The Future of IBM's Business Analytics
Data Warehousing and Business Intelligence on System z

Mike Biere
IBM

August 3rd 2010
Session Number: ----

SHARE in Seattle

System z: The platform for the future

"you cannot think seriously about your longer-term IT architecture without thinking equally seriously about what today's mainframe environment has to offer“

CIO Magazine: Mainframe computing is set for a rebirth – September 29, 2009

The World is Changing.

The Reality of Living in a Globally Integrated World is Upon Us.

6x Increase in global water usage since the 1900s, twice the rate of human population growth

40% to 70%
The losses of electrical energy due to inefficiency - around the world

85%
Idle computer capacity

$11.5 billion
Worth of produce is wasted in India because of outdated post-harvest infrastructure

$0.70 per $1.00
Spent on IT maintenance

$100 billion
Lost annually in the US due to healthcare fraud

22%
of total port volume in North America is empty containers

$40 billion
Annual consumer product and retail sales lost in United States due to supply chain inefficiencies

Annual impact of congested roadways
$78B lost
3.7B lost hrs
2.3B gallons of gas

SHARE in Seattle

Source: Various IBM and Public Studies

3

Market Dynamics Are Shifting

- **Troubled economy**
  - *Do more with less – business & IT*
  - *Economies of scale/consolidation*
- **BI Strategic Asset/Mission Critical**
  - *Broader, more intense users*
  - *High availability & performance expectations*
  - *Access to more data*
- **Corporate regulatory compliance driving security**
- **Environmental concerns**

IBM: 2009 CIO survey results

CIOs select their ten most important visionary plan elements

- 3/4s of CIOs anticipate moving to a strongly centralized, shared infrastructure to improve economies of scale
- 83% say Business Intelligence & analytics - is their top focus area

Organizations are Operating with Blind Spots

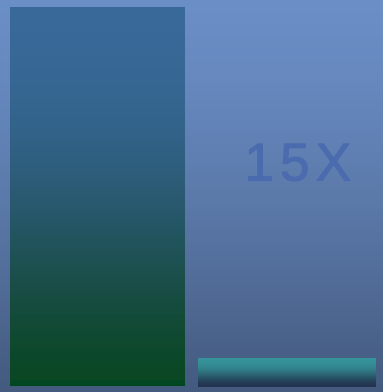
1 in 3

Business leaders **frequently make decisions** based on information they don't trust, or don't have

1 in 2

Business leaders say **they don't have access to the information they need** to do their jobs

Top Performers Demonstrate Expertise



Predict and prepare for the future by evaluating trade-offs proactively

- Industry Top performers
- Industry Under performers

Source: IBM: Break Away with Business Analytics and Optimization Study

Cognos BI & System z

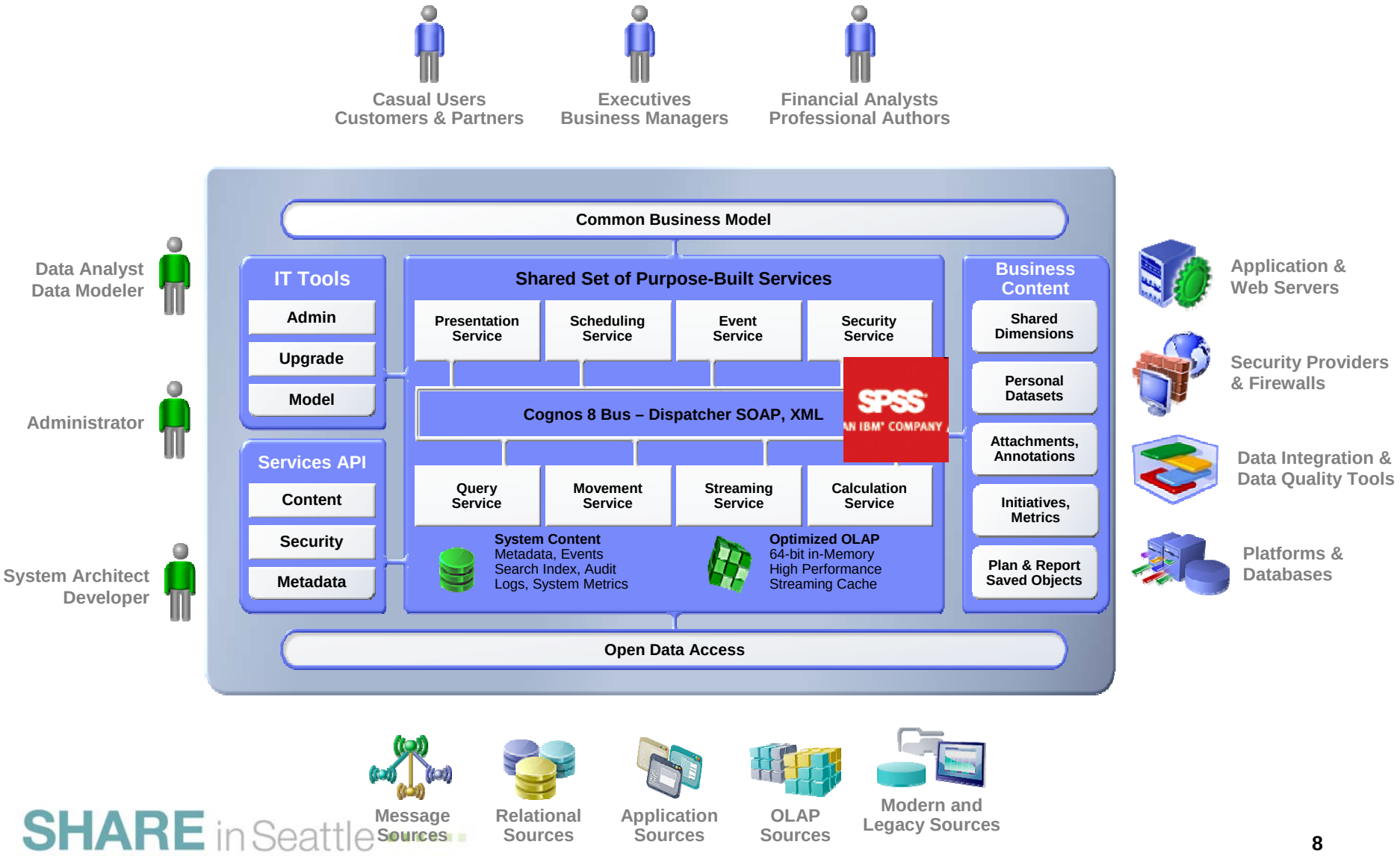
Simplifying the management and maintenance of your enterprise BI infrastructure.

- Customers have told us they want the following from their BI and DW infrastructure:
  - ***Fewer BI tools in house – BI standardization***
  - Server consolidation - Significant savings in the hardware, software, operating and people costs associated with the management and maintenance of your enterprise BI infrastructure.
  - ***Rapid deployment at a low cost***
  - Full range of BI capabilities including real-time monitoring, reporting, analysis & dash boards tighly integrated
  - A reduction in the time associated with deploying a new BI application and/or increasing capacity.
  - Maximum scalability, reliability, availability and security
  - ***Simplified and faster access to the transactional data*** located on System z – Operational BI scenarios

The Core Value Proposition

- Customers who will be interested in Cognos on System z because they…
  - Are “z-centric”
  - Have most of their data there
  - Desire to provide a lower cost, single platform solution for DW and/or BI
  - Position BI as mission critical
  - Are looking at new BI operations such as real-time and/or Operational BI
  - Require assured 24x7 operation (System z is known for its 99.999% availability)
  - Want to consolidate distributed servers or see a need to
  - Want to standardize on one or fewer BI tools
  - Have Linux processors on System z and wish to make them more useful (IFLs)
  - Have stringent data security rules
  - Want an alternative to IBI and SAS
  - Wish to cut costs such as software, hardware, staff support, power

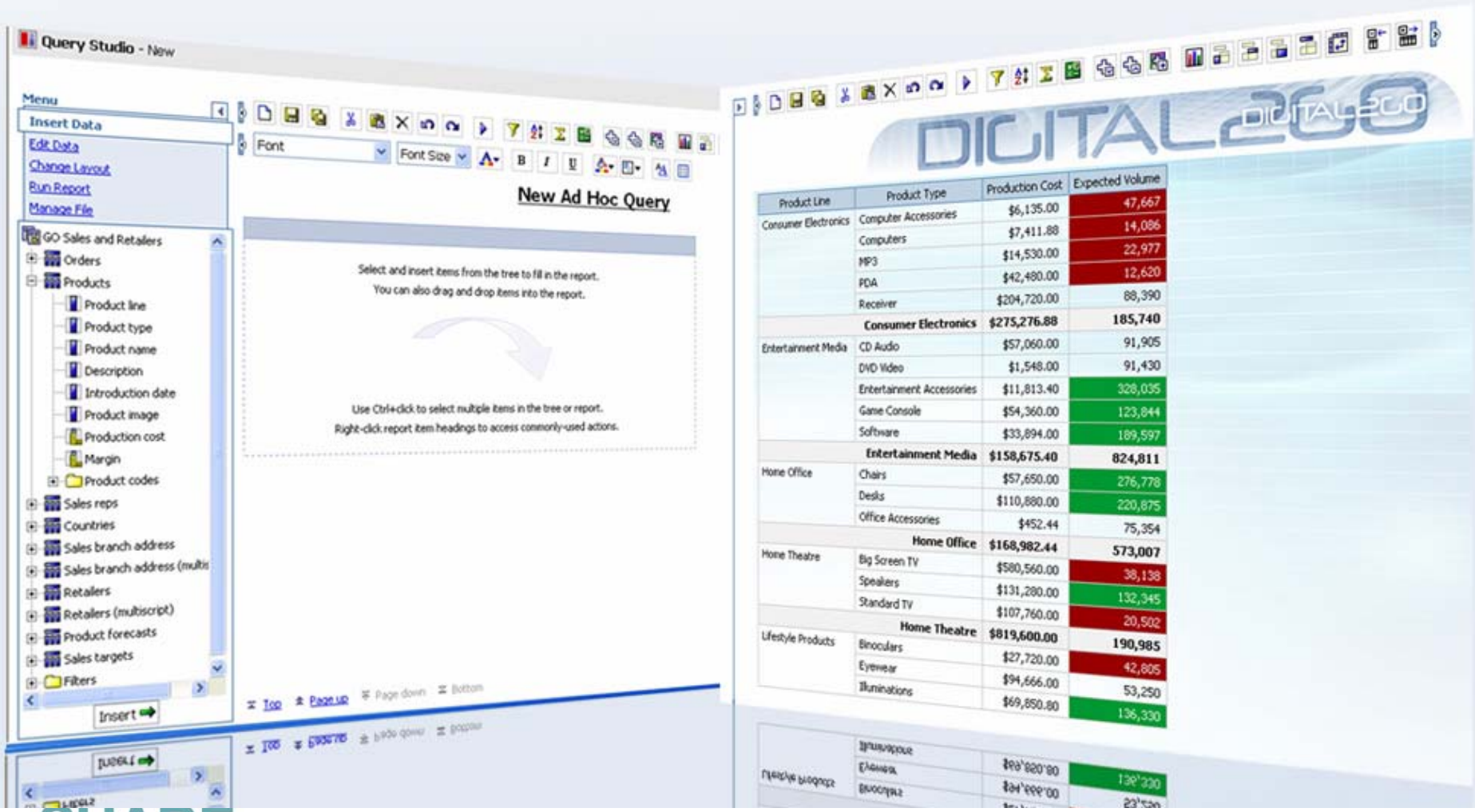
Cognos architecture fits IBM's BI SOA Model



