# System z Premier Executive Event

## Database Technology Enhancements - Reducing business costs and increasing business value


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IBM Software Group

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# Disclaimer

**Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.**

# Top Challenges


1. Reducing Costs of Information Technology
2. Continuous Service Availability
3. Boost Business Resilience and Reduce Risks
4. Deliver Differentiating Innovative Solutions
5. Security, Auditing and Regulatory Compliance
6. Accessing intelligent information on demand

# Investment Priorities

- **Innovation**
  - Higher Performance
  - Leverage existing skills and experience
  - Reduced risk
  - Faster ‘realized’ time to value
- **Lower Costs – “My projects have to impact the bottom line”**

# Delivering Business Value- A Stakeholder Perspective

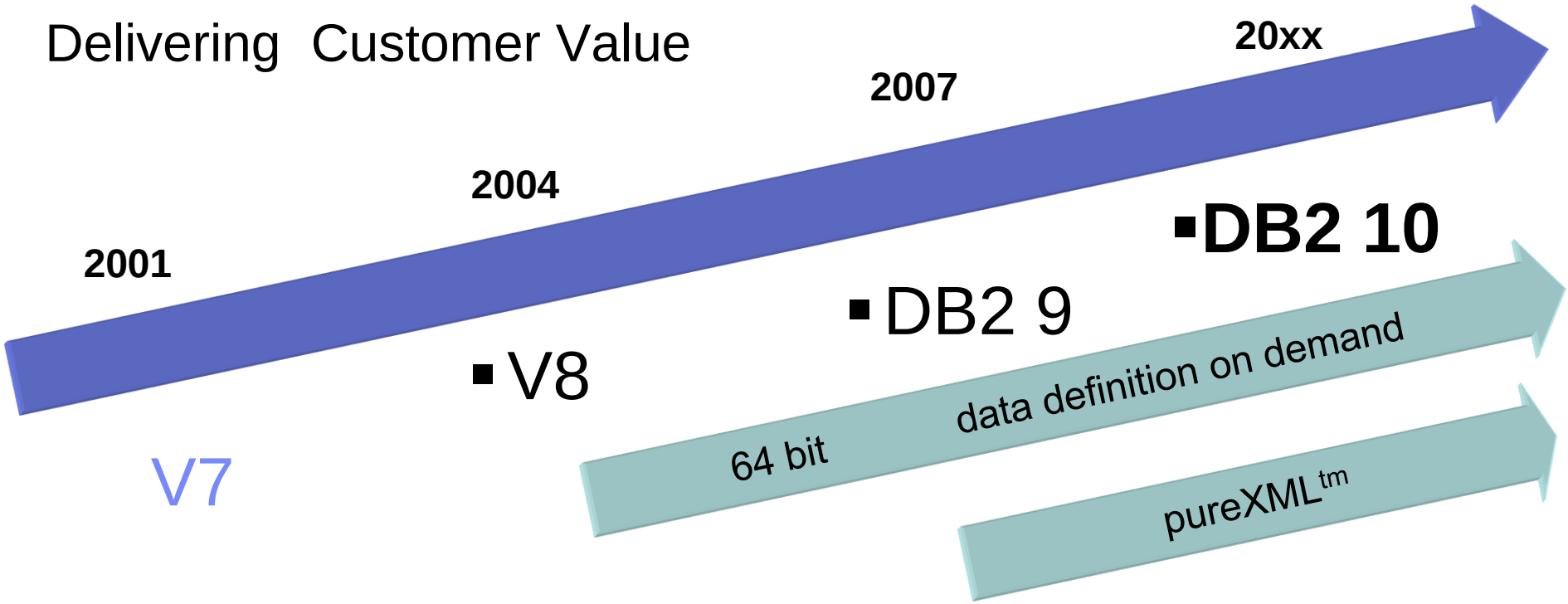
- **Constant cost pressures**
  - Performance improvements in key workloads: transactions, batch, …
  - Synergy with System z to help reduce costs
- **I need DB2 to be able to scale with my business**
  - Many more concurrent users, simpler growth
  - Reduce DBA workload, eliminate time-consuming tasks
- **I need to improve the resilience of my data**
  - More online, more secure
  - Easier privileges with finer granularity authority
  - Ability to have administrators without data access, better auditing

