Redefining What's Possible on System z with Data Warehousing and Business Intelligence

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Agenda

- Why Warehousing on System z ?

- System z10™

- DB2 for z/OS Enhancements in V8 and V9

- Information Server for System z

- Technology Preview for Cognos for System z

Why Warehouse and BI on System z?

Dynamic Warehousing
A New Approach to Leveraging Information

Information On Demand
to Optimize Real-Time
Processes

Action

*Dynamic
Warehousing*

OLAP & Data Mining
to Understand Why and
Recommend Future Action

Analysis

*Traditional Data
Warehousing*

Query & Reporting
to Understand
What Happened

Reporting

Examples of Dynamic Warehousing in Action
Enabling Information On Demand for Business Advantage

Traditional warehousing		Dynamic warehousing
Insurance fraud analysis and reporting	▶	Identifying potentially fraudulent claims prior to approval and payment **Transforms healthcare**
Reporting on customer issues	▶	Identifying possible related issues, churn risk and cross-sell opportunities while engaged with the customer **Transforms customer service**
Historical sales analysis and reporting	▶	Understanding relevant customer information to identify cross sell opportunities and improve negotiating position at the point of sale **Transforms sales effectiveness**
Crime statistics and reporting	▶	Identifying related incidents and potential suspects prior to arriving at the crime scene **Transforms crime fighting**

The Changing Warehouse Terrain

"As a direct effect of the mixed workload, with continuous loading and the increase in automated transactions from the functional analytics in OLTP, the transactional DBMSs have an edge that challenges the DW DBMSs"
………from Gartner Magic Quadrant

Traditional warehouse

OLTP

DW

Benefits of a transactional data server foundation

Optimized for real-time access,
High availability and reliability
Scalable, secure and auditable

Dedicated warehousing

Advanced data partitioning
Workload management

DBMS

Data Warehousing on DB2 for z/OS – What is driving this?

- Customer commitment to the z platform
  - Customers want to protect their significant investment in System z
  - TCO can be reduced through the utilization of existing processors, people, practices
  - TCO may also be achieved through a consolidation approach

- New BI trends are changing the DBMS landscape
  - The distinction is blurring between warehouse and OLTP databases based on new trends such as Dynamic Warehouse and Operational BI, driving:
    - The need for increased reliability, availability, security, and compliance in a DWH DBMS
    - The need for very current warehouse data, where proximity to the source provides an advantage

- Many z customers already have a DWH on DB2 z/OS
  - This drives requirements into hardware and software, which in turn drives a trend
  - DB2 has responded with increased functionality and performance; hardware changes are driving down costs

- Specialty processors provide new ways to optimize TCO
  - zIIPs and IFLs are driving down hardware and software costs; DWH/BI can make excellent use of these processors, ultimately driving TCO advantages

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**

Cost of Ownership is King
The 'Hidden' Operational Costs of Computing

- 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
- 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

- 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

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

Another Motivation – "Going Green"
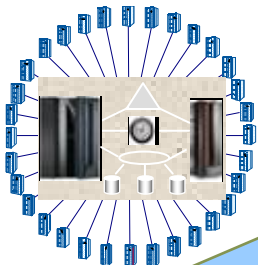

Now it's easy being green!

Technology Evolution with Mainframe Specialty Engines

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

IBM System z9 Integrated Information Processor (IBM zIIP) 2006

- Centralized data sharing across mainframes

System z9 Application Assist Processor (zAAP) 2004

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

Integrated Facility for Linux (IFL) 2001

- Incorporation of JAVA into existing mainframe solutions

Internal Coupling Facility (ICF) 1997

- Support for new workloads and open standards

Specialty Processors in a DB2 for z/OS Warehouse Solution

Member A
OLTP

Member C
DWH

CEC One

Member B
OLTP

Member D
DWH

CEC Two

**ETL Tools
DWH Mgmt**

BI Tools

Extract

Load

Query

zIIP

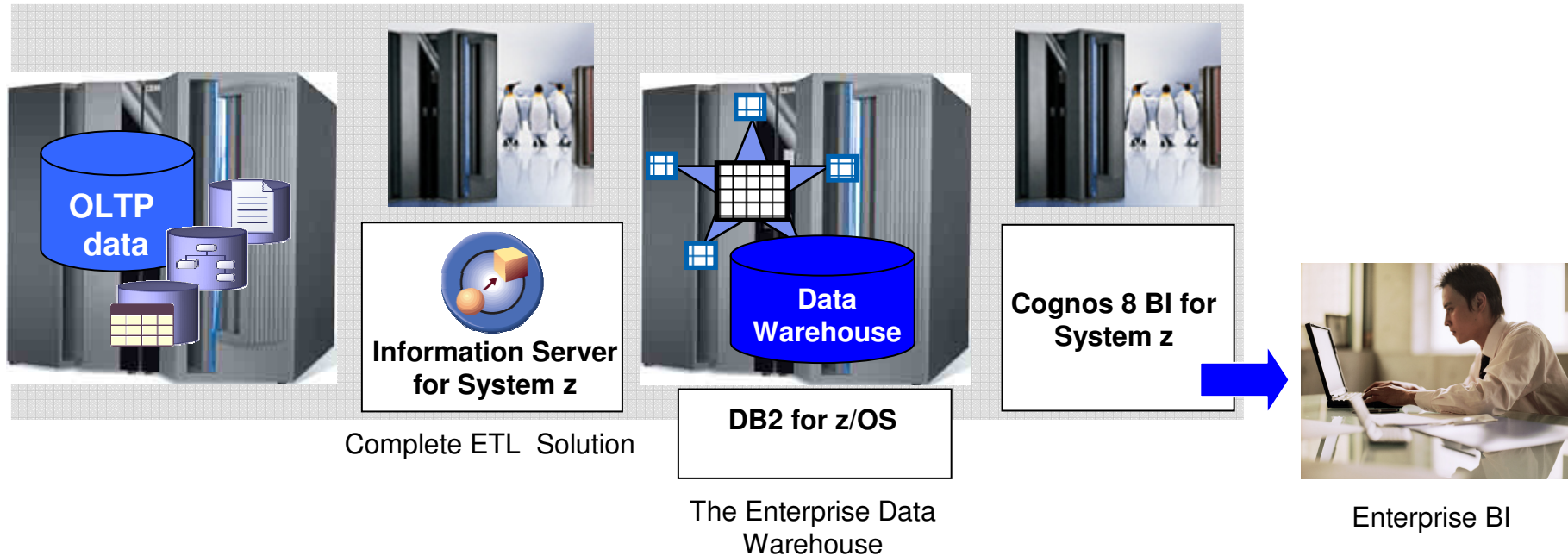CP   z/OS   ICF   CP   z/OS   IFL   zLinux
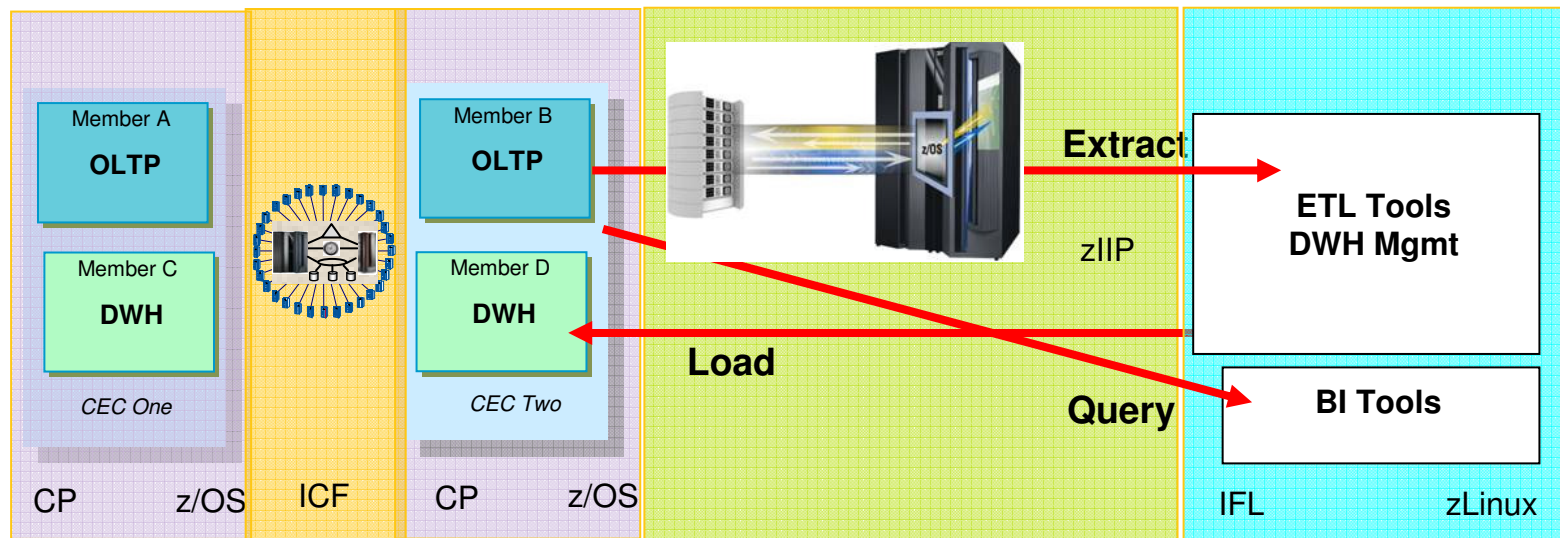
ICF – Uniquely allows a Data Warehouse database to coexist with an OLTP database

