The IBM zEnterprise System
A New Dimension in Computing

Jim Elliott

Consulting Sales Specialist – System z

zChampion and Linux Champion

Systems & Technology Group

IBM

2011-05-19

Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries.

IBM*	POWER*	WebSphere*
IBM (logo)*	POWER7*	zEnterprise
AIX*	PowerVM	z/OS*
BladeCenter*	PR/SM	z/VM*
DataPower*	System x*	z/VSE
DB2*	System z*	

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license there from.

Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

InfiniBand is a trademark and service mark of the InfiniBand Trade Association.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office.

IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency, which is now part of the Office of Government Commerce.

* All other products may be trademarks or registered trademarks of their respective companies.

Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.

All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.

This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.

All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.
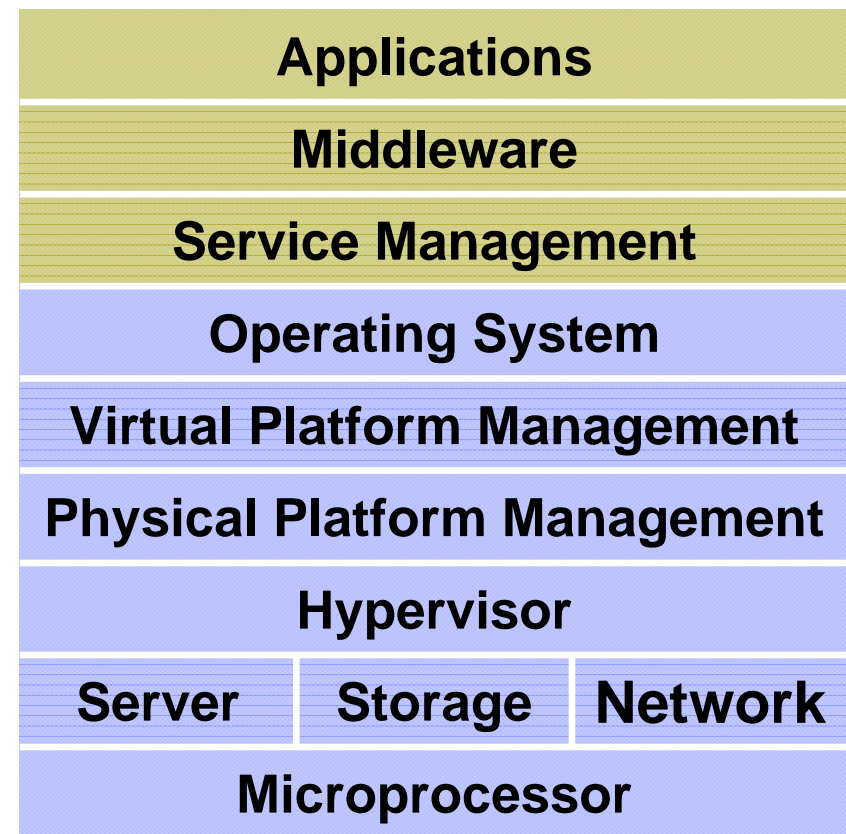
Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.

Today's IBM System z is …

- **The world's most trusted transaction processing and data server for business critical applications**

- **The world's most cost-efficient platform for data center consolidation and virtualization**

- **The world's most dependable and scalable hardware and middleware platform for new business applications**

