

IBM zEnterprise Unified Resource Manager Overview

The value for z/VM



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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.

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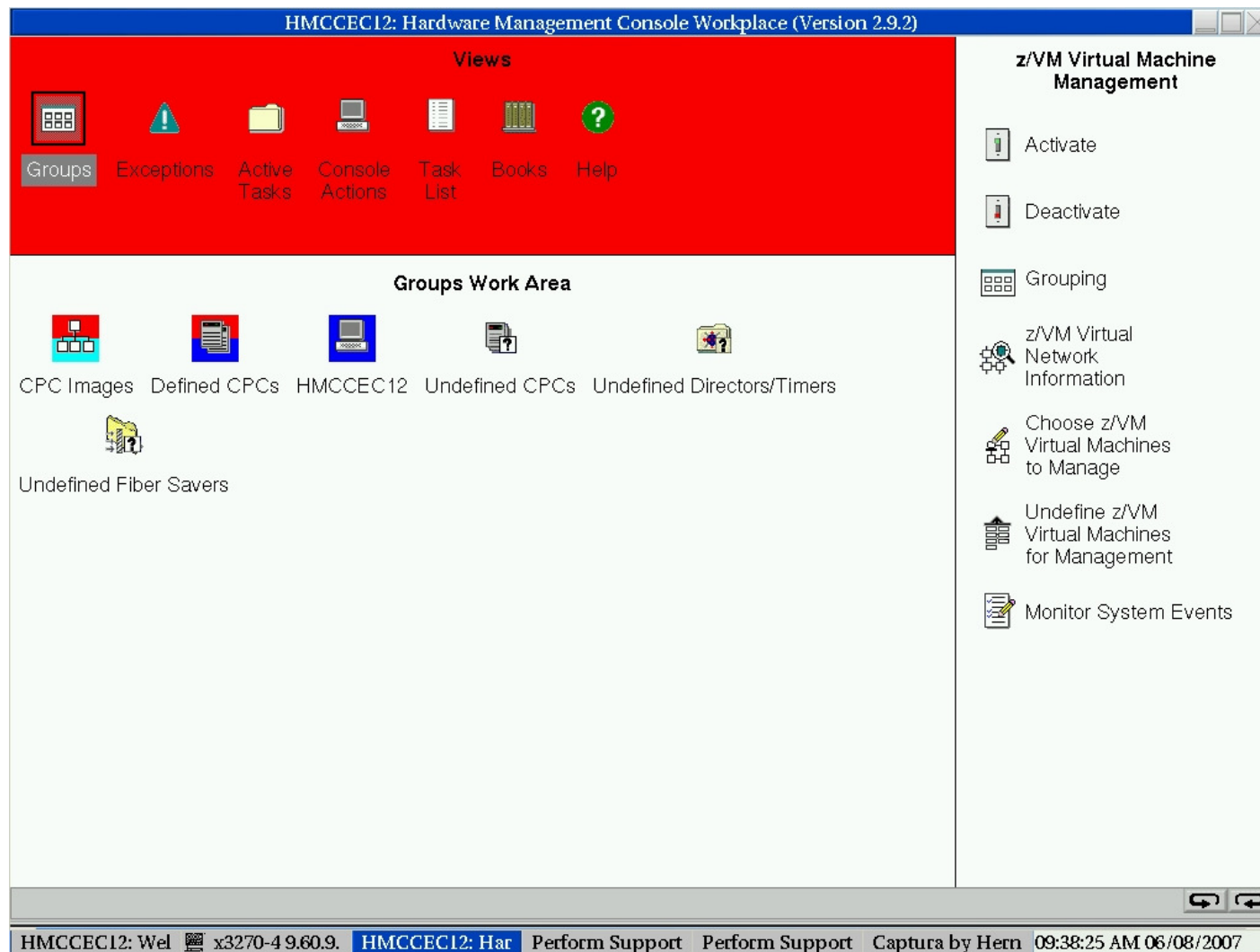
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Agenda

- System z10 HMC-Based z/VM Management
- zEnterprise HMC-Based z/VM Management
- New HMC Roles
- Unified Resource Manager
- Managing z/VM on zEnterprise
- Examples
- Performance Management
- Conclusion

System z10 HMC-Based z/VM Management



IBM zEnterprise System – 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**

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

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

- Selected IBM POWER7® blades and IBM System x® Blades¹ 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

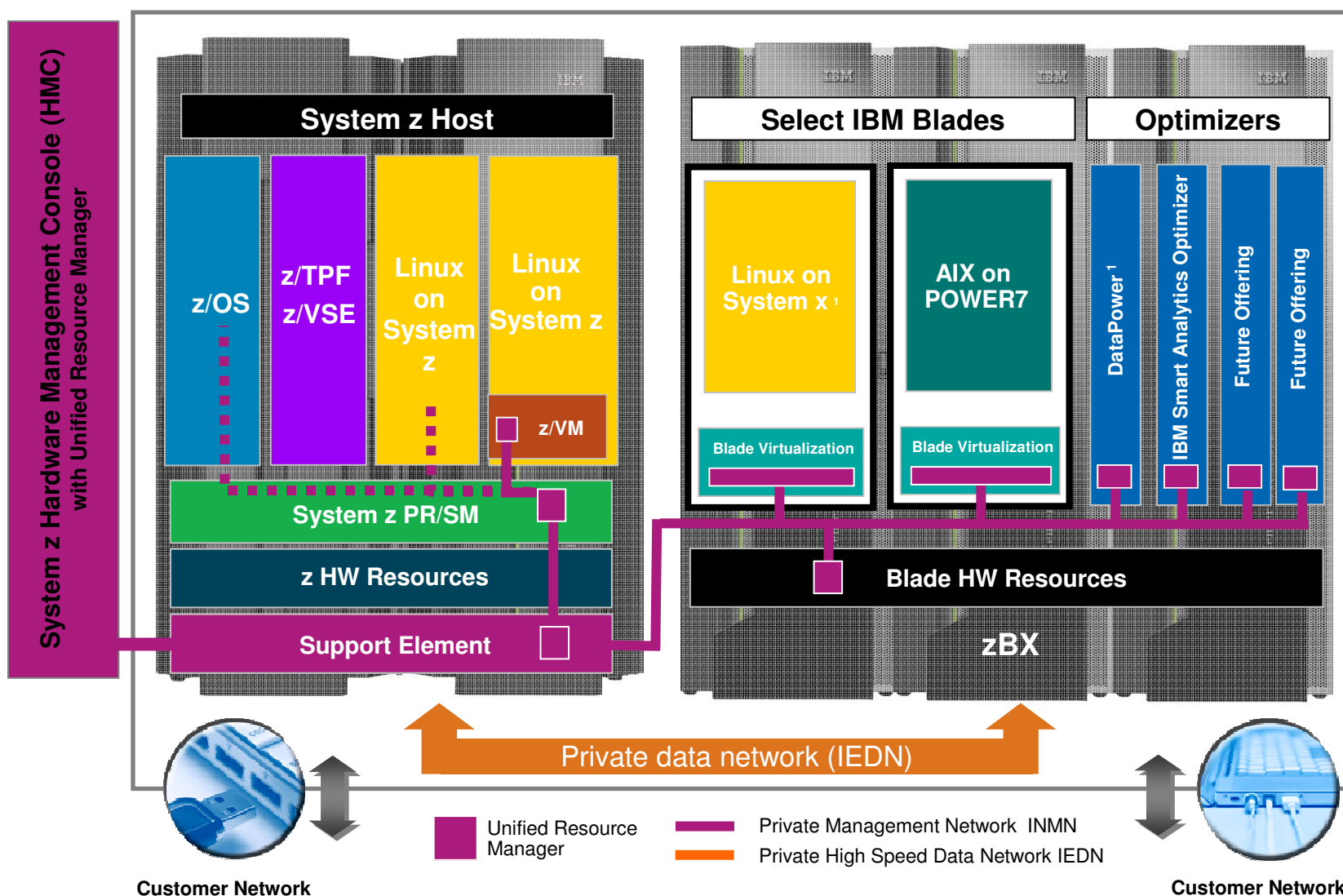
The world's fastest and most scalable system:
IBM zEnterprise™ 196 (z196)



- 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)

