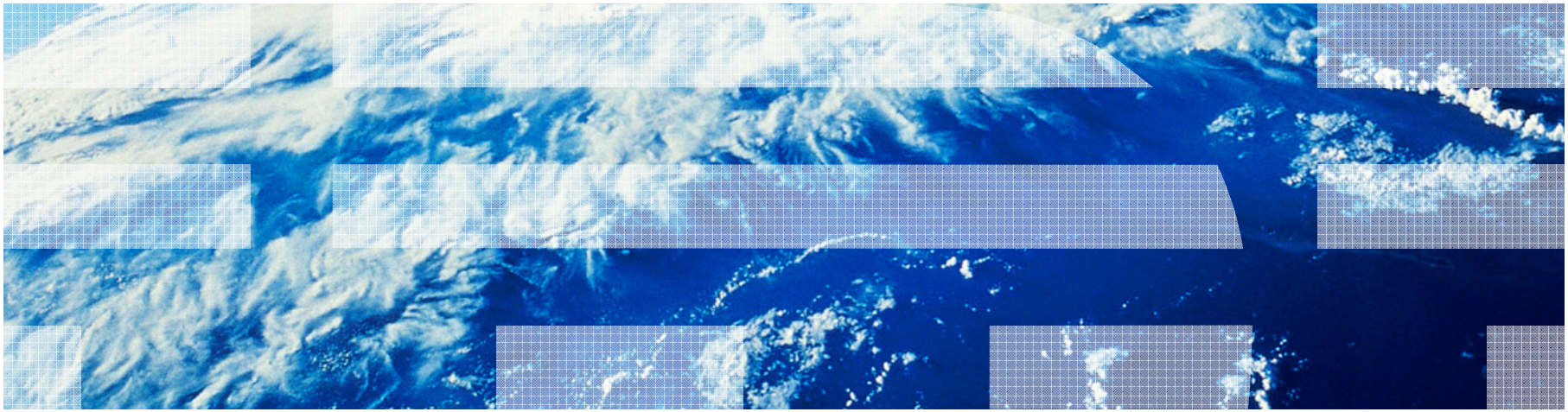
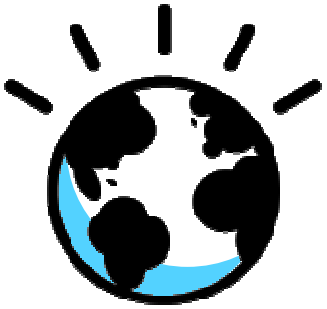
Maximize the Value of your data with Business Intelligence on System z

A New Era in Reliable Information



The world is changing and becoming more…



Instrumented

Interconnected

Intelligent

- Estimates for the amount of data created this year reach as high as 40 exabytes. That's more data than what was created in the previous 5,000 years combined.
- The number of text messages sent daily exceeds the population of the planet.
- Over 2.7 billion Google searches are performed every month.
- The amount of new, technical information is doubling every two years. For students entering a four-year technical program, this means half of what they learn in their freshman year will be obsolete by their junior year. By 2010, it's claimed the amount of information will double every 72 hours.

Source: AMR Research - Data, Data Everywhere: When the Stream Turns Into a Torrent (December 2008)

The resulting explosion of information creates a need for a new kind of intelligence

… to help build a Smarter Planet

With this change comes an explosion in information …

Volume of Digital Data

Variety of Information

Velocity of Decision Making

… Yet organizations are operating with blind spots

Lack of Insight

1 in 3 managers frequently make critical decisions without the information they need

Inefficient Access

1 in 2 don't have access to the information across their organization needed to do their jobs

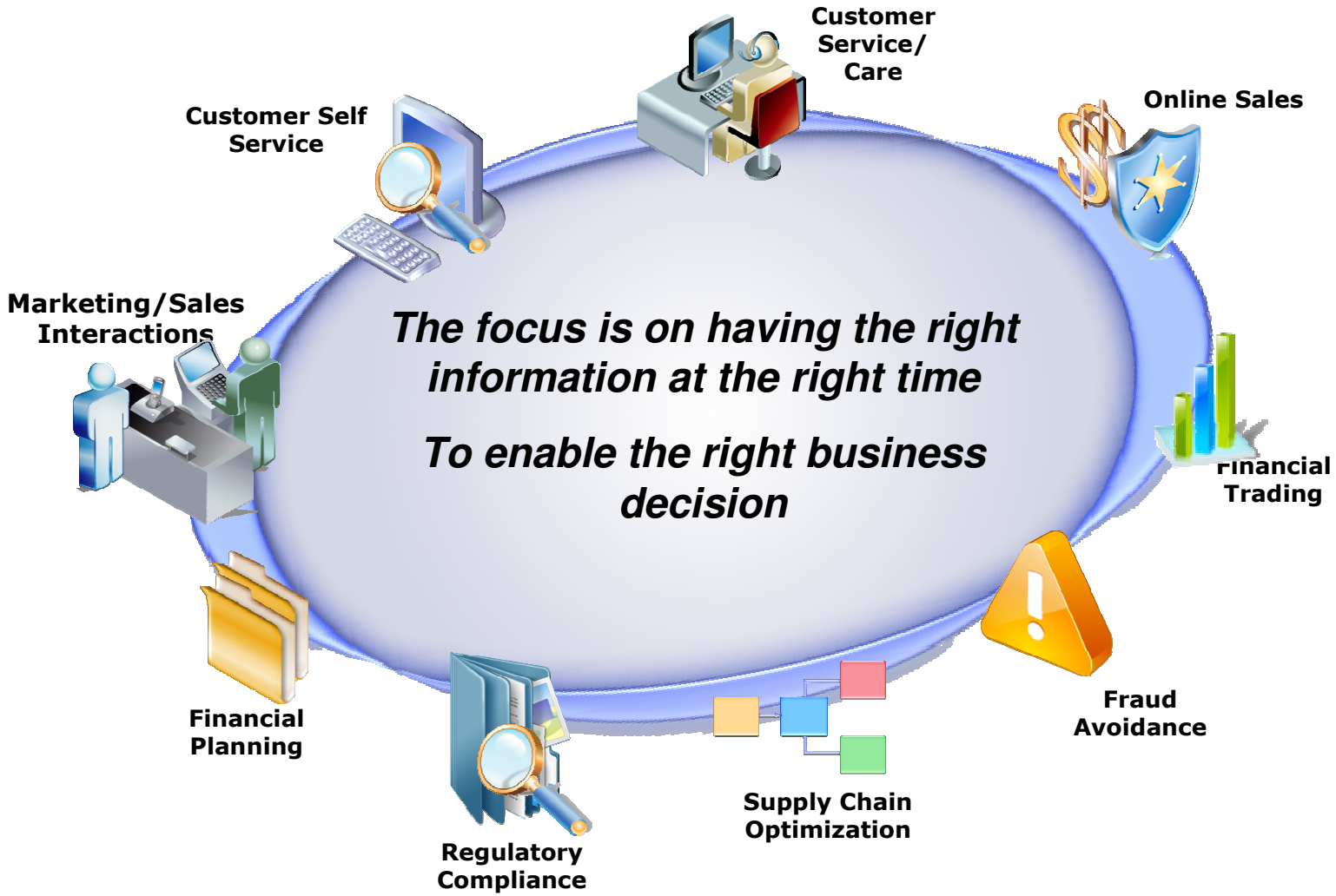
Inability to Predict

3 in 4 business leaders say more predictive information would drive better decisions

Source: IBM Institute for Business Value

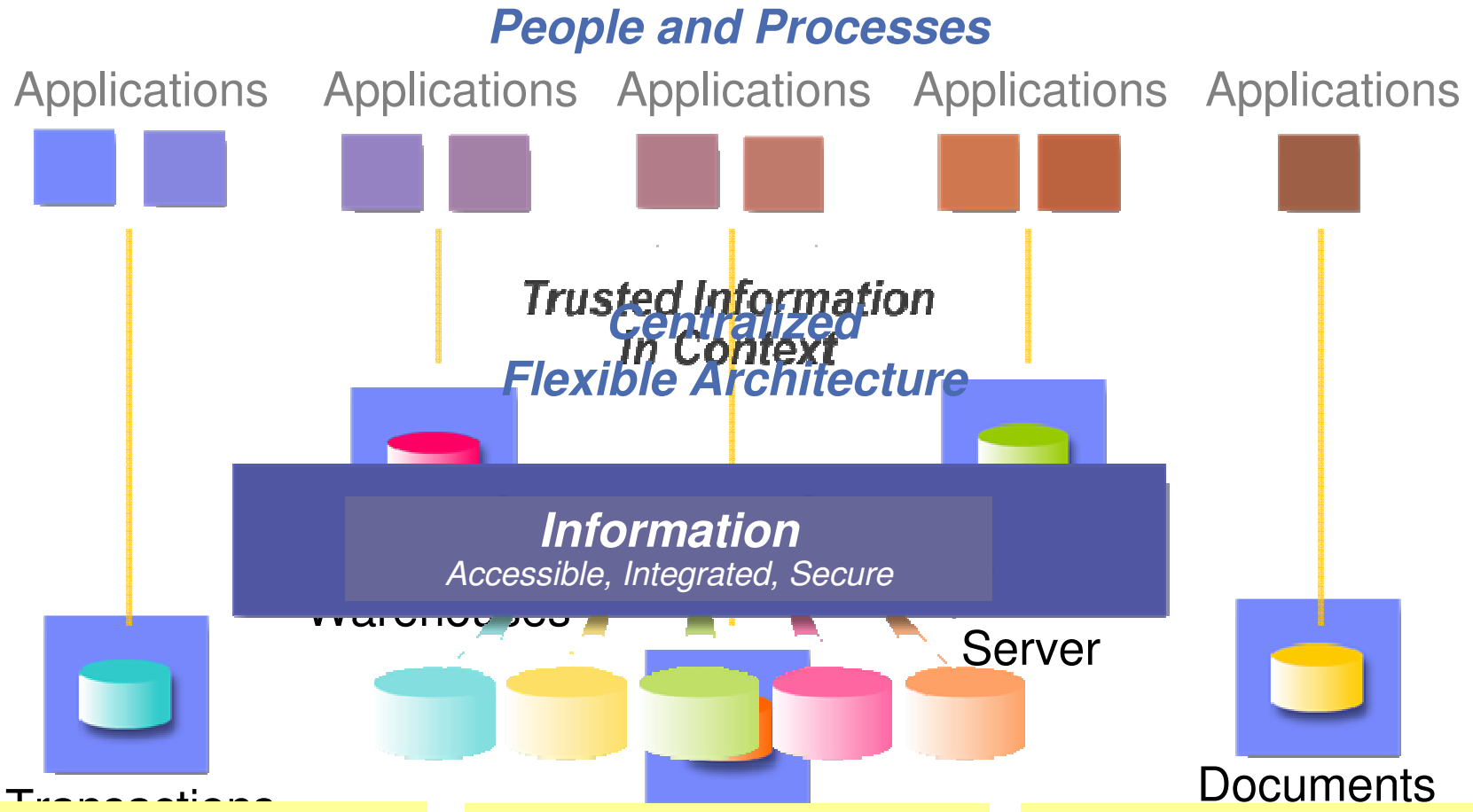
Applications are Moving to Optimized Business Processes

Creating a New Set of Requirements



The Need for Information On Demand

Business needs demand a strategic, centralized approach



***60%+ of CEOs**:*
Need to do a better job leveraging information

***70% of employee time**:*
Spent searching for relevant information

Providing the Right Information .....

