IBM System z Technology Summit

Leveraging DB2 for z/OS for data warehousing and business analytics

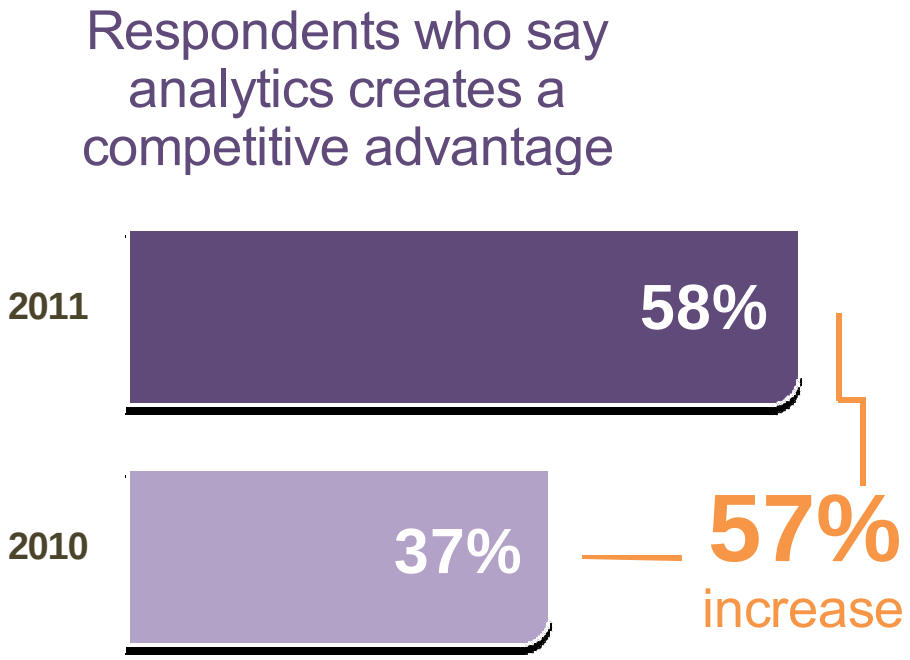
Generate
More Revenue

Reduce Risk

Predict Future Outcomes
with Greater Confidence

Lower Costs

The ability to create competitive advantage using analytics surged dramatically in 12 months; the bottom-line impact is clear



Organizations achieving a competitive advantage with analytics are

2.2x

more likely to **substantially outperform their industry peers**

Source: The New Intelligent Enterprise a joint MIT Sloan Management Review and IBM Institute of Business Value analytics research partnership.

Elevated demand for Business Analytics

More users, with higher expectations

- Needs to be employed in every function and department and shared with customers and suppliers
- Needs to support strategic, tactical and operational decisions
- Must be timely, accurate and integrated across the enterprise
- Must be protected with stringent levels of security

