Cognos 8 BI for Linux on System z
An Enterprise Business Intelligence Solution
Overview

Introduction

With the acquisition of Cognos, IBM filled out its SOA portfolio with a world class, leading edge Business Intelligence solution. IBM had been on a course to create the world's best infrastructure for its Data Warehousing and Information on Demand agendas. Despite the acquisition and creation of its extensive portfolio in those areas, IBM realized that in order to evolve a total solution it had to either build or buy the front end tooling customers demanded. They set their sights on Cognos as the perfect solution.

Why Cognos? IBM had already created a rich suite of products and technologies to satisfy customer demands and deliver on its promise of trusted information and rapid integration and enrichment of data. Evaluations of Cognos functions compared to others in the marketplace clearly demonstrated that there was little, if any, overlap with the offerings from both companies.

After the acquisition there were a myriad of requests for product integration and enhancements in relation to the IBM portfolio but the project that was first out of the gate was to port Cognos 8 BI to System z. This was a customer-initiated project not an IBM or Cognos move simply to add another supported platform. In order to keep the cost to the System z customer at a minimum as well as deliver an offering in the shortest amount of time it was decided to deliver Cognos 8 BI under Linux for System z.

This dynamic, enterprise-wide deployment option for Cognos 8 BI has been steadily growing in interest and acceptance. There are significant unique aspects to this deployment as well as a very powerful set of value-add elements. This overview is intended to provide insight into why a customer should carefully consider the implementation of Cognos 8 BI for Linux on System z.

Cognos 8 BI

Cognos is the leading BI vendor on the market today. It offers a full suite of Performance Management and Business Intelligence offerings for any customer in any industry. In 2003 Cognos decided to start anew with its portfolio by building an integrated platform that is extensible and tightly integrated.

The Cognos 8 architecture provides a layered approach to PM and BI with a foundation upon access to all data anywhere in the enterprise and culminating in its ability to deliver output to the end user in any format and upon a myriad of devices.

By taking this approach it provided a simplified architecture for inclusion into IBM's emerging SOA strategy and product line. Cognos 8 is an expanded suite of PM and BI functions. The Cognos 8 BI suite includes a rich set of functions such as:

- ✓ Query
- ✓ Reporting
- ✓ Dashboards
- ✓ Analytics (access to numerous OLAP sources)
- ✓ Event detection and Triggers
- ✓ Metadata integration delivering a single version of the truth
- ✓ Office Integration
- ✓ And much more …

For more information on the Cognos 8 BI for System z portfolio please visit the following web site:

Cognos 8 BI - built on an SOA to deploy successfully within changing
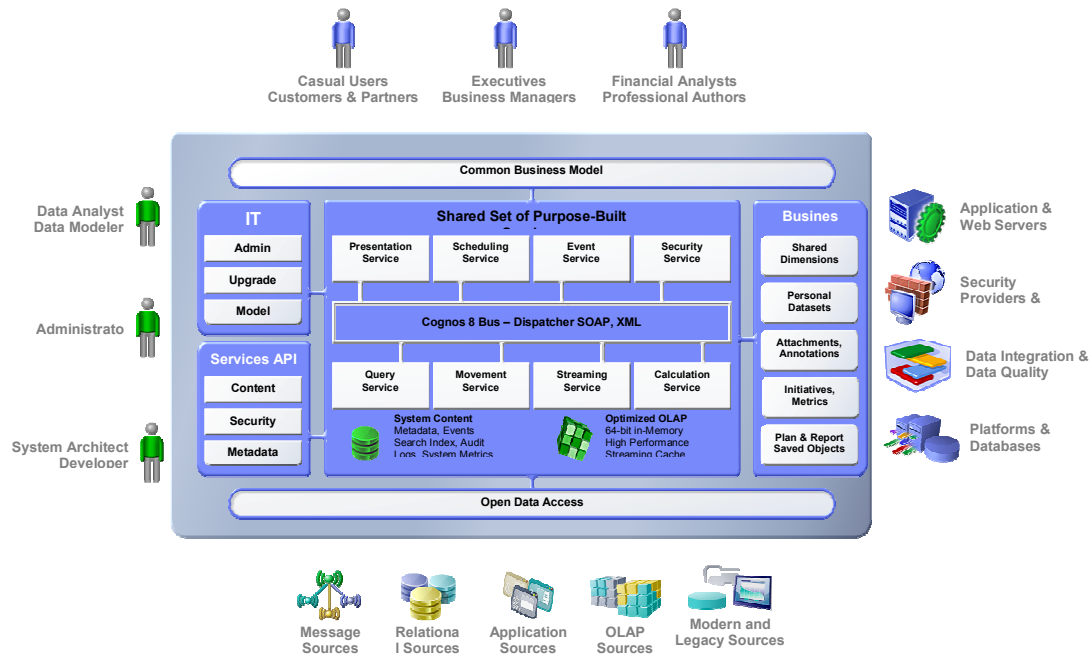
Cognos 8 BI Architecture

