

IBM zEnterprise Unified Resource Manager Overview

The value for z/VM



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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.

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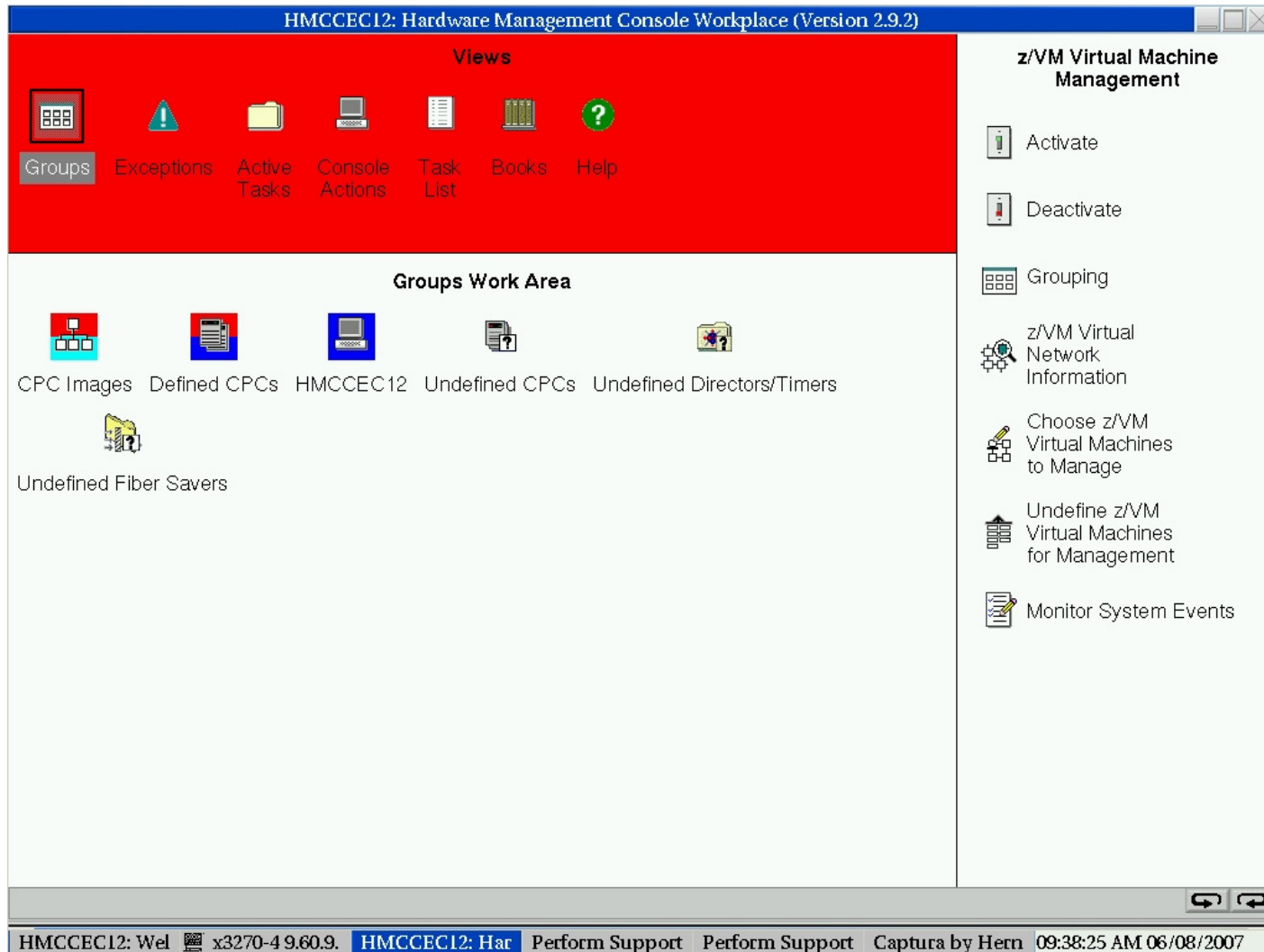
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Agenda

- 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

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

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

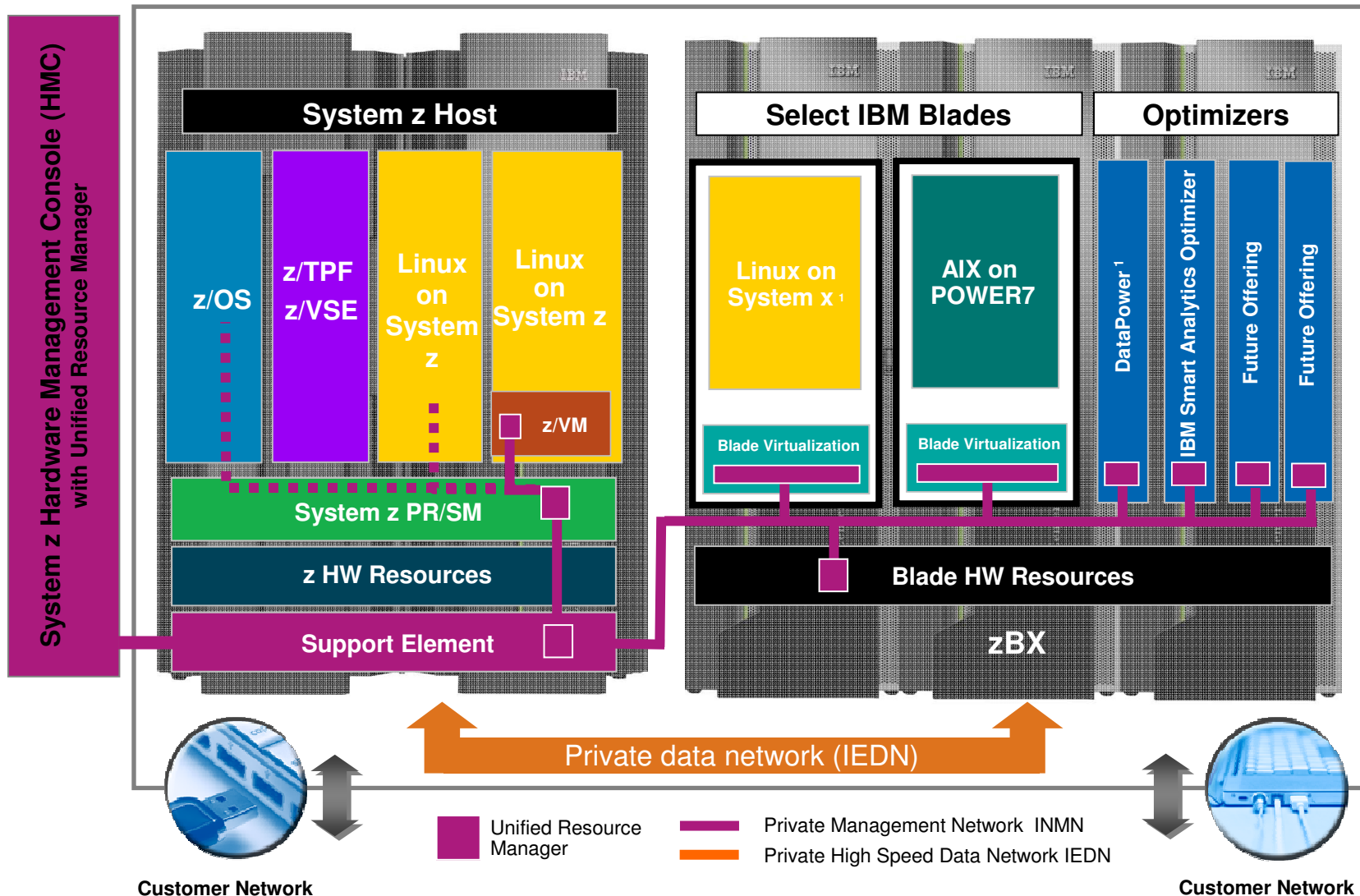
- Selected IBM POWER7® blades and IBM System x® Blades¹ for tens of thousands of AIX® and Linux applications
- High performance optimizers and appliances to accelerate time to insight and reduce cost
- Dedicated high performance private network



- 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

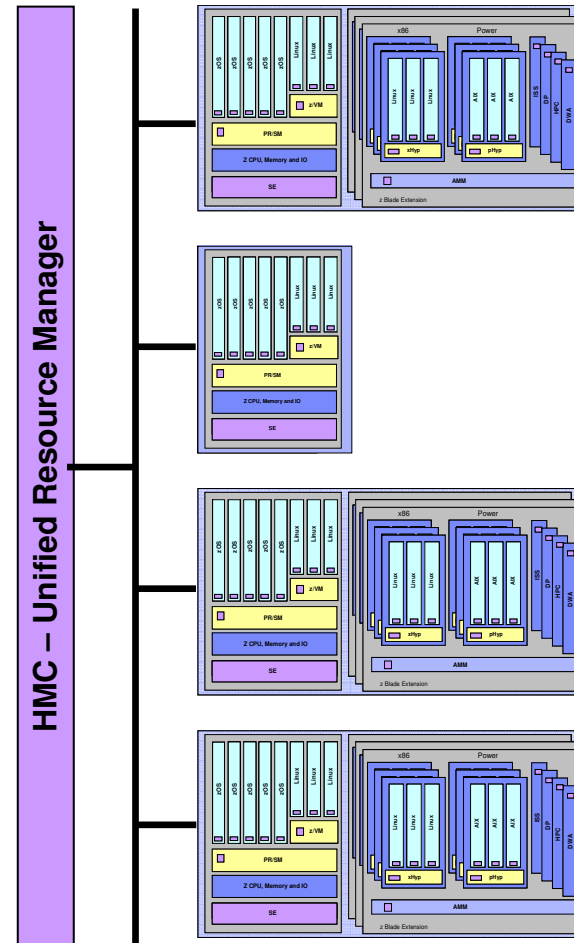
Use the smarter solution to improve your application design



