------------------------------------------------------------+
```

By default, only those procedures for which CPU activity was measured are displayed. Deselect this option to display all procedure names.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-----------------------------------------------------------------------------+
|                                                                More:     +    |
| +--------------- The following report line was selected ---------------+    |
| | LPFRAYV4  B300-PROCESS-ACCTS     59.95 OOOOOOOOOOOOOOOOOOOOOOOOOOOOOO|    |
| +-------------------------------------------------------------------+    |
|                                                                            |
| Calculation Details                                                        |
|    Data management CPU measurements          4,820                         |
|    In load module                            LPFRAYV4                      |
|    Executing routine                         B300-PROCESS-ACCTS            |
|    Total CPU measurements                    8,040                         |
|    Percent in category                       59.95%                        |
|                                                                            |
|                                                                            |
| Processor states for the CPU usage measurements                            |
|                                                                            |
|                                      Nbr of                                |
|    Processor State                   Samples  Percentage                   |
|                                                                            |
|    Storage key 8                       4,820     100.00%                   |
|                                                                            |
|    Problem state                       4,820     100.00%                   |
|    Supervisor state                        0       0.00%                   |
|                                                                            |
|    Execution in SVC                        0       0.00%                   |
|                                                                            |
|    Execution in real-mode                  0       0.00%                   |
|                                                                            |
|    Primary-space mode                  4,820     100.00%                   |
|    Access-register mode                    0       0.00%                   |
|    Secondary-space mode                    0       0.00%                   |
|    Home-space mode                         0       0.00%                   |
|                                                                            |
|    Execution on processor 0            2,818      58.46%                   |
|    Execution on processor 1            2,002      41.53%                   |
|                                                                            |
|    In private storage ABOVE            4,820     100.00%                   |
|    In private storage BELOW                0       0.00%                   |
+-----------------------------------------------------------------------------+
```

C08 - CPU usage referred attribution

Usage

Use this report to see attribution of CPU usage measured in system modules referred back to the points of invocation in application modules.

Quantification

Each report line quantifies CPU usage as a percentage. Each percentage represents the ratio of CPU consumption observed for the reported item to the total CPU consumption measured in the address space.

Detail line hierarchy

The first level detail line shows an application module to which CPU usage in system modules has been attributed. You can expand each line to reveal additional hierarchical levels of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 Application Module
 Level 2 CSECT in application module
  Level 3 Offset in CSECT
  Level 3 Source statement
   Level 4 System module
    Level 5 CSECT in System module
   Level 4 Unresolved address
```

Detail line descriptions

Application module

This identifies an application module to which attribution of CPU usage in system routines has been referred. During the measurement, Application Performance Analyzer determined that execution in system modules was initiated by a system request statement (such as a CALL) with an invocation point in the identified application module.

Under Heading	This is Displayed
Name	Name of application load module in which CPU usage measured in system modules was attributed.
Description	Functional description of the load module if one is available. Otherwise, "Application Program" is shown here.
Percent of CPU Time	The percentage of attributed system module CPU usage referred back to this application module.

CSECT in application module

These lines appear under the application module detail line. Each one reports an external name (CSECT) within the application module in which invocation points for attributed CPU execution reside.

Under Heading	This is Displayed
Name	Name of CSECT in which CPU usage measured in system modules was attributed.
Description	CSECT in loadmodname appears here.

Under Heading	This is Displayed
Percent of CPU Time	The percentage of attributed system module CPU usage referred back to this CSECT.

Offset in CSECT

These lines appear under the CSECT detail line. Each one reports a return address offset – the point in the CSECT at which control is returned from the attributed system services CPU usage. This identifies the address of the application statement.

Under Heading	This is Displayed
Name	The hexadecimal offset of the return point in the CSECT of the system execution invocation request.
Description	"Offset in csectname" appears here.
Percent of CPU Time	The percentage of CPU time measured in this system routine for the indicated invocation/return address.

Source statement

One or more lines showing the source statement appear at the same level as the Offset in CSECT detail line. This appears only when the source program has been mapped and loaded. For more information, see Chapter 10, "Source program mapping," on page 569.

System Module

This line identifies a system module in which CPU usage was measured and attributed to the reported application module.

Under Heading	This is Displayed
Name	The name of a system module in which CPU usage was measured and referred back to the application module under which this line appears.
Description	Functional description of the system module.
Percent of CPU Time	The percentage of CPU time measured in this system routine for the invocation/return address under which this line appears.

CSECT in System Module

This line identifies a CSECT within a system module in which CPU usage was measured and attributed to the reported application module.

Under Heading	This is Displayed
Name	The name of the CSECT in which CPU usage was measured and referred back to the application module under which this line appears.
Description	Functional description of the CSECT.
Percent of CPU TIme	The percentage of CPU time measured in this system CSECT for the invocation/return address under which this line appears.

Unresolved address

This line identifies an unresolved address in which CPU usage was measured and attributed to the reported application module.

Under Heading	This is Displayed
Name	An unresolved address range in which CPU usage was measured and referred back to the application module under which this line appears.
Description	“Unresolved Address”
Percent of CPU Time	The percentage of CPU time measured in this address range.

Sample reports

A sample report is shown here. This has been expanded to the third level, and the source has been mapped and loaded. (It can be expanded further to show details of the modules.)

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
C08: CPU Usage Referred Attribution (3598/TSTJOB01)          Row 00001 of 00027
Command ===> ____________________________________________________ Scroll ===> CSR

Name      Description             Percent of CPU time * 10.00%  ±1.0%%
                                      *....1....2....3....4....5....6....7....8.
SAMPLE1   Application Program    88.37 ========================================
→ SAMPLE1   CSECT in SAMPLE1     88.37 ========================================
  → 000854    Attribution Offset 35.06 =================
              > Source statement in: Sample1Mainline
              >               Open Input SalesActivityFile

  → 00088A    Attribution Offset 24.23 ===========
              > Source statement in: Sample1Mainline
              >               Open OUTPUT SalesReportFile

  → 000918    Attribution Offset 14.22 =======
              > Source statement in: Sample1Mainline
              >               Close SalesActivityFile

  → 000936    Attribution Offset 13.89 =======
              > Source statement in: Sample1Mainline
              >               Close SalesReportFile

  → 000814    Attribution Offset  0.73
              > Source statement in: Sample1Mainline
              >            Inspect B tallying C for all '**'replacing all'**'

  → 000A72    Attribution Offset  0.20
              > Source statement in: ProcessSalesRecord
              >            Read SalesActivityFile
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a “/” on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Application Module, CSECT, Attribution Offset, System Module, Unresolved Address	Display context help information.
++	Application Module, CSECT, Attribution Offset, System Module, Unresolved Address	Show additional details.

Cmd	When Applied To Object	Action
+	Application Module, CSECT, Attribution Offset	Expand to reveal next level.
-	Application Module, CSECT, Attribution Offset, System Module, Unresolved Address	Collapse to hide next level .
M	Application Module, CSECT, System Module, Unresolved Address	Display load module information.
P	CSECT, Attribution Offset	Display source program mapping.
C09	Application Module, CSECT, Attribution Offset, System Module, Unresolved Address	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent CPU	Zoom out scale .
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------+
|                                                          More:     +    |
| +--------------- The following report line was selected ---------------+ |
| |   > 0005BE    Attribution Offset  7.23 OOOO                         | |
| +-------------------------------------------------------------------+ |
|                                                                         |
| Calculation Details                                                     |
|    CPU measurements attributed to services   582                        |
|    In the csect                              LPFRAYV4                   |
|    Return offset                             0005BE                     |
|    Total CPU measurements                    8,040                      |
|    Percent in category                       7.23%                      |
|                                                                         |
| Source Statement in: PROCEDURE-DIVISION                                 |
|                     write VSAM-record                                   |
|                                                                         |
|                                                                         |
| Processor states for the CPU usage measurements                         |
|                                                                         |
|                                      Nbr of                             |
|    Processor State                   Samples  Percentage                |
|                                                                         |
|    Storage key 0                         303      52.06%                |
|    Storage key 8                         279      47.93%                |
|                                                                         |
|    Problem state                         257      44.15%                |
|    Supervisor state                      325      55.84%                |
|                                                                         |
|    Execution in SVC                      325      55.84%                |
|                                                                         |
|    Execution in real-mode                  0       0.00%                |
|                                                                         |
|    Primary-space mode                    582     100.00%                |
|    Access-register mode                    0       0.00%                |
|    Secondary-space mode                    0       0.00%                |
|    Home-space mode                         0       0.00%                |
|                                                                         |
|    Execution on processor 0              302      51.89%                |
|    Execution on processor 1              280      48.10%                |
|                                                                         |
|    In private storage ABOVE                0       0.00%                |
|    In private storage BELOW                0       0.00%                |
|    In common storage ABOVE               420      72.16%                |
|    In common storage BELOW               162      27.83%                |
|                                                                         |
|    Execution in AMODE 24                   0       0.00%                |
|    Execution in AMODE 31                 582     100.00%                |
|    Execution in AMODE 64                   0       0.00%                |
+-------------------------------------------------------------------------+
```

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------+
|                                                          More:    -     |
|    In private storage ABOVE                1       0.02%                |
|    In private storage BELOW               31       0.92%                |
|    In common storage ABOVE             2,222      66.48%                |
|    In common storage BELOW             1,088      32.55%                |
|                                                                         |
|    Execution in AMODE 24                 192       5.74%                |
|    Execution in AMODE 31               3,150      94.25%                |
|    Execution in AMODE 64                   0       0.00%                |
+-------------------------------------------------------------------------+
```

C09 - CPU usage by PSW/object code

Use this report to see information about sampled CPU execution at the machine-instruction level. This report is most useful when used in Subset Analysis mode to provide more detailed analysis for a particular quantification. You can display this report by entering the “C09” line command on an eligible CPU usage report detail line. The C09 report will show you information about the executed machine instructions.

Quantification

Each report line quantifies CPU usage as a percentage. Each percentage represents the ratio of CPU consumption observed for the reported item to the total CPU consumption measured in the address space.

Detail line hierarchy

The first level detail line shows a PSW (program status word) address value that Application Performance Analyzer recorded when it made an active CPU observation. Each repeated CPU usage observation at the same PSW address is accumulated and reported as a single detail line.

In addition to the PSW address value, Application Performance Analyzer creates a separate first-level detail line if any of the following values are different:

- Execution in problem or supervisor mode
- Address mode (AMODE) 24, 31 or 64
- Address-space control: primary-space, AR mode, secondary-space or homespace
- PSW key
- SVC number if execution was in a supervisor call
- Object code at the PSW address

You can expand the first level detail line to show the object code at the PSW address. Object code is reported in the form of disassembled machine instructions. Application Performance Analyzer displays a line for each machine instruction from 12 bytes of object code captured during the measurement. The PSW address points to the sixth byte of the 12 bytes, so the first instructions reported are the ones that preceded the sampled instruction.

Detail line descriptions

PSW address line

One line appears for each unique PSW address. By default, these are sorted in descending sequence by CPU activity.

Under Heading	This is Displayed
Address	The PSW address of the sampled instruction.
Module	The load module name at the sampled address, or 'Unknown' if Application Performance Analyzer was unable to determine the module name.
AM	The address mode (AMODE): 24, 31 or 64.
S/P	The SVC number if execution was in a supervisor call or S or P followed by the storage key. “S” indicates supervisor mode and “P” indicates problem mode. For example, “P8” indicates execution in problem mode in storage key 8.

Under Heading	This is Displayed
AS	The address space control mode. AR indicates access-register mode, SS indicates secondary-space mode and HS indicates home-space mode. Blanks are shown for primary-space mode.
ASID	The ASID (address space ID) in hexadecimal of the address space that acquired the storage at the PSW address. This is shown only if the storage was acquired by an address space other than the measured one – a foreign address space. One example of this is the processing of an SQL request. Execution often occurs in load modules fetched into storage by one of the DB2 address spaces.
Percent of CPU Time	The percentage of CPU time observed at the indicated address.

Machine instruction line

Each line shows one machine instruction in disassembled format. These lines pertain to the PSW address line shown above.

Sample reports

A sample report is shown here. The first entry has been expanded with the "+" line command.

```
  File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| C09: CPU Usage by PSW/Object Code (2133/TSTJOB01)       Row 00001 of 00018    |
| Command ===> ____________________________________________ Scroll ===> CSR      |
|                                                                               |
| Address    Module   AM  S/P AS ASID   Percent of CPU Time * 10.00%  ±1.6%     |
|                                          *....1....2....3....4....5....6...   |
| 17801392 - LPFRAYVS 31   P8          98.2 ================================    |
|                                                                               |
| → LPFRAYVS+05D6     47F0 B240         BC  15,576(,R11)                        |
| → LPFRAYVS+05DA     FA20 9820  A06C   AP  2080(3,R9),108(1,R10)76(,R11)       |
|                                                                               |
| 178012E4 + LPFRAYVS 31   P8           0.48                                    |
| 17801360 + LPFRAYVS 31   P8           0.25                                    |
| 17801416 + LPFRAYVS 31   P8           0.23                                    |
| 17801302 + LPFRAYVS 31   P8           0.15                                    |
| 17801312 + LPFRAYVS 31   P8           0.15                                    |
| 178012C4 + LPFRAYVS 31   P8           0.12                                    |
| 17801342 + LPFRAYVS 31   P8           0.10                                    |
| 178012F0 + LPFRAYVS 31   P8           0.07                                    |
| 17801362 + LPFRAYVS 31   P8           0.05                                    |
| 178012C6 + LPFRAYVS 31   P8           0.05                                    |
| 1780129A + LPFRAYVS 31   P8           0.02                                    |
| 1780137A + LPFRAYVS 31   P8           0.02                                    |
| 178012C0 + LPFRAYVS 31   P8           0.02                                    |
|                                                                               |
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Address	Display context help information.
++	Address	Show additional details.

Cmd	When Applied To Object	Action
+	Address	Expand to reveal next level.
-	Address	Collapse to hide next level .
M	Address	Display load module information.

on headings

Cmd	When Applied To Object	Action
?	Address, Percent CPU	Display context help information.
+	Address	Expand to reveal all entries.
+	Percent CPU	Zoom in scale.
–	Address	Collapse to show only first level.
–	Percent CPU	Zoom out scale.
SV	Address	Sort next level by value.
SA	Address	Sort next level by address.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | 18802338 + LPFRAYV4 31  P8          50.44 00000000000000000000000000  |     |
|  +-------------------------------------------------------------------------+  |
|                                                                               |
|  Calculation Details                                                          |
|     CPU measurements                          4,056                           |
|     PSW address                               18802338                        |
|     Total CPU measurements                    8,040                           |
|     Percent in category                       50.44%                          |
|                                                                               |
|  PSW Information                                                              |
|     PSW Address                  18802338                                     |
|     Module Name                  LPFRAYV4                                     |
|     CSECT Name                   LPFRAYV4                                     |
|     Module+Offset                LPFRAYV4+1748                                |
|     CSECT+Offset                 LPFRAYV4+1748                                |
|     Addressing Mode (AMODE)      31 bit                                       |
|     Address Space Control        Primary Space                                |
|     Problem/Supervisor Mode      Problem Mode                                 |
|                                                                               |
|  Machine Instructions                                                         |
|    LPFRAYV4+1744    47F0 B0C2        BC    15,194(,R11)                       |
|    LPFRAYV4+1748    FA20 A830 9075   AP    2096(3,R10),117(1,R9) <- PSW add    |
|                                                                               |
+-------------------------------------------------------------------------------+
```

C10 - CPU Usage by Natural Program

Use this report to see how CPU time was consumed by execution of Natural programs. The Natural data extractor must be turned on during the measurement in order to produce this report.

Quantification

Each report line quantifies time measured as a percentage of total time, the percentage represents the ratio of the number of CPU active measurements in the indicated Natural object to the total number of CPU active observations.

Detail line hierarchy

An unexpanded report shows a line for each Natural Program. The name field shows the Natural program name. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 Natural program
 Level 2 Natural statement
```

Detail line descriptions

Natural Program detail line

This is the first-level detail line.

Under Heading	This is Displayed
Program	The Natural program name for which CPU activity is reported.
Library	The name of the library or folder from which the Natural program was obtained.
Percent of CPU Time	The percentage of CPU time consumed during execution in the indicated Natural program.

Natural statement detail line

This is the second-level detail line.

Under Heading	This is Displayed
Program	The four digit Natural statement number for which CPU activity is reported, this will be “0000” for CPU activity for which a statement number could not be determined.
Library	The description of the line: “stmt #”, followed by the Natural statement number for which CPU activity is reported.
Percent of CPU Time	The percentage of CPU time consumed during execution in the indicated Natural statement.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
+-------------------------------------------------------------------------------+
| C10: CPU Usage by Natural Program (0236/TSTJOB01)        Row 00001 of 00022   |
| Command ===> _____________________________________________ Scroll ===> CSR     |
|                                                                               |
| Program   Library              Percent of CPU Time * 10.00%  ±1.9%            |
|                               *....1....2....3....4....5....6....7....8....9  |
| NATPGM1   SYSLIB             99.67 ========================================== |
| → 0010      stmt # 10        38.42 ====================                      |
| → 0020      stmt # 20        27.77 ===============                           |
| → 0090      stmt # 90        24.93 =============                             |
| → 0120      stmt # 120        8.53 ====                                      |
|                                                                               |
| NATPGM2   SYSLIB              0.16                                            |
| → 2985      stmt # 2985       0.05                                            |
| → 3687      stmt # 3687       0.02                                            |
|                                                                               |
| NATPGM3   SYSLIB              0.08                                            |
| → 0183      stmt # 183        0.05                                            |
| → 0621      stmt # 621        0.02                                            |
|                                                                               |
+-------------------------------------------------------------------------------+
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Program, Natural statement	Display context help information.
++	Program, Natural statement	Show additional details.
+	Program	Expand to reveal next level.
-	Program	Collapse to hide next level.
SV	Program	Sort next level by value.
SN	Program	Sort next level by statement number.

on headings

Cmd	When Applied To Object	Action
?	Program, Library, Percent CPU	Display context help information.
+	Program	Expand to reveal all entries.
+	Library	Expand field size.
+	Percent CPU	Zoom in scale.
–	Program	Collapse to show only first level.
-	Library	Reduce field size.
–	Percent CPU	Zoom out scale.
SV	Program, Library, Percent CPU	Sort next level by value.
SN	Program, Library, Percent CPU	Sort next level by statement number.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |  0010       stmt # 10 38.42 ======================                  |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     CPU measurements                          1,700                           |
|     Total CPU measurements                    3,949                           |
|     Percent of total                          38.42%                          |
|                                                                               |
|                                                                               |
|  Processor states for the CPU usage measurements                              |
|                                                                               |
|                                      Nbr of                                   |
|     Processor State                  Samples   Percentage                     |
|                                                                               |
|     Storage key 8                          1       0.05%                      |
|     Storage key 9                      1,699      99.94%                      |
|                                                                               |
|     Problem state                      1,700     100.00%                      |
|     Supervisor state                       0       0.00%                      |
|                                                                               |
|     Execution in SVC                       0       0.00%                      |
|                                                                               |
|     Execution in real-mode                 0       0.00%                      |
|                                                                               |
|     Primary-space mode                 1,700     100.00%                      |
|     Access-register mode                   0       0.00%                      |
|     Secondary-space mode                   0       0.00%                      |
|     Home-space mode                        0       0.00%                      |
|                                                                               |
|     Execution on processor 0           1,700     100.00%                      |
|                                                                               |
|     In private storage ABOVE           1,700     100.00%                      |
|     In private storage BELOW               0       0.00%                      |
|     In common storage ABOVE                0       0.00%                      |
|     In common storage BELOW                0       0.00%                      |
+-------------------------------------------------------------------------------+
```

W01 - WAIT time by task/category

Overview

This report analyzes measured CPU WAIT time. It shows, for each Task (TCB), the percentage of elapsed time the Task was observed to be in a WAIT. Under each task, this information is shown under the following general categories:

APPLCN
Application Code

SYSTEM
System/OS Services

DATAMG
Data Management (DASD) Requests

DB2SQL
SQL Processing

IMSDLI
IMS DL/I calls

ADABAS
Adabas requests

In addition, any WAIT time observed at locations for which no load module name could be determined is attributed to a category:

NOSYMB
No Module Name Found

The Task (TCB) name is the object at the top level of the hierarchy for this report, and is the only object visible when the report is first displayed.

A sample report is shown here, as it would appear when it is first displayed:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
W01: WAIT Time by Category (0651/TSTJOB01)                  Row 00001 of 00009
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description         Percent of CPU time * 10.00%  ±2.3%%
                                      *....1....2....3....4....5....6....7....8.
ISPTASK-008  TCB=008B8D90       99.65  ========================================
PMSEL-012    TCB=00893528       99.58  ========================================
ISPF-007     TCB=008E1190       99.18  ========================================
ISPTASK-009  TCB=008B8738       16.54  ========
EXEC-013     TCB=008A67C0        1.01  =
ALLOC-017    TCB=008A67C0        0.06
ALLOC-015    TCB=008A67C0        0.05
ALLOC-016    TCB=008A67C0        0.04
CALL-014     TCB=008A6390        0.00
```

You can expand the entire report to show all detail lines at all hierarchical levels by entering the "+" line command on the Name heading.

Detail line descriptions

Each line represents a System Object – an object to which WAIT time is attributed. These lines are arranged hierarchically. You can expand a line (using the "+" line command) to reveal a breakdown into subordinate objects. Each type of object shown in this report is described here:

Task This is the highest level object in the report. Each active Task is reported. The percentage of the measurement time interval the task was observed to be WAITing is reported.

Note: A SETUP option is available which specifies that all Tasks – including inactive tasks – are to be displayed.

Name Column
The name of the program specified in the ATTACH macro that started the task as well as the TCB index number is shown.

Description Column
The TCB address is shown. For CICS measurements that have the CICS data extractor selected, the TCB mode is displayed for CICS TCBs. This immediately follows the TCB address.

Category
WAIT time within a Task is categorized as APPLCN, SYSTEM, DATAMG, IMSDLI, DB2SQL, ADABAS or NOSYMB.

DPA Group

Within a category – usually the SYSTEM category – load modules can be further arranged into Descriptive Program Attribution (DPA) groups. These are functional groups like: IMS, DB2, VSAM.

Note: A SETUP option is available from which you can specify aggregation of modules into Group or Subgroup. Subgroup offers a more granular, less inclusive categorization than Group. Application Performance Analyzer uses the module name to locate descriptive information in its DPA tables.

Name Column

The symbolic name of the Group/Subgroup appears under this heading.

Description Column

A Group/Subgroup description appears under this heading.

Load Module

A load module line appears under a Group/Subgroup line, under a Category line, or under an SVC line.

Name Column

The load module name appears under this heading.

Description Column

If a DPA functional description is found for the module name, it is reported under this heading. Otherwise "Application Program" is displayed.

CSECT (Control Section)

These lines can appear as subordinate, breakdown items under a load module line. If Application Performance Analyzer were able to find ESD (External Symbol Dictionary) information, during the measurement process, for a load module, these items will appear under the load module and the measured WAIT time will be attributed to them.

Name Column

The CSECT name appears under this heading.

Description Column This will display "CSECT in xxxxxxxx" where xxxxxxxx is the name of the load module to which the CSECT belongs.

SVC (Supervisor Call)

This line shows attribution of measured WAIT time during execution of an MVS Supervisor Call.

Name Column

"SVC" followed by a 3-digit decimal SVC number (000 to 255) appears under this heading. For example, "SVC120."

Description Column

A description of the SVC service, or the name of the macro which invokes the SVC appears under this heading. For example, "GETMAIN/FREEMAIN."

SQL Statement

This item attributes WAIT activity to a DB2 SQL statement.

Name Column

A sequence number is assigned to each unique SQL statement

observed during the measurement. This sequence number is shown in the name field. It is possible for some sequences numbers to be missing (sequence gaps) from the report. This will occur if a sequence number was assigned to SQL statements but no WAIT activity was measured for these statements.

Description Column
The name of the program that issued the SQL request followed by the precompiler statement number (enclosed in parentheses) is shown here. This is followed by the SQL function (for example, SELECT, INSERT, COMMIT).

DL/I Call
This item attributes WAIT activity to an IMS DL/I call.

Name Column
A sequence number is assigned to each unique DL/I call statement observed during the measurement. This sequence number is shown in the name field.

Description Column
The DL/I function code appears followed by the PCB name followed by the relative PCB number in parentheses. The location of the call, in *csect+offset* format, follows.

Adabas Call
This item attributes WAIT activity to an Adabas call.

Name Column
A sequence number is assigned to each unique Adabas call statement observed during the measurement. This sequence number is shown in the name field.

Description Column
The name of the program that issued the Adabas request and the offset within the program, followed by the Adabas command code that was issued, is displayed in the field.

Unresolved Address
This item attributes measurement WAIT time to a range of addresses for which a corresponding load module name could not be determined.

Name Column
WAIT time observed in a 4096 (4K) byte range of addresses is reported in an Unresolved Address line. This range is expressed in the format "HHHHHxxx" where HHHHH are the 5 high order hexadecimal digits of the address. For example, "08915xxx" means the range from 08915000 to 08915FFF.

Description Column
"Unresolved Address" appears under this heading.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Task, Category, Load Module, SVC, CSECT, Unresolved Address	Display context help information.
++	Task, Category, Load Module, SVC, CSECT, Unresolved Address	Show additional details.
+	Task, Category, Load Module, SVC	Expand to reveal next level.
–	Task, Category, Load Module, SVC	Collapse to hide next level.
SV	Task, Category, SVC	Sort next level by value.
SN	Task, Category, SVC	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	Load Module, CSECT	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent WAIT	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduces field size
–	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

SETUP options

The following SETUP options can be selected with the SETUP primary command:

Reporting by Group / SubGroup
This option allows you to aggregate modules into Group or SubGroup. SubGroup offers a more granular, less inclusive categorization than Group. For example, when reporting by Group, all SVCs would be reported under the “SVC” Group. When reporting by SubGroup, SVCs would be reported under SubGroups such as SVCTYPE1, SVCTYPE2, etc.

Include inactive tasks
You can choose to include or eliminate inactive tasks from the report. An inactive task is one for which there were no observations of CPU consumption.

Show the DB2SQL category
This shows activity attributed to DB2 SQL statements. If it is not selected, the activity is included in the appropriate system modules in the SYSTEM category. This category is not applicable for CICS measurements.

Show the DATAMG category
This shows activity attributed to data management functions, which include basic access functions such as READ and WRITE. Processing of

OPEN and CLOSE functions is not included in this category. If it is not selected, the activity will instead be included in the appropriate system modules in the SYSTEM category.

Show the IMSDLI category
This shows activity attributed to IMS DLI calls. If it is not selected, the activity will instead be included in the appropriate system modules in the SYSTEM category.

Show the ADABAS category
This shows activity attributed to Adabas requests. If it is not selected, the activity is included in the appropriate system modules in the SYSTEM category.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | ISPF-007     TCB=008DFA10       98.66 00000000000000000000000000000000|      |
| +-----------------------------------------------------------------------+      |
|                                                                               |
| Calculation Details                                                           |
|    Wait measurements                          9,866                           |
|    Task                                       ISPF-007                        |
|    Total measurements                         10,000                          |
|    Percent of total                           98.66%                          |
|                                                                               |
+-------------------------------------------------------------------------------+
```

W02 - WAIT time by task/module

Overview

This report analyzes measured CPU WAIT time. It shows, for each Task (TCB), the percentage of elapsed time the Task was observed to be in a WAIT. Under each task, a further breakdown of wait time is shown by load modules.

In addition, any wait time measured at locations for which no load module name could be determined is attributed to hexadecimal address ranges.

Detail line descriptions

Each line represents a System Object - an object to which measured activity is attributed. These lines are arranged hierarchically. You can expand a line (using the "+" line command) to reveal a breakdown into subordinate objects. Each type of object shown in this report is described here:

Task This is the highest level object in the report. Each active Task is reported. The percentage of the total measured CPU time which was measured in this Task is reported. A SETUP option is available that specifies that all Tasks, including inactive tasks, are to be displayed.

Name Column
The name of the program specified in the ATTACH macro that started the task as well as the TCB index number is shown.

Description Column
The TCB address is shown. For CICS measurements that have the CICS data extractor selected, the TCB mode is displayed for CICS TCBs. This immediately follows the TCB address.

Load Module

Name Column
The load module name appears under this heading.

Description Column
If a DPA functional description is found for the module name, it is reported under this heading. Otherwise "Application Program" is displayed.

CSECT (Control Section)
These lines can appear as subordinate, breakdown items under a load module line. If Application Performance Analyzer was able to find ESD (External Symbol Dictionary) information, during the measurement process, for a load module, these items will appear under the load module and the measured wait time will be attributed to them.

Name Column
The CSECT name appears under this heading.

Description Column
This will display "CSECT in xxxxxxxx" where xxxxxxxx is the name of the load module to which the CSECT belongs.

Unresolved Address
This item attributes wait time to a range of addresses for which a corresponding load module name could not be determined.

Name Column
Activity observed in a 4096 (4K) byte range of addresses is reported in an Unresolved Address line. This range is expressed in the format "HHHHHxxx" where HHHHH are the 5 high order hexadecimal digits of the address. For example: "08915xxx" means the range from 08915000 to 08915FFF.

Description Column
"Unresolved Address" appears under this heading. A sample report is shown here. File

A sample report is shown here.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
W02: WAIT Time by Module (0651/TSTJOB01)                    Row 00001 of 00017
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description          Percent of Time in WAIT * 10.00%  ±0.8%
                                    *....1....2....3....4....5....6....7....8.
IKJEFT01-004 TCB=008FF6E0       100.00 ========================================
IKJEFT02-005 TCB=008E1640       100.00 ========================================
IKJEFT09-006 TCB=008E1328       100.00 ========================================
EX-010       TCB=008B84DB       100.00 ========================================
CALL-011     TCB=008B8248       100.00 ========================================
ISPTASK-008  TCB=008B8D90        99.65 ========================================
PMSEL-012    TCB=00893528        99.58 ========================================
ISPF-007     TCB=008E1190        99.18 ========================================
ISPTASK-009  TCB=008B8738        16.54 =========
EXEC-013     TCB=008A67C0         1.01 =
ALLOC-017    TCB=008A67C0         0.06
ALLOC-015    TCB=008A67C0         0.05
ALLOC-016    TCB=008A67C0         0.04
IEAVAR00-001 TCB=008FE0A8         0.00
IEAVTSDT-002 TCB=008FFE88         0.00
IEESB605-003 TCB=008FFBF8         0.00
CALL-014     TCB=008A6390         0.00
```

A sample report with a task fully expanded is shown here.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
W02: WAIT Time by Module (0651/TSTJOB01)                    Row 00001 of 00086
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description          Percent of Time in WAIT * 10.00%  ±0.8%
                                    *....1....2....3....4....5....6....7....8.
ISPTASK-009  TCB=008B8738       16.54 ========
→ ISPSUBS      Application Prog 11.21 ======
  → ISPCDI       CSECT in ISPSU  8.86 ====
  → ISPCAT       CSECT in ISPSU  2.21 =
  → ISPCCI       CSECT in ISPSU  0.09
  → ISPDPD       CSECT in ISPSU  0.04
→ IGG019BB     Data Management   4.57 ===
  → IGG019BB     CSECT in IGG01  4.57 ===
→ IGG0CLHA     Data Management   0.25
  → IGG0CLXA     CSECT in IGG0C  0.25
→ IEAVEWAT     Task management   0.18
  → IGC001       CSECT in IEAVE  0.18
→ IGC018       Supervisor Contr  0.17
  → SVC018       CSECT in IGC01  0.17
→ IGC0013I     Supervisor Contr  0.12
  → ICVDSD03     CSECT in IGC00  0.07
  → ICVCMI03     CSECT in IGC00  0.04
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Task, Load Module, CSECT, Unresolved Address	Display context help information.
++	Task, Load Module, CSECT, Unresolved Address	Show additional details.

Cmd	When Applied To Object	Action
+	Task, Load Module	Expand to reveal next level.
–	Task, Load Module	Collapse to hide next level.
SV	Task	Sort next level by value.
SN	Task	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	Load Module, CSECT	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent WAIT	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

SETUP options

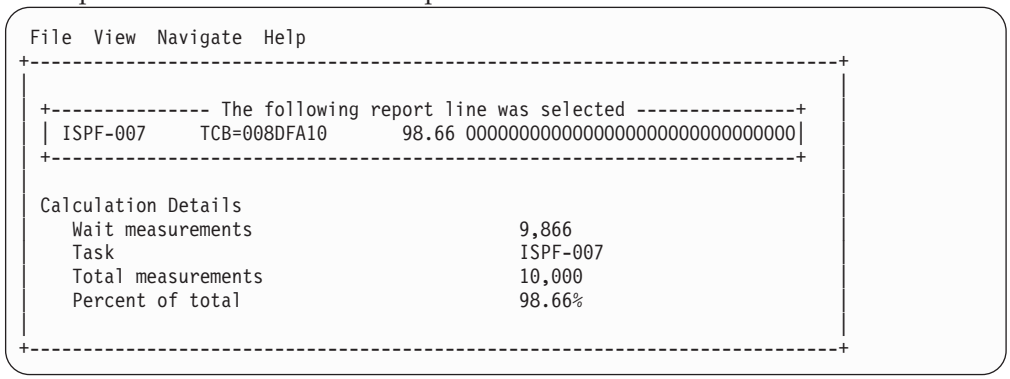
The following SETUP option can be selected with the SETUP primary command:

Include inactive tasks
You can choose to include or eliminate inactive tasks from the report. An inactive task is one for which there were no observations of CPU consumption.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:



W03 - WAIT time referred attribution

Usage

Use this report to see attribution of WAIT time. WAITs issued in system modules are referred back to the points of invocation in application modules.

Quantification

Each report line quantifies WAIT time as a percentage. Each percentage represents the ratio of time in WAIT to the elapsed time of the measurement.

Detail line hierarchy

The first level detail line shows a task (TCB). For CICS measurements that have the CICS data extractor selected, the TCB mode is displayed for CICS TCBs. This immediately follows the TCB address. The second level detail line shows an application module to which WAIT time in system modules has been attributed. You can expand each line to reveal additional hierarchical levels of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 Task
 Level 2 Application Module
  Level 3 CSECT in application module
   Level 4 Offset in CSECT
   Level 4 Source statement
    Level 5 System module
     Level 6 CSECT in System module
    Level 5 Unresolved address
```

Detail line descriptions

Application module

This identifies an application module to which attribution of WAIT time in system routines has been referred. During the measurement, Application Performance Analyzer determined that WAIT in system modules was initiated by a system request statement (such as a CALL) with an invocation point in the identified application module.

Under Heading	This is Displayed
Name	Name of application load module in which WAIT time observed in system modules was attributed.
Description	Functional description of the load module if one is available. Otherwise, "Application Program" is shown here.
Percent of Time in WAIT	The percentage of attributed system module WAIT time referred back to this application module.

CSECT in application module

These lines appear under the application module detail line. Each one reports an external name (CSECT) within the application module in which invocation points for attributed WAIT reside.

Under Heading	This is Displayed
Name	Name of CSECT in which WAIT time observed in system modules was attributed.

Under Heading	This is Displayed
Description	CSECT in loadmodname appears here.
Percent of Time in WAIT	The percentage of attributed system module WAIT time referred back to this CSECT.

Offset in CSECT

These lines appear under the CSECT detail line. Each one reports a return address offset – the point in the CSECT at which control is returned from the attributed system services WAIT. This identifies the address of the application statement.

Under Heading	This is Displayed
Name	The hexadecimal offset of the return point in the CSECT of the system execution invocation request.
Description	"Offset in csectname" appears here.
Percent of Time in WAIT	The percentage of WAIT time observed in this system routine for the indicated invocation/return address.

Source statement

One or more lines showing the source statement appear at the same level as the Offset in CSECT detail line. This appears only when the source program has been mapped and loaded. See Chapter 10, "Source program mapping," on page 569 for more information.

System module

This line identifies a system module in which WAIT was observed and attributed to the reported application module.

Under Heading	This is Displayed
Name	The name of a system module in which WAIT time was measured and referred back to the application module under which this line appears.
Description	Functional description of the system module.
Percent of Time in WAIT	The percentage of WAIT time observed in this system routine for the invocation/return address under which this line appears.

CSECT in System module

This line identifies a CSECT within a system module in which wait time was measured and attributed to the reported application module.

Under Heading	This is Displayed
Name	The name of the CSECT in which wait time was measured and referred back to the application module under which this line appears.
Description	Functional description of the CSECT.
Percent of Time in WAIT	The percentage of WAIT time measured in this system CSECT for the invocation/return address under which this line appears.

Unresolved address

This line identifies an unresolved address in which WAIT time was observed and attributed to the reported application module.

Under Heading	This is Displayed
Name	An unresolved address range in which WAIT time was measured and referred back to the application module under which this line appears.
Description	"Unresolved Address"
Percent of Time in WAIT	The percentage of WAIT time observed in this address range.

Sample reports

A sample report is show here, it has been expanded four levels.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
W03: WAIT Referred Attribution by Task (1917/TSTJOB01)        Row 00001 of 00053
Command ===> _____________________________________________ Scroll ===> CSR

Name         Description        Percent of CPU time * 10.00%  ±0.9%%
                                      *....1....2....3....4....5....6....7....8.
LPFRAYVS-001 TCB=008EA1C0       39.68 ====================
→ LPFRAYVS     Regression test3 39.11 ====================
  → LPFRAYVS     CSECT in LPFRA 39.11 ====================
    → 0005AA       Attribution  35.76 =================
              > Source statement in: PROCEDURE-DIVISION
              >                   write VSAM-record

      → IDA019L1     Virtual I/ 35.76 =================
    → 0004C0       Attribution   2.72 =
              > Source statement in: PROCEDURE-DIVISION
              >            OPEN OUTPUT VSAM1-FILE

      → IGG0CLHA     Data Manag  2.48 =
      → IDA019L1     Virtual I/  0.23
      → IGC0013I     Supervisor  0.00
    → 00065A       Attribution   0.34
              > Source statement in: PROCEDURE-DIVISION
              >            close VSAM1-FILE
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Task, Load Module, CSECT, Offset, System Module, Unresolved Address	Display context help information.
++	Task, Load Module, CSECT, Offset, System Module, Unresolved Address	Show additional details.
+	Task, Load Module, Offset	Expand to reveal next level.
–	Task, Load Module, Offset	Collapse to hide next level.
SV	Task	Sort next level by value.
SN	Task	Sort next level by name.
M	Load Module, CSECT, System Module	Display load module information.
P	CSECT, Offset	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent WAIT	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent WAIT	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent WAIT	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:

```
+-------------------------------------------------------------+
|    Options for WAIT Referred Attribution by Task            |
|                                                             |
|    Enter "/" to select an option                            |
|    /  Include "inactive" tasks in the report. An            |
|       inactive task is one for which there were no          |
|       observations of CPU consumption.                      |
|                                                             |
|                                                             |
+-------------------------------------------------------------+
```

Include Inactive Tasks

You can include or eliminate inactive tasks from the report. An inactive task is one for which there were no observation of CPU consumption.

W04 - WAIT time by task ENQ/RESERVE

Usage

Use this report to view the wait time, QNAME and RNAME resulting from ENQueue or RESERVE requests.

Level 1 shows the MVS TCB (Task Control Block). The Name field identifies the attached subtask load module as well as a sequence number (Task Index). The Task/TCB address is shown in the Description field.

When expanded, level 2 shows a line for each unique ENQueue or RESERVE request. The Name column shows the QNAME and the description column shows the RNAME of the request. The RNAME can be up to 255 bytes. The full RNAME is shown in the detail window.

Quantification

Each report line quantifies wait time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which an ENQueue/RESERVE request was in a wait state to the total number of samples.

Detail line hierarchy

An unexpanded report shows a line for each MVS task for which ENQueue or RESERVE activity was sampled. You can expand each line to reveal an additional hierarchical level of detail.

The hierarchy is illustrated here:

```
Level 1 TCB Task
 Level 2 ENQueue/RESERVE
```

Detail line descriptions

TCB Task detail line

This is the first-level detail line.

Under Heading	This is Displayed
Name	The name of the program specified in the ATTACH macro that started the task as well as the TCB index number.
Description	The TCB address is shown. For CICS measurements that have the CICS data extractor selected, the TCB mode is displayed for CICS TCBs. This immediately follows the TCB address.
Percent of Time in WAIT	The percentage of the measurement interval time during which the task was waiting on an ENQueue/RESERVE.

ENQueue/ RESERVE detail line

This is the second-level detail line.

Under Heading	This is Displayed
Name	The QNAME is shown.
Description	The RNAME is shown. Only 40 characters are shown. If the RNAME is longer, the full name can always be found in the Detail window.
Percent of Time in WAIT	The percentage of the measurement interval time during which the indicated ENQueue/RESERVE was waiting.

Sample reports

A sample report is show here, it has been expanded to the second level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
W04: Wait Time by Task ENQ/RESERVE (5331/TSTJOB01)           Row 00001 of 00013
Command ===> ____________________________________________________ Scroll ===> CSR

Name            Description               Percent of Time in WAIT * 5.00%  ±0.5%
                                             *....1....2....3....4....5....6....7
ISPF-007        TCB=008DF5E8              6.95 =======
→ ISPFEDIT        ADS04.ISPF.ISPPROF      2.78 ===
→ SYSZRACF        SYS1.RACFDS             2.78 ===
→ SPFEDIT         USR01.SIMPLIST.TABLES   1.39 =

ISPTASK-008     TCB=008DF2D0              4.17 ====
→ SYSVTOC         BKNSM2                  1.39 =
→ SPFEDIT         USR01.SIMPLIST.L200708  1.39 =
                  .LOG
→ SYSZRACF        SYS1.RACFDS             1.39 =

 EXEC-016       TCB=008AAE88              2.78 ===
→ SYSZRACF        SYS1.RACFDS             2.78 ===
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Task, ENQ/RESERVE	Display context help information.
++	Task, ENQ/RESERVE	Show additional details.
+	Task	Expand to reveal next level.
–	Task	Collapse to hide next level.
SV	Task	Sort next level by value.
SN	Task	Sort next level by name.

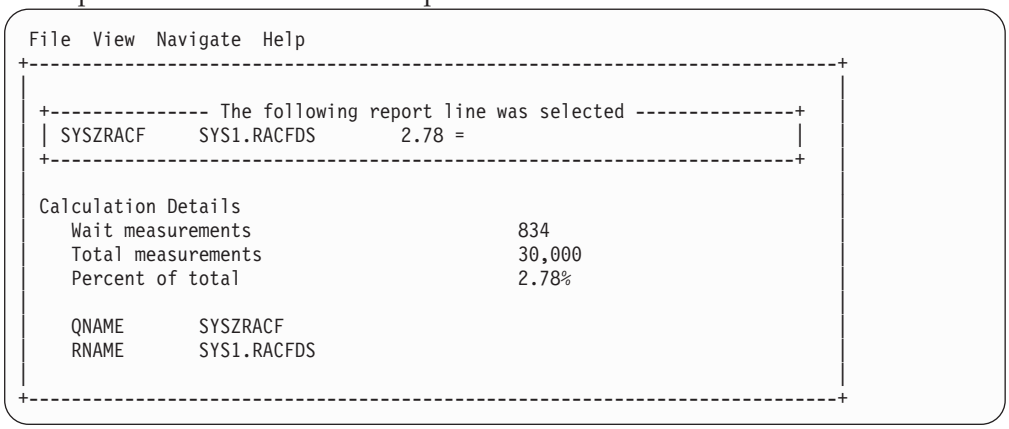
on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent WAIT	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent WAIT	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent WAIT	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:



W05 - WAIT time by tape DDNAME

Usage

Use this report to view the wait time resulting from requests for tape mounts.

This report displays one line for each unique DDNAME for which tape mount waits occurred. The DDNAME column specifies the DDNAME for the tape and the device column specifies the device number for the tape unit.

Quantification

Each report line quantifies wait time measured as a percentage of total time. The percentage represents the ratio of the number of samples for which a wait for a tape mount was observed and the total number of samples.

Detail line descriptions

DDNAME detail line

Under Heading	This is Displayed
DDNAME	The DDNAME name.
Device	The device number for the tape unit.
Percent of Time in WAIT	The percentage of the measurement interval time during which the indicated DDNAME was waiting for a tape mount.

Sample reports

A sample report is show here.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
W05: Wait Time by Tape DDNAME (5508/TSTJOB01)                Row 00001 of 00011
Command ===> ____________________________________________________ Scroll ===> PAGE

DDNAME    Device        Percent of Time in WAIT * 10.00%  ±58.8%
                            *....1....2....3....4....5....6....7....8....9....*
SYSUT2    590          66.66 ==============================
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	DDNAME	Display context help information.
++	DDNAME	Show additional details.

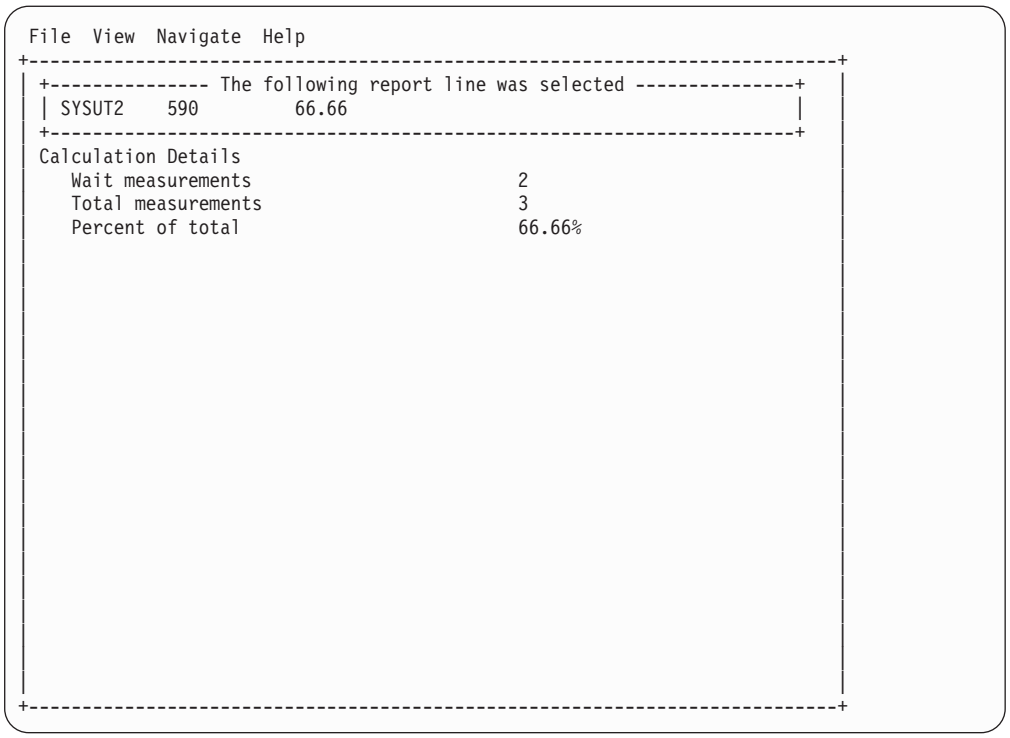
on headings

Cmd	When Applied To Object	Action
?	DDNAME, Device, Percent WAIT	Display context help information.
SV	DDNAME, Device, Percent WAIT	Sort next level by value.
SN	DDNAME, Device, Percent WAIT	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:



D01 - DASD usage by device

Note: This report also covers TAPE I/O.

Overview

This report shows how much I/O time was used by each DASD (direct access storage device) or tape device for which activity was measured during the observation session. The quantification is based on the number of samples activity on the device was observed. This is expressed as a percentage of the total number of samples.

Two types of detail lines are shown:

- Volume
- Cylinder Address (for DASD)

Initially, only the Volume lines are visible. You can expand a Volume line (using the "+" line command) to reveal its subordinate Cylinder Address lines.

A sample report is shown here, it has been fully expanded:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
D01: DASD Usage Time by Device (0618/TSTJOB01)               Row 00001 of 00006
Command ===> ____________________________________________ Scroll ===> CSR

Volume>Cyl   Unit-Dev>DD        Percent of Time * 10.00%  ±2.2%
                                    *....1....2....3....4....5....6....7....8..
BKNSM2       0A93-3390          8.90 ====
→ Cyl_00BA          VSAM1       8.85 ====
→ Cyl_0007          VSAM1       0.05

BKNSM1       0A92-3390          1.25 ==
→ Cyl_0086          INFILE      1.25 ==
```

Detail line descriptions

Volume

This shows the VOLSER value for a DASD or TAPE device for which I/O activity was measured.

Cylinder Address

These lines appear when the "+" line command is used to expand a Volume line. Each line shows a particular DASD cylinder and further breaks down the measurement by file into quantification by specific cylinders.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Volume, Cylinder Address	Display context help information.
++	Volume, Cylinder Address	Show additional details.
+	Volume	Expand to reveal next level.
–	Volume	Collapse to hide next level.
SV	Volume	Sort next level by value.
SN	Volume	Sort next level by name.

on headings

Cmd	When Applied To Object	Action
?	Volume>Cyl, Unit-Dev>DD, Percent Time	Display context help information.
+	Volume>Cyl	Expand to reveal all entries.
+	Unit-Dev>DD	Expand field size.
+	Percent Time	Zoom in scale.
–	Volume>Cyl	Collapse to show only first level.
–	Unit-Dev>DD	Reduce field size.
–	Percent Time	Zoom out scale.
SV	Volume>Cyl	Sort next level by value.

Cmd	When Applied To Object	Action
SN	Volume>Cyl	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | BKNSM2       0A99-3390         45.09 00000000000000000000000         |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     Data management CPU measurements          138                             |
|     Device address                            0A99                            |
|     Volume serial number                      BKNSM2                          |
|     I/O unit type                             DASD                            |
|     Device                                    3390                            |
|     Total CPU measurements                    306                             |
|     Percent of total                          45.09%                          |
|                                                                               |
+-------------------------------------------------------------------------------+
```

SETUP options

The following SETUP option can be selected with the SETUP primary command:

Minimum percentage of time
: You can set this option to eliminate reporting of I/O where the percentage of time is below a certain threshold.

D02 - DASD usage by DDNAME

Note: This report also covers TAPE I/O.

Overview

This report shows how much DASD or TAPE I/O time was measured for each file that was open during the observation session. The quantification is based on the number of samples activity on the file was observed. This is expressed as a percentage of the total number of samples.

Two types of detail line are shown:

- DDNAME
- Cylinder Address (for DASD)

Initially, only the DDNAME lines are visible. You can expand a DDNAME line (using the "+" line command) to reveal its subordinate Cylinder Address lines.

A sample report is shown here, it has been fully expanded:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
D02: DASD Usage Time by DDNAME (0618/TSTJOB01)               Row 00001 of 00006
Command ===> _____________________________________________ Scroll ===> CSR

DDNAME>Cyl   Volume>Unit        Percent of Time * 10.00%  ±2.2%
                                    *....1....2....3....4....5....6....7....8..
VSAM1-02      BKNSM2           8.90 =====
→ Cyl_00BA         0A93-3390   8.85 =====
→ Cyl_0007         0A93-3390   0.05

INFILE       BKNSM1            1.25 ==
→ Cyl_0086         0A92-3390   1.25 ==
```

Detail line descriptions

DDNAME

This represents a file which was open during the observation session. If the same DDNAME is open (and closed) multiple times during the session, it is suffixed with an instance number to indicate this.

Cylinder Address

These lines appear when the "+" line command is used to expand a DDNAME line. Each line shows a particular DASD cylinder and further breaks down the measurement by file into quantification by specific cylinders.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	DDName, Cylinder Address	Display context help information.
++	DDName, Cylinder Address	Show additional details.
+	DDName	Expand to reveal next level.
–	DDName	Collapse to hide next level.
SV	DDName	Sort next level by value.
SN	DDName	Sort next level by name.

on headings

Cmd	When Applied To Object	Action
?	DDName>Cyl, Unit–Dev>DD, Percent Time	Display context help information.
+	DDName>Cyl	Expand to reveal all entries.
+	Volume>Unit	Expand field size.
+	Percent Time	Zoom in scale.
–	DDName>Cyl	Collapse to show only first level.
–	Volume>Unit	Reduce field size.
–	Percent Time	Zoom out scale.

Cmd	When Applied To Object	Action
SV	DDName>Cyl	Sort next level by value.
SN	DDName>Cyl	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-----------------------------------------------------------------------------+
|                                                                More:     +    |
| +--------------- The following report line was selected ---------------+    |
| | VSAM1         BKNSM2           45.09 00000000000000000000000         |    |
| +-------------------------------------------------------------------+    |
|                                                                             |
| Calculation Details                                                         |
|    Data management CPU measurements          138                            |
|    I/O unit type                             DASD                           |
|    Servicing I/O requests for DD Name        VSAM1                          |
|    Total CPU measurements                    306                            |
|    Percent of total                          45.09%                         |
|                                                                             |
|                                                                             |
| VSAM file VSAM1 OPENed at 7:27:14.84 Friday Oct 7 2005                      |
|                                                                             |
|    DDNAME               VSAM1                                               |
|    Open Intent          KEY,DIR,OUT                                         |
|    Dataset Name         USER1.DATA.TESTPF.DAT                               |
|    Storage Class        BKNSMS                                              |
|    Device Type          3390                                                |
|    % Free Bytes in CI   10%                      Initial       Last         |
|    Volume Serial        BKNSM2   CI Splits        0             0          |
|    CI Size              8,192    CA Splits        0             0          |
|    Record Size (LRECL)  80       Logical Records  8             7,282      |
|    Number of Extents    1        Deleted Records  1             1          |
|    SHAREOPTIONS         (1 3)    Insrted Records  0             0          |
|    Organization         KSDS     Retrved Records  1             1          |
|    CIs per CA           78       Updated Records  0             0          |
|    Free CIs per CA      11       Bytes Free Space 1,908,736     1,327,104  |
|    Free Bytes per CI    819      Number of EXCPs  13            7,287      |
|    % Free CIs in CA     15%                                                 |
|    Strings              1                                                   |
|    DATA Buffers         2                                                   |
|    INDEX Buffers        1                                                   |
|                                                                             |
+-----------------------------------------------------------------------------+
```

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
| Index Component of VSAM1                                                      |
|                                                                               |
|                                                          More:   -            |
|    Dataset Name         USER1.DATA.TESTPF.IDX                                 |
|    Storage Class        BKNSMS                                                |
|    Device Type          3390                                                  |
|    % Free Bytes in CI   0%                        Initial       Last          |
|    Volume Serial        BKNSM2   CI Splits         0             0           |
|    CI Size              1,024    CA Splits         0             0           |
|    Record Size (LRECL)  1,017    Logical Records   1             1           |
|    Number of Extents    1        Deleted Records   0             0           |
|    SHAREOPTIONS         (1 3)    Insrted Records   0             0           |
|    Organization         KSDS     Retrved Records   0             0           |
|    CIs per CA           33       Updated Records   0             71          |
|    Free CIs per CA      0        Bytes Free Space  32,768        32,768      |
|    Free Bytes per CI    0        Number of EXCPs   4             75          |
|    % Free CIs in CA     0%                                                    |
+-------------------------------------------------------------------------------+
```

SETUP options

The following SETUP option can be selected with the SETUP primary command:

Minimum percentage of time
You can set this option to eliminate reporting of I/O where the percentage of time is below a certain threshold.

D03 - DASD usage by data set

Note: This report also covers TAPE I/O.

Overview

This report shows how much DASD or TAPE I/O time was used by each data set for which activity was measured during the observation session. The quantification is based on the number of samples activity on the device was observed. This is expressed as a percentage of the total number of samples.

Two types of detail line are shown:

- Data set
- DDNAME

Initially, only the data set lines are visible. You can expand a data set line (using the "+" line command) to reveal its subordinate DDNAME lines.

A sample report is shown here, it has been fully expanded:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
D03: DASD Usage Time by Dataset (0618/TSTJOB01)              Row 00001 of 00005
Command ===> ____________________________________________________ Scroll ===> CSR

Dataset_Name>DDName   Percent of Time * 10.00%  ±2.2%
                           *....1....2....3....4....5....6....7....8..
USER1.DATA.TESTPF      8.90 ====
→ VSAM1-02   BKNSM2    8.90 ====

USER1.TESTPF2.INFILE   1.25 ==
→ INFILE  BKNSM1       1.25 ==
```

Detail line descriptions

Data set
This shows the name of a data set that was open at some point during the observation sesion.

DDNAME
This line shows a DDNAME corresponding to the data set name. There could be multiple entries under a data set if the data set was open more than once (concurrently or serially) with different DDNAMEs. If the same DDNAME is open (and closed) multiple times for the data set, it is suffixed with an instance number to indicate this.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Data set Name, DDName	Display context help information.
++	Data set Name, DDName	Show additional details.
+	Data set Name	Expand to reveal next level.
–	Data set Name	Collapse to hide next level.
SV	Data set Name	Sort next level by value.
SN	Data set Name	Sort next level by name.

on headings

Cmd	When Applied To Object	Action
?	Data set Name>DDName, Percent Time	Display context help information.
+	Data set Name>DDName	Expand to reveal all entries.
+	Percent Time	Zoom in scale.
–	Data set Name>DDName	Collapse to show only first level.
–	Percent Time	Zoom out scale.
SV	Data set Name>DDName	Sort next level by value.
SN	Data set Name>DDName	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | ARA01.DATA.TESTPF                    45.09 00000000000000000000000   |      |
| +----------------------------------------------------------------------+      |
|                                                                               |
| Calculation Details                                                           |
|    Data management CPU measurements          138                              |
|    I/O unit type                             DASD                             |
|    Data set name                             ARA01.DATA.TESTPF                |
|    Total CPU measurements                    306                              |
|    Percent of total                          45.09%                           |
+-------------------------------------------------------------------------------+
```

SETUP options

The following SETUP option can be selected with the SETUP primary command:

Minimum percentage of time
You can set this option to eliminate reporting of I/O where the percentage of time is below a certain threshold.

D04 - Data set attributes

This report lists information about each of the data sets (DASD and TAPE) which were open at some point during the observation session. Various attributes of each of the data sets are reported.

A sample report is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
D04: Dataset Attributes (0618/TSTJOB01)                      Row 00001 of 00105
Command ===> ____________________________________________ Scroll ===> CSR

SORT by: DDname enter SF, by Dataset Name enter SD.
Dataset information reported for  4  Files.

Non-VSAM file OUTFILE OPENed at 6:45:30.18 Monday Jan 26 2004

   DDNAME               OUTFILE
   Open Intent          OUTPUT
   Dataset Name         USER1.TESTPF2.OUTFILE
   Device Type          3390     Number of Extent 3
   Volume Serial        BKNSM1   Dataset Organiza PS
   Block Size (BLKSIZE) 27,930   RECFM            FIXED BLOCKED
   Record Size (LRECL)  133      Data Buffers     0


Non-VSAM file INFILE OPENed at 6:45:30.53 Monday Jan 26 2004

   DDNAME               INFILE
   Open Intent          INPUT
   Dataset Name         USER1.TESTPF2.INFILE
   Device Type          3390     Number of Extent 1
   Volume Serial        BKNSM1   Dataset Organiza PS
   Block Size (BLKSIZE) 13,300   RECFM            FIXED BLOCKED
   Record Size (LRECL)  133
```

Scrolling down in this example shows some VSAM file information.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
D04: Dataset Attributes (0618/TSTJOB01)                      Row 00026 of 00105
Command ===> ____________________________________________ Scroll ===> CSR

VSAM file VSAM1(1) OPENed at 6:45:33.66 Monday Jan 26 2004

   DDNAME               VSAM1
   Open Intent          KEY,DIR,OUT,RST
   Dataset Name         USER1.DATA.TESTPF.DAT
   Storage Class        BKNSMS
   Device Type          3390
   % Free Bytes in CI   10%                     Initial       Last
   Volume Serial        BKNSM2   CI Splits       0             0
   CI Size              8,192    CA Splits       0             0
   Record Size (LRECL)  80       Logical Records 0             0
   Number of Extents    1        Deleted Records 0             0
   SHAREOPTIONS         (1 3)    Insrted Records 0             0
   Organization         KSDS     Retrved Records 0             0
   CIs per CA           78       Updated Records 0             0
   Free CIs per CA      11       Byter Free Space 1,916,928    1,916,928
   Free Bytes per CI    819      Number of EXCPs 2             2
   % Free CIs in CA     15%
   Strings              0
   DATA Buffers         0
   INDEX Buffers        0
```

This example shows the index component:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
D04: Dataset Attributes (2133/TSTJOB01)                     Row 00060 of 00116
Command ===>                                                  Scroll ===> CSR
Index Component of VSAM1(1)

   Dataset Name         USER1.DATA.TESTPF.IDX
   Storage Class        BKNSMS
   Device Type          3390
   % Free Bytes in CI   0%                      Initial       Last
   Volume Serial        BKNSM2   CI Splits       0             0
   CI Size              1,024    CA Splits       0             0
   Record Size (LRECL)  1,017    Logical Records 0             0
   Number of Extents    1        Deleted Records 0             0
   SHAREOPTIONS         (1 3)    Insrted Records 0             0
   Organization         KSDS     Retrved Records 0             0
   CIs per CA           33       Updated Records 0             0
   Free CIs per CA      0        Bytes Free Space 33,792       33,792
   Free Bytes per CI    0        Number of EXCPs 1             1
   % Free CIs in CA     0%
```

When available to Application Performance Analyzer, the following additional DASD statistics are displayed in D04, and in the detail windows of other DASD reports:

- Average Response Time
- Average Pending Time
- Average Disconnect Time
- Average Connect Time
- Average Queued Time
- Total I/Os
- Cache Candidates
- Cache Hits
- Write Candidates

- Write Hits

This example shows some of the additional DASD statistics:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
D04: Dataset Attributes (4167/AGM01G)                      Row 00005 of 00125
Command ===>                                                 Scroll ===> CSR
VSAM file BNCSTFL OPENed at 16:19:58.25 Tuesday Aug 25  2009

   DDNAME               BNCSTFL
   Open Intent          KEY,DIR,SEQ,OUT
   Dataset Name         BNET.CICS22C.BNCSTFL.DATA
   Storage Class        BKNDATA
   Device Type          3390
   % Free Bytes in CI   0%                       Initial       Last
   Volume Serial        BKNA91+  CI Splits        0             0
                        BKNA93
   CI Size              8,192    CA Splits        0             0
   Record Size (LRECL)  516      Logical Records  14            14
   Number of Extents    1        Deleted Records  0             0
   SHAREOPTIONS         (4 3)    Insrted Records  0             0
   Organization         KSDS     Retrved Records  15,858,330    15,918,231
   CIs per CA           12       Updated Records  1             1
   Free CIs per CA      0        Bytes Free Space 90,112        90,112
   Free Bytes per CI    0        Number of EXCPs  7,991,951     8,051,851
   % Free CIs in CA     0%
   Strings              1        String Waits     0
   DATA Buffers         2        String Waits HWM 0
   INDEX Buffers        1
   Avg Response Time    0.0256   Avg Pending Time 0.0000
   Avg Disconnect Time  0.0000   Avg Connect Time 0.0128
   Avg Queued Time      0.0000   Total I/Os       59,900
   Cache Candidates     59,900   Cache Hits       59,900
```

You can place your cursor on the SORT field and enter any of the following sort codes to re-sort the report:

- SF By DDName
- SD By Data set name

D05 - DASD EXCP summary

Note: This report also covers TAPE I/O.

Usage

Use this report to see a summary of the number of EXCPs for each open data set.

Quantification

Each report line shows EXCP counts for a DDNAME. The EXCP count at the time the file was first observed to be open and the count at the time the file was last observed to be open are reported. The difference between these two values is also reported; this is the number of EXCPs occurring during the measurement interval.

Detail line hierarchy

There is only one detail line level in this report.

Detail line descriptions

EXCP counts

Each detail line shows the following information.

Under Heading	This is Displayed
DDNAME	The DDNAME of the file. If multiple OPENs occurred for the DDNAME, a separate line is reported for each "instance." A sequence number is appended to the DDNAME indicating the instance.
Type	The type of file (VSAM, Non-VSAM, Tape, etc.)
Concat	The concatenation number. A value (+0, +1, +2 ...) appears here to indicate the data set position in a concatenation.
At Start	The EXCP count for the data set when first observed. For VSAM data sets, the system maintains this count for the life of the file. For non-VSAM, this only reflects EXCPs during the step.
At End	The EXCP count for the data set when last observed. For VSAM data sets, the system maintains this count for the life of the file. For non-VSAM, this only reflects EXCPs during the step.
During Measurement	The number of EXCPs for the measurement duration. This is computed as the difference between the "At Start" count and the "At End" count. **Note:** The system maintains EXCP counts at the data set level. If a data set had more than one file open concurrently under different DDNAMEs, then overlapping EXCP counts will be reported.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
D05: DASD EXCP Summary (0647/TSTJOB01)                        Row 00001 of 00082
Command ===> ____________________________________________________ Scroll ===> CSR
                                          ____________ Number of EXCPs ____________
DDNAME         Type        Concat  At Start     At End   During Measurement

SAMPIN         Non-VSAM                  0         30              30
ISPMLIB        Non-VSAM      +2         22         26               4
ISP07053       Non-VSAM                 19         21               2
SYS00117       VSAM-DATA              3648       3649               1
               VSAM_INDEX               41         42               1
SYS00116       VSAM-DATA                 2          3               1
               VSAM_INDEX                1          2               1
ISP07078-3     Non-VSAM                 35         37               2
ISP07073       Non-VSAM                  4          5               1
ISP07074       Non-VSAM                 20         21               1
ISP07078-1     Non-VSAM                 34         35               1
ISP07078-2     Non-VSAM                 34         35               1
ISPPROF        Non-VSAM                 50         50               0
ISPPLIB        Non-VSAM      +0          0          0               0
ISPTLIB        Non-VSAM      +2          0          0               0
ISPPLIB        Non-VSAM      +2          6          6               0
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	DDName	Display context help information.
++	DDName	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	DDName	Display context help information.
SV	DDName	Sort next level by value.
SN	DDName	Sort next level by name.

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:

```
  File  View  Navigate  Help
- +-------------------------------------------------------------+ -------------
D | Options for DASD EXCP Summary                                | 001 of 00107
C |                                                              | ll ===> CSR
  | Enter "/" to select an option                                |
  |   _  Omit files for which no EXCPs were counted              | ________
D |      during the measurement interval. Unselect to            | asurement
  |      include all files.                                      |
S |                                                              | 82
I +-------------------------------------------------------------+  0
```

Select this option to omit files from the report for which no I/O activity was observed. Deselect this option to display all files.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------+
|                                                            More:    +    |
| +--------------- The following report line was selected -------------+   |
| | INFILE         Non-VSAM                 0         14            14|   |
| +-------------------------------------------------------------------+   |
|                                                                         |
| Non-VSAM file INFILE OPENed at 6:45:30.53 Monday Jan 26 2004             |
|                                                                         |
|    DDNAME               INFILE                                          |
|    Open Intent          INPUT                                           |
|    Dataset Name         USER1.TESTPF2.INFILE                            |
|    Device Type          3390     Nbr of Extents   1                     |
|    Volume Serial        BKNSM1   Dataset Org      PS                    |
|    Block Size (BLKSIZE) 13,300   RECFM            FIXED BLOCKED         |
|    Record Size (LRECL)  133      Data Buffers     0                     |
|                                                                         |
+-------------------------------------------------------------------------+
```

D06 - DASD VSAM statistics

Usage

Use this report to see file access statistics for each open VSAM data set.

Quantification

Each report line shows a VSAM DDNAME and its associated file access statistics.

Detail line hierarchy

There is only one detail line level in this report.

Detail line descriptions

VSAM statistics

Each detail line shows the following information.

Under Heading	This is Displayed
DDNAME	The DDNAME of the file. If multiple OPENs occurred for the DDNAME, a separate line is reported for each "instance." A sequence number is appended to the DDNAME indicating the instance.
Retrvd	The number of records retrieved from the file during the measurement interval.
Added	The number of new records added to the file during the measurement interval.
Insrtd	The number of records inserted during the measurement interval. This count is also included in the 'added' record count.
Deletd	The number of records deleted from the file during the measurement interval.
Updatd	The number of updates to existing records during the measurement interval.
EXCPs	The number of EXCPs during the measurement interval.
FreeSpc	The change, in bytes, to the amount of free space during the measurement interval. This is shown as a plus or minus value to indicate if the free space increased or decreased.
CISplts	The change in the number of CI splits during the measurement interval. This is shown as a plus or minus value to indicate if the number of CI splits increased or decreased.
CASplts	The change in the number of CA splits during the measurement interval. This is shown as a plus or minus value to indicate if the number of CA splits increased or decreased.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
D06: DASD VSAM Statistics (0650/TSTJOB01)                    Row 00001 of 00006
Command ===> ____________________________________________________ Scroll ===> CSR

                 Logical Records During Interval                +/- During Inte
DDNAME        Retrvd   Added  Insrtd  Deletd  Updatd   EXCPs  FreeSpc CISplts C

FILEA            749      +0       0       0       0       0       +0      +0
DFHLCD             0      +0       0       0       0       0       +0      +0
DFHGCD             0      +0       0       0       0       0       +0      +0
DFHTEMP            0      +0       0       0       0       0       +0      +0
DFHINTRA           0      +0       0       0       0       0       +0      +0
DFHLRq             0      +0       0       0       0       0       +0      +0
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	DDName	Display context help information.
++	DDName	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	DDName	Display context help information.
SV	DDName	Sort next level by value.
SN	DDName	Sort next level by name.

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:

```
  File  View  Navigate  Help
- +-------------------------------------------------------------+ -------------
D | Options for DASD VSAM Statistics                             | 001 of 00006
C |                                                              | ll ===> CSR
  | Enter "/" to select an option                                |
  |   _  Omit files for which no EXCPs were counted              | - During Inte
D |      during the measurement interval. Unselect to            | Spc CISplts C
  |      include all files.                                      |
  |                                                              |
  +-------------------------------------------------------------+
```

Select this option to omit from the report files for which no activity took place. Deselect this option to display all files.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-----------------------------------------------------------------------------+
|                                                                More:    +    |
| +--------------- The following report line was selected -------------+      |
| | VSAM1-02      BKNSM2          8.90 ===                              |      |
| +-------------------------------------------------------------------+      |
|                                                                             |
| VSAM file FILEA OPENed at 13:04:47.81 Tuesday Mar 2 2004                    |
|                                                                             |
|    DDNAME               FILEA                                               |
|    Open Intent          KEY,DSN,DIR,SEQ,SKP,OUT,NLW,LSR SHRPOOL=1           |
|    Dataset Name         BNET.CICS22A.FILEA.DATA                             |
|    Storage Class        BKNDATA                                             |
|    Device Type          3390                                                |
|    % Free Bytes in CI   0%                       Initial       Last         |
|    Volume Serial        BKNA91   CI Splits        0             0           |
|    CI Size              18,432   CA Splits        0             0           |
|    Record Size (LRECL)  80       Logical Records  44            44          |
|    Number of Extents    1        Deleted Records  0             1           |
|    SHAREOPTIONS         (1 3)    Insrted Records  0             0           |
|    Organization         KSDS     Retrved Records  117,704       118,453     |
|    CIs per CA           3        Updated Records  0             0           |
|    Free CIs per CA      0        Byter Free Space 36,864        36,864      |
|    Free Bytes per CI    0        Number of EXCPs  29            29          |
|    % Free CIs in CA     0%                                                  |
|    Strings              1                                                   |
|    DATA Buffers         1                                                   |
|    INDEX Buffers        1                                                   |
|                                                                             |
| Index Component of FILEA                                                    |
|                                                                             |
|    Dataset Name         BNET.CICS22A.FILEA.INDEX                            |
|    Storage Class        BKNSMS                                              |
|    Device Type          3390                                                |
|    % Free Bytes in CI   0%                       Initial       Last         |
|    Volume Serial        BKNA91   CI Splits        0             0           |
|    CI Size              512      CA Splits        0             0           |
|    Record Size (LRECL)  505      Logical Records  1             1           |
|    Number of Extents    1        Deleted Records  0             0           |
+-----------------------------------------------------------------------------+
```

```
 File  View  Navigate  Help
+-----------------------------------------------------------------------------+
|                                                                More:  - +    |
|    SHAREOPTIONS         (2 3)    Insrted Records  0             0           |
|    Organization         KSDS     Retrved Records  0             0           |
|    CIs per CA           49       Updated Records  0             0           |
|    Free CIs per CA      0        Byter Free Space 24,576        24,576      |
|    Free Bytes per CI    0        Number of EXCPs  35            35          |
|    % Free CIs in CA     0%                                                  |
|                                                                             |
| Shared Resource Pool Information for LSR Pool 1                             |
|                                                   Initial     Last          |
|    Type (Data/Index)    DATA     Reads                  1        1          |
|    Buffer Size          512      Reads Avoided          0      228          |
|    Buffers              8        User Writes            0        0          |
|    Hiperspace Buffers   0        Non-user Writes        0        0          |
```

D07 - DASD activity timeline

Note: This report also covers TAPE I/O.

Usage

Use this report to see, for each file, how I/O activity was distributed over the measurement interval.

Quantification

A graph, in bar chart format, is displayed for each DDNAME. The horizontal axis represents the measurement interval which spans 50 columns. Each column represents an equal 1/50th sub-interval of time. A scale is shown at the bottom of the graph indicating the percentage of time progression in the overall interval.

In each column, a vertical graph shows (roughly) how much I/O activity took place during the sub-interval. If any I/O activity did take place, a vertical bar of 1, 2, 3, 4 or 5 characters, extending upward from the scale, is displayed indicating the percentage of time in the sub-interval I/O was observed.

Detail line descriptions

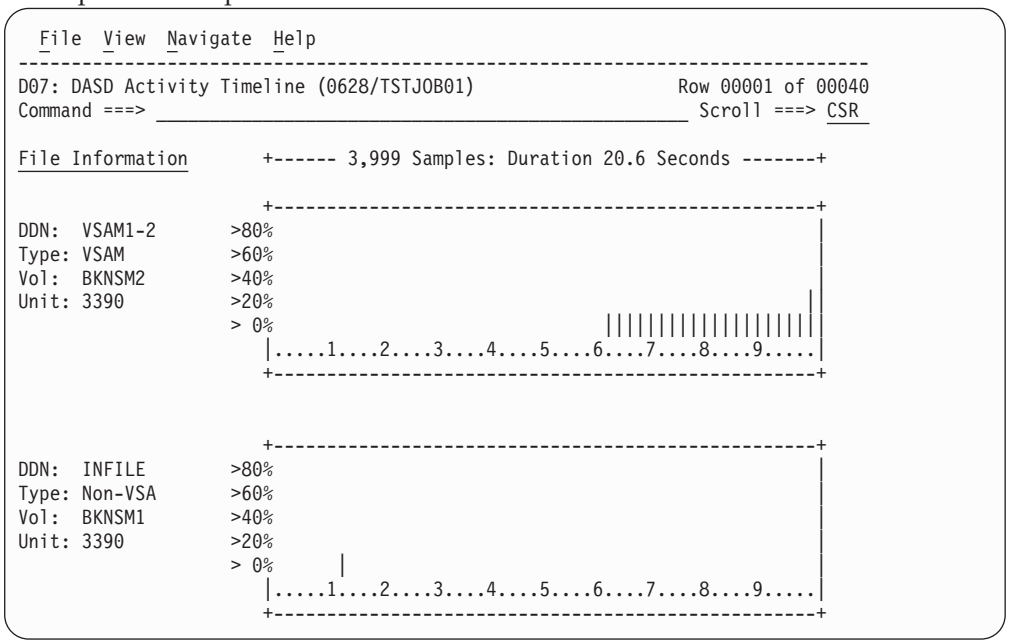
File I/O activity distribution

A group of lines is shown for each reported file. Some information about the file appears to the left and a bar chart to the right.

Under Heading	This is Displayed
File Information	File Information The following information is shown for each file. • The DDNAME • Type of file (VSAM, non-VSAM, Tape, etc.) • Volser • Unit (device type)
nnnn Samples: Duration ...	A graph showing the distribution of I/O activity over the measurement interval.

Sample reports

A sample of the report is shown here:



Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

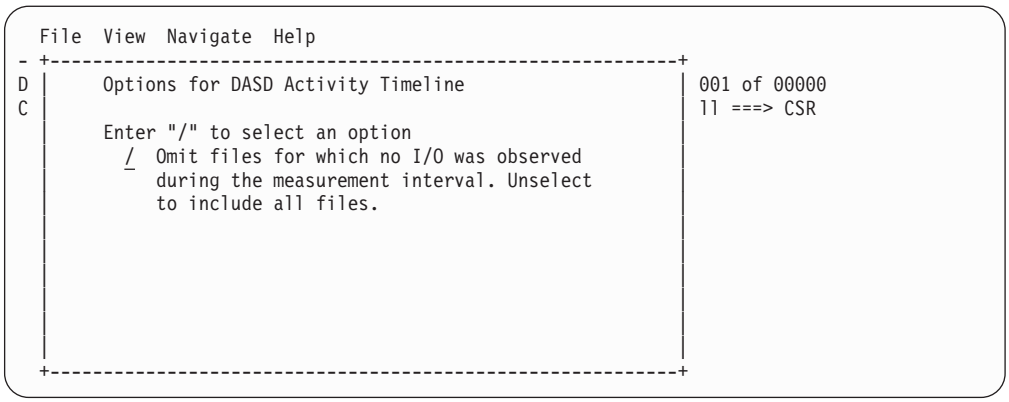
Cmd	When Applied To Object	Action
?	DDName	Display context help information.
++	DDName	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	DDName	Display context help information.
SV	DDName	Sort next level by value.
SN	DDName	Sort next level by name.

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:

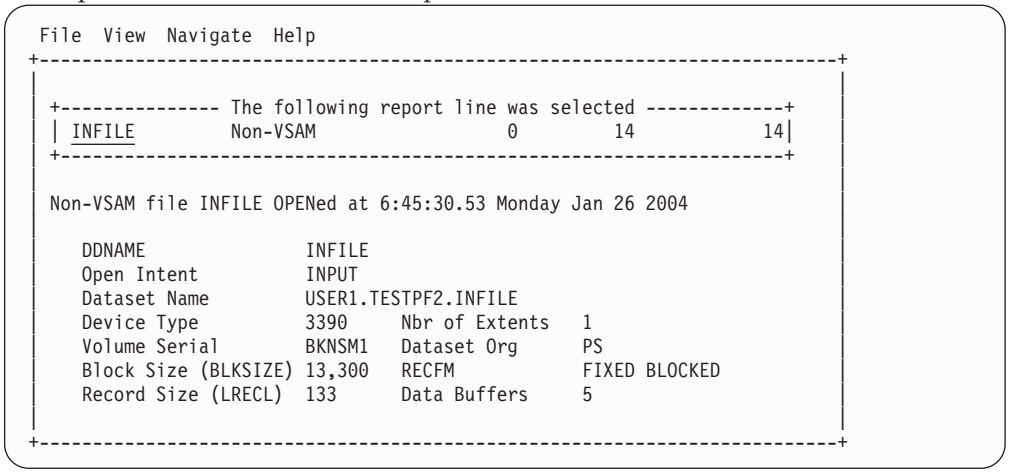


Select this option to omit from the report files for which no activity took place. This is the default option. Deselect this option to display all files, which will typically result in the display of numerous empty graphs.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:



D08 - DASD I/O wait time

Usage

Use this report to examine delays resulting from waits during DASD I/O operations. Note: This report is not applicable to CICS.

Quantification

Samples are counted in which the following conditions were observed:

- All TCBs (tasks) are in WAIT state
- One (or more) TCB is waiting for completion of a DASD I/O request

The number of samples satisfying these conditions divided by the total number of samples represents the percentage of time the step was waiting for completion of DASD I/O. These percentages are computed and reported by DDNAME.

Detail line hierarchy

An unexpanded D08 report shows a line for each DDNAME causing a delay in execution while waiting for DASD I/O activity to complete. You can expand each line to reveal additional hierarchical levels of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 DDNAME
 Level 2 File I/O Request
  Level 3 Supervisor Call (SVC)
   Level 4 Module
    Level 5 CSECT

 Level 2 File I/O Request
  Level 3 Module
   Level 4 CSECT

 Level 2 Supervisor Call (SVC)
  Level 3 Module
   Level 4 CSECT
```

Detail line descriptions

DDNAME

This line identifies the DDNAME of a file for which delays due to wait for I/O completion were observed.

Under Heading	This is Displayed
Description	The volume ID (VOLSER) for the DDNAME. For a multivolume data set, the first volume is displayed.
Percent of Time	The percentage of the measurement interval time the step was waiting for completion of I/O for the indicated DDNAME.

File I/O request

This line identifies the file request macro that caused a wait for I/O completion.

Under Heading	This is Displayed
Name	The DASD I/O macro function (GET, PUT, CHECK, etc.) that caused the wait.
Description	The address of the macro (return address) in CSECT+offset format.
Percent of Time	The percentage of the measurement interval time the step was waiting for completion of I/O for the indicated macro.

Load module

This line identifies the data management load module in which the wait occurred.

Under Heading	This is Displayed
Name	Name of load module in which WAIT request was issued.
Description	Functional description of the load module if one is available.
Percent of Time	The percentage of the measurement interval time the step was waiting for completion of I/O.

CSECT

This line identifies the CSECT in the data management load module in which the wait occurred.

Under Heading	This is Displayed
Name	Name of CSECT in which WAIT request was issued.
Description	Functional description of the CSECT if one is available.
Percent of Time	The percentage of the measurement interval time the step was waiting for completion of I/O.

Supervisor Call (SVC)

This line identifies an SVC (Supervisor Call) that issued the wait.

Under Heading	This is Displayed
Name	Name of SVC (Supervisor Call) in which WAIT request was issued.
Description	Functional description of the SVC.
Percent of Time	The percentage of the measurement interval time the step was waiting for completion of I/O.

Sample reports

A sample of the report as it is first displayed is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
D08: DASD I/O Wait Time (0099/TSTJOB01)                      Row 00001 of 00006
Command ===> ____________________________________________ Scroll ===> CSR

Name         Description        Percent of CPU time * 10.00%  ±3.5%
                                     *....1....2....3....4....5....6....7....8.
VSOUT1         BKNSM1            7.07 ====
VSOUT2         BKNSM1            5.05 ===
VSOUT3         BKNSM1            3.03 ==
VSINP4         BKNSM1            1.26 =
QSOUT5         BKNSM1            0.25
QSINP6         BKNSM1            0.12
```

Here is a sample of the report which has been fully expanded by entering the "+" line command on the Name heading:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
D08: DASD I/O Wait Time (0099/TSTJOB01)                      Row 00001 of 00030
Command ===> _____________________________________________ Scroll ===> CSR

Name          Description        Percent of CPU time * 10.00%  ±3.5%
                                       *....1....2....3....4....5....6....7....8.
VSOUT1          BKNSM1             7.07 ====
→ PUT            U0053+C8          7.07 ====
  → IDA019L1      Virtual I/O (VI 7.07 ====
    → IDA019R3      CSECT in IDA0 7.07 ====

VSOUT2          BKNSM1             5.05 ===
→ PUT            U0053+194         5.05 ===
  → IDA019L1      Virtual I/O (VI 5.05 ===
    → IDA019R3      CSECT in IDA0 4.80 ==
    → IDA019RZ      CSECT in IDA0 0.25

VSOUT3          BKNSM1             3.03 =
→ PUT            U0053+266         3.03 =
  → IDA019L1      Virtual I/O (VI 3.03 =
    → IDA019R3      CSECT in IDA0 3.03 =
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	DDName, File I/O Request, Load Module, CSECT, SVC	Display context help information.
++	DDName, File I/O Request, Load Module, CSECT, SVC	Show additional details.
+	DDName, File I/O Request, Load Module, SVC	Expand to reveal next level.
–	DDName, File I/O Request, Load Module, SVC	Collapse to hide next level.
SV	DDName, File I/O Request	Sort next level by value.
SN	DDName, File I/O Request	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	CSECT	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	DDName	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of Time	Zoom out scale.

Cmd	When Applied To Object	Action
SV	Name, Description, Percent of Time	Sort next level by value.
SN	Name, Description, Percent of Time	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------+
|                                                          More:     +    |
| +--------------- The following report line was selected ---------------+ |
| | VSAM1         BKNSM2              4.04 OO                            | |
| +-------------------------------------------------------------------+ |
|                                                                         |
| Calculation Details                                                     |
|    Data management CPU measurements          124                        |
|    I/O unit type                             DASD                       |
|    Servicing I/O requests for DD Name        VSAM1                      |
|    Total measurements                        3,063                      |
|    Percent of total                          4.04%                      |
|                                                                         |
|                                                                         |
| VSAM file VSAM1 OPENed at 7:27:14.84 Friday Oct 7 2005                  |
|                                                                         |
|    DDNAME               VSAM1                                           |
|    Open Intent          KEY,DIR,OUT                                     |
|    Dataset Name         USER1.DATA.TESTPF.DAT                           |
|    Storage Class        BKNSMS                                          |
|    Device Type          3390                                            |
|    % Free Bytes in CI   10%                      Initial       Last     |
|    Volume Serial        BKNSM2   CI Splits        0             0      |
|    CI Size              8,192    CA Splits        0             0      |
|    Record Size (LRECL)  80       Logical Records  8             7,282  |
|    Number of Extents    1        Deleted Records  1             1      |
|    SHAREOPTIONS         (1 3)    Insrted Records  0             0      |
|    Organization         KSDS     Retrved Records  1             1      |
|    CIs per CA           78       Updated Records  0             0      |
|    Free CIs per CA      11       Bytes Free Space 1,908,736     1,327,104 |
|    Free Bytes per CI    819      Number of EXCPs  13            7,287  |
|    % Free CIs in CA     15%                                             |
|    Strings              1                                               |
|    DATA Buffers         2                                               |
|    INDEX Buffers        1                                               |
|                                                                         |
| Index Component of VSAM1                                                |
|                                                                         |
+-------------------------------------------------------------------------+
```

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                              More:   -        |
|    Dataset Name         USER1.DATA.TESTPF.IDX                                 |
|    Storage Class        BKNSMS                                                |
|    Device Type          3390                                                  |
|    % Free Bytes in CI   0%                        Initial       Last          |
|    Volume Serial        BKNSM2   CI Splits         0             0          |
|    CI Size              1,024    CA Splits         0             0          |
|    Record Size (LRECL)  1,017    Logical Records   1             1          |
|    Number of Extents    1        Deleted Records   0             0          |
|    SHAREOPTIONS         (1 3)    Insrted Records   0             0          |
|    Organization         KSDS     Retrved Records   0             0          |
|    CIs per CA           33       Updated Records   0             71         |
|    Free CIs per CA      0        Bytes Free Space  32,768        32,768     |
|    Free Bytes per CI    0        Number of EXCPs   4             75         |
|    % Free CIs in CA     0%                                                    |
+-------------------------------------------------------------------------------+
```

D09 - VSAM buffer pool usage

Usage

Use this report to see information about activity in VSAM LSR buffer pools.

A buffer pool number can be associated with a VSAM file. This is indicated in the Open Intent field in any reports that show detailed file information. For example, report D04 might show the following:

```
KEY,DSN,DIR,SEQ,SKP,OUT,NLW,LSR SHRPOOL=1
```

This indicates the file uses shared buffer pool number 1. Refer to report D09 to examine how effectively the buffer pool was able to reduce the I/O activity for the associated file(s).

For each buffer pool, activity is quantified for each buffer size and type (DATA or INDEX component). The buffer size corresponds to the CI size for the associated file component. VSAM will choose buffers which are at least as large as and closest in size to the CI size.

Quantification

The following values are reported.

Under Heading	This is Displayed
Type	DATA or INDEX. This indicates if the buffers are for VSAM DATA or INDEX components
Buffer Size	The buffer size, in bytes.
Buffers	The number of buffers in virtual storage.
Hiperspace™ Buffers	The number of buffers in Hiperspace.
Reads	The number of physical reads to the file. This is the number of reads that could not be avoided because no buffer contained a copy of the CI. Three values are shown: “Initial,” which is the value at the start of the measurement interval; “Last,” which is the value at the end; and “Difference,” which is the difference between the other two values. The difference between the two values represents the activity for the duration of the interval.

Under Heading	This is Displayed
Reads Avoided	The number of avoided reads (look-asides). This is the number of reads avoided because copies of the referenced CIs were found in the buffer pool. Three values are shown: “Initial,” which is the value at the start of the measurement interval; “Last,” which is the value at the end; and “Difference,” which is the difference between the other two values. The difference between the two values represents the activity for the duration of the interval. High values indicate the buffer pool was effective in causing I/O operations to be avoided.
User Writes	The number of physical writes performed to the file at the request of the user program. Three values are shown: “Initial,” which is the value at the start of the measurement interval; “Last,” which is the value at the end; and “Difference,” which is the difference between the other two values. The difference between the two values represents the activity for the duration of the interval.
Non-user Writes	The number of forced physical writes performed to the file. Three values are shown: “Initial,” which is the value at the start of the measurement interval; “Last,” which is the value at the end; and “Difference,” which is the difference between the other two values. The difference between the two values represents the activity for the duration of the interval.

Sample reports

A sample of the report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
D09: VSAM BUffer Pool Usage (5096/TSTJOB01)                  Row 00001 of 00022
Command ===> ____________________________________________ Scroll ===> CSR


Shared Resource Pool Information for LSR Pool 1
                                                 Initial     Last    Difference
   Type (Data/Index)    INDEX    Reads                 1        1             0
   Buffer Size          512      Reads Avoided    260279   270299         10020
   Buffers              5        User Writes           0        0             0
   Hiperspace Buffers   0        Non-user Writes       0        0             0

   Type (Data/Index)    DATA     Reads               576      609            33
   Buffer Size          8192     Reads Avoided    259704   269691          9987
   Buffers              5        User Writes           0        0             0
   Hiperspace Buffers   0        Non-user Writes       0        0             0

   Type (Data/Index)    INDEX    Reads                 0        0             0
   Buffer Size          8192     Reads Avoided         0        0             0
   Buffers              5        User Writes           0        0             0
   Hiperspace Buffers   0        Non-user Writes       0        0             0

   Type (Data/Index)    DATA     Reads                 0        0             0
   Buffer Size          20480    Reads Avoided         0        0             0
   Buffers              5        User Writes           0        0             0
   Hiperspace Buffers   0        Non-user Writes       0        0             0
```

G01 - Coupling facility summary

Usage

Use this report to see a summary of the coupling facility data collected during the observation session.

Facility summary

Fields under this heading summarize the storage and usage of the coupling facility by facility name. The facility name is listed in the heading.

Under Heading	This is Displayed
CF Storage	Total coupling facility storage
CF Storage Used	Total used coupling facility storage.
CF Dump Storage	Total coupling facility storage dump space.
CF Storage for Structures	Total coupling facility storage used by structures.
Subchannel Contention Count	Count of times a free subchannel was not available for synchronous immediate operations.
Subchannel Contention Time uSec	Amount of time in microseconds waiting for a free subchannel for synchronous immediate operations (u-sec).
Failed Request Count	Count of the number of summed times – for unsuccessful operations.
Failed Request Time uSec	Summed service time of unsuccessful operations (u-sec).
Number of Processors	Number of processors used by the coupling facility.
Processor Utilization	Processor utilization of coupling facility processors expressed as a percentage of the sampling time.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
G01: Coupling Facility Statistics (0003/TSTJOB01)            Row 00001 of 00023
Command ===> ____________________________________________ Scroll ===> CSR

 Facility Summary - CFCC1
   CF Storage                        74,496K
   CF Storage Used                   9,216K
   CF Dump Storage                   2,048K
   CF Storage for Structures         7,168K
   Subchannel Contention Count       0
   Subchannel Contention Time uSec   0
   Failed Request Count              0
   Failed Request Time uSec          0
   Number of Processors              1
   Processor Utilization             0%
 Facility Summary - CFCCC2
   CF Storage                        74,496K
   CF Storage Used                   2,048K
   CF Dump Storage                   2,048K
   CF Storage for Structures         0K
   Subchannel Contention Count       0
   Subchannel Contention Time uSec   0
   Failed Request Count              0
   Failed Request Time uSec          0
   Number of Processors              1
   Processor Utilization             51%
```

G02 - Coupling facility mean times

Usage

Use this report to see an analysis of how time was spent by the Coupling Facility during the observation session. Expand a Coupling Facility report line to see a further breakdown by structure name within the facility name.

Quantification

Each report line quantifies time as arithmetic means for each measured facility. The means are calculated by dividing the total of all time spent servicing the facility by its number of requests. The means are expressed in units of micro-seconds.

Detail line hierarchy

An unexpanded G02 report shows a line for each facility name in the Coupling Facility. You can expand each line to reveal an additional hierarchical level of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 Facility Name
 Level 2 Structure Name
```

Detail line descriptions

Facility detail line

This is the first-level detail line. Each line shows information about a facility name in the coupling facility.

Under Heading	This is Displayed
Name	The facility name.
Requests - Sync	The number of synchronous operations to the coupling facility.
Requests - Asynch	The number of asynchronous operations to the coupling facility.
Requests - Queued	The number of queued operations to the coupling facility.
Requests - Delay	The number of operations to the coupling facility that were delayed for dump serialization.
uSeconds - Sync	Mean micro-seconds service time per synchronous operation to the coupling facility.
uSeconds - Async	Mean micro-seconds service time per asynchronous operation to the coupling facility.
uSeconds - Queued	Mean micro-seconds service time for operations queued for the coupling facility.
uSeconds - Delay	Mean micro-seconds service time for operation delays for dump serialization.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
G02: Coupling Facility Mean Service Times (0003/TSTJOB01)     Row 00001 of 00002
Command ===> _____________________________________________ Scroll ===> CSR

                ---- Number of Requests ----        ------ Mean uSeconds -------
Name            Sync  Asynch  Queued   Delay        Sync  Asynch  Queued    Delay
CFCC1           4112       0       0       0           1       0       0        0
CFCC2              0       0       0       0           0       0       0        0
```

G03 - Coupling facility total times

Usage

Use this report to see an analysis of how time was spent by the Coupling Facility during the observation session. Expand a Coupling Facility report line to see a further breakdown by structure name within the facility name.

Quantification

Each report line quantifies total time for each measured facility. The totals are the sum of all structures within the facility name. The totals are expressed in units of microseconds.

Detail line hierarchy

An unexpanded G03 report shows a line for each facility name in the Coupling Facility. You can expand each line to reveal an additional hierarchical level of detail (using the "+" line command). The hierarchy is illustrated here:

```
Level 1 Facility Name
 Level 2 Structure Name
```

Detail line descriptions

Facility detail line

This is the first-level detail line. Each line shows information about a facility name in the coupling facility.

Under Heading	This is Displayed
Name	The facility name.
Requests - Sync	The number of synchronous operations to the coupling facility.
Requests - Asynch	The number of asynchronous operations to the coupling facility.
Requests - Queued	The number of queued operations to the coupling facility.
Requests - Delay	The number of operations to the coupling facility that were delayed for dump serialization.
uSeconds - Sync	Total micro-seconds service time per synchronous operation to the coupling facility.
uSeconds - Async	Total micro-seconds service time per asynchronous operation to the coupling facility.
uSeconds - Queued	Total micro-seconds service time for operations queued for the coupling facility.

Under Heading	This is Displayed
uSeconds - Delay	Total micro-seconds service time for operation delays for dump serialization.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
G03: Coupling Facility Total Service Times (0003/TSTJOB01)    Row 00001 of 00002
Command ===> _____________________________________________ Scroll ===> CSR

                ---- Number of Requests ----        ------ Total uSeconds ------
Name            Sync  Asynch  Queued   Delay        Sync  Asynch  Queued   Delay
CFCC1           4112       0       0       0        4352       0       0       0
CFCC2              0       0       0       0           0       0       0       0
```

V01 - Measurement variance summary

Usage

Use this report to analyze variances between multiple separate measurements. To gain access to variance reporting, issue the “V” line command from the Observation Session List. The “V” line command selects the base measurement for comparison. Prior to entering the line command you must previously tag at least one measurement by entering the “T” line command in the Observation Session List. Up to 20 measurements can be tagged at one time. This report quantifies variances between tagged measurements and the base measurement.

Measurements analyzed

The first segment of the V01 report lists the measurements analyzed in the report. Each measurement is assigned a two-digit sequential reference number. This segment of the report identifies each of the measurements and their reference number.

The measurement identified by reference number 01 is the "base" measurement, the measurement to which the other measurements are compared. Throughout this report, measurements are identified by their reference numbers.

Variances

A percentage value is displayed under the heading "Variance" in various segments of this report. Its value quantifies the variance between a particular performance figure for the compared measurement and the corresponding value for the base measurement. A plus (+) value indicates a higher value than the base measurement and a minus (-) value indicates a lower value. The value is the percentage by which the compared measurement figure exceeds (+) or is less than (-) the corresponding base measurement value. Any value exceeding 999 percent is reported as "999%." The magnitude of the value is also represented graphically by a string of greater-than or less-than symbols.

CPU time TCB

This report segment compares the TCB CPU times that were recorded by the operating system during the measurement sessions.

CPU time SRB

This report segment compares the SRB CPU times that were recorded by the operating system during the measurement sessions.

EXCP requests

This report segment compares the number of EXCPs that were processed during the measurement sessions.

Service units

This report segment compares the number of service units recorded by the operating system during the measurement sessions.

Percentage of CPU active samples

This report segment compares the percentage of samples during which one or more TCBs was executing CPU instructions.

Percentage of WAIT samples

This report segment compares the percentage of samples during which all TCBs were in WAIT state.

Percentage of queued samples

This report segment compares the percentage of samples during which no CPU activity was taking place but one or more TCBs was suspended and waiting to be dispatched.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
V01: Measurement Variance Summary (2312/TSTJOB01)            Row 00001 of 00059
Command ===> ____________________________________________________ Scroll ===> CSR

The Following Measurements are Analyzed

 Ref  ReqNum  Job Name  Date         Time     Description
 01    2312   TSTJOB01  Mar-30-2007  10:54    Test 2
 02    2311   TSTJOB01  Mar-30-2007  10:52    Test 1


_______________________________________________________________________________
CPU Time TCB

 Ref     CPU Time TCB   Variance
 01        11.41 sec
 02        11.73 sec      + 2 %


_______________________________________________________________________________
CPU Time SRB

 Ref     CPU Time SRB   Variance
 01         1.52 sec
 02         1.61 sec      + 5 %


_______________________________________________________________________________
EXCP Requests

 Ref     EXCP Requests  Variance
 01             7,721
 02             7,710      - 0 %


_______________________________________________________________________________
Service Units

 Ref     Service Units  Variance
 01             7,721
 02             7,710      + 3 %

_______________________________________________________________________________
```

```
--------------------------------------------------------------------------------
Percentage of CPU Active Samples

             --- Sample Count ---
Ref          CPU Active      Total      Percentage       Variance
 01            2,171         4,136        52.51%
 02            2,452         4,790        51.21%         - 2 %

--------------------------------------------------------------------------------
Percentage of WAIT Samples

             --- Sample Count ---
Ref          TCB WAIT        Total      Percentage       Variance
 01            1,739         4,136        42.06%
 02            1,979         4,790        41.33%         - 1 %

--------------------------------------------------------------------------------
Percentage of Queued Samples
             --- Sample Count ---

Ref          Queued          Total      Percentage       Variance
 01              224         4,136         5.41%
 02              357         4,790         7.45%          + 37 % >>
```

V02 - CICS variance summary

Usage

Use this report to analyze variances in CICS data between multiple measurements. To gain access to CICS variance reporting, issue the “V” line command on a CICS measurement from the Observation Session List. The “V” line command selects the base measurement for comparison. Prior to entering the “V” line command you must previously have tagged at least one CICS measurement by entering the “T” line command in the Observation Session List. Up to 20 measurements can be tagged at one time. This report will quantify CICS data variances between tagged measurements and the base measurement.

Measurements analyzed

The first segment of the V02 report lists the measurements analyzed in the report. Each measurement is assigned a two digit sequential reference number. This segment of the report identifies each of the measurements and their reference number.

The measurement identified by reference number 01 is the “base” measurement, which is the one to which the other measurements are compared. Throughout this report, measurements are identified by their reference numbers.

Variances

A percentage value is displayed under the heading "Variance" in various segments of this report. Its value quantifies the variance between a particular performance figure for the compared measurement and the corresponding value for the base measurement. A plus (+) value indicates a higher value than the base measurement and a minus (-) value indicates a lower value. The value is the percentage by which the compared measurement figure exceeds (+) or is less than (-) the corresponding base measurement value. Any value exceeding 999 percent is reported as "999%." The magnitude of the value is also represented graphically by a string of greater-than or less-than symbols.

CICS Transaction Statistics

This report segment displays the starting and ending task number in each measurement, the number of transactions counted and observed, and compares the transaction rate per second between measurements.

Mean Execution Time

This report segment compares the mean execution time of all CICS transactions sampled during the measurement sessions

Mean Suspend Time

This report segment compares the mean suspend time of all CICS transactions sampled during the measurement sessions.

Mean CICS Dispatch Delay Time

This report segment compares the mean CICS dispatch delay time of all CICS transactions sampled during the measurement sessions.

Mean MVS Dispatch Delay Time

This report segment compares the mean MVS dispatch delay time of all CICS transactions sampled during the measurement sessions.

Mean Service Time

This report segment compares the mean service time of all CICS transactions sampled during the measurement sessions.

Sample reports

The following sample report shows the variances between a base CICS measurement and 3 tagged CICS measurements.

```
V02: CICS Measurement Variance Summary (5592/CICS32A)         Row 00001 of 00064

 The Following Measurements are Analyzed

  Ref  ReqNum  Job Name  Date         Time     Description
   01   5592   CICS32A   Aug-09-2010  12:36    Variance 1 (Base)
   02   5593   CICS32A   Aug-09-2010  12:39    Variance 2
   03   5594   CICS32A   Aug-09-2010  12:41    Variance 3
   04   5595   CICS32A   Aug-09-2010  12:42    Variance 4

_____________________________________________________________________________
CICS Transaction Statistics

         -Task Number-      --Transaction--
   Ref    Start     End      Count     Obsvd      Rate          Variance
    01   10,894  12,640      1,746     1,075      58.20 per sec
    02   15,236  17,408      2,172     1,054      74.89 per sec   + 28 % >>
    03   17,408  19,474      2,066       900      71.24 per sec   + 22 % >
    04   19,580  21,251      1,671       908      57.62 per sec   - 0 %

_____________________________________________________________________________
Mean Execution Time

   Ref        Time          Variance
    01      0.0225 sec
    02      0.0204 sec       - 9 %
    03      0.0216 sec       - 4 %
    04      0.0175 sec       - 22 % <

_____________________________________________________________________________
Mean Suspend Time

   Ref        Time          Variance
    01      1.4997 sec
    02      1.0826 sec       - 27 % <<
    03      1.2369 sec       - 17 % <
    04      0.5693 sec       - 62 % <<<
```

```
 V02: CICS Measurement Variance Summary (5592/CICS32A)        Row 00039 of 00064
_____________________________________________________________________________
Mean CICS Dispatch Delay Time

   Ref        Time          Variance
   01      0.0337 sec
   02      0.4190 sec       +999 % >>>>>>>>>
   03      0.3559 sec       +956 % >>>>>>>>>
   04      0.9112 sec       +999 % >>>>>>>>>

_____________________________________________________________________________
Mean MVS Dispatch Delay Time

   Ref        Time          Variance
    01      0.0051 sec
    02      0.0056 sec       + 9 %
    03      0.0058 sec       + 13 % >
    04      0.0055 sec       + 7 %

_____________________________________________________________________________
Mean Service Time

   Ref        Time          Variance
    01      1.5610 sec
    02      1.5276 sec       - 2 %
    03      1.6202 sec       + 3 %
    04      1.5035 sec       - 3 %
```

V03 - DB2 variance summary

Usage

Use this report to analyze variances in DB2 data between multiple measurements. To gain access to DB2 variance reporting, issue the “V” line command on a DB2 measurement from the Observation Session List. The “V” line command selects the base measurement for comparison. Prior to entering the “V” line command you must previously have tagged at least one DB2 measurement by entering the “T” line command in the Observation Session List. Up to 20 measurements can be tagged at one time. This report will quantify DB2 data variances between tagged measurements and the base measurement.

Measurements analyzed

The first segment of the V03 report lists the measurements analyzed in the report. Each measurement is assigned a two digit sequential reference number. This segment of the report identifies each of the measurements and their reference number.

The measurement identified by reference number 01 is the “base” measurement, which is the one to which the other measurements are compared. Throughout this report, measurements are identified by their reference numbers.

Variances

A percentage value is displayed under the heading "Variance" in various segments of this report. Its value quantifies the variance between a particular performance figure for the compared measurement and the corresponding value for the base measurement. A plus (+) value indicates a higher value than the base measurement and a minus (-) value indicates a lower value. The value is the percentage by which the compared measurement figure exceeds (+) or is less than (-) the corresponding base measurement value. Any value exceeding 999 percent is reported as "999%." The magnitude of the value is also represented graphically by a string of greater-than or less-than symbols.

SQL calls sampled

This report segment displays the subsystem name and version of the DB2 subsystem being used, and compares the number of calls sampled during the measurement sessions.

SQL observations

This report segment compares the number of samples taken while an SQL call was in-flight.

SQL calls executed

This report segment compares the number of calls executed during the sample based on the REQCT count for the active threads.

Avg SQL call rate

This report segment compares average SQL call rate per second.

SQL calls counted

This report segment compares the number of calls counted by the DB2+ intercept during sampling. This segment is displayed for measurements with the DB2+ extractor active.

SQL throughput

This report segment compares the throughput rate of the samples based on the number of calls made during the time that SQL was active in the sample.

SQL service time

This report segment compares the total service time of the samples while an SQL call was active. This segment is displayed for measurements with the DB2+ extractor active.

SQL call max time

This report segment compares the highest service time for an SQL call. This segment is displayed for measurements with the DB2+ extractor active.

SQL call min time

This report segment compares the lowest service time for an SQL call. This segment is displayed for measurements with the DB2+ extractor active.

SQL CPU time

This report segment compares the total CPU time used to process SQL calls. This segment is displayed for measurements with the DB2+ extractor active.

SQL call max CPU

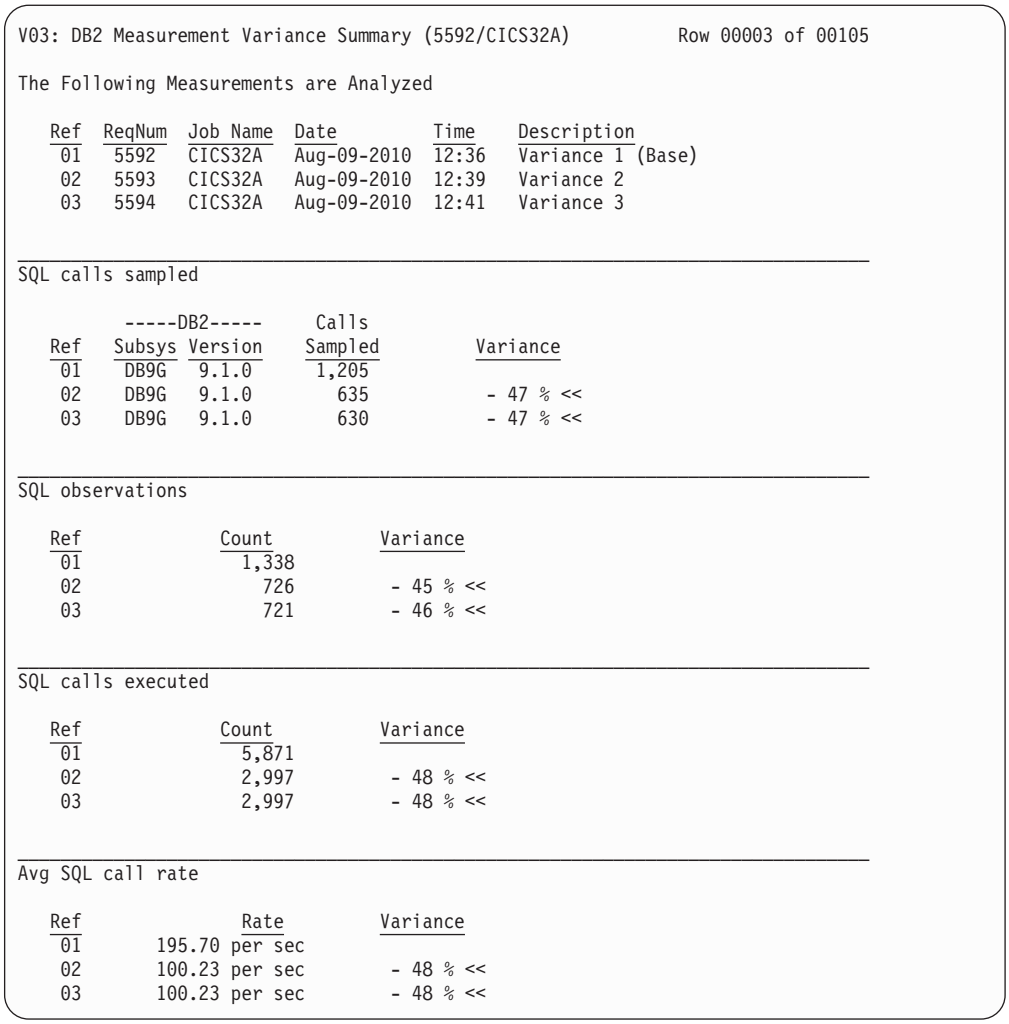
This report segment compares the highest CPU time for an SQL call. This segment is displayed for measurements with the DB2+ extractor active.

SQL call min CPU

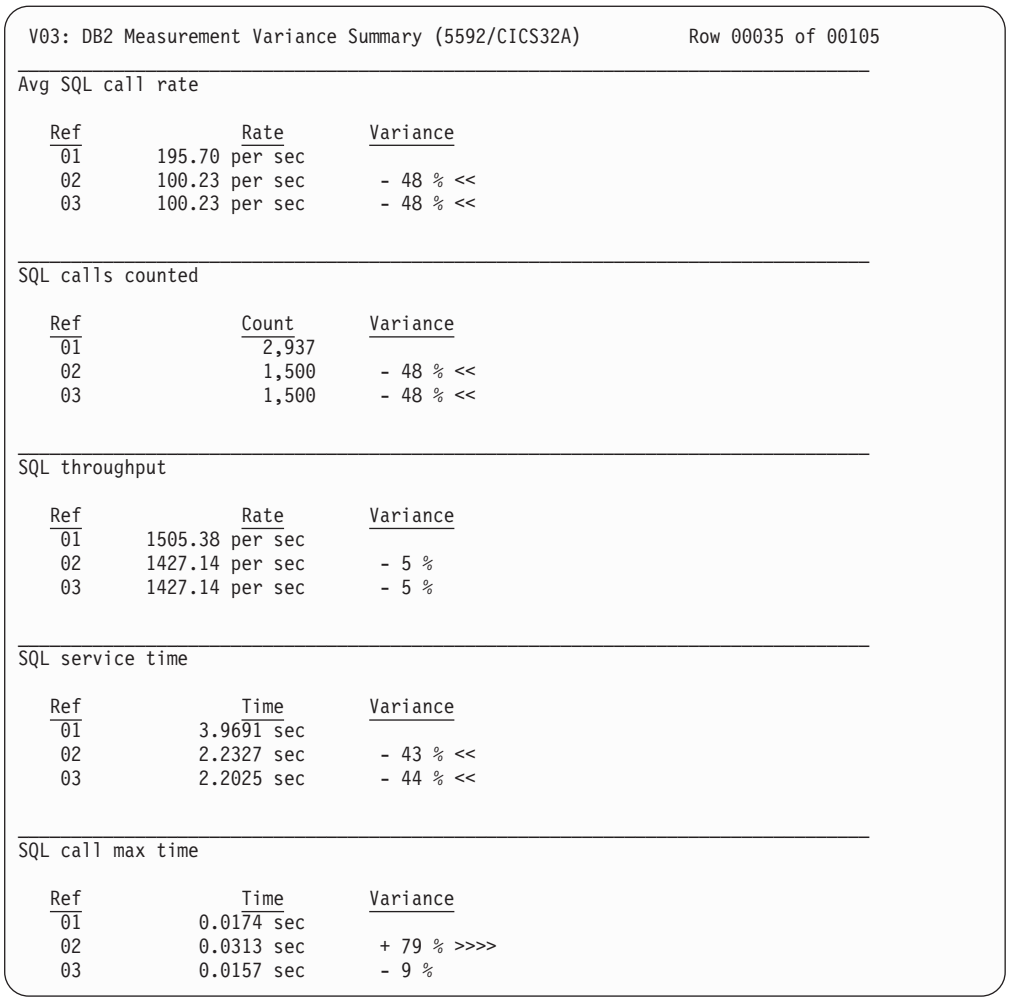
This report segment compares the lowest CPU time for an SQL call. This segment is displayed for measurements with the DB2+ extractor active.

Sample reports

The following sample report shows the variances between a base DB2 measurement and 2 tagged DB2 measurements.



```
V03: DB2 Measurement Variance Summary (5592/CICS32A)          Row 00003 of 00105

The Following Measurements are Analyzed

   Ref  ReqNum  Job Name  Date         Time    Description
    01   5592   CICS32A   Aug-09-2010  12:36   Variance 1 (Base)
    02   5593   CICS32A   Aug-09-2010  12:39   Variance 2
    03   5594   CICS32A   Aug-09-2010  12:41   Variance 3


SQL calls sampled

          -----DB2-----     Calls
   Ref    Subsys Version    Sampled         Variance
    01    DB9G   9.1.0      1,205
    02    DB9G   9.1.0        635           - 47 % <<
    03    DB9G   9.1.0        630           - 47 % <<


SQL observations

   Ref             Count          Variance
    01               1,338
    02                 726          - 45 % <<
    03                 721          - 46 % <<


SQL calls executed

   Ref             Count          Variance
    01               5,871
    02               2,997          - 48 % <<
    03               2,997          - 48 % <<


Avg SQL call rate

   Ref               Rate          Variance
    01       195.70 per sec
    02       100.23 per sec          - 48 % <<
    03       100.23 per sec          - 48 % <<
```



```
V03: DB2 Measurement Variance Summary (5592/CICS32A)          Row 00035 of 00105
_____________________________________________________________________________
Avg SQL call rate

   Ref               Rate        Variance
    01       195.70 per sec
    02       100.23 per sec       - 48 % <<
    03       100.23 per sec       - 48 % <<


_____________________________________________________________________________
SQL calls counted

   Ref               Count       Variance
    01                 2,937
    02                 1,500      - 48 % <<
    03                 1,500      - 48 % <<


_____________________________________________________________________________
SQL throughput

   Ref               Rate        Variance
    01      1505.38 per sec
    02      1427.14 per sec       - 5 %
    03      1427.14 per sec       - 5 %


_____________________________________________________________________________
SQL service time

   Ref               Time        Variance
    01          3.9691 sec
    02          2.2327 sec       - 43 % <<
    03          2.2025 sec       - 44 % <<


_____________________________________________________________________________
SQL call max time

   Ref               Time        Variance
    01          0.0174 sec
    02          0.0313 sec       + 79 % >>>>
    03          0.0157 sec       - 9 %
```

```
 V03: DB2 Measurement Variance Summary (5592/CICS32A)          Row 00067 of 00105
_____________________________________________________________________________
SQL call max time

   Ref               Time       Variance
    01           0.0174 sec
    02           0.0313 sec      + 79 % >>>>
    03           0.0157 sec      - 9 %


_____________________________________________________________________________
SQL call min time

   Ref               Time       Variance
    01           0.0003 sec
    02           0.0003 sec
    03           0.0003 sec


_____________________________________________________________________________
SQL CPU time

   Ref               Time       Variance
    01           1.9055 sec
    02           0.9905 sec      - 48 % <<
    03           1.0115 sec      - 46 % <<


_____________________________________________________________________________
SQL call max CPU

   Ref               Time       Variance
    01           0.0033 sec
    02           0.0032 sec      - 3 %
    03           0.0033 sec


_____________________________________________________________________________
SQL call min CPU

   Ref               Time       Variance
    01           0.0002 sec
    02           0.0003 sec      + 50 % >>>
    03           0.0002 sec
```

V04 - IMS variance summary

Usage

Use this report to analyze variances in IMS data between multiple measurements. The IMS+ extractor must be active in the selected measurements to display meaningful variance data. To gain access to IMS variance reporting, issue the “V” line command on an IMS measurement from the Observation Session List. The “V” line command selects the base measurement for comparison. Prior to entering the “V” line command you must previously have tagged at least one IMS measurement by entering the “T” line command in the Observation Session List. Up to 20 measurements can be tagged at one time. This report quantifies IMS data variances between tagged measurements and the base measurement.

Measurements analyzed

The first segment of the V04 report lists the measurements analyzed in the report. Each measurement is assigned a two digit sequential reference number. This segment of the report identifies each of the measurements and their reference number.

The measurement identified by reference number 01 is the “base” measurement, which is the one to which the other measurements are compared. Throughout this report, measurements are identified by their reference numbers.

Variances

A percentage value is displayed under the heading "Variance" in various segments of this report. Its value quantifies the variance between a particular performance figure for the compared measurement and the corresponding value for the base measurement. A plus (+) value indicates a higher value than the base measurement and a minus (-) value indicates a lower value. The value is the percentage by which the compared measurement figure exceeds (+) or is less than (-) the corresponding base measurement value. Any value exceeding 999 percent is reported as "999%." The magnitude of the value is also represented graphically by a string of greater-than or less-than symbols.

Txn observations

This report segment displays the subsystem name and version of the IMS subsystem being used, and compares the number of transactions sampled during the measurement sessions.

IMS Txns counted

This report segment compares the number of transactions counted during the measurement sessions.

Transaction rate

This report segment compares the transaction rate per second during the measurement sessions.

Txn throughput

This report segment compares the transaction throughput rate per second based on the number of transactions counted by the transaction service time.

IMS Txn svc time

This report segment compares the total service time while IMS transactions were active during the measurement sessions.

IMS Txn max svc

This report segment compares the longest running IMS transaction during the measurement sessions.

IMS Txn min svc

This report segment compares the shortest running IMS transaction during the measurement sessions.

IMS Txn CPU time

This report segment compares the total CPU time used by all IMS transactions during the measurement sessions.

IMS Txn max CPU

This report segment compares the highest CPU time for IMS transactions during the measurement sessions.

IMS Txn min CPU

This report segment compares the lowest CPU time for IMS transactions during the measurement sessions.

DLI observations

This report segment compares the number of samples taken while a DLI call was in-flight.

DLI call count

This report segment compares the number of DLI calls counted during the measurement sessions.

DLI call rate

This report segment compares the DLI call rate per second during the measurement sessions.

DLI call thruput

This report segment compares the DLI call throughput rate per second based on the number of DLI calls counted by the DLI service time.

DLI svc time

This report segment compares the total service time for DLI calls during the measurement sessions.

DLI max svc

This report segment compares the longest running DLI call during the measurement sessions.

DLI min svc

This report segment compares the shortest running DLI call during the measurement sessions.

DLI CPU time

This report segment compares the total CPU time used by all DLI calls during the measurement sessions.

DLI max CPU

This report segment compares the highest CPU time for a DLI call during the measurement sessions.

DLI min CPU

This report segment compares the lowest CPU time for a DLI call during the measurement sessions.

Sample reports

The following sample report shows the variances between a base IMS measurement and 1 tagged IMS measurement.

```
V04: IMS Measurement Variance Summary (5497/IMSAMPP1)          Row 00001 of 00148

 The Following Measurements are Analyzed

  Ref  ReqNum  Job Name  Date         Time     Description
   01   5497   IMSAMPP1  Jul-06-2010  14:52    IMS+ (2)
   02   5498   IMSAMPP1  Jul-06-2010  14:57    IMS+ (3)

_____________________________________________________________________________
Txn observations

         -----IMS-----      Txns
  Ref   Subsys Version    Sampled     Variance
   01    IMSA  10.1.0         35
   02    IMSA  10.1.0         17       - 51 % <<<

_____________________________________________________________________________
IMS Txns counted

  Ref              Count        Variance
   01                 27
   02                 16         - 40 % <<

_____________________________________________________________________________
Transaction rate

  Ref              Rate         Variance
   01         0.15 per sec
   02         0.08 per sec       - 46 % <<


_____________________________________________________________________________
Txn throughput

  Ref              Rate         Variance
   01       90.00 per sec
   02      160.00 per sec        + 77 % >>>>
```

```
IMS Txn svc time

   Ref              Time          Variance
    01          0.3463 sec
    02          0.1850 sec        - 46 % <<


IMS Txn max svc

   Ref              Time          Variance
    01          0.0294 sec
    02          0.0213 sec        - 27 % <<


IMS Txn min svc

   Ref              Time          Variance
    01          0.0019 sec
    02          0.0037 sec        + 94 % >>>>


IMS Txn CPU time

   Ref              Time          Variance
    01          0.2175 sec
    02          0.1246 sec        - 42 % <<


 IMS Txn max CPU

   Ref              Time          Variance
    01          0.0152 sec
    02          0.0120 sec        - 21 % <
```

```
IMS Txn min CPU

   Ref              Time          Variance
    01          0.0019 sec
    02          0.0023 sec        + 21 % >


DLI observations

   Ref             Count          Variance
    01                 8
    02                 3        - 62 % <<<


DLI call count

   Ref             Count          Variance
    01               204
    02               100        - 50 % <<<


DLI call rate

   Ref              Rate          Variance
    01         1.13 per sec
    02         0.55 per sec       - 51 % <<<


DLI call thruput

   Ref              Rate          Variance
    01      2040.00 per sec
    02         0.00 per sec       -100 % <<<<<
```

```
DLI svc time

   Ref              Time          Variance
    01          0.1201 sec
    02          0.0744 sec        - 38 % <<

DLI max svc

   Ref              Time          Variance
    01          0.0128 sec
    02          0.0100 sec         - 21 % <

DLI min svc

   Ref              Time          Variance
    01          0.0000 sec
    02          0.0000 sec

DLI CPU time

   Ref              Time          Variance
    01          0.0484 sec
    02          0.0308 sec         - 36 % <<

DLI max CPU

   Ref              Time          Variance
    01          0.0019 sec
    02          0.0023 sec         + 21 % >
```

```
 DLI min CPU

  Ref              Time          Variance
    01          0.0001 sec
    02          0.0001 sec
```

Chapter 4. CICS performance analysis reports

This section describes the CICS Performance Analysis Reports.

For information about ...	See ...
The CICS data extractor	"Overview of CICS data extractor"
E01 CICS session statistics	"E01 - CICS session statistics" on page 179
E02 CICS CPU and use count by program	"E02 - CICS CPU and use count by program" on page 182
E03 CICS CPU usage by transaction	"E03 - CICS CPU usage by transaction" on page 184
E04 CICS mean service time by transaction	"E04 - CICS mean service time by transaction" on page 191
E05 CICS total service time by transaction	"E05 - CICS total service time by Txn" on page 202
E06 CICS service time by task ID	"E06 - CICS service time by task ID" on page 213
E07 CICS wait by transaction	"E07 - CICS wait by Txn" on page 223
E08 CICS mean service time by terminal ID	"E08 - CICS mean service time by terminal ID" on page 225
E09 CICS total service time by terminal ID	"E09 - CICS total service time by terminal ID" on page 234
E10 CICS mean service time by user ID	"E10 - CICS mean service time by user ID" on page 243
E11 CICS total service time by user ID	"E11 - CICS total service time by user ID" on page 251
E12 CICS CPU/service time by transaction	"E12 - CICS CPU/service time by transaction" on page 258
X01 CICS mean service time by transaction (for multiple CICS address spaces)	"X01 - CICS mean service time by transaction" on page 261
X02 CICS total service time by transaction (for multiple CICS address spaces)	"X02 - CICS total service time by txn" on page 269
X03 CICS mean service time by terminal ID (for multiple CICS address spaces)	"X03 - CICS mean service time by terminal ID" on page 277
X04 CICS total service time by terminal ID (for multiple CICS address spaces)	"X04 - CICS total service time by terminal ID" on page 285

Overview of CICS data extractor

In order to use the CICS Performance Analysis Reports, the CICS data extractor must be turned on when the Observation Request is entered. You must select the CICS data extractor in the Schedule New Measurement panel, and enter the transaction name(s) or patterns you want to observe. For more information on entering an observation request for CICS, see "Panel 5 – Subsystems" on page 29.

There are two distinct types of data that Application Performance Analyzer gathers when the CICS extractor is active: Session statistics, and Transaction measurement data.

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Session statistics

This data is a summary of how much CICS related activity occurred in the region during the Observation Session. The activity measured is directly related to services requested by in-flight transactions. The data provides an indication on the load (or stress level) that transactions are placing on the region. In a region that is idle, almost all these numbers would be zero. Data for the majority of these statistics are gathered once at the start of the session and once at the end of the session. The statistics are then calculated by taking the delta of each set of data values.

Transaction measurement data

There is one sample record created for each in-flight transaction during each sampling interval. A transaction is only sampled if it was specified when the Observation Request was created. For some reports the sample records are analyzed to produce CPU usage and Service Time by transaction. These reports describe the load that a transaction is placing on the CICS region.

The sample record consists of transaction state data captured during a sampling interval. This information is used to generate the Session Activity report. This report highlights the state of sampled transactions. State information includes:

1. Whether the transaction was running or suspended (active or not)
2. Module information where it was running
3. Module information where to be resumed if suspended
4. Information on the CICS service executing on behalf of the application (if applicable)

CICS+ Extractor

CICS+ is a CICS measurement option (data extractor) in which the precise number of CICS transactions are counted during the measurement interval. It records the exact service time and CPU time for each transaction. This data is displayed in the E12 report only, and has no effect on the other CICS reports.

Activating the CICS+ option automatically activates the CICS option. The extractor applies to CICS TS 3.1 and above. Your installer may have chosen to limit access to this data extractor.

Overview of CICS Multiple Address Space Support

CICS multiple address space (MASS) support allows you to measure and analyze multiple CICS regions simultaneously. Transaction data from multiple regions is merged to produce a set of 4 CICS reports showing multi-region activity. These reports are X01, X02, X03 and X04.

To enter CICS MASS observations:

1. Start a NEW request.
2. In Panel 1 – Job Information, enter either a Job name/Pattern with an asterisk (*) or a multi-job measurement with a percent (%) for the CICS regions you want to measure.
3. In Panel 4 – Active Jobs, if you entered an asterisk (*) in the Job Name/Pattern field, select the CICS regions from the list of active jobs presented. If you entered a percent (%) in the Job Name/Pattern field, the CICS regions that match the pattern are displayed. It is not necessary to select the CICS regions in

this case, unless you want to limit the measurement to specific CICS regions. The maximum number of regions you are permitted to select is determined during the installation of Application Performance Analyzer.

4. In Panel 2 – Options, select the CICS data extractor.
5. Complete any other relevant panels for your request. You can specify further CICS measurement criteria in Panel 5 – Subsystems.

Once the NEW request is complete and submitted, Application Performance Analyzer creates and starts separate observation requests for each CICS region selected for measurement.

When the separate observation requests are completed, you can view the CICS MASS reports by using the tag (T) and report (S or R) commands.

- Tag up to 20 CICS region measurements to be included in the CICS MASS reports.
- Select one of the CICS region measurements for reporting, using the S or R command. This measurement does not have to be tagged.

In addition to the standard reports for the selected observation, Application Performance Analyzer generates the specific CICS MASS reports that show multi-region activity for all selected CICS regions.

E01 - CICS session statistics

Usage

Use this report to see a summary of the CICS measurement data collected during the observation session.

Note: Be aware that a reset of CICS statistics, if done during the measurement interval, can invalidate some of the values reported here.

Detail line descriptions

Environmental Information

Fields under this heading describe characteristics of the CICS environment.

CICS Release
The CICS version and release.

Transaction Statistics

Some CICS processing statistical values are shown under this heading.

First Transaction TaskId
The value of the CICS TaskId at the beginning of the observation session.

Last Transaction TaskId
The value of the CICS TaskId at the end of the observation session.

Number of TaskId Increments
The difference between the first and last CICS TaskId.

Number of Observed Transactions
The number of transactions with unique CICS TaskId values observed. If this value does not correspond to the number of increments, it could be an indication that not all executed transactions were measured. Some transactions could have been excluded as specified in the measurement

request or transactions can be missed if a sampling rate is chosen that is slower than the transaction throughput rate.

Transaction Rate
The average number of transactions per second during the measurement interval.

Peak Active Transactions
The maximum number of concurrently active transactions observed during the measurement interval.

Peak Active Txns (Overall)
The maximum number of concurrently active transactions that occurred during the entire execution of the CICS region.

MaxTask
The maximum number of concurrent transactions CICS is configured for.

Mean Transaction Time

The average service time for the transactions observed during the measurement interval.

The service time consists of:

Execution Time
The time a CPU is processing the transaction.

Suspend Time
The time the transaction is suspended by CICS.

CICS Dispatch Delay Time
The time the transaction is delayed by CICS.

MVS Dispatch Delay Time
The time execution is delayed by the MVS dispatcher.

Service Time
The sum of the execution time, the suspend time, and the delay time.

Service Statistics

These are counts of service requests issued by CICS programs during the measurement interval:

- Program Requests
- Terminal Messages
- Storage Getmains
- Storage Freemains
- File I/O Requests
- Temporary Storage Requests
- Transient Data Requests
- Journal Write Requests

Exception or Critical Conditions

These are counts of certain exception or critical conditions that occurred during the measurement interval:

- System Dumps
- System Dumps Suppressed
- Transaction Dumps
- Transaction Dumps Suppressed

- Storage Violations
- Short on Storage occurrences
- Times at MaxTask
- Times at Class MaxTask

Transaction Counts

A list of each transaction code that was measured and the number of executions is shown here.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
E01: CICS Session Statistics (0866/CICS23A)                  Row 00001 of 00045
Command ===> ____________________________________________________ Scroll ===> CSR

Environmental Information
   CICS Release                       CICS/TS 2.3

Transaction Statistics
   First Transaction TaskId           0002089
   Last Transaction TaskId            0002242
   Number of TaskId Increments        153
   Number of Observed Transactions    153
   Transaction Rate (per sec)         2.18
   Peak Active Txns (Observed)        1
   Peak Active Txns (Overall)         2
   MaxTask                            5

Mean Transaction Time (Execution + Suspend + Delay = Service)
   Execution Time                     0.0727747
   Suspend Time                       0.232708
   CICS DIspatch Delay Time           0.052427
   MVS Dispatch Delay Time            0.018062
   Service Time                       0.375944

Service Statistics
   Program Requests                   536
   Terminal Messages                  305
   Storage Getmains                   3,295
   Storage Freemains                  3,279
   File I/O Requests                  0
   Temporary Storage Requests         0
   Transient Data Requests            0
   Journal Write Requests             0

Exception or Critical Conditions
   System Dumps                       0
   System Dumps Suppressed            0
   Transaction Dumps                  0
   Transaction Dumps Suppressed       0
   Storage Violations                 0
   Short on Storage occurrences       0
   Times at MaxTask                   0
```

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
E01: CICS Session Statistics (0866/CICS23A)                  Row 00040 of 00047
Command ===> ____________________________________________________ Scroll ===> CSR

Transaction Counts

  TranId    Count
 DNC1      151
 CESN        2
 CQRY        1
 CATA        1
```

E02 - CICS CPU and use count by program

Usage

Use this report to get CPU usage and call counts for CICS programs that were executing during the observation session.

Quantification

Each report line displays the number of times a program was called by CICS services. The report will not show any calls using a direct method such as a branch and link register (BALR). Each report line also quantifies CPU usage as a percentage. Each percentage represents the ratio of CPU consumption observed for the reported program to the total CPU consumption measured in the address space.

Note that the sum of all the percentages will normally be less than 100 percent because only those CICS transactions being measured are quantified in the report, but the percentage is the portion of the total CICS region CPU consumption. Similarly, any CICS region CPU overhead not attributable to CICS transactions will not be quantified in the report.

A program name of "CICS" is used quantify CPU consumption not directly attributable to a CICS program. A CICS program in this report is a program that is defined in the CICS System Definition (CSD) dataset.

Note: The E02 report cannot be directly compared to the C02 CPU Usage report because C02 reports CPU usage by module, and E02 reports CPU directly used by or attributable to a CICS program. For example, CPU time used while processing an EXEC CICS command would be reported in a DFH program in the C02 report, but would be attributed to the CICS application program making the call in the E02 report.

Detail line hierarchy

The E02 shows one level, the detail lines cannot be expanded.

The hierarchy is illustrated here:

Sample reports

A sample is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
E02: CICS CPU and Use Counts by Pgm (3090/CICS23A)           Row 00001 of 00016
Command ===> ____________________________________________________ Scroll ===> CSR

Name          Calls         Percent of CPU Time * 10.00%  ±1.5%
                                *....1....2....3....4....5....6....7....8....9..
CICSDB2         300         36.82 ==================
SAMPREAD        501         30.56 ===============
DSN5CA0          30         10.05 =====
CSQCTRUE          0          4.09 ==
DFHD2EX1          0          3.79 ==
CICS              0          3.74 ==
DB2DRVR           1          2.44 =
READDRVR          1          2.29 =
MQSAMP1         100          2.12 =
MQDRVR            1          1.54 =
SAMPBGN1        200          1.22 =
CSQ4CVK1        100          1.09 =
IMSDRVR           1          0.19
DFHEMTD           1          0.00
DFHEITMT          1          0.00
DFHEMTP           1          0.00
```

Detail line descriptions

CICS program name detail line

This is the only level for the detail line. Each line shows information about a CICS program for which CPU consumption was measured.

Under Heading	This is Displayed
Name	The CICS program name.
Calls	The number of times this program was called by another CICS program. The call must be done by an EXEC CICS API call.
Percent of CPU Time	The percentage of CPU time consumed during execution of the program.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Load Module	Display context help information.
++	Load Module	Show additional details.
M	Load Module	Display load module information.

on headings

Cmd	When Applied To Object	Action
?	Name, Percent CPU	Display context help information.

Cmd	When Applied To Object	Action
+	Percent CPU	Zoom in scale.
-	Percent CPU	Zoom out scale.
+	Percent CPU	Zoom in scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.
SC	Name	Sort by call count.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | SAMPREAD         501       30.56 ================                   |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|     Call count at start:          3                                           |
|     Call count at end:          504                                           |
|     Difference:                 501                                           |
|     Load count:                   0                                           |
|     CPU active samples:       1,225                                           |
|     Total CPU active:         4,008                                           |
|                                                                               |
+-------------------------------------------------------------------------------+
```

E03 - CICS CPU usage by transaction

Usage

Use this report to see how CPU consumption was distributed across the CICS transactions that were executing during the observation session.

Expand a CICS transaction report line to see a further breakdown by program, CICS command and SQL Request.

Quantification

Each report line quantifies CPU usage as a percentage. Each percentage represents the ratio of CPU consumption observed for the reported item (transaction, program, CICS command or SQL request) to the total CPU consumption measured in the address space. The sum of all the percentages will normally be less than 100 percent because only those CICS transactions being measured are quantified in the report. But the percentage is the portion of the total CICS region CPU consumption.

Similarly, any CICS region CPU overhead not attributable to CICS transactions will not be quantified in the report.

Detail line hierarchy

An unexpanded E03 report shows a line for each CICS transaction for which CPU usage was measured. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Transaction
 Level 2 CICS Program
  Level 3 CICS Command
  Level 3 CICS Command

  ...
 Level 2 CICS Program
  Level 3 SQL Request
  Level 3 SQL Request

  ...
 Level 2 CICS Program
  Level 3 DL/I Request
  Level 3 DL/I Request

  ...
 Level 2 CICS Program
  Level 3 Module
  Level 3 Module
  Level 3 System Services

  ...
 Level 2 CICS Program
  Level 3 Adabas Request
  Level 3 Adabas Request

  ...
 Level 2 System Services
  Level 3 Module
  Level 3 Module
  Level 3 System Services

  ...
```

Sample reports

When the report is first displayed, only the first level of the hierarchy is visible (transaction). A sample is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
E03: CICS CPU Usage by Transaction (0817/CICS23A)             Row 00001 of 00004
Command ===> ____________________________________________________ Scroll ===> CSR

Name   NTxns/Description              Percent of CPU time * 10.00%  ±1.5%
                                          *....1....2....3....4....5....6....7
DNC1     327                          77.22 ==================================
FINQ     295                           8.35 ====
```

You can enter the "+" line command on a transaction to expand to the next level. A sample of the report with a transaction expanded to the second level of the hierarchy (CICS program) is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E03: CICS CPU Usage by Transaction (0817/CICS23A)            Row 00001 of 00015
Command ===> _____________________________________________ Scroll ===> CSR

Name   NTxns/Description              Percent of CPU time * 10.00%  ±1.5%
                                          *....1....2....3....4....5....6....7
DNC1     327                         77.22 ====================================
→ PFSAMPC   EXEC SQL                 35.01 =================
→ DFHD2EX1  CICS Program             16.38 =======
→ PFSAMPB   EXEC SQL                  8.14 ====
→ PFSAMPA   EXEC SQL                  3.59 ==
→ PFSAMPA   CICS Program              3.54 ==
→ CICS      System Services           3.11 ==
→ PFSAMPB   CICS Program              3.02 ==
→ PFSAMPA   EXEC CICS                 2.05 =
→ PFSAMPC   CICS Program              1.89 =
→ CEECCICS  EXEC CICS                 0.34
→ PFSAMPB   EXEC CICS                 0.09
FINQ     295                          8.35 ====
```

You can enter the "+" line command on a program to expand to the next level. In the sample below, a line with description "EXEC SQL" has been expanded, showing the SQL commands:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E03: CICS CPU Usage by Transaction (0817/CICS23A)            Row 00001 of 00027
Command ===> _____________________________________________ Scroll ===> CSR

Name   NTxns/Description              Percent of CPU time * 10.00%  ±1.5%
                                          *....1....2....3....4....5....6....7
DNC1     327                         77.22 ====================================
→ PFSAMPC   EXEC SQL                 35.01 =================
  → +1BE2     FETCH                  13.29 ======
  → +662A     FETCH                   6.56 ===
  → +0F52     SELECT                  3.36 ==
  → +6E9C     SELECT                  2.72 =
  → +1164     SELECT                  2.33 =
  → +6C4C     SELECT                  1.89 =
  → +6248     SELECT                  1.85 =
  → +1588     OPEN                    1.55 =
  → +64D0     OPEN                    0.89
  → +6752     CLOSE                   0.29
  → +2348     CLOSE                   0.22
```

Detail line descriptions

CICS transaction detail line

This is the first-level detail line. Each line shows information about a CICS transaction for which CPU consumption was measured.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	If this is a recognized CICS transaction, a functional description.
Percent of CPU Time	The percentage of CPU time consumed during execution of the transaction.

CICS program or system services detail line

This is a second-level detail line shown directly under the CICS transaction detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The third-level lines shown under this item can be CICS command lines, SQL requests, DL/I requests or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, DB2 SQL, or IMS DLI calls, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, this displays “EXEC CICS.” If lines grouped under this line are SQL request lines, this displays “EXEC SQL”. If lines grouped under this line are DL/I request lines, this displays “EXEC DLI”. Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if it is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Percent of CPU Time	The percentage of CPU time consumed while executing in the identified program during execution of the transaction under which the line appears.

CICS command detail line

These lines appear under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This is in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command descriptor. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command descriptor is preceded by the hexadecimal offset of the command from the start of the CSECT.
Percent of CPU Time	The percentage of CPU time consumed while executing the CICS command.

SQL Request detail line

These lines appear under a CICS Program detail line. Each one represents an SQL request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL call. This is in +xxxx format. This field is always displayed in red
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Percent of CPU Time	The percentage of CPU time consumed while executing the SQL request.

DL/I Request detail line

These lines appear under a CICS Program detail line. Each one represents an IMS DL/I request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DL/I call. This is in +xxxx format. This field is always displayed in red.
Description	The DL/I function code followed by the PCB name.
Percent of CPU Time	The percentage of CPU time consumed while executing the DL/I request.

Active module detail line

These lines appear under a CICS Program detail line. Each one represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The name of the module that was executing.
Description	A functional description of the module if one is available.
Percent of CPU Time	The percentage of CPU time consumed while executing in the module within the grouping under which the detail line appears.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Percent of CPU Time	The percentage of CPU time consumed while executing the Adabas request.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Transaction, Load Module, CSECT, Command, Seqno, DL/I Request	Display context help information.
++	Transaction, Load Module, CSECT, Command, Seqno, DL/I Request	Show additional details.
+	Transaction, Load Module	Expand to reveal next level.
–	Transaction, Load Module	Collapse to hide next level.
SV	Transaction, Load Module	Sort next level by value.
SN	Transaction, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	CICS Active Module, Command, CSECT, Seqno, DL/I Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Sort next level by name.
+	Percent CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce description field size.
–	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

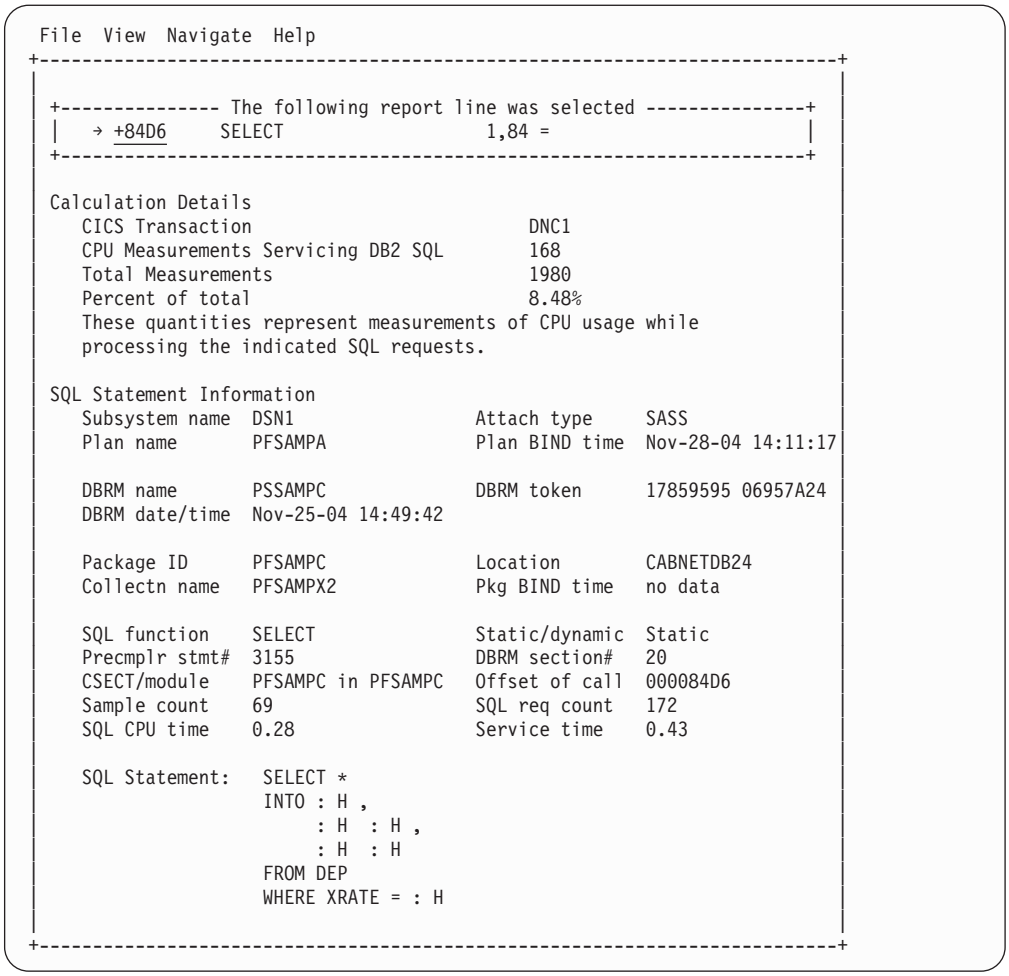
Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here, this one is for a CICS command:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |   > +2C70     RETURN                  0.72                          |     |
|  +-------------------------------------------------------------------------+  |
|                                                                               |
|  Calculation Details                                                          |
|     CICS Transaction                          DNC1                            |
|     CPU Measurements Servicing CICS Commands  21                              |
|     Total Measurements                        2906                            |
|     Percent of total                          0.72%                           |
|                                                                               |
|  Command Attributes                                                           |
|       CICS Command                  EXEC CICS RETURN                          |
|       Issued in Load Module         PFSAMPA                                   |
|       Return Offset in Module       +2C90                                     |
|       Name of CSECT                 PFSAMPA                                   |
|       Return Offset in CSECT        +2C70                                     |
|                                                                               |
|  The command execution measurement counts are                                 |
|       Executing (CPU active)        21                                        |
|       Suspended by CICS             0                                         |
|       Delayed                                                                 |
|          CICS dispatch delay        0                                         |
|          MVS delay (WAIT)           0                                         |
|          MVS delay (Busy)           0                                         |
|                                                                               |
+-------------------------------------------------------------------------------+
```

A sample detail window for an SQL command is shown here:



SETUP options

The following SETUP option can be selected with the SETUP primary command:

Minimum CPU percentage
You can set this option to eliminate modules where the CPU percentage is below a certain threshold.

E04 - CICS mean service time by transaction

Usage

Use this report to see an analysis of how time was spent by the CICS transactions that were executing during the observation session. Expand a CICS transaction report line to see a further breakdown by program, CICS command, DL/I request and SQL request.

Quantification

Each report line quantifies time as arithmetic means for each measured transaction. The means are calculated by dividing the total of all time spent servicing all occurrences of a transaction by its number of occurrences. The means are expressed in units of seconds. The mean service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded E04 report shows a line for each measured CICS transaction. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Transaction
 Level 2 CICS Program
  Level 3 CICS Command
  Level 3 CICS Command

  ...
 Level 2 CICS Program
  Level 3 SQL Request
  Level 3 SQL Request

  ...
 Level 2 CICS Program
  Level 3 DL/I Request
  Level 3 DL/I Request

  ...
 Level 2 CICS Program
  Level 3 Module
  Level 3 Module
  Level 3 System Services

  ...
 Level 2 CICS Program
  Level 3 Adabas Request
  Level 3 Adabas Request

  ...
 Level 2 System Services
  Level 3 Module
  Level 3 Module
  Level 3 System Services

  ...
```

Sample reports

When the report is first displayed, only the first level of the hierarchy is visible (transaction). A sample is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E04: CICS Mean Service Time by Txn (0817/CICS23A)            Row 00001 of 00004
Command ===> ____________________________________________________ Scroll ===> CSR

                                        -------- Mean Time in Seconds ---------
Name    NTxns Description          Error Execution + Suspend + Delay  =  Service

DNC1     327                     ± 5.5%    0.103     0.013    0.023      0.140
FINQ     295                     ± 5.8%    0.012     0.000    0.011      0.023
```

You can enter the "+" line command on a transaction to expand to the next level. A sample of the report with a transaction expanded to the second level of the hierarchy (CICS Program) is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E04: CICS Mean Service Time by Txn (0817/CICS23A)            Row 00001 of 00004
Command ===> _____________________________________________ Scroll ===> CSR

                                        -------- Mean Time in Seconds ---------
Name    NTxns Description          Error Execution + Suspend + Delay  =  Service

DNC1      327                    ± 5.5%     0.103     0.013    0.023      0.140
→ PFSAMPC     EXEC SQL                       0.046     0.000    0.004      0.051
→ DFHD2EX1    CICS Program                   0.021     0.011    0.002      0.035
→ PFSAMPB     EXEC SQL                       0.010     0.000    0.002      0.013
→ CICS        System Services                0.004     0.000    0.008      0.012
→ PFSAMPA     CICS Program                   0.004     0.000    0.002      0.007
→ PFSAMPA     EXEC SQL                       0.004     0.000    0.001      0.006
→ PFSAMPB     CICS Program                   0.004     0.000    0.000      0.004
→ PFSAMPC     CICS Program                   0.002     0.000    0.000      0.002
→ PFSAMPA     EXEC CICS                      0.002     0.000    0.000      0.002
→ CEECCICS    EXEC CICS                      0.000     0.000    0.000      0.000
→ PFSAMPB     EXEC CICS                      0.000     0.000    0.000      0.000
```

You can enter the "+" line command on a program to expand to the next level. In the sample below, a line with description "EXEC SQL" has been expanded, showing the SQL commands:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E04: CICS Mean Service Time by Txn (0817/CICS23A)            Row 00001 of 00041
Command ===> _____________________________________________ Scroll ===> CSR

                                        -------- Mean Time in Seconds ---------
Name    NTxns Description          Error Execution + Suspend + Delay  =  Service

DNC1      327                    ± 5.5%     0.103     0.013    0.023      0.140
→ PFSAMPC     EXEC SQL                       0.046     0.000    0.004      0.051
  → +1BE2     FETCH                          0.017     0.000    0.001      0.019
  → +662A     FETCH                          0.008     0.000    0.000      0.009
  → +0F52     SELECT                         0.004     0.000    0.000      0.005
  → +6E9C     SELECT                         0.003     0.000    0.000      0.004
  → +1164     SELECT                         0.003     0.000    0.000      0.003
  → +6C4C     SELECT                         0.002     0.000    0.000      0.002
  → +6248     SELECT                         0.002     0.000    0.000      0.002
  → +1588     OPEN                           0.002     0.000    0.000      0.002
  → +64D0     OPEN                           0.001     0.000    0.000      0.001
  → +6752     CLOSE                          0.000     0.000    0.000      0.000
  → +2348     CLOSE                          0.000     0.000    0.000      0.000
```

Detail line descriptions

CICS transaction detail line

This is the first-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	If this is a recognized CICS transaction, a functional description.
Error	The margin of error for the mean values calculated by using the number of executions of the transaction as the sample size.
Execution	The mean time, in seconds, a CPU was actively executing for the transaction.

Under Heading	This is Displayed
Suspend	The mean time, in seconds, CICS had suspended execution of the transaction.
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The mean service time for the transaction. This includes execution, suspend and delay time.

CICS program or system services detail line

This is a second-level detail line shown directly under the CICS transaction detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The third-level lines shown under this item can be either CICS command lines, SQL Request lines, DL/I Request lines or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, DB2 SQL, or IMS DLI calls, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
NTxns	If lines grouped under this line are CICS command lines, this displays “EXEC CICS”. If lines grouped under this line are SQL request lines, this displays “EXEC SQL”. If lines grouped under this line are DL/I request lines, this displays “EXEC DLI”. Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if it is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Description	If this is a recognized CICS transaction, a functional description.
Execution	The mean time, in seconds, CPU execution was observed while transaction control was under the CICS program identified in the Name column.

Under Heading	This is Displayed
Suspend	The mean time, in seconds, CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The mean service time for the transaction control was under the CICS program identified in the Name column. This includes execution, suspend and delay time.

CICS command detail line

These lines appear under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This is in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command descriptor. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command descriptor is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The mean time, in seconds, CPU execution was observed while the CICS command was being processed.
Suspend	The mean time, in seconds, CICS had suspended execution of the transaction while the CICS command was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The mean service time for the transaction the CICS command was being processed. This includes execution, suspend and delay time.

SQL request detail line

These lines appear under a CICS Program detail line. Each one represents an SQL request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function — SELECT, FETCH, UPDATE, etc.
Execution	The mean time, in seconds, CPU execution was observed while the SQL request was being processed.
Suspend	The mean time, in seconds, CICS had suspended execution of the transaction while the SQL request was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The mean service time for the transaction the SQL request was being processed. This includes execution, suspend and delay time.

DL/I request detail line

These lines appear under a CICS Program detail line. Each one represents an IMS DL/I request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DL/I command. This is in +xxxx format. This field is always displayed in red.
Description	The DL/I function code followed by the PCB name.
Execution	The mean time, in seconds, CPU execution was observed while the DL/I request was being processed.
Suspend	The mean time, in seconds, CICS had suspended execution of the transaction while the DL/I request was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The mean service time for the transaction the DL/I request was being processed. This includes execution, suspend and delay time.

Module/system services detail line

These lines appear under a CICS Program detail line. Each one represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, “CICS” is displayed in the name field and “System Services” in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or “CICS” if a module name could not be determined.
Description	A functional description of the module if one is available. “System Services” is displayed if the module name could not be determined.
Execution	The mean time, in seconds, for execution of the module within the grouping under which the detail line appears.
Suspend	This field will contain a value of zero.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The mean service time for the transaction the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in +xxxx format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The mean time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.
Delay	The mean time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Transaction, Load Module, CSECT, Command, Seqno, DL/I Request	Display context help information.
++	Transaction, Load Module, CSECT, Command, Seqno, DL/I Request	Show additional details.
+	Transaction, Load Module	Expand to reveal next level.
–	Transaction, Load Module	Collapse to hide next level.
SV	Transaction, Load Module	Sort next level by value.
SN	Transaction, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	CICS Active Module, Command, CSECT, Seqno, DL/I Request	Display source program mapping.

on headings

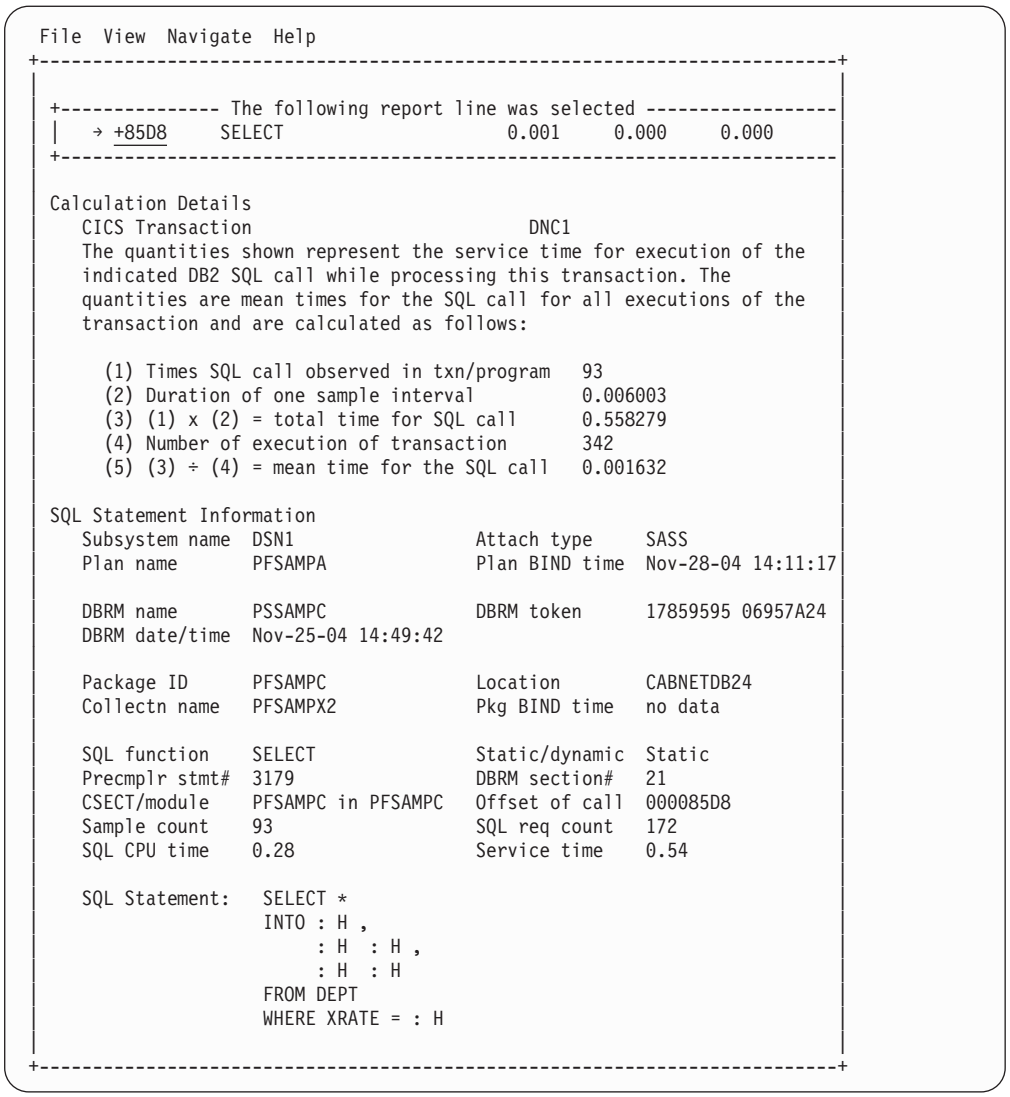
Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter “++” (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here, this one is for a CICS command:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |   > +2C70     RETURN              0.000     0.000    0.000      0.000|     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     CICS Transaction                          DNC1                            |
|     The quantities shown represent the service time for execution of the      |
|     indicated CICS command while processing this transaction. The             |
|     quantities are mean times for the command for all executions of the       |
|     transaction and are calculated as follows:                                |
|                                                                               |
|       (1) Times command observed in txn/program    26                         |
|       (2) Duration of one sample interval          0.006003                   |
|       (3) (1) × (2) = total time for command       0.156078                   |
|       (4) Number of executions of transaction      342                        |
|       (5) (3) ÷ (4) = mean time for the command    0.000456                   |
|                                                                               |
|  Command Attributes                                                           |
|       CICS Command                  EXEC CICS RETURN                          |
|       Issued in Load Module         PFSAMPA                                   |
|       Return Offset in Module       +2C90                                     |
|       Name of CSECT                 PFSAMPA                                   |
|       Return Offset in CSECT        +2C70                                     |
|                                                                               |
|  The command execution measurement counts are                                 |
|       Executing (CPU active)        21                                        |
|       Suspended by CICS             5                                         |
|       Delayed                                                                 |
|          CICS dispatch delay        0                                         |
|          MVS delay (WAIT)           0                                         |
|          MVS delay (Busy)           0                                         |
|                                                                               |
+-------------------------------------------------------------------------------+
```

A sample detail window for an SQL command is shown here:



E05 - CICS total service time by Txn

Usage

Use this report to see an analysis of how time was spent by the CICS transactions that were measured during the observation session. Expand a CICS transaction report line to see a further breakdown by program and by CICS command.

Quantification

Each report line quantifies total times for each measured transaction. The total times are expressed in units of seconds. The total service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded E05 report shows a line for each measured CICS transaction. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Transaction
 Level 2 CICS Program
  Level 3 CICS Command
  Level 3 CICS Command

  ...
 Level 2 CICS Program
  Level 3 SQL Request
  Level 3 SQL Request

  ...
 Level 2 CICS Program
  Level 3 DL/I Request
  Level 3 DL/I Request

  ...
 Level 2 CICS Program
  Level 3 Module
  Level 3 Module
  Level 3 System Services

  ...
 Level 2 CICS Program
  Level 3 Adabas Request
  Level 3 Adabas Request

  ...
 Level 2 System Services
  Level 3 Module
  Level 3 Module
  Level 3 System Services

  ...
```

Detail line descriptions

CICS transaction detail line

This is the first-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	If this is a recognized CICS transaction, a functional description.
Error	The margin of error based on a sample population of the number of executions of the transaction.
Execution	The total time, in seconds, that a CPU was actively executing for the transaction.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction. This includes execution, suspend and delay time.

CICS program or system services detail line

This is a second-level detail line shown directly under the CICS transaction detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The third-level lines shown under this item can be either CICS command lines, SQL Request lines, DL/I Request lines or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, DB2 SQL, or IMS DLI calls, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, this displays “EXEC CICS”. If lines grouped under this line are SQL request lines, this displays “EXEC SQL”. If lines grouped under this line are DL/I request lines, this displays “EXEC DLI”. Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if it is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Execution	The total time, in seconds, CPU execution was observed while transaction control was under the CICS program identified in the Name column.
Suspend	The total time, in seconds, CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction control was under the CICS program identified in the Name column. This includes execution, suspend and delay time.

CICS command detail line

These lines appear under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This is in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command descriptor. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command descriptor is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The total time, in seconds, CPU execution was observed while the CICS command was being processed.
Suspend	The total time, in seconds, CICS had suspended execution of the transaction while the CICS command was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction the CICS command was being processed. This includes execution, suspend and delay time.

SQL request detail line

These lines appear under a CICS Program detail line. Each one represents an SQL request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function — SELECT, FETCH, UPDATE, etc.
Execution	The total time, in seconds, CPU execution was observed while the SQL request was being processed.
Suspend	The total time, in seconds, CICS had suspended execution of the transaction while the SQL request was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction the SQL request was being processed. This includes execution, suspend and delay time.

DL/I request detail line

These lines appear under a CICS Program detail line. Each one represents an IMS DL/I request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DL/I command. This is in +xxxx format. This field is always displayed in red.
Description	The DL/I function code followed by the PCB name.
Execution	The total time, in seconds, CPU execution was observed while the DL/I request was being processed.
Suspend	The total time, in seconds, CICS had suspended execution of the transaction while the DL/I request was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction the DL/I request was being processed. This includes execution, suspend and delay time.

Module/system services detail line

These lines appear under a CICS Program detail line. Each one represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, “CICS” is displayed in the name field and “System Services” in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or “CICS” if a module name could not be determined.
Description	A functional description of the module if one is available. “System Services” is displayed if the module name could not be determined.
Execution	The total time, in seconds, for execution of the module within the grouping under which the detail line appears.
Suspend	This field will contain a value of zero.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fourth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The total time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.
Delay	The total time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

When the report is first displayed, only the first level of the hierarchy is visible (transaction). A sample is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E05: CICS Total Service Time by Txn (0817/CICS23A)           Row 00001 of 00004
Command ===> _____________________________________________ Scroll ===> CSR

                                      -------- Mean Time in Seconds ---------
Name    NTxns Description          Error Execution + Suspend + Delay  =  Service

DNC1     327                     ± 5.5%   33.736     4.419    7.649     45.805
FINQ     295                     ± 5.8%    3.649     0.000    3.379      7.029
```

You can enter the "+" line command on a transaction to expand to the next level. A sample of the report with a transaction expanded to the second level of the hierarchy (CICS Program) is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E05: CICS Total Service Time by Txn (0817/CICS23A)          Row 00001 of 000015
Command ===> _____________________________________________ Scroll ===> CSR

                                      -------- Total Time in Seconds --------
Name    NTxns Description          Error Execution + Suspend + Delay  =  Service

DNC1     327                     ± 5.5%   33.736     4.419    7.649     45.805
→ PFSAMPC     EXEC SQL                     15.298     0.000    1.569     16.868
→ DFHD2EX1    CICS Program                  7.159     3.709    0.869     11.738
→ PFSAMPB     EXEC SQL                      3.559     0.000    0.949      4.509
→ CICS        System Services               1.359     0.089    2.799      4.249
→ PFSAMPA     CICS Program                  1.549     0.259    0.769      2.579
→ PFSAMPA     EXEC SQL                      1.569     0.000    0.539      2.109
→ PFSAMPB     CICS Program                  1.319     0.179    0.079      1.579
→ PFSAMPC     CICS Program                  0.829     0.139    0.000      0.969
→ PFSAMPA     EXEC CICS                     0.899     0.009    0.039      0.949
→ CEECCICS    EXEC CICS                     0.149     0.019    0.029      0.199
→ PFSAMPB     EXEC CICS                     0.039     0.009    0.000      0.049
```

You can enter the "+" line command on a program to expand to the next level. In the sample below, a line with description "EXEC SQL" has been expanded, showing the SQL commands:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E05: CICS Total Service Time by Txn (0817/CICS23A)           Row 00001 of 00027
Command ===> _____________________________________________ Scroll ===> CSR

                                      -------- Total Time in Seconds --------
Name    NTxns Description          Error Execution + Suspend + Delay  =  Service

DNC1     327                     ± 5.5%   33.736     4.419    7.649     45.805
→ PFSAMPC     EXEC SQL                     15.298     0.000    1.569     16.868
  → +1BE2     FETCH                         5.809     0.000    0.579      6.389
  → +662A     FETCH                         2.869     0.000    0.109      2.979
  → +0F52     SELECT                        1.469     0.000    0.239      1.709
  → +6E9C     SELECT                        1.189     0.000    0.129      1.319
  → +1164     SELECT                        1.019     0.000    0.189      1.209
  → +6C4C     SELECT                        0.829     0.000    0.109      0.939
  → +6248     SELECT                        0.809     0.000    0.079      0.889
  → +1588     OPEN                          0.679     0.000    0.059      0.739
  → +64D0     OPEN                          0.389     0.000    0.029      0.419
  → +6752     CLOSE                         0.129     0.000    0.019      0.149
  → +2348     CLOSE                         0.099     0.000    0.019      0.119
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Transaction, Load Module, CSECT, Command, Seqno, DL/I Request	Display context help information.
++	Transaction, Load Module, CSECT, Command, Seqno, DL/I Request	Show additional details.
+	Transaction, Load Module	Expand to reveal next level.
–	Transaction, Load Module	Collapse to hide next level.
SV	Transaction, Load Module	Sort next level by value.
SN	Transaction, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	CICS Active Module, Command, CSECT, Seqno, DL/I Request	Display source program mapping.

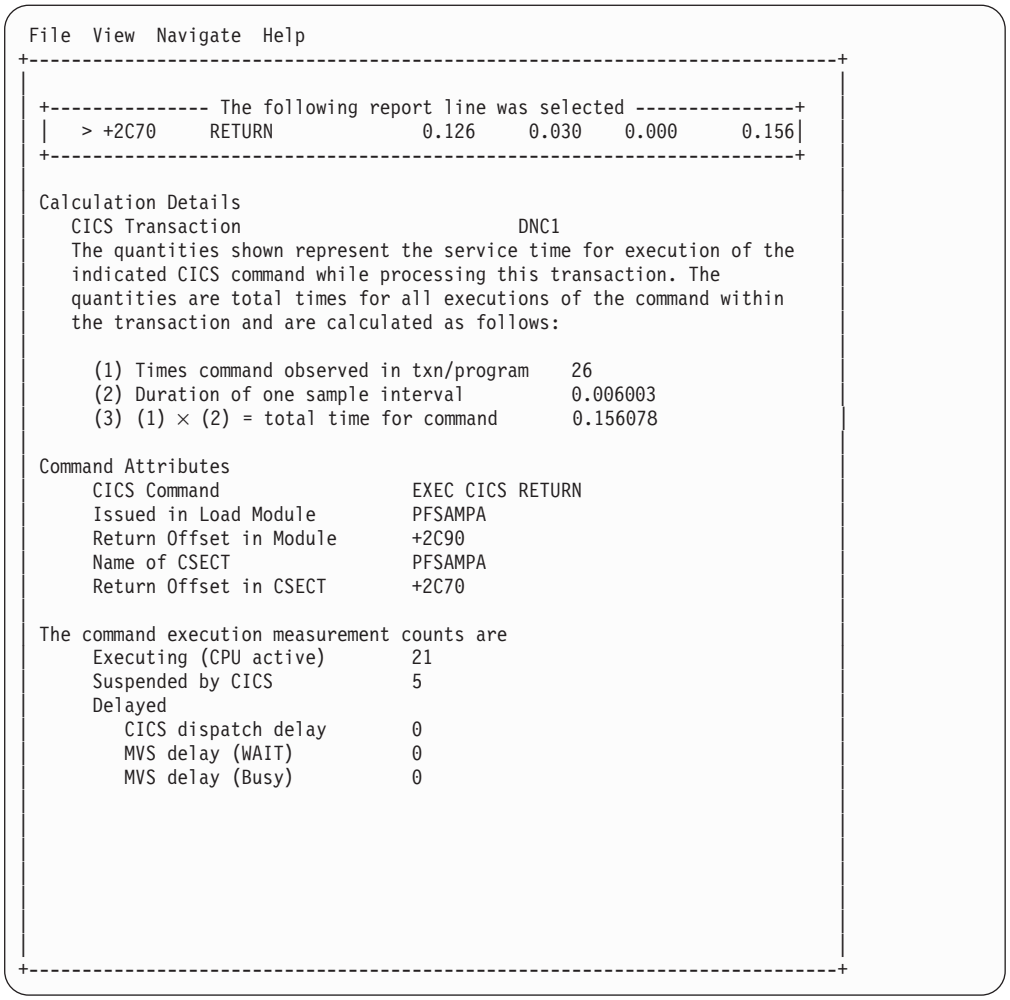
on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here, this one is for a CICS command:



A sample detail window for an SQL command is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected -------------------+  |
| |   → +6E9C     SELECT                    1.189     0.000     0.129       |  |
| +-------------------------------------------------------------------------+  |
|                                                                               |
| Calculation Details                                                           |
|    CICS Transaction                          DNC1                             |
|    The quantities shown represent the service time for execution of the       |
|    indicated CICS command while processing this transaction. The              |
|    quantities are total times for all executions of the command within        |
|    the transaction and are calculated as follows:                             |
|                                                                               |
|      (1) Times SQL call observed in txn/program   132                         |
|      (2) Duration of one sample interval          0.009999                    |
|      (3) (1) x (2) = total time for SQL call      1.319868                    |
|                                                                               |
| SQL Statement Information                                                     |
|    DBRM name        PSSAMPC                                                   |
|    DBRM token       17652081 1C3E933C                                         |
|    Precmplr stmt#   3179                                                      |
|    SQL Call Module  PFSAMPC                                                   |
|    SQL Call CSECT   PFSAMPC                                                   |
|    SQL Call Offset  00006E9C                                                  |
|    SQL Function     SELECT                                                    |
|    Subsystem name   DSN1                                                      |
|    Connection Type  SASS                                                      |
|    Package/Plan:                                                              |
|      Location       CABNETDB24                                                |
|      Collectn name  PFSAMPC6                                                  |
|      Package ID     PFSAMPC                                                   |
|      Plan name      PFSAMPA                                                   |
|                                                                               |
|    SQL Req Count   105                                                        |
|                                                                               |
|    SQL Statement:  SELECT *                                                   |
|                    INTO : H ,                                                 |
|                         : H  : H ,                                            |
|                         : H  : H                                              |
|                    FROM DEP                                                   |
|                    WHERE XRATE = : H                                          |
+-------------------------------------------------------------------------------+
```

E06 - CICS service time by task ID

Usage

Use this report to see a chronology of occurrences of CICS transactions. Expand a CICS transaction report line to see a separate line for each execution of the transaction. Expand a task number report line to see a further breakdown by program, CICS command, SQL request and DL/I request.

Quantification

Each report line quantifies total times for each measured transaction. The total times are expressed in units of seconds. The total service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded E06 report shows a line for each measured CICS transaction. You can expand each line to reveal a line for each occurrence of the transaction.

The hierarchy is illustrated here:

```
Level 1 CICS Transaction
 Level 2 CICS Transaction Occurrence
  Level 3 CICS Program
   Level 4 CICS Command
   Level 4 CICS Command
    ...
  Level 3 CICS Program
   Level 4 SQL Request
   Level 4 SQL Request
    ...
  Level 3 CICS Program
   Level 4 DLI Request
   Level 4 DLI Request
    ...
  Level 3 CICS Program
   Level 4 Module
   Level 4 Module
   Level 4 System Services
    ...
  Level 3 CICS Program
   Level 4 Adabas Request
   Level 4 Adabas Request
    ...
  Level 3 System Services
   Level 4 Module
   Level 4 Module
   Level 4 System Services
    ...
 Level 2 CICS Transaction Occurrence
    ...
```

Detail line descriptions

CICS transaction detail line

This is the first-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	If this is a recognized CICS transaction, a functional description.
Error	The margin of error based on a sample population of the number of executions of the transaction.
Execution	The total time, in seconds, that a CPU was actively executing for the transaction.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fifth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction. This includes execution, suspend and delay time.

