DB2 Performance – Making the end run successful

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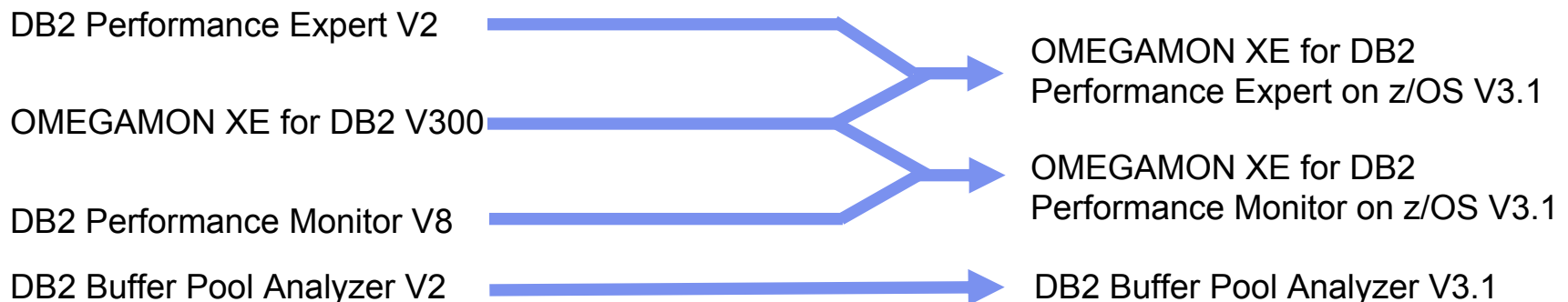**DB2** Information Management Software

Convergence activities

- **Merge the best of both the DB2 PM/PE and OMEGAMON XE DB2 product offerings into a new offering**
  - ▶ Simply speaking, we've combined the DB2 PM/PE reporting and performance warehouse functions with the real-time monitoring strength and integrated OMEGAMON end user capabilities (XE and Classic VTAM)
- **Merge functions of both data collectors into one**
  - ▶ Reduce footprint and system resources
- **Provide new unique functions to both former customer sets**
- **The "Performance Expert" is a combination of the Performance Monitor and the DB2 Buffer Pool Analyzer, plus additional "expert" functions, i.e. ROT (Rules of Thumb) and expert SQL queries.**

DB2 Performance Expert V2

OMEGAMON XE for DB2 V300 ──────→ OMEGAMON XE for DB2 Performance Expert on z/OS V3.1

DB2 Performance Monitor V8 ──────→ OMEGAMON XE for DB2 Performance Monitor on z/OS V3.1

DB2 Buffer Pool Analyzer V2 ──────→ DB2 Buffer Pool Analyzer V3.1

Why and How to converge both products?

- Analysis of product portfolio, strategy, and market penetration
- Joint detailed analysis - function by function
- Experiences from both sides about strong and weak functions
- Experience from internal and external users
- Interview with customers (CAC, Questionnaire)
- Known customer requirements
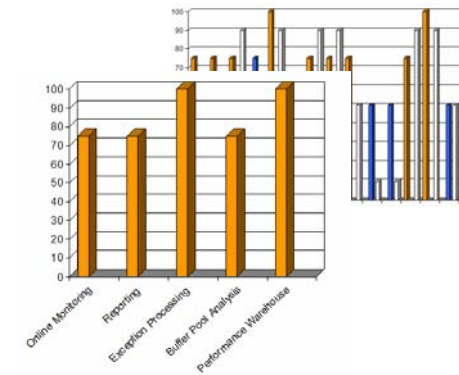
Objectives:

- IBM to provide a cross zSeries and integrated monitoring solution
- Satisfy current customer requirements for both product lines
- Combine the best-of-breed functions from both products
- Enrich the customer satisfaction having one or both product offerings

… with V3.1.0 comes …

- **Simplification and technical integration**
  - ▶ One server address space

  - ▶ Usage of DB2 PE server functions as well as certain OMEGAMON functions

- **User requirements, functions**
  - ▶ Integrated monitoring of CICS, IMS, MVS and DB2