New requirements have emerged

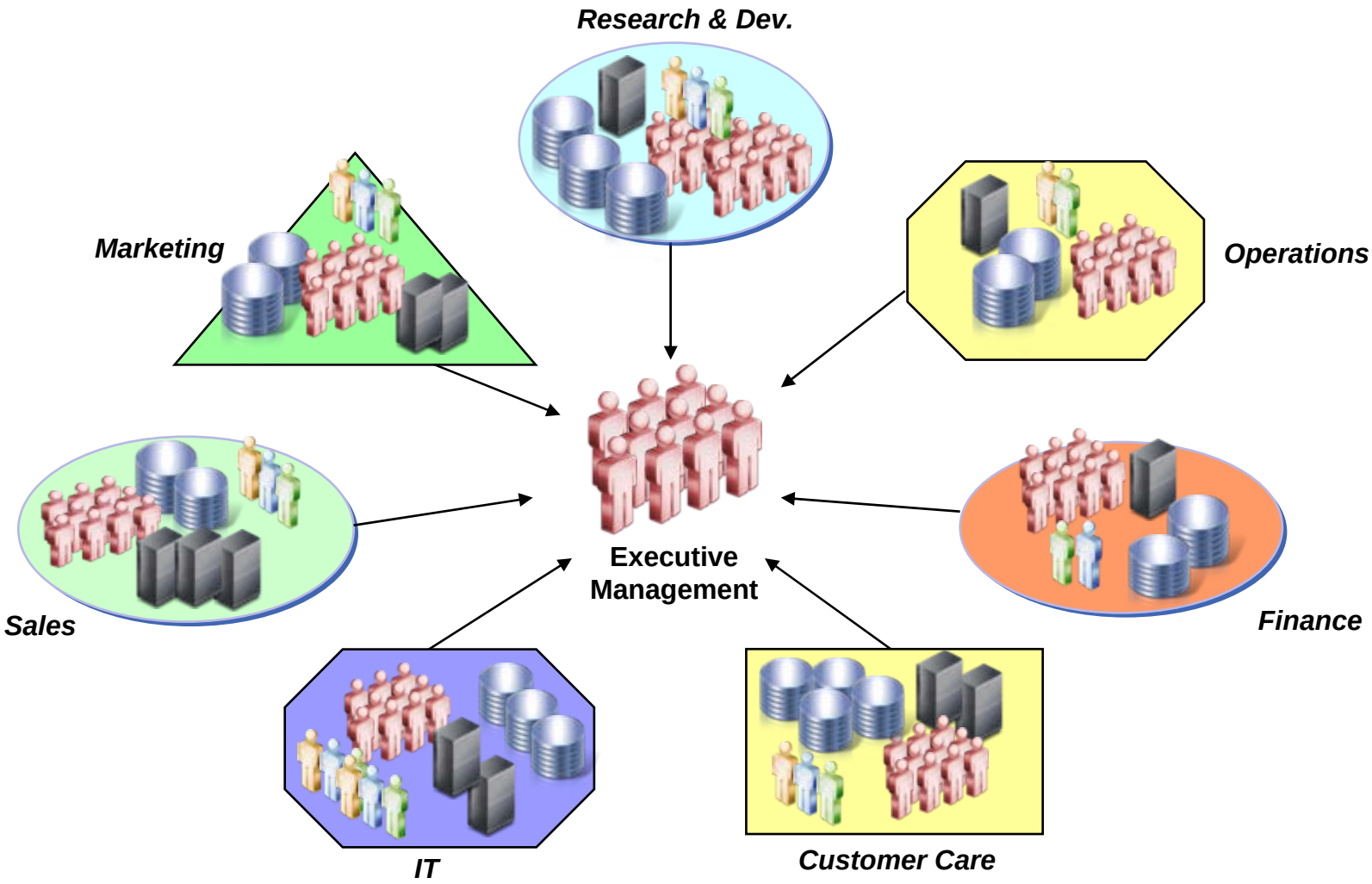
More aggressive requirements

- Enterprise-level scale & performance
- Mission critical availability
- Faster access to operational data
- Rapid, cost effective deployment & expansion
- More integrated view of data across the environment

Driving new focuses

- Modernization
- Standardization & Consolidation
- Operational BI
- Data Governance
- Cloud Computing

Current State of Affairs: Execution by Department



What's hindering success?

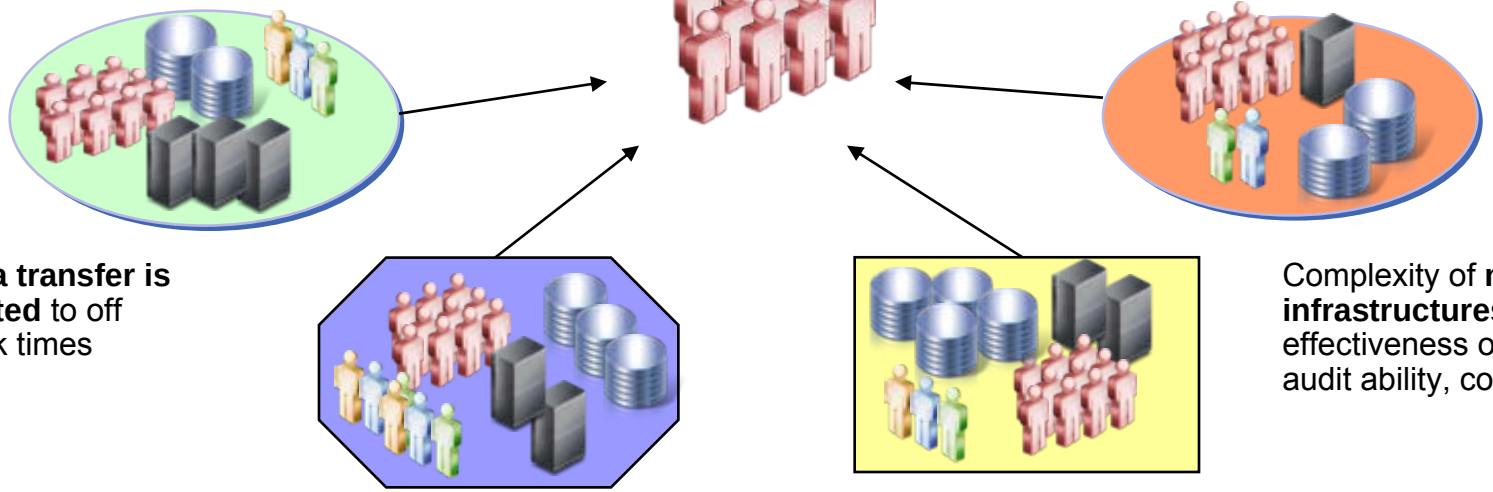
Growth = **re-engineering**

Each depart. needs to finance & acquire the HW, SW admin, facilities, training & support to meet demand

Insufficient processing power to support large or complex queries

Duplicate environments needed for development, test, production, high availability are multiplied over applications and lines of business

Servers are run at **sub-capacity**



Data transfer is limited to off peak times

Complexity of **multiple infrastructures** is impacting effectiveness of DR, admin., audit ability, compliance, etc.,

Multiple copies of the data are being created

Inconsistency of **security controls** across duplicated data

What role can you play to help overcome these barriers?

- Help meet new requirements by extending the characteristics of the transactional systems to data warehousing and business analytics
- Enable operational business analytics by co-locating data warehousing and business analytics closer to the transactional data
- Help minimize cost and reduce complexity by supporting a centralized, scalable infrastructure
- Respond quickly to data warehousing and business analytic needs by enabling rapid deployment and expansion

An average of 70% of transactional data that sources today's informational systems originates on System z

How can System z help?

Co-locations of data warehousing, business analytics, transactional data

Reduced **data movement**

Lower latency and **near real time** data

Rapid acceleration of complex queries

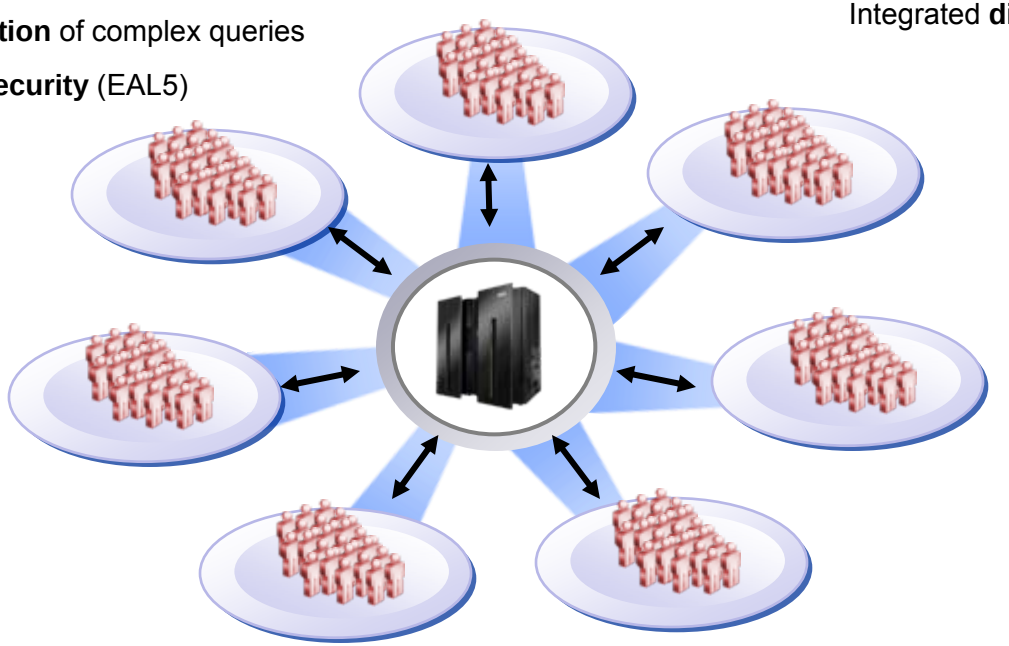
High **security** (EAL5)