- **A thoroughly modern application environment for traditional and Cloud delivery models**
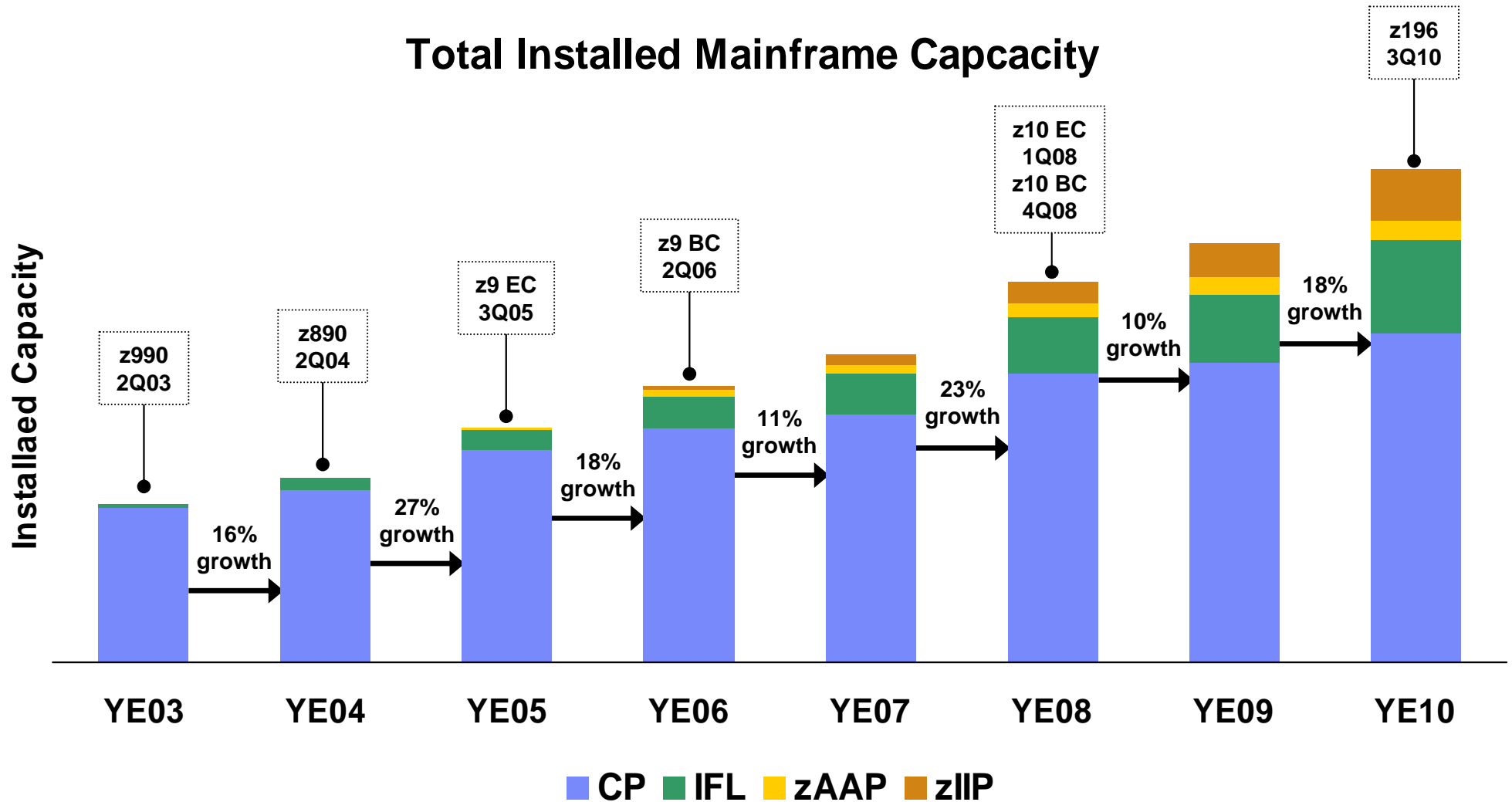
Innovation, integration and optimization at every level

Applications
Middleware
Service Management
Operating System
Virtual Platform Management
Physical Platform Management
Hypervisor

Server	Storage	Network

Microprocessor

Focused, collaborative innovation
A "complete systems" approach
Intelligent performance

IBM Mainframe growth year to year

Total Installed Mainframe Capcacity

Installaed Capacity

z990 2Q03

z890 2Q04

z9 EC 3Q05

z9 BC 2Q06

z10 EC 1Q08 z10 BC 4Q08

z196 3Q10

16% growth

27% growth

18% growth

11% growth

23% growth

10% growth

18% growth

| YE03 | YE04 | YE05 | YE06 | YE07 | YE08 | YE09 | YE10 |

■ **CP** ■ **IFL** ■ **zAAP** ■ **zIIP**

System z Technology Summit   2011-05-19

System z investment areas

1. **Innovate to address the IT infrastructure challenges of today and the future**
   - Further simplify, consolidate and reduce the costs of an IT infrastructure
   - Integrate, virtualize and coherently manage the multiple and varied elements of business applications
   - Scale up and leverage System z strengths in data serving

2. **Extend strengths of System z**
   - Invest for continued leadership in System z: performance, virtualization, enterprise security, enterprise business continuity
   - Extend System z best of breed capabilities to a broader set of workloads
   - Deploy optimized technologies for specific applications or components

3. **Expand the ecosystem and support core applications that our clients want**
   - Recruit new solutions and solution providers and integrators
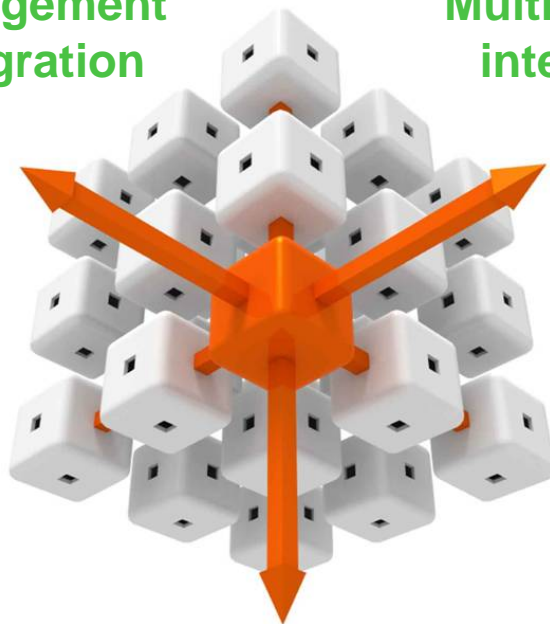   - Expand skills and capabilities across the globe

