



DB2 for z/OS Trends and Directions

Gregory N. Lotko *Director DB2 for z/OS*



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IBM INFORMATION ON DEMAND 2007
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Mandalay Bay
Las Vegas, Nevada

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This presentation will start with Greg sharing his priorities for the DB2 for z/OS business and who we are as a team. The discussion will then move to how the product supports and is an integral part of a Service Oriented Architecture (SOA). The audience will receive an update on DB2 for z/OS Version 8 including customer usage examples and what enhancements have been made over the past year. With the General Availability of DB2 9 for z/OS in March of 2007, significant new enhancements have been made to the product and the response from Beta customers, analysts, and early adopters has been overwhelmingly positive. Finally, the talk will end with an eye to the future with some insight into what the team is working on next!

IBM Data Servers

Reduce cost of deployment and management of data

- *Innovation to reduce the cost of infrastructure*
- *Innovation to manage the lifecycle of data - from modeling and design through change management and sunsetting*

Enable rapid use of data throughout the enterprise

- *Innovation that accelerates SOA and XML initiatives*
- *Innovation that leverages Web 2.0 and situational applications*



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First let's connect back to Arvind Krishna's keynote presentation for IBM Data Servers. You'll see as we proceed through my presentation that DB2 for z/OS is working in every one of these areas to reduce costs and to manage data more effectively. Rapid use of data comes from the SOA and XML work as well as from implementing new ways to be more interactive, with rapid development with the latest innovations.

Agenda

- The Team
- SOA and DB2
- DB2 for z/OS V8
- DB2 9 for z/OS
- What's Next?



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We'll take a brief look at some of the team which delivers this work. Then we'll continue with a discussion of SOA and interaction with DB2. DB2 for z/OS Version 8 is running well for almost every customer today. Most of this discussion will focus on DB2 9 and its contents. We'll then take a look beyond DB2 9.

DB2 for z/OS Organization

				
<i>Jeff Josten, DE Development</i>	<i>Gene Fuh, DE Query Technology</i>	<i>Dave Jeffries Development</i>	<i>Curt Cotner IBM Fellow, VP CTO for Database Servers</i>	<i>Greg Lotko Director DB2 for z/OS</i>
				
<i>Natalie Cummings Quality & Performance</i>	<i>Chris Akey WW Service</i>	<i>Don Grossweiler Customer Advocacy</i>	<i>Stan Wong CSDL</i>	<i>Juergen Schimpf Germany</i>
				
<i>Jim Teng, DE Data Mgmt.</i>	<i>John Campbell, DE Development.</i>	<i>Bryan Smith, DE Info. Mgmt.</i>	<i>Namik Hrle, DE Info. Mgmt.</i>	<i>Roger Miller Evangelist</i>
				
			<i>Terrie Jacopi Development</i>	


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These are key management and technical leaders. Curt Cotner is an IBM Fellow, Vice President and Chief Technology Officer for Database Servers. He leads a large group in many locations to provide the common application development and administration client for IDS, DB2 for luw and DB2 for z/OS. Greg Lotko is the Director of DB2 for z/OS, heading this group of second line managers and technologists. Jeff Josten, Jim Teng, Gene Fuh, John Campbell, Bryan Smith and Namik Hrle are Distinguished Engineers. Most of this group is presenting here.

- 1297 Future Technology Directions for Database Access from Java Curt Cotner
- 1298 IBM Data Servers: Application Development & Administration Directions Curt Cotner
- 1649 DB2 9 for z/OS: Latest News and a Peek into the Future Jeffrey Josten
- 1229 New Technology for Top Query Performance Issues in DB2 for z/OS Gene Fuh
- 1265 What's New in DB2 for z/OS Buffer Pool Management James Teng
- 1272 What's New in DB2 for z/OS Backup and Recovery James Teng
- 1687 DB2 for z/OS V8 Tuning Away CPU Regression John Campbell
- 1688 DB2 for z/OS® V8 Migration: Are You Done Yet? John Campbell
- 1060 IBM DB2 Utilities Update Bryan F. Smith
- 1061 IBM DB2 RUNSTATS Utility and Real-Time Statistics Bryan F. Smith
- 1226 Fast Track to Optimal DB2 Performance Namik Hrle
- 1924 Why SAP on DB2 for z/OS Namik Hrle, Helmut Roesner
- 1018 Planning Your Migration to DB2 9, Roger Miller
- 1019 Best Practices in DB2 Security, Roger Miller

DB2 for z/OS Technical Leadership: STSMs



Akira Shibamiya, Perf



Jay Yothers, Dev.



Nigel Slinger, Dev, Tech Sup



Peggy Zagelow, Dev



Chris Crone, Dev.



Julie Watts, Data Mgr.



Jim Pickel, Connectivity



Greg Dyck, Dev



Maryela Weihrauch, Perf.



Guogen Zhang, XML BI



Jim Ruddy, Adv Dev



Fen-Ling Lin, SQL Comp & Par.



Steve Chen, SQL semantic



Haakon Roberts, Dev



Kevin McBride, User Experience



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Here is the DB2 for z/OS technical leadership team, showing only the Senior Technical Staff Members (STSMs). Of course the team is much deeper, as shown on the prior slide. Curt Cotner is an IBM Fellow. Jeff Josten, Jim Teng, Gene Fuh, John Campbell, Bryan Smith and Namik Hrle are Distinguished Engineers. Akira Shibamiya, Jay Yothers, Nigel Singer, Peggy Zagelow, Chris Crone, Julie Watts, Jim Pickel, Greg Dyck, Maryela Weihrauch, Guogen Zhang, Jim Ruddy, Fen-Ling Lin, Steve Chen, and Haakon Roberts are STSMs.

One IBM Fellow, 6 Distinguished Engineers and 15 Senior Technical Staff Members provide the core technical leadership for the team, which has many more technical leaders and specialists. STSMs have 11 presentations.

1227 DB2 9 Select, Insert, Update, Delete SQL Application Performance Akira Shibamiya

1228 DB2 9 System Performance Topics Akira Shibamiya

1300 Best Practices for DB2 9 for z/OS pureXML Guogen Zhang, Steve Chen

1356 DB2 for z/OS Availability Enhancements Haakon P. Roberts

1357 Large Objects in DB2 for z/OS: Past, Present and Future Haakon P. Roberts

1453 Faster Fetch and Insert Christopher J. Crone

1696 Text Search on DB2 for z/OS Data Peggy Zagelow

1700 DB2 for z/OS Stored Procedures: Best Practices and FAQ Peggy Zagelow

1705 Not-Logged Table Spaces in DB2 9 for z/OS Jay Yothers,

1849 DB2 for z/OS and WebSphere Integration Update Maryela E. Weihrauch

1851 DB2 for z/OS in an SOA Maryela E. Weihrauch

DB2 for z/OS Line Management Team



Here is the DB2 for z/OS line management team, first line managers, showing the development group on the first two lines, user technology on the left of the third line, service on the right of the third line, then performance and test managers on the fourth line.



This is the wider organization for Information Management Mainframe Software, headed by Dan Wardman. IMS, DB2, Tools, z/Growth, SDS, Site Operations, Strategy and Marketing.

See session 2317 DB2 for z/OS, IMS and Tools: Spotlight Keynote

Dan Wardman, IBM, Vice President, Information Management Development

Greg Lotko, IBM, Director, DB2 for z/OS Development

Beverly Tyrrell, IBM, Director, IMS

Tom Ramey, IBM, Director, Information Management Tools

1459 Information Management Tools: Keys to Your Business Success Tom Ramey

1122 IMS Trends and Directions Beverly Tyrrell

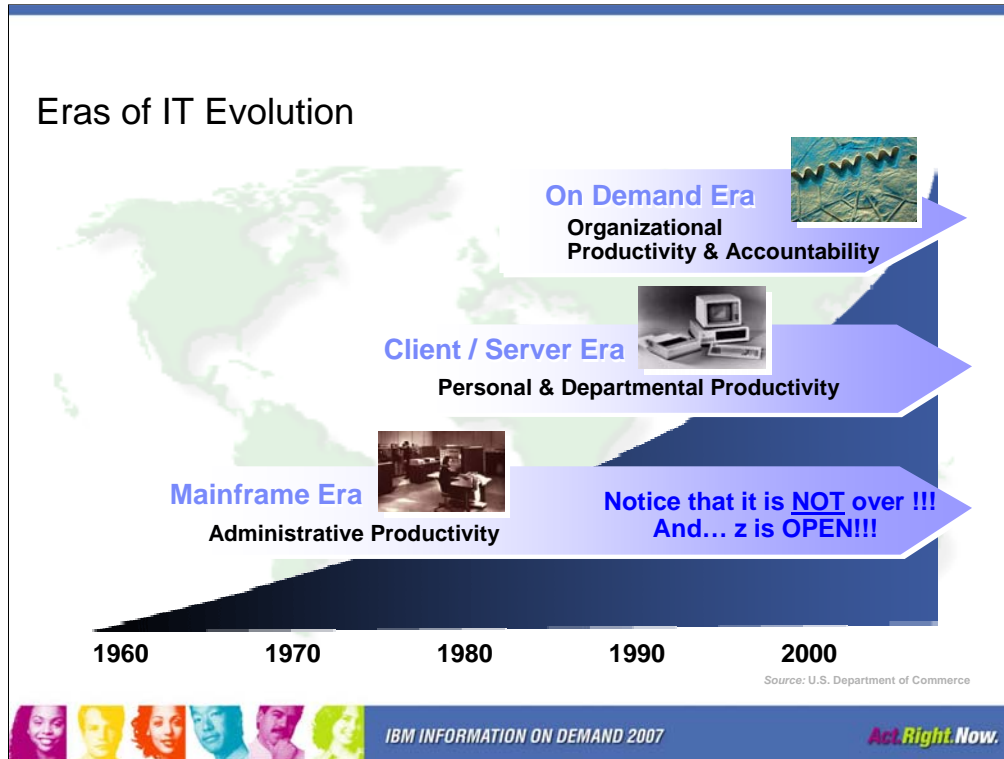
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We're at the early stage of what IBM calls the "On Demand Era". On Demand is a computing era, which began around the Internet with "e-business", but I want you to think back further to the earlier stages of IT automation with the mainframe era, which was a wonderful technology for automating the back office. It's still being used. But it penetrated what it did really well, and wasn't designed to do things like plant floor manufacturing, or departmental computing, or personal computing. It was designed for the enterprise.

So another style of computing, called "client-server" was invented to provide much greater flexibility, but which also created lots of islands of automation. Connecting those islands costs IT organizations, according to Gartner, roughly 42 percent of their IT budgets – just to make "stuff work with stuff."

That's an overhang in our industry which "On Demand" needs to deal with.