To the right person, at the right time –

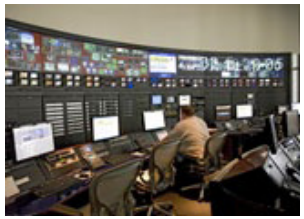
... Changes The Way We Do Business

Delivering Information When it Has the Most Impact

Traditional Warehousing		Operational Business Intelligence
Caring for high value customers		**Identifying seats for rerouted passengers due to flight delays before the flight arrives** ---------- ***Travel and Transportation***
Crime statistics and reporting		**Identifying related incidents and potential suspects prior to arriving at the crime scene** ---------- ***Transforms law enforcement***
Customer Analysis		**Understanding relevant customer info to identify cross sell and up sell opportunities & improve value of sale at the point of sale** ---------- ***Transforms sales effectiveness***
Insurance fraud analysis & reporting		**Identifying potentially fraudulent claims prior to approval and payment rather than after the fact** ---------- ***Transforms insurance fraud***

IBM System z

Delivers Superior IT Optimization and Workload Consolidation for Your Dynamic Infrastructure

Reduce Cost		System z delivers superior **resource sharing** and **virtualization efficiency** – helping users optimize their spending on energy, floor space, software, and staffing.
Improve Service		System z provides an extensive set of time-tested **command and control** functions that help users maintain service agreements during peak periods and satisfy business demands with incredible **speed and agility**.
Manage Risk		System z offers unrivaled system **availability** and **flexible** business continuance and disaster recovery options to help clients protect their business.

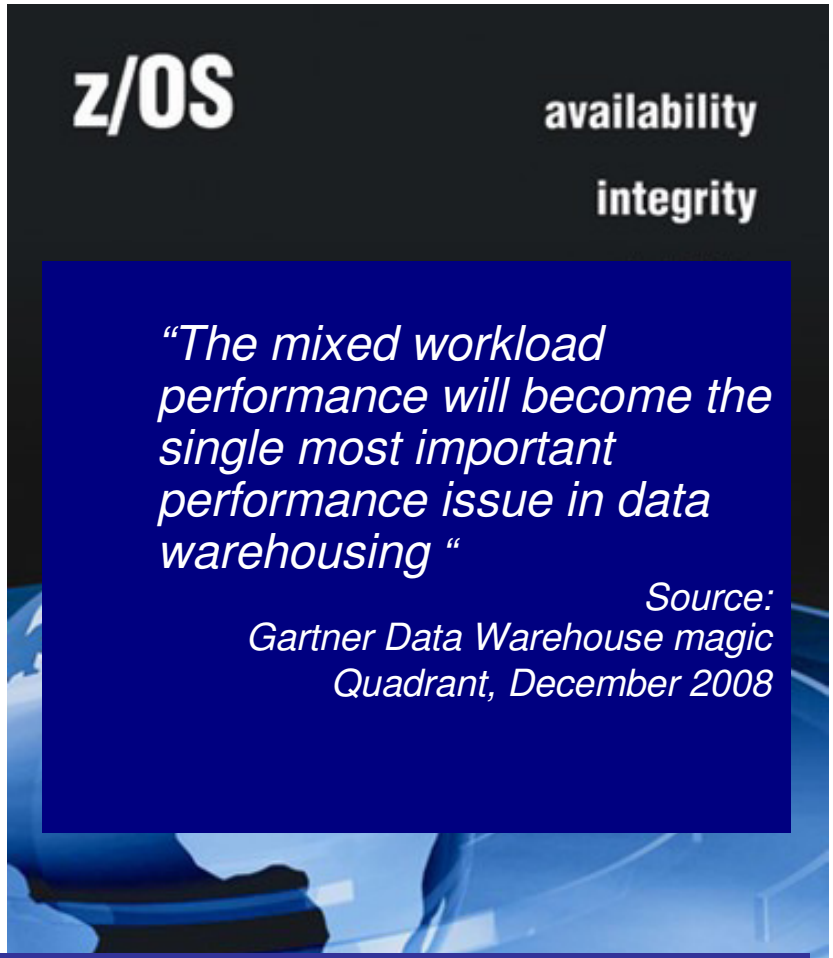
System z offers a clear advantage over competitive alternatives because it delivers better business value in these key areas.

Data Warehousing & Business Intelligence Trends

- Enterprises are becoming Information on Demand businesses
  - *Information as a strategic asset*
- Collocating data with operational systems on System z
  - *Minimizes data duplication & movement*
  - *Improves control and availability for critical business information*
- Operational Business Intelligence
  - *Requires rapidly turning raw data into business information*
- Information as a service (SOA) initiatives
  - *Requires "utility class" reliability and availability*
- BI platform standardization
  - *Reduce loose collection of individual BI tools*
  - *BI platform accessed via a browser-based thin client*

Data Warehousing on System z

- *A large portion of today's operational data resides on the mainframe*
  - *DB2 zOS, The world's largest known TP database*
  - *IMS - A transactional workhorse for very large workloads.*
  - *VSAM -Data behind some of the largest banking applications in the world!*
- *BI is moving to the strengths of the z platform*
  - *Secure, scalable, highly reliable (99.999 available)*
  - *Operations become dependent on the data warehouse*
- *Powerful and Mature Workload Management for mixed workloads*
  - *Demands drive the need for high speed and low latency, blurring the lines between DW and OLTP database characteristics*



*–The **transactional DBMSs** have an edge that challenges the data warehousing DBMSs*

–Source: Garner Data Warehouse magic Quadrant, 2006

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

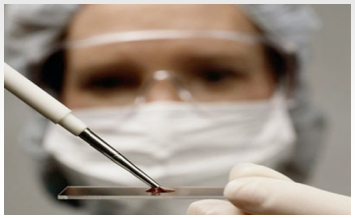
Ease of Use

- 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

System z – Scalable and secure data serving

- Centralized data serving for the enterprise
- A common view of data updated in real time
- The Scalability and flexibility to be responsive
- Underpinned by availability and security
- Enablement of zIIP specialty engine helps reduce cost
- DB2 for z/OS over 100 enhancements in V8 / V9

SMART IS: Data on a grand Scale



IBM – The 50TB Study:

- Load and compress four million rows per second
- Scan up to 300 billion rows in an hour
- Prioritize critical queries above longer queries in workload
- Compress data and indexes by up to 60%-

Adding the IBM InfoSphere™ Advantage

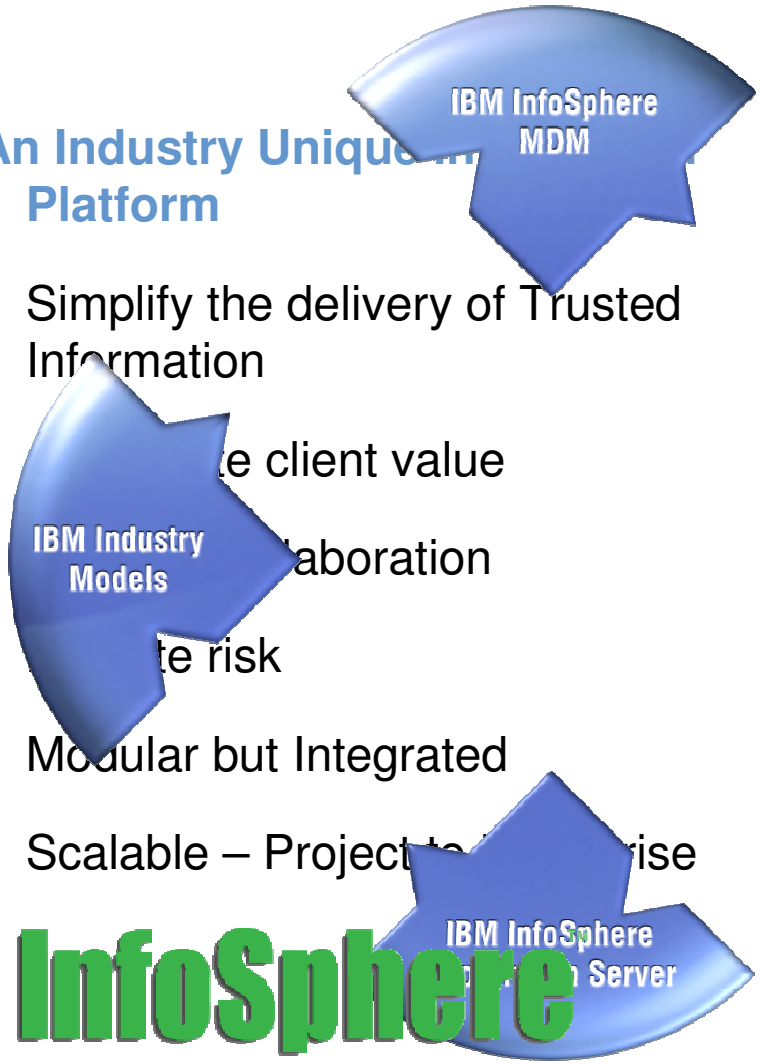
- Easily deployable, integrated platform
- Value acceleration
- Simplified scalability at lower cost
- Industry-specific acceleration
- Broadest and deepest integration
- Protection for your investment

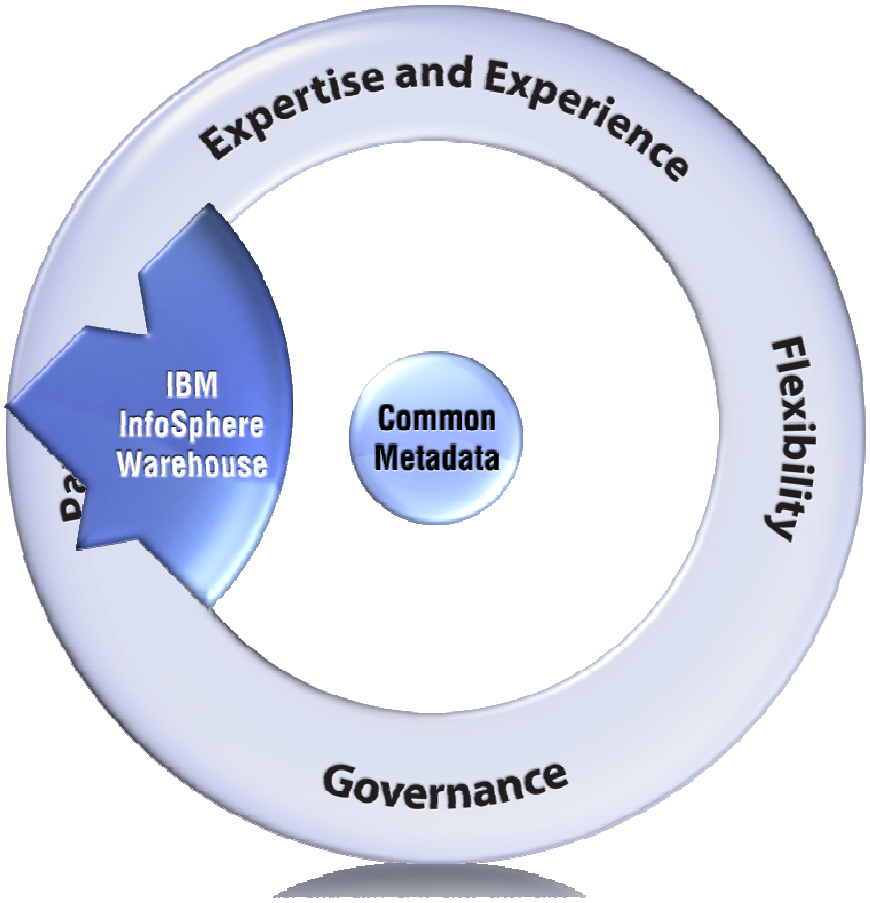
Delivering Trusted Information for Business Optimization