High **availability** (99.999%)

Performs at **100% capacity**

Prioritization of critical queries & workloads

Integrated **disaster recovery**



Processors, disk, memory added dynamically without outage

Pre-install then activate as needed

Flexible deployment options

Centralized, scalable infrastructure

Virtualization

Start with your **final architecture**

Florida Hospital

Strengthens Data Warehousing Strategy with DB2 for z/OS

- Created a clinical dimensional data warehouse that incorporates **billions of patient diagnostic records** used by researchers and clinicians
- Delivers the **high performance and 24x7 availability** vital to hospital processes
- Meets requirements for **consistent uptime, superior scalability and recoverability**

*"System z is a very **agile platform** for us. We have the **highest-performance utilities** in the world, we have a **platform that will scale**, and the best disk in the world. It's just not fair to the other platforms, but that's **where you want to be** if you need to respond **in the warehouse space**."*

Bob Goodman, Senior Database Administrator, Florida Hospital

Zürcher Kantonalbank

IT staff relies on IBM DB2 for z/OS data warehousing to improve operational efficiencies

- DB2 for z/OS is central to ZKB's strategy to **securely deliver information** to branches and customers
- System z supports a **timely, accurate, state-of-the-business data warehouse** while running more than 4,000 batch jobs during the day and 8,000 in the evening
- Extensively leverages workload management facilities to **meet business critical requirements for timely, accurate information**

Zürcher Kantonalbank

*"Running our data warehouse platform on System z allows us to achieve **consistent performance and reliable uptime**, which are crucial for maintaining the **highest degree of customer confidence** in the bank and its services."*

Hermann Schelling, Head of Database Engineering,
Zürcher Kantonalbank

Created 4Q 2010

Miami-Dade County

Selects IBM System z platform to expand their IBM Cognos 8 BI enterprise infrastructure

- **Deployed rapidly** from a distributed model to a System z environment in just over a week
- **Reduced complexity and cost** of Business Intelligence deployments by consolidating onto a single platform
- **Consolidated multiple disparate data sources** onto a single platform to enhance ROI
- Significantly improved **availability and disaster recovery** capabilities

*"We are now able to expand the usage of our Business Intelligence reporting. We have users from over 42 county departments with **over 1500 users creating and consuming reports with stable environments on System z."***

Jaci Newmark, Project Lead,
Enterprise Business Intelligence Architecture, Miami-Dade County

IBM Blue Insight

Selects System z platform to deploy an internal Private Analytics Cloud

- **Consolidated** over 100 departmental BI products **to one Cognos 8 BI solution on System z**
- Rapidly deployed and expanded to **support a global workforce of over 200K users**
- Enabled business users with self service support to over 60 data sources delivering **timely, accurate and simplified access**
- Projected **$25M in savings** (60% Consolidation, 35% Standardization, 5% Automation)

*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 **+$25M savings over 5 years**.*

-IBM CIO Office-

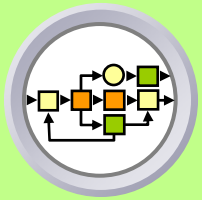
System z responds to modern analytic demands

- Supports strategic, tactical and operational decisions
- Helps reduce uncertainty in decision making
- Helps improve competitive positioning
- Enhances business performance

Delivers an end-to-end solution on a single platform…

- Data warehousing
- Business intelligence
- Predictive analytics

Combines innovative capabilities & platform strengths to support…



- Timely, accurate and secure information
- Superior availability, scalability and performance
- Reduced costs and complexity
- Rapid deployment and expansion

