Romney White – System z Architecture and Technology
SHARE – March, 2011 – Anaheim, CA

# IBM zEnterprise Unified Resource Manager Overview

## The value for z/VM

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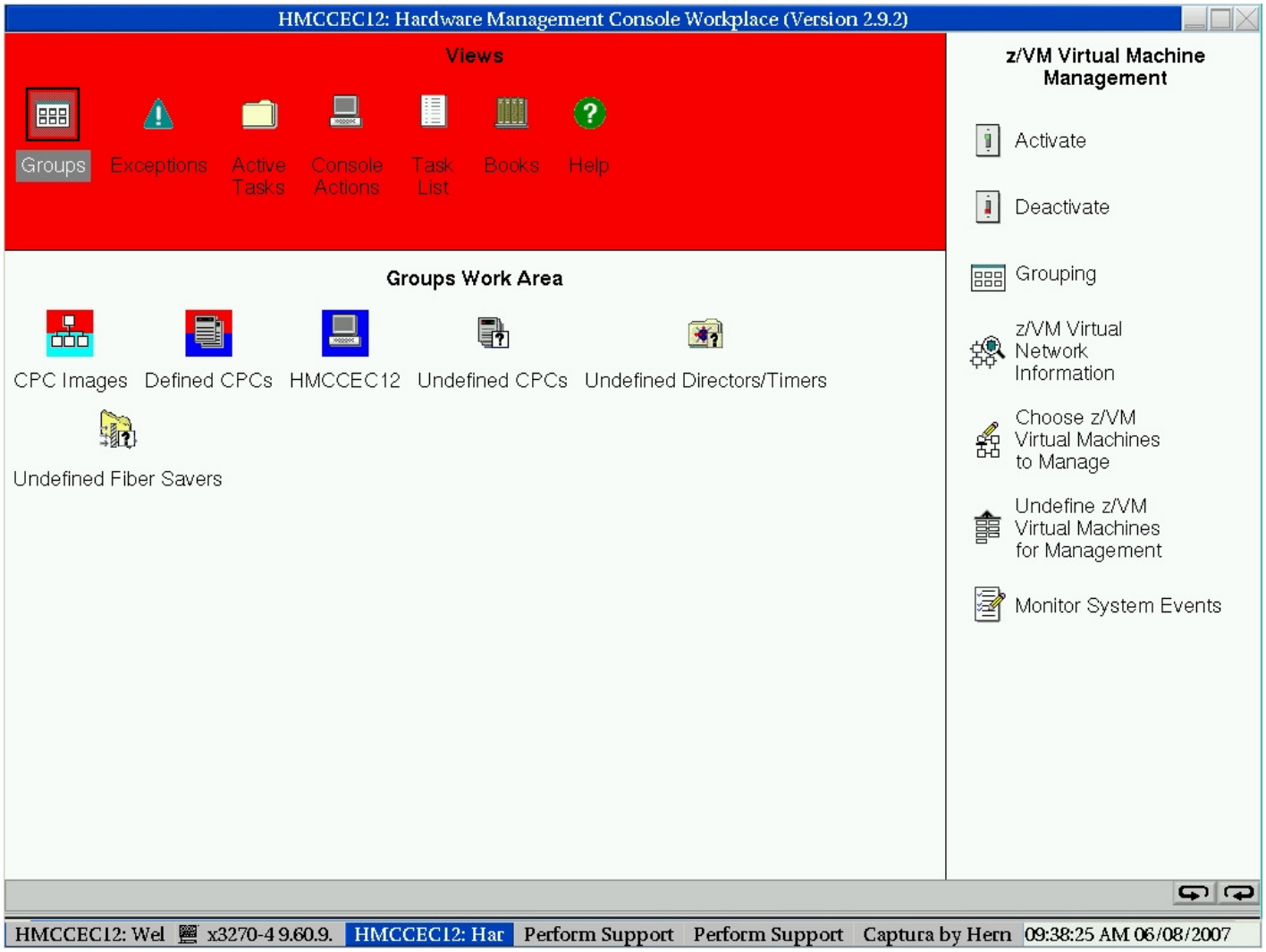
# Agenda

- 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® 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


**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)

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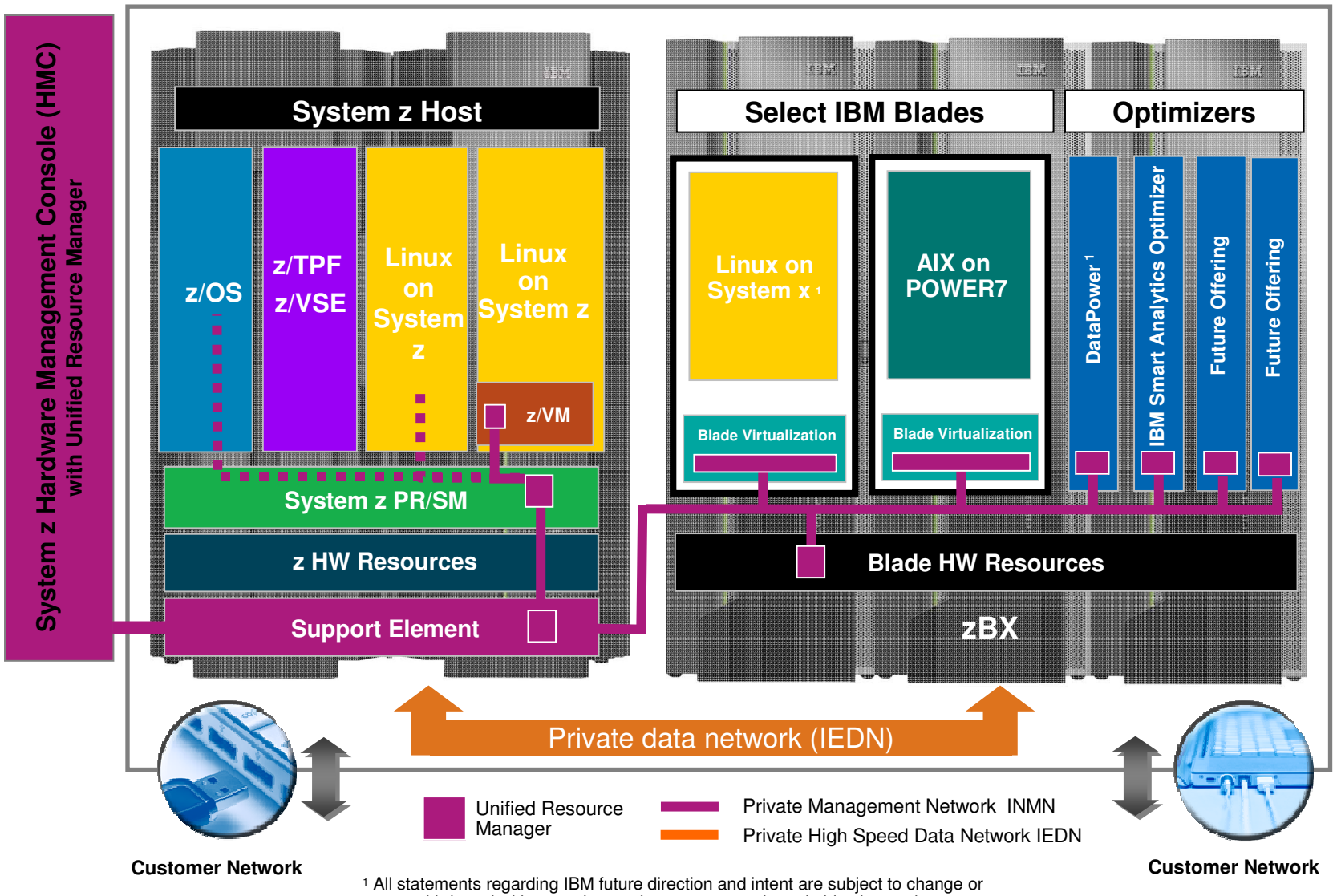
# Putting zEnterprise System to the task

*Use the smarter solution to improve your application design*

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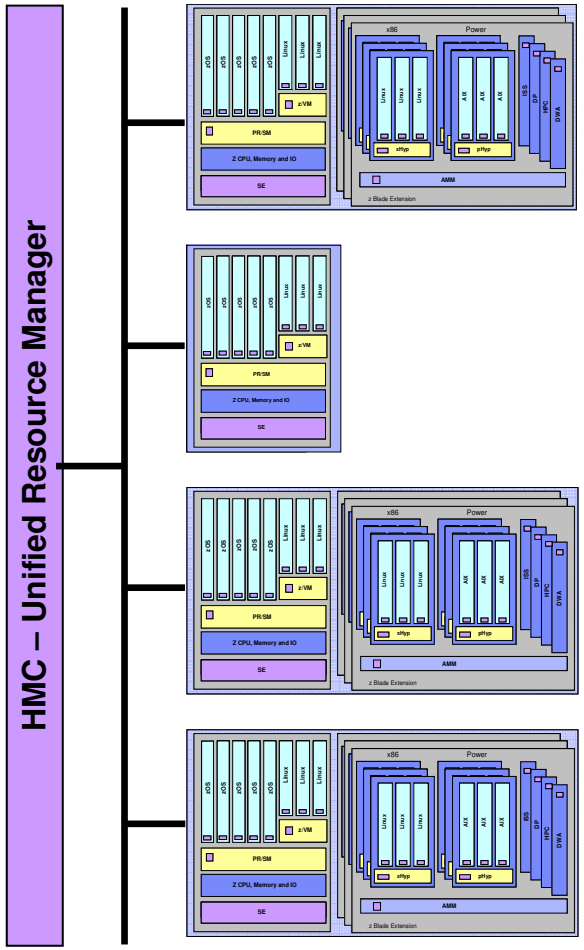
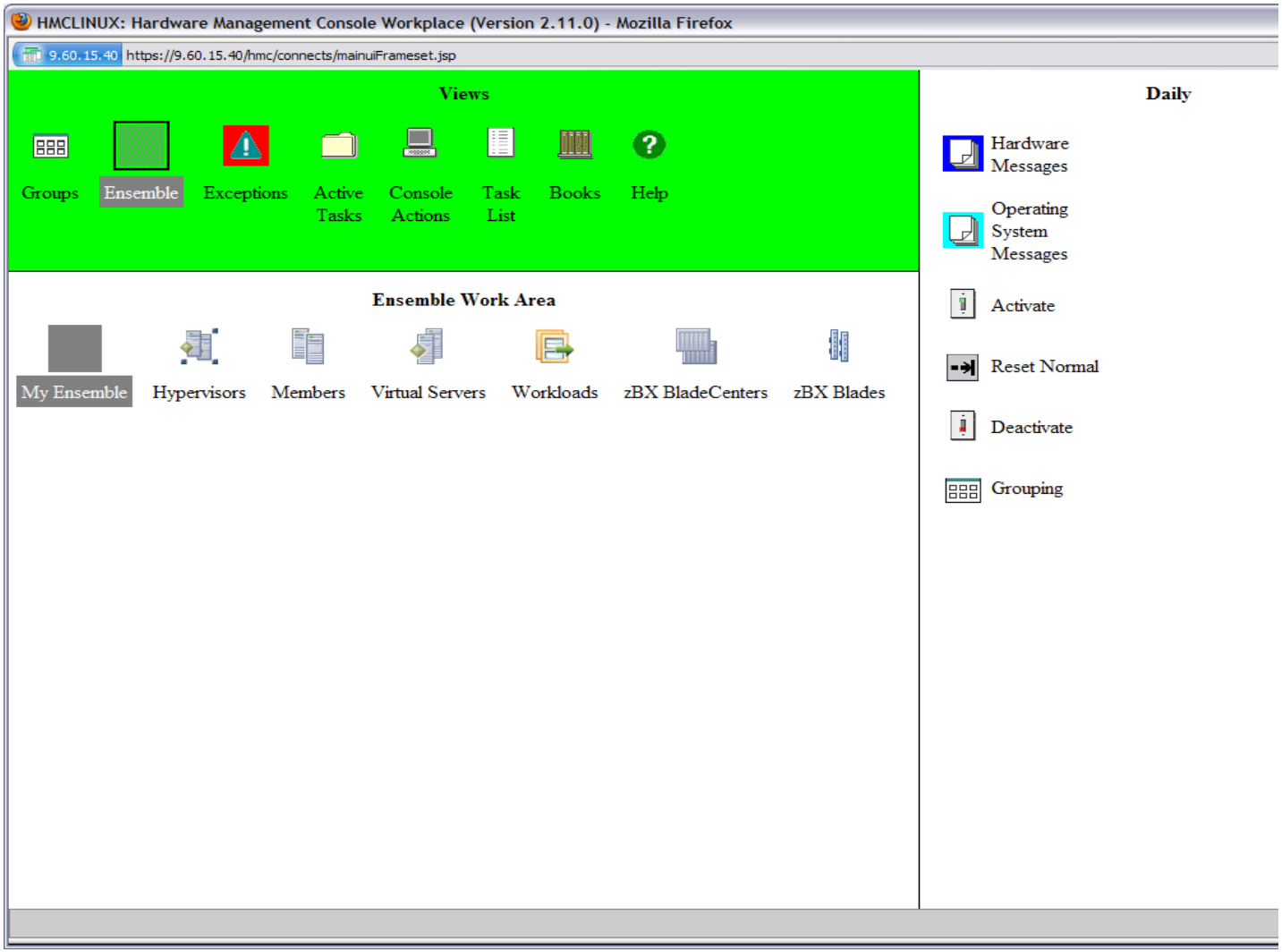
# zEnterprise Ensemble