The IBM zEnterprise System
A New Dimension in Computing

Management integration

Multi-platform integration

Stack integration

- **One of the world's fastest and most scalable enterprise systems with virtually unrivalled reliability, security and manageability**
- **One of the industry's most efficient platforms for large-scale data center simplification and consolidation**
- **A "System of Systems," integrating IBM's leading technologies to help dramatically improve productivity of today's multi-architecture data centers and tomorrow's private clouds**
- **IBM's Smart Analytics Optimizer can deliver up to 10-times improvement in performance for complex queries**
- **Customers can simplify, govern and enhance the security of XML and IT services with IBM WebSphere DataPower Integration Appliance for XI50 for zEnterprise**

IBM zEnterprise system – Best in class technologies

A system of systems that unifies IT for predictable service delivery

Unified management for a smarter system: zEnterprise Unified Resource Manager

- 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: 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: zEnterprise BladeCenter® Extension (zBX)

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

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

IBM zEnterprise 196 – The heart of the new machine
The industry's fastest and most scalable enterprise system

5.2 GHz superscalar processor

Up to 96 Cores, 1 to 80 configurable for client use

45 sub-capacity settings

Up to 3 TB RAIM memory

Over 100 new instructions

1.5MB L2 Cache per core

24MB L3 Cache per processor chip

192MB L4 Cache per book

Cryptographic enhancements

Optional water cooling

Optional DC power

Dramatic improvement over IBM System z10 EC

For Linux
Up to **60%**
Improvement in performance

for **35%**
Less cost
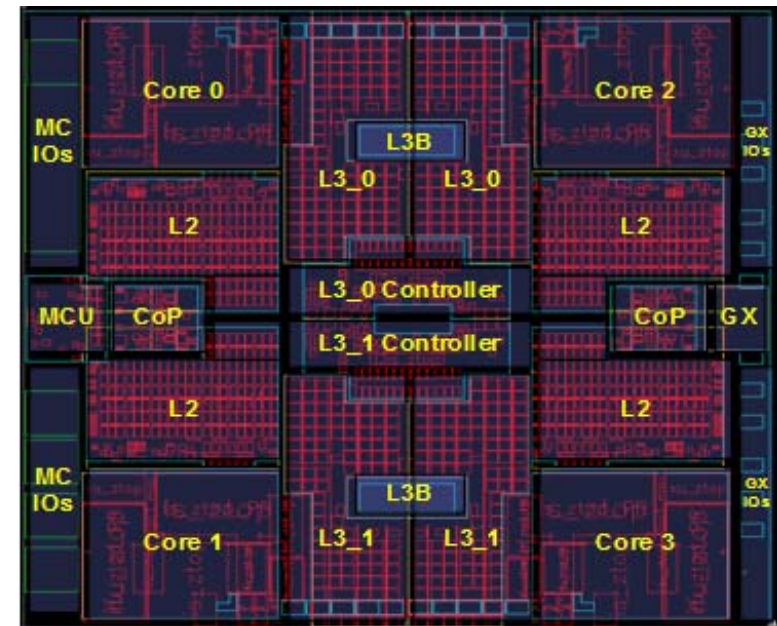
For z/OS
Up to **40%**
Improvement in performance