IFL – Enables efficient data movement (secure, high-speed hipersockets)

- **Lowers TCO through reduced hardware and software costs**
- **Enables use of zIIPs during extract and further reduces costs**

zIIP – Further enables lower cost of Business Intelligence queries

Data Warehouse and BI Architecture for System z

OLTP data

Information Server for System z

Complete ETL Solution

Data Warehouse

DB2 for z/OS

The Enterprise Data Warehouse

Cognos 8 BI for System z

Enterprise BI

Core Offering for Enterprise Data Warehouse and BI:

- Information Server for System z
  - A complete set of ETL tools for warehouse population and management
- DB2 for z/OS , including the new Value Unit Edition
  - A new value point for new DB2 z/OS workloads
- Coming Soon! Cognos 8 BI for System z (beta announced 2/26)
  - A comprehensive System z offering for Enterprise BI

System z10TM

Introducing the IBM System z10™ Enterprise Class…
a marriage of evolution and revolution

Evolution

- Scalability and virtualization to reduce cost and complexity
- Improved efficiency to further reduce energy consumption
- Improved security and resiliency to reduce risk
- New heights in storage scalability and data protection

Revolution

- 4.4 GHz chip to deliver improved performance for CPU intensive workloads
- 'Just in time' deployment of capacity resources
- Vision to expand System z capabilities with Cell BE™ technology

Continuing the modular design for flexibility
Facilitates upgradeability and availability

IBM System z10 Enterprise Class (z10 EC)
Machine Type: 2097

5 Models: E64, E56, E40, E26, E12

Processor Units (PUs):

- One to four book modular design
- Sub-capacity available up to 12 CPs
- Enterprise Quad Core technology – 4.4 GHz
- Enhanced capacity 64-way model
- 17 PUs per book (17 and 20 for Model E64)
  - New core sparing technology
  - More SAPs per system
  - Configurable PUs allow you to design the system to meet your needs (e.g. CPs, specialty engines, SAPs)
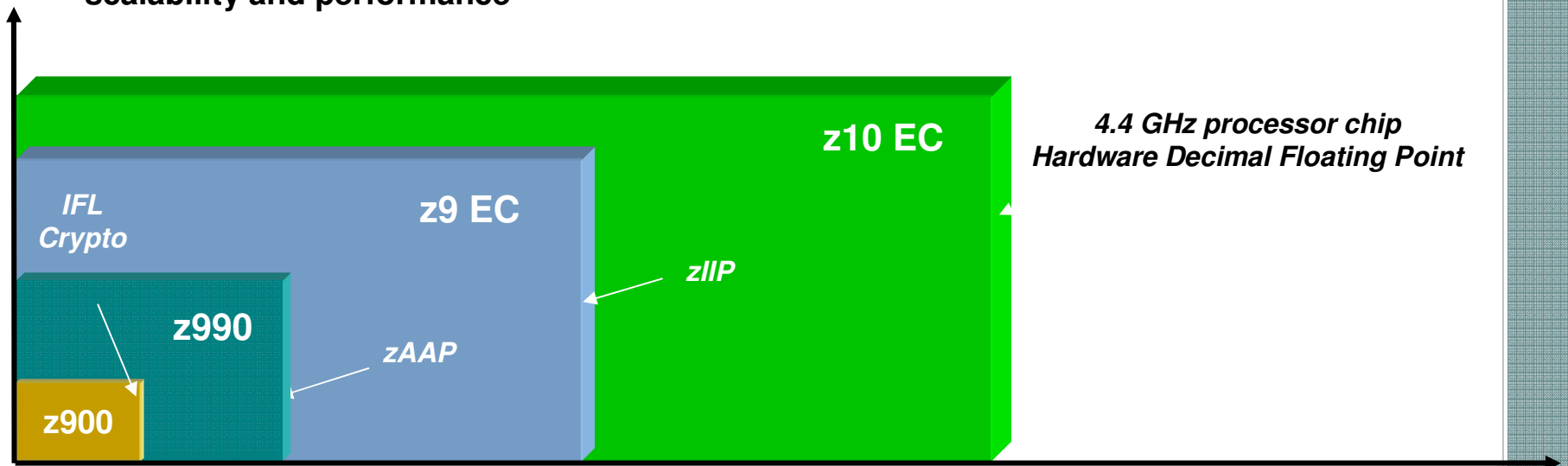
Memory:

