IBM

z/OS® V1R10

GRS IPCS enhancements

*e*business on demand software

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Session objectives

- The purpose of line item

- How to install line item

- How to invoke line item

- How to find information in the publications

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Overview

- Problem statement / need addressed:
  - ▶ More ENQs are outstanding as systems/sysplexes get larger
  - ▶ GRS's IPCS report processing can take a long time
    - Hours in some cases.
    - Impacts problem determination time
    - The reports are used by almost all
  - ▶ Some critical debugging information was not presented

- Solution:
  - ▶ Provide report filtering to focus in on the information required
  - ▶ Provide more critical ENQ related information
  - ▶ Restructure for performance
  - ▶ Rolled down to z/OS V1R9 via APAR OA22997

- Benefit: Faster problem determination and reduced stress levels

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GRS IPCS reports needed to be faster and provide more diagnostic data.

GRS IPCS report improvements

- Performance improvements
  - Code restructured to increase performance
  - Filtering options reduce the amount of data processed/presented

- New GRS panel
  - Filter options and summary/detailed report types
    - Better performance
    - Noise reduction

- QCBTRACE/GRSTRACE ENQ attributes improvements
  - Event TODs show ENQ history (request, contention, ownership)
  - Altered by RNLs, exits, third party managed, and so on
  - Directed ENQ details.. Requesting TCB/Target TCB

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GRS has 2 major reporting interfaces. Note that GRSTRACE is the same as QCBTRACE.

GRSDATA – provides complex wide ENQ information that is gathered by a systems wide GQSCAN at dump or execution time (if live system data).

QCBTRACE – provides ENQ information based on internal GRS control blocks that are contained in the GRS address space of system that the dump was taken on. In STAR mode, QCBTRACE does not provide any information about other systems in the sysplex. However, it can provide more detailed ENQ information for ENQs that are obtained on the local system. It knows very little or nothing about A) the dumped system's ENQs that are related to waiters or blockers on other systems B) It nothing about holders on other systems. However, as QCBTRACE can use GRS internal control blocks, it can provide more information about the ENQs that originated on the dumping system.

IPCS Component/GRSDATA panel

```
----------------- IPCS MVS ANALYSIS OF DUMP CONTENTS -----------------
To display information, specify the corresponding option number.

     1  SYMPTOMS    - Symptoms                        *******************
     2  STATUS      - System environment summary      * USERID  - NICK
     3  WORKSHEET   - System environment worksheet    * DATE    - 07/09/18
     4  SUMMARY     - Address spaces and tasks        * JULIAN  - 07.261
     5  CONTENTION  - Resource contention             * TIME    - 11:13
     6  COMPONENT   - MVS component data              * PREFIX  - NICK
     7  TRACES      - Trace formatting                * TERMINAL- 3278A
                                                      * PF KEYS - 24
```

```
----------------- IPCS MVS DUMP COMPONENT DATA ANALYSIS --------------
To display information, specify "S option name" or enter S to the left
of the option desired.  Enter ? to the left of an option to display
help regarding the component support.

S Name      Abstract
_ ALCWAIT    Allocation wait summary
_ AOMDATA    AOM analysis
_ APPCDATA   APPC/MVS Data Analysis
_ ASCHDATA   APPC/MVS Scheduler Data Analysis
_ ASMCHECK   Auxiliary storage paging activity
_ ASMDATA    ASM control block analysis
_ AVMDATA    AVM control block analysis
_ COMCHECK   Operator communications data
_ COUPLE     XCF Coupling analysis
_ CSFDATA    ICSF control block analysis
_ CTRACE     Component trace summary
_ DAEDATA    DAE header data
_ DB2DATA    DB2 analysis
_ DIVDATA    Data in virtual storage
_ DLFDATA    Data Lookaside Facility data
_ DLFTRACE   Data Lookaside Facility trace
S GRSDATA    GRS managed resources
_ IMSDUMP    IMS analysis
_ IOSCHECK   Active input/output requests
```

You get to the GRSDATA panel by way of

• 2-Analysis   - not shown on this chart

• 6-Component – first screen capture on this chart

• Then select GRSDATA – second screen capture on this chart

New keywords can also be used using keywords directly specified on the IP GRSDATA or IP VERBX GRSTRACE command.

• Note that 5-contention from the main panel results in a GRS report that is similar to the GRSDATA Summary report when the contention filter is applied (ENQs in contention). However, it has no filter capability. GRSTRACE can provide a lot more detail for ENQs from the locally dumped system.

