



DB2 9 for z/OS Is Here: Part 1 – Overview



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TAKE BACK CONTROL

DB2 9 for z/OS – Addressing corporate goals

- Evolve Your Environment & SOA
 - Integrated pureXML®
 - WebSphere® integration
- Improved IT Infrastructure for Compliance Efforts
 - Trusted security context
 - Database roles
 - Auditing, encryption improved
- Simplify development and porting
 - Many SQL improvements
 - Native SQL stored procedures
 - DDL porting improvements
- Data Warehousing
 - SQL enhancements
 - Query optimization improvements
- Decrease Complexity and Cost
 - Performance improvements
 - Volume-based backup/recovery
 - Index compression
 - Optimization Service Center
- Continuous Availability
 - Schema evolution enhancements
 - Partition by growth
 - Fast table replacement



DB2 9 for z/OS Innovation: SOA and XML

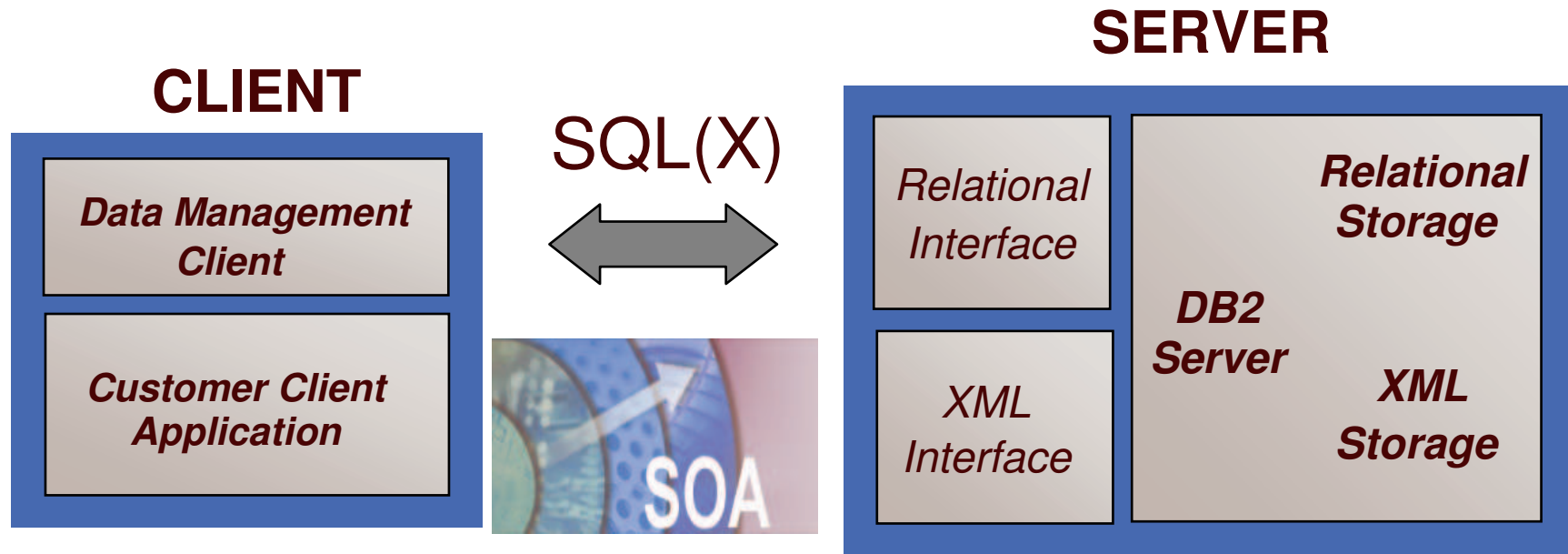
- Integration with WebSphere
- Native XML data type, hybrid data base server





Capabilities Inside the Engine pureXML™

Performance, Performance, Performance



Native storage Schema Index Functions Utilities



*"This is not a bolt-on or band-aid approach,
DB2 9 for z/OS is XML without compromise"*
Kevin Campbell, Application Architect, Univar USA



