





DB2 10 for z/OS – More for less

DB2 10 for z/OS provides the best reduction in CPU for transactions and batch in 22 years. We expect most customers to reduce CPU times between 5% and 10% initially, with opportunity for more. Applications which can take advantage of additional benefits, such as hash access, can have larger CPU and memory reductions. Scalability is the second major benefit, with the ability to run five to ten times as many threads in a single subsystem by moving 80% to 90% of the virtual storage above the bar. Schema evolution or data definition on demand enhancements improves availability. SQL and pureXML improvements extend usability and application portability for this platform. Productivity improvements for application developers and for database administrators are very important as data grows in scale and complexity.

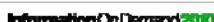
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DB2 for z/OS The most robust and cost effective data server

| | DB2 | DB2 9 | DB2 10 |
|---|--|---|--------|
|  <p>Efficiency</p> <ul style="list-style-type: none"> ▪ Deep synergy with System z ▪ HW Compression ▪ Consolidation | <ul style="list-style-type: none"> • Up to 20% utility CPU savings • Compress indexes, save 50% disk • Native SQL procedures • More CPU on specialty engines | <ul style="list-style-type: none"> • Save up to 5-10% CPU batch & transactions out-of-the-box (rebind) • On-the-fly data Compression • Temporal data support • Skip-level migration | |
|  <p>Resilience</p> <ul style="list-style-type: none"> ▪ Unmatched availability ▪ Unparalleled security ▪ Industry leading reliability | <ul style="list-style-type: none"> • Flexible context and role security • Expanded online schema changes • Volume level backup & recovery | <ul style="list-style-type: none"> • Ten times more concurrent users • More online schema changes • More granular access control | |
|  <p>Growth</p> <ul style="list-style-type: none"> ▪ Near-linear scalability ▪ Optimized for SOA ▪ Flexible development ▪ Warehousing capabilities | <ul style="list-style-type: none"> • Seamless integration of XML and relational • Improved SQL • Partition by growth • OLAP expressions | <ul style="list-style-type: none"> • Enhanced query parallelism • More SQL compatibility • Improved pureXML and SQL PL | |

V8 out of service April 2012



Customers have come to know DB2 as the most robust and cost effective data server. With every version of DB2, we are focused on the needs of our customers to operate efficiently, to be up and running 24x7, and to grow with their business. With DB2 9, customers get CPU and disk savings as well as a boost in application productivity with the new pureXML technology. For the next DB2 version, a lot of customers are getting excited. We are putting a lot of focus on out-of-the-box performance improvements and productivity improvements such as online schema, temporal data support, and fine-grain security controls. DB2 continues to be the choice for mission critical business data and we continue to make it easier for customers to keep data on the platform.

DB2 9: One of the key initiatives of V8 was online schema evolution, and that theme is expanding and changing to be data definition on demand. These are key improvements for resilience. One of the important changes is to be able to replace one table quickly with another. Another is to be able to rename a column or an index. A new type of table space combines the attributes of segmented and partitioned, without a partitioning key. Rebuild index can be run with much less disruption. Online table space reorganization for a few partitions is improved a lot, removing the BUILD2 phase for all types of secondary indexes. Table space and index logging can be altered.

Many other improvements help with performance, with scalability and with availability. Index on an expression can be combined with caseless comparisons to improve text search. Improved insert rates can result from improved latching of the log data. Significant reductions in cpu usage are provided with new utilities.

Today's complex applications include both transactions and reporting, so performing both well is imperative. The key improvements for reporting are optimization enhancements to improve query and reporting performance and ease of use. More queries can be expressed in SQL with new SQL enhancements. Improved data is provided for the optimizer, with improved algorithms. Improved cpu and elapsed times can be achieved with the FETCH FIRST clause specified on a subquery. The INTERSECT and EXCEPT clauses make SQL easier to write.

