

# IBM System z Technology Summit



## DB2 10 Overview & Migration Planning

**Presenter Name**

**Title**



# DB2 for z/OS The most robust and cost effective data server

## DB2

## DB2 9

## DB2 10



- Deep synergy with System z
- HW Compression
- Consolidation

- Up to 20% utility CPU savings
- Compress indexes, save 50% disk
- Native SQL procedures
- More CPU on specialty engines

- Save up to 5-10% CPU batch & transactions out-of-the-box (rebind)
- On-the-fly data Compression
- Temporal data support
- Skip-level migration



- Unmatched availability
- Unparalleled security
- Industry leading reliability

- Flexible context and role security
- Expanded online schema changes
- Volume level backup & recovery

- Ten times more concurrent users
- More online schema changes
- More granular access control



- Near-linear scalability
- Optimized for SOA
- Flexible development
- Warehousing capabilities

- Seamless integration of XML and relational
- Improved SQL
- Partition by growth
- OLAP expressions

- Enhanced query parallelism
- More SQL compatibility
- Improved pureXML and SQL PL

**V8 out of service April 2012**

## Top 10 in DB2 10 for z/OS

1. CPU reductions for transactions, queries, & batch
2. Ten times more users by avoiding memory constraints
3. More concurrency for catalog, utilities, and SQL
4. More online change: data definition, utilities, & subsystem
5. Improved security with more granularity
6. Temporal or versioned data
7. SQL enhancements improve portability
8. pureXML performance and usability
9. Hash, index include columns, skip migration, ...
10. Productivity improved for database & systems administrators, and application programmers



**Pick your**

**favorite!**

# DB2 10 for Cost Savings and Performance

- Significant savings in processing costs
- Up to 6 times the number of SAP users on a single system
- Time Travel temporal capabilities built directly into the database
- Direct Row access accelerates high performance applications



*"We have measured a 38% reduction in CPU for heavy insert workloads in a data sharing environment. That's a significant savings which provides immediate business benefit."*

*Peter Paetsch, BMW Group*

*"We expect to reduce our data sharing requirements by 25%, which means less system, storage and resource expenses."*

*Banco do Brasil*



*"The new temporal functionality in DB2 10 for z/OS will allow us to drastically simplify our data-related queries and reduce our processing cost by having DB2 handle data movement more efficiently than our custom code."*

*Large Insurance Company*



*"As much as 80% of our applications can use this, which will drastically save developer time and even more importantly make applications easier to understand to improve business efficiency and effectiveness."*

bankdata

*"In addition to the cost savings, DB2 10 for z/OS offers a far superior data server environment than Oracle."*

*Manuel Gomez Burriert, CECA  
(Spanish Bank Federation)*



*"As a multi-national corporation, we must adhere to strict local audit requirements. The security and administration capabilities in DB2 10 are a key driver for us to move to this version."*

UniCredit Group

## Some Beta Customer Performance Feedback

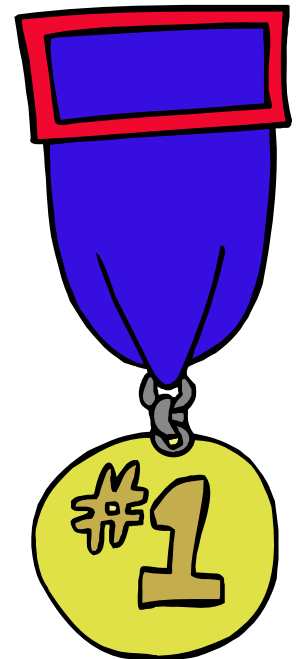
Workload	Results
Customer1: Distributed Concurrent Insert	50% DB2 elapsed time reduction; 15% chargeable CPU reduction after enabling high perf DBAT
Customer2: CICS online transactions	Approx. 7% CPU reduction in DB2 10 CM after REBIND, Another 4% reduction with 1MB page usage
Customer3: CICS online transactions	Approx 5% CPU reduction
Customer4: Data sharing heavy concurrent insert	38% CPU reduction
Customer5: Queries	Average CPU reduction 28% from V8 to DB2 10 NFM
Customer6: Batch	Overall 28% CPU reduction after rebind packages
Customer7: DDF OLTP	40% CPU reduction for JDBC stored procedures workload, 15% CPU reduction for securities trading

## Beta Customer Feedback on Selected New Functions

Workload	Results
Multi row insert (data sharing)	33% CPU reduction from DB2 9, 4x improvement from V8 due to LRSN spin reduction
Parallel Index Update	30-40% Elapsed time improvement with class 2 CPU time reduction
Inline LOB	SELECT LOB shows 80% CPU reduction
Include Index	17% CPU reduction in insert after using INCLUDE INDEX
Hash Access	20-30% CPU reduction in random access 16% CPU reduction comparing Hash Access and Index-data access. 5% CPU reduction comparing Hash against Index only access

## Top Items Driving DB2 10 Decisions

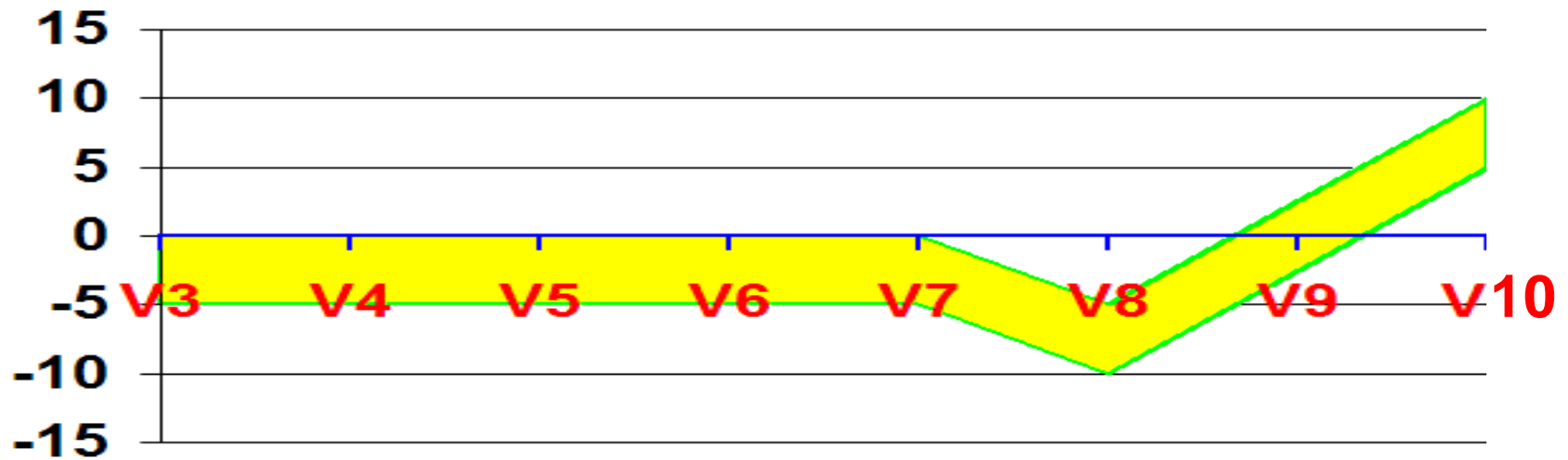
- **CPU / Performance improvements**
  - **Virtual storage enhancements**
    - Reduce number of members, save money
  - **Stability & regression**
  - **Security enhancements**
    - Built-in security, trace & audit features, new roles, end-to-end auditing
    - Cleaner/safer environment; Better audit/compliance
  - **Temporal**
- Vast majority of beta customers plan production in 2011**
- **Skip-level migration DB2 V8 → DB2 10**



## DB2 10 Performance

- Most customers 5% - 10% CPU reduction out of the box after rebind
- Some workloads and customer situations can reduce

