



**DB2** Information Management Software

# Data Warehousing on System z...

*Is it right for you?*

Michaelyn Shelley-David – [michaelyn@us.ibm.com](mailto:michaelyn@us.ibm.com)

Jaime F. Anaya – [janaya@us.ibm.com](mailto:janaya@us.ibm.com)

IBM Software Group



# Disclaimer

The information contained in this presentation has not been submitted to any formal IBM review and is distributed on an "As Is" basis without any warranty either expressed or implied. The use of this information is a customer responsibility.

The materials in this presentation are also subject to

- enhancements at some future date,
- a new release of DB2, or
- a Programming Temporary Fix (PTF)

*IBM MAY HAVE PATENTS OR PENDING PATENT APPLICATIONS COVERING SUBJECT MATTER IN THIS DOCUMENT. THE FURNISHING OF THIS DOCUMENT DOES NOT IMPLY GIVING LICENSE TO THESE PATENTS.*

TRADEMARKS: THE FOLLOWING TERMS ARE TRADEMARKS OR ® REGISTERED TRADEMARKS OF THE IBM CORPORATION IN THE UNITED STATES AND/OR OTHER COUNTRIES: AIX, AS/400, DATABASE 2, DB2, e-business logo, Enterprise Storage Server, ESCON, FICON, OS/390, OS/400, ES/9000, MVS/ESA, Netfinity, RISC, RISC SYSTEM/6000, iSeries, pSeries, xSeries, SYSTEM/390, IBM, Lotus, NOTES, WebSphere, z/Architecture, z/OS, zSeries, System z.

*THE FOLLOWING TERMS ARE TRADEMARKS OR REGISTERED TRADEMARKS OF THE MICROSOFT CORPORATION IN THE UNITED STATES AND/OR OTHER COUNTRIES: MICROSOFT, WINDOWS, WINDOWS NT, ODBC and WINDOWS 95.*

***For additional information visit the URL***

**<http://www.ibm.com/legal/copytrade.phtml> for "Copyright and trademark information"**

# Agenda

- Warehousing Overview
- Decision criteria for warehousing
- How does IBM support warehousing strategies for System z
- IBM's Warehousing on System z roadmap
- Summary
- Q & A

# Understanding Terminology

- Business Intelligence (BI) and Data Warehousing (DW), and Warehousing (WH) are sometimes used interchangeably
  - Typically BI includes end user tools for query, reporting, analysis, dashboarding, etc...
  - Both concepts depend on each other
    - BI almost always assumes a Warehouse (WH), Operational Data Store (ODS), or Data Mart (DM) exists with timely, trusted information
    - A DW depends on end user tools that turn data into information.
- Both terms (DW/WH and BI) address desire for timely, accurate, available data delivered when, where, and how the end users want it

# Questions You May be Asking Yourself

# Questions about BI compliance

- Is our BI Warehouse in compliance
  - When will compliance issue force closer attention to data placement and data movement
  - Internal and external auditing compliance
    - Can you tell your auditors where all of your customer data is today
    - Can you tell them who did what to your data and when
- What does the Sarbanes-Oxley Act mean for my enterprise
  - Or SEPA, or Basel II, or the US Patriot Act, etc.
- Can my executives provide accurate, reliable, and timely information for public reporting
- Do we have the capabilities for:
  - Audits that meet the explicit requirements of Sarbanes-Oxley
  - Appropriate record retention
  - Mandated internal controls for IT systems
- How can I maintain volumes of data and still be able to access it when necessary
  
- **In short:** Who is ultimately responsible for compliance—are we ready

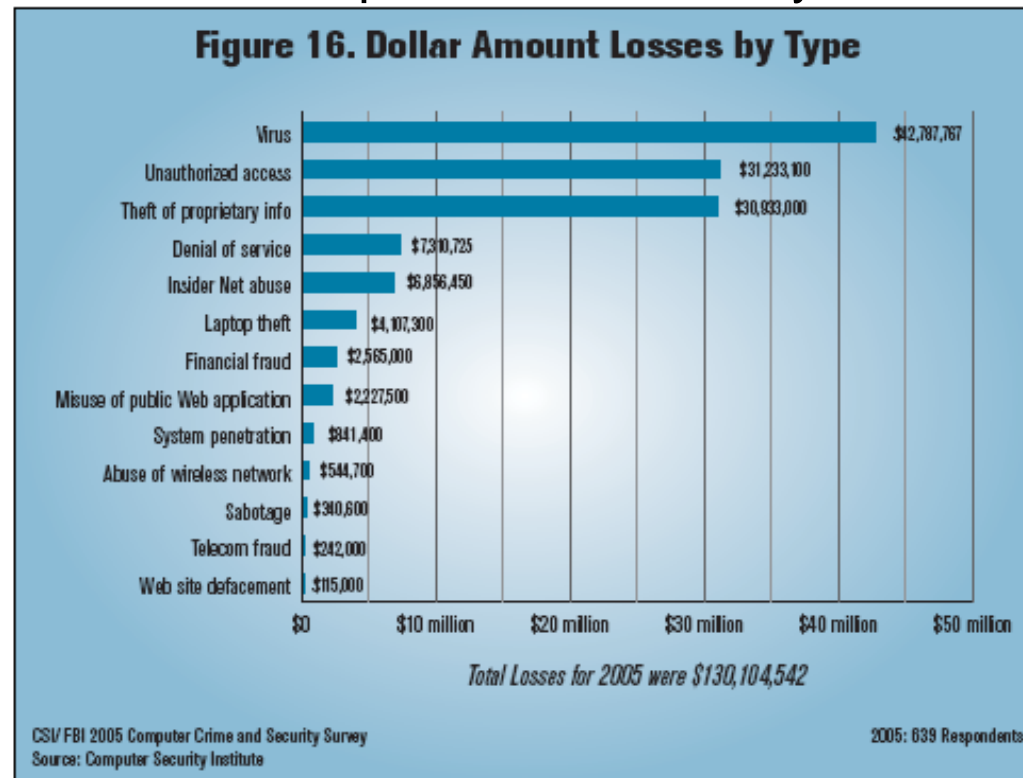
## Questions about risk to your BI solution

- How secure is our data
  - Where is the data that “runs” your business today?
  - Do you move it for use in DW and BI applications?
  - Is it ending up in multiple places to satisfy different BI solution needs
  - When it is in multiple places, are you sure which copies are correct/current
- What would the cost be
  - if you had a security breach?
  - if your data warehouse was unavailable?