Reporting, Analysis, Dashboards

- **Enterprise Reporting**
  - Supports multiple report types: Production, Managed, Ad-hoc, Financial, etc
  - Is adaptable to any data source
  - Operates from a single metadata layer
  - Can be personalized and targeted
  - Can be distributed via email, portal, MS-Office, search application and mobile device
- **Analysis**
  - Enables the guided exploration of information that pertains to all dimensions of your business
  - Performs complex analysis and scenario modeling easily and quickly
  - Gets to the “why” behind an event or action to improve business performance.
  - Moves from summary level to detail levels of information effortlessly
- **Dashboards**
  - Translate complex information into high-impact presentations
  - Allow you to spot changes
  - Are highly intuitive
  - Align decision makers

Self Service – User Centric Studios



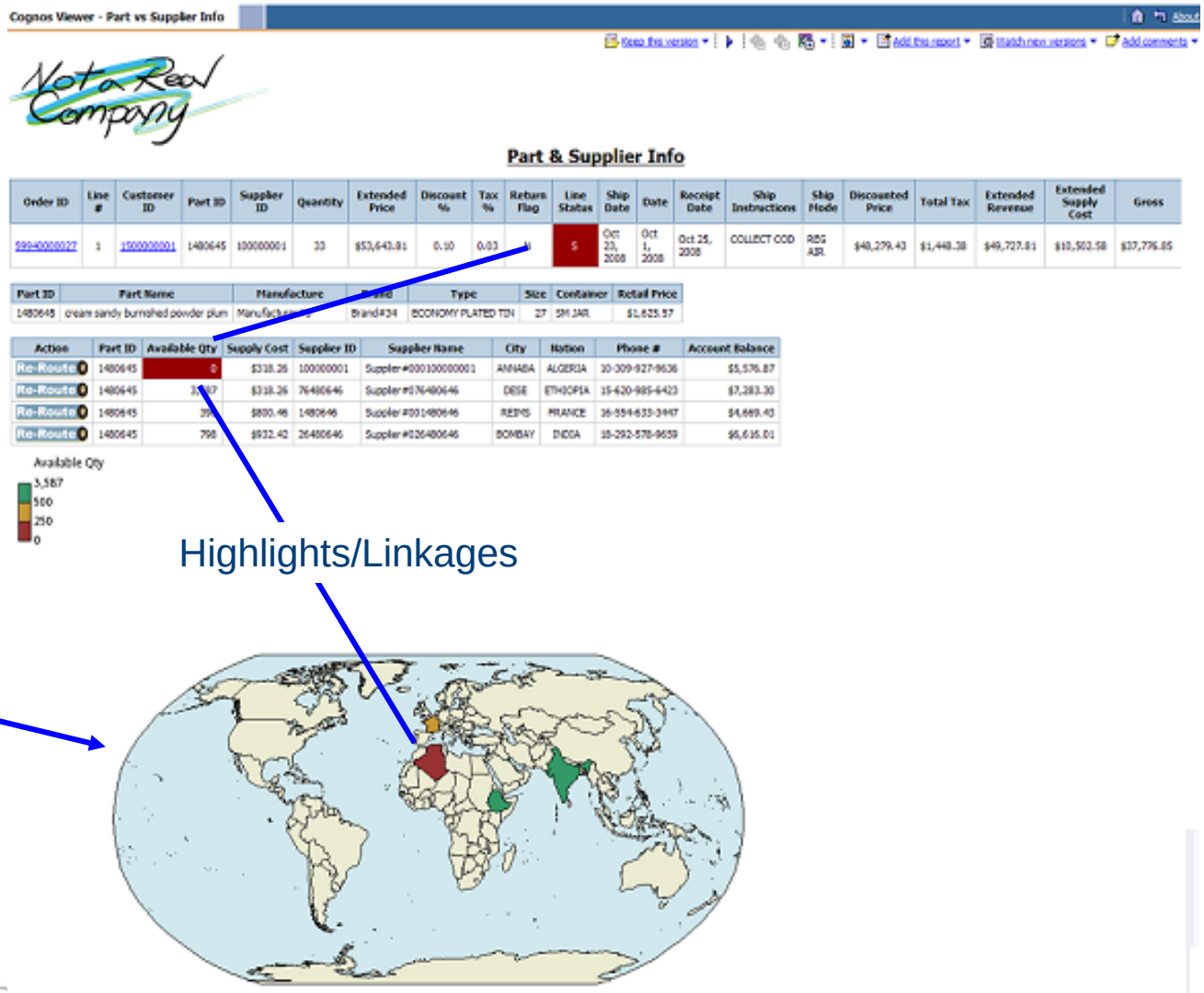
Compound reports

Icon/graphic

DB2

Highlights/Linkages

Oracle



Multi-dimensional analysis – OLAP

Cognos Viewer - Regional Performance

About

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Regional Performance

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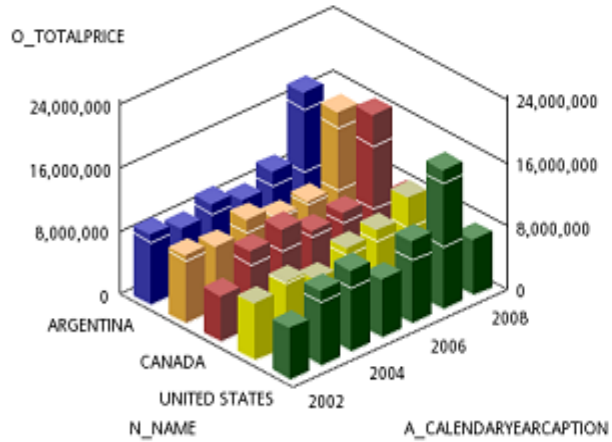
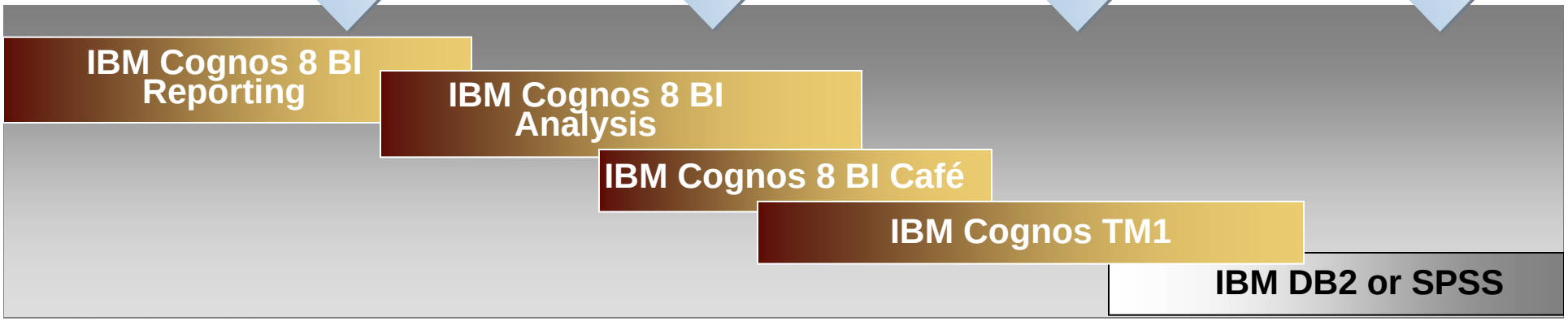


O_TOTALPRICE	2002	2003	2004	2005	2006	2007	2008
ARGENTINA	8,903,234.52	7,865,636.13	9,261,800.28	7,974,006	9,829,223.82	18,085,415.46	9,253,722.44
BRAZIL	8,641,797.5	7,988,007.71	9,611,839.88	8,165,500.15	8,464,643.68	17,982,437.04	9,911,745.28
CANADA	5,853,351.63	9,718,616.01	10,763,358.4	8,763,704.71	9,276,182.17	19,912,845.16	7,621,027.42
PERU	7,187,485	8,151,364.97	6,698,209.7	8,907,036.06	9,406,884.87	11,771,766.12	8,362,814.64
UNITED STATES	6,453,242.64	9,369,248.47	10,245,887.71	7,351,463.72	10,351,386.81	17,645,357.82	7,032,636.14

The Four Styles of Analysis

Broad Usage (Consumers) ⟷ **Focused Usage** (Specialist)

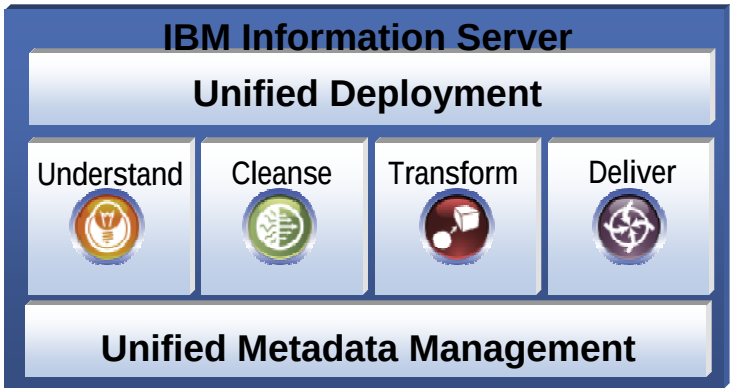
Analytical Reporting *Drill*	Trending *Slice and Dice*	Scenario Modeling *What-if*	Predictive Modeling *What might be*
• Top down view	• Personal exploration	• Model scenarios	• Uncover patterns
• Drillable reports	• Compare & contrast	• Reorganize, reshape	• Apply algorithms
• Sort top & bottom	• Rotate and nest	• Compare scenarios	• Mine data and text
• Analyze then query	• Work disconnected	• Save versions	• Predict outcomes
• Market shifts	• Sales trend analysis	• Financial analysis	• Fraud prevention
• Product ranking	• Market analysis	• Profitability analysis	• Churn analysis