CICS transaction number detail line

This detail line shows information about a single execution of the transaction.

Under Heading	This is Displayed
Name	The 'Task ID' of the transaction. This is a sequence number assigned to the transaction by CICS. CICS increments this value for each transaction execution. It serves as a unique transaction identifier.
Description	The time of day at which the transaction was executed.
Execution	The total time, in seconds, CPU execution was observed while the transaction was being processed.
Suspend	The total time, in seconds, CICS had suspended execution of the transaction.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fifth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction. This includes execution, suspend and delay time.

CICS program or system services detail line

This is a third-level detail line shown directly under the CICS transaction detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The fourth-level lines shown under this item can be either CICS command lines, SQL request lines, DLI request lines or module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, this displays “EXEC CICS.” If lines grouped under this line are SQL request lines, this displays “EXEC SQL.” If lines grouped under this line are DLI request lines, this displays “EXEC DLI.” Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if it is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Execution	The total time, in seconds, CPU execution was observed while transaction control was under the CICS program identified in the Name column.
Suspend	The total time, in seconds, CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fifth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction control was under the CICS program identified in the Name column. This includes execution, suspend and delay time.

CICS command detail line

detail line These lines appear under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This is in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command descriptor. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command descriptor is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The total time, in seconds, CPU execution was observed while the CICS command was being processed.
Suspend	The total time, in seconds, CICS had suspended execution of the transaction while the CICS command was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fifth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction the CICS command was being processed. This includes execution, suspend and delay time.

SQL request detail line

These lines appear under a CICS Program detail line. Each one represents an SQL request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Execution	The total time, in seconds, CPU execution was observed while the SQL request was being processed.
Suspend	The total time, in seconds, CICS had suspended execution of the transaction while the SQL request was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, execution of the transaction was delayed. This is a fifth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction the SQL request was being processed. This includes execution, suspend and delay time.

DLI request detail line

These lines appear under a CICS Program detail line. Each one represents an IMS DLI request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DLI command. This is in +xxxx format. This field is always displayed in red.
Description	The DLI function code followed by the PCB name.
Execution	The total time, in seconds, CPU execution was observed while the DLI request was being processed.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the DLI request was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, that execution of the transaction was delayed. This is a fifth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction the DLI request was being processed. This includes execution, suspend and delay time.

Module/system services detail line

These lines appear under a CICS Program detail line. Each one represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, “CICS” is displayed in the name field and “System Services” in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or “CICS” if a module name could not be determined.
Description	A functional description of the module if one is available. “System Services” is displayed if the module name could not be determined.
Execution	The total time, in seconds, for execution of the module within the grouping under which the detail line appears.
Suspend	This field will contain a value of zero.

Under Heading	This is Displayed
Delay	The mean time, in seconds, that execution of the transaction was delayed. This is a fifth-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.
Service	The total service time for the transaction the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The total time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.
Delay	The total time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

When the report is first displayed, only the first level of the hierarchy is visible (transaction). A sample is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E06: CICS Service Time by Task Id (0712/CICS23A)              Row 00001 of 00003
Command ===> _____________________________________________ Scroll ===> CSR

                                        -------- Total Time in Seconds --------
Name   Count Description          Error Execution + Suspend + Delay  =  Service

CKAM       1                     ±99.9%    0.000   141.069    0.000    141.069
DNC1      72                     ±11.9%    0.665    63.709   54.076    118.451
FINQ     174                     ± 7.6%    1.576     0.035   73.506     75.118
```

By entering "+" on a transaction line, it is expanded into the CICS transaction occurrence detail line:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E06: CICS Service Time by Task Id (0712/CICS23A)              Row 00001 of 00177
Command ===> _____________________________________________ Scroll ===> CSR

                                        -------- Total Time in Seconds --------
Name   Count Description          Error Execution + Suspend + Delay  =  Service

CKAM       1                     ±99.9%    0.000   141.069    0.000    141.069
DNC1      72                     ±11.9%    0.665    63.709   54.076    118.451
FINQ     174                     ± 7.6%    1.576     0.035   73.506     75.118
→ 01531      16:34:50.97                   0.000     0.000    0.361      0.361
→ 01533      16:34:51.87                   0.000     0.000    0.513      0.513
→ 01534      16:34:53.55                   0.000     0.000    0.303      0.303
→ 01536      16:34:53.99                   0.000     0.000    0.490      0.490
→ 01537      16:34:54.92                   0.000     0.000    0.256      0.256
→ 01539      16:34:55.30                   0.035     0.000    0.490      0.525
→ 01540      16:34:56.39                   0.000     0.000    0.482      0.482
→ 01541      16:34:58.06                   0.000     0.000    0.397      0.397
→ 01542      16:34:58.60                   0.000     0.000    0.408      0.408
→ 01544      16:34:59.08                   0.000     0.000    0.432      0.432
→ 01545      16:34:59.99                   0.023     0.000    0.280      0.303
→ 01547      16:34:00.48                   0.011     0.000    0.361      0.373
→ 01548      16:34:00.92                   0.000     0.000    0.443      0.443
```

Line commands

on objects

Cmd	When Applied To Object	Action
?	Transaction, Task ID, CICS Program	Display context help information.
++	Transaction, Task ID, CICS Program	Show additional details.
+	Transaction, Task ID, CICS Program	Expand to reveal next level.
–	Transaction, Task ID, CICS Program	Collapse to hide next level.
SV	Transaction, Task ID, CICS Program	Sort next level by value.
SN	Transaction, Task ID, CICS Program	Sort next level by name.

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.

Cmd	When Applied To Object	Action
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+------------------------------------------------------------------------------+
|                                                                              |
|  +--------------- The following report line was selected ---------------+    |
|  | DNC1     342            ± 5.4%   15.547     1.596    3.373     20.518|    |
|  +-----------------------------------------------------------------------+    |
|                                                                              |
|  Calculation Details                                                         |
|     CICS Transaction                          DNC1                           |
|     The quantities shown represent the service time for executions of        |
|     this transaction. The service time is the sum of execution time,         |
|     suspend time and delay time. The quantities are total times for all      |
|     executions of the transaction and are calculated as follows:             |
|                                                                              |
|       (1) Number of times transaction observed     3418                      |
|       (2) Duration of one sample interval          0.006003                  |
|       (3) (1) × (2) = total time for transaction   20.518254                 |
|                                                                              |
|  The transaction execution measurement counts are                            |
|       Executing (CPU active)        2590                                     |
|       Suspended by CICS             266                                      |
|       Delayed                                                                |
|          CICS dispatch delay        125                                      |
|          MVS delay (WAIT)           0                                        |
|          MVS delay (Busy)           437                                      |
|                                                                              |
|  Measurement counts for service requests made by this transaction            |
|       Program requests              51                                       |
|       Terminal messages             0                                        |
|       Getmain requests              10                                       |
|       Freemain requests             11                                       |
|       File I/O requests             0                                        |
|       File suspends                 0                                        |
|       Temporary storage requests    0                                        |
|       Transient data requests       0                                        |
|       Dump system requests          0                                        |
|       Dump transaction requests     0                                        |
|       Journal requests              0                                        |
|                                                                              |
+------------------------------------------------------------------------------+
```

E07 - CICS wait by Txn

Usage

Use this report to see where CICS transactions were waiting. Expand a CICS transaction report line to see a further breakdown by resource name.

Quantification

Each report line quantifies accumulated wait as a percentage. Each percentage represents the ratio of wait time observed for the reported item (transaction or

resource), to the total number of wait observations measured in the address space. There can be many wait observations recorded for the same CICS sample.

Detail line hierarchy

An unexpanded E07 report shows a line for each CICS transaction which was observed to be in a wait. You can expand each line to reveal additional hierarchical levels of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 CICS Transaction
 Level 2 Wait Resource
 Level 2 CICS Dispatch Delay
 Level 2 MVS Delay (Wait)
 Level 2 MVS Delay (Busy)

    ...
```

Detail line descriptions

CICS transaction detail line

This is the first-level detail line. Each line shows information about a CICS transaction which was observed in a wait.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns/Description	The number of executions of the transaction, and if this is a recognized CICS transaction, a functional description.
Percent wait time	The percentage of wait observations for this transaction of the total number of wait observations for the region.
Delay	The mean time, in seconds, that execution of the transaction was delayed. This is a second-level detail line shown directly under the CICS transaction detail line. This line represents a CICS resource type or a wait type. The complete list of resource types is documented in the *CICS Transaction Server for z/OS Problem Determination Guide* The most common wait types include: **CICS** The CICS region was busy processing other transactions and could not dispatch this transaction. **MVSWait** The entire region was in a wait for an MVS service. **MVSBusy** The MVS system was busy and did not dispatch the CICS region. **CICSSusp** The transaction has been suspended by CICS while waiting on a resource.

Sample reports

A sample report is shown here, the transaction has been expanded to the second level.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E07: CICS Wait by Txn (1623/CICS23A)                          Row 00001 of 00005
Command ===> ____________________________________________________ Scroll ===> CSR

Name   NTxns/Description             Percent of CPU time * 10.00%  ±1.5%
                                        *....1....2....3....4....5....6....7
DNC1     342                        24.80 ============
→ MVSBusy   MVS Delay (Busy)        13.09 =======
→ CICSSusp  Suspend                  7.51 ===
→ CICSDly   CICS Dispatch Delay      4.14 ==
→ MVSWait   MVS Delay (Wait)         0.04
```

Line commands

on objects

Cmd	When Applied To Object	Action
?	Transaction, Resource/Wait type	Display context help information.
++	Transaction, Resource/Wait type	Show additional details.
+	Transaction	Expand to reveal next level.
–	Transaction	Collapse to hide next level.
SV	Transaction	Sort next level by value.
SN	Transaction	Sort next level by name.

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

E08 - CICS mean service time by terminal ID

Usage

Use this report to see an analysis of how time was spent on CICS terminals that were executing during the observation session. Expand a CICS terminal report line to see a further breakdown by transaction, program, CICS command, DLI request and SQL request.

Quantification

Each report line quantifies time as arithmetic means for all measured transactions on the terminal. The means are calculated by dividing the total of all time spent servicing all occurrences of transactions on the terminal by the number of occurrences. The means are expressed in units of seconds. The mean service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded E08 report shows a line for each measured CICS terminal, and one line for all non-terminal-attached transactions. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Terminal
 Level 2 CICS Transaction
  Level 3 CICS Program
   Level 4 CICS Command
   Level 4 CICS Command

    ...
  Level 3 CICS Program
   Level 4 SQL Request
   Level 4 SQL Request

    ...
  Level 3 CICS Program
   Level 4 DLI Request
   Level 4 DLI Request

    ...
  Level 3 CICS Program
   Level 4 Module
   Level 4 Module
   Level 4 System Services

    ...
  Level 3 CICS Program
   Level 4 Adabas Request
   Level 4 Adabas Request

    ...
  Level 3 System Services
   Level 4 Module
   Level 4 Module
   Level 4 System Services
```

Detail line descriptions

CICS terminal detail line

This is the first-level detail line. Each line shows information about a CICS terminal for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS terminal ID. This will be the terminal ID or N/A if a terminal ID was not available during the sample. A terminal might not be available because the transaction was running while not attached to the terminal, or the transaction was not attached to the terminal during initialization or termination.
NTxns	The number of executions of transactions on this terminal.
Description	This will either be terminal transaction or nonterminal transaction.
Error	The margin of error for the mean values calculated by using the number of executions of transactions for this terminal as a sample size.
Execution	The mean time, in seconds, that a CPU was actively executing transactions on this terminal.

Under Heading	This is Displayed
Suspend	The mean time, in seconds, that CICS had suspended execution of transactions on this terminal.
Delay	The mean time, in seconds, execution of the transactions on this terminal was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for transactions on this terminal, including execution, suspend, and delay time.

CICS transaction detail line

This is the second-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	A functional description (if the transaction is a recognized CICS transaction).
Error	The margin of error for the mean values calculated by using the number of executions of the transaction as the sample size.
Execution	The mean time, in seconds, a CPU was actively executing for the transaction.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction.
Delay	The mean time, in seconds, execution of the transaction was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction. This includes execution, suspend and delay time.

CICS program or system services detail line

This is a third-level detail line shown directly under the CICS transaction detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The fourth-level lines shown under this item can be either CICS command lines, SQL Request lines, DLI Request lines, or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
NTxns	The number of executions of the transaction.
Description	If lines grouped under this line are CICS command lines, the description displays “EXEC CICS.” If lines grouped under this line are SQL request lines, the description displays “EXEC SQL.” If lines grouped under this line are DLI request lines, the description displays “EXEC DLI.” Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if the CICS module name is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Execution	The mean time, in seconds, that CPU execution was observed while transaction control was under the CICS program identified in the Name column.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.
Delay	The mean time, in seconds, that execution of the transaction was delayed while transaction control was under the CICS program identified in the Name column. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction during which control was under the CICS program identified in the Name column. Service time includes execution, suspend, and delay time.

CICS command detail line

These lines appear under a CICS program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This hexadecimal offset appears in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command descriptor. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command descriptor is preceded by the hexadecimal offset of the command from the start of the CSECT.

Under Heading	This is Displayed
Execution	The mean time, in seconds, that CPU execution was observed while the CICS command was being processed.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while the CICS command was being processed.
Delay	The mean time, in seconds, that execution of the transaction was delayed while the CICS command was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction the CICS command was being processed. This includes execution, suspend, and delay time.

SQL request detail line

These lines appear under a CICS program detail line. Each line represents an SQL request issued by the program identified in the name field of the CICS program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Execution	The mean time, in seconds, that CPU execution was observed while the SQL request was being processed.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while the SQL request was being processed.
Delay	The mean time, in seconds, that execution of the transaction was delayed while the SQL request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction the SQL request was being processed. This includes execution, suspend and delay time.

DLI request detail line

These lines appear under a CICS Program detail line. Each line represents an IMS DLI request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DLI command. This is in +xxxx format. This field is always displayed in red.
Description	The DLI function code followed by the PCB name.

Under Heading	This is Displayed
Execution	The mean time, in seconds, that CPU execution was observed while the DLI request was being processed.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while the DLI request was being processed.
Delay	The mean time, in seconds, that execution of the transaction was delayed while the DLI request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction the DLI request was being processed. This includes execution, suspend and delay time.

Module/system services detail line

These lines appear under a CICS Program detail line. Each line represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, "CICS" is displayed in the name field and "System Services" is displayed in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or "CICS" if a module name could not be determined.
Description	A functional description of the module if one is available. "System Services" is displayed if the module name could not be determined.
Execution	The mean time, in seconds, for execution of the module within the grouping under which the detail line appears.
Suspend	This field will contain a value of zero.
Delay	The mean time, in seconds, that the identified module was preempted by MVS.
Service	The mean service time for the transaction the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The mean time, in seconds, during which CPU execution was observed while the Adabas request was being processed.

Under Heading	This is Displayed
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.
Delay	The mean time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

A sample report is shown here, the transaction has been expanded to the second level.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
E08: CICS Mean Service Time by Termid (2669/CICS23A)          Row 00001 of 00005
Command ===> _____________________________________________ Scroll ===> CSR

                                                 --------- Mean Time in Seconds ---------
Name    NTxns Description         Error  Execution  + Suspend + Delay  =  Service

ET38      342  Terminal Attached  ± 5.4%    0.044      0.008    0.004      0.057
→ DNC1    342                     ± 5.4%    0.044      0.008    0.004      0.057
  → DFHD2EX1  CICS Program                  0.013      0.003    0.000      0.018
  → PFSAMPA   CICS Program                  0.001      0.000    0.000      0.001
  → PFSAMPB   CICS Program                  0.000      0.000    0.000      0.001
  → CICS      System Services               0.001      0.000    0.000      0.001
  → PFSAMPC   CICS Program                  0.000      0.000    0.000      0.001
  → PFSAMPA   EXEC CICS                     0.000      0.000    0.000      0.000
  → CEECCICS  EXEC CICS                     0.000      0.000    0.000      0.000
  → PFSAMPB   EXEC CICS                     0.000      0.000    0.000      0.000
  → PFSAMPC   EXEC CICS                     0.000      0.000    0.000      0.000


ET40      325  Terminal Attached  ± 5.5%    0.042      0.007    0.005      0.056
→ DNC1    325                     ± 5.5%    0.042      0.007    0.005      0.056
  → DFHD2EX1  CICS Program                  0.012      0.003    0.001      0.016
  → PFSAMPA   CICS Program                  0.001      0.000    0.000      0.001
  → PFSAMPB   CICS Program                  0.000      0.000    0.000      0.001
  → PFSAMPC   CICS Program                  0.000      0.000    0.000      0.001
  → CICS      System Services               0.000      0.000    0.000      0.001
  → PFSAMPA   EXEC CICS                     0.000      0.000    0.000      0.000
  → PFSAMPB   EXEC CICS                     0.000      0.000    0.000      0.000
  → CEECCICS  EXEC CICS                     0.000      0.000    0.000      0.000
  → PFSAMPC   EXEC CICS                     0.000      0.000    0.000      0.000


ET33      122  Terminal Attached  ± 9.0%    0.043      0.009    0.005      0.057
→ DNC1    122                     ± 9.0%    0.043      0.009    0.005      0.057
  → DFHD2EX1  CICS Program                  0.004      0.001    0.000      0.006
  → PFSAMPC   CICS Program                  0.000      0.000    0.000      0.000
  → CiCS      System Services               0.000      0.000    0.000      0.000
  → PFSAMPA   CICS Program                  0.000      0.000    0.000      0.000
  → PFSAMPB   CICS Program                  0.000      0.000    0.000      0.000
  → PFSAMPA   EXEC CICS                     0.000      0.000    0.000      0.000
  → PFSAMPB   EXEC CICS                     0.000      0.000    0.000      0.000
  → CEECCICS  EXEC CICS                     0.000      0.000    0.000      0.000
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Terminal, Transaction, Load Module, CSECT, Command, SQL Request, DLI Request	Display context help information.
++	Terminal, Transaction, Load Module, CSECT, Command, SQL Request, DLI Request	Show additional details.
+	Terminal, Transaction, Load Module	Expand to reveal next level.
–	Terminal, Transaction, Load Module	Collapse to hide next level.
SV	Terminal, Transaction, Load Module	Sort next level by value.
SN	Terminal, Transaction, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	Command, CSECT, SQL Request, DLI Request, CICS Active Module	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or press the enter key) on any line to open a window containing additional information.

A sample detail window for a CICS command report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |   → +118E     RETURN TRANSID(DNC1)        0.000     0.000    0.000   |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     CICS Transaction                                                          |
|     The quantities shown represent the service time for execution             |
|     of the indicated CICS command while processing transaction DNC1.          |
|     The quantities are mean times for the command for all executions          |
|     of the transaction and are calculated as follows:                         |
|                                                                               |
|       (1) Times command observed in txn/program     6                         |
|       (2) Duration of one sample interval           0.009999                  |
|       (3) (1) × (2) = total time for transaction    0.059994                  |
|       (4) NUmber of executions of transaction       327                       |
|       (5) (3) ÷ (4) = mean time for the command     0.000183                  |
|                                                                               |
|  Command Attributes                                                           |
|       CICS Command                  EXEC  CICS RETURN TRANSID(DNC1)           |
|       Issued in Load Module         PFSAMPA                                   |
|       Return offset in Module       +11AE                                     |
|       Name of CSECT                 PFSAMPA                                   |
|       Return of Offset in CSECT     +118E                                     |
|                                                                               |
|  The command execution measurement counts are                                 |
|       Executing (CPU active)        5                                         |
|       Suspended by CICS             0                                         |
|       Delayed                                                                 |
|          CICS dispatch delay        0                                         |
|          MVS delay (WAIT)           0                                         |
|          MVS delay (Busy)           1                                         |
|                                                                               |
+-------------------------------------------------------------------------------+
```

A sample detail window for an SQL command is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |   → +85D8    SELECT                      0.001     0.000    0.000   |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     The quantities shown represent the service time for execution             |
|     of the indicated DB2 SQL call while processing transaction DNC1.          |
|     The quantities are mean times for the SQL call for all executions         |
|     of the transaction and are calculated as follows:                         |
|                                                                               |
|       (1) Times SQL call observed in txn/program    93                        |
|       (2) Duration of one sample interval           0.006003                  |
|       (3) (1) x (2) = total time for SQL call       0.558279                  |
|       (4) Number of executions of transaction       342                       |
|       (5) (3) ÷ (4) = mean time for the SQL call    0.001632                  |
|                                                                               |
|  SQL Statement Information                                                    |
|     Subsystem name   DSN1                Attach type     SASS                 |
|     Plan name        PFSAMPA             Plan BIND time  Nov-28-04 14:11:17    |
|                                                                               |
|     DBRM name        PFSAMPC             DBRM token      17859595 06957A24    |
|     DBRM date/time   Nov-25-04 14:49:42                                       |
|                                                                               |
|     Package ID       PFSAMPC             Location        CABNETDB24           |
|     Collectn name    PFSAMPX1            Pkg BIND time   no data              |
|                                                                               |
|     SQL function     SELECT              Static/dynamic  Static               |
|     Precmplr stmt#   3179                DBRM section#   21                   |
|     CSECT/module     PFSAMPC in PFSAMPC  Offset of call  000085D8             |
|     Sample count     93                  SQL req count   172                  |
|     SQL CPU time     0.28                Service time    0.54                 |
|                                                                               |
|     SQL Statement    SELECT * INTO : H , : H , : H : H , : H FROM DEPT        |
|                      WHERE XRATE = : H                                        |
|                                                                               |
|                                                                               |
+-------------------------------------------------------------------------------+
```

E09 - CICS total service time by terminal ID

Usage

Use this report to see an analysis of how time was spent on CICS terminals that were executing during the observation session. Expand a CICS terminal report line to see a further breakdown by transaction, program, CICS command, DLI request, and SQL request.

Quantification

Each report line quantifies total times for transactions measured on a terminal. The total times are expressed in units of seconds. The total service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded E09 report shows one line for each measured CICS terminal, and one line for all nonterminal attached transactions. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Terminal
 Level 2 CICS Transaction
  Level 3 CICS Program
   Level 4 CICS Command
   Level 4 CICS Command

    ...
  Level 3 CICS Program
   Level 4 SQL Request
   Level 4 SQL Request

    ...
  Level 3 CICS Program
   Level 4 DLI Request
   Level 4 DLI Request

    ...
  Level 3 CICS Program
   Level 4 Module
   Level 4 Module
   Level 4 System Services

    ...
  Level 3 CICS Program
   Level 4 Adabas Request
   Level 4 Adabas Request

    ...
  Level 3 System Services
   Level 4 Module
   Level 4 Module
   Level 4 System Services
```

Detail line descriptions

CICS terminal detail line

This is the first-level detail line. Each line shows information about a CICS terminal for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS terminal ID. This will be the terminal ID or N/A if a terminal ID was not available during the sample. A terminal might not be available because the transaction was running while not attached to the terminal, or the transaction was not attached to the terminal during initialization or termination.
NTxns	The number of executions of transactions on this terminal.
Description	This will either be terminal transaction or nonterminal transaction.
Error	The margin of error for the mean values calculated by using the number of executions of transactions for this terminal as a sample size.
Execution	The total time, in seconds, a CPU was actively executing transactions on this terminal.
Suspend	The total time, in seconds, that CICS had suspended execution of transactions on this terminal.

Under Heading	This is Displayed
Delay	The total time, in seconds, execution of the transactions on this terminal was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for transactions on this terminal, including execution, suspend, and delay time.

CICS transaction detail line

This is the first-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	A functional description (if the transaction is a recognized CICS transaction).
Error	The margin of error based on a sample population of the number of executions of the transaction.
Execution	The total time, in seconds, that a CPU was actively executing for the transaction.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction.
Delay	The total time, in seconds, that execution of the transaction was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction. This includes execution, suspend, and delay time.

CICS program or system services detail line

This is a second-level detail line shown directly under the CICS transaction detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The third-level lines shown under this item can be either CICS command lines, SQL request lines, DLI request lines, or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, the description displays “EXEC CICS.” If lines grouped under this line are SQL request lines, the description displays “EXEC SQL.” If lines grouped under this line are DLI request lines, the description displays “EXEC DLI.” Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if the CICS module name is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Execution	The total time, in seconds, that CPU execution was observed while transaction control was under the CICS program identified in the Name column.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.
Delay	The total time, in seconds, that execution of the transaction was delayed while transaction control was under the CICS program identified in the Name column. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction during which control was under the CICS program identified in the Name column. Service time includes execution, suspend, and delay time.

CICS command detail line

These lines appear under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This hexadecimal offset appears in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command descriptor. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command descriptor is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The total time, in seconds, that CPU execution was observed while the CICS command was being processed.

Under Heading	This is Displayed
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the CICS command was being processed.
Delay	The total time, in seconds, that execution of the transaction was delayed while the CICS command was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the CICS command was being processed. This includes execution, suspend, and delay time.

SQL request detail line

These lines appear under a CICS program detail line. Each line represents an SQL request issued by the program identified in the name field of the CICS program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Execution	The total time, in seconds, that CPU execution was observed while the SQL request was being processed.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the SQL request was being processed.
Delay	The total time, in seconds, that execution of the transaction was delayed while the SQL request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction the SQL request was being processed. This includes execution, suspend and delay time.

DLI request detail line

These lines appear under a CICS Program detail line. Each line represents an IMS DLI request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DLI command. This is in +xxxx format. This field is always displayed in red.
Description	The DLI function code followed by the PCB name.
Execution	The total time, in seconds, that CPU execution was observed while the DLI request was being processed.

Under Heading	This is Displayed
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the DLI request was being processed.
Delay	The total time, in seconds, that execution of the transaction was delayed while the DLI request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the DLI request was being processed. This includes execution, suspend, and delay time.

Module/system services detail line

These lines appear under a CICS Program detail line. Each line represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, "CICS" is displayed in the name field and "System Services" is displayed in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or "CICS" if a module name could not be determined.
Description	A functional description of the module if one is available. "System Services" is displayed if the module name could not be determined.
Execution	The total time, in seconds, for execution of the module within the grouping under which the detail line appears.
Suspend	This field will contain a value of zero.
Delay	The total time, in seconds, that the identified module was preempted by MVS.
Service	The total service time for the transaction the during which the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The total time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.

Under Heading	This is Displayed
Delay	The total time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

A sample report is shown here, the transaction has been expanded to the second level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
E09: CICS Total Service Time by Termid (2669/CICS23A)         Row 00001 of 00036
Command ===> _____________________________________________ Scroll ===> CSR

                                        -------- Total Time in Seconds --------
Name    NTxns Description         Error  Execution  + Suspend + Delay  =  Service

ET38      342  Terminal Attached  ± 5.4%   15.207      2.795    1.637     19.640
→ DNC1    342                     ± 5.4%   15.207      2.795    1.637     19.640
  → DFHD2EX1  CICS Program                 10.912      2.597    0.755     14.265
  → PFSAMPA   CICS Program                  1.085      0.053    0.215      1.355
  → PFSAMPB   CICS Program                  0.743      0.071    0.221      1.037
  → CICS      System Services               0.851      0.011    0.077      0.941
  → PFSAMPC   CICS Program                  0.545      0.059    0.305      0.911
  → PFSAMPA   EXEC CICS                     0.641      0.000    0.041      0.683
  → CEECCICS  EXEC CICS                     0.179      0.000    0.017      0.197
  → PFSAMPB   EXEC CICS                     0.179      0.000    0.000      0.179
  → PFSAMPC   EXEC CICS                     0.065      0.000    0.000      0.065


ET40      325  Terminal Attached  ± 5.5%   13.893      2.555    1.775     18.224
→ DNC1    325                     ± 5.5%   13.893      2.555    1.775     18.224
  → DFHD2EX1  CICS Program                 10.120      2.417    0.803     13.341
  → PFSAMPA   CICS Program                  0.791      0.017    0.257      1.067
  → PFSAMPB   CICS Program                  0.737      0.017    0.215      0.971
  → PFSAMPC   CICS Program                  0.557      0.041    0.317      0.917
  → CICS      System Services               0.689      0.059    0.089      0.839
  → PFSAMPA   EXEC CICS                     0.653      0.000    0.065      0.719
  → PFSAMPB   EXEC CICS                     0.161      0.000    0.011      0.173
  → CEECCICS  EXEC CICS                     0.149      0.000    0.005      0.155
  → PFSAMPC   EXEC CICS                     0.029      0.000    0.005      0.035


ET33      122  Terminal Attached  ± 9.0%    5.261      1.109    0.629      7.000
→ DNC1    122                     ± 9.0%    5.261      1.109    0.629      7.000
  → DFHD2EX1  CICS Program                  3.647      1.043    0.293      4.985
  → PFSAMPC   CICS Program                  0.251      0.035    0.143      0.431
  → CICS      System Services               0.311      0.011    0.077      0.401
  → PFSAMPA   CICS Program                  0.311      0.011    0.047      0.371
  → PFSAMPB   CICS Program                  0.281      0.005    0.047      0.335
  → PFSAMPA   EXEC CICS                     0.287      0.000    0.005      0.293
  → PFSAMPB   EXEC CICS                     0.101      0.000    0.005      0.107
  → CEECCICS  EXEC CICS                     0.041      0.000    0.005      0.047
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Transaction, Load Module, CSECT, Command, SQL Request, DLI Request	Display context help information.
++	Transaction, Load Module, CSECT, Command, SQL Request, DLI Request	Show additional details.
+	Transaction, Load Module	Expand to reveal next level.
–	Transaction, Load Module	Collapse to hide next level.
SV	Transaction, Load Module	Sort next level by value.
SN	Transaction, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	Command, CSECT, SQL Request, DLI Request, CICS Active Module	Display source program mapping.

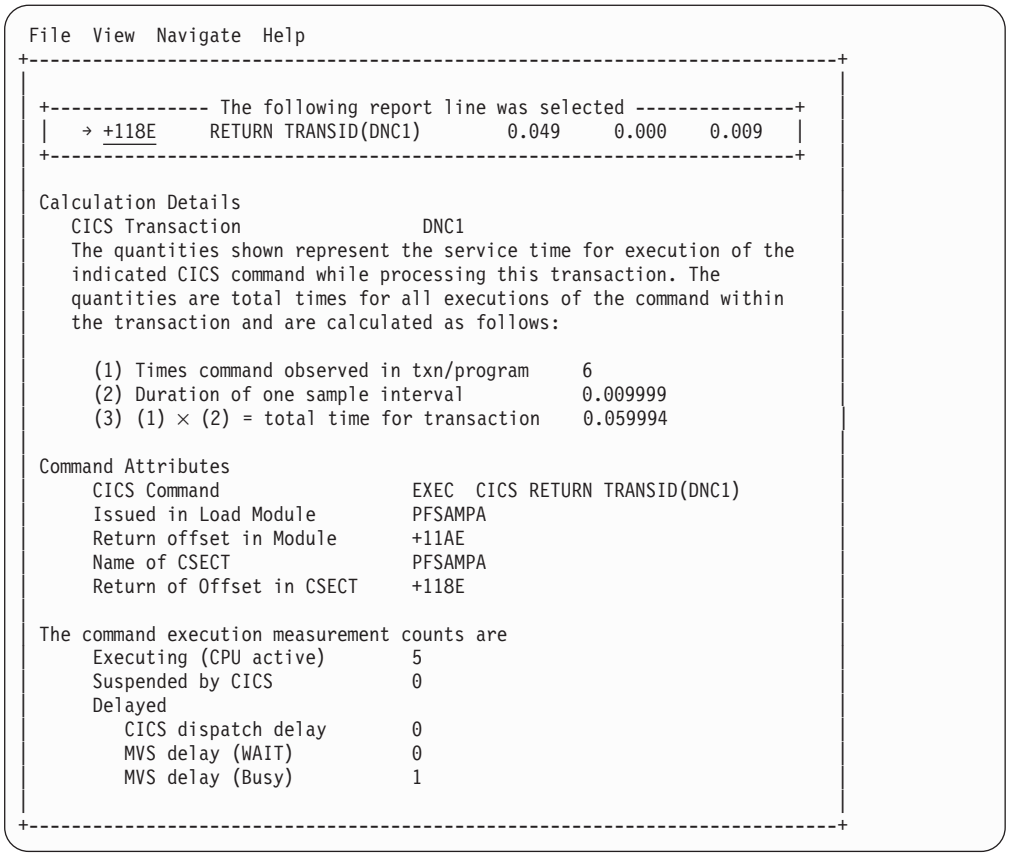
on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or press the enter key) on any line to open a window containing additional information.

A sample detail window for a CICS command report is shown here:



A sample detail window for an SQL command is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |   → +6E9c    SELECT                       1.189     0.000    0.129   |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     CICS Transaction                DNC1                                      |
|     The quantities shown represent the service time for execution of the      |
|     indicated DB2 SQL call while processing this transaction. The             |
|     quantities are total times for all executions of the command within       |
|     the transaction and are calculated as follows:                            |
|                                                                               |
|       (1) Times SQL call observed in txn/program    132                       |
|       (2) Duration of one sample interval           0.009999                  |
|       (3) (1) x (2) = total time for SQL call       1.319868                  |
|                                                                               |
|  SQL Statement Information                                                    |
|     DBRM name        PFSAMPC                                                  |
|     DBRM Token       17652081 1C3E933C                                        |
|     Precmplr stmt#   3179                                                     |
|     SQL Call Module  PFSAMPC                                                  |
|     SQL Call CSECT   PFSAMPC                                                  |
|     SQL Call Offset  00006E9C                                                 |
|     SQL Function     SELECT                                                   |
|     Subsystem name   DSN1                                                     |
|     Connection Type  SASS                                                     |
|     Package/Plan:                                                             |
|       Location       CABNETDB21                                               |
|       Collectn Name  PFSAMPC6                                                 |
|       Package ID     PFSAMPC                                                  |
|       Plan Name      PFSAMPA                                                  |
|                                                                               |
|     SQL Req Count:   105                                                      |
|                                                                               |
|     SQL Statement:                                                            |
|                      SELECT *                                                 |
|                      INTO : H ,                                               |
|                      : H  : H ,                                               |
|                      : H  : H                                                 |
|                      FROM DEP                                                 |
|                      WHERE XRATE = : H                                        |
|                                                                               |
|                                                                               |
+-------------------------------------------------------------------------------+
```

E10 - CICS mean service time by user ID

Usage

Use this report to see an analysis of how time was spent by CICS users that were executing during the observation session. Expand a CICS user ID report line to see a further breakdown by transaction, program, CICS command, DLI request and SQL request.

Quantification

Each report line quantifies time as arithmetic means for all measured transactions initiated by the user. The means are calculated by dividing the total of all time spent servicing all occurrences of transactions initiated by the user, by the number of occurrences. The means are expressed in units of seconds. The mean service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded E10 report shows one line for each measured CICS user. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS User ID
 Level 2 CICS Transaction
  Level 3 CICS Program
   Level 4 CICS Command
   Level 4 CICS Command

    ...
  Level 3 CICS Program
   Level 4 SQL Request
   Level 4 SQL Request

    ...
  Level 3 CICS Program
   Level 4 DLI Request
   Level 4 DLI Request

    ...
  Level 3 CICS Program
   Level 4 Module
   Level 4 Module
   Level 4 System Services

    ...
  Level 3 CICS Program
   Level 4 Adabas Request
   Level 4 Adabas Request

    ...
  Level 3 System Services
   Level 4 Module
   Level 4 Module
   Level 4 System Services
```

Detail line descriptions

CICS user detail line

This is the first-level detail line. Each line shows information about a CICS terminal for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS user ID.
NTxns	The number of executions of transactions initiated by this user.
Description	
Error	The margin of error for the mean values calculated by using the number of executions of transactions by this user as a sample size.
Execution	The mean time, in seconds, during which a CPU was actively executing transactions initiated by this user.
Suspend	The mean time, in seconds, during which CICS had suspended execution of transactions initiated by this user.

Under Heading	This is Displayed
Delay	The mean time, in seconds, during which execution of the transactions initiated by this user was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for transactions initiated by this user. This includes execution, suspend and delay time.

CICS transaction detail line

This is the second-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	If this is a recognized CICS transaction, a functional description.
Error	The margin of error for the mean values calculated by using the number of executions of the transaction as the sample size.
Execution	The mean time, in seconds, during which a CPU was actively executing for the transaction.
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction.
Delay	The mean time, in seconds, during which execution of the transaction was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction. This includes execution, suspend and delay time.

CICS program or system services detail line

This is a third-level detail line shown directly under the CICS transaction detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The third-level lines shown under this item can be either CICS command lines, SQL request lines, DLI request lines, or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, the description displays “EXEC CICS.” If lines grouped under this line are SQL request lines, the description displays “EXEC SQL.” If lines grouped under this line are DLI request lines, the description displays “EXEC DLI.” Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if the CICS module name is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Execution	The mean time, in seconds, during which CPU execution was observed while transaction control was under the CICS program identified in the Name column.
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.
Delay	The mean time, in seconds, during which execution of the transaction was delayed while transaction control was under the CICS program identified in the Name column. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction during which control was under the CICS program identified in the Name column. Service time includes execution, suspend and delay time.

CICS command detail line

These lines appear under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This hexadecimal offset appears in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command descriptor. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command descriptor is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The mean time, in seconds, during which CPU execution was observed while the CICS command was being processed.

Under Heading	This is Displayed
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction while the CICS command was being processed.
Delay	The mean time, in seconds, during which execution of the transaction was delayed while the CICS command was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the CICS command was being processed. This includes execution, suspend, and delay time.

SQL request detail line

These lines appear under a CICS program detail line. Each line represents an SQL request issued by the program identified in the name field of the CICS program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Execution	The mean time, in seconds, during which CPU execution was observed while the SQL request was being processed.
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction while the SQL request was being processed.
Delay	The mean time, in seconds, during which execution of the transaction was delayed while the SQL request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the SQL request was being processed. This includes execution, suspend and delay time.

DLI request detail line

These lines appear under a CICS Program detail line. Each line represents an IMS DLI request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DLI command. This is in +xxxx format. This field is always displayed in red.

Under Heading	This is Displayed
Description	The DLI function code followed by the PCB name.
Execution	The mean time, in seconds, during which CPU execution was observed while the DLI request was being processed.
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction while the DLI request was being processed.
Delay	The mean time, in seconds, during which execution of the transaction was delayed while the DLI request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the DLI request was being processed. This includes execution, suspend, and delay time.

Module/system services detail line

These lines appear under a CICS Program detail line. Each line represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, “CICS” is displayed in the name field and “System Services” is displayed in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or “CICS” if a module name could not be determined.
Description	A functional description of the module if one is available. “System Services” is displayed if the module name could not be determined.
Execution	The mean time, in seconds, for execution of the module within the grouping under which the detail line appears.
Suspend	This field will contain a value of zero.
Delay	The mean time, in seconds, that the identified module was preempted by MVS.
Service	The mean service time for the transaction during which the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.

Under Heading	This is Displayed
Execution	The mean time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.
Delay	The mean time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

A sample report is shown here, the transaction has been expanded to the second level.

```
  File  View  Navigate  Help
------------------------------------------------------------------------------
E10: CICS Mean Service Time by Userid (1873/CICS32A)          Row 00001 of 00032
Command ===> ____________________________________________________ Scroll ===> CSR

                                                 --------- Mean Time in Seconds ---------
Name    NTxns Description         Error  Execution  + Suspend + Delay  =  Service

AHM01       0                    ±99.9%   16.731      4.407   28.184     49.323
→ MQS1      0                    ±99.9%   14.917      0.299    2.338     17.555
  → MQSAMP1   CICS Program                 12.848      0.089    0.944     13.882
  → CEECCICS  EXEC CICS                     1.888      0.119    0.479      2.488
  → CEEPLPKA  EXEC CICS                     0.000      0.000    0.659      0.659
  → CICS      System Services               0.104      0.089    0.239      0.434
  → DFHTFP    CICS Program                  0.059      0.000    0.000      0.059
  → MQSAMP1   EXEC CICS                     0.014      0.000    0.014      0.029

→ MQDR      0                    ±99.9%    0.359      0.404   15.966     16.731
  → CSQ4CVK1  CICS Program                  0.239      0.254   15.696     16.191
  → MQDRVR    EXEC CICS                     0.089      0.044    0.224      0.359
  → MQDRVR    CICS Program                  0.014      0.104    0.044      0.164
  → CICS      System Services               0.014      0.000    0.000      0.014

→ TDB2      0                    ±99.9%    1.379      3.463    8.305     13.147
  → CICS      System Services               0.329      2.413    6.506      9.250
  → CICSDB3   CICS Program                  0.989      0.899    1.769      3.658
  → CEECCICS  EXEC CICS                     0.014      0.149    0.014      0.179
  → CICSDB3   EXEC CICS                     0.044      0.000    0.014      0.059

→ DBDR      0                    ±99.9%    0.074      0.239    1.574      1.888
  → DB2DRVR   EXEC CICS                     0.074      0.239    1.574      1.888

AGM02       0                    ±99.9%    0.000     29.984    0.000     29.984
→ CKAM      0                    ±99.9%    0.000     29.984    0.000     29.984
  → DFHMQMON  EXEC CICS                     0.000     29.984    0.000     29.984
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	User ID, Transaction, Load Module, CSECT, Command, SQL Request, DLI Request	Display context help information.
++	User ID, Transaction, Load Module, CSECT, Command, SQL Request, DLI Request	Show additional details.
+	User ID, Transaction, Load Module	Expand to reveal next level.
–	User ID, Transaction, Load Module	Collapse to hide next level.
SV	User ID, Transaction, Load Module	Sort next level by value.
SN	User ID, Transaction, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	Command, CSECT, SQL Request, DLI Request, CICS Active Module	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter “++” (or press the enter key) on any line to open a window containing additional information.

A sample detail window for a CICS command report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |   → +06B8     PROGRAM(CSQ4CVK1)        0.014  0.044  0.104  0.164    |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     CICS Transaction                    MQDR                                  |
|     The quantities shown represent the service time for execution of the      |
|     indicated CICS command while processing this transaction. The             |
|     quantities are mean times for the command for all executions of the       |
|     transaction and are calculated as follows:                                |
|                                                                               |
|       (1) Times command observed in txn/program    11                         |
|       (2) Duration of one sample interval          0.014992                   |
|       (3) (1) × (2) = total time for command       0.164912                   |
|       (4) Number of executions of transaction      0                          |
|       (5) (3) / (4) = mean time for the command    252.263688                 |
|                                                                               |
|  Command Attributes                                                           |
|       CICS Command                  EXEC  CICS LINK PROGRAM(CSQ4CVK1)         |
|       Issued in Load Module         MQDRVR                                    |
|       Return offset in Module       +06D8                                     |
|       Name of CSECT                 MQDRVR                                    |
|       Return Offset in CSECT        +06B8                                     |
|                                                                               |
|  The command execution measurement counts are                                 |
|       Executing (CPU active)        1                                         |
|       Suspended by CICS             3                                         |
|       Delayed                                                                 |
|          CICS dispatch delay        0                                         |
|          MVS delay (WAIT)           0                                         |
|          MVS delay (Busy)           7                                         |
|                                                                               |
+-------------------------------------------------------------------------------+
```

E11 - CICS total service time by user ID

Usage

Use this report to see an analysis of how time was spent by CICS users that were measured during the observation session. Expand a CICS user ID report line to see a further breakdown by transaction, program, CICS command, DLI request and SQL request.

Quantification

Each report line quantifies total times for transactions measured for a CICS user. The total times are expressed in units of seconds. The total service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded E11 report shows one line for each measured CICS user ID. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS User ID
 Level 2 CICS Transaction
  Level 3 CICS Program
   Level 4 CICS Command
   Level 4 CICS Command

    ...
```

```
Level 3 CICS Program
 Level 4 SQL Request
 Level 4 SQL Request

  ...
Level 3 CICS Program
 Level 4 DLI Request
 Level 4 DLI Request

  ...
Level 3 CICS Program
 Level 4 Module
 Level 4 Module
 Level 4 System Services

  ...
Level 3 CICS Program
 Level 4 Adabas Request
 Level 4 Adabas Request

  ...
Level 3 System Services
 Level 4 Module
 Level 4 Module
 Level 4 System Services
```

Detail line descriptions

CICS terminal detail line

This is the first-level detail line. Each line shows information about a CICS user for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS user ID.
NTxns	The number of executions of transactions initiated by this user.
Description	This is either Terminal Txn or Non-Terminal Txn.
Error	The margin of error for the mean values calculated by using the number of executions of transactions by this user as a sample size.
Execution	The total time, in seconds, during which a CPU was actively executing transactions initiated by this user.
Suspend	The total time, in seconds, during which CICS had suspended execution of transactions initiated by this user.
Delay	The total time, in seconds, during which execution of the transactions initiated by this user was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for transactions initiated by this user. This includes execution, suspend and delay time.

CICS transaction detail line

This is the second-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	If this is a recognized CICS transaction, a functional description.
Error	The margin of error based on a sample population of the number of executions of the transaction.
Execution	The total time, in seconds, during which a CPU was actively executing for the transaction.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction.
Delay	The total time, in seconds, during which execution of the transaction was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction. This includes execution, suspend and delay time.

CICS program or system services detail line

This is a second-level detail line shown directly under the CICS transaction detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The third-level lines shown under this item can be either CICS command lines, SQL request lines, DLI request lines, or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, the description displays “EXEC CICS.” If lines grouped under this line are SQL request lines, the description displays “EXEC SQL.” If lines grouped under this line are DLI request lines, the description displays “EXEC DLI.” Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if the CICS module name is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Execution	The total time, in seconds, during which CPU execution was observed while transaction control was under the CICS program identified in the Name column.

Under Heading	This is Displayed
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.
Delay	The total time, in seconds, during which execution of the transaction was delayed while transaction control was under the CICS program identified in the Name column. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction during which control was under the CICS program identified in the Name column. Service time includes execution, suspend and delay time.

CICS command detail line

These lines appear under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This hexadecimal offset appears in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command descriptor. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command description is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The total time, in seconds, during which CPU execution was observed while the CICS command was being processed.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while the CICS command was being processed.
Delay	The total time, in seconds, during which execution of the transaction was delayed while the CICS command was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the CICS command was being processed. This includes execution, suspend, and delay time.

SQL request detail line

These lines appear under a CICS program detail line. Each line represents an SQL request issued by the program identified in the name field of the CICS program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Execution	The total time, in seconds, during which CPU execution was observed while the SQL request was being processed.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while the SQL request was being processed.
Delay	The total time, in seconds, during which execution of the transaction was delayed while the SQL request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the SQL request was being processed. This includes execution, suspend and delay time.

DLI request detail line

These lines appear under a CICS Program detail line. Each line represents an IMS DLI request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DLI command. This is in +xxxx format. This field is always displayed in red.
Description	The DLI function code followed by the PCB name.
Execution	The total time, in seconds, during which CPU execution was observed while the DLI request was being processed.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while the DLI request was being processed.
Delay	The total time, in seconds, during which execution of the transaction was delayed while the DLI request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the DLI request was being processed. This includes execution, suspend, and delay time.

Module/system services detail line

These lines appear under a CICS Program detail line. Each line represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, "CICS" is displayed in the name field and "System Services" is displayed in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or "CICS" if a module name could not be determined.
Description	A functional description of the module if one is available. "System Services" is displayed if the module name could not be determined.
Execution	The total time, in seconds, for execution of the module within the grouping under which the detail line appears.
Suspend	This field will contain a value of zero.
Delay	The total time, in seconds, that the identified module was preempted by MVS.
Service	The total service time for the transaction during which the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The total time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.
Delay	The total time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

A sample report is shown here. The transaction has been expanded to the second level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
E11: CICS Total Service Time by Userid (1873/CICS32A)         Row 00001 of 00032
Command ===> ____________________________________________________ Scroll ===> CSR

                                          -------- Total Time in Seconds --------
Name    NTxns Description         Error  Execution  + Suspend + Delay  =  Service

AHM01     0                      ±99.9%   16.731      4.407   28.184     49.323
→ MQS1    0                      ±99.9%   14.917      0.299    2.338     17.555
  → MQSAMP1   CICS Program                12.848      0.089    0.944     13.882
  → CEECCICS  EXEC CICS                    1.888      0.119    0.479      2.488
  → CEEPLPKA  EXEC CICS                    0.000      0.000    0.659      0.659
  → CICS      System Services              0.104      0.089    0.239      0.434
  → DFHTFP    CICS Program                 0.059      0.000    0.000      0.059
  → MQSAMP1   EXEC CICS                    0.014      0.000    0.014      0.029

→ MQDR    0                      ±99.9%    0.359      0.404   15.966     16.731
  → CSQ4CVK1  CICS Program                 0.239      0.254   15.696     16.191
  → MQDRVR    EXEC CICS                    0.089      0.044    0.224      0.359
  → MQDRVR    CICS Program                 0.014      0.104    0.044      0.164
  → CICS      System Services              0.014      0.000    0.000      0.014

→ TDB2    0                      ±99.9%    1.379      3.463    8.305     13.147
  → CICS      System Services              0.329      2.413    6.506      9.250
  → CICSDB3   CICS Program                 0.989      0.899    1.769      3.658
  → CEECCICS  EXEC CICS                    0.014      0.149    0.014      0.179
  → CICSDB3   EXEC CICS                    0.044      0.000    0.014      0.059

→ DBDR    0                      ±99.9%    0.074      0.239    1.574      1.888
  → DB2DRVR   EXEC CICS                    0.074      0.239    1.574      1.888

AGM02     0                      ±99.9%    0.000     29.984    0.000     29.984
→ CKAM    0                      ±99.9%    0.000     29.984    0.000     29.984
  → DFHMQMON  EXEC CICS                    0.000     29.984    0.000     29.984
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	User ID, Load Module, CSECT, Command, SQL Request, DLI Request	Display context help information.
++	User ID, Load Module, CSECT, Command, SQL Request, DLI Request	Show additional details.
+	User ID, Load Module	Expand to reveal next level.
–	User ID, Load Module	Collapse to hide next level.
SV	User ID, Load Module	Sort next level by value.
SN	User ID, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	Command, CSECT, SQL Request, DLI Request, CICS Active Module	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or press the enter key) on any line to open a window containing additional information.

A sample detail window for a CICS command report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |   → +0750   START TRANSID(MQS1)       0.014  0.000  0.000  0.014     |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     CICS Transaction                    MQDR                                  |
|     The quantities shown represent the service time for execution of the      |
|     indicated CICS command while processing this transaction. The             |
|     quantities are total times for all executions of the command within       |
|     the transaction and are calculated as follows:                            |
|                                                                               |
|       (1) Times command observed in txn/program    1                          |
|       (2) Duration of one sample interval          0.014992                   |
|       (3) (1) × (2) = total time for command       0.014992                   |
|                                                                               |
|  Command Attributes                                                           |
|       CICS Command                 EXEC  CICS START TRANSID(MQS1)             |
|       Issued in Load Module        MQDRVR                                     |
|       Return offset in Module      +0770                                      |
|       Name of CSECT                MQDRVR                                     |
|       Return Offset in CSECT       +0750                                      |
|                                                                               |
|  The command execution measurement counts are                                 |
|       Executing (CPU active)       1                                          |
|       Suspended by CICS            0                                          |
|       Delayed                                                                 |
|          CICS dispatch delay       0                                          |
|          MVS delay (WAIT)          0                                          |
|          MVS delay (Busy)          0                                          |
|                                                                               |
+-------------------------------------------------------------------------------+
```

E12 - CICS CPU/service time by transaction

Usage

Use this report to see an analysis of how much time was used by the CICS transactions that were measured during the observation session. A prerequisite for this report is activation of the CICS+ option during the measurement. This option records exact CPU and service times for CICS transactions. Expand a CICS transaction report line to see a further breakdown by task number.

Quantification

Each report line shows the following for each CICS transaction:

- Number of transactions executed
- Percentage of total CPU used for this transaction
- Total CPU used for this transaction
- Mean CPU used for this transaction
- Total service time for this transaction
- Mean service time for this transaction

Detail line hierarchy

An unexpanded E11 report shows one line for each measured CICS user ID. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Transaction
 Level 2 CICS Task Number
 Level 2 CICS Task Number
              ...
```

Detail line descriptions

CICS transaction detail line

This is the first-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	If this is a recognized CICS transaction, a functional description.
% of CPU	The percent CPU consumed by this transaction, out of the total recorded for this report.
CPU Time: Total	The total task CPU time for all tasks counted for this CICS transaction. Large numbers will be expressed in minutes with an M suffix.
CPU Time: Mean	The mean task CPU time per CICS transaction. Large numbers will be expressed in minutes with an M suffix.
Svc Time: Total	The total service time for all tasks for this CICS transaction. Large numbers will be expressed in minutes with an M suffix.
Svc Time: Mean	The mean service time per CICS transaction. Large numbers will be expressed in minutes with an M suffix.

CICS task number detail line

This is the second-level detail line shown directly under the CICS transaction detail line. It quantifies the CPU and service time for each individual CICS task run under this transaction id.

Under Heading	This is Displayed
Name	The task number of the CICS transaction.
Description	The start time of the CICS transaction.
CPU Time: Total	The total task CPU time for this task.

Under Heading	This is Displayed
CPU Time: Mean	The mean task CPU time for this task. This is the same as the total time since it applies to only 1 task. This shows the CPU time to 5 decimal positions.
Svc Time: Total	The total service time for this task.
Svc Time: Mean	The mean service time for this task. This is the same as the total time since it applies to only 1 task. This shows the CPU time to 5 decimal positions.

Sample reports

A sample report is shown here. The CICS transaction has been expanded to the second level (task number).

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
E12: CICS CPU/Service Time by Transaction (1860/CICS32A)      Row 00001 of 00603
Command ===> _____________________________________________ Scroll ===> CSR

                                                 --CPU Time--     --Svc Time--
Name     NTxns Description          % of CPU     Total  Mean     Total  Mean

TDB2      600                        64.5%   4.25   0.00709    83.55  0.13925
→ 08879      16:05:08.21                      0.01   0.01550     0.09  0.09333
→ 09180      16:05:20.52                      0.01   0.01099     0.05  0.05510
→ 08883      16:05:08.22                      0.00   0.00977     0.15  0.15520
→ 08880      16:05:08.21                      0.00   0.00965     0.09  0.09113
→ 08901      16:05:08.46                      0.00   0.00925     0.13  0.13706
→ 09185      16:05:20.54                      0.00   0.00910     0.16  0.16997
→ 09013      16:05:09.75                      0.00   0.00844     0.13  0.13625
→ 09283      16:05:21.42                      0.00   0.00842     0.21  0.21626
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Transaction, Task	Display context help information.
++	Transaction, Task	Show additional details.
+	Transaction	Expand to reveal next level.
–	Transaction	Collapse to hide next level.
SV	Transaction	Sort next level by value.
SN	Transaction	Sort next level by name.

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.

Cmd	When Applied To Object	Action
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or press the enter key) on any line to open a window containing additional information.

A sample detail window for a CICS command report is shown below. This example shows a CICS task ID:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |   → 08879    16:05:08.21             0.01   0.01550    0.09    0.0933|     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  CPU and Service Time for CICS Transaction                                    |
|     Transaction ID                          TDB2                              |
|     Start Time                              16:05:08.21                       |
|     Stop Time                               16:05:08.30                       |
|     Task Number                             08879                             |
|     Dispatch Time                           0.04277                           |
|     CPU Time                                0.01550                           |
|     Suspend Time                            0.05055                           |
|     Dispatch Wait Time                      0.04030                           |
|     File Control Requests                   370064                            |
|     DB2 Requests                            3                                 |
|     IMS Requests                            0                                 |
|     MQ Requests                             0                                 |
+-------------------------------------------------------------------------------+
```

X01 - CICS mean service time by transaction

Usage

Use this report to see an analysis of how time was spent by the CICS transactions that were measured during the observation session in multiple regions. CICS sample data from the selected regions is merged to produce a single report showing multi-region activity. Transaction data from the multiple regions is correlated using the network unit of work ID to relate the remote activity to the local transaction. Since this is based on sample data, there are samples from the remote region that do not match with a local transaction. These are reported under the remote transaction name, such as CSMI.

Expand a CICS transaction report line to see a further breakdown by region, program, CICS command, DLI request and SQL request.

Quantification

Each report line quantifies time as arithmetic means for each measured transaction. The means are calculated by dividing the total of all time spent servicing all occurrences of a transaction by its number of occurrences. The means are expressed in units of seconds. The mean service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded X01 report shows one line for each measured CICS transaction. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Transaction
   Level 2 CICS Region Applid
      Level 3 CICS Program
         Level 4 CICS Command
               Level 4 CICS Command

    ...
     Level 2 CICS Region Applid
        Level 3 CICS Program
           Level 4 SQL Request
           Level 4 SQL Request

    ...
     Level 2 CICS Region Applid
        Level 3 CICS Program
           Level 4 DLI Request
           Level 4 DLI Request

    ...
     Level 2 CICS Region Applid
        Level 3 CICS Program
           Level 4 Module
           Level 4 Module
           Level 4 System Services

    ...
     Level 2 CICS Region Applid
        Level 3 CICS Program
           Level 4 Adabas Request
           Level 4 Adabas Request

    ...
     Level 2 CICS Region Applid
        Level 3 System Services
           Level 4 Module
           Level 4 Module
           Level 4 System Services
```

Detail line descriptions

CICS transaction detail line

This is the first-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	A functional description (if the transaction is a recognized CICS transaction).
Error	The margin of error for the mean values calculated by using the number of executions of the transaction as the sample size.
Execution	The mean time, in seconds, that a CPU was actively executing for the transaction.

Under Heading	This is Displayed
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction.
Delay	The mean time, in seconds, that execution of the transaction was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction. This includes execution, suspend, and delay time.

CICS region applid detail line

This is the second-level detail line shown directly under the CICS transaction detail line. This line represents the VTAM applid of the CICS region sampled. If a transaction shows more than 1 region applid, then activity was measured in multiple regions for that transaction.

Under Heading	This is Displayed
Name	The CICS region applid. This is the VTAM applid of the region where the samples were taken.
NTxns	The number of executions of the transaction.
Description	"Region Applid"
Execution	The mean time, in seconds, that a CPU was actively executing for the transaction in the region.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction in the region.
Delay	The mean time, in seconds, that execution of the transaction was delayed in the region. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction in the region. This includes execution, suspend, and delay time.

CICS program or system services detail line

This is a third-level detail line shown directly under the CICS region applid detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The fourth-level lines shown under this item can be either CICS command lines, SQL Request lines, DLI Request lines or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, the description displays “EXEC CICS.” If lines grouped under this line are SQL request lines, the description displays “EXEC SQL.” If lines grouped under this line are DLI request lines, the description displays “EXEC DLI.” Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if the CICS module name is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Execution	The mean time, in seconds, that CPU execution was observed while transaction control was under the CICS program identified in the Name column.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.
Delay	The mean time, in seconds, that execution of the transaction was delayed while transaction control was under the CICS program identified in the Name column. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction during which control was under the CICS program identified in the Name column. Service time includes execution, suspend, and delay time.

CICS command detail line

These lines are displayed under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This hexadecimal offset appears in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command description. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command description is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The mean time, in seconds, that CPU execution was observed while the CICS command was being processed.

Under Heading	This is Displayed
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while the CICS command was being processed.
Delay	The mean time, in seconds, that execution of the transaction was delayed while the CICS command was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the CICS command was being processed. This includes execution, suspend, and delay time.

SQL request detail line

These lines are displayed under a CICS program detail line. Each line represents an SQL request issued by the program identified in the name field of the CICS program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Execution	The mean time, in seconds, that CPU execution was observed while the SQL request was being processed.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while the SQL request was being processed.
Delay	The mean time, in seconds, that execution of the transaction was delayed while the SQL request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the SQL request was being processed. This includes execution, suspend and delay time.

DLI request detail line

These lines are displayed under a CICS Program detail line. Each line represents an IMS DLI request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DLI command. This is in +xxxx format. This field is always displayed in red.
Description	The DLI function code followed by the PCB name.
Execution	The mean time, in seconds, that CPU execution was observed while the DLI request was being processed.

Under Heading	This is Displayed
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while the DLI request was being processed.
Delay	The mean time, in seconds, that execution of the transaction was delayed while the DLI request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the DLI request was being processed. This includes execution, suspend, and delay time.

Module/system services detail line

These lines are displayed under a CICS Program detail line. Each line represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, "CICS" is displayed in the name field and "System Services" is displayed in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or "CICS" if a module name could not be determined.
Description	A functional description of the module if one is available. "System Services" is displayed if the module name could not be determined.
Execution	The mean time, in seconds, for execution of the module within the grouping under which the detail line is displayed.
Suspend	This field will contain a value of zero.
Delay	The mean time, in seconds, that the identified module was preempted by MVS.
Service	The mean service time for the transaction during which the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The mean time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.

Under Heading	This is Displayed
Delay	The mean time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

When the report is first displayed, only the first level of the hierarchy is visible (transaction). A sample is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
X01: CICS Mean Service Time by Txn (1682/CICS32A)            Row 00001 of 00002
Command ===> _____________________________________________ Scroll ===> CSR

                                        -------- Mean Time in Seconds --------
Name   NTxns Description         Error  Execution  + Suspend + Delay  =  Service

RDDR       2                    ±71.4%    0.359     16.333    0.809     17.502
READ     680                    ± 3.8%    0.020      2.860    0.068      2.950
```

You can enter the + line command on a transaction to expand to the next level. A sample of the report with a transaction expanded to the third level of the hierarchy (CICS Region Applid and CICS Program) is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
X01: CICS Mean Service Time by Txn (1682/CICS32A)            Row 00001 of 00010
Command ===> _____________________________________________ Scroll ===> CSR

                                        -------- Mean Time in Seconds --------
Name   NTxns Description         Error  Execution  + Suspend + Delay  =  Service

RDDR       2                   ±71.4%     0.359     16.333    0.809     17.502
→ CICS32A     Region Applid               0.119     16.333    0.749     17.202
 →  READDRVR   EXEC CICS                  0.119     16.333    0.749     17.202

→ CICS32B     Region Applid               0.031      0.000    0.007      0.039
 →  DFHMIRS    EXEC CICS                  0.021      0.000    0.001      0.023
 →  DFHMIRS    CICS Program               0.005      0.000    0.003      0.009
 →  CICS       System Services            0.003      0.000    0.001      0.005
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Transaction, Region Applid, Load Module, CSECT, Command, SQL Request, DLI Request	Display context help information.

Cmd	When Applied To Object	Action
++	Transaction, Region Applid, Load Module, CSECT, Command, SQL Request, DLI Request	Show additional details.
+	Transaction, Region Applid, Load Module	Expand to reveal next level.
–	Transaction, Region Applid, Load Module	Collapse to hide next level.
SV	Transaction, Region Applid, Load Module	Sort next level by value.
SN	Transaction, Region Applid, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	Command, CSECT, SQL Request, DLI Request, CICS Active Module	Display source program mapping.

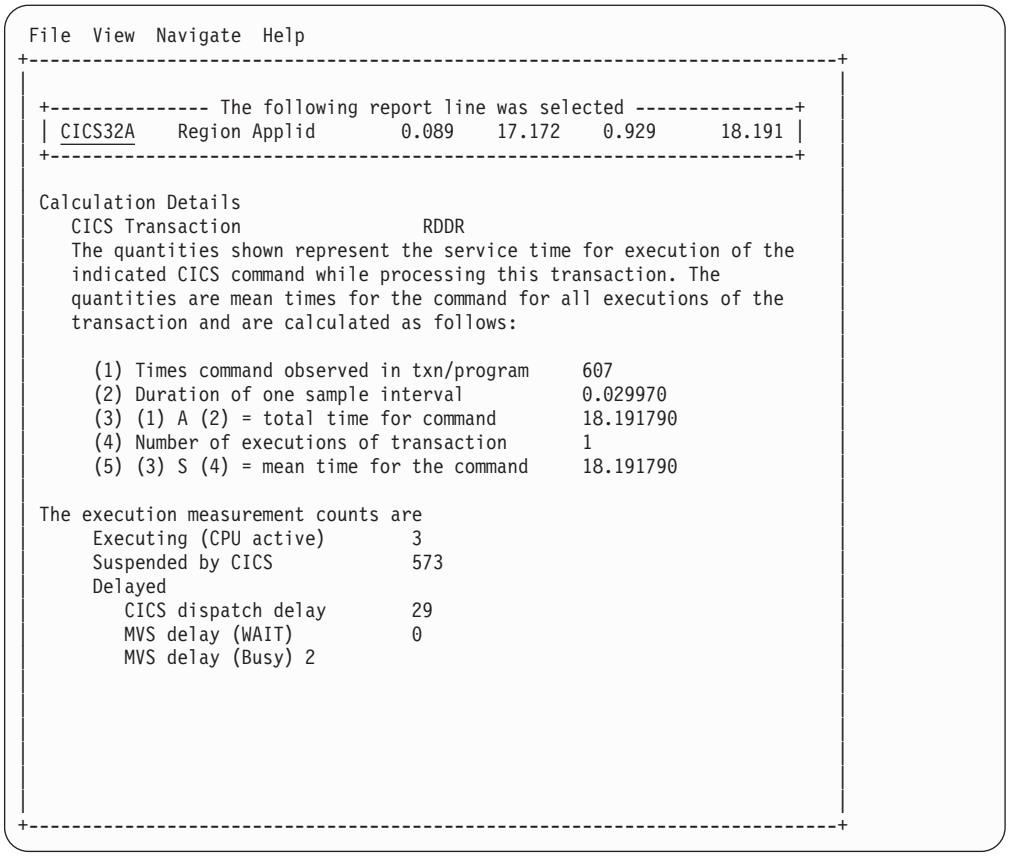
on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or press the enter key) on any line to open a window containing additional information.

A sample detail window for this report is shown below. This example shows a CICS region:



X02 - CICS total service time by txn

Usage

Use this report to view an analysis of how time was spent by the CICS transactions that were measured during the observation session in multiple regions. CICS sample data from the selected regions is merged to produce a single report showing multi-region activity. Transaction data from the multiple regions is correlated using the network unit of work ID to relate the remote activity to the local transaction. Since this is based on sample data, there will be samples from the remote region that do not match with a local transaction. These are reported under the remote transaction name, such as CSMI.

Expand a CICS transaction report line to see a further breakdown by region, program, CICS command, DLI request and SQL request.

Quantification

Each report line quantifies total times for each measured transaction. The total times are expressed in units of seconds. The total service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded X02 report shows one line for each measured CICS transaction. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Transaction
   Level 2 CICS Region Applid
      Level 3 CICS Program
         Level 4 CICS Command
         Level 4 CICS Command

    ...
     Level 2 CICS Region Applid
       Level 3 CICS Program
          Level 4 SQL Request
              Level 4 SQL Request

    ...
    Level 2 CICS Region Applid
       Level 3 CICS Program
          Level 4 DLI Request
          Level 4 DLI Request

    ...
    Level 2 CICS Region Applid
       Level 3 CICS Program
          Level 4 Module
          Level 4 Module
          Level 4 System Services

    ...
     Level 2 CICS Region Applid
        Level 3 CICS Program
           Level 4 Adabas Request
           Level 4 Adabas Request

    ...
    Level 2 CICS Region Applid
       Level 3 System Services
          Level 4 Module
          Level 4 Module
          Level 4 System Services
```

Detail line descriptions

CICS transaction detail line

This is the first-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	A functional description (if the transaction is a recognized CICS transaction).
Error	The margin of error based on a sample population of the number of executions of the transaction.
Execution	The total time, in seconds, that a CPU was actively executing for the transaction.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction.

Under Heading	This is Displayed
Delay	The total time, in seconds, that execution of the transaction was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction. This includes execution, suspend, and delay time.

CICS region applid detail line

This is the second-level detail line shown directly under the CICS transaction detail line. This line represents the VTAM applid of the CICS region sampled. If a transaction shows more than 1 region applid, then activity was measured in multiple regions for that transaction.

Under Heading	This is Displayed
Name	The CICS region applid. This is the VTAM applid of the region where the samples were taken.
NTxns	The number of executions of the transaction.
Description	"Region Applid"
Execution	The total time, in seconds, that a CPU was actively executing for the transaction in the region.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction in the region.
Delay	The total time, in seconds, that execution of the transaction was delayed in the region. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction in the region. This includes execution, suspend, and delay time.

CICS program or system services detail line

This is a third-level detail line shown directly under the CICS region applid detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The fourth-level lines shown under this item can be either CICS command lines, SQL Request lines, DLI Request lines or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, the description displays “EXEC CICS.” If lines grouped under this line are SQL request lines, the description displays “EXEC SQL.” If lines grouped under this line are DLI request lines, the description displays “EXEC DLI.” Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if the CICS module name is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Execution	The total time, in seconds, that CPU execution was observed while transaction control was under the CICS program identified in the Name column.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.
Delay	The total time, in seconds, that execution of the transaction was delayed while transaction control was under the CICS program identified in the Name column. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction during which control was under the CICS program identified in the Name column. Service time includes execution, suspend, and delay time.

CICS command detail line

These lines are displayed under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This hexadecimal offset appears in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command description. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command description is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The total time, in seconds, that CPU execution was observed while the CICS command was being processed.

Under Heading	This is Displayed
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the CICS command was being processed.
Delay	The total time, in seconds, that execution of the transaction was delayed while the CICS command was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the CICS command was being processed. This includes execution, suspend, and delay time.

SQL request detail line

These lines are displayed under a CICS program detail line. Each line represents an SQL request issued by the program identified in the name field of the CICS program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Execution	The total time, in seconds, that CPU execution was observed while the SQL request was being processed.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the SQL request was being processed.
Delay	The total time, in seconds, that execution of the transaction was delayed while the SQL request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the SQL request was being processed. This includes execution, suspend and delay time.

DLI request detail line

These lines are displayed under a CICS Program detail line. Each line represents an IMS DLI request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DLI command. This is in +xxxx format. This field is always displayed in red.
Description	The DLI function code followed by the PCB name.
Execution	The total time, in seconds, that CPU execution was observed while the DLI request was being processed.

Under Heading	This is Displayed
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the DLI request was being processed.
Delay	The total time, in seconds, that execution of the transaction was delayed while the DLI request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the DLI request was being processed. This includes execution, suspend, and delay time.

Module/system services detail line

These lines are displayed under a CICS Program detail line. Each line represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, "CICS" is displayed in the name field and "System Services" is displayed in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or "CICS" if a module name could not be determined.
Description	A functional description of the module if one is available. "System Services" is displayed if the module name could not be determined.
Execution	The total time, in seconds, for execution of the module within the grouping under which the detail line is displayed.
Suspend	This field will contain a value of zero.
Delay	The total time, in seconds, that the identified module was preempted by MVS.
Service	The total service time for the transaction during which the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The total time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.

Under Heading	This is Displayed
Delay	The total time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

When the report is first displayed, only the first level of the hierarchy is visible (transaction). A sample is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
X02: CICS Total Service Time by Txn (1684/CICS32A)           Row 00001 of 00002
Command ===> _____________________________________________ Scroll ===> CSR

                                      -------- Total Time in Seconds --------
Name   NTxns Description         Error  Execution  + Suspend + Delay  =  Service

READ     340                    ± 5.4%    7.672   1028.360   27.422   1063.455
RDDR       1                    ±99.9%    0.449     17.172    1.018     18.641
```

You can enter the + line command on a transaction to expand to the next level. A sample of the report with a transaction expanded to the third level of the hierarchy (CICS Region Applid and CICS Program) is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
X02: CICS Total Service Time by Txn (1684/CICS32A)           Row 00001 of 00011
Command ===> _____________________________________________ Scroll ===> CSR

                                      -------- Total Time in Seconds --------
Name   NTxns Description         Error  Execution  + Suspend + Delay  =  Service

READ      340                 ± 5.4%      7.672    1028.360   27.422   10623.455
→ CICS32B     Region Applid                3.686     970.788    3.956     978.430
  → SAMPREAD  EXEC CICS                    3.416     970.788    3.926     978.130
  → SAMPREAD  CICS Program                 0.149       0.000    0.029       0.179
  → CICS      System Services              0.119       0.000    0.000       0.119

→ CICS32A     Region Applid                3.986      57.572   23.466      85.024
  → DFHMIRS   CICS Program                 2.697      57.482   22.327      82.507
  → CICS      System Services              1.288       0.089    1.138       2.517

RDDR        1                 ±99.9%      0.449      17.172    1.018      18.641
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Transaction, Region Applid, Load Module, CSECT, Command, SQL Request, DLI Request	Display context help information.
++	Transaction, Region Applid, Load Module, CSECT, Command, SQL Request, DLI Request	Show additional details.
+	Transaction, Region Applid, Load Module	Expand to reveal next level.
–	Transaction, Region Applid, Load Module	Collapse to hide next level.
SV	Transaction, Region Applid, Load Module	Sort next level by value.
SN	Transaction, Region Applid, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	Command, CSECT, SQL Request, DLI Request, CICS Active Module	Display source program mapping.

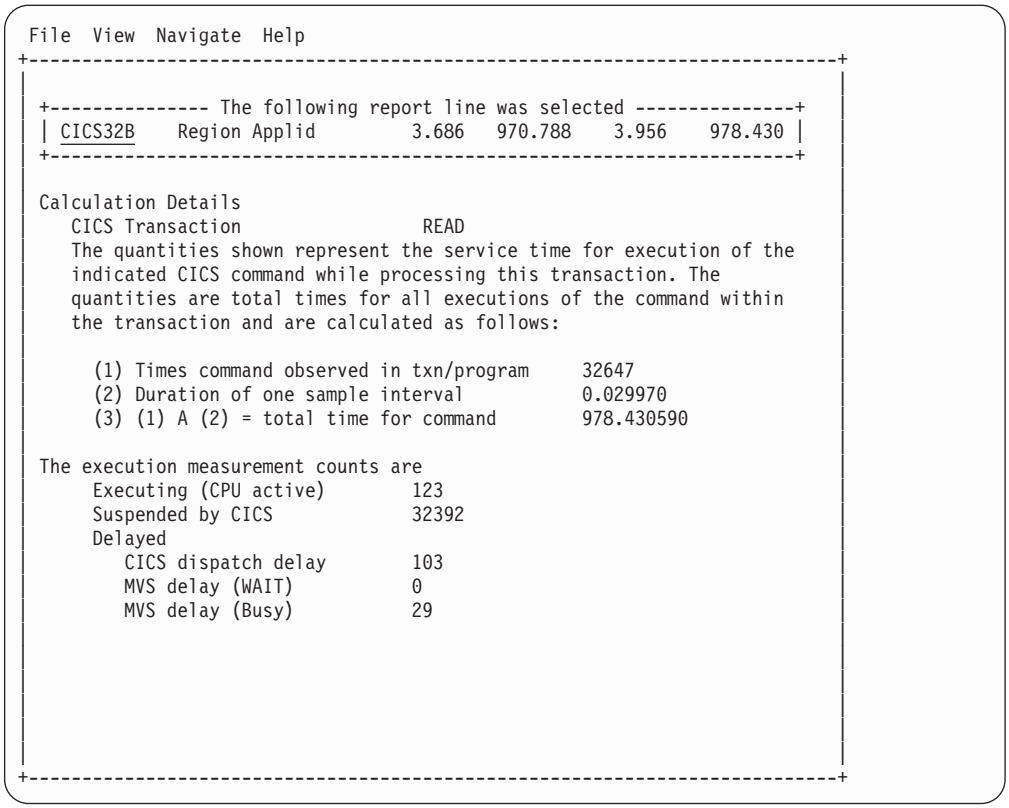
on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter “++” (or press the enter key) on any line to open a window containing additional information.

A sample detail window for this report is shown below. This example shows a CICS region:



X03 - CICS mean service time by terminal ID

Usage

Use this report to see an analysis of how time was spent on CICS terminals that were measured during the observation session in multiple regions. CICS sample data from the selected regions is merged to produce a single report showing multiregion activity. Transaction data from the multiple regions is correlated using the network unit of work id to relate the remote activity to the local transaction. Since this is based on sample data, there will be samples from the remote region that do not match with a local transaction. These will be reported under the remote transaction name, such as CSMI.

Expand a CICS terminal report line to see a further breakdown by transaction, region, program, CICS command, DLI request and SQL request.

Quantification

Each report line quantifies time as arithmetic means for all measured transactions on the terminal. The means are calculated by dividing the total of all time spent servicing all occurrences of transactions on the terminal by the number of occurrences. The means are expressed in units of seconds. The mean service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded X03 report shows one line for each measured CICS terminal and 1 line for all non-terminal attached transactions. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Terminal
   Level 2 CICS Transaction
      Level 3 CICS Region Applid
         Level 4 CICS Program
                 Level 5 CICS Command
                 Level 5 CICS Command

    ...
       Level 3 CICS Region Applid
          Level 4 CICS Program
                  Level 5 SQL Request
                  Level 5 SQL Request

    ...
       Level 3 CICS Region Applid
           Level 4 CICS Program
              Level 5 DLI Request
              Level 5 DLI Request

    ...
       Level 3 CICS Region Applid
           Level 4 CICS Program
              Level 5 Module
              Level 5 Module
              Level 5 System Services

    ...
       Level 3 CICS Region Applid
          Level 4 CICS Program
            Level 5 Adabas Request
            Level 5 Adabas Request

    ...
       Level 3 CICS Region Applid
          Level 4 System Services
             Level 5 Module
             Level 5 Module
             Level 5 System Services
```

Detail line descriptions

CICS terminal detail line

This is the first-level detail line. Each line shows information about a CICS terminal for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS terminal ID. This is the terminal ID or N/A if a terminal ID was not available during the sample. A terminal might not be available because the transaction was running non-terminal attached, or the transaction was not attached to the terminal during initialization or termination.
NTxns	The number of executions of transactions on this terminal.
Description	This is either Terminal Txn or Non-Terminal Txn.
Error	The margin of error for the mean values calculated by using the number of executions of transactions for this terminal as a sample size.
Execution	The mean time, in seconds, that a CPU was actively executing transactions on this terminal.

Under Heading	This is Displayed
Suspend	The mean time, in seconds, that CICS had suspended execution of transactions on this terminal.
Delay	The mean time, in seconds, that execution of transactions on this terminal was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for transactions on this terminal. This includes execution, suspend, and delay time.

CICS transaction detail line

This is the second-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	A functional description (if the transaction is a recognized CICS transaction).
Error	The margin of error for the mean values calculated by using the number of executions of the transaction as the sample size.
Execution	The mean time, in seconds, that a CPU was actively executing for the transaction.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction.
Delay	The mean time, in seconds, that execution of the transaction was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction. This includes execution, suspend, and delay time.

CICS region applid detail line

This is the third-level detail line shown directly under the CICS transaction detail line. This line represents the VTAM applid of the CICS region sampled. If a transaction shows more than 1 region applid, then activity was measured in multiple regions for that transaction.

Under Heading	This is Displayed
Name	The CICS region applid. This is the VTAM applid of the region where the samples were taken.
NTxns	The number of executions of the transaction.

Under Heading	This is Displayed
Description	"Region Applid"
Execution	The mean time, in seconds, that a CPU was actively executing for the transaction in the region.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction in the region.
Delay	The mean time, in seconds, that execution of the transaction was delayed in the region. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction in the region. This includes execution, suspend, and delay time.

CICS program or system services detail line

This is a fourth-level detail line shown directly under the CICS region applid detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The fifth-level lines shown under this item can be either CICS command lines, SQL Request lines, DLI Request lines or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, the description displays “EXEC CICS.” If lines grouped under this line are SQL request lines, the description displays “EXEC SQL.” If lines grouped under this line are DLI request lines, the description displays “EXEC DLI.” Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if the CICS module name is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.
Execution	The mean time, in seconds, that CPU execution was observed while transaction control was under the CICS program identified in the Name column.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.

Under Heading	This is Displayed
Delay	The mean time, in seconds, that execution of the transaction was delayed while transaction control was under the CICS program identified in the Name column. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The mean service time for the transaction during which control was under the CICS program identified in the Name column. Service time includes execution, suspend, and delay time.

CICS command detail line

These lines are displayed under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This hexadecimal offset appears in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command description. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command description is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The mean time, in seconds, that CPU execution was observed while the CICS command was being processed.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while the CICS command was being processed.
Delay	The mean time, in seconds, that execution of the transaction was delayed while the CICS command was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the CICS command was being processed. This includes execution, suspend, and delay time.

SQL request detail line

These lines are displayed under a CICS program detail line. Each line represents an SQL request issued by the program identified in the name field of the CICS program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Execution	The mean time, in seconds, that CPU execution was observed while the SQL request was being processed.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while the SQL request was being processed.
Delay	The mean time, in seconds, that execution of the transaction was delayed while the SQL request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the SQL request was being processed. This includes execution, suspend and delay time.

DLI request detail line

These lines are displayed under a CICS Program detail line. Each line represents an IMS DLI request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DLI command. This is in +xxxx format. This field is always displayed in red.
Description	The DLI function code followed by the PCB name.
Execution	The mean time, in seconds, that CPU execution was observed while the DLI request was being processed.
Suspend	The mean time, in seconds, that CICS had suspended execution of the transaction while the DLI request was being processed.
Delay	The mean time, in seconds, that execution of the transaction was delayed while the DLI request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the DLI request was being processed. This includes execution, suspend, and delay time.

Module/system services detail line

These lines are displayed under a CICS Program detail line. Each line represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, “CICS” is displayed in the name field and “System Services” is displayed in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or "CICS" if a module name could not be determined.
Description	A functional description of the module if one is available. "System Services" is displayed if the module name could not be determined.
Execution	The mean time, in seconds, for execution of the module within the grouping under which the detail line is displayed.
Suspend	This field will contain a value of zero.
Delay	The mean time, in seconds, that the identified module was preempted by MVS.
Service	The mean service time for the transaction during which the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The mean time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The mean time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.
Delay	The mean time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The mean service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

A sample report that has been expanded four levels is shown below .

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
X03: CICS Mean Service Time by Term (1684/CICS32A)           Row 00001 of 00033
Command ===> _____________________________________________ Scroll ===> CSR

                                        -------- Mean Time in Seconds --------
Name   NTxns Description         Error  Execution  + Suspend + Delay  =  Service

ET36      1  Terminal Attached  ±99.9%     0.449     17.172    1.018     18.641
→ RDDR    1                     ±99.9%     0.449     17.172    1.018     18.641
  → CICS32A   Region Applid                0.089     17.172    0.929     18.191
    → READDRVR EXEC CICS                   0.089     17.172    0.929     18.191
      → +0700 START TRANSID(READ)          0.059     12.377    0.029     12.467
      → +0884 START TRANSID(READ)          0.000      0.719    0.149      0.869
      → +0B84 START TRANSID(READ)          0.000      0.749    0.059      0.809
      → +0984 START TRANSID(READ)          0.000      0.509    0.149      0.659
      → +0904 START TRANSID(READ)          0.000      0.539    0.089      0.629
      → +0A04 START TRANSID(READ)          0.000      0.539    0.059      0.599
      → +0784 START TRANSID(READ)          0.000      0.479    0.089      0.569
      → +0804 START TRANSID(READ)          0.000      0.389    0.119      0.509
      → +0A84 START TRANSID(READ)          0.000      0.329    0.089      0.419
      → +0B04 START TRANSID(READ)          0.000      0.359    0.029      0.389
      → +0BFC SEND TEXT                    0.029      0.179    0.059      0.269
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Terminal, Transaction, Region Applid, Load Module, CSECT, Command, SQL Request, DLI Request	Display context help information.
++	Terminal, Transaction, Region Applid, Load Module, CSECT, Command, SQL Request, DLI Request	Show additional details.
+	Terminal, Transaction, Region Applid, Load Module	Expand to reveal next level.
–	Terminal, Transaction, Region Applid, Load Module	Collapse to hide next level.
SV	Terminal, Transaction, Region Applid, Load Module	Sort next level by value.
SN	Terminal, Transaction, Region Applid, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	Command, CSECT, SQL Request, DLI Request, CICS Active Module	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.

Cmd	When Applied To Object	Action
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or press the enter key) on any line to open a window containing additional information.

A sample detail window for this report is shown below. This example shows a CICS region:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | CICS32A    Region Applid         0.089   17.172    0.929    18.191   |      |
| +-----------------------------------------------------------------------+      |
|                                                                               |
| Calculation Details                                                           |
|    CICS Transaction                          RDDR                             |
|    The quantities shown represent the service time for execution of the       |
|    indicated CICS command while processing this transaction. The              |
|    quantities are mean times for the command for all executions of the        |
|    transaction and are calculated as follows:                                 |
|                                                                               |
|      (1) Times command observed in txn/program     607                        |
|      (2) Duration of one sample interval           0.029970                   |
|      (3) (1) A (2) = total time for command        18.191790                  |
|      (4) Number of executions of transaction       1                          |
|      (5) (3) S (4) = mean time for the command     18.191790                  |
|                                                                               |
| The execution measurement counts are                                          |
|      Executing (CPU active)        3                                          |
|      Suspended by CICS             573                                        |
|      Delayed                                                                  |
|         CICS dispatch delay        29                                         |
|         MVS delay (WAIT)           0                                          |
|         MVS delay (Busy)           2                                          |
|                                                                               |
|                                                                               |
|                                                                               |
|                                                                               |
|                                                                               |
+-------------------------------------------------------------------------------+
```

X04 - CICS total service time by terminal ID

Usage

Use this report to view an analysis of how time was spent on CICS terminals that were measured during the observation session in multiple regions. CICS sample data from the selected regions is merged to produce a single report showing multiregion activity. Transaction data from the multiple regions is correlated using the network unit of work ID to relate the remote activity to the local transaction. Since this is based on sample data, there will be samples from the remote region that do not match with a local transaction. These are reported under the remote transaction name, such as CSMI.

Expand a CICS terminal report line to see a further breakdown by transaction, region, program, CICS command, DLI request and SQL request.

Quantification

Each report line quantifies total times for transactions measured on a terminal. The total times are expressed in units of seconds. The total service time is shown and is further broken down into execution time, suspend time, and delay time.

Detail line hierarchy

An unexpanded X04 report shows one line for each measured CICS terminal and 1 line for all non-terminal attached transactions. You can expand each line to reveal additional hierarchical levels of detail.

The hierarchy is illustrated here:

```
Level 1 CICS Terminal
   Level 2 CICS Transaction
      Level 3 CICS Region Applid
         Level 4 CICS Program
               Level 5 CICS Command
               Level 5 CICS Command

   ...
      Level 3 CICS Region Applid
         Level 4 CICS Program
               Level 5 SQL Request
               Level 5 SQL Request

   ...
      Level 3 CICS Region Applid
           Level 4 CICS Program
              Level 5 DLI Request
              Level 5 DLI Request

   ...
      Level 3 CICS Region Applid
         Level 4 CICS Program
            Level 5 Module
            Level 5 Module
            Level 5 System Services

   ...
      Level 3 CICS Region Applid
         Level 4 CICS Program
            Level 5 Adabas Request
            Level 5 Adabas Request

   ...
      Level 3 CICS Region Applid
         Level 4 System Services
            Level 5 Module
            Level 5 Module
            Level 5 System Services
```

Detail line descriptions

CICS terminal detail line

This is the first-level detail line. Each line shows information about a CICS terminal for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS terminal ID. This is the terminal ID or N/A if a terminal ID was not available during the sample. A terminal might not be available because the transaction was running non-terminal attached, or the transaction was not attached to the terminal during initialization or termination.
NTxns	The number of executions of transactions on this terminal.
Description	This is either Terminal Txn or Non-Terminal Txn.
Error	The margin of error for the mean values calculated by using the number of executions of transactions for this terminal as a sample size.
Execution	The total time, in seconds, that a CPU was actively executing transactions on this terminal.
Suspend	The total time, in seconds, that CICS had suspended execution of transactions on this terminal.
Delay	The total time, in seconds, that execution of transactions on this terminal was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for transactions on this terminal. This includes execution, suspend, and delay time.

CICS transaction detail line

This is the second-level detail line. Each line shows information about a CICS transaction for which measurement data was recorded.

Under Heading	This is Displayed
Name	The CICS transaction code.
NTxns	The number of executions of the transaction.
Description	A functional description (if the transaction is a recognized CICS transaction).
Error	The margin of error based on a sample population of the number of executions of the transaction.
Execution	The total time, in seconds, that a CPU was actively executing for the transaction.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction.
Delay	The total time, in seconds, that execution of the transaction was delayed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction. This includes execution, suspend, and delay time.

CICS region applid detail line

This is the third-level detail line shown directly under the CICS transaction detail line. This line represents the VTAM applid of the CICS region sampled. If a transaction shows more than 1 region applid, then activity was measured in multiple regions for that transaction.

Under Heading	This is Displayed
Name	The CICS region applid. This is the VTAM applid of the region where the samples were taken.
NTxns	The number of executions of the transaction.
Description	"Region Applid"
Execution	The total time, in seconds, that a CPU was actively executing for the transaction in the region.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction in the region.
Delay	The total time, in seconds, that execution of the transaction was delayed in the region. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction in the region. This includes execution, suspend, and delay time.

CICS program or system services detail line

This is a fourth-level detail line shown directly under the CICS region applid detail line. This line represents a CICS program (usually an application) that was in control during execution of the transaction. The fifth-level lines shown under this item can be either CICS command lines, SQL Request lines, DLI Request lines or Module lines.

If no CICS application program was dispatched, “CICS” is shown under the Name heading and “System Services” under the Description heading.

Under Heading	This is Displayed
Name	The module name of the CICS program. If lines grouped under this line are CICS command lines, this field is displayed in red. For Module lines grouped under this line, the field is turquoise. “CICS” is displayed here if no application program was in control.
Description	If lines grouped under this line are CICS command lines, the description displays “EXEC CICS.” If lines grouped under this line are SQL request lines, the description displays “EXEC SQL.” If lines grouped under this line are DLI request lines, the description displays “EXEC DLI.” Otherwise, if the program name is a recognized CICS module name (a DFH* name), a functional description is shown, and “CICS Program” is displayed if the CICS module name is not recognized; indicating this is likely an application program. “System Services” is displayed if no application program was in control.

Under Heading	This is Displayed
Execution	The total time, in seconds, that CPU execution was observed while transaction control was under the CICS program identified in the Name column.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while transaction control was under the CICS program identified in the Name column.
Delay	The total time, in seconds, that execution of the transaction was delayed while transaction control was under the CICS program identified in the Name column. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay • MVS WAIT
Service	The total service time for the transaction during which control was under the CICS program identified in the Name column. Service time includes execution, suspend, and delay time.

CICS command detail line

These lines are displayed under a CICS Program detail line. Each one represents a CICS command issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC CICS command. This hexadecimal offset appears in +xxxx format. If the CSECT containing the EXEC CICS is not the same name as the module identified in the CICS Program line above, this field contains the CSECT name. In this case, the offset is shown in the description field. This field is always displayed in red.
Description	The CICS command description. If, as noted above, the CSECT name containing the EXEC CICS is different from the module name, the CICS command description is preceded by the hexadecimal offset of the command from the start of the CSECT.
Execution	The total time, in seconds, that CPU execution was observed while the CICS command was being processed.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the CICS command was being processed.
Delay	The total time, in seconds, that execution of the transaction was delayed while the CICS command was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the CICS command was being processed. This includes execution, suspend, and delay time.

SQL request detail line

These lines are displayed under a CICS program detail line. Each line represents an SQL request issued by the program identified in the name field of the CICS program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC SQL command. This is in +xxxx format. This field is always displayed in red.
Description	The SQL request function – SELECT, FETCH, UPDATE, etc.
Execution	The total time, in seconds, that CPU execution was observed while the SQL request was being processed.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the SQL request was being processed.
Delay	The total time, in seconds, that execution of the transaction was delayed while the SQL request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the SQL request was being processed. This includes execution, suspend and delay time.

DLI request detail line

These lines are displayed under a CICS Program detail line. Each line represents an IMS DLI request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC DLI command. This is in +xxxx format. This field is always displayed in red.
Description	The DLI function code followed by the PCB name.
Execution	The total time, in seconds, that CPU execution was observed while the DLI request was being processed.
Suspend	The total time, in seconds, that CICS had suspended execution of the transaction while the DLI request was being processed.
Delay	The total time, in seconds, that execution of the transaction was delayed while the DLI request was being processed. Transaction execution can be delayed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the DLI request was being processed. This includes execution, suspend, and delay time.

Module/system services detail line

These lines are displayed under a CICS Program detail line. Each line represents a module that was executing under control of the program identified in the name field of the CICS Program line under which these lines are grouped. If Application Performance Analyzer was unable to determine a module name, "CICS" is displayed in the name field and "System Services" is displayed in the description field.

Under Heading	This is Displayed
Name	The name of the module that was executing or "CICS" if a module name could not be determined.
Description	A functional description of the module if one is available. "System Services" is displayed if the module name could not be determined.
Execution	The total time, in seconds, for execution of the module within the grouping under which the detail line is displayed.
Suspend	This field will contain a value of zero.
Delay	The total time, in seconds, that the identified module was preempted by MVS.
Service	The total service time for the transaction during which the identified module was executing or delayed.

Adabas request detail line

These lines appear under a CICS Program detail line. Each one represents an Adabas request issued by the program identified in the name field of the CICS Program line under which these lines are grouped.

Under Heading	This is Displayed
Name	The hexadecimal offset in the identified CICS program of the return address of the EXEC ADABAS command. This is in *+xxxx* format. This field is always displayed in red.
Description	The Adabas request function -- OP, CL, L2, etc.
Execution	The total time, in seconds, during which CPU execution was observed while the Adabas request was being processed.
Suspend	The total time, in seconds, during which CICS had suspended execution of the transaction while the Adabas request was being processed.
Delay	The total time, in seconds, during which execution of the transaction was delayed while the Adabas request was being processed for one of the following reasons: • CICS dispatch delay • MVS dispatch delay
Service	The total service time for the transaction during which the Adabas request was being processed. This includes execution, suspend and delay time.

Sample reports

A sample report that has been expanded five levels is shown below .

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
X04: CICS Total Service Time by Term (1684/CICS32A)          Row 00001 of 00098
Command ===> _____________________________________________ Scroll ===> CSR

                                          -------- Total Time in Seconds --------
Name   NTxns Description         Error  Execution  + Suspend + Delay  =  Service

N/A     340  Non-Terminal Atta  ± 5.4%     7.672   1028.360   27.422   1063.455
→ READ  340                     ± 5.4%     7.672   1028.360   27.422   1063.455
 → CICS32B   Region Applid                 3.686    970.788    3.956    978.430
   → SAMPREAD EXEC CICS                    3.416    970.788    3.926    978.130
     → +04C4 READ FILE(FILEA)              3.266    970.788    3.926    977.981
       → ALLOCATE Wait on Interregion      0.000    863.885    0.000    863.885
       → IRLINK Wait on InterRegion Li     0.000    106.873    0.000    106.873
       → CICSDly CICS Dispatch Delay       0.000      0.000    3.086      3.086
       → MVSBusy MVS Delay (Busy)          0.000      0.000    0.839      0.839
       → CICSSusp Suspend                  0.000      0.029    0.000      0.029
     → +0468 RETURN                        0.089      0.000    0.000      0.089
     → +03E0 RETRIEVE                      0.059      0.000    0.000      0.059
     →
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Terminal, Transaction, Region Applid, Load Module, CSECT, Command, SQL Request, DLI Request	Display context help information.
++	Terminal, Transaction, Region Applid, Load Module, CSECT, Command, SQL Request, DLI Request	Show additional details.
+	Terminal, Transaction, Region Applid, Load Module	Expand to reveal next level.
–	Terminal, Transaction, Region Applid, Load Module	Collapse to hide next level.
SV	Terminal, Transaction, Region Applid, Load Module	Sort next level by value.
SN	Terminal, Transaction, Region Applid, Load Module	Sort next level by name.
M	Load Module	Display load module information.
P	Command, CSECT, SQL Request, DLI Request, CICS Active Module	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.

Cmd	When Applied To Object	Action
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or press the enter key) on any line to open a window containing additional information.

A sample detail window for this report is shown below. This example shows a CICS region:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | CICS32B       Region Applid        3.686   970.788   3.956   978.430 |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     CICS Transaction                READ                                      |
|     The quantities shown represent the service time for execution of the      |
|     indicated CICS command while processing this transaction. The             |
|     quantities are total times for all executions of the command within       |
|     the transaction and are calculated as follows:                            |
|                                                                               |
|       (1) Times command observed in txn/program     32647                     |
|       (2) Duration of one sample interval           0.029970                  |
|       (3) (1) A (2) = total time for command        978.430590                |
|                                                                               |
|  The execution measurement counts are                                         |
|       Executing (CPU active)        123                                       |
|       Suspended by CICS             32392                                     |
|       Delayed                                                                 |
|          CICS dispatch delay        103                                       |
|          MVS delay (WAIT)           0                                         |
|          MVS delay (Busy)           29                                        |
|                                                                               |
|                                                                               |
|                                                                               |
|                                                                               |
|                                                                               |
+-------------------------------------------------------------------------------+|
```

Chapter 5. IMS performance analysis reports

This section describes the IMS Performance Analysis Reports.

For information about ...	See ...
The IMS data extractor	"Overview of IMS data extractor" on page 296
The IMS+ extractor	"IMS+ extractor" on page 296
IMS Multiple Address Space Support (MASS)	"Overview of IMS Multiple Address Space Support" on page 296
I01 IMS measurement profile	"I01 - IMS measurement profile" on page 297
I02 IMS DL/I call timeline	"I02 - IMS DL/I call timeline" on page 302
I03 IMS transaction timeline	"I03 - IMS transaction timeline" on page 303
I04 IMS transaction activity timeline	"I04 - IMS transaction activity timeline" on page 305
I05 IMS DL/I CPU usage by PSB	"I05 - IMS DL/I CPU usage by PSB" on page 311
I06 IMS DL/I CPU usage by transaction	"I06 - IMS DL/I CPU usage by transaction" on page 314
I07 IMS DL/I CPU usage by DL/I call	"I07 - IMS DL/I CPU usage by DL/I call" on page 318
I08 IMS DL/I WAIT time by PSB	"I08 - IMS DL/I WAIT time by PSB" on page 321
I09 IMS DL/I WAIT time by transaction	"I09 - IMS DL/I WAIT time by transaction" on page 324
I10 IMS DL/I WAIT time by DL/I call	"I10 - IMS DL/I WAIT time by DL/I call" on page 327
I11 IMS DL/I activity by PSB	"I11 - IMS DL/I activity by PSB" on page 330
I12 IMS DL/I activity by transaction	"I12 - IMS DL/I activity by transaction" on page 333
I13 IMS DL/I activity by DL/I call	"I13 - IMS DL/I activity by DL/I call" on page 337
I14 IMS PSB/PCB attributes	"I14 - IMS PSB/PCB attributes" on page 340
I15 IMS DL/I call attributes	"I15 - IMS DL/I call attributes" on page 341
I16 IMS transaction service times	"I16 - IMS transaction service times" on page 342
I17 IMS transaction DL/I call counts	"I17 - IMS transaction DL/I call counts" on page 344
I18 IMS CPU/Svc time by DL/I calls	"I18 - IMS CPU/Svc time by DL/I calls" on page 346
I19 IMS CPU/Svc time by PSB	"I19 - IMS CPU/Svc time by PSB" on page 348
I20 IMS CPU/Svc time by transaction	"I20 - IMS CPU/Svc time by transaction" on page 350
I21 IMS CPU/Svc time by PCB	"I21 - IMS CPU/Svc time by PCB" on page 352

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Overview of IMS data extractor

When the IMS data extractor is active all DL/I calls in the target address space are recorded each time a sample is taken. For each DL/I call in flight, all of the call parameters, SSAs etc, are recorded, as well as the module and offset from which the call was made. In a CICS region there can be multiple IMS threads active and so multiple DL/I calls can be recorded each time an IMS sample is taken in a CICS region.

Additionally, several IMS environment parameters are recorded each time a sample is taken. These parameters include, the region type and its status, the PSB, transaction code, IMS version and release, message sequence number and time stamp from the IOPCB. In the case of a CICS region, the scheduling and termination of PSBs is also recorded.

IMS+ extractor

IMS+ is an IMS measurement option (data extractor) in which the precise number of DL/I calls is counted as well as the exact DL/I service time and CPU time by DL/I call. Activating the IMS+ option automatically activates the IMS option. Many of the IMS reports require that the IMS+ extractor be used.

Note: Running measurements with the IMS+ data extractor turned on causes each IMS call to be intercepted to collect additional data. This may have a small impact on the performance of the target address space. Care should be taken when using this feature with other products that also intercept IMS calls as unpredictable results may occur. Your installer may have chosen to limit access to this feature.

Overview of IMS Multiple Address Space Support

IMS multiple address space (MASS) support allows you to measure an IMS transaction that is eligible to run in multiple MPP regions, either within a single IMS subsystem or within an IMSPlex. You specify the IMS transaction and the IMS subsystem or IMSPlex group name to measure. Application Performance Analyzer determines the MPP regions that are eligible to process the transaction and returns a list of active MPP regions in Panel 4. You select the regions you want to measure. Application Performance Analyzer creates a parent observation for each IMS subsystem and one child observation request for each selected MPP region grouped within the IMS subsystem.

To enter IMS MASS observations:

1. Start a NEW request.
2. In Panel 1 – Job Information, enter a dash (-) in the Job name/Pattern field.
3. In Panel 5 – Subsystems, enter either the IMS subsystem ID or the IMSPlex group name, and the IMS transaction code.
4. In Panel 4 – Active Jobs, Application Performance Analyzer returns a list of active MPP regions that are eligible to process the transaction. Select the MPP regions you want to measure. The maximum number of regions you are permitted to select is determined during the installation of Application Performance Analyzer.
5. In Panel 2 – Options, select the IMS+ data extractor.
6. Complete any other relevant fields for your observation request.

Once the NEW request is complete and submitted, Application Performance Analyzer creates and starts separate observation requests for each MPP region selected for measurement. The observations are displayed in the R02 Observation List as child observations under an IMS parent. You can view the IMS reports for each MPP region individually. When any of the selected MPP regions has not processed the IMS transaction during the measurement interval, the measurement has a status of Ended, with 1 Sample and no IMS reports are generated.

The NEW line command can be entered on any of the child observations or the IMS parent. When the NEW command is entered on a child observation, the new request is considered a single region request with a transaction code specification, and is initialized with the same parameter values as the original request. When the NEW line command is entered on the IMS parent of a single IMS subsystem, the new request is considered an IMS MASS request and is initialized with the same parameter values as the original request for a single IMS subsystem. The Panel 4 Active Jobs list is populated with the eligible MPP regions at the time of the new request and the desired regions must selected from the list.

I01 - IMS measurement profile

Usage

Use this report to see a general overview of the IMS measurement data. This is a good report to examine first when analyzing IMS information. It provides an at-a-glance summary of various aspects of the measurement data and helps you choose which other reports to concentrate on. Information about the IMS environment is shown at the top of this report. This is followed by a series of mini performance graphs illustrating various types of measured activity.

IMS environment

This does not appear if the measurement was for a CICS region.

Under Heading	This is Displayed
DFSRRC00 parms	The PARM data that was passed to DFSRRC00 (the IMS region controller) in the EXEC statement.
IMS system ID	The system name of the IMS subsystem under which the measured activity took place.
IMS region name	The JOB name/STC name of the IMS dependent region.
IMS version	The IMS version.
IMS region type	The type of dependent region: BMP, MPP, etc.

Performance graphs

These are histograms quantifying measurement data. To the right of some of the graphs, report codes of reports that show related and more detailed information are displayed. You can display the report by skipping the cursor to one of these fields and by pressing the ENTER key.

Most active IMS PSBs

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
IMS PSB Name	An IMS PSB name is shown and the number of samples in which processing of DL/I calls under this PSB was observed. The percentage and the graph represent the proportion of the overall measurement time DL/I calls were being serviced under this PSB.

Most active IMS transactions

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
IMS Transaction Code	An IMS transaction code is shown and the number of samples in which processing of DL/I calls under this transaction was observed. The percentage and the graph represent the proportion of the overall measurement time DL/I calls were being serviced in this transaction.

Most active DL/I calls

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
DL/I Call	A DL/I call identified by three fields: a unique sequence number assigned to the DL/I call, its DL/I function code and its PCB name. The percentage and the graph represent the proportion of samples in which processing this DL/I call was observed. The percentage and the graph represent the proportion the overall measurement time all executions of this DL/I call were being serviced.

Most CPU consumptive DL/I

Under Heading	This is Displayed
Total DL/I CPU Time	The number of seconds of CPU time consumed by all executions of DL/I calls during the measurement. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.

Under Heading	This is Displayed
DL/I Call	A DL/I call identified by three fields: a unique sequence number assigned to the DL/I call, its DL/I function code and its PCB name. The quantification and the graph show the number of CPU seconds of execution for this DL/I call.

Most frequent transactions

This requires that the IMS+ measurement option is active and the execution of IMS transaction was observed. The graphic information is based on the number of transactions counted.

Under Heading	This is Displayed
Total txns counted	The total number of IMS transactions counted during the measurement. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
IMS transaction	The IMS transaction code and the number of executions of this transaction.

Most frequent DL/I calls

This requires that the IMS+ measurement option was active. The graphic information is based on the number of DL/I calls counted.

Under Heading	This is Displayed
Total DL/I calls counted	The total number of DL/I calls counted during the measurement. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
DL/I call	A DL/I call identified by three fields: a unique sequence number assigned to the call, its DL/I function code and its PCB name. The number of executions of this call is quantified.

Transaction statistics

This requires that the IMS+ measurement option was active and the execution of IMS transaction was observed.

Under Heading	This is Displayed
IMS Txns counted	The number of IMS transactions counted during the measurement interval.
Transaction rate	The average rate, in transactions per second, at which transactions were processed during the measurement interval.
Txn observations	The number of samples transaction execution was observed.
Txn throughput	The theoretical transaction throughput, in transactions per second, based on the number of counted transactions divided by the number of seconds transactions were executing.
IMS Txn svc time	The total service time for all observed transactions.
IMS Txn CPU time	The total CPU time consumed by all observed transactions.
IMS Txn max svc	The maximum service time observed for a single transaction execution.

Under Heading	This is Displayed
IMS Txn max CPU	The maximum CPU time observed for a single transaction execution.
IMS Txn min svc	The minimum service time observed for a single transaction execution.
IMS Txn min CPU	The minimum CPU time observed for a single transaction execution.

DLI call statistics

This requires that the IMS+ measurement option was active for the measurement and the execution of DLI calls was observed.

Under Heading	This is Displayed
DLI call count	The number of DLI calls counted during the measurement session.
DLI call rate	The DLI call rate per second during the measurement session.
DLI observations	The numbers of samples taken when a DLI call was in-flight.
DLI call thruput	The DLI call throughput rate per second based on the number of DLI calls counted divided by the DLI service time.
DLI svc time	The total service time for DLI calls during the measurement session.
DLI CPU time	The total CPU time for DLI calls during the measurement session.
DLI max svc	The service time of the longest running DLI call during the measurement session.
DLI max CPU	The highest CPU time for a DLI call during the measurement session.
DLI min svc	The service time of the shortest running DLI call during the measurement session.
DLI min CPU	The lowest CPU time for a DLI call during the measurement session.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
I01: IMS Measurement Profile (0954/ADSMPP)                  Row 00001 of 00049
Command ===> ____________________________________________ Scroll ===> CSR

 IMS Environment ------------------------------------------------------------
| DFSRRC00 parms     MSG,002002002000,N00000000,,,,,7,10,,,,,DSN1,,,N,,,     |
|-------------------------------------------------------------------------------|
| IMS system id      IMSP              | IMS region name    ADSMPP               |
| IMS version        8.1.0             | IMS region type    MPP                  |
*-------------------------------------------------------------------------------*

Most Active IMS PSBs ----------------------------------------     Reports:
 Samples                   3,000  100.0% ' ' ' ' ' ' ' '             I05   I08
 XTEITS20                     49    1.6% *                          I11


Most Active IMS Transactions ---------------------------------   Reports:
 Samples                   3,000  100.0% ' ' ' ' ' ' ' '             I04   I06
 TMEITS20                     49    1.6% *                          I09   I12


Most Active IMS DLI Calls ------------------------------------   Reports:
 Samples                   3,000  100.0% ' ' ' ' ' ' ' '             I07   I10
 00001 GU   IOPCB             32    1.0% *                          I13
 00002 ISRT IOPCB             11    0.3% *

Most CPU consumptive DLI -------------------------------------   Reports:
 Total DLI CPU time         0.25  100.0% ' ' ' ' ' ' ' '             I18   I19
 00001 GU   IOPCB            0.20   81.3% ********************       I20   I21
 00002 ISRT IOPCB            0.04   18.6% ***

Most Frequent Transactions -----------------------------------   Reports:
 Total txns counted          104  100.0% ' ' ' ' ' ' ' '             I03   I04
 TMEITS20                    104  100.0% ********************       I16   I17
```

Remainder of report after scrolling down is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
I01: IMS Measurement Profile (0954/ADSMPP)                  Row 00031 of 00049
Command ===> ____________________________________________ Scroll ===> CSR

Most Frequent DL/I Calls ------------------------------------- Reports:
 Total DLI calls counted     620  100.0% ' ' ' ' ' ' ' '             I02    I17
 00001 GU   IOPCB            206   33.2% ******                    I18
 00002 ISRT IOPCB            104   16.7% ***

 Transactions Statistics----------------------------------------------------
| IMS Txns counted     104             | Transaction rate    3.47 per sec     |
| Txn observations     612             | Txn throughput      24.18 per sec    |
|-------------------------------------------------------------------------------|
| IMS Txn svc time     4.3456 sec      | IMS Txn CPU time    2.2794 sec       |
| IMS Txn max svc      0.1496 sec      | IMS Txn max CPU     0.0266 sec       |
| IMS Txn min svc      0.0276 sec      | IMS Txn min CPU     0.0206 sec       |
|                                                                               |
 DLI Call Statistics--------------------------------------------------------
| DLI call count       790             | DLI call rate       39.69 per sec    |
| DLI observations     1,692           | DLI call thruput    246.19per sec    |
|-------------------------------------------------------------------------------|
| DLI svc time         7.1757 sec      | DLI CPU time        5.7611 sec       |
| DLI max svc          0.2504 sec      | DLI max CPU         0.0453 sec       |
| DLI min svc          0.0276 sec      | DLI min CPU         0.0206 sec       |
*-------------------------------------------------------------------------------*
```

I02 - IMS DL/I call timeline

Usage

Use this report to see the chronology of DL/I calls observed during the measurement interval. Each line shows information about one executed DL/I call. The IMS+ feature must have been enabled when the measurement was performed.

The number of DLI calls displayed in this report is limited by the value of the IMSIMaxTraceSize parameter specified during Application Performance Analyzer installation, or by the value on panel 2 of the measurement request (if your installation has configured this field). The report is truncated when the number of DLI calls issued reaches the value specified for IMSIMaxTraceSize.

Quantification

Each report line shows information pertaining to one IMS DL/I call.

Detail line hierarchy

The I02 report shows only one detail line level. It cannot be expanded.

Detail line descriptions

Under Heading	This is Displayed
Call Seq	A sequence number assigned to the DL/I call execution.
Func	The DL/I function code.
PCB Name	The name of the PCB referenced by the DL/I call.
ID	An identifier assigned to each unique DL/I call. This is useful when examining printed reports. You can use this identifier to locate detailed information about the DL/I call in the I15 DL/I Call Attributes report.
Location	The location, in CSECT+offset format, of the return address of the DL/I call.
Stat	The PCB status code returned by IMS upon completion of the DL/I call.
Call Time	The time of day at which the DL/I call occurred.
Duration	The duration of the DL/I call in seconds.

Sample reports

Below is an IMS DL/I call timeline sample report:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I02: IMS DL/I Call Timeline (0805/ADSMPP)                    Row 00001 of 01128
Command ===> ____________________________________________________ Scroll ===> CSR

CallSeq  Func  PCB Name  Id    Location       Stat  Call Time     Duration

000001   GU    I0PCB     0001  BBSFIN00+038C        20:36:10.29   0.0001
000002   GHU   DBSCA001  0002  BBSAP012+0E0E        20:36:11.20   0.0556
000003   GHU   DBSCN001  0003  BBSAP012+0EE4        20:36:11.26   0.0133
000004   GHU   DBSCA002  0004  BBSAP012+1086        20:36:11.27   0.0003
000005   ISRT  DBSCA002  0005  BBSAP012+1110        20:36:11.27   0.0003
000006   GHU   DBSTL001  0006  BBSAP012+11B0        20:36:11.27   0.0232
000007   ISRT  DBSTL001  0007  BBSAP012+1252        20:36:11.30   0.0003
000008   REPL  DBSCA001  0008  BBSAP012+131E        20:36:11.30   0.0001
000009   REPL  DBSCN001  0009  BBSAP012+13A4        20:36:11.30   0.0023
000010   ISRT  I0PCB     0010  BBSFIN00+0410  QH    20:36:11.46   0.0002

000011   GU    I0PCB     0001  BBSFIN00+038C        20:36:11.46   0.0087
000012   GHU   DBSCA001  0002  BBSAP012+0E0E        20:36:11.47   0.0396
000013   GHU   DBSCN001  0003  BBSAP012+0EE4        20:36:11.51   0.0257
000014   GHU   DBSCA002  0004  BBSAP012+1086        20:36:11.54   0.0002
```

Line commands

on objects

Cmd	When Applied To Object	Action
?	DL/I call	Display context help information.
++	DL/I call	Show additional details.
M	DL/I call	Display load module information.
P	DL/I call	Display source program mapping.

I03 - IMS transaction timeline

Usage

Use this report to see the chronology of IMS transactions observed during the measurement interval. Each line shows information about one executed IMS transaction and can be expanded to show the sequence of DL/I calls executed by the transaction. The IMS+ feature must have been enabled when the measurement was performed.

The number of transactions and DLI calls displayed in this report is limited by the value of the IMSIMaxTraceSize parameter specified during Application Performance Analyzer installation, or by the value on panel 2 of the measurement request (if your installation has configured this field). The report is truncated when the number of DLI calls issued reaches the value specified for IMSIMaxTraceSize.

Quantification

Each report line shows information pertaining to one IMS transaction.

Detail line hierarchy

The unexpanded I03 report shows a line for each observed IMS transaction. You can expand each line to reveal one additional hierarchical level of detail. The hierarchy is illustrated here:

```
Level 1 IMS Transaction
 Level 2 DL/I Call
```

Detail line descriptions

IMS transaction detail line

This is the first-level detail line. Each line shows information about an observed IMS transaction. These lines appear in transaction chronological sequence.

Under Heading	This is Displayed
TranCode	The IMS transaction code.
PSB/PCB	The name of the PSB under which the IMS transaction was scheduled.
Location	The LTERM where the transaction originated.
Txn Time	The time of day at which the IMS transaction was initiated. This is the time at which the transaction program received control upon return from the GU-IOPCB call.
Duration	The duration of the IMS transaction in seconds. The duration is measured from the time of return from the GU-IOPCB to the time of entry to the next GU-IOPCB.

DL/I call detail line

Line This is the second-level detail line. Each line shows information about an observed IMS DL/I Call that was executed in the transaction. These lines appear in DL/I call chronological sequence.

Under Heading	This is Displayed
TranCode	A sequence number assigned to the DL/I call execution.
PSB/PCB	The name of the PCB referred to by the DL/I call.
ID	An identifier assigned to each unique DL/I call. This is useful when examining printed reports. You can use this identifier to locate detailed information about the DL/I call in the I15 DL/I Call Attributes report.
Func	The DLI function code.
Location	The location, in CSECT+offset format, of the return address of the DL/I call.
Stat	The PCB status code returned by IMS upon completion of the DL/I call.
Txn Time	The time of day at which the DL/I call occurred.
Duration	The duration of the DL/I call in seconds.

Sample reports

A sample report is shown below. The first TranCode has been expanded to the second level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I03: IMS Transaction Timeline (0805/ADSMPP)                  Row 00001 of 00111
Command ===> _____________________________________________ Scroll ===> CSR

TranCode   PSB/PCB    Id    Func   Location       Stat  Txn Time       Duration

BBSDR000   BBSFIN00                                    20:36:10.29     1.1639

± 000001   I0PCB      0001  GU     BBSFIN00+038C       20:36:10.29     0.0001
→ 000002   DBSCA001   0002  GHU    BBSAP012+0E0E       20:36:11.20     0.0556
→ 000003   DBSCN001   0003  GHU    BBSAP012+0EE4       20:36:11.26     0.0133
→ 000004   DBSCA002   0004  GHU    BBSAP012+1086       20:36:11.27     0.0003
→ 000005   DBSCA002   0005  ISRT   BBSAP012+1110       20:36:11.27     0.0003
→ 000006   DBSTL001   0006  GHU    BBSAP012+11B0       20:36:11.27     0.0232
→ 000007   DBSTL001   0007  ISRT   BBSAP012+1252       20:36:11.30     0.0003
→ 000008   DBSCA001   0008  REPL   BBSAP012+131E       20:36:11.30     0.0001
→ 000009   DBSCN001   0009  REPL   BBSAP012+13A4       20:36:11.30     0.0023
→ 000010   IOPCB      0010  ISRT   BBSFIN00+0410  QH   20:36:11.46     0.0002

BBSDR000   BBSFIN00               TERMX09             20:36:11.47     0.0760
BBSDR000   BBSFIN00                                    20:36:11.55     0.0273
BBSDR000   BBSFIN00                                    20:36:11.58     0.0467
```

Line commands

on objects

Cmd	When Applied To Object	Action
?	Trancode, DL/I call	Display context help information.
++	Trancode, DL/I call	Show additional details.
+	Trancode	Expand to reveal next level.
–	Trancode	Collapse to hide next level.
M	Trancode, DL/I call	Display load module information.
P	Trancode, DL/I call	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Trancode	Display context help information.
+	Trancode	Expand to reveal all entries.
–	Trancode	Collapse to show only first level.

I04 - IMS transaction activity timeline

Usage

Use this report to see, for each IMS transaction, how execution of that transaction was distributed over the measurement interval.

Quantification

A graph, in bar chart format, is displayed for each observed IMS transaction code. The horizontal axis represents the measurement interval which spans 50 columns.

Each column represents an equal 1/50th subinterval of time. A scale is shown at the bottom of the graph indicating the percentage of time progression in the overall interval.

In each column, a vertical graph shows the approximate percentage of time during the subinterval that execution of the IMS transaction took place. A vertical bar of 1, 2, 3, 4 or 5 characters, extending upward from the scale, is displayed indicating the percentage of time in the subinterval execution of the indicated transaction was observed.

Detail line descriptions

IMS transaction activity distribution

A group of lines is shown for each reported transaction. Some information about the transaction appears to the left, and a bar chart appears to the right.

Under Heading	This is Displayed
Txn	The IMS transaction code.
PSB	The name of the PSB and program.
Txns	The number of executions of the transaction that occurred during the measurement interval. This value is available only if the IMS+ measurement option was enabled.

Sample reports

A sample report is shown below.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
I04: IMS Transaction Activity Timeline (0805/ADSMPP)          Row 00001 of 00018
Command ===> _____________________________________________ Scroll ===> CSR

IMS Transaction         <----- 2,000 Samples: Duration 59.8 Seconds ----->

Txn:  BBSDR000      >80%       *     * * *   * * *
PSB:  BBSFIN00      >60%       **  * * * * * * * *
Txns: 50            >40%       **  * * * * * * * *
                    >20%       ******* * *** * * *
                    > 0%       ***************** *
                        *....1....2....3....4....5....6....7....8....9....*

Txn: BBSCR000       >80%              *       * *
PSB: BBSFIN00       >60%         *  * * * * * * * *
Txns: 49            >40%         ** * * * * * * * *
                    >20%         **** * * *** * * *
                    > 0%        *************** ***
                        *....1....2....3....4....5....6....7....8....9....*
```

Line commands

on objects

Cmd	When Applied To Object	Action
?	Trancode	Display context help information.
++	Trancode	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	IMS Transaction Display	Display context help information.
SV	IMS Transaction	Sort next level entries by value.
SN	IMS Transaction	Sort next level entries by name.

Detail lines for reports I05 through I13

This section describes the common format of detail lines shared by reports I05 through I13. These reports quantify activity based on the basis of the PSW (Program Status Word) address values observed at the time of the sample. This format is not exclusive to the IMS reports, it is also used in CPU reports such as C01, and Wait reports such as W01.

Detail lines reported for PSW sampling

Various report detail lines quantify activity on the basis of the PSW (Program Status Word) address values observed at the time of the sample. One PSW observation is recorded for each TCB. Depending on the report, the 'activity' might be: CPU usage, WAIT time, Queued time, or overall service time.

The analysis reports classify the PSW address values and aggregate them into 'objects'. The reports show each of these objects in one detail line arranged in a hierarchy. Each successive level in the hierarchy represents a more granular breakdown of the quantifications reported in the higher level items.

These objects are reported with a Name field, a Description, a quantification expressed as a percentage, and a histogram depicting the quantity. Descriptions of these detail lines are presented here.

APPLCN - Application code category

A group of lines is shown for each reported transaction. Some information about the transaction appears to the left, and a bar chart appears to the right.

Under Heading	This is Displayed
Name	“APPLCN”
Description	“Application Code”
Percent of Time	The percentage of activity measured in application code. The classification as application code is done on the basis of load module names and DPA (Descriptive Program Attribution) tables.

SYSTEM - System/OS services category

Under Heading	This is Displayed
Name	“SYSTEM”
Description	“System/OS Services”

Under Heading	This is Displayed
Percent of Time	The percentage of activity measured in system services. The classification as SYSTEM is done on the basis of load module names and DPA (Descriptive Program Attribution) tables. These include core operating system services as well as major system applications or subsystems: DB2, IMS, CICS, MQSeries, etc. SVC (Supervisor Call) routines and MVS Nucleus routines are included in this category.

NOSYMB - No module name found

Under Heading	This is Displayed
Name	"NOSYMB"
Description	"No Module Name"
Percent of Time	The percentage of activity measured at addresses for which associated module names could not be determined. An example of this would be execution of instructions moved into an area of GETMAINed storage.

DPA group

Under Heading	This is Displayed
Name	DPA Group name
Description	Description of the DPA group. For example: MVS, IMS, DB2, SVC, LERUNLIB, etc.
Percent of Time	The percentage of activity measured in modules in the indicated grouping.

DPA subgroup

Under Heading	This is Displayed
Name	DPA Subgroup name.
Description	Description of the DPA subgroup. For example: MVS, IMS, SVCTYPE1, SVCTYPE2, LEBASE, LECOBOL, etc.
Percent of Time	The percentage of activity measured in modules in the indicated grouping.

NOSYMB address range

Under Heading	This is Displayed
Name	Hexadecimal address range.
Description	"Unresolved Address."
Percent of Time	The percentage of activity measured at the indicated address range. These are addresses for which no corresponding module name could be determined. These measurements are aggregated under the NOSYMB category. Each report line represents a 4K (4096 bytes) range of addresses. The address range is displayed under the Name heading in the format HHHHHxxx. HHHHH displays the first five hexadecimal digits of the address and xxx represents the three lower order digits: a range from X'000' to X'FFF' (decimal 0 to 4095).

SVC - Supervisor call

Under Heading	This is Displayed
Name	SVCnnn - where nnn is the supervisor call number in decimal.
Description	Description of the supervisor call function.
Percent of Time	The percentage of activity measured in the indicated supervisor call.

CSECT - Control section

Under Heading	This is Displayed
Name	A CSECT (Control Section) name.
Description	Functional description of the CSECT if one is available. Otherwise “csectname in modulename” appears.
Percent of Time	The percentage of activity measured in the indicated CSECT.

DB2SQL - DB2 SQL processing category

Under Heading	This is Displayed
Name	“DB2SQL”
Description	“SQL Processing.”
Percent of Time	The percentage of activity measured while processing SQL requests.

SQL statement

Under Heading	This is Displayed
Name	A unique reference number assigned to the SQL statement.
Description	The name of the program that issued the SQL request as well as the precompiler statement number of the SQL statement in PGMNAME(stmt#) format. This is followed by the SQL function name. For example: SELECT, INSERT, COMMIT, etc.
Percent of Time	The percentage of activity measured while processing the indicated SQL statement.

DATAMG - Data management processing category

Under Heading	This is Displayed
Name	“DATAMG”
Description	“Data Mgmt Processing.”
Percent of Time	The percentage of activity measured in routines that were servicing data management (DASD) requests. This includes basic access functions (such as READ and WRITE) to files. Processing of OPEN and CLOSE functions is not included in this category.

DDNAME

Under Heading	This is Displayed
Name	DDNAME of a DASD file.

Under Heading	This is Displayed
Description	Access method for the indicated file: VSAM, QSAM, etc.
Percent of Time	The percentage of activity measured in routines that were servicing data management (DASD) requests for the indicated DDNAME. This includes basic access functions (such as READ and WRITE) to files. Processing of OPEN and CLOSE functions is not included in this category.

DASD I/O request

Under Heading	This is Displayed
Name	Type of I/O request.
Description	Program name and offset of the I/O request.
Percent of Time	The percentage of activity measured in routines that were servicing data management (DASD) requests for the indicated request.

IMS PSB

Under Heading	This is Displayed
Name	IMS PSB Name. NONIMS to indicate IMS activity for which no PSB has been scheduled.
Description	The type of IMS dependent region: BMP, MPP, IFP, etc.
Percent of Time	The percentage of activity measured under the indicated IMS PSB.

IMS transaction

Under Heading	This is Displayed
Name	IMS transaction code.
Description	The PSB to which the IMS transaction belongs.
Percent of Time	The percentage of activity measured while executing the indicated IMS transaction.

IMS DL/I call

Under Heading	This is Displayed
Name	A unique reference number assigned to the DL/I call.
Description	The DL/I function code followed by the PCB name followed by the relative PCB number in parentheses. The location of the call in csect+offset format follows this.
Percent of Time	The percentage of activity measured while executing the indicated DL/I call.

IMSDLI - IMS DL/I processing category

Under Heading	This is Displayed
Name	“IMSDLI”
Description	“IMS DL/I Calls.”

Under Heading	This is Displayed
Percent of Time	The percentage of activity measured in the processing of IMS DL/I calls.

I05 - IMS DL/I CPU usage by PSB

Usage

Use this report to see the distribution of CPU usage in an IMS-dependent region. This report aggregates CPU usage by IMS PSB and is meaningful when measuring a region in which multiple IMS PSBs are scheduled (for example, an MPP region). Both IMS and non-IMS CPU usage is reported. IMS CPU usage measured during the execution of DL/I calls is reported under detail lines, which identify each of the DL/I calls. Non-DL/I call CPU usage is reported as application code or system routines.

This report is intended for measurements of IMS-dependent regions (MPP, BMP, FPP) as well as IMS batch DL/I regions.

Note:
You should not use this report to analyze CICS measurements.

Quantification

Each report line quantifies CPU usage as a percentage of the overall CPU usage observed for the measurement interval. Each quantity is expressed as a percentage representing the ratio of the number of CPU active observations for the object on the report detail line to the total number of CPU active observations in the measurement.

Detail line hierarchy

An unexpanded I05 report shows a line for each IMS PSB in which CPU usage was observed. The name field reports the PSB name. I05 reports CPU usage for which there was no IMS PSB on a separate line named NONIMS. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 PSB Name or 'NONIMS'
 Level 2 IMSDLI - DL/I call execution
  Level 3 DL/I call identification
    Level 4 Category
     Level 5 Load module
      Level 6 CSECT
    Level 4 SVC total
     Level 5 SVCnnn
      Level 6  Load module
       Level 7  CSECT
 Level 2  APPLCN - application code
  Level 3  Load module
    Level 4  CSECT
 Level 2 SYSTEM - system routines
  Level 3 Category
    Level 4 Load module
     Level 5 CSECT
  Level 3 SVC total
    Level 4 SVCnnn
     Level 5 Load module
      Level 6 CSECT
```

```
Level 2 NOSYMB - no load module name
 Level 3 hexadecimal addresses
```

Detail line descriptions

PSB detail line

This is the first-level detail line. It aggregates activity by IMS PSB.

Under Heading	This is Displayed
Name	IMS PSB Name. NONIMS to indicate IMS activity for which no PSB has been scheduled.
Description	The type of IMS dependent region: BMP, MPP, IFP, etc.
Percent of Time	The percentage of activity measured under the indicated IMS PSB.

Other detail lines

Other detail lines are subcategories and show objects based on observed PSW addresses. See “Detail lines for reports I05 through I13” on page 307.

Sample reports

A sample report is shown below. The report is expanded to the second level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I05: IMS CPU Usage by PSB (0805/ADSMPP)                      Row 00001 of 00008
Command ===> ____________________________________________________ Scroll ===> CSR

Name      Description             Percent of CPU time * 10.00%  ±10.1%
                                      *....1....2....3....4....5....6....7....8.
BBSFIN00  PSB in MPP region      98.98 ========================================
→ SYSTEM    System/OS Services   57.57 ============================
→ IMSDLI    IMS DL/I Calls       30.30 ===============
→ APPLCN    Application Code     10.10 =====
→ NOSYMB    No Module Name        1.01 =

NONIMS    Not IMS Execution      1.01 =
→ SYSTEM    System/OS Services    1.01 =
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a “/” on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display context help information
++	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Show additional details
+	PSB, DL/I call, Category, Load Module, SVC, SQL command	Expand to reveal next level

Cmd	When Applied To Object	Action
-	PSB, DL/I call, Category, Load Module, SVC, SQL command	Collapse to hide next level
SV	PSB, DL/I call, Category, SVC, SQL command	Sort next level by value
SN	PSB, DL/I call, Category, SVC, SQL command	Sort next level by name
M	Load Module, CSECT	Display load module information
P	Load Module, DL/I call, CSECT, SQL command	Display source program mapping
C01	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C01 report subset
C02	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C02 report subset
C03	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C03 report subset
C08	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C08 report subset
C09	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C09 report subset

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries
+	Description	Expand field size
+	Percent CPU	Zoom in scale
-	Name	Collapse to show only first level
-	Description	Reduce field size
-	Percent CPU	Zoom out scale
SV	Name	Sort next level by value
SN	Name	Sort next level by name

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-----------------------------------------------------------------------------+
|                                                                More:     +    |
| +--------------- The following report line was selected ---------------+    |
| | BBSFIN00  PSB in MPP region      98.98 OOOOOOOOOOOOOOOOOOOOOOOOOOOOOO|    |
| +-------------------------------------------------------------------------+   |
|                                                                              |
| Calculation Details                                                          |
|    IMS DL/I call CPU measurements            98                              |
|    PSB                                       BBSFIN00                        |
|    Total CPU measurements                    99                              |
|    Percent of total                          98.98%                          |
|                                                                              |
| IMS PSB Information                                                          |
|    PSB Name        BBSFIN00              IMS system      IMSP                |
|    No.of PCBs      27                    LIST=NO PCBs    12                  |
|    Txn count       99                    DL/I calls      1010                |
|    Sample count    611                                                       |
|                                                                              |
|    PCBNum  Name      Type  DBD/LTRM PROCOPT  LIST                            |
|        1   IOPCB      TP                     YES                             |
|        2   ALT1       TP                     YES                             |
|        3   ALT2       TP                     YES                             |
|        4   DBSCN001   DB   DBSCN000   A      YES                             |
|        5   DBSCN002   DB   DBSCN000   A      YES                             |
|        6   DBSCN003   DB   DBSCN000   A      YES                             |
|        7   DBSCI001   DB   DBSCI000   A      YES                             |
|        8   DBSCI002   DB   DBSCI000   A      YES                             |
|        9   DBSCI003   DB   DBSCI000   A      YES                             |
|       10   DBSCA001   DB   DBSCA000   A      YES                             |
|       11   DBSCA002   DB   DBSCA000   A      YES                             |
|       12   DBSCA003   DB   DBSCA000   A      YES                             |
|       13   DBSTL001   DB   DBSTL000   A      YES                             |
|       14   DBSTL002   DB   DBSTL000   A      YES                             |
|       15   DBSTL003   DB   DBSTL000   A      YES                             |
|       16   DBSCNA01   DB   DBSCN000   A      NO                              |
|       17   DBSCNA02   DB   DBSCN000   A      NO                              |
|       18   DBSCNA03   DB   DBSCN000   A      NO                              |
|       19   DBSCIA01   DB   DBSCI000   A      NO                              |
+-----------------------------------------------------------------------------+
```

I06 - IMS DL/I CPU usage by transaction

Usage

Use this report to see the distribution of CPU usage in an IMS-dependent region. This report aggregates CPU usage by IMS transaction and is meaningful when measuring a region in which multiple IMS transactions are scheduled (for example, an MPP region). Both IMS and non-IMS CPU usage is reported. IMS CPU usage measured during the execution of DL/I calls is reported under detail lines, which identify each of the DL/I calls. Non-DL/I call CPU usage is reported as application code or system routines.

This report is intended for measurements of IMS-dependent regions (MPP, BMP, FPP) as well as IMS batch DL/I regions.

Note:
You should not use this report to analyze CICS measurements.

Quantification

Each report line quantifies CPU usage as a percentage of the overall CPU usage observed for the measurement interval. Each quantity is expressed as a percentage

representing the ratio of the number of CPU active observations for the object on the report detail line to the total number of CPU active observations in the measurement.

Detail line hierarchy

An unexpanded I06 report shows a line for each IMS transaction in which CPU usage was observed. The name field reports the transaction code. I06 reports CPU usage for which no IMS transaction was active under a line identifying the PSB name. If no IMS PSB was active the CPU usage is reported under a line named "NONIMS." You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Trancode, PSB Name or 'NONIMS'
 Level 2 IMSDLI - DL/I call execution
  Level 3 DL/I call identification
    Level 4 Category
     Level 5 Load module
      Level 6 CSECT
    Level 4 SVC total
     Level 5 SVCnnn
      Level 6 Load module
       Level 7 CSECT
 Level 2 APPLCN - application code
  Level 3 Load module
    Level 4 CSECT
 Level 2 SYSTEM - system routines
  Level 3 Category
    Level 4 Load module
     Level 5 CSECT
  Level 3 SVC total
    Level 4 SVCnnn
     Level 5 Load module
      Level 6 CSECT


 Level 2 NOSYMB - no load module name
  Level 3 hexadecimal addresses
```

Detail line descriptions

Transaction detail line

This is the first-level detail line. It aggregates activity by IMS transaction. A PSB line is reported for any activity under IMS that is not under an IMS transaction.

Under Heading	This is Displayed
Name	IMS transaction code.
Description	The PSB to which the IMS transaction belongs.
Percent of Time	The percentage of activity measured while executing the indicated IMS transaction.

Other detail lines

Other detail lines are subcategories and show objects based on observed PSW addresses. See "Detail lines for reports I05 through I13" on page 307.

Sample reports

A sample report is shown below. The report is expanded to the second level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I06: IMS CPU Usage by Txn (0805/ADSMPP)                     Row 00001 of 00013
Command ===> _____________________________________________ Scroll ===> CSR

Name      Description             Percent of CPU time * 10.00%  ±10.1%
                                      *....1....2....3....4....5....6....7....8.
BBSDR000  Txn in PSB BBSFIN00    55.55 ==============================
→ SYSTEM    System/OS Services   29.29 ==============
→ IMSDLI    IMS DL/I Calls       19.19 =========
→ APPLCN    Application Code      6.06 ===
→ NOSYMB    No Module Name        1.01 =

BBSCR000  Txn in PSB BBSFIN00    43.43 ======================
→ SYSTEM    System/OS Services   28.28 =============
→ IMSDLI    IMS DL/I Calls       11.11 ======
→ APPLCN    Application Code      4.04 ==

NONIMS    Not IMS Execution      1.01 =
→ SYSTEM    System/OS Services    1.01 =
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	TranCode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display context help information.
++	Trancode, PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Show additional details.
+	Trancode, PSB, DL/I call, Category, Load Module, SVC, SQL command	Expand to reveal next level.
-	Trancode, PSB, DL/I call, Category, Load Module, SVC, SQL command	Collapse to hide next level.
SV	Trancode, PSB, DL/I call, Category, SVC, SQL command	Sort next level by value.
SN	Trancode, PSB, DL/I call, Category, SVC, SQL command	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	Load Module, CSECT, DL/I call, SQL command	Display source program mapping.
C01	Trancode, PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C01 report subset.
C02	Trancode, PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C02 report subset.

Cmd	When Applied To Object	Action
C03	Trancode, PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C03 report subset
C08	Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C08 report subset.
C09	Trancode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
-	Name	Collapse to show only first level.
-	Description	Reduce field size.
-	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | BBSDR000  Txn in PSB BBSFIN00    55.55 OOOOOOOOOOOOOOOOOOOOOOOOOOOO  |      |
| +-----------------------------------------------------------------------+      |
|                                                                               |
| Calculation Details                                                           |
|    IMS DL/I call CPU measurements            55                               |
|    IMS transaction                           BBSDR000                         |
|    Total CPU measurements                    99                               |
|    Percent of total                          55.55%                           |
|                                                                               |
| IMS Transaction Information                                                   |
|    IMS Trancode    BBSDR000              IMS system      IMSP                 |
|    PSB name        BBSFIN00              Txn count       50                   |
|    Total time      10.1332               Total CPU time  0.4327               |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I07 - IMS DL/I CPU usage by DL/I call

Usage

Use this report to see the distribution of CPU usage across IMS DL/I calls. I07 reports only CPU activity that occurred during processing of DL/I calls.

This report is intended for measurements of IMS-dependent regions (MPP, BMP, FPP) as well as IMS batch DL/I regions.

Note:
You should not use this report to analyze CICS measurements.

Quantification

Each report line quantifies CPU usage as a percentage of the total CPU usage observed for all DL/I call processing. CPU usage observed outside of DL/I call processing is excluded from the calculation. Each quantity is expressed as a percentage representing the ratio of the number of CPU active observations for the object described by the report detail line to the total number of CPU active observations in DL/I call processing.

Detail line hierarchy

An unexpanded I07 report shows a line for each IMS DL/I call in which CPU usage was observed. The name field shows a sequence number assigned to each unique DL/I call. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 DL/I call identification
 Level 2 Category
  Level 3 Load module
    Level 4 CSECT
 Level 2 SVC total
  Level 3 SVCnnn
    Level 4 Load module
      Level 5 CSECT
```

Detail line descriptions

See “Detail lines for reports I05 through I13” on page 307.

Sample reports

A sample report is shown below. The report is expanded to the second level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I07: IMS CPU Usage by DL/I Call (0805/ADSMPP)                Row 00001 of 00039
Command ===> _____________________________________________ Scroll ===> CSR

Name      Description             Percent of DLI CPU time * 10.00%  ±18.5%
                                      *....1....2....3....4....5....6....7....8.
00001     GU-IOPCB(1) BBSFIN00+0 46.66 ======================
→ IMS       IMS Subsystem        33.33 ================
→ MVS       MVS System           10.00 =====
→ NOSYMB    No Module Name        3.33 ==

00006     GHU-DBSTL001(13) BBSAP  6.66 ===
→ IMS       IMS Subsystem         3.33 ==
→ SVC       SVC Routines          3.33 ==

00018     REPL-DBSCN001(4) BBSAP  6.66 ===
→ IMS       IMS Subsystem         6.66 ===

00002     DBSCA001(10) BBSAP      6.66 ===
→ SVC       SVC Routines          6.66 ===

00009     DBSCN001(4) BBSAP       6.66 ===
→ IMS       IMS Subsystem         6.66 ===
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display context help information.
++	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Show additional details.
+	DL/I call, Category, Load Module, SVC, SQL command	Expand to reveal next level.
-	DL/I call, Category, Load Module, SVC, SQL command	Collapse to hide next level.
SV	DL/I call, Category, SVC, SQL command	Sort next level by value.
SN	DL/I call, Category, SVC, SQL command	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	CSECT, DL/I call, SQL command	Display source program mapping.
C01	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C01 report subset.
C02	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C02 report subset.

Cmd	When Applied To Object	Action
C03	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C03 report subset
C08	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C08 report subset.
C09	Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
-	Name	Collapse to show only first level.
-	Description	Reduce field size.
-	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | 00001     GU-IOPCB(1) BBSFIN00+0 46.66 00000000000000000000000       |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     IMS DL/I call CPU measurements            14                              |
|     Total CPU measurements                    30                              |
|     Percent of total                          46.66%                          |
|                                                                               |
|  DL/I Call Information                                                        |
|     Function code   GU                    PSB Name        BBSFIN00            |
|     PCB Name        IOPCB                 IMS Id-Region   IMSP-ADSMPP         |
|     PCB Number      1                     Call type       CBLTDLI             |
|     CSECT/module    BBSFIN00 in BBSFIN00  Offset of call  0000038C            |
|     Sample count    10                    Call count      60                  |
|     DLI CPU time    0.14                  Service time    0.19                |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I08 - IMS DL/I WAIT time by PSB

Usage

Use this report to identify any delays caused by wait conditions in IMS regions. This report shows wait time by IMS PSB and is meaningful when measuring a region in which multiple IMS PSBs are scheduled (for example, a MPP region). Only wait time observed when an IMS PSB is active is reported. Wait time is identified both within the processing of DL/I calls and outside of DL/I call processing.

This report is intended for measurements of IMS-dependent regions (MPP, BMP, FPP) and IMS batch DL/I regions.

Note:
You should not use this report to analyze CICS measurements.

Quantification

Each report line quantifies wait time as a percentage of the overall time IMS PSBs were active. Each quantity is expressed as a percentage representing the ratio of the number of samples in which the active IMS program was waiting to the total number of samples IMS programs were active. Any time when no IMS programs were active is excluded. This ensures that quantifications are not distorted by inactive intervals such as those that occur between scheduled transactions.

Detail line hierarchy

An unexpanded I08 report shows a line for each IMS PSB that was observed. The name field reports the PSB name. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 PSB Name or 'NONIMS'
 Level 2 IMSDLI - DL/I call execution
  Level 3 DL/I call identification
    Level 4 Category
     Level 5 Load module
      Level 6 CSECT
    Level 4 SVC total
     Level 5 SVCnnn
      Level 6 Load module
       Level 7 CSECT
 Level 2 APPLCN - application code
  Level 3 Load module
    Level 4 CSECT
 Level 2 SYSTEM - system routines
  Level 3 Category
    Level 4 Load module
     Level 5 CSECT
  Level 3 SVC total
    Level 4 SVCnnn
     Level 5 Load module
      Level 6 CSECT


 Level 2 NOSYMB - no load module name
  Level 3 hexadecimal addresses
```

Detail line descriptions

PSB detail line

This is the first-level detail line. It aggregates activity by IMS transaction.

Under Heading	This is Displayed
Name	IMS PSB Name. NONIMS to indicate IMS activity for which no PSB has been scheduled.
Description	The type of IMS dependent region: BMP, MPP, IFP, etc.
Percent of Time	The percentage of activity measured under the indicated IMS PSB.

Other detail lines

Other detail lines are subcategories and show objects based on observed PSW addresses. See "Detail lines for reports I05 through I13" on page 307.

Sample reports

A sample report is shown below. The report is expanded to the third level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I08: IMS WAIT Time by PSB (0805/ADSMPP)                      Row 00001 of 00020
Command ===> _____________________________________________ Scroll ===> CSR
 Name      Description                Percent of Time * 10.00%  ±3.5
                                      *....1....2....3....4....5....6....7....8
BBSFIN00    PSB in MPP region    82.42 ========================================
→ IMSDLI     IMS DL/I Calls      73.24 ====================================
  → 00012    GHU-DBSCN001(4) BB  35.15 ==================
  → 00003    GHU-DBSCN001(4) BB  33.37 =================
  → 00011    GHU-DBSCA001(10) B   1.91 ==
  → 00002    GHU-DBSCA001(10) B   1.78 ==
  → 00015    GHU-DBSTL001(13) B   0.25
  → 00018    REPL-DBSCN001(4) B   0.25
  → 00001    GU-IOPCB(1) BBSFIN   0.25
  → 00006    GHU-DBSTL001(13) B   0.12
  → 00007    ISRT-DBSTL001(13)    0.12
→ SYSTEM   System/OS Services     5.60 ====
  → SVC      SVC Routines         5.35 ====
  → LERUNLIB Language Environme   0.25
→ APPLCN   Application Code       3.56 ===
  → BKN00SUP Application Progra   1.65 =
  → BKN00102 Application Progra   1.14 =
  → BKN00101 Application Progra   0.38
  → BKN00103 Application Progra   0.25
  → BKN00111 Application Progra   1.12 =
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display context help information.

Cmd	When Applied To Object	Action
++	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Show additional details.
+	PSB, DL/I call, Category, Load Module, SVC, SQL command	Expand to reveal next level.
-	PSB, DL/I call, Category, Load Module, SVC, SQL command	Collapse to hide next level.
SV	PSB, DL/I call, Category, SVC, SQL command	Sort next level by value.
SN	PSB, DL/I call, Category, SVC, SQL command	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	Load Module, CSECT, DL/I call, SQL command	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
-	Name	Collapse to show only first level.
-	Description	Reduce field size.
-	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter “++” (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-----------------------------------------------------------------------------+
|                                                                More:     +    |
| +--------------- The following report line was selected ---------------+    |
| | BBSFIN00  PSB in MPP region      82.42 00000000000000000000000000000|    |
| +-------------------------------------------------------------------------+   |
|                                                                               |
| Calculation Details                                                           |
|    IMS DL/I call wait time measurements      647                              |
|    PSB                                       BBSFIN00                         |
|    Total measurements                        785                              |
|    Percent of total                          82.42%                           |
|                                                                               |
| IMS PSB Information                                                           |
|    PSB Name        BBSFIN00              IMS system      IMSP                 |
|    No.of PCBs      27                    LIST=NO PCBs    12                   |
|    Txn count       99                    DL/I calls      1010                 |
|    Sample count    611                                                        |
|                                                                               |
|    PCBNum  Name      Type  DBD/LTRM PROCOPT  LIST                             |
|        1   IOPCB      TP                     YES                              |
|        2   ALT1       TP                     YES                              |
|        3   ALT2       TP                     YES                              |
|        4   DBSCN001   DB   DBSCN000   A      YES                              |
|        5   DBSCN002   DB   DBSCN000   A      YES                              |
|        6   DBSCN003   DB   DBSCN000   A      YES                              |
|        7   DBSCI001   DB   DBSCI000   A      YES                              |
|        8   DBSCI002   DB   DBSCI000   A      YES                              |
|        9   DBSCI003   DB   DBSCI000   A      YES                              |
|       10   DBSCA001   DB   DBSCA000   A      YES                              |
|       11   DBSCA002   DB   DBSCA000   A      YES                              |
|       12   DBSCA003   DB   DBSCA000   A      YES                              |
|       13   DBSTL001   DB   DBSTL000   A      YES                              |
|       14   DBSTL002   DB   DBSTL000   A      YES                              |
|       15   DBSTL003   DB   DBSTL000   A      YES                              |
|       16   DBSCNA01   DB   DBSCN000   A      NO                               |
|       17   DBSCNA02   DB   DBSCN000   A      NO                               |
|       18   DBSCNA03   DB   DBSCN000   A      NO                               |
|       19   DBSCIA01   DB   DBSCI000   A      NO                               |
+-----------------------------------------------------------------------------+
```

I09 - IMS DL/I WAIT time by transaction

Usage

Use this report to identify any delays caused by wait conditions in IMS regions. This report shows wait time by IMS transaction and is meaningful when measuring a region in which multiple IMS transactions are scheduled (for example, a MPP region). Only wait time observed when an IMS PSB is active is reported. Wait time is identified both within the processing of DL/I calls and outside of DL/I call processing.

Quantification

Each report line quantifies wait time as a percentage of the overall time IMS PSBs were active. Each quantity is expressed as a percentage, which represents the ratio of the number of samples in which the active IMS program was waiting compared to the total number of samples IMS programs were active. Any time during when no IMS programs were active are excluded. This ensures that quantifications are not distorted by inactive intervals such as those that occur between scheduled transactions.

Detail line hierarchy

An unexpanded I09 report shows a line for each IMS transaction observed. The name field reports the transaction code. In the event that no IMS transaction was active but a PSB was active, the PSB will be identified in the report line. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Trancode, PSB Name or 'NONIMS'
 Level 2 IMSDLI - DL/I call execution
  Level 3 DL/I call identification
    Level 4 Category
     Level 5 Load module
      Level 6 CSECT
    Level 4 SVC total
     Level 5 SVCnnn
      Level 6 Load module
       Level 7 CSECT
 Level 2 APPLCN - application code
  Level 3 Load module
    Level 4 CSECT
 Level 2 SYSTEM - system routines
  Level 3 Category
    Level 4 Load module
     Level 5 CSECT
  Level 3 SVC total
    Level 4 SVCnnn
     Level 5 Load module
      Level 6 CSECT


 Level 2 NOSYMB - no load module name
  Level 3 hexadecimal addresses
```

Detail line descriptions

Transaction detail line

This is the first-level detail line. It aggregates activity by IMS transaction. For any activity under IMS which is not under an IMS transaction a PSB line is reported.

Under Heading	This is Displayed
Name	IMS transaction code.
Description	The PSB to which the IMS transaction belongs.
Percent of Time	The percentage of activity measured while executing the indicated IMS transaction.

Other detail lines

Other detail lines are subcategories and show objects based on observed PSW addresses. See “Detail lines for reports I05 through I13” on page 307.

Sample reports

A sample report is shown below. The report is expanded to the third level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I09: IMS WAIT Time by TXn (0805/ADSMPP)                     Row 00001 of 00026
Command ===> ____________________________________________ Scroll ===> CSR

 Name      Description                Percent of Time * 10.00%  ±3.5
                                      *....1....2....3....4....5....6....7....8
BBSDR000    Txn in PSB BBSFIN00  42.80 ======================
→ IMSDLI     IMS DL/I Calls      35.54 ==================
  → 00003    GHU-DBSCN001(4) BB  33.37 =================
  → 00002    GHU-DBSCA001(10) B   1.78 ==
  → 00006    GHU-DBSTL001(13) B   0.12
  → 00001    GU-IOPCB(1) BBSFIN   0.25
  → 00007    ISRT-DBSTL001(13)    0.12
→ SYSTEM   System/OS Services     3.69 ===
  → SVC      SVC Routines         3.43 ===
  → LERUNLIB Language Environme   0.25
→ APPLCN   Application Code       3.56 ===
  → BKN00SUP Application Progra   1.65 =
  → BKN00102 Application Progra   1.14 =
  → BKN00101 Application Progra   0.38
  → BKN00103 Application Progra   0.25
  → BKN00111 Application Progra   1.12 =
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Trancode, PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display context help information.
++	Trancode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Show additional details.
+	Trancode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command	Expand to reveal next level.
-	Trancode, PSB, Category, DL/I call, Load Module, SVC, SQL command	Collapse to hide next level.
SV	Trancode, PSB, Category, DL/I call, Load Module, SVC, SQL command	Sort next level by value.
SN	Trancode, PSB, Category, DL/I call, Load Module, SVC, SQL command	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	Load Module, CSECT, DL/I call, SQL command	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
-	Name	Collapse to show only first level.
-	Description	Reduce field size.
-	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | BBSDR000  Txn in PSB BBSFIN00    42.80 00000000000000000000          |      |
| +-----------------------------------------------------------------------+     |
|                                                                               |
| Calculation Details                                                           |
|    IMS DL/I call wait time measurements      336                              |
|    IMS transaction                           BBSDR000                         |
|    Total measurements                        785                              |
|    Percent of total                          42.80%                           |
|                                                                               |
| IMS Transaction Information                                                   |
|    IMS Trancode    BBSDR000              IMS system      IMSP                 |
|    PSB name        BBSFIN00              Txn count       50                   |
|    Total time      10.1332               Total CPU time  0.4327               |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I10 - IMS DL/I WAIT time by DL/I call

Usage

Use this report to identify delays caused by wait conditions in specific DL/I calls. This report is intended for measurements of IMS-dependent regions (MPP, BMP, FPP) as well as IMS batch DL/I regions.

Note:
You should not use this report to analyze CICS measurements.

Quantification

Each report line quantifies wait time as a percentage of the total time observed for all DL/I call processing. Time observed outside of DL/I call processing is excluded from the calculation. Each quantity is expressed as a percentage representing the ratio of the number of wait samples for the object described by the report detail line to the total number of samples in DL/I call processing.

Detail line hierarchy

An unexpanded I10 report shows a line for each IMS DL/I call. The name field shows a sequence number assigned to each unique DL/I call. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 DL/I call identification
 Level 2 Category
  Level 3 Load module
    Level 4 CSECT
 Level 2 SVC total
   Level 3 SVCnnn
    Level 4 Load Module
     Level 5 CSECT
```

Detail line descriptions

See "Detail lines for reports I05 through I13" on page 307.

Sample reports

A sample report is shown below. The report is expanded to the third level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I10: IMS WAIT Time by DL/I Call (0805/ADSMPP)                Row 00001 of 00037
Command ===> _____________________________________________ Scroll ===> CSR

 Name      Description                Percent of Time * 10.00%  ±4.0
                                      *....1....2....3....4....5....6....7....8
00012    GHU-DBSCN001(4) BBSAP0   45.17 ========================
→ IMS     IMS Subsystem           45.17 ========================
  → DFSREP00   IMS Dispatcher Int 45.17 ========================

00003    GHU-DBSCN001(4) BBSAP0   42.88 ======================
→ IMS     IMS Subsystem           42.88 ======================
  → DFSREP00   IMS Dispatcher Int 42.71 ======================
  → DBFDEDB0   IMS Module          0.16

00011    GHU-DBSCA001(10) BBSAP    2.45 ==
→ IMS     IMS Subsystem           2.45 ==
  → DBFDEDB0   IMS Module          2.45 ==

00002    GHU-DBSCA001(10) BBSAP    2.29 ==
→ IMS     IMS Subsystem           2.29 ==
  → DBFDEDB0 IMS Module           2.29 ==
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display context help information.
++	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Show additional details.

Cmd	When Applied To Object	Action
+	DL/I call, Category, Load Module, SVC, SQL command	Expand to reveal next level.
-	DL/I call, Category, Load Module, SVC, SQL command	Collapse to hide next level.
SV	DL/I call, Category, SVC, SQL command	Sort next level by value.
SN	DL/I call, Category, SVC, SQL command	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	DL/I call, CSECT, SQL command	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
-	Name	Collapse to show only first level.
-	Description	Reduce field size.
-	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | 00012     GHU-DBSCN001(4) BBSAP0 45.17 00000000000000000000000       |     |
|  +-------------------------------------------------------------------+     |
|                                                                               |
|  Calculation Details                                                          |
|     IMS DL/I call wait time measurements      276                             |
|     Total measurements                        611                             |
|     Percent of total                          45.17%                          |
|                                                                               |
|  DL/I Call Information                                                        |
|     Function code   GHU                   PSB Name        BBSFIN00            |
|     PCB Name        DBSCN001              IMS Id-Region   IMSP-ADSMPP          |
|     PCB Number      4                     Call type       CBLTDLI             |
|     CSECT/module    BBSAP011 in BBSAP011  Offset of call  00000E68            |
|     Sample count    277                   Call count      49                  |
|     DLI CPU time    0.02                  Service time    8.21                |
|                                                                               |
|     SSA/FSA         01 SBSCNTL (CNTLNUM  =...)                                |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I11 - IMS DL/I activity by PSB

Usage

Use this report to see how time is consumed in IMS-dependent regions. All time is reported regardless of whether the time is CPU usage or wait. This report shows activity by IMS PSB and is meaningful when measuring a region in which multiple IMS PSBs are scheduled (for example, a MPP region). Only time observed while an IMS PSB was active is reported. Time is identified both within the processing of DL/I calls and outside of DL/I call processing but only when an IMS PSB is active.

This report is intended for measurements of IMS-dependent regions (MPP, BMP, FPP) as well as IMS batch DL/I regions.

Note:
You should not use this report to analyze CICS measurements.

Quantification

Each report line quantifies time as a percentage of the overall time IMS PSBs were active. Each quantity is expressed as a percentage representing the ratio of the number of samples in which the active IMS program was observed compared to the total number of samples IMS programs were active. Any time when no IMS programs were active is excluded. This ensures that quantifications are not distorted by inactive intervals such as those that occur between scheduled transaction.

Detail line hierarchy

An unexpanded I11 report shows a line for each IMS PSB in which activity was observed. The name field reports the PSB name. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Trancode, PSB Name or 'NONIMS'
 Level 2 IMSDLI - DL/I call execution
  Level 3 DL/I call identification
    Level 4 Category
     Level 5 Load module
      Level 6 CSECT
    Level 4 SVC total
     Level 5 SVCnnn
      Level 6 Load module
       Level 7 CSECT
 Level 2 APPLCN - application code
  Level 3 Load module
    Level 4 CSECT
 Level 2 SYSTEM - system routines
  Level 3Category
    Level 4 Load module
     Level 5 CSECT
  Level 3 SVC total
    Level 4 SVCnnn
     Level 5 Load module
      Level 6CSECT


 Level 2 NOSYMB - no load module name
  Level 3 hexadecimal addresses
```

Detail line descriptions

PSB detail line

This is the first-level detail line. It aggregates activity by IMS transaction.

Under Heading	This is Displayed
Name	IMS PSB Name. NONIMS to indicate IMS activity for which no PSB has been scheduled.
Description	The type of IMS dependent region: BMP, MPP, IFP, etc.
Percent of Time	The percentage of activity measured under the indicated IMS PSB.

Other detail lines

Other detail lines are subcategories and show objects based on observed PSW addresses. See "Detail lines for reports I05 through I13" on page 307.

Sample reports

A sample report is shown below. The report is expanded to the third level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I11: IMS DL/I Activity by PSB (0805/ADSMPP)                  Row 00001 of 00034
Command ===> ____________________________________________________ Scroll ===> CSR

 Name      Description                 Percent of Time * 10.00%  ±3.5
                                       *....1....2....3....4....5....6....7....8
BBSFIN00   PSB in MPP region    100.00 ========================================
→ IMSDLI     IMS DL/I Calls      77.83 ================================
  → 00012    GHU-DBSCN001(4) BB  35.28 ==============
  → 00003    GHU-DBSCN001(4) BB  33.50 ==============
  → 00001    GU-I0PCB(1) BBSFIN   2.29 ==
  → 00002    GHU-DBSCA001(10) B   2.16 ==
  → 00011    GHU-DBSCA001(10) B   1.91 ==
  → 00018    REPL-DBSCN001(4) B   0.50
  → 00006    GHU-DBSTL001(13) B   0.38
  → 00015    GHU-DBSTL001(13) B   0.38
  → 00009    REPL-DBSCN001(4) B   0.38
  → 00007    ISRT-DBSTL001(13)    0.38
  → 00004    GHU-DBSCA002(11) B   0.12
  → 00017    REPL-DBSCA001(10)    0.12
  → 00013    GHU-DBSCA002(11) B   0.12
  → 00008    REPL-DBSCA001(10)    0.12
  → 00010    ISRT-IOPCB(1) BBSF   0.12
→ SYSTEM   System/OS Services     16.94 =======
  → SVC      SVC Routines         15.28 =======
  → LERUNLIB Language Environme    1.14 ==
  → MVS      MVS System            0.50
→ APPLCN   Application Code        5.09 ===
  → BKN00SUP Application Progra    2.03 ==
  → BKNCS102 Application Progra    1.27 ==
  → BKNCS101 Application Progra    0.38
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display context help information.
++	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Show additional details.
+	PSB, DL/I call, Category, Load Module, SVC, SQL command	Expand to reveal next level.
-	PSB, DL/I call, Category, Load Module, SVC, SQL command	Collapse to hide next level.
SV	PSB, DL/I call, Category, SVC, SQL command	Sort next level by value.
SN	PSB, DL/I call, Category, SVC, SQL command	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	DL/I call, CSECT, SQL command	Display source program mapping.
C01	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C01 report subset.
C02	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C02 report subset.
C03	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C03 report subset
C08	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C08 report subset.
C09	PSB, DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
-	Name	Collapse to show only first level.
-	Description	Reduce field size.
-	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  |   > 00012     GHU-DBSCN001(4) BB 35.28 0000000000000000000           |     |
|  +----------------------------------------------------------------------+     |
|                                                                               |
|  Calculation Details                                                          |
|     IMS DL/I call activity measurements       277                             |
|     Total measurements                        785                             |
|     Percent of total                          35.28%                          |
|                                                                               |
|  DL/I Call Information                                                        |
|     Function code   GHU                   PSB Name        BBSFIN00            |
|     PCB Name        DBSCN001              IMS Id-Region   IMSP-ADSMPP          |
|     PCB Number      4                     Call type       CBLTDLI             |
|     CSECT/module    BBSAP011 in BBSAP011  Offset of call  00000E68            |
|     Sample count    277                   Call count      49                  |
|     DLI CPU time    0.02                  Service time    8.21                |
|                                                                               |
|     SSA/FSA         01 SBSCNTL (CNTLNUM  =...)                                |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I12 - IMS DL/I activity by transaction

Usage

Use this report to see how time is consumed in IMS-dependent regions. All time is reported regardless of whether the time is CPU usage or wait. This report shows activity by IMS transaction and is meaningful when measuring a region in which multiple IMS transactions are scheduled (for example, a MPP region). Only time observed while an IMS PSB was active is reported. Time is identified both within the processing of DL/I calls and outside of DL/I call processing but only when an IMS PSB is active.

This report is intended for measurements of IMS-dependent regions (MPP, BMP, FPP) as well as IMS batch DL/I regions.

Note:
You should not use this report to analyze CICS measurements.

Quantification

Each report line quantifies time as a percentage of the overall time IMS PSBs were active. Each quantity is expressed as a percentage representing the ratio of the number of samples in which the active IMS program was observed compared to the total number of samples IMS programs were active. Any time when no IMS programs were active is excluded. This ensures that quantifications are not distorted by inactive intervals such as those that occur between scheduled transaction.

Detail line hierarchy

An unexpanded I12 report shows a line for each IMS transaction observed. The name field reports the transaction code. In the event that no IMS transaction was

active but a PSB was active, the PSB will be identified in the report line. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Trancode, PSB Name or 'NONIMS'
 Level 2 IMSDLI - DL/I call execution
  Level 3 DL/I call identification
    Level 4 Category
     Level 5 Load module
      Level 6 CSECT
    Level 4 SVC total
     Level 5 SVCnnn
      Level 6  Load module
       Level 7  CSECT
 Level 2 APPLCN - application code
  Level 3 Load module
    Level 4 CSECT
 Level 2SYSTEM - system routines
  Level 3 Category
    Level 4 Load module
     Level 5 CSECT
  Level 3 SVC total
    Level 4 SVCnnn
     Level 5 Load module
      Level 6 CSECT


 Level 2 NOSYMB - no load module name
  Level 3 hexadecimal addresses
```

Detail line descriptions

Transaction detail line

This is the first-level detail line. It aggregates activity by IMS transaction. A PSB line is reported for any activity under IMS that is not under an IMS transaction.

Under Heading	This is Displayed
Name	IMS transaction code
Description	The PSB to which the IMS transaction belongs.
Percent of Time	The percentage of activity measured while executing the indicated IMS transaction.

Other detail lines

Other detail lines are subcategories and show objects based on observed PSW addresses. See “Detail lines for reports I05 through I13” on page 307.

Sample reports

A sample report is shown below. The report is expanded to the third level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I12: IMS DL/I Activity by Txn (0805/ADSMPP)                  Row 00001 of 00046
Command ===> _____________________________________________ Scroll ===> CSR

 Name      Description                Percent of Time * 10.00%  ±3.5
                                      *....1....2....3....4....5....6....7....8
BBSDR000   Txn in PSB BBSFIN00   52.48 ============================
→ IMSDLI    IMS DL/I Calls       38.47 ====================
  → 00003     GHU-DBSCN001(4) BB 33.50 =================
  → 00002     GHU-DBSCA001(10) B  2.16 ==
  → 00001     GU-IOPCB(1) BBSFIN  1.27 ==
  → 00006     GHU-DBSTL001(13) B  0.38
  → 00009     REPL-DBSCN001(4) B  0.38
  → 00007     ISRT-DBSTL001(13)   0.38
  → 00004     GHU-DBSCA002(11) B  0.12
  → 00008     REPL-DBSCA001(10)   0.12
  → 00010     ISRT-IOPCB(1) BBSF  0.12
→ SYSTEM    System/OS Services    9.29 =======
  → SVC      SVC Routines         8.53 ======
  → LERUNLIB Language Environme   0.50
  → MVS      MVS System           0.25
→ APPLCN   Application Code       4.58 ===
  → BKN00SUP Application Progra   2.03 ==
  → BKNCS102 Application Progra   1.14 ==
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Trancode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display context help information.
++	Trancode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Show additional details.
+	Trancode, PSB, Category, DL/I call, Load Module, SVC, SQL command	Expand to reveal next level.
-	Trancode, PSB, Category, DL/I call, Load Module, SVC, SQL command	Collapse to hide next level.
SV	Trancode, PSB, Category, DL/I call, Load Module, SVC, SQL command	Sort next level by value.
SN	Trancode, PSB, Category, DL/I call, Load Module, SVC, SQL command	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	Load Module, CSECT, DL/I call, SQL command	Display source program mapping.
C01	Trancode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C01 report subset.

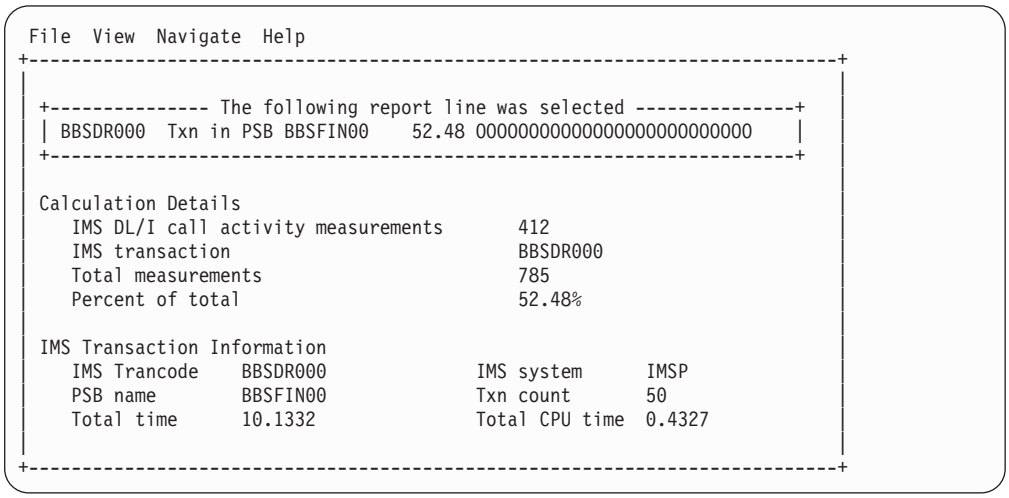
Cmd	When Applied To Object	Action
C02	Trancode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C02 report subset.
C03	Trancode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C03 report subset
C08	Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C08 report subset.
C09	Trancode, PSB, Category, DL/I call, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
-	Name	Collapse to show only first level.
-	Description	Reduce field size.
-	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:



I13 - IMS DL/I activity by DL/I call

Usage

Use this report to see how time is consumed in IMS-dependent regions by specific DL/I calls. All time is reported regardless of whether the time is CPU usage or wait.

This report is intended for measurements of IMS-dependent regions (MPP, BMP, FPP) as well as IMS batch DL/I regions.

Note:
You should not use this report to analyze CICS measurements.

Quantification

Each report line quantifies time as a percentage of the total time observed for all DL/I call processing. Time observed outside of DL/I call processing is excluded from the calculation. Each quantity is expressed as a percentage representing the ratio of the number of samples for the object described by the report detail line to the total number of samples in DL/I call processing.

Detail line hierarchy

An unexpanded I13 report shows a line for each IMS DL/I call. The name field shows a sequence number assigned to each unique DL/I call. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 DL/I call identification
 Level 2 Category
  Level 3 Load module
    Level 4 CSECT
 Level 2 SVC total
  Level 3 SCVnnn
    Level 4 Load module
     Level 5 CSECT
```

Detail line descriptions

See “Detail lines for reports I05 through I13” on page 307.

Sample reports

A sample report is shown below. The report is expanded to the third level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I13: DL/I Activity by DL/I Call (0805/ADSMPP)                Row 00001 of 00089
Command ===> _____________________________________________ Scroll ===> CSR

 Name      Description                Percent of DLI Time * 10.00%  ±4.0
                                      *....1....2....3....4....5....6....7....8
 00012     GHU-DBSCN001(4) BBSAP0 45.33 ======================
 → IMS       IMS Subsystem        45.33 ======================
   → DFSREP00  IMS Dispatcher Int 45.17 ======================
   → DFSLMGR0  IMS Global Lock Ma  0.16

 00003     GHU-DBSCN001(4) BBSAP0 43.04 ====================
 → IMS       IMS Subsystem        42.88 ====================
   → DFSREP00  IMS Dispatcher Int 42.71 ====================
   → DBFDEDB0  IMS Module          0.16
 → SVC       SVC Routines          0.16
  → SVC138     PGSER                0.16

 00001     GU-IOPCB(1) BBSFIN00+0  2.94 ==
 → IMS       IMS Subsystem         2.29 ==
   → DFSREP00  IMS Dispatcher Int  0.65
   → DBFSYNC0  IMS Module          0.49
   → DFSQGU00  IMS Module          0.32
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display context help information.
++	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Show additional details.
+	DL/I call, Category, Load Module, SVC, SQL command	Expand to reveal next level.
-	DL/I call, Category, Load Module, SVC, SQL command	Collapse to hide next level.
SV	DL/I call, Category, Load Module, SVC, SQL command	Sort next level by value.
SN	DL/I call, Category, Load Module, SVC, SQL command	Sort next level by name.
M	Load Module, CSECT	Display load module information.
P	DL/I call, CSECT, SQL command	Display source program mapping.
C01	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C01 report subset.
C02	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C02 report subset.

Cmd	When Applied To Object	Action
C03	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C03 report subset
C08	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C08 report subset.
C09	DL/I call, Category, Load Module, SVC, CSECT, SQL command, Unresolved Address	Display C09 report subset.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size.
+	Percent CPU	Zoom in scale.
-	Name	Collapse to show only first level.
-	Description	Reduce field size.
-	Percent CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | 00012     GHU-DBSCN001(4) BBSAP0 45.33 00000000000000000000000       |      |
| +-----------------------------------------------------------------------+     |
|                                                                               |
| Calculation Details                                                           |
|    IMS DL/I call activity measurements       277                              |
|    Total measurements                        611                              |
|    Percent of total                          45.33%                           |
|                                                                               |
| DL/I Call Information                                                         |
|    Function code   GHU                   PSB Name        BBSFIN00             |
|    PCB Name        DBSCN001              IMS Id-Region   IMSP-ADSMPP          |
|    PCB Number      4                     Call type       CBLTDLI              |
|    CSECT/module    BBSAP011 in BBSAP011  Offset of call  00000E68             |
|    Sample count    277                   Call count      49                   |
|    DLI CPU time    0.02                  Service time    8.21                 |
|                                                                               |
|    SSA/FSA         01 SBSCNTL (CNTLNUM  =...)                                 |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I14 - IMS PSB/PCB attributes

Usage

This report is intended primarily for use when analyzing measurements using printed reports. Use I14 to look up detailed information about PSBs (and their PCBs) referred to by detail lines in other reports. When analyzing data in interactive mode, you can look up this information by pressing the ENTER key (or entering the "++" line command) on any detail line that refers to the PSB.

