



IBM® System z® Technical Seminars 2011

Optimizing your IT Infrastructure - *Seattle*

Technology Update

zEnterprise Hybrid Architecture Overview and Storage Alignment

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Agenda

- zEnterprise Server Overview
- The Business Value of zManager
- zManager *Planned Extensions*
- Workloads
- Smarter Computing *Alignment*





THE z196 SERVER



IBM zEnterprise System - Best-in-class systems and software technologies *A "System of Systems" that unifies IT for predictable service delivery*



IBM zEnterprise 196 (z196)

- Optimized to host large-scale database, transaction, and mission-critical applications
- The most efficient platform for large-scale Linux® consolidation
- Capable of massive scale-up
- New easy-to-use z/OS® V1.12

zEnterprise Unified Resource Manager

- Unifies management of resources, extending IBM System z® qualities of service end-to-end across workloads
- Provides platform, hardware and workload management

zEnterprise BladeCenter Extension (zBX)

- Selected IBM POWER7® blades and IBM System x® blades for deploying applications in a multi-tier architecture
- High-performance optimizers and appliances to accelerate time to insight and reduce cost
- Dedicated high-performance private network



The heart of a zEnterprise: The z196

Up to **40%** Improvement for traditional z/OS workloads

Up to an ADDITIONAL

30% Improvement in CPU intensive workloads via compiler enhancements

Up to **60%** Total capacity improvement

1 to 80 configurable for client use

IFL, zIIP, zAAP, ICFs and optional SAPs

Up to 3 TB RAIM memory

45 subcapacity settings

Cryptographic enhancements

Optional water cooling and/or HV DC Power

Upgradeable from z10 EC and z9 EC

zEnterprise 196 (z196)

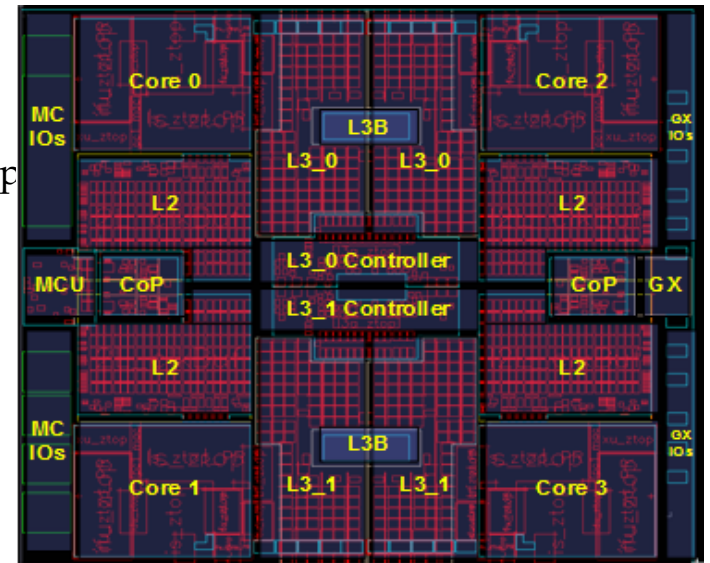
Machine Type: 2817

Models: M15, M32, M49, M66, M80

- **Processor Units, Memory, I/O**
 - One to four books
 - Hot pluggable I/O drawer
 - 1.5MB L2 Cache per core, 24MB L3 Cache per processor chip
- **Focus on the environment**
 - Options to help eliminate hotspots and save on energy
 - Static power savings
 - Query maximum potential power
 - Leadership technology for cooling and power distribution
- **Operating System Flexibility**
 - z/OS, z/VM, z/VSE, z/TPF and Linux on System z
- **Security and reliability**
 - Elliptic curve cryptography
 - Concurrent patch update enhancements
 - InfiniBand Coupling links

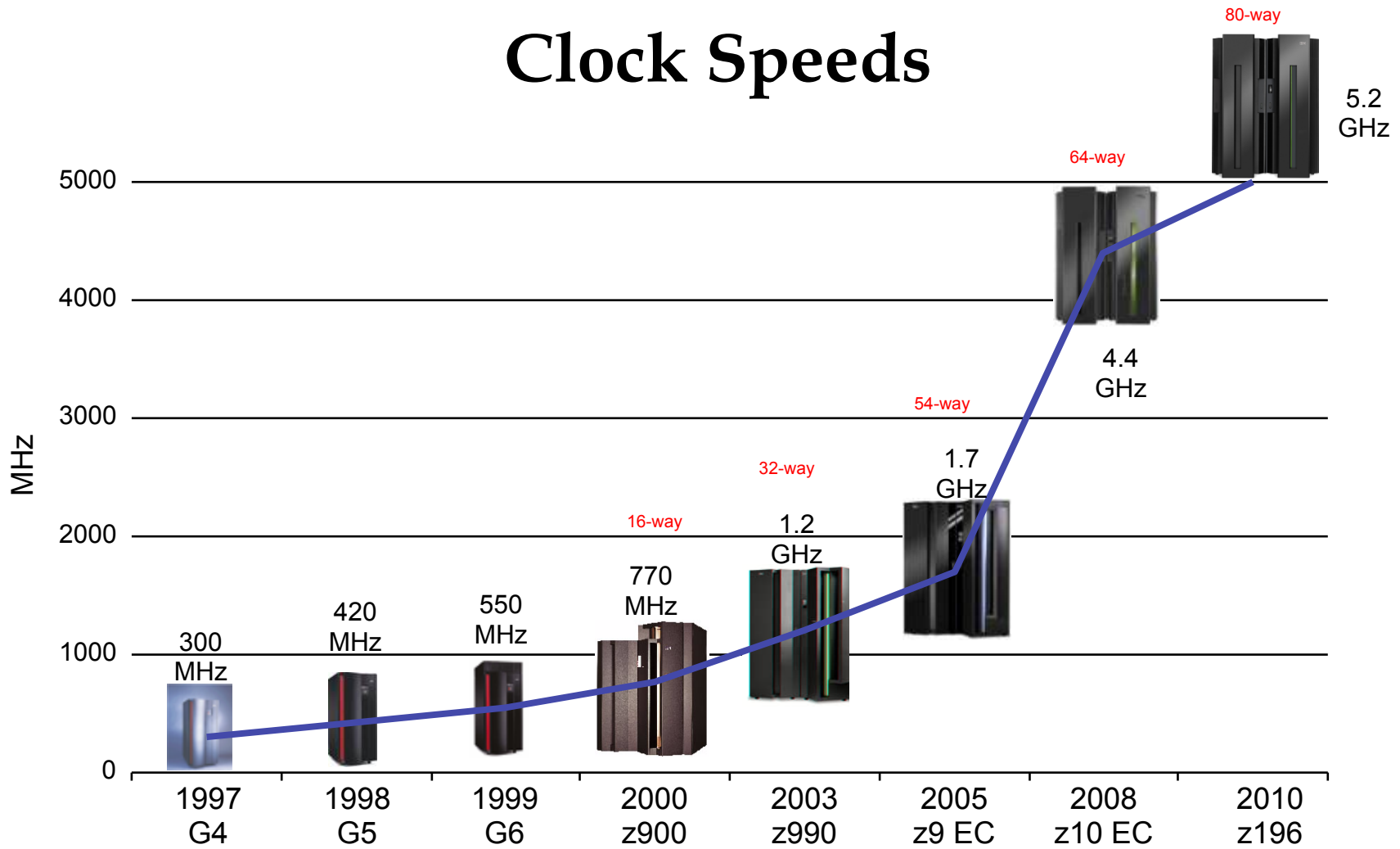
z196 - IBM leadership technology at the core

- **New 5.2 GHz Quad Core Processor Chip boosts hardware price/performance**
 - ✓ 100 new instructions - improvements for CPU intensive, Java, and C++ applications
 - ✓ Over twice as much on-chip cache as System z10 to help optimize data serving environment
 - ✓ Out-of-order execution sequence gives significant performance boost for compute intensive applications
 - ✓ Significant improvement for floating point workloads
- **Performance improvement for systems with large number of cores - improves MP ratio**
- **Data compression and cryptographic processors right on the chip**



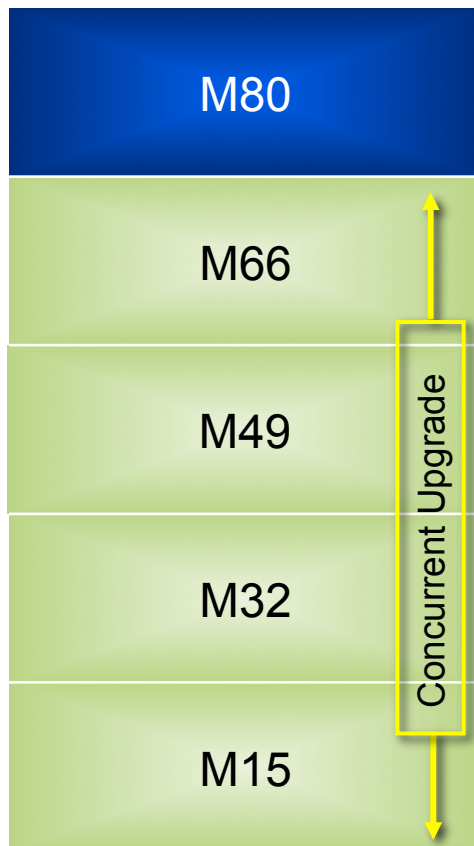
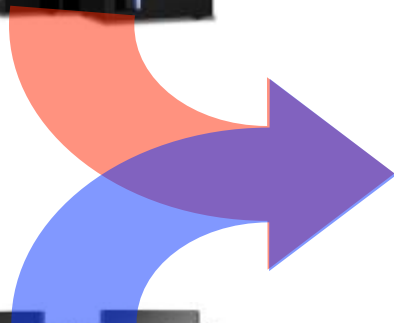


