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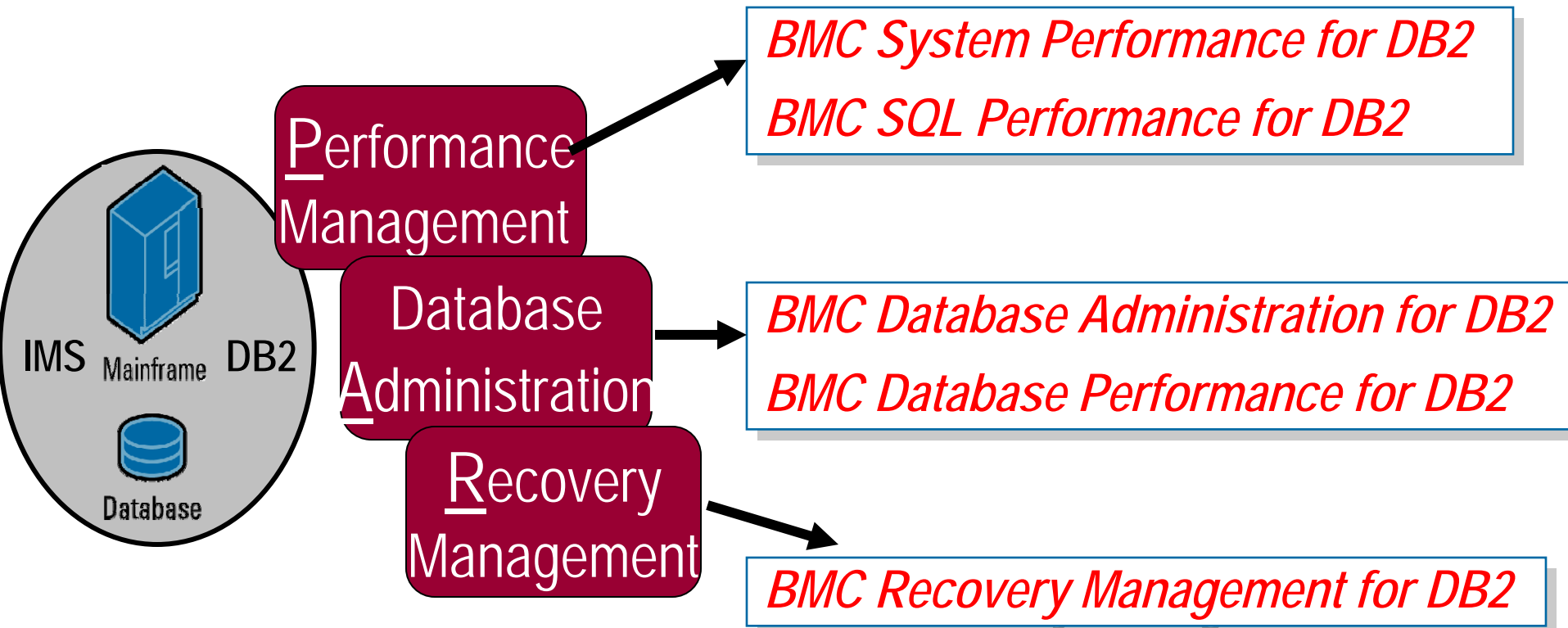


BMC DB2 9 Support and Other Great Things

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BMC Data Management DB2 on z/OS Solutions



BMC DB2 9 Support Timeline

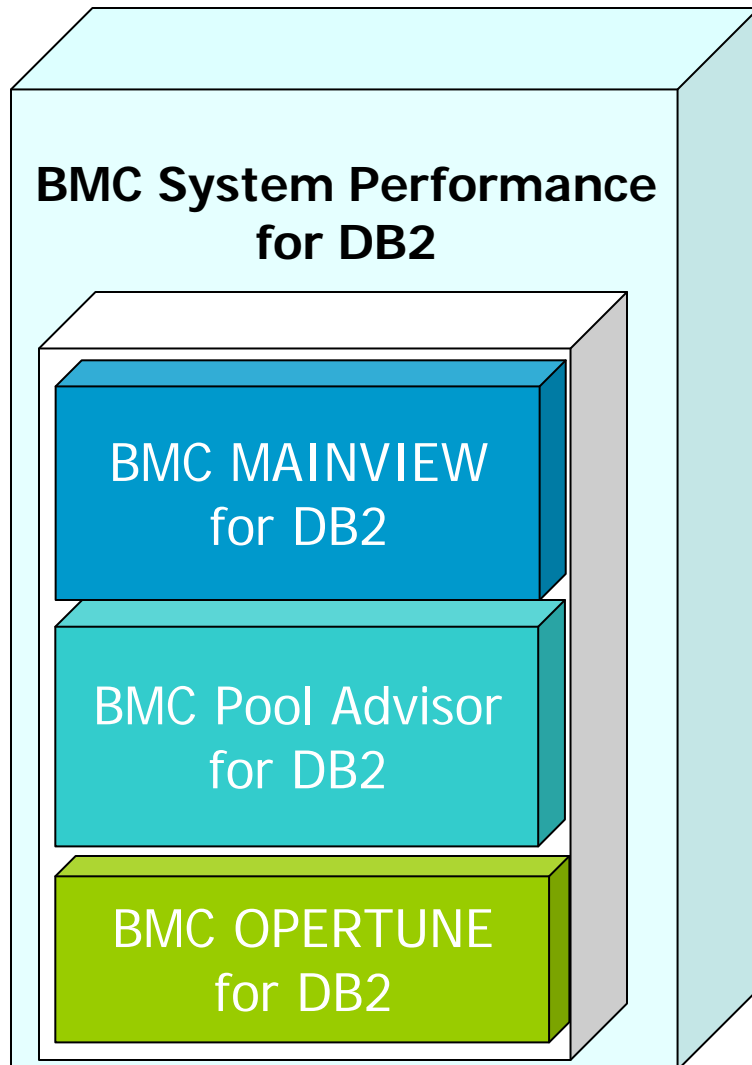


- › BMC System Performance for DB2 9.1
 - August, 2007
- › BMC SQL Performance for DB2 9.1
 - August, 2007
- › BMC Recovery Management for DB2 8.1
 - August 2007
- › BMC Database Administration for DB2 4.1 & 4.2
 - Initial support in August 2007
 - Extensive Addition DB2 9 support in June 2008
- › BMC Database Performance for DB2 4.1 & 4.2
 - Extensive support in August 2007
 - Additional DB2 9 support in June 2008 (utility only)

