IBM®

Workload Profiles for zEnterprise
SHARE 2011
Anaheim, CA.

Last Update *February 27 2011*

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Session Abstract

Are you curious on the type of workloads that are appropriate for the zEnterprise Offering? Have you heard of the Customer Workload Projects and/or the zEnterprise Workload Architectural Assessment? If you are interested in learning more, consider attending this Lunch & Learn session. The IBM Speaker will address those questions as well as share the benefits of running workloads within IBM's zEnterprise hybrid computing model.

Session Objectives

- **Share IBM's** *Fit for Purpose* **Platform Selection concept.**

- **Identify the business problem IBM's** *zEnterprise Unified Resource Manager (zManager)* **was developed to solve.**

- **Provide an understanding of IBM's current** *zEnterprise Hybrid Architecture* **and provide** *insight* **on IBM's zEnterprise Design Strategy.**

- **Describe the characteristics of workloads that are strong zEnterprise (Hybrid) candidates.**

- **Share with you next steps relative to identifying potential zEnterprise Candidates.**

- **Provide a Forum for Q&A**

Agenda

- **Platforming and the need for Fit for Purpose**

- **The Business Value of zManager**

- **zEnterprise Architecture – *The Foundation***
  - The IBM zEnterprise 196 (z196)
  - The IBM zEnterprise BladeCenter®Extension (zBX)
    - General Purpose Blades and Optimizers
  - The IBM zEnterprise Unified Resource Manager

- **IBM zEnterprise** *– The Value of an Abstracted Interface*

- **IBM zEnterprise** *– Design Strategy*

- **Workload Considerations**
  - Characteristics and *Leading Questions*
  - Common Client Themes

- **zEnterprise Workload Architectural Assessment**

- **The zBX Starter Kit Offering**

- *Close*

IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT)

Platforming and F4P

The idea of "one size fits all" is attractive … *But, in reality unachievable*

A Better Approach is to "*Run the workload on the right technology*"

Each platform architecture is different …

… and has a natural affinity to different workload characteristics

Match the workload characteristics to the right platform(s) …

… to deliver a best fit solution for the workload

Repeat this across the infrastructure …

… to optimize service delivery for the business

That's why heterogeneous infrastructures are the norm today and why heterogeneous infrastructures are the future.

Different Workloads Have Different Characteristics

Workloads

- Huge transaction volume
- Extreme I/O bandwidth
- Data Integrity *Statement*
- EAL5
- Native 2-Phase Commit
- With z196, excellent Integer, DFP, and BFP
- Native High Performance Clear/ Secure Key Services
- BC/DR – *Consistent RTO-RPO*
- Guest:Core Ratio (50+:1)
- Huge cache
- Highest QoS when using z/OS

Workloads

- HPC, parallel, *HTTP-webby*
- High I/O bandwidth
- EAL4+
- Best Integer, DFP & BFP
- High Scale, Excellent HPC
- Guest:Core Ratio (10:1 HPC)
- Large cache
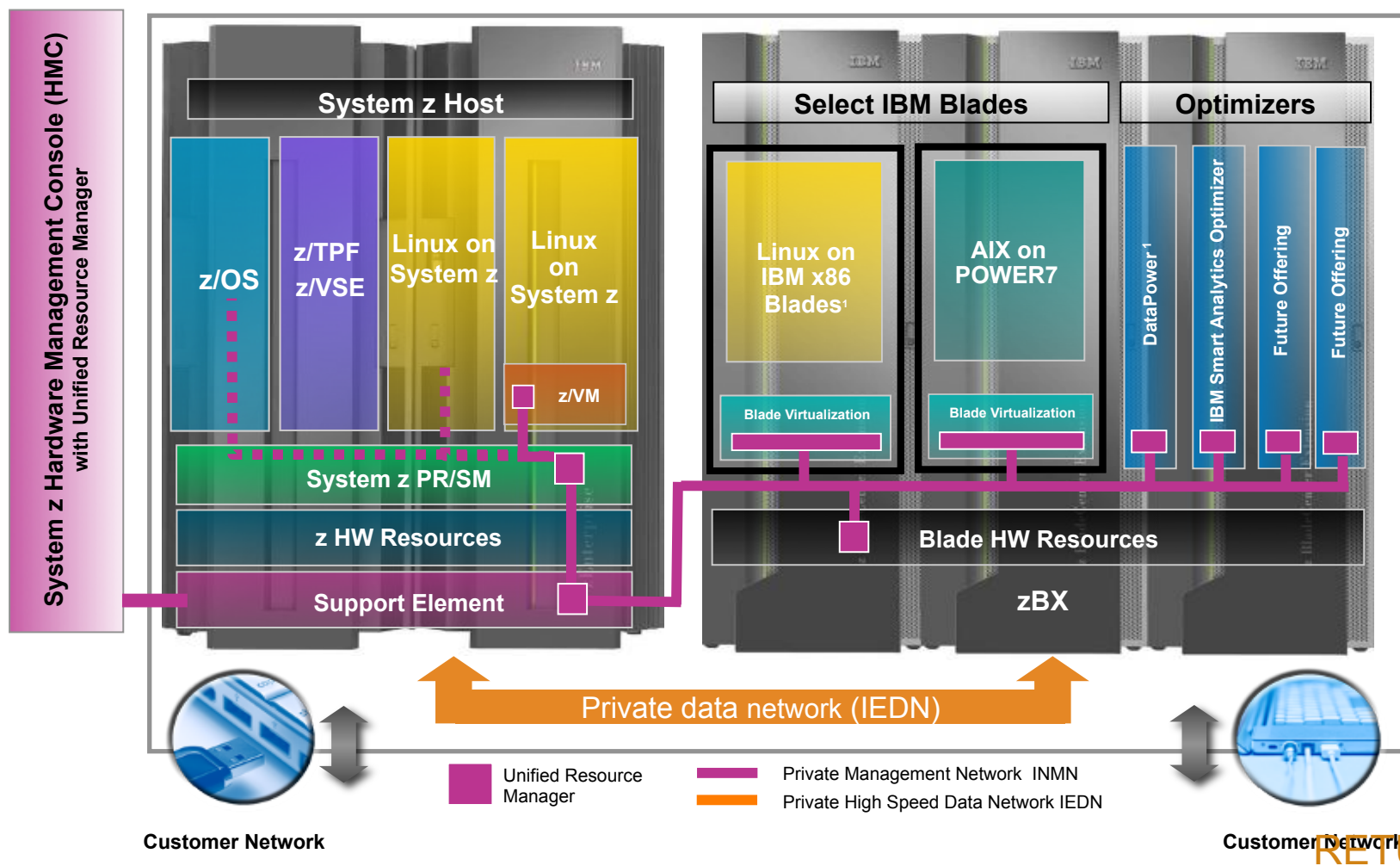- Best in class UNIX/RISC QoS

Workloads

- With Nehalem, respectable single thread performance and applications
- Modest I/O bandwidth
- Good BFP
- Good Scale
- Guest:Core Ratio (Simple e.g. 5:1)
- Modest cache
- Best in class Intel QoS

Large Systems	Power7	eX5
z/OS - z/VM & Linux	AIX	Windows/Linux

Putting the zEnterprise Hybrid System to the task
Leverage Fit for Purpose to align Workload Needs to the _correct_ Architecture
….   not the _only_ Architecture

System z Hardware Management Console (HMC)
with Unified Resource Manager

System z Host

Select IBM Blades

Optimizers

z/OS

z/TPF
z/VSE

Linux on
System z

Linux
on
System z

z/VM

Linux on
IBM x86
Blades[1]

AIX on
POWER7

DataPower[1]

IBM Smart Analytics Optimizer

Future Offering

Future Offering

Blade Virtualization

Blade Virtualization

System z PR/SM

z HW Resources

Support Element

Blade HW Resources

zBX

Private data network (IEDN)

Unified Resource Manager

Private Management Network INMN

Private High Speed Data Network IEDN

Customer Network

Customer Network

RETURN
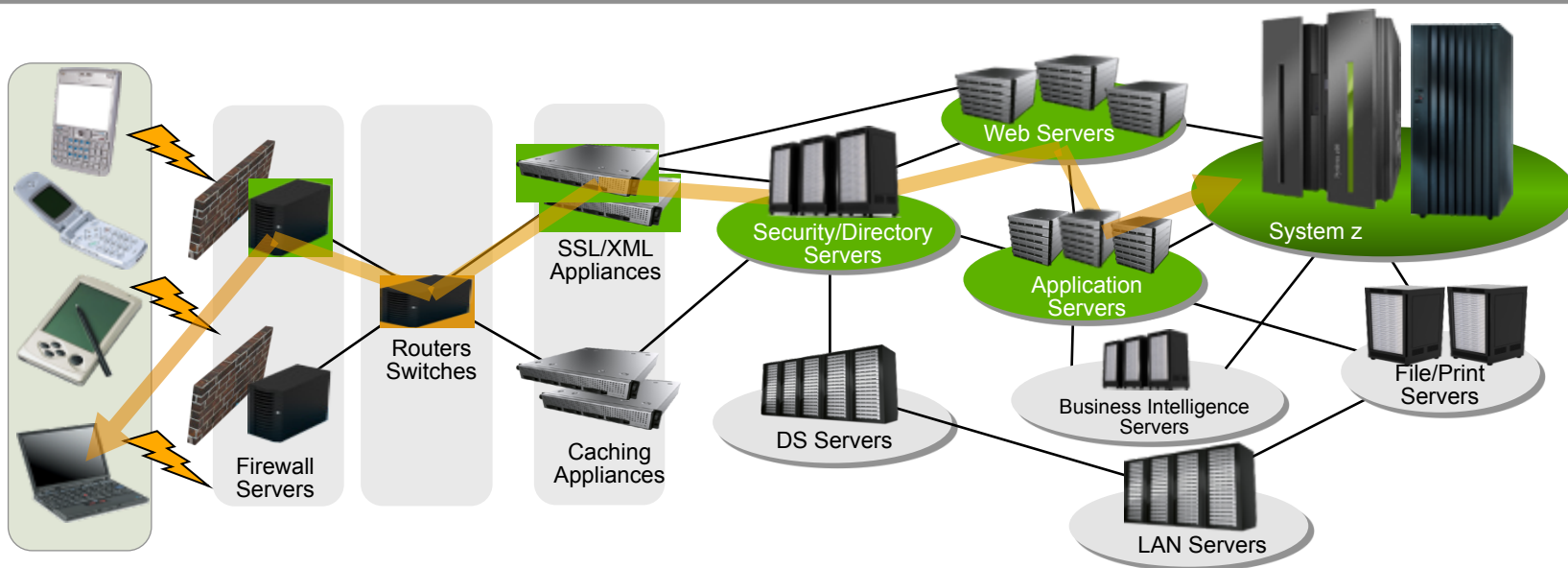
IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT)

The Business Value of zManager

Information technology today: Limitations

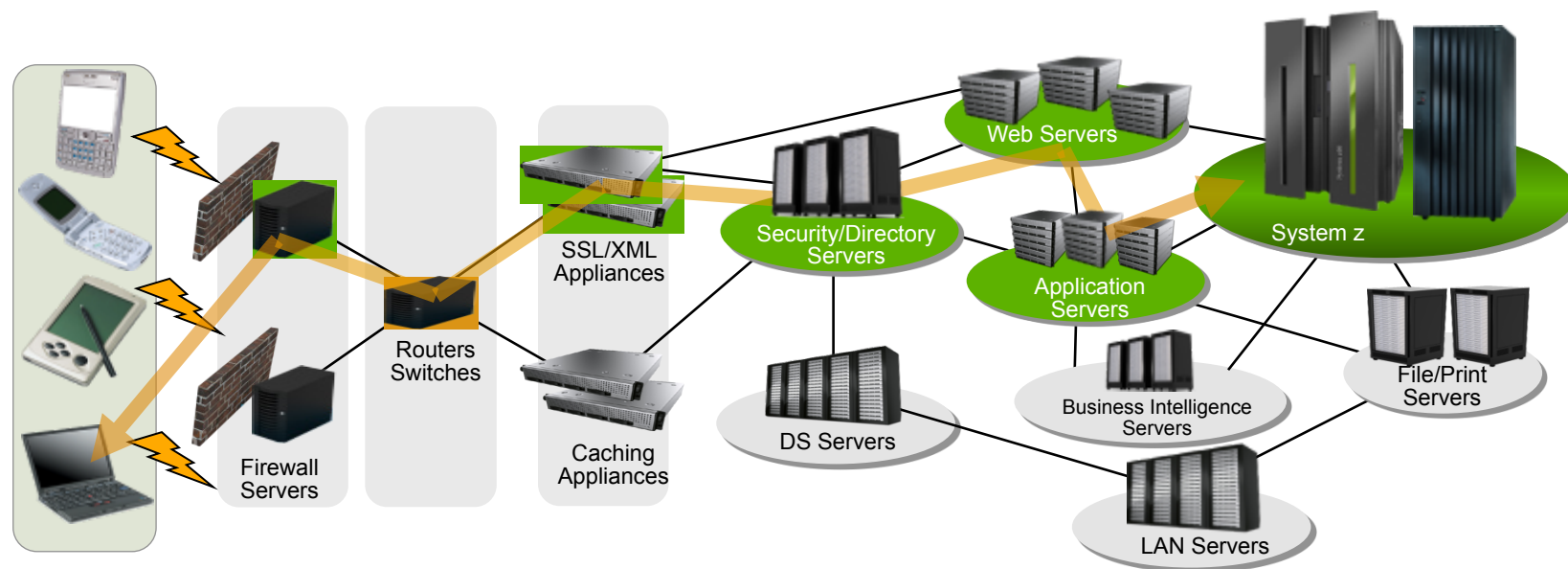Information technology today is limited by the technology and architecture configurations available.