Clock Speeds



- G4 – 1st full-custom CMOS S/390®
- G5 – IEEE-standard BFP; branch target prediction
- G6 – Copper Technology (Cu BEOL)
- z900 – Full 64-bit z/Architecture®
- z990 – Superscalar CISC pipeline
- z9 EC – System level scaling
- z10 EC – Architectural extensions
- z196 – Out of order, improved superscalar, new architecture

z196 System upgrades



- z196 to higher hardware z196 model
 - Upgrade of z196 Models M15, M32, M49 and M66 to M80 is disruptive
 - When upgrading to z196 all the Books are replaced
 - Upgrade from Air to Water cooled not available
- Upgrade Approaches
 - MES Upgrade (upgrade in place)
 - Push-Pull
 - Side-by-Side

z196 Features

| |
|---|
| Five hardware models |
| Quad core PU chip |
| Up to 80 processors configurable as CPs, zAAPs, zIIPs , IFLs, ICFs, or optional SAPs |
| Increased capacity processors |
| Out of order instruction execution |
| Over 100 new and enhanced instructions |
| Improved processor cache design |
| Numerous sub-capacity CPs at capacity settings 4, 5, or 6 |
| Up to 3 TB of Redundant Array of Independent Memory (RAIM) |
| Unified Resource Manager suites |
| Cryptographic enhancements |
| On Demand enhancements |
| Energy efficiencies |



| |
|--|
| 2 New OSA CHPIDs – OSX and OSM |
| Three subchannel sets per LCSS |
| 8 slot, 2 domain I/O drawer |
| Concurrent I/O drawer add, remove, replace |
| FICON discovery and autoconfiguration |
| Doubled HiperSockets to 32 |
| Physical Coupling Links increased to 80 |
| Doubled Coupling CHPIDs to 128 |
| CFCC Level 17 |
| Optional water cooling |
| Optional High Voltage DC power |
| Static Power Save Mode |
| Optional Top Exit I/O cable exit |
| STP enhancements |
| zBX-002 with IBM Smart Analytics Optimizer, IBM Blades |



THE z114 SERVER

Introducing the IBM zEnterprise 114

Bringing hybrid computing to a broader set of businesses



IBM zEnterprise 114 (z114)

- New I/O subsystem for improved system connectivity
- Security enhancements
- Clustering improvements
- New IBM zEnterprise 114 for mid-sized businesses

zEnterprise Unified Resource Manager

- Delivering APIs to enable management of Unified Resource Manager from external tools¹

zEnterprise BladeCenter Extension (zBX)

- Introduction of select System x blades into zBX
- Support for Linux & in the future Windows¹ to broaden application support and integration.



Technology designed for the SMB Space

zEnterprise 114 (z114)

Machine Type: 2818

2 Models: M05 & M10

■ New technology in a new package

- ▶ Modular 2 drawer design for lower cost of entry
- ▶ Granularity for right-sizing your system
- ▶ Additional Scale for consolidation and growth
- ▶ Improved data center efficiency
- ▶ Same Qualities of Service as the z196
- ▶ Hybrid enabled to drive workload expansion and integration

■ Improved Platform Economics

- ▶ New Software Curve
- ▶ Lower Hardware Maintenance
- ▶ Lower specialty engine and memory prices
- ▶ Upgradeability for investment protection

Up to **18%** Improvement for traditional z/OS workloads ¹

Up to an **ADDITIONAL 25%** Improvement in CPU intensive workloads via compiler enhancements²

Up to **12%** Total capacity improvement ¹

Scales From **26 - 3100 MIPS**

Up to **130** available capacity settings

From **1-10** configurable cores for client use includes CPs, IFL, zIIP, zAAP, and ICFs

From **0-2** IBM provided spare cores

Up to **256** GB RAIM fault tolerant memory

Fully Upgradeable from the IBM System z10 Business Class™ (z10 BC) & IBM System z9® Business Class (z9 BC); and to the z196 M15

¹Relative capacity and performance compares at equal software levels as measured by IBM Large System Performance Reference (LSPR) workloads using z/OS® 1.11. Results may vary
²The z114 will exhibit up to 25% increase for CPU intensive workload as provided by multiple C/C++ compiler level improvements when going from z/OS 1.09 to z/OS 1.12

Providing investment protection

- Continuing to protect your investment with two generation upgrades
- Full upgradeability within each server family
- Temporary or permanent growth when you need it
- z114 offers two models:
 - ▶ M05 and M10.
 - ▶ M05 is upgradeable to M10
- z114 (M10) is upgradeable to the z196 (M15 Air cooled only)





Highly Granular Server Capability

| | CP | IFL | zIIP | zAAP | ICF | Add'l SAP | Std SAP | Spare |
|-----|-----|------|------|------|------|-----------|---------|-------|
| M05 | 0-5 | 0-5 | 0-2 | 0-2 | 0-5 | 0-2 | 2 | 0 |
| M10 | 0-5 | 0-10 | 0-5 | 0-5 | 0-10 | 0-2 | 2 | 2 |

Larger ↑

| | | | | |
|-------|-------|-------|-------|-------|
| Z01 | Z02 | Z03 | Z04 | Z05 |
| Y01 | Y02 | Y03 | Y04 | Y05 |
| X01 | X02 | X03 | X04 | X05 |
| W01 | W02 | W03 | W04 | W05 |
| V01 | V02 | V03 | V04 | V05 |
| U01 | U02 | U03 | U04 | U05 |
| T01 | T02 | T03 | T04 | T05 |
| S01 | S02 | S03 | S04 | S05 |
| R01 | R02 | R03 | R04 | R05 |
| Q01 | Q02 | Q03 | Q04 | Q05 |
| P01 | P02 | P03 | P04 | P05 |
| O01 | O02 | O03 | O04 | O05 |
| N01 | N02 | N03 | N04 | N05 |
| M01 | M02 | M03 | M04 | M05 |
| L01 | L02 | L03 | L04 | L05 |
| K01 | K02 | K03 | K04 | K05 |
| J01 | J02 | J03 | J04 | J05 |
| I01 | I02 | I03 | I04 | I05 |
| H01 | H02 | H03 | H04 | H05 |
| G01 | G02 | G03 | G04 | G05 |
| F01 | F02 | F03 | F04 | F05 |
| E01 | E02 | E03 | E04 | E05 |
| D01 | D02 | D03 | D04 | D05 |
| C01 | C02 | C03 | C04 | C05 |
| B01 | B02 | B03 | B04 | B05 |
| A01 | A02 | A03 | A04 | A05 |
| 1-way | 2-way | 3-way | 4-way | 5-way |

↓ Smaller

- Complete capacity matrix available on both models.
- Granularity levels similar to z10 BC to facilitate upgrades and incremental growth
- Model M10 provides specialty engine scale out capabilities
- Any to any capacity upgrade/downgrade capability within the Model
- CBU capability from smallest to largest capacities within the Model
- On/Off CoD within the Model
- Linux only and ICF only servers

Leverage the latest operating systems to exploit the full value of the z114, z196

z/OS Version 1 Release 13



- The new face of z/OS - the z/OS Management Facility adds new software deployment and disk management tasks and many enhancements that help create a more productive and integrated z/OS experience.
- Foundation for modern batch and 'real time' batch applications - updates to shorten batch window, simplify batch programming, and give you more flexibility in deploying batch applications.
- Autonomics for improved, early error detection - helps provide early warning of certain system issues before they can impact your business
- Performance for new and traditional workloads
- Support of new encryption and compliance standards and keys

z/VM® and Linux on System z



- Server and application consolidation on System z using Linux and z/VM is the industry leader in large-scale, cost-efficient virtual server hosting
- zEnterprise extends the choice of integrated workloads through blades on zBX
- The z114 lowers the entry cost to get started with the Enterprise Linux Server
- Faster cores and a bigger system cache on the z196 and the z114 let you do even more with less when running Linux on z/VM
- Integrated blades on zBX will offer added dimension for workload optimization including applications on Windows

z/VSE® Version 5.1



- Introduces 64-bit virtual addressing to z/VSE
 - ▶ Reduces memory constraints
 - ▶ Allows to exploit more 'data in memory'
- Continues the z/VSE strategy of protect, integrate, and extend (in short "PIE")
 - ▶ Protect existing customer investments in applications and data on z/VSE
 - ▶ Integrate z/VSE with the rest of IT
 - ▶ Extend with Linux on System z to build modern integrated solutions
- Exploitation of selected zEnterprise functions and features as well as IBM System Storage options
- Includes a SoD on CICS Explorer capabilities for CICS TS for VSE/ESA™





DS8800 Business Class configuration meets the needs of new System z114 model

- **Single-frame DS8800 Business Class system**
 - Streamlined, lower cost configuration to meet the needs of System z114 deployments
 - Dual 2-way processor complex
 - New configuration options reduce costs and provide more capacity in single frame
 - Supports minimum of 8 drives and up to 240 drives
 - Cache options of 16, 32, or 64GB

- **Same great features and capabilities**
 - Same enterprise performance
 - Same system resiliency
 - Same business continuity solutions
 - Same System z optimization capabilities
 - Same optimization features such as Easy Tier, I/O Priority Manager, Thin Provisioning, etc.
 - Same advanced security

Configured with more drives per device adapter to reduce configuration cost and increasing adapter utilization



z114 Features

| |
|---|
| Two hardware models |
| Up to 10 processors configurable as CPs, zAAPs, zIIPs , IFLs, ICFs, or optional SAPs |
| Up to 26 sub-capacity settings across a maximum of 5 General Purpose CPs |
| Up to 256 GB of Redundant Array of Independent Memory (RAIM) for System |
| Dedicated Spares on the Model M10 |
| Increased capacity processors |
| Out of order instruction execution |
| Improved processor cache design |
| New and additional instructions |
| On Demand enhancements |
| CFCC Level 17 enhancements |
| Cryptographic enhancements |
| 6 and 8 GBps interconnects |
| Additional STP enhancements |

z114



| |
|--|
| Doubled HiperSockets to 32 |
| Doubled Coupling CHPIDs to 128 |
| New 32 slot PCIe Based I/O Drawer |
| Increased granularity of I/O adapters |
| New form factor I/O adapters i.e FICON Express8S and OSA-Expres4S |
| Improved PSIFB Coupling Link |
| Physical Coupling Links increased to 72 |
| Optional High Voltage DC power |
| Optional overhead I/O cable exit |
| NRF Support with either top exit or bottom exit I/O and power |
| 2 New OSA CHPIDs – OSX and OSM |
| zBX-002 with ISAOPT, POWER7, DataPower XI50z and IBM System x Blades |
| Platform Management from HMC |
| Reclassification from “general business” environment to “data center” |

