IBM Tivoli OMEGAMON XE for DB2 Performance Monitor / Expert on z/OS

More control of your system performance

Steven Fafard, email: sfafard@us.ibm.com
Norbert Jenninger, email: jen@de.ibm.com

IBM **Information Management** software

ON **DEMAND BUSINESS**™

Agenda

- Objectives of today's discussion

- OMEGAMON XE for DB2 PM/PE (OM PE) Functions and Capability
  - ▶ Reporting & Performance Warehouse
  - ▶ Real-Time Monitoring

- OM PE V420
  - ▶ Release Objectives and Key Focus Areas

  - ▶ Position on the OM PE Roadmap

  - ▶ Technical Discussion on OM PE V420
    - ✓ ICAT – monitoring profiles
    - ✓ TEP – HTML navigation
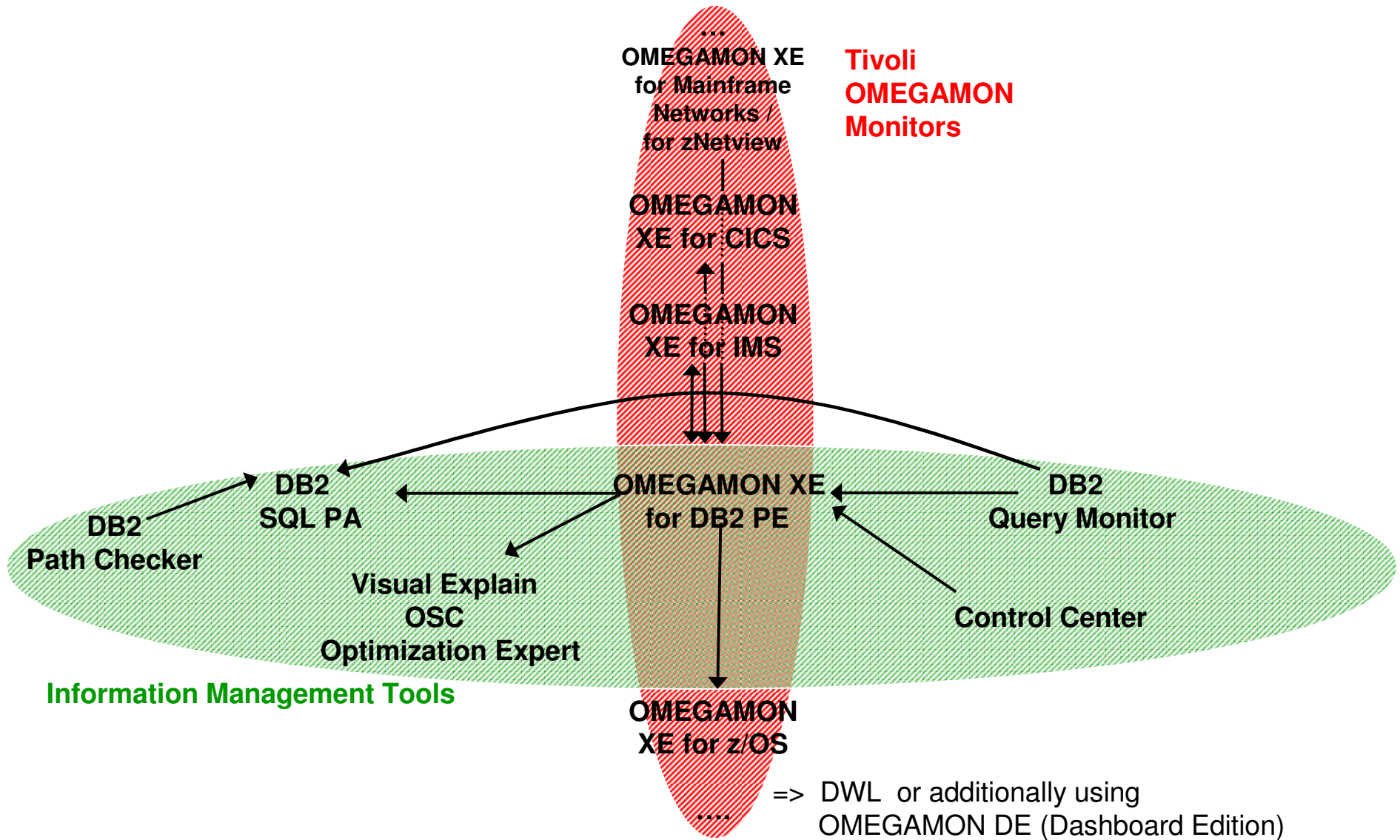   - ✓ Batch reporting

Objectives of today's discussion

- Demonstrate how OMEGAMON XE for DB2 PE is poised to regain, restore, and reiterate our position as THE world-class DB2 monitoring solution

  - With a powerful, responsive VTAM-based 3270 interface coupled with a flexible, state-of-the-art web-based GUI for integrated enterprise-wide system availability management

  - Plus the premier batch reporting and performance analysis engine

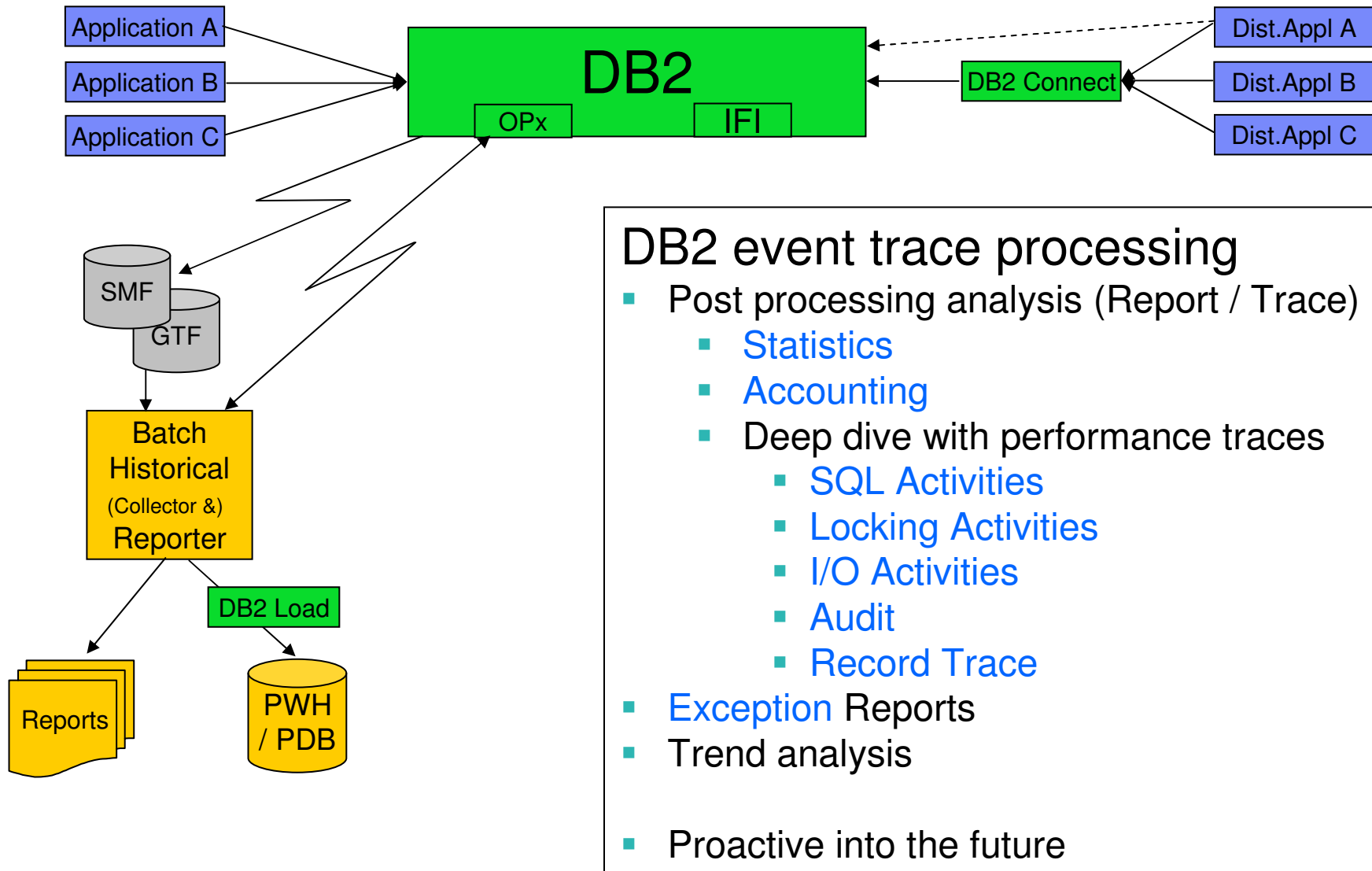# DB2 Performance monitoring offerings - Version 420
More Control of your System and Application Performance

IBM Tivoli OMEGAMON XE for DB2 Performance Expert v420	
.. is **IBM Tivoli OMEGAMON XE for DB2 Performance Monitor v420** with a DB2 Performance Warehouse for expert analysis of DB2 application performance data. It also includes buffer pool analysis features (**IBM DB2 Buffer Pool Analyzer v420)** for superior overall DB2 management capabilities.	
IBM Tivoli OMEGAMON XE for DB2 Performance Monitor v420	**IBM DB2 Buffer Pool Analyzer v420**
What is it? Provides comprehensive monitoring functionality to manage the efficiency and performance of DB2 on z/OS-based applications online, in real time, as well as "offline" via batch reports coupled with a DB2 Performance Database for offline analysis of DB2 application performance data.	Helps database administrators manage buffer pools more efficiently by providing information about current buffer pool behavior and using simulation to anticipate future behavior.
Value Proposition Enables businesses to protect and grow revenue as well as manage expense and customer satisfaction via providing visibility into and expert advice regarding DB2 and DB2 application performance.	Manage real storage mainframe costs

New Features and functions with V420
 o Reduction of total cost of ownership (TCO) with RAS, scalability, and configuration improvements
 o Support for DB2 thread information for DB2 subsystems participating in a DB2 data sharing group via OMEGAMON's Classic 3270 interface. (Previously, data sharing performance data was available only through the GUI (TEP) interface.)
 o Continual investment in the power of the Tivoli Enterprise Portal (TEP) GUI:
   ▪ New horizontal navigation capability in the TEP GUI enables easy, in context, analysis of related performance information.
   ▪ Several new key DB2 resource attributes now available to the TEP
 o Day One support for DB2, the operating system, and related middleware
	Maintenance release; PTF roll-up

Horizontal and vertical Integration from the OM PE perspective

**OMEGAMON XE
for Mainframe
Networks /
for zNetview**

**Tivoli
OMEGAMON
Monitors**

**OMEGAMON
XE for CICS**

**OMEGAMON
XE for IMS**

**DB2
SQL PA**

**OMEGAMON XE
for DB2 PE**

**DB2
Query Monitor**

**DB2
Path Checker**

**Visual Explain
OSC
Optimization Expert**

Control Center

Information Management Tools

**OMEGAMON
XE for z/OS**

=> DWL or additionally using
OMEGAMON DE (Dashboard Edition)