  - ▶ VTAM and Web client end user interface

  - ▶ Near-term History and Object analysis

  - ▶ DB2 Connect Monitoring

  - ▶ Expert analysis functions and Buffer Pool analysis with recommendation
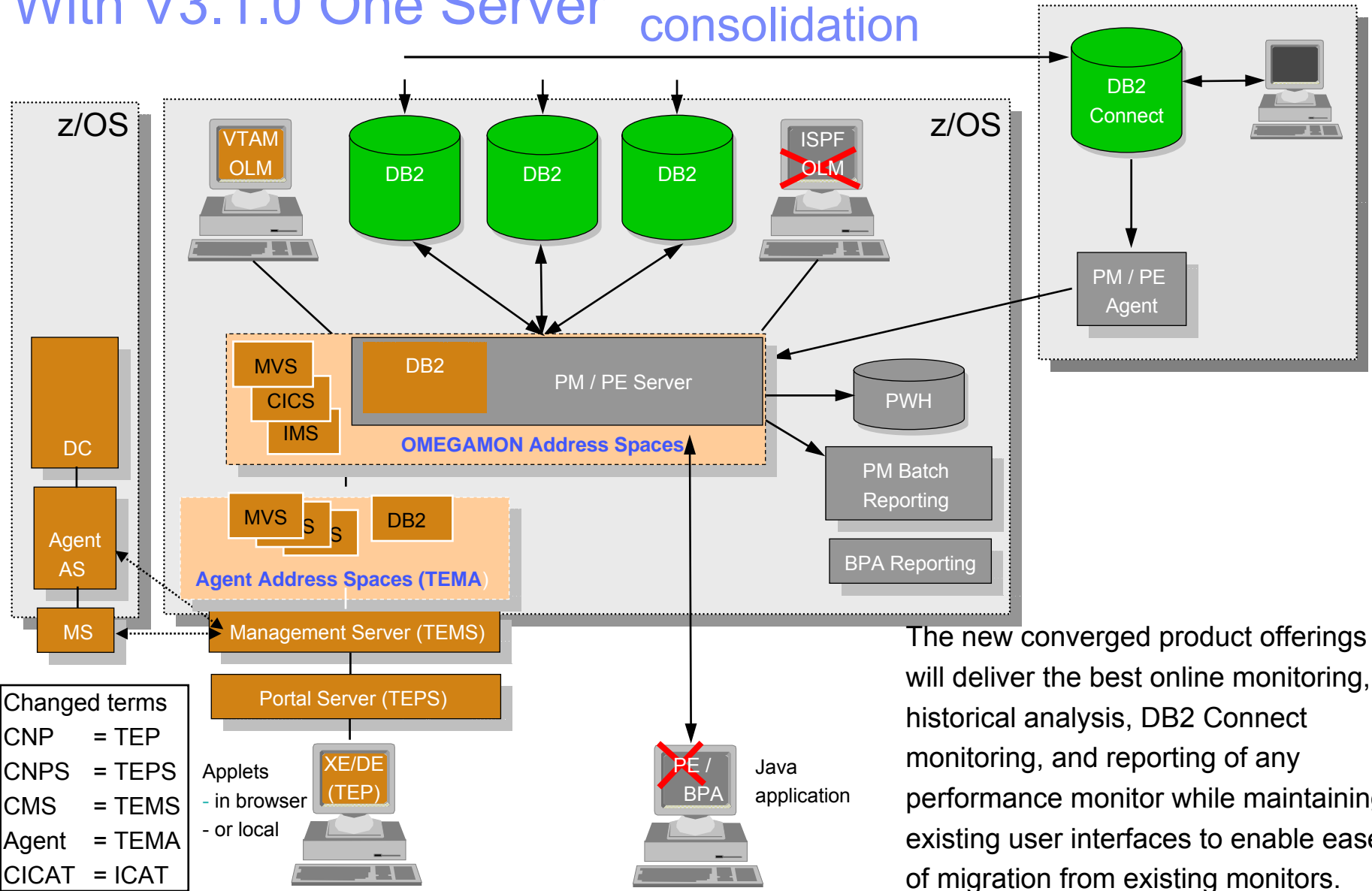
Today's IT monitoring landscape
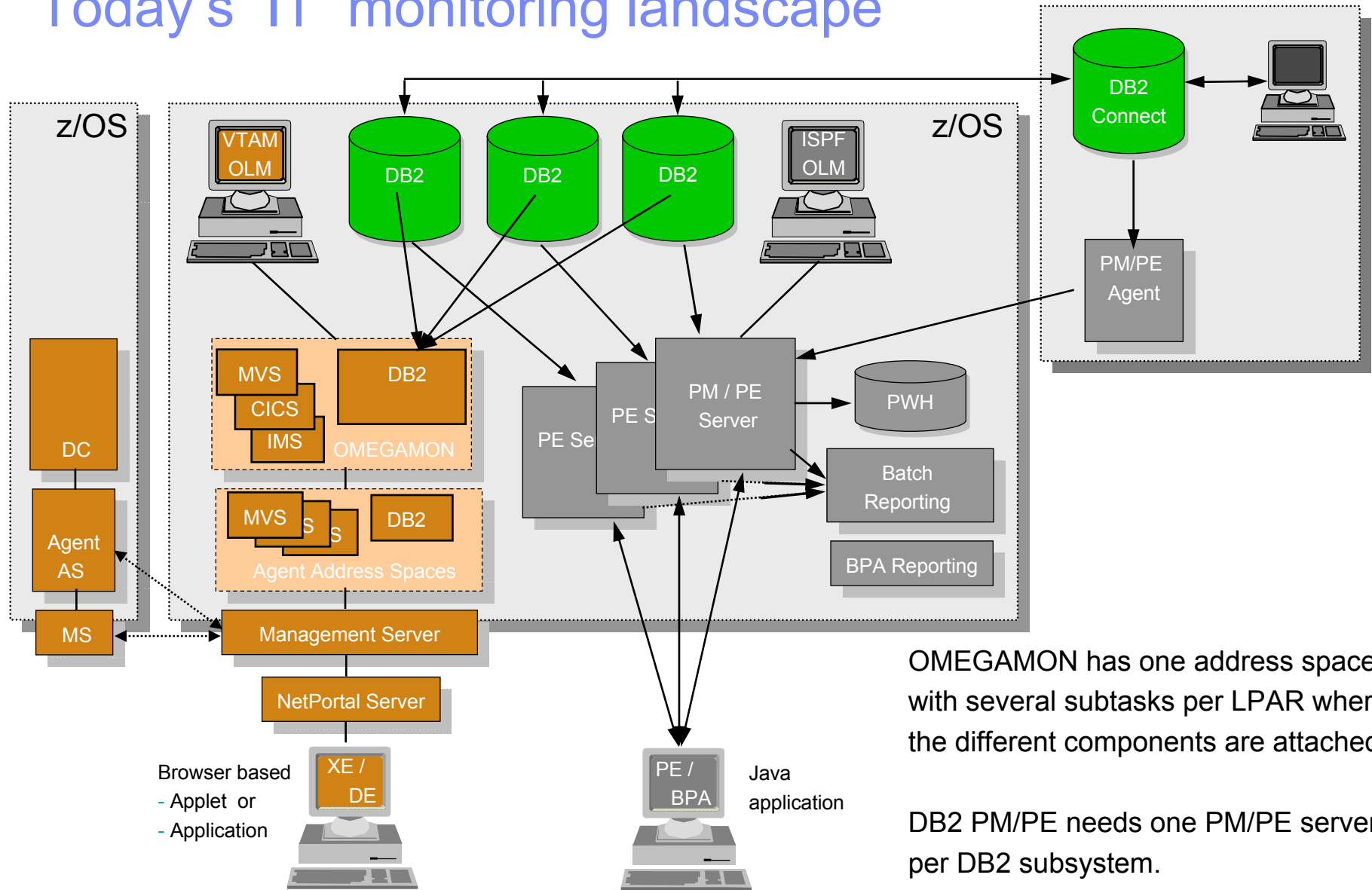
OMEGAMON has one address space with several subtasks per LPAR where the different components are attached.