The overall architecture of Cognos 8 is divided into 3 main components:

1. Open Data Architecture: access to any and all sources of data from a myriad of sources and platforms via a common, tightly controlled and managed metadata layer. It ensures consistency, confidence, and a single version of the truth across the enterprise.
2. Common Services layer: the applications that access the data layer including query, reporting, charting etc. These applications may be opened to all users or allocated in accordance to their needs, requirements, and skills.
3. Presentation layer: output to a wide variety of output types and devices (HTML, PDF, Excel, PDAs, etc.)

The architecture lends itself well to extensibility such that new features and functions may readily be snapped into place and users immediately understand how to use and take advantage of them. We believe this is a clear advantage over modular BI systems that may have been collected over time from a variety of sources and acquisitions.

Why Implement BI on System z?

There are numerous aspects many customers see in considering this deployment model. It is not a situation where new System z hardware installations are the driving force. Rather it is primarily a scenario where a customer wishes to enhance the value of an existing infrastructure as well as contain costs.

What we consistently hear from interested parties are the following:

"We are 'z-centric' and consider the System z to be critical to our overall operation and business survival"

"We have most of their data there and it just keeps coming in. We are capturing more data in a week than we once did in a year"

"We need to provide a lower cost, single platform solution for Data Warehousing and/or Business Intelligence than what we have implemented now"

Business Intelligence is mission critical for us. It is not just a convenient set of tools we use to embellish our data; it is part of our internal business DNA and cannot afford for it to be unavailable"

"We are looking at new BI operations such as real-time and/or Operational BI. Our end users demand faster access to data at more highly detailed levels than before"

"We require assured 24x7 operation (System z is known for its 99.999% availability). When our BI processes are unavailable, we lose money"

"Want to consolidate distributed servers or see a need to do so as we have created an environment of data duplication and server growth that is out of control"

"We want to standardize on one or fewer BI tools. We have several and have not effectively deployed what we have yet pay some substantial maintenance for them"

"We have Linux processors on System z and wish to make them more useful (IFLs). BI is an application that is high-value and would justify a greater investment in Linux on System z"

"We are looking for a more efficient, rapid deployment model for our increased BI usage"

"We want to fully integrate our BI processes and Data Warehouse in as seamless a manner as possible. Delays in data access and update for our end users are unacceptable"

"We have stringent data security rules ... we cannot expose sensitive data to the outside and must embrace whatever is the best in this area"

"We need to cut costs such as software, hardware, staff support, and power consumption. Our understanding is that System z is the lowest cost option for these"

You can probably add some of your own value points or unique observations as to why System z might make sense for your BI implementation. Let's examine a few of the more salient points listed above.

Cost Factors

System z has proven to be the lowest TCO option when compared to large distributed systems. IBM has a cost analysis application that may be used to weigh your options. There are several base costs that are considered in our evaluation:

- ✓ Hardware
- ✓ Software
- ✓ Staffing
- ✓ Power
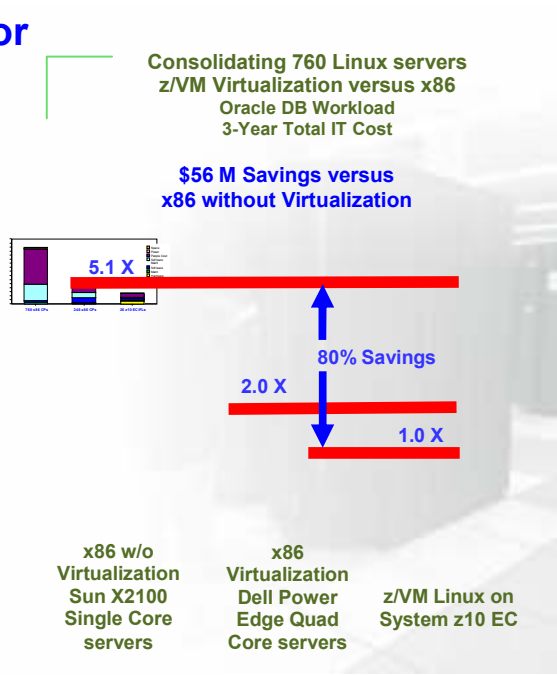- ✓ Time users lose waiting for data duplication, ETL, etc.