Optimistic Locking Support

- Built-in timestamp for each row or page
 - Automatically updated by DB2
 - Allows simple timestamp predicate to validate that row has not changed since last access
- Eliminates need for complex predicates on WebSphere CMP updates, improves performance



DB2 9 for z/OS Innovation: Data Privacy, Security, and Regulatory Compliance

- ❑ Network Trusted Contexts
- ❑ Roles
- ❑ Improved auditing
- ❑ Secure Socket Layer
- ❑ Encryption enhancements

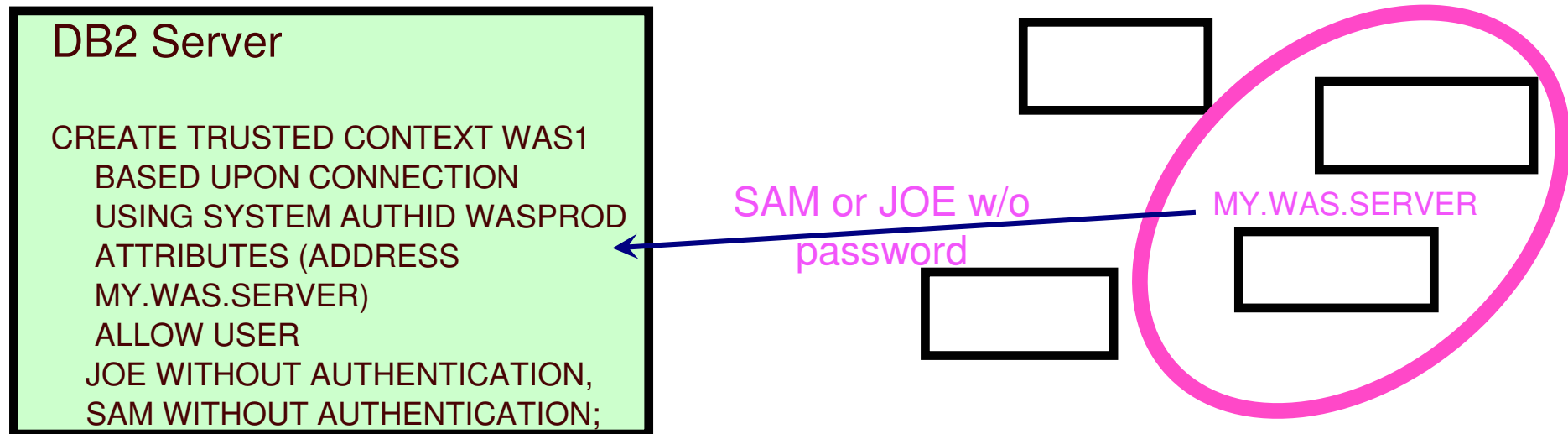


"The new security and compliance tracking capabilities of DB2 9 for z/OS will allow us to simplify our existing process..."
- Bob Perih, Senior Vice President, Citigroup



Trusted Security Context

- Identifies “trusted” DDF, RRS Attach, or DSN application servers
- Allows selected DB2 authids on connections without passwords
 - reduces complexity of password management
 - reduces need for an all-inclusive “system authid” in app servers with ability to switch users
 - more visibility/auditability of which user is current running
 - enables mixed security capabilities from a single app server



Database ROLES

- ROLE is a “virtual authid”
 - Assigned via TRUSTED CONTEXT
 - Provides additional privileges only when in a trusted environment using existing primary AUTHID.
 - Can optionally be the OWNER of DB2 objects

```
CREATE ROLE PROD_DBA;  
GRANT DBADM ... TO PROD_DBA;
```

```
CREATE TRUSTED CONTEXT DBA1 ...  
    DEFAULT ROLE PROD_DBA  
    WITH ROLE AS OBJECTOWNER;
```



DB2 9 for z/OS Innovation: SQL

- ❑ Numerous new SQL capabilities
- ❑ Easier application porting
- ❑ Simplified application development