InfoSphere Information Server for System z

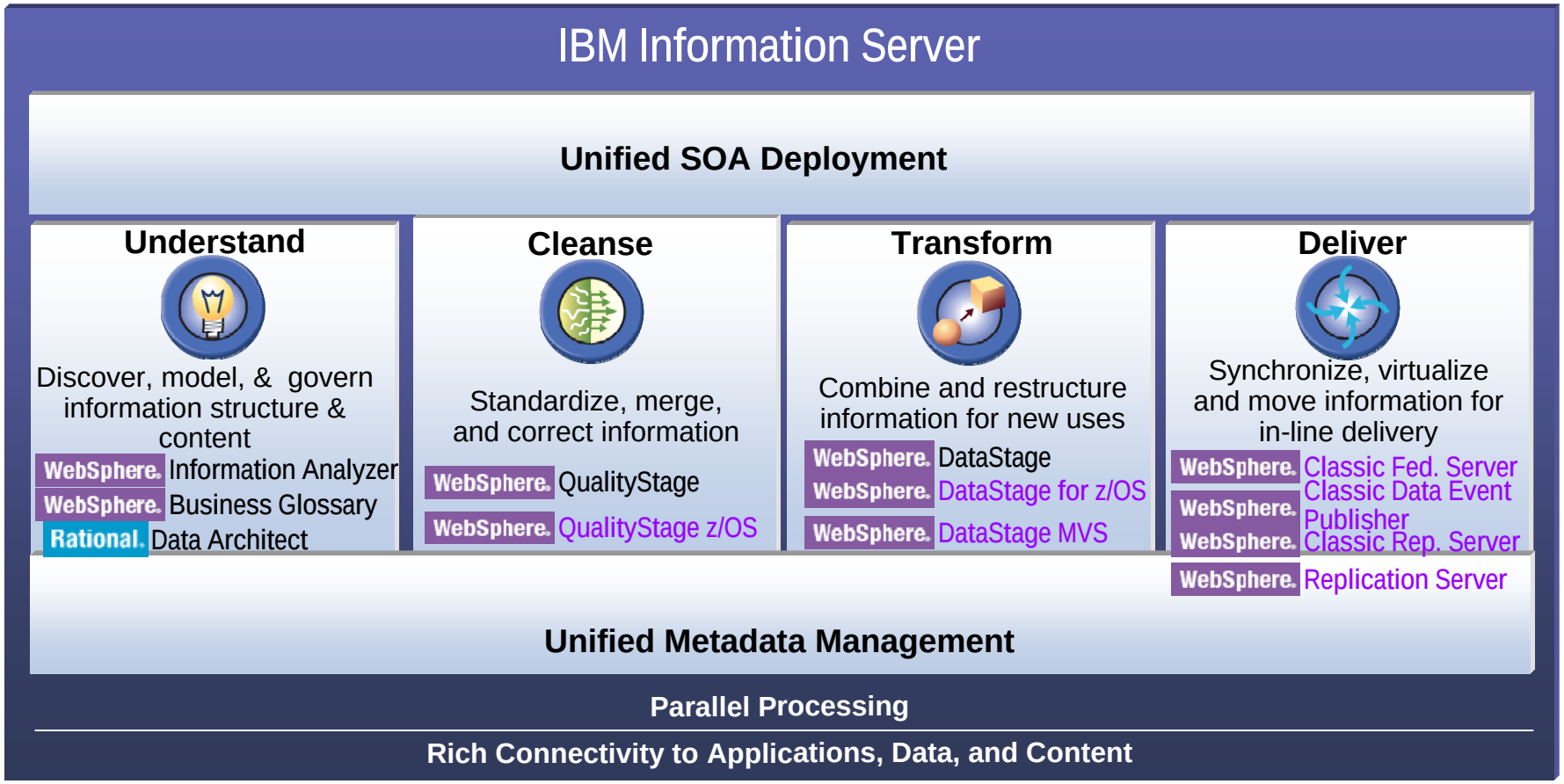
Accelerating the delivery of trusted information

Profile, cleanse, and transform information from heterogeneous data sources to drive greater business insight



- **Significant cost savings on System z**
- **Scalable to any volume and processing requirements**
- **Fully integrated, auditable data quality**
- **Metadata-driven integration for increased productivity**

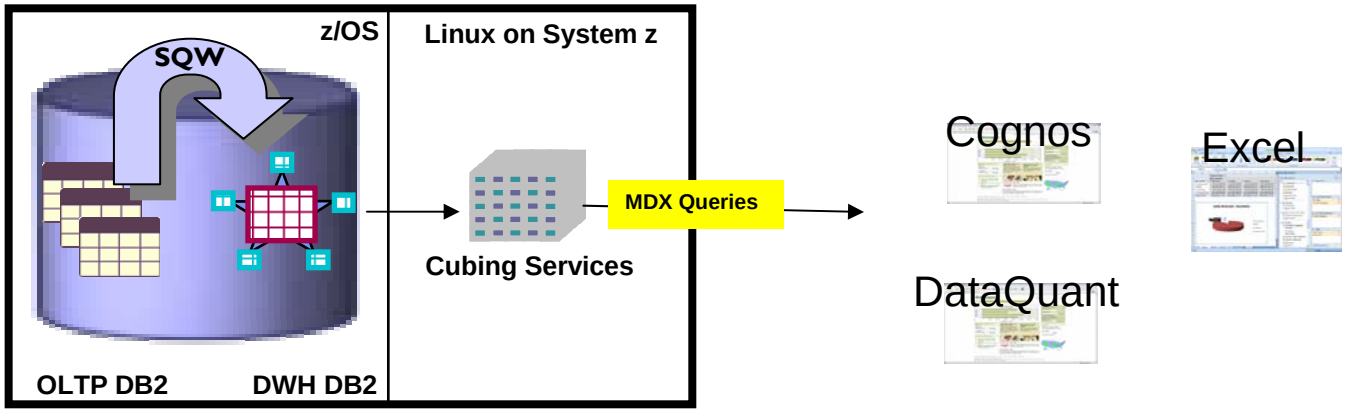
IBM Information Server - for Linux on System z



InfoSphere Warehouse on System z

Adds core data warehouse and analytics capability to DB2 for z/OS

- Advanced physical database modeling and design
- In-database data movement and manipulation capabilities of ***SQL Warehouse Tool*** (SQW)
- Optimize multidimensional reporting and analysis of data with ***Cubing Services***



IBM Smart Analytics Optimizer

Technology Preview for System z

What is it?

- ✓ A high performance extension that easily integrates with IBM data systems, delivering predictable, order-of-magnitude faster, analytic query response times, while lowering operating costs

How is it different

- ✓ **Deep integration with IBM data management systems**
- ✓ **High performance query software, based on advanced data in-memory technologies**
- ✓ **Leveraging existing data system investment and values without any changes to applications**
- ✓ **For System z, extends gold-standard manageability, security, and availability to high-performance analytic applications**

Currently in Beta

Orders of Magnitude Faster for Queries

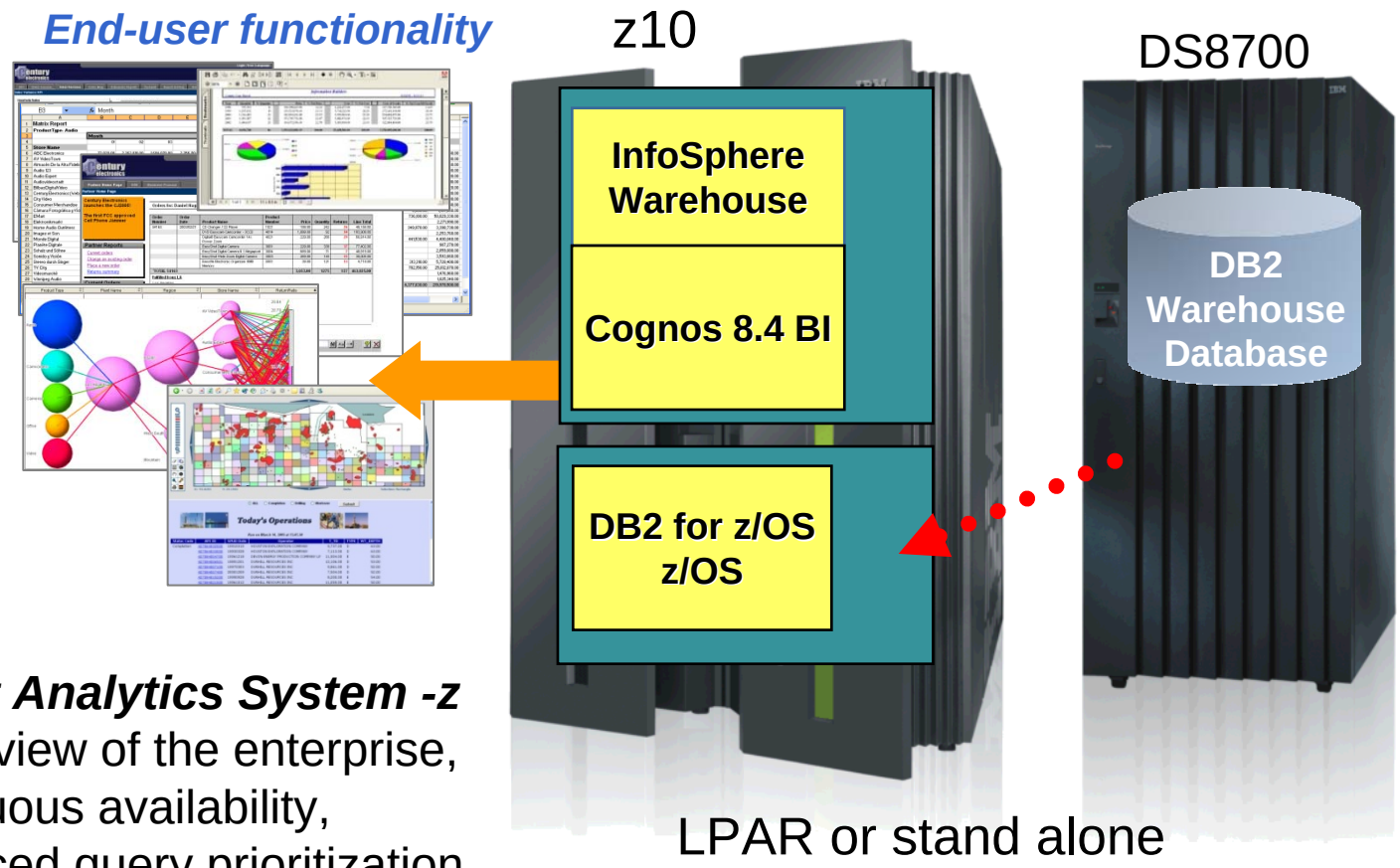
Beta Customer Results

For customers who have struggled with gaining the required performance out their complex queries of full table scans, multiple compares, and complex logic – *the results are astounding!*