Here is one illustration of cost factors contrasting System z to other options.

Cost Savings – one key factor

Your IT Cost may vary:

- •**Up to 80% Saving in IT Cost**
- •**Up to 96% Less Hardware**
- •760 x86 Processor Cores vs 26 IFLs
- •**Potential for dramatic reductions in software expense for processor based licenses**
- •**Potential reductions in power and cooling**
- •**Up to 93% Savings in KWatts and Energy Costs in this scenario**
- •**Up to 46% Less Space**
- •**Up to 89% People savings**

Energize your IT savings with z10 EC.

Consolidating 760 Linux servers z/VM Virtualization versus x86
Oracle DB Workload
3-Year Total IT Cost

$56 M Savings versus x86 without Virtualization

5.1 X

80% Savings

2.0 X

1.0 X

x86 w/o Virtualization Sun X2100 Single Core servers

x86 Virtualization Dell Power Edge Quad Core servers

z/VM Linux on System z10 EC

If you examine the cost savings shown above, it clearly shows System z to have advantages in several areas. The mainframe has changed drastically in the last decade with many enhancements and exciting new technologies such as the specialty engines that support modern technologies (Linux,

Java, etc.) without contributing to the overall processing costs measured in MSUs and paid accordingly.

Server consolidation has been a very powerful factor in the increased usage and interest in System z. Note the savings included in the areas of IT and hardware. A well-managed, centralized processor complex offers all the rich functionality as its distributed counterpart without many of the cost increases associated with a distributed server farm.

Cognos 8 BI for Linux on System z is deployed as a thin client (browser-based) architecture. The end user has no idea what server they are accessing and typically could care less. What is important is the "up time" of the server and its reliability.

Another factor to consider is that the typical distributed server is not usually permitted to run at full capacity. Some resources are held in reserve (failover, backup, test environments, etc.). Unused cycles are all cost and zero productivity. If a server is sitting idle it is just "waiting very fast".


Rapid Deployment for Expanding BI growth

How long does it take you to acquire and fully install a new distributed server? Many customers have told us it takes them 30-90 days to fully implement a new distributed server. Running Cognos 8 BI under Linux for System z you may be able to bring up a new Linux server is a matter of seconds.

There is emerging data that suggest the efficiencies of running Cognos 8 BI under Linux on System z are even higher than expected. Virtualization on System z (zVM) has been in play for many years but with the implementation of Cognos 8 there it takes on a new dynamic.

System z is well known for its ability to run at full capacity. The ability for System z to maximize every cycle and dynamically load balance is just inherent in the architecture. It is not unusual to over commit a System z's cycles and it will handle this just fine.