DB2 PM/PE needs one PM/PE server per DB2 subsystem.

With V3.1.0 One Server and later UI consolidation

z/OS

z/OS

VTAM OLM

DB2

DB2

DB2

ISPF OLM

DB2 Connect

OMEGAMON Address Spaces

MVS
CICS
IMS

DB2

PM / PE Server

PWH

PM / PE Agent

PM Batch Reporting

DC

BPA Reporting

Agent AS

Agent Address Spaces (TEMA)

MVS
S S
DB2

MS

Management Server (TEMS)

Portal Server (TEPS)

Changed terms

CNP	=	TEP
CNPS	=	TEPS
CMS	=	TEMS
Agent	=	TEMA
CICAT	=	ICAT

XE/DE (TEP)

Applets
- in browser
- or local

PE / BPA

Java application

The new converged product offerings will deliver the best online monitoring, historical analysis, DB2 Connect monitoring, and reporting of any performance monitor while maintaining existing user interfaces to enable ease of migration from existing monitors.

Summary of functions – OMEGAMON XE for DB2 Performance Monitor/Expert for z/OS

- Real-time monitoring
  - ▶ Threads and Statistics monitoring
  - ▶ DB2 Connect monitoring
  - ▶ Object Analysis
  - ▶ Data Sharing/Sysplex data (DB2Plex data)
- Near-term history
- Trace collection **(also as part of the PWH process support)**
- Reporting
  - ▶ Accounting, Statistics, SQL Activities, Locking, I/O Activity, Audit, Utilities, Record Trace
  - ▶ Executable as separate jobs or via PWH process engine
- Performance Warehouse with expert analysis support
- Buffer Pool Analysis, expert advice, and simulation **(only with the OMEGAMON XE for DB2 Performance Expert)**

Product Enhancements

- **What OMEGAMON customers get with the converged product**
  - ▶ Usage of DB2 IFI API
    - Provide more consistency and better quality of data (less dependence on control block changes)
  - ▶ World Class Batch Reporting – In-depth problem analysis
    - With the recent extensions of
      - − Package Level Accounting
      - − Locking suspension – new output format for direct spreadsheet usage
      - − Extended SQL Activity report with input host variables
      - − Additional predefined report layouts
  - ▶ Performance Warehouse
    - Expert analysis (ROT and SQL Performance queries)
  - ▶ DB2 Connect Monitoring
  - ▶ Snapshot history for online adhoc problem analysis
  - ▶ Notification of exceptional events – deadlocks, timeouts, coupling facility rebuild, data set overflow

Product Enhancements

- **What DB2 PE/PM customers get with the converged product**
  - ▸ Integrated cross z-Series monitoring (enterprise wide)
  - ▸ Near term history
  - ▸ Object Analysis
  - ▸ WLM enclave information for stored procedures
  - ▸ Smaller footprint (fewer address spaces)
  - ▸ VTAM and Web Client
  - ▸ Monitor DB2 messages and master console
  - ▸ EDM pool (DBD,SK, CT etc section) content display
  - ▸ 18 Customer requirements (See Product Functionality page)

Product Enhancements

- **What NEW customers of OMEGAMON XE for DB2 PM/PE will get**

  ▸ A new converged product which will leverage OMEGAMON's legendary real-time monitoring and enterprise-wide systems management capability and DB2 Performance Monitor's legendary reporting capability

  ▸ A competitive alternative for a fully integrated monitoring solution

  ▸ A product tightly integrated into the IBM Tivoli OMEGAMON Suite of products

Product Functionality

- All SPE and New Functions PTFs of the former OMEGAMON and DB2 PM/PE releases are also included
  - ▶ New and extended workspaces at XE of information available on Classic
    - Thread monitoring
    - Distributed Data Facility (DDF)
    - Enclave
  - ▶ The CICS Transplex capability in OMEGAMON XE for DB2 enhancement provides a correlation ID that can be used to correlate a DB2 thread with a CICS transaction and back.
    - Correlation with CICS requires OMEGAMON DE and the current release of OMEGAMON XE for CICS
  - ▶ Extended DBM1 virtual storage consumption reporting in OLM and reports
  - ▶ Handling of DB2 V8 threads

Upgrade to the converged product offerings …

Customer has installed	New product offering DB2 PM & OMEGAMON for DB2	New product offering DB2 PE & OMEGAMON for DB2
OMEGAMON XE for DB2 V300	priced upgrade	priced upgrade
DB2 Performance Monitor for z/OS V8	priced upgrade	priced upgrade
DB2 Performance Expert for z/OS V2	-	priced upgrade
DB2 Buffer Pool Analyzer for z/OS V2	priced upgrade	priced upgrade
OM XE V300 & DB2 PM V8	No-charge upgrade	priced upgrade
OM XE V300 & DB2 PE V2	-	No-charge upgrade
OM XE V300 & DB2 BPA V2	priced upgrade	priced upgrade

Contact your IBM representative for more information.