More detail to follow

BMC System Performance for DB2

An Introduction



› Solution objectives

- Solve the problem of monitoring, managing and optimizing the performance of DB2 subsystems
- Increase staff productivity by providing built-in intelligence and automation with *advisor technology*

› Solution Components

- BMC MAINVIEW for DB2 on z/OS
 - Provides the tools to manage enterprise-wide DB2 performance on z/OS
- BMC Pool Advisor for DB2
 - Actively manages DB2 virtual storage usage
 - Can optimize storage resources across pools
 - Delivers solution functionality that automates problem resolution
- BMC OPERTUNE for DB2
 - Provides the means to make many DB2 configuration changes easily and immediately

MAINVIEW for DB2



Storage Specifics

- ◆ Buffer Pools
- ◆ EDM Pool
- ◆ Statement Cache
- ◆ Storage Details

Exception Analysis

- ◆ Extensive exception facility
- ◆ Integration with AutoOperator

```
W1 =EZDBA=====18=====D=====1
Analyze One DB2
. Set Context t
> DB2 Easy Menu
Current Status
. DB2 Status Detail
. DB2 Storage - Detail

Analyze One or More DB2s
. Exceptions-Monitor
. Exceptions-Alert/Alarm
> Page Set Menu

Current Thread Activity
. Active Threads
> Thread Menu
. Suspended Threads/Lock
> Locking Menu

Workload Analysis
. Thread History
. Workload Objecti
. Lockout Events (
. Lockout Events (
. Lock Contention

Catalog / Explain
. History Traces
. Start Trace
> Event Traces

Catalog Manager
> SSI Easy Menu
Current Status
. DB2 Status List
. DB2 Storage / DB2
. Buffer Pool Totals/DB2

MAIN Menu
. What's New
```

Current Thread Activity

- ◆ Current Thread Details
- ◆ Details by Connection
- ◆ Stored Procedure Details
- ◆ Summaries by Multiple Qualifiers

Object Analysis

- ◆ I/O Response Times
- ◆ Catalog Analysis
- ◆ Restricted Object Analysis

Workload Analysis

- ◆ Thread History
- ◆ Detail Thread Accounting
- ◆ Summaries by multiple qualifiers

Application Analysis

- ◆ Detailed Application Tracing
- ◆ SQL Analysis with Explain support
- ◆ Lock Analysis

DB2 9 Impacts on Performance Products



- › 64-bit – DIST address space
 - Numerous DDF control block changes
- › Two new pools separated from EDM for SKCT & SKPT, one pool ATB
- › Many new ZPARMs (25 or so)
- › New instrumentation – statistics, accounting, storage, detail events
 - New SQL types, XML lock, new counts, etc.
- › New thread identifiers
 - Role and trusted context
- › Converging of temp space usage into WORKFILE database
- › New Start Trace qualifiers
- › IP V6 support
 - Location can now actually be a long name

BMC MAINVIEW

DB2 9 Support



› New accounting data in various views

- Package switch count added (count of executions!)
- New class 3 wait for TCP/IP LOB materialization
- Accounting Class 10 supported
- Show role, trusted context and original application userid
- New SQL counts

› New statistics data in various views

- New Preemptible SRB and ZIIP fields
- New skeleton pool details (SKCT, SKPT)
- New commands (4)
- 9 new SQL counts
- New views for converged temp table / work files

