# DB2 Tools Update:
## The Key to Optimized DB2 Environments and Reduced TCO

**Information Management** software

# *Agenda*

- **Intro and Background - IBM is investing in tools for the long haul and lower TCO**

- Why IBM's DB2 Tools Are Better For Managing DB2 V8 & DB2 9

- Performance Management Tools Update

- Major Tools Updates

- Regulatory Compliance

- Summary

# IBM DB2 Tools for z/OS and Multiplatforms - Product Portfolio

## Business Analysis
- **IBM DataQuant**
- **IBM QMF**
- **DB2 Web Query Tool**

## Utilities Management
- DB2 Utilities Suite
- DB2 Automation Tool
- DB2 Automation Toolkit SAP Ed.
- DB2 Cloning Tool
- DB2 Storage Management Utility
- **DB2 High Performance Unload**

## Application Management
- DB2 Path Checker
- DB2 Bind Manager
- **DB2 Data Archive Expert**
- **DB2 Table Editor**
- **DB2 Test Database Generator**

## Database Administration
- DB2 Administration Tool
- DB2 Object Comparison Tool
- Data Encryption for DB2 and IMS
- DB2 Thread Expert
- DB2 Administration Toolkit SAP Editi
- DB2 Audit Management Expert
- **DB2 Change Management Expert**

## Recovery Management
- Application Recovery Tool for IMS and DB2 Databases
- DB2 Archive Log Accelerator
- DB2 Change Accumulation Tool
- DB2 Log Analysis Tool
- **DB2 Object Restore Tool**
- **DB2 Recovery Expert**

## Information Integration
- **WebSphere Classic Data Event Publisher**
- **WebSphere Classic Federation Server**
- **WebSphere Classic Replication Server**
- **WebSphere Data Event Publisher**
- **WebSphere DataStage**
- **WebSphere QualityStage**
- **WebSphere Replication Server**

## Performance Management
- OMEGAMON XE DB2 Performance Expert
- OMEGAMON XE DB2 Performance Monitor
- DB2 Buffer Pool Analyzer
- DB2 Optimization Expert
- DB2 Query Monitor
- DB2 SQL Performance Analyzer
- DB2 Performance Toolkit SAP Edition
- **DB2 Performance Expert**

- Available on zSeries        - **Available on zSeries and Multiplatforms (LUW)**        - Only available on Multiplatforms (LUW)

IBM

# DB2 and IMS Tools

## Reducing TCO is our first focus ⟶

- ✓ Provide autonomic features to add capability and simplify operations
- ✓ Avoid tedious tasks and reduce errors
- ✓ Preserve your investment in z/OS applications and databases
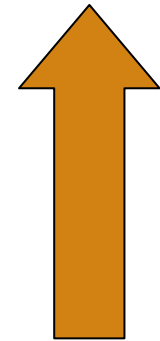
**2007: Reduce your TCO**

**2004 Autonomic Computing and End to End Monitoring**

**2000: Reduce your TCO**

**2003: Integration of products, new capabilities, better performance**

**2001-2002  Product replacements**

**2003-
Day 1 Support**

**Investment**

4

# *DB2 for z/OS Tools – Delivering  Customer Value*

**2007**

**2006**

**2005**

**2004**

- **DB2 V9 Exploitation**
  - **DB2 Optimization Expert**
  - **More New Tools**
  - **More New Releases**
  - **Continued focus on Lowering our customers TCO of DB2 and Autonomic Computing**

- **New Tools**
  - **DB2 Recovery Expert**
  - **DB2 Audit Management Expert**
  - **DB2 Cloning Tool**
  - **DB2 Storage Management Utility**
  - **Regulatory Compliance Tools Suite**
- **New Releases/New Function**
  - **DB2 Administration Toolkit the SAP Edition**
  - **DB2 Automation Toolkit the SAP Edition**
  - **DB2 Performance Toolkit the SAP Edition**
  - **Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS**
  - **Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS**
  - **DB2 Administration Tool**
  - **DB2 Object Comparison Tool**
  - **DB2 Automation Tool**
  - **DB2 Path Checker**
  - **DB2 Data Archive Expert**
  - **DB2 Table Editor**
  - **DB2 High Performance Unload**
  - **DB2 SQL Performance Analyzer**
  - **DB2 Test Database Generator**
  - **DB2 Query Monitor**
  - **DB2 Buffer Pool Analyzer**

- **New Tools**
  - **DB2 Thread Expert**
  - **DB2 Administration Toolkit the SAP Edition**
  - **DB2 Automation Toolkit the SAP Edition**
  - **DB2 Performance Toolkit the SAP Edition**
  - **Tivoli OMEGAMON XE for DB2 Performance Expert on z/OS**
  - **Tivoli OMEGAMON XE for DB2 Performance Monitor on z/OS**
  - **WebSphere DataStage for z/OS**
  - **WebSphere QualityStage for z/OS**
- **New Releases/New Function**
  - **DB2 Administration Tool**
  - **DB2 Object Comparison Tool**
  - **DB2 Automation Tool**
  - **DB2 Path Checker**
  - **DB2 Bind Manager**
  - **DB2 Data Archive Expert**
  - **DB2 SQL Performance Analyzer**
  - **DB2 Test Database Generator**
  - **DB2 Query Monitor**
  - **DB2 Log Analysis Tool**
  - **DB2 Buffer Pool Analyzer**