IPCS Component/GRSDATA panel

```
---------------------- IPCS - GRSDATA SUBCOMMAND -------------- Enter option
SELECT OPTION ===>
 Select a report type. The default is the GRSDATA report type.
   * GRSDATA        _ GRSTRACE
 Select a level of detail. The default is SUMMARY reporting.
   * SUMMARY        _ DETAIL (GRSTRACE only)
 Select the time format to use for the GRSTRACE report. The default is LOCAL.
   _ LOCAL          _ GMT          _ UTC
 Select zero or more filtering options. The default is NO filtering.
 Filters that do not apply to a given report will be ignored.
   SYSNAME  SY1_____   JOBNAME  _____   ASID x'____'  TCB x'_____'
   QNAME    MYQNAME_
   RNAME    _____
   SCOPE:   _ STEP    _ SYSTEM    _ SYSTEMS
   _ CONTENTION      _ RESERVE
   START TIME MM/DD/YY,HH:MM:SS.DDDDDD  STOP TIME MM/DD/YY,HH:MM:SS.DDDDDD

 GRSDATA SUMMARY SYSNAME('SY1') QNAME('MYQNAME')

 S = START  selected report.
 R = Reset all panel variables.
 END = Exit GRSDATA panel.
```

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This is the new GRSDATA IPCS panel that is presented. Directly invoking the GRSDATA or VERBX GRSTRACE commands will not present this panel.

GRSDATA Panel Filter Explanations:

At least one requestor in a resource chain must match all of the filtering options in order for a resource to be returned.

•SYSNAME : Name of the system requesting the resource.

•JOBNAME : Name of the job requesting the resource.

•ASID   : Address space number (in hex) requesting the resource.

•TCB   : TCB address of the requesting task.

•QNAME   : QNAME (Major Name) of the resource.

•RNAME   : RNAME (Minor Name) of the resource.

•SCOPE   : Select any combination (no selection means any scope).

•CONTENTION   : Select this to only show resources in contention. This is filter is for ENQ contention only. Device contention will not be taken into consideration.

•RESERVE   : Select this to only show resources with non-converted RESERVE requests.

START TIME   : Select a start time. Only resources with requests that occurred at or after this time will be shown.

STOP TIME   : Select a stop time. Only resources with requests that occurred at or before this time will be shown.

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The time filters above are expected to be in the time format LOCAL, GMT, or UTC)

IPCS Component/GRSDATA panel - GRSTRACE

```
SELECT OPTION ===>
 Select a report type. The default is the GRSDATA report type.
   _ GRSDATA          * GRSTRACE
 Select a level of detail. The default is SUMMARY reporting.
   _ SUMMARY          _ DETAIL (GRSTRACE only)
 Select the time format to use for the GRSTRACE report. The default is LOCAL.
   _ LOCAL            * GMT           _ UTC
 Select zero or more filtering options. The default is NO filtering.
 Filters that do not apply to a given report will be ignored.
   SYSNAME _____   JOBNAME _____   ASID x'____'  TCB x'_____'
   QNAME    SYSDSN__
   RNAME    MYDATASETNAME_____
   SCOPE:   _ STEP    _ SYSTEM   * SYSTEMS
   _ CONTENTION       _ RESERVE
   START TIME MM/DD/YY,HH:MM:SS.DDDDDD  STOP TIME MM/DD/YY,HH:MM:SS.DDDDDD

 VERBX GRSTRACE ' QNAME(''SYSDSN'') RNAME(''MYDATASETNAME'') SYSTEMS TIME(GMT)
'
   S = START  selected report.
   R = Reset all panel variables.
   END = Exit GRSDATA panel.
```

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After the report type and any filters are indicated, you enter an S on the selection option line to run the report.

Note that as items are selected, the IP command that would be issued by hand is displayed in white. In this example the IP VERBX GRSTRACE command with associated keywords that could also be used from the command line. The filters are also re-iterated in the report header to insure that the report read understands what the selection criteria was.

IPCS GRSTRACE summary output

MAJOR NAME: xmajorname

MINOR NAME: xminorname
 SCOPE: xscope   **SYSNAME:** xsysname **STATUS:** xstatus
 ASID: xasid   **TCB:** xtcb   **JOBNAME:** xjobname
 MASID: xmasid   **MTCB:** xmtcb
 Reserve Device: xdevice **Volser:** xvolser
 Critical ENQ Time(s):
  Request: xdate xtime
  Contention: xdate xtime
  Grant: xdate xtime
  Delta Time Waiting: xdeltatime
  Movewaiter: xdate xtime

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The times related to the ENQ request are displayed: Request, Contention (if there was contention), Grant time, and Movewaiter time (if moved by ISGADMIN service). The Delta Time Waiting is only displayed if the ENQ request originally resulted in contention and then subsequently granted access after contention resolution.

For the summary report, internal control blocks address are not displayed as they clutter up the screen. They are available in the detailed report for IBM support personnel.

Remember that GRSTRACE only processes from the dumping system's perspective. As such, there are cases where information for remote systems is not available.