with **60%**
More capacity

- With no increase in energy consumption
- And even better performance with new software
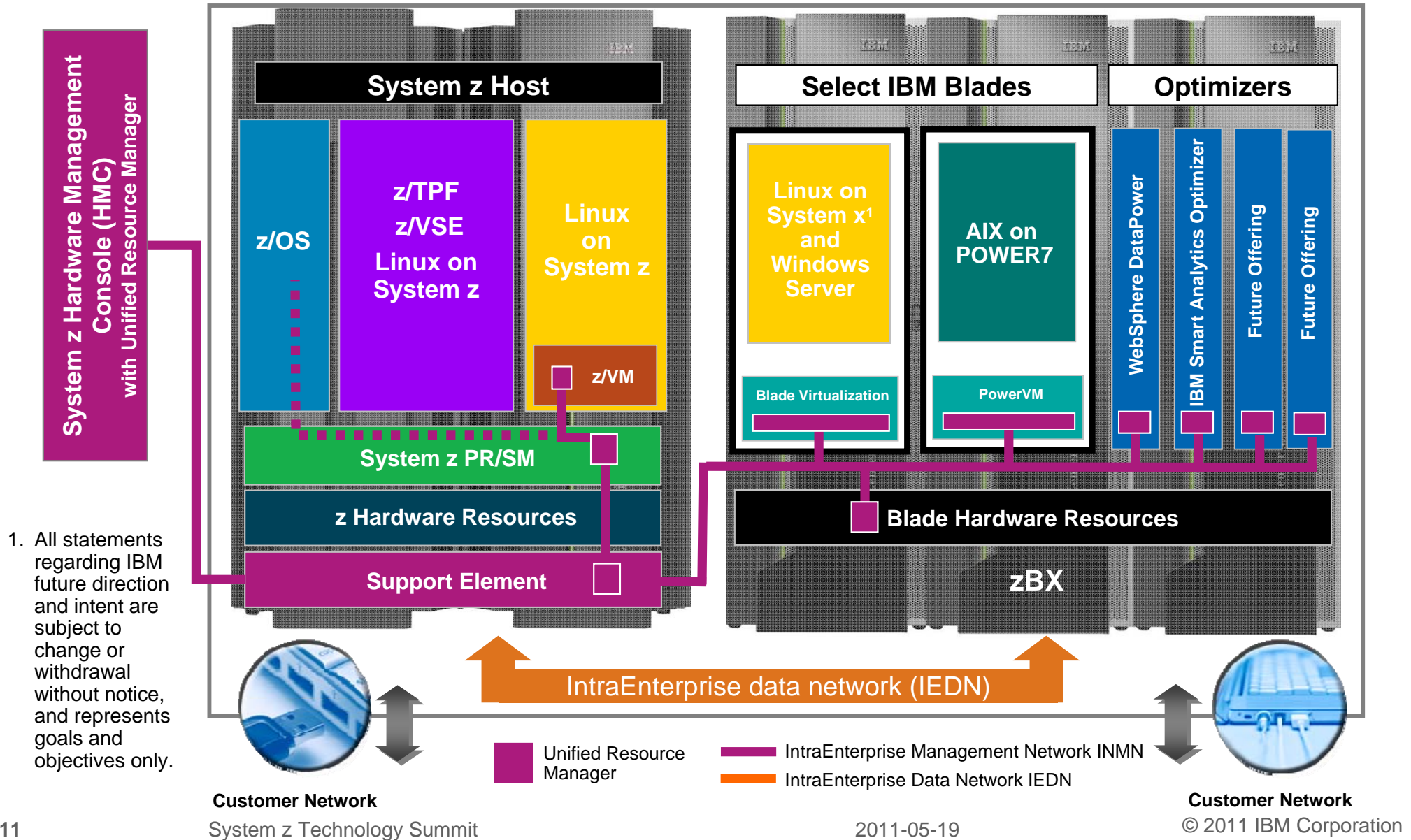
z196 – IBM leadership technology at the core

- **New 5.2 GHz Quad Core Processor Chip boosts hardware price/performance**
  - Over 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**

A look inside the IBM zEnterprise System
Enabling a new dimension in application architecture

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

System z Host

z/OS	z/TPF z/VSE Linux on System z	Linux on System z
		z/VM

System z PR/SM

z Hardware Resources

Support Element

Select IBM Blades

Linux on System x[1] and Windows Server	AIX on POWER7
Blade Virtualization	PowerVM

Optimizers

WebSphere DataPower	IBM Smart Analytics Optimizer	Future Offering	Future Offering

Blade Hardware Resources

zBX

IntraEnterprise data network (IEDN)

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

Customer Network

Customer Network

	Unified Resource Manager		IntraEnterprise Management Network INMN
			IntraEnterprise Data Network IEDN

zEnterprise BladeCenter Extension (zBX)

An infrastructure to host and integrate non-System z components with System z

- **BladeCenter Frame to host multiple resource types**
  - Select IBM blades – POWER7 and IBM System x[1]
  - Optimizers – IBM Smart Analytics Optimizer and WebSphere® DataPower® XI50z
- **More System z-like service than BladeCenter**
  - Fully integrated system with tested and supported components
  - Redundant switches, power, blowers, network to improve availability
  - A simplified service method to provide tested code updates
  - Yet, no System z software running in zBX – No MIPS/MSU rating
- **Connected to z196 with dual (redundant) 10 Gb secure link**
  - Connection between zBX and z196 for data and support

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

Design points of zEnterprise BladeCenter Extension (zBX)
Customers have connectivity but want management