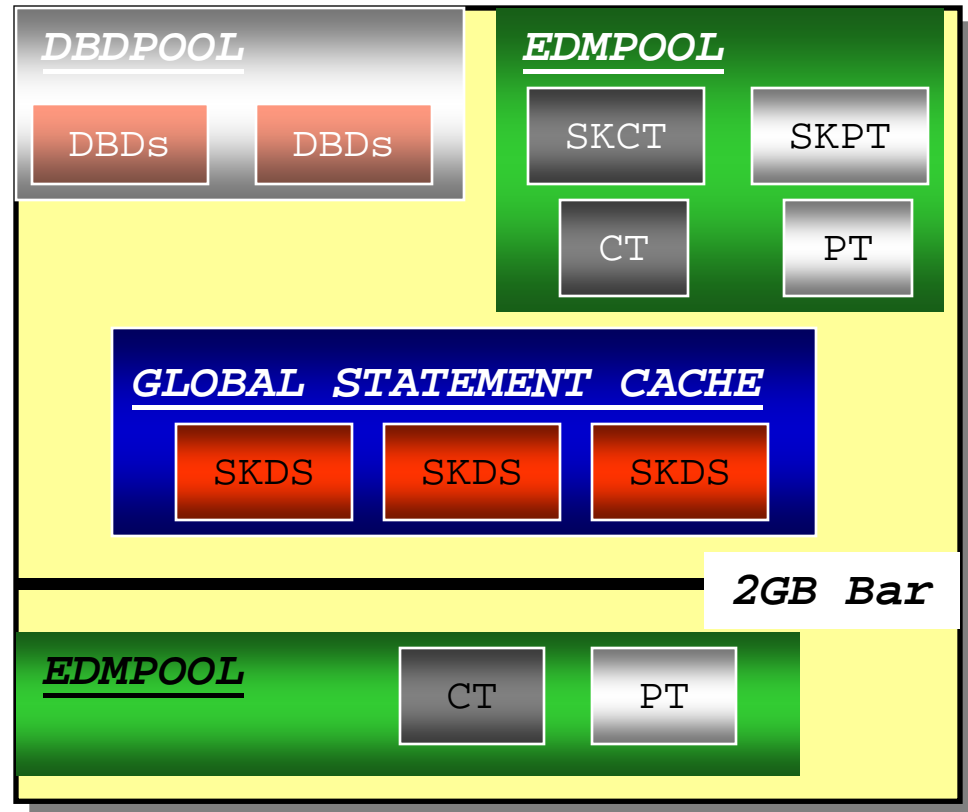
› ZPARAMs

- All new ZPARAMs (20-25) added to appropriate detail views and indexes



› EDMPOOL changes – more above the bar

- Plan and package skeletons above the bar
- Bound/Prepared DML Statements
 - Statement Text
 - SQLDA DESCRIBE output
 - Portion of native SQL PL package
- Portions of static SQL sections (CT/PT) are moved as well
- Requires rebind to realize full benefit
- Further reduces VSC in the DBM1 address space
 - Reduces below-the-bar storage by 10% - 15% on average



MAINVIEW for DB2 Views STEDMP/D – EDM Changes



```
W1 =STEDMPD=====DIA1=====*=====17JUN2008==21:40:23
```

EDM Pool Statistics Detail....

Storage Usage.....	%Pool	#Pages
EDM Pool.....		12867

Section for new pools – (n/a if not V9)

Skeleton Statement Pool Below.		25600
Free.....	86.98	22266
Used for CT.....	0.13	34
Used for PT.....	12.89	3300
Skeleton Statement Pool Above.		524287
Free.....	100.00	524287
Used for CT.....	0.00	0
Used for PT.....	0.00	0

New package search data

Package search Not-found.....		
Not-Found Records Found...	0	398
Not-Found Records Added...	0	72
Not-Found Records Removed.	0	0



› Trace Enhancements

- Additional DB2 9 qualifiers when starting a DB2 9 trace
 - Correlation ID, workstation user/transaction/application
 - Better filtering by DB2, instead of after-the-fact in MAINVIEW for DB2
 - Cost reductions
- Three new DB2 9 trace events have been added
 - TCP/IP LOB Materialization Lock Waits
 - Trusted context DDL and usage

› XML Lock Types have been added to lock views (LS*) and to DTRAC events

› Support for IP V6 Long Names

Additional Navigation and Usability Enhancements



- › Improved DB2 Status views
- › The ZPARM index views ZPNAMEx have been revised to improve readability
- › THDACTV view has been extensively revised to improve usability and add new fields
 - A new hyperlink is provided on the enclave token field to the MAINVIEW for z/OS WLM enclave view WMENCLVZ
- › Enhanced DDF Monitoring
 - Views with extensive information about distributed client access
 - Active threads (DBATs)
 - Inactive connections waiting for additional SQL requests
 - All DRDA requests including DB2 Connect PE / EE and Java
 - TCP/IP and VTAM information
 - Unique overview data on network connections / conversations
 - With drilldown to conversation details or active thread details

MAINVIEW for DB2

Enhanced DDF Monitoring



- › A central view of DDF (Distributed Data Facility)
 - Hyperlinks to different areas of interest

```
24MAR2008 13:03:20 ----- MAINVIEW WINDOW INTERFACE (V5.0.05) -----
COMMAND ==> █ SCROLL ==> PAGE
CURR WIN ==> 1 ALT WIN ==>
W1 =EZDDF=====DHN1=====*=====24MAR2008==13:03:20===MVDB2===D===1

          DB2 DDF Menu
-----+-----+
| Place cursor on |
| menu item and  |
| press ENTER    |
+-----+-----+

Connections
. Client Products - SSI
. All Locations
. TCP/IP Locations
. SNA Locations
> Connection Menu

Monitors
. DBAT DRDA Workload
. DBAT PVT Workload
. DDF DIST Paging
. DDF Active Monitors

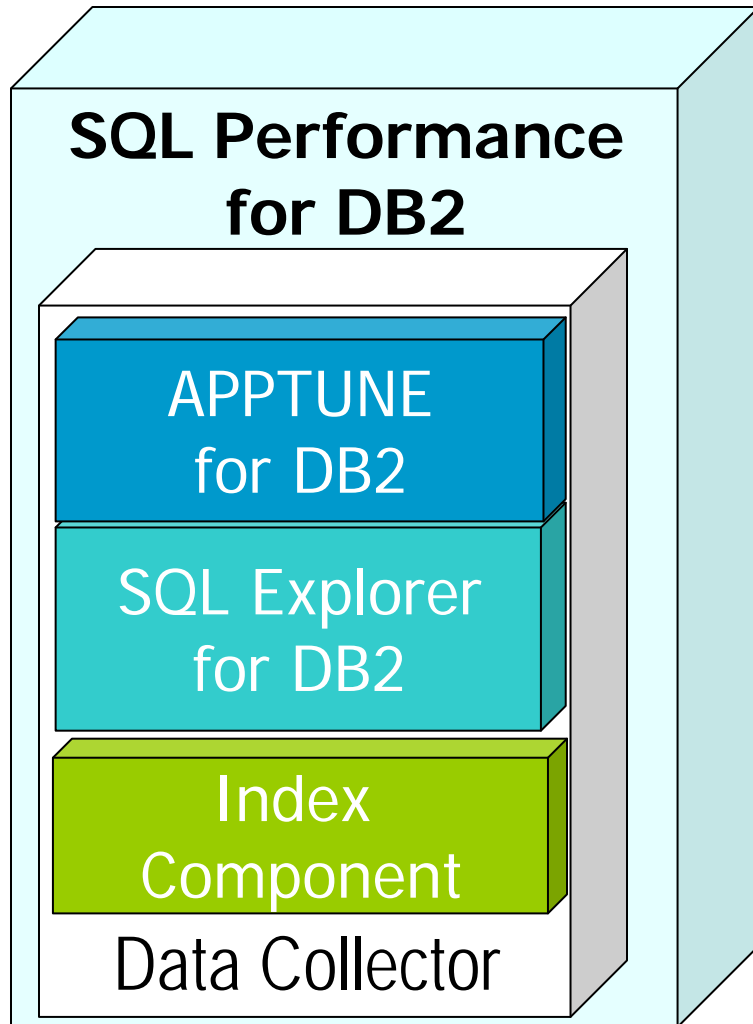
Threads
. Active DBATs
. DB2 Connect
. Univ. JDBC Driver
. Inactive Threads

Statistics - One DB2
. Global DDF Statistics
. DDF Activity Counts

Statistics - SSI
. Global DDF Statistics
. DDF Activity Counts

ZPARAMs - One DB2
. DDF ZPARAMs
```