### Average %CPU improvements version to version



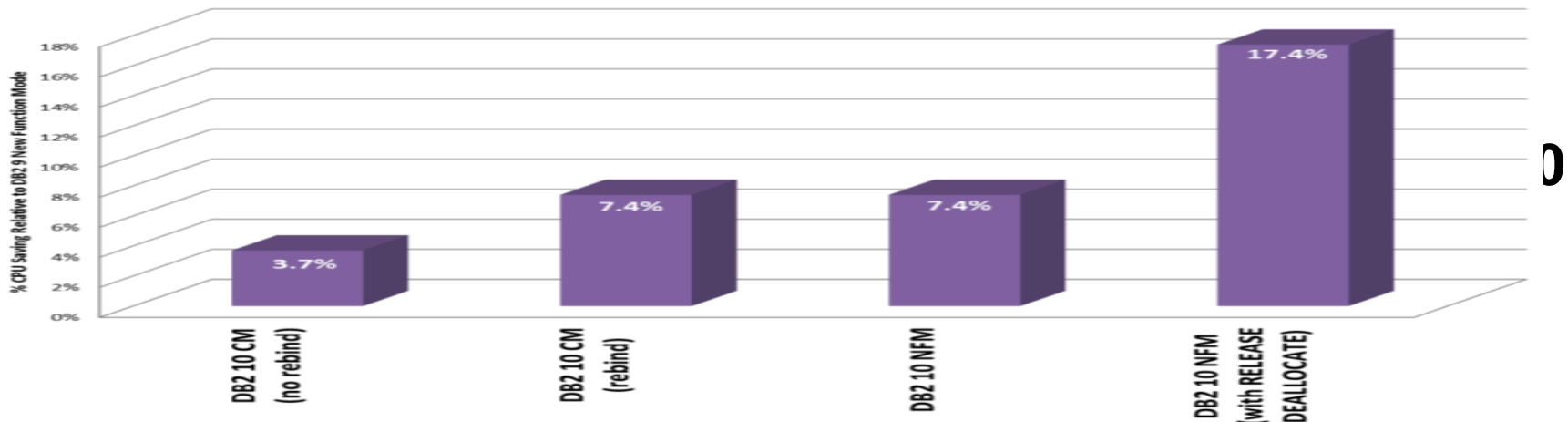


# Preliminary Measurements of IBM Relational Warehouse Workload (IRWW) with data sharing

## Base DB2 9 NFM REBIND with PLANMGMT(EXTENDED)

- DB2 9 NFM → DB2 10 CM without REBIND measured 3.7% CPU reduction from DB2 9
- DB2 10 CM REBIND getting same access path measured 7.4% CPU reduction from DB2 9
- DB2 10 NFM measured same 7.4% CPU reduction from

DB2 10 CPU Savings Relative to DB2 9 New Function Mode  
IBM Relational Warehouse Workload with Data Sharing



# DB2 10 for z/OS: Out-of-the-Box Savings

## CPU reductions for transactions, queries, and batch

- Out-of-the-box CPU reductions of 5-10% for traditional workloads with REBIND
- Up to additional 10% CPU savings using new functions or avoiding constraints
- Out-of-the box CPU reductions of up to 20% for new workloads

## Scales with less complexity and cost

- 5-10x more concurrent users – up to 20,000 per subsystem
- Significant scale-up capabilities in addition to existing scale-out support
- Consolidate to fewer LPARs and subsystems

## Improved operational efficiencies and lower administration cost

- Automatic diagnostics, tuning, and compression

## Even better performance

- Elapsed time improvement for small LOBS and Complex Queries



# DB2 Deep Synergy With System z

Key integration points include:

- Data sharing (availability and scale out)
- zIIP and other specialty engines
- Unicode conversion
- Encrypted communication & data
- Hardware data compression & encryption
- Cross-memory, memory protection keys
- Sorting
- Multi-core, large N-way
- 64-bit addressing and large memory
- z/OS Workload Manager
- z/OS Security Server (RACF)
- z/OS RRS integrated commit coordinator
- System z10 1 MB page size, decimal float
- Solid state disks
- zEnterprise z196, zBX, z10, ...



IBM, Information Management Software

IBM

## DB2 10 for z/OS Performance Topics

Discover the functions that provide reduced CPU time in CM and NFM

Understand improved scalability and availability

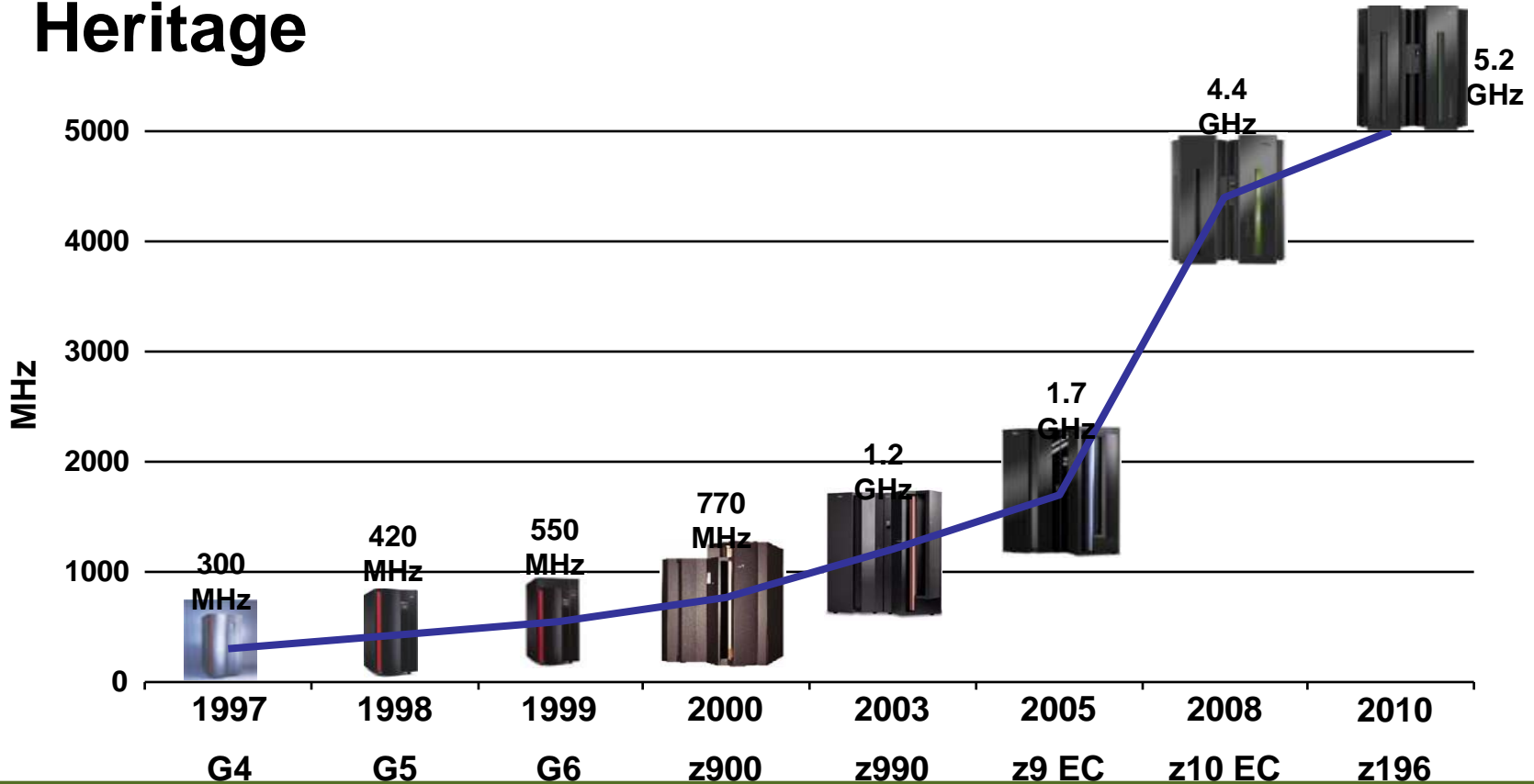
Evaluate the impact of new functions



ibm.com/redbooks

**Redbooks**

# z196 Continues the CMOS Mainframe Heritage



- **G4** – 1<sup>st</sup> full-custom CMOS S/390®
- **G5** – IEEE-standard BFP; branch target prediction
- **G6** – Copper Technology (Cu BEOL)

