Lesson 7: Creating and Configuring Virtual Machine Settings

MOAC 70-410: Installing and Configuring Windows Server 2012

Microsoft Official Academic Course

WILEY

Overview

- Exam Objective 3.1: Create and Configure Virtual Machine Settings
- Virtualizing Servers
- Installing Hyper-V
- Using Hyper-V Manager
- Configuring Resource Metering

Virtualizing Servers

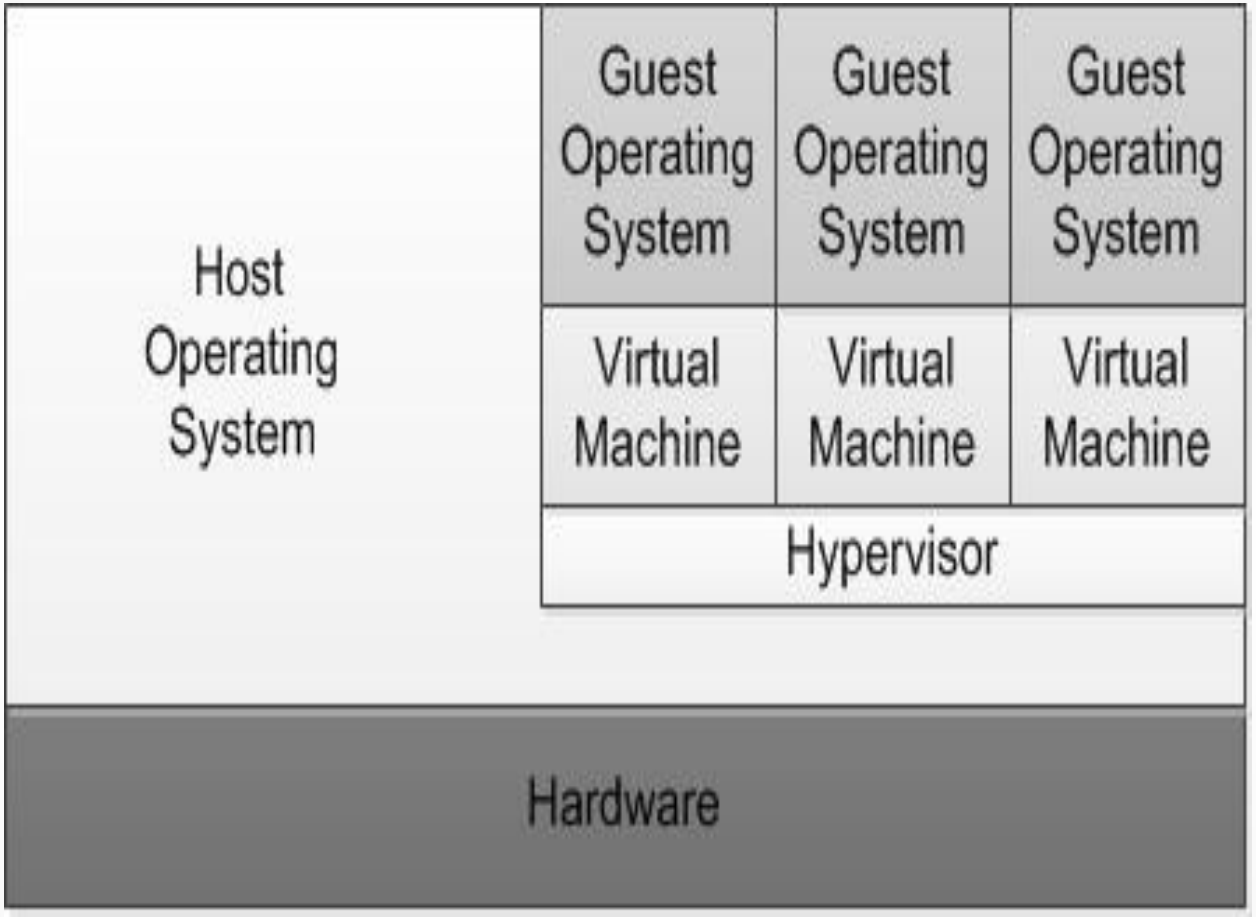
Lesson 7: Creating and Configuring Virtual Machine Settings

Virtualization Architectures

Type II Virtualization

- Requires a "host" operating system
- Using the Type II Hypervisor, you create a virtual hardware environment for each VM
- Install a "guest" operating system on each VM, just like installing a new computer
- The host operating system shares access to the computer's processor with the hypervisor
- Does not provide the same performance as separate physical computers
- Good testing or lab environment