BMC SQL Performance for DB2 Solution Overview



› Solution objectives

- Identify and solve SQL performance problems quickly
- Control or eliminate poorly performing SQL code
- Proactive identification of inefficient SQL

› Solution components

- APPTUNE captures and analyzes SQL execution metrics
- SQL Explorer is the SQL tuning tool that proactively identifies performance problems
- Index Component provides specific reports and analysis for effectively managing DB2 indexes

DB2 9 Impact for SQL Explorer / Common Explain / Index Component



- › All new DB2 9 data types are supported in SQL Explorer, Index Component and Common Explain.
 - Note: DECFLOAT was not included in DB2 9's beta code and may not work in DB2 9 at GA.
- › All new DB2 9 SQL Syntax changes are supported
- › New Index on Expression is supported in Common Explain and Index Component.
- › Universal Table Space type is supported by the cloning feature in the Index Component
- › Index Component cloning feature also supports copying histogram statistics from the original index into the new columns in SYSCOLDIST and the new table SYSKEYTGTDIST.



DB2 9 – SQL Statements Accessing XML objects



SQL Statement Accessing XML

Program	Call Type	Sect No.	Stmt No.	SQL Calls	SQL Errors	Total Elapsed	IN-SQL CPU	Time	Getpage
+ XML003	SELECT	8	160	1	1	00:00.00036	00:00.00031		5
						Averages:	00:00.00036	00:00.00031	5
Statement Type: STATIC									
SQL Statement text:									
* SELECT	CID, XMLSERIALIZE(XMLQUERY('fn:substring(//phone/text(),5,10)' PASSING BY REF INFO) AS CLOB(8))								
INTO	:H, :H								
FROM	AFDQA.M5CUSTOMER								
WHERE	XMLSERIALIZE(XMLQUERY('fn:substring(//phone/text(),1,3)' PASSING BY REF INFO) AS CLOB(3)) LIKE :H								

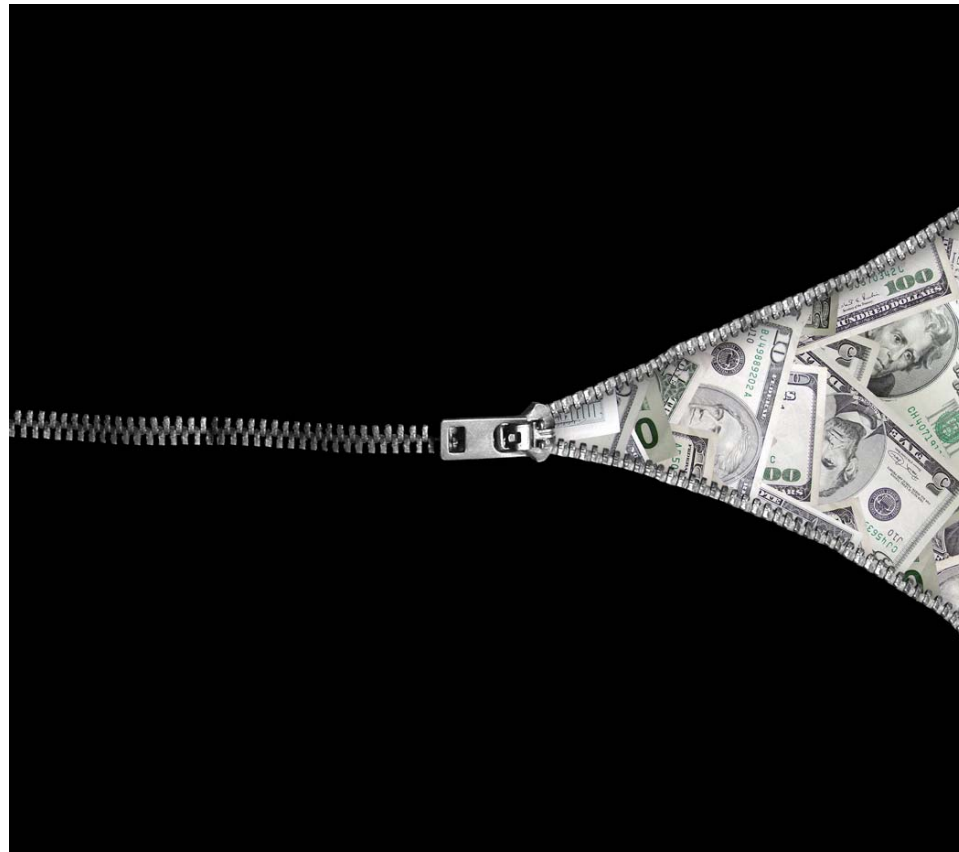
Object Report Showing XML Object access characteristics

