



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

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Agenda

- Intro and Background - IBM is investing in tools for the long haul
- Why IBM's DB2 Tools Are Better For Managing DB2 V8 & DB2 V9
- Latest information and future plans
 - Lower TCO
 - Regulatory Compliance
 - Autonomic Computing

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

2000: Reduce your TCO

2001-2002 Product replacements

2003-Day 1 Support

2003: Integration of products, new capabilities, better performance

2004 Autonomic Computing and End to End Monitoring

Investment

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 V8 Support

- Longer names
 - Tools using new ISPF features
 - Allows for scrollable "columns"
- Sequence objects
- Identity column enhancements
- Unicode
- New Zparms
- Materialized Query Tables
- More than 254 Partitions

DB2 V8 Support (continued)

- Support for VOLATILE tables
- Stored Procedure and User Defined Function Enhancements
- Default for ROWID GENERATED clause
- Support for EXCLUDING clause
- Online Schema Evolution
- Data-Partitioned Secondary Indexes (DPSI)

DB2 V8 Support (continued)

- Support for Plan Table changes
- Support for RUNSTATS REPORT NO UPDATE NONE
- Aliases for Plan Tables
- Distribution Statistics for Non-Indexed Columns
- System Level Point in Time Recovery
- Plus more

DB2 V8 and IBM zIIP can add value to database work

- Portions of the following DB2 for z/OS V8 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 for z/OS V8 utilities*
 - Internal DB2 utility functions used to maintain index maintenance structures

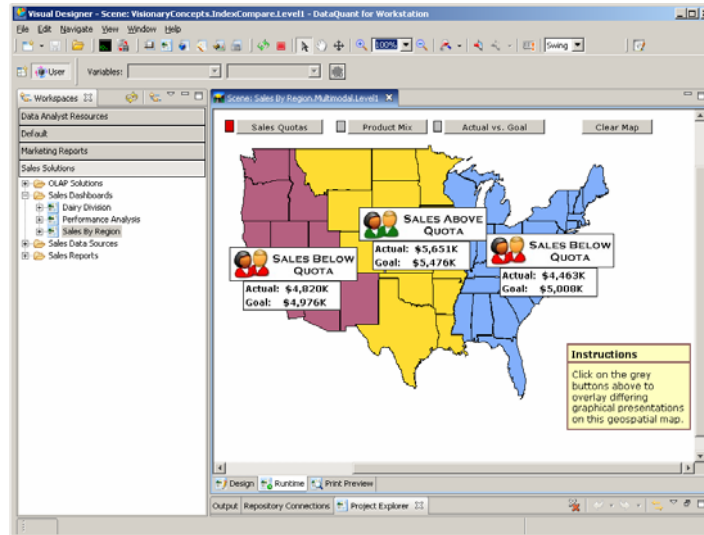
* The zIIP is designed so that a program can work with z/OS to have all or a portion of its enclave Service Request Block (SRB) work directed to the zIIP. The above types of DB2 V8 work are those executing in enclave SRBs, of which portions can be sent to the zIIP.

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



IBM DataQuant – Interactive Visual dashboards



DB2 V9

- Another Mega-Release
- Our tools will again be there on **Day One**
- Combined with zIIP engine workload relief
 - Game changer for z/OS Platform
 - Opens up new application opportunities

DB2 V9 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



DB2 V9 Support

- 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
- Online Create Index and Rebuild Index



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 Edit
- 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