DB2 Family SQL

z z/OS V7

common

LUW Linux, Unix & Windows V8.2



Z { Range partitioning

C
O
M
M
O
N { Inner and Outer Joins, Table Expressions, Subqueries, GROUP BY, Complex Correlation, Global Temporary Tables, CASE, 100+ Built-in Functions, Limited Fetch, Insensitive Scroll Cursors, UNION Everywhere, MIN/MAX Single Index Support, Self Referencing Updates with Subqueries, Sort Avoidance for ORDER BY, and Row Expressions, Call from trigger, statement isolation

U
W { Updateable UNION in Views, ORDER BY/FETCH FIRST in subselects & table expressions, GROUPING SETS, ROLLUP, CUBE, INSTEAD OF TRIGGER, EXCEPT, INTERSECT, 16 Built-in Functions, MERGE, Native SQL Procedure Language, SET CURRENT ISOLATION, BIGINT data type, file reference variables, SELECT FROM UPDATE, DELETE & MERGE, multi-site join, 2M Statement Length, GROUP BY Expression, Sequences, Scalar Fullselect, Materialized Query Tables, Common Table Expressions, Recursive SQL, CURRENT PACKAGE PATH, VOLATILE Tables, Star Join Sparse Index, Qualified Column names, Multiple DISTINCT clauses, ON COMMIT DROP, Transparent ROWID Column, FOR READ ONLY KEEP UPDATE LOCKS, SET CURRENT SCHEMA, Client special registers, long SQL object names, SELECT from INSERT



DB2 Family SQL

z z/OS V9

common

LUW Linux, Unix & Windows Viper



z

Multi-row INSERT, FETCH & multi-row cursor UPDATE, Dynamic Scrollable Cursors, GET DIAGNOSTICS, Enhanced UNICODE for SQL, join across encoding schemes, IS NOT DISTINCT FROM, Session variables, TRUNCATE, DECIMAL FLOAT, VARBINARY, optimistic locking, FETCH CONTINUE, ROLE, MERGE

c

o

m

m

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n

Inner and Outer Joins, Table Expressions, Subqueries, GROUP BY, Complex Correlation, Global Temporary Tables, CASE, 100+ Built-in Functions including SQL/XML, Limited Fetch, Insensitive Scroll Cursors, UNION Everywhere, MIN/MAX Single Index Support, Self Referencing Updates with Subqueries, Sort Avoidance for ORDER BY, and Row Expressions, 2M Statement Length, GROUP BY Expression, Sequences, Scalar Fullselect, Materialized Query Tables, Common Table Expressions, Recursive SQL, CURRENT PACKAGE PATH, VOLATILE Tables, Star Join Sparse Index, Qualified Column names, Multiple DISTINCT clauses, ON COMMIT DROP, Transparent ROWID Column, Call from trigger, statement isolation, FOR READ ONLY KEEP UPDATE LOCKS, SET CURRENT SCHEMA, Client special registers, long SQL object names, SELECT from INSERT, Range partitioning, UPDATE, DELETE & MERGE, INSTEAD OF TRIGGER, Native SQL Procedure Language, BIGINT, file reference variables, XML, FETCH FIRST & ORDER BY in subselect and fullselect, caseless comparisons, INTERSECT, EXCEPT, not logged tables

u

w

Updateable UNION in Views, GROUPING SETS, ROLLUP, CUBE, 16 Built-in Functions, SET CURRENT ISOLATION, multi-site join, MERGE, XQuery



Text improvements in DB2 9

- 30 new & improved character functions
- Index on expression: e.g. UPPER, COLLATION_KEY
- LOB improvements
- pureXML
- Text search server



DB2 9 Spatial Support

Enabling Open Geospatial Consortium (OGC) compliant geospatial applications

- Spatial data types
- Spatial functions and predicates
- Spatial indexes
- Spatial search
- OGC-compliant spatial catalog



Map
GPS
Address
Street
State
...