OMEGAMON And Tivoli Enterprise Portal
An Integrated Solution

Tivoli Enterprise Portal & OMEGAMON DE – Dashboard Edition

High level monitoring
Visualization And Analysis
Multi-system view
Cross Platform View

OMEGAMON
XE For DB2
PM/PE V3.1.0

3270 Interface

OMEGAMON XE

Subsystem details
3270 Interface
Historical details

Subsystem level monitoring
Browser And GUI interface
Proactive Alerting & Automation

OMEGAMON Example Scenarios

Tivoli Enterprise Portal & OMEGAMON DE – Dashboard Edition

Thread Management

High level monitoring
Visualization And Analysis
Multi-system view
Cross Platform View

DB2 Connect Monitoring

OMEGAMON
XE For DB2
PM/PE V3.1.0

3270 Interface

OMEGAMON XE

Subsystem details
3270 Interface
Historical details

I/O Analysis

Automated Actions

Subsystem level monitoring
Browser And GUI interface
Proactive Alerting & Automation

Using OMEGAMON XE For DB2 PM/PE Example Solution Scenario

- ## DB2 Thread Management

  - ▶ DB2 performance analyst is responsible for identifying and managing problem applications on multiple DB2 subsystems

  - ▶ The DB2 performance analyst would like to have a customized view of DB2 thread activity with the ability to filter and highlight problems

  - ▶ If a problem is identified the DB2 performance analyst would like to be able to issue manual actions to address the issue

Use The OMEGAMON XE Portal
Tivoli Enterprise Portal (TEP) Provides Powerful Capabilities

The Enterprise view is one of the default views

The portal enables the ability to manage multiple subsystems from a single screen. Systems are selectable from the navigation tree.

Portal Workspace Customization

- OMEGAMON XE For DB2 PM/PE provides the ability to build customized real time displays (workspaces)

- Any of the product provided workspaces may be adjusted to meet user needs

- The user may make new workspaces as needed to target specific monitoring needs

  ▶ Create workspaces to target specific technical problems

- These new workspaces are stored in the Tivoli Enterprise Portal (TEP) server

  ▶ New workspaces may be used by any user with appropriate authority and access to the TEP

Building A Custom Thread Management View

Select A DB2 subsystem and select one of the thread views (in this example Detailed Thread Exceptions).

Thread View Customization
Control The Content And Layout Of The Workspace

Right click and select 'properties' to begin the customization process.

Add Filters To The View To Control Content

Select the Filters Tab.

Select which columns are to appear in the workspace.

Click in the column area under Plan Name. Click on the v symbol to select a string scan function.

And/Or logic may be used to monitor just for JDBC & Distserv threads

Highlight Potential Problems

Specify if certain columns may be highlighted as warning or critical.
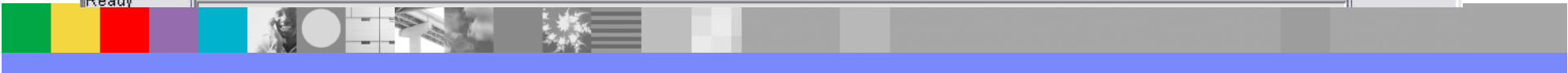
Thread Exceptions View Is Now Filtered And Highlighted

Filtered display showing just JDBC & Distserv.

Highlight problem threads.

To Issue A Command

Right click and select take action to issue a command.

Select A Command

Select a command from the drop down menu.

OMEGAMON XE For DB2 PM/PE Workspace Customization

- The workspace customization techniques demonstrated here may be used for any of the various OMEGAMON XE workspaces

  ▶ Customized views if saved are stored in the portal server

- The approach may be used for single DB2 subsystem views and to create multiple subsystem views of DB2 activity

- If OMEGAMON DE (Dashboard Edition) is available, information from other OMEGAMON monitors (example CICS, IMS, z/OS) may be added to custom displays

Using OMEGAMON XE For DB2 PM/PE Automation Scenario

- **Automated DB2 Thread Management**

  - ▶ DB2 performance analyst is responsible for identifying and managing problem applications on multiple DB2 subsystems

  - ▶ The DB2 performance analyst would like to have a OMEGAMON automatically identify problem application threads

  - ▶ If a problem is found OMEGAMON is to issue a command automatically to address the issue

Automation Example
Automated Kill Of A Runaway Thread Scenario

Specify multiple attributes with And/Or logic

Create an alert tracking for problem DB2 threads. Click add attributes to add more logic to the check.

Specify sampling interval

Automated Correction Example
Specifying The Cancel Command

Action tab allows specification of the DB2 Cancel command with the correct token already specified.

Seeing The Command In Action
Monitoring The Problem Thread

File   Edit   View   Help

Physical

- Enterprise
  - OS/400 Systems
  - Windows Systems
    - TIVOM01
      - Universal Agent
      - Universal Database - DB2:TIVOM01:UD
      - Universal Data Provider
      - Windows NT
  - OS/390 Systems
    - SYS1
      - CICS
      - DB2
        - DSN1:SYS1:DB2
          - System Status
          - Detailed Thread Exception

Physical

A filtered view, similar to what was created in the earlier scenario may be used to see problem threads real time.