A pictorial representation of differences between a System z and a distributed environment might look like this:
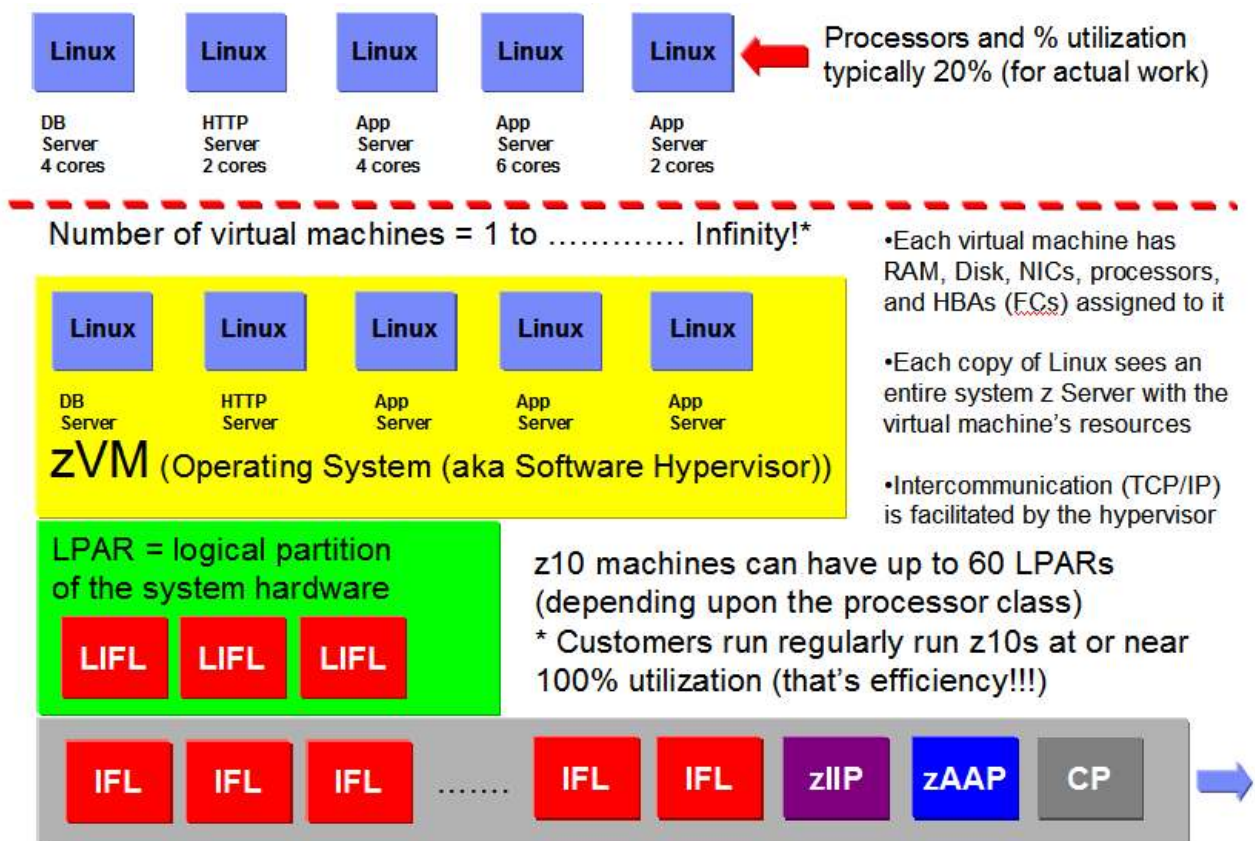
The image may appear a bit 'busy' at first, but to net it out we are moving a server farm with 6 servers into a common System z environment. Above the dotted line we depict multiple distributed Linux servers. These could also be Windows or UNIX/AIX, it doesn't matter. When we migrate the distributed workload to System z, we offer a virtual architecture.

The way System z manages time and resources in a very unique manner. It permits the full range of system resources to be committed in a productive manner rather than withholding processing power "just in case".

System z allows the dynamic expansion and contraction of resources thus test environments or adjustments for peak workloads may be made on the fly without permanently committing resources (hardware, partitions, etc.)

Processing Efficiency

This paper is not intended to malign a distributed environment. There are numerous instances where customers will prefer a distributed architecture or a hybrid one where processes are split between System z and its distributed brethren.

However, significant testing has been performed on the System z implementation to ensure several key elements hold true. First, does it scale and how well? Second, can it sustain an operational BI load to meet the emerging real-time requirements demanded by many customers? Third, does it demonstrate any unique execution characteristics in contrast with distributed?

First, let's examine the scalability. The following figure illustrates the results we performed with 90,000 names users of Cognos 8 BI on System z.

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
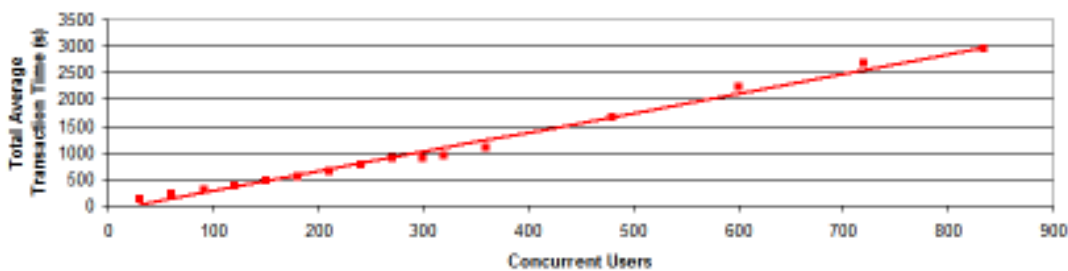
"Cognos, ...makes it easy for companies to deploy BI and PM to a broader user population, while minimizing the resulting workload for IT departments."
- Nucleus Research, Cognos Takes on the Rest of the Enterprise, November, 2007

Testing was conducted on up to 90,000 named users

Second, there is the need to support Operational BI. Leading industry analysts tell us they hear customers saying they want immediate access to data. They wish to support a broader base of end users such as customer service reps. Such users require access to up to date information that is more highly detailed (transactional) than the traditional aggregated information contained in a data warehouse. They also need to access this data in real-time or near real-time mode.