DB2 10: DB2 10 for z/OS provides the best reduction in CPU for transactions, queries, and batch for over 20 years, since V2R1. We expect most customers to reduce CPU times between 5% and 10% as soon as DB2 10 is out of the box, after rebinding static SQL applications. Applications which can take advantage of additional benefits, such as hash access, index include columns, inline large objects, parallel index updates, faster single row retrievals, work file in-memory, index list prefetch, 64 bit memory enhancements, use of the System z10 1 megabyte page size, buffer pools in memory, access path enhancements, member clustering for universal table spaces, efficient caching of dynamic SQL statements with literals, improved large object streaming, and SQL procedure language performance can have additional CPU and memory reductions. As always with performance, individual customer experiences will vary, and individual workloads will vary more.

Scalability is the second major benefit, with the ability to run five to ten times as many threads in a single subsystem by moving 80% to 90% of the virtual storage above the bar. Schema evolution or data definition on demand enhancements improve availability, by using an ALTER where the only prior option was DROP and recreate. Improved concurrency to DB2 catalog access and utilities extends the scaling. Security is enhanced with better granularity for administrative privileges, masking for data, and new audit capabilities.

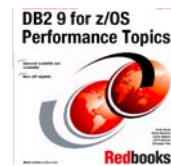
SQL, pureXML, and web services improvements extend usability and application portability to the System z, z/OS and DB2 for z/OS platform. Temporal or versioned data improves productivity for applications in a wide range of industries. Applications ranging from SAP to warehousing see benefits from every category and item.

The net result is productivity improvements in DB2 10 for application developers, for database administrators, and for systems administrators that are very important as data grows in scale and complexity.

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, ...



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Data sharing is a prime example of deep synergy with System z.

DB2 worked with the System z design team for nearly 10 years to produce a robust platform for horizontal scaling. The evolution has continued for 15 more years now after delivery.

Hardware data compression and encryption provides improved costs, easier management and robust resilience for the platform. Cross-memory and protection keys work with APF authorization and RACF for the underlying system integrity.

Specialty engines can reduce costs very substantially, reducing both hardware and software costs.

The z/OS workload manager (WLM) has changed in almost every release to improve work flow with DB2. DB2 has a dispatcher, the z/OS WLM.

Sorting, decimal arithmetic, decimal float, encryption, and Unicode conversions are examples of unique instructions in z/Architecture that DB2 uses.

DB2 has unique ways to use the z10 and zEnterprise to deliver additional value.

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 IBM Smart Analytics Optimizer
- Excellent synergy with DB2 10 → significant CPU reduction and scalability increase
 - CPU reductions, increased zIIP usage
 - Remove key single system scaling inhibitors: virtual storage, latching, catalog, utilities, ...
 - Translation Lookaside Buffer changes expected to improve performance for 1MB page sizes
 - Buffer pool management



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The zEnterprise z196 and DB2 10 take synergy to the next level. See Chris Crone's presentation for more detail. Faster CPUs, more CPUs, and more memory means better DB2 performance and scalability.

Compression hardware improvements are expected to increase DB2 data compression performance.

192M L4 Cache is expected to benefit DB2 workloads, as DB2 uses the memory. DB2 can take an advantage of cache optimization on zEnterprise.

Hybrid architecture delivers new opportunities for DB2 query performance acceleration with IBM Smart Analytics Optimizer.

Excellent synergy with DB2 10 removes many single system scaling inhibitors – virtual storage, latching, catalog concurrency, and utility concurrency.

The Translation Lookaside Buffer Changes are expected to improve DB2 10 performance for 1MB page sizes. Buffer pool improvements for large buffers will provide additional help.

Combined with DB2 10 improvements CPU reduction, buffer pool management, relief for virtual storage constraint and latch contention, DB2 applications can enjoy significant cost reduction and scalability improvement on zEnterprise.

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



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

CPU reductions for transactions, queries, and batch

- CPU reductions of 5-10% for traditional workloads
- CPU reductions of up to 20% for new workloads
- Up to additional 10% CPU savings using new functions
- For static SQL, REBIND typically required

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



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Improved operational efficiency for out-of-the-box savings Version 10 delivers great value by reducing CPU usage. Compared to previous releases of DB2 for z/OS, most customers can achieve out-of-the-box CPU savings of five to ten percent for traditional workloads and up to 20 percent for some workloads. DB2 reduces CPU usage by optimizing processor times and memory access, leveraging the latest processor improvements, larger amounts of memory, solid-state drives, and z/OS enhancements. Improved scalability and constraint relief can add to the savings. Productivity improvements for database and systems administrators can drive even more savings.