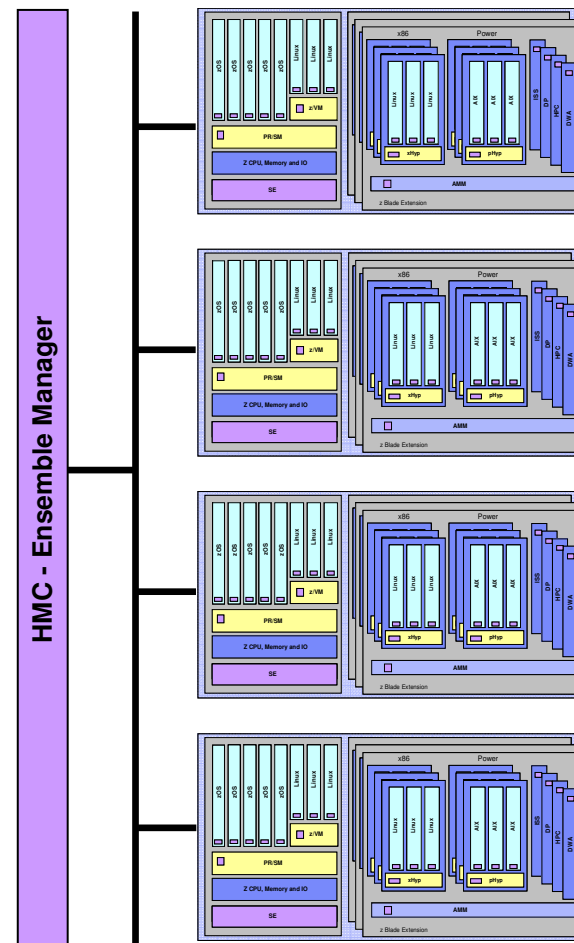
Putting zEnterprise System to the task

Use the smarter solution to improve your application design

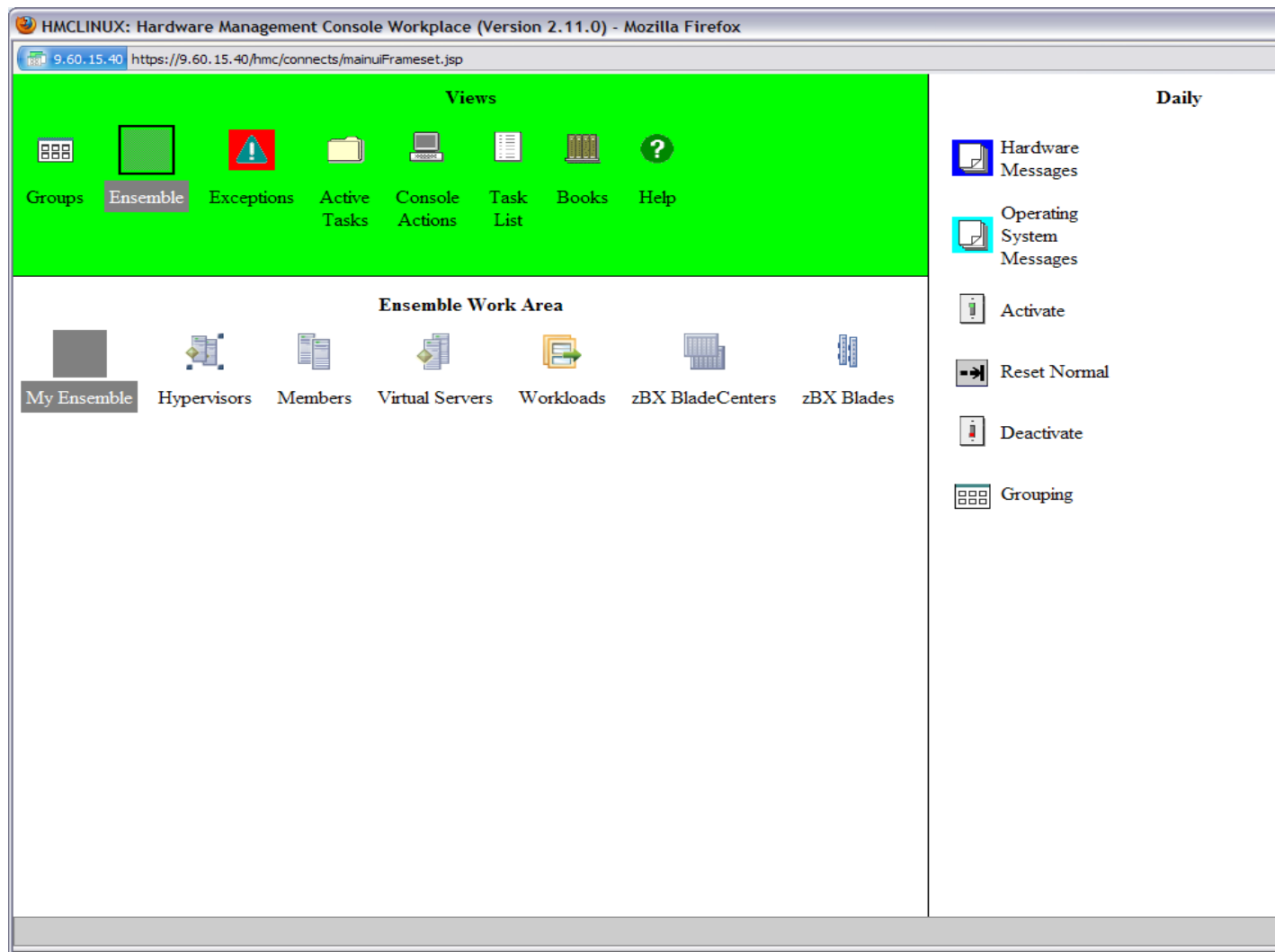


zEnterprise Ensemble

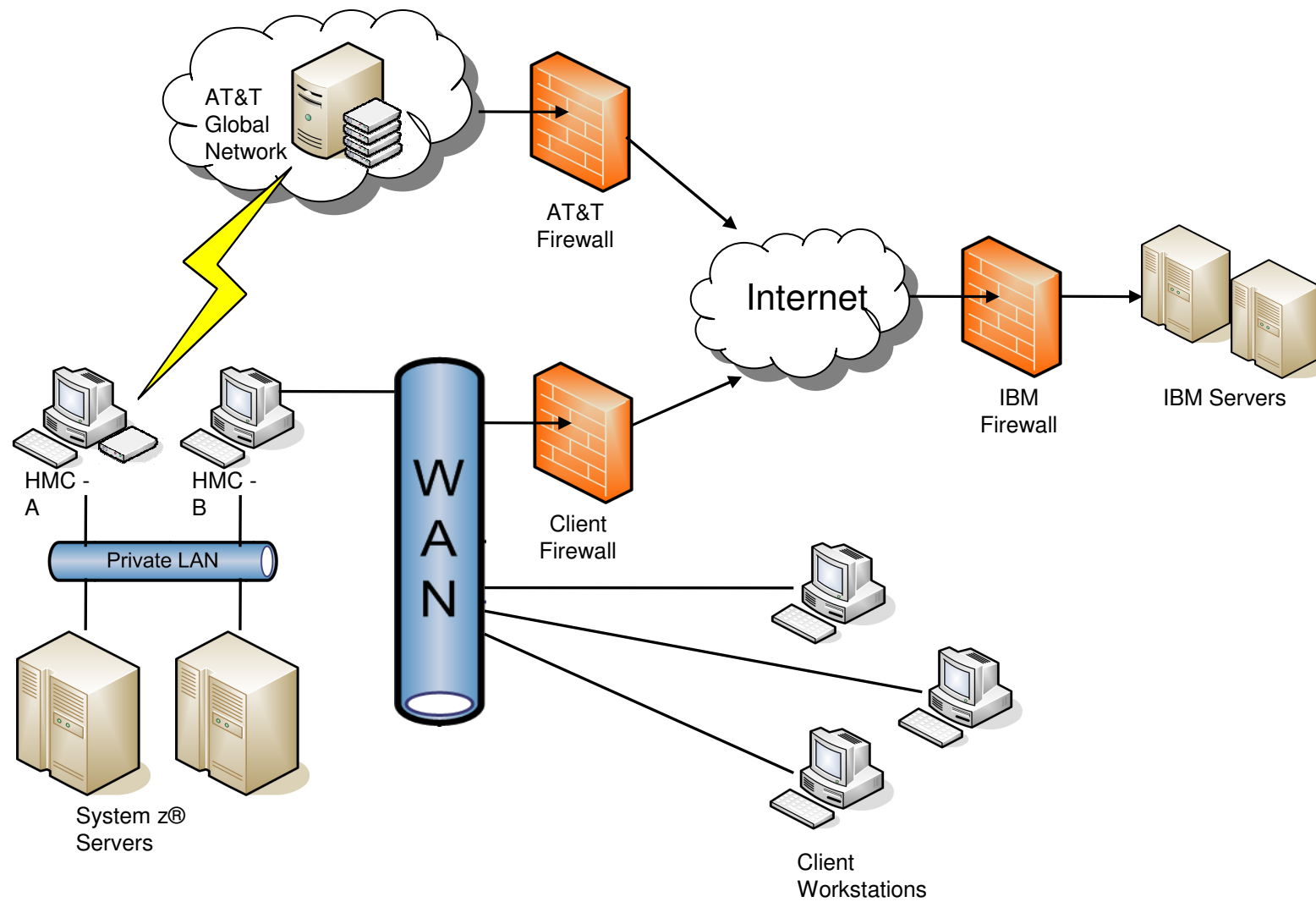
- A zEnterprise Node is a single zCEC with 0 to 4 racks with up to two blade centers per rack
- A zEnterprise Ensemble is a collection of 1 to 8 zEnterprise Nodes managed as a single virtualized pool of server resources
- A zEnterprise node can be a member of a single ensemble
- An ensemble is the management scope for the Unified Resource Manager
- A primary / alternate pair of HMCs provide the management console for the ensemble
 - The alternate HMC takes over in case the primary fails



zEnterprise HMC-Based z/VM Management



HMC Connectivity



HMC Security Infrastructure

- Hardware Management Console (HMC) extended to support new management roles
 - Secure SSL based remote access (optional)
 - Full complement of certificate management capabilities
 - Complete user management suite
 - Full-function user definition
 - Highly flexible password rule definition
 - Centralized authentication using LDAP
 - Complete access controls for tasks and resources allowed for each user (i.e., User Roles)
 - Automatic replication of configuration data
 - Full-function embedded firewall

Ensemble Management Users and Roles

- New task and resource roles enable isolation across management disciplines
- New predefined users EnsOperator and EnsAdmin

Role	Description
Ensemble Administrator	Responsible for creating and managing the zGryphon ensemble Create Ensemble, Add Member...
Virtual Network Administrator	Responsible for Managing Virtual Networks, Hosts, and MAC Prefixes Manage Virtual Networks, Add Hosts to Virtual Networks, Create VLAN IDs...
Virtual Server Administrator	Responsible for managing virtual servers New /Modify Virtual Server, Add Virtual Disk, Migrate...
Virtual Server Operator	Responsible for performing and scheduling virtual server activation/deactivation, mounting virtual media Activate, Deactivate, Mount Virtual Media, Console session...
Storage Resource Administrator	Responsible for managing storage resources – Storage Access Lists, WWPNS, z/VM Storage Groups Export WWPNS, Import SAL, Add Storage Resources...
Workload Administrator	Responsible for managing workloads New /Modify workload, Add / Remove Virtual Servers..
Performance Management Administrator	Responsible for managing performance policies New /Modify performance policy, Import policy
Performance Management Operator	Responsible for performing and scheduling policy activations and creating threshold notifications Activate, Export Policy, Monitor System Events
Energy Management Administrator	Responsible for managing power settings including power capping and power savings Set Power Cap, Set Power Savings Mode, Set zBX Power Policy

zEnterprise Unified Resource Manager

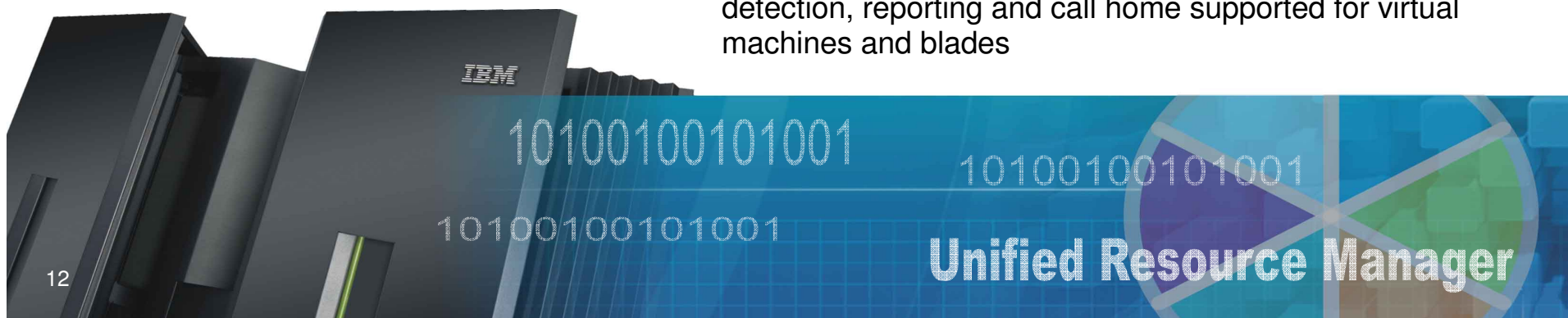
Transforming the way resources are managed and deployed