# DB2 for z/OS Technical Strategy

- Extend the lead in availability, scalability and performance.
  - Parallel Sysplex:  the best scale-out solution in the industry
  - Tight integration between DB2 and the System z hardware and z/OS operating system
  - Advanced solutions for compliance with data security and privacy regulations
  - Workload consolidation:  System z is the ultimate consolidation platform
  - Eliminate all causes of outages
- Reduce cost of ownership
  - Database technology that can handle large workloads with fewer people
  - Storage and CPU optimization, including specialty engines
  - Advanced autonomics to make the system more self-managing and self-tuning
- Application enablement
  - Apps can easily connect to DB2 from anywhere
  - Advanced SQL, XML capability, application portability
- Improved data warehousing capabilities

# DB2 for z/OS Into the Future

Delivering Customer Value




## Themes

Reliability Availability Serviceability
Performance Scalability
Security Productivity
Application Development
SQL XML SOA

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




| | DB2 | DB2 9 | DB2 10 |
|---|---|---|---|
| Efficiency | ▪ Deep synergy with System z<br>▪ HW Compression<br>▪ Consolidation | • 20%-30% Utility CPU savings<br>• Compress indexes, save 50% disk<br>• More CPU on specialty engines | • Save up to 20% CPU batch & transactions<br>• On-the-fly data Compression<br>• Temporal data support<br>• Skip-level migration |
| Resilience | ▪ Unmatched availability<br>▪ Unparalleled security<br>▪ Industry leading reliability | • Flexible context and role security<br>• Expanded online schema changes<br>• Volume level backup & recovery | • Ten times more concurrent users<br>• More online schema changes<br>• More granular access control |
| Growth | ▪ Near-linear scalability<br>▪ Optimized for SOA<br>▪ Flexible development<br>▪ Warehousing capabilities | • Seamless integration of XML and relational<br>• Improved SQL<br>• Partition by growth<br>• OLAP expressions | • Enhanced query parallelism<br>• More SQL compatibility<br>• Improved pureXML and SQL PL |

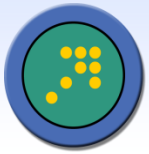
**Beta started: Mar 12, 2010**

# DB2 9

# DB2 9 for z/OS field update

- DB2 9: Migrations continue through 2010
- DB2 V8: Migration finishing in most of world
  - **100% of Top 100**
  - **V8 End of Service: April 12, 2012**
- How's the Quality (compared to V8)?
  - **Lower overall PMR volume**
  - **Less Severity 1 APARs**
  - **Lower PE rate**

# DB2 9 for z/OS *Serving the Most Demanding Data Goals*

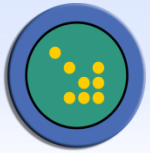


## *SOA Enablement*

- *pureXML*
- *Optimistic locking for WebSphere*
- *LOB performance, usability*

## *Dynamic Warehousing*

- *Many SQL improvements*
- *New built-in OLAP expressions*
- *Dynamic index ANDing*
- *Histogram statistics*
- *Optimization Service Center*



## *Simplification, Reduced Cost*

- *Index compression*
- *Partition By Growth tables*
- *Cloned tables*
- *Volume based backup / recovery*

## *Workload Consolidation*

- More online schema changes
- Online REBUILD INDEX
- Trusted context and ROLEs
- Parallel Sysplex cluster improvements

# Best Practices When Going to DB2 9

- Leverage CST/RSU process: Start with latest RSU + Identified Hipers
- Use the DB2 9 'Package Stability' function for static SQL
- Minimize potential query performance issues
- Every customer experience is different
- Ensure an PMR is opened prior to migration start

# DB2 10 for z/OS

# DB2 10 for z/OS - Delivering Business Value!

- CPU reductions for most workloads
- Five to 10 times more concurrent users
- Greater concurrency for data definition and access
- More online changes for definitions and utilities
- Improved security with improved granularity
- Temporal or versioned data
- pureXML and SQL enhancements to improve portability
- Productivity improved