- **DB2 V8 Exploitation**
- **New Tools**
  - **DB2 Test Data Base Generator**
  - **DB2 II Classic Federation**
- **New Releases/New Function**
  - **DB2 Administration Tool**
  - **DB2 Archive Log Accelerator**
  - **DB2 Object Comparison Tool**
  - **DB2 Automation Tool**
  - **DB2 SQL Performance Analyzer**
  - **DB2 Query Monitor**
  - **DB2 Log Analysis Tool**
  - **DB2 Object Restore**
  - **DB2 High Performance Unload**
  - **Major new function delivered via PTFs for DB2 Admin and DB2 Object Compare**
  - **DB2 Data Propagator for z/OS**
  - **DB2 Replidata for z/OS**

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# *Key Attributes of the Tools Value in V8*

- A Mega-Release

- Our tools were there on **Day One**
  - All DB2 tools exploit DB2 V8 today
    - Exploitation was developed early on and tested by ESP customers
    - DB2 Tools had V8 function support since before DB2 V8 GA
    - Major investment was required to get complete support in place
    - Exploitation included new components to take advantage of new capabilities in DB2

# *DB2 9*

- Another Mega-Release

- Our tools were there on **Day One**

- Combined with zIIP engine workload relief

  - Game changer for z/OS  Platform

  - Opens up new application opportunities

# *DB2 9 Tools Support*

- NOT LOGGED table support

- Clone table support

- Outage Analysis Items

- Decimal Float Datatype

- Utility Template Switching

- Index By Expression

- Partition By Growth Tablespaces

- BIGINT, VARBINARY, BINARY data types

- New Zparms

- Online Create Index and Rebuild Index

- Universal Tablespace

- Skip Locked Rows

- IPv6 support

- Utility syntax and functionality enhancements

- XML support

- Global Query Optimization

- Reordered row format

- REORG LOB to reclaim space/allow LOG NO

- Online check LOB and DATA

- Volume-based utilities

- Online Reorg Improvements

# DB2 and IBM zIIP can add value to database work

- Portions of the following DB2 for z/OS V8 and DB2 9 workloads may benefit from zIIP*:

    1 - ERP, CRM, Business Intelligence or other  enterprise  applications

    - Via DRDA over a TCP/IP connection

**New Specialty Engine**

2 - Data warehousing applications*

- Requests that utilize parallel queries

3 - DB2 utilities*

- Internal DB2 utility functions used to maintain index maintenance structures

\* 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 work execute in enclave SRBs, of which portions can be sent to the zIIP.

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# DB2 Performance Management Tools monitor and tune DB2 systems and applications to obtain optimal performance and lowest cost.

OMEGAMON XE for DB2 PE

DB2 Query Monitor

Monitor

**DB System**

**Applications**

**Network**

Tune and Control
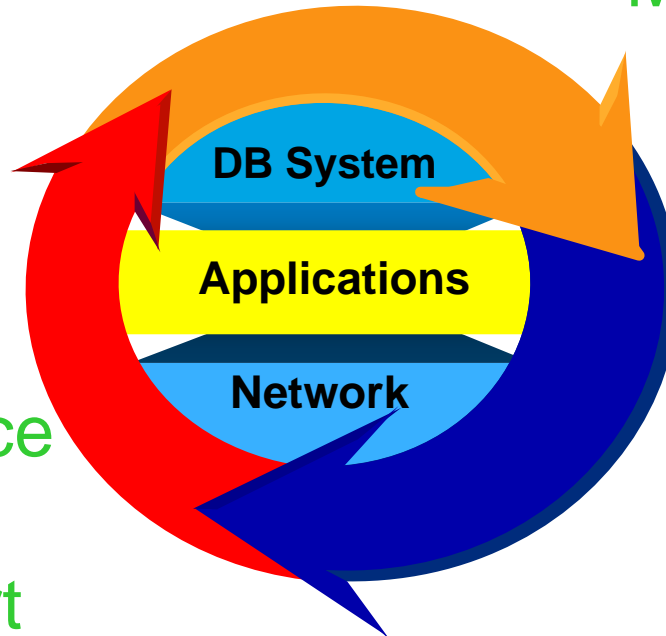
Analyze

Optimization Service Center and Optimization Expert

DB2 Path Checker

DB2 SQL Performance Analyzer

# *Tivoli OMEGAMON XE for DB2 PE on z/OS 4.1.0*

- Improves the ability to monitor and manage mainframe based applications
through a single integrated solution

- Familiar interfaces from DB2 PE and OMEGAMON XE products makes for
easy migration

  - DB2 z/OS V8 and DB2 9 exploitation

  - DB2 Connect reporting/monitoring

  - Performance warehouse (historical data mining)