# Cost of Security Incidents

- ✓ **Computer Crime Survey indicates virus attacks still continue as the source of the greatest financial losses.**
- ✓ **Unauthorized access, and theft of proprietary information show a dramatic cost increase year to year.**
- ✓ **Loss from unauthorized access to information:**
  - \$51,545 in 2004 -> \$303,234 in 2005
- ✓ **Loss from theft of proprietary information**
  - \$168,529 in 2004 -> \$355,552 in 2005.
- ✓ **The percentage of organizations reporting computer intrusions to law enforcement has continued a multi-year decline.**
- ✓ **Major reason for non reporting is concern over reputation damage.**

## CSI/FBI Computer Crime Survey 2005





# Questions about meeting end user demands

- Is BI Mission Critical for my business?
- Is our BI warehouse becoming real time oriented?
  - Do we need a warehouse that can run help run our business in the present rather than analyze what happened to the business in the past
  - Is the need to access operational data in near real time making BI part of the OLTP workload
- How will we handle continued growth in data?
- Can my users easily access timely data on the mainframe?
  - Will user access compromise security
- Can we scale (and control):
  - The amount of total data
  - The number of queries/transactions
  - The number of users and the sophistication of their demands
- How can I meet increasing end user demands without additional resources?

## Questions about your enterprise BI strategy

- Do we have a clear and focused BI strategy
  - Can it be integrated easily into the rest of the business
  - Can it be supported by the current IT infrastructure
- Our business runs on System z (for very good reasons!) -- should our BI warehouse be there too
- What is the best BI warehouse infrastructure for our business
  - Standalone warehouse on z
  - A hybrid environment (System z plus distributed)

# What IBM is hearing from our System z customers

## ■ Needs:

- Increasing demands for sophisticated analysis with real time operational data Need reporting & analytic capabilities for operational data on z/OS
- High requirement for system, platform, and data security
- Desire to optimize & leverage existing System z infrastructure and skills

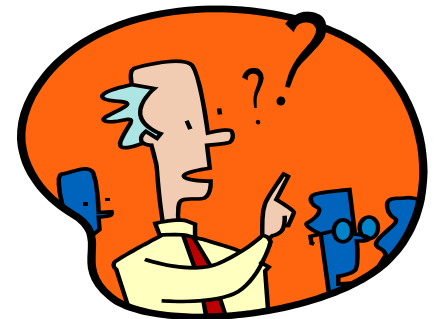
## ■ Issues:

- Existing solution requires complex and costly data movement
- Requirements for compliance across end-to-end data integration and analytic components
- Need help managing high growth of ‘3 Vs’
  - Volume, Variety, Velocity

# How does IBM support Warehousing on System z

# System z makes data available

- **System z and DB2 for z/OS provide highest levels of availability, resiliency, security, and recovery**
  - **Sysplex and DB2 data sharing**
    - Availability (GDPS for DR)
    - Parallelism and Horizontal scalability
- **System z Work Load Manager**
  - Can balance workload with different SLAs based on business policies/needs
  - Provides 100%+ system utilization
- **Single System**
  - Easy to integrate
  - Less costly to manage, Lower TCO
- **Provide true real-time Operational Data Store (ODS)**
  - Operational data is on DB2 for z/OS
  - Real time ODS can be on same DB2
  - Near real time ODS kept in sync with the operational data
    - (same or different DB2 instance)



# Cost of Ownership is King

## The 'Hidden' Operational Costs of Computing

- Downtime
  - **Cost of downtime can vary by industry and can range from hundreds of thousands to millions of dollars per hour**  
©Robert Francis Group. All Rights Reserved 2005
- Security breaches
  - **More Than 90% Of Companies Expose Sensitive Data**  
Reconnex Insider Threat Index August 2005
  - **Businesses Reluctant To Report Cyber Attacks**  
2005 CSI/FBI Computer Crime and Security Survey
  - **One In Four Identity-Theft Victims Never Fully Recover**  
Nationwide Mutual Insurance Co. Survey July 2005
  - **Card Associations Unite Setting Standards to Fight Fraud**  
Green Sheet Inc. August 2005 Issue 2
- Management and administration
  - **'However, the costs of supporting and managing these complex environments and infrastructures have soared, and now far outweigh the customer's expenditure on new systems themselves'**  
© Software Strategies 2005 11



*IBM Mainframe solutions are highly available, highly secure and highly managed to help lower TCO*

# Operational data and ODS together means

- Reduced complexity
- Reduced cost
- Shared processes, tools, procedures
- Streamlined compliance and security

# Compliance is better supported on System z

- Single version of the truth
  - Data confined to one location regardless of where the application is running
- Single process to manage compliance
- Fewer people to manage compliance process
- Single place for auditors to look
- Industry specific data models



