IBM DB2 Tools for z/OS

Making Your Business Resilient

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Jin Zhang, IBM Silicon Valley Lab

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Agenda

- ***What is meant by "Resiliency"?***
- ***Is your Business Resilient? What are the Trouble Signs?***
- ***High Availability***
- ***Disaster Preparedness***
- ***DB2 Tools to Help You Ensure Resiliency***
- ***The Proof in the Customer Experience***

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What Does it Mean to be Resilient?

- *High Availability*
- *Reliability and Serviceability*
- *Efficient disaster recovery*
- *Proactive performance*
- *Security*
- *Advanced virtualization*

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What is High Availability?

- ***GOAL: Minimize the affect of a resource that is temporarily unavailable***
- ***Short term in nature***
- ***Localized to a single site***
- ***Might be the result of a planned or unplanned outage***
- ***Achieved by utilizing redundant components***

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What is Disaster Recovery?

- ***GOAL: Minimize the affect of a system wide or site wide resource unavailability***
- ***Longer term in nature***
- ***Affecting one or more critical resources***
- ***Always unplanned***

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Trouble Signs

- ***Do you experience database failures?***
- ***Do hardware failures ever occur?***
- ***Has your business ever lost data or corrupted it's data?***
- ***Have you ever needed to restore data from a backup?***
- ***Ever experience application failures?***
- ***Are you missing your service-level agreements (SLAs)?***
- ***Are you seeing poor resource performance and consumption (such as CPU spikes)?***
- ***Is your process of viewing resources across the data center slow?***
- ***Would you like a virtualized view of your data with a single point-of-control?***

If you answered "YES" to any of these,
your business has a need to become MORE RESILIENT

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Does this story happen to your business?

Real-World Scenario:

- ***A large beverage company***
- ***Spending 2-3 days to clone a single SAP instance***
- ***Sometimes there can be over 90 instances***
- ***Need to roll out to production FASTER***
- ***Need to have a clone that's usable on the same LPAR***
- ***Need to reduce labor cost from this long cloning operation***

A resilient goal that seems impossible:

- ***Can IBM reduce this time to less than an hour per DB2 subsystem clone?***

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Does this story happen to your business?

Real-World Scenario:

- ***A major US airline***
- ***Had a DELETE transaction that was running for 13 seconds***
- ***This transaction is at extremely high volume – 13 sec. is TOO LONG!***
- ***Need to improve production performance***
- ***Customer satisfaction is at stake!***

A resilient goal that seems impossible:

- ***Can IBM reduce this time to less than 1 second?***
- ***(By the way, we don't even know where to start the tuning)***

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Does this story happen to your business?

Real-World Scenario:

- ***Applications perform slowly***
  - **SLAs are being missed**
  - **Customer satisfaction declining**
- ***Backups seem to take forever***
- ***Batch jobs run into working hours***
- ***Increased infrastructure & storage costs***
  - **"Every time I turn around, we are buying more storage"**
- ***Data Retention Compliance***

A resilient goal that seems impossible:

- ***Can IBM help us to improve the application performance by 100%?***

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Does this story happen to your business?

Real-World Scenario:

- ***Management notices that new application functionality is delayed three months***
- ***The business is unable to compete for customers because their software lacks "state-of-the-art" functionality***
- ***The CFO is complaining over how high the IT budget has become to fix application defects***
- ***Developers are sitting around waiting for their copy of the database to work with***
- ***3TB of total storage used for production, testing, training and other functions, require labor to support such large storage***

A resilient goal that seems impossible:

- ***Can IBM help us to reduce the storage usage by 50%?***

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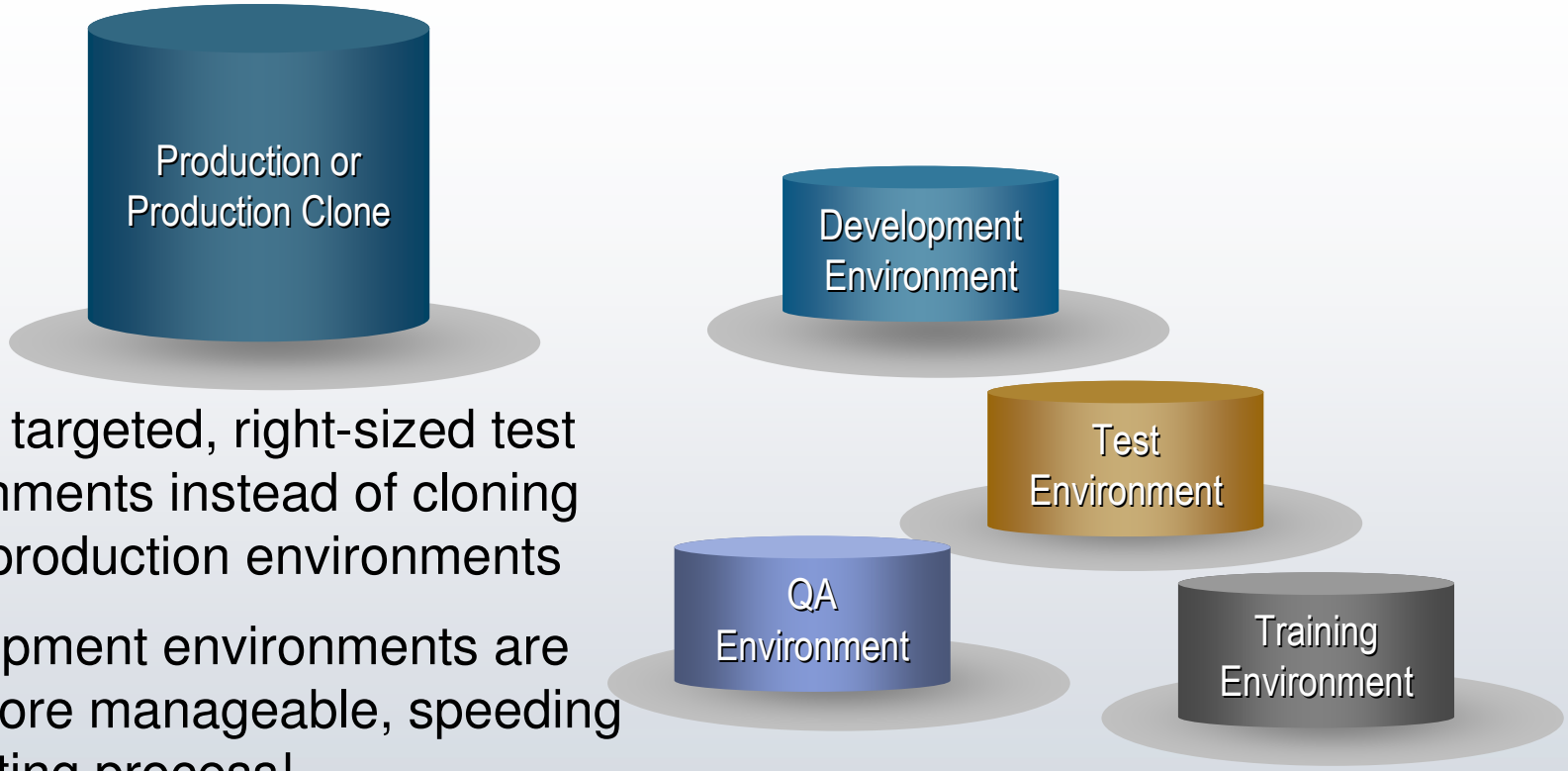
What is Test Data Management?



Create targeted, right-sized test environments instead of cloning entire production environments

Development environments are then more manageable, speeding the testing process!

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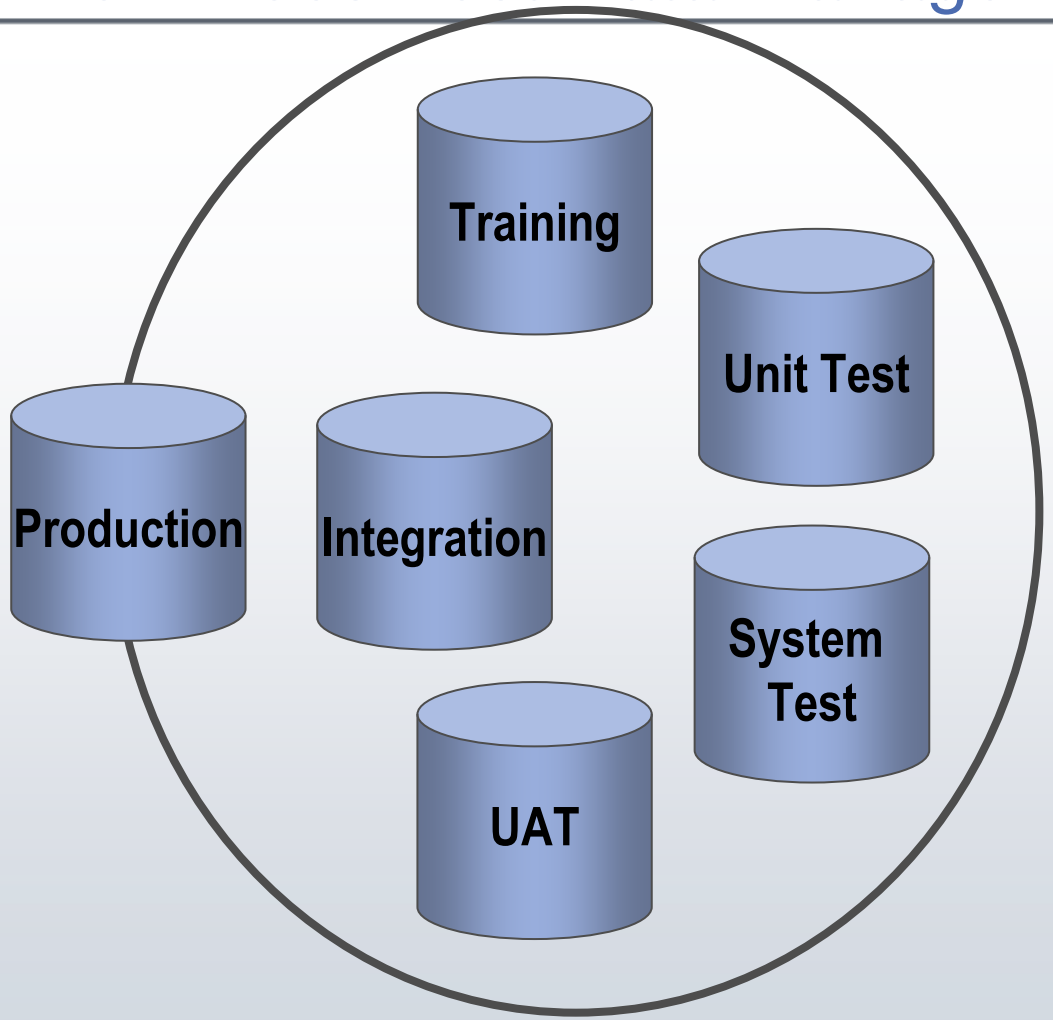
How Does Test Data Management Impact Cost?