  - DB2 to CICS, IMS, z/OS transaction linking

  - History monitoring

  - Event exceptions

  - zIIP reporting
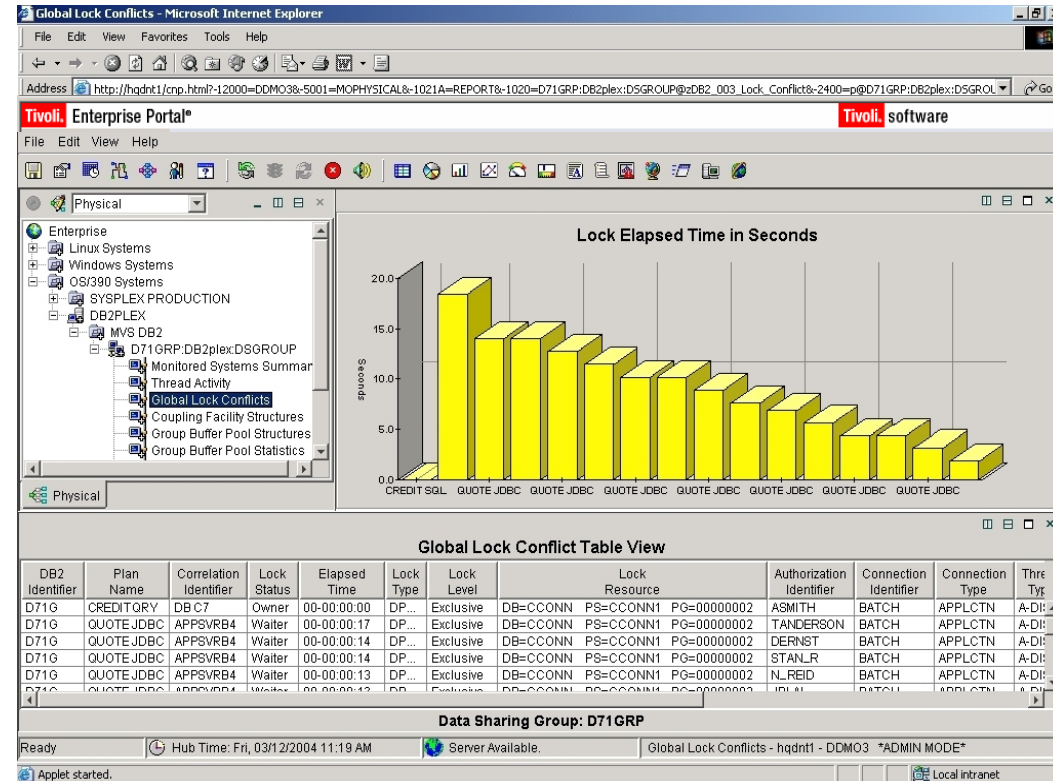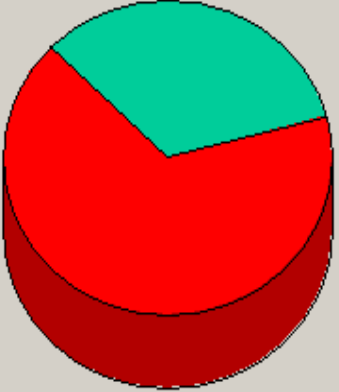
# *DB2 Connect Monitoring – The different views*

# *DB2 Query Monitor*

- Low overhead SQL statement monitor

- Identify SQL requests which are consuming excessive resources and may be preventing critical requests from completing on schedule

- Proactively manage DB2 resources

- React quickly and effectively to DB2 problems like inefficient SQL or inadequate object structures

- Determine which tables and indexes are actually being used
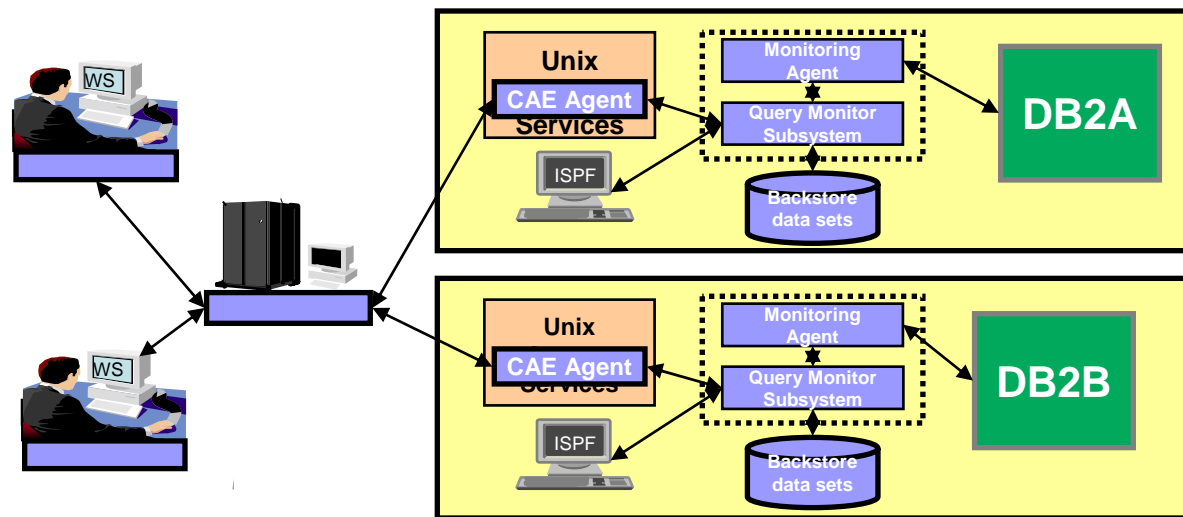
# *What does SQLPA do ?*

Forecasts SQL performance:

– Response Times

– CPU Times

– I/O Counts

plus the **COST** of the query, in terms of:

– Charge Back (monetary, in national currency)

– QUNITS ™ (query service units)

**Transforms Optimizer access paths into <u>real world</u> costs**

# *What else can SQLPA do ?*

- *Enhanced* **EXPLAIN** report:

  - Catalog Statistics

  - Access Path Information

  - RI Relationships

- Key **ADVICE** on each SQL statement:

  - Warnings and Alerts

  - Guidelines and Recommendations

  - Performance Notes and Good News

- **What If Analysis**

*SQLPA teaches users how to write better SQL*

# *How DB2 Pathchecker can help with your V8 or DB2 9 migration?*

- New optimizer delivered with V8 and DB2 9
    - Access path changes can occur based on optimizer changes or catalog statistics
    - Rebind highly recommended

- Planning for the release – DB2 Path Checker will catch undesirable Access Path changes and allow intervention before the rebind
    - Understanding how applications currently execute will help isolate the true new version introduced problems via access path regression analysis
    - Though the use of the TEST command in DB2 Path Checker the issues with a mass rebind may be identified without risking actual changes to the earlier system
    - Unacceptable access paths can be avoided by favoring the old access path via optimizer hint generated by Pathchecker

