



IBM DB2 Tools for z/OS - Update

The future runs on System z

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Agenda

- DB2 Tools Portfolio
- Database protection and threats to the business
- IBM Data Server Security Blueprint
- Data Governance - Guardium and AME
- DB2 Tools – in general
- OM PE 420 – update
- RE 2.x, LAT 3.x, Cloning Tool 2.x, HPU 3.x - update
- DB2 Admin Tool Update - update
- DB2 Utility Enhancement Tool – update
- DB2 QM - update
- Encryption for DB2 (and IMS)
- DB2 Tools Customizer (TC/z)



DB2 for z/OS Tools Portfolio

Application Management

- DB2 Administration Tool
- DB2 Path Checker
- DB2 Bind Manager
- DB2 Query Monitor
- DB2 SQL Performance Analyzer
- DB2 High Performance Unload
- DB2 Table Editor
- Data Studio
- Optim Development Studio
- Optim Data Growth
- Optim Query Tuner
- Optim Test Data Management
- InfoSphere Data Architect

Utilities Management

- DB2 Utilities Suite
- DB2 Automation Tool
- DB2 Automation Toolkit SAP Edition
- DB2 Utilities Enhancement Tool
- DB2 High Performance Unload

Database Administration

- DB2 Administration Tool
- DB2 Object Comparison Tool
- DB2 Administration Toolkit SAP Edition
- DB2 Storage Management Utility

Performance Management

- OMEGAMON XE DB2 Performance Expert
- OMEGAMON XE DB2 Performance Monitor
- DB2 Query Monitor
- DB2 SQL Performance Analyzer
- DB2 Buffer Pool Analyzer
- DB2 Performance Toolkit SAP Edition
- Optim Query Workload Tuner
- Optim Development Studio
- Optim pureQuery Runtime

Backup and Recovery

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

Data Governance

- Optim Data Growth
- Optim Data Privacy
- Optim Test Data Management
- DB2 Audit Management Expert
- Data Encryption for DB2 and IMS
- Guardium

Business Intelligence

- Cognos for Linux on System z
- DataQuant
- QMF

Database Protection: 3 Key Business Drivers

1. Internal threats

- Identify unauthorized changes (governance)
- Prevent data leakage



1. External threats

- Prevent theft



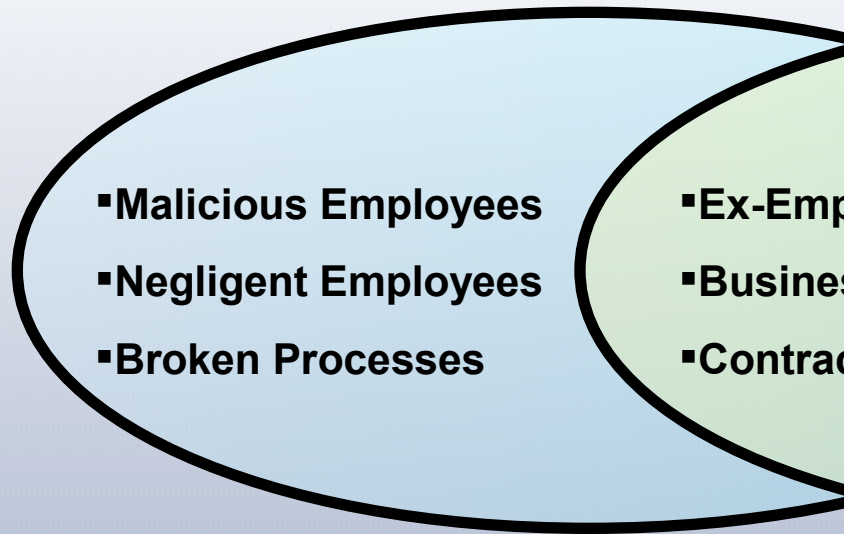
1. Compliance

- Simplify processes
- Reduce costs

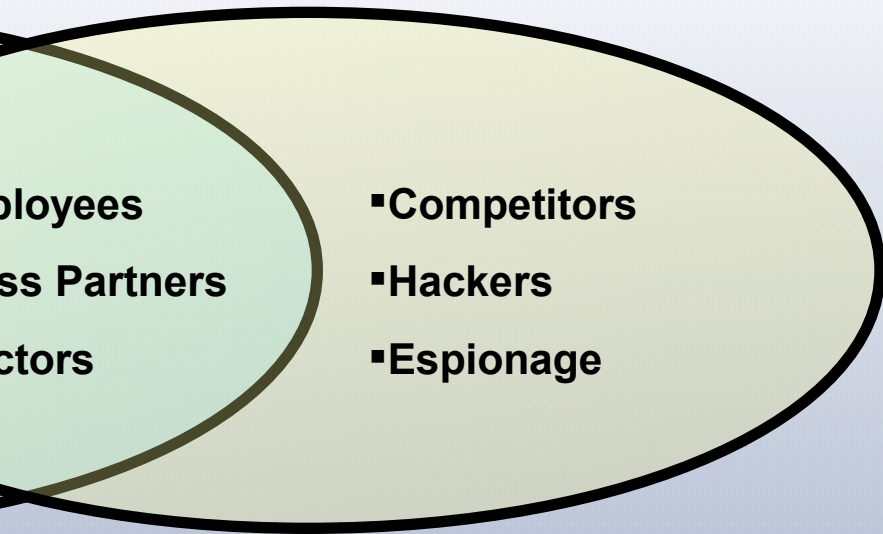


Threats to the business

Internal Threats



External Threats



✓ **System z data is usually the most critical in the enterprise**

✓ **System z is well protected from external threats**

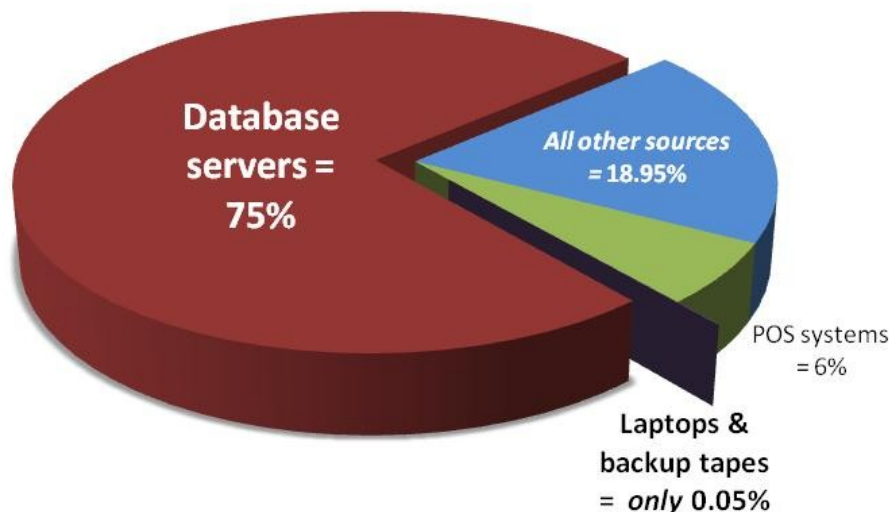
✓ **Obviously, the largest concern is internal threats**

