IBM System z Technology Summit

Administering and Optimizing Your DB2 9 & DB2 10 for z/OS Environment with Tools

Tom Crocker

DB2 Client Technical Professional

Tom_Crocker@uk.ibm.com

Disclaimer/Trademarks

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements, or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

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

This information may contain examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious, and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

<u>Trademarks</u>   The following terms are trademarks or registered trademarks of other companies and have been used in at least one of the pages of the presentation:

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both: DB2 Universal Database, eServer, FlashCopy, IBM, IMS, iSeries, Tivoli, z/OS, zSeries, Guardium, IBM Smart Analytics Optimizer, Data Encryption Tool for IMS and DB2 Databases, DB2 Administration Tool / DB2 Object Compare for z/OS, DB2 Audit Management Expert for z/OS, DB2 Automation Tool for z/OS, DB2 Bind Manager for z/OS, DB2 Change Accumulation Tool for z/OS, DB2 Cloning Tool for z/OS, DB2 High Performance Unload for z/OS, DB2 Log Analysis Tool for z/OS, DB2 Object Restore for z/OS, DB2 Path Checker for z/OS, DB2 Query Management Facility for z/OS, DB2 Query Monitor for z/OS, DB2 Recovery Expert for z/OS, DB2 SQL Performance Analyzer for z/OS, DB2 Table Editor for z/OS , DB2 Utilities Enhancement Tool for z/OS, DB2 Utilities Suite for z/OS, InfoSphere Change Data Capture, InfoSphere Data Event Publisher, InfoSphere Replication Server, Optim Data Growth Solution for z/OS, Optim Development Studio, Optim pureQuery Runtime, Optim Query Workload Tuner, Optim Test Data Management Solution for z/OS, Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS
EMC and TimeFinder are trademarks of EMC Corporation
Hitachi is a traademark of Hitchi Ltd

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.
Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.
Other company, product, or service names may be trademarks or service marks of others.

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

Up to 20% CPU reductions for transactions, queries, and batch

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

Scales with less complexity and cost

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

Improved operational efficiencies and lower administration cost

- Automatic diagnostics, tuning, and compression

Even better performance

- Elapsed time improvement for small LOBS and Complex Queries

DB2 10 for z/OS
Cut costs.
Improve performance.
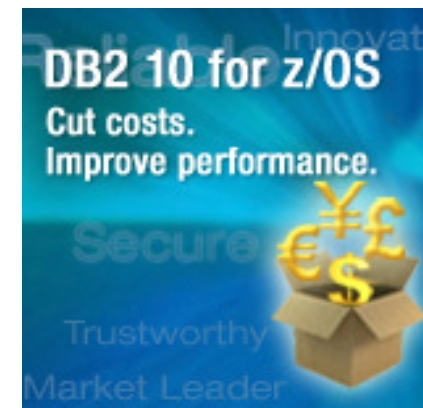
DB2 10 for z/OS: Savings and performance

- Up to 40% savings in processing costs

- Up to 6 times the number of SAP users on a single system

- Time Travel temporal capabilities built directly into the database

- Direct Row access accelerates high performance applications

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

We expect to reduce our data sharing requirements by 25%, which means less system, storage and resource expenses
Banco do Brasil

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

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

"In addition to the cost savings, DB2 10 for z/OS offers a far superior data server environment than Oracle"
Manuel Gomez Burrierl, CECA (Spanish Bank Federation)
ceca CONFEDERACION ESPAÑOLA DE CAJAS DE AHORROS

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

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

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

All New with DB2 10!

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

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

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

QMF 10 *delivers built-in visualizations and reports that dramatically extend the value to end users. A new metadata layer simplifies the process to understand and create reports.*

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

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

n

Roadmap to Exploit DB2 10 for z/OS
Accelerate your ability to leverage compelling DB2 10 features

Administer DB2 Performance Savings

Optimize Dynamic Infrastructure Performance

Drive DB2 Efficiency and Productivity

Recover DB2 Advanced Technology

Accelerate Time to Value

Administer DB2 10 Performance Savings

DB2 Administration Tool 10.1 Exploitation

- **Drive immediate DB2 10 out-of-the-box Performance Savings**

- **Exploit DBA-managed Performance Improvements**
  - Include additional Columns in Indexes to Exploit Index Only Access
  - Convert LOBs to in-line to boost performance

- **Extend Administration Capabilities**
  - Manage new Security models
  - Reduce Schema change overhead
  - Recover from Access Path regressions
  - Manage Autonomic Statistics collection