In Version 10, performance improvements focus on reducing CPU processing time without causing significant administration or application changes. Most performance improvements are implemented by simply migrating to Version 10 and rebinding. You gain significant performance improvements from distributed data facility (DDF) optimization, buffer pool enhancements, parallelism enhancements, and more.

Most customers should see 5% - 10% CPU reduction out of the box after rebinding. Some workloads and customer situations can reduce CPU time more. While versions 3, 4, 5, 6, and 7 generally increased CPU times by a small amount, less than 5%, version 8 increased CPU time by 5% to 10% for most customers. DB2 9 often reduced CPU a little or increased very little (less than 2%). New function, improved scalability, and faster hardware compensated for the increases in CPU time. Using the new function could change the increases into reductions, particularly with DB2 V8 and multi-row fetch.

Early DB2 10 performance benchmarking and customer experience has shown that most customers can expect to get 5% to 10% CPU reduction after rebinding. Some customers will get more and some less. Some situations can reduce CPU time more than that. Customers who have scalability issues, such as virtual storage constraints or latching can see higher improvements. Opportunities for tuning can take advantage of memory improvements. High volume, short-running distributed transactions can take advantage of CPU reductions, using release deallocate. Concurrent sequential insert can be reduced from 5% - 40%. Queries can be improved as much as 20% without access path change, and more for better access paths. A workload with native SQL procedures has shown up to 20% CPU reduction. For DB2 utilities, customers moving from DB2 9 should expect a small (0% to 7%) reduction in CPU times varying by utility, while customers moving from DB2 V8 will see larger CPU reductions in the range of 20%.

Productivity improvements: Improvements in SQL and XML improve productivity for those who develop new applications and for those who are porting from other platforms. Automating, reducing, or eliminating tasks, and avoiding manual invocation improves productivity and can help avoid problems. Resiliency improvements for virtual storage and availability increase productivity. DB2 10 improvements make the install, migration, and service processes faster and more reliable, including the ability to skip from V8 to DB2 10.

Innovations in Version 10 drive new value in resiliency through scalability improvements and fewer outages, whether those outages are planned or unplanned. Scalability delivers the ability to handle five to ten times more concurrent users in a single DB2 subsystem than in previous releases of DB2 for z/OS (as many as 20,000 concurrent threads). Improved availability is supported by schema evolution, or data definition on demand, and manageability enhancements for query performance

DB2 10 for z/OS - Feedback from Beta Customers



We are really thrilled about "Temporal Data" feature – this feature has the potential to significantly reduce overheads. We have estimated that 80% of our existing temporal applications could have used "the DB2 10 temporal features" instead of application code - this feature will drastically save developer time, testing time – and even more importantly make applications easier to understand so improve business efficiency and effectiveness

Frank Petersen -System Programmer

BANKDATA

bankdata

"We use very large buffer pools – some of them up to 3.2GB in size. We rely on efficient access to buffered data and any saving in the cost of accessing that data will be very beneficial."

Philipp Nowak, BMW DB2 Product Manager

We have measured a 38% reduction in CPU and a 7% reduction in suspend time for some heavy insert workloads in a data sharing environment. That's a significant saving which provides immediate business benefit."

Philipp Nowak, BMW DB2 Product Manager



The customer quotes speak for themselves. See more on the web:

<http://www.ibm.com/software/data/db2/zos/db2-10/>

<http://www.ibm.com/software/data/db2/zos/db2-10/testimonials.html>



What Customers are Saying

fiserv.

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 achieve 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

Danske Bank



"DB2 10 enhances our ability to support our rapidly growing workloads while delivering some very valuable new function with immediate business benefits."