- **\$197**
 - Cost to companies per compromised record
- **\$6.3 Million**
 - Average cost per data breach “incident”
- **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
 - For 90,000 records the combined Direct and Indirect costs (\$197 per record) = \$17,730,000!
- **The indirect costs are incalculable**



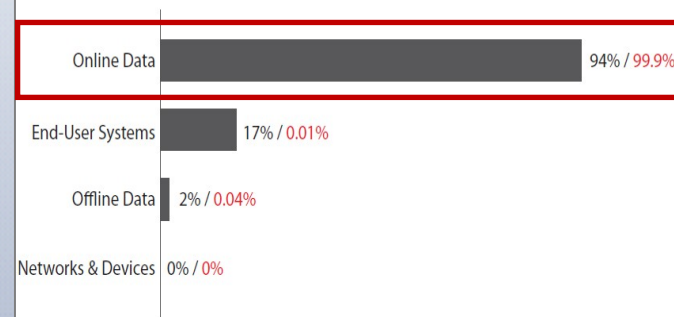
Database Servers = Vast Majority of Compromised Records

% of Records Breached (2009)



Online data = 99.9% of all compromised records

Figure 25. Asset classes by percent of breaches (black) and records (red)



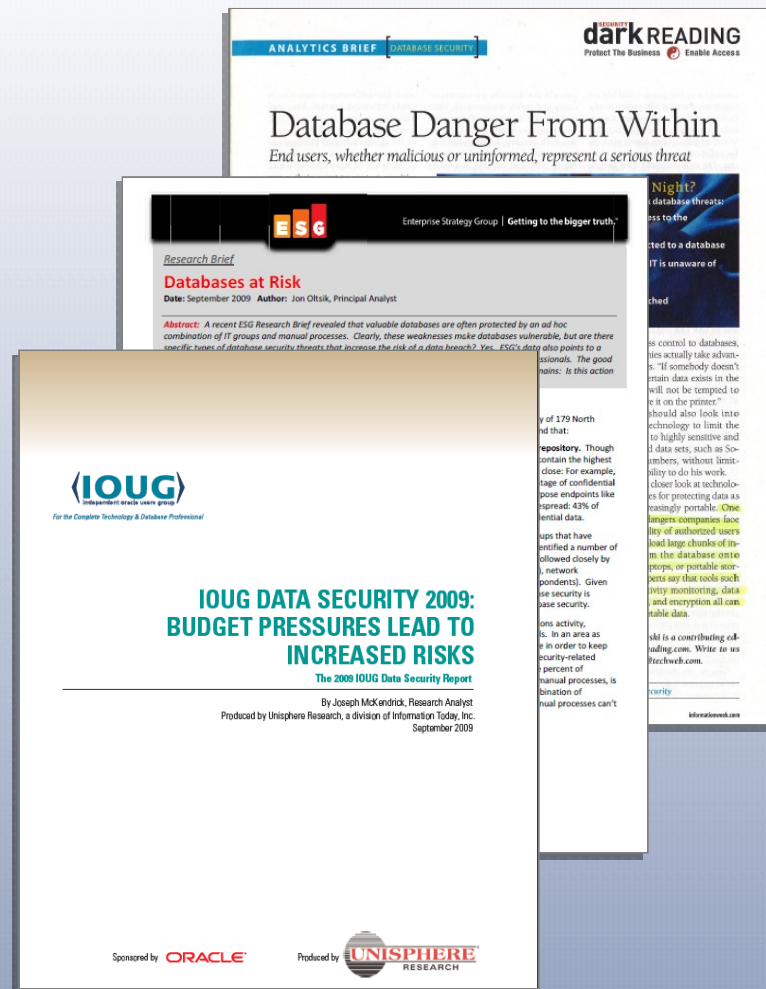
“Although much angst and security funding is given to **offline data, mobile devices, and end-user systems**, these assets are simply **not a major point of compromise.**”

2009 Data Breach Report from Verizon Business RISK Team

http://www.verizonbusiness.com/resources/security/reports/2009_databreach_rp.pdf

Database Danger from Within

- **“Organizations overlook the most imminent threat to their databases: authorized users.” (Dark Reading)**
- **“No one group seems to own database security ... This is not a recipe for strong database security” ... 63% depend primarily on manual processes.” (ESG)**
- **Most organizations (62%) cannot prevent super users from reading or tampering with sensitive information ... most are unable to even detect such incidents ... only 1 out of 4 believe their data assets are securely configured (Independent Oracle User Group).**



http://www.darkreading.com/database_security/security/app-security/showArticle.jhtml?articleID=220300753
<http://www.guardium.com/index.php/landing/866/>

The Compliance Mandate

Audit Requirements	COBIT (SOX)	PCI-DSS	ISO 27002	Data Privacy & Protection Laws	NIST SP 800-53 (FISMA)
1. Access to Sensitive Data (Successful/Failed SELECTs)		✓	✓	✓	✓
2. Schema Changes (DDL) (Create/Drop/Alter Tables, etc.)	✓	✓	✓	✓	✓
3. Data Changes (DML) (Insert, Update, Delete)	✓		✓		
4. Security Exceptions (Failed logins, SQL errors, etc.)	✓	✓	✓	✓	✓
5. Accounts, Roles & Permissions (DCL) (GRANT, REVOKE)	✓	✓	✓	✓	✓

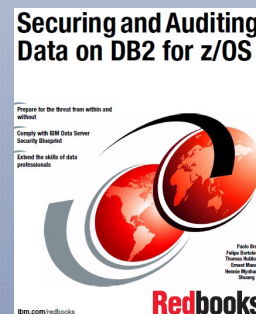
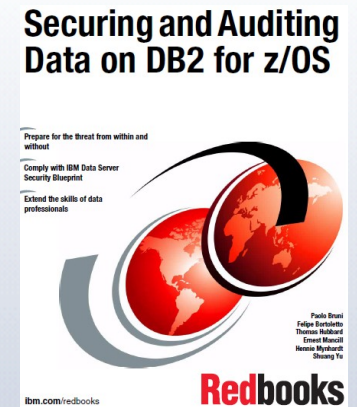
DDL = Data Definition Language (aka schema changes)

DML = Data Manipulation Language (data value changes)