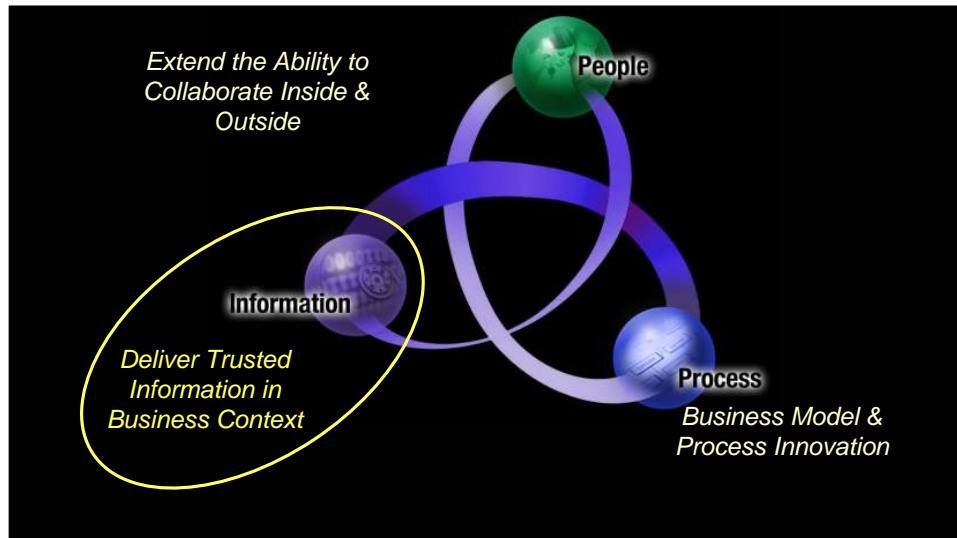
The rise of the Internet and the open, standard-based, widely available and accessible networking of the Internet brought about the "e-business" boom and also provides the foundation for the "On Demand Era".

The "On Demand Era" will require developing the standards, openness and interoperability, which will allow computing to move into the network. The challenge of today is to integrate to solve business problems, reducing costs and making the enterprise more efficient.

The era of the mainframe is not over. Mainframes are the heavy lifting servers. Mainframes are open, with standard interfaces able to run the old and the newest applications. It's about delivering business value.

Innovation Requires a Business Centric View of SOA

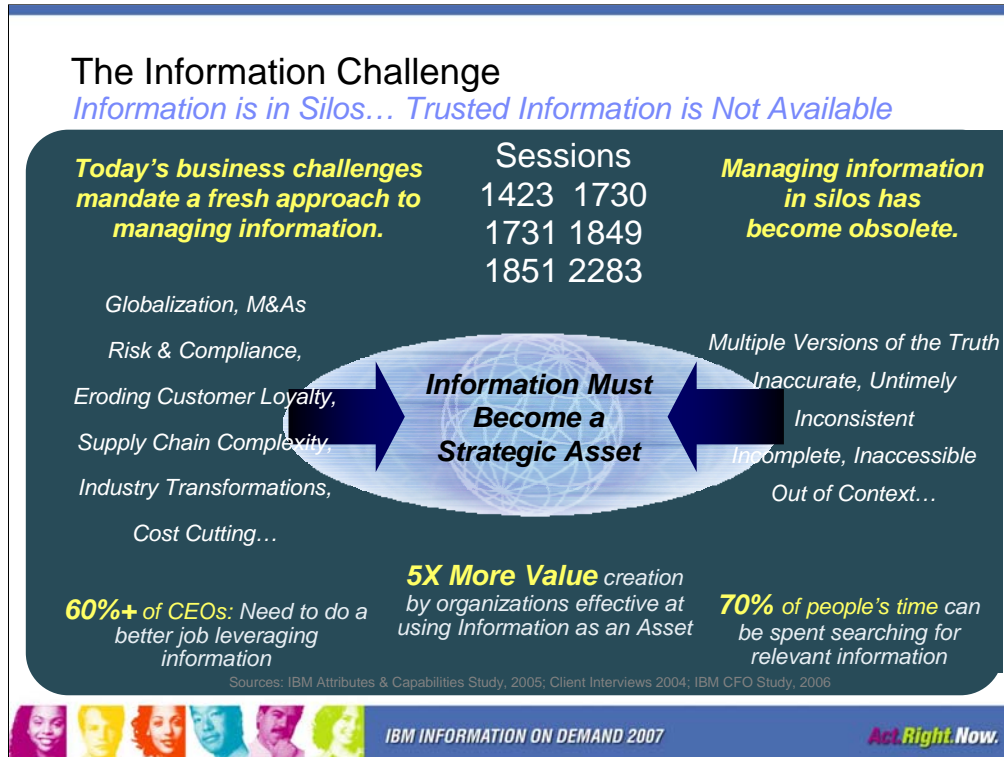
Drive Innovation Priorities Through People, Process, and Information



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SOA has a number of key dimensions. Most of the time, we see the business centric view. The people focus must always be included. At other times, the business model and process are the focus. There is one more key focal point for SOA, and that is the information. Without all the legs of this stool, the platform is not stable.



Critical business challenges are moving ineffective management of information from a chronic to an acute problem.

Business initiatives, compliance, mandates, legislation, liability, connected supply and demand chains, and ever decreasing business cycles all depend on information.

Outsourcing, mergers and acquisitions, ERP / application consolidation, and data warehousing / business intelligence more expensive and difficult without effective information management.

New technologies, standards and flexible architectures are now coming together to provide information in the context of business, during the course of business...

Expertise has been honed to help develop innovative use of information and effective governance of information.


These forces include 1) emerging technologies, such as RFID and Telematics; 2) broader macro-economic trends, including new compliance requirements, mergers and acquisitions; and 3) the need to better leverage the avalanche of new data sources for competitive advantage.

IBM Information Management

System z Update: Continuing Client Momentum

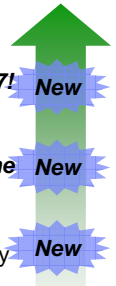
Continuing Growth

- **Double digit MIPS growth***
 - DB2: 50% YTY
 - IMS: 22% YTY
- **Strong revenue growth****
 - DB2: 24 consecutive years YTY growth
 - IMS: 7 years YTY growth




Continuing IBM Deliveries

- **DB2 9 for z/OS GA March 2007!** New
 - Hybrid XML Data Server
 - Compliance, SOA, zIIP ...
- **Specialized Information Engine** New
 - zIIP 2006 enhanced 2007
- **IMS** New
 - V10 more XML & Java xQuery
 - SOAP XML adapters




Optimize Infrastructure, Skills & Cost

- System z TCO advantages
- Skill and infrastructure re-use
- Governance and security advantages
- Globalization




Information Led Business Innovation

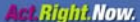
- SOA Data Serving
 - Help meet demanding SLA requirements
 - Enabled by open standards
- Master Data Management, +++



Source: *IBM, 2004-5; **IBM



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IMS - 22% MIPS growth DB2 - 50% MIPS growth DB2 has over 95% RDBMS market share on z/OS. DB2 9 for z/OS became generally available March 2007. WCC has about 30% of their customers running against data on z.

IMS SOAP Gateway V9.2 and IMS V9 XML Adapter and Task Manager, for July GA. Utilizes WebSphere Developer for z tooling for XML transformation to/from existing unchanged IMS applications. Enables as web services critical IMS business information on z, utilizing standards to provide interoperation with client applications independent of location, programming language and platform . These IMS SOA enhancements continue to ensure the mainframe remains the primary platform for today's new breed of SOA applications. In-house Performance tests benchmarking 22,000 IMS trans/second on a single z system with IMS Database update, demonstrating that nothing can match the performance of IMS and the z platform, making this the industry leader for on demand business needs.

Industries worldwide rely on IMS to run their business. IMS serves 200 million end users, managing over 15 million gigabytes of production data, processing over 50 billion trans/day. IMS on z is open, able to interact in heterogeneous environments. IMS and WebSphere converge to bring modern application development, serving, data, and management to System z. IBM's is designing hardware/software to make IMS on z accessible to the next generation of IT professional. IMS V10 announced Oct. 2006. QPP started Jan 2007, and GA is October 2007. IMS runs the world. DB2 runs the universe.

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- **DB2 for z/OS V8**
- DB2 9 for z/OS
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Where you put your data is vital to your business Why Customers Choose DB2 on System z

- **Delivers secure information services you can trust**

- Unmatched synergy with System z and z/OS
- Offers the ideal platform for SOA
- Cost effective choice for customers to scale up to an enterprise-wide solution

Proven history, DB2 for z/OS in:

- 56 of the top 56 WW banks*
- 23 of the top 25 US retailers**
- 9 of the top 10 global life/health insurance providers***

- **Concurrent HW/SW upgrades provide the highest possible availability**

- **Better risk management that IT**

- **investments today will support future requirements**

- Helps address regulatory compliance with ability to establish centralized policies and procedures for privacy, security and audit

- **Total Cost of Ownership advantages**

Top companies as identified in: WW Banks from The Banker.com:
*http://www.thebanker.com/news/fullstory.php/aid/1699/Tto_1000_World_Banks.html
**US Retailers from National Retail Federation July 2005:
<http://www.stores.org/pdf/TOP100printwithad.pdf>
***Insurance - 2005 Ward's 50 Benchmark Group: www.merit.com/news/Wards50.asp
http://www.marketwire.com/mwirelease.html_b1?release_id=213236



DB2 delivered the world's largest core banking benchmark result delivering a record 9,445 business transactions per second in real-time based on more than 380 million accounts with 3 billion transaction histories¹



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Bank of China Online Workload Scalability: The customer's goal was 4,100 TPS according to their anticipated transaction volume. The benchmark reached this goal easily. IBM and Financial Network Services Deliver World's Largest Core Banking Benchmark Thursday February 8, 4:30 pm ET FNS BANCS Application on IBM Mainframe Redefines Transaction Processing Performance in the Banking Industry -- SYDNEY, AUSTRALIA and ARMONK, NY--(MARKET WIRE)--Feb 8, 2007 -- IBM (NYSE:IBM - News) and Financial Network Services (FNS), a subsidiary of Tata Consultancy Services, today announced the world's largest core banking benchmark result delivering a record 9,445 business transactions per second (tps) in real-time based on more than 380 million accounts with three billion transaction histories. --- IBM and FNS worked with Bank of China, one of Asia's largest and most innovative banks, on the record-breaking scalability benchmark powered by an IBM System z9 Parallel Sysplex(TM) mainframe running DB2 database software and FNS's BANCS core banking application software. The benchmark, independently audited by InfoSizing, tops FNS's previous online transaction processing (OLTP) record. As a result, banks and financial services companies will be able to process key transactions faster, lower total cost of ownership and more easily manage growing transaction volumes with limited operational risk. Tony Ward, CEO, Financial Network Services, states, "FNS and IBM have delivered an outstanding core banking benchmark result which highlights FNS's ability to deliver a core banking platform that will attain high levels of availability, scalability and robustness for the largest banks in the world. FNS has been developing core banking solutions for over two decades and has invested heavily in core banking technology to help our clients boost their bottom line and drive more value than from legacy systems." The goal of the benchmark was to execute a range of tests that covered OLTP scalability, End-of-Day batch processing, and End-of-Month batch processing with a target of handling unprecedented transaction volumes. The transaction and account mix was based on real customer projected workload characteristics in their production environment including: Cash Deposit, Credit Transaction, Cash Withdrawal, Debit Transaction, Loan Account Inquiry, Deposit Account Inquiry, Loan Repayment Cash and Loan Repayment Credit Transaction. "IBM mainframes scale to meet the most extreme transaction processing demands in the banking industry today," said Ian Hurst, IBM's Global Financial Sector General Manager. "The combination of FNS's BANCS application software and IBM's System z9 mainframe technology helps our clients lower their transaction processing response times and reduce transaction costs through world class performance, reliability and availability." System Details: The benchmark was performed at IBM's System z Customer Benchmark Center in Poughkeepsie, New York, from June to August 2006. The solution was based on FNS's BANCS core banking software package running on two IBM System z9 Enterprise Class Model 2094 (S54-754) machines and four DS8300 model 2107-922 storage subsystems. IBM System z9 was allocated with over 30,000 MIPS and 52 TB of DASD running on z/OS with DB2 relational database software and a CICS/TS Environment. The FNS BANCS solution only utilized 85 percent capacity of MIPS and 35 percent of DASD for application data processing, revealing massive scalability and optimum system performance. * About FNS: Founded in 1982, Financial Network Services (FNS), acquired by TATA Consultancy Services in October 2005, is a specialist banking software and services company which ranks highly amongst the world's top suppliers of banking solutions. From its beginnings producing component based retail banking solutions, FNS has enhanced its flagship solution, BANCS, to incorporate universal banking functionality spanning multi-delivery channels, treasury, trade and payments capabilities built on the same advanced technology foundation. FNS has implemented its BANCS solution in over 100 sites with variety of operational size and complexity across some 35 countries. IBM System z customers include: ChinaTrust Commercial Bank, Nova Ljubljanska Banka, KorAm Bank, Bank Keshavarsi and African Bank. For further information, visit www.fns.com.au. About IBM: For more information about IBM, please visit www.ibm.com/banking. For specific information on our Worldwide Customer Benchmark Centers, please visit <http://www.ibm.com/systems/services/>. * Source: InfoSizing FNS BANCS Scalability on IBM System z - Report Date: September 20, 2006