IBM tested Cognos 8 BI for Linux on System z with a 50TB data warehouse both residing on System z. A summary of the results is as follows:

- **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

There is an IBM Redbook that details the results. It may be found at: www.redbooks.ibm.com. Search for Cognos and locate the book with the id: SG24-7674.

Finally, let's address the question about any unique characteristics of the System z implementation. An IBM partner recently tested an existing distributed environment where the customer was quite happy with Cognos but had some concerns about ongoing scale and growth in their existing implementation.

The customer's data and Cognos content (queries, reports, OLAP, dashboards) were ported to System z with no changes and no tuning or tweaking. The results were quite stunning. Their summary notes include the following:

- The application was successfully and without loss of functionality ported to the System z platform. This required no redevelopment.
- Both Performance as well as Scaleability Tests clearly outperformed the client's platform.
- Even with a simple logical (single application server) architecture on System Z, consistently high performance and reliability was achieved.
- 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

Data and Data Warehousing Considerations

IBM has invested heavily in Data Warehouse technologies on all platforms. More System z customers demanded parity for their preferred platform in enabling technology thus IBM stepped up and enabled two significant DW packages on System z and integrated them with Cognos.

The driving force was the customers desire to fully implement their existing data infrastructure (DB2, IMS, VSAM, and others) with DW technologies (data definition, ETL, building and maintaining a DW and more.). The most critical aspect was that the majority of their data resided on Sytstem z and they wanted to maintain it there rather than copy, clone, massage etc. "off platform".

Data security as well as use of existing backup and recovery processes on System z make a unified platform very appealing to many of IBM's customers. The use of internal data transfer processes such as 'hiper-sockets' have proven to be of tremendous benefit in providing high-speed data access in comparison to a network environment.

InfoSphere Information Server

This is a tightly integrated suite of DW technolgies that provide end to end prcesses for data definition, data cleansing, ETL, data validaton, and warehouse building processes. The following figure depicts the overall infrastructure.
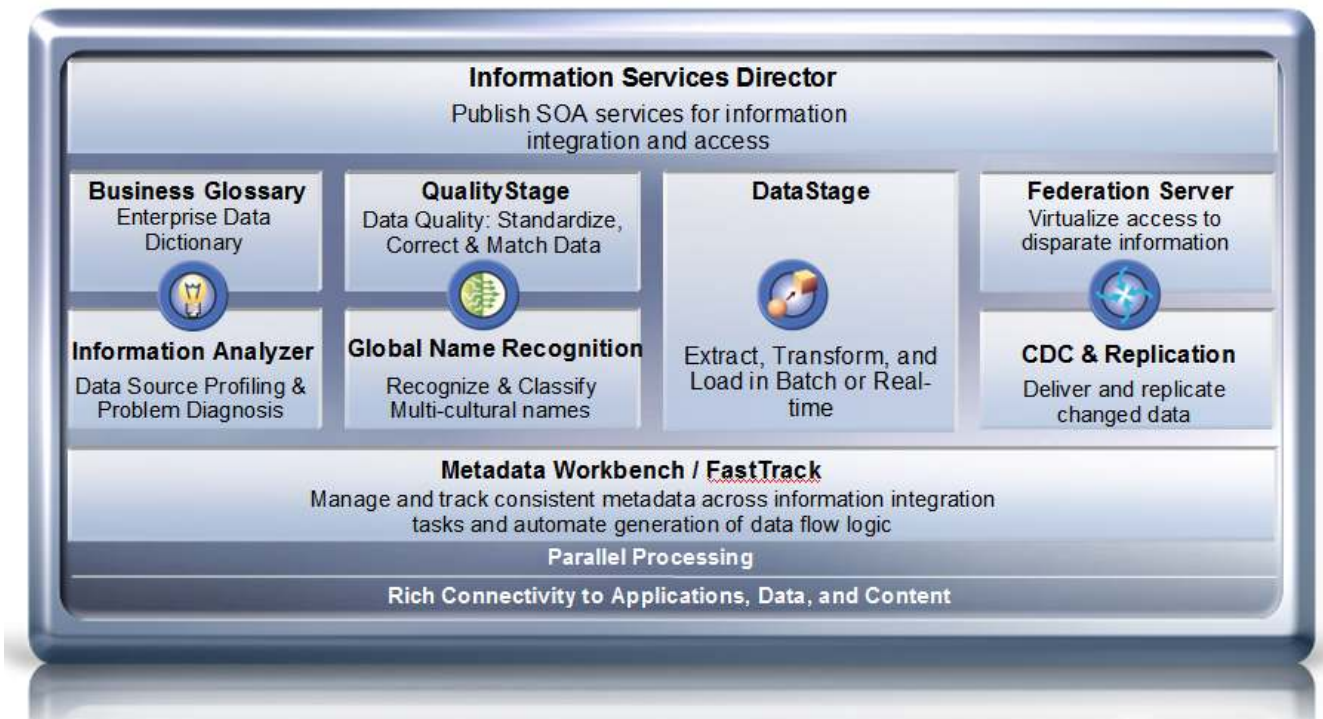
One example of the ongoing integration story is the tight coupling of Cognos 8 BI with Business Glossary. An end user may be suspicious of how a particular data item (eg: a column in a report) is defined. By tightly integrating Business Glossary with Cognos 8 BI, the end user can take the mouse pointer and 'hover' over a value and receive extensive information about the particular value, how it is derived, what it is used for, etc.