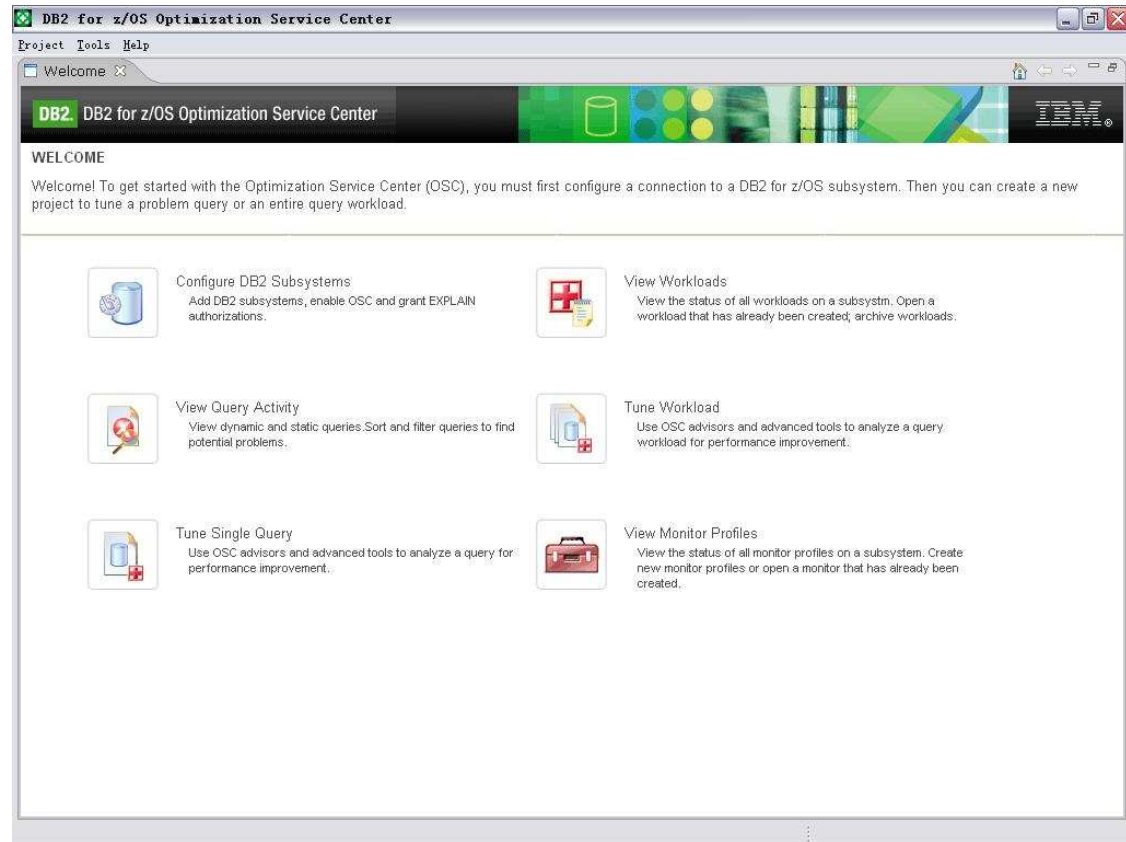
DB2 9 for z/OS Innovation: Data Warehousing

- ❑ SQL enhancements
 - ❑ OLAP functions
- ❑ Query optimization improvements
 - ❑ More Statistics
 - ❑ Star Join enhancements
 - ❑ And more ...
- ❑ Index improvements
- ❑ Optimization Service Center



Performance Tuning with the Optimization Service Center

- Identify Problem Query
- Tune Problem Query
- Monitor & Capture Query Workload
- Tune Query Workload



DB2 9 for z/OS Innovation: Cost

- ❑ Cost Savings
 - ❑ Performance improvements
 - ❑ Synergy with System z
 - ❑ Reduced Complexity



DB2 9 for z/OS Performance Improvements

- Synergy with new hardware: zIIP, MIDAW, DS8000
- Significant CPU time reduction in most utilities
- Indexing improvements, index compression
- INSERT performance improvements
- LOB performance improvements
- DDF enhancements
- Logging improvements
- Query/Access Path Performance Enhancements
- Improved virtual storage usage below bar



Synergy with new I/O hardware

- DS8000 with Ficon Express and MIDAW (Modified Indirect Data Address Word)
 - MIDAW requires z9 (2094) and z/OS 1.6 or later
 - Sequential read throughput
 - 40MB/sec on ESS 800
 - 69MB/sec with DS8000
 - 109MB/sec with DS8000 and MIDAW
 - 138MB/sec with 2 stripes
 - Bigger read, write, preformat quantity
 - 183MB/sec in sequential read with 2 stripes
 - Similar for write
 - Performance gap between EF (Extended Format) and non EF datasets or 4K and bigger page practically gone