- ☑ 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, _supporting a specific Client Workload_, have the potential to move from _this…_

zEnterprise Hybrid Computing

Remember it's ALL about the workload……………

Subset of components that represent a specific workload

Web
Servers

Firewall

Router

Database
Server

Storage

Router

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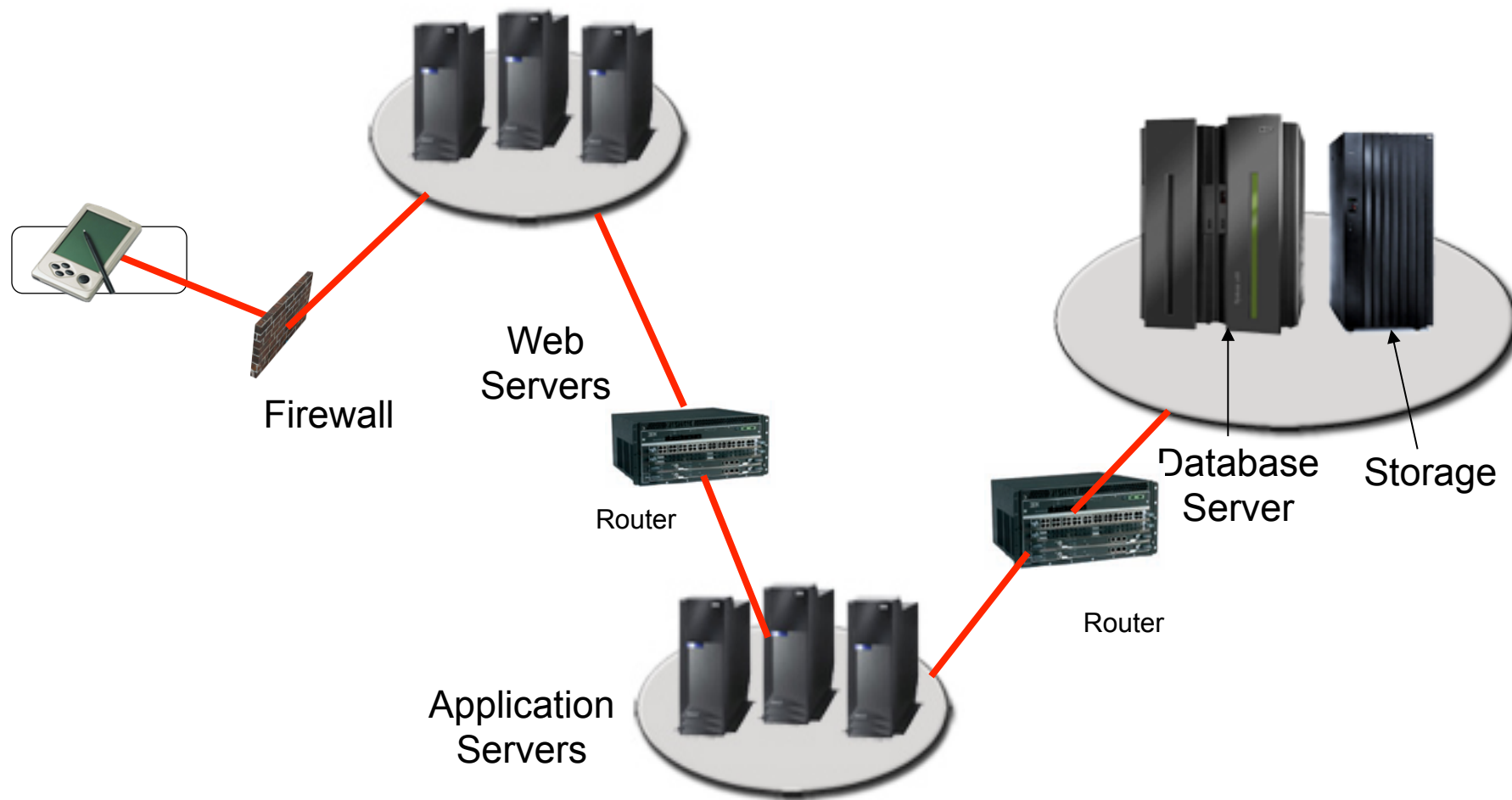
**It is possible to understand the Physical & Logical components that
make up an existing or proposed zEnterprise Workload.**

To this…
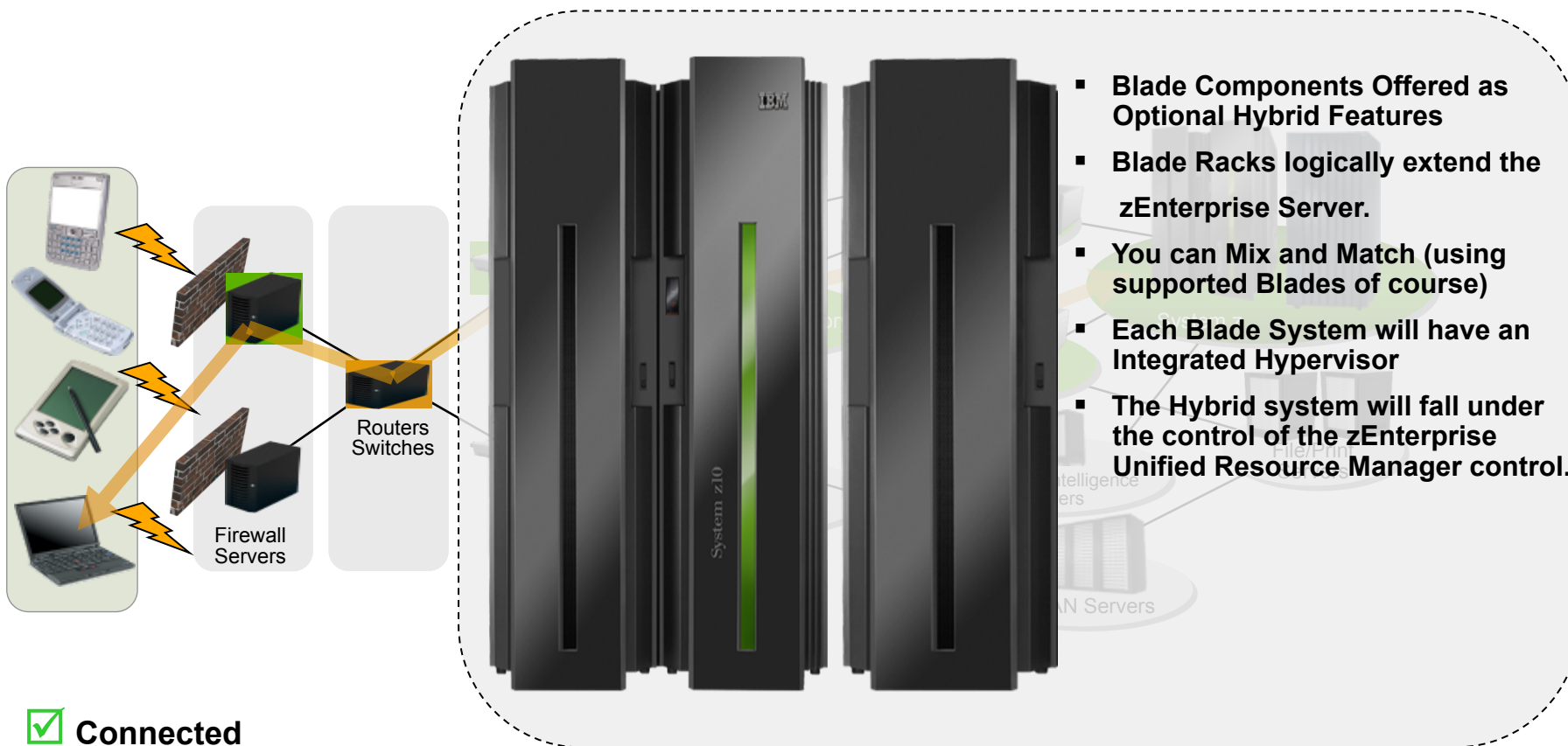
- **Blade Components Offered as Optional Hybrid Features**
- **Blade Racks logically extend the zEnterprise Server.**
- **You can Mix and Match (using supported Blades of course)**
- **Each Blade System will have an Integrated Hypervisor**
- **The Hybrid system will fall under the control of the zEnterprise Unified Resource Manager control.**

Routers
Switches

Firewall
Servers

☑ **Connected**

☑ **Integrated**

☑ **Flexible, Dynamic, and Responsive**

☑ **Aligned with Business Service Objectives**

Assessing the Value of End-to-End System 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 Servicability Management**

  - Basic Operations Controls

  - Automated Problem Management, Diagnostics, Field Guided Repairs

- **Multi-System Energy Monitoring, Control, and Management**

  - Energy Monitoring and Extended Controls

Assessing the Value of End-to-End System 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 Business Intelligence**

  – Automatic DB2 Exploitation

  – In-Memory Database and *Lossless* Data Compression

  – Query Acceleration

  – Single Platform Data Store

- **Integrated Support for Service-Oriented Architecture** (IBM WebSphere DataPower Integration Appliance XI50 for zEnterprise)

The Unified Resource Manager *(Firmware)*
Is 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
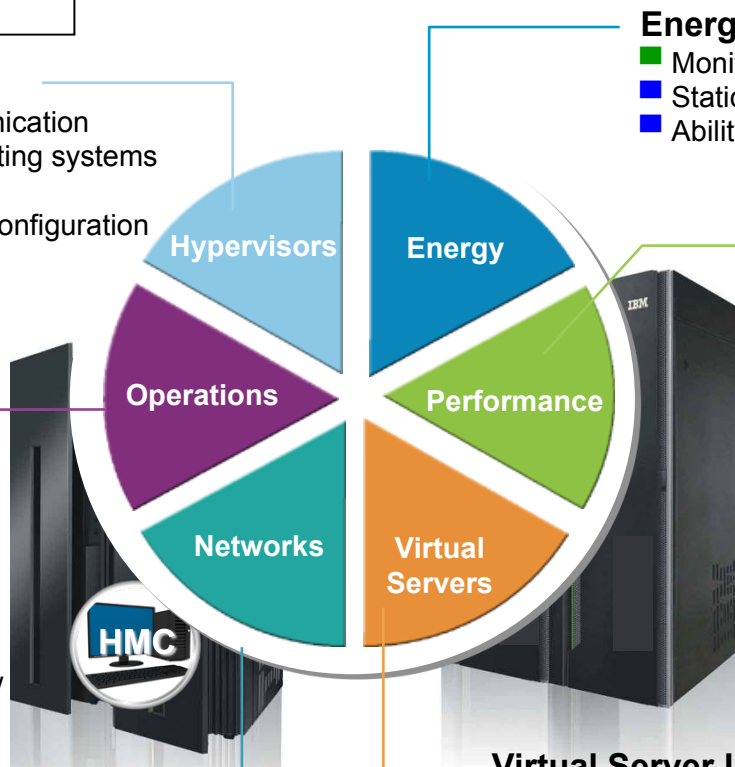
Energy Management
- ■ Monitor & trend report CPU power
- ■ Static power saving
- ■ Ability to query maximum potential power

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

Diagram labels: Hypervisors, Energy, Operations, Performance, Networks, Virtual Servers, HMC

RETURN

IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT)

The zEnterprise z196 (z196)

IBM zEnterprise – Best in Class Systems and Software Technologies

A system of systems that unifies IT for predictable service delivery

Unified management for a smarter system: zEnterprise Unified Resource Manager

- Part of the IBM System Director family, provides platform, hardware and workload management
- Unifies management of resources, extending IBM System z® qualities of service across the infrastructure

The world's fastest and most scalable system: IBM zEnterprise™ 196 (z196)

- Ideal for large scale data and transaction serving and mission critical applications
- Most efficient platform for Large-scale Linux® consolidation
- Leveraging a large portfolio of z/OS® and Linux on System z applications
- Capable of massive scale up, over 50 Billion Instructions per Second (BIPS)

Scale out to a trillion instructions per second: IBM zEnterprise BladeCenter® Extension (zBX)

- Selected IBM POWER7™ blades and IBM System x® Blades[1] for tens of thousands of AIX® and Linux applications
- High performance optimizers and appliances to accelerate time to insight and reduce cost
- Dedicated high performance private network

z/OS z/VM z/VSE z/TPF Linux HMC AIX Linux

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zEnterprise Hybrid Computing

The heart of a zEnterprise: The new z196

zEnterprise 196 (z196)