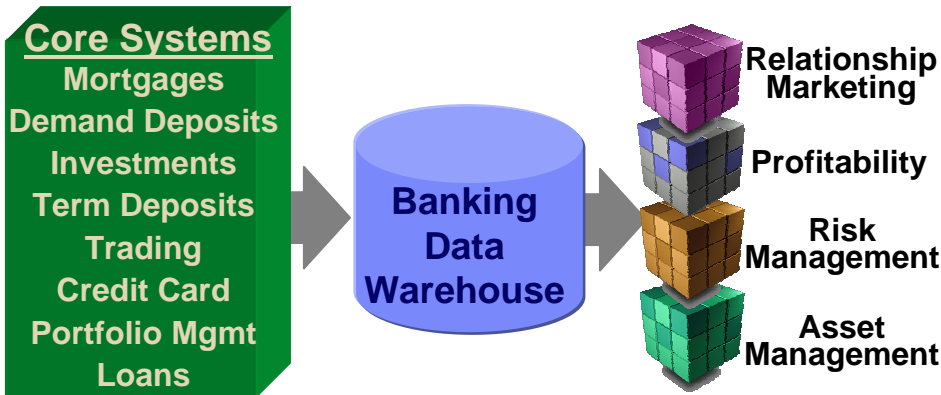
# IBM's Industry Models assist DW Compliance

- Strategic, business-oriented blueprint for transforming an existing IT landscape using a Service-oriented Architecture
  - Detailed pre-defined business content
  - Focused on key business issues:
    - Compliance, Customer Insight, Cost Reduction
- Superior, integrated platform containing data, process and integration models, repository and proven methodology
- Industry-specific Analysis and Design accelerators
- Typical Technical usage areas:
  - Business Intelligence (BI)
  - Service oriented Architecture (SOA)

# IBM Data Models – Foundation for Industry Business Solutions

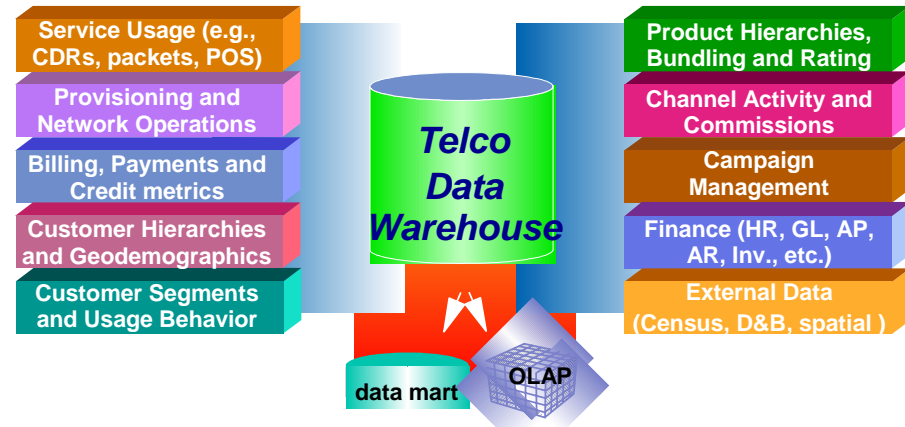
## Banking

### Banking Data Warehouse (BDW)



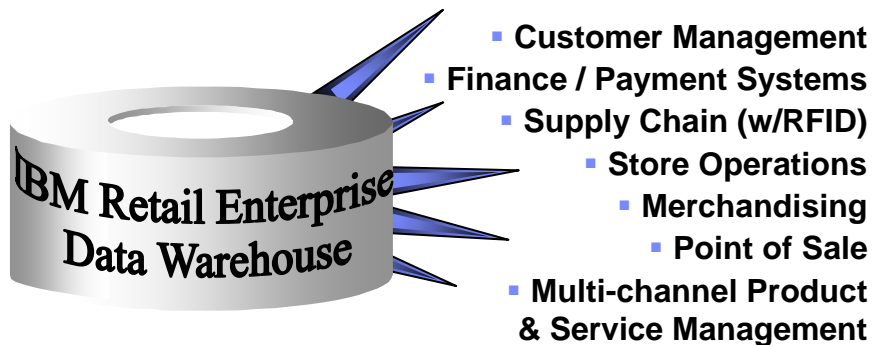
## Telecommunications

### Telco Data Warehouse (TDW)



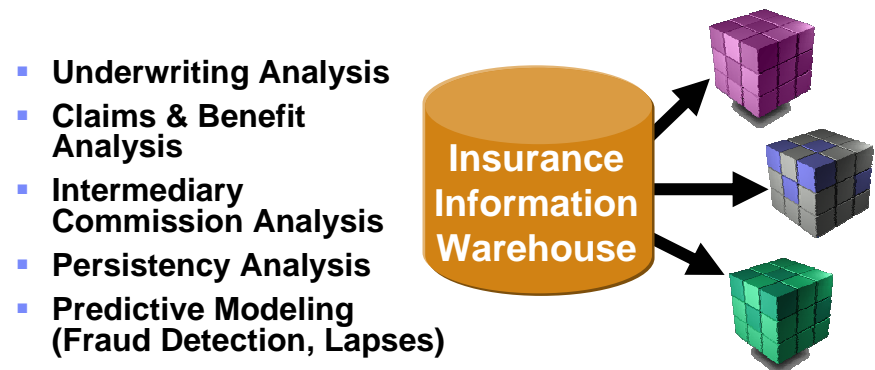
## Retail

### Retail Business Intelligence Solution (RBIS)



## Insurance

### Insurance Information Warehouse (IIW)



# Data Models Address Compliance Challenges

## Basel II & Solvency II



BANK FOR INTERNATIONAL SETTLEMENTS

- International accord for the handling of risk
- Requires the collection of 7 years of data
- Focuses on credit and operational risk
- Specifies the need for supervisory control
- Reporting guidelines being defined