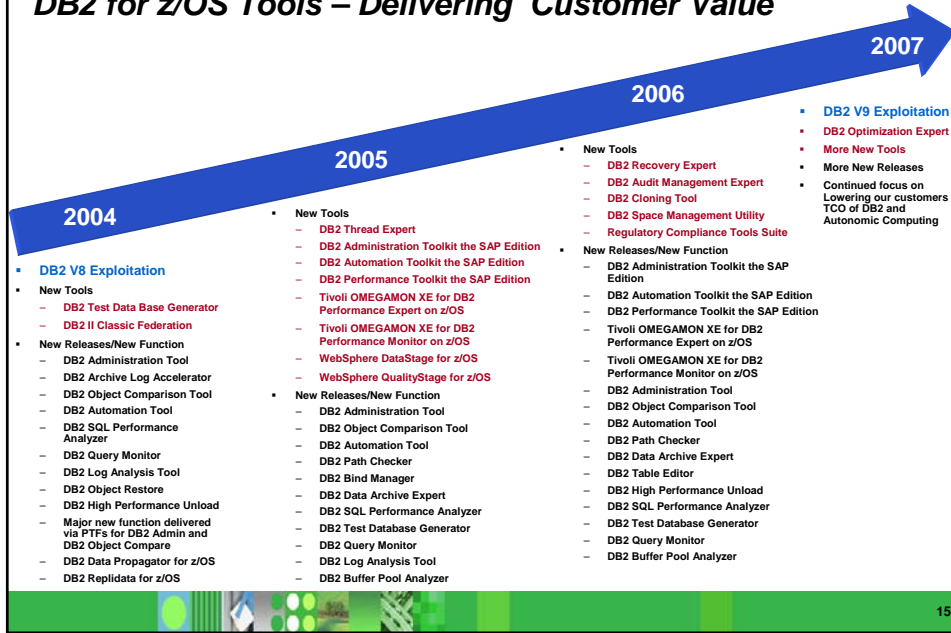
- Available on zSeries

- Available on zSeries and Multiplatforms (LUW)

- Only available on Multiplatforms (LUW)

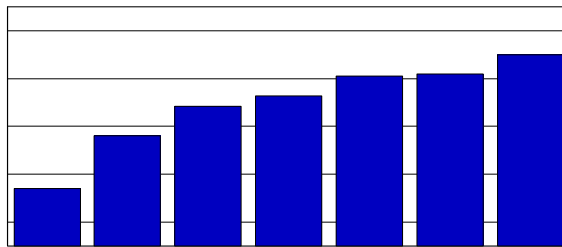


DB2 for z/OS Tools – Delivering Customer Value



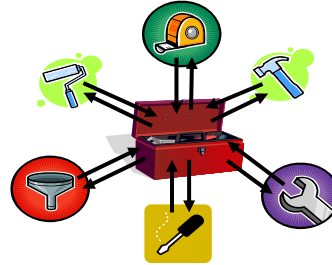
Development Investment

IBM investment in DB2 and IMS Tools



Lowering TCO

- Tuning for performance
- Automating repetitive tasks
- Utility management
- Complex recoveries
- Managing application changes
- Cloning DB2
- Complying with regulations and auditing requirements
- Replication in complex environments



Monitoring: Combine the strengths of both offerings



DB2 PM/PE/BPA

- In depth Reporting
- DB2 Monitoring
- Performance DB
- Expert analysis
- Buffer Pool Analysis
- DB2 Connect Monitoring

DB2 Information Management Software

OMEGAMON

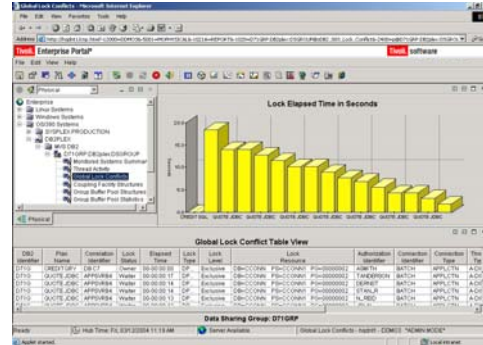
- Cross-zSeries monitoring
- Consistent "look and feel"
- Web browser, 3270 VTAM
- Integrated "dashboard"
- Online monitoring

Tivoli software

The expertise of two leaders in the industry have come together!

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 v8.1 exploitation
 - DB2 Connect reporting/monitoring
 - Performance warehouse (historical data mining)
 - DB2 to CICS transaction linking
 - History monitoring
 - Event exceptions
 - Threshold checking



Tivoli OMEGAMON XE for DB2 PE – Product Enhancements

- What **legacy DB2 PE customers** get with the converged product
 - Integrated cross z-Series monitoring (enterprise wide)
 - Near term history
 - Object Analysis
 - Smaller footprint (fewer address spaces)
 - VTAM and Web Client
 - Monitor DB2 messages and master console
 - EDM pool (DBD,SK, CT etc section) content display
 - 18 other Customer requirements
 - WLM enclave information for stored procedures