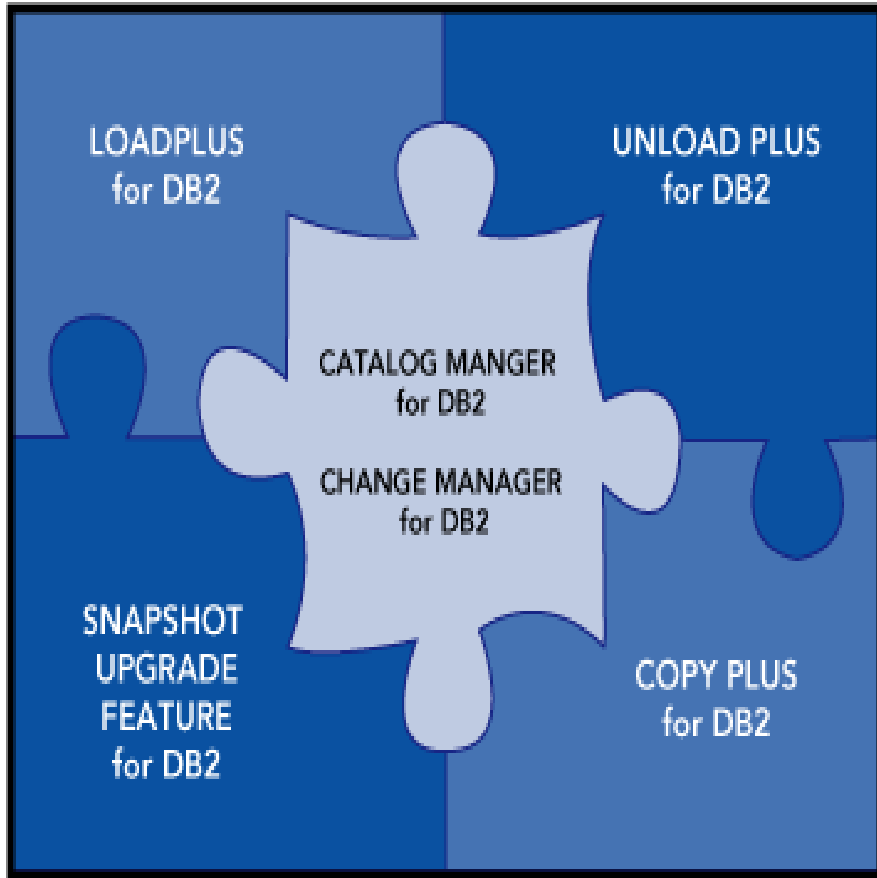
Creator	Name	Ty	BPool	BPool HRatio	Getpage Number	Time	% failed
+ AFDQA	M5CUSTOMER	T	BP0	100 %	2	00.0000	0.5 0
+ AFDQA	I_NODEIDX M5CUSTO>>	I	BP0	100 %	2	00.0000	0.4 0
+ XML5	XM5C0000		BP16K0	100 %	1	00.0000	0.2 0

zIIP Processor Reporting Support



- › APPTUNE, SQL Explorer, and the Index Component can all report on SQL workloads running on a zIIP processor
- › APPTUNE 6.1 includes reporting on zIIP specific metrics





› Administration Components

- Comprehensive Catalog Management
- Automation Schema management within and across DB2 subsystems
- Drives BMC and IBM utilities to move data at high speed with high reliability

› Integrated high-speed utilities

- UNLOAD PLUS – drives unload processes at high speeds with extensive data conversion facilities
- LOADPLUS – Populates DB2 tables and indexes at high speed with added functionality
- COPY PLUS – High-speed copies standalone or as part of the schema management process
- SNAPSHOT UPGRADE – enables online utility function

CATALOG MANGER for DB2 9.1

DB2 9 Support



- › CATALOG MANAGER supports the following features of version 9 of DB2 Universal Database for z/OS:
 - Create, alter, and drop trusted context and role objects
 - Create lists from new catalog tables
 - Supports new keywords on the CREATE and ALTER panels, and on Utility panels
 - GRANT and REVOKE commands support grant and revoke privileges on the new object types and authorizations
 - CATALOG MANAGER provides the ability to rename indexes and columns
- › Native SQL Stored Procedure report added via SPE in August 2008
 - New and updated panels provided
 - Command generation
 - ACTIVATE, REGENERATE, BINDDEPLOY, REBIND
- › Additional SPEs will be delivered on an on-going basis

CATALOG MANAGER for DB2 9.1

Additional Enhancements



- › Enhanced ability to search for users using the SEARCH US command
- › Enhancements to panels
 - Improved usability, maintainability, and consistency enhancements have been made to the Confirm SQL panels
 - 13 additional special registers added to the DB2 Special Registers panel, some of them updateable. Special registers include:
 - Client Application Name
 - Client User Id
 - Client Workstation Name
- › Ability to specify options for the DESCRIBE report
 - Include/exclude specific data
 - format of the data
 - order of column names
 - width of the column that displays the data

CHANGE MANAGER for DB2 9.1

DB2 9 Support



- › ALTER TABLE RENAME COLUMN statement to rename a table column
- › Rename indexes with the RENAME INDEX statement
- › Increased index buffer pool sizes
- › Using the LOGGED attribute to turn off table space logging
- › universal table spaces (range-partitioned and partition-by-growth)
- › XML data types in DB2 objects, and XPATH expressions in XML value index statements
- › New SQL data types:
 - BIGINT, which supports big integers
 - BINARY, which represents a fixed-length binary string
 - VARBINARY, which represents a varying-length binary string
- › Objects that are created implicitly
- › New SQL statements and functions in view and trigger text
- › Use of an ALTER TABLE statement to modify a column's default value instead of dropping and re-creating the table
- › index compression
- › Random ordering of index key columns