# 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
- 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

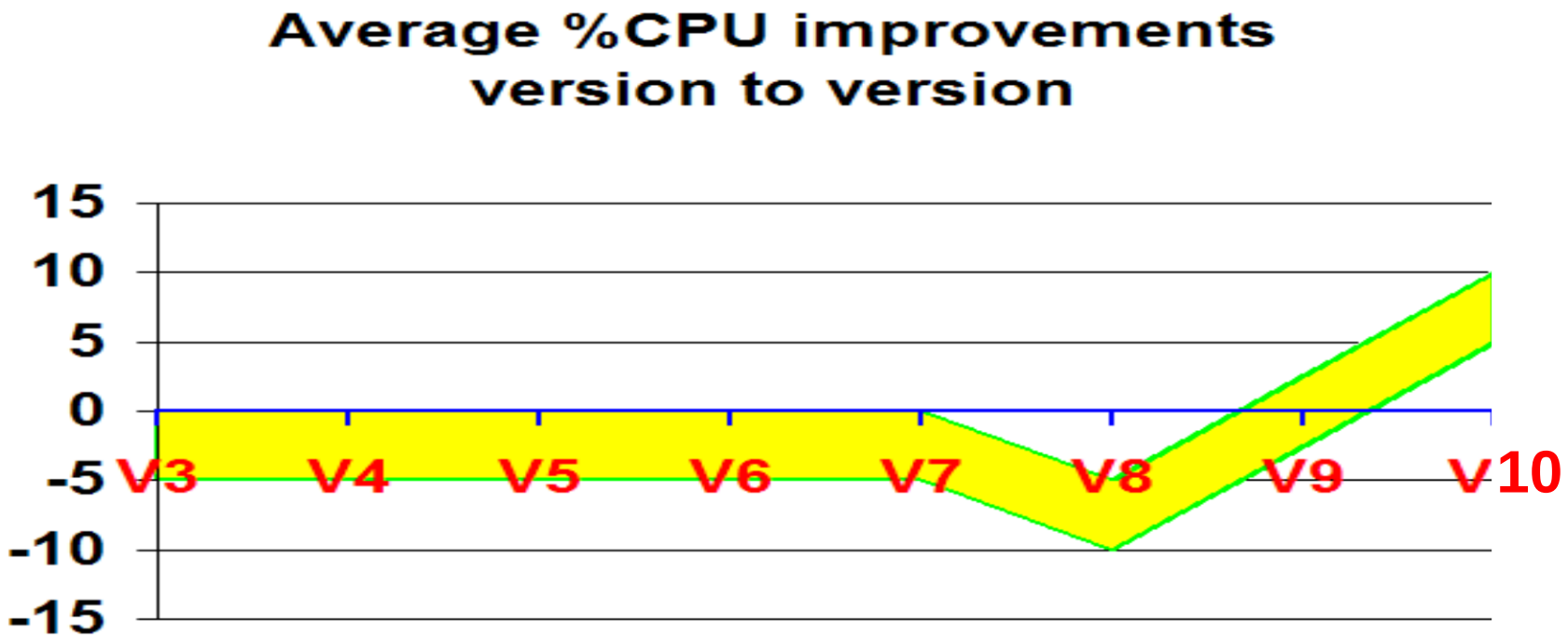
# DB2 10 Performance

**Constant Cost Pressures**

- Performance improvements in key workloads: Transactions, Batch, Insert, …
- Lower CPU usage for large & small DB2 subsystems