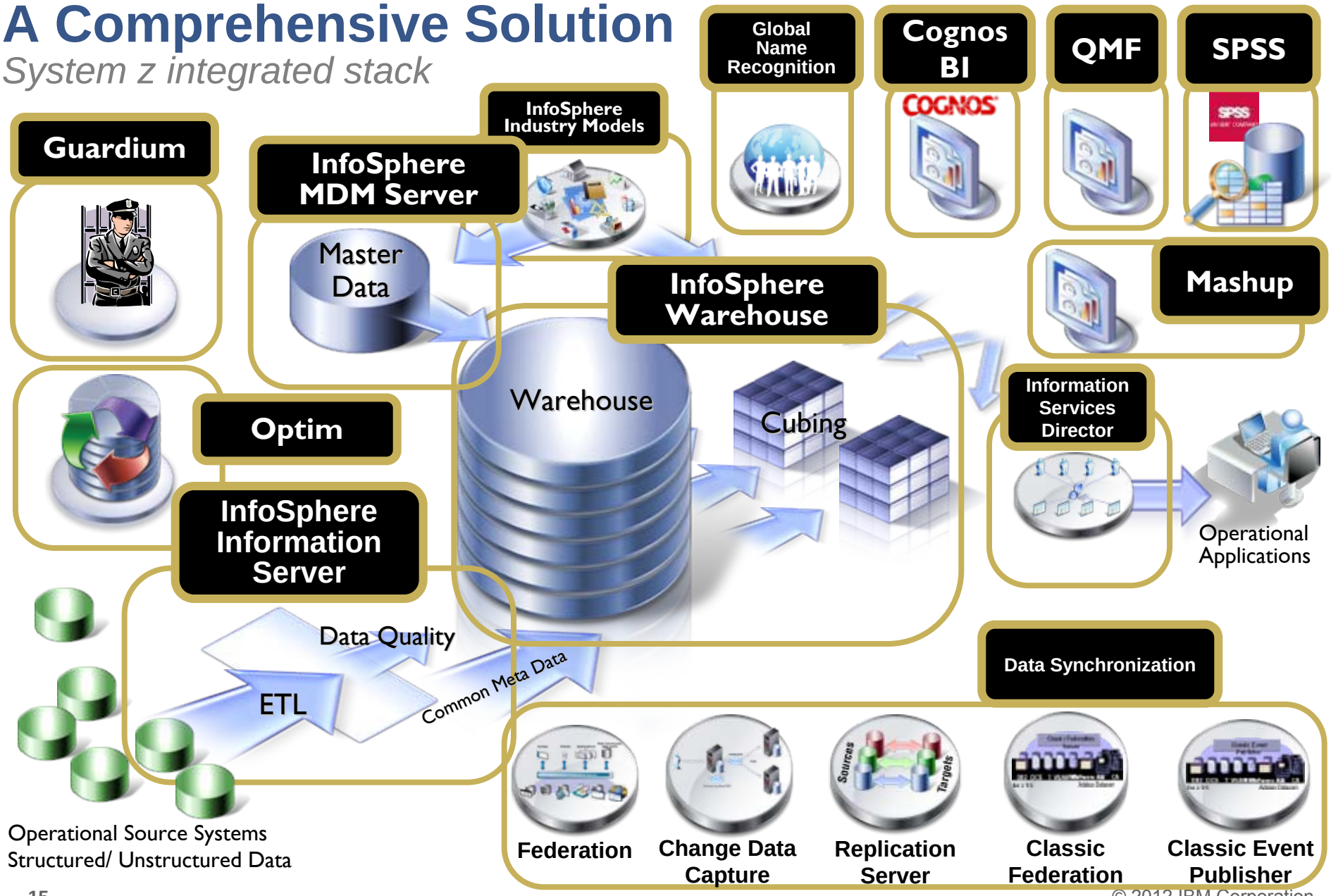
Evolves with your business…

Start with what you need
- Functionality
- Application
- Department
- Enterprise

Deploy the *way you need*
- Turnkey optimized
- Private cloud
- Services and education

A Comprehensive Solution

System z integrated stack

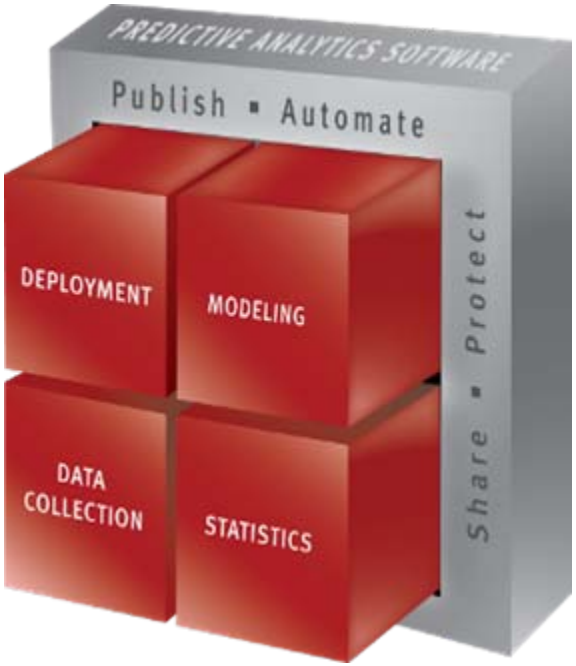


Cognos BI on System z

Now available for
z/OS &
Linux on System z

- **Delivers information where, when and how it is needed**
  - Self-service reporting and analysis
  - Individualized by user
  - Automated delivery of information in context
  - Author once, consume anywhere
- **Full range of BI capabilities**
  - Query, reporting, analysis, dashboarding, realtime monitoring
- **Purpose-built SOA platform**
  - Fits client environments and scales easily

IBM SPSS for Linux on System z



- Full breadth of predictive analytics
  - Data collection, statistics, data mining, predictive modeling, deployment services…
- Putting prediction in hands of the business
  - Decision Management
- Driving better business outcomes
  - Attract and retain more profitable customers
  - Detect and prevent fraud
  - Improve resource allocation

Flexible Deployment Options

Smart Analytics System 9700

- *Integrated solution of HW, SW and services based on zEnterprise 196 platform*
- *Enables customers to rapidly deploy cost effective game changing analytics across their business.*

Smart Analytics System 9710 *(NEW!)*

- *Integrated solution of HW, SW and services based upon the new zEnterprise 114 platform*
- *Delivers the quality of service of System z at an entry level cost*

Private Cloud

IBM Smart Analytics Cloud

- *IBM Smart Business - services with industry leading hardware & software*
- *A private cloud computing solution for business intelligence (BI) & analytics*

DB2 Analytics Accelerator *(NEW!)*

Accelerating decisions to the speed of business

Blending System z and Netezza technologies to deliver unparalleled, mixed workload performance for complex analytic business needs.