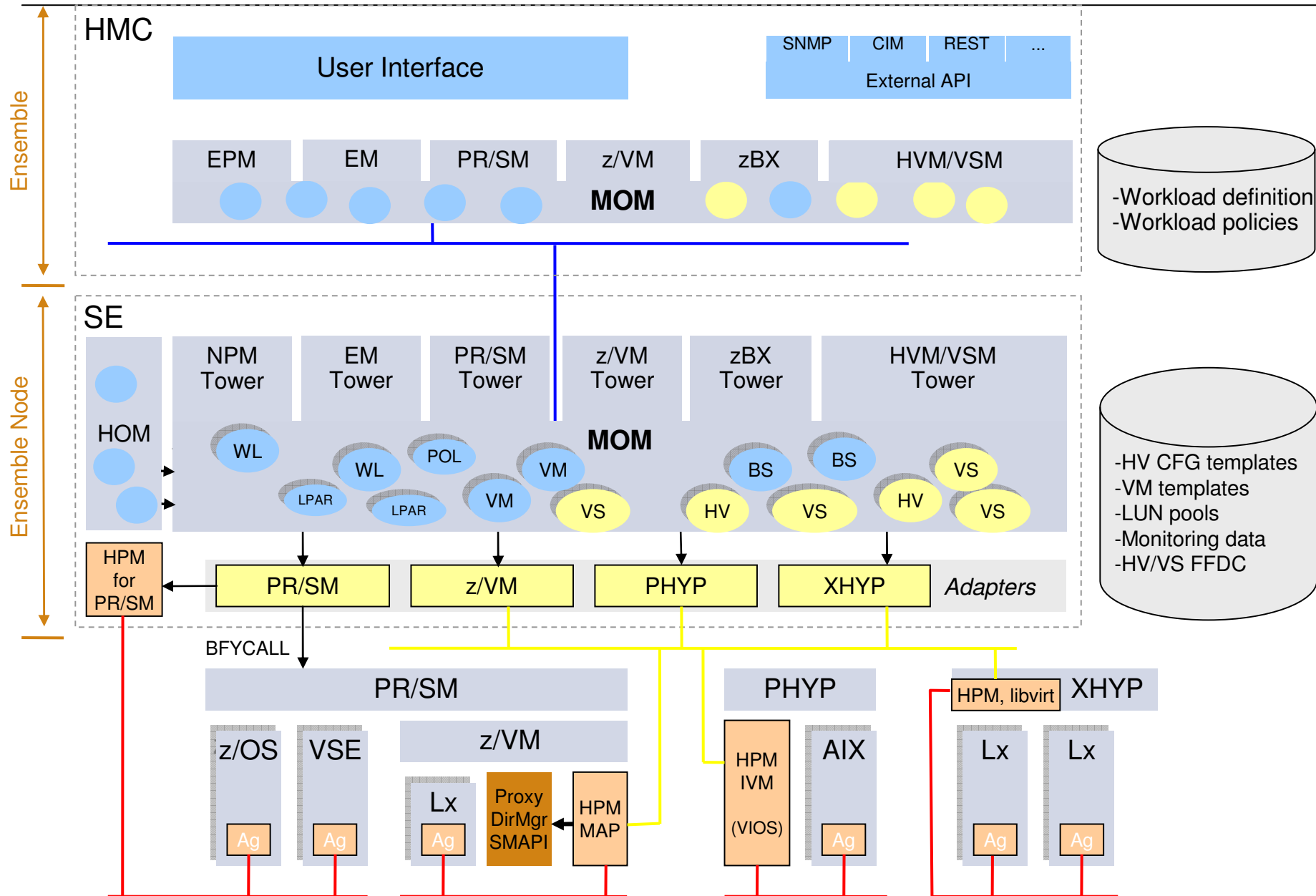
What is it?

*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.*

How is it different?

- **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:** Hardware problem detection, reporting and call home supported for virtual machines and blades





Synergy with z/VM

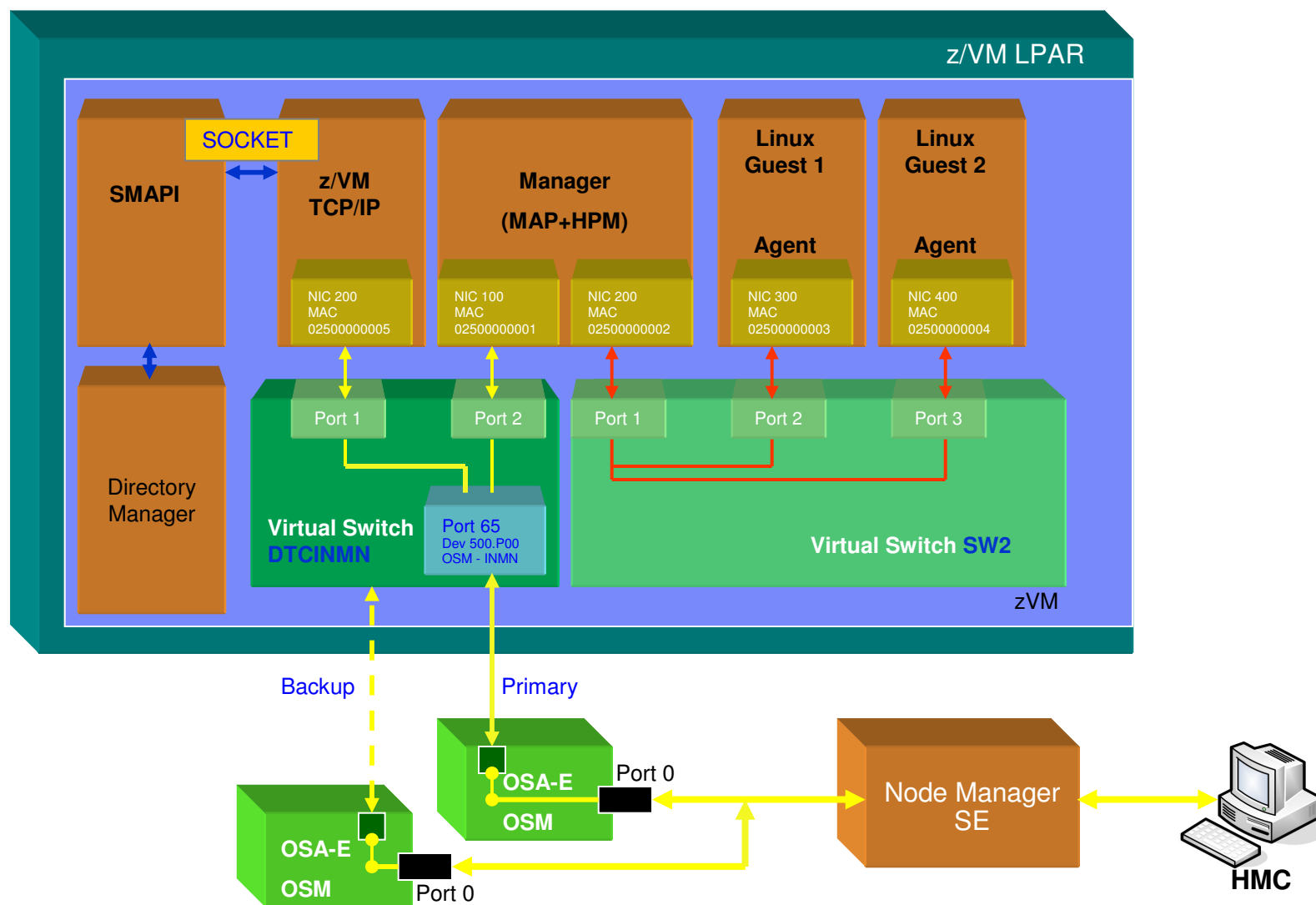
- Server and application consolidation on System z using Linux and z/VM is the industry leader in large-scale, cost-efficient virtual server hosting
- zEnterprise introduces virtual server provisioning and management for Linux guests running on z/VM
 - Use the Unified Resource Manager to create z/VM virtual machines
 - Simplify the skill level needed to manage a Linux on z/VM environment
- Faster cores and a bigger system cache on the z196 let you do even more with less when running Linux on z/VM
- Integrated blades on zBX offer an new dimension for workload optimization