- Up to 1.5 TB / 384 GB per book
- 16 GB HSA separately managed and not included in customer purchased memory
- Books connected in star topology via L2 cache

I/O:

- 6 GBps InfiniBand host buses for I/O
- FICON/FCP Enhancements
- New OSA-Express3 10 GbE [1]
- InfiniBand Coupling Links [1]

Improved server performance and scalability with faster and more processors and improved dispatching synergy

- **The z10 EC delivers on average 50% more performance in a n-way configuration**
  - The uniprocessor is expected to deliver 62% more performance than z9™ EC uniprocessor *
- **The z10 EC 64-way offers 70% more server capacity than the largest z9 EC****
- **Introducing HiperDispatch for improved synergy with z/OS® operating system to deliver scalability and performance**

z10 EC

4.4 GHz processor chip
Hardware Decimal Floating Point

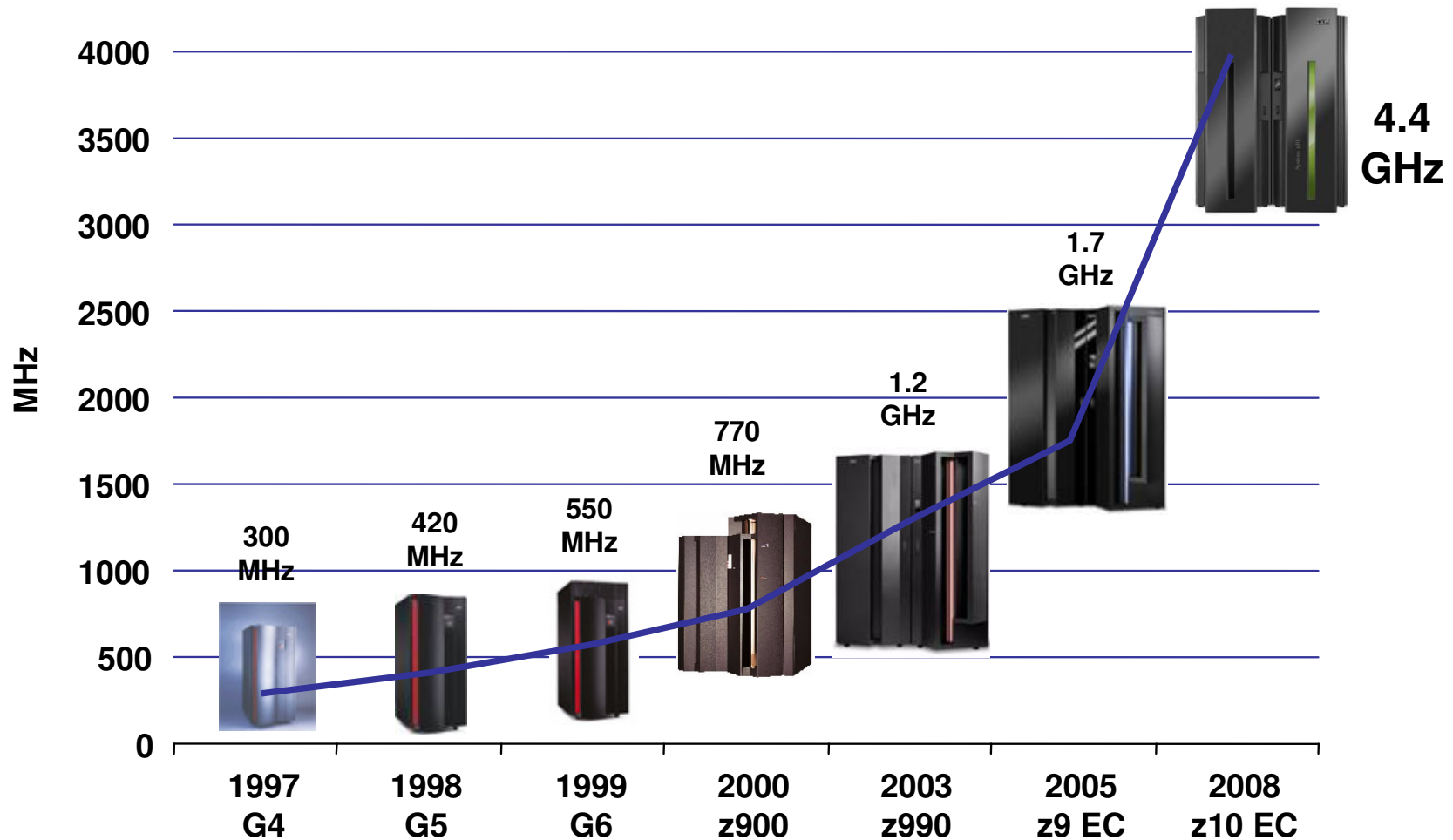z9 EC

IFL
Crypto

zIIP

z990

zAAP

z900

Significant capacity for traditional growth and consolidation

* LSPR mixed workload average running z/OS 1.8 - z10 EC 701 versus z9 EC 701
** This is a comparison of the z10 EC 64-way and the z9 EC S54 and is based on LSPR mixed workload average running z/OS 1.8

IBM z10 EC Continues the CMOS Mainframe Heritage

- G4 - 1st full-custom CMOS S/390®
- G5 - IEEE-standard BFP; branch target prediction
- G6 – Copper Technology (Cu BEOL)

- z900 - Full 64-bit z/Architecture®
- z990 - Superscalar CISC pipeline
- z9 EC - System level scaling