- **Time Travel with Temporal Data – "as of"**
  - Record changes in history – System Time
  - Define, update and query events in past or future – Business Time
  - Browse Temporal Data "as of" a point in time with DB2 Table Editor 4.3

DB2 Admin Tool 10.1 Include Index non-key Column

```
ADB21XAA              DSNA Alter Index - Add Columns           Row 1 to 12 of 12
Command ===> _                                              Scroll ===> CSR


Line commands:  A - Add as ascending    D - Add as descending
                R - Add as random       I - Add as include
ALTER INDEX "J148286"."ADB_PROP_#_3I4"
 ADD COLUMN ( ... )


Sel Column Name            Col Type Length Null ColSeq Ord
    *                      *               * *         * *

--- ------------------>  -------- ------ ---- ------ ---
    LOG_ID                 INTEGER          N      1 A
    ID                     INTEGER          N      2
    LOG_TIMESTAMP          TIMESTMP         N
    LOG_ACTION             INTEGER          N
    TIMESTAMP              TIMESTMP         N
    DB2SYS                 VARCHAR          N
    TYPE                   VARCHAR          N
    COLLECTION             VARCHAR          N
    PROPERTY               VARCHAR          N
    VALUE                  VARCHAR          Y
    CCC                    CLOB             Y
    DB2_GENERATED_ROWI ROWID              N
******************** END OF DB2 DATA *****************************
```

Easily include columns in primary indexes

8

ation

Inline LOBs with DB2 Admin Tool 10.1

```
ADB21TAB  --------------------- DSNA Alter Table --------------------- 10:22
Command ===>

                                                              More:     +

ALTER TABLE
Table schema . . J148286    >   Specify length of
Table name . . . TIMESTZ        inline portion of LOB

ADD
Column name  . . NEWCOL1        >   (? to look up)
Column type  . . CLOB               (Built-in only)
Data length  . . 10000              (Built-in only)
Inline length  . 1000_              (0-32680 BLOB or CLOB, 0-16340 DBCLOB)
Precision  . . .                    (used only w/FLOAT and DECIMAL)
Scale  . . . . .                    (used only w/DECIMAL and TIMESTAMP)
Type schema  . .            >       (User-defined only)
Type name  . . .            >       (User-defined only)
WITH TIME ZONE .                    (Yes/No - for TIMESTAMP only)

Allow nulls  . .       (Yes or blank-nullable, No-NOT NULL)
FOR ? DATA . . .       (B-Bit, S-SBCS, M-Mixed, blank-N/A)
WITH DEFAULT . .       (Yes, No, L (SECLABEL) or enter value below)
Default value  .                                              >
GENERATED  . . .       (A-ALWAYS,                D-DEFAULT,
```

ation

Time Travel "as of" with DB2 Table Editor 4.3

```
ETI$HIST  V4R3    ----------    History View    ----------  2010/11/19  11:55:23
Option  ===>                                          Scroll ===> CSR
--------------------------------------------------------------------------
                                    Creator ==> PDDAB                        >
                                    Table   ==> POLICY_INFO_STIME            >
--------------------------------------------------------------------------

Date Changed                        Data
2010-08-11-10.40.22.4288759070      A457802
2010-08-11-10.40.15.5550727820      A456802
2010-07-05-11.38.59.7969314680      A456802
2010-07-05-11.38.48.9224441870      A45680
2010-06-19-13.07.43.5821303760      A456
***************** Bottom of Data ********************************************
```

Historical view of data changes

```
Valid Commands: CANcel, END/PF3
```

Corporation

Optimize Dynamic Infrastructure Performance

OMEGAMON XE for DB2 Performance Expert 5.1 Exploitation

- **Extended Insight**
  - Surface DB2 for z/OS end-to-end response time metrics
    - Visibility to **all** the components that make up end-user response time
    - Facilitates platform-agnostic identification of response time bottlenecks
    - Enables near-instantaneous response to and prevention of application slowdowns
  - Leverages Tivoli Enterprise Portal GUI