Paulo Sahadi, Senior Production Manager, Information Management Division, Banco do Brasil

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

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

Manuel Gomez Burrieri
CECA (Spanish Bank Federation)



The customer quotes speak for themselves. See more on the web:
<http://www.ibm.com/software/data/db2/zos/db2-10/>
<http://www.ibm.com/software/data/db2/zos/db2-10/testimonials.html>

Sample of Beta Customers' 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 app |



Here are some customer examples of performance results for a broad workload.


Beta Customers' 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 Further improvements delivered late in the beta program. |




These are some more specific situations and performance results.



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
 - Larger MAXKEEPD values for KEEPYNAMIC=YES



DB2 10

| | |
|----------------|--------------|
| Global DSC | CT/PT |
| DBD | |
| Local DSC | SKCT SKPT |
| Thread / Stack | |

Thread / Stack/ working
75-90% less usage
DBM1 below bar
after REBIND

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Laboratory measurements and early customer experience have shown substantial savings in the primary constrained address space, DBM1. Most measurements have shown 75% to 90% savings for the virtual storage in that address space below the 2 GB bar. Some EDMPOOL and some working storage remains below the bar.

This storage relief allows many more threads or concurrent users in a DB2 subsystem, allowing new possibilities for optimization.

Some customers will be able to consolidate data sharing members, saving on memory, CPU and administration time.

Other customers will be able to use the storage to improve service or to reduce CPU time more. Some common examples are expected to be use of RELEASE(DEALLOCATE) and larger amounts of dynamic statement cache.

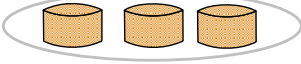
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Running Many Active Threads

Today

Coupling Technology

| LPAR1 | LPAR2 | LPAR3 |
|--------------------|--------------------|--------------------|
| DB2A (500 thds) | DB2B (500 thds) | DB2C (500 thds) |
| DB2D (500 thds) | DB2E (500 thds) | DB2F (500 thds) |

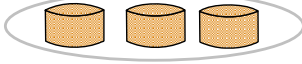


- Data sharing and sysplex allows for efficient scale-out of DB2 images
- Sometimes multiple DB2s per LPAR

DB2 10

Coupling Technology

| LPAR1 | LPAR2 | LPAR3 |
|---------------------|---------------------|---------------------|
| DB2A (2500 thds) | DB2B (2500 thds) | DB2C (2500 thds) |



- 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


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Customers are constrained by virtual memory to various degrees. This slide shows a relatively extreme situation experienced by some customers today. With a maximum of 500 threads (very dependent upon workload) in a DB2 subsystem, this customer is using two DB2 subsystems in the same data sharing group on a single LPAR. This is not efficient for memory of CPU, but avoids the memory constraints with fewer LPARs. Additional relief for virtual storage comes with IMS 11 and other products.


This example allows customers to run 10 times as many threads in a single DB2 subsystem, improving efficiency for storage and CPU. The biggest change is easier management and simpler growth. Most customers use data sharing for high availability, and that need still exists. Extreme scale continues to need data sharing, but fewer data sharing members can mean easier management and reduced resource consumption. In this example, changing from 6 members to 3 can mean a reduction of 1.5% in CPU time, as a rule of thumb.

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3



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



Monitor

Audit

Access

Database Administrator Tasks

System Administrator Tasks

Security Administrator Tasks

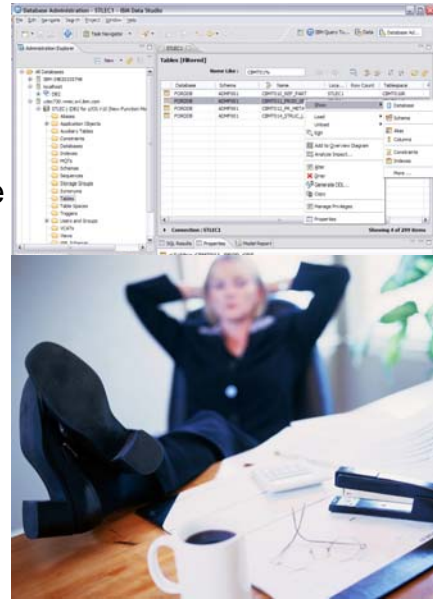
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Customers are being pressed for a wide range of improved security and compliance. Data retention is a growing need. Protecting sensitive data from the privileged users and administrators is required. Separation of authority for security, access, and some common tasks, like EXPLAIN will help. Auditing for privileged users can also make compliance simpler. Access control is refined in several ways with better granularity for the administrative privileges and with finer grained access control at the row and column level, including the ability to mask access to some fields. Auditing is also enhanced.