- What happens to packages which haven't been bound for many releases or old applications where source is no longer available?
    - If the application (DBRM) is no longer available, the BLDDBRM function is available in Path Checker to build DBRM from the catalog
    - A number of SQL queries are shipped with Path Checker to help find potential problems prior to V8 or V9 implementation

# *Optimization Service Center and Optimization Expert*

**Index Advisor**

- Analyzes a workload and recommends indexes
  - Enabling you to select the best index to optimize query and application performance
- These recommendations can be implemented immediately
- Future: recommends MQTs and partitioning
- Runs with DB2 9

**Key value areas:**

- Lowers Total Cost of Ownership by optimal exploitation of DB2 for z/OS
- Increases Quality of Service by proactively solving problems before they occur
- Decreases reliance on zSeries specific skills through autonomics and open tools

## Optimization Service Center (OSC)

**No charge standalone IPLA offering**

- Visual Explain

- Stats Advisor

- Service SQL

- Visual Plan Hint

## Optimization Expert (OE)

**Priced OTC offering**

- Index Advisor

- Query Advisor

- MQT Advisor *

  * scheduled for future release

# IBM DB2 Tools that help a successful migration to DB2 9

- Run **DB2 Path Checker** in TEST mode to compare a "new" bind with the contents of the backup plan_table – and use this tool to allow for access path regression analysis

- Using **DB2 SQL PA**, pass it the statements with different access paths to get costing and more detailed explain information

- Run **DB2 SQL PA in V8** – save the QLIMITS report and use to compare with the costing under DB2 9

- Use **OMEGAMON XE DB2 Performance Expert and DB2 Query Monitor** to monitor existing V8 subsystem performance and provide performance baseline for post-migration analysis

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# Database Change Management
## in DB2 Admin/DB2 Object Compare 7.2

- A collaborative change management process
- Changes are stored in a set of DB2 tables
  - Audit trail provided for changes
  - Meta data now stored in DB2 (versions, masks, ignores)
- Supports a collaborative Change Management process
  - Tool determines if another change for this object, or it's dependents, is in process
  - User can join the changes, supersede it, ignore it, etc.
  - Establishes a change ID for tracking purposes
- Tool then automates the steps
  - Provides an easy interface to modify the existing object
  - Automatically propagates the change to dependent objects
  - Builds job streams to enact the change / User submits the jobs
  - Provides an impact analysis report
  - Changes can be promoted to other systems
  - Can create a new version file
- Virtual changes can be built on top of changes not yet deployed

# *DB2 Cloning Tool*

- **Clones a DB2 subsystem or DB2 application (if isolated)**
  - Renames and catalogs the data sets, fixes the volume internals, optionally updates all DB2 internal control information
  - No requirement for a clone in a separate LPAR
  - Supports DB2, PeopleSoft, and SAP

- **Is extremely fast and cheap!**
  - Uses FlashCopy (or Timefinder) technology, only volumes are eligible for cloning
  - Reduces production online downtime when cloning – takes just minutes
  - Dramatically reduces costs of traditional methods
    - Uses less personnel time
    - DB2 no longer needs to be shut down or conditioned the long traditional way
  - Provides virtually 24x7 access to the customer's data
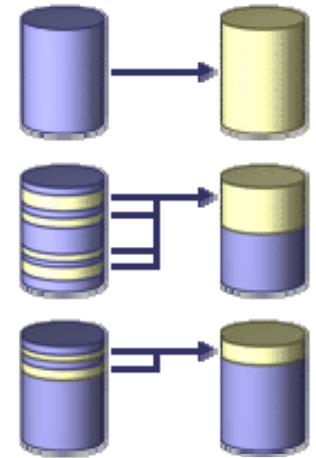
# DB2 Thread Expert