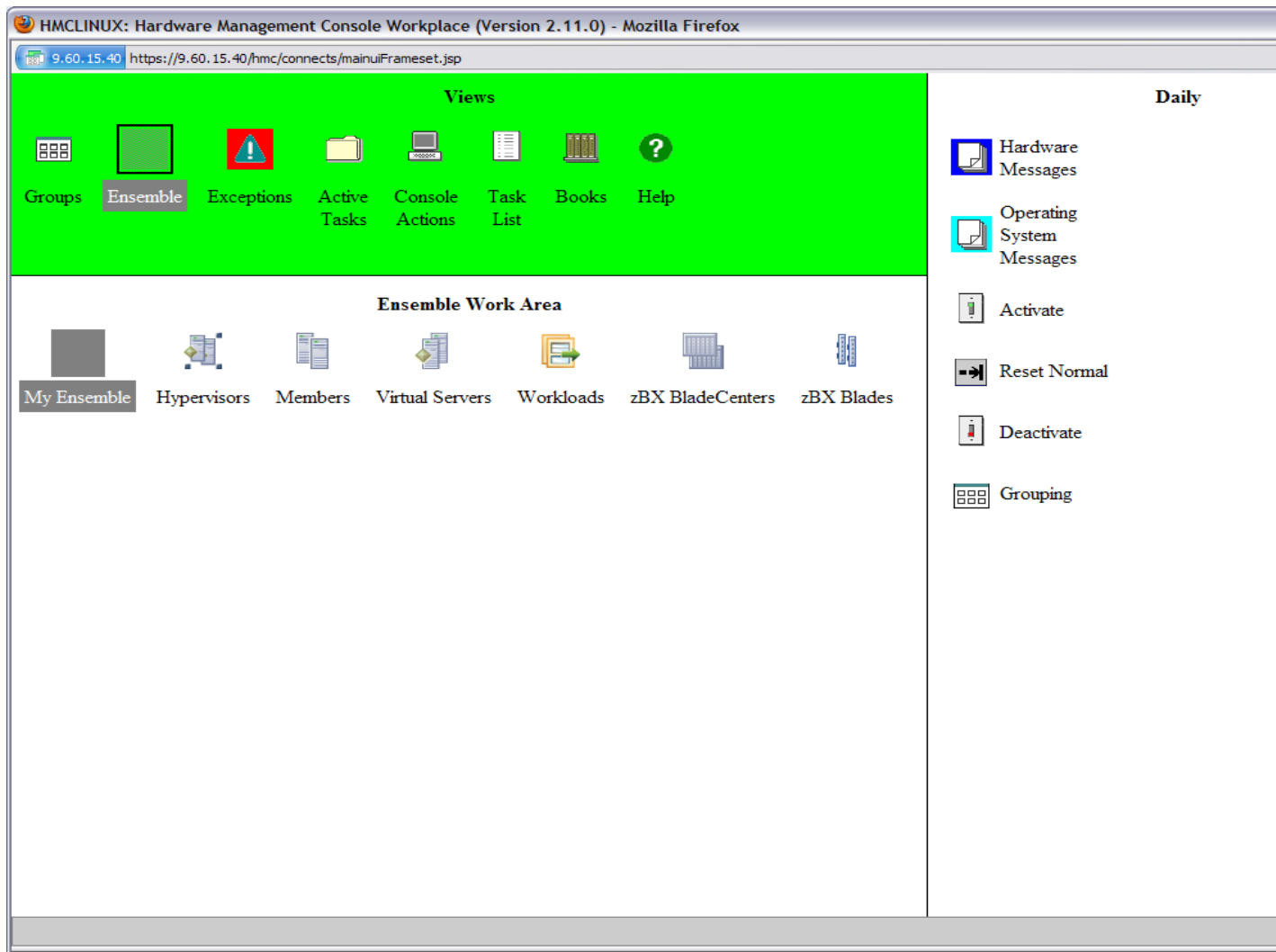
¹ All statements regarding IBM future direction and intent are subject to change or withdrawal without notice, and represents goals and objectives only.

zEnterprise Ensemble

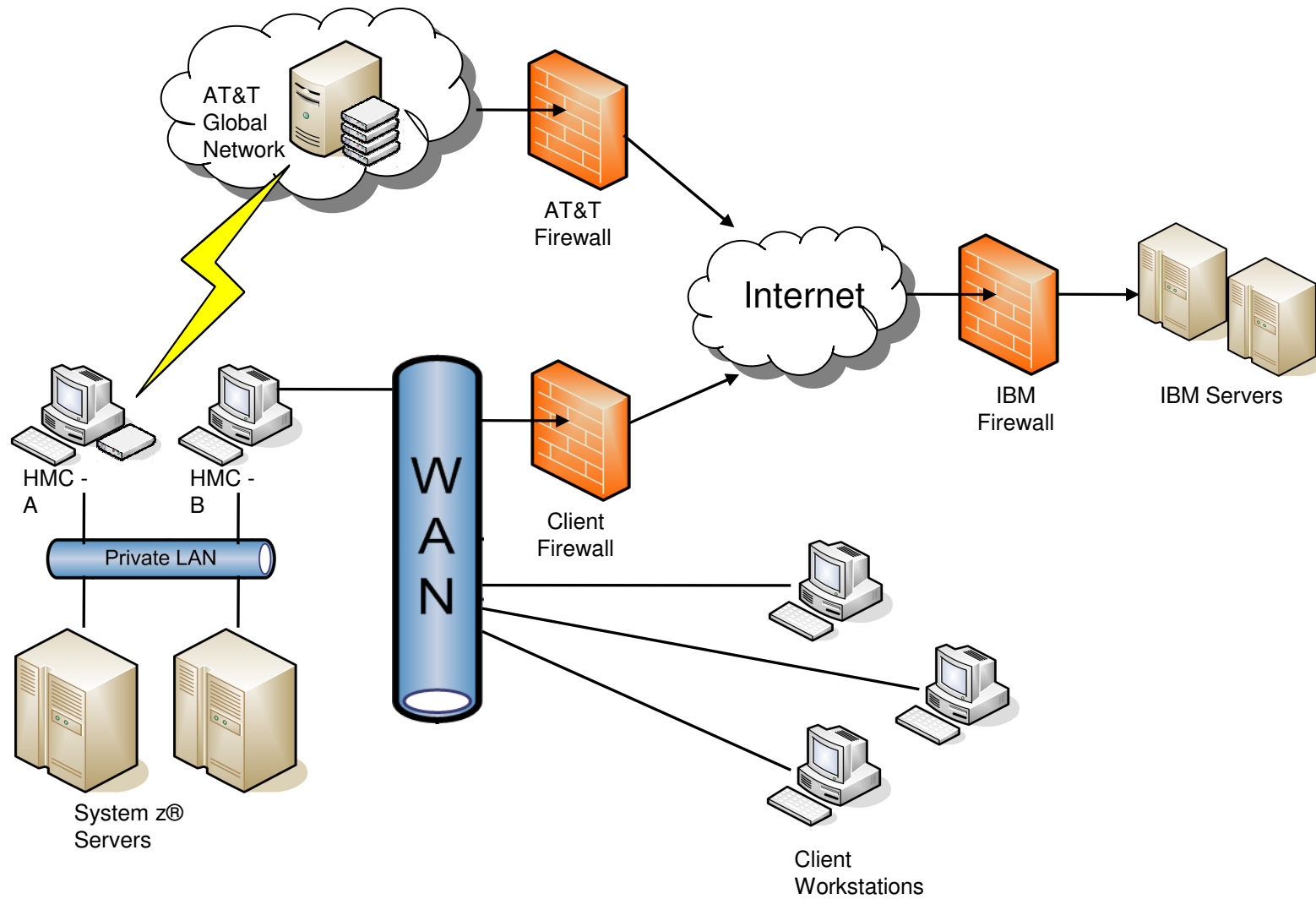
- A zEnterprise Node is a single zCEC with 0 to 4 zBX racks and up to two blade centers per rack
- A zEnterprise Ensemble is a collection of 1 to 8 zEnterprise Nodes managed as a single virtualized pool of server resources
- A zEnterprise node can be a member of a single ensemble
- An ensemble is the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

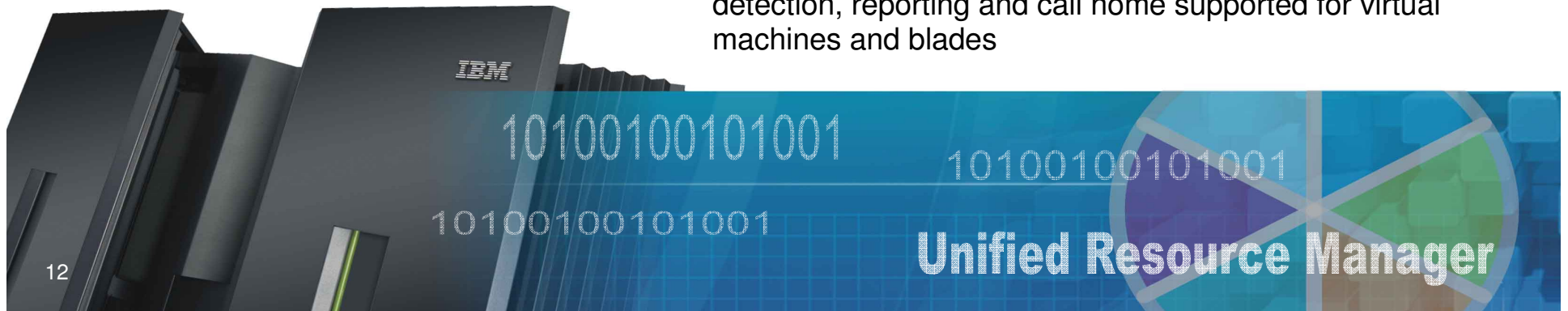
Transforming the way resources are managed and deployed