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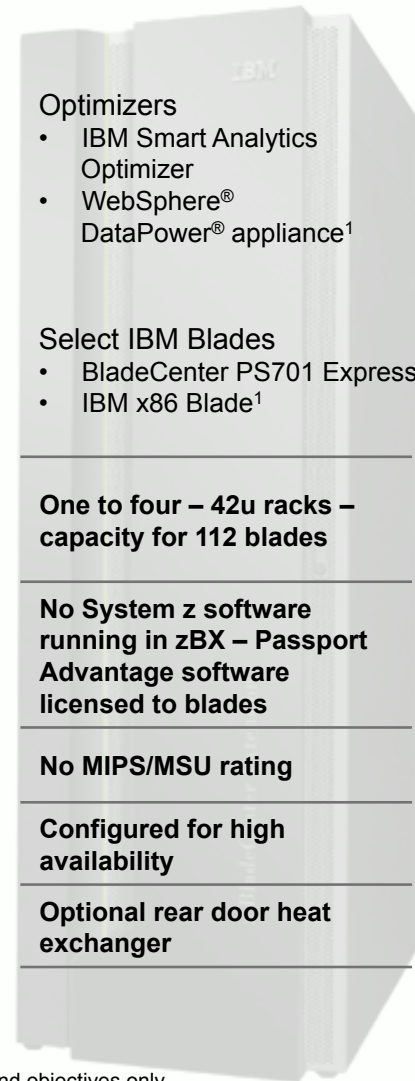
THE zENTERPRISE BLADECENTER EXTENSION (zBX)

...The value extends to heterogeneous platforms

IBM zEnterprise BladeCenter Extension (zBX)

Machine Type: 2458 – Model 002

- Integrated, Standard IBM Certified Components driven by System z order
- System z support
 - Problem reporting, hardware and firmware updates
- Expanding operating system support
- Simplified management
 - Improved time to install and implement new applications
 - Central point of management for heterogeneous workloads
 - No change to applications



... managed by the zEnterprise Unified Resource Manager

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zBX ... Infrastructure to support hybrid resources

- **zBX will contain:**
 - ✓ **Optimizers** that are dedicated to workloads
 - ✓ **IBM Application Server Blades** – running *any* application supported by the operating system installed on the blade – with no change
 - ✓ zBX is a System z machine type for integrated fulfillment, maintenance, and support
- **Secure network connection between zBX and z196 for data and support**
 - ✓ High Speed and Private, point to point Data Network
 - ✓ Very Low Latency, much fewer ‘hops’ , no need for encryption / firewall
- **Sharing of ALL resources with up to 8 196 servers**
- **Configuration, support, monitoring, management is provided by the Unified Resource Manager**





zEnterprise zBX functions and features

zBX



| |
|---|
| One hardware model |
| zBX is controlled by one specific z196 |
| Up to 4 Racks (B, C, D and E) |
| 2 BladeCenters Chassis per rack |
| Non-acoustics doors standard |
| Optional Rear Door Heat Exchanger |
| Optional acoustic doors |
| Redundant Power, Cooling and Management Modules |
| 10 GbE and 1000BASE-T Network modules |
| 8 Gb SR FC modules |

| |
|---|
| Advance Management Module |
| 1000BASE-T and 10 GbE TORs |
| Up to 112 Blades |
| IBM Smart Analytics Optimizer |
| POWER7 Blades |
| IBM x86 Blades |
| WebSphere DataPower Appliances |
| HMCs required for Unified Resource Manager |
| Additional zBX owned HMC required if System maintained by Third Party |

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zEnterprise System



IBM zEnterprise 196 (z196)
IBM zEnterprise 114 (z114)



IBM zEnterprise BladeCenter Extension (zBX)

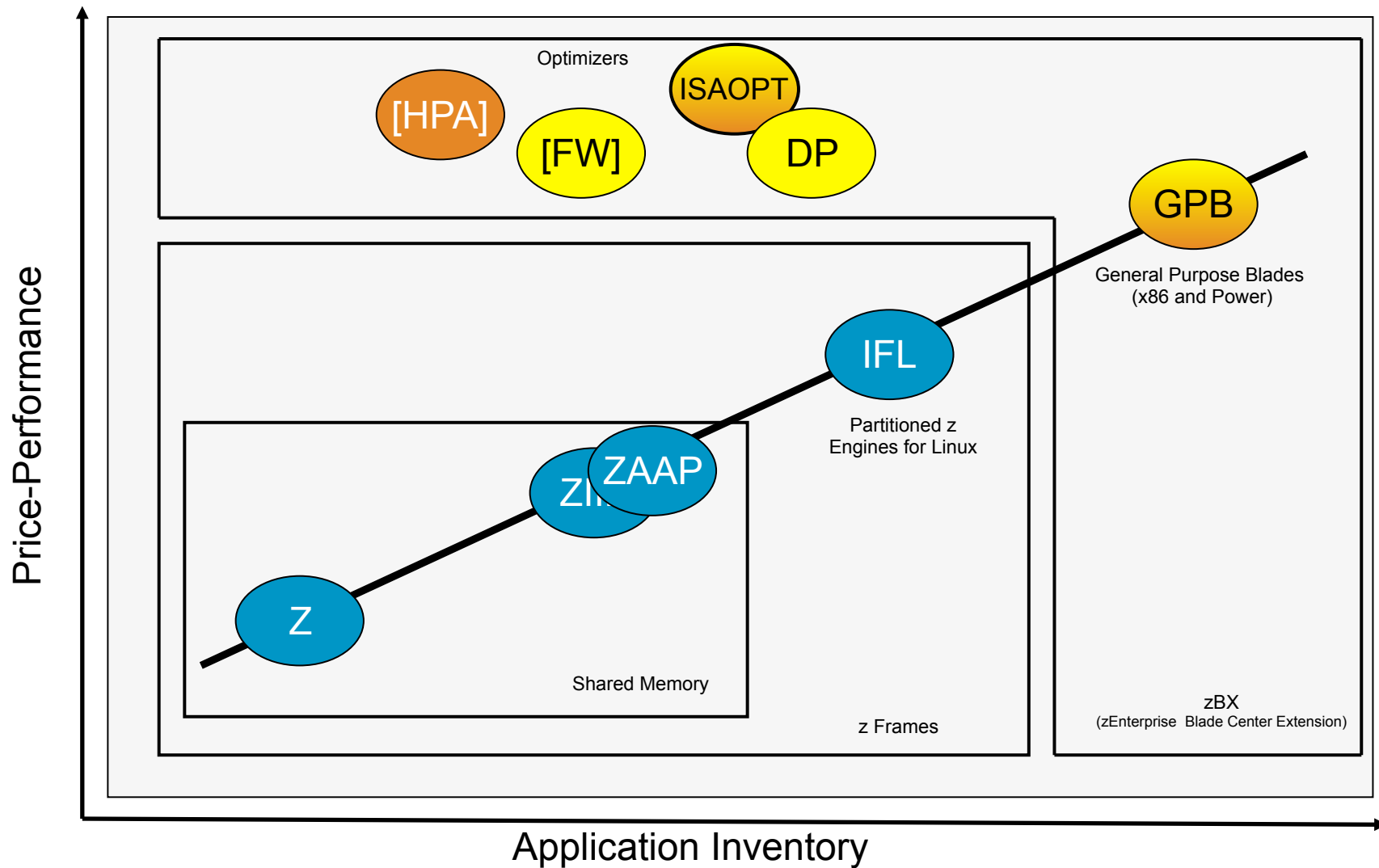
The above hardware components are called a *Node*.
The entire heterogeneous environment is managed as a Single Logical Resource Space by zManager.



GENERAL PURPOSE BLADES

(ALWAYS VIRTUALIZED)

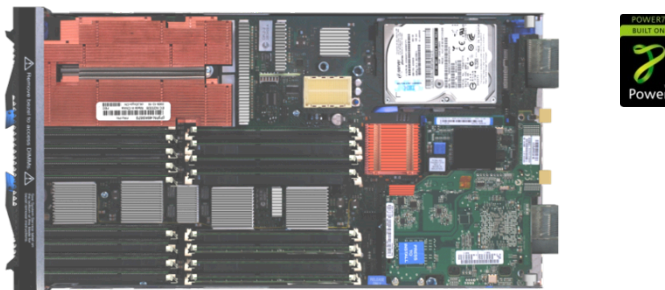
What are *Specialty Engines* ?



IBM zEnterprise™ BladeCenter® Extension

IBM POWER7™ Blades

Machine Type: 8406
Model 71Y



Processor Units, Memory, I/O:

- POWER7 8-core processor 3.0GHz
- Single wide blade server
- 3 configurations supported by zEnterprise
 - 32GB, 64GB, 128GB
- Flexibility in ordering – acquired through existing channels, including IBM

Environmental:

- EnergyScale Technology with dynamic energy optimization
- POWER7 Intelligent Threads technology enables workload optimization

Software:

- AIX OS 5.3 or greater
- PowerVM

Security and Reliability:

- Hot Swap Power Blades in BladeCenter Chassis
- Auto sensing by zCEC initiates configuration and firmware updates done at HMC
- System z service
 - Problem reporting and ‘phone home’ capability
 - Blade warranty provided as part of zBX warranty and terms
 - Support by IBM System z Service Support Rep (SSR)



IBM zEnterprise™ BladeCenter® Extension IBM System x® Blades (2011)

- MT 7873 (Hammerhead Westmere)

Customer Configuration:

- Intel 8 core Processor
- 2 Processor sockets
- 2.13 GHz 105W
- Max 14 A16M's per BC-H
- Memory 1066 Mhz with 6.4 GTs
- 16 DIMM slots
- 100GB SSD Internal Disk
- Blades acquired by customer
- OS Support (64 bit only):
 - Rhel 5.5 and up.
 - SLES 11 (SP 1 and up)
 - Windows Server 2008 Datacenter Edition (SOD)

| BLADE | PART NUMBER | OPTIONAL PART NUMBER (i.e. MES) | FEATURE CODE | CONFIG 0 | CONFIG 1 |
|--|-------------|---------------------------------|--------------|----------|----------|
| Blade Base | 69Y3056 | 69Y3056 | A16M | 1 | 1 |
| Initial Processor 2.13 GHz 105W (E7-2830 8C) | 69Y3071 | 69Y3071 | A16S | 1 | 1 |
| Additional Processor 2.13 GHz 105W (E7-2830 8C) | 69Y3072 | 69Y3074 | A179 | 1 | 1 |
| # Intel Processors (Sockets) | | | | 2 | 2 |
| Blade Width | | | | Single | Single |
| Total Cores | | | | 16 | 16 |
| Memory kits 8 GB 1333 Mhz | 46C0558 | 46C0570 | A17Q | 8 | 16 |
| GB/Core | | | | 4 | 8 |
| Speed Burst Card | 46M6843 | 59Y5889 | 1741 | 1 | 1 |
| SSD Exp Card | 46M6906 | 46M6908 | 5765 | 1 | 1 |
| 50GB MLC SSD | 43W7727 | 43W7726 | 5428 | 2 | 2 |
| No Internal Raid | | | 9012 | 1 | 1 |
| CFFh 10GbE | 46M6170 | 46M6168 | 0099 | 1 | 1 |
| CIOv 8Gb FC | 44X1946 | 44X1945 | 1462 | 1 | 1 |



NOTE this information is a *Statement of Direction* only.