- **Enhance the overall experience of attaching blades and optimizers**
  - Increase availability of infrastructure – build in redundancy
  - Provide System z-like maintenance – by System z SSR – 24x7 warranty support, call home
- **Improve the connectivity between blades and IBM System z®**
  - Build a very high speed secure network
  - Ensure network availability – build in redundancy
  - Simplify – Significantly reduce the need for connection devices / black boxes (e.g. routers, switches)
- **Automate as many functions as possible across the infrastructure**
  - Consolidate "platform management" function and offer as integrated virtualization firmware for each component
  - Manage across multiple heterogeneous platforms including mainframes, POWER®, x86
  - Automatically maintain consistent firmware levels on distributed servers

IBM POWER7 and IBM System x[1] Blades

General purpose processors under one management umbrella

What is it?

- **The zBX infrastructure can host select IBM POWER7 and IBM System x blades[1]. Each blade comes with an installed hypervisor that offers the possibility of running an application that spans z/OS, Linux on System z, AIX on POWER®, or Linux (3Q2011) or Windows Server (4Q2011) on IBM System x[1] but under a single management umbrella.**

How is it different?

- **Complete management:** Advanced management brings operational control and cost benefits, improved security, workload management based on goals and policies.
- **Virtualized and Optimized:** Virtualization means fewer resources are required to meet peak demands with optimized interconnection.
- **Integrated:** Integration with System z brings heterogeneous resources together that can be managed as one.
- **Transparency:** Applications certified to run on AIX 5.3 or AIX 6.1 are certified and run on the POWER7 blade. No changes to deployed guest images.
- **More applications:** Brings larger application portfolio to System z.

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

IBM Smart Analytics Optimizer

Breakthrough technologies to accelerate business analytics

What is it?

- **The IBM Smart Analytics Optimizer is a workload optimized, appliance-like, add-on, that enables the integration of business insights into operational processes to drive winning strategies. It accelerates select queries, with unprecedented response times.**

Up to **80X** performance increase

How is it different?

- **Performance:** Unprecedented response times to enable 'train of thought' analyses frequently blocked by poor query performance.
- **Integration:** Connects to DB2® through deep integration providing transparency to all applications.
- **Self-managed workloads:** Queries are executed in the most efficient way.
- **Transparency:** Applications connected to DB2 are entirely unaware of IBM Smart Analytics Optimizer.
- **Simplified administration:** Appliance-like hands-free operations, eliminating many database tuning tasks.

Faster insights for enabling new opportunities

WebSphere DataPower Integration Appliance XI50 for zEnterprise (XI50z) helps extend the value of zEnterprise

What is it?

- **The IBM WebSphere DataPower XI50z integrated in the zEnterprise System, can help simplify, govern, and enhance the security of XML and IT services by providing connectivity, gateway functions, data transformation, protocol bridging, and intelligent load distribution.**
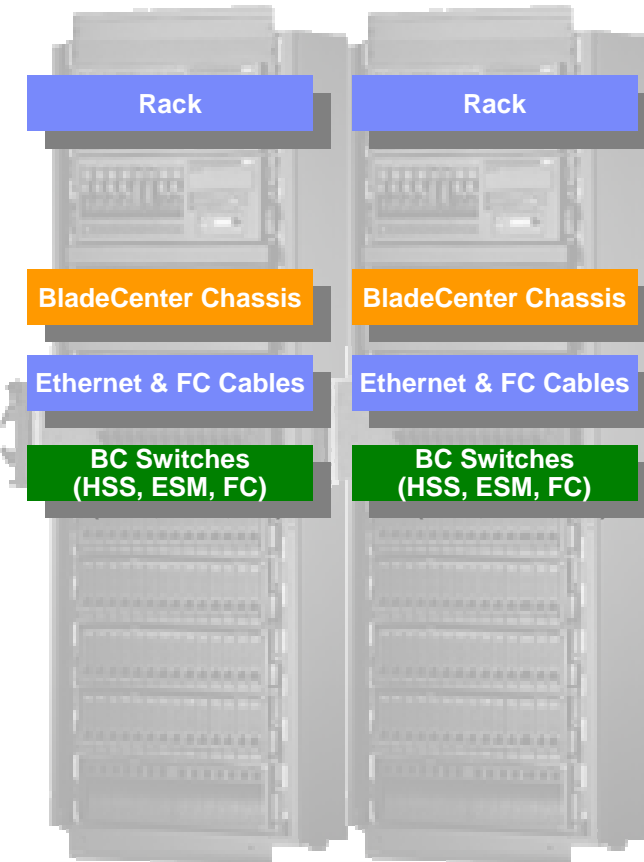
How is it different?

- **Security:** VLAN support provides enforced isolation of network traffic with secure private networks.