For more information on IBM's InfoSphere Information Server please visit:

http://www-01.ibm.com/software/data/integration/info_server_system_z/

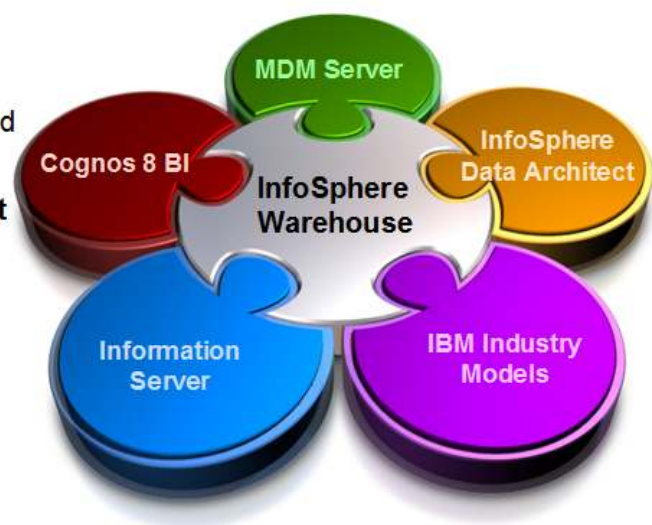**InfoSphere Warehouse on System z**

IBM recently announced an extended bundle for Data Warehousing that provides new functionality for making a System z warehouse even easier and more powerful. One feature included is Cubing Services. This technology allows a BI user to access DB2 as if it were an OLAP 'cube' rather than have to create and manage OLAP 'cubes'.

Cubing Services allows for larger and more selective OLAP access without the need to build cubes, maintain them and it does this dynamically thus providing access to more up to date information without extensive delays and lag time.

A pictorial overview of this new package is as follows along with some of the significamt features contained therein.

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 Service
- **Additional capabilities available as part of a broad System z Solution**
  - Cognos 8 BI
  - InfoSphere Data Architect
  - Information Server
  - MDM Server
  - Industry Data Models

MDM Server
InfoSphere Data Architect
Cognos 8 BI
InfoSphere Warehouse
Information Server
IBM Industry Models

For more information on IBM's InfoSphere Warehouse on System z please visit:

http://www-01.ibm.com/software/data/infosphere/warehouse-z/

Summary

IBM and Cognos have evolved a solid solution suite for Data Warehousing and Business Intelligence on System z. The demand from IBM customers fueled this initiative and has resulted in the delivery of an end-to-end DW and BI solution set.

In order to assure our customers confidence to enable and facilitate Data Warehousing and Business Intelligence initiatives on System z, extensive testing and performance measurement work has been completed.

By implementing these solutions on Linux for System z IBM has kept the cost low, the impact on a customer's System z minimal, and make extensive use of the specialty processors available on this dynamic platform.

System z offers high ROI, low TCO, and superior deployment in comparison to other options. Its unparalleled security and availability make it the perfect platform to deliver DW and BI solutions at the enterprise level.