- **Summary SQL Reporting**

- **Manage thousands of Threads**

- **Support new DB2 10 Monitoring Data**

- **Lower Monitoring Overhead**

User | User experience
Application | App pre- and post-processing / transaction / SQL 1 / SQL 2 / COMMIT
WebSphere or Java App Server
JCC Driver
Network
DB2 z/OS
Operating System
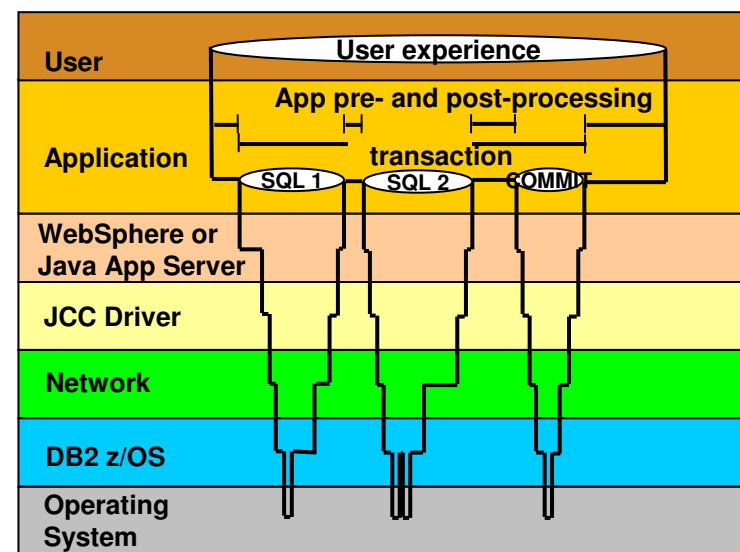
OMEGAMON DB2 PE 5.1 Extended Insight
Zoom into selected workload and see the TOP SQL list

Top SQL statements executed by Java or CLI applications like SAP, Cognos, DataStage or WebSphere
▪ **Zoom in on a selected SQL**

Detailed End-to-End Response Time

OMEGAMON DB2 PE 5.1 Extended Insight
Select Static or Dynamic SQL and zoom into SQL details

SQL Statement Text

Tune SQL with Optim Query Workload Tuner

Java class, package and method shown if pureQuery Is installed.

Corporation

Drive DB2 10 Efficiency & Productivity

DB2 Automation Tool 3.1 Exploitation

- **Autonomic Statistics**
  - Exploit real-time, sampling driven Statistics collection
  - Invoke RUNSTATS with new Profile option
  - Interface with existing Job Schedulers

- **FlashCopy Image Copy**
  - Reduce Batch-windows
  - Reduce CPU consumption with Storage-based Backups
  - Drive improved Recovery Time Objectives

- **Avoid Unnecessary Reorgs**
  - Set REORG thresholds based on DB2 10 Best Practices
  - Detect when Indexes are insensitive to Clustering
  - Avoid REORGs for poorly structured Indexes

Exploit Online Reorgs with DB2 Utilities Enhancement Tool 2.1

- Define policy to cancel Threads immediately before Switch Phase
- Exploit REORG Force option to eliminate Drain Failures
- No changes required to REORG Jobs

DB2 Automation Tool 3.1 Exceptions
CLUSTERSENS and HASHACCESS

Avoid unnecessary REORGs to maintain high cluster ratio

DB2 Automation Tool 3.1
Cancel Readers Preventing Online Reorg Drains


```
AUTOTOOL V3R1 ----------- Online Reorg options ---------- 2010/09/01  17:06:38
Option   ===>                                                 ___ll ===> CSR
 Commands: END - Return to the prev                                        CSR

 Creator: CSJENN     Name: TESTING                             CSJENN

 Enter the options to associate with this utility profile

 Sharelevel . . . . . . . . . ==> C    (R - Reference, C - Change, N - None)
 Drain Wait . . . . . . . . . ==> 10   (blank, 0-1800 seconds)
 Retry  . . . . . . . . . . . ==> 0    (blank, 0-255)
 Retry Delay  . . . . . . . . ==> 1    (blank, 1-1800 seconds)
 Timeout  . . . . . . . . . . ==> T    (A - Abend, T - Term, N - None)
 Force                        ==> _    (A - All, R - Readers, N - None)
 AUX  . . . . . . . . . . . . ==> n    (Y - Yes, N - No)
                             Include                Update
 Deadline Options            ==> N (Y - Yes, N - No) ==> N (Y - Yes, N - No)
 Shrlevel Change Options     ==> Y (Y - Yes, N - No) ==> N (Y - Yes, N - No)




 *HAA$UOP -SDSF
```

Force Readers holding claims preventing REORG switch

Drive DB2 9 & 10 Efficiency & Productivity

DB2 Sort 1.1

- Significant CPU and Elapsed Time reduction in Sort
  - LOAD, REORG, RUNSTATS, REBUILD INDEX, CHECK INDEX, CHECK DATA
  - Presort from DB2 Utilities Enhancement Tool for LOAD REPLACE
- Unique API to allow authorized utilities to invoke the sorting software
- Valuable for customers with large amount of data and aggressive SLA's