Production	500GB
Training	500GB
Unit Test	500GB
System Test	500GB
UAT	500GB
Integration	500GB
Total	3 TB

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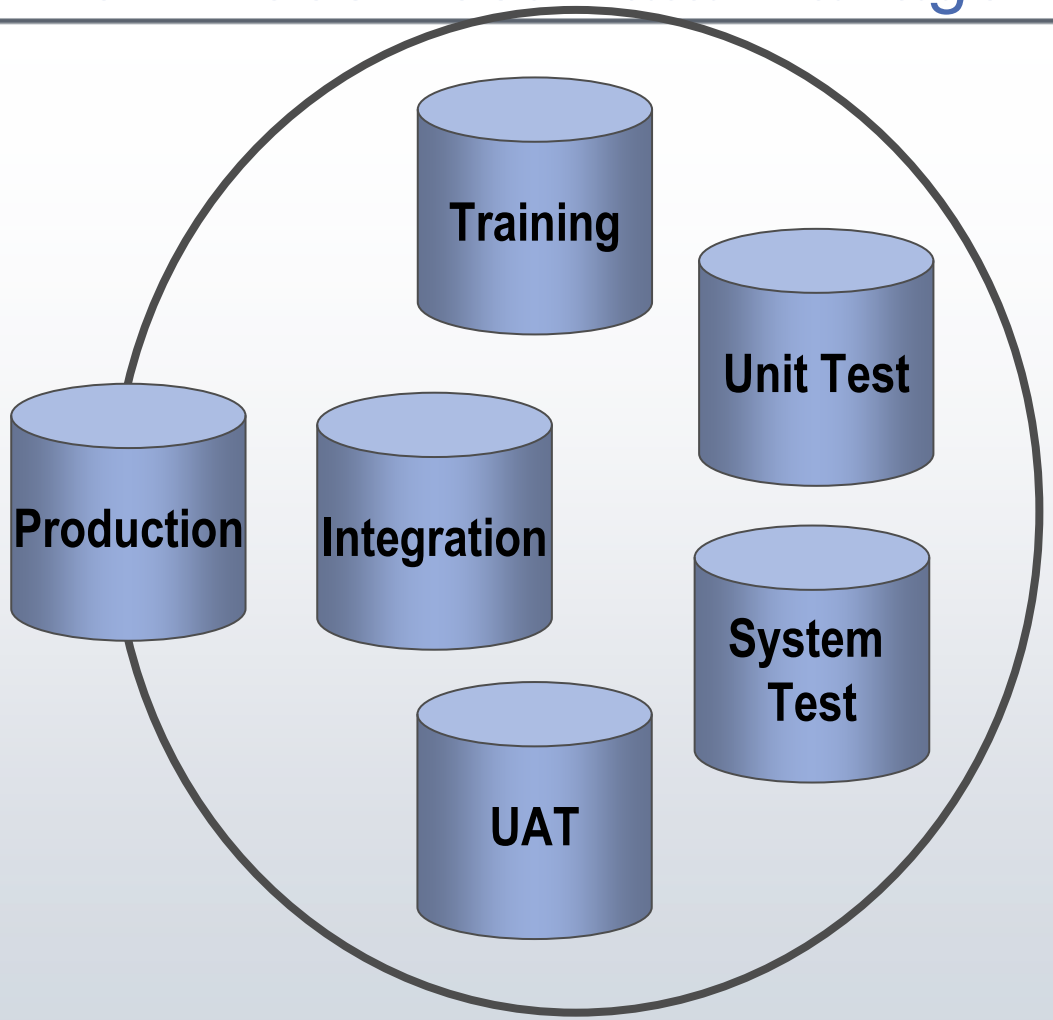
How Does Test Data Management Impact Cost?



Production	200GB
Training	200GB
Unit Test	200GB
System Test	200GB
UAT	200GB
Integration	200GB
Total	1.2 TB