- z10 EC – Architectural extensions

Enhancements in DB2 for z/OS V8 and V9

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
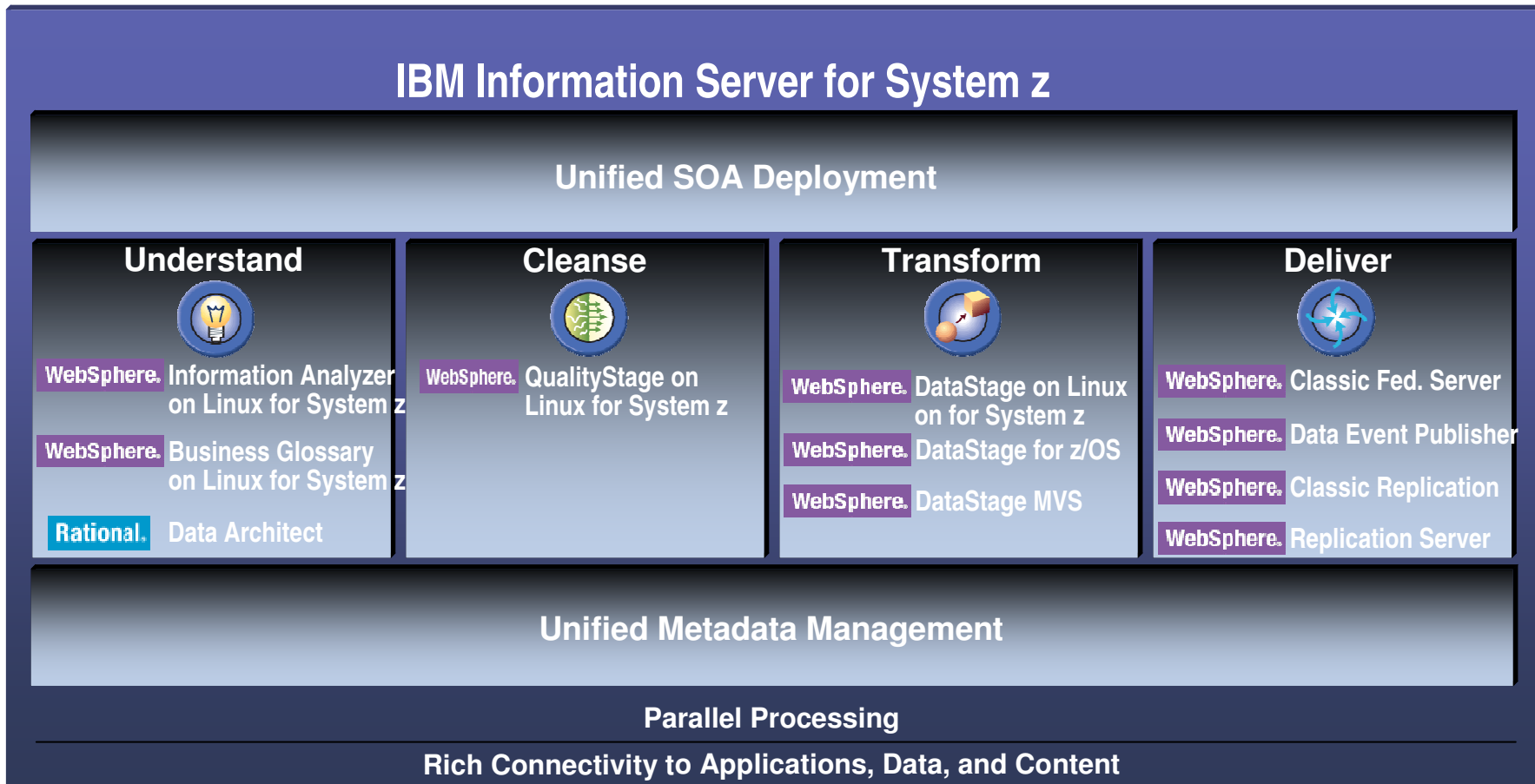- MERGE statement
- SET operations

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
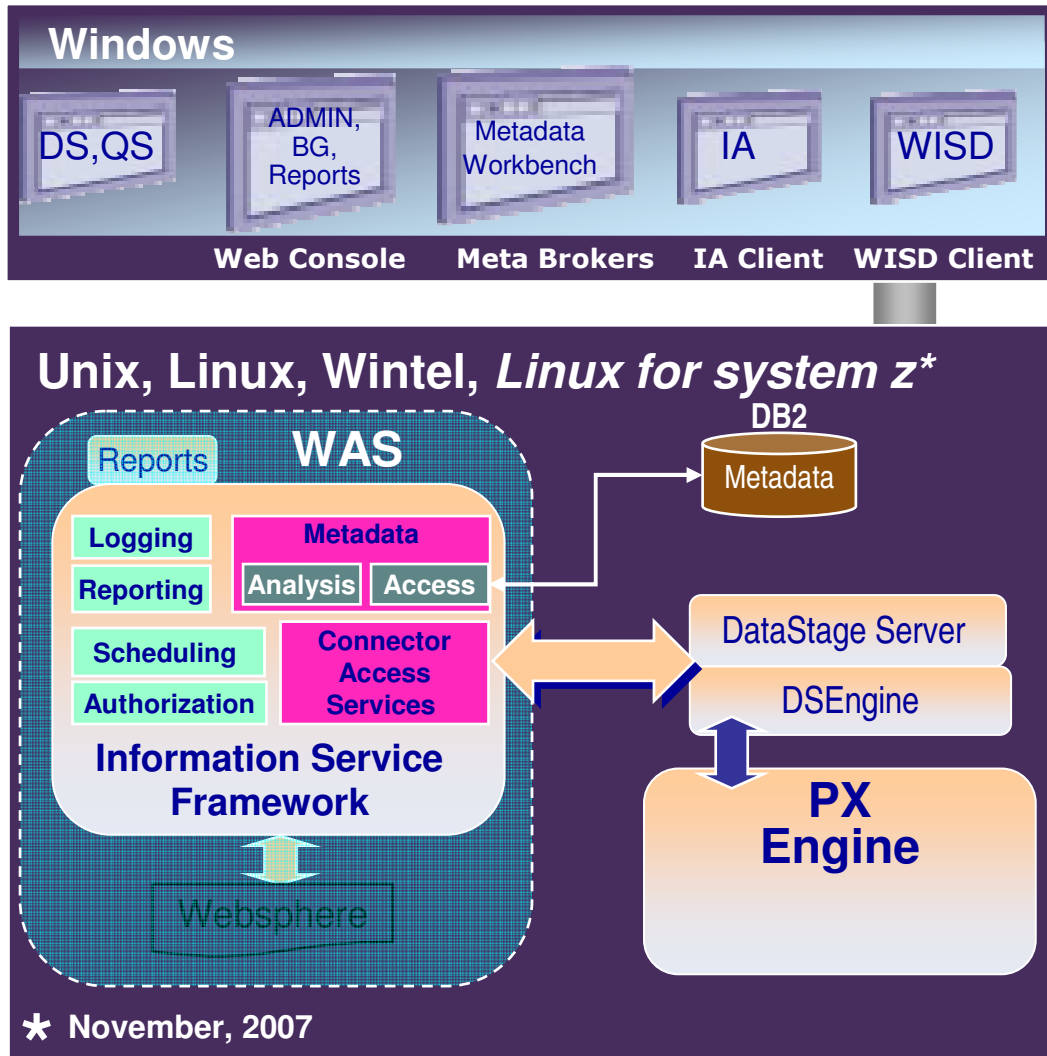- DSNACCOR enhancements

Information Server on System z

IBM Information Server for System z

IBM Information Server for System z

Unified SOA Deployment

Understand	Cleanse	Transform	Deliver
WebSphere Information Analyzer on Linux for System z	**WebSphere** QualityStage on Linux for System z	**WebSphere** DataStage on Linux on for System z	**WebSphere** Classic Fed. Server
WebSphere Business Glossary on Linux for System z		**WebSphere** DataStage for z/OS	**WebSphere** Data Event Publisher
Rational Data Architect		**WebSphere** DataStage MVS	**WebSphere** Classic Replication
			WebSphere Replication Server