AuthID   P 22 (P390A)

Count: 0   2000   4000   6000   8000   10000   12000

Detailed Thread Exceptions

Package Name	Authorization Identifier	DB2ID	CPU Utilization	Elapsed Time	Getpage Count	Thread Status
DSNESM68	P390A	DSN1	7.2	00:00:22	10577	IN_DB2

DB2 System: DSN1,   MVS System: SYS1

Ready | Hub Time: Mon. 04/04/2005 02:59 PM | Server Available. | Detailed Thread Exception - 9.73.235.210 - SYSADMIN *ADMIN MODE*

Automated Corrections Example
The Cancel Command Is Issued

```
  Display  Filter  View  Print  Options  Help
 -------------------------------------------------------------------
 SDSF SYSLOG    12.101 SYS1 SYS1 04/04/2005 2W    32267      COLUMNS  38 117
 COMMAND INPUT ===> _                                      SCROLL ===> CSR
 STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG  EXCEED MAXIMUM USE COUNT
 STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG  EXCEED MAXIMUM USE COUNT
 STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG  EXCEED MAXIMUM USE COUNT
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 STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG  EXCEED MAXIMUM USE COUNT
 STC00625 00000090  CSV002I REQUESTS FOR MODULE KPDCSVG  EXCEED MAXIMUM USE COUNT
 STC00625 00000290  -  CANCEL THREAD(556)
 STC00023 00000090  DSNV426I  - DSNVCT THREAD '556' HAS BEEN CANCELED
 STC00023 00000090  DSN3201I  - ABNORMAL EOT IN PROGRESS FOR USER=P390A 855
      855 00000090  CONNECTION-ID=TSO CORRELATION-ID=P390A JOBNAME=P390A ASID=004
      855 00000090  TCB=008E1798
 5 DFS996I *IMS READY*   IVP1
 3 ISTEXC200 - DYN COMMANDS MAY BE ENTERED
 ****************************** BOTTOM OF DATA ****************************************
```

About OMEGAMON Automation

- OMEGAMON XE For DB2 PM/PE V3.1.0 provides powerful GUI based monitoring, alerting, and automation capabilities

- Any monitored attribute may be used in an alert

- Any alert may be used to drive automation

- Two main types of automation
  - ▶ Situations – 'reflex' automation
  - ▶ Policies – more sophisticated automation scenarios, multiple commands and components

- Automation integrated directly into the OMEGAMON user interface
  - ▶ No REXX or other procedural code required

Using OMEGAMON XE For DB2 PM/PE Connect Monitoring Scenario

- ### Integrated DB2 Connect Monitoring

  ▶ DB2 performance analyst is responsible for identifying and managing problem applications from a variety of sources, including DB2 Connect

  ▶ The DB2 performance analyst would like to have a real time view of Connect activity integrated within the OMEGAMON XE portal

  ▶ Have OMEGAMON highlight problem DB2 Connect applications

OMEGAMON XE For DB2 PM/PE V3.1.0
DB2 Connect Gateway Status

DB2 Connect server status and performance overview is accessible from the portal.
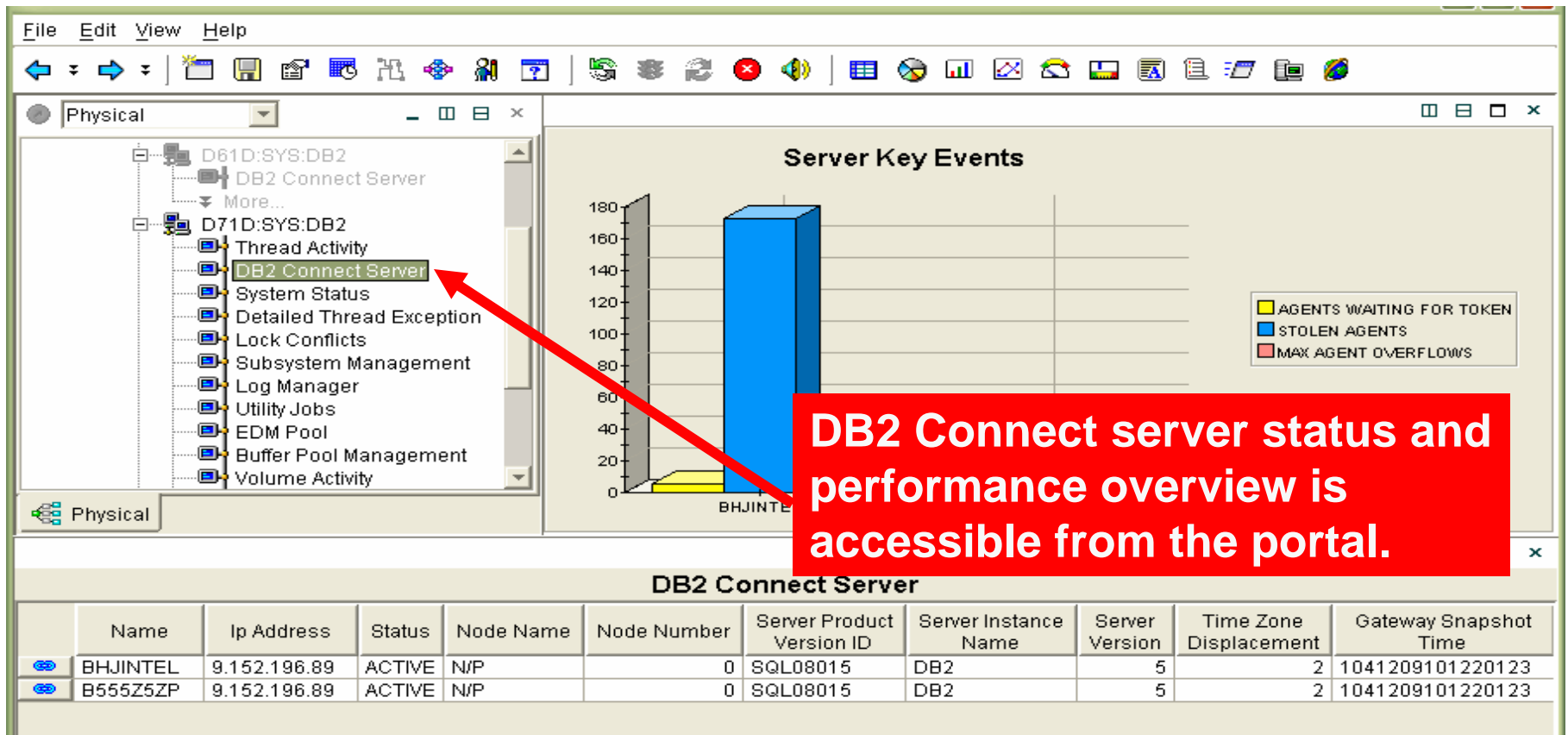
Correlate DB2 Connect Activity With DB2 Thread Activity