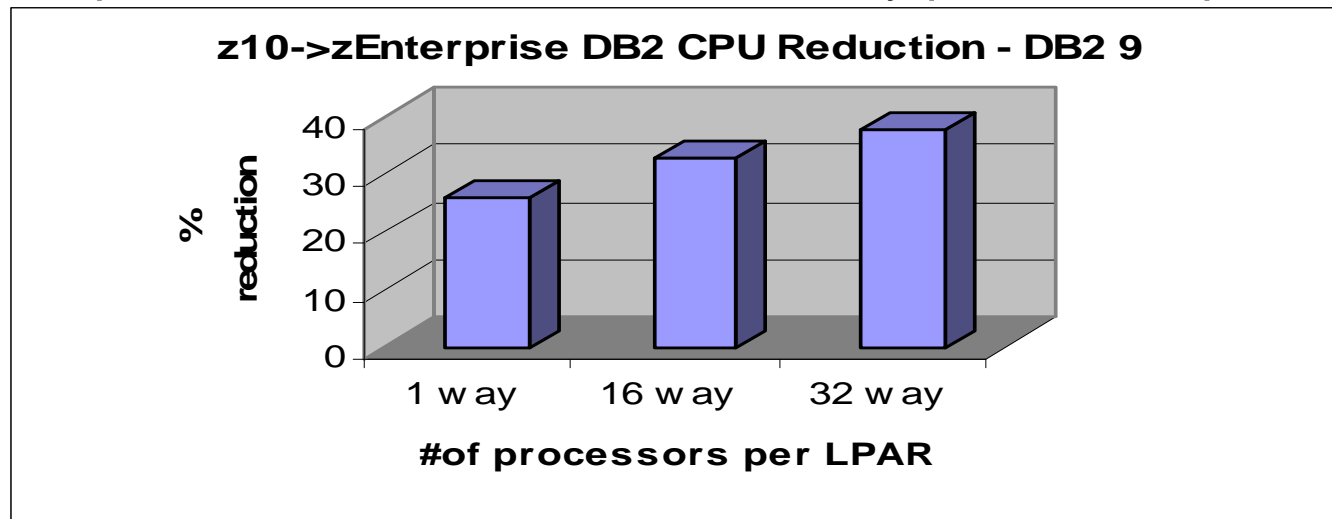
- **z900** – Full 64-bit z/Architecture
- **z990** – Superscalar CISC pipeline
- **z9 EC** – System level scaling

- **z10 EC** – Architectural extensions
- **z196** – Additional Architectural extensions & new cache structure

# DB2 and zEnterprise 196 performance

## Measurement data currently available shows

- DB2 OLTP workloads observing 1.3x to 1.6x DB2 CPU reduction compared to z10 processors
- Higher DB2 CPU reduction can be achieved as number of processors per LPAR increases
- With DB2 10 and zEnterprise, CPU reduction can be up to 1.8x compared to DB2 9 and z10 with many processors per LPAR



# System zEnterprise Benefits for DB2

## *Taking System z synergy to the next level*

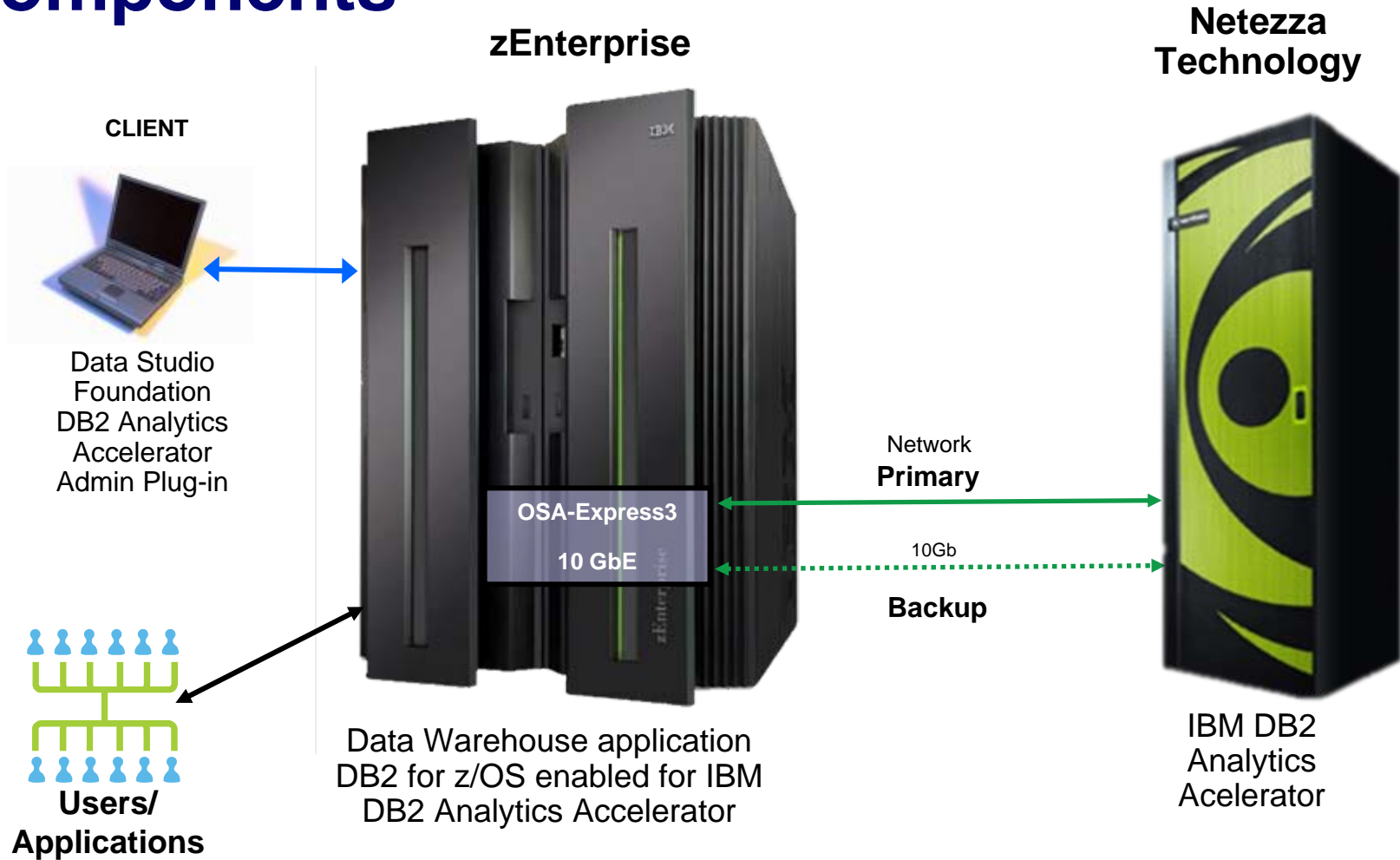
- Faster CPUs, more CPUs, more memory → better DB2 performance, scalability
- Compression hardware expected to increase DB2 data compression performance
- Cache optimization, 192M L4 Cache expected to benefit DB2 work
- Hybrid architecture query performance acceleration with Analytics Optimizer
- Excellent synergy with DB2 10 → significant CPU reduction and scalability increase
  - CPU reductions
  - Remove key single system scaling inhibitors: storage, latching, catalog, utilities, ...
  - Translation Lookaside Buffer changes expected improve performance for 1MB page sizes
  - Buffer pool management



# Hardware Trends Impacting DB2

- **Drive towards multi core, slowing growth in processor frequency**
  - Higher N-ways, more parallelism bring potential latching bottlenecks, memory cache thrashing, ...
  - S/W techniques for single threaded performance growth
  - Clustered systems for massive scale out and continuous availability
- **Specialty engines (price/performance)**
- **Hybrid systems, accelerators**
  - Use cores that are more specialized to their purpose
  - New performance opportunities
  - New programming paradigms (e.g. OpenCL)
- **Memory hierarchy design**
  - Higher cpu frequencies, n-ways make cache utilization a critical factor
  - Translation Lookaside Buffer design, large System z page sizes
- **Solid state disk (and other disk related improvements)**
  - Performance, energy consumption, reliability benefits over HDD

# IBM DB2 Analytics Accelerator V2 Product Components





# Tailored to your needs

*A Hybrid Solution*

## IBM Netezza

## IBM System z with IBM DB2 Analytics Accelerator

### Focused Appliance

- Appliance with a streamlined database and HW acceleration for performance critical functionality
- Price/performance leader
- Speed and ease of deployment and administration
- Optimized performance for deep analytics, multifaceted, reporting and complex queries

### Mixed Workload System

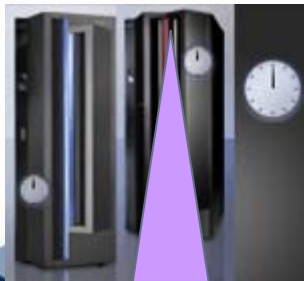
- Mixed workload system z with operational transaction systems, data warehouse, operational data store, and consolidated data marts.
- Unmatched availability, security and recoverability
- Natural extension to System z to enable pervasive analytics across the organization.
- Speed and ease of deployment and administration

**Simplicity**

*The right mix of simplicity and flexibility*

**Flexibility**

# Mainframe Innovation: Specialty Engines



**Internal Coupling  
Facility (ICF) 1997**



**Integrated Facility  
for Linux® (IFL)  
2000**



**System z Application  
Assist Processor (zAAP)  
2004**

## Eligible for zAAP:

- Java execution environment
- z/OS XML System Services



**IBM System z Integrated  
Information Processor and  
(2006)**

## Eligible for zIIP:

- DB2 remote access, XML, large parallel queries, utilities (index, sort, stats)
- ISVs
- IPsec encryption
- XML System Services
- Global Mirror (XRC)
- HiperSockets for large messages (e.g. DRDA)
- IBM GBS Scalable Architecture for Financial Reporting
- z/OS CIM Server
- zAAP on zIIP

\* Statements represent the current intention of IBM. IBM development plans are subject to change or withdrawal without further notice.