Unified Metadata Management

Parallel Processing

Rich Connectivity to Applications, Data, and Content

- **COMPLETE**: fully integrated information integration software platform
- **MAXIMIZE**: scalability, security, manageability and reliability of the mainframe
- **FLEXIBLE**: perform information integration directly on the mainframe
- **COST EFFECTIVE**: no added z/OS operational costs

IBM Information Server for System z

Windows

DS,QS	ADMIN, BG, Reports	Metadata Workbench	IA	WISD
	Web Console	**Meta Brokers**	**IA Client**	**WISD Client**

Unix, Linux, Wintel, _Linux for system z*_

WAS

Reports

Logging

Reporting

Metadata

Analysis | Access

Scheduling

Authorization

Connector Access Services

Information Service Framework

Websphere

DB2

Metadata

DataStage Server

DSEngine

PX Engine

★ November, 2007

New Linux for z deployment option
- Robust, parallel processing
- Hipersocket connectivity to z data
- Full Information Server suite: Information Analyzer, QualityStage, DataStage, Information Services Director, …
- Minimal impact on z/OS costs: Leverages IFLs and zIIPs

IBM Information Server for System z
Benefits of this Linux for system z architecture

Significant cost savings

- z/OS MIPs consumption dramatically reduced vs. USS or MVS approaches
  Minimizes impact on other z/OS software costs
- Job Processing is on zLinux (except the z/OS data access)
  MIPs charged at IFL rate … NOT z/OS rate
- DB2 workload on z/OS can qualify for offload to ZIIP specialty engines

High performance z data connectivity

- Batch Pipes for DB2 load, DRDA to DB2 over hipersockets
- SQL to Classic over hipersockets
- Integration with MQ and therefore with the Data Event Publishers

Seamless integration with other IBM Information Server platforms

- Same operational architecture and metadata Repository
- Eliminates deployment issues
- Maintains value of DataStage for z/OS investments

Information Server Family of Products

- **Information Server on System z**
  - DataStage, Quality Stage, Information Analyzer, Information Services Director

- **Classic Federation**
  - Integration with Information Server
  - Provides full extract from IMS, VSAM, IDMS, Adabas, Datacom

- **Log based Capture programs**
  - DataMirror, Event Publishers, Classic Event Publishers
  - Provides incremental near real time feed to Information Server from IMS, VSAM, IDMS, Adabas, DB2 all platforms, Oracle, MS SQL

Technology Preview of Cognos for System z

Data Warehouse and BI factors on System z

- Enterprise data is often captured on a System z platform

- The rate and volume of captured data becoming increasing exponentially

- Most BI and DW projects are targeted toward upper echelons within the enterprise leaving many potential users and contributors behind

- Real-time and operational uses of data (e.g. customer service) are becoming increasingly in vogue

- 24x7 operation and system security/regulatory compliance are high priority within the enterprise

Customer DW and BI concerns

- **Data Warehouse**
  - Platform selection – what's best for me versus what's 'hot'
  - Data placement and platforms in play
  - DBMS's installed and requirements to 'federate'
  - Data volumes growing exponentially
  - Data formats required to support increasing
    - XML
    - Unstructured data
    - Etc.

- **Business Intelligence**
  - Proliferation of tools
  - Low ROI (e.g. lower deployment than volume purchased)
  - Vendor support for enhancements (e.g. exploit DB2 V9, zIIPs, zAAPs, etc.)
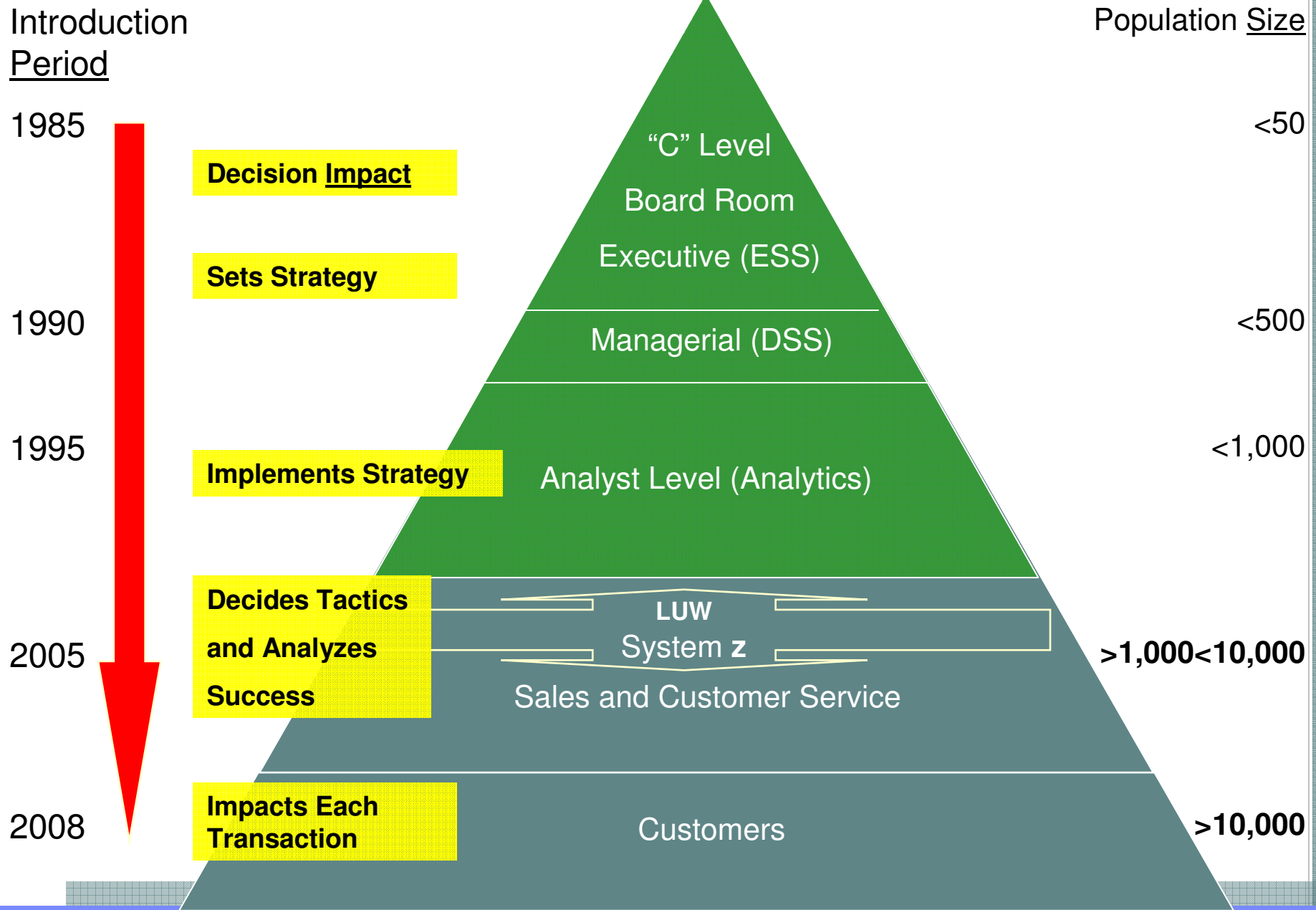 - Increased # servers to support BI success