From the 'Thread Activity' view the user may see additional DB2 Connect information

Highlight Potential Application Issues

Using techniques demonstrated earlier the user may highlight potential performance issues.

Workspaces may be customized.

Situation automation as well as real time views may be created.

DB2 Connect Monitoring In Classic Interface

```
                        ZTCNS      VTM       O2        V310./C D751 07/27/05 16:22:03    2
> Help PF1                                                                    Back PF3
>
>        THREAD INFORMATION:  Enter a selection letter on the top line.
>
> A-DB2 Connect Server  B-Overview    *-Statement Info    D-Package Statistics
>
=====================================================================================
>               DB2 Connect Server - Statement Information
 PLAN
+ Thread:    Plan=DISTSERV   Connid=SERVER    Corrid=DB2BP.EXE     Authid=JEN
+ Dist   :   Type=DATABASE ACCESS, Luwid=G998C447.PD0E.050727141933=267
+ Location :   PMO5D751
 tcns       ....
+
+ SQL Statements
+ -----------------------------------------------------------------
+ Section Number                        =       201
+ Query Cost Estimate                   =         0
+ Query Number of Rows Estimate         =         0
+ Statement Operation                   = SELECT
+ Number of Successful Fetches          =        30
+ Blocking Cursor                       =         1
+ Outbound Blocking Cursor              =         0
+ Application Creator                   = NULLID
+ Package Name                          = SQLC2E03
+ Stmt Trans: No of Transmissions       =         2
+ Stmt Trans: No of Statements          =         3
+
+ Time
+ -----------------------------------------------------------------
+ Statement Start Timestamp    = 2005-07-27-16.19.40.968000
+ Statement Stop Timestamp     = 2005-07-27-16.19.50.161000
+ Time Spent on Gateway Processing = 00:00:00.022361
+ Host Response Time           = 00:00:03.193351
+ Host Recent Stmt Elapsed Time = 00:00:09.192430
+ Stmt Elapsed Execution Time  = 00:00:00.542800
+ Local: System CPU Time       = 00:00:00.000000
+ Local: User CPU Time         = 00:00:00.000000
```

Using OMEGAMON XE For DB2 PM/PE
DB2 Object Performance Analysis Scenario

- DB2 performance analyst would like to be able to analyze I/O and getpage activity real time

  ‣ This analysis may be used as part of a buffer pool tuning exercise

  ‣ The analyst would like to be able to see what applications are performing the I/O

- OMEGAMON XE For DB2 PM/PE object analysis provides the following:

  ‣ Real-time monitoring of DB2 getpage and I/O activity

  ‣ Monitor by database, pageset, dataset, and extent level

  ‣ Monitor by DASD volume

  ‣ Monitor by DB2 application

  ‣ Analyze/Isolate application I/O activity

  ‣ See the impact of non-DB2 I/O on the DB2 subsystem

OMEGAMON XE For DB2 PM/PE
Classic Interface Object Analysis Information

```
_____ ZMENU    VTM     O2      V310./C DB21 01/24/06 16:48:20   2
>  Help/News/Index PF1                    Exit PF3                 PF Keys PF5
>
>     Type a selection letter at the left end of the top line and press ENTER.
>
=======================================================================
>          OMEGAMON II FOR DB2 CLASSIC INTERFACE -- REALTIME MAIN MENU

_ S   SUMMARY ............. Summary of DB2 activity
_ E   EXCEPTIONS .......... Current or potential system problems
_ T   THREAD ACTIVITY ...... Thread activity information
_ U   THREAD ACTIVITY ...... Thread activity information by Package
_ L   LOCKING CONFLICTS .... Locking conflict information
_ R   RESOURCE MANAGERS .... Resource manager, other DB2 subsystem information
_ A   APPLICATION TRACE .... Trace and view application activity
_ D   DISTRIBUTED DATA ..... Distributed database system information
_ O   OBJECT ANALYSIS ...... Object and Volume information
_ G   DB2 CONNECT SERVER .   DB2 Connect/Gateways with connection to DB2
_ C   MVS CONSOLE .......... MVS console to issue
_ B   DB2 CONSOLE .......... DB2 console to issue
_ M   MISCELLANEOUS ........ Address space informa
_ P   PROFILE .............. Customize OMEGAMON
_ H   HISTORICAL ........... Online historical inf
_ I   IFCID TRACE .......... Start an IFCID Trace
```