- **Improved support:** Monitoring of hardware with "call home" for current or expected problems and support by System z Service Support Representative.

- **System z packaging:** Increased quality with pre-testing of blade and zBX. Upgrade history available to ease growth. Guided placement of blades to optimize.

- **Operational controls:** Monitoring rolled into System z environment from single console. Time coordination with System z. Consistent change management with Unified Resource Manager.
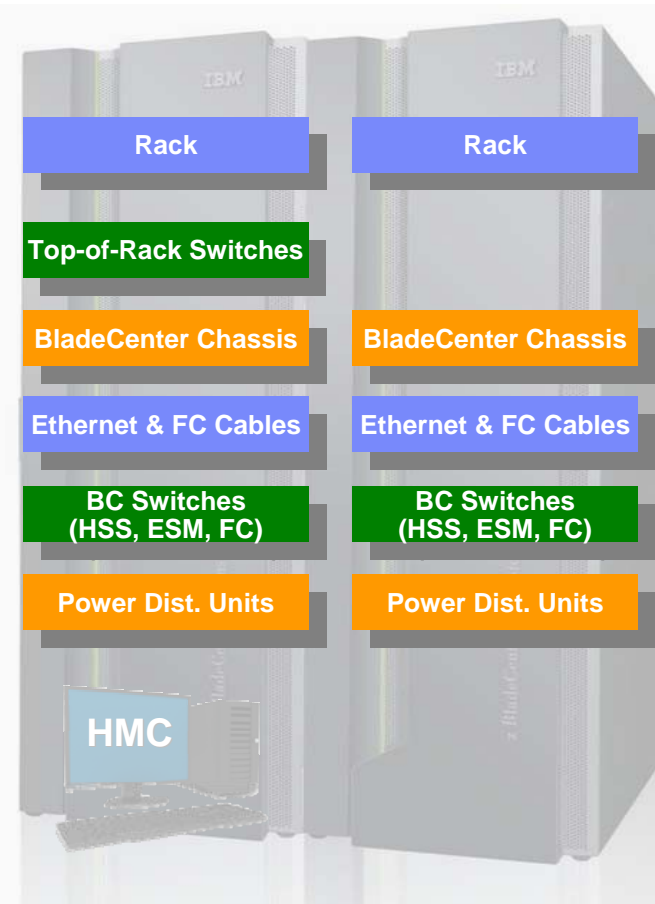
zBX – A uniquely configured extension of the zEnterprise
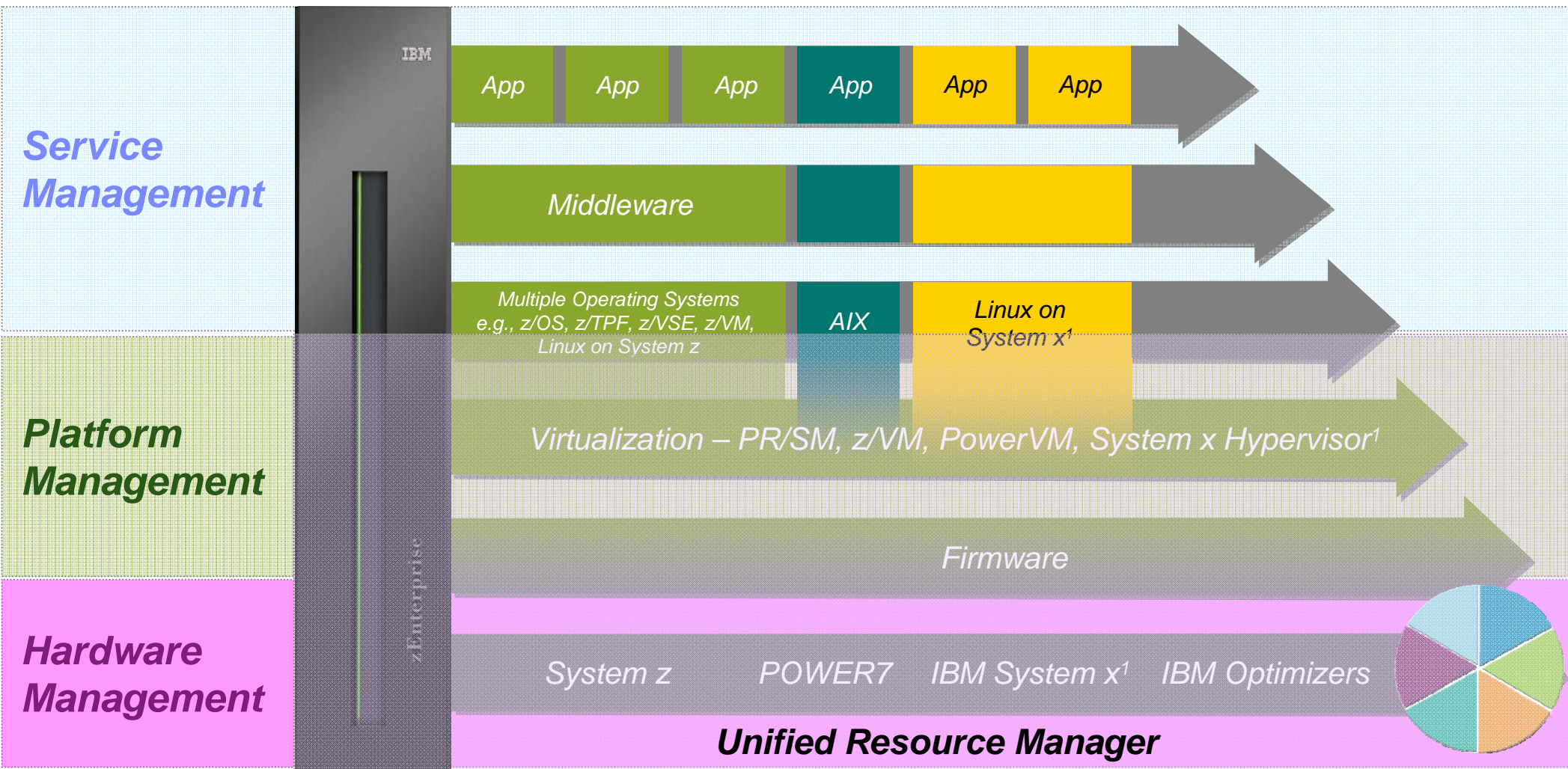*Looks like a rack with BladeCenters but much more*