DB2 for z/OS V8 field update – after 3.5 years
Sessions 1687, 1688, 1453, 2080, 2217, 2219, ...

- More than half of the WW MIPS & Customers on V8
- More than 99% of the top 100 Customers
- More than 95% of the top 200 Customers

- How's the quality (comparison to v7)?
 - **Lower** overall PMR volume
 - **Less** Sev 1 APARs
 - **Quicker** APAR closure time
 - **Lower** PE rate
 - **Less** multisystem outages
- **It's better than v7 !!!**



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Many customers are still migrating to DB2 for z/OS Version 8. The largest DB2 customers have almost all moved to Version 8. 99 of the largest 100 customers are running Version 8. 95% of the top 200 customers are running V8. Many customers are implementing DB2 9 in development, moving toward production.

Now that DB2 V8 has been generally available in the field for over three years, let's compare with V7 at the same point. For almost all of the key quality measures, V8 is better. The most important issue for many customers is PTFs in Error (PEs), and the rate is lower on V8. The PMR volume is lower and the number of field severity 1 problems is lower. V7 was widely regarded as a high quality version, and DB2 V8 total field experience is better than V7.

Part of the improvement in overall quality measures is due to more rigorous testing. Some of the improvement is due to the reduced amount of new function added in the service stream. Still these numbers represent the averages, and we know that our customers are not average. Individual customer results are highly skewed, so the average numbers might not reflect your experience.

The average, median and mode customer submits 0 new APARs that have never been encountered before. We anticipate that the average customer will submit fewer than 10 problems in a year, with questions and some problems that are diagnosed with an existing fix. Note the smile on the face of the support person.

Service Best Practice

Use Consolidated Service Test

Service Update (SUP)

June 15, 2007

Recommended Service

Cross product tested levels

Best practice for service:

two or three per year

<http://www.ibm.com/servers/eserver/zseries/zos/servicetst/mission.html>



Consolidated Service Test and the RSU

The Consolidated Service Test Mission

Our mission is to provide a consolidated, tested, and recommended set of service for z/OS and key subsystems on a quarterly basis with published results. This means that when you order your current service deliverable (ShopzSeries) you'll receive and install one recommended service package with a tested level of service for all these products.

How we do our testing

We test in a customer-like production sysplex environment in an IBM test lab and are continuously improving our CST test environment. We run batch and data-sharing applications that exploit and stress the latest functions with up to two levels of subsystems on three levels of z/OS systems. As we test, we observe how each product runs and how they interact in this environment. We report problems to the IBM Support Center. We have the following FMIIDs installed on our systems. For more information about our environment, see our [CST Quarterly Report](#).

We have a quarterly CST test cycle:



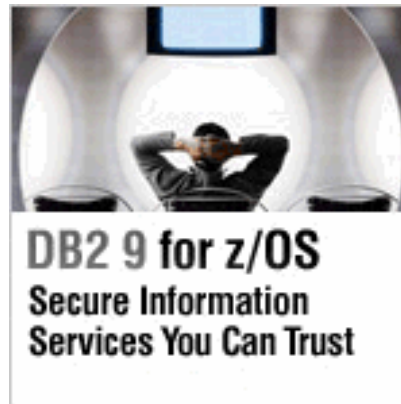
Consolidated Service Test provides a way to leverage more IBM testing and experience from many customers across a much broader set of products, including z/OS, IMS, CICS, DB2, WebSphere and many tools. This technique is working for very large, very small and in between customers. If you don't have an extensive test suite - like most customers, then this technique can help a lot in reducing research and finding a stable service level. Effective June 15, 2007, the DB2 for z/OS Version 8 SUP tape is available world-wide for new customer orders. This SUP tape was built differently than prior SUPs, such that its build in May integrated PTFs COR-closed through December 2006, which had also completed a Consolidated Service Test (CST) cycle. Once PTFs complete a CST cycle, they are assigned a Recommended Service Upgrade (RSU) status. Our DB2 for z/OS Version 8 SUP tape contains CST tested PTFs which were marked "RSU 0703" (they completed CST testing in March 2007). This SUP build integrated a total of 964 PTFs (the delta since our December 2005 SUP), which is nearly 1,000 fewer PTFs our new customers need to deal with during their DB2 V8 installation experience. For additional information on CST and RSU, please see:

<http://www.ibm.com/servers/eserver/zseries/zos/servicetst/mission.html>

Installing two or three CST levels a year means more current service, but not too current. If you want a process that has proven track record for success and can reduce your work, then look at the CST. Use current CST recommended service level: all service plus a two to four month later level for hipers & PE fixes. Stage that level through development systems & production. Match your levels with CST, across operating system & key subsystems. Enhanced HoldData provides a much faster way to discover missing hipers and PEs without fixes.

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DB2 for z/OS Strategic Direction

- **Secure data server for System z SOA computing**
 - Centralized Processing of Massive Quantities of Data
 - Native XML support
 - SOA, Java, Unicode, ERP, BI, OLTP, Batch
- **Improved Application Enablement Through Extensive SQL Function**
 - Object-Oriented Extensions - User defined functions & types
 - Rules Driven Integrity – table constraints & referential integrity
 - Vendor Enabling and Portability
- **Premier Use of Parallel Technology and z/OS – System z Integration**
 - Data Sharing
 - Continuous Availability
 - Incremental Growth
 - Work Load Balancing
- **Continual Performance Improvement**
 - Optimizer Technology
 - Transaction, Query, Batch, Utility Concurrency with Application Processing
 - Utilities and Tools Focus

 **Bank Financial Group**

With legendary DB2 reliability
DB2 for z/OS has provided 10 years of continuous availability for customer account information, including product migrations.







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DB2 9 is the next huge step in the DB2 for z/OS strategy. Start with improvements to the ability to scale, to handle more applications with better productivity, and to manage the data securely. XML and SQL enhancements help with productivity and performance, and make the task of porting applications easier. DB2 9 improves performance, scalability and availability. Working with System z provides improvements in many ways. The net result is decreased total cost of ownership.

DB2 9 for z/OS

Addressing Corporate Data Goals

SOA Enablement	<ul style="list-style-type: none">• pureXML• Optimistic locking for WebSphere• LOB performance, usability	
Dynamic Warehousing	<ul style="list-style-type: none">• Many SQL improvements• Dynamic index ANDing• Histogram statistics• New built-in OLAP expressions• Optimization Service Center	
Simplification, Reduced TCO	<ul style="list-style-type: none">• Index compression• Partition By Growth tables• Cloned tables• Volume based backup / recovery	
Workload Consolidation	<ul style="list-style-type: none">• More online schema changes• Online REBUILD INDEX• Trusted context and ROLES• Parallel Sysplex clustering improvements	



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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. Changing DB2 early code does not require an IPL.

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 9 Availability & Scalability Improvements

New features enhance availability & scalability of the DB2 9 environment to manage your 7x24 infrastructure easily

Sessions 1227, 1265, 1272, 1274, 1356, 1703, 1705, 1553, 2214

- **New and improved DB2 capabilities**

- Improved INSERT performance
- New universal table space
- Partition by growth
- Not logged table space
- Online schema change enhancements
- Clone tables
- Data sharing enhancements

- **More online utilities**

- Online Reorg enhancements
- Online Check Data, Check LOB
- Online Rebuild Index

- **Memory improvements 64 bit++**



Land Registry
Cymraeg



UK government Land Registry runs DB2 for z/OS to maintain the world's largest known transaction processing (OLTP) database – 23.1 TB! ¹

1 - Winter Corporation's "2005 Top Ten" awards - <http://www.wintercorp.com/index.html>



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DB2 9 offers a broad range of improvements in both availability and scalability. INSERT, UPDATE and DELETE performance is improved substantially with faster logging, and reduced index page splitting. The Universal Table Space (UTS) provides a structure that is both partitioned and segmented for better performance. UTS includes both Partitioned by Range and Partitioned by Growth table spaces. PBR is range partitioning, but using the improved segmented page structure. Partitioned by Growth helps in situations where the data is large or might become large, but there is no good partitioning key. As the table grows, partitions are added. PBG has most of the utility benefits of partitioning. The not logged table space is for situations where there are massive, parallel inserts and recovery is not needed. Be careful, you can dig yourself a very deep hole.

DB2 9 adds to the list of attributes which can be altered, rather than requiring the table space to be dropped and recreated. Now we can rename columns and indexes, alter a column to set a default, alter logging, and change STOGROUP SMS constructs. Clone tables allows us to have two similar tables and then to exchange one for the other very quickly. Customers asked for an online LOAD REPLACE technique, but often the LOAD utility is not used, so the capability is implemented with ALTER.

Online reorganization for a few partitions is much more online, with no BUILD2 phase. Check data, Check LOB and REBUILD INDEX utilities now have an online option. More memory is moved above the 2 GB bar, giving some VSCR help. More memory is moved above the 2 GB bar, giving some VSCR help.

Streamlined Compliance in DB2 9 for z/OS Sessions 1019, 1148, 1346

- Building on the security features of DB2 for z/OS V8, DB2 9 provides even greater control, flexibility and audit
- DB2 9 provides more flexible authorization assignment & control
 - Database Roles and Trusted Context
- Improved audit selectivity ensures security performance, improved problem isolation and performance monitoring
- Extend encryption to tape controller (now) and disk storage (future direction)



Common Criteria security certification: DB2 for z/OS V8 in evaluation at EAL3+ level.