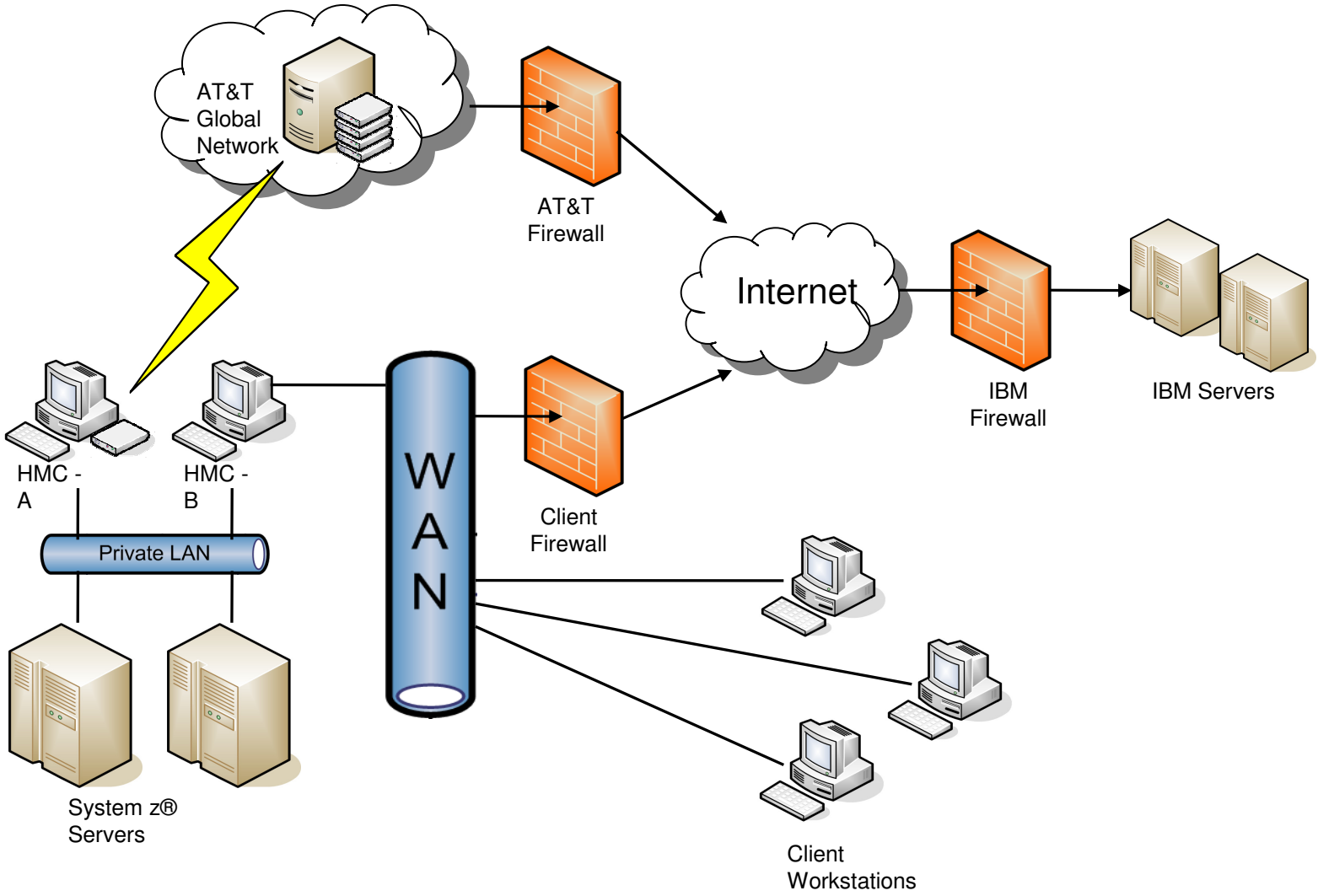
- A zEnterprise Node is a single zCEC with 0 to 4 zBX racks and up to two blade centers per rack
- A zEnterprise Ensemble is a collection of 1 to 8 zEnterprise Nodes managed as a single virtualized pool of server resources
- A zEnterprise node can be a member of a single ensemble
- An ensemble is the 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<br>Create Ensemble, Add Member… |
| **Virtual Network Administrator** | Responsible for Managing Virtual Networks, Hosts, and MAC Prefixes<br>Manage Virtual Networks, Add Hosts to Virtual Networks, Create VLAN IDs… |
| **Virtual Server Administrator** | Responsible for managing virtual servers<br>New /Modify Virtual Server, Add Virtual Disk, Migrate… |
| **Virtual Server Operator** | Responsible for performing and scheduling virtual server activation/deactivation, mounting virtual media<br>Activate, Deactivate, Mount Virtual Media, Console session… |
| **Storage Resource Administrator** | Responsible for managing storage resources – Storage Access Lists, WWPNs, z/VM Storage Groups<br>Export WWPN, Import SAL, Add Storage Resources… |
| **Workload Administrator** | Responsible for managing workloads<br>New /Modify workload, Add / Remove Virtual Servers.. |
| **Performance Management Administrator** | Responsible for managing performance policies<br>New /Modify performance policy, Import policy |
| **Performance Management Operator** | Responsible for performing and scheduling policy activations and creating threshold notifications<br>Activate, Export Policy, Monitor System Events |
| **Energy Management Administrator** | Responsible for managing power settings including power capping and power savings<br>Set Power Cap, Set Power Savings Mode, Set zBX Power Policy |

# zEnterprise Unified Resource Manager

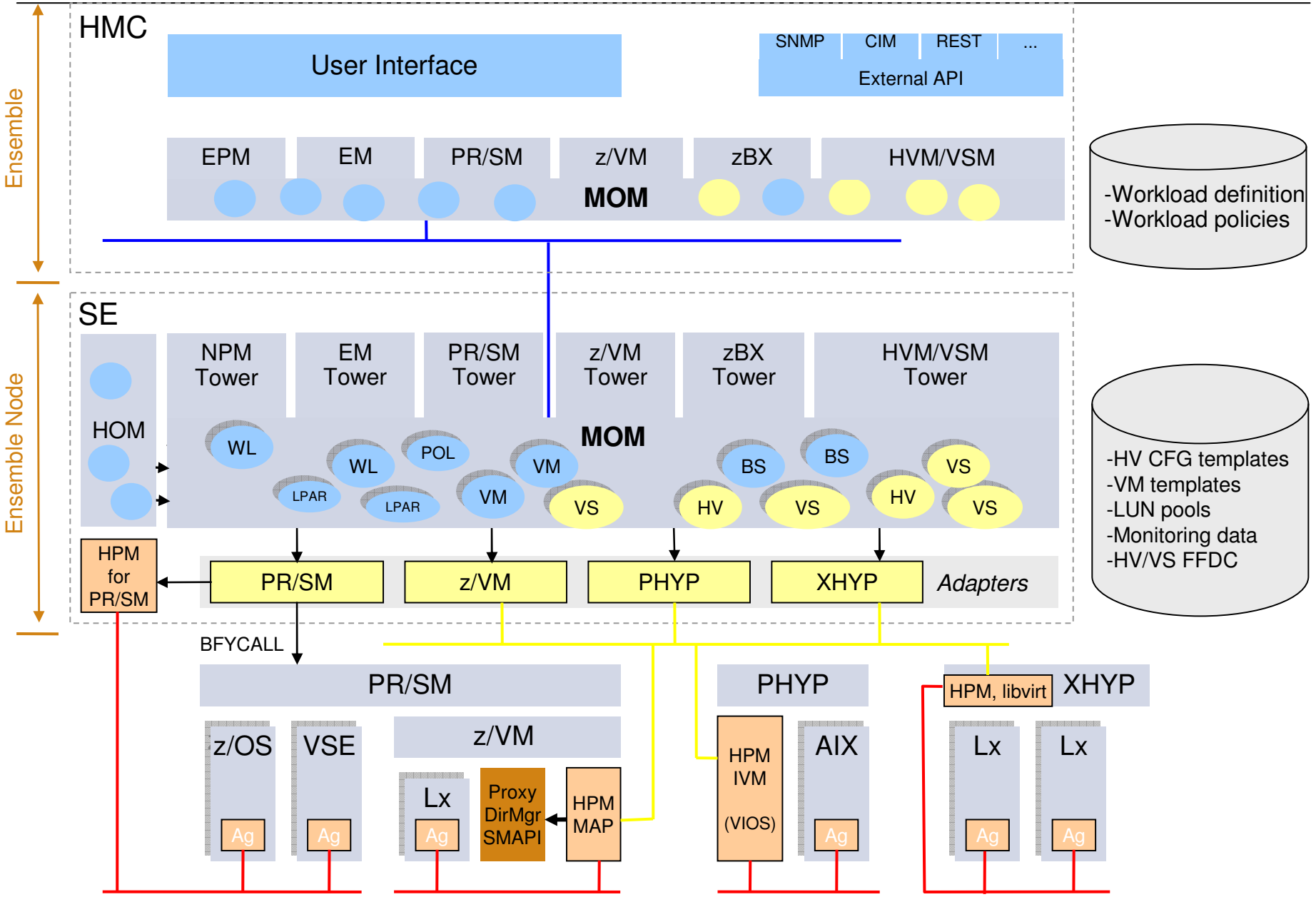
*Transforming the way resources are managed and deployed*

## 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:** **H**ardware problem detection, reporting and call home supported for virtual machines and blades



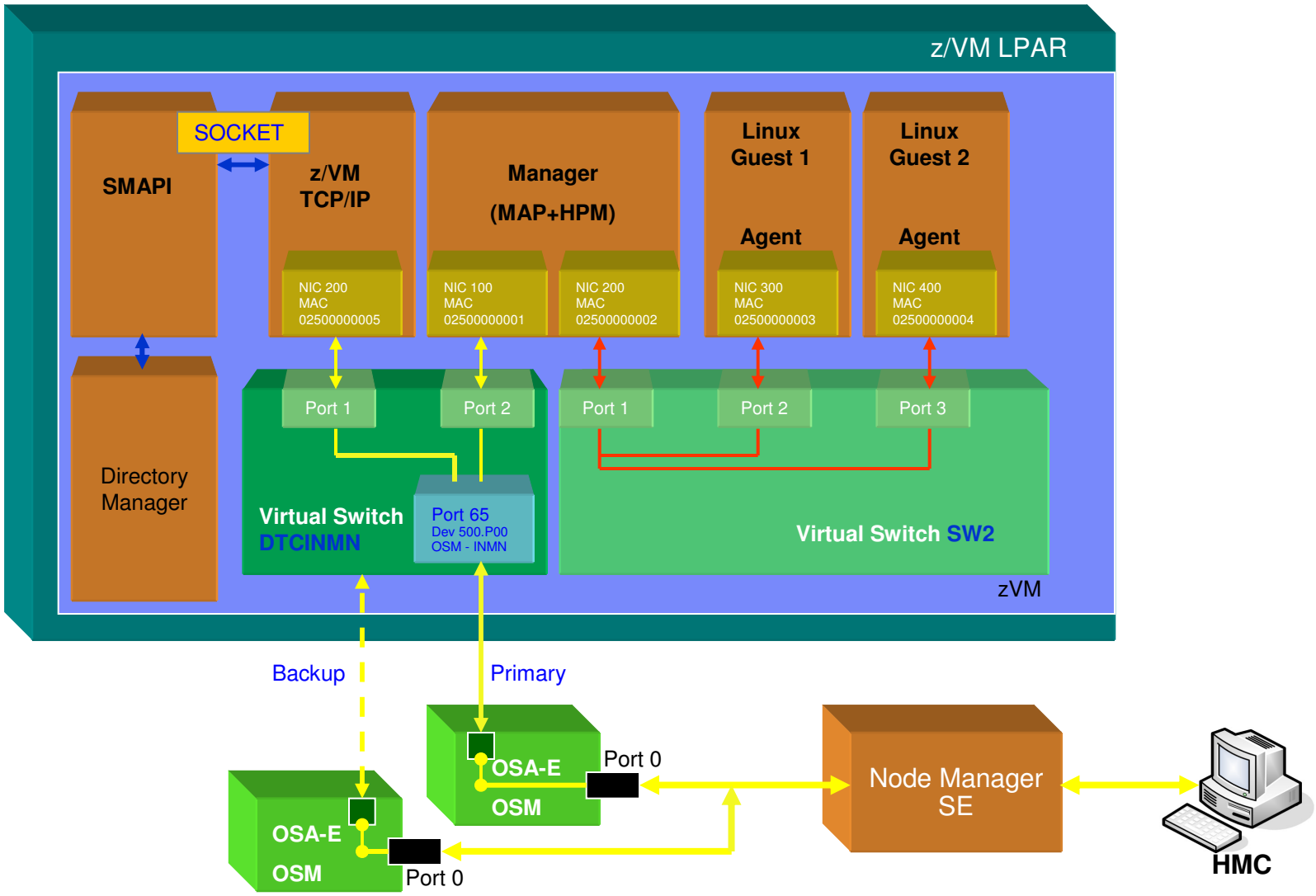
# Synergy with z/VM

- 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

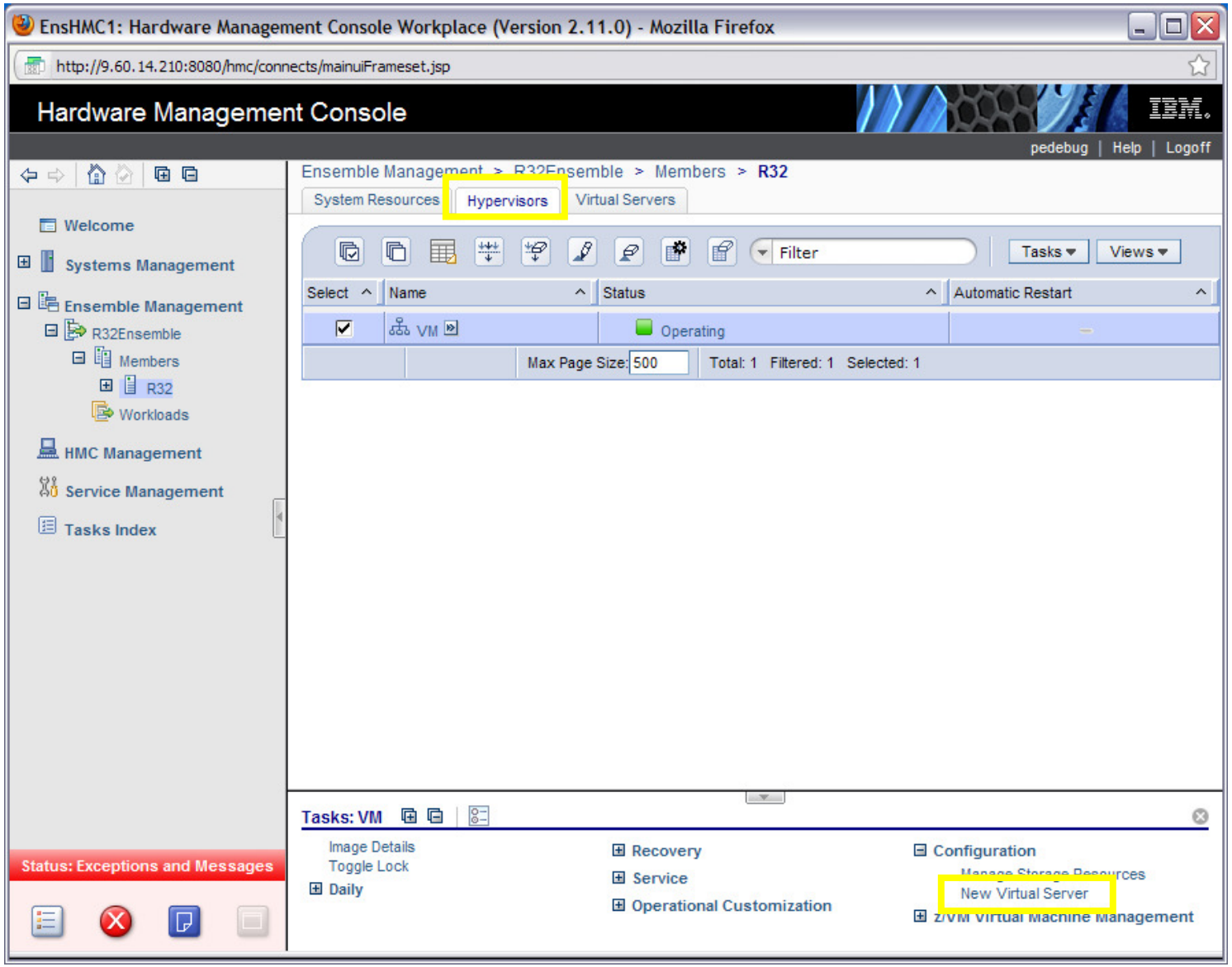
- Software
  - z/VM 6.1 with applicable PTFs
    - •z/VM Management Guest – HPM and MAP
    - •z/VM SMAPI server
    - •z/VM Directory Maintenance server (or equivalent)
    - •INMN and IEDN virtual switch controllers
    - •Control point for MAC assignment and VLAN access
  - Supported Linux SLES and 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