## DB2 & IBM zIIP Add Value to Database Work

Portions of the following DB2 for z/OS V8, DB2 9 and 10 workloads may benefit from zIIP or zAAP for XML (DB2 9 in blue, DB2 10 in green)\*:

### 1 – DRDA over TCP/IP connections

- DB2 9 for z/OS Remote native SQL procedures  
XML schema validation
- DB2 9 XML parsing
- Increased portion of DRDA redirected to zIIPs to 60%

Improved performance via reduced processor switching

### 2 - Requests that use parallel queries

- DB2 9 higher percentage of parallel queries zIIP eligible
- DB2 10 more queries eligible, more parallelism

### 3 - DB2 Utilities LOAD, REORG & REBUILD functions used to maintain index structures and sort

- DB2 10 RUNSTATS – options other than column group

### 4 - DB2 10 buffer pool prefetch and deferred write

## Performance Enhancements Few Changes (CM)

- **SQL runtime improved efficiency**
- **Address space, memory changes to 64 bit, some REBINDs**
- **Faster single row retrievals via open / fetch / close chaining**
- **Distributed thread reuse High Performance DBATs**
- **DB2 9 utility enhancements in CM8**
- **Parallel index update at insert**
- **Workfile in-memory enhancements**
- **Index list prefetch**
- **Solid State Disk use**
- **Buffer pool enhancements**
  - Utilize 1MB page size on z10
  - “Fully in memory” option (ALTER BUFFERPOOL)

## Performance Enhancements requiring REBIND (CM)

- **Most access path enhancements**
- **Further SQL runtime improvements**
- **Use of RELEASE(DEALLOCATE)**
- **SQL paging performance enhancements**
  - Single index access for complex OR predicates:
- **IN list performance**
  - Optimized Stage1 processing (single or multiple IN lists)
  - Matching index scan on multiple IN lists
- **Safe query optimization**
- **Query parallelism improvements**
- **More stage 2 predicates can be pushed down to stage 1**
- **More aggressive merge of views and table expressions**
  - Avoid materialization of views
- **If migrating from V8, get new RUNSTATS before mass rebind**

## **Performance Enhancements requiring NFM**

- **DB2 catalog concurrency and productivity**
- **Compress on insert**
- **Most utility enhancements**
- **LOB streaming between DDF and rest of DB2**
- **Faster fetch and insert, lower virtual storage consumption**
- **SQL Procedure Language performance improvements**
- **Workfile spanned records, partition by growth**
- **Access to currently committed data**
- **Insert improvement for universal table spaces**
- **Locking improvement for multirow insert**
- **Efficient caching of dynamic SQL statements with literals**

## Performance Enhancements requiring NFM + DBA

- Hash access path      **Create + Reorg + rebind to activate**
- Index include columns      **Alter + Rebuild + rebind to activate**
- Inline LOBs      **Alter (need universal table space and reordered row format)**
- DEFINE NO for LOB and XML columns
- MEMBER CLUSTER for universal table space      **Alter + Reorg**
- Alter to universal table space, page size, data set size, segment size  
**Alter + Reorg**
- Online reorg for all catalog and directory table spaces

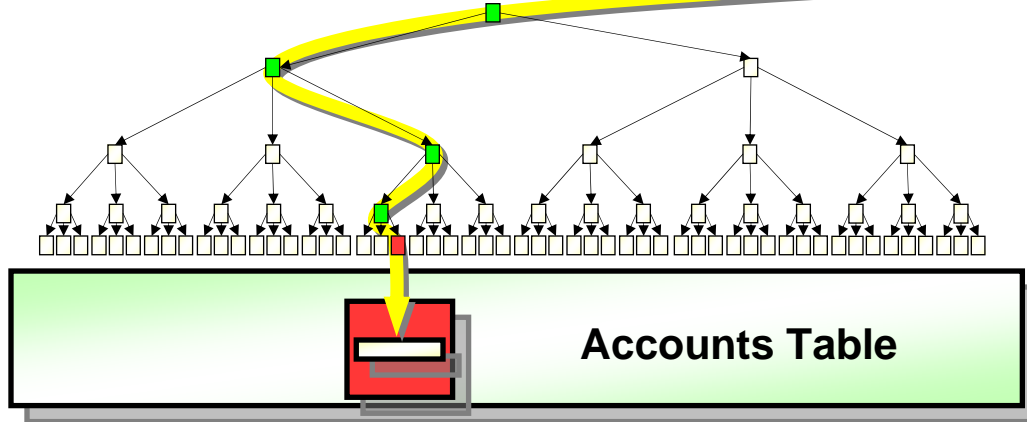
# Hashing Summary



- **Provides fast, direct location of most rows**
  - Reduces I/O and CPU in most cases
  - Can replace an existing Primary or Unique Key Index
    - Faster Insertion/Deletion
- **Size of Fixed Size Hash Area is important**
  - Too small and performance degrades, too large and space is wasted
- **DB2 helps you manage the size**
  - REORG AUTOESTSPACE YES
  - RTS tracks the number of overflowed entries
- **If clustering is important for query performance, then be aware that Hash will eliminate these benefits**
- **LOAD performance is slower with hash**



# Best practice for hash INDEX on AcctID



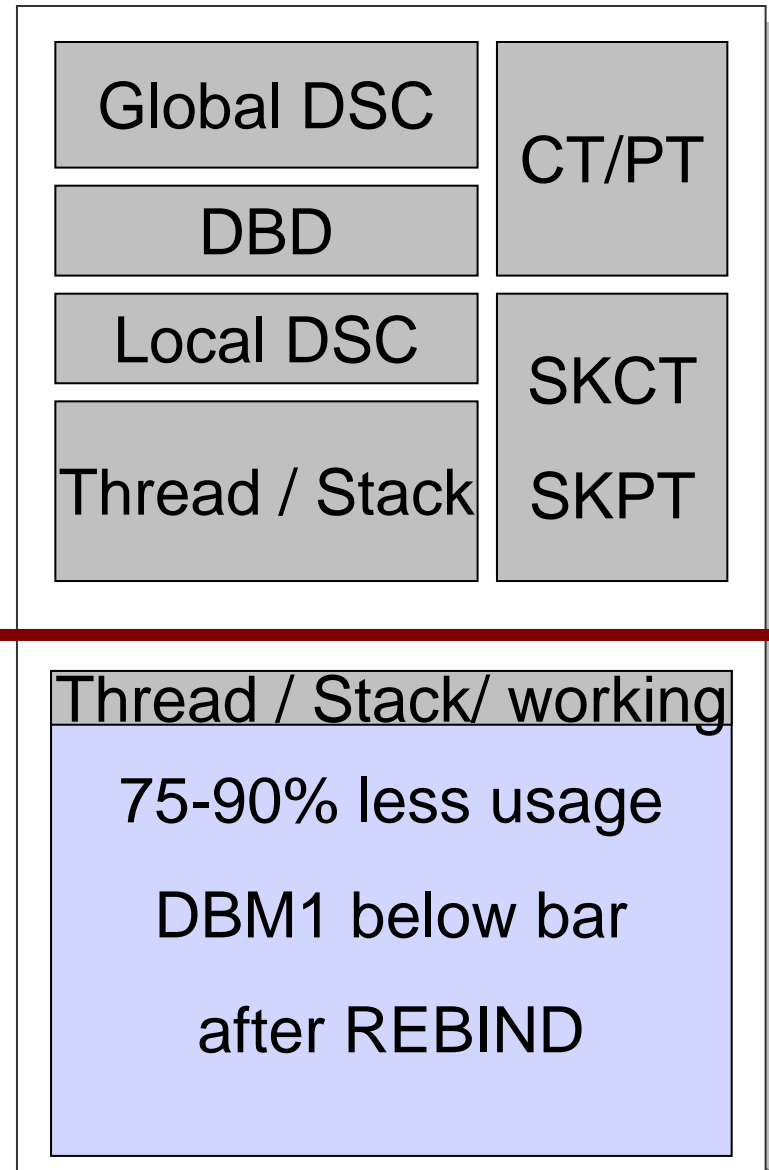
Select Balance  
From Accounts  
WHERE acctID = 17