The IBM InfoSphere Vision on System z

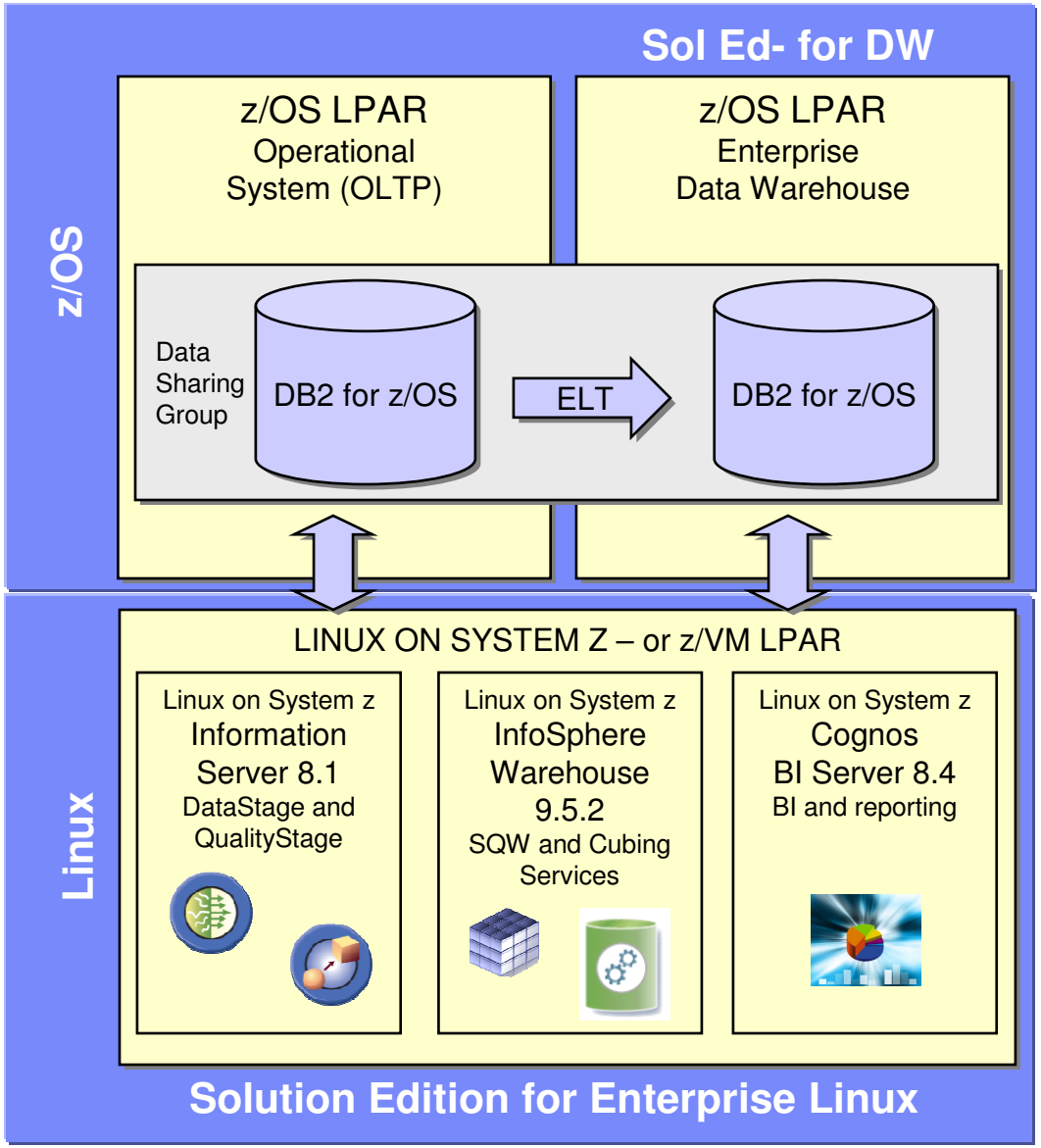
An Industry Unique[illegible] Platform

- Simplify the delivery of Trusted Information
- [illegible]te client value
- [illegible]laboration
- [illegible]te risk
- Modular but Integrated
- Scalable – Project to [illegible]rise





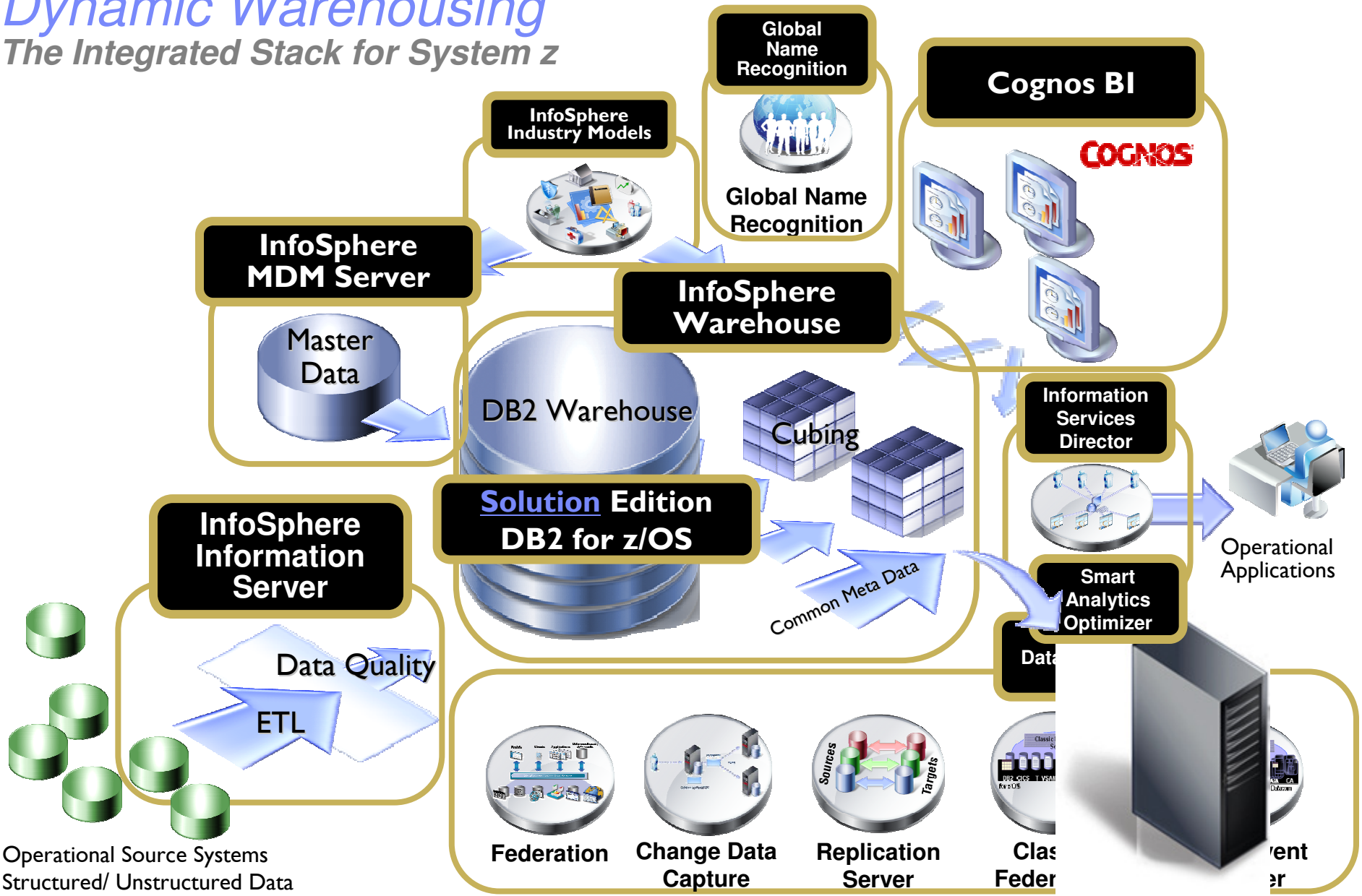
Ultimate Consolidation Opportunity



- Consolidation of mission-critical data on System z
- Leveraging existing environment:
  - ,high availability,
  - security
  - Backup/recovery
  - governance procedures
  - as well as skills
- Efficient data movement within a data sharing group (no network)
- Performance and TCO improvements through cubing services (data marts) and DB2 enhancements
- Complex transformations and data quality are driven on Linux on System z with Information Server

Dynamic Warehousing

The Integrated Stack for System z



Data Warehousing capabilities that Exist Today for System z

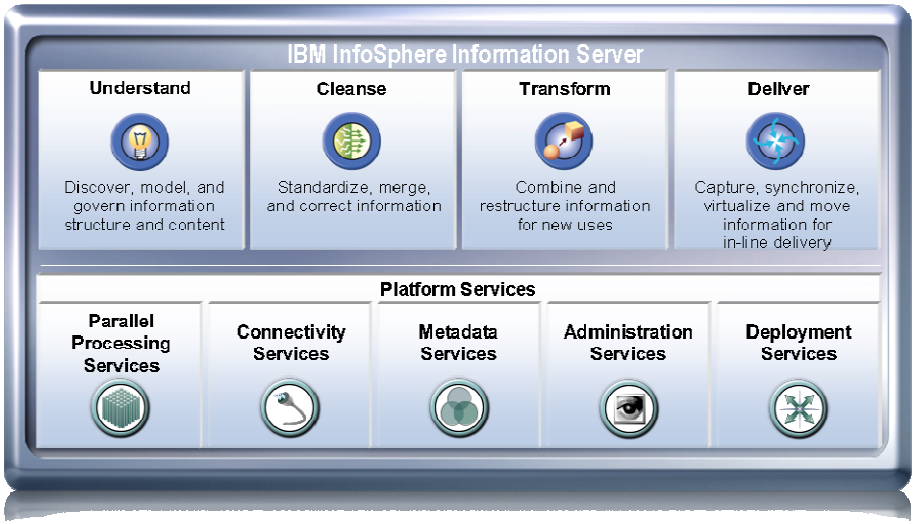
- **Database Management**
  - DB2 z/OS V8 & V9 EDW Base
    - Functional and performance enhancements
    - DB2 family compatibility – including MQTs
    - Concurrent query-utility execution – eliminates many planned outages
- **Performance Optimization**
  - Data Partitioning: Range Partitioning, Data Sharing
  - Workload Control: WLM, IBM Director
  - Deep Compression: Hardware/Software compression, Data Compression, Index Compression (V9)

Supporting Products:

- **Data Movement and Transformation**
  - Information Server (zLinux)
  - QualityStage, DataStage (zOS) DataStage (MVS)
  - WS II Classic Federation, WS Classic Event Publishers, Distributed DBMS Event Publishers, BatchPipes for OS/390, DB2 Unload/Load Utilities
- **Analyze/Report**
  - Cognos 8 BI, QMF, DataQuant, SAFR (formally Geneva ERS)
  - Partner offerings from Hyperion, Business Objects, MicroStrategy, SAS, IBI
- **Modeling and Design**
  - Rational Data Architect
  - Industry Data Models
  - Master Data Management Server
- **Administration and Control**
  - IBM Tivoli Omegamon XE for DB2 Performance Expert on z/OS, DB2 Query Monitor, Optimization Service Center (V9)

InfoSphere Information Server for Linux on System z

- Complete Information Server on System z
- Native Parallel Processing
- Native Data Access
- Easy SOA Enablement
- Low cost IFL Engine



Fast access to large volumes of data across the mainframe

IBM Information Server for Linux for System z

Benefits of this hybrid architecture

Significant cost savings

- z/OS MIPs consumption dramatically reduced vs. USS or MVS approaches
- Minimizes impact on other z/OS software costs
- All 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

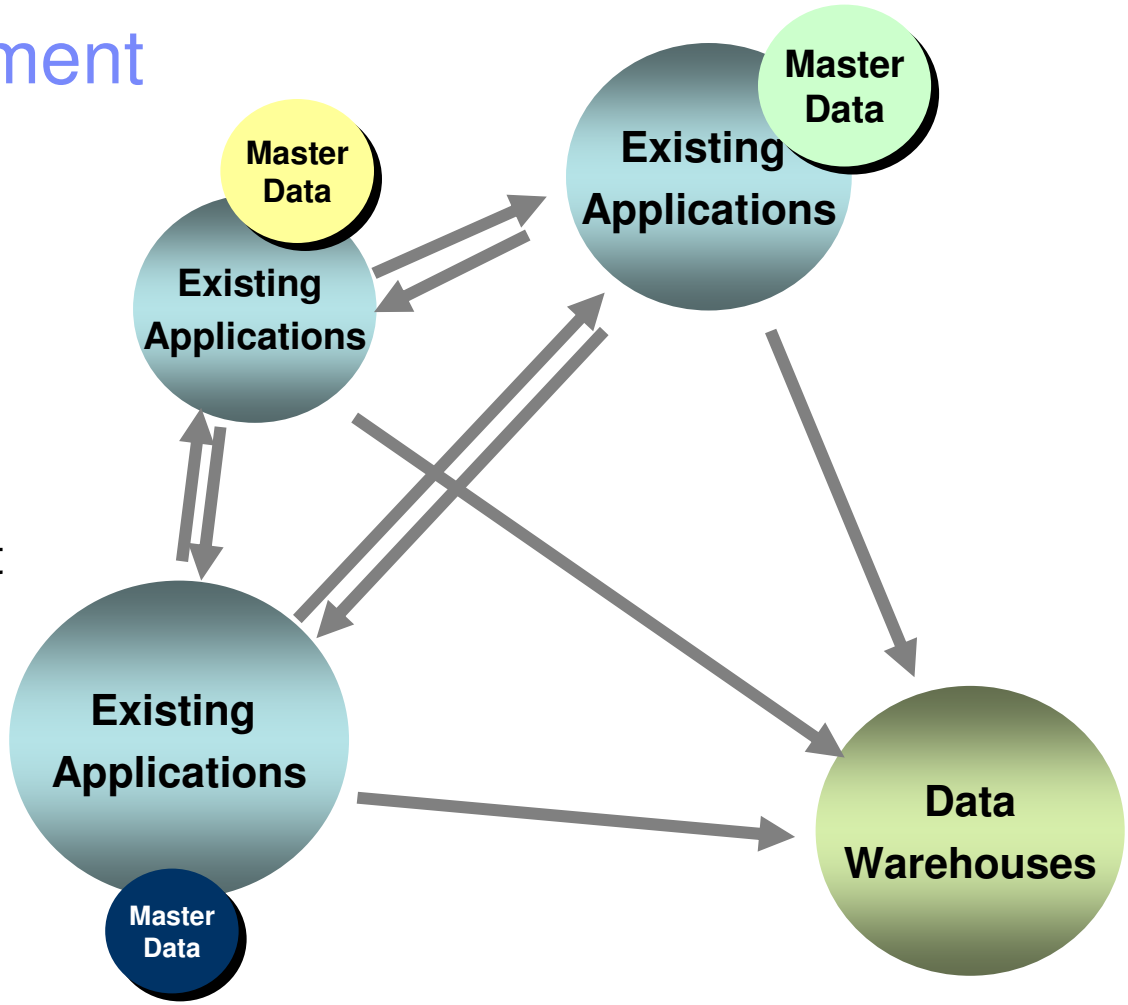
- Batch Pipes for DB2 load, DRDA to DB2 over hipersockets
- SQL to Classic over hipersockets
- Integration with MQ and therefore with the Data Event Publishers

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

Benefits of Master Data Management

- Decouples master information from individual applications
- Becomes a central, application independent resource
- Simplifies ongoing integration tasks and new app development
- Ensure consistent master information across transactional and analytical systems



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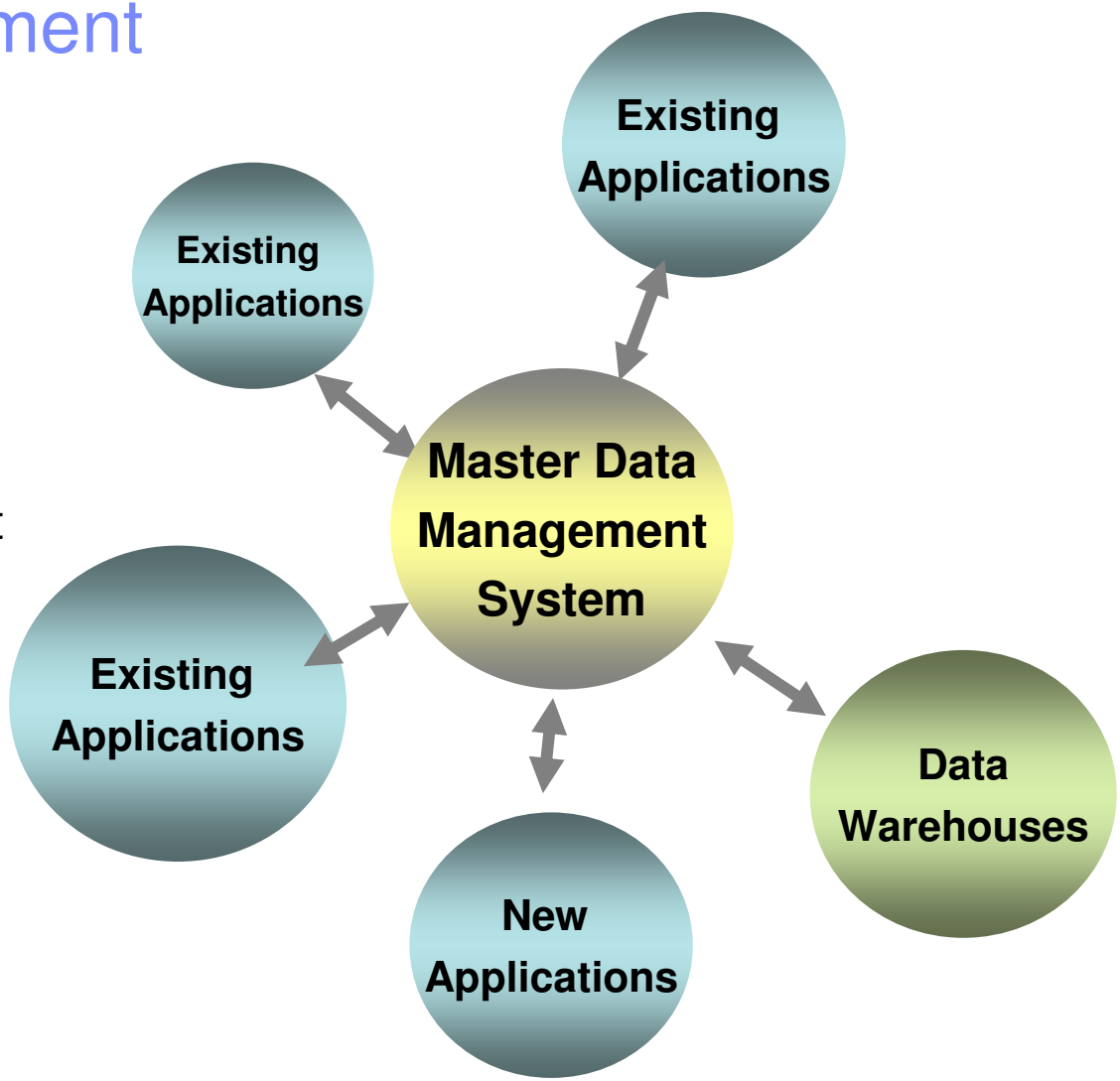
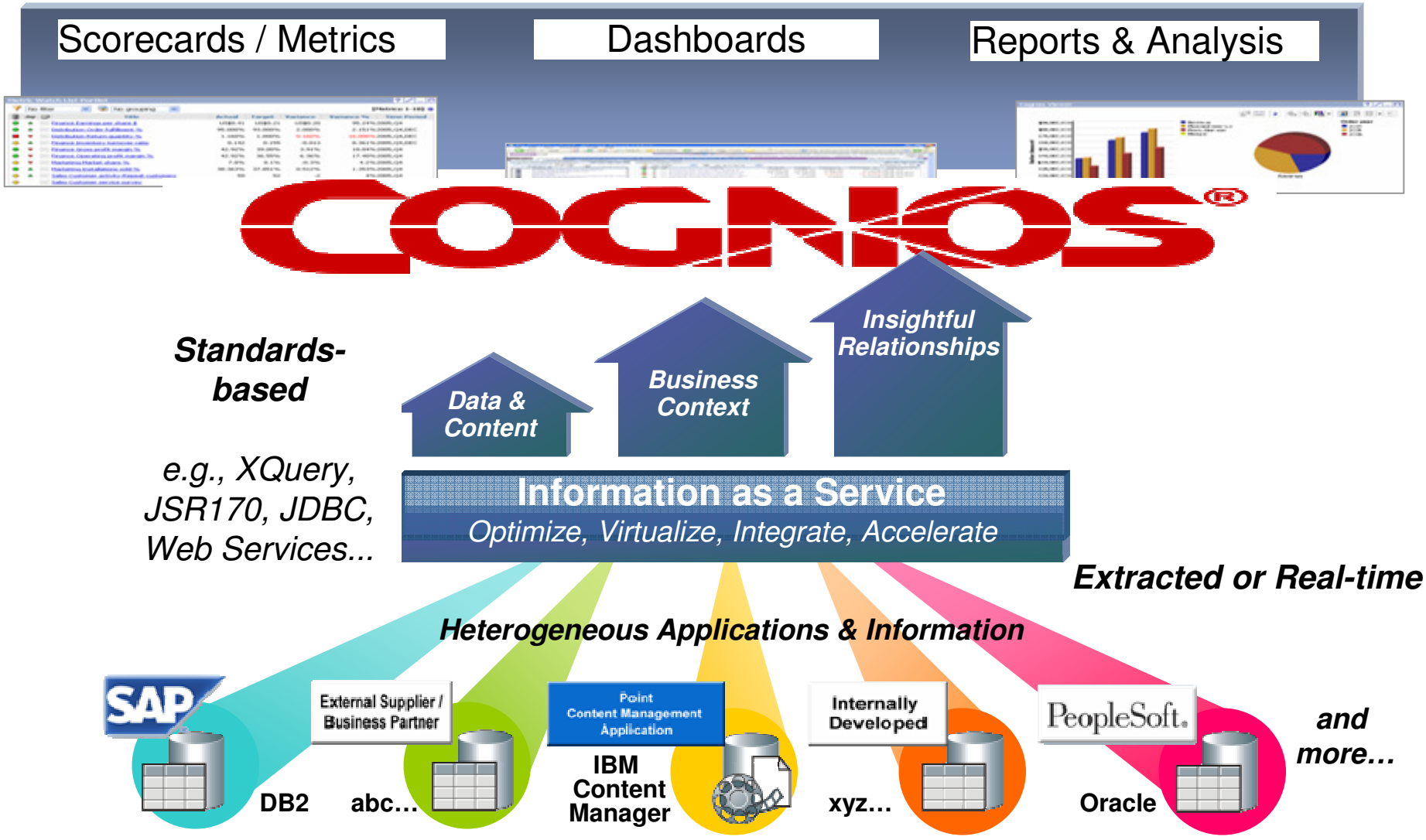


IBM / Cognos Business Intelligence Solution

Fully SOA Compliant



IBM Cognos 8 BI – Lineage

Making information …usable!