Detail line descriptions

PSB information

The following information is reported for each PSB:

Under Heading	This is Displayed
PSB Name	The name of the PSB.
IMS System	The system ID of the IMS subsystem. This information might not be available for a CICS measurement.
No. of PCBs	The number of PCBs in the PSB. This information is available only if the IMS+ measurement option was enabled.
LIST=NO PCBs	The number of PCBs in the PSB defined with the LIST=NO option. These PCBs are not visible to the application in the PSB list passed by IMS. They are accessed by symbolic name using the AIB interface. This information is available only if the IMS+ measurement option was enabled.
Txn Count	The number of IMS transactions under this PSB counted during the measurement. This information is available only if the IMS+ measurement option was enabled.
DL/I calls	The number of DL/I calls executed under this PSB during the measurement. This information is available only if the IMS+ measurement option was enabled.
Sample count	The number of times execution under this PSB was sampled.

PCB information

The PCBs are listed if the IMS+ measurement option was enabled.

Under Heading	This is Displayed
PSBNum	The relative PCB number.
Name	The symbolic name of the PCB defined in the label field of the PCB macro.
Type	TP or DB indicates a data communications or data base PCB.
DBD/LTRM	The data base name for a data base PCB. The PCB LTERM parameter value for a data communications PCB.
PROCOPT	The processing options for a data base PCB.
LIST	Indicates whether the PCB was defined as LIST=YES or LIST=NO.

Sample reports

A sample report is shown below.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I14: IMS PSB/PCB Attributes (0805/ADSMPP)                    Row 00001 of 00036
Command ===> ____________________________________________________ Scroll ===> CSR

IMS PSB Information for PSBName BBSFIN00

   PSB Name       BBSFIN00              IMS system         IMSP
   No.of PCBs     27                    LIST=NO PCBs       12
   Txn count      99                    DL/I calls         1010
   Sample count   611

   PCBNum   Name     Type   DBD/LTRM  PROCOPT  LIST
     1      IOPCB     TP                       YES
     2      ALT1      TP                       YES
     3      ALT2      TP                       YES
     4      DBSCN001 DB    DBSCN000     A      YES
     5      DBSCN002 DB    DBSCN000     A      YES
     6      DBSCN003 DB    DBSCN000     A      YES
     7      DBSCI001 DB    DBSCI000     A      YES
     8      DBSCI002 DB    DBSCI000     A      YES
     9      DBSCI003 DB    DBSCI000     A      YES
    10      DBSCA001 DB    DBSCA000     A      YES
    11      DBSCA002 DB    DBSCA000     A      YES
    12      DBSCA003 DB    DBSCA000     A      YES
    13      DBSTL001 DB    DBSTL000     A      YES
    14      DBSTL002 DB    DBSTL000     A      YES
    15      DBSTL003 DB    DBSTL000     A      YES
    16      DBSCNA01 DB    DBSCN000     A       NO
    17      DBSCNA02 DB    DBSCN000     A       NO
    18      DBSCNA03 DB    DBSCN000     A       NO
```

I15 - IMS DL/I call attributes

Usage

This report is intended primarily for use when analyzing measurements using printed reports. Use I15 to look up detailed information about DL/I calls referred to by detail lines in other reports. When analyzing data in interactive mode, you can look up this information by pressing the ENTER key (or entering the "++" line command) on any detail line that refers to the DL/I call.

Detail line descriptions

DL/I call information

The following information is reported for each DL/I call:

Under Heading	This is Displayed
DL/I Call ID	A unique reference number assigned to the call.
Function Code	The DL/I function code.
PSB Name	The name of the PSB under which all occurrences of this DL/I call executed.
PCB Name	The name of the PCB referenced by the DL/I call.
IMS ID-Region	The ID of the IMS subsystem and the name of the IMS-dependent region.
PCB Number	The relative PCB number in its PSB.

Under Heading	This is Displayed
Call Type	The language interface used by the call: <*ASMTDLI*, *CBLTDLI*, etc.> was sampled.
CSECT/Module	The CSECT name and load module of the DL/I call.
Offset of call	The offset in the CSECT of the call.
Sample count	The number of times activity in this DL/I call was sampled.
Call count	The number of occurrences of this DL/I call observed. This information is available only if the IMS+ measurement option was enabled.
DL/I CPU time	The number of seconds of CPU time consumed by all occurrences of the DL/I call. This information is available only if the IMS+ measurement option was enabled.
Service time	The number of seconds of service time for all occurrences of the DL/I call. This information is available only if the IMS+ measurement option was enabled.

Sample reports

A sample report is shown below.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I15: IMS DL/I Call Attributes (0805/ADSMPP)                  Row 00001 of 0192
Command ===> ____________________________________________ Scroll ===> CSR

DL/I Call Id 00001

   Function code   GU                   PSB Name           BBSFIN00
   PCB Name        IOPCB                IMS Id-Region      IMSP-ADSMPP
   PCB Number      1                    Call type          CBLTDLI
   CSECT/module    BBSFIN00 in BBSFIN00 Offset of call     0000038C
   Sample count    9                    Call count         60
   DL/I CPU time   0.14                 Service time       0.19

DL/I Call Id 00002

   Function code   GHU                  PSB Name           BBSFIN00
   PCB Name        DBSCA001             IMS Id-Region      IMSP-ADSMPP
   PCB Number      10                   Call type          CBLTDLI
   CSECT/module    BBSAP012 in BBSAP012 Offset of call     00000E0E
   Sample count    16                   Call count         50
   DLI CPU time    0.04                 Service time       0.66

  SSA/FSA          01 SBSABAS (ACCTNUM =...)
```

I16 - IMS transaction service times

Usage

Use this report to see information about IMS transaction service times. This report is meaningful only when measuring an IMS-dependent region in which transactions are executed. The IMS+ feature must have been enabled when the measurement was performed.

Quantification

Use this report to see information about IMS transaction service times. This report is meaningful only when measuring an IMS-dependent region in which transactions are executed. The IMS+ feature must have been enabled when the measurement was performed.

Detail line hierarchy

The I16 report shows one detail line level. It cannot be expanded.

Detail line descriptions

The following information is reported for each DL/I call:

Under Heading	This is Displayed
TranCode	The IMS transaction code.
PSB/PGM	The name of the PSB and program.
Counts: Txns	The number of executions of the transaction that occurred during the measurement interval.
Counts: Fetch	The number of times the program was fetched by IMS. In general, the program is fetched when the transaction is scheduled. The number of fetches of the program is also affected by the limit count value for the transaction. A high fetch count could mean that a performance improvement might be realized by raising the limit count or pre-loading the program.
Counts: Sched	The number of times the program was scheduled for successive executions of the transaction. This is the count of sets of consecutive transaction executions that occurred before QC status was returned to the GU-IOPCB call.
Total Time	The total execution time of the transaction during the measurement interval.
Avg/Txn	The average execution time for the transaction based on the measurement interval.
CPU Time	The total CPU time consumed by all executions of the transaction during the measurement interval.

Sample reports

A sample report is shown below.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
I16: IMS Transaction Service Times (0805/ADSMPP)              Row 00001 of 0002
Command ===> _____________________________________________ Scroll ===> CSR

                      ------ Counts ---------------- Times (secs) ---------
TranCode    PSB/PGM     Txns   Fetch  Sched   Total Time   Avg/Txn   CPU Time

BBSDR000    BBSFIN00     50     20     20       10.133      0.202     0.432
BBSCR000    BBSFIN00     49     20     20        9.438      0.192     0.407
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Trancode	Display context help information.
++	Trancode	Show additional details.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected -------------+        |
| | BBSDR000   BBSFIN00    50    20     20     10.133     0.202   0.432|        |
| +-----------------------------------------------------------------+           |
|                                                                               |
| IMS Transaction Information                                                   |
|    IMS Trancode     BBSDR000             IMS system      IMSP                 |
|    PSB name         BBSFIN00             Txn count       50                   |
|    Total time       10.1332              Total CPU time  0.4327               |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I17 - IMS transaction DL/I call counts

Usage

Use this report to see information about the number of DL/I calls issued by each of the measured IMS transactions. This report is meaningful only when measuring an IMS-dependent region in which transactions are executed. The IMS+ feature must have been enabled when the measurement was performed.

Quantification

Each report line shows information pertaining to one IMS transaction.

Detail line hierarchy

An unexpanded I17 report shows a line for each IMS transaction code for which transaction execution was observed. You can expand each line to reveal one additional hierarchical level of detail. The hierarchy is illustrated here:

```
Level 1 IMS Transaction
 Level 2 DL/I Call
```

Detail line descriptions

IMS transaction detail line

This is the first-level detail line. Each line shows information about one IMS transaction code.

Under Heading	This is Displayed
Tran/PCB	The IMS transaction code.
PSB/DBD	The name of the PSB and program.
PCBNum	No data is reported in the transaction detail line.

Under Heading	This is Displayed
Func	No data is reported in the transaction detail line.
DL/I Call Count: Total	The total number of DL/I calls counted for all executions of the transaction during the measurement interval.
DL/I Call Count: Minimum	The minimum number of DL/I calls observed in a single execution of the transaction during the measurement interval.
DL/I Call Count: Maximum	The maximum number of DL/I calls observed in a single execution of the transaction during the measurement interval.
DL/I Call Count: Average	The average number of DL/I calls per transaction for all executions of the transaction during the measurement interval.

DL/I call detail line

This is the second-level detail line. Each line shows information about a DL/I call for which execution was observed under the transaction.

Under Heading	This is Displayed
Tran/PCB	The name of the PCB referenced by the indicated DL/I call.
PSB/DBD	The DBD name for the DL/I call for database calls.
PCBNum	The relative PCB number of the PCB referenced by the DL/I call.
Func	The DL/I function code.
DL/I Call Count: Total	The total number of occurrences of the indicated DL/I call counted for all executions of the transaction during the measurement interval.
DL/I Call Count: Minimum	The minimum number of occurrences of the indicated DL/I call observed in a single execution of the transaction during the measurement interval.
DL/I Call Count: Maximum	The maximum number of occurrences of the indicated DL/I call observed in a single execution of the transaction during the measurement interval.
DL/I Call Count: Average	The average number of occurrences of the indicated DL/I call per transaction during the measurement interval.

Sample reports

A sample report is shown below.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I17: IMS Transaction DL/I Call Counts (0805/ADSMPP)            Row 00001 of 0002
Command ===> ____________________________________________________ Scroll ===> CSR

                                      ------- DL/I Call Counts ------------
TranPCB     PSB/DBD   PCBNum  Func    Total   Minimum   Maximum    Average

BBSCR000    BBSFIN00                   490       10        10        10.00
BBSDR000    BBSFIN00                   500       10        10        10.00
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Trancode, PCB	Display context help information.
+	Trancode	Show additional details.
-	Trancode	Collapse to hide next level.
++	Trancode, PCB	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	Tran/PCB	Display context help information.
+	Tran/PCB	Expand to reveal all entries.
-	Tran/PCB	Collapse to show only first level.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected -------------+        |
| | BBSCR000    BBSFIN00                  490       10     10     10.00|        |
| +-----------------------------------------------------------------------+     |
|                                                                               |
| IMS Transaction Information                                                   |
|    IMS Trancode     BBSCR000             IMS system      IMSP                 |
|    PSB name         BBSFIN00             Txn count       49                   |
|    Total time       9.4387               Total CPU time  0.4074               |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I18 - IMS CPU/Svc time by DL/I calls

Usage

Use this report to see information about exact CPU times and service times for DL/I calls. The IMS+ feature must have been enabled when the measurement was performed.

Quantification

Each report line shows information pertaining to one DL/I call.

Detail line hierarchy

The I18 report shows one detail line level. It cannot be expanded.

Detail line descriptions

Under Heading	This is Displayed
Call	A unique reference number assigned to the DL/I call.

Under Heading	This is Displayed
Func	The DL/I function code.
PCB Name	The name of the PCB referenced by the DL/I call.
Location	The location of the DL/I call in CSECT+offset format.
Count	The number of executions of the DL/I call counted.
Svc time/Prcnt	The total service time for all executions of this DL/I call and the percentage of the total DL/I call service time.
CPU time/Prcnt	The total CPU time consumed by all executions of this DL/I call and the percentage of the total DL/I call CPU time.

Sample reports

A sample report is shown below.

```
  File  View  Navigate  Help
------------------------------------------------------------------------------
I18: IMS CPU/Service Time by DL/I Call (0805/ADSMPP)          Row 00001 of 0018
Command ===> _____________________________________________ Scroll ===> CSR

                                                  ---- DL/I Processing Time ----
Call    Func  PCB Name  Location      Count    Svc Time/Prcnt    CPU Time/Prcnt

0012    GHU   DBSCN001  BBSAP011+0E68   49      8.210  44.4%       0.028   4.8%
0003    GHU   DBSCN001  BBSAP012+0EE4   50      7.823  42.3%       0.031   5.4%
0002    GHU   DBSCA001  BBSAP012+0E0E   50      0.664   3.5%       0.048   8.3%
0011    GHU   DBSCA001  BBSAP011+0D92   49      0.590   3.1%       0.047   8.2%
0001    GU    IOPCB     BBSFIN00+038C  119      0.557   3.0%       0.148  25.8%
0015    GHU   DBSTL001  BBSAP011+111E   49      0.134   0.7%       0.045   7.8%
0006    GHU   DBSTL001  BBSAP012+11B0   50      0.114   0.6%       0.043   7.5%
0018    REPL  DBSCN001  BBSAP011+12EA   49      0.107   0.5%       0.036   6.2%
0009    REPL  DBSCN001  BBSAP012+13A4   50      0.075   0.4%       0.035   6.1%
0007    ISRT  DBSTL001  BBSAP012+1252   50      0.072   0.3%       0.027   4.7%
0010    ISRT  IOPCB     BBSFIN00+0410   99      0.034   0.1%       0.010   1.7%
0016    ISRT  DBSTL001  BBSAP011+11C0   49      0.016   0.0%       0.015   2.6%
0013    GHU   DBSCA002  BBSAP011+0FF4   49      0.015   0.0%       0.011   1.9%
0004    GHU   DBSCA002  BBSAP012+1086   50      0.014   0.0%       0.010   1.7%
0005    ISRT  DBSCA002  BBSAP012+1110   50      0.011   0.0%       0.011   1.9%
0014    ISRT  DBSCA002  BBSAP011+107E   49      0.011   0.0%       0.011   1.9%
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	DL/I Call	Display context help information.
++	DL/I Call	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	Call	Display context help information.
SV	Call	Sort next level by value.

Cmd	When Applied To Object	Action
SN	Call	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected -------------+        |
| | 0012   GHU DBSCN001   BBSAP011+0E68  49  8.210  44.4%   0.028  4.8%|        |
| +-------------------------------------------------------------------+        |
|                                                                               |
| DL/I Call Information                                                         |
|    Function code  GHU                    PSB Name         BBSFIN00          |
|    PCB Name       DBSCN001               IMS Id-Region    IMSP-ADSMPP       |
|    PCB Number     4                      Call type        CBLTDLI           |
|    CSECT/module   BBSAP011 in BBSAP011   Offset of call   00000E68          |
|    Sample count   277                    Call count       49                |
|    DLI CPU time   0.02                   Service time     8.21              |
|                                                                               |
|    SSA/FSA        01 SBSCNTL (CNTLNUM =...)                                   |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I19 - IMS CPU/Svc time by PSB

Usage

Use this report to see information about exact CPU times and service times for DL/I calls by PSB. The IMS+ feature must have been enabled when the measurement was performed.

Quantification

Each report line shows information pertaining to one PSB.

Detail line hierarchy

The I19 report shows one detail line level. It cannot be expanded.

Detail line descriptions

Under Heading	This is Displayed
PSB Name	The IMS PSB name.
Txn Count	The number of transaction executions counted under the indicated PSB.
DL/I Count	The number of DL/I calls counted under the indicated PSB.
Svc time/Prcnt	The total service time for all executions of DL/I calls under the indicated PSB and the percentage of the total DL/I call service time.
CPU time/Prcnt	The total CPU time consumed by all executions of DL/I calls under the indicated PSB and the percentage of the total DL/I call CPU time.

Sample reports

A sample report is shown below.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I19: IMS CPU/Service Time by PSB (0805/ADSMPP)                Row 00001 of 0001
Command ===> ____________________________________________________ Scroll ===> CSR

             Txn   DL/I          ---- DL/I Processing Time -----
PSB Name    Count  Count         Svc Time/Prcnt   CPU Time/Prcnt

BBSFIN00     101   1010          18.466  100.0%     0.573 100.0%
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	PSB Name	Display context help information.
++	PSB Name	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	PSB Name	Display context help information.
SV	PSB Name	Sort next level by value.
SN	PSB Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected -------------+       |
|  | BBSFIN00        99     1010      18.466   100.0%    0.573  100.0%  |       |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  IMS PSB Information                                                          |
|     PSB Name        BBSFIN00                IMS system      IMSP              |
|     No.of PCBs      27                      LIST=NO PCBs    12                |
|     Txn count       99                      DL/I calls      1010              |
|     Sample count    611                                                       |
|                                                                               |
|     PCBNum  Name     Type   DBD/LTRM   PROCOPT    LIST                       |
|       1     IOPCB     TP                          YES                        |
|       2     ALT1      TP                          YES                        |
|       3     ALT2      TP                          YES                        |
|       4     DBSCN001  DB    DBSCN000      A       YES                        |
|       5     DBSCN002  DB    DBSCN000      A       YES                        |
|       6     DBSCN003  DB    DBSCN000      A       YES                        |
|       7     DBSCI001  DB    DBSCI000      A       YES                        |
|       8     DBSCI002  DB    DBSCI000      A       YES                        |
|       9     DBSCI003  DB    DBSCI000      A       YES                        |
|      10     DBSCA001  DB    DBSCA000      A       YES                        |
|      11     DBSCA002  DB    DBSCA000      A       YES                        |
|      12     DBSCA003  DB    DBSCA000      A       YES                        |
|      13     DBSTL001  DB    DBSTL000      A       YES                        |
|      14     DBSTL002  DB    DBSTL000      A       YES                        |
|      15     DBSTL003  DB    DBSTL000      A       YES                        |
|      16     DBSCNA01  DB    DBSCN000      A       NO                         |
|      17     DBSCNA02  DB    DBSCN000      A       NO                         |
|      18     DBSCNA03  DB    DBSCN000      A       NO                         |
|      19     DBSCIA01  DB    DBSCI000      A       NO                         |
|      20     DBSCIA02  DB    DBSCI000      A       NO                         |
|      21     DBSCIA03  DB    DBSCI000      A       NO                         |
|      22     DBSCAA01  DB    DBSCA000      A       NO                         |
|      23     DBSCAA02  DB    DBSCA000      A       NO                         |
|      24     DBSCAA03  DB    DBSCA000      A       NO                         |
|      25     DBSTLA01  DB    DBSTL000      A       NO                         |
+-------------------------------------------------------------------------------+
```

I20 - IMS CPU/Svc time by transaction

Usage

Use this report to see information about exact CPU times and service times for DL/I calls by IMS transaction. The IMS+ feature must have been enabled when the measurement was performed.

Quantification

Each report line shows information pertaining to one IMS transaction code.

Detail line hierarchy

The I20 report shows one detail line level. It cannot be expanded.

Detail line descriptions

Under Heading	This is Displayed
TranCode	The IMS transaction code.
Txn Count	The number of executions of the transaction that occurred during the measurement interval.

Under Heading	This is Displayed
Txn Total Time: Service	The total service time for all execution in the indicated transaction. This includes DL/I call execution and all other program execution.
Txn Total Time: CPU	The total DL/I CPU time consumed by all execution in the indicated transaction. This includes DL/I call execution and all other program execution.
Svc time/% of Txn	The total service time for all executions of DL/I calls in the indicated transaction. The percentage indicates how much of the service time was in DL/I call processing. This total does not include GU-IOPCB wait times (not attributed to transaction service time) and may differ from other reports.
CPU time/% of Txn	The total CPU time for all executions of DL/I calls in the indicated transaction. The percentage indicates how much of the CPU time was in DL/I call processing.

Sample reports

A sample report is shown below.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I20: IMS CPU/Service Time by Transaction (0805/ADSMPP)         Row 00001 of 0002
Command ===> ____________________________________________________ Scroll ===> CSR

            Txn   -- Txn Total Time ----    ----- DL/I Processing Time ------
TranCode    Count  Service       CPU Time    Svc time %of Txn  CPU Time %of Txn

BBSDR000    50      10.133       0.432        8.995    88.7%     0.372   86.1%
BBSCR000    49       9.438       0.407        9.316    98.7%     0.356   87.4%
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	TranCode	Display context help information.
++	TranCode	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	TranCode	Display context help information.
SV	TranCode	Sort next level by value.
SN	TranCode	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected -------------+       |
|  | BBSDR000     50    10.133    0.432    8.995   88.7%   0.372  86.1% |       |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  IMS Transaction Information                                                  |
|    IMS Trancode     BBSDR000             IMS system      IMSP                 |
|    PSB name         BBSFIN00             Txn count       50                   |
|    Total time       10.1332              Total CPU time  0.4327               |
|                                                                               |
+-------------------------------------------------------------------------------+
```

I21 - IMS CPU/Svc time by PCB

Usage

Use this report to see information about exact CPU times and service times for DL/I calls by individual PCB. The IMS+ feature must have been enabled when the measurement was performed.

Quantification

Each report line shows information pertaining to one DL/I call.

Detail line hierarchy

The I21 report shows one detail line level. It cannot be expanded.

Detail line descriptions

Under Heading	This is Displayed
PSB Name	The PSB name.
PCB Name	The name of the PCB.
PCBNum	The relative PCB number.
Count	The total number of executions of DL/I calls that referenced the indicated PCB.
Svc time/Percent	The total service time for all executions of DL/I calls in the indicated PCB and the percentage of the total DL/I service time.
CPU time/Percent	The total CPU time consumed by all executions of DL/I calls in the indicated PCB and the percentage of the total DL/I CPU time.

Sample reports

A sample report is shown below.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
I21: IMS CPU/Service Time by PCB (0805/ADSMPP)                Row 00001 of 0002
Command ===> ____________________________________________________ Scroll ===> CSR

                                          --------- DL/I Call Counts ------
PSB Name  PCB Name  PCBNum  Count      Svc time/Percent    CPU Time/Percent

BBSFIN00  DBSCN001    4       198        16.216  87.8%      0.131  22.8%
BBSFIN00  DBSCA001   10       198         1.268   6.8%      0.106  18.4%
BBSFIN00  IOPCB       1       218         0.591   3.2%      0.158  27.5%
BBSFIN00  DBSTL001   13       198         0.337   1.8%      0.132  23.0%
BBSFIN00  DBSCA002   11       198         0.053   0.2%      0.044   7.6%
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

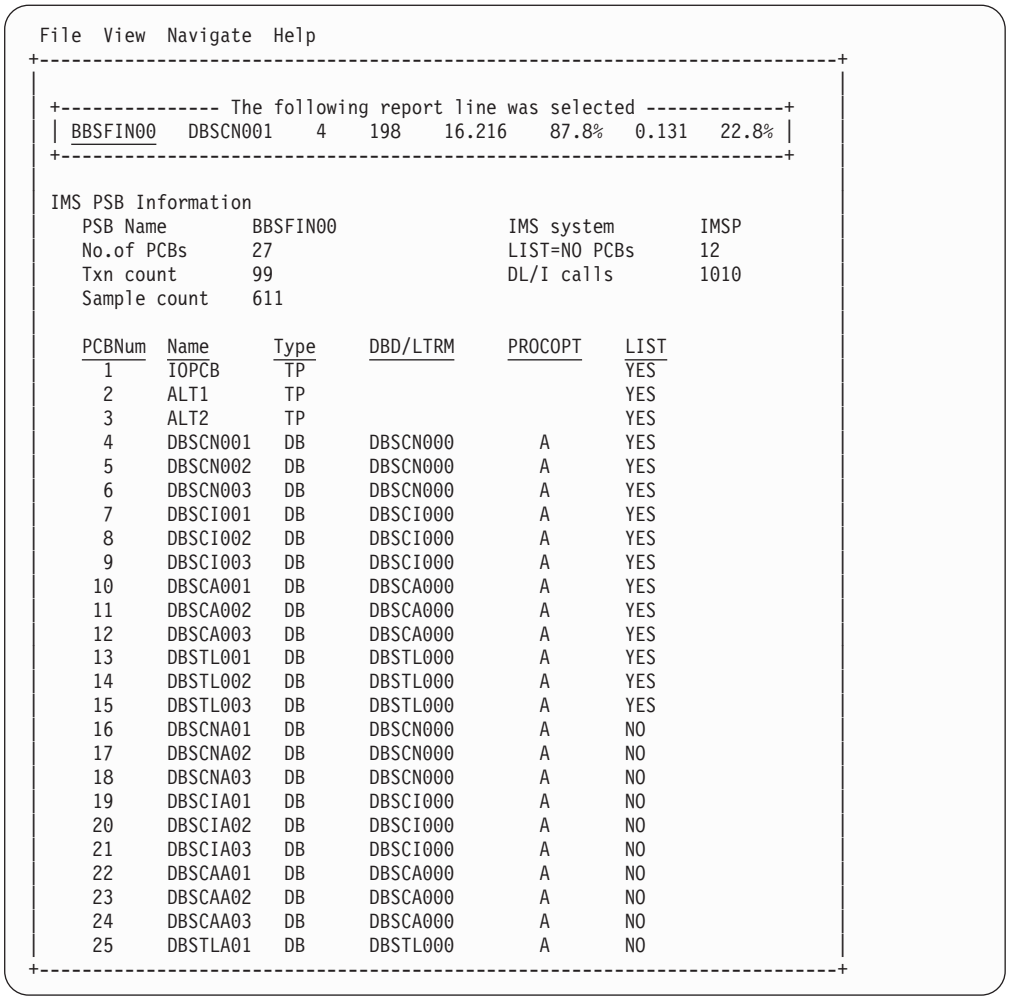
Cmd	When Applied To Object	Action
?	PCB	Display context help information.
++	PCB	Show additional details.

on headings

Cmd	When Applied To Object	Action
?	PSB Name	Display context help information.
SV	PSB Name	Sort next level by value.
SN	PSB Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:


File View Navigate Help
The following report line was selected
BBSFIN00 DBSCN001 4 198 16.216 87.8% 0.131 22.8%
IMS PSB Information
PSB Name BBSFIN00
IMS system IMSP
No.of PCBs 27
LIST=NO PCBs 12
Txn count 99
DL/I calls 1010
Sample count 611
PCBNum Name Type DBD/LTRM PROCOPT LIST
1 IOPCB TP YES
2 ALT1 TP YES
3 ALT2 TP YES
4 DBSCN001 DB DBSCN000 A YES
5 DBSCN002 DB DBSCN000 A YES
6 DBSCN003 DB DBSCN000 A YES
7 DBSCI001 DB DBSCI000 A YES
8 DBSCI002 DB DBSCI000 A YES
9 DBSCI003 DB DBSCI000 A YES
10 DBSCA001 DB DBSCA000 A YES
11 DBSCA002 DB DBSCA000 A YES
12 DBSCA003 DB DBSCA000 A YES
13 DBSTL001 DB DBSTL000 A YES
14 DBSTL002 DB DBSTL000 A YES
15 DBSTL003 DB DBSTL000 A YES
16 DBSCNA01 DB DBSCN000 A NO
17 DBSCNA02 DB DBSCN000 A NO
18 DBSCNA03 DB DBSCN000 A NO
19 DBSCIA01 DB DBSCI000 A NO
20 DBSCIA02 DB DBSCI000 A NO
21 DBSCIA03 DB DBSCI000 A NO
22 DBSCAA01 DB DBSCA000 A NO
23 DBSCAA02 DB DBSCA000 A NO
24 DBSCAA03 DB DBSCA000 A NO
25 DBSTLA01 DB DBSTL000 A NO

Chapter 6. DB2 performance analysis reports

This section describes the DB2 Performance Analysis Reports.

For information about ...	See ...
The DB2 data extractor	"Overview of DB2 data extractor" on page 356
The DB2+ data extractor	"The DB2+ data extractor" on page 356
Displaying SQL Statement Text	"Displaying SQL Statement Text" on page 357
SQL statement sequence numbers	"SQL statement sequence numbers" on page 358
DB2 Multiple Address Space Support	"Overview of DB2 Multiple Address Space Support" on page 358
F01 DB2 session statistics	"F01 - DB2 measurement" on page 359
F02 DB2 SQL activity timeline	"F02 - DB2 SQL activity timeline" on page 364
F03 DB2 SQL activity by DBRM	"F03 - DB2 SQL activity by DBRM" on page 367
F04 SQL execution summary	"F04 - DB2 SQL activity by statement" on page 371
F05 DB2 SQL activity by plan	"F05 - DB2 SQL activity by plan" on page 375
F06 SQL statement attributes	"F06 - DB2 SQL statement attributes" on page 378
F07 DB2 SQL wait time by DBRM	"F07 - DB2 SQL wait time by DBRM" on page 381
F08 DB2 SQL wait time by statement	"F08 - DB2 SQL wait time by statement" on page 384
F09 DB2 SQL wait time by plan	"F09 - DB2 SQL wait time by plan" on page 386
F10 DB2 SQL CPU/Svc time by DBRM	"F10 - DB2 SQL CPU/Svc time by DBRM" on page 389
F11 DB2 SQL CPU/Svc Time by Stmt	"F11 - DB2 SQL CPU/Svc time by stmt" on page 392
F12 DB2 SQL CPU/Svc Time by Plan	"F12 - DB2 SQL CPU/Svc time by plan" on page 395
F13 DB2 SQL threads analysis	"F13 - DB2 SQL threads analysis" on page 399
F14 DB2 CPU by plan/stored proc	"F14 - DB2 CPU by plan/stored proc" on page 400
F15 DB2 SQL CPU/Svc Time by Rq Loc	"F15 - DB2 SQL CPU/Svc Time by Rq Loc" on page 404
F16 - DB2 SQL CPU/Svc Time by Enclave	"F16 - DB2 SQL CPU/Svc Time by Enclave" on page 407
F17 - DB2 SQL CPU/Svc Time by Corrid	"F17 - DB2 SQL CPU/Svc Time by Corrid" on page 410

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For information about ...	See ...
F18 - DB2 SQL CPU/Svc Time by Wkstn	"F18 - DB2 SQL CPU/Svc Time by Wkstn" on page 414
F19 - DB2 SQL CPU/Svc Time by EndUsr	"F19 - DB2 SQL CPU/Svc Time by EndUsr" on page 418
DB2 EXPLAIN report	"DB2 EXPLAIN report" on page 421
DB2SQL Category in report C01	"DB2SQL category in C01 report" on page 424

Overview of DB2 data extractor

In order to use the DB2 Performance Analysis Reports, the DB2 data extractor must be turned on when the Observation Request is entered. You must select the DB2 data extractor in the Schedule New Measurement panel.

The DB2 extractor collects measurement data directly related to SQL activity. During each sampling interval, Application Performance Analyzer interrogates DB2 to determine if the application or transaction is currently performing a DB2 request. If it is, a DB2 measurement record is created that describes the request. If the request was to process an SQL statement then details of the SQL statement are also recorded. These DB2 records later are analyzed to produce the DB2 reports.

The DB2+ data extractor

There is a second DB2 data extractor called DB2+. You will see this if your installation has it enabled, and your TSO ID has authority to use it.

Turning on the DB2+ data extractor allows Application Performance Analyzer to collect the data required to report exact SQL request counts, SQL CPU time, and SQL Service Time. The DB2+ data extractor needs to be selected to produce report F10, F11, F12, F15, F16, F17, F18, and F19. Also some fields in the F01 report require DB2+.

Turning on DB2+ will insure that the SQL text reported on SQL statements is accurate. Without DB2+ turned on, it is possible for the SQL text to be incorrect. This is true for both static and dynamic SQL.

Note: Running Application Performance Analyzer measurements with the DB2+ data extractor turned on causes each DB2 call to be intercepted to collect additional data. This might have a small impact on the performance of the target address space. Care should be taken when using this feature with other products that also intercept DB2 calls as unpredictable results might occur. Your installer might have chosen to limit access to this feature.

Measuring DDF activity

If you measure a DB2 DDF address space with the DB2+ extractor turned on, Application Performance Analyzer captures the remote SQL activity detected in the address space. The data is reported in the following reports: F02, F10, F11, F12, F15, F16, F17, F18 and F19. The only other report available for a DDF measurement is S01 Measurement Profile.

For DDF measurements only, Application Performance Analyzer records the enclave CPU time, zIIP time, and zIIP on CP time for each observed SQL call.

There are some limitations when reporting on a DDF address space:

1. The SQL calls observed will not correlate one-for-one with those issued by the application at the requester site. Some calls will not be observed because they are not sent to the DIST address space.
2. Multiple SQL calls can be issued by DB2 when processing a particular SQL call. For example, an OPEN call could result in FETCH and CLOSE calls being issued by the DIST address space. These calls will have the same statement number as the OPEN call.
3. When a CALL statement results in invoking a stored procedure in the same DB2 subsystem, the stored procedure calls can also be observed in the DIST address space.
4. Some dynamic SQL statements can be shown as static. This is because the DIST address space is treating them as though they are static.
5. The SQL function of remote SQL calls display as the actual SQL function, however because they are remote:
   - The SQL text might not be accurate.
   - Issuing an EXPLAIN request against a SQL statement with a type of Remote SQL can result in an error at the server rather than being caught in the TSO session of the user.
6. Some SQL calls have a statement type of Remote SQL instead of the expected SQL type. For example, INSERT and DELETE calls are observed as Remote SQL. As a consequence:
7. A CALL statement might not always have SQL text available.
8. A DESCRIBE statement does not have any SQL text available.

Notes:

1. If you want to select a DDF address space from a list when setting up the measurement, enter **DIST* in the Job Name pattern field.
2. If you want to limit the scope of a DDF measurement, you may filter the measurement for specific Correlation Id, End User Id and/or Workstation Id in Panel 5 of the NEW dialog.
3. The Number of Samples specified for a DDF measurement is not used because each DDF call is intercepted rather than sampled. The number of samples will always be converted to approximately one per second.

Displaying SQL Statement Text

When SQL statement text is displayed in a DB2 report, a limit of up to 4,000 characters, or up to 15,000 characters is displayed, depending on the circumstances. SQL statements exceeding the limit are truncated.

For non-DDF observations, the SQL text for dynamic SQL can be up to 15,000 characters long. If the DB2V option is selected, then static SQL text can also be up to 15,000 characters long. Otherwise, static SQL text is limited to 4,000 characters.

For DDF observations, the SQL text for dynamic SQL can be up to 15,000 characters long. Static SQL statements are limited to 4,000 characters.

When the execution of a SQL statement is unsuccessful, DB2 sets a negative SQLCODE. In this situation, Application Performance Analyzer displays the negative SQLCODE in the DB2 reports, rather than the SQL statement text. Report

F11 SQL CPU/Service Time by Statement provides a SETUP option to limit the display of SQL statements to only those that ended successfully or to only those that ended unsuccessfully.

SQL statement text formatting

SQL statement text is displayed unformatted in the main body of the DB2 reports. Complex SQL statements may be difficult to interpret, therefore for readability purposes the SQL statement text in the report detail windows is displayed formatted. To view the formatted SQL text in the detail window, use the '++' line command or press the Enter key as a shortcut. If statement formatting fails for any reason, it is displayed unformatted in the detail window with an accompanying warning message.

When a formatted static SQL statement is displayed, all tokens are separated by a single space, with two possible exceptions:

- Between a host variable marker and a host variable name, for example :H
- Between escaped qualified references, for example. "#SALES"."$TARGETS"

When a formatted dynamic SQL statement is displayed:

- All tokens except escaped identifiers and string literals are displayed in upper case.
- All excess whitespace characters (including line breaks and tabs) are removed.
- All comments are removed.
- All tokens are separated by a single space.

If the unformatted SQL statement text is truncated and leaves a trailing string literal or escaped identifier with no terminating delimiter, the formatted SQL statement text will display with a matching closing delimiter appended, to prevent a parsing error.

SQL statement text with DBCS identifiers (for example, Japanese or Korean) is always displayed unformatted.

SQL statement sequence numbers

A sequence number is assigned by Application Performance Analyzer to each unique SQL statement observed during the measurement. In most DB2 reports, this sequence number is preceded by either "S" or "D" indicating if the SQL statement is static or dynamic. Application Performance Analyzer will stop sampling when 99,999 unique SQL statements are observed. When this maximum is reached the observation request is cancelled with the reason 'Maximum SQL statements exceeded'.

Overview of DB2 Multiple Address Space Support

DB2 multiple address space (MASS) support allows you to create a request to measure a specific DB2 stored procedure or user-defined function, regardless of which WLM region it executes in.

You can also measure DB2 activity in stored procedures and user-defined functions that are invoked from any job you are measuring, by selecting the Collateral DB2 data extractor (CDB2). In this case, the measured job does not have to be a stored procedure or user-defined function.

To enter a DB2 MASS observation that measures a specific DB2 stored procedure or user-defined function:

1. Start a NEW request.
2. In Panel 1 – Job Information, enter a dash (-) in the Job name/Pattern field.
3. In Panel 5 – Subsystems, enter the DB2 subsystem name, the schema name, and the stored procedure name or the user-defined function name. You must also indicate whether you are measuring a stored procedure or a user-defined function.
4. In Panel 2 – Options, select the DB2 data extractor.
5. Complete any other relevant fields for your observation request.

Once the NEW request is complete and submitted, Application Performance Analyzer creates and starts an observation request for the DB2 stored procedure or user-defined function. It will execute for the duration specified on the NEW request.

To enter an observation that measures a DB2 batch job that invokes a DB2 stored procedure or user-defined function:

1. Start a NEW request.
2. In Panel 1 – Job Information, enter the batch job name in the Job name/Pattern field.
3. In Panel 2 – Options, select the DB2+ and CDB2 data extractors.
4. Complete any other relevant fields for your observation request.

Once the NEW request is complete and submitted, Application Performance Analyzer creates and starts an observation request for the DB2 batch job. Because the collateral DB2 extractor is on, when the DB2 batch job calls the stored procedure or user-defined function, Application Performance Analyzer generates a separate measurement. This measurement is displayed in the R02 Observation List as child observations under the parent.

F01 - DB2 measurement

Usage

Use this report to see a general overview of the DB2 measurement data. This is a good report to examine first when analyzing DB2 information. It provides an at-a-glance summary of various aspects of the measurement data and helps you choose which other reports to concentrate on. The first section of this report consists of a series of mini performance graphs illustrating various types of activity that was measured. This is followed by a section that reports measurement values.

Performance graphs

These are histograms quantifying measurement data. To the right of some of the graphs, report codes of reports that show related and more detailed information are displayed. You can display the report by skipping the cursor to one of these fields and by pressing the ENTER key.

Most Active DB2 Plans

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
DB2 Plan Name	A DB2 plan name is shown and the number of samples in which processing of SQL requests under this plan was observed. The percentage and the graph represent the proportion of the overall measurement time SQL requests were being serviced under this DB2 plan.

Most active package/DBRMs

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
Package or DBRM Name	A package or DBRM name is shown and the number of samples in which processing of SQL requests in this Package/DBRM was observed. The percentage and the graph represent the proportion of the overall measurement time SQL requests were being serviced in this Package/DBRM.

Most active SQL statements

Under Heading	This is Displayed
Samples	The number of samples done during the measurement upon which this graph is based. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
SQL Statement	The DBRM name, precompiler statement number, SQL function and the number of samples in which processing of this SQL request was observed. The percentage and the graph represent the proportion of the overall measurement time this SQL request was being serviced.

Most CPU consumptive SQL

This requires that the DB2+ measurement option was active.

Under Heading	This is Displayed
Total SQL CPU Time	The number of seconds of CPU time consumed by all executions of SQL requests during the measurement. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.

Under Heading	This is Displayed
SQL Statement	The DBRM name, precompiler statement number, SQL function and the number of CPU seconds of execution for this statement.

Most frequent SQL statements

This requires that the DB2+ measurement option was active. The graphic information is based on the number of SQL requests counted.

Under Heading	This is Displayed
Total SQL Calls Counted	The total number of SQL requests counted during the measurement. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
SQL Statement	The DBRM name, precompiler statement number, SQL function and the number of SQL requests counted for this statement.

Single SQL call service time

This requires that the DB2+ measurement option was active.

Under Heading	This is Displayed
Total SQL Service Time	The number of seconds of service time for all executions of SQL requests during the measurement. This number represents 100 percent of the data upon which the graph is based and is used as the divisor to compute the percentages shown in other lines in the graph.
SQL statement identification	The DBRM name, precompiler statement number, SQL function and the number of seconds of service time for this statement.

DB2 measurement statistics

A grid of values is shown for the overall DB2 measurement and then a separate grid for each DB2 subsystem. If only one subsystem was observed then only one grid appears.

Under Heading	This is Displayed
DB2 Subsystem Name	The name of the DB2 subsystem.
DB2 Version	The version of DB2 for the subsystem.
SQL Calls Sampled	The number of unique SQL requests in which samples were taken.
SQL observations	The number of samples in which SQL activity was observed.
SQL Calls Executed	The number of SQL requests executed determined on the basis of lower and upper REQCT values for each of the DB2 threads.
Avg SQL call rate	This is the average number of SQL calls per second for the measurement interval. This is based on the SQL calls counted value if it was measured (DB2+ option active). Otherwise it is based on the SQL calls executed value.
SQL Calls Counted	The number of SQL requests counted by the DB2+ measurement feature. This value is available only if the DB2+ measurement option was selected for the measurement. This is an exact SQL request count for the measurement interval.

Under Heading	This is Displayed
SQL throughput	A theoretical SQL request throughput rate based on the number of SQL requests for the portion of the measurement interval SQL processing was occurring. (Time other non-SQL application activity was taking place is excluded.) This is based on the SQL calls counted value if it was measured (DB2+ option active). Otherwise it is based on the SQL calls executed value.
SQL service time	The total service time for SQL processing. This value is available only if the DB2+ measurement option was selected for the measurement.
SQL CPU time	The total CPU time in the measured region for SQL processing. This value is available only if the DB2+ measurement option was selected for the measurement.
SQL max time	The maximum service time for a single SQL call. This value is available only if the DB2+ measurement option was selected for the measurement.
SQL max CPU	The maximum CPU time for a single SQL call. This value is available only if the DB2+ measurement option was selected for the measurement.
SQL min time	The minimum service time for a single SQL call. This value is available only if the DB2+ measurement option was selected for the measurement.
SQL min CPU	The minimum CPU time for a single SQL call. This value is available only if the DB2+ measurement option was selected for the measurement.

Sample reports

A sample report is shown here, it is a scrollable report, and is shown here split into two screen images.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
F01: DB2 Measurement Profile (1354/CICS23A)                  Row 00001 of 00060
Command ===> _____________________________________________ Scroll ===> CSR

Most Active DB2 Plans ---------------------------------------    Reports:
 Samples                  10,000  100.0% ' ' ' ' ' ' ' ' ' ' '    F07
 PFSAMPA                   1,710   17.1% ***


Most Active Package/DBRMs -----------------------------------    Reports:
 Samples                  10,000  100.0% ' ' ' ' ' ' ' ' ' ' '    F03
 PFSAMPC                   1,173   11.7% **
 PFSAMPB                     302    3.0% *
 PFSAMPA                     235    2.3% *


Most Active SQL Statements ----------------------------------    Reports:
 Samples                  10,000  100.0% ' ' ' ' ' ' ' ' ' ' '    F04
 PFSAMPC:01466 FETCH         452    4.5% *
 PFSAMPA:00816 SELECT        273    2.7% *
 PFSAMPC:03054 FETCH         215    2.1% *
 PFSAMPB:00678 SELECT        195    1.9% *
 PFSAMPB:00816 UPDATE        148    1.4% *


Most CPU consumptive SQL ------------------------------------    Reports:
 Total SQL CPU time         6.24  100.0% ' ' ' ' ' ' ' ' ' ' '    F10 F11
 PFSAMPC:01466 FETCH        1.62   25.9% *****                    F12
 PFSAMPA:00816 SELECT       0.88   14.2% **
 PFSAMPC:03054 FETCH        0.75   12.1% **
 PFSAMPB:00678 SELECT       0.68   11.0% **
 PFSAMPC:01316 SELECT       0.44    7.1% *
```

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
F01: DB2 Measurement Profile (1354/CICS23A)                  Row 00031 of 00061
Command ===> _____________________________________________ Scroll ===> CSR

Most Frequent SQL Statements --------------------------------    Reports:
 Total SQL calls counted   4,492  100.0% ' ' ' ' ' ' ' ' ' ' '
 PFSAMPC:03054 FETCH       1,730   38.5% *******
 PFSAMPC:01466 FETCH         346    7.7% *
 PFSAMPA:00816 SELECT        343    7.6% *
 PFSAMPB:00678 SELECT        343    7.6% *
 PFSAMPC:01443 OPEN          173    3.8% *


Most CPU consumptive SQL ------------------------------------    Reports:
 Total SQL service time    11.03  100.0% ' ' ' ' ' ' ' ' ' ' '
 PFSAMPB:00678 SELECT       0.16   25.9% *****
 PFSAMPC:01466 FETCH        0.09   14.2% **
 PFSAMPA:00816 SELECT       0.03   12.1% **
 PFSAMPC:01347 SELECT       0.03   11.0% **
 PFSAMPC:01316 SELECT       0.01    7.1% *


 DB2 measurements statistics----------------------------------------------
| DB2 subsystem name DSN1            | DB2 version          7.1.0        |
|-----------------------------------------------------------------------|
| SQL calls sampled  1,521           | SQL observations     1,890        |
| SQL calls executed 5,517           | Avg SQL call rate    91.95 per sec|
| SQL calls counted  4,492           | SQL throughput       510.83 per sec|
|-----------------------------------------------------------------------|
| SQL service time   11.0362 sec     | SQL CPU time         6.2409 sec   |
| SQL call max time  0.1678 sec      | SQL call max CPU     0.0598 sec   |
| SQL call min time  0.0001 sec      | SQL call min CPU     0.0001 sec   |
*-----------------------------------------------------------------------*
```

F02 - DB2 SQL activity timeline

Usage

Use this report to see information about the chronology of SQL requests that were sampled over the duration of the measurement and to identify any calls with excessive service times. Each line shows information about one SQL call. By default, the detail lines are sorted chronologically by DB2 thread. You can also request that the data be sorted in descending sequence by SQL call duration. Enter the "SD" line command on the "Threads" heading field to sort in this sequence. This will bring to the top of the report any SQL calls that might have had excessive service times.

When the DB2+ feature is active for a measurement, the number of SQL calls displayed in this report is limited by the value of the DB2IMaxTraceSize parameter specified during Application Performance Analyzer installation, or by the value on panel 2 of the measurement request (if your installation has configured this field). The report is truncated when the number of SQL calls issued reaches the value specified for DB2IMaxTraceSize.

Quantification

When the DB2+ feature is not active, each report line shows the time at which the first sample for the identified SQL call took place. The duration of the interval execution of the SQL call was observed is also reported. This is derived from the number of samples and the sampling interval. This gives an indication of the service time for the particular SQL call.

When the DB2+ feature is active each report line shows the time at which the identified SQL call started. The service time or duration of execution of the SQL call is also reported. This is measured directly by the DB2+ feature.

Detail line hierarchy

An unexpanded F02 report shows a line for each SQL call that was measured by the DB2+ feature or that was sampled one or more times. You can expand each line to reveal one additional hierarchical level of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 SQL Call
 Level 2 SQL Statement Text

    ...
```

Detail line descriptions

SQL Call execution detail line

This is the first-level detail line. Each line shows information about one SQL call.

Under Heading	This is Displayed
Thread	A sequence number identifying the DB2 thread. Application Performance Analyzer assigns a unique sequence number to each DB2 thread that was observed.
REQCT	The REQCT value for the SQL call.
Program	The name of the DBRM in which the SQL call was defined.

Under Heading	This is Displayed
Stmt#	The precompiler statement number of the SQL statement.
SQL Function	The SQL function performed by the reported statement: SELECT, INSERT, UPDATE, etc.
Samps	The number of samples recorded for the interval described by this report line. This can be zero if the identified SQL call was measured by the DB2+ feature but not sampled.
Call Time	When the DB2+ feature is not active this is the time at which the first sample in the sequence of samples reported by this line occurred. When the DB2+ feature is active each report line shows the time at which the identified SQL call started. The time is shown in minutes, seconds and hundredths of seconds.
Interval	When the DB2+ feature is not active, this is the duration of the interval, in seconds, during which samples were recorded for the indicated SQL call. This can provide a good indication of the service time for the SQL call. When the DB2+ feature is active, this is measured directly by the DB2+ feature.
CPU Time	The CPU time, in seconds, for the reported SQL call as measured by the DB2+ feature. If an SQL call was not measured by the DB2+ feature but was sampled, the CPU time will be reported as Not Available (N/A). This might occur at the beginning of a measurement before the DB2+ feature completes initialization, depending on the sampling rate and system activity.

SQL statement text detail line

This is second-level detail line shown directly under the SQL statement detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

When the report is first displayed, only the first level of the hierarchy is visible (Thread). A sample is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F02: DB2 SQL Activity Timeline (1264/CICS23A)                Row 00001 of 01596
Command ===> ____________________________________________ Scroll ===> CSR

Thread  REQCT  Program   Stmt#  SQL Function  Samps Call Time  Interval  CPU Time

 52577  08557  PFSAMPA     816  SELECT            1  08:24:45.96   0.00     0.002
 52577  08564  PFSAMPA     816  SELECT            1  08:24:46.25   0.00     0.001
 52577  08566  PFSAMPB     678  SELECT            1  08:24:46.27   0.00     0.002
 52577  08567  PFSAMPC    1316  SELECT            2  08:24:46.27   0.01     0.001
 52577  08569  PFSAMPC    1443  OPEN              1  08:24:46.28   0.00     0.002
 52577  08570  PFSAMPC    1466  FETCH             2  08:24:46.29   0.01     0.003
 52577  08571  PFSAMPC    1466  FETCH             2  08:24:46.30   0.01     0.002
 52577  08586  PFSAMPC    3155  SELECT            3  08:24:46.32   0.01     0.006
 52577  08587  PFSAMPC    3179  SELECT            1  08:24:46.33   0.00     0.005
 52577  08588  PFSAMPB     816  UPDATE            1  08:24:46.34   0.00     0.002
 52577  08592  PFSAMPA     816  SELECT            1  08:24:46.50   0.00     0.001
 52577  08598  PFSAMPA     816  SELECT            1  08:24:46.68   0.00     0.001
 52577  08599  PFSAMPB     408  SET HOST VAR      1  08:24:46.69   0.00     0.002
 52577  08601  PFSAMPC    1316  SELECT            5  08:24:46.69   0.03     0.003
 52577  08604  PFSAMPC    1466  FETCH             1  08:24:46.73   0.00     0.001
 52577  08605  PFSAMPC    1466  FETCH             3  08:24:46.74   0.01     0.001
 52577  08607  PFSAMPC    2989  SELECT            1  08:24:46.76   0.00     0.002
```

You can enter a "+" line command to expand to the next level, which is the SQL text. The report is shown here where a thread has been expanded:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
F02: DB2 SQL Activity Timeline (1264/CICS23A)                Row 00001 of 01599
Command ===> _____________________________________________ Scroll ===> CSR

Thread  REQCT  Program   Stmt#  SQL Function  Samps Call Time  Interval  CPU Time

 52577  08557  PFSAMPA     816  SELECT            1  08:24:45.96   0.00     0.002
 52577  08564  PFSAMPA     816  SELECT            1  08:24:46.25   0.00     0.001
 52577  08566  PFSAMPB     678  SELECT            1  08:24:46.27   0.00     0.002
 52577  08567  PFSAMPC    1316  SELECT            2  08:24:46.27   0.01     0.001
 52577  08569  PFSAMPC    1443  OPEN              1  08:24:46.28   0.00     0.002
 52577  08570  PFSAMPC    1466  FETCH             2  08:24:46.29   0.01     0.003
 52577  08571  PFSAMPC    1466  FETCH             2  08:24:46.30   0.01     0.002
 52577  08586  PFSAMPC    3155  SELECT            3  08:24:46.32   0.01     0.006
              > SELECT * INTO : H , : H , : H , : H , : H : H FROM
              > DEPT WHERE XRATE = : H

 52577  08587  PFSAMPC    3179  SELECT            1  08:24:46.33   0.00     0.005
 52577  08588  PFSAMPB     816  UPDATE            1  08:24:46.34   0.00     0.002
 52577  08592  PFSAMPA     816  SELECT            1  08:24:46.50   0.00     0.001
 52577  08598  PFSAMPA     816  SELECT            1  08:24:46.68   0.00     0.001
 52577  08599  PFSAMPB     408  SET HOST VAR      1  08:24:46.69   0.00     0.002
 52577  08601  PFSAMPC    1316  SELECT            5  08:24:46.69   0.03     0.003
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Thread	Display context help information.
++	Thread	Show additional details.
+	Thread	Expand to reveal next level.
–	Thread	Collapse to hide next level.

on headings

Cmd	When Applied To Object	Action
?	Thread	Display context help information.
+	Thread	Expand to reveal all entries.
–	Thread	Collapse to hide next level.
ST	Thread	Sort chronologically by DB2 thread.
SD	Thread	Sort descending by SQL call duration.
SC	Thread	Sort descending by SQL CPU Time

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. For example, entering "++" on an SQL line will cause this detail window to appear:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| SQL Call Information                                                          |
|    Sample count    1                    DB2 Authid      USER1                 |
|    SQL CPU time    0.002                Service time    0.00                  |
|                                                                               |
| SQL Statement Information                                                     |
|    Subsystem name  DSN1                 Attach type     SASS                  |
|    Plan name       PFSAMPC              Plan bind time  no data               |
|                                                                               |
|    DBRM name       PFSAMPA              DBRM token      17D8B8DF 05CC86F8     |
|    DBRM date/time May-08-06 15:48:14                                          |
|                                                                               |
|    Package ID      PFSAMPA              Location        CABNETDB24            |
|    Collectn name   PFSAMPX1             Pkg BIND time   no data              |
|                                                                               |
|    SQL function    SELECT               Static/dynamic  Static                |
|    Precmplr stmt#  678                  DBRM section#   4                     |
|    CSECT/module    PFSAMPA in PFSAMPA   Offset of call  00002764              |
|    Sample count    147                  SQL req count   333                   |
|    SQL CPU time    0.60                 Service time    0.84                  |
|                                                                               |
|    SQL Statement:                                                             |
|                    SELECT *                                                   |
|                    INTO : H ,                                                 |
|                         : H  : H ,                                            |
|                         : H  : H                                              |
|                    FROM DEP                                                   |
|                    WHERE XRATE = : H                                          |
|                                                                               |
| DB2 Thread Information                                                        |
|     Thread sequence number              00001                                 |
|     Attachment type                     CICS                                  |
|                                                                               |
|     First REQCT value observed          05256                                 |
|     Time of first REQCT                 14:06:47.24                           |
|                                                                               |
|     Last REQCT value observed           10613                                 |
|     Time of last REQCT                  14:07:46.74                           |
|                                                                               |
|     Total REQCT increments              5,358                                 |
|     Duration first to last              59.49                                 |
|     SQL rate for thread, per second     90.06                                 |
|     Number of samples for thread        1,417                                 |
|     Number of REQCT values sampled      1,292                                 |
|                                                                               |
+-------------------------------------------------------------------------------+
```

F03 - DB2 SQL activity by DBRM

Usage

Use this report to see how time was consumed by SQL request processing. The percentage of time is reported by each module that issued SQL requests. Expand a module line to see a further breakdown of time consumption by individual SQL request issued by the module.

Note: This report shows all SQL calls that were sampled, but when the DB2+ feature is active it will not show SQL calls that were measured by the DB2+ feature but not sampled.

Quantification

Each report line quantifies service time for all SQL requests issued by a module (DBRM). This is further broken down by SQL request. Each quantity is expressed as a percentage of the overall measurement interval.

Detail line hierarchy

An unexpanded F03 report shows a line for each module that issued SQL requests. You can expand each line to reveal two additional hierarchical levels of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 Module (DBRM)
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text

    ...
```

Detail line descriptions

SQL DBRM (Module) detail line

This is the first-level detail line. Each line shows information about a DBRM (Module) for which SQL request measurement data was recorded.

Under Heading	This is Displayed
Name	The DBRM name. The DBRM name is often the same name as the corresponding module in which SQL requests were issued.
Percent of Time	The percentage of the measurement interval duration SQL Requests for the indicated DBRM Name were being processed.

SQL request detail line

This is the second-level detail line shown directly under the DBRM/Module detail line. It quantifies the aggregated service time for a specific SQL request.

Under Heading	This is Displayed
Name	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either "S" or "D" precedes the sequence number indicating if the SQL statement is static or dynamic.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request.
SQL Function	The SQL function. The is the name of the SQL function: SELECT, FETCH, UPDATE, etc.
Percent of Time	The percentage of the measurement interval duration the indicated SQL Request was being processed.

Note: It is normal for the counts for the second-level items to add up to a higher value than the first level line. The reason for this is that the program level line shows the percentage of time DB2 processing is active. For a sample, DB2 is counted as being active only once, regardless of the number of SQL

statements being processed (concurrently). So its percentage can be lower than the sum of the individual SQL request statement percentages because of overlaps.

SQL statement text detail line

This is third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

When the report is first displayed, only the first level of the hierarchy is visible (DBRM Name). A sample is shown here:

```
   File  View  Navigate  Help
-------------------------------------------------------------------------------
F03: SQL Activity by Module (0659/CICS23A)                 Row 00001 of 00003
Command ===> _____________________________________________Scroll ===> CSR
Name     Stmt# SQL Function  Percent of Time * 10.00% ±1.1%
                                 *....1....2....3....4....5....6....7.
PFSAMPC                        17.22  =========
PFSAMPB                         6.31  ===
PFSAMPA                         2.00  =
```

You can enter the "+" line command on a DBRM Name to expand to the next level, which is SQL commands. Then you can expand the SQL commands to show the SQL. A sample is shown here with the first DBRM expanded, and then one of the SQL commands expanded:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
F03:  SQL Activity by Module (0659/CICS23A)                 Row 00001 of 00019
Command ===> _____________________________________________ Scroll ===> CSR

Name      Stmt#  SQL Function   Percent of Time * 10.00%  ±1.1%
                                        *....1....2....3....4....5....6.....7.
PFSAMPC                              17.22 =========
→ S00012  01466  FETCH                9.13 =====
→ S00008  01316  SELECT               1.82 =
→ S00017  03054  FETCH                1.81 =
→ S00010  01347  SELECT               1.48 =
→ S00011  01443  OPEN                 0.80
→ S00018  03155  SELECT               0.66
             > SELECT * INTO : H , : H , : H , : H , : H : H FROM DEP
             > T WHERE XRATE = : H

→ S00015  02989  SELECT               0.48
→ S00019  03179  SELECT               0.43
→ S00014  01562  CLOSE                0.26
→ S00016  03046  OPEN                 0.25
→ S00020  03065  CLOSE                0.05
→ S00009  01316  SELECT               0.01
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Module, Seqno	Display context help information.

Cmd	When Applied To Object	Action
++	Module, Seqno	Show additional details.
+	Module, Seqno	Expand to reveal next level.
–	Module, Seqno	Collapse to hide next level.
SV	Module	Sort next level by value.
M	Module, Seqno	Display load module information.
SS	Module	Sort next level by Seqno.
P	Seqno	Display source program mapping.
EX	Seqno	Display DB2 EXPLAIN data.

on headings

Cmd	When Applied To Object	Action
?	Name, Percent Time	Display context help information.
+	Name, Percent Time	Expand to reveal all entries.
–	Name, Percent Time	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level entries by name

Detail window

You can enter “++” (or the Enter key) on any line to display a pop-up window containing additional information. For example, entering “++” on an SQL line will cause this detail window to appear:

```
  File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | > S00012    3179 SELECT                0.84                          |     |
|  +------------------------------------------------------------------------+   |
|                                                                               |
|  Calculation Details                                                          |
|     DB2 SQL activity measurements             84                             |
|     SQL request                               SELECT                          |
|     In program                                PFSAMPC                         |
|     Precompiler statement number              3179                            |
|     Total measurements                        10,000                          |
|     Percent of total                          0.84                            |
|                                                                               |
|  SQL Statement Information                                                    |
|     Subsystem name  DSN1                 Attach type     SASS                 |
|     Plan name       PFSAMPA              Plan bind time  May-11-05 13:57:39   |
|                                                                               |
|     DBRM name       PFSAMPC              DBRM token      179FD30A 1B977868    |
|     DBRM date/time  May-11-05 13:56:56                                        |
|                                                                               |
|     Package ID      PFSAMPC              Location        CABNETDB24           |
|     Collectn name   PFSAMPX1             Pkg BIND time   May-11-05 13:57:36   |
|                                                                               |
|     SQL function    SELECT               Static/dynamic  Static               |
|     Precmplr stmt#  3179                 DBRM section#   21                   |
|     CSECT/module    PFSAMPC in PFSAMPC   Offset of call  00008610             |
|     Sample count    84                   SQL req count   172                  |
|     SQL CPU time    0.28                 Service time    0.45                 |
|                                                                               |
|     SQL Statement:  SELECT *                                                  |
|                     INTO : H ,                                                |
|                          : H  : H ,                                           |
|                          : H  : H                                             |
|                     FROM VDEP                                                 |
|                     WHERE DEPTNO = : H                                        |
|                                                                               |
+-------------------------------------------------------------------------------+
```

SETUP options

The following SETUP option can be selected with the SETUP primary command:

Minimum percentage of time
You can set this option to eliminate reporting of SQL activity where the percentage of time is below a certain threshold.

F04 - DB2 SQL activity by statement

Usage

Use this report to see how time was consumed by SQL request processing. The percentage of time is reported by each SQL request.

Note: This report shows all SQL calls that were sampled, but when the DB2+ feature is active it will not show SQL calls that were measured by the DB2+ feature but not sampled.

Quantification

Each report line quantifies service time for all executions of an SQL request. Each quantity is expressed as a percentage of the overall measurement interval.

Detail line hierarchy

An unexpanded F04 report shows a line for each SQL request. You can expand each line to reveal one additional hierarchical level of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 SQL Request
 Level 2 SQL Statement Text

   ...
```

Detail line descriptions

SQL request detail line

This is the first-level detail line. It quantifies the aggregated service time for a specific SQL request.

Under Heading	This is Displayed
Seqno	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either "S" or "D" precedes the sequence number indicating if the SQL statement is static or dynamic.
Program	The DBRM name for the program that issued the SQL request.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request.
SQL Function	The SQL function. The is the name of the SQL function: SELECT, FETCH, UPDATE, etc.
Percent of Time	The percentage of the measurement interval duration the indicated SQL Request was being processed.

SQL statement text detail line

This is second-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F04: SQL Activity by Statement (0659/CICS23A)                Row 00001 of 00020
Command ===> ____________________________________________________ Scroll ===> CSR

Seqno   Program  Stmt#  SQL Function Percent of Total Time * 10.00%  ±1.1%
                                        *....1....2....3....4....5....6....7...
S00012  PFSAMPC  01466  FETCH        9.13 =====
S00013  PFSAMPB  00816  UPDATE       3.28 ==
S00001  PFSAMPA  00816  SELECT       2.00 =
S00008  PFSAMPC  01316  SELECT       1.82 =
S00017  PFSAMPC  03054  FETCH        1.81 =
S00004  PFSAMPB  00678  SELECT       1.67 =
S00010  PFSAMPC  01347  SELECT       1.48 =
S00002  PFSAMPB  00408  SET HOST VA  1.26 =
S00011  PFSAMPC  01433  OPEN         0.80
S00018  PFSAMPC  03155  SELECT       0.66
S00015  PFSAMPC  02989  SELECT       0.48
S00019  PFSAMPC  03179  SELECT       0.43
S00014  PFSAMPC  01562  CLOSE        0.26
S00016  PFSAMPC  03046  OPEN         0.25
S00020  PFSAMPC  03065  CLOSE        0.05
S00007  PFSAMPB  01385  SELECT       0.03
S00005  PFSAMPB  00947  SELECT       0.02
S00003  PFSAMPB  00408  SET HOST VA  0.01
S00006  PFSAMPB  01163  SELECT       0.01
S00009  PFSAMPC  01316  SELECT       0.01
```

Each line can be expanded to display the SQL statement by entering the "+" line command on the Sequence Number. For example, "+" was entered on the third line in this report to display the SQL.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F04: SQL Activity by Statement (0659/CICS23A)                Row 00001 of 00022
Command ===> ____________________________________________________ Scroll ===> CSR

Seqno   Program  Stmt#  SQL Function Percent of Total Time * 10.00%  ±1.1%
                                        *....1....2....3....4....5....6....7...
S00012  PFSAMPC  01466  FETCH        9.13 =====
S00013  PFSAMPB  00816  UPDATE       3.28 ==
S00001  PFSAMPA  00816  SELECT       2.00 =
             > SELECT * INTO : H FROM DEPTA WHERE XRATE = : H

S00008  PFSAMPC  01316  SELECT       1.82 =
S00017  PFSAMPC  03054  FETCH        1.81 =
S00004  PFSAMPB  00678  SELECT       1.67 =
S00010  PFSAMPC  01347  SELECT       1.48 =
S00002  PFSAMPB  00408  SET HOST VA  1.26 =
S00011  PFSAMPC  01433  OPEN         0.80
S00018  PFSAMPC  03155  SELECT       0.66
S00015  PFSAMPC  02989  SELECT       0.48
S00019  PFSAMPC  03179  SELECT       0.43
S00014  PFSAMPC  01562  CLOSE        0.26
S00016  PFSAMPC  03046  OPEN         0.25
S00020  PFSAMPC  03065  CLOSE        0.05
S00007  PFSAMPB  01385  SELECT       0.03
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Seqno	Display context help information.
++	Seqno	Show additional details.
+	Seqno	Expand to reveal next level.
–	Seqno	Collapse to hide next level.
M	Seqno	Display load module information.
P	Seqno	Display source program mapping.
EX	Seqno	Display DB2 EXPLAIN data

on headings

Cmd	When Applied To Object	Action
?	Seqno, Percent of Time	Display context help information.
+	Seqno	Expand to reveal all entries.
+	Percent of Time	Zoom in scale.
–	Seqno	Collapse to show only first level.
–	Percent of Time	Zoom out scale
SV	Seqno	Sort next level by value.
SS	Seqno	Sort next level by Seqno.

Detail window

You can enter “++” (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering “++” on an SQL line will cause this detail window to pop up:

```
  File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | > S00012    3179 SELECT                0.84                          |     |
|  +-------------------------------------------------------------------------+  |
|                                                                               |
|  Calculation Details                                                          |
|     DB2 SQL activity measurements             84                             |
|     SQL request                               SELECT                          |
|     In program                                PFSAMPC                         |
|     Precompiler statement number              3179                            |
|     Total measurements                        10,000                          |
|     Percent of total                          0.84                            |
|                                                                               |
|  SQL Statement Information                                                    |
|     Subsystem name  DSN1                 Attach type     SASS                 |
|     Plan name       PFSAMPA              Plan bind time  May-11-05 13:57:39   |
|                                                                               |
|     DBRM name       PFSAMPC              DBRM token      179FD30A 1B977868    |
|     DBRM date/time  May-11-05 13:56:56                                        |
|                                                                               |
|     Package ID      PFSAMPC              Location        CABNETDB24           |
|     Collectn name   PFSAMPX1             Pkg BIND time   May-11-05 13:57:36   |
|                                                                               |
|     SQL function    SELECT               Static/dynamic  Static               |
|     Precmplr stmt#  3179                 DBRM section#   21                   |
|     CSECT/module    PFSAMPC in PFSAMPC   Offset of call  00008610             |
|     Sample count    84                   SQL req count   172                  |
|     SQL CPU time    0.28                 Service time    0.45                 |
|                                                                               |
|     SQL Statement:  SELECT *                                                  |
|                     INTO : H ,                                                |
|                          : H  : H ,                                           |
|                          : H  : H                                             |
|                     FROM VDEP                                                 |
|                     WHERE DEPTNO = : H                                        |
|                                                                               |
+-------------------------------------------------------------------------------+
```

SETUP options

The following SETUP option can be selected with the SETUP primary command:

Minimum percentage of time
You can set this option to eliminate reporting of SQL activity where the percentage of time is below a certain threshold.

F05 - DB2 SQL activity by plan

Usage

Use this report to see how time was consumed by SQL request processing. The percentage of time is reported by each DB2 plan under which measured SQL activity was recorded. Expand a plan line to see a further breakdown of time consumption by individual SQL request.

Note: This report shows all SQL calls that were sampled, but when the DB2+ feature is active it will not show SQL calls that were measured by the DB2+ feature but not sampled.

Quantification

Each report line quantifies service time for all SQL requests issued under a DB2 Plan. This is further broken down by SQL request. Each quantity is expressed as a percentage of the overall measurement interval.

Detail line hierarchy

An unexpanded F05 report shows a line for each module that issued SQL requests. You can expand each line to reveal two additional hierarchical levels of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 DB2 Plan
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text

    ...
```

Detail line descriptions

DB2 plan detail line

This is the first-level detail line. Each line shows information about a DB2 Plan for which SQL request measurement data was recorded.

Under Heading	This is Displayed
Seqno	A sequence number assigned to the DB2 plan.
Plan/Pgm	The DB2 plan name.
Percent of Time	The percentage of the measurement interval duration the indicated DB2 plan was being processed.

SQL request detail line

This is the second-level detail line shown directly under the DB2 Plan detail line. It quantifies the aggregated service time for a specific SQL request.

Under Heading	This is Displayed
Seqno	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either "S" or "D" precedes the sequence number indicating if the SQL statement is static or dynamic.
Plan/Pgm	The DBRM name for the program that issued the SQL request.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request.
SQL Function	SQL Function The SQL function. The is the name of the SQL function: SELECT, FETCH, UPDATE, etc.
Percent of Time	The percentage of the measurement interval duration the indicated SQL Request was being processed.

SQL statement text detail line

This is third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

A sample report is shown here with a plan expanded to the second level (statement) and a statement expanded to show the SQL text.

```
  File  View  Navigate  Help
------------------------------------------------------------------------------
F05:  SQL Activity by Plan (1336/CICS23A)                    Row 00001 of 00017
Command ===> _____________________________________________ Scroll ===> CSR

Seqno     Plan/Pgm  Stmt# SQL Function   Percent of Time * 10.00%  ±1.1%
                                            *....1....2....3....4....5....6.....7.
P0001     PFSAMPA                       20.60 ==========
→ S00003  PFSAMPC    1466 FETCH          5.79 ===
→ S00001  PFSAMPA     816 SELECT         3.10 ==
             > SELECT NEXTLIM INTO : H FROM MRATE WHERE CURATE = : H

→ S00005  PFSAMPC    3054 FETCH          2.29 =
→ S00012  PFSAMPB     678 SELECT         1.94 =
→ S00011  PFSAMPC    1316 SELECT         1.47 =
→ S00010  PFSAMPB     816 UPDATE         1.40 =
→ S00007  PFSAMPC    3179 SELECT         1.09 =
→ S00002  PFSAMPC    1347 SELECT         0.89
→ S00009  PFSAMPC    3155 SELECT         0.79
→ S00008  PFSAMPC    2989 SELECT         0.68
→ S00013  PFSAMPC    1433 OPEN           0.60
→ S00004  PFSAMPC    3046 OPEN           0.30
→ S00014  PFSAMPC    1562 CLOSE          0.14
→ S00006  PFSAMPC    3065 CLOSE          0.12
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

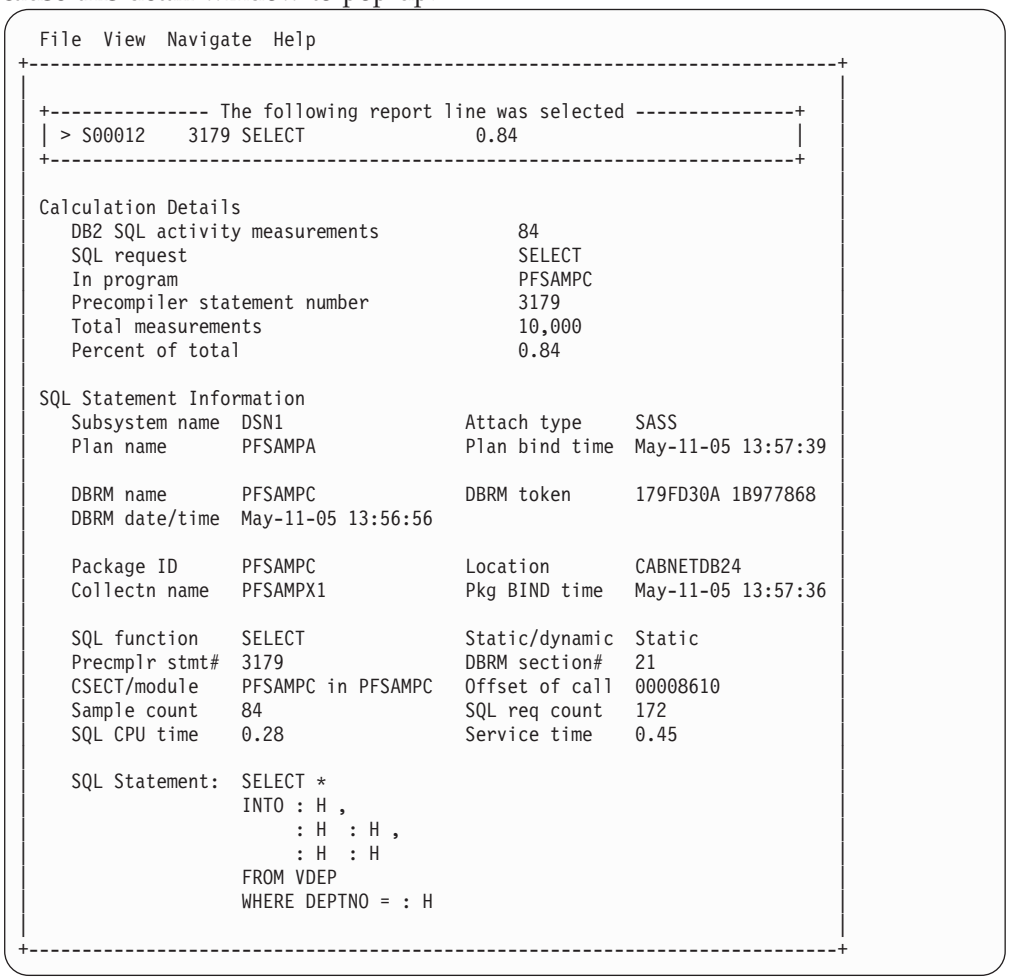
Cmd	When Applied To Object	Action
?	Plan Seqno, SQL Seqno	Display context help information.
++	Plan Seqno, SQL Seqno	Show additional details.
+	Plan Seqno, SQL Seqno	Expand to reveal next level.
–	Plan Seqno, SQL Seqno	Collapse to hide next level.
M	SQL Seqno	Display load module information.
P	SQL Seqno	Display source program mapping.
EX	SQL Seqno	Display DB2 EXPLAIN data

on headings

Cmd	When Applied To Object	Action
?	Seqno, Percent of Time	Display context help information.
+	Seqno	Expand to reveal all entries.
+	Percent of Time	Zoom in scale.
–	Seqno	Collapse to show only first level.
–	Percent of Time	Zoom out scale.
SV	Seqno	Sort next level by value.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. For example, entering "++" on an SQL line will cause this detail window to pop up:



SETUP options

The following SETUP option can be selected with the SETUP primary command:

Minimum percentage of time
: You can set this option to eliminate reporting of SQL activity where the percentage of time is below a certain threshold.

F06 - DB2 SQL statement attributes

Usage

Use this report to see detailed information about each of the measured SQL statements. This is useful as a reference report when working with printed copies of other DB2 reports that do not show full SQL statement details. (When browsing online, the pop-up detail windows show this information.) The following information is shown for each SQL statement for which activity was observed.

Under Heading	This is Displayed
SQL Statement ID	A unique sequence number assigned by Application Performance Analyzer to the SQL statement. This is shown in other DB2 reports that display SQL statement information.
Subsystem name	The name of the DB2 subsystem under which the SQL statement was executed.
Attachment type	The type of DB2 attachment for the thread under which the SQL statement was executed.
Plan name	The name of the DB2 plan under which the SQL statement was executed.
Plan Bind Time	The date and time of the BIND of the plan.
DBRM Name	The name of the DBRM under which the SQL statement was executed.
DBRM Token	The DBRM consistency token. This is an 8 byte hexadecimal value that identifies the DBRM.
DBRM Date/Time	The date and time of the DBRM. This is the time at which the precompiler created the DBRM.
Package ID	The package ID. This is omitted if there was no package bound for the DBRM.
Location	The location name associated with the package. This is omitted if there was no package bound for the DBRM.
Collection Name	The collection name for the package. This is omitted if there was no package bound for the DBRM.
Package Bind Time	The date and time of the BIND of the package. This is omitted if there was no package bound for the DBRM.
SQL Function	The SQL function: SELECT, UPDATE, FETCH, etc.
Precmplr Stmt#	The statement number assigned by the precompiler to the SQL statement.
Static/Dynamic	This indicates if the SQL request was Static or Dynamic.
DBRM Section#	The section number assigned by the precompiler to the SQL statement. Groups of related statements (such as OPEN, FETCH, CLOSE) are correlated using the section number.
PREPARE Stmt#	The statement number of the corresponding PREPARE statement. This field only applies to dynamic SQL statement that operate on SQL text processed by a corresponding PREPARE statement. In order for this information to appear, it is required that execution of the corresponding PREPARE was sampled.
CSECT/Module	The name of the load module and CSECT in which the SQL call was issued.
Offset of Call	The offset of the SQL call return address in the CSECT or module.
SQL Req Count	The number of SQL calls counted for the indicated statement. This information is available only if the DB2+ measurement option was active. It indicates the number of calls counted at the indicated SQL statement number for the duration of the measurement. Counting begins when the first SQL call is sampled.
Sample Count	The number of Samples in which execution of the indicate statement was measured.

Under Heading	This is Displayed
Total CPU Time	The total CPU time consumed by processing of the indicated statement in the measured region. This information is available only if the DB2+ measurement option was active. It indicates the accumulated CPU time used by the indicated SQL statement number for the duration of the measurement. Accumulation begins when the first SQL call is sampled.
Total Service Time	The total service time for processing of the indicated statement. This information is available only if the DB2+ measurement option was active. It indicates the accumulated service time used by the indicated SQL statement number for the duration of the measurement. Accumulation begins when the first SQL call is sampled.
SQL Statement	The SQL statement text.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F06: DB2 SQL Statement Attributes (1623/CICS23A)             Row 00001 of 00324
Command ===> ____________________________________________ Scroll ===> CSR



SQL Statement Id 00001

   Subsystem name  DSN1                   Attach type     SASS
   Plan name       PFSAMPA                Plan BIND time  Nov-28-04 14:11:17

   DBRM name       PSSAMPA                DBRM token      17859595 050DCBBC
   DBRM date/time  Nov-25-04 14:50:15

   Package ID      PFSAMPA                Location        CABNETDB24
   Collectn name   PFSAMPX1               Pkg BIND time   no data

   SQL function    SELECT                 Static/dynamic  Static
   Precmplr stmt#  816                    DBRM section#   1
   CSECT/module    PFSAMPA in PFSAMPA     Offset of call  000007FA
   Sample count    324                    SQL req count   342
   SQL CPU time    0.91                   Service time    1.72

   SQL Statement:   SELECT NEXTLIM INTO : H FROM MRATE WHERE CURATE = :
                    H


SQL Statement Id 00002

   Subsystem name  DSN1                   Attach type     SASS
   Plan name       PFSAMPA                Plan BIND time  Nov-28-04 14:11:17

   DBRM name       PFSAMPC                DBRM token      17859595 06957A24
   DBRM date/time  Nov-25-04 14:49:42

   Package ID      PFSAMPC                Location        CABNETDB24
   Collectn name   PFSAMPX1               Pkg BIND time   no data

   SQL function    SELECT                 Static/dynamic  Static
   Precmplr stmt#  1316                   DBRM section#   6
```

F07 - DB2 SQL wait time by DBRM

Usage

Use this report to see information about WAIT time that occurred during the processing of SQL requests. The percentage of time is reported for each module (DBRM) that issued SQL requests and is expressed as the percentage of the total measurement interval.

In addition, a SETUP option lets you choose to see the WAIT time expressed as a percentage of SQL service time. The two quantification options help answer these questions about SQL processing wait time:

- For how much of the overall measurement interval was the address space in a WAIT during SQL processing?
- For how much of the SQL processing time was the address space in a WAIT?

You can further expand each module line to see a further breakdown and quantification by individual SQL statements.

Note: This report shows all SQL calls that were sampled, but when the DB2+ feature is active it will not show SQL calls that were measured by the DB2+ feature but not sampled.

Quantification

Each report line quantifies wait time for all SQL requests issued by a module (DBRM). This is further broken down by SQL request.

Depending on a report SETUP option, the quantities are expressed as a percentage of the overall measurement interval or as a percentage of the overall service time for the DBRM.

Keep in mind that quantification applies only to the region being measured. DB2 executes in multiple address spaces and a WAIT in the measured address space could indicate the region was suspended while part of the SQL processing was being serviced by another region.

Detail line hierarchy

An unexpanded F07 report shows a line for each module that issued SQL requests. You can expand each line to reveal two additional hierarchical levels of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 Module (DBRM)
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text

    ...
```

Detail line descriptions

SQL DBRM (Module) detail line

This is the first-level detail line. Each line shows information about a DBRM (Module) for which SQL request measurement data was recorded.

Under Heading	This is Displayed
Name	The DBRM name.
Percent	Either Percent of Total Time or Percent of DBRM SQL Time depending on SETUP option. This is the percentage of time that SQL processing for the indicated DBRM was observed to be in WAIT state.

SQL request detail line

This is the second-level detail line shown directly under the DBRM/Module detail line. It quantifies the wait time for a specific SQL request.

Under Heading	This is Displayed
Name	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.
Stmt#	The precompiler statement number of the SQL statement.
SQL Function	The SQL function.
Percent	The percentage of the total time or of the DBRM time (depending on SETUP option) for which SQL processing for the indicated statement was in WAIT state.

SQL statement text detail line

This is third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This shows the report with one DBRM expanded to the second level (SQL statement):

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
F07:  SQL WAIT Time by DBRM (0611/CICS23A)                  Row 00001 of 00009
Command ===> _____________________________________________ Scroll ===> CSR

Name      Stmt#  SQL Function   Percent of Total Time * 10.00%  ±2.5%
                                          *....1....2....3....4....5....6.....7.
PFSAMPD                                 25.49 =============
→ S00001    435  FETCH                12.05 =======
→ S00003    541  UPDATE                7.50 ===
→ S00004    465  FETCH                 3.95 ==
→ S00002    455  FETCH                 1.91 =
→ S00005    485  FETCH                 0.06
→ S00008    462  OPEN                  0.00
→ S00006    481  CLOSE                 0.00
→ S00007    451  CLOSE                 0.00
```

You can use the + command to expand an SQL statement and show the SQL text as shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
F07:  SQL WAIT Time by DBRM (0611/CICS23A)                  Row 00001 of 00009
Command ===> _____________________________________________ Scroll ===> CSR

Name      Stmt#  SQL Function   Percent of Total Time * 10.00%  ±2.5%
                                          *....1....2....3....4....5....6.....7.
PFSAMPD                                 25.49 =============
→ S00001    435  FETCH                 12.05 =======
→ S00003    541  UPDATE                 7.50 ===
→ S00004    465  FETCH                  3.95 ==
→ S00002    455  FETCH                  1.91 =
             > DECLARE RATE2 CURSOR FOR SELECT * FROM CUSTAMTS
→ S00005    485  FETCH                  0.06
→ S00008    462  OPEN                   0.00
→ S00006    481  CLOSE                  0.00
→ S00007    451  CLOSE                  0.00
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

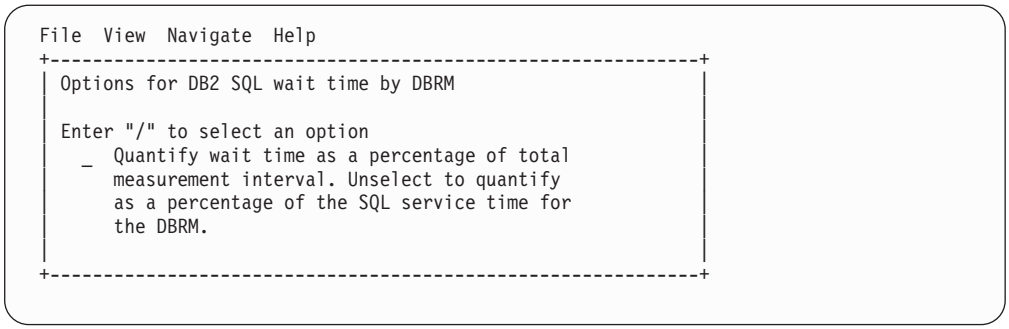
Cmd	When Applied To Object	Action
?	DBRM, Seqno	Display context help information.
++	DBRM, Seqno	Show additional details.
+	DBRM, Seqno	Expand to reveal next level.
–	DBRM, Seqno	Collapse to hide next level.
M	DBRM, Seqno	Display load module information.
P	Seqno	Display source program mapping.
SV	DBRM	Sort next level by value.
SS	DBRM	Sort lines by program and statement number.
EX	Seqno	Display DB2 EXPLAIN data

on headings

Cmd	When Applied To Object	Action
?	Name, Percent of Total Time	Display context help information.
+	Name	Expand to reveal all entries.
+	Percent of Total Time	Zoom in scale.
–	Name	Collapse to show only first level.
–	Percent of Total Time	Zoom out scale.
SV	Seqno	Sort next level by value.
SN	Name	Sort next level entries by name

SETUP options

Enter the SETUP primary command to select options for this report. The following option is available:



F08 - DB2 SQL wait time by statement

Usage

Use this report to see information about WAIT time that occurred during the processing of SQL requests. The percentage of time is reported for each SQL statement sampled during the measurement.

In addition, a SETUP option lets you choose to see the WAIT time expressed as a percentage of SQL service time. The two quantification options help answer these questions about SQL processing wait time:

- For how much of the overall measurement interval was the address space in a WAIT during SQL processing?
- For how much of the SQL processing time was the address space in a WAIT?

Note: This report shows all SQL calls that were sampled, but when the DB2+ feature is active it will not show SQL calls that were measured by the DB2+ feature but not sampled.

Quantification

Each report line quantifies wait time for an SQL request observed during the measurement.

Depending on a report SETUP option, the quantities are expressed as a percentage of the overall measurement interval or as a percentage of the overall service time for the SQL statement.

Keep in mind that quantification applies only to the region being measured. DB2 executes in multiple address spaces and a WAIT in the measured address space could indicate the region was suspended while part of the SQL processing was being serviced by another region.

Detail line hierarchy

An unexpanded F08 report shows a line for each observed SQL statement. You can expand each line to reveal one additional hierarchical level of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 SQL Request
 Level 2 SQL Statement Text
Level 1 SQL Request
 Level 2 SQL Statement Text
    ...
```

Detail line descriptions

SQL request detail line

This is the first-level detail line. It quantifies the wait time for a specific SQL request.

Under Heading	This is Displayed
Seqno	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.
Program	The DBRM name for the program that issued the SQL request.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request.
SQL Function	The SQL function. The is the name of the SQL function: SELECT, FETCH, UPDATE, etc.
Percent of Total Time	The percentage of the total time or of the SQL statement service time (depending on SETUP option) for which processing for the indicated statement was in WAIT state.

SQL statement text detail line

This is second-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This shows the report with one of the SQL statements expanded to show the next level, which is SQL text.

```
  File  View  Navigate  Help
------------------------------------------------------------------------------
F08: SQL WAIT Time by Statement (0611/CICS23A)               Row 00001 of 00010
Command ===> ____________________________________________________ Scroll ===> CSR

Seqno   Program  Stmt#  SQL Function Percent of Total Time * 10.00%  ±2.5%
                                        *....1....2....3....4....5....6....7...
S00001  PFTESTD    435  FETCH       12.05 ======
S00003  PFTESTD    541  UPDATE       7.50 ===
S00004  PFTESTD    465  FETCH        3.95 ==
S00002  PFTESTD    455  FETCH        1.91 =
              > DECLARE RATE2 CURSOR FOR SELECT * FROM CUSTAMTS

S00005  PFTESTD    485  FETCH        0.06
S00007  PFTESTD    451  CLOSE        0.00
S00008  PFTESTD    462  OPEN         0.00
S00006  PFTESTD    481  CLOSE        0.00
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a “/” on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Seqno	Display context help information.

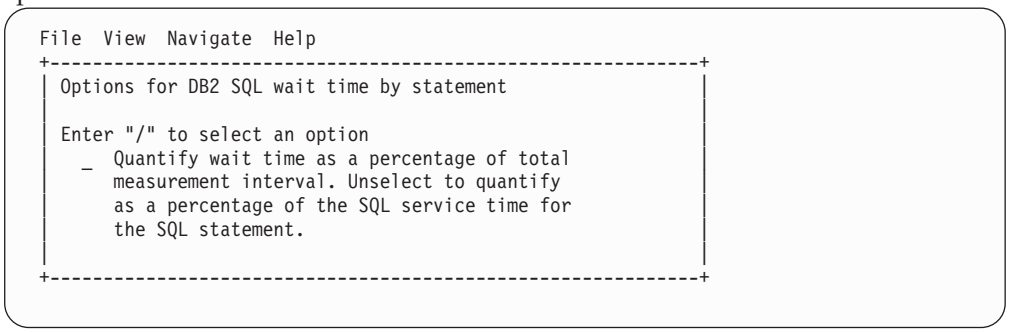
Cmd	When Applied To Object	Action
++	Seqno	Show additional details.
+	Seqno	Expand to reveal next level.
–	Seqno	Collapse to hide next level.
M	Seqno	Display load module information.
P	Seqno	Display source program mapping.
EX	Seqno	Display DB2 EXPLAIN data

on headings

Cmd	When Applied To Object	Action
?	Seqno, Percent of Total Time	Display context help information.
+	Seqno	Expand to reveal all entries.
+	Percent of Total Time	Zoom in scale.
–	Seqno	Collapse to show only first level.
–	Percent of Total Time	Zoom out scale.
SV	Seqno	Sort next level by value.
SS	Seqno	Sort next level by program and statement number.

SETUP options

Enter the SETUP primary command to select options for this report. The following option is available:



F09 - DB2 SQL wait time by plan

Usage

Use this report to see information about WAIT time that occurred during the processing of SQL requests. The percentage of time is reported for each observed DB2 Plan under which SQL requests were issued. It is expressed as the percentage of the total measurement interval.

In addition, a SETUP option lets you choose to see the WAIT time expressed as a percentage of SQL service time. The two quantification options help answer these questions about SQL processing wait time:

1. For how much of the overall measurement interval was the address space in a WAIT during SQL processing?

2. For how much of the SQL processing time was the address space in a WAIT?

You can further expand each DB2 Plan line to see a further breakdown and quantification by individual SQL statements. The SQL statements can be expanded to show the SQL text.

Note: This report shows all SQL calls that were sampled, but when the DB2+ feature is active it will not show SQL calls that were measured by the DB2+ feature but not sampled.

Quantification

Each report line quantifies wait time for all SQL requests issued under a DB2 Plan. This is further broken down by SQL request.

Depending on a report SETUP option, the quantities are expressed as a percentage of the overall measurement interval or as a percentage of the overall service time under the Plan.

Keep in mind that quantification applies only to the region being measured. DB2 executes in multiple address spaces and a WAIT in the measured address space could indicate the region was suspended while part of the SQL processing was being serviced by another region.

Detail line hierarchy

An unexpanded F09 report shows a line for each module that issued SQL requests. You can expand each line to reveal two additional hierarchical levels of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 DB2 Plan
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text
    ...
```

Detail line descriptions

DB2 plan detail line

This is the first-level detail line. Each line shows information about a DB2 Plan under whose execution SQL request measurement data was recorded.

Under Heading	This is Displayed
Seqno	A sequence number assigned, by Application Performance Analyzer, to the DB2 plan.
Plan/Pgm	The name of a DB2 plan.
Percent of Total Time	The percentage of the total time or of the SQL processing time for the PLAN (depending on SETUP option) for which SQL processing under the plan was in WAIT state.

SQL request detail line

This is the second-level detail line shown directly under the Plan detail line. It quantifies the wait time for a specific SQL request.

Under Heading	This is Displayed
Seqno	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.
Plan/Pgm	The name of a DB2 plan.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request.
SQL Function	The SQL function. The is the name of the SQL function: SELECT, FETCH, UPDATE, etc.
Percent of Total Time	The percentage of the total time or of the SQL processing time for the PLAN (depending on SETUP option) for which processing for the indicated statement was in WAIT state.

SQL statement text detail line

This is third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

In this sample, the P0001 plan line has been expanded to the second level (SQL statement), and one of the statements has been expanded to the third level to show the SQL text.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F09: SQL WAIT Time by Plan (0611/CICS23A)                    Row 00001 of 00010
Command ===> ____________________________________________________ Scroll ===> CSR

Seqno     Plan/Pgm  Stmt#  SQL Function  Percent of Total Time * 10.00%  ±2.5%
                                            *....1....2....3....4....5....6....7...
P0001     PFPLN022                     25.49 =============
→ S00001  PFTESTD     435  FETCH         12.05 =======
→ S00003  PFTESTD     541  UPDATE         7.50 =====
→ S00004  PFTESTD     465  FETCH          3.95 ==
→ S00002  PFTESTD     455  FETCH          1.91 =
              > DECLARE RATE2 CURSOR FOR SELECT * FROM CUSTAMTS

→ S00005  PFTESTD    485  FETCH         0.06
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a “/” on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Plan Seqno, Seqno	Display context help information.
++	Plan Seqno, Seqno	Show additional details.
+	Plan Seqno, Seqno	Expand to reveal next level.
–	Plan Seqno, Seqno	Collapse to hide next level.
M	Seqno	Display load module information.
P	Seqno	Display source program mapping.

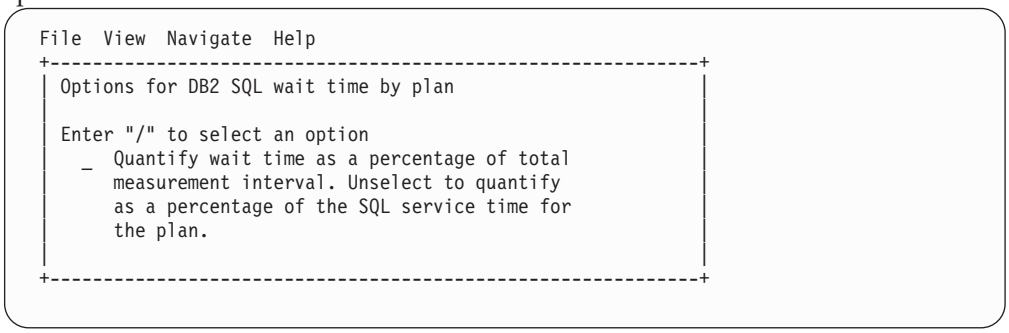
Cmd	When Applied To Object	Action
EX	Seqno	Display DB2 EXPLAIN data

on headings

Cmd	When Applied To Object	Action
?	Seqno,Percent of Time	Display context help information.
+	Seqno	Expand to reveal all entries.
+	Percent of Time	Zoom in scale.
–	Seqno	Collapse to show only first level.
–	Percent of Time	Zoom out scale.
SV	Seqno	Sort next level by value.

SETUP options

Enter the SETUP primary command to select options for this report. The following option is available:



F10 - DB2 SQL CPU/Svc time by DBRM

Usage

A prerequisite for this report is activation of the DB2+ option during the measurement. This option records exact SQL call counts, total SQL service time and total SQL processing CPU time by embedded SQL statement. When measuring a distributed data facility (DDF) address space, SQL Enclave and SQL zIIP CPU times are also recorded. This report shows quantification by DBRM. You can further expand each DBRM line to see a further breakdown and quantification by individual embedded SQL statement.

Quantification

Each report line shows the following for each DBRM and, when expanded, for each SQL statement observed in the DBRM.

- Number of SQL calls.
- Total CPU time for the SQL call processing.
- Mean SQL call CPU time, or percent of total used.
- Total service time for the SQL call processing.
- Mean SQL call service time, or percent of total used.

A setup option is available to display the percent used in place of the mean fields. Keep in mind that measured CPU time applies only to the region being measured. DB2 executes in multiple address spaces and CPU could also be consumed in other DB2 regions not reflected in this report. For DDF only, this is reflected in the enclave CPU times shown in the detail windows of this report.

Detail line descriptions

SQL DBRM (Module) detail line

This is the first-level detail line. Each line shows information about a DBRM (Module) for which SQL request measurement data was recorded.

Under Heading	This is Displayed
Name	The DBRM name.
Nbr of Calls	The number of SQL calls counted for this DBRM.
CPU Time: Total	The total CPU time for all SQL calls counted for this DBRM. Large numbers will be expressed in minutes with an M suffix.
CPU Time: Mean	The mean CPU time per SQL call. Large numbers will be expressed in minutes with an M suffix.
CPU time: Pct	The percent of total CPU time this DBRM used.
Svc Time: Total	The total service time for all SQL calls for this DBRM. Large numbers will be expressed in minutes with an M suffix.
Svc Time: Mean	The mean service time per SQL call. Large numbers will be expressed in minutes with an M suffix.
Svc time: Pct	The percent of total service time this DBRM used.

SQL request detail line

This is the second-level detail line shown directly under the DBRM/Module detail line. It quantifies an individual SQL statement.

Under Heading	This is Displayed
Name	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request. When the statement number is zero, it indicates that the SQL statement was not produced by the DB2 precompiler or the SQL preprocessor, but was generated by some other means. For example, JDBC SQL statements have statement numbers that are zero.
SQL Function	The SQL function. The is the name of the SQL function: SELECT, FETCH, UPDATE, etc.
Nbr of Calls	The number of SQL calls counted for this SQL statement.
CPU Time: Total	The total CPU time for all SQL calls counted for this statement. Large numbers will be expressed in minutes with an M suffix.
CPU Time: Mean	The mean CPU time per SQL call. Large numbers will be expressed in minutes with an M suffix.
CPU Time: Pct	The percent of total CPU time this statement used.

Under Heading	This is Displayed
Svc Time: Total	The total service time for all SQL calls for this statement. Large numbers will be expressed in minutes with an M suffix.
Svc Time: Mean	The mean service time per SQL call. Large numbers will be expressed in minutes with an M suffix.
Svc Time: Pct	The percent of total service time this statement used.

SQL statement text detail line

This is third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This sample shows the report expanded to the second level (SQL statement), and one of the statements has been expanded to the third level to show the SQL text.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F10: SQL CPU/Service Time by DBRM (1286/CICS23A)              Row 00001 of 00014
Command ===> ____________________________________________________ Scroll ===> CSR

                                 Nbr of    --CPU Time--     --Svc Time--
Name       Stmt#  SQL Function   SQL Calls  Total   Mean     Total   Mean

PFSAMPC                          1,204      3.08   0.00256   5.57   0.00462
± S00003    1466  FETCH            516      2.27   0.00441   3.86   0.00749
→ S00006    1316  SELECT           172      0.39   0.00227   1.01   0.00588
→ S00005    1347  SELECT           172      0.25   0.00150   0.40   0.00232
             > SELECT CUSACCT INTO : H FROM ACTINFO WHERE SPCRATE =
             > : H AND INDX01 = '01'

→ S00008    1443  OPEN             172      0.11   0.00064   0.21   0.00122
→ S00007    1562  CLOSE            172      0.04   0.00026   0.07   0.00045
PFSAMPB                          514      1.04   0.00203   1.70   0.00331
→ S00002     672  SELECT           342      0.69   0.00204   1.13   0.00332
→ S00004     810  UPDATE           172      0.34   0.00201   0.56   0.00331
PFSAMPA                          342      0.84   0.00246   1.74   0.00511
→ S00002     815  SELECT           342      0.84   0.00246   1.74   0.00511
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	DBRM, Seqno	Display context help information.
++	DBRM, Seqno	Show additional details.
+	DBRM, Seqno	Expand to reveal next level.
–	DBRM, Seqno	Collapse to hide next level.
M	DBRM, Seqno	Display load module information.
P	Seqno	Display source program mapping.
SV	DBRM	Sort next level entries by value.

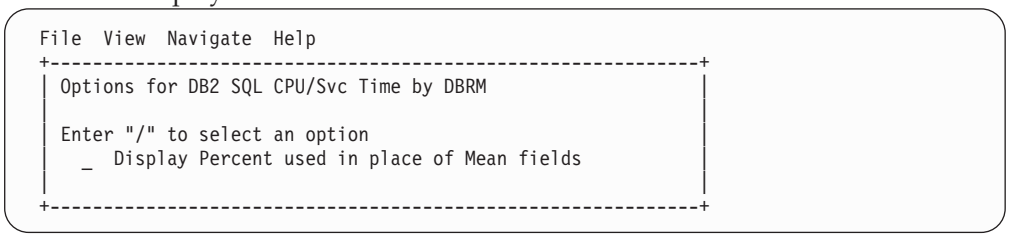
Cmd	When Applied To Object	Action
SS	DBRM	Sort lines by program and statement number.
EX	Seqno	Display DB2 EXPLAIN data
SD	DBRM	Sort next level entries by service time

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level entries by name
SD	Name	Sort next level entries by service time

SETUP options

Enter the SETUP primary command to select options for this report. The following window is displayed:



Display Percent used in place of Mean fields
When selected, this displays the percent of total CPU and total service time used by each DBRM (Module) and SQL statement, rather than the mean time.

F11 - DB2 SQL CPU/Svc time by stmt

Usage

A prerequisite for this report is activation of the DB2+ option during the measurement. This option records exact SQL call counts, total SQL service time and total SQL processing CPU time by embedded SQL statement. When measuring a distributed data facility (DDF) address space, SQL Enclave and SQL zIIP CPU times are also recorded.

Quantification

Each report line shows the following for each SQL statement:

- Number of SQL calls.
- Total CPU time for the SQL call processing.
- Mean SQL call CPU time, or percent of total used.
- Total service time for the SQL call processing.
- Mean service time per SQL call, or percent of total used.

A setup option is available to display the percent used in place of the mean fields. Keep in mind that measured CPU time applies only to the region being measured. DB2 executes in multiple address spaces and CPU could also be consumed in other DB2 regions not reflected in this report. For DDF only, this is reflected in the enclave CPU times shown in the detail windows of this report.

Detail line hierarchy

An unexpanded F11 report shows a line for each measured SQL request. You can expand each line to reveal one additional hierarchical level of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 SQL Request
 Level 2 SQL Statement Text
Level 2 SQL Request
  Level 3 SQL Statement Text

    ...
```

Detail line descriptions

SQL request detail line

This is the first-level detail line. It quantifies an individual SQL statement.

Under Heading	This is Displayed
Seqno	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either "S" or "D" precedes the sequence number indicating if the SQL statement is static or dynamic.
Name	The DBRM name.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request. When the statement number is zero, it indicates that the SQL statement was not produced by the DB2 precompiler or the SQL preprocessor, but was generated by some other means. For example, JDBC SQL statements have statement numbers that are zero.
SQL Function	The SQL function. The is the name of the SQL function: SELECT, FETCH, UPDATE, etc.
Nbr of Calls	The number of SQL calls counted for this SQL statement.
CPU Time: Total	The total CPU time for all SQL calls counted for this statement. Large numbers will be expressed in minutes with an M suffix.
CPU Time: Mean	The mean CPU time per SQL call. Large numbers will be expressed in minutes with an M suffix.
CPU time: Pct	The percent of total CPU time this statement used.
Svc Time: Total	The total service time for all SQL calls for this statement. Large numbers will be expressed in minutes with an M suffix.
Svc Time: Mean	The mean service time per SQL call. Large numbers will be expressed in minutes with an M suffix.
Svc time: Pct	The percent of total service time this statement used.

SQL statement text detail line

This is second-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This sample shows the report with one of the lines expanded to the second level to show SQL text.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F11: SQL CPU/Service Time by Statement (1300/CICS23A)         Row 00001 of 00017
Command ===> ____________________________________________________ Scroll ===> CSR

                                    Nbr of    --CPU Time--        --Svc Time--
Seqno  Name      Stmt# SQL Function SQL Calls  Total   Mean        Total   Mean

S00007 PFSAMPC    1466 FETCH             344   1.48    0.00432      2.35   0.00685
S00001 PFSAMPA     816 SELECT            342   0.88    0.00258      1.70   0.00497
              > SELECT NEXTLIM INTO : H FROM MRATE WHERE CURATE = : H

S00009 PFSAMPC    3054 FETCH           1,720   0.74    0.00043      1.15   0.00066
S00003 PFSAMPB     678 SELECT            342   0.47    0.00137      0.75   0.00221
S00004 PFSAMPC    1316 SELECT            172   0.42    0.00249      0.76   0.00446
S00010 PFSAMPB     816 UPDATE            172   0.39    0.00231      0.75   0.00441
S00002 PFSAMPB     408 SET HOST VAR      342   0.38    0.00112      0.72   0.00211
S00005 PFSAMPC    1347 SELECT            172   0.27    0.00161      0.48   0.00282
S00014 PFSAMPC    3155 SELECT            172   0.27    0.00160      0.41   0.00243
S00012 PFSAMPC    3179 SELECT            172   0.27    0.00158      0.47   0.00277
S00011 PFSAMPC    2989 SELECT            172   0.22    0.00130      0.38   0.00221
S00008 PFSAMPC    3046 OPEN              172   0.20    0.00121      0.29   0.00170
S00006 PFSAMPC    1443 OPEN              172   0.11    0.00067      0.31   0.00181
S00013 PFSAMPC    1562 CLOSE             172   0.04    0.00028      0.08   0.00048
S00015 PFSAMPC    3065 CLOSE             172   0.03    0.00021      0.05   0.00034
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Seqno	Display context help information.
++	Seqno	Show additional details.
+	Seqno	Expand to reveal next level.
–	Seqno	Collapse to hide next level.
M	Seqno	Display load module information.
P	Seqno	Display source program mapping.
EX	Seqno	Display DB2 EXPLAIN data

on headings

Cmd	When Applied To Object	Action
?	Seqno	Display context help information.
+	Seqno	Expand to reveal all entries.
–	Seqno	Collapse to show only first level.

Cmd	When Applied To Object	Action
SV	Seqno	Sort next level by value.
SS	Seqno	Sort lines by program and stmt number
SD	Seqno	Sort next level entries by service time

SETUP options

Enter the SETUP primary command to select options for this report. The following window is displayed:

```
+-------------------------------------------------------------+
| Options for DB2 SQL CPU/Svc Time by Stmt                    |
|                                                             |
| Enter "/" to select an option                               |
| / Show SQL statements with a positive SQLCODE               |
| (these are successful calls).                               |
|                                                             |
| / Show SQL statements with a negative SQLCODE               |
| (these are failed calls).                                   |
|                                                             |
| / Show SQL statements by statement number and               |
| ignore differences in SQL text.                             |
|                                                             |
| /Display Percent used in place of Mean fields               |
|                                                             |
+-------------------------------------------------------------+
```

Show SQL statements with positive SQLCODE
This shows SQL statements that end successfully with a zero or positive SQLCODE. When selected, successful SQL statements are included in the report.

Show SQL statements with negative SQLCODE
This shows SQL statements that are unsuccessful; that is, with a negative SQLCODE. When selected, unsuccessful SQL statements are included in the report.

Show SQL statements by statement number
This displays dynamic SQL statements consolidated by statement number and ignores differences in the SQL text. When selected, only one line is displayed per statement number regardless of the contents of the SQL text. The detail window for each statement number displays the SQL information for the first call from this statement.

Display Percent used in place of Mean fields
When selected, this displays the percent of total CPU and total service time used by each SQL statement, rather than the mean time.

F12 - DB2 SQL CPU/Svc time by plan

Usage

A prerequisite for this report is activation of the DB2+ option during the measurement. This option records exact SQL call counts, total SQL service time and total SQL processing CPU time by embedded SQL statement. When measuring a distributed data facility (DDF) address space, SQL Enclave and SQL zIIP CPU

times are also recorded. This report shows quantification by DB2 Plan. You can further expand each DB2 Plan line to see a further breakdown and quantification by individual embedded SQL statement.

Quantification

Each report line shows the following for each DB2 Plan and, when expanded, for each SQL statement observed under the Plan.

- Number of SQL calls.
- Total CPU time for the SQL call processing.
- Mean SQL call CPU time, or percent of total used.
- Total service time for the SQL call processing.
- Mean SQL call service time, or percent of total used.

A setup option is available to display the percent used in place of the mean fields. Keep in mind that measured CPU time applies only to the region being measured. DB2 executes in multiple address spaces and CPU could also be consumed in other DB2 regions not reflected in this report. For DDF only, this is reflected in the enclave CPU times shown in the detail windows of this report.

Detail line hierarchy

An unexpanded F12 report shows a line for each DB2 Plan under which SQL request were issued. You can expand each line to reveal two additional hierarchical levels of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 DB2 Plan
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text
    ...
```

Detail line descriptions

DB2 Plan detail line

This is the first-level detail line. Each line shows information about a DB2 Plan under which SQL request measurement data was recorded.

Under Heading	This is Displayed
Seqno	A sequence number assigned, by Application Performance Analyzer, to the DB2 plan.
Plan/Pgm	The DB2 Plan name.
Nbr of Calls	The number of SQL calls counted for this DB2 Plan.
CPU Time: Total	The total CPU time for all SQL calls counted for this statement. Large numbers will be expressed in minutes with an M suffix.
CPU Time: Mean	The mean CPU time per SQL call. Large numbers will be expressed in minutes with an M suffix.
CPU time: Pct	The percent of total CPU time this plan used.
Svc Time: Total	The total service time for all SQL calls for this statement. Large numbers will be expressed in minutes with an M suffix.
Svc Time: Mean	The mean service time per SQL call. Large numbers will be expressed in minutes with an M suffix.

Under Heading	This is Displayed
SVC time: Pct	The percent of total service time this plan used.

SQL request detail line

This is the second-level detail line shown directly under the DB2 Plan detail line. It quantifies an individual SQL statement.

Under Heading	This is Displayed
Seqno	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.
Plan/Pgm	The DBRM name.
Stmt#	The precompiler statement number of the SQL statement.When the statement number is zero, it indicates that the SQL statement was not produced by the DB2 precompiler or the SQL preprocessor, but was generated by some other means. For example, JDBC SQL statements have statement numbers that are zero.
SQL Function	The SQL function.
Nbr of Calls	The number of SQL calls counted for this statement.
CPU Time: Total	The total CPU time for all SQL calls counted for this statement. Large numbers will be expressed in minutes with an M suffix.
CPU Time: Mean	The mean CPU time per SQL call. Large numbers will be expressed in minutes with an M suffix.
CPU time: Pct	The percent of total CPU time this statement used.
Svc Time: Total	The total service time for all SQL calls for this statement. Large numbers will be expressed in minutes with an M suffix.
Svc Time: Mean	The mean service time per SQL call. Large numbers will be expressed in minutes with an M suffix.
SVC time: Pct	The percent of total service time this statement used.

SQL statement text detail line

This is third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This sample shows the report with the plan expanded to the second level and one of the SQL statement lines expanded to the third level to show SQL text.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F12: SQL CPU/Service Time by Plan (1300/CICS23A)              Row 00001 of 00018
Command ===> _____________________________________________ Scroll ===> CSR

                                    Nbr of    --CPU Time--        --Svc Time--
Seqno  Plan/PGM  Stmt# SQL Function SQL Calls  Total   Mean        Total   Mean

P0001  PFSAMPA                         4,810   6.25    0.00130     10.73   0.00223
→ S00007 PFSAMPC    1466 FETCH           344   1.48    0.00432      2.35   0.00685
→ S00001 PFSAMPA     816 SELECT          342   0.88    0.00258      1.70   0.00497
             > SELECT NEXTLIM INTO : H FROM MRATE WHERE CURATE = : H

→ S00009 PFSAMPC    3054 FETCH         1,720   0.74    0.00043      1.15   0.00066
→ S00003 PFSAMPB     678 SELECT          342   0.47    0.00137      0.75   0.00221
→ S00004 PFSAMPC    1316 SELECT          172   0.42    0.00249      0.76   0.00446
→ S00010 PFSAMPB     816 UPDATE          172   0.39    0.00231      0.75   0.00441
→ S00002 PFSAMPB     408 SET HOST V      342   0.38    0.00112      0.72   0.00211
→ S00005 PFSAMPC    1347 SELECT          172   0.27    0.00161      0.48   0.00282
→ S00014 PFSAMPC    3155 SELECT          172   0.27    0.00160      0.41   0.00243
→ S00012 PFSAMPC    3179 SELECT          172   0.27    0.00158      0.47   0.00277
→ S00011 PFSAMPC    2989 SELECT          172   0.22    0.00130      0.38   0.00221
→ S00008 PFSAMPC    3046 OPEN            172   0.20    0.00121      0.29   0.00170
→ S00006 PFSAMPC    1443 OPEN            172   0.11    0.00067      0.31   0.00181
→ S00013 PFSAMPC    1562 CLOSE           172   0.04    0.00028      0.08   0.00048
→ S00015 PFSAMPC    3065 CLOSE           172   0.03    0.00021      0.05   0.00034
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

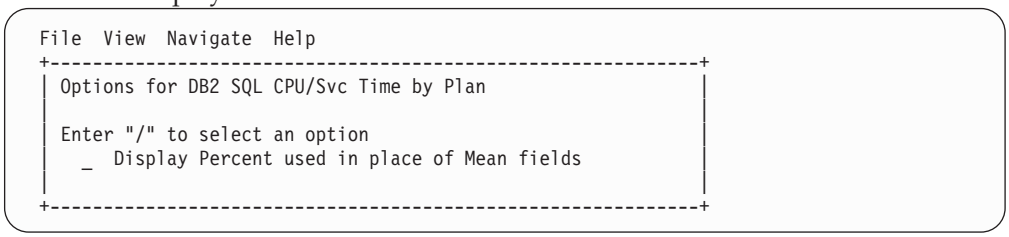
Cmd	When Applied To Object	Action
?	Plan Seqno, Seqno	Display context help information.
++	Plan Seqno, Seqno	Show additional details.
+	Plan Seqno, Seqno	Expand to reveal next level.
–	Plan Seqno, Seqno	Collapse to hide next level.
SV	Plan Seqno	Sort next level entries by value.
SS	Plan Seqno	Sort lines by program and statement number.
M	Seqno	Display load module information.
P	Seqno	Display source program mapping.
EX	Seqno	Display DB2 EXPLAIN data
SD	Plan Seqno	Sort next level entries by service time

on headings

Cmd	When Applied To Object	Action
?	Seqno	Display context help information.
+	Seqno	Expand to reveal all entries.
–	Seqno	Collapse to show only first level.
SV	Seqno	Sort next level by value.
SD	Seqno	Sort next level entries by service time

SETUP options

Enter the SETUP primary command to select options for this report. The following window is displayed:



Display Percent used in place of Mean fields
When selected, this displays the percent of total CPU and total service time used by each DB2 plan and SQL statement, rather than the mean time.

F13 - DB2 SQL threads analysis

Usage

Use this report to see information about DB2 threads observed during the sampling of SQL call activity.

Quantification

Each report line represents a range of REQCT values for one DB2 thread. A new line is reported each time a reset of the REQCT value occurs for the thread (when the value reaches 32767 and is reset to 1).

Detail line hierarchy

Report F13 shows only one level. The detail lines cannot be expanded.

Detail line descriptions

Thread detail line

Under Heading	This is Displayed
SeqNum	A unique sequence number assigned to the DB2 thread.
Thread Addr	An address of the DB2 'ACE' control block.
Attach	The type of attachment to DB2 for the thread. This can be: CAF, SSRF, CICS, IMS or CIB.
REQCT Range	This is the range of REQCT values observed. The lower value is the first REQCT value observed during any measurement sample. Lower values might have occurred during the measurement which were not sampled. The higher value is the last REQCT value observed during a measurement sample. Higher values might have occurred during the measurement which were not sampled. In the case where the range is a continuation after a REQCT reset, a lower value of 1 will be reported. In the case where the range is followed by another detail line after a REQCT reset, an upper value of 32768 will be reported.

Under Heading	This is Displayed
SQL Calls Executed	The number of SQL calls executed. This number is derived from the REQCT values.
SQL Calls Sampled	This is the number of unique REQCT values within the reported range for which samples occurred. This number will often be significantly lower than the Calls Executed number because the rate of SQL call processing is typically much higher than the measurement sampling rate. Hence, not all SQL calls are sampled.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F13: DB2 Threads Analysis (3398/CICS23A)                    Row 00001 of 00020
Command ===> ____________________________________________ Scroll ===> CSR

                                                --- SQL Calls ---
SeqNum   Thread Addr  Attach   REQCT Range     Executed  Sampled

000035    167CCAD0     CAF     00003-04003        4,001      844
                               Thread Totals      4,001      844

000036    167CCCA8     CAF     00003-04002        4,000      866
                               Thread Totals      4,000      866

000037    172B61F8     CAF     00003-04001        3,999      908
                               Thread Totals      3,999      908
```

F14 - DB2 CPU by plan/stored proc

Usage

Use this report to see how CPU resource was consumed by each stored procedure measured during the sampling interval. The percentage of time is reported for each DB2 plan under which measured stored procedure activity was recorded. Expand a plan line to see a further breakdown of time consumption by category.

Quantification

Each report line quantifies CPU usage as a percentage. Each percentage represents the ratio of CPU consumption observed for the reported item to the total CPU consumption measured in the address space.

Detail line hierarchy

An unexpanded F14 report shows a line for each plan that was measured in the stored procedure address space. You can expand each line to reveal additional hierarchical levels of detail (using the "+" line command).

Only the DB2SQL Category hierarchy is shown here. Activity for the Stored Procedure which is not related to SQL processing will be shown in the SYSTEM,

APPLCN, or NOSYMB categories. For information about these other categories, see “C01 - CPU usage by category” on page 75. The hierarchy is illustrated here:

```
Level 1 DB2 Plan
 Level 2 DB2SQL Category
  Level 3 DB2 DBRM
   Level 4 DB2 Load Module
```

Detail line descriptions

DB2 Plan detail line

This is the first-level detail line. Each line shows information about a DB2 Plan for which stored procedure measurement data was recorded.

Under Heading	This is Displayed
Seqno	A sequence number assigned to the DB2 plan.
Description	The plan name.
Percent of Time	The percentage of the measurement interval duration stored procedure requests under the indicated DB2 Plan were being processed.

Category detail line

This is a second-level detail line. This line shows one of five categories to which CPU time has been attributed:

APPLCN
Application Code

SYSTEM
System/OS Services

DB2SQL
SQL Processing

DATAMG
Data Management (DASD) Requests

NOSYMB
No Module Name Found, any execution measured at locations for which no load module name could be determined is attributed to this category.

As F14 is used for analyzing CPU consumption in DB2 Store Procedures, the category DB2SQL is the one where you should see the majority of the activity. This category and the detail lines under it are described here. For detailed information on the other categories, see “C01 - CPU usage by category” on page 75.

Under Heading	This is Displayed
Seqno	The category name “DB2SQL.”
Description	The category description “SQL Processing.”
Percent of Time	The percentage of the measurement interval duration SQL requests under the indicated DB2 Plan were being processed.

DB2 DBRM detail line

This is a third-level detail line shown directly under the DB2 Plan detail line. It quantifies the percentage CPU time for a specific SQL request.

Under Heading	This is Displayed
Seqno	A sequence number assigned, by Application Performance Analyzer, to the SQL statement.
Description	The DBRM name, DBRM statement number and SQL function.
Percent of Time	The percentage of the measurement interval duration the indicated SQL Request was being processed.

DB2 load module detail line

This is a fourth-level detail line showing activity for DB2 load modules used in the SQL request processing.

Under Heading	This is Displayed
Seqno	The DB2 Load Module name.
Description	If a DPA functional description is found for the module name, it is reported under this heading.
Percent of Time	The percentage of the measurement interval duration the indicated SQL Request being processed was in this module.

Sample reports

A sample report is shown here, it has been expanded to the second level.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F14: DB2 CPU by Plan/Stored Proc (0888/CICS23A)              Row 00001 of 00019
Command ===> _____________________________________________ Scroll ===> CSR

Seqno     Description           Percent of CPU time * 10.00%  ±2.3%
                                     *....1....2....3....4....5....6....7....8.
P0001     DB2MAIN               39.68 ====================
→ DB2SQL    SQL Processing      38.41 ===================
→ SYSTEM    System/OS Services   1.16 =
→ APPLCN    Application Code     0.05
→ NOSYMB    No Module Name       0.05
→ DATAMG    Data Mgmt Processin  0.00

P0002     TRSAMP                35.29 =================
→ DB2SQL    SQL Processing      34.07 ================
→ SYSTEM    System/OS Services   1.11 =
→ NOSYMB    No Module Name       0.11
→ APPLCN    Application Code     0.00
→ DATAMG    Data Mgmt Processin  0.00

P0003     WLSAMP1M              24.79 ==========
→ DB2SQL    SQL Processing      24.45 ==========
→ SYSTEM    System/OS Services   0.33
→ APPLCN    Application Code     0.00
→ DATAMG    Data Mgmt Processin  0.00
```

Line commands

on objects

Cmd	When Applied To Object	Action
?	Plan Seqno, Category, Seqno, Load Module	Display context help information.
++	Plan Seqno, Category, Seqno, Load Module	Show additional details.

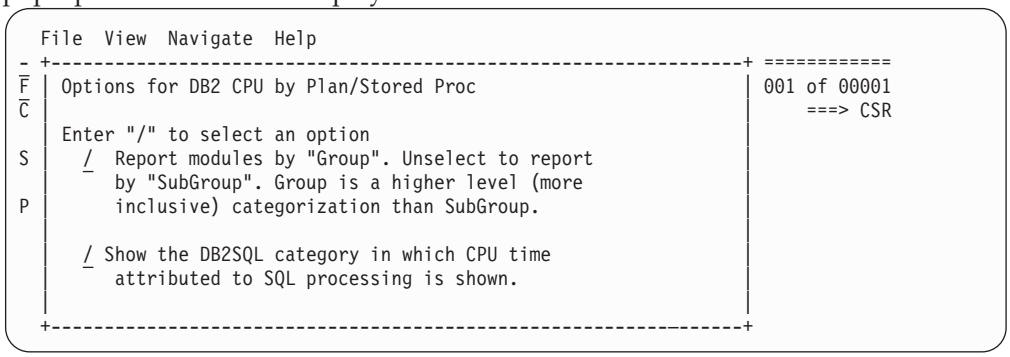
Cmd	When Applied To Object	Action
+	Plan Seqno, Category, Seqno, Load Module	Expand to reveal next level.
–	Plan Seqno, Category, Seqno, Load Module	Collapse to hide next level.
SV	Plan Seqno, Category, Seqno	Sort next level entries by value.
SN	Plan Seqno, Category, Seqno	Sort next level entries by name.
M	Load Module	Display load module information.
P	Load Module, Seqno	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Seqno, Description, Percent of CPU	Display context help information.
+	Seqno	Expand to reveal all entries.
+	Description	Expand description field size
+	Percent of CPU	Zoom in scale.
–	Seqno	Collapse to show only first level.
–	Description	Reduce description field size.
–	Percent of CPU	Zoom out scale.
SV	Seqno	Sort next level by value.
SN	Seqno	Sort next level by name.

SETUP options

Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:



Reporting by Group / SubGroup

This option allows you to aggregate modules into Group or SubGroup. SubGroup offers a more granular, less inclusive categorization than Group. For example, when reporting by Group, all SVCs would be reported under the “SVC” Group. When reporting by SubGroup, SVCs would be reported under SubGroups such as SVCTYPE1 and SVCTYPE2.

Show the DB2SQL category

This shows activity attributed to DB2 SQL statements. If it is not selected, the activity will instead be included in the appropriate system modules in the SYSTEM category. This is not available for CICS measurements.

F15 - DB2 SQL CPU/Svc Time by Rq Loc

Usage

A prerequisite for this report is activation of the DB2+ option during the measurement. Also this report is only created when measuring a Distributed Data Facility (DDF) address space. Exact SQL call counts, total SQL service time, total SQL processing CPU time, SQL Enclave, and SQL zIIP times by SQL statement are recorded. This report shows quantification by Requester Location. You can further expand each line to see a more detailed breakdown and quantification by individual SQL statement.

Note: This report is for DDF measurements only.

Quantification

Each report line shows the following for each Requester Location and, when expanded, for each SQL statement observed for the Requester Location.

- Number of SQL calls
- Total CPU time for the SQL call processing
- Mean SQL call CPU time, or percent of total used
- Total service time for the SQL call processing
- Mean SQL call service time, or percent of total used

A setup option is available to display the percent used in place of the mean fields. Remember that measured CPU time applies only to the region being measured. DB2 executes in multiple address spaces and CPU could also be consumed in other DB2 regions not reflected in this report. This is reflected in the enclave CPU times shown in the detail windows of this report.

Detail line hierarchy

An unexpanded F15 report shows a line for each module that issued SQL requests. You can expand each line to reveal two additional hierarchical levels of detail (using the "+" line command). The hierarchy is illustrated here:

```
Level 1 Requester Location
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text
```

Detail line descriptions

Requester Location detail line

This is the first-level detail line. Each line shows information about a Requester Location for which SQL request measurement data was recorded.

Under Heading	This is Displayed
Name	The Requester Location name.
Nbr of Calls	The number of SQL calls counted for this Requester Location.
CPU Time: Total	The total CPU time for all SQL calls counted for this Requester Location.
CPU Time: Mean	The mean CPU time per SQL call.
CPU time: Pct	The percent of total CPU time this requestor location used.

Under Heading	This is Displayed
Svc Time: Total	The total service time for all SQL calls for this Requester Location.
Svc Time: Mean	The mean service time per SQL call.
Svc time: Pct	The percent of total service time this requestor location used.

SQL request detail line

This is the second-level detail line shown directly under the Requester Location detail line. It quantifies an individual SQL statement.

Under Heading	This is Displayed
Name	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.
Plan/Pgm	The DBRM name.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request. When the statement number is zero, it indicates that the SQL statement was not produced by the DB2 precompiler or the SQL preprocessor, but was generated by some other means. For example, JDBC SQL statements have statement numbers that are zero.
SQL Function	The SQL function. The is the name of the SQL function, SELECT, FETCH, UPDATE, etc. Nbr of Calls The number of SQL calls counted for this SQL statement.
Nbr of Calls	The number of SQL calls counted for this SQL statement.
CPU Time: Total	The total CPU time for all SQL calls counted for this statement.
CPU Time: Mean	The mean CPU time per SQL call.
CPU time: Pct	The percent of total CPU time this statement used.
Svc Time: Total	The total service time for all SQL calls for this statement.
Svc Time: Mean	The mean service time per SQL call.
Svc time: Pct	The percent of total service time this statement used.

SQL statement text detail line

This is the third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This sample shows the report with one location expanded to the third level (SQL text).

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F15: DB2 SQL CPU/Svc Time by Rq Loc (6783/CICS23A)           Row 00001 of 01067
Command ===> ____________________________________________________ Scroll ===> CSR

                                    Nbr of     --CPU Time--     --Svc Time--
Name     Plan/Pgm  Stmt#  SQL Functn  SQL Calls  Total   Mean     Total   Mean

CABNETDB24                              295     1.66    0.00562   4.11   0.01394
 - D00156 DDF2425A   279  FETCH            1     0.73    0.73480   0.79   0.79001
               > Select count(*) from SYSIBM.SYSPACKSTMT
               > (PREPARE of SQL was done at Stmt# 269 Seqno D00154)

 - D00258 DDF2425A   279 FETCH             1     0.12    0.12491    0.14  0.14127
               > Select count(*) from SYSIBM.SYSVLTREE
               > (PREPARE of SQL was done at Stmt# 269 Seqno D00256)
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Location, Seqno	Display context help information.
++	Location, Seqno	Show additional details.
+	Location, Seqno	Expand to reveal next level.
–	Location, Seqno	Collapse to hide next level.
P	Seqno	Display source program mapping.
SV	Location	Sort next level entries by value.
SS	Location	Sort lines by program and statement number.
EX	Seqno	Display DB2 EXPLAIN data.
SD	Location	Sort next level entries by service time

on headings

Cmd	When Applied To Object	Action
?	Name	Display context help information.
+	Name	Expand to reveal all entries.
–	Name	Collapse to show only first level.
SV	Name	Sort next level by value.
SN	Name	Sort next level entries by name
SD	Name	Sort next level entries by service time

SETUP options

Enter the SETUP primary command to select options for this report. The following window is displayed:

```
File  View  Navigate  Help
+-------------------------------------------------------------+
| Options for DB2 SQL CPU/Svc Time by Rq Loc                  |
|                                                             |
| Enter "/" to select an option                               |
|   _  Display Percent used in place of Mean fields           |
|                                                             |
+-------------------------------------------------------------+
```

Display Percent used in place of Mean fields
When selected, this displays the percent of total CPU and total service time used by each Requestor Location and SQL statement, rather than the mean time.

F16 - DB2 SQL CPU/Svc Time by Enclave

Usage

A prerequisite for this report is activation of the DB2+ option during the measurement. Also, this report is only created when measuring a Distributed Data Facility (DDF) address space. Exact SQL call counts, total SQL service time, total SQL task CPU time, SQL Enclave, and SQL zIIP times by SQL statement are recorded. This report shows quantification by Enclave token. You can further expand each line to see a further breakdown and quantification by individual SQL statement.

Note: This report is for DDF measurements only.

Quantification

Each report line shows the following for each Enclave token and, when expanded, for each SQL statement observed for the Enclave token.

- Number of SQL calls
- Total task CPU time for the SQL call processing
- Mean SQL call task CPU time, or percent of total used
- Total service time for the SQL call processing
- Mean SQL call service time, or percent of total used

A setup option is available to display the percent used in place of the mean fields. Keep in mind that the task CPU time applies only to the region being measured. DB2 executes in multiple address spaces and CPU could also be consumed in other DB2 regions not reflected in this report. This is reflected in the enclave CPU times shown in the detail windows of this report.

Detail line hierarchy

An unexpanded F16 report shows a line for each Enclave token that issued SQL requests. You can expand each line to reveal two additional hierarchical levels of detail (using the + line command). The hierarchy is illustrated here:

```
Level 1 Enclave token
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text
```

Detail line descriptions

Enclave token detail line

This is the first-level detail line. Each line shows information about an Enclave token for which SQL request measurement data was recorded.

Under Heading	This is Displayed
Token	The Enclave token name.
Nbr of SQL Calls	The number of SQL calls counted for this Enclave token.
CPU Time: Total	The total task CPU time for all SQL calls counted for this Enclave token.
CPU Time: Mean	The mean CPU time per SQL call.
CPU time: Pct	The percent of total CPU time this Enclave token used.
Svc Time: Total	The total service time for all SQL calls for this Enclave token.
Svc Time: Mean	The mean service time per SQL call.
SVC time: Pct	The percent of total service time this Enclave token used.

SQL request detail line

This is the second-level detail line shown directly under the Enclave token detail line. It quantifies an individual SQL statement.

Under Heading	This is Displayed
Token	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request. When the statement number is zero, it indicates that the SQL statement was not produced by the DB2 precompiler or the SQL preprocessor, but was generated by some other means. For example, JDBC SQL statements have statement numbers that are zero.
SQL Function	The SQL function. This is the name of the SQL function (SELECT, FETCH, UPDATE, etc.)
Nbr of Calls	The number of SQL calls counted for this SQL statement.
CPU Time: Total	The total task CPU time for all SQL calls counted for this statement.
CPU Time: Mean	The mean task CPU time per SQL call.
CPU Time: Pct	The percent of total CPU time this statement used.
Svc Time: Total	The total service time for all SQL calls for this statement.
Svc Time: Mean	The mean service time per SQL call.
Svc Time: Pct	The percent of total service time this statement used.

SQL statement text detail line

This is the third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This sample shows the report with one Enclave token expanded to the third level (SQL text).

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
F16: DB2 SQL CPU/Svc Time by Enclave (1641/DB2ADIST)          Row 00001 of 01410
Command ===> _____________________________________________ Scroll ===> PAGE

                              Nbr of    --CPU Time--         --Svc Time--
Token      Stmt# SQL Function    SQL Calls  Total   Mean         Total    Mean

00000020-0000017E                      1     0.04   0.04177       0.05    0.05652
± D00026       0 EXECUTE IMME          1     0.04   0.04177       0.05    0.05652
              > EXPLAIN PLAN SET QUERYNO=1 FOR SELECT
              > COALESCE(FIELD_ONE_KEY, DEP2_COL1_KEY) AS COL1_KEY
              > ,COALESCE(DEP2_COL2_KEY, DEP3_COL2_KEY) AS COL2_KEY
              > ,DEP3_COL3_KEY ,DEP3_COL4 ,DEP3_COL5 ,DEP2_COL3
              > ,DEP2_COL4 ,FIELD_TWO ,FIELD_THREE ,FIELD_FOUR
              > ,FIELD_FIVE ,FIELD_SIX ,FIELD_SEVEN
              > ,CHAR(FIELD_EIGHT,ISO) ,CHAR(FIELD_NINE,ISO)
              > ,FIELD_TEN ,TIMEZONE () FROM MAIN FULL OUTER JOIN DEP2
              > ON DEP2_COL1_KEY = FIELD_ONE_KEY LEFT JOIN DEP3 ON
              > DEP3_COL1_KEY = DEP2_COL1_KEY AND DEP3_COL2_KEY =
              > DEP2_COL2_KEY ORDER BY COL1_KEY ,COL2_KEY
              > ,DEP3_COL3_KEY

00000024-00000198                      1     0.04   0.04154       0.04     0.04668
→ D00026       0 EXECUTE IMME          1     0.04   0.04154       0.04     0.04668
              > EXPLAIN PLAN SET QUERYNO=1 FOR SELECT
              > COALESCE(FIELD_ONE_KEY, DEP2_COL1_KEY) AS COL1_KEY
              > ,COALESCE(DEP2_COL2_KEY, DEP3_COL2_KEY) AS COL2_KEY
              > ,DEP3_COL3_KEY ,DEP3_COL4 ,DEP3_COL5 ,DEP2_COL3
              > ,DEP2_COL4 ,FIELD_TWO ,FIELD_THREE ,FIELD_FOUR
              > ,FIELD_FIVE ,FIELD_SIX ,FIELD_SEVEN
              > ,CHAR(FIELD_EIGHT,ISO) ,CHAR(FIELD_NINE,ISO)
              > ,FIELD_TEN ,TIMEZONE () FROM MAIN FULL OUTER JOIN DEP2
              > ON DEP2_COL1_KEY = FIELD_ONE_KEY LEFT JOIN DEP3 ON
              > DEP3_COL1_KEY = DEP2_COL1_KEY AND DEP3_COL2_KEY =
              > DEP2_COL2_KEY ORDER BY COL1_KEY ,COL2_KEY
              > ,DEP3_COL3_KEY

00000020-000001A8                      1     0.04   0.04167       0.04     0.04925
→ D00026       0 EXECUTE IMME          1     0.04   0.04167       0.04     0.04925
              > EXPLAIN PLAN SET QUERYNO=1 FOR SELECT
              > COALESCE(FIELD_ONE_KEY, DEP2_COL1_KEY) AS COL1_KEY
              > ,COALESCE(DEP2_COL2_KEY, DEP3_COL2_KEY) AS COL2_KEY
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Token, Seqno	Display context help information.
++	Token, Seqno	Show additional details.
+	Token, Seqno	Expand to reveal next level.
–	Token, Seqno	Collapse to hide next level.
SV	Token	Sort next level entries by value.
SS	Token	Sort lines by program and statement number.

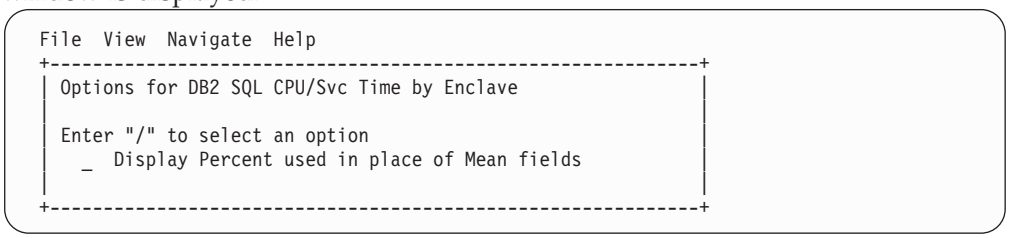
Cmd	When Applied To Object	Action
SD	Token	Sort next level entries by service time
P	Seqno	Display source program mapping.
EX	Seqno	Display DB2 EXPLAIN data.

on headings

Cmd	When Applied To Object	Action
?	Token	Display context help information.
+	Token	Expand to reveal all entries.
–	Token	Collapse to show only first level.
SV	Token	Sort next level by value.
SN	Token	Sort next level by name.
SD	Token	Sort next level by service time.

SETUP options

Enter the SETUP primary command to select options for this report. The following window is displayed:



Display Percent used in place of Mean fields
When selected, this displays the percent of total CPU and total service time used by each Enclave token and SQL statement, rather than the mean time.

F17 - DB2 SQL CPU/Svc Time by Corrid

Usage

A prerequisite for this report is activation of the DB2+ option during the measurement. Also this report is only created when measuring a Distributed Data Facility (DDF) address space. Exact SQL call counts, total SQL service time, total SQL task CPU time, SQL Enclave, and SQL zIIP times by SQL statement are recorded. This report shows quantification by Correlation ID. You can further expand each line to see a further breakdown and quantification by individual SQL statement.

Note: This report is for DDF measurements only.

Quantification

Each report line shows the following for each Correlation ID and, when expanded, for each SQL statement observed for the Correlation ID.

- Number of SQL calls
- Total task CPU time for the SQL call processing

- Mean SQL call task CPU time, or percent of total used
- Total service time for the SQL call processing
- Mean SQL call service time, or percent of total used

A setup option is available to display the percent used in place of the mean fields. Keep in mind that the task CPU time applies only to the region being measured. DB2 executes in multiple address spaces and CPU could also be consumed in other DB2 regions not reflected in this report. This is reflected in the enclave CPU times shown in the detail windows of this report.

Detail line hierarchy

An unexpanded F17 report shows a line for each Correlation ID that issued SQL requests. You can expand each line to reveal two additional hierarchical levels of detail (using the + line command). The hierarchy is illustrated here:

```
Level 1 Correlation ID
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text
```

Detail line descriptions

Correlation ID detail line

This is the first-level detail line. Each line shows information about a Correlation ID for which SQL request measurement data was recorded.

Under Heading	This is Displayed
Corrid	The Correlation ID name.
Nbr of SQL Calls	The number of SQL calls counted for this Correlation ID.
CPU Time: Total	The total task CPU time for all SQL calls counted for this Correlation ID.
CPU Time: Mean	The mean CPU time per SQL call.
CPU Time: Pct	The percent of total CPU time this Correlation ID used.
Svc Time: Total	The total service time for all SQL calls for this Correlation ID.
Svc Time: Mean	The mean service time per SQL call.
Svc Time: Pct	The percent of total service time this Correlation ID used.

SQL request detail line

This is the second-level detail line shown directly under the Correlation ID detail line. It quantifies an individual SQL statement.

Under Heading	This is Displayed
Corrid	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.

Under Heading	This is Displayed
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request. When the statement number is zero, it indicates that the SQL statement was not produced by the DB2 precompiler or the SQL preprocessor, but was generated by some other means. For example, JDBC SQL statements have statement numbers that are zero.
SQL Function	The SQL function. This is the name of the SQL function (SELECT, FETCH, UPDATE, etc.)
Nbr of Calls	The number of SQL calls counted for this SQL statement.
CPU Time: Total	The total task CPU time for all SQL calls counted for this statement.
CPU Time: Mean	The mean task CPU time per SQL call.
CPU Time: Pct	The percent of total CPU time this statement used.
Svc Time: Total	The total service time for all SQL calls for this statement.
Svc Time: Mean	The mean service time per SQL call.
Svc Time: Pct	The percent of total service time this statement used.

SQL statement text detail line

This is the third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This sample shows the report with one Correlation ID expanded to the third level (SQL text).

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
F17: DB2 SQL CPU/Svc Time by Corrid (1641/DB2ADIST)          Row 00001 of 00314
Command ===> _____________________________________________ Scroll ===> PAGE

                                Nbr of     --CPU Time--        --Svc Time--
Corrid       Stmt#  SQL Function   SQL Calls  Total   Mean        Total   Mean

db2bp.exe                             160     0.63   0.00394      25.92   0.16200
± D00026       0  EXECUTE IMME         4     0.16   0.04137      0.20    0.05004
              >  EXPLAIN PLAN SET QUERYNO=1 FOR SELECT
              >  COALESCE(FIELD_ONE_KEY, DEP2_COL1_KEY) AS COL1_KEY
              >  ,COALESCE(DEP2_COL2_KEY, DEP3_COL2_KEY) AS COL2_KEY
              >  ,DEP3_COL3_KEY ,DEP3_COL4 ,DEP3_COL5 ,DEP2_COL3
              >  ,DEP2_COL4 ,FIELD_TWO ,FIELD_THREE ,FIELD_FOUR
              >  ,FIELD_FIVE ,FIELD_SIX ,FIELD_SEVEN
              >  ,CHAR(FIELD_EIGHT,ISO) ,CHAR(FIELD_NINE,ISO)
              >  ,FIELD_TEN ,TIMEZONE () FROM MAIN FULL OUTER JOIN DEP2
              >  ON DEP2_COL1_KEY = FIELD_ONE_KEY LEFT JOIN DEP3 ON
              >  DEP3_COL1_KEY = DEP2_COL1_KEY AND DEP3_COL2_KEY =
              >  DEP2_COL2_KEY ORDER BY COL1_KEY ,COL2_KEY
              >  ,DEP3_COL3_KEY
± D00007       0  FETCH              4     0.07    0.01895      0.07    0.01983
              >  ( SELECT T1.FIELD_ONE_KEY AS
              >  UNION_COLUMN_01 ,T1.FIELD_TWO AS
              >  UNION_COLUMN_02 FROM AIF04.MAIN T1 WHERE NOT EXISTS
              >  (SELECT * FROM AIF04.DEP1 T2 WHERE T1.FIELD_ONE_KEY =
              >  T2.DEP1_COL1_KEY1 ) UNION SELECT T3.FIELD_ONE_KEY
              >  AS UNION_COLUMN_01 ,T3.FIELD_TWO
              >  AS UNION_COLUMN_02 FROM AIF04.MAIN T3 WHERE NOT EXISTS
              >  (SELECT * FROM AIF04.DEP2 T4 WHERE T3.FIELD_ONE_KEY =
              >  T4.DEP2_COL1_KEY ) ) UNION ALL ( SELECT
              >  T2.FIELD_ONE_KEY AS UNION_COLUMN_01
              >  ,T2.FIELD_TWO AS UNION_COLUMN_02 FROM
              >  AIF04.MAIN T2 WHERE NOT EXISTS (SELECT * FROM
              >  AIF04.DEP1 T1 WHERE T2.FIELD_ONE_KEY =
              >  T1.DEP1_COL1_KEY1 ) UNION SELECT T4.FIELD_ONE_KEY
              >  AS UNION_COLUMN_01 ,T4.FIELD_TWO
              >  AS UNION_COLUMN_02 FROM AIF04.MAIN T4 WHERE NOT EXISTS
              >  (SELECT * FROM AIF04.DEP2 T3 WHERE T4.FIELD_ONE_KEY =
              >  T3.DEP2_COL1_KEY ) )
              >  (PREPARE of SQL was done at Stmt# 0 Seqno D0005)
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Corrid, Seqno	Display context help information.
++	Corrid, Seqno	Show additional details.
+	Corrid, Seqno	Expand to reveal next level.
–	Corrid, Seqno	Collapse to hide next level.
SV	Corrid	Sort next level entries by value.
SS	Corrid	Sort lines by program and statement number.
SD	Corrid	Sort next level entries by service time
P	Seqno	Display source program mapping.
EX	Seqno	Display DB2 EXPLAIN data.

on headings

Cmd	When Applied To Object	Action
?	Corrid	Display context help information.
+	Corrid	Expand to reveal all entries.
–	Corrid	Collapse to show only first level.
SV	Corrid	Sort next level by value.
SN	Corrid	Sort next level by name.
SD	Corrid	Sort next level by service time.

SETUP options

Enter the SETUP primary command to select options for this report. The following window is displayed:

```
File  View  Navigate  Help
+-------------------------------------------------------------+
| Options for DB2 SQL CPU/Svc Time by Corrid                  |
|                                                             |
| Enter "/" to select an option                               |
|   _  Display Percent used in place of Mean fields           |
|                                                             |
+-------------------------------------------------------------+
```

Display Percent used in place of Mean fields
When selected, this displays the percent of total CPU and total service time used by each Correlation ID and SQL statement, rather than the mean time.

F18 - DB2 SQL CPU/Svc Time by Wkstn

Usage

A prerequisite for this report is activation of the DB2+ option during the measurement. Also this report is only created when measuring a Distributed Data Facility (DDF) address space. Exact SQL call counts, total SQL service time, total SQL task CPU time, SQL Enclave, and SQL zIIP times by SQL statement are recorded. This report shows quantification by Workstation ID. You can further expand each line to see a further breakdown and quantification by individual SQL statement.

Note: This report is for DDF measurements only.

Quantification

Each report line shows the following for each Workstation ID and, when expanded, for each SQL statement observed for the Workstation ID.

- Number of SQL calls
- Total task CPU time for the SQL call processing
- Mean SQL call task CPU time, or percent of total used
- Total service time for the SQL call processing
- Mean SQL call service time, or percent of total used

A setup option is available to display the percent used in place of the mean fields. Keep in mind that the task CPU time applies only to the region being measured.

DB2 executes in multiple address spaces and CPU could also be consumed in other DB2 regions not reflected in this report. This is reflected in the enclave CPU times shown in the detail windows of this report.

Detail line hierarchy

An unexpanded F18 report shows a line for each Workstation ID that issued SQL requests. You can expand each line to reveal two additional hierarchical levels of detail (using the + line command). The hierarchy is illustrated here:

```
Level 1 Workstation ID
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text
```

Detail line descriptions

Workstation ID detail line

This is the first-level detail line. Each line shows information about a Workstation ID for which SQL request measurement data was recorded.

Under Heading	This is Displayed
Wkstn	The Workstation ID name.
Nbr of SQL Calls	The number of SQL calls counted for this Workstation ID.
CPU Time: Total	The total task CPU time for all SQL calls counted for this Workstation ID.
CPU Time: Mean	The mean CPU time per SQL call.
CPU Time: Pct	The percent of total CPU time this Workstation ID used.
Svc Time: Total	The total service time for all SQL calls for this Workstation ID.
Svc Time: Mean	The mean service time per SQL call.
Svc Time: Pct	The percent of total service time this Workstation ID used.

SQL request detail line

This is the second-level detail line shown directly under the Workstation ID detail line. It quantifies an individual SQL statement.

Under Heading	This is Displayed
Wkstn	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request. When the statement number is zero, it indicates that the SQL statement was not produced by the DB2 precompiler or the SQL preprocessor, but was generated by some other means. For example, JDBC SQL statements have statement numbers that are zero.
SQL Function	The SQL function. This is the name of the SQL function (SELECT, FETCH, UPDATE, etc.)
Nbr of Calls	The number of SQL calls counted for this SQL statement.
CPU Time: Total	The total task CPU time for all SQL calls counted for this statement.

Under Heading	This is Displayed
CPU Time: Mean	The mean task CPU time per SQL call.
CPU Time: Pct	The percent of total CPU time this statement used.
Svc Time: Total	The total service time for all SQL calls for this statement.
Svc Time: Mean	The mean service time per SQL call.
Svc Time: Pct	The percent of total service time this statement used.

SQL statement text detail line

This is the third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This sample shows the report with one Workstation id expanded to the third level (SQL text)

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F18: DB2 SQL CPU/Svc Time by Wkstn (1641/DB2ADIST)           Row 00001 of 00337
Command ===> ____________________________________________________ Scroll ===> CSR

                                 Nbr of     --CPU Time--        --Svc Time--
Wkstn      Stmt#  SQL Function   SQL Calls  Total   Mean        Total   Mean

D12A3H26                             105     0.57   0.00548       0.61   0.00586
± D00016       0  EXECUTE IMME         3     0.11   0.03885       0.13    0.04345
               >  EXPLAIN PLAN SET QUERYNO=1 FOR SELECT
               > COALESCE(FIELD_ONE_KEY, DEP2_COL1_KEY) AS COL1_KEY
               > ,COALESCE(DEP2_COL2_KEY, DEP3_COL2_KEY) AS COL2_KEY
               > ,DEP3_COL3_KEY ,DEP3_COL4 ,DEP3_COL5 ,DEP2_COL3
               > ,DEP2_COL4 ,FIELD_TWO ,FIELD_THREE ,FIELD_FOUR
               > ,FIELD_FIVE ,FIELD_SIX ,FIELD_SEVEN
               > ,CHAR(FIELD_EIGHT,ISO) ,CHAR(FIELD_NINE,ISO)
               > ,FIELD_TEN ,TIMEZONE () FROM MAIN FULL OUTER JOIN DEP2
               > ON DEP2_COL1_KEY = FIELD_ONE_KEY LEFT JOIN DEP3 ON
               > DEP3_COL1_KEY = DEP2_COL1_KEY AND DEP3_COL2_KEY =
               > DEP2_COL2_KEY ORDER BY COL1_KEY ,COL2_KEY
               > ,DEP3_COL3_KEY

→ D00020       0  FETCH               12     0.08    0.00744      0.09    0.00763
               >  SELECT * FROM PLAN_TABLE ORDER BY QUERYNO, QBLOCKNO,
               >  PLANNO
               >  (PREPARE of SQL was done at Stmt# 0 Seqno D00017)

→ D00019       0  OPEN                3     0.08    0.02768      0.08    0.02891
               >  SELECT * FROM PLAN_TABLE ORDER BY QUERYNO, QBLOCKNO,
               >  PLANNO
               >  (PREPARE of SQL was done at Stmt# 0 Seqno D00017)

→ D00034       0  FETCH               3     0.05    0.01741      0.05    0.01809
               >  ( SELECT T1.FIELD_ONE_KEY AS
               > UNION_COLUMN_01 ,T1.FIELD_TWO AS
               > UNION_COLUMN_02 FROM AIF04.MAIN T1 WHERE NOT EXISTS
               > (SELECT * FROM AIF04.DEP1 T2 WHERE T1.FIELD_ONE_KEY =
               > T2.DEP1_COL1_KEY1 ) UNION SELECT T3.FIELD_ONE_KEY
               > AS UNION_COLUMN_01 ,T3.FIELD_TWO
               > AS UNION_COLUMN_02 FROM AIF04.MAIN T3 WHERE NOT EXISTS
               > (SELECT * FROM AIF04.DEP2 T4 WHERE T3.FIELD_ONE_KEY =
               > T4.DEP2_COL1_KEY ) ) UNION ALL ( SELECT
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

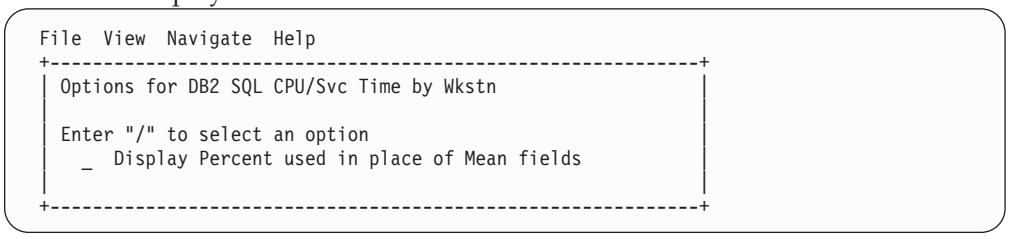
Cmd	When Applied To Object	Action
?	Wkstn, Seqno	Display context help information.
++	Wkstn, Seqno	Show additional details.
+	Wkstn, Seqno	Expand to reveal next level.
–	Wkstn, Seqno	Collapse to hide next level.
SV	Wkstn	Sort next level entries by value.
SS	Wkstn	Sort lines by program and statement number.
SD	Wkstn	Sort next level entries by service time
P	Seqno	Display source program mapping.
EX	Seqno	Display DB2 EXPLAIN data.

on headings

Cmd	When Applied To Object	Action
?	Wkstn	Display context help information.
+	Wkstn	Expand to reveal all entries.
–	Wkstn	Collapse to show only first level.
SV	Wkstn	Sort next level by value.
SN	Wkstn	Sort next level by name.
SD	Wkstn	Sort next level by service time.

SETUP options

Enter the SETUP primary command to select options for this report. The following window is displayed:



Display Percent used in place of Mean fields

When selected, this displays the percent of total CPU and total service time used by each Workstation ID and SQL statement, rather than the mean time.

F19 - DB2 SQL CPU/Svc Time by EndUsr

Usage

A prerequisite for this report is activation of the DB2+ option during the measurement. Also this report is only created when measuring a Distributed Data Facility (DDF) address space. Exact SQL call counts, total SQL service time, total SQL task CPU time, SQL Enclave, and SQL zIIP times by SQL statement are recorded. This report shows quantification by End User ID. You can further expand each line to see a further breakdown and quantification by individual SQL statement.

Note: This report is for DDF measurements only.

Quantification

Each report line shows the following for each End User ID and, when expanded, for each SQL statement observed for the End User ID.

- Number of SQL calls
- Total task CPU time for the SQL call processing
- Mean SQL call task CPU time, or percent of total used
- Total service time for the SQL call processing
- Mean SQL call service time, or percent of total used

A setup option is available to display the percent used in place of the mean fields. Keep in mind that the task CPU time applies only to the region being measured. DB2 executes in multiple address spaces and CPU could also be consumed in other DB2 regions not reflected in this report. This is reflected in the enclave CPU times shown in the detail windows of this report.

Detail line hierarchy

An unexpanded F19 report shows a line for each End User ID that issued SQL requests. You can expand each line to reveal two additional hierarchical levels of detail (using the + line command). The hierarchy is illustrated here:

```
Level 1 End User ID
 Level 2 SQL Request
  Level 3 SQL Statement Text
 Level 2 SQL Request
  Level 3 SQL Statement Text
```

Detail line descriptions

End User ID detail line

This is the first-level detail line. Each line shows information about an End User ID for which SQL request measurement data was recorded.

Under Heading	This is Displayed
EndUsr	The End User ID name.
Nbr of SQL Calls	The number of SQL calls counted for this End User ID.
CPU Time: Total	The total task CPU time for all SQL calls counted for this End User ID.
CPU Time: Mean	The mean CPU time per SQL call.
CPU Time: Pct	The percent of total CPU time this End User ID used.

Under Heading	This is Displayed
Svc Time: Total	The total service time for all SQL calls for this End User ID.
Svc Time: Mean	The mean service time per SQL call.
Svc Time: Pct	The percent of total service time this End User ID used.

SQL request detail line

This is the second-level detail line shown directly under the End User ID detail line. It quantifies an individual SQL statement.

Under Heading	This is Displayed
EndUsr	A sequence number. This is assigned by Application Performance Analyzer to uniquely identify the SQL request. Either “S” or “D” precedes the sequence number indicating if the SQL statement is static or dynamic.
Stmt#	The precompiler statement number. This is the statement number assigned by the precompiler to the SQL request. When the statement number is zero, it indicates that the SQL statement was not produced by the DB2 precompiler or the SQL preprocessor, but was generated by some other means. For example, JDBC SQL statements have statement numbers that are zero.
SQL Function	The SQL function. This is the name of the SQL function (SELECT, FETCH, UPDATE, etc.)
Nbr of Calls	The number of SQL calls counted for this SQL statement.
CPU Time: Total	The total task CPU time for all SQL calls counted for this statement.
CPU Time: Mean	The mean task CPU time per SQL call.
CPU Time: Pct	The percent of total CPU time this statement used.
Svc Time: Total	The total service time for all SQL calls for this statement.
Svc Time: Mean	The mean service time per SQL call.
Svc Time: Pct	The percent of total service time this statement used.

SQL statement text detail line

This is the third-level detail line shown directly under the SQL request detail line. It shows the SQL statement text. If necessary, more than one line is displayed in order to show the full SQL text.

Sample reports

This sample shows the report with one End User ID expanded to the third level (SQL text).

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
F19: DB2 SQL CPU/Svc Time by EndUsr (1641/DB2ADIST)          Row 00001 of 00336
Command ===> _____________________________________________ Scroll ===> CSR

                                Nbr of     --CPU Time--        --Svc Time--
EndUsr       Stmt#  SQL Function   SQL Calls  Total   Mean        Total   Mean

USR01                               121     0.67   0.00555       16.74   0.13837
± D00016       0  EXECUTE IMME         3     0.11   0.03885       0.13    0.04345
               >  EXPLAIN PLAN SET QUERYNO=1 FOR SELECT
               > COALESCE(FIELD_ONE_KEY, DEP2_COL1_KEY) AS COL1_KEY
               > ,COALESCE(DEP2_COL2_KEY, DEP3_COL2_KEY) AS COL2_KEY
               > ,DEP3_COL3_KEY ,DEP3_COL4 ,DEP3_COL5 ,DEP2_COL3
               > ,DEP2_COL4 ,FIELD_TWO ,FIELD_THREE ,FIELD_FOUR
               > ,FIELD_FIVE ,FIELD_SIX ,FIELD_SEVEN
               > ,CHAR(FIELD_EIGHT,ISO) ,CHAR(FIELD_NINE,ISO)
               > ,FIELD_TEN ,TIMEZONE () FROM MAIN FULL OUTER JOIN DEP2
               > ON DEP2_COL1_KEY = FIELD_ONE_KEY LEFT JOIN DEP3 ON
               > DEP3_COL1_KEY = DEP2_COL1_KEY AND DEP3_COL2_KEY =
               > DEP2_COL2_KEY ORDER BY COL1_KEY ,COL2_KEY
               > ,DEP3_COL3_KEY

→ D00020       0  FETCH               12     0.08    0.00744      0.09    0.00763
               >  SELECT * FROM PLAN_TABLE ORDER BY QUERYNO, QBLOCKNO,
               >  PLANNO
               >  (PREPARE of SQL was done at Stmt# 0 Seqno D00017)

→ D00019       0  OPEN                3     0.08    0.02768      0.08    0.02891
               >  SELECT * FROM PLAN_TABLE ORDER BY QUERYNO, QBLOCKNO,
               >  PLANNO
               >  (PREPARE of SQL was done at Stmt# 0 Seqno D00017)

→ D00034       0  FETCH               3     0.05    0.01741      0.05    0.01809
               >  ( SELECT T1.FIELD_ONE_KEY AS
               > UNION_COLUMN_01 ,T1.FIELD_TWO AS
               > UNION_COLUMN_02 FROM AIF04.MAIN T1 WHERE NOT EXISTS
               > (SELECT * FROM AIF04.DEP1 T2 WHERE T1.FIELD_ONE_KEY =
               > T2.DEP1_COL1_KEY1 ) UNION SELECT T3.FIELD_ONE_KEY
               > AS UNION_COLUMN_01 ,T3.FIELD_TWO
               > AS UNION_COLUMN_02 FROM AIF04.MAIN T3 WHERE NOT EXISTS
               > (SELECT * FROM AIF04.DEP2 T4 WHERE T3.FIELD_ONE_KEY =
               > T4.DEP2_COL1_KEY ) ) UNION ALL ( SELECT
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	EndUsr, Seqno	Display context help information.
++	EndUsr, Seqno	Show additional details.
+	EndUsr, Seqno	Expand to reveal next level.
–	EndUsr, Seqno	Collapse to hide next level.
SV	EndUsr	Sort next level entries by value.
SS	EndUsr	Sort lines by program and statement number.
SD	EndUsr	Sort next level entries by service time
P	Seqno	Display source program mapping.

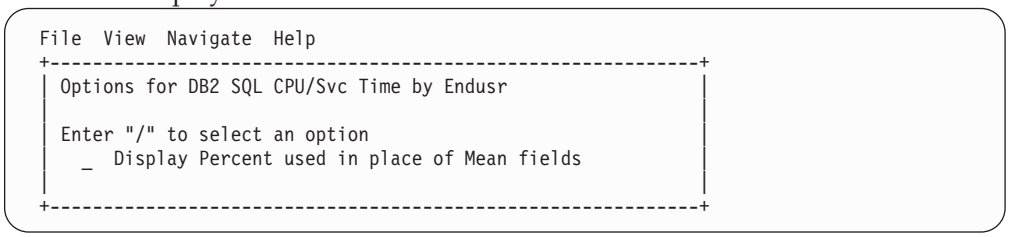
Cmd	When Applied To Object	Action
EX	Seqno	Display DB2 EXPLAIN data.

on headings

Cmd	When Applied To Object	Action
?	EndUsr	Display context help information.
+	EndUsr	Expand to reveal all entries.
–	EndUsr	Collapse to show only first level.
SV	EndUsr	Sort next level by value.
SN	EndUsr	Sort next level by name.
SD	EndUsr	Sort next level by service time.

SETUP options

Enter the SETUP primary command to select options for this report. The following window is displayed:



Display Percent used in place of Mean fields
When selected, this displays the percent of total CPU and total service time used by each End User ID and SQL statement, rather than the mean time.

DB2 EXPLAIN report

The DB2 EXPLAIN report is displayed by typing the command “EX” on an SQL statement, it is available in most DB2 reports.

Usage

Use this report to see information from PLAN_TABLE built by a DB2 EXPLAIN request for a particular SQL statement. Each report line represents a row in the result PLAN_TABLE. You obtain this report by issuing an “EX” line command against the SQL statement you want explained. Application Performance Analyzer will issue a dynamic EXPLAIN request on the SQL text of the statement you have selected.

Note:
Not all SQL statements can be the subject of a dynamic EXPLAIN request. Included among these are UPDATE or DELETE statements with a WHERE CURRENT OF clause.

A prerequisite for this report is activation of the DB2+ option during the measurement.

The EXPLAIN request is executed at the time you request it. It is not issued at the time of the measurement. Thus any changes made to the DB2 objects since the

measurement was requested will affect the EXPLAIN request. It is valid to select a DECLARE CURSOR or a SELECT INTO statement for EXPLAIN. Application Performance Analyzer will remove the DECLARE CURSOR clause or the INTO clause before issuing the dynamic EXPLAIN. Application Performance Analyzer will also substitute any :H host variable placeholders in static SQL statements with a question mark. Application Performance Analyzer can issue EXPLAIN on SQL statements up to 15000 bytes long.

Field descriptions

The values of certain columns from each row of PLAN_TABLE are displayed in each report line. To see more detailed information, including values of additional PLAN_TABLE columns, issue the "++" line command or press the ENTER key. For full descriptions of these columns, refer to *DB2 Universal Database™ for z/OS: Application Programming and SQL Guide*.

Under Heading	This is Displayed
Blk Num	The value of the QBLOCKNO column. This is also an input field. Use the "++" line command or press the ENTER key to display more information about the PLAN_TABLE row.
Plan Num	The value of the PLANNO column.
Mix Op	The value of the MIXOPSEQ column.
Join Mthd	The value of the METHOD column.
Acc Type	The value of the ACCESSTYPE column.
Match Cols	The value of the MATCHCOLS column.
Index Only	The value of the INDEXONLY column.
Sort New	U J O G The values of the SORTN_UNIQ, SORTN_JOIN, SORTN_ORDERBY and SORTN_GROUPBY columns.
Sort Comp	U J O G The values of the SORTC_UNIQ, SORTC_JOIN, SORTC_ORDERBY and SORTC_GROUPBY columns.
Table Name	The value of the TNAME column.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|DB2 EXPLAIN (0167/CICS23A)                                  Row 00001 of 00010 |
|Command ===> _____________________________________________Scroll ===> CSR      |
|                                                                               |
| Blk    Plan   Mix  Join   Acc   Match  Index  Sort New   Sort Comp   Table    |
| Num.   Num.    Op  Mthd   Type  Cols   Only   U J O G    U J O G     Name     |
|                                                                               |
| 0001     1     0   0      R     0      N     N N N N    N N N N     MAIN     |
| 0001     2     0   3            0      N     N N N N    Y N N N              |
| 0002     1     0   0      R     0      N     N N N N    N N N N     DEP1     |
| 0003     1     0   0      R     0      N     N N N N    N N N N     MAIN     |
| 0004     1     0   0      R     0      N     N N N N    N N N N     DEP2     |
| 0005     1     0   0      R     0      N     N N N N    N N N N     MAIN     |
| 0005     2     0   3            0      N     N N N N    Y N N N              |
| 0006     1     0   0      R     0      N     N N N N    N N N N     DEP1     |
| 0007     1     0   0      R     0      N     N N N N    N N N N     MAIN     |
| 0008     1     0   0      R     0      N     N N N N    N N N N     DEP2     |
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field).

on objects

Cmd	When Applied To Object	Action
?	Blk Num	Display context help information.
++	Blk Num	Show additional details.

Note: There are no line commands on headings for this report.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown below (shown in three scrollable screen segments).

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------+
|                                                          More:    +      |
|    DB2 EXPLAIN Data for Selected Row                                    |
|                                                                         |
|        Block number          0003                                       |
|        Plan number           0001                                       |
|        Join method           None                                       |
|        Table creator         USER4                                      |
|        Table name            MAIN                                       |
|        Access type           Table space scan                           |
|        Matching columns      0                                          |
|        Index creator         n/a                                        |
|        Index name            n/a                                        |
|        Index only            No                                         |
|        Merge join columns    0                                          |
|        Correlation name      T3                                         |
|        Page range screening  n/a                                        |
|        Join type             n/a                                        |
|        Query block type      SELECT                                     |
|        Direct row access     n/a                                        |
|                                                                         |
|        Sort       New     Composite                                     |
|        Unique     No      No                                            |
|        Join       No      No                                            |
|        Order by   No      No                                            |
|        Group by   No      No                                            |
|                                                                         |
|        Lock mode          Intent Share                                  |
|        Prefetch           Pure sequential                               |
|        Function evaluation After data retrieval and sorting             |
|        Multiple index operation sequence no. 0                          |
|                                                                         |
|        Parallelism Information:                                         |
|           Number of tasks            0                                  |
|           Group identifier           0                                  |
|           Join degree                0                                  |
|           Join group id              0                                  |
|           Sort composite group id    0                                  |
+-------------------------------------------------------------------------+
```

```
 File  View  Navigate  Help
+------------------------------------------------------------------------------+
|                                                          More:   - +         |
|    Sort new table group id       0                                           |
|    Parallelism mode              n/a                                         |
|                                                                              |
|                                                                              |
|  Descriptive Names Mapped to PLAN_TABLE Column Names                         |
|                                                                              |
|    Descriptive Name                          Column Name                     |
|    Block number                              QBLOCKNO                        |
|    Plan number                               PLANNO                          |
|    Join method                               METHOD                          |
|    Table creator                             CREATOR                         |
|    Table name                                TNAME                           |
|    Access type                               ACCESSTYPE                      |
|    Matching columns                          MATCHCOLS                       |
|    Index creator                             ACCESSCREATOR                   |
|    Index name                                ACCESSNAME                      |
|    Index only                                INDEXONLY                       |
|    Unique                                    SORTN_UNIQ, SORTC_UNIQ          |
|    Join                                      SORTN_JOIN, SORTC_JOIN          |
|    Order by                                  SORTN_ORDERBY, SORTC_ORDERBY    |
|    Group by                                  SORTN_GROUPBY, SORTC_GROUPBY    |
|    Lock mode                                 TSLOCKMODE                      |
|    Prefetch                                  PREFETCH                        |
|    Function evaluation                       COLUMN_FN_EVAL                  |
|    Multiple index operation sequence no.     MIXOPSEQ                        |
|    Number of tasks                           ACCESS_DEGREE                   |
|    Group identifier                          ACCESS_PGROUP_ID                |
|    Join degree                               JOIN_DEGREE                     |
|    Join group id                             JOIN_PGROUP_ID                  |
|    Sort composite group id                   SORTC_PGROUP_ID                 |
|    Sort new table group id                   SORTN_PGROUP_ID                 |
|    Parallelism mode                          PARALLELISM_MODE                |
|    Merge join columns                        MERGE_JOIN_COLS                 |
|    Correlation name                          CORRELATION_NAME                |
|    Page range screening                      PAGE_RANGE                      |
|    Join type                                 JOIN_TYPE                       |
+------------------------------------------------------------------------------+
```

```
 File  View  Navigate  Help
+------------------------------------------------------------------------------+
|                                                          More:    -          |
|    Query block type                          QBLOCK_TYPE                     |
|    Direct row access                         PRIMARY_ACCESSTYPE              |
+------------------------------------------------------------------------------+
```

DB2SQL category in C01 report

More DB2 measurement data is presented in the C01 CPU Usage by Category report, under the category DB2SQL. If you expand the DB2SQL with the "+" line command, SQL Statement items will be displayed.