## Payment Regulations



- SEPA initiative to establish a single euro payments area
- Secure fast and efficient payments in the euro-zone
- Standard service levels to be enacted by 2010
- Other regulatory Issues - Check 21, OFAC

## Corporate Governance



U.S. SECURITIES  
AND EXCHANGE  
COMMISSION

*"We are the investor's advocate."*  
William O. Douglas  
SEC Chairman, 1937-1939

- Systems Control Effectiveness
- Decision Support Evaluation
- Clarity of Financial Reporting
- Internal Control Assessments/ Reviews & Governance
- Financial Reporting Disclosure
- Legislation in force in many countries, e.g. Sarbanes Oxley Act (SOX)

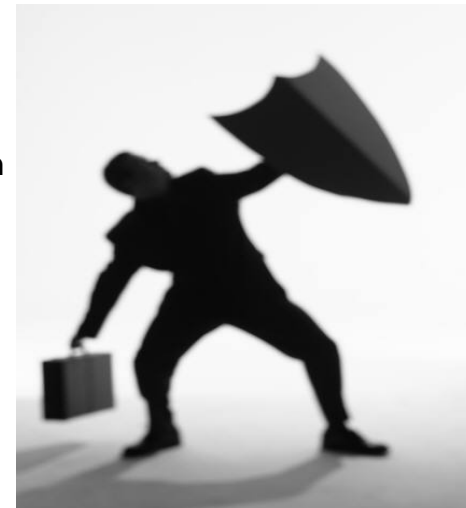
## Anti Money Laundering



- Many jurisdictions now have AML legislation in force (US PATRIOT Act, UK Proceeds of Crime Act)
- Financial Action Task Force (FATF) set up to establish an anti-money laundering network that would include regional anti-money laundering bodies

# Additional Assistance for Compliance

- **Superb z9 Cryptography**
  - Hardware assisted
  - End-to-end
- **IBM tools to assist in Compliance**
  - **DB2 Audit Management Expert**
    - Centralized easy-to-use support for your auditing needs Enables auditors to collect, view, analyze, and report on data and save it into an audit repository
    - Provides accurate record of who did what, when and where
  - **DB2 Test Data Base Generator**
    - Use transformation capabilities to protect sensitive production data for use in test environments
    - Take one more area off the auditor's checklist
  - **DB2 Data Archive Expert**
    - Large amounts of data need to be kept to comply with retention requirements
    - Regulations require a centralized approach to archiving as opposed to application by application
    - Operational benefits to archiving inactive production data



# Security - Empowered by System z

- ✓ Built in security to address the full spectrum of security requirements
- ✓ Policy based security management
- ✓ Addresses security functional domains
- ✓ Designed to meet evolving applications needs
- ✓ Addresses multiple resource types- applications, data, networks
- ✓ Positions System z as a “secured vault”
- ✓ Proven heritage and experience base
- ✓ Common criteria certified
- ✓ Simplifies security infrastructure
- ✓ Integrated System z, z/OS and DB2 security
- ✓ Most important -----
  - ✓ DB2 is integrated with it!
  - ✓ It Works!



*“Whilst the performance and resilience characteristics are formidable, it is the security features that are likely to attract most attention”*

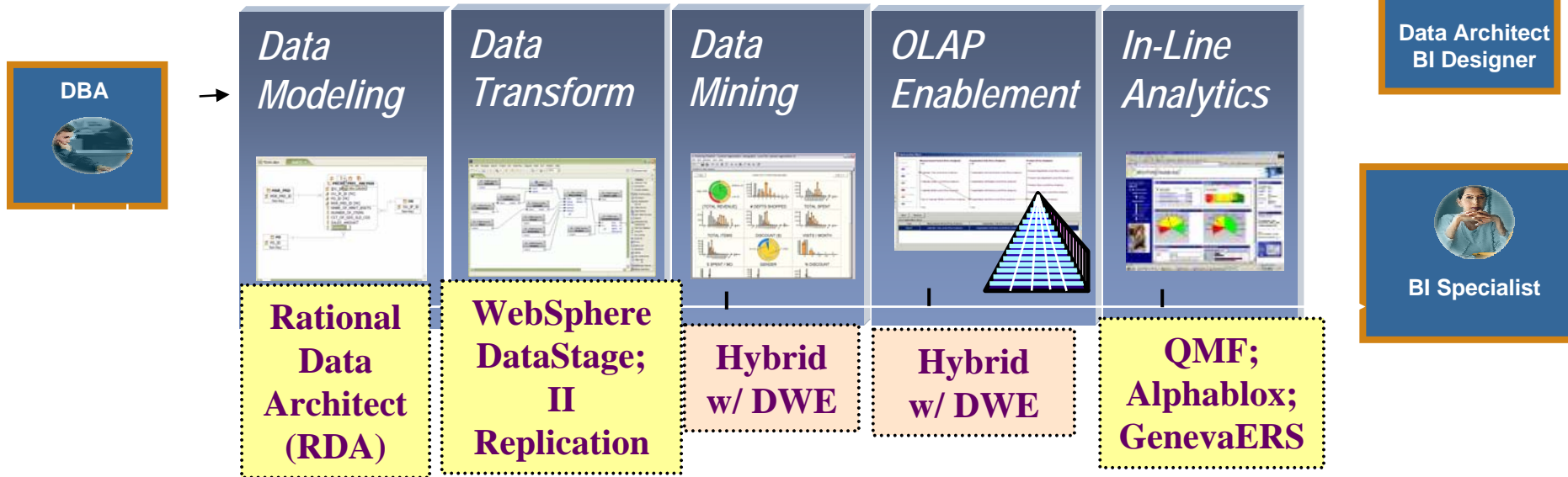
Tony Lock – Chief Analyst, Bloor Research 2005