Machine Type: 2817

Models: M15, M32, M49, M66, M80

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

- **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
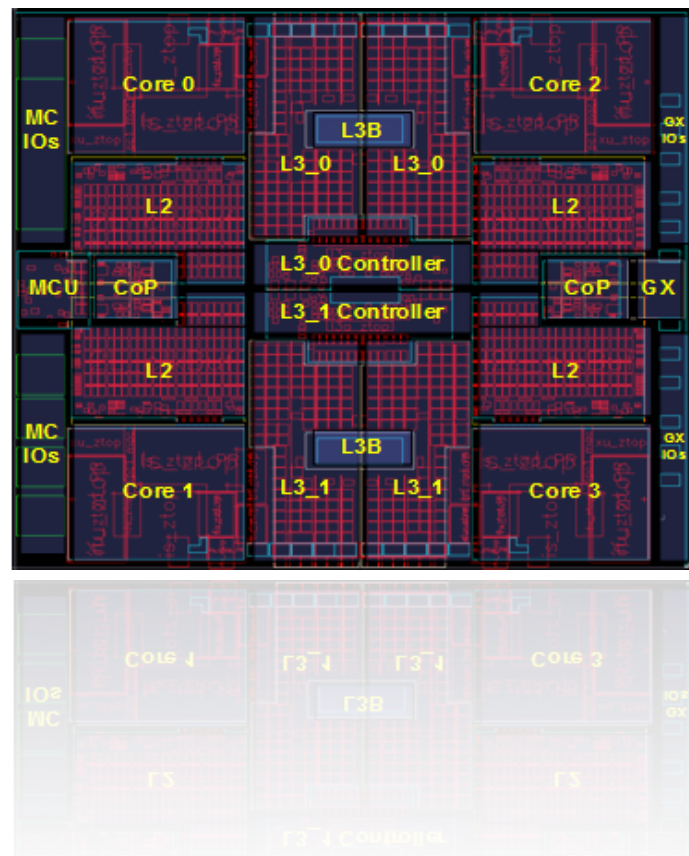
- **Operating System Flexibility**
  - z/OS, z/VM, z/VSE, z/TPF and Linux on System z
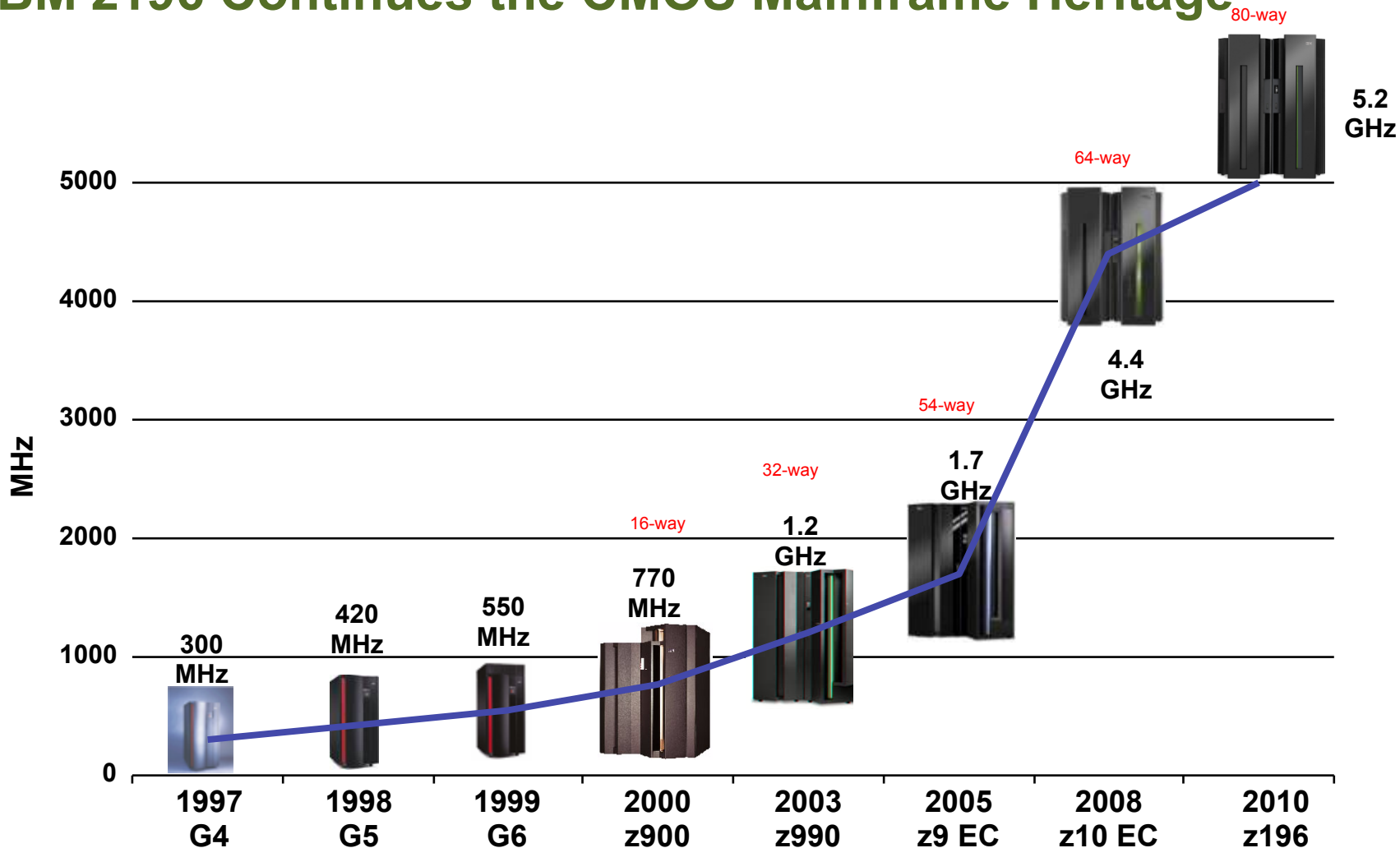
- **Security and reliability**
  - Elliptic curve cryptography
  - Concurrent patch update enhancements
  - InfiniBand Coupling links

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**

IBM z196 Continues the CMOS Mainframe Heritage

MHz (y-axis): 0, 1000, 2000, 3000, 4000, 5000

- **300 MHz** — 1997 G4
- **420 MHz** — 1998 G5
- **550 MHz** — 1999 G6
- **770 MHz** — 16-way — 2000 z900
- **1.2 GHz** — 32-way — 2003 z990
- **1.7 GHz** — 54-way — 2005 z9 EC
- **4.4 GHz** — 64-way — 2008 z10 EC
- **5.2 GHz** — 80-way — 2010 z196
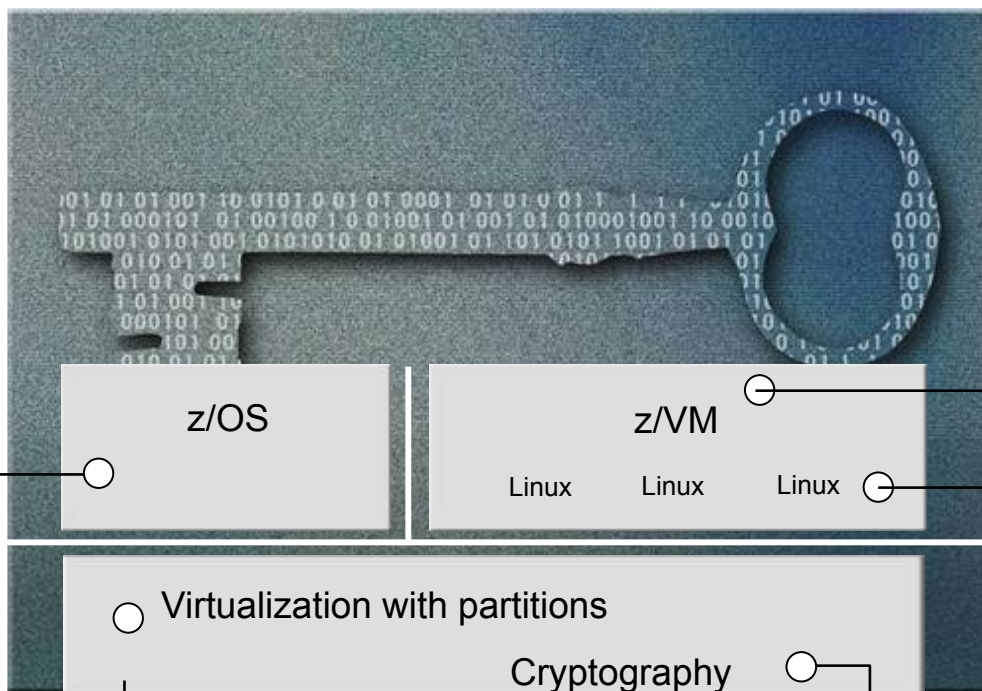
- **G4** – 1st full-custom CMOS S/390®
- **G5** – IEEE-standard BFP; branch target prediction
- **G6** – Copper Technology (Cu BEOL)

- **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

zEnterprise Hybrid Computing

Certifications for System z

The Common Criteria program developed by NIST and NSA establishes an organizational and technical framework to evaluate the trustworthiness of IT Products and protection profiles

z/OS

z/VM

Linux   Linux   Linux

Virtualization with partitions

Cryptography

z9 EC, z9 BC, z10 EC, z10 BC

z196 - Pending

- z/VM
- Common Criteria EAL4+
  - z/VM 5.4 + RACF with CAPP and LSPP – designed for compliance
  - Plan to have z/VM 6.1 evaluated during 2011

Linux on System z

- Common Criteria
  - Novell SUSE SLES9 and 10 certified at EAL4+ with CAPP

  - RHEL5 EAL4+ with CAPP and LSPP

- Common Criteria EAL4+
  - with CAPP and LSPP
  - z/OS 1.10
  - z/OS 1.11 June 2010
  - z/OS 1.12 under evaluation
- IdenTrust™ certification for z/OS as a Digital Certificate Authority (PKI Services)
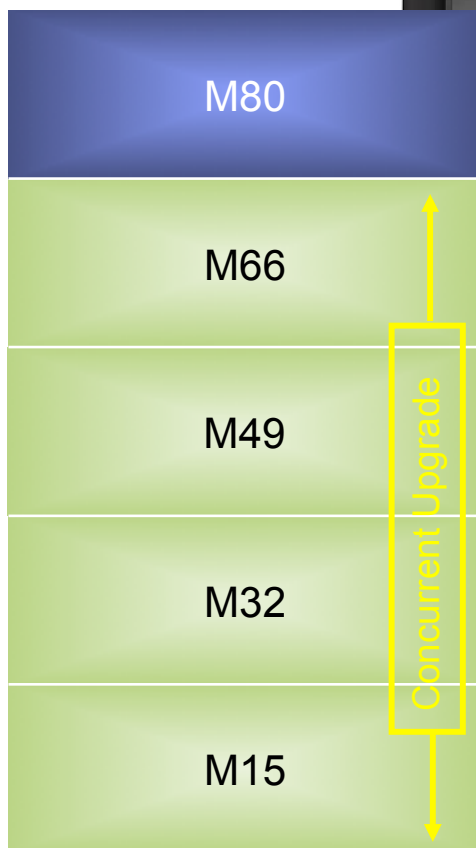
- Common Criteria EAL5 for Logical partitions

- FIPS 140-2 level 4 for Crypto Express2

See: www.ibm.com/security/standards/st_evaluations.shtml

z196 System Upgrades

z9 EC

z10 EC

M80
M66
M49
M32
M15

Concurrent Upgrade
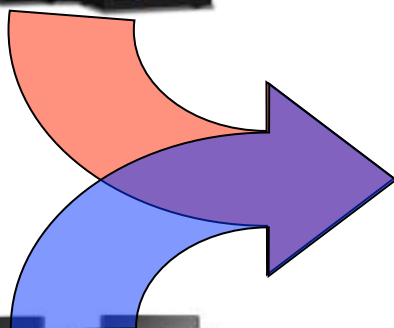
- z196 to higher hardware z196 model
  - Upgrade of z196 Models M15, M32, M49 and M66 to M80 is disruptive
  - When upgrading to z196 all the Books are replaced
  - Upgrade from Air to Water cooled not available
- Any z9 EC to any z196
- Any z10 EC to any z196

zEnterprise z196 Functions and 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

Up to 15 subcapacity 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

z196

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 Exist I/O cable exit

STP enhancements

zBX-002 with IBM Smart Analytics Optimizer, IBM Blades

zEnterprise System

IBM zEnterprise 196 (z196)

IBM zEnterprise BladeCenter Extension (zBX)

RETURN

IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT)

The zEnterprise Bladecenter Extension (zBX)

zBX … Infrastructure to Support Hybrid Resources

- **zBX houses the multiplatform solutions key to the zEnterprise System.**
  - Optimizers that are dedicated to workloads.
  - Select virtualized 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.

[1] All statements regarding IBM future direction and intent are subject to change or withdrawal without notice and represents goals and objectives only.

… and 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

Optimizers
- **IBM Smart Analytics Optimizer**
- **WebSphere® DataPower® appliance[1]**

Select IBM Blades
- **BladeCenter PS701 Express**
- **IBM x86 Blade[1]**

One to four – 42u racks – capacity for 112 blades

No System z software running in zBX – Passport Advantage software licensed to blades

No MIPS/MSU rating

Configured for high availability

Optional rear door heat exchanger

… managed by the
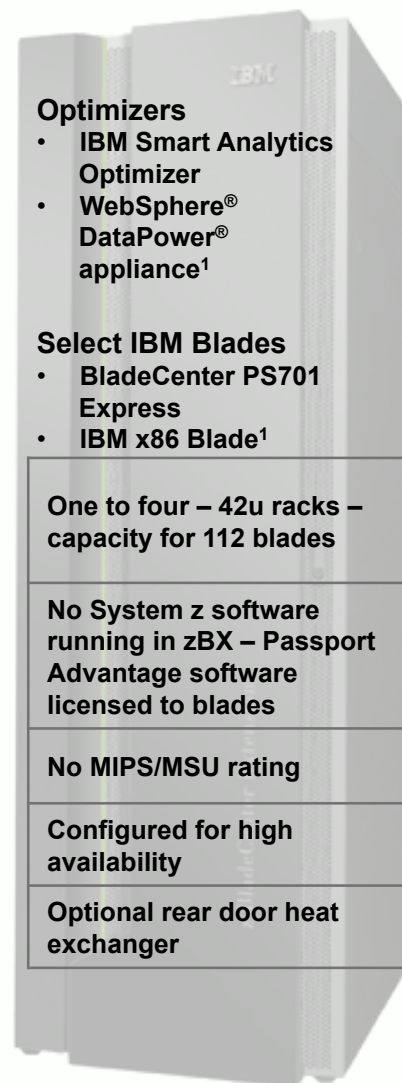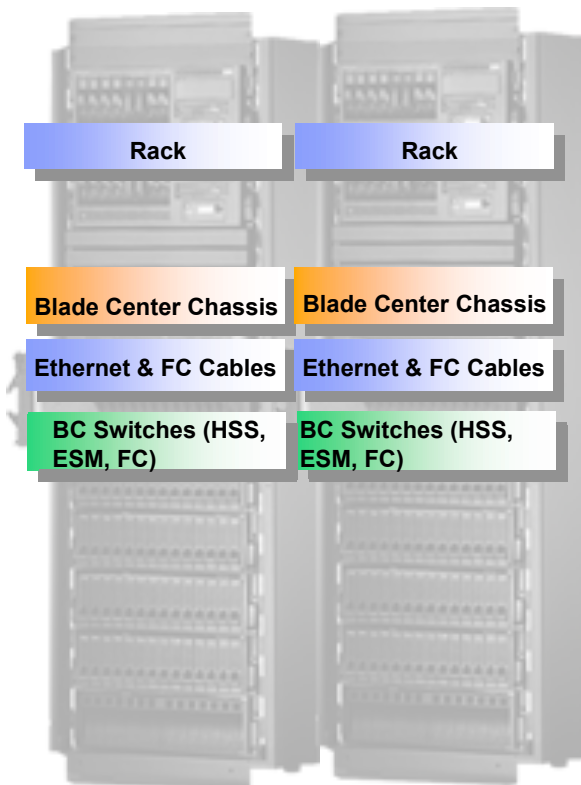*zEnterprise Unified Resource Manager*

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zBX
A uniquely configured extension of the zEnterprise

Looks like a rack with
BladeCenters but much more...