z/VM Enhancements for zEnterprise Unified Resource Manager

Complete virtual machine management from the HMC

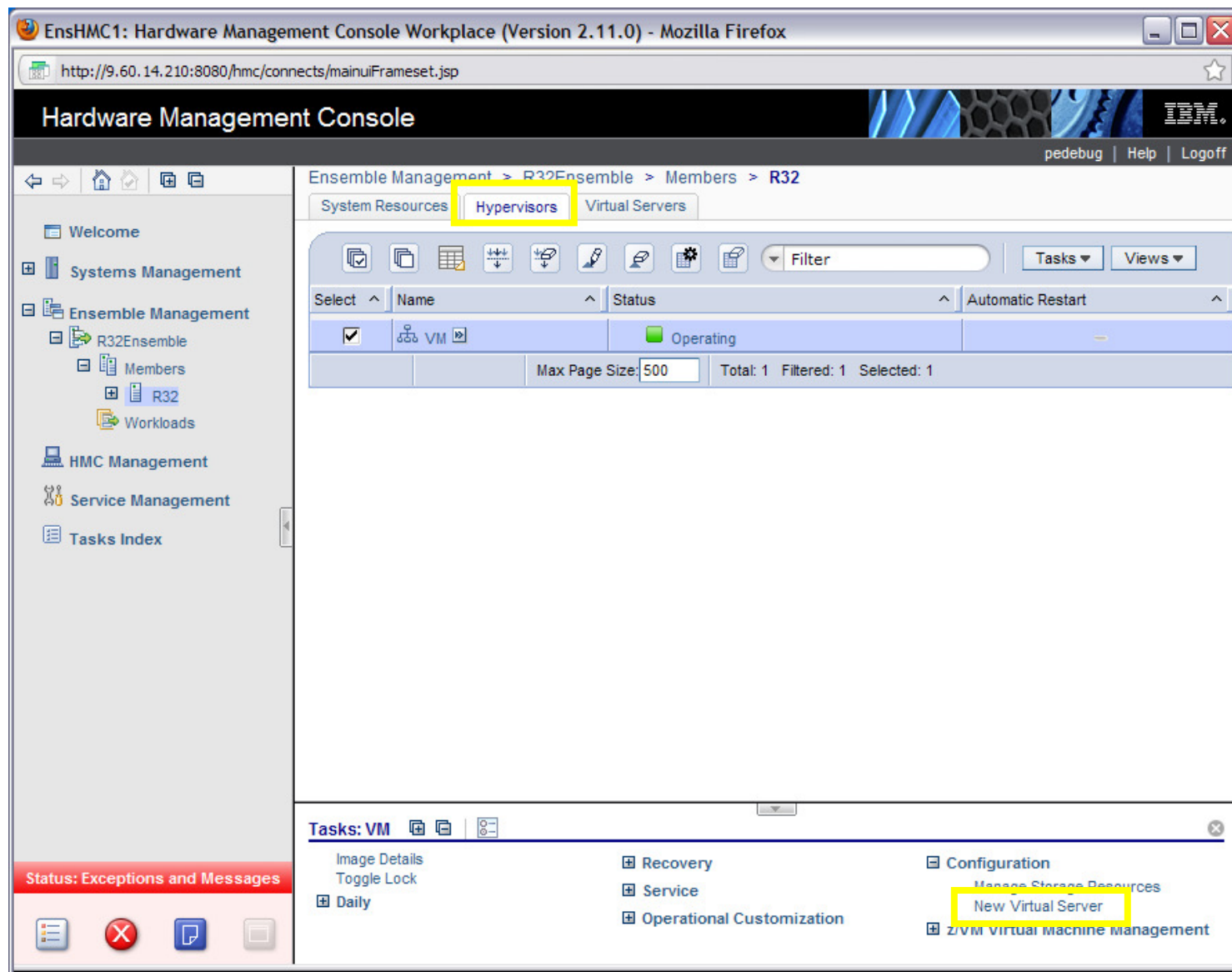
- **Software**
 - z/VM 6.1 with applicable PTFs
 - z/VM Management Guest – HPM and MAP
 - z/VM SMAPI server
 - z/VM Directory Maintenance server (or equivalent)
 - INMN and IEDN virtual switch controllers
 - Control point for MAC assignment and VLAN access
 - Supported Linux SLES and RHEL distributions
 - Optional Guest Performance Management Provider
 - Legacy NIC can connect to IEDN or INMN via virtual switch
- INMN and IEDN access provided via new z/VM virtual switch types
 - Up-link can be virtual machine NIC (for Management Guest purposes)
 - Ensemble membership conveys Ensemble UUID and MAC prefix
 - Automatic connection to INMN
- SMAPI manages SYSTEM CONFIG
- z/VM is authoritative source of virtual machine state
 - State changes automatically reflected to Unified Resource Manager

z/VM Management Infrastructure



Use Cases

- New virtual server
- Virtual server details
- Create virtual network
- Associate virtual server with virtual network



EnsHMC1: Hardware Management Console Workplace (Version 2.11.0) - Mozilla Firefox

http://9.60.14.210:8080/hmc/connects/mainuiFrameset.jsp

Hardware Management Console

pedebug | Help | Logoff

Ensemble Management > R32Ensemble > Members > R32

System Resources **Hypervisors** Virtual Servers

Select ^ Name ^ Status ^ Automatic Restart ^

<input checked="" type="checkbox"/>	VM	Operating	
-------------------------------------	----	-----------	--

Max Page Size: 500 Total: 1 Filtered: 1 Selected: 1

Tasks: VM

- Image Details
- Toggle Lock
- Daily
- Recovery
- Service
- Operational Customization
- Configuration
- Manage Storage Resources
- New Virtual Server**
- z/VM Virtual Machine Management

Status: Exceptions and Messages

EnsHMC1: New Virtual Server - Mozilla Firefox

http://9.60.14.210:8080/hmc/content?taskId=71&refresh=138

New Virtual Server - R32:VM

- ✓ Welcome
- **Enter Name**
- Assign Processors
- Specify Memory
- Add Network
- Add Storage
- Specify Options
- Select Workloads
- Performance Management
- Summary

Enter Name
Enter in a name and description for the virtual server.

Hypervisor name: VM
Hypervisor type: Image

Name: * BuyerVM

Description: zVM Virtual Server

< Back Next > Finish Cancel Help

EnsHMC1: New Virtual Server - Mozilla Firefox

http://9.60.14.210:8080/hmc/content?taskId=71&refresh=138

New Virtual Server - R32:VM

- ✓ [Welcome](#)
- ✓ [Enter Name](#)
- [Assign Processors](#)
- [Specify Memory](#)
- [Add Network](#)
- [Add Storage](#)
- [Specify Options](#)
- [Select Workloads](#)
- [Performance Management](#)
- [Summary](#)

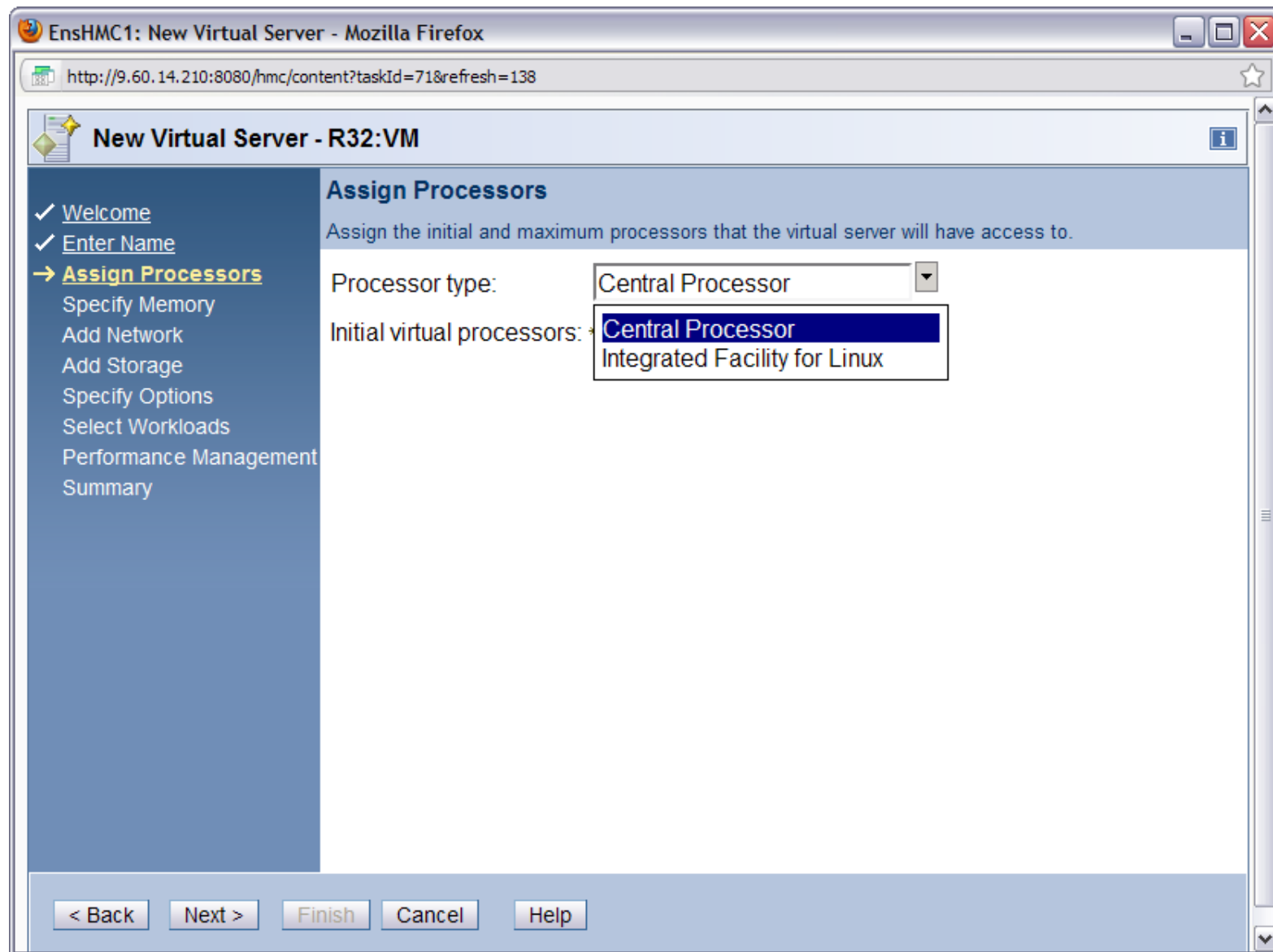
Assign Processors

Assign the initial and maximum processors that the virtual server will have access to.

Processor type:

Initial virtual processors: *

< Back Next > Finish Cancel Help



EnsHMC1: New Virtual Server - Mozilla Firefox

http://9.60.14.210:8080/hmc/content?taskId=71&refresh=138

New Virtual Server - R32:VM

- ✓ Welcome
- ✓ Enter Name
- ✓ Assign Processors
- **Specify Memory**
- Add Network
- Add Storage
- Specify Options
- Select Workloads
- Performance Management
- Summary

Specify Memory

Specify the amount of dedicated memory that will be available for the virtual server. The memory amount must be specified in increments of 1 MB.

Initial memory: * 1024 MB

< Back Next > Finish Cancel Help

EnshMC1: New Virtual Server - Mozilla Firefox

http://9.60.14.210:8080/hmc/content?taskId=73&refresh=139

New Virtual Server - R32:VM

- ✓ [Welcome](#)
- ✓ [Enter Name](#)
- ✓ [Assign Processors](#)
- ✓ [Specify Memory](#)
- [Add Network](#)
- [Add Storage](#)
- [Specify Options](#)
- [Select Workloads](#)
- [Performance Management](#)
- [Summary](#)

Add Network

Add the network adapters that the virtual server will use to access the networks.