DB2 10 Most customers 5% - 10% CPU reduction out of the box with rebind

Some workloads and customer situations can reduce CPU time up to 20%



## Performance improvements

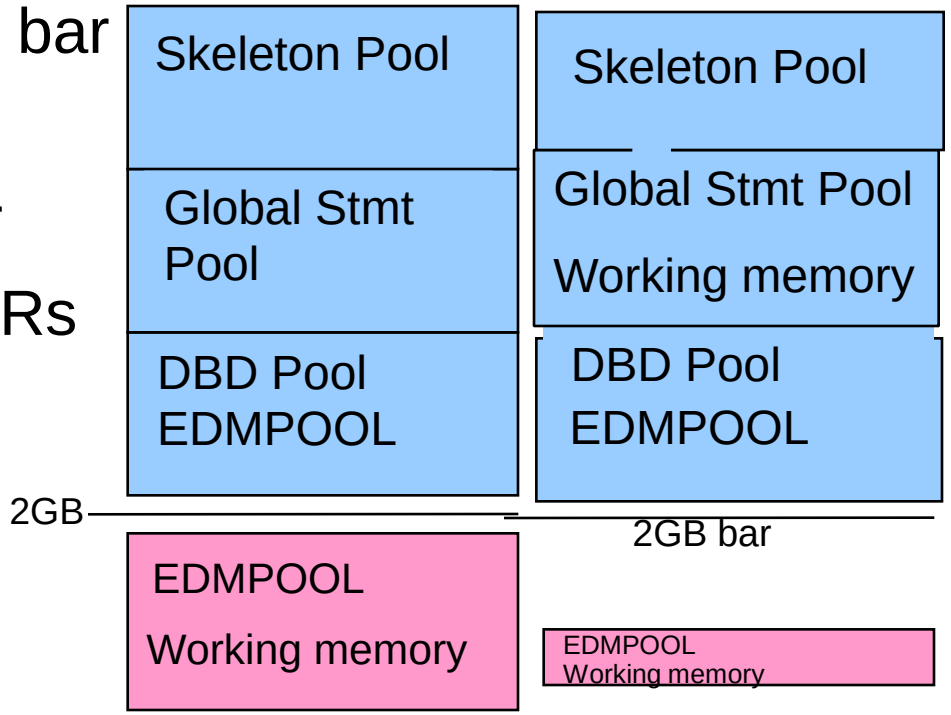
- Run time enhancements out-of-the-box
- Hash access path
- Inline LOBs
- In-memory data or index
- Parallel index update at insert
- Faster single row retrievals
- MEMBER CLUSTER for universal table space
- Efficient caching of dynamic SQL statements with literals
- LOB streaming between DDF and rest of DB2
- Index INCLUDE columns

# DB2 10: 64 bit Evolution Virtual Storage Relief

**DB2 9 helped (~ 10% – 15%)**

**DB2 10: 5 to 10 times more threads, up to 20,000**

- Move 80% - 90% above bar
- More concurrent work
- Reduce need to monitor
- Able to consolidate LPARs
- Reduced cost
- Easier to manage
- Easier to grow




**REBIND is needed for much of savings.**

# Temporal Data

- **Business Time**
  - Effective Dates, Valid Time
  - Useful for tracking of business events over time, application logic greatly simplified
- **System Time**
  - Assertion Dates, Knowledge Dates, Transaction Time
  - Useful for auditing, compliance
- **Bi-temporal**
  - Inclusion of both System Time and Business Time in row

# Integrated XML Support

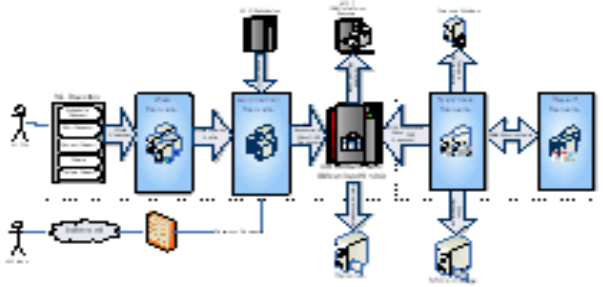
**Business Value**:

- Declarative language, reduce complexity, dramatically improve application development
- Directly store & query in inherent hierarchical format
  - No decomposition/composition
  - No normalize/de-normalize
- Native processing with good XML index design = high performance
- Ideally suited to versatile schemas that are diverse and evolve, and end-user customizable applications
  - Sparsely populated attribute values (null vs. absence)
- Manage XML data with ACID properties, auditing and regulatory compliance, together with relational data