Get more insight from your data

- Fast, predictable response times for “right-time” analysis
- Accelerate analytic query response times
- Improve price/performance for analytic workloads
- Minimize the need to create data marts for performance
- Highly secure environment for sensitive data analysis
- Transparent to the application

Performance & Savings

Query	Total Rows Reviewed	Total Rows Returned	DB2 Only Hours	DB2 Only Sec(s)	DB2 with IDAA Hours	DB2 with IDAA Sec(s)	Times Faster
Query 1	2,813,571	853,320	2:39	9,540	0.0	5	1,908
Query 2	2,813,571	585,780	2:16	8,220	0.0	5	1,644
Query 3	8,260,214	274	1:16	4,560	0.0	6	760
Query 4	2,813,571	601,197	1:08	4,080	0.0	5	816
Query 5	3,422,765	508	0:57	4,080	0.0	70	58
Query 6	4,290,648	165	0:53	3,180	0.0	6	530
Query 7	361,521	58,236	0:51	3,120	0.0	4	780
Query 8	3,425.29	724	0:44	2,640	0.0	2	1,320
Query 9	4,130,107	137	0:42	2,520	0.1	193	13

Queries run faster

- Save CPU resources
- People time
- Business opportunities

Actual customer results, October 2011

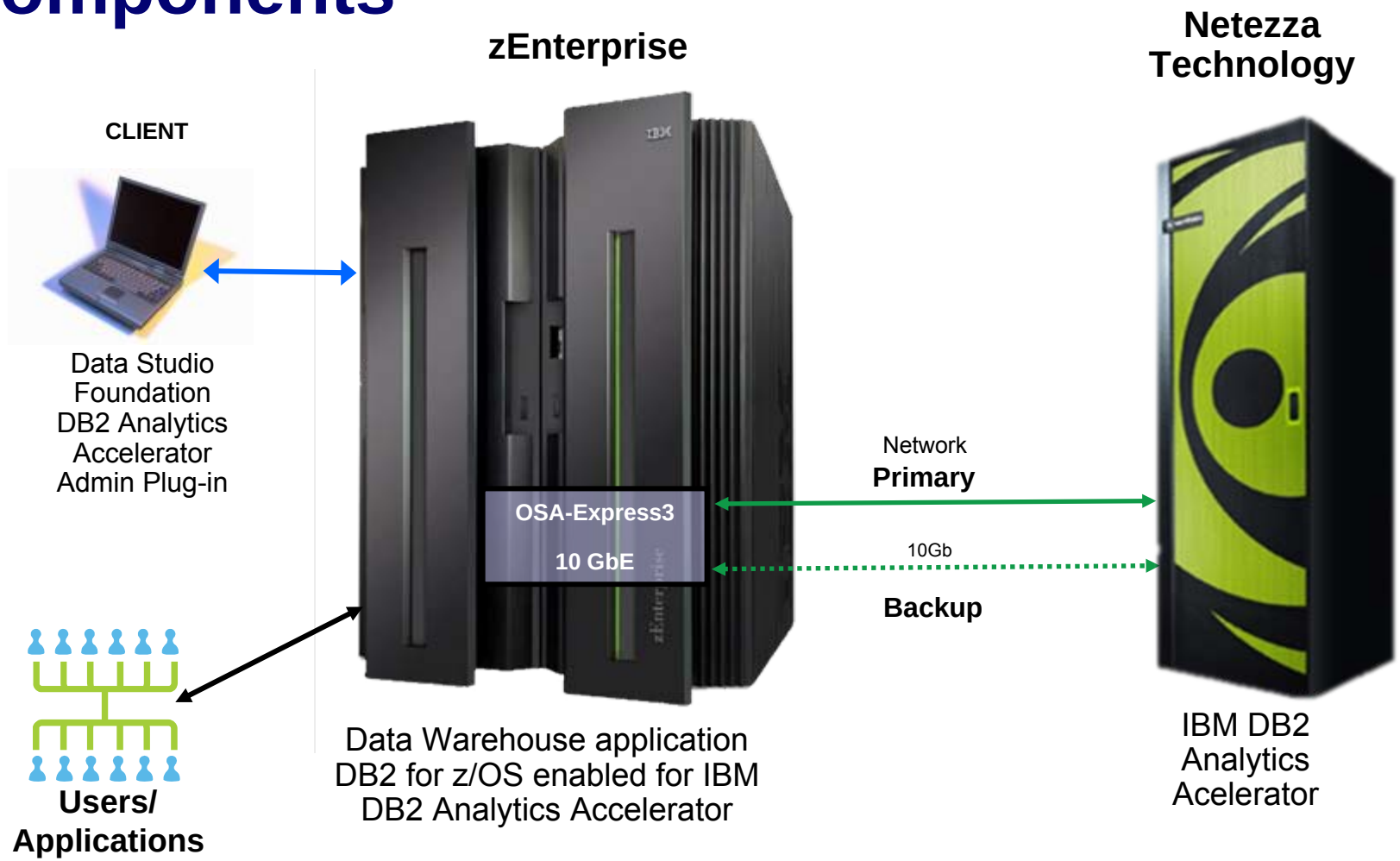
DB2 Analytics Accelerator: "we had this up and running in days with queries that ran over 1000 times faster"

DB2 Analytics Accelerator: "we expect ROI in less than 4 months"

Accelerating decisions to the speed of business

Advance to 31 minute mark for DB2 Analytics Accelerator section of keynote

IBM DB2 Analytics Accelerator V2 Product Components



Deep DB2 Integration within zEnterprise

Applications

Application Interfaces
(standard SQL dialects)

DBA Tools, z/OS Console, ...

Operational Interfaces
(e.g. DB2 Commands)