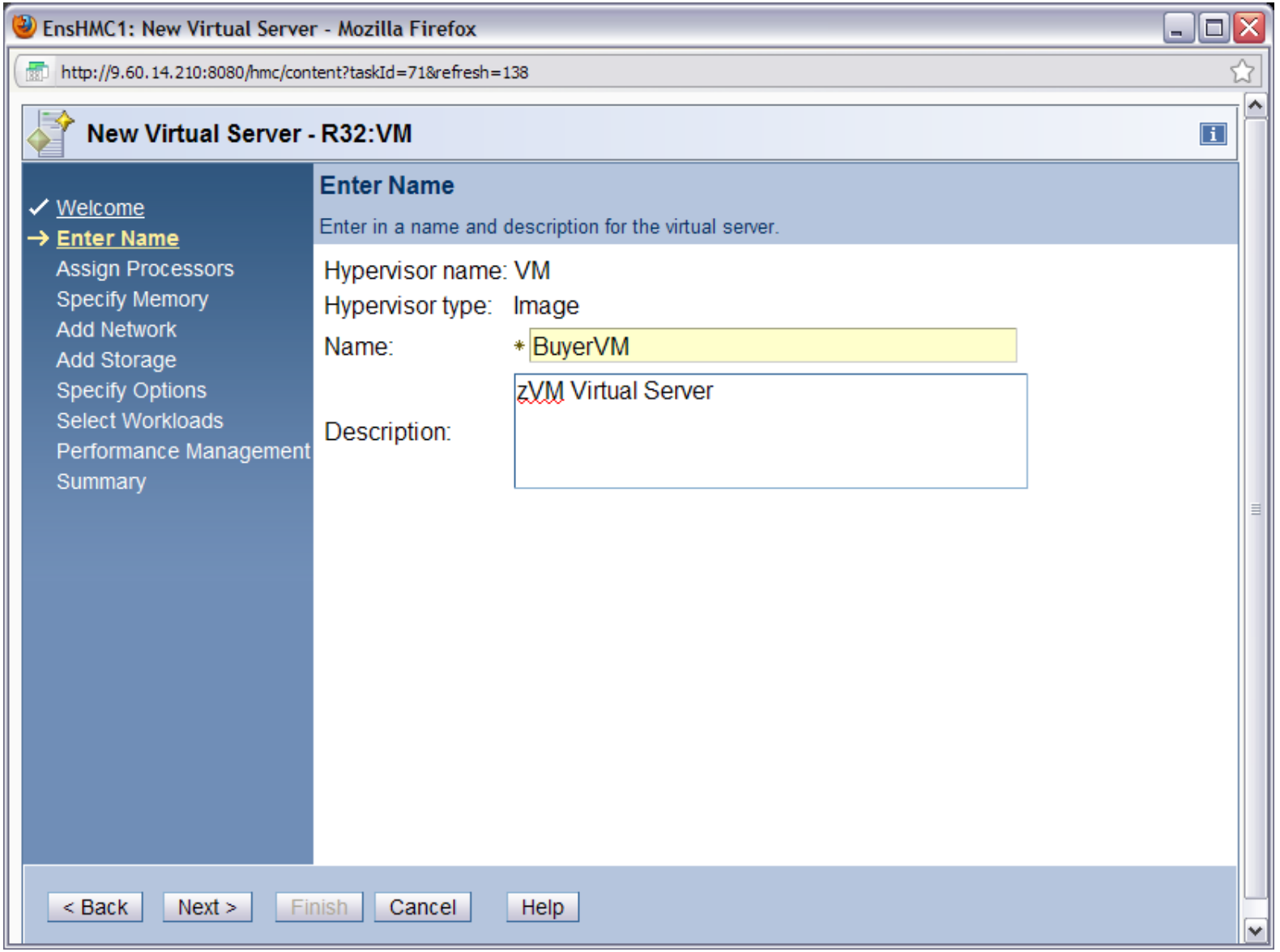
# z/VM Management Infrastructure

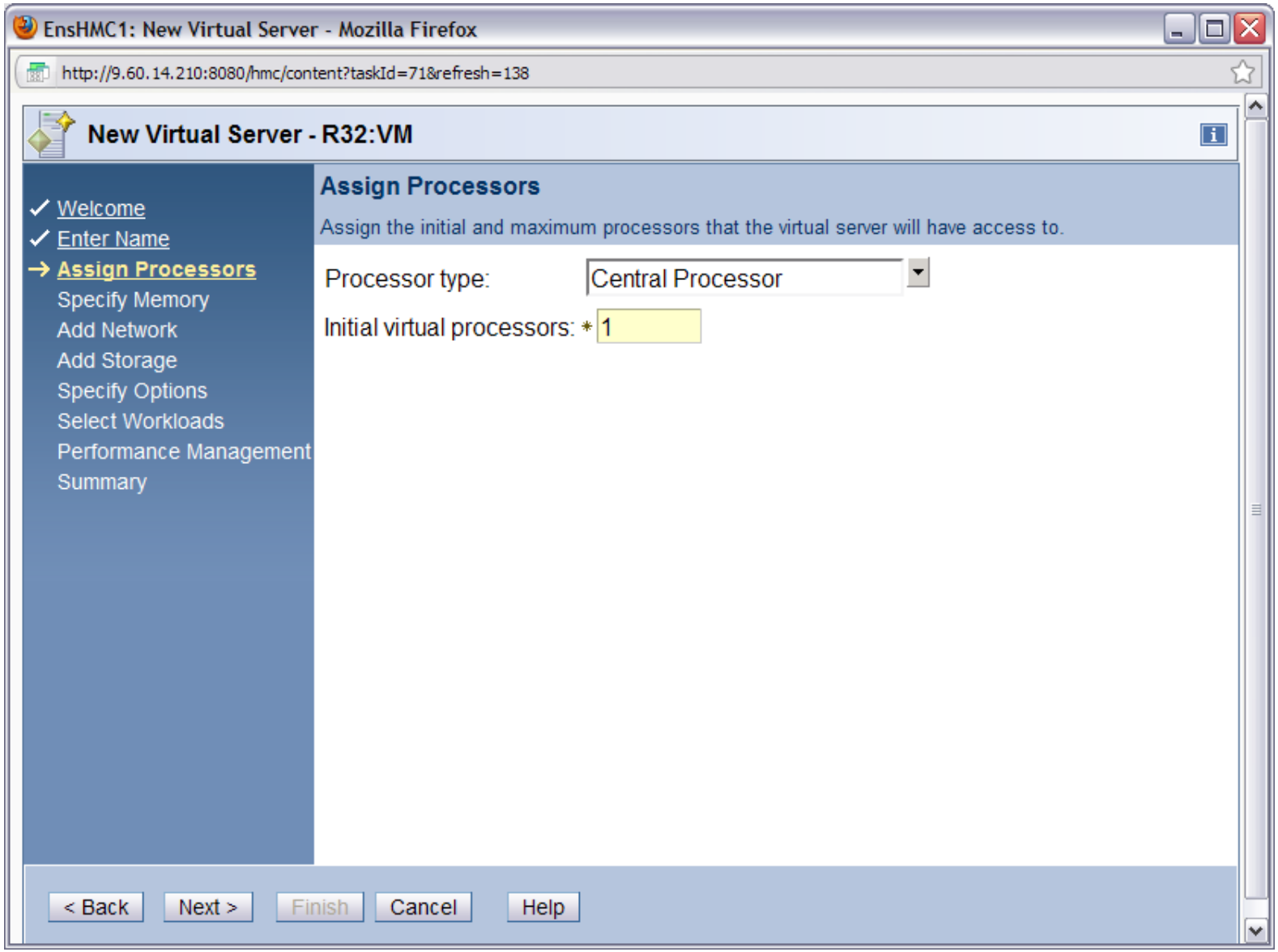


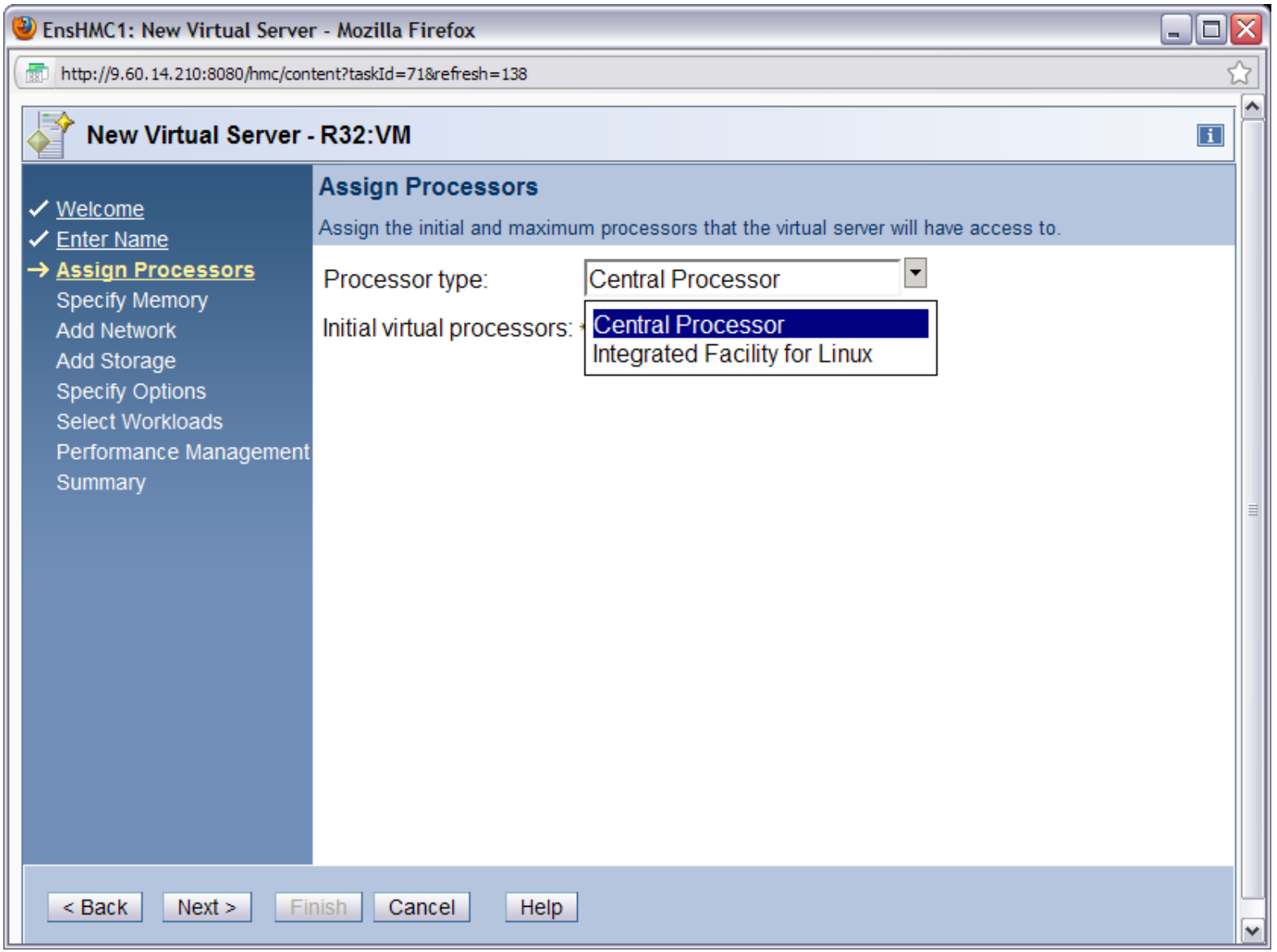
# Use Cases

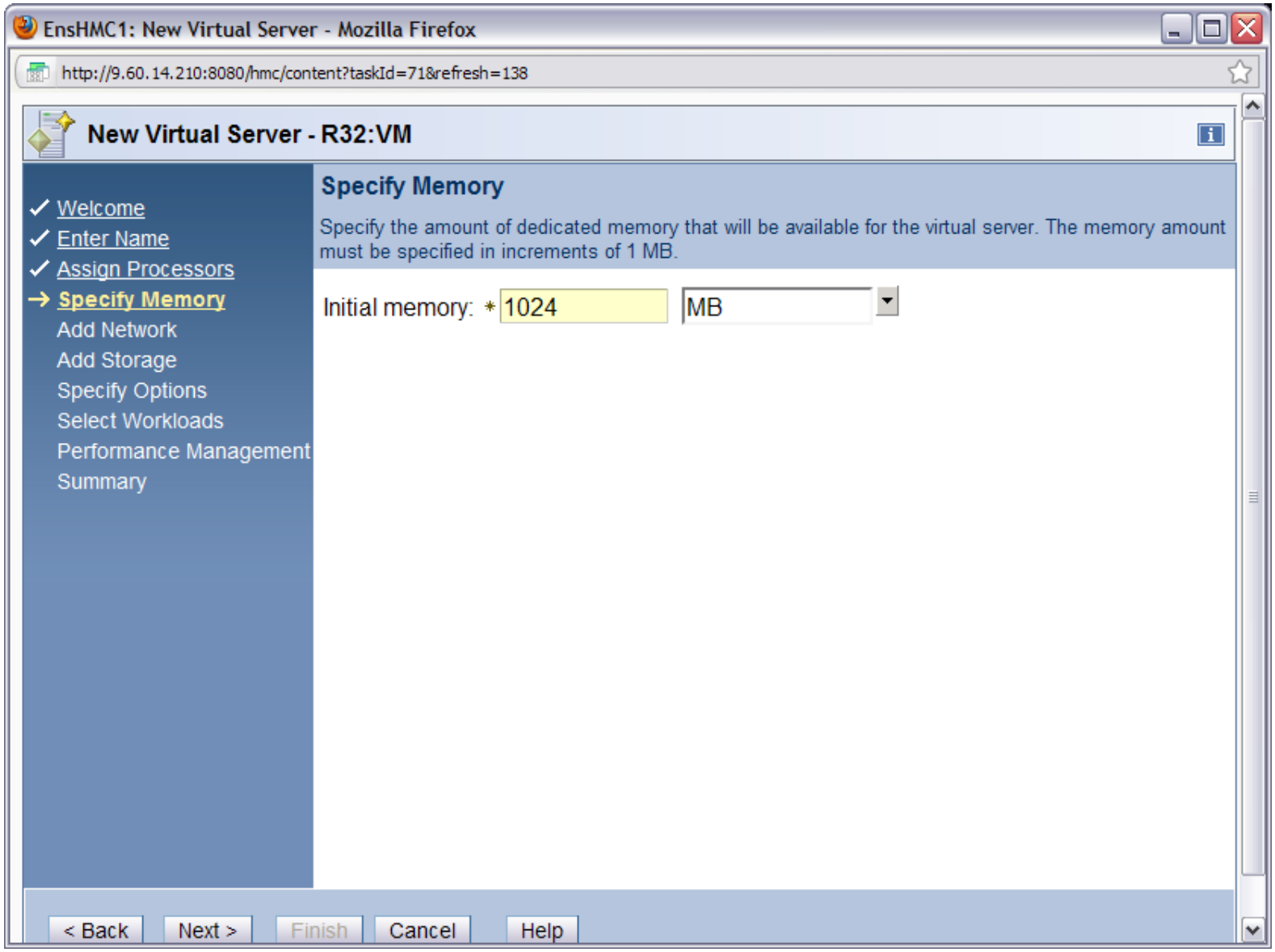
- New virtual server
- Virtual server details
- Create virtual network
- Associate virtual server with virtual network