■ = Page in Bufferpool  
■ = Page Read from Disk

- ❑ Table has a unique key. Queries are equal predicates on unique values to return a single row of data
- ❑ Most access to the data in the table is truly random, no need for clustering
- ❑ Size of data in the table is relatively stable, or the maximum size is known
- ❑ Many rows fit on a single data page.
- ❑ Rows of relatively uniform size.
- ❑ Index on the table's unique key would have more than 3 levels, not index only
- ❑ Monitor real time statistics to ensure that hash access is used, and tune the size of the hash space.

# Virtual storage improvements

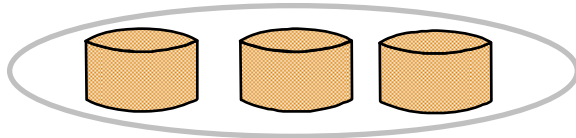
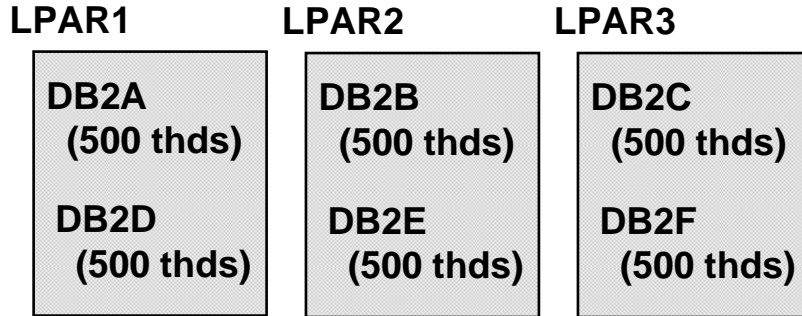
- **DBM1 below 2GB**
  - 75-90% less usage in DB2 10 compared to DB2 9
  - Some of working storage (stack, xproc storage) stays below 2GB
- **Larger number of threads**
  - Possible data sharing member consolidation
- **Improve CPU with storage**
  - More release deallocate



# Running Many Active Threads

## Pre DB2 10

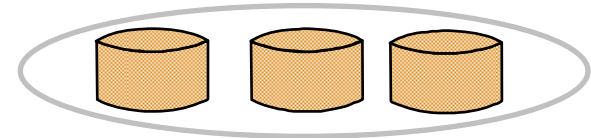
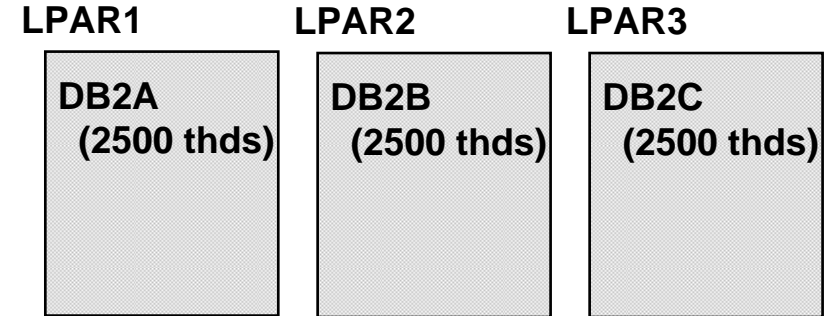
Coupling Technology



- Data sharing and sysplex allows for efficient scale-out of DB2 images
- Sometimes multiple DB2s / LPAR

## DB2 10

Coupling Technology



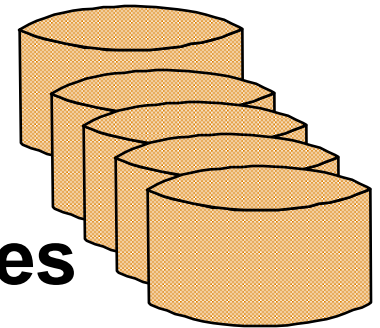
- More threads per DB2 image
- More efficient use of large n-ways
- Easier growth, lower costs, easier management
- Data sharing and Parallel Sysplex still required for very high availability and scale
- Rule of thumb: save ½ % CPU for each member reduced, more on memory

## Other System Scaling Improvements

- **Other bottlenecks can emerge in extremely heavy workloads**
  - several improvements reduce latching and other system serialization contention
  - new option to for readers to avoid waiting for inserters
  - eliminate UTSERIAL lock contention for utilities
  - Use 64-bit common storage to avoid ECSA constraints
  
- **Concurrent DDL/BIND/Prepare processes may compete**
  - restructure parts of DB2 catalog to avoid the contention
  
- **SPT01 64GB limit can be a constraint, especially if package stability is enabled**
  - Allow many more packages by using LOBs
  
- **Improved accounting rollup, compress SMF option**

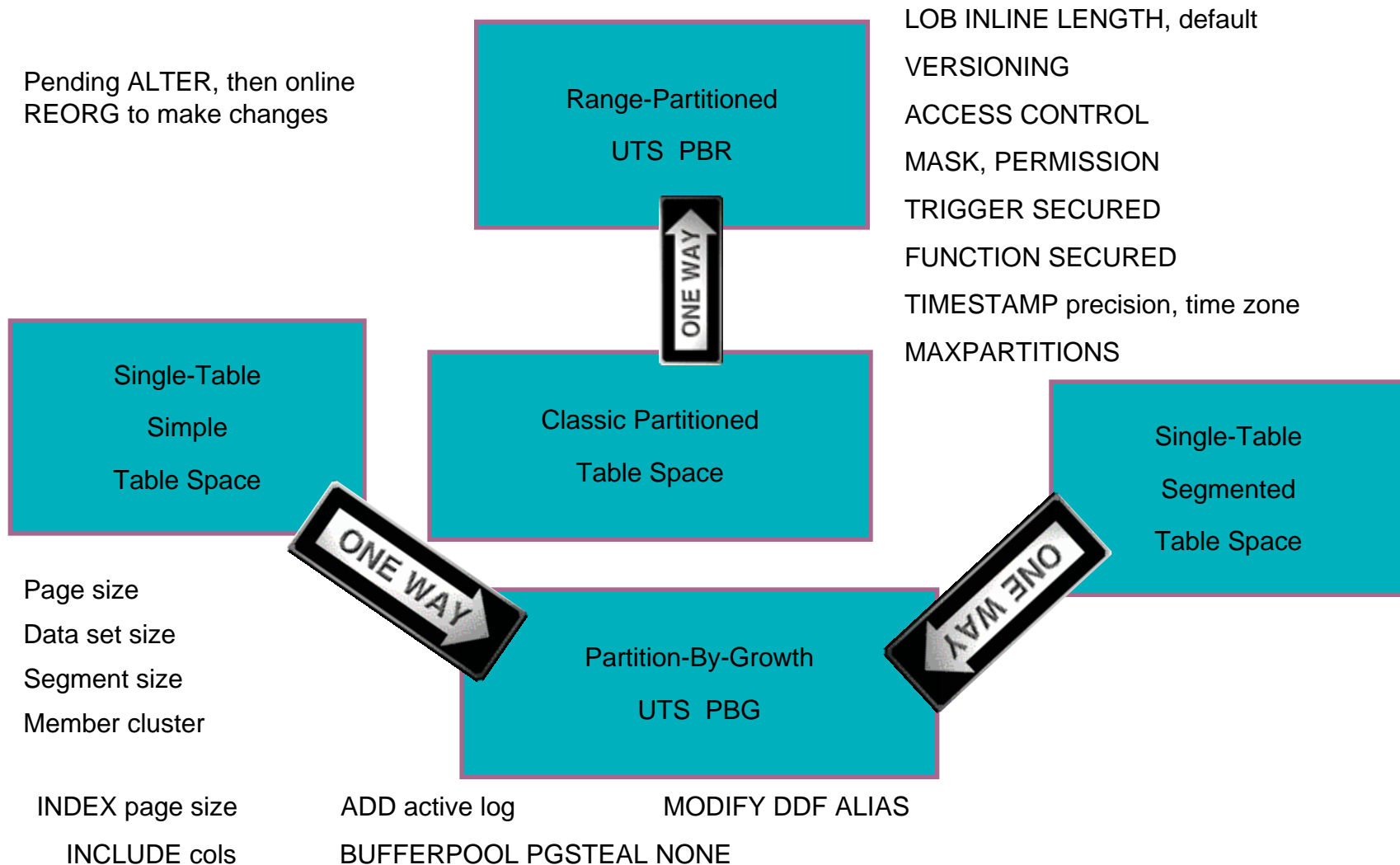
## Major changes in DB2 10 catalog & directory