Thus we are seeing several new trends

- Resurging interest in System z due to its strengths
- Customer requests to enable DW and BI on System z because:
  - That's where much of the data already resides
  - The majority of the BI tools are deployed as thin client (browser-based) solutions
  - Increased interest in centralized control and standardization versus scattered and difficult to rein in solutions
- Business intelligence as a 'platform' not a loose collection of tools
- Information as a service (SOA) initiatives
- Federated approach to data due to location, format, platform disparities
- BI tools standardization
- Operational BI (aka: Operational Intelligence)

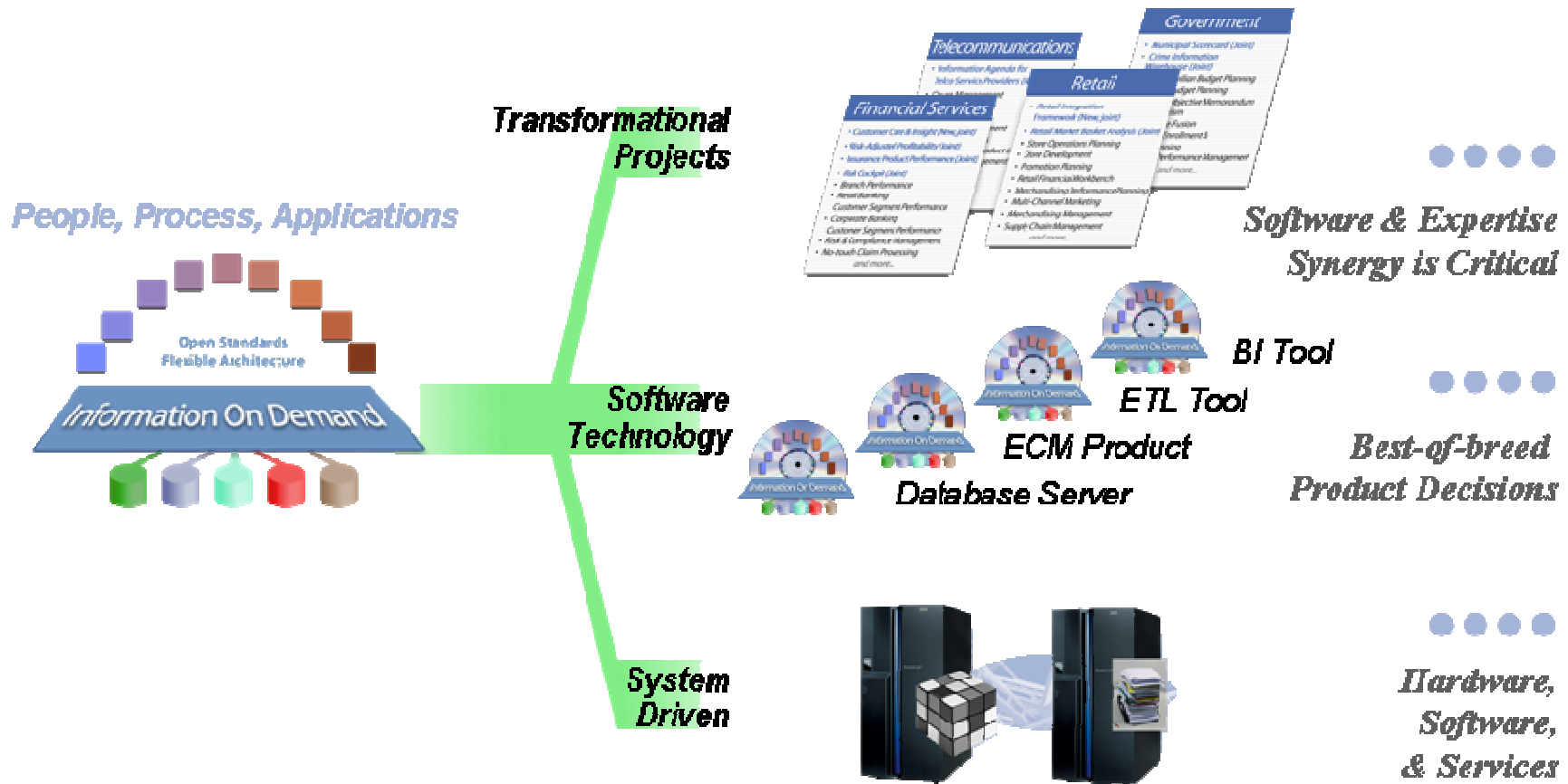# Operational BI (Operational Intelligence)

- Major BI Growth Area is Operational Intelligence
  - Deliver BI content
    - to customer facing people in order to optimize
      Sales
      Customer Service
      Corporate efficiency
      High customer retention
    - via OI components with operational systems & information portals

  - Central to System z BI/DW Strategy (supported by Gartner et al)

Operational Intelligence Introduction and User Population

Introduction
Period

Population Size

1985	**Decision Impact**	<50
	Sets Strategy	
1990		<500
1995	**Implements Strategy**	<1,000
2005	**Decides Tactics and Analyzes Success**	>1,000<10,000
2008	**Impacts Each Transaction**	>10,000

"C" Level

Board Room

Executive (ESS)

Managerial (DSS)

Analyst Level (Analytics)

LUW
System **z**

Sales and Customer Service

Customers

Companies Buy BI Technology in Multiple Ways
IBM Addresses them All…With Cognos

One Platform, One Architecture

USER

**Zero Footprint
Task-Based Interfaces**

WEB, OFFICE, MOBILE, SEARCH…

REPORTING | QUERY | ANALYSIS | DASHBOARDS | SCORECARDS
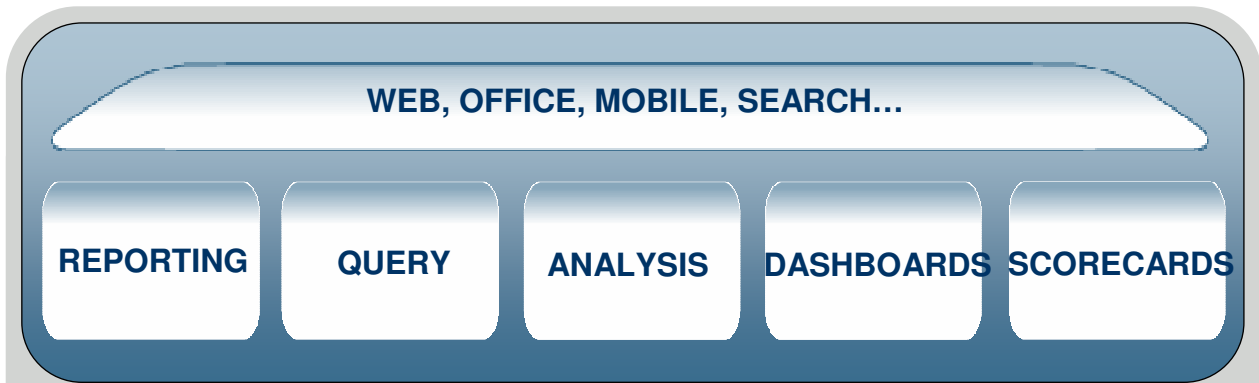
SERVICES

**Purpose-Built Web
Services Architecture**

INFORMATION | MANAGEMENT | FRAMEWORK

DATA

Open Data Access

Transaction Systems

Warehouses (Relational & OLAP)