DB2 for z/OS

Data Manager | Buffer Manager | . . . | IRLM | Log Manager

Superior availability reliability, security, Workload management

z/OS on System z

IBM DB2 Analytics Accelerator

Netezza

Superior performance on analytic queries

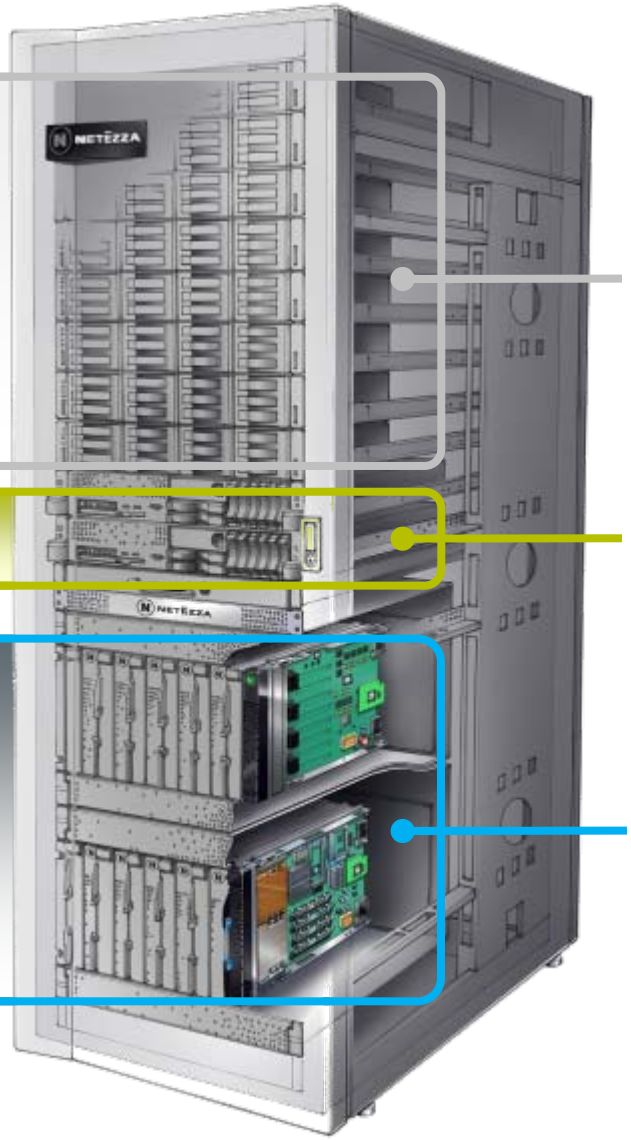
DB2 Analytics Accelerator V2

Powered by Netezza 1000 Appliance

Disk Enclosures

SMP Hosts

Snippet Blades™
(S-Blades, SPUs)

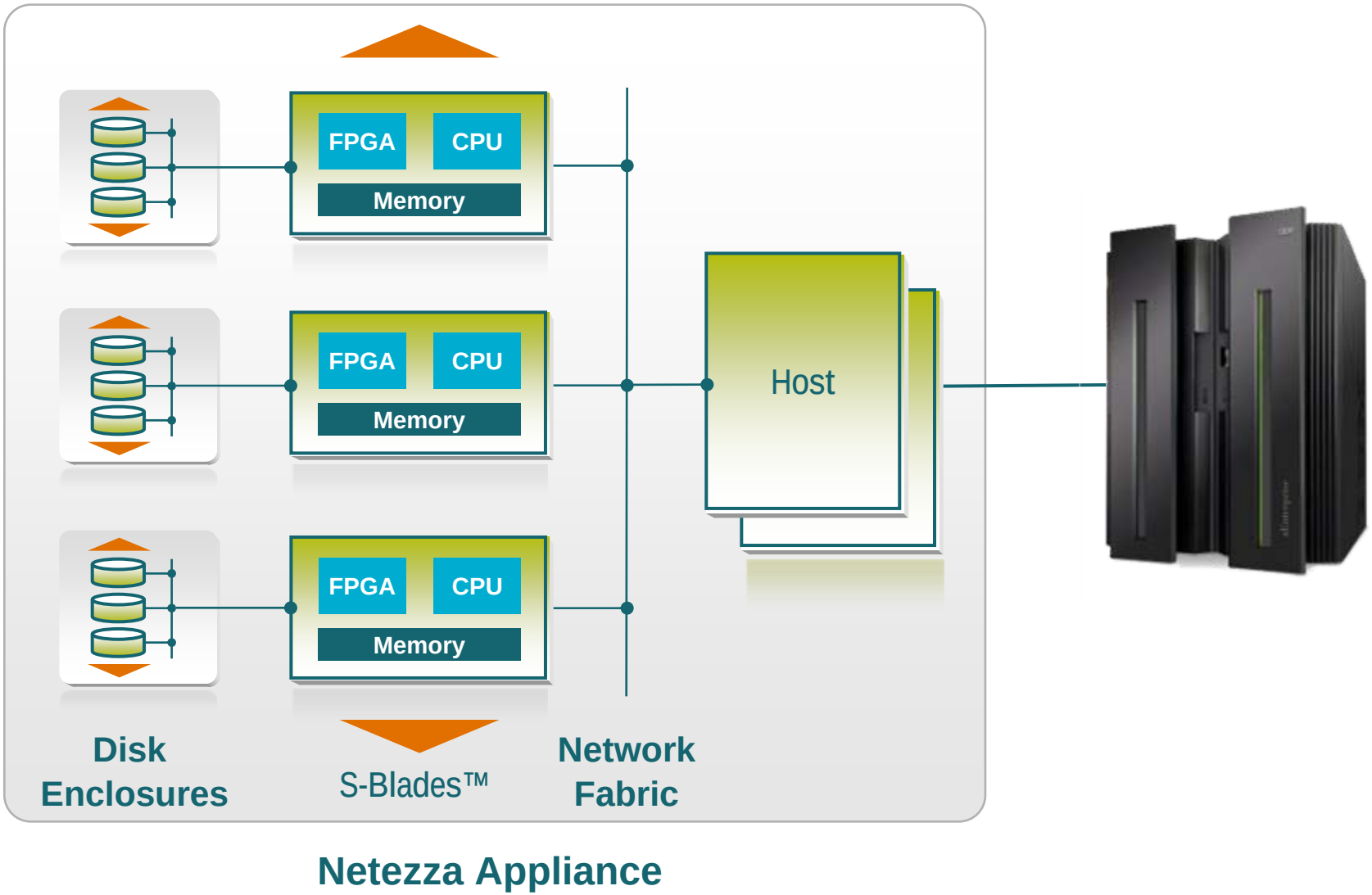


Slice of User Data
Swap and Mirror partitions
High speed data streaming
High compression rate
EXP3000 JBOD Enclosures
12 x 3.5" 1TB, 7200RPM, SAS (3Gb/s)
max 116MB/s (200-500MB/s compressed data)
e.g. TF12:
8 enclosures → 96 HDDs
32TB uncompressed user data (→ 128TB)