DB2 10: Productivity – Doing More with Less!



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



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Some of the improvements come with Data Studio for application programming and administration – stronger cross-platform graphical interfaces, better integration with Java, improvements in the ability to develop and debug.

Some of the improvements come within DB2 for z/OS. Improvements in SQL and XML improve productivity for those who develop new applications and for those who are porting from other platforms. Some of the improvements remove complexity from application tasks.

DB2 has a strong focus on making DB2 easier to use by automating tasks and eliminating tasks where possible. Avoiding the manual invocations can also help avoid problems for running the function too often or not often enough. Where the task cannot be eliminated, the frequency and monitoring can be reduced, such as the need to reorganize. The improvements for virtual storage and for availability also help DBA productivity.

Allowing tailored names for DSNHDECP will permit many subsystems to share the SDSNEXIT data set.

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



Access path improvements deliver improved response time and reduced resources and simpler management for packages and queries. The performance improvements include better optimization for some common situations, improved caching for dynamic SQL statements which contain literals instead of parameter markers, and increased parallel processing. Removing some parallel restrictions provides faster response times and allows more use of zIIP.

Access path stability improvements help eliminate regression from a REBIND. The DB2 9 package management changes helped many customers reduce their fear of REBIND, and these improvements take the next step, extending and expanding the capability. New capabilities make the processing more efficient and easier to manage.

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



DB2 10 provides the ability to version your data by date. Using the timestamp picoseconds enhancements all the data within a table can have unique timestamps. This enhancement along timestamp time zone capabilities provides the application designer with options for tables that hold global data activities. This is an important feature for global financial and other global industry companies.

Large object are also improved by being able to put smaller LOBs that will fit on the same data page within the data row. This allows the row and the related LOB data to be on the same row and eliminate the extra I/Os to get the LOB data from its other table. This feature combined with the ability to use NULL or default values for the LOB gives additional reasons to have small LOBs in-line with their associated row data.

LOB handling is also improved as the LOB data can be included in the standard input/output files with other non-LOB data. This eliminates the hassles of the large amount of extra LOB files previously needed to support the loading and unloading of LOB data within your system.

DB2 10 also improves its compatibility and SQL consistency within the DB2 family and with other DBMS vendors. This allows any other DBMS vendor systems to be more easily ported to DB2 10 on System z eliminating availability, scalability and performance problems. This feature can quickly resolve your performance, maintenance and scalability for some of your UNIX systems, some SAP or other packaged software systems.

This compatibility also extends to the ability to implicitly cast unlike data types for easily moving or integrating data across application data types, program languages and platforms.

This portability is also reflected in the new package level parameters to control whether the application looks at only currently committed data or not. This improves application concurrency and provides flexibility within your application design for when the system should ignore rows that are in the process of being inserted and only use currently committed rows

The Timestamp with Time Zone and the pico seconds of the timestamps features are a great way to set up a fact table within a data warehouse or business intelligence database. These components along with the new SQL capabilities for calculating a moving sum or moving average are additional DB2 10 capabilities that make it easier for operational business intelligence applications.

Temporal data or versioned 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



In DB2 10, you can create a temporal table, which is a base table with one or more time periods defined on it. DB2 supports two built-in types of periods, which are the system time period and the business time period. The system time period is a system-maintained period in which DB2 maintains the start and end timestamp values for a row. The business time period is a user-specified period in which you maintain the start and end values for a row.