... and its acceleration factor : :

Runtime of queries w/o ISAO	Factor	with ISAO
163 s	48	3s
2311 s	511	5s
25 s	12	2s
1593 s	206	8s
35 s	4	8s
5435 s	1424	4s

IBM Smart Analytics System - 9600



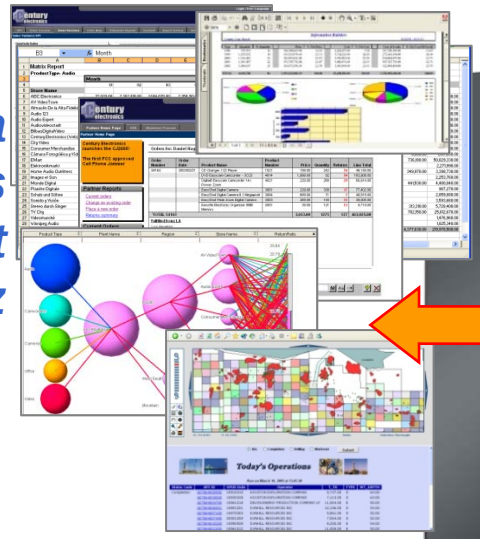
IBM Smart Analytics System -z

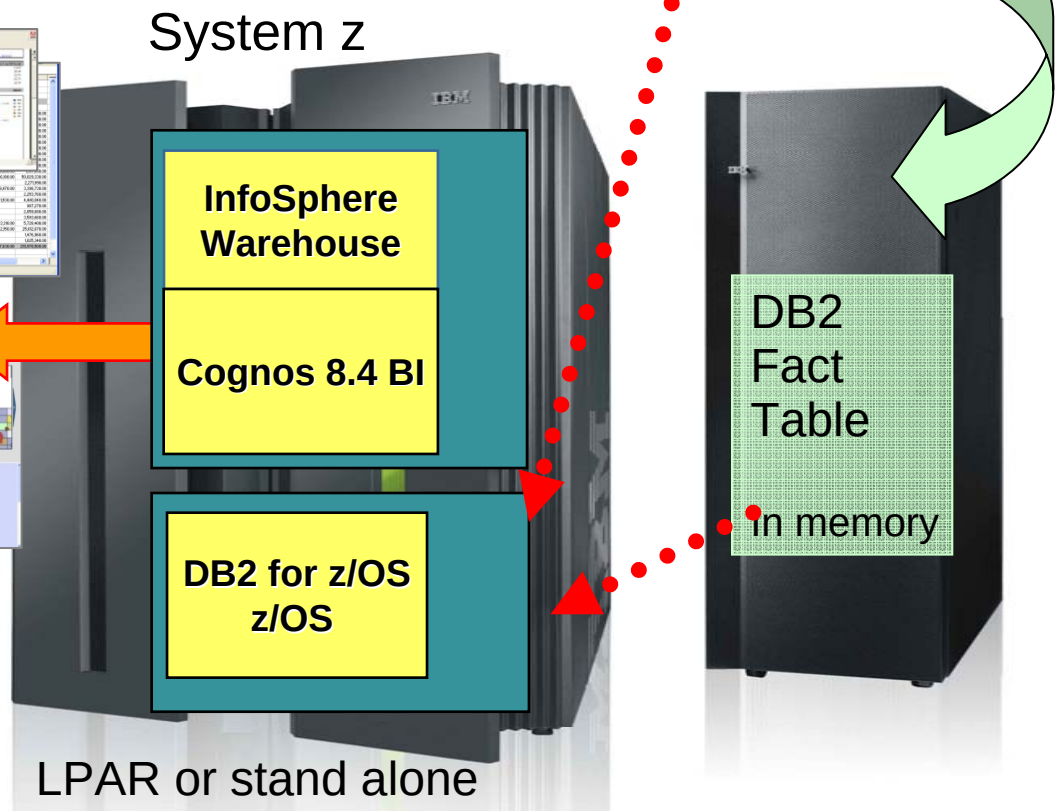
- single view of the enterprise,
- continuous availability,
- advanced query prioritization,
- and simplified data governance

Leveraging System z
For a comprehensive BI environment

FOUNDATION

Building a business BI environment on System z





IBM Smart Analytics System -z

- **Data Warehousing and tooling LPARS**

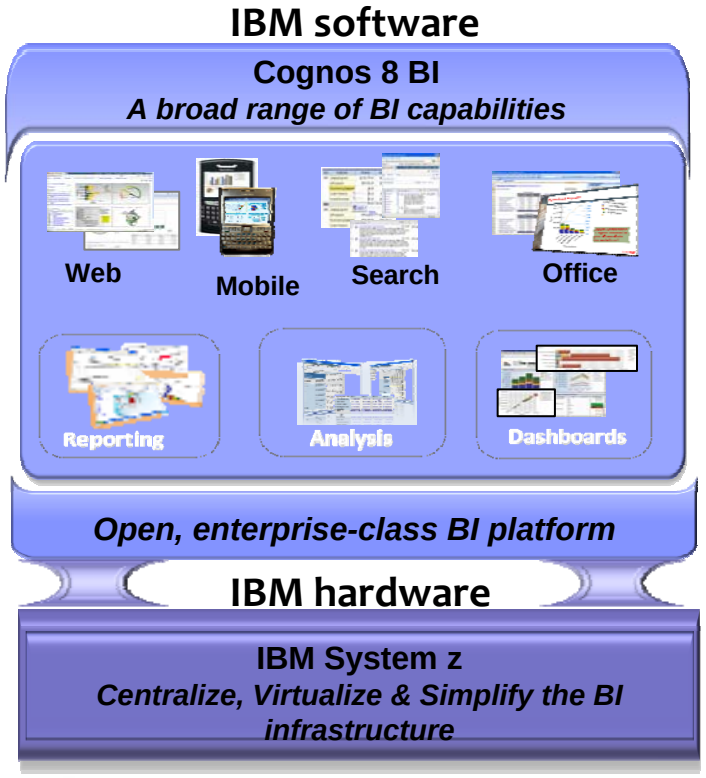
IBM Smart Analytics Optimizer:

- **Integrates into an existing BI environment**
- **Supports processing of multi-dimensional queries**

Smart Analytics Cloud

A private cloud optimized for analytic services in large enterprises

	Defined as …	To create…	That delivers …
Smart Analytics Cloud	**IBM Smart Business - services with industry leading hardware & software**	**A private cloud computing solution for business intelligence (BI) & analytics**	**A services solution for delivering business intelligence to the entire organization**



IBM Services

- Create awareness of BI and understand the needs for a BI strategy across the organization
- Complete a readiness assessment to define the scope and priorities for the solution

- Deploy Cognos 8 BI for Linux on System z as a private cloud
- Provide the skills for the on going management & expansion of their BI private cloud deployment

IBM Cognos Now! – Real Time Monitoring

For critical, intra-day monitoring of operational KPIs and metrics
- Aggregated across multiple transactional systems and data sources
- No BPM system required

Closed loop business optimization
- Complete loop from monitor to alerting to corrective action
- Identify, customize operational KPIs and metrics
- Understand and perform root cause analysis
- Drive rapid, effective decision-making and action

Autonomy for line of business user
- Self service model
- User-defined thresholds, alerts
- Graphical watch points
- Customization by end users

Cost effective, low risk and rapid deployment
- No roles based pricing, unlimited user pricing in Americas
- Prepackaged hardware, software or VM appliance
- ***We are exploring the connectivity between Cognos Now! And CICS CBE***

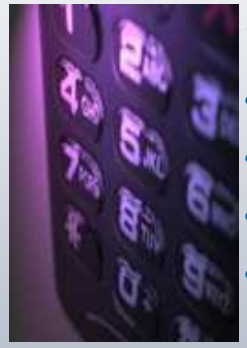
Cognos Now! Solution Investment Areas

Banking

- *Transaction Processing*
- *CD Purchase Monitoring*
- *Program Trader Desktop*

Utilities

- *Grid Transmission Monitoring*
- *Dispatch/Field Service Utilization*
- *Smart Meter Monitoring*



Telecommunications

- *Churn Management*
- *Call Center Operations*
- *Agent Utilization*
- *SLA Monitoring*

Green Sigma

- *Monitoring emissions rate near real time or sub-hourly for carbon, electric, gas, water for facilities, plants, office buildings, etc.*
- *Carbon intelligence*
- *Electricity/Gas/H20 consumption*

Insurance

- *Online Sales Agent Utilization*

Manufacturing

- *Quality Management*
- *Delivery Monitoring*
- *Fulfillment / Logistics*

SPSS products for System z

Announce Overview – July 2010, GA – Q3 2010

Increase the value of your data and optimize business decisions

- Industry-leading products for statistical analysis and data mining, with a unifying platform supporting the secure management and deployment of analytical assets.