Reporting on DB2 Event Traces

DB2 event trace processing

- Post processing analysis (Report / Trace)
  - Statistics
  - Accounting
  - Deep dive with performance traces
    - SQL Activities
    - Locking Activities
    - I/O Activities
    - Audit
    - Record Trace
- Exception Reports
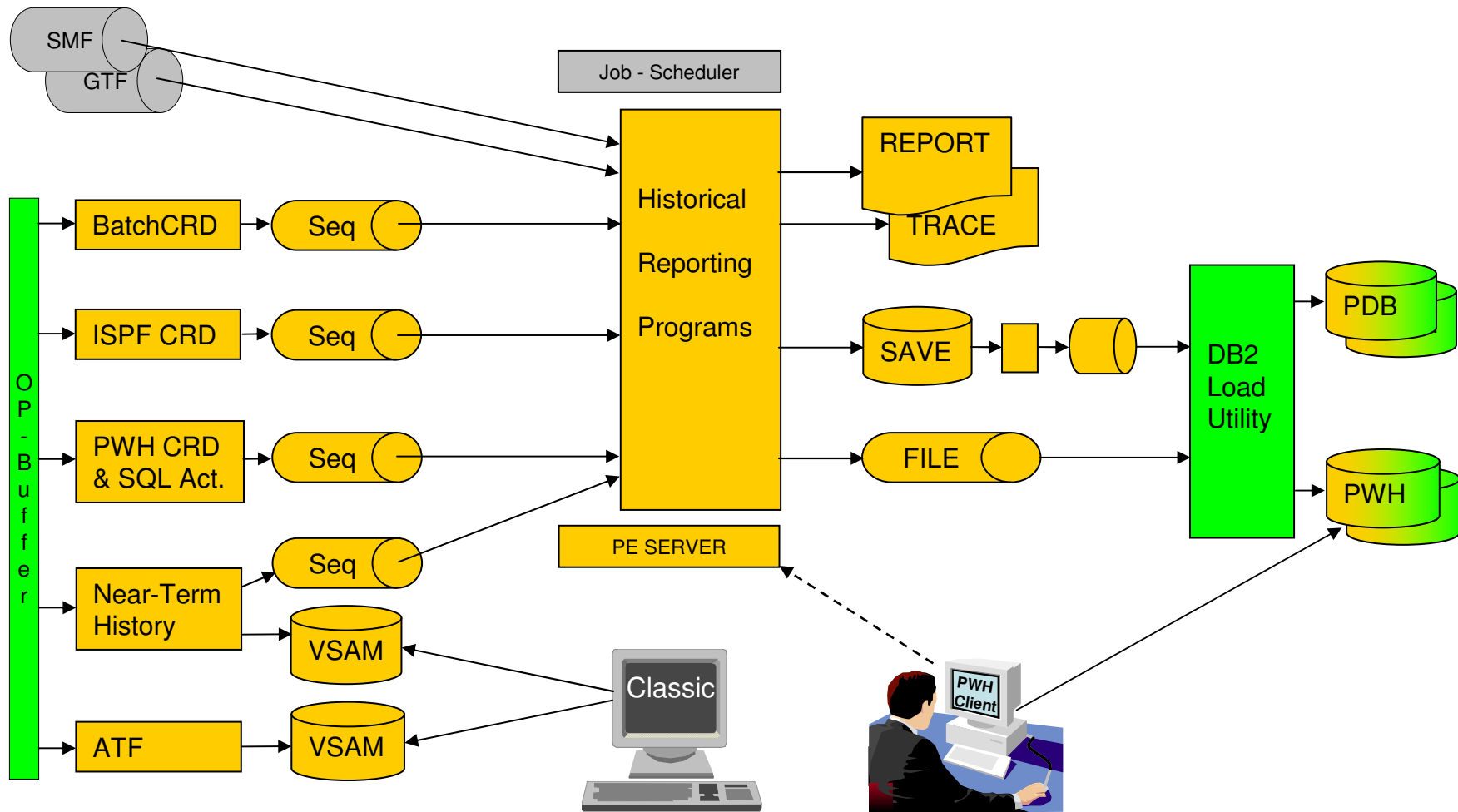- Trend analysis

- Proactive into the future

Broad Flexibility in Trace Collection, Reporting, saving to DBs

DB2 event trace processing

DB2 Trace collection   **Processing / Reporting**   **Performance DB archiving**

Expert Analysis using Rule-of-Thumb and Expert Queries

Rule-of-Thumb Properties

General | Definition

Select table and column to be added to the 'Value expression'

VALUE and additional columns

Table: DB2PM_STAT_BUFFER

Report block: Buffer Pool General

Columns:

Column Name	Field Name	Description
CURR_ACTIVE_BUFF	QBSTCBA	The number of currently active
VPOOL_FULL	QBSTXFL	The number of times a usable
EXPANSION_FAILED	QBSTXFV	The total number of virtual buf

VALUE expression >> DB2PM_STAT_BUFFER.READ_PAGE_INS_REQ/(DB2PM_STAT_BUFFER.SYNC_READ_IO+DB2PM_STAT_BUFFER.SEQ_PREFETCH_PAGE+DB2PM_STAT_BUFFER.LIST_PREFETCH_PAGE+DB2PM_STAT_BUFFER.DYN_PREFETCH_PAGE)

Additional columns >>

WARNING and PROBLEM thresholds

VALUE > WARNING threshold 0.01

Recommendation: Increase available Central Storage or reduce Virtual Pool size and use Hiper Poc

PROBLEM threshold 0.05

Recommendation: Increase available Central Storage or reduce Virtual Pool size and use Hipe

Define thresholds and recommendations

OK | Apply | Cancel

Rules of Thumb Analysis Result

Result View Help

jdbc:db2:D621 - My own ROT - DB2PM.Statistics.Buf   'All' view for ro

Filter | Result matrix | Row details | Column details

Attention values for rules of thumb sorted by time stamps

INTERVAL_TSTAMP	DM threshold	Merge pass degrad	No_prefetch_no_buf	Page_in for read	Page_in for write	Prefetch disabled	Synch rea
2001-01-10 23:05:0...	OK	-	OK	problem	OK	OK	-
2001-01-10 23:05:0...	OK	OK	OK	OK	OK	OK	warning
2001-01-10 23:05:0...	OK	-	OK	problem	OK	OK	-
2001-01-10 23:05:0...	OK	OK	OK	OK	OK	OK	warning
2001-01-10 23:05:3...	OK	OK	OK	problem	problem	OK	problem
2001-01-10 23:05:3...	OK	-	-	problem	OK	-	-
2001-01-10 23:05:3...	OK	OK	OK	problem	problem	OK	problem
2001-01-10 23:05:3...	OK	-	-	problem	OK	-	-
2001-01-10 23:09:5...	OK	-	OK	warning	OK	OK	warning
2001-01-10 23:09:5...	OK	-	-	-	-	-	-

Depending on the selected ROT and the performance data you may get a result matrix, select row and column to get more specific information

Rules of Thumb Analysis Result

Result View Help

jdbc:db2:D621 - My own ROT - DB2PM.Statistics.Buf   'All' view for ro

Filter | Result matrix | Row details | Column details

Selected time stamp: 2001-01-10 23:05:05.800069

ROT name	Attention
DM threshold	OK
Merge pass degrad	-
No_prefetch_no_buf	OK
Page_in for read	problem
Page_in for write	OK
Prefetch disabled	OK
Synch reads-sequ	-
Workf requ reject	-
Workfile prefetch	-
Write engine	OK

Rules of thumb details

ROT description: Page-In for read i/o < 1 to 5% of pages read

VALUE expression: DB2PM_STAT_BUFFER.READ_PAGE_INS_REQ/(DB2PM_STAT_BUFFER.SYNC_READ_IO+DB2PM_STAT_BUFFER.SEQ_PREFETCH_PAGE+DB2PM_STAT_BUFFER.LIST_PREFETCH_PAGE+DB2PM_STAT_BUFFER.DYN_PREFETCH_PAGE)

VALUE: $5.62248995983936e\text{-}001 > 0.05$ (Problem threshold)

Recommendation: Increase available Central Storage or reduce Virtual Pool si

Value expression columns:

Name	Value
DB2PM_STAT_BUFFER.READ_...	1.40000000000000e+(
DB2PM_STAT_BUFFER.SYNC_...	2.37000000000000e+(

Additional columns:

Name	Value

Predefined expert rules

- Database table column wizard
- Point and drop support

Analyze using
- Single rule
- Cluster of rules
- Zoom-in

Expert Buffer Pool Analysis (Object Placement) and Simulation

Buffer Pool Analysis - Object Placement

Use this function to get object placement recommendations and generate appropriate ALTER statements.

3. Object placement: Assign objects to buffer pools (optional).   Reset selected   Reset all

Object Name	Type	Page	Used	Cat...	Seq. Access [%]	Change Rate [%]	Size ...	Current	Recom...	User-...
FIJ1DB01.FIJCCONT	INDEX	4K	YES	---	0	0	1	BP1	BP1	BP1
FIJ1DB01.FIJCENGC	INDEX	4K	YES	---	0	0	1	BP1	BP1	BP1
					53	46	BP1	BP3	BP3	
					0	?	BP1	BP1	BP1	
					0	?	BP1	BP1	BP1	
FIJ1DB01.FIJCINVD	INDEX	4K	YES	---	0	0	5	BP1	BP1	BP1
FIJ1DB01.FIJCITEM	INDEX	4K	YES		0	4	BP1	BP1	BP1	
FIJ1DB01.FIJCITMD	INDEX					4	BP1	BP1	BP1	
FIJ1DB01.FIJCITMR	INDEX					1	BP1	BP1	BP1	
FIJ1DB01.FIJCLOCA	INDEX					13	BP1	BP1		
FIJ1DB01.FIJCPLNO	INDEX					6	BP1	BP3		
FIJ1DB01.FIJCPLPG	INDEX	4K	YES	---	0					
FIJ1DB01.FIJCPROD	INDEX	4K	YES	---	0					
FIJ1DB01.FIJCSHPC	INDEX	4K	YES	---	59					
FIJ1DB01.FIJCWIPG	INDEX	4K	YES	---	0					
FIJ1DB01.FIJCWORD	INDEX	4K	YES	---	6					
FIJ1DB01.FIJS0004	TABLESP...	4K	YES	---	17					
FIJ1DB01.FIJS0005	TABLESP...	4K	YES	---	0					
FIJ1DB01.FIJS0009	TABLESP...	4K	YES	---	32					
FIJ1DB01.FIJS0010	TABLESP...	4K	YES	---	2					

Buffer pool data file : SGI2FILE.bpd

in F:\BPODAT\July02

The first step result shows the recommended buffer pools for each object.

The user can overwrite the recommended buffer pool if desired.

Object usage
- Random vs Sequ.
- Change Rate
- Object Size
- Recommendation based on Buffer Pool Pattern

Recommended sizing for separate Buffer Pools

This table indicates how the available memory should be distribu...

Click here to see more online help

Total Pages	BP0 pages	BP1 pages	BP2 pages
300	100	100	100
400	100	100	200
500	100	100	300
600	100	100	400
700	200	100	400
800	300	100	400
900	300	100	500
1000	400	100	500
11..	500	100	500

Simulated behaviour of each separate Buffer Pools

This table indicates the behaviour of each buffer pool for ...