Windows

IBM's intent is to support

Microsoft Windows Server 2008 – Datacenter Edition on the HX5 7873 blades installed in the zBX.
64 bit version only.



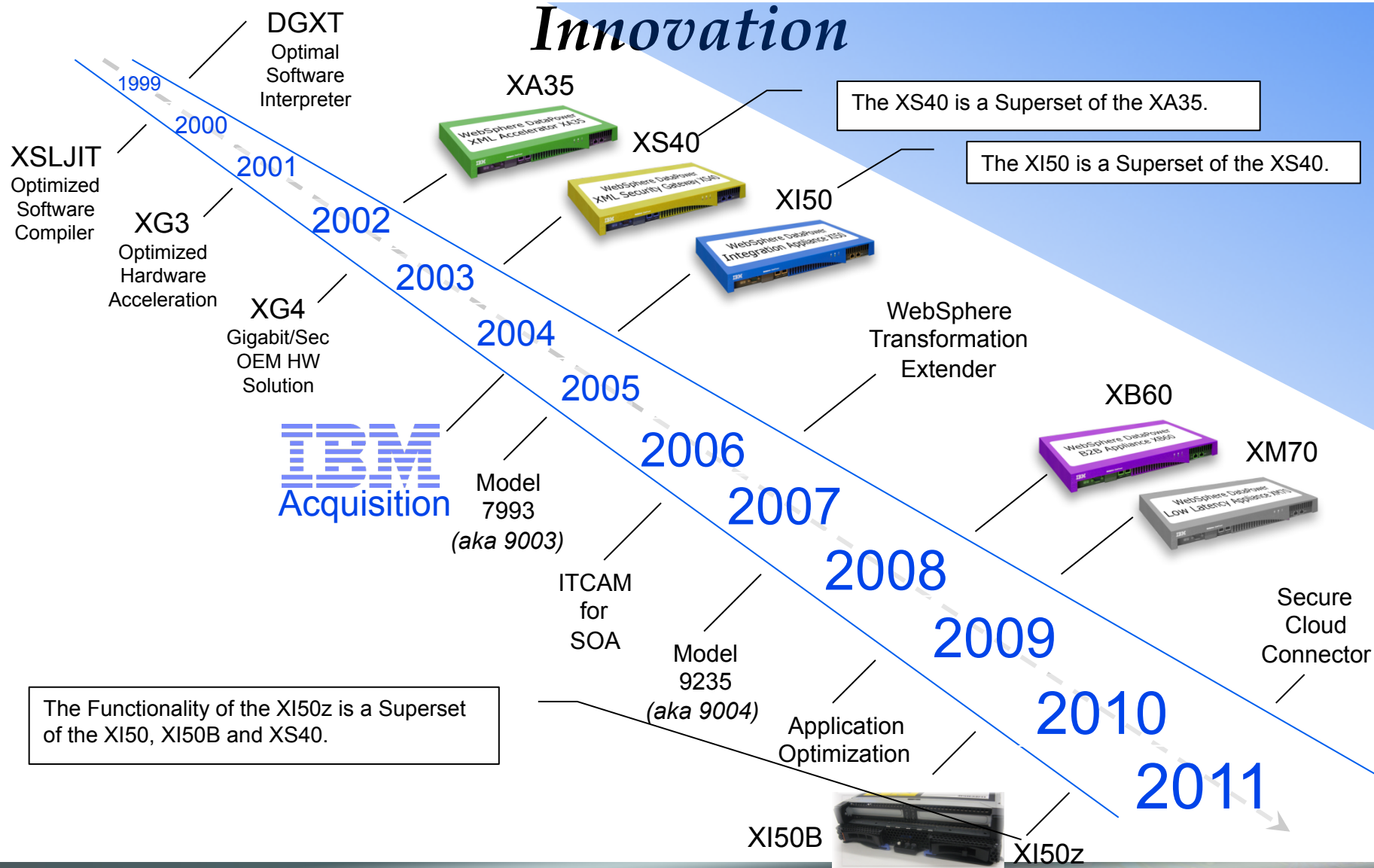
OPTIMIZERS

(CLOSED SOLUTIONS)



WebSphere DataPower Appliances

Innovation



The WebSphere DataPower XI50z

- The XI50z includes all the base capability found in the existing XI50, XI50B, and XS40 offerings.
- The XI50z is packaged as a Blade Form-Factor for installation in the **IBM zEnterprise BladeCenter Extension (zBX)**.
- The XI50z supports all ESB, Security, and Integration capabilities of **DataPower XI50 v3.8.1**
- The XI50z is the **Highest capacity** DataPower appliance for SOA workloads, is optimized for zEnterprise environments.
- The XI50z tightly **integrates** with zEnterprise Unified Resource Manager
 - Unified hardware and firmware management.
 - Monitoring of the DataPower Blade and Energy Consumption.
 - Consolidated Error Logging across the Ensemble.
 - Serviceability, monitoring, and reporting capabilities of zEnterprise



XI50B MES Upgrades to the XI50z are not possible.

What is the IBM Smart Analytics Optimizer?

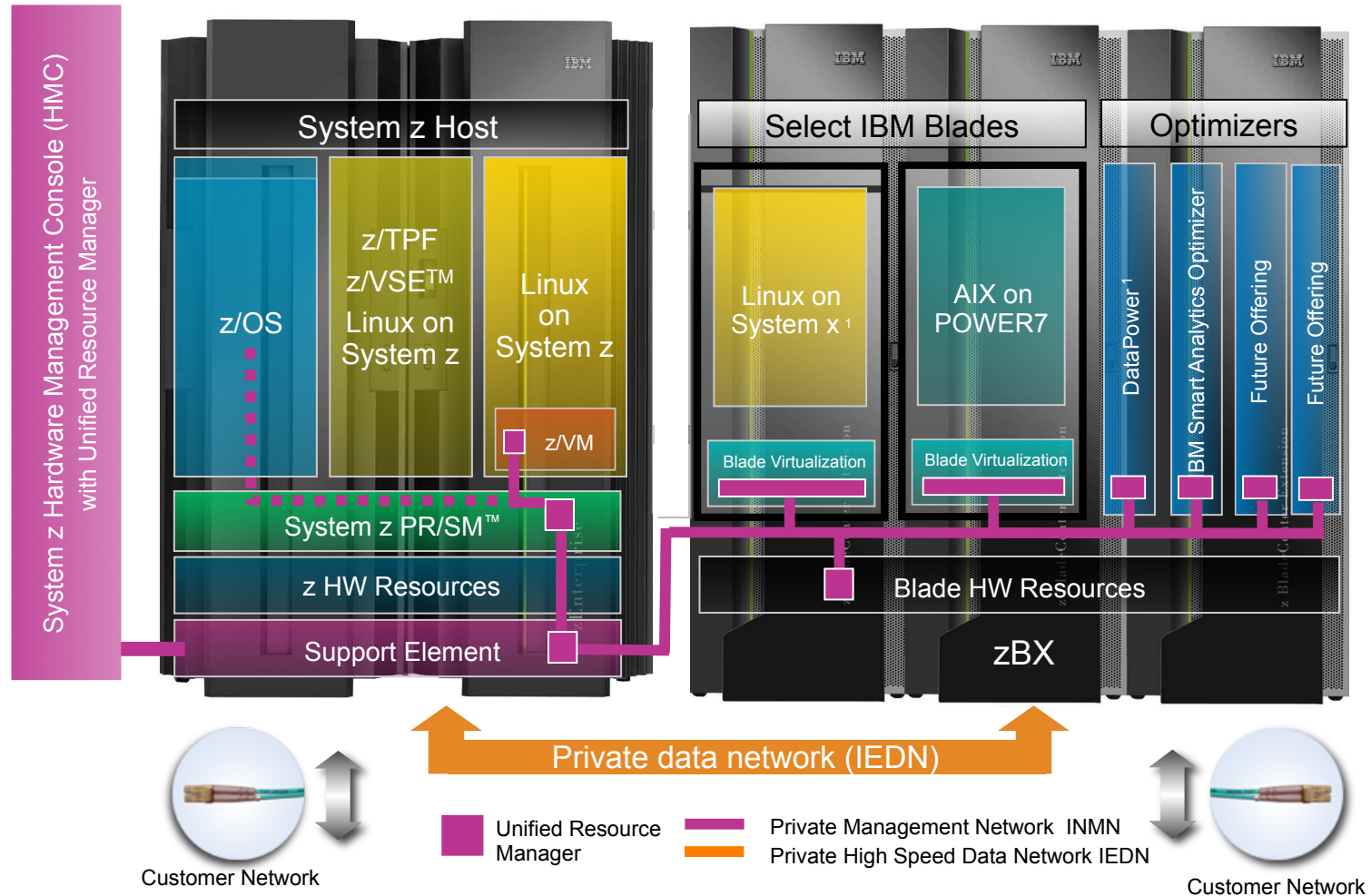
- Hardware and software solution to run complex business queries.
- Integrates IBM DB2 V9 for z/OS into a data warehouse environment.
- Significantly reduces the response time for the complex queries.
 - ✓ By running the queries in parallel across multiple blades.
 - ✓ By keeping the data in the blade memory to eliminate I/O.
- Optimizer is transparent to the application.
 - ✓ DB2 selects the queries run on the optimizer.
 - ✓ If optimizer is not available, query will run in DB2 on z/OS.



Preview - IBM Smart Analytics Optimizer V2 (Netezza) offers unprecedented performance for complex queries, and upcoming versions will further expand those capabilities.