A sample is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
C01: CPU Usage by Category (0645/CICS23A)                  Row 00001 of 00014
Command ===> _____________________________________________ Scroll ===> CSR

Name      Description             Percent of CPU time * 10.00%  ±2.6%
                                      *....1....2....3....4....5....6....7....8.
SYSTEM    System/OS Services     76.39 ======================================
DB2SQL    SQL Processing         17.02 ========
→ 00008     PFSAMPC(1466) FETCH   8.00 ====
→ 00003     PFSAMPB(408) SET HOS  2.10 =
→ 00010     PFSAMPB(816) UPDATE   2.03 =
→ 00004     PFSAMPC(1316) SELECT  1.56 =
→ 00006     PFSAMPC(1347) SELECT  0.94
→ 00002     PFSAMPB(678) SELECT   0.67
→ 00001     PFSAMPA(816) SELECT   0.67
→ 00007     PFSAMPC(1443) OPEN    0.61
→ 00009     PFSAMPC(1562) CLOSE   0.40

APPLCN    Application Code        6.58 ===
```

You can enter the "+" command to further expand each SQL statement one more level to display a breakdown by load module.

SQL Statement

This item attributes measured activity to a DB2 SQL statement.

Name Column

A sequence number is assigned by Application Performance Analyzer to each unique SQL statement observed during the measurement. This sequence number is shown in the name field. It is possible for some sequences numbers to be missing (sequence gaps) from the report. This will occur if a sequence number was assigned to SQL statements but no CPU activity was measured for these statements.

Description Column

The name of the program that issued the SQL request followed by the precompiler statement number (enclosed in parentheses) is shown here. This is followed by the SQL function (e.g. SELECT, INSERT, COMMIT).

Chapter 7. MQSeries performance analysis reports

This section describes the MQSeries performance analysis reports.

For information about ...	See ...
The MQSeries data extractor	"Overview of MQSeries data extractor"
Q01 MQSeries activity summary	"Q01 - MQSeries activity summary" on page 428
Q02 MQSeries CPU usage by queue	"Q02 - MQSeries CPU usage by queue" on page 430
Q03 MQSeries CPU usage by request	"Q03 - MQSeries CPU usage by request" on page 433
Q04 MQSeries CPU usage by transaction	"Q04 - MQSeries CPU usage by Txn" on page 435
Q05 MQSeries service time by queue	"Q05 - MQSeries service time by queue" on page 438
Q06 MQSeries Serv Time by Request	"Q06 - MQSeries service time by request" on page 441
Q07 MQSeries service time by transaction	"Q07 - MQSeries service time by Txn" on page 443
Q08 MQSeries wait time by queue	"Q08 - MQSeries wait time by queue" on page 446
Q09 MQSeries wait time by request	"Q09 - MQSeries wait time by request" on page 449
Q10 MQSeries wait time by transaction	"Q10 - MQSeries wait time by Txn" on page 451

Overview of MQSeries data extractor

In order to use the MQSeries Performance Analysis Reports, the MQSeries data extractor must be turned on when the Observation Request is entered. You must select the MQS data extractor in the Enter an Observation Request panel.

This data extractor provides the ability to observe/sample and report on MQSeries interface calls (both dynamic and static) in Batch, IMS and CICS programs. More specifically, to show the CPU and wait time spent in MQSeries interface calls and to attribute the time spent to a particular MQSeries interface call.

When the MQSeries data extractor is selected, Application Performance Analyzer will record the following information in the sample file for each MQSeries call that it observes:

- Environment (Batch, IMS or CICS)
- Load module that issued the call
- Offset within the load module of the return address from the MQ call
- Type of MQI call (MQOPEN, MQGET, etc.)
- Queue Manager name
- Object name (for example, the queue name)

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- Message size (actual length for MQPUT/MQPUT1, buffer length for MQGET)
- MQ Options (for MQOPEN, MQGET, MQPUT MQCLOSE)
- Message type, priority and persistence
- Transaction ID (CICS and IMS)

Note: In an IMS environment, Application Performance Analyzer might not be able to determine the default Queue Manager name for some samples if the Application Performance Analyzer task has not previously sampled any. This might result in the MQ object name being unknown for the first few calls. Subsequent sampling runs will obtain the MQ object name for each sample.

Q01 - MQSeries activity summary

Usage

Use this report to see a summary of the MQSeries requests (Calls) issued during the observation session and a list of the MQSeries objects referenced by these requests.

Detail line descriptions

Access to the following MQSeries objects observed

Each referenced object is described under this heading. For each object, the following information is reported:

Under Heading	This is Displayed
Object Seq. Nbr	A unique sequence number assigned by Application Performance Analyzer to each unique object.
Object Manager Name	The name of the MQSeries Queue Manager – usually four characters. This name is combined with the object name to fully qualify the name.
Object Name	A one to 48 character MQSeries object name. Some functions do not reference an object. In this case, Application Performance Analyzer shows an entry with 'n/a' in this field.

Under Heading	This is Displayed
Object Type	The type of object. One of the following is shown: • Queue • Namelist • Process • Storage Class • Queue Manager • Channel • Auth Info • CF Structure • Alias Queue • Model Queue • Local Queue • Remote Queue • Sender Channel • Server Channel • Reqstr Channel • Recvr Channel • Current Channel • Saved Channel • SVRCON Channel • CLNTCON Channel

MQSeries calls observed

Each observed MQSeries request is listed under this heading. For each request, the following information is reported:

Under Heading	This is Displayed
Module	The name of the load module that issued the MQSeries request.
CSECT	The name of the CSECT in the module containing the MQSeries CALL.
Offset	The hexadecimal offset in the CSECT of the return address to the CALL.
Function	The MQSeries function: • CONNECT • DISCONN • OPEN • CLOSE • GET • PUT • PUT1 • COMMIT • BACKOUT • INQUIRE • SET
Queue Mgr	The Queue Manager name.
Object Name	The object name.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
Q01: MQSeries Activity Summary (0643/MQTST01)                Row 00001 of 00023
Command ===> ____________________________________________________ Scroll ===> CSR

Access to the Following MQSeries Objects Observed

   Object Sequence Number 0001
   Queue Manager Name     CSQ1
   Object Name            n/a

   Object Sequence Number 0002
   Queue Manager Name     CSQ1
   Object Name            SYSTEM.DEFAULT.ALIAS.QUEUE
   Object Type            Queue

MQSeries Calls Observed

   Module    CSECT    Offset   Function   Queue Mgr   Object Name

   MQBCS01   MQBCS01  0030A4   CONNECT    CSQ1
   MQBCS01   MQBCS01  00313E   OPEN       CSQ1        SYSTEM.DEFAULT.ALIAS.Q
   MQBCS01   MQBCS01  00334C   PUT        CSQ1        SYSTEM.DEFAULT.ALIAS.Q
   MQBCS01   MQBCS01  0033DC   CLOSE      CSQ1        SYSTEM.DEFAULT.ALIAS.Q
   MQBCS01   MQBCS01  0033DC   CLOSE      CSQ1
   MQBCS01   MQBCS01  003452   COMMIT     CSQ1
   MQBCS01   MQBCS01  0034c8   DISCONN    CSQ1
```

Q02 - MQSeries CPU usage by queue

Usage

Use this report to see how CPU resources were consumed by MQSeries Requests. The percentage of CPU usage is reported by MQSeries Queue Name. Expand the Queue Name detail lines to see a further breakdown by individual MQSeries Request.

Quantification

Each report line quantifies CPU usage for an MQSeries Queue Name. This is further broken down by MQSeries Request.

Detail line hierarchy

An unexpanded Q02 report shows a line for each MQSeries Queue. You can expand each line to reveal one additional hierarchical level of detail.

The hierarchy is illustrated here:

```
Level 1 MQSeries Queue
 Level 2 MQSeries Request
 Level 2 MQSeries Request

 ...
```

Detail line descriptions

MQSeries queue detail line

This is the first-level detail line. Each line shows information about an MQSeries Queue for which measurement data was recorded.

Under Heading	This is Displayed
Name	The MQSeries Queue Manager name. This name, in combination with the Queue Name, uniquely identifies the MQSeries Queue.
Description	The MQSeries Queue Name. This name, in combination with the Queue Manager Name, uniquely identifies the MQSeries Queue.
Percent of CPU Time	The percentage of CPU time consumed while executing MQSeries Requests for the indicated MQSeries Queue Name.

MQSeries request detail line

This is a second-level detail line shown directly under the MQSeries Queue detail line. It quantifies CPU usage for a specific MQSeries Request.

Under Heading	This is Displayed
Name	The MQSeries Request function. This is the MQSeries function specified by the MQSeries Request.
Description	Program name and offset. This is the name of the program in which the MQSeries CALL was issued and the hexadecimal offset of the CALL return address.
Percent of CPU Time	The percentage of CPU time consumed while executing the indicated MQSeries Request.

Sample reports

A sample report is shown here. It has been fully expanded by entering "+" on the Name field.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
Q02: MQSeries CPU Usage by Queue (0643/MQTST01)              Row 00001 of 00010
Command ===> ____________________________________________ Scroll ===> CSR

Name      Description                 Percent of CPU time * 10.00%  ±2.8%
                                          *....1....2....3....4....5....6....7.
CSQ1      SYSTEM.DEFAULT.ALIAS.QUEUE 75.90 ====================================
→ PUT       MQBCS01+334C             75.50 ====================================
→ OPEN      MQBCS01+313E              0.32
→ CLOSE     MQBCS01+33DC              0.08

CSQ1    No Object Name                8.83 ===
→ CONNECT   MQBCS01+30A4              7.06 ===
→ DISCONN   MQBCS01+34C8              1.60 =
→ CLOSE     MQBCS01+33DC              0.08
→ COMMIT    MQBCS01+3452              0.08
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Queue, Request	Display context help information.
++	Queue, Request	Show additional details.
+	Queue	Expand to reveal next level.

Cmd	When Applied To Object	Action
–	Queue	Collapse to hide next level.
SV	Queue	Sort next level by value.
SN	Queue	Sort next level by name.
P	Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size
+	Percent of CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | > PUT       MQBCS01+334C             78.70 00000000000000000000000000|      |
| +-------------------------------------------------------------------------+   |
|                                                                               |
| Calculation Details                                                           |
|    MQ Series CPU measurements                1,201                            |
|    Total CPU measurements                    1,526                            |
|    Percent of total                          78.70%                           |
|                                                                               |
|                                                                               |
| MQSeries Request Details                                                      |
|    Calling Module   MQBCS01                                                   |
|    CSECT            MQBCS01                                                   |
|    Offset           00334C                                                    |
|    Request Type     PUT                                                       |
|    Queue Manager    CSQ1                                                      |
|    Object Name      SYSTEM.DEFAULT.LOCAL.QUEUE                                |
|    Object Type      Queue                                                     |
|                                                                               |
+-------------------------------------------------------------------------------+
```

Q03 - MQSeries CPU usage by request

Usage

Use this report to see how CPU resources were consumed by MQSeries Requests. The percentage of CPU usage is reported by MQSeries Request. Expand the MQSeries Request lines to see a further breakdown by MQSeries Queue.

Quantification

Each report line quantifies CPU usage for an MQSeries Request. This is further broken down by MQSeries Queue Name.

Detail line descriptions

MQSeries request detail line

This is a first-level detail line shown directly under the MQSeries Queue detail line. It quantifies CPU usage for a specific MQSeries Request.

Under Heading	This is Displayed
Name	The MQSeries Request function. This is the MQSeries function specified by the MQSeries Request.
Description	Program name and offset. This is the name of the program in which the MQSeries CALL was issued and the hexadecimal offset of the CALL return address.
Percent of CPU Time	The percentage of CPU time consumed while executing the indicated MQSeries Request.

MQSeries queue detail line

This is the second-level detail line. Each line shows information about an MQSeries Queue for which measurement data was recorded.

Under Heading	This is Displayed
Name	The MQSeries Queue Manager name. This name, in combination with the Queue Name, uniquely identifies the MQSeries Queue.
Description	The MQSeries Queue Name. This name, in combination with the Queue Manager Name, uniquely identifies the MQSeries Queue.
Percent of CPU Time	The percentage of CPU time consumed while executing MQSeries Requests for the indicated MQSeries Queue Name.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
Q03: MQSeries CPU Usage by Request (0643/MQTST01)            Row 00001 of 00007
Command ===> _____________________________________________ Scroll ===> CSR

Name      Description              Percent of CPU time * 10.00%  ±2.8%
                                       *....1....2....3....4....5....6....7.
PUT       MQBCS01+334C            75.50 ===================================
CONNECT   MQBCS01+30A4             7.06 ===
DISCONN   MQBCS01+34C8             1.60 =
OPEN      MQBCS01+313E             0.32
CLOSE     MQBCS01+33DC             0.08
CLOSE     MQBCS01+33DC             0.08
COMMIT    MQBCS01+3452             0.08
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Request, Queue	Display context help information.
++	Request, Queue	Show additional details.
+	Request	Expand to reveal next level.
–	Request	Collapse to hide next level.
P	Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size
+	Percent of CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | > PUT       MQBCS01+334C             78.70 00000000000000000000000000|     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     MQ Series CPU measurements               1,201                           |
|     Total CPU measurements                   1,526                           |
|     Percent of total                         78.70%                           |
|                                                                               |
|                                                                               |
|  MQSeries Request Details                                                     |
|     Calling Module   MQBCS01                                                  |
|     CSECT            MQBCS01                                                  |
|     Offset           00334C                                                   |
|     Request Type     PUT                                                      |
|     Queue Manager    CSQ1                                                     |
|     Object Name      SYSTEM.DEFAULT.LOCAL.QUEUE                               |
|     Object Type      Queue                                                    |
|                                                                               |
+-------------------------------------------------------------------------------+
```

Q04 - MQSeries CPU usage by Txn

Usage

Use this report to see how CPU resources were consumed by MQSeries Requests. The percentage of CPU usage is reported by CICS or IMS transaction. Expand the transaction detail lines to see a further breakdown by MQSeries Queue and by individual MQSeries Request.

Quantification

Each report line quantifies CPU usage for a CICS or IMS transaction under which MQSeries Requests were serviced. This is further broken down by MQSeries Queue and by MQSeries Request.

Detail line hierarchy

An unexpanded Q04 report shows a line for each CICS or IMS transaction. You can expand each line to reveal one additional hierarchical level of detail.

The hierarchy is illustrated here:

```
Level 1 CICS/IMS Transaction Level
 Level 2 MQSeries Queue
  Level 3 MQSeries Request
  Level 3 MQSeries Request

 ...
```

Detail line descriptions

CICS/IMS transaction detail line

This is the first-level detail line. Each line shows information about a CICS or IMS transaction under which MQSeries requests were issued.

Under Heading	This is Displayed
Name	A CICS or IMS transaction code. This is the transaction under which measured MQSeries Requests were issued. “Batch” is shown here for request not issued under control of a CICS or IMS transaction.
Description	“CICS Transaction” or “IMS Transaction”. “Not in IMS/CICS Txn” is shown here if the request was not issued under control of a CICS or IMS transaction.
Percent of CPU Time	The percentage of CPU time consumed while executing MQSeries Requests under control of the indicated transaction.

MQSeries queue detail line

This is the second-level detail line. Each line shows information about an MQSeries Queue for which measurement data was recorded.

Under Heading	This is Displayed
Name	The MQSeries Queue Manager name. This name, in combination with the Queue Name, uniquely identifies the MQSeries Queue.
Description	The MQSeries Queue Name. This name, in combination with the Queue Manager Name, uniquely identifies the MQSeries Queue.
Percent of CPU Time	The percentage of CPU time consumed while executing MQSeries Requests for the indicated MQSeries Queue Name.

MQSeries request detail line

This is a third-level detail line shown directly under the MQSeries Queue detail line. It quantifies CPU usage for a specific MQSeries Request.

Under Heading	This is Displayed
Name	The MQSeries Request function. This is the MQSeries function specified by the MQSeries Request.
Description	Program name and offset. This is the name of the program in which the MQSeries CALL was issued and the hexadecimal offset of the CALL return address.
Percent of CPU Time	The percentage of CPU time consumed while executing the indicated MQSeries Request.

Sample reports

A sample report is show here. It has been fully expanding by entering “+” on the Name heading.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
Q04: MQSeries CPU Usage by Txn/Queue (0025/MQTST01)          Row 00001 of 00015
Command ===> _____________________________________________ Scroll ===> CSR

Name      Description                Percent of CPU time * 10.00%  ±2.8%
                                        *....1....2....3....4....5....6....7.
MQS1      CICS Transaction          13.71 ======
→ CSQ1      CSQ1.DEFXMIT.QUEUE      13.20 ======
  → GET       MQSAMP1+2DF2          10.92 ====
  → OPEN      MQSAMP1+2C2C           1.94 =
  → CLOSE     MQSAMP1+31A0           0.34
→ CSQ1      No Object Name           0.50
  → CLOSE     MQSAMP1+31A0           0.50

MQDR      CICS Transaction           8.03 ====
→ CSQ1      CSQ1.DEFXMIT.QUEUE       7.80 ====
  → PUT       CSQ4CVK1+284E          5.65 ===
  → OPEN      CSQ4CVK1+277E          1.86 =
  → CLOSE     CSQ4CVK1+29E2          0.28
→ CSQ1      No Object Name           0.23
  → CLOSE     CSQ4CVK1+29E2          0.12
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Transactions, Queue, Request	Display context help information.
++	Transactions, Queue, Request	Show additional details.
+	Transactions, Queue	Expand to reveal next level.
–	Transactions, Queue	Collapse to hide next level.
SV	Transactions, Queue	Sort next level by value.
SN	Transactions, Queue	Sort next level by name.
P	Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size
+	Percent of CPU	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of CPU	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | > PUT       MQBCS01+334C             78.70 00000000000000000000000000|      |
| +-------------------------------------------------------------------+         |
|                                                                               |
| Calculation Details                                                           |
|    MQ Series CPU measurements               1,201                            |
|    Total CPU measurements                   1,526                            |
|    Percent of total                         78.70%                           |
|                                                                               |
|                                                                               |
| MQSeries Request Details                                                      |
|    Calling Module   MQBCS01                                                   |
|    CSECT            MQBCS01                                                   |
|    Offset           00334C                                                    |
|    Request Type     PUT                                                       |
|    Queue Manager    CSQ1                                                      |
|    Object Name      SYSTEM.DEFAULT.LOCAL.QUEUE                                |
|    Object Type      Queue                                                     |
|                                                                               |
+-------------------------------------------------------------------------------+
```

Q05 - MQSeries service time by queue

Usage

Use this report to see how time was consumed by MQSeries Requests. The percentage of time is reported by MQSeries Queue Name. Expand the Queue Name detail lines to see a further breakdown by individual MQSeries Request.

Quantification

Each report line quantifies service time for an MQSeries Queue Name. The service time is the actual time measured MQSeries requests were being processed. This is further broken down by MQSeries Request.

Detail line hierarchy

An unexpanded Q05 report shows a line for each MQSeries Queue. You can expand each line to reveal one additional hierarchical level of detail.

The hierarchy is illustrated here:

```
Level 1 MQSeries Queue
 Level 2 MQSeries Request
 Level 2 MQSeries Request

 ...
```

Detail line descriptions

MQSeries queue detail line

This is the first-level detail line. Each line shows information about an MQSeries Queue for which measurement data was recorded.

Under Heading	This is Displayed
Name	The MQSeries Queue Manager name. This name, in combination with the Queue Name, uniquely identifies the MQSeries Queue.
Description	The MQSeries Queue Name. This name, in combination with the Queue Manager Name, uniquely identifies the MQSeries Queue.
Percent of Time	The percentage of the measurement interval duration MQSeries Requests for the indicated Queue Name were being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

MQSeries request detail line

This is a second-level detail line shown directly under the MQSeries Queue detail line. It quantifies time consumed during executions of a specific MQSeries Request.

Under Heading	This is Displayed
Name	The MQSeries Request function. This is the MQSeries function specified by the MQSeries Request.
Description	Program name and offset. This is the name of the program in which the MQSeries CALL was issued and the hexadecimal offset of the CALL return address.
Percent of Time	The percentage of the measurement interval duration the indicated MQSeries request was being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

Sample reports

A sample report is show here. It has been fully expanded by pressing "+" on the Name heading.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
Q05: MQSeries Service Time by Queue (0025/MQTST01)           Row 00001 of 00010
Command ===> ____________________________________________________ Scroll ===> CSR

Name      Description                Percent of time * 10.00%  ±0.9%
                                         *....1....2....3....4....5....6....7.
CSQ1      CSQ1.DEFXMIT.QUEUE        29.71 ==============
→ GET       MQSAMP1+2DF2            14.79 =======
→ PUT       CSQ4CVK1+284E            8.56 ===
→ OPEN      CSQ4CVK1+277E            2.64 =
→ OPEN      MQSAMP1+2C2C             2.54 =
→ CLOSE     CSQ4CVK1+29E2            0.61
→ CLOSE     MQSAMP1+31A0             0.55

CSQ1      No Object Name            0.90
→ CLOSE     MQSAMP1+31A0             0.50
→ CLOSE     CSQ4CVK1+29E2            0.39
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Queue, Request	Display context help information.
++	Queue, Request	Show additional details.
+	Queue	Expand to reveal next level
–	Queue	Collapse to hide next level
SV	Queue	Sort next level by value.
SN	Queue	Sort next level by name.
P	Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size
+	Percent of Time	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of Time	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | > PUT       MQBCS01+334C             72.46 00000000000000000000000000|     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     MQ Series activity measurements           1,645                           |
|     Total measurements                        2,270                           |
|     Percent of total                          72.46%                          |
|                                                                               |
|                                                                               |
|  MQSeries Request Details                                                     |
|     Calling Module   MQBCS01                                                  |
|     CSECT            MQBCS01                                                  |
|     Offset           00334C                                                   |
|     Request Type     PUT                                                      |
|     Queue Manager    CSQ1                                                     |
|     Object Name      SYSTEM.DEFAULT.LOCAL.QUEUE                               |
|     Object Type      Queue                                                    |
|                                                                               |
+-------------------------------------------------------------------------------+
```

Q06 - MQSeries service time by request

Usage

Use this report to see how time was consumed by MQSeries Requests. The percentage of time is reported by MQSeries Request. Expand the MQSeries Request lines to see a further breakdown by MQSeries Queue.

Quantification

Each report line quantifies service time for an MQSeries Request. This is further broken down by MQSeries Queue Name.

Detail line hierarchy

An unexpanded Q06 report shows a line for each MQSeries Request. You can expand each line to reveal one additional hierarchical level of detail.

The hierarchy is illustrated here:

```
Level 1 MQSeries Request
 Level 2 MQSeries Queue
 Level 2 MQSeries Queue

 ...
```

Detail line descriptions

MQSeries request detail line

This is a first-level detail line shown directly under the MQSeries Queue detail line. It quantifies consumption of time for a specific MQSeries Request.

Under Heading	This is Displayed
Name	The MQSeries Request function. This is the MQSeries function specified by the MQSeries Request.
Description	Program name and offset. This is the name of the program in which the MQSeries CALL was issued and the hexadecimal offset of the CALL return address.
Percent of Time	The percentage of the measurement interval duration the indicated MQSeries request was being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

MQSeries queue detail line

This is the second-level detail line. Each line shows information about an MQSeries Queue for which measurement data was recorded.

Under Heading	This is Displayed
Name	The MQSeries Queue Manager name. This name, in combination with the Queue Name, uniquely identifies the MQSeries Queue.
Description	The MQSeries Queue Name. This name, in combination with the Queue Manager Name, uniquely identifies the MQSeries Queue.

Under Heading	This is Displayed
Percent of Time	The percentage of the measurement interval duration MQSeries Requests for the indicated Queue Name were being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
Q06: MQSeries Service Time by Request (0643/MQTST01)          Row 00001 of 00007
Command ===> ____________________________________________________ Scroll ===> CSR

Name      Description              Percent of time * 10.00%  ±2.3%
                                       *....1....2....3....4....5....6....7.
PUT       MQBCS01+334C            60.38 ==============================
CONNECT   MQBCS01+30A4            10.84 ====
DISCONN   MQBCS01+34C8             1.42 =
COMMIT    MQBCS01+3452             1.09 =
OPEN      MQBCS01+313E             0.21
CLOSE     MQBCS01+33DC             0.05
CLOSE     MQBCS01+33DC             0.05
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Request, Queue	Display context help information.
++	Request, Queue	Show additional details.
+	Request	Expand to reveal next level
–	Request	Collapse to hide next level
P	Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size
+	Percent of Time	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of Time	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+------------------------------------------------------------------------------+
|                                                                              |
| +--------------- The following report line was selected ---------------+     |
| | > PUT       MQBCS01+334C             72.46 00000000000000000000000000|     |
| +--------------------------------------------------------------------+     |
|                                                                              |
| Calculation Details                                                          |
|    MQ Series activity measurements           1,645                           |
|    Total measurements                        2,270                           |
|    Percent of total                          72.46%                          |
|                                                                              |
|                                                                              |
| MQSeries Request Details                                                     |
|    Calling Module   MQBCS01                                                  |
|    CSECT            MQBCS01                                                  |
|    Offset           00334C                                                   |
|    Request Type     PUT                                                      |
|    Queue Manager    CSQ1                                                     |
|    Object Name      SYSTEM.DEFAULT.LOCAL.QUEUE                               |
|    Object Type      Queue                                                    |
|                                                                              |
+------------------------------------------------------------------------------+
```

Q07 - MQSeries service time by Txn

Usage

Use this report to see how time was consumed by MQSeries Requests. The percentage of time is reported by CICS or IMS transaction. Expand the transaction detail lines to see a further breakdown by MQSeries Queue and by individual MQSeries Request.

Quantification

Each report line quantifies time consumed by MQSeries requests in a CICS or IMS transaction. This is further broken down by MQSeries Queue and by MQSeries Request.

Detail line hierarchy

An unexpanded Q07 report shows a line for each CICS or IMS transaction. You can expand each line to reveal one additional hierarchical level of detail.

The hierarchy is illustrated here:

```
Level 1 CICS/IMS Transaction
 Level 2 MQSeries Queue
  Level 3 MQSeries Request
  Level 3 MQSeries Request

  ...
```

Detail line descriptions

CICS/IMS transaction detail line

This is the first-level detail line. Each line shows information about a CICS or IMS transaction under which MQSeries requests were issued.

Under Heading	This is Displayed
Name	A CICS or IMS transaction code. This is the transaction under which measured MQSeries Requests were issued. “Batch” is shown here for request not issued under control of a CICS or IMS transaction.
Description	“CICS Transaction” or “IMS Transaction.” “Not in IMS/CICS Txn” is shown here if the request was not issued under control of a CICS or IMS transaction.
Percent of Time	The percentage of the measurement interval duration MQSeries Requests under control of the indicated transaction were being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

MQSeries queue detail line

This is the second-level detail line. Each line shows information about an MQSeries Queue for which measurement data was recorded.

Under Heading	This is Displayed
Name	The MQSeries Queue Manager name. This name, in combination with the Queue Name, uniquely identifies the MQSeries Queue.
Description	The MQSeries Queue Name. This name, in combination with the Queue Manager Name, uniquely identifies the MQSeries Queue.
Percent of Time	The percentage of the measurement interval duration MQSeries Requests for the indicated Queue Name were being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

MQSeries request detail line

This is a third-level detail line shown directly under the MQSeries Queue detail line. It quantifies time consumption for a specific MQSeries Request.

Under Heading	This is Displayed
Name	The MQSeries Request function. This is the MQSeries function specified by the MQSeries Request.
Description	Program name and offset. This is the name of the program in which the MQSeries CALL was issued and the hexadecimal offset of the CALL return address.
Percent of Time	The percentage of the measurement interval duration the indicated MQSeries request was being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

Sample reports

A fully expanded report is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
Q07: MQSeries Service Time by Txn/Queue (0025/MQTST01)        Row 00001 of 00015
Command ===> ____________________________________________________ Scroll ===> CSR

Name      Description                Percent of time * 10.00%  ±0.9%
                                        *....1....2....3....4....5....6....7.
MQS1      CICS Transaction          18.40 =========
→ CSQ1      CSQ1.DEFXMIT.QUEUE      17.89 =========
  → GET       MQSAMP1+2DF2          14.79 =======
  → OPEN      MQSAMP1+2C2C           2.54 =
  → CLOSE     MQSAMP1+31A0           0.55
→ CSQ1      No Object Name           0.50
  → CLOSE     MQSAMP1+31A0           0.50

MQDR      CICS Transaction          12.21 ====
→ CSQ1      CSQ1.DEFXMIT.QUEUE      11.82 ====
  → PUT       CSQ4CVK1+284E          8.56 ===
  → OPEN      CSQ4CVK1+277E          2.64 =
  → CLOSE     CSQ4CVK1+29E2          0.61
→ CSQ1      No Object Name           0.39
  → CLOSE     CSQ4CVK1+29E2          0.39
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Transaction, Queue, Request	Display context help information.
++	Transaction, Queue, Request	Show additional details.
+	Transaction, Queue	Expand to reveal next level.
–	Transaction, Queue	Collapse to hide next level.
SV	Transaction, Queue	Sort next level by value.
SN	Transaction, Queue	Sort next level by name.
P	Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size
+	Percent of Time	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of Time	Zoom out scale.

Cmd	When Applied To Object	Action
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+------------------------------------------------------------------------------+
|                                                                              |
|  +--------------- The following report line was selected ---------------+    |
|  | > PUT       MQBCS01+334C             72.46 00000000000000000000000000|    |
|  +------------------------------------------------------------------------+    |
|                                                                              |
|  Calculation Details                                                         |
|     MQ Series activity measurements           1,645                          |
|     Total measurements                        2,270                          |
|     Percent of total                          72.46%                         |
|                                                                              |
|                                                                              |
|  MQSeries Request Details                                                    |
|     Calling Module   MQBCS01                                                 |
|     CSECT            MQBCS01                                                 |
|     Offset           00334C                                                  |
|     Request Type     PUT                                                     |
|     Queue Manager    CSQ1                                                    |
|     Object Name      SYSTEM.DEFAULT.LOCAL.QUEUE                              |
|     Object Type      Queue                                                   |
|                                                                              |
+------------------------------------------------------------------------------+
```

Q08 - MQSeries wait time by queue

Usage

Use this report to see how much wait time occurred during processing of MQSeries Requests. The percentage of time is reported by MQSeries Queue Name. Expand the Queue Name detail lines to see a further breakdown by individual MQSeries Request.

Quantification

Each report line quantifies wait time attributed to requests for an MQSeries Queue Name. This is further broken down by MQSeries Request.

Detail line hierarchy

An unexpanded Q08 report shows a line for each MQSeries Queue. You can expand each line to reveal one additional hierarchical level of detail.

The hierarchy is illustrated here:

```
Level 1 MQSeries Queue
 Level 2 MQSeries Request
 Level 2 MQSeries Request

 ...
```

Detail line descriptions

MQSeries queue detail line

This is the first-level detail line. Each line shows information about an MQSeries Queue for which measurement data was recorded.

Under Heading	This is Displayed
Name	The MQSeries Queue Manager name. This name, in combination with the Queue Name, uniquely identifies the MQSeries Queue..
Description	The MQSeries Queue Name. This name, in combination with the Queue Manager Name, uniquely identifies the MQSeries Queue.
Percent of Time	The percentage of the measurement interval duration MQSeries Requests for the indicated Queue Name were being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

MQSeries request detail line

This is a second-level detail line shown directly under the MQSeries Queue detail line. It quantifies wait time during executions of a specific MQSeries Request.

Under Heading	This is Displayed
Name	The MQSeries Request function. This is the MQSeries function specified by the MQSeries Request.
Description	Program name and offset. This is the name of the program in which the MQSeries CALL was issued and the hexadecimal offset of the CALL return address.
Percent of Time	The percentage of the measurement interval duration the indicated MQSeries request was being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

Sample reports

A fully expanded report is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
Q08: MQSeries Wait Time by Queue (0025/MQTST01)              Row 00001 of 00011
Command ===> ____________________________________________ Scroll ===> CSR

Name      Description                Percent of time * 10.00%  ±0.9%
                                         *....1....2....3....4....5....6....7.
CSQ1      CSQ1.DEFXMIT.QUEUE         5.80 ===
→ GET       MQSAMP1+2DF2             3.01 ==
→ PUT       CSQ4CVK1+284E            1.60 =
→ OPEN      CSQ4CVK1+277E            0.59
→ OPEN      MQSAMP1+2C2C             0.38
→ CLOSE     CSQ4CVK1+29E2            0.18
→ CLOSE     MQSAMP1+31A0             0.01

CSQ1      No Object Name             0.10
→ CLOSE     MQSAMP1+31A0             0.08
→ CLOSE     CSQ4CVK1+29E2            0.01
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Queue, Request	Display context help information.
++	Queue, Request	Show additional details.
+	Queue	Expand to reveal next level.
–	Queue	Collapse to hide next level.
SV	Queue	Sort next level by value.
SN	Queue	Sort next level by name.
P	Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size
+	Percent of Time	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of Time	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | > PUT       MQBCS01+334C             19.55 0000000000                |      |
| +-----------------------------------------------------------------------+      |
|                                                                               |
| Calculation Details                                                           |
|    MQ Series wait measurements               444                              |
|    Total measurements                        2,270                            |
|    Percent of total                          19.55%                           |
|                                                                               |
|                                                                               |
| MQSeries Request Details                                                      |
|    Calling Module   MQBCS01                                                   |
|    CSECT            MQBCS01                                                   |
|    Offset           00334C                                                    |
|    Request Type     PUT                                                       |
|    Queue Manager    CSQ1                                                      |
|    Object Name      SYSTEM.DEFAULT.LOCAL.QUEUE                                |
|    Object Type      Queue                                                     |
|                                                                               |
+-------------------------------------------------------------------------------+
```

Q09 - MQSeries wait time by request

Usage

Use this report to see how much wait time occurred during processing of MQSeries Requests. The percentage of wait time is reported by MQSeries Request. Expand the MQSeries Request lines to see a further breakdown by MQSeries Queue.

Quantification

Each report line quantifies wait time for an MQSeries Request. This is further broken down by MQSeries Queue Name.

Detail line hierarchy

An unexpanded Q09 report shows a line for each MQSeries Request. You can expand each line to reveal one additional hierarchical level of detail.

The hierarchy is illustrated here:

```
Level 1 MQSeries Request
 Level 2 MQSeries Queue
 Level 2 MQSeries Queue

 ...
```

Detail line descriptions

MQSeries request detail line

This is a first-level detail line shown directly under the MQSeries Queue detail line. It quantifies wait time for a specific MQSeries Request.

Under Heading	This is Displayed
Name	The MQSeries Request function. This is the MQSeries function specified by the MQSeries Request.

Under Heading	This is Displayed
Description	Program name and offset. This is the name of the program in which the MQSeries CALL was issued and the hexadecimal offset of the CALL return address.
Percent of Time	The percentage of the measurement interval duration the indicated MQSeries request was being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

MQSeries queue detail line

This is the second-level detail line. Each line shows information about an MQSeries Queue for which measurement data was recorded.

Under Heading	This is Displayed
Name	The MQSeries Queue Manager name. This name, in combination with the Queue Name, uniquely identifies the MQSeries Queue.
Description	The MQSeries Queue Name. This name, in combination with the Queue Manager Name, uniquely identifies the MQSeries Queue.
Percent of Time	The percentage of the measurement interval duration MQSeries Requests for the indicated Queue Name were being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

Sample reports

A sample report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
Q09: MQSeries Wait Time by Request (0643/MQTST01)            Row 00001 of 00003
Command ===> _____________________________________________ Scroll ===> CSR

Name      Description              Percent of time * 10.00%  ±2.3%
                                       *....1....2....3....4....5....6....7.
COMMIT    MQBCS01+3452             1.04 =
CONNECT   MQBCS01+30A4             0.38
DISCONN   MQBCS01+34C8             0.21
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Request, Queue	Display context help information.
++	Request, Queue	Show additional details.
+	Request	Expand to reveal next level.
–	Request	Collapse to hide next level.

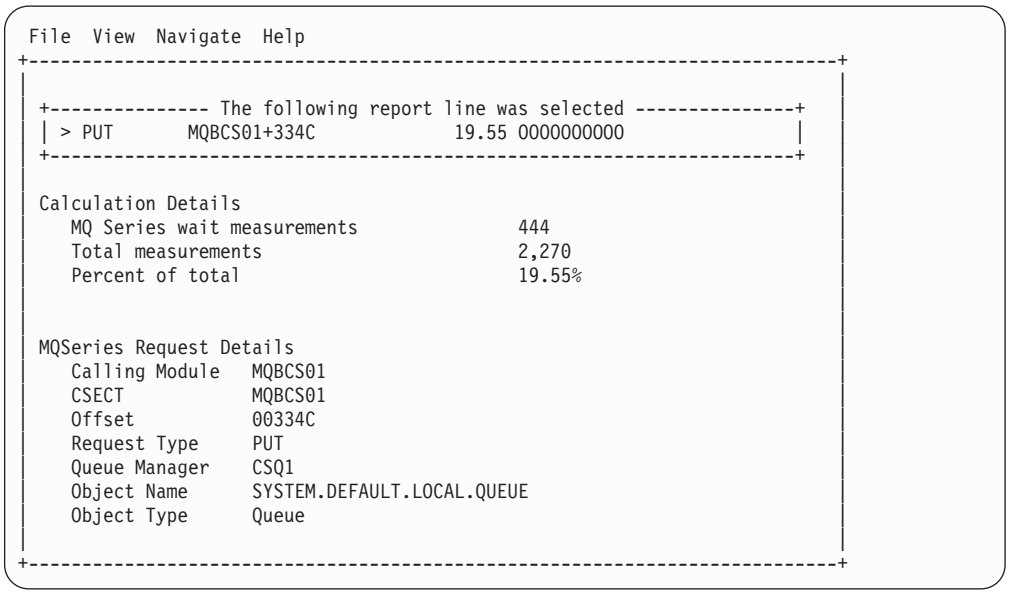
Cmd	When Applied To Object	Action
P	Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size
+	Percent of Time	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of Time	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information. A sample detail window for this report is shown here:



Q10 - MQSeries wait time by Txn

Usage

Use this report to see how much wait time occurred during processing of MQSeries Requests. The percentage of wait time is reported by CICS or IMS transaction. Expand the transaction detail lines to see a further breakdown by MQSeries Queue and by individual MQSeries Request.

Quantification

Each report line quantifies wait time in MQSeries requests in a CICS or IMS transaction. This is further broken down by MQSeries Queue and by MQSeries Request.

Detail line hierarchy

An unexpanded Q10 report shows a line for each CICS or IMS transaction. You can expand each line to reveal one additional hierarchical level of detail (using the "+" line command).

The hierarchy is illustrated here:

```
Level 1 CICS/IMS Transaction
 Level 2 MQSeries Queue
  Level 3 MQSeries Request
  Level 3 MQSeries Request

  ...
```

Detail line descriptions

CICS/IMS transaction detail line

This is the first-level detail line. Each line shows information about a CICS or IMS transaction under which MQSeries requests were issued.

Under Heading	This is Displayed
Name	A CICS or IMS transaction code. This is the transaction under which measured MQSeries requests were issued. "Batch" is shown here for requests not issued under control of a CICS or IMS transaction.
Description	Either "CICS Transaction" or "IMS Transaction." If the request was not issued under control of a CICS or IMS transaction, "Not in IMS/CICS Txn" will be displayed.
Percent of Time	The percentage of the measurement interval duration during which MQSeries requests under control of the indicated transaction were being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

MQSeries queue detail line

This is the second-level detail line. Each line shows information about an MQSeries Queue for which measurement data was recorded.

Under Heading	This is Displayed
Name	The MQSeries Queue Manager name. This name, in combination with the Queue Name, uniquely identifies the MQSeries Queue.
Description	The MQSeries Queue Name. This name, in combination with the Queue Manager Name, uniquely identifies the MQSeries Queue.

Under Heading	This is Displayed
Percent of Time	The percentage of the measurement interval duration MQSeries Requests for the indicated Queue Name were being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

MQSeries request detail line

This is a third-level detail line shown directly under the MQSeries Queue detail line. It quantifies wait time for a specific MQSeries Request.

Under Heading	This is Displayed
Name	The MQSeries Request function. This is the MQSeries function specified by the MQSeries Request.
Description	Program name and offset. This is the name of the program in which the MQSeries CALL was issued and the hexadecimal offset of the CALL return address.
Percent of Time	The percentage of the measurement interval duration the indicated MQSeries request was being processed. This represents the percentage of samples for MQSeries requests out of the total number of samples, except for CICS measurements, where it represents the percentage of samples for MQSeries requests out of the total number of CICS samples.

Sample reports

A fully expanded report is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
Q10: MQSeries Wait Time by Transaction (0025/MQTST01)         Row 00001 of 00015
Command ===> ____________________________________________________ Scroll ===> CSR

Name      Description                Percent of time * 2.5%  ±0.9%
                                        *....1....2....3....4....5....6....7.
MQS1      CICS Transaction           3.64 =======
→ CSQ1      CSQ1.DEFXMIT.QUEUE       3.62 =======
  → GET       MQSAMP1+2DF2           3.01 ======
  → OPEN      MQSAMP1+2C2C           0.59 =
  → CLOSE     MQSAMP1+31A0           0.01
→ CSQ1      No Object Name           0.01
  → CLOSE     MQSAMP1+31A0           0.01

MQDR      CICS Transaction           2.25 ====
→ CSQ1      CSQ1.DEFXMIT.QUEUE       2.17 ====
  → PUT       CSQ4CVK1+284E          1.60 ===
  → OPEN      CSQ4CVK1+277E          0.38 =
  → CLOSE     CSQ4CVK1+29E2          0.18
→ CSQ1      No Object Name           0.08
  → CLOSE     CSQ4CVK1+29E2          0.08
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Transaction, Queue, Request	Display context help information.
++	Transaction, Queue, Request	Show additional details.
+	Transaction, Queue	Expand to reveal next level.
–	Transaction, Queue	Collapse to hide next level.
SV	Transaction, Queue	Sort next level by value.
SN	Transaction, Queue	Sort next level by name.
P	Request	Display source program mapping.

on headings

Cmd	When Applied To Object	Action
?	Name, Description, Percent CPU	Display context help information.
+	Name	Expand to reveal all entries.
+	Description	Expand field size
+	Percent of Time	Zoom in scale.
–	Name	Collapse to show only first level.
–	Description	Reduce field size.
–	Percent of Time	Zoom out scale.
SV	Name	Sort next level by value.
SN	Name	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | > PUT       MQBCS01+334C             19.55 0000000000               |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     MQ Series wait measurements               444                             |
|     Total measurements                        2,270                           |
|     Percent of total                          19.55%                          |
|                                                                               |
|                                                                               |
|  MQSeries Request Details                                                     |
|     Calling Module   MQBCS01                                                  |
|     CSECT            MQBCS01                                                  |
|     Offset           00334C                                                   |
|     Request Type     PUT                                                      |
|     Queue Manager    CSQ1                                                     |
|     Object Name      SYSTEM.DEFAULT.LOCAL.QUEUE                               |
|     Object Type      Queue                                                    |
|                                                                               |
+-------------------------------------------------------------------------------+
```

Chapter 8. Java/USS/HFS performance analysis reports

This section describes the Java performance analysis reports.

For information about ...	See ...
The Java data extractor	"Overview of Java data extractor" on page 456
J01 Java summary and attributes	"J01 - Java summary and attributes" on page 458
J02 Java heap usage timeline	"J02 - Java heap usage timeline" on page 459
J03 Java CPU usage by thread	"J03 - Java CPU usage by thread" on page 462
J04 Java CPU usage by package	"J04 - Java CPU usage by package" on page 463
J05 Java CPU usage by class	"J05 - Java CPU usage by class" on page 466
J06 Java CPU usage by method	"J06 - Java CPU usage by method" on page 469
J07 Java CPU usage by call path	"J07 - Java CPU usage by call path" on page 472
J09 Java service time by package	"J09 - Java service time by package" on page 475
J10 Java service time by class	"J10 - Java service time by class" on page 478
J11 Java service time by method	"J11 - Java service time by method" on page 481
J12 java service time by call path	"J12 - Java service time by call path" on page 484
J14 Java wait time by package	"J14 - Java wait time by package" on page 487
J15 Java wait time by class	"J15 - Java wait time by class" on page 490
J16 Java wait time by method	"J16 - Java wait time by method" on page 493
J17 Java wait time by call path	"J17 - Java wait time by call path" on page 496
H01 HFS Service Time by Path Name	"H01 - HFS Service Time by Path Name" on page 499
H02 HFS Service Time by Device	"H02 - HFS Service Time by Device" on page 501
H03 HFS File Activity	"H03 - HFS File Activity" on page 504
H04 HFS File Attributes	"H04 - HFS File Attributes" on page 506
H05 HFS Device Activity	"H05 - HFS Device Activity" on page 507
H06 HFS Device Attributes	"H06 - HFS Device Attributes" on page 509
H07 HFS Activity Timeline	"H07 - HFS Activity Timeline" on page 510
H08 HFS Wait Time by Path Name	"H08 - HFS Wait Time by Path Name" on page 512
H09 HFS Wait Time by Device	"H09- HFS Wait Time by Device" on page 514

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For information about ...	See ...
H10 HFS Service Time by Request	"H10- HFS Service Time by Request" on page 517
H11 HFS Wait Time by Request	"H11- HFS Wait Time by Request" on page 519

Overview of Java data extractor

In order to use the Java Performance Analysis Reports, the Java data extractor must be turned on when the Observation Request is entered. You must select the Java data extractor in the Schedule New Measurement panel.

The Java data extractor collects Java call stack information for each Java application thread. The call stack information identifies the methods in the call chain. Information about each method includes the package (if any), class, method and signature (parameter types and return type), and the source line number being executed (if available).

Java Version Support

Application Performance Analyzer supports Java at the following levels:

- Java V1.4.2 SR13 and above
- Java V5 SR10 and above
- Java V6 SR6 and above

Considerations for Java V5 and V6

Before Java V5 and V6 programs can be sampled, the J9VM support in Application Performance Analyzer must be enabled. Contact your systems programmer to verify this support is enabled.

Only one observation at a time is supported for a specific Java V5 or V6 address space.

IMS Java V5 and V6 programs are not supported.

CICS Java programs are supported for CICS/TS 4.2 and above.

Application Performance Analyzer will stop sampling Java V5 and V6 programs when the main thread ends, even if the specified number of samples has not been reached.

The Java Measurement reports for V5 and V6 are the same as V1.4.2. However, for V5 they are unrelated to the CPU Usage Analysis and CPU Wait Analysis reports.

Java calls that are observed with a native method at the top of the call stack are only included in the Service Time reports. This is because the J9VM does not know whether the native method is executing, waiting, or queued for execution.

Java V5 and V6 native methods are identified in the method detail pop-up window of Java Service Time reports.

To measure applications running under Java V5 or V6, you must add the '-Dcom.ibm.tools.attach.enable=yes' run time parameter.

To measure applications running under Java V5 SR10 or SR11, or Java V6 SR6 or SR7, you must run the application with UID=0. This UID=0 restriction is removed with the following Java PTFs:

- Java V5 31-bit SR12 (UK59131)
- Java V5 64-bit SR12 (UK59134)
- Java V6 31-bit SR8 (UK56434)
- Java V6 64-bit SR8 (UK56435)

When measuring applications running with '-Dcom.ibm.tools.attach.enable=yes' and without 'UID=0', J9VM may write some OPEN access violations in the system log. These can be ignored, as J9VM is attempting to open tmp directories that require UID=0 access. These directories have no significance to Application Performance Analyzer and will not affect the measurement.

USS multiple address space measurements

Spawned address spaces and substeps might be generated when measuring USS. Application Performance Analyzer will measure these additional address spaces if you specify a value in the USS observations field in the Schedule New Measurement panel.

When you use this feature, a USS master record will be displayed above all the associated measurements. The master record has a status of **USS**.

An example is shown here:

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
R02: IBM APA for z/OS Observation List (ZRAY)                Row 00001 of 00221
Command ===> _____________________________________________  Scroll ===> CSR

ReqNum  Owned By  Description      Job Name  Date/Time        Samples  Status

+-------------------------------------------------------------------------------+
| 2385 +  USER1     USS TEST#1     ARAUTEE   Apr-18 19:56       2,500  USS    |
| → 2386          BPXBATCH RUN               Apr-18 19:56          10  Ended  |
| → 2387          BPXPRECP *OMVSEX           Apr-18 19:56           7  Ended  |
| → 2388          BPXPRECP *OMVSEX  *Java*   Apr-18 19:57       2,500  Ended  |
| → 2389          BPXPRFC  STEP1             Apr-18 19:56          29  Ended  |
| → 2390          BPXPRFC  STEP1             Apr-18 19:57       2,500  Ended  |
| → 2391          BPXPRFC  STEP1             Apr-18 19:57       2,500  Ended  |
| → 2392          BPXPRFC  STEP1    *Java*   Apr-18 19:57       2,500  Ended  |
| → 2393          BPXPRFC  STEP1    *Java*   Apr-18 19:57       2,500  Ended  |
+-------------------------------------------------------------------------------+
```

You can expand the USS master record by entering a "+" on the sequence number. The additional measurements in the expanded record include the original measurement (the initiating step) and any spawned address spaces or substeps.

The description field in the subordinate measurements under the USS master record is populated with the program name and step name. For spawned address spaces, this would normally be BPXPRFC STEP1. For substeps, this would normally be BPXPRECP *OMVSEX.

If Java is detected in a step, then *Java* is placed in the description to the right of the program and step name.

If the step is run from the USS shell, and a Java command string is available, then the Java command string will be placed in the description instead of the information described above.

J01 - Java summary and attributes

Usage

This report displays general information about the observed Java environment. There are four sections:

- Java Virtual Machines
- Java Packages
- Java Classes
- Java Methods

Java Virtual Machines

This section identifies Java Virtual Machines (JVMs) observed during the measurement session.

Java packages

This section lists each of the Java packages in which activity was observed during the measurement session. Each package is assigned a unique sequence number, which is cross referenced in other reports.

Java classes

This section lists each of the Java classes in which activity was observed during the measurement session. Each cass is assigned a unique sequence number, which is cross referenced in other reports.

Java methods

This section lists each of the Java methods in which activity was observed during the measurement session. Each method is assigned a unique sequence number, which is cross referenced in other reports.

Warnings and errors

In some circumstances Application Performance Analyzer will be unable to produce complete Java reports when the Java data extractor is turned on during measurement. In this case, a 'Warnings and Errors' section will be displayed in J01 with a message indicating the problem. Please refer to the Application Performance Analyzer *Messages Guide* for specific details of the problem.

Sample reports

A sample report is shown here.

```
File  View  Navigate  Help
------------------------------------------------------------------------------
J01: Java Summary/Attributes (8551/JVMTST01)                 Row 00001 of 00082
Command ===> ____________________________________________________ Scroll ===> CSR

Observed Java Virtual Machines (JVMs)

JVMId  Identifier   Heap   Max Description
 00001  18754508     1M   67  J2RE 1.4.2 IBM z/OS Persistent Reusable VM
                             build cm142-20060824 (SR6)

 Observed Java Packages

  PkgId  Package Name
  00001  java/util/zip
  00002  java/lang
  00003  java/util/jar
  00004  sun/misc
  00005  java/security
  00006  java/net
  00007  java/io
  00008  com/ibm/jvm/io

 Observed Java Classes

  ClsId  PkgId  Class Name

  00001  00002  Object
  00002  00001  ZipFile
  00003  00003  JarFile
  00004  00004  URLClassPath$Loader
  00005  00004  URLClassPath$JarLoader
  00006  00004  URLClassPath$3

 Observed Java Methods

  MthId  ClsId  Method Name

  00001  00002  open
  00002  00002  <init>
  00003  00003  <init>
  00004  00003  <init>
  00005  00005  getJarFile
  00006  00005  <init>
  00007  00006  run
  00008  00007  doPrivileged1
```

J02 - Java heap usage timeline

Note: This report is for Java V5 and above only.

Overview

This timeline analysis report breaks the observation session duration into a number of (approximately) fixed-length, chronological time intervals. Each line represents one of these intervals. By default, 15 intervals are reported, each representing approximately the same number of samples. This illustrates any progressive resource usage trends. The values under the heading Storage quantify the amount of heap storage allocated by the JVM during the interval.

A SETUP option is available from which you can specify the number of intervals and whether to include total heap storage in the report. Heap storage used is presented in green, and the additional storage to make up the total is presented in white.

Detail line descriptions

Each line represents reports values under the following headings:

- SEQN
- Storage
- Total

SEQN

This is the sequence number of the interval. Intervals are numbered 0001, 0002, etc.

Storage

This is the amount of heap storage in use by the Java application. This is an effective measurement of the Java application's demand on central storage. The value is expressed in units of kilobytes (1024 bytes) or megabytes (1048576 bytes). Each line shows the maximum value observed during the particular interval.

Total

This is the amount of heap storage allocated to the Java application. This is an effective measurement of the Java application's demand on central storage. The value is expressed in units of kilobytes (1024 bytes) or megabytes (1048576 bytes). Each line shows the maximum value observed during the particular interval.

Sample reports

A sample report is shown here. It reports on heap usage (green) and heap total (white).

```
  File  View  Navigate  Help
------------------------------------------------------------------------------
J02: Java Heap Usage Timeline (0116/JVMTST01)                Row 00001 of 00047
Command ===> _____________________________________________ Scroll ===> CSR

SEQN    Storage    Total   <----1140K----------------------------------2140K-->
                           *....+....+....+....+....+....+....+....+....+....*
0001     1615K     2048K    ====================
0002     1243K     2048K    ====
0003     1243K     2048K    ====
0004     1243K     2048K    ====
0005     1243K     2048K    ====
0006     1243K     2048K    ====
0007     1243K     2048K    ====
0008     1243K     2048K    ====
0009     1243K     2048K    ====
0010     1341K     2048K    ==========
0011     1351K     2048K    ==========
0012     1352K     2048K    ==========
0013     1352K     2048K    ==========
0014     1352K     2048K    ==========
0015     1352K     2048K    ==========
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

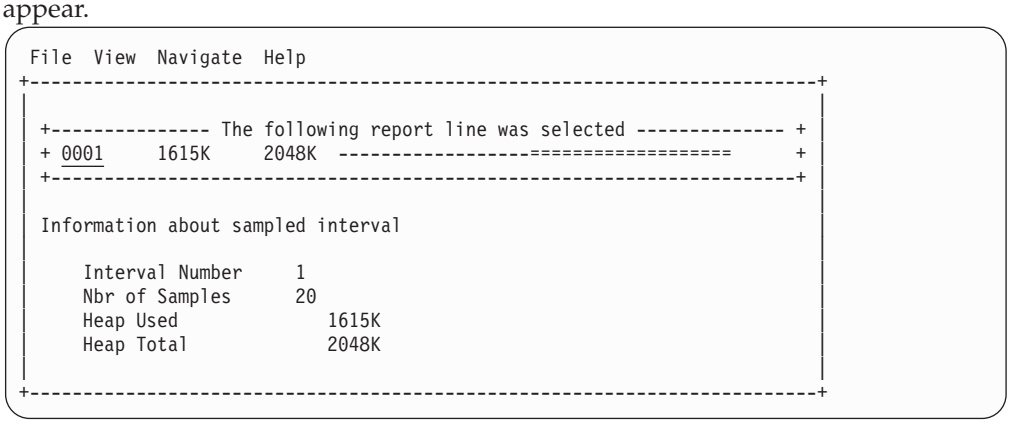
on objects

Cmd	When Applied To Object	Action
?	SEQN	Display context help information.
++	SEQN	Show additional details.

Detail window

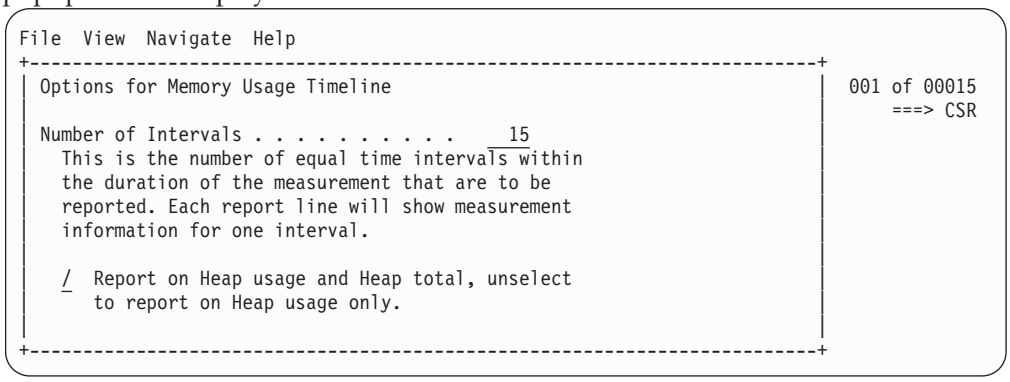
You can enter "++" (or the Enter key) on any line to display a popup window containing additional information.

For example, entering "++" on a sequence number will cause this detail window to appear.



SETUP options

Enter the SETUP primary command to select options for this report. The following popup will be displayed:



Number of Intervals

Use this option to change the number of equal time intervals that are reported.

Report on Heap usage and total

Select this option to include total heap storage in the report. Heap usage is displayed in green and total heap storage is displayed in white.

J03 - Java CPU usage by thread

Usage

Use this report to see how CPU time was consumed by execution of Java programs for each Java thread. The report shows one line for each Java thread. When the JVM reuses a z/OS Task Control Block (TCB), the individual CPU times for the threads cannot be obtained. In this case, the thread name is preceded by a number in parentheses. All threads that have reused a particular TCB will have the same number and the percentage used will indicate the total of all threads using the same TCB.

Quantification

Each report line quantifies time measured as a percentage of total time. The percentage represents the ratio of the CPU time in the indicated Java thread to the total CPU time consumed during the sampling period.

Detail line descriptions

Java Thread detail line

This report shows one detail line for each unique Java thread.

Under Heading	This is Displayed
JavaID	The unique sequence number assigned to this Java thread.
Thread Name	The name of the thread.
Percent of Time	The percentage of CPU used by this thread out of the total used during the sampling period..

Sample reports

A sample report is shown here. The (1) before the Thread Name indicates that these threads reused the same TCB.

```
  File  View  Navigate  Help
------------------------------------------------------------------------------
J03: Java CPU Usage by Thread (0116/JVMTST01)                Row 00001 of 00012
Command ===> ____________________________________________________ Scroll ===> CSR

JavaId  Thread Name                  Percent of CPU Time * 10.00%
                                         *....1....2....3....4....5....6....7...
0003    (1)Attachment 2305          18.72 ==========
0002    (1)Alpha                    18.72 ==========
0001    main                        18.56 ==========

Note: Items in parentheses indicate a thread that reused a TCB
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	JavaId	Display context help information.

Cmd	When Applied To Object	Action
++	JavaId	Show additional details.

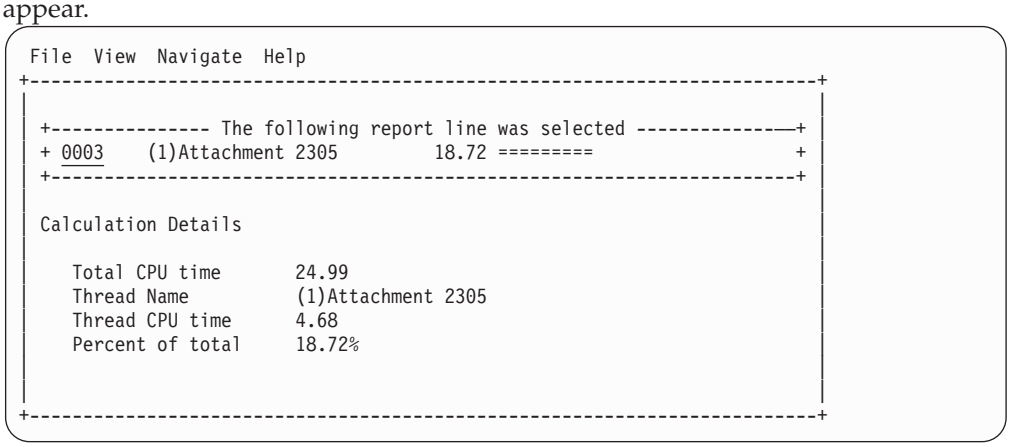
on headings

Cmd	When Applied To Object	Action
?	JavaId	Display context help information.
SV	JavaId	Sort next level by value.
SN	JavaId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a popup window containing additional information.

For example, entering "++" on a sequence number will cause this detail window to appear.



J04 - Java CPU usage by package

Usage

Use this report to see how CPU time was consumed by execution of Java programs in each unique package. The unexpanded report shows one or more lines for each Java package in which execution was observed.

You can further expand each line item to show classes within the package, then methods within the class, then source lines within the method.

Quantification

Each report line quantifies time measured as a percentage of total time, the percentage represents the ratio of the number of CPU active measurements in the indicated Java object to the total number of CPU active observations.

Detail line hierarchy

An unexpanded report shows a line for each Java Package. The name field shows a sequence number assigned to each unique Package. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Package
 Level 2 Java Class
  Level 3 Java Method
   Level 4 Java Line Number

 ...
```

Detail line descriptions

Java package detail line

This is the first-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number is assigned to each observed Java Package and is displayed in this column.
Pkg/Cls/Mthd	The name of a Java Package.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java class detail line

This is the second-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java class is displayed in this column.
Pkg/Cls/Mthd	The name of a Java class.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java method detail line

This is the third-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java Method is displayed in this column.
Pkg/Cls/Mthd	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the fourth-level detail line.

Under Heading	This is Displayed
JavaID	The line number of a Java source statement.
Pkg/Cls/Mthd	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been fully expanded to show all four levels.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
J04: Java CPU Usage by Package (0116/JVMTST01)               Row 00001 of 00276
Command ===> ____________________________________________________ Scroll ===> CSR

JavaId  Pkg/Cls/Mthd                Percent of CPU Time * 10.00%   ±3.1%
                                        *....1....2....3....4....5....6....7...
00002   java/lang                   39.52 ====================
→ 00104   StrictMath                20.05 ==========
  → 00228   log                     10.52 =====
    → 00000   line # unknown        10.52 =====
  → 00226   sqrt                     9.53 =====
    → 00000   line # unknown         9.53 =====
→ 00029   Math                      15.83 ========
  → 00219   log                     10.71 =====
    → 02290   line # 2290            9.04 =====
    → 00000   line # unknown         1.67 =
  → 00227   sqrt                     5.01 ===
    → 02312   line # 2312            4.12 ==
    → 00000   line # unknown         0.88
  → 00048   max                      0.09
    → 02760   line # 2760            0.09
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Package, Class, Method, line number	Display context help information.
++	Package, Class, Method, line number	Show additional details.
+	Package, Class, Method	Expand to reveal next level.
–	Package, Class, Method	Collapse to hide next level.

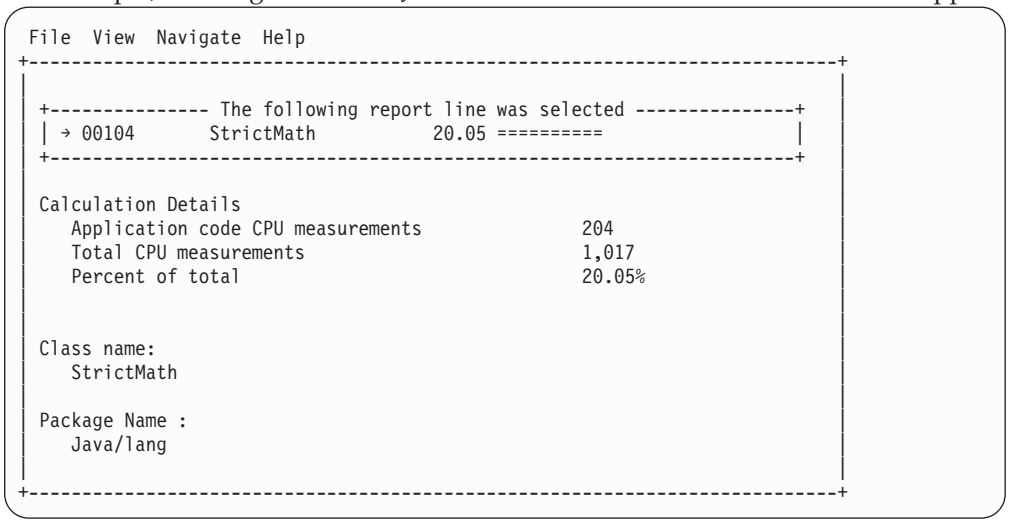
on headings

Cmd	When Applied To Object	Action
?	JavaId, Pkg/Cls/Mthd, Percent of Time	Display context help information.
+	JavaId	Expand to reveal all entries.
+	Pkg/Cls/Mthd	Expand description field size.
+	Percent of Time	Zoom in scale.
–	JavaId	Collapse to show only first level.
–	Pkg/Cls/Mthd	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	JavaId	Sort next level by value.
SN	JavaId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Java class will cause this detail window to appear.



Note: If you have Java source program mapping information specified, this detail window will display the Java source when invoked from a Java line number object.

J05 - Java CPU usage by class

Usage

Use this report to see how CPU time was consumed by execution of Java programs in each unique class. The unexpanded report shows one or more lines for each Java class in which execution was observed.

Note: The class name is implicitly qualified by the package name, which can be seen in the detail window for the class.

You can further expand each line item to show methods within the class, then source lines within the method.

Quantification

Each report line quantifies time measured as a percentage of total time, the percentage represents the ratio of the number of CPU active measurements in the indicated Java object to the total number of CPU active observations.

Detail line hierarchy

An unexpanded report shows a line for each Java class. The name field shows a sequence number assigned to each unique class. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Class
 Level 2 Java Method
  Level 3 Java Line Number
```

Detail line descriptions

Java class detail line

This is the first-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number is assigned to each observed Java class and is displayed in this column.
Class/Method	The name of a Java class.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java method detail line

This is the second-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java method is displayed in this column.
Class/Method	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the third-level detail line.

Under Heading	This is Displayed
JavaID	The line number of a Java source statement.
Class/Method	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
--------------------------------------------------------------------------------
J05: Java CPU Usage by Class (0116/JVMTST01)                 Row 00001 of 00186
Command ===> ____________________________________________________ Scroll ===> CSR

JavaId  Class/Method                Percent of CPU Time* 10.00%   ±3.1%
                                        *....1....2....3....4....5....6....7...
00102   Burner                      32.15 ===============
→ 00220   calc                      27.72 ============
→ 00221   baby                       4.42 ==

00104    StrictMath                 20.05 ==========
→ 00228   log                       10.52 =====
→ 00226   sqrt                       9.53 =====

00029    Math                       15.83 ========
→ 00219   log                       10.71 =====
→ 00227   sqrt                       5.01 ===
→ 00048   max                        0.09

00019    JarFile                     1.37 =
→ 00037   hasClassPathAttribute      0.98
→ 00085   getManifest               0.19
→ 00114   initializeVerifier        0.09
→ 00025   getJarEntry               0.09
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Class, Method, line number	Display context help information.
++	Class, Method, line number	Show additional details.
+	Class, Method	Expand to reveal next level.
–	Class, Method	Collapse to hide next level.

on headings

Cmd	When Applied To Object	Action
?	JavaId, Class/Method, Percent of Time	Display context help information.
+	JavaId	Expand to reveal all entries.
+	Class/Method	Expand description field size.
+	Percent of Time	Zoom in scale.
–	JavaId	Collapse to show only first level.
–	Class/Method	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	JavaId	Sort next level by value.
SN	JavaId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Java method will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | → 00104   calc                    27.72 ==============              |     |
|  +-------------------------------------------------------------------+     |
|                                                                               |
|  Calculation Details                                                          |
|     Application code CPU measurements              282                        |
|     Total CPU measurements                         1,017                      |
|     Percent of total                               27.72%                     |
|                                                                               |
|                                                                               |
|  Method Name:                                                                 |
|     calc                                                                      |
|                                                                               |
|  Method Descriptor:                                                           |
|     (I)D                                                                      |
|                                                                               |
|  Method Signature:                                                            |
|     calc(int) double                                                          |
|                                                                               |
|  Class Name:                                                                  |
|     Burner                                                                    |
|                                                                               |
|  Package Name:                                                                |
|     com/basamps/sample                                                        |
|                                                                               |
+-------------------------------------------------------------------------------+
```

Note: If you have Java source program mapping information specified, this detail window will display the Java source when invoked from a Java line number object.

J06 - Java CPU usage by method

Usage

Use this report to see how CPU time was consumed by execution of Java programs in each unique method. The unexpanded report shows one or more lines for each Java method in which execution was observed.

Note: The method name is implicitly qualified by its package and class names, which can be seen in the detail window for the method.

You can further expand each line item to show methods within the class, then source lines within the method.

Quantification

Each report line quantifies time measured as a percentage of total time, the percentage represents the ratio of the number of CPU active measurements in the indicated Java object to the total number of CPU active observations.

Detail line hierarchy

An unexpanded report shows a line for each Java method. The name field shows a sequence number assigned to each unique method. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Method
  Level 2 Java Line Number
```

Detail line descriptions

Java method detail line

This is the first-level detail line.

Under Heading	This is Displayed
MthId	A unique sequence number assigned to each observed Java method is displayed in this column.
Method	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the second-level detail line.

Under Heading	This is Displayed
MthId	The line number of a Java source statement.
Method	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
J06: Java CPU Usage by Method (0116/JVMTST01)               Row 00001 of 00186
Command ===> _____________________________________________ Scroll ===> CSR

MthId   Method                      Percent of CPU Time * 10.00%   ±3.1%
                                        *....1....2....3....4....5....6....7...
00220   calc                        27.72 ============
→ 00029   line # 29                25.46 ===========
→ 00024   line # 24                 1.37
→ 00036   line # 36                 0.29
→ 00027   line # 27                 0.19
→ 00026   line # 26                 0.19
→ 00000   line # unknown            0.19

00219   log                         10.71 =====
→ 02290   line # 2290               9.04 =====
→ 00000   line # unknown            1.67 =

00228   log                         10.52 ======
→ 00000   line # unknown            10.52 ======

00226   sqrt                         9.53 ======
→ 00000   line # unknown             9.53 ======

00227   sqrt                         5.01 ====
→ 02312   line # 2312                4.12 ===
→ 00000   line # unknown             0.88
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Method, line number	Display context help information.
++	Method, line number	Show additional details.
+	Method	Expand to reveal next level.
–	Method	Collapse to hide next level.

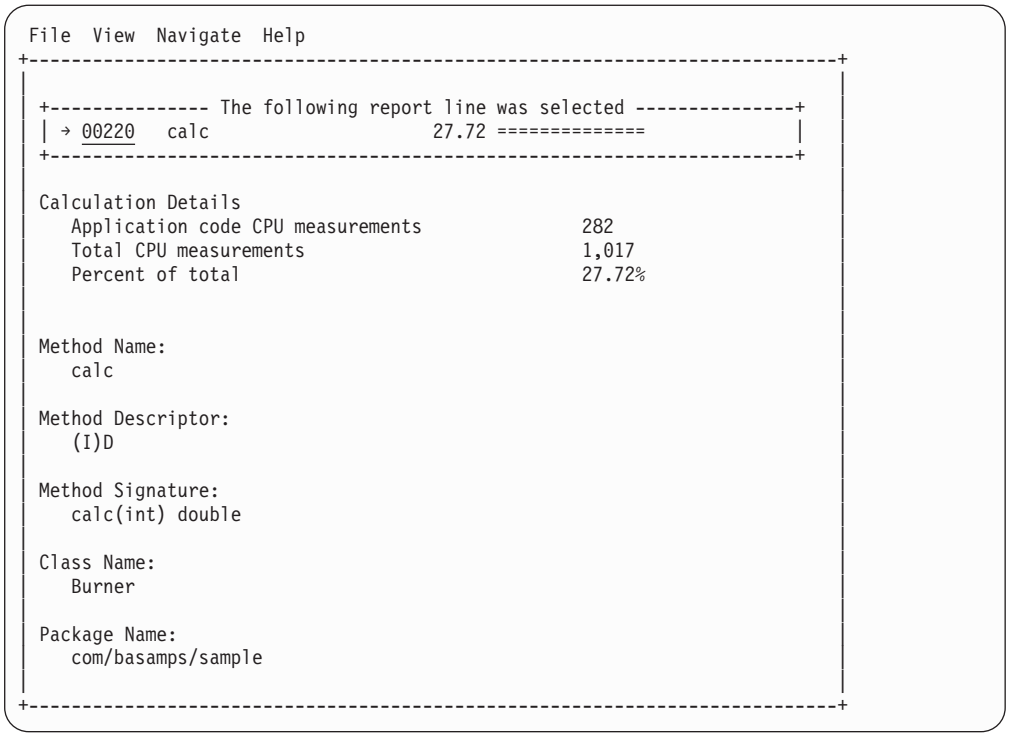
on headings

Cmd	When Applied To Object	Action
?	MthId, Method, Percent of Time	Display context help information.
+	MthId	Expand to reveal all entries.
+	Method	Expand description field size.
+	Percent of Time	Zoom in scale.
–	MthId	Collapse to show only first level.
–	Method	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	MthId	Sort next level by value.
SN	MthId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Java method will cause this detail window to appear.



Note: If you have Java source program mapping information specified, this detail window will display the Java source when invoked from a Java line number object.

J07 - Java CPU usage by call path

Usage

Use this report to see how CPU time was consumed by execution of Java programs in each unique call path. The unexpanded report shows one or more lines for each Java method in which execution was observed. Execution in a method is quantified and reported separately for each different call path. (A call path represents a path of control in the form: A calls B calls C calls D ... etc.)

By expanding the first-level method line you can see a line for each of the calling methods in the path of control. These are shown in reverse order of control. In the case of A calls B calls C calls D, method D (in which execution was observed) is reported in the first-level line and the second-level lines show C then B then A.

Quantification

The first-level report line quantifies CPU time measured as a percentage of total time, the percentage represents the ratio of the number of CPU active measurements in the indicated Java object to the total number of CPU active observations.

Detail line hierarchy

An unexpanded report shows a line for each Java method line. The name field shows a sequence number assigned to each unique method line. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Method
  Level 2 Calling Java Method Line
```

Detail line descriptions

Java method detail line

This is the first-level detail line.

Under Heading	This is Displayed
MthId	A unique sequence number assigned to each observed Java method is displayed in this column.
Method	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the second-level detail line.

Under Heading	This is Displayed
MthId	A unique sequence number assigned to each observed Java method.
Method	The line number of the statement that invoked the next method in the call path and the name of the method.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
J07: Java CPU Usage by Call Path (0116/JVMTST01)             Row 00001 of 01831
Command ===> _____________________________________________ Scroll ===> CSR

MthId   Method                       Percent of CPU Time * 10.00%   ±3.1%
                                         *....1....2....3....4....5....6....7...
00220   calc                         25.36 ============
→ 00221   line 16 baby
→ 00218   line 25 main

00228   log                          10.42 =====
→ 00219   line 2290 log
→ 00220   line 29 calc
→ 00221   line 16 baby
→ 00218   line 25 main

00226   sqrt                          9.43 ======
→ 00227   line 2312 sqrt
→ 00220   line 29 calc
→ 00221   line 16 baby
→ 00218   line 25 main

00219   log                           8.94 =====
→ 00220   line 29 calc
→ 00221   line 16 baby
→ 00218   line 25 main
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Method, line number	Display context help information.
++	Method, line number	Show additional details.
+	Method	Expand to reveal next level.
–	Method	Collapse to hide next level.

on headings

Cmd	When Applied To Object	Action
?	MthId, Method, Percent of Time	Display context help information.
+	MthId	Expand to reveal all entries.
+	Method	Expand description field size.
+	Percent of Time	Zoom in scale.
–	MthId	Collapse to show only first level.
–	Method	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	MthId	Sort next level by value.
SN	MthId	Sort next level by name.

Detail window

You can enter “++” (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering “++” on a Java method will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | → 00220   calc                     27.72 ==============              |     |
|  +-------------------------------------------------------------------------+  |
|                                                                               |
|  Calculation Details                                                          |
|     Application code CPU measurements              282                        |
|     Total CPU measurements                         1,017                      |
|     Percent of total                               27.72%                     |
|                                                                               |
|                                                                               |
|  Method Name:                                                                 |
|     calc                                                                      |
|                                                                               |
|  Method Descriptor:                                                           |
|     (I)D                                                                      |
|                                                                               |
|  Method Signature:                                                            |
|     calc(int) double                                                          |
|                                                                               |
|  Class Name:                                                                  |
|     Burner                                                                    |
|                                                                               |
|  Package Name:                                                                |
|     com/basamps/sample                                                        |
|                                                                               |
+-------------------------------------------------------------------------------+
```

J09 - Java service time by package

Usage

Use this report to see how service time was consumed by execution of Java programs in each unique package. The unexpanded report shows one or more lines for each Java package in which execution was observed.

You can further expand each line item to show classes within the package, then methods within the class, then source lines within the method.

Quantification

Each report line quantifies service time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which execution of the indicated Java object (package, class, method or line) was in flight to the total number of samples. An observation is counted as execution regardless of the CPU state (active, WAIT, or queued).

Detail line hierarchy

An unexpanded report shows a line for each Java method line. The name field shows a sequence number assigned to each unique method line. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Package
  Level 2 Java Class
   Level 3 Java Method
     Level 4 Java Line Number
```

Detail line descriptions

Java package detail line

This is the first-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java package and is displayed in this column.
Pkg/Cls/Mthd	The name of a Java package.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java class detail line

This is the second-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java class is displayed in this column.
Pkg/Cls/Mthd	The name of a Java class.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java method detail line

This is the third-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java method is displayed in this column.
Pkg/Cls/Mthd	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the fourth-level detail line.

Under Heading	This is Displayed
JavaID	The line number of a Java source statement.
Pkg/Cls/Mthd	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
J09: Java Service Time by Package (0116/JVMTST01)            Row 00001 of 01831
Command ===> ____________________________________________________ Scroll ===> CSR

JavaId  Pkg/Cls/Mthd                Percent of Time * 10.00%   ±2.4%
                                        *....1....2....3....4....5....6....7...
00002   java/lang                  33.01 =================
→ 00104   StrictMath               16.50 ========
→ 00029   Math                     12.87 ======
→ 00005   ClassLoader               1.01 =
→ 00010   String                    0.65
→ 00017   ClassLoader$NativeLibrar  0.47
→ 00040   StringBuffer              0.29
→ 00096   Thread                    0.29
→ 00021   Runtime                   0.11
→ 00022   System                    0.11
→ 00077   Character                 0.11
→ 00057   Class                     0.11
→ 00097   Shutdown                  0.11
→ 00001   Object                    0.05
→ 00047   StringCoding              0.05
→ 00049   StringCoding$DecoderCach  0.05
→ 00079   Throwable                 0.05
→ 00103   FloatingDecimal           0.05

00020   com/baseamps/sample        28.84 ================
→ 00102   Burner                   28.84 ================
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Package, Class, Method, line number	Display context help information.
++	Package, Class, Method, line number	Show additional details.
+	Package, Class, Method	Expand to reveal next level.
–	Package, Class, Method	Collapse to hide next level.

on headings

Cmd	When Applied To Object	Action
?	JavaId, Pkg/Cls/Mthd, Percent of Time	Display context help information.
+	JavaId	Expand to reveal all entries.
+	Pkg/Cls/Mthd	Expand description field size.
+	Percent of Time	Zoom in scale.
–	JavaId	Collapse to show only first level.
–	Pkg/Cls/Mthd	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	JavaId	Sort next level by value.

Cmd	When Applied To Object	Action
SN	JavaId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Java class will cause this detail window to appear.

```
 File  View  Navigate  Help
+------------------------------------------------------------------------------+
|                                                                              |
|  +--------------- The following report line was selected ---------------+    |
|  | → 00104   StrictMath              16.50 ========                     |    |
|  +------------------------------------------------------------------------+  |
|                                                                              |
|  Calculation Details                                                         |
|     Application code CPU measurements              277                       |
|     Total measurements                             1,678                     |
|     Percent of total                               16.50%                    |
|                                                                              |
|                                                                              |
|  Class Name:                                                                 |
|     StrictMath                                                               |
|                                                                              |
|  Package Name:                                                               |
|     java/lang                                                                |
|                                                                              |
+------------------------------------------------------------------------------+
```

Note: If you have Java source program mapping information specified, this detail window will display the Java source when invoked from a Java line number object.

J10 - Java service time by class

Usage

Use this report to see how service time was consumed by execution of Java programs in each unique class. The unexpanded report shows one or more lines for each Java class in which execution was observed.

Note: The class name is implicitly qualified by the package name, which can be seen in the detail window for the class.

You can further expand each line item to show methods within the class, then source lines within the method.

Quantification

Each report line quantifies service time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which execution of the indicated Java object (package, class, method or line) was in flight to the total number of samples. An observation is counted as execution regardless of the CPU state (active, WAIT, or queued).

Detail line hierarchy

An unexpanded report shows a line for each Java class. The name field shows a sequence number assigned to each unique class. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Class
  Level 2 Java Method
   Level 3 Java Line Number
```

Detail line descriptions

Java class detail line

This is the first-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java class and is displayed in this column.
Class/Method	The name of a Java class.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java method detail line

This is the second-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java method is displayed in this column.
Class/Method	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the third-level detail line.

Under Heading	This is Displayed
JavaID	The line number of a Java source statement.
Class/Method	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
--------------------------------------------------------------------------------
J10: Java Service Time by Class (0116/JVMTST01)              Row 00001 of 00208
Command ===> _____________________________________________ Scroll ===> CSR

JavaId  Class/Method               Percent of Time * 10.00%   ±2.4%
                                       *....1....2....3....4....5....6....7...
00102   Burner                    28.84 ==============
→ 00220   calc                    23.95 ============
→ 00221   baby                     4.88 ==

00104    StrictMath                16.50 =======
→ 00226   sqrt                      8.28 ===
→ 00228   log                       8.22 ===

00029    Math                      12.87 ======
→ 00219   log                       8.52 ===
→ 00227   sqrt                      4.23 ==
→ 00048   max                       0.11

00018    ZipFile                    1.54 =
→ 00049   getEntry                 0.77
→ 00062   open                      0.59
→ 00039   getInflater               0.05
→ 00054   read                      0.05
→ 00035   getEntry                 0.05
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Class, Method, line number	Display context help information.
++	Class, Method, line number	Show additional details.
+	Class, Method	Expand to reveal next level.
–	Class, Method	Collapse to hide next level.

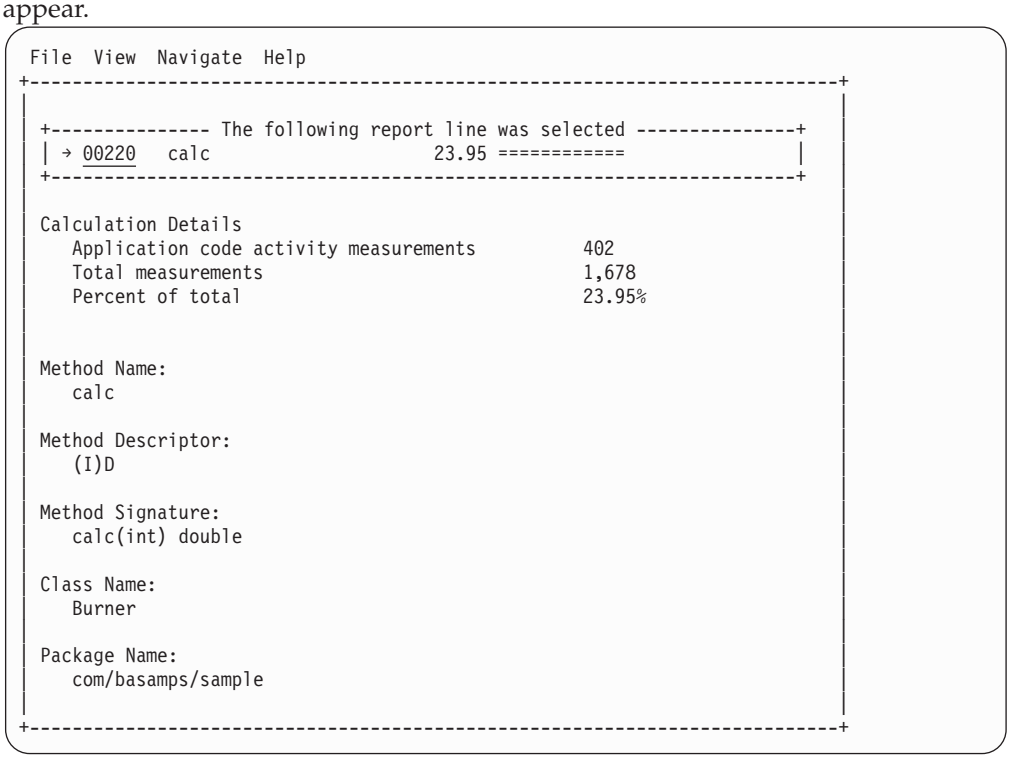
on headings

Cmd	When Applied To Object	Action
?	JavaId, Class/Method, Percent of Time	Display context help information.
+	JavaId	Expand to reveal all entries.
+	Class/Method	Expand description field size.
+	Percent of Time	Zoom in scale.
–	JavaId	Collapse to show only first level.
–	Class/Method	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	JavaId	Sort next level by value.
SN	JavaId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Java method will cause this detail window to appear.



Note: If you have Java source program mapping information specified, this detail window will display the Java source when invoked from a Java line number object.

J11 - Java service time by method

Usage

Use this report to see how service time was consumed by execution of Java programs in each unique method. The unexpanded report shows one or more lines for each Java method in which execution was observed.

Note: The method name is implicitly qualified by its package and class names, which can be seen in the detail window for the method.

You can further expand each line item to show methods within the class, then source lines within the method.

Quantification

Each report line quantifies service time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which execution of the indicated Java object (package, class, method or line) was in flight to the total number of samples. An observation is counted as execution regardless of the CPU state (active, WAIT, or queued).

Detail line hierarchy

An unexpanded report shows a line for each Java method. The name field shows a sequence number assigned to each unique method. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Method
 Level 2 Java Line Number
```

Detail line descriptions

Java method detail line

This is the first-level detail line.

Under Heading	This is Displayed
MthId	A unique sequence number assigned to each observed Java method is displayed in this column.
Method	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the second-level detail line.

Under Heading	This is Displayed
MthId	The line number of a Java source statement.
Method	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the third-level detail line.

Under Heading	This is Displayed
JavaID	The line number of a Java source statement.
Class/Method	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
J11: Java Service Time by Method (0116/JVMTST01)              Row 00001 of 00313
Command ===> _____________________________________________ Scroll ===> CSR

JavaId  Class/Method                Percent of CPU Time * 10.00%   ±2.4%
                                        *....1....2....3....4....5....6....7...
00220   calc                       23.95 ============
→ 00029   line # 29                21.51 ===========
→ 00024   line # 24                 1.31 =
→ 00036   line # 36                 0.41
→ 00027   line # 27                 0.35
→ 00000   line # unknown            0.23
→ 00026   line # 26                 0.11

00219   log                         8.52 =====
→ 02290   line # 2290               6.19 ====
→ 00000   line # unknown            2.32 =

00226   sqrt                        8.28 =====
→ 00000   line # unknown            8.28 =====

00228   log                         8.22 =====
→ 00000   line # unknown            8.22 =====
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Method, line number	Display context help information.
++	Method, line number	Show additional details.
+	Method	Expand to reveal next level.
–	Method	Collapse to hide next level.

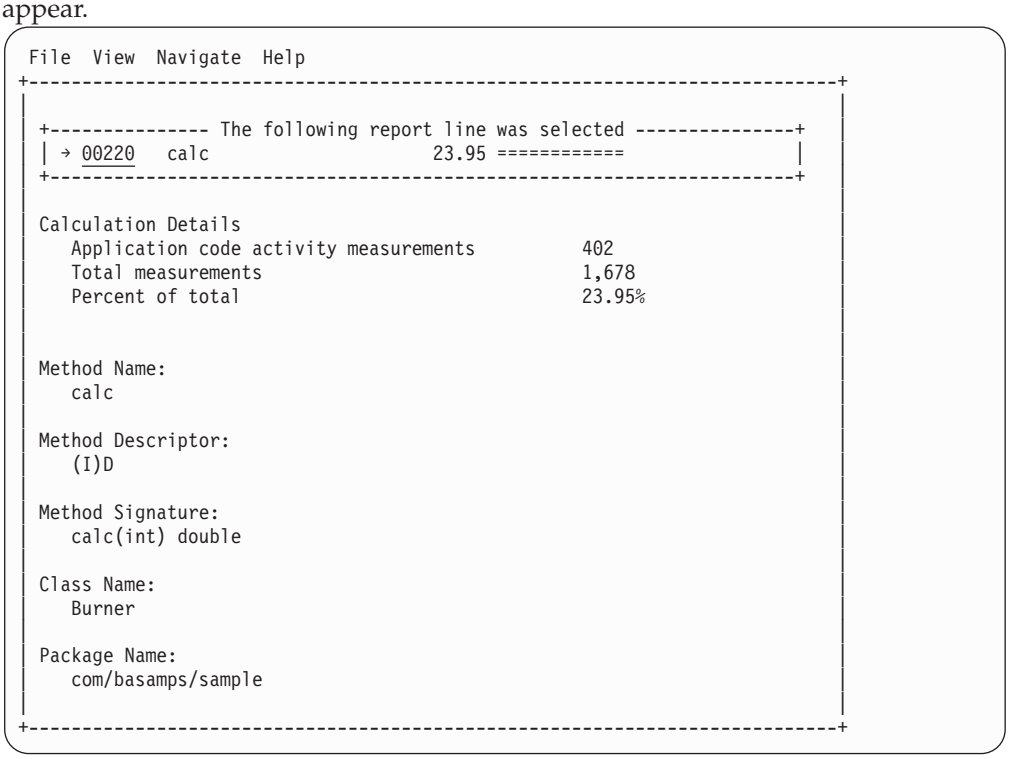
on headings

Cmd	When Applied To Object	Action
?	MthId, Method, Percent of Time	Display context help information.
+	MthId	Expand to reveal all entries.
+	Method	Expand description field size.
+	Percent of Time	Zoom in scale.
–	MthId	Collapse to show only first level.
–	Method	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	MthId	Sort next level by value.
SN	MthId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Java method will cause this detail window to appear.



Note: If you have Java source program mapping information specified, this detail window will display the Java source when invoked from a Java line number object.

J12 - Java service time by call path

Usage

Use this report to see how service time was consumed by execution of Java programs in each unique call path. The unexpanded report shows one or more lines for each Java method in which execution was observed. Execution in a method is quantified and reported separately for each call path. (A call path represents a path of control in the form: A calls B calls C calls D, etc.)

By expanding the first-level method line you can see a line for each of the calling methods in the path of control. These are shown in reverse order of control. In the case of A calls B calls C calls D, method D (in which execution was observed) is reported in the first-level line and the second-level lines show C then B then A.

Quantification

The first-level report line quantifies service time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which

execution of the indicated Java object (method or line) was in flight to the total number of samples. An observation is counted as execution regardless of the CPU state (active, WAIT, or queued).

Detail line hierarchy

An unexpanded report shows a line for each Java method line. The name field shows a sequence number assigned to each unique method line. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Method
 Level 2 Calling Java Method Line
```

Detail line descriptions

Java method detail line

This is the first-level detail line.

Under Heading	This is Displayed
MthId	A unique sequence number assigned to each observed Java method is displayed in this column.
Method	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the second-level detail line.

Under Heading	This is Displayed
MthId	A unique sequence number assigned to each observed Java method.
Method	The line number of the statement that invoked the next method in the call path and the name of the method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
--------------------------------------------------------------------------------
J12: Java Service Time by Call Path (0116/JVMTST01)          Row 00001 of 02766
Command ===> _____________________________________________ Scroll ===> CSR

MthId  Method                        Percent of Time * 10.00%   ±2.4%
                                         *....1....2....3....4....5....6....7...
00220   calc                        21.45 ===========
→ 00221   line 16 baby
→ 00218   line 25 main

00226   sqrt                         8.22 ====
→ 00227   line 2312 sqrt
→ 00220   line 29 calc
→ 00221   line 16 baby
→ 00218   line 25 main

00228   log                          8.16 ====
→ 00219   line 2290 log
→ 00220   line 29 calc
→ 00221   line 16 baby
→ 00218   line 25 main


00219   log                          6.13 ===
→ 00220   line 29 calc
→ 00221   line 16 baby
→ 00218   line 25 main
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Method, line number	Display context help information.
++	Method, line number	Show additional details.
+	Method	Expand to reveal next level.
–	Method	Collapse to hide next level.

on headings

Cmd	When Applied To Object	Action
?	MthId, Method, Percent of Time	Display context help information.
+	MthId	Expand to reveal all entries.
+	Method	Expand description field size.
+	Percent of Time	Zoom in scale.
–	MthId	Collapse to show only first level.
–	Method	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	MthId	Sort next level by value.

Cmd	When Applied To Object	Action
SN	MthId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a line number will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | → 00218   line 25 main                                               |      |
| +----------------------------------------------------------------------+      |
|                                                                               |
| Calculation Details                                                           |
|    Application code activity measurements          1                          |
|    Total measurements                              1,678                      |
|    Percent of total                                0.05%                      |
|                                                                               |
|                                                                               |
| Method Name:                                                                  |
|    main[Ljava/lang/String;)V                                                  |
|                                                                               |
| Method Descriptor:                                                            |
|    (I)D                                                                       |
|                                                                               |
| Method Signature:                                                             |
|    main(java.lang.String[]) void                                              |
|                                                                               |
| Class Name:                                                                   |
|    Burner3Test                                                                |
|                                                                               |
+-------------------------------------------------------------------------------+
```

J14 - Java wait time by package

Usage

Use this report to see how much WAIT time was measured during execution of Java programs in each unique package. The unexpanded report shows one or more lines for each Java package in which execution was observed.

You can further expand each line item to show classes within the package, then methods within the class, then source lines within the method.

Quantification

Each report line quantifies WAIT time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which execution of the indicated Java object (package, class, method or line) was in a wait state, to the total number of samples.

Detail line hierarchy

An unexpanded report shows a line for each Java package. The name field shows a sequence number assigned to each unique package. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Package
 Level 2 Java Class
  Level 3 Java Method
   Level 4 Java Line Number
```

Detail line descriptions

Java package detail line

This is the first-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number is assigned to each observed Java package and is displayed in this column.
Pkg/Cls/Mthd	The name of a Java package.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java class detail line

This is the second-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java class is displayed in this column.
Pkg/Cls/Mthd	The name of a Java Class.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java method detail line

This is the third-level detail line.

Under Heading	This is Displayed
JavaID	The line number of a Java source statement.
Pkg/Cls/Mthd	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the fourth-level detail line.

Under Heading	This is Displayed
JavaID	The line number of a Java source statement.
Pkg/Cls/Mthd	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
J14: Java Wait Time by Package (0116/JVMTST01)              Row 00001 of 00022
Command ===> _____________________________________________ Scroll ===> CSR

JavaId  Pkg/Cls/Mthd                Percent of Time * 2.50%   ±2.4%
                                        *....1....2....3....4....5....6....7...
00006   java/util/zip               0.89 ==
→ 00018   ZipFile                   0.89 ==

00002   java/lang                   0.77 ==
→ 00005   ClassLoader               0.35 =
→ 00096   Thread                    0.23
→ 00017   ClassLoader$NativeLibrar  0.05
→ 00057   Class                     0.05
→ 00021   Runtime                   0.05

00018   com/dovetail/jzos           0.23
→ 00078   ZFile                     0.23

00005   java/io                     0.17
→ 00098   FileInputStream           0.11
→ 00012   UnixFileSystem            0.05

00007   java/util/jar               0.05
→ 00019   JarFile                   0.05
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Package, Class, Method, line number	Display context help information.
++	Package, Class, Method, line number	Show additional details.
+	Package, Class, Method	Expand to reveal next level.
–	Package, Class, Method	Collapse to hide next level.

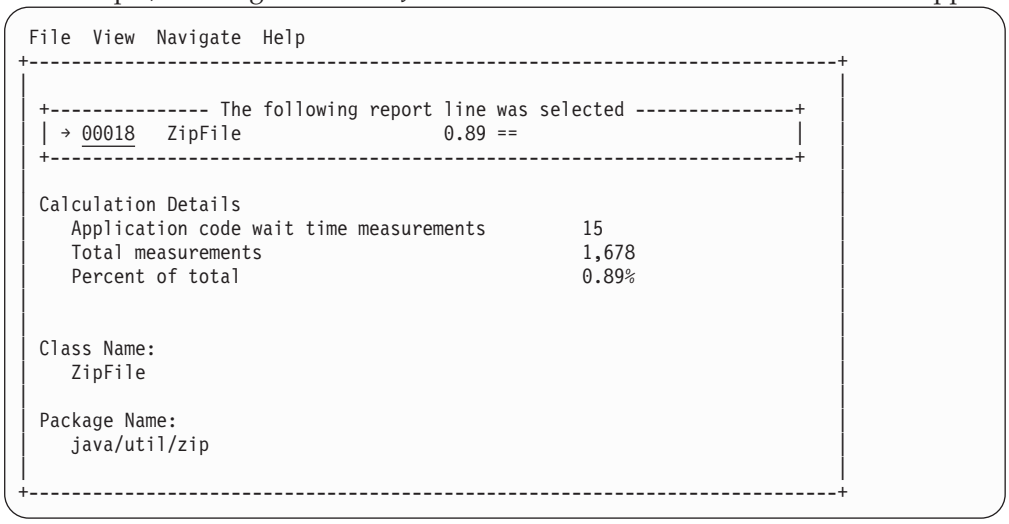
on headings

Cmd	When Applied To Object	Action
?	JavaId, Pkg/Cls/Mthd, Percent of Time	Display context help information.
+	JavaId	Expand to reveal all entries.
+	Pkg/Cls/Mthd	Expand description field size.
+	Percent of Time	Zoom in scale.
–	JavaId	Collapse to show only first level.
–	Pkg/Cls/Mthd	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	JavaId	Sort next level by value.
SN	JavaId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Java class will cause this detail window to appear.



Note: If you have Java source program mapping information specified, this detail window will display the Java source when invoked from a Java line number object.

J15 - Java wait time by class

Usage

Use this report to see how much WAIT time was measured during execution of Java programs in each unique class. The unexpanded report shows one or more lines for each Java class in which execution was observed.

Note: The class name is implicitly qualified by the package name, which can be seen in the detail window for the class.

You can further expand each line item to show methods within the class, then source lines within the method.

Quantification

Each report line quantifies WAIT time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which execution of the indicated Java object (class, method or line) was in a wait state, to the total number of samples.

Detail line hierarchy

An unexpanded report shows a line for each Java class. The name field shows a sequence number assigned to each unique class. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Class
 Level 2 Java Method
  Level 3 Java Line Number
```

Detail line descriptions

Java class detail line

This is the first-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number is assigned to each observed Java class and is displayed in this column.
Class/Method	The name of a Java class.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java method detail line

This is the second-level detail line.

Under Heading	This is Displayed
JavaID	A unique sequence number assigned to each observed Java method is displayed in this column.
Class/Method	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the third-level detail line.

Under Heading	This is Displayed
JavaID	The line number of a Java source statement.
Class/Method	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
--------------------------------------------------------------------------------
J15: Java Wait Time by Class (0116/JVMTST01)                 Row 00001 of 00033
Command ===> _____________________________________________ Scroll ===> CSR

JavaId  Class/Method               Percent of Time * 2.50%   ±2.4%
                                       *....1....2....3....4....5....6....7...
00018   ZipFile                    0.89 ==
→ 00049   getEntry                 0.65 =
→ 00062   open                     0.23

00005   ClassLoader                0.35 =
→ 00139   findBootstrapClass       0.35 =

00029   ZFile                      0.23
→ 00173   fopen                    0.23

00096   Thread                     0.23
→ 00203   start                    0.23

00098   FileInputStream            0.11
→ 00207   readBytes                0.11

00019   JarFile                     0.05
→ 00037   hasClassPathAttribute     0.05
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Class, Method, line number	Display context help information.
++	Class, Method, line number	Show additional details.
+	Class, Method	Expand to reveal next level.
–	Class, Method	Collapse to hide next level.

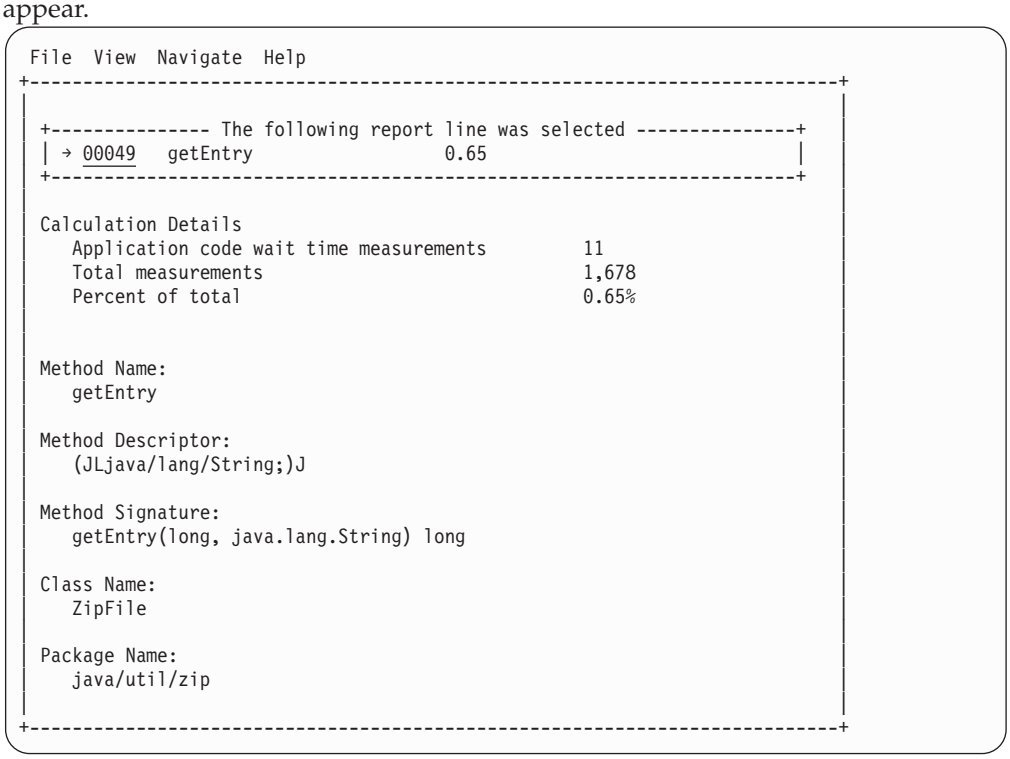
on headings

Cmd	When Applied To Object	Action
?	JavaId, Class/Method, Percent of Time	Display context help information.
+	JavaId	Expand to reveal all entries.
+	Class/Method	Expand description field size.
+	Percent of Time	Zoom in scale.
–	JavaId	Collapse to show only first level.
–	Class/Method	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	JavaId	Sort next level by value.
SN	JavaId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Java method will cause this detail window to appear.



Note: If you have Java source program mapping information specified, this detail window will display the Java source when invoked from a Java line number object.

J16 - Java wait time by method

Usage

Use this report to see how much WAIT time was measured during execution of Java programs in each unique method. The unexpanded report shows one or more lines for each Java method in which execution was observed.

Note: The method name is implicitly qualified by its package and class names, which can be seen in the detail window for the method.

You can further expand each line item to show methods within the class, then source lines within the method.

Quantification

Each report line quantifies WAIT time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which execution of the indicated Java object (method or line) was in a wait state, to the total number of samples.

Detail line hierarchy

An unexpanded report shows a line for each Java Method. The name field shows a sequence number assigned to each unique Method. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Method
 Level 2 Java Line Number
```

Detail line descriptions

Java method detail line

This is the first-level detail line.

Under Heading	This is Displayed
MthId	A unique sequence number assigned to each observed Java method is displayed in this column.
Method	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the second-level detail line.

Under Heading	This is Displayed
MthId	The line number of a Java source statement.
Method	The line number of a Java source statement or “unknown” if the line number could not be determined.
Percent of Time	The percentage of activity measured in the indicated Java object.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
--------------------------------------------------------------------------------
J16: Java Wait Time by Method (0116/JVMTST01)                Row 00001 of 00035
Command ===> ____________________________________________________ Scroll ===> CSR

JavaId  Class/Method                Percent of CPU Time * 2.50%   ±2.4%
                                        *....1....2....3....4....5....6....7...
00049   getEntry                    0.65 =
→ 00000   line # unknown            0.65 =

00139   findBootstrapClass          0.35 =
→ 00000   line # unknown            0.35 =

00062   open                        0.23
→ 00000   line # unknown            0.23

00173   fopen                       0.23
→ 00000   line # unknown            0.23

00203   start                       0.23
→ 00000   line # unknown            0.23

00207   readBytes                   0.11
→ 00000   line # unknown            0.11
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Method, line number	Display context help information.
++	Method, line number	Show additional details.
+	Method	Expand to reveal next level.
–	Method	Collapse to hide next level.

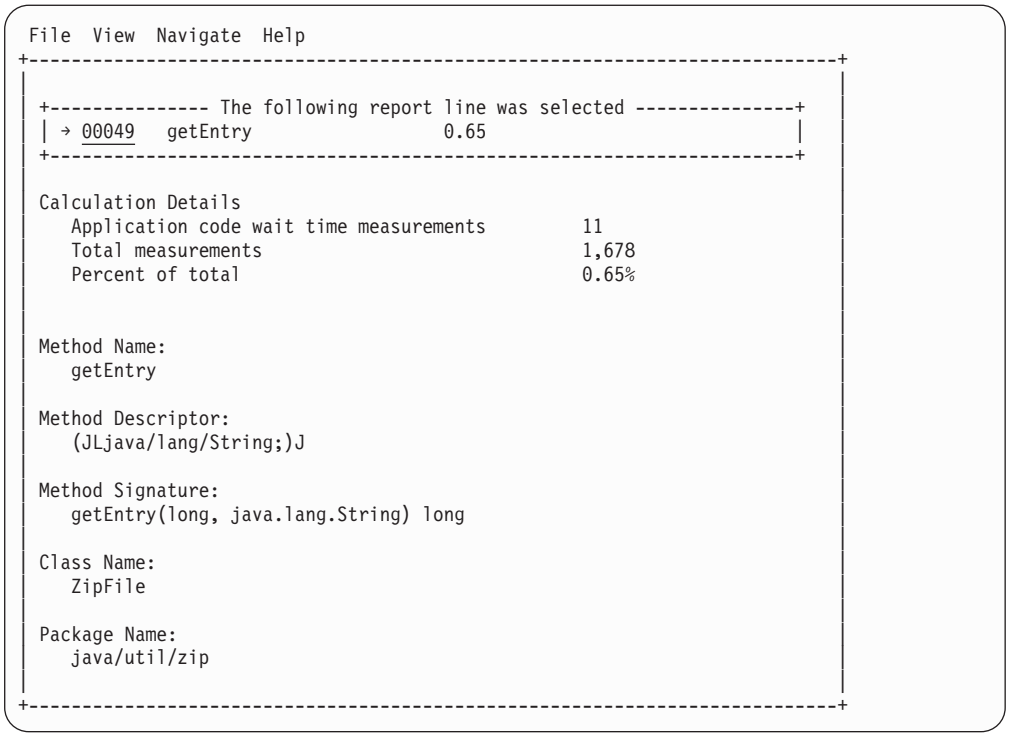
on headings

Cmd	When Applied To Object	Action
?	MthId, Method, Percent of Time	Display context help information.
+	MthId	Expand to reveal all entries.
+	Method	Expand description field size.
+	Percent of Time	Zoom in scale.
–	MthId	Collapse to show only first level.
–	Method	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	MthId	Sort next level by value.
SN	MthId	Sort next level by name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Java method will cause this detail window to appear.



Note: If you have Java source program mapping information specified, this detail window will display the Java source when invoked from a Java line number object.

J17 - Java wait time by call path

Usage

Use this report to see how much WAIT time was measured during execution of Java programs in each unique call path. The unexpanded report shows one or more lines for each Java method in which execution was observed. Execution in a method is quantified and reported separately for each call path. (A call path represents a path of control in the form of: A calls B calls C calls D, etc.)

By expanding the first-level method line you can see a line for each of the calling methods in the path of control. These are shown in reverse order of control. In the case of A calls B calls C calls D, method D (in which execution was observed) is reported in the first-level line and the second-level lines show C then B then A.

Quantification

The first-level report line quantifies WAIT time measured as a percentage of total time, the percentage represents the ratio of the number of samples in which execution of the indicated Java object (method or line) was in a wait state, to the total number of samples.

Detail line hierarchy

An unexpanded report shows a line for each Java method line. The name field shows a sequence number assigned to each unique method line. You can expand each line to reveal additional hierarchical levels of detail. The hierarchy is illustrated here:

```
Level 1 Java Method
 Level 2 Calling Java Method Line
```

Detail line descriptions

Java method detail line

This is the first-level detail line.

Under Heading	This is Displayed
MthId	A unique sequence number assigned to each observed Java method is displayed in this column.
Method	The name of a Java method.
Percent of Time	The percentage of activity measured in the indicated Java object.

Java line number

This is the second-level detail line.

Under Heading	This is Displayed
MthId	A unique sequence number assigned to each observed Java method.
Method	The line number of the statement that invoked the next method in the call path and the name of the method.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
J17: Java Wait Time by Call Path (0116/JVMTST01)              Row 00001 of 00158
Command ===> _____________________________________________ Scroll ===> CSR

MthId   Method                       Percent of Time * 2.50%   ±2.4%
                                        *....1....2....3....4....5....6....7...
00049   getEntry                     0.59 =
→ 00035   line 173 getEntry
→ 00036   line 257 getEntry
→ 00025   line 244 getJarEntry
→ 00037   line 483 hasClassPathAtt
→ 00038   line 29 jarFileHasClassP
→ 00028   line 889 getClassPath
→ 00002   line 351 getLoader
→ 00003   line 205 getResource
→ 00004   line 846 run
→ 00005   doPrivileged1
→ 00006   line 389 doPrivileged
→ 00007   line 371 findClass
→ 00008   line 572 loadClass
→ 00009   line 442 loadClass
→ 00010   line 504 loadClass

00139   findBootstrapClass           0.29 =
→ 00140   line 1062 findBootstrapC
→ 00008   line 565 loadClass
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Method, line number	Display context help information.
++	Method, line number	Show additional details.
+	Method	Expand to reveal next level.
–	Method	Collapse to hide next level.

on headings

Cmd	When Applied To Object	Action
?	MthId, Method, Percent of Time	Display context help information.
+	MthId	Expand to reveal all entries.
+	Method	Expand description field size.
+	Percent of Time	Zoom in scale.
–	MthId	Collapse to show only first level.
–	Method	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	MthId	Sort next level by value.
SN	MthId	Sort next level by name.

Detail window

You can enter “++” (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering “++” on a Java method will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | → 00049   getEntry                  0.65                            |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     Application code wait time measurements         11                        |
|     Total measurements                              1,678                     |
|     Percent of total                                0.65%                     |
|                                                                               |
|                                                                               |
|  Method Name:                                                                 |
|     getEntry                                                                  |
|                                                                               |
|  Method Descriptor:                                                           |
|     (JLjava/lang/String;)J                                                    |
|                                                                               |
|  Method Signature:                                                            |
|     getEntry(long, java.lang.String) long                                     |
|                                                                               |
|  Class Name:                                                                  |
|     ZipFile                                                                   |
|                                                                               |
|  Package Name:                                                                |
|     java/util/zip                                                             |
|                                                                               |
+-------------------------------------------------------------------------------+
```

H01 - HFS Service Time by Path Name

Usage

Use this report to see how Service time was consumed by HFS file activity during the observation session. Each report line shows an HFS file, listed by path name, for which activity was observed. If HFS file activity was observed during a sample, but could not be attributed to a specific file, the activity is aggregated to a single report line with a path name of “unknown”.

Quantification

Each report line quantifies Service time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which an HFS call against the indicated HFS file was inflight to the total number of samples. An observation is counted as inflight regardless of the CPU state: Active, WAIT, or Queued.

Detail line descriptions

HFS File detail line

Under Heading	This is Displayed
FileId	A unique sequence number assigned to each HFS file.
Path Name	The HFS file path name.
Percent of Time	The percentage of activity measured in the indicated HFS file.

Sample reports

A sample report is shown here.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
H01: HFS Service Time by Path Name (8242/JVMTST01)           Row 00001 of 00070
Command ===> _____________________________________________ Scroll ===> CSR

FileId   Path Name                          Percent of Time * 10.00%   ±1.0%
                                               *....1....2....3....4....5....6..
00002    /dev/ttyp0001                      70.36
00000    unknown                            66.59
00001    /dev/ttyp0000                      50.49
00063    /tmp/ofile.txt                     13.28
00021    /Z18/usr/lpp/java/J1.4/lib/core.   1.59
00080    /Z18/usr/lpp/java/J1.4/lib/core.   1.18
00062    /u/zfs/ifile.txt                   0.53
00041    /Z18/usr/lpp/java/J1.4/lib/ext/d   0.32
00032    /Z18/usr/lpp/java/J1.4/lib/ibmor   0.18
00075    /u/zfs/platz                       0.18
00044    /Z18/usr/lpp/java/J1.4/lib/ext/i   0.16
00005    /dev/ptyp0001                      0.15
00043    /Z18/usr/lpp/java/J1.4/lib/ext/i   0.15
00072    /u/zfs/platz                       0.15
00070    /u/zfs/platz                       0.14
00036    /u/zfs/platz                       0.12
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	FileId	Display context help information.
++	FileId	Show additional details.

on headings

Cmd	When Applied To Heading	Action
?	FileId, Path Name, Percent of Time	Display context help information.
+	Path Name	Expand description field size.
+	Percent of Time	Zoom in scale.
–	Path Name	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	FileId	Sort next level by value.
SN	FileId	Sort next level by FileId.
SP	FileId	Sort next level by Path Name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a FileId will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
|  +--------------- The following report line was selected ---------------+     |
|  | 00002   /dev/ttyp001                70.36                            |     |
|  +-----------------------------------------------------------------------+    |
|                                                                               |
|  Calculation Details                                                          |
|     HFS file measurements                      7.036                         |
|     Total measurements                         10.000                         |
|     Percent of total                           70.36%                         |
|                                                                               |
|                                                                               |
|  HFS File Information                                                         |
|     Path name          /dev/ttyp0001                                          |
|     File type          Character Special File Major 2        Minor 1         |
|     Opened             7:05:22.45 Friday Mar 16 2007                          |
|     Device#            4                                                      |
|     Serial#            17                                                     |
|     Open Flags         Read/Write Read_Only Write_Only                        |
|                        Not_a_controlling_terminal                             |
|                                                                               |
+-------------------------------------------------------------------------------+
```

SETUP options

The SETUP command displays the following options:

```
Minimum Percentage of Time . . . . . .  0.00

This is the minimum percentage of HFS activity
measured for which an item is to be included in
the report.
```

By default, all HFS files with inflight activity during an observation session are displayed. Use the Minimum Percent of Time option to limit the report to files with activity above the specified threshold.

H02 - HFS Service Time by Device

Usage

Use this report to see how Service time was consumed by HFS device activity during the observation session. The unexpanded report shows an HFS device, listed by device number, for which activity was observed. If HFS file activity was observed during a sample, but could not be attributed to a specific file and device, the activity is aggregated to a single report line with a device number of "unknown". You can further expand each line item to show the HFS files associated with the device.

Quantification

Each report line quantifies Service time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which an HFS call against the indicated HFS device was inflight to the total number of samples. An observation is counted as inflight regardless of the CPU state: Active, WAIT, or Queued.

Detail line hierarchy

An unexpanded report shows a line for each HFS device. The name field shows a sequence number assigned to each unique device. You can expand each line to reveal an additional hierarchical level of detail. The hierarchy is illustrated here: Level 1 HFS Device Level 2 HFS File

```
Level 1 HFS Device
 Level 2 HFS File
```

Detail line descriptions

HFS Device detail line

This is the first-level detail line.

Under Heading	This is Displayed
DevId	A unique sequence number assigned to each HFS device.
Device#>Path Name	The HFS device number.
Percent of Time	The percentage of activity measured in the indicated HFS device.

HFS File detail line

This is the first-level detail line.

Under Heading	This is Displayed
DevId	A unique sequence number assigned to each HFS file.
Device#>Path Name	The HFS file path name..
Percent of Time	The percentage of activity measured in the indicated HFS file.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
H02: HFS Service Time by Device (8242/JVMTST01)              Row 00001 of 00085
Command ===> ____________________________________________________ Scroll ===> CSR

DevId   Device#>PathName                  Percent of Time * 10.00%   ±1.0%
                                             *....1....2....3....4....5....6..
00001   4                                 85.07
→ 00002   /dev/ttyp0001                   70.36
→ 00001   /dev/ttyp0000                   50.49
→ 00005   /dev/ptyp0001                    0.15
→ 00066   /dev/null                        0.06
→ 00004   /dev/ptyp0000                    0.06
→ 00066   /dev/null                        0.04
→ 00066   /dev/null                        0.03
→ 00066   /dev/null                        0.02
→ 00066   /dev/null                        0.02
→ 00066   /dev/null                        0.01
→ 00066   /dev/null                        0.01

00000   unknown                           66.59
00009   8                                 13.28
→ 00063   /tmp/ofile.txt                  13.28
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	DevId, FileId	Display context help information.
++	DevId, FileId	Show additional details.
+	DevId	Expand to reveal next level.
-	DevId	Collapse to hide next level.
SV	DevId	Sort next level by value.
SN	DevId	Sort next level by FileId.
SP	DevId	Sort next level by Path Name.

on headings

Cmd	When Applied To Heading	Action
?	DevId, Device#>PathName, Percent of Time	Display context help information.
+	DevId	Expand to reveal all entries.
+	Device#>PathName	Expand field size.
+	Percent of Time	Zoom in scale.
–	DevId	Collapse to show only first level.
–	Device#>PathName	Reduce field size.
–	Percent of Time	Zoom out scale.
SV	DevId	Sort next level by value.
SN	DevId	Sort next level by DevId.
SD	DevId	Sort next level by Device#.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a DevId will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | 00001    4          85.07                                           |      |
| +-----------------------------------------------------------------------+     |
|                                                                               |
| Calculation Details                                                           |
|    HFS device measurements                   8.507                           |
|    Total measurements                        10.000                          |
|    Percent of total                          85.07%                          |
|                                                                               |
|                                                                               |
| HFS Device Information                                                        |
|    Device                    4                                                |
|    Dataset name              HFS.ADCD.DEV                                     |
|    DD name                   SYS00006                                         |
|    Physical file system      HFS                                              |
|    Mount point               /X235/dev                                        |
|    Mounted                   8:40:24.22 Friday Mar 9 2007                     |
|                                                                               |
+-------------------------------------------------------------------------------+
```

SETUP options

The SETUP command displays the following options:

```
Minimum Percentage of Time . . . . . .  0.00

This is the minimum percentage of HFS activity
measured for which an item is to be included in
the report.
```

By default, all HFS devices with inflight activity during an observation session are displayed. Use the Minimum Percent of Time option to limit the report to devices with activity above the specified threshold.

H03 - HFS File Activity

Usage

Use this report to display the Read/Write counts for each HFS file captured during the observation session. Each report line shows an HFS file, listed by path name, and its associated Read/Write count.

Quantification

Each report line quantifies the Read/Write count by subtracting the Read count at the start of the observation session from the Read count at the end of the observation session; subtracting the Write count at the start of the observation session from the Write count at the end of the observation session; and adding the two differences together.

Detail line descriptions

HFS File detail line

Under Heading	This is Displayed
FileId	A unique sequence number assigned to each HFS file.
Path Name	The HFS file path name.
File Type	The HFS file type.

Under Heading	This is Displayed
Reads/Writes	The Read/Write count for the indicated HFS file.

Sample reports

A sample report is shown here.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
H03: HFS File Activity (8242/JVMTST01)                      Row 00001 of 00198
Command ===> _____________________________________________ Scroll ===> CSR

FileId   Path Name                          File Type                Reads/Writes

00063    /tmp/ofile.txt                     Regular File                55,985
00021    /Z18/usr/lpp/java/J1.4/lib/core.   Regular File                   715
                            jar
00080    /Z18/usr/lpp/java/J1.4/lib/core.   Regular File                   644
                            jar
00062    /u/zfs/ifile.txt                   Regular File                   261
00005    /dev/ptyp0001                      Character Special File         171
00070    /u/zfs/platz                       Regular File                   100
00066    /dev/null                          Character Special File          98
00036    /u/zfs/platz                       Regular File                    98
00068    /u/zfs/platz                       Regular File                    97
00074    /dev/null                          Character Special File          96
00035    /dev/null                          Character Special File          89
00064    /u/zfs/platz                       Regular File                    88
00072    /u/zfs/platz                       Regular File                    88
00069    /dev/null                          Character Special File          86
00075    /u/zfs/platz                       Regular File                    84
00065    /dev/null                          Character Special File          74
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	FileId	Display context help information.
++	FileId	Show additional details.

on headings

Cmd	When Applied To Heading	Action
?	FileId	Display context help information.
SV	FileId	Sort next level by value.
SN	FileId	Sort next level by FileId.
SD	FileId	Sort next level by Path Name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a FileId will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| File 00063                                                                    |
|    Path name        /tmp/ofile.txt                                            |
|    File type        Regular File                                              |
|    Opened           7:08:32.33 Friday Mar 16 2007                             |
|    Device#          8                                                         |
|    Serial#          491                                                       |
|    Open Flags       Write_Only Truncate Create                                |
|                                                                               |
|    File Activity            Initial              Last              Delta      |
|       Read Requests               0                 0                  0      |
|       Write Requests              0            55,985             55,985      |
|       Dir I/O Blocks             12                12                  0      |
|       Blocks Read                 1                 1                  0      |
|       Blocks Written              0            55,985             55,985      |
|       Bytes Read                 12                12                  0      |
|       Bytes Written               0         2,127,115          2,127,115      |
|                                                                               |
+-------------------------------------------------------------------------------+
```

SETUP options

The SETUP command displays the following options:

```
Enter "/" to select an option

 _ Omit files for which no activity was observed
during the measurement interval. Unselect to
include all files.
```

By default, all HFS files are displayed. Select this option to omit HFS files that had no read/write activity during the observation session.

H04 - HFS File Attributes

Usage

Use this report to see detailed information about each HFS file that was open during the observation session. This is useful as a reference report when working with printed copies of other HFS reports that do not show full HFS file details. (When browsing online, the popup detail windows show this information.)

Detail line descriptions

The following information is shown for each HFS device.

Under Heading	This is Displayed
FileId	A unique sequence number assigned to the HFS file. This is shown in other HFS reports that display HFS file information.
Path Name	The HFS file path name.
File Type	The HFS file type.
Major	If the file type is Character Special, the associated Major number is displayed.
Minor	If the file type is Character Special, the associated Minor number is displayed.
Opened	The date and time that the file was opened (local time).
Device#	The HFS device number associated with the file.

Under Heading	This is Displayed
Serial#	The HFS file serial number.
Open Flags	All the file Open Flags that are set are listed here.
Mode Flags - File Type	The HFS file type listed in the HFS Mode Flags.
Mode Flags - Permissions	The file permissions (Read/Write/Execute) categorized by Owner, Group, and Other.
Mode Flags - Set Id Flags	The Set Id is indicated by either Userid or Group. The Sticky bit setting is also displayed here (if on).
File Activity	The file activity is listed by category. The initial counts recorded at the start of the observation session, the final counts recorded at the end of the observation, and the delta are all listed.

Sample reports

A sample report is shown here.

```
File  View  Navigate  Help
--------------------------------------------------------------------------------
H04: HFS File Attributes (8242/JVMTST01)                    Row 00001 of 02162
Command ===> ____________________________________________ Scroll ===> CSR

HFS file information reported for 115 files.

FileId 00001
   Path name         /dev/ttyp0000
   File type         Character Special File Major 2     Minor 0
   Opened            6:47:58.93 Friday Mar 16 2007
   Device#           4
   Serial#           12
   Open Flags        Read/Write Read_Only Write_Only
                     Not_a_controlling_terminal

   File Activity             Initial                 Last              Delta
      Read Requests               11                   12                  1
      Write Requests              33                   40                  7
      Dir I/O Blocks              19                   19                  0
      Blocks Read                  5                    5                  0
      Blocks Written               0                    0                  0
      Bytes Read              14,883               14,901                 18
      Bytes Written            1,244                1,350                106
```

H05 - HFS Device Activity

Usage

Use this report to display the Read/Write counts for each HFS device captured during the observation session. Each report line shows an HFS device, listed by device number, and its associated Read/Write count.

Quantification

Each report line quantifies the Read/Write count by subtracting the Read count at the start of the observation session from the Read count at the end of the observation session; subtracting the Write count at the start of the observation session from the Write count at the end of the observation session; and adding the two differences together.

Detail line descriptions

The following information is shown for each HFS device.

Under Heading	This is Displayed
DevId	A unique sequence number assigned to each HFS device.
Device#	The HFS device number.
Mount Point	The directory at which the file system was mounted.
Reads/Writes	The Read/Write count for the indicated HFS device.

Sample reports

A sample report is shown here.

```
File  View  Navigate  Help
--------------------------------------------------------------------------------
H05: HFS Device Activity (8242/JVMTST01)                    Row 00001 of 00009
Command ===> ____________________________________________ Scroll ===> CSR

DevId   Device#    Mount Point                                      Reads/Writes

00009   8          /X235/tmp                                            55,985
00004   24         /Z18/usr/lpp/java                                     6,463
00001   4          /X235/dev                                               996
00005   11         /u/zfs                                                  984
00003   10         /u                                                       81
00007   12         /Z18/usr/lpp/db2/db2810                                  12
00008   16         /Z18/usr/lpp/cicsts/cicsts31                             12
00002   3          /Z18                                                      0
00006   7          /X235/etc                                                 0
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	DevId	Display context help information.
++	DevId	Show additional details.

on headings

Cmd	When Applied To Heading	Action
?	DevId	Display context help information.
SV	DevId	Sort next level by value.
SN	DevId	Sort next level by DevId.
SD	DevId	Sort next level by Device#.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a DevId will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| Device 00004                                                                  |
|    Device#                    24                                              |
|    Dataset name               JVA140.HFS                                      |
|    DD name                    SYS00025                                        |
|    Physical file system       HFS                                             |
|    Mount point                /Z18/usr/lpp/java                               |
|    Mounted                    8:40:36.62 Friday Mar 9 2007                    |
|                                                                               |
|    Device Activity          Initial              Last              Delta      |
|       Read Requests         186,308           192,771              6,463      |
|       Write Requests              0                 0                  0      |
|       Dir I/O Blocks         67,554            73,030              5,476      |
|       Blocks Read           247,016           258,524             11,508      |
|       Blocks Written              0                 0                  0      |
|       Bytes Read        462,232,053       501,613,789         39,381,736      |
|       Bytes Written               0                 0                  0      |
|                                                                               |
+-------------------------------------------------------------------------------+
```

SETUP options

The SETUP command displays the following options:

```
Enter "/" to select an option

 _ Omit devices for which no activity was observed
during the measurement interval. Unselect to
include all devices.
```

By default, all HFS devices are displayed. Select this option to omit HFS devices that had no read/write activity during the observation session.

H06 - HFS Device Attributes

Usage

Use this report to see detailed information about each HFS device captured during the observation session. This is useful as a reference report when working with printed copies of other HFS reports that do not show full HFS device details. (When browsing online, the popup detail windows show this information.)

Detail line descriptions

The following information is shown for each HFS device.

Under Heading	This is Displayed
DevId	A unique sequence number assigned to the HFS device. This is shown in other HFS reports that display HFS device information.
Device#	The HFS device number.
Dataset Name	The dataset containing the HFS file system.
DD Name	The DD name assigned to the HFS dataset.
Physical File System	The file system type - HFS, zFS, NFS.
Mount Point	The directory at which the file system was mounted.
Mounted	The date and time that the file system was mounted (local time).

Under Heading	This is Displayed
Device Activity	The device activity is listed by category. The initial counts recorded at the start of the observation session, the final counts recorded at the end of the observation, and the delta are all listed.

Sample reports

A sample report is shown here.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
H06: HFS Device Attributes (8242/JVMTST01)                   Row 00001 of 0165
Command ===> ____________________________________________ Scroll ===> CSR

HFS device information reported for 9 devices.

DevId 00001
   Device#                   4
   Dataset name              HFS.ADCD.DEV
   DD name                   SYS00006
   Physical file system      HFS
   Mount point               /X235/dev
   Mounted                   8:40:24.22 Friday Mar 9 2007


   Device Activity          Initial              Last                 Delta
      Read Requests           5,922             6,138                   216
      Write Requests          1,070             1,850                   780
      Dir I/O Blocks            565               579                    14
      Blocks Read                56                56                     0
      Blocks Written              0                 0                     0
      Bytes Read            220,179           221,394                 1,215
      Bytes Written          70,730            71,540                   810
```

H07 - HFS Activity Timeline

Usage

Use this report to see, for each HFS file, how activity on the file was distributed over the measurement interval.

Quantification

A graph, in bar chart format, is displayed for each observed HFS file. The horizontal axis represents the measurement interval which spans 50 columns. Each column represents an equal 1/50th sub-interval of time. A scale is shown at the bottom of the graph indicating the percentage of time progression in the overall interval.

In each column, a vertical graph shows (roughly) the percentage of time during the sub-interval that activity on the HFS file took place. A vertical bar of 1, 2, 3, 4 or 5 characters, extending upward from the scale, is displayed indicating the percentage of time in the sub-interval during which file activity was observed.

Detail line descriptions

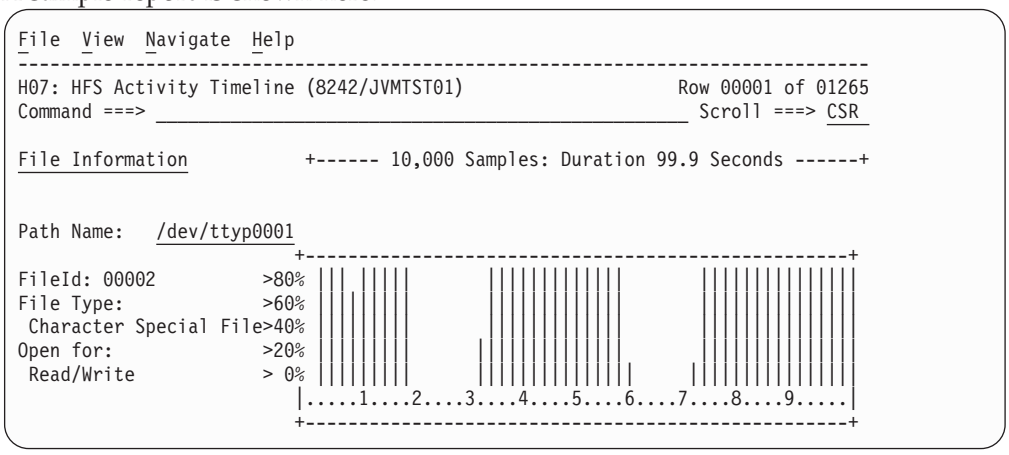
HFS Activity Distribution

A group of lines is shown for each reported HFS file. Some information about the HFS files is displayed to the left, and a bar chart is displayed on the right.

Under Heading	This is Displayed
Path Name	The HFS file path name.
File Type	The HFS file type.
Open for	The mode for which the file was opened: Read/Write, Read Only, Write Only.

Sample reports

A sample report is shown here.



Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Path Name	Display context help information.
++	Path Name	Show additional details.

on headings

Cmd	When Applied To Heading	Action
?	File Information	Display context help information.
SV	File Information	Sort next level by value.
SN	File Information	Sort next level by FileId.
SP	File Information	Sort next level by Path Name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a Path Name will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| FileId 00002                                                                  |
|    Path name         /dev/ttyp0001                                            |
|    File type         Character Special File Major 2      Minor 1              |
|    Opened            7:05:22.45 Friday Mar 16 2007                            |
|    Device#           4                                                        |
|    Serial#           17                                                       |
|    Open Flags        Read/Write Read_Only Write_Only                          |
|                      Not_a_controlling_terminal                               |
|                                                                               |
|    File Activity             Initial               Last             Delta    |
|       Read Requests                7                 20                13    |
|       Write Requests              29                 60                31    |
|       Dir I/O Blocks              19                 19                 0    |
|       Blocks Read                  5                  5                 0    |
|       Blocks Written               0                  0                 0    |
|       Bytes Read              14,810             15,073               263    |
|       Bytes Written            1,829              2,252               423    |
+-------------------------------------------------------------------------------+
```

SETUP options

The SETUP command displays the following options:

```
Enter "/" to select an option

 _ Omit files for which no activity was observed
during the measurement interval. Unselect to
include all files.
```

By default, all HFS files are displayed. Select this option to omit HFS files that had no read/write activity during the observation session.

H08 - HFS Wait Time by Path Name

Usage

Use this report to identify delays resulting from waits during HFS requests. Each report line shows an HFS file, listed by path name, for which wait time was observed. If a wait was observed during a sample where there was an inflight HFS request, but could not be attributed to a specific file, the wait is aggregated to a single report line with a path name of "unknown".

Quantification

Each report line quantifies wait time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which an HFS call against the indicated HFS file was in a wait to the total number of samples.

Detail line descriptions

HFS File detail line

Under Heading	This is Displayed
FileId	A unique sequence number assigned to each HFS file.
Path Name	The HFS file path name
Percent of Time	The percentage wait time measured for the indicated file.

Sample reports

A sample report is shown here.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
H08: HFS Wait Time by Path Name (8242/JVMTST01)              Row 00001 of 00046
Command ===> _____________________________________________ Scroll ===> CSR

FileId   Path Name                          Percent of Time * 10.00%   ±1.0%
                                               *....1....2....3....4....5....6..
00002    /dev/ttyp0001                     70.29
00000    unknown                           66.53
00001    /dev/ttyp0000                     50.46
00021    /Z18/usr/lpp/java/J1.4/lib/core.   0.94
00080    /Z18/usr/lpp/java/J1.4/lib/core.   0.62
00063    /tmp/ofile.txt                     0.32
00041    /Z18/usr/lpp/java/J1.4/lib/ext/d   0.31
00062    /u/zfs/ifile.txt                   0.24
00032    /Z18/usr/lpp/java/J1.4/lib/ibmor   0.18
00044    /Z18/usr/lpp/java/J1.4/lib/ext/i   0.14
00026    /Z18/usr/lpp/java/J1.4/lib/chars   0.09
00042    /Z18/usr/lpp/java/J1.4/lib/ext/g   0.09
00034    /Z18/usr/lpp/java/J1.4/lib/ibmpk   0.08
00072    /u/zfs/platz                       0.08
00075    /u/zfs/platz                       0.08
00029    /Z18/usr/lpp/java/J1.4/lib/ibmjg   0.07
00036    /u/zfs/platz                       0.07
00054    /Z18/usr/lpp/java/J1.4/lib/ext/r   0.07
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	FileId	Display context help information.
++	FileId	Show additional details.

on headings

Cmd	When Applied To Heading	Action
?	FileId, Path Name, Percent of Time	Display context help information.
+	Path Name	Expand description field size.
+	Percent of Time	Zoom in scale.
–	Path Name	Reduce description field size.
–	Percent of Time	Zoom out scale.
SV	FileId	Sort next level by value.
SN	FileId	Sort next level by FileId.
SP	FileId	Sort next level by Path Name.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a FileId will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | 00002   /dev/ttyp0001                    70.29                       |      |
| +----------------------------------------------------------------------+      |
|                                                                               |
| Calculation Details                                                           |
|    HFS file wait time measurements           7,029                            |
|    Total measurements                        10,000                           |
|    Percent of total                          70.29%                           |
|                                                                               |
| HFS File Information                                                          |
|    Path name         /dev/ttyp0001                                            |
|    File type         Character Special File Major 2      Minor 1              |
|    Opened            7:05:22.45 Friday Mar 16 2007                            |
|    Device#           4                                                        |
|    Serial#           17                                                       |
|    Open Flags        Read/Write Read_Only Write_Only                          |
|                      Not_a_controlling_terminal                               |
+-------------------------------------------------------------------------------+
```

SETUP options

The SETUP command displays the following options:

```
Minimum Percentage of Time . . . . . 0.00

This is the minimum percentage of HFS wait time
measured for which an item is to be included in
the report.
```

By default, all HFS files with wait time during an observation session are displayed. Use the Minimum Percent of Time option to limit the report to files with wait time above the specified threshold.

H09- HFS Wait Time by Device

Usage

Use this report to identify delays resulting from waits during HFS requests. Each report line shows an HFS device, listed by device number, for which wait time was observed. If a wait was observed during a sample, where there was an inflight HFS request, but could not be attributed to a specific file and device, the wait is aggregated to a single report line with a device number of "unknown". You can further expand each line item to show the HFS files associated with the device.

Quantification

Each report line quantifies wait time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which an HFS call against the indicated HFS device was in a wait to the total number of samples.

Detail line hierarchy

An unexpanded report shows a line for each HFS device. The name field shows a sequence number assigned to each unique device. You can expand each line to reveal an additional hierarchical level of detail. The hierarchy is illustrated here:

```
Level 1 HFS Device
 Level 2 HFS File
```

Detail line descriptions

HFS Device detail line

This is the first-level detail line.

Under Heading	This is Displayed
DevId	A unique sequence number assigned to each HFS device.
Device#>Path Name	The HFS device number.
Percent of Time	The percentage wait time measured for the indicated HFS device.

HFS File detail line

This is the second-level detail line.

Under Heading	This is Displayed
DevId	A unique sequence number assigned to each HFS file.
Device#>Path Name	The HFS file path name.
Percent of Time	The percentage activity measured for the indicated HFS file.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
-------------------------------------------------------------------------------
H09: HFS Wait Time by Device (8242/JVMTST01)                 Row 00001 of 00057
Command ===> _____________________________________________ Scroll ===> CSR

DevId   Device#>PathName                    Percent of Time * 10.00%   ±1.0%
                                              *....1....2....3....4....5....6..
00001   4                                  84.84
→ 00002   /dev/ttyp0001                    70.29
→ 00001   /dev/ttyp0000                    50.46

00000   unknown                            66.53
00004   24                                  3.27
→ 00021   /Z18/usr/lpp/java/J1.4/lib/core   0.94
→ 00080   /Z18/usr/lpp/java/J1.4/lib/core   0.62
→ 00041   /Z18/usr/lpp/java/J1.4/lib/ext/   0.31
→ 00032   /Z18/usr/lpp/java/J1.4/lib/ibmo   0.18
→ 00044   /Z18/usr/lpp/java/J1.4/lib/ext/   0.14
→ 00026   /Z18/usr/lpp/java/J1.4/lib/char   0.09
→ 00042   /Z18/usr/lpp/java/J1.4/lib/ext/   0.09
→ 00034   /Z18/usr/lpp/java/J1.4/lib/ibmp   0.08
→ 00029   /Z18/usr/lpp/java/J1.4/lib/ibmj   0.07
→ 00054   /Z18/usr/lpp/java/J1.4/lib/ext/   0.07
→ 00081   /Z18/usr/lpp/java/J1.4/lib/grap   0.07
→ 00043   /Z18/usr/lpp/java/J1.4/lib/ext/   0.06
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	DevId, FileId	Display context help information.

Cmd	When Applied To Object	Action
++	DevId, FileId	Show additional details.
+	DevId	Expand to reveal next level.
–	DevId	Collapse to hide next level.
SV	DevId	Sort next level by value.
SN	DevId	Sort next level by FileId.
SP	DevId	Sort next level by Path Name.

on headings

Cmd	When Applied To Heading	Action
?	DevId, Device#>Path Name, Percent of Time	Display context help information.
+	DevId	Expand to reveal all entries.
+	Device#>Path Name	Expand field size.
+	Percent of Time	Zoom in scale.
–	DevId	Collapse to show only first level.
–	Device#>Path Name	Reduce field size.
–	Percent of Time	Zoom out scale.
SV	DevId	Sort next level by value.
SN	DevId	Sort next level by DevId.
SD	DevId	Sort next level by Device#.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a DevId will cause this detail window to appear.

```
 File  View  Navigate  Help
+-----------------------------------------------------------------------------+
|                                                                             |
| +--------------- The following report line was selected ---------------+    |
| | 00001   4                                 84.84                       |    |
| +-------------------------------------------------------------------------+    |
|                                                                             |
| Calculation Details                                                         |
|    HFS device wait time measurements         8.484                          |
|    Total measurements                        10,000                         |
|    Percent of total                          84.84%                         |
|                                                                             |
| HFS Device Information                                                      |
|    Device#                    4                                             |
|    Dataset name               HFS.ADCD.DEV                                  |
|    DD name                    SYS00006                                      |
|    Physical file system       HFS                                           |
|    Mount point                /X235/dev                                     |
|    Mounted                    8:40:24.22 Friday Mar 9 2007                  |
+-----------------------------------------------------------------------------+
```

SETUP options

The SETUP command displays the following options:

```
Minimum Percentage of Time . . . . . 0.00

This is the minimum percentage of HFS wait time
measured for which an item is to be included in
the report.
```

By default, all HFS devices with wait time during an observation session are displayed. Use the Minimum Percent of Time option to limit the report to devices with activity above the specified threshold.

H10- HFS Service Time by Request

Usage

Use this report to see how Service time was consumed by HFS file requests during the observation session. The unexpanded report shows an HFS request, listed by Request name, for which activity was observed. If an HFS file request was observed during a sample, but could not be attributed to a specific file, the request is aggregated to a single report line with a request name of "unknown". You can further expand each line item to show the HFS files associated with the request.

Quantification

Each report line quantifies Service time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which an HFS request was inflight to the total number of samples. An observation is counted as inflight regardless of the CPU state: Active, WAIT, or Queued.

Detail line hierarchy

An unexpanded report shows a line for each HFS request. The name field shows a sequence number assigned to each unique request type. You can expand each line to reveal an additional hierarchical level of detail. The hierarchy is illustrated here:

```
Level 1 HFS Request
 Level 2 HFS File
```

Detail line descriptions

HFS Request detail line

This is the first-level detail line.

Under Heading	This is Displayed
ReqId	A unique sequence number assigned to each request type.
Request>Path Name	The HFS request name.
Percent of Time	The percentage activity measured for the indicated HFS request.

HFS File detail line

This is the second-level detail line.

Under Heading	This is Displayed
ReqId	A unique sequence number assigned to each HFS file.
Request>Path Name	The HFS file path name.
Percent of Time	The percentage activity measured for the indicated HFS file.

Sample reports

A sample report is shown here. It has been expanded to the second level.

```
File  View  Navigate  Help
--------------------------------------------------------------------------------
H10: HFS Service Time by Request (8242/JVMTST01)              Row 00001 of 00090
Command ===> ____________________________________________________ Scroll ===> CSR

ReqId   Request>PathName                    Percent of Time * 10.00%   ±1.0%
                                               *....1....2....3....4....5....6..
00001   read                               86.02
→ 00002   /dev/ttyp0000                    70.35
→ 00001   /dev/ttyp0000                    50.48
→ 00021   /Z18/usr/lpp/java/J1.4/lib/core   1.52
→ 00080   /Z18/usr/lpp/java/J1.4/lib/core   1.10
→ 00062   /u/zfs/ifile.txt                  0.53
→ 00041   /Z18/usr/lpp/java/J1.4/lib/ext/   0.32
→ 00032   /Z18/usr/lpp/java/J1.4/lib/ibmo   0.18
→ 00075   /u/zfs/platz                      0.18
→ 00043   /Z18/usr/lpp/java/J1.4/lib/ext/   0.15
→ 00044   /Z18/usr/lpp/java/J1.4/lib/ext/   0.15
→ 00072   /u/zfs/platz                      0.15
→ 00070   /u/zfs/platz                      0.14
→ 00036   /u/zfs/platz                      0.12
→ 00064   /u/zfs/platz                      0.12
→ 00022   /Z18/usr/lpp/java/J1.4/lib/grap   0.11
→ 00005   /dev/ptyp0001                     0.11
→ 00026   /Z18/usr/lpp/java/J1.4/lib/char   0.10
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	ReqId, FileId	Display context help information.
++	ReqId, FileId	Show additional details.
+	ReqId	Expand to reveal next level.
–	ReqId	Collapse to hide next level.
SV	ReqId	Sort next level by value.
SN	ReqId	Sort next level by FileId.
SP	ReqId	Sort next level by Path Name.

on headings

Cmd	When Applied To Heading	Action
?	ReqId, Request>PathName, Percent of Time	Display context help information.
+	ReqId	Expand to reveal all entries.
+	Request>Path Name	Expand field size.
+	Percent of Time	Zoom in scale.
–	ReqId	Collapse to show only first level.
–	Request>Path Name	Reduce field size.

Cmd	When Applied To Heading	Action
–	Percent of Time	Zoom out scale.
SV	ReqId	Sort next level by value.
SN	ReqId	Sort next level by ReqId.
SR	ReqId	Sort next level by Request.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a ReqId will cause this detail window to appear.

```
 File  View  Navigate  Help
+-------------------------------------------------------------------------------+
|                                                                               |
| +--------------- The following report line was selected ---------------+      |
| | 00001   read                              86.02                      |      |
| +----------------------------------------------------------------------+      |
|                                                                               |
| Calculation Details                                                           |
|    HFS request measurements                  8.602                           |
|    Total measurements                        10,000                          |
|    Percent of total                          86.02%                          |
+-------------------------------------------------------------------------------+
```

SETUP options

The SETUP command displays the following options:

```
Minimum Percentage of Time . . . . . 0.00

This is the minimum percentage of HFS activity
measured for which an item is to be included in
the report.
```

By default, all HFS requests captured during an observation session are displayed. Use the Minimum Percent of Time option to limit the report to requests with activity above the specified threshold.

H11- HFS Wait Time by Request

Usage

Use this report to identify delays resulting from waits during HFS requests. Each report line shows an HFS request, listed by Request name, for which wait time was observed. If a wait was observed during a sample, where there was an inflight HFS request, but could not be attributed to a specific file, the wait is aggregated to a single report line with a request name of "unknown". You can further expand each line item to show the HFS files associated with the request.

Quantification

Each report line quantifies wait time measured as a percentage of total time. The percentage represents the ratio of the number of samples in which an HFS request was in a wait, to the total number of samples.

Detail line hierarchy

An unexpanded report shows a line for each HFS request. The name field shows a sequence number assigned to each unique request type. You can expand each line to reveal an additional hierarchical level of detail. The hierarchy is illustrated here:

```
Level 1 HFS Request
 Level 2 HFS File
```

Detail line descriptions

HFS Request detail line

This is the first-level detail line.

Under Heading	This is Displayed
ReqId	A unique sequence number assigned to each request type.
Request>Path Name	The HFS request name.
Percent of Time	The percentage wait time measured for the indicated HFS request.

HFS File detail line

This is the second-level detail line.

Under Heading	This is Displayed
ReqId	A unique sequence number assigned to each HFS file.
Request>Path Name	The HFS file path name.
Percent of Time	The percentage wait time measured for the indicated HFS file.

Sample reports

A sample report is shown here.

```
File  View  Navigate  Help
--------------------------------------------------------------------------------
H11: HFS Wait Time by Request (8242/JVMTST01)                Row 00001 of 00052
Command ===> _____________________________________________ Scroll ===> CSR

ReqId   Request>PathName                    Percent of Time * 10.00%   ±1.0%
                                              *....1....2....3....4....5....6..
00001   read                                35.38
→ 00002   /dev/ttyp0001                     70.29
→ 00001   /dev/ttyp0000                     50.46
→ 00021   /Z18/usr/lpp/java/J1.4/lib/core    0.94
→ 00080   /Z18/usr/lpp/java/J1.4/lib/core    0.62
→ 00041   /Z18/usr/lpp/java/J1.4/lib/ext/    0.31
→ 00062   /u/zfs/ifile.txt                   0.24
→ 00032   /Z18/usr/lpp/java/J1.4/lib/ibmo    0.18
→ 00044   /Z18/usr/lpp/java/J1.4/lib/ext/    0.14
→ 00026   /Z18/usr/lpp/java/J1.4/lib/char    0.09
→ 00042   /Z18/usr/lpp/java/J1.4/lib/ext/    0.09
→ 00034   /Z18/usr/lpp/java/J1.4/lib/ibmp    0.08
→ 00072   /u/zfs/platz                       0.08
→ 00075   /u/zfs/platz                       0.08
→ 00029   /Z18/usr/lpp/java/J1.4/lib/ibmj    0.07
→ 00036   /u/zfs/platz                       0.07
→ 00054   /Z18/usr/lpp/java/J1.4/lib/ext/    0.07
→ 00081   /Z18/usr/lpp/java/J1.4/lib/grap    0.07
```

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	ReqId, FileId	Display context help information.
++	ReqId, FileId	Show additional details.
+	ReqId	Expand to reveal next level.
–	ReqId	Collapse to hide next level.
SV	ReqId	Sort next level by value.
SN	ReqId	Sort next level by FileId.
SP	ReqId	Sort next level by Path Name.

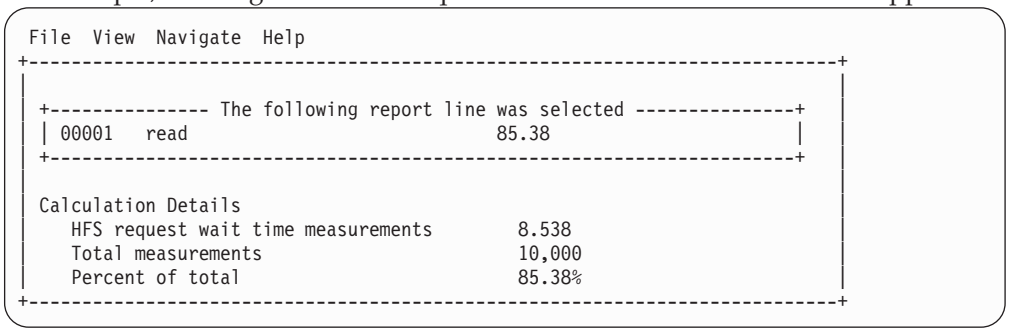
on headings

Cmd	When Applied To Heading	Action
?	ReqId, Request>PathName, Percent of Time	Display context help information.
+	ReqId	Expand to reveal all entries.
+	Request>Path Name	Expand field size.
+	Percent of Time	Zoom in scale.
–	ReqId	Collapse to show only first level.
–	Request>Path Name	Reduce field size.
–	Percent of Time	Zoom out scale.
SV	ReqId	Sort next level by value.
SN	ReqId	Sort next level by ReqId.
SR	ReqId	Sort next level by Request.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

For example, entering "++" on a ReqId will cause this detail window to appear.



SETUP options

The SETUP command displays the following options:

```
Minimum Percentage of Time . . . . . 0.00

This is the minimum percentage of HFS wait time
measured for which an item is to be included in
the report.
```

By default, all HFS requests captured during an observation session are displayed. Use the Minimum Percent of Time option to limit the report to requests with wait time above the specified threshold.

Chapter 9. Quick start guide for compiling and assembling programs for use with IBM Problem Determination Tools products

This chapter describes the minimal steps required to prepare your programs for use with IBM Problem Determination Tools products. For more detailed information, refer to 'Part 2. Preparing your program for debugging' of the *Debug Tool for z/OS User's Guide*, 'Part 2. Fault Analyzer Installation and Administration' of the *Fault Analyzer for z/OS User's Guide*, or 'Appendix B. Creating side files using CAZLANGX' of the *Application Performance Analyzer for z/OS User's Guide*.

The purpose of this chapter is to provide instructions for a single compile method for organizations that are using some combination of Debug Tool for z/OS, Fault Analyzer for z/OS, and Application Performance Analyzer for z/OS. If your enterprise is only using Debug Tool for z/OS, you can alternatively refer to 'Part 2. Preparing your program for debugging' of the *Debug Tool for z/OS User's Guide*. If your enterprise is only using Fault Analyzer for z/OS, alternatively refer to 'Part 2. Fault Analyzer Installation and Administration' of the *Fault Analyzer for z/OS User's Guide*. If your enterprise is only using Application Performance Analyzer for z/OS, alternatively refer to 'Appendix B. Creating side files using CAZLANGX' of the *Application Performance Analyzer for z/OS User's Guide*.

Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS are designed to use load modules and other files produced by IBM compilers. You must compile your programs with certain compiler options so that they produce load modules and files that these products can use.

This chapter uses the term 'source information files' to refer to the types of files that are used by Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS. The different kinds of source information files that are the subject of discussion in this chapter include:

- SYSDEBUG files
- LANGX files
- Compiler listings
- DWARF files
- Expanded source files

Be aware that different compilers generate different kinds of source information files. If you use more than one compiler, you might have more than one type of source information library.

When you compile your programs with the compiler options described in this chapter, you can use the load modules and source information files created by the compilers as follows:

- Prepare the module for debugging (if you are using Debug Tool for z/OS). Debug Tool for z/OS lets you work with program statements and variables.

  When a program is compiled with the right options, the module that is produced by the compiler can be debugged and a source information file, which contains program statements, can be produced. When you use Debug Tool for z/OS to debug a program, Debug Tool for z/OS uses the source information file to display the program source statements in the source window.

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Depending on the source language and compiler used, either the load module, source information file, or DWARF file contains information about statements and variables, such as offsets and lengths, and contains information that allows the debugger to locate statements and variables in storage. If you do not compile with the correct compile options, debugging is limited to something called 'disassembly' mode, where machine code is displayed, but no source statements or variables.

- Utilize Fault Analyzer for z/OS to automatically pinpoint the source statement that caused an abend, and can show you the values of variables in your programs at the time of an abend.
- Utilize Application Performance Analyzer for z/OS to show you precisely which program statements are utilizing the most CPU time and wait time, to give you information you need to tune your applications.

Updating your build process

If someone recently installed one or more of the IBM Problem Determination Tools products on your system, the program build processes might not have been updated yet. Updating the build processes is an important and necessary part of implementing the IBM Problem Determination Tools products.

In many organizations, there is clear ownership of these build processes. In other organizations, it might not be obvious who should make the changes. Many organizations use standard compile processes or PROCs that your system administrators maintain and have updated to prepare programs for the IBM Problem Determination Tools products. If this is the case, find out what processes have been made available and how to use them. In other organizations, each developer maintains their own compile JCL or PROCs to compile programs. If this is the case, update your own compile JCL to prepare your programs for the IBM Problem Determination Tools products as described below.

Start by researching what is required for each compiler individually. For example, the changes required for Enterprise COBOL for z/OS, Enterprise PL/I for z/OS, C/C++ and Assembler are all slightly different.

In general, there are three changes that might be needed to compiler JCL to produce programs that can be used by the IBM Problem Determination Tools:

1. Specify compiler options required by the IBM Problem Determination Tools. For example, in the case of Enterprise COBOL for z/OS, a `TEST` options is needed.
2. Code the JCL to produce and save the source information files that the IBM Problem Determination Tools products need. Newer compilers can generate the required source information files directly. Some older compilers require an additional step in the compile job to run a special utility program that produces the needed file.
3. In certain environments, it is advantageous to include a special Debug Tool for z/OS module into the application load module during the link edit step. In most cases this is optional, but it can simplify starting Debug Tool for z/OS for certain types of programs. For certain older compilers running in certain environments, you must include a special module to enable Debug Tool for z/OS.

Updating your promotion process

Typically, when a program is tested, program load modules are promoted through different stages before reaching production. For example, when a new program is compiled for the first time, it might be placed into a test load library. After unit testing is completed, perhaps the compiled program is promoted to a quality assurance environment. And eventually, it is promoted into production. On your system, you might know these stages by different names, such as:

- Unit test
- System test
- Model office

Consider whether you want the ability to use Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS throughout your programs' life cycle. Even if you do not plan to use Debug Tool for z/OS with production programs, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS are very useful in those stages. To enable the IBM Problem Determination Tools products at each stage, update your promotion processes to retain the source information files. Promotions can be accomplished by performing a recompile, a copy, or a move. Perform the same steps with your source information files that you perform with your load modules or object modules. For each load library or object library, you should have a corresponding set of source information libraries. Whenever you promote a load module or object module, you should promote the source information file as well. This ensures that the source information file is available for Fault Analyzer and Application Performance Analyzer, and you can continue to take advantage of the IBM Problem Determination Tools products at all stages of your program's life cycle.

Preparing your programs

Each compiler produces different kinds of source information files, and each of the IBM Problem Determination Tools products reads different kinds of files. It can be time-consuming to research all the different combinations, but for each compiler, there is a suggested method described below. If you use the suggested methods, then your programs will be ready to take full advantage of the IBM Problem Determination Tools products.

- "Enterprise COBOL for z/OS Version 4 programs"
- "Enterprise COBOL for z/OS Version 3 and COBOL for OS/390 and VM programs" on page 529
- "COBOL for MVS and VM programs" on page 532
- "VS COBOL II programs" on page 535
- "OS/VS COBOL programs" on page 539
- "Enterprise PL/I Version 3.7 and later programs" on page 541
- "Enterprise PL/I Version 3.5 and Version 3.6 programs" on page 546
- "Enterprise PL/I Version 3.4 and earlier programs" on page 551
- "PL/I for MVS and VM and OS PL/I programs" on page 555
- "z/OS XL C and C++ programs" on page 559
- "Assembler programs" on page 566

Enterprise COBOL for z/OS Version 4 programs

The following table shows various compiler options that can be used to prepare Enterprise COBOL for z/OS Version 4 programs for use with the IBM Problem

Determination Tools products (Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant runtime overhead.

Table 3. Examples of compiler options and source information files supported by IBM Problem Determination Tools products for Enterprise COBOL for z/OS Version 4

Compiler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
TEST(NOHOOK, SEPARATE, EJPD), LIST, MAP, SOURCE, NONUMBER, XREF(SHORT)	SYSDEBUG	Yes	Suggested for production and test		
NOTEST, LIST, MAP, SOURCE, NONUMBER, XREF(SHORT)	Compiler listing	Yes	N/A	Supported	Supported
NOTEST, LIST, MAP, SOURCE, NUMBER, XREF(SHORT)		Yes	N/A	Supported	N/A
LIST, MAP, SOURCE, NONUMBER, XREF(SHORT)	LANGX file	Yes	N/A	Supported	Supported

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing Enterprise COBOL for z/OS Version 4 programs

Perform the following steps for compiling your Enterprise COBOL for z/OS Version 4 programs using the compiler options suggested in Table 3:

1. Create libraries (PDSE is suggested unless PDS is required in your organization) for SYSDEBUG files. Create one or more SYSDEBUG libraries for each environment, such as test, production, and so on.
2. Create a corresponding SYSDEBUG library for each load library. Specify `LRECL=(80 to 1024),RECFM=FB,BLKSIZE=(multiple of lrecl < 32K)`.
3. For all programs in both test and production environments, specify the following compiler options:
   `TEST(NOHOOK,SEPARATE,EJPD),LIST,MAP,SOURCE,NONUMBER,XREF(SHORT)`.

   The `TEST` compiler option is required if you plan to use Debug Tool for z/OS to debug a program. The `TEST` option is optional if you plan to use Fault Analyzer for z/OS or Application Performance Analyzer for z/OS.

   The `SEPARATE` sub-option produces a SYSDEBUG file.

   `NOHOOK` and `SEPARATE` produce a production-ready module that can still be debugged.

   If the `OPT` option is also used, `EJPD` might reduce optimization but enables the debugger's `JUMPTO` and `GOTO` commands. These commands are disabled when `OPT` and `NOEJPD` are both used.

4. When the TEST option is not used, save the compiler listing in a file, or use the *xxx*LANGX utility program to create a LANGX file. Equivalent *xxx*LANGX utilities are available in Debug Tool for z/OS as EQALANGX, in Fault Analyzer for z/OS as IDILANGX and in Application Performance Analyzer for z/OS as CAZLANGX. Fault Analyzer for z/OS and Application Performance Analyzer for z/OS can use compiler listings and LANGX files to provide source-level support.
5. The LIST, MAP, SOURCE, and XREF options are needed only if a compiler listing or a LANGX file will be used to provide source information to Fault Analyzer for z/OS or Application Performance Analyzer for z/OS. If a SYSDEBUG file will be used with these products or if you will not be using Fault Analyzer for z/OS or Application Performance Analyzer for z/OS, the LIST, MAP, SOURCE, and XREF options are optional.
6. The NONUMBER compiler option is needed only if a compiler listing file will be used to provide source information to Application Performance Analyzer for z/OS. If a SYSDEBUG file will be used with Application Performance Analyzer for z/OS, or if you will not be using Application Performance Analyzer for z/OS, the NONUMBER option is optional.
7. Code a SYSDEBUG DD in the JCL of the compiler step:

   ```
   //SYSDEBUG DD DSN= SYSDEBUG.pds(pgmname),DISP=SHR
   ```

   Save the SYSDEBUG file produced by the compiler in the SYSDEBUG library and specify a member name that is equal to the program name of your application program. This is the source information file for Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS.
8. Modify the promotion process to promote SYSDEBUG files. When a load module is promoted, for example from test to production, promote the corresponding SYSDEBUG file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the SYSDEBUG file that you perform with the module during promotion.
9. Optionally, include a Debug Tool Language Environment (LE) exit module into the load module during the linkage editor step. This is one way to enable Debug Tool's panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs.

Sample JCL for compiling Enterprise COBOL for z/OS Version 4 programs

Below is a JCL example for compiling an Enterprise COBOL for z/OS Version 4 program for use with the IBM Problem Determination Tools products. This is a generic sample, and might not meet all your requirements to generate your modules.

Notice that the TEST compiler option is specified. Code the correct sub-options of the TEST compiler option for the version of the compiler that you are using. You can also code any other compatible compiler options that are required by your programs.

Also notice that a SYSDEBUG DD statement has been coded. This is the source information file that the compiler produces. It refers to a SYSDEBUG library that is a PDS or PDSE. The member name must be the same as the program name.

For Enterprise COBOL for z/OS, these are the only required changes.

However, there is an optional change in the linkage editor step. The example below shows that a special Language Environment exit module is included in the application load module. Although this is not required, it enables the use of Debug Tool panel 6, which makes the debugger easier to start in some environments. If you prefer to use panel 6 to start Debug Tool, this is one way to enable it. If you do not plan to use Debug Tool panel 6, then do not include an exit module.

```
//*     - - -  ADD A JOB CARD ABOVE THIS LINE  - - -
//*
//*  SAMPLE JCL TO PREPARE AN ENTERPRISE COBOL PROGRAM
//*  FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//*     FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//*  NOTES:
//*
//*   COMPILER:
//*    1. A TEST COMPILER PARM IS REQUIRED FOR DEBUG TOOL
//*    2. COMPILER PARM TEST(NOHOOK,SEPARATE,EJPD) HAS ADVANTAGES:
//*         - THE MODULE IS READY FOR DEBUG TOOL
//*         - THE MODULE IS PRODUCTION-READY (NO RUN-TIME OVERHEAD)
//*         - A SYSDEBUG FILE IS CREATED THAT CAN BE USED BY DT,FA,APA
//*    3. COMPILER PARMS LIST,MAP,SOURCE,XREF ARE REQUIRED IF YOU PLAN
//*       TO USE THE COMPILER LISTING WITH FA OR APA, OR XXXLANGX
//*
//*   BINDER (LINKAGE EDITOR):
//*    4. THE INCLUDE FOR MODULE EQAD?CXT IS *OPTIONAL*.  IT IS AN
//*       LE EXIT MODULE THAT CAN BE USED TO START DEBUG TOOL.
//*       UNDERSTAND THE METHODS AVAILABLE FOR STARTING DEBUG TOOL,
//*       AND CHOOSE WHETHER YOU WANT TO USE THE LE EXITS.
//*         IF YOU USE THIS METHOD, LOAD THE CORRECT EXIT MODULE:
//*            EQADBCXT: FOR BATCH PROGRAMS
//*            EQADICXT: FOR ONLINE IMS PROGRAMS
//*            EQADDCXT: FOR DB2 STORED PROCEDURES (OF TYPE MAIN AND SUB)
//*           (for SUB this is supported only for invocations through call_sub)
//*            (DO NOT INCLUDE AN EXIT FOR CICS PROGRAMS)
//*
//*  SET PARMS FOR THIS COMPILE:
//*  ---------------------------
//   SET MEM=SAM1                              PROGRAM NAME
//   SET COBOLLIB='IGY.V4R1.SIGYCOMP'          COBOL COMPILER LOADLIB
//   SET DTLIB='EQAW.SEQAMOD'                  DEBUG TOOL LOADLIB
//   SET LELIB='CEE.SCEELKED'                  LE LINKEDIT LIBRARY
//   SET UNITDEV=SYSALLDA                      UNIT FOR TEMP FILES
//*
//*  ****************************
//*        COMPILE STEP
//*  ****************************
//COMPILE  EXEC PGM=IGYCRCTL,REGION=0M,
//   PARM=('TEST(NOHOOK,SEPARATE,EJPD),LIST,MAP,XREF(SHORT),NONUMBER,SOURCE')
//STEPLIB  DD DISP=SHR,DSN=&COBOLLIB
//SYSIN    DD DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSLIB   DD DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD DISP=SHR,DSN=&SYSUID..ADLAB.LISTING(&MEM)
//SYSDEBUG DD DISP=SHR,DSN=&SYSUID..ADLAB.SYSDEBUG(&MEM)
//SYSLIN   DD DISP=(MOD,PASS),DSN=&&LOADSET,UNIT=&UNITDEV,
//            SPACE=(80,(10,10))
//SYSUT1   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT2   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT3   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT4   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT5   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT6   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT7   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//*
```

```
//CBLPRINT  EXEC PGM=IEBGENER,REGION=0M
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD DSN=&SYSUID..ADLAB.LISTING(&MEM),DISP=SHR
//SYSUT2    DD SYSOUT=*
//SYSIN     DD DUMMY
//*  ********************************
//*        LINK-EDIT (BINDER) STEP
//*  ********************************
//LKED EXEC PGM=IEWL,REGION=0M,COND=(5,LT,COMPILE),PARM='LIST,XREF'
//SYSLIB   DD DISP=SHR,DSN=&LELIB
//DTLIB    DD DISP=SHR,DSN=&DTLIB
//SYSLMOD  DD DSN=&SYSUID..ADLAB.LOAD(&MEM),DISP=SHR
//SYSLIN   DD DISP=(OLD,DELETE),DSN=&&LOADSET
//*  INCLUDING A DEBUG TOOL LE EXIT (EQADBCXT, EQADDCXT, OR EQADICXT) IS OPTIONAL.
//*  AN EXIT ENABLES STARTING DEBUG TOOL USING THE USER EXIT DATA SET UTILITY
//*  (ONE OF THE DEBUG TOOL ISPF UTILITIES)
//*  //        DD *
//*   INCLUDE DTLIB(EQADBCXT)
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD UNIT=&UNITDEV,DCB=BLKSIZE=1024,SPACE=(1024,(200,20))
```

Enterprise COBOL for z/OS Version 3 and COBOL for OS/390 and VM programs

The following table shows various compiler options that can be used to prepare Enterprise COBOL for z/OS Version 3 and COBOL for OS/390 and VM programs for use with the IBM Problem Determination Tools products (Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant runtime overhead.

Table 4. Examples of compiler options and source information files supported by IBM Problem Determination tools products for Enterprise COBOL for z/OS Version 3 and COBOL for OS/390 and VM

Compiler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
TEST(NONE, SYM, SEPARATE), LIST, MAP, SOURCE, NONUMBER, XREF(SHORT)	SYSDEBUG	Yes	Suggested for production and test		
NOTEST, LIST, MAP, SOURCE, NONUMBER, NOOPT, XREF(SHORT)	Compiler listing	Yes	N/A	Supported	Supported
NOTEST, LIST, MAP, SOURCE, XREF(SHORT), NUMBER		Yes	N/A	Supported	N/A
LIST, MAP, SOURCE, NONUMBER, XREF(SHORT)	LANGX file	Yes	N/A	Supported	Supported

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing Enterprise COBOL for z/OS Version 3 and COBOL for OS/390 and VM programs

Perform the following steps for compiling your Enterprise COBOL for z/OS Version 3 and COBOL for OS/390 and VM programs using the compiler options suggested in Table 4 on page 529:

1. Create libraries (PDSE is suggested unless PDS is required in your organization) for SYSDEBUG files. Allocate one or more SYSDEBUG libraries for each environment, such as test, production, and so on.
2. Create a corresponding SYSDEBUG library for each load library. Specify `LRECL=(80 to 1024),RECFM=FB,BLKSIZE=(multiple of lrecl < 32K)`.
3. For all programs in both test and production environments, use `TEST(NONE,SYM,SEPARATE),LIST,MAP,SOURCE,NONUMBER,XREF(SHORT)`.

   `TEST` is required by Debug Tool for z/OS.

   The `SEPARATE` sub-option produces a SYSDEBUG file. Specifying `NONE` with `SEPARATE` produces a production-ready module that can still be debugged.

   If `OPTIMIZE` is specified, the debugger `JUMPTO` and `GOTO` commands are disabled. These commands are enabled when `NOOPTIMIZE` is specified.
4. The `LIST`, `MAP`, `SOURCE`, and `XREF` options are needed only if a compiler listing or a LANGX file will be used to provide source information to Fault Analyzer for z/OS or Application Performance Analyzer for z/OS. If a SYSDEBUG file will be used with these products, or if you will not be using Fault Analyzer for z/OS or Application Performance Analyzer for z/OS, the `LIST`, `MAP`, `SOURCE`, and `XREF` options are optional.
5. The `NONUMBER` compiler option is needed only if a compiler listing file will be used to provide source information to Application Performance Analyzer for z/OS. If a SYSDEBUG file will be used with Application Performance Analyzer for z/OS, or if you will not be using Application Performance Analyzer for z/OS, the `NONUMBER` option is optional.
6. Code a SYSDEBUG DD in the JCL of the compiler step.

   ```
   //SYSDEBUG DD DSN= SYSDEBUG.pds(pgmname),DISP=SHR
   ```

   Save the SYSDEBUG file produced by the compiler in the SYSDEBUG library and specify a member name that is equal to the program name of your application program. This is the source information file for Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS.
7. Modify the promotion process to promote SYSDEBUG files. When a load module is promoted, for example from test to production, promote the corresponding SYSDEBUG file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the SYSDEBUG file that you perform with the module during promotion.
8. Optionally, include a Debug Tool Language Environment exit module into the load module during the linkage editor step. This is one way to enable Debug Tool's panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs.

Sample JCL for compiling Enterprise COBOL for z/OS Version 3 programs

Below is a JCL example for compiling an Enterprise COBOL for z/OS Version 3 program for use with the IBM Problem Determination Tools products. This is a generic sample, and might not meet all your requirements.

Notice that a TEST option is specified. Code the correct sub-option of the TEST compiler option for the version of the compiler that you are using. You can also code any other compatible compiler options that are required by your programs.

Also notice that a SYSDEBUG DD statement has been coded. This is the source information file that the compiler produces. It refers to a SYSDEBUG library that is a PDS or PDSE. The member name must be the same as the program name.

For Enterprise COBOL for z/OS, these are the only required changes.

However, there is an optional change in the linkage editor step. The example below shows that a special Language Environment exit module is included in the application load module. Although this is not required, it enables the use of Debug Tool panel 6, which makes the debugger easier to start in some environments. If you prefer to use panel 6 to start Debug Tool, this is one way to enable it. If you do not plan to use Debug Tool panel 6, then do not include an exit module.