***Proven secure by 40  
years of operation!***

# Meeting End User Needs with Warehousing on System z by supporting your Warehousing strategy

# Where IBM has invested for DW on z (so far!)

## Industry Data Models: Banking, Retail



### System Admin Tools to address

- Security and Regulatory Compliance
- Performance
- Application Management



# What WH/BI Capabilities Exist Today For System z

- DB2 V8
  - Functional and performance enhancements
  - Easier online reporting and data management capabilities
  - DB2 family compatibility – including MQTs
- Integration
  - WebSphere QualityStage, WebSphere DataStage, WebSphere Replication Server & WebSphere II Classic Federation
- Analyze/Report
  - DB2 Alphablox, DB2 QMF
  - Partner offerings from Hyperian, Business Objects, Cognos, SAS, IBI, etc.
- Security and Regulatory Compliance
  - DB2 Data Archive Expert, DB2 Test Database Generator, DB2 Audit Manager Expert, IBM Encryption for DB2 and IMS Databases
- Performance
  - IBM Tivoli Omegamon XE for DB2 Performance Expert on z/OS, DB2 High Performance Unload (HPU)
- Application Management
  - DB2 Table Editor, DB2 Web Query Tool, DB2 Automation Tool, DB2 Query Monitor



# IBM Supports Alternative BI Architectures

- “Pure” System z BI Solution
  - ODS, Data Warehouse & Datamart(s) in DB2 z/OS
    - On same subsystem, or on different subsystems on same LPAR, or on different subsystems on different LPARs
  - End User Tools (e.g. QMF, Business Objects, Cognos) access DB2 z/OS directly (fat client implementation) or via browser (web server implementation)
    - Example is QMF for Windows vs. QMF for WebSphere
- “Hybrid” BI Solution
  - ODS & Data Warehouse in DB2 z/OS
  - Reporting solution runs on distributed WAS, e.g. Alphablox, QMF, Cognos ReportNet, Business Objects Server
  - Relational, Multidimensional (OLAP) and Statistical Datamarts on pSeries and/or xSeries supporting End User Tools, e.g. Hyperion Essbase, Cognos, SPSS, etc.

# IBM's Warehousing on System z roadmap

# Why warehousing on System z

- IBM System z customers are asking for more warehousing capabilities
  - To answer specific needs and concerns
    - Security, availability, compliance, data volume and timeliness (including real time or near real time), etc.
  - To maximize their technology investments
    - System z infrastructure and resources
- Advances in recent mainframe hardware and software technologies have optimized the z/OS platform for enterprise data integration and warehousing
- Significant DW capabilities have been added to DB2 V8 with even more coming in v9
  - DB2 enhancements are specifically focused on warehousing
  - Strengthen DB2 as the data hub of the enterprise
- New specialty engines free up capacity and optimize z IT infrastructure
  - DB2 enhancements are specifically focused on warehousing
    - Strengthen DB2 as the data hub of the enterprise
- Development and acquisition of technologies to meet the growing need for secure, available, auditable warehouses

# DB2 V8 exploitation of IBM zIIP value add

- Portions of the following DB2 for z/OS V8 workloads may benefit from zIIP\*:
  - ERP, CRM, Business Intelligence or other enterprise applications
    - Via DRDA over a TCP/IP connection (enclave SRBs, not stored procedures or UDFs)



## 2 - Data warehousing applications\*

- Requests that utilize parallel queries

## 3 - DB2 for z/OS V8 utilities LOAD, REORG & REBUILD\*

- 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.

## System z Enterprise Hub for Mission Critical Data

- ❖ With a strong foundation for transaction processing, built on 40+ years of technology innovation, System z servers with z/OS and DB2 can provide a premier platform for data serving (OLTP, Warehousing, Web Services, and more) today and into the future\*
- ❖ IBM plans to continue to invest in new solutions to address customers' strategic information on demand goals\*



### Today's Capabilities

- Industry-leading data integrity and security
- Data sharing solution for centralized view of data
- Scalability and availability for enterprise class workloads
- Comprehensive systems and data management environment



### Extension of capabilities\*

- New specialty engine (zIIP) with DB2 exploitation - for mission critical ERP, CRM, and Data Warehousing workloads \*
- Database support improves regulatory compliance and autonomies
- Support of encryption capability (tape subsystem) with z/OS centralized key mgmt
- Data protection to achieve highest levels of security certifications



### Future direction\*

- Additional zIIP exploitation where it makes sense anywhere in the software stack
- DB2 enhancements to help improve usability and reduce complexity and management costs.
- DB2 query enhancements (table scan acceleration via DS8000 and more)
- Support of encryption capability (disk subsystem) with z/OS centralized key mgmt
- Handle larger volumes of data, with improved scalability for varied workloads (**OLTP, Warehousing**)

\*All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

# Summary

# Where you put your Data Matters....

## Confidence in System z, z/OS and DB2 for z/OS

### ■ Integrity

- z/OS® System Integrity Programming Standard – in writing
- IBM System z™ integrity features that help protect data

### ■ High availability

- Designed with a ‘Never go down’ philosophy as opposed to a ‘rapid reboot’ philosophy
- Capability of providing concurrent HW maintenance and upgrades and rolling changes to DB2® for z/OS (in a Parallel Sysplex® cluster) can mean fewer database outages

### DB2 for z/OS in:

- 25 of the top 25 WW banks\*
- 23 of the top 25 US retailers\*\*
- 9 of the top 10 global life/ health insurance providers\*\*\*

### ■ Security

- Encryption, encryption, encryption – comprehensive solution
- MLS – merge data into single server and helps preserve data isolation.
- Helping address regulatory compliance with ability to establish centralized policies and procedures for privacy, security and audit