Click here to see more online help

Buffer Pool Pages	Buffer Pool BP0			Buffer Pool BP1			Buffer Pool BP2		
	Misses	Application Hit Ratio	Global Miss Ratio	Misses	Application Hit Ratio	Global Miss Ratio	Misses	Application Hit Ratio	Global Miss Ratio
100	22931	51.8	12.5	686	86.4	0.4	128569	1.6	70.2
200	11012	76.8	6.0	639	87.3	0.3	113565	13.1	62.0
300	4190	91.2	2.3	639	87.3	0.3	36315	72.2	19.8
400	2667	94.4	1.5	639	87.3	0.3	11791	91.0	6.4
500	1721	96.4	0.9	639	87.3	0.3	10139	92.2	5.5
600	1550	96.7	0.8	639	87.3	0.3	10013	92.3	5.5

Simulated behavior of Buffer Pool BP2

This table indicates the behaviour of an individual simulated buffer pool.
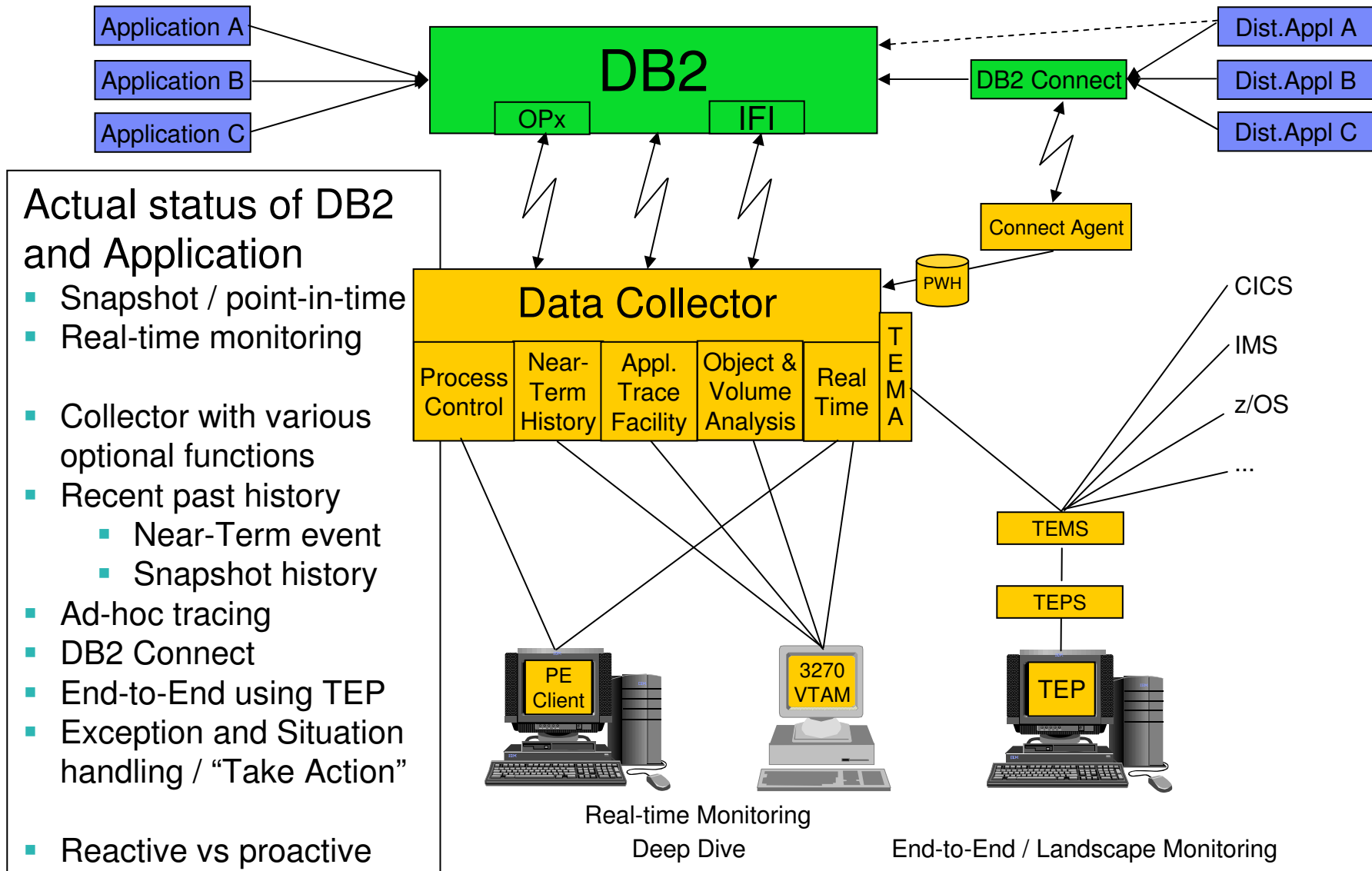
Click here to see more online help

Buffer Pool Pages	All		Random		Sequential Prefetch		List Prefetch	
	Total Misses	Application Hit Ratio	Misses	% of Total Misses	Misses	% of Total Misses	Misses	% of T Miss
100	128569	1.6	1925	1.5	126216	98.2	427	0.3
200	113565	13.1	1918	1.7	111583	98.3	63	0.1
300	36315	72.2	1901	5.2	34378	94.7	35	0.1
400	11791	91.0	1868	15.8	9889	83.9	33	0.3
500	10139	92.2	1854	18.3	8252	81.4	32	0.3
600	10013	92.3	1834	18.3	8146	81.4	32	0.3
700	9910	92.4	1815	18.3	8064	81.4	30	0.3
800	9529	92.7	1798	18.9	7700	80.8	30	0.3
900	8252	93.7	1785	21.6	6436	78.0	30	0.4
1000	6527	95.0	1770	27.1	4727	72.4	29	0.4
1100	5915	95.5	1751	29.6	4134	69.9	29	0.5
1200	5870	95.5	1735	29.6	4105	69.9	29	0.5
1300	5827	95.5	1713	29.4	4087	70.1	26	0.4
1400	5792	95.6	1694	29.2	4074	70.3	23	0.4
1500	5732	95.6	1664	29.0	4045	70.6	22	0.4

What-If Simulation
- Object Re-Placement
- Buffer Pool Size (Range)
- Best Balance between Buffer Pools
- Single vs. separate BPs

Real-Time Monitoring Functions and Views (user interfaces)

Application A
Application B
Application C

DB2
OPx   IFI

Dist.Appl A
DB2 Connect
Dist.Appl B
Dist.Appl C

Connect Agent

PWH

Actual status of DB2 and Application

- Snapshot / point-in-time
- Real-time monitoring

- Collector with various optional functions
- Recent past history
  - Near-Term event
  - Snapshot history
- Ad-hoc tracing
- DB2 Connect
- End-to-End using TEP
- Exception and Situation handling / "Take Action"

- Reactive vs proactive

Data Collector

Process Control	Near-Term History	Appl. Trace Facility	Object & Volume Analysis	Real Time	T E M A

PE Client

3270 VTAM

Real-time Monitoring
Deep Dive

CICS
IMS
z/OS
...

TEMS
TEPS
TEP

End-to-End / Landscape Monitoring

More Control of your System and Application Performance

PE Client

ISPF Online Monitor

Classic Interface

Tivoli Enterprise Portal

Full Picture with even more Functions and Capabilities

Application A

Application B

Application C

DB2

OPx   IFI

Dist.Appl A

DB2 Connect

Dist.Appl B

Dist.Appl C

Connect Agent

SMF

GTF

PWH

Data Collector

Process Control	Near-Term History	Appl. Trace Facility	Object & Volume Analysis	Real Time	T E M A

CICS

IMS

z/OS

...

Batch Historical

(Collector &)

Reporter

DB2 Load

Reports

Analysis

PWH / PDB

PE Client

▪ Perform. Queries

▪ ROT

BPA Expert Object Analysis & Simulation

3270 VTAM

TEMS

TEPS

TEP

Real-time Monitoring

Deep Dive

End-to-End / Landscape Monitoring

More Analysis and Expert functions

- ▪ PWH
- ▪ Buffer Pool Analyzer
- ▪ Process engine

... More, Detection of Exceptional Situations with Take Action

In Real-time with
- Pre-defined Situations
- Audio and Video Alerting
- Manual or Automatic Take Action
- Optional running in the Background with Alert via User Exit

In Batch with dedicated Exception Reports
- Exception Profiling to better find threshold values which fits to the customers workload

IBM

Objectives of OMEGAMON XE for DB2 PE and PM V420

☑ Build the foundation for the future
  ▸ A merger of two advanced technologies to provide a best of breed DB2 monitoring offering exposed potential challenges for large installations
  ▸ Continual DB2 on z/OS advancements revealed the necessity for a more flexible implementation that could respond quickly and reliably

☑ Improve the installation and configuration experience
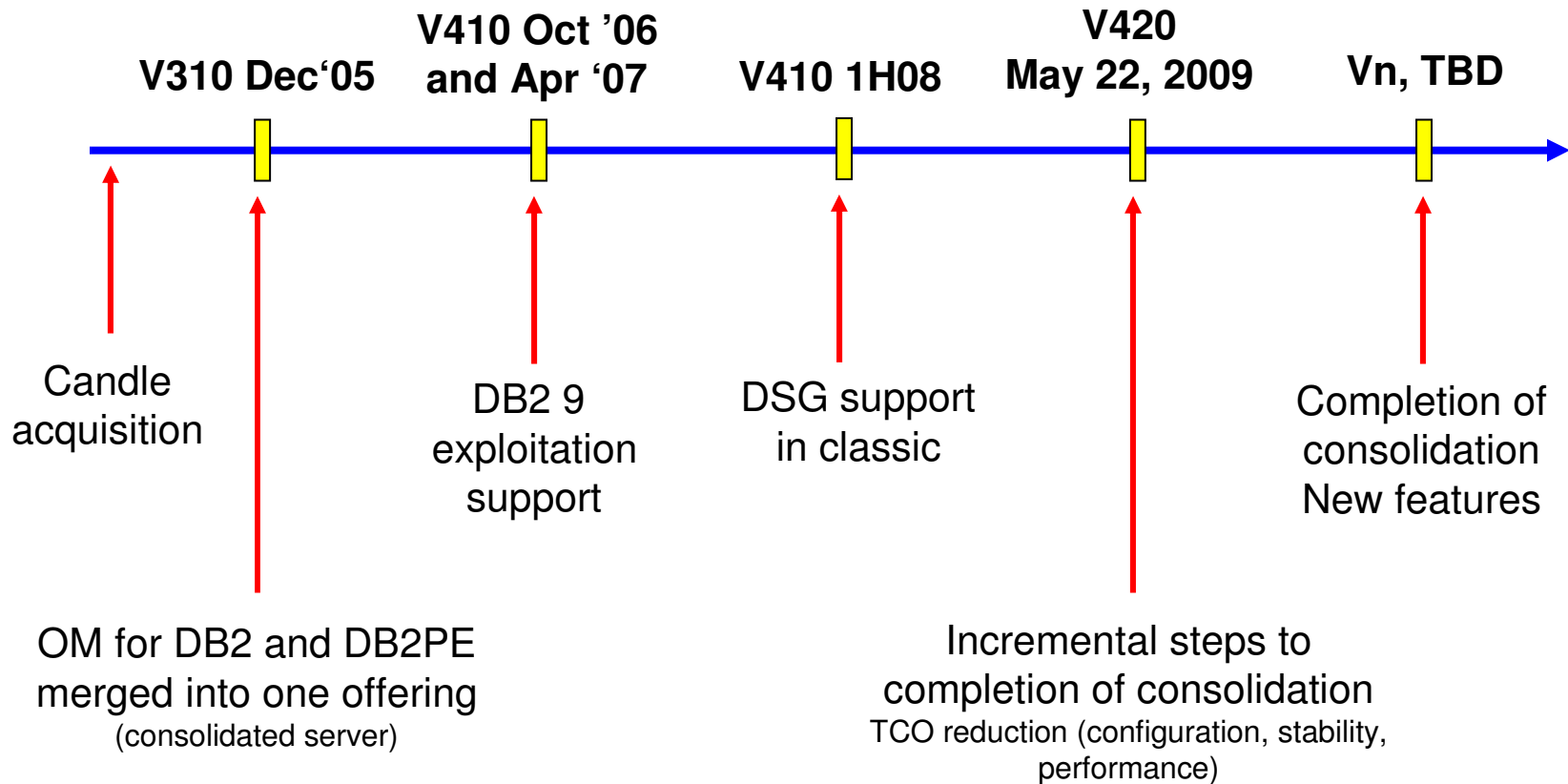 ▸ Migrate from a parameter-driven configuration to a task-driven configuration

☑ Continue to drive down TCO through user interface and collector convergence, integration, and RAS

OM PE V420 Key focus areas

- ☑ Quality and reduced resource consumption
  - ▶ Significant internal architectural improvements to improve code path optimization and to drive convergence
    - ▪ Continued centralization of services and facilities used within OMEGAMON:
      - – memory management in classic OMEGAMON PE component
      - – Continued migration to PE Server subtask for data collection
      - – MVS subsystem to isolate services used by OMEGAMON components across LPARs
    - ▪ Extensive testing under high and complex workloads
- ☑ ICAT Configuration tool enhancements for OM PE
  - ▶ Configuration DB2 subsystem profiles approach
  - ▶ Including near re-write of the *Configuration Guide*
- ☑ TEP improvements via new HTML navigator
- ☑ Currency support and new features in Reporting
- ☑ ITM 6.2.1 features
  - ▶ Among other features… The High Availability Hub TEMS for z/OS

OMPM/PE History, Product Roadmap, and Direction

V310 Dec'05 **V410 Oct '06 and Apr '07** **V410 1H08** **V420 May 22, 2009** **Vn, TBD**

Candle acquisition

DB2 9 exploitation support

DSG support in classic

Completion of consolidation New features

OM for DB2 and DB2PE merged into one offering
(consolidated server)

Incremental steps to completion of consolidation
TCO reduction (configuration, stability, performance)

Review of V410 <u>new function</u> added after GA ...