XML

Flat, Legacy or Modern

Cognos 8 BI from IBM

Cognos 8 Performance Management Platform
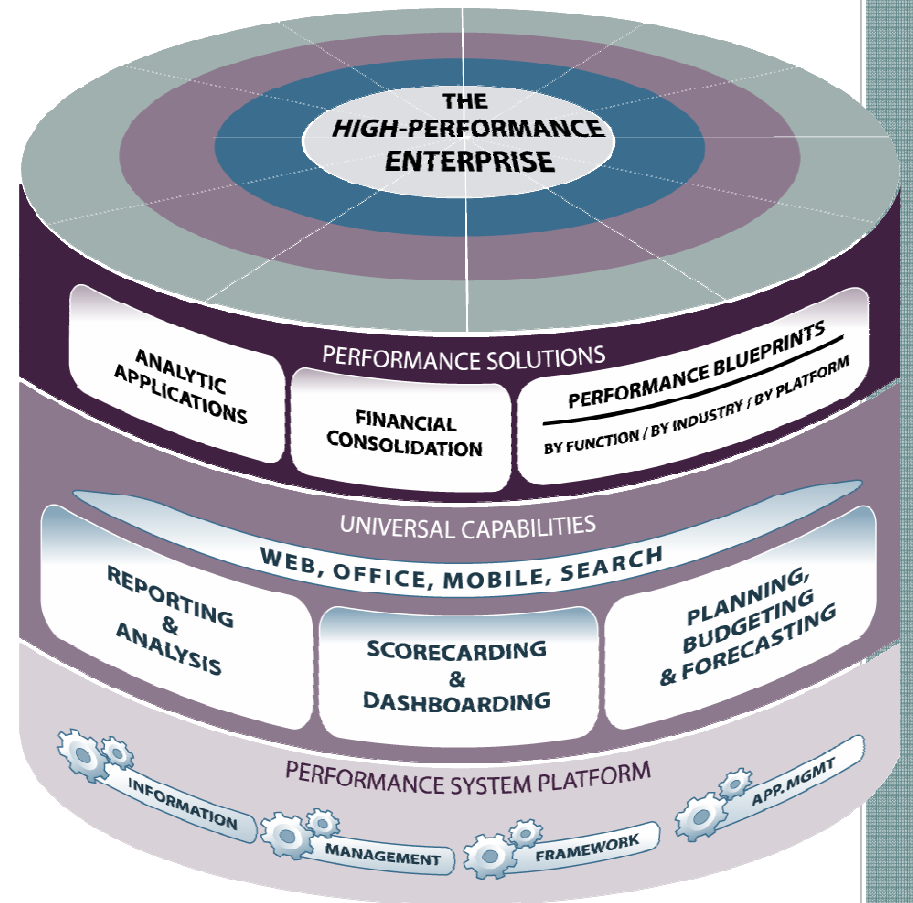
Cognos 8 BI Portfolio

Report Studio

Query Studio

Anaysis Studio

PowerPlay Studio

Event Studio

Metrics Studio

Go! Search

Go! Mobile

Cognos Now!

Cognos 8 – Enterprise Architecture
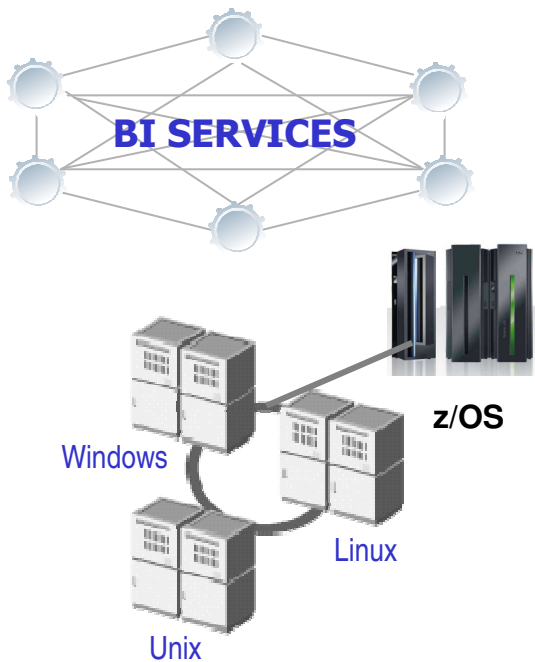
- **Minimize risk on mission-critical deployments**

  Peer-to-peer services provide infinitely flexible distribution with zero duplication and zero inter-dependency for full fault tolerance

- **Gain high performance AND IT agility**

  Intelligent load balancing for optimized performance. Configurable rules eliminate manual tuning and easily adapt to change

- **Best leverage existing infrastructure**

  Location transparency across heterogeneous operating environments – now and in the future

- **Confidently rollout to thousands of users**

  Linearly scalability ensures predictability as user volumes and demands grow

BI SERVICES

Windows

z/OS

Linux

Unix

Overall Transactions Scalability
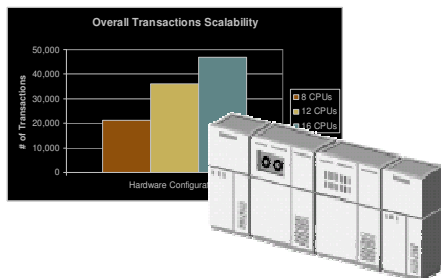
Cognos 8 BI on Linux for System z … customer driven initiative

