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

Mike Biere
IBM

August 3rd 2010
Session Number: ----
"you cannot think seriously about your longer-term IT architecture without thinking equally seriously about what today's mainframe environment has to offer"
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Worth of produce is wasted in India because of outdated post-harvest infrastructure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

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

$78B lost
Annual impact of congested roadways

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

2.3B gallons of gas

Source: Various IBM and Public Studies
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 tightly 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

Common Business Model

Shared Set of Purpose-Built Services

Presentation Service
Scheduling Service
Event Service
Security Service

Cognos 8 Bus – Dispatcher SOAP, XML

System Content
Metadata, Events
Search Index, Audit Logs, System Metrics

Optimized OLAP
64-bit in-Memory
High Performance Streaming Cache

Open Data Access

IT Tools
Admin
Upgrade
Model

Services API
Content
Security
Metadata

Business Content
Shared Dimensions
Personal Datasets
Attachments, Annotations
Initiatives, Metrics
Plan & Report Saved Objects

Application & Web Servers
Security Providers & Firewalls
Data Integration & Data Quality Tools
Platforms & Databases

Message Sources
Relational Sources
Application Sources
OLAP Sources
Modern and Legacy Sources

Casual Users
Customers & Partners

Executives
Business Managers

Financial Analysts
Professional Authors

Data Analyst
Data Modeler

Administrator

System Architect
Developer
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

Regional Performance

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The Four Styles of Analysis

Broad Usage (Consumers)

Analytical Reporting
- Drill
- Top down view
- Drillable reports
- Sort top & bottom
- Analyze then query
- Market shifts
- Product ranking

Trending
- Slice and Dice
- Personal exploration
- Compare & contrast
- Rotate and nest
- Work disconnected
- Sales trend analysis
- Market analysis

Focused Usage (Specialist)

Scenario Modeling
- What-if
- Model scenarios
- Reorganize, reshape
- Compare scenarios
- Save versions
- Financial analysis
- Profitability analysis

Predictive Modeling
- What might be
- Uncover patterns
- Apply algorithms
- Mine data and text
- Predict outcomes
- Fraud prevention
- Churn analysis

IBM Cognos 8 BI Reporting
IBM Cognos 8 BI Analysis
IBM Cognos 8 BI Café
IBM Cognos TM1
IBM DB2 or SPSS
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

IBM Information Server
Unified Deployment

Understand | Cleanse | Transform | Deliver

Unified Metadata Management

• 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

Unified SOA Deployment

Understand
Discover, model, & govern information structure & content
- WebSphere Information Analyzer
- WebSphere Business Glossary
- Data Architect

Cleanse
Standardize, merge, and correct information
- WebSphere QualityStage
- WebSphere QualityStage z/OS

Transform
Combine and restructure information for new uses
- WebSphere DataStage
- DataStage for z/OS
- DataStage MVS

Deliver
Synchronize, virtualize and move information for in-line delivery
- WebSphere Classic Fed. Server
- WebSphere Classic Data Event Publisher
- WebSphere Classic Rep. Server
- WebSphere Replication Server

Unified Metadata Management

Parallel Processing

Rich Connectivity to Applications, Data, and Content
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:

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<th>Factor</th>
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IBM Smart Analytics System - 9600

Building an end-to-end BI environment on System z

IBM Smart Analytics System -z
• single view of the enterprise,
• continuous availability,
• advanced query prioritization,
• and simplified data governance

End-user functionality

z10

InfoSphere Warehouse

Cognos 8.4 BI

DB2 for z/OS

z/OS

LPAR or stand alone

DS8700

DB2 Warehouse Database
Leveraging System z
For a comprehensive BI environment

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**

<table>
<thead>
<tr>
<th><strong>Smart Analytics Cloud</strong></th>
<th><strong>IBM Smart Business - services with industry leading hardware &amp; software</strong></th>
<th><strong>A private cloud computing solution for business intelligence (BI) &amp; analytics</strong></th>
<th><strong>A services solution for delivering business intelligence to the entire organization</strong></th>
</tr>
</thead>
</table>

**IBM software**

- Cognos 8 BI  
  *A broad range of BI capabilities*

**Open, enterprise-class BI platform**

**IBM hardware**

- IBM System z  
  *Centralize, Virtualize & Simplify the BI infrastructure*

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**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 ongoing 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

### Insurance
- Online Sales Agent Utilization

### 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/H2O consumption

### 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
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.
CICS and Event Processing Overview

CICS Event Processing

- Event Capture
- Filtering
- Enrichment
- Formatting
- Routing

Extensible
Secured
Monitored etc.

CICS Transaction Server for z/OS

WebSphere Business Events

WebSphere Business Monitor

Other Event Consumers

Development & Deployment Tools

Existing Business Logic

Code NOT changed

Captured Events
IMS Integration with Cognos

Topology

Author

Report Authoring

COGNOS BI

Published Reports

COGNOS Framework Manager

ODBC

VVM

IMS JDBC

IMS
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

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

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

Linear Scalability
IBM Cognos 8 BI for Linux on System z

“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 accommodate 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 runnable.
  - 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 improvement 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

[Image]

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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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%
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.

Number of virtual machines = 1 to Infinity!

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)
- 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

Access to All Data
- Relational
- Flat files
- OLAP
- Cognos Reports

PowerCube

Business modeling
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