### ■ Total Cost of Ownership (TCO)

- **Systems and database management**

**IBM is uniquely positioned to help customers make  
the very best use of their information assets  
-- *Whether on mainframe or distributed platform***



# Questions

# Additional Supporting Information

# All of Those Hardware Features



- **Parallel Sysplex (Data sharing)**
  - Coupling Facilities for high performance multi-system data sharing
  - Provides scalability and availability
- **Workload Manager™ (WLM)**
  - Business importance honored in mixed workloads
  - Improve utilization
- **Hardware-assists**
  - Data compression- Reduce storage and CPU, faster backup and recovery, possible performance boost, excellent TCO
  - Encryption – secure data
  - Sort Assist
  - Unicode Translation
- **IBM Total Storage**
  - Parallel Access Volumes (PAV)

# More choice for your business *Evolution of specialty engines*

Building on a strong track record of technology innovation with specialty engines, IBM introduces the System z9 Integrated Information Processor



**IBM System z9 Integrated Information Processor (IBM zIIP) 2006**

Designed to help improve resource optimization for eligible data workloads within the enterprise

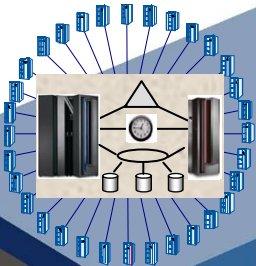
**IBM System z Application Assist Processor (zAAP) 2004**

Designed to help improve resource optimization for z/OS Java™ technology-based workloads



**Integrated Facility for Linux (IFL) 2001**

Support for new workloads and open standards



**Internal Coupling Facility (ICF) 1997**

Centralized data sharing across mainframes

# New IBM System z9 Integrated Information Processor (IBM zIIP)

- New specialty engine for the System z9 mainframe designed to help:
  - Customers integrate data across the enterprise
  - Improve resource optimization and lower the cost of ownership for eligible data serving workloads
  
- z/OS manages and directs work between the general purpose processor and the zIIP
  - Number of zIIPs per z9 EC and z9 BC not to exceed number of standard processors
  - No changes anticipated to DB2 for z/OS V8 applications
  - Price for each zIIP is \$125k (US) – consistent with other specialty engines.\*
  - No IBM software charges on the zIIP – consistent with other specialty engines
  
- DB2 for z/OS V8 will be first IBM exploiter of the zIIP with
  - System z9
  - z/OS 1.6 or later
  - DB2 for z/OS V8

## DB2 Audit Management Expert helps auditors and DBAs

- Provides centralized auditing tools that can bring together information from many different sources into a correlated, coherent view of the system
- Enables auditors to collect, view, analyze, and report on data and save it into an audit repository
- Enables product administrators to define customized filter policies for the collection of audit data
- Provides a separate administration user interface to allow product administrators to easily define users and groups, assign privileges, define data collection policies, and perform other administrative tasks
- Provides an auditor-friendly reporting user interface with many different options for examining data in the repository. The user interface allows detailed analysis and visualization of data collected by the DB2 auditing tool
- Allows the ability to automatically generate reports. Auditors can write their own reports against the repository in the report facility of their choice and export the data into other applications such as Excel®. Batch reporting is also available
- Performs detailed log analysis of collected data

# DB2 V8: More Than 50 Features Relevant to BI

## Performance

- Data-partitioned secondary indexes (DPSI)
- Multiple DISTINCT clauses in SQL statements
- Reduced lock contention on volatile tables
- Coupling Facility lock propagation reduction
- Multi-row INSERT/FETCH
- REOPT(ONCE) to reduce host variables impact on access paths
- Index-only access for VARCHAR columns
- Backward index scan
- Faster short PREPARE
- IN access path performance
- DDF performance enhancements

## Business warehouse

- Sparse index for star join
- More tables in join
- Common table expressions
- Recursive SQL
- Materialized query tables

## Continuous availability

- Changing clustering index as online operation
- Elimination of BUILD2 phase of REORG with DPSIs
- Online schema evolution for many column types
- Volume-level, automated backup and recovery
- CI size larger than 4 KB
- More log data sets
- Conditional restart enhancements
- Support for synchronizing log point

## Architecture

- Unicode support
- Introduction of DB2 Connect
- DB2 Universal Driver for JDBC
- 64-bit virtual storage for most DB2 storage areas
- Up to 4096 partitions
- Longer table/column names
- SQL statements up to 2 MB
- ASCII precompiler

## Ease of use

- Clustering decoupled from partitioning
- New REORG option to reorganize all partitions in Reorg-pending state
- CREATE INDEX invalidates statements from dynamic statement cache
- Indexes created as deferred are ignored by DB2 optimizer
- LOB ROWID transparency
- Collecting distribution statistics on arbitrary sets of columns with RUNSTATS
- Fast cached SQL invalidation
- Automatic space management
- Statements IDs of cached statements as input to EXPLAIN
- Statement ID in IFCID 124
- Long-running non-committing reader alerts
- Lock escalation reporting
- Transaction-based DB2 accounting and workload management
- Stored procedures to facilitate database administration
- Network statistics with DB2 Connect
- DRDA ping
- Comments in dynamic SQL
- CTE-based optimizer hints

# DB2 9: Another Feature Rich Release for BI

## Performance

- New row internal structure for faster VARCHAR processing
- Fast delete of all the rows in a partition
- Numerous enhancements in 'smaller' LOB performance
- Fast LOB streaming
- Reducing log latch contention
- Deleting first n rows
- Skipping uncommitted inserted/updated qualifying rows
- Faster release of LOB locks
- Reducing data sharing overhead for global indexes
- Functional indexes