CHANGE MANAGER for DB2 9.1

Additional Enhancements



› Support for IBM UNLOAD utility

- The products now support using the IBM UNLOAD utility with the IBM LOAD utility to perform the following tasks:
- dynamically allocate unload (SYSREC) data sets
- unload and load columns that contain XML, LOB, and Unicode data
- multitask by unloading and loading data in partitioned table spaces
- unload and load data in a full-recovery baseline

› Ability to perform online reorganizations

- CHANGE MANAGER can now build a worklist that includes an online reorganization when the
 - WORKID contain only changes that can be accomplished by using ALTER statements
 - BMC REORG PLUS for DB2 and the IBM DB2 REORG utility are supported
- Some limitations exist

Database Administration Solution 4.1

Getting to DB2 9



- › Leveraging BMC solution features to get to DB2 9
 - BMC solution supports new DB2 9 features and automates implementation
- › CATALOG MANAGER for DB2
 - Generates DDL for creation/alteration of objects using new features
 - As an example
 - Add a CLONE
 - New commands, utility options etc.
- › CHANGE MANAGER is the answer for features that require a drop/rebuild process
 - Completely automates the process
 - Leverage the CM/Pilot feature to automate mass changes

```
ALTER TABLE MKTCWR.RM_IND_2  
ADD CLONE MKTCWR.CLONE_RM_IND_2;
```

CHANGE MANAGER for DB2 CM/PILOT



› “DML-like” language

- Data manipulation-like language that is used to update, delete, and migrate DB2 data structures
- Can perform mass changes to objects
- INSERT, LIKE, UPDATE, DELETE, MIGRATE DB2 objects
- Portable, so you can take it from site to site and use it over and over again...

MIGRATE DATABASES

**INCLUDE DATA, TABLES, FOREIGNKEYS, INDEXES, VIEWS,
TABLESPACES, AUTHORIZATIONS, SYNONYMS, ALIASES**

WHERE

NAME = 'DEMOCIS0';

CHANGE MANAGER for DB2 9.2

CM/PILOT...For Example



- › With CM/Pilot UPDATE DML a user can change
 - TCP and ICP tablespaces to partition by range tablespaces
 - TCP, ICP and other single table tablespaces to partition by growth tablespaces
 - And many other changes
- › With migrate DML a user can also do the same conversions above and produce a migrate worklist
- › DML Examples

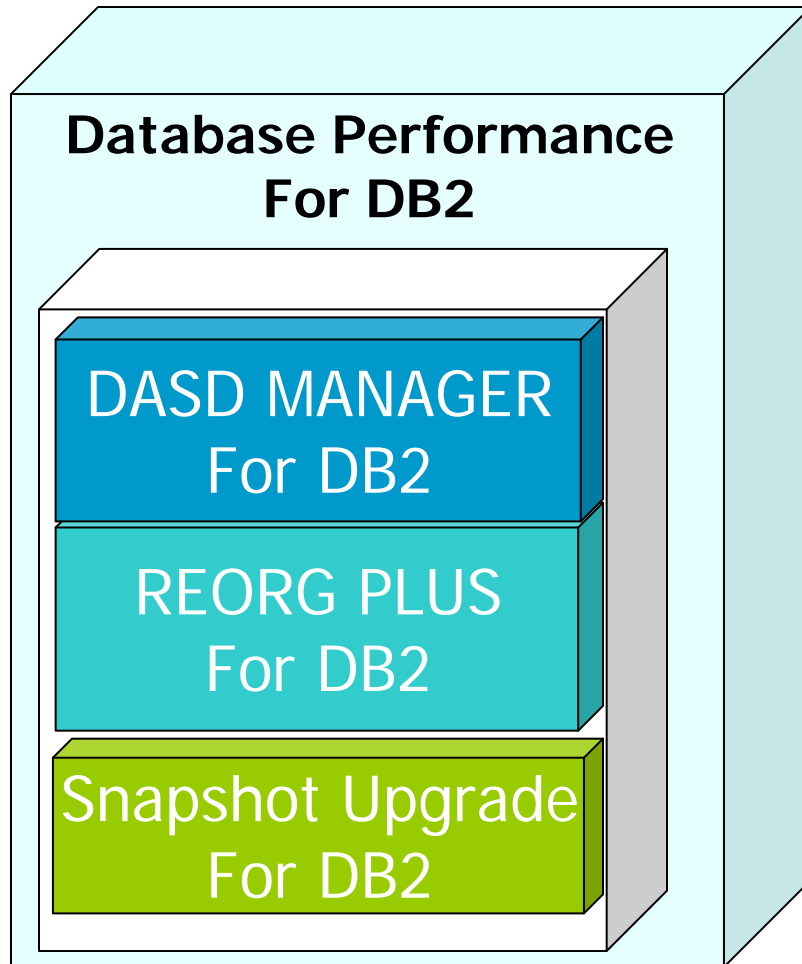
Change TCP/ICP to Partition By Range

```
UPDATE TABLESPACE  
SET SEGSIZE = 32  
WHERE  
  DBNAME LIKE 'DEMTCP%';
```

Existing Tablespace to Partition By Growth

```
UPDATE TABLESPACE  
SET MAXPARTITIONS = 10  
WHERE DBNAME = 'MG025'  
AND NTABLES = 1;
```

BMC Database Performance for DB2 Solution Overview



› Solution objectives

- Automate utility processes
- Eliminate unnecessary utility processes

› Solution components

- DASD MANAGER for DB2 automates utility processing
 - Collects statistics, including RTS
 - Identifies objects in need of maintenance
 - Generates optimized job streams
- REORG for DB2 reduces CPU and improves elapsed time for reorganizations
- Snapshot Upgrade for DB2 enables online utility execution for BMC utilities