## *A job-level interface to cancel DB2 threads*

SQL

Thread

Tablespace

Blocker

1. Batch Thread Cancel

2. Run Utility/Batch Job

Utility/Batch Job
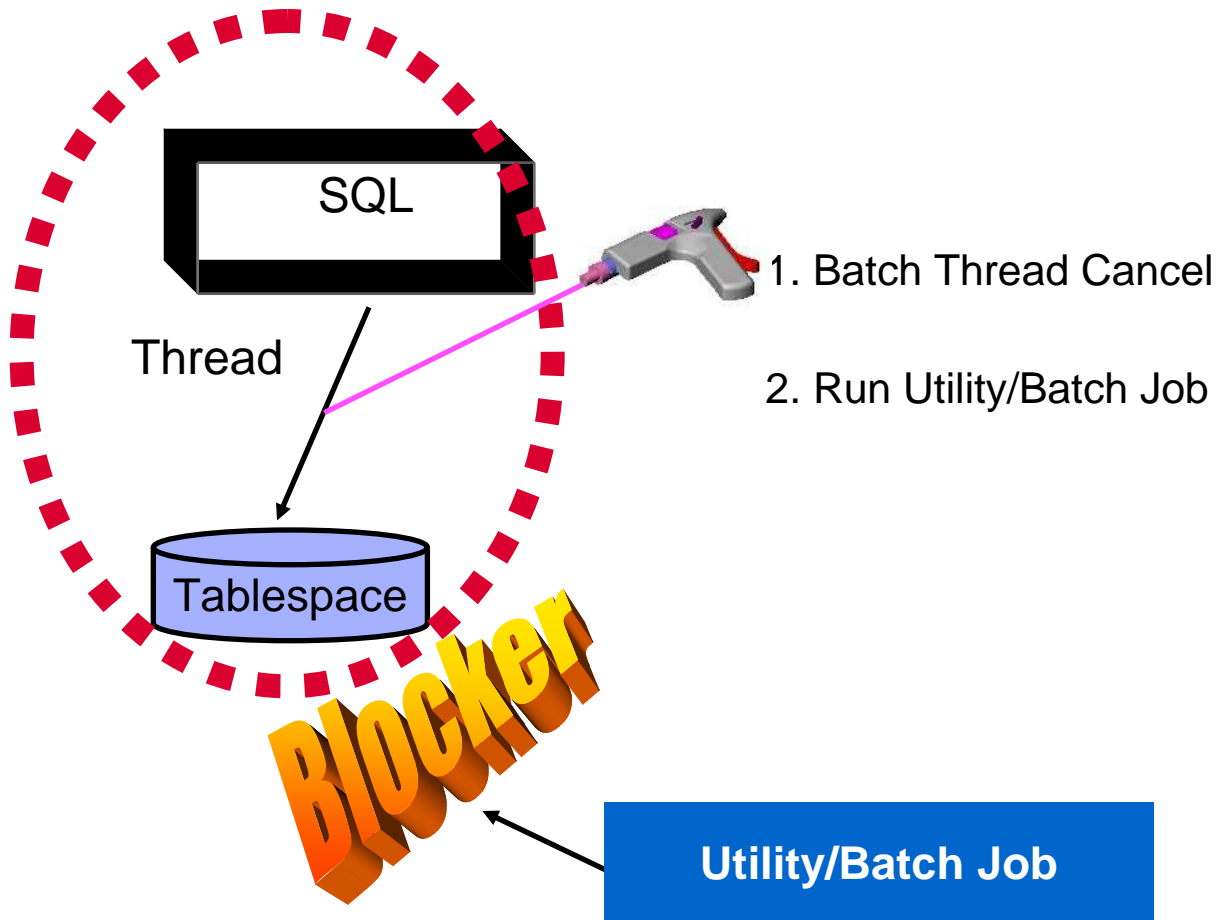
**DB2 Thread Expert**

- **Cancel threads at different levels**
  - Database
  - Tablespace (and optionally indexes)
  - attach type
- **Supports wildcards for objects**
- **Differentiates between readers and writer threads**
- **ISPF interface**
- **Blocks new threads from starting**

# DB2 Storage Management Utility (SMU)

- Displays information by volume, database, or table space

- Performs interactive scans, space map analysis, and analyzes space-related factors that affect DB2 performance

- Identifies tables that are in need of reorganization or an image copy

- Recovers wasted DASD space

  - Identifies widows and orphans and simplifies the cleanup of nonexistent DB2 objects and forgotten VSAM data sets.

- Historical information about the number of data sets, extents, allocated space, and used space for trend analysis and planning

*Save time and money, optimizing your database DASD performance*

# *DB2 Recovery Expert for z/OS*

- Provide Expert assist for performing many types of DB2 recoveries
- DB2 Recovery Expert analyzes the requested recovery and …..
- Provides a selection of possible recovery plans
  - Determines the necessary recovery assets and utilities
  - Estimates the relative costs of the different scenarios
  - Builds and submits required JCL
  - Uses a versioning repository to inspect versions available for restoration including dependent objects even if they no longer exist in the DB2 catalog
  - Saves recovery and log analysis specifications for later use
- **A simple, self-managing recovery solution** that enables database recovery operations with minimal disruption
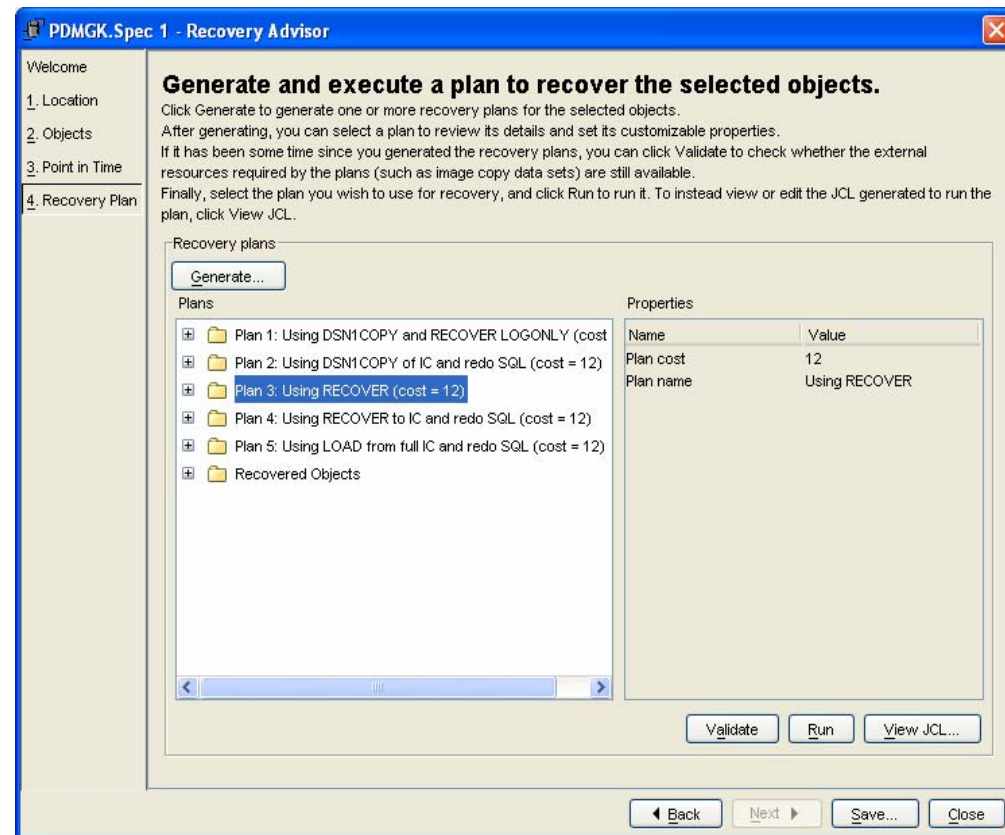
# *Why Create Another Replication Architecture?*