The `SYSTEM_TIME` period is meaningful because of versioning. Versioning specifies that old rows are archived into another table. The table that contains the current active rows of a table is called the system-maintained temporal table. The table that contains the archived rows is called the history table. DB2 creates a history table and a table space to hold that table when you define a base table to use versioning, or when you enable versioning on an existing table. You can delete the rows from the history table when those rows are no longer needed.

Using these two built-in periods together in the same table creates a bi-temporal table. You can use a bi-temporal table to keep user-specified period information and system-based historical information. Therefore, you have a lot of flexibility in how you query data based on periods of time.

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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



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The enhancements cover many aspects of the database technology including new applications support, SQL enhancements, performance and scalability, continuous availability, data warehousing improvements as well as reducing the total cost of ownership.

DB2 10 for z/OS satisfies or partially satisfies many requirements from the worldwide user group communities such as Guide Share Europe, Japan GUIDE/SHARE, and SHARE Incorporated. In addition, this release satisfies many requirements submitted directly to IBM by customers or Business Partners.

As with recent previous releases, Enterprise Applications providers, such as SAP, many other web applications and their customers have been a very important source of the requests for new functions and features.

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



A range of XML improvements delivers a strong release 2 of the pureXML function. Customers use of DB2 9 pureXML shaped this delivery of improved performance and usability.

Multi-versioning: During the execution of a SQL statement, a row with an XML column can be kept in a work file. The row in the work file does not contain the actual XML document. Instead, the information needed for DB2 to retrieve the XML document from the XML table is cached in the work file. The problem occurs if the XML document in the XML table is deleted or updated. When the row in the work file is fetched, DB2 cannot find the expected XML document in the XML table, and the SQL statement fails with an error SQLCODE.

XML UPDATE: Applications which require parts of XML documents to be modified need to break apart the XML document into modifiable pieces, make the modification to a piece, and then construct the pieces back into an XML document.

SP/UDF/Trigger support: XML variables inside SQL PL, XML arguments, transition variables.

The CHECK DATA utility is extended to check XML data.

DB2 Tools for z/OS: Day 1 Savings with IBM Tools



- 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 V10 drives down costs with autonomies, 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.

Tivoli OMEGAMON XE for DB2 Performance Expert V5.1 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!

DB2 Sort V1.1 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.

DB2 Administration Tool V10.1 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.



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Utilities – Focus on eliminating outages, improving performance, reducing resource consumption, reduce complexity and improve automation. Day 1 utility support for DB2 10 function. Some key enhancements are:

- Flashcopy support at data-set level for COPY, RECOVER, REORG, LOAD, & REBUILD INDEX, For ex: can create an image copy data set to be a transaction-consistent image copy data set with no application outage
 - Significant enhancement to REORG to reduce outages, including Support new Online Schema in DB2 10 and hash table, both before and after conversion to hash format, Improved performance for part-level REORG w/ non-partitioning indexes and REORG INDEX to reduce ET, SHRLEVEL CHANGE support for LOB table space for both LOY YES/NO w/ no mapping table required
 - Major enhancements to RUNSTATS incl. zIIP support, autonomic features, page & auto-sampling rates
- Admin Tool: DBA-managed performance improvements - Easily migrate existing tables to hash access, Manage new Security models and autonomic statistics collection, Rollout Application BiTemporal Data – “as of”
HPU - new internal format to UNLOAD (perf. Feature) to as well as TCPIP support via USS pipe and native XML UNLOAD support

Tivoli OMEGAMON XE for DB2 Performance Expert, v5.1 W5655-W37 introduces an end-to-end response time measurement capability surfacing DB2 for z/OS SQL metrics, making it IBM's most comprehensive DB2 application performance assessment tool. Use it to evaluate the efficiency of, and optimize performance of your DB2 for z/OS DBs across your heterogeneous application environment. It offers all the capabilities of Tiv. OMEGAMON XE for DB2 PM on z/OS and Buffer Pool Analyzer for z/OS, in addition to its own unique capabilities.

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Jump into DB2 10! The water's fine.



DB2 V8 DB2 9 DB2 10

Key Questions are WHEN? and HOW?