- Faster access to z/OS data

- Encapsulate their data, DW, and BI on the same platform

- Take advantage of mainframe features and benefits

- z/OS versus server farms

- Near real-time access to deliver Operational BI

Report Authoring Modes in C8

* Operational BI reporting – key areas of technology and function

Professional Authoring Mode

- Report against any data source *
- Advanced query capabilities
- Multiple formats
- Powerful layout capabilities
- Burst reports to multiple locations *
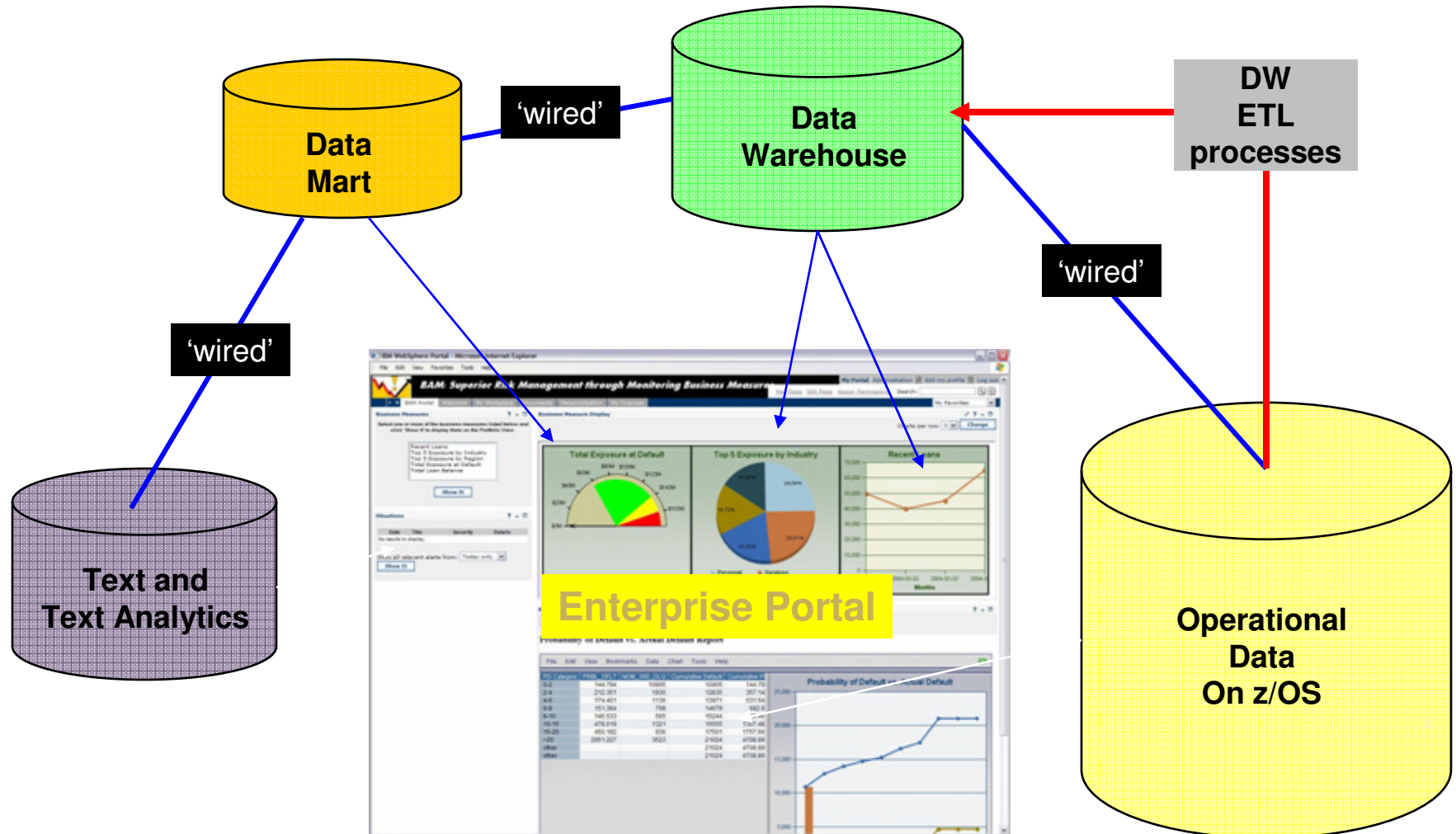- Pixel Perfect Layout ; Structure or GUI layout

Express Authoring Mode

- Static Reports *
- Dynamic Reports *
- Complex account dimension and measure intersections
- Calculations

Query Studio

- Ad Hoc Query *
- Live Data *
- Simple Formatting
- Templates *

An Operational BI portal application

Portals – operational integration

Prompt values:
- ☑ Communicate with other portlets
  - ⦿ Portlets not using a channel
  - ◯ Portlets using channel:
    - [   ]

Drill down and drill up:
- ☑ Communicate with other portlets on the page
  - ⦿ Portlets not using a channel
  - ◯ Portlets using channel:
    - [   ]

Global Prompt Filters
Drill Synchronization

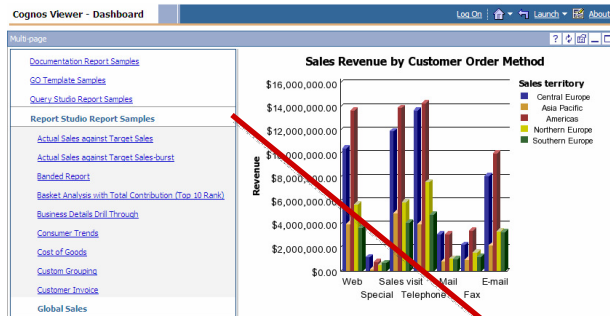EIP Integration with WebSphere

WAS, NetWeaver, Plumtree, Sharepoint

Cognos Search portlet

Cognos Navigator portlet

Cognos Viewer portlet

Cognos

Cognos Search

Cognos Viewer

Revenue by Product Line

Great Outdoors

Product line	Revenue	Gross profit	Quantity sold
Camping Equipment	$89,713,990.92	$21,674,664.30	866,234
Golf Equipment	$25,905,465.58	$11,681,524.78	99,400
Mountaineering Equipment	$20,891,350.60	$6,976,917.56	301,958
Outdoor Protection	$3,171,114.92	$1,788,162.84	557,854
Personal Accessories	$31,894,465.86	$11,712,542.78	389,908

10:11:49 AM   1   COGNOS 8

Cognos Viewer - Dashboard

Log On   Launch   About

Multi-page

Documentation Report Samples
GO Template Samples
Query Studio Report Samples
Report Studio Report Samples
Actual Sales against Target Sales
Actual Sales against Target Sales-burst
Banded Report
Basket Analysis with Total Contribution (Top 10 Rank)
Business Details Drill Through
Consumer Trends
Cost of Goods
Custom Grouping
Customer Invoice
Global Sales

Sales Revenue by Customer Order Method

Sales territory
- Central Europe
- Asia Pacific
- Americas
- Northern Europe
- Southern Europe

Revenue: $16,000,000.00 / $14,000,000.00 / $12,000,000.00 / $10,000,000.00 / $8,000,000.00 / $6,000,000.00 / $4,000,000.00 / $2,000,000.00 / $0.00

Web / Sales visit / Mail / E-mail / Special / Telephone / Fax

Horizontal or Vertical Tabbed Portal Pages

Summary

- Cognos 8 BI for System z
  - provides a BI platform
  - provides the ability to standardize on a single source of technology for BI and Performance Management
  - may provide lower TCO, skills requirements, and maintenance costs

- Operational BI
  - is targeted toward a wider, more granular use within the enterprise
  - enhances the value IBM Cognos 8 BI on System z
  - increases the value of data to the enterprise

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