Internal Format for up to 4x Load Performance Improvements

- DB2 UNLOAD & LOAD Utilities
- DB2 High Performance Unload 4.1
- Exploit with DB2 Utilities Enhancement Tool 2.1 Constant & ValueIf Options

Unload and Load DB2 Data via USS Pipes & TCP/IP

- DB2 UNLOAD & LOAD Utilities
- DB2 High Performance Unload 4.1

Fast XML Data Unload

- DB2 High Performance Unload 4.1

DB2 Sort 1.1 Performance Improvements

- **Customers using DB2 Sort 1.1 may see**

  – Up to 30% in reduction of elapsed time *

  – Up to 50% reduction of CPU *

  – Up to 30% zIIP offload of remaining CPU *

- **IBM DB2 Utilities where you'll see performance benefits**

  – LOAD, REORG, RUNSTATS, REBUILD INDEX, CHECK INDEX, CHECK DATA

  – DB2 Utilities Enhancement 2.1 Tool LOAD Presort

- **Workloads that may benefit from utility sort processing and DB2 Sort 1.1**

  – Highly-transactional workloads performing lots of insert, update, delete operations requiring RUNSTATS and REORG

  – Applications such as data warehousing applications that are performing frequent or large volumes of loading data requiring LOAD and REBUILD INDEX

  – Eliminate many Sort Capacity Exceeded errors

Customer results may vary. Results based on analysis done at SVL lab

Recover DB2 10 Advanced Technology

DB2 Recovery Expert 2.2

- Exploit FlashCopy Image Copy
  - Take Consistent Online Image Copies in seconds
  - Reduce CPU and Batch-windows
  - Improve Recovery Times
  - Automate Recovery Jobs
  - Native EMC Storage-based copies
- Exploit RECOVER BACKOUT for faster recoveries

DB2 Log Analysis Tool 3.2

- Undo and Redo Temporal Data
- Support FlashCopy Image Copy
- Support all new DB2 10 Log changes

Further Exploit FlashCopy Image Copy

- DB2 Administration Tool 10.1
- DB2 Automation Tool 3.2
- DB2 Change Accumulation Tool 2.1
- DB2 High Performance Unload 4.1

DB2 Recovery Expert 2.2
FlashCopy and Snap Image Copies

```
ROCKBACK  V2R2 ----------- Image Copy Options ----------- 2010/11/19  11:58:23
Option    ===> █
-----------------------------------------------------------------------------
  Creator: PDDUDEA      Name: PAYROLL APPLICATION          SSID: EA1A
  Share Option: U  (Upd,View,No)    Description:
-----------------------------------------------------------------------------
Enter the Image Copy options to associate with this Object profile:

Global Image Copy Options
Fast Replication Method    ==> D       (Snap/Dfsmsdss)
   Update Fast Rep Options  ==> N       (Yes/No)
Sharelevel                 ==> C       (Reference/Change)
Scope                      ==> A       (All/Pending)
Number of Tasks            ==> 04      (01-99)
Traditional Image Copy options
All Parts in one Copy       ==> Y       (Yes/No)
Local Primary               ==> N       (Yes/No/Update)
Local Backup                ==> N       (Yes/No/Update)
Recovery Site Primary       ==> N       (Yes/No/Update)
Recovery Site Backup        ==> N       (Yes/No/Update)
VSAM Image Copy options
Register VSAM Copy          ==> Y       (Yes/No)
Number of VSAM Generations ==> 0001    (0000-9999 0 = Keep all gens)
```

EMC Snap

IBM FlashCopy

RECOVER BACKOUT with DB2 Recovery Expert 2.2

DB2 Log Analysis Tool 3.2 Redo Temporal Data

© 2011 IBM Corporation

Jump into DB2 10!   The water's fine.

DB2 V8   DB2 9   DB2 10

Key Questions are WHEN? and HOW?