From the classic interface main menu select option 'O' to see object analysis information

Object Analysis
I/O & Getpage By Database With Drill Down Detail

```
_____ ZOJO1     VTM     O2        V310./I DB21 01/25/06 12:12:13   2
> Help PF1       Back PF3      Up PF7       Down PF8     Sort PF10     Zoom PF11
>
>       OBJECT ANALYSIS:  Enter a selection letter on the top line.
>
> A-DATABASE ALLOCS  *-DATABASE ACTIVITY   C-THREAD ACTIVITY  D-DISPLAY OPTIONS
=========================================================================
>                              DATABASE ACT
 OJO1
+ Interval Time  = 00:15:00
+ Total Getpage  =  1189497
+
+ Database = SU06BPOB
+ *
+           % of     % of   Getp              Sync      Pre     Async    Other
+ Spacenam  Getp     I/O    per RIO   Getpage  Read     Fetch    Write    Write
+ --------  ----    ------  --------- -------  -------  -------  -------  -----
+ GLWSDPT   13.2%    3.9%      67.4   157294    1406      926      217        0
+ GLWSEMP   12.8%   15.7%      17.1   152812    3629     5290     1136        0
+ GLWSEPA     .5%    2.3%       6.2     6351     940       77      469        0
+ GLWSPJA     .1%    1.5%       2.9     2027     621       57      324        0
+ GLWSPRJ   29.2%   21.6%      25.7   347403    2823    10690      309        0
+ GLWSSPL     .4%     .5%      22.8     4898     214        0      168        0
+ GLWS001     .3%    2.1%       3.4     4742    1202      168        0        0
+ GLWS002    1.2%    5.6%       4.5    15432    3400        0      183        0
+ GLWXACT1    .0%     .2%       1.0      192     189        0        0        0
+ GLWXDNG1    .0%     .3%       4.5      648     141        0       73        0
+ GLWXDPT1   3.0%    1.8%      33.3    36797     869      234       85        0
+ GLWXDPT2    .1%     .7%       4.9     1834     371        0      114        0
```

To see detail for an object position the cursor and press F11.

To see the thread actvity enter option 'C'.

Thread Activity For An Object

```
_____ ZOJT6     VTM      O2        V310./I DB21 01/25/06 12:08:45   2
> Help PF1         Back PF3          Up PF7           Down PF8         Sort PF10
>
===============================================================================
>                          THREAD ACTIVITY BY DATABASE
 OJT6
+ Interval Time  = 00:15:00                      Interval Elapsed = 00:02:03
+ Total Getpage  =   524325                      Total I/O        =    25181
+
+ Database = SU06BPOB
+ *
+                                         Sync     ------ Prefetch I/O -----
+ Planname  Authid     Correlation   Getpage   Read       Seq     List   Dynamic
+ --------  --------   -----------   -------   -------   -------  ------- -------
+ DSNREXX   DMMJB      DMMJBRNB       524325    16918      7397     283      583
===============================================================================
```

Object analysis will correlate the I/O and getpage activity to the DB2 threads.

This helps to target potential problem applications.

DB2 Bufferpool Tuning with the Buffer Pool Analyzer - a case study

- **Objective:**

  ▶ Show how the Bufferpool Analyzer can be used to reallocate objects to reduce the synchronous reads with the benefit of improved throughput for the same amount of storage

  ▶ Provide guidance on the tradeoff between allocating additional storage and further reductions in the I/O

DB2 Buffer Pool Analyzer - Functions

- Data collection of virtual buffer pool activity via the DB2 IFI interface

- Comprehensive reporting of the buffer pool activity, including:
  - ▶ Ordering by various identifiers (for example, buffer pool, plan, object, primary authorization id)
  - ▶ Sorting by, for example, getpage, sequential prefetch, and synchronous read
  - ▶ Filtering capability
  - ▶ Loading into DB2 tables

- Simulation of buffer pool usage for:
  - ▶ Varying buffer pool size
  - ▶ Different object placement

- Display of report and simulation results on workstation in form of tables, graphs, and diagrams

Case Study Flow

- Application consisting of 17 tables and 25 stored procedures driven from a rexx procedure

- All application pagesets allocated to BP20, sized at 1000 pages, before tuning

- Run the application for 3 minutes whilst tracing for 2 minutes

- Use Buffer Pool Analyzer to determine re-allocation to 3 pools and re-size within the 1000 page limit

  ▸ BP17 – small objects

  ▸ BP18 – objects whose primary access path is random

  ▸ BP19 – objects whose primary access path is sequential

- Rerun the application to measure the outcome

Application Throughput - Before and After tuning

	BEFORE Tuning		AFTER Tuning	
	SP Calls	Elapsed Secs	SP Calls	Elapsed secs
DPTADD	89	0.022	89	0.021
DPTBAL	119	0.090	143	0.087
DPTDEL	26	0.157	26	0.154
DPTMGR	58	0.053	96	0.030
DPTUPD	86	0.018	98	0.014
DPTUPR	73	0.033	88	0.033
EMPADD	827			
EMPDEL	77			
EMPFND	49			
EMPUPD	83	0.026	90	0.023
PRJADD	80	0.945	71	0.945
PRJUPD	45	0.013	51	0.013
Total	1612		1513	
Tran rate	8.9	calls per second	9.5	calls per second