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While DB2 for z/OS V8 provides many enhancements for security, there are still many more needs and much more work to do. DB2 9 roles are used to provide a more flexible technique than groups or users in assigning and controlling authorization, while improving consistency with the industry. A network trusted context provides a technique to work with other environments more easily, improving flexibility. The instead of trigger is an SQL technique that allows a trigger to be used in place of a view, consistent with DB2 for LUW. Improved audit selectivity is needed for being able to see that security is functioning. Secure Socket Layer or SSL implementation provides encryption of data on the wire. Some additional techniques for data encryption will help protect data at rest and in backups – now for tapes and in the future for disks.

Common Criteria: z/OS V1.7 with the RACF optional feature has achieved EAL4+ for Controlled Access Protection Profile (CAPP) and Labeled Security Protection Profile (LSPP). z/OS and DB2 are evaluated for the Common Criteria EAL4 evaluation. DB2 for z/OS Version 8 is in-evaluation under the Common Criteria for CAPP and LSPP with a conformance claim of EAL3+. See:

<http://www.ibm.com/systems/z/security/>

<http://www.ibm.com/systems/z/security/mls.html>

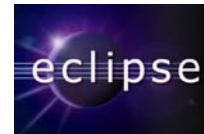
http://www.ibm.com/systems/z/security/ccs_certification.html

http://www.ibm.com/security/standards/st_evaluations.shtml

<http://www.ibm.com/software/tivoli/governance/action/08162007.html>

Leverage Existing Application Development Skills

- *New Converged SQL & Developer Workbench*
- *Key Database Technologies*
 - XML, SQL, SQL Procedures
 - SOA, Web Services
- *Developer Communities*
 - COBOL, PL/I, C, C++,
 - REXX, APL2, Assembler, Fortran
 - Java (JDBC / SQLJ)
 - .NET (C#, VB .NET)
 - Open Source
 - PHP
 - Perl
 - Python
 - Ruby on Rails
 - Toad for DB2
 - ...



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DB2 for z/OS handles many more languages than most people think. There are many different interfaces used for the languages to fit the style appropriate to the language. The languages on this chart are not all of those which are supported by or to DB2 for z/OS.

The DB2 for z/OS precompiler works with assembler, C, C++, COBOL, PL/I and Fortran. The DB2 for z/OS coprocessor works with C, C++, COBOL, and PL/I. ODBC or CLI APIs are provided for C and C++. Java has JDBC and SQLJ, with JLINQ on the way. REXX and APL2 interfaces are provided. Other languages and application generators connect to DB2 using call attach or RRS attach for local connections, DRDA or private protocols for remote connections. Other languages use these of APIs or those implemented in DB2 Connect and other client deliveries. Some examples include WebSphere Developer for z, Enterprise Generation Language. Both Microsoft .NET and open source languages use this variety of connections.

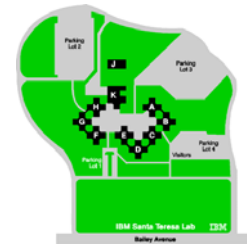
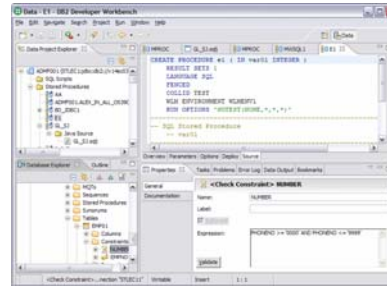
DB2 9 Easier Application Development

Simplify development process

Improve performance

Numerous SQL enhancements

- Merge / Truncate
- Select from update, delete & merge
- Instead of triggers
- BIGINT & DECIMAL FLOAT
- New Built-in functions e.g. SOUNDEX
- DDL porting improvements
- Optimistic locking
- **Developer Workbench** 1416, 1612
- **Spatial or geographic data** 1452
- **Text Search server coming**
- **Native SQL Stored Procedures** 1338, 1700



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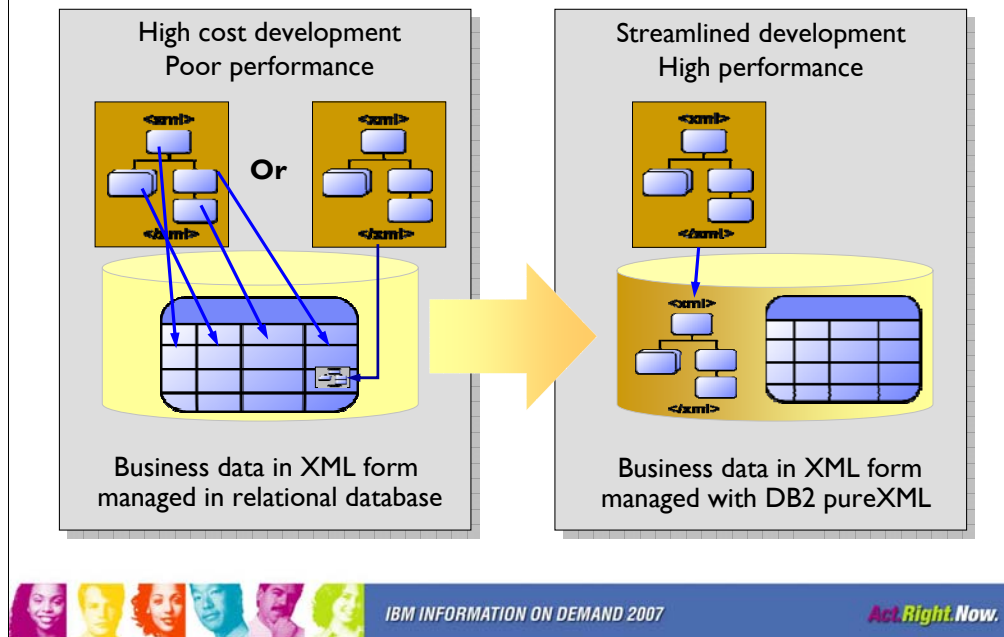
Act Right Now.

A tremendous number of enhancements helps application developers to simplify the development process and gain performance improvements when accessing DB2 data. As the DB2 SQL is more consistent with use across the industry, porting an application to DB2 9 for z/OS is much simpler. The learning process is also much faster for those who know only some other DBMS or platform. The additional function delivered in DB2 9 means that applications can use what is provided, rather than delivering this level.

These SQL enhancements are noted on prior slides, but they include new SQL statements, new data types, and many new functions.

DB2 9: A New Generation Hybrid Data Server

Sessions 1259, 1300, 1443, 2082



Key point: The amount of business information in XML form is already as great or greater than other forms and growing faster - failure to leverage efficiently as structured data means high cost and/or missed opportunity. DB2 9 provides the best of both worlds, pureXML™ for native storage and integrating XML with object-relational. Performance, integrity, protection, and scale from the proven DB2 infrastructure with the flexibility of XML/XPath and relational/SQL. This overcomes the complexity & limitations of prior models (shred, CLOB, or XML only). In 2006 IBM introduced a new generation data server with the availability of DB2 9. The explosive growth of XML based data standards in all industries means competitive advantage for those businesses that use it most effectively and efficiently. Client, policy and claims processing in Insurance; supply chain management in Retail; financial transactions and asset management in Banking; patient care in Healthcare; citizen service in Government; implementing Service Oriented Architectures (SOA) in Computing Software and Services - and many other processes across all industries - increasingly rely on information captured and exchanged in XML form. Our clients are increasingly managing XML format text documents in a content management system for proper governance and efficient use in the business process workflow. But few are realizing the full value of all the business data they possess that are in XML format.

Early users of the pureXML feature of DB2 9 are taking advantage of the fact that data in XML format is well structured and can be queried via standard languages such as XPath and XQuery. By doing so they are bringing that data to bear in both transactional and analytic processes - with higher performance and lower development costs than previously possible with a relational database. The difference is that DB2 9 supports both relational (tabular) and XML (hierarchical) structures in the same database so that both can be easily, efficiently and securely managed, analyzed and delivered. Unlike other relational data servers - and previous versions of DB2 - pureXML eliminates the overhead of fitting the "square peg" XML tree structure into the "round hole" row and column relational structure.

Until DB2 9, managing XML data records with a relational data servers meant decomposing the data into columns - a process known as shredding. Or by storing the entire data record in a single cell as a character large object - known as a CLOB. The CLOB approach does not cost overhead as the data records go in. But when you query these records you pay the overhead of parsing each one at runtime which can be a significant performance impact to the application. With shredding, overhead is paid up front to turn the data into a relational record that can be queried efficiently. But overhead is also paid later if the record needs to be recreated for delivery in XML format. This process also affects the fidelity of the record itself - leading to an approach that uses both shredding and CLOB methods for applications that require both performance and fidelity. This results in even more overhead to ensure the records remain in sync.

DB2 for z/OS 9 pureXML

Industry Bundles

- **Quick start for customers and partners based on popular industry standard XML**
 - ACORD for Insurance (enabled for DB2 for z/OS)
 - FIXML (enabled for DB2 for z/OS) for Banking
 - CDISC for Clinical Data
 - FpML will allow for more efficient usage by applications
- **Demonstrations and samples using industry standard XML formats with DB2 pureXML**
- **Data Model with registered XML schemas and XML documents stored in DB2 pureXML database**
- **Sample XML queries**
- **Example services**
 - Create, Replace, Update, Delete and Query
 - Atom feeds
 - XForms

Learn more:
<http://www.alphaworks.ibm.com/tech/purexml>

IBM INFORMATION ON DEMAND 2007 **Act Right. Now.**

Learn more from the DB2 XML Wiki on alphaworks and DeveloperWorks
<http://www.ibm.com/developerworks/wikis/display/db2xml/Home>

DB2 XML partners:

AgencyPort: AgencyPort is the leading provider of web-based new business, endorsement and renewal solutions designed specifically for property and casualty insurers.

Altova - XML development tools: Altova is the provider of the world's leading XML development tools, including XMLspy the industry standard XML development environment. **Coral8 - Complex Event Processing**

Coral8: The Coral8 Engine enables you to build and deploy powerful Complex Event Processing (CEP) applications for any enterprise business function that can benefit from real-time awareness.

Exegenix - Document Conversion to XML: Exegenix technology converts content into XML quickly, accurately, and cost-effectively, with no re-keying, and no dependency on consistently-formatted input.

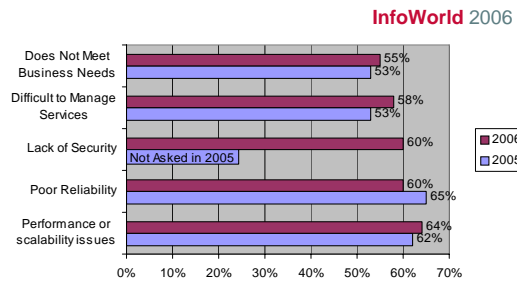
JustSystems - Rapid XML Application Development: The combination of xfy from JustSystem and DB2 9 allows users to quickly assemble XML applications to access and manage a wide range data.

Napersoft - Customer Communications Management: Napersoft provides Customer Communications Management solutions with its family of WebDemand360 Correspondence Manager for WebSphere offerings and DB2 9.

Nextance - Contract Performance Management: Nextance offers Contract Performance Management solutions that take full advantage of DB2 9 XML capabilities.

System z Hub for Business Critical Data
Addresses key issues to realize the benefits of an SOA

- **SOA challenges are principally performance, reliability and security: System z strengths**
- **DB2 provides the central, secure data server for a successful SOA strategy**
 - Cost-effective enterprise performance
 - IT productivity and full use of resources
 - Leverages new security capabilities for data availability, integration and security.