Select	ID	Network Name	Network Description
Total: 0			

[Add](#) [Edit](#) [Remove](#)

[Manage Virtual Networks](#)

< Back Next > Finish Cancel Help

EnsHMC1: New Virtual Server - Mozilla Firefox

http://9.60.14.210:8080/hmc/content?taskId=73&refresh=139

New Virtual Server - R32:VM

- ✓ [Welcome](#)
- ✓ [Enter Name](#)
- ✓ [Assign Processors](#)
- ✓ [Specify Memory](#)
- ✓ [Add Network](#)
- [Add Storage](#)
- [Specify Options](#)
- [Select Workloads](#)
- [Performance Management](#)
- [Summary](#)

Add Storage

Add the storage drives that the virtual server will use to access the storage resources.

Select	Device	Name	Description	Resource Name	Mode	Size
Total: 0						

[Add](#) [Edit](#) [Remove](#)

[Manage Storage Resources](#)

< Back Next > Finish Cancel Help

EnsHMC1: New Virtual Server - Mozilla Firefox

http://9.60.14.210:8080/hmc/content?taskId=73&refresh=139

New Virtual Server - R32:VM

- ✓ [Welcome](#)
- ✓ [Enter Name](#)
- ✓ [Assign Processors](#)
- ✓ [Specify Memory](#)
- ✓ [Add Network](#)
- ✓ [Add Storage](#)
- **[Specify Options](#)**
- [Select Workloads](#)
- [Performance Management](#)
- [Summary](#)

Specify Options

Choose the boot source for your virtual server.

Privilege classes: *

IPL boot device:

IPL parameters:

IPL load parameters:

< Back Next > Finish Cancel Help

EnsHMC1: New Virtual Server - Mozilla Firefox

http://9.60.14.210:8080/hmc/content?taskId=73&refresh=139

New Virtual Server - R32:VM

- ✓ [Welcome](#)
- ✓ [Enter Name](#)
- ✓ [Assign Processors](#)
- ✓ [Specify Memory](#)
- ✓ [Add Network](#)
- ✓ [Add Storage](#)
- ✓ [Specify Options](#)
- [Select Workloads](#)
- [Performance Management](#)
- [Summary](#)

Select Workloads

Select the workloads that this virtual server will participate in.

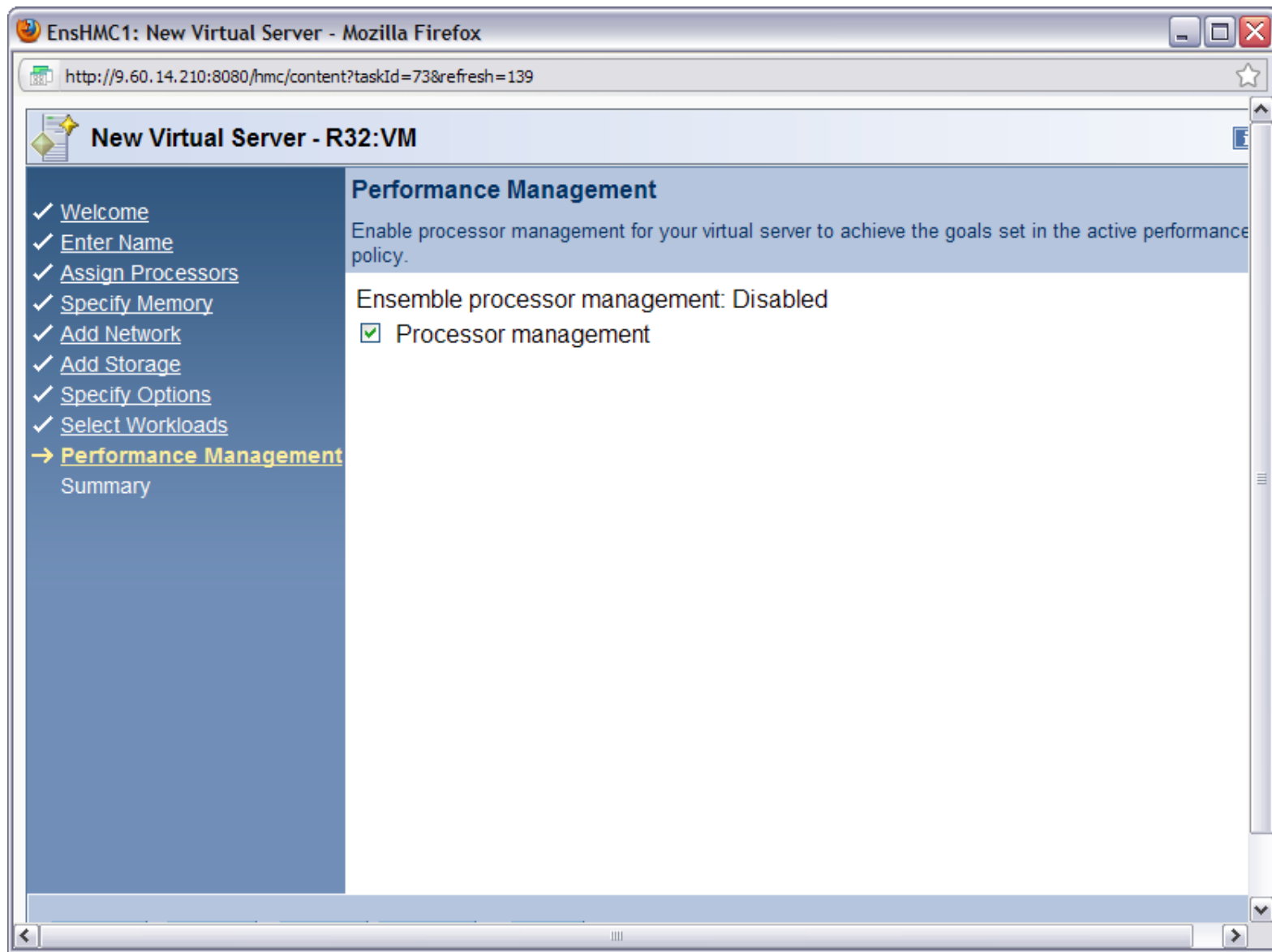
☒ Use Default workload

☐ Select workloads

Select	Name	Description
No workloads available		
Total: 0		

[New Workload](#)

< Back Next > Finish Cancel Help



EnsHMC1: New Virtual Server - Mozilla Firefox

http://9.60.14.210:8080/hmc/content?taskId=73&refresh=139

New Virtual Server - R32:VM

Summary

Verify the information below before completing the wizard.

Name:	BuyerVM
Description:	z/VM Virtual Server
Initial virtual processors:	1
Assigned dedicated memory:	1024 MB
Network Devices:	
Storage Devices:	
IPL parameters:	
IPL load parameters:	
Privilege classes:	G
Workloads:	Default
Processor management:	Enabled

[Welcome](#)
[Enter Name](#)
[Assign Processors](#)
[Specify Memory](#)
[Add Network](#)
[Add Storage](#)
[Specify Options](#)
[Select Workloads](#)
[Performance Management](#)
→ [Summary](#)

< Back Next > Finish Cancel Help

EnsHMC1: Virtual Server Details - Mozilla Firefox

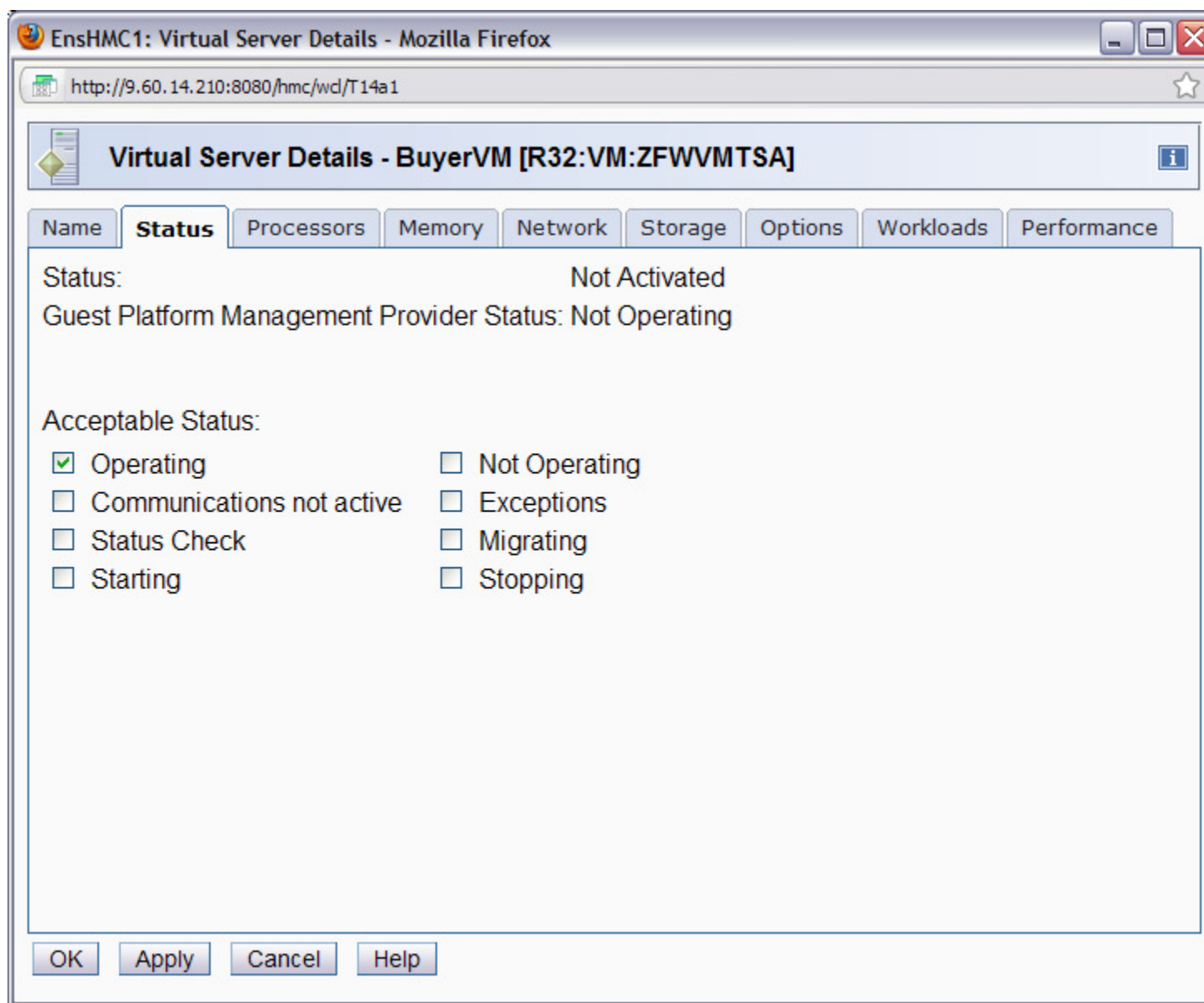
http://9.60.14.210:8080/hmc/content?taskId=74&refresh=143

Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]

Name | Status | Processors | Memory | Network | Storage | Options | Workloads | Performance

Hypervisor name: VM
Hypervisor type: Image
UUID: 4c3352da-9f37-11df-8cdb-001f163803de
Name: *BuyerVM
Description:

OK Apply Cancel Help



EnsHMC1: Virtual Server Details - Mozilla Firefox

http://9.60.14.210:8080/hmc/wcd/T14a1

Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]

Name Status **Processors** Memory Network Storage Options Workloads Performance

Processor type: Central Processor

Initial virtual processors: * 1

Maximum virtual processors: * 1

Share mode: Relative

Share limit: None

Initial relative shares: * 0

OK Apply Cancel Help

EnsHMC1: Virtual Server Details - Mozilla Firefox

http://9.60.14.210:8080/hmc/wd/T14a1

Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]

Name Status Processors **Memory** Network Storage Options Workloads Performance

Initial memory: * 1 MB

Maximum memory: * 1 MB

OK Apply Cancel Help

EnsHMC1: Virtual Server Details - Mozilla Firefox

http://9.60.14.210:8080/hmc/wcd/T14a1

Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]

Name Status Processors Memory **Network** Storage Options Workloads Performance

MAC Prefix:

Network Adapters:

Select	ID	Network Name	Network Description	MAC Address
Total: 0				

Add Edit Remove

Manage Virtual Networks

OK Apply Cancel Help

EnsHMC1: Virtual Server Details - Mozilla Firefox

http://9.60.14.210:8080/hmc/wd/T14a1

Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]

Name Status Processors Memory Network **Storage** Options Workloads Performance

Storage Drives:

Select	Device	Name	Description	Resource Name	Mode	Size
Total: 0						

Add Edit Remove

Manage Storage Resources

OK Apply Cancel Help

EnsHMC1: Virtual Server Details - Mozilla Firefox

http://9.60.14.210:8080/hmc/wcd/T14a1

Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]

Name Status Processors Memory Network Storage **Options** Workloads Performance

Privilege classes: * G

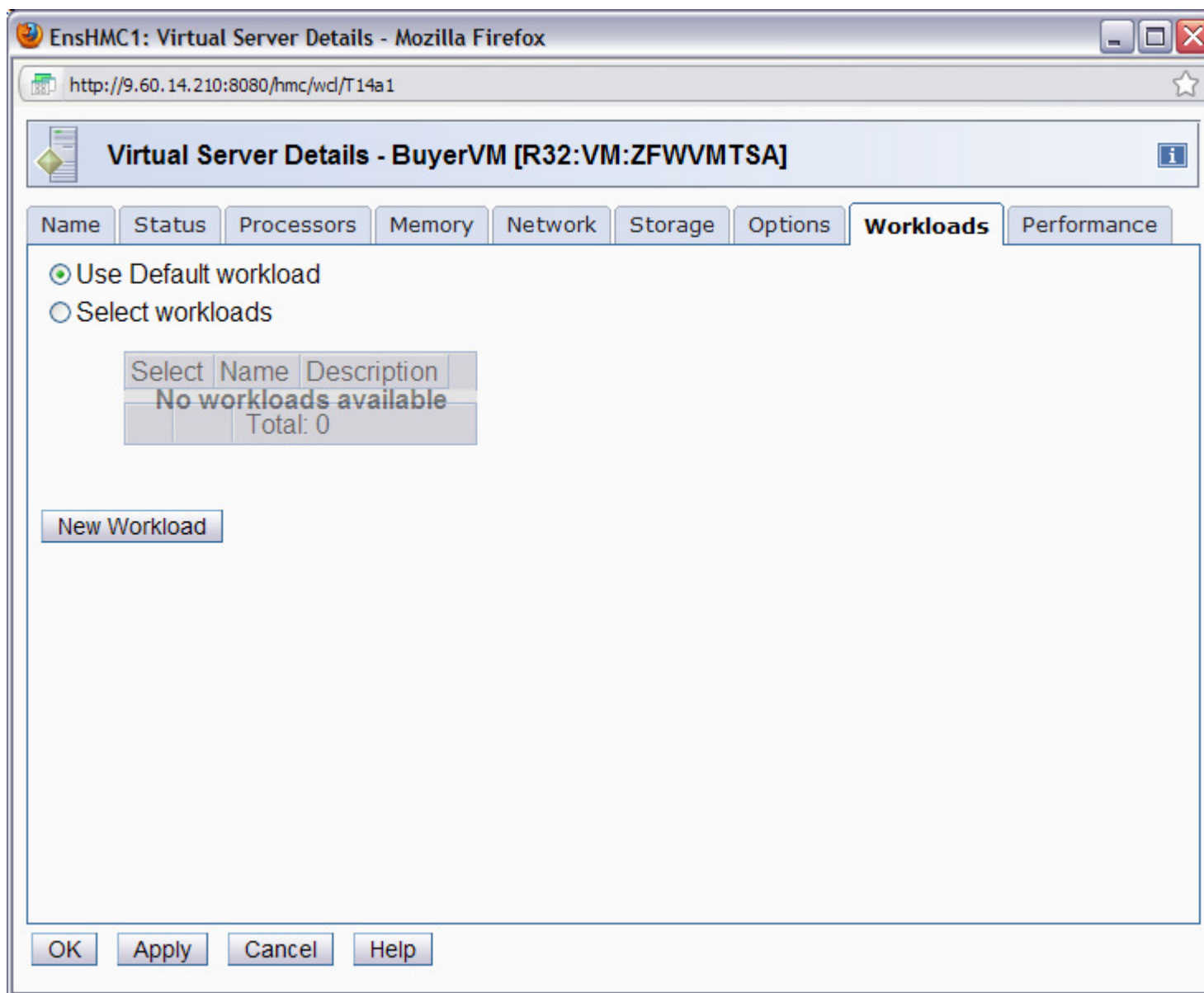
IPL boot device:

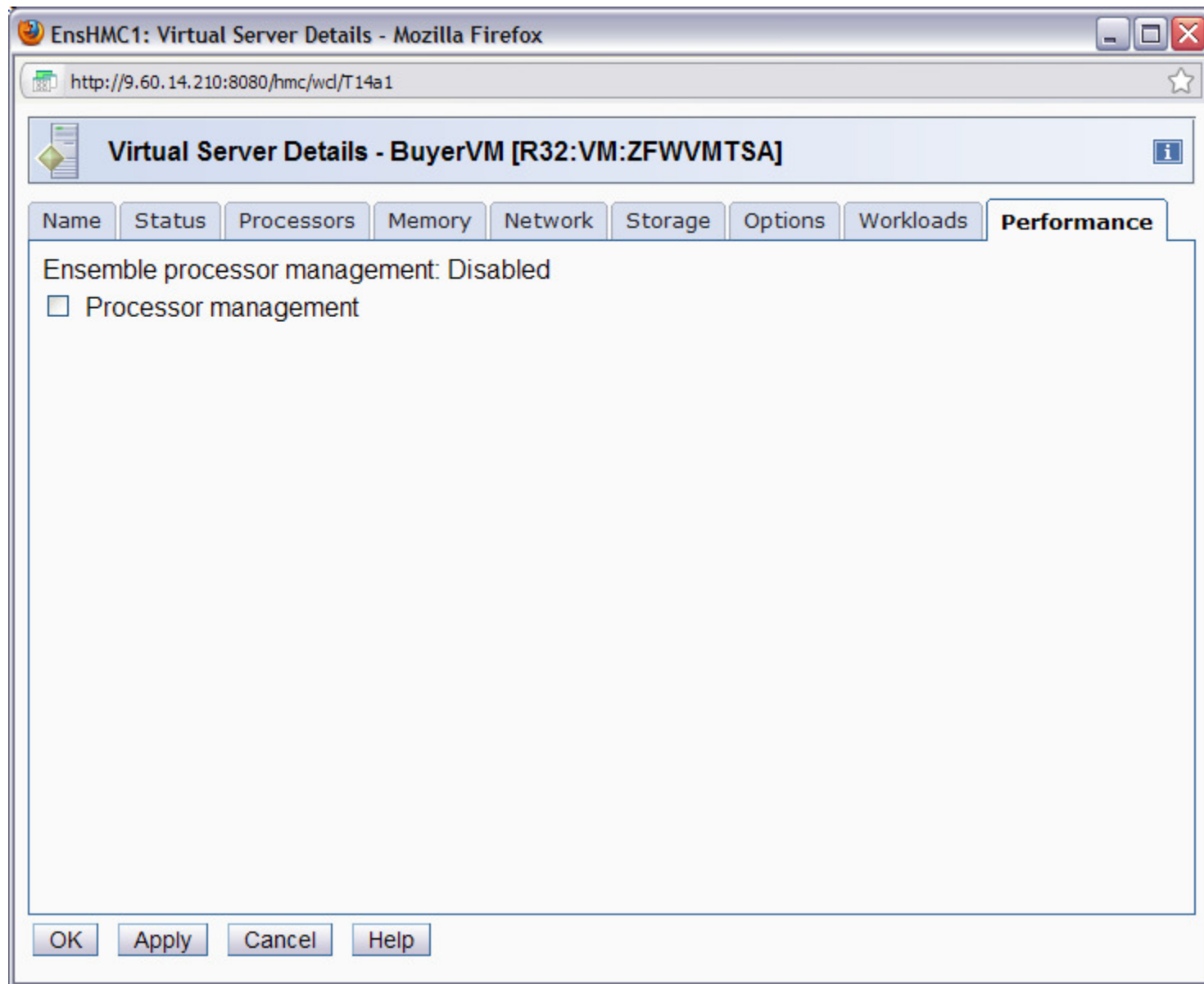
IPL parameters:

IPL load parameters:

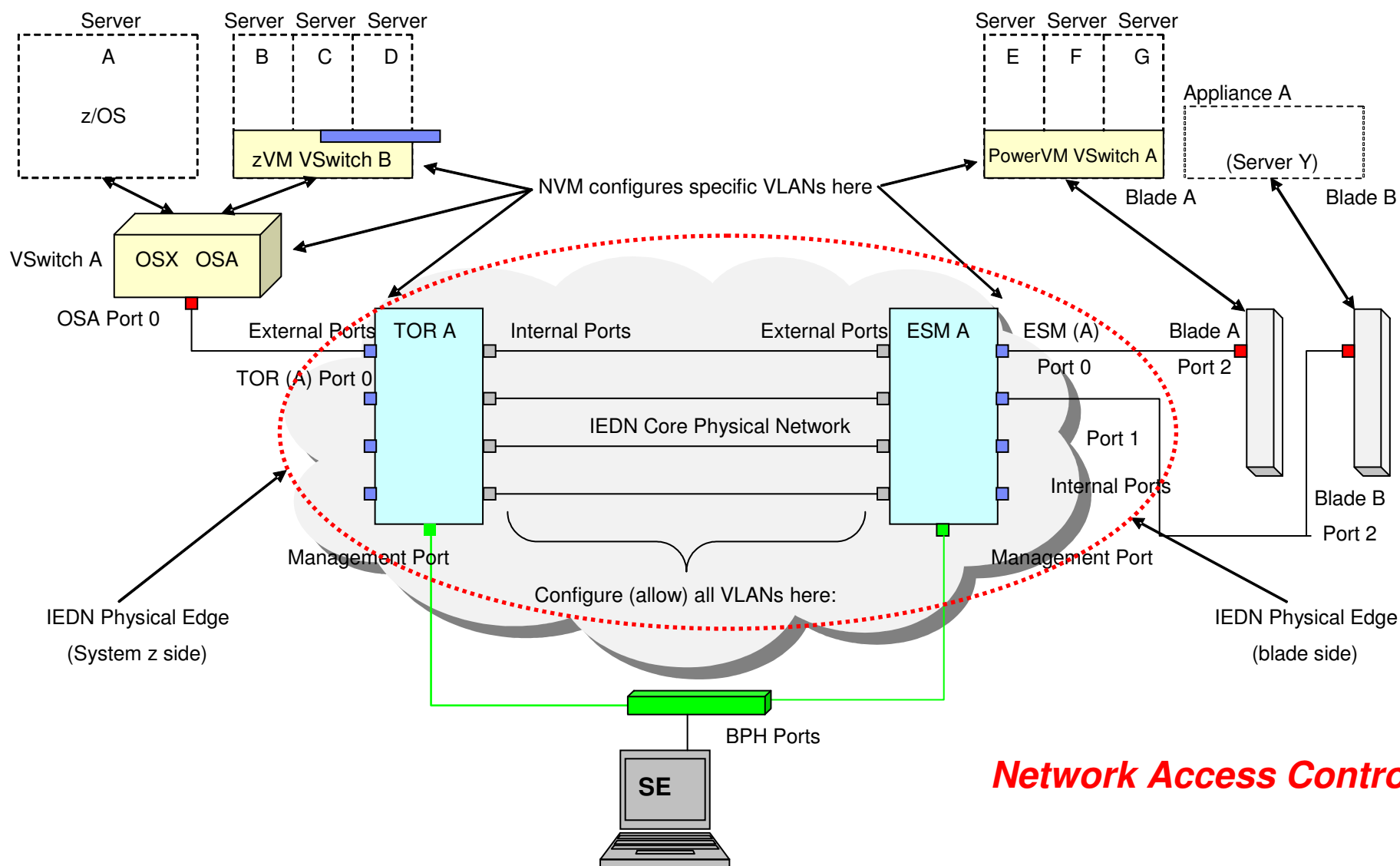
☐ Enable Guest Platform Management Provider Support

OK Apply Cancel Help





Virtual Networks and Access Controls



Create Virtual Network

NEXTGEN: Manage Virtual Networks - Mozilla...

9.60.92.193 https://9.60.92.193/hmc/wcd/T34a#tableTop_4bd44l

Create Virtual Network - My Ensemble

General Settings

Name: * VendorVirtualNetwork

Description: All vendor virtual servers on this VLAN

VLAN ID: * 11 (10-1034)

OK Cancel Help

NEXTGEN: Manage Virtual Networks - Mozilla Firefox

9.60.92.193 https://9.60.92.193/hmc/wcd/T3df

Manage Virtual Networks - My Ensemble

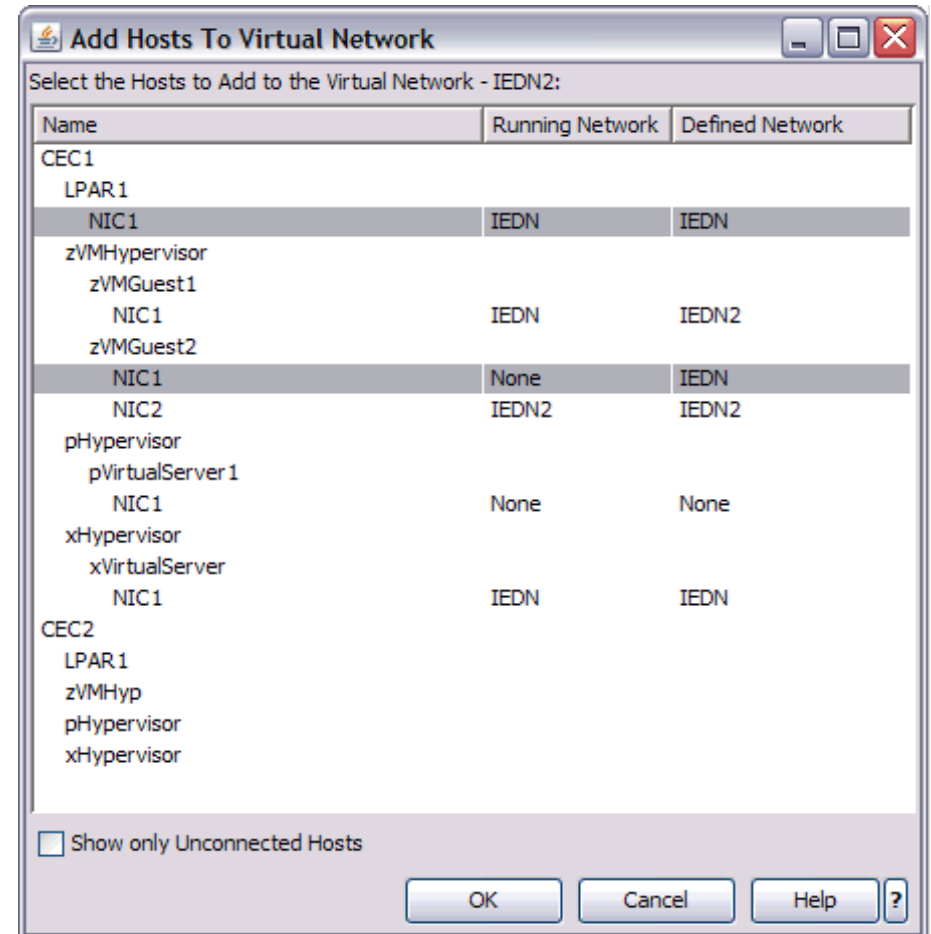
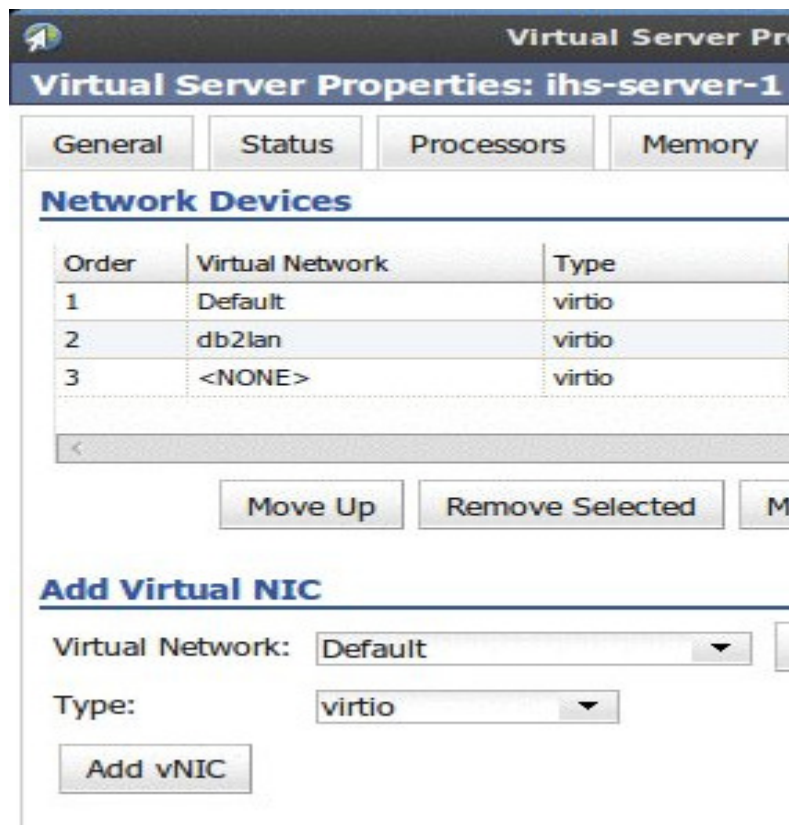
Virtual Networks:

--- Select Action ---

Select ^	Name ^	Status ^	VLAN ID ^	Description ^
<input type="radio"/>	Default	Inactive	10	Default virtual network
<input checked="" type="radio"/>	VendorVirtualNetwork	Inactive	11	All vendor virtual servers on th...