DASD MANAGER PLUS for DB2 9.1

DB2 9 Support



- › Columns renamed through the DB2 RENAME COLUMN option
- › Universal table spaces – Partitioned by Range or Growth
- › The universal table space can either be partitioned-by-growth or by range:
 - › Table spaces that defined as NOT LOGGED
 - › Clone tables
 - › New data types
 - BIGINT
 - VARBINARY
 - BINARY
- › Index page sizes of 4 KB, 8 KB, 16 KB, or 32 KB
- › Histogram statistics
- › SMS class definitions in STOGROUP definitions

DASD MANAGER PLUS for DB2 9.1

Additional Enhancements



- › Direct integration to the DB2 real-time statistics (RTS) catalog tables

–RTS exceptions used to BMCTRIG process

Panel name	Keyword	Exception Name
Append inserts	APPENDINS	APPNDINS
Mods since copy	COPYMODS	COPYMODS
DB2 RTS	DB2RTS	N/A
Load after copy	LOADAFTERCOPY	LOADCOPY
Load after stats	LOADAFTERSTATS	LOADSTAT
Rebd after copy	REBDAFTERCOPY	REDBCOPY
Rebd after stats	REBDAFTERSTATS	REDBSTAT

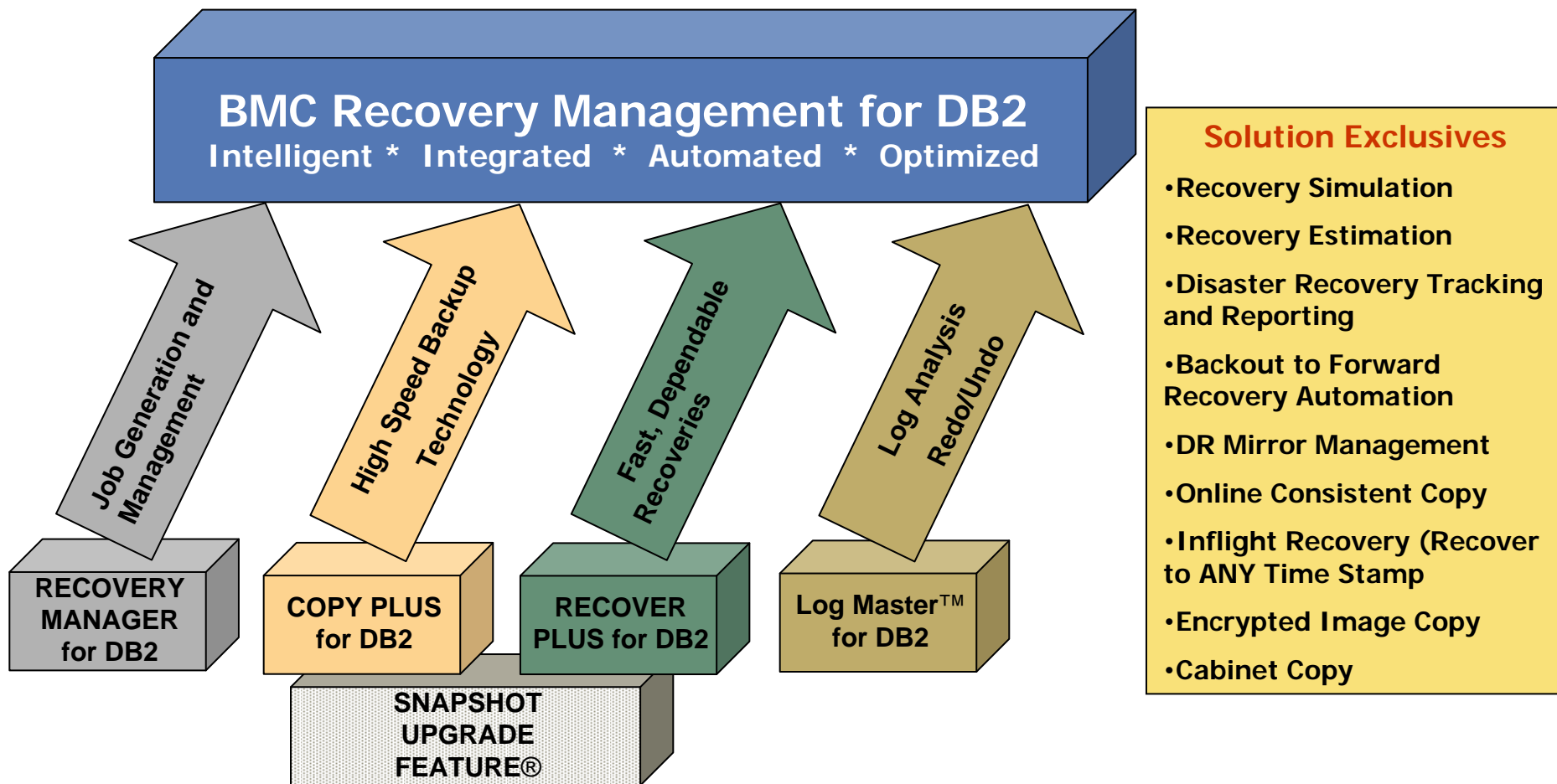
Panel name	Keyword	Exception Name
Reorg after copy	REORGAFTERCOPY	REORCOPY
Reorg after stats	REORGAFTERSTATS	REORSTAT
Mass del reorg	REORGMASDELETE	REORMDEL
Mods since reorg	REORGMODS	REORMODS
Mass del stats	STATSMASDELETE	STATMDEL
Mods since stats	STATSMODS	STATMODS
Unclust inserts	UNCLUSTINS	UNCLUST

- › Added support for BMC and IBM utility options
- › Improved performance in statistics collection process
- › Numerous additional usability enhancement

BMC Recovery Management for DB2 Solution Overview



Integrating the capabilities of mature, patented functions.