Tivoli OMEGAMON XE for DB2 PE – Product Enhancements

- What **legacy OMEGAMON** customers get with the converged product
 - World Class Batch Reporting – In-depth problem analysis
 - With the recent extensions of
 - Package Level Accounting
 - Locking suspension – new output format for direct spreadsheet usage
 - Extended SQL Activity report with input host variables
 - Additional predefined report layouts
- A Performance Warehouse
 - Expert analysis (ROT and SQL Performance queries)
 - Buffer Pool analysis – saving time and money by optimizing system resources
 - DB2 Connect Monitoring
 - Snapshot history for online ad hoc problem analysis
 - Notification of exceptional events – deadlocks, timeouts, etc
 - Usage of DB2 IFI API
 - Provide more consistency and better quality of data (less dependence on control block changes)

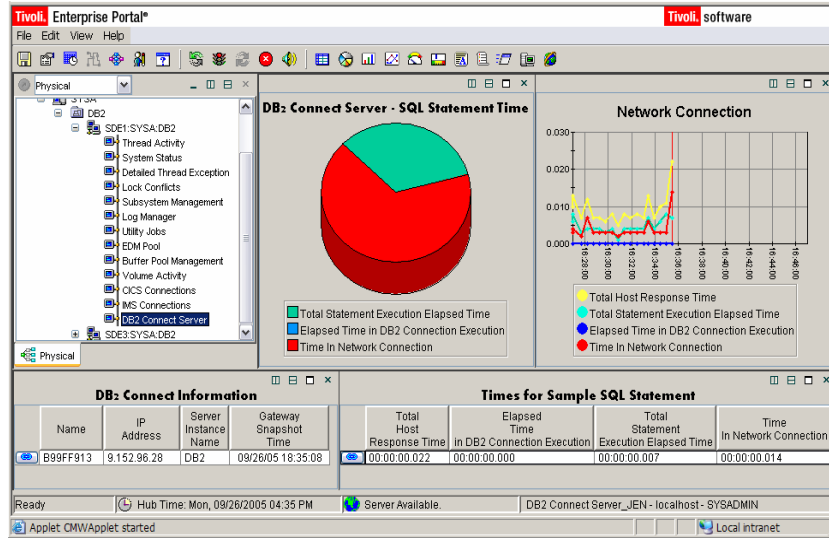
You can detect exceptional situations/events, see details and Expert Advise, and you can Take Action

The screenshot displays the Tivoli Enterprise Portal interface. On the left, a tree view shows the system hierarchy. The main area contains two tables: 'Initial Situation Values' and 'Current Situation Values'. Both tables show 100% usage for the 'Application' log on server 'Primary NDEOD3NT'. A 'Take Action' dialog box is open at the bottom, with a dropdown menu set to 'Select Action'. A text box provides expert advice: 'One of your event logs is close to full. If you have NT write over the old entries (wrap around), no action is needed. If this message appears too often, consider enlarging the log file or investigate where the log messages come from.'

% Usage	Server Name	Timestamp	Log Name	Max Size	Current Size	Record Count	Retention
100	Primary NDEOD3NT	06/26/02 18:39:27	Application	524,288	524,288	3,173	7 C.C.

% Usage	Server Name	Timestamp	Log Name	Max Size	Current Size	Record Count	Retention
100	Primary NDEOD3NT	07/01/02 11:20:19	Application	524,288	524,288	3,173	7 C.C.

DB2 Connect Monitoring – The different views



OM PE 4.1.0

As part of the OMEGAMON 4.1.0 family announcement

- Globalization – Translation of the TEP GUI into 10 Languages
- Agent Versioning
- Dynamic Workspace Linkage (DWL)

Product-provided DWL (TEP GUI) providing greater System z monitoring integration between OMEGAMON XE for DB2 PM/ PE on z/OS and the following:

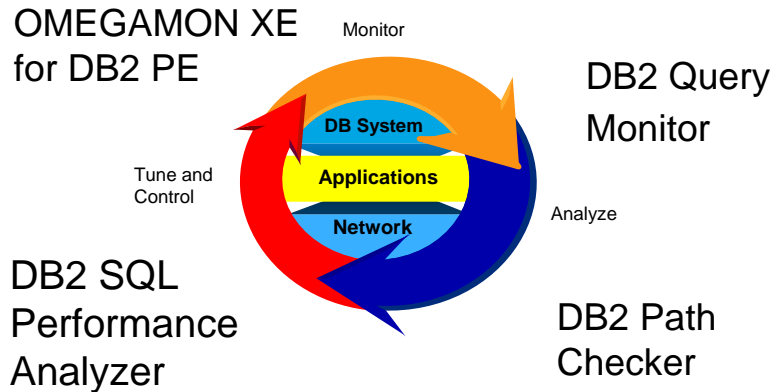
- OMEGAMON XE on z/OS for threads running in enclaves
- OMEGAMON XE for CICS on z/OS for CICS DB2 threads
- OMEGAMON XE for IMS on z/OS for IMS DB2 threads

In addition

- OMPE 4.1.0 will support DB2 V9
- The enhanced thread overview will show additional lock information and changed pages (CASTOUT) in all Group Buffer Pools for faster problem analysis
- zIIP support with CPU offload and eligible zIIP CPU offload information

DB2 Performance Management Tools

Provide tools to monitor and tune DB2 systems and applications to obtain optimal performance and lowest cost



How DB2 Pathchecker can help with your V8 or V9 migration?



- New optimizer delivered with V8 and V9
 - 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

What does SQLPA do ?

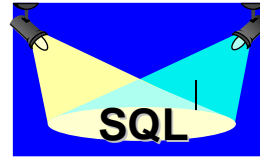
Forecasts SQL performance:

- 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 real world costs



What else can SQLPA do ?

It provides an **Enhanced EXPLAIN** report:

- Catalog Statistics
- Access Path Information
- RI Relationships

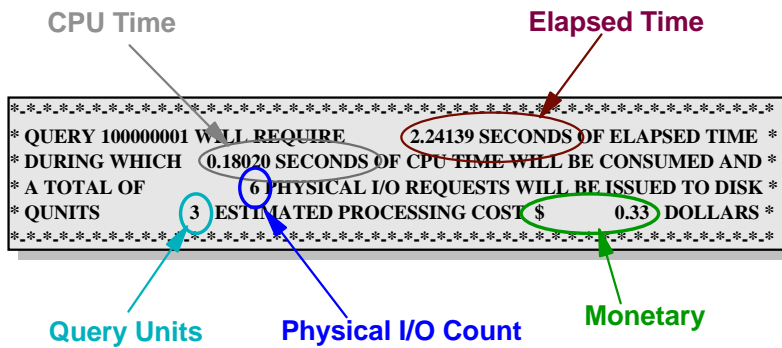
Plus key **ADVICE** on each SQL statement:

- Warnings and Alerts
- Guidelines and Recommendations
- Performance Notes and Good News

SQLPA teaches users how to write better SQL



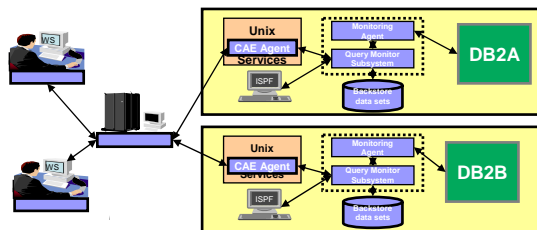
Cost Summary



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



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 autonomies 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

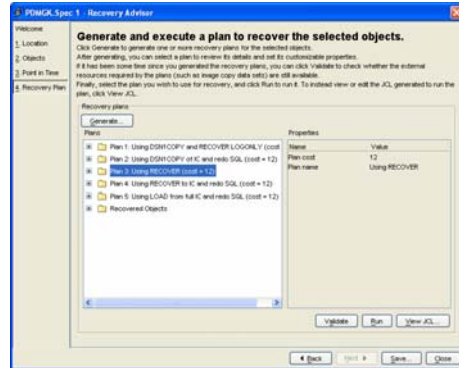
IBM DB2 Tools that help a successful migration to DB2 V9

- 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 V9
- Use **OMEGAMON XE DB2 Performance Expert** to monitor existing V8 subsystem performance and provide performance baseline for post-migration analysis



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 needed recovery assets and utilities
 - Estimates the relative costs of the different plans
 - Builds and submits required JCL
 - Uses a versioning repository to inspects version levels available for restoration including related 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



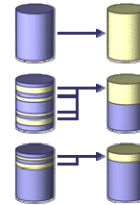
Database Change Management in DB2 Admin/DB2 Object Compare 7.2