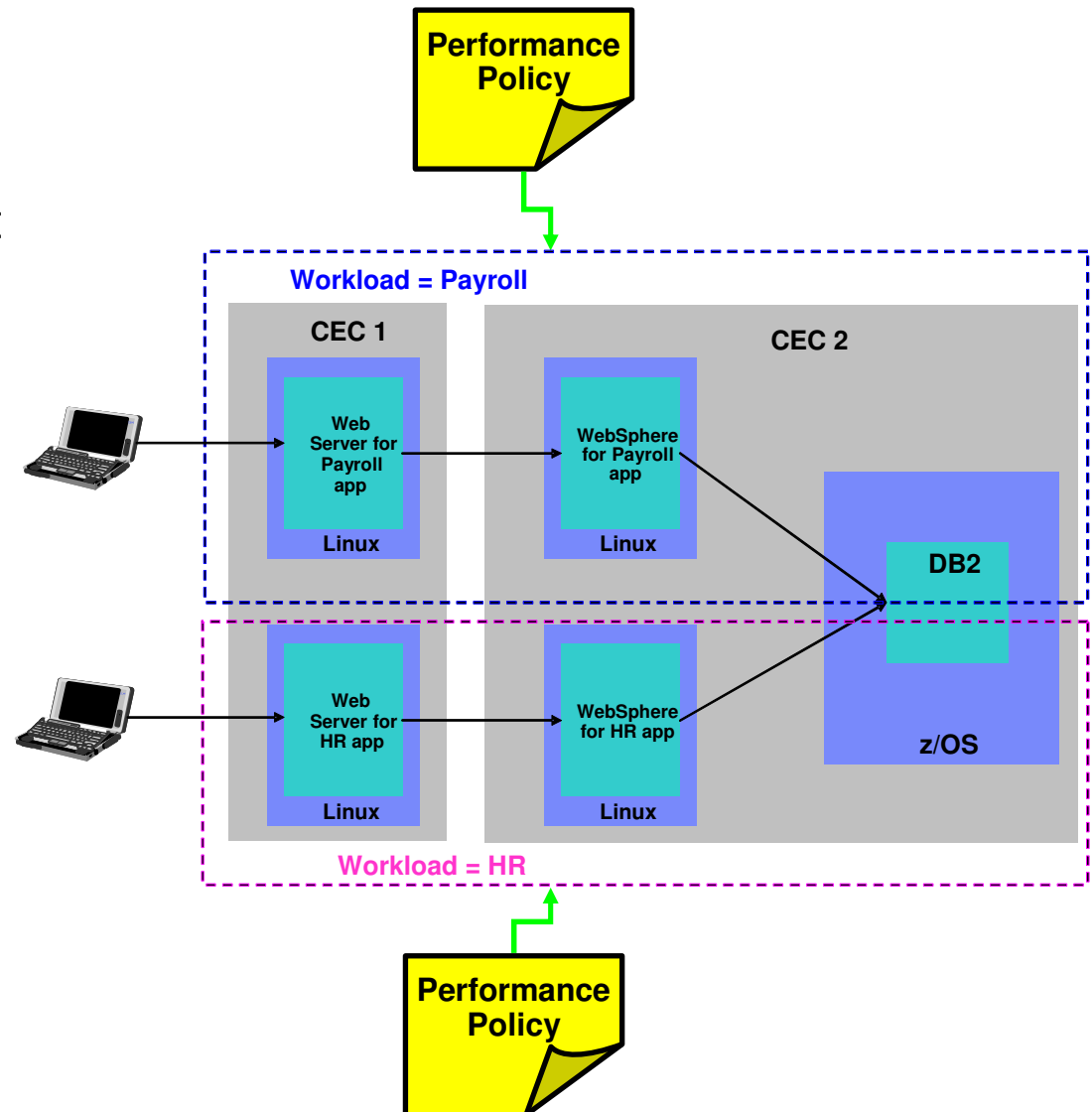
Close Help

Associate Virtual Server With Virtual Network



Workload

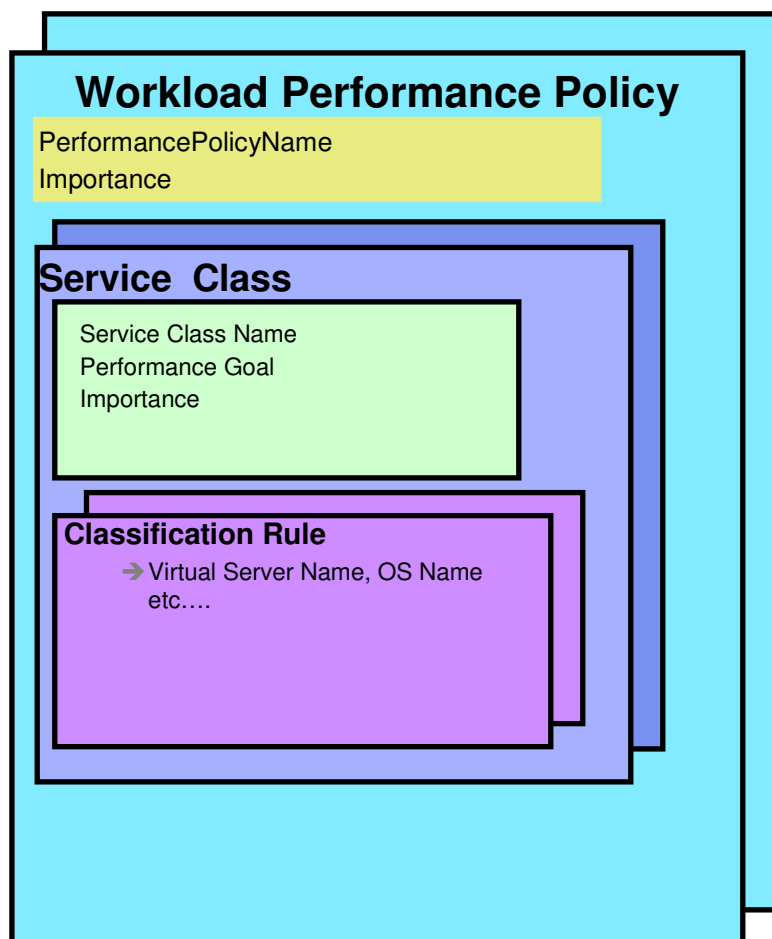
- A Workload is a grouping mechanism and “management view” of virtual servers supporting a business application
- Provides the context within which associated platform resources are presented, monitored, reported, and managed
- Performance policy is associated with Workload



Workload Performance Policy

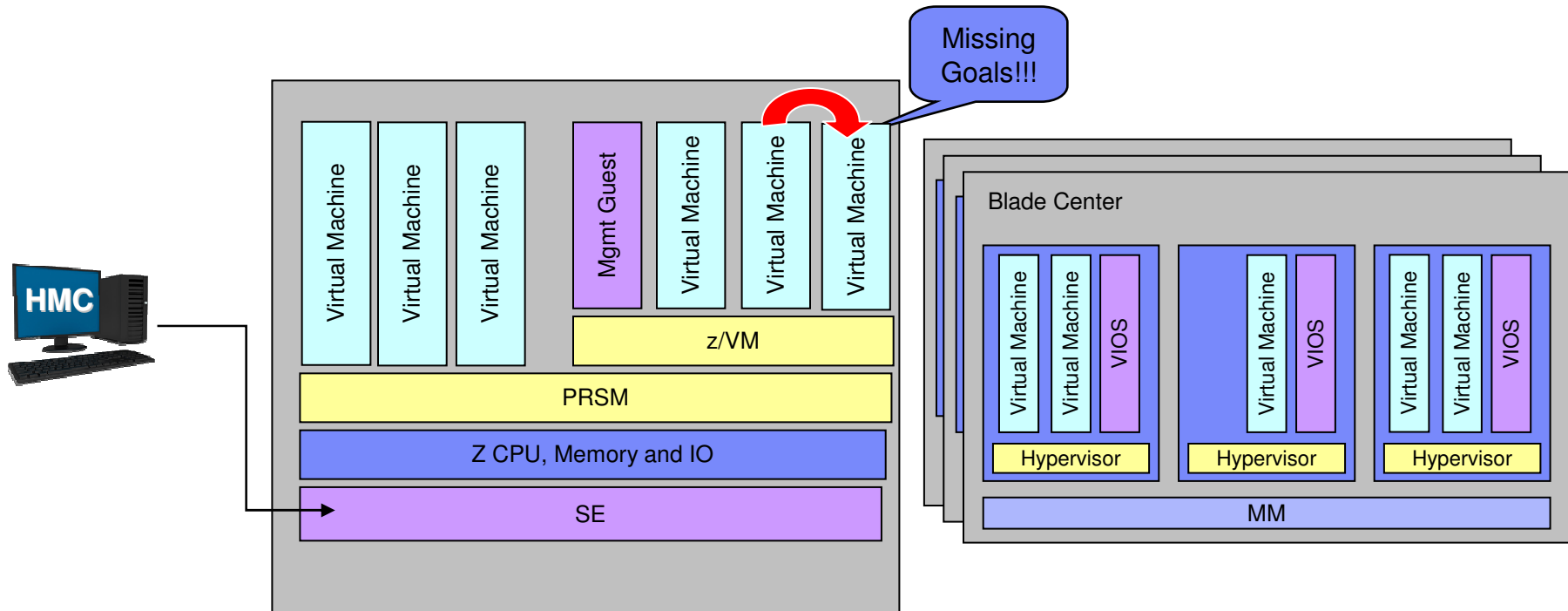
- Defines performance goals for virtual servers in a workload
 - Conceptually similar to simplified z/OS WLM Policy
- Provides basis for monitoring and management of platform resources used by virtual servers in a Workload
- Workload to performance policy relationship:
 - Multiple performance policies associated with a workload
 - A single policy is active at a given time
 - Can dynamically change the policy that is active
 - Through the UI
 - Through a time-based schedule
 - Example: Day shift / night shift policy

Workload Performance Policy...



- Policy structure:
 - Policy contains a set of service classes
 - Classification rules map each virtual server within the workload to a service class
 - A service class assigns a performance goal and importance
- HMC is console for policy creation and editing
 - Wizard for policy creation
 - Repository for policies under development and saved policies
 - Links to workload-based performance reporting

Managing Resources across z/VM Virtual Machines



- Manage CPU resources across z/VM virtual machines
 - Detect that a virtual machine is part of a workload not achieving its goals
 - Determine that virtual machine performance can be improved with additional resources
 - Project effect on all relevant Workloads of moving resources to virtual machine
 - If good trade-off based on policy, redistribute resources

IBM zEnterprise System:

A revolutionary change has come to IT bringing a new dimension in computing

- Redefining IT frameworks to bring change to operational silos and extend System z governance to z/VM virtual machines and blades
- Driving business decisions based on insight rather than hindsight
- Improving agility to compete with consolidation and simplification
- Delivering consistent business controls across applications and platforms
- Focused on integration and collaboration to fuel business growth



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Thank you