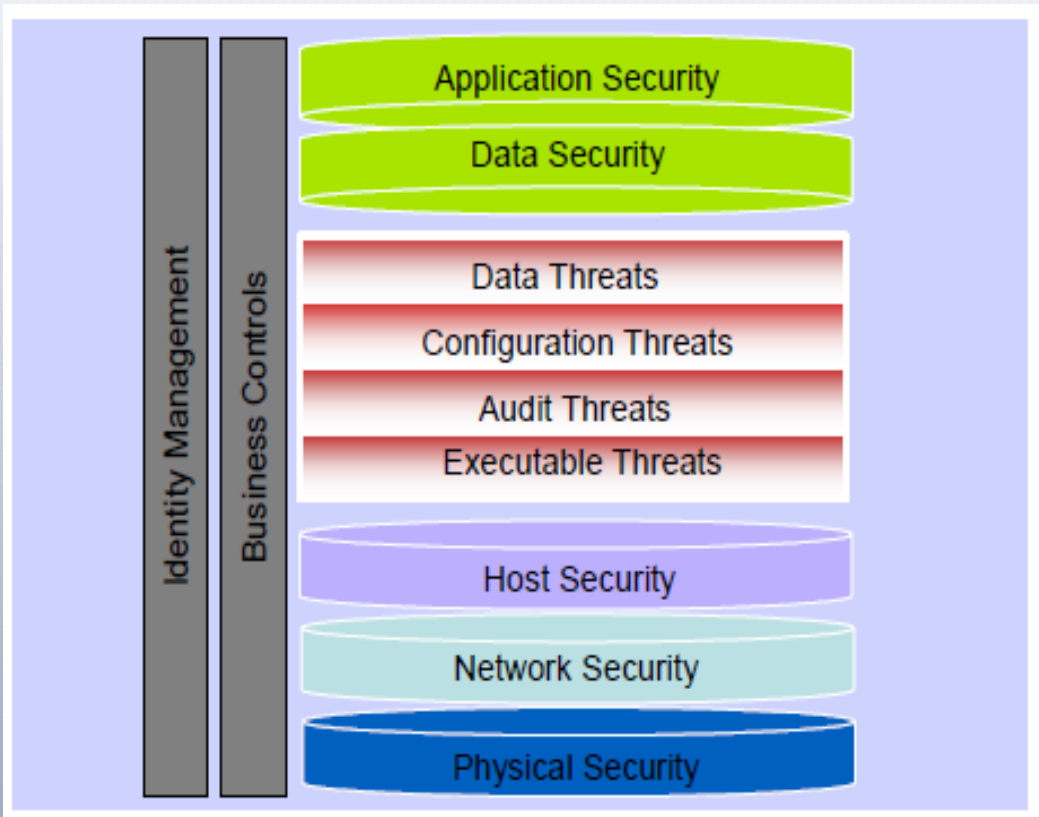
DCL = Data Control Language

IBM Data Server Security Blueprint

- The IBM Data Server Security Blueprint is intended to provide a starting point to help database professionals understand the various avenues of attack that can threaten data stored on DB2 for z/OS, and how the various elements of the System z hardware, z/OS operating system, and DB2 can provide protection to the threats.