- **zBX is assembled and built at the IBM plant**
  - All parts and microcode – tested and shipped as a completed package
- **zBX hardware redundancy provides improved availability**
  - Redundant switches provide guaranteed connection between z196 and zBX
  - Redundant Power Distribution Units improve availability
  - Extra blowers manage heat dispersion/removal
- **zBX provides an isolated and secure network**
  - Four top-of-rack switches for connection to the controlling z196
  - Redundant 10 Gb private data network (IEDN)

Rack | **Rack**

BladeCenter Chassis | BladeCenter Chassis

Ethernet & FC Cables | Ethernet & FC Cables

BC Switches (HSS, ESM, FC) | BC Switches (HSS, ESM, FC)

Rack infrastructure hosting IBM BladeCenters

Rack | **Rack**

Top-of-Rack Switches

BladeCenter Chassis | BladeCenter Chassis

Ethernet & FC Cables | Ethernet & FC Cables

BC Switches (HSS, ESM, FC) | BC Switches (HSS, ESM, FC)

Power Dist. Units | Power Dist. Units

HMC

IBM zEnterprise BladeCenter Extension (zBX)

zEnterprise extends Service Management for improved governance

Service Management

App | App | App | App | App | App

Middleware

Multiple Operating Systems e.g., z/OS, z/TPF, z/VSE, z/VM, Linux on System z | AIX | Linux on System x[1]

Platform Management

Virtualization – PR/SM, z/VM, PowerVM, System x Hypervisor[1]

Firmware

Hardware Management

System z | POWER7 | IBM System x[1] | IBM Optimizers

Unified Resource Manager

Focused, collaborative innovation – A "complete systems" approach

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

zEnterprise Unified Resource Manager design points

*Integrate and manage your mainframe and distributed environment as one*

- **Incorporate "hardware management / platform management" capabilities into robust firmware to control each attached hardware component – mainframe to blade**
  - Hypervisors managed as firmware
  - Network managed by firmware – improved access control
  - Single management point of control – the HMC – reduced complexity of day-to-day operations
  - Simplified installation – auto discovery and configuration of resources inserted into the zBX

- **Deliver workload awareness to optimize the system resources in accordance with understanding the policies assigned to that particular workload.**

- **System z service and support management for the z196 and the virtual machines and blades**
  - Monitoring of heterogeneous architectures for problems, logging and analyzing of events, initiating recovery procedures, call home and notifying the user – all with time stamps to maintain data and transaction integrity

- **Offers virtual server provisioning and management for Linux guests running on z/VM – even if you don't have a zBX**
  - Simplified skill level needed to manage a Linux on z/VM environment

Manage your mainframe and distributed servers with the same tools, same techniques, same practices