- 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

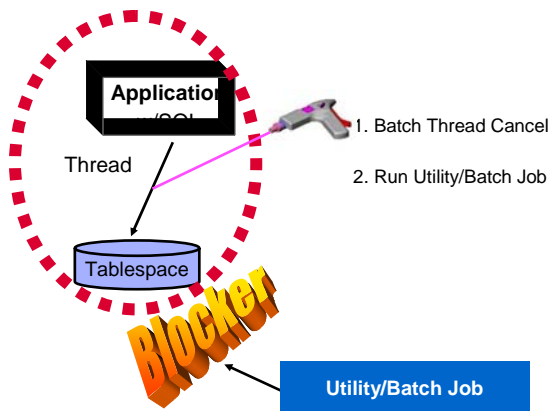


- Clones a DB2 subsystem or DB2 application (if isolated)
 - Renames and catalogs the data sets, fixes the volume internals, optionally updates all DB2 internal control information
 - No requirement for a clone in a separate LPAR
 - Supports DB2, PeopleSoft, and SAP
- Is extremely fast and cheap!
 -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

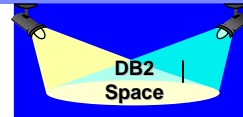
A job-level interface to cancel DB2 threads



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 Space Management Utility (SMU)



- Displays information by volume, database, or table space, making it easy to understand DASD constraints
- Performs interactive scans and space map analysis and analyzes space-related factors that affect DB2 performance
- Identifies tables that are in need of reorganization or an image copy to better utilize run times.
- Recovers wasted DASD space
 - Finds DB2 widows and orphans, which simplifies the clean-up of nonexistent and forgotten DB2 objects and VSAM data sets.
- Allows access to historical information about the number of data sets, number of extents, and space allocated compared against space used for DASD trend analysis and capacity planning

Save time and money, optimizing your database DASD performance

Compliance

The Requirements of Regulatory Compliance

Regulators have multiple goals. which drive investment in several areas

- ✓ Improved risk management across the enterprise
- ✓ Integrity of financial reporting processes and related business practices
- ✓ Customer information security



- **People:** Professionals with regulatory experience will be hired to enable firms to meet and anticipate new regulatory requirements
- **Process:** More robust processes and procedures will enable top management to monitor and enhance regulatory compliance
- **Technology:** Significant investment will be made. The following are critical for your DB2 systems:

Patriot Act	HIPAA	Anti-Money Laundering
SEC Rule 17A-4	Gramm-Leach Bliley	Basel II
Corporate Information Security Accountability Act of 2003	Department of Defense - 5015.2	
Sarbanes Oxley	California Bill 1386	

- 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



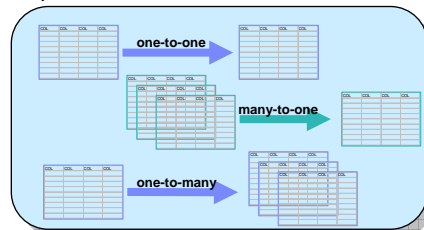
- Row level encryption
- Supports all levels of DB2 - no application changes needed
- Exploits System z and S/390 Crypto Hardware features, which results in low overhead encryption/decryption
 - Uses the ANSI Data Encryption Algorithm (DEA), also known as the U.S. National Institute of Science and Technology (NIST) Data Encryption Standard (DES) 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

<http://www.ibm.com/software/data/db2imstools/db2tools/ibmencrypt.html>

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



41

DB2 TDBG Examples

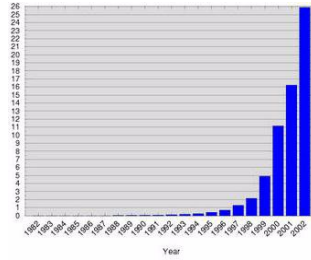
- Create a target column ACCT_BALANCE which is a random number that falls within a specified range
- Create a target column that generates random values for positions 1-6 of a Social Security Number
- Create a target column that is exactly the PIN column with the 3rd and 5th positions replaced (masked) with the letter X
- A person's last name in a table has to be transformed into another name, but has to be a recognizable name.
 - Generate a random number
 - Use the generated number as a key to a “names” table
 - Replace the original name with the one from the lookup table for the target
- The order number in a table has to be changed to another number. This should also be applied to any dependent tables
 - Generate a random number. This is the key, so duplicate numbers are not allowed
 - Make sure the dependent table has the same order number