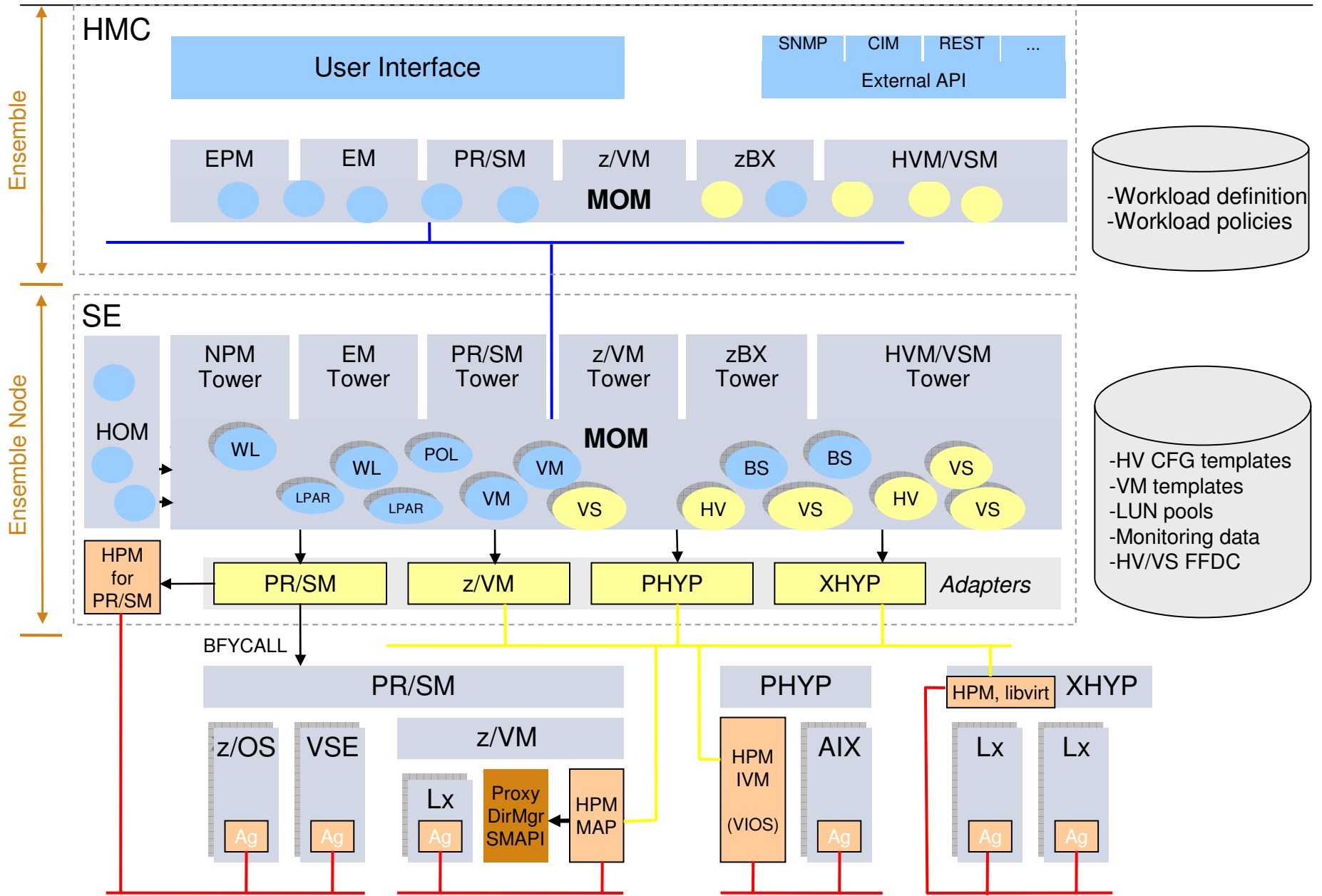
What is it?

*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

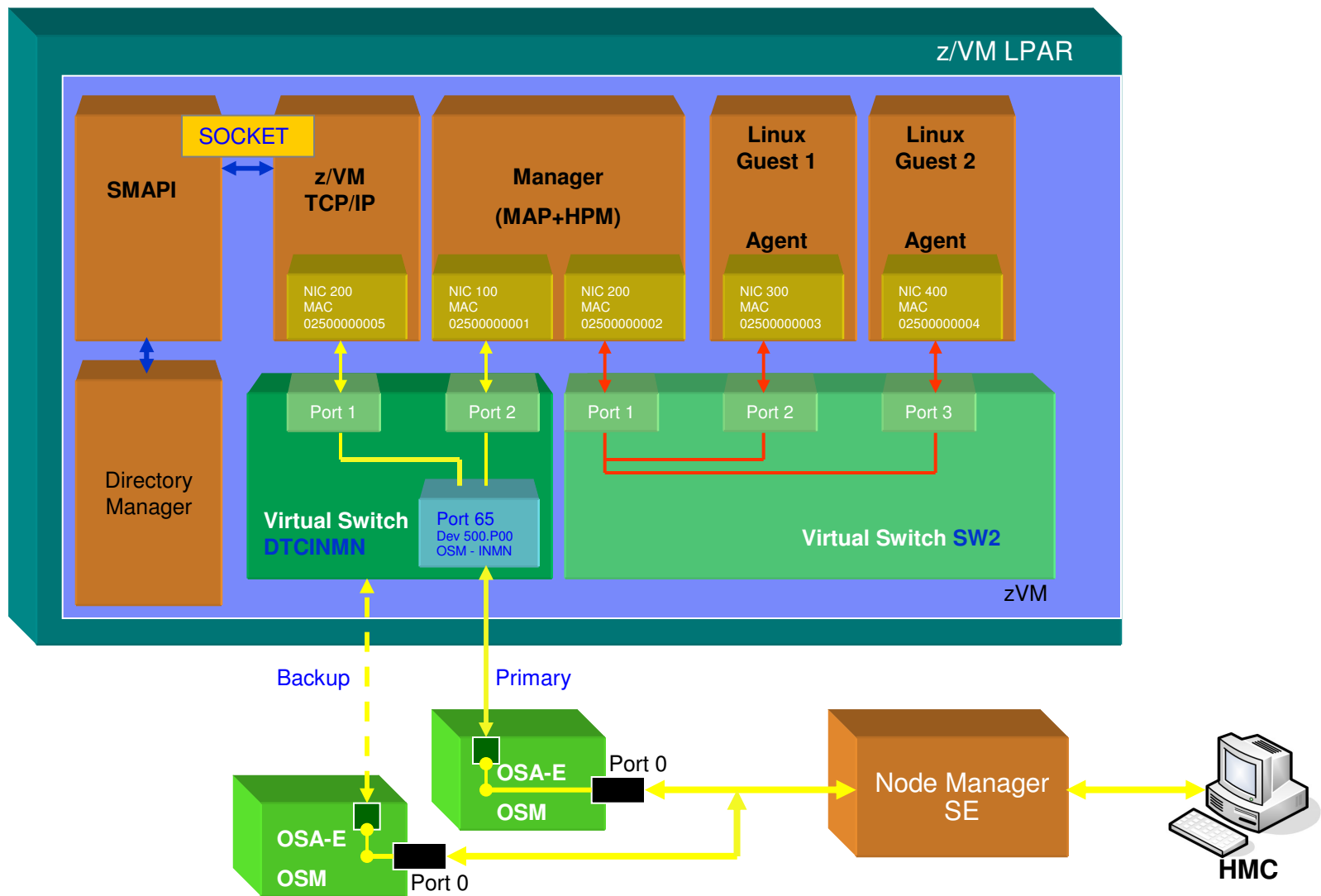
- Server and application consolidation on System z using Linux and z/VM is the industry leader in large-scale, cost-efficient virtual server hosting
- zEnterprise introduces virtual server provisioning and management for Linux guests running on z/VM
 - Use the Unified Resource Manager to create z/VM 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 a 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 Platform 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

The screenshot displays the IBM Hardware Management Console (HMC) interface within a Mozilla Firefox browser window. The browser title is "EnsHMC1: Hardware Management Console Workplace (Version 2.11.0) - Mozilla Firefox" and the address bar shows "http://9.60.14.210:8080/hmc/connects/mainuiFrameset.jsp".

The main header of the application is "Hardware Management Console" with an IBM logo on the right. Below the header, there is a breadcrumb trail: "Ensemble Management > R32Ensemble > Members > R32".

The left sidebar contains a navigation menu with the following items: Welcome, Systems Management, Ensemble Management (with sub-items R32Ensemble, Members, R32, and Workloads), HMC Management, Service Management, and Tasks Index.

The main content area is titled "System Resources" and has a sub-tab "Hypervisors" highlighted in yellow. Below the tabs, there is a toolbar with icons for selection, refresh, and other actions, along with a "Filter" input field and "Tasks" and "Views" dropdown menus.

A table displays the hypervisor resources:

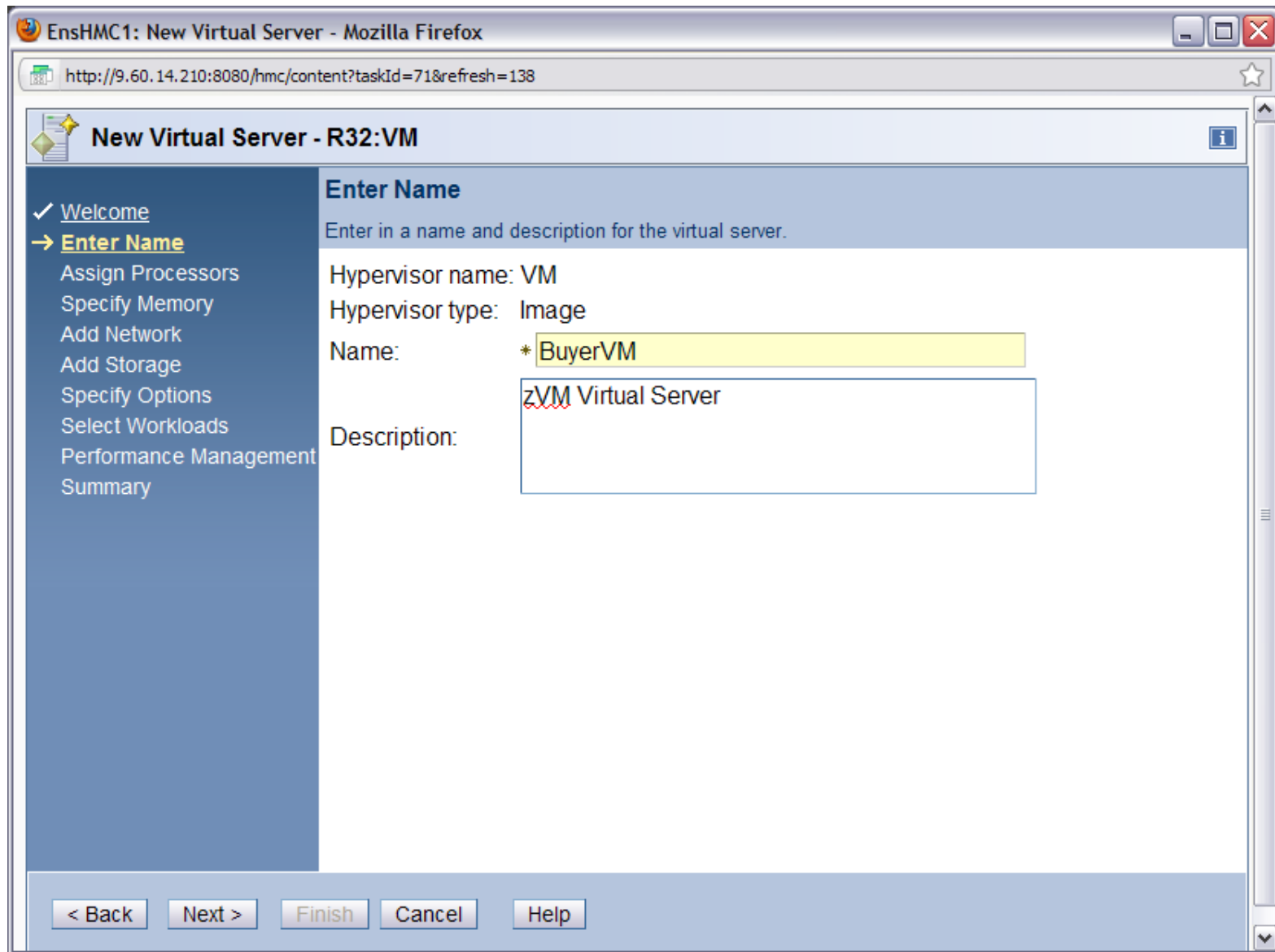
Select	Name	Status	Automatic Restart
<input checked="" type="checkbox"/>	VM	Operating	-