- Client Benefits:
  - Find new ways to more effectively target profitable new customers, and grow and retain existing customers
  - Quickly identify risky or fraudulent activity and be able to act upon those findings with increased confidence and insights
  - System z is the ideal infrastructure for implementing IBM SPSS predictive analytic solutions because it provides a scalable, secure, reliable infrastructure that is ideal for consistent service delivery and more effective use of resources,

Learn More: IBM SPSS Software

SPSS Predictive Analytics Software

Key Categories

IBM SPSS Modeler

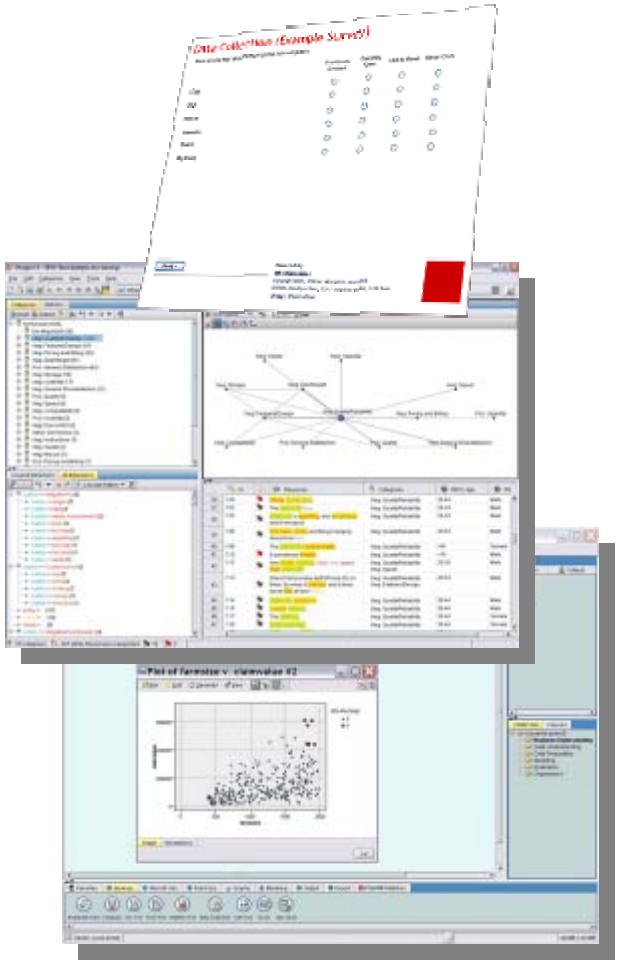
A powerful, versatile data mining workbench that helps you gain unprecedented insight from your data and easily build and deploy predictive models.

IBM SPSS Collaboration and Deployment Services

A platform for the management and deployment of analytical assets.

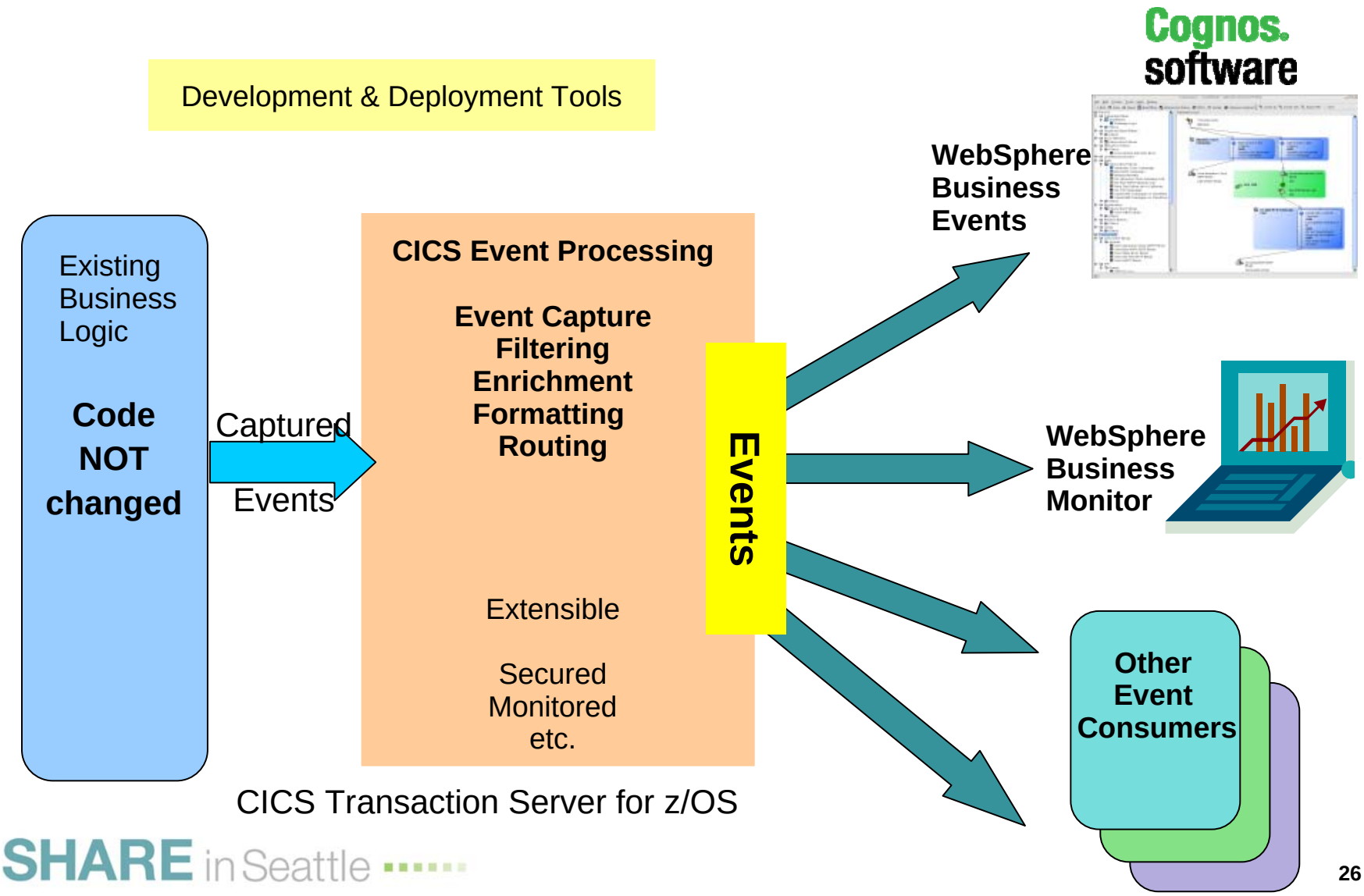
IBM SPSS Statistics

provides advanced statistics and data management capabilities for analysts researching business problems