- **zBX is assembled and built at the IBM plant**

- **zBX HW redundancy provides improved availability**

- **zBX provides deployment of native binaries**

- **There is no need for recertification**

Rack
Top-of-Rack Switches
Blade Center Chassis
Ethernet & FC Cables
BC Switches (HSS, ESM, FC)
Power Dist. Units

Rack
Blade Center Chassis
Ethernet & FC Cables
BC Switches (HSS, ESM, FC)
Power Dist. Units

HMC
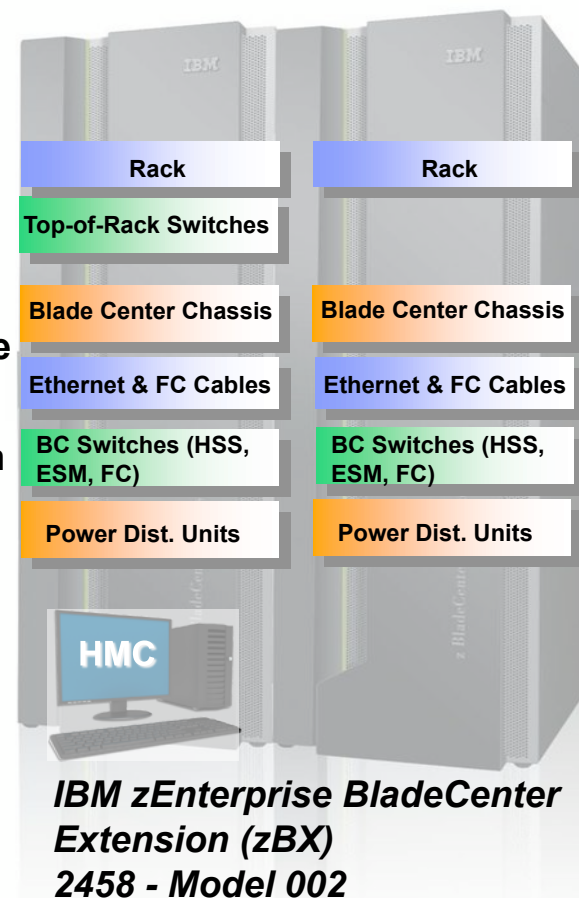
IBM zEnterprise BladeCenter Extension (zBX)
2458 - Model 002

Rack
Blade Center Chassis
Ethernet & FC Cables
BC Switches (HSS, ESM, FC)

Rack
Blade Center Chassis
Ethernet & FC Cables
BC Switches (HSS, ESM, FC)

Rack infrastructure hosting IBM BladeCenters

zEnterprise System

IBM zEnterprise 196 (z196)

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.

zEnterprise System *Blueprint*

Service Management and Reporting (Deployment, Performance, Availability, Security, Energy)

HMC (with Unified Resource Management)

| zOS | zOS | zOS | zOS | zOS | Linux | Linux | Linux |

z/VM

PR/SM

Z CPU, Memory and IO

SE

x86

Linux | Linux | Linux

xHyp

Power

AIX | AIX | AIX

pHyp

Firewall | DP | HPA | iSAO

AMM

z Blade Extension

Private Data Network (IEDN)
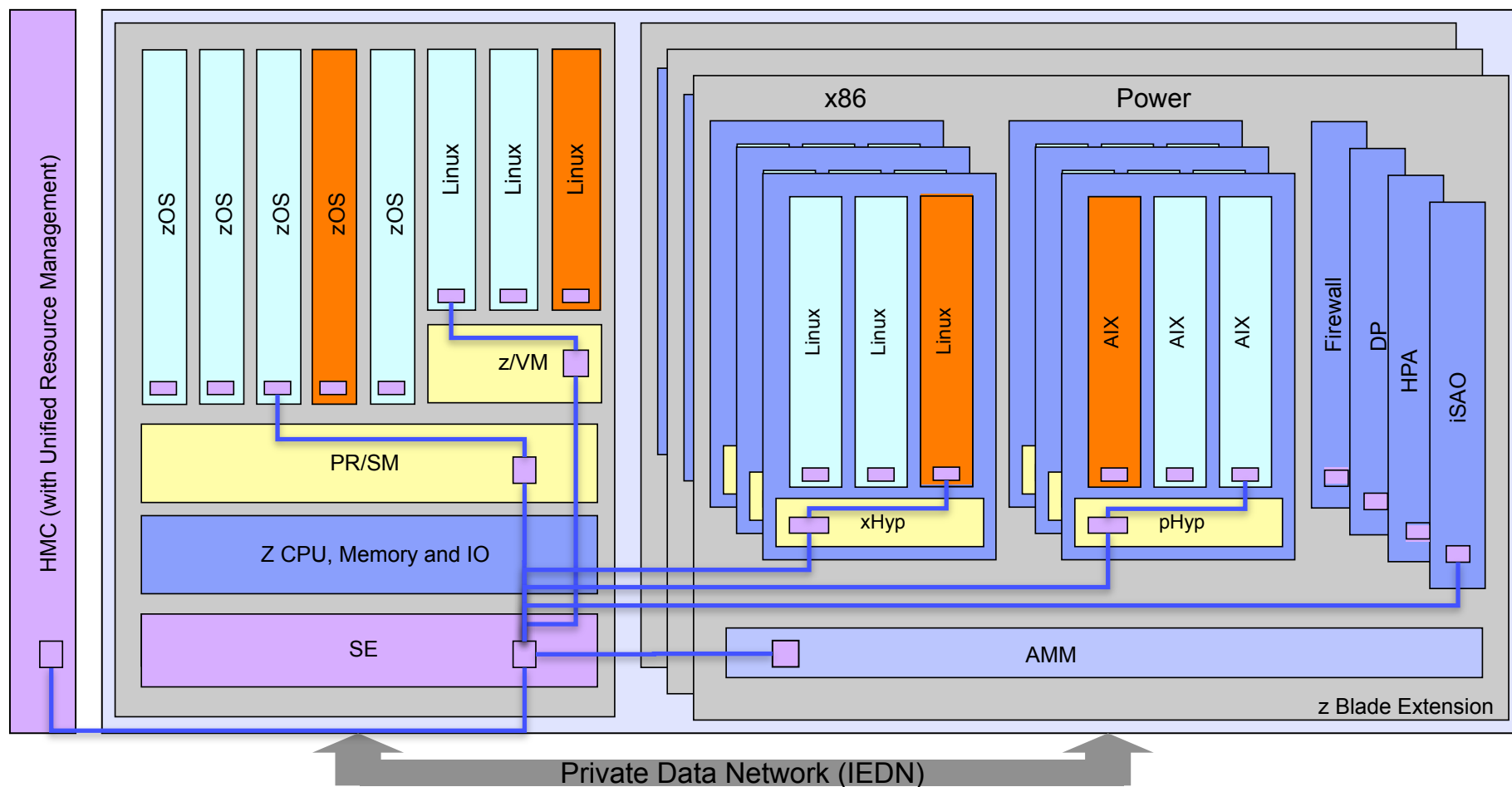
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WebSphere DataPower Appliance*

IBM Smart Analytics Optimizer

POWER7 Blades

IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT

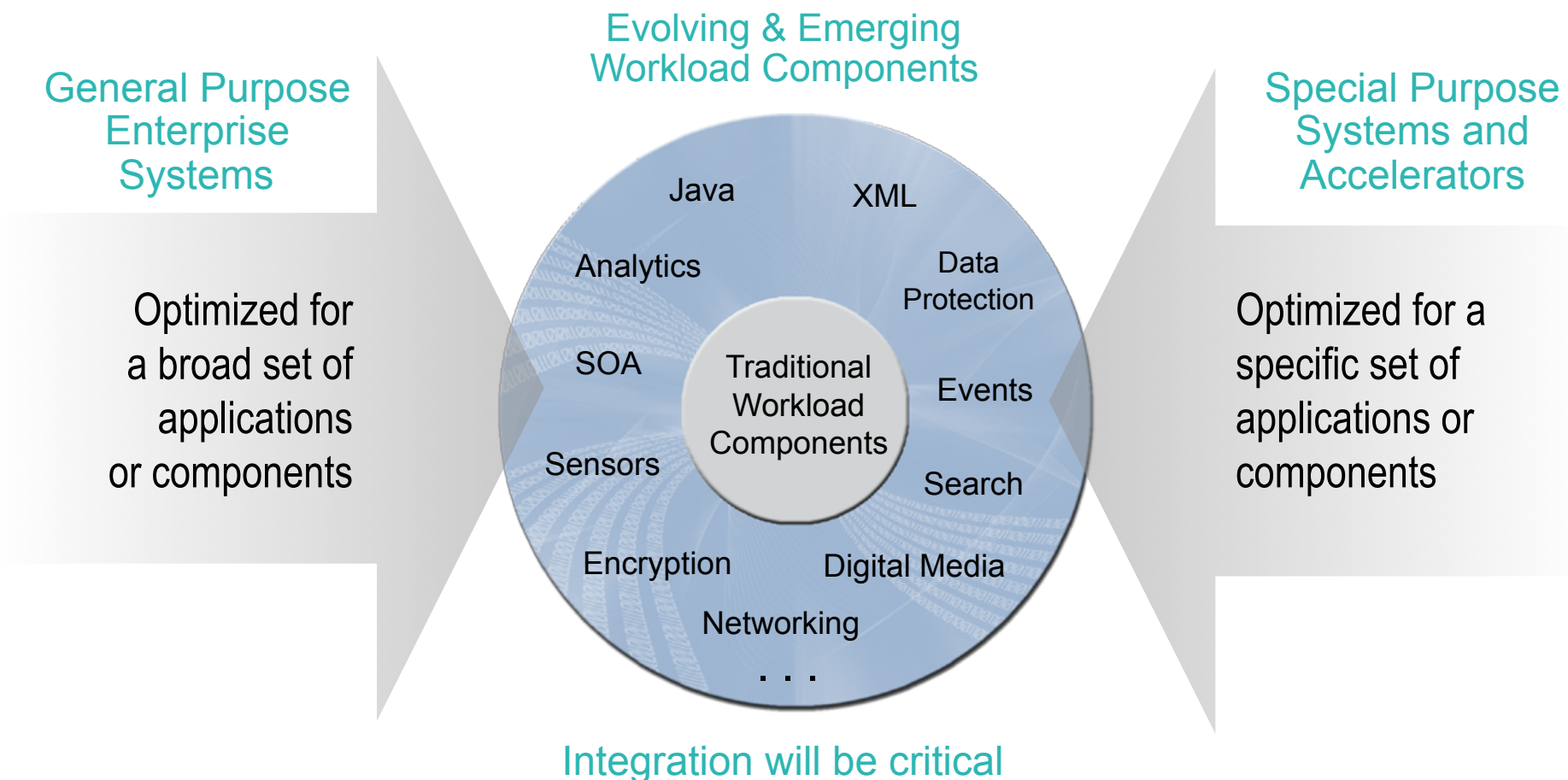## General Purpose Blades and Optimizers

IBM x86 Blades*

Emerging Applications require Diverse Compute Capabilities

Future objectives include extended application integration and optimization

Evolving & Emerging
Workload Components

General Purpose
Enterprise
Systems

Special Purpose
Systems and
Accelerators

Optimized for
a broad set of
applications
or components

Optimized for a
specific set of
applications or
components

Java   XML

Analytics   Data
Protection

SOA   Traditional
Workload
Components   Events

Sensors   Search

Encryption   Digital Media

Networking

. . .