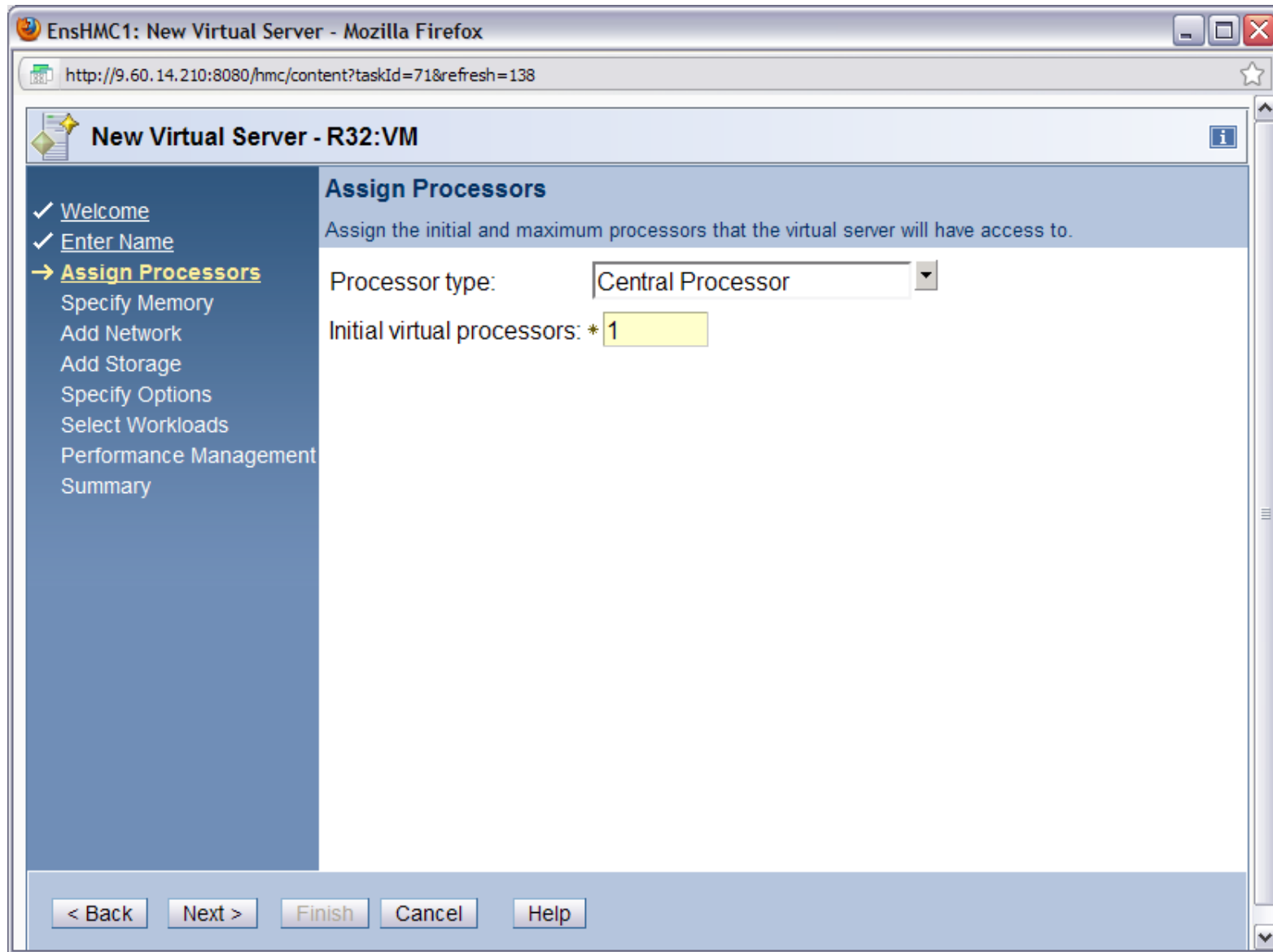
Below the table, it shows "Max Page Size: 500", "Total: 1", "Filtered: 1", and "Selected: 1".

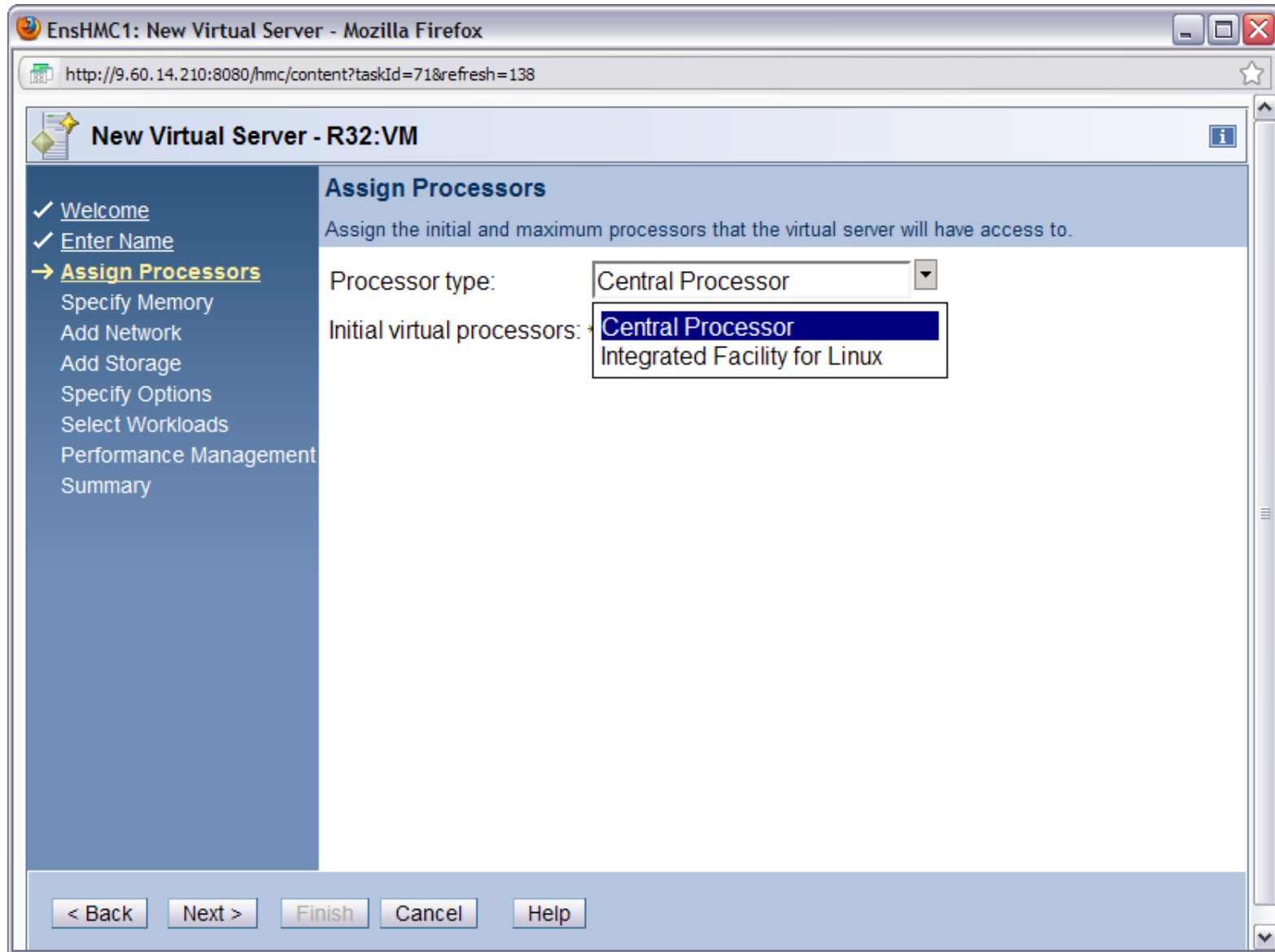
At the bottom of the interface, there is a "Tasks: VM" section with a close button. It contains several task categories:

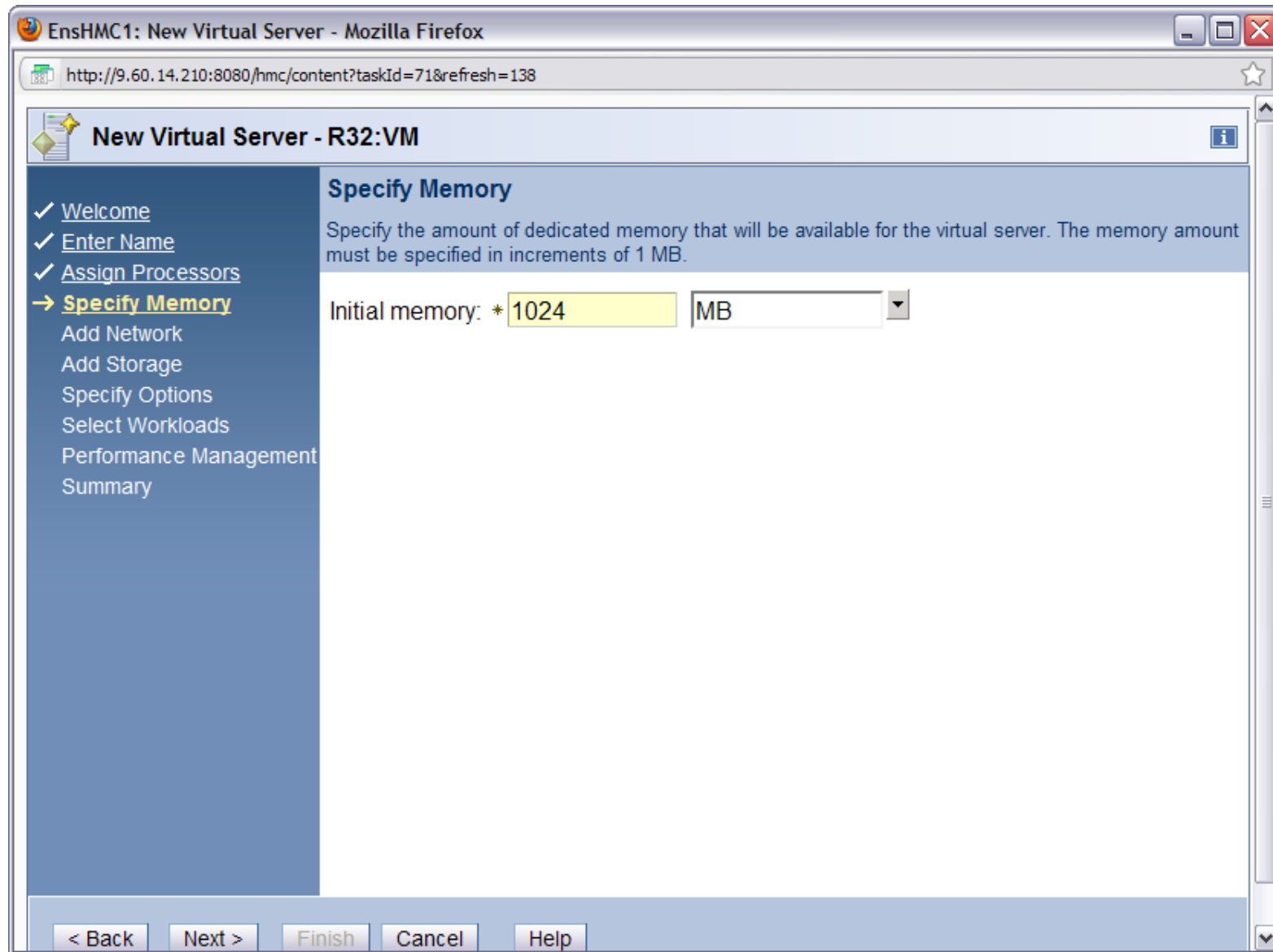
- Image Details
- Toggle Lock
- Daily
- Recovery
- Service
- Operational Customization
- Configuration
- Manage Storage Resources
- New Virtual Server** (highlighted in yellow)
- Z/VM Virtual Machine Management

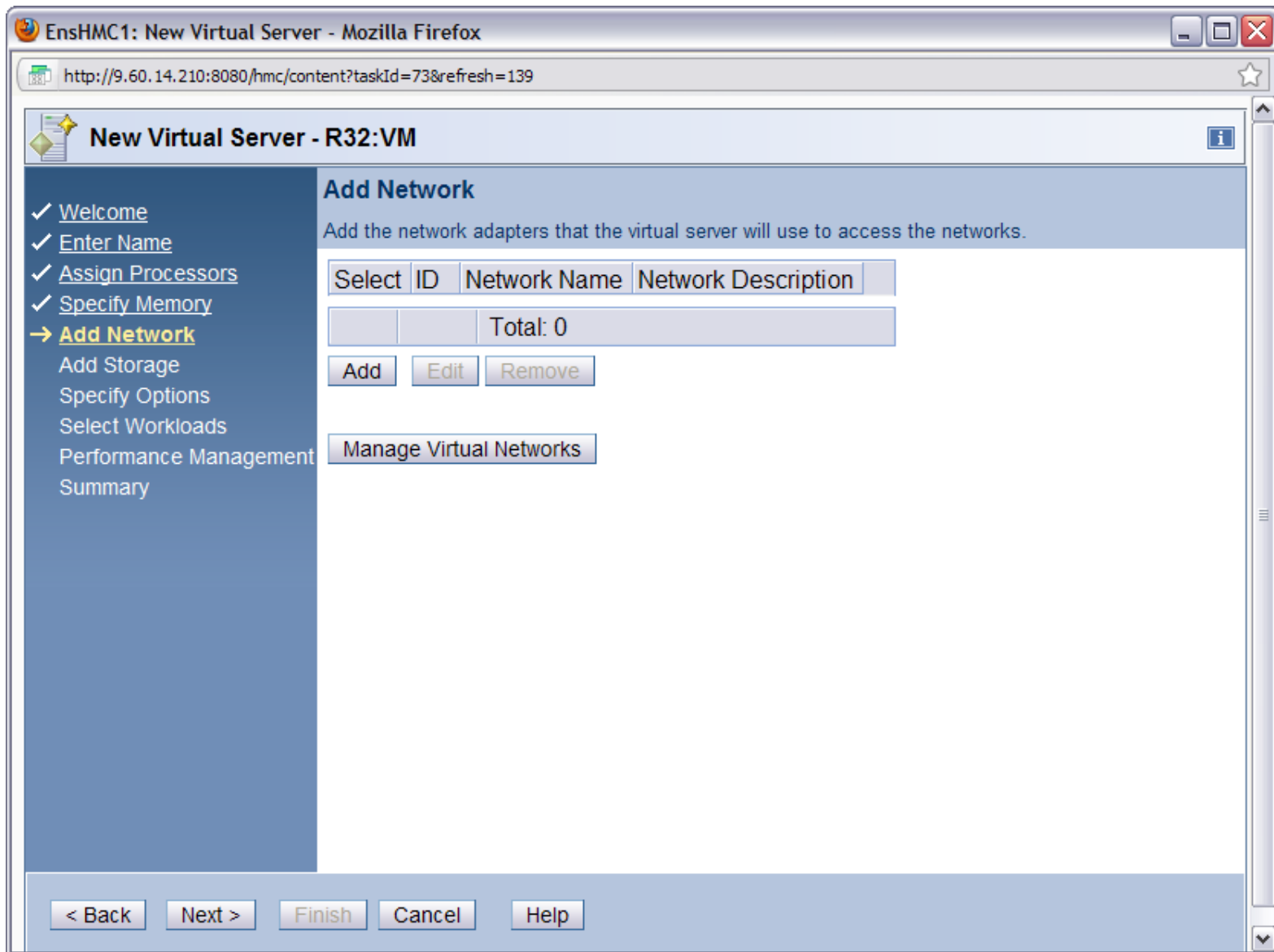
At the bottom left, there is a "Status: Exceptions and Messages" section with icons for a list, a red 'X', a document, and a window.

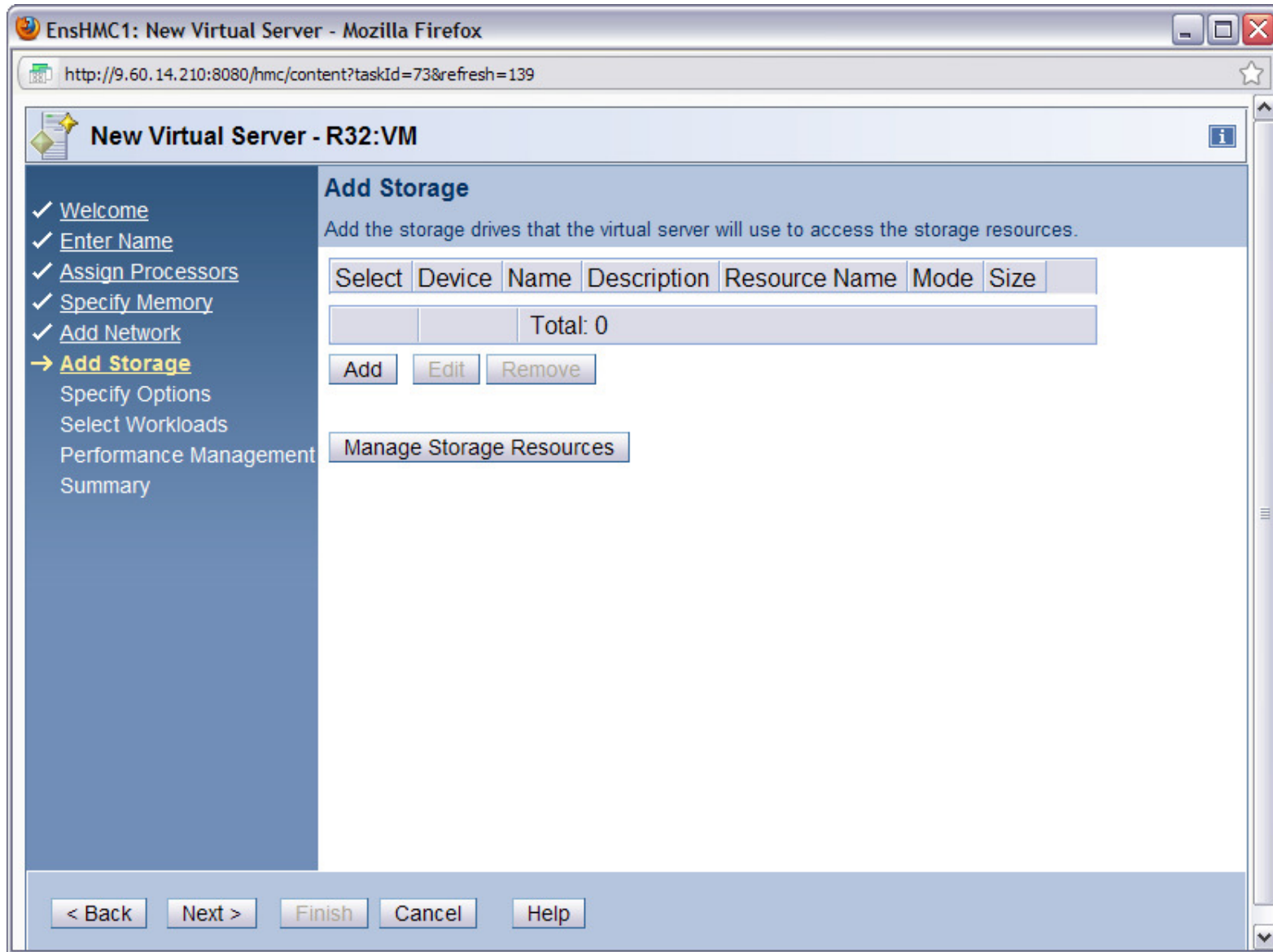












EnsHMC1: New Virtual Server - Mozilla Firefox

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.