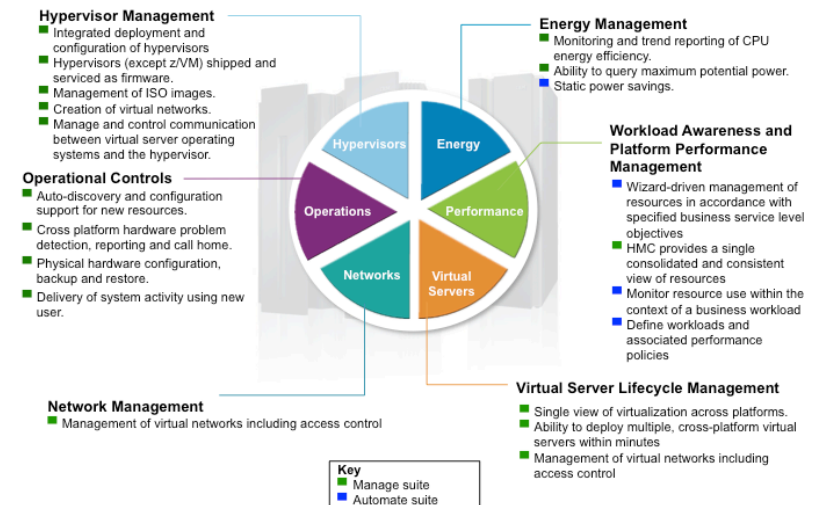
The zEnterprise Hybrid System



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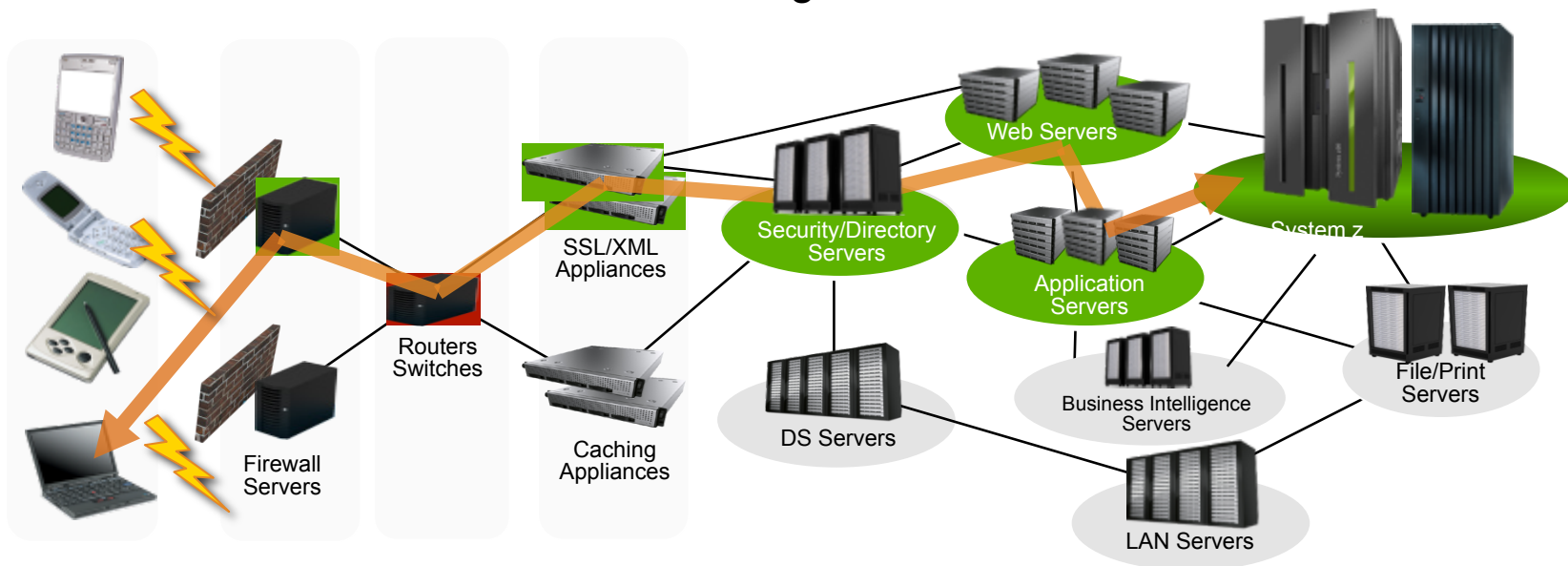
IBM zEnterprise Unified Resource Manager



zMANAGER BUSINESS VALUE

Information technology today: *Limitations*

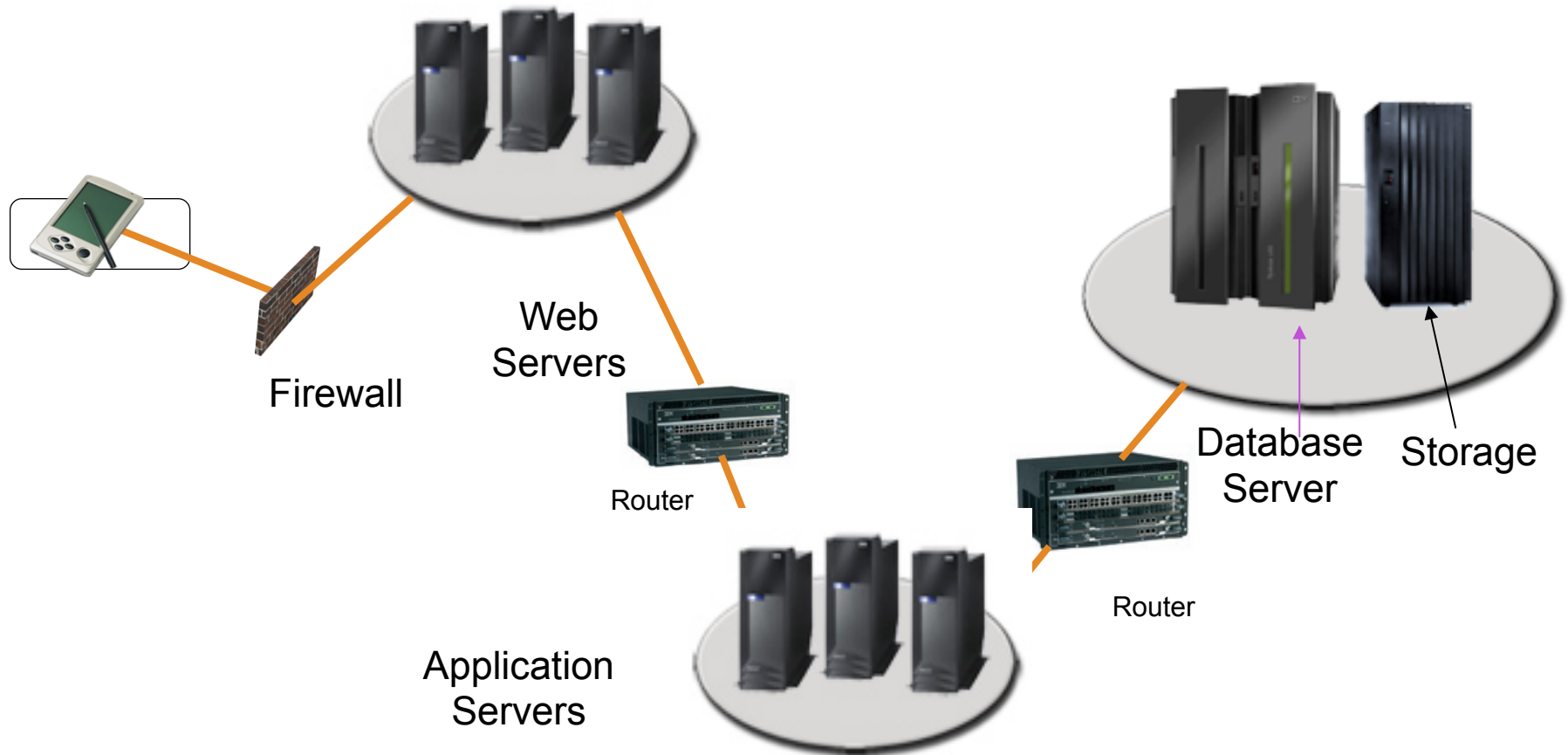
Information technology today is limited by the technology and architecture configurations available.



- Connected
- Integrated
- Flexible, Dynamic, and Responsive
- Aligned with Business Service Objectives

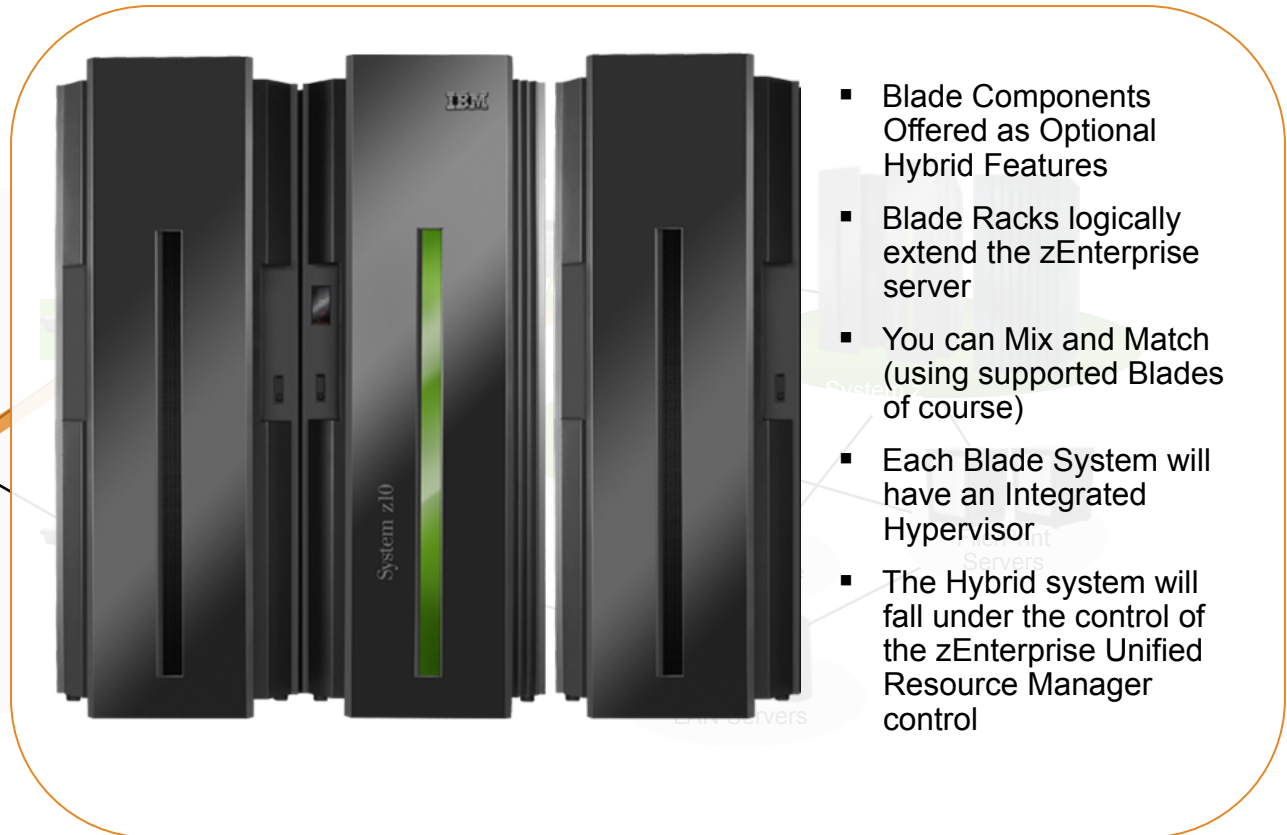
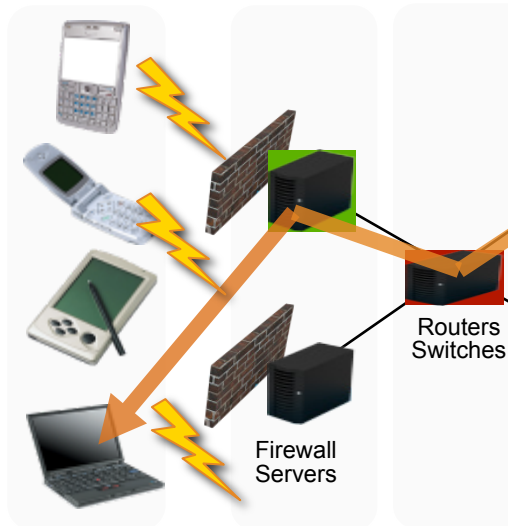
A Better Approach is needed.
 zEnterprise provides the ability to manage the IT infrastructure and Business Application as an integrated whole.