## Business warehouse

- Dynamic index ANDing
- Reduce temporary tables materialization
- Generalizing sparse index/in-memory data caching

## Continuous Availability

- Partition-by-growth as a means to remove non-partitioned tablespace size limit
- Full support for system-level backup and recover (automatic offload to tapes and individual objects recovery)
- Renaming SCHEMA and VCAT to facilitate fast database provisioning
- Rename index
- Reorganization of LOBs to reclaim space
- Online REORG enhancements
- Online REBUILD index

## Architecture/SQL

- Thin DB2 Connect Client
- FOR BIT DATA collating sequence (VARBINARY)
- Full JDBC compliance
- Enable Decimal Float data type (pre-conditioning)
- BIGINT data type
- Index compression

## Architecture/SQL (con't)

- Provide more VS relief for thread related storage (partially)
- Unicode support for all CLI functions
- MERGE statement
- SET operations

## Ease of Use

- Implicit objects creation
- Enhancing real time statistics (Optimization Service Center)
- Autonomic reoptimization
- Integration of Real Time Statistics tables into the catalog
- Simulating indexes in EXPLAIN (Optimization Service Center)
- More autonomic bufferpools tuning (WLM synergy)
- RLF support for end-user correlation
- TRACE support for end-user correlation
- Enhance tracing in DB2 Connect
- Identifying unused indexes
- Enhancing IFC for IRLM diagnostics
- DSNACCOR enhancements



# Business Benefits of DB2 9

**Greater business insight  
faster**

- *pureXML™ makes XML as data cost effective*
- *Delivers trusted information in business context*
- *Facilitates SOA for greater business flexibility*

**Optimized infrastructure**

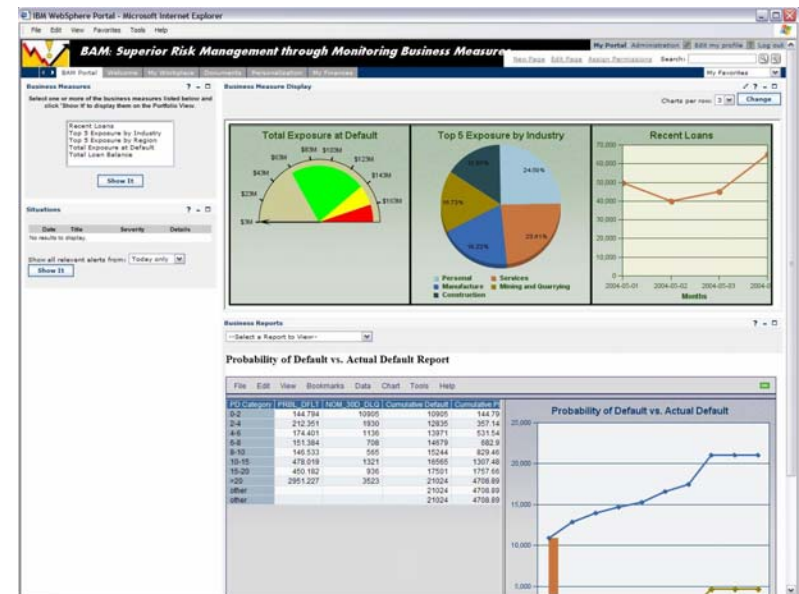
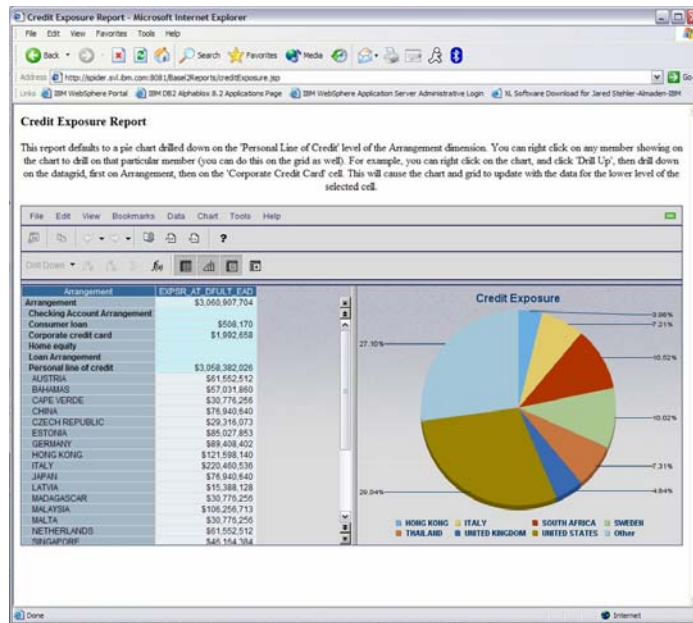
- *Minimize administration costs with extensive self optimizing capabilities*
- *Reduce storage costs by up to 80%*
- *Provides scalability and resiliency for all workloads*

**Faster, lower cost  
development**

- *pureXML simplifies access to XML data*
- *Provides interfaces & integration for popular programming languages and tools*
- *Consistent usage of industry standards*