```
//*    - - -  ADD A JOB CARD ABOVE THIS LINE  - - -
//*
//*  SAMPLE JCL TO PREPARE AN ENTERPRISE COBOL PROGRAM
//*  FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//*     FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//*  NOTES:
//*
//*   COMPILER:
//*    1. A TEST COMPILER PARM IS REQUIRED FOR DEBUG TOOL
//*    2. COMPILER PARM TEST(NONE,SYM,SEP) HAS THREE ADVANTAGES:
//*         - THE MODULE IS READY FOR DEBUG TOOL
//*         - THE MODULE IS PRODUCTION-READY (NO RUN-TIME OVERHEAD)
//*         - A SYSDEBUG FILE IS CREATED THAT CAN BE USED BY DT,FA,APA
//*    3. COMPILER PARMS LIST,MAP,SOURCE,XREF ARE REQUIRED IF YOU PLAN
//*       TO USE THE COMPILER LISTING WITH FA OR APA, OR XXXLANGX
//*    4. COMPILER PARM NOOPT IS OPTIONAL.  HOWEVER, THE DEBUG TOOL
//*       COMMANDS JUMPTO AND GOTO WILL NOT BE AVAILABLE IF
//*       THE OPT PARM IS USED
//*
//*   BINDER (LINKAGE EDITOR):
//*    5. THE INCLUDE FOR MODULE EQAD?CXT IS *OPTIONAL*.  IT IS AN
//*       LE EXIT MODULE THAT CAN BE USED TO START DEBUG TOOL.
//*       UNDERSTAND THE METHODS AVAILABLE FOR STARTING DEBUG TOOL,
//*       AND CHOOSE WHETHER YOU WANT TO USE THE LE EXITS.
//*         IF YOU USE THIS METHOD, LOAD THE CORRECT EXIT MODULE:
//*            EQADBCXT: FOR BATCH PROGRAMS
//*            EQADICXT: FOR ONLINE IMS PROGRAMS
//*            EQADDCXT: FOR DB2 STORED PROCEDURES (OF TYPE MAIN AND SUB)
//*           (for SUB this is supported only for invocations through call_sub)
//*            (DO NOT INCLUDE AN EXIT FOR CICS PROGRAMS)
//*
//*  SET PARMS FOR THIS COMPILE:
//*  ---------------------------
//   SET MEM=SAM1                              PROGRAM NAME
//   SET COBOLLIB='IGY.V3R4.SIGYCOMP'          COBOL COMPILER LOADLIB
//   SET DTLIB='EQAW.SEQAMOD'                  DEBUG TOOL LOADLIB
//   SET LELIB='CEE.SCEELKED'                  LE LINKEDIT LIBRARY
//   SET UNITDEV=SYSALLDA                      UNIT FOR TEMP FILES
//*
```

```
//*  ***************************
//*        COMPILE STEP
//*  ***************************
//COMPILE  EXEC PGM=IGYCRCTL,REGION=0M,
//   PARM=('TEST(NONE,SYM,SEPARATE),LIST,MAP,SOURCE,NONUMBER,XREF(SHORT)')
//STEPLIB  DD DISP=SHR,DSN=&COBOLLIB
//SYSIN    DD DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSLIB   DD DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD DISP=SHR,DSN=&SYSUID..ADLAB.LISTING(&MEM)
//SYSDEBUG DD DISP=SHR,DSN=&SYSUID..ADLAB.SYSDEBUG(&MEM)
//SYSLIN   DD DISP=(MOD,PASS),DSN=&&LOADSET,UNIT=&UNITDEV,
//            SPACE=(80,(10,10))
//SYSUT1   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT2   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT3   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT4   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT5   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT6   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT7   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//*
//CBLPRINT  EXEC PGM=IEBGENER,REGION=0M
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD DSN=&SYSUID..ADLAB.LISTING(&MEM),DISP=SHR
//SYSUT2    DD SYSOUT=*
//SYSIN     DD DUMMY
//*  ********************************
//*        LINK-EDIT (BINDER) STEP
//*  ********************************
//LKED EXEC PGM=IEWL,REGION=0M,COND=(5,LT,COMPILE),PARM='LIST,XREF'
//SYSLIB   DD DISP=SHR,DSN=&LELIB
//DTLIB    DD DISP=SHR,DSN=&DTLIB
//SYSLMOD  DD DSN=&SYSUID..ADLAB.LOAD(&MEM),DISP=SHR
//SYSLIN   DD DISP=(OLD,DELETE),DSN=&&LOADSET
//*  INCLUDING A DEBUG TOOL LE EXIT (EQADBCXT, EQADDCXT, OR EQADICXT) IS OPTIONAL.
//*  AN EXIT ENABLES STARTING DEBUG TOOL USING THE USER EXIT DATA SET UTILITY
//*  (ONE OF THE DEBUG TOOL ISPF UTILITIES)
//*  //        DD *
//*   INCLUDE DTLIB(EQADBCXT)
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD UNIT=&UNITDEV,DCB=BLKSIZE=1024,SPACE=(1024,(200,20))
```

COBOL for MVS and VM programs

The following table shows various compiler options that can be used to prepare COBOL for MVS and VM programs for use with the IBM Problem Determination Tools products (Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant run-time overhead.

Table 5. Examples of compiler options and source information files supported by IBM Problem Determination tools products for COBOL for MVS and VM

Compiler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
TEST(ALL, SYM), LIST, MAP, SOURCE, NOOPT, NONUMBER, XREF(SHORT)	Compiler listing	No	Suggested for test. (Using Debug Tool in production for this compiler is not suggested.)		
NOTEST, LIST, MAP, SOURCE, NONUMBER, XREF(SHORT)		Yes	N/A	Suggested for production	
NOTEST, LIST, MAP, SOURCE, NONUMBER, XREF(SHORT)	LANGX file	Yes	N/A	Supported	Supported

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing COBOL for MVS and VM programs

Perform the following steps for compiling your COBOL for MVS and VM programs:

1. Create libraries (PDSE is suggested unless PDS is required in your organization) for compiler listing files. Allocate one or more compiler listing libraries for each environment, such as test and production.
2. Create a corresponding listing library for each load library. Specify `LRECL=133,RECFM=FBA,BLKSIZE=(multiple of lrecl < 32K)`.
3. For all programs, such as batch, CICS, and IMS:
   - In test environments, specify compiler options `TEST(ALL,SYM),NOOPT,LIST,MAP,SOURCE,NONUMBER,XREF(SHORT)` to create a module that can be used with Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS.

     `TEST` is required for Debug Tool for z/OS.

     The `ALL` sub-option adds debug hooks, which will add some run-time overhead.

     `SYM` stores symbolics data required by Debug Tool for z/OS into the module, which can make it significantly larger.

     The other options format the compiler listing as required by Debug Tool for z/OS, Fault Analyzer for z/OS, and Application Performance Analyzer for z/OS.
   - In production environments, specify compiler options `NOTEST,LIST,MAP,SOURCE,NONUMBER,XREF(SHORT)` to create a production-ready module that can be used with Fault Analyzer for z/OS and Application Performance Analyzer for z/OS (but not Debug Tool for z/OS). Specify `OPTIMIZE` if preferred.

     `NOTEST` disables source level debugging with Debug Tool , but can provide better performance and smaller module size.

The other options (except OPTIMIZE) format the compiler listing as required by Fault Analyzer for z/OS and Application Performance Analyzer for z/OS.

4. Modify the SYSPRINT DD in the JCL of the compiler step to refer to a file.

   ```
   //SYSPRINT DD DSN= compiler.listing.pds(pgmname),DISP=SHR
   ```

   Save the compiler listing in a file in the compiler listing library and specify a member name that is equal to the program name of your application program. This is the source information file for Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS.
5. Modify the promotion process to promote compiler listing files. When a load module is promoted, for example, from test to production, promote the corresponding compiler listing file or files. A promotion can be a recompile, a copy, or a move. Perform the same steps with the compiler listing file that you perform with the module during promotion.
6. Optionally, include a Debug Tool Language Environment exit module into the load module during the linkage editor step. This is one way to enable Debug Tool's panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs.

Sample JCL for compiling COBOL for MVS and VM programs

Below is a JCL example for compiling an COBOL for MVS and VM program for use with the IBM Problem Determination Tools products. This is a generic sample, and might not meet all your requirements.

Notice that a TEST option is specified. Code the correct sub-options of the TEST compiler option for the version of the compiler that you are using. You can also code any other compatible compiler options that are required by your programs.

Also notice that the SYSPRINT DD refers to a permanent file. This is the source information file that the compiler produces. It refers to a listing library that is a PDS or PDSE. The member name must be the same as the program name. For COBOL for MVS and VM, these are the only required changes.

However, there is an optional change in the linkage editor step. The example below shows that a special Language Environment exit module is included in the application load module. Although this is not required, it enables the use of Debug Tool panel 6, which makes the debugger easier to start in some environments. If you prefer to use panel 6 to start Debug Tool, this is one way to enable it. If you do not plan to use Debug Tool panel 6, then do not include an exit module.

```
//*     - - -  ADD A JOB CARD ABOVE THIS LINE  - - -
//*
//*  SAMPLE JCL TO PREPARE A COBOL FOR MVS AND VM PROGRAM
//*  FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//*     FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//*  NOTES:
//*
//*   COMPILER:
//*    1. A TEST COMPILER PARM IS REQUIRED FOR DEBUG TOOL
//*    2. COMPILER PARMS LIST,MAP,SOURCE,XREF ARE REQUIRED IF YOU PLAN
//*       TO USE THE COMPILER LISTING WITH FA OR APA, OR XXXLANGX
//*    3. COMPILER PARM NOOPT IS OPTIONAL.  HOWEVER, THE DEBUG TOOL
//*       COMMANDS JUMPTO AND GOTO WILL NOT BE AVAILABLE IF
//*       THE OPT PARM IS USED
```

```
//*
//*   BINDER (LINKAGE EDITOR):
//*    4. THE INCLUDE FOR MODULE EQAD?CXT IS *OPTIONAL*.  IT IS AN
//*       LE EXIT MODULE THAT CAN BE USED TO START DEBUG TOOL.
//*       UNDERSTAND THE METHODS AVAILABLE FOR STARTING DEBUG TOOL,
//*       AND CHOOSE WHETHER YOU WANT TO USE THE LE EXITS.
//*         IF YOU USE THIS METHOD, LOAD THE CORRECT EXIT MODULE:
//*            EQADBCXT: FOR BATCH PROGRAMS
//*            EQADICXT: FOR ONLINE IMS PROGRAMS
//*            EQADDCXT: FOR DB2 STORED PROCEDURES (OF TYPE MAIN AND SUB)
//*           (for SUB this is supported only for invocations through call_sub)
//*            (DO NOT INCLUDE AN EXIT FOR CICS PROGRAMS)
//*
//*  SET PARMS FOR THIS COMPILE:
//*  --------------------------
//   SET MEM=SAM1                              PROGRAM NAME
//   SET COBOLLIB='IGY.SIGYCOMP'               COBOL COMPILER LOADLIB
//   SET DTLIB='EQAW.SEQAMOD'                  DEBUG TOOL LOADLIB
//   SET LELIB='CEE.SCEELKED'                  LE LINKEDIT LIBRARY
//   SET UNITDEV=SYSALLDA                      UNIT FOR TEMP FILES
//*
//*  ***************************
//*        COMPILE STEP
//*  ***************************
////COMPILE  EXEC PGM=IGYCRCTL,REGION=0M,
//   PARM=(NOTEST,LIST,MAP,SOURCE,NONUMBER,XREF(SHORT)')
//STEPLIB  DD DISP=SHR,DSN=&COBOLLIB
//SYSIN    DD DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSLIB   DD DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD DISP=SHR,DSN=&SYSUID..ADLAB.LISTING(&MEM)
//SYSDEBUG DD DISP=SHR,DSN=&SYSUID..ADLAB.SYSDEBUG(&MEM)
//SYSLIN   DD DISP=(MOD,PASS),DSN=&&LOADSET,UNIT=&UNITDEV,
//            SPACE=(80,(10,10))
//SYSUT1   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT2   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT3   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT4   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT5   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT6   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT7   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//*
//CBLPRINT  EXEC PGM=IEBGENER,REGION=0M
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD DSN=&SYSUID..ADLAB.LISTING(&MEM),DISP=SHR
//SYSUT2    DD SYSOUT=*
//SYSIN     DD DUMMY
//*  ********************************
//*        LINK-EDIT (BINDER) STEP
//*  ********************************
//LKED EXEC PGM=IEWL,REGION=0M,COND=(5,LT,COMPILE),PARM='LIST,XREF'
//SYSLIB   DD DISP=SHR,DSN=&LELIB
//*** DTLIB    DD DISP=SHR,DSN=&DTLIB
//SYSLMOD  DD DSN=&SYSUID..ADLAB.LOAD(&MEM),DISP=SHR
//SYSLIN   DD DISP=(OLD,DELETE),DSN=&&LOADSET
//*  INCLUDING A DEBUG TOOL LE EXIT (EQADBCXT, EQADDCXT, OR EQADICXT) IS OPTIONAL.
//*  AN EXIT ENABLES STARTING DEBUG TOOL USING THE USER EXIT DATA SET UTILITY
//*  (ONE OF THE DEBUG TOOL ISPF UTILITIES)
//*  //        DD *
//*   INCLUDE DTLIB(EQADBCXT)
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD UNIT=&UNITDEV,DCB=BLKSIZE=1024,SPACE=(1024,(200,20))
```

VS COBOL II programs

If you are currently using the TEST option to compile your programs, consider using NOTEST. Using NOTEST allows you to take advantage of Debug Tool for z/OS functionality that is not available when compiling with the TEST option. Examples

of Debug Tool for z/OS functions that are available when compiling with the NOTEST option include the automonitor feature and using AT ENTRY *program name* breakpoints. Compiling with NOTEST also allows you to generate a module that can be debugged but does not incur additional overhead when running without the debugger.

The following table shows various compiler options that can be used to prepare VS COBOL II programs for use with the IBM Problem Determination Tools products (Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant run-time overhead.

Table 6. Examples of compiler options and source information files supported by Problem Determination tools products for VS COBOL II

Compiler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
NOTEST, LIST, MAP, SOURCE, XREF, NONUMBER, NOOFFSET	Compiler listing	Yes	N/A	Supported	Supported
NOTEST, LIST, MAP, SOURCE, XREF, NUMBER		Yes	N/A	Supported	N/A
NOTEST, LIST, MAP, NOOPT, SOURCE, XREF, NONUMBER	LANGX file	Yes	Suggested for production and test		

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing VS COBOL II programs

Perform the following steps for compiling your VS COBOL II programs using the compiler options suggested in Table 6:

1. Allocate libraries (PDSE is suggested unless PDS is required for your organization) for LANGX files. Allocate one or more LANGX libraries for each environment, such as test and production.
2. Create a corresponding LANGX library for each load library. Specify LRECL=1562 or greater,RECFM=VB,BLKSIZE= lrecl+4 to 32k.
3. For all programs, such as batch, CICS, and IMS, in both test and production environments, compile with NOTEST,LIST,MAP,NOOPT,SOURCE,XREF,NONUMBER compiler options.
4. Modify the SYSPRINT DD in the compiler step to refer to a file. It can be either a permanent or temporary file. This will be the input to the *xxx*LANGX utility.
5. Add a step after the compiler step to run the Problem Determination tools *xxx*LANGX utility. This utility program reads the compiler listing and generates a LANGX file. This is the source information file for Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS. Save the LANGX file in the LANGX file library and specify a member name that is

equal to the program name of your application program. Equivalent *xxx*LANGX utilities are available in Debug Tool for z/OS as EQALANGX, in Fault Analyzer for z/OS as IDILANGX and in Application Performance Analyzer for z/OS as CAZLANGX.

6. If the module is linked with Language Environment services, optionally include a Debug Tool Language Environment exit module into the load module during the linkage editor step. This is one way to enable the Debug Tool panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs or if the module is not linked with Language Environment services (it is linked with COBOL II runtime services).
7. Modify the promotion process to promote LANGX files. When a load module is promoted, for example, from test to production, promote the corresponding LANGX file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the LANGX file that you perform with the module during promotion.

Sample JCL for compiling VS COBOL II programs

Below is an example of JCL for compiling a VS COBOL II program for use with IBM Problem Determination Tools products. This is a generic sample, and might not meet all your requirements.

Notice the compiler options used and notice that the compiler listing is passed to an added step that generates a LANGX file. The compiler listing can be stored in a permanent file or can be passed in a temporary file. For VS COBOL II, these are the only required changes.

However, there is an optional change in the linkage editor step. The following example includes a special Language Environment exit module in the application load module. Although this is not required, it enables the use of Debug Tool panel 6, which makes the debugger easier to start in some environments. If you prefer to use panel 6 to start Debug Tool, this is one way to enable it. If you do not plan to use Debug Tool panel 6, then do not include an exit module. Do not include the exit module for CICS programs or if the module is not linked with Language Environment services (it is linked with COBOL II runtime services).

```
//*     - - -  ADD A JOB CARD ABOVE THIS LINE  - - -
//*
//*  SAMPLE JCL TO PREPARE A VS COBOL II PROGRAM
//*  FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//*     FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//*  NOTES:
//*
//*   COMPILER:
//*    1. COMPILER OPTIONS LIST,MAP,SOURCE,XREF ARE REQUIRED IF YOU
//*       PLAN TO USE THE LISTING WITH A PD TOOLS PRODUCT, OR TO
//*       PROCESS THE LISTING WITH AN XXXLANGX UTILITY
//*    2. COMPILER OPTION NOTEST IS SUGGESTED FOR ALL COBOL II
//*       PROGRAMS, EVEN IF IBM DEBUG TOOL FOR Z/OS WILL BE USED
//*
//*   BINDER (LINKAGE EDITOR):
//*    3. IN THIS EXAMPLE, THE MODULE IS LINKED WITH LANGUAGE
//*       ENVIRONMENT RUNTIME SERVICES. THIS IS CONTROLLED BY THE
//*       LIBRARY OR LIBRARIES SPECIFIED IN THE SYSLIB DD IN THE
//*       BINDER STEP.
//*    4. THE INCLUDE FOR MODULE EQAD?CXT IS *OPTIONAL*.  IT IS AN
```

```
//*       LE EXIT MODULE THAT CAN BE USED TO START DEBUG TOOL.
//*       UNDERSTAND THE METHODS AVAILABLE FOR STARTING DEBUG TOOL,
//*       AND CHOOSE WHETHER YOU WANT TO USE THE LE EXITS.
//*         IF YOU USE THIS METHOD, LOAD THE CORRECT EXIT MODULE:
//*            EQADBCXT: FOR BATCH PROGRAMS
//*            EQADICXT: FOR ONLINE IMS PROGRAMS
//*            EQADDCXT: FOR DB2 STORED PROCEDURES (OF TYPE MAIN AND SUB)
//*              (for SUB this is supported only for invocations through call_sub)
//*         (DO NOT INCLUDE AN EXIT FOR CICS PROGRAMS, OR FOR
//*          PROGRAMS LINKED WITH THE COBOL II RUNTIME SERVICES
//*          INSTEAD OF LANGUAGE ENVIRONMENT RUNTIME SERVICES)
//*
//*  SET OPTIONS FOR THIS COMPILE:
//*  --------------------------
//   SET MEM=SAMII1                          PROGRAM NAME
//   SET COB2COMP='IGY.V1R4M0.COB2COMP'      COBOL II COMPILER LIB
//   SET DTLIB='EQAW.SEQAMOD'                DEBUG TOOL LOADLIB
//   SET LELKED='CEE.SCEELKED'               LE LINK LIBRARY
//   SET LELIB='CEE.SCEERUN'                 LE RUNTIME LIBRARY
//   SET UNITDEV=SYSALLDA                    TEMP DATASET UNIT
//   SET LANGX='EQALANGX'                    XXXLANGX UTILITY PROGRAM
//   SET LANGXLIB='EQAW.SEQAMOD'             LIB FOR XXXLANGX UTILITY
//*
//*  ****************************
//*        COMPILE STEP
//*  ****************************
//COMPILE  EXEC PGM=IGYCRCTL,REGION=4M,
//   PARM=('NOTEST,LIST,MAP,NOOPT,SOURCE,XREF,NONUMBER',
//         'RES,APOST,LIB,DYNAM,NORENT,NOSSRANGE')
//STEPLIB  DD DISP=SHR,DSN=&COB2COMP
//SYSIN    DD DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSLIB   DD DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD DISP=SHR,DSN=&SYSUID..ADLAB.LISTING(&MEM)
//SYSLIN   DD DISP=(MOD,PASS),DSN=&&LOADSET,UNIT=&UNITDEV,
//            SPACE=(80,(10,10))
//SYSUT1   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT2   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT3   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT4   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT5   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT6   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT7   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//*
//CBLPRINT  EXEC PGM=IEBGENER,REGION=0M
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD DSN=&SYSUID..ADLAB.LISTING(&MEM),DISP=SHR
//SYSUT2    DD SYSOUT=*
//SYSIN     DD DUMMY
//*
//* ********************************
//* STEP TO GENERATE A LANGX FILE
//* ********************************
//LANGX EXEC PGM=&LANGX,REGION=32M,
//   PARM='(COBOL ERROR 64K CREF'
//STEPLIB  DD DISP=SHR,DSN=&LANGXLIB
//         DD DISP=SHR,DSN=&LELIB
//LISTING  DD DSN=&SYSUID..ADLAB.LISTING(&MEM),DISP=SHR
//IDILANGX DD DISP=SHR,DSN=&SYSUID..ADLAB.EQALANGX(&MEM)
//*
//*  ********************************
//*        LINK-EDIT (BINDER) STEP
//*  ********************************
//LKED EXEC PGM=IEWL,REGION=0M,COND=(5,LT,COMPILE),PARM='LIST,XREF'
//SYSLIB   DD DISP=SHR,DSN=&LELKED
//DTLIB    DD DISP=SHR,DSN=&DTLIB
//SYSLMOD  DD DSN=&SYSUID..ADLAB.LOAD(&MEM),DISP=SHR
//SYSLIN   DD DISP=(OLD,DELETE),DSN=&&LOADSET
```

```
//*  INCLUDING A DEBUG TOOL LE EXIT (EQADBCXT, EQADDCXT, OR EQADICXT) IS OPTIONAL.
//*  AN EXIT ENABLES STARTING DEBUG TOOL USING THE USER EXIT DATA SET UTILITY
//*  (ONE OF THE DEBUG TOOL ISPF UTILITIES)
//*  //        DD *
//*   INCLUDE DTLIB(EQADBCXT)
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD UNIT=&UNITDEV,DCB=BLKSIZE=1024,SPACE=(1024,(200,20))
```

OS/VS COBOL programs

The following table shows various compiler options that can be used to prepare OS/VS COBOL programs for use with the IBM Problem Determination Tools products (Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant run-time overhead.

Table 7. Examples of compiler options and source information files supported by Problem Determination tools products for OS/VS COBOL

Compiler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
DMAP, NOCLIST, NOLST, PMAP, SOURCE, VERB, XREF(SHORT)	Compiler listing	Yes	N/A	Supported	Supported
(LIST,NOPMAP) or (CLIST,NOPMAP) or (CLIST,PMAP)		Yes	N/A	N/A	N/A
NOBATCH, NOCLIST, NOCOUNT, DMAP, NOLST, PMAP, SOURCE, NOSYMDMP, NOTEST, NOOPT, VERB, XREF(SHORT)	LANGX file	Yes	Suggested for production and test		

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing OS/VS COBOL programs

Perform the following steps for compiling your OS/VS COBOL programs:

1. Allocate libraries (PDSE is suggested unless PDS is required for your organization) for LANGX files. Allocate one or more LANGX libraries for each environment, such as test and production.
2. Create a corresponding LANGX library for each load library. Specify `LRECL=1562 or greater,RECFM=VB,BLKSIZE= lrecl+4 to 32k`.
3. For all programs, such as batch, CICS, and IMS, in both test and production environments, compile with the `NOBATCH, NOCLIST, NOCOUNT, DMAP, NOLST, PMAP, SOURCE, NOSYMDMP, NOTEST, NOOPT, VERB, XREF(SHORT)` compiler options. The module is production-ready and can be debugged using Debug Tool for z/OS.

4. Modify the SYSPRINT DD in the compiler step to refer to a file. It can be either a permanent or temporary file. This will be the input to the *xxx*LANGX utility.
5. Add a step after the compiler step to run the Problem Determination tools *xxx*LANGX utility. This utility program reads the compiler listing and generates a LANGX file, which is the source information file for Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS. Save the LANGX file in the LANGX file library, and specify a member name that is equal to the program name of your application program. Equivalent *xxx*LANGX utilities are available in Debug Tool for z/OS as EQALANGX, in Fault Analyzer for z/OS as IDILANGX and in Application Performance Analyzer for z/OS as CAZLANGX.
6. Modify the promotion process to promote LANGX files. When a load module is promoted, for example, from test to production, promote the corresponding LANGX file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the LANGX file that you perform with the module during promotion.

Sample JCL for compiling OS/VS COBOL programs

Below is a JCL example for compiling an OS/VS program for use with the IBM Problem Determination Tools products:

```
//*     - - -  ADD A JOB CARD ABOVE THIS LINE  - - -
//*
//*  SAMPLE JCL TO PREPARE AN OS VS COBOL PROGRAM
//*  FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//*     FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//*  NOTES:
//*
//*   COMPILER:
//*    -  COMPILER PARMS DMAP,NOCLIST,NOLST,PMAP,SOURCE,VERB,XREF
//*       ARE REQUIRED IF YOU PLAN TO USE THE COMPILER LISTING WITH
//*       PD TOOLS AND/OR PROCESS IT WITH XXXLANGX
//*
//*   A STEP THAT PROCESSES THE SYSADATA FILE,
//*   AND CREATES A LANGX FILE IS NEEDED.
//*
//*  SET PARMS FOR THIS COMPILE:
//*  --------------------------
// SET MEM=SAMOS1                       PROGRAM NAME
// SET OSVSCOMP='IGY.VSCOLIB'           OS VS COBOL COMPILER LIBRARY
// SET LELIB='CEE.SCEELKED'             LE LINKEDIT LIBRARY
// SET UNITDEV=SYSALLDA                 UNIT FOR TEMP FILES
// SET SCEERUN='CEE.SCEERUN'            LANGUAGE ENVIRON SCEERUN LIB
// SET LANGX='EQALANGX'                 XXXLANGX UTILITY PROGRAM
// SET LANGXLIB='EQAW.SEQAMOD'          LIBRARY FOR XXXLANGX UTILITY
//*    NOTE: THE XXXLANGX UTILITY IS AVAILABLE WITH DEBUG TOOL,
//*          FAULT ANALYZER, AND APA WITH DIFFERENT NAMES.  YOU CAN
//*          USE ANY OF THEM... THEY ALL PRODUCE THE SAME RESULTS.
//*      IF YOU HAVE DEBUG TOOL, YOU CAN SET:
//*         LANGX='EQALANGX'  LANGXLIB=(THE DT SEQAMOD LIBRARY)
//*      IF YOU HAVE FAULT ANALYZER YOU CAN SET:
//*         LANGX='IDILANGX'  LANGXLIB=(THE FA SIDIAUTH LIBRARY)
//*      IF YOU HAVE APA (APP. PERFORMANCE ANALYZER) YOU CAN SET:
//*         LANGX='CAZLANGX'  LANGXLIB=(THE APA SCAZAUTH LIBRARY)
//*
//*  ***************************
//*        COMPILE STEP
//*  ***************************
//COMPILE  EXEC PGM=IKFCBL00,REGION=4M,
//   PARM=('DMAP,NOCLIST,NOLST,NOOPT,SOURCE,VERB,XREF(SHORT)')
//*   FOR DT (CHECK DEFAULTS): NOBATCH,NOCOUNT,PMAP,NOSYMDMP,NOTEST
//STEPLIB  DD DISP=SHR,DSN=&OSVSCOMP
```

```
//SYSIN    DD DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSLIB   DD DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD DISP=SHR,DSN=&SYSUID..ADLAB.OSVSCOB.LISTING(&MEM)
//SYSLIN   DD DISP=(MOD,PASS),DSN=&&LOADSET,UNIT=&UNITDEV,
//            SPACE=(80,(10,10))
//SYSUT1   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT2   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT3   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT4   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT5   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT6   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//SYSUT7   DD SPACE=(80,(10,10),,,ROUND),UNIT=&UNITDEV
//*
//CBLPRINT  EXEC PGM=IEBGENER,REGION=0M
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD DSN=&SYSUID..ADLAB.OSVSCOB.LISTING(&MEM),DISP=SHR
//SYSUT2    DD SYSOUT=*
//SYSIN     DD DUMMY
//*
//*  ********************************
//*     STEP TO GENERATE LANGX FILE
//*  ********************************
//LANGX    EXEC PGM=&LANGX,REGION=32M,
//  PARM='(COBOL ERROR 64K CREF'
//STEPLIB  DD DISP=SHR,DSN=&LANGXLIB
//         DD DISP=SHR,DSN=&SCEERUN
//LISTING  DD DSN=&SYSUID..ADLAB.OSVSCOB.LISTING(&MEM),DISP=SHR
//IDILANGX DD DISP=SHR,DSN=&SYSUID..ADLAB.EQALANGX(&MEM)
//*
//*  ********************************
//*        LINK-EDIT (BINDER) STEP
//*  ********************************
//LKED EXEC PGM=IEWL,REGION=0M,COND=(5,LT,COMPILE),PARM='LIST,XREF'
//SYSLIB   DD DISP=SHR,DSN=&LELIB
//SYSLMOD  DD DSN=&SYSUID..ADLAB.LOAD(&MEM),DISP=SHR
//SYSLIN   DD DISP=(OLD,DELETE),DSN=&&LOADSET
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD UNIT=&UNITDEV,DCB=BLKSIZE=1024,SPACE=(1024,(200,20))
```

Enterprise PL/I Version 3.7 and later programs

The following table shows various compiler options that can be used to prepare Enterprise PL/I Version 3.7 and later programs for use with the IBM Problem Determination Tools products (IBM Debug Tool for z/OS, IBM Fault Analyzer for z/OS and IBM Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for production environments have no significant run-time overhead.

Table 8. Examples of compiler options and source information files supported by IBM Problem Determination Tools products for Enterprise PL/I Version 3.7 and later

Compiler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
For Enterprise PL/I Version 3.7: TEST(ALL, SYM, NOHOOK, SEPARATE, SEPNAME, AALL), NOPT, AGGREGATE, ATTRIBUTES (FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL) For Enterprise PL/I Version 3.8 and later: TEST(ALL, SYM, NOHOOK, SEPARATE, SEPNAME), LISTVIEW(AALL), NOPT, AGGREGATE, ATTRIBUTES (FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)	SYSDEBUG file used by Debug Tool for z/OS and Fault Analyzer for z/OS. LANGX file used by Application Performance Analyzer for z/OS	Although the module is larger than a module compiled with the NOTEST option, you can use the module in production if needed.	Suggested for test. You can also use these options in a production environment if the increased load module size is not an issue.		
AGGREGATE, ATTRIBUTES (FULL), NOBLKOFF, LIST, MAP, NEST, NOTEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)	Compiler listing	Yes	N/A	Supported	N/A
	LANGX file	Yes	N/A	Suggested for production and test	

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing Enterprise PL/I Version 3.7 and later programs

Perform the following steps for compiling your Enterprise PL/I Version 3.7 and later programs:

1. Create a library (PDSE is suggested unless PDS is required for your organization) for SYSDEBUG files. This is only needed in test environments where debugging will be performed using `LRECL=(80 to 1024),RECFM=FB,BLKSIZE=(multiple of lrecl < 32K)`.
2. Allocate one or more LANGX libraries for each environment, such as test and production.
3. Create a corresponding LANGX library for each load library. Specify `LRECL=1562 or greater,RECFM=VB,BLKSIZE= lrecl+4 to 32k`.
4. For all programs, such as batch, CICS, and IMS:
   - In test environments:
     - When using the Enterprise PL/I Version 3.7 compiler:

       For all programs, specify the following compiler options:
       `TEST(ALL,SYM,NOHOOK,SEPARATE,SEPNAME,AALL), NOPT, AGGREGATE, ATTRIBUTES(FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)`.
     - When using the Enterprise PL/I Version 3.8 and later compilers:

       For all programs, specify the following compiler options:
       `TEST(ALL,SYM,NOHOOK,SEPARATE,SEPNAME), LISTVIEW(AALL), NOPT, AGGREGATE, ATTRIBUTES(FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)`.

     `TEST(...)` and `NOPT` are required by Debug Tool.

     The `SEPARATE` sub-option produces a SYSDEBUG file. Save the SYSDEBUG file created by the compiler for IBM Debug Tool for z/OS and optionally, IBM Fault Analyzer for z/OS.

     The `AALL (AFTERALL)` sub-option of `TEST` or `LISTVIEW` stores program source information in the SYSDEBUG file that contains information after the last preprocessor, such as macros and INCLUDEs. This expanded source information is available in the source window of IBM Debug Tool for z/OS while debugging.

     The other options format the compiler listing as required for the *xxx*LANGX utility.

     Consider using the `TEST(ALL,NOHOOK,SEPARATE)` options for best performance and to produce a module that can be debugged. Depending on the policies in your organization, the module can be considered for production.
   - In production environments:
     - When using the Enterprise PL/I Version 3.7 or later compiler:

       For all programs, specify `NOTEST, AGGREGATE, ATTRIBUTES(FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)`.

     `NOTEST` disables Debug Tool, but produces a smaller load module.

     The other options format the compiler listing as required for the *xxx*LANGX utility to produce a production-ready module that can be used with IBM Fault Analyzer for z/OS and IBM Application Performance Analyzer for z/OS (but not IBM Debug Tool for z/OS).
5. When a `TEST(...SEPARATE)` option is used, code a SYSDEBUG DD in the second compiler step as follows:

   ```
   //SYSDEBUG DD DSN= sysdebug.pds(pgmname),DISP=SHR
   ```

   This is the source information file for IBM Debug Tool for z/OS, and optionally, IBM Fault Analyzer for z/OS. Save it in the SYSDEBUG library,

and specify a member name that is equal to the primary entry point name or CSECT name of your application program.

6. Modify the SYSPRINT DD in the compiler step. This is the compiler listing. Write the listing to either a permanent or temporary file. This is the input to the *xxx*LANGX utility.

   Note: This compiler typically renames CSECTs according to an internal compiler algorithm. Therefore, it is not recommended to store PL/I compiler listings or side files using CSECT names as they might not be found by IBM Application Performance Analyzer for z/OS or IBM Fault Analyzer for z/OS. Instead, use the primary entry point name.

7. Add a step after the compile step to run the *xxx*LANGX utility. This utility reads the compiler listing and generates a LANGX file. This is the source information file for IBM Fault Analyzer for z/OS and IBM Application Performance Analyzer for z/OS. Equivalent *xxx*LANGX utilities are available in IBM Debug Tool for z/OS as EQALANGX, in IBM Fault Analyzer for z/OS as IDILANGX and in IBM Application Performance Analyzer for z/OS as CAZLANGX. Save the LANGX file in the LANGX file library, and specify a member name that is equal to the primary entry point name of your application program.
8. Modify the promotion process to promote LANGX files. When a load module is promoted, for example, from test to production, promote the corresponding LANGX file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the LANGX file that you perform with the module during promotion.
9. If you compile with the TEST option and will promote these modules into production, promote the SYSDEBUG file for your production environment.
10. Optionally, include a Debug Tool Language Environment exit module into the load module during the linkage editor step. This is one way to enable Debug Tool's panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs.

Sample JCL for compiling Enterprise PL/I for z/OS Version 3.7 or later programs

Below is a JCL example for compiling an Enterprise PL/I for z/OS Version 3.7 or later program for use with the IBM Problem Determination Tools products.

```
//* - - - ADD A JOB CARD ABOVE THIS LINE - - -
//*
//* SAMPLE JCL TO PREPARE AN ENTERPRISE PL/I V3.7 OR LATER
//* PROGRAM FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//* FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//* NOTES:
//*
//* COMPILER:
//* 1. COMPILER PARMS TEST IS REQUIRED FOR DEBUG TOOL
//* 2. COMPILER PARM NOPT IS RECOMMENDED FOR DEBUG TOOL
//* 3. COMPILER PARM:
//*     TEST(ALL,SYM,NOHOOK,SEPARATE,SEPNAME,AALL) (V3.7)
//*     TEST(ALL,SYM,NOHOOK,SEPARATE,SEPNAME),LISTVIEW(AALL), (V3.8+)
//*    IS USED BECAUSE:
//*    - THE MODULE IS READY FOR DEBUG TOOL
//*    - NOHOOK DOES NOT HAVE RUN-TIME CPU OVERHEAD. HOWEVER, THE
```

```
//*      MODULE IS LARGER BECAUSE OF STATEMENT TABLE
//*    - A SYSDEBUG FILE IS CREATED THAT CAN BE USED BY DT,FA,APA
//* 4. COMPILER PARMS AGGREGATE,ATTRIBUTES(FULL),NOBLKOFF,LIST,
//*    MAP,NEST,NONUMBER,OPTIONS,SOURCE,STMT,XREF(FULL) ARE NEEDED
//*    TO PROCESS THE COMPILER LISTING WITH XXXLANGX
//*
//* BINDER (LINKAGE EDITOR):
//* 5. THE INCLUDE FOR MODULE EQAD?CXT IS OPTIONAL. IT IS AN
//*    LE EXIT MODULE THAT CAN BE USED TO START DEBUG TOOL.
//*    UNDERSTAND THE METHODS AVAILABLE FOR STARTING DEBUG TOOL,
//*    AND CHOOSE WHETHER YOU WANT TO USE THE LE EXITS.
//*    IF YOU USE THIS METHOD, LOAD THE CORRECT EXIT MODULE:
//*      EQADBCXT: FOR BATCH PROGRAMS
//*      EQADICXT: FOR ONLINE IMS PROGRAMS
//*      EQADDCXT: FOR DB2 STORED PROCEDURES (OF TYPE MAIN AND SUB)
//*           (for SUB this is supported only for invocations through call_sub)
//*    (DO NOT INCLUDE AN EXIT FOR CICS PROGRAMS)
//*
//* SET PARMS FOR THIS COMPILE:
//* --------------------------
//  SET MEM=PADSTAT                   PROGRAM NAME
//  SET PLICOMP='IBMZ.V3R7.SIBMZCMP'  PLI COMPILER LOADLIB
//  SET DTLIB='EQAW.SEQAMOD'          DEBUG TOOL LOADLIB
//  SET LEHLQ='CEE'                   LE HIGH LVL QUALIFIER
//  SET UNITDEV=SYSALLDA              UNIT FOR TEMP FILES
//  SET LANGX='EQALANGX'              XXXLANGX UTILITY PROGRAM
//  SET LANGXLIB='EQAW.SEQAMOD'       LIBRARY FOR XXXLANGX UTILITY
//*   NOTE: YOU CAN USE THE XXXLANGX UTILITY SHIPPED WITH DT, FA,
//*         OR APA. THE NAMES ARE DIFFERENT, BUT RESULTS ARE THE SAME.
//*         USE ANY OF THEM... THEY ALL PRODUCE THE SAME RESULTS.
//* IF YOU HAVE:     SET LANGX TO:    SET LANGXLIB TO:
//* DEBUG TOOL       EQALANGX         THE DT SEQAMOD LIBRARY
//* FAULT ANALYZER   IDILANGX         THE FA SIDIAUTH LIBRARY
//* APA              CAZLANGX         THE APA SCAZAUTH LIBRARY
//*
//ALLOCOBJ EXEC PGM=IEFBR14 ALLOC OBJ LIB IF NEEDED
//OBJ DD DSN=&SYSUID..ADLAB.OBJ,SPACE=(CYL,(3,1,15)),
// DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=8000,DISP=(MOD,CATLG)
//*
//* ************************************
//* COMPILE STEP
//* ************************************
//COMPILE EXEC PGM=IBMZPLI,REGION=0M,
// PARM=('TEST(ALL,SYM,NOHOOK,SEPARATE,SEPNAME,AALL),LIST,MAP,SOURCE,',
// 'XREF(FULL),NOBLKOFF,AGGREGATE,ATTRIBUTES(FULL),NEST,OPTIONS,NOPT,',
// 'STMT,NONUMBER,OFFSET')
//*  Note: The above options are for Enterprise PL/I Version 3.7
//*        For Enterprise PL/I Version 3.8+, change the TEST option
//*        to  TEST(ALL,SYM,NOHOOK,SEPARATE,SEPNAME), and add the
//*        LISTVIEW(AALL) option
//STEPLIB  DD DSN=&PLICOMP,DISP=SHR
//         DD DSN=&LEHLQ..SCEERUN,DISP=SHR
//SYSIN    DD DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSLIB   DD DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD DISP=SHR,DSN=&SYSUID..ADLAB.ENTPLI.LISTING(&MEM)
//SYSDEBUG DD DISP=SHR,DSN=&SYSUID..ADLAB.SYSDEBUG(&MEM)
//SYSUT1   DD SPACE=(CYL,(5,2),,CONTIG),DCB=BLKSIZE=1024,UNIT=&UNITDEV
//SYSLIN   DD DSN=&SYSUID..ADLAB.OBJ(&MEM),DISP=SHR
//*
//PLIPRINT EXEC PGM=IEBGENER,REGION=0M
//SYSPRINT DD SYSOUT=*
//SYSUT1   DD DSN=&SYSUID..ADLAB.ENTPLI.LISTING(&MEM),DISP=SHR
//SYSUT2   DD SYSOUT=*
//SYSIN    DD DUMMY
//*
//* ********************************
//* STEP TO GENERATE LANGX FILE
```

```
//* ********************************
//LANGX EXEC PGM=&LANGX,REGION=32M,
// PARM='(PLI ERROR 64K CREF'
//STEPLIB  DD DISP=SHR,DSN=&LANGXLIB
//         DD DISP=SHR,DSN=&LEHLQ..SCEERUN
//LISTING  DD DSN=&SYSUID..ADLAB.ENTPLI.LISTING(&MEM),DISP=SHR
//IDILANGX DD DISP=SHR,DSN=&SYSUID..ADLAB.EQALANGX(&MEM)
//*
//* ********************************
//* LINK-EDIT (BINDER) STEP
//* ********************************
//LINK EXEC PGM=IEWL,PARM=(LET,MAP,LIST),REGION=0M
//SYSLIB   DD DSN=&LEHLQ..SCEELKED,DISP=SHR
//DTLIB    DD DSN=&DTLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSLMOD  DD DISP=SHR,DSN=&SYSUID..ADLAB.LOAD(&MEM)
//SYSUT1   DD UNIT=SYSDA,SPACE=(TRK,(10,10))
//SYSLIN   DD DSN=&SYSUID..ADLAB.OBJ(&MEM),DISP=(OLD,PASS)
//* INCLUDING A DEBUG TOOL LE EXIT (EQADBCXT, EQADDCXT, OR EQADICXT)
//* IS OPTIONAL. THE EXIT ENABLES STARTING DEBUG TOOL WITH THE
//* USER EXIT DATA SET UTILITY (ONE OF THE DEBUG TOOL ISPF UTILITIES)
//*
//* //  DD *
//* INCLUDE DTLIB(EQADBCXT)
```

Enterprise PL/I Version 3.5 and Version 3.6 programs

The following table shows various compiler options that can be used to prepare Enterprise PL/I Version 3.5 and Version 3.6 programs for use with the IBM Problem Determination Tools products (IBM Debug Tool for z/OS, IBM Fault Analyzer for z/OS and IBM Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant run-time overhead.

Table 9. Examples of compiler options and source information files supported by IBM Problem Determination Tools products for Enterprise PL/I Version 3.5 and Version 3.6

Compiler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
Preprocess (1st stage) to expand source, In compile (2nd stage): For Enterprise PL/I Version 3.5: TEST(ALL, SYM, NOHOOK, SEPARATE), NOPT, AGGREGATE, ATTRIBUTES (FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL) For Enterprise PL/I Version 3.6: TEST(ALL, SYM, NOHOOK, SEPARATE, SEPNAME), NOPT, AGGREGATE, ATTRIBUTES (FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)	SYSDEBUG file used by Debug Tool for z/OS and Fault Analyzer for z/OS. LANGX file used by Application Performance Analyzer for z/OS	Although the module is larger than a module compiled with the NOTEST option, you can use the module in production if needed.	Suggested for test. You can also use these options in a production environment if the increased load module size is not an issue.		
AGGREGATE, ATTRIBUTES (FULL), NOBLKOFF, LIST, MAP, NEST, NOTEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)	Compiler listing	Yes	N/A	Supported	N/A
	LANGX file	Yes	N/A	Suggested for production and test	

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing Enterprise PL/I Version 3.5 and Version 3.6 programs

Perform the following steps for compiling your Enterprise PL/I Version 3.5 and Version 3.6 programs:

1. Create a library (PDSE is suggested unless PDS is required for your organization) for SYSDEBUG files. This is only needed in test environments where debugging will be performed using `LRECL=(80 to 1024),RECFM=FB,BLKSIZE=(multiple of lrecl < 32K)`.
2. Allocate one or more LANGX libraries for each environment, such as test and production.
3. Create a corresponding LANGX library for each load library. Specify `LRECL=1562 or greater,RECFM=VB,BLKSIZE= lrecl+4 to 32k`.
4. Run a two-stage compile. The first stage preprocesses the program, so the IBM Problem Determination Tools products have access to fully expanded source code with INCLUDEs and macros. The second stage compiles the program. For all programs, such as batch, CICS, and IMS:
   - In the first compile stage, in both test and production environments, specify compiler options `MACRO,MDECK,NOCOMPILE,NOSYNTAX,INSOURCE` to expand INCLUDEs and macros. The output SYSPUNCH DD will be the input SYSIN DD to the second compile stage.
   - In the second compile stage, in test environments,
     – When using the Enterprise PL/I Version 3.5 compiler:

       For all programs, specify the following compiler options:
       `TEST(ALL,SYM,NOHOOK,SEPARATE), NOPT, AGGREGATE, ATTRIBUTES(FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)`.
     – When using the Enterprise PL/I Version 3.6 compiler:

       For all programs, specify the following compiler options:
       `TEST(ALL,SYM,NOHOOK,SEPARATE,SEPNAME), NOPT, AGGREGATE, ATTRIBUTES(FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)`.

     `TEST(...)` and `NOPT` are required by Debug Tool.

     The `SEPARATE` sub-option produces a SYSDEBUG file. Save the SYSDEBUG file created by the compiler for Debug Tool (and optionally, Fault Analyzer).

     The other options format the compiler listing as required for the *xxx*LANGX utility.

     Consider using `TEST(ALL,SYM,NOHOOK,SEPARATE)` for best performance and to produce a module that can be debugged. Depending on the policies in your organization, the module can be considered for production.
   - In the second compile stage, in production environments, specify compiler options `NOTEST, AGGREGATE, ATTRIBUTES(FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)`.

     Note: The above options can be used with both the Enterprise PL/I Version 3.5 and Version 3.6 compilers.

   `NOTEST` disables Debug Tool, but produces a smaller load module.

   The other options format the compiler listing as required for the *xxx*LANGX utility to produce a production-ready module that can be used with Fault Analyzer for z/OS and Application Performance Analyzer for z/OS (but not Debug Tool for z/OS).
5. When a `TEST(...SEPARATE)` parm is used, code a SYSDEBUG DD in the second compiler step as follows:

```
//SYSDEBUG DD DSN= sysdebug.pds(pgmname),DISP=SHR
```

This is the source information file for IBM Debug Tool for z/OS, IBM Application Performance Analyzer for z/OS and optionally, IBM Fault Analyzer for z/OS. Save it in the SYSDEBUG library, and specify a member name that is equal to the primary entry point name or CSECT name of your application program.

6. Modify the SYSPRINT DD in the second compiler stage. This is the compiler listing. Write the listing to either a permanent or temporary file. This is the input to the *xxx*LANGX utility.

   Note: This compiler typically renames CSECTs according to an internal compiler algorithm. Therefore, it is not recommended to store PL/I compiler listings or side files using CSECT names as they might not be found by IBM Application Performance Analyzer for z/OS or IBM Fault Analyzer for z/OS. Instead, use the primary entry point name.

7. Add a step after the compile step to run the *xxx*LANGX utility. This utility reads the compiler listing and generates a LANGX file. This is the source information file for IBM Fault Analyzer for z/OS and IBM Application Performance Analyzer for z/OS. Equivalent *xxx*LANGX utilities are available in IBM Debug Tool for z/OS as EQALANGX, in IBM Fault Analyzer for z/OS as IDILANGX and in IBM Application Performance Analyzer for z/OS as CAZLANGX. Save the LANGX file in the LANGX file library, and specify a member name that is equal to the primary entry point name of your application program.
8. Modify the promotion process to promote LANGX files. When a load module is promoted, for example, from test to production, promote the corresponding LANGX file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the LANGX file that you perform with the module during promotion.
9. If you compile with the TEST option and will promote these modules into production, promote the SYSDEBUG file for your production environment.
10. Optionally, include a Debug Tool Language Environment exit module into the load module during the linkage editor step. This is one way to enable Debug Tool's panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs.

Sample JCL for compiling Enterprise PL/I Version 3.5 or Version 3.6 programs

Below is a JCL example for compiling an Enterprise PL/I for z/OS Version 3.5 or Version 3.6 program for use with the IBM Problem Determination Tools products.

```
//*     - - -  ADD A JOB CARD ABOVE THIS LINE  - - -
//*
//* SAMPLE JCL TO PREPARE AN ENTERPRISE PL/I V3.5 OR
//* ENTERPRISE PL/I V3.6 PROGRAM FOR THE IBM ZSERIES
//* FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//* FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//* NOTES:
//*
//* COMPILER:
//* 1. A 2-STAGE COMPILE IS PERFORMED. STAGE 1 (PREPROCESS) IS
//*    DONE TO EXPAND INCLUDES AND MACROS IN THE PROGRAM, SO THAT
```

```
//*    THE SYSDEBUG FILE CREATED IN STAGE 2 (COMPILE) HAS ALL STMTS.
//* 2. COMPILER PARMS TEST AND NOPT ARE REQUIRED FOR DEBUG TOOL
//* 3. COMPILER PARM TEST(ALL,SYM,NOHOOK,SEP) (V3.5) OR
//*    TEST(ALL,SYM,NOHOOK,SEP,SEPNAME) (V3.6) IS USED BECAUSE:
//*    - THE MODULE IS READY FOR DEBUG TOOL
//*         - NOHOOK DOES NOT HAVE RUN-TIME CPU OVERHEAD. HOWEVER, THE
//*           MODULE IS LARGER BECAUSE OF STATEMENT TABLE
//*         - A SYSDEBUG FILE IS CREATED THAT CAN BE USED BY DT,FA,APA
//*    4. COMPILER PARMS AGGREGATE,ATTRIBUTES(FULL),NOBLKOFF,LIST,
//*       MAP,NEST,NONUMBER,OPTIONS,SOURCE,STMT,XREF(FULL) ARE NEEDED
//*       TO PROCESS THE COMPILER LISTING WITH XXXLANGX
//*
//*   BINDER (LINKAGE EDITOR):
//*    5. THE INCLUDE FOR MODULE EQAD?CXT IS OPTIONAL.  IT IS AN
//*       LE EXIT MODULE THAT CAN BE USED TO START DEBUG TOOL.
//*       UNDERSTAND THE METHODS AVAILABLE FOR STARTING DEBUG TOOL,
//*       AND CHOOSE WHETHER YOU WANT TO USE THE LE EXITS.
//*         IF YOU USE THIS METHOD, LOAD THE CORRECT EXIT MODULE:
//*            EQADBCXT: FOR BATCH PROGRAMS
//*            EQADICXT: FOR ONLINE IMS PROGRAMS
//*            EQADDCXT: FOR DB2 STORED PROCEDURES (OF TYPE MAIN AND SUB)
//*           (for SUB this is supported only for invocations through call_sub)
//*            (DO NOT INCLUDE AN EXIT FOR CICS PROGRAMS)
//*
//*  SET PARMS FOR THIS COMPILE:
//*  --------------------------
//   SET MEM=PADSTAT                       PROGRAM NAME
//   SET PLICOMP='IBMZ.V3R5.SIBMZCMP'      PLI COMPILER LOADLIB
//   SET DTLIB='EQAW.SEQAMOD'              DEBUG TOOL LOADLIB
//   SET LEHLQ='CEE'                       LE HIGH LVL QUALIFIER
//   SET UNITDEV=SYSALLDA                  UNIT FOR TEMP FILES
//   SET LANGX='EQALANGX'                  XXXLANGX UTILITY PROGRAM
//   SET LANGXLIB='EQAW.SEQAMOD'           LIBRARY FOR XXXLANGX UTILITY
//*    NOTE: YOU CAN USE THE XXXLANGX UTILITY SHIPPED WITH DT, FA,
//*          OR APA. THE NAMES ARE DIFFERENT, BUT RESULTS ARE THE SAME
//*          USE ANY OF THEM... THEY ALL PRODUCE THE SAME RESULTS.
//*      IF YOU HAVE:     SET LANGX TO:    SET LANGXLIB TO:
//*      DEBUG TOOL       EQALANGX         THE DT SEQAMOD LIBRARY
//*      FAULT ANALYZER   IDILANGX         THE FA SIDIAUTH LIBRARY
//*      APA              CAZLANGX         THE APA SCAZAUTH LIBRARY
//*
//ALLOCOBJ EXEC PGM=IEFBR14             ALLOC OBJ LIB IF NEEDED
//OBJ   DD DSN=&SYSUID..ADLAB.OBJ,SPACE=(CYL,(3,1,15)),
//  DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=8000,DISP=(MOD,CATLG)
//*  ************************************
//*     PREPROCESS STEP (COMPILE STAGE 1)
//*  ************************************
//PRECOMP  EXEC PGM=IBMZPLI,REGION=0M,
//   PARM=('MACRO,MDECK,NOCOMPILE,NOSYNTAX,INSOURCE')
//STEPLIB  DD   DSN=&PLICOMP,DISP=SHR
//         DD   DSN=&LEHLQ..SCEERUN,DISP=SHR
//SYSIN    DD   DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSLIB   DD   DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD   SYSOUT=*
//SYSUT1   DD   SPACE=(1024,(200,50),,CONTIG,ROUND),DCB=BLKSIZE=1024,
//              UNIT=&UNITDEV
//SYSPUNCH DD DISP=(MOD,PASS),DSN=&&SRC1,UNIT=&UNITDEV,
//            SPACE=(80,(10,10))
//*
//*  ************************************
//* COMPILE STEP (COMPILE STAGE 2)
//* ************************************
//COMPILE EXEC PGM=IBMZPLI,REGION=0M,
// PARM=('TEST(ALL,SYM,NOHOOK,SEPARATE),LIST,MAP,SOURCE,XREF(FULL),',
// 'NOBLKOFF,AGGREGATE,ATTRIBUTES(FULL),NEST,OPTIONS,NOPT,',
// 'STMT,NONUMBER,OFFSET')
//*  Note: The above options are for Enterprise PL/I Version 3.5
```

```
//*        For Enterprise PL/I Version 3.6, change the TEST option
//*        to:  TEST(ALL,SYM,NOHOOK,SEPARATE,SEPNAME)
//STEPLIB  DD DSN=&PLICOMP,DISP=SHR
//         DD DSN=&LEHLQ..SCEERUN,DISP=SHR
//SYSIN    DD DSN=&&SRC1,DISP=(OLD,PASS)
//SYSLIB   DD DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD DISP=SHR,DSN=&SYSUID..ADLAB.ENTPLI.LISTING(&MEM)
//SYSDEBUG DD DISP=SHR,DSN=&SYSUID..ADLAB.SYSDEBUG(&MEM)
//SYSUT1   DD SPACE=(CYL,(5,2),,CONTIG),DCB=BLKSIZE=1024,UNIT=&UNITDEV
//SYSLIN   DD DSN=&SYSUID..ADLAB.OBJ(&MEM),DISP=SHR
//*
//PLIPRINT  EXEC PGM=IEBGENER,REGION=0M
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD DSN=&SYSUID..ADLAB.ENTPLI.LISTING(&MEM),DISP=SHR
//SYSUT2    DD SYSOUT=*
//SYSIN     DD DUMMY
//*
//*  ********************************
//*     STEP TO GENERATE LANGX FILE
//*  ********************************
//LANGX    EXEC PGM=&LANGX,REGION=32M,
//  PARM='(PLI ERROR 64K CREF'
//STEPLIB  DD DISP=SHR,DSN=&LANGXLIB
//         DD DISP=SHR,DSN=&LEHLQ..SCEERUN
//LISTING  DD DSN=&SYSUID..ADLAB.ENTPLI.LISTING(&MEM),DISP=SHR
//IDILANGX DD DISP=SHR,DSN=&SYSUID..ADLAB.EQALANGX(&MEM)
//*
//* ********************************
//* LINK-EDIT (BINDER) STEP
//* ********************************
//LINK EXEC PGM=IEWL,PARM=(LET,MAP,LIST),REGION=0M
//SYSLIB DD DSN=&LEHLQ..SCEELKED,DISP=SHR
//DTLIB DD DSN=&DTLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSLMOD DD DISP=SHR,DSN=&SYSUID..ADLAB.LOAD(&MEM)
//SYSUT1 DD UNIT=SYSDA,SPACE=(TRK,(10,10))
//SYSLIN DD DSN=&SYSUID..ADLAB.OBJ(&MEM),DISP=(OLD,PASS)
//*  INCLUDING A DEBUG TOOL LE EXIT (EQADBCXT, EQADDCXT, OR EQADICXT)
//*  IS OPTIONAL.  THE EXIT ENABLES STARTING DEBUG TOOL WITH THE
//*  USER EXIT DATA SET UTILITY (ONE OF THE DEBUG TOOL ISPF UTILITIES)
//*  //        DD *
//*   INCLUDE DTLIB(EQADBCXT)
```

Enterprise PL/I Version 3.4 and earlier programs

The following table shows various compiler options that can be used to prepare Enterprise PL/I Version 3.4 and earlier programs for use with the IBM Problem Determination Tools products (Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant run-time overhead.

Table 10. Examples of compiler options and source information files supported by IBM Problem Determination Tools products for Enterprise PL/I Version 3.4 and earlier

Compiler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
Preprocess (1st stage) to expand source, In compile (2nd stage): TEST(ALL), NOPT, AGGREGATE, ATTRIBUTES (FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL))	Expanded source file used by Debug Tool for z/OS, LANGX file used by Fault Analyzer for z/OS and Application Performance Analyzer for z/OS	No	Suggested for test. (Using Debug Tool in production for this compiler is not recommended.)		
AGGREGATE, ATTRIBUTES (FULL), NOBLKOFF, LIST, MAP, NEST, NOTEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL))	Compiler listing	Yes	N/A	Supported	N/A
	LANGX file	Yes	N/A	Suggested for production and test	

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing Enterprise PL/I Version 3.4 and earlier programs

Perform the following steps for compiling your Enterprise PL/I Version 3.4 and earlier programs:

1. Create a library (PDSE is suggested unless PDS is required for your organization) for expanded source files. This is only needed in test environments where debugging will be performed. The library can be any RECFM / LRECL / BLKSIZE supported as input by the compiler.
2. Allocate libraries (PDSE is suggested unless PDS is required for your organization) for LANGX files. Allocate one or more LANGX libraries for each environment, such as test or production.
3. Create a corresponding LANGX library for each load library. Specify `LRECL=1562 or greater,RECFM=VB,BLKSIZE= lrecl+4 to 32k`.
4. Run a 2–stage compile. The first stage preprocesses the program, so the IBM Problem Determination Tools have access to fully expanded source code with INCLUDEs and macros. The second stage compiles the program.
   - In the first compile stage, in both test and production environments:
     – Specify compiler options `MACRO,MDECK,NOCOMPILE,NOSYNTAX,INSOURCE` to expand INCLUDEs and macros.

- Save the output, the expanded source file, in a permanent file in the expanded source file library and specify *member name = program name*. This is the source information file for Debug Tool for z/OS. The output SYSPUNCH DD will be the input SYSIN DD to the second compiler stage.

- In the second compile stage, for all programs, such as batch, CICS, and IMS:
  - In test environments, specify compiler options `TEST(ALL), NOPT, AGGREGATE, ATTRIBUTES(FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL)`.

    `TEST(ALL)` and `NOPT` are required by Debug Tool. Debug hooks are inserted, which add some runtime overhead. Symbolic data required by Debug Tool is also stored in the module, which can make it significantly larger.

    The other options format the compiler listing as required for the *xxx*LANGX utility.
  - In production environments, specify compiler options `NOTEST, AGGREGATE, ATTRIBUTES(FULL), NOBLKOFF, LIST, MAP, NEST, NONUMBER, OFFSET, OPTIONS, SOURCE, STMT, XREF(FULL))`.

    `NOTEST` disables Debug Tool, but provides the best performance. This produces a production-ready module that can be used with Fault Analyzer for z/OS and Application Performance Analyzer for z/OS (but not Debug Tool).

    The other options format the compiler listing as required for the *xxx*LANGX utility.

5. Modify the SYSPRINT DD in the second compiler stage. This is the compiler listing. Save the compiler listing to either a permanent or temporary file. This will be the input to the *xxx*LANGX utility.

   Note: This compiler typically renames CSECTs according to an internal compiler algorithm. Therefore, it is not recommended to store PL/I compiler listings or side files using CSECT names as they might not be found by Application Performance Analyzer for z/OS or Fault Analyzer for z/OS. Instead, use the primary entry point name.
6. Add a step after the compiler step to run the *xxx*LANGX utility. The *xxx*LANGX utility reads the compiler listing and generates a LANGX file, which is the source information file for Fault Analyzer for z/OS and Application Performance Analyzer for z/OS. Equivalent *xxx*LANGX utilities are available in Debug Tool for z/OS as EQALANGX, in Fault Analyzer for z/OS as IDILANGX and in Application Performance Analyzer for z/OS as CAZLANGX. Save the LANGX file in the LANGX file library, and specify a member name that is equal to the primary entry point name or CSECT name of your application program.
7. Modify the promotion process to promote LANGX files. When a load module is promoted, for example, from test to production, promote the corresponding LANGX file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the LANGX file that you perform with the module during promotion.
8. Optionally, include a Debug Tool Language Environment exit module into the load module during the linkage editor step. This is one way to enable Debug Tool's panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs.

9. For CICS applications only, if the Debug Tool DTCN transaction will be used to start Debug Tool, link edit the Debug Tool CICS startup exit module EQADCCXT into the application load module to enable Debug Tool in CICS. This is not needed if using the CADP transaction instead of DTCN.

Sample JCL for compiling Enterprise PL/I for z/OS Version 3.4 or earlier programs

Below is a JCL example for compiling an Enterprise PL/I for z/OS Version 3.4 or earlier program for use with the IBM Problem Determination Tools products.

```
//*     - - -  ADD A JOB CARD ABOVE THIS LINE  - - -
//*
//*  SAMPLE JCL TO COMPILE WITH ENTERPRISE PLI V3.4 AND PREVIOUS
//*  FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//*     FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//*  NOTES:
//*
//*   COMPILER:
//*    1. A 2-STAGE COMPILE IS PERFORMED.  STAGE 1 (PREPROCESS) IS
//*       DONE TO EXPAND INCLUDES AND MACROS IN THE PROGRAM, SO THAT
//*       A SOURCE FILE IS CREATED FOR DEBUG TOOL THAT HAS ALL STMTS.
//*    2. COMPILER PARM TEST AND NOPT ARE REQUIRED FOR DEBUG TOOL
//*    3. COMPILER PARMS AGGREGATE,ATTRIBUTES(FULL),NOBLKOFF,LIST,
//*       MAP,NEST,NONUMBER,OPTIONS,SOURCE,STMT,XREF(FULL) ARE NEEDED
//*       TO PROCESS THE COMPILER LISTING WITH XXXLANGX
//*
//*   BINDER (LINKAGE EDITOR):
//*    4. THE INCLUDE FOR MODULE EQAD?CXT IS OPTIONAL.  IT IS AN
//*       LE EXIT MODULE THAT CAN BE USED TO START DEBUG TOOL.
//*       UNDERSTAND THE METHODS AVAILABLE FOR STARTING DEBUG TOOL,
//*       AND CHOOSE WHETHER YOU WANT TO USE THE LE EXITS.
//*         IF YOU USE THIS METHOD, LOAD THE CORRECT EXIT MODULE:
//*            EQADBCXT: FOR BATCH PROGRAMS
//*            EQADICXT: FOR ONLINE IMS PROGRAMS
//*            EQADDCXT: FOR DB2 STORED PROCEDURES (OF TYPE MAIN AND SUB)
//*           (for SUB this is supported only for invocations through call_sub)
//*            (DO NOT INCLUDE AN EXIT FOR CICS PROGRAMS)
//*
//*  SET PARMS FOR THIS COMPILE:
//*  ---------------------------
//   SET MEM=PTEST                          PROGRAM NAME
//   SET PLICOMP='IBMZ.V3R4.SIBMZCMP'       PLI COMPILER LOADLIB
//   SET DTLIB='EQAW.SEQAMOD'               DEBUG TOOL LOADLIB
//   SET LEHLQ='CEE'                        LE HIGH LVL QUALIFIER
//   SET UNITDEV=SYSALLDA                   UNIT FOR TEMP FILES
//   SET LANGX='EQALANGX'                   XXXLANGX UTILITY PROGRAM
//   SET LANGXLIB='EQAW.SEQAMOD'            LIBRARY FOR XXXLANGX UTILITY
//*    NOTE: YOU CAN USE THE XXXLANGX UTILITY SHIPPED WITH DT, FA,
//*          OR APA. THEY NAMES ARE DIFFERENT, BUT RESULTS ARE THE SAME
//*          USE ANY OF THEM... THEY ALL PRODUCE THE SAME RESULTS.
//*      IF YOU HAVE:     SET LANGX TO:    SET LANGXLIB TO:
//*      DEBUG TOOL       EQALANGX         THE DT SEQAMOD LIBRARY
//*      FAULT ANALYZER   IDILANGX         THE FA SIDIAUTH LIBRARY
//*      APA              CAZLANGX         THE APA SCAZAUTH LIBRARY
//*
//ALLOCOBJ EXEC PGM=IEFBR14              ALLOC OBJ LIB IF NEEDED
//XSOURCE DD DSN=&SYSUID..ADLAB.EXPANDED.SOURCE,SPACE=(CYL,(3,1,15)),
//  DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=8000,DISP=(MOD,CATLG)
//OBJ   DD DSN=&SYSUID..ADLAB.OBJ,SPACE=(CYL,(3,1,15)),
//  DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=8000,DISP=(MOD,CATLG)
//*  ************************************
//*     PREPROCESS STEP (COMPILE STAGE 1)
//*  ************************************
//PRECOMP  EXEC PGM=IBMZPLI,REGION=0M,
//   PARM=('MACRO,MDECK,NOCOMPILE,NOSYNTAX,INSOURCE')
```

```
//STEPLIB  DD   DSN=&PLICOMP,DISP=SHR
//         DD   DSN=&LEHLQ..SCEERUN,DISP=SHR
//SYSIN    DD   DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSLIB   DD   DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD   SYSOUT=*
//SYSUT1   DD   SPACE=(1024,(200,50),,CONTIG,ROUND),DCB=BLKSIZE=1024,
//             UNIT=&UNITDEV
//SYSPUNCH DD DISP=SHR,DSN=&SYSUID..ADLAB.EXPANDED.SOURCE(&MEM)
//*
//*  ************************************
//*     COMPILE STEP (COMPILE STAGE 2)
//*  ************************************
//COMPILE  EXEC PGM=IBMZPLI,REGION=0M,
// PARM=('TEST(ALL),LIST,MAP,SOURCE,XREF(FULL),',
//       'NOBLKOFF,AGGREGATE, ATTRIBUTES(FULL),NEST,OPTIONS,NOPT,',
//       'STMT,NONUMBER,OFFSET')
//STEPLIB  DD DSN=&PLICOMP,DISP=SHR
//         DD DSN=&LEHLQ..SCEERUN,DISP=SHR
//SYSIN    DD DISP=SHR,DSN=&SYSUID..ADLAB.EXPANDED.SOURCE(&MEM)
//SYSLIB   DD DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD DISP=SHR,DSN=&SYSUID..ADLAB.ENTPLI.LISTING(&MEM)
//SYSUT1   DD SPACE=(CYL,(5,2),,CONTIG),DCB=BLKSIZE=1024,UNIT=&UNITDEV
//SYSLIN   DD DSN=&SYSUID..ADLAB.OBJ(&MEM),DISP=SHR
//*
//PLIPRINT  EXEC PGM=IEBGENER,REGION=0M
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD DSN=&SYSUID..ADLAB.ENTPLI.LISTING(&MEM),DISP=SHR
//SYSUT2    DD SYSOUT=*
//SYSIN     DD DUMMY
//*
//*  *********************************
//*     STEP TO GENERATE LANGX FILE
//*  *********************************
//LANGX    EXEC PGM=&LANGX,REGION=32M,
//  PARM='(PLI ERROR 64K CREF'
//STEPLIB  DD DISP=SHR,DSN=&LANGXLIB
//         DD DISP=SHR,DSN=&LEHLQ..SCEERUN
//LISTING  DD DSN=&SYSUID..ADLAB.ENTPLI.LISTING(&MEM),DISP=SHR
//IDILANGX DD DISP=SHR,DSN=&SYSUID..ADLAB.EQALANGX(&MEM)
//*
//* *********************************
//* LINK-EDIT (BINDER) STEP
//* *********************************
//LINK EXEC PGM=IEWL,PARM=(LET,MAP,LIST),REGION=0M
//SYSLIB DD DSN=&LEHLQ..SCEELKED,DISP=SHR
//DTLIB DD DSN=&DTLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSLMOD DD DISP=SHR,DSN=&SYSUID..ADLAB.LOAD(&MEM)
//SYSUT1 DD UNIT=SYSDA,SPACE=(TRK,(10,10))
//SYSLIN DD DSN=&SYSUID..ADLAB.OBJ(&MEM),DISP=(OLD,PASS)
//*  INCLUDING A DEBUG TOOL LE EXIT (EQADBCXT, EQADDCXT, OR EQADICXT)
//*  IS OPTIONAL.  THE EXIT ENABLES STARTING DEBUG TOOL WITH THE
//*  USER EXIT DATA SET UTILITY (ONE OF THE DEBUG TOOL ISPF UTILITIES)
//*  //        DD *
//*   INCLUDE DTLIB(EQADBCXT)
```

PL/I for MVS and VM and OS PL/I programs

The following table shows various compiler options that can be used to prepare Enterprise COBOL for z/OS Version 4 programs for use with the IBM Problem Determination Tools products (Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant run-time overhead.

For the test environment, you need both the listing and the LANGX file (for Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). In production, only the LANGX file is suggested.

Table 11. Examples of compiler options and source information files supported by IBM Problem Determination Tools products for PLI for MVS and VM and OS PLI

Compiler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
TEST(ALL), AGGREGATE, ATTRIBUTES (FULL), ESD, LIST, MAP, NEST, NOPT, OPTIONS, SOURCE, STMT, XREF(FULL)	Compiler listing	No	Suggested for test. (Using Debug Tool in production for this compiler is not recommended.)	Supported	Supported
	LANGX file	No	N/A	Supported	N/A
NOTEST, AGGREGATE, ATTRIBUTES (FULL), ESD, LIST, MAP, NEST, OPTIONS, SOURCE, STMT, XREF(FULL)	Compiler listing	Yes	N/A	Supported	Suggested for production and test
	LANGX file	Yes	N/A	Suggested for production and test	N/A

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing PL/I for MVS and VM and OS PL/I programs

Perform the following steps for compiling your PL/I for MVS and VM and OS PL/I programs:

1. Create a library (PDSE is suggested unless PDS is required for your organization) for compiler listing files. This is only needed in test environments where debugging will be performed. Specify `LRECL=125 minimum,RECFM=VBA,BLKSIZE= lrecl+4 to 32k`.
2. Allocate libraries (PDSE is suggested unless PDS is required for your organization) for LANGX files. Allocate one or more LANGX libraries for each environment, such as test and production.
3. Create a corresponding LANGX library for each load library. Specify `LRECL=1562 or greater,RECFM=VB,BLKSIZE= lrecl+4 to 32k`.
4. For all programs, such as batch, CICS, and IMS:
   - In test environments, specify compiler options `TEST(ALL), NOPT, AGGREGATE, ATTRIBUTES(FULL), ESD, LIST, MAP, NEST, OPTIONS, SOURCE, STMT, XREF(FULL)`.

     `TEST(ALL)` and `NOOPT` are required by Debug Tool. `TEST` adds debug hooks, which add some runtime overhead. Symbolic data required by Debug Tool is stored in the module, which can make it significantly larger.

     The other options format the compiler listing as required by Debug Tool and by the *xxx*LANGX utility.

- In production environments, specify compiler options `NOTEST, AGGREGATE, ATTRIBUTES(FULL), ESD, LIST, MAP, NEST, OPTIONS, SOURCE, STMT, XREF(FULL)`.

  `NOTEST` disables Debug Tool, but provides the best performance.

  The other options format the compiler listing as required for the *xxx*LANGX utility.

  This produces a production-ready module that can be used with Fault Analyzer for z/OS and Application Performance Analyzer for z/OS but not Debug Tool for z/OS.

5. Modify the SYSPRINT DD in the compiler step. This is the compiler listing. Save this to a permanent file. The compiler listing is the input to the *xxx*LANGX utility and is the source information file for Debug Tool for z/OS

   Note: This compiler typically renames CSECTs according to an internal compiler algorithm. Therefore, it is not recommended to store PL/I compiler listings or side files using CSECT names as they might not be found by Application Performance Analyzer for z/OS or Fault Analyzer for z/OS. Instead, use the primary entry point name.

6. Add a step after the compiler step to run the *xxx*LANGX utility. This utility reads the compiler listing and saves a LANGX file. This is the source information file for Fault Analyzer for z/OS and Application Performance Analyzer for z/OS. Equivalent *xxx*LANGX utilities are available in Debug Tool for z/OS as EQALANGX, in Fault Analyzer for z/OS as IDILANGX and in Application Performance Analyzer for z/OS as CAZLANGX. Save it in the LANGX file library and specify a member name that is equal to the primary entry point name of your application program.
7. Modify the promotion process to promote LANGX files. When a load module is promoted, for example, from test to production, promote the corresponding LANGX file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the LANGX file that you perform with the module during promotion.
8. Optionally, include a Debug Tool Language Environment exit module into the load module during the linkage editor step. This is one way to enable Debug Tool's panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs.
9. For CICS applications only, if the Debug Tool DTCN transaction will be used to start Debug Tool, link-edit the Debug Tool CICS startup exit module EQADCCXT into the application load module to enable Debug Tool in CICS. This is not needed if using the CADP transaction instead of DTCN.

Sample JCL for compiling PL/I for MVS and VM programs

Below is a JCL example for compiling an PL/I for MVS and VM program for use with the IBM Problem Determination Tools products.

```
//*     - - -  ADD A JOB CARD ABOVE THIS LINE  - - -
//*
//*  SAMPLE JCL TO PREPARE A PLI FOR MVS AND VM PROGRAM
//*  FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//*     FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//*  NOTES:
//*
//*   COMPILER:
```

```
//*    1. COMPILER PARM TEST IS REQUIRED FOR DEBUG TOOL
//*    2. COMPILER PARMS AGGREGATE,ATTRIBUTES(FULL),ESD,LIST,
//*       MAP,NEST,OPTIONS,SOURCE,STMT,XREF(FULL) ARE NEEDED
//*       FOR PD TOOLS TO PROCESS THE COMPILER LISTING
//*
//*   BINDER (LINKAGE EDITOR):
//*    3. THE INCLUDE FOR MODULE EQAD?CXT IS OPTIONAL.  IT IS AN
//*       LE EXIT MODULE THAT CAN BE USED TO START DEBUG TOOL.
//*       UNDERSTAND THE METHODS AVAILABLE FOR STARTING DEBUG TOOL,
//*       AND CHOOSE WHETHER YOU WANT TO USE THE LE EXITS.
//*         IF YOU USE THIS METHOD, LOAD THE CORRECT EXIT MODULE:
//*            EQADBCXT: FOR BATCH PROGRAMS
//*            EQADICXT: FOR ONLINE IMS PROGRAMS
//*            EQADDCXT: FOR DB2 STORED PROCEDURES (OF TYPE MAIN AND SUB)
//*           (for SUB this is supported only for invocations through call_sub)
//*            (DO NOT INCLUDE AN EXIT FOR CICS PROGRAMS)
//*
//*  SET PARMS FOR THIS COMPILE:
//*  --------------------------
//   SET MEM=PADSTAT                     PROGRAM NAME
//   SET PLICOMP='IEL.V1R1M1.SIELCOMP'   PLI COMPILER LOADLIB
//   SET DTLIB='EQAW.SEQAMOD'            DEBUG TOOL LOADLIB
//   SET LEHLQ='CEE'                     LE HIGH LVL QUALIFIER
//   SET UNITDEV=SYSALLDA                UNIT FOR TEMP FILES
//   SET LANGX='EQALANGX'                XXXLANGX UTILITY PROGRAM
//   SET LANGXLIB='EQAW.SEQAMOD'         LIBRARY FOR XXXLANGX UTILITY
//*    NOTE: YOU CAN USE THE XXXLANGX UTILITY SHIPPED WITH DT, FA,
//*          OR APA. THE NAMES ARE DIFFERENT, BUT RESULTS ARE THE SAME
//*          USE ANY OF THEM... THEY ALL PRODUCE THE SAME RESULTS.
//*      IF YOU HAVE:     SET LANGX TO:    SET LANGXLIB TO:
//*      DEBUG TOOL       EQALANGX         THE DT SEQAMOD LIBRARY
//*      FAULT ANALYZER   IDILANGX         THE FA SIDIAUTH LIBRARY
//*      APA              CAZLANGX         THE APA SCAZAUTH LIBRARY
//*
//ALLOCOBJ EXEC PGM=IEFBR14             ALLOC OBJ LIB IF NEEDED
//OBJ   DD DSN=&SYSUID..ADLAB.OBJ,SPACE=(CYL,(3,1,15)),
//  DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=8000,DISP=(MOD,CATLG)
//*
//*  ************************************
//*     COMPILE STEP
//*  ************************************
//*
//COMPILE  EXEC PGM=IEL1AA,REGION=6M,
// PARM=('TEST(ALL),NOPT,AGGREGATE,ATTRIBUTES(FULL),ESD,LIST,MAP,',
//       'NEST,OPTIONS,SOURCE,STMT,XREF(FULL)')
//STEPLIB  DD   DSN=&PLICOMP,DISP=SHR
//SYSIN    DD   DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSLIB   DD   DISP=SHR,DSN=&SYSUID..ADLAB.COPYLIB
//SYSPRINT DD   DISP=SHR,DSN=&SYSUID..ADLAB.PLIMVS.LISTING(&MEM)
//SYSUT1   DD   SPACE=(CYL,(1,1)),UNIT=SYSDA
//SYSLIN   DD DSN=&SYSUID..ADLAB.OBJ(&MEM),DISP=SHR
//*
//PLIPRINT  EXEC PGM=IEBGENER,REGION=0M
//SYSPRINT  DD SYSOUT=*
//SYSUT1    DD DSN=&SYSUID..ADLAB.PLIMVS.LISTING(&MEM),DISP=SHR
//SYSUT2    DD SYSOUT=*
//SYSIN     DD DUMMY
//*
//*  ********************************
//*     STEP TO GENERATE LANGX FILE
//*  ********************************
//LANGX    EXEC PGM=&LANGX,REGION=32M,
//  PARM='(PLI ERROR 64K CREF'
//STEPLIB  DD DISP=SHR,DSN=&LANGXLIB
//         DD DISP=SHR,DSN=&LEHLQ..SCEERUN
//LISTING  DD DSN=&SYSUID..ADLAB.PLIMVS.LISTING(&MEM),DISP=SHR
//IDILANGX DD DISP=SHR,DSN=&SYSUID..ADLAB.EQALANGX(&MEM)
```

```
//*
//* ********************************
//* LINK-EDIT (BINDER) STEP
//* ********************************
//LINK EXEC PGM=IEWL,PARM=(LET,MAP,LIST),REGION=0M
//SYSLIB DD DSN=&LEHLQ..SCEELKED,DISP=SHR
//DTLIB DD DSN=&DTLIB,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSLMOD DD DISP=SHR,DSN=&SYSUID..ADLAB.LOAD(&MEM)
//SYSUT1 DD UNIT=SYSDA,SPACE=(TRK,(10,10))
//SYSLIN DD DSN=&SYSUID..ADLAB.OBJ(&MEM),DISP=(OLD,PASS)
//*  INCLUDING A DEBUG TOOL LE EXIT (EQADBCXT, EQADDCXT, OR EQADICXT)
//*  IS OPTIONAL.  THE EXIT ENABLES STARTING DEBUG TOOL WITH THE
//*  USER EXIT DATA SET UTILITY (ONE OF THE DEBUG TOOL ISPF UTILITIES)
//*  //        DD *
//*   INCLUDE DTLIB(EQADBCXT)
```

z/OS XL C and C++ programs

The following table shows various compiler options that can be used to prepare z/OS XL C and C++ programs for use with the IBM Problem Determination Tools products (Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant run-time overhead.

Table 12. Examples of compiler options and source information files supported by IBM Problem Determination Tools products for C++

Compiler options	Output produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
Preprocess (1st stage) to expand source, In compile (2nd stage): TEST, ATTRIBUTE(FULL), NOIPA, LIST, NESTINC(255), NOOFFSET, NOOPT, SOURCE, XREF	Expanded source file used by Debug Tool for z/OS, compiler listing used by Fault Analyzer for z/OS and Application Performance Analyzer for z/OS	No	Suggested for test. (Using Debug Tool in production for this compiler is not recommended.)	Supported	Supported
	Expanded source file used by Debug Tool for z/OS, LANGX file used by Fault Analyzer for z/OS and Application Performance Analyzer for z/OS	No	Supported	Supported	Supported

Table 12. Examples of compiler options and source information files supported by IBM Problem Determination Tools products for C++ (continued)

Compiler options	Output produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
NOTEST, ATTRIBUTE(FULL), NOIPA, LIST, NESTINC(255), NOOFFSET, NOOPT, SOURCE, XREF	Compiler listing	Yes	N/A	Suggested for production and test	Suggested for production and test
	LANGX file	Yes	N/A	Supported	Supported
Preprocess (1st stage) to expand source. In compile (2nd stage): DEBUG(FORMAT (DWARF), HOOK(LINE, NOBLOCK, PATH), SYMBOL, FILE(location))	Expanded source file and DWARF file	No	Supported. (Using Debug Tool in production for this compiler is not recommended.)	N/A	N/A

Notes:

1. The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.
2. The FORMAT(DWARF) option is supported for z/OS Version 1.6 and higher.

Table 13. Examples of compiler options and source information files supported by IBM Problem Determination Tools products for C

Compiler options	Output produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
Preprocess (1st stage) to expand source, In compile (2nd stage): TEST(ALL), AGGREGATE, NOIPA, LIST, NESTINC(255), NOOFFSET, NOOPT, SOURCE, XREF	Expanded source file used by Debug Tool for z/OS, compiler listing used by Fault Analyzer for z/OS and Application Performance Analyzer for z/OS	No	Suggested for test. (Using Debug Tool in production for this compiler is not recommended.)	Supported	Supported
	Expanded source file used by Debug Tool for z/OS, LANGX file used by Fault Analyzer for z/OS and Application Performance Analyzer for z/OS	No	Supported	Supported	Supported
NOTEST, AGGREGATE, NOIPA, LIST, NESTINC(255), NOOFFSET, NOOPT, SOURCE, XREF	Compiler listing	Yes	N/A	Suggested for production and test	Suggested for production and test
	LANGX file	Yes	N/A	Supported	Supported
Preprocess (1st stage) to expand source. In compile (2nd stage): DEBUG(FORMAT (DWARF), HOOK(LINE, NOBLOCK, PATH), SYMBOL, FILE(location))	Expanded source file and DWARF file	No	Supported. (Using Debug Tool in production for this compiler is not recommended.)	N/A	N/A

Notes:

1. The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.
2. The FORMAT(DWARF) option is supported for z/OS Version 1.6 and higher.

Preparing z/OS XL C and C++ programs

Perform the following steps for compiling your z/OS XL C and C++ programs:

1. Create a library (PDSE is suggested unless PDS is required for your organization) for expanded source files. This is only needed in test

environments where debugging will be performed. This can be any RECFM / LRECL / BLKSIZE supported as input by the compiler.

2. Allocate libraries (PDSE is suggested unless PDS is required for your organization) for compiler listing files. Allocate one or more compiler listing libraries for each environment, such as test and production.
3. Create a corresponding listing library for each load library. Specify LRECL=133,RECFM=FBA,BLKSIZE=(multiple of lrecl up to 32k) or LRECL=137 or greater, RECFM=VBA,BLKSIZE= lrecl+4 to 32k.
4. Run a 2-stage compile. The first stage preprocesses the program, so the IBM Problem Determination Tools products have access to fully expanded source code. The second stage compiles the program.
   - In the first compile stage, in both test and production environments:
     - Specify compiler options `PP(COMMENTS,NOLINES)` to expand INCLUDEs and macros. The output is SYSUT10 DD, which is the expanded source file and is the input for the second compiler stage.
     - Modify the SYSUT10 DD to enable Debug Tool, by saving it in a expanded source library and specify a member name that is equal to the primary entry point name or CSECT name of your application program.
   - For all programs, such as batch, CICS, and IMS, for the second compiler stage:
     - In test environments:
       - For C++, specify compiler options `TEST, ATTRIBUTE(FULL), NOIPA, LIST, NESTINC(255), NOOFFSET, NOOPT, SOURCE, XREF`.

         `TEST` and `NOOPT` are required by Debug Tool. Debug hooks are inserted, which will adds runtime overhead. Symbolic data required by Debug Tool is stored in the module, which can make it significantly larger.

         The other options format the compiler listing as required by Fault Analyzer for z/OS and Application Performance Analyzer for z/OS.
       - For C, specify compiler options `TEST(ALL), AGGREGATE, NOIPA, LIST, NESTINC(255), NOOFFSET, NOOPT, SOURCE, XREF`.

         `TEST(ALL)` and `NOOPT` are required by Debug Tool. Debug hooks are inserted, which adds runtime overhead. Symbolic data required by Debug Tool is stored in the module, which can make it significantly larger.

         The other options format the compiler listing as required by Fault Analyzer for z/OS and Application Performance Analyzer for z/OS.
     - In production environments:
       - For C++, specify compiler options: `NOTEST, ATTRIBUTE(FULL), NOIPA, LIST, NESTINC(255), NOOFFSET, NOOPT, SOURCE, XREF`.
       - For C, specify compiler options: `NOTEST, AGGREGATE, NOIPA, LIST, NESTINC(255), NOOFFSET, NOOPT, SOURCE, XREF`.

     `NOTEST` disables Debug Tool, but provides the best performance. This produces a production-ready module that can be used with Fault Analyzer for z/OS and Application Performance Analyzer for z/OS, but not Debug Tool for z/OS.

     The other options format the compiler listing as required for Fault Analyzer for z/OS and Application Performance Analyzer for z/OS.
5. Modify the SYSCPRT DD in the second compiler stage to refer to a file. This is the compiler listing and is the source information file for Fault Analyzer for

z/OS and Application Performance Analyzer for z/OS. Save it in the compiler listing library and specify a member that is equal to the CSECT name of your application program.

```
//SYSCPRT DD DSN=compiler.listing.pds(csect-name),DISP=SHR
```

Note: To enable source support in Fault Analyzer, it is a requirement that CSECTs in C programs are named using:

```
#pragma csect(code, "csect_name")
```

where, if using a PDS(E), *csect_name* matches the compiler listing or LANGX file member name.

6. Modify the promotion process to promote compiler listing files. When a load module is promoted, for example, from test to production, promote the corresponding compiler listing file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the compiler listing file that you perform with the module during promotion.
7. Optionally, include a Debug Tool Language Environment exit module into the load module during the linkage editor step. This is one way to enable Debug Tool's panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs.
8. For CICS applications only: if the Debug Tool DTCN transaction will be used to start Debug Tool, link edit the Debug Tool CICS startup exit module EQADCCXT into the application load module to enable Debug Tool in CICS. This is not needed if using the CADP transaction instead of DTCN.

Sample JCL for compiling z/OS C++ programs

Below is a JCL example for compiling an z/OS C/C++ program for use with the IBM Problem Determination Tools products.

```
//* ADD A JOB CARD HERE
//*
//*
//*  SAMPLE JCL TO PREPARE A Z/OS C PROGRAM PROGRAM
//*  FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//*     FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//*  NOTES:
//*
//*   COMPILER:
//*    1. A 2-STAGE COMPILE IS PERFORMED.  STAGE 1 (PREPROCESS) IS
//*       DONE TO EXPAND INCLUDES AND MACROS IN THE PROGRAM AND TO
//*       PRODUCE AN EXPANDED SOURCE FILE.
//*    2. THE EXPANDED SOURCE FILE IS RETAINED.  IT IS USED BY
//*       DEBUG TOOL.
//*    2. COMPILER PARMS TEST AND NOOPT ARE REQUIRED FOR DEBUG TOOL.
//*    3. COMPILER PARMS AGGREGATE, NOIPA, LIST, NOOFFSET, SOURCE,
//*       AND XREF(FULL) ARE NEEDED TO FORMAT THE COMPILER LISTING
//*       SO THAT IT CAN BE PROCESSED WITH XXXLANGX
//*
//*   A STEP RUNS TO PRODUCE A LANGX FILE FOR FAULT ANALYZER AND APA.
//*    NOTE: YOU CAN USE THE XXXLANGX UTILITY SHIPPED WITH DT, FA,
//*          OR APA. THE NAMES ARE DIFFERENT, BUT THE RESULTS ARE THE SAME.
//*          USE ANY OF THEM... THEY ALL PRODUCE THE SAME RESULTS.
//*      IF YOU HAVE:     THEN EXECUTE MODULE:
//*      DEBUG TOOL       EQALANGX, AND ENSURE THAT THE DT SEQAMOD LIBRARY
//*                         IS AVAILABLE (VIA STEPLIB, JOBLIB, OR LINKLIST)
//*      FAULT ANALYZER   IDILANGX, AND ENSURE THAT THE FA SIDIAUTH LIBRARY
```

```
//*                         IS AVAILABLE (VIA STEPLIB, JOBLIB, OR LINKLIST)
//*      APA              CAZLANGX, AND ENSURE THAT THE APA SCAZAUTH LIBRARY
//*                         IS AVAILABLE (VIA STEPLIB, JOBLIB, OR LINKLIST)
//*
//*   BINDER (LINKAGE EDITOR):
//*    1. AN INCLUDE FOR MODULE EQAD?CXT IS OPTIONAL.  IT IS AN
//*       LE EXIT MODULE THAT CAN BE USED TO START DEBUG TOOL.
//*       UNDERSTAND THE METHODS AVAILABLE FOR STARTING DEBUG TOOL,
//*       AND CHOOSE WHETHER YOU WANT TO USE THE LE EXITS.
//*         IF YOU USE THIS METHOD, INCLUDE THE CORRECT EXIT MODULE:
//*            EQADBCXT: FOR BATCH PROGRAMS
//*            EQADICXT: FOR ONLINE IMS PROGRAMS
//*            EQADDCXT: FOR DB2 STORED PROCEDURES (OF TYPE MAIN AND SUB)
//*           (for SUB this is supported only for invocations through call_sub)
//*            (DO NOT INCLUDE AN EXIT FOR CICS PROGRAMS)
//*
//*  SET PARMS FOR THIS COMPILE:
//*  ---------------------------
//*       CPRFX: THE PREFIX THE C/C++ COMPILE IS INSTALLED UNDER
//*       LEPRFX: THE PREFIX FOR THE LE RUNTIME AND LINK LIBS
//*       DTPRFX: THE PREFIX OF THE DEBUG TOOL SEQAMOD LIBRARY
//*
//    SET CPRFX=CBC
//    SET LEPRFX=CEE
//    SET DTPRFX=EQAW
//*
//*****************************************************************/
//* CREATE C/C++ COMPILER LISTING SYSPRINT, EXPANDED SOURCE DEBUG,  */
//* AND EQALANGX FILES                                              */
//*****************************************************************/
//ALLOC EXEC PGM=IEFBR14
//LISTING DD DSN=&SYSUID..ADLAB.CLST,
//           DISP=(MOD,CATLG),
//           DCB=(DSORG=PO,RECFM=VBA,LRECL=137,BLKSIZE=0),
//           SPACE=(TRK,(20,20,50)),UNIT=SYSDA
//DBGSRC  DD DSN=&SYSUID..ADLAB.CDBG,
//           DISP=(MOD,CATLG),
//           DCB=(DSORG=PO,RECFM=FB,LRECL=80,BLKSIZE=0),
//           SPACE=(TRK,(20,20,50)),UNIT=SYSDA
//LANGX   DD DSN=&SYSUID..ADLAB.EQALANGX,
//           DISP=(MOD,CATLG),
//           DCB=(DSORG=PO,RECFM=VB,LRECL=1562,BLKSIZE=0),
//           SPACE=(TRK,(40,40,50)),UNIT=SYSDA
//*                                                               *
//*****************************************************************
//*-----------------------------------------------------------------
//*  COMPILE STEP1: GENERATE EXPANDED C/C++ SOURCE FILE IN THE DD
//*                 SYSUT10
//*-----------------------------------------------------------------
//COMP1   EXEC PGM=CCNDRVR,REGION=0M,
// PARM=('PP(COMMENTS,NOLINES)')
//STEPLIB  DD  DSNAME=&LEPRFX..SCEERUN2,DISP=SHR
//         DD  DSNAME=&CPRFX..SCCNCMP,DISP=SHR
//SYSMSGS  DD  DUMMY,DSN=&CPRFX..SCBC3MSG(EDCMSGE),DISP=SHR
//SYSLIB   DD  DSNAME=&LEPRFX..SCEEH.H,DISP=SHR
//         DD  DSNAME=&LEPRFX..SCEEH.SYS.H,DISP=SHR
//         DD  DSNAME=&SYSUID..ADLAB.COPYLIB,DISP=SHR
//SYSPRINT DD  SYSOUT=*
//SYSOUT   DD  SYSOUT=*
//SYSCPRT  DD  SYSOUT=*
//SYSUT1   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//SYSUT5   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT6   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT7   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
```

```
//   DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT8   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT9   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=VB,LRECL=137,BLKSIZE=882)
//SYSUT10  DD  DISP=SHR,DSN=&SYSUID..ADLAB.CDBG(TMC01A)
//SYSUT14  DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//             DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT16  DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//             DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT17  DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//             DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSLIN   DD  DUMMY
//SYSIN    DD  DSNAME=&SYSUID..ADLAB.SOURCE(TMC01A),DISP=SHR
//*
//*--------------------------------------------------------------------
//*  COMPILE STEP2: COMPILE THE EXPANDED SOURCE FILE WITH THE DEBUG
//*                 COMPILER OPTION TEST(ALL)
//*--------------------------------------------------------------------
//COMP2   EXEC PGM=CCNDRVR,REGION=0M,
//  PARM=('TEST(ALL), AGGREGATE, NOIPA, LIST, NESTINC(255),',
//    ' NOOFFSET, NOOPT, SOURCE, XREF')
//STEPLIB  DD  DSNAME=&LEPRFX..SCEERUN2,DISP=SHR
//         DD  DSNAME=&CPRFX..SCCNCMP,DISP=SHR
//         DD  DSNAME=&LEPRFX..SCEERUN,DISP=SHR
//SYSMSGS  DD  DUMMY,DSN=&CPRFX..SCBC3MSG(EDCMSGE),DISP=SHR
//SYSLIB   DD  DSNAME=&LEPRFX..SCEEH.H,DISP=SHR
//         DD  DSNAME=&LEPRFX..SCEEH.SYS.H,DISP=SHR
//SYSCPRT  DD  DISP=SHR,DSN=&SYSUID..ADLAB.CLST(TMC01A)
//SYSOUT   DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SYSUT1   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//SYSUT5   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT6   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT7   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT8   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT9   DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//   DCB=(RECFM=VB,LRECL=137,BLKSIZE=882)
//SYSUT10  DD  SYSOUT=*
//SYSUT14  DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//             DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT16  DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//             DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSUT17  DD  UNIT=SYSDA,SPACE=(32000,(30,30)),
//             DCB=(RECFM=FB,LRECL=3200,BLKSIZE=12800)
//SYSLIN   DD DSN=&&TEMOBJ1(TMC01A),DISP=(,PASS),UNIT=SYSDA,
// SPACE=(TRK,(20,20,20)),DCB=(RECFM=FB,BLKSIZE=3120,LRECL=80,DSORG=PO)
//SYSIN    DD  DSNAME=&SYSUID..ADLAB.CDBG(TMC01A),DISP=SHR
//*
//*--------------------------------------------------------------------
//* LINK STEP: LINK THE COMPILED OBJECT DECK
//*--------------------------------------------------------------------
//LKED EXEC PGM=IEWL,PARM=(LET,MAP,LIST)
//SYSLIB DD DSN=&LEPRFX..SCEELKED,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSLMOD DD DISP=SHR,DSN=&SYSUID..ADLAB.LOAD
//SYSUT1 DD SPACE=(TRK,(10,10)),UNIT=SYSDA
//OBJECT DD DISP=(OLD,PASS),DSN=&&TEMOBJ1
//* DTLIB DD DSN=&DTPRFX..SEQAMOD,DISP=SHR
//SYSLIN DD *
INCLUDE OBJECT(TMC01A)
ENTRY CEESTART
```

```
NAME TMC01(R)
/*
//*  INCLUDING A DEBUG TOOL LE EXIT (EQADBCXT, EQADDCXT, OR EQADICXT)
//*  IS OPTIONAL.  THE EXIT ENABLES STARTING DEBUG TOOL WITH THE
//*  USER EXIT DATA SET UTILITY (ONE OF THE DEBUG TOOL ISPF UTILITIES).
//*  AN INCLUDE CAN BE ADDED TO SYSLIN IN THE APPRORIATE SEQUENCE:
//*   INCLUDE DTLIB(EQADBCXT)
//*************************************************************
//* GENERATE THE TMC01A EQALANGX FILE
//*************************************************************
//LANGX1   EXEC PGM=EQALANGX,REGION=32M,
//  PARM='(C ERROR'
//STEPLIB  DD DISP=SHR,DSN=&DTPRFX..SEQAMOD
           DD DISP=SHR,DSN=&LEPRFX..SCEERUN
//LISTING  DD DSN=&SYSUID..ADLAB.CLST(TMC01A),DISP=SHR
//IDILANGX DD DSN=&SYSUID..ADLAB.EQALANGX(TMC01AX),DISP=(OLD)
```

Assembler programs

The following table shows various assembler options that can be used to prepare programs for use with the IBM Problem Determination Tools products (Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS). The methods suggested in the following table indicate if the load module produced is suitable for a production environment. Load modules suitable for a production environments have no significant run-time overhead.

Table 14. Examples of assembler options and source information files supported by IBM Problem Determination Tools products for Assembler

Assembler options	Source information file type produced	Is the load module production ready?	Options supported and suggested for Debug Tool for z/OS	Options supported and suggested for Fault Analyzer for z/OS	Options supported and suggested for Application Performance Analyzer for z/OS
ADATA	SYSADATA file	Yes	N/A	Supported	Supported
ADATA	LANGX file	Yes	Suggested for production and test		

Note: The highlighted row or rows in the table above indicate the suggested compiler options and source information file types for each product.

Preparing Assembler programs

Perform the following steps for assembling your programs:

1. Allocate libraries (PDSE is suggested unless PDS is required for your organization) for LANGX files. Allocate one or more LANGX libraries for each environment, such as test and production.
2. Create a corresponding LANGX library for each load library. Specify LRECL=1562 or greater,RECFM=VB,BLKSIZE= lrecl+4 to 32k.
3. For all programs, such as batch, CICS, and IMS, in both test and production environments, specify `ADATA`.

   `ADATA` instructs the assembler to produce a SYSADATA file, which contains source and symbolic data about the program. This produces a production-ready module that can be debugged using Debug Tool for z/OS. `ADATA` does not affect the contents of the assembled module.

4. Add a SYSADATA DD in the assembler step. This file is created by the assembler and it can be a permanent or temporary file. Specify `LRECL=8188 or greater,RECFM=VB,BLKSIZE= lrecl+4 to 32k`. This file is the input to the *xxx*LANGX utility.
5. Add a step after the assembler step to run the *xxx*LANGX utility. The *xxx*LANGX utility reads the SYSADATA file and creates a LANGX file. The LANGX file is the source information file for Debug Tool for z/OS, Fault Analyzer for z/OS and Application Performance Analyzer for z/OS. Equivalent *xxx*LANGX utilities are available in Debug Tool for z/OS as EQALANGX, in Fault Analyzer for z/OS as IDILANGX and in Application Performance Analyzer for z/OS as CAZLANGX.
6. Save the LANGX file in the LANGX file library, and specify a member name that is equal to the CSECT name.
7. Modify the promotion process to promote LANGX files. When a load module is promoted, for example, from test to production, promote the corresponding LANGX file or files. A promotion can be a recompile, copy, or move. Perform the same steps with the LANGX file that you perform with the module during promotion.
8. If the assembler program is Language Environment-enabled, optionally include a Debug Tool Language Environment exit module into the load module during the linkage editor step. This is one way to enable Debug Tool's panel 6 in ISPF, a simple panel-driven method to start the debugger automatically when a program runs, without JCL changes, based on the program name and user ID. Use module EQADBCXT for batch programs (including IMS batch), EQADICXT for IMS/TM programs and EQADDCXT for DB2 stored procedures. Do not include the exit module for CICS programs.
9. For CICS programs only: If the program is a CICS main program, is enabled for Language Environment, and the Debug Tool DTCN transaction will be used to start Debug Tool, then supplied module EQADCCXT must be included in the load module during the linkage editor step.

Sample JCL for assembling a program

Below is a JCL example for assembling a program for use with the IBM Problem Determination Tools products.

```
//*     - - -  ADD A JOB CARD ABOVE THIS LINE  - - -
//*
//*  SAMPLE JCL TO PREPARE AN ASSEMBLER PROGRAM
//*  FOR THE IBM ZSERIES PD TOOLS PRODUCTS:
//*     FAULT ANALYZER, DEBUG TOOL, AND APPLICATION PERF. ANALYZER
//*
//*  NOTES:
//*
//*   ASSEMBLER:
//*    1. AN ADATA PARM IS REQUIRED TO PRODUCE A SYSADATA FILE
//*
//*   A STEP THAT PROCESSES THE SYSADATA FILE,
//*   AND CREATES A LANGX FILE IS NEEDED.
//*
//*   BINDER (LINKAGE EDITOR):
//*    1. AMODE / RMODE CAN BE CODED AS NEEDED BY THE PROGRAM.  THEY ARE
//*       NOT REQUIRED FOR PD TOOLS.
//*
//*  SET PARMS FOR THIS COMPILE:
//*  ---------------------------
//   SET MEM=ASAM1                        PROGRAM NAME
//   SET Language EnvironmentHLQ='CEE'    Language Environment HIGH LVL QUALIFIER
//   SET UNITDEV=SYSALLDA                 UNIT FOR TEMP FILES
//   SET LANGX='EQALANGX'                 XXXLANGX UTILITY PROGRAM
//   SET LANGXLIB='EQAW.SEQAMOD'          LIBRARY FOR XXXLANGX UTILITY
```

```
//*    NOTE: YOU CAN USE THE XXXLANGX UTILITY SHIPPED WITH DT, FA,
//*          OR APA. THE NAMES ARE DIFFERENT, BUT RESULTS ARE THE SAME
//*          USE ANY OF THEM... THEY ALL PRODUCE THE SAME RESULTS.
//*      IF YOU HAVE:     SET LANGX TO:    SET LANGXLIB TO:
//*      DEBUG TOOL       EQALANGX         THE DT SEQAMOD LIBRARY
//*      FAULT ANALYZER   IDILANGX         THE FA SIDIAUTH LIBRARY
//*      APA              CAZLANGX         THE APA SCAZAUTH LIBRARY
//*
//*  ********************************
//*      ASSEMBLER STEP
//*  ********************************
//ASM1 EXEC  PGM=ASMA90,COND=(4,LT),REGION=32M,
//      PARM='ADATA,OBJECT'
//SYSIN    DD DISP=SHR,DSN=&SYSUID..ADLAB.SOURCE(&MEM)
//SYSPRINT DD SYSOUT=*
//SYSLIN   DD DISP=SHR,DSN=&SYSUID..ADLAB.OBJ(&MEM)
//SYSADATA DD DISP=SHR,DSN=&SYSUID..ADLAB.SYSADATA(&MEM)
//SYSLIB  DD  DSN=SYS1.MODGEN,DISP=SHR
//        DD  DSN=SYS1.MACLIB,DISP=SHR
//        DD  DSN=&LEHLQ..SCEEMAC,DISP=SHR
//SYSUT1  DD  DISP=(NEW,DELETE),DSN=&&SYSUT1,SPACE=(1700,(900,450)),
//     UNIT=&UNITDEV
//SYSUT2  DD  DISP=(NEW,DELETE),DSN=&&SYSUT2,SPACE=(1700,(600,300)),
//     UNIT=&UNITDEV
//SYSUT3  DD  DISP=(NEW,DELETE),DSN=&&SYSUT3,SPACE=(1700,(600,300)),
//     UNIT=&UNITDEV
//*
//*  ********************************
//*     STEP TO GENERATE LANGX FILE
//*  ********************************
//LANGX    EXEC PGM=&LANGX,REGION=32M,
//  PARM='(ASM ERROR'
//STEPLIB  DD DISP=SHR,DSN=&LANGXLIB
//         DD DISP=SHR,DSN=&LEHLQ..SCEERUN
//SYSADATA DD DSN=&SYSUID..ADLAB.SYSADATA(&MEM),DISP=SHR
//IDILANGX DD DSN=&SYSUID..ADLAB.EQALANGX(&MEM),DISP=SHR
//*
//*  ********************************
//*        LINK-EDIT (BINDER) STEP
//*  ********************************
//LINK     EXEC PGM=IEWL,PARM='MAP',REGION=0M
//SYSLIB   DD DSN=&LEHLQ..SCEELKED,DISP=SHR
//SYSPRINT DD SYSOUT=*
//SYSLMOD  DD DISP=SHR,DSN=&SYSUID..ADLAB.LOAD(&MEM)
//SYSUT1   DD UNIT=SYSDA,SPACE=(TRK,(10,10))
//SYSLIN   DD DSN=&SYSUID..ADLAB.OBJ(&MEM),DISP=SHR
//         DD *
     MODE AMODE(31),RMODE(24)
     ENTRY ASAM1
//*
```

Chapter 10. Source program mapping

This section describes the Source Program Mapping feature.

For information about ...	See ...
Entering source mapping details	"A01 - Source program mapping panel" on page 571
Java source program mapping	"A03 - Java source program mapping panel" on page 574
Source mapping dataset list	"A04 - Source mapping dataset list" on page 577
Source mapping common data set list	"A05 - Source mapping common list" on page 579
Source program mapping pick list	"A011 - Source program mapping pick list" on page 580
The source program attribution report	"P01 - Source program attribution" on page 582
USS Source Program Attribution report	"P03 - USS Source Program Attribution" on page 585
USS Source Lines report	"P04 - USS Source Lines" on page 588

Introduction to source program mapping

Application Performance Analyzer handles source program mapping differently for Java than for other programming languages.

The common data set list

If the Common Data Store (CDS) is enabled during installation of Application Performance Analyzer, users have the ability to create and maintain a common list of source information data sets (for languages other than Java) that is unique to each instance of Application Performance Analyzer. The common data set list is shareable by all users of the Application Performance Analyzer instance. It is accessed from the 'A05: Source Mapping Common List' panel. All users may view the common list and authorized users may update the common list. When Application Performance Analyzer is searching for program source, it will search the user's personal list as defined in the 'A04: Source Mapping Dataset List' panel first, and if not found, then search the common list.

For languages other than Java

When you specify source program mapping files, many reports allow you to enter a "P" line command to view the program source associated with that entry in the report. The "P" line command is available on many object types: CSECTs, DB2 SQL statements, CICS commands, etc. The data is displayed in the P01: Source Program Attribution report. This report can also be included in a print request.

The 'P' line command

When you enter the 'P' line command, Application Performance Analyzer first checks if the source is loaded. If it is, the source is displayed in the P01: Source Program Attribution report.

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If the source is not loaded, your A04: Source Mapping Dataset List is searched for the source member. If no source member is found in any of the data sets, the common list as defined in A05: Source Mapping Common List is searched. If no source member is found in any of the data sets in the list, the A01: Source Program Mapping panel is displayed, allowing you to enter the source mapping information for the current observation session.

When one or more source members are found in your A04: Source Mapping Dataset List or the A05: Source Mapping Common List, the behavior of Application Performance Analyzer depends on whether or not you requested to match the compile date and time. When you request to not match the compile date and time, the first instance of a source member is loaded regardless of its date and time and the source is displayed in the P01: Source Program Attribution report.

When you request to match the compile date and time, the first source member found that matches the load module compile date and time is loaded and the source is displayed in the P01: Source Program Attribution report.

If none of the source members match the compile date and time, a pick list of datasets that contain the source member is displayed in the A011: Source Programming Mapping Pick List panel. When you select one of these source members, it is loaded and you are returned to the report from which you entered the 'P' line command. You must then re-enter the 'P' line command to display in the P01: Source Program Attribution report.

The 'P' line command for C/C++ (without timestamp match)

When you enter the 'P' line command, Application Performance Analyzer first checks if the source is loaded. If it is, the source is displayed in the P01: Source Program Attribution report.

Typically, source mapping for C/C++ programs is dependent on an exact match between the listing timestamp and the CSECT timestamp generated at compile time. A recompiled C/C++ source listing cannot be loaded directly from the A01, A04 or A11 panels. In some cases, this function is required when the source listing that matches the compiled program is not available. To accommodate this situation, Application Performance Analyzer will allow a listing to be loaded for a specific CSECT with no timestamp matching. You must enter the 'P' line command on a CSECT in one of the supporting reports. You are then directed to the A01: Source Program Mapping panel where you specify the listing to be loaded. This listing will then be loaded and related to the CSECT selected, without timestamp checking, and you are returned to the report. You must then re-enter the 'P' line command to display the P01: Source Program Attribution report.

For Java

When you specify source program mapping files for Java, the program source is viewed in the detail windows in the Java reports, rather than by using the "P" line command. The detail window from a Java Line Number contains Java source mapping information. This detail window is displayed by entering the "++" command (or the Enter key) on the Java Line Number.

USS programs using debug files

When you want to source map C or C++ programs compiled under USS, you can use debug files in ELF/DWARF format. To source map, you need to specify the "P" line command on a CSECT object in the various CPU

reports. This displays the P04: USS Source Lines report. In the P04 report, you can use the "P" line command again on a source line object in order to display the P03: USS Source Program Attribution report.

You can also go directly to the P03 USS Source Program Attribution report (without going through the P04 report), by using the “P” line command on an object code address report line in the C03 report, or an attribution offset line in the W03 report.

The absolute pathname to the debug file is contained within the CSECT for the compiled program. APA is able to extract this file name from the executable USS file during sampling. Hence you do not need to identify the debug file via the A01 panel for source mapping. However, APA can only extract information from the executable USS file if it can locate it during sampling. If the program is executed using a relative path name, then you will have to specify the directory in which it can be found. You do this in the Options panel (panel 2) when you create the request.

A01 - Source program mapping panel

Note: The A01 panel is not used for Java. For information about the Java source program mapping panel, see “A03 - Java source program mapping panel” on page 574.

Overview

This panel allows you to specify and manage associations between source program mapping (SPM) files and observation sessions. Application Performance Analyzer's SPM feature allows measured addresses to be mapped to their corresponding source program statements. You must identify SPM files for each of the observation sessions that use this feature. An SPM file can be sequential or a member in a partitioned data set.

It can be one of the following file types:

- A listing produced by the compiler (COBOL, C, OR C++)
- An ADATA (Associated Data) file produced by High Level Assembler
- A SYSDEBUG file (for COBOL only)
- A side file member produced by the IDILANGX utility

Note: For PL/I source mapping, a LANGX side file must be used.

The SPM files can be retrieved from:

- A PDS(E) or sequential file
- A third party listing (if your installation has enabled support for this)

This panel consists of two sections:

1. An input area in which you can specify an SPM file name and type.
2. A report area in which existing SPM file associations are listed.

A sample Source Program Mapping panel is shown here:

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
A01: Source Program Mapping (1972/TSTJOB01)                  Row 00001 of 00058
Command ===> _____________________________________________ Scroll ===> CSR

Enter the following information to specify a source mapping file to be
used in the analysis of this measurement information.

 File type . . . .   _      (L=listing, A=ADATA, S=LANGX SideFile, D=SYSDEBUG)
 Data set name . .   ____________________________________________
                     (Leave blank to search A04 dataset list)
 Member name . . .   _________ Match on Compile Date & Time    Y


Seqn  ID-ReqNum  Type/Status  Lang   Member     DSN
0001  FF21-0002   L-Inact     ASM    CAZC0010   BNPF.FF2100B.LISTINGS
0002  DEMO-0003   L-Inact     ASM    BKNC0120   BN00.TSTP.LISTINGS
0003  DEMO-0004   L-Inact     COB    CAZCOB01   USER1.TSTP.LISTINGS
0004  DEMO-0005   L-Inact     COB    SAMCAZ03   USER2.CICS.LISTINGS
```

Another sample Source Program Mapping panel is shown here. Support for third-party listings has been enabled.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
A01: Source Program Mapping (1971/TSTJOB01)                  Row 00001 of 00058
Command ===> _____________________________________________ Scroll ===> CSR

Enter the following information to specify a source mapping file to be
used in the analysis of this measurement information.

 File type . . . .   _      (L=listing, A=ADATA, S=LANGX SideFile, D=SYSDEBUG)
 Repository. . . .   _        (T=Third Party, O=Other)
 Data set name . .   ____________________________________________
                     (Leave blank to search A04 dataset list)
 Member name . . .   _________ Match on Compile Date & Time    Y


Seqn  ID-ReqNum  Type/Status  Lang   Member     DSN
0001  FF21-0002   L-Inact     ASM    CAZC0010   BNPF.FF2100B.LISTINGS
0002  DEMO-0003   L-Inact     ASM    BKNC0120   BN00.TSTP.LISTINGS
0003  DEMO-0004   L-Inact     COB    CAZCOB01   USER1.TSTP.LISTINGS
0004  DEMO-0005   L-Inact     COB    SAMCAZ03   USER2.CICS.LISTINGS
```

File specification input area

In this area you enter information about an SPM file to be associated with the current observation session. The fields are described below, but these might vary depending on your installation.

File type

Specify L for a compiler listing file, A for an assembler ADATA file, S for a LANGX SideFile, or D for a SYSDEBUG file.

Listing files are supported for the following versions of COBOL: PP5668-958 COBOL II, PP 5688-197 COBOL for MVS/VM, PP 5648-A25 COBOL for OS/390/VM, PP 5655-G53 Enterprise COBOL, PP 5655-S71 Enterprise COBOL for z/OS V4R1, OS/VS COBOL PP 5740, PL/I: PP 5655-H31 Enterprise PL/I for z/OS, PP 5668-910 IBM OS PL/I OPTIMIZING COMPILER (PL/I support using LANGX side files only)), C/C++: PP 5694-A01 z/OS C/C++ V1R2.0 and above.

For complete information on compiler options, refer to “Required compiler options for creating listings or CAZLANGX side files” on page 736.

Repository
T for a third party repository, or O for any other type such as a PDS or sequential data set.

Data set name
Specify the name of the sequential or partitioned data set containing the SPM file. Your TSO Prefix will be added as the first qualifier if you enter a name without quotes.

If this field is left blank, the A04 Source Map Dataset List is searched for the member name specified.

Member name
Include the member name if the data set is partitioned.

Match on Compile Date and Time
Specify 'Y' for Yes if you want the compile date and time of the source to be matched to the date and time in the matching CSECT in the measurement data. This feature only works with LE compliant modules.

If you use this feature in conjunction with a blank dataset name, your A04 Source Mapping Dataset List is searched for a source module with a compile date and time matching the CSECT. If one is found, it will be loaded. If matching source members are found, but none have the correct date and time stamp, you are given a Pick List of datasets and you can choose to use one of these.

If you specify 'N' for No in conjunction with a blank dataset name, the first instance of a matching source member in your A04 Source Mapping Dataset List is loaded, regardless of its date and time.

The behavior of this setting applies only to non C/C++ Source Map datasets. For C/C++, the field is ignored. C/C++ source mapping always requires a date/time match.

List of existing SPM file associations
This section shows a scrollable list of existing associations between SPM files and observation sessions. These SPM associations are “private” to your own TSO userid and are recorded in your TSO profile. Each TSO user needs to set up his or her own SPM information.

Any entries for file associations applicable to the current observation session will appear at the top of the list. The value under the ID-ReqNum field will be displayed in red to indicate this.

Fields displayed in the File Association List are described here:

Seqn This is simply the line number of the entry. Line commands can be entered to this field.

ID-ReqNum
This shows the observation session request number with which the SPM file is associated. The request number is prefixed by the Application Performance Analyzer identifier.

Type/Status
This indicates the type of SPM file and whether the mapping information

has been “loaded” (available for use). “L” indicates a compiler listing file, “A” indicates an assembler ADATA file, and “S” indicates a LANGX SideFile.

Lang The source program language is shown here: ASM, C, C++, COB or PLI.

Member
The member within a partitioned data set is shown here. This field is blank if the data set is non-partitioned.

DSN The data set name of the SPM file is shown here.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a “/” on any input field to open a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	Seqn	Display context help information.
++	Seqn	Show additional details.
C	Seqn	Copy this SPM file association to the current observation session.
D	Seqn	Delete this entry.
L	Seqn	Load this SPM file and bind it to the current observation session.
F	Seqn	Fill the input fields with the values for this SPM file association

A03 - Java source program mapping panel

Overview

This panel allows you to specify information needed by the Source Program Mapping (SPM) feature for Java programs.

During the measurement, the measurement task determines and records source file names for each of the Java classes in which execution is observed. However, the source file names are not fully qualified. Use this panel to specify sequences of file name prefixes that will be concatenated as high level qualifiers to the captured source program file names in order to form fully qualified HFS path names.

The A03 panel lets you save a set of file name prefixes in an ordered list. Each name in the list is assigned a search sequence ("SrchSeq"): 01, 02, 03, etc.

Note: It is helpful to think of the file name prefixes as directory names, and think of stored Java class source file names as files within these directories. Using this analogy, SPM tries to locate a Java class source file by searching each of these directories. It searches the directories in the sequence (01, 02, 03, etc.) indicated by the SrchSeq value.

You can store a default, global list of prefixes and you can store a list for a specific measurement. When attempting to resolve file names, SPM will search the directories specified for the particular measurement first, and then it will search the global list.

The Java source program mapping panel consists of two sections:

1. An input area in which you specify a file name prefix to be added to a list, and an option specifying whether you are working with the global (default) list or the list for the current measurement.
2. A scrollable list of file name prefixes. The list you are working with (current measurement or default) appears at the top of the list.

A sample Java source program mapping panel is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
A03: Java Source Program Mapping (7544/JVMTST01)              Row 00001 of 00007
Command ===> ____________________________________________________ Scroll ===> CSR

Enter "/"
 /    To work with file name prefix list for curent measurement. Blank
      for global (default) file name prefix list.

Enter new HFS path name prefix to be added (up to 150 characters)
 ____________________________________________________________________________
 ____________________________________________________________________________

Seqn  ID-ReqNum  SrchSeq     Path Name
0001  SST  -7544   01       /u/java/src
0002  SST  -7544   02       /u/jtest/pathOne
0003  SST  -7537   01       /u/jtest/pathThree/security/Section/src
0004  SST  -7537   02       /u/java/src
0005  SST  -7537   03       /u/jtest/pathFive/development/source
0006  SST  -7537   04       /u/jtest/pathFour
0007  SST  -7537   05       /u/jtest/pathTwo/alphaAlpha/bravoBravo/charlieCharli
```

File prefix specification input area

Specify either '/' or blank in the option field to indicate whether you want to work with the file prefix list for the current measurement or with the global (default) file prefix list.

To add a new file name prefix to the selected list, enter the prefix name in the two line input field. A prefix name can have up to 150 characters. The name will be added to the end of the ordered list, which means it will be assigned the highest SrchSeq value.

Detail lines

This area is scrollable. Each detail line displays a file name prefix, which are organized by ordered-list groups.

Under Heading	This is Displayed
Seqn	A sequence number indicating the detail line's position in the entire scrollable list. This field accepts line commands. Enter "/" to display a line command menu for this field.
ID-ReqNum	The name of the measurement task and the request number of the measurement to which the file prefix applies. A value of 0000 appears for the request number if the path name is part of the default list and applies globally.

Under Heading	This is Displayed
SrchSeqn	A value indicating the relative sequence in which the file prefix is applied. SrchSeq values for an ordered list begin with 01 and appear in sequence (01, 02, 03, etc.). The maximum value is 99.
Path Name	The file path name prefix. This name can end with a forward slash. If it does not end with a forward slash, one will automatically be added before it is concatenated with the Java class source file name.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to open a menu of line commands available for that field.)

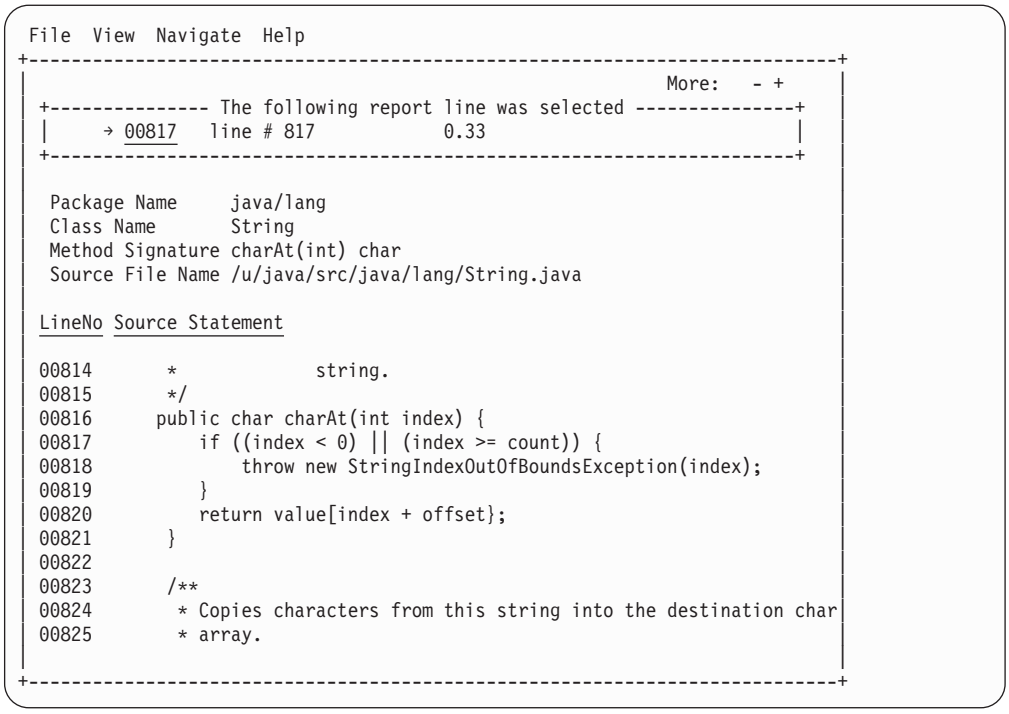
on objects

Cmd	When Applied To	Action
?	Seqn	Display context help information.
D	Seqn	Delete the entry.
H	Seqn	Move higher in search order.
L	Seqn	Move lower in search order.
S	Seqn	Copy path name to input field.

Java report detail window

Once the Java source program mapping details have been entered in the A03 panel, the source can be viewed in the detail windows of the Java reports. Display the detail window by entering the "++" line command (or enter key) on the Java Line Number object in the Java report.

A sample Java report detail window with source mapping is shown here:

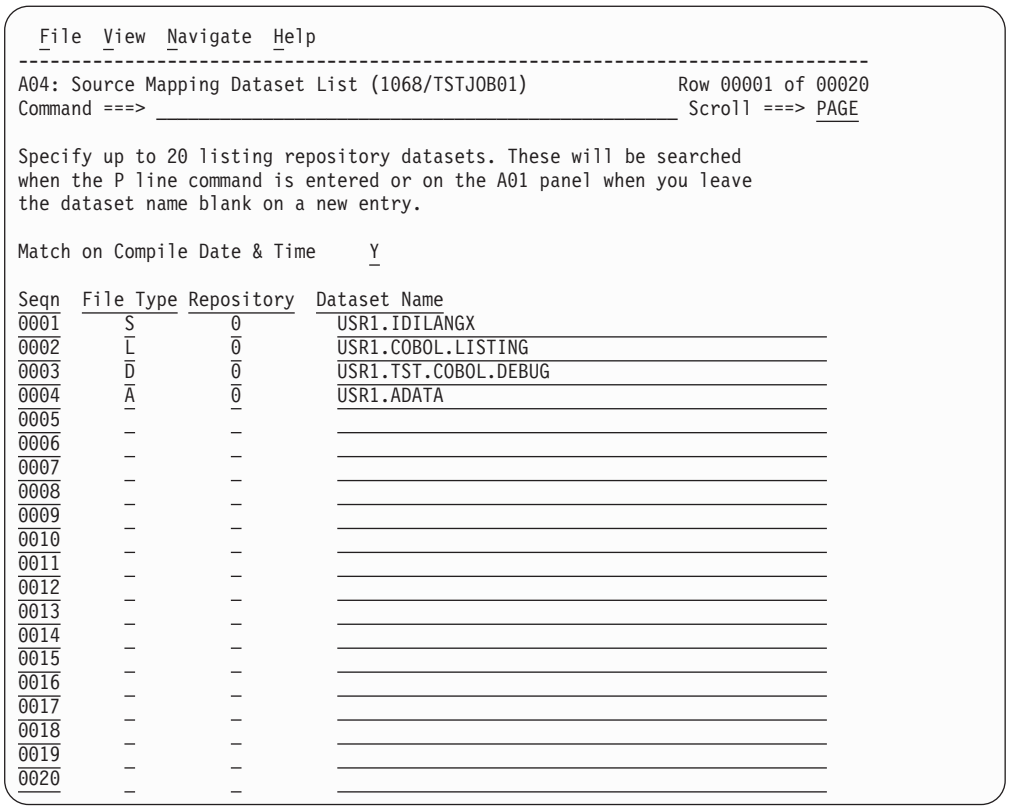


A04 - Source mapping dataset list

Overview

This panel allows you to specify a list of partitioned dataset names that Source Program Mapping (SPM) will use to search for a source program. The datasets will be searched in the specified order. The list is saved in the common data store, if enabled, otherwise it is saved in your ISPF profile. The list is searched when the 'P' line command is entered and when you do not specify a dataset name in the A01 Source Program Mapping panel.

A sample panel is shown here:



Match on Compile Date & Time description

The value entered here applies to all entries in the dataset list. Specify 'Y' for Yes if you want the compile date and time of the source to be matched to the date and time in the matching CSECT in the measurement data. Specify 'N' for No if you want the source to be loaded regardless of its date and time. For more details, refer to “Match on Compile Date and Time” on page 573.

Dataset list description

A scrollable list of up to 20 dataset names can be maintained here. Each row in the list consists of four parts: a sequence number, a file type, a repository and a dataset name field. These fields are described below.

Seqn A sequence number indicating the detail line's position in the list. This field accepts line commands to Move, Insert, and Delete. To display a line command menu for this field, enter / .

File type
Specify L for a compiler listing file, A for an assembler ADATA file, S for a LANGX SideFile, or D for a SYSDEBUG file.

Repository
Specify T for a third party repository, or O for any other type.

Dataset name
The name of the dataset to be searched. This is an input field where you specify a fully qualified dataset name. The name must not be enclosed in quotes.

Commands to save and edit

This panel supports a limited set of ISPF Edit type line commands. The commands supported are listed below. (Block moves are not supported).

I Insert

D Delete

M Move

A After

PF3 or the END command saves the list and terminates the dialog, but you must press Enter first to record any changes. The CANCEL command terminates the dialog without saving any changes.

A05 - Source mapping common list

Overview

This panel allows you to specify a common list of partitioned dataset names that Source Program Mapping (SPM) uses to search for a source program. This list is common to all users, and is searched in the specified order when the 'P' command is used, and a source match is not found in the user's personal dataset list as defined in their A04: Source Mapping Dataset List panel. The list is saved in the common data store, and can be maintained by any user with AdministerProduct authorization. Users without AdministerProduct authorization can view the list, but update operations are disabled. For details on setting up AdministerProduct authorization, refer to Chapter 2 of the *Application Performance Analyzer for z/OS Customization Guide*.

When datasets in the common list are searched, the user's setting for 'Match on Compile Date & Time' as defined in their A04: Source Mapping Dataset List panel is used. By default, Application Performance Analyzer will not search for an exact match on compile date and time.

A sample panel is shown here:

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
A05 - Source Mapping Common List (0002/TSTJOB)               Row 00001 of 00050
Command ===> _____________________________________________ Scroll ===> CSR

Specify up to 50 listing repository datasets to be used as a common
list of datasets for all users when source mapping.


Seqn  File Type Repository  Dataset Name
0001      L         0       COMMON.COBOL.SOURCE
0002      S         0       COMMON.PLI.IDILANGX
0003      A         0       COMMON.ADATA
0004      _         _       ____________________________________________
0005      _         _       ____________________________________________
0006      _         _       ____________________________________________
0007      _         _       ____________________________________________
0008      _         _       ____________________________________________
0009      _         _       ____________________________________________
0010      _         _       ____________________________________________
```

Dataset list description

A scrollable list of up to 50 dataset names can be maintained here. Each one in the list consists of four parts: a sequence number, a file type, a repository, and a dataset name field. These fields are described below.

Seqn A sequence number indicating the detail line's position in the list. This field accepts line commands to Move, Insert, and Delete. To display a line command menu for this field, enter / .

File type
Specify L for a compiler listing file, A for an assembler ADATA file, S for a LANGX SideFile, or D for a SYSDEBUG file.

Repository
Specify T for a third party repository, or O for any other type.

Dataset name
The name of the dataset to be searched. This is an input field where you specify a fully qualified dataset name. The name must not be enclosed in quotes.

Commands to save and edit

This panel supports a limited set of ISPF Edit type line commands. The commands supported are listed below. (Block moves are not supported).

I Insert

D Delete

M Move

A After

PF3 or the END command saves the list and terminates the dialog, but you must press Enter first to record any changes. The CANCEL command terminates the dialog without saving any changes.

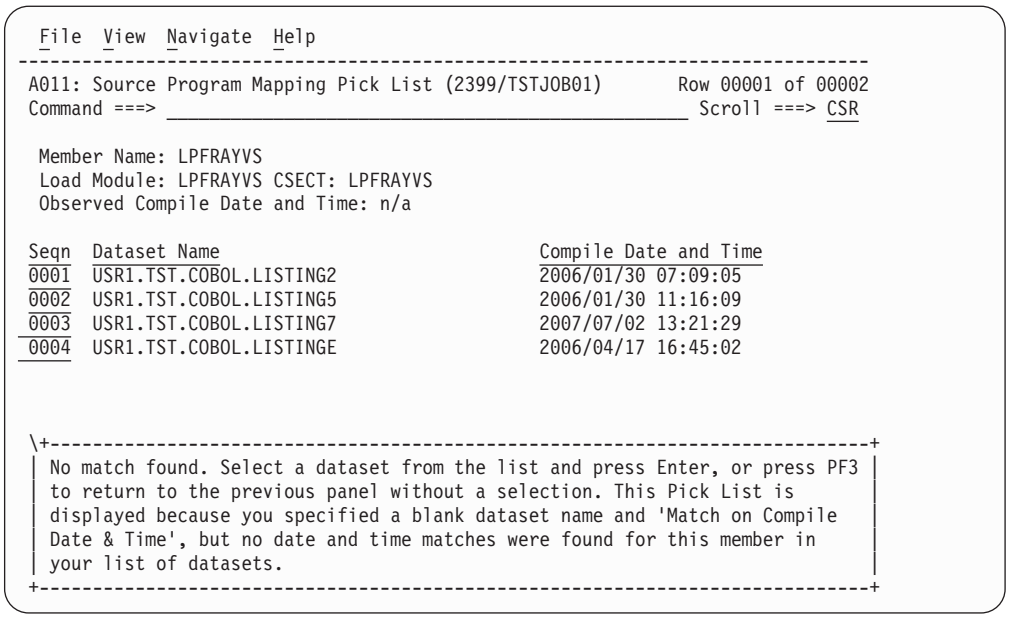
A011 - Source program mapping pick list

Overview

This dialog is displayed by the 'P' line command and the A01 Source Program Mapping panel. It is displayed when you have requested that your SPM dataset list be searched for a source member with a compile date/time match, but no date/time match can be found. A list of datasets containing members which match the SPM mapping request, but not the date and time, is presented in the Pick List.

From this list you can select (pick) an SPM dataset that you wish to use for source mapping purposes. After selecting an SPM dataset and pressing Enter, the selected SPM dataset and member will be loaded and bound to the current observation session. Also, when displayed from the A01 Source Program Mapping panel, a new row is added to the A01 SPM list reflecting this addition.

A sample pick list panel is shown here:



Field descriptions

Member name
The source member name.

Load module
The load module name that matched the source member and the measurement.

CSECT
The CSECT name that matched the source member and the measurement.

Observed compile date and time
The date and time extracted from the LE entry point for the CSECT. This is only available for LE compliant modules.

Pick list description
This lower section of this panel is a scrollable list. Each row in the list consists of three fields: a sequence number, a dataset name, and compile date & time. These fields are described below.

The Select line command allows you to select the SPM dataset you want to use. When this dialog is displayed from the A01 Source Program Mapping panel, after selecting a dataset and pressing Enter, the selected dataset is loaded and added to your list of SPM file associations and you are returned to the A01 dialog. When this dialog is displayed from the 'P' line command, the source member from the selected dataset is loaded and after pressing Enter, you are returned to the report from which you entered the 'P' line command. You must then re-enter the 'P' line command to display in the P01: Source Program Attribution report. In either case, press PF3 to return without making a selection.

Seqn A sequence number indicating the detail line's position in the entire scrollable list. This field accepts the 'S' (Select) line command.

Dataset name
The name of the SPM dataset containing the SPM data for the CSECT found in the current observation.

Compile Date and Time
The date and time when this SPM member was created (compiled).

P01 - Source program attribution

Overview

This report maps measured CPU activity to its corresponding source program statements. You use the "P" line command, on an eligible line command field, to launch this report. (See the individual Performance Analysis reports to determine which lines allow the "P" command.) Source statements from a single compile (or assembly) unit are shown. Depending on the selected SETUP options, all or part of the source program is shown. A count value is shown for statements in which CPU activity was measured; each count value indicates the number of times execution in the statement was observed. Optionally, depending on a SETUP option, the counts are also shown graphically.

This report also shows attribution of CPU usage measured in system modules referred back to the points of invocation in application modules ("Referred Attribution"). This referred attribution line is displayed directly under the source statement, and is displayed in pink.

A sample report is shown here with the graphics option turned off.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
P01: Source Program Attribution (0453/TSTJOB01)              Row 00001 of 00043
Command ===> ____________________________________________ Scroll ===> CSR

LineNo Offset Count Source Statement

000120                    *- - - - - - - - - - - - - - - - - - - - - - - - - -
000121
000122 00034A                  Open Input   DataFile1
                9  <- CPU time attributed to above statement
000123
000124 00036C                  If DataFile1-file-status-ok
000128                         End-If
000129
000130 000388                  Open Output  DataFile2
                7  <- CPU time attributed to above statement
000131
000132 0003A6                  If DtaFile2-file-status-ok
000167                    *- - - - - - - - - - - - - - - - - - - - - - - - - -
000168
000169 0004B0    2             Read DataFile1
000170                            At End
000171 0004F4                         Set DataFile1-eof To True
000186 00050A                  Move dataRecord to dataRecordCopy
000187
000188 000510    8             Perform until Char-Column > 80
000189
000190 000524                     If dataChar(Char-Column) Not = Space
000193 00056C                        Move 1 to Word-Length(Word-Count)
000194
000195 000582    6                Perform until dataChar(Char-Column) = Spac
000196                                        or Char-Column > 80
000197 0005AE                           Add 1 to Char-Column
000229 00066A                     Move Word-Length(Word-Subscript1) to ws-Word-
000230
000231 000688  735                Perform until Word-Updated or
```

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
P01: Source Program Attribution (0453/TSTJOB01)              Row 00001 of 00043
Command ===> _____________________________________________ Scroll ===> CSR

LineNo Offset Count Source Statement
000169 0004B0    2             Read DataFile1
000170                            At End
000171 0004F4                        Set DataFile1-eof To True
000186 00050A                   Move dataRecord to dataRecordCopy
000187
000188 000510    8              Perform until Char-Column > 80
000189
000190 000524                      If dtaChar(Char-Column) Not = Space
000193 00056C                         Move 1 to Word-Length(Word-Count)
000194
000195 000582    6                    Perform until dataChar(Char-Column) = Spac
000196                                             or Char-Column > 80
000197 0005AE                            Add 1 to Char-Column
000229 00066A                      Move Word-Length(Word-Subscript1) to ws-Word-
000230
000231 000688  735                 Perform until Word-Updated or
000232                                           Word-Subscript2 > Total-Word-Co
000233
000235 0006D0                         Move Word-Length(Word-Subscript1) to ws-Wo
000236
000237 0006EE   49                    If All-Word-Value(Word-Subscript2) =
000238                                   dataRecordCopy(ws-Word-Column:ws-Word-L
000239 000730                              Add 1 to All-Word-Count(Word-Subscript2
000249 00079E                         Move Total-Word-Count to Word-Subscript2
000250 0007A8                         Move 1 to All-Word-Count(Word-Subscript2)
000251 0007C2   15                    Move dataRecordCopy(ws-Word-Column:ws-Word
000252                                     to All-Word-Value(Word-Subscript2)
000253                                End-If
```

Code segments

The reported CPU activity depends on the item upon which the “P” line command was entered to launch this report. Only the CPU activity which was aggregated to quantify that item is included in the source mapping report. If, for example, this report was launched from an item on the CPU Usage by Code Slice report, then only activity for the range of addresses in the selected “slice” is reflected in the source statement counts. Statements outside such a selected address range are displayed in blue, while those within the range appear in green.

Detail line descriptions

LineNo

This field displays a 6 digit sequence number corresponding to the source statement line position. The sequence values begin at 000001 and increase by 1 for each statement. Gaps in the sequence occur if SETUP options are chosen resulting in some statements being omitted from the report. This field is also an input field and accepts line commands.

Offset

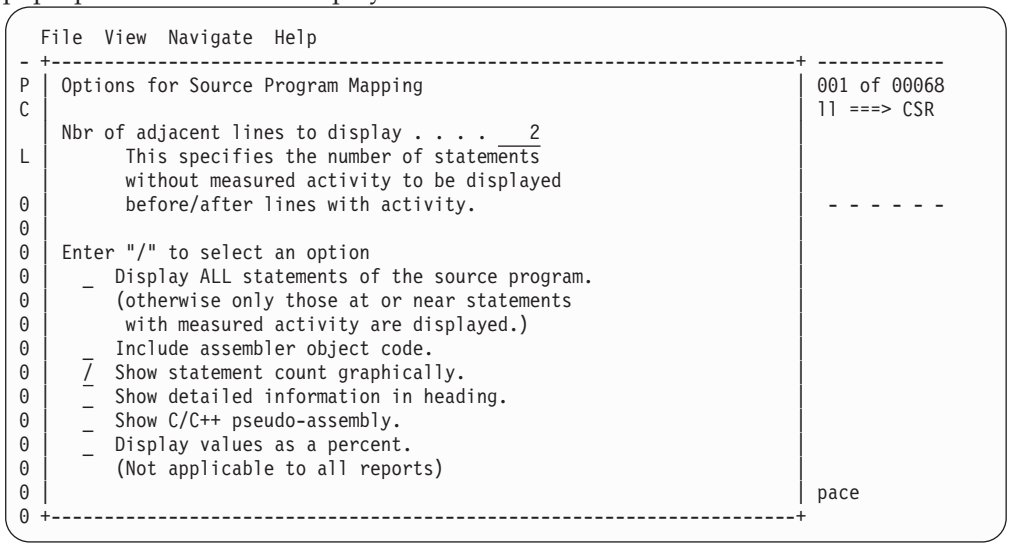
This field contains the hexadecimal offset of the object code associated with the source statement. The offset is relative to the beginning of the CSECT (Control Section). Blanks are shown here if there is no object code address associated with the statement (comments, continuations, non-procedural statements, etc.).

Count
The number of times execution was observed at the statement is shown here, or blank if no execution was measured. The maximum value is 9999. Values exceeding 9999 are shown as 9999+.

Source statement
The source program statement is shown here. For an assembler program, you can select a SETUP option to choose whether to show only the 80 byte source statement or to show the full assembly listing format (including offset, object code etc.)

Header information
A SETUP option can be selected to display information about the mapped program in the heading section of each page. This information includes: load module name, load library name, CSECT name, source mapping file name, compile date/time, and code segment address range (when applicable). It is usually preferable to turn off this option as it occupies several lines at the top of the screen.

SETUP options
Enter the SETUP primary command to select options for this report. The following pop-up window will be displayed:



Number of adjacent lines to display
Use this parameter to control how many adjacent source lines you would like to see on either side on a source line with activity. This is used to give context to the active source lines displayed. This parameter is ignored if you turn on the Display ALL statements option.

Display ALL statements
Choose this option if you would like to see the entire source program. Otherwise, only source statements with activity, or statements adjacent to statements with activity are included.

Include assembler object code
Use this option to choose whether to show only the 80 byte source statement or to show the full assembly listing format (including offset, object code etc.)

Show statement count graphically

This option will cause a graph to be displayed on top of the source statements, indicating how much activity each active source statement has.

Show detailed information in heading

This option will cause detailed information about the source program to be displayed. This includes the load module, name of library it was loaded from, the CSECT, the source mapping file name, compiler name, and compile date and time.

Show C/C++ pseudo assembly

This option will cause pseudo-assembly for C/C++ programs to be displayed.

Display values as a percent

This option will cause the values for the source statement to be displayed as a percentage (instead of a count). This is only applicable when you are source mapping from a report which slows percentages.

Detail window

You can enter "++" (or the Enter key) on any line to display a pop-up window containing additional information.

A sample detail window for this report is shown here:

```
  File  View  Navigate  Help
+-------------------------------------------------------------------------+
|                                                                         |
|                                                                         |
| Source Statement Information                                            |
|           Perform until Char-Column > 80                                |
|   CSECT Name:          COB01                                            |
|   Offset:              000510                                           |
|   Object Code Size:    20 bytes                                         |
|   Activity Count:      8 times                                          |
|                                                                         |
| Module Information for COB01                                            |
|   Load Address      08B00B38 to 08B01FFF                                |
|   Module Size       5,320                                               |
|   Attributes        REUS,NORENT,APFLIB                                  |
|   Module Loation    JPA                                                 |
|   Loadlib DDNAME    STEPLIB                                             |
|   Load Library      BNPF.UTIL.LOADLIB                                   |
|                                                                         |
| ESD Information for COB01                                               |
|    External  Offset  Length  Start Addr  End Addr                       |
|    COB01  000000    4152   08B00B38   08B01B6F                          |
|    IGZEBST   001038    1168   09B01B70   08B01FFF                       |
|                                                                         |
+-------------------------------------------------------------------------+
```

P03 - USS Source Program Attribution

Overview

The P03 report is used for source mapping USS programs. It requires the programs to have debug files in the ELF/DWARF format associated with them.

This report maps measured CPU or Wait activity to its corresponding source program statements. Use the "P" line command, on an eligible line command field (see below), to launch this report. Source statements from a single compile unit are shown. A count or percent value is shown for the statement selected in which CPU activity was measured; the count value indicates the number of times execution of

the statement was observed. A percent value shows the percent as calculated on the report. Optionally, depending on a SETUP option, the counts are also shown graphically.

Eligible line commands

The P03 report can be launched with a "P" line command from one of the following:

- A USS Source Line in the P04: USS Source Lines report
- An object code address report line in the C03 report
- An attribution offset line in the W03 report

A sample report is shown here.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
P03: USS Source Program Attribution (0539/JVMTST01)          Row 00028 of 00047
Command ===> ____________________________________________ Scroll ===> PAGE

LineNo Count Source Statement

000028                          l = i + m;
000029        /*                printf(" a[I]=%d a[L]=%d

000030                          c++;
000031  120                     if (a[i-1] <= a[l-1]) {
000032                              i = 0;
000033                          } else {
000034                              t = a[i-1];
000035                              a[i-1] = a[l-1];
000036                              a[l-1] = t;
000037                              i = i - m;
000038                              s++;
000039                          }
000040                      }
000041                      j += 1;
000042                  }
000043                  m = m >> 1;
000044              }
000045              printf(" iterations=%d swaps=%d
000046        }
```

Detail line descriptions

Table 15. Detail Line Descriptions

Under Heading	This is Displayed
LineNo	This field displays a 6 digit sequence number corresponding to the source statement line position.
Count	The number of times execution was observed at the statement is shown here. The maximum value is 9999. Values exceeding 9999 are shown as 9999+.
Prcnt	If the percent option has been selected in the SETUP for source mapping, the values for the statement are displayed as a percentage. This percentage is the same as percent shown on the report for that line item. The ++ detail popup shows the calculation used to arrive at the percent.

Table 15. Detail Line Descriptions (continued)

Under Heading	This is Displayed
Source Statement	The source program statement is shown here.

Header information

A SETUP option can be selected to display information about the mapped program in the heading section of each page.

Table 16. Mapped Program Header Information

Under Heading	This is Displayed
Debug file	This is the absolute path name of the DWARF debug file that was generated by the compiler for the selected CSECT (Control Section).
Debug file date	This is the current file modification date and time of the DWARF debug file.
Compile date	This is the date and time that the CSECT was compiled, as recorded in the executable program. If the current file modification date and time of the debug file differs from the compile date and time by more than 1 minute, a warning is displayed.
Source file name	This is the absolute path name of the source file that contains the requested source statement line.
Source file date	This is the current file modification date and time of the source file.
Source compile date	This is the date and time that the source file was compiled, as recorded in the DWARF debug file. If the current file modification date and time of the source file is not the same as the compile date and time, a warning is displayed.

SETUP options

The following SETUP options can be selected with the SETUP primary command:

Show statement count graphically

This option will cause a graph to be displayed on top of the source statements, indicating how much activity each active source statement has.

Show detailed information in heading

This option will show the following additional header fields: Debug file, Debug file date, Compile date, Source file name, Source file date, and Source compile date.

Display values as a percent

This option will cause the values for the source statement to be displayed as a percentage (instead of a count). Not applicable to all reports.

P04 - USS Source Lines

Overview

The P04 report is used for mapping source lines in USS programs. It requires the programs to have debug files in the ELF/DWARF format associated with them.

This report maps measured CPU or Wait activity to specific source lines within a CSECT. Use the “P” line command, on an eligible line command field, to launch this report. Source statements from a single compile unit are shown. A percent value is shown for source statements in which CPU activity was measured. A "P" command can be entered on the LineNo field to see the source for that line.

A sample report is shown here.

```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
P04: USS Source Lines (0539/JVMTST01)                        Row 00001 of 00017
Command ===> ____________________________________________________ Scroll ===> CSR


Debug file name        /u/aif04/xcs5d.dbg
Debug file date        2007-11-12 15:13:11
Compile date           2007-11-12 15:13:10


LineNo  FileNo         Percent of CPU Time * 10.00% ±3.2%
                            *....1....2....3....4....5....6....7....8....9....*

000031       1       12.77=======
000027       1        6.60 ====
000035       1        4.89 ==
000034       1        4.57 ==
000028       1        4.36 ==
000036       1        4.36 ==
000040       1        3.19 ==
000025       1        2.55 =
000030       1        2.44 =
000033       1        2.44 =
000041       1        2.34 =
000038       1        2.02 =
000037       1        1.91 =
000039       1        1.70 =
000032       1        1.38 =
000026       1        0.63
000042       1        0.53
```

Detail line descriptions

Table 17. USS Source Detail Line Descriptions

Under Heading	This is Displayed
LineNo	This field displays a 6 digit sequence number corresponding to the source statement line number.
Fileno	This field contains the file number for the source module within the CSECT (Control Section).
Percent of CPU Time	Displays the percent of CPU active samples on this line number out of the total number of CPU active samples taken.

Header information

Table 18. USS Source Header Information

Under Heading	This is Displayed
Debug file	This is the absolute path name of the DWARF debug file that was generated by the compiler for the selected CSECT (Control Section).
Debug file date	This is the current file modification date and time of the DWARF debug file.
Compile date	This is the date and time that the CSECT was compiled, as recorded in the executable program. If the current file modification date and time of the debug file differs from the compile date and time by more than 1 minute, a warning is displayed.

Line commands

The line commands available in this report, and the objects and headings to which they apply, are summarized below. (You can enter a "/" on any input field to popup a menu of line commands available for that field.)

on objects

Cmd	When Applied To Object	Action
?	LineNo	Display context help information.
++	LineNo	Show additional details.
P	LineNo	Display source program mapping.

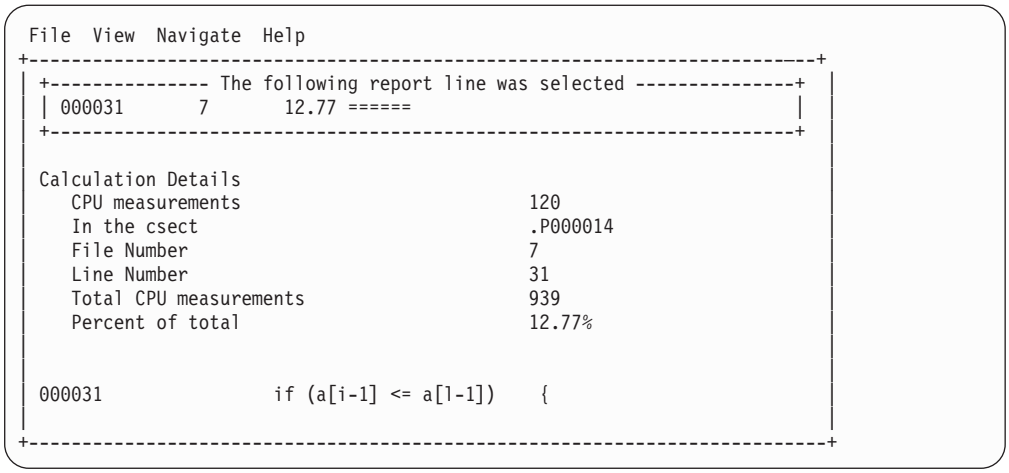
on headings

Cmd	When Applied To Heading	Action
?	LineNo	Display context help information.
SV	LineNo	Sort next level by value.

Detail window

You can enter "++" (or the Enter key) on any line to display a popup window containing additional information.

A sample detail window for this report is shown here:


File View Navigate Help
The following report line was selected
000031 7 12.77 ======
Calculation Details
CPU measurements 120
In the csect .P000014
File Number 7
Line Number 31
Total CPU measurements 939
Percent of total 12.77%
000031 if (a[i-1] <= a[l-1]) {

Chapter 11. Printing reports and creating XML documents

This section explains how to produce Application Performance Analyzer performance analysis reports suitable for printing, or in XML document format suitable for further processing. You generate a printable report or an XML document, in batch, by submitting JCL. In most situations, you can use Application Performance Analyzer's ISPF-based report request facility which will generate and submit the JCL for you. This facility is discussed in the first two sections of this chapter. The remaining sections explain the JCL and control statements; these sections are of interest only if you intend to prepare the JCL and control statements manually.

For information about ...	See ...
The available options, and overall capabilities of the report printing facility	"About Application Performance Analyzer's report printing and XML document feature"
Using Application Performance Analyzer's ISPF-based report request facility	"Using the ISPF report request facility" on page 592
How to prepare JCL to produce reports	"Preparing JCL to print reports or create XML documents" on page 596
Control statements to specify report options	"Specifying control statements" on page 599
Producing, viewing and printing high-quality reports in PDF format	"Reports in PDF format" on page 602
Processing and transferring report data contained in XML document files	"Reports in XML document format" on page 602
The sections that you can include in a performance analysis report and how to specify them in SECTION control statements	"Report SECTION descriptions" on page 603

About Application Performance Analyzer's report printing and XML document feature

Most of the Application Performance Analyzer's interactive performance analysis reports are available in format suitable for printing or in XML document format suitable for further processing. Application Performance Analyzer allows you to generate reports and XML documents by submitting JCL that executes the program `CAZPRINT`. You can use Application Performance Analyzer's ISPF-based report request facility to build the necessary JCL and `CAZPRINT` control statements. Alternatively, you can manually prepare and submit your own JCL. `CAZPRINT` can produce report output in three different formats:

Line printer
The traditional FBA 121 character-per-line SYSOUT format.

PDF Adobe Portable Document Format.

XML Extensible Markup Language document format.

Line printer format

You would typically route line printer format as a JES SYSOUT file. You produce this by specifying a `PRINT` control statement. You specify a DD name in the `PRINT`

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statement and supply a DD statement for that name. This is the most direct (and convenient) way of producing report output, but formatting is constrained by inherent line printer device limitations.

PDF format

PDF is the preferable format because it offers high quality printed output as well as advanced viewing capabilities. You produce a PDF file by specifying a `CONVERT` control statement. You specify a DD name in the `CONVERT` statement and supply a DD statement for that name which defines the output file. You then need to transfer the file to a PC platform on which you can view and print the report.

XML document format

When you wish to further process the report data, you can produce an XML document file. You produce an XML document file by specifying a `CONVERT` control statement. You specify a DD name in the `CONVERT` statement and supply a DD statement for that name which defines the XML document file. You may browse, edit or further process the XML document on the mainframe, or transfer it to another platform. XML documents are produced in the English language only.

Report sections

A single performance analysis report is comprised of a number of report Sections. A report section typically has a counterpart report in the ISPF reporting environment. For example, *C01: CPU Analysis by Category* is implemented as a single report in the ISPF environment and can be included as one section of a printed report. The same 3- character identifiers used to denote ISPF reports are used to denote report sections. You specify that a report section is to be included by supplying a SECTION control statement.

Using the ISPF report request facility

To request a batch performance analysis report or XML document using Application Performance Analyzer's ISPF facility, select an observation session item in the usual way – enter the "R" line command on the observation session list screen. Then, from the report selection menu, select A02.

A screen will then be displayed listing the available report sections that you can select to be included in the report or XML document.

An example of the A02 dialog is shown here.

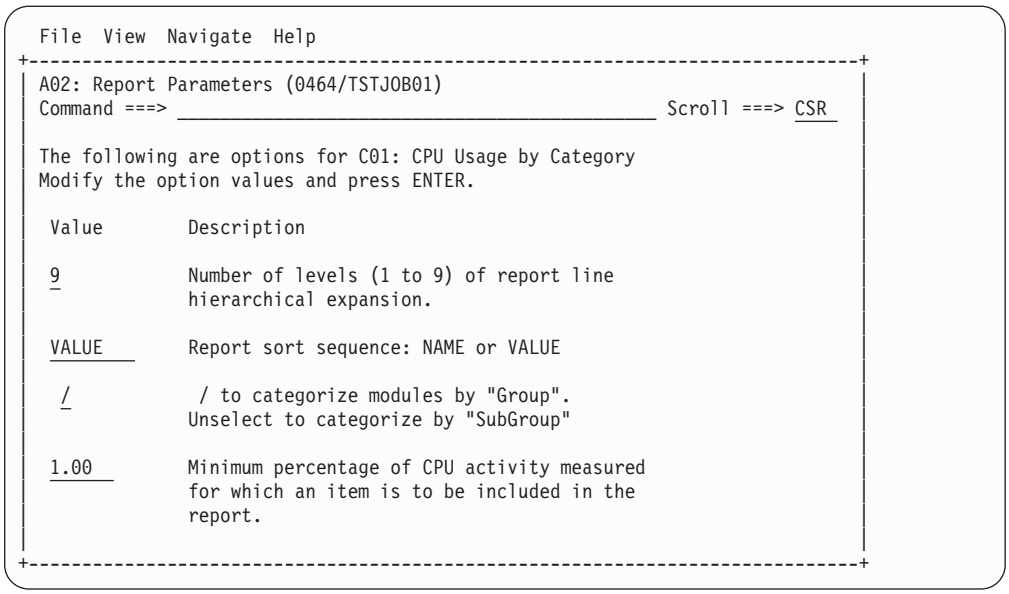
```
  File  View  Navigate  Help
-------------------------------------------------------------------------------
A02: Request Printed Reports (0464/TSTJOB01)                 Row 00001 of 00030
Command ===> _____________________________________________ Scroll ===> CSR

Enter / to include a section in the report or file, blank to exclude the section,
S to include the section and set formatting options. Use UP/DOWN (PF7/PF8)
to scroll the list of report sections. After entering your selections,
press ENTER to generate the report JCL.

    Select   Report Section

      /      S01 Session Statistics
      /      S02 Load Module Attributes
      /      S03 Load Module Summary
      /      S04 TCB Summary
      /      S05 Memory Usage Timeline
      /      S06 Data Space Usage Timeline
      /      S07 TCB Execution Summary

      /      C01 CPU Usage by Category
      /      C02 CPU Usage by Module
      /      C03 CPU Usage by Code Slice
      /      C04 CPU Usage Timeline
```

You simply make your selections, press ENTER, and Application Performance Analyzer will build and submit the JCL. The selectable report sections—as illustrated above—include only those applicable to the selected measurement file. DB2 report sections, for example, will not appear as available selections if no DB2 data exists in the measurement file. By default, all the applicable reports are selected. However, if you prefer to have the previous selections "remembered", you can request this using the SETUP primary command while you are in this panel.

Specifying formatting options

You can modify the format of some report sections by specifying formatting options. To do so, select the report section with the "S" line command instead of a slash (/) character. A pop-up window will appear in which you can modify the current option values.

If you enter more than one "S" line command, the formatting option pop-up window for only the first one encountered will appear; you should enter "S" line commands one at a time. The following illustrates the formatting options pop-up window, which will appear if you enter the "S" line command on the C01: CPU Usage by Category report section.



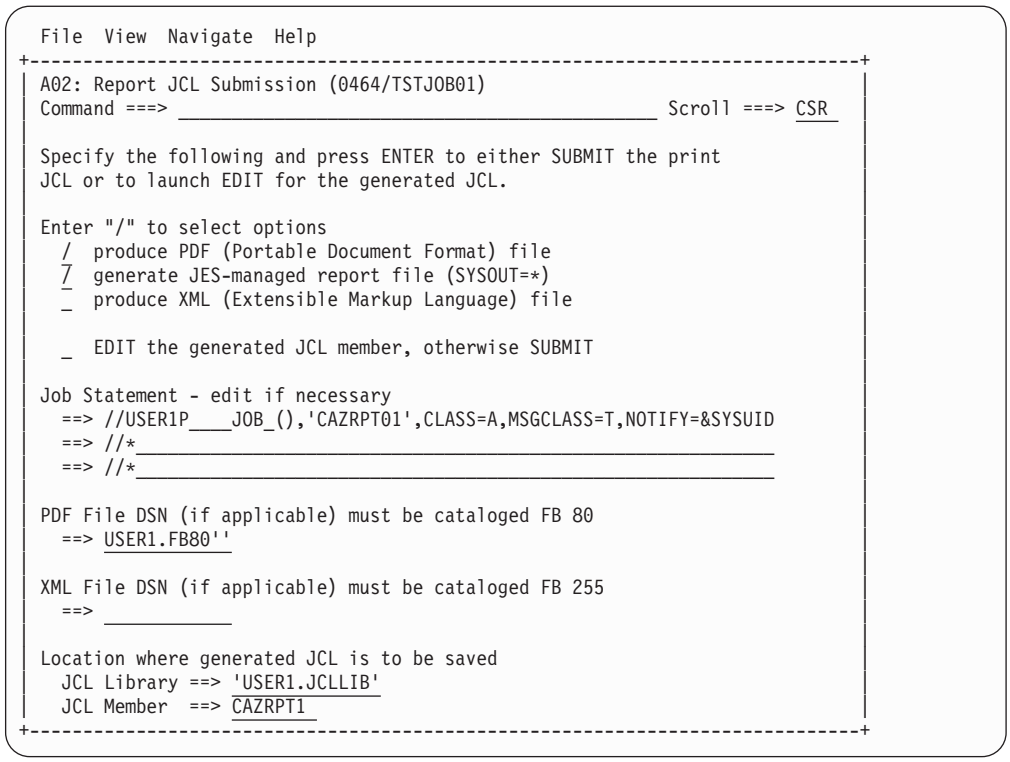
Modify the values and press the ENTER key and you will be returned to the report section selection dialog.

Application Performance Analyzer will “remember” the option values you specify. These will become your new default values and will be used for future printed report requests.

The JCL submission/EDIT dialog

Pressing ENTER to the report section selection dialog will take you to the JCL submission dialog – if you did not modify any input fields prior to pressing ENTER. The report section selection dialog will continue to display until you have pressed ENTER without having modified any input fields.

The JCL submission dialog is illustrated below. Pressing the ENTER key will cause the generated JCL to be submitted directly, or will launch EDIT for the generated JCL member. This dialog is illustrated here.



Input to the JCL submission/EDIT dialog

Produce PDF file

Enter a slash (/) to select this option or a space to deselect it. CAZPRINT will write a file in downloadable PDF (Portable Document Format) file.

Generate JES-managed report file

Enter a slash (/) to select this option or a space to deselect it. CAZPRINT will write a standard SYSOUT format report file.

Produce XML file

Enter a slash (/) to select this option or a space to deselect it. CAZPRINT will write a file in XML (Extensible Markup Language) document format. This option cannot be selected when either the PDF file or the JES-managed report file options are selected.

EDIT the generated JCL

Enter a slash (/) if you want EDIT to be launched for the generated JCL member when you press the ENTER key. Blank in this field will cause the JCL to be SUBMITted immediately when you press the ENTER key.

Job Statement

The generated JOB statement is shown in three lines. You can modify the statement to suit your preferences or to comply with your installation. Be aware, however, that no validation is done on your input; an input error can cause a JCL error when the job is submitted.

PDF File DSN

If you have specified that a PDF file is to be written, you must specify the DSN of the file in this field. The file must be a sequential dataset with fixed length 80 byte records. If the file is not pre-allocated and cataloged, Application Performance Analyzer allocates and catalogs it.

XML File DSN
If you have specified that an XML document file is to be written, you must specify the DSN of the file in this field. The file must be a sequential dataset with fixed length 255 byte records. If the file is not pre-allocated and cataloged, Application Performance Analyzer allocates and catalogs it.

JCL Library
Enter the DSN of a JCL library. This a partitioned data set in which the generated JCL member will be stored before it is submitted (or EDITed).

JCL Member
Enter the name of the JCL member here.

Source program mapping

The report section selection dialog displays one selectable line for the P01 Source Program Attribution report section for each applicable program. However, you must first load the source mapping data. For details on loading source mapping data, refer to Chapter 10, "Source program mapping," on page 569. Each P01 selection line displays the name of the source mapped program.

```
  File  View  Navigate  Help
--------------------------------------------------------------------------------
A02: Request Printed Reports (0464/TSTJOB01)                 Row 00031 of 00035
Command ===> _____________________________________________ Scroll ===> CSR

Enter / to include a section in the report, blank to exclude the section,
S to include the section and set formatting options. Use UP/DOWN (PF7/PF8)
to scroll the list of report sections. After entering your selection,
press ENTER to generate the report JCL.

    Select   Report Section

      /      P01 Source Program Attribution for SAMPFINQ
      7      P01 Source Program Attribution for PFSAMPA
      7      P01 Source Program Attribution for PFSAMPB
      7      P01 Source Program Attribution for PFSAMPC
```

Preparing JCL to print reports or create XML documents

You have the option of manually preparing and submitting your own report JCL. The ISPF report request facility will meet most requirements, but by preparing your own JCL and control statements you can use the full formatting flexibility of the CAZPRINT program.

The following CAZPRINT capabilities that are not available directly by using the ISPF report request facility are available if you prepare your own JCL and control statements:

- Include multiple instances of the same report section in a single report. For example, you can include two instances of C01: CPU Usage by Category in your report. Having multiple instances allows you to sort reports using more than one category. For example, one can be sorted by VALUE (most intense CPU activity at the top) and another sorted by program NAME.
- Include report sections from different measurement files in a single report.
- Customize the sequence in which report sections appear in the report.

The following illustrates an example of JCL and control statements to produce a performance analysis report:

```
//CAZRPT01 JOB (job parameters)
//*
//STEP1    EXEC PGM=CAZPRINT
//STEPLIB  DD   DISP=SHR,DSN=hlq.SCAZAUTH
//SFILE01  DD   DISP=SHR,DSN=measurement.file.name
//CAZLOG   DD   SYSOUT=*
//PRINT1   DD   SYSOUT=*
//PDFFILE  DD   DISP=SHR,DSN=any.file
//*
//*  Instream control statements.
//*
//CAZCTL   DD   *
*
 PROFILE 01 Input=SFILE01
*
   SECTION S01 Profile=01
   SECTION S02 Profile=01
   SECTION S03 Profile=01
   SECTION S04 Profile=01
   SECTION S05 Profile=01
   SECTION S06 Profile=01
   SECTION S07 Profile=01
*
   SECTION C01 Profile=01
   SECTION C02 Profile=01
   SECTION C03 Profile=01
   SECTION C04 Profile=01
   SECTION C05 Profile=01
*
   SECTION W01 Profile=01
*
   SECTION D01 Profile=01
   SECTION D02 Profile=01
   SECTION D03 Profile=01
   SECTION D04 Profile=01
*
 CONVERT Format=PDF DDNAME=PDFFILE
 PRINT DDNAME=PRINT1
*
/*
```

The above illustrates JCL and control statements that produce output in both line printer format and in PDF format. A brief explanation of the JCL statements is presented below. Detailed descriptions of each of the DD statements are then presented later in this section. For detailed descriptions of the control statements (ddname CAZCTL) see, "Specifying control statements" on page 599.

STEPLIB
: The load library containing Application Performance Analyzer components. This can be omitted if Application Performance Analyzer is installed in a linklist library.

SFILE01
: The measurement file.

CAZLOG
: Output file for error and informational message.

PRINT1
: Output file for the line printer report.

PDFFILE
: Output file for the PDF report.

CAZCTL
: Control statements.

The input measurement file

You must provide a DD statement for the file (the "sample file") containing the Application Performance Analyzer measurement data. You can choose any DD name for this file; the DD name is referred to in a PROFILE control statement. The DSN of the measurement file can be determined by displaying the ISPF report S01: Session Statistics or by entering the "++" line command to the item in the Observation Session List ISPF dialog.

Multiple measurement files

Typically you will produce a report to analyze data from a single measurement file. Application Performance Analyzer also allows you to produce multiple reports in a single job step. You can even include report sections from separate measurement files in a single report. In either event, you need to specify a separate DD statement and a separate PROFILE control statement for each measurement file.

The CAZLOG log file

You must supply a DD statement for DD name CAZLOG. Application Performance Analyzer reports any errors or informational messages to this file. Typically, you will route this as a JES file.

The report output file

If you include a PRINT control statement to produce a line printer format report, you must also supply a DD statement for this output. Typically you will specify a JES output file. If you prefer to write this to a permanent file, specify a FB or FBA file with LRECL=121. If your job step is to produce multiple line printer reports, you must supply a DD statement (and a corresponding PRINT statement) for each one.

The PDF output file

If you include a CONVERT control statement to produce a report in PDF format, you must also supply a DD statement for this file. This must be a FB, LRECL=80 file. If your job step is to produce multiple PDF reports, you must supply a DD statement (and a corresponding CONVERT statement) for each report.

Downloading and viewing a PDF file

In order to view or print a PDF file you must perform a file transfer operation to download the file to a PC. When downloading (using IND$FILE or FTP) be sure to download in binary. Do not specify ASCII translation or CRLF. Once you have download the file you can use any version of the Adobe PDF Viewer (Acrobat) program capable of displaying PDF version 1.3.

The XML document file

If you include a CONVERT control statement to produce a report in XML document format, you must also supply a DD statement for this file. This must be a FB, LRECL=255 file.

If your job step is to produce multiple XML document files, you must supply a DD statement (and corresponding CONVERT statement) for each document file.

Application Performance Analyzer creates a version 1.0 self-contained XML document using EBCDIC encoding (ebcdic-cp-us/Cp037). See Appendix C, "XML document layout," on page 741 for a complete description of the XML document.

Processing and transferring an XML document file

The XML document file containing the report data can be browsed or edited on the mainframe, or transferred to another platform for further processing. When transferring to another platform, appropriate character set translation may be required; including carriage return and line feed characters.

Specifying control statements

The CAZCTL DD statement specifies a file containing a sequence of control statements. These control statements can be included as instream data or the DD statement can allocate a SYSIN-type member. The DD statement and the control statements are mandatory.

General syntax rules

The syntax rules for control records are as follows:

- An asterisk (*) in column 1 indicates a comment record.
- Double slashes (//) and any characters to the right are ignored. This can be used to include comment text to the right of the statement text.
- Data in columns 73 to 80 is ignored.
- A statement consists of a verb followed by positional and keyword parameters. The allowable verbs are: `PROFILE`, `SECTION`, `MAP`, `CONVERT`, `PRINT`. If there are positional parameters, they must be coded before any keyword parameters.
- The verb and the positional and keyword parameters must be separated from each other by a comma and/or at least one space.
- A value containing embedded spaces must be enclosed in quotes.
- A statement can span multiple records, but a single parameter expression must be on a single record.
- Unless otherwise noted, commands are not case sensitive.

The PROFILE statement

The PROFILE statement specifies a measurement file. The format of the PROFILE statement is shown here:

```
PROFILE nn INPUT=ddn|INPUTDSN=dsn
```

The PROFILE statement requires two parameters. The first mandatory parameter is positional and specifies a numeric value from 01 to 99. This effectively labels the PROFILE statement. There is a special case where multiple PROFILE statements with the same numeric label are specified. This is for Variance reporting and is described below.

In most cases, you will only specify one PROFILE statement and this value will be 01. Specify multiple PROFILE statements if you want to report on input from more than one measurement file in a single CAZPRINT step (or print a Variance report as described below). When you specify more than one PROFILE statement, each must specify a unique value in this parameter.

You must also code either the INPUT or INPUTDSN keyword parameter. The INPUT keyword parameter specifies the DD name of the input measurement file. There must be a corresponding DD statement in the JCL. The INPUTDSN keyword parameter specifies the dataset name of the input measurement file. In this case, it is not necessary to include a corresponding DD statement in the JCL.

TYPE keyword for Variance report

To print a Variance report, you need to specify the Tagged measurement files as well as the base measurement file to which they are to be compared. In this case, additional PROFILE statements with the same numeric label are coded, and a TYPE=TAGGED keyword is added. Up to 20 PROFILE statements with TYPE=TAGGED are permitted. An example of two PROFILE statements for Variance reporting is shown below:

```
PROFILE 01 INPUT=SFILE02 TYPE=TAGGED
PROFILE 01 INPUT=SFILE01
```

There must be corresponding DDNAMEs for the two PROFILE INPUT keywords.

The MAP statement

The MAP statement specifies source program mapping information. This statement is required if you want the report to include mapping of addresses to application source statements.

An example of a MAP statement is shown here:

```
MAP TYPE=L FILE=TEST1.PGM.LISTINGS MEMBER=COBTEST1 PROFILE=01
```

MAP statements are optional and must be placed after their corresponding PROFILE statement(s) and before PRINT or CONVERT statements. Each MAP statement specifies a file that contains information enabling Application Performance Analyzer to map sampled addresses to source program statements.