Islands of computing, have the potential to move from *this*...



It is possible to understand the Physical & Logical components that make up an existing or proposed zEnterprise Workload.

To this...



- ✓ Connected
- ✓ Integrated
- ✓ Flexible, Dynamic, and Responsive
- ✓ Aligned with Business Service Objectives

zManager Value – *End to End Systems Management*

- Multi-System Provisioning/Management: Physical Resources
 - ✓ A single Hardware Management Console, SPoC
 - ✓ Automatic Resource Discovery and Configuration
 - ✓ Automatic System-Resource/Device Inventory Management
 - ✓ Automatic Firmware Deployment and Change Management
 - ✓ Automatic Physical Network Provisioning and Management
- Multi-System Provisioning/Management: Virtual Resources
 - ✓ Automatic Virtual Network Provisioning and Management
- Multi-System Monitoring, Control, and Serviceability Management
 - ✓ Basic Operations Controls
 - ✓ Automated Problem Management, Diagnostics, Field Guided Repairs
- Multi-System Energy Monitoring, Control, and Management
 - ✓ Energy Monitoring and Extended Controls

zManager Value – *End to End Systems Management ...*

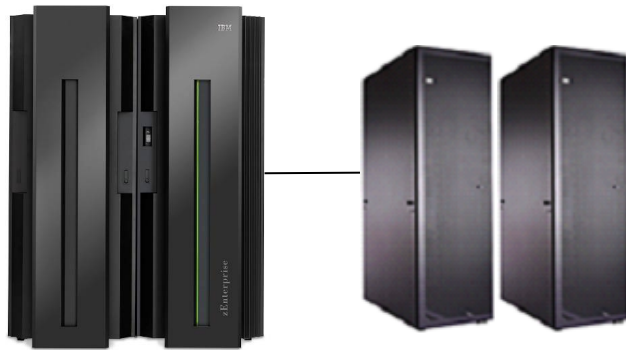
- Multi-Architecture Virtual Server Management
 - ✓ Automatic Hypervisor provisioning and Lifecycle Management
 - ✓ Automatic Virtual Server provisioning and Lifecycle Management

- Multi-Architecture Workload-Based Monitoring and Reporting
 - ✓ Workload Definition and Monitoring as a Whole
- Multi-Architecture Performance Management
 - ✓ Goal-Oriented Workload Performance Policies
 - ✓ Multi-Architecture System Resource Allocation Actions

- Integrated Support for Optimizers

zManager Value – *The Abstracted Interface*

A do-it-yourself solution ...



zEnterprise



- | | |
|---|--|
| <ul style="list-style-type: none"> ▪ Islands of consolidation ▪ Distributed management practices can be inconsistent and ad hoc ▪ Cultural divides within the organization persist | <ul style="list-style-type: none"> ▪ New-found optimizations via Fit for Purpose ▪ Consistent and structured management with zManager ▪ Unified culture around zEnterprise strategy |
|---|--|



Abstracted Interface First Example

Hypervisor Setup and Configuration Timings

| Current FTE Tasks (per Blade) | Elapsed Time | Labor Time |
|--|---------------------------|----------------------|
| Initial communication setup & education | 6 min 26 sec | 6 min 26 sec |
| Boot VIOS disc & install (creates LPAR for VIOS automatically) | 37 min 59 sec | 36 min |
| Configure VIOS networking | 2 min 49 sec | 2 min 49 sec |
| Create new storage pool for LPARs | 35 sec | 35 sec |
| Install VIOS service fix packs | 61 min 5 sec | 20 sec |
| TOTAL TIME | 1 hr 48 min 52 sec | 46 min 10 sec |

| zManager Tasks (per Blade) | Elapsed Time | Labor Time |
|-----------------------------|--------------------|---------------------|
| Add entitlement for a blade | 90 min | 92 sec |
| TOTAL TIME | 1 hr 30 min | 1 min 32 sec |

zEnterprise Economics
IBM SWG CPO
Feb. 2011

97% reduction
in labor time



Abstracted Interface Second Example

Network Setup and Configuration Timings

| Current FTE Tasks (for two BladeCenters) | Elapsed/Labor Time |
|---|--------------------|
| Planning (includes time to go over docs, etc) | 5 hrs |
| Cabling | 2 hrs |
| AMM Configuration | 2 hrs |
| Logical Configuration (L2) | 8 hrs |
| Blades network configuration | 4 hrs |
| Testing | 2 hrs |
| Documenting the configuration | 3 hrs |
| TOTAL TIME | 26 hrs |

| zManager Tasks (for two BladeCenters) | Elapsed/Labor Time |
|--|--------------------|
| Planning | 3 hrs |
| Cabling (pre-cabled in zBX) | 0 hrs |
| AMM Configuration (done in zBX) | 0 hrs |
| Logical configuration (L2) | 30 mins |
| Blades network configuration | 1 hr 30 mins |
| Testing (pre-tested) | 0 hrs |
| Documenting the configuration (all part of zManager) | 0 hrs |
| TOTAL TIME | 5 hrs |

81% reduction
in labor time



The Unified Resource Manager (Firmware)

A new architectural component introduced with zEnterprise

Key

- Manage suite (standard)
- Automate suite (optional)

Hypervisor Management

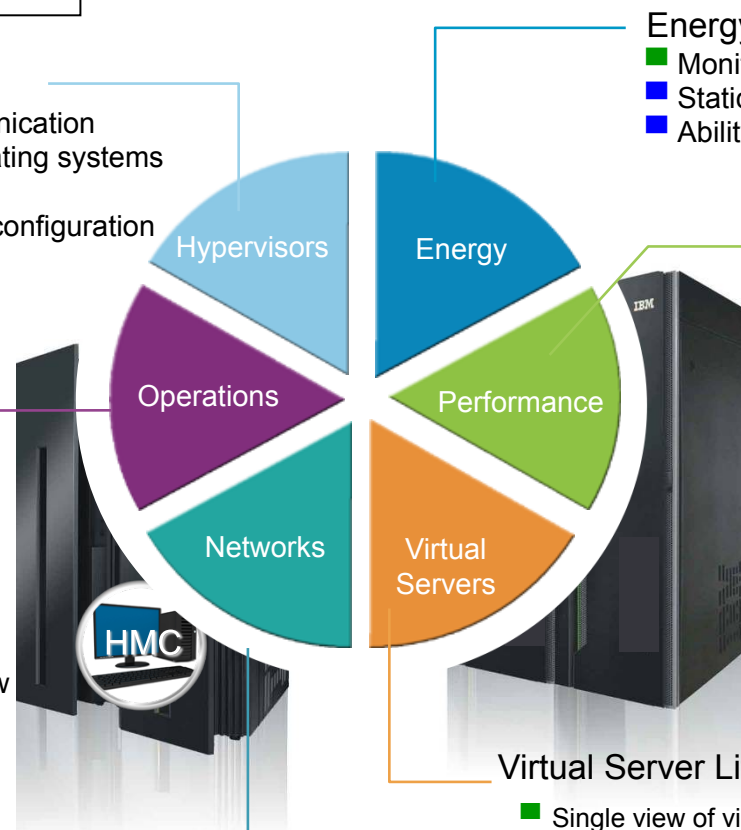
- Manage and control communication between virtual server operating systems and the hypervisor
- Integrated deployment and configuration of hypervisors
- Creation of Virtual Links

Operational Controls

- Auto-discovery and configuration support for new resources
- Cross platform hardware problem detection, reporting and call home
- Physical hardware configuration, backup and restore
- Delivery of system activity using new user interface

Network Management

- Private, secure and physically isolated data and service networks



Energy Management

- Monitor & trend report CPU power
- Static power saving
- Ability to query maximum potential power

Workload Awareness and Platform Performance Management

- Wizard-driven management of resources in accordance with specified business service level objectives
- HMC provides a single consolidated and consistent view of resources
- Monitor resource use within the context of a business workload
- Define workloads and associated performance policies

Virtual Server Lifecycle Management

- Single view of virtualization across platforms.
- Ability to deploy multiple, cross-platform virtual servers within minutes
- Management of virtual networks including access control



ZMANAGER PLANNED EXTENSIONS

Hybrid Development Strategy

Dynamic, integrated, and workload optimized

- **First - Continue to Focus on New Capabilities, Performance and Efficiency**
 - ✓ Continued Advancements in System z Technology and Performance
 - ✓ Special-purpose compute acceleration for greater levels of workload performance and scalability

- **Second - Focus on Management**
 - ✓ Horizontal IT Infrastructure Integration
 - Business service workloads are inherently heterogeneous;
 - They are deployed on heterogeneous system structures
 - A hybrid system is a heterogeneous virtualized platform, providing “One Infrastructure” Integration
 - Integration provides investment protection, reduction of complexity, improved resiliency, and lower cost of ownership

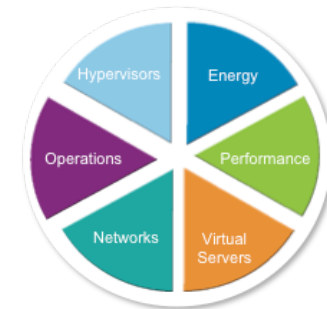
 - ✓ Dynamic IT Infrastructure Management
 - Continue to look for ways to drag-down OS-Resident Capability into the base hardware.
 - This is not as foreign as it sounds, Hypervisors are much like an OS anyway