Knowing the "data lineage" - the who, what, when, where, and why – of data is of paramount concern to Finance.

Understanding the source of information:

- **Lineage in technical terms:**
  - Tracks data – the application/system origin, the date and time
  - What changes were made to the data
  - who was responsible for accessing and processing it
- **Lineage in business terms:**
  - Describes where the information comes from by providing metadata details
  - Provides information including author, business descriptions from model

IBM Cognos 8 BI for Linux on System z

Making information ...secure!

Sending and storing unsecured data exposes it to various risks

- **Cognos security:**
  - Authentication – limits access to approved users
  - Authorization – what each authenticated user can see
  - Encryption – protecting data transmissions
- **Combining with the security strengths of System z**
  - Encryption /compression of data on tape, disk, network
  - DB2, z/OS, System z together have multiple security levels
    - You can deliver PCI data - compliance

IBM Cognos 8 BI – Federated Server

Making information ...seamless!

- **Accessing information across the enterprise:**
  - Integrate information on the glass
  - Provides a seamless view of the business
  - Access across silo's of applications/data
  - Sybase, Oracle, DB2/LUW, Informix
- **Easy, fast integration of legacy data sources with BI applications**
  - WebSphere Information Integrator Classic Federation
    - Extends Cognos connectivity to VSAM, IMS,
    - CA-IDMS, CA-DataCom, Software AG Adabas

IBM Cognos 8 BI – Go!Search

New pic: searching / mag.glass

Making information
...easy to locate!

Enables everyday users to find reports, scorecards, and other content created in IBM Cognos 8 Buisness Intelligence

- **Sharing information across the enterprise:**
  - Ensure consistent information across business units
  - Avoid re-creating reports, graphs
- **Fast and secure access to ranked and relevant BI**
  - search all BI content and create views of information to answer search criteria
- **Integrated BI and enterprise content**
  - results return all relevant structured content (reports, analyses, etc.)
  - and unstructured content (Word documents, PDFs, etc.)
  - within a single interface

IBM Cognos 8 - Go! Dashboard

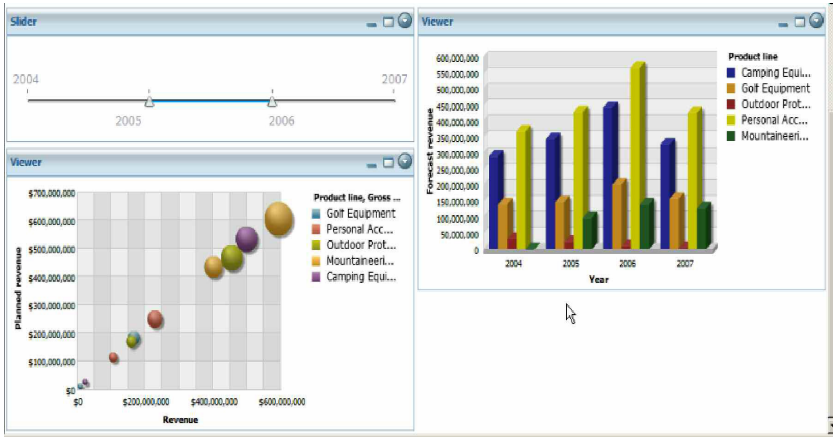
Making complex
Business information,
… understandable!

- Translate data from various corporate systems into:
  - visually rich presentations
  - gauges, maps, charts, and other graphical elements
  - Integrated results from multiple sources, combined in a more meaningful way

- Full range of dashboards —
  - operational, tactical, strategic
  - Designed to help monitor, measure, and manage corporate performance

Go! Dashboard Features

Making information
...esay to integrate!



Extensible Dashboard

- *Your mailbox for regularly delivered BI reports.*
- *Links to Web pages (such as maps).*
- *RSS readers to capture data - external business news and multimedia.*
- *Applications, authored by IT using the IBM Cognos software developers' kit, that extend and customize your BI deployment (scorecards, mash-ups, and more).*

IBM Cognos 8 Go! Mobile

Making information ...accessible!

Gives mobile workers the ability to make information-driven decisions, regardless of location, by securely receiving and interacting with IBM® Cognos® 8 BI on their mobile devices.

Device Operating Systems

- *BlackBerry*
- *Symbian S60 3rd Edition*
- *Microsoft® Windows® Mobile*

created to fit the needs of mobile workers across the organization —

- *salespeople who need customer and pipeline details,*
- *operations personnel who need supply chain information*
- *and executives who must have information from every part of the business.*

Extend your reach by delivering the right information at the right time.

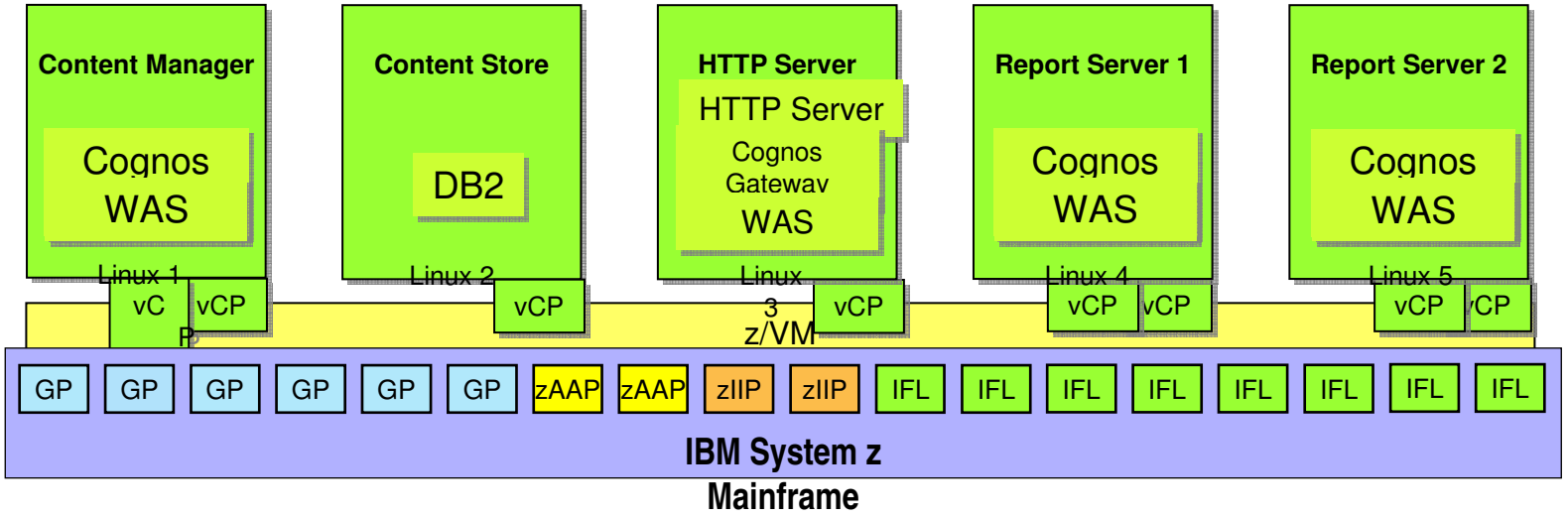
IBM Cognos 8 BI Go!Now

Making information
...Real Time!

- **Cognos Go!Now delivers operational dashboards**:
  - providing real-time monitoring of key performance indicators (KPIs)
  - and operational metrics from disparate data sources
- **Empowering the frontline workers –**
  - Detect and rapidly respond to changing business conditions
  - Expose problems or opportunities in real-time to continuously drive operational efficiencies.
  - Deliver operational optimization throughout sales, customer service, manufacturing, IT and marketing organizations.

IBM Cognos 8 BI in z/VM "Distributed" Deployment

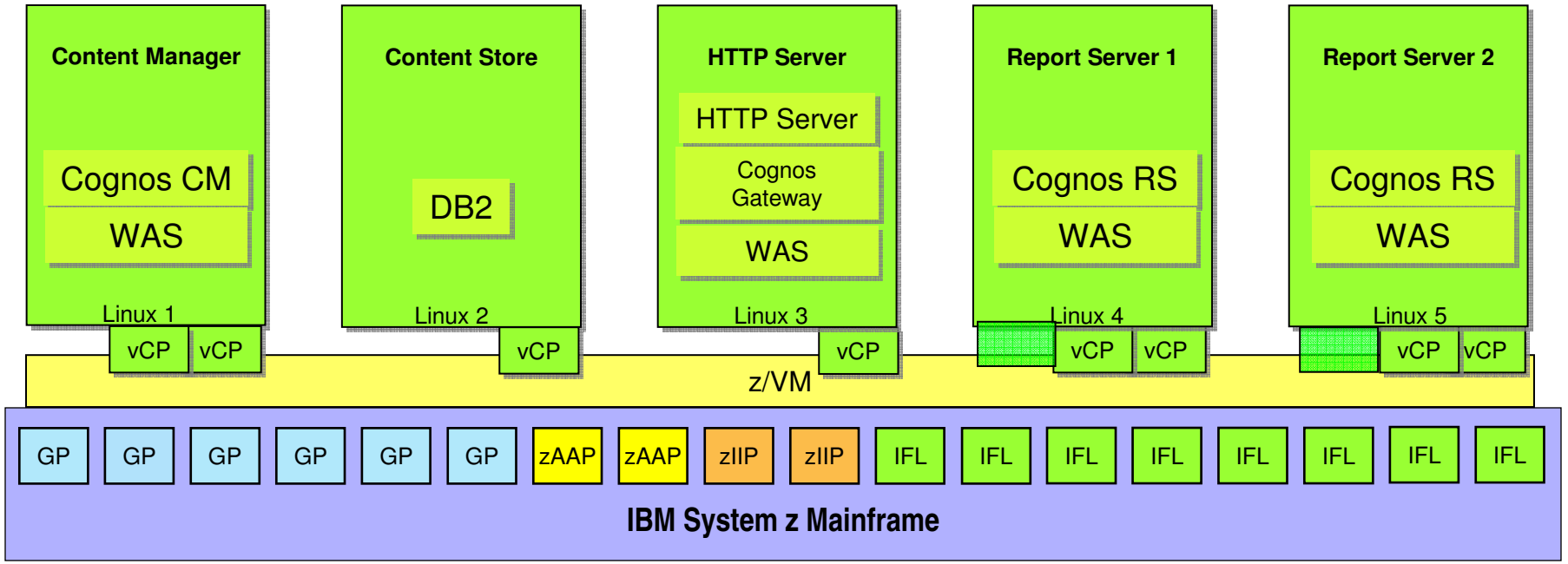
For Scalability



- Number of virtual Cognos instances – similar to other platforms' physical servers
- Cognos components distributed on individual Linux "guest" servers
- Number of virtual CPs per Cognos instance same as other distributed deployments -- minimum 2 virtual CPs per Content Manager and Report Servers instance
- Over-commit ratio CP varies from 1.5/1 to 20/1 or more – highly dependent upon how active the guest servers are