42



Inactive (dormant) Data

- How is data being archived today?
 - Mostly by home grown application code
 - Tailored to each application
 - Costly to maintain
 - Not compliant with regulations
- Inactive data exists everywhere
 - Transactional histories, Data Warehouses, ...
- Inactive data is not unusable
 - it just has a lower probability of access
- Why keep inactive data?
 - Legislated by government
 - Business need
 - Trend analysis
 - Previous customer history
- As databases grow in size, the percentage of inactive data grows

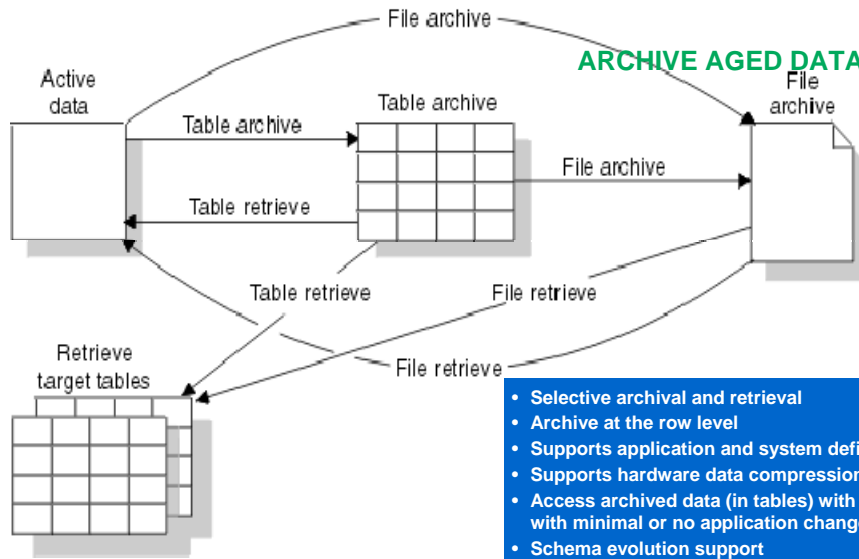


10GB	10% inactive
100GB	50% inactive
2TB	80% inactive
50TB	95% inactive

*Reference: Inmon



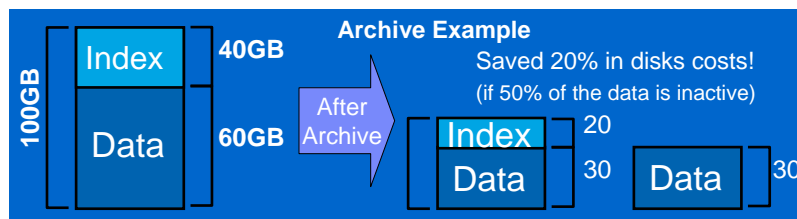
DB2 DATA ARCHIVE EXPERT



- Selective archival and retrieval
- Archive at the row level
- Supports application and system defined RI
- Supports hardware data compression
- Access archived data (in tables) with SQL with minimal or no application changes
- Schema evolution support

DB2 Data Archive Expert Benefits

- 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)



45

Database Security

- The assertion
 - Any business should know who is reading or changing their valuable information stored in their databases
- **For the DBA**
 - **Management said we have to audit access to tables with sensitive data, so get with the auditors and take care of it!**
- Now what ??
 - Which Audit Trace classes do we start?
 - What audit information do we want?
 - Where do we put it?
 - How many audit trace records will we produce?
 - Do we run the Audit Trace all the time?
 - How do we get reports from the Audit Trace data?
 - What other sources of audit information is there?
 - How do I set up enough reports to keep the Auditors busy?
 - How do we get the Auditors to do this?
 - How much of my time will I have to spend with the Auditors?