Hybrid Development Strategy

Guiding principals

- **Primary Focus on Dynamic, Workload Optimized, Infrastructure Management**
 - ✓ To integrate, monitor, and manage the heterogeneous infrastructure resources as a single, logical, virtualized system
 - ✓ To provide dynamic deployment and management of virtual server images and virtualized appliances in a service optimized infrastructure
 - ✓ To provide built-in capability for upward integration with Data Center Management Tools
- **Look for ways to leverage *Workload Accelerators and Optimizers***
- **Enable Hybrid Computing through exploitation of General Purpose Blades**
 - ✓ To incorporate additional “specialty engines” to host applications on their native processor architectures
 - ✓ To consolidate and manage a multiple-tier, heterogeneous infrastructure with reduced complexity and lower cost
 - ✓ To enable better integration with System z transaction processing, messaging, and data serving capabilities

zEnterprise zManager features GA1



- Integrated and Automated Hardware Management
- Abstracted and Simplified Platform Virtualization Management
- Cross-Platform Workload Awareness and Resource Management
- Cross-Platform Performance, Availability, and Energy Management
- Private High-Speed Data and Management Networks
- Integrated Hypervisors and Hardware Modules
- Transparent Application Accelerator Appliances for
- DB2 Queries, XML Processing, SOA Protocol Conversions & Security

Looking ahead: zManager roadmap

2010

- Blade Attach (SAO)
- Power Application Server Blades
- HW & Firmware Inventory and Configuration
- Blade Firmware Update
- HMC Operational Control for Blades
- Private System Control Network to zBX
- Management Network
- Hypervisor Management
- Ensemble Membership Services
- Virtual Server Provisioning (LPAR, z/VM, PHyp)
- Private Data Network (IEDN)
- Virtual Network Provisioning
- Performance Management
- Energy Monitoring and Controls

2011

- Data Power Integration
- x86 Application Server Blades Resource Monitoring
- Windows
- Virtual Server Provisioning (x86)
- GDPS Extensions
- External Management APIs
- Extensive Instrumentation
- IBM Director VMControl Integration

Enhancements

- x86 Application Server Blades CPU Management
- Availability Management
- Enterprise Management Tooling Integration
- Energy Management
- High Performance Business Analytics
- SVC Integration
- RDMA Capable Connectivity
- Integrated Firewall
- Directed Virtual Server Relocation
- zHYP
- Placement Advisors
- Autonomic Virtual Server Relocation
- Security Isolation and Compliance Reporting
- Virtual Storage Management
- CUoD for zBX
- WAS Acceleration



WORKLOAD CANDIDATES



Workload Characteristics for Deployment

| Description | Enablement Category | Benefit Category | | | |
|---|----------------------------------|------------------|------|---------|-----------------------|
| | | CAPEX | OPEX | Agility | Regulatory Compliance |
| Look for workloads with a Large Systems Dependency – Data is a “classic” example. | Application Enablement | X | X | | |
| An IFL-only z196 Server is available. This configuration will support a Linux on zEnterprise Database Server and zBX application hosting. | | X | X | | |
| “Do you provide Near-Real Time Fraud Detection today”? Would you like to move to a Real-Time Model? | | X | X | X | |
| Are you looking for ways to integrate existing SOA Business Logic with emerging, strategic Web technologies? While ensuring zero program changes, low latency, and reduced operational expenses? | | X | X | | |
| Is Big Data on your radar? Are you exploring options for deploying Hadoop on your infrastructure to gain competitive advantage? | | X | X | X | X |
| Timing is everything. | | X | X | | |
| <hr/> | | | | | |
| Are you conducting Off-Platform Data Feeds today? | Infrastructure Enablement | | X | | |
| Are regulatory requirements driving the need for a secure, Private, E2E Data Network? | | | | | X |
| Are you hosting cross-platform queue managers? | | | X | | |
| Are you already running zHybrid enabled workloads (DB2, WebSphere)? | | X | X | X | |
| Did you know that XML and SOAP messages can bypass your Firewall security? Are your web services secure from intrusion via SQL Injection and other XML or SOAP Threats? | | | X | | X |
| Does your current infrastructure provide the range of architecture options required to optimize each applications performance? | | X | X | | |
| Are you currently evaluating the benefits of a Private Cloud? Are you aware that one of the prerequisites required for any As-A-Service Offering is an Infrastructure that is both Highly Automated and Highly Virtualized? | | X | X | X | |
| What is your Corporate Backbone network speed? 10Gbits? | | X | X | | |



zEnterprise Workload Architecture Assessment

Workshop Goals

1. For a specific Workload, determine if the zEnterprise/zBX/zManager Framework is a “*good fit*”.
2. Contrast various Target Platforms based on the Functional and Non-Functional Requirements of this workload.
3. Provide a structured set of deliverables that share the Logical and Physical Design of the source Workload mapped to the zEnterprise System.
4. Provide an appropriate understanding of the zEnterprise Hybrid Architecture.

Workshop Delivery schedule

- A Large Team is not required, just those that know the Workload well (1-3 Architects).
- A Client-Designated Technical Lead will be necessary.
- The workshop takes just over 2 days.
- Workshop Results are communicated to the appropriate Client Sponsor.

| Day of Week | Description | Duration (hours) | Target Audience |
|-------------------|---|------------------|--|
| Day 1 AM | Understanding the zEnterprise Architecture - <i>Technical Foundation Session</i> Objective: Educate EAD, ADM, SD, and Senior Networking and Security resources on the zEnterprise Architecture. This sets the foundation for the Assessment Activities. | 2 | EAD, ADM, S&D, Senior Network and Security Resources |
| Day 1 PM | Application Discovery: Data and Network Flows/Application Discussion (Led by Senior Client Architects knowledgeable of the application). Objective: Educate IBM on the Off-Platform Data and Network Flows unique to this workload. | 2 | IBM Workload Assessment Team |
| Day 1 PM | Solution Design: Interim zBX Logical Design (IMT West WSS Specialist). Objective: Initial High-Level Sketches based on Day 1 discussions. | 2 | IBM Workload Assessment Team |
| [Day 1 PM] | Solution Design: zEnterprise Open Discussion/Futures Objective: Demonstrate to the client that the zManager roadmap is sound, High Level Strategic Design Session. | 2 | CTO, CIO, CFO, Senior Enterprise Architects, ADM, & Service Delivery |
| Day 2 AM | Application Discovery: Functional-Non Functional Requirements Gathering. (WSS Specialist). Objective: Gather requirements for | 4 | IBM Workload Assessment Team |
| Day 2 PM | Application Discovery: Workload Classification and Capacity Needs. (Client Led). Objective: Educate IBM on the Business Flows, Groupings, and required Capacity needs.. | 2 | IBM Workload Assessment Team |
| Day 2 PM | Solution Design: zBX Logical Design (IMT West WSS Specialist Led) Objective: Perform the Source Workload to Target zBX Frame Mapping, document proposed Ensemble Topology, and run eConfig for proposal inclusion. | 2 | Client Lead Architects |
| Day 3 AM | Solution Discovery: Workshop Results (IBM Development or IMT West WSS Specialist Led) Objective: Share results of study. | 2 | CTO, CIO, CFO, Senior Enterprise Architects, ADM, & Service Delivery |
| Total Time | | 18 | |