Fifth Third Bank

Saving tens of millions of dollars by optimizing transaction-processing resources to SOA solution that provides richer array of services. Go to market faster and more cost effectively, improving responsiveness and the bottom line.



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As we read about challenges in an SOA environment, the technical issues are often about performance, reliability and security. These are the heart of the System z strengths.

DB2 provides the central, secure data server for a successful SOA strategy, with

Cost-effective enterprise performance

IT productivity and full use of resources

Leverages new security capabilities for data availability, integration and security

Optimize Infrastructure, Skills & Cost 1924, 1226 

SAP Certified on DB2 9 for z/OS 13 July 2007

Enables growth of System z9 SAP workloads through resource optimization

“Enhancements in DB2 for z/OS, along with the new zIIP processor, will increase total value for our System z clients. We look forward to certifying DB2 for z/OS as it becomes available so our clients may benefit from these new values and the unique System z qualities of service.”

Dr. Torsten Wittkugel, Vice President
DB/OS Platform Development, SAP AG



SAP on DB2 for z/OS

New! IBM DB2 for z/OS V9 has been successfully certified to support SAP systems

After a formal verification process of the functionality and quality of the new DB2 database release with regard to SAP environments and its products SAP solutions are now supported on DB2 for z/OS V9.



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IBM DB2 9 for z/OS has been successfully certified to support SAP systems: <https://www.sdn.sap.com/irj/sdn/db2?prtmode=print>

- After a formal verification process of the functionality and quality of the new DB2 database release with regard to SAP environments and its products SAP solutions are now supported on DB2 9 for z/OS. The new database version has well passed SAP's validation tests on SAP R/3 4.6, SAP NetWeaver '04, SAP NetWeaver 7.0 and SAP ABAP stack 7.1. SAP releases DB2 9 for z/OS for all SAP solutions based on the current SAP technologies.

For migration to DB2 9 and prerequisites please refer to the SAP note [1043951](#) and the BestPractices document in the Knowledge Center. New IBM Redbooks are available (see IBM Information Sources page).

- Enhancing SAP - DB2 9, SG24-7239, <http://www.redbooks.ibm.com/abstracts/SG247239.html>
- Best practices SAP BI - DB2 9, SG24-6489-01, <http://www.redbooks.ibm.com/redpieces/abstracts/sg246489.html>

Dynamic Warehousing
A New Approach to Leveraging Information

Information On Demand
to Optimize Real-Time
Processes

Dynamic Warehousing

Dynamic Warehousing Requires:

1. *Real-time access – in context*
2. *Analytics – as part of a business process*
3. *Unstructured information – extracted knowledge*
4. *Extended capabilities – tightly integrated*

OLAP to Un...
Recom...

Query &
to Un...
What happened

Reporting

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Traditional warehousing focused on query and reporting to understand what happened, and evolved to enable OLAP and data mining to understand the why those things happened and recommend future action.

Dynamic warehousing is a new approach to address the primary business challenges that organizations face today, which requires the ability to deliver the right information to the right people at the right time to more effectively leverage information and enable more effective business decisions. It's about information on demand to optimize real-time processes. I think of dynamic warehousing as the business intelligence analog of Service Oriented Architecture (SOA). Dynamic Warehousing includes four key abilities:

1. *Support for real-time access to aggregated, cleansed information, which can be delivered in the context of the activities and processes being performed;*
2. *Embedded analytics that can be leveraged as part of a business process;*
3. *The ability to incorporate knowledge from unstructured information; and*
4. *A complete set of integrated capabilities that extend beyond the warehouse to enable Information on Demand*

The distinction between data warehousing and online transaction processing is blurring. Data warehousing and analytic applications are accessing operational or near-real-time data. Transactions have become more complex to provide better interaction and productivity for people. Dynamic warehousing has capabilities and strengths on all IBM platforms. The traditional mainframe strengths for consistency with operational data, high security, and continuous availability match well with dynamic warehousing.

Dynamic Warehousing with System z

Mission-critical analysis of operational data

Sessions 1022, 1227, 1229, 1258, 1299, 1308, 1333, 1568, 1593, 1819, 1903

Rapid and secure user-access to data analysis

- **Interactive executive dashboards & information portals**

Improved query and reporting optimizations

- **Parallel queries & SQL Procedures may run on zIIP**
- **Improved SQL & optimization**

Up to 50% reduction of storage for indexes

- **Index compression added to data compression**

Up to 50% reduction of CPU utilization

- **Across many queries & most utilities**



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DB2 9 provides many improvements for Data Warehouse. 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. Accompanying DB2 9 is a new product, IBM DataQuant, which has the critical mass of features that allow it to be positioned as a viable BI and data analytics offering with support for both graphical reports and interactive visual dashboards. It provides a sophisticated graphics engine, supporting dozens of charts and layouts and over 100 built in functions. DataQuant provides very granular security- limit information on a per user/group, also tailor look and feel for users. It also provides a rich client or web-based development/runtime environment. IBM DataQuant is deally suited to the rapid fulfillment of 'everyday' dashboard and reporting requirements. It is simple to develop and deploy – quick turnaround at low development cost. It also allows IT groups / analysts to quickly respond to custom requirements. Where IBM DataQuant fits: Where there's a need to distribute data using straightforward graphical reports and information dashboards Where quick prototyping and rapid development is more important than complex analytical features In QMF and/or z-based environments where tracking, governing and z-based deployment are valued factors For customers that find competitor solutions too complex and costly

Index compression or also deep compression provide a significant reduction in storage. The index compression relies upon page level compression instead of row-level compression (technique used for tables). Indexes with 32K page sizes can save up to 8x on disk space with the compression feature turned on. Improved index compression with minimal overhead resulting in Beta customers reporting 50% or more savings in disk space

The key performance improvements in DB2 9 are reduced cpu time in the utilities, improved LOB performance and scalability, improved optimization for SQL, the zIIP processing for remote native SQL procedures, reduced cpu time for data with varying length and better sequential access.

Significant CPU time reduction in most utilities:

10% - 20% in Copy, Recover Table Space	
5% - 30% in Load, Reorg, Rebuild	20% - 60% in Check Index
35% in Load Partition	40% - 50% in Reorg Index

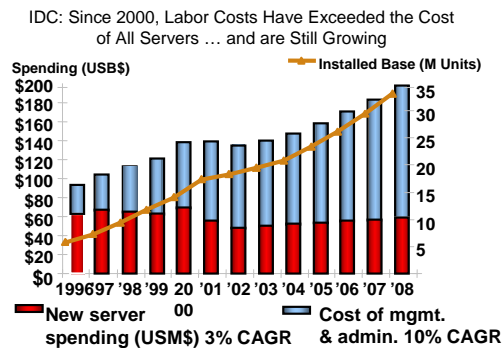
Additional 10% to 15% improvement in virtual storage. Remote Native SQL stored procedures can take advantage of zIIP. Improved data is provided for the optimizer, with improved algorithms. New optimizer techniques and more SQL functions enhance DB2 for z/OS as a DWH platform. New OmniFind text search functions provide efficient communication interactions with DB2 for z/OS. OmniFind text indexes are persisted into DB2 tables for backup/recovery purposes.

1 - Winter Corporation's "2005 Top Ten" awards - <http://www.wintercorp.com/index.html>

1022 Best Practices for Dynamic Warehousing on System z Jaime F. Anaya

Reduced TCO and Administration Requirements

- **DB2 9 further reduces cost of ownership and System z-specific skill needs**
- **Improved productivity with increased consistency with DB2 family and other relational databases**
- **Cost reductions through processing reductions, use of zIIP, disk compression and improved memory use**



BALDOR
MOTORS • DRIVES • GENERATORS

Decreasing cost of IT?

After consolidating SAP & DB2 on System z, IT expenses as a percentage of sales decreased from over 2% of sales to .9%!



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Improvements in total cost of ownership are very broad for DB2 9. Performance improvements include ways to reduce CPU times, reducing hardware and software costs. Both software and hardware can be reduced by using zIIP processors. DB2 9 has a new category for use of zIIP – in remote native SQL procedures and in expanded ability to run in parallel.

Improved productivity is a larger cost reduction for many customers. Productivity changes help with application life cycles and with database administration. DB2 9 reduces the need to have skills and knowledge specific to System z. Applications from other platforms and other DBMS can be ported to DB2 more easily. These changes also improve DB2 family consistency.

DB2 & IBM zIIP value sessions 1782, 1308, 1338

Portions of DB2 for z/OS V8 and **DB2 9 (in blue)** workloads may benefit from zIIP*:

- 1 - **ERP, CRM, Business Intelligence or other enterprise applications**
 - Via DRDA over a TCP/IP connection (enclave SRBs) (enclave SRBs, not stored procedures or UDFs)
 - **DB2 9 for z/OS Remote native SQL procedures**
 - **DB2 9 XML parsing via DRDA to fully utilize zIIP (statement of direction)**



- 2 - **Data warehousing applications*:** SQL Requests using parallel queries, including star schema
 - **DB2 9 higher percentage of star join parallel queries eligible for zIIP**
- 3 - **DB2 Utilities LOAD, REORG & REBUILD*** (DB2 utility functions used to maintain index structures)

* zIIP allows a program working with z/OS to have all or a portion of its enclave Service Request Block (SRB) work directed to zIIP. Above types of DB2 work are those running in enclave SRBs, of which portions can be sent to zIIP.



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DB2 9 uses zIIP in two new ways, remote native SQL procedures and increased use of parallelism. See presentations by Gopal Krishnan, Terry Purcell, and Yumi Tsuji.

The zIIP is designed so that a program can work with z/OS to have all or a portion of its enclave Service Request Block (SRB) work directed to the zIIP. The above types of DB2 V8 work are those executing in enclave SRBs, of which portions can be sent to the zIIP. Not all of this work will be run on zIIP. z/OS will direct the work between the general processor and the zIIP. The zIIP is designed so a software program can work with z/OS to dispatch workloads to the zIIP with no anticipated changes to the application – only changes in z/OS and DB2.

IBM DB2 for z/OS version 8 was the first IBM software able to take advantage of the zIIP. Initially, the following workloads can benefit:

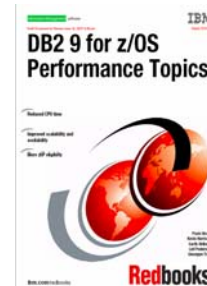
- SQL processing of DRDA network-connected applications over TCP/IP: These DRDA applications include ERP (e.g. SAP), CRM (Siebel), or business intelligence and are expected to provide the primary benefit to customers. Stored procedures and UDFs run under TCBs, so they are not generally eligible, except for the call, commit and result set processing. DB2 9 remote native SQL Procedure Language is eligible for zIIP processing. BI application query processing utilizing DB2 parallel query capabilities; and functions of specified DB2 utilities that perform index maintenance.
- For more, see <http://www.ibm.com/systems/z/ziip/>

DB2 9 cost savings:

Selected features that save CPU or storage

Sessions 1226, 1228, 1281, 1357, 1427, 1467, 1739, 1892

- Index compression
- zIIP and SQL native stored procedures
- CPU reductions in most utilities: LOAD, REORG, RUNSTATS, COPY, RECOVER, CHECK, ...
- INSERT performance enhancements
- Improved performance for VARCHAR
- Improve LOB performance and manageability
- DDF 64-bit shared memory
- 10 to 15% improvement in virtual storage
- Improved query performance
- Enhanced index split, larger pages and sequential key insert
- See much more in the DB2 9 Performance Topics redbook, SG24-7473



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Index compression can save around half of the disk space used for indexes. This is especially helpful in a data warehousing environment.