Integration will be critical

Both General and Special Purpose capabilities are needed

Specialty Engines

Optimizers

??? ??? ISAOPT DP

GPB

General Purpose Blades
(x86 and Power)

IFL

Partitioned Z
Engines for Linux

ZAAP
ZIP

Z

Shared Memory

z Frames

zBX
(zEnterprise Blade Center Extension)

Price-Performance

Application Inventory
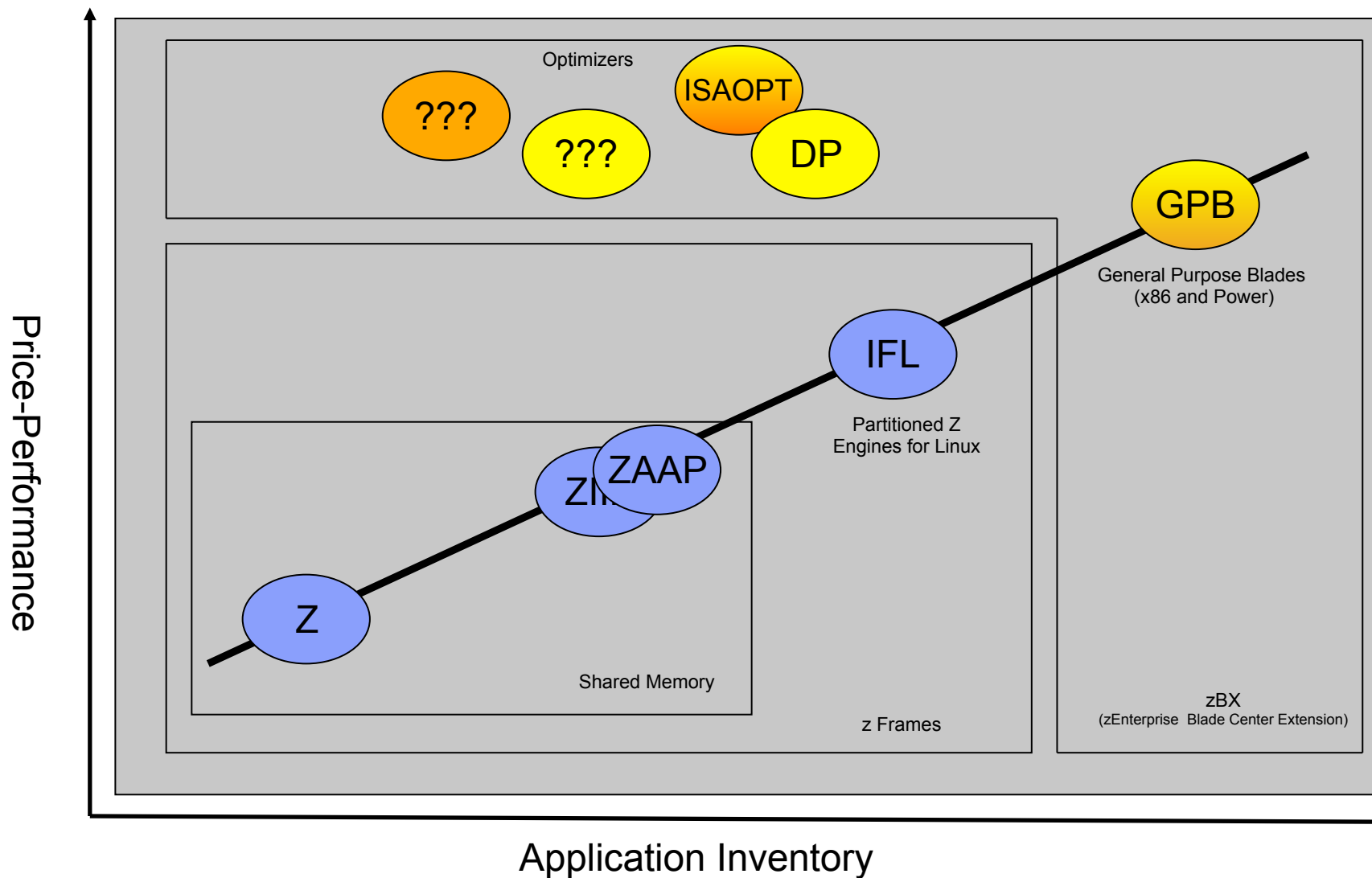
IBM BladeCenter PS701 Express

Machine Type: 8406

Model 71Y
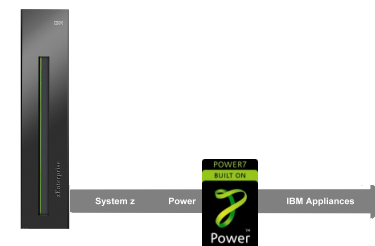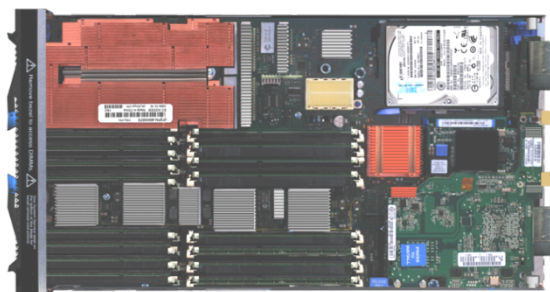
Processor Units, Memory, I/O:

- POWER7 8-core processor 3.0GHz

- Single wide blade server

- 3 configurations supported by zEnterprise
  - 32GB, 64GB, 128GB

- Flexibility in ordering – acquired though 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)
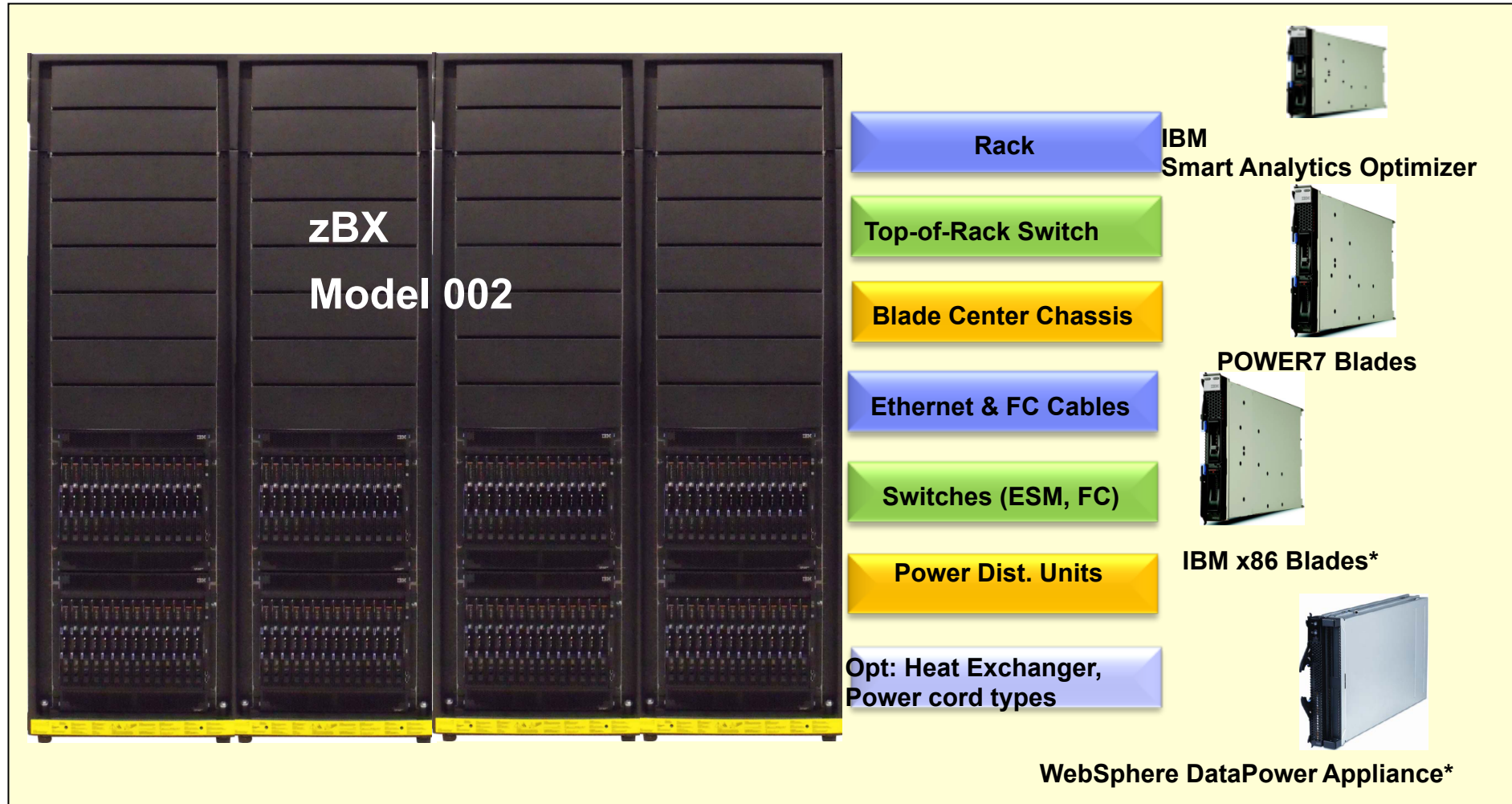
Data Warehousing Acceleration

- **Data warehouses are designed to answer a different type of question than transactional data is designed to answer.**

- **For Example:** *What are the top 5 items, in terms of sales, across the various geographical regions of our company, over the past 3 months?*

- **In the data warehouse query above, we notice a couple important traits.**
  - The question is aligned with various **dimensions** of the data, <u>Items</u>, <u>Geographical Regions</u>, and <u>Time</u>.
  - The question is asking for **metrics** corresponding to various combinations of the different dimensions.
  - It is also very common for the query to reference a lot of data, but return a fairly small result set.
  - It is common for data warehouse queries to ask questions of aggregate information.
    - In this case, **total** sales by product over a three month period.

- **These types of queries are processor and I/O intensive.**

IBM's ISAOPT Offering provides Hardware Acceleration for ever changing Business Intelligent Queries.

zBX Hardware Components Summary

zBX Infrastructure

Blades

zBX

Model 002

Rack

IBM
Smart Analytics Optimizer

Top-of-Rack Switch

Blade Center Chassis

POWER7 Blades

Ethernet & FC Cables

Switches (ESM, FC)

IBM x86 Blades*

Power Dist. Units

Opt: Heat Exchanger,
Power cord types

WebSphere DataPower Appliance*

IBM zEnterprise Unified Resource Manager

Hypervisor Management
- Integrated deployment and configuration of hypervisors
- Hypervisors (except z/VM) shipped and serviced as firmware.
- Management of ISO images.
- Creation of virtual networks.
- Manage and control communication between virtual server operating systems and the hypervisor.

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.

Energy Management
- Monitoring and trend reporting of CPU energy efficiency.
- Ability to query maximum potential power.
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Network Management
- Management of virtual networks including access control

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

Key
- Manage suite
- Automate suite

IMT West zEnterprise Hybrid Assessment and Delivery (NA IO)

zManager Overview

z196 and zBX – Unified Resource Management (zManager)

z196

zBX Infrastructure

Change Management
Configuration Management
Operations Management
Performance Management

Serviceability Management
Problem Management
Service Reporting

Rack

Top-of-Rack Switch

Blade Center Chassis

Ethernet & FC Cables

Switches (ESM, FC)