Accelerate DB2 10 Time to Value

DB2 Cloning Tool 2.2

- Exploit Storage-based copies to drastically reduce CPU and outages
- Create Subsystem and Object Clones to test DB2 10 with minimal effort
  - Automatically reduce number of Data Sharing Members
  - Convert Data Sharing to non-Data Sharing
  - Create Subsystem Clone from System Level Backup
  - Mask sensitive production data
- Supports native IBM, EMC and Hitachi Storage-based copies

DB2 Query Monitor 2.3

- Track SQL Performance before and after Migration

DB2 Path Checker 4.1

- Identify potential Access Path regressions
- Export SQL to Optim Query Workload Tuner or Data Studio for tuning
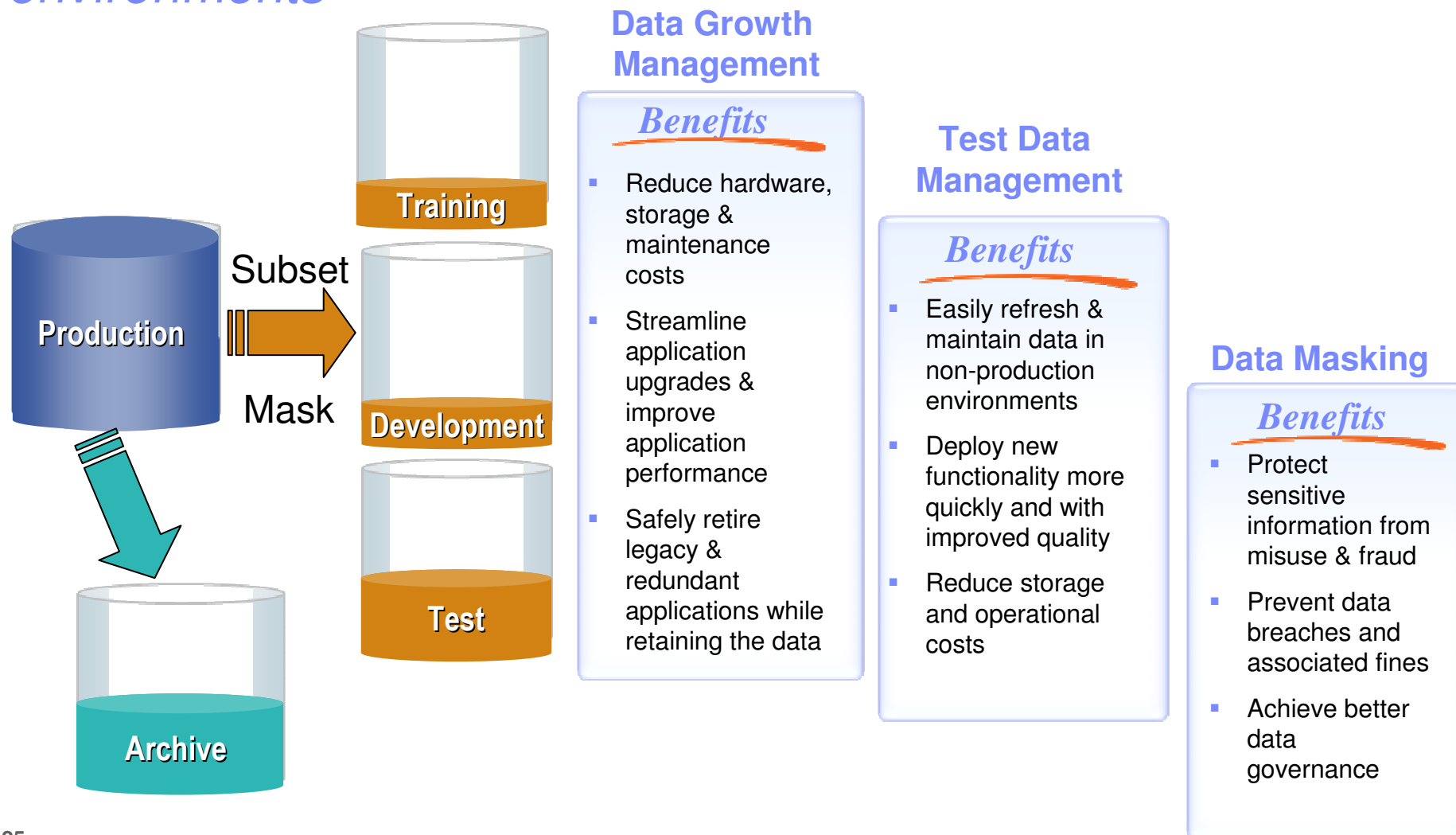- Save packages with DB2 9 Plan Management before DB2 10 Migration

DB2 Bind Manager 2.4

- Identify and Free unused Packages
- Reduce Bind impacts

IBM InfoSphere Optim solutions
*Managing data throughout its lifecycle in heterogeneous environments*