46

DB2 Audit Management Expert for z/OS

- New Tool !
- Provides centralized auditing of DB2 bringing together information from many different sources into a correlated, coherent view
- Enables auditors to collect, view, analyze and report on data and save it into an audit repository
- Allows auditors to automatically generate their own reports and export the data into other applications such as Excel spreadsheets



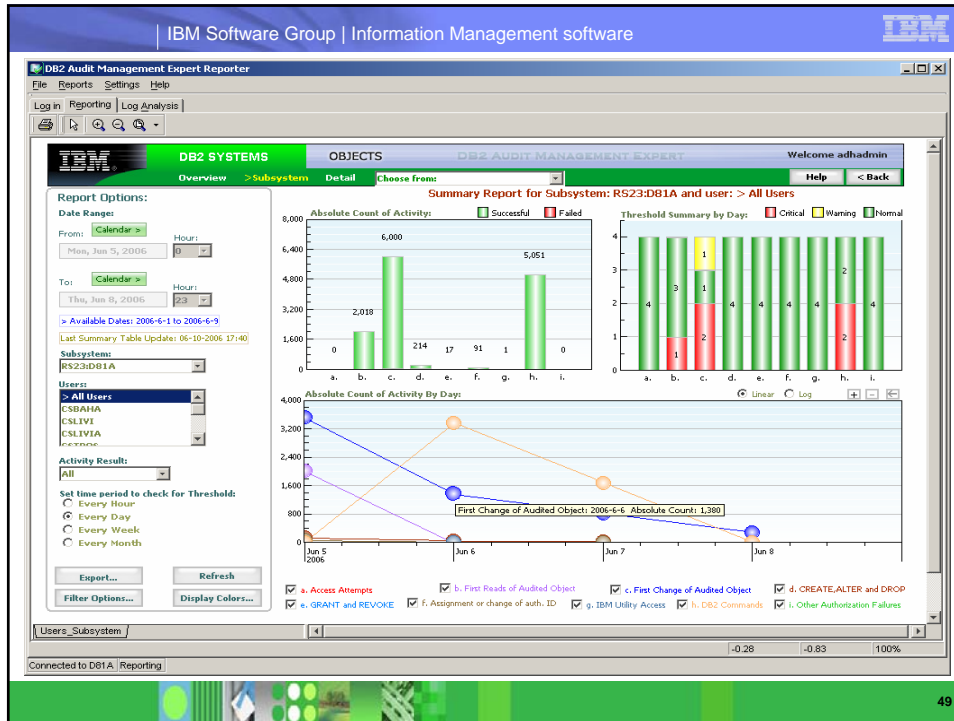
Makes life for auditors and DBAs much easier !!

47

Audit Management Expert Overview

- Collects and correlates information from DB2 resources
 - Audit Trace Data, Log Analysis data
 - Turns on appropriate audit trace types based on collection profiles
- Provides a central resource for auditors to produce a coherent view of DB2 access information
- Auditors will be able to Access:
 - SELECT, INSERT, UPDATE, and DELETE activity by user or by object
 - CREATE, ALTER, and DROP operations against an audited object
 - Utility access to an audited object
 - DB2 commands entered
 - Assignment or modification of an authorization ID
- Provides auditors with flexible options for examining the data in the audit repository

48



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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

50

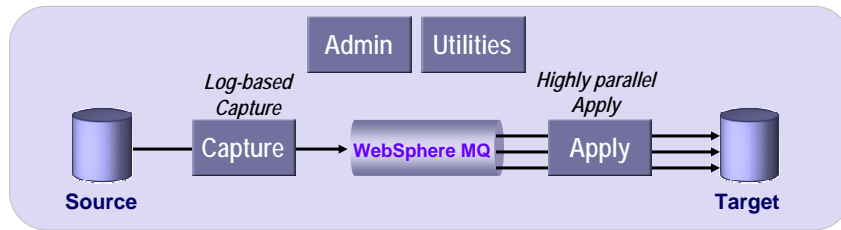
Q Replication -- low latency for peer-to-peer environments

Function

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

Usage

- High availability
- Workload distribution
- Application integration

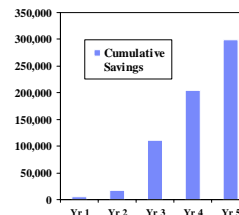


- DB2 UDB source on z/OS, Linux, UNIX, and Windows
- DB2 UDB native apply target on z/OS, Linux, UNIX, and Windows
- Oracle, SQL Server, Sybase, and Informix federation apply targets (and more coming!)

Summary



- 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 - fast
- With IBM Tools you have a **long-term commitment** to DB2 and IMS Customers



Thank
You