IBM Cognos 8 BI in z/VM "Distributed" Deployment

For Scalability



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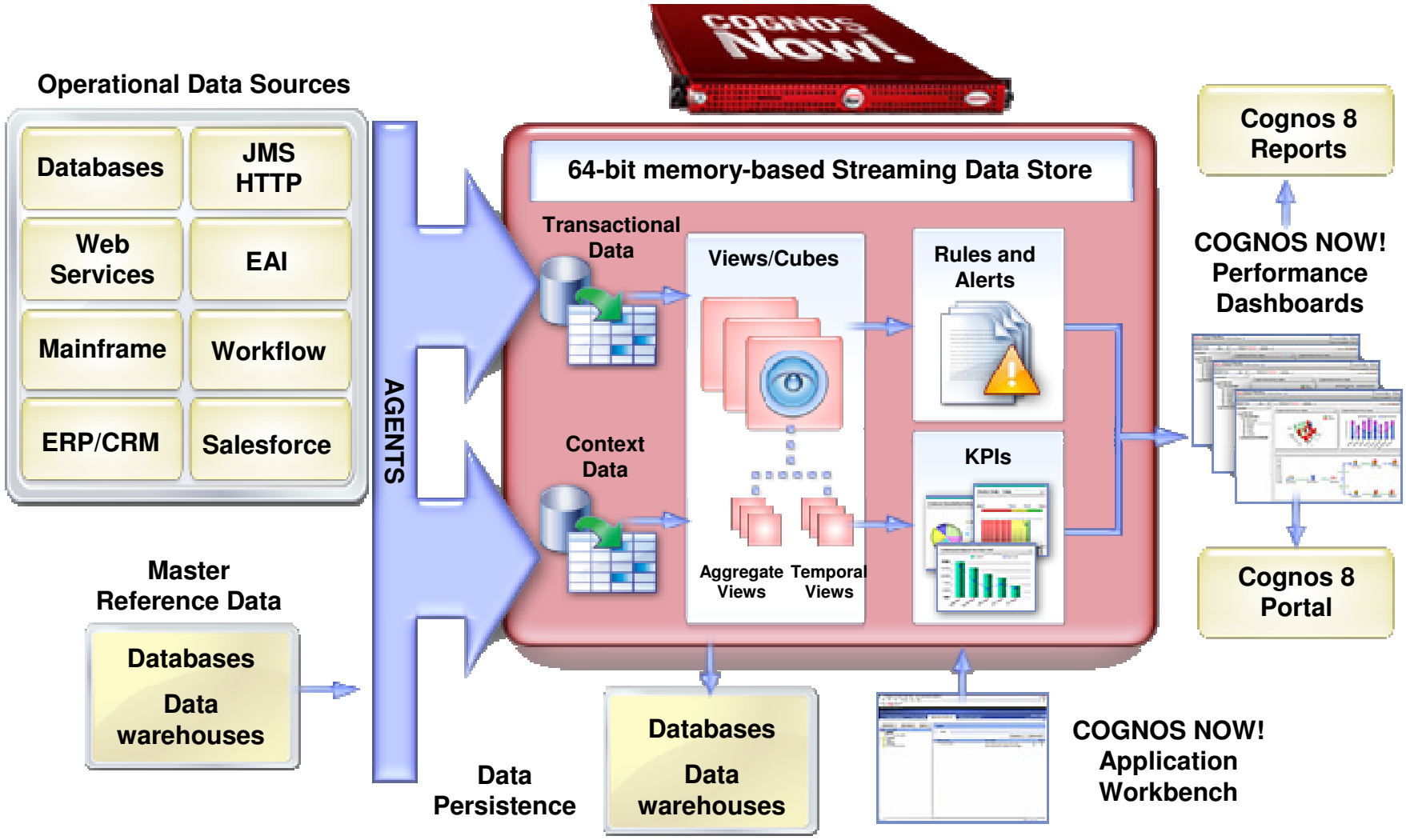
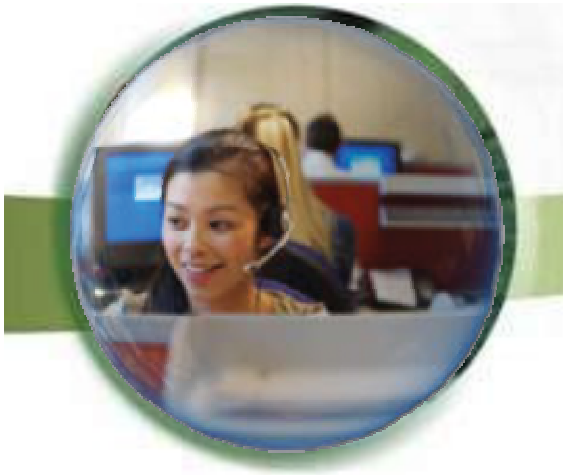
Operational Business Intelligence with Cognos Now!



Business Intelligence on System z

Making your business
...succeed!



- **Easy to scale infrastructure for BI:**
  - Easy to add capacity via images on zLinux
  - Simplify data access via federation
- **Combining with the strengths of System z**
  - Lower environmental, staffing costs
  - Leverage data sharing, concurrent processes for availability
  - Simplify your infrastructure
  - WLM to identify, manage critical queries within workload

Mashups; Another Approach to Operational BI

A Mashup is -

- an easy way to present, Business Intelligence, Analytics, Collaboration, Wiki's, and a whole range of information types & applications on a user's workstation/laptop

Mashups are-

- are SOA applications on the Glass – they are lightweight, fast and easy way to create composite applications.

IBM Mashup Center

A end to end mashup platform, supporting line of business assembly of simple, flexible, and dynamic web applications – with the management, security, and governance capabilities IT requires

- **Create** new applications by reusing existing data and services
- **Unlock** Enterprise, Web, Personal and Departmental Information
- **Develop** widgets from enterprise systems
- **Discover** and share mashups, widgets, feeds, and services
- **Transform** information into new feeds

Customer Outlook for Mainframe Industry

Annual Worldwide Mainframe Industry Survey

1,000+ large mainframe customers

Highlights of the survey include:

- Respondents consider mainframes as critical to service oriented architecture and web services initiatives as a data hub and transaction server
- 74% of respondents do not believe they can successfully move mission critical workloads to a distributed platform at any cost
- So….
  - How critical is your data warehouse?
  - How critical is your companies future?

Survey conducted by BMC Software, as reported in Business Wire on 8/28/07

Smart Analytics in action at IBM

The Smart Analytics Cloud enables IBM to deliver business intelligence with greater efficiency across the enterprise.

- Establishes a corporate strategy for service delivery of BI.
- Reduces the time and cost to deliver BI to new divisions and departments.
- Maintains current departmental business processes, corporate security and compliance.
- Maximizes departmental budgets by subscribing to standard services.
- Private cloud solution implementation offers economies of scale and flexibility.

Compelling results:

- Consolidating >20 multi-product, departmental BI deployments to Cognos 8 BI on System z.
- Deploying a private cloud to support >200,000 named users across our global workforce.
- Realizing value from >60 data sources across IBM.
- 1 petabyte of data

SMART IS: Delivering Business Intelligence with greater efficiency across the corporation

Customer Quote: CIO OFFICE:
"Our commitment to informed decision making led us to consider private cloud delivery of Cognos via System z, which is the enabling foundation that makes possible >$20M savings over 5 years."

Common Data Center Challenges

Increasing complexity

Energy and cooling problems

Rising costs

The problems are not just in IT

The Modern Server - the Mainframe

- **Designed for high availability and responsiveness**
- **Maximum throughout per unit cost**
- **Tight centralized control for**
  - Security
  - Stability / Change Management
  - Backup / Recovery
  - Auditability
  - Resource / Cost Management and Accounting
- **Simplified and low cost operations and administration**

… with the same functions, capabilities, skill requirements and end-user experience as on other platforms

Top 10 Reasons for Dynamic Warehousing on System z

10. Lower Software Costs
9. Reduced Complexity
8. Reduced Administration Costs
7. Better Utilization of Resouces
6. Lower Costs in - power, cooling , foot print
5. Lower Data Latency
4. Higher Performance
3. Reduced Risk
2. Improved Service
1. Reduced Total Cost

IBM System z- designed for the 21st century

- Trusted Platform for SOA
  - *IMS 10 XQuery and Web services enhancements ease data service delivery*
  - *DB2 9 pureXML for seamless and efficient integration of XML & relational data*

BEKINS Since 1891

IMS Is How You Run 100 Million Transactions a Day

- Industry's Highest Level of Availability & Scalability
  - *Unmatched availability for "utility class" information access*
  - *Rapid and non-disruptive scalability for variable mission critical*
  - *Requirements*

TD Bank Financial Group

100% availability of information for 10 consecutive years

- Unmatched Risk and Compliance Management
  - *New security capabilities for greater control and business flexibility*
  - *Improved auditing and accountability*

citi

"DB2 9 for z/OS simplifies our security process..."

- Lowest Operating Cost
  - *Reduced operating costs through z/OS and zIIP engine exploitation*
  - *Superior environmental efficiency - power, cooling, and space*

First National Bank Omaha

"$2M yearly savings moving to System z. *It's revolutionary. It paid for itself in a year*"

Oracle Consolidation on System z from Sun Solaris

A Large Japanese Electronics Industry Client

83% Savings on ISV Software Licensing

- Client evaluated the System z capabilities and determined that all applications could successfully migrate without rewriting the existing Java applications
- IBM understood client pain points and was able to quickly design, develop, and implement a solution

Pain Points	Solution Value
▪ Instability of distributed environment	▪ Stable nonstop core system
▪ Frequent outages and reliability	▪ Superior reliability, availability, and scalability
▪ Poor transaction performance due to complex physical network	▪ Improved transaction rate with high-speed internal network
▪ Poor scalability	▪ Highly scalable environment with System z virtualization
▪ High hardware and software cost associated with aging infrastructure	▪ Optimized hardware cost (System z + System x hybrid system)
▪ Migration concerns of existing Java application	▪ Existing Java applications run without rewrite

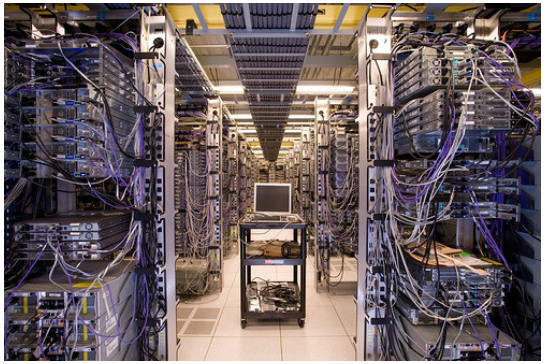
"IBM System z is the best system as the next generation open platform in terms of reliability, scalability, and system performance. We evaluated IBM because of its end-to-end support including installation services and maintenance services. Also, IBM demonstrated the high quality proposal, articulated the clear and concrete architecture roadmap, so that we concluded that IBM is the best and the trusted partner."