Production

Subset →

Training

Mask

Development

Test

Archive

Data Growth Management

Benefits

- Reduce hardware, storage & maintenance costs
- Streamline application upgrades & improve application performance
- Safely retire legacy & redundant applications while retaining the data

Test Data Management

Benefits

- Easily refresh & maintain data in non-production environments
- Deploy new functionality more quickly and with improved quality
- Reduce storage and operational costs

Data Masking

Benefits

- Protect sensitive information from misuse & fraud
- Prevent data breaches and associated fines
- Achieve better data governance

IBM InfoSphere Optim Test Data Management Solution

Test Data Management

Create "right-size" production-like environments for application testing
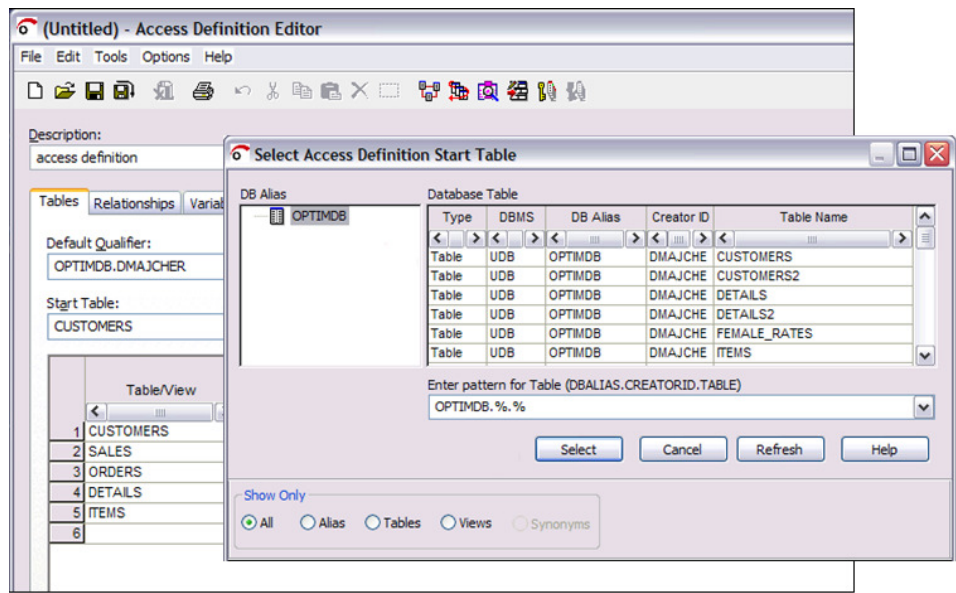
Requirements

- Create referentially intact, "right-sized" test databases

- Automate test result comparisons to identify hidden errors

- Shorten iterative testing cycles and accelerate time to market

Benefits

- Deploy new functionality more quickly and with improved quality

- Easily refresh & maintain test environments

- Reduce storage and operational costs

# IBM InfoSphere Optim Data Growth Solution

Data Growth

Manage data growth and improve performance by intelligently archiving historical data

Requirements

- Archive, manage and retain application data according to business policies

- Minimize downtime during application upgrades

- Consolidate application portfolio and retire legacy applications

Benefits

- Reduce hardware, storage and maintenance costs

- Streamline application upgrades and improve application performance

- Safely retire legacy & redundant applications while retaining the data
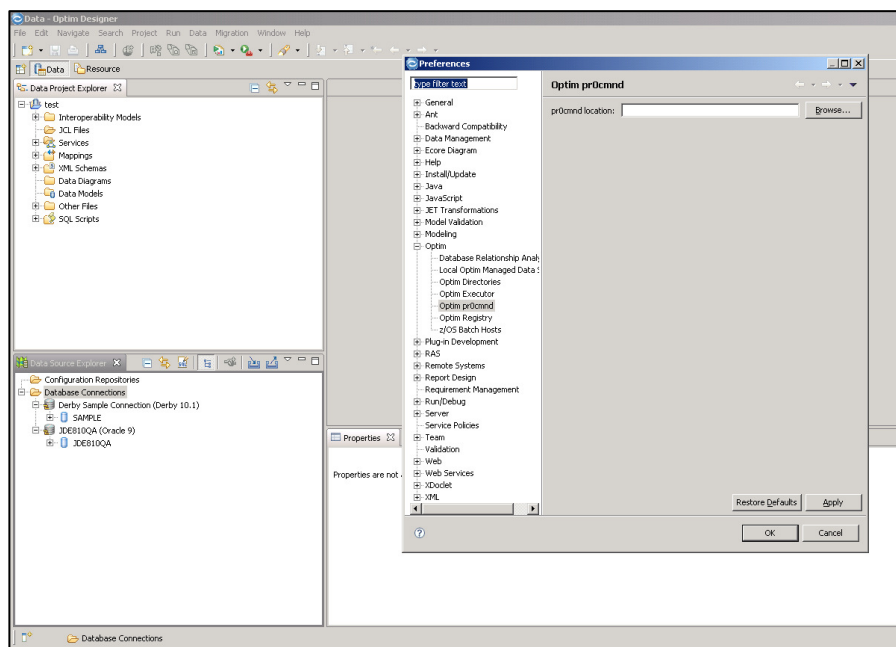
IBM InfoSphere Guardium Data Redaction