- **Performance**:
  Combine high throughput with low latency

- **Capability**:
  Significantly improve multi-directional replication support

- **Manageability**:
  Reduce the number of replication objects to be defined and managed, ease the definition process with new Replication Center wizards

- **More function**:
  Event publishing, table difference utility

# *Q Replication --*
## *low latency for peer-to-peer environments*

### Function

- Replicate rows or transactions
- Filter and transform data
- Detect and resolve conflict
- Configure and monitor environment

### Usage

- High availability
- Workload distribution
- Application integration
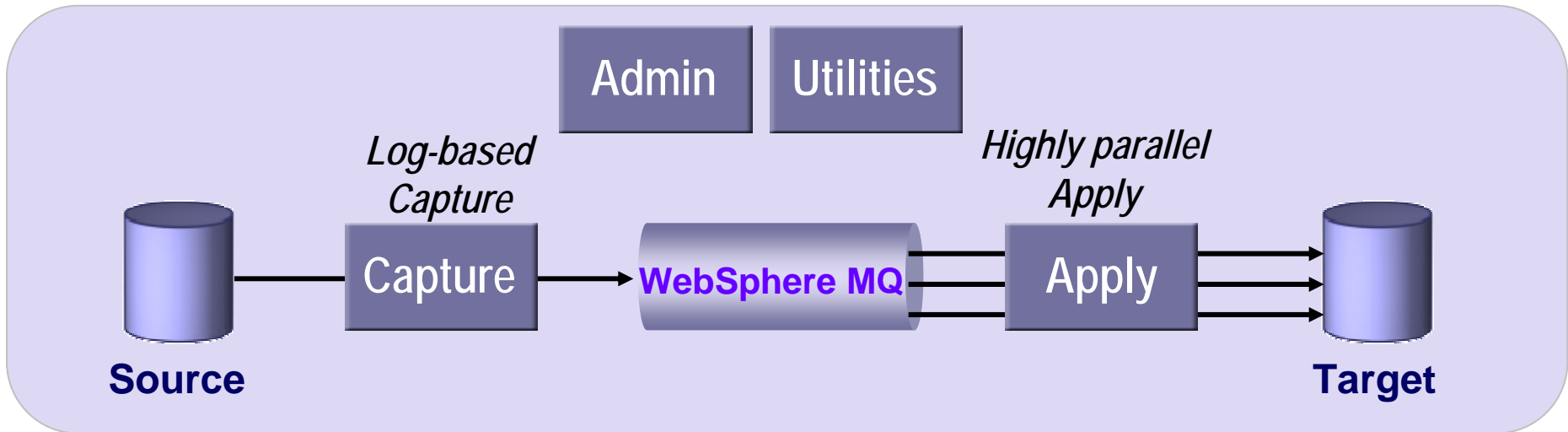


- DB2 UDB source on z/OS, Linux, UNIX, and Windows
- DB2 UDB native apply target on z/OS, Linux, UNIX, and Windows
- Oracle, SQL Server, Sybase, and Informix federation apply targets (and more coming!)

# IBM DataQuant for z/OS - GA March 16, 2007

- Adds compelling new Warehouse/Business Intelligence component to WH on z
- Visual Dashboards, Enhanced Graphical Reporting, Security and Personalization, SOA Layer, Enhanced Analytics
- Offers a "thick" client with DataQuant for Workstation, or a pure HTML, browser based client with DataQuant for WebSphere
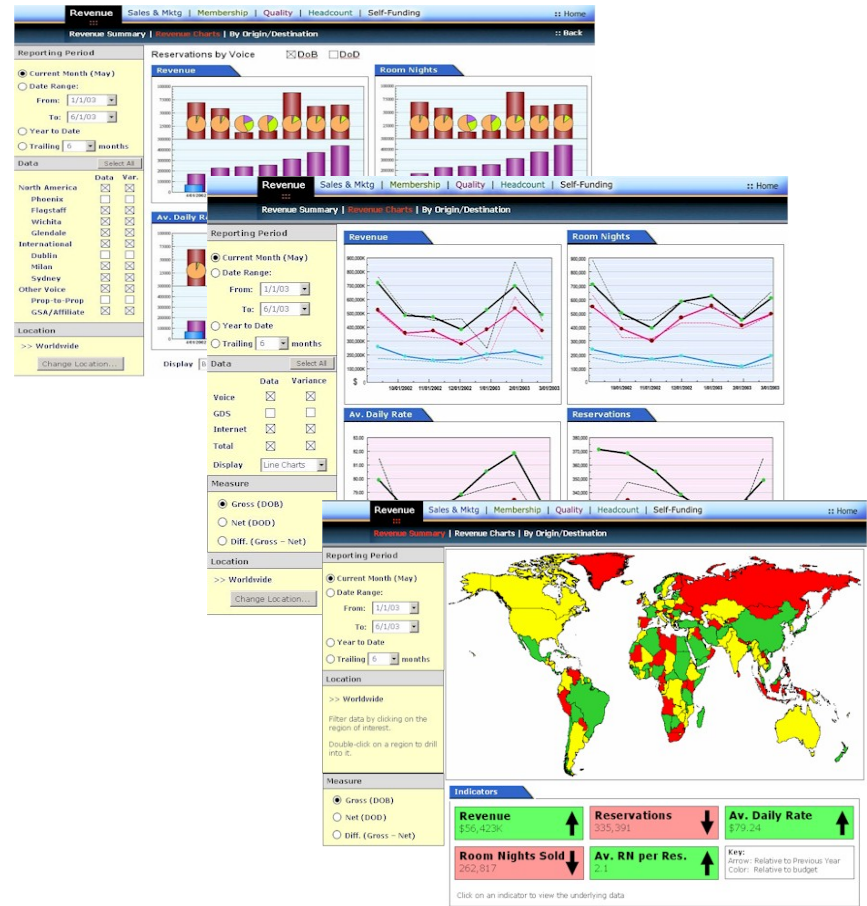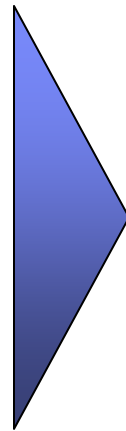
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# *The Requirements of Regulatory Compliance*