- DB2 9 exploitation – the primary v410 objective
- IFCID 225 support in classic
- Data sharing group support for threads in classic
- zIIP support in classic and the TEP
- IFCID 197 (DB2 messages) support in the TEP
  - ▶ Create situations based on "important" DB2 messages
- Numerous new high water mark statistics attributes added along with product-provided situations (value out of the box.)
- Support for near-term history to feed OM PE batch reporting processes including the Performance Warehouse
- Facility to run Collect Report Data (CRD) in batch
- New thread displays (in classic) allowing further distinction between active and inactive thread

Review of V410 <u>new function</u> added after GA

- Workstation (distributed) information added to NTH Display
- New Thread History selection by CORRID
- New sub-interval parameter for near-term history (enables collection for extremely large workload, e.g. distributed)
- Extensions to Application Trace (ATF):
  - ▸ Supporting multiple plan-names and / or authids
  - ▸ Support for long-running traces (> 60 minutes)
- Dynamic Workspace Linking (DWL) on the TEP provided to OMEGAMON XE for Mainframe Networks, OMEGAMON XE for IMS, OMEGAMON XE for zNetview
- Launch OSC/OE from PE Client
- ….

On to V420!

OM PE V420 key focus area: ICAT/monitoring profiles

Goal

More flexible DB2 subsystem configuration

- reduce the effort for middle or large installations
  - ▸ first setup
  - ▸ changing an existing configuration
  - ▸ applying maintenance

Approach

Quick initial product setup

- Configure user interfaces and basic monitoring functionality

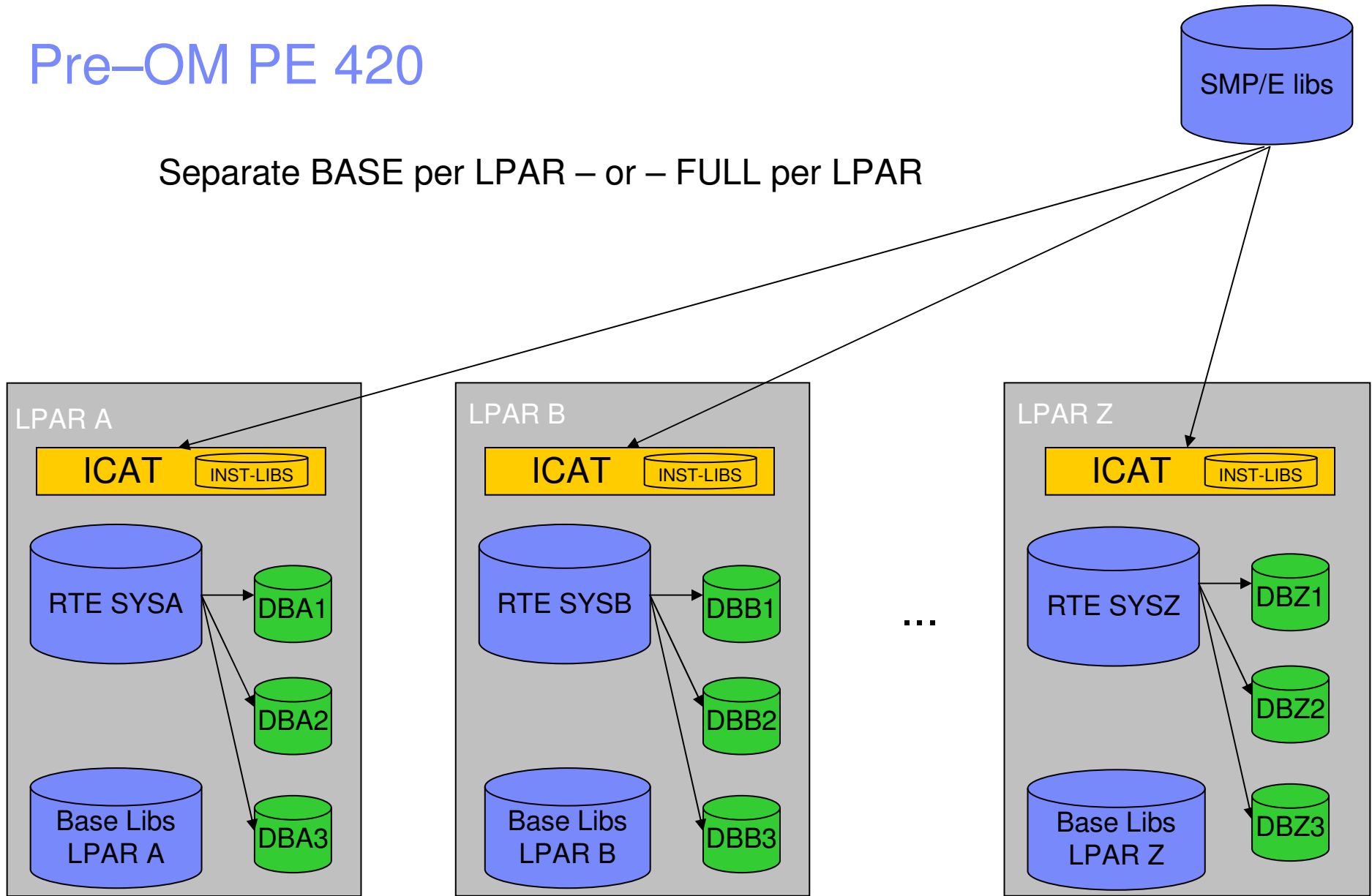**Then, use PROFILES for the DB2 subsystem configuration**

- Profiles specify the monitoring functionality to be enabled for a DB2 subsystem
- Profiles are reusable for several DB2 subsystems

ICAT configuration methodology before OM PE V420
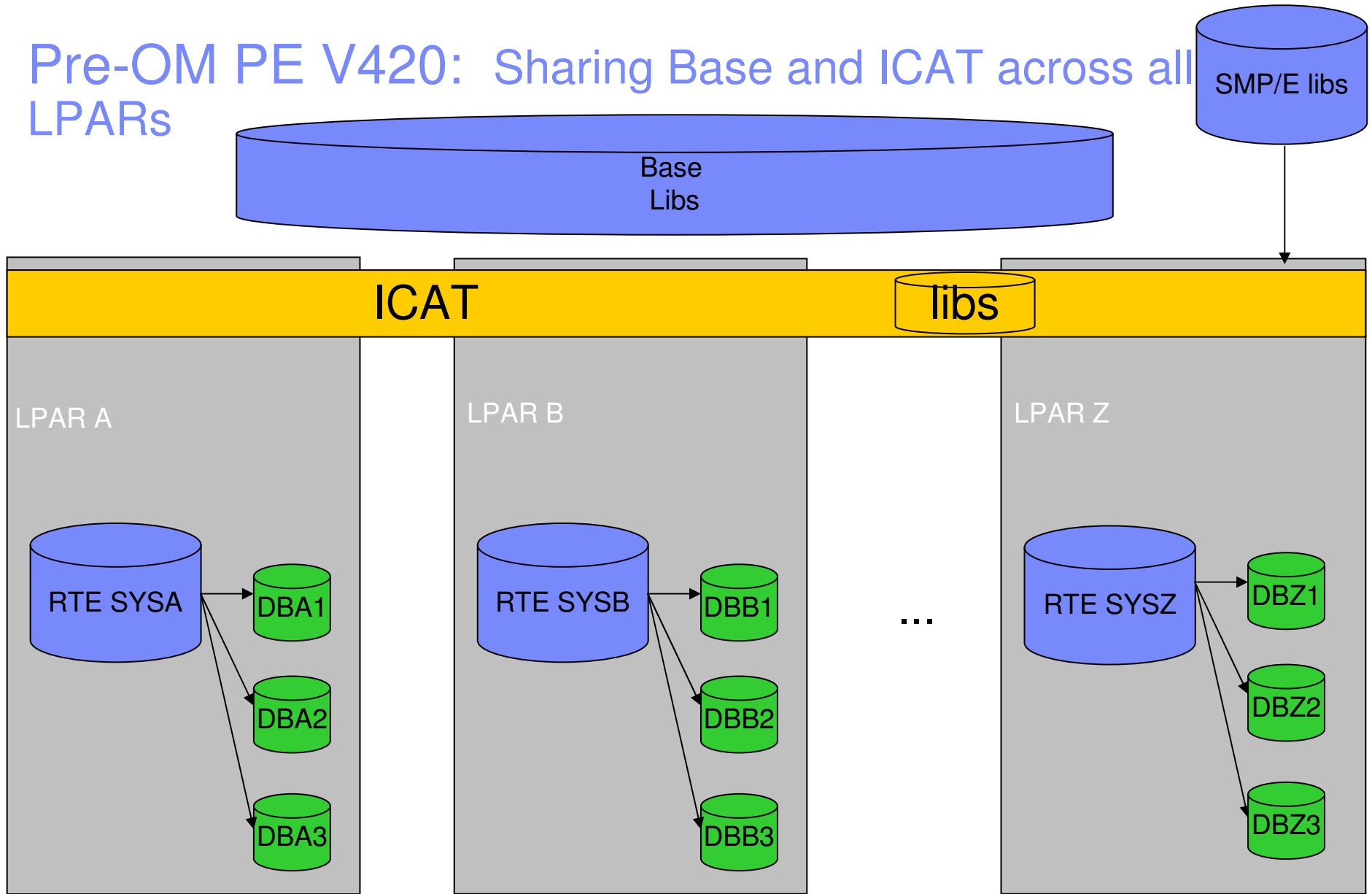
- **Run ICAT per LPAR**
  - ▶ Create RTE (Share Base or SMP, or select FULL RTE)
    - Configure per DB2 subsystem within RTE
    - Assign data sets, create runtime members, load per RTE
- **Run ICAT once for RTE model**
  - ▶ Create one model RTE with all DB2 subsystems
  - ▶ ...
  - ▶ Use BatchICAT
    - Edit and Copy BatchICAT parameter member, run BatchICAT create on target LPAR
    - Edit, copy and create jobs at Model RTE and copy jobs for execution to target LPAR.

Pre–OM PE 420

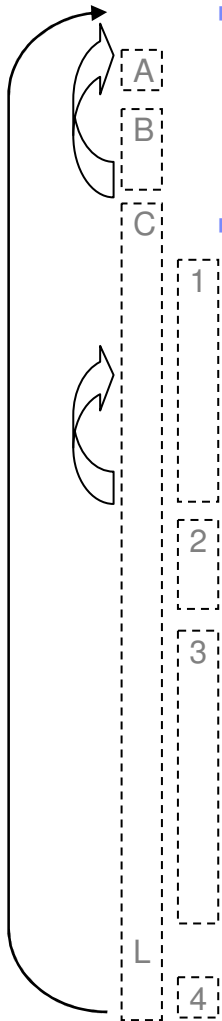**SMP/E libs**

Separate BASE per LPAR – or – FULL per LPAR

LPAR A

ICAT   INST-LIBS

RTE SYSA → DBA1

DBA2

Base Libs LPAR A   DBA3

LPAR B

ICAT   INST-LIBS

RTE SYSB → DBB1

DBB2

Base Libs LPAR B   DBB3

...