Data Redaction

Protect sensitive unstructured data in documents and forms

Before

After

Requirements

- Protect unstructured data in textual, graphical and form based documents

- Control data views with user role policies

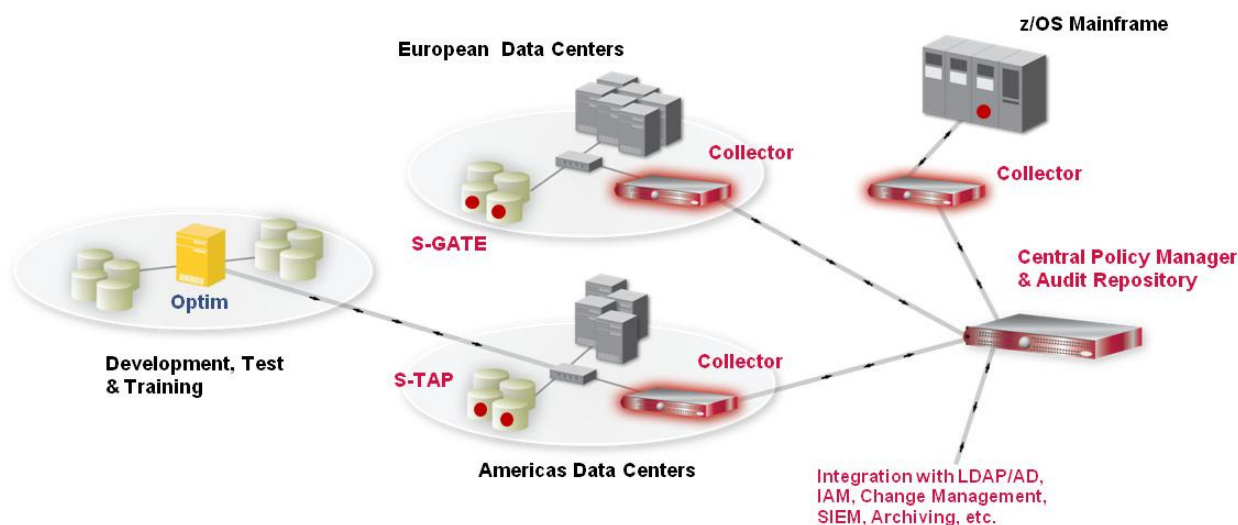- Automate batch workflow process with optional human review

Benefits

- Prevent unintentional data disclosure

- Comply with regulatory and corporate compliance standards

- Increase efficiency and reduce risk via automation

IBM InfoSphere Guardium

Database Protection and Compliance Made Simple

16

European Data Centers

z/OS Mainframe

Collector

Collector

S-GATE

Central Policy Manager & Audit Repository

Optim

Development, Test & Training

S-TAP

Collector

Americas Data Centers

Integration with LDAP/AD, IAM, Change Management, SIEM, Archiving, etc.

Requirements

- **Maintain a trusted information supply chain by protecting sensitive data from unauthorized access or changes**

  - **In 2010 92% of compromised records came from DB servers**

- **Validate compliance with regulatory mandates**

- **Minimize operational costs**

Benefits

- **Secures high-value databases by continuous monitoring and protecting against threats from legitimate users and potential hackers**

- **Streamlines compliance processes with automated and centralized controls; slashing compliance costs**