Power Dist. Units

Opt: Heat Exchanger,
Power cord types
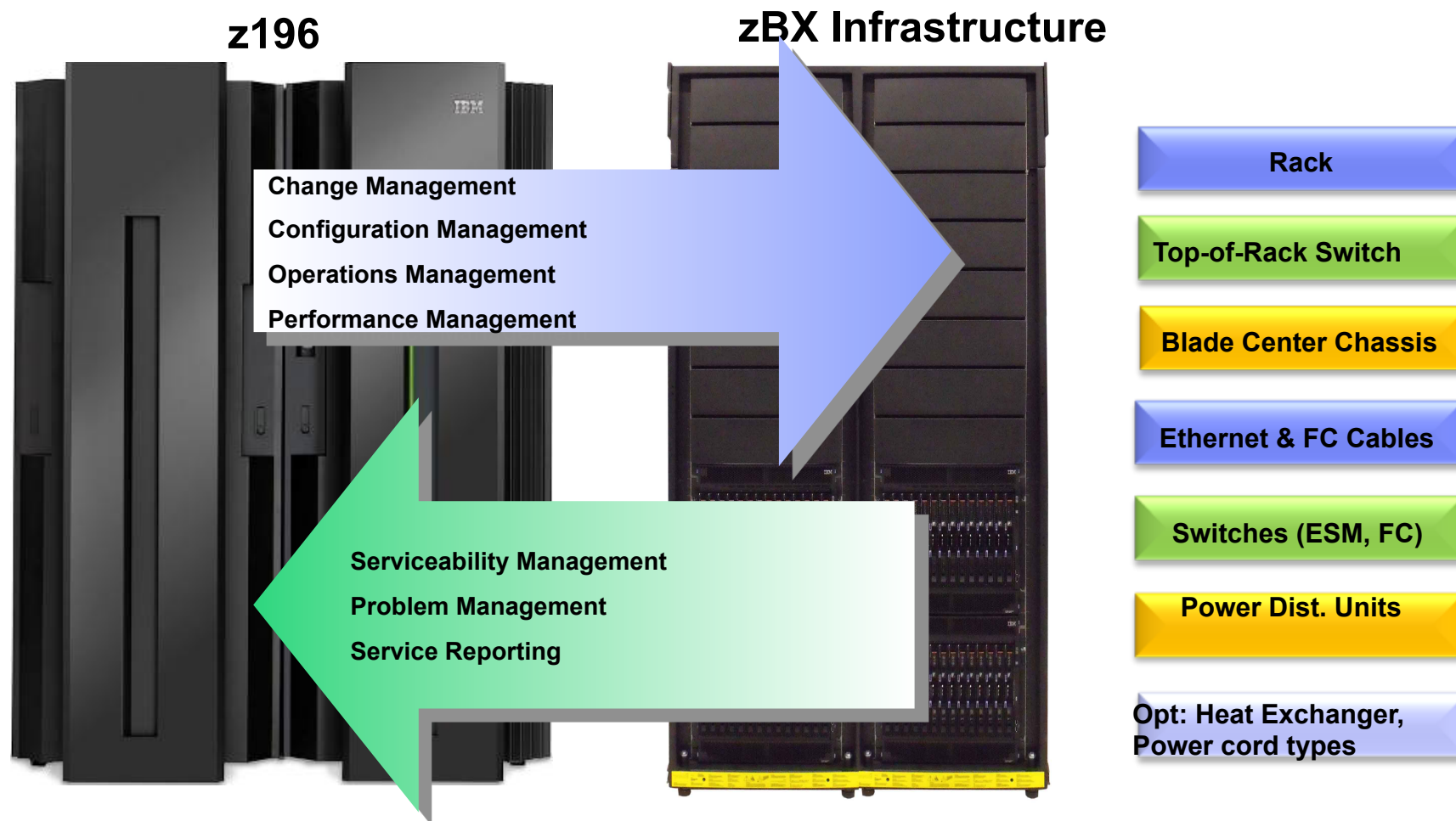
zEnterprise Unified Resource Manager
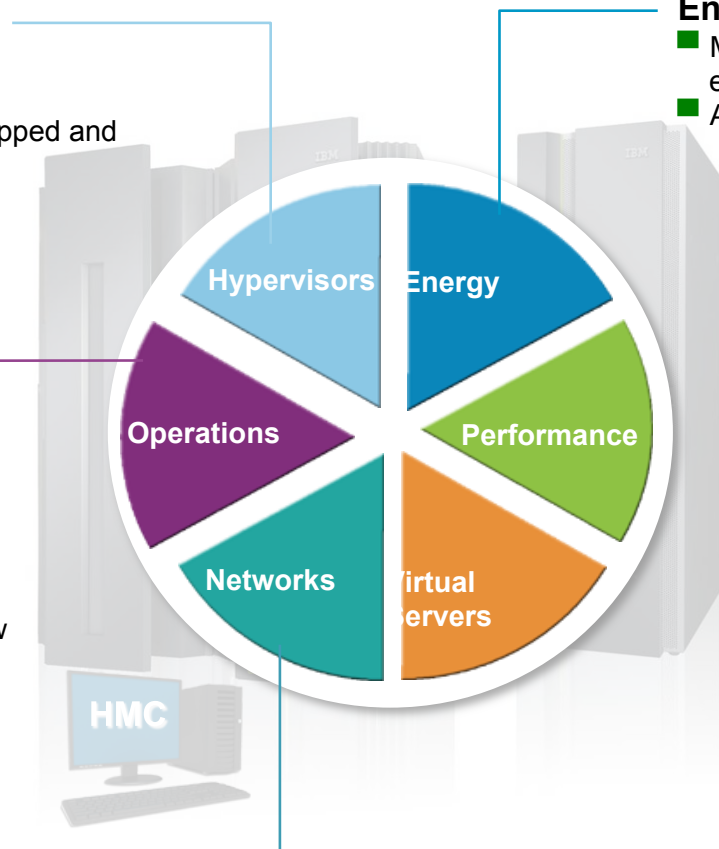## *Hardware Management*

Hypervisor Management
- Integrated deployment and configuration of hypervisors
- Hypervisors (except z/VM) shipped and serviced as firmware.
- Management of ISO images.
- Creation of virtual networks.

Energy Management
- Monitoring and trend reporting of CPU energy efficiency.
- Ability to query maximum potential power.

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.

Network Management
- Management of virtual networks including access control

Hypervisors | Energy

Operations | Performance

Networks | Virtual Servers

HMC

Key
- Manage suite
- Automate suite

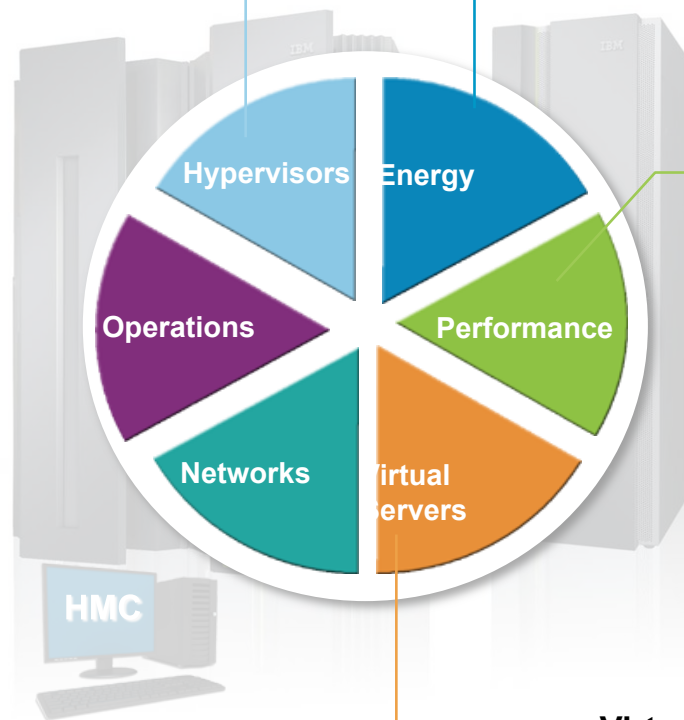# zEnterprise Unified Resource Manager
Platform Management

Hypervisor Management
- ■ Manage and control communication between virtual server operating systems and the hypervisor.

Energy Management
- ■ Static power savings

Hypervisors · Energy · Performance · Virtual Servers · Networks · Operations · HMC

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

Key
- ■ Manage suite
- ■ Automate suite

zEnterprise hardware management and platform management …

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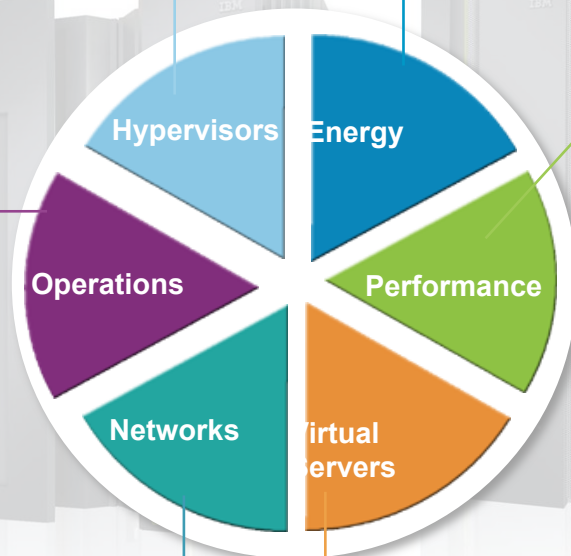
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Wheel segments:
- Hypervisors
- Energy
- Operations
- Performance
- Networks
- Virtual Servers

Key
- Manage suite
- Automate suite

Management stack

Building an architectural construct of hardware, software, and Enterprise Service Management

Service Management

- Visibility, Control and Automation for Applications, Transactions, Databases and Data Center Resources
- End-to End Workload Management and Service Level Objectives that Align IT Management with Business Goals
- Common Usage and Accounting for business accounting
- Dynamic/Centralized Management of Application Workloads based on Policies
- Business Resilience for multi-site recovery
- End to end Enterprise Security

Platform Management

- Workload based Resource Allocation and Provisioning for zEnterprise
- Physical and Virtual Resource Management (Server, Storage, Network)
- Goal Oriented Resource Management of zEnterprise (Availability, Performance, Energy, Security)
- Ensemble Network and Storage Management

Extending with
Unified Resource Manager (zManager)

- **Hypervisor management and creation of virtual networks**
- **Operational controls, service and support for hardware / firmware**

Hardware Management

- Configuration management for hardware / firmware
- Operational controls for the hardware / firmware
- Service and Support for the hardware / firmware
- Lifecycle management for the platform's virtual resources

- **Network management of private and secure data and support networks**
- **Energy monitoring and management**
- **Workload awareness and platform performance management**
- **Virtualization management – single view of virtualization across the platform**
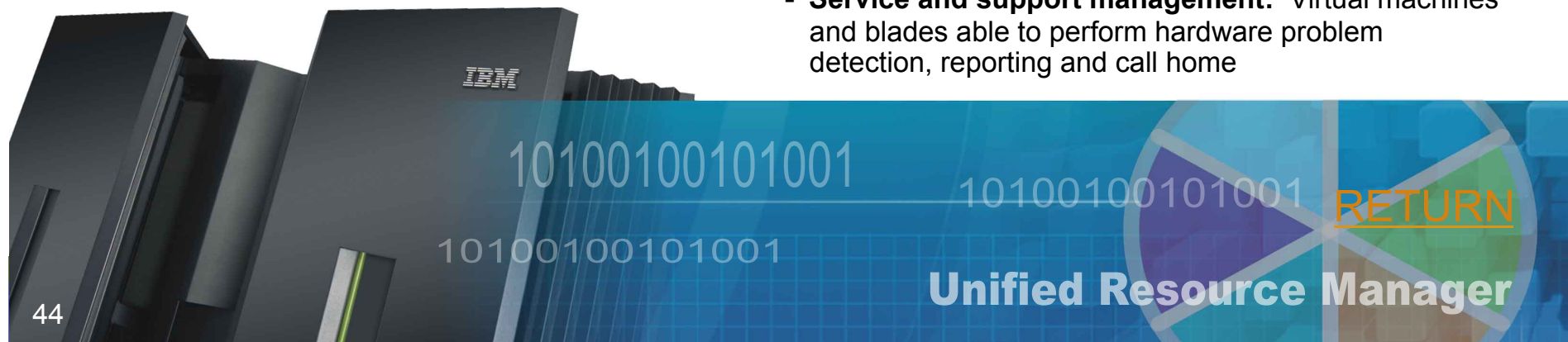
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zEnterprise Unified Resource Manager
Transforming the way resources are managed and deployed

In Summary -

Unified Resource Manager provides **_workload awareness_** *to optimize the system resources in accordance with understanding the policies assigned to that particular workload. Functions are grouped into two suites of tiered functionality that enable different levels of capability - Manage suite and Automate suite.*
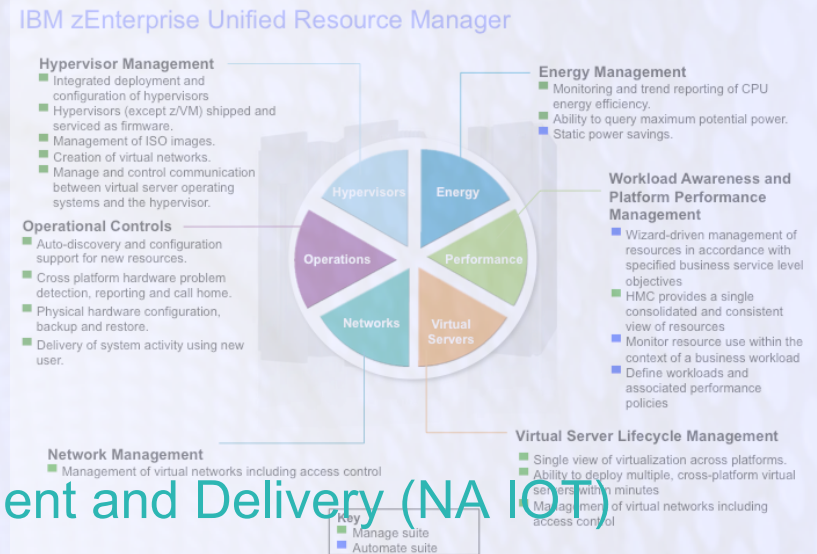
Major Differences -

- **Heterogeneous management:** Total systems management across heterogeneous resources

- **Integration:** Single point of control, common skills for resources, reduced complexity of day to day operations.

- **Monitoring.** New dashboard for CPU resources and energy management.

- **Simplified installation:** Auto discovery and configuration of resources and workloads with single interface

- **Secure:** Improved network security with lower latency, less hops and less complexity. Improved control of access due to management of hypervisors as firmware.