Storage reduced by 60%

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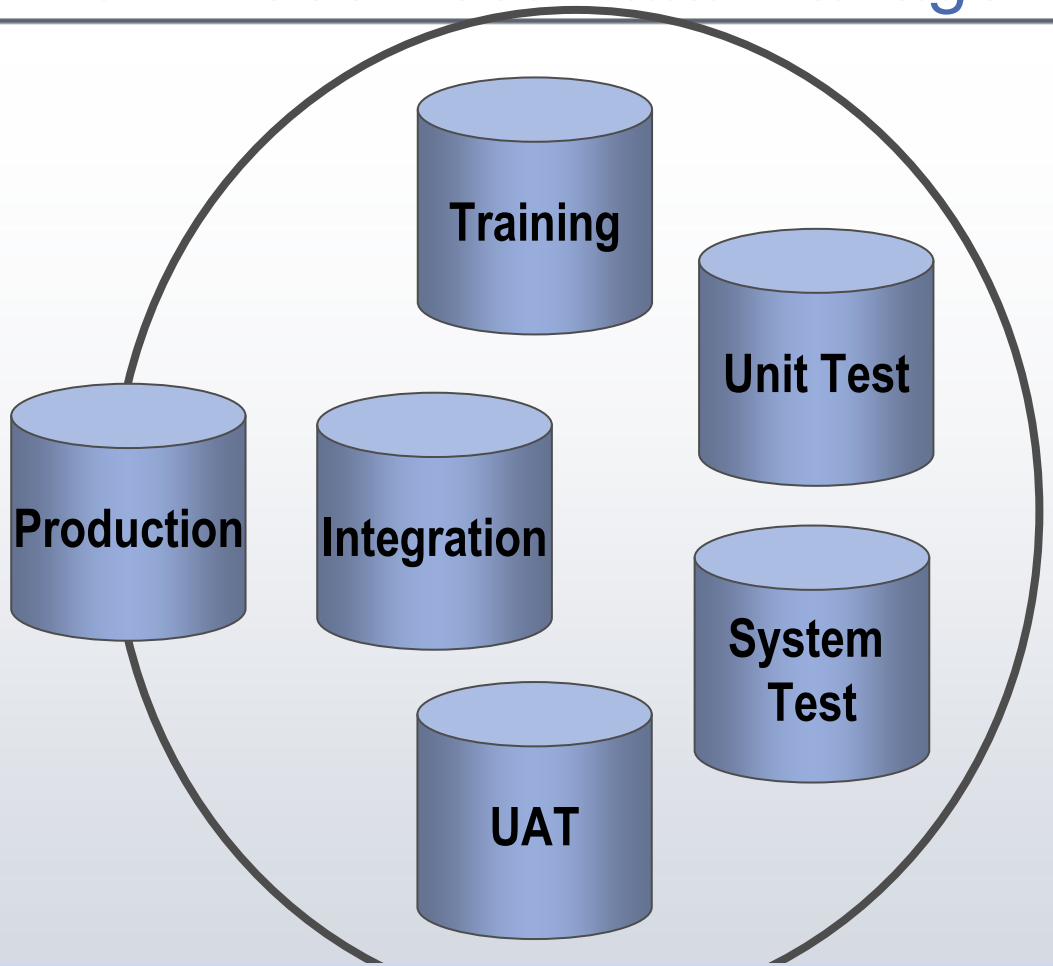
How Does Test Data Management Impact Cost?



Production	200GB
Training	25GB
Unit Test	25GB
System Test	25GB
UAT	25GB
Integration	25GB
Total	325GB

Storage reduced by 89%

Creating right-sized targeted test environments saves storage costs & speeds testing

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Does this story happen to your business?

Real-World Scenario:

- ***A health care company***
- ***An application designed to use dynamic SQL, and dynamic statement caching***
- ***CPU consumption is becoming a concern***
- ***Need to improve application performance***

A resilient goal that seems impossible:

- ***Can IBM help us to reduce the CPU by 50%?***

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A Success Story – A Large Worldwide Financial Services Company Gains Significant Cost Savings by Monitoring SQL

Challenges

- ***A financial services company serving 68 million customers. Required to evaluate and find the premier dynamic SQL monitoring product from the myriad of monitoring products in the marketplace***

Solutions

- ***IBM DB2 Query Monitor for z/OS, the only product among those evaluated that did not require standard DSN traces to be started***
- ***The company selected IBM DB2 Query Monitor for z/OS as the strategic tool to identify the most expensive SQL statements that were running in the System z environment.***

Benefits

- ***DB2 Query Monitor active 24X7 in all 36 North American DB2 subsystems***
- ***Used the product to track down SQL statements that were increasing chargeback costs to the users***
- ***The company experienced tremendous cost savings by using DB2 Query Monitor, and was able to show a true return on investment.***

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Return On Investment Discussion

- *DB2 Query Monitor*
  - Lower Overhead Collection
  - No DB2 traces required - will use typical Accounting and Statistics class already being used
  - Alert Capability allows you to take action **before** situations impact DB2
    - For example can alert on Negative SQL codes, bufferpool hit ratios, i/o, CPU, etc.
    - Can take corrective actions such as commands and job submission when exceptional events occur
  - Can be used in Development to prevent poorly tuned SQL production impact
  - GUI interface helps users become productive faster
  - Auditing tie-in allows you to avoid 5-15% overhead – 1+1<2 !

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Some real world DB2 QM ROI Savings

- ***Scenario 1 – Customer Account System:***
  - CPU Costs $500.00 per hour
  - 10 million transactions per day. Each transaction averages .011361 of Class 2 CPU time.
  - Transaction accrues $15,720.00 per day in CPU charge back.
  - The transaction has 5 SQL statements and one is found to use a LIKE rather than a WHERE.
  - Modifying the statement to use a WHERE reduces CPU by 35%.
  - **$2,008,230 in yearly savings on CPU charge back**

- ***Scenario 2 – Customer Account System:***
  - A change is made to the monthly billing system and promoted to production.
  - During month end processing it is discovered the changed caused the program to loop in DB2 and the program ran for over 20 hours before it was canceled. SLAs were missed.
  - A workload is setup in DB2 Query Monitor for the billing system to capture exceptions and issue alerts when the billing program uses more than 60 minutes of CPU time.
  - The next month another issue occurred, but Query Monitor emailed alerts to operations and the DBA team and the problem was corrected and the SLAs were met.

- ***Scenario 3 – Customer Account System:***
  - An end user complains that he could not perform his work on Saturday morning because of a broken application. (He tells the DBA on Monday morning.)
  - The DBA reviews the negative SQL Codes History in DB2 Query Monitor and finds the user was entering duplicate data in the application.
  - Development is able to code a fix (and messages) to check for the duplicate data and the user is educated on how to enter the proper data.