IPCS GRSTRACE summary example

Example of IP VERBX GRSTRACE 'QNAME(''TES?ENQ'') SUMMARY'

```
MAJOR NAME: TESTENQ

*  MINOR NAME: DUMMYENQ
     SCOPE: SYSTEMS  SYSNAME: S1      STATUS: *SHARED*   /OWN
       ASID: 0000002C  TCB: 006FF020   JOBNAME: GRSTOOL
       Critical ENQ Time(s):
         Request:     06/04/2007 15:30:05.804018
         Grant:       06/04/2007 15:30:05.834250
     SCOPE: SYSTEMS  SYSNAME: S1      STATUS: *SHARED*   /OWN
       ASID: 00000028  TCB: 006FF020   JOBNAME: GRSTOOL
       Critical ENQ Time(s):
         Request:     06/04/2007 15:32:18.460284
         Contention:  06/04/2007 15:32:18.484524
         Grant:       06/04/2007 15:32:34.846436
         Delta Time Waiting: 00:00:16.361911
     SCOPE: SYSTEMS  SYSNAME: S2      STATUS: *EXCLUSIVE* /WAIT
       ASID: 0000002F  TCB: 006FF020   JOBNAME: GRSTOOL
       Critical ENQ Time(s):
         Request:     06/04/2007 15:33:18.738913
       Some ENQ information is unavailable for this remote request        [
```

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Note that the dump was taken on S1, so information about S2's ENQ request is limited. In this example, the contention time is not available.

IPCS GRSTRACE detail output

```
MAJOR NAME: xmajorname
    MINOR NAME: xminorname
        Resource Creation Time: xdate xtime
        Last Movewaiter Time:  xdate xtime
      SCOPE: xscope    SYSNAME: xsysname  STATUS: xstatus
       ASID: xasid    TCB: xtcb     JOBNAME: xjobname
      MASID: xmasid   MTCB: xmtcb
      Reserve Device: xdevice Volser: xvolser
      Critical ENQ Time(s):
        Request:   xdate xtime
        Contention:  xdate xtime
        Grant:      xdate xtime
        Delta Time Waiting: xdeltatime
        Movewaiter: xdate xtime
      Caller PSW: xpsw          Caller TCB: xcallertcb
      Request Type: xrequesttype
      RNL Processing Actions: xrnlactions
      Affected by ISGNQXIT/FAST
      Affected by ISGNQXITBATCH/CND
      Managed by an Alternate Serialization Product
      ISGENQ Userdata:
        xuserdata
      QEL: xqeladdr         QXB: xqxbaddr
      QCB: xqcbaddr          SVRB: xsvrbaddr
```

Additional detail information is in green

▪xrnlactions can be INCL EXCL or CON

•**New fields presented**

•⬚   **Userdata from an ISGENQ REQUEST=OBTAIN.**

•⬚   **The ENQ caller's PSW and the requesting TCB if different from the ENQ owning TCB (that is, directed ENQ)**

•⬚   **RNL processing actions (when applicable)**

•⬚   **Affected by GRS installation exits indicator**

•⬚   **Alternate serialization management indicator**

•**Note that these additional items are only presented where applicable and available in the dump.**

IPCS GRSTRACE detail example

Example of IP VERBX GRSTRACE 'RNAME(USERDATA*) DETAIL'

```
MAJOR NAME: SYSZFCT0

  MINOR NAME: USERDATA#TEST
    Resource Creation Time: 05/21/2007 13:17:39.698278
   SCOPE: SYSTEM    SYSNAME: S1       STATUS: *EXCLUSIVE* /OWN
    ASID: 0000001F   TCB: 006FF020    JOBNAME: USERDT01
    Critical ENQ Time(s):
     Request:    05/21/2007 13:17:39.698259
       Grant:    05/21/2007 13:17:39.698279
    Caller PSW: 070C5001_872E0788
    Request Type: LINKAGE=ISGENQ
    ISGENQ Userdata:
      E3C8C9E240C9E240C140E3C5E2E34040 *THIS IS A TEST  *
      40404040404040404040404040404040 *              *
    QEL: 00000001_000E3B80     QXB: 00000001_00117310
    QCB: 00000001_00008E08     RB: 006E6F98
```

Note the wildcard in the rname pattern search.

Interactions and dependencies

- Hardware dependencies
  - ▶ None

- Software dependencies
  - ▶ None

- Exploiters
  - ▶ All debuggers and analysts

Migration and coexistence considerations

- The SPE roll back (APAR OA22997) will work with dumps taken before and after it was applied. It also changes mainline ENQ routines to gather some additional diagnostic data that is reported on. However, if the dump was taken before the APAR is applied, SPE roll back indicates that the data is not available.

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Installation

- No changes

Session summary

- GRS IPCS reports are better
  - ▶ Better data
  - ▶ Faster reporting
  - ▶ Faster at finding what you need

- The function has also been rolled back to V1R9 in APAR OA22997

Appendix

- Publications
  - ▸ GA22-7588 MVS Diagnosis Reference
  - ▸ SA22-7594 z/OS: MVS Interactive Problem Control System (IPCS) Commands
  - ▸ SA22-7596 z/OS: MVS Interactive Problem Control System (IPCS) User's Guide

Diagnosis reference has examples of the report output.

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GRS IPCS enhancements

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