Utility cpu time reductions:

10% to 20% in Copy, Recover table space / index*

5% to 30% in Load*, Reorg*, Rebuild Index*

20% to 60% in Check Index*

35% in Load Partition*

30% to 40% in Runstats Index*

40% to 50% in Reorg Index*

70% in Load Replace Partition with dummy input

* Indicates that the savings are in the index processing.

See much more in DB2 9 Performance Topics redbook, SG24-7473

DB2 9 Utilities Overview sessions 1060, 1061, 2223

- **Performance improvements and CPU reductions**
- **More online utilities: REORG, REBUILD INDEX, CHECK, REPAIR**
- **New functions in DB2 9 for z/OS (XML, new data types, clone tables, universal table spaces, partition by growth, not logged, ...)**
- **LOB improvements**
- **Improved recovery consistency**
- **Template switching**
- **Histogram statistics**
- **Backup and restore for individual object, tapes**



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CPU reductions are very substantial, with some customers experiencing 20% to 30% savings. More online utilities are coming! Online rebuild build an index in place after setting RBDP. Dynamic SQL will avoid the index until available. This works well for non-unique indexes. Online reorg solves the outage during the BUILD2 phase when reorging a partition at a time. Online Check Data and Check Lob are the same as existing utilities, only with SHRLEVEL CHANGE. Check has the SHRLEVEL CHANGE technique extended to SHRLEVEL REFERENCE.

XML support in utilities is very extensive. Cloned tables are somewhat like Online Load Replace. There is the live table, and then there is the shadow or clone. One can load the clone, and then when ready for the clone to become live, a "switch" can be trigger with DDL.

Volume-based utilities allow recovery of individual objects after a volume based backup. It also extends system based backups and restores to and from tape.

Broken page recovery is a serviceability improvements when data has become broken because log apply fails.

Template switching allows using tape vs disk if a size or limit on the dataset is exceeded. Modify Recovery is extended to allow n number of backups vs an age. Histogram stats uses quantiles to give the optimizer more statistics.

DB2 9: Another features rich release ...

Most relevant to SAP, many other vendors & customers

- SHRLEVEL(REFERENCE) for REORG of LOB table spaces
- Online RENAME COLUMN
- Online RENAME INDEX
- Online CHECK DATA & CHECK LOB
- Faster REORG by intra-REORG parallelism
- More online REORG by eliminating BUILD2 phase
- LOB Locks reduction
- Online REBUILD INDEX
- Renaming SCHEMA
- Renaming VCAT
- Tape support for BACKUP and RESTORE SYSTEM utilities
- Recovery of individual table spaces and indexes from volume-level backups
- Enhanced STOGROUP definition
- Preserving consistency when recovering individual objects to a prior point in time
- Global query optimization
- Generalizing sparse index and in-memory data caching method
- Autonomic reoptimization
- Logging enhancements
- LOBs Network Flow Optimization
- Faster operations for variable-length rows
- NOT LOGGED table spaces
- Index on expressions
- Universal table spaces
- Partition-by-growth table spaces
- APPEND option at insert
- Autonomic index page split
- Different index page sizes
- Faster and more automatic DB2 restart
- MODIFY RECOVERY enhancements
- RLF improvements for remote application servers such as SAP
- Thin DB2 Connect client
- Index compression
- DECIMAL FLOAT
- BIGINT
- VARBINARY & BINARY
- MERGE statement
- FETCH CONTINUE
- SELECT FROM UPDATE / DELETE / MERGE
- Enhanced CURRENT SCHEMA
- Automatic creation of database objects
- Modify early code without requiring an IPL
- Utilities CPU reduction
- Temporary space consolidation
- Removing more reasons for 'soft' outages
- Conditional restart enhancement: automatic search for the appropriate checkpoint
- ALTER column default
- ...

TCO Reduction

Performance

SQL XML

Continuous Availability

Scalability

Portability

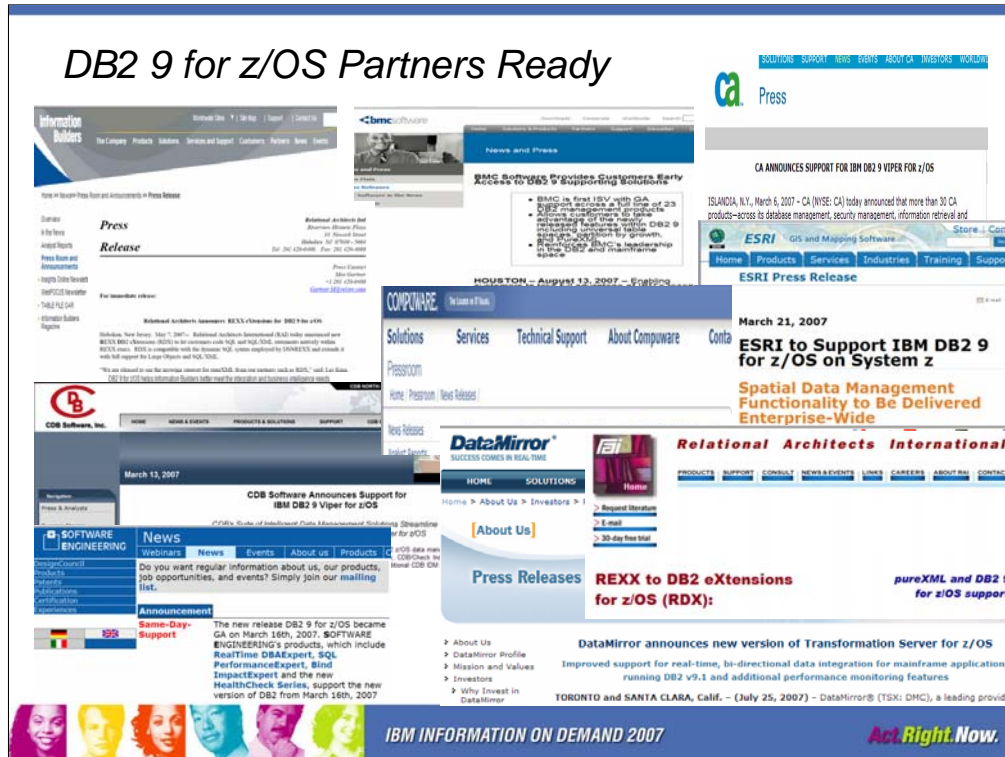


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Most of the key items in this version help our key enterprise application partners: SAP, PeopleSoft and Siebel, but also improve many other applications and customers. Customers working on the web and Service Oriented Architecture (SOA) see most of these benefits too. SQL flexibility improvements allow DB2 to be efficient in performance and in productivity for our partners. There are more than 50 items for each partner, improving the performance, scalability, continuous availability, SQL and portability. So the net is a reduction or improvement in the total cost of ownership.

From an external standpoint, DB2 9 looks like the same size as DB2 V8, but the code size is much smaller. We expect that to deliver better quality and faster rollout. Vendors have been able to be ready for DB2 9.



Here are just a few of the DB2 partners that have announced that they are ready to run with DB2 9 for z/OS. These are images of the web pages from IBI, BMC, CA, ESRI, Compuware, CDB, Software Engineering, SoftBase, DataMirror and Relational Architects. Talk to your vendors about DB2 9.

Of course, if your tool vendor is IBM, you can check on the web for the precise release and PTF levels of the Information Management Tools releases and service needed to work with DB2 9 for z/OS. Note that the matrix lists some levels of tools with an X in the NS or not supported column. See the later version, with an X under T for toleration or under E for exploit or the ability to use those new improvements.

<http://www.ibm.com/support/docview.wss?rs=434&context=SSZJXP&dc=D600&uid=swg21256800>

XML ISVs => DB2 for z/OS

- **Brook Path Partners** is currently enabling/porting solution to z pureXML
- **Information Builders** will support z pureXML upon customer request
- **BMC** is enabling/developing their tools to support z pureXML
- **Princeton Softech** is developing their solutions to support z pureXML
- **Altova**, a leading IDE for XML, will support z pureXML
- **Relational Architects** has pureXML support in RDX
- **IBM tools & utilities** have incorporated pureXML

- Strongly encouraging ISVs to enable both DB2 LUW and z/OS
- DB2 for z/OS business seen as a huge opportunity by these vendors



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•When application and tool vendors work with us to enable for DB2 pureXML, they frequently ask where the money is. Our answer is simple and straight forward, DB2 for z/OS is a huge business for us and a great business opportunity for them. This is resonating and encouraging them to enable for both DB2 for luw and DB2 for z/OS.

Why Migrate to DB2 9 for z/OS?

1018

▪ Business needs

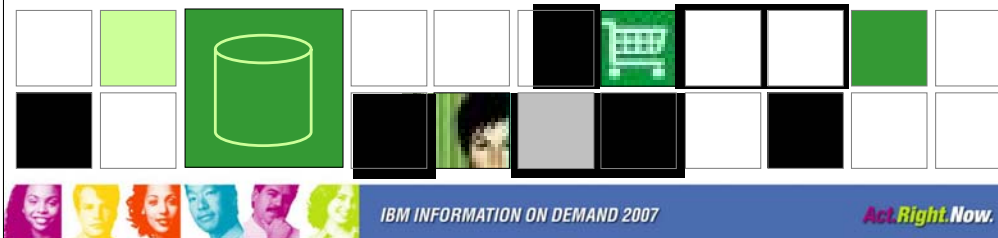
- Reduce CPU time
- Improve business agility
- Service Oriented Architecture

▪ Application developers need

- Powerful new SQL enhancements
- Portability with SQL and data definition compatibility
- PureXML for a powerful SQL and XML interface to XML data

▪ Database Administrators need

- Improve availability and performance
- More flexible security and easier regulatory compliance
- Better web application & data warehouse function and performance
- LOB function, performance, usability



DB2 9 has a lot for everyone, unlocking the potential of V8. Here are just a few of the highlights. The business needs include CPU cycle reductions that deliver in most utilities, improved query optimization, improved business agility via faster implementation cycles, and new pureXML™ that builds a strong foundation for SOA and XML initiatives. Kevin Campbell, an Application Architect at Univar USA said it better than I can, “This is not a bolt-on or band-aid approach, DB2 9 for z/OS is XML without compromise.”

Database Administrators (DBAs) need improved database availability and performance including LOBs, reorganization, backup and recovery, and partitioning enhancements. DBAs also get more flexible trusted network context and role-based security to help with regulatory compliance. A wide range of enhancements improve ERP application and data warehouse functionality and performance. Large object (LOB) function is added with file reference variables and REORG, while performance is improved.

Application developers are most excited by PureXML, which adds a powerful SQL and XML interface to access XML data stored in a native format. Application developers need powerful new SQL enhancements including MERGE and TRUNCATE statements, INTERSECT and EXCEPT set operations, and spatial support for geographical data. Text handling is improved with the XML changes, many new built-in functions, and an upcoming text server. Improved SQL and data definition compatibility with other DB2 platforms makes porting much easier.