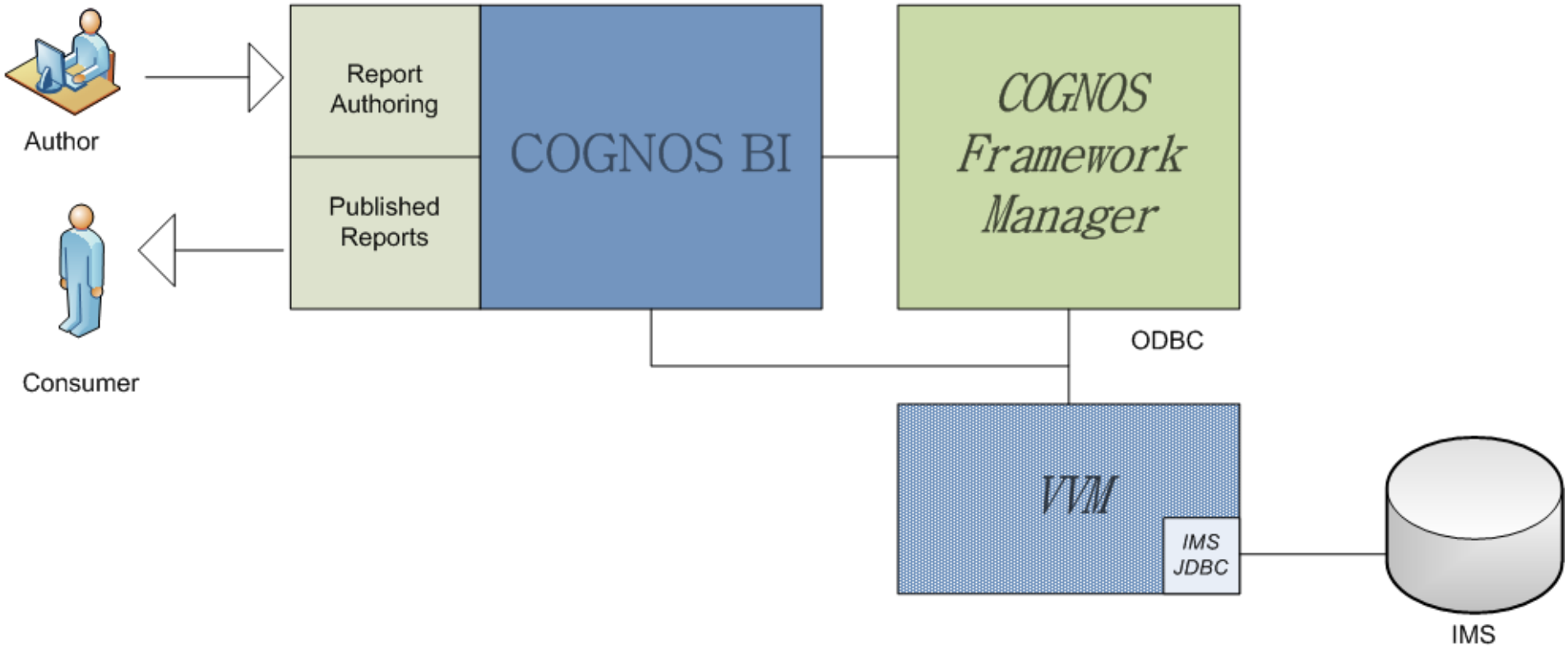
SPSS AN IBM® COMPANY

CICS and Event Processing Overview

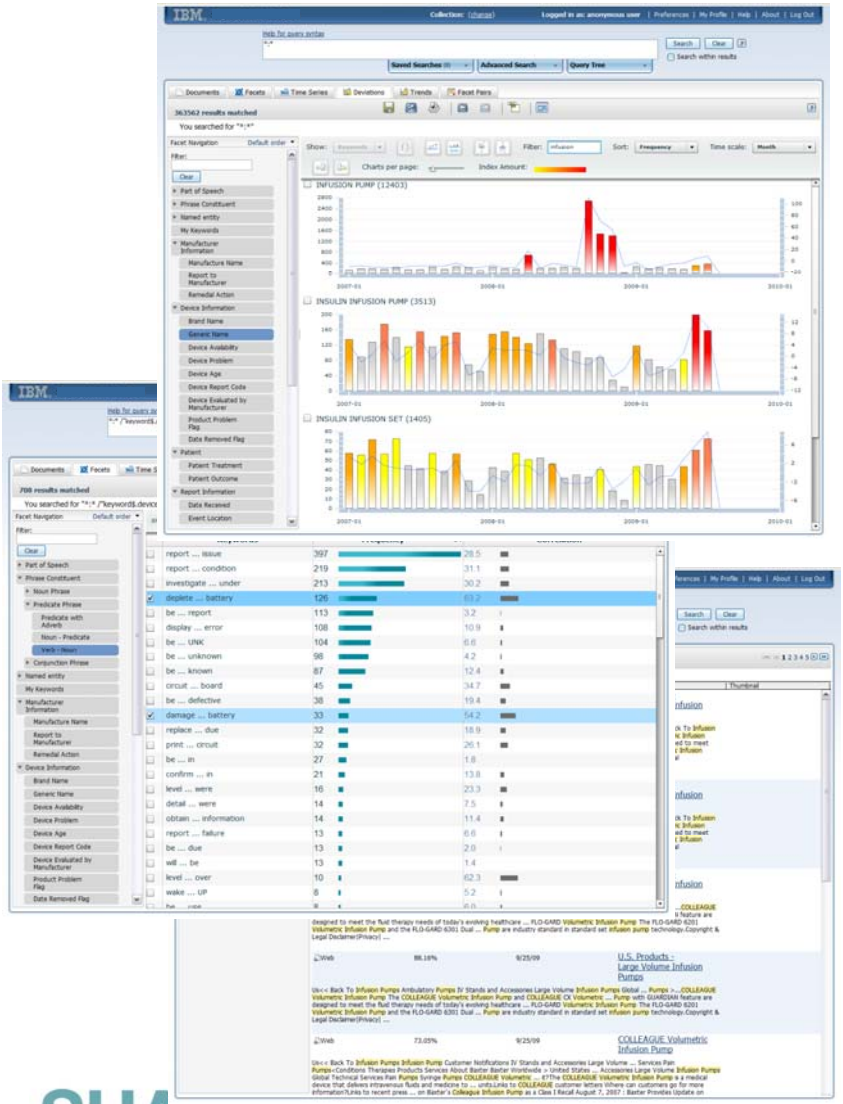


IMS Integration with Cognos

Topology



Cognos Content Analytics – *not on System z yet*



- Analyze and explore structured and unstructured information
- Automatic extraction of meaningful concepts and entities from text
- Open, standard UIMA-based text analysis pipeline
- Integration with Cognos for reporting against unstructured concepts
- Multiple graphical views of the facets (dimensions) of unstructured content
- Automatic highlighting of interesting anomalies and correlations in the data
- Support for analysis of over 30 content sources and over 150 content formats
- Integration with ICM for analysis of document categories, classes, and clusters
- Highly scalable & extensible

Performance/Benchmarks/Deployment

IBM FMS – currently running 40,000 users of Cognos 8 on System z - proof of Success with User Requirements

Yes we are now drinking our own Kool-Aid!!

Replaced previous system in 5 months

- Exorbitant ISV charges erased
- On-demand reporting model
- WW deployment with substantial cost savings

Simplified User Experience

- Single, unified web portal for all their FMS reporting needs supporting multiple browsers
- Reduced number of reports (from 14 to 4) providing the same level of information
- Data populated on existing reports dramatically decreased due to drill down capabilities
- Significant improvement in reporting performance and response time
- Users now quickly and easily define what information they view and how they access it

Increased User Adoption

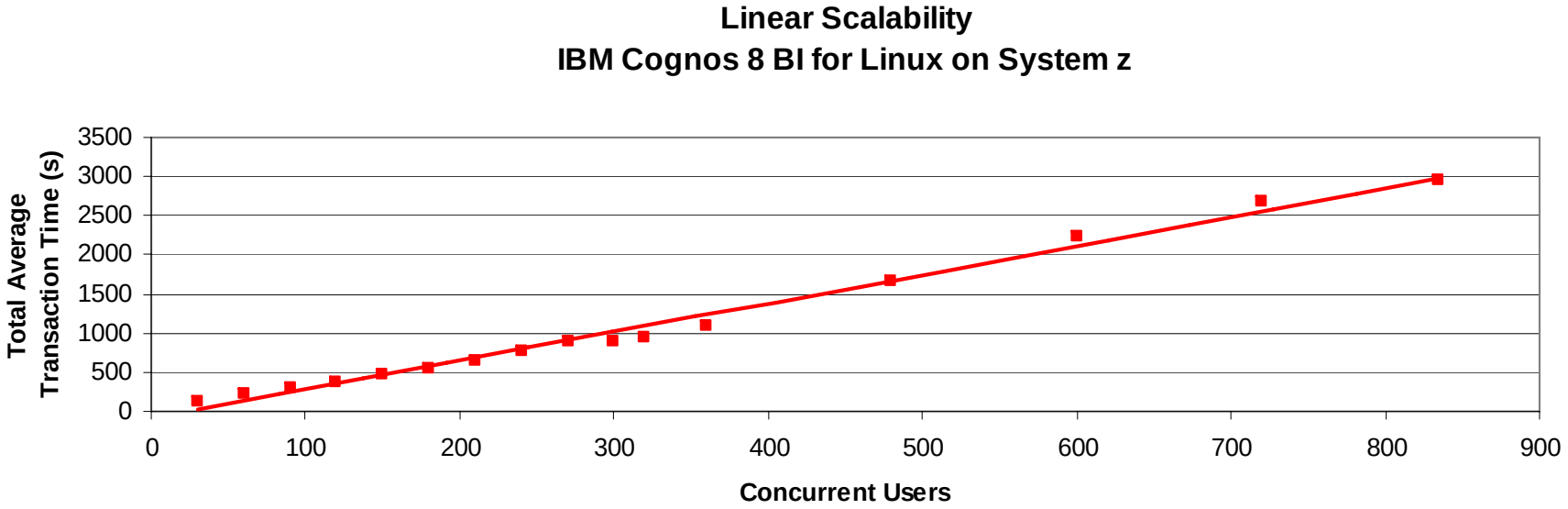
- Accommodated a larger user population as a result of System z strengths and capabilities
- Ran approx. 350,000 reports in the 1st 5 months, validating fast and broad user adoption

Delivered Increased analysis value to the Business

- New information for Territory Analysis - assist managers in analyzing a seller's territory coverage before achievement and commission payments are available

Proven that Cognos 8 BI for Linux for System z can: Scale Across the Enterprise

*Testing demonstrated IBM Cognos 8 BI for Linux on System z **scales linearly** to large user groups.*



"**Cognos, …makes it easy for companies to deploy BI and PM** to a broader user population, while **minimizing the resulting workload for IT** departments."

- Nucleus Research, Cognos Takes on the Rest of the Enterprise, November, 2007

- Testing was conducted on up to **90,000 named users**

Numius Case Study

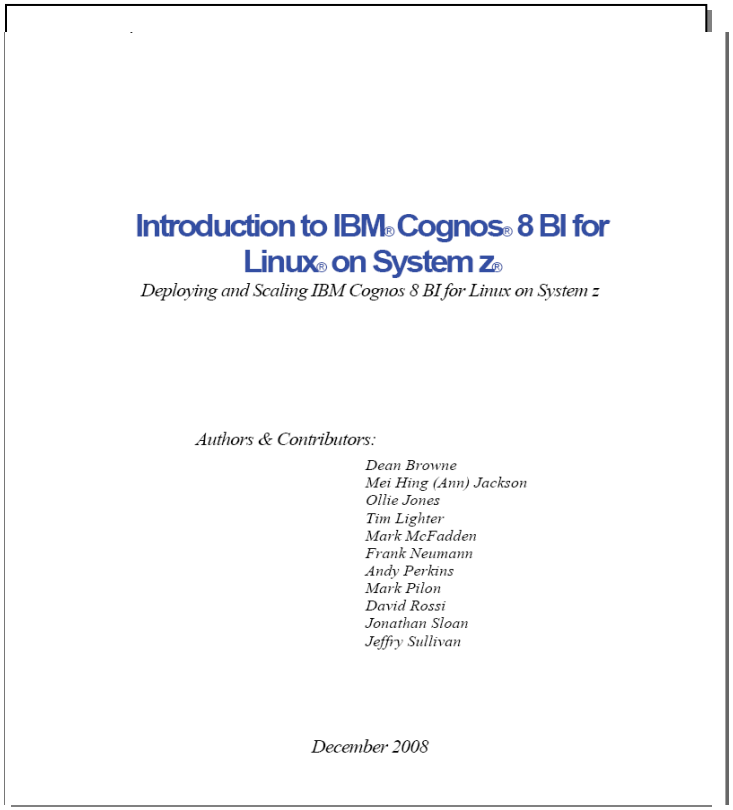
- **Numius tested an existing customer's distributed Cognos environment on System z**
  - The application was successfully and without loss of functionality ported to the System z platform. This required no redevelopment.
  - The client's application would not require a redesign to accomodate its growth in data volumes or in terms of users.
  - Reports that are not practically useable at client's site now become relevant again. Reports that did not run at client's site now are runable.
  - Client would be able to serve many multiples of current number of users with the very simple architecture from this PoC.
  - Client could scale out to more complex architecture without increased hardware complexity.
  - ***Throughput (not clock speed) 400x that of distributed***
  - Much of the improvment was a result of the processing synergy between Cognos 8 BI on System z and DB2 for zOS

50TB Summary – Operational BI validation

- System z and Cognos BI can respond to operational BI requirements
  - Successfully ran **400 active users** simulating call center agents accessing a prompted operational BI report
  - Average **1.75 seconds** response time for query and report creation per user over a 15 min run (steady state), at **56% Linux CPU** utilization
  - DB2 for z/OS provides **very efficient access** to operational BI data
- Cognos configuration options for Linux on System z
  - Multiple 31Bit WebSphere Application Servers on a single system
  - Varied resources assigned to Linux on System z and Cognos
- Load testing techniques using Rational Performance Tester
  - Strategic IBM tool for performance/load tests also recommended for customer tests
- Collateral
  - Best practices and results in Redbook: 50TB Redbook SG24-7674 http://www.redbooks.ibm.com/
  - Collected detailed performance measurement data

10TB study – Configuration validation

- All performance related data used in this section were done with Cognos 8.4 accessing a 10 TB z/OS DB2 data source and are further described in



Introduction to IBM® Cognos® 8 BI for Linux® on System z®

Deploying and Scaling IBM Cognos 8 BI for Linux on System z

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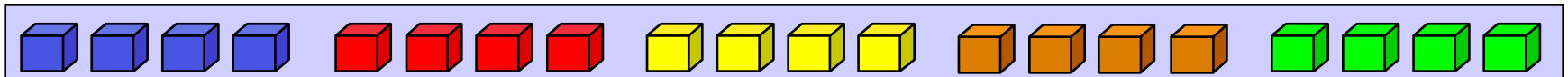
December 2008

http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/WP101437

Virtualization Concepts



Virtual Resources

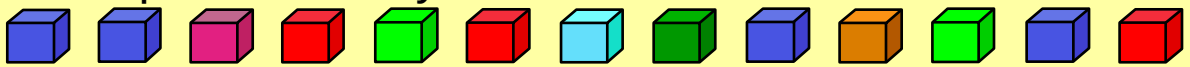
- Proxies for real resources: same interfaces/functions, different attributes.
- May be part of a physical resource or multiple physical resources.