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Is your current fish bowl getting constrained? What is limiting you? Is it CPU? Virtual storage? Latching? DB2 catalog and directory? Concurrent utilities? Are you currently running DB2 9? V8? V7? Should you migrate to DB2 10?

The answer is a definite Yes. The question is not so much whether to migrate as when and how to migrate. If you are running DB2 9 today, then DB2 10 is in your future, giving you more room to grow, with fewer limits, lower costs, and more for less. If you are running DB2 V8 today, then you have a choice of jumping to DB2 9 or directly to DB2 10. So the key question is, "When should I migrate to DB2 10?"

DB2 10 for z/OS At a Glance

| | |
|---|---|
| Performance, Scalability | <ul style="list-style-type: none">• CPU reductions out-of-the-box• Hash access to data, index include columns• Ten times more threads per DB2 image |
| Availability Security Productivity | <ul style="list-style-type: none">• 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 | <ul style="list-style-type: none">• Versioned data or temporal queries• pureXML enhancements• SQL improvements that simplify porting |
| Dynamic Warehousing | <ul style="list-style-type: none">• Moving sum, moving average• Many query optimization improvements• Query parallelism restrictions removed• IBM Smart Analytics Optimizer |



DB2 10 for z/OS provides the best reduction in CPU for transactions and batch for 22 years, since V2R1. We expect most customers to reduce CPU times between 5% and 10%. Applications which can take advantage of additional benefits, such as hash access, can have larger CPU and memory reductions. Scalability is the second major benefit, with the ability to run five to ten times as many threads in a single subsystem by moving 80% to 90% of the virtual storage above the bar. Schema evolution or data definition on demand enhancements improves availability. SQL, pureXML, web services extend usability and application portability for this platform. Productivity improvements for application developers and for database administrators are very important as data grows in scale and complexity. DBAs can avoid running statistics, some REORGs, and benefit from memory, and utilities enhancements. Warehousing continues to evolve, with improvements in SQL and XML, better optimization techniques, increased parallelism and the new IBM Smart Analytics Optimizer.

Questions?



Watch for upcoming white papers and conferences

IOD

IDUG

Share



I hope we have lots of questions, but thank you in any case. We have provided many additional notes in the slides and additional slides at the end of this presentation. We have a new white paper on DB2 10 from Dave Beulke now and expect to have another from Julian Stuhler of Triton Consulting in the future.

https://www14.software.ibm.com/webapp/iwm/web/signup.do?source=sw-infomgt&S_PKG=db2_zos_reduce_costs

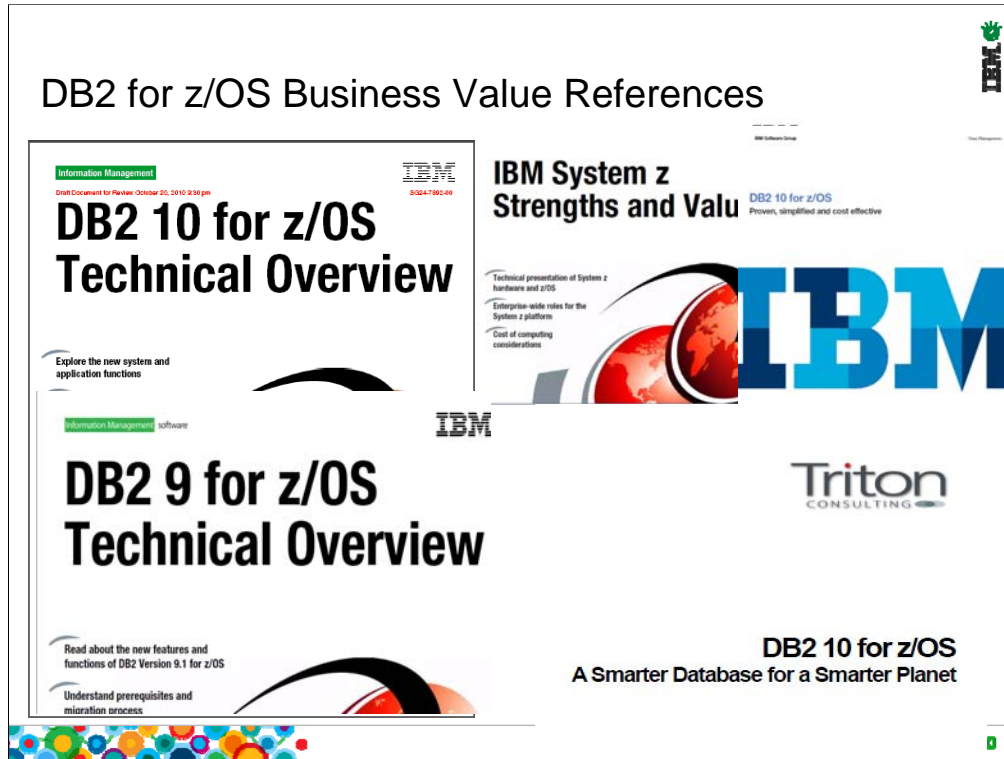
DB2 10 is a hot topic at upcoming conferences, so please plan to attend IOD, IDUG or Share.