Guardium Database Activity Monitoring
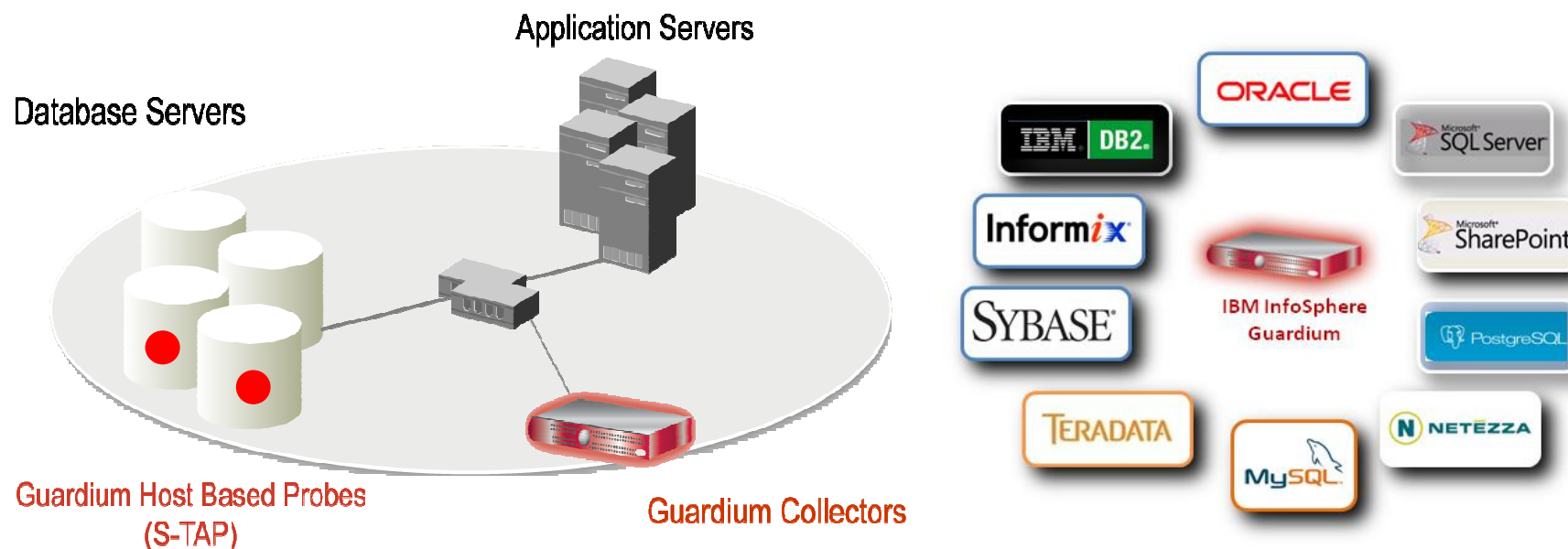
- Non-invasive architecture
  - Outside database
  - Minimal performance impact
  - No DBMS or application changes
- Cross-DBMS solution
- 100% visibility including local DBA access

- Enforces separation of duties
- Does not rely on DBMS-resident logs that can easily be erased by attackers, rogue insiders
- Granular, real-time policies & auditing
  - *Who, what, when, how*
- Automated compliance reporting, sign-offs & escalations (SOX, PCI, NIST, etc.)

Exploit DB2 10 for z/OS with IBM DB2 Tools

Accelerate your ability to leverage compelling DB2 10 features with comprehensive Tools support

Data Encryption Tool for IMS and DB2 Databases
DB2 Administration Tool / DB2 Object Compare for z/OS
DB2 Audit Management Expert for z/OS
DB2 Automation Tool for z/OS
DB2 Bind Manager for z/OS
DB2 Change Accumulation Tool for z/OS
DB2 Cloning Tool for z/OS
DB2 High Performance Unload for z/OS
DB2 Log Analysis Tool for z/OS
DB2 Object Restore for z/OS
DB2 Path Checker for z/OS
DB2 Query Management Facility for z/OS
DB2 Query Monitor for z/OS
DB2 Recovery Expert for z/OS
DB2 SQL Performance Analyzer for z/OS
DB2 Table Editor for z/OS
DB2 Utilities Enhancement Tool for z/OS
DB2 Utilities Suite for z/OS
InfoSphere Change Data Capture
InfoSphere Data Event Publisher
InfoSphere Replication Server
Optim Data Growth Solution for z/OS
Optim Development Studio
Optim pureQuery Runtime
Optim Query Workload Tuner
Optim Test Data Management Solution for z/OS
Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS

Exploitation PTFs: http://www-01.ibm.com/support/docview.wss?uid=swg21409518

IBM DB2 Tools and DB2 10 for z/OS

Exploit out-of-the-box Savings

Extend Productivity

Accelerate Time to Value

Thank You!