MAP statement parameters

TYPE This keyword parameter is mandatory and specifies the type of source mapping input data. You must specify one of the following values:

- **L** To specify that the input file is a compiler listing.
- **S** To specify that the input file is a LANGX SideFile.
- **A** To specify that the input file is an assembler ADATA file.
- **D** To specify that the input file is a SYSDEBUG file.

FILE This keyword parameter is mandatory and specifies the data set name of the file containing source mapping information.

MEMBER
This keyword parameter is optional and specifies the member name of the file. You must include the MEMBER parameter if the FILE parameter specifies a partitioned data set.

PROFILE
This keyword parameter is optional. Specify the profile number here – a numeric value between 01 and 99. The value must match a value specified in the first parameter of a PROFILE statement. If omitted, a value of 01 is assumed.

The SECTION statement

The SECTION statement specifies a section to be included in the report. At least one SECTION statement is required. SECTION statements must be placed after their corresponding PROFILE statement(s) and before PRINT or CONVERT statements. An example of a SECTION statement is shown here:

```
SECTION C01 PROFILE=01 Levels=9 Minimum=2.5 MLD=Y
```

The above example specifies that the C01 section (CPU Analysis by Category) be included in the report. PROFILE=01 refers to the PROFILE statement that specifies the measurement file from which the report section is to be produced.

Each SECTION statement can specify common parameters (those that apply to all report sections) and section-specific parameters (those that apply to specific section types). The common parameters are described here. Descriptions of the section-specific parameters are presented in "Report SECTION descriptions" on page 603.

SECTION statement common parameters

Section code
This is the first (and only) positional parameter and is mandatory. It specifies a code identifying the type of report section. It is always 3 characters in length. The first character is alphabetic and the second and third characters are numeric.

PROFILE
This keyword parameter is optional. Specify the profile number here – a numeric value between 01 and 99. The value must match a value specified in the first parameter of a PROFILE statement. If omitted, a value of 01 is assumed. By referring to a PROFILE statement, this parameter specifies the measurement file from which the report section is to be built.

The PRINT statement

The PRINT statement tells CAZPRINT to write the report in conventional line printer format – a sequential file with ANSI carriage control characters. The report will contain each of the sections specified in SECTION statements. The sections are arranged in the report in the same sequence in which the SECTION statements appeared.

An example of a PRINT statement is shown here:

```
PRINT DDNAME=PRINT1 MLD=N
```

PRINT statement parameters

DDNAME
The DDNAME keyword parameter is mandatory. This specifies the DD name for the report output. A corresponding DD statement must be provided in the JCL.

LANG
The LANG keyword parameter is optional. If omitted it defaults to ENU to indicate the reports are to be created in the English language. Other acceptable values are JPN for Japanese and KOR for Korean.

MLD The MLD keyword parameter is optional, if omitted it defaults to Y. This specifies whether or not Multi-Line Descriptions should be printed (Y=Yes, N=No). This is similar to the PREF option in Application Performance Analyzer ISPF: "Show long descriptions on multiple lines," and when generating JCL with Application Performance Analyzer ISPF , the PREF setting will be used to set MLD.

The CONVERT statement

A CONVERT statement can be specified instead of or in addition to a PRINT statement. Like PRINT, CONVERT tells CAZPRINT to write the report and specifies the output destination. Instead of writing the report in conventional line

printer format, the CONVERT statement creates a report file in an alternate format; either PDF or XML. When XML is specified, a PRINT statement cannot be included in the job step. You cannot include a CONVERT statement for PDF and a CONVERT statement for XML in the same job step.

Two examples of CONVERT statements are shown here.

```
CONVERT DDNAME=PDF1 FORMAT=PDF MLD=N
CONVERT DDNAME=XML1 FORMAT=XML LANG=ENU MLD=N
```

CONVERT statement parameters

DDNAME
This mandatory parameter specifies the DD name of a file to which the converted report is to be written. A corresponding DD statement must be included in the JCL. When requesting a PDF, the file must be sequential, in FB format with 80 byte records. When requesting an XML document, the file must be sequential, in FB format with 255 byte records.

FORMAT
This mandatory parameter specifies the format to which the report is to be converted. It must specify PDF or XML.

LANG
The LANG keyword parameter is optional. If omitted it defaults to ENU to indicate the reports are to be created in the English language. Other acceptable values for PDF files are JPN for Japanese and KOR for Korean. ENU is the only acceptable value for XML documents.

MLD The MLD keyword parameter is optional, if omitted it defaults to Y. This specifies whether or not multi-line descriptions should be printed (Y=Yes, N=No). This is similar to the PREF option in Application Performance Analyzer ISPF: "Show long descriptions on multiple lines," and when generating JCL with Application Performance Analyzer ISPF, the PREF setting will be used to set MLD.

Reports in PDF format

Application Performance Analyzer can produce a report in the form of a PDF (Portable Document Format) file. On the mainframe, this is written to a sequential file with fixed-length 80 byte records. To view or print the file you will need to download it to a PC using either IND$FILE file transfer or FTP. No data conversion is required, so be sure to specify a binary file transfer. The content in an Application Performance Analyzer PDF report is essentially the same as a corresponding SYSOUT report. However, PDF's advanced formatting capabilities make this format more readable than a SYSOUT report.

Reports in XML document format

Application Performance Analyzer can produce an XML (Extensible Markup Language) document file containing the selected report information in the English language only. On the mainframe, this is written to a sequential file with fixed-length 255 byte records. It is encoded in EDBCIC (ebcdic-cp-us/Cp037) and may be viewed, edited, or processed on the mainframe. If the XML document file is required on another platform, it may need character set translation, including carriage return and line feed characters. After the document file has been transferred to the target platform, ensure that the encoding attribute on the XML declaration is changed to the appropriate value. For example, when downloading the file to a Windows platform, using IND$FILE file transfer, the ASCII and CRLF

parameters must be specified. After the file transfer is complete, the encoding attribute on the XML declaration must be changed to UTF-8 in the Windows document file.

The XML file is a stand-alone document and has been declared as such. For the most part, the XML elements and tags can be related to their corresponding report fields by the element names and structure. For a complete description of the XML document, see Appendix C, "XML document layout," on page 741.

Report SECTION descriptions

This section describes the report sections that you can include in a performance analysis report and the parameters that can be specified on the corresponding SECTION statements.

SECTION statement parameter summary

Each section requires a SECTION statement. SECTION statements for some report sections accept (or require) certain keyword parameters that allow you to set formatting options. The following table summarizes the available report sections, their parameters, and their default values. The Sequence parameter accepts different values, depending on the report section. For each report section, the acceptable values are listed, with the default value listed first.

These defaults only apply until you change them by selecting the report in A02: Request Printed Reports, after that Application Performance Analyzer will "remember" your selections.

Report section	Section ID	Parameters and default values
Measurement Profile	S01	

Load Module Attributes	S02	`Sequence=NAME/ADDRESS/`
		`SIZE/LIBRARY`
		`OmitESD=N`
		`OmitNUC=N`
		`OmitPLPA=N`
		`Omitdup=N`

Load Module Summary	S03	`Sequence=NAME/ADDRESS/` `SIZE/LIBRARY`
TCB Summary	S04	
Memory Usage Timeline	S05	`Intervals=45`
Data Space Usage Timeline	S06	`Intervals=45`
TCB Execution Summary	S07	
Processor Utilization Summary	S08	
Measurement Analysis	S09	

CPU Usage by Category	C01	`Levels=9`
		`Sequence=VALUE/NAME`
		`DPAGroup=Y`
		`ShowDB2=Y`
		`Minimum=0.00`
		`MLD=Y`
		`Datamg=Y`
		`ShowIMS=Y`
		`ADABAS=Y`

Report section	Section ID	Parameters and default values
CPU Usage by Module	C02	Levels=9 Sequence=VALUE/NAME Minimum=0.00 MLD=Y
CPU Usage by Code Slice	C03	Levels=9 Sequence=VALUE/ ADDRESS/LOCATION SliceSize=64 Minimum=0.00
CPU Usage Timeline	C04	Intervals=45
CPU Usage Task/Category	C05	Levels=9 Sequence=VALUE/NAME DPAGroup=Y ShowDB2=Y ShowInact=Y MLD=Y Datamg=Y ShowIMS=Y ADABAS=Y
CPU Usage Task/Module	C06	Levels=9 Sequence=VALUE/NAME ShowInact=Y MLD=Y
CPU Usage by Procedure	C07	Sequence=VALUE/NAME OmitCPU=N
CPU Usage Referred Attribution	C08	Levels=9 Sequence=VALUE/NAME MLD=Y
CPU Usage by PSW/ObjCode	C09	Levels=2 Sequence=VALUE/ADDRESS
CPU Usage by Natural Program	C10	Levels=9 Sequence=VALUE/NAME
DASD Usage by Device	D01	Levels=9 Sequence=VALUE/NAME Minimum=0.00
DASD Usage by DDNAME	D02	Levels=9 Sequence=VALUE/NAME Minimum=0.00
DASD Usage by Dataset	D03	Levels=9 Sequence=VALUE/NAME Minimum=0.00
Dataset Attributes	D04	Sequence=FILE/DSN
DASD EXCP Summary	D05	Sequence=VALUE/NAME OmitEXCP=N
DASD VSAM Statistics	D06	Sequence=VALUE/NAME OmitEXCP=N
DASD Activity Timeline	D07	Sequence=VALUE/NAME OmitEXCP=N
DASD I/O Wait Time	D08	Levels=9 Sequence=VALUE/NAME MLD=Y
VSAM Buffer Pool Usage	D09	

Report section	Section ID	Parameters and default values
Wait Time by Task/Category	W01	Levels=9 Sequence=VALUE/NAME DPAGroup=Y ShowDB2=Y ShowInact=Y MLD=Y Datamg=Y ShowIMS=Y ADABAS=Y
Wait Time by Task/Module	W02	Levels=9 Sequence=VALUE/NAME ShowInact=Y MLD=Y
Wait Time Referred Attribution	W03	Levels=9 Sequence=VALUE/NAME ShowInact=Y MLD=Y
Wait Time by Task ENQ/RESERVE	W04	Levels=9 Sequence=VALUE/NAME MLD=Y
Wait Time by Tape DDNAME	W05	Sequence=VALUE/NAME
IMS Measurement Profile	I01	
IMS DL/I Call Timeline	I02	
IMS Transaction Timeline	I03	Levels=9
IMS Txn Activity Timeline	I04	Sequence=VALUE/NAME
IMS CPU Usage by PSB	I05	Levels=9 Sequence=VALUE/NAME MLD=Y
IMS CPU Usage by Transaction	I06	Levels=9 Sequence=VALUE/NAME MLD=Y
IMS CPU Usage by DL/I Call	I07	Levels=9 Sequence=VALUE/NAME MLD=Y
IMS WAIT Time by PSB	I08	Levels=9 Sequence=VALUE/NAME MLD=Y
IMS WAIT Time by Transaction	I09	Levels=9 Sequence=VALUE/NAME MLD=Y
IMS WAIT Time by DL/I Call	I10	Levels=9 Sequence=VALUE/NAME MLD=Y
IMS DL/I Activity by PSB	I11	Levels=9 Sequence=VALUE/NAME MLD=Y
IMS DL/I Activity by Txn	I12	Levels=9 Sequence=VALUE/NAME MLD=Y
IMS DL/I Activity by DL/I Call	I13	Levels=9 Sequence=VALUE/NAME MLD=Y
IMS PSB/PCB Attributes	I14	

Report section	Section ID	Parameters and default values
IMS DL/I Call Attributes	I15	
IMS Transaction Service Times	I16	
IMS Transaction DL/I Counts	I17	`Levels=9`
IMS CPU/Svc Time by DL/I Call	I18	`Sequence=VALUE/NAME`
IMS CPU/Svc Time by PSB	I19	`Sequence=VALUE/NAME`
IMS CPU/Svc Time by Txn	I20	`Sequence=VALUE/NAME`
IMS CPU/Svc Time by PCB	I21	`Sequence=VALUE/NAME`
CICS Session Statistics	E01	
CICS CPU and Use Counts by Pgm	E02	`Sequence=VALUE/NAME/COUNT`

CICS CPU Usage by Txn	E03	`Levels=9`
		`Sequence=VALUE/NAME`
		`Minimum=0.00`
		`MLD=Y`

CICS Mean Service Time by Txn	E04	`Levels=9`
		`Sequence=VALUE/NAME`
		`MLD=Y`

CICS Total Service Time by Txn	E05	`Levels=9`
		`Sequence=VALUE/NAME`
		`MLD=Y`

CICS Service Time by Task ID	E06	`Levels=1`
		`Sequence=VALUE/NAME`
		`MLD=Y`

CICS WAIT by Txn	E07	`Levels=9`
		`Sequence=VALUE/NAME`
		`MLD=Y`

CICS Mean Service Time by Trm	E08	`Levels=9`
		`Sequence=VALUE/NAME`
		`MLD=Y`

CICS Total Service Time by Trm	E09	`Levels=9`
		`Sequence=VALUE/NAME`
		`MLD=Y`

CICS Mean Service Time by user ID	E10	`Levels=9`
		`Sequence=VALUE/NAME`
		`MLD=Y`

CICS Total Service Time by user ID	E11	`Levels=9`
		`Sequence=VALUE/NAME`
		`MLD=Y`

CICS CPU/Service Time by Txn	E12	`Levels=2` `Sequence=VALUE/NAME`

CICS Mean Service Time by Txn (for multiple CICS address spaces)	X01	`Levels=9`
		`Sequence=VALUE/NAME`
		`MLD=Y`

CICS Total Service Time by Txn (for multiple CICS address spaces)	X02	`Levels=9`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Report section	Section ID	Parameters and default values
CICS Mean Service Time by Term (for multiple CICS address spaces)	X03	Levels=9 Sequence=VALUE/NAME MLD=Y
CICS Total Service Time by Term (for multiple CICS address spaces)	X04	Levels=9 Sequence=VALUE/NAME MLD=Y
DB2 Measurement Profile	F01	
DB2 SQL Activity Timeline	F02	Levels=9 Sequence=THREAD/CPU/ DURATION
DB2 SQL Activity by DBRM	F03	Levels=9 Sequence=VALUE/NAME Minimum=0.00
DB2 SQL Activity by Statement	F04	Levels=9 Sequence=VALUE/NAME Minimum=0.00
DB2 SQL Activity by Plan	F05	Levels=9 Sequence=VALUE Minimum=0.00
DB2 SQL Statement Attributes	F06	
DB2 SQL Wait Time by DBRM	F07	Levels=9 Sequence=VALUE/NAME OfTotal=Y
DB2 SQL Wait Time by Statement	F08	Levels=9 Sequence=VALUE/NAME OfTotal=Y
DB2 SQL Wait Time by Plan	F09	Levels=9 Sequence=VALUE OfTotal=Y
DB2 SQL CPU/Svc Time by DBRM	F10	Levels=1 Sequence=VALUE/NAME/ DURATION stmtPct=N
DB2 SQL CPU/Svc Time by Stmt	F11	Levels=2 Sequence=VALUE/NAME/DURATION posSQL=Y negSQL=Y stmtSQL=N stmtPct=N
DB2 SQL CPU/Svc Time by Plan	F12	Levels=2 Sequence=VALUE/DURATION stmtPct=N
DB2 SQL Threads Analysis	F13	
DB2 CPU by Plan/Stored Proc	F14	Levels=9 Sequence=VALUE/NAME DPAGroup=Y ShowDB2=Y MLD=Y
DB2 SQL CPU/Svc Time by Rq Loc	F15	Levels=2 Sequence=VALUE/NAME/ DURATION stmtPct=N

Report section	Section ID	Parameters and default values
DB2 SQL CPU/Svc Time by Enclav	F16	Levels=2 Sequence=VALUE/NAME/ DURATION stmtPct=N
DB2 SQL CPU/Svc Time by Corrid	F17	Levels=2 Sequence=VALUE/NAME/ DURATION stmtPct=N
DB2 SQL CPU/Svc Time by Wkstn	F18	Levels=2 Sequence=VALUE/NAME/DURATION stmtPct=N
DB2 SQL CPU/Svc Time by EndUsr	F19	Levels=2 Sequence=VALUE/NAME/DURATION stmtPct=N
Coupling Facility Summary	G01	
Coupling Facility Mean Times	G02	Levels=9
Coupling Facility Total Times	G03	Levels=9
MQSeries Activity Summary	Q01	
MQSeries CPU Usage by Queue	Q02	Levels=9 Sequence=VALUE/NAME MLD=Y
MQSeries CPU Usage by Request	Q03	Levels=9 Sequence=VALUE/NAME MLD=Y
MQSeries CPU Usage by Txn	Q04	Levels=9 Sequence=VALUE/NAME MLD=Y
MQSeries Serv Time by Queue	Q05	Levels=9 Sequence=VALUE/NAME MLD=Y
MQSeries Serv Time by Request	Q06	Levels=9 Sequence=VALUE/NAME MLD=Y
MQSeries Serv Time by Txn	Q07	Levels=9 Sequence=VALUE/NAME MLD=Y
MQSeries Wait Time by Queue	Q08	Levels=9 Sequence=VALUE/NAME MLD=Y
MQSeries Wait Time by Request	Q09	Levels=9 Sequence=VALUE/NAME MLD=Y
MQSeries Wait Time by Txn	Q10	Levels=9 Sequence=VALUE/NAME MLD=Y
Source Program Attribution	P01	Program=pgmname (no default value) AdjLines=4 AllSource=N AsmObj=Y Header=Y Percent=N
Java Summary/Attributes	J01	

Report section	Section ID	Parameters and default values
Java Heap Usage Timeline	J02	`Intervals=15` `Totals=Y`
Java CPU Usage by Thread	J03	`Sequence=VALUE/NAME` `MLD=Y`

Java CPU Usage by Package	J04	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java CPU Usage by Class	J05	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java CPU Usage by Method	J06	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java CPU Usage by Call Path	J07	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java Svc Time by Package	J09	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java Svc Time by Class	J10	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java Svc Time by Method	J11	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java Svc Time by Call Path	J12	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java Wait Time by Package	J14	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java Wait Time by Class	J15	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java Wait Time by Method	J16	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

Java Wait Time by Call Path	J17	`Levels=2`
		`Sequence=VALUE/NAME`
		`MLD=Y`

HFS Service Time by Path Name	H01	`Sequence=VALUE/FILEID/PATHNAME`
		`Minimum=0.00`
		`MLD=Y`

HFS Service Time by Device	H02	`Levels=2`
		`Sequence=VALUE/DEVID/DEVICE`
		`Minimum=0.00`
		`MLD=Y`

HFS File Activity	H03	`Sequence=VALUE/FILEID/PATHNAME` `OmitEXCP=N`
HFS File Attributes	H04	
HFS Device Activity	H05	`Sequence=VALUE/DEVID/DEVICE` `OmitEXCP=N`
HFS Device Attributes	H06	

Report section	Section ID	Parameters and default values
HFS Activity Timeline	H07	`Sequence=VALUE/FILEID/PATHNAME` `OmitEXCP=N`

HFS Wait Time by Path Name	H08	`Sequence=VALUE/FILEID/PATHNAME`
		`Minimum=0.00`
		`MLD=Y`

HFS Wait Time by Device	H09	`Levels=2`
		`Sequence=VALUE/DEVID/DEVICE`
		`Minimum=0.00`
		`MLD=Y`

HFS Service Time by Request	H10	`Levels=2`
		`Sequence=VALUE/REQID/REQUEST`
		`Minimum=0.00`
		`MLD=Y`

HFS Wait Time by Request	H11	`Levels=2`
		`Sequence=VALUE/REQID/REQUEST`
		`Minimum=0.00`
		`MLD=Y`

Measurement Variance Summary	V01	
CICS Variance Summary	V02	
DB2 Variance Summary	V03	
IMS Variance Summary	V04	

SECTION parameter descriptions

The SECTION statement parameters are described in the following list. They are presented in alphabetical keyword sequence.

ADABAS This parameter applies to report sections that can attribute measured system activity to Adabas while it is processing Adabas calls. Specify Y to display measurements in routines that were processing Adabas calls in a separate ADABAS category.

AdjLines
Specifies the number of adjacent source lines. This applies to the reporting of source program lines and attribution of system activity to source statements. Source statements for which system activity is measured will be reported, but those statements for which no activity is measured are normally omitted. The value of this parameter specifies the number of source lines immediately preceding and following any line with measured activity that are also to be included in the report. This helps provide some context for isolated source lines with measured activity.

AllSource
This applies to the reporting of source program lines. A value of Y specifies that all source lines are to be shown in the report, including those for which no system activity is attributed. A value of Y in this parameter overrides any value specified in the `AdjLines` parameter. Specify N to control which lines are reported using the `AdjLines` parameter.

AsmObj
This applies to the reporting of source program lines for an assembler program. Specify Y to include object code (from the assembly listing) in each source line. Specify N to omit object code.

Datamg
This parameter applies to report sections that attribute measured system activity to the data management processing category. Specify Y to display measurements in routines that were servicing data management requests in a separate DATAMG category. This includes basic access functions (such as READ and WRITE) to files. Processing of OPEN and CLOSE functions is not included in this category.

DPAGroup
This parameter applies to report sections that attribute measured system activity to program categories. This attribution can be done to Groups or Subgroups. A group is a higher level (more inclusive) categorization than a subgroup. For example, activity in DB2 modules can be attributed to the group "DB2 Subsystem" or, alternatively, to subgroups such as "Buffer Manager," "Call Attachment Facility," "Data Manager," etc. Specify DPAGroup=Y to attribute to group and DPAGroup=N to attribute to subgroup.

Header This applies to the P01 source program report. A value of Y specifies that detailed information about the source program is to appear in the heading area in each page in the report section. This information includes: source mapping file name and type, compile date and time, compiler product and version.

Intervals
This applies to "timeline" report sections in which measurement information is reported in equal time intervals. It specifies the number of intervals into which the report section is to be divided, which is generally, one line per interval. The value must be between 2 and 256.

Levels
This applies to report sections in which lines are arranged in a hierarchy. The value, a single numeric digit: 0 to 9, specifies the number of hierarchical levels to be included in the report. These are equivalent to the ISPF report line items in which the "+" line command is used to expand the hierarchy.

Minimum
This applies to report sections that allow you to exclude measurements of objects when those measurement values are below the specified minimum. The unit is percentage and is expressed as two digits, followed by an optional decimal point and up to two decimal places.

MLD This applies to report sections where DPA descriptions are reported. The MLD=Y parm is used to specify that Multi Line Descriptions should be printed, so that you can see all of the description text. MLD=N specifies that Multi Line Descriptions should not be printed, in which case only one line per module/csect will be printed, and the description will be truncated if it does not fit on one line.

negSQL This applies to report sections where CPU/Service time is reported by SQL statement. Specify Y to include SQL statements that end in a negative SQLCODE.

Oftotal
This applies to report sections in which SQL wait time is reported. Specify Y to quantify wait time as a percentage of total measurement interval. Specify N to quantify as a percentage of the SQL service time.

OmitCPU
This parameter applies to reports where CPU activity is attributed to program procedures. Specify Y to exclude procedures for which no CPU activity was measured, N to include them.

Omitdup
This parameter applies to report sections in which load modules are reported. A value of Y specifies that modules that have been reloaded at a new address, but have the same name and size to be reported only once.

OmitESD
This applies to report sections in which detailed information about load modules is reported. A value of Y specifies that ESD (External Symbol Dictionary) information is not to be reported.

OmitEXCP
This applies to report sections in which the number of EXCPs or read/write count is reported for files or devices. Specify Y to exclude files or devices for which no EXCPs or read/writes were counted, or specify N to include them.

OmitNUC
This applies to report sections in which load modules are reported. A value of Y specifies that Nucleus modules are to be excluded from the report.

OmitPLPA
This applies to report sections in which load modules are reported. A value of Y specifies that PLPA (Pageable Link Pack Area) modules are to be excluded from the report.

Percent
This applies to the source mapping report section - P01. Specify Y to display the values for the source statement as a percentage, or specify N to display values as a count. This is only applicable when source mapping a report that shows percentages.

posSQL This applies to report sections where CPU/Service time is reported by SQL statement. Specify Y to include SQL statements that end successfully; that is, with a zero or positive SQLCODE.

Program
This applies to the source mapping report section (P01). It specifies the name of the source program to reported.

Pseudo
This applies to the source mapping report section - P01. Specify Y to display C/C++ pseudo-assembly.

Sequence
This specifies the sequence in which items in the report are to be sorted. Possible values for this parameter are listed below. Not all values are appropriate for each report.

- ADDRESS to sort in ascending sequence by load module address
- CPU to sort in descending sequence by SQL CPU time
- DSN to sort in ascending sequence by dataset name
- DURATION to sort in descending sequence by SQL call duration or service time
- FILE to sort in ascending sequence by DDName
- LIBRARY/LOADLIB to sort in ascending sequence by load library name

- LOCATION to sort in ascending sequence by the address of the start of the code slice in the form of csect or module plus offset
- NAME to sort in ascending sequence by item name
- SIZE to sort in ascending sequence by load module size
- THREAD to sort chronologically by DB2 thread
- VALUE to sort in descending sequence by amount of measured activity

ShowDB2
This parameter applies to report sections that can attribute measured system activity to DB2 while it is processing SQL requests. Specify Y to display measurements in routines that were processing SQL requests in a separate DB2SQL category.

ShowIMS
This parameter applies to report sections that can attribute measured system activity to IMS while it is processing DLI calls. Specify Y to display measurements in routines that were processing DLI calls in a separate IMSDLI category.

ShowInact
This parameter is generally applicable to report sections that present information by TCB (Task). A value of Y (normally the default) specifies that information for inactive tasks is to be included in the report. An inactive task is one which was observed to be in a wait state for the full duration of the observation session.

SliceSize
This parameter applies to report sections that present information by code slice (block of storage containing object code). Use this parameter to vary the code slice size. A code slice size value must be between 4 and 99992 and must be an even value that is divisible by 4.

stmtPct
This parameter applies to DB2 reports that display mean times. When 'Y' is specified, the mean times are replaced with the percent of total used.

stmtSQL
This applies to report sections where CPU/Service time is reported by SQL statement. Specify Y to consolidate dynamic SQL statements by statement number, ignoring differences in SQL statement text. When 'Y' is specified, one line is displayed per statement number regardless of the contents of the SQL statement text. When 'N' is specified, one line is displayed for each unique dynamic SQL statement.

Totals This applies to report sections where total values can be displayed graphically, in addition to usage values. Specify Y to report on usage and total values.

Chapter 12. Batch interface commands

Application Performance Analyzer has a command language which allows you to submit requests using JCL. The command language can be used to create the same types of requests available in Application Performance Analyzer/ISPF.

Application Performance Analyzer also provides a batch import program to load the sample file of a completed observation request. This program can be used as an alternative to the IMPORT command available in Application Performance Analyzer/ISPF.

For information about ...	See ...
General syntax, types of commands and examples	"Command syntax"
Command summary diagram	"Command summary diagram" on page 616
Setting up the JCL	"Sample JCL" on page 617
Coding the NEW command, with keyword descriptions and examples	"NEW" on page 622
Coding the TNEW command	"TNEW" on page 631
Coding the DELETE command	"DELETE" on page 632
Coding the KEEP command	"KEEP" on page 632
Coding the CANCEL command	"CANCEL" on page 632
Batch Import command	"Batch import" on page 632

Command syntax

The batch interface command format consists of a single high level command keyword (NEW, TNEW, DELETE, KEEP, or CANCEL) followed by a series of keywords and parameters in the format: KEYWORD=(parameter1, parameter2,...).

If there is only one parameter specified for a keyword, then the parentheses "(...)" are optional. For example, DURATION=120 and DURATION=(120) are both acceptable.

When a list of parameters is specified, the parentheses "(...)" are mandatory. For example, FEATURES=(CICS,IMS,DB2).

A semicolon must be present at the end of the command string.

Example of NEW command

The following example create a new observation request. It requests that job CAZTEST01 be measured for 60 seconds and 10000 samples, with the IMS and DB2 features turned on.

```
NEW JOBNAME=CAZTEST01
ACTIVE=NO
SAMPLES=10000 DURATION=60
FEATURES=(IMS,DB2)
;
```

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Example of TNEW command

The following example creates a new threshold observation request. It requests that the second step in job TSTJOB01 be measured for 60 seconds and 10000 samples. The measurement starts only when the CPU time for step 2 in TSTJOB01 exceeds 30 seconds and the EXCP count exceeds 20000.

```
TNEW JOBNAME=TSTJOB01
ACTIVE=NO
STEP=(2)
SAMPLES=10000 DURATION=60
TMSEL=("CPU=30 EXCP=20000")
;
```

Example of DELETE command

The following example deletes observation 0985.

```
DELETE REQNUM=0985
;
```

Example of KEEP command

The following example applies the KEEP command to observation 0985. This means the request will be kept until it is manually deleted, no expiration date will apply.

```
KEEP REQNUM=0985
;
```

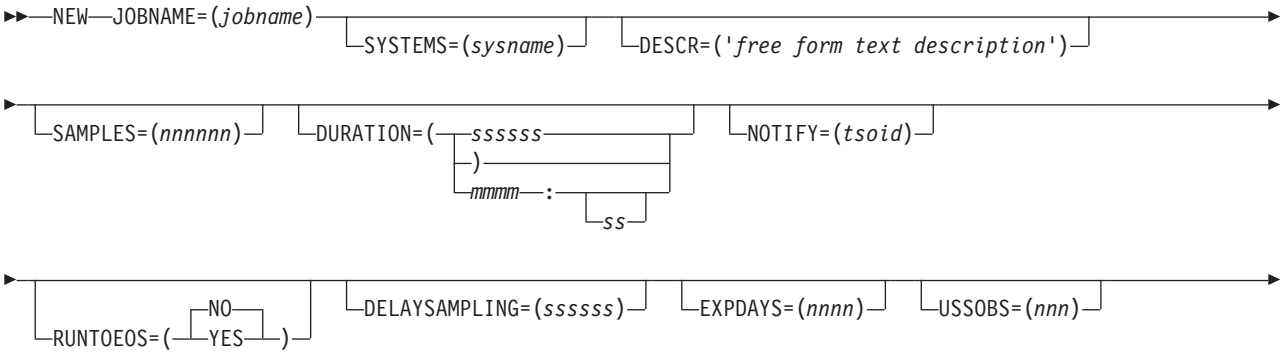
Example of CANCEL command

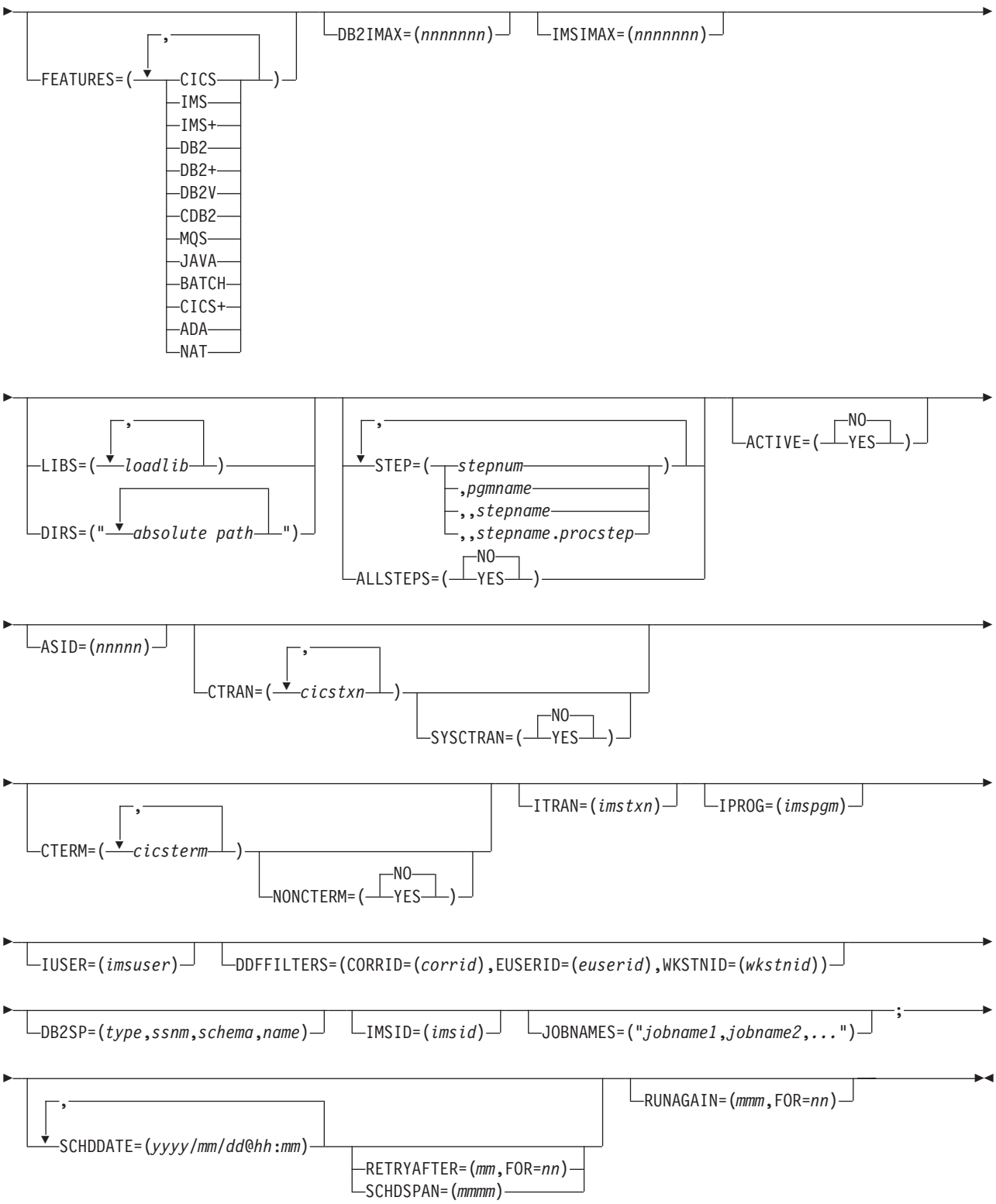
The following example cancels active observation 0985.

```
CANCEL REQNUM=0985
;
```

Command summary diagram

This diagram shows a summary of the parameters allowed in a NEW command, they are described in detail on the following pages.





Sample JCL

The following illustrates an example of how to set up the Batch Interface JCL and create a basic measurement request. There is a sample template of this JCL supplied in *hlq*.SCAZSAMP in member CAZBATCH.

```
//SAMPJOB1 JOB (job parameters)
//*
//CAZBATCH EXEC PGM=CAZBATCH,PARM='STCID=CAZ0'
//STEPLIB DD DISP=SHR,DSN=hlq.SCAZAUTH
//SYSPRINT DD SYSOUT=*
//SYSIN DD *
NEW JOBNAME=APPJOB01
ACTIVE=NO
SAMPLES=5000 DURATION=30
DESCR='Sample request for APPJOB01'
;
/*
//
```

The above example uses the Application Performance Analyzer started task named CAZ0 as specified on the EXEC statement as `PARM='STCID=CAZ0'`. You must specify your Application Performance Analyzer started task name here. This parameter can be omitted if only one instance of Application Performance Analyzer is running on your image.

In STEPLIB, replace *hlq* with the high-level qualifier used for Application Performance Analyzer in your installation.

The commands in the above example create a NEW request to measure job APPJOB01, which is not yet active, for 5000 samples with a duration of 30 seconds. A user composed description is also specified.

Using the API to submit a command

This section describes how to code a call to the Application Performance Analyzer command API in an application program. The command API can be called from Assembler, COBOL, PL/I, C or C++ programs. Sample programs for each language are shipped in *hlq*.SCAZSAMP.

The sample program names for each language are:

- Assembler: CAZAPASM
- C: CAZAPC
- C++: CAZAPCC
- COBOL: CAZAPCOB
- PL/I: CAZAPPLI

Notes:

1. You must modify the sample code to contain the started task and the system parameters.
2. You must modify the COBOL sample code CAZAPCOB.

Environment

Authorization
Problem state key 8, Supervisor state any key

Dispatchable unit mode
TCB

Cross memory mode
PASN = SASN = HASN

Amode
24-bit, 31-bit, or 64-bit

ASC mode
Primary or AR

Interrupt status
Enabled for I/O and external interrupts

Locks No locks held

Control parameters
Must be in the primary address space, key 8, and below the bar

Error recovery
The API does not provide error recovery

Input registers

Upon entry to CAZAPI01, the general purpose registers (GPRs) contain:

Register	Contents
1	Address of a standard CALL parameter list.
13	Address of a standard register 72-byte save area that must be addressable in primary mode and below the bar.
14	Return address.
15	Entry address of CAZAPI01.

Output registers

When control returns to the caller, the general purpose registers (GPRs) contain:

Register	Contents
0	Reason code.
1	Used as a work register by CAZAPA01.
2-13	Unchanged.
14	Used as a work register by CAZAPI01.
15	Return code.

When control returns to the caller, the access registers (ARs) contain:

Register	Contents
0	Used as a work register by CAZAPI01.
1-15	Unchanged.

Syntax

```
CALL CAZAPI01,(Command,
Reply,
STCID,
return_code,
reason_code,
),VL
```

It is recommended that the calling program pre-fetch CAZAPI01 instead of including the module in your load module during the link-edit step. This way you can avoid relinking your load module if a newer version of CAZAPI01 becomes available.

Parameters

Command
Specifies a 2-byte length field followed by the input command string to be submitted to Application Performance Analyzer. The length field describes the length of the command string only; it does not include the length of this length field.

Reply
Specifies a 2-byte length field followed by a buffer used by CAZAPI01 to return one or more information/error messages describing the result of processing the command. The length field must contain the maximum length of this buffer; it does not include the length of this length field. It is recommended that the buffer be a minimum of 512 bytes long and be initialized to nulls so that the caller can easily determine whether messages have been returned or not.

If messages are returned then each message will be terminated by a single null character, the last message will be terminated by two consecutive null characters. The length field will be updated to contain the length of the messages including all null characters.

STCID
Specifies a 4-byte field that contains the Application Performance Analyzer STCID to which the command will be submitted. The STCID must be left justified and blank padded.

If the first byte of this field is blank or null then CAZAPI01 will attempt to connect to the currently executing Application Performance Analyzer started task. If more than one Application Performance Analyzer STC is active the request will fail.

return_code
Specifies a 4-byte field to contain the return code.

reason_code
Specifies a 4-byte field to contain the reason code.

VL Must be coded and causes the high-order bit of the last parameter address to set to 1.

Return codes

When CAZAPI01 returns control to your program, GPR 15 and *return_code* contain a return code. The following list identifies return codes in hexadecimal format and describes what each means:

00 The operation was successful.

08 The operation failed because of an error. (Refer to reason code for an explanation of the error.)

Reason codes

When CAZAPI01 returns control to your program, GPR 0 and *reason_code* contain a reason code. The following table identifies reason codes in hexadecimal and decimal formats and describes what each means:

Table 19. Reason codes

Hexadecimal	Decimal	Explanation
00	00	Not applicable.
04	04	Caller is not running in TCB mode.
08	08	Caller's PASN and SASN are not equal.
0C	12	Caller is not running with DAT-on.
10	16	Caller is running disabled.
14	20	Caller is in problem state and not key 8.
18	24	Caller is not in primary or AR ASC modes.
1C	28	The STCID field contained a null or blank first character, CAZAPI01 attempted to access the currently executing Application Performance Analyzer STC but found more than one STC executing.
20	32	The specified STCID was not defined to this system.
24	36	There are no Application Performance Analyzer STCs active on this system.
28	40	The specified STCID is not currently active on this system.
2C	44	Application Performance Analyzer's name token was not created. This indicates that no Application Performance Analyzer STC has ever been started on this system since the last IPL.
30	48	Command string contains an unrecognized command verb. Currently, only the CANCEL, DELETE, KEEP, NEW and TNEW commands are allowed to be submitted via this API.
34	52	The Application Performance Analyzer STC detected an error while processing the command. Refer to the message(s) returned in the Reply buffer for more information.

Table 19. Reason codes (continued)

Hexadecimal	Decimal	Explanation
38	56	The Application Performance Analyzer STC command interface has abended. Depending on the error, an SVC dump may have been created. If an SVC dump was not produced then, the interface's error recovery will have percolated the abend up to the next error handler in the caller's address space.

Abend code

CAZAPI01 will produce a user abend code: 4085 in the event of an recoverable error. The following table identifies abend reason codes in hexadecimal and decimal formats and explains the reason for the abend:

Table 20. Abend code

Hexadecimal	Decimal	Explanation
FA0	4000	The input parameter pointer was zero.
FA4	4004	Either the input command pointer was zero or the length field contained zeros.
FA8	4008	Either the reply command pointer was zero or the length field contained zeros.
FAC	4012	The STCID pointer was zero.
FB0	4016	The return_code pointer was zero.
FB4	4020	The reason_code pointer was zero.
FB8	4024	The VL bit was turned on prior to the last parameter.
FAC	4028	The VL bit was not turned on on the last parameter.
FC0	4032	Internal error. Contact product support.
FC4	4036	Internal error. Contact product support.

Command descriptions

NEW

The NEW command is used to create a new Observation Request.

NEW
Mandatory.

Indicates that this is a NEW request.

JOBNAME

Mandatory.

Specifies the name of the job (or started task or TSO user) to be measured.

Creating multi-job measurements (%)

You can also specify a special pattern character of percent sign "%". This acts as a place holder for zero or more characters in the name. It can be placed anywhere in the name except as the ninth character in an eight character jobname. A patterned name indicates that you want to measure all active jobs whose jobname matches the pattern. You cannot specify a jobname pattern of "%".

The maximum number of jobs that can be measured from a multi-job request is defined during the installation of Application Performance Analyzer. When this limit is exceeded, Application Performance Analyzer stops creating measurements for this request, and the status of the request is displayed as 'Stoppd'. The measurements that executed (within the limit) are accessible for report viewing under the request. To increase the limit, contact your system programmer.

Example: `%MSMPP%` causes one sampling request to be created for each active job whose jobname contains "MSMPP".

The `ASID` keyword is ignored when the jobname specifes a pattern.

The ACTIVE keyword is automatically set to YES when the jobname specifies a pattern.

Measuring a specific DB2 stored procedure or user-defined function

To measure a specific DB2 stored procedure or user-defined function, use a dash (-) for the JOBNAME. The information identifying the DB2 stored procedure or user-defined function must be supplied in the DB2SP keyword. The following keywords are also accepted; SYSTEMS, DESCR, SAMPLES, DURATION, NOTIFY, EXPDAYS, USSOBS, FEATURES, LIBS, DIRS and DB2IMAX. All other keywords are invalid and will result in an error. This feature is only available when the WLM Intercept is activated during Application Performance Analyzer installation, and you are given appropriate security access to it. Contact your system programmer for access if necessary.

Measuring a specific IMS transaction across multiple MPP regions

To measure a group of IMS MPP regions that are eligible to schedule a specific IMS transaction code, use a dash (-) for the JOBNAME. The IMS subsystem ID is specified in the IMSID keyword. The transaction code is specified in the ITRAN keyword. The region names are specified in the JOBNAMES keyword. The following keywords are also accepted; SYSTEMS, DESCR, SAMPLES, DURATION, NOTIFY, EXPDAYS, FEATURES, LIBS, and IMSIMAX. All other keywords are invalid and will be ignored or result in an error. This feature is only available when the IMS Intercept is activated during Application Performance Analyzer installation, and you are given appropriate security access to it. Contact your system programmer for access if necessary.

SYSTEMS

Mandatory within a sysplex.

Specifies a target system within a sysplex. You can also enter an asterisk (*), in which case the target job is measured on the first system to run it. When an asterisk (*) is entered, the keyword ACTIVE=YES is invalid. This keyword is invalid in a non-sysplex environment.

Example: `SYSTEMS=SYS3`

DESCR
Optional unless set as mandatory during installation.

Specifies a free form text description for this observation request. The text must be within single quotes, and if mandatory must be a minimum of 8 characters.

Example: DESCR= 'Any user text goes here'

SAMPLES
Optional.

If omitted, the default number of samples will be used. Specifies the number of samples to take during the measurement.

Example: `SAMPLES=10000`

DURATION
Optional.

If omitted, the default duration will be used. Specifies the duration of the measurement in seconds.

Example: `DURATION=120`

NOTIFY
Optional.

Specifies a TSO userid to notify when the measurement ends.

Example: `NOTIFY=USER01`

RUNTOEOS
Optional.

Specify YES to indicate that the measurement should continue to run until the job step has completed, even if the target number of observations has been reached.

DELAYSAMPLING
Optional.

This indicates that sampling should be delayed for the specified amount of time (in seconds). After the target job step starts, Application Performance Analyzer will delay the start of the measurement for the number of seconds specified.

EXPDAYS
Optional.

If omitted the installation default will be used.

Specifies the number of days the measurement data for this observation request should be retained on before being automatically deleted. To keep the measurement data indefinitely, use EXPDAYS=0.

Example: `EXPDAYS=30`

USSOBS
Optional.

Specify the maximum number of spawned address spaces or substeps to measure for a USS observation, up to the maximum defined in the system configuration. The same sampling frequency will be used for each spawned address space or substep. Sampling overhead can be high if several spawned address spaces are running simultaneously.

When this field is specified, the collection of measurements will be grouped under a USS master record on the Observation List panel.

FEATURES
Optional.

Specifies which data extractors, if any, need to be turned on for this measurement. The data extractor values are: CICS, CICS+, IMS, IMS+, DB2, DB2+, DB2V, CDB2, MQS, Java, ADA, NAT. A list of data extractors is separated by commas.

If your installation has any default extractors set, the FEATURES command will override these. If you need to override default extractors and want to turn all extractors off, specify FEATURES=(BATCH).

Example: `FEATURES=(CICS,DB2)`

DB2IMAX
Optional.

Enter the value to limit the number of DB2+ SQL call interceptions for which full details will be written to the sample file. Collecting full details on every interception allows the F02 Timeline report to report exact times for all SQL calls. The F02 report will be truncated at the number of calls specified in this field. The DB2+ data extractor continues to collect the data it requires for the other reports for the duration of the measurement. The value cannot exceed the default value specified for DB2IMaxTraceSize during Application Performance Analyzer installation.

Example: `DB2IMAX=(10000)`

IMSIMAX
Optional.

Enter the value to limit the number of IMS+ DLI call interceptions for which full details will be written to the sample file. Collecting full details on every interception allows the I02 and I03 Timeline reports to report exact times for all DLI calls and IMS transactions. The I02 and I03 reports will be truncated at the number of calls specified in this field. The IMS+ data extractor continues to collect the data it requires for the other reports for the duration of the measurement. The value cannot exceed the default value specified for IMSIMaxTraceSize during Application Performance Analyzer installation.

Example: `IMSIMAX=(10000)`

LIBS
Optional.

Specifies additional load libraries to be searched. A list of data set names is separated by commas. A maximum of 10 data set names is allowed.

Example: `LIBS=(USER1.LOADLIB,TEST1.LOADLIB)`

DIRS
Optional.

Specifies up to 440 bytes of HFS directory path names to be searched by Application Performance Analyzer, enclosed in quotes and each separated by

one or more spaces. These are applicable only when sampled HFS programs have relative path names. The LIBS and DIRS keywords are mutually exclusive.

Example: `DIRS=("/u/axx01 /u/axx01/cpp")`

STEP

Optional.

If omitted, the first step will be measured.

Multiple STEP keywords can be specified. Specifying multiple STEP keywords creates a multistep request. A maximum of 20 STEP keywords is allowed.

Each STEP can have multiple positional parameters:

1. stepnum specifies the step number. If stepnum is specified, none of the other 3 step specification parameters can be included.
2. pgmname specifies the program name. If pgmname is specified, none of the other 3 step specification parameters can be included.
3. stepname specifies the step name. It can be specified as just a step name, or in the format stepname.procstep. If this parameter is specified, the stepnum and pgmname parameters must not be specified. If stepname is specified without .procstep, it identifies an EXEC statement that contains a PGM parameter, not one that invokes a procedure.

If the format stepname.procstep is coded, then stepname identifies an EXEC statement that invoked a procedure, and procstep identifies the EXEC statement containing a PGM parameter within that procedure.

This parameter can not be specified when selecting an active job.

Example 1: STEP=3
This indicates that the third step in the job should be measured.

Example 2: STEP=(,TESTPGM1)
This indicates that the first step that runs the program TESTPGM1 should be measured.

Example 3: STEP=(,,STEP007)
This indicates that the step named STEP007 should be measured, where STEP007 is the step name on and EXEC statement that executes a program (not an EXEC statement that invokes a procedure).

Example 4: STEP=(,,PROC02.STEP007)
This indicates that the step named STEP007 within the procedure invoked by step PROC02 should be measured.

Example 5:STEP=3 STEP=5 STEP=6 STEP=(,,STEP012)
This shows STEP being repeated to create a multistep measurement.

ALLSTEPS

Optional.

Specify ALLSTEPS=YES to create a multi-step request which measures all steps in the job. When specified for a threshold measurement on the TNEW command, all steps in the job that meet the threshold criteria are measured. When ALLSTEPS=YES is specified, the STEP keyword is meaningless, and will be ignored if coded.

Example: `ALLSTEPS=YES`

ACTIVE

Mandatory.

Specify YES if the job is active, or NO if the job is not active.

Example: `ACTIVE=YES`

ASID
Optional.

If omitted, Application Performance Analyzer will measure the first job it finds with the JOBNAME. Specifies the ASID, in decimal, of the job to be measured. Only applies when ACTIVE=YES.

Example: `ASID=1023`

CTRAN
Mandatory when CICS is specified in FEATURES, otherwise does not apply.

Specifies one or more CICS trancodes to measure. For all transactions, use CTRAN=*. A list of transactions is separated by commas. A maximum of 16 transactions is allowed.

Example 1: `CTRAN=(TRNA,TRNB,TRNC)`

Example 2: `CTRAN=*`

SYSCTRAN
Optional, if omitted the default of NO will be used.

Specify YES if you want to measure the CICS system transactions.

CTERM
Optional.

Specifies one or more CICS terminal ids to measure. A list of terminal ids is separated by commas. You can also specify a terminal id pattern, such as a terminal id prefix followed by an asterisk (*) or an asterisk itself. The asterisk indicates that all terminals starting with the prefix are to be included in the measurement. The asterisk on its own indicates that all terminals are to be included. A maximum of 8 terminal ids / patterns is allowed.

Example:

```
CTERM=(TRM1,TRM2,TRM3)
CTERM=TRM*
CTERM=*
```

NONCTERM
Optional. If omitted, the default value of YES will be used.

Specify NO if you do not want to measure CICS transactions that run non-terminal attached.

ITRAN
Optional.

When measuring a single IMS/MPP or IMS/IFP region as entered in the JOBNAME parameter, this specifies an IMS transaction to include when measuring that IMS/MPP or IMS/IFP region. You can also specify a transaction ID pattern, such as a transaction ID prefix followed by an asterisk (*) or an asterisk by itself. The asterisk indicates that all transaction ids starting with the prefix are to be included in the measurement. The asterisk on its own indicates that all transactions are to be included.

Example:

```
ITRAN=IMSTRN1
ITRAN=IMSTRN*
ITRAN=*
```

Note: Values in ITRAN, IPROG and IUSER are ANDed together to determine which transactions are included in a measurement.

Note: When limiting the observation to specific IMS transactions in an MPP or IFP region, Application Performance Analyzer samples only when the transactions are running. The observation continues to run for the requested duration.

When measuring multiple IMS/MPP regions simultaneously, as indicated by a dash '-' in the JOBNAME parameter and a list of IMS/MPP regions in the JOBNAMES parameter, this specifies a single IMS transaction to include when measuring the IMS/MPP regions. In this case, the complete transaction code must be provided and the IPROG and IUSER parameters are not applicable.

Example:

```
JOBNAME=(-) ITRAN=(TXNA) JOBNAMES=("IMSMPP1,IMSMPP2,IMSMPP3")
```

IPROG

Optional.

Specifies an IMS program to include when measuring an MPP or IFP region. You can also specify a program name pattern, such as a program name prefix followed by an asterisk (*) or an asterisk by itself. The asterisk indicates that all programs starting with the prefix are to be included in the measurement. The asterisk on its own indicates that all programs are to be included.

Example:

```
IPROG=IMSPGM1
IPROG=IMSPGM*
IPROG=*
```

Note: Values in ITRAN, IPROG and IUSER are ANDed together to determine which transactions are included in a measurement.

Note: When limiting the observation to specific IMS programs in an MPP or IFP region, Application Performance Analyzer samples only when the transactions associated with the programs are running. The observation continues to run for the requested duration.

IUSER

Optional.

Specifies an IMS user id to include when measuring an MPP or IFP region. You can also specify a user id pattern, such as a user id prefix followed by an asterisk (*) or an asterisk by itself. The asterisk indicates that transactions initiated by user IDs starting with the prefix are to be included in the measurement. The asterisk on its own indicates that transactions initiated by all users are to be included.

Example:

```
IUSER=IMSUSR1
IUSER=IMSUSR*
IUSER=*
```

Note: Values in ITRAN, IPROG and IUSER are ANDed together to determine transactions that are included in a measurement.

Note: When limiting the observation to specific IMS users in an MPP or IFP region, Application Performance Analyzer samples only when the

transactions initiated by the IMS users are running. The observation continues to run for the requested duration.

DDFFILTERS
Optional

Identifies the DDF filtering criteria that are used to limit the scope of a DDF measurement, to specific correlation id, end user id or workstation id or any combination. It accepts up to three sub-keywords; CORRID, EUSERID and WKSTNID. Values in CORRID, EUSERID, and WKSTNID are ANDed together to determine SQL requests that are included in the measurement. In any of these sub-keywords, you may also specify a wildcard pattern using an asterisk (*) or a percent sign (%). An asterisk is used to indicate one or more characters that can appear in place of the asterisk. It can be used as a prefix or a suffix, or both. Alternatively, a percent sign is used to indicate any single character, and can appear any number of times.

CORRID=(*corrid*)
Optional.

Specify a DB2 correlation id or pattern. This identifies a DB2 correlation id to be included in the measurement when measuring a DDF address space. A correlation id of null (binary zero) may be specified by entering ',NULL' as the *corrid*.

EUSERID=(*euserid*)
Optional. Specify an end user id or pattern. This identifies an end user id to be included in the measurement when measuring a DDF address space. An end user id of null (binary zero) may be specified by entering ',NULL' as the *euserid*d.

WKSTNID=(*wkstnid*)
Optional. Specify a workstation id or pattern. This identifies a workstation id to be included in the measurement when measuring a DDF address space. A workstation id of null (binary zero) may be specified by entering ',NULL' as the *wkstnid*.

Example:

```
DDFFILTERS=(CORRID=(,NULL),EUSERID=(DDFUSER1),WKSTNID=(*))
```

This indicates that remote SQL with a null correlation id, originating from the user DDFUSER1 from any workstation will be included for the measurement for the observed DDF address space.

DB2SP
Optional.

Identifies the DB2 stored procedure or user-defined function to be measured. It requires 4 positional parameters to identify the type (stored procedure or user-defined function), the DB2 subsystem name, the schema and the name of the procedure or function, in the format DB2SP=(*type*,*ssnm*,*schema*,*name*).

Type can be either P for stored procedure or F for user-defined function. For both *schema* and *name*, you can also specify a name pattern, for example, a name prefix followed by an asterisk (*) or an asterisk by itself. Application Performance Analyzer will measure the first DB2 stored procedure or user-defined function executed by the DB2 subsystem that matches the schema and name concatenation. If a single asterisk is coded in both schema and name, Application Performance Analyzer will measure the first stored procedure or user-defined function executed by the DB2 subsystem.

```
Example1: DB2SP=(P,DSN1,SCHEMA1,SP1)
```

This indicates that the first occurrence of DB2 stored procedure SCHEMA.SP1, which runs in the DB2 Subsystem DSN1 is to be measured.

```
Example2: DB2SP=(F,DSN2,SCHEMA2,UDF2)
```

This indicates that the first occurrence of user-defined function SCHEMA2.UDF2, which runs in the DB2 Subsystem DSN2 is to be measured.

```
Example3: DB2SP=(P,DSN1,SCH*,SP1)
```

This indicates that the first occurrence of stored procedure SP1 with a schema that begins with SCH, that runs in the DB2 Subsystem DSN1 is to be measured.

IMSID

Optional.

Specifies the IMS subsystem ID for an IMS Multiple Region request. An IMS Multiple Region request is identified by specifying a dash in the JOBNAME keyword. Refer to the JOBNAME parameter description for details.

Example:

```
IMSID=(IMSA)
```

JOBNAMES

Optional.

Specifies the names of the IMS MPP regions to be measured for an IMS Multiple Region request. The region names must be separated by commas and enclosed in quotes. An IMS Multiple Region request is identified by specifying a dash in the JOBNAME keyword. Refer to the JOBNAME parameter description for details.

Example:

```
JOBNAMES=("IMSAMPP1,IMSAMPP4,IMSAMPP5")
```

SCHDDATE

Mandatory if this is a Future Schedule request, otherwise does not apply.

Multiple SCHDDATE keywords can be specified to schedule future requests on multiple dates and times. Date/time is specified in the format: yyyy/mm/dd@hh:mm.

Example:

```
SCHDDATE=2004/12/03@16:00
SCHDDATE=2004/12/10@16:00
SCHDDATE=2004/12/17@16:00
SCHDDATE=2004/12/24@16:00
```

This creates a future schedule request to run a measurement on each of the four dates and times specified.

RETRYAFTER

Optional.

This is only used for future schedule requests (one or more SCHDDATE keywords must be present), where the job is expected to be active (ACTIVE=YES specified). Specifies that Application Performance Analyzer should retry the request if the target job was not active on the first attempt. Also specifies how many times to retry.

Specified in the format: (mm, FOR=nn), where mm is the number of minutes between retry attempts, and nn is the number of times to retry.

Example: `RETRYAFTER=(15,FOR=3)`

SCHDSPAN
Optional.

This is only used for future schedule requests (one or more SCHDDATE keywords must be present), where the measurement is to begin when the job becomes active (ACTIVE=NO specified). Specifies the number of minutes that this request will wait for the job to become active before Application Performance Analyzer expires the request.

Example: `SCHDSPAN=120`

RUNAGAIN
Optional.

This indicates that for a specified time interval, if the target job runs again, the measurement should be run again. The For= parm indicates how many times the measurement should potentially be repeated. The time interval is reset after each rerun of the target job. The maximum time interval for a future schedule request is 999 minutes. The maximum time interval for a single occurrence request is 31,680 minutes (22 days).

Example: `RUNAGAIN=(60,FOR=3)`

This means that for 60 minutes after the target job starts, Application Performance Analyzer will run the measurement again, if the job starts again. It will do this up to three times.

TNEW

The TNEW command is used to create a new Observation Request which starts only when the specified threshold criteria has been satisfied for the target job-step or job-steps. The criteria are: CPU Time, Elapsed Time, and EXCP Count.

TNEW
Mandatory.

Indicates that this is a new threshold request.

JOBNAME
Mandatory.

Specifies the name of the job (or started task or TSO user) to be measured.

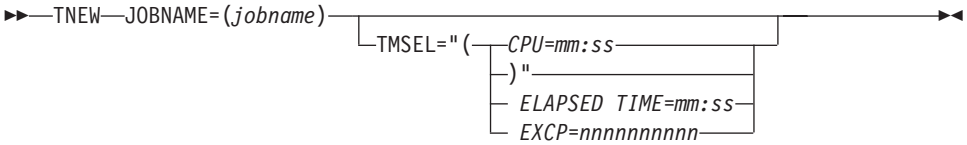
TMSEL
Mandatory.

Specifies the criteria upon which the measurement will begin. The TMSEL keyword accepts the following parameters: CPU, ELAPSEDTIME, and EXCP, in the format TMSEL=("CPU=mm:ss ELAPSEDTIME=mm:ss EXCP=nnnnnnnnnn). When more than one threshold criteria is specified, all the criteria must be met for the measurement to begin.

CPU=mm:ss specifies the threshold amount of CPU time. When the target job-step exceeds this amount of CPU time, the measurement begins. Time can be entered in seconds or in minutes and seconds. To specify the threshold time in minutes and seconds, separate the minutes value from the seconds value using a colon.

ELAPSEDTIME=mm:ss specifies the threshold amount of elapsed time. When the target job-step exceeds this amount of elapsed time, the measurement begins. Time can be entered in seconds or in minutes and seconds. To specify the threshold time in minutes and seconds, separate the minutes value from the seconds value using a colon.

EXCP=nnnnnnnnnn specifies the threshold EXCP count. When the target job-step exceeds this EXCP count, the measurement begins.



Example:

```
TNEW JOBNAME=TSTJOB01
TMSEL=("CPU=30 ELAPSEDTIME=5:00 EXCP=5000");
```

TNEW accepts the same keywords as the NEW command, with the exception of the Schedule, DB2 stored procedure or user-defined function, and IMS multiple address space keywords, which are not applicable for Threshold Monitor requests. The following keywords are not accepted on the TNEW command: DELAYSAMPLING, DB2SP, IMSID, JOBNAMES, RUNAGAIN, SCHDDATE, RETRYAFTER, and SCHDSPAN. Only one STEP keyword is accepted. The ALLSTEPS keyword can be used to measure all steps in the job that meet the threshold criteria.

DELETE

The DELETE command is used to delete an observation request.

REQNUM
Mandatory.

Specifies the request number to be deleted.

KEEP

The KEEP command is used to override the expiration date on an observation request, and keep it until it is manually removed.

REQNUM
Mandatory.

Specifies the request number to be kept.

CANCEL

The CANCEL command is used to cancel an active observation request.

REQNUM
Mandatory.

Specifies the request number to be cancelled.

Batch import

The batch import program CAZIMPRT is used to load a sample file into an Application Performance Analyzer R02 Observation Session List. This can be a native sample file or one that has been previously exported. The import program creates a new observation in the target system, assigning a new request number. The date and time of the imported request is set to the current date and time and the expiry date is recalculated based on the rules of the importing system.

Sample template JCL is supplied in hlq.SCAZSAMP in member

```
CAZIMPRT.

//CAZIMPRT JOB  (job parameters)
//*
//S1 EXEC PGM=CAZIMPRT,REGION=4M,PARM='STCID=stcid'
//STEPLIB DD DISP=SHR,DSN=hlq.SCAZAUTH
//SYSPRINT DD SYSOUT=*
//SAMPIN DD DSN=inputdsn,DISP=SHR
```

1. Add the JOB parameters to meet your system requirements.
2. On the EXEC statement, replace *stcid* with the Application Performance Analyzer instance id of the system you want to import into. This parameter can be omitted if only one instance of Application Performance Analyzer is running on your image.
3. On the STEPLIB DD statement, replace *hlq*.SCAZAUTH with the name of your installation's authorized library containing Application Performance Analyzer's load modules.
4. On the SAMPIN DD statement, replace *inputdsn* with the name of the native sample file or TSO XMIT file containing the sample to be imported.

Chapter 13. Realtime Monitor

The Realtime Monitor facility lets you view information about an in-progress measurement. Start this facility by selecting an active measurement from Observation Session List using the “R” line command. You can also choose to have the Realtime Monitor launched automatically when you start a measurement for an active job. Use SETUP in the Observation Session List to select this option.

Auto-refresh mode

In this mode the panel is refreshed automatically to show changing data as it is measured. In auto-refresh mode the keyboard is locked. To halt auto-refresh mode, and unlock the keyboard, press the Attention key. You can then refresh the panel manually by repeatedly pressing the ENTER key.

To re-activate the auto-refresh mode, enter the PULSE primary command. You can abbreviate this as P.

Monitor views

The Realtime Monitor facility offer various views of the measurement data. The upper portion of the screen shows a menu of the available monitor views. To select a view, either enter its code on the command line or place the cursor on the field and press the ENTER key.

ACCUM and CURRENT modes

Some monitor views display data based on either all the accumulated (ACCUM) data for the measurement, or for the last measured “time slice” (CURRENT). “(ACCUM)” or “(CURRENT)” is displayed on the heading line of views affected by this mode setting.

Enter the ACCUM command to set the mode to report accumulate data. You can abbreviate this as A. Enter the CURRENT command to set the mode to report on the most recent time slice. You can abbreviate this as C. Use the SETUP command to adjust the size of the time slice (expressed as number of samples). The default value is 100 samples.

SETUP command

Use the SETUP command to change various default options. You can change the following:

- Panel displayed at startup
- Display auto-refresh enabled
- Auto-refresh interval
- Length of current time slice

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View 1. Measurement overview

View 1. Measurement Overview shows an at-a-glance summary of the measurement status and shows a very high level overview of observed resource usage. If in 'autorefresh' mode, data in this screen will refresh automatically at the specified rate. Otherwise press ENTER to refresh the data.

A sample report is shown here:

```
File View Navigate Help
-------------------------------------------------------------------------------
M01: IBM APA for z/OS Realtime Monitor (2132/CICS22A)       Row 00001 of 00025
Command ===> _____________________________________________Scroll ===> PAGE
  1. Overview   3. Environment   5. Data Mgmt
  2. CPU Util.  4. CPU/Modules
_______________________________________________________________________________
View 1. Measurement Overview

+Measurement Progress ------------------------------------------------------+
| Requested    90,000  100.0% ''''''''''''''''''''''                        |
| Samples Done 39,673   44.0% --------------------                         |
| CPU Active    4,314   10.8% -----                                        |
| WAIT         34,393   86.6% ----------------------------------------     |
| Queued          966    2.4% -                                            |
+-------------------------------------------------------------------------+

+System Resource Usage----------------+--------------------------------------+
| CPU time TCB       21.96 sec        | No.of TCBs         9                 |
| CPU time SRB       3.50 sec         | EXCPs              0                 |
| Storage frames     6,611            | Dataspace frames   0                 |
| Pages in           0                | Pages out          0                 |
+-------------------------------------+--------------------------------------+

+DB2 Activity-------------------------+--------------------------------------+
| SQL call count     7,809            | DB2 plan           PFSAMPA           |
| SQL samples        2,287            | DB2 DBRM           PFSAMPC           |
+-------------------------------------+--------------------------------------+

+CICS Transactions--------------------+--------------------------------------+
| Active txns        0                | Current TranId     n/a               |
| Suspended txns     8                | CICSTaskId         1,672             |
+-------------------------------------+--------------------------------------+
```

Measurement progress

This section shows the progress of the measurement by reporting the total number of samples completed. The sample counts are further subdivided by CPU Active samples, TCB WAIT samples, and Queued samples.

Under heading	This is displayed
Requested	The number of samples requested. A fixed percentage value of 100 percent is shown here as this number of samples represents the entire measurement. The actual number of samples performed could exceed this value if the “run to end of step” option was selected. Similarly the measurement could terminate before the indicated number of samples is done if the measured step terminates first.
Samples Done	The number of samples done. This is the number of samples performed so far. A percentage value and histogram indicate the ratio of samples completed to the number of requested samples.
CPU Active	The number of samples done in which one or more CPUs were executing instructions in the measured region. A percentage value and histogram indicate the ratio of the number of CPU Active samples to the total number of samples completed so far.

Under heading	This is displayed
WAIT	The number of samples done in which all TCBs were in WAIT (non dispatchable) state. A percentage value and histogram indicate the ratio of the number of WAIT samples to the total number of samples completed so far.
Queued	The number of samples done in which no TCBs were CPU active and at least one TCB was dispatchable. This indicates a state in which work was not being done in the measured region because no CPU (or memory) was available. A percentage value and histogram indicates the ratio of the number of Queued samples to the total number of samples completed so far.

System resource usage

This section shows various aspects of general resource usage observed during the measurement interval. Resources quantified here are: CPU time, storage usage, EXCPs, and paging.

Under heading	This is displayed
CPU Time TCB	The number of CPU seconds consumed by all TCBs in the measured region for the duration of the measurement interval.
No. of TCBs	The number of TCBs in existence at the time of the last data refresh.
CPU Time SRB	The number of CPU seconds consumed in SRB mode in the measured region for the duration of the measurement interval.
EXCPs	The number of EXCPs (Execute Channel Program) performed during the measurement interval.
Storage Frames	The number of 4K byte page frames (real storage) for virtual storage assigned to the address space at the time of the last data refresh.
Data Space Frames	The number of 4K byte page frames (real storage) for Data Space storage assigned to the address space at the time of the last data refresh.
Pages in	The number of page in operations performed during the measurement interval.
Pages out	The number of page out operations performed during the measurement interval.

DB2 activity

This section shows information about DB2 activity observed during the measurement interval.

Under heading	This is displayed
SQL call count	The number of SQL calls counted during the measurement interval. This information is available only if the DB2+ feature was enabled for the measurement.
SQL samples	The number of samples in which SQL call processing was in progress.
DB2 Plan	The name of the DB2 Plan for the last SQL request whose execution was sampled. This information is available only if the DB2 feature was enabled for the measurement.

Under heading	This is displayed
DB2 DBRM	The name of the DB2 DBRM for the last SQL request whose execution was sampled. This information is available only if the DB2 feature was enabled for the measurement.

CICS transactions

This section shows information about CICS transactions that are currently active. This information is available only if the address space being measured is a CICS region and the CICS measurement feature is enabled.

Under heading	This is displayed
Active txns	The number of CICS transactions currently active (includes suspended transactions).
Current TranId	The transaction ID of the currently executing CICS transaction.
Suspended txns	The number of CICS transactions currently suspended. This number is also included in the Active txns value.
CICS TaskId	The task number of the CICS transaction currently executing.

View 2. CPU utilization

View 2. CPU Utilization quantifies distribution of CPU usage. The quantifications are reported in two modes: Overall and Current.

Overall mode appears on the left side of the screen and shows accumulated quantifications based on the overall measurement. Each quantity is an overall sample count. It is also expressed as a percentage and illustrated by a histogram.

Current mode appears on the right side of the screen and shows quantifications representing the last measured time slice. Each quantity is a sample count for the time slice and is also illustrated by a histogram. (Use the SETUP command to adjust the size of the time slice.)

If in “auto-refresh” mode data in this screen will refresh automatically at the specified rate. Otherwise press ENTER to refresh the data.

A sample report is shown here:

```
  File  View   Navigate   Help
-------------------------------------------------------------------------------
M01: IBM APA for z/OS Realtime Monitor (2132/CICS22A)       Row 00001 of 00028
Command ===>_____________________________________________ Scroll ===> PAGE

  1. Overview    3. Environment   5. Data Mgmt
  2. CPU Util.   4. CPU/Modules
_______________________________________________________________________________
View 2. CPU Utilization

+Overall CPU Activity 7 min 7.81 sec --------------+ +Current 0.66 sec ------+
| Samples      64,179   71.3% --------------       | | 100 ''''''''         |
| CPU Active    5,597    8.7% -                    | |  39 =======          |
| WAIT         57,303   89.2% ------------------   | |  52 =========        |
| Queued        1,279    1.9% -                    | |   9 =                |
+-------------------------------------------------+ +----------------------+

+CPU Usage Distribution ---------------------------+ +Current ---------------+
| CPU Active    5,597    8.7% -                    | |   39 ''''''''        |
| Application     104    1.8% -                    | |    1 =               |
| System        2,119   37.8% -------             | |   18 ========        |
| DB2 SQL         217    3.8% -                    | |    0                 |
| Data Mgmt         0    0.0%                      | |    0                 |
| Unresolved    3,164   56.4% -----------         | |   20 =========       |
+-------------------------------------------------+ +----------------------+

+CPU Modes ----------------------------------------+ +Current ---------------+
| CPU Active    5,604    8.7% -                    | |  39 ''''''''         |
| Supv Mode     3,828   68.3% --------------      | |  23 ==========       |
| Prob Mode     1,776   31.6% ------              | |  16 =======          |
| In SVC          424    7.5% -                    | |   2 =                |
| AMODE 24          0    0.0%                      | |   0                  |
| AMODE 31      5,604  100.0% --------------------| |  39 ==================|
| AMODE 64          0    0.0%                      | |   0                  |
| User key      1,887   33.6% ------              | |  16 =======          |
| System key    3,717   66.3% --------------      | |  23 ==========       |
+-------------------------------------------------+ +----------------------+
```

CPU activity

This section shows sample counts for the overall measurement and for the current time slice. These are categorized as CPU Active, WAIT and Queued.

Under heading	This is displayed
Samples	The number of samples performed in the overall measurement and in the time slice. The percentage shown in the Overall CPU Activity section represents the ratio of the number of samples completed to the number of samples requested.
CPU Active	The number of samples done in which one or more CPUs were executing instructions in the measured region. The percentage value indicates the ratio of the total number of CPU Active samples to the total number of samples completed so far. The first histogram represents this percentage and shows the proportion of the overall measurement time in which CPU activity was observed. The second sample count shows the number of CPU Active samples in the current time slice. The second histogram shows the proportion of the current time slice in which CPU activity was observed.

Under heading	This is displayed
CPU WAIT	The number of samples done in which all TCBs were in WAIT (non dispatchable) state. The percentage value indicates the ratio of the total number of CPU WAIT samples to the total number of samples completed so far. The first histogram represents this percentage and shows the proportion of the overall measurement time in which all TCBs were in WAIT state. The second sample count shows the number of CPU WAIT samples in the current time slice. The second histogram shows the proportion of the current time slice in which all TCBs were observed to be in WAIT state.
Queued	The number of samples done in which no TCBs were CPU active and at least one TCB was dispatchable. This indicates a state in which work was not being done in the measured region because no CPU (or memory) was available. The percentage value indicates the ratio of the total number of Queued samples to the total number of samples completed so far. The first histogram represents this percentage and shows the proportion of the overall measurement time in which a TCB was dispatchable and not serviced. The second sample count shows the number of Queued samples in the current time slice. The second histogram shows the proportion of the current time slice in which one or more TCBs was dispatchable and not serviced.

CPU usage distribution

This section shows a breakdown of CPU active TCB observations. CPU active observations are broken down by categories: Application code, System services, DB2 and Data management.

Under heading	This is displayed
CPU Active	The number of observations of CPU Active TCBs. This value could be higher than the number of CPU Active samples because each CPU Active TCB is counted. Two or more TCBs could be serviced concurrently by separate CPUs. The percentage value indicates the ratio of the total number of CPU Active samples to the total number of samples completed so far. The first histogram represents this percentage and shows the proportion of the overall measurement time for which CPU activity was observed. The second sample count shows the number of CPU Active TCB observations in the current time slice.
Application	The number of CPU Active TCB observations in which execution was observed in application programs. This is a subset of the CPU Active observation count. The percentage value indicates the ratio of the number of application program observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed in application code. The second count shows the number of application code CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in application code in this time slice.

Under heading	This is displayed
System	The number of CPU Active TCB observations in which execution was observed in system services. This is a subset of the CPU Active observation count. The percentage value indicates the ratio of the number of system services observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed in system routines. The second count shows the number of system services CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in system services in this time slice.
DB2 SQL	The number of CPU Active TCB observations in which execution was in DB2 routines servicing SQL requests. This is a subset of the CPU Active observation count. The percentage value indicates the ratio of the number of DB2 observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be processing SQL requests. The second count shows the number of DB2 services CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in DB2 services in this time slice.
Data management	The number of CPU Active TCB observations in which execution was in the servicing of Data Management requests. This is a subset of the CPU Active observation count. The percentage value indicates the ratio of the number of Data Management service observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be processing Data Management requests. The second count shows the number of Data Management services CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in Data Management services in this time slice.
Unresolved	The number of CPU Active TCB observations in which execution was in object code in storage locations for which no load module information could be obtained. This can occur for modules fetched into CSA by a region other than the one being measured. This quantity is a subset of the CPU Active observation count. The percentage value indicates the ratio of the number of unresolved location observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be in unresolved storage locations. The second count shows the number of unresolved storage location CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in unresolved storage locations in this time slice.

CPU modes

This section shows a breakdown of CPU active TCB observations by mode of CPU execution. These modes are not all mutually exclusive. For example, execution in Problem State could also be counted as execution in AMODE 31.

Under heading	This is displayed
CPU Active	The number of observations of CPU Active TCBs. This value could be higher than the number of CPU Active samples because each CPU Active TCB is counted. Two or more TCBs could be serviced concurrently by separate CPUs. The percentage value indicates the ratio of the total number of CPU Active samples to the total number of samples completed so far. The first histogram represents this percentage and shows the proportion of the overall measurement time for which CPU activity was observed. The second sample count shows the number of CPU Active TCB observations in the current time slice.
Supv Mode	The number of CPU Active TCB observations in which execution was in Supervisor Mode. The percentage value indicates the ratio of the number of Supervisor Mode observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be in Supervisor Mode. The second count shows the number of Supervisor Mode CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in Supervisor Mode in this time slice.
Prob Mode	The number of CPU Active TCB observations in which execution was in Problem Mode. The percentage value indicates the ratio of the number of Problem Mode observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be in Problem Mode. The second count shows the number of Problem Mode CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in Problem Mode in this time slice.
In SVC	The number of CPU Active TCB observations in which execution was in a Supervisor Call. The percentage value indicates the ratio of the number of SVC execution observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be in a Supervisor Call. The second count shows the number of Problem Mode CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in SVC execution in this time slice.
AMODE 24	The number of CPU Active TCB observations in which execution was in 24 bit addressing mode. The percentage value indicates the ratio of the number of AMODE 24 observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be in AMODE 24. The second count shows the number of AMODE 24 CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in AMODE 24 in this time slice.

Under heading	This is displayed
AMODE 31	The number of CPU Active TCB observations in which execution was in 31 bit addressing mode. The percentage value indicates the ratio of the number of AMODE 31 observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be in AMODE 31. The second count shows the number of AMODE 31 CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in AMODE 31 in this time slice.
AMODE 64	The number of CPU Active TCB observations in which execution was in 64 bit addressing mode. The percentage value indicates the ratio of the number of AMODE 64 observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be in AMODE 64. The second count shows the number of AMODE 64 CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in AMODE 64 in this time slice.
User key	The number of CPU Active TCB observations in which execution was in user storage key (Key 8). The percentage value indicates the ratio of the number of user key observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be in user key. The second count shows the number of user key CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in user key in this time slice.
System key	The number of CPU Active TCB observations in which execution was in system storage key (not key 8). The percentage value indicates the ratio of the number of system key observations to the number of CPU Active observations. The first histogram represents this percentage and shows the proportion of the overall CPU time for which CPU activity was observed to be in system key. The second count shows the number of system key CPU Active observations in the current time slice. The histogram represents the proportion of CPU time in system key in this time slice.

View 3. Measurement environment

The data reported here is static and shows the measurement request parameters and information about the measurement environment.

A sample report is shown here:

```
  File  View  Navigate   Help
--------------------------------------------------------------------------------
M01: IBM APA for z/OS Realtime Monitor (2132/CICS22A)       Row 00001 of 00028
Command ===>_____________________________________________ Scroll ===> PAGE
  1. Overview    3. Environment   5. Data Mgmt
  2. CPU Util.   4. CPU/Modules
________________________________________________________________________________
View 3. Measurement Environment

+Request Parameters-------------------------------------------------------------+
| Request number     2132                                                      |
| Description        CICS region                                               |
| Data extractors    CICS,DB2,DB2+                                             |
+-----------------------------------+-----------------------------------+
| Requesting user    USR01          | Nbr of samples      90,000        |
| Time of request    09:53:34       | Duration            600 sec       |
| Date of request    Tue May-31-2005| Active/pending      Active        |
| Job name           CICS22A        | Proc step name      n/a           |
| Step name/number   n/a            | Delay time          none          |
| Step program       n/a            |                                   |
+-----------------------------------+-----------------------------------+

+Measurement Environment--------------+-----------------------------------+
| Job name           CICS22A         | Region size <16MB   1,712,128K    |
| Job number         STC02108        | Region size >16MB   4K            |
| Step name          CICS22A         | Step program        DFHSIP        |
| ASID               71              | Region type         CICS TS 2.2   |
| DB2 Attach type    CICS            |                                   |
+-----------------------------------+-----------------------------------+
| System ID          X235            | IBM APA Version     1.100A        |
| SMFID              X235            | O/S level           z/OS 01.06.00 |
+-----------------------------------+-----------------------------------+
| Nbr of CPUs        2               | CPU model           1247          |
| CPU rate factor    6,015           | CPU version         0A            |
| MIPS per CPU       54              | SUs per second      2660.0        |
+-----------------------------------+-----------------------------------+
```

Request parameters

These values were established when the measurement was requested.

Under heading	This is displayed
Request number	The unique four-digit identifier assigned to the measurement.
Description	A description specified when the measurement was requested.
Data extractors	The specified data extractors (DB2, CICS, etc.)
Requesting user	The TSO user ID of the user that requested the measurement.
Time of request	The time of day the request was made.
Date of request	The date upon which the request was made.
Job name	The name of the job that was specified to be measured.
Step name/number	The step name or step number that was specified to be measured, if applicable.
Step program	The name of the step program that was specified to be measured, if applicable.
Number of samples	The number of samples specified.

Under heading	This is displayed
Duration	The specified measurement duration.
Active/pending	Indicates whether the measurement request specified an active job (an immediate measurement) or one that was to run later when execution of the job step is detected.
Proc step name	The procedure step name, if specified.
Delay time	The number of seconds specified for which the start of the measurement was to be delayed from the start of the job step.

Measurement environment

Values relating to the environment in which the measurement took place are reported here.

Under heading	This is displayed
Job name	The name of the measured job.
Job number	The job number of the measured job assigned by JES.
Step name	The name of the measured step.
ASID	The ASID (address space ID) of the measured job.
DB2 attach type	The type of DB2 attachment, if DB2 data recorded.
Region size < 16MB	The region size in the 24 bit address range.
Region size > 16MB	The region size above the 24 bit address range.
Step program	The name of the measurement step program (specified in the EXEC JCL statement).
Region type	The type of region (Batch, TSO, IMS, CICS, etc.) measured.
System ID	The system identifier of the system on which the measurement took place.
SMFID	The SMF ID assigned to the system on which the measurement took place.
IBM APA vers.	The version of IBM Application Performance Analyzer for z/OS that performed the measurement.
O/S Level	The operating system and level.
Nbr of CPUs	The number of CPUs in the system on which the measurement took place.
CPU rate factor	The factor used to determine CPU performance.
MIPS per CPU	The speed, in machine instructions per second, of one CPU. This is derived using the CPU rate factor.
CPU model	The CPU model number.
CPU version	The CPU version.
SUs per second	The number of service units per CPU second.

View 4. CPU active modules

Overall CPU activity

A sample report is shown here:

```
   File  View  Navigate  Help
--------------------------------------------------------------------------------
M01: IBM APA for z/OS Realtime Monitor (2132/CICS22A)        Row 00001 of 00034
Command ===>_____________________________________________________ Scroll ===> PAGE
  1. Overview    3. Environment   5. Data Mgmt
  2. CPU Util.   4. CPU/Modules
________________________________________________________________________________
View 4. CPU Active Modules (CURRENT)

+Overall CPU Activity 8 min 14.33 sec --------------+ +Current 0.66 sec ------+
| Samples      74,159   82.3% -----------------      | | 100 ''''''''           |
| CPU Active    7,584   10.2% --                     | |  42 =======            |
+---------------------------------------------------+ +------------------------+
Name     Description           Percent of CPU Time * 10.00% ±15.6%
                                 *....1....2....3....4....5....6....7....8....9
DFHSIP CICS Services        11.90 ======
DFHPGDM PG domain - initi    7.14 ====
185C6xxx Unresolved Addres   4.76 ==
152D3xxx Unresolved Addres   4.76 ==
186E3xxx Unresolved Addres   2.38 =
17AEFxxx Unresolved Addres   2.38 =
17D88xxx Unresolved Addres   2.38 =
DFHMCX   BMS fast path mod   2.38 =
18227xxx Unresolved Addres   2.38 =
18542xxx Unresolved Addres   2.38 =
17848xxx Unresolved Addres   2.38 =
--------------------------------------------------------------------------------
```

Under heading	This is displayed
Samples	The number of samples performed in the overall measurement. The percentage shown section represents the ratio of the number of samples completed to the number of samples requested. This percentage is also represented by a histogram.
CPU Active	The number of samples done in which one or more CPUs were executing instructions in the measured region. The percentage value indicates the ratio of the total number of CPU Active samples to the total number of samples completed so far. The histogram represents this percentage and shows the proportion of the overall measurement time in which CPU activity was observed.

Current

This shows the number of samples in the current time slice and the number of these samples in which CPU activity was observed. The heading shows the elapsed time of the time slice.

Under heading	This is displayed
Samples	The number of samples performed in the current time slice.
CPU Active	The number of samples in the current time slice in which one or more CPUs were executing instructions in the measured region. The histogram represents the proportion of the time slice in which CPU activity was observed.

Module attribution

Each detail line in this section shows a load module name and the percentage of observed CPU activity attributed to the module. The quantifications shown in this section apply to the full measurement if in ACCUM mode and to the last time slice if in CURRENT mode. Enter the ACCUM command or the CURRENT command to switch between these two modes.

Under heading	This is displayed
Name	The name of the module in which CPU activity was observed. Use the "+" line command to expand this line to show CSECT information. For an address range for which a module name could not be determined, this shows a hexadecimal address range.
Description	A functional description of the module if one is available.
Percent of CPU Time	The percentage of CPU time consumed while executing in the module. This is the ratio of the number of CPU Active TCB observations in the module to the total number of CPU Active observations.

View 5. Data mgmt service time

In ACCUM mode, files for which EXCPs were processed during the measurement are shown. In CURRENT mode, files for which EXCPs were processed since the last data refresh are shown. In both cases the detail lines are sorted in descending sequence by EXCP count since the last data refresh.

A sample report is shown here:

```
  File  View  Navigate   Help
-------------------------------------------------------------------------------
M01: IBM APA for z/OS Realtime Monitor (2133/CICS22A)       Row 00001 of 00004
Command ===>_____________________________________________ Scroll ===> PAGE
  1. Overview    3. Environment   5. Data Mgmt
  2. CPU Util.   4. CPU/Modules
_______________________________________________________________________________
View 5. Data Mgmt Service Time (ACCUM)

DDNAME    Type    EXCPs   CPU-Wait-Queued   Dataset Name
VSAM1     VSAM    4,568   =======           USR01.DATA.TESTPF
INFILE    QSAM       45                     USR01.TESTPF2.INFILE
OUTFILE   QSAM       20                     USR01.TESTPF2.OUTFILE
STEPLIB               2                     APL1.RTEST.LOADLIB
-------------------------------------------------------------------------------
```

Under heading	This is displayed
DDNAME	The DDNAME to which the file is allocated. A separate line appears for each OPEN of the DDNAME. A separate line also appears for each data set in a concatenation.
Type	The type of file access (QSAM, BSAM, etc.) is reported if this information was determined. Measurement of execution in a data management routine for the file must have taken place for this to be reported.
EXCPs	In ACCUM mode, the number of EXCPs since the first file activity measurement. In CURRENT mode, the number of EXCPs since the last data refresh.

Under heading	This is displayed
CPU-Wait-Queued	A histogram showing the proportion of samples in which execution was observed in data management routines servicing access of the file. The colors green, red and yellow indicate CPU active, Wait and Queued respectively. The width of the field represents 100 percent of the measurement interval for ACCUM mode and 100 percent of the last time slice for CURRENT mode.
Data set Name	The name of the data set.

Chapter 14. Application Performance Analyzer Graphical User Interface (GUI).

This chapter describes the Application Performance Analyzer GUI. All menus, tool bars and views that are part of the Application Performance Analyzer GUI are detailed in this chapter.

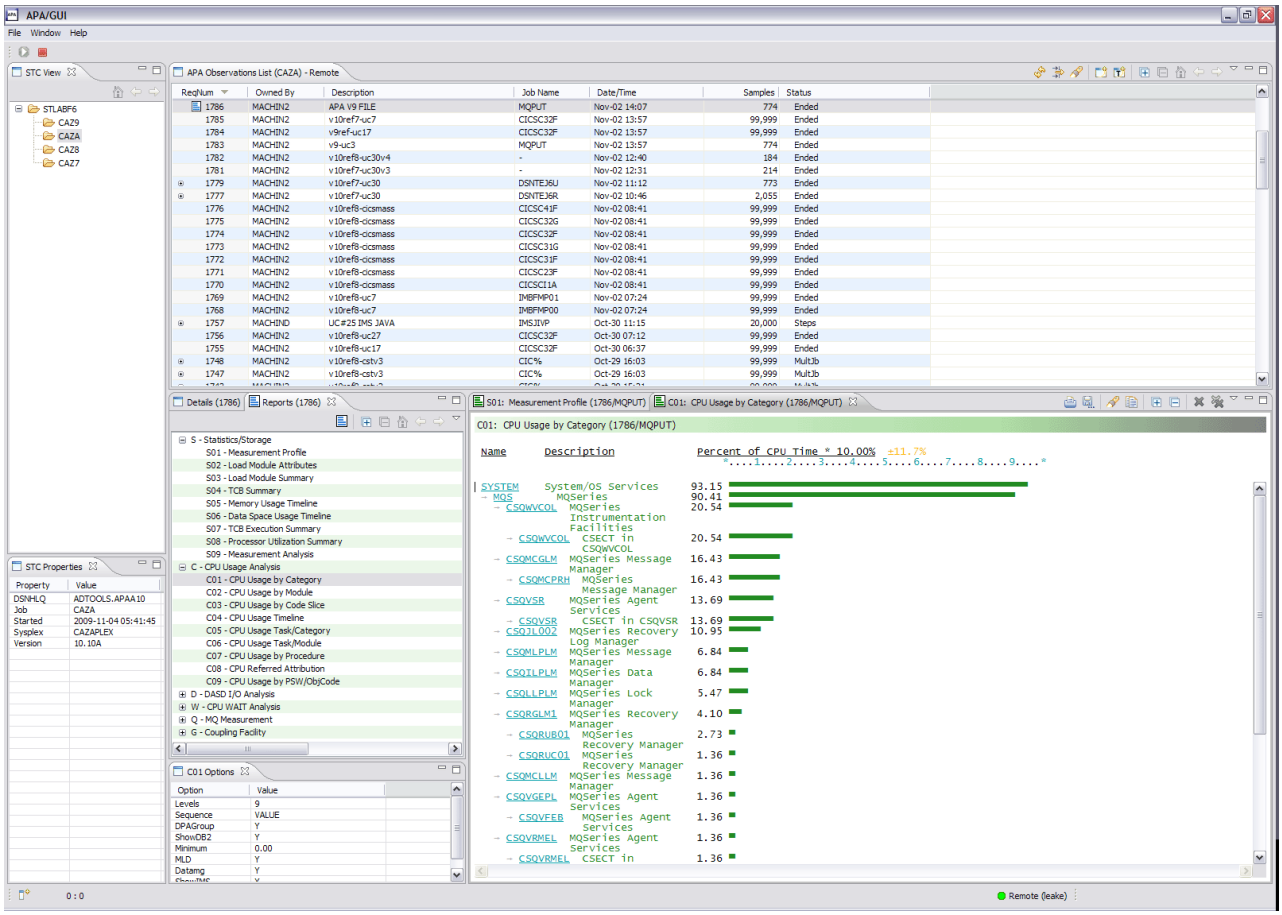

Figure 1. The Application Performance Analyzer GUI

Getting started with the Application Performance Analyzer GUI

The Application Performance Analyzer GUI is a desktop version of Application Performance Analyzer ISPF. The Application Performance Analyzer GUI encompasses both the Observation Request and Reporting functions, including the R02 screens list, detail views, edit functions and reports for the Observation.

The Application Performance Analyzer GUI is an alternative interface to Application Performance Analyzer, meant to provide a majority of parallel tools and functionality as those from Application Performance Analyzer ISPF, the main interface to Application Performance Analyzer. The Application Performance Analyzer GUI is used for submitting new observation requests and for navigating the Performance Analysis Reports generated from observation requests. The Application Performance Analyzer GUI is organized into several components,

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which include a menu, tool bars, views, wizards and dialogs. Tool bars are available both from the main application and for most of the views.

The views display and provide functions to multiple components of Application Performance Analyzer at once. The major views include:

- STC View, which lists all active started tasks,
- Observations List View, which lists all observations,
- Observation Detail View, which provides details of an observation,
- Reports List View, which lists all reports for an observation, and
- Report View, which displays an individual report.

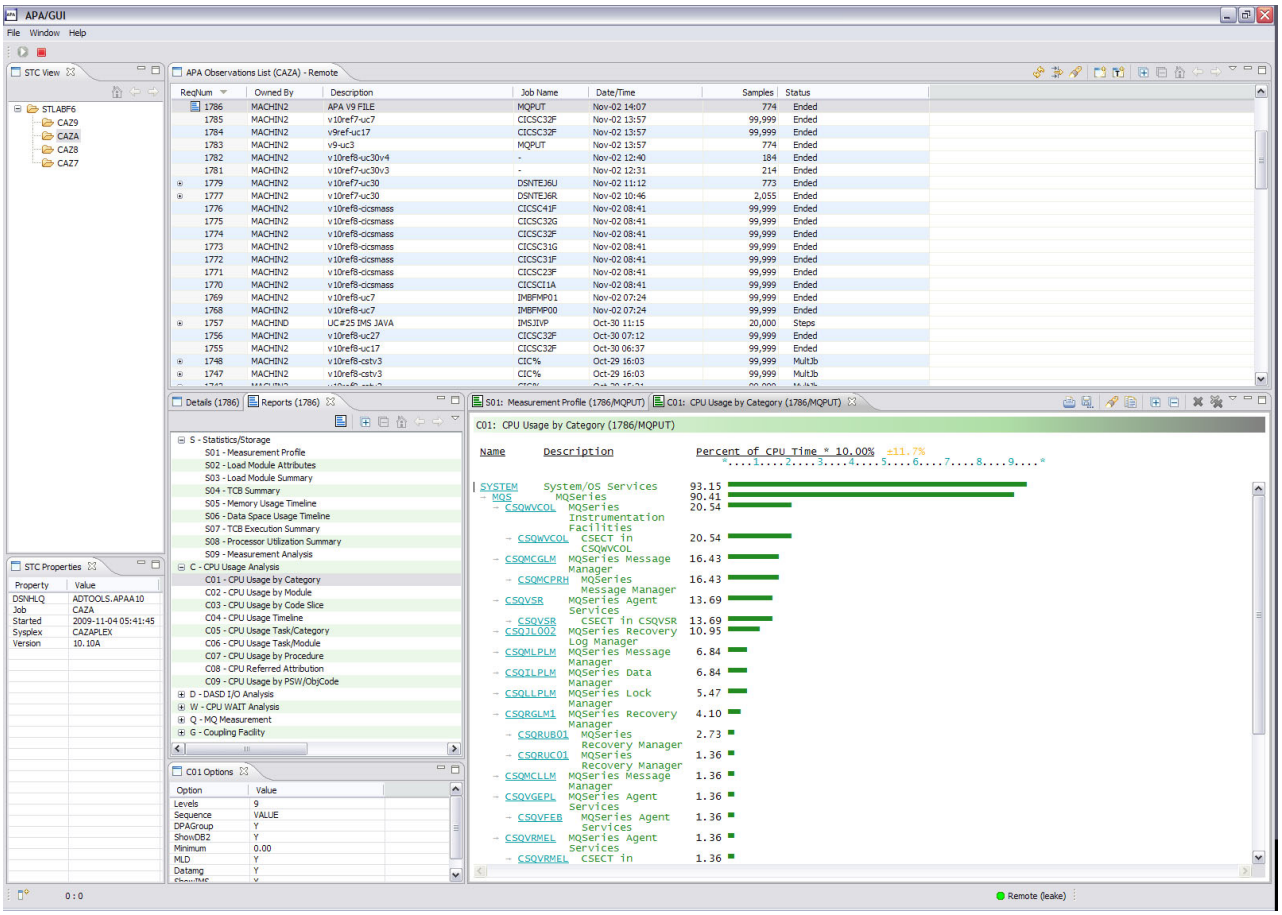


Figure 2. The Application Performance Analyzer GUI layout

System requirements

The Application Performance Analyzer GUI must be installed on a Windows platform (XP, Vista, 7, Server 2003/2008).

Details of software prerequisites are in Chapter 7 of the *Application Performance Analyzer for z/OS Customization Guide*.

Communications

The Application Performance Analyzer GUI platform has built-in support for both local and remote (z/OS) repositories. The local repository is populated and refreshed automatically with the most recent transaction data, with the exception

of the observation reports. Reports are downloaded on request by selecting Download Reports from the context menu of the Observation List or clicking the Download Reports button on the Reports View.

The initial install of the Application Performance Analyzer GUI connects to the remote repository, while subsequent startups automatically load and display the local repository of the Startup Application Performance Analyzer started task. The remote repository is accessed via TCP/IP communications between the Application Performance Analyzer GUI and z/OS. An Application Performance Analyzer Listener started task must be installed and active on z/OS.

The figure below provides an example of a local connection. Refer to Figure 2 on page 650 for an example of a remote connection.

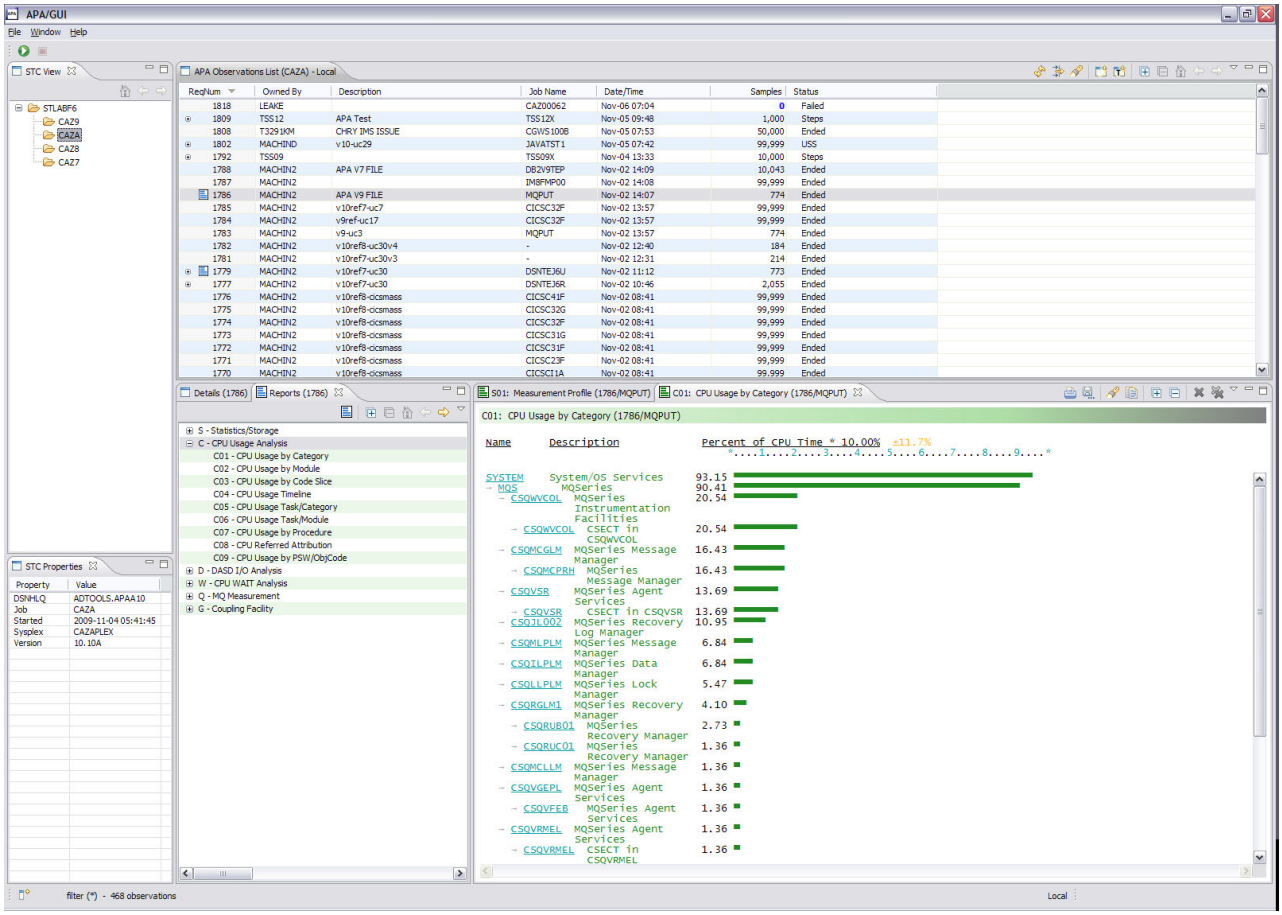


Figure 3. Local vs. remote connections

Logon dialog

A logon to z/OS is required to connect to the Application Performance Analyzer remote repository. The logon dialog is displayed where the connection Host Address, Host Port, TSO id, and password or pass phrase must be entered to connect to z/OS. The port number must be unique and not used by another plugin.

The connection settings group includes a checkbox to indicate a secure connection is used. When this is checked, a keystore and keystore pass phrase, located in the Network Connections Preferences are required for the secure connection to z/OS.

The address, port and TSO user ID are saved as a Network Connection Preference the first time they are entered. If any are changed in a subsequent login, they are not saved as a preference, but kept only for the connection session. The Network Connection Preferences page includes the settings to change and save these preferences.

The Logon dialog also includes an option to save the password. If this option is checked, the password is stored and automatically filled-in for future connections to z/OS. The saved password is deleted if the Save password box is subsequently unchecked.

When connecting to the remote repository on z/OS, Application Performance Analyzer might display informational or error messages. If "Automatic update notification" is selected in Workspace Preferences, Application Performance Analyzer will check if a new version of the GUI is available for download, and if so, will display a message to the user. Application Performance Analyzer will also display error messages when it finds an incompatibility between the GUI version and the z/OS version.

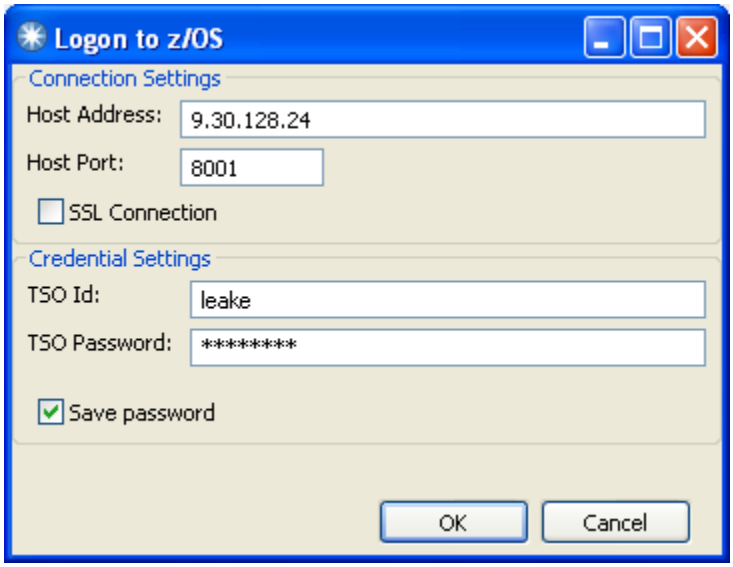


Figure 4. Logon dialog

Select STC dialog

The Select STC dialog is displayed after the initial successful logon to z/OS. A list of active Application Performance Analyzer Started Tasks (STC's) is displayed in which the default startup STC must be selected. The default STC is the started task which is selected at the startup of Application Performance Analyzer.

The default STC is saved as a Network Connection Preference and can be changed from either the Network Connection Preferences dialog or from the Set as Default STC context menu item of the STC List view.

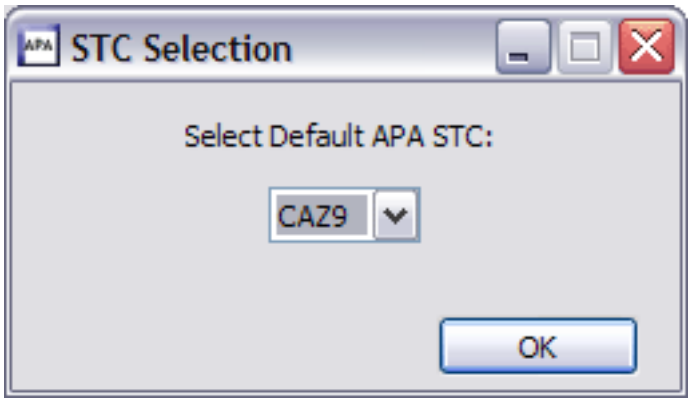


Figure 5. STC dialog

Main menu bar

The Main Menu bar contains application-level actions that include the File/Explorer, Window and Help menus.

File/Explorer menu

The File/Explorer Menu actions include:

- Exit APA. This action exits the Application Performance Analyzer GUI, closing the application.
-

  Connect APA. This action connects to the Remote repository on z/OS (Application Performance Analyzer on z/OS).

  A logon dialog is displayed in which the host address, host port, TSO user ID and password must be entered to connect to z/OS. Once a successful connection has been established, the Observations List is automatically refreshed with the latest observations from z/OS.
-

  Disconnect APA. This action disconnects the connection to the z/OS remote repository (Application Performance Analyzer on z/OS). The Observations List is automatically set to the Local repository.

Window menu

The Window Menu actions include:

- Open Perspective. This action lists perspectives that can be opened and opens the selected perspective.
- Show View. This action lists views that can be displayed. If the selected view is hidden, it will be shown (displayed).
- Save Perspective As. This action saves the current Application Performance Analyzer GUI layout as a new perspective.
- Reset Perspective. This action resets the current perspective to the original, default Application Performance Analyzer GUI layout.
- Preferences. This action opens the User Preferences dialog. Refer to "Preferences" on page 657 for details.

Help menu

The Help menu actions include:

- Help Contents. This action launches a browser window displaying Application Performance Analyzer GUI Help contents.

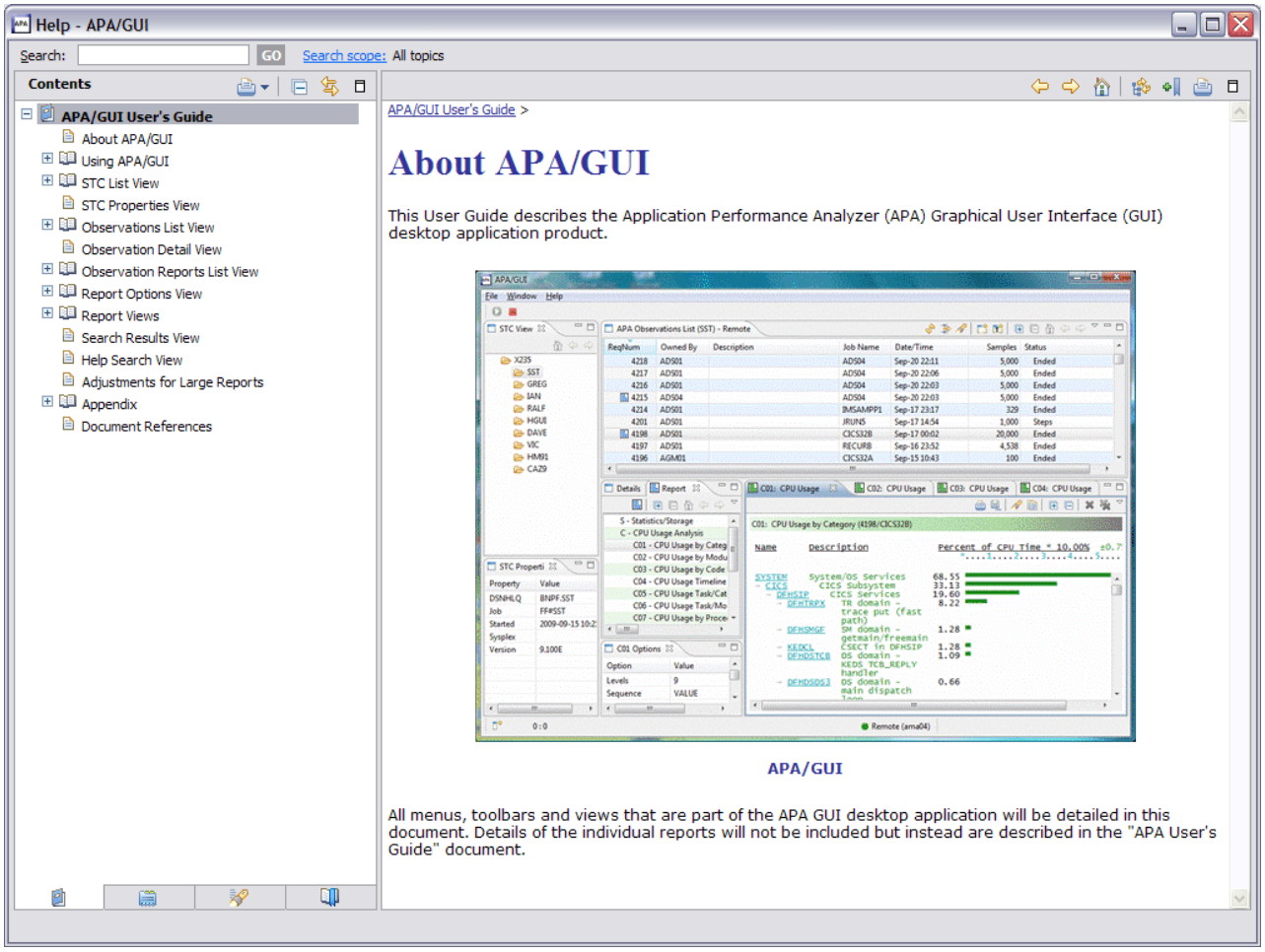


Figure 6. Help Contents browser dialog

- Help Search. This action displays the Help Search view. This view searches the Help content for the input search string and returns the results. Refer to “Help Search view” on page 721 for details.

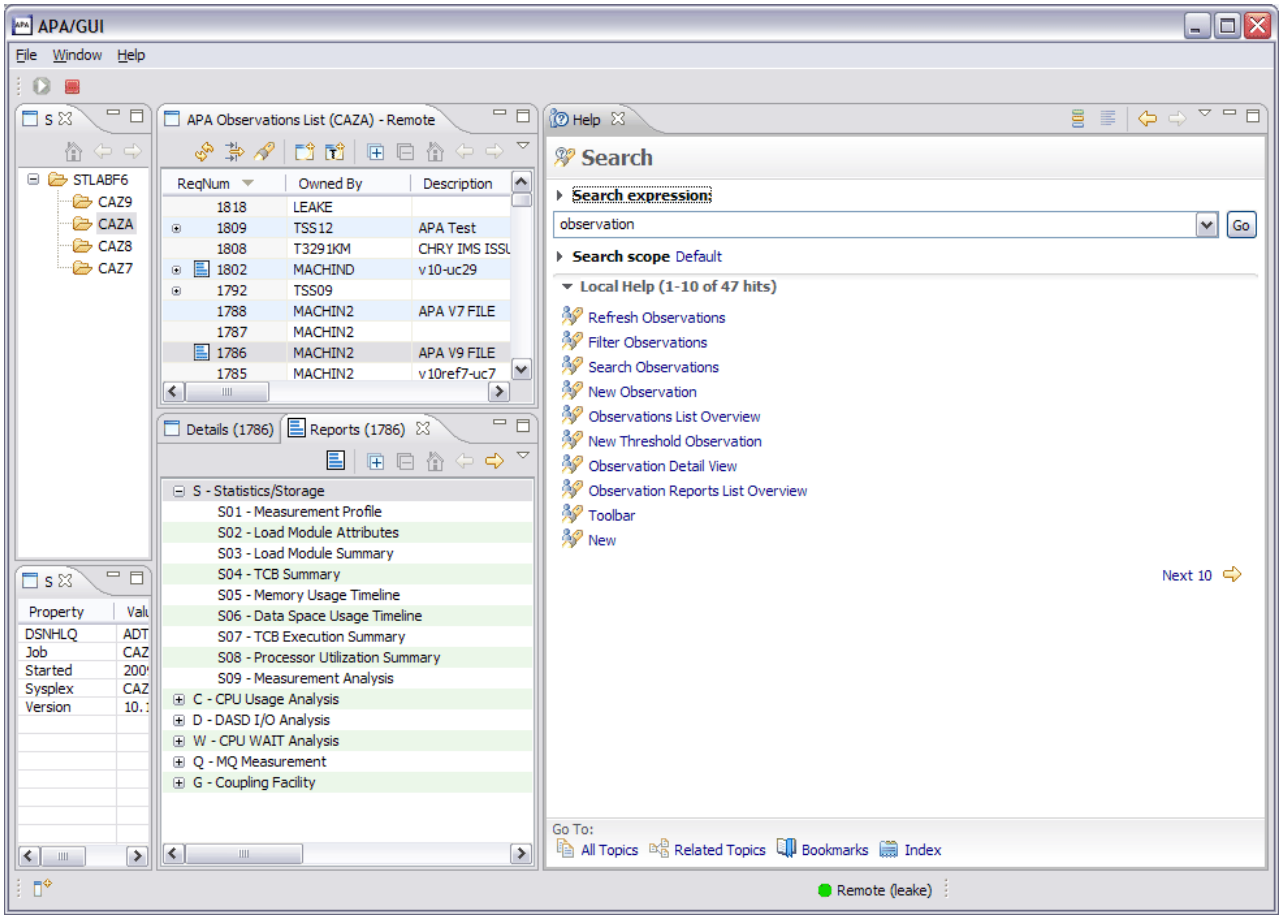


Figure 7. Help Search dialog

- About. This action displays a dialog which provides product, packaging and release information about the Application Performance Analyzer GUI.

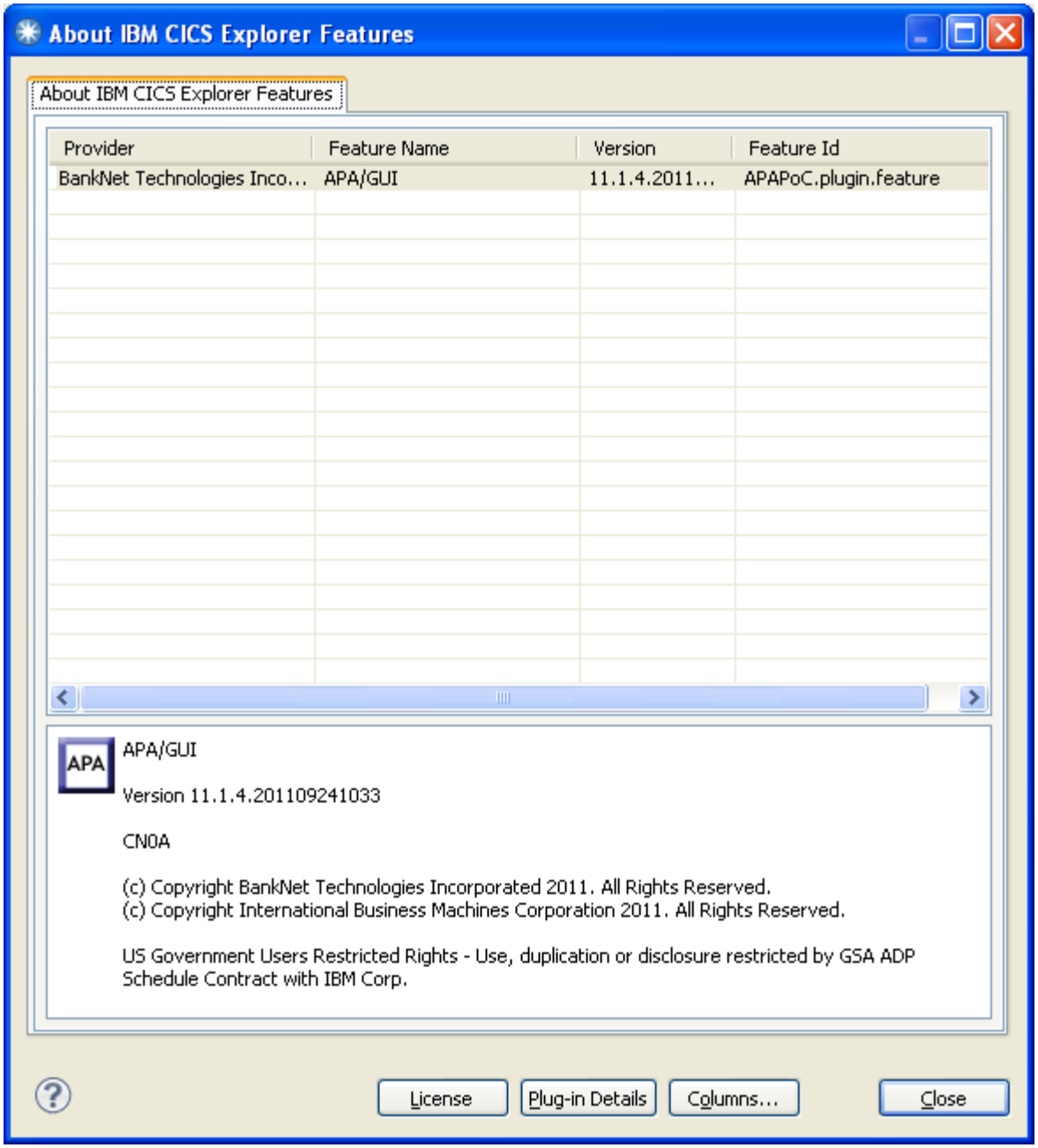


Figure 8. About APA/GUI dialog

Main toolbar

The Main Application Performance Analyzer GUI toolbar provides buttons for application-level actions which include:

•

This action connects to the Remote repository on z/OS (Application Performance Analyzer on z/OS). The Observations List is automatically refreshed with the latest observations from z/OS.

A Logon dialog is displayed in which the host address, host port, TSO user ID and password must be entered to connect to z/OS. Once a successful connection has been established, the Observations List is automatically refreshed with the latest observations from z/OS.

-

  Disconnect APA. This action disconnects the connection to the z/OS remote repository (Application Performance Analyzer on z/OS). The Observations List is automatically set to the Local repository.

Preferences

The Application Performance Analyzer GUI application preferences are accessed using the Window menu of the Main Toolbar. Preferences are persistent user property settings for the Application Performance Analyzer GUI.

General preferences

General preferences include general purpose view property settings.

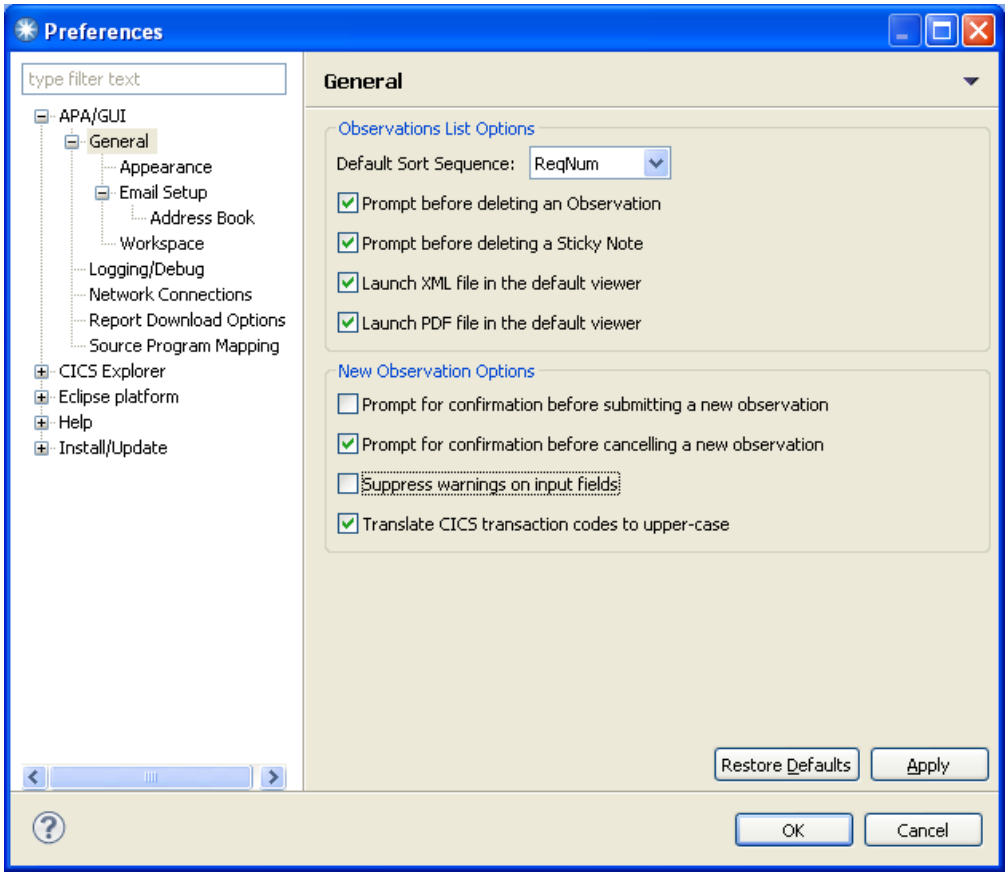


Table 21. General preferences and descriptions

Preference	Description
Default Sort Sequence	Order to sequence the observations in the Observations List view Default: *ReqNum*

Table 21. General preferences and descriptions (continued)

Preference	Description
Prompt before deleting an Observation?	Prompt (confirmation) is displayed prior to deleting an observation. Default: checked
Prompt before deleting a Sticky Note	Prompt (confirmation) will be displayed prior to deleting a sticky note Default: checked
Launch XML in the default viewer	Downloaded XML reports will be automatically launched in the default desktop XML viewer. Default: checked
Launch PDF in the default viewer	Downloaded PDF reports will be automatically launched in the default desktop PDF viewer (Adobe Acrobat). Default: unchecked
Prompt for confirmation before submitting a new observation	Prompt (confirmation) will be displayed prior to submitting a new observation request. Default: unchecked
Prompt for confirmation before cancelling a new observation	Prompt (confirmation) will be displayed prior to cancelling a new observation request. Default: unchecked
Suppress warnings on input fields	Suppress warnings (yellow light) on input fields for a new observation request. Default: unchecked
Translate CICS transaction codes to upper-case	Translate/transform CICS transaction codes to upper-case. Default: checked

Appearance preferences

Appearance preferences, accessible from the General preferences category, include property settings related to the overall GUI appearance.

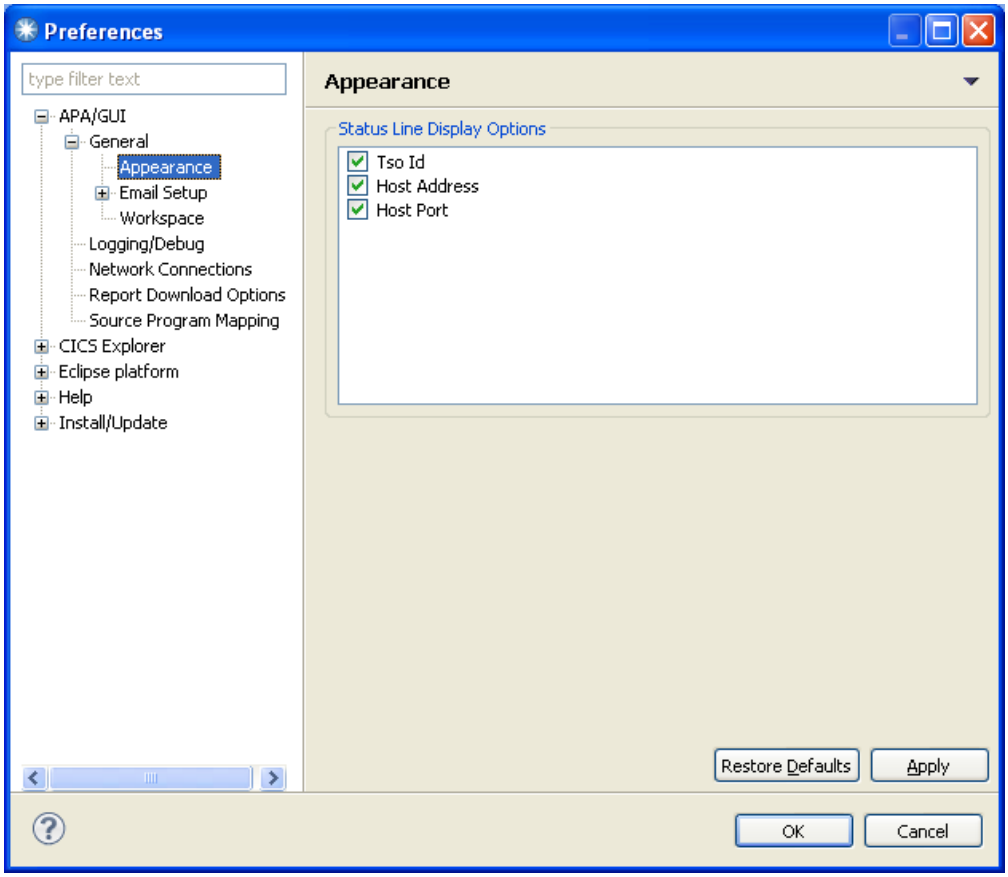


Table 22. Appearance preferences and descriptions

Preference	Description
Status Line Display Options	Connection information to display on the status line, including; TSO id, Host Address, Host Port. Default: TSO id

Email preferences

The Application Performance Analyzer GUI report e-mail function provides a tool to send a report view, optionally including any associated sticky notes, to one or more e-mail addresses. E-mail setup preferences, accessible from the General preferences category, include property settings for e-mail communications. The e-mail SSL Certificate must reside in the keystore file location defined in the Network Connection Preferences.

Note: Application Performance Analyzer GUI must be exited and re-started for e-mail changes to take effect.

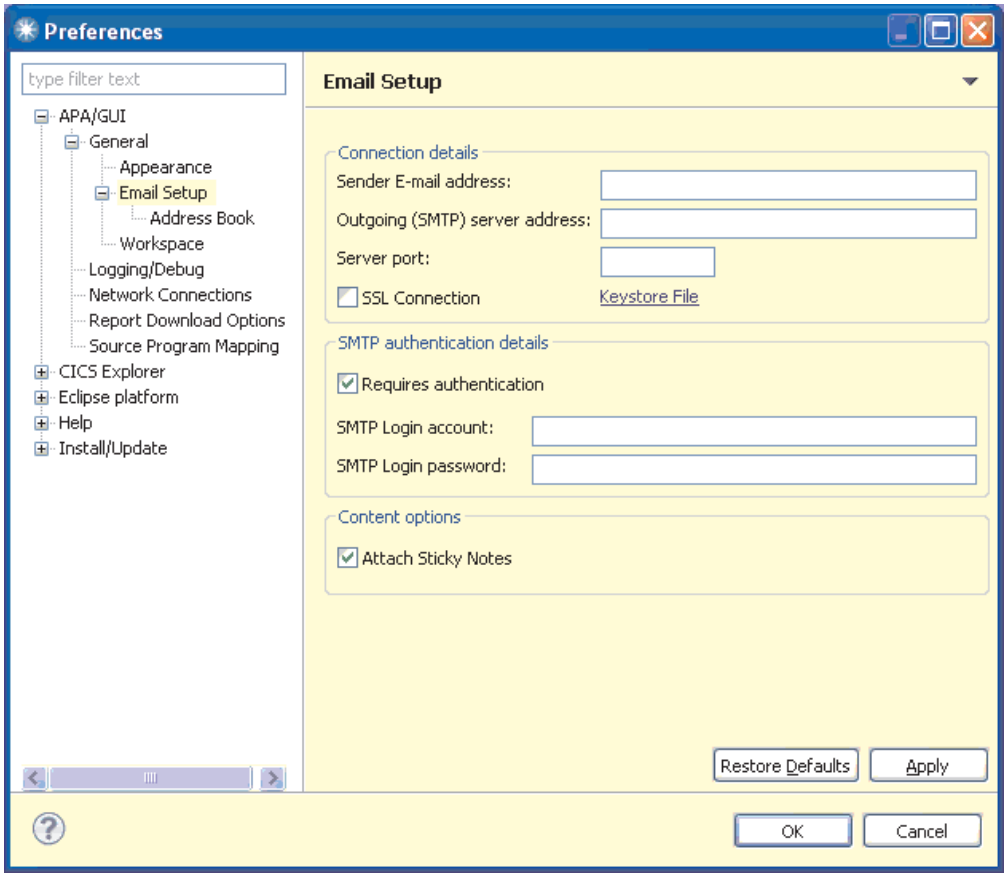


Table 23. Email preferences and descriptions

Preference	Description
Sender E-mail address	Sender ("from") e-mail address used to send Application Performance Analyzer GUI e-mails.
Outgoing (SMTP) server address	SMTP server address.
Server port	Port for the SMTP server. Default: 25
SSL Connection	SMTP server requires an SSL connection. Default: unchecked
Keystore File	Link to Keystore file preference located in the Network Connection Preferences.
Requires authentication	SMTP server requires authentication information Default: unchecked
SMTP Login account	Account/user id to login/connect to the SMTP server.
SMTP Login password	Account password for SMTP server login.
Attach Sticky Notes	Include sticky notes (if any) as e-mail attachment. Default: unchecked

Address book preferences

Address book preferences, accessible from the Email setup preferences category, provides a repository to store a list of contact e-mail addresses. It is used to select the "To" and "Cc" addresses for an Application Performance Analyzer GUI e-mail.

A new address must be entered in the 'New Address' text box then click the "Add" button. It will then be displayed in the address list below. Addresses displayed in the list can be copied or deleted. Copied addresses can then be pasted into the new address text box.

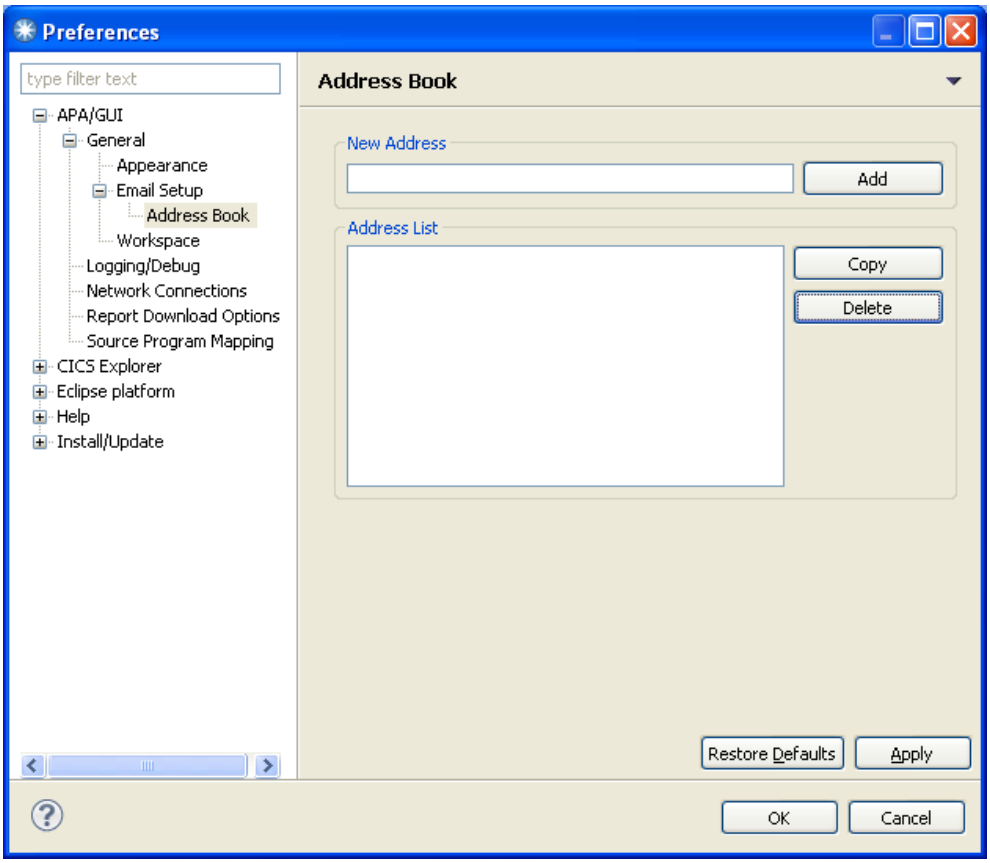


Figure 9. Address book preferences window

Workspace preferences

Workspace preferences, accessible from the General preferences category, include workspace-level property settings.

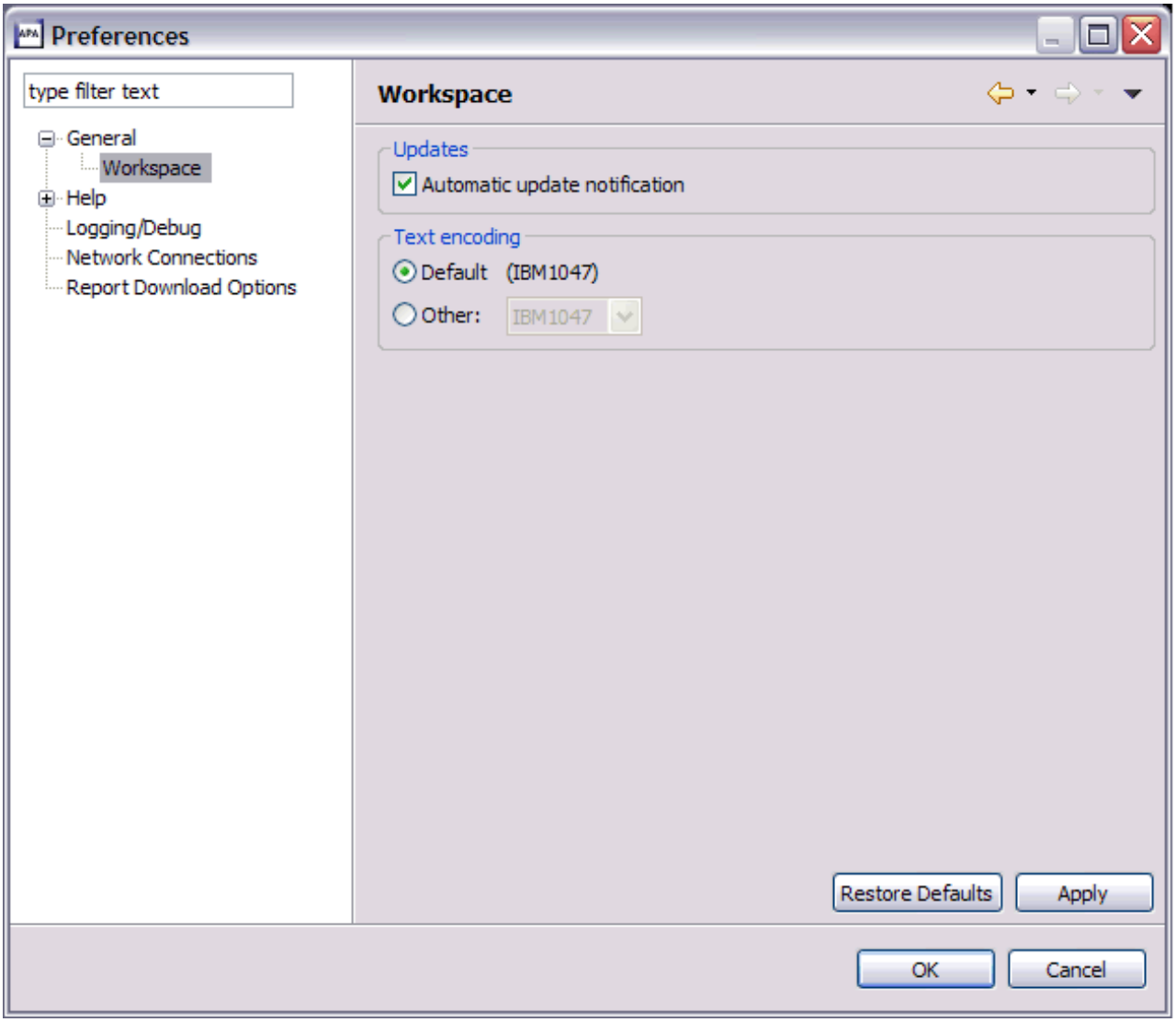


Figure 10. Workspace Preferences dialog

Table 24. Workspace preferences and descriptions

Preference	Description
Text Encoding	Codepage to use. Value is one of: IBM1047. Default: IBM1047
Automatic update notification	Check and notify user when updates are available. This is done at connect time. Default: checked

Logging/debug preferences

Logging/debug preferences include property settings for error, warning and information messages along with a debug option to save the downloaded z/OS dataspace. Log messages are written to the apatrace.log file, located in the c:*apa*\workspace\.metadata directory, where *apa* is the folder that the Application Performance Analyzer GUI was installed in.

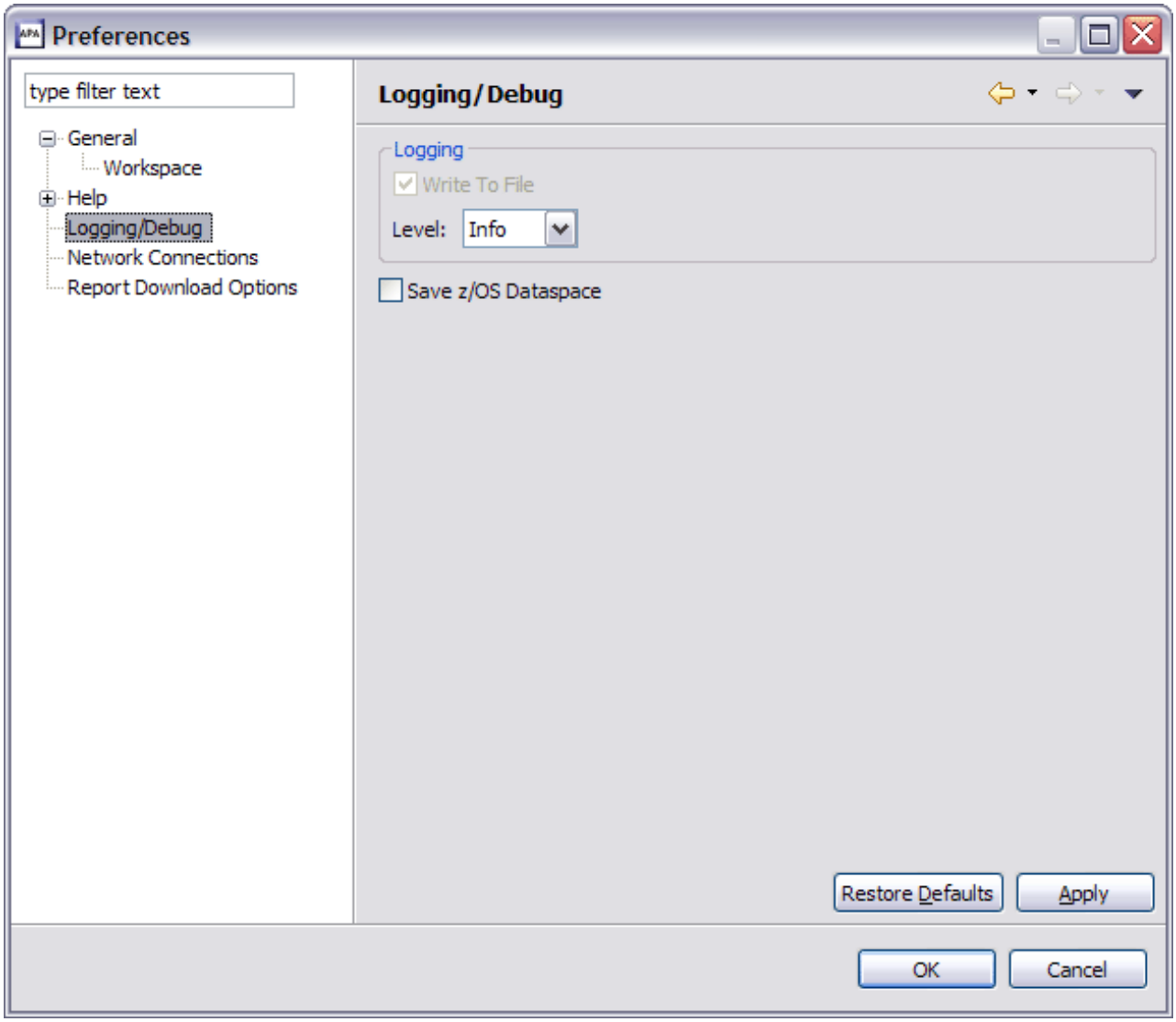


Figure 11. Logging Preferences dialog

Table 25. Logging/debug preferences and descriptions

Preference	Description
Write to file	Write the errors to the apatrace log file. Default: checked
Level	Level of error logging. Value is one of: Fatal, Error, Warn, Info, Debug, All, and Off. Default: Info
Save z/OS Dataspace	Save the downloaded z/OS dataspace. This is used for data debugging purposes. Default: unchecked

Network connections preferences

Network connections preferences include property settings related to z/OS communications and network connectivity.

Note: Application Performance Analyzer GUI must be exited and re-started for SSL connection changes to take effect.

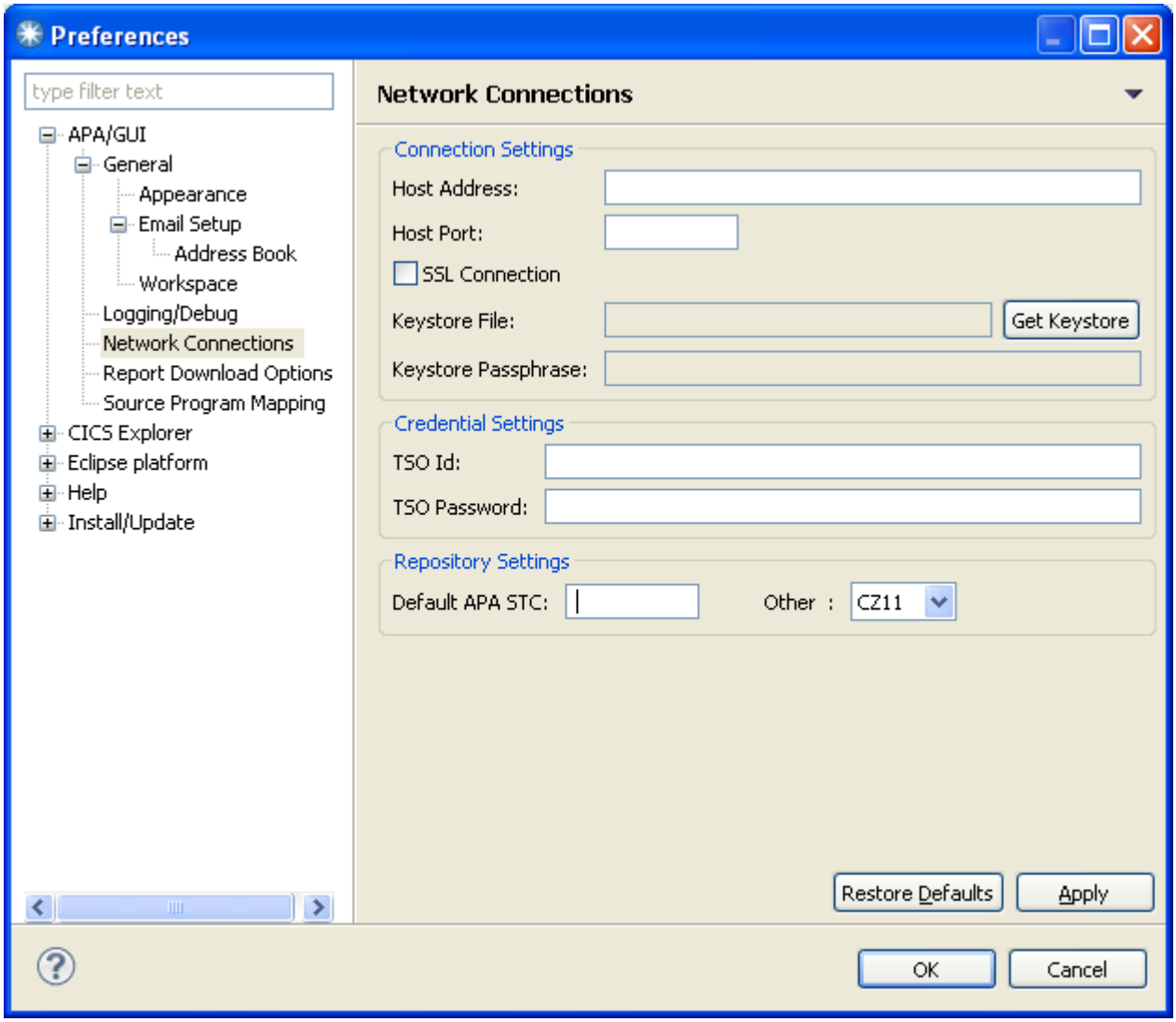


Figure 12. Network Connections preferences dialog

Table 26. Network connections preferences and descriptions

Preference	Description
Host Address	z/OS server address where the Application Performance Analyzer server communications reside
Host Port	Port where the z/OS Application Performance Analyzer server is listening
SSL Connection	Use SSL (secure) connection Default: unchecked
Keystore File	Keystore file used for SSL connection, should point to the directory and file that has the keystore.
Keystore Pass phrase	Pass phrase for keystore – should have the password used to access the keystore file.

Table 26. Network connections preferences and descriptions (continued)

Preference	Description
Connection TSO Id	TSO user ID that is to be used for the Application Performance Analyzer GUI communications
Connection TSO Password	Password for TSO user ID to be used for the Application Performance Analyzer GUI communications
Default APA STC	Default Application Performance Analyzer started task
Other	List of active Application Performance Analyzer STC's from which to optionally select the Default Application Performance Analyzer STC

Report download options preferences

Report download options preferences include property settings for downloading and viewing reports. The first scrollable list includes all report categories and reports that are available in Application Performance Analyzer to be downloaded. Individual report categories and reports that are to be downloaded, can be selected or unselected from the list.

The second scrollable list, located at the bottom of the window, includes all options for the selected report. Click the Edit button or double-click the option, and an edit dialog window is displayed in which the value can be modified. Any changes are applied to all downloads of the selected report type.

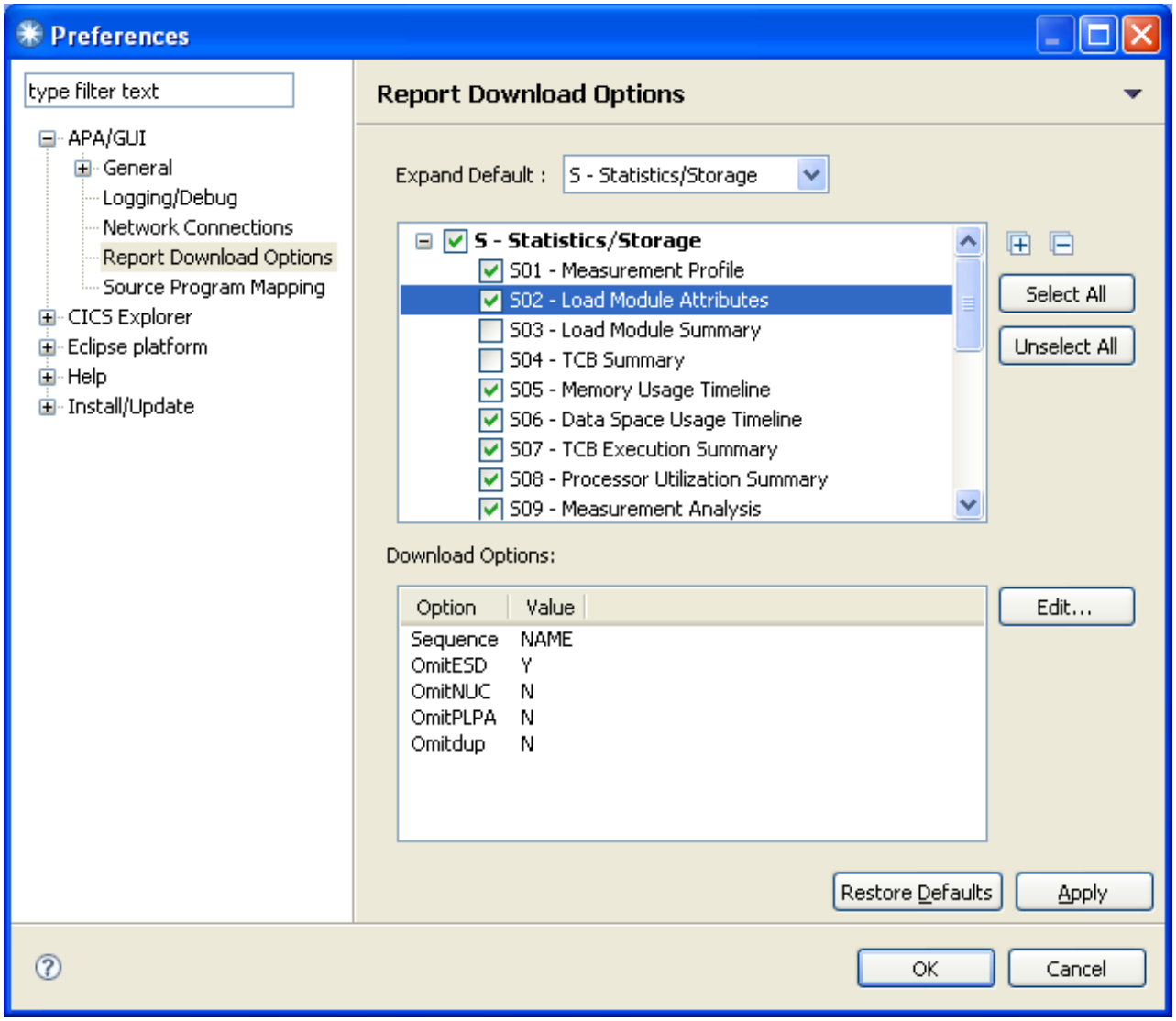


Figure 13. Report download options dialog

The second scrollable list, located at the bottom of the window, includes all options for the selected report. Click the Edit button or double-click the option, and an edit dialog window is displayed in which the value can be modified. Any changes are applied to all downloads of the selected report type.

Table 27. Report download options preferences and descriptions

Preference	Description
Expand Default	Sets which report category will be expanded when the report list is initially displayed. Default: C – CPU Usage Analysis
Download Options	Report download options – used when reports are downloaded. Default: System Configuration settings

Source program mapping preferences

Source Program Mapping preferences include property settings related to downloading and viewing details for a source program.

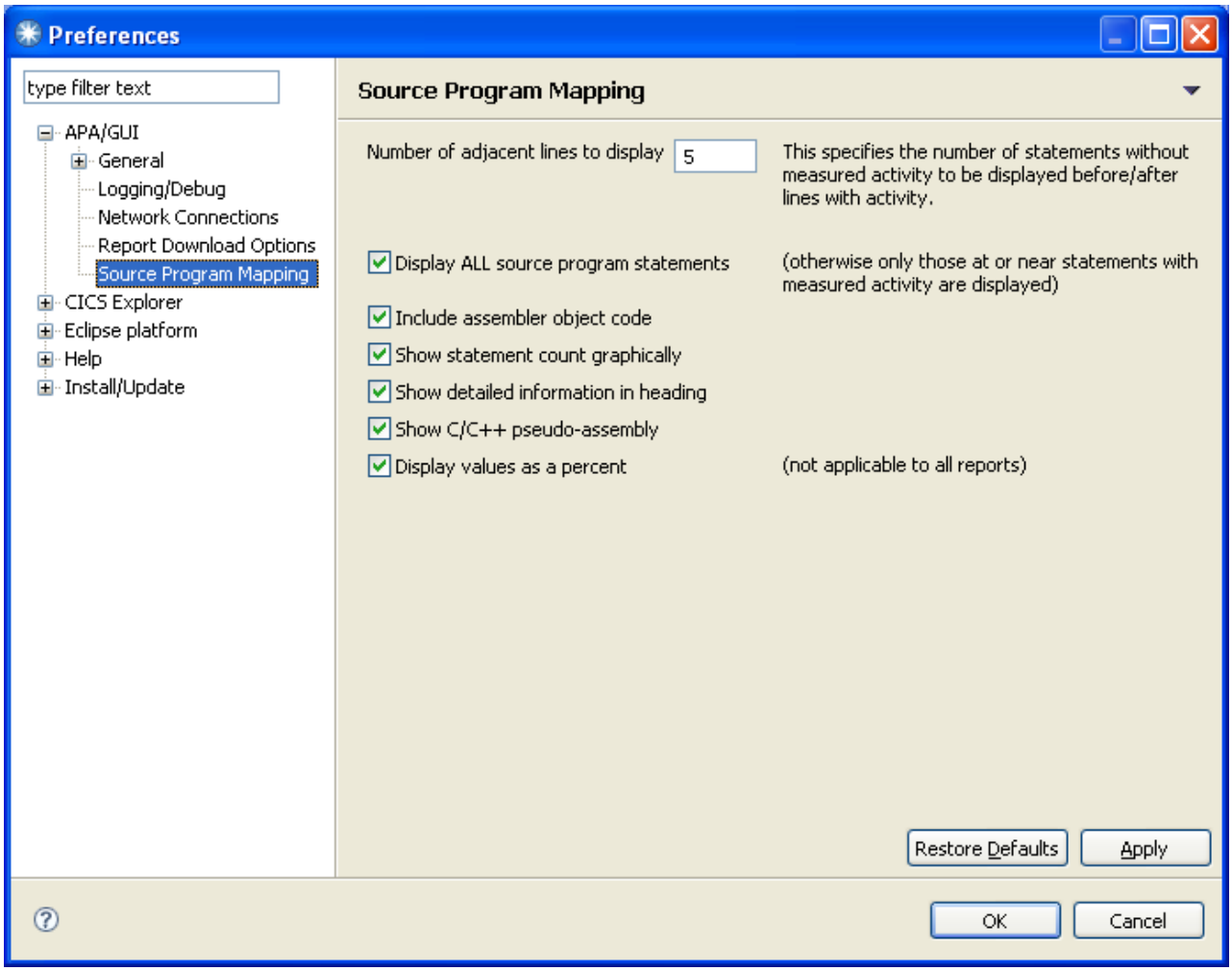


Figure 14. Source program mapping preferences

Table 28. Source program mapping preferences and descriptions

Preference	Description
Number of adjacent lines to display	This specifies the number of statements without measured activity to be displayed before/after lines with activity. Default: 2
Display ALL source program statements	(otherwise only those at or near statements with measured activity are displayed) Default: unchecked
Include assembler object code	Includes assembler object code in the display Default: unchecked

Table 28. Source program mapping preferences and descriptions (continued)

Preference	Description
Show statement count graphically	Displays statement count as a graph. Default: checked
Show detailed information in heading	Includes detailed heading information in the display. Default: unchecked
Show C/C++ pseudo-assembly	Includes C/C++ pseudo-assembly in the display. Default: unchecked
Display values as a percent	(not applicable to all reports) Default: unchecked

Status line

Located at the bottom of the application window, the status line includes a shortcut tool bar for FastView buttons (left corner) and displays three categories of status information:

- View status (left-side)
- Application status (center)
- Job progress status (right-side)

FastView is a feature that provides docking and undocking of views. If Fastview is selected for a view, its icon is displayed as a button in the shortcut toolbar area of the status line. Refer to "View navigation" on page 669 for details on setting the view as a Fastview.

View status information includes the display of the number of observations and filtering options when the Observations List view is active. The cursor location from the Report View (line, column) is also displayed when a Report View is active.

Application status information includes Local when the local repository is active and Remote when the z/OS Application Performance Analyzer is connected and the remote repository is active. A green dot is displayed for unsecure remote connections and a green dot with a padlock is displayed for secure (SSL) connections. The application status display can be customized in the 'Appearance Preferences' to include the TSO id, Host Address and/or Host Port.

Job progress information is displayed when a long-running task is active, for example, downloading data or formatting a large report.

List navigation

Views that display lists of information, such as the STC List, Observations List and Reports List include Expand All, Collapse All, Home, Backward and Forward navigation actions on the view toolbar.

The navigation buttons assist navigation of the list and are activated when a row has children rows. In addition to the toolbar buttons, each row with children

displays an expand command, “+” (XP) or “>” (Vista) on the row. When clicked, the row is expanded to reveal the child observations.

Lists include multi-row selection capability. Press and hold the CTRL button and mouse click each desired row, then when all target rows are selected, click the right-mouse button, select the action and it will be applied to all selected rows. The same applies if the Shift button is pressed instead of CTRL, except all rows between the first clicked row and the next clicked row are selected.

Expand all

Expand all. Expands all collapsed rows (parent rows with children), so the full tree is displayed.

Collapse all

Collapse all. Collapses all expanded rows (parent rows with children) so only the parent row is displayed (the tree is collapsed).

Home

Home. Home swaps the list items to display the original list.

Backward

Backward. Backward swaps the list items to display the previously displayed list.

Forward

Forward. Forward swaps the list items to display only the children of the selected row.

View navigation

All views can be closed, moved, viewed with Fastview, detached, re-attached, minimized and maximized. Right-click the view tab and the context menu displays navigation actions for the view.

The Detach action detaches the view and changes it into a separate popup dialog displayed on top of the Application Performance Analyzer GUI. It can be re-attached to the Application Performance Analyzer GUI by right-clicking the view tab and selecting detach a second time from the context menu of the popup.

The view can also be minimized to the Shortcut toolbar area of the status line by selecting FastView. An icon is displayed for each view that is minimized via Fastview.

STC list view

The STC (Started Task) list view, displayed at the top left-side of the Application Performance Analyzer GUI, lists all active Application Performance Analyzer tasks started on this image of the sysplex for which the connection was established. This view, by default, is not displayed at startup, but can be opened by selecting Window, Show View, STC View. The active STC is pre-selected. You can change

STCs by clicking on a different started task. The desktop will be refreshed to show the changed STC properties, Observations List and Observation Detail views.

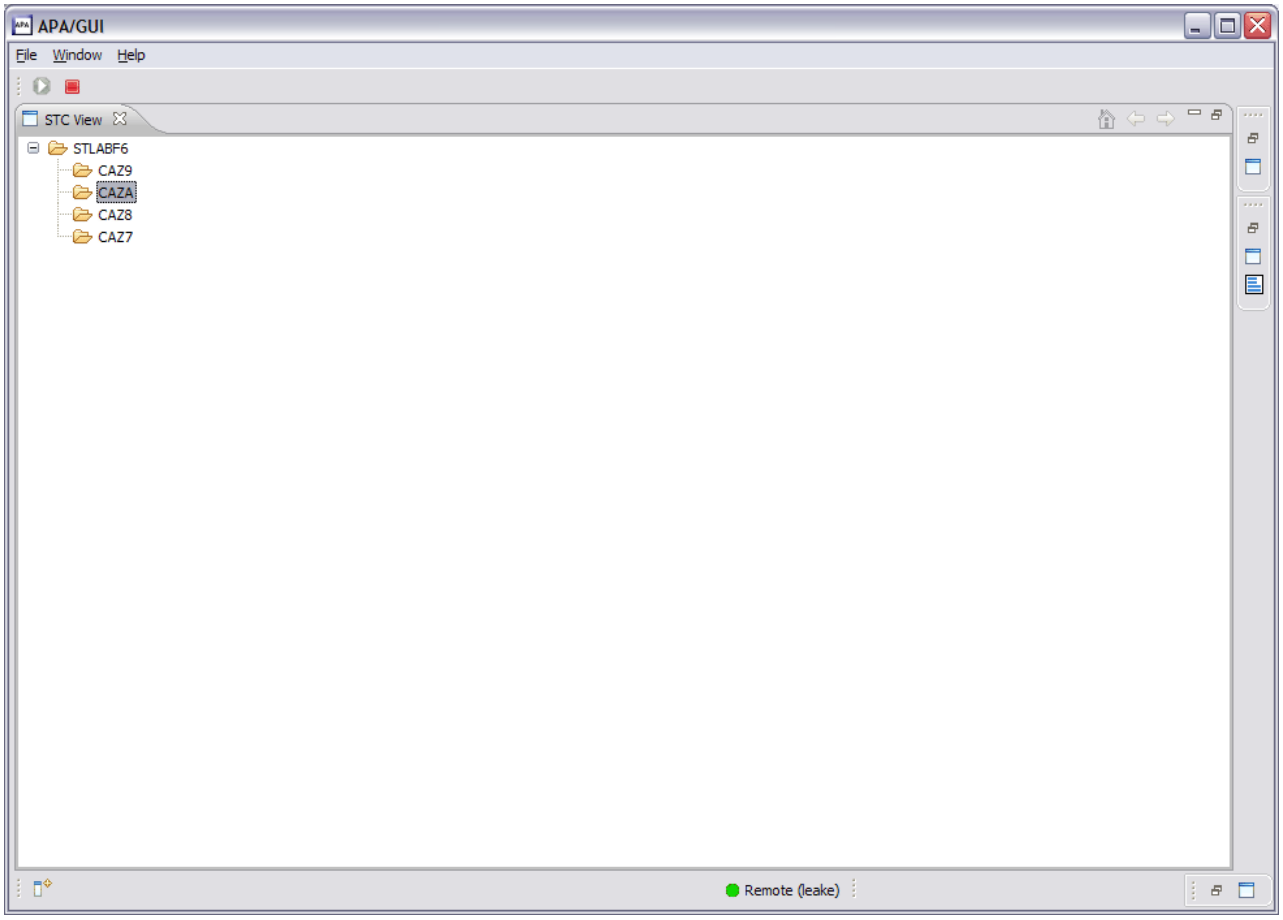


Figure 15. STC list view

Context menu

The STC List context menu is accessed by a right-mouse button click on a started task. It provides STC (row) level actions which include:

- Set as Default STC
- Mapping Repository

Set as Default STC

Set as Default STC changes the Application Performance Analyzer/GUI default STC.

Mapping Repository

The Mapping Repository launches the Source Program Mapping Repository editor dialog. The editor provides an interface to manage files/directories of source program listings used for the source program mapping display feature of individual reports.

The repository is segmented into two lists: Libraries and Directories. Libraries are listing data sets located in the MVS environment. Directories are paths for listings located in the Unix System Services – USS environment.

A mapping repository of Libraries and Directories is defined for each started task (STC). As the repositories are resident in the z/OS environment, this action is only available if the z/OS connection has been established, the remote repository is active, and the common data store (CDS) has been enabled during Application Performance Analyzer for z/OS installation.

Libraries repository: The Libraries Repository maintains two types of listing dataset lists; Personal and Common. Personal lists are unique to the User within an STC, where up to 20 datasets may be defined. Common lists are included for all Users within an STC. Only Users with Administrative access authorization may edit this list, where up to 50 datasets may be defined. The Source Program Mapping feature searches libraries in your Personal list first, followed by the libraries in the Common list. If the source is not found, an error message is displayed.

Individual datasets can be added, copied, deleted and moved up or down in the list. Additionally as a bulk feature, rows selected from the list can be copied to the Windows clipboard and new datasets added directly from the clipboard. The z/OS repository is updated once the 'OK' button is clicked.

The Personal list of libraries provides function equivalent to the ISPF "A04 - Source Mapping Dataset List" function. However, the indicator to "Match on Compile Date & Time" is not available in the GUI, and the default of 'No' is always used. Application Performance Analyzer for z/OS synchronizes your Personal list in the GUI with your "A04 – Source Mapping Dataset List" in ISPF.

The Common list of libraries provides function equivalent to the ISPF "A05 - Source Mapping Common List" function. While all users can view the Common list, access to update the Common list is restricted to users with Administrative access authorization. Application Performance Analyzer for z/OS synchronizes the Common list in the GUI with the "A05 - Source Mapping Common List" in ISPF.

Note: A 3rd party repository type ("Third Party") can only be used if the CAZRXOEM clist has been customized for use.

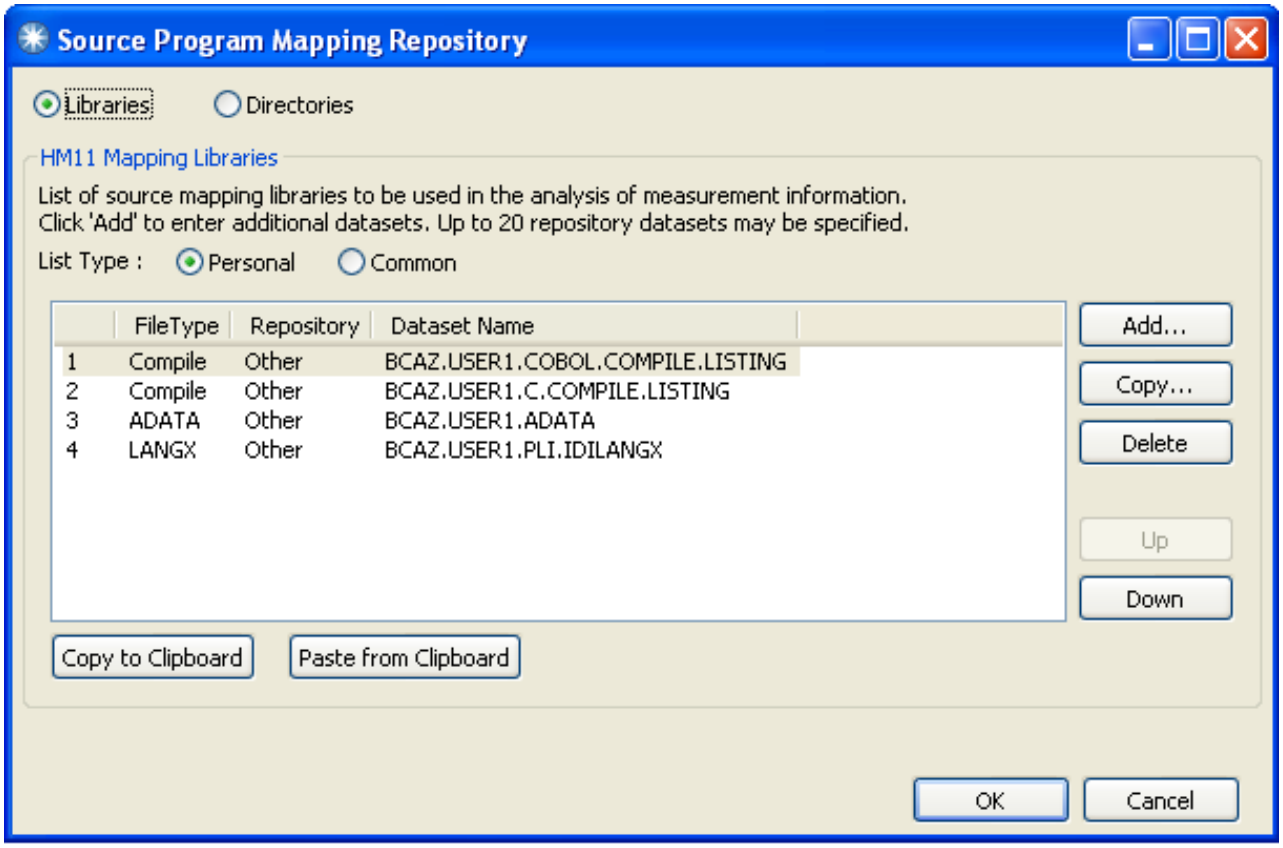


Figure 16. Personal libraries repository

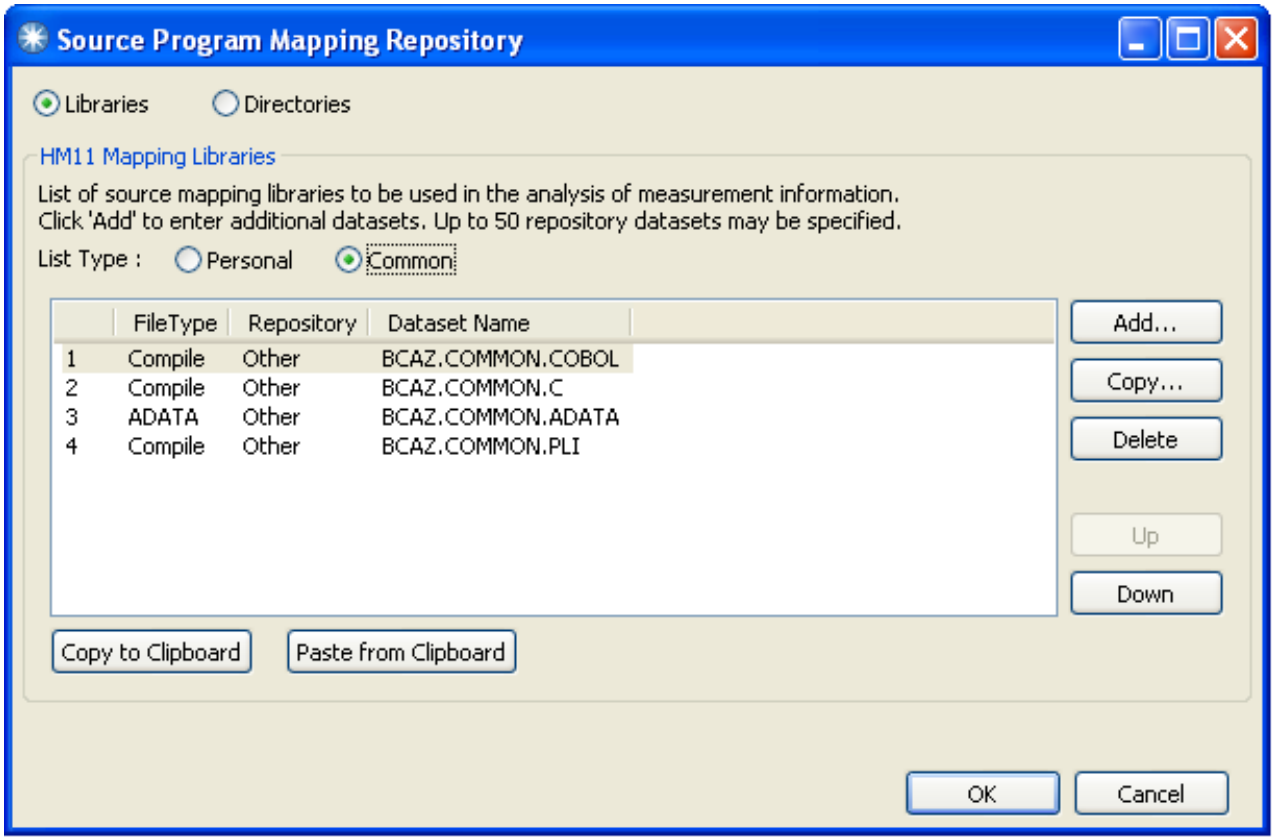


Figure 17. Common libraries repository

Directories repository: The Directories Repository is used for source mapping Java programs. It maintains your personal directory list for directories related to either individual Observation request numbers or global for all Observation requests within an STC. It is unique to each user. Up to 99 directories may be defined. Each directory path is assigned an ID-ReqNum and Sequence number. The ID-ReqNum is formatted where the ID is the STC and ReqNum is the Observation request number (“0000” for global) for the directory. The sequence number is unique within each ID-ReqNum and defines the search order for the directories in the list.

Individual directories can be added, copied, deleted and moved up or down in the list. Additionally as a bulk feature, rows selected from the list can be copied to the Windows clipboard and new directories added directly from the clipboard. The z/OS repository is updated once the ‘OK’ button is clicked.

Application Performance Analyzer for z/OS synchronizes your Directories Repository in the GUI with your “A03 - Java Source Program Mapping” information in ISPF.