<http://www.ibm.com/software/data/db2/zos/events.html>

<http://www.idug.org>

<http://www.share.org>

<http://www.ibm.com/software/uk/data/conf/>



Here are some resources for a discussion of business value in DB2. White papers are useful for a quick summary, and IBM Redbooks publications provide more detailed technical discussion.

<http://www.ibm.com/software/data/db2/zos/db2-10/>

ftp://ftp.software.ibm.com/software/data/pubs/papers/DB2_for_zOS_V9_Business_Value_White_Paper.pdf

http://www.ibm.com/software/os/systemz/newsletter/mainstreamed11_uk.html

The Business Value of DB2 for z/OS, SG24-6763,
<http://www.redbooks.ibm.com/abstracts/sg246763.html>

DB2 9 for z/OS Technical Overview, SG24-7330, chapter 2 on System z synergy,
<http://www.redbooks.ibm.com/abstracts/sg247330.html>

DB2 9 for z/OS Performance Topics, SG24-7473, performance on z10,
<http://www.redbooks.ibm.com/abstracts/sg247473.html>

What DB2 Means to Business Value, Talk DB2 in business terms the suits can understand.
<http://www.ibmdatabasemag.com/story/showArticle.jhtml?articleID=199201819>

System z Strengths and Values, SG24-7333,
<http://www.redbooks.ibm.com/abstracts/sg247333.html>

http://www.idug.org/wps/portal/idug/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKLN4o38rAES YGYnoH6kehCAQghX4_83FT9IKBUpDIQyMzDRz8qJzU9MbISP1jfWz9AvyA3NKLC29ERAP8BqUk!/delta/base64xml/L0IJSk03dWIDU1EhIS9JRGpBQU15QUJFUkVSRUlnLzRGR2dkWW5LSjBGUm9YZmcvN18yXzZITA!!?PC_7_2_6HL_WCM_CONTEXT=/wps/wcm/connect/IDUG+Site/Solutions+Journal/Solutions+Journal+Online+Magazine/Volume+15%2C+Number+2/IDUG-SolutionsJournalArticle-Content-Developer-s+Corner%3A+Time+to+Plan+for+Migration+Again



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This product became generally available on October 22, 2010.

See the web for current information, the announcement, ...

<http://www.ibm.com/software/data/db2/zos/db2-10/>

http://www.ibm.com/common/ssi/rep_ca/5/877/ENUSZP10-0015/ENUSZP10-0015.PDF

<http://www.ibm.com/support/docview.wss?uid=swg27017960>

<http://www.ibm.com/support/docview.wss?uid=swg21006951>

<http://it.toolbox.com/blogs/db2zos/db2-10-for-zos-beta-announced-today-36790>

<http://www.ibm.com/developerworks/spaces/db2zos>

<http://davebeulke.com/?p=625>

<http://community.solutionscenter.techweb.com/community/mainframe/blog/2010/02/09/db2-10-for-zos-beta-starts-today>

<http://www.triton.co.uk/blog/?p=415>