## Regulators have multiple goals. . .

- ✓ Improved risk management across the enterprise

- ✓ Integrity of financial reporting processes and related business practices

- ✓ Customer information security

Patriot Act

HIPAA          Anti-Money Laundering

SEC Rule 17A-4

Basel II

Gramm-Leach Bliley

Corporate Information Security Accountability Act of 2003

Department of Defense - 5015.2

California Bill 1386

Sarbanes Oxley

## . . . which drive investment in several areas

- ▪ <u>People</u>: Professionals with regulatory experience will be hired to enable firms to meet and anticipate new regulatory requirements

- ▪ <u>Process</u>: More robust processes and procedures will enable top management to monitor and enhance regulatory compliance

- ▪ <u>Technology</u>: Significant investment will be made. The following are critical for your DB2 systems:

  - ▪ **Encrypt sensitive data**

  - ▪ **Protect sensitive production data**

  - ▪ **Save data for future audits and to comply with retention rules**

  - ▪ **Auditability - discover who did what, where and when**

# *IBM Data Encryption for IMS and DB2 Databases*

- Row level encryption

- Supports all levels of DB2 - no application changes needed

- Exploits System z and S/390 Crypto Hardware features, which results in low overhead encryption/decryption

  - Uses the ANSI Data Encryption Algorithm (DEA), also known as the U.S. National Institute of Science and Technology (NIST) Triple Data Encryption Standard (TDES) algorithm

- Supports both secure key and clear key encryption

- Compatible with DB2 Load/Unload utilities and DB2 Tools

- Performance is similar to row level data compression

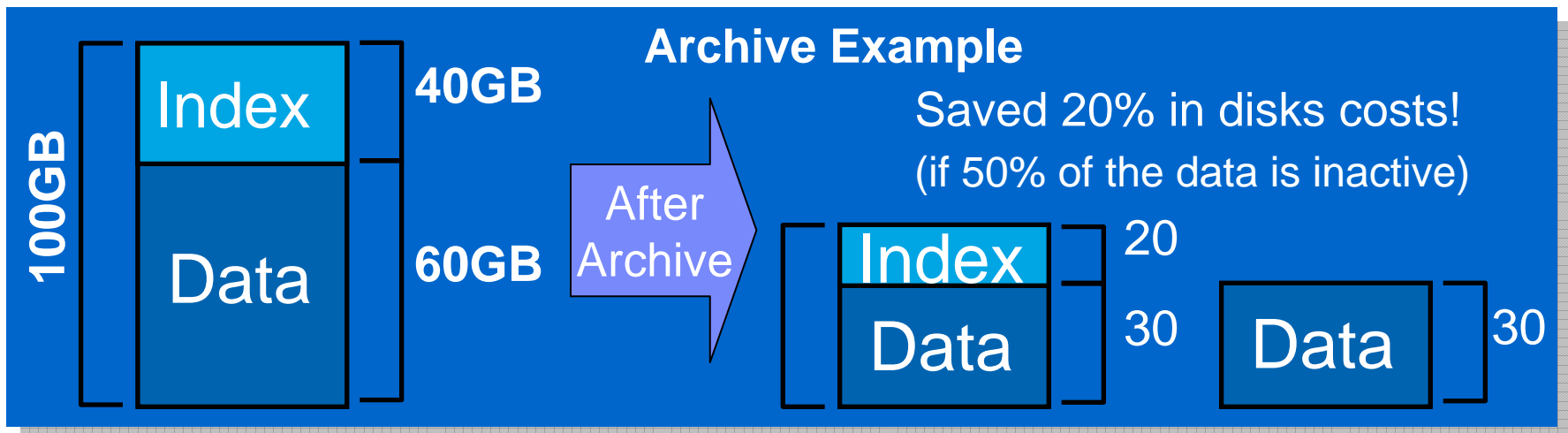# *DB2 Test Database Generator*

- A powerful tool that provides several methods of generating test data for DB2 easily

- From scratch or from existing data sources

- Maintains referential integrity while extracting data sets from source databases

- Create test data in new or existing tables

- Copy a slice of data instead of all of the data

- Create a restructured database for testing

- Useful for regulatory compliance and data protection

1.  **Start with data that exists somewhere in your enterprise**
2.  **Leverage knowledge of data relationships**
3.  **Apply transformation rules**
4.  **Create test data**