Virtualization

- Creates virtual resources and "maps" them to real resources.
- Primarily accomplished with software and/or firmware.

Resources

- Components with architected interfaces/functions.
- May be centralized or distributed. Usually physical.
- Examples: memory, disk drives, networks, servers.

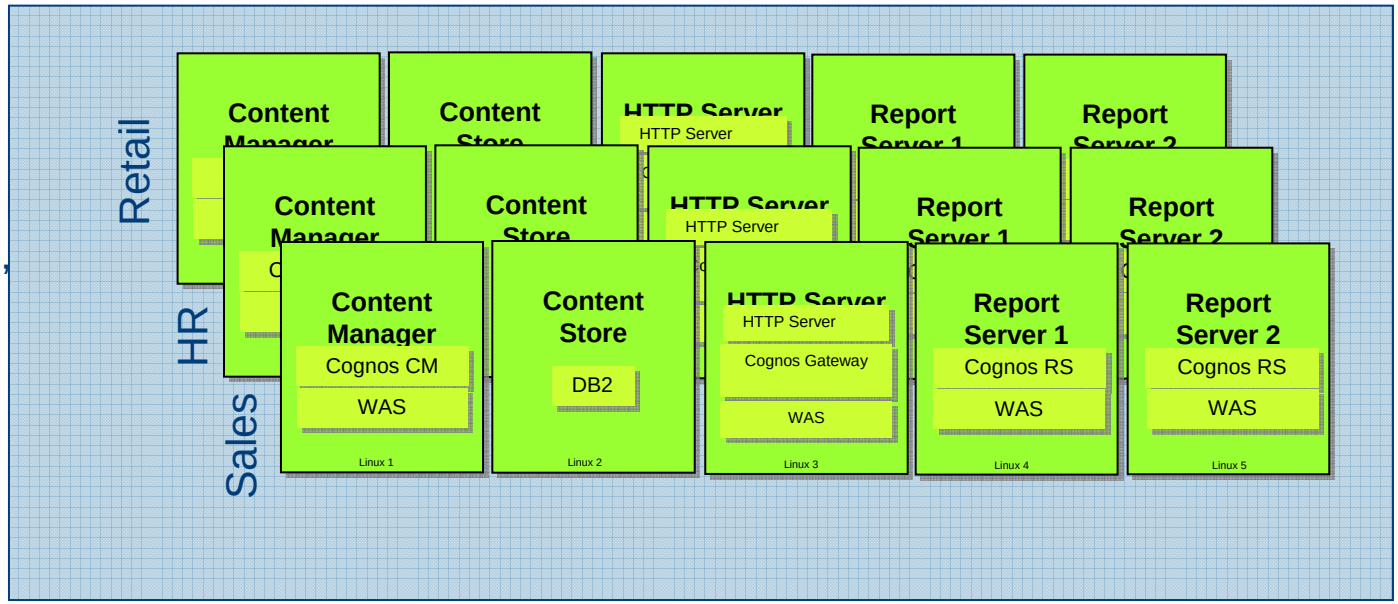


- **Separates presentation of resources to users from actual resources**
- **Aggregates pools of resources for allocation to users as virtual resources**

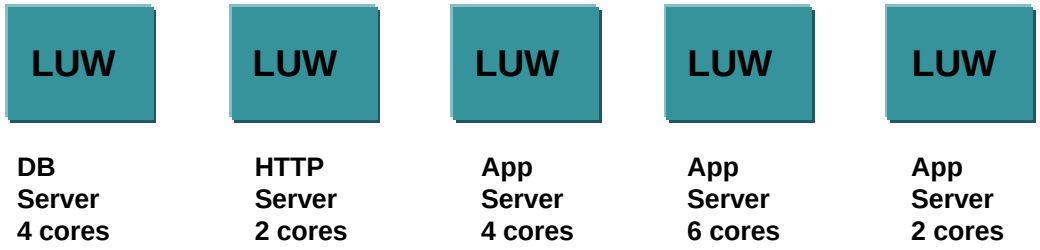
Virtualizing the Data Centre

Multi-Tenancy Enterprise Configuration

'Private Cloud' Architecture

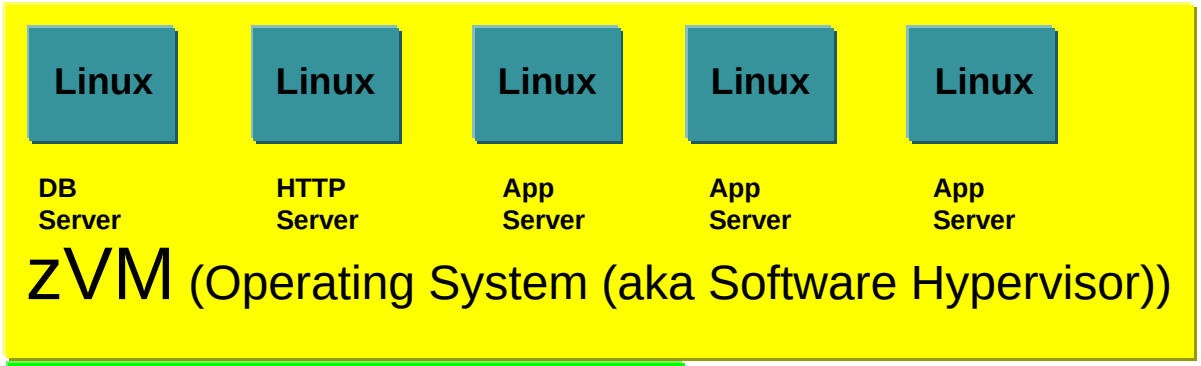


Single z10 – Target Utilization = 99%



Processors and % utilization typically 20% (for actual work)

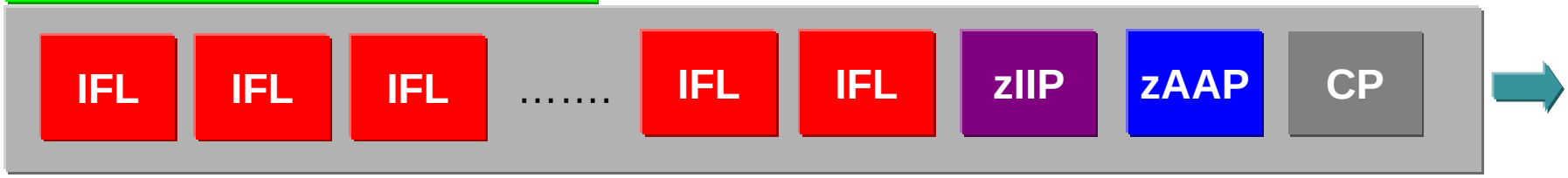
Number of virtual machines = 1 to ……. Infinity!*



- Each virtual machine has RAM, Disk, NICs, processors, and HBAs (FCs) assigned to it
- Each copy of Linux sees an entire system z Server with the virtual machine's resources
- Intercommunication (TCP/IP) is facilitated by the hypervisor

LPAR = logical partition of the system hardware

z10 machines can have up to 60 LPARs (depending upon the processor class)
* Customers run regularly run z10s at or near 100% utilization (that's efficiency!!!)



IBM Cognos 8.4.1 BI for Linux on System z

Product Capabilities

8.3
- Ad hoc query, reporting and analysis (Query Studio, Report Studio & Analysis Studio)
- Dashboards and charting (Cognos Connection & Report Viewer)
- Event management (Event Studio)
- Integration with Microsoft Office (Go! Office and CAFÉ)
- Cube building (Transformer)

8.4
- Query Studio: more user preferences, filtering & sorting enhancements
- Analysis Studio: suppression across multiple items, display date cube last updated
- Reports: more drill through capabilities, pass filters from source report to target report, more charts and graphics
- Access WebSphere Business Glossary
- Lineage of data item life cycle
- Parameterized SQL Governor

8.4 Extended
- Go! Search
- Virtual View Manager
- InfoSphere Federation Server
  - Cubing Services (IWHz)

8.4.1
- TM1 Cubes as data source - client access only
- Mash-up

Initial Conformance

Operating System:	• DB2 z/OS 8 and 9 • DB2 LUW 9.5 • Oracle 10g • Informix Database Server 11.5 • InfoSphere Warehouse 9.5.2 for DB2 z/OS
Application Server:	• Apache Tomcat • WebSphere 6.109 (31bit) • WebSphere 6.1 64bit • Oracle Application Server (31bit) • JBoss Application Server (31bit) • SAP NetWeaver 7.0 Application Server (64bit)
Content Store:	• Derby on Linux for System z • DB2 9.5 LUW • DB2 9 for z/OS • Oracle 10g
Directory Server:	• Netscape Directory Server 6 • Sun ONE Directory Server 5.1 SP1, 5.2 • IBM Tivoli Directory Server 5.2, 6.0 • Novell e-Directory Server 8.7.3 • LDAP version 3 compliant server
Web Server:	• IBM HTTP server 2.0 • IPv6 • WebSphere Portal Server