DB2 9 for z/OS RedBooks & RedPapers

- Powering SOA with IBM Data Servers SG24-7259
- LOBs with DB2 for z/OS: SG24-7270
- Securing DB2 & MLS z/OS SG24-6480-01
- DB2 9 Technical Overview SG24-7330
- Enhancing SAP - DB2 9 SG24-7239
- Best practices SAP BI - DB2 9 SG24-6489-01
- DB2 9 Performance Topics SG24-7473
- DB2 9 Optimization Service Center SG24-7421
- Index Compression with DB2 9 for z/OS paper
- DB2 Stored Procedures SG24-7083 update

IBM
LOBs with DB2 for z/OS:
Stronger and Faster



IBM
Securing DB2 and
Implementing MLS on
z/OS

IBM
DB2 9 for z/OS
Technical Overview

IBM
Enhancing SAP by
using
DB2 9 for z/OS

IBM
DB2 9 for z/OS
Performance Topics



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See the DB2 library for detailed information.

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

Eight redbooks and one paper with substantial DB2 9 content are on the web, with one more in the works for later this year. Check for updates.

- Powering SOA with IBM Data Servers, SG24-7259

<http://www.redbooks.ibm.com/abstracts/SG247259.html>

- LOBs with DB2 for z/OS: Stronger & Faster SG24-7270

<http://www.redbooks.ibm.com/abstracts/SG247270.html>

- Securing DB2 & MLS z/OS, SG24-6480-01

<http://www.redbooks.ibm.com/abstracts/sg246480.html>

- DB2 9 Technical Overview, SG24-7330

<http://www.redbooks.ibm.com/abstracts/SG247330.html>

- Enhancing SAP - DB2 9, SG24-7239,

<http://www.redbooks.ibm.com/abstracts/SG247239.html>

- Best practices SAP BI - DB2 9, SG24-6489-01,

<http://www.redbooks.ibm.com/redpieces/abstracts/sg246489.html>

- DB2 9 Performance Topics, SG24-7473, in review

<http://www.redbooks.ibm.com/abstracts/SG247473.html>

- Index Compression with DB2 9 for z/OS, redpaper REDP4345

<http://www.redbooks.ibm.com/abstracts/redp4345.html?Open>

- DB2 9 Optimization Service Center, SG24-7421,

<http://www.redbooks.ibm.com/redpieces/abstracts/sg247421.html>

- DB2 for z/OS Stored Procedures: CALL & Beyond SG24-7083-01 update later



Here are some recent examples of the press and reactions to DB2 9. This version appears to be launching very quickly, with more customers and vendors interested in the capabilities. It also appears much more consumable than V8.

Agenda

- The Team
- SOA and DB2
- DB2 for z/OS V8
- DB2 9 for z/OS
- **What's Next?**



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Let's see, we've delivered versions 1, 2, 3, 4, 5, 6, 7, 8, and 9.
What do you suppose is next?

Possible late DB2 9 additions after GA	1649
<ul style="list-style-type: none"> ▪ XML extensions: e.g. XMLTABLE and XMLCAST 	
<ul style="list-style-type: none"> ▪ Text index server 	1696
<ul style="list-style-type: none"> • Text search CHAR, VARCHAR, CLOB & XML columns • Efficient communication interaction with DB2 for z/OS • Text indexes kept in DB2 tables for backup & recovery 	
<ul style="list-style-type: none"> ▪ Optimization, utilities, spatial, security and ALTER changes 	

The diagram illustrates the architecture for late DB2 9 additions. On the left, a circle labeled 'Parallel Sysplex' contains four blue boxes, each labeled 'DB2'. On the right, a circle contains two orange boxes, each labeled 'Text Server'. A horizontal line labeled 'TCP/IP' connects the two circles. Two arrows originate from the 'Text Server' circle: one points to the top 'DB2' instance in the 'Parallel Sysplex', and the other points to the top 'Text Server' instance in the right circle.



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As with V8, we expect have very few enhancements after general availability, working diligently to avoid changes that might affect existing customers. If we are confident that these items can deliver without impacting customers, these are possible.

Some improvements with new functions for XML, an XMLTABLE and XMLCAST are likely to come after general availability, with some new XPath functions.

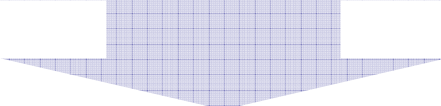
A specialized text search engine on a separate server is expected to come in DB2 9, but will deliver after general availability. While the server is separate, the text indexes are saved into DB2 tables to provide improved backup and recovery and consistency with DB2 data.

Improved ability to control access paths can help customers manage optimization. Several enhancements for utilities with better ability to extend function, incremental FlashCopy, LOAD with presorted input provide improved function and performance. Adding some spatial APIs, adding some flexibility in trusted context, and being able to ALTER TABLE ALTER COLUMN DROP DEFAULT are also in process.

Common AD and Tooling Requirements

→ IBM Data Studio

- **Common Application Development and Tooling in support of DB2 LUW, DB2 for z/OS, IDS, but decoupled from the Data Server release schedules**
- **AD technologies included: Java Common Client (JCC), .NET, LinQ, PHP, Ruby, EGL, WebSphere persistence, AD tooling, open source AD offerings, CLI common client**

- 
- *Differentiate IBM databases through common APIs and Tooling*
 - *Foster portable customer skills across our products through common User Experience.* Leverage Eclipse for client intense use cases (analysis, development).
 - *Lower cost of development and service through reuse and support of common components*
 - *Uniform experience for IBM's Data Server customers and vendors*



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Common Application Development and Tooling supports DB2 for luw, DB2 for z/OS, IDS, but decoupled from the Data Server release schedules. AD technologies included: Java Common Client (JCC), .NET, LinQ, PHP, Ruby, EGL, WebSphere persistence, AD tooling, open source AD offerings, CLI common client.

Differentiate IBM databases through common APIs and Tooling

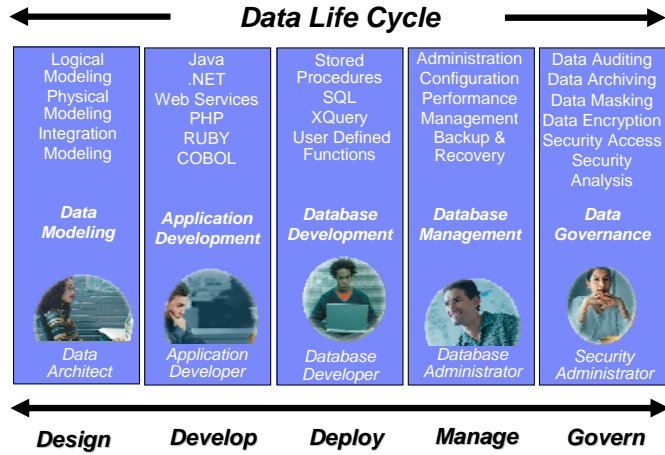
Foster portable customer skills across our products through common User Experience. Leverage Eclipse for client intense use cases (analysis, development).

Lower cost of development and service through reuse and support of common components

Uniform experience for IBM's Data Server customers and vendors

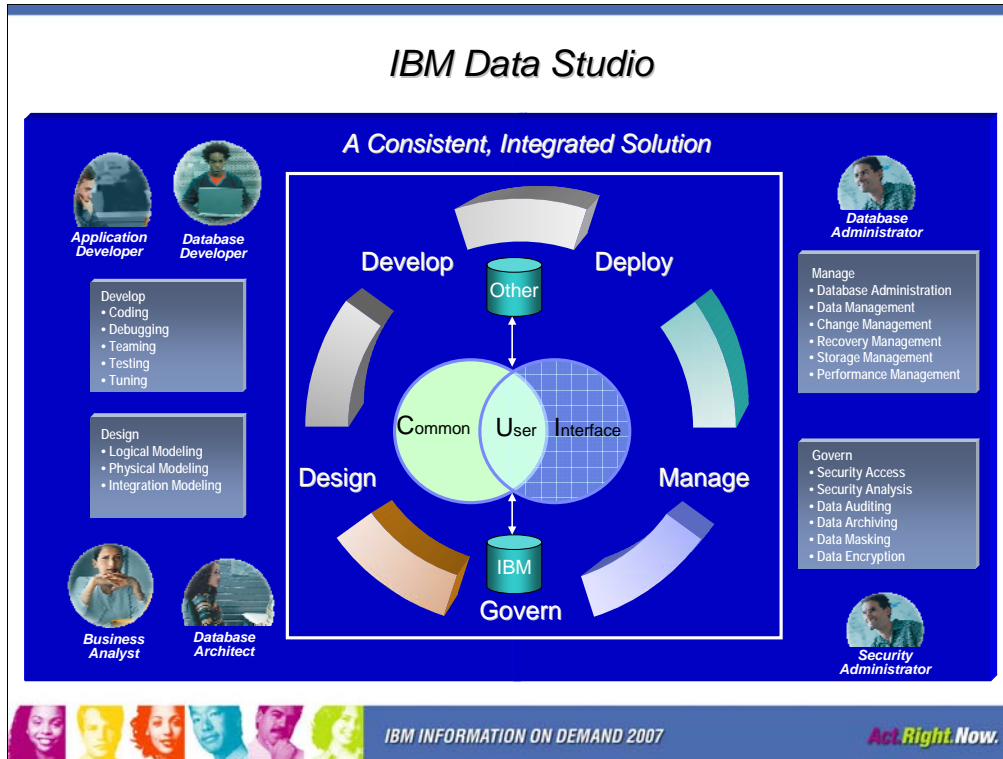
IBM Data Studio

Who will use it ?



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Slide objective: set up for onion peel. First we give you a comprehensive look at the total Consul portfolio

Points:

1. Consul provides the depth of security management on the mainframe, right side of the diagram and the breadth across the enterprise with comprehensive compliance management from the distributed environment on the left side of the diagram
2. Distributed portfolio is InSight
 1. Focus is on access monitoring, log management and compliance reporting
3. Mainframe portfolio is zSecure
 1. Focus is on integrated mainframe audit, monitoring, compliance and administration
 2. z/OS
 3. RACF
4. The intersection is the overlap and illustrates how Consul integrates mainframe data into InSight to provide the comprehensive compliance management view across the enterprise

IBM Data Studio v1.1

- Empowering developers and database administrators
- Complimentary and available in October of 2007
- Support for DB2 on all platforms and IDS

DB2 for LUW	DB2 for z/OS	DB2 for i5/OS	IDS
<ul style="list-style-type: none"> • Physical Data Modeling • Data Distribution Viewer • Integrated Query Editor • SQL Builder • SQL Routine Debugger • Java Routine Debugger • XML Editor • XML Schema Editor • pureQuery for Java • Data Web Services • Object Management • Data Management • Update Statistics • Health Monitoring* • Visual Explain • Security Access Controls • Project Management <p>* Technical Preview</p>	<ul style="list-style-type: none"> • Physical Data Modeling • Data Distribution Viewer • Integrated Query Editor • SQL Builder • SQL Routine Debugger • Java Routine Debugger • XML Editor • XML Schema Editor • pureQuery for Java • Data Web Services • Object Management • Data Management • Update Statistics • Visual Explain • Security Access Controls • Project Management 	<ul style="list-style-type: none"> • Physical Data Modeling • Data Distribution Viewer • Integrated Query Editor • SQL Builder • SQL Routine Debugger • Java Routine Debugger • XML Editor • XML Schema Editor • pureQuery for Java • Data Web Services • Object Management • Data Management • Security Access Controls • Project Management 	<ul style="list-style-type: none"> • Physical Data Modeling • Data Distribution Viewer • Integrated Query Editor • SQL Builder • XML Editor • XML Schema Editor • pureQuery for Java • Data Web Services • Object Management • Data Management • Security Access Controls • Project Management






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Application Development & Administration Client 1298

- **API support** 1750, 1811, 1747, 2627
 - Java pureQuery (JLinQ) 1648, 1727
 - Open Source (PHP, Python, Ruby, etc.)
 - .NET, EGL, and other technologies
- **SOA / Web Services / Web Access**
 - Data Server Web Services
- **AD tooling**
 - .NET, DWB, RAD
- **Administration tooling**
 - Rational Data Architect (RDA) 1201
 - IBM Data Servers Administration Console 1726, 2164

This slide shows the scope and mission for IBM's Common Application Development and Administration organization. A wide range of administration and application development function delivers for IBM relational database: Informix Dynamic Server, DB2 for Linux, UNIX and Windows, DB2 Connect and DB2 for z/OS. The new IBM Data Servers organization is changing the face of IBM relational database as it provides the client for Informix and DB2 for Linux, UNIX, Windows, i5/OS and z/OS.