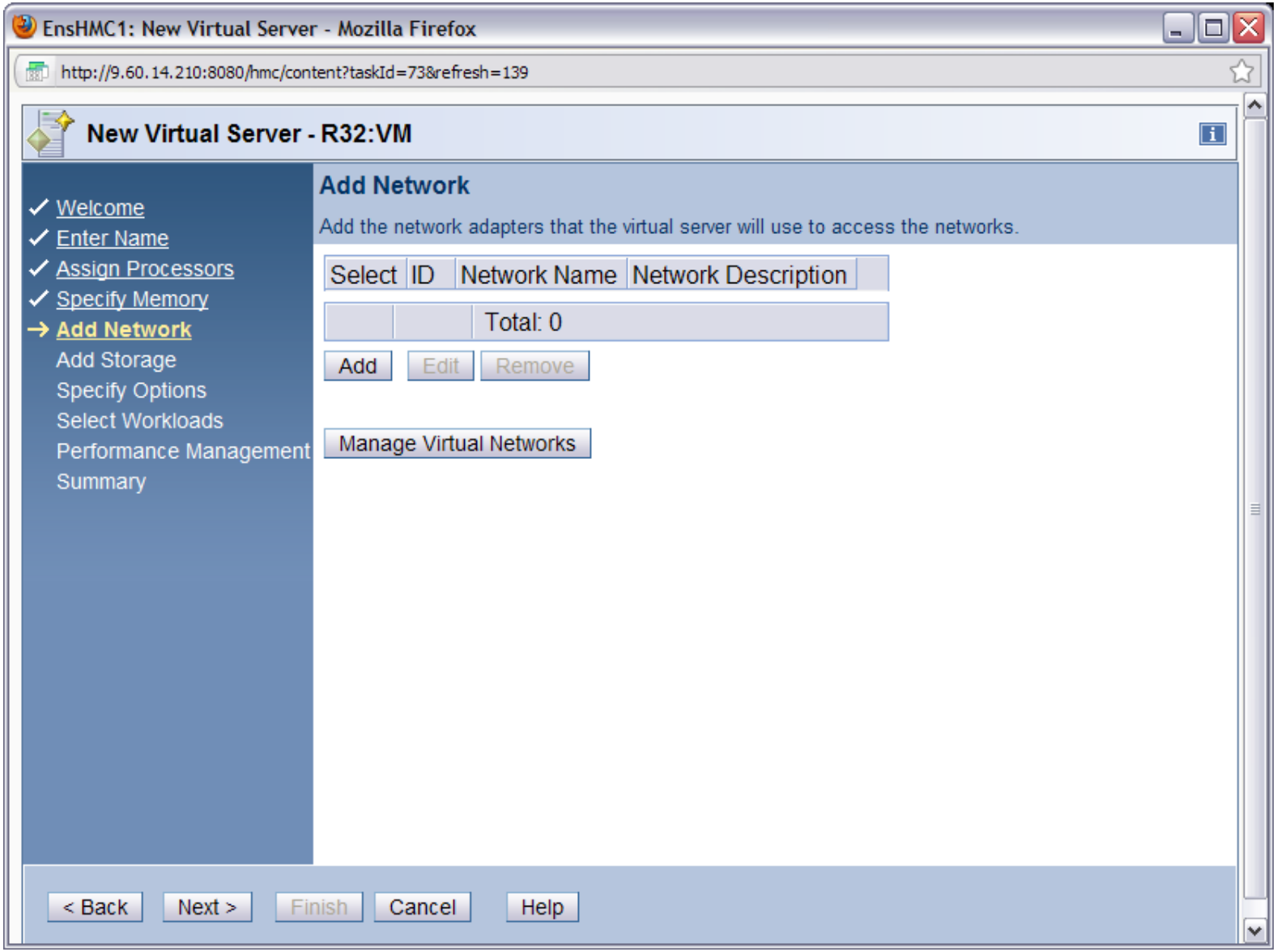


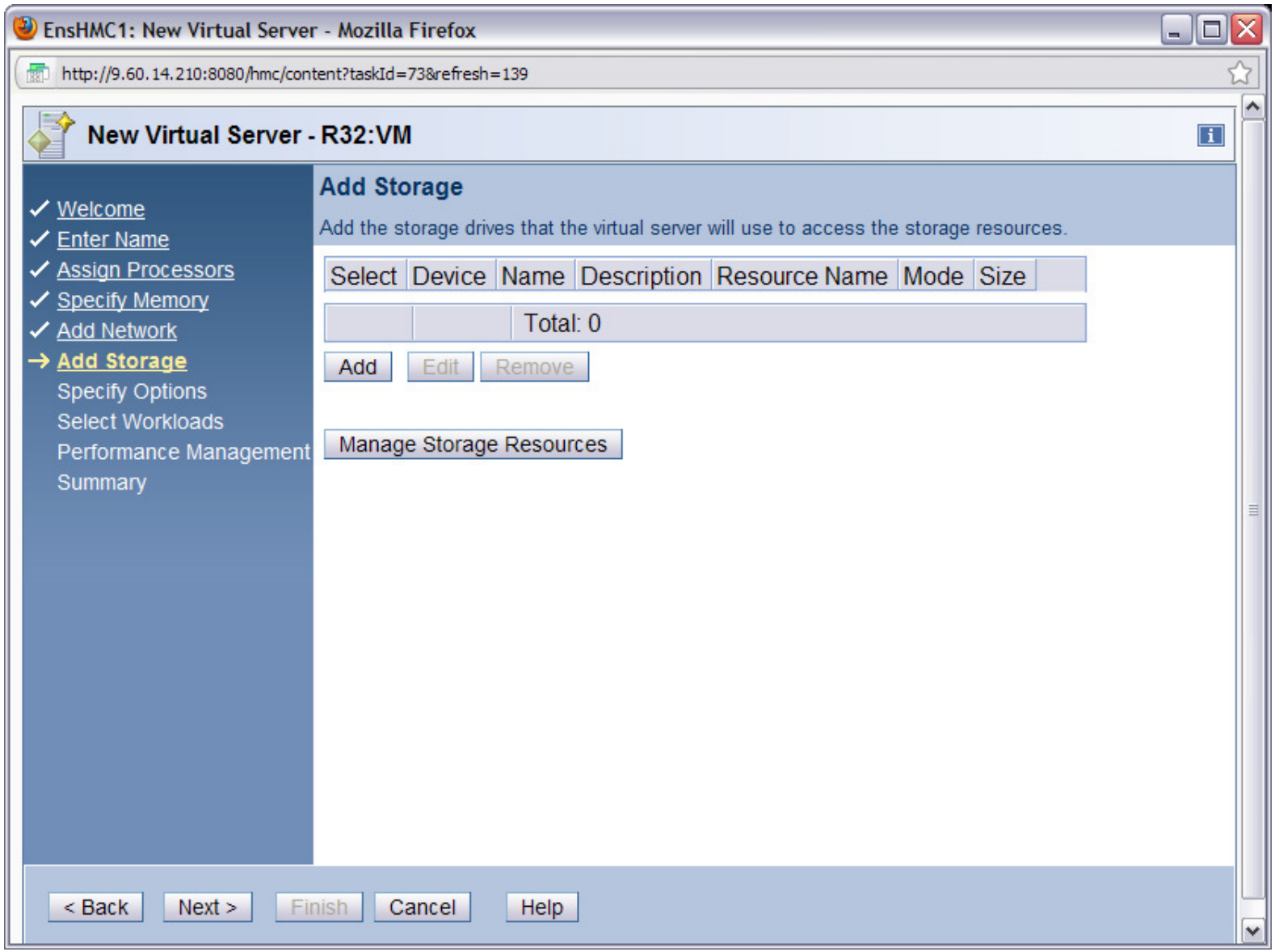


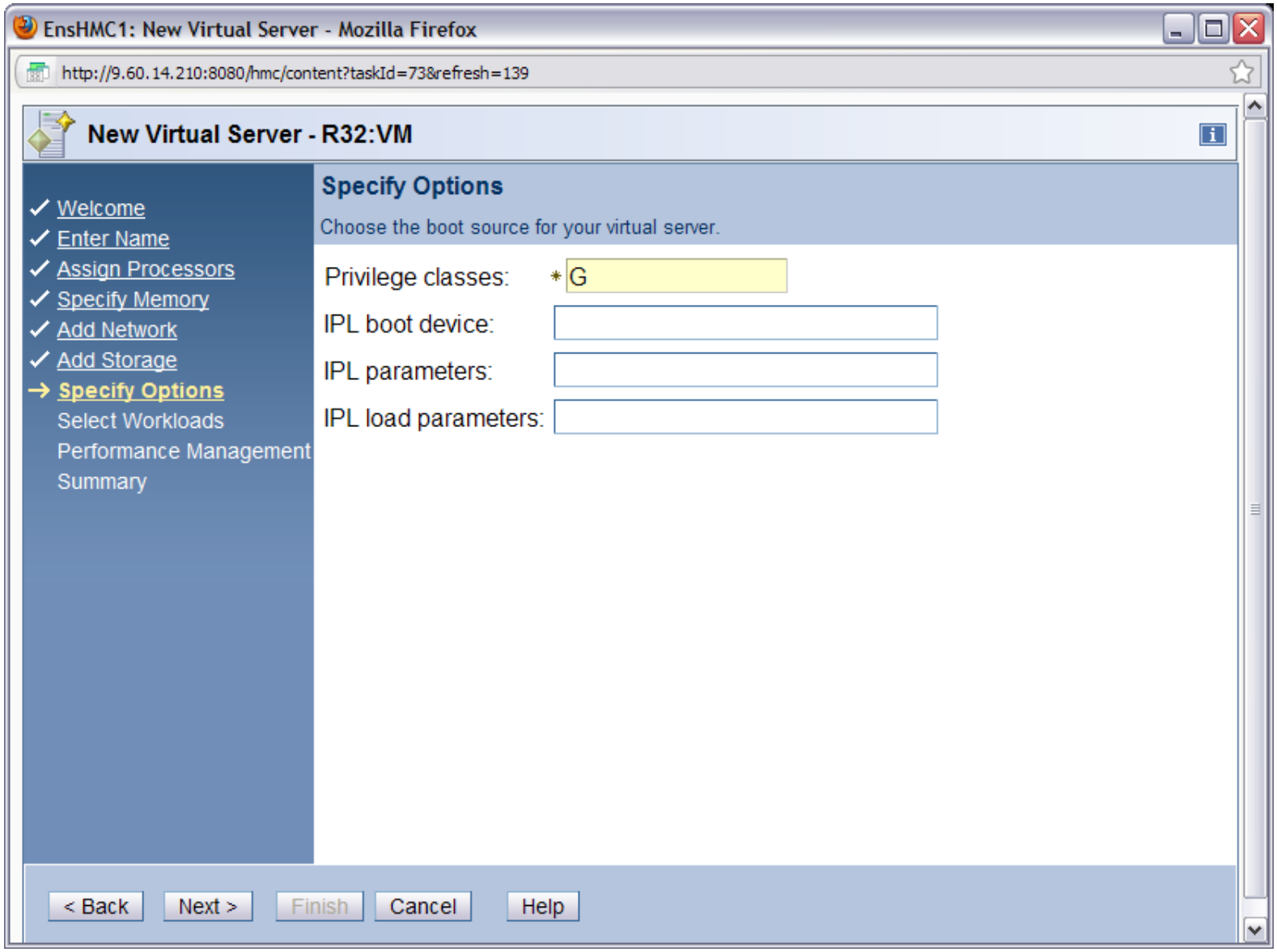


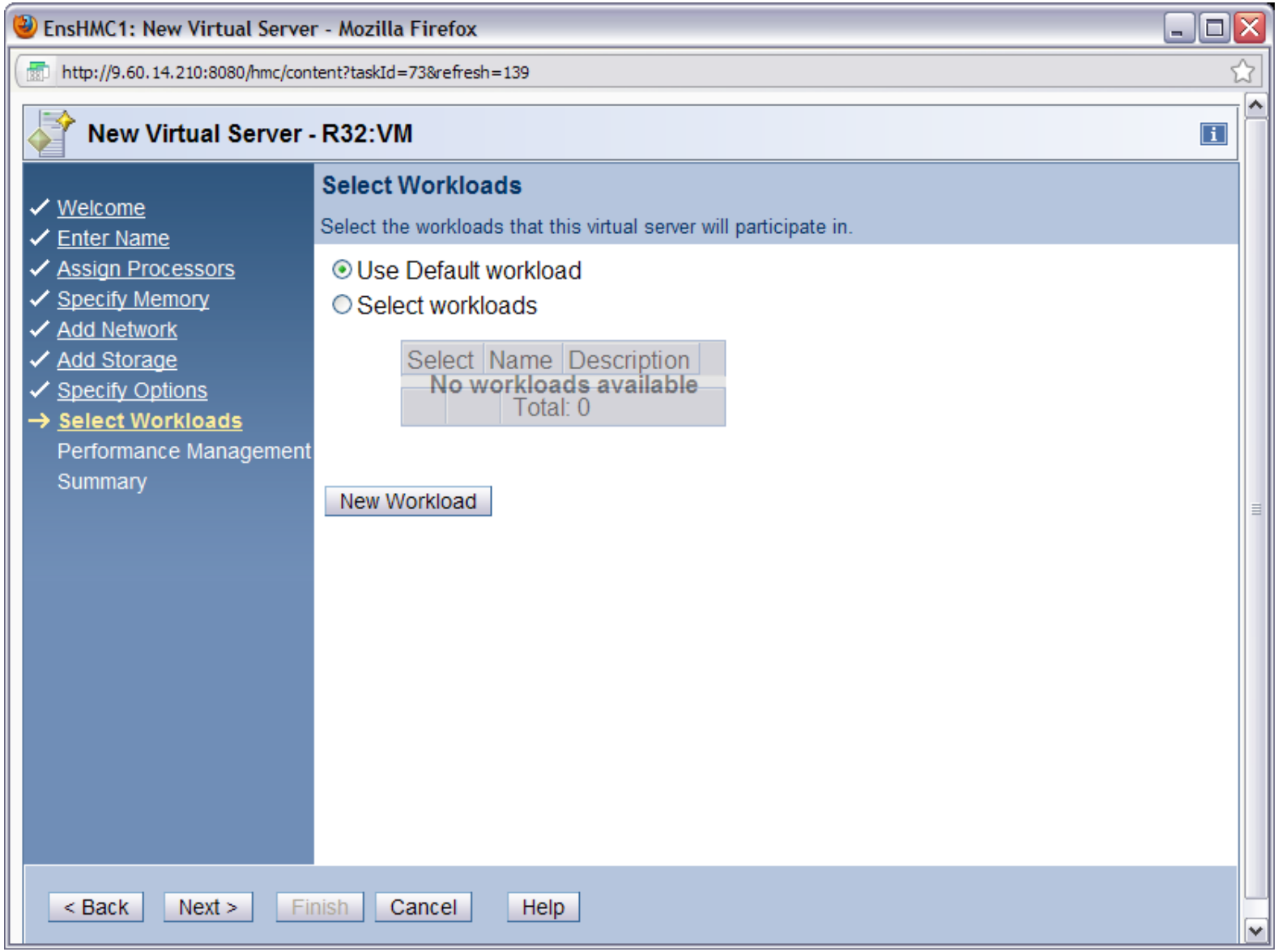


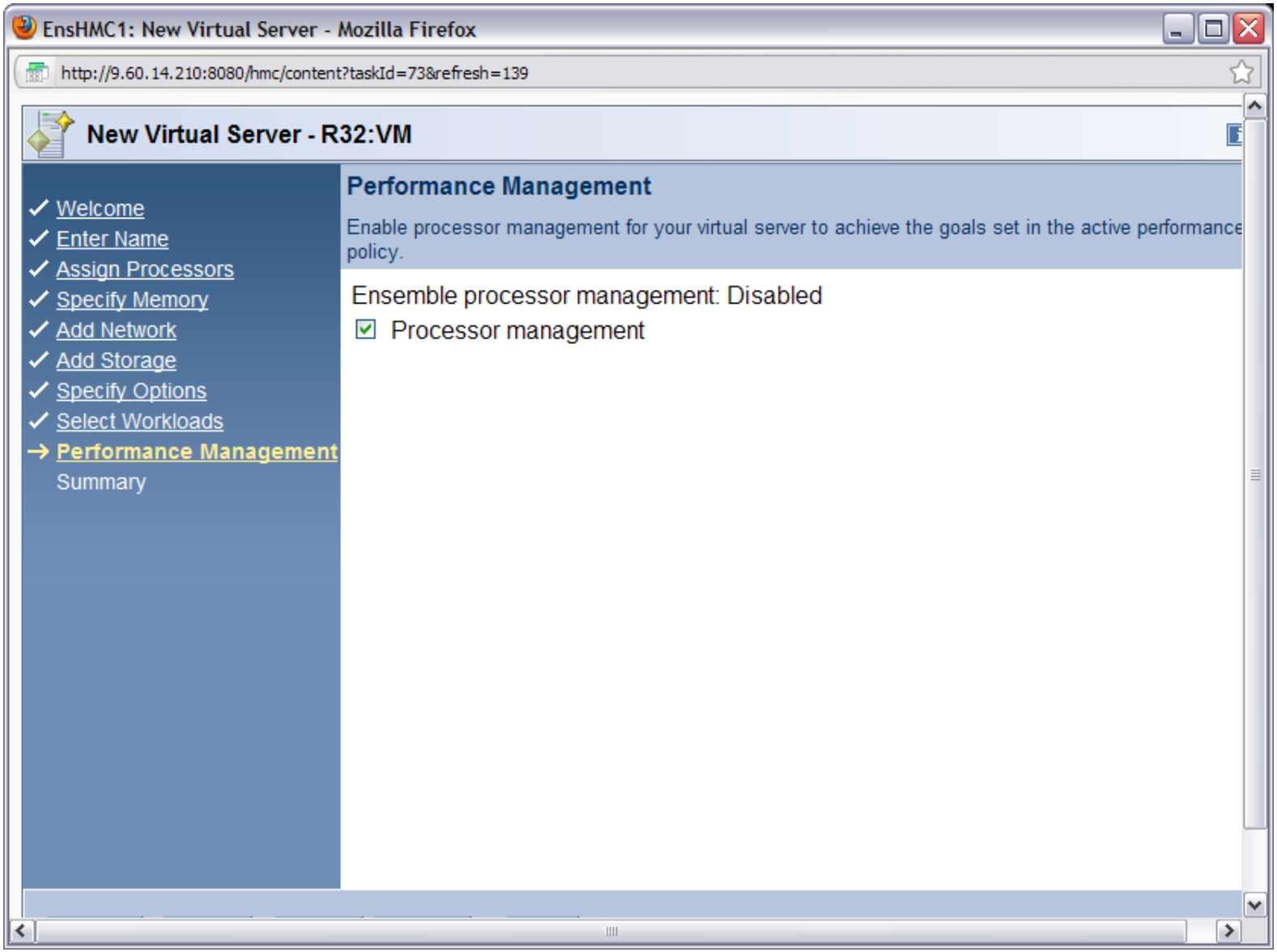


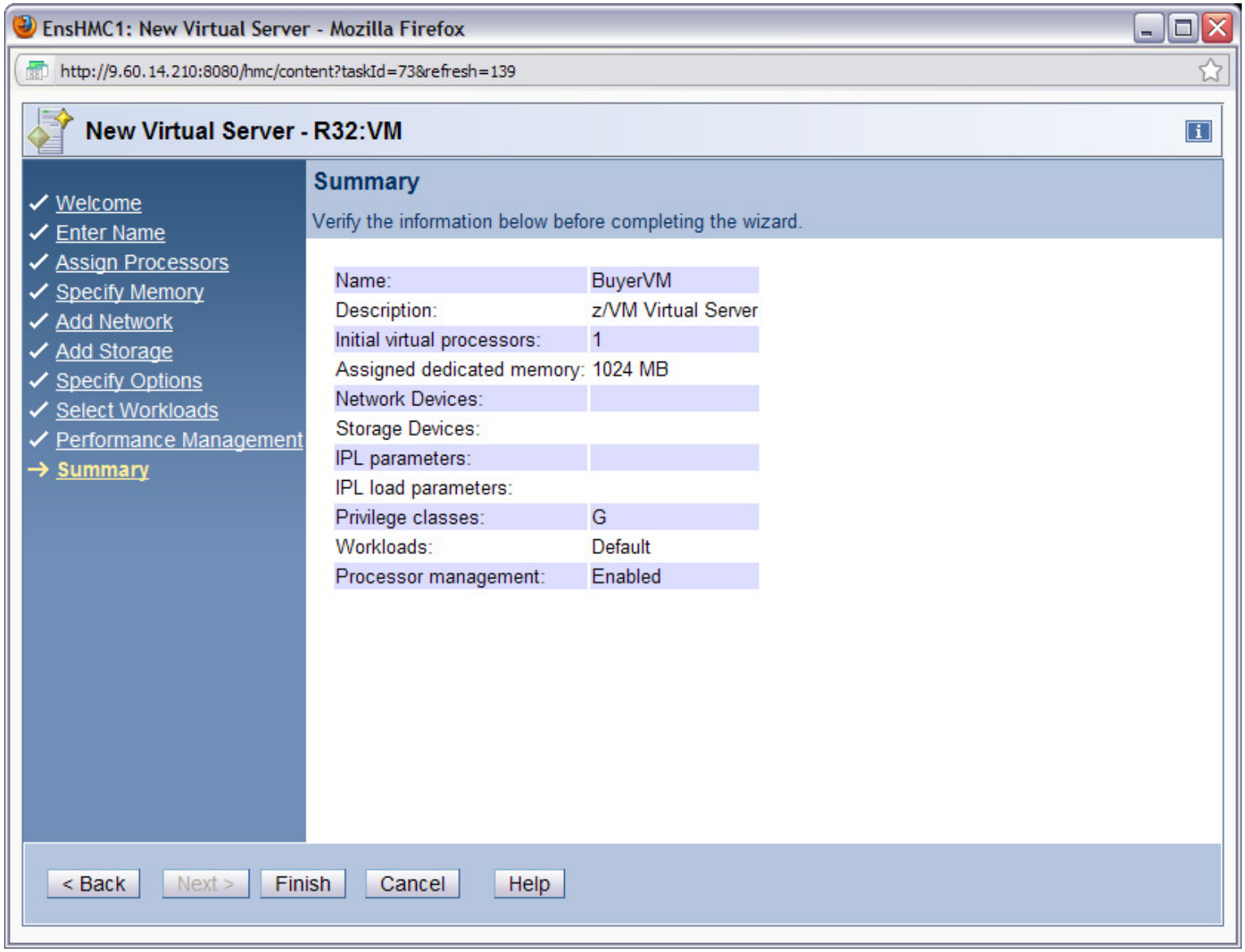


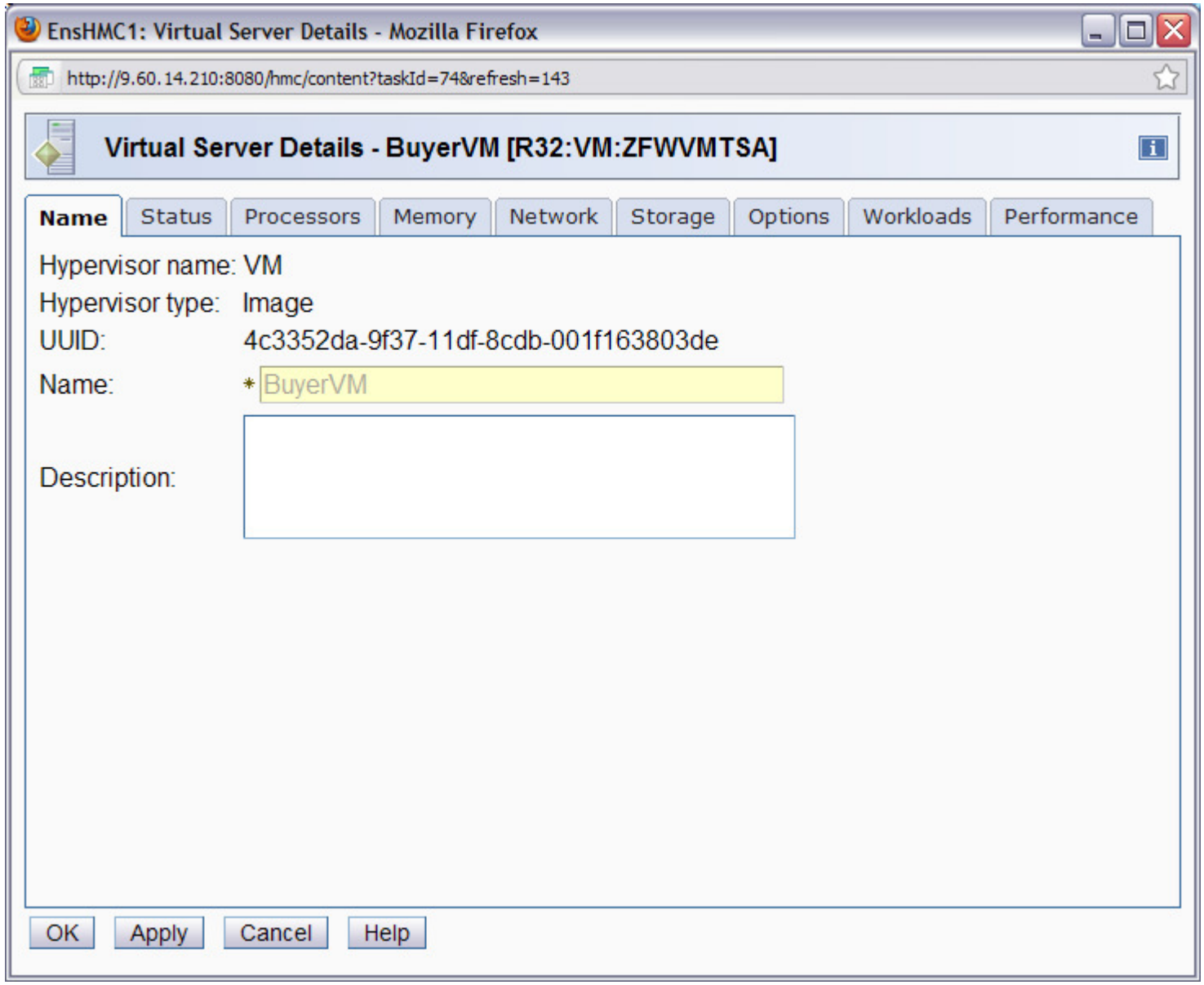


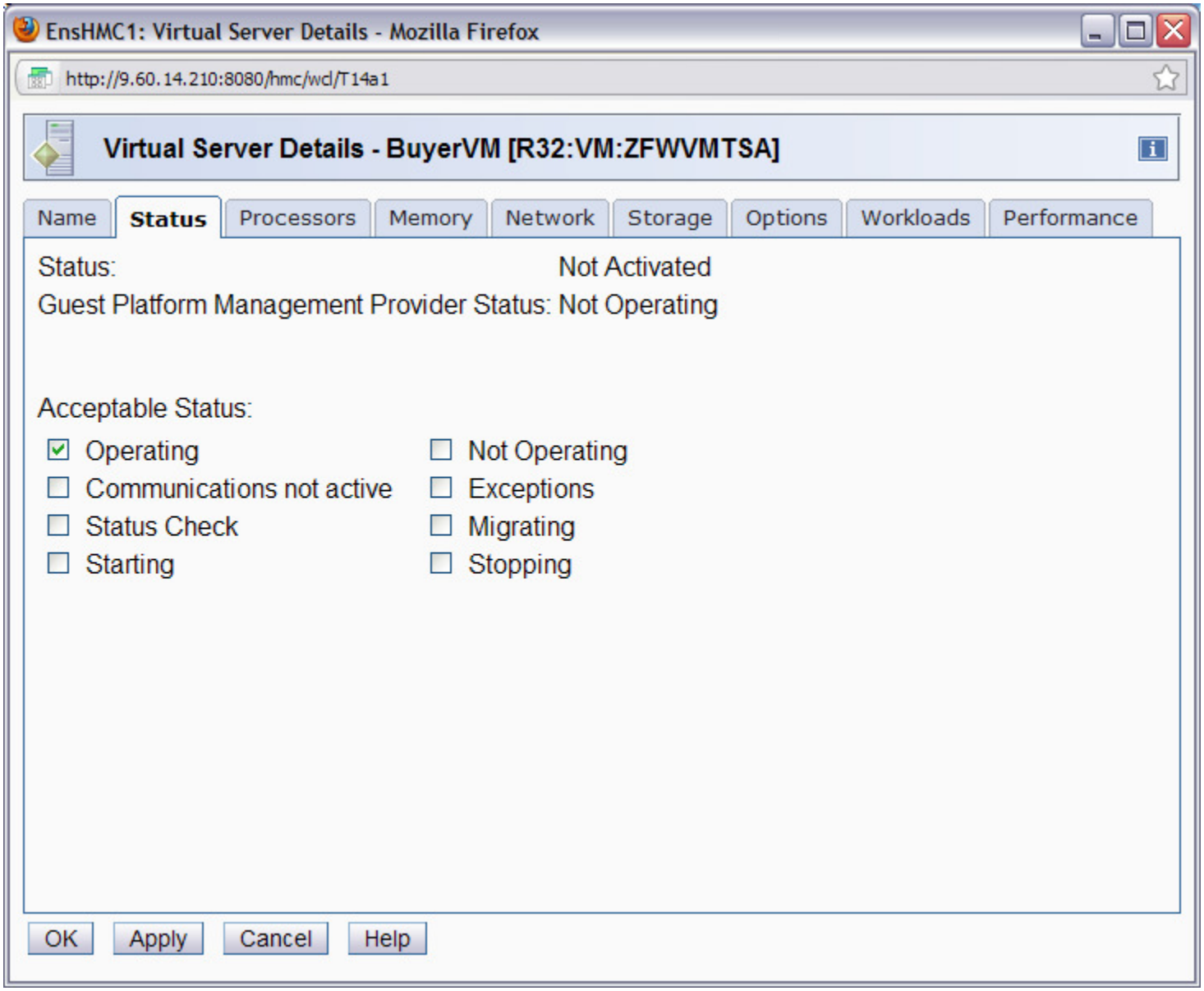


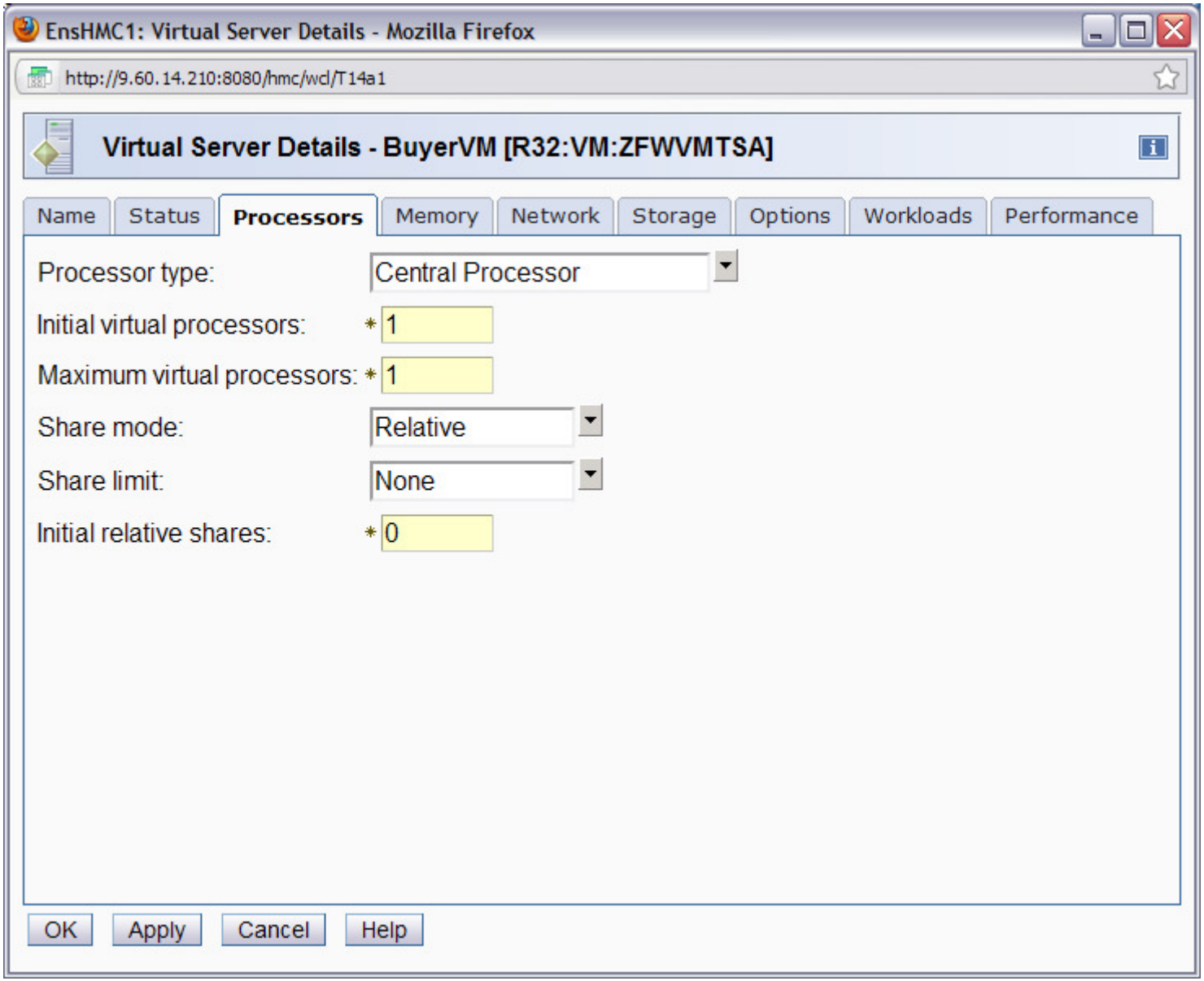