- **Improve availability and productivity**
- **Increase maximum size substantially**
- **Reduce contention: BIND, DDL, utilities**
- **Catalog changes: Remove links**
  - Many more table spaces, partition by growth
  - Row level locking, reordered row format
  - CLOB and BLOB columns for long strings
    - Inline for performance
  - Online reorganization and check
  - More automatic: DB2-managed SMS-controlled



# Improved availability ALTER REORG

Pending ALTER, then online REORG to make changes



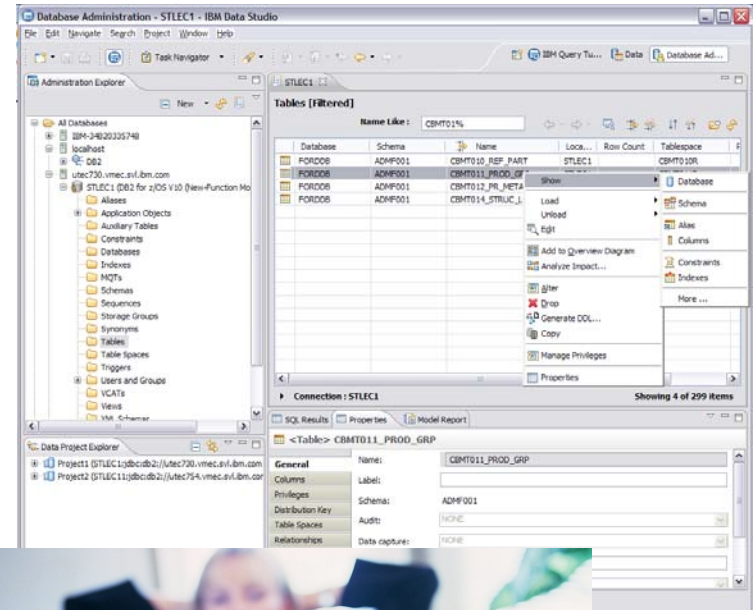
# Business Security & Compliance

- Protect sensitive data from privileged users & improve productivity
  - SECADM & DBADM without data access
  - Usability: DBADM for all DB
  - Revoke without cascade
- Separate authorities to perform security related tasks, e.g. security administrator, EXPLAIN, performance monitoring and management
- Audit privileged users
- Row and column access control
  - Allow masking of value
  - Restrict user access to individual cells



## DB2 10: Productivity – Doing More with Less!

- Easier performance & scaling, simpler memory management
- Reduce contention, more online processing
- Reduced need for REORG
- Auto statistics collection
- Monitoring enhanced





## DB2 10 Utilities Enhancements

- REORG SHRLEVEL(CHANGE) for LOBs
- Online REORG enhancements
  - SHRLEVEL(CHANGE) for all catalog & directory
  - Option to cancel blocking threads
  
- Improved usability & availability
  - Allow disjoint partition ranges
  - Permit movement of rows between partitions when LOB columns exist
    - Allow REBALANCE and ALTER LIMITKEY even when LOB columns exist
    - Allow DISCARD to delete associated LOB values
  - Messages to estimate length of REORG phases and time to completion

# Query Processing Enhancements

## ■ Performance Improvements

- Improved caching of dynamic SQL with literals
- Safe Query Optimization
- Aggressive View Merge
- IN List Processing
- SQL Pagination
- Parallelism Enhancements

## ■ Access Path Stability

- Relief from package REBIND regression



# Query Enhancements

- **CPU time reductions for queries, batch, & transactions**
  - Complex predicate processing improvements
- **SQL enhancements: Moving Sum, Moving Average, temporal, timestamp, implicit cast, SQL PL, ...**
- **pureXML improvements**
- **Access improvements: Index include columns, Hash**
- **Optimization techniques**
  - Remove parallelism restrictions; more even parallel distribution
  - Scalability: memory and latching relief allow more parallel
  - Increased zIIP use – parallel, prefetch, RUNSTATS
  - In-memory techniques for faster query performance
- **Analysis: instrumentation, Data Studio & Optim Query Tuner**

# Many improvements for SAP & web applications

- **Autonomics**
  - Compress on the fly on INSERT
  - Auto-statistics
  - Hints enhancements
  - Access path lock-in and fallback for dynamic SQL
  - Automatic checkpoint interval
  - Automated installation, configuration & activation of DB2 supplied stored procedures & UDFs
  - Data set FlashCopy in COPY & inline copy
  - Inline image copies for COPY YES indexes
  - UNLOAD from FlashCopy backup
  - REORG enhancements
  - Reduce need for reorganizations for indices
- **Performance**
  - CPU reductions
  - Hash access path
- Numerous optimizer enhancements, paging through result sets
- Parallel index update at insert
- Faster single row retrievals
- Inline LOBs
- LOB streaming between DDF and rest of DB2
- Faster fetch and insert, lower virtual storage consumption
- DEFINE NO for LOBs and XML
- MEMBER CLUSTER for UTS
- Query parallelism enhancements: lifting restrictions
- Dynamic Index ANDing Enhancements
- Option to avoid index entry creation for NULL value
- Index include columns
- Buffer pool enhancements
- **Scalability**
  - Many more threads
  - Reducing latch contention
  - Workfile spanned records, PBG support, and in-memory enhancements
- **Availability**
  - More online schema changes for table spaces, tables and indexes via online REORG
  - Online REORG for LOBs
  - Online add log  
Automatically delete CF structures before/during first DB2 restart
- **Portability**
  - Allow non-NULL default values for inline LOBs
  - Loading and unloading tables with LOBs in stream
  - Currently committed locking semantics
  - Default SAP settings for DB2
- **Security**
  - More granular DBA privileges

## DB2 10 Application Enablement and Portability

- **Data versioning by date**
- **pureXML enhancements**
- **Large object improvements**
  - Allow non-NULL default values for inline LOBs
  - Loading and unloading tables with LOBs
    - LOBs in input/output files with other non-LOB data
- **Improved portability and SQL consistency**
  - Currently committed locking semantics
  - Implicit casting or loose typing
  - Timestamp with time zone
  - Variable timestamp precision – seconds to picoseconds
  - Moving Sum, Moving Average

# Versioned data or Temporal Data

- **Table-level specification to control data management based upon time**
- **Two notions of time:**
  - System time: notes the occurrence of a data base change
    - “row xyz was deleted at 10:05 pm”
    - Query at current or any prior period of time
    - Useful for auditing, compliance
  - Business time: notes the occurrence of a business event
    - “customer xyz’s service contract was modified on March 23”
    - Query at current or any prior/future period of time
    - Useful for tracking of business events over time, application logic greatly simplified
- **New syntax in FROM clause to specify a time criteria for selecting historical data**



# DB2 SQL 2010

z z/OS 10



## Common ILM Linux, Unix & Windows 9.8

**Z** { Multi-row INSERT, FETCH & multi-row cursor UPDATE, Dynamic Scrollable Cursors, GET DIAGNOSTICS, Enhanced UNICODE SQL, join across encoding schemes, IS NOT DISTINCT FROM, VARBINARY, FETCH CONTINUE, MERGE, SELECT from MERGE, **data versioning, access controls**