LPAR Z

ICAT   INST-LIBS

RTE SYSZ → DBZ1

DBZ2

Base Libs LPAR Z   DBZ3

Pre-OM PE V420: Sharing Base and ICAT across all LPARs

SMP/E libs

Base
Libs

ICAT

libs

LPAR A

RTE SYSA → DBA1

DBA2

DBA3

LPAR B

RTE SYSB → DBB1

DBB2

DBB3

...
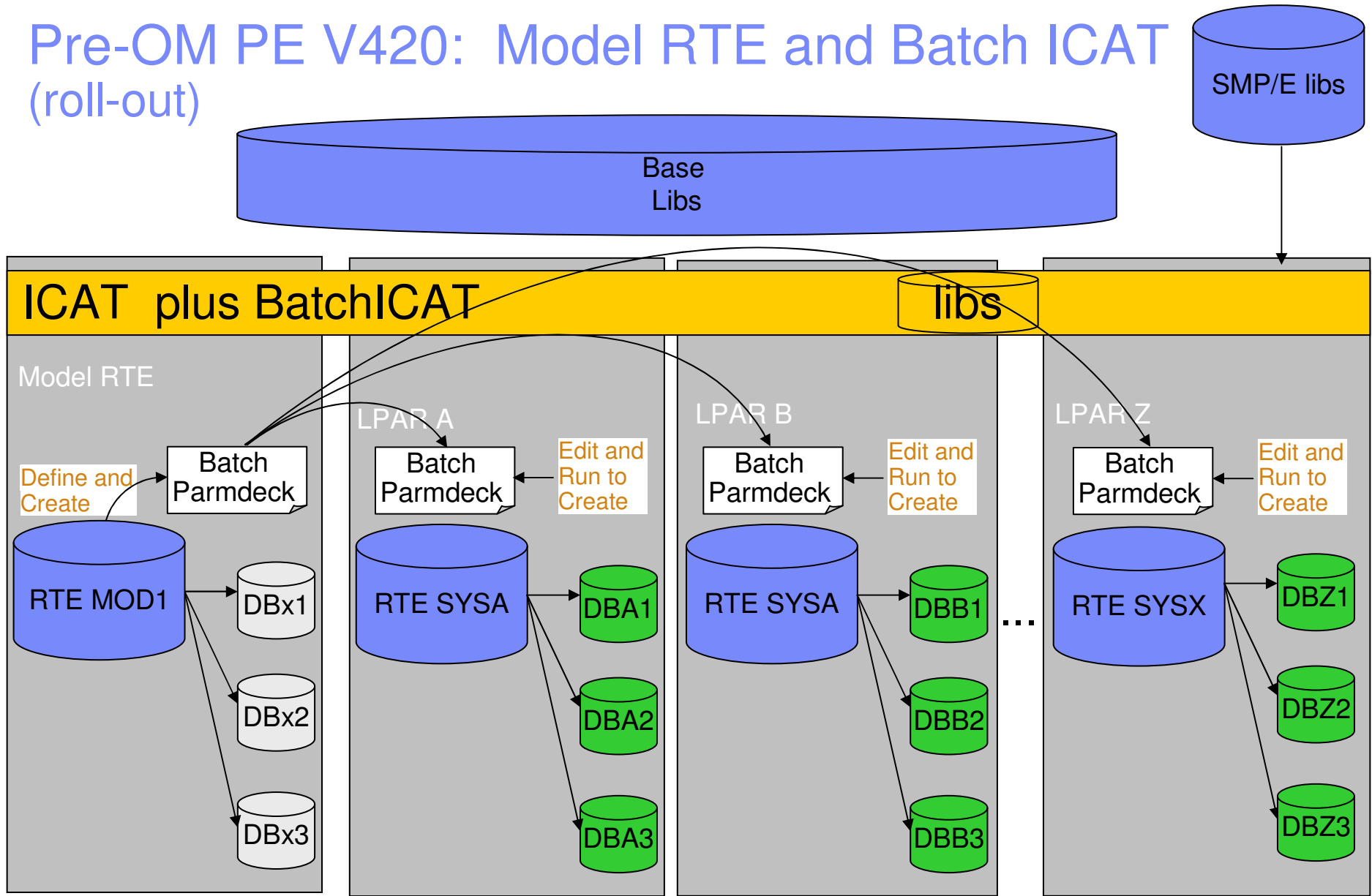
LPAR Z

RTE SYSZ → DBZ1

DBZ2

DBZ3

Pre-OM PE V420: Sharing Base and sharing ICAT across all LPARs

- Copy and create ~~own~~ ICAT libs ~~on each LPAR~~ <u>once</u>
- Add <u>Base once</u> and RTE separately per LPAR
  - ▶ Define setup and names for RTE (Base and RTE, or FULL)
  - ▶ Create jobs to define VSAM and allocate NON-VSAM datasets
  - ▶ Run jobs to define VSAM and allocate NON-VSAM datasets
- Configure and customize per RTE
  - ▶ Define setup of data collector, and RTE wide functions
    - Autostart components, Classic and CUA UI setup, work libs
  - ▶ Define for each DB2 subsystems the DB2 subsystem related setup
    - DB2 libs
    - Setup for autostart components (OA, NTH)
    - Setup for additional features (ATF, PWH, Snapshot history, explain, SQL PA)
  - ▶ Create job for additional RTE datasets (VSAM datasets) for all DB2 subsystems
  - ▶ Run job for additional RTE datasets (VSAM datasets) for all DB2 subsystems
  - ▶ Create job to generate RTE wide startup parameters, commands, and STC jobs, copy specific member from SMP/E libs, assemble and link out modules
  - ▶ Run job to generate RTE wide startup parameters, commands and STC jobs, copy specific member from SMP/E libs, assemble and link out modules
  - ▶ Create job to generate DB2 specific parameter member and data collector STC
  - ▶ Run job to generate DB2 specific parameter member and data collector STC
  - ▶ Complete the Configuration

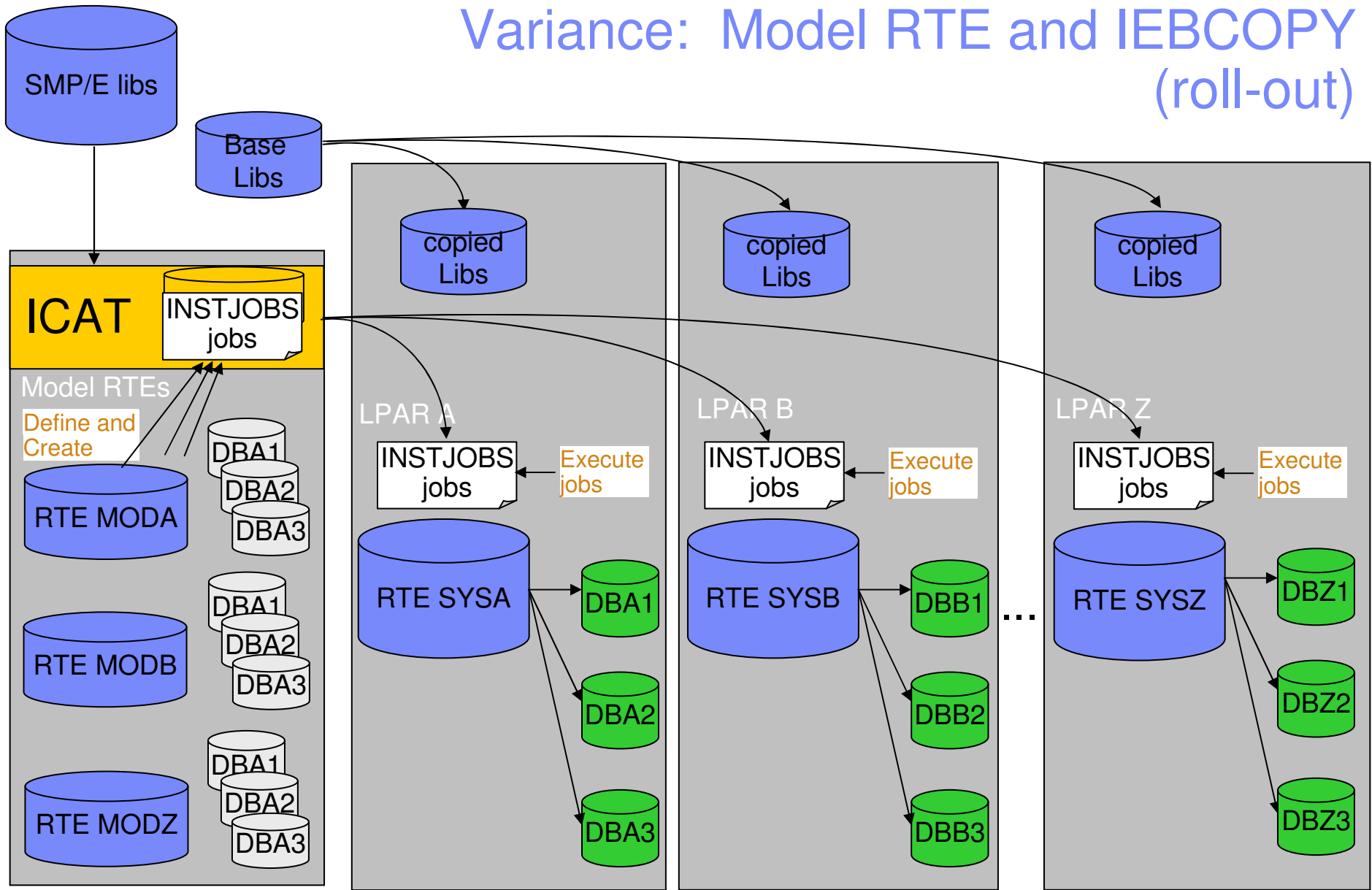*Run of created jobs need to be executed on target LPAR*

Pre-OM PE V420: Model RTE and Batch ICAT (roll-out)

SMP/E libs

Base
Libs

ICAT plus BatchICAT   libs

Model RTE

LPAR A   LPAR B   LPAR Z

Batch
Parmdeck

Define and
Create

RTE MOD1

DBx1

DBx2

DBx3

Batch
Parmdeck

Edit and
Run to
Create

RTE SYSA

DBA1

DBA2

DBA3

Batch
Parmdeck

Edit and
Run to
Create

RTE SYSA

DBB1

DBB2

DBB3

...

Batch
Parmdeck

Edit and
Run to
Create

RTE SYSX

DBZ1

DBZ2

DBZ3

Variance: Model RTE and IEBCOPY (roll-out)

SMP/E libs

Base Libs

copied Libs

copied Libs

copied Libs

ICAT INSTJOBS jobs

Model RTEs

Define and Create

RTE MODA

DBA1
DBA2
DBA3

RTE MODB

DBA1
DBA2
DBA3

RTE MODZ

DBA1
DBA2
DBA3

LPAR A

INSTJOBS jobs ← Execute jobs

RTE SYSA → DBA1

DBA2

DBA3

LPAR B

INSTJOBS jobs ← Execute jobs

RTE SYSB → DBB1

DBB2

DBB3

LPAR Z

INSTJOBS jobs ← Execute jobs

RTE SYSZ → DBZ1

DBZ2

DBZ3

. . .

WHAT is New with DB2 monitoring profiles?

Today

- In larger environments many DB2 subsystems are of the same type and therefore monitored in the same way (same configuration), e.g.