The sum is greater than the parts

Recovery Management for DB2 8.1

DB2 9 Support



- › XML related spaces - supports backing up and recovering XML-related objects by using either BMC or IBM utilities
- › Automatic creation of objects – Implicitly created objects are supported
- › NOT LOGGED objects – Support back up and recovery of objects with the NOT LOGGED attribute
- › New catalog and directory spaces – Supports back up and recovery of new DB2 9 Catalog and Directory spaces
- › Index pages greater than 4 KB – 8KB, 16KB, and 32KB index pages are supported
- › Universal table spaces – Supports back up & recovery of partition-by-range and partition-by growth tablespaces
- › Reordered row format (RRF) is supported
- › Index on expression – Supports new index in DB2 9
- › Compressed indexes – Supports back up and recovery of compressed indexes
- › Clone tables – Supports tablespaces containing cloned tables in the group creation, backup and recovery JCL generation, and reporting

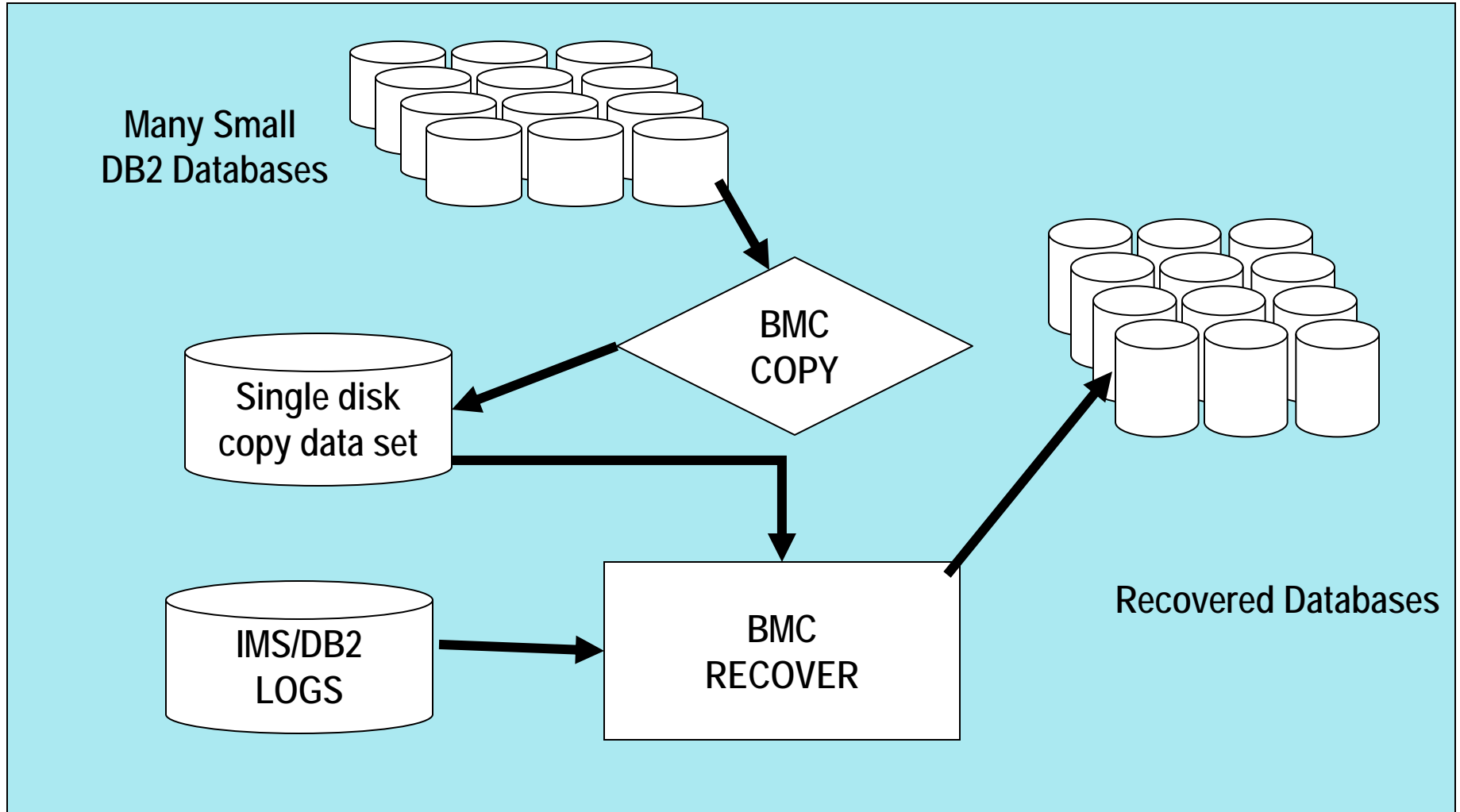
Recovery Management for DB2 8.1

Additional Enhancements



- › Cabinet copy – Combines multiple tablespace copies into a single sequential dataset
 - Reduces dataset allocation overhead significantly
- › BACKOUT AUTO strategy for enhanced recoveries
 - RECOVER PLUS enhancements improve performance, reduce errors and simplifies restart actions
- › Incremental index copies
 - Supports creating and restoring incremental index copies
- › Online Consistent Copy enhancements
 - RECOVER PLUS supports forward recovery by using Online Consistent Copies and log apply to recover to the current time or to a point in time

Recovery Management for DB2 8.1 CABINET COPY in Action



Summary



- › Extensive support across all DB2 solutions delivered in August 2007
- › Major releases in June 2008 filled gaps in the administration solutions
 - Remaining gaps being addressed with SPEs (Small Programming Enhancements) in many cases
- › Major new releases of performance solutions coming in November
- › BMC remains strongly committed to the DB2 on z/OS market
 - Timely support for new DB2 releases
 - Added value in each product release