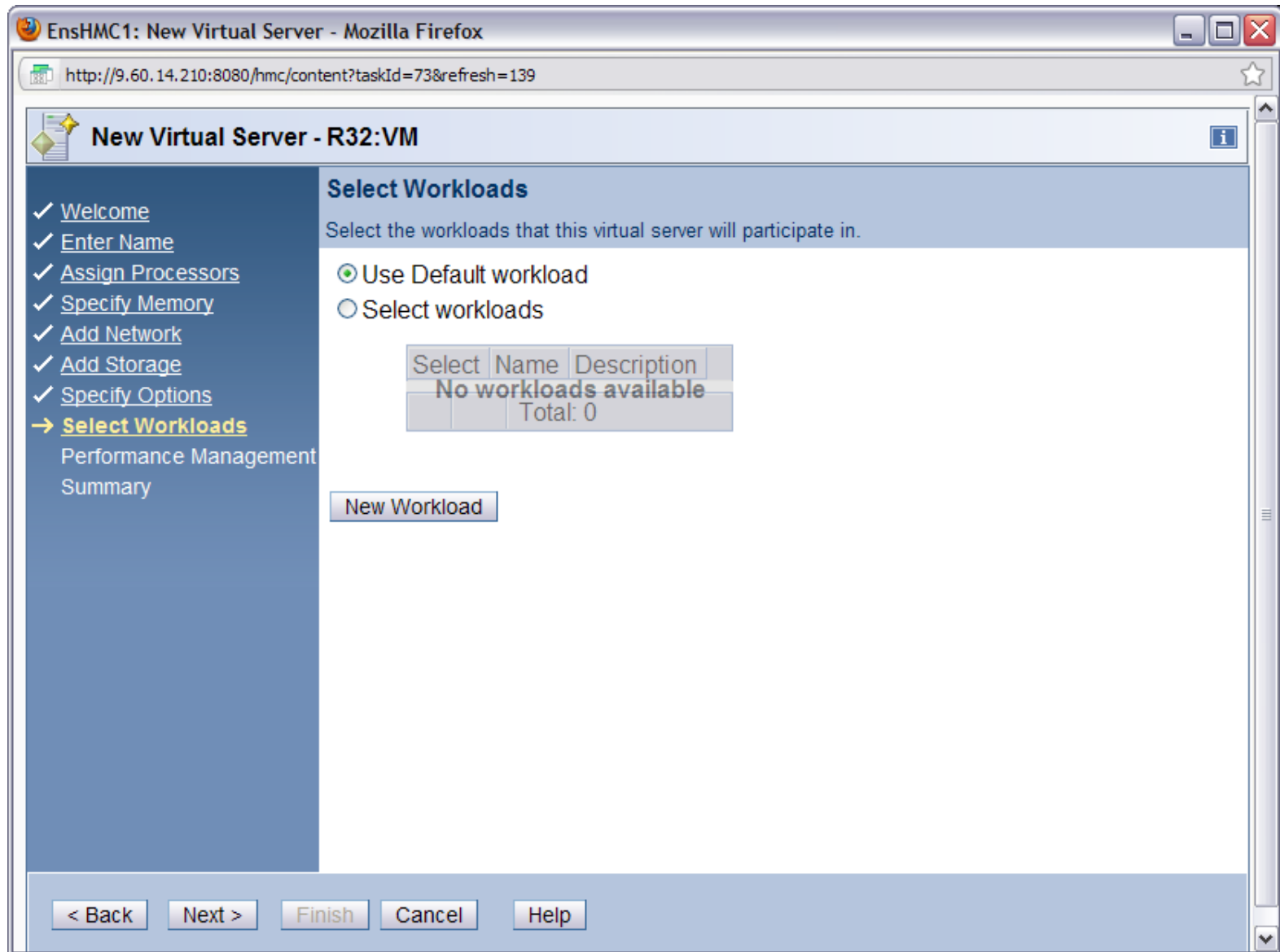
Privilege classes: *

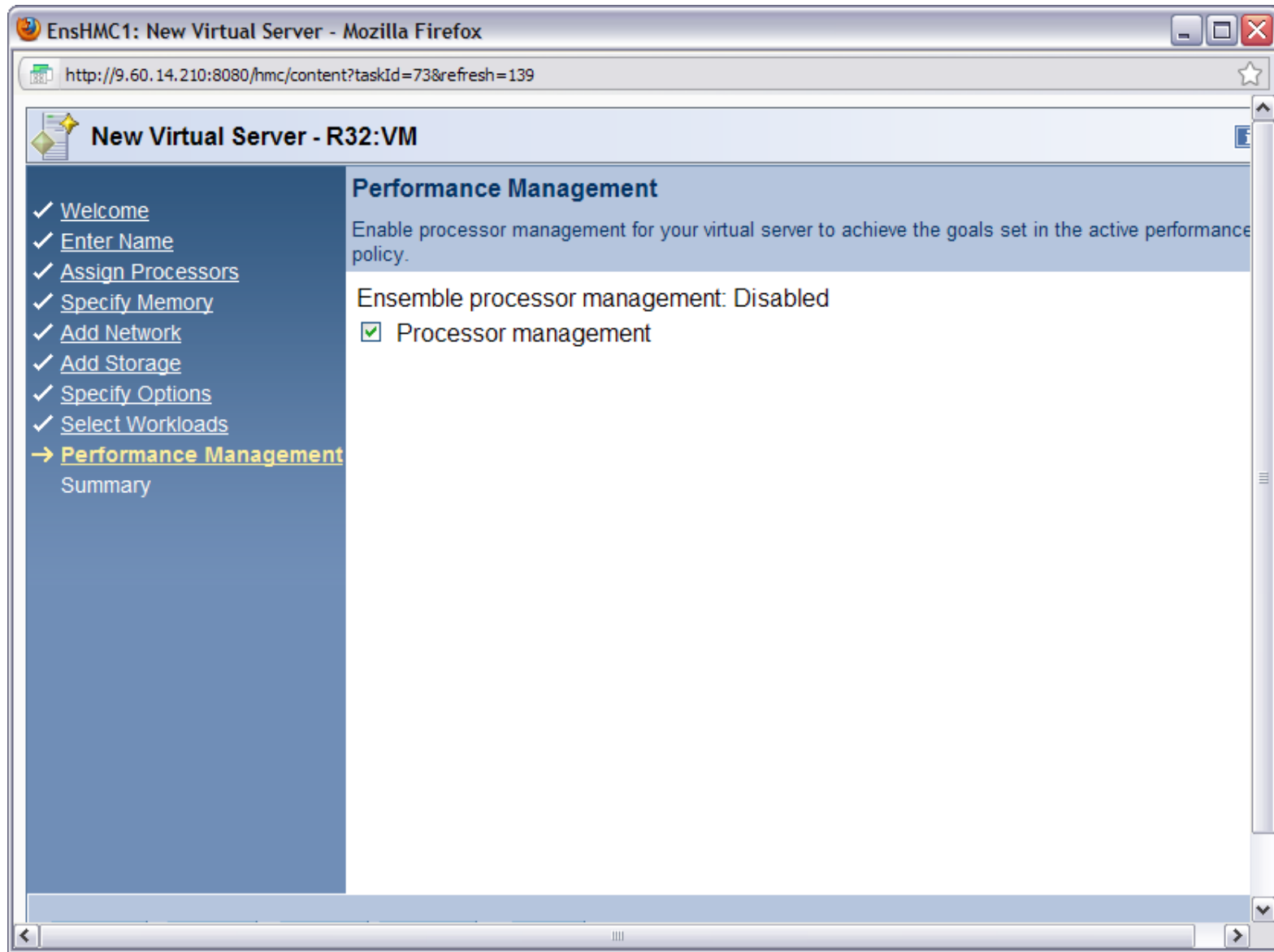
IPL boot device:

IPL parameters:

IPL load parameters:

< Back Next > Finish Cancel Help





The screenshot shows a web browser window titled 'EnsHMC1: New Virtual Server - Mozilla Firefox'. The address bar contains the URL 'http://9.60.14.210:8080/hmc/content?taskId=73&refresh=139'. The main content area is titled 'New Virtual Server - R32:VM' and features a left-hand navigation pane with a list of steps: Welcome, Enter Name, Assign Processors, Specify Memory, Add Network, Add Storage, Specify Options, Select Workloads, Performance Management, and Summary (highlighted with a yellow arrow). The main area displays a 'Summary' section with the instruction 'Verify the information below before completing the wizard.' Below this, a table lists the configuration details for the virtual server.

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

At the bottom of the wizard, there are five buttons: '< Back', 'Next >', 'Finish', 'Cancel', and 'Help'.

The screenshot shows a Mozilla Firefox browser window titled 'EnsHMC1: Virtual Server Details - Mozilla Firefox'. The address bar contains the URL 'http://9.60.14.210:8080/hmc/content?taskId=74&refresh=143'. The main content area is titled 'Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]' and features a tabbed interface with the following tabs: Name, Status, Processors, Memory, Network, Storage, Options, Workloads, and Performance. The 'Name' tab is active, displaying the following information:

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

At the bottom of the window, there are four buttons: OK, Apply, Cancel, and Help.