IBM Data Server Security Blueprint

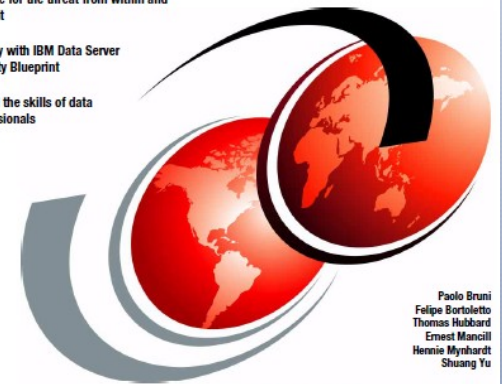


Securing and Auditing Data on DB2 for z/OS

Prepare for the threat from within and without

Comply with IBM Data Server Security Blueprint

Extend the skills of data professionals

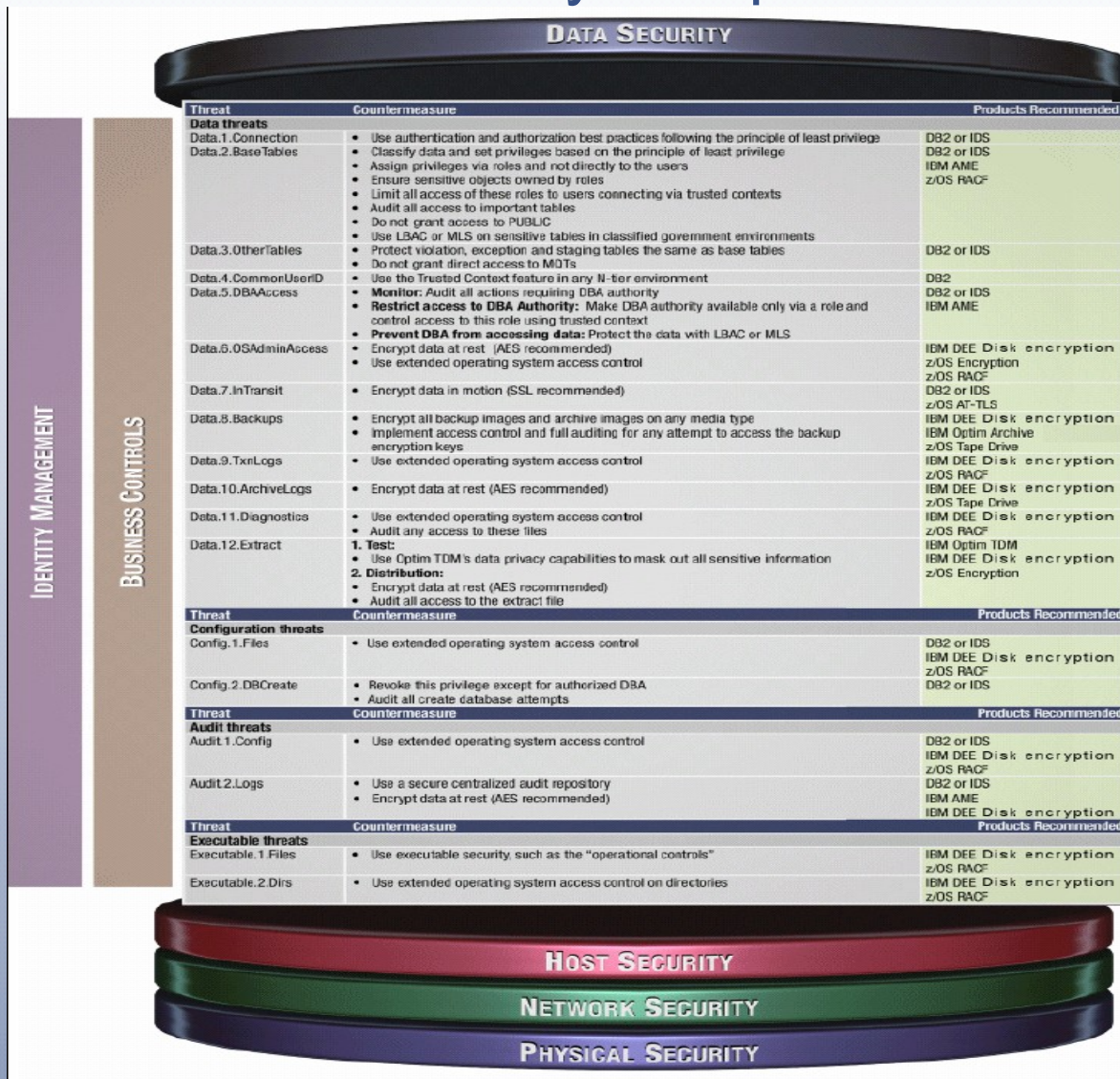


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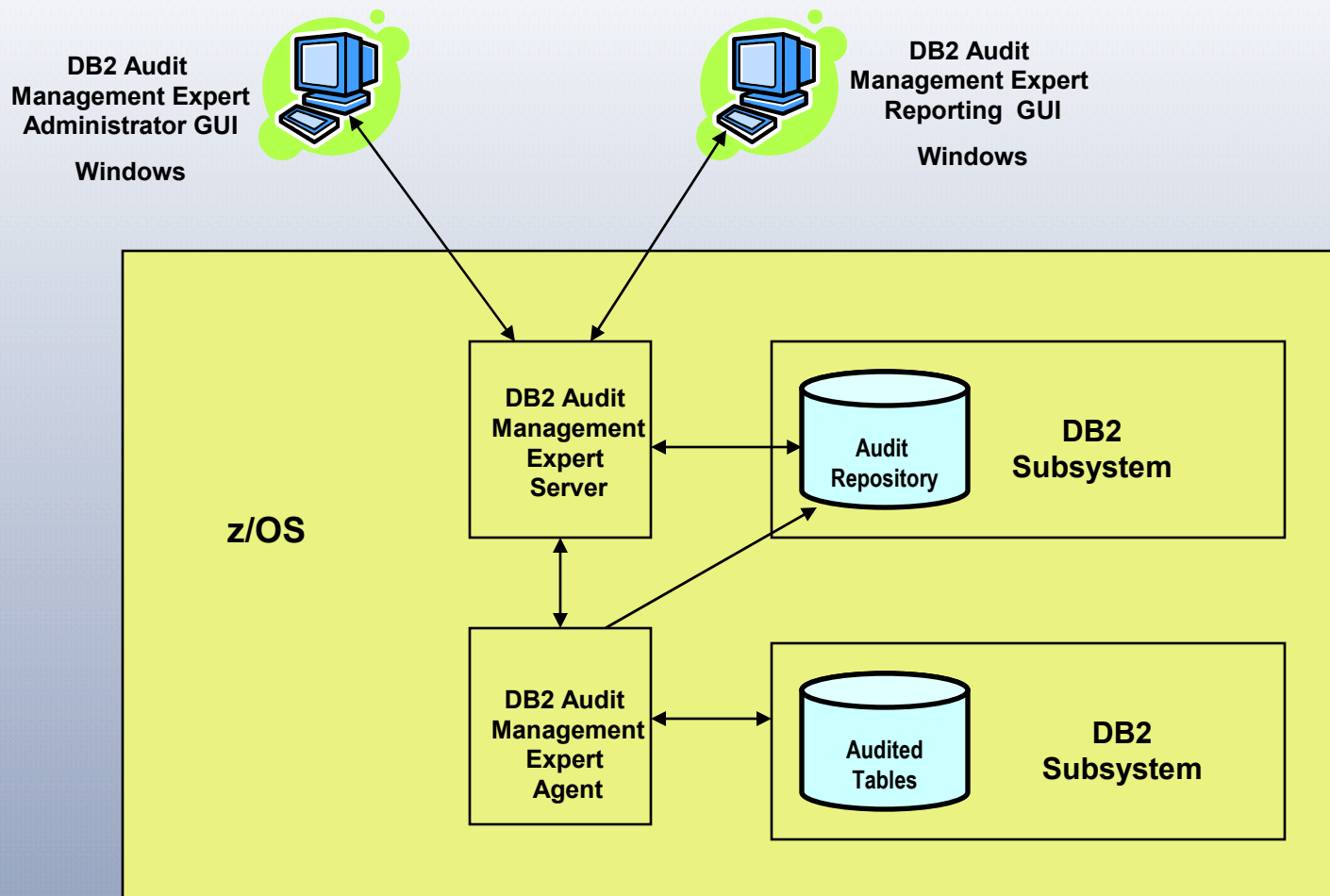
IBM Data Server Security Blueprint



How AME addresses all aspects of Data Protection ?

- **Collects and correlates information from DB2 resources.**
 - Audit Trace Data, Log Analysis data
- **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.

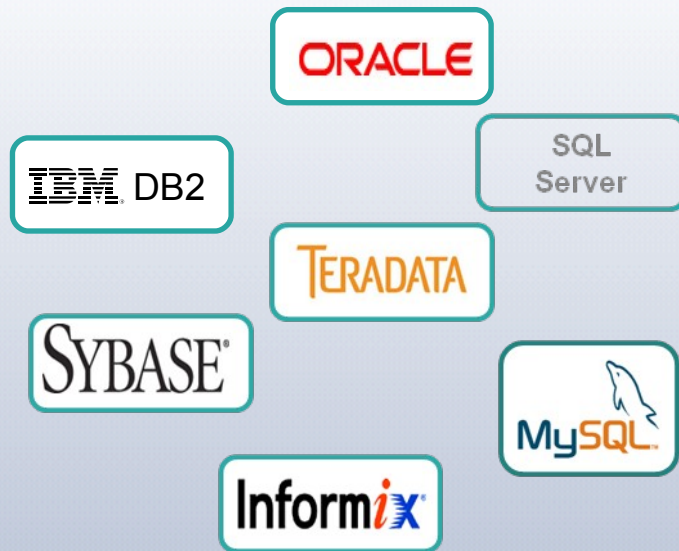
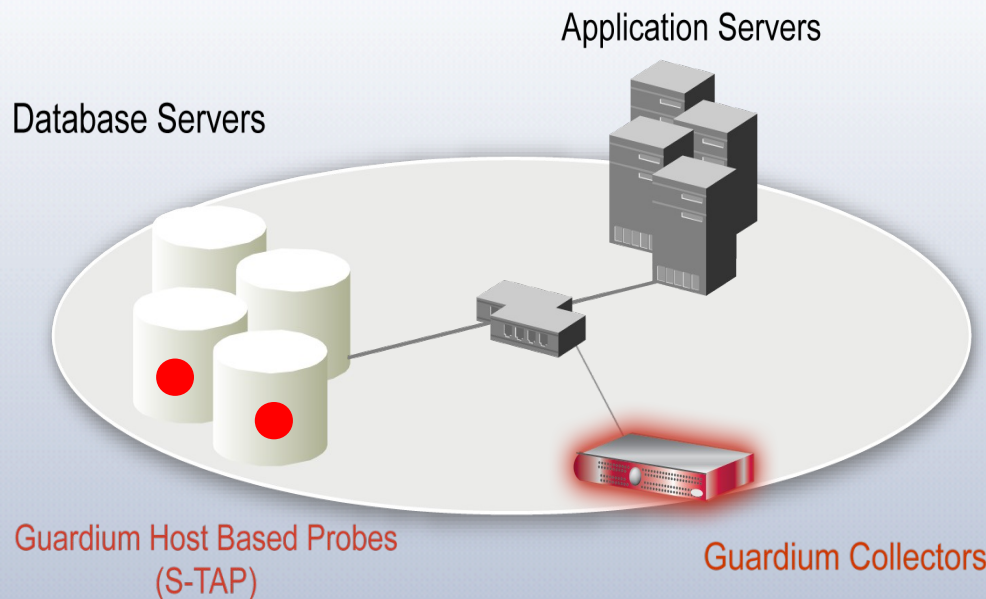
DB2 Audit Management Expert Architecture



How Guardium addresses all aspects of Data Protection ?