Unified Resource Manager

zEnterprise Unified Resource Manager
Two suites of tiered functionality
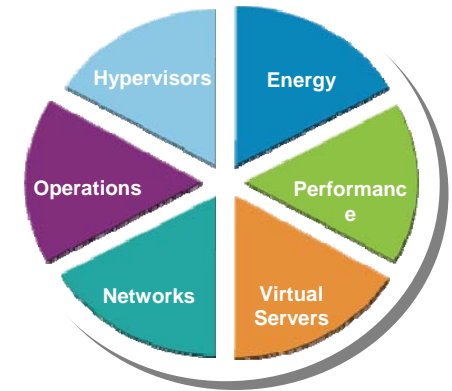
- **Manage**
  - Monitoring and trend reporting of CPU energy efficiency
  - Integrated hardware / asset management across all elements of the system
  - Private and physically isolated connections for secure support and data sharing
  - Simple administrative wizard
- **Automate**
  - Additional wizard function – Capability to associate workload resources with a named business process
  - Ability to manage to a user-defined performance service level policy and enable performance monitoring, reporting and resource optimization
  - Static power savings (reduce power on z196 during low utilization such as DR or backup servers) and energy management capabilities

Unified Resource Manager can help you to align the needs of the business with what IT can deliver and that brings real value

DS8000 family models
Two base models with scalable controllers and capacity

DS8700

- **POWER6 controllers (2-way and 4-way)**
- **4 Gb/s and 8 Gb/s host adapters; 2 Gb/s device adapters**
- **3.5" large-form-factor Fibre Channel drive interface**

DS8800

- **POWER6+ controllers (2-way and 4-way)**
- **8 Gb/s host and device adapters**
- **2.5" small-form-factor SAS-2 drive interface**

DS8700/DS8800 microcode and function merge
Same world-class functionality on both hardware platforms

- **Both DS8800 and DS8700 now share same microcode and deliver same functionality**
  - Enabled quick introduction of exciting new DS8800 hardware features for existing clients accustomed to exceptional code reliability
- **Key DS8700 functions now supported on DS8800 with Release 6.1**
  - Easy Tier and Storage Tier Advisor tool
  - Thin Provisioning
  - z/OS Metro/Global Mirror Incremental Resync
  - Remote Pair FlashCopy
  - z/OS Distributed Data Backup
  - z/OS FICON Discovery and Auto Configuration (zDAC)
  - High Performance FICON for System z extended distance support
  - Multiple Global Mirror sessions
  - Volume deletion protection

DS8000 hardware overview

- DS8800 (2-way and 4-way)
  - Two dual POWER6+ based processor servers
  - Up to 384 GB Cache
  - 4- and 8-port 8 Gbps Fibre Channel/FICON host adapters
  - Up to 1,056 drives
  - Disk drive support
    - Solid-state: 300 GB
    - 6 Gbps Serial attach SCSI (SAS-2) drives: 146 GB 15K RPM; 450 GB, 600 GB 10K RPM
    - 6 Gbps SAS-2 drives with Full Disk Encryption: 450 GB, 600 GB 10K RPM
  - Physical capacity from 2.3 TB up to 634 TB with support for 3 full frames

- DS8700 (2-way and 4-way)
  - Two dual POWER6 based processor servers
  - Up to 384 GB Cache
  - 4-port 4 Gbps Fibre Channel/FICON host adapters
  - Up to 1,024 drives
  - Three tiers of drive options
    - Solid-state: 73 GB, 146 GB, 600 GB
    - Fibre Channel: 146 GB, 300 GB, 450 GB 15K RPM
    - Serial ATA (SATA): 2 TB 7200K RPM
  - Physical capacity from 1.1 TB up to 2,048 TB with support for 5 full frames

System z education on the Web
ibm.com/vm/devpages/jelliott/educate.html

- **On my education page, there are lots of links to education materials on System z**
  - IBM Training
  - IBM Webcasts
  - Non-IBM System z Training
  - Internet Discussion Lists
  - System z Academic Initiative
  - Information Centers and the Education Assistant
  - ABCs of z/OS System Programming
  - z/OS Communications Server
- **This web page is frequently updated and you can subscribe to change notifications**

The IBM zEnterprise System:

Extending System z cost savings and value to a new dimension

- **Designed to meet the need of today's heterogeneous data centers**
- **Enables a mixed set of workloads to be deployed on best fit technologies**
- **Delivers lower acquisition and operating costs than a one size fits all approach**
- **Reduces risk by extending the reach of System z qualities of service**
- **Improves service through tighter integration for multi-tier workloads**
  - 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
    - WebSphere DataPower Appliances[1]

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

Thanks!

J. L. (Jim) Elliott
Consulting Sales Specialist – System z
zChampion & Linux Champion
Systems & Technology Group

IBM Canada Ltd.
3600 Steeles Avenue East
Markham, ON L3R 9Z7

Office: 905-316-5813
Mobile: 416-527-0666
Fax: 845-491-5004
Jim_Elliott@ca.ibm.com
ibm.com/vm/devpages/jelliott/