  - Development systems
  - Test systems
  - Production environment 1
  - Production environment 2

  or

  - Data sharing groups with 'n' members

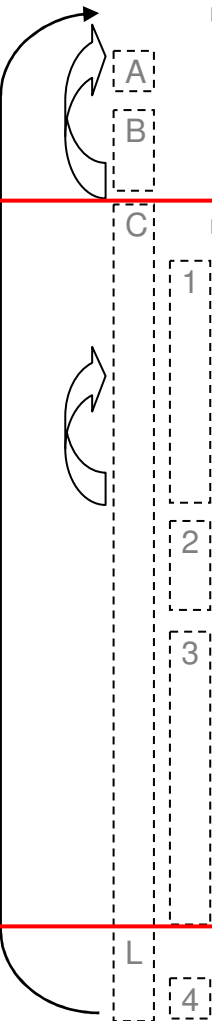# WHAT is New with DB2 Monitoring Profiles?

The improvements

➢ Instead of configuring each single member, each DB2 subsystem
  ▸ Define few profiles for each type of DB2 subsystem
  ▸ Assign the profiles to the DB2 subsystems/members via table view
    ▪ Variable controlled, support of SYSAFF parm
    ▪ Only few additional specification necessary for PWH and PE client port via table view

➢ Changes done for a profile will become effective for all DB2 subsystems to which this profile is assigned.

➢ Easier administration of your whole IT (DB2) monitoring environment

WHAT is New with DB2 Monitoring Profiles?
Let's take the Sharing Base and ICAT libs Scenario

- Copy and create ~~own~~ ICAT libs ~~on each LPAR~~ once
- Add <u>Base once</u> and RTE separately per LPAR
  - ▶ Define setup and names for RTE (Base and RTE, or FULL)
  - ▶ Create jobs to define VSAM and allocate NON-VSAM datasets
  - ▶ Run jobs to define VSAM and allocate NON-VSAM datasets
- Configure and customize per RTE
  - ▶ Define setup of data collector, and RTE wide functions
    - Autostart components, Classic and CUA UI setup, work libs
  - ▶ Define for each DB2 subsystems the DB2 subsystem related setup
    - DB2 libs
    - Setup for autostart components (OA, NTH)
    - Setup for additional features (ATF, Plan, Snapshot history, explain, SQL PA)
  - ▶ Create job for additional RTE datasets (VSAM datasets) for all DB2 subsystems
  - ▶ Run job for additional RTE datasets (VSAM datasets) for all DB2 subsystems
  - ▶ Create job to generate RTE wide startup parameters, commands, and STC jobs, copy specific member from SMP/E libs, assemble and linkedit modules
  - ▶ Run job to generate RTE wide startup parameters, commands, and STC jobs, copy specific member from SMP/E libs, assemble and linkedit modules
  - ▶ Create job to generate DB2 specific parameter member and data collector STC
  - ▶ Run job to generate DB2 specific parameter member and data collector STC

  Instead of ...

  - ▶ Complete the Configuration

A B C 1 2 3 L 4

WHAT is New with DB2 Monitoring Profiles?
=> Define Profiles per DB2 subsystem type and associate
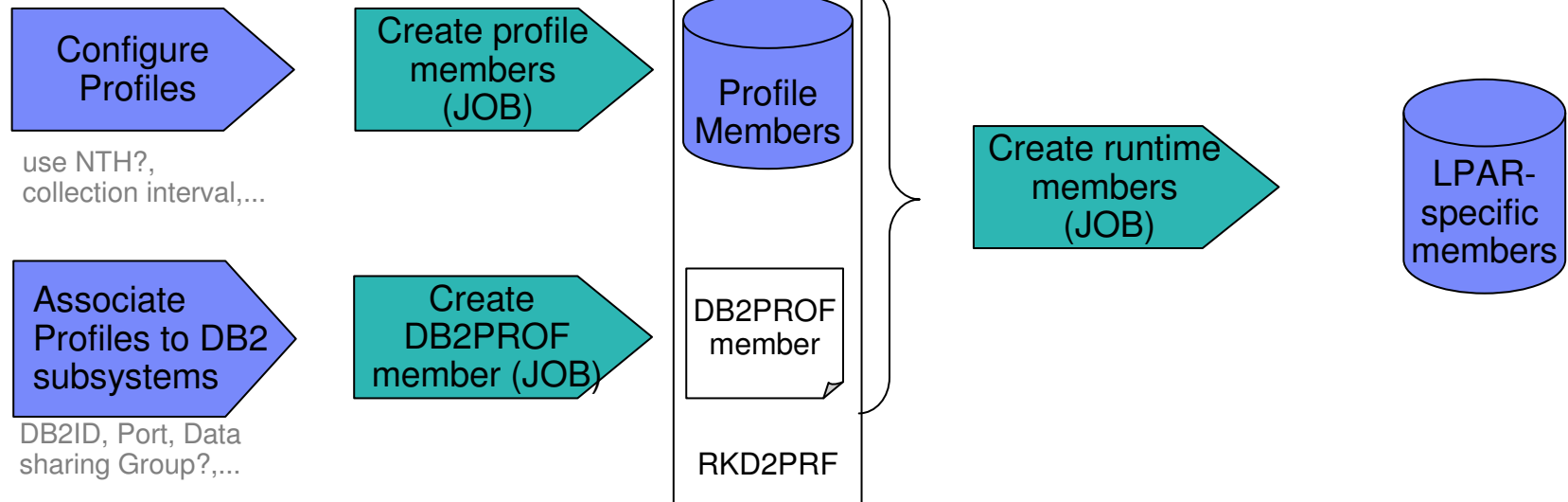
- Configure and customize per RTE
  - ▶ Define basic product setup (RTE wide functions)
    - OMEGAMON Collector, Event Exception, CPU parallelism, DB2 libs for V8 and V9
    - End user interfaces (Classic, CUA, ISPF
    - PE Client support
  - ▶ Create job to generate RTE wide startup parameters, commands, and STC jobs
  - ▶ Run job to generate RTE wide startup parameters, commands, and STC jobs
  - ▶ Define Profiles for the different types of DB2 subsystems (e.g. Dev.,Test, Prod.)
    - Create profile, base definition like DB2 libs
    - Setup for optional features (OA, NTH, Periodic Exception, Snapshot history, Explain, SQL PA)
  - ▶ Create job to generate and save Profile members, to define DB2 subsystem related VSAM dataset, jobs, and parameter members
  - ▶ Run job for to generate and save Profile members, to define DB2 subsystem related VSAM dataset, jobs, and parameter members
  - ▶ Associate DB2 subsystems with Profiles (table view)
    - Define DB2 version, DB2 ssid
  - ▶ Configure Performance Warehouse and PE client for all DB2 subsystems in one step (table view)
  - ▶ Create job to generate DB2 specific parameter runtime member
  - ▶ Run job to generate DB2 specific parameter runtime member

Create runtime members (DB2 subsystem)

Specify
Specify
Specify
**Specify
Config per DB2
subsystem**
Config per DB2
subsystem
Config per DB2
subsystem

Create runtime
members
(JOB)

LPAR-
specific
members

Old approach

DB2 monitoring profile approach

Configure
Profiles

use NTH?,
collection interval,...

Create profile
members
(JOB)

Profile
Members

DB2PROF
member

RKD2PRF

Create runtime
members
(JOB)

LPAR-
specific
members

Associate
Profiles to DB2
subsystems

DB2ID, Port, Data
sharing Group?,...

Create
DB2PROF
member (JOB)

Create runtime members (DB2 subsystem)

```
OMEGAMON XE for DB2 PE - Main Menu -          RTE: SYSA420 -
Option ===>

                                              Last selected
 Perform the following steps in the order presented:  Date    Time

    I  Configuration information (What's New)         <=== Revised

    1  Basic product setup (incl. User interfaces)   09/01/20  15:49
    2  Configure monitoring profiles                 09/01/20  15:28
    3  Configure DB2 subsystem monitoring            09/01/20  15:47
    4  Complete the configuration                    09/01/20  13:56

 Optional:
    5  Install OMEGAMON subsystem
```

```
--------------------- Monitoring profile configuration -------- Row 1 from 2
Option ===>                                        SCROLL ===> CSR

  Select a monitoring profile with an action code, then press Enter.
  Actions: C Clone, D Delete, S Select for processing
  Note:  To add a profile, specify the new profile ID on the first blank line.
         To clone an existing profile, specify the name of the clone on the
         first blank line a

cloned.

     PROFID    Description

  _  DEMO      DB2 V8 demo
  _  TEST      DB2 V9 test
      * * * End of monitor
```

```
OMEGAMON XE for DB2 PE - Profile configuration -      RTE: SYSA420 -
Option ===>

              Monitoring Profile ID: DEMO

  Select the options for the monitoring functions that you want to
  configure for this monitoring profile:

                                                    Last selected
                                                    Date      Time
    1  Object/Volume Analysis configuration   (start ECM)  09/01/20 13:45
    2  Periodic Exception Processing configuration  (disabled)  09/01/20 13:45
    3  Near-Term Historical Collector configuration (enabled)   09/01/20 15:25
    4  Snapshot History configuration               (enabled)   09/01/20 15:18
       (incl. DB2 Connect Monitoring configuration) (enabled)
    5  DB2 EXPLAIN configuration                    (enabled)   09/01/20 13:46
    6  SQL Performance Analyzer configuration       (disabled)

F1=Help  F3=Back
```

Create runtime members (DB2 subsystem)

```
OMEGAMON XE for DB2 PE – Main Menu –            RTE: SYSA420 –
Option ===>

                                                Last selected
   Perform the following steps in the order presented:   Date      Time

     I   Configuration information (What's New)           <=== Revised

     1   Basic product setup (incl. User interfaces)      09/01/20  15:49
     2   Configure monitoring profiles                    09/01/20  15:28
     3   Configure DB2 subsystem monitoring               09/01/20  15:47
     4   Complete the configuration                       09/01/20  13:56
```

```
OMEGAMON XE for DB2 PE  –DB2 subsystem monitoring menu– RTE: SYSA420 –
Option ===>

 Perform the following steps in the order presented:      Last selected
                                                          Date      Time

  1  Associate DB2 subsystems with monit
  2  Specify PE Client port information
  3  Configure Performance Warehouse
  4  Create runtime members (DB2 related

F1=Help  F3=Back
```

```
-------------------- DB2 subsystem monitoring configuration ----- Row 1 f
Option ===>                                            SCROLL ===>

  Specify all DB2 subsystems to be monitored and and associate a profile I

  Actions:
  To add a DB2 subsystem enter values in the first blank line and press EN
  To associate  a profile enter P in the action field and press ENTER.
  To update values change the values and press ENTER.
  To delete a DB2 subsystem enter D in the action field and press ENTER.
  To select a DB2 subsystem enter S in the action field and press ENTER.

        DB2                                                      z/OS
  START ver-                                                     System ID
  (Y,N) sion DB2ID Description                         PROFID   (SMFID)
  _   Y    81   SDE1  SYSA V8_____ DEMO    SYSA
  _   N    81   SDE2  SYSB V8_____ DEMO    SYSB
  _   Y    81   SDE3  SYSA V8_____ DEMO    SYSA
  _   Y    91   SN51  SYSA V9_____ TEST    SYSA
  _   N    91   SN52  SYSB V9_____ TEST    SYSB
              * * * End of DB2ID table  * * *
```

```
Select a DB2ID name with an action code, th
  Actions:
  Y Enable Performance Warehouse for the D
  N Disable Performance Warehouse for the
  S Select existing PWH configuration.


     PWH        PWH
     job name   enabled  DB2ID  Description
  _  SDE1OMP6     Y      SDE1   SYSA V8
  _  _____     N      SDE2   SYSB V8
  _  _____     N      SDE3   SYSA V8
  _  SN51OMP6     Y      SN51   SYSA V9
  _  _____     N      SN52   SYSB V9
   * * * End of Performance Warehouse table
```