The new IBM Data Servers offering consolidates database administration and application development (APIs, developer tools) across IBM's relational databases. You will see names of some components changing to ones which include IBM Data Server, for instance IBM Data Server Administration Console and IBM Data Server Developer Workbench. Other Data Server deliveries include the Client, Runtime Client, and Drivers for ODBC, CLI, .NET, JDBC, SQLJ, Ruby, PHP, Perl, and Python. Application Development APIs strategy includes new support for PHP and Ruby on Rails, dramatic improvements in Java with JLinQ and keeping Microsoft support very current. The next generation of SOA web services comes from Data Server.

Recent improvements in application development tooling for both DB2 and Rational make the application life cycle more productive with better quality. The new Web-based administration console project provides a much improved, more productive way to administer IBM relational databases.

1298 IBM Data Servers: Application Development & Administration Directions Curt Cotner

Java Application Development Requirements 1297

- **Description:**

- Support application development and execution for the Java platform

- **Provide the ability to ...**

- Update JDBC standard level
- Java Language Integrated Query pureQuery (JLinQ)
- Improve on XML and SOA tooling support
- Improve Java capabilities for all servers



- **Key technology components:**

- Python server support and IDS integration
- JDBC 4 Compliance
- Integrated Xquery builder and SOA web services tooling support
- Integrate new unified Visual Explain



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For the Java world, this chart shows the primary linkage between the market / customer / competitive needs, and the high level features / requirements to be implemented by this offering/family. It grounds the offering plans in the business context, and shows that the features being planned derive from business needs. The word "scenario" in this context is like a cross-product use case.

Microsoft and Open Source Languages Application Development Requirements

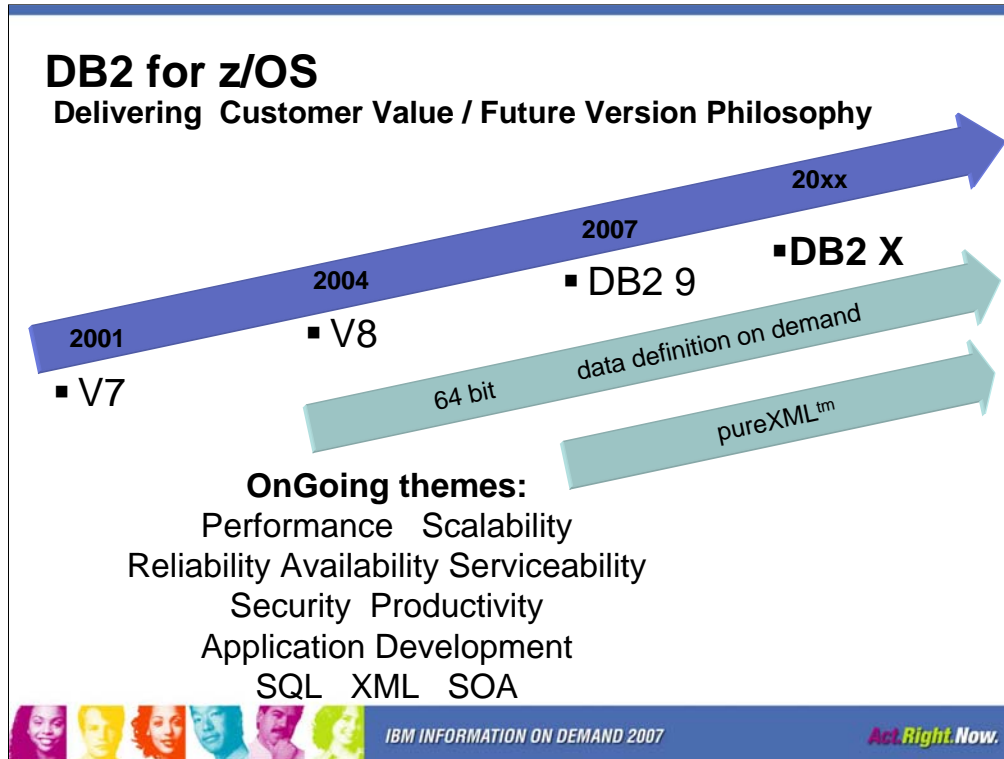
- **Description: Support application development and execution for the Microsoft and Open Source specific models**
- **Provide the ability to ...**
 - Extend support for Open Source programming languages
 - Improve .NET capabilities for all servers
- **Key technology components:**
 - 64 bit .NET enablement and support for all servers
 - Support new server data types
 - Ruby on Rails support and PHP enhancements
 - Python server support
 - Integrated XQuery builder and support for SOA



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Act Right Now.

For the Microsoft and open source languages, this chart shows the primary linkage between the market / customer / competitive needs, and the high level features / requirements to be implemented by this offering/family. It grounds the offering plans in the business context, and shows that the features being planned derive from business needs. The word "scenario" in this context is like a cross-product use case.



DB2 for z/OS V7 became generally available (GA) March 2001, and V8 delivered three years later. DB2 9 became generally available in March 2007, three more years. We expect the next version will be 2.5 to 3 years from DB2 9 GA to DB2 10 or DB2 X or whatever the name becomes.

The themes for future versions will continue to focus on core platform strengths of performance, scalability, reliability, stability, availability, resilience, and security. PureXML and Schema evolution or data definition on demand will be ongoing for a long time. In contrast, most of the 64 bit evolution should be completed in DB2 X.

The key interfaces for customers and vendors expand for both XML and for SQL. Information is a key leg of the SOA platform, and DB2 for z/OS provides many advantages for data management in SOA.

Standards, interoperability, portability and security along with secure access using the latest technologies are key touch points. Productivity improvements for application developers and for database administrators are very important as data grows in scale and complexity.

Beyond DB2 9 Improvement Focus Areas

1649 2170 2171

- Performance: OLTP, Query, Index & LOBs
- Scalability & 64 Bit Memory
- SQL & SQL Procedures
- XML
- SOA
- Security
- Availability
- Autonomics

Administration
Security

IBM INFORMATION ON DEMAND 2007 *Act Right. Now.*

Beyond DB2 9, many of the focus areas are ones we have seen in the past. We need to have substantial improvements in performance, so that transactions and queries can improve, as well as improvements in LOBs and XML.

More work is needed in scalability, so that more threads can be run, with less work to manage and tune virtual storage.

SQL and SQL procedure language continue to need enhancements to improve programmer productivity and make porting from other DBMS much faster and easier.

XML made a huge stride in DB2 9, and customer usage will show many improvements needed.

Service Oriented Architecture requires many other changes to complement the SQL and XML changes.

Availability improvements continue, reducing planned outages with more changes that do not need an outage.

Autonomics help with productivity, even as they improve performance and availability by reducing or eliminating tasks in administration and security.

Utilities and Tools Futures

- Web-based administrative console
- High priority requirements
 - Auto-stats
 - Auto-storage management
 - Auto-compression
 - Recover to a different table space in a different DB2 with consistency
 - Reduce RUNSTATS resource consumption
 - Dataset-level FlashCopy
 - UTSERIAL elimination
 - REORG Enhancements (LOBs, etc.)
 - ...

Manual invocation of

- RUNSTATS
- COPY/BACKUP SYSTEM
- QUIESCE
- MODIFY RECOVERY
- REORG



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Our utilities have 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.

A vision for System z advanced data serving
System z Enterprise Hub for Mission Critical Data

- With a strong foundation for transaction processing, built on 40+ years of technology innovation, System z servers with z/OS and DB2 can provide a premier platform for data serving, today and into the future*
- IBM plans to continue to invest in new solutions to address customers' strategic information on demand goals*

Today's Capabilities

- Industry-leading data integrity and security
- Data sharing solution for centralized view of data
- Scalability and availability for enterprise class workloads
- Comprehensive systems and data management environment

Extension of capabilities*

- New specialty engine (zIIP) with DB2 exploitation - for mission critical distributed, ERP, CRM, and Data Warehousing workloads *
- DB2 9 and tools improve regulatory compliance and autonomies
- Encryption capability (TS1120 tape subsystem) with z/OS centralized key mgmt
- Data protection to achieve highest levels of security certifications

Future direction*

- Additional zIIP exploitation: DB2 9 adds Native SQL procedures
- DB2 enhancements to help improve usability and reduce complexity and management costs.
- IPSec using zIIP
- z/OS XML parsing using zIIP or zAAP
- DB2 table scan acceleration via DS8000
- Encryption capability (disk subsystem) with z/OS centralized key mgmt
- Handle larger volumes of data, with improved scalability

*All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

IBM INFORMATION ON DEMAND 2007 **Act Right. Now.**

We have been working on specialty processors for a long time, and have just delivered new capabilities with the zIIP. The improved cost of ownership can help a lot for some customers, but not at all for others. There have been several big recent changes:

The z9 Business Class and Enterprise Class extend zIIP capabilities to many more customers. Only the largest customers needed the z9-109 processors, and the upgrade steps were very large ones. The new z9 Business Class and Enterprise Class processors have a much greater range of processing power with more granular upgrade options. The entry level z9 processor now starts at under \$100,000.

Query work is broadened beyond just the star joins to all large parallel queries. If you have a warehouse that uses parallel processing and significant CPU time, then the zIIP may provide a benefit.

The TS1120 tape subsystem has added encryption capability with several options for centralized key management.

The Data Serving Roadmap provides more information about this slide: <http://www.ibm.com/systems/z/ziip/data.html>

A Special Event for System z Attendees

The DB2, IMS and Tools team welcomes you to a special night of southern hospitality at the:



Crossroads Room
Wednesday, October 17th - 6:30 pm – 8:30 pm

Please join your colleagues, conference speakers along with key members from IBM team.

Drinks and Cajun Hors D'oeuvres will be served

Crossroads Room is on the casino level adjacent to the restaurant

Wear your
IOD Z
badge for
entry



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Thanks for coming to this session.