one-to-one

many-to-one

one-to-many
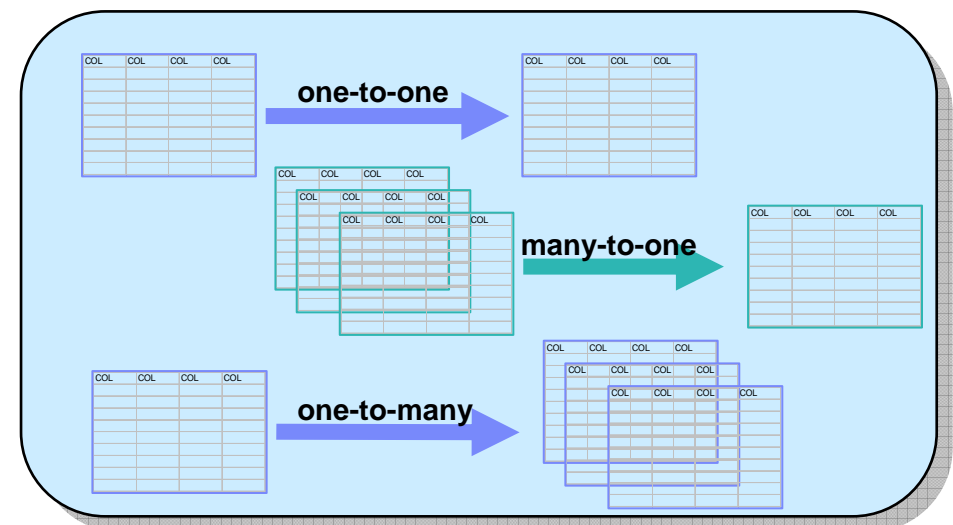
# DB2 Data Archive Expert

- Reduce operational costs
- Free up developers from writing customized archiving software
- Support a centralized archiving strategy for audit purposes
- Discover related tables using the DB2 Grouper component
- Allow the data to be removed/deleted from the source independently from the copy to the archive
- Works with data hardware compression
- Provide a choice of archiving strategies
  - To table, to file, to both (multi-tier)

**Archive Example**

100GB

Index — 40GB

Data — 60GB

After Archive

Saved 20% in disks costs!
(if 50% of the data is inactive)

Index — 20

Data — 30

Data — 30

# DB2 Audit Management Expert for z/OS

- Centralized auditing of DB2, bringing together information from many different sources into a coherent view

- Auditors can collect, view, analyze and report on data and save it into an audit repository

- Auditors can automatically generate their own reports and export the data for other applications
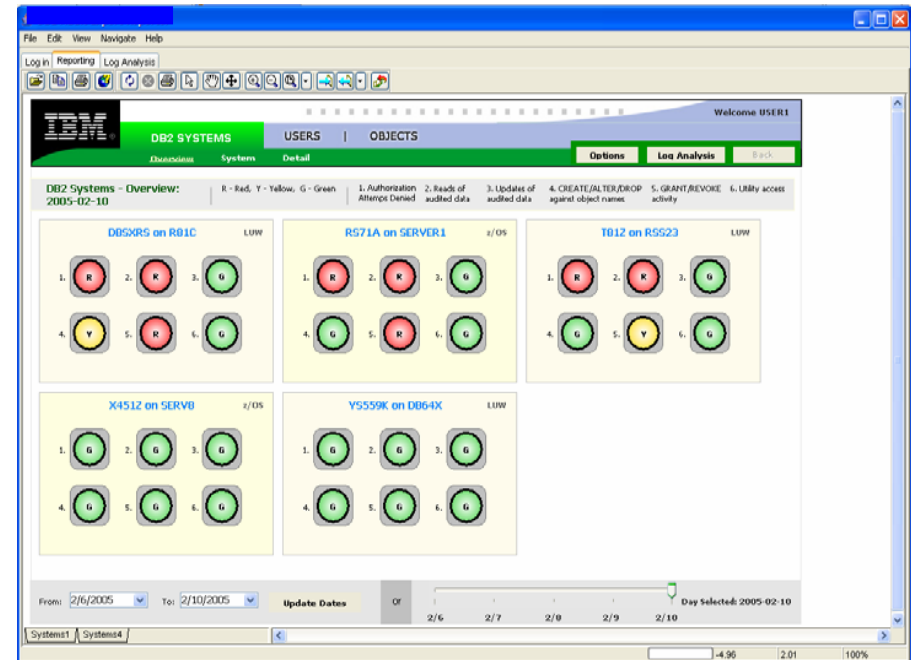


Makes life for auditors and DBAs  much easier !!

# *Audit Management Expert*

- Collects and correlates information from DB2 resources
  - Audit trace data and log data
- Central resource to produce a coherent view of DB2 access information
- Auditors will be able to report:
  - DML activity by user or by object
  - DDL operations against an audited object
  - Utility access to an audited object
  - DB2 commands
  - Assignment or modification of an authorization ID
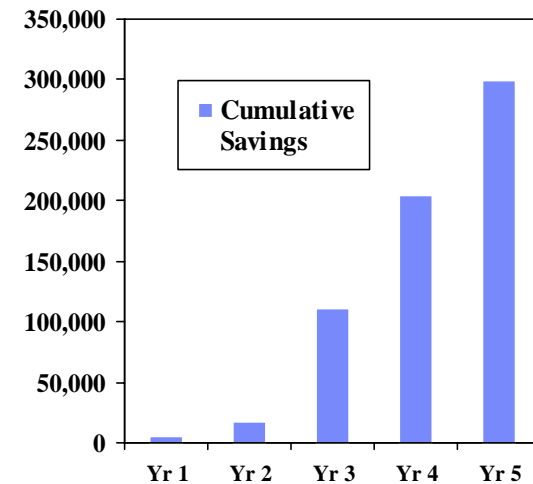- Provides flexible options for examining the data in the audit repository

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# *IBM's database tools provide a long-term commitment to our DB2 and IMS customers by:*

- Providing comprehensive cross-platform integrated tools with common interfaces

- **Improving TCO** and Time to Value
  - Database servers have "Day 1" support by tools at GA
  - Improve productivity of DBAs and the database servers
  - Frequent delivery of versions and releases to address customer requirements quickly

- **Improving TCO** by providing functions that let you
  - Manage bigger environments without adding staff
  - Focus on business value rather than maintenance
  - Avoid tedious tasks
  - Reduce errors
  - Enable people with less experience to be productive - faster