Create runtime members (DB2 subsystem)

```
OMEGAMON XE for DB2 PE – Main Menu –            RTE: SYSA420 –
Option ===>

                                          Last selected
 Perform the following steps in the order presented:   Date     Time

   I  Configuration information (What's New)          <=== Revised

   1  Basic product setup (incl. User interfaces)     09/01/20  15:49
   2  Configure monitoring profiles                   09/01/20  15:28
   3  Configure DB2 subsystem monitoring              09/01/20  15:47
   4  Complete the configuration                      09/01/20  13:56

 Optional:
   5  Install OMEGAMON subsystem
   6  Run migration utility

   V  Overview of the current configuration


 F1=Help  F3=Back
```

```
OMEGAMON XE for DB2 PE – Configuration overview –      Row 1 from 5
Command ===>

 User Interfaces (Classic Interface and ISPF Dialogs cannot be disabled):
  Classic      ISPF      PE
 Interface   Dialogs   Client    CUA
     Y          Y         Y        Y


 DB2 subsystem configuration:

                       Perio.                  DB2      DB2        z/OS
                       Excp.           Snapshot Connect  EX-    SQL system ID
 DB2ID PROFID  PWH  OA ECM Proc.  NTH  History  Monit.  LAIN  PA  (SMFID)
 SDE1  DEMO     Y   N  Y   N      Y    Y        Y       Y     N   SYSA
 SDE2  DEMO     N   N  Y   N      Y    Y        Y       Y     N   SYSB
 SDE3  DEMO     N   N  Y   N      Y    Y        Y       Y     N   SYSA
 SN51  TEST     Y   N  Y   N      Y    Y        N       Y     N   SYSA
 SN52  TEST     N   N  Y   N      Y    Y        N       Y     N   SYSB
      * * * End of overview panel  * * *
```
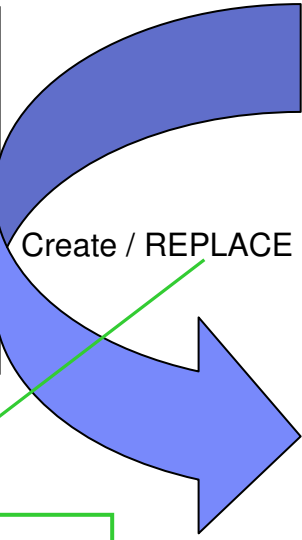
List of all subsystems

Which functi0on are Enabled for a DB2 subsystem

Associate DB2 subsystem with profile

Created DB2PROF member on RKD2PRF:

```
DB2ID=SN51
PROFILE=TEST
SYSTEMID=SYSA
MONITOR_STARTUP=Y
VERSION=91
EXITLIB=SYS1.SN51.SDSNEXIT
PORT=6991
DSG=DSN5
$$
```

Create / REPLACE

```
/*JOBPARM SYSAFF=SYSA
//RPLC    EXEC PGM=IKJEFT01
//SYSEXEC  DD DSN=JEN.KO2.V420.TKANCUS,DISP=SHR
//SYSTSPRT DD SYSOUT=*
//KD2PFRPT DD SYSOUT=*
//SYSTSIN  DD *
%KD2CRPLC +
D01SYS.KO2.V420.SYSA +
D01SYS.KO2.V420.SYSB +
D01SYS.KO2.V420.R +
N +
Y +
Y +
RUN
/*
```

Lib of source (model) RTE

Lib of target RTE

Created profile member template on RKD2PRF:

```
****************************************************************
* NAME: OM PE$002
* ************************************************************
DATASHARINGGROUP=%DSG%
**************************************************************
* Activate Snapshot History Processing
**************************************************************
SNAPSHOTHISTORY=Y
SHDATASETSIZE=16
SHSTATISTICS=(Y,120)
SHSQLCACHE=(Y,300)
SHDATASETSTATISTICS=(Y,300)
SHSYSTEMPARAMETERS=(Y,300)
....
```

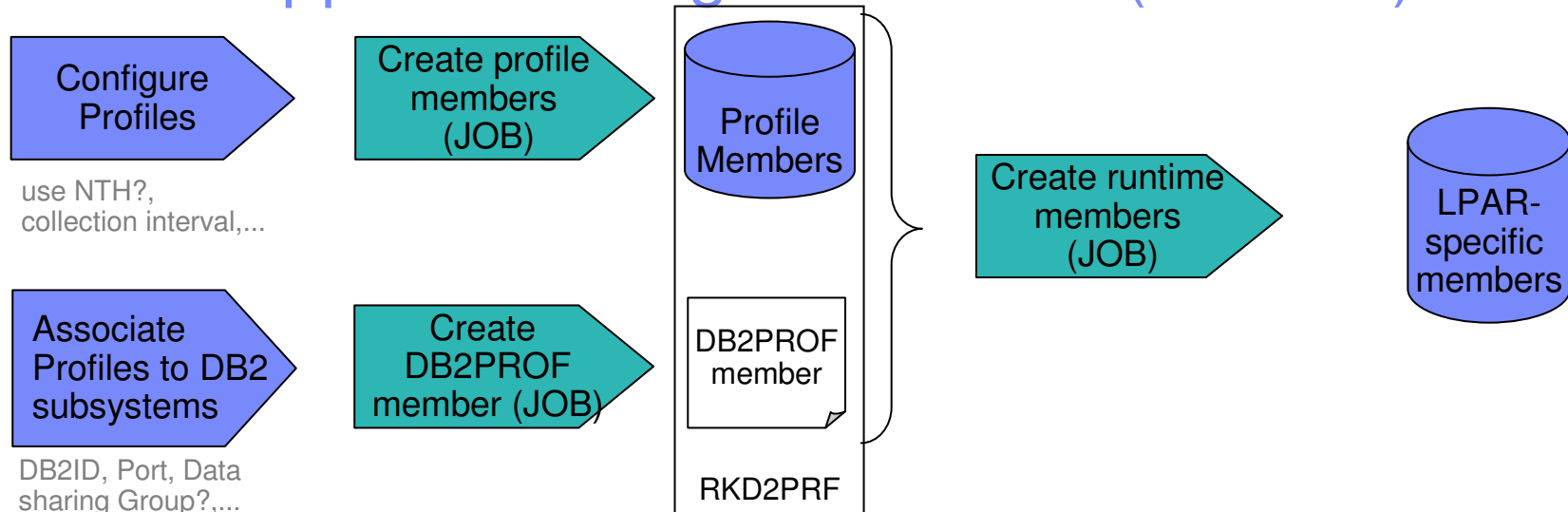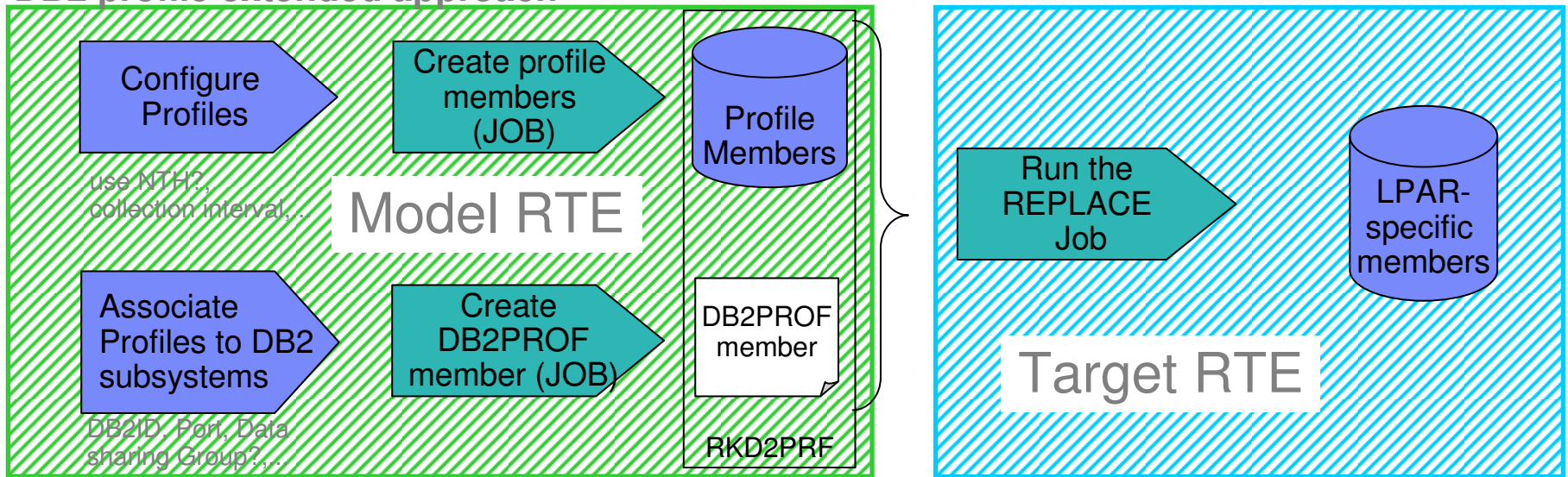**LPAR-specific member on RKD2PAR/RKD2SAM:**

```
****************************************************************
* NAME: OM PED111
* ************************************************************
DATASHARINGGROUP=Y
**************************************************************
* Activate Snapshot History Processing
**************************************************************
SNAPSHOTHISTORY=Y
SHDATASETSIZE=16
SHSTATISTICS=(Y,120)
SHSQLCACHE=(Y,300)
SHDATASETSTATISTICS=(Y,300)
SHSYSTEMPARAMETERS=(Y,300)
....
```

Extended approach using Model RTE (Roll-out)

Configure Profiles

use NTH?,
collection interval,...

Create profile members (JOB)

Profile Members

Associate Profiles to DB2 subsystems

DB2ID, Port, Data sharing Group?,...

Create DB2PROF member (JOB)

DB2PROF member

RKD2PRF

Create runtime members (JOB)

LPAR-specific members

DB2 profile approach

DB2 profile extended approach

Configure Profiles

use NTH?,
collection interval,...

Model RTE

Create profile members (JOB)

Profile Members

Associate Profiles to DB2 subsystems

DB2ID, Port, Data sharing Group?,...

Create DB2PROF member (JOB)

DB2PROF member

RKD2PRF

Run the REPLACE Job

LPAR-specific members

Target RTE

Migrating to V420 DB2 Monitoring Profiles

- Migrating your V410 ICAT configuration to V420 Monitoring Profiles is automatic:

  - Just invoke ICAT and open the RTEs
    (or run BatchICAT again, if previously used)
  - New profile members will be created

- Extended approach may be used to update and roll-out new profiles which were defined on (model) RTE.