**C** { 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, 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, UPDATE or DELETE, INSTEAD OF TRIGGER, Native SQL Procedure Language, BIGINT, file reference variables, XML, FETCH FIRST & ORDER BY in subselect & fullselect, caseless comparisons, INTERSECT, EXCEPT, not logged tables, OmniFind, spatial, range partitions, data compression, session variables, DECIMAL FLOAT, optimistic locking, ROLE, TRUNCATE, index & XML compression, created temps, **inline LOB, administrative privileges, implicit cast, date/time changes, currently committed, moving sum & average, index include columns, PureScale**

**U** { Updateable UNION in Views, GROUPING SETS, ROLLUP, CUBE, more Built-in Functions, SET CURRENT ISOLATION, multi-site join, MERGE, MDC, XQuery, XML enhancements, array data type, global variables, even more vendor syntax, temp table compression

**W**

## pureXML improved performance & usability

- XML schema validation in the engine for improved usability and performance
- Binary XML exchange format improves performance
- XML multi-versioning for more robust XML queries
- Allow easy update of XML document nodes
- Stored procedure, UDF, Trigger enhanced support
- XML index matching with date/timestamp
- CHECK DATA utility checks XML



# Expanding DB2 for z/OS ISV community



**Jump into DB2 10! The water's fine.**



**DB2 V8**

**DB2 9**

**DB2 10**

**Key Questions are WHEN? and HOW?**

# DB2 10 for z/OS: Skip-Level Migration

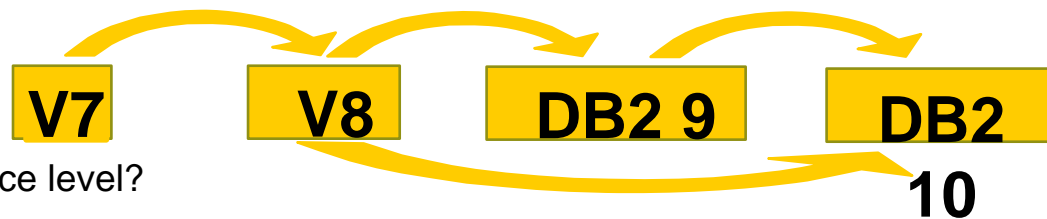
May move from V8 to DB2 10 but just because you can, doesn't mean you always should....

Migration, fallback and data sharing coexistence fully supported

Mix of DB2 9 and 10 or DB2 V8 and 10

Key considerations:

- Risk/reward analysis
  - What's your risk? Tolerance level?
  - How will you do it? What's your mitigation plan? Are ISVs ready?
  - What workloads do you need to test and can you test them properly?
  - Do you have best practice service and test processes?
- Migration cost savings is not 2X versus two migrations
  - Migration considerations for two versions still apply
  - Larger migration project, longer migration timeline
  - Applications and ISVs need to be ready
- Timing: V8 end of service April 2012, other software, service & test process



# Sample Improvements for Guesstimate

- Run time CPU reductions 5% - 10%
- 1 MB page size 0% - 5% z10, z196
- Page fix buffers 0% - 8% V8 & high IO, in use?
- Release deallocate 0% - 15% short trans, batch
- Virtual storage constraints 0% - 5% memory, latches
- Data sharing fewer members 1% for each 2 members
- Improved dynamic SQL cache 0% - 20% literals
- Insert 0% - 40% high volume insert
- Predicate evaluation 0% - 60% complex predicates
- Access: hash, index include 0% - 5% access improved
- Increased use of zIIP 0% - 3% IO, RUNSTATS, parallel
- Utilities (from V8) 3% - 20% about same for 9 → 10
- Productivity: memory, temporal, security, admin, ... priceless

# Are you ready for DB2 10?

- Check prerequisites
- Contact vendors
- Migration planning workshop
- Plan gains, testing, memory, and performance
- Build detailed migration plan
- Check information APARs
- Apply required service
- Run premigration checks DSNTIJPA (or M) early and often
- Resolve incompatible changes
- Get rid of private protocol
- Convert to packages from DBRMs in plans
- Upgrade plan table formats to Unicode V8 or DB2 9 level
- Get ready for SMS
- Save performance and access path information
- Get all the parts out of the box

# DB2 Migration Planning Workshops

- Understand breadth of features in DB2 for z/OS
- Bring together a toolbox of resources for your migration planning
- Explain the current migration process
- Bring a project focus to migration
- Remain relevant through GA life of the product
  - Updated with field experiences
- Check with IBM sales team for workshop availability



# Important features of information center

- Find helpful usage instructions in the “Information center home” section.
- Easily send feedback by clicking the Feedback link at the bottom of any topic.
- Conveniently download the PDF version of the information from the link at the bottom of any topic. *(Look for the PDF icon!)*

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Search:  GO Search scope: ten

**Contents**

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    - Planning for DB2
      - What's New?
      - Planning for DB2 10 for z/OS
    - Installing and migrating DB2
      - Installation and migration
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        - DB2 internationalization
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        - Administering IBM Spatial Support for DB2 for z/OS
        - Managing security with the RACF access control module
      - Monitoring and tuning DB2 performance
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        - Programming for Java
        - Programming for ODBC
        - Programming for XML
      - Implementing DB2 stored procedures
      - Troubleshooting for DB2
      - DB2 reference information
        - DB2 catalog tables
          - DB2 commands
          - DB2-supplied user tables
          - DB2 SQL
          - DB2 utilities
        - Stored procedures provided by DB2
        - Information resources for DB2 for z/OS and related products
      - DB2 glossary

**DB2 10 for z/OS information**

Welcome to the DB2® 10 for z/OS® (DB2 for z/OS) information, where you can find topics that you need to use DB2 for z/OS. By using this information, you can install or migrate to Version 10 of DB2 for z/OS, develop and run application programs, and administer and operate DB2 databases and subsystems.

These topics can also be found in DB2 for z/OS PDF books. To see the correspondence between the PDF books and the information center topics and to download PDF books, view this table.

Subscribe to DB2 10 for z/OS information updates

**Resources**

<p><b>Getting started</b></p> <ul style="list-style-type: none"> <li>Planning for Version 10</li> <li>DB2 for z/OS information roadmap</li> <li>What's new in the information center</li> </ul>	<p><b>General product information</b></p> <ul style="list-style-type: none"> <li>DB2 for z/OS home page</li> <li>Terminology and citations</li> <li>Accessibility for DB2</li> </ul>
<p><b>News and events</b></p> <ul style="list-style-type: none"> <li>News about DB2 for z/OS</li> <li>Upcoming DB2 for z/OS events</li> </ul>	<p><b>DB2 administration</b></p> <ul style="list-style-type: none"> <li>Administration</li> <li>Data sharing</li> <li>Managing performance</li> </ul>
<p><b>Programming with DB2</b></p> <ul style="list-style-type: none"> <li>Application programming and SQL</li> <li>Programming for Java™</li> <li>Programming for ODBC</li> <li>Programming for XML with DB2</li> </ul>	<p><b>Communities</b></p> <ul style="list-style-type: none"> <li>DB2 for z/OS Exchange</li> <li>developerWorks Information Management forums</li> <li>International DB2 User Group (IDUG®)</li> <li>Information Management user groups</li> <li>SHARE</li> </ul>
<p><b>IBM® Information Management training</b></p> <ul style="list-style-type: none"> <li>DB2 for z/OS training</li> <li>Professional certification</li> </ul>	<p><b>Related information</b></p> <ul style="list-style-type: none"> <li>IBM Redbooks™</li> <li>IBM Publications Center</li> <li>IBM Information Centers</li> </ul>

**Support and assistance**

- Send feedback
- Search for messages and codes
- DB2 for z/OS Support
- DB2 developerWorks site
- DB2 for z/OS downloads
- Information Management Business Partner Solutions
- IBM Global Solutions directory
- Survey: Quality technical information

**Using the information center**

- Navigating
- Searching
- Setting bookmarks
- Printing topics
- Displaying information in your preferred language
- Accessibility

Terms of use | Library | Support | Feedback  
[http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.db2z10.doc/db2z\\_10\\_prodhome.htm](http://publib.boulder.ibm.com/infocenter/dzichelp/v2r2/topic/com.ibm.db2z10.doc/db2z_10_prodhome.htm)  
 Last updated: December, 2010

# IBM DB2 Tools: Are you ready for DB2 10?

- Exploit DB2 10 performance savings out-of-the-box
- Optimize Performance Across Multi-Platform Applications
- Lower CPU costs while reducing batch windows
- Higher data availability through simplified recovery operations



## All New with DB2 10!

**DB2 Utilities Suite 10** drives down costs with autonomics, page sampling and further offloads processing to zIIPs and FlashCopy. Developed in conjunction with DB2 10 to provide maximum data integrity and exploit all new functions out of the box.