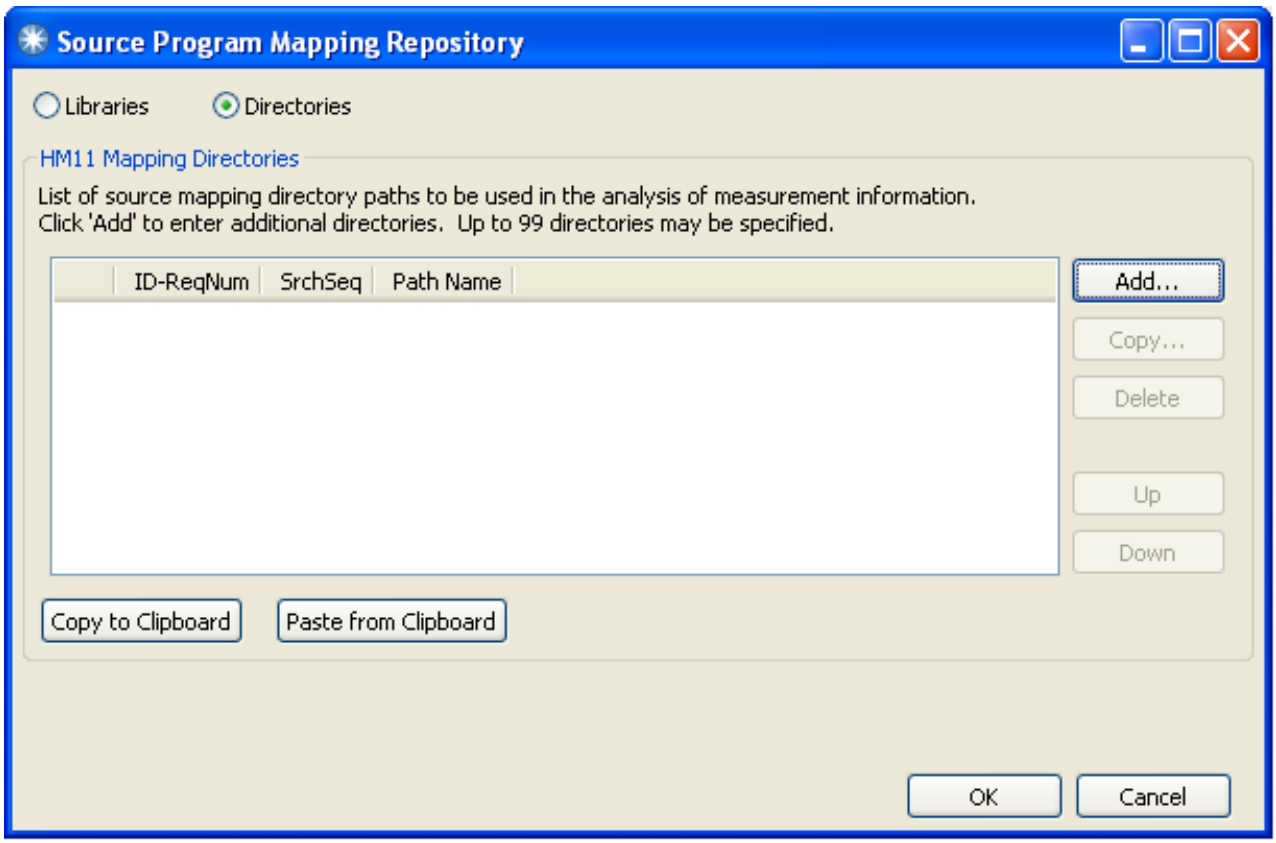


Figure 18. Directories repository

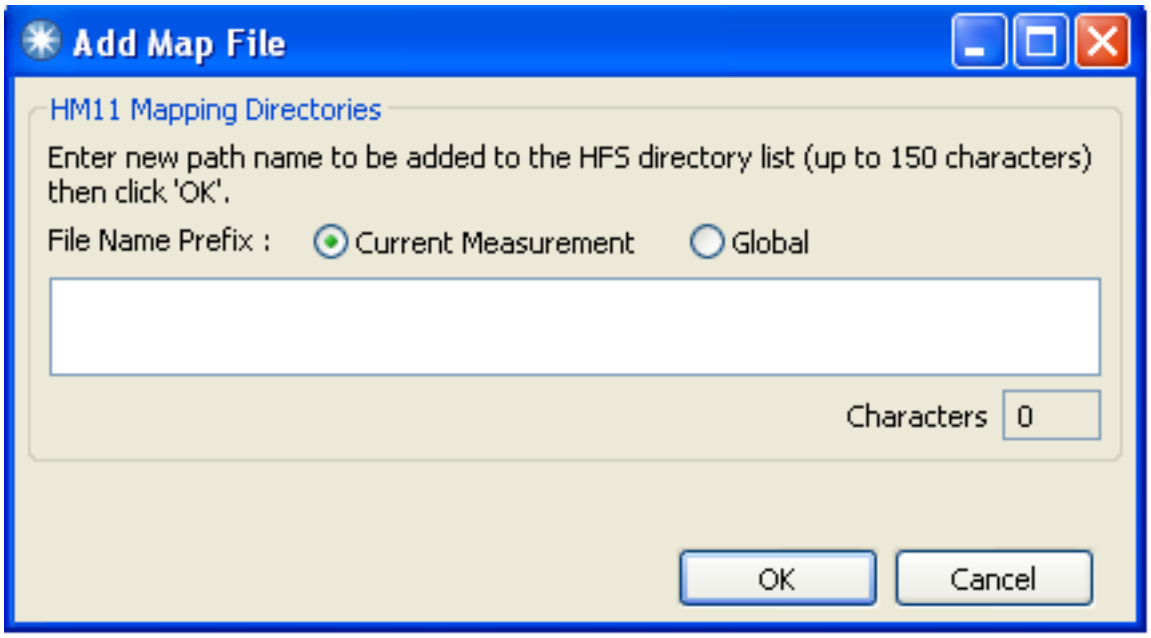


Figure 19. Directories repository – Add Map File

STC Properties view

The STC (Started Task) Properties view, displayed at the bottom left-side of the Application Performance Analyzer GUI, lists all properties for the selected (active) STC. This view is opened when the STC List view is opened and is closed in conjunction with close of the STC List view.

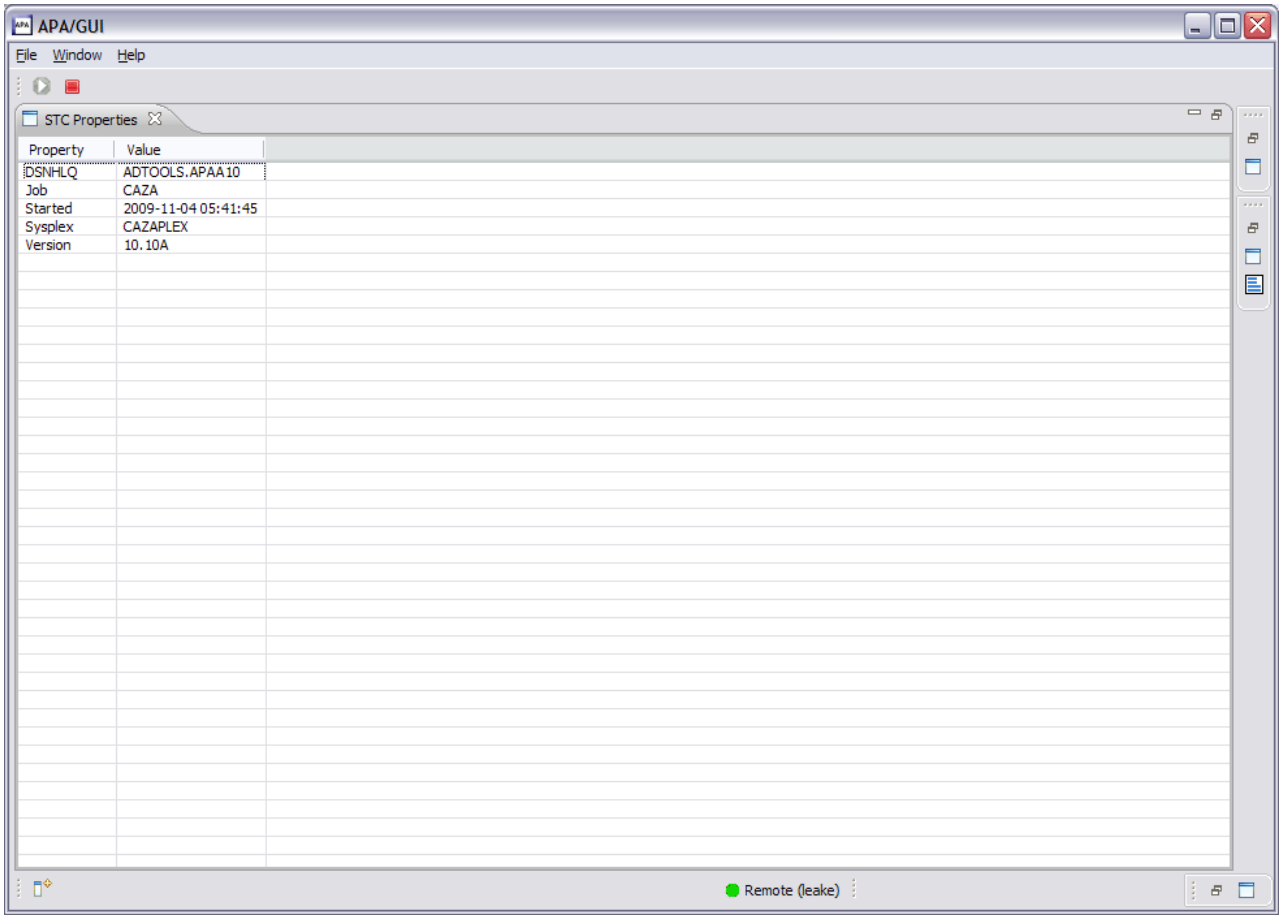


Figure 20. STC Properties view

Observations List view

The Observations List view, located at the top center of the Application Performance Analyzer GUI, lists all observations for the selected (active) STC, sequenced based on the User Preference. This view includes a toolbar, sortable columns and a row-specific context menu. The tab title for this view displays the active started task for the list with either Local, indicating the local repository is active, or Remote when the remote repository is active.

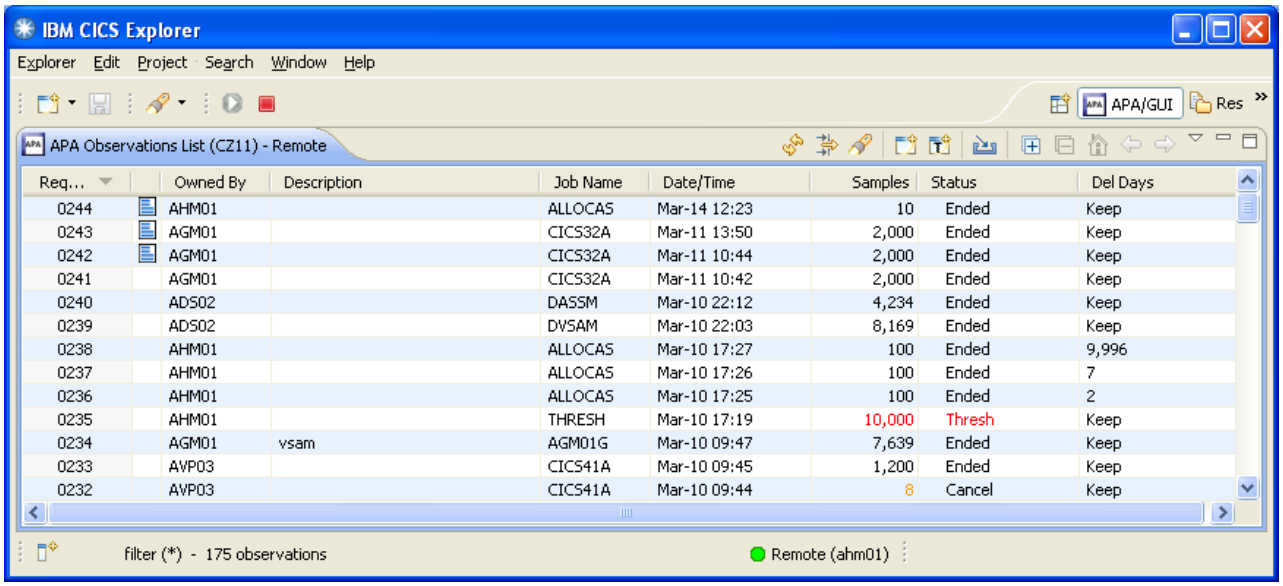


Figure 21. Observation List view

Each row represents an individual observation and includes the Request Number, Reports Downloaded, Owned By, Description, Job Name, Date/Time of the Observation, number of Samples taken, Observation Status and the Delete Days (number of days before the observation will be deleted).

If the observation is a parent with children, the display default contains the observations list collapsed. An expand command, "+" (XP) or ">" (Vista), is displayed, which when clicked, expands the row to reveal the child observations.

A reports icon is displayed on each row where reports for an observation have been downloaded. A sticky note icon is displayed on each observation request row which has a sticky note. Double-clicking the observation row will launch the sticky note dialog, where comments may be entered and the sticky note saved, printed, or deleted.A context menu is available for each observation. Right-click on the row of the desired observation and the list of available menu actions is displayed. Refer to "Context menu" on page 696 for details.

For each observation list row that is selected, the Observation Detail and Observation Reports List views are updated to the active (selected) request. Refer to "Observation Detail view" on page 702 and "Observation Reports List view" on page 702 for details. Refer to "R02 - Observation session list" on page 8 for details of the individual fields.

Toolbar

The Observations List toolbar provides buttons for view-level actions that include: Refresh Observations List, Filter Observations List, Search Observations, New Observation, New Trigger Observation, and Import Observation. Additionally, common navigation actions are available including Expand All (expand all observations) and Collapse All (collapse all observations). The toolbar includes a Local Pull Down button, a down arrow icon, located at the far right-side of the toolbar. The pull down provides an alternative path to many of the toolbar actions.

Refresh observations

Refresh Observations reloads the Observations List view with observations retrieved and downloaded from the z/OS remote repository.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Filter observations

Filter Observations provides the functionality to filter the Observations List. A dialog is displayed where the filter pattern is entered. Observations can be filtered by Owned By or Job Name values and the results sequenced by any one of the Observations List column types.

Once the OK button is clicked, all observations matching the filter pattern are downloaded from z/OS and the Observations List refreshed with the new list of observations. A filter pattern of "*" indicates no filtering will be applied to the specified field.

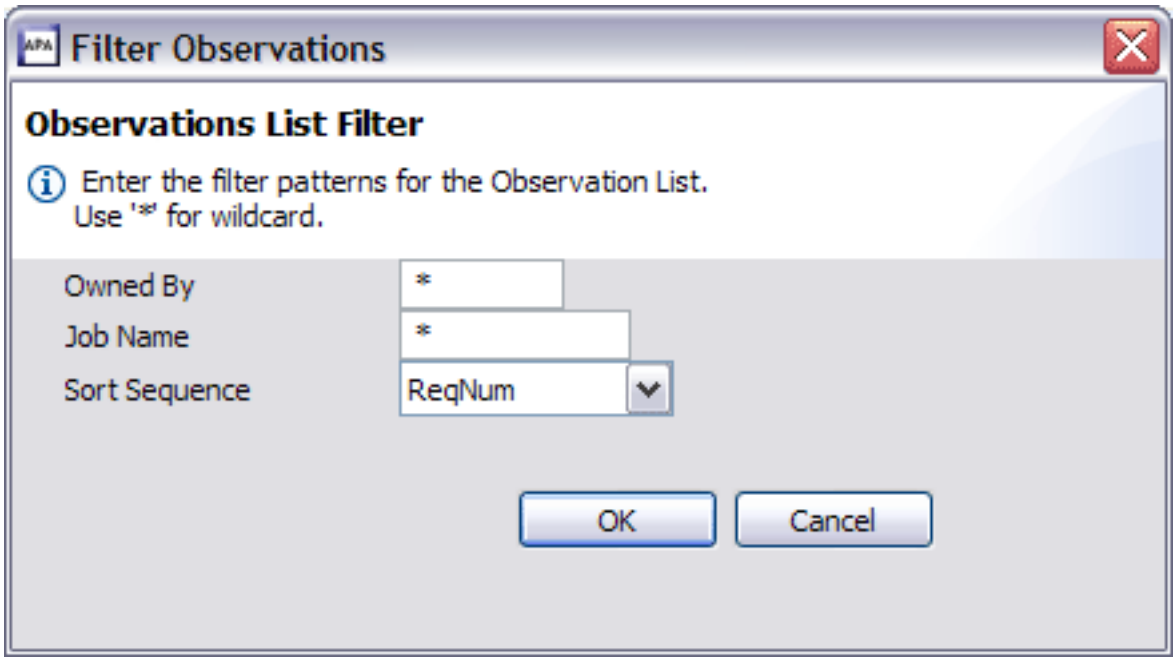


Figure 22. Filter Observations dialog

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Search observations

Search Observations provides a tool to scan the list of observations for a given search string and return a list of matching results. A dialog is displayed in which the search string is entered. Additional filtering can also be specified, including limiting the search to one of the Observation List column types, setting a date range, limit the request number range and/or limit by sample size.

Once the OK button is clicked, all observations matching the search pattern are searched. The Search Results View is opened and the results displayed. Refer to "Help Search view" on page 721 for details of the search results.

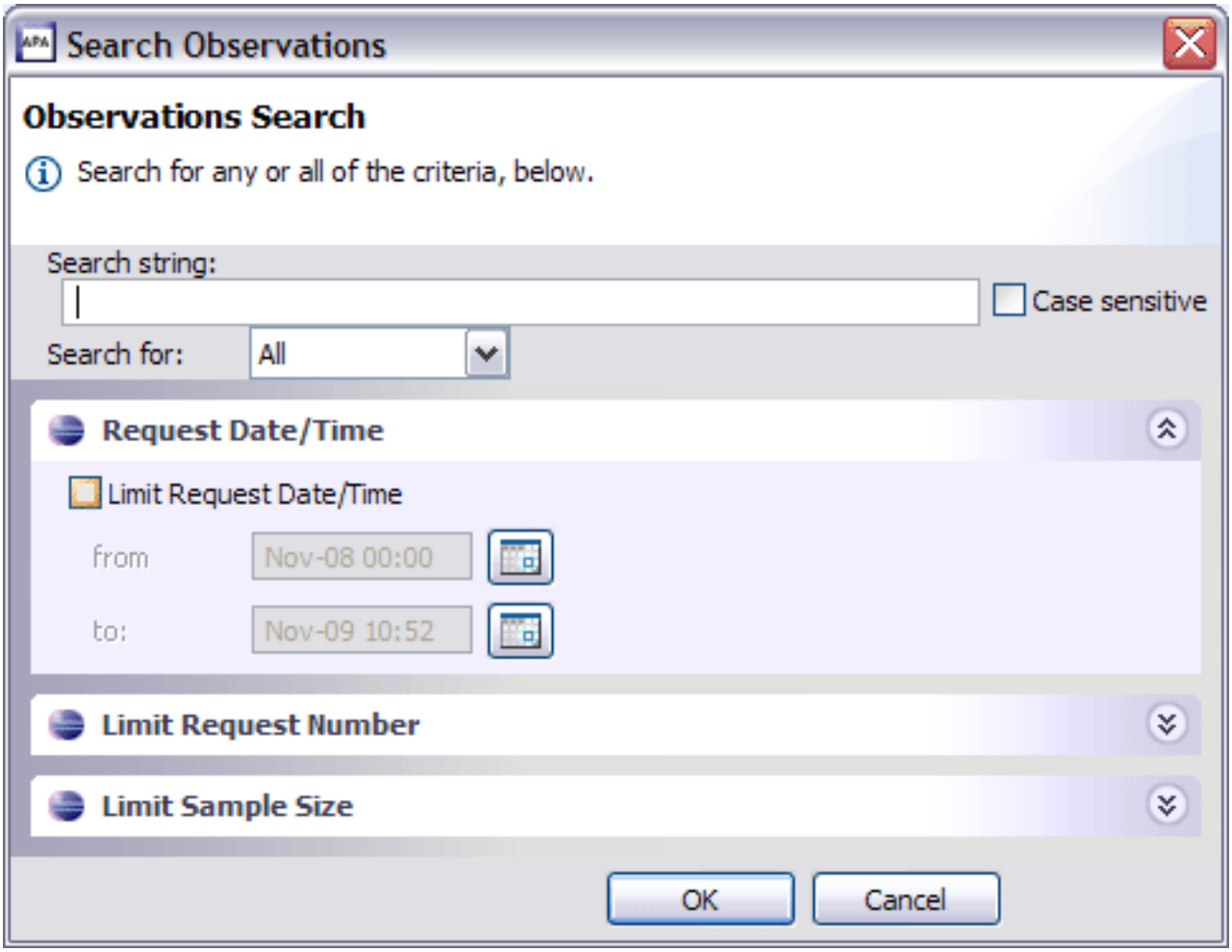


Figure 23. Search Observations dialog

New observation

New Observation provides the functionality to create and submit a new observation to Application Performance Analyzer. A dialog is displayed where the details of the new observation must be provided.

The New Observation dialog is initially structured with seven tabs in which detailed request specification information can be entered. Each tab name is preceded by a symbol indicating if data has been entered to the tab. The symbol is displayed in green (green light) if data has been entered and is error free. A yellow or red light is displayed if there are warnings or errors in the data. The yellow warning lights may be suppressed by selecting the 'Suppress warnings on input fields' checkbox in the General Preferences dialog. Refer to "Entering an observation request" on page 15 for details of the individual fields and edits.

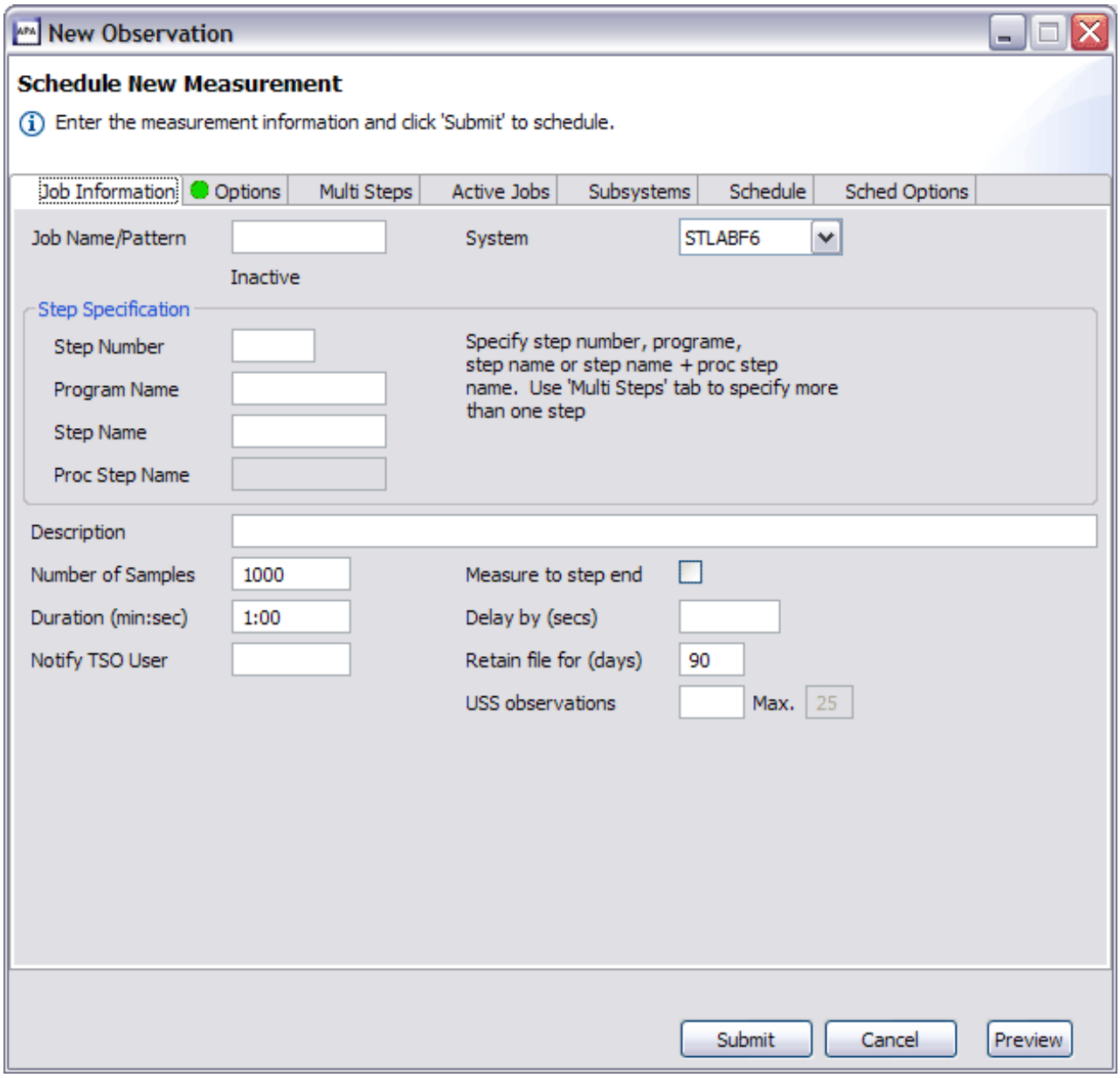


Figure 24. New Observation dialog

If a dash ("-") is entered in the job name field (Job Information tab), a DB2-specific or an IMS Multiple Address Space observation is created. The New Observation dialog is restructured with only three tabs including the Job Information (with limited fields), Options and Subsystems, where the DB2 radio button fields are activated by default. The IMS radio button is also enabled, where, if selected, IMS Multiple Address Space parameters are entered.

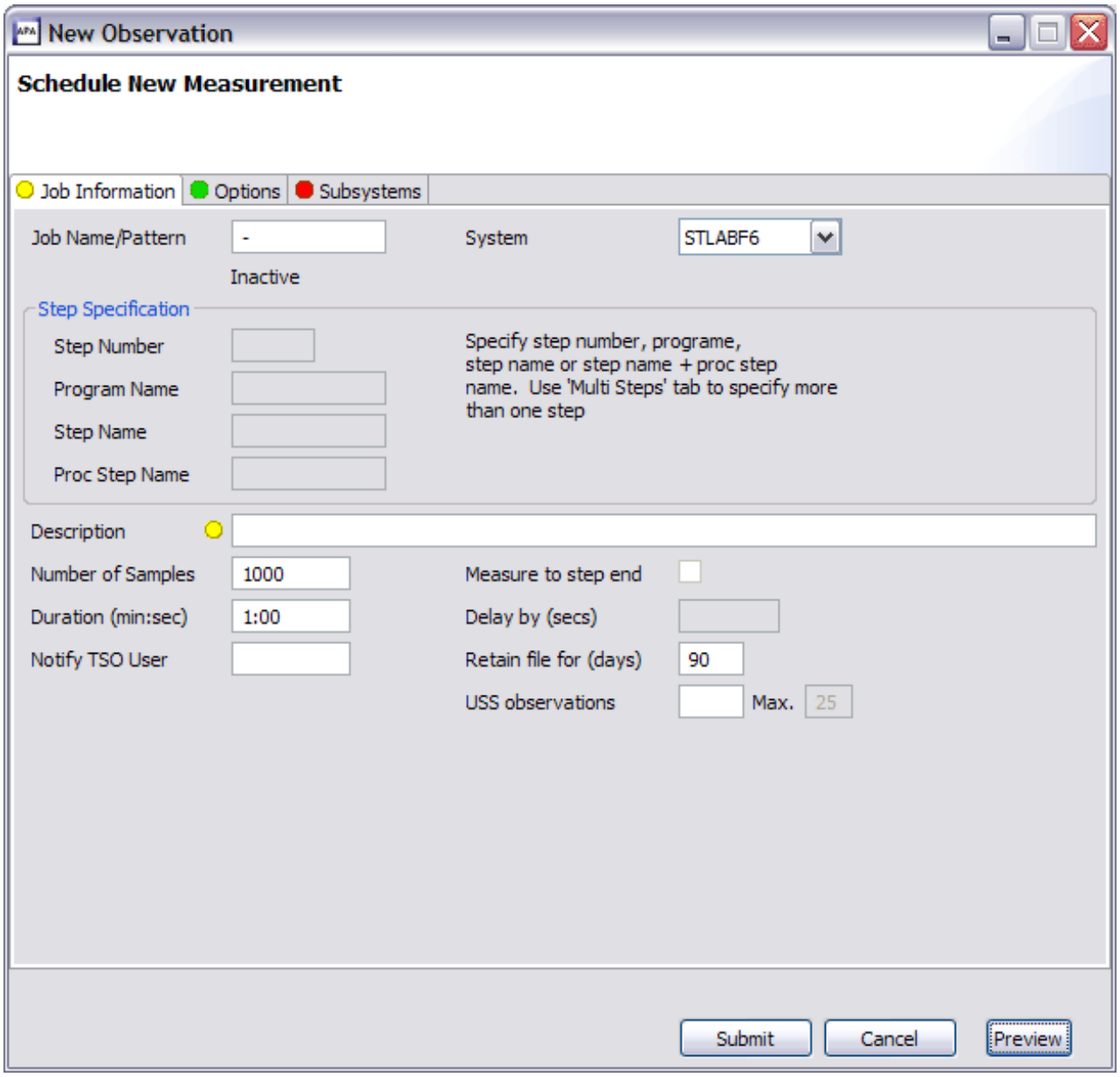


Figure 25. New Observation (DB2-specific or IMS Multiple Address Space) dialog

The Preview button can be clicked at any time to view the request parameters as they are being built. Once the required data has been entered and green light(s) are displayed, the request is valid and ready to be submitted. Once the Submit button is clicked to submit the request, the Observations List automatically displays the new observation on the list.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Job Information tab

The Job Information tab includes job-related parameters for the new observation request. If the started task is part of a sysplex, a System dropdown listing the images in the sysplex is displayed. Otherwise, the dropdown is hidden. An entry field colored grey cannot be edited.

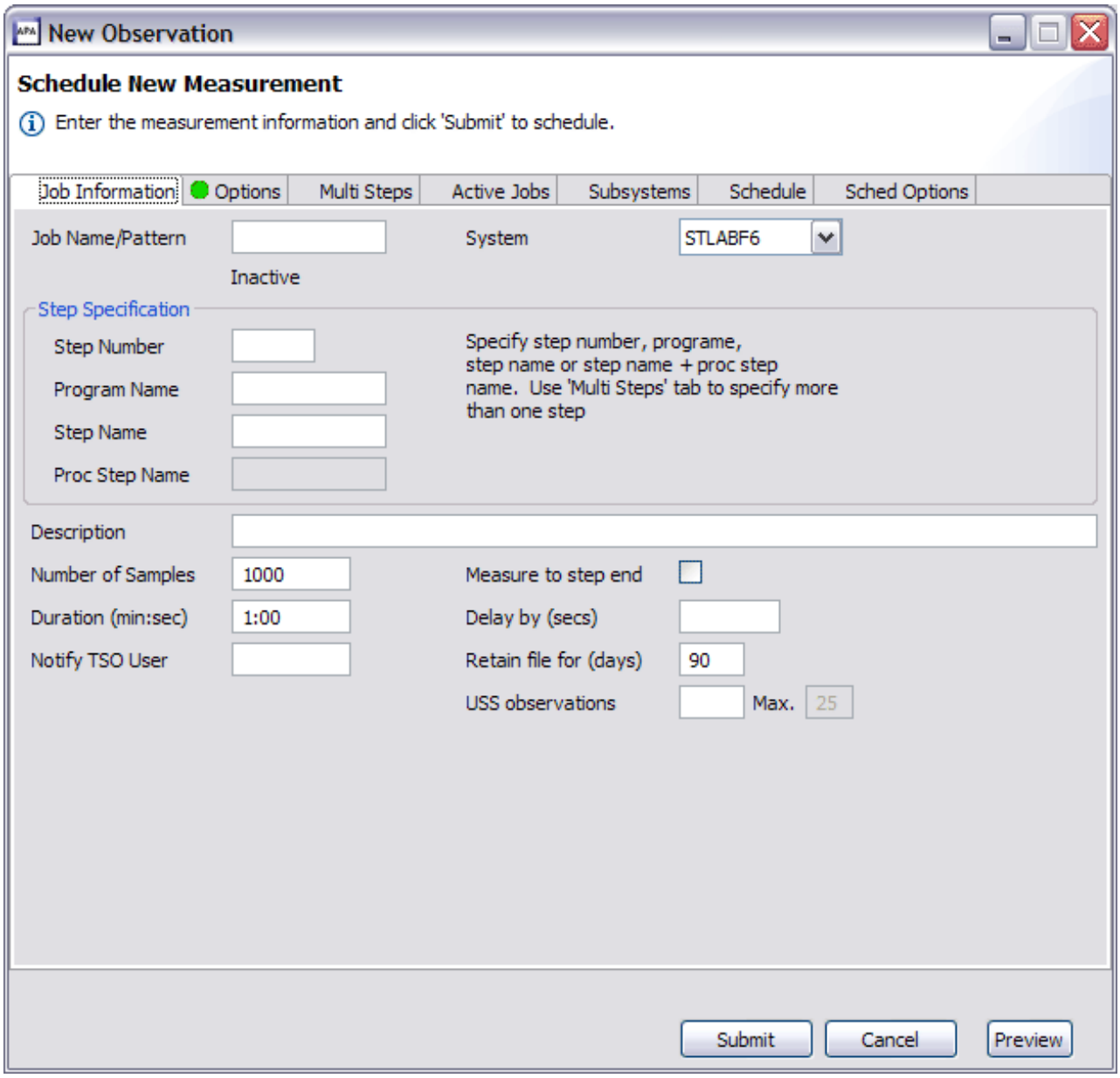


Figure 26. Job Information tab

Refer to "Panel 1 – Job Information" on page 17 and "Panel 6 – Sysplex" on page 33 for details of the individual fields and edits.

Options tab

The Options tab is used to enter extended measurement options (Data Extractors), and also to specify additional load libraries to be searched for external symbol information. Click the Directories radio button to enter additional HFS Directories. Both the load libraries and directories are validated real-time on the z/OS server.

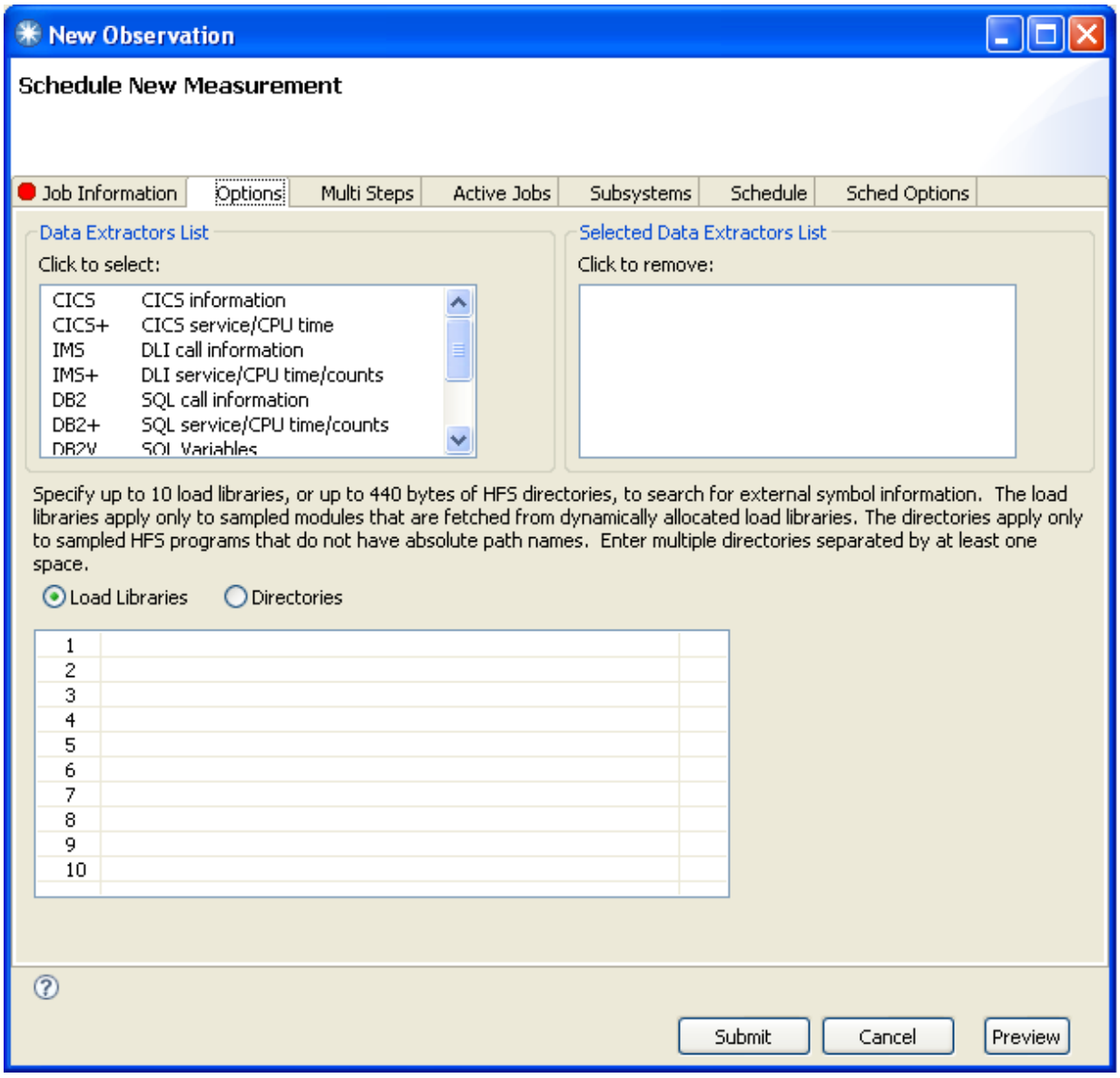


Figure 27. Options tab

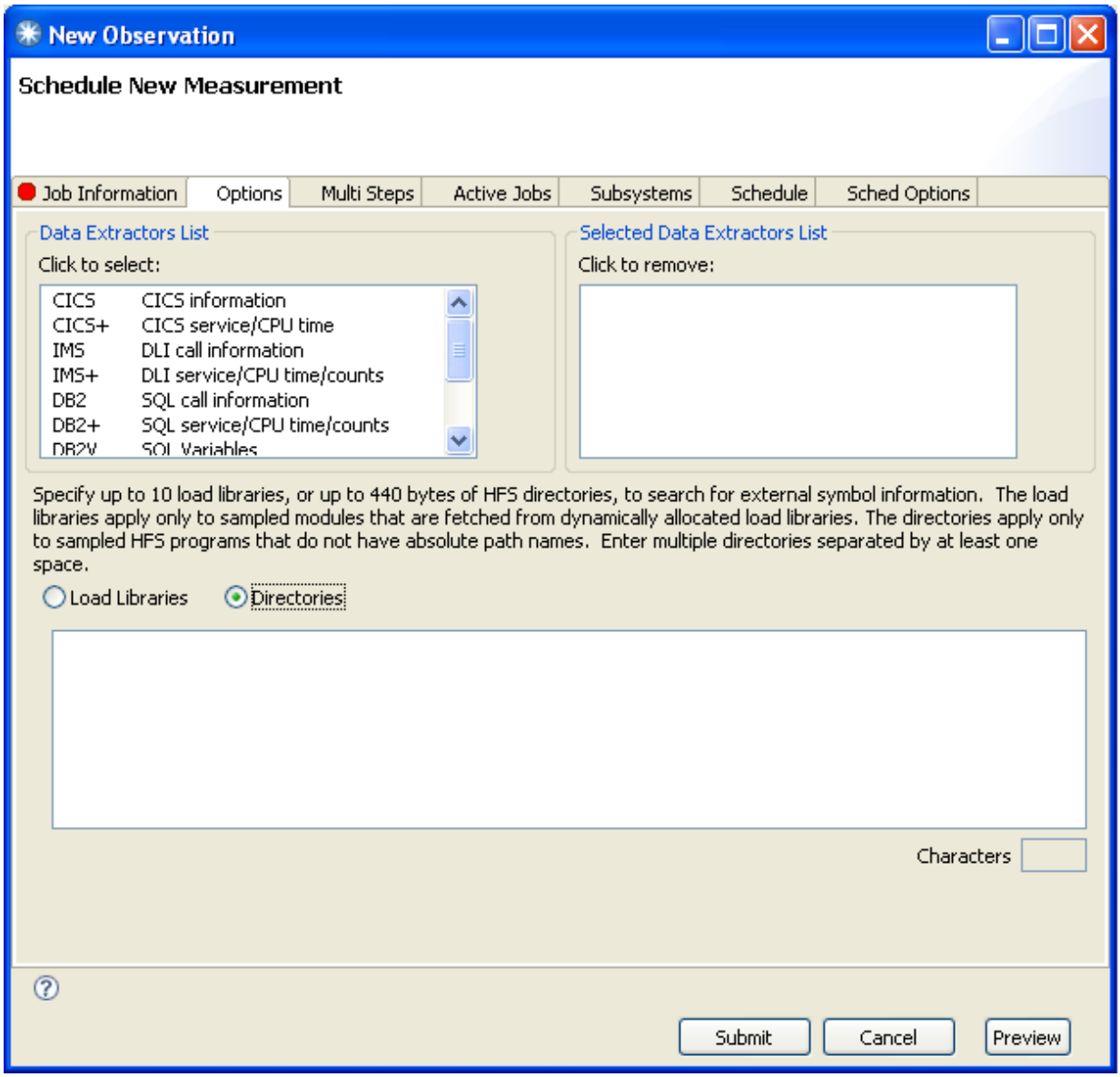


Figure 28. Options tab

Refer to "Panel 2 – Options" on page 22 for details of the individual fields and edits.

Multi Steps tab

The Multi Steps tab is used to specify that multiple job steps are to be measured. Up to 20 steps can be measured, using the same specification rules described for single step measurements entered in the Job Information tab.

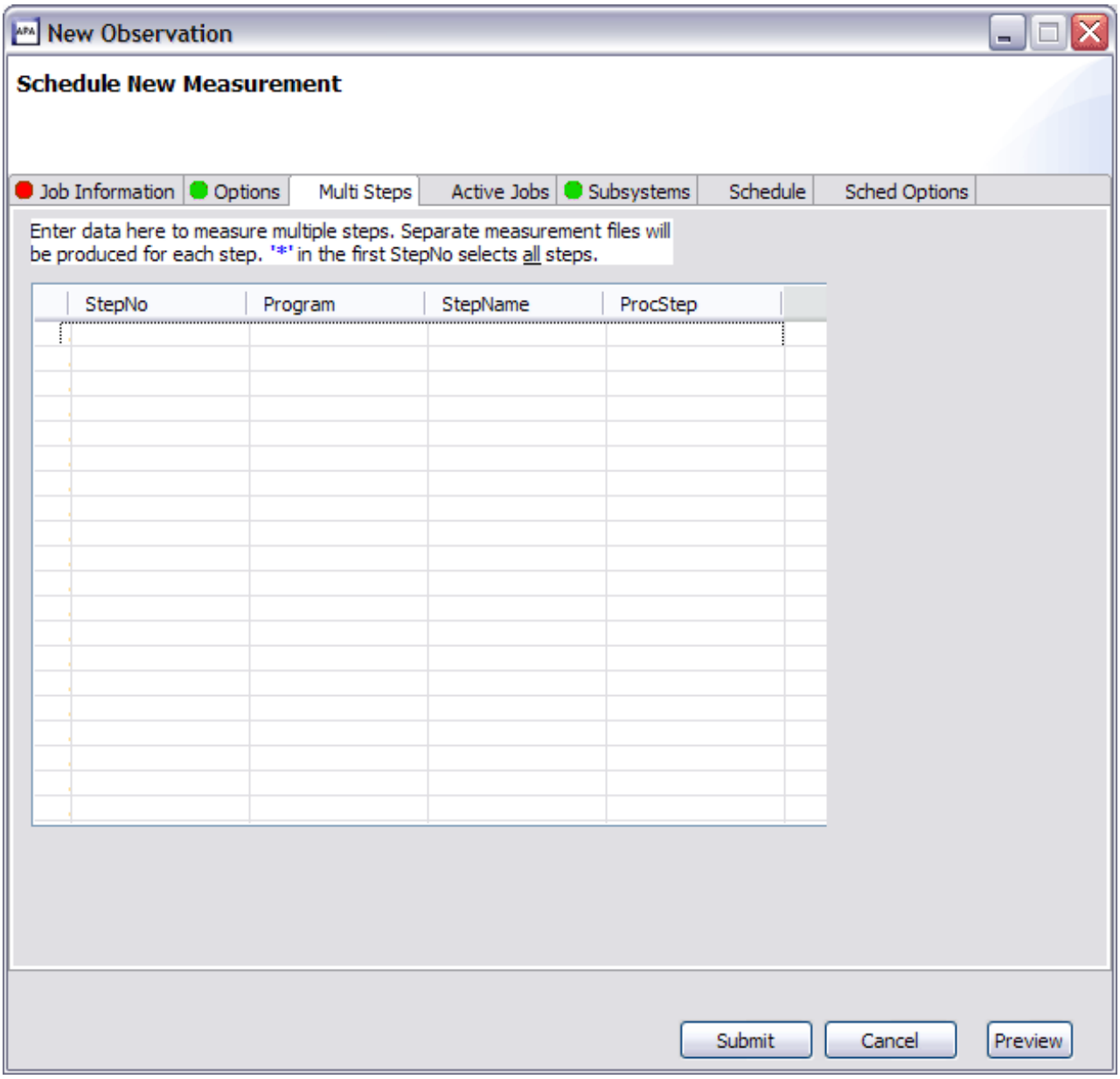


Figure 29. Multi Steps tab

Refer to "Panel 3 input fields" on page 27 for details of the individual fields and edits.

Active Jobs tab

The Active Jobs tab is used to select active jobs from a list. A Prefix can be entered to limit the jobs listed. If you enter a Pattern in the Job name/Pattern field from the Job Information tab, this is entered as the Prefix in the Active Jobs tab. The z/OS server is accessed real-time to return the list of active jobs that are displayed in the Active Jobs List section. All selected jobs are displayed in the Selected Jobs List section. Up to 20 jobs or the system configuration value can be selected.

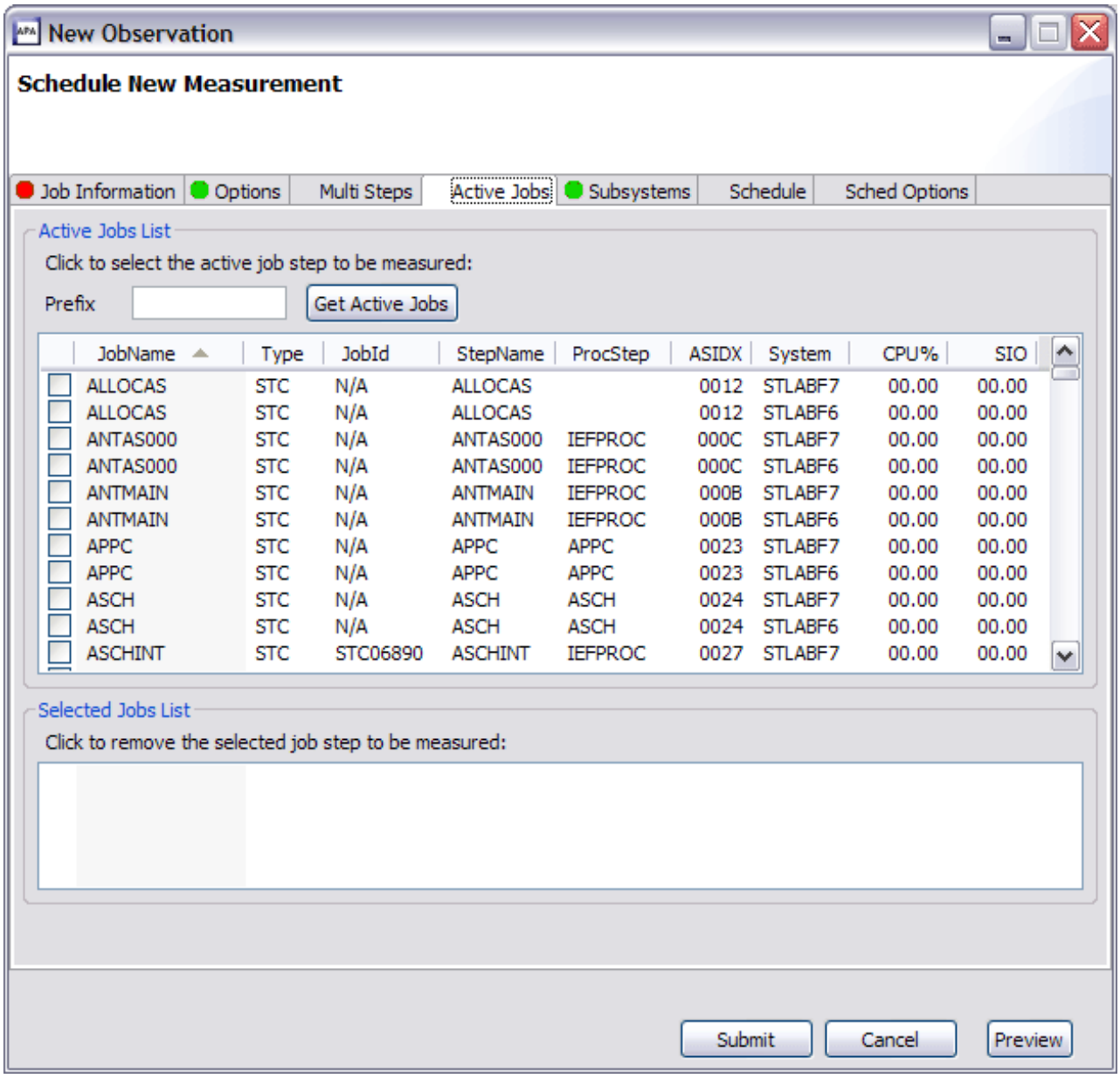


Figure 30. Active Jobs tab

Refer to "Panel 4 – Active Jobs" on page 28 for details of the individual fields and edits.

Subsystems tab

The Subsystems tab is used to specify information about the measurement of a CICS region, IMS selection parameters, DB2 parameters, or DDF selection criteria. Specify the CICS transaction codes for which CICS measurement information is to be recorded. Click on the IMS radio button for IMS measurement parameters. A transaction, program name, and user ID to limit the measurement information can be entered. Click on the DDF radio button for DDF measurement criteria which includes Correlation Id, End User Id and Workstation Id. Nulls are allowed (checkbox) and any of the DDF entry fields can be prefixed or suffixed with an "*". "%" is also allowed. DB2 and IMS Multiple Address Space fields are only enabled if a dash ("-") is entered in the job name field (Job Information tab). Application Performance Analyzer will display different fields on the Subsystems tab,

depending on the radio button selected.

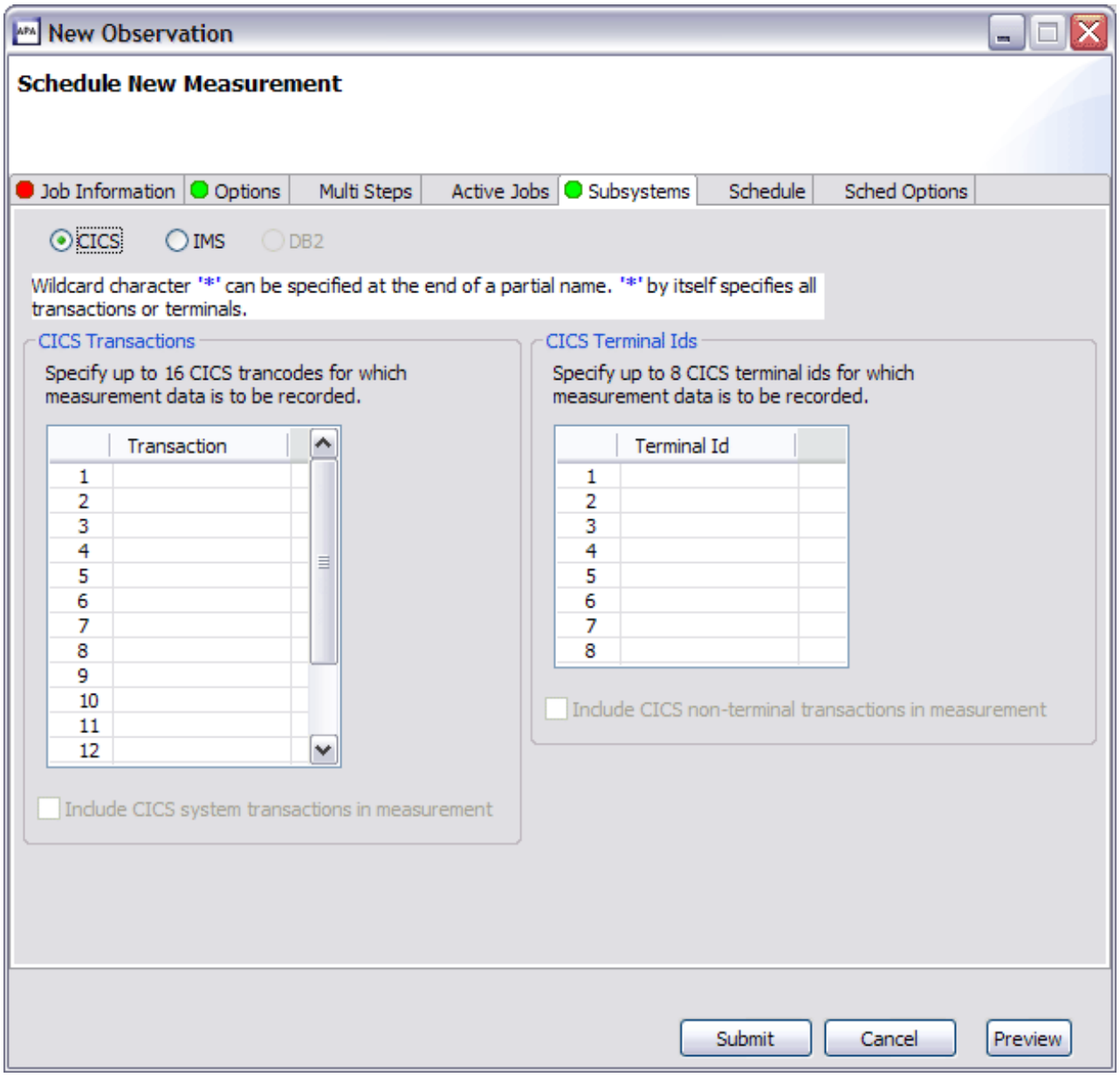


Figure 31. Subsystems tab - CICS option

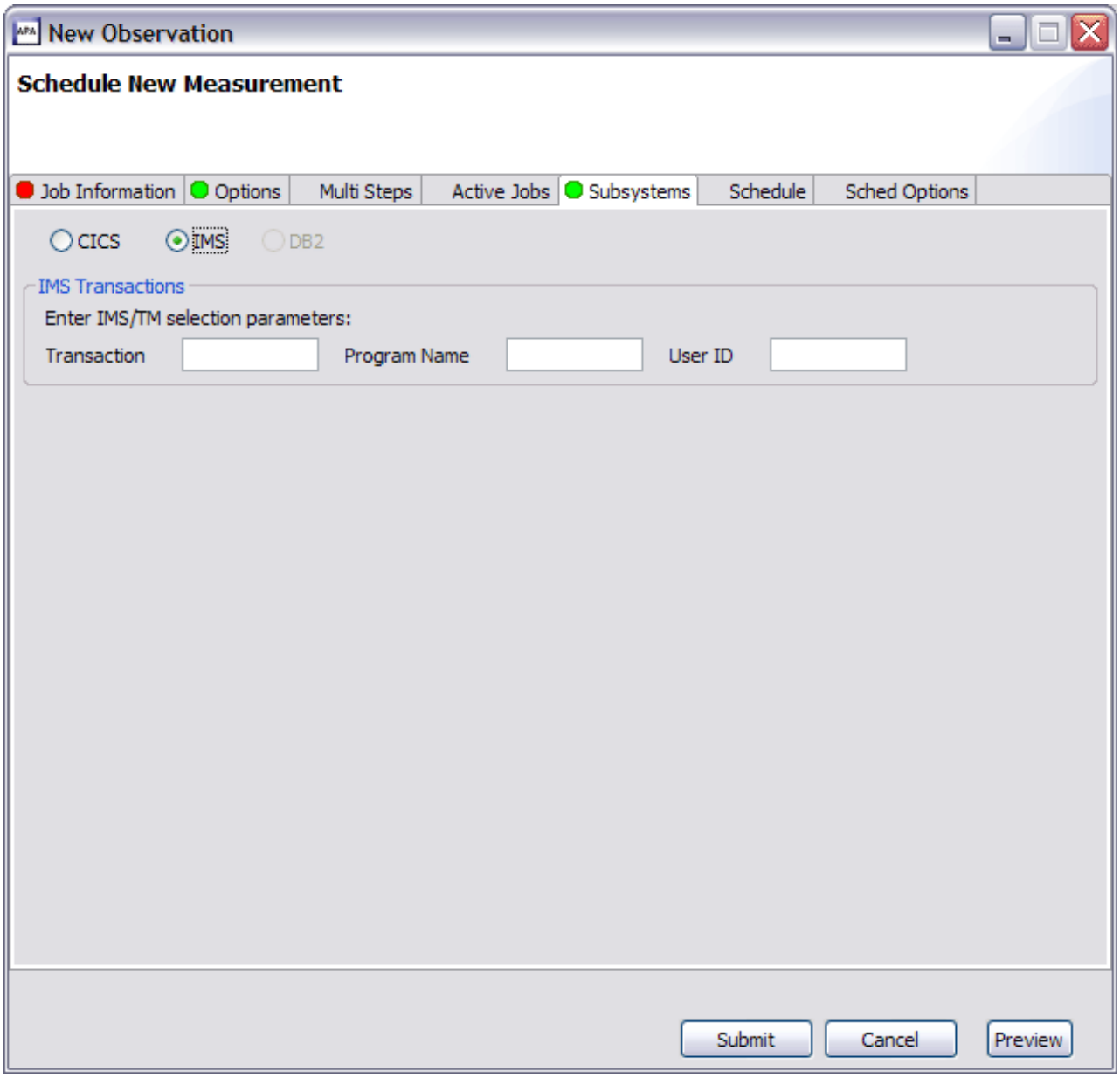


Figure 32. Subsystems tab - IMS option

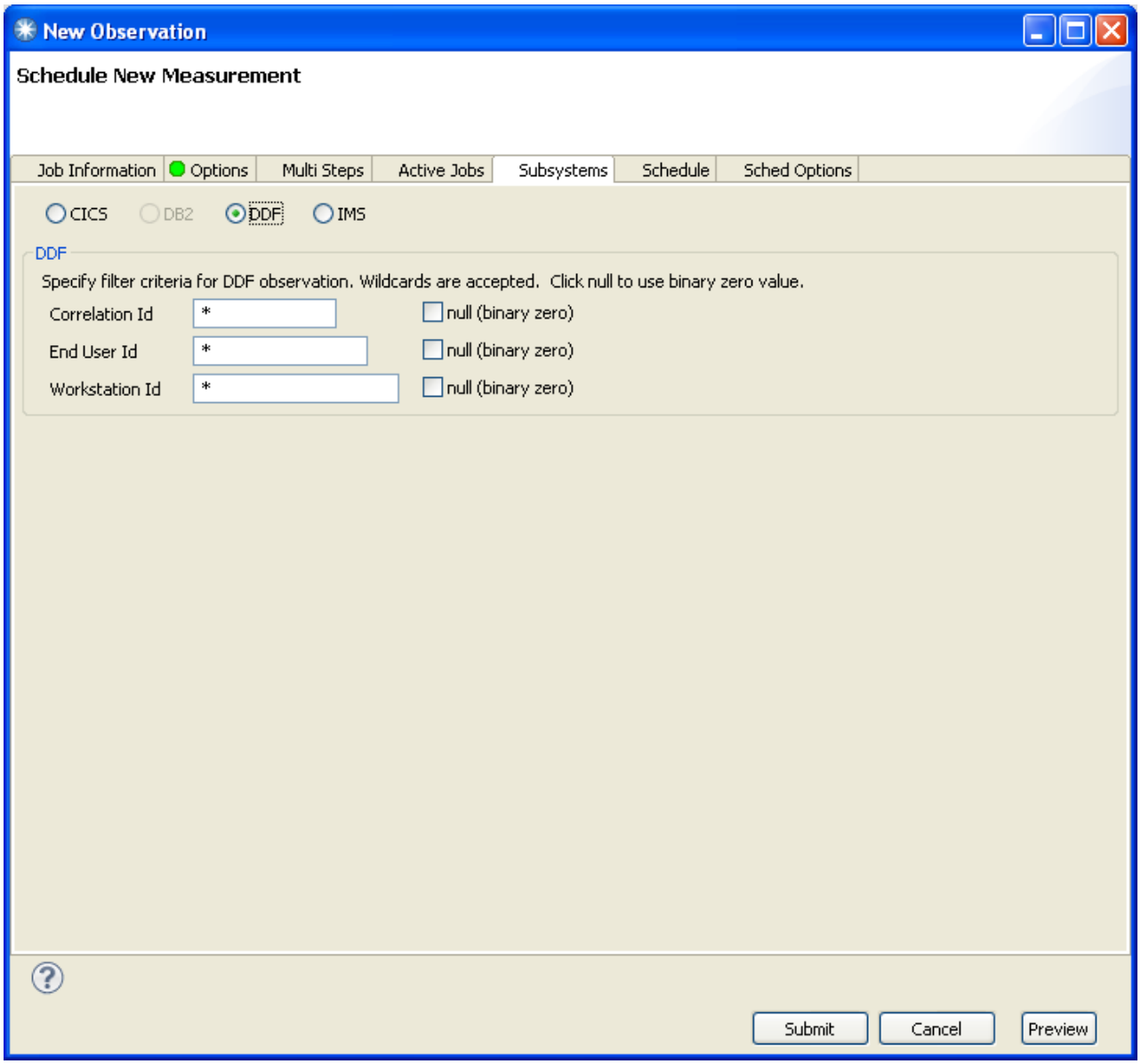


Figure 33. Subsystems tab - DDF option

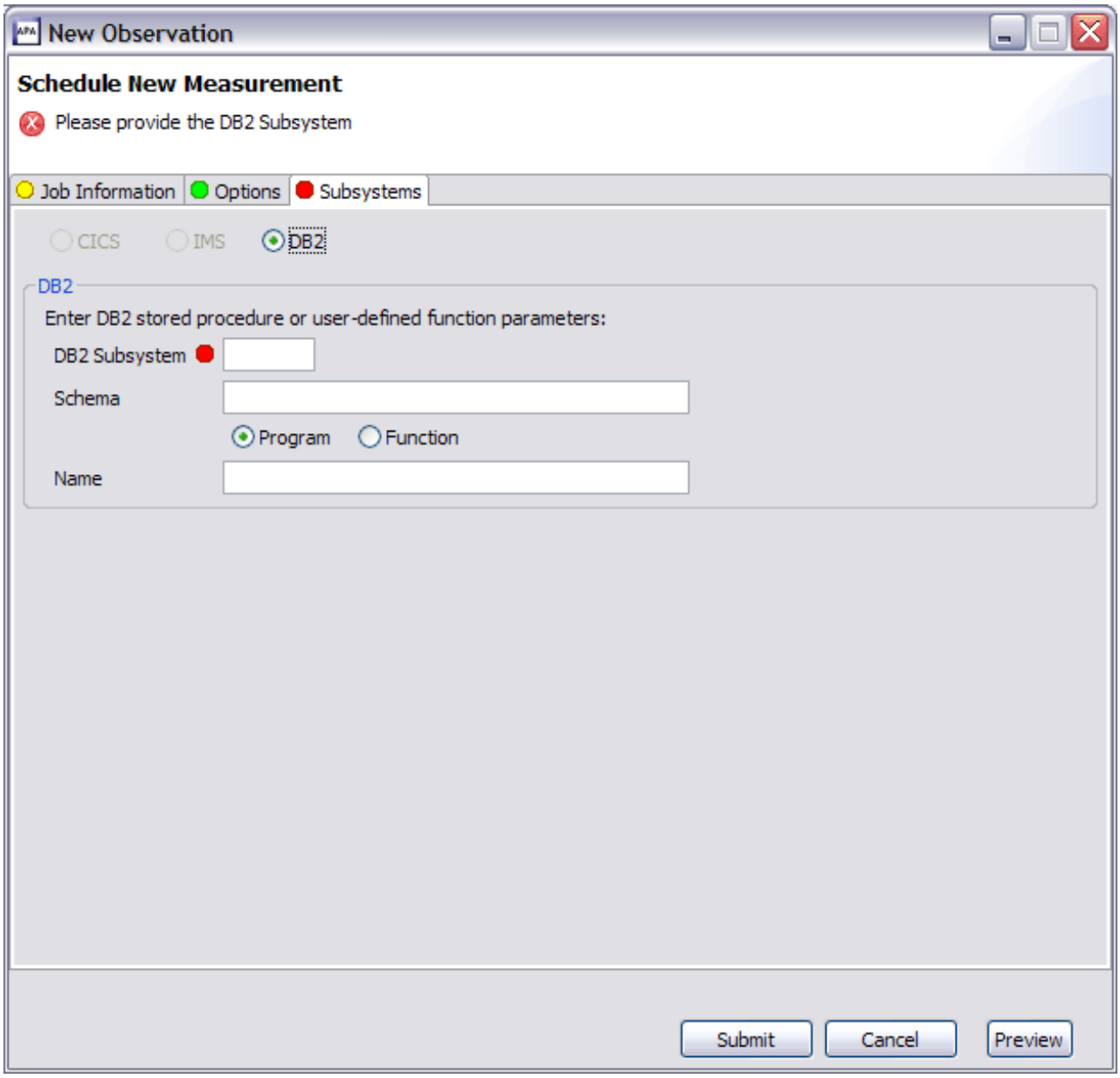


Figure 34. Subsystems tab - DB2 option

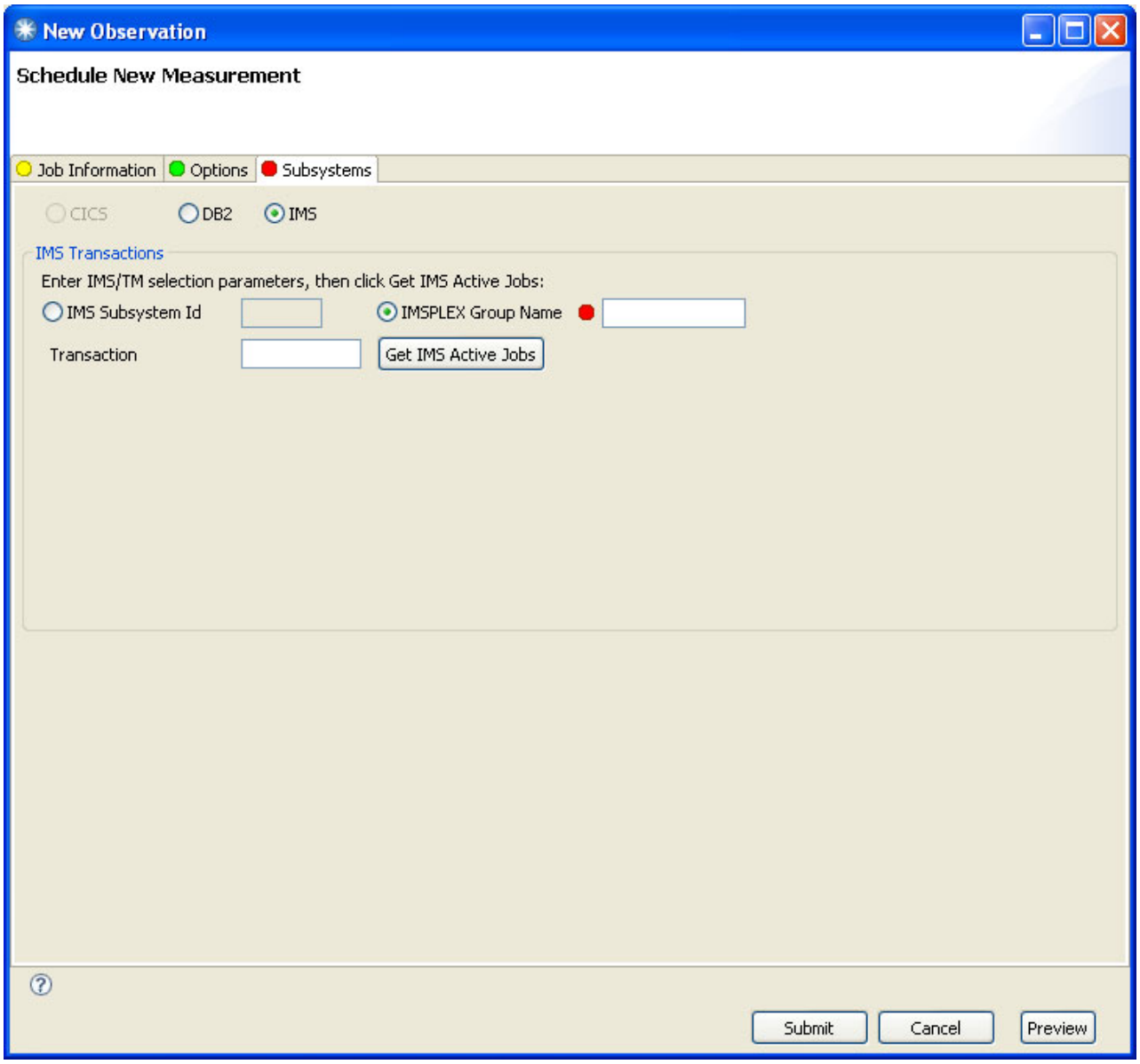


Figure 35. Subsystems tab - IMS Multiple Address Space option

Enter the IMS Subsystem name or IMSPLEX Group Name, and the IMS Transaction that is to be measured, and then press the "Get IMS Active Jobs" button to display the list of IMS MPP regions that are eligible to process the transaction. Select the IMS MPP regions that Application Performance Analyzer is to measure from this list.

Refer to "Panel 5 – Subsystems" on page 29 for details of the individual fields and edits.

Schedule tab

The Schedule tab is used to generate a schedule for repetitions of future measurements. A maximum of 105 future scheduled measurement entries is allowed.

Click the calendar button to select a date/time or enter the value directly. Enter the Repeat and After fields, then click Add to Schedule to add the date(s). The entry(s)

are added to the Measurement Schedule. Click the checkbox to select or unselect one or many entries or click Select All to select all or Unselect All to deselect all the entries.

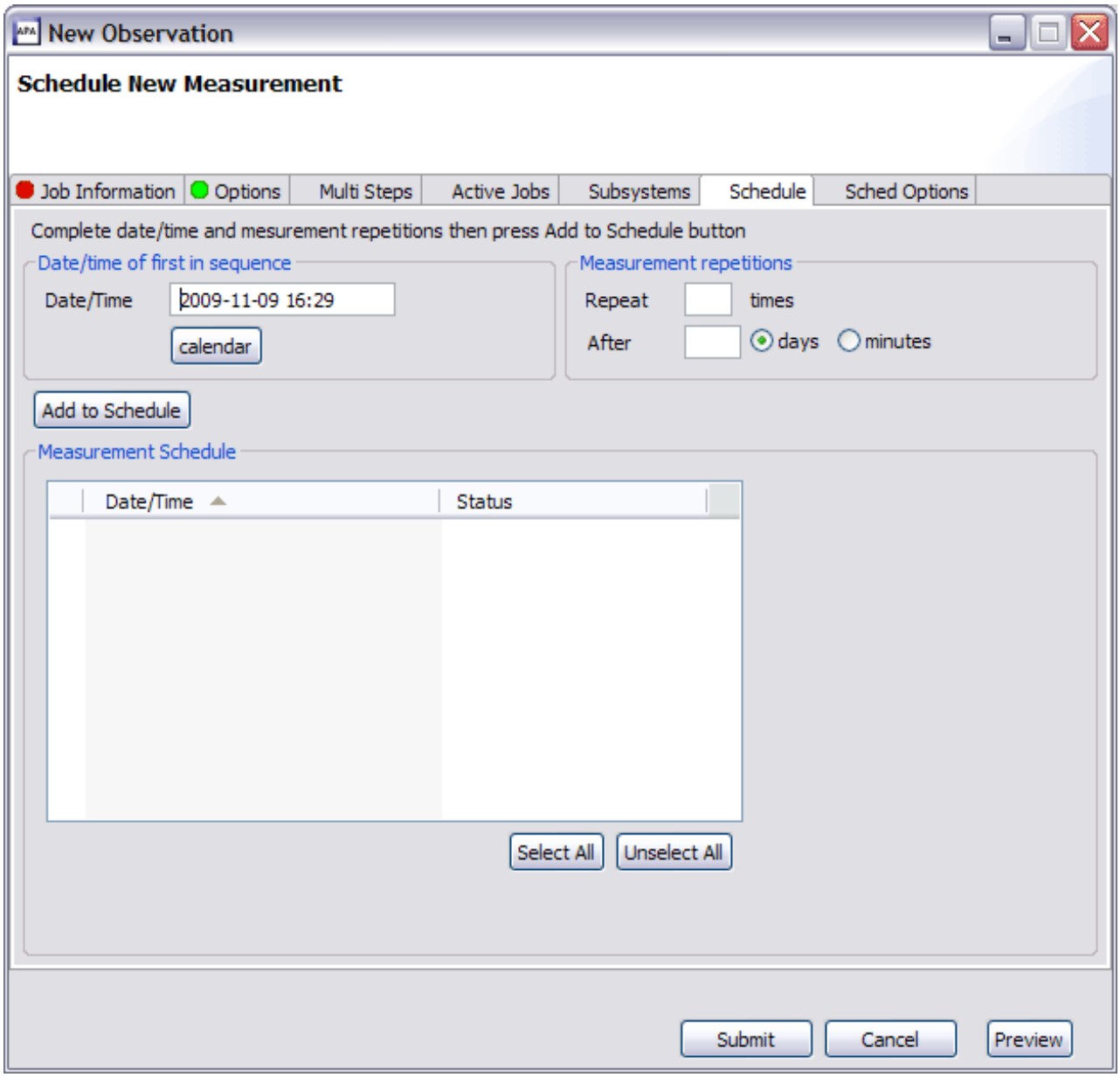


Figure 36. Schedule tab

Refer to "Panel 7 – Schedule" on page 34 for details of the individual fields and edits.

Sched Options tab

The Sched Options tab includes additional scheduling options in which the available fields depend on if the Measure active job field is checked and whether or not a future schedule has been entered on the Schedule tab.

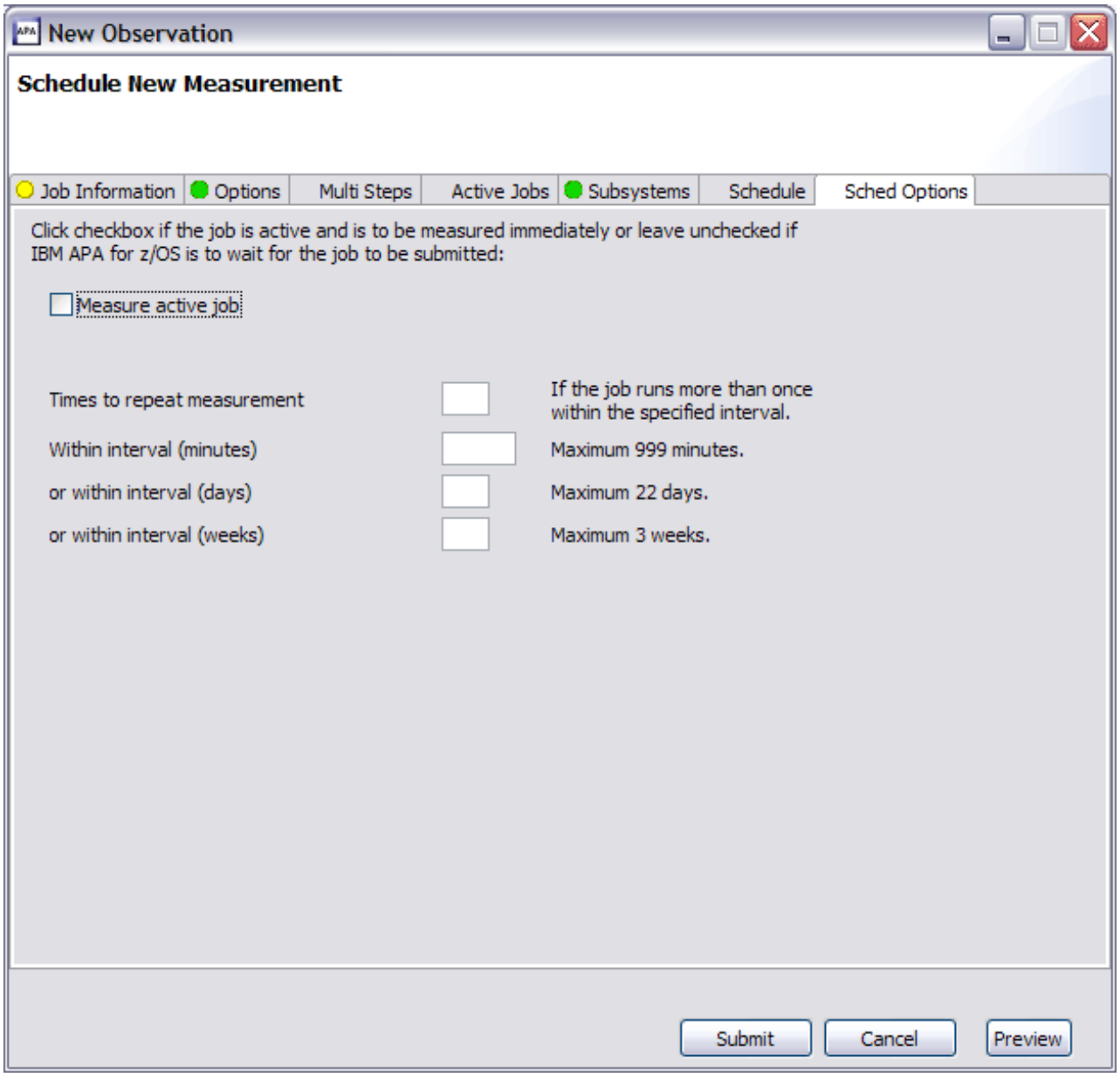


Figure 37. Sched Options tab

Refer to "Panel 8 – Sched Options" on page 37 for details of the individual fields and edits.

New threshold observation

New Threshold Observation provides the functionality to create and submit a new threshold monitor observation to Application Performance Analyzer. The Threshold Observation request starts only when specified threshold criteria have been satisfied for the target job-step. The criteria are:

- CPU Time
- Elapsed Time
- EXCP Count

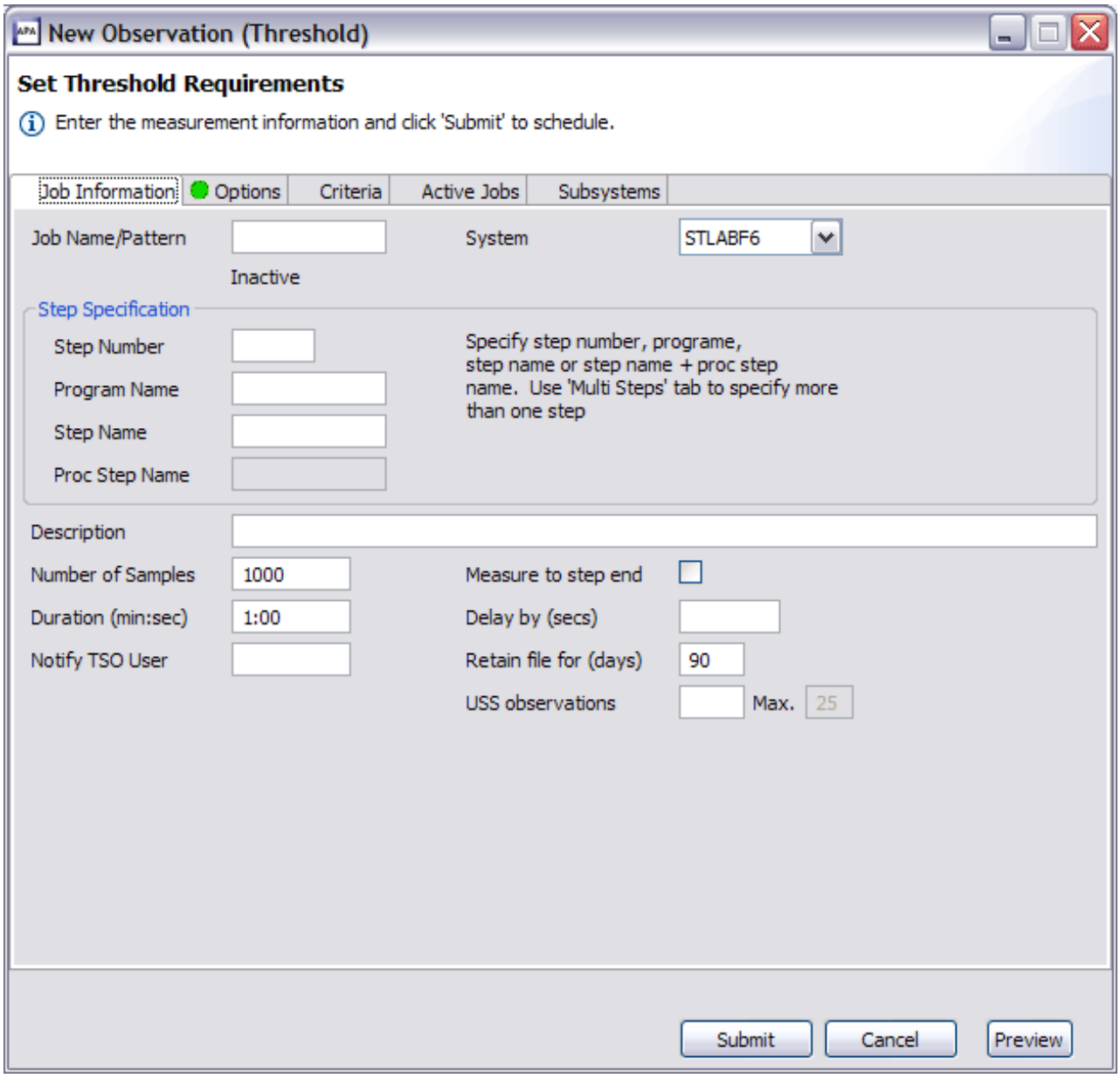


Figure 38. New Threshold Observation dialog

A dialog, incorporating many of the same tabs as for a New Observation, is displayed, where the details for the new threshold observation must be provided. Refer to "New observation" on page 678 for details on the functions of the dialog.

Refer to "Entering a Threshold Monitor request" on page 40 for details of the individual fields and edits for a threshold observation.

Click the Submit button to submit the request. The Observations List automatically refreshes and displays the new observation on the list.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Criteria tab

The Criteria tab is the only tab in the New Threshold Observation dialog that is specific to Threshold requests only. This tab is used to specify the Threshold Criteria that triggers the measurement to run.

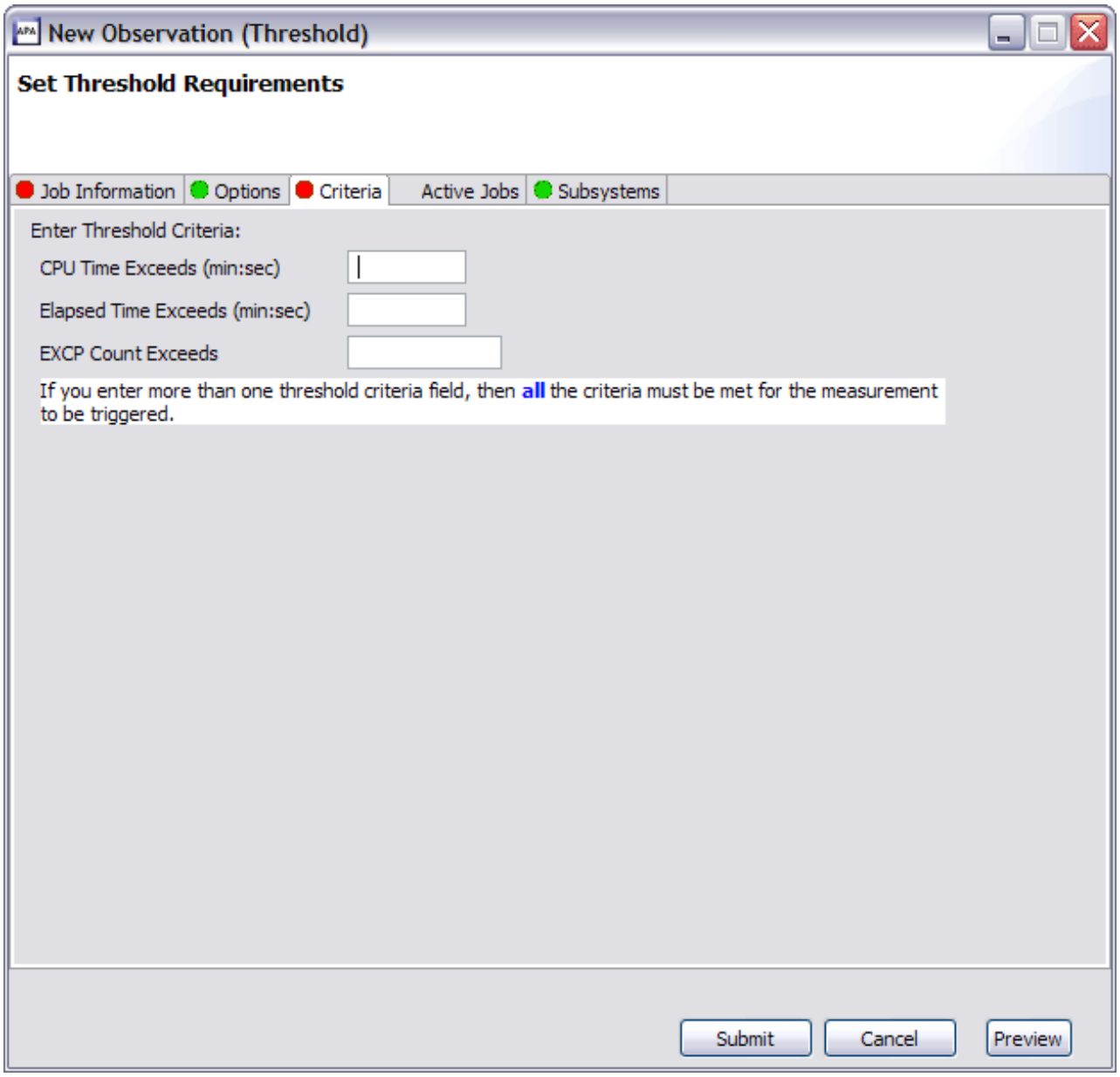


Figure 39. Criteria tab

Refer to "Panel 3 - Criteria" on page 40 for details of the individual fields and edits.

Import Observation

Import Observation provides a means to import a previously exported observation to the active started task. The entry fields include the Import dataset name, optional description and option to delete the imported dataset. A **dataset list** button is also available where a dataset name can be selected from datasets that

are listed based on a full or partial dataset name. When the **OK** button is clicked, the observation is imported and the Observations List refreshed with the new observation.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

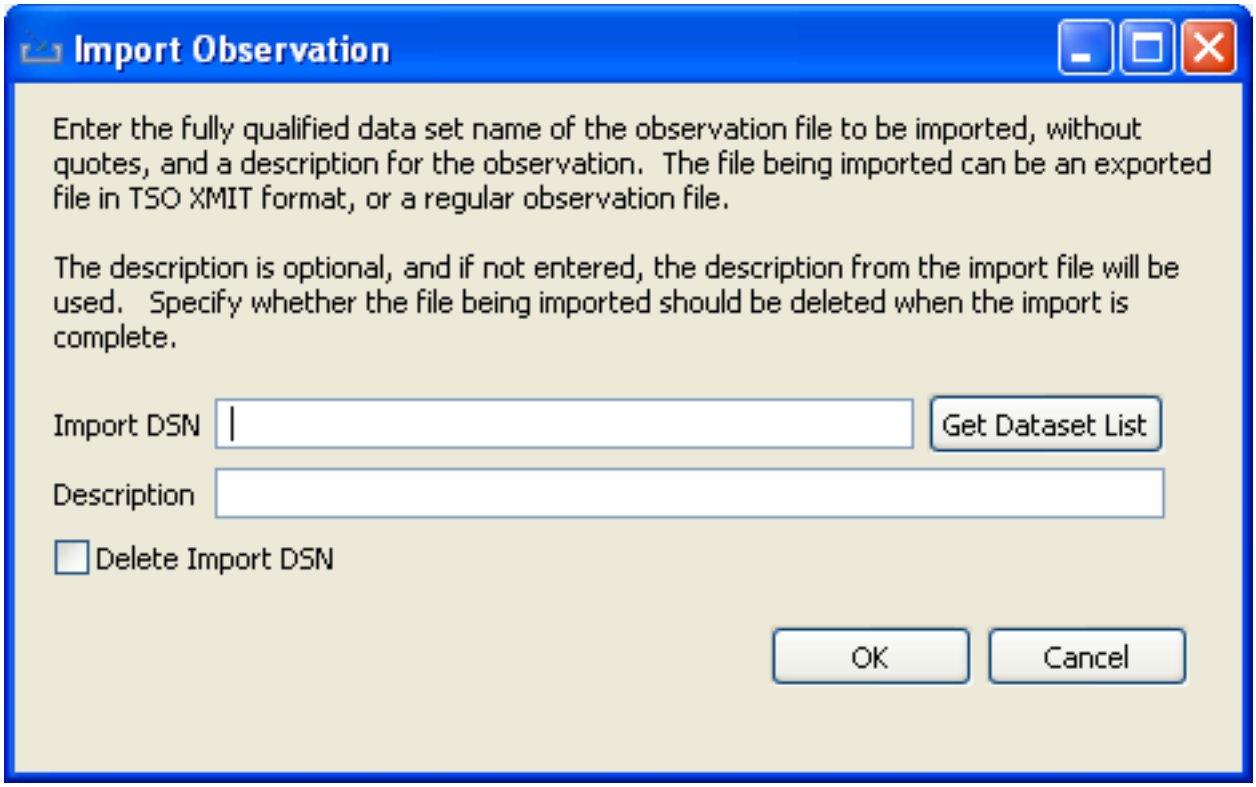


Figure 40. Import Observation dialog

Dataset List

The Dataset List dialog provides a means to retrieve a list of datasets based on a dataset name pattern, where the results are displayed and a single dataset may be selected. The dataset name may include filter keys which are interpreted as follows:

`*` A single asterisk by itself indicates that either is a qualifier or one or more characters within a qualifier can occupy that position. An asterisk can precede or follow a set of characters.

`**` A double asterisk indicates that zero or more qualifiers can occupy that position. A double asterisk cannot precede or follow any characters; it must be preceded or followed by either a period or a blank.

`%` A single percent sign by itself indicates that exactly one alphanumeric or national character can occupy that position.

`%%` One to eight percent signs can be specified in each qualifier.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

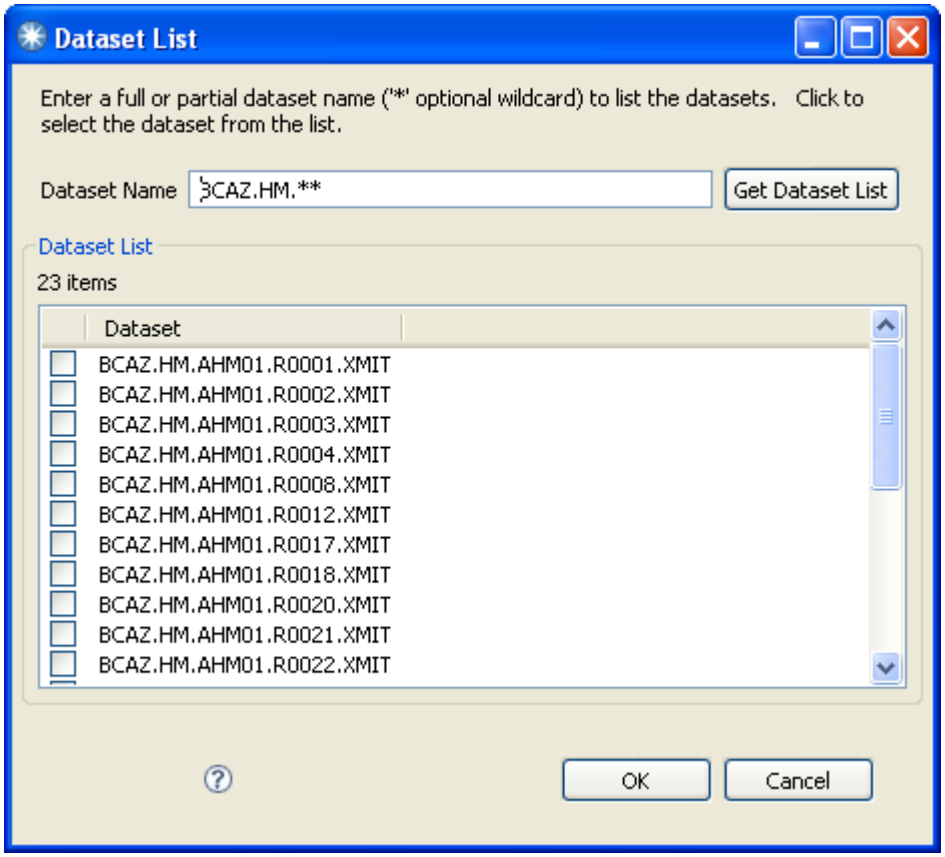


Figure 41. Dataset List dialog

Context menu

The Observations List context menu is accessed by a right-mouse button click on an observation request. The Observations List context menu provides Observation (row) level actions that include:

- Download Reports
- Sticky Notes
- Sub
- New
- Trigger
- Modify
- Export
- Keep
- Delete
- Cancel
- Mapping Repository
- Download XML
- Download PDF
- Delete Reports
- Tag
- Clear All Tags

- Generate Variance Reports
- Generate CICS MASS Reports

The Download Reports menu item is disabled if an Observation sample file does not exist, for example, the Observation is not in a completed status. The Delete Reports menu item is only enabled if reports have been downloaded for the selected Observation.

Download reports

Download Reports provides functionality to retrieve the Application Performance Analyzer reports for an Observation. Download Reports triggers formatting of the observation reports on z/OS then download the reports to the local repository. The reports are then available for viewing in the Observation Reports List View. A reports icon is displayed on the observation request row where the reports download was issued.

Once the reports have been downloaded, they are available until deleted via the Delete Reports action.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Sticky notes

Sticky Notes provides a tool to write, save, print and delete notes for a specific Observation Request. A sticky note icon is displayed on the observation request row where the note was saved. The sticky note can also be launched by double-clicking the observation row. This is a GUI only feature, and not available in the Application Performance Analyzer ISPF interface.

Sub

Sub issues an immediate submission of an Observation request. A new Observation request is automatically submitted to Application Performance Analyzer on z/OS, using the same parameters as the original request. No data entry dialog is presented for this action.

Use Sub instead of New when none of the original request parameters need to be changed.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

New

New Observation provides the functionality to create and submit a new observation to Application Performance Analyzer. Because the New Observation request is issued from the context menu instead of the toolbar, the New Observation dialog is pre-populated with values from the selected observation request. All other functionality remains the same.

Refer to “New observation” on page 678 and “New threshold observation” on page 692 in “Toolbar” on page 676 for details.

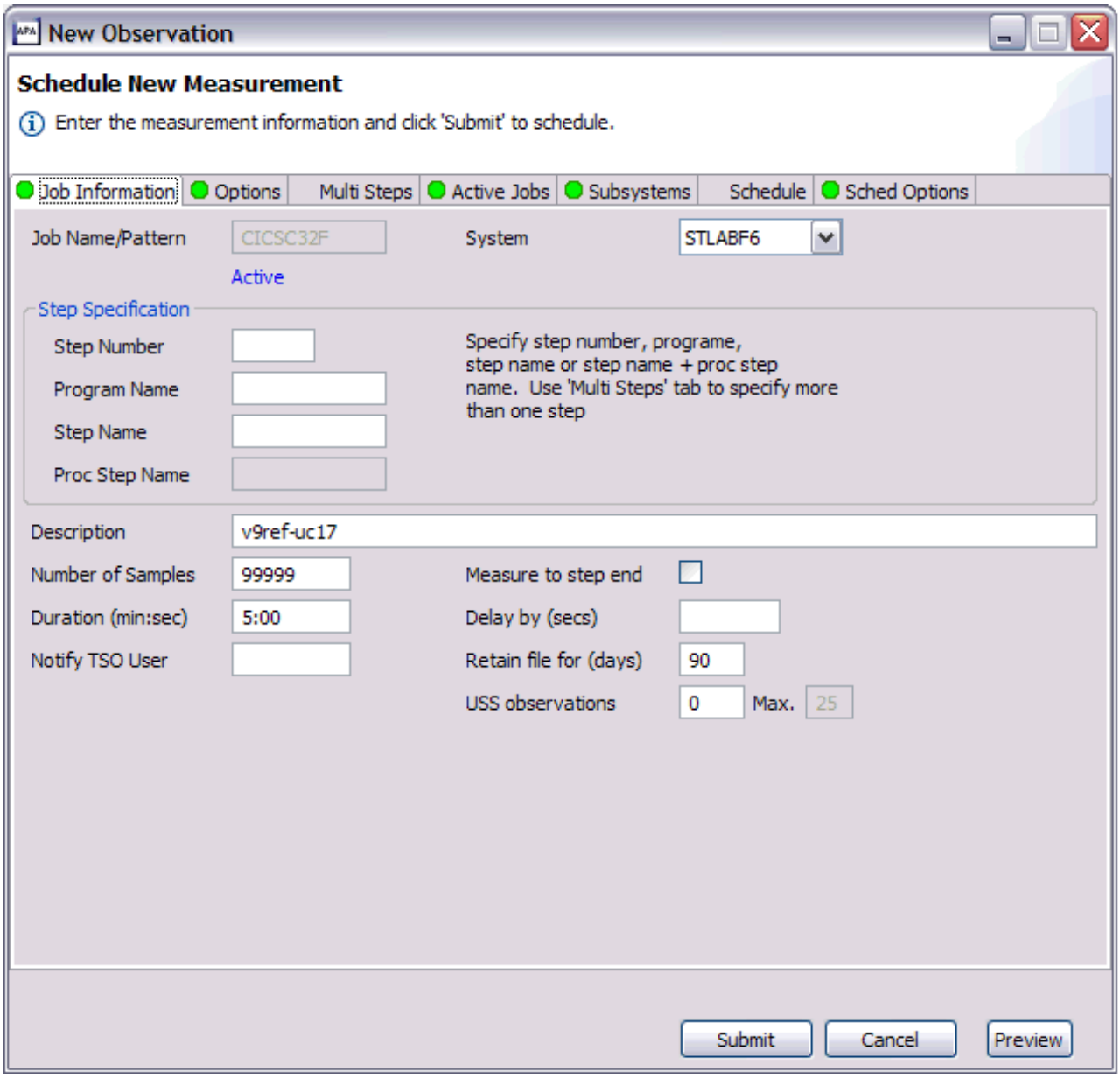


Figure 42. New Observation (context menu) dialog

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Trigger

Trigger creates a new request to be triggered when this request starts. This can only be used on a request that is in SCHED status.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Modify

Modify provides the functionality to edit the parameters of an observation request that has not yet started. A Modify Observation dialog is displayed, pre-populated with values from the selected observation. All other functionality (edits, fields, etc) remains the same as for a New Observation.

Refer to “New observation” on page 678 and “New threshold observation” on page 692 in “Toolbar” on page 676 for details.

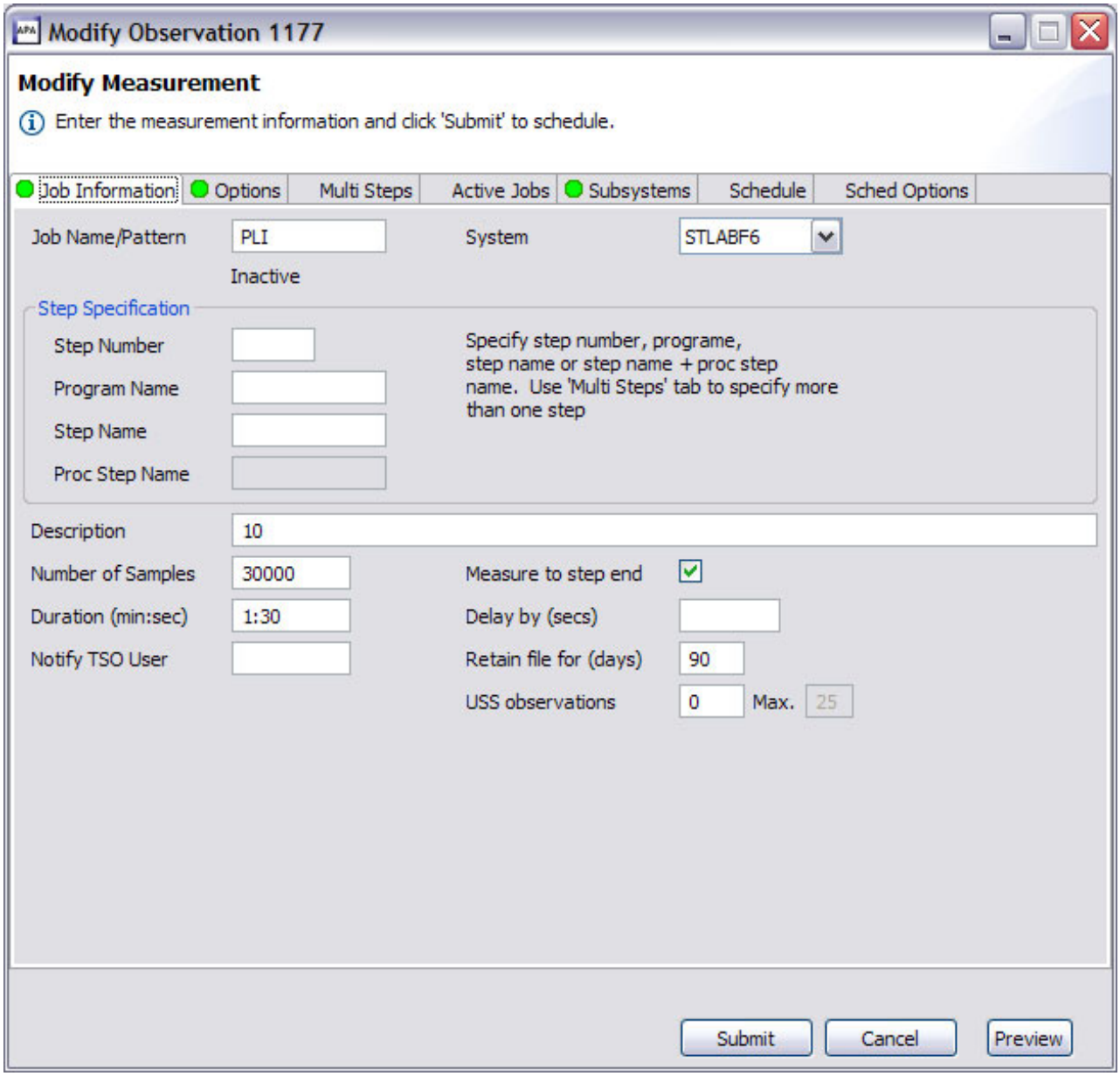


Figure 43. Modify Observation dialog

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Export

Export saves the observation request to a TSO dataset in XMIT format where it can be imported to other started tasks using the Import Observation action. An information dialog is displayed showing the exported dataset name once completed.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Keep

Keep updates the observation request so that the request is kept until it is manually deleted. This overrides the auto delete feature.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Delete

Delete removes the observation request. The Observations List automatically refreshes with the deleted observation removed from the list. Additionally any open reports for this request are also removed.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Cancel

Cancel cancels an active observation request.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Mapping Repository

The Mapping Repository launches the Source Program Mapping Repository editor dialog. The editor provides an interface to manage files/directories of source program listings used for the source program mapping display feature of individual reports.

For further details, please refer to the Mapping Repository description in "Context menu" on page 670 for details.

Download XML

Download XML downloads reports for the observation request in XML format. The User is prompted for the location to save the XML file. Report categories, reports and report options are based on the Report download options preferences settings.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Download PDF

Download PDF downloads reports for the observation request in PDF format. The User is prompted for the location to save the PDF file. Report categories, reports and report options are based on the Report download options preferences settings.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Delete reports

Delete Reports deletes the observation request reports from the local repository. The reports icon displayed on the Observations List row is removed and any open reports for this request are also removed from the display. Reports can be re-downloaded by selecting Download Reports from the context menu.

Tag

T

The Tag action is used to flag an Observation(s) used for the Generate Variance Reports and Generate CICS MASS Reports features. The Tag icon is displayed on the Observations List row that was tagged and is removed if the Tag action is selected for an Observation that was already tagged or if the Clear All Tags action is selected, where all tags will be cleared. Up to 20 Observations that include a Sample DSN file can be tagged.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Clear all tags

The Clear All Tags action removes the tag setting for all Observation(s) that are tagged. The Tag icon is removed for each tagged row.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Generate variance reports

Generate Variance Reports provides functionality to compare up to 20 observations, creating a V – Variance Reports series report. One or more observations must already be tagged and the Observation where the Generate Variance Reports is selected serves as the base.

When selected, this action triggers formatting of the V01 – Measurement Variance Summary report on z/OS and then downloads the report to the local repository. The report is then available for viewing in the Observation Reports List View. A reports icon is displayed on the observation where this action was selected. Once the report is downloaded, it is available until deleted via the Delete Reports action.

If, in addition to the Variance Report, all the reports for the observation are to be viewed, the Download Reports action must be selected after the Generate Variance Report has completed.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Generate CICS MASS reports

Generate CICS MASS Reports provides functionality to report on the activity in up to 21 CICS regions (up to 20 tagged and one base), and creates an X – Multi Address Space series of reports. One or more observations that include a CICS Extractor must already be tagged and the Observation in which the Generate CICS MASS Reports is selected serves as the base.

When selected, this action triggers formatting of the Multi Address Space reports on z/OS and then downloads the reports to the local repository. The reports are then available for viewing in the Observation Reports List View. A reports icon is displayed on the observation where this action was selected. Once the report is downloaded, it is available until deleted via the Delete Reports action.

If, in addition to the CICS MASS Reports, all the reports for the observation are to be viewed, the Download Reports action must be selected after the Generate CICS MASS Reports has completed.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Observation Detail view

The Observation Detail view, the first tab located at the bottom center of the Application Performance Analyzer GUI, displays detailed information of the selected request from the Observations List. The tab title for this view displays the request number of the selected request.

The data in the view is organized into several groups:

- General Information (general purpose information about the observation request)
- Measurement Criteria (measurement criteria of the request)
- Measurement Information (results of the measurement request)
- Data Extractors (types of data extractors that were included)
- Steps Information (multi-step job information)
- Scheduling Information (future scheduled job information)

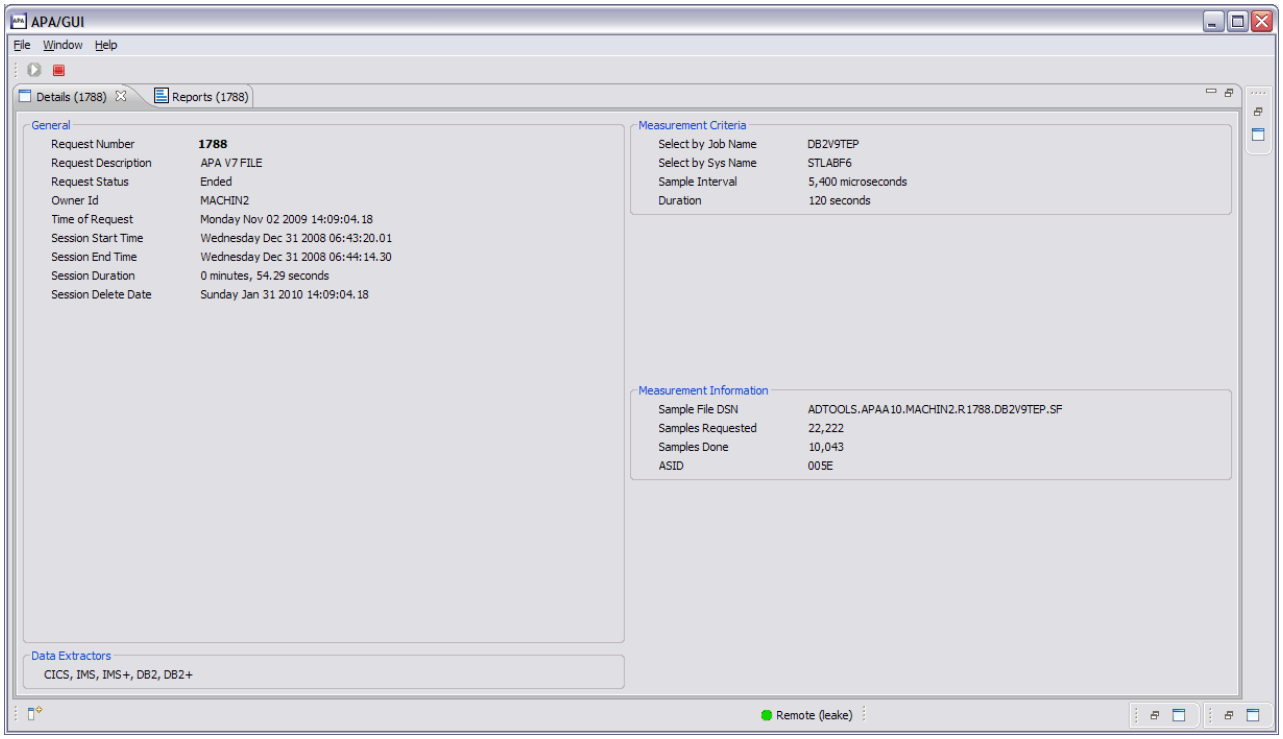


Figure 44. Observation Detail view

Observation Reports List view

The Observation Reports List view, the second tab located at the bottom center of the Application Performance Analyzer GUI, displays a list of reports for the selected request from the Observations List. This view includes a toolbar and a row-specific context menu. The tab title for this view displays the request number

of the selected request. An empty page is displayed if the reports have not yet been downloaded for the selected request.

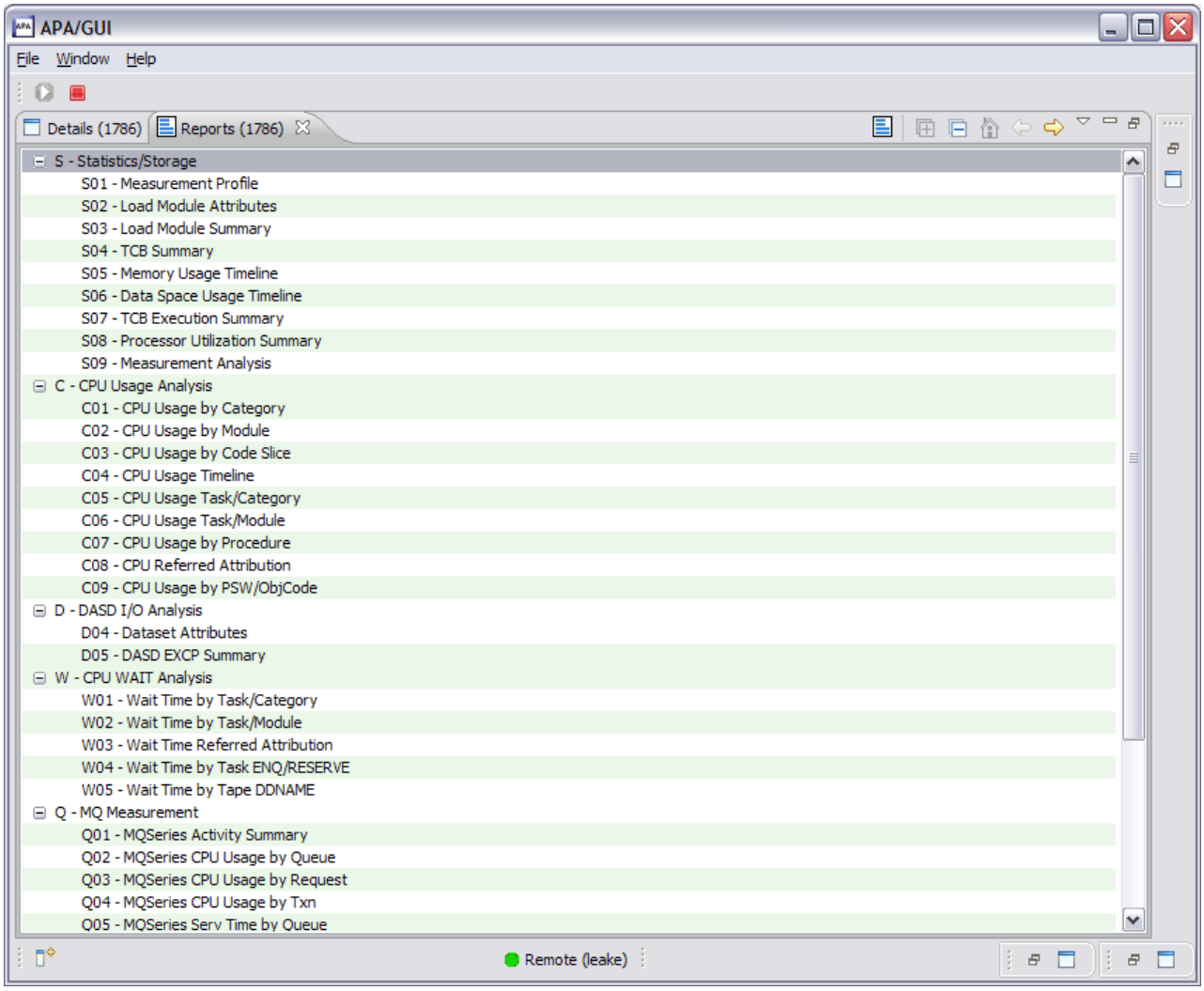


Figure 45. Observation Reports List view

The reports list is a 2-level tree-view. The first level (parent) rows represent the report category while the second-level (child) rows are for the individual reports. Not all categories and reports are listed in the Reports List view, only those that exist for the selected observation. The list is opened to the category set for the Expand Default user preference.

The category rows are for informational/organizational purposes only and result in no action if clicked (other than if the category is expanded). For each report row that is selected, a new Report View is opened and the Report Options view is updated to the active (selected) report. Refer to “Report views” on page 707 and “Report Options view” on page 705 for details.

A context menu is available for each row on the report list. Right-click the row of the desired report or category and the list of available menu actions is displayed. Refer to “Context menu” on page 704 for details.

Refer to Chapter 3, “Performance analysis reports,” on page 43 through Chapter 8, “Java/USS/HFS performance analysis reports,” on page 455 for details of the individual reports.

Toolbar

The Reports List toolbar provides buttons for view-level actions that include Download Reports. Additionally, common navigation actions are available, including Expand All (expand all report categories) and Collapse All (collapse all report categories).

The toolbar includes a Local Pull Down button, represented by a down arrow icon located at the far right-side of the toolbar. The pull down provides an alternative path to many of the toolbar actions.

Download reports

The Download Reports button downloads reports for the active (selected) observation request of the Observations List view. If the reports are already downloaded, they are re-downloaded. Refer to “Download reports” on page 697 for details.

Once the reports are downloaded, the Reports List view is updated with the list of reports that are available for the selected observation request.

Context menu

The Reports List context menu is accessed by a right-mouse button click in the view. It provides actions that include Download Report, Download XML and Download PDF. Once the reports are downloaded, the Reports List view is updated with the list of reports that are available for the selected observation request.

Download report

The Download Report action downloads a single report from z/OS. Any report can be downloaded with the exception of the Variance (“V”) and CICS MASS (“X”) reports. This feature is convenient when the Report Options have been modified and only the single report needs to be downloaded.

Once the report has been downloaded it will be refreshed in the Report View once the download is complete.

Download XML

Download XML downloads a single report for the observation request in XML format. Any report can be downloaded with the exception of the Variance (“V”) and CICS MASS (“X”) reports. The User is prompted for the location to save the XML file. Report categories, reports and report options are based on the Report download options preferences settings.

Download PDF

Download PDF will download a single report for the observation request in PDF format. Any report can be downloaded with the exception of the Variance (“V”) and CICS MASS (“X”) reports. The User is prompted for the location to save the PDF file. Report categories, reports and report options are based on the Report download options preferences settings.

Report Options view

The Report Options view, located below the Reports List view, lists all report options for the selected (active) report from the Reports List. The view is opened and updated when a report is selected from the Reports List and includes a row-specific context menu. The view is closed if no reports are selected and none are displayed in the Report View. The tab title for this view displays the ID of the selected report.

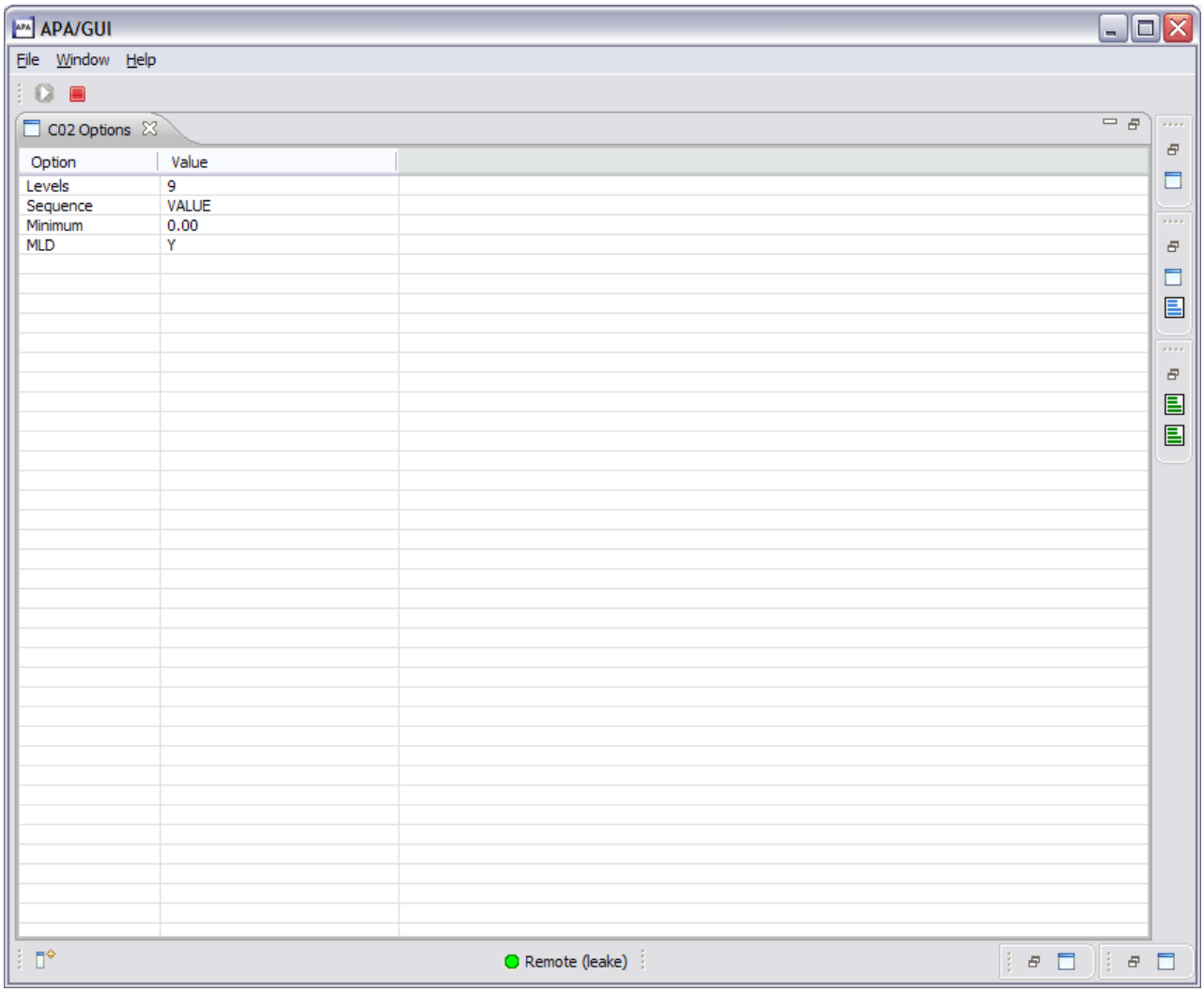


Figure 46. Report Options view

Each report option can be edited and changed via the Context Menu or by double-clicking on the desired row. An edit dialog window is displayed in which the value can be modified.

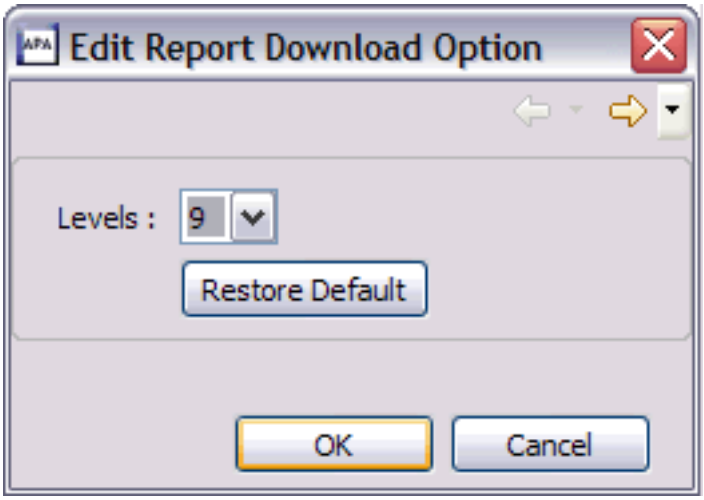
The individual report can then be downloaded with the new report options applied and the Report View refreshed with the updated report. Refer to "Report views" on page 707 for details.

Any report can be edited and downloaded with the exception of the Variance ("V") and CICS MASS ("X") reports.

The modified report options are only applied for the selected observation request report. Alternatively, if the report option value should be a permanent change that would be applied to all observation requests, the report option preference located in the User Preferences should be modified instead. Refer to “Report download options preferences” on page 665 for details.

Note: In reports with multiple levels of detail, for example the E06 CICS Service Time by Task Id report, expanding the report requires the following steps:

1. In the Observation Reports List view, select the report to be expanded.
2. In the Options panel for that report, located in the lower left pane in the GUI, double click the Levels option.
3. A dialog box is displayed, as shown below. Enter a new value for Levels.



4. Right click E06 CICS Service Time by Task Id in the Observation Reports List view and and select the download option. The expansion of the report now occurs.

Context menu

The Report Options context menu is accessed by a right-mouse button click in the view. It provides actions that include:

- Edit Option
- Download Report
- Download XML
- Download PDF

Edit option

The Edit Option action invokes a dialog where the report option can be changed. The changes only apply to the selected observation request report. For the changed option to take effect, the report must be downloaded (and thus the new report option applied) via the Download Report context menu or from the Reports List view. Refer to “Report download options preferences” on page 665 for details on the edit options dialogs.

Download report

Download Report downloads the individual report for the active (selected) report of the selected observation request. Refer to “Download reports” on page 697 for details. Any modifications to the options for the report take effect with this

download. The report displayed in the Report View is refreshed once the download is complete.

Download XML

Download XML will download the individual report in XML format for the active (selected) report of the selected observation request. The User is prompted for the location to save the XML file. Report categories, reports and report options are based on the Report download options preferences settings.

Download PDF

Download PDF will download the individual report in PDF format for the active (selected) report of the selected observation request. The User is prompted for the location to save the PDF file. Report categories, reports and report options are based on the Report download options preferences settings.

Report views

The Report view, located next to the Reports List view, displays an individual report selected from the Reports List. This a multiple-instance view, where multiple reports can be opened at once – one view per report, including reports from observation requests other than the active observation. This allows for comparison capabilities of the same report, but from different observations or viewing multiple reports at once.

Each report has a separate view that includes a toolbar and context menu for each instance. A set of accelerator keys is also available, which provides quick keyed access to some of the actions.

The tab title for this view identifies the report ID, name, observation request it is for and job name of the observation.

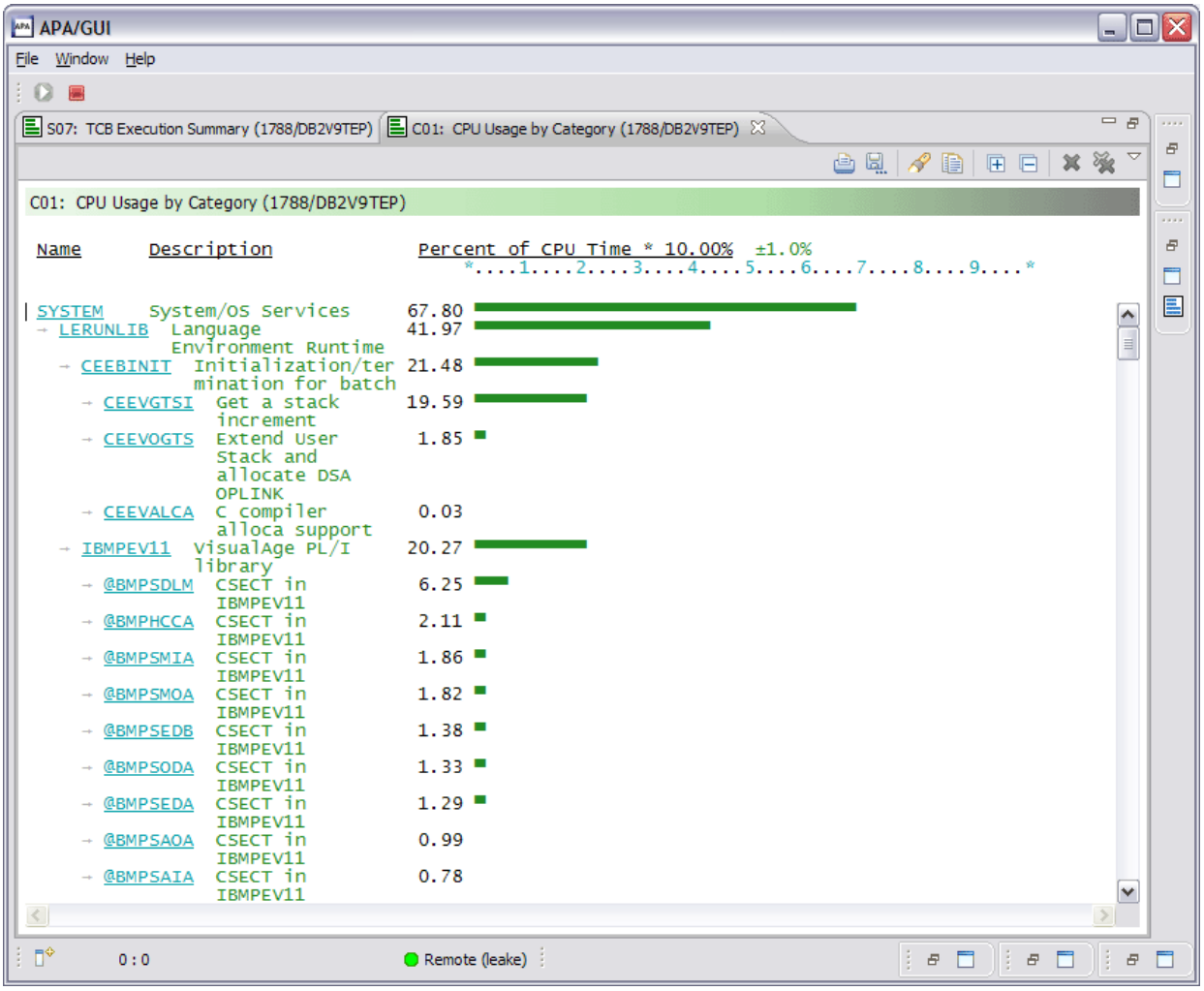


Figure 47. Report view

The report is organized by two sections: the header and report body. The header section includes a line for the report ID/name and can include non-scrollable report column headings.

The report body is scrollable and includes tree expand/collapse capability. Hyperlinked text is identified when the cursor is changed from a pointer to a hand and can include both expand/collapse functionality (an internal link - within the document) or a link to a separate report. If the link to a separate report is clicked, a new Report view is opened to display the selected report. If an internal link is clicked, the next level of report is expanded. If the link is clicked again, the next level is collapsed.

Some reports include sort functionality, accessible via the context menu of hyperlinked text. The list of sort options is unique for each report. Refer to "Context menu" on page 715 for details of the report sort options.

Refer to Chapter 3, "Performance analysis reports," on page 43 through Chapter 8, "Java/USS/HFS performance analysis reports," on page 455 for details of the individual reports.

Accelerator keys

Each report view includes a set of accelerator keys – a keyboard combination that provides a quick method to run a report view action. The accelerator keys include actions to Print, Find, Select All, Copy, Close Report and Close All Reports. The key sequences are:

Table 29. Accelerator key combinations

Action	Accelerator keys
Print	Ctrl + 'P' Prints the report.
Find	Ctrl + 'F' Finds search string in the report.
Select All	Ctrl + 'A' Selects all rows in the report.
Copy	Ctrl + 'C' Copies selected text to the Windows clipboard.
Close Report	Ctrl + 'W' Closes a report.
Close All Reports	Ctrl + Shift + 'W' Closes all reports.

Note: The 'Paste' (Ctrl + 'V') Windows accelerator keys are also available to copy/paste the report contents to another Windows-based application.

Toolbar

The Report view toolbar provides buttons for report-level actions that include:

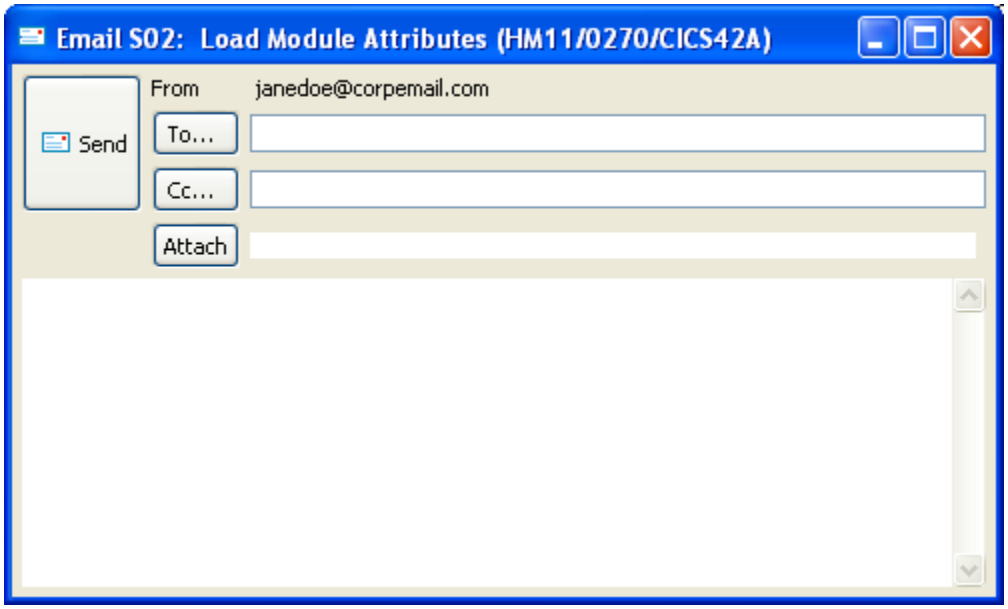
- Email Report
- Sticky Notes
- Launch Html
- Print
- Save As
- Find
- Copy
- Close Report
- Close All Reports

Additionally, common navigation actions are available including Expand All (expand the complete report) and Collapse All (collapse the report to the parent-level). The toolbar includes a Local Pull Down button, represented by a down arrow icon located at the far right-side of the toolbar. The pull down provides an alternative path to many of the toolbar actions.

Email report

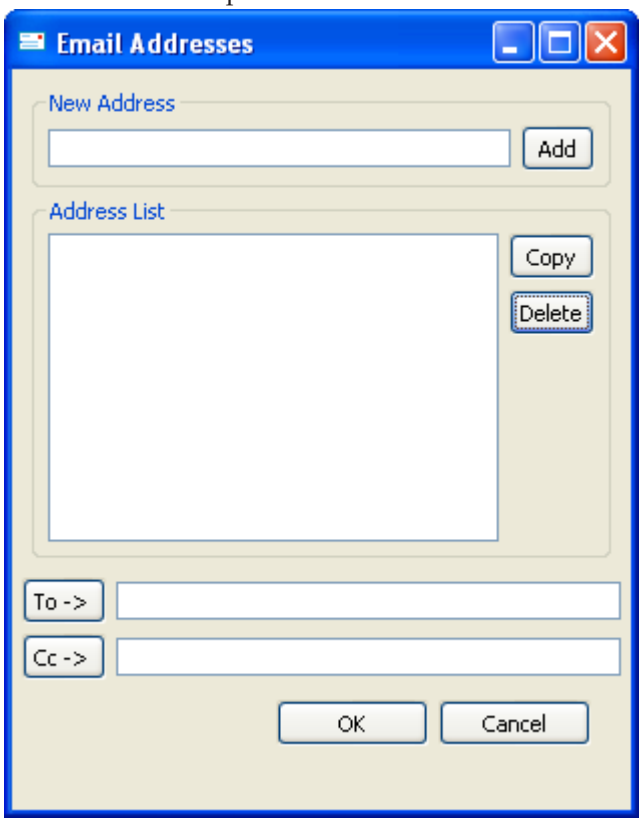
The report e-mail function provides a tool to send a report view, including any associated sticky notes, to one or more e-mail addresses. The From e-mail and SMTP information are sourced from the Email preferences, which must be setup prior to sending an e-mail.

Note: This is a GUI-only feature that is available only when a z/OS connection has been established and the e-mail option has been enabled during the customization of Application Performance Analyzer for z/OS Listener.



An e-mail addresses dialog is launched if the “To...” or “Cc...” buttons are clicked and provides a tool to select addresses from the e-mail address book list. Reference

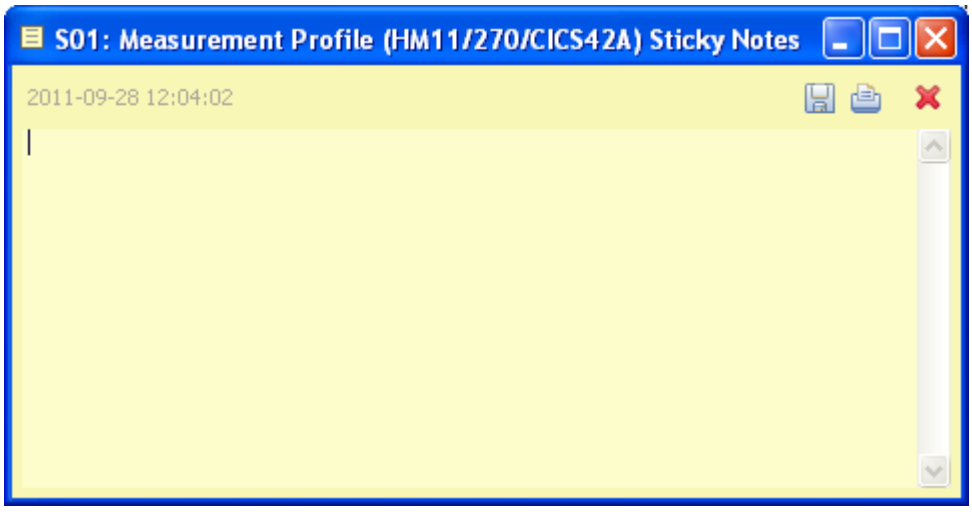
the Address Book preference for more details.



Additional file attachments can be added to the e-mail. A file dialog is launched when the "Attach" button is clicked. The selected file is added to the list of file attachments to be included in the e-mail.

Sticky Notes

Sticky Notes provides a tool to write, save, print and delete notes for a specific report. A sticky note icon is displayed in the reports list view for each report row where a sticky note was saved. The sticky note can also be launched by double-clicking the report row in the reports list view. This is a GUI only feature, and not available in the Application Performance Analyzer ISPF interface.



Launch Html

The Launch Html action will launch the active report view in the desktop default HTML browser, providing a browser-enabled static version of the Application Performance Analyzer report.

Print

The Print action provides print functionality for the report. A print dialog is launched in which the printer and page options can be selected and then the report printed.

Save As

Save As provides functionality to save the report to disk. A file dialog is launched in which the file options and file name can be entered and then the report saved to disk. The figure below shows a report saved to a text file.

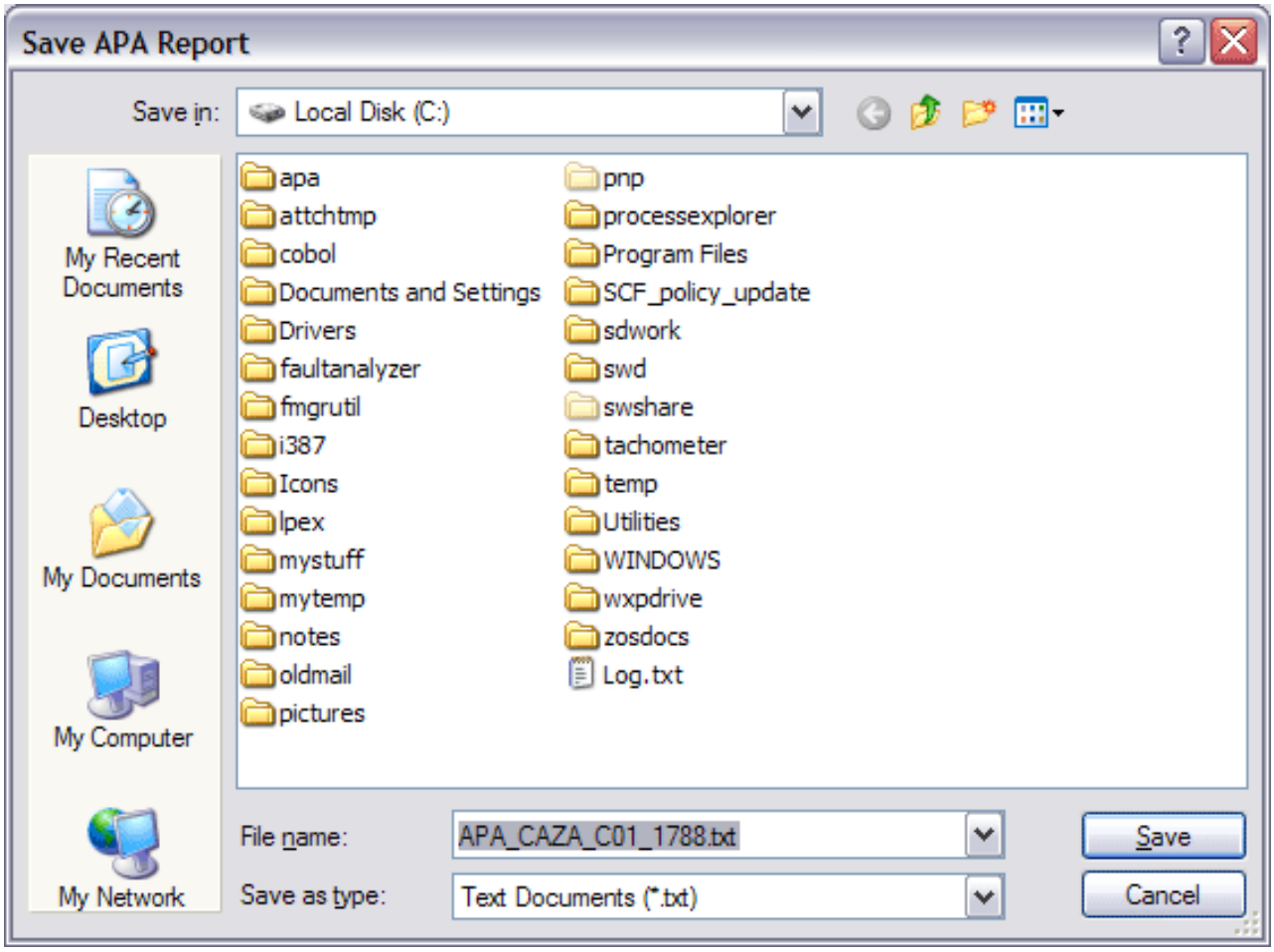


Figure 48. Save As dialog

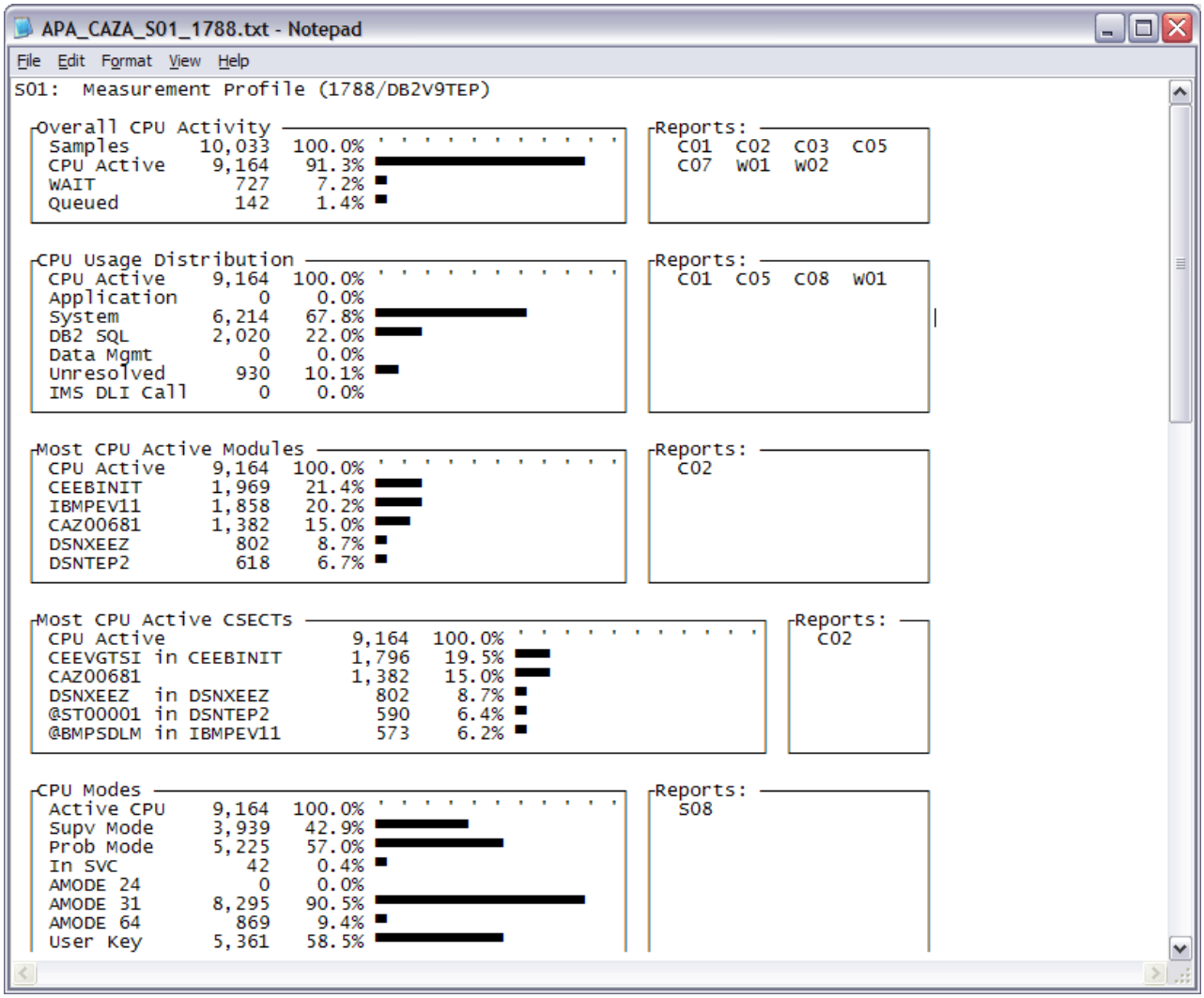


Figure 49. Saved Application Performance Analyzer GUI report sample

Find

The Find action launches a dialog in which search text and search options are entered, including matching the case of the input text and starting the search from the beginning of the report (default) or the end of the report.

The report is searched for the text. Once a match is found, the text will be highlighted in grey. Click the Find Next button to navigate to the next location of the search text.

Figure 50. Find dialog

Copy

Copy functions like the same Windows command by taking any text that is selected (highlighted) and copying it to the clipboard. Once the text is in the clipboard, it can be pasted (Ctrl + 'V') to other Windows applications. A limit of 200,000 lines can be copied.

The figure below shows a report in which the Select All accelerator key (Ctrl + 'A') is used to copy the complete report. Copy (Ctrl + 'C') is then used to copy to the clipboard, followed by Paste (Ctrl + 'V') to paste the report into Word.

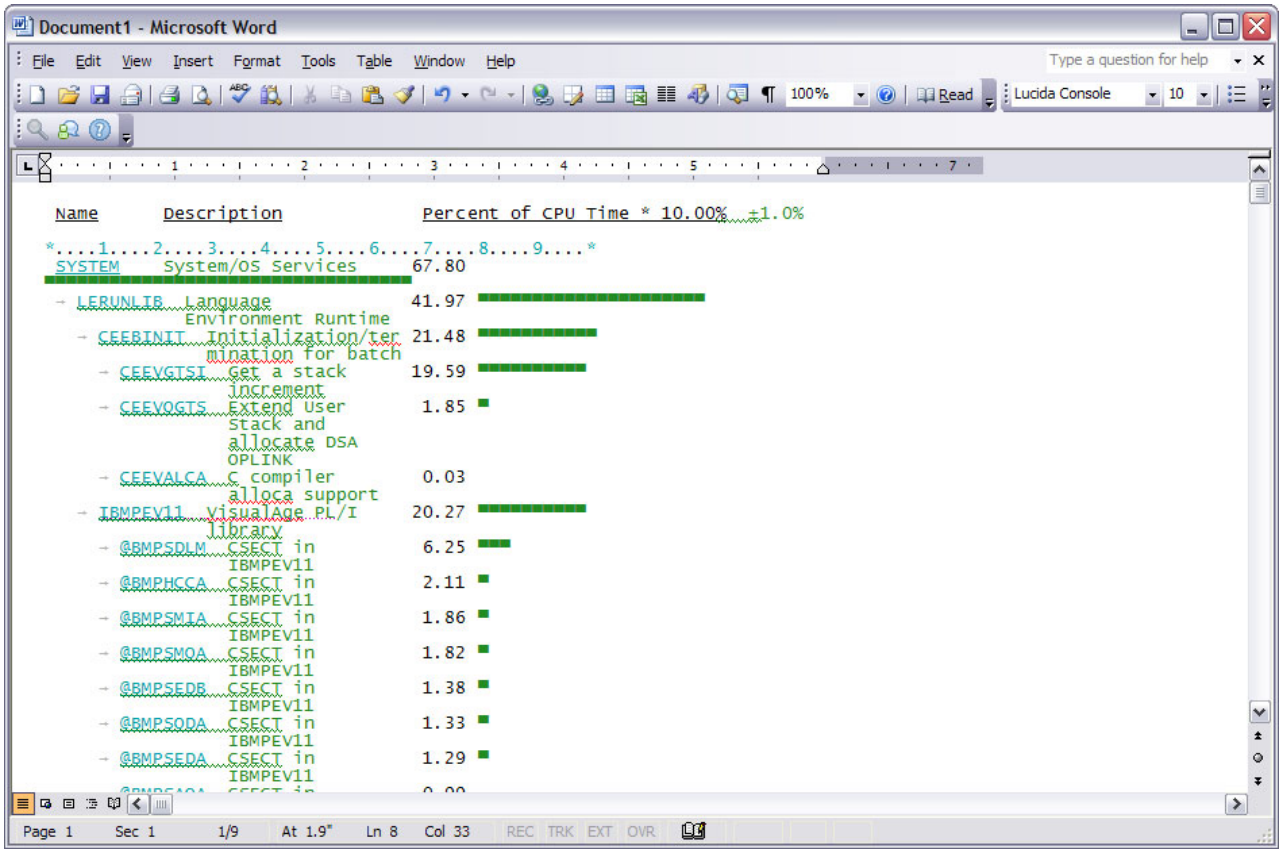


Figure 51. Copy/Paste report to Word sample

Close report

Close Report closes the report and removes the view from the display.

Close all reports

Close All Reports closes all reports and removes all Report views from the display. The Report Options view is also closed.

Context menu

The Report context menu is accessed by a right-mouse button click for both report header and body hyperlinked text only, and is not available for all reports. All menu items except Sort by are available within the report body only. It provides actions which include: Details, DB2 Explain SQL, Sort by, Module Information and Source Program Mapping.

Details

The Details context menu action displays detailed information for the requested report line. Details are not available for all report lines and all reports. When selected, a new window displays the detail report contents. The nature of the information displayed varies widely depending on the type of item selected. This

is the equivalent to entering '++' in the Application Performance Analyzer ISPF interface.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

DB2 Explain SQL

The DB2 Explain SQL context menu action displays detailed SQL query information for the requested report line. DB2 Explain SQL is only available for 'F' – DB2 Measurement reports. When selected, a new window will display two tabs; SQL Information and SQL Text.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

SQL Information tab

The SQL Information tab provides a detailed overview of the SQL statement.

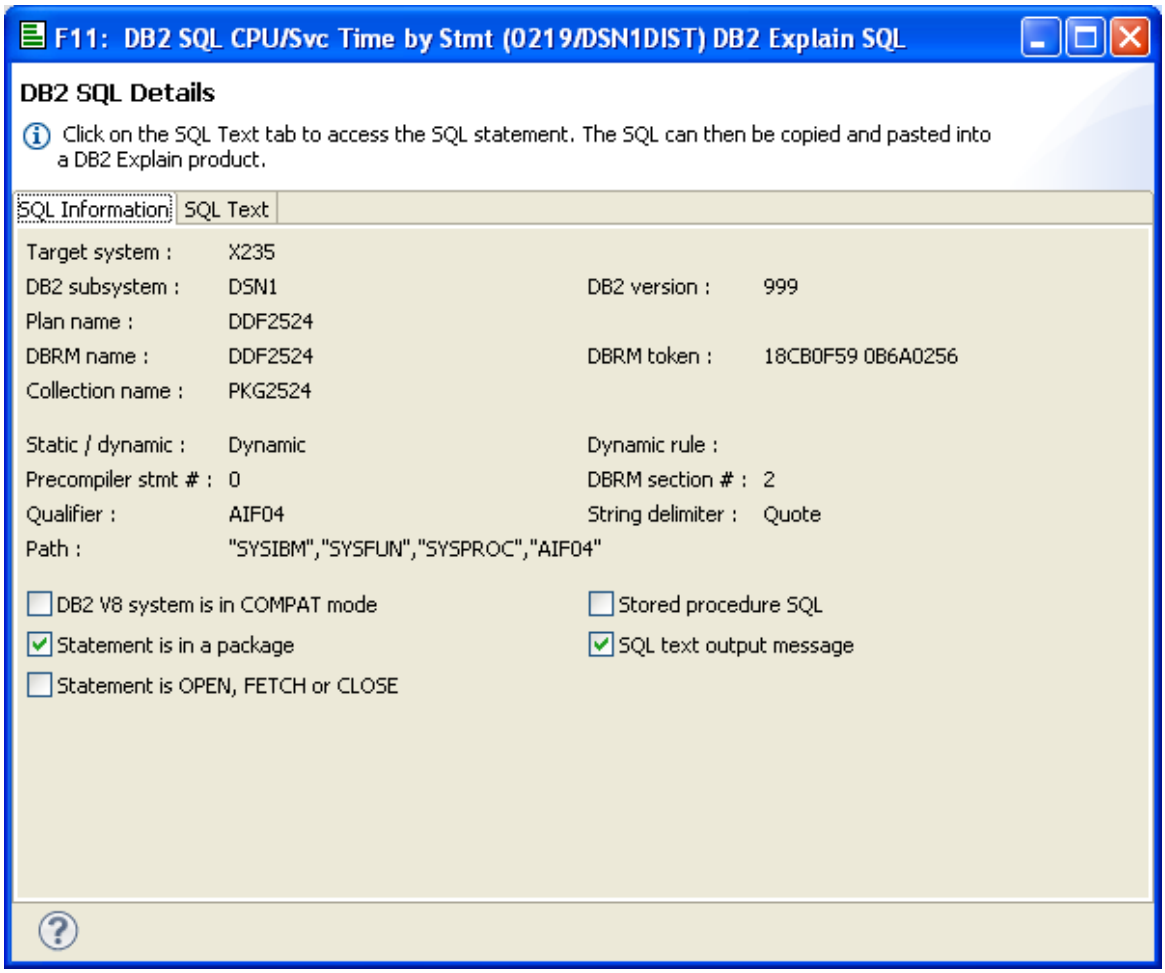


Figure 52. SQL Information tab

SQL Text tab

The SQL Text tab displays the SQL text statement that can be used as input to DB2 or Visual Explain products. The contents can be copied (Ctrl+A to select all then right mouse-button click and select 'copy' or Ctrl+C) then pasted to an editor or other tool.

Note: Display of dynamic SQL text is limited to 15,000 characters.

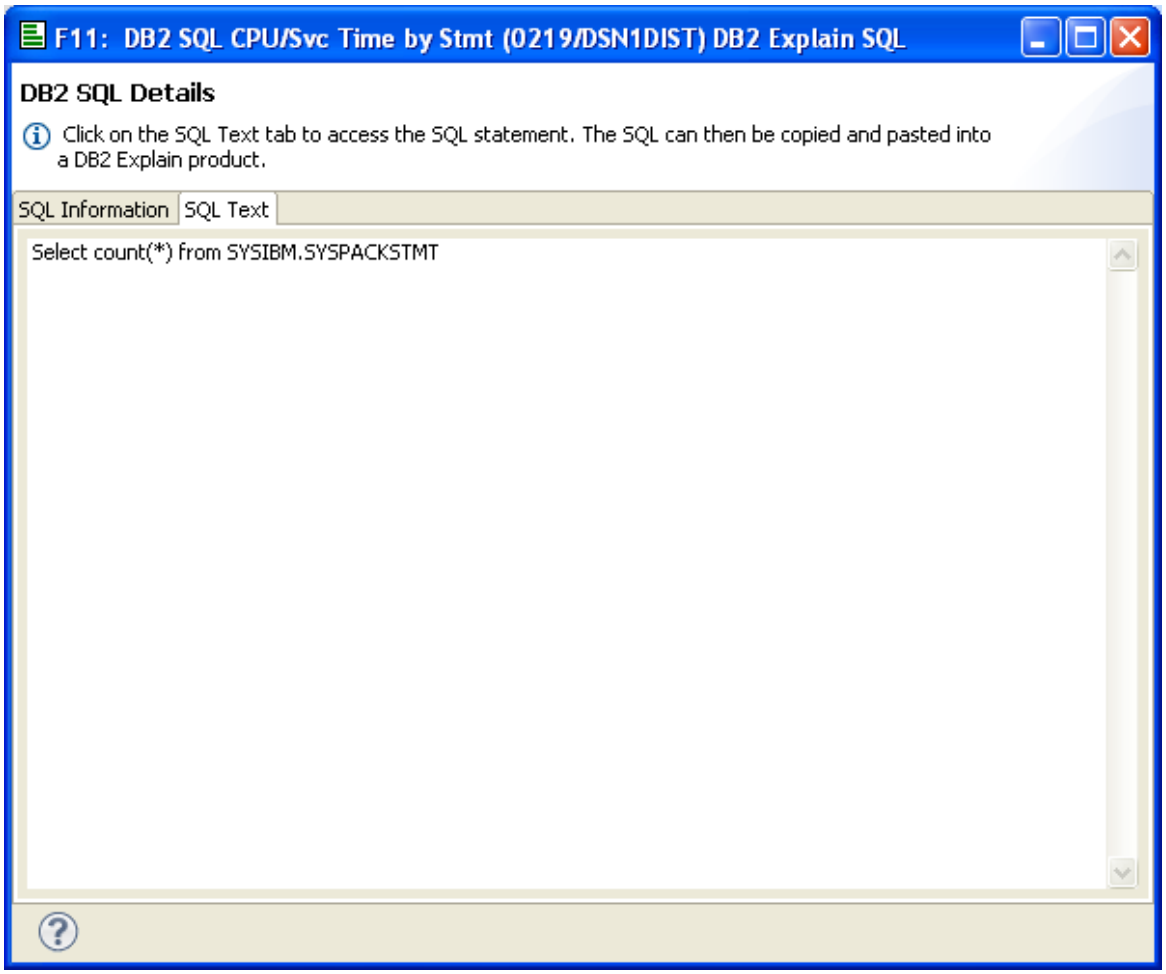


Figure 53. SQL Text tab

Sort by

The context menu provides sort actions that are unique for each report. The table below lists the report and context menu sort actions that are available for the Application Performance Analyzer GUI. When clicked, the report is sorted in the order of the selected request.

Table 30. Report sort actions

Report	Sort actions
S03	1. Sort by NAME 2. Sort by SIZE 3. Sort by ADDRESS 4. Sort by LIBRARY
C01, C02, C05, C06, C07, C08 , C10	1. Sort by NAME 2. Sort by VALUE

Table 30. Report sort actions (continued)

Report	Sort actions
C03	1. Sort by VALUE 2. Sort by ADDRESS 3. Sort by LOCATION
C09	1. Sort by VALUE 2. Sort by ADDRESS
D01, D02, D03, D05, D06, D08	1. Sort by NAME 2. Sort by VALUE
W01, W02, W03, W04, W05	1. Sort by NAME 2. Sort by VALUE
H01, H03, H08	1. Sort by VALUE 2. Sort by FILEID 3. Sort by PATHNAME
H02, H05, H09	1. Sort by VALUE 2. Sort by DEVID 3. Sort by DEVICE
H10, H11	1. Sort by VALUE 2. Sort by REQID 3. Sort by REQUEST
I05, I06, I07, I08, I09, I10, I11, I12, I13, I18, I19, I20, I21	1. Sort by NAME 2. Sort by VALUE
E02	1. Sort by NAME 2. Sort by VALUE 3. Sort by COUNT
E03, E04, E05, E06, E07, E08, E09, E10, E11, E12	1. Sort by NAME 2. Sort by VALUE
F02	1. Sort by THREAD 2. Sort by DURATION 3. Sort by CPU
F03, F04, F07, F08, F14	1. Sort by NAME 2. Sort by VALUE
F05, F09	1. Sort by VALUE
F10, F11, F15, F16, F17, F18, F19	1. Sort by NAME 2. Sort by VALUE 3. Sort by DURATION

Table 30. Report sort actions (continued)

Report	Sort actions
F12	1. Sort by DURATION 2. Sort by VALUE
Q02, Q03, Q04, Q05, Q06, Q07, Q08, Q09, Q10	1. Sort by NAME 2. Sort by VALUE
J03 ,J04, J05, J06, J07, J09, J10, J11, J12, J14, J15, J16, J17	1. Sort by NAME 2. Sort by VALUE
X01, X02, X03, X04	1. Sort by NAME 2. Sort by VALUE

Refer to Chapter 3, "Performance analysis reports," on page 43 through Chapter 8, "Java/USS/HFS performance analysis reports," on page 455 for additional details of the individual report sort options.

Module Information

The Module Information context menu action displays detailed information for the program corresponding to the requested report line. Module information is only available for all report lines related to application programs. When selected, a new window will display the module information contents. The nature of the information displayed varies depending on the type of module displayed. This is the equivalent to entering the 'M' line command in the Application Performance Analyzer ISPF interface.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

Source Program Mapping

The Source Program Mapping context menu action displays the source code for the program corresponding to the requested report line. Source Program Mapping is only available for report lines related to application programs and requires setup of a source mapping repository, which provides a list of libraries/directories to locate the source code. When selected, a new window displays the source code information contents. The nature of the information displayed varies depending on the type of module displayed. Detail windows for multiple lines can be displayed at once.

Note: This action is only available if the z/OS connection has been established and the remote repository is active.

As an example, while viewing the CPU Usage by Category report, shown below, right-mouse button click on the "COBVSAM" report line hyperlink and select the "Source Program Mapping" action.

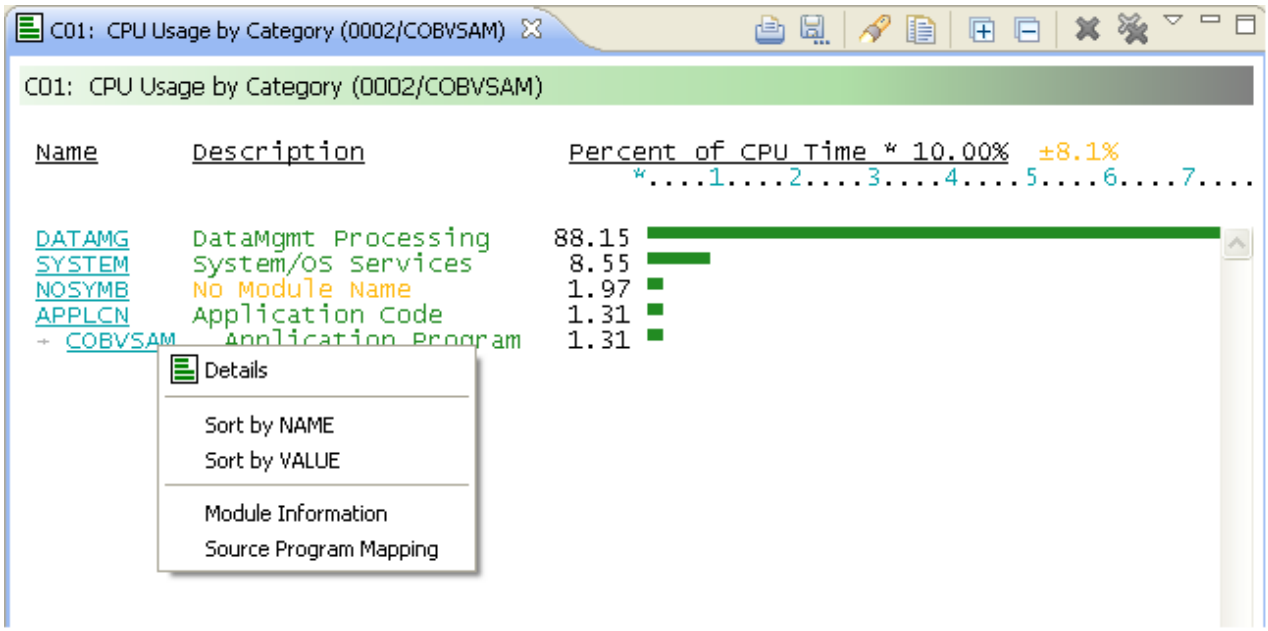


Figure 54. Source program mapping context menu option

A detail window is displayed, showing the source code details of the application module for the "COBVSAM" report line.

A toolbar is available that provides buttons for report detail-level actions, including: Print, Save As, Find and Copy.

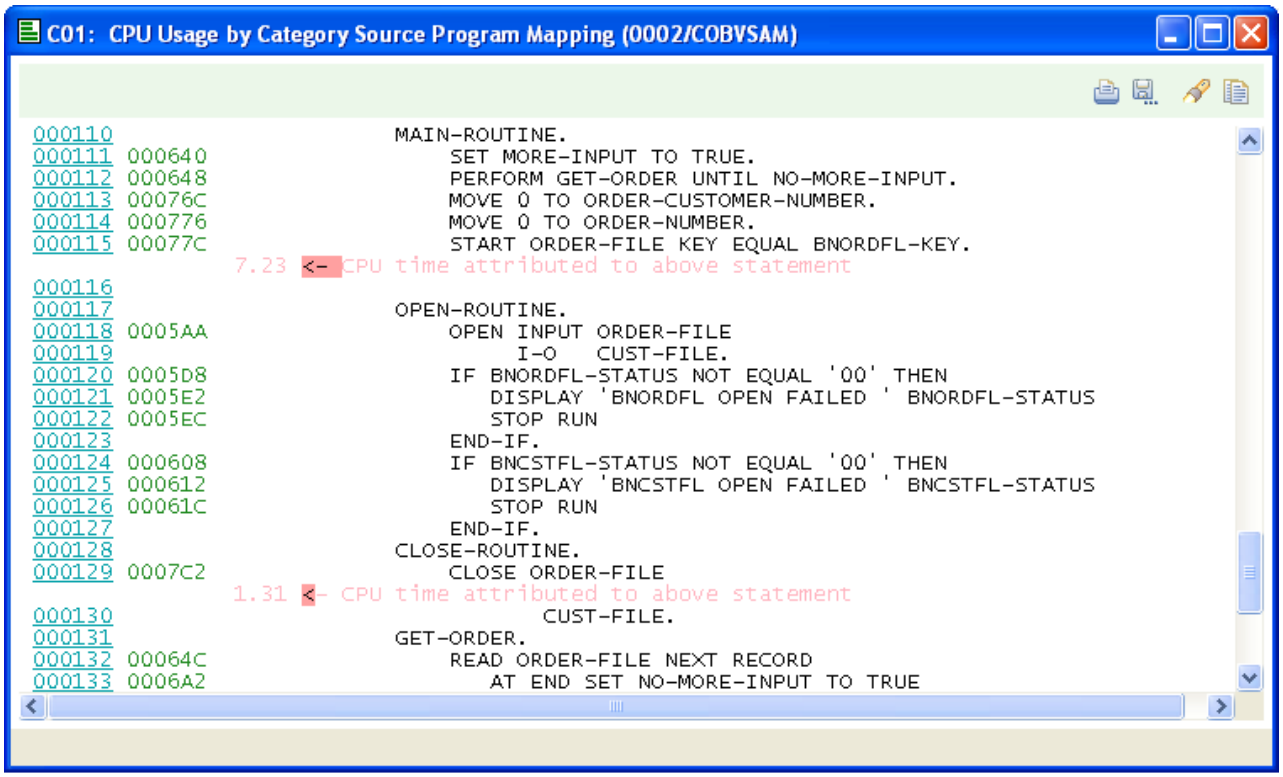


Figure 55. Source program mapping dialog

Search Results view

The Search Results view, located at the top right side of the Application Performance Analyzer GUI, is opened (activated) after a search request is entered from the Search Observations dialog. A scrollable list of the search results is displayed, including the Observation Request Number, Description and Job Name.

The list can be sorted by clicking on the column header. The Observations List and Observation Detail views are also dynamically refreshed with the current (selected) Search Results view row.

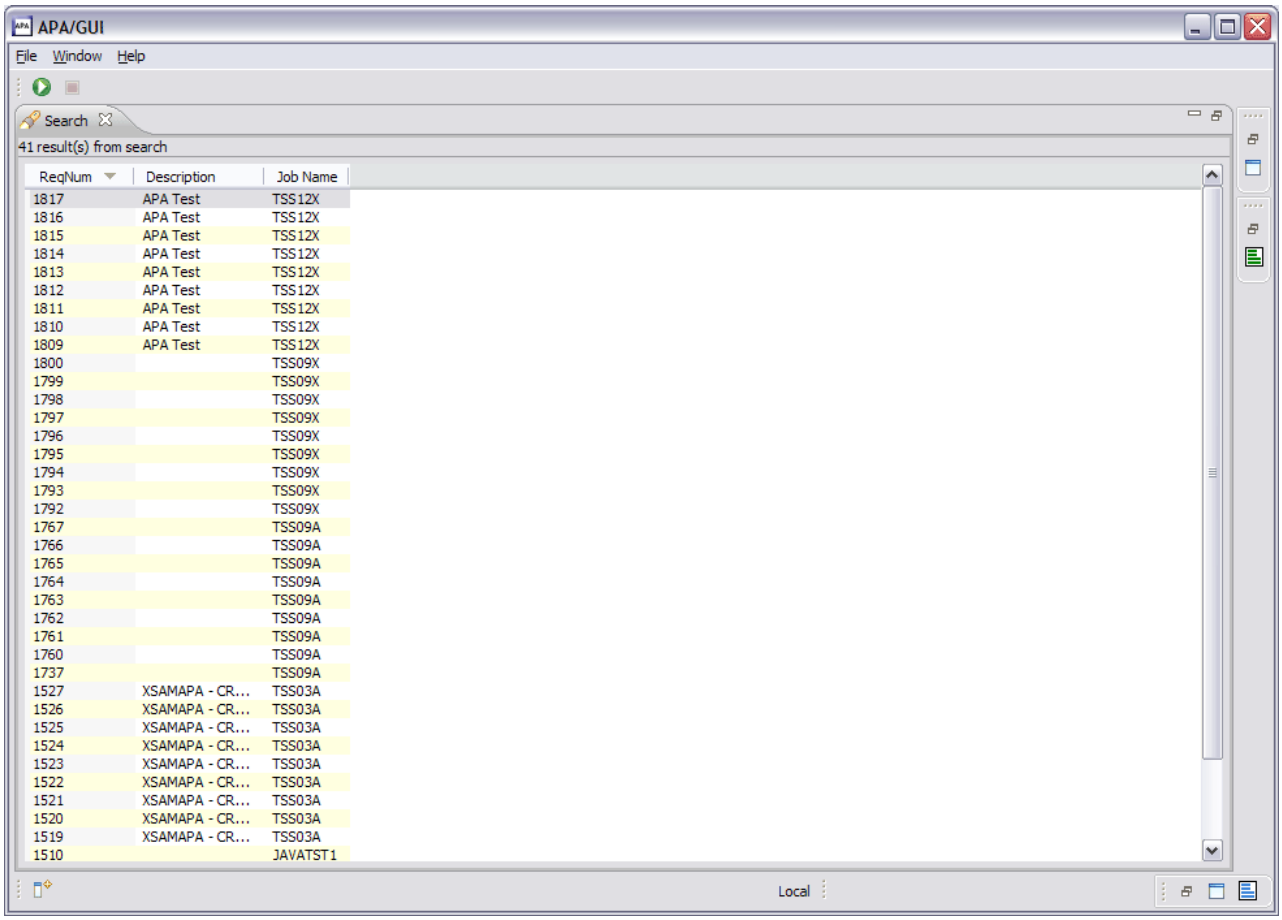


Figure 56. Search Results view

Help Search view

The Help Search view, located at the top right side of the Application Performance Analyzer GUI, is opened (activated) when the Help Search action from the Help Main Menu bar is selected. It provides a search tool for the Application Performance Analyzer GUI Help documentation.