Summary – ICAT DB2 monitoring profiles

- **Configure monitoring functionality in a profile and reuse it for many DB2 subsystems**

- **More flexible DB2 subsystem monitoring configuration**
  - ▸ reduce the configuration + rollout effort
  - ▸ easy to move DB2 subsystems from one LPAR to another
  - ▸ easy to add a new DB2 subsystem or change a profile configuration
  - ▸ Less manual changes necessary

- **View all configuration options at a glance**

Future – pre-defined monitoring profiles – OUT OF THE BOX

- **Application development systems**
  - ☑ Real-time
  - ☑ Near-term
  - ☐ Historical

- **Application staging and test systems**
  - ☑ Real-time
  - ☑ Near-term
  - ☑ Historical

- **Production systems**
  - ☑ Real-time
  - ☑ Near-term
  - ☑ Historical

D E V **T E S T** **P R O D**
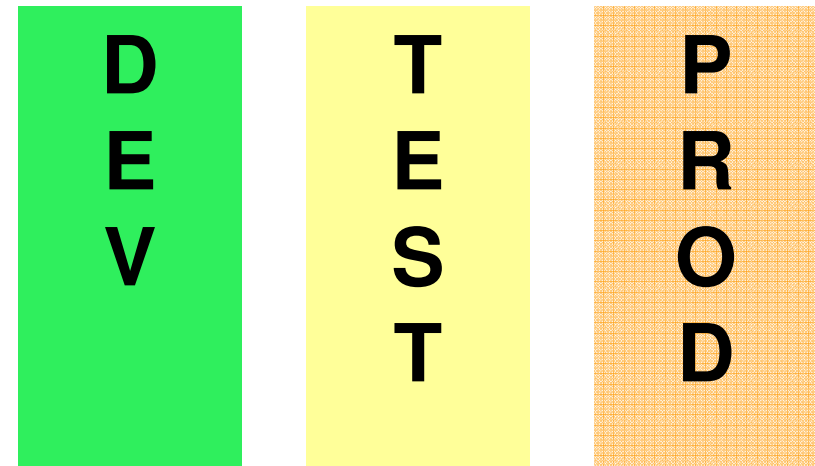
Make PE server subtask stoppable

Currently only **all** PE server instances can be stopped together via OP command. It would be desirable for customers to being able to start/stop each instance separately and - moreover - to being able to start/stop subtasks within each instance (like HM or EXCP) .

- Implementation
  - ▶ New operator commands:
    - The OMEGAMON server subtask PESERVER will accept the following operator commands to start and stop a data server instance:
    - Start the data server instance
      - /F <started task name>,F PESERVER,S <DB2 subsystem ID>
    - Stop the data server instance
      - /F <started task name>,F PESERVER,P <DB2 subsystem ID>
  - ▶ New ICAT options:
    - New private parameter "Start Performance Monitoring" with option "Automatic" or "Manual".

Additional useful manuals

- Tivoli® OMEGAMON XE and Tivoli Management Services on z/OS Version 6.2.1 **Common Planning and Configuration Guide (SC23-9734)**
- Tivoli® OMEGAMON XE and Tivoli Management Services on z/OS **Upgrade Guide (SC23-9745**)

OM PE V420 key focus area: TEP - HTML navigator Navigation prior to OM PE V420 (without the HTML navigator feature)

With OM PE V420: the HTML navigator feature

OM PE V420 Key focus area: Batch Reporting – Accounting Balance CPU vs ACWORK consumption

- Objective: Improve CPU consumption or ACWORK space requirements when invoking Batch Accounting REPORT or SAVE

- Details
  - ▸ Some Batch Accounting SAVE and REPORT jobs were not performing as expected. Some customers wish to minimize the CPU consumption, others to minimize the ACWORK space. However the CPU consumption and the size of ACWORK depend from each other.

- Implementation
  - ▸ Introduction of the new option "OPTIMIZE" that allows the customer to affect a balance between the CPU and the amount of ACWORK space

Batch Accounting – Disk space Estimator

- Objective: Enable the customer to determine the disk space required to process a given input dataset.

- Details
  - ▶ Customers with large systems increasingly run into scalability issues where batch processing results in B37 (out of space).
- Implementation
  - ▶ Batch processing provides a new option "CALCULATE"

  - ▶ If this option is specified along with the normal report requests, the requested report is not produced, but instead the batch job terminates early with the joblog containing an entry stating the size of ACWORK that would be required to process the reports.

Batch Accounting – Disk space Estimator and Balance CPU vs ACWORK consumption

CALCULATE and OPTIMIZE are option of the ACCOUNTIG REDUCE command

```
     ACCOUNTING
          REDUCE
                    CALCULATE
                    OPTIMIZE(ACWORK)        same as OPTIMZE(100)
     ***            OPTIMIZE(CPUTIME)       same as OPTIMZE(0)
     ***            OPTIMIZE(0-100)         option to balance with any
                                               value between CPU and DASD


                    ||
                    ||
                    ||
```

- **DPMLOG contains CALCULATE estimation results**

```
FPEA0800I   THE ALLOCATED SPACE FOR ACWORK WAS SUFFICIENT.
            3027129 BYTES HAVE BEEN WRITTEN TO THE ACWORK DATA SET,
            CONSUMED BY 160 RECORDS WITH AN AVERAGE LENGTH OF 18920.
            THE MAXIMUM RECORD LENGTH WAS 29900.
FPEC0999I   EXECUTION COMPLETE. RETURN CODE 0
```

Batch Statistics (Work File database)

With DB2 9 the previous temporary WORKFILE and TEMP databases were converged into a single WORKFILE database. DB2 9 introduced now via service stream New WORK FILE DATABASE instrumentation which we show in the LONG reports and traces

```
WORK FILE DATABASE                 QUANTITY
---------------------------        --------

MAX TOTAL STORAGE         (KB)         5120

CURRENT TOTAL STORAGE     (KB)         1600
  STORAGE IN 4K TS        (KB)           64
  STORAGE IN 32K TS       (KB)         1536

4K USED INSTEAD OF 32K TS                 0
32K USED INSTEAD OF 4K TS                 0

AGENT MAX STORAGE         (KB)            0
  NUMBER OF MAX EXCEEDED                  0
```

(refer also to ZPARMs MAXTEMPS and IFCID 343)

Batch Statistics (CPU and Storage metrics)

Via Service stream of DB2 V8 and 9 new CPU AND STORAGE METRICS were introduced into IFCID 1. Statistics LONG report and trace shows these instrumentation data. Beside the reports the Performance DB and Performance Warehouse were extended for these fields.

```
CPU AND STORAGE METRICS                    QUANTITY
----------------------------      ------------------

CP LPAR                                        4.00
CPU UTILIZATION LPAR                          39.20
CPU UTILIZATION DB2                            0.00
CPU UTILIZATION DB2 MSTR                       0.00
CPU UTILIZATION DB2 DBM1                       0.00


UNREFERENCED INTERVAL COUNT                65535.00


REAL STORAGE LPAR      (MB)                 3071.00
FREE REAL STORAGE LPAR (MB)                 1537.10
USED REAL STORAGE DB2  (MB)                  194.65


VIRTUAL STORAGE LPAR   (MB)                10269.35
FREE VIRTUAL STOR LPAR (MB)                 8936.10
USED VIRTUAL STOR DB2  (MB)                  194.65
```

In order to get non-zero values, the DB2 subsystem parameter ZOSMETRICS must be switched on and the RMF monitor (Type III) must be running. DB2 retrieves the QWOS values from RMF.

Batch Statistics (IFCID 225)

DB2 V8 introduced a new field `BUFFER MANAGER STORAGE CNTL BLKS` in IFCID 225 (DBM1 storage blocks) to track the storage consumption of the BB1RMID pool (storage pool for page set control blocks)

```
DBM1 AND MVS STORAGE BELOW 2 GB                              QUANTITY
------------------------------------------     --------------------
TOTAL DBM1 STORAGE BELOW 2 GB         (MB)                     228.95
 TOTAL GETMAINED STORAGE              (MB)                     138.87
   VIRTUAL BUFFER POOLS               (MB)                        N/A
...
 TIME AT HWM                                           20:26:48.69
  BUFFER & DATA MANAGER TRACE TBL     (MB)                        N/A
  BUFFER MANAGER STORAGE CNTL BLKS    (MB)                       5.02
 TOTAL FIXED STORAGE                  (MB)                       0.41
...
```

Did you knew: Since DB2 9 IFCID 225 belongs now to SMF type 100.

Batch Statistics (IFCID 225)

```
DBM1 STORAGE ABOVE 2 GB                                     QUANTITY
------------------------------------------------   --------------------
FIXED STORAGE                             (MB)                     6.73
GETMAINED STORAGE                         (MB)                  4429.26
  COMPRESSION DICTIONARY                   (MB)                     7.31
...
VARIABLE STORAGE                          (MB)                   146.13
  DYNAMIC STMT CACHE CNTL BLKS             (MB)                     0.00
  THREAD COPIES OF CACHED SQL STMTS       (MB)                      N/A
    IN USE STORAGE                        (MB)                     0.00
    HWM FOR ALLOCATED STATEMENTS          (MB)                     0.00
STAR JOIN MEMORY POOL                     (MB)                      N/A    ←  v8
...                                                                           only
```

Batch Statistics (miscellaneous)

- DB2 9 introduced new instrumentation (QXSTXMLV) for keeping track of XML storage usage.
- HIGH LOG RBA shows the high used RBA address of the reporting interval now also shown in the Report.

```
MISCELLANEOUS                           VALUE
------------------------     --------------------
HIGH LOG RBA                 00000006660E3B98
BYPASS COL                                  0.00
MAX SQL CASCADING LEVEL                      0.00
MAX STOR LOB VALUES  (MB)                    0.00
MAX STOR XML VALUES  (MB)                    0.00
```

Further Batch Report additions

Statistics

- Show new latch counter field QVLSLC254 added to Report and Trace
- New DB2 new derived value added to the report
    - BP Hit % - Random
    - BP Hit % - Sequential

```
BP1      READ OPERATIONS              QUANTITY
------------------------------       ---------

BPOOL HIT RATIO (%)                    100.00
BPOOL HIT RATIO (%)  SEQU              100.00
BPOOL HIT RATIO (%)  RANDOM            100.00
```

Record Trace

- Support of new fields

System Parameter

- Support of new fields

ITM 6.2.1 Improvements

▶ **Provide additional Batch Mode improvements for faster deployment.**

▶ <u>**Requirements:**</u>

- ▪ **Provide Phase 3 support of "Clone batch parameter members" function.**
  Benefit: This RTE Utility already provides a more automated "*quickstart*" RTE generation for faster deployment of our products. Phase 2 provided further functionality in allowing a customer to select/exclude the list of products to clone. Phase 3 will allow a customer to specify what type of TEMS to clone (if any), etc.

▶ <u>**Enablement support:**</u>

- ▪ Common Infrastructure: Future HKCI310 PTF UA43882 configuration PTF.

ITM 6.2.1 Improvements

Support High-Availability z/OS Hub TEMS

- What is the High-Availability HUB capability?
  - ‣ Similar to the clustering capabilities on distributed platform, this will define an HA solution for z/OS which will fulfill customer failover requirements for a z/OS-based Hub TEMS.

- Enabled via
  - ‣ Common ICAT infrastructure maintenance:
    - Future HKCl310 and HKDS621 PTF
    - Plus OM PE enablement support out of the box

Other ITM 6.2.1 highlights

- 64-bit integer support (in agent, TEMS, TEPS)
- TDW support now on z/OS

Packaging improvements - NEW

- 1 DVD for app support

- ITM is no longer bundled, but pre-req'd

- Refer also to technote
  - http://www-01.ibm.com/support/docview.wss?uid=swg21255545

References - Bibliography

Publication title OMEGAMON XE for DB2 PM/PE on z/OS V420	number
Configuration and Customization	GC19-2511
Messages	GC19-2506
Monitoring Performance from the OMEGAMON Classic Interface	SC19-2507
Monitoring Performance from ISPF	SC19-2509
Monitoring Performance from Expert Client	SC19-2508
Reporting Users Guide	SC19-2510
Report Reference	SC19-2504
Report Command Reference	SC19-2505
Information Roadmap	GC18-9834
IBM DB2 Buffer Pool Analyzer User's Guide	SC19-2512
IBM DB2 Buffer Pool Analyzer Configuration Guide	SC19-2513
OMEGAMON XE for DB2 Performance Expert on z/OS Program Directory	GI10-8721
OMEGAMON XE for DB2 Performance Expert on z/OS License Information	GC18-9992
OMEGAMON XE for DB2 Performance Expert on z/OS Japanese Program Dir.	GI10-8722

IBM Tivoli OMEGAMON XE for DB2 Performance Monitor / Expert on z/OS

Teleconference: More control of your system performance

Steven Fafard, email: sfafard@us.ibm.com
Norbert Jenninger, email: jen@de.ibm.com