IDAA Server
SQL Compiler, Query Plan, Optimize
Administration
2 front/end hosts, IBM 3650M3
clustered active-passive
2 Nehalem-EP Quad-core 2.4GHz per host

Processor &
streaming DB logic
High-performance database
engine streaming joins,
aggregations, sorts, etc.
e.g. TF12: 12 back/end SPUs
(more details on following charts)

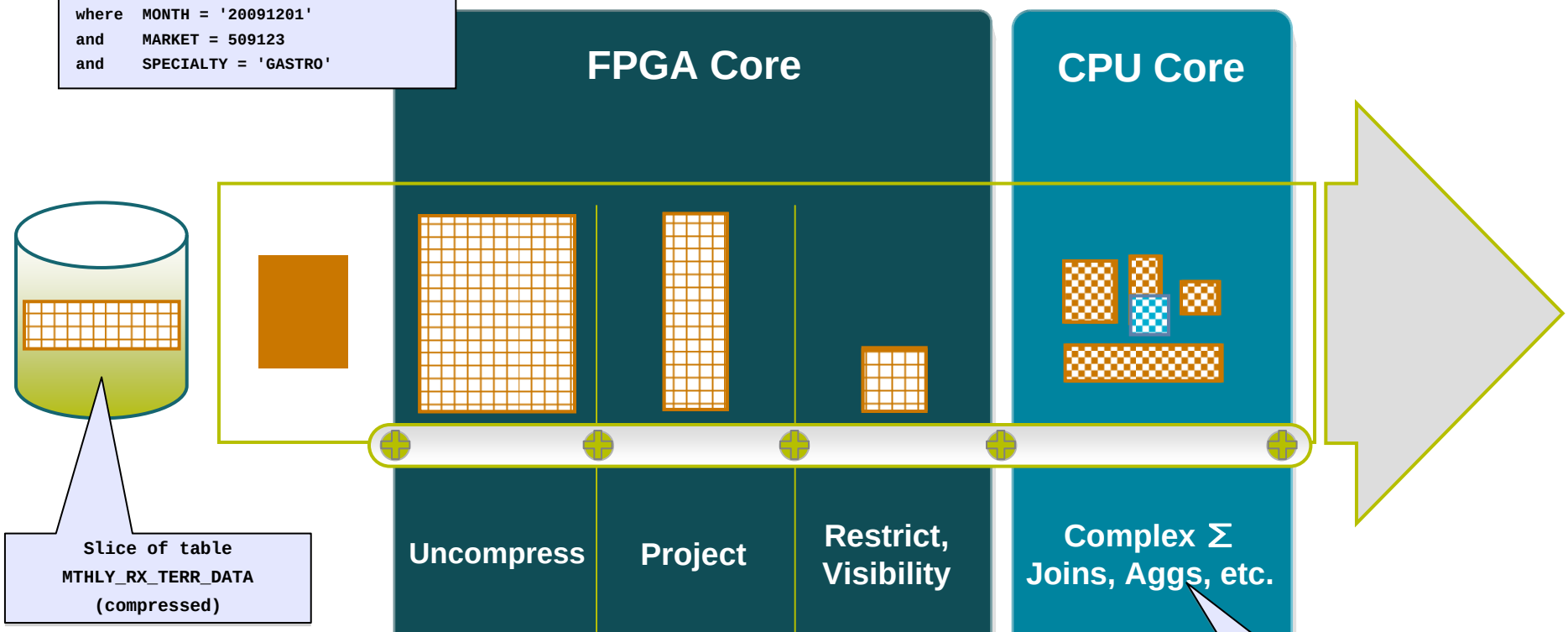
The Appliance Connected to a System z



Netezza Appliance

The Key to the Speed

```
select DISTRICT,
       PRODUCTGRP,
       sum(NRX)
from   MTHLY_RX_TERR_DATA
where  MONTH = '20091201'
and    MARKET = 509123
and    SPECIALTY = 'GASTRO'
```