The throughput has increased by 7% despite reducing the prefetch quantity for the sequential accessed objects
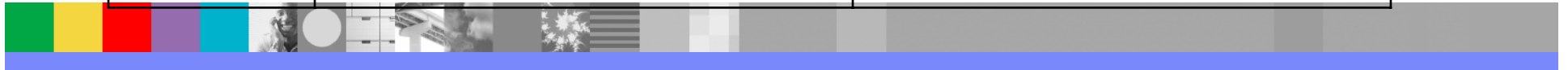
Buffer Pool Analyzer Reports – Before and After

	BEFORE	AFTER			
BPID	BP20	BP17	BP18	BP19	TOTAL
BP Hit ratio(%)					
System	54.5	100.0	98.5	21.2	55.0
Application	97.1	100.0	98.5	98.9	98.8
Getpage	495860	255			
Sequential	246155	1			
Random	245130	254			
Ridlist	4575				
Hit	479823	25539	182527	269947	478013
Miss random	12935	0	2815	2085	4900
Miss asynch	1290	0	0	1019	1019
Read request	21370	0	2812	16830	19642
Synchronous	**14181**	0	2810	3083	**5893**
Seq prefetch	6482	0	0	13017	13017
List pref	284	0	0	606	606
Dyn prefetch	423	0	2	124	126
Read page	225391	0	2816	215064	217880
Synchronous	**14181**	0	2810	3083	**5893**
Seq prefetch	195324	0	0	201652	201652
List pref	6245	0	0	8536	8536
Dyn prefetch	9641	0	6	1793	1799

The synchronous reads have reduced by 58% though note there has been an increase in the number of prefetch reads
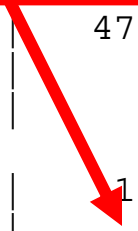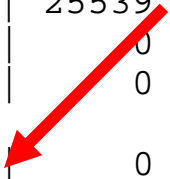
Buffer Pool Analyzer – Step 1 – run trace

Parameter	Value	Description
DB2SSID	(DB21)	DB2 subsystem id
PLANNAME	(FPEPLAN)	DB2 BPA planname
RECORD_FORMAT	(SHORT)	STandard or SHort(default)
DATATYPE	(DETAIL)	DEtail(default), SUmmary, or CAtalog
STARTTIME	(IM)	IMmediately(default) or hh:mm:ss,
DURATION	(2m)	Maximum job duration
MAX_RECORDS	(1M)	Maximum number of records to be collected
BUFSIZE	(1024)	Specifies the op buffer size in the DB2 Start Trace command.
SAMPLING	(15,10)	Indicates that tracing is done in sampling mode.

Buffer Pool Analyzer – Step 2 – object placement

Name	Page	Seq Access	Size	Data	Index	Sort Temp	Comment
BP17	4K	all	-40	YES	NO	NO	Small data pagesets
BP17	4K	all	-10	NO	YES	NO	Small index pagesets
BP18	4K	-50	all	YES	YES	NO	Random Access
BP19	4K	50-	all	YES	YES	YES	Sequential Access

- 50 means less than 50%

50- means greater than or equal to 50%

Buffer Pool Analyzer – Step 3 – ALTER Bufferpools

```
BP                          PG    VP    VP    PG
Name     VP Size            Steal SEQT  PSEQT FIX   DWQT  VDWQT
------   --------  -------- ----- ----  ----- ----  ----  -----


BEFORE
BP20        1000            LRU    80     50  YES    30       5


AFTER
BP17          80            FIFO   20     50  YES    40       5
BP18         644            LRU    20     50  YES    10       5
BP19         276            LRU    80     50  YES    10       5
```

BP17 is sized to hold all the objects and so can use FIFO as the page steal method

The other BP parameters were also reset according to the recommendation by BPA

Buffer Pool Analyzer – Step 4 – Run Simulation

Total Pages	Separate Buffer Pools			Combined Buffer Pool		
	Misses	Application Hit Ratio	Global Miss Ratio	Misses	Application Hit Ratio	Global Miss Ratio
280	88348	81.7	16.5	51209	89.4	9.5
330	56364	88.9	10.5	46128	90.9	8.6
430	30760	93.9	5.7	26570	94.8	4.9
480	24935	95.1	4.6	24201	95.2	4.5
530	23063	95.5	4.3	23313	95.4	4.3
1680	14774	97.1	2.8	14449	97.1	2.7
1730	13923	97.3	2.6	14165	97.2	2.6
1780	13089	97.4	2.4	13980	97.2	2.6
1980	11697	97.7	2.2	12556	97.5	2.3
2030	11042	97.8	2.1	12234	97.6	2.3
2430	7728	98.5	1.4	9219	98.2	1.7
2630	6432	98.7	1.2	8430	98.3	1.6
2780	5864	98.8	1.1	8123	98.4	1.5
2830	5666	98.9	1.1	8034	98.4	1.5
2880	5619	98.9	1.0	7959	98.4	1.5

DB2 Bufferpool Tuning with Buffer Pool Analyzer

- **Summary**

  - ▶ Correct object placement can improve application throughput by reducing synchronous IO

  - ▶ Buffer Pool Analyzer can simulate the usage of pools to show the tradeoff between storage and IO

  - ▶ Simple extension to automate object placement through sampling, loading data to DB2 table and using SQL to generate ALTERs