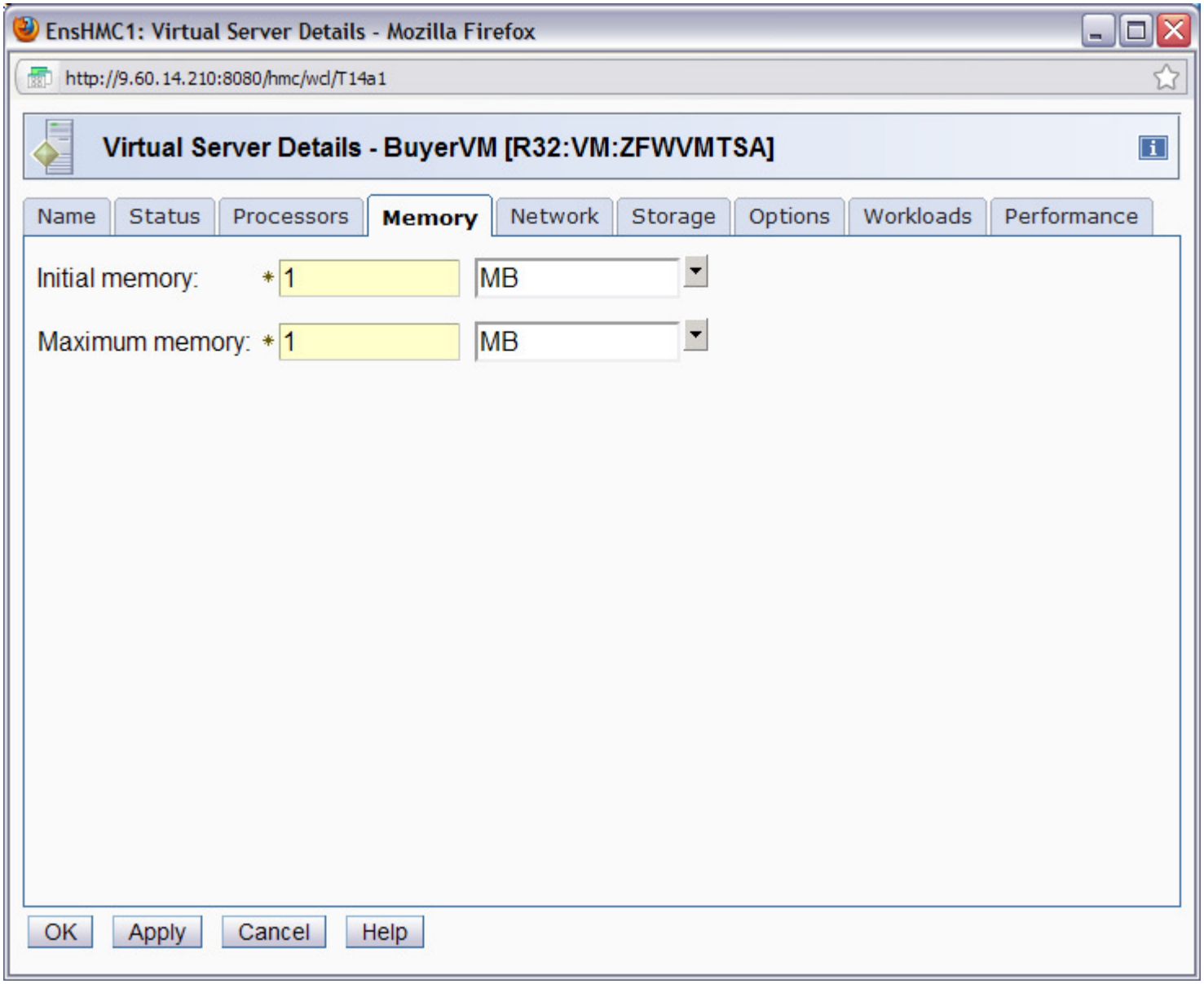


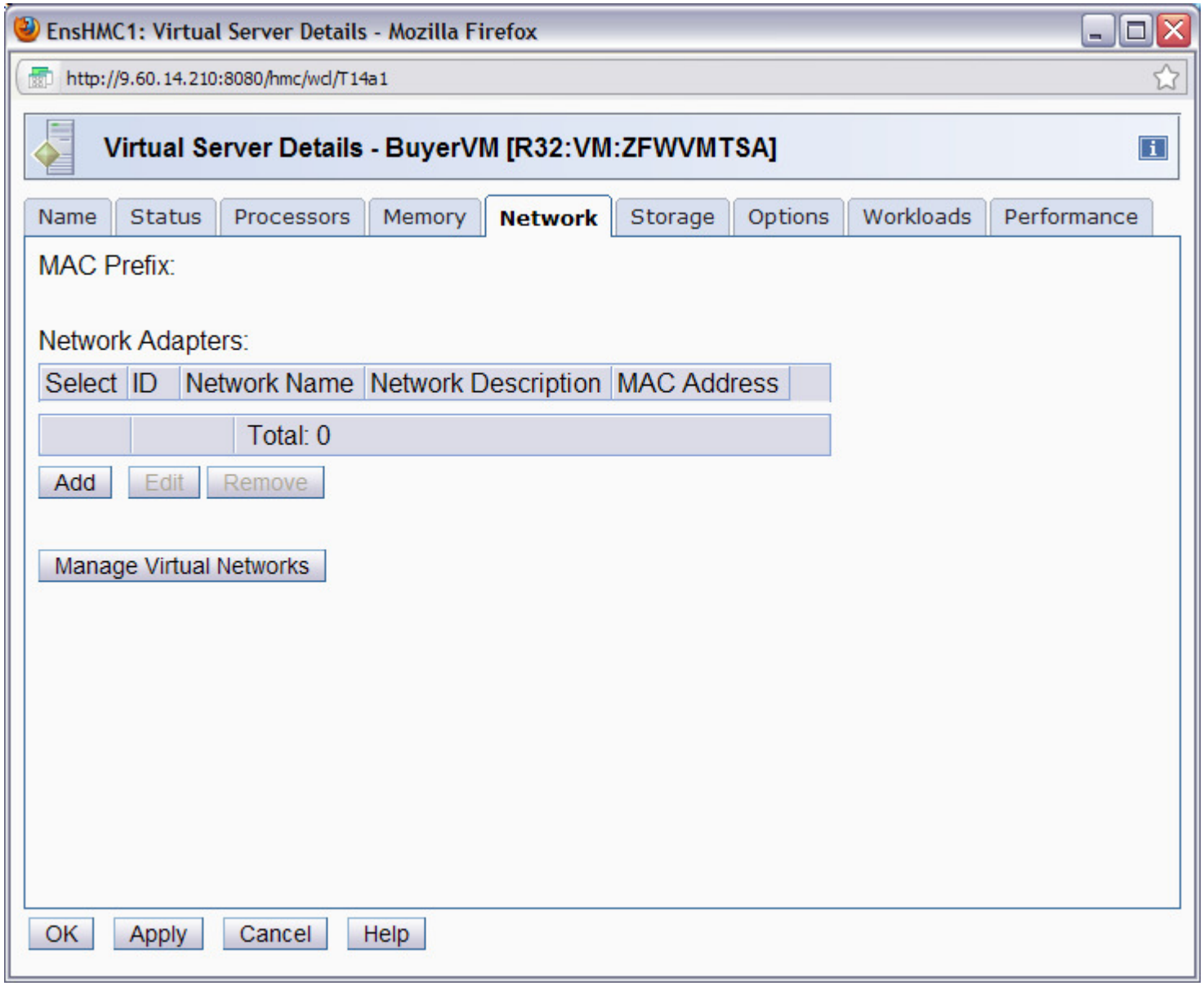


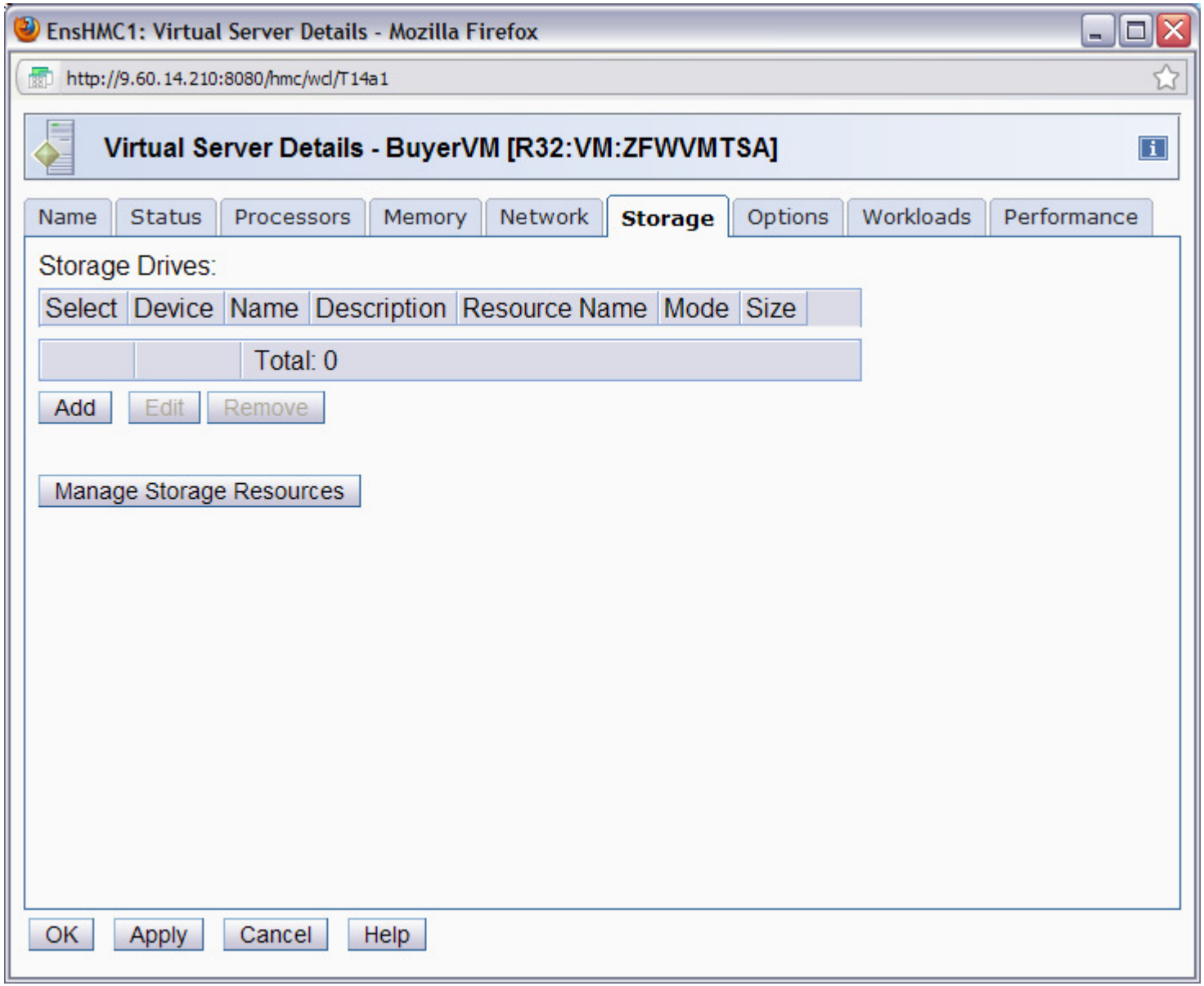


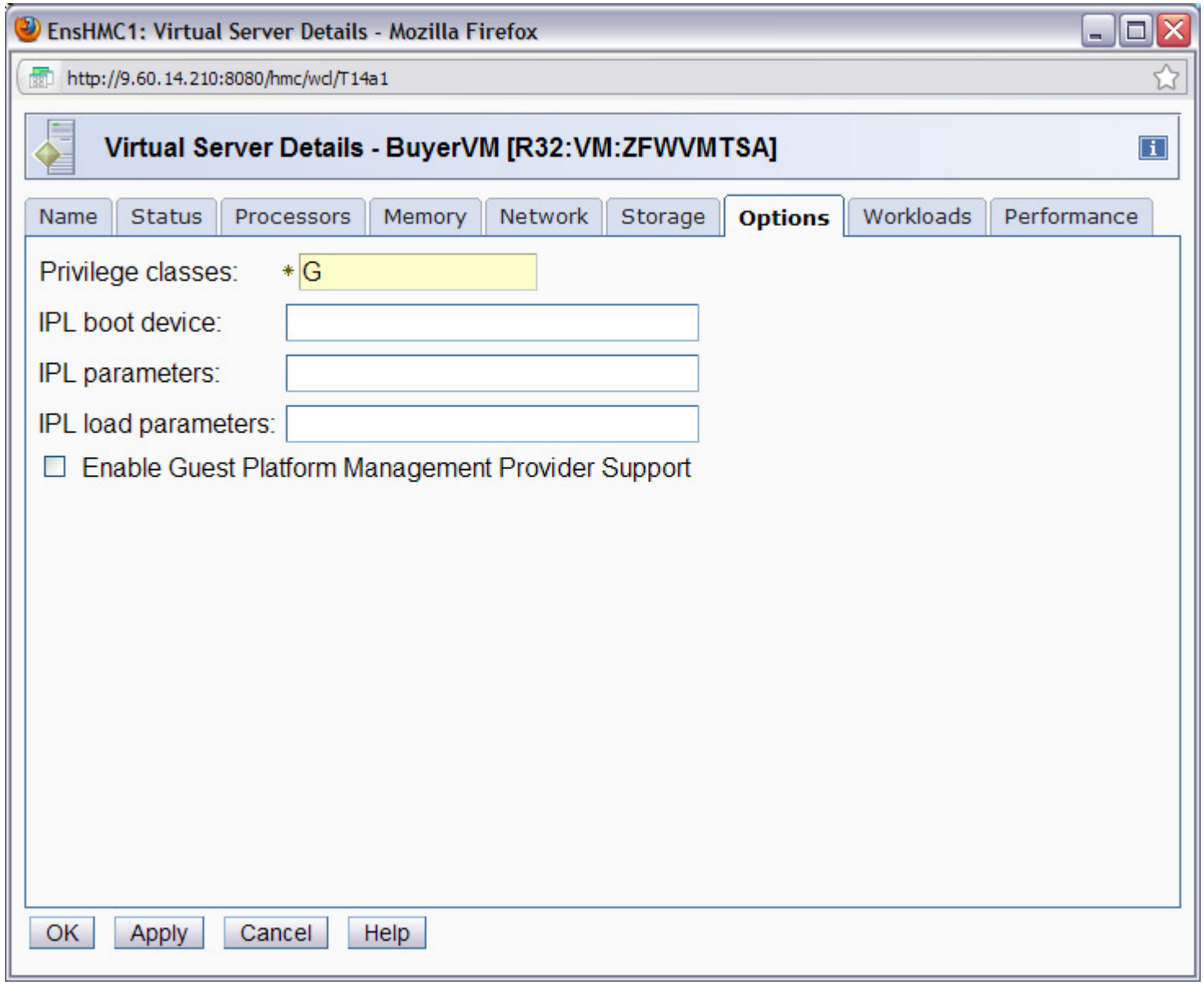


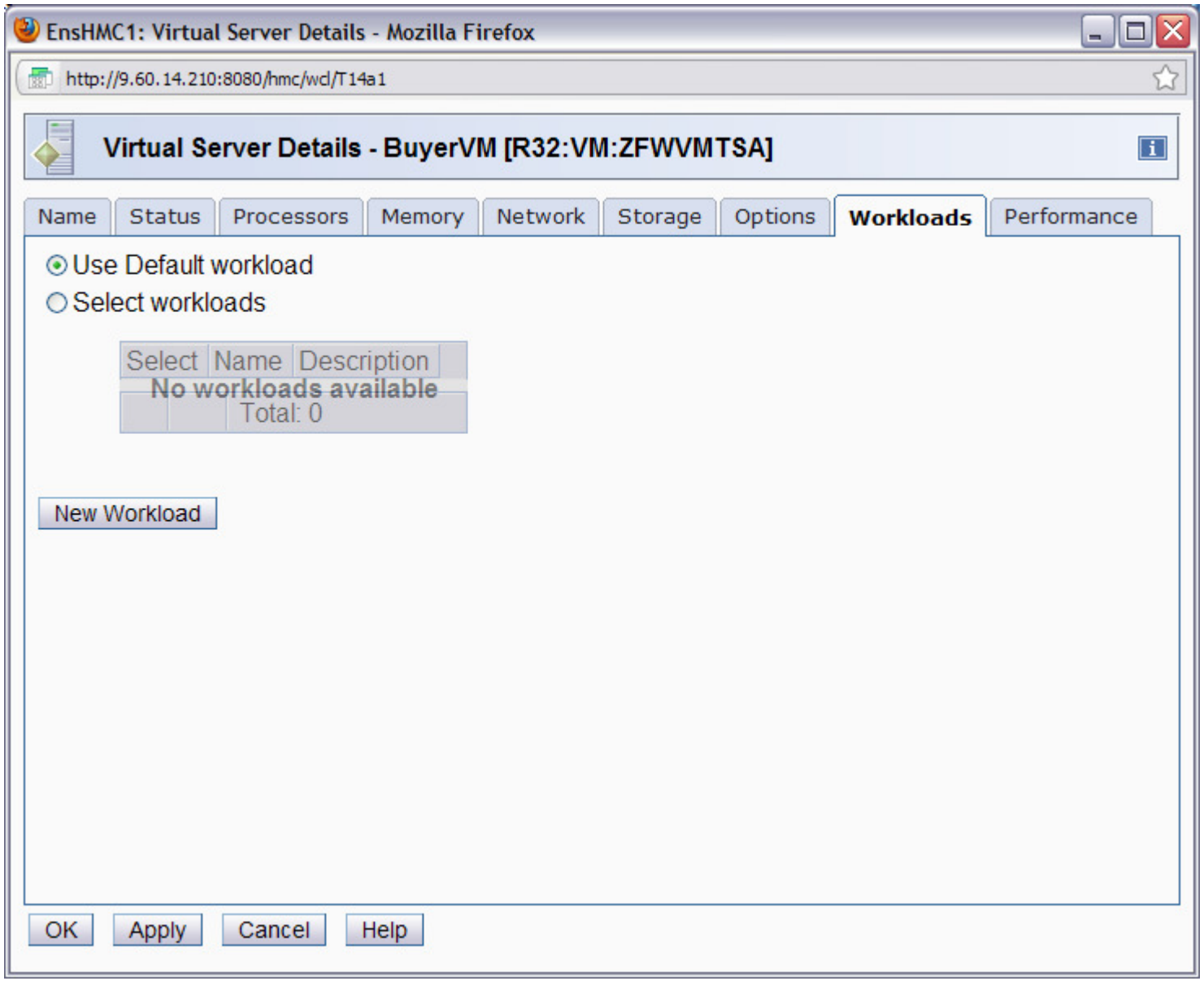


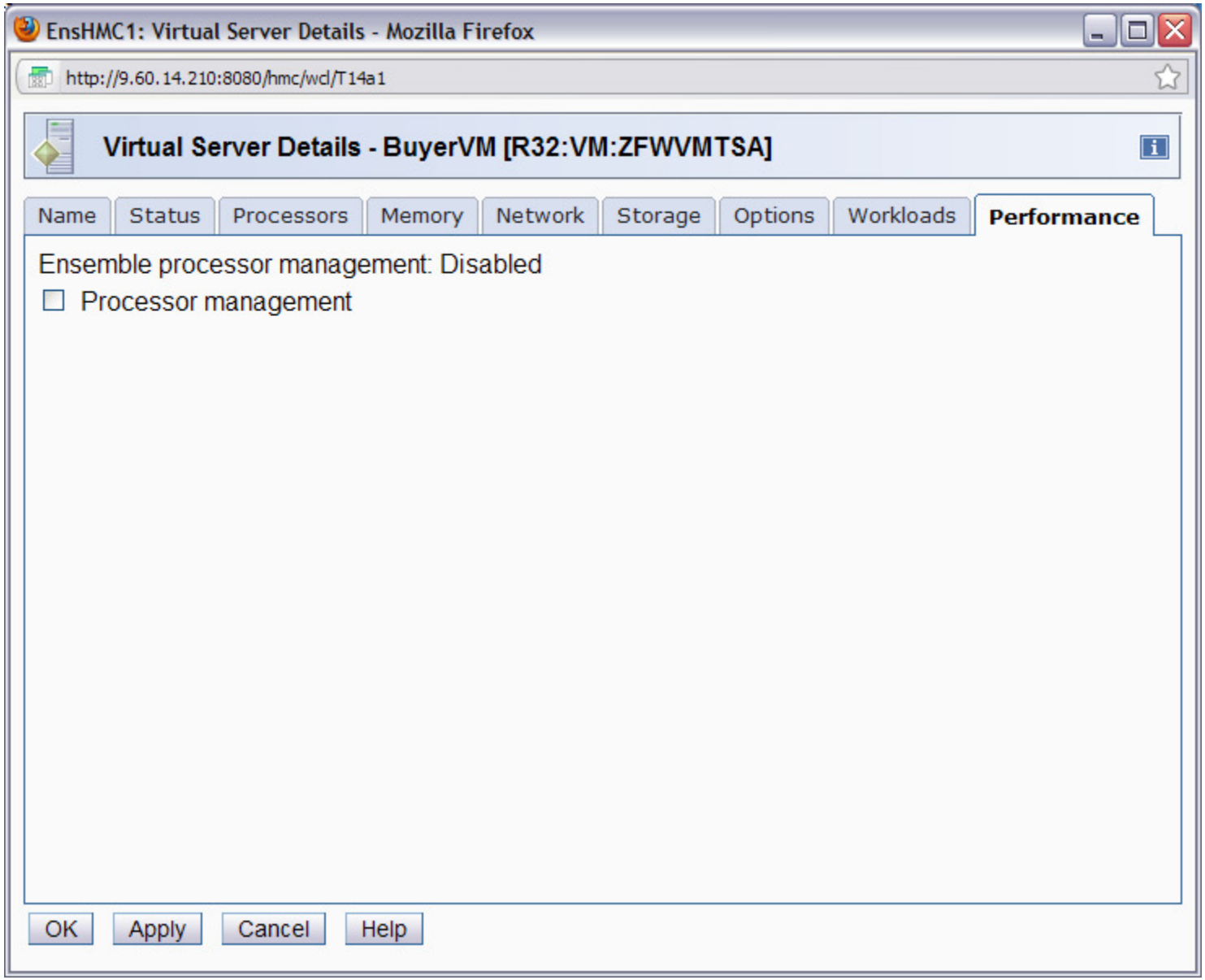




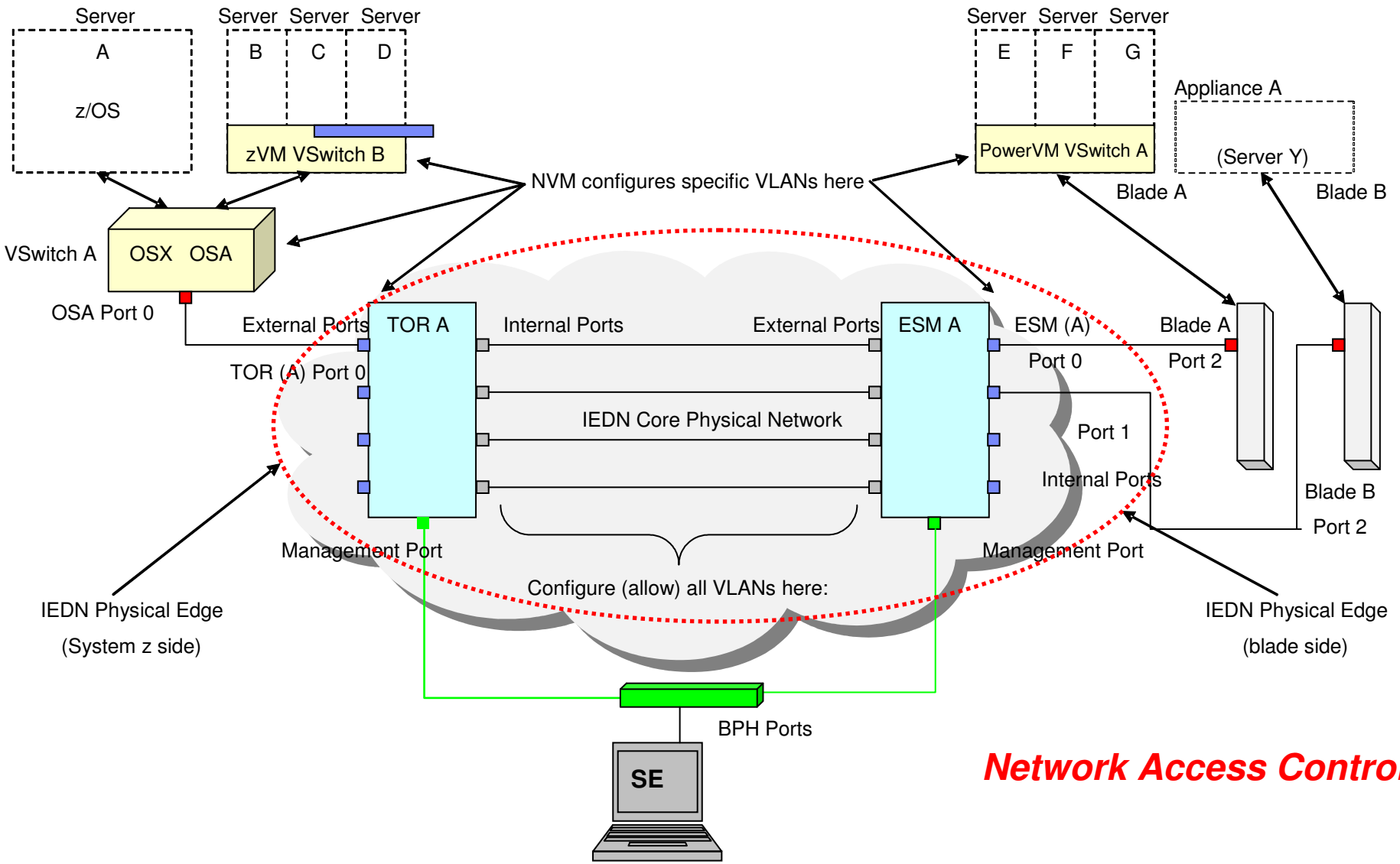






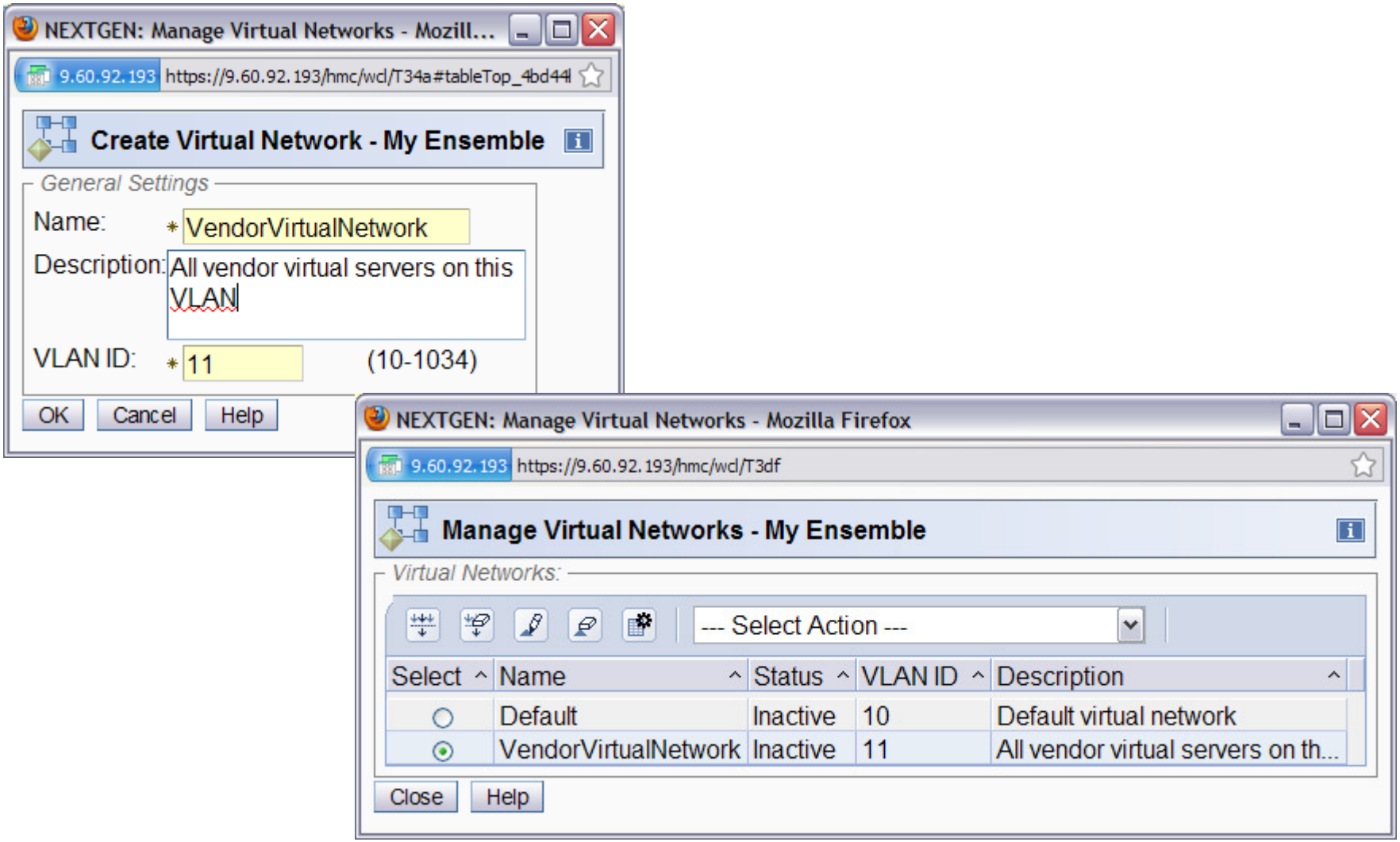