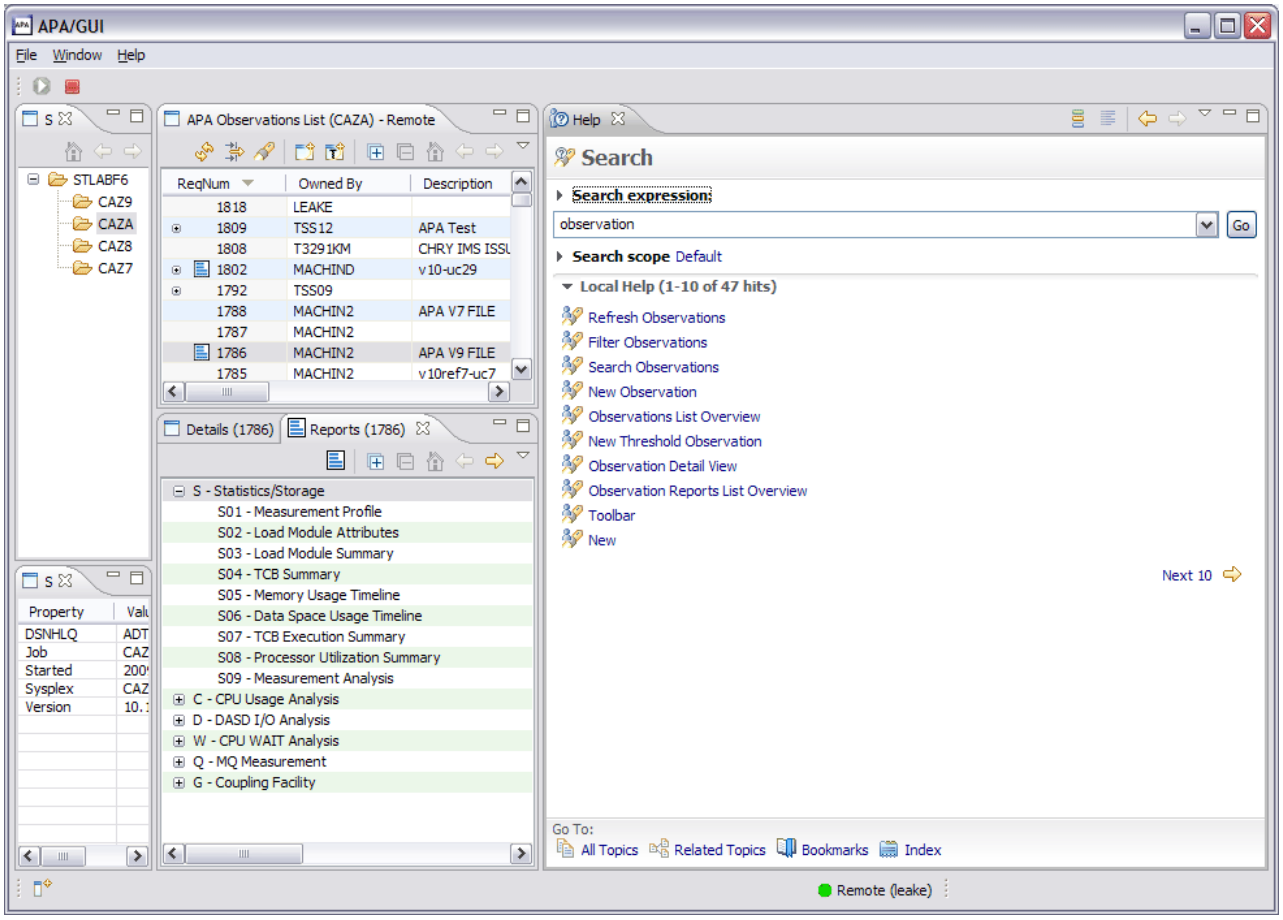


Figure 57. Help Search view

Configuring and Tuning

Memory Settings

The Application Performance Analyzer/GUI is by default, configured to support the download and viewing of most reports in Application Performance Analyzer. Observations can occasionally produce extremely large reports for which the CICS Explorer default memory settings are not sufficient.

To view these large reports, follow the instructions on how to increase the default memory settings that may have been provided with CICS Explorer.

Appendix A. Support resources and problem solving information

This section shows you how to quickly locate information to help answer your questions and solve your problems. If you have to call IBM support, this section provides information that you need to provide to the IBM service representative to help diagnose and resolve the problem.

For a comprehensive multimedia overview of IBM software support resources, see the IBM Education Assistant presentation "IBM Software Support Resources for System z Enterprise Development Tools and Compilers products" at http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp?topic=/com.ibm.iea.debugt/debugt/6.1z/TrainingEducation/SupportInfoADTools/player.html.

- "Searching knowledge bases"
- "Getting fixes" on page 725
- "Subscribing to support updates" on page 725
- "Contacting IBM Support" on page 726

Searching knowledge bases

You can search the available knowledge bases to determine whether your problem was already encountered and is already documented.

- "Searching the information center"
- "Searching product support documents"

Searching the information center

You can find this publication and documentation for many other products in the IBM System z Enterprise Development Tools & Compilers information center at http://publib.boulder.ibm.com/infocenter/pdthelp/v1r1/index.jsp. Using the information center, you can search product documentation in a variety of ways. You can search across the documentation for multiple products, search across a subset of the product documentation that you specify, or search a specific set of topics that you specify within a document. Search terms can include exact words or phrases, wild cards, and Boolean operators.

To learn more about how to use the search facility provided in the IBM System z Enterprise Development Tools & Compilers information center, you can view the multimedia presentation at http://publib.boulder.ibm.com/infocenter/pdthelp/v1r1/index.jsp?topic=/com.ibm.help.doc/InfoCenterTour800600.htm.

Searching product support documents

If you need to look beyond the information center to answer your question or resolve your problem, you can use one or more of the following approaches:

- Find the content that you need by using the IBM Support Portal at www.ibm.com/software/support or directly at www.ibm.com/support/entry/portal.

  The IBM Support Portal is a unified, centralized view of all technical support tools and information for all IBM systems, software, and services. The IBM

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Support Portal lets you access the IBM electronic support portfolio from one place. You can tailor the pages to focus on the information and resources that you need for problem prevention and faster problem resolution.

Familiarize yourself with the IBM Support Portal by viewing the demo videos at https://www.ibm.com/blogs/SPNA/entry/the_ibm_support_portal_videos?lang=en_us about this tool. These videos introduce you to the IBM Support Portal, explore troubleshooting and other resources, and demonstrate how you can tailor the page by moving, adding, and deleting portlets.

Access a specific IBM Software Support site:

- Application Performance Analyzer for z/OS Support
- Debug Tool for z/OS Support
- Enterprise COBOL for z/OS Support
- Enterprise PL/I for z/OS Support
- Fault Analyzer for z/OS Support
- File Export for z/OS Support
- File Manager for z/OS Support
- WebSphere Developer Debugger for System z Support
- WebSphere Studio Asset Analyzer for Multiplatforms Support
- Workload Simulator for z/OS and OS/390 Support

- Search for content by using the IBM masthead search. You can can use the IBM masthead search by typing your search string into the Search field at the top of any ibm.com page.
- Search for content by using any external search engine, such as Google, Yahoo, or Bing. If you use an external search engine, your results are more likely to include information that is outside the ibm.com domain. However, sometimes you can find useful problem-solving information about IBM products in newsgroups, forums, and blogs that are not on ibm.com. Include "IBM" and the name of the product in your search if you are looking for information about an IBM product.
- The IBM Support Assistant (also referred to as ISA) is a free local software serviceability workbench that helps you resolve questions and problems with IBM software products. It provides quick access to support-related information. You can use the IBM Support Assistant to help you in the following ways:
  - Search through IBM and non-IBM knowledge and information sources across multiple IBM products to answer a question or solve a problem.
  - Find additional information through product and support pages, customer news groups and forums, skills and training resources and information about troubleshooting and commonly asked questions.

  In addition, you can use the built in Updater facility in IBM Support Assistant to obtain IBM Support Assistant upgrades and new features to add support for additional software products and capabilities as they become available.

  For more information, and to download and start using the IBM Support Assistant for IBM System z Enterprise Development Tools & Compilers products, please visit http://www.ibm.com/support/docview.wss?rs=2300&context=SSFMHB&dc=D600&uid=swg21242707&loc=en_US&cs=UTF-8&lang=en.

  General information about the IBM Support Assistant can be found on the IBM Support Assistant home page at http://www.ibm.com/software/support/isa.

Getting fixes

A product fix might be available to resolve your problem. To determine what fixes and other updates are available, select a link from the following list:

- Latest PTFs for Application Performance Analyzer for z/OS
- Latest PTFs for Debug Tool for z/OS
- Latest PTFs for Fault Analyzer for z/OS
- Latest PTFs for File Export for z/OS
- Latest PTFs for File Manager for z/OS
- Latest PTFs for Optim Move for DB2
- Latest PTFs for WebSphere Studio Asset Analyzer for Multiplatforms
- Latest PTFs for Workload Simulator for z/OS and OS/390

When you find a fix that you are interested in, click the name of the fix to read its description and to optionally download the fix.

Subscribe to receive email notifications about fixes and other IBM Support information as described in Subscribing to Support updates..

Subscribing to support updates

To stay informed of important information about the IBM products that you use, you can subscribe to updates. By subscribing to receive updates, you can receive important technical information and updates for specific Support tools and resources. You can subscribe to updates by using the following:

- RSS feeds and social media subscriptions
- My Notifications

RSS feeds and social media subscriptions

For general information about RSS, including steps for getting started and a list of RSS-enabled IBM web pages, visit the IBM Software Support RSS feeds site at http://www.ibm.com/software/support/rss/other/index.html. For information about the RSS feed for the IBM System z Enterprise Development Tools & Compilers information center, refer to the Subscribe to information center updates topic in the information center at http://publib.boulder.ibm.com/infocenter/pdthelp/v1r1/topic/com.ibm.help.doc/subscribe_info.html.

My Notifications

With My Notifications, you can subscribe to Support updates for any IBM product. You can specify that you want to receive daily or weekly email announcements. You can specify what type of information you want to receive (such as publications, hints and tips, product flashes (also known as alerts), downloads, and drivers). My Notifications enables you to customize and categorize the products about which you want to be informed and the delivery methods that best suit your needs.

To subscribe to Support updates, follow the steps below. Additional information is provided at http://www.ibm.com/support/docview.wss?rs=615&uid=swg21172598.

1. Go to the IBM software support site at http://www.ibm.com/software/support.

2. Click the **My Notifications** link in the **Notifications** portlet on the page that is displayed.
3. If you have already registered for **My notifications**, sign in and skip to the next step. If you have not registered, click **register now**. Complete the registration form using your e-mail address as your IBM ID and click **Submit**.
4. In the **My notifications** tool, click the **Subscribe** tab to specify products for which you want to receive e-mail updates.
5. To specify Problem Determination Tools products, click **Other software** and then select the products for which you want to receive e-mail updates, for example, **Debug Tool for z/OS** and **File Manager for z/OS**.
6. To specify a COBOL or PL/I compiler, click **Rational** and then select the products for which you want to receive e-mail updates, for example, **Enterprise COBOL for z/OS**.
7. After selecting all products that are of interest to you, scroll to the bottom of the list and click **Continue**.
8. Determine how you want to save your subscription. You can use the default subscription name or create your own by entering a new name in the **Name** field. It is recommended that you create your own unique subscription name using something easily recognized by you. You can create a new folder by entering a folder name in the **New** field or select an existing folder from the pulldown list. A folder is a container for multiple subscriptions.
9. Specify the types of documents you want and the e-mail notification frequency.
10. Scroll to the bottom of the page and click **Submit**.

To view your current subscriptions and subscription folders, click **My subscriptions**.

If you experience problems with the **My notifications** feature, click the **Feedback** link in the left navigation panel and follow the instructions provided.

Contacting IBM Support

IBM Support provides assistance with product defects, answering FAQs, and performing rediscovery.

After trying to find your answer or solution by using other self-help options such as technotes, you can contact IBM Support. Before contacting IBM Support, your company must have an active IBM maintenance contract, and you must be authorized to submit problems to IBM. For information about the types of available support, see the information below or refer to the Support portfolio topic in the Software Support Handbook at http://www14.software.ibm.com/webapp/set2/sas/f/handbook/offerings.html.

- For IBM distributed software products (including, but not limited to, Tivoli®, Lotus®, and Rational® products, as well as DB2 and WebSphere® products that run on Windows, or UNIX operating systems), enroll in Passport Advantage® in one of the following ways:

  Online

  Go to the Passport Advantage Web site at http://www.lotus.com/services/passport.nsf/ WebDocs/Passport_Advantage_Home and click **How to Enroll**.

  By phone

  For the phone number to call in your country, go to the Contacts page of

the *IBM Software Support Handbook* on the Web at http://www14.software.ibm.com/webapp/set2/sas/f/handbook/contacts.html and click the name of your geographic region.

- For customers with Subscription and Support (S & S) contracts, go to the Software Service Request Web site at http://www.ibm.com/support/servicerequest.
- For customers with IBMLink, CATIA, Linux, S/390®, iSeries®, pSeries®, zSeries®, and other support agreements, go to the IBM Support Line Web site at http://www.ibm.com/services/us/index.wss/so/its/a1000030/dt006.
- For IBM eServer™ software products (including, but not limited to, DB2 and WebSphere products that run in zSeries, pSeries, and iSeries environments), you can purchase a software maintenance agreement by working directly with an IBM sales representative or an IBM Business Partner. For more information about support for eServer software products, go to the IBM Technical Support Advantage Web site at http://www.ibm.com/servers/eserver/techsupport.html.

If you are not sure what type of software maintenance contract you need, call 1-800-IBMSERV (1-800-426-7378) in the United States. From other countries, go to the Contacts page of the *IBM Software Support Handbook* on the Web at http://www14.software.ibm.com/webapp/set2/sas/f/handbook/contacts.html and click the name of your geographic region for phone numbers of people who provide support for your location.

Complete the following steps to contact IBM Support with a problem:

1. "Define the problem and determine the severity of the problem"
2. "Gather diagnostic information" on page 728
3. "Submit the problem to IBM Support" on page 728

To contact IBM Software support, follow these steps:

Define the problem and determine the severity of the problem

Define the problem and determine severity of the problem When describing a problem to IBM, be as specific as possible. Include all relevant background information so that IBM Support can help you solve the problem efficiently.

IBM Support needs you to supply a severity level. Therefore, you need to understand and assess the business impact of the problem that you are reporting. Use the following criteria:

Severity 1
The problem has a **critical** business impact. You are unable to use the program, resulting in a critical impact on operations. This condition requires an immediate solution.

Severity 2
The problem has a **significant** business impact. The program is usable, but it is severely limited.

Severity 3
The problem has **some** business impact. The program is usable, but less significant features (not critical to operations) are unavailable.

Severity 4
The problem has **minimal** business impact. The problem causes little impact on operations, or a reasonable circumvention to the problem was implemented.

For more information, see the Getting IBM support topic in the Software Support Handbook at http://www14.software.ibm.com/webapp/set2/sas/f/handbook/getsupport.html.

Gather diagnostic information

To save time, if there is a Mustgather document available for the product, refer to the Mustgather document and gather the information specified. Mustgather documents contain specific instructions for submitting your problem to IBM and gathering information needed by the IBM support team to resolve your problem. To determine if there is a Mustgather document for this product, go to the product support page and search on the term Mustgather. At the time of this publication, the following Mustgather documents are available:

- Mustgather: Read first for problems encountered with Application Performance Analyzer for z/OS: http://www.ibm.com/support/docview.wss?rs=2300 &context=SSFMHB&q1=mustgather&uid=swg21265542&loc=en_US&cs=utf-8 ⟨=en
- Mustgather: Read first for problems encountered with Debug Tool for z/OS: http://www.ibm.com/support/docview.wss?rs=615&context=SSGTSD &q1=mustgather&uid=swg21254711&loc=en_US&cs=utf-8&lang=en
- Mustgather: Read first for problems encountered with Fault Analyzer for z/OS:http://www.ibm.com/support/docview.wss?rs=273&context=SSXJAJ &q1=mustgather&uid=swg21255056&loc=en_US&cs=utf-8&lang=en
- Mustgather: Read first for problems encountered with File Manager for z/OS: http://www.ibm.com/support/docview.wss?rs=274&context=SSXJAV &q1=mustgather&uid=swg21255514&loc=en_US&cs=utf-8&lang=en
- Mustgather: Read first for problems encountered with Enterprise COBOL for z/OS: http://www.ibm.com/support/docview.wss?rs=2231&context=SS6SG3 &q1=mustgather&uid=swg21249990&loc=en_US&cs=utf-8&lang=en
- Mustgather: Read first for problems encountered with Enterprise PL/I for z/OS: http://www.ibm.com/support/docview.wss?rs=619&context=SSY2V3 &q1=mustgather&uid=swg21260496&loc=en_US&cs=utf-8&lang=en

If the product does not have a Mustgather document, please provide answers to the following questions:

- What software versions were you running when the problem occurred?
- Do you have logs, traces, and messages that are related to the problem symptoms? IBM Software Support is likely to ask for this information.
- Can you re-create the problem? If so, what steps were performed to re-create the problem?
- Did you make any changes to the system? For example, did you make changes to the hardware, operating system, networking software, and so on.
- Are you currently using a workaround for the problem? If so, be prepared to explain the workaround when you report the problem.

Submit the problem to IBM Support

You can submit your problem to IBM Support in one of three ways:

Online using the IBM Support Portal

Click **Service request** on the IBM Software Support site at http://www.ibm.com/software/support. On the right side of the Service request page, expand the Product related links section. Click Software

support (general) and select ServiceLink/IBMLink to open an Electronic Technical Response (ETR). Enter your information into the appropriate problem submission form.

Online using the Service Request tool
The Service Request tool can be found at http://www.ibm.com/software/support/servicerequest.

By phone
Call 1-800-IBMSERV (1-800-426-7378) in the United States or, from other countries, go to the Contacts page of the *IBM Software Support Handbook* at http://www14.software.ibm.com/webapp/set2/sas/f/handbook/contacts.html and click the name of your geographic region.

If the problem you submit is for a software defect or for missing or inaccurate documentation, IBM Support creates an Authorized Program Analysis Report (APAR). The APAR describes the problem in detail. Whenever possible, IBM Support provides a workaround that you can implement until the APAR is resolved and a fix is delivered. IBM publishes resolved APARs on the IBM Support website daily, so that other users who experience the same problem can benefit from the same resolution.

After a Problem Management Record (PMR) is open, you can submit diagnostic MustGather data to IBM using one of the following methods:

- FTP diagnostic data to IBM. For more information, refer to http://www.ibm.com/support/docview.wss?rs=615&uid=swg21154524.
- If FTP is not possible, email diagnostic data to techsupport@mainz.ibm.com. You must add PMR xxxxx bbb ccc in the subject line of your email. xxxxx is your PMR number, bbb is your branch office, and ccc is your IBM country code. Go to http://itcenter.mainz.de.ibm.com/ecurep/mail/subject.html for more details.

Always update your PMR to indicate that data has been sent. You can update your PMR online or by phone as described above.

Appendix B. Creating side files using CAZLANGX

Refer to Chapter 9, "Quick start guide for compiling and assembling programs for use with IBM Problem Determination Tools products," on page 523 for the recommended method of preparing your programs for use with the IBM Problem Determination Tools products. If you choose to create a CAZLANGX side file instead of following the suggested method in Chapter 9, "Quick start guide for compiling and assembling programs for use with IBM Problem Determination Tools products," on page 523, this appendix provides the needed information.

You can use a program named CAZLANGX (which is the same as IDILANGX shipped in the IBM Fault Analyzer product) to create a side file from a compiler listing.

The sample JCL below:

- Allocates a new data set *yourhlq*.CAZLANGX to hold the side file, which will be created in the next step.
- Compiles an Enterprise COBOL program.

  Note: You can only compile one program per compile step in order to name the compiler listing PDS(E) member (if using a partitioned data set), and to ensure that only one compiler listing is written to the output file.
- Executes CAZLANGX to process the listing and store it as a side file where Application Performance Analyzer can access it.
- Writes the listing as part of the job output.

The sample JCL is provided as member CAZSCMPS in the *hlq*.SCAZSAMP data set.

```
//CAZSCMPS JOB <JOB PARAMETERS>
//         JCLLIB ORDER=(IGY.V3R3M0.SIGYPROC) <== INSTALLATION
//*                                               IGYWC PROC
//*****************************************************************
//*    Licensed Materials - Property of IBM                       *
//*    5697-N37                                                   *
//*    (C) Copyright IBM Corp. 2005                               *
//*                                                               *
//*    All Rights Reserved                                        *
//*    US Government Users Restricted Rights - Use, duplication   *
//*    or disclosure restricted by GSA ADP Schedule Contract      *
//*    with IBM Corp.                                             *
//*****************************************************************
//*                                                               *
//*       IBM Application Performance Analyzer for z/OS           *
//*       Version 1 Release 1 Modification 0                      *
//*                                                               *
//*  This JCL compiles a COBOL program and produces a side file   *
//*  from the program listing that Application Performance        *
//*  Analyzer uses to obtain the source information.              *
//*  The compiled output is then written to SYSUT2 in the         *
//*  IEBGENER step.                                               *
//*                                                               *
//*  CAUTION: This is neither a JCL procedure nor a complete      *
//*  job.  Before using this job step, you will have to           *
//*  make the following modifications:                            *
//*                                                               *
//*  1) Add the job parameters to meet your system requirements.  *
```

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```
//*  2) This job invokes the COBOL procedure IGYWC.              *
//*     Update the procedure library name on the JCLLIB          *
//*     statement as appropriate.                                *
//*  3) Change "#hlq" to the appropriate high-level qualifier.   *
//*  4) Change "#yourhlq" to the appropriate high-level          *
//*     qualifier.                                               *
//*                                                              *
//****************************************************************
//*
//* Pre-allocate data set CAZLANGX to which the side file
//* will be written.
//*
//ALLOC    EXEC PGM=IEFBR14
//CAZLANGX DD DSN=#yourhlq.CAZLANGX,DISP=(NEW,CATLG),
//            UNIT=SYSALLDA,SPACE=(TRK,(20,20,10)),
//            DCB=(RECFM=VB,LRECL=1562,BLKSIZE=0)
//*
//* Compile a COBOL program.
//*
//CBLRUN   EXEC IGYWC,PARM.COBOL='LIST,MAP,SOURCE,XREF'
//COBOL.SYSIN DD DATA,DLM='##'
 CBL APOST,NOOPT,DYNAM,SSRANGE,RENT
       IDENTIFICATION DIVISION.
       PROGRAM-ID. CAZSCBL1
       ENVIRONMENT DIVISION.
       INPUT-OUTPUT SECTION.
       FILE-CONTROL.
       DATA DIVISION.
       FILE SECTION.

       WORKING-STORAGE SECTION.
       01  FILLER                 PIC X(20)  VALUE 'WORKING-STORAGE'.
       01  NUMBERX PIC 999999 COMP-3.
       01  ERROR-FLD.
           05  ERROR-COUNT PIC 999999 COMP-3.
           05  FLDY REDEFINES ERROR-COUNT.
               07 FLDZ PIC XXXX.
       01  BAD-RESULT PIC 99 COMP-3.

       PROCEDURE DIVISION.
       MAIN SECTION.
           DISPLAY '*** CAZSCBL1 - START OF PROGRAM'.
       LOOP SECTION.
       START000.
           MOVE 3 TO ERROR-COUNT.
           ADD 986885 TO ERROR-COUNT GIVING NUMBERX.
           MOVE 'ABCD' TO FLDZ.
           IF NUMBERX > 0 THEN PERFORM CLEAR.
           DISPLAY '*** CAZSCBL1 - END OF PROGRAM'.
           GOBACK.
       CLEAR SECTION.
       START001.
           DIVIDE NUMBERX BY ERROR-COUNT GIVING BAD-RESULT.
           EXIT.
       END PROGRAM CAZSCBL1.
##
//COBOL.SYSPRINT DD DSN=&&COBLIST(CAZSCBL1),
//         DISP=(,PASS),SPACE=(TRK,(10,5,5),RLSE),
//         DCB=(RECFM=FBA,LRECL=133,BLKSIZE=0)
//*
//*  Create a side file.
//*
//CAZLANGX EXEC PGM=CAZLANGX,REGION=4096K,
// PARM='CAZSCBL1 (COBOL ERROR '
//STEPLIB  DD  DISP=SHR,DSN=#hlq.SCAZAUTH
//LISTING  DD  DISP=(OLD,PASS),DSN=&&COBLIST    1
//IDILANGX DD  DISP=SHR,DSN=#yourhlq.CAZLANGX
```

```
//SYSUDUMP DD  SYSOUT=*
//*
//* Print the COBOL listing.
//*
//IEBGENER EXEC PGM=IEBGENER,REGION=4096K
//SYSUT1   DD  DISP=OLD,DSN=&&COBLIST(CAZSCBL1)
//SYSUT2   DD  SYSOUT=*
//SYSPRINT DD  SYSOUT=*
//SYSIN    DD  *
//*
```

Note: 1 DDname must be LISTING for all types of compiler listings, or SYSADATA for an assembler SYSADATA file.

After you have created and stored a side file, there is no benefit to Application Performance Analyzer in retaining the listing.

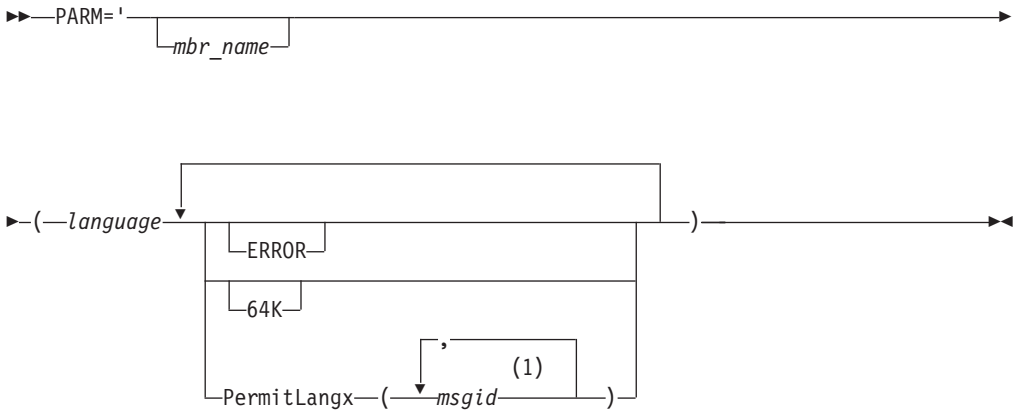
If you already have listings, you can turn them into side files. Here is sample JCL to do this:

```
//CAZLANGX JOB <JOB PARAMETERS>
//*************************************************************
//* This job produces a side file from a program listing
//* that Application Performance Analyzer can use
//* for obtaining source information.
//* This particular example is set up for a COBOL extraction
//* from CAZ.LISTING.COBOL(COBOLA) to CAZ.CAZLANGX
//*************************************************************
//CAZLANGX EXEC PGM=CAZLANGX,REGION=4096K,
// PARM='COBOLA (COBOL ERROR'
//STEPLIB  DD  DISP=SHR,DSN=hlq.SCAZAUTH
//LISTING  DD  DISP=SHR,DSN=yourhlq.LISTING.COBOL   1
//IDILANGX DD  DISP=SHR,DSN=yourhlq.CAZLANGX
//SYSUDUMP DD  SYSOUT=*
```

Note: 1 DDname must be LISTING for all types of compiler listings, or SYSADATA for an assembler SYSADATA file.

CAZLANGX parameters

The PARM string passed to CAZLANGX should contain:



Notes:

1 Either a comma or a blank character is permitted as a delimiter.

Parameters

mbr_name **(Optional)**
The compiler listing or ADATA file member name in the input data set identified by the LISTING DD name (for a compiler listing) or the SYSADATA DD name (if an ADATA file). If this parameter is omitted, the JCL must specify for the compiler listing or ADATA file, either a sequential data set, or a PDS(E) data set with member name. Also, the output CAZLANGX member will be named according to the input program name. In the case of COBOL, for example, this is the name found on the PROGRAM-ID source line.

language **(Required)**
The language of the compiler listing or ADATA file. The options are:

- COBOL
- PLI
- ASM

ERROR (Optional)
A parameter that provides additional diagnostics on variables for which information is incomplete.

64K (Optional)
A parameter that provides side file compatibility with Debug Tool for z/OS. For more information see, "Side file compatibility with Debug Tool for z/OS."

PermitLangx (*msgid*, ...) (Optional)
A parameter that specifies message IDs for compiler error messages that should be ignored.

Side file compatibility with Debug Tool for z/OS

If using Debug Tool for z/OS, the 64K option should be included as stated for Debug Tool EQALANGX when generating side files with the Debug Tool EQALANGX or the Application Performance Analyzer CAZLANGX utilities. This option is also recognized by CAZLANGX, and the side file produced by EQALANGX or CAZLANGX, will then be usable by both Debug Tool and Application Performance Analyzer.

For details of how to specify the 64K option, see "CAZLANGX parameters" on page 733.

Including a CAZLANGX step in your SCLM translator

If you use the ISPF/PDF Software Configuration and Library Manager (SCLM) to manage your application software, then you might want to include a CAZLANGX step in your SCLM translator, since Application Performance Analyzer side files generally take up less disk space than compiler listings. Shown in the following are examples of a CAZLANGX step inserted into a High Level Assembler and a COBOL SCLM translator.

High Level Assembler SCLM example

```
*          SYSADATA DDNAME used in HLASM step.
     *          (* SYSADATA *)
                FLMALLOC  IOTYPE=W,DDNAME=SYSADATA,RECFM=VB,RECNUM=9000,    C
                    LRECL=8188,BLKSIZE=8192,PRINT=Y
     *
     *
     * CAZLANGX BUILD TRANSLATOR
```

```
*
           FLMTRNSL  CALLNAM='CAZLANGX',                                C
               FUNCTN=BUILD,                                            C
               COMPILE=CAZLANGX,                                        C
               DSNAME=CAZ.SCAZMOD1,                                     C
               VERSION=3.5.2,                                           C
               GOODRC=0,                                                C
               PORDER=1,                                                C
               OPTIONS='@@FLMMBR(ASM ERROR OFT CAZLANGX FAULT'
*
*          (* SYSADATA *)
           FLMALLOC  IOTYPE=U,DDNAME=SYSADATA
*
*          (* CAZLANGX *)
           FLMALLOC  IOTYPE=P,DDNAME=IDILANGX,DFLTTYP=IDILANGX,         C
               KEYREF=OUT2,BLKSIZE=27998,LRECL=1562,RECFM=VB,           C
               RECNUM=10000,DIRBLKS=50,DFLTMEM=*
```

COBOL SCLM example

```
*********************************************************************
    *        --COPY SYSPRINT FILE TO LISTING
    * The COPYFILE EXEC, in dataset PDFTDEV.PROJDEFS.EXEC contains the
    * following:
    *
    * /* REXX */
    * /*******************************************************************/
    * /* Copy file I to file O.  Both are assumed to be pre-allocated.   */
    * /*******************************************************************/
    * PARSE UPPER ARG I","O .
    * "EXECIO * DISKR "I" (STEM R. FINIS "
    * "EXECIO * DISKW "O" (STEM R. FINIS "
    * RETURN
    *
    *********************************************************************
    *
             FLMTRNSL   CALLNAM='COPY FILES      ',                     C
                   FUNCTN=BUILD,                                        C
                   COMPILE=COPYFILE,                                    C
                   DSNAME=PDFTDEV.PROJDEFS.EXEC,                        C
                   CALLMETH=TSOLNK,                                     C
                   VERSION=1.0,                                         C
                   PORDER=1,                                            C
                   OPTIONS=(SYSPRINT,LISTING),                          C
                   GOODRC=0
              FLMALLOC  IOTYPE=W,RECFM=VBA,LRECL=133,                   C
                   RECNUM=90000,DDNAME=LISTING
    *
              FLMTRNSL  CALLNAM='CAZLANGX',                             C
                   FUNCTN=BUILD,                                        C
                   COMPILE=CAZLANGX,                                    C
                   DSNAME=CAZ.SCAZMOD1,                                 C
                   VERSION=3.5.2,                                       C
                   GOODRC=0,                                            C
                   PORDER=1,                                            C
                   OPTIONS='@@FLMMBR(COBOL ERROR OFT CAZLANGX FAULT'
    *
    *          (* LISTING *)
               FLMALLOC  IOTYPE=U,DDNAME=LISTING
    *
    *          (* CAZLANGX *)
               FLMALLOC  IOTYPE=P,DDNAME=CAZLANGX,DFLTTYP=CAZLANGX,     C
                   KEYREF=OUT2,BLKSIZE=27998,LRECL=1562,RECFM=VB,       C
                   RECNUM=10000,DIRBLKS=50,DFLTMEM=*
```

COBOL Report Writer Precompiler

If you are using the COBOL Report Writer Precompiler (program number 5798-DYR), it is important that you run it as a stand-alone precompiler as opposed to invoking it via the COBOL compiler EXIT option. Otherwise, information that is required by Application Performance Analyzer to identify the point of failure source code statement might be missing from the compiler listing.

Symptoms that you might experience if using the COBOL Report Writer Precompiler as a COBOL compiler exit are:

- Return code 3114 from CAZLANGX if trying to convert the COBOL compiler listing file to a side file.
- The following messages issued during fault analysis:
  - IDISF8100S COBOL LISTING file contains NO recognized records
  - IDISF8132S Input or Output file format invalid
- Failure to determine point of failure source line.

Required compiler options for creating listings or CAZLANGX side files

The following are the compiler options needed to produce listings or CAZLANGX side files suitable for Application Performance Analyzer:

OS/VS COBOL:

- DMAP
- NOCLIST
- NOLST
- NOOPT (Note 1)
- PMAP
- SOURCE
- VERB
- XREF

COBOL compilers (other than OS/VS COBOL):

- LIST,NOOFFSET (Note 2)
- NOOPT (Note 1)
- MAP
- SOURCE
- XREF(SHORT) (Note 3)

VisualAge® PL/I:

- AGGREGATE
- ATTRIBUTES(FULL)
- LIST
- NEST
- OPTIONS
- SOURCE
- XREF(FULL)

Enterprise PL/I:

- AGGREGATE
- ATTRIBUTES(FULL)
- LIST
- MAP
- NEST
- SOURCE
- STMT
- NONUMBER
- OFFSET
- XREF(FULL)
- OPTIONS
- NOBLKOFF

PL/I compilers (other than VisualAge PL/I and Enterprise PL/I):

- AGGREGATE
- ATTRIBUTES(FULL)
- ESD
- LIST
- MAP
- NEST
- OPTIONS
- SOURCE
- STMT
- XREF(FULL)

Assembler:

- ADATA

C/C++:

- LIST
- NOOFFSET

Notes:

1. Although NOOPT is recommended, the use of OPTIMIZE is allowed (including OPT(1) or OPT(2) for C) , in which case the compiler merges and rearranges statement numbers in the compiled code. The Application Performance Analyzer analysis will be limited to what can be determined from the optimized compiler listing, which can vary from having no effect on the Application Performance Analyzer report, to inaccurate identification of the source line that failed. The source line number will usually be close, but not necessarily accurate with OPTIMIZE. It is dependent on the compiler's rearrangement or elimination of source statements during its optimization processing.
2. Although LIST and NOOFFSET are recommended, the use of NOLIST and OFFSET is allowed, in which case Application Performance Analyzer will not be able to warn the user if the compiler listing is not a good match with what is in storage.

3. XREF(SHORT) is a minimum requirement; XREF(FULL) is permitted and has no detrimental effect.
4. ATTRIBUTES is a minimum requirement; ATTRIBUTES(FULL) is permitted and has no detrimental effect.

TEST option considerations

With all compilers, the additional use of the TEST option may provide program information in addition to what is available via the side files.

If TEST(,,SEPARATE) is used when compiling a COBOL program, then a COBOL SYSDEBUG file is written.

If the SYSDEBUG file is to be used instead of a compiler listing, or a CAZLANGX side file created from a compiler listing, then it should be retained for use by Debug Tool for z/OS and Application Performance Analyzer.

Naming compiler listings or side files

Store compiler listings or side files in sequential data sets, or as members of PDS(E) data sets.

If stored in PDS(E) data sets, then the member name must be equal to the primary entry point name or CSECT name of your application program. If the application program contains multiple CSECTs, then they must be compiled separately in order to create separate compiler listing or side file members. If you store with any other name, Application Performance Analyzer will be unable to find the side file or listing.

Note: The PL/I compiler typically renames CSECTs according to an internal compiler algorithm. Therefore, it is not recommended to store PL/I compiler listings or side files using CSECT names as they might not be found by Application Performance Analyzer. Instead, use the primary entry point name.

If compiler listings or side files are stored in sequential data sets, and the data set names follow a convention that permits the program name to be part of the data set name, then the specification of these data sets in the DataSets option can be done easily using variable substitution.

Naming CSECTs for Application Performance Analyzer

To facilitate source code information, Application Performance Analyzer must be able to match CSECT names with the compiler listings or side files provided, For this to be possible, all CSECTs must be named. Whereas the names of CSECTs in programs written in most high-level languages are automatically assigned, special requirements apply to programs written assembler, as explained in the following. Failure to follow these requirements will prevent source code information from being determined for these types of programs.

Assembler programs

It is a requirement that CSECTs in assembler programs are named using either:

- `csect_name CSECT`
- `csect_name START`

If using a PDS(E), the csect_name must match the SYSADATA or side file data set member name.

Compiler listings and side file attributes

Compiler listings and side files must be allocated using the following attributes:

DDname Attributes:

CAZADATA
Sequential data set or PDS(E), RECFM=VB, LRECL=8188

CAZLC
Sequential data set or PDS(E), and either:

- RECFM=VB or VBA and LRECL=137
- RECFM=FB or FBA and LRECL=133

CAZLCOB
Sequential data set or PDS(E), RECFM=FBA, LRECL=133

CAZLCOBO
Sequential data set or PDS(E), RECFM=FBA, LRECL=121

CAZSYSDB
Sequential data set or PDS(E), RECFM=FB, LRECL=1024

CAZLANGX
Sequential data set or PDS(E), RECFM=VB, LRECL=1562

CAZLPLI
Sequential data set or PDS(E), RECFM=VBA, LRECL=125

CAZLPLIE
Sequential data set or PDS(E), RECFM=VBA, LRECL=137

For variable length records, the indicated record lengths (LRECL) are minimum values.

In order for Application Performance Analyzer to read the compiler listings or side files, they must not be allocated as temporary data sets (for example, using &&dsname-type data set names in your JCL).

For the purpose of conserving disk space, compiler listings can be stored in ISPF packed format. This is done by using the PACK ON option from within ISPF edit of the file. The ISPF packed format is not permitted for IDILANGX or IDIADATA data sets.

Appendix C. XML document layout

This appendix describes the layout of the XML documents and associates each element to the matching field in the online report.

XML declaration

The XML declaration is included as the first line in the document. It describes the version, encoding and standalone attributes as follows:

```
<?xml version="1.0" encoding="ebcdic-cp-us" standalone="yes" ?>
```

Root tag

The tag pair <ReportSet> and </ReportSet> define the root element.

Layout standards

Immediately following the root tag <ReportSet>, elements describing the details of the completed request are enclosed within a <MeasurementInformation> and </MeasurementInformation> tag pair. This data is viewed online by typing the line command "++" on top of the Request Number on the R02 panel.

The data for individual report sections (e.g., S01, C02, etc.) follow the </MeasurementInformation> closing tag and are enclosed within separate <Report> and </Report> tag pairs.

Immediately following the <Report> tag, every report section contains the following 4 common elements:

- <ReportId>*Report Code*</ReportId>
- <ReportName>*Report Name*</ReportName>
- <MarginOfError>*Margin of Error %*</MarginOfError>
- <MeasurementDivisor>*Measurement Divisor*</MeasurementDivisor>

Report Code and *Report Name* are unique for each report. The *Margin of Error %* value reflects the level of precision calculated for the report. When margin of error is not applicable for a report, this value is empty. The *Measurement Divisor* value contains the total number of samples taken and is used to calculate percentages in the report. Where there are no percentages presented in the report, this value is empty.

In the following tables, numeric data is represented by n, regardless of the size and format of the data.

Measurement information

The measurement information data is displayed online after typing the line command "++" on top of the Request Number in the R02 panel. In the XML document file, this data is enclosed within the <MeasurementInformation> and </MeasurementInformation> tag pair. The table below lists the sub elements for this data.

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Field title in online report	XML element
	<MeasurementTaskId>*stcid*</MeasurementTaskId>
Request Number	<RequestNumber>*nnnn*</RequestNumber>
Request Description	<RequestDescription>*description*</RequestDescription>
Request Status	<RequestStatus>*status*</RequestStatus>
Owner Id	<OwnerId>*owner*</OwnerId>
Time of Request	<TimeOfRequest>*Day Mon-dd-yyyy hh:mm:ss.ss*</TimeOfRequest>
Session Start Time	<SessionStartTime>*Day Mon-dd-yyyy hh:mm:ss.ss*</ SessionStartTime>
Session End Time	<SessionEndTime>*Day Mon-dd-yyyy hh:mm:ss.ss*</ SessionEndTime>
Session Duration	<SessionDuration>*duration*</SessionDuration>
Session Delete Date	<SessionDeleteDate>*Day Mon-dd-yyyy*</SessionDeleteDate>
Select by Job Name	<Jobname>*name*</Jobname>
Select by Sys Name	<SysName>*name*</SysName>
Sample Interval	<SampleInterval>*interval*</SampleInterval>
Duration	<Duration>*duration*</Duration>
Sample File DSN	<SampleFileDSN>*dsn*</SampleFileDSN>
Samples Requested	<SamplesRequested>*n*</SamplesRequested>
Samples Done	<SamplesDone>*n*</SamplesDone>
ASID	<ASID>*asid*</ASID>
Data Extractors	<Extractors>
	<Extractor>None</Extractor> if none selected
CICS	<Extractor>CICS</Extractor> omitted if not selected
CICS+	<Extractor>CICS+</Extractor> omitted if not selected
IMS	<Extractor>IMS</Extractor> omitted if not selected
IMS+	<Extractor>IMS+</Extractor> omitted if not selected
DB2	<Extractor>DB2</Extractor> omitted if not selected
DB2+	<Extractor>DB2+</Extractor> omitted if not selected
DB2 Variables	<Extractor>DB2V</Extractor> omitted if not selected
Collateral DB2	<Extractor>CDB2</Extractor> omitted if not selected
MQSeries	<Extractor>MQS</Extractor> omitted if not selected
JAVA	<Extractor>JAVA</Extractor> omitted if not selected
ADA	<Extractor>ADA</Extractor> omitted if not selected
NAT	<Extractor>NAT</Extractor> omitted if not selected
	</Extractors>

Performance analysis reports

S01 Measurement Profile

Field title in online report	XML element
Overall CPU Activity	<OverallCPUActivity>
Samples	<Samples>*n*</Samples>
	<SamplesPercent>*n*%</SamplesPercent>
Reports	<Reports>C01 C02 C03 C05 C07 W01 W02</Reports>
CPU Active	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
Wait	<Wait>*n*</Wait>
	<WaitPercent>*n*%</WaitPercent>
Queued	<Queued>*n*</Queued>
	<QueuedPercent>*n*%</Queued>
	</OverallCPUActivity>
CPU Usage Distribution	<CPUUsageDistribution>
CPU Active	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	<Reports>C01 C05 C08 W01</Reports>
Application	<Application>*n*</Application>
	<ApplicationPercent>*n*%</ApplicationPercent>
System	<System>*n*</System>
	<SystemPercent>*n*%</SystemPercent>
DB2 SQL	<DB2SQL>*n*</DB2SQL>
	<DB2SQLPercent>*n*%</DB2SQLPercent>
Data Mgmt	<DataMgt>*n*</DataMgt>
	<DataMgtPercent>*n*%</DataMgtPercent>
Unresolved	<Unresolved>*n*</Unresolved>
	<UnresolvedPercent>*n*%</UnresolvedPercent>
IMS DLI Call	<IMSDLICall>*n*</IMSDLICall>
	<IMSDLICallPercent>*n*%</IMSDLICallPercent>
	</CPUUsageDistribution>
Most CPU Active Modules	<MostCPUActiveModules>
CPU Active	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	<Reports>C02</Reports>
	<CPUActiveModules>
Module Name	<Module>*name*</Module>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>

Field title in online report	XML element
	</CPUActiveModules>
	</MostCPUActiveModules>
Most CPU Active CSECTS	<MostCPUActiveCSECTs>
Active CPU	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	<Reports>C02</Reports>
	<CPUActiveCSECTs>
CSECT in *Module*	<CSECT>*csect in module*</CSECT>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</CPUActiveCSECTs>
	</MostCPUActiveCSECTs>
CPU Modes	<CPUModes>
Active CPU	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
Reports	<Reports>S08</Reports>
Supv Mode	<SupvModeActive>*n*</SupvModeActive>
	<SupvModePercent>*n*%</SupvModePercent>
Prob Mode	<ProbModeActive>*n*</ProbModeActive>
	<ProbModePercent>*n*%</ProbModePercent>
In SVC	<InSVCActive>*n*</InSVCActive>
	<InSVCPercent>*n*%</InSVCPercent>
AMODE 24	<AMODE24Active>*n*</AMODE24Active>
	<AMODE24Percent>*n*%</AMODE24Percent>
AMODE 31	<AMODE31Active>*n*</AMODE31Active>
	<AMODE31Percent>*n*%</AMODE31Percent>
AMODE 64	<AMODE64Active>*n*</AMODE64Active>
	<AMODE64Percent>*n*%</AMODE64Percent>
User Key	<UserKeyActive>*n*</UserKeyActive>
	<UserKeyPercent>*n*%</UserKeyPercent>
System Key	<SystemKeyActive>*n*</SystemKeyActive>
	<SystemKeyPercent>*n*%</SystemKeyPercent>
	</CPUModes>
Most Active DB2 Plans	<MostActiveDB2Plans>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>F05</Reports>
	<Plans>
Plan Name	<PlanName>*name*</PlanName>

Field title in online report	XML element
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</Plans>
	</MostActiveDB2Plans>
Most Active Package/DBRMs	<MostActivePackageDBRMs>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>F03</Reports>
	<DBRMs>
DBRM Name	<DBRM>*name*</DRRM>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</DBRMs>
	</MostActivePackageDBRMs>
Most Active SQL Statements	<MostActiveSQLStatements>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>F04</Reports>
	<SQLStatement>
Program:offset:verb	<ProgramOffsetVerb>*program:offset:verb*</ProgramOffsetVerb>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</SQLStatement>
	</MostActiveSQLStatements>
Most Active IMS PSBs	<MostActiveIMSPSBs>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>I05 I08 I11</Reports>
	<ActiveIMSPSBs>
PSB Name	<PSBName>*name*</PSBName>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</ActiveIMSPSBs>
	</MostActiveIMSPSBs>
Most Active IMS DLI Calls	<MostActiveIMSDLICalls>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>I07 I10 I13</Reports>

Field title in online report	XML element
	<ActiveIMSDLICalls>
Sequence Number:DLI Function Code:PCB Name	<IMSCall>*imscall*</IMSCall>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</ActiveIMSDLICalls>
	</MostActiveIMSDLICalls>
Request Parameters	<RequestParameters>
Request Number	<RequestNumber>*nnnn*</RequestNumber>
Description	<Description>*description*</Description>
Sample file DSN	<SampleFileDSN>*dsn*</SampleFileDSN>
Retention	<Retention>*Day Mon-dd-yyyy*</Retention>
Data Extractors	<DataExtractors>*extractor list*</DataExtractors>
IMS Subsystem Id	<IMSSubsystemId>*systemid*</IMSSubsystemId>
IMS Tran Code	<IMSTransactionCode>*tranid*</IMSTransactionCode>
IMS Program Name	<IMSProgramName>*name*</IMSProgramName>
IMS User Id	<IMSUserID>*userid*</IMSUserID>
Specific DB2 Parms	<SpecificDB2Parms>P|F</SpecificDB2Parms>
DB2 Subsystem	<DB2SubSystem>*name*</DB2SubSystem>
Schema	<Schema>*name*</Schema>
Name	<Name>*name*</Name>
Requesting user	<RequestingUser>*userid*</RequestingUser>
Nbr of samples	<NumberOfSamples>*n*</NumberOfSamples>
Time of request	<TimeOfRequest>*hh:mm:ss*</TimeOfRequest>
Duration	<Duration>*n sec*</Duration>
Date of request	<DateOfRequest>*Day Mon-dd-yyyy*</DateOfRequest>
Active/pending	<ActivePending>*Status*</ActivePending>
Job name	<JobName>*name*</JobName>
Proc step name	<ProcStepName>*procstepname*</ProcStepName>
Step name/number	<StepName>*stepname*</StepName>
Delay time	<DelayTime>*n*</DelayTime>
Step program	<StepProgram>*steppgm*</StepProgram>
	</RequestParameters>
Measurement environment	<MeasurementEnvironment>
Job name	<JobName>*name*</JobName>
Region size <16MB	<RegionSizeBelow>*nK*</RegionSizeBelow>
Job number	<JobNumber>*number*</JobNumber>
Region size >16MB	<RegionSizeAbove>*nK*</RegionSizeAbove>
Step name	<StepName>*stepname*</StepName>
Step program	<StepProgram>*steppgm*</StepProgram>

Field title in online report	XML element
Proc step name	<ProcStepName>*procstepname*</ProcStepName>
Region type	<RegionType>*regiontype*</RegionType>
ASID	<ASID>*asid*</ASID>
DB2 Attach type	<DB2AttachType>*type*</DB2AttachType>
System ID	<SystemID>*sysid*</SystemID>
APA Version	<APAVersion>*version*</APAVersion>
SMFID	<SMFID>*smfid*</SMFID>
O/S level	<OSLevel>*oslevel*</OSLevel>
Nbr of CPUs	<NbrOfCPUs>*n*</NbrOfCPUs>
CPU model	<CPUModel>*model*</CPUModel>
CPU rate factor	<CPURateFactor>*n*</CPURateFactor>
CPU version	<CPUVersion>*version*</CPUVersion>
MIPS per CPU	<MIPSPerCPU>*n*</MIPSPerCPU>
SUs per second	<SUsPerSecond>*n*</SUsPerSecond>
	</MeasurementEnvironment>
Measurement statistics	<MeasurementStatistics>
Start time	<StartTime>*hh:mm:ss*</StartTime>
Start date	<StartDate>*Day Mon-dd-yyyy*</StartDate>
End time	<EndTime>*hh:mm:ss*</EndTime>
End date	<EndDate>*Day Mon-dd-yyyy*</EndDate>
Total samples	<TotalSamples>*n*</TotalSamples>
Duration	<Duration>*n min n sec*</Duration>
Sampling rate	<SamplingRate>*n per sec*</SamplingRate>
Report dataspace	<ReportDataspace>*n*MB</ReportDataspace>
CPU/WAIT samples	<CPUWaitSamples>*n*</CPUWaitSamples>
Sample dataspace	<SampleDataspace>*n*MB</SampleDataspace>
TCB samples	<TCBSamples>*n*</TCBSamples>
Meas significance	<MeasurementSignificance>*n*%</MeasurementSignifica nce>
CPU queued samples	<CPUQueuedSamples>*n*</CPUQueuedSamples>
Overall CPU	<OverallCPU>*n*%</OverallCPU>
Pages in	<PagesIn>*n*</PagesIn>
EXCPs	<EXCPs>*n*</EXCPs>
Pages out	<PagesOut>*n*</PagesOut>
	</MeasurementStatistics>
CPU consumption	<CPUConsumption>
CPU active samples	<CPUActiveSamples>*n*</CPUActiveSamples>
CPU time TCB	<CPUTimeTCB>*n sec*</CPUTimeTCB>
CPU active time	<CPUActiveTime>*n*%</CPUActiveTime>
CPU time SRB	<CPUTimeSRB>*n sec*</CPUTimeSRB>
CPU WAIT samples	<CPUWaitSamples>*n*</CPUWaitSamples>

Field title in online report	XML element
Service Units	<ServiceUnits>*n*</ServiceUnits>
CPU WAIT time	<CPUWaitTime>*n*%</CPUWaitTime>
Measurement SRB	<MeasurementSRB>*n sec*</MeasurementSRB>
zAAP CPU Time	< zAAPCPUTime>*n* sec< /zAAPCPUTime>
zAAP Time on CP	< zAAPTimeonCP >*n* sec</ zAAPTimeonCP >
Task Time on CP	< TaskTimeonCP>*n* sec</TaskTimeonCP>
Norm. Factor	< NormFactor>*n*</ NormFactor>
Normalized Time	< NormalizedTime>*n* sec</ NormalizedTime>
	</CPUConsumption>
DDF CPU consumption	<DDFCPUConsumption>
Task CPU time	<TaskCPUTime>*n sec*</TaskCPUTime>
zIIP time	<zIIPTime>*n sec*</zIIPTime>
Enclave CPU time	<EnclaveCPUTime>*n sec*</EnclaveCPUTime>
zIIP on CP time	<zIIPonCPTime>*n sec*</zIIPonCPTime>
	</DDFCPUConsumption>
	<ClientEnclaveConsumption>
Client SRB Time	<ClientSRBTime>*n sec*</ClientSRBTime>
Total TCB Time	<TotalTCBTime>*n sec*</TotalTCBTime>
	</ClientEnclaveConsumption>

S02 Load Module Attributes

The table below lists all possible report tag pairs and their sub-elements hierarchically. When the XML document is created, the report tag pairs may be repeated, nested or eliminated as appropriate for the data in the report, and depending on the setup options chosen.

Field title in online report	XML element
	<LoadModuleAttributes>
Module Information for	<ModuleInformationFor>*name*</ModuleInformationFor>
Load Address	<LoadAddress>*n to n*</LoadAddress>
Module Size	<ModuleSize>*n*</ModuleSize>
Attributes	<Attributes>*attributes*</Attributes>
Module Location	<ModuleLocation>*location*</ModuleLocation>
SVC Module for	<SVCModuleFor>*n*</SVCModuleFor>
Loadlib DDNAME	<DDName>*ddname*</DDName>
Load Library	<LoadLibrary>*dsn*</LoadLibrary>
Program Group	<ProgramGroup>*pgmgroup*</ProgramGroup>
Subgroup	<SubGroup>*subgroup*</SubGroup>
Function	<Function>*function*</Function>
	<ESDInformationFor>

Field title in online report	XML element
ESD Information for	<ModuleName<*name*>/ModuleName>
	<ESDInformation>
External	<External>*external*</External>
Offset	<Offset>*n*</Offset>
Length	<Length>*n*</Length>
Start Addr	<StartAddr>*n*</StartAddr>
End Addr	<EndAddr>*n*</EndAddr>
Entry Points	<EntryPointCompiler>
Compiled by	<CompilerLanguage>*language*</CompilerLanguage>
	<CompilerVersion>*version*</CompilerVersion>
at	<TimeStamp>*yyyy/mm/dd hh:mm:ss*</TimeStamp>
	<EntryPointOffset>
	<HexOffset>+*n*</HexOffset>
	<EntryPointName<*name*>/EntryPointName>
	</EntryPointOffset>
	</EntryPointCompiler>
	</ESDInformation>
	</ESDInformationFor>
	</LoadModuleAttributes>

S03 Load Module Summary

The LoadModuleSummary tag pair and sub-elements are repeated for each module in the report.

Field title in online report	XML element
	<LoadModuleSummary>
Module	<ModuleName>*name*</ModuleName>
Locn	<Location>*location*</Location>
Address	<Address>*n*</Address>
Count	<Count>*n*</Count>
Size(bytes)	<Size>*n*</Size>
Attributes	<Attributes>*attributes*</Attributes>
DDName	<DDName>*ddname*</DDName>
LoadLibrary	<DatasetName>*dsn*</DatasetName>
	</LoadModuleSummary>

S04 TCB Summary

The TCBSummary tag pair and sub-elements are repeated for each task in the report. These tag pairs and sub-elements are also nested, with the ATTACHed subtasks relative to the parent tasks that performed the ATTACH function.

Field title in online report	XML element
	<TCBSummary>
TCB_Name	<TCBName>*name-index*</TCBName>
Address	<Address>*n*</Address>
Samples	<Samples>*n*</Samples>
CPU Active	<CPUActive>*n*%</CPUActive>
CPU WAIT	<CPUWait>*n*%</CPUWait>
Queued	<Queued>*n*%</Queued>
	</TCBSummary>

S05 Memory Usage Timeline

The UsageTimeline tag pair and sub-elements are repeated for each time interval.

Field title in online report	XML element
	<UsageTimeline>
SEQN	<SequenceNumber>*n*</SequenceNumber>
Seconds	<Seconds>*n*</Seconds>
Storage	<Storage>*n*K</Storage>
	</UsageTimeline>

S06 Data Space Usage Timeline

The UsageTimeline tag pair and sub-elements are repeated for each time interval.

Field title in online report	XML element
	<UsageTimeline>
SEQN	<SequenceNumber>*n*</SequenceNumber>
Seconds	<Seconds>*n*</Seconds>
Storage	<Storage>*n*K</Storage>
	</UsageTimeline>

S07 TCB Execution Summary

The TCBExecutionSummary tag pair and sub-elements are repeated for each task in the report. These tag pairs and sub-elements are also nested, with the ATTACHed subtasks relative to the parent tasks that performed the ATTACH function.

Field title in online report	XML element
	<TCBExecutionSummary>
TCB_Name	<TCBName>*name-index*</TCBName>
Seconds	<MeasuredCPU>*n* Sec</MeasuredCPU>
Storage	<TCBTotalCPU>*n* Sec</TCBTotalCPU>

Field title in online report	XML element
	<FirstSample>*n*</FirstSample>
	<LastSample>*n*</LastSample>
	</UsageTimeline>

S08 Processor Utilization Summary

The ProcessorUtilizationSummary tag pair and sub-elements are repeated for each CPU state in the report.

Field title in online report	XML element
	<ProcessorUtilizationSummary>
Processor State	<ProcessorState>*state*</ProcessorState>
Nbr of Samples	<NumberOfSamples>*n*</NumberOfSamples>
Percentage	<Percentage>*n%*</Percentage>
	</ProcessorUtilizationSummary>

S09 Measurement Analysis

The DetailLine element data is limited to 200 characters. When the details are greater than 200 characters, multiple DetailLine elements are included.

Field title in online report	XML element
	<MeasurementAnalysis>
	<Summary>*summary*</Summary>
	<Reports>*list of reports*</Reports>
	<AnalysisDetail>
	<DetailLine>*details*</DetailLine>
	</AnalysisDetail>
	</MeasurementAnalysis>

C01 CPU Usage by Category

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<Category>
Name	<CategoryName>*name*</CategoryName>
Description	<CategoryDescription>*description*</CategoryDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>

Field title in online report	XML element
	</Category>
	<SQLRequest>
Name	<SequenceNumber>*n*</SequenceNumber>
Description	<ProgramStatementFunction>*name(stmt)function*</Progra mStatementFunction>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</SQLRequest>
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDes cription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</LoadModule>
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CSECT>
	<NoSymAddressRange>
Name	<AddressRange>*address*</AddressRange>
Description	<AddressRangeDescription>Unresolved Address</ AddressRangeDescription
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</NoSymAddressRange>
	<DPAGroup>
Name	<DPAGroupName>*name*</DPAGroupName>
Description	<DPAGroupDescription>*description*</DPAGroupDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</DPAGroup>
	<SVCRoutine>
Name	<SVCId>*svcid*</SVCId>
Description	<SVCDescription>*description*</SVCDescription>
	<Measurements>*n*</Measurements>

Field title in online report	XML element
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</SVCRoutine>
	<DLICall>
Name	<SequenceNumber>*n*<SequenceNumber>
Description	<FunctionPCBProgramOffset>*FuncNameNameOffset*</ FunctionPCBProgramOffset>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</DLICall>
	<File>
Name	<DDName>*ddname*</DDName>
Description	<AccessMethod>*accessmethod*</AccessMethod>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</File>
	<DMRequest>
Name	<MacroName>*name*</MacroName>
Description	<MacroLocation>*location*</MacroLocation>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</DMRequest>
	<ADABASCommand>
Name	<Command>*n*</Command>
Description	<CSECTOffset>*offset*</CSECTOffset>
	<Measurement>*n*</Measurement>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</ADABASCommand>

C02 CPU Usage by Module

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDescription>

Field title in online report	XML element
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CSECT>
	</LoadModule>
	<NoSymAddressRange>
Name	<AddressRange>*address*</AddressRange>
Description	<AddressRangeDescription>Unresolved Address</ AddressRangeDescription
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</NoSymAddressRange>

C03 CPU Usage by Code Slice

The Code Slice tag pair and sub-elements are repeated for each code slice in the report.

Field title in online report	XML element
	<CodeSlice>
Address	<CodeSliceAddress>*n*</CodeSliceAddress>
Size Location	<SizeAndLocation>*n loc+offset*</SizeAndLocation>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<CodeAddress>
Address	<Address>*address*</Address>
Location	<Location>*loc+offset*</Location>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CodeAddress>
	</CodeSlice>

C04 CPU Usage Timeline

The Interval tag pair and sub-elements are repeated for each interval reported.

Field title in online report	XML element
	<Interval>
SEQN	<SequenceNumber>*n*</SequenceNumber>
Seconds	<Seconds>*n*</Seconds>
Sig	<Significance>*n*%</Significance>
	<Measurements>*n*</Measurements>
Percent of Interval * 10.00%	<Percent>*n*</Percent>
	</Interval>

C05 CPU Usage by Task/Category

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<Task>
Name	<TaskName>*name*</TaskName>
Description	<TCBAddress>TCB=*address*</TCBAddress>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</Task>
	<Category>
Name	<CategoryName>*name*</CategoryName>
Description	<CategoryDescription>*description*</CategoryDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</Category>
	<SQLRequest>
Name	<SequenceNumber>*n*</SequenceNumber>
Description	<ProgramStatementFunction>*name(stmt)function*</Progra mStatementFunction>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</SQLRequest>
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>

Field title in online report	XML element
Description	<LoadModuleDescription>*description*</LoadModuleDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</LoadModule>
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CSECT>
	<NoSymAddressRange>
Name	<AddressRange>*address*</AddressRange>
Description	<AddressRangeDescription>Unresolved Address</ AddressRangeDescription
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</NoSymAddressRange>
	<DPAGroup>
Name	<DPAGroupName>*name*</DPAGroupName>
Description	<DPAGroupDescription>*description*</DPAGroupDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</DPAGroup>
	<SVCRoutine>
Name	<SVCId>*svcid*</SVCId>
Description	<SVCDescription>*description*</SVCDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</SVCRoutine>
	<DLICall>
Name	<SequenceNumber>*n*</SequenceNumber>
Description	<FunctionPCBProgramOffset>*FuncNameNameOffset*</ FunctionPCBProgramOffset>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</DLICall>

Field title in online report	XML element
	<File>
Name	<DDName>*ddname*</DDName>
Description	<AccessMethod>*accessmethod*</AccessMethod>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</File>
	<DMRequest>
Name	<MacroName>*name*</MacroName>
Description	<MacroLocation>*location*</MacroLocation>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</DMRequest>
	<ADABASCommand>
Name	<Command>*n*</Command>
Description	<CSECTOffset>*offset*</CSECTOffset>
	<Measurement>*n*</Measurement>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</ADABASCommand>

C06 CPU Usage by Task/Module

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<Task>
Name	<TaskName>*name*</TaskName>
Description	<TCBAddress>TCB=*n*</TCBAddress>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</Task>
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</LoadModule>

Field title in online report	XML element
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CSECT>
	<NoSymAddressRange>
Name	<AddressRange>*address*</AddressRange>
Description	<AddressRangeDescription>Unresolved Address</ AddressRangeDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</NoSymAddressRange>

C07 CPU Usage by Procedure

Field title in online report	XML element
	<SourceProgramProcedure>
Program	<Program>*name*</Program>
Procedure Name	<ProcedureName>*name*</ProcedureName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</SourceProgramProcedure>
	<Category>
Program	<CategoryName>*name*</CategoryName>
Procedure Name	<CategoryDescription>*description*</CategoryDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</Category>

C08 CPU Usage Referred Attribution

Field title in online report	XML element
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDescription>
	<Measurements>*n*</Measurements>

Field title in online report	XML element
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<AttributionOffset>
Name	<Offset>*n*</Offset>
Description	<OffsetInCSECT>Attribution Offset in *name*</OffsetInCSECT>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<SourceStatements>
Source Statement in:	<ProcedureName>*n*</ProcedureName>
	<SourceStatement>*source*</SourceStatement>
	</SourceStatements>
	</AttributionOffset>
	</CSECT>
	</LoadModule>

C09 CPU Usage by PSW/Object Code

Field title in online report	XML element
	<PSW Location>
Address	<Address>*n*</Address>
Module	<ModuleName>*name*</ModuleName>
AM	<AddressingMode>*n*</AddressingMode>
S/P	<SVCNumberorStateStorageKey>*aa*</ SVCNumberorStateStorageKey>
AS	<AddressSpaceMode>*mode*</AddressSpaceMode>
ASID	<ASID>*asid*</ASID>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<MachineInstruction>
	<ModuleOffset>*name+offset*</ModuleOffset>
	<ObjectCode>*object code*</ObjectCode>
	<DisassembledCode>*object code*</DisassembledCode>
	</MachineInstruction>

Field title in online report	XML element
	</PSWLocation>

C10 CPU Usage by Natural Program

Field title in online report	XML element
	<NaturalProgram>
Program	<ProgramName>*name*</ProgramName>
Library	<Library>*library*</Library>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<NaturalStatement>
Program	<StatementNumberKey>*n*</StatementNumberKey>
Library	<StatementNumber>stmt # *n*</StatementNumber>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</NaturalStatement>
	</NaturalProgram>

W01 WAIT Time by Task/Category

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<Task>
Name	<TaskName>*name*</TaskName>
Description	<TCBAddress>TCB=*n*</TCBAddress>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</Task>
	<Category>
Name	<CategoryName>*name*</CategoryName>
Description	<CategoryDescription>*description*</CategoryDescription>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</Category>
	<SQLRequest>

Field title in online report	XML element
Name	<SequenceNumber>*n*</SequenceNumber>
Description	<ProgramStatementFunction>*name(stmt)function*</ ProgramStatementFunction>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</SQLRequest>
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDescription>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</LoadModule>
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</CSECT>
	<NoSymAddressRange>
Name	<AddressRange>*address*</AddressRange>
Description	<AddressRangeDescription>Unresolved Address</ AddressRangeDescription>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</NoSymAddressRange>
	<DPAGroup>
Name	<DPAGroupName>*name*</DPAGroupName>
Description	<DPAGroupDescription>*description*</DPAGroupDescription>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</DPAGroup>
	<SVCRoutine>
Name	<SVCId>*svcid*</SVCId>
Description	<SVCDescription>*description*</SVCDescription>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>

Field title in online report	XML element
	</SVCRoutine>
	<DLICall>
Name	<SequenceNumber>*n*</SequenceNumber>
Description	<FunctionPCBProgramOffset>*FuncNameNameOffset*</FunctionPCBProgramOffset>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</DLICall>
	<File>
Name	<DDName>*ddname*</DDName>
Description	<AccessMethod>*accessmethod*</AccessMethod>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</File>
	<DMRequest>
Name	<MacroName>*name*</MacroName>
Description	<MacroLocation>*location*</MacroLocation>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</DMRequest>
	<ADABASCommand>
Name	<Command>*n*</Command>
Description	<CSECTOffset>*offset*</CSECTOffset>
	<Measurement>*n*</Measurement>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</ADABASCommand>

W02 WAIT Time by Task/Module

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<Task>
Name	<TaskName>*name*</TaskName>
Description	<TCBAddress>TCB=*n*</TCBAddress>
	<Measurements>*n*</Measurements>

Field title in online report	XML element
Percent of TIME in WAIT * 10.00%	<Percent>*n*</Percent>
	</Task>
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDescription>
	<Measurements>*n*</Measurements>
Percent of TIME in WAIT * 10.00%	<Percent>*n*</Percent>
	</LoadModule>
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of TIME in WAIT * 10.00%	<Percent>*n*</Percent>
	</CSECT>
	<NoSymAddressRange>
Name	<AddressRange>*address*</AddressRange>
Description	<AddressRangeDescription>Unresolved Address</ AddressRangeDescription>
	<Measurements>*n*</Measurements>
Percent of TIME in WAIT * 10.00%	<Percent>*n*</Percent>
	</NoSymAddressRange>

W03 WAIT Referred Attribution by Task

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<Task>
Name	<TaskName>*name*</TaskName>
Description	<TCBAddress>TCB=*n*</TCBAddress>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</Task>
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDescription>

Field title in online report	XML element
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	<AttributionOffset>
Name	<Offset>*n*</Offset>
Description	<OffsetInCSECT>Attribution Offset in *csectname*</ OffsetInCSECT>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	<SourceStatements>
Source Statement in:	<ProcedureName>*name*</ProcedureName>
	<SourceStatement>*source*</SourceStatement>
	</SourceStatements>
	</AttributionOffset>
	</CSECT>
	</LoadModule>

W04 WAIT Time by Task ENQ/RESERVE

Field title in online report	XML element
	<Task>
Name	<TaskName>*name*</TaskName>
Description	<TCBAddress>TCB=*n*</TCBAddress>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	<Enqueue>
Name	<QName>*name*</QName>
Description	<RName>*name*</RName>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</Enqueue>
	</Task>

W05 WAIT Time by Tape DDNAME

Field title in online report	XML element
	<WaitForTape>
DDNAME	<DDName>*ddname*</DDName>
Device	<Device>*description*</Device>
	<Measurements>*n*</Measurements>
Percent of Time in WAIT * 10.00%	<Percent>*n*</Percent>
	</WaitForTape>

D01 DASD Usage Time by Device

Field title in online report	XML element
	<ByVolser>
Volume>Cyl	<Volser>*volser*</Volser>
Unit-Dev>DD	<UnitDevice>*unit-device*</UnitDevice>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<ByCylinder>
Volume>Cyl	<Cylinder>Cyl_*n*</Cylinder>
Unit-Dev>DD	<DDName>*ddname*</DDName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</ByCylinder>
	</ByVolser>

D02 DASD Usage Time by DDNAME

Field title in online report	XML element
	<ByDDName>
DDNAME>Cyl	<DDName>*ddname*</DDName>
Volume>Unit	<Volser>*volser*</Volser>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<ByCylinder>
DDNAME>Cyl	<Cylinder>Cyl_*n*</Cylinder>
Volume>Unit	<UnitDevice>*unit-device*</UnitDevice>
	<Measurements>*n*</Measurements>

Field title in online report	XML element
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</ByCylinder>
	</ByDDName>

D03 DASD Usage Time by Dataset

Field title in online report	XML element
	<ByDataset>
Dataset Name>DDName	<DatasetName>*dsn*</DatasetName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<ByDDName>
Dataset Name>DDName	<DDName>*ddname*</DDName>
	<Volser>*volser*</Volser>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</ByDDName>
	</ByDataset>

D04 Dataset Attributes

Field title in online report	XML element
	<DatasetAttributes>
	<FileType>*filetype*</FileType>
	<DDName>*ddname*</DDName>
OPENed at	<OpenTime>*hh:mm:ss.ss*</OpenTime>
	<OpenDate>*Day Month dd yyyy*</OpenDate>
	<FileDefinition>
DDNAME	<DDName>*ddname*</DDName>
Open Intent	<OpenIntent>*intent*</OpenIntent>
Dataset Name	<DatasetName>*dsn*</DatasetName>
	<ManagementClass>*class*</ManagementClass>
	<StorageClass>*class*</StorageClass>
	<DataClass>*class*</DataClass>
Device Type	<DeviceType>*type*</DeviceType>
Nbr of Extents	<NbrOfExtents>*n*</NbrOfExtents>

Field title in online report	XML element
Dataset Org	<DatasetOrg>*dsorg*</DatasetOrg>
Block Size(BLKSIZE)	<BlockSize>*n*</BlockSize>
RECFM	<RecordFormat>*rfm*</RecordFormat>
Record Size (LRECL)	<RecordSize>*n*</RecordSize>
Data Buffers	<DataBuffers>*n*</DataBuffers>
	<VOLSERS>
Volume Serial	<Volser>*volser*</Volser>
	</VOLSERS>
	</FileDefinition>
	<VSAMDataComponent>
DDNAME	<DDName>*ddname*</DDName>
Open Intent	<OpenIntent>*intent*</OpenIntent>
Dataset Name	<DatasetName>*dsn*</DatasetName>
	<ManagementClass>*class*</ManagementClass>
	<StorageClass>*class*</StorageClass>
	<DataClass>*class*</DataClass>
Device Type	<DeviceType>*type*</DeviceType>
% Free Bytes in CI	<PercentFreeBytesInCI>*n%*</PercentFreeBytesInCI>
CI Splits (Initial)	<CISplitsInitial>*n*</CISplitsInitial>
CI Splits (Last)	<CISplitsLast>*n*</CISplitsLast>
CI Size	<CISize>*n*</CISize>
CA Splits (Initial)	<CASplitsInitial>*n*</CASplitsInitial>
CA Splits (Last)	<CASplitsLast>*n*</CASplitsLast>
Record Size (LRECL)	<RecordSize>*n*</RecordSize>
Logical Records (Initial)	<RecordsInitial>*n*</RecordsInitial>
Logical Records (Last)	<RecordsLast>*n*</RecordsLast>
Number of Extents	<NbrOfExtents>*n*</NbrOfExtents>
Deleted Records (Initial)	<DeletedRecordsInitial>*n*</DeletedRecordsInitial>
Deleted Records (Last)	<DeletedRecordsLast>*n*</DeletedRecordsLast>
SHAREOPTIONS	<ShareOptions>*(n n)*</ShareOptions>
Insrted Records (Initial)	<InsertedRecordsInitial>*n*</InsertedRecordsInitial>
Insrted Records (Last)	<InsertedRecordsLast>*n*</InsertedRecordsLastl>
Organization	<Organization>*org*</Organization>
Retrved Records (Initial)	<RetrievedRecordsInitial>*n*</RetrievedRecordsInitial>
Retrved Records (Last)	<RetrievedRecordsLast>*n*</RetrievedRecordsLast>
CIs per CA	<CIsPerCa>*n*</CIsPerCa>
Updated Records (Initial)	<UpdatedRecordsInitial>*n*<UpdatedRecordsInitial>
Updated Records (Last)	<UpdatedRecordsLast>*n*<UpdatedRecordsLast>
Free CIs per CA	<FreeCIsPerCa>*n*</FreeCIsPerCa>

Field title in online report	XML element
Bytes Free Space (Initial)	<BytesFreeSpaceInitial>*n*</BytesFreeSpaceInitial>
Bytes Free Space (Last)	<BytesFreeSpaceLast>*n*</BytesFreeSpaceLast>
Free Bytes per CI	<FreeBytesPerCI>*n*</FreeBytesPerCI>
Number of EXCPs (Initial)	<NumberOfEXCPsInitial>*n*</NumberOfEXCPsInitial>
Number of EXCPs (Last)	<NumberOfEXCPsLast>*n*</NumberOfEXCPsLast>
% Free CIs in CA	<PercentFreeCisInCA>*n*%</PercentFreeCisInCA>
Strings	<Strings>*n*</Strings>
String Waits	<StringWaits>*n*</StringWaits>
String Waist HWM	<StringWaitsHWM>*n*</StringWaitsHWM>
Data Buffers	<DataBuffers>*n*</DataBuffers>
Index Buffers	<IndexBuffers>*n*</IndexBuffers>
	<VOLSERS>
Volume Serial	<Volser>*volser*</Volser>
	</VOLSERS>
	</VsamDataComponent>
	<VSAMIndexComponent>
Dataset Name	<DatasetName>*dsn*</DatasetName>
	<ManagementClass>*class*</ManagementClass>
	<StorageClass>*class*</StorageClass>
	<DataClass>*class*</DataClass>
Device Type	<DeviceType>*type*</DeviceType>
% Free Bytes in CI	<PercentFreeBytesInCI>*n*%</PercentFreeBytesInCI>
CI Splits (Initial)	<CISplitsInitial>*n*</CISplitsInitial>
CI Splits (Last)	<CISplitsLast>*n*</CISplitsLast>
CI Size	<CISize>*n*</CISize>
CA Splits (Initial)	<CASplitsInitial>*n*</CASplitsInitial>
CA Splits (Last)	<CASplitsLast>*n*</CASplitsLast>
Record Size (LRECL)	<RecordSize>*n*</RecordSize>
Logical Records (Initial)	<RecordsInitial>*n*</RecordsInitial>
Logical Records (Last)	<RecordsLast>*n*</RecordsLast>
Number of Extents	<NbrOfExtents>*n*</NbrOfExtents>
Deleted Records (Initial)	<DeletedRecordsInitial>*n*</DeletedRecordsInitial>
Deleted Records (Last)	<DeletedRecordsLast>*n*</DeletedRecordsLast>
SHAREOPTIONS	<ShareOptions>*(n n)*</ShareOptions>
Insrted Records (Initial)	<InsertedRecordsInitial>*n*</InsertedRecordsInitial>
Insrted Records (Last)	<InsertedRecordsLast>*n*</InsertedRecordsLastl>
Organization	<Organization>*org*</Organization>
Retrved Records (Initial)	<RetrievedRecordsInitial>*n*</RetrievedRecordsInitial>

Field title in online report	XML element
Retrved Records (Last)	<RetrievedRecordsLast>*n*</RetrievedRecordsLast>
CIs per CA	<CIsPerCa>*n*</CIsPerCa>
Updated Records (Initial)	<UpdatedRecordsInitial>*n*<UpdatedRecordsInitial>
Updated Records (Last)	<UpdatedRecordsLast>*n*<UpdatedRecordsLast>
Free CIs per CA	<FreeCIsPerCa>*n*</FreeCIsPerCa>
Bytes Free Space (Initial)	<BytesFreeSpaceInitial>*n*</BytesFreeSpaceInitial>
Bytes Free Space (Last)	<BytesFreeSpaceLast>*n*</BytesFreeSpaceLast>
Free Bytes per CI	<FreeBytesPerCI>*n* </FreeBytesPerCI>
Number of EXCPs (Initial)	<NumberOfEXCPsInitial>*n*</NumberOfEXCPsInitial>
Number of EXCPs (Last)	<NumberOfEXCPsLast>*n*</NumberOfEXCPsLast>
% Free CIs in CA	<PercentFreeCisInCA>*n*%</PercentFreeCisInCA>
	<VOLSERS>
Volume Serial	<Volser>*volser*</Volser>
	</VOLSERS>
	</VsamIndexComponent>
	<DasdPerformance>
Avg Response Time	<AvgResponseTime>*n*</AvgResponseTime>
Avg Pending Time	<AvgPendingTime>*n*</AvgPendingTime>
Avg Disconnect Time	<AvgDisconnectTime>*n*</AvgDisconnectTime>
Avg Connect Time	<AvgConnectTime>*n*</AvgConnectTime>
Avg Queued Time	<AvgQueuedTime>*n*</AvgQueuedTime>
Total I/Os	<TotalIOs>*n*</TotalIOs>
Cache Candidates	<CacheCandidates>*n*</CacheCandidates>
Cache Hits	<CacheHits>*n*</CacheHits>
Write Candidates	<WriteCandidates>*n*</WriteCandidates>
Write Hits	<WriteHits>*n*</WriteHits>
	</DasdPerformance>
Concatenated Datasets	<ConcatenatedDatasets>
	<DSName>*dsn*</DSName> Repeated as necessary
	</ConcatenatedDatasets>
	</DatasetAttributes>

D05 DASD EXCP Summary

Field title in online report	XML element
	<DASDEXCPSummary>
DDNAME	<DDName>*ddname*</DDName>

Field title in online report	XML element
Type	<Type>*type*</Type>
Concat	<ConcatenationNumber>+*n*</ConcatenationNumber>
At Start	<StartEXCPs>*n*</StartEXCPs>
At End	<EndEXCPs>*n*</EndEXCPs>
During Measurement	<DifferenceEXCPs>*n*</DifferenceEXCPs>
	</DASDEXCPSummary>

D06 DASD VSAM Statistics

Field title in online report	XML element
	<VSAMStatistics>
DDNAME	<DDName>*ddname*</DDName>
Retrvd	<RecordsRetrieved>*n*</RecordsRetrieved>
Added	<RecordsAdded>+*n*</RecordsAdded>
Insrtd	<RecordsInserted>*n*</RecordsInserted>
Deletd	<RecordsDeleted>*n*</RecordsDeleted>
Updatd	<RecordsUpdated>*n*</RecordsUpdated>
EXCPs	<EXCPs>*n*</EXCPs>
FreeSpc	<ChangeFreeSpace>+*n*</ChangeFreeSpace>
CISplts	<ChangeCISplits>+*n*</ChangeCISplits>
CASplts	<ChangeCASplits>+*n*</ChangeCASplits>
Str Wt	<StringWaits>*n*</StringWaits>
StrHWM	<StringWaitsHWM>*n*</StringWaitsHWM> >
	</VSAMStatistics

D07 DASD Activity Timeline

Field title in online report	XML element
	<DASDActivityTimeline>
	<Samples>*n*</Samples>
	<Duration>*n*</Duration>
DDN	<DDN>*ddname*</DDN>
Type	<Type>*type*</Type>
Vol	<Vol>*volser*</Vol>
Unit	<Unit>*unit*</Unit>
	<Intervals>
	<IntervalPct>*n*</IntervalPct> Repeated 50 times
	</Interval>
	</DASDActivityTimeline>

D08 DASD I/O Wait Time

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	**XML element**
	<ByDDName>
Name	<DDName>*ddname*</DDName>
Description	<Volser>*volser*</Volser>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<SVCRoutine>
Name	<SVCId>*svcid*</SVCId>
Description	<SVCDescription>*description*</SVCDescription>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</SVCRoutine>
	<DMRequest>
Name	<MacroName>*name*</MacroName>
Description	<MacroLocation>*location*</MacroLocation>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</DMRequest>
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDescription>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</LoadModule>
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</CSECT>
	</ByDDName>

D09 VSAM Buffer Pool Usage

Field title in online report	XML element
	<LSRPool>
LSR Pool	<PoolNumber>*n*</PoolNumber>
Type (Data/Index)	<Type>*type*</Type>
Reads (Initial)	<ReadsInitial>*n*</ReadsInitial>
Reads (Last)	<ReadsLast>*n*</ReadsLast>
Reads (Difference)	<ReadsDifference>*n*</ReadsDifference>
Buffer Size	<BufferSize>*n*</BufferSize>
Reads Avoided (Initial)	<ReadsAvoidedInitial>*n*</ReadsAvoidedInitial>
Reads Avoided (Last)	<ReadsAvoidedLast>*n*</ReadsAvoidedLast>
Reads Avoided (Difference)	<ReadsAvoidedDifference>*n*</ReadsAvoidedDifference>
Buffers	<Buffers>*n*</Buffers>
User Writes (Initial)	<UserWritesInitial>*n*</UserWritesInitial>
User Writes (Last)	<UserWritesLast>*n*</UserWritesLast>
User Writes (Difference)	<UserWritesDifference>*n*</UserWritesDifference>
Hiperspace Buffers	<HiperspaceBuffers>*n*</HiperspaceBuffers>
Non-user Writes (Initial)	<NonUserWritesInitial>*n*</NonUserWritesInitial>
Non-user Writes (Last)	<NonUserWritesLast>*n*</NonUserWritesLast>
Non-user Writes (Difference)	<NonUserWritesDifference>*n*</NonUserWritesDifference>
	</LSRPool>

G01 Coupling Facility Statistics

Field title in online report	XML element
	<CouplingFacilityStatistics>
Facility Summary	<CFName>*name*</CFName>
CF Storage	<CFStorage>*n*K</CFStorage>
CF Storage Used	<CFStorageUsed>*n*K</CFStorageUsed>
CF Dump Storage	<CFDumpStorage>*n*K</CFDumpStorage>
CF Storage for Structures	<CFStorageForStructures>*n*K</CFStorageForStructures>
Subchannel Contention Count	<SubchannelContentionCount>*n*</SubchannelContenti onCount>
Subchannel Contention Time uSec	<SubchannelContentionCountuSec>*n*</ SubchannelContentionCountuSec>
Failed Request Count	<FailedRequestCount>*n*</FailedRequestCount>
Failed Request Time uSec	<FailedRequestTimeuSec>*n*</FailedRequestTimeuSec>
Number of Processors	<NumberOfProcessors>*n*</NumberOfProcessors>

Field title in online report	XML element
Processor Utilization	<ProcessorUtilization>*n*%</ProcessorUtilization>
	</CouplingFacilityStatistics>

G02 Coupling Facility Mean Service Times

Field title in online report	XML element
	<CouplingFacilityServiceTimes>
Name	<CFName>*name*</CFName> or <StructureName>*name*</StructureName>
Number of Requests (Sync)	<RequestsSync>*n*</RequestsSync>
Number of Requests (Async)	<RequestsAsynch>*n*</RequestsAsynch>
Number of Requests (Queued)	<RequestsQueued>*n*</RequestsQueued>
Number of Requests (Delay)	<RequestsDelay>*n*</RequestsDelay>
Mean uSeconds (Sync)	<SecondsSync>*n*</SecondsSync>
Mean uSeconds (Async)	<SecondsAsynch>*n*</SecondsAsynch>
Mean uSeconds (Queued)	<SecondsQueued>*n*</SecondsQueued>
Mean uSeconds (Delay)	<SecondsDelay>*n*</SecondsDelay>
	</CouplingFacilityServiceTimes>

G03 Coupling Facility Total Service Times

Field title in online report	XML element
	<CouplingFacilityServiceTimes>
Name	<CFName>*name*</CFName> or <StructureName>*name*</StructureName>
Number of Requests (Sync)	<RequestsSync>*n*</RequestsSync>
Number of Requests (Async)	<RequestsAsynch>*n*</RequestsAsynch>
Number of Requests (Queued)	<RequestsQueued>*n*</RequestsQueued>
Number of Requests (Delay)	<RequestsDelay>*n*</RequestsDelay>
Total uSeconds (Sync)	<SecondsSync>*n*</SecondsSync>
Total uSeconds (Async)	<SecondsAsynch>*n*</SecondsAsynch>
Total uSeconds (Queued)	<SecondsQueued>*n*</SecondsQueued>
Total uSeconds (Delay)	<SecondsDelay>*n*</SecondsDelay>

Field title in online report	XML element
	</CouplingFacilityServiceTimes>

V01 Measurement Variance Summary

The following tag pairs are repeated multiple times in each variance report. The first occurrence of the tag pair reports the base measurement (Ref 01). Following Ref 01, the tag pairs are repeated for every tagged measurement (Ref *n*).

- <MeasurementsAnalyzed></MeasurementsAnalyzed>
- <CPUTimeTCBVariance></CPUTimeTCBVariance>
- <CPUTimeSRBVariance></CPUTimeSRBVariance>
- <EXCPRequestsVariance></EXCPRequestsVariance>
- <ServiceUnitsVariance></ServiceUnitsVariance>
- <CPUActiveSamplesVariance></CPUActiveSamplesVariance>
- <WaitSamplesVariance></WaitSamplesVariance>
- <QueuedSamplesVariance></QueuedSamplesVariance>

Field title in online report	XML element
The Following Measurements are Analyzed	<MeasurementsAnalyzed>
Ref	<Ref>*n*</Ref>
ReqNum	<ReqNum>*n*</ReqNum>
Job Name	<JobName>*name*</JobName>
Date	<Date>*Mon-dd-yyyy*</Date>
Time	<Time>*hh:mm*</Time>
Description	<Description>*description*</Description>
	</MeasurementsAnalyzed>
CPU Time TCB	<CPUTimeTCBVariance>
Ref	<Ref>*n*</Ref>
CPU Time TCB	<CPUTimeTCB>*n sec*</CPUTimeTCB>
Variance	<Variance>*variance*</Variance>
	</CPUTimeTCBVariance>
CPU Time SRB	<CPUTimeSRBVariance>
Ref	<Ref>*n*</Ref>
CPU Time SRB	<CPUTimeSRB>*n sec*</CPUTimeSRB>
Variance	<Variance>*variance*</Variance>
	</CPUTimeSRBVariance>
EXCP Requests	<EXCPRequestsVariance>
Ref	<Ref>*n*</Ref>
EXCP Requests	<EXCPRequests>*n*</EXCPRequests>
Variance	<Variance>*variance*</Variance>
	</EXCPRequestsVariance>

Field title in online report	XML element
Service Units	<ServiceUnitsVariance>
Ref	<Ref>*n*</Ref>
Service Units	<ServiceUnits>*n*</ServiceUnits>
Variance	<Variance>*variance*</Variance>
	</ServiceUnitsVariance>
Percentage of CPU Active Samples	<CPUActiveSamplesVariance>
Ref	<Ref>*n*</Ref>
Sample Count (CPU Active)	<CPUActive>*n*</CPUActive>
Sample Count (Total)	<Total>*n*</Total>
Percentage	<Percentage>*n%*</Percentage>
Variance	<Variance>*variance*</Variance>
	</CPUActiveSamplesVariance>
Percentage of WAIT Samples	<WaitSamplesVariance>
Ref	<Ref>*n*</Ref>
Sample Count (TCB Wait)	<TCBWait>*n*</TCBWait>
Sample Count (Total)	<Total>*n*</Total>
Percentage	<Percentage>*n%*</Percentage>
Variance	<Variance>*variance*</Variance>
	</WaitSamplesVariance>
Percentage of Queued Samples	<QueuedSamplesVariance>
Ref	<Ref>*n*</Ref>
Sample Count (Queued)	<Queued>*n*</Queued>
Sample Count (Total)	<Total>*n*</Total>
Percentage	<Percentage>*n%*</Percentage>
Variance	<Variance>*variance*</Variance>
	</QueuedSamplesVariance>

V02 CICS Variance Summary

The following tag pairs are repeated multiple times in each variance report. The first occurrence of the tag pair reports the base measurement (Ref 01). Following Ref 01, the tag pairs are repeated for every tagged measurement (Ref *n*).

- <MeasurementsAnalyzed></MeasurementsAnalyzed>
- <CICSTransactionVariance></CICSTransactionVariance>
- <CICSCPUTimeVariance></CICSCPUTimeVariance>
- <CICSSuspendTimeVariance></CICSSuspendTimeVariance>
- <CICSDispatchTimeVariance></CICSDispatchTimeVariance>
- <CICSMVSDispatchTimeVariance></CICSMVSDispatchTimeVariance>

- <CICSServiceTimeVariance></CICSServiceTimeVariance>

Field title in online report	XML element
The Following Measurements are Analyzed	<MeasurementsAnalyzed>
Ref	<Ref>*n*</Ref>
ReqNum	<ReqNum>*n*</ReqNum>
Job Name	<JobName>*name*</JobName>
Date	<Date>*Mon-dd-yyyy*</Date>
Time	<Time>*hh:mm*</Time>
Description	<Description>*description*</Description>
	</MeasurementsAnalyzed>
CICS Transaction Statistics	<CICSTransactionVariance>
Ref	<Ref>*n*</Ref>
Task Number Start	<TaskStart>*n*</TaskStart>
Task Number End	<TaskEnd>*n*</TaskEnd>
Transaction Count	<TranCount>*n*</TranCount>
Transaction Obsvd	<TranObserved>*n*</TranObserved>
Rate	<TranRate>*n* per sec</TranRate>
Variance	<Variance>*variance*</Variance>
	</CICSTransactionVariance>
Mean Execution Time	<CICSCPUTimeVariance>
Ref	<Ref>*n*</Ref>
Time	<MeanCPUTime>*n* sec</MeanCPUTime>
Variance	<Variance>*variance*</Variance>
	</CICSCPUTimeVariance>
Mean Suspend Time	<CICSSuspendTimeVariance>
Ref	<Ref>*n*</Ref>
Time	<MeanSuspendTime>*n* sec</MeanSuspendTime>
Variance	<Variance>*variance*</Variance>
	</CICSSuspendTimeVariance>
Mean CICS Dispatch Delay Time	<CICSDispatchTimeVariance>
Ref	<Ref>*n*</Ref>
Time	<MeanDispatchTime>*n* sec</MeanDispatchTime>
Variance	<Variance>*variance*</Variance>
	</CICSDispatchTimeVariance>
Mean MVS Dispatch Delay Time	<CICSMVSDispatchTimeVariance>
Ref	<Ref>*n*</Ref>
Time	<MeanMVSDispatchTime>*n* sec</MeanMVSDispatchTime>

Field title in online report	XML element
Variance	<Variance>*variance*</Variance>
	</CICSMVSDispatchTimeVariance>
Mean Service Time	<CICSServiceTimeVariance>
Ref	<Ref>*n*</Ref>
Time	<MeanServiceTime>*n* sec</MeanServiceTime>
Variance	<Variance>*variance*</Variance>
	</CICSServiceTimeVariance>

V03 DB2 Variance Summary

The following tag pairs are repeated multiple times in each variance report. The first occurrence of the tag pair reports the base measurement (Ref 01). Following Ref 01, the tag pairs are repeated for every tagged measurement (Ref *n*).

- <MeasurementsAnalyzed></MeasurementsAnalyzed>
- <DB2SQLVariance></DB2SQLVariance>
- <SQLObservations></SQLObservations>
- <SQLCallsExecuted></SQLCallsExecuted>
- <SQLCallRate></SQLCallRate>
- <SQLCallsCounted></SQLCallsCounted>
- <SQLThroughput></SQLThroughput>
- <SQLServiceTime></SQLServiceTime>
- <SQLCallMaxTimet></SQLCallMaxTime>
- <SQLCallMinTime></SQLCallMinTime>
- <SQLCPUTime></SQLCPUTime>
- <SQLCallMaxCPUTime></SQLCallMaxCPUTime>
- <SQLCallMinCPUTime></SQLCallMinCPUTime>

Field title in online report	XML element
The Following Measurements are Analyzed	<MeasurementsAnalyzed>
Ref	<Ref>*n*</Ref>
ReqNum	<ReqNum>*n*</ReqNum>
Job Name	<JobName>*name*</JobName>
Date	<Date>*Mon-dd-yyyy*</Date>
Time	<Time>*hh:mm*</Time>
Description	<Description>*description*</Description>
	</MeasurementsAnalyzed>
SQL calls sampled	<DB2SQLVariance>
Ref	<Ref>*n*</Ref>
Subsys	<Subsystem>*name*</Subsystem>
Version	<Version>*version*</Version>
Calls Sampled	<CallsSampled>*n*</CallsSampled>

Field title in online report	XML element
Variance	<Variance>*variance*</Variance>
	</DB2SQLVariance>
SQL observations	<SQLObservations>
Ref	<Ref>*n*</Ref>
Count	<SQLCount>*n*</SQLCount>
Variance	<Variance>*variance*</Variance>
	</SQLObservations>
SQL calls executed	<SQLCallsExecuted>
Ref	<Ref>*n*</Ref>
Count	<SQLCount>*n*</SQLCount>
Variance	<Variance>*variance*</Variance>
	</SQLCallsExecuted>
Avg SQL call rate	<SQLCallRate>
Ref	<Ref>*n*</Ref>
Rate	<SQLRate>*n* per sec</SQLRate>
Variance	<Variance>*variance*</Variance>
	</SQLCallRate>
SQL calls counted	<SQLCallsCounted>
Ref	<Ref>*n*</Ref>
Count	<SQLCount>*n*</SQLCount>
Variance	<Variance>*variance*</Variance>
	</SQLCallsCounted>
SQL throughput	<SQLThroughput>
Ref	<Ref>*n*</Ref>
Rate	<SQLRate>*n* per sec</SQLRate>
Variance	<Variance>*variance*</Variance>
	</SQLThroughput>
SQL service time	<SQLServiceTime>
Ref	<Ref>*n*</Ref>
Time	<ServiceTime>*n* sec</ServiceTime>
Variance	<Variance>*variance*</Variance>
	</SQLServiceTime>
SQL call max	<SQLCallMaxTime>
Ref	<Ref>*n*</Ref>
Time	<ServiceTime>*n* sec</ServiceTime>
Variance	<Variance>*variance*</Variance>
	</SQLCallMaxTime>
SQL call min time	<SQLCallMinTime>
Ref	<Ref>*n*</Ref>
Time	<ServiceTime>*n* sec</ServiceTime>

Field title in online report	XML element
Variance	<Variance>*variance*</Variance>
	</SQLCallMinTime>
SQL CPU time	<SQLCPUTime>
Ref	<Ref>*n*</Ref>
Time	<CPUTime>*n* sec</CPUTime>
Variance	<Variance>*variance*</Variance>
	</SQLCPUTime>
SQL call max CPU time	<SQLCallMaxCPUTime>
Ref	<Ref>*n*</Ref> >
Time	<CPUTime>*n* sec</CPUTime>
Variance	<Variance>*variance*</Variance>
	</SQLCallMaxCPUTime>
SQL call min CPU time	<SQLCallMinCPUTime>
Ref	<Ref>*n*</Ref>
Time	<CPUTime>*n* sec</CPUTime>
Variance	<Variance>*variance*</Variance>
	</SQLCallMinCPUTime>

V04 IMS Variance Summary

The following tag pairs are repeated multiple times in each variance report. The first occurrence of the tag pair reports the base measurement (Ref 01). Following Ref 01, the tag pairs are repeated for every tagged measurement (Ref *n*).

- <MeasurementsAnalyzed></MeasurementsAnalyzed>
- <TxnObservations></TxnObservations>
- <TxnsCounted></TxnsCounted>
- <TransactionRate></TransactionRate>
- <TxnThroughput></TxnThroughput>
- <TxnServiceTime></TxnServiceTime>
- <TxnCallMaxTime></TxnCallMaxTime>
- <TxnCallMinTime></TxnCallMinTime>
- <TxnCPUTime></TxnCPUTime>
- <TxnCallMaxCPUTime></TxnCallMaxCPUTime>
- <TxnCallMinCPUTime></TxnCallMinCPUTime>
- <DLIObservations></DLIObservations>
- <DLICallsCounted></DLICallsCounted>
- <DLICallRate></DLICallRate>
- <DLICallThroughput></DLICallThroughput>
- <DLICallServiceTime></DLICallServiceTime>
- <DLICallMaxTime></DLICallMaxTime>
- <DLICallMinTime></DLICallMinTime>
- <DLICallCPUTime></DLICallCPUTime>
- <DLICallMaxCPUTime></DLICallMaxCPUTime>

- <DLICallMinCPUTime></DLICallMinCPUTime>

Field title in online report	XML element
The Following Measurements are Analyzed	<MeasurementsAnalyzed>
Ref	<Ref>*n*</Ref>
ReqNum	<ReqNum>*n*</ReqNum>
Job Name	<JobName>*name*</JobName>
Date	<Date>*Mon-dd-yyyy*</Date>
Time	<Time>*hh:mm*</Time>
Description	<Description>*description*</Description>
	</MeasurementsAnalyzed>
Txn observations	<TxnObservations>
Ref	<Ref>*n*</Ref>
IMS Subsys	<Subsystem>*name*</Subsystem>
IMS Version	<Version>*version*</Version>
Txns Sampled	<TxnsSampled>*n*</TxnsSampled>
Variance	<Variance>*variance*</Variance>
	</TxnObservations>
IMS Txns counted	<TxnsCounted>
Ref	<Ref>*n*</Ref>
Count	<TxnCount>*n*</TxnCount>
Variance	<Variance>*variance*</Variance>
	</TxnsCounted>
Transaction rate	<TransactionRate>
Ref	<Ref>*n*</Ref>
Rate	<TxnRate>*n* per sec</TxnRate>
Variance	<Variance>*variance*</Variance>
	</TransactionRate>
Txn throughput	<TxnThroughput>
Ref	<Ref>*n*</Ref>
Rate	<TxnRate>*n* per sec</TxnRate>
Variance	<Variance>*variance*</Variance>
	</TxnThroughput>
IMS Txn svc time	<TxnServiceTime>
Ref	<Ref>*n*</Ref>
Time	<ServiceTime>*n* sec</ServiceTime>
Variance	<Variance>*variance*</Variance>
	</TxnServiceTime>
IMS Txn max svc	<TxnCallMaxTime>
Ref	<Ref>*n*</Ref>

Field title in online report	XML element
Time	<ServiceTime>*n* sec</ServiceTime>
Variance	<Variance>*variance*</Variance>
	</TxnCallMaxTime>
IMS Txn min svc	<TxnCallMinTime>
Ref	<Ref>*n*</Ref>
Time	<ServiceTime>*n* sec</ServiceTime>
Variance	<Variance>*variance*</Variance>
	</TxnCallMinTime>
IMS Txn CPU time	<TxnCPUTime>
Ref	<Ref>*n*</Ref>
Time	<CPUTime>*n* sec</CPUTime>
Variance	<Variance>*variance*</Variance>
	</TxnCPUTime>
IMS Txn max CPU	<TxnCallMaxCPUTime>
Ref	<Ref>*n*</Ref>
Time	<CPUTime>*n* sec</CPUTime>
Variance	<Variance>*variance*</Variance>
	</TxnCallMaxCPUTime>
IMS Txn min CPU	<TxnCallMinCPUTime>
Ref	<Ref>*n*</Ref>
Time	<CPUTime>*n* sec</CPUTime>
Variance	<Variance>*variance*</Variance>
	</TxnCallMinCPUTime>
DLI observations	<DLIObservations>
Ref	<Ref>*n*</Ref>
Count	<CallsSampled>*n*</CallsSampled>
Variance	<Variance>*variance*</Variance>
	</DLIObservations>
DLI call count	<DLICallsCounted>
Ref	<Ref>*n*</Ref>
Count	<CallCount>*n*</CallCount>
Variance	<Variance>*variance*</Variance>
	</DLICallsCounted>
DLI call rate	<DLICallRate>
Ref	<Ref>*n*</Ref>
Rate	<CallRate>*n* per sec</CallRate>
Variance	<Variance>*variance*</Variance>
	</DLICallRate>
DLI call thruput	<DLICallThroughput>
Ref	<Ref>*n*</Ref>

Field title in online report	XML element
Rate	<CallRate>*n* per sec</CallRate>
Variance	<Variance>*variance*</Variance>
	</DLICallThroughput>
DLI svc time	<DLICallServiceTime>
Ref	<Ref>*n*</Ref>
Time	<ServiceTime>*n* sec</ServiceTime>
Variance	<Variance>*variance*</Variance>
	</DLICallServiceTime>
DLI max svc	<DLICallMaxTime>
Ref	<Ref>*n*</Ref>
Time	<ServiceTime>*n* sec</ServiceTime>
Variance	<Variance>*variance*</Variance>
	</DLICallMaxTime>
DLI min svc	<DLICallMinTime>
Ref	<Ref>*n*</Ref>
Time	<ServiceTime>*n* sec</ServiceTime>
Variance	<Variance>*variance*</Variance>
	</DLICallMinTime>
DLI CPU time	<DLICallCPUTime>
Ref	<Ref>*n*</Ref>
Time	<CPUTime>*n* sec</CPUTime>
Variance	<Variance>*variance*</Variance>
	</DLICallCPUTime>
DLI max CPU time	<DLICallMaxCPUTime>
Ref	<Ref>*n*</Ref>
Time	<CPUTime>*n* sec</CPUTime>
Variance	<Variance>*variance*</Variance>
	</DLICallMaxCPUTime>
DLI min CPU time	<DLICallMinCPUTime>
Ref	<Ref>*n*</Ref>
Time	<CPUTime>*n* sec</CPUTime>
Variance	<Variance>*variance*</Variance>
	</DLICallMinCPUTime>

CICS Performance analysis reports

E01 CICS Session Statistics

Field title in online report	XML element
	<CICSSummary>
CICS Release	<CICSRelease>*CICS Release*</CICSRelease>
First Transaction TaskId	<FirstTaskId>*n*</FirstTaskId>
Last Transaction TaskId	<LastTaskId>*n*</LastTaskId>
Number of TaskId Increments	<TaskIdIncrements>*n*</TaskIdIncrements>
Number of Observed Transactions	<ObservedTransactions>*n*</ObservedTransactions>
Transaction Rate (per sec)	<TransactionRate>*n*</TransactionRate>
Peak Active Txns (Observed)	<PeakActiveTransactionsObserved>*n*</ PeakActiveTransactionsObserved>
Peak Active Txns (Overall)	<PeakActiveTransactionsOverall>*n*</ PeakActiveTransactionsOverall>
Max Task <MaxTask>n</ MaxTask>	Execution Time <ExecutionTime>*n*</ExecutionTime>
Suspend Time	<SuspendTime>*n*</SuspendTime>
CICS Dispatch Delay Time	<CICSDispatchDelayTime>*n*</CICSDispatchDelayTime>
MVS Dispatch Delay Time	<MVSDispatchDelayTime>*n*</MVSDispatchDelayTime>
Service Time	<ServiceTime>*n*</ServiceTime>
Program Requests	<ProgramRequests>*n*</ProgramRequests>
Terminal Messages	<TerminalMessages>*n*</TerminalMessages>
Storage Getmains	<StorageGetmains>*n*</StorageGetmains>
Storage Freemains	<StorageFreemains>*n*</StorageFreemains>
File I/O Requests	<FileIORequests>*n*</FileIORequests>
Temporary Storage Requests	<TemporaryStorageRequests>*n*</TemporaryStorageRequests>
Transient Data Requests	<TransientDataRequests>*n*</TransientDataRequests>
Journal Write Requests	<JournalWriteRequests>*n*</JournalWriteRequests>
System Dumps	<SystemDumps>*n*</SystemDumps>
System Dumps Suppressed	<SystemDumpsSuppressed>*n*</SystemDumpsSuppressed>
Transaction Dumps	<TransactionDumps>*n*</TransactionDumps>
Transaction Dumps Suppressed	<TransactionDumpsSuppressed>*n*</ TransactionDumpsSuppressed>
Storage Violations	<StorageViolations>*n*</StorageViolations>
Short on Storage occurrences	<ShortOnStorageOccurrences>*n*</ShortOnStorageOccurrences>

Field title in online report	XML element
Times at MaxTask	<TimesAtMaxTask>*n*</TimesAtMaxTask>
Times at Class MaxTask	<TimesAtClassMaxTask>*n*</TimesAtClassMaxTask>
	<TransactionCounts>
TranId	<TransactionId>*tranid*</TransactionId>
Count	<TransactionCount>*n*</TransactionCount>
	</TransactionCounts>
	</CICSSummary>

E02 CICS CPU and Use Counts by Pgm

Field title in online report	XML element
	<DetailLine>
Name	<Name>*name*</Name>
Calls	<Description>*n*</Description>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</DetailLine>

E03 CICS CPU Usage by Transaction

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report

Field title in online report	XML element
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns/Description	<CICSTxnCount>*n*</CICSTxnCount>
	<Description>*description*</Description>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CICSTranId>
	<CICSProgram>
Name	<Program>*name*</Program>
NTxns/Description	<Description>*description*</Description>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CICSProgram>
	<CICSCommand>

Field title in online report	XML element
Name	<CSECT>*name*</CSECT>
NTxns/Description	<Offset>*offset*</Offset>
NTxns/Description	<Command>*command*</Command>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CICSCommand>
	<CICSService>
Name	<Program>*name*</Program>
NTxns/Description	<Description>*description*</Description>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
NTxns/Description	<SQLVerb>*verb*</SQLVerb>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
NTxns/Description	<DLIRequest>*dlirequest*</DLIRequest>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
NTxns/Description	<Command>*command*</Command>
	<Measurement>*n*</Measurement>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</ADABASCommand>

E04 CICS Mean Service Time by Txn

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>
	<CICSService>

Field title in online report	XML element
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<SQL>*offset*</SQL>
Description	<Description>*sqlverb*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

E05 CICS Total Service Time by Txn

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>
	<CICSService>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>

Field title in online report	XML element
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<SQL>*offset*</SQL>
Description	<Description>*sqlverb*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

E06 CICS Total Service Time by Task ID

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>

Field title in online report	XML element
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSTaskId>
Name	<TaskId>*tasknumber*</TaskId>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTaskId>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>

Field title in online report	XML element
	<CICSService>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<SQLVerb>*sqlverb*</SQLVerb>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

E07 CICS Wait by Txn

Field title in online report	XML element
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns/Description	<CICSTxnCount>*n*</CICSTxnCount>
	<Description></Description>
	<Measurements>*n*</Measurements>
Percent of Wait Time * 10.00%	<Percent>*n*</Percent>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
NTxns/Description	<Description>*description*</Description>
	<Measurements>*n*</Measurements>
Percent of Wait Time * 10.00%	<Percent>*n*</Percent>
	</CICSWait>
	</CICSTranId>

E08 CICS Mean Service Time by Termid

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<CICSTerminal>
Name	<TerminalId>*termid*</TerminalId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTerminal>
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>

Field title in online report	XML element
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>
	<CICSService>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<SQLVerb>*sqlverb*</SQLVerb>

Field title in online report	XML element
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

E09 CICS Total Service Time by Termid

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<CICSTerminal>
Name	<TerminalId>*termid*</TerminalId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTerminal>

Field title in online report	XML element
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>
	<CICSService>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>

Field title in online report	XML element
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<SQLVerb>*sqlverb*</SQLVerb>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

E10 CICS Mean Service Time by User ID

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<CICSUserid>
Name	<Userid>*userid*</Userid>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>

Field title in online report	XML element
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSUserid>
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>

Field title in online report	XML element
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>
	<CICSService>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<SQLVerb>*sqlverb*</SQLVerb>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

E11 CICS Total Service Time by User ID

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<CICSUserid>
Name	<Userid>*userid*</Userid>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSUserid>
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>

Field title in online report	XML element
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>
	<CICSService>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<SQLVerb>*sqlverb*</SQLVerb>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>

Field title in online report	XML element
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

E12 CICS CPU/Service Time by Transaction

Field title in online report	XML element
	<CPUTimeByTransaction>
Name	<Transaction>name</Transaction>
NTxns	<NumberOfTxns>n</NumberOfTxns>
% of CPU	<PctCPUTime>n%</PctCPUTime>
--CPU Time -- Total	<TotalCPUTime>n</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>n</MeanCPUTime>
--Svc Time-- Total	<TotalServiceTime>n</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>n</MeanServiceTime>
	<CPUTimeByTransactionDetail>
Name	<TaskNumber>n</TaskNumber>
Description	<StartTime>hh.mm.ss.ss</StartTime>
--CPU Time -- Total	<TotalCPUTime>n</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>n</MeanCPUTime>
--Svc Time-- Total	<TotalServiceTime>n</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>n</MeanServiceTime>
	</CPUTimeByTransactionDetail>
	</CPUTimeByTransaction>

X01 CICS Mean Service Time by Txn

This report is generated for multiple CICS address space reporting.

The XML elements presented below can be repeated multiple times and occur under different parent elements. In the XML document, all elements are listed in hierarchical order as they are displayed in the online report.

Field title in online report	XML element
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>

Field title in online report	XML element
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSApplid>
Name	<Applid>*name*</Applid>
Description	<Description>Region Applid</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSApplid>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>command</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>
	<CICSService>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>

Field title in online report	XML element
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<SQL>*offset*</SQL>
Description	<Description>*sqlverb*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

X02 CICS Total Service Time by Txn

This report is generated for multiple CICS address space reporting.

The XML elements presented below can be repeated multiple times and occur under different parent elements. In the XML document, all elements are listed in hierarchical order as they are displayed in the online report.

Field title in online report	XML element
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>

Field title in online report	XML element
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSApplid>
Name	<Applid>*name*</Applid>
Description	<Description>Region Applid</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSApplid>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service <ServiceTime>n</ServiceTime>	
	</CICSWait>
	<CICSService>

Field title in online report	XML element
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<SQL>*offset*</SQL>
Description	<Description>*sqlverb*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

X03 CICS Mean Service Time by Term

This report is generated for multiple CICS address space reporting.

The XML elements presented below can be repeated multiple times and occur under different parent elements. In the XML document, all elements are listed in hierarchical order as they are displayed in the online report.

Field title in online report	XML element
	<CICSTerminal>
Name	<TerminalId>*termid*</TerminalId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTerminal>
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSApplid>
Name	<Applid>*name*</Applid>
Description	<Description>Region Applid</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSApplid>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>

Field title in online report	XML element
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>
	<CICSService>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<SQLVerb>*sqlverb*</SQLVerb>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>n</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>

Field title in online report	XML element
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

X04 CICS Total Service Time by Term

This report is generated for multiple CICS address space reporting.

The XML elements presented below can be repeated multiple times and occur under different parent elements. In the XML document, all elements are listed in hierarchical order as they are displayed in the online report.

Table 31. XML Elements for X04 Report Field Titles

Field title in online report	XML element
	<CICSTerminal>
Name	<TerminalId>*termid*</TerminalId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTerminal>
	<CICSTranId>
Name	<TransactionId>*tranid*</TransactionId>
NTxns	<CICSTxnCount>*n*</CICSTxnCount>
Description	<Description></Description>
Error	<MarginofError>*n*%</MarginofErrors>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSTranId>
	<CICSApplid>
Name	<Applid>*name*</Applid>
Description	<Description>Region Applid</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>

Table 31. XML Elements for X04 Report Field Titles (continued)

Field title in online report	XML element
Service	<ServiceTime>*n*</ServiceTime>
	</CICSApplid>
	<CICSProgram>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSProgram>
	<CICSCommand>
Name	<CSECT>*name*</CSECT>
Description	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSCommand>
	<CICSWait>
Name	<WaitReason>*reason*</WaitReason>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSWait>
	<CICSService>
Name	<Program>*name*</Program>
Description	<Description>*description*</Description>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSService>
	<CICSSQL>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<SQLVerb>*sqlverb*</SQLVerb>
Execution	<ExecTime>*n*</ExecTime>

Table 31. XML Elements for X04 Report Field Titles (continued)

Field title in online report	XML element
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSSQL>
	<CICSDLI>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<DLIRequest>*dlirequest*</DLIRequest>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</CICSDLI>
	<ADABASCommand>
	<CSECT>*name*</CSECT>
Name	<Offset>*offset*</Offset>
Description	<Command>*command*</Command>
Execution	<ExecTime>*n*</ExecTime>
Suspend	<SuspendTime>*n*</SuspendTime>
Delay	<DelayTime>*n*</DelayTime>
Service	<ServiceTime>*n*</ServiceTime>
	</ADABASCommand>

IMS Performance analysis reports

I01 IMS Measurement Profile

Field title in online report	XML element
IMS Environment	<IMSEnvironment>
DFSRRC00 parms	<DFSRRC00Parms>*parms*</DFSRRC00Parms>
IMS system id	<SystemId>*systemid*</SystemId>
IMS region name	<RegionName>*name*</RegionName>
IMS version	<Version>*version*</Version>
IMS region type	<RegionType>*regiontype*</RegionType>
	</IMSEnvironment>
Most Active IMS PSBs	<MostActiveIMSPSBs>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>I05 I08 I11</Reports>

Field title in online report	XML element
	<ActiveIMSPSBs>
	<PSBName>*name*</PSBName>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</ActiveIMSPSBs>
	</MostActiveIMSPSBs>
Most Active IMS Transactions	<MostActiveIMSTransactions>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>I04 I06 I09 I12</Reports>
	<ActiveIMSTransactions>
	<TransactionId>*tranid*</TransactionId>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</ActiveIMSTransactions>
	</MostActiveIMSTransactions>
Most Active IMS DLI Calls	<MostActiveIMSDLICalls>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>I07 I10 I13</Reports>
	<ActiveIMSDLICalls>
	<IMSCall>*imscall*</IMSCall>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</ActiveIMSDLICalls>
	</MostActiveIMSDLICalls>
Most CPU consumptive DLI	<MostCPUConsumptiveDLI>
Total DLI CPU time	<CPUTime>*n*</CPUTime>
	<Percent>*n*%</Percent>
Reports	<Reports>I18 I19 I20 I21</Reports>
	<CPUConsumptiveDLI>
	<IMSCall>*imscall*</IMSCall>
	<CPUTime>*n*</CPUTime>
	<CPUTimePercent>*n*%</CPUTimePercent>
	</CPUConsumptiveDLI>
	</MostCPUConsumptiveDLI>
Most Frequent Transactions	<MostFrequentTransactions>

Field title in online report	XML element
Total txns counted	<Transactions>*n*</Transactions>
	<Percent>*n*%</Percent>
Reports	<Reports>I03 I04 I16 I17</Reports>
	<FrequentTransactions>
	<TransactionId>*tranid*</TransactionId>
	<TransactionsCounted>*n*</TransactionsCounted>
	<PercentOfTransactions>*n*%</PercentOfTransactions>
	</FrequentTransactions>
	</MostFrequentTransactions>
Most Frequent DL/I Calls	<MostFrequentDLICalls>
Total DLI call count	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
	Reports <Reports>I02 I17 I18</Reports>
	<FrequentDLICalls>
	<IMSCall>*imscall*</IMSCall>
	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
	</FrequentDLICalls>
	</MostFrequentDLICalls>
Transaction Statistics	<TransactionStatistics>
IMS Txns counted	<TransactionsCounted>*n*</TransactionsCounted>
Transaction rate	<TransactionRate>*n* per sec</TransactionRate>
Txn observations	<TransactionObservations>*n*</TransactionObservations>
Txn throughput	<TransactionThroughput>*n* per sec</TransactionThroughput>
IMS Txn svc time	<TransactionServiceTime>*n* sec</TransactionServiceTime>
IMS Txn CPU time	<TransactionCPUTime>*n* sec</TransactionCPUTime>
IMS txn max svc	<TransactionMaximumService>*nssec*</TransactionMaximumService>
IMS Txn max CPU	<TransactionMaximumCPU>*n* sec</TransactionMaximumCPU>
IMS Txn min svc	<TransactionMinimumService>*n* sec</TransactionMinimumService>
IMS Txn min CPU	<TransactionMinimumCPU>*n* sec</TransactionMinimumCPU>
	</TransactionStatistics>

I02 IMS DL/I Call Timeline

The DLICallTimeline tag pair and sub-elements are repeated for each DLI call.

Field title in online report	XML element
	<DLICallTimeline>
CallSeq	<CallSeq>*n*</CallSeq>

Field title in online report	XML element
Func	<Function>*function*</Function>
PCB Name	<PCBName>*name*</PCBName>
Id	<Id>*n*</Id>
Location	<Location>*location*</Location>
Stat	<Status>*status*</Status>
Call Time	<CallTime>*hh:mm:ss.ss*</CallTime>
Duration	<Duration>*n*</Duration>
	</DLICallTimeline>

I03 IMS Transaction Timeline

The IMSTransactionTimeLine tag pair and sub-elements are repeated for each IMS transaction.

Field title in online report	XML element
	<IMSTransactionTimeLine>
TranCode	<TransactionCode>*tranid*</TransactionCode>
PSB/PCB	<PSBName>*name*</PSBName>
Location	<LTERM>*lterm*</LTERM>
Txn Time	<TransactionTime>*hh:mm:ss.ss*</TransactionTime>
Duration	<Duration>*n*</Duration>
	<DLICallTimeLine>
TranCode	<CallSeq>*n*</CallSeq>
PSB/PCB	<PCBName>name</PCBName>
Id	<Id>*n*</Id> Func
	<Function>*function*</Function>
Location	<Location>*location*</Location>
Stat	<Status>*status*</Status>
Txn Time	<CallTime>*hh:mm:ss.ss*</CallTime>
Duration	<Duration>*n*</Duration>
	</DLICallTimeline>
	</IMSTransactionTimeLine>

I04 IMS Transaction Activity Timeline

Field title in online report	XML element
	<IMSTransactionActivityTimeLine>
TranCode	<Samples>*n*</Samples>
PSB/PCB	<Duration>*n*</Duration>
Location	<Txn>*tranid*</Txn>

Field title in online report	XML element
Txn Time	<TransactionTime>*hh:mm:ss.ss*</TransactionTime>
Duration	<PSB>*name*</PSB>
	<Txns>*n*</Txns>
	<Intervals>
	<IntervalCount>*n*</IntervalCount> Repeated 50 times
	</Interval>
	</IMSTransactionActivityTimeLine>

I05 to I13

This section describes the common tag pairs and elements of the XML detail lines shared by reports I05 through I13. The same information is categorized and displayed differently in each report. The report names covered by the following XML are:

- I05 IMS CPU Usage by PSB
- I06 IMS CPU Usage by Txn
- I07 IMS CPU Usage by DL/I Call
- I08 IMS WAIT Time by PSB
- I09 IMS WAIT Time by Txn
- I10 IMS WAIT Time by DL/I Call
- I11 IMS DL/I Activity by PSB
- I12 IMS DL/I Activity by Txn
- I13 IMS DL/I Activity by DL/I Call

The XML elements presented below may be repeated multiple times and appear under different parent elements. In the XML document, all elements are listed in hierarchical order as they appear in the online report.

Field title in online report	XML element
	<Category>
Name	<CategoryName>*name*</CategoryName>
Description	<CategoryDescription>*description*</CategoryDescription >
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>
	</Category>
	<CSECT>
Name	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>
	</CSECT>
	<DLICall>

Field title in online report	XML element
Name	<SequenceNumber>*n*</SequenceNumber>
Description	<FunctionPCBProgramOffset>*FuncNameNameOffset*</ FunctionPCBProgramOffset>
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>
	</DLICall>
	<DMRequest>
Name	<MacroName>*name*</MacroName>
Description	<MacroLocation>*location*</MacroLocation>
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>
	</DMRequest>
	<DPAGroup>
Name	<DPAGroupName>*name*</DPAGroupName>
Description	<DPAGroupDescription>*description*</DPAGroupDescription>
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>
	</DPAGroup>
	<File>
Name	<DDName>*ddname*</DDName>
Description	<AccessMethod>*accessmethod*</AccessMethod>
	<Measurements>*n*</Measurements>
Percent of xxxTime * 10.00%	<Percent>*n*</Percent>
	</File>
	<LoadModule>
Name	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDescription>
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>
	</LoadModule>
	<NoSymAddressRange>
Name	<AddressRange>*address*</AddressRange>
Description	<AddressRangeDescription>Unresolved Address</ AddressRangeDescription
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>

Field title in online report	XML element
	</NoSymAddressRange>
	<PSB>
Name	<PSBName>*name*</PSBName>
Description	<Description>*description*</Description>
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>
	</PSB>
	<SQLRequest>
Name	<SequenceNumber>*n*</SequenceNumber>
Description	<ProgramStatementFunction>*name(stmt)function*</ ProgramStatementFunction>
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>
	</SQLRequest>
	<SVCRoutine>
Name	<SVCId>*svcid*</SVCId>
Description	<SVCDescription>*description*</SVCDescription>
	<Measurements>*n*</Measurements>
Percent of xxx Time * 10.00%	<Percent>*n*</Percent>
	</SVCRoutine>

I14 IMS PSB/PCB Attributes

Field title in online report	XML element
	<IMSPSBAttributes>
PSB name	<PSBName>*name*</PSBName>
IMS system	<IMSSystem>*imssystem*</IMSSystem>
No.of PCBs	<NumberOfPCBs>*n*</NumberOfPCBs>
LIST=NO PCBs	<LISTNOPCBs>*n*</LISTNOPCBs>
Txn count	<TransactionCount>n</TransactionCount>
DL/I calls	<DLICalls>*n*</DLICalls>
Sample count	<SampleCount>*n*</SampleCount>
	<IMSPCBs>
PCBNum	<PCBNumber>*n*</PCBNumber>
Name	<PCBName>*name*</PCBName>
Type	<PCBType>*type*</PCBType>
DBD/LTRM	<DBDLterm>*name*</DBDLterm>
PROCOPT	<PROCOPT>*procopt*</PROCOPT>

Field title in online report	XML element
LIST	<List>*yesno*</List>
	</IMSPCBs>
	</IMSPSBAttributes>

I15 IMS DL/I Call Attributes

Field title in online report	XML element
	<DLICallAttributes>
DL/I Call Id	<DLICallId>*n*</DLICallId>
Function code	<FunctionCode>*code*</FunctionCode>
PSB Name	<PSBName>*name*</PSBName>
PCB Naame	<PCBName>*name*</PCBName>
IMS Id-Region	<IMSIdRegion>*imsid-region*</IMSIdRegion>
PCB Number	<PCBNumber>*n*</PCBNumber>
Call type	<CallType>*calltype*</CallType>
CSECT/module	<CSECTModule>*csect in module*</CSECTModule>
Offset of call	<OffsetOfCall>*n*</OffsetOfCall>
Sample count	<SampleCount>*n*</SampleCount>
Call count	<CallCount>*n*</CallCount>
DLI CPU time	<DLICPUTime>*n*</DLICPUTime>
Service time	<ServiceTime>*n*</ServiceTime>
	<DLICall>
SSA/FSA	<SSANum>*n*</SSANum>
	<SSA>*ssa*</SSA>
	</DLICall>
	</DLICallAttributes>

I16 IMS Transaction Service Times

Field title in online report	XML element
	<IMSTransactionServiceTimes>
TranCode	<TransactionCode>*tranid*</TransactionCode>
PSB/PGM	<PSBProgram>*name*</PSBProgram>
Txns	<TransactionCount>*n*</TransactionCount>
Fetch	<FetchCount>*n*</FetchCount>
Sched	<ScheduleCount>*n*</ScheduleCount>
Total time	<TotalTime>*n*</TotalTime>
Avg/Txn	<AverageTimePerTransaction>*n*</AverageTimePerTransaction>
CPU Time	<CPUTime>*n*</CPUTime>

Field title in online report	XML element
	</IMSTransactionServiceTimes>

I17 IMS Transaction DL/I Call Counts

Field title in online report	XML element
	<IMSTransactionDLICallCounts>
Tran/PCB	<TransactionCode>*tranid*</TransactionCode>
PSB/DBD	<PSBname>*name*</PSBname>
Total	<DLITotalCount>*n*</DLITotalCount>
Minimum	<DLIMinimumCount>*n*</DLIMinimumCount>
Maximum	<DLIMaximumCount>*n*</DLIMaximumCount>
Average	<DLIAverageCount>*n*</DLIAverageCount>
	<IMSTransactionDLICallCountsByPCB>
Tran/PCB	<PCBName>*name*</PCBName>
PSB/DBD	<DBDName>*name*</DBDName>
PCBNum	<PCBNumber>*n*</PCBNumber>
Func	<Function>*function*</Function>
Total	<DLITotalCount>*n*</DLITotalCount>
Minimum	<DLIMinimumCount>*n*</DLIMinimumCount>
Maximum	<DLIMaximumCount>*n*</DLIMaximumCount>
Average	<DLIAverageCount>*n*</DLIAverageCount>
	</IMSTransactionDLICallCountsByPCB>
	</IMSTransactionServiceTimes>

I18 IMS CPU/Service Time by DL/I Call

Field title in online report	XML element
	<IMSCPUTimeByCall>
Call	<CallNumber>*n*</CallNumber>
Func	<Function>*function*</Function>
PCB Name	<PCBName>*name*</PCBName>
Location	<Location>*location*</Location>
Count	<CallCount>*n*</CallCount>
Svc time	<DLIServiceTime>*n*</DLIServiceTime>
Prcnt	<DLIServicePercent>*n*%</DLIServicePercent>
CPU Time	<DLICPUTime>*n*</DLICPUTime>
Prcnt	<DLICPUPercent>*n*%</DLICPUPercent>
	</IMSCPUTimeByCall>

I19 IMS CPU/Service Time by PSB

Field title in online report	XML element
	<IMSCPUTimeByPSB>
PSB Name	<PSBName>*name*</PSBName>
Txn Count	<TransactionCount>*n*</TransactionCount>
DL/I Count	<CallCount>*n*</CallCount>
Svc time	<DLIServiceTime>*n*</DLIServiceTime>
Prcnt	<DLIServicePercent>*n*%</DLIServicePercent>
CPU Time	<DLICPUTime>*n*</DLICPUTime>
Prcnt	<DLICPUPercent>*n*%</DLICPUPercent>
	</IMSCPUTimeByPSB>

I20 IMS CPU/Service Time by Transaction

Field title in online report	XML element
	<IMSCPUTimeByTransaction>
TranCode	<TransactionCode>*tranid*</TransactionCode>
Txn Count	<TransactionCount>*n*</TransactionCount>
Service	<TransactionServiceTime>*n*</TransactionServiceTime>
CPU Time	<TransactionCPUTime>*n*</TransactionCPUTime>
Svc time	<DLIServiceTime>*n*</DLIServiceTime>
%of Txn	<DLIServicePercent>*n*%</DLIServicePercent>
CPU Time	<DLICPUTime>*n*</DLICPUTime>
%of Txn	<DLICPUPercent>*n*%</DLICPUPercent>
	</IMSCPUTimeByTransaction>

I21 IMS CPU/Service Time by PCB

Field title in online report	XML element
	<IMSCPUTimeByPCB>
PSB Name	<PSBName>*name*</PSBName>
PCB Name	<PCBName>*name*</PCBName>
PCB Num	<PCBNumber>*n*</PCBNumber>
Count	<CallCount>*n*</CallCount>
Svc time	<DLIServiceTime>*n*</DLIServiceTime>
Percent	<DLIServicePercent>*n*%</DLIServicePercent>
CPU Time	<DLICPUTime>*n*</DLICPUTime>
Percent	<DLICPUPercent>*n*%</DLICPUPercent>
	</IMSCPUTimeByPCB>

DB2 Performance analysis reports

F01 DB2 Measurement profile

Field title in online report	XML element
Most Active DB2 Plans	<MostActiveDB2Plans>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>F05</Reports>
	<Plans>
	<PlanName>*name*</Planame>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</Plans>
	</MostActiveDB2Plans>
Most Active Package/DBRM	<MostActiveDBRMs>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>F03</Reports>
	<DBRMs>
	<DBRM>*name*</DBRM>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</DBRMs>
	</MostActiveDBRMs>
Most Active SQL Statements	<MostActiveSQL>
Samples	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
Reports	<Reports>F04</Reports>
	<SQLStatement>
	<ProgramOffsetVerb>*name:offset verb*</ProgramOffsetVerb>
	<CPUActive>*n*</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</SQLStatement>
	</MostActiveSQL>
Most CPU consumptive SQL	<MostCPUConsumptiveSQL>
Total SQL CPU time	<CPUTime>*n*</CPUTime>
	<Percent>*n*%</Percent>
Reports	<Reports>F10 F11 F12</Reports>

Field title in online report	XML element
	<SQLStatement>
	<ProgramOffsetVerb>*name:offset verb*</ProgramOffsetVerb>
	<CPUActive>*n*%</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</SQLStatement>
	</MostCPUConsumptiveSQL>
Most Frequent SQL Statements	<MostFrequentSQL>
Total SQL call count	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
	<SQLStatement>
	<ProgramOffsetVerb>*name:offset verb*</ProgramOffsetVerb>
	<CPUActive>*n*%</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</SQLStatement>
	</MostFrequentSQL>
Single SQL Call Service Time	<SingleSQLCallServiceTime>
Total SQL service count	<Samples>*n*</Samples>
	<Percent>*n*%</Percent>
	<SQLStatement>
	<ProgramOffsetVerb>*name:offset verb*</ProgramOffsetVerb>
	<CPUActive>*n*%</CPUActive>
	<CPUActivePercent>*n*%</CPUActivePercent>
	</SQLStatement>
	</SingleSQLCallServiceTime>
Db2 Measurement Statistics	<DB2MeasurementStatistics>
DB2 subsystem name	<SubsystemName>*name*</SubsystemName>
DB2 version	<Version>*version*</Version>
SQL calls sampled	<CallsSampled>*n*</CallsSampled>
SQL observations	<SQLObservations>*n*</SQLObservations>
SQL calls executed	<CallsExecuted>*n*</CallsExecuted>
Avg SQL call rate	<CallRate>*n* per sec</CallRate>
SQL calls counted	<CallsCounted>n</CallsCounted>
SQL throughput	<SQLThroughput>*n* per sec</SQLThroughput>
SQL service time	<ServiceTime>*n* sec</ServiceTime>
SQL CPU time	<CPUTime>*n* sec</CPUTime>
CQL call max time	<CallMaxTime>*n* sec</CallMaxTime>
SQL call max CPU	<CallMaxCPU>*n* sec</CallMaxCPU>
SQL call min time	<CallMinTime>*n* sec</CallMinTime>

Field title in online report	XML element
SQL call min CPU	<CallMinCPU>*n* sec</CallMinCPU>
	</DB2MeasurementStatistics>

F02 DB2 SQL Activity Timeline

The SQLActivityTimeline tag pair and sub-elements are repeated for each SQL call.

Field title in online report	XML element
	<SQLActivityTimeline>
Thread	<Thread>*n*</Thread>
REQCT	<REQCT>*n*</REQCT>
Program	<Program>name</Program>
Stmt#	<StatementNumber>*n*</StatementNumber>
SQL Function	<SQLFunction>*function*</SQLFunction>
Samps	<Samples>*n*</Samples>
Call Time	<CallTime>*hh:mm:ss.ss*</CallTime>
Interval	<Interval>*n*</Interval>
CPU Time	<CPUTime>*n*</CPUTime>
	<GetPagesIdx>*n*</GetPagesIdx>
	<GetPages>*n*</GetPages>
	<SyncReadIO>*n*</SyncReadIO>
	<PrefetchReq>*n*</PrefetchReq>
	<SyncWriteIO>*n*</SyncWriteIO>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLActivityTimeline>

F03 SQL Activity by DBRM

Field title in online report	XML element
	<DetailLine>
Name	<Name>*name*</Name>
	<Description></Description>
	<Measurements>*n*</Measurements>

Field title in online report	XML element
Percent of Time * 10.00%	<Percent>*n* %</Percent>
	<SQLRequest>
Name	<SequenceNumber>*seqno*</SequenceNumber>
Stmt# SQL Function	<ProgramStatementFunction>*stmt function*</ ProgramStatementFunction>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLRequest>
	</DetailLine>

F04 SQL Activity by Statement

Field title in online report	XML element
	<SQLRequest>
Seqno	<SequenceNumber>*seqno*</SequenceNumber>
Program Stmt# SQL Function	<ProgramStatementFunction>*name stmt function*</ ProgramStatementFunction>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLRequest>

F05 SQL Activity by Plan

Field title in online report	XML element
	<DetailLine>
Seqno	<Name>*seqno*</Name>
Plan/Pgm	<Description>*name*</Description>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>n %</Percent>
	<SQLRequest>
Seqno	<SequenceNumber>*seqno*</SequenceNumber>
Plan/Pgm Stmt# SQL Function	<ProgramStatementFunction>*name stmt function*</ ProgramStatementFunction>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLRequest>
	</DetailLine>

F06 DB2 SQL Statement Attributes

Field title in online report	XML element
	<SQLStatementAttributes>
SQL Statement Id	<StatementId>*n*</StatementId>
Subsystem name	<SubsystemName>*name*</SubsystemName>
Attach type	<AttachType>*attachtype*</AttachType>
Plan name	<PlanName>*name*</PlanName>
Plan bind time	<PlanBindTime>*Mon-dd-yy hh:mm:ss*</PlanBindTime>
DBRM name	<DBRMName>*name*</DBRMName>
DBRM token	<DBRMToken>*token*</DBRMToken>
DBRM date/time	<DBRMTime>*Mon-dd-yy hh:mm:ss*</DBRMTime>
Package ID	<PackageId>*packageid*</PackageId>
Location	<Location>*location*</Location>
Collectn name	<CollectionName>*name*</CollectionName>
Pkg BIND time	<PackageBindTime>*Mon-dd-yy hh:mm:ss*</PackageBindTime>

Field title in online report	XML element
SQL function	<SQLFunction>*function*</SQLFunction>
Static/dynamic	<StaticDynamic>*static or dynamic*</StaticDynamic>
Precmplr stmt#	<PrecompilerStatementNumber>*n*</PrecompilerStatementNumber>
DBRM section#	<DBRMSectionNumber>*n*</DBRMSectionNumber>
Prepare stmt#	<PrepareStatementNumber>*n*</PrepareStatementNumber>
CSECT/module	<CSECTModule>*csect* in *module*</CSECTModule>
Offset of call	<OffsetOfCall>*n*</OffsetOfCall>
Sample count	<SampleCount>*n*</SampleCount>
SQL req count	<SQLREQCT>*n*</SQLREQCT>
SQL CPU time	<SQLCPUTime>*n*</SQLCPUTime>
Service time	<ServiceTime>*n*</ServiceTime>
	<SQLTextLines>
SQL Statement	<SQLTEXT>*sqltext*</SQLTEXT>
	</SQLTextLines>
	</SQLStatementAttributes\t>

F07 SQL WAIT Time by DBRM

Field title in online report	XML element
	<DetailLine>
Name	<Name>*name*</Name>
	<Description></Description>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n %*</Percent>
	<SQLRequest>
Name	<SequenceNumber>*seqno*</SequenceNumber>
Stmt# SQL Function	<ProgramStatementFunction>*stmt function*</ProgramStatementFunction>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLRequest>

Field title in online report	XML element
	</DetailLine>

F08 SQL WAIT Time by Statement

Field title in online report	XML element
	<SQLRequest>
Seqno	<SequenceNumber>*seqno*</SequenceNumber>
Program Stmt# SQL Function	<ProgramStatementFunction>*name stmt function*</ ProgramStatementFunction>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLRequest>

F09 SQL WAIT Time by Plan

Field title in online report	XML element
	<DetailLine>
Seqno	<Name>*seqno*</Name>
Plan/Pgm	<Description>*name*</Description>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n* %</Percent>
	<SQLRequest>
Seqno	<SequenceNumber>*seqno*</SequenceNumber>
Plan/Pgm Stmt# SQL Function	<ProgramStatementFunction>*name stmt function*</ ProgramStatementFunction>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>

Field title in online report	XML element
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLRequest>
	</DetailLine>

F10 SQL CPU/Service Time by DBRM

Field title in online report	XML element
	<SQLCPUTimeByDBRM>
Name	<DBRMName>*name*</DBRMName>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<GetPagesIdx>*n*</GetPagesIdx>
	<GetPages>*n*</GetPages>
	<SyncReadIO>*n*</SyncReadIO>
	<PrefetchReq>*n*</PrefetchReq>
	<SyncWriteIO>*n*</SyncWriteIO>
	<SQLCPUTimeByDBRMDetail>
Name	<SequenceNumber>*seqno*</SequenceNumber>
Stmt#	<StatementNumber>*n*</StatementNumber>
SQL Function	<SQLFunction>*function*</SQLFunction>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>

Field title in online report	XML element
	</PrepareInfo>
	</SQLTextLines>
	</SQLCPUTimeByDBRMDetail>
	</SQLCPUTimeByDBRM>

F11 SQL CPU/Service Time by Statement

Field title in online report	XML element
	<SQLCPUTimeByStatement>
Seqno	<SequenceNumber>*seqno*</SequenceNumber>
Name	<ProgramName>*name*</ProgramName>
Stmt#	<StatementNumber>*n*</StatementNumber>
SQL Function	<SQLFunction>*function*</SQLFunction>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalServiceTime>*n*</TotalServiceTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<GetPagesIdx>*n*</GetPagesIdx>
	<GetPages>*n*</GetPages>
	<SyncReadIO>*n*</SyncReadIO>
	<PrefetchReq>*n*</PrefetchReq>
	<SyncWriteIO>*n*</SyncWriteIO>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLCPUTimeByStatement>

F12 SQL CPU/Service Time by Plan

Field title in online report	XML element
	<SQLCPUTimeByPlan>
Seqno	<SequenceNumber>*seqno*</SequenceNumber>

Field title in online report	XML element
Plan/Pgm	<PlanName>*name*</PlanName>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalServiceTime>*n*</TotalServiceTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<GetPagesIdx>*n*</GetPagesIdx>
	<GetPages>*n*</GetPages>
	<SyncReadIO>*n*</SyncReadIO>
	<PrefetchReq>*n*</PrefetchReq>
	<SyncWriteIO>*n*</SyncWriteIO>
	</SQLCPUTimeByPlanDetail>
Seqno	<SequenceNumber>*seqno*</SequenceNumber>
Plan/Pgm	<ProgramName>*name*</ProgramName>
Stmt#	<StatementNumber>*n*</StatementNumber>
SQL Function	<SQLFunction>*function*</SQLFunction>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalServiceTime>*n*</TotalServiceTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLCPUTimeByPlanDetail>
	</SQLCPUTimeByPlan>

F13 DB2 Threads Analysis

Field title in online report	XML element
	<DB2 Threads Analysis>

Field title in online report	XML element
SeqNum	<SeqNum>*n*</SeqNum>
Thread Addr	<ThreadAddr>*address*</ThreadAddr>
Attach	<Attach>*type*</Attach>
REQCT Range	<REQCTRange>*n-n*</REQCTRange>
--- SQL Calls --- Executed	<CallsExecuted>*n*</CallsExecuted>
--- SQL Calls --- Sampled	<CallsSampled>*n*</CallsSampled>
	</DB2ThreadsAnalysis>
	<ThreadTotals>
	<TotalCallsExecuted>*n*</TotalCallsExecuted>
	<TotalCallsSampled>*n*</TotalCallsSampled>
	</ThreadTotals>

F14 DB2 CPU by Plan/Stored Proc

Field title in online report	XML element
	<DetailLine>
Seqno	<Name>*seqno*</Name>
Description	<Description>*name*</Description>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<Category>
Seqno	<CategoryName>*name*</CategoryName>
Description	<CategoryDescription>*description*</CategoryDescription >
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</Category>
	<CSECT>
Seqno	<CSECTName>*name*</CSECTName>
Description	<CSECTDescription>*description*</CSECTDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</CSECT>
	<DMRequest>
Seqno	<MacroName>*name*</MacroName>
Description	<MacroLocation>*location*</MacroLocation>
	<Measurements>*n*</Measurements>

Field title in online report	XML element
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</DMRequest>
	<DPAGroup>
Seqno	<DPAGroupName>*name*</DPAGroupName>
Description	<DPAGroupDescription>*description*</DPAGroupDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</DPAGroup>
	<File>
Seqno	<DDName>*ddname*</DDName>
Description	<AccessMethod>*accessmethod*</AccessMethod>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</File>
	<LoadModule>
Seqno	<LoadModuleName>*name*</LoadModuleName>
Description	<LoadModuleDescription>*description*</LoadModuleDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</LoadModule>
	<NoSymAddressRange>
Seqno	<AddressRange>*address*</AddressRange>
Description	<AddressRangeDescription>Unresolved Address</ AddressRangeDescription
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</NoSymAddressRange>
	<SQLRequest>
Seqno	<SequenceNumber>*n*</SequenceNumber>
Description	<ProgramStatementFunction>*name(stmt)function*</ ProgramStatementFunction>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</SQLRequest>
	<SVCRoutine>
Seqno	<SVCId>*svcid*</SVCId>

Field title in online report	XML element
Description	<SVCDescription>*description*</SVCDescription>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</SVCRoutine>

F15 DB2 SQL CPU/Svc Time by Rq Loc

Field title in online report	XML element
	<SQLTimeByRequestLocation>
Name	<LocationName>*location*</LocationName>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<GetPagesIdx>*n*</GetPagesIdx>
	<GetPages>*n*</GetPages>
	<SyncReadIO>*n*</SyncReadIO>
	<PrefetchReq>*n*</PrefetchReq>
	<SyncWriteIO>*n*</SyncWriteIO>
	<SQLTimeByStatement>
Name	<SequenceNumber>*seqno*</SequenceNumber>
Plan/Pgm	<PlanName>*name*</PlanName>
Stmt#	<StatementNumber>*n*</StatementNumber>
SQL Function	<SQLFunction>*function*</SQLFunction>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>

Field title in online report	XML element
	</PrepareInfo>
	</SQLTextLines>
	</SQLTimeByStatement>
	</SQLTimeByRequestLocation>

F16 DB2 SQL CPU/Svc Time by Enclave

Field title in online report	XML element
	<SQLTimeByEnclave>
Token	<Token>*token*</Token>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<GetPagesIdx>*n*</GetPagesIdx>
	<GetPages>*n*</GetPages>
	<SyncReadIO>*n*</SyncReadIO>
	<PrefetchReq>*n*</PrefetchReq>
	<SyncWriteIO>*n*</SyncWriteIO>
	<SQLTimeByStatement>
Token	<SequenceNumber>*seqno*</SequenceNumber>
Stmt#	<StatementNumber>*n*</StatementNumber>
SQL Function	<SQLFunction>*function*</SQLFunction>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>

Field title in online report	XML element
	</SQLTextLines>
	</SQLTimeByStatement>
	</SQLTimeByEnclave>

F17 DB2 SQL CPU/Svc Time by Corrid

Field title in online report	XML element
	<SQLTimeByCorrelationId>
CorrId	<CorrelationId>*id*</CorrelationId>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<GetPagesIdx>*n*</GetPagesIdx>
	<GetPages>*n*</GetPages>
	<SyncReadIO>*n*</SyncReadIO>
	<PrefetchReq>*n*</PrefetchReq>
	<SyncWriteIO>*n*</SyncWriteIO>
	<SQLTimeByStatement>
CorrId	<SequenceNumber>*seqno*</SequenceNumber>
Stmt#	<StatementNumber>*n*</StatementNumber>
SQL Function	<SQLFunction>*function*</SQLFunction>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>

Field title in online report	XML element
	</SQLTimeByStatement>
	</SQLTimeByCorrelationId>

F18 DB2 SQL CPU/Svc Time by Wkstn

Field title in online report	XML element
	<SQLTimeByWorkstationId>
Wkstn	<WorkstationId>*id*</WorkstationId>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<GetPagesIdx>*n*</GetPagesIdx>
	<GetPages>*n*</GetPages>
	<SyncReadIO>*n*</SyncReadIO>
	<PrefetchReq>*n*</PrefetchReq>
	<SyncWriteIO>*n*</SyncWriteIO>
	<SQLTimeByStatement>
Wkstn	<SequenceNumber>*seqno*</SequenceNumber>
Stmt#	<StatementNumber>*n*</StatementNumber>
SQL Function	<SQLFunction>*function*</SQLFunction>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLTimeByStatement>

Field title in online report	XML element
	</SQLTimeByWorkstationId>

F19 DB2 SQL CPU/Svc Time by EndUsr

Field title in online report	XML element
	<SQLTimeByEndUser>
EndUsr	<EndUser>*user*</EndUser>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<SQLTimeByStatement>
EndUsr	<SequenceNumber>*seqno*</SequenceNumber>
Stmt#	<StatementNumber>*n*</StatementNumber>
SQL Function	<SQLFunction>*function*</SQLFunction>
Nbr of SQL Calls	<NumberOfCalls>*n*</NumberOfCalls>
--CPU Time -- Total	<TotalCPUTime>*n*</TotalCPUTime>
--CPU Time-- Mean	<MeanCPUTime>*n*</MeanCPUTime>
--CPU Time-- Pct	<PctCPUTime>*n*</PctCPUTime>
--Svc Time-- Total	<TotalServiceTime>*n*</TotalServiceTime>
--Svc Time-- Mean	<MeanServiceTime>*n*</MeanServiceTime>
--Svc Time-- Pct	<PctServiceTime>*n*</PctServiceTime>
	<GetPagesIdx>*n*</GetPagesIdx>
	<GetPages>*n*</GetPages>
	<SyncReadIO>*n*</SyncReadIO>
	<PrefetchReq>*n*</PrefetchReq>
	<SyncWriteIO>*n*</SyncWriteIO>
	<SQLTextLines>
	<SQLTEXT>*sqltext*</SQLTEXT>
	<PrepareInfo>
	<PrepareStatementNumber>*n*</PrepareStatementNumber>
	<PrepareSequenceNumber>*seqno*</PrepareSequenceNumber>
	</PrepareInfo>
	</SQLTextLines>
	</SQLTimeByStatement>
	</SQLTimeByEndUser>

Java/USS/HFS Performance analysis reports

J01 Java Summary/Attributes

Field title in online report	XML element
	<JavaSummary>
JVMId	<JVMId>*n*</JVMId>
Identifier	<Identifier>*n*</Identifier>
Heap	<Heap>*n*M</Heap>
Max	<HeapMax>*n*M</HeapMax>
Description	<Description>*description*</Description>
	</JavaSummary>
	<ObservedJavaPackages>
	<JavaPackages>
PkgId	<PkgId>*n*</PkgId>
Package Name	<PackageName>*name*</PackageName>
	</JavaPackages>
	</ObservedJavaPackages>
	<ObservedJavaClasses>
	<JavaClasses>
ClsId	<ClsId>*n*</ClsId>
PkgId	<PkgId>*n*</PkgId>
Class Name	<ClassName>*name*</ClassName>
	</JavaClasses>
	</ObservedJavaClasses>
	<ObservedJavaMethods>
	<JavaMethods>
MthId	<MthId>*n*</MthId>
ClsId	<ClsId>*n*</ClsId>
Method Name	<MethodName>*name*</MethodName>
	</JavaMethods>
	</ObservedJavaMethods>

J02 Java Heap Usage Timeline

Field title in online report	XML element
	<UsageTimeline>
SEQN	<SequenceNumber>*n*</SequenceNumber>
Storage	<StorageUsed>*n*K</Storage Used>
Total	<StorageTotal>*n*K</StorageTotal>
	</UsageTimeline>

J03 Java CPU Usage by Thread

Field title in online report	XML element
	<JavaCPUbyThread>
JavaId	<JavaId>*n*</JavaId>
Thread Name	<ThreadName>*name*</ThreadName>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</JavaCPUbyThread>

J04 Java CPU Usage by Package

Field title in online report	XML element
	<JavaPackage>
JavaId	<JavaPackageId>*n*</JavaPackageId>
Pkg/Cls/Mthd	<JavaPackageName>*name*</JavaPackageName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<JavaClass>
JavaId	<JavaClassId>*n*</JavaClassId>
Pkg/Cls/Mthd	<JavaClassName>*name*</JavaClassName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<JavaMethod>
JavaId	<JavaMethodId>*n*</JavaMethodId>
Pkg/Cls/Mthd	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<JavaLine>
JavaId	<JavaLineNumberId>*n*</JavaLineNumberId>
Pkg/Cls/Mthd	<JavaLineNumber>*lineno*</JavaLineNumber>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</JavaLine>
	</JavaMethod>
	</JavaClass>
	</JavaPackage>

J05 Java CPU Usage by Class

Field title in online report	XML element
	<JavaClass>
JavaId	<JavaClassId>*n*</JavaClassId>
Class/Method	<JavaClassName>*name*</JavaClassName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<JavaMethod>
JavaId	<JavaMethodId>*n*</JavaMethodId>
Class/Method	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<JavaLine>
JavaId	<JavaLineNumberId>*n*</JavaLineNumberId>
Class/Method	<JavaLineNumber>*lineno*</JavaLineNumber>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</JavaLine>
	</JavaMethod>
	</JavaClass>

J06 Java CPU Usage by Method

Field title in online report	XML element
	<JavaMethod>
MthId	<JavaMethodId>*n*</JavaMethodId>
Method	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<JavaLine>
MthId	<JavaLineNumberId>*n*</JavaLineNumberId>
Method	<JavaLineNumber>*lineno*</JavaLineNumber>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</JavaLine>
	</JavaMethod>

J07 Java CPU Usage by Call Path

Field title in online report	XML element
	<JavaMethod>
MthId	<JavaMethodId>*n*</JavaMethodId>
Method	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</JavaMethod>

J09 Java Service Time by Package

Field title in online report	XML element
	<JavaPackage>
JavaId	<JavaPackageId>*n*</JavaPackageId>
Pkg/Cls/Mthd	<JavaPackageName>*name*</JavaPackageName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaClass>
JavaId	<JavaClassId>*n*</JavaClassId>
Pkg/Cls/Mthd	<JavaClassName>*name*</JavaClassName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaMethod>
JavaId	<JavaMethodId>*n*</JavaMethodId>
Pkg/Cls/Mthd	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaLine>
JavaId	<JavaLineNumberId>*n*</JavaLineNumberId>
Pkg/Cls/Mthd	<JavaLineNumber>*lineno*</JavaLineNumber>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</JavaLine>
	</JavaMethod>
	</JavaClass>
	</JavaPackage>

J10 Java Service Time by Class

Field title in online report	XML element
	<JavaClass>
JavaId	<JavaClassId>*n*</JavaClassId>
Class/Method	<JavaClassName>*name*</JavaClassName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaMethod>
JavaId	<JavaMethodId>*n*</JavaMethodId>
Class/Method	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaLine>
JavaId	<JavaLineNumberId>*n*</JavaLineNumberId>
Class/Method	<JavaLineNumber>*lineno*</JavaLineNumber>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</JavaLine>
	</JavaMethod>
	</JavaClass>

J11 Java Service Time by Method

Field title in online report	XML element
	<JavaMethod>
MthId	<JavaMethodId>*n*</JavaMethodId>
Method	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaLine>
MthId	<JavaLineNumberId>*n*</JavaLineNumberId>
Method	<JavaLineNumber>*lineno*</JavaLineNumber>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</JavaLine>
	</JavaMethod>

J12 Java Service Time by Call Path

Field title in online report	XML element
	<JavaMethod>
MthId	<JavaMethodId>*n*</JavaMethodId>
Method	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</JavaMethod>

J14 Java Wait Time by Package

Field title in online report	XML element
	<JavaPackage>
JavaId	<JavaPackageId>*n*</JavaPackageId>
Pkg/Cls/Mthd	<JavaPackageName>*name*</JavaPackageName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaClass>
JavaId	<JavaClassId>*n*</JavaClassId>
Pkg/Cls/Mthd	<JavaClassName>*name*</JavaClassName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaMethod>
JavaId	<JavaMethodId>*n*</JavaMethodId>
Pkg/Cls/Mthd	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaLine>
JavaId	<JavaLineNumberId>*n*</JavaLineNumberId>
Pkg/Cls/Mthd	<JavaLineNumber>*lineno*</JavaLineNumber>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</JavaLine>
	</JavaMethod>
	</JavaClass>
	</JavaPackage>

J15 Java Wait Time by Class

Field title in online report	XML element
	<JavaClass>
JavaId	<JavaClassId>*n*</JavaClassId>
Class/Method	<JavaClassName>*name*</JavaClassName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaMethod>
JavaId	<JavaMethodId>*n*</JavaMethodId>
Class/Method	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaLine>
JavaId	<JavaLineNumberId>*n*</JavaLineNumberId>
Class/Method	<JavaLineNumber>*lineno*</JavaLineNumber>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</JavaLine>
	</JavaMethod>
	</JavaClass>

J16 Java Wait Time by Method

Field title in online report	XML element
	<JavaMethod>
MthId	<JavaMethodId>*n*</JavaMethodId>
Method	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<JavaLine>
MthId	<JavaLineNumberId>*n*</JavaLineNumberId>
Method	<JavaLineNumber>*lineno*</JavaLineNumber>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</JavaLine>
	</JavaMethod>

J17 Java Wait Time by Call Path

Field title in online report	XML element
	<JavaMethod>
MthId	<JavaMethodId>*n*</JavaMethodId>
Method	<JavaMethodName>*name*</JavaMethodName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</JavaMethod>

H01 HFS Service Time by Path Name

Field title in online report	XML element
	<HFSTimeByPathName>
FileId	<FileId>*n*</FileId>
Path Name	<PathName>*name*</PathName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</HFSTimeByPathName>

H02 HFS Service Time by Device

Field title in online report	XML element
	<HFSTimeByDevice>
DevId	<DeviceId>*n*</DeviceId>
Device#>PathName	<DeviceNumber>*n*</DeviceNumber>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<HFSTimeByPathName>
DevId	<FileId>*n*</FileId>
Device#>PathName	<PathName>*name*</PathName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</HFSTimeByPathName>
	</HFSTimeByDevice>

H03 HFS File Activity

Field title in online report	XML element
	<HFSFileActivity>
FileId	<FileId>*n*</FileId>
PathName	<PathName>*name*</PathName>
File Type	<FileType>*filetype*</FileType>
Reads/Writes	<ReadsWrites>*n*</ReadsWrites>
	</HFSFileActivity>

H04 HFS File Attributes

Field title in online report	XML element
	<HFSFileAttributes>
FileId	<FileId>*n*</FileId>
Path name	<PathName>*name*</PathName>
File type	<FileType>*filetype*</FileType>
Major	<FileTypeMajor>*n*</FileTypeMajor>
Minor	<FileTypeMinor>*n*</FileTypeMinor>
Opened	<OpenTime>*hh:mm:ss.ss*</OpenTime>
Opened	<OpenDate>*Day Mon dd yyyy*</OpenDate>
Device#	<DeviceNumber>*n*</DeviceNumber>
Serial#	<SerialNumber>*n*</SerialNumber>
Open Flags	<OpenFlags>*flags*</OpenFlags>
File type	<ModeFlagsFileType>*type*</ModeFlagsFileType>
Permissions: Owner	<PermissionOwner>*permission*</PermissionOwner>
Permissions: Group	<PermissionGroup>*permission*</PermissionGroup>
Permissions: Other	<PermissionOther>*permission*</PermissionOther>
	<SetIdFlags>*setid*</SetIdFlags>
Read Requests Initial	<ReadRequestsFirst>*n*</ReadRequestsFirst>
Last	<ReadRequestsLast>*n*</ReadRequestsLast>
Delta	<ReadRequestsDelta>*n*</ReadRequestsDelta>
Write Requests Initial	<WriteRequestsFirst>*n*</WriteRequestsFirst>
Last	<WriteRequestsLast>*n*</WriteRequestsLast>
Delta	<WriteRequestsDelta>*n*</WriteRequestsDelta>
DIR I/O Blocks Initial	<DirectoryRequestsFirst>*n*</DirectoryRequestsFirst>
Last	<DirectoryRequestsLast>*n*</DirectoryRequestsLast>
Delta	<DirectoryRequestsDelta>*n*</DirectoryRequestsDelta>
Blocks Read Initial	<BlocksReadFirst>*n*</BlocksReadFirst>
Last	<BlocksReadLast>*n*</BlocksReadLast>
Delta	<BlocksReadDelta>*n*</BlocksReadDelta>

Field title in online report	XML element
Blocks Written Initial	<BlocksWrittenFirst>*n*</BlocksWrittenFirst>
Last	<BlocksWrittenLast>*n*</BlocksWrittenLast>
Delta	<BlocksWrittenDelta>*n*</BlocksWrittenDelta>
Bytes Read Initial	<BytesReadFirst>*n*</BytesReadFirst>
Last	<BytesReadLast>*n*</BytesReadLast>
Delta	<BytesReadDelta>*n*</BytesReadDelta>
Bytes Written Initial	<BytesWrittenFirst>*n*</BytesWrittenFirst>
Last	<BytesWrittenLast>*n*</BytesWrittenLast>
Delta	<BytesWrittenDelta>*n*</BytesWrittenDelta>
	</HFSFileAttributes>

H05 HFS Device Activity

Field title in online report	XML element
	<HFSDeviceActivity>
DevId	<DeviceId>*n*</DeviceId>
Device#	<DeviceNumber>*n*</DeviceNumber>
Mount Point	<MountPoint>*mountpoint*</MountPoint>
Reads/Writes	<ReadsWrites>*n*</ReadsWrites>
	</HFSDeviceActivity>

H06 HFS Device Attributes

Field title in online report	XML element
	<HFSDeviceAttributes>
DevId	<DeviceId>*n*</DeviceId>
Device#	<DeviceNumber>*n*</DeviceNumber>
Dataset name	<DatasetName>*dsn*</DatasetName>
DD name	<DDName>*ddname*</DDName>
Physical file system	<PhysicalFileSystem>*filesystem*</PhysicalFileSystem>
Mount point	<MountPoint>*mountpoint*</MountPoint>
Mounted	<MountTime>*hh:mm:ss.ss*</MountTime>
Mounted	<MountDate>*Day Mon dd yyyy*</MountDate>
Read Requests Initial	<ReadRequestsFirst>*n*</ReadRequestsFirst>
Last	<ReadRequestsLast>*n*</ReadRequestsLast>
Delta	<ReadRequestsDelta>*n*</ReadRequestsDelta>
Write Requests Initial	<WriteRequestsFirst>*n*</WriteRequestsFirst>
Last	<WriteRequestsLast>*n*</WriteRequestsLast>
Delta	<WriteRequestsDelta>*n*</WriteRequestsDelta>

Field title in online report	XML element
DIR I/O Blocks Initial	<DirectoryRequestsFirst>*n*</DirectoryRequestsFirst>
Last	<DirectoryRequestsLast>*n*</DirectoryRequestsLast>
Delta	<DirectoryRequestsDelta>*n*</DirectoryRequestsDelta>
Blocks Read Initial	<BlocksReadFirst>*n*</BlocksReadFirst>
Last	<BlocksReadLast>*n*</BlocksReadLast>
Delta	<BlocksReadDelta>*n*</BlocksReadDelta>
Blocks Written Initial	<BlocksWrittenFirst>*n*</BlocksWrittenFirst>
Last	<BlocksWrittenLast>*n*</BlocksWrittenLast>
Delta	<BlocksWrittenDelta>*n*</BlocksWrittenDelta>
Bytes Read Initial	<BytesReadFirst>*n*</BytesReadFirst>
Last	<BytesReadLast>*n*</BytesReadLast>
Delta	<BytesReadDelta>*n*</BytesReadDelta>
Bytes Written Initial	<BytesWrittenFirst>*n*</BytesWrittenFirst>
Last	<BytesWrittenLast>*n*</BytesWrittenLast>
Delta	<BytesWrittenDelta>*n*</BytesWrittenDelta>
	</HFSDeviceAttributes>

H07 HFS Activity Timeline

Field title in online report	XML element
	<HFSActivityTimeline>
File Information Samples	<Samples>*n*</Samples>
Duration	<Duration>*n*</Duration>
Path Name	<PathName>*name*</PathName>
FileId	<FileId>*n*</FileId>
File Type	<FileType>*filetype*</FileType>
Open for	<OpenFor>*mode*</OpenFor>
	<Intervals>
	<IntervalPct>*n*</IntervalPct> Repeated 50 times
	</Interval>
	</HFSActivityTimeline>

H08 HFS Wait Time by Path Name

Field title in online report	XML element
	<HFSTimeByPathName>
FileId	<FileId>*n*</FileId>
Path Name	<PathName>*name*</PathName>

Field title in online report	XML element
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</HFSTimeByPathName>

H09 HFS Wait Time by Device

Field title in online report	XML element
	<HFSTimeByDevice>
DevId	<DeviceId>*n*</DeviceId>
Device#>PathName	<DeviceNumber>*n*</DeviceNumber>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<HFSTimeByPathName>
DevId	<FileId>*n*</FileId>
Device#>PathName	<PathName>*name*</PathName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</HFSTimeByPathName>
	</HFSTimeByDevice>

H10 HFS Service Time by Request

Field title in online report	XML element
	<HFSTimeByRequest>
ReqId	<RequestId>*n*</RequestId>
Request>PathName	<Request>*request*</Request>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<HFSTimeByPathName>
ReqId	<FileId>*n*</FileId>
Request>PathName	<PathName>*name*</PathName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</HFSTimeByPathName>
	</HFSTimeByRequest>

H11 HFS Wait Time by Request

Field title in online report	XML element
	<HFSTimeByRequest>
ReqId	<RequestId>*n*</RequestId>
Request>PathName	<Request>*request*</Request>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<HFSTimeByPathName>
ReqId	<FileId>*n*</FileId>
Request>PathName	<PathName>*name*</PathName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</HFSTimeByPathName>
	</HFSTimeByRequest>

MQSeries Performance analysis reports

Q01 MQSeries Activity Summary

Field title in online report	XML element
	<MQSeriesObjectsObserved>
Object Sequence Number	<ObjectSequenceNumber>*n*</ObjectSequenceNumber >
Object Manager Name	<QueueManagerName>*name*</QueueManagerName>
Object Name	<ObjectName>*name*</ObjectName>
Object Type	<ObjectType>*type*</ObjectType>
	</MQSeriesObjectsObserved>
	<MQSeriesCallsObserved>
Module	<Module>*name*</Module>
CSECT	<CSECT>*name*</CSECT>
Offset	<Offset>*n*</Offset>
Function	<Function>*function*</Function>
Queue Mgr	<QueueManager>*name*</QueueManager>
Object Name	<ObjectName>*name*</ObjectName>
	</MQSeriesCallsObserved>

Q02 MQSeries CPU Usage by Queue

Field title in online report	XML element
	<MQQueue>
Name	<QueueManager>*name*</QueueManager>
Description	<QueueName>*name*</QueueName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<MQRequest>
Name	<MQRequestFunction>*function*</MQRequestFunction>
Description	<ProgramNameOffset>*name+offset*</ProgramNameOffset>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</MQRequest>
	</MQQueue>

Q03 MQSeries CPU Usage by Request

Field title in online report	XML element
	<MQRequest>
Name	<MQRequestFunction>*function*</MQRequestFunction>
Description	<ProgramNameOffset>*name+offset*</ProgramNameOffset>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<MQQueue>
Name	<QueueManager>*name*</QueueManager>
Description	<QueueName>*name*</QueueName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</MQQueue>
	</MQRequest>

Q04 MQSeries CPU Usage by Txn/Queue

Field title in online report	XML element
	<Transaction>
Name	<TranName>*name*</TranName>
Description	<TranDescription>*description*</TranDescription>

Field title in online report	XML element
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<MQQueue>
Name	<QueueManager>*name*</QueueManager>
Description	<QueueName>*name*</QueueName>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	<MQRequest>
Name	<MQRequestFunction>*function*</MQRequestFunction>
Description	<ProgramNameOffset>*name+offset*</ProgramNameOffset>
	<Measurements>*n*</Measurements>
Percent of CPU Time * 10.00%	<Percent>*n*</Percent>
	</MQRequest>
	</MQQueue>
	</Transaction>

Q05 MQSeries Service Time by Queue

Field title in online report	XML element
	<MQQueue>
Name	<QueueManager>*name*</QueueManager>
Description	<QueueName>*name*</QueueName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<MQRequest>
Name	<MQRequestFunction>*function*</MQRequestFunction>
Description	<ProgramNameOffset>*name+offset*</ProgramNameOffset>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</MQRequest>
	</MQQueue>

Q06 MQSeries Service Time by Request

Field title in online report	XML element
	<MQRequest>

Field title in online report	XML element
Name	<MQRequestFunction>*function*</MQRequestFunction>
Description	<ProgramNameOffset>*name+offset*</ProgramNameOffset>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<MQQueue>
Name	<QueueManager>*name*</QueueManager>
Description	<QueueName>*name*</QueueName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</MQQueue>
	</MQRequest>

Q07 MQSeries Service Time by Txn/Queue

Field title in online report	XML element
	<Transaction>
Name	<TranName>*name*</TranName>
Description	<TranDescription>*description*</TranDescription>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<MQQueue>
Name	<QueueManager>*name*</QueueManager>
Description	<QueueName>*name*</QueueName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<MQRequest>
Name	<MQRequestFunction>*function*</MQRequestFunction>
Description	<ProgramNameOffset>*name+offset*</ProgramNameOffset>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</MQRequest>
	</MQQueue>
	</Transaction>

Q08 MQSeries Wait Time by Queue

Field title in online report	XML element
	<MQQueue>
Name	<QueueManager>*name*</QueueManager>
Description	<QueueName>*name*</QueueName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<MQRequest>
Name	<MQRequestFunction>*function*</MQRequestFunction>
Description	<ProgramNameOffset>*name+offset*</ProgramNameOffset>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</MQRequest>
	</MQQueue>

Q09 MQSeries Wait Time by Request

Field title in online report	XML element
	<MQRequest>
Name	<MQRequestFunction>*function*</MQRequestFunction>
Description	<ProgramNameOffset>*name+offset*</ProgramNameOffset>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<MQQueue>
Name	<QueueManager>*name*</QueueManager>
Description	<QueueName>*name*</QueueName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</MQQueue>
	</MQRequest>

Q10 MQSeries Wait Time by Txn/Queue

Field title in online report	XML element
	<Transaction>
Name	<TranName>*name*</TranName>
Description	<TranDescription>*description*</TranDescription>

Field title in online report	XML element
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<MQQueue>
Name	<QueueManager>*name*</QueueManager>
Description	<QueueName>*name*</QueueName>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	<MQRequest>
Name	<MQRequestFunction>*function*</MQRequestFunction>
Description	<ProgramNameOffset>*name+offset*</ProgramNameOffset>
	<Measurements>*n*</Measurements>
Percent of Time * 10.00%	<Percent>*n*</Percent>
	</MQRequest>
	</MQQueue>
	</Transaction>

Source Program Attribution

P01 Source Program Attribution

Field title in online report	XML element
	<LoadModuleInformation>
Load Module	<LoadModuleName>*name*</LoadModuleName>
LIB	<LoadLibrary>*library*</LoadLibrary>
CSECT	<CSECTName>*name*</CSECTName>
Mapped by	<SourceMappingFile>*file*</SourceMappingFile>
	<SourceLanguage>*language*</SourceLanguage>
Compiler	<Compiler>*compiler*</Compiler>
Compile Time	<CompileTime>*yyyy/mm/dd hh:mm:ss*</CompileTime>
	</LoadModuleInformation>
	<SourceStatement>
LineNo	<LineNumber>*n*</LineNumber>
Offset	<Offset>*n*</Offset>
Prcnt or Count	<Percent>*n*</Percent> or <Count>*n*</Count>
Source Statement	<Statement>*stmt*</Statement>
	<Attribution>
	<Percent>*n*</Percent> or <Count>*n*</Count>

Field title in online report	XML element
	</Attribution>
	</SourceStatement>

Appendix D. Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully. The accessibility features in z/OS provide accessibility for IBM Application Performance Analyzer.

The major accessibility features in z/OS enable users to:

- Use assistive technology products such as screen readers and screen magnifier software
- Operate specific or equivalent features by using only the keyboard
- Customize display attributes such as color, contrast, and font size

Using assistive technologies

Assistive technology products work with the user interfaces that are found in z/OS. For specific guidance information, consult the documentation for the assistive technology product that you use to access z/OS interfaces.

Keyboard navigation of the user interface

Users can access z/OS user interfaces by using TSO/E or ISPF. Refer to the following publications:

- *z/OS TSO/E Primer*
- *z/OS TSO/E User's Guide*
- *z/OS ISPF User's Guide Volume 1*

These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

Accessibility of this document

The XHTML format of this document that will be provided in the IBM Problem Determination Tools information center at http://publib.boulder.ibm.com/infocenter/pdthelp/index.jsp is accessible to visually impaired individuals who use a screen reader.

To enable your screen reader to accurately read syntax diagrams, source code examples, and text that contains the period or comma picture symbols, you must set the screen reader to speak all punctuation.

When you use JAWS for Windows, the links to accessible syntax diagrams might not work. Use IBM Home Page Reader to read the accessible syntax diagrams.

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Glossary

A

abend. Abnormal end of a task. The termination of a task before its completion because of an error condition that cannot be resolved by recovery facilities while the task is executing.

access plan. The set of access paths that are selected by the optimizer to evaluate a particular SQL statement.

APF. Authorized program facility. A facility that permits the identification of programs that are authorized to use restricted functions.

authorized program. A system program or user program that is allowed to use restricted functions.

B

batch. A processing mode in which a predefined series of actions are performed with little or no interaction between the user and the system.

bind. To convert the output from the SQL compiler to a usable control structure.

C

checkpoint. A place in a program at which a check is made, or at which data is recorded, to provide real-time monitoring.

checkpoint data set. A data set that contains checkpoint records.

connection authorization exit. An exit that approves or disapproves requests for a connection to another program.

D

data set. The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access.

dynamic. Pertaining to events that occur at run time or during processing.

E

explain. To capture detailed information about the access plan that was chosen by the SQL compiler to resolve an SQL statement.

G

GUI. A graphical user inteface.

I

ISPF. Interactive system productivity facility. An IBM licensed program that serves as a full-screen editor and dialog manager.

J

JCL. Job control language. A control language that is used to identify a job to an operating system and to describe the job's requirements.

M

monitor. To collect data about an application from the running agents that are associated with the application.

P

panel. An area of the screen that displays formatted information and that can include entry fields.

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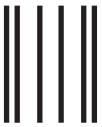

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