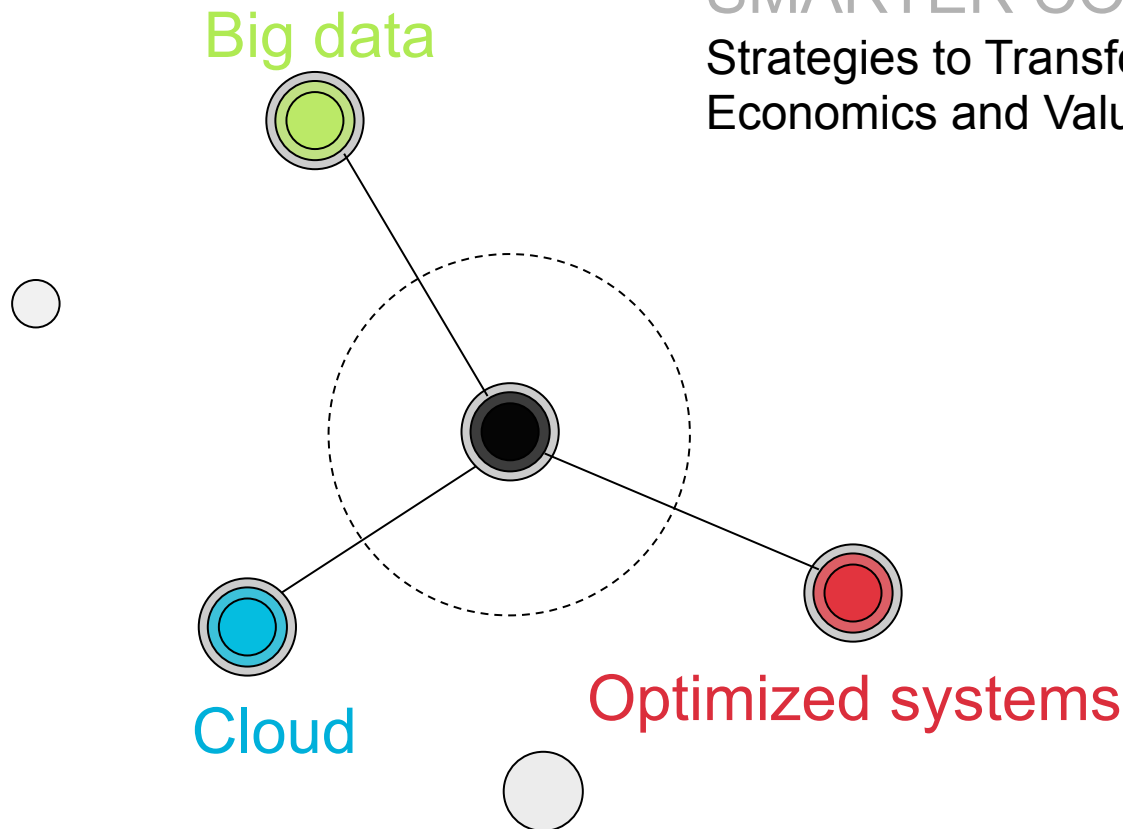


IBM SMARTER COMPUTING *ALIGNMENT*

IBM Smarter Computing Alignment

SMARTER COMPUTING

Strategies to Transform IT to Deliver Breakthrough Economics and Value



Cloud Computing is a Delivery Model

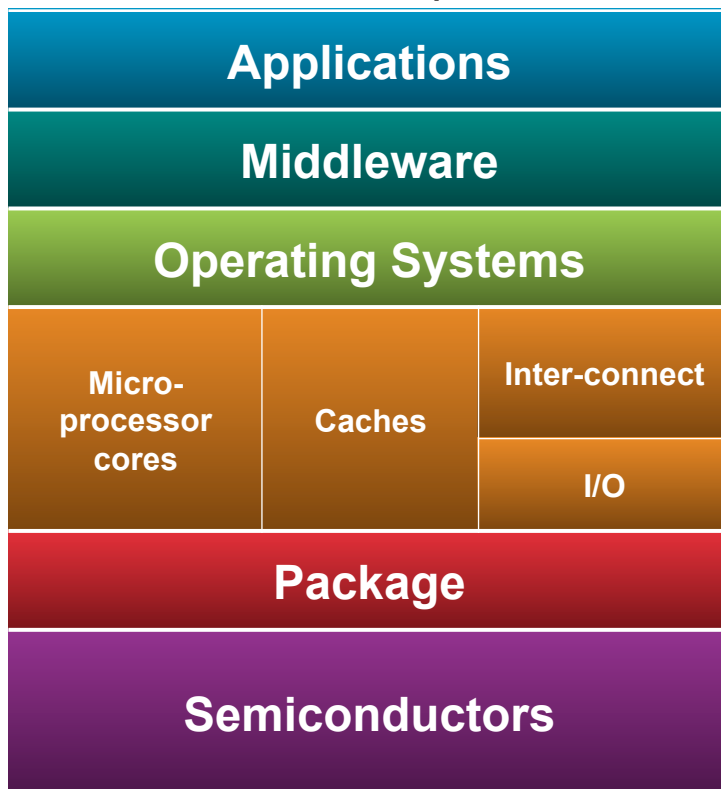
Optimized Systems aligned to Fit for Purpose

Customers are looking for ways to exploit Big Data to gain a strategic competitive advantage

Optimized Systems

Domain Knowledge

- Workload characteristics
- Interdependencies
- Architecture options



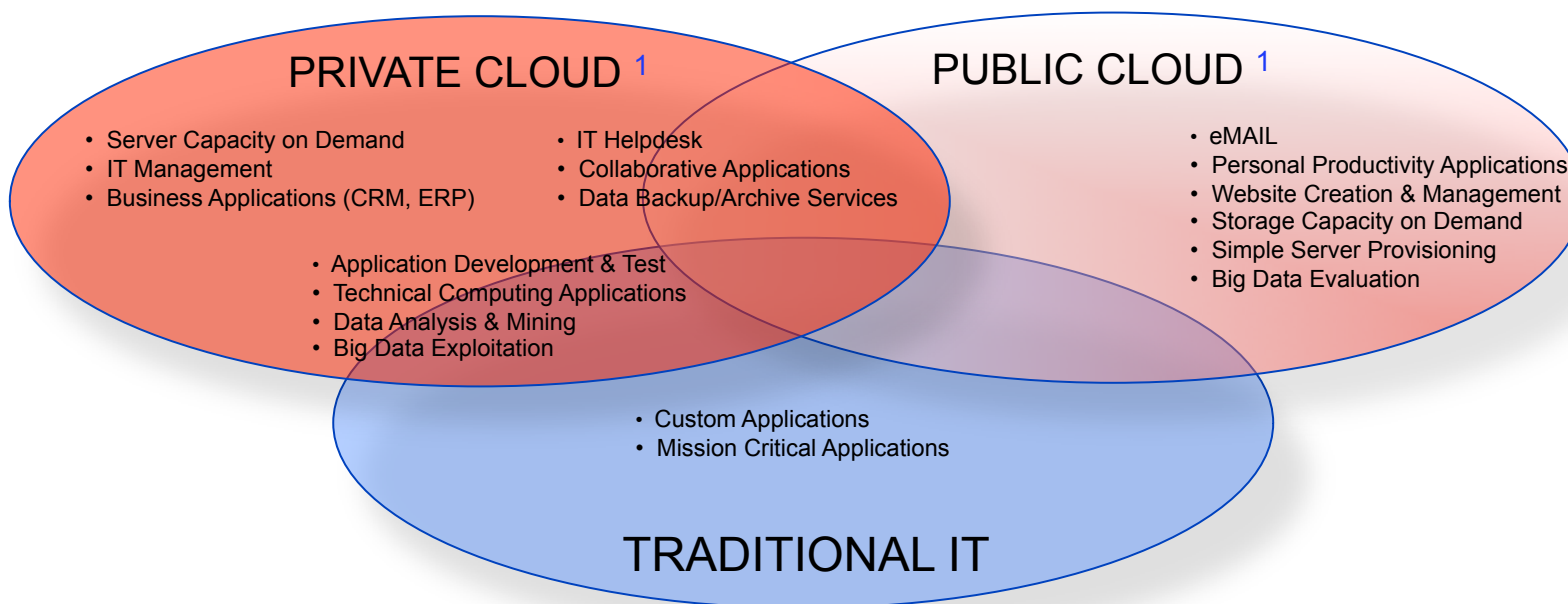
Hardware

- Multi-core architectures
- Advanced threading
- Low latency

Software

- Stack integration
- Middleware tuned for hardware
- Integrated management across architectures

Cloud Computing



Each company has unique needs that must be assessed to determine the correct destination for each workload, but in all cases – IT must manage across this emerging Hybrid Environment.

zEnterprise is uniquely positioned to support your Hybrid Cloud Environment

¹Based on the percent of customers that indicated they would adapt Cloud for a given workload in their organization, rated 4 or 5 on a 1-5 Scale IDC May 2010. Source IDC EB Strategy Analysis

What is Big Data?

- **Big Data** - *A term used to describe the processing of datasets that grow so large they become awkward to work with using traditional Database Management Systems and Tools. This type of data is typically Un-Structured.*



- **InfoSphere BigInsights and InfoSphere Streams** - *This is IBM's portfolio of software and services for the analysis and visualization of Big Data (V³).*

One Consultant's View ...

Industry analysts see the importance of being an early adopter of Big Data Analytics ...

Consider the following Gartner perspective.

Publication Date: 14 January 2011
Gartner Burton IT1 Research Note G00208798

Gartner:

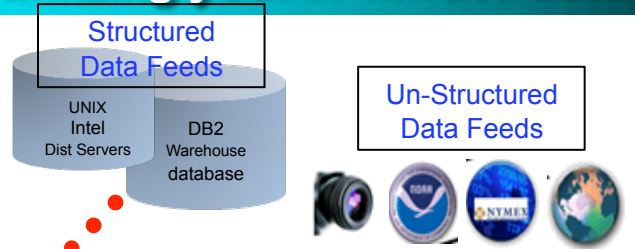
*Big data analytics and the Apache Hadoop open source project are rapidly emerging as the preferred solution to address business and technology trends that are disrupting traditional data management and processing. **Enterprises can gain a competitive advantage by being early adopters of big data analytics.** ...*

Within this paper, Gartner points out that there are differentiated RAS, CPU and I/O characteristics for servers deployed as core nodes, data nodes and edge nodes. Gartner shares that server selection should focus on the differing requirements of core nodes (JobTracker, namenodes), data nodes (datanodes, TaskTracker) and edge nodes (data movement in/out of the cluster). Also per Gartner, core and edge nodes will require increased reliability, redundancy, and support. A medium-size Hadoop Cluster is between 40-80 Nodes.

There is a the strong alignment between the processing, networking and storage capabilities of a properly configured zBX frame and the corresponding typical requirements for data nodes in a Hadoop Cluster. A medium-sized Hadoop Cluster (40-80 nodes) can easily fit within a zBX Frame to provide an extremely valuable secondary application during off-peak hours. Larger Clusters can be accommodated via either larger zEnterprise ensembles with multiple zBXes or by deploying additional nodes outside the ensemble.

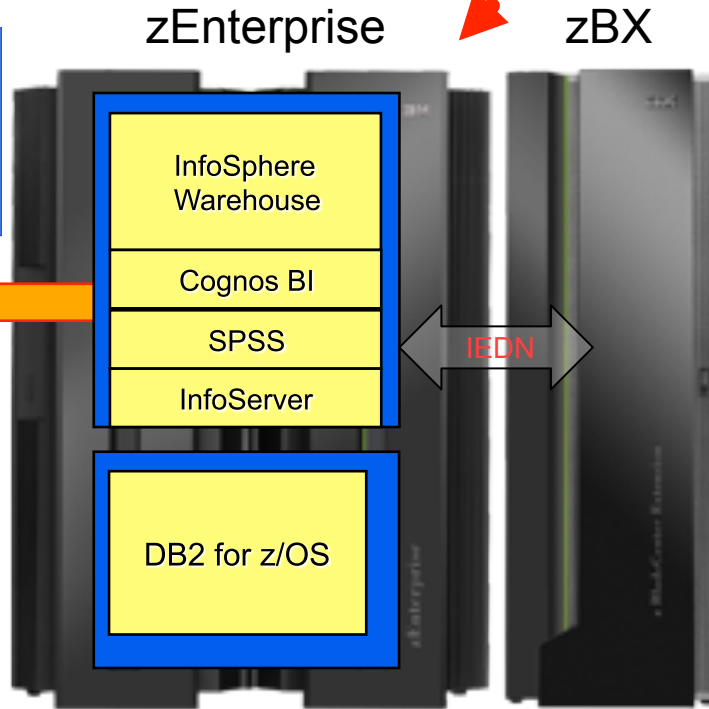
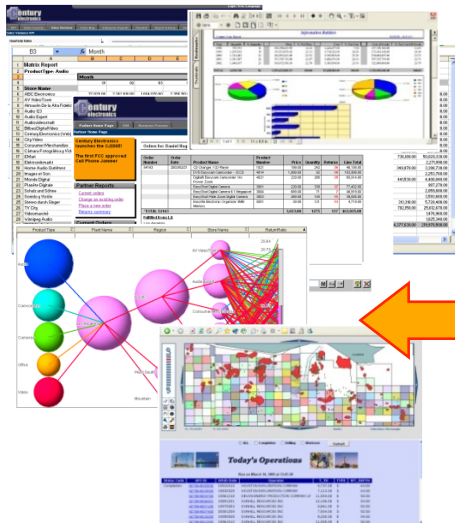


Big Data InfoSphere BigInsights on zEnterprise



FOUNDATION

Building an end-to-end BI environment on zEnterprise



IBM Smart Analytics System for z

- Reduce complexity
- Improved Security
- Highly available,
- Single View of the Business
- Centralized data management
- Query/workload prioritization
- Strong InfoSphere BigInsights alignment

BigInsights on zBX for Small to Medium Scale (<500 Data Nodes) per zEnterprise Ensemble Node

Thank You!