Utility CPU time reduction up to –

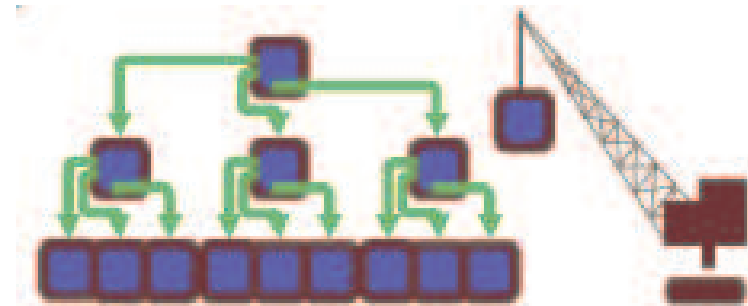
* primarily from index processing

- 10% to 20% in Copy, Recover table space / index*
- 5% to 30% in Load*, Reorg*, Rebuild Index*
- 20% to 60% in Check Index*
- 35% in Load Partition*
- 30% to 40% in Runstats Index*
- 40% to 50% in Reorg Index*
- 70% in Load Replace Partition with dummy input*



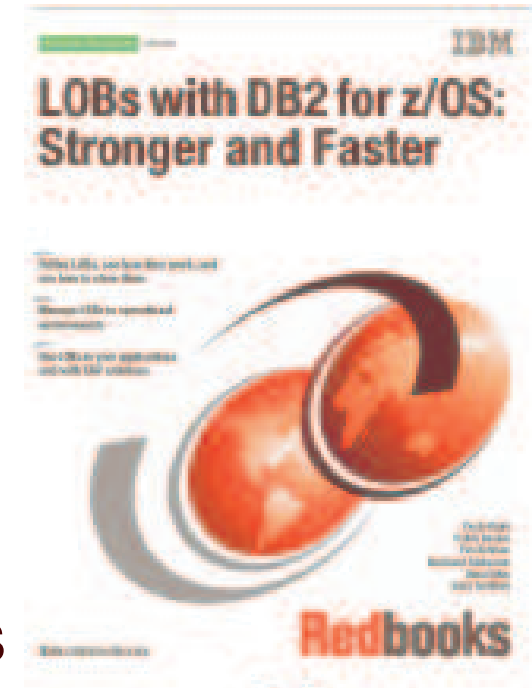
Index Changes

- Index compression
 - Compression of indexes for BI workloads
 - No compression dictionaries – compression on the fly
- INDEX on expression
- Ability to identify unused indexes
- Page sizes 8K, 16K, 32K
- Online REBUILD INDEX
- REORG without BUILD2
- Randomized index key



LOB Functionality

- SQL
 - File reference variables
 - FETCH CONTINUE
 - Automatic object creation
- New network flows for delivering LOBs
- Utilities
 - REORG reclaim fragmented space and improve access performance
 - REORG share level reference (read only)
 - Online CHECK LOB & CHECK DATA
 - Sample unload DSNTIAUL



DDF Improvements

- 64-bit exploitation by DDF
 - Special “shared private” with DBM1 to eliminate many of the data moves on SQL operations
- Support for IPv6 and SSL
- VTAM definition is now optional
- Prepare for elimination of PRIVATE protocol requester
 - Includes tools for identifying which packages need to be bound at remote servers