Merrill Lynch Wealth Management
Bank of America Corporation

# BoA Merrill Lynch Wealth Management

- Customer Review Center (CRC), a pioneering distributed application to use DB2 as mission critical database
- Extensive use of complex DB2 types/XML to improve performance and scalability
- 10 fold increase in CRC's production capabilities.
  - Process 25000+ reports in an hour compared to 2500 reports in previous solution
- Shared their pureXML experiences in IOD 2009
- Won Innovation Award at IOD 2009
- More applications to exploit XML

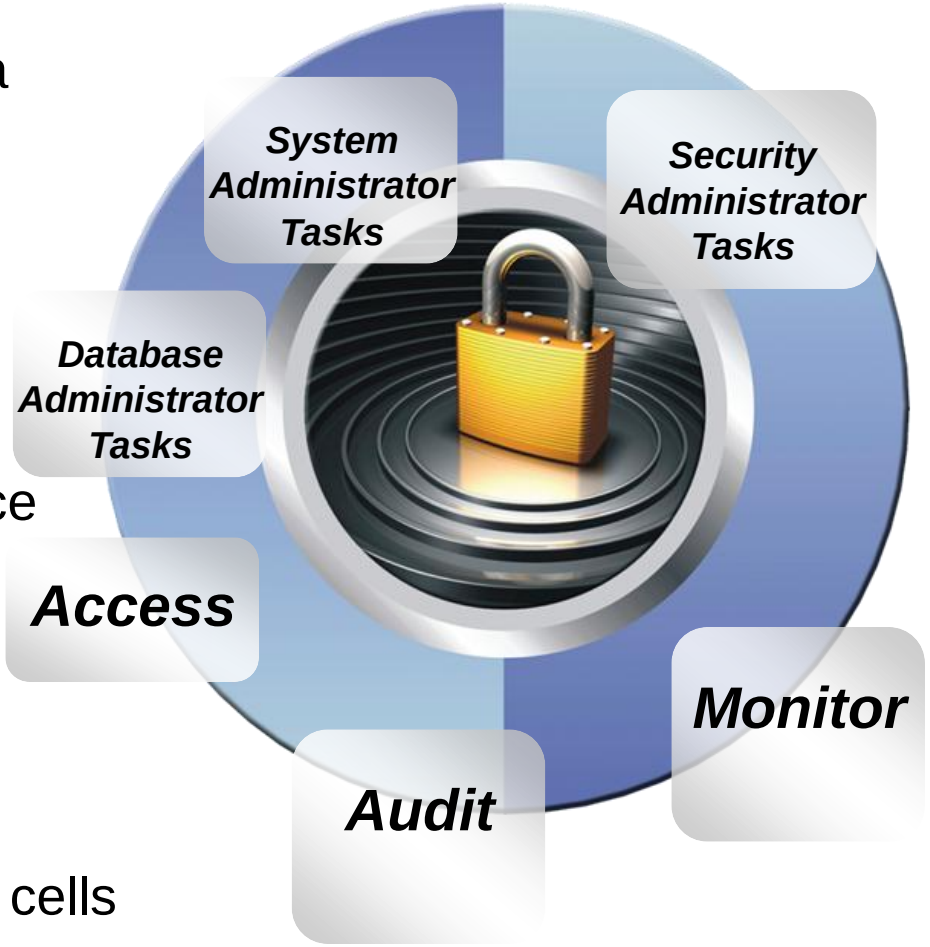


# Query Processing Enhancements

- **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 REBIND regression

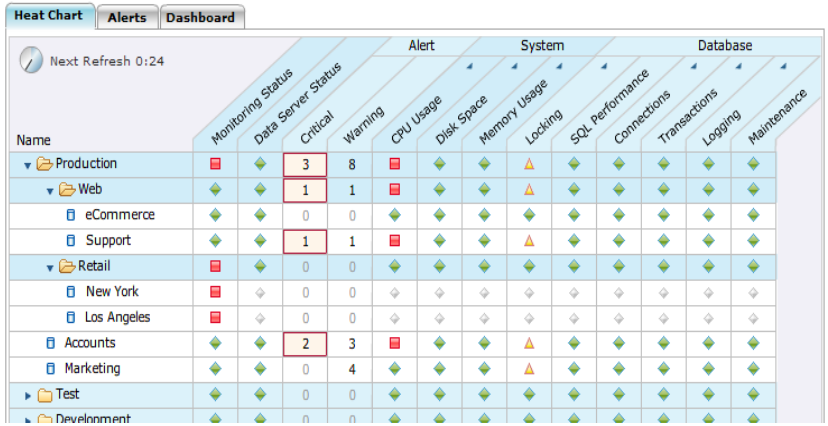
# Business Security & Compliance

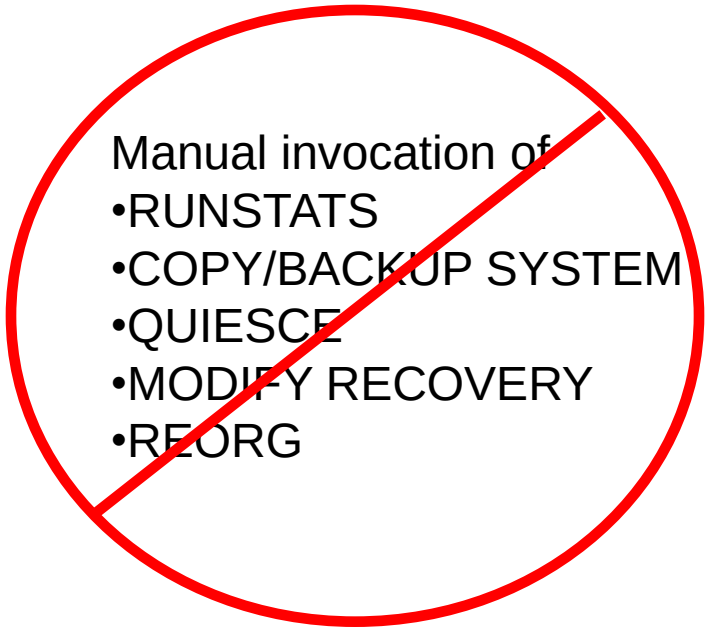
- Protect sensitive data from privileged users & improve productivity
  - SECADM & DBADM without data access
  - Usability: DBADM for all DB
  - Revoke without cascade
- Separate authorities to perform security related tasks, e.g. security administrator, EXPLAIN, performance monitoring and management
- 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 scaling, simpler memory management
- Reduce contention, more online processing
- Access path stability
- Reduced need for REORG
- Auto statistics collection
- Monitoring enhanced