# Virtual Networks and Access Controls

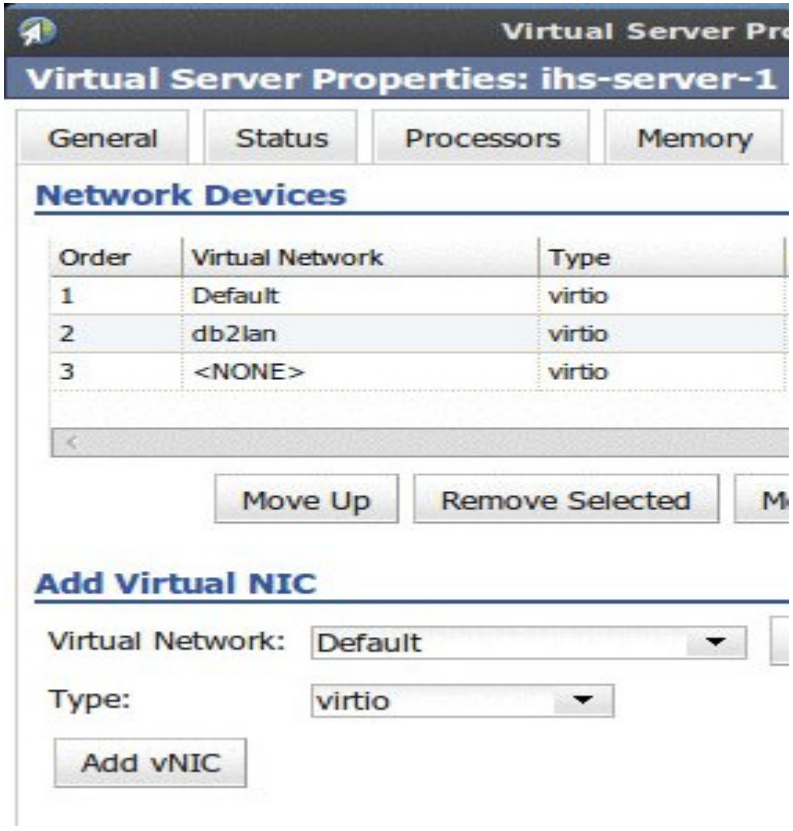


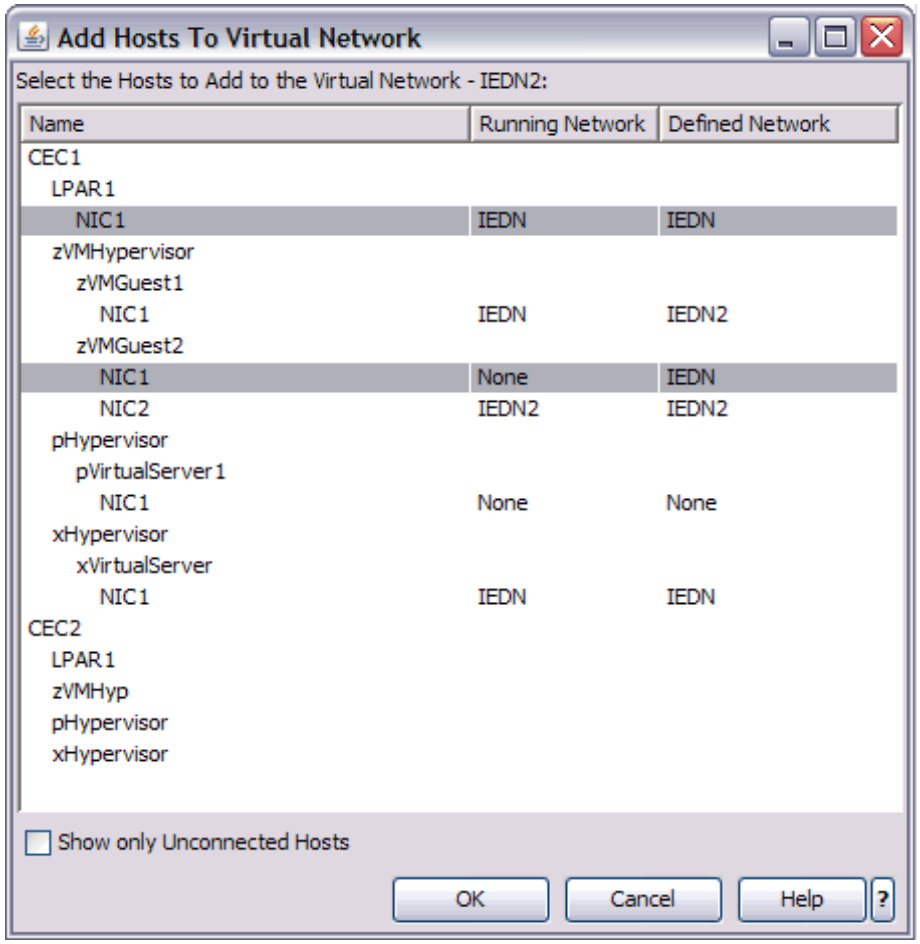

***Network Access Control***

# Create Virtual Network



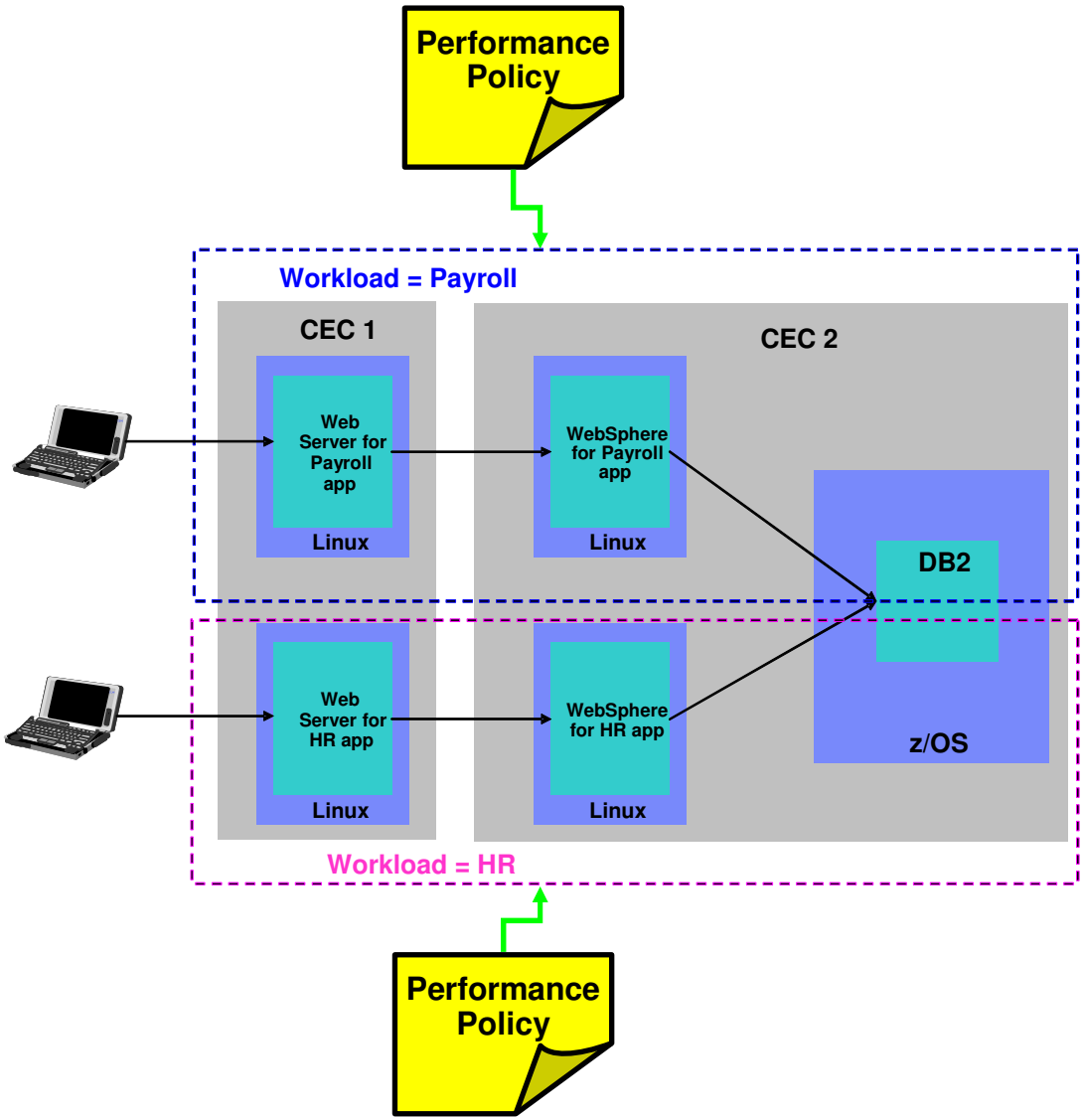
# Associate Virtual Server With Virtual Network



# Workload

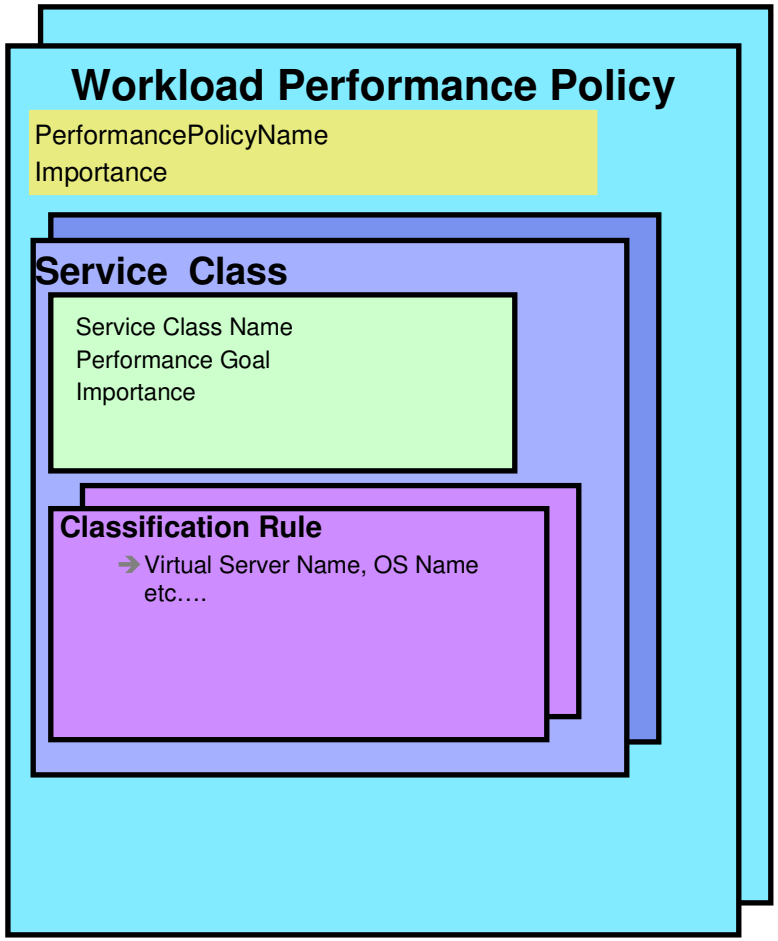