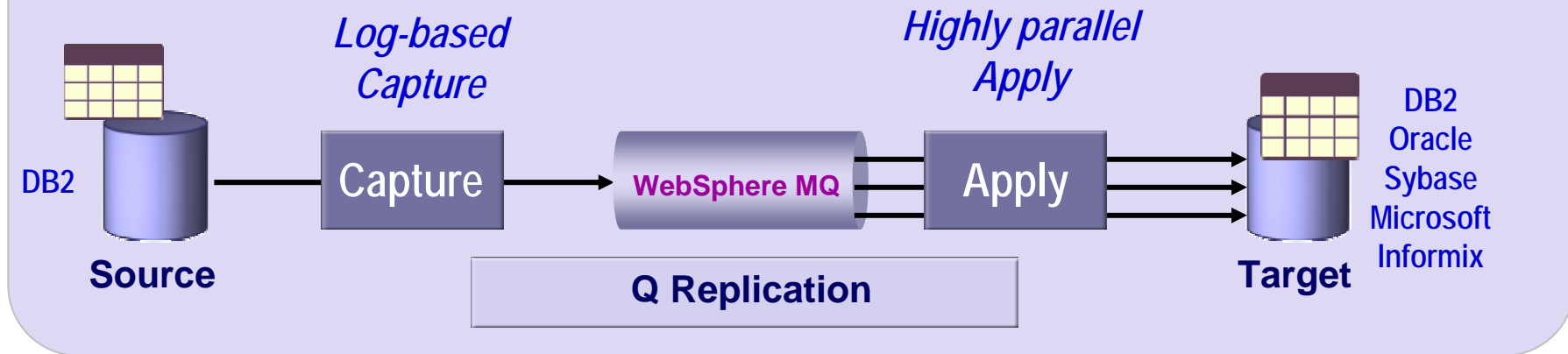
# Analytics with DB2 Alphablox

- Platform for Customized Analytic Applications and Inline Analytics
- Provide reporting and dashboard capabilities on key indicators
- Leverage operations such as ranking, ordering, filtering, trending, and other sophisticated statistical functions and calculations
- Drive data analysis from multiple data sources, both relational and multidimensional

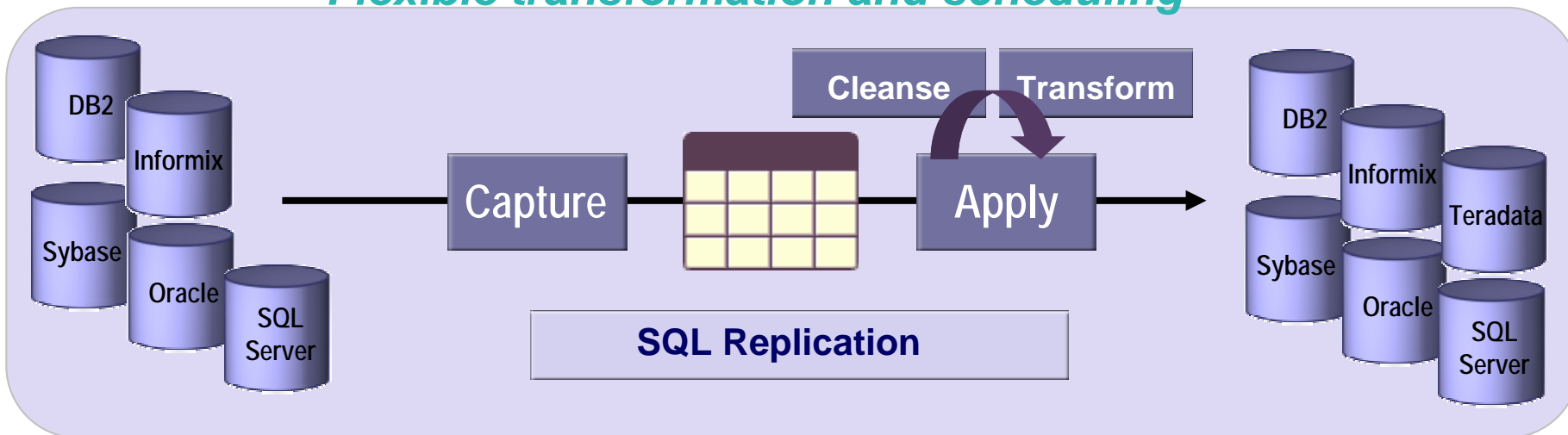


# WebSphere II Replication

*Extremely low latency replication for peer-to-peer environments*



*Flexible transformation and scheduling*




# WebSphere Information Integrator Classic Federation

- Provides end user access to mainframe data
  - Enables end users to integrate mainframe data with business applications and processes
- How it does it ?
  - Connects mainframe data with any ODBC or JDBC enabled platform
  - Sources supported include CA-IDMS, CA-Datcom/DB, Software AG Adabas, IMS/DB, VSAM and DB2 UDB for z/OS
- What is the benefit ?
  - Accelerates time-to-value of enterprise integration projects
  - Minimize dependence on scarce mainframe skills




# Data Transformation & Movement: WebSphere DataStage

- Codeless visual design of data flows with hundreds of built-in transformation functions
- Optimized reuse of data integration objects
- Leverages parallel processing without requiring design changes
- Capable of supporting batch and real-time operations




**Developers**



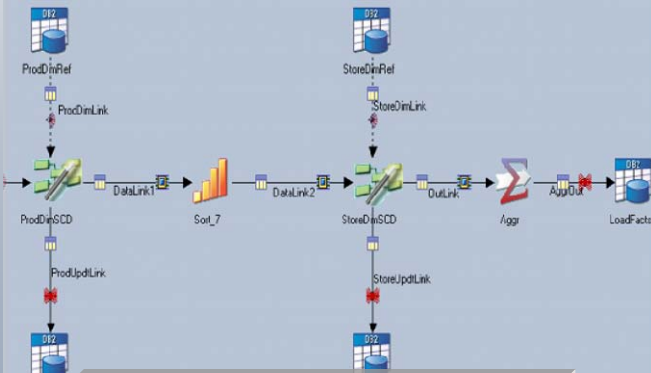
**Architects**

**Transform**



**WebSphere. DataStage®**

**Transform and aggregate any volume of information in batch or real time through visually designed logic**



**Hundreds of Built-in Transformation Functions**