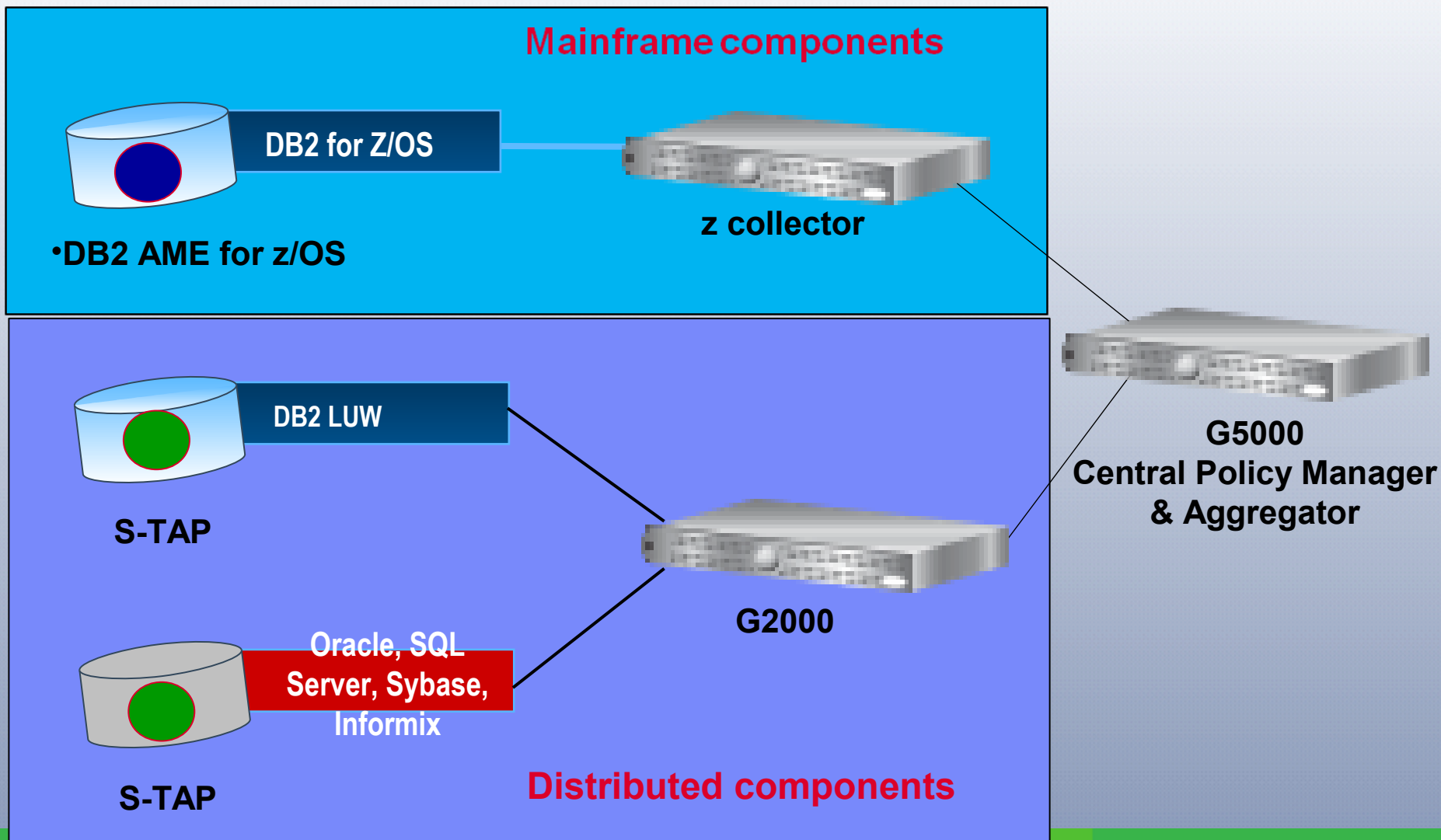


Real-Time Database Monitoring



- Non-invasive architecture
 - Outside database
 - Minimal performance impact (3 - 5%)
 - 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.)

Single set of security policies & compliance views for both mainframe & distributed environments



OMEGAMON XE for DB2 PE and PM - Overview

- Superior overall DB2 management capabilities
- Comprehensive monitoring functionality to manage the efficiency and performance of DB2 on z/OS-based applications
 - ▶ Online and real time deep dive analysis capability plus “offline” via reports
- DB2 Performance Warehouse for expert analysis of DB2 application performance data.
- GUI integration with the IBM Tivoli Monitoring portfolio of systems management products
- Integration with DB2 Tools on z/OS (like SQLPA,...)

Objectives of OMEGAMON XE for DB2 PE and PM V420

☑ **Build the foundation for the future**

- ▶ A merger of two advanced technologies to provide a best of breed DB2 monitoring offering exposing potential challenges for large installations
- ▶ Continual DB2 on z/OS advancements revealed the necessity for a more flexible implementation that could respond quickly and reliably

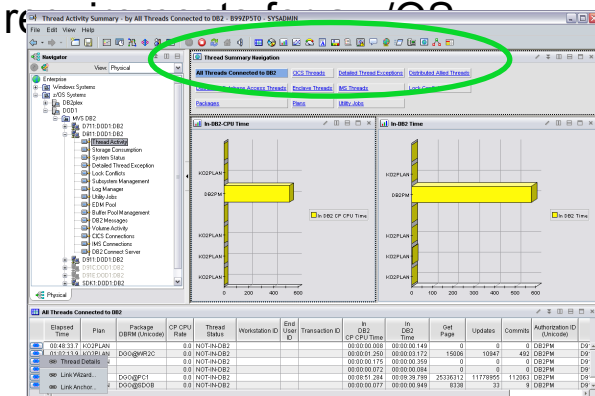
☑ **Improve the installation and configuration experience**

- ▶ Migrate from a parameter-driven configuration to a task-driven configuration

☑ **Continue to drive down TCO through user interface and collector convergence, integration, and RAS**