**DB2 Administration Tool/Object Compare 10.1** extends the value of DB2 10 with new capabilities that allow DBAs to quickly exploit DB2 10 features like schema evolution. Reduces the overhead of many routine tasks.

**DB2 Sort 1.1** lowers the cost of DB2 Utility sort processing by exploiting advanced features of System z and z/OS while optimizing overall system efficiency. Significantly reduces batch windows.

**Tivoli OMEGAMON XE for DB2 Performance Expert 5.1** extends its insight into distributed workloads and offers a robust infrastructure to support DB2 10 subsystem consolidation, with lower monitoring overhead.

The recommended performance monitor of DB2 10!

**QMF 10** delivers built-in visualizations and reports that dramatically extend the value to end users.

A new metadata layer simplifies the process to understand and create reports.

**DB2 High Performance Unload 4.1** reduces the cost of extracting DB2 10 data with support for TCP/IP Pipes and the new internal format as well as a new native XML data unload capability.



# DB2 10 for z/OS At a Glance

## Performance, Scalability

- CPU reductions out-of-the-box
- Hash access to data, index include columns
- Ten times more threads per DB2 image

## Availability Security Productivity

- More online schema changes
- Improved concurrency: catalog, data, & utilities
- Row and column access control, masking
- Administrator privileges with finer granularity
- Administration productivity enhancements

## Application Enablement

- Versioned data or temporal queries
- pureXML enhancements
- SQL improvements that simplify porting

## Dynamic Warehousing

- Moving sum, moving average
- Many query optimization improvements
- Query parallelism restrictions removed
- IBM DB2 Analytics Accelerator

# Questions?



# DB2 9 and 10 IBM Redbooks Publications

1. DB2 10 Technical Overview SG24-7892 new
2. Extremely pureXML DB2 10 & 9 SG24-7915 new
3. DB2 10 Performance Topics coming soon
4. DB2 9 Technical Overview SG24-7330
5. DB2 9 Performance Topics SG24-7473
6. DB2 9 Stored Procedures SG24-7604
7. Serialization and Concurrency SG24-4725-01
8. Distributed Functions SG24-6952
9. Utilities SG24-6289-01
10. DB2 and Storage Management, SG24-7823
11. Index Compression with DB2 9 for z/OS redp4345
12. SQL Reference for Cross-Platform Development
13. Enterprise Database Warehouse, SG24-7637
14. 50 TB Data Warehouse on System z, SG24-7674
15. LOBs with DB2 for z/OS SG24-7270
16. Deploying SOA Solutions SG24-7663
17. Enhancing SAP - DB2 9 SG24-7239
18. Best practices SAP BI - DB2 9 SG24-6489-01
19. Data Sharing in a Nutshell, SG24-7322
20. Securing DB2 & MLS z/OS SG24-6480-01
21. Data Sharing: Dist Load Balancing & config. redp4449
22. Packages Revisited, SG24-7688
23. Ready to Access Solid-State Drives redp4537
24. Buffer Pool Monitoring & Tuning redp4604
25. Securing & Auditing Data SG24-7720



# More information and resources

- **DB2 main web page** <http://www.ibm.com/software/data/db2/zos/>
- **DB2 10 web page** <http://www.ibm.com/software/data/db2/zos/db2-10/>
- **DB2 books, Information Center**
  - <http://www.ibm.com/support/docview.wss?rs=64&uid=swg27011656>
  - <http://publib.boulder.ibm.com/infocenter/imzic>
- **DB2 best practices web page**
  - <https://www.ibm.com/developerworks/data/bestpractices/db2zos/>
- **DB2 for z/OS IBM Redbooks publications**
  - <http://www.redbooks.ibm.com/cgi-bin/searchsite.cgi?query=db2&SearchOrder=4&SearchFuzzy=>
- **DB2 presentations**
  - <ftp://ftp.software.ibm.com/software/data/db2/zos/presentations/>

# DB2 10 Resources and Contacts

- **Website** <http://www.ibm.com/software/data/db2/zos/db2-10/>
  - Case Studies, Customer statements
  - Demos: DB2 10 for z/OS, QMF 10
  - Brochures: DB2 10 for z/OS Highlights, QMF 10 What's New
- **Presentations**
  - DB2 10's new functions –  
<ftp://public.dhe.ibm.com/software/data/db2/zos/presentations/v10-new-function/>
  - Overviews -  
<ftp://public.dhe.ibm.com/software/data/db2/zos/presentations/overview>
  - Migration -  
<ftp://public.dhe.ibm.com/software/data/db2/zos/presentations/migration>

# (cont) DB2 10 Resources and Contacts

- **Books**

- DB2 10 for z/OS Technical Overview <http://www.redbooks.ibm.com/abstracts/sg247892.html>
- DB2 10 for z/OS Performance Topics – *coming soon*  
<http://www.redbooks.ibm.com/abstracts/sg247942.html>
- Extremely pureXML in DB2 10 for z/OS <http://www.redbooks.ibm.com/abstracts/sg247915.html>
- DB2 10 for z/OS Book  
<ftp://public.dhe.ibm.com/common/ssi/ecm/en/imm14075usen/IMM14075USEN.PDF>

- **Whitepapers**

- Business Value Whitepaper – Julian Stuhler, Triton Consulting: “DB2 10 for z/OS: A Smarter Database for a Smarter Planet” <http://public.dhe.ibm.com/software/data/sw-library/db2/analystreports/tritonconsulting-db210forzos-smarterdatabase.pdf>
- A Matter of Time: Temporal Data Management  
[http://public.dhe.ibm.com/software/data/sw-library/db2/papers/A\\_Matter\\_of\\_Time\\_-\\_DB2\\_zOS\\_Temporal\\_Tables\\_-\\_White\\_Paper\\_v1.4.1.pdf](http://public.dhe.ibm.com/software/data/sw-library/db2/papers/A_Matter_of_Time_-_DB2_zOS_Temporal_Tables_-_White_Paper_v1.4.1.pdf)
- Why DB2 for z/OS is Better than Oracle RAC  
[https://www14.software.ibm.com/webapp/iwm/web/signup.do?lang=en\\_US&source=sw-infomgt&S\\_PKG=db2z-better-thank-oracle-rac-wp](https://www14.software.ibm.com/webapp/iwm/web/signup.do?lang=en_US&source=sw-infomgt&S_PKG=db2z-better-thank-oracle-rac-wp)
- zJournal article by Willy Favero → <http://www.mainframezone.com/z-journal>

## (cont) DB2 10 Resources and Contacts

SAP Whitepapers DB2 10 for z/OS is certified for SAP NetWeaver 7.30 and SAP R/3 4.6

- SAP article on DB2 10 (*published by SAP*) <http://www.sdn.sap.com/irj/sdn/db2>
- SAP Best Practice Guide for Migrating to DB2 10 for z/OS (*published by SAP*) <https://websmp207.sap-ag.de/~sapidb/011000358700001414122010E>
- (Updated) Business Continuity Guide for Running SAP on System z – based on DB2 10 for z/OS, DB2 Connect 9.7 FP3a, SAP NetWeaver 7.10 and Tivoli Automation for z/OS V3.3 <http://publibfp.dhe.ibm.com/epubs/pdf/iapacs03.pdf>
- DB2 10 for z/OS with SAP on IBM System z Performance Report – new techdocs white paper  
<http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP101845>
- DB2 10 for z/OS – Optimized for SAP –  
<http://cattail.boulder.ibm.com/cattail/?source=s#view=andreas.r.mueller@de.ibm.com/files/3198290001883DDBA202FBE4093F23B6>
- SAP on DB2 10 for z/OS - Being More Productive, Reducing Costs and Improving Performance – <http://www.sdn.sap.com/irj/sdn/db2?rid=/library/uuid/005c6b33-aaf0-2d10-fcbb-b42e89ac5791>