The screenshot shows a Mozilla Firefox browser window titled 'EnsHMC1: Virtual Server Details - Mozilla Firefox'. The address bar contains the URL 'http://9.60.14.210:8080/hmc/wcd/T14a1'. The main content area is titled 'Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]' and features a tabbed interface with the following tabs: Name, Status (selected), Processors, Memory, Network, Storage, Options, Workloads, and Performance. The 'Status' tab displays the following information:

Status: Not Activated
Guest Platform Management Provider Status: Not Operating

Acceptable Status:

<input checked="" type="checkbox"/> Operating	<input type="checkbox"/> Not Operating
<input type="checkbox"/> Communications not active	<input type="checkbox"/> Exceptions
<input type="checkbox"/> Status Check	<input type="checkbox"/> Migrating
<input type="checkbox"/> Starting	<input type="checkbox"/> Stopping

At the bottom of the window, there are four buttons: OK, Apply, Cancel, and 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

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

The screenshot shows a web browser window titled "EnsHMC1: Virtual Server Details - Mozilla Firefox". The address bar contains the URL "http://9.60.14.210:8080/hmc/wcd/T14a1". The main content area is titled "Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]". Below the title is a navigation bar with tabs: Name, Status, Processors, Memory, Network, Storage, Options, Workloads, and Performance. The "Options" tab is selected. The content under the "Options" tab includes:

- Privilege classes: *G
- IPL boot device: [text input field]
- IPL parameters: [text input field]
- IPL load parameters: [text input field]
- Enable Guest Platform Management Provider Support

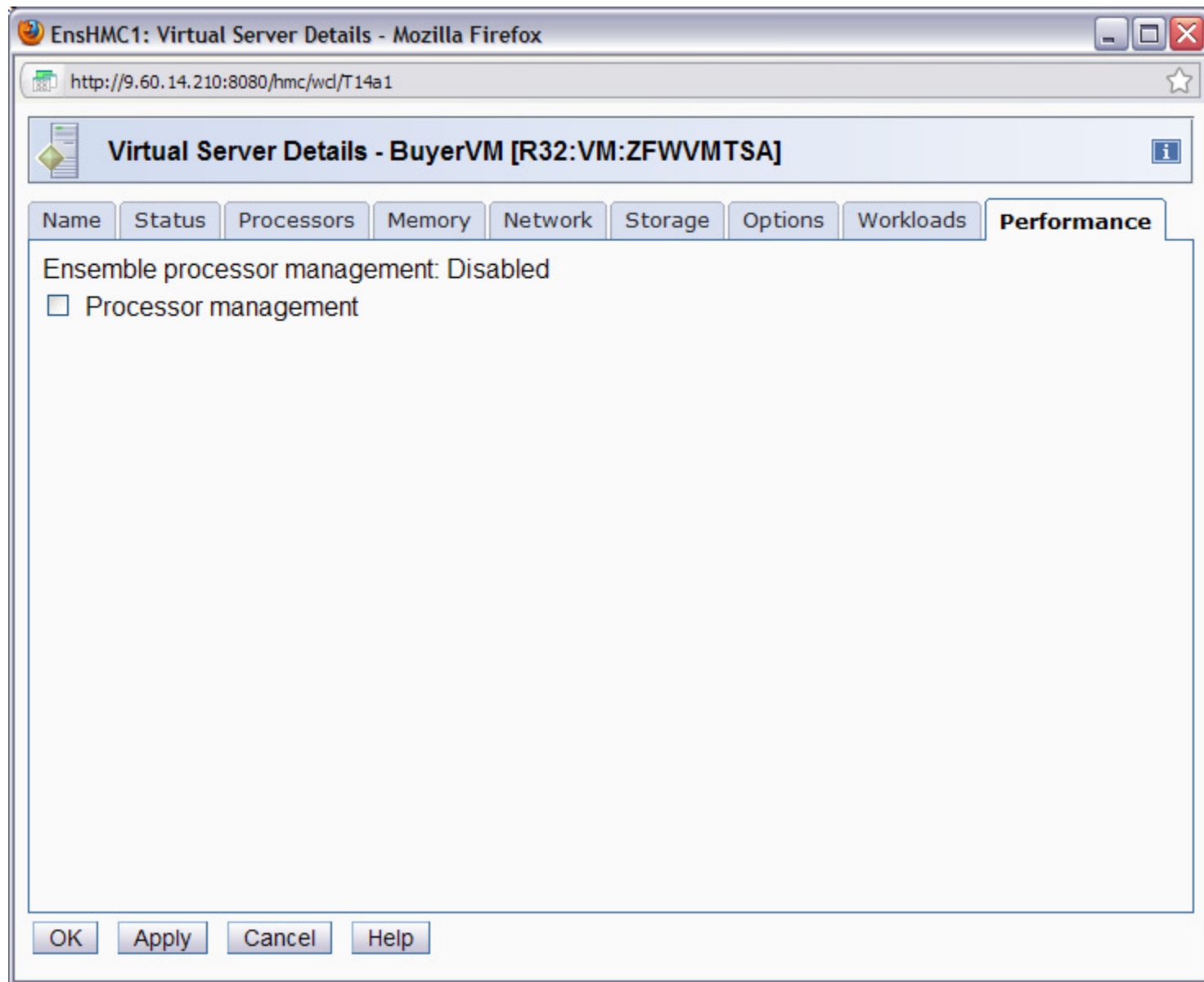
At the bottom of the window are four buttons: OK, Apply, Cancel, and Help.

The screenshot shows a web browser window titled "EnSHMC1: Virtual Server Details - Mozilla Firefox" with the URL "http://9.60.14.210:8080/hmc/wd/T14a1". The main content area is titled "Virtual Server Details - BuyerVM [R32:VM:ZFWVMTSA]". Below the title is a navigation bar with tabs: "Name", "Status", "Processors", "Memory", "Network", "Storage", "Options", "Workloads" (which is selected and highlighted), and "Performance".

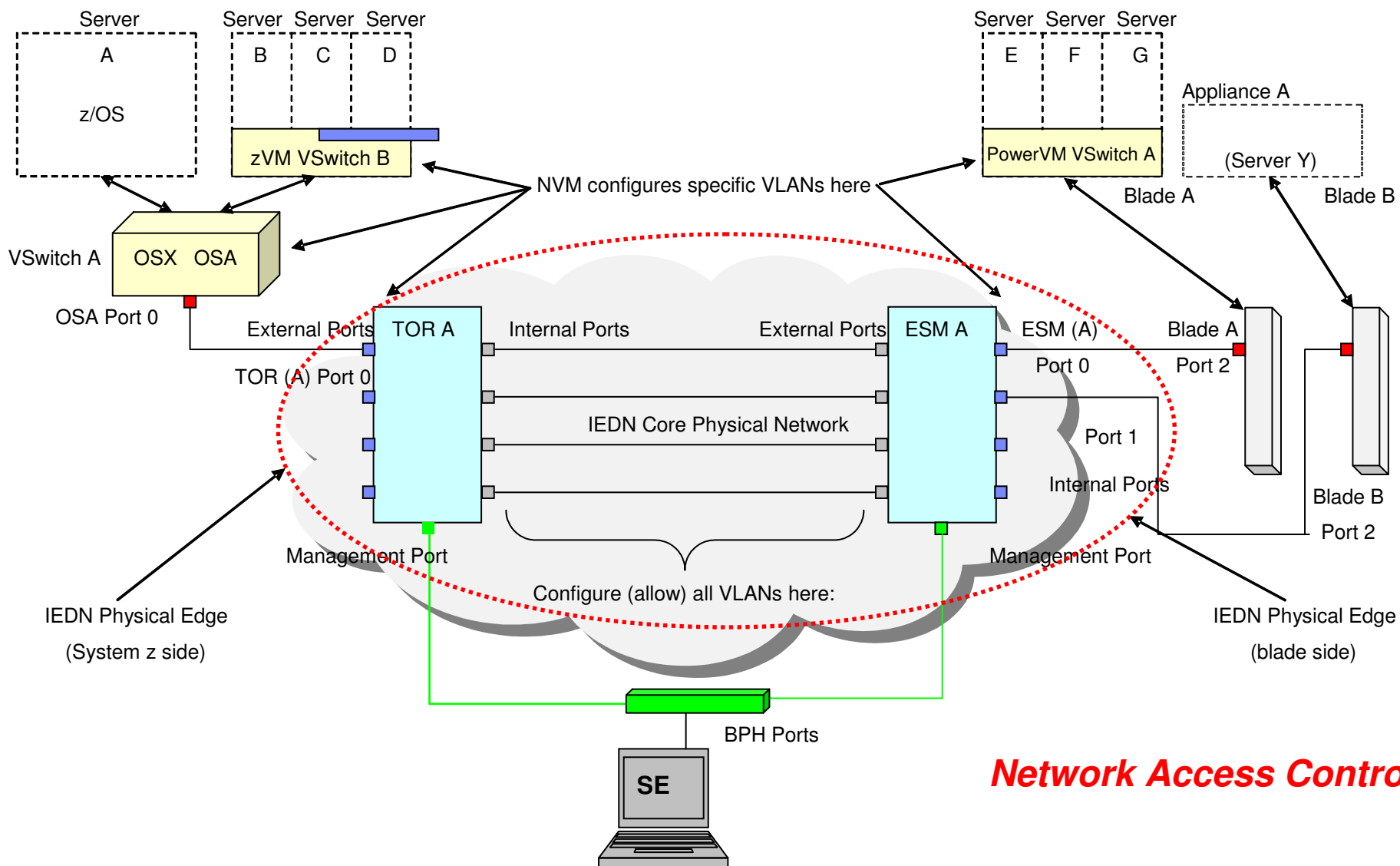
Under the "Workloads" tab, there are two radio buttons: "Use Default workload" (which is selected) and "Select workloads". Below these is a table with the following content:

Select	Name	Description
No workloads available		
Total: 0		

Below the table is a "New Workload" button. At the bottom of the window are four buttons: "OK", "Apply", "Cancel", and "Help".



Virtual Networks and Access Controls



Create Virtual Network

NEXTGEN: Manage Virtual Networks - Mozill...