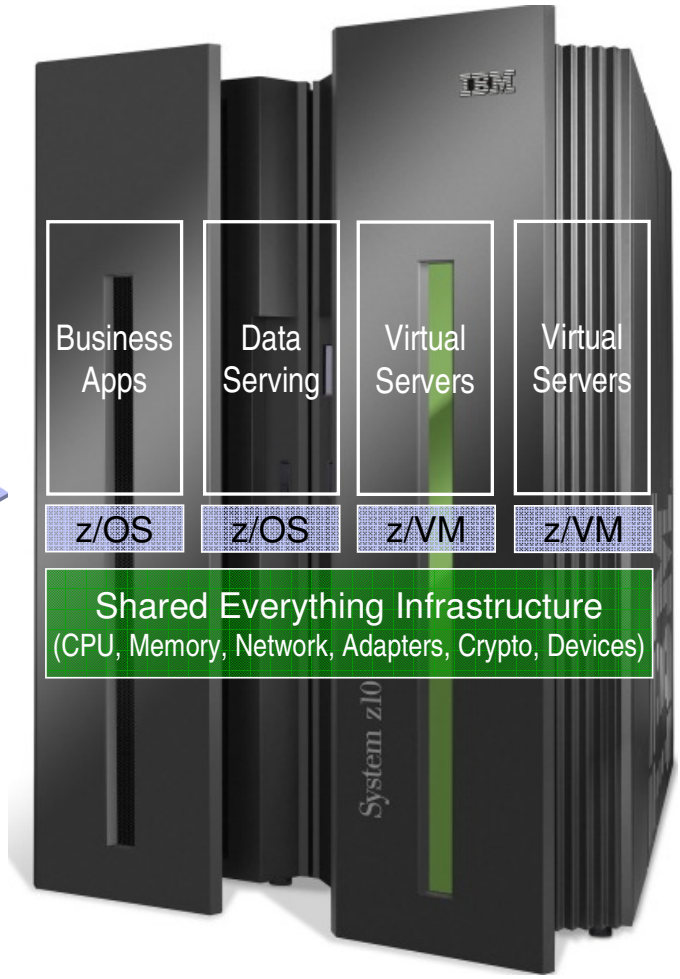
– Client Corporate Information Officer (CIO)

System z IT Optimization and Consolidation

Saving Money and Reducing Complexity
Helping You "Do More with Less"

- Consolidate more servers per core and spend less on software, more than 70% less in some cases
- Manage more server images with fewer people, up to 50% improvement in staff productivity
- Save up to 80% on energy and floor space
- Deploy new servers and applications faster
- Absorb workload spikes and maintain service level agreements with less complexity
- Spend less on disaster recovery





The Other Hidden Costs – “Going Green”

Three issues that are becoming major items it the IT budget:

1. **Floor space**
2. **Power Consumption**
3. **Cooling Requirements**

"In a market where green computing, consolidation and virtualization are at the forefront of every CIO's agenda, the IBM System z mainframe represents a solid alternative to distributed platforms,"

Justin Steinman, Vice President of Solutions and Product Marketing, Novell.

Power and Cooling vs The Competition

z10 mainframes can outperform HP Superdomes on power consumption by a factor of 2.5x or greater. The key is the capacity of the machine to run work in the industry's leading virtual and automated enterprise systems environment, not just comparing a single frame z10 to a single frame HP Superdome.

	One System z10 EC 	Four 64 Way HP Superdomes 
ENERGY COSTING		
Server Steady State Watts	**18,425**	**86,744**
Watts Required to Cool the Servers	**11,055**	**52,046**
TOTAL WATTS POWER & COOLING	29,480	138,790
TOTAL COST FOR POWER & COOLING	**$25,824**	**$121,580**

An IBM System z10 EC has the equivalent capacity of nearly 1,500 x86 servers with an 85% smaller footprint and up to 85% lower energy costs.

The Cost of Ownership

Recognizing 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*'

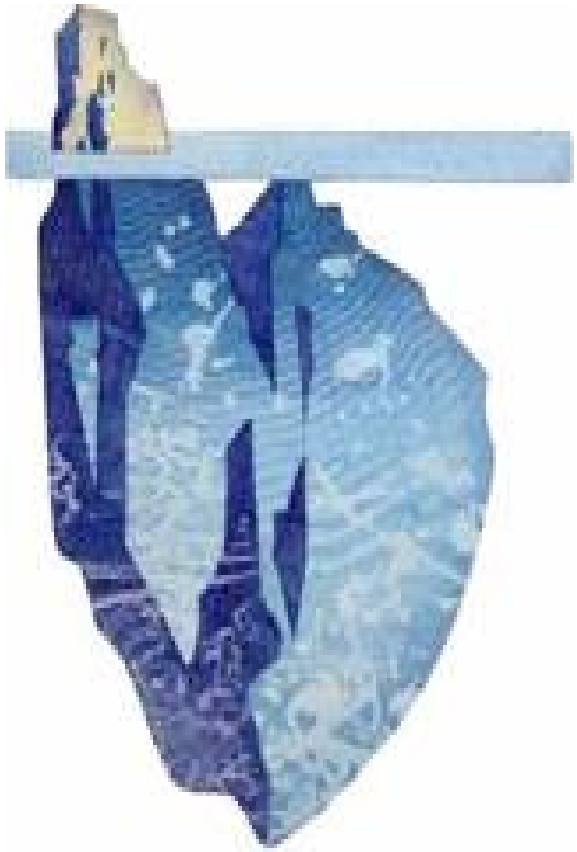
    © Software Strategies 2005 11
- Security breaches
  - More Than 90% Of Companies Expose Sensitive Data

    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
- Downtime
  - *Cost of downtime can vary by industry and can range from hundreds of thousands to millions of dollars per hour*

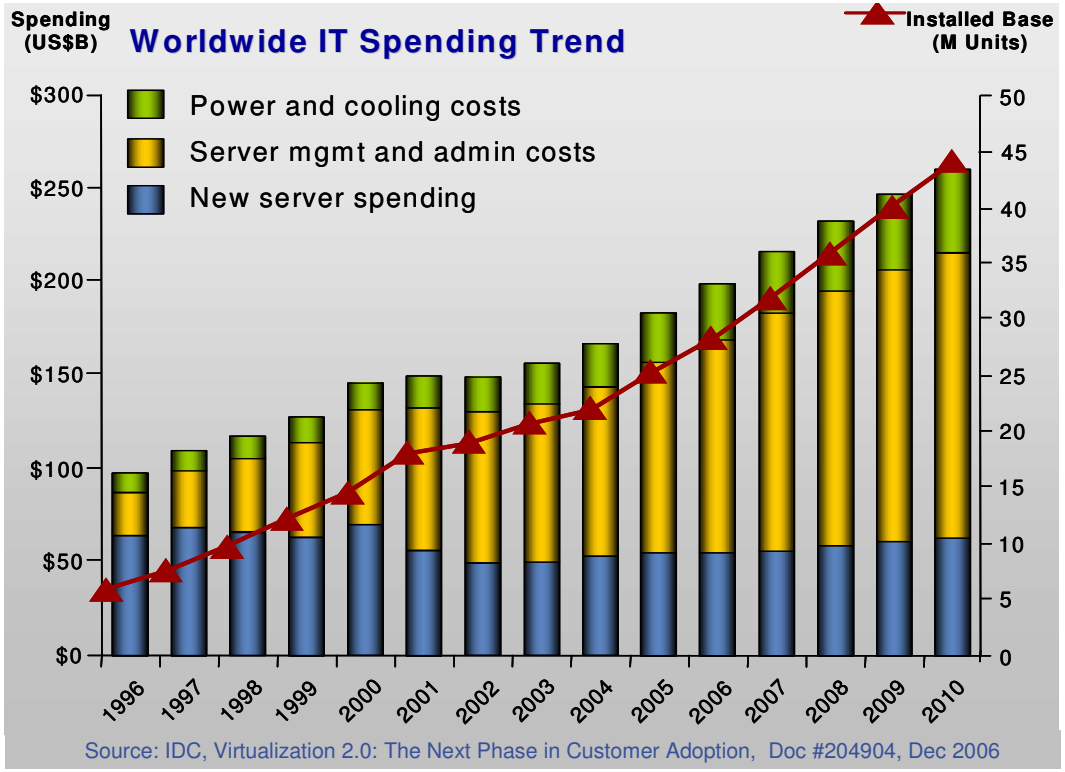
    ©Robert Francis Group. All Rights Reserved 2005



IBM Mainframe solutions are a cost effective alternative to large server farms of commodity servers, providing high availability, security and lower TCO

Cost effective alternative to masses of commodity servers

– *Management/Administration costs are already exceeding new server spending*
– *Power and energy costs growing dramatically*



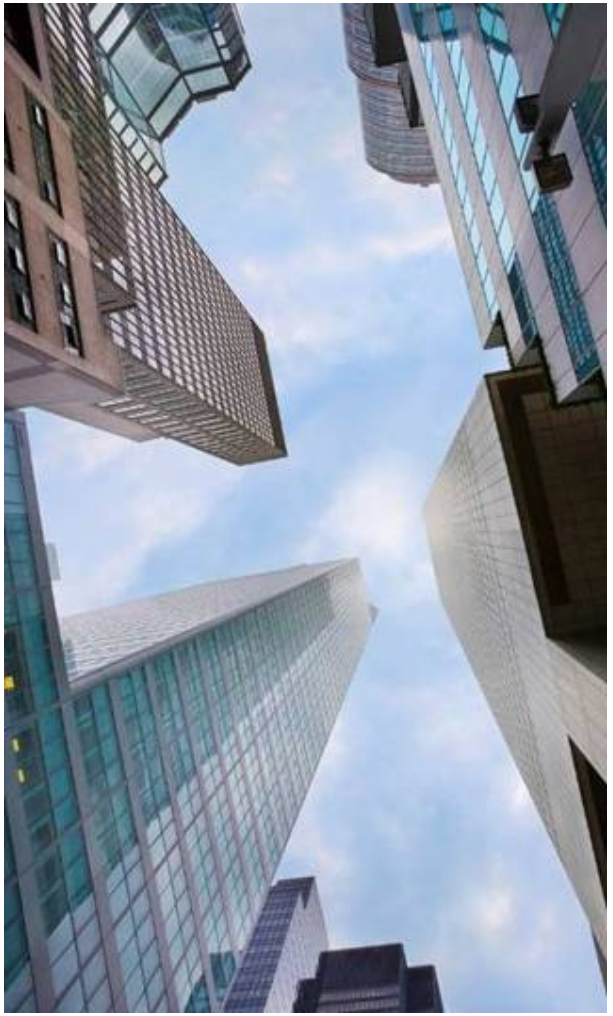
Source: IDC, Virtualization 2.0: The Next Phase in Customer Adoption, Doc #204904, Dec 2006