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10 Surprising Things You Can Do with DB2 Query Monitor

Displaying performance-related information about specific queries is the traditional use for DB2 Query Monitor. Tom Glaser points out that its full capabilities go way beyond the expected:

These 10 DB2 Query Monitor tasks will help out any application programmer, DBA, or DB2 systems programmer:

1. **Research DB2 commands**
2. **Display host variables**
3. **Exploit DB2 Resource Limit Facility**
4. **Display SQL Communications Area**
5. **Determine SQL error patterns**
6. **Explore dynamic SQL overhead**
7. **Identify resource unavailable -904 errors**
8. **Determine access path changes**
9. **Identify logging increases**
10. **Display DB2 subsystem statistics**

Tom Glaser, Technical Director, Mainframe Strategic Planning at AT&T

DATABASE Magazine (Issue 4, Nov 2008)

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Cost of Auditing is getting too high (also ineffective)

- Business operation is getting delayed because DBAs are busy preparing auditing reports
- **Possible Solution for Effective Usage of DBA Resources**
  - ***DB2 Audit Management Expert***

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Audit Management Expert and Encryption Tool

- ***What AME does***
  - Provides greater data integrity of audited data through automation, centralization, and segregation of duties so auditors can easily get information while requiring fewer resources.
  - Identifies inappropriate access and use of production data
  - Lower Overhead Audit Data Collection
  - Separation of Roles (privileged users cannot be responsible for gathering auditing data)
  - Removal of DB2 Trace record restrictions
    - 32 concurrent traces
    - DB2 records only 1st read and 1st write
  - Comprehensive, centralized approach

- ***DB2 AME Data Capture capability extends business benefit***
  - Provides an audit data collection platform to collect DB2 audit data for third party “enterprise auditing” vendors (currently Tizor and Imperva)
    - Gives the “z” view for these enterprise auditing products

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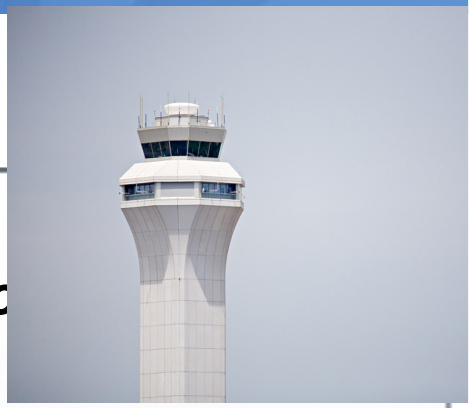
We Are Protected
Are we in Compliance? Are we Protected



- ***RACF is the premier security product for z/OS and do***
  job of protecting access to secured assets
- ***"We don't need to audit, we have RACF" The environments that DB2***
  and IMS run in
- ***"We control who connects to the DB2 SYSADM group and we***
  know that these people are authorized to do"
- ***"We trust our DBAs"***

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That is probably what these guys said…

Heartland Payment Systems Inc. - Computerworld 1/20/2009

- Provider of credit card and debit card processing services
- Data breach may displace TJX companies in the record books as the largest ever involving payment data with potentially over 100M cards being compromised
- **Company said they were accelerating their efforts to deploy end-to-end encryption to protect its transaction base**
- **Better late than never**

Societe Generale SA

- Biggest ever trading scandal in history
- January, 2008 announcement that the comp **Lost $7.68B** due to risky and unauthorized by one employee
  - Described as a "devious information technology wiz"
  - Circumvented internal control systems and set up an elaborate trading system to hide fictitious trades
  - At one point in time, the total exposure to the bank was **$50B!!!**

A large insurance company

- An employee needed to pay off gambling debts
- Decided to sell identity information pilfered from their databases on 110,000 customers
  - Sold 36,000 Names/Addresses/ID#s/birth dates for $25,000
- The United States Secret Service (Ooops) intercepted sale
- Employee sentenced to 5 Years in Jail, ordered to pay the company $520,000

TJX Companies

- Over 45 million credit and debit card numbers stolen in a computer system breach
- Began in July, 2005 and was not detected until 12 2006!
- 2007: $197M in breach related pretax charge against earnings
  - Includes $40.9M settlement with Visa
- 2008: $24M settlement with MasterCard

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Counter Arguments To "We Are Protected"

- ***RACF does two things:***
  - Prevents people from accessing a resource that is not essential or appropriate for their jobs
  - Allows people access to the necessary data to do their jobs

- ***But RACF does NOT:***
  - Prevent a malicious update if the user has authority to the data
  - Prevent an authorized user from accessing sensitive data that is ***NOT*** within the scope of their job
  - Provide meaningful information about access to protected DB2 resources (authorized or not)
    - Did someone grant their other userid or someone else DB2 SYSADM (system administration) authority?
    - Is someone reading data during off hours? Why?
    - Authorized access to data does not ensure the data is accessed in accordance with "proper use" criteria.

When there is a will, there is a way. Calculate your risk!

Yes protect sensitive data – but a comprehensive auditing of access not only makes sense… it is mandated by every governance/compliance regulation

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Auditing Overview

- ***Privileged users must be trusted with sensitive data in order to do their jobs. For example, DBAs***
  - Their responsibilities include maintaining, copying, loading, reorganizing, and recovering sensitive data.