# 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?
  - Are you missing out on DB2 9 value in the meantime?
- Migration cost savings is not 2X versus two migrations
  - Migration considerations for two versions still apply
  - Larger migration project, longer migration timeline, more risk
  - Applications and ISVs may not be ready
- Timing: GA, V8 end of service, other software, ability to test early software

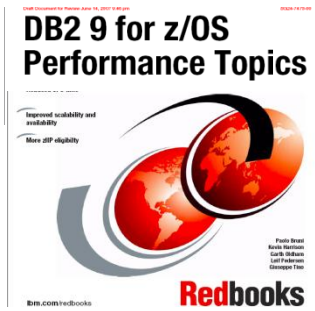
# Top 10 in DB2 10 for z/OS

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 changes for data definition, utilities and subsystems
5. Improved security with more granularity
6. Temporal or versioned data
7. SQL enhancements improve portability
8. pureXML performance and usability enhancements
9. Hash, index include columns, skip migration, …
   **Pick your favorite!**
10. Productivity improved for database & systems administrators, and application programmers

# 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, …

# DB2 10 for z/OS Summary

- Out-of-the-box savings by improving operational efficiencies
- Unsurpassed resiliency for business-critical information
- Rapid application and warehouse deployment for business growth
- Enhanced query and reporting facilities

Introducing

# DB2 10 for z/OS Beta

"We are really excited about the potential of DB2 10 for z/OS to help us achieve our goals for continuous availability, performance, reduced cost, and future growth."