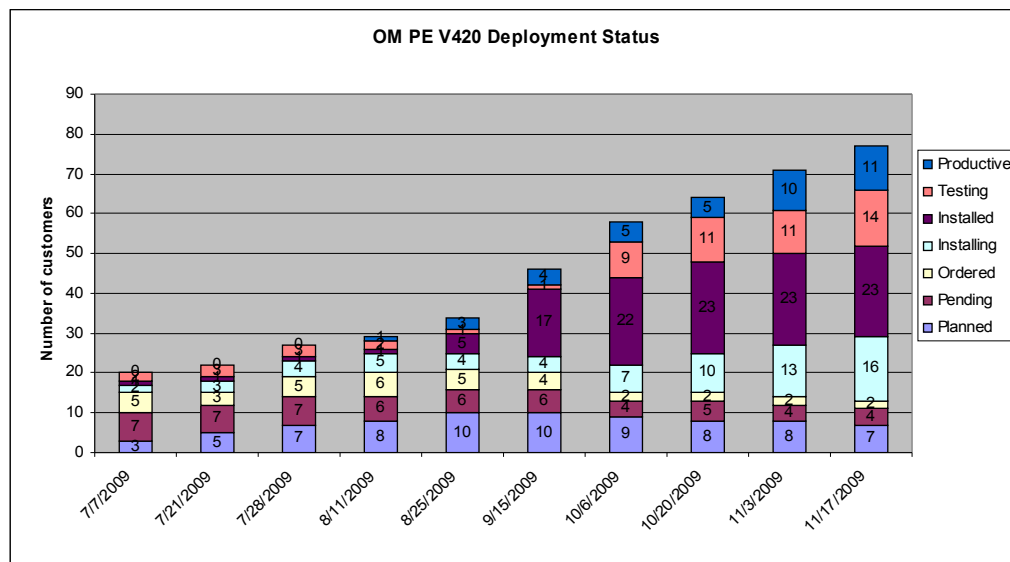
What's New in v4.2? – Additional Items

- **Provides a flexible mechanism for DB2 subsystem configuration**
 - ▶ Reduces effort for installing and maintaining the product
 - Initial setup, changing an existing configuration. applying maintenance
- **Profile created for DB2 subsystem**
 - ▶ Specifies the monitoring function to be enabled for the subsystem
 - ▶ Reusable for several DB2 subsystems
- **Batch Accounting Improvements**
 - ▶ “OPTIMIZE” option that enables optimization on CPU consumption or ACWORK size
 - ▶ “CALCULATE” option to determine the disk space required to process a given input
- **ITM infrastructure upgrade to ITM v6.2.1**
 - ▶ High-Availability HUB capability that fulfills customer failover re based monitoring server
- **Usability Improvement – Navigator buttons**



OMEGAMON PE V420 deployment status (Nov 2009)

- **OM PE V420 GA'd in May 2009**
 - ▶ Steady rise in V420 deployments since GA
- **Overall downward trending in OM PE PMRs and APARs:**
 - Few field defects reported in v420
 - V410 defects quickly forward-fitted to 420
 - SUP tape GA Dec 2009



IBM DB2 Tools that help a successful migration to DB2 9 (or to DB2 10)

- Run [DB2 Cloning Tool](#) to create whole test subsystems or subsets quickly with low impact to production
- Run [DB2 Bind Manager](#) if the application (DBRM) is no longer available, the BLDDBRM function lets you build the DBRM from the catalog
- 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](#) to monitor existing V8 subsystem performance and provide performance baseline for post-migration analysis

Recovery Expert

- **Different types of recovery situations all requiring different recovery solutions**
 - ▶ Hardware failures
 - ▶ Application failures
 - ▶ Accidentally dropped objects
 - ▶ Application System recovery
 - ▶ Disaster recovery

- **Different recovery choices**
 - ▶ Recover to
 - Current, IC, PIT, LRSN, Timestamp (quite time)
 - ▶ Recover using
 - IC, log, DSN1COPY, undo, redo
 - ▶ Recover related objects

Recovery Expert

■ Automap Support

- ▶ Easy definitions of Backup Profiles and map target to source
- ▶ Exclude target copy pool volumes to limit scope backup scope
- ▶ Drive partial Backup System to reduce DASD requirements

■ Create Image Copies from System Level Backup

- ▶ Drive downstream processes that require Image Copies

■ EMC Virtual Device Support

- ▶ Enhanced Incremental System Level Backup
- ▶ DFSHSM support post GA via PTF

■ CPU savings !!!

Log Analysis

- **Log Forward and Log Backwards in same run**
 - ▶ Accelerates Log based replication
 - ▶ Supports tablespace changes like reorg without user intervention

- **Automatic HSM recalls**

- **Resolve Started UOW**

Cloning Tool

- **New ISPF Interface**

- ▶ Allow easy customization of JCL

- **Tablespace data masking**

- ▶ STATIC RULE , FIELD = CONSTANT VALUE
- ▶ MASK RULE, FIELD = [a-z0-9]*10
- ▶ PATTERN RULE (Sir | Mr) Bill
- ▶ RANDOM RULE, FIELD = RAND(1, 100)
- ▶ USER EXIT RULE , FIELD = USER_EXIT()
- ▶ SEQUENCE RULE , SEQ(1, 1)
- ▶ SCRAMBLE RULE , SCRAMBLE(FIELD)
- ▶ CURRENT DATE, CURRENT TIME, CURRENT TIMESTAMP RULES
- ▶ CURRENT USER RULE

- **CPU savings !!!!**

DB2 High Performance Unload for z/OS

➤ What is it?

- DB2 High Performance Unload for z/OS is a flexible, easy-to-use product that provides a fast and efficient tool to unload and extract data for movement across enterprise systems or for in-place reorganizations.

➤ What's its value to customers?

- Enables businesses to speed data extraction and data migration tasks which have become more time-consuming and complex. It supports the unloading of large amounts of data and increases the efficiency and availability of DB2 applications.

➤ New functions and features:

- The ONDEMAND_RESOURCE_ALLOCATION PARMLIB option has been added, which allows better management of a long list of objects that were unloaded in a single DB2 HPU step by using LISTDEF and TEMPLATE
- The TEMPLATE statement has been updated to support HFS files when LOB data is unloaded by using Lob File Reference
- Support for LAST_IC using image copies per partitions has been added to the COPYDDN option
- The ability to obtain one output file per partition when you use a global full image copy as input has been added
- The SQLPART option has been added to the SELECT block, which allows you to generate an output file per partition when you use DB2 FORCE
- New EXECUTE NO option allows generating the LOADDDN file without unloading the data

■ CPU savings !!!!

What's New in DB2 for z/OS Utilities and zIIP?