In the absence of auditing, it is impossible to trace when or if these special privileges have been abused

- ***Auditing must implemented in a way to prevent privileged users from interfering with its collection or reporting (called Separation of Roles)***
  - Centralized and independent of the users you are auditing!
- ***DBAs should do their job duties, and auditors should be able to run audit reports independently of them.***
  - Separation of Roles
  - More accurate audits
  - Reduced cost of gathering audit data

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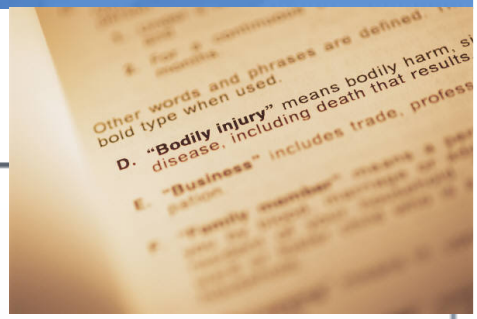
A Large Insurance Company…
-- DB2 Audit Management Expert



Challenges

- ***A well known insurance company needed a solution that would help it guard against compliance failures, which can present enormous costs to businesses in today's environment.***
- ***The company wanted a solution that could provide the auditing capabilities needed by its IT organization to help minimize the liability associated with growing compliance demands.***

Solutions

- ***Following a proof of concept (POC) and 45-day trial of the product, this company selected the IBM DB2 Audit Management Expert for z/OS tool to help them meet internal auditing and external regulatory compliance requirements.***
- ***DB2 Audit Management Expert (DB2 AME) for z/OS provides the company with comprehensive, detailed auditing capabilities of data on its DB2 for z/OS data server to help database administrators, security administrators and auditors deliver accurate, timely data and reports for use in auditing activities.***

Benefits

- ***With the implementation of DB2 AME, the company is now able to:***
  - provide details on who made changes to the data, as well as where and when the changes were made
  - let auditors participate in data auditing activities with less database administrator involvement
  - free up valuable IT staff resources
  - eliminate manual auditing processes that can be time-consuming and error-prone

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The Costs of a Data Breach

- ***According to the latest research…***
  - Average breach was 26,300 customer records
  - Average opportunity cost was 2 percent loss of all customers
  - Customer loss ranged from 0 to 7 percent, depending on industry sector
  - Averaged $2.6 million per company with breached data
  - Averaged $98 per customer whose data was lost
- ***Total Direct and Indirect costs of a data breach***
  - $56 (direct costs) + $98 (indirect costs) = $154 *per record!*
- ***A second source of data is Forester Research, who has published the following numbers on total costs per data breach:***
  - For non regulated companies - $90 per record
  - For regulated companies - $155 per record
  - For highly regulated companies - $305 per record

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An example from the news

- ***A U.S. bank loses a computer tape containing names, addresses, Social Security numbers, and checking account numbers. 90,000 customer records are lost.***
  - Direct Costs per record
    - Free or discounted services……$26
    - Notification letters, phone calls, e-mails, media……$14
    - Legal defense services and criminal investigations……$7
    - Legal, audit, and accounting fees……$4
    - Call center expenses……$3
    - Public and investor relations……$1
    - Internal investigations……$1
    - The total direct costs per record breached……$56
  - **For 90,000 records the combined Direct and Indirect costs ($154 per record) = $13,860,000!**

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System-Related Problems

- **System-Related Problems**
  - Outage related to a REORG and locks
  - Outage related to a dropped table
  - DB2 Logs run out of disk space
  - DB2 runs out of disk space (eg. during an application update)

- ***Possible Solution for Continuous Data Availability:***
  - ***DB2 9 for z/OS Backup Restore with Flash Copy before a reorganization***
  - ***DB2 Change Accumulation Tool while recovering data***
  - ***DB2 Automation Tool or DB2 Recovery Expert to create an instant copy that works with flash copy at the object level***

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Application-Related Problems

- **Application-Related Problems**
  - Batch loads corrupt data
  - DB2 needs to come down for application maintenance due to table locks
  - Schema changes/re-indexing

- ***Possible Solution for Continuous Data Availability:***
  - DB2 Administration Tool
  - DB2 Object Comparison Tool
  - DB2 Change Manager Tool to generate the correct utilities to avoid human error
  - DB2 Log Analysis Tool to recover data
  - DB2 Object Restore
  - DB2 Recovery Expert (to recover dropped objects to a point-in-time, without incurring a loss of data)

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DB2 Logs run out of disk space

- **DB2 Logs run out of disk space**
- ***Possible Solution for Continuous Data Availability:***
  - DB2 Archive Log Accelerator to reduce volume of data on Logs
  - Tivoli OMEGAMON XE for DB2 Performance Expert
    - Use alerts to notify team when archive logs run low on disk space, as determined by setting threshold values

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DB2 runs out of disk space (during application update)

- **DB2 runs out of Disk space (during application update)**
- ***Possible Solution for Continuous Data Availability:***
  - DB2 Automation Tool to avoid situation
  - Recovery Expert to optimize rollback, fix & reapply

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Batch Loads Corrupt Data

- **Batch Loads Corrupt Data**
- ***Possible Solution for Continuous Data Availability***
  - ***DB2 Recovery Expert, which provides multiple options, point-in-time recovery, undo/redo of undesired changes, and recovery of dropped objects***
  - ***DB2 Cloning Tool***
  - ***DB2 Log Analysis Tool to undo corrupted data***
  - ***DB2 z/OS v9 Backup Restore with DB2 Change Accumulation Tool***

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Bring Down DB2 for Application Maintenance

- Bring Down DB2 for Application Maintenance Due to table locks
- **Possible Solution for Continuous Data Availability**
  - ***DB2 Cloning Tool***
  - ***DB2 Utilities Enhancement Tool and DB2 recovery Expert***

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What is your availability requirement?