*- Jan Michael Christensen, Vice President, Danske Bank*

# What beta customers are seeing now….

- **OLTP**
  - Customer Z – 7% projected CPU reduction for CICS transactions, straight out of the box!
  - 5.2% CPU Reduction, 14.4% reduction in chargeable CPU
  - 16% CPU reduction w/o rebind; 27% CPU reduction w/rebind
- **Virtual Storage Constraint Relief**
  - 96% reduction of DBM1 virtual storage
  - 2X improvement in the number of threads loaded when testing some big threads
  - Successfully ran with 2504 active threads and with 13440 SD users. All of the threads were active, the response time was great, and, there was plenty of virtual storage.
- **Insert Performance**
  - Cobal Batch concurrent insert: 14.5% improvement in CM w/o bind; 25% after rebind in NFM
  - 33% CPU reduction with multi-row insert V9, 4x vs V8.
  - Data Sharing Heavy Concurrent INSERT Performance 38% CPU reduction
- **Bind/Rebind**
  - V9 baseline for concurrent rebinds showed 100s of deadlocks. V10 handled 10-20 concurrent REBINDS
- **Results may vary based on your driving habits!**

# IBM Customers and Business Partners discuss the value they attain with DB2 for z/OS

Danske Bank

"Continuous availability, reduced performance cost and future growth with constraints are of paramount importance to our business. We are really excited about the potential of DB2 10 for z/OS to help us achieves our goals in each of these areas. Our high expectation is the reason why Danske Bank will invest a lot of effort in the Beta program."

*- Jan Michael Christensen, Vice President, Danske Bank (link resides outside of ibm.com)*

Danske Bank

fiserv.

"24/7 availability in parallel with reducing our mainframe total cost of ownership are two of our top operating priorities. DB2 10 for z/OS has numerous new features such as increasing the capacity of DB2 and more efficient data access that will assist us in achieving our goals."

*- Anthony Ciabattoni, Engineer Architect DB2, Fiserv (link resides outside of ibm.com)*

"DB2 for z/OS has always been the platform for people needing the highest levels of scalability, availability, and reliability. DB2 10 for z/OS continues this tradition by both expanding and fine-tuning this highest standards as database users demand more scalability, better price-performance and operational excellence."

*- Martin Hubel, Martin Hubel Consulting Inc (link resides outside of ibm.com)*


"Every new release of DB2 delivers a tremendous amount of new features. DB2 10 is of course no exception. In my opinion the two most important are,
- the ability to easily alter almost any tablespace attribute
- the support for temporal data."

*- Peter Backland, DB2 Independent Consultant, formerly Vice President at IDUG*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# IBM Customers and Business Partners discuss the value they attain with DB2 for z/OS

"With DB2 10 for z/OS, IBM has once again redefined the benchmark for large-scale database systems. I'm particularly impressed by the potential for significant productivity improvements through the new temporal data support, enhanced autonomic functions and SQL and XML extensions. These enhancements will help my customers to directly drive competitive advantage through more rapid deployment of application and warehousing workloads."

*- Julian Stuhler, DB2 Specialist, IBM Gold Consultant, IBM Data Champion, Past President, International DB2 Users Group, Solutions Delivery Director, Triton Consulting - The Information Management Specialists*

triton consulting

DB2 10 for z/OS Beta
Cut Costs & Improve Performance

"DB2 10 is a release which, like every release in the past, is packed with great features. From a technical point, we see a further exploitation for z/OS with features like more 64 bit exploitation and capabilities to handle large volumes. From a business point of view, we see great features like security enhancements, which complement the already robust security in DB2 and deeply embedded XML enhancements which make creation of SOA services easy. The many enhancements show that DB2 for z/OS is a key player in IBM's overall strategy. DB2 for z/OS is part of technologies like pureQuery and pureXML which are frameworks which enable IBM customers to build, test and exploit applications with a ease, confident and minimum costs. This new release of DB2 proves once again that the mainframe is a state of the art platform with a low TOC!"