9.60.92.193 https://9.60.92.193/hmc/wd/T34a#tableTop_4bd44

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/wd/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

Virtual Server Properties: ihs-server-1

General | Status | Processors | Memory

Network Devices

Order	Virtual Network	Type
1	Default	virtio
2	db2lan	virtio
3	<NONE>	virtio

Move Up | Remove Selected | M

Add Virtual NIC

Virtual Network:

Type:

Add vNIC

Add Hosts To Virtual Network

Select the Hosts to Add to the Virtual Network - IEDN2:

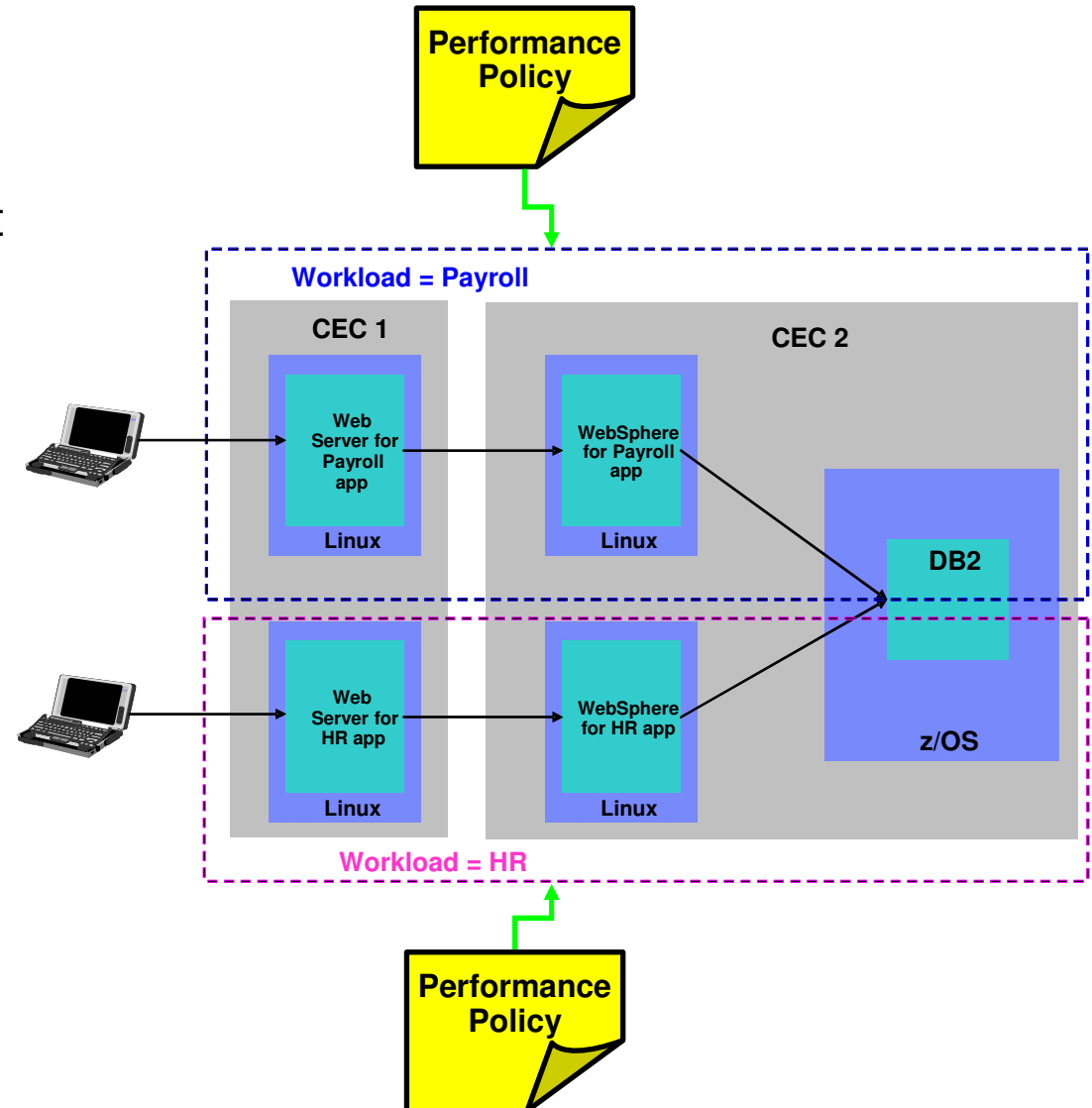
Name	Running Network	Defined Network
CEC1		
LPAR1		
NIC1	IEDN	IEDN
zVMHypervisor		
zVMGuest1		
NIC1	IEDN	IEDN2
zVMGuest2		
NIC1	None	IEDN
NIC2	IEDN2	IEDN2
pHypervisor		
pVirtualServer1		
NIC1	None	None
xHypervisor		
xVirtualServer		
NIC1	IEDN	IEDN
CEC2		
LPAR1		
zVMHyp		
pHypervisor		
xHypervisor		

Show only Unconnected Hosts

OK | Cancel | Help ?

Workload

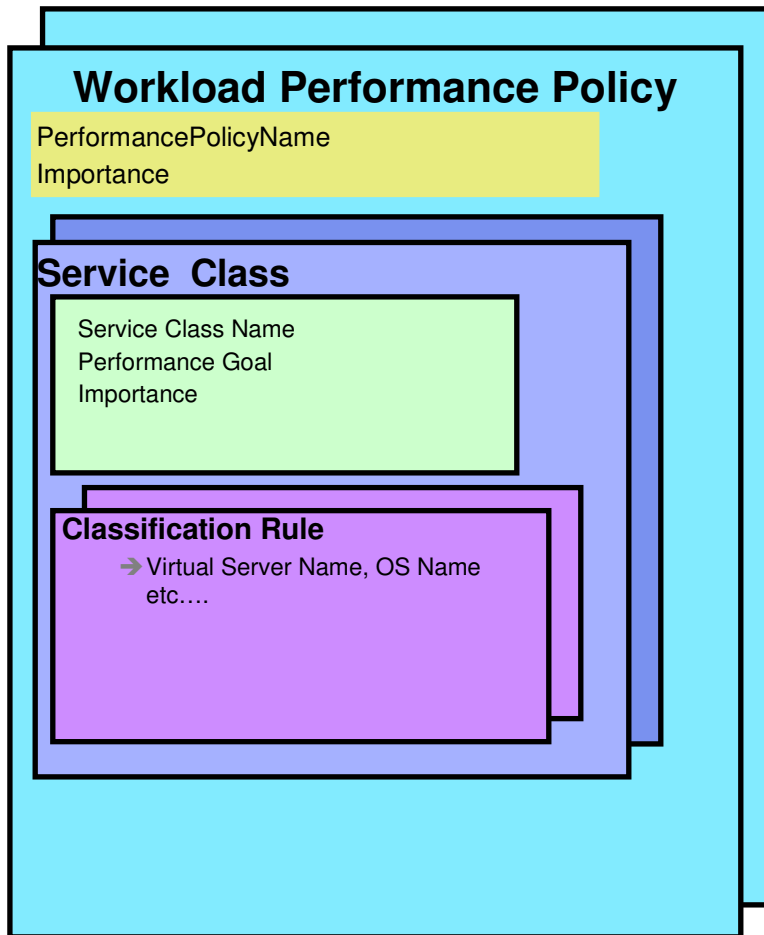
- A Workload is a grouping mechanism and “management view” of virtual servers supporting a business application
- Provides the context within which associated platform resources are presented, monitored, reported, and managed
- Performance policy is associated with Workload



Workload Performance Policy

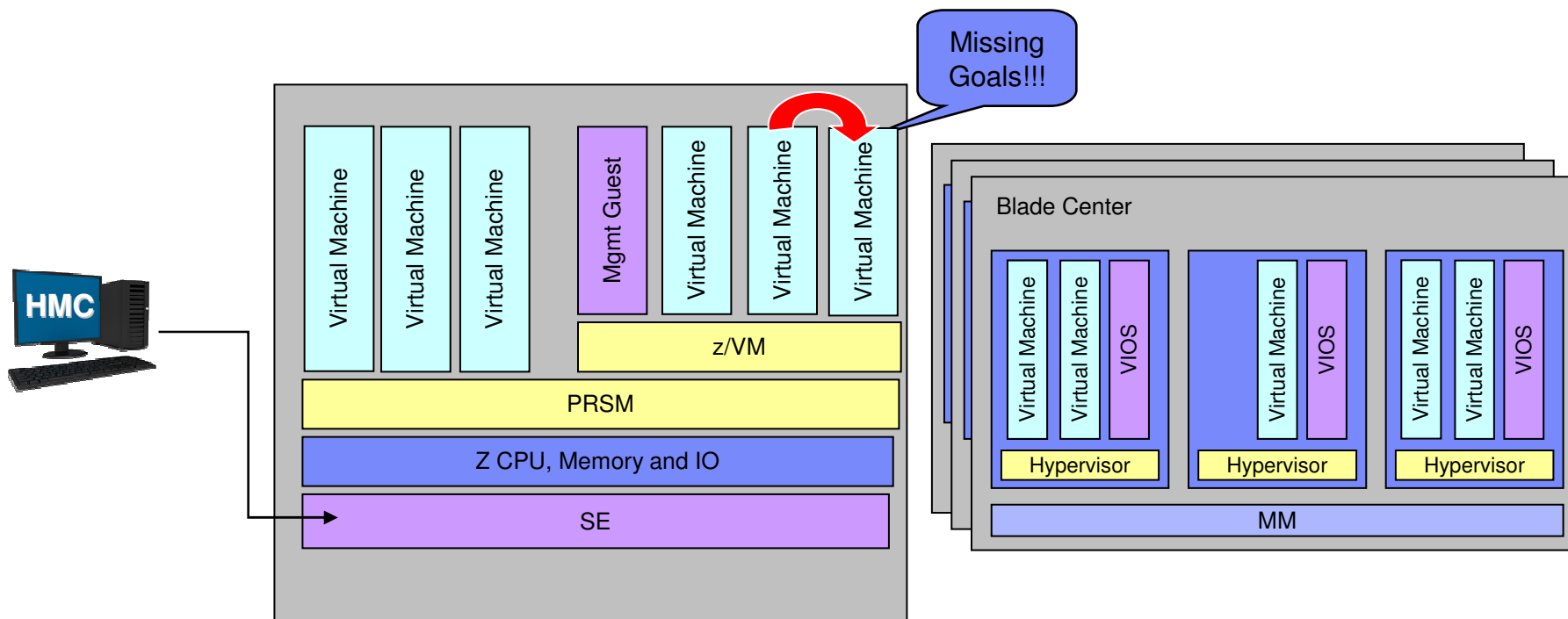
- Defines performance goals for virtual servers in a workload
 - Conceptually similar to simplified z/OS WLM Policy
- Provides basis for monitoring and managing platform resources used by virtual servers in a Workload
- Workload relationship to performance policy
 - Multiple performance policies associated with a workload
 - A single policy is active at a given time
 - Can dynamically change the active policy
 - Through the UI
 - On 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