Availability	*Downtime Minute per Year*
99.999%	*5 minutes*
99.99%	*50 minutes*
99.9%	*8 hours, 20 minutes*
99%	*3 days, 11 hours, 18 minutes*
95%	*18 days, 6 hours*
90%	*34 days, 17 hours, 17 minutes*
85%	*54 days, 18 hours*

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Direct Costs of Downtime

Application Segment	Average Cost of Downtime/Hour
Shipping - Distribution	*$28,000 per hour*
Tele-Ticket Sales	*$69,000 per hour*
Airline Reservations	*$89,000 per hour*
Home Shopping	*$113,000 per hour*
Pay Per View - Television	*$150,000 per hour*
Credit Card Sales	*$2,650,000 per hour*
Financial Market	*$6,450,000 per hour*
Source: Giga Group 2005	

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Why Do Something?

Eliminated downtime associated with rebuilding test environments - savings of up to **$250,000 per year.** Achieved more than **$100,000 annual savings** collectively for 10 to 15 projects.

Scotiabank

nab

Reduced the time needed to create a test environment by up to **90% (from 20 days to just 2 days).** Improved time-to-deployment of new application functionality, contributing to critical business/financial initiatives.

Reduced **operational cost** and **improved efficiencies** by reducing the size of test database from 1.2TB to 24GB

Metavante

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On To The Future…

- ***What we have delivered recently***
- ***What's cooking in the kitchen…***

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OMPE v410 new function added after GA ...

- ***DB2 9 exploitation – the primary v410 objective***
- ***IFCID 225 support in classic***
- ***Data sharing group support for threads in classic***
- ***zIIP support in classic and the TEP***
- ***IFCID 197 (DB2 messages) support in the TEP***
  - Create situations based on “important” DB2 messages
- ***Numerous new high water mark statistics attributes added along with product-provided situations (value out of the box.)***
- ***Support for near-term history to feed OM PE batch reporting processes including the Performance Warehouse***
- ***Facility to run Collect Report Data (CRD) in batch***
- ***New thread displays (in classic) allowing further distinction between active and inactive thread***

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OMPE v410 new function added after GA – Cont.

- ***Workstation (distributed) information added to NTH Display***
- ***New Thread History selection by CORRID***
- ***New sub-interval parameter for near-term history (enables collection for extremely large workload, e.g. distributed)***
- ***Extensions to Application Trace (ATF):***
  - Supporting multiple plan-names and / or authids
  - Support for long-running traces (> 60 minutes)
- ***Dynamic Workspace Linking (DWL) on the TEP provided to OMEGAMON XE for Mainframe Networks, OMEGAMON XE for IMS, OMEGAMON XE for zNetview***
- ***Launch Optim Query Tuner / Query Workload Tuner from PE Client***
- ***….***

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OMPE V420 Key focus areas

- ☑ ***Reduced resource consumption***
  - Significant internal architectural improvements to improve code path optimization and to drive convergence
    - Continued centralization of services and facilities used within OMEGAMON:
      - memory management in classic OMEGAMON PE component
      - Continued migration to PE Server subtask for data collection
      - MVS subsystem to isolate services used by OMEGAMON components across LPARs
    - Extensive testing under high and complex workloads
- ☑ ***ICAT Configuration tool enhancements for OM PE***
  - Configuration DB2 subsystem profiles approach
  - Including near re-write of the *Configuration Guide*
- ☑ ***TEP improvements via new HTML navigator***
- ☑ ***Currency support and new features in Reporting***
- ☑ ***ITM 6.2.1 features***
  - Among other features… The High Availability Hub TEMS for z/OS

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Recent Core Optim Developments

- ***Optim for z/OS enhancements:***
  - Double Byte Character Set support (DB2 GRAPHIC data types)
  - Additional DB2 z/OS data type enhancements (eg. BINARY, LOBs)
  - Improvements for large volumes of data (partitions, large z/OS data sets)
  - Enhanced IMS support, especially for logical relationships
- ***Optim Distributed***
  - Additional data sources (Teradata, iSeries, new DB versions, etc)
  - Additional Data Privacy capabilities (DP data, shuffle, etc)
  - Performance enhancements (7.1.1 focus on I/O performance)
- ***Optim Application Support Requirements***
  - Additional Applications (SAP, new App modules & versions, OEM deals)
- ***Other Developments***
  - Optim Services Oriented Architecture solution
  - Data Studio integration with InfoSphere Data Architect
  - DRA (Data Relationship Analyzer). Exeros acquisition and customer data model discovery.
  - Enterprise Content Management (FileNet) integration

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Key Core Optim Customer Requirements

- ***Optim for z/OS***
  - SMP/E support
  - Basics: support BIGINT, DECFLOAT, XML, and Unicode
  - Improve parity with Optim Client/Server (eg. Data Privacy, Archive)
  - Expand native z/OS support for IMS and file data
- ***Optim Distributed***
  - Ongoing: added support for additional operating systems and data bases
  - Additional Data Privacy capabilities
- ***Optim Application Support***
  - Additional Applications. Ease Optim Apps Customization.
- ***Other Requirements***
  - Common Optim core UI (optional, SOA, Eclipse-based)
  - Ongoing: Improved integration (Data Studio, IDA, ECM, DRA)
  - Ongoing: Performance and Capacity enhancements