Federated Data Sources

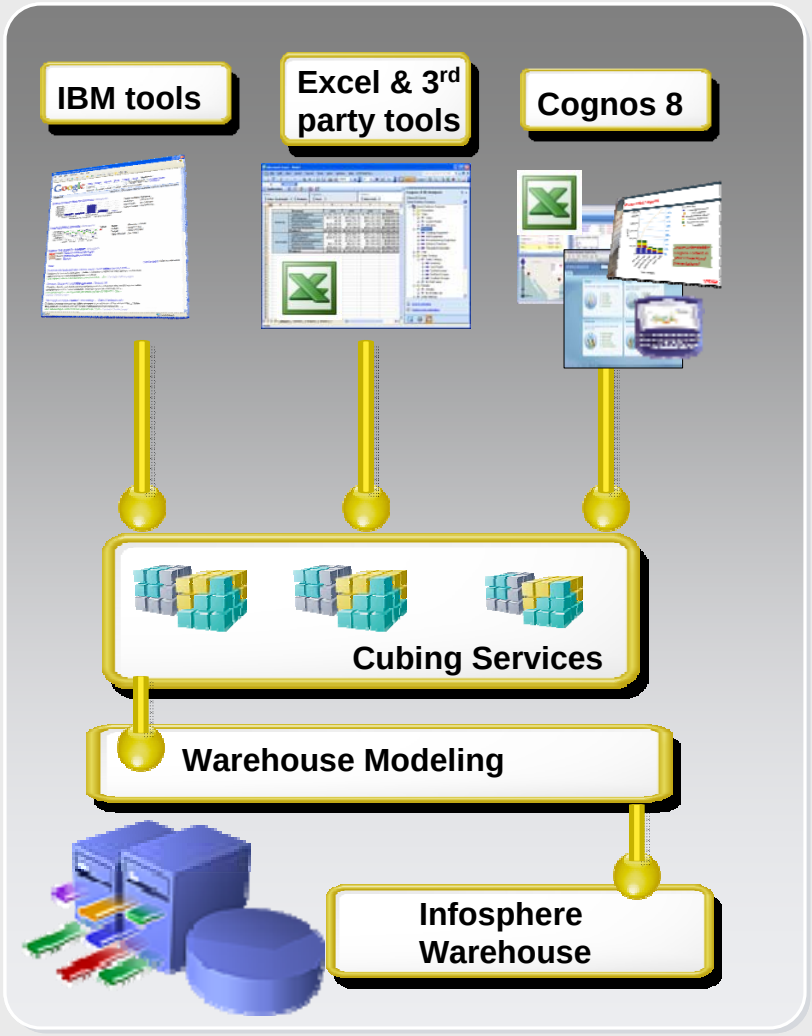
- Virtual View Manager (Included) – SQL Server, Oracle, MySQL, TD … require JDBC driver from z
- Federation Server ($$) – SQL Server, Oracle, MS Excel, MS Access, TD …
- Classic Fed via Federation Server ($$) – VSAM, IMS, Adabas, IDMS, Datacomm, TD …

Summary

- IBM has responded to customer requests for DW and BI on System z
- We have invested billions in new technologies and building a new information-led infrastructure
- BI has evolved from a static, report-centric environment to a more real-time and embedded analytics model
- DW has evolved to a more global, federated, real-time environment
- We are using our own technology to change our business
- You can use it to change yours

Addenda and additional information

IBM InfoSphere Warehouse Cubing Services



Primary OLAP Use:
Large enterprise IT deployments

Operational Planning, Financial analytics, business reporting

Ideal for:

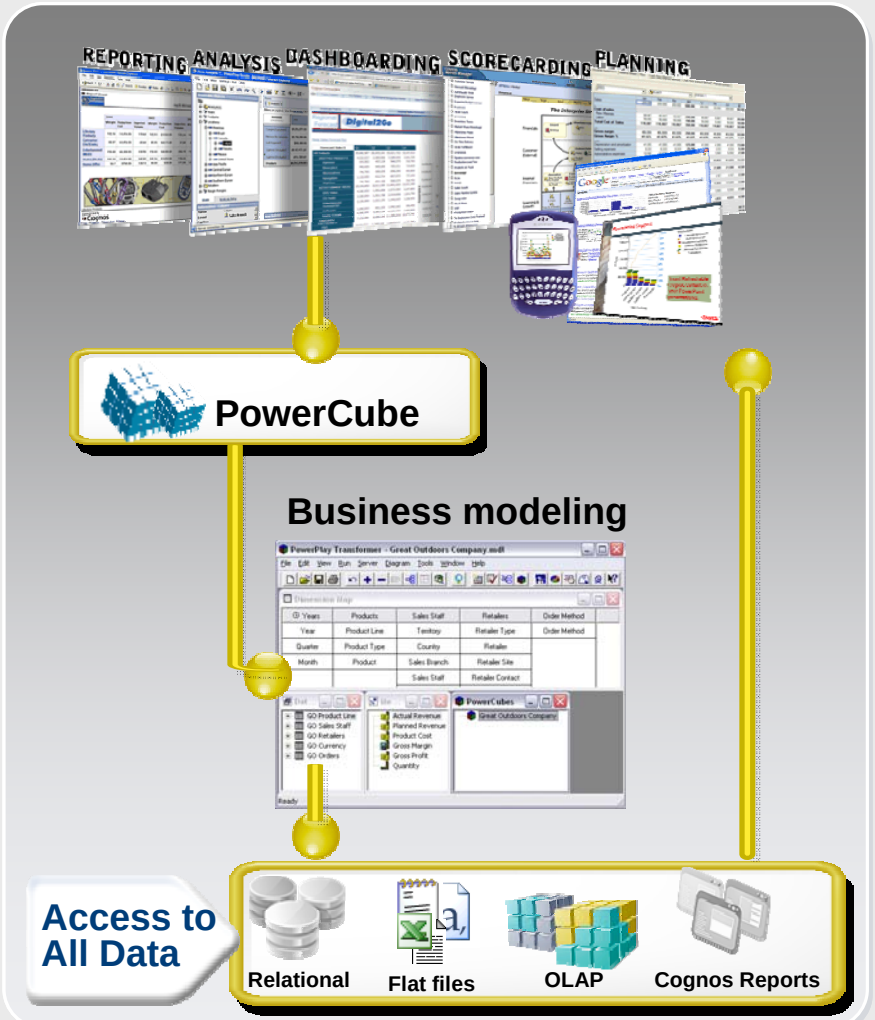
- Very large data sets with very large dimensions
- Enterprise rollouts requiring near real time data

Because of its unique:

- Scalable, low latency OLAP
- Standard, Open APIs
- Integrated IT tooling

For IT departments

IBM Cognos PowerCube – MOLAP



Primary OLAP Use:
Trending / Slice & Dice

Line of business self service OLAP

Optimized for:

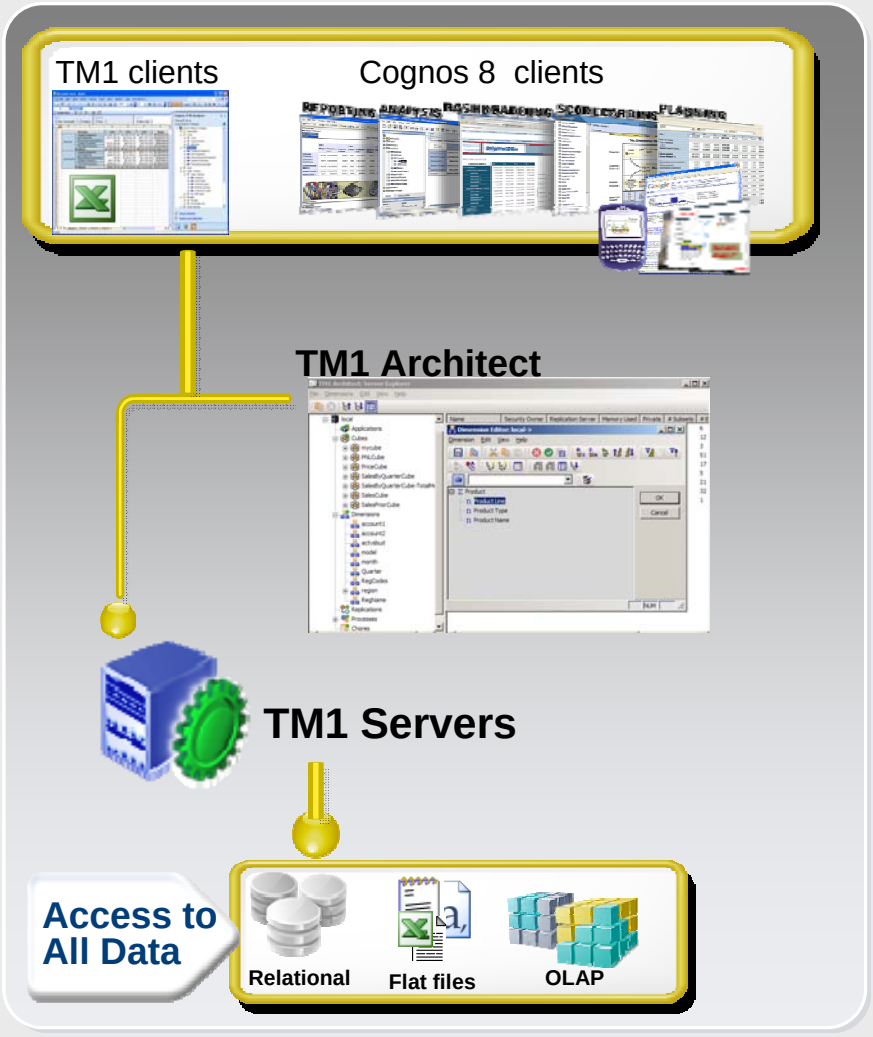
- Highest consistent query performance
- Enterprise rollouts such as internet delivery

Because of its ability to provide:

- Pre-aggregated compressed data that can be disconnected
- Automatic time series analysis, trending, & point in time data

For all types of business users

IBM Cognos TM1 – in memory MOLAP



Primary OLAP Use:
What-if scenario modeling

Operational Planning
Financial analytics & reporting

Ideal for:

- write-back planning applications in moderate sized communities;
- complex models demanding read/write interactivity

Because of its unique:

- On demand aggregation and calculations with 64 bit in-memory processing

For all types of business users