- A Workload is a grouping mechanism and “management view” of virtual servers supporting a business application
- Provides the context within which associated platform resources are presented, monitored, reported, and managed
- Performance policy is associated with Workload



# Workload Performance Policy

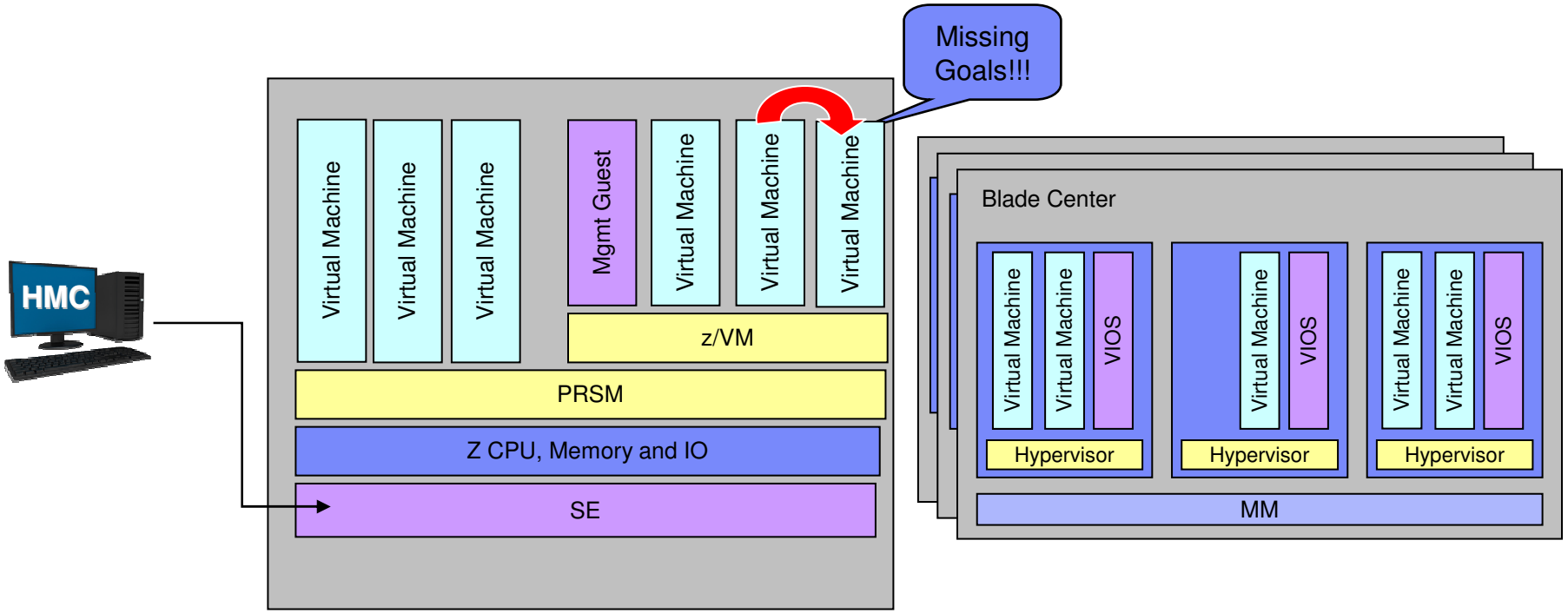
- Defines performance goals for virtual servers in a workload
  - Conceptually similar to simplified z/OS WLM Policy
- Provides basis for monitoring and managing platform resources used by virtual servers in a Workload
- Workload relationship to performance policy
  - Multiple performance policies associated 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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