- **Additional zIIP engine offload for the DB2 Utilities**
 - ▶ For DB2 Version 8 and DB2 9
- **What is eligible?**
 - ▶ Almost all DB2 utilities sorting of fixed-length records in the memory object sort path
- **System requirements**
 - ▶ System z9 or z10 with specialty engines and z/OS V1.10 with PTF UK48846 from APAR PK85856* and PTFs for either DB2 Version 8 or DB2 9
 - ▶ For DB2 Version 8:
 - PTF UK48911 from APAR PK85889*
 - ▶ For DB2 9:
 - PTF UK48912 from APAR PK85889*

PK85856* and PK85889* - DB2 Utilities will invoke DFSORT when sorting fixed length records in a way that will allow offload to zIIP processors

DFSORT zIIP offload Customer Value

- **Almost all utility sort processing involves fixed-length records, so this new support will apply to most utilities**
 - ▶ Exception is REORG data sorts that handle variable length records and is not eligible for the offload
- **Most utility processing involves sorting index keys**
 - ▶ Can represent a significant amount of data
 - ▶ Can consume up to 60% of utility CPU time in sort processing
- **Initial testing determined approximately 50%* of sort CPU time will be offloaded with this enhancement depending on**
 - ▶ if the sort processing selects the memory object sort path
 - ▶ the size of data being sorted
 - ▶ available system resources
- **Who will benefit?**
 - ▶ Customers who are constrained on CPU during utility processing or who would like to reduce internal CPU charge back costs for the utilities

**Actual results may vary*

What's New in Admin Tool ? - DB2 9 Support

■ **Catalog Navigation**

- ▶ System catalog panels incorporate DB2 Version 9 catalog changes
- ▶ Authorization enhancements, including Trusted Contexts and Roles
 - Show Grantee (RE) and Show Grantor (RR) line commands
- ▶ Clone table support

■ **Manage Stored Procedures (NativeSP)**

- ▶ Use the CREATE Stored Procedure function to create an NativeSP
- ▶ Easily deploy a set of NSPs to a production system from a test environment
- ▶ Manage multiple versions of an NSP to facilitate fallback

■ **XML Datatype**

- ▶ Create / manage implicit XML tables
- ▶ New Commands to support XML tables
 - XML – Shows XML tables for a base table
 - XMLR – Shows XML column information and the related XML table

Success Story: Enhanced Change Management



Change Management - The process in a nutshell:

IMPORT

ANALYZE

RUN

Enhanced Change Management is an enhanced technique of IBM DB2 Administration Tool and IBM DB2 Object Comparison Tool for managing DB2 DDL changes across DB2 environments

The company realized these benefits from using Change Management:

- Change Management gives the company the opportunity to execute DDL activities in a designated time slot to fulfill SLA requirements
- Executed changes are stored inside Change Management tables to fulfill legal requirements ("Who did what when?")
- Change Management ensures that all activities can be organized and well structured

DB2 Utilities Enhancement Tool for z/OS (Preview)

➤ What is it?

- DB2 Utilities Enhancement Tool for z/OS provides additional features and functions not found in the DB2 Utilities Suite that address the most demanding needs of DB2 Utility environments. It enables database administrators the ability to proactively cancel threads on DB2 objects that utilities and applications need to access during batch processing. It also.

➤ What's its value to customers?

- Enables businesses to provide more user control over DB2 utilities and applications and thus, DB2 resources and availability. It increases the productivity of the DBAs by reducing time-consuming maintenance tasks and helps free their time so that they can focus on higher priority tasks.

➤ New functions and features:

- More control over thread processing with the ability to define Policy Rules.
- This release increases the usability of REORG, LOAD and CHECK DATA utilities by providing additional options that increase productivity and improve availability:
 - During a SHRLEVEL CHG REORG with no mapping table defined, DB2 UET can automatically create a temporary mapping table and corresponding index using pre-defined sizes. The DB2 UET also drops the temporary objects upon completion.
 - The LOAD utility syntax is enhanced with additional keywords, PRESORT, CONSTANT and VALUEIF.
 - When using the DB2 UET with the CHECK DATA utility, you can write discarded DB2 rows to a flat file automatically created by the DB2 UET, instead of to a DB2 table that must be defined by the user .

DB2 Query Monitor (Preview)

- **Sysplex support in ISPF Client**
-
- **Full function WEB Client**
 - ▶ Activity Browser
 - View data from intervals data sets or archive data
 - Pie chart graphs
 - Customized views
 - Filters
 - ▶ Alert Browser
 - ▶ QM Administration
 - Edit and Manage Scopes
 - Control CAE Monitoring for Alerts
 - Define Actions and Responses
- **Deprecate Windows Client**

Data Encryption Tool for DB2 and IMS Databases

■ Inhibitors

- ▶ Self Encrypting Devices
 - Does customer have 100% self encrypting devices?
 - Do auditors have concerns about tracking location of data?
- ▶ Index Encryption
 - Encrypting indexes introduces performance problems
 - Personal Account Numbers should be placed in 1 column index
 - Information is useless without additional Personal Identity Information
- ▶ EDITPROC Restrictions
 - DB2 V9 to lift restrictions
 - Long column names, New Data Types, Alter Add Columns
 - Still need unload/drop/create/load to initially encrypt data

■ Exploits new Z10 CEX3C Encryption, CPACF Protected Key

- ▶ Requires PK99119 and ICSF HCR7770

DB2 Tools Customizer for z/OS (TCz)

- Drive post-SMP/E configuration, tailoring, customization
- Provide consistent, usable, simple solution
- No-Charge Prerequisite for ISPF based DB2 Tools
 - ▶ Separate FMID to be shipped with every DB2 Tool product
 - ▶ Except OMEGAMON DB2