- **Service and support management:** Virtual machines and blades able to perform hardware problem detection, reporting and call home

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RETURN

Unified Resource Manager

IBM zEnterprise Unified Resource Manager

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zManager – *Abstracted Interface Value*

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The Value of an Abstracted Management Layer
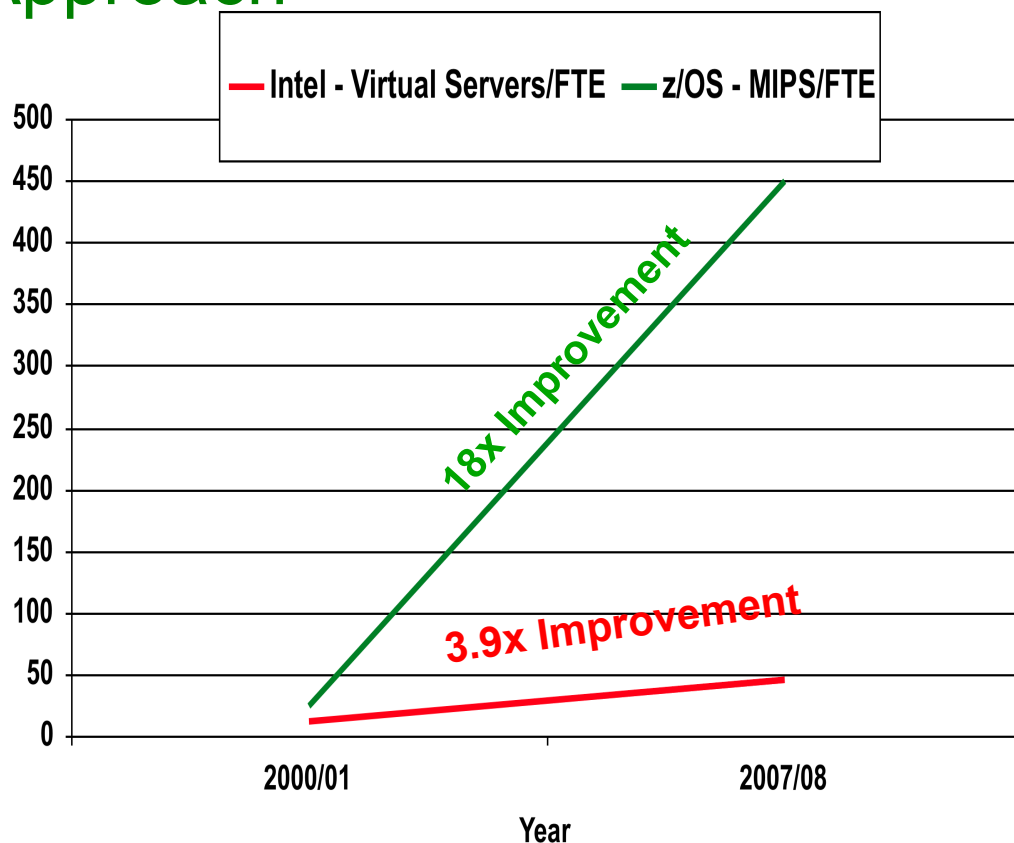
A do-it-yourself solution...
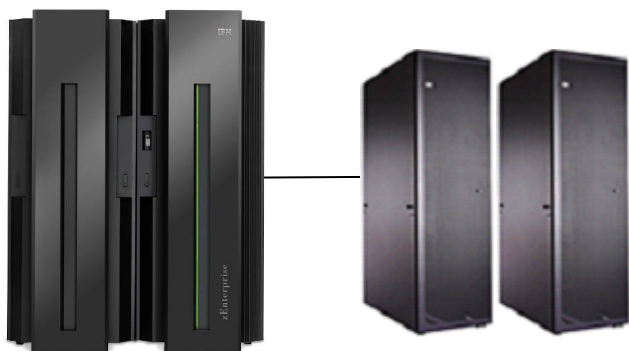
zEnterprise

- Islands of consolidation
- Distributed management practices can be inconsistent and ad hoc
- Cultural divides within the organization persist

- New-found optimizations via Fit for Purpose
- Consistent and structured management with zManager
- Unified culture around zEnterprise strategy

Labor Costs Trends favor a Centralized Management Approach

Intel - Virtual Servers/FTE   **z/OS - MIPS/FTE**

18x Improvement

3.9x Improvement

500
450
400
350
300
250
200
150
100
50
0

2000/01   **2007/08**

Year

Large scale consolidation and consistent **structured management practices** drive increases in labor productivity

Small scale consolidation with ad hoc management achieves lesser gains

The more workloads you consolidate and manage with consistent structured practices… *the lower the management labor cost*

Source: IBM Scorpion Studies and IDC Three Data Centers – One Vision.PDF (IDC, 2010)

zManager Provides Structured Management For zEnterprise Virtual Environments

Process	Typical Distributed Management Practices	zManager
Asset Management	■ Discover assets with ad hoc methods ■ Manual entitlement management	■ Automated discovery and management of entitlement assets
Deployment Management	■ Manually configure hypervisor and build networks	■ Automated deployment of hypervisor and attachment to integrated networks
Security Management	■ Different ways to manage administrator access	■ Centralized, fine-grained administrator access management
Change Management	■ No visibility into impact of changes	■ Track dependencies for change impact
Capacity and Performance Management	■ No end-to-end transaction monitoring ■ Manually adjust CPU resources to meet changing workload demands	■ End-to-end transaction monitoring to isolate issues ■ Automatic CPU resource adjustments to meet changing workload demands

Hypervisor Setup And Configuration Lab Test 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**

97% reduction in labor time

zEnterprise Economics - IBM SWG CPO - Feb. 2011

Network Setup And Configuration Lab Test 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

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IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT)

zEnterprise – *Design Strategy*

Hybrid Strategy: *Dynamic, Integrated, & 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 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 manage the infrastructure resources in accordance with specified business service level objectives associated with the business service workloads

  – 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*

  – To extend and accelerate System Z business service workloads

- **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

  – And 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**

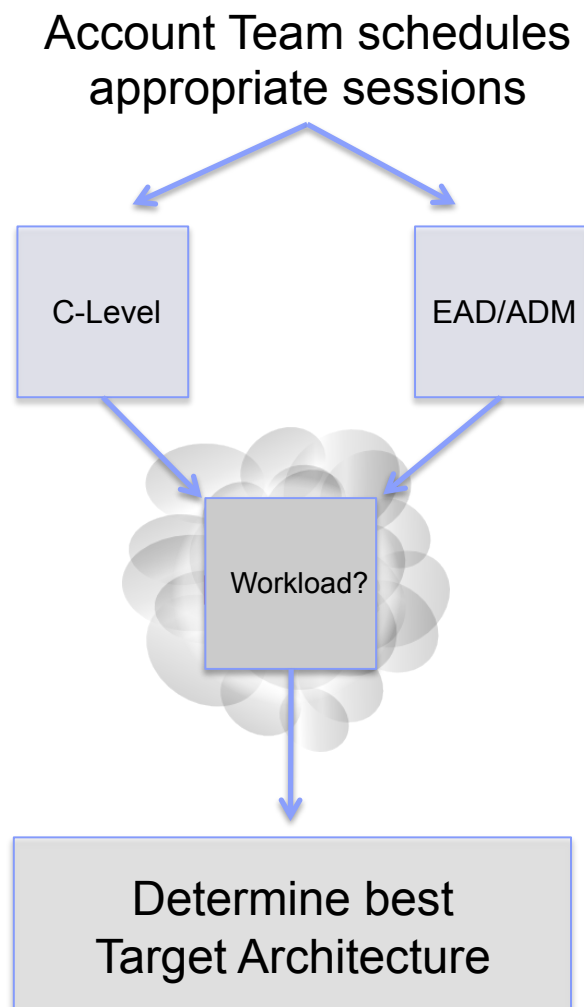- **DB2 Queries, XML Processing, SOA Protocol Conversions & Security**

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IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT)

zEnterprise Workload Architectural Assessment

First, a workload must be identified

Account Team schedules
appropriate sessions

C-Level

EAD/ADM

A separate Team Leads this session.
Who should attend these sessions?
Are they outside of SD?

Workload?

Once a workload is identified, the
Assessment is scheduled.

Determine best
Target Architecture

Workshop Goals

1. For a specific Workload, determine if the zEnterprise/zBX/zManager Framework is a "*good fit*".

2. Provide *low-level* zEnterprise education to the Client Participants (architects), with a primary focus on zManager (including PPM), and the zBX nest.

   Doing so, will facilitate the various Source to Target Mapping Discussions.

3. Provide a structured set of deliverables that share the Logical and Physical Design of the source Workload mapped to the zEnterprise System.

4. Contrast various Target Platforms based on the Functional and Non-Functional Requirements of this workload.

5. Provide the opportunity for a Development-Led discussions and/or Strategic Architecture Planning.

Delivery Schedule – *Option 1*

Day of Week	Description	Duration (hours)	Target Audience
Day 1 AM	Understanding the zEnterprise Architecture - *Technical Foundation Session* *Objective: Educate EAD, ADM, SD, and Senior Networking and Security resources on the zEnterprise Architecture. This sets the foundation for the Assessment Activities.*	4	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 knowledgable of the application). **Objective:** Educate IBM on the Off-Platform Data and Network Flows unique to this workload (both zBX to z196 and zBX to SAN Fabric).	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 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.	3	Client Lead Architects
Day 2 PM	**Solution Discovery:** zEnterprise Open Discussion/Futures (WSS Specialist, IBM Development if required) **Objective:** Demonstrate to the client that the zManager roadmap is sound, share current state of x86 integration.	1	CTO, CIO, CFO, Senior Enterprise Architects, ADM, & Service Delivery
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	20	

Delivery Schedule – *Option 2*

Task ID	Description	Duration (hours)	Target Audience
1	**Data Collection and Transmission to IBM:** Provide to the Client the **Assessment Preparation Guide.pdf** and **Workload Requirements Collection Sheet V210.pdf** and ask them to assemble the material andprovide to the Designated IBM Contact.	N/A	Client Designated Technical Lead, IBM Assessment Team Lead
2	**High Level Data Review:** Upon receipt of the data from IBM, schedule a 1 hour Conferene Call with the Customer. During that call, the contents of the provided data will be reviewed. Any questions related to data interpretation and/or missing material will be raised at that time.	1	IBM Workload Assessment Team
3	**Solution Design:** Working remotely, the Workload Assessment Team reduces the data.	N/A	IBM Workload Assessment Team
4	**Design Validation, Requirement Gathering:** This is our first of two Face to Face sessions with the customer. During this meeting, IBM will walk the client thru the proposed Solution Design and request initial Feedback. IBM will also work with the client to review their specified Functional and Non-Functional Requirements along with validating the Platform Scoring present within the model.	3	IBM Workload Assessment Team and Designated Client Resources
5	**Solution Discovery:** Workshop Results (IBM Development or IMT West WSS Specialist Led) **Objective:** Share results of study.	2	IBM Workload Assessment Team, IBM Account Team, Key Client Stake Holders
	Total Time	6	

Capture Specific FR-NFR for this Workload

Functional

Number	Requirements		Weight
	Primary	Secondary	
1	Disk I/O Thruput	P7 I/O Thruput Rate (LOW)	10
2	Network I/O Thruput	P7 Aggregate Network Traffic (LOW)	10
3	Processor Architecture	Clock Speed requirement of 2.66 GHz or less	6
4	Core Requirement (Vertical)	Partition requirement of 8 or less Cores	6
5	Memory Requirements	Platform memory requirement of 128GB or less	5
6	Data Access Requirement (POWER)	EMC	10
7	Application Portability	Platform Certification Available	10
8	OS Specific Requirement	Workload requires AIX or LINUX.	5
9	OS Specific Requirement	Native 2PC Support	6
10			

FR – If a platform fails to meet a Functional Requirement, that platform is "*ruled out*".

Non-Functional

| Number	Non-Functional Requirements		Weight
	Primary	Secondary	
1	Systems Management	Automatic System Firmware Update	6
2	Systems Management	Hypervisor provisioned from a TCB	6
3	Systems Management	Automatic Hypervisor lifecycle management	6
4	Systems Management	Automatic 24x7x365 Hardware Support	10
5	Operational Management	Simple, abstracted Administrator Support for hardware and platform management across heterogenous architectures.	10
6	Operational Management	SPOC for hardware and platform management	10
7	Operational Management	Cross Platform Monitoring with consistent attributes	7
8	Operational Management	Policy-Based, Cross-Workload Resource Management	10
9	Governance	Secure, Role-Based System Management	10
10	Governance	Automated Multi-Architecture BC/DR Support	7
11	Governance	Simplified BC/DR Staffing Model	7
12	Continuous Availability	Live Partition Mobility	10
13	Continuous Availability	Local Data Replication (Hyperswap)	7
14	Other Considerations	Network Latency Consistency	10
15			
16			
17			
18			
19			
20			

Then… Score Them (FR Example)

Scoring	Functional Workload Requirements Comparative Platform Score									
Demonstrated Can Exceed (5)										
Likely Exceeds (4)		�(gray)							▩(gray)	
Demonstrated Can Meet (3)			▩(green)	▩(green)					▩(green)	▩(green)
Likely to Meet (2)										
Marginal (1)										
Does Not Meet (0)	▩(red)				▩(red)	▩(red)	▩(red)			
Platform	z/OS	z/Linux	pASB	xASB	iSAO	DataPower	User Defined Appliance (UDA)	UNIX	INTEL	Standard Blade Center
	zEnterprise zBX							Standalone Server		
Platform Scores	0.00	3.89	2.78	2.78	0.00	0.00	0.00	3.78	3.11	3.11

Criteria	Ranking
Does not Meet	0
Marginal	1
Likely to Meet	2
Demonstrated can meet	3
Likely exceeds	4
Demonstrated can exceed	5