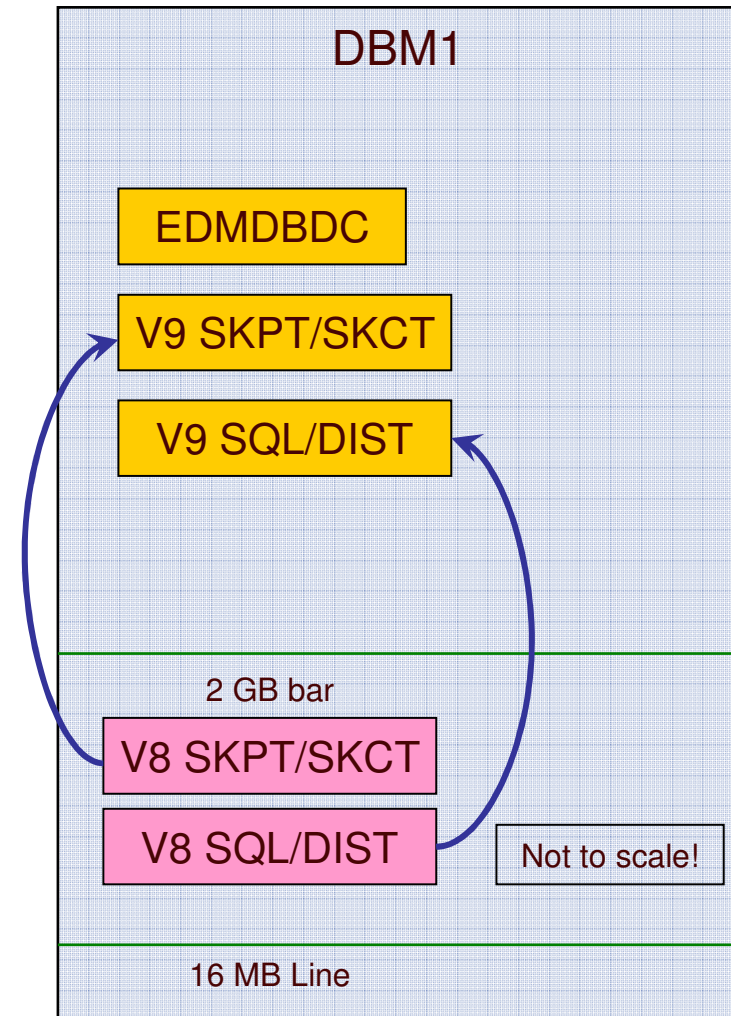
Volume-based backup/recovery

- FlashCopy technology used to capture entire content of disk volumes
- RECOVER modified to enable object-level recovery from volume FlashCopy
 - Restore assumes that the object has not moved volumes
- Eliminates labour associated with setting up COPY jobs for each database / table space
- Full integration of tape into BACKUP/RESTORE SYSTEM utilities



DB2 9 VSTOR Constraint Relief

- EDMPOOL Changes:
 - V8 – DBD storage moved above 2GB bar.
 - V9 – SKCT and SKPT storage and some CT/PT storage moved above 2GB bar.
- Other changes:
 - Some storage acquired for distributed applications moved above 2GB bar.
 - Some storage acquired for dynamic SQL statement execution moved above 2GB bar.



Availability/Usability Enhancements

- Fast replacement of one table with another – CLONE tables
- Rename column and index
- Rename SCHEMA and VCAT
- Table space that can add partitions, for growth
- Modify ERLY code without requiring an IPL
- LOGGED / NOT LOGGED table spaces and indexes
- Create & alter STOGROUP SMS constructs
- More online utilities
- Recover to consistent PIT without need for a quiesce



DB2 9 Data Sharing Enhancements

- Restart performance enhancements
 - Reduced impact of retained locks
- Auto-recover GRECP/LPL objects on group restart
- Index performance improvements
- Detect unused indexes so they can be dropped
- Various GBP enhancements
- Log latch contention relief
- DB2 overall health taken into account for WLM routing
- Balance group attach connections across multiple members on same LPAR



Reduced Cost of Administration

Comprehensive Data Management Tools

Agility

- DataQuant
- Query Management Facility
- WebSphere Replication Server

New

Enhanced

Performance

- DB2 Optimization Expert
- OMEGAMON XE for DB2 PE
- DB2 Query Monitor

New

Compliance

- DB2 Audit Management Expert
- DB2 Data Archive Expert
- DB2 Test Database Generator
- IBM Encryption Tool

Enhanced

Efficiency

- DB2 Utilities Suite
- DB2 Storage Management Utility
- DB2 recovery expert
- DB2 Automation Tool

Enhanced



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