2000 –
Raw processing "horsepower" is the primary goal, while the infrastructure to support it is assumed ready

2006 –
Raw processing "horsepower" is a given, but the infrastructure to support deployment is a limiting factor

Smarter Virtualization
with IBM System z and z/VM

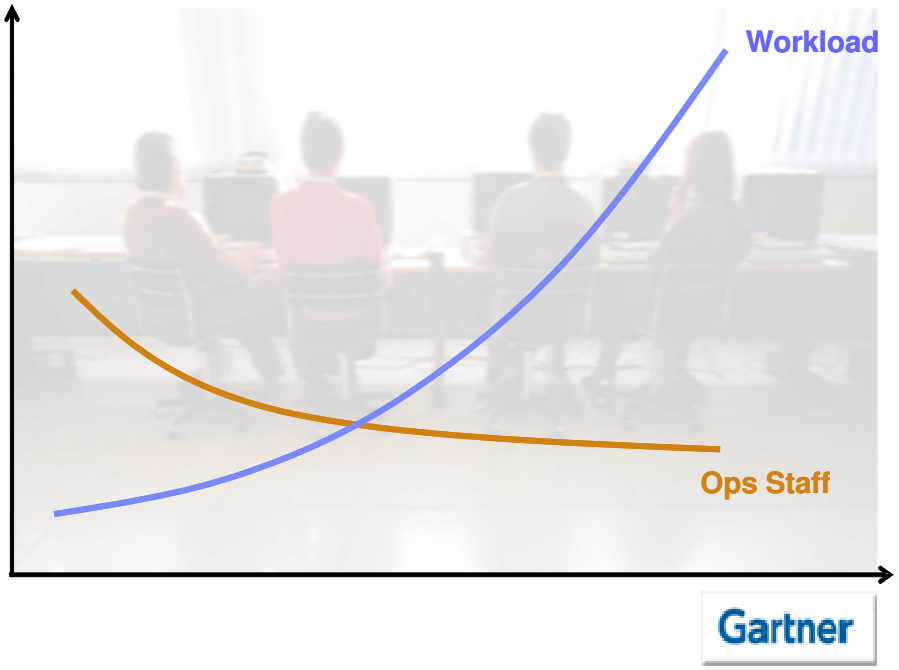
- **Do more with less**
  - Consolidate more servers, more networks, more applications, and more data in a single machine with Linux and z/VM
  - Achieve nearly 100% utilization of system resources nearly 100% of the time
  - Enjoy the highest levels of resource sharing, I/O bandwidth, system availability, and staff productivity
- **Reduce costs on a bigger scale**
  - Consume less power and floor space
  - Save on software license fees
  - Minimize hardware needed for business continuance and disaster recovery
- **Manage growth and complexity**
  - Exploit extensive z/VM facilities for life cycle management: *provisioning, monitoring, workload mgmt, capacity planning, security, charge back, patching, backup, recovery, more...*
  - Add hardware resources to an already-running system without disruption – the epitome of Dynamic Infrastructure
  - Consolidation on a **scale up** machine like System z means fewer cables and fewer components to impede growth



Boost your departments productivity:

by managing excess growth and complexity with System z10 BC

Use System z10 BC to increase your enterprise's productivity



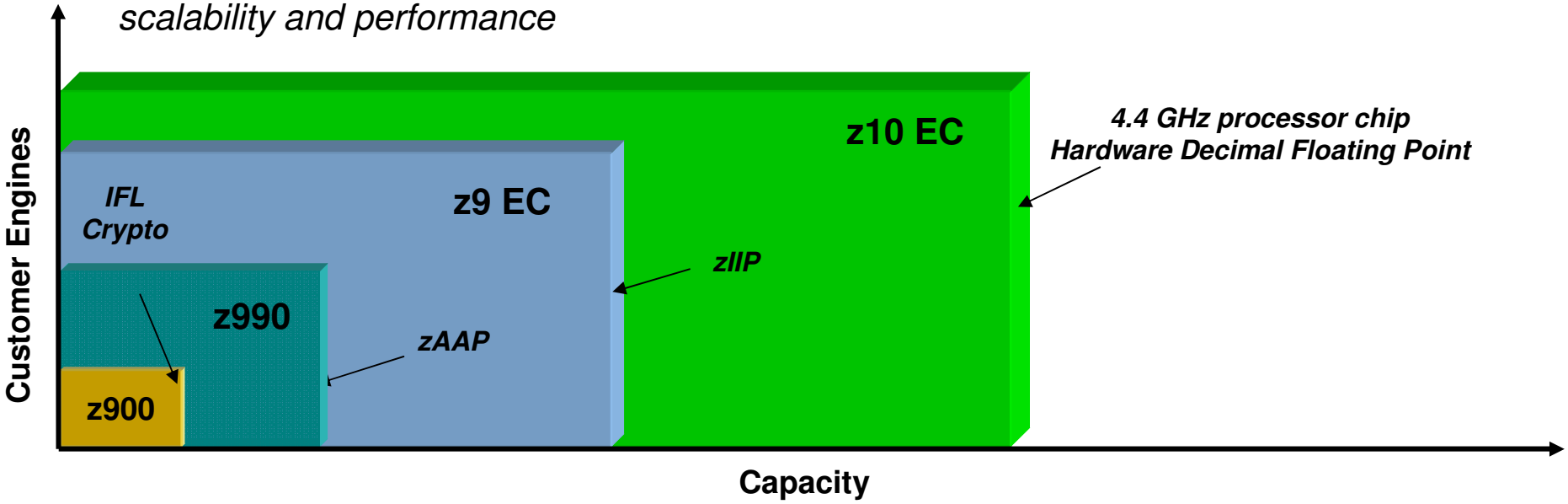
"Now we have achieved an environment on the mainframe where we have
- a 75 percent reduction of people worldwide managing them,
- but those people are managing about 1,000 times the data and probably 1,000 times the transactions.
- This is a result of the tools and automation."

Ralph Crosby, IT Business Edge, June 25, 2008

Mainframe data center staffing levels have not significantly changed despite large increases in workload volumes.

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*

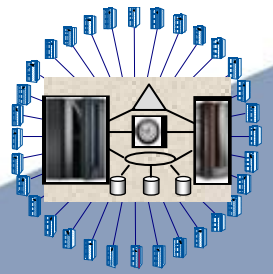


Significant capacity for traditional growth and consolidation

* 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

Driving Value ***Up*** and Cost ***Down***

Evolution of Specialty Engines



Internal Coupling Facility (ICF) 1997

- Centralized data sharing across mainframes

Integrated Facility for Linux (IFL) 2001

- Support for new workloads and open standards

System z9 Application Assist Processor (zAAP) 2004

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

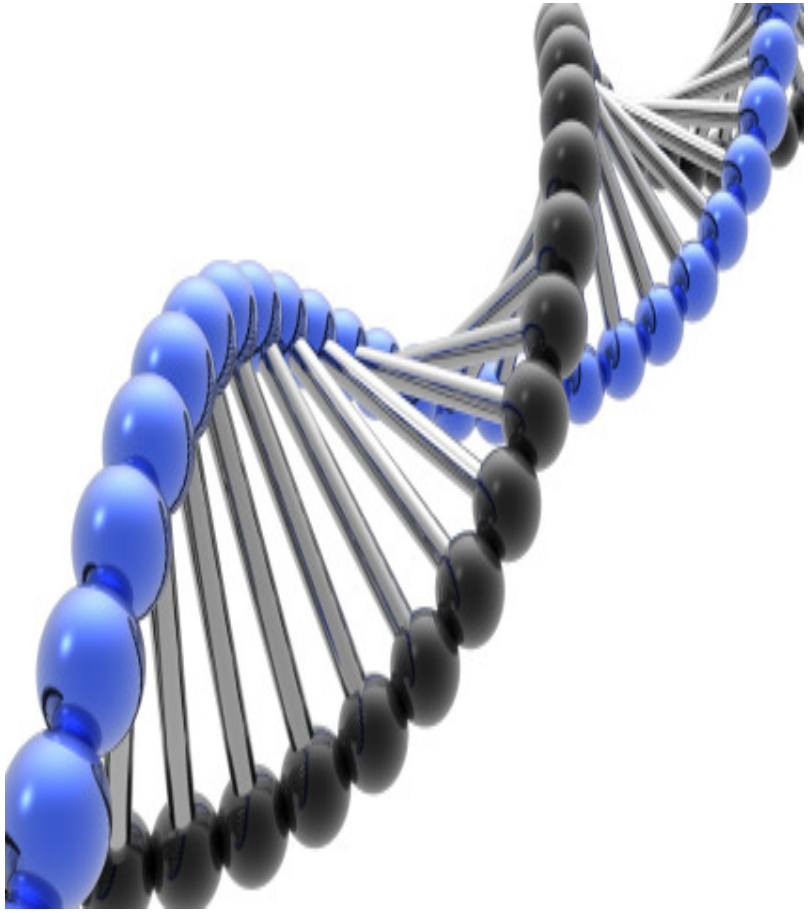
IBM System z9 Integrated Information Processor (zIIP) 2006

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

Server Architecture Genetics

Consider the Heritage of the Server Platform that you use to simplify your IT

- **x86 systems**
  - Key value proposition: *end-user autonomy*
  - "Ctl-Alt-Del" not a problem for a single-user system
- **UNIX systems**
  - Key value proposition: *processor speed*
  - Sweet spot: engineering/scientific computing
- **Mainframe systems**
  - Key value proposition: *mixed workloads and high I/O workloads*
  - Delivering high degrees of efficiency, availability, workload management, security



Virtualization technology can be significantly constrained or compromised by the underlying system architecture.

Customer Quotes

Erik Heidt, VP, Fifth Third Bank

- *“DB2 on z10 is our preferred RDBMS platform for highly-critical or highly-sensitive data, over Oracle, over Microsoft, over Sybase, over any others”*

Khalid Ishaque, Architect, Northwest Airlines

- *"after studying and learning about IMS & DB2 for the mainframe, I have found that they are some of the best technologies available anywhere"*
- *"System z provides us with a means to consolidate the workload resulting from our merger" (with Delta Airlines)*
- *"it is not possible to do what IMS does on another platform and today's IMS doesn't require extensive knowledge of IMS or Cobol to be effective"*

Robin Cobb, SVP from Bank of America

- *"we have over 59 million customers, nearly 20,00 ATM's and 6000 retail branches, all supported by DB2 and IMS on System z"*

The System z Software Strategy

- **Reinvigorate the System z Ecosystem:**
  - Attract New System z Customers and Application Workloads
  - Retain and Grow Existing System z customers
  - Make the Mainframe Relevant to a new IT Generation

- **Platform Modernization and Simplification are key:**
  - **Evolve as a Modern Server**
    - Systematic Reengineering of the Software Stack
    - More Open Standards Compliant and Common Middleware
    - Integration with the z Platform for Added Functions
    - Accelerate innovation on System z with new Application Development Capabilities
  - **Deliver Extensive Data Management Services**
    - Leading Edge Relational Function
    - Reinvigorated Data Warehousing Competitiveness
    - Autonomic Tooling to Augment Human Expertise
  - **Bring Virtualization to a new Level**
    - Logical as well as Physical Consolidation
    - Manage many Systems as if they were One
    - More End to End Management Capability from a z Central Point of Control