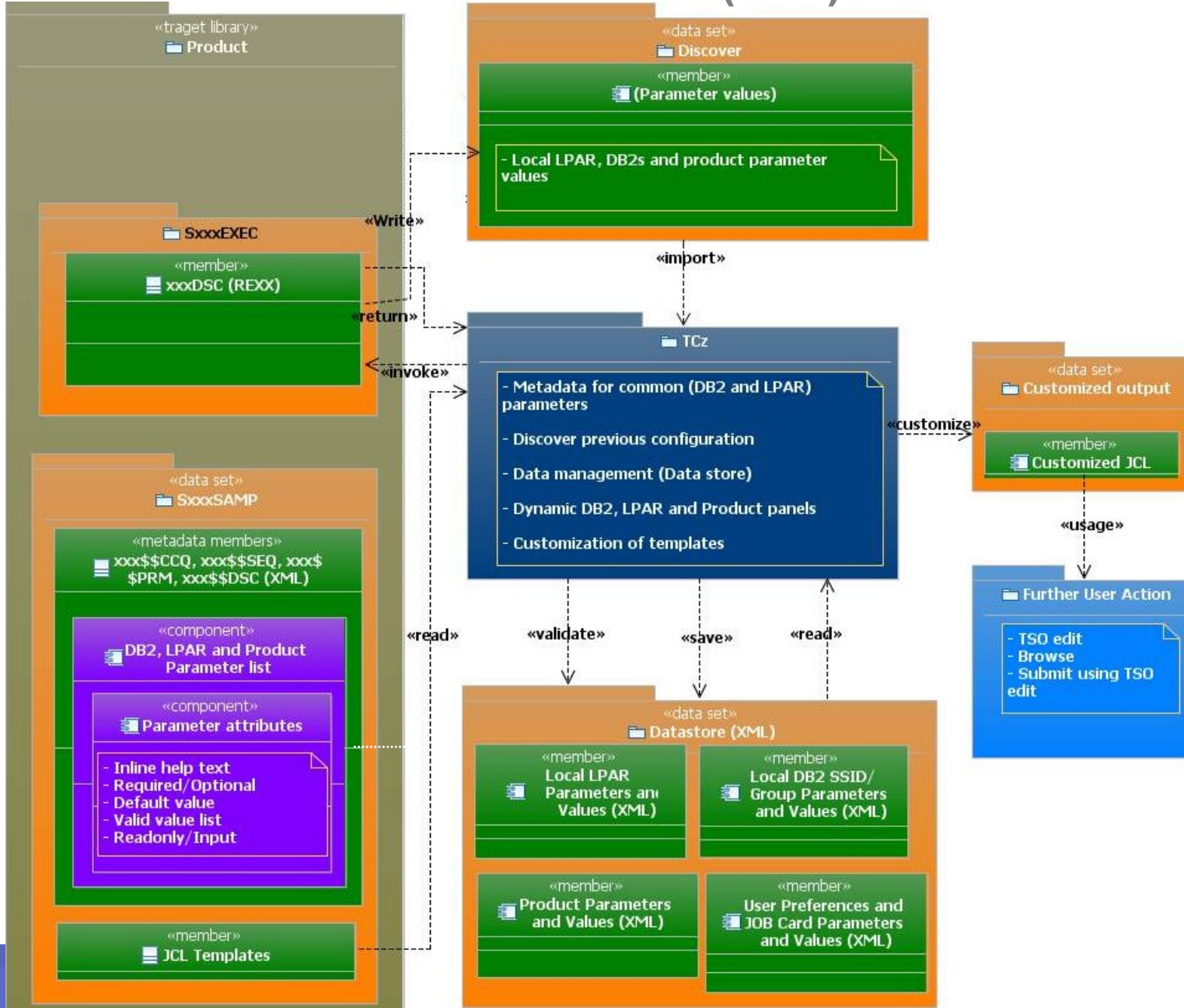
Planned delivery in next release of SQL PA

Benefits of TCz

Common customization utility for all DB2 Tool products provides:

- a. Consummability: Faster time to Tool usage
 - Due to automatic Discovery of previous release customization parameters, there is less manual entry. Product templates are customized by TCz. Provides Job execution sequence.
- a. Easy customization of multiple tools simultaneously
 - Step by step, with HELP text, ISPF panel-driven dialog allows specification of multiple DB2 Tool products customization.
- a. Faster propagation of customization across multiple LPARs
 - Resulting product customized skeletons can be saved on shared DASD or user can transmit to other systems for usage on other LPARs.
- a. Easier upgrades
 - Parameters from previous customization are saved for future new product releases and DB2 upgrades

DB2 Tools Customizer for z/OS (TCz)



DB2 Admin Tool Xploitation

DB2 Administration Tool Xploitation

- Drive immediate DB2 10 out-of-the-box Performance Savings
- Xploit DBA-managed Performance Improvements
 - ▶ Easily migrate existing Tables to Hash Access
 - ▶ Include additional Columns in Indexes to Xploit Index Only Access
- Xtend Administration Capabilities
 - ▶ Manage new Security models
 - ▶ Reduce Schema change overhead
 - ▶ Recover from Access Path regressions
 - ▶ Manage Autonomic Statistics collection
- Rollout Application BiTemporal Data – “as of”
 - ▶ Record changes in history – System Time
 - ▶ Define, update and query events in past or future – Business Time
 - ▶ Launch DB2 Table Editor to browse BiTemporal Data “as of” a point in time



DB2 Admin Tool Xploitation

- **Online Schema**
- **New security models**
- **Hash Tables**
- **Index Include Columns**
- **Temporal Data**
- **Inline LOBS**
 - ▶ Variable records
- **Access Path Stability**
- **Autostats**
 - ▶ Manage profiles
 - ▶ Retain old profiles and allow them to be reused



DB2 Automation Tool Xploitation

■ Autostats

- ▶ Support new architecture as proposed by Data Studio team
- ▶ Interface with existing job schedules

■ Reorg Avoidance

- ▶ Exploit new Clustering RTS
- ▶ Exploring how to avoid Reorgs for IM enhancements

■ Flashcopy Image Copies

■ Futures

- ▶ Support for Scheduler products



OMEGAMON for DB2 Xploitation

- **DB2 X support**
- **Customer requirements**
 - ▶ DS extensions - leverage a new OM PE XCF communication infrastructure to obtain:
 - CPU-Utilization of remote threads in classic
 - DSN Activity of remote threads in classic
 - ▶ Non-DS related OMEGAMON extensions
 - ATF* to include SQL-Statement text and associated host variables for static SQL
- **Support for ISAO**
- **Improved consumability via PARMLIB alternative to ICAT**
 - Extended Insight (E2E) for DB2 z/OS (OM EI)
- ATF* - Application Trcae Facility



Optimize Dynamic Infrastructure Performance

OMEGAMON for DB2 Xploitation

- Response Time Monitoring
 - ▶ 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
- Monitor Smart Analytics Optimizer



Recovery Tooling Xploitation

■ DB2 Log Analysis Tool

- ▶ Undo / Redo Temporal Data
- ▶ Flashcopy Image Copies
- ▶ Full support of all V10 log changes



■ Additional Flashcopy Image Copy Support

- ▶ DB2 Change Accumulation Tool
- ▶ DB2 Automation Tool
- ▶ DB2 High Performance Unload
- ▶ DB2 Administration Tool

Recovery Tooling Xploitation

■ DB2 Recovery Expert

- Undo and Redo BiTemporal Data with SQL undo/redo plans
- Xploit 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
- Xploit Recover Backout for faster recoveries



Cloning Tool Xploitation

- Create Subsystem Clones to test DB2 10 with minimal effort
- Xploit Storage-based copies to drastically reduce CPU and outages
- Automatically reduce number of Data Sharing Members
- **Convert Data Sharing to non-Data Sharing**
- **Mask sensitive data (without OPTIM)**
- **Create Subsystem Clone from System Level Backup**
- Supports native IBM, EMC and Hitachi Storage-based copies



Path Checker, Bind Manager and QM Xploitation

■ Path Checker

- ▶ Provide option to selectively drive Plan Management in V9/V10
- ▶ Save Access Paths based on potential regressions
- ▶ Invoke DB2 9 Plan Management before DB2 10 Migration

■ Bind Manager

- ▶ Drive V10 Plan Management



■ Query Monitor

- ▶ Track SQL Performance before and after Migration

Thank
YOU