Functional Requirements – *Weighted Bar*
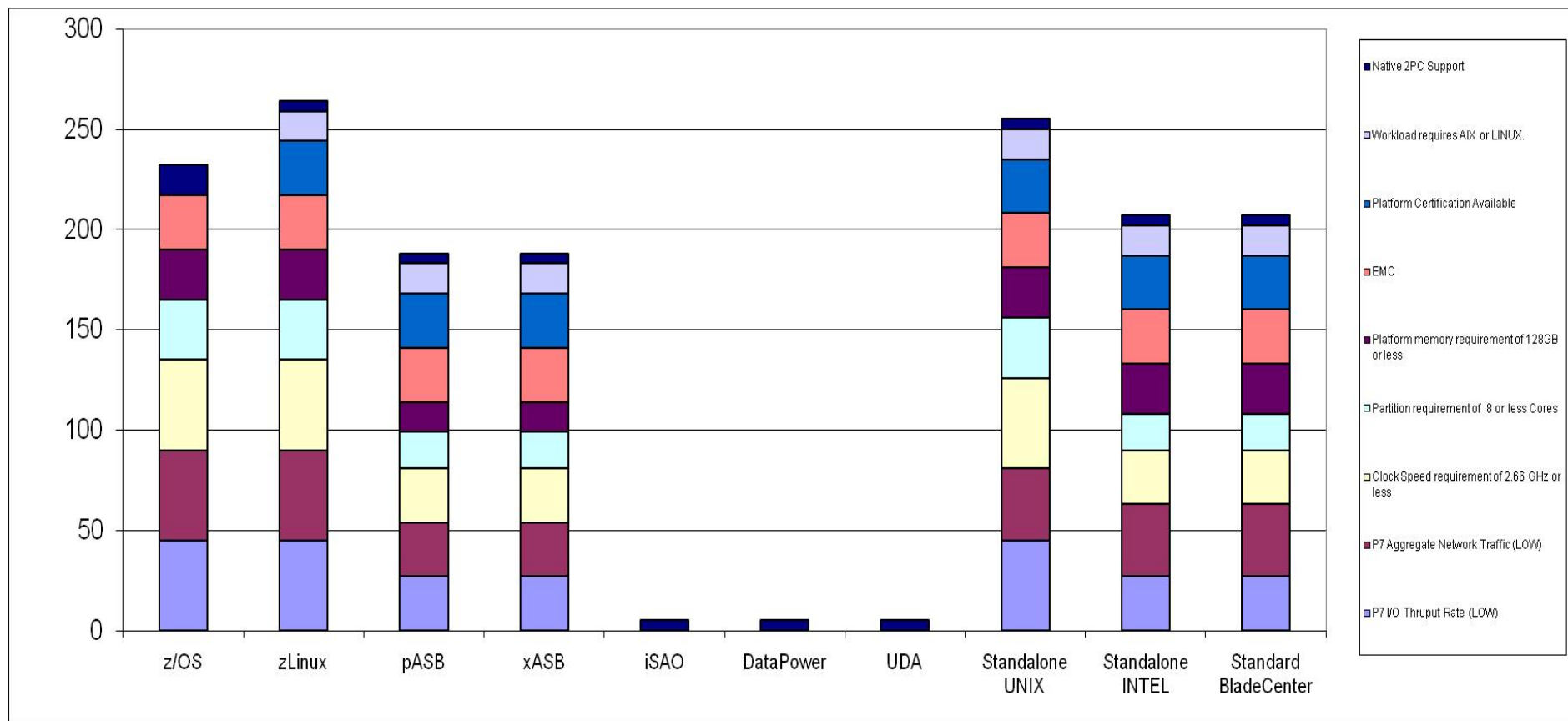
NFR Example

Scoring	Non-Functional Workload Requirements *Comparative Platform Score*									
Demonstrated Can Exceed (5)										
Likely Exceeds (4)										
Demonstrated Can Meet (3)										
Likely to Meet (2)										
Marginal (1)										
Does Not Meet (0)										
Platform	z/OS	z/Linux	pASB	xASB	iSAO	DataPower	User Defined Appliance (UDA)	UNIX	INTEL	Standard Blade Center
	zEnterprise zBX							Standalone Server		
Platform Scores	2.64	2.64	2.64	2.64	2.00	2.00	2.00	1.29	1.29	1.29

Criteria	Ranking
Does not Meet	0
Marginal	1
Likely to Meet	2
Demonstrated can meet	3
Likely exceeds	4
Demonstrated can exceed	5

Non-Functional Requirements – *Weighted Bar* (1st 10)
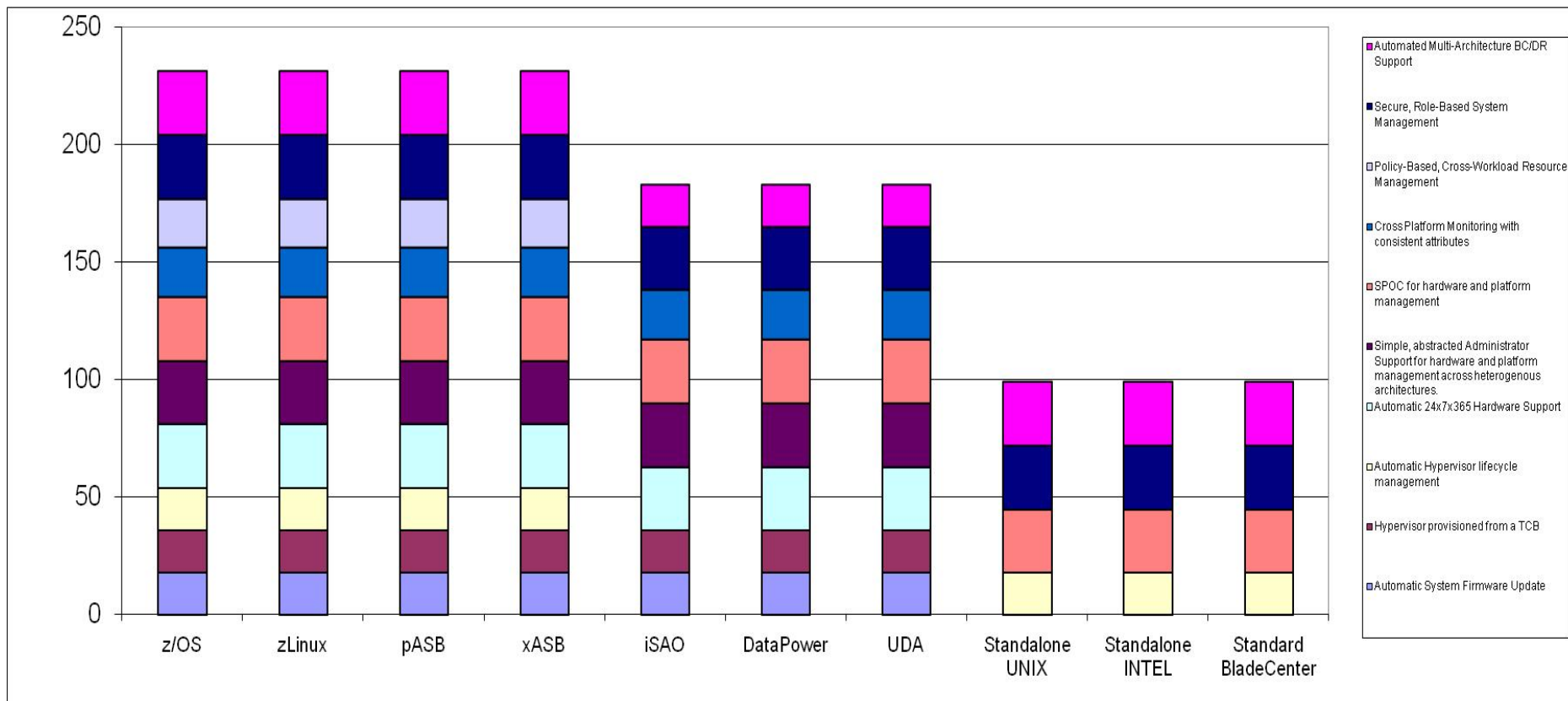
A *Fit Assessment* and Incremental Configuration needs are also documented.

Client Preparation Guide

Workshop Survey

To justify the potential investment, a corresponding TCO is available at no charge.

IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT)

Leading Questions

Workload Selection Considerations *(Leading Questions)*

Sample Workload Characteristics that lend themselves to zEnterprise deployment.

1. **An IFL-only z196 Server is available. This configuration would:**

   – Support a Linux on zEnterprise Database Server and zBX application hosting.

   – Remember, proximity of Data is important. So too are Software License Fees.

   – zManager provides Operational Simplicity by *abstracting the End User Interfaces (hardware, platform, workload),* simplifying the Skill Requirement and reducing operational expenses.

2. **Are you conducting Off-Platform Data Feeds today?**

   – They are an excellent candidate for this offering.

3. **Are you hosting cross-platform queue managers?**

   – Another excellent candidate for this offering.

4. **Do you have CPU-intensive workloads needing better performance?**

   – The z196's fast clock and OOO execution is perfect for serial or consolidated workloads, while its I/O Subsystem ensures optimum Data freshness.

   – The zBX's General Purpose Blades excel at parallel workloads, while its *High Speed Private Data Network ensures Network and z196 Data Transfers are efficient.*

Workload Selection Considerations …

5. **Timing is everything. You may already be well positioned to benefit from the zEnterprise Fit for Purpose Platforming Model.**

   – Do you have POWER or Linux-based workloads approaching a Technology Refresh that have a Large Systems data or services dependency?

   – Are you preparing to make a Re-platforming Decision for an existing workload?

   – Are you preparing to make a Platforming decision for a new workload?

6. **What is your Corporate Backbone network speed? 10Gbits?**

   – What about the servers hung off your CISCO Access Layer? This is something less than 10 Gbits, most likely.

   – By investing in a z196-zBX-zManager solution, you can upgrade your network for key workloads without having to "upgrade your network".

   – You simply re-deploy the eligible UNIX/x86 (SOD) servers within the zBX Frame and they will immediately benefit from a 10Gb cross-connection.

7. **Are you already running hybrid-capable applications (DB2, WebSphere)?**

   – If so, you can exploit dynamic Fit for Purpose execution via the Smart Analytics Optimizer and WebSphere Compute Grid.

Workload Selection Considerations …

8. **For those in the Financial Services Sector, "Do you provide Near-Real Time Fraud Detection today"? Would you like to move to a Real-Time Model?**

   – The Private High Speed, Point to Point Data Network is excellent in that it will ensure a High Scale and extremely Low Latency Network".

   – You need such a network framework in place to ensure Authorizations from the EFT Switch do not Time Out resulting in Stand-Ins, or your customer *pulling out another card*.

   – Also, how do you obtain your neural network ruling? Is it also an off-platform feed? Reconsider point 3 covered earlier.

9. **Look for workloads with a Large Systems Dependency - Data is a "classic" example.**

   – Proximity of Data is important (throughput increases and response time decreases as the application and data servers move closer together) - Network Hops are expensive.

   – As stated earlier, zManager will provide Operational Simplicity by *abstracting the End User Interfaces (hardware, platform, workload),* simplifying the Skill Requirement and reducing operational expenses.

Workload Selection Considerations …

10. Recognize that a *Fit for Purpose* platforming approach ensures appropriate Capital Expenditures.

- Buy the resources you *need* based on insights into the alignment of your Workload Characteristics with the available hardware Architectures.
- Versus defaulting to a single Architecture (one-size fits all mentality).
- *CTOs appreciate operational and capital cost reduction capabilities.*

11. Is your client evaluating the benefits of a Private Cloud? Are they aware that one of the prerequisites required for any *As-A-Service* Offering is an Infrastructure that is both Highly Automated and Highly Virtualized.

- A Highly Automated, Highly Virtualized infrastructure will directly complement Heterogeneous workloads and promote simplified management.
- zManager provides this base capability as Firmware.

zEnterprise Hybrid Computing

Workload Selection Considerations …

12. 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?

- Consider the DataPower XI50z, a new, 10 Gigabit wire-speed ESB appliance that integrates applications and services by routing communications between services, performing communication protocol and data format transformations as required.

- Provides advanced capabilities such as service prioritization, intelligent load management via inbound queuing and dynamic outbound routing, while reducing management and environmental costs.

13. 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?

- The DataPower XI50z is also a hardened, XML/SOAP firewall appliance with fine-grained AAA policies, field-level security, and z196 RACF and Crypto integration.

- Secure your web services and meet PCI compliance requirements by using the XI50z to inspect messages and signatures, sign and encrypt/decrypt messages, validate schemas, and mask internal resources via service virtualization.

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IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT)

Common Client Themes

Workload Messaging Team – Common Themes

- **Having spent time messaging across C-Level and Senior Architects within EAD, ADM, and SD the following themes have emerged.**

  – End to End Performance Management.

  – Operational Simplicity zManager will offer relative to existing Distributed SAN, LAN, and AMM Management.

  – Automated Firmware Management.

  – Energy Management and eHMC User Role(s) capabilities zManager will offer them.

- ***Such capability only exists from IBM.***

  – *Existing offerings from HP and the Virtual Computing Environment (formerly Acadia) simply re-bundle existing solutions and offer limited choice.*

  – *VCE claims "Removing Choice is part of the Simplification Process".[1]*

  – *Both HP BladeCenter Matrix and the VCE have embraced a <u>One Size Fits All Mentality.</u>*

  – *VCE openly recognizes the existing Distributed Challenges as an "Accidental Architecture".[1]*

[1] *See Vblock Infrastructure Packages Reference Architecture, page 3 under the section titled: What Constitutues VBlock Infrastructure Packages"*

IMT West zEnterprise Hybrid Assessment and Delivery (NA IOT)

The zBX Starter Kit

Starter Kits and Services

- **Test Level Services:**
  - Comprehensive services supporting rapid integration of a pilot application deployed in a test zBX environment.
  - These services are used to demonstrate the entire complement of planned GA1 capabilities

- **Production Level Services:**
  - Comprehensive services supporting integration of the pilot application in a production zBX environment.
  - Analyze the Client's recovery and operational procedures.
  - Migration of this workload into production.

- **A sample POWER7 Starter Kit would consist of the following Features:**
  - A pair of POWER7 PS701 Blades.
  - 32, 64, or 128 Gbytes of Memory each.
  - POWERVM Hypervisor.
  - Appropriate SAN Attachment Support.
  - The zManager _Automate_ Feature.
    -

zEnterprise BladeCenter® Extension (zBX) Starter Kit

NEW!

This offering provides a cost-effective package of hardware, software, and services to help customers get started with deploying the IBM zEnterprise BladeCenter Extension (zBX) technology. The package includes zBX hardware, Unified Resource Manager Automate firmware, and Ensemble Enablement (EE) services.

Base Offering Components:
- One zBX Model 002 (2458-002)
- Ensemble Manage & Automate features
- zEnterprise Ensemble Enablement Services

Additional Components (not included in the price of the Starter Kit):
- Two PS701 Power 7 Blades (8406-71Y)
- IBM AIX and PowerVM Enterprise Edition License Offerings

Optional (included):
- 2 OSA Express3 1000Base T Cards
- 2 OSA-Express3 10GbE Cards, SR or LR
- 1 HMC and Display to be used as secondary HMC

Contact your Sales Specialist.

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