*- Klaas Brant, Founder, KBCE (link resides outside of ibm.com)*

Suada soft.

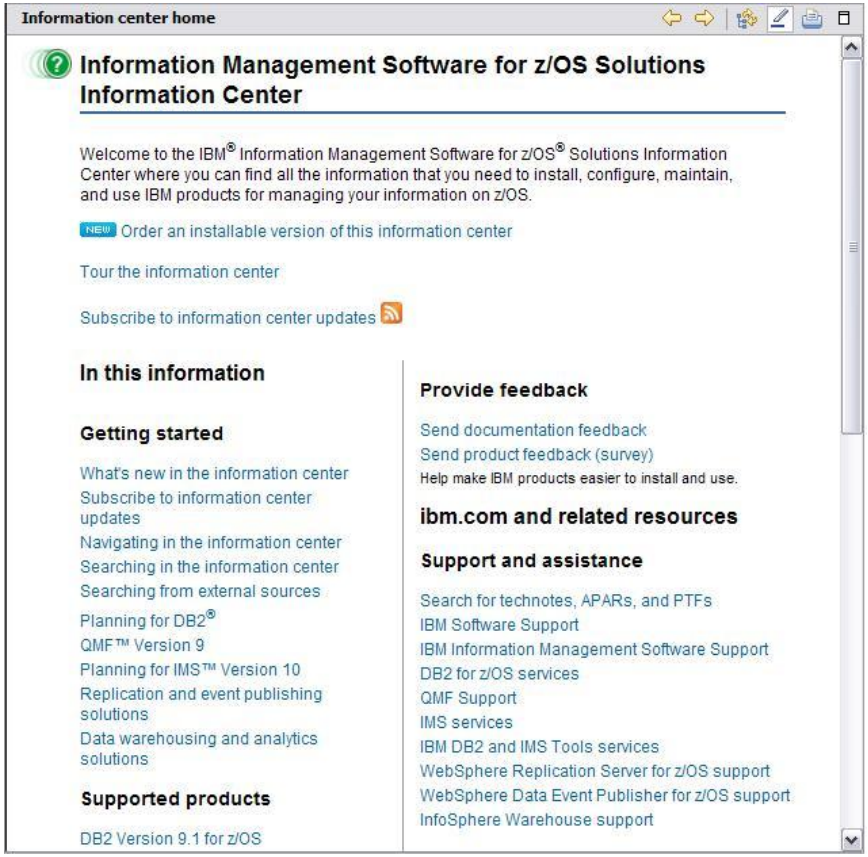
"Every user will almost certainly love and someday implement the temporal queries feature in DB2 10 for z/OS. It allows to query data over current, any prior or future period in business time and keep a history of the lifecycle of a row. This feature will halt the burden of creating triggers or setting up replication in order to achieve the same, complex queries or routines can be avoided in order to collect and retrieve that information. Regulatory and compliance laws can be fulfilled more easily when setting up data versioning becomes as simple as this. "

*- Luc Vandaele, CEO, SuadaSoft (link resides outside of ibm.com)*

KBCE
Klaas Brant Consulting & Education

# Information Management Software for z/OS Solutions Information Center

- Find the latest product information for DB2® for z/OS®, IMS™, DB2 QMF™, IBM® DB2 and IMS Tools, Replication and Event Publishing, and Data Warehousing and Analytics.
- Learn how to use the information center by taking the animated tours that are available from the home page.
- Subscribe to RSS feeds for automatic notification of updates; information is frequently updated.
- Find troubleshooting information (search for Technotes, APARs, PTFs, and IBM Redbooks).
- Find product information through Google searches.



# Why Customers Choose DB2 for z/OS? Business Value!

- **High Availability**
- **High Performance and Scalability**
- **Reliability and Security**
- **Wide Range of Work Loads**
- **Competitive total cost of ownership (TCO)**

**DB2 Usage by Industry Segment**