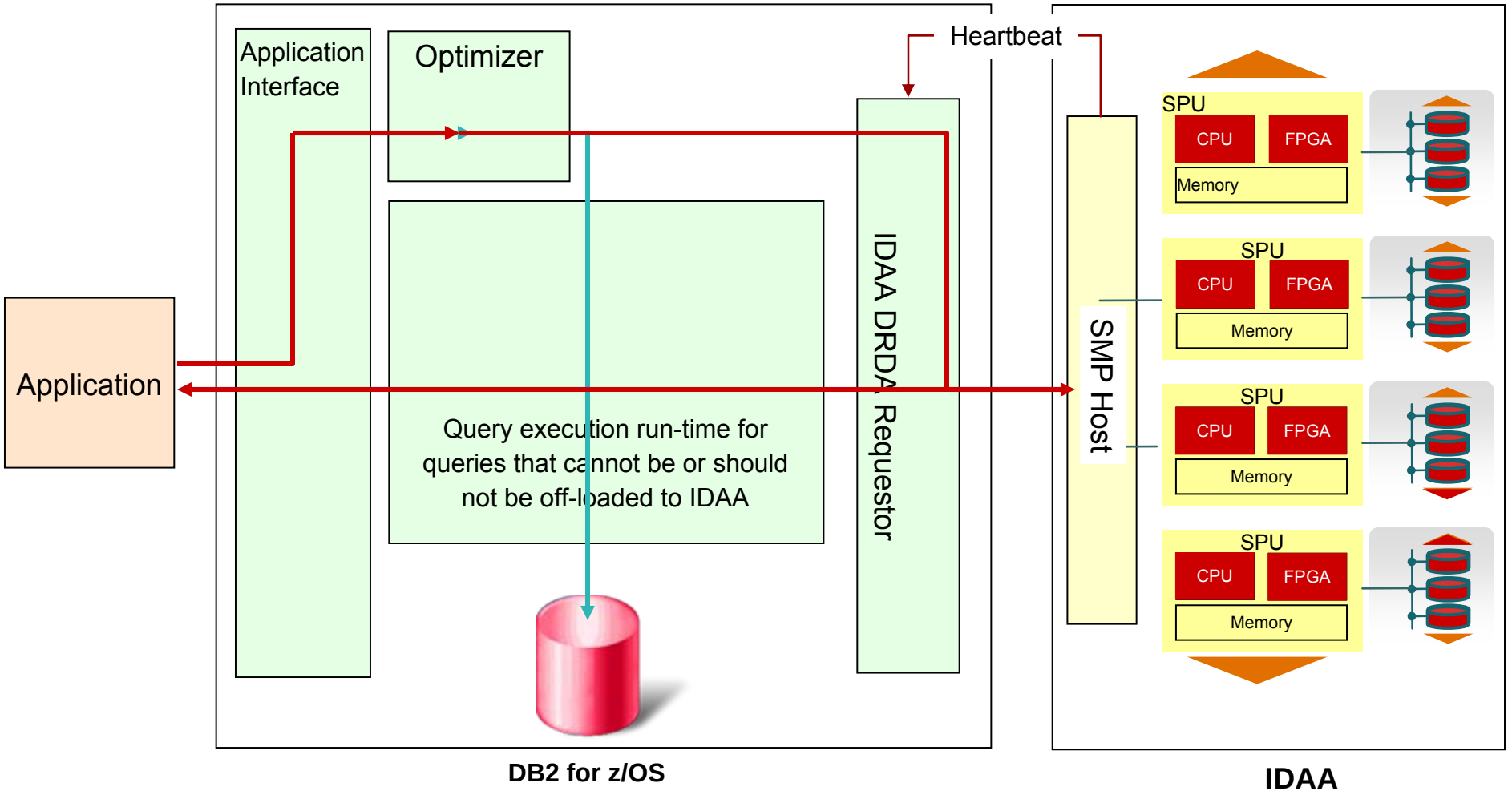
Slice of table MTHLY_RX_TERR_DATA (compressed)

```
select DISTRICT,
       PRODUCTGRP,
       sum(NRX)
```

```
where MONTH = '20091201'
and   MARKET = 509123
and   SPECIALTY = 'GASTRO'
```

sum(NRX)

Query Execution Process Flow



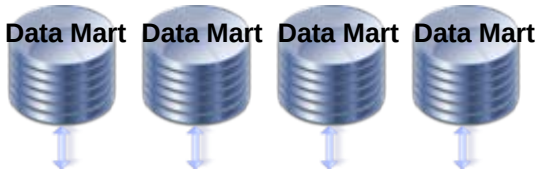
Tailored to your needs

A Hybrid Solution

IBM Netezza	IBM System z with IBM DB2 Analytics Accelerator
Focused Appliance	**Mixed Workload System**
• Appliance with a streamlined database and HW acceleration for performance critical functionality • Price/performance leader • Speed and ease of deployment and administration • Optimized performance for deep analytics, multifaceted, reporting and complex queries	• Mixed workload system z with operational transaction systems, data warehouse, operational data store, and consolidated data marts. • Unmatched availability, security and recoverability • Natural extension to System z to enable pervasive analytics across the organization. • Speed and ease of deployment and administration

Simplicity *The right mix of simplicity and flexibility* **Flexibility**

The Ultimate Consolidation Platform



Data Mart Consolidation

Transaction System
(OLTP)

Data Warehousing
Business Intelligence
Predictive Analytics

System z PR/SM
Recognized leader in mixed virtualization and workload isolation

z/OS:
Recognized leader in mixed workloads with security, availability and recoverability

Netezza:
Recognized leader in cost-effective high speed deep analytics

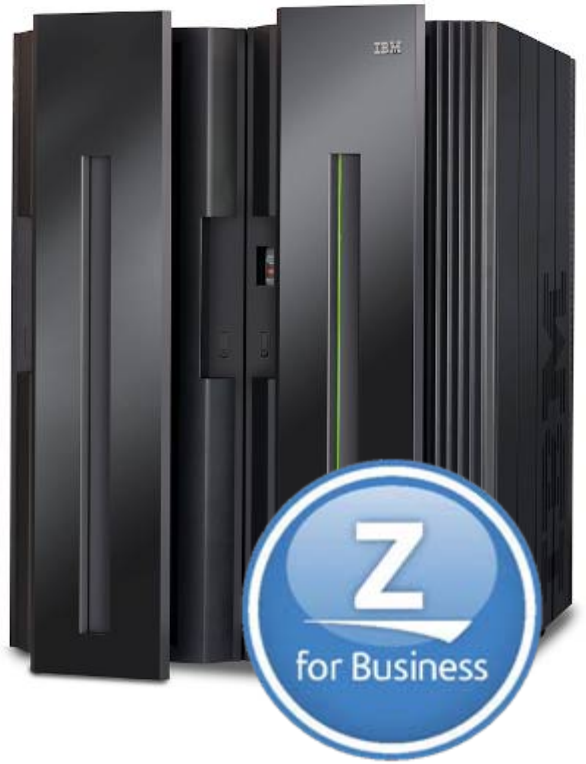
Together:
Destroying the myth that transactional and decision support workloads have to be on separate platforms

Bringing it all together

- ***Better Business Response***
- ***Reduced Costs***
- ***More Available***
- ***More Secure***
- ***Reduced Data Movement***
- ***Better Governance***
- ***Reduced Data Latency***
- ***Reduced Complexity***
- ***Reduced Resources***

Today's IBM System z is ...

- **The world's most trusted transaction processing and data server for business critical applications**
- **The world's most cost-efficient platform for data center consolidation and virtualization**
- **The world's most dependable and scalable hardware and middleware platform for new business applications**
- **A thoroughly modern application environment for traditional and Cloud delivery models**



The zEnterprise 196 is the world's fastest and most scalable enterprise system. (50 BIPS)

Based on 5.2GHz core processor speed