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What Are We Working On - DB2 for z/OS Tools

- ***DB2 Version Support***
  - Key products will have Day-1 support for DB2 X
  - Support for previous DB2 versions
- ***Research in:***
  - End-to-end monitoring
  - Tools install customization
  - Integration and awareness within the portfolio
  - Migration tooling

Subject to change, future information, not to be shared without IBM permission

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Summary

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DB2 for z/OS Tools to Ensure Resiliency

- ***DB2 Automation Tool***
- ***Optim Database Relationship Analyzer***
- ***DB2 Recovery Expert***
- ***DB2 Log Analysis Tool***
- ***DB2 Administration Tool***
- ***DB2 Object Comparison Tool***
- ***Tivoli OMEGAMON XE for DB2 Performance Expert***
- ***Tivoli OMEGAMON XE for DB2 Performance Monitor***
- ***DB2 Query Monitor***
- ***DB2 Cloning Tool***
- ***Optim Data Growth Solution***
- ***Optim Test Data Manager***
- ***Optim Data Privacy Solution***
- ***And many more…***

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DB2 Tools Portfolio

Application Management
- DB2 Administration Tool
- DB2 Path Checker
- DB2 Bind Manager
- DB2 Optimization Expert
- DB2 Query Monitor
- DB2 SQL Performance Analyzer
- IBM Optim Data Growth
- IBM Optim Test Data Management
- DB2 High Performance Unload
- DB2 Table Editor

Utilities Management
- DB2 Utilities Suite
- DB2 Automation Tool
- DB2 Utilities Enhancement Tool
- DB2 High Performance Unload

Business Intelligence
- IBM DataQuant
- IBM QMF
- DB2 Web Query Tool

Database Administration
- DB2 Administration Tool
- DB2 Object Comparison Tool
- DB2 Storage Management Utility
- DB2 Change Management Expert

Performance Management
- OMEGAMON XE DB2 Performance Expert
- OMEGAMON XE DB2 Performance Monitor
- DB2 SQL Performance Analyzer
- DB2 Buffer Pool Analyzer
- DB2 Optimization Expert
- DB2 Query Monitor
- DB2 Performance Expert

Information Integration
- InfoSphere Information Server
- InfoSphere CDC for System z
- WebSphere Replication Server
- WebSphere Data Event Publisher
- WebSphere Classic Federation Server
- WebSphere Classic Data Event Publisher
- WebSphere Classic Replication Server

Backup and Recovery
- Application Recovery Tool for IMS and DB2 Databases
- DB2 Archive Log Accelerator
- DB2 Change Accumulation Tool
- DB2 Cloning Tool
- DB2 Log Analysis Tool
- DB2 Object Restore Tool
- DB2 Recovery Expert

Data Governance
- IBM Optim Data Growth
- IBM Optim Data Privacy
- IBM Optim Test Data Management
- DB2 Audit Management Expert
- IBM Database Encryption Expert
- Data Encryption for DB2 and IMS

* Available only on System z | * Available on System z and LUW | * Available only on LUW

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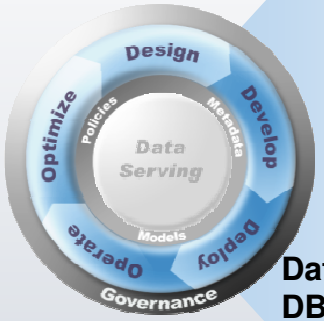
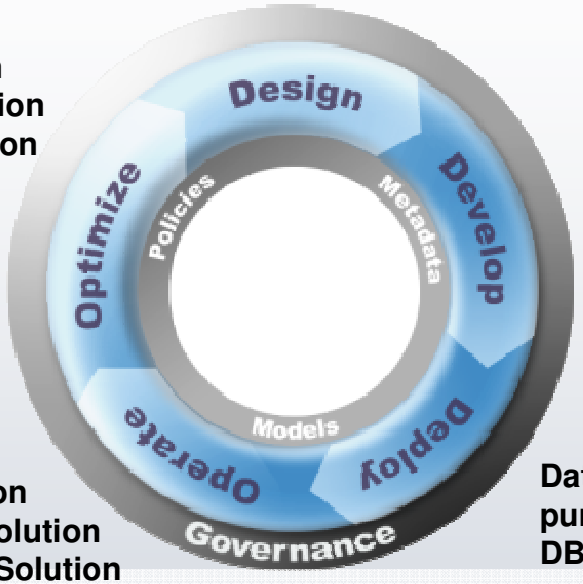
DB2 and IMS Solutions that manage the value of your data throughout its lifetime



Optim Data Growth Solution
DB2 Performance Mgt Solution
IMS Performance Mgt Solution

Data Studio Administrator
DB2/IMS Administration Solution
DB2/IMS Backup & Recovery Solution
DB2/IMS Utilities Management Solution
IMS Transaction Management Solution

Rational
Data
Architect



Data Studio Developer
Optim Test Data Management
Optim Data Privacy Solution

Data Studio Developer
pureQuery Runtime
DB2/IMS Application Mgt Solution

DB2/IMS Data Governance Solution

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Summary

- ***IBM Tools works with DB2 z/OS to provide value for customers***
- ***IBM Tools portfolio is continuing to grow***
- ***We'd love to hear your feedback:***
  - What function is needed
  - What tool is needed
  - What function can be improved
  - And more!
- ***Please feel free to contact me at jinz@us.ibm.com***

Thank You!

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