Virtualization Architectures



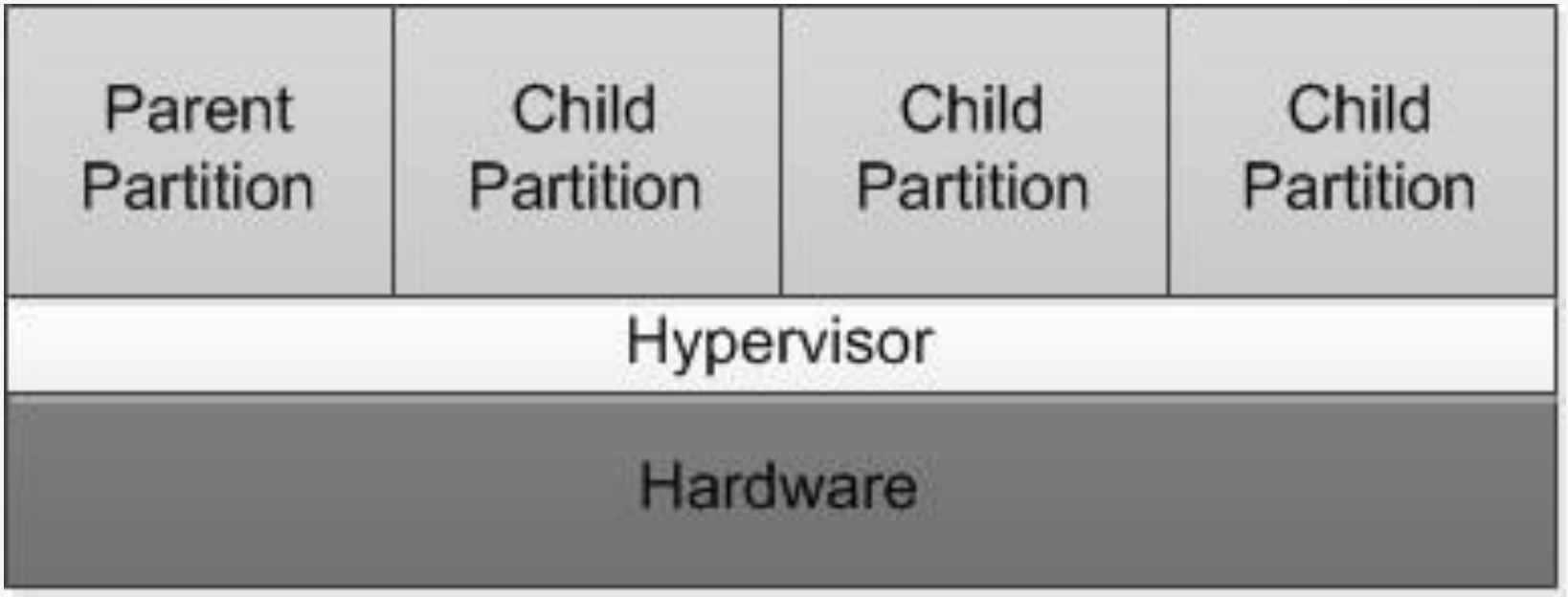
A hybrid VMM sharing hardware access with a host operating system

Virtualization Architectures

Type I Virtualization

- Hypervisor is an abstraction layer that interacts directly with the computer's physical hardware
- No host operating system required
- Individual environments, called partitions have their own operating systems installed and accesses hardware through the hypervisor
- No host operating system is sharing processor
- Parent partition runs the virtualization stack which creates and manages the child partitions

Virtualization Architectures



A Type 1 VMM, with the hypervisor providing all hardware access

Hyper-V Implementations

- Hyper-V role is required for the operating system to function as the computer's parent partition, enabling it to host VMs.
- Only Standard and Datacenter editions support Hyper-V.
- No special requirements are needed for the guest operating systems (Microsoft or non-Microsoft).

Hyper-V Licensing

- You must have licenses for both physical and virtual instances of the operating system.
- Datacenter licensing allows you to create and run an unlimited number of VMs.
- Standard provides 2 virtual instances only.

Hyper-V Hardware Limitations

- Windows Server 2012 Hyper-V host system:
  - Up to 320 logical processors
  - Supporting up to 2,048 virtual CPUs
  - Up to 4 TB of physical memory
- One server can host as many as 1,024 active VMs
- Each VM can have up to 64 virtual CPUs and up to 1 TB of memory
- Hyper-V can support clusters with up to 64 nodes and 8,000 VMs

Hyper-V Server

- Subset of Windows Server 2012
- Free downloadable product, but does not include licenses for operating systems installed in the VMs
- Includes the Hyper-V role and limited File and Storage services and Remote Desktop capabilities
- Hyper-V role is installed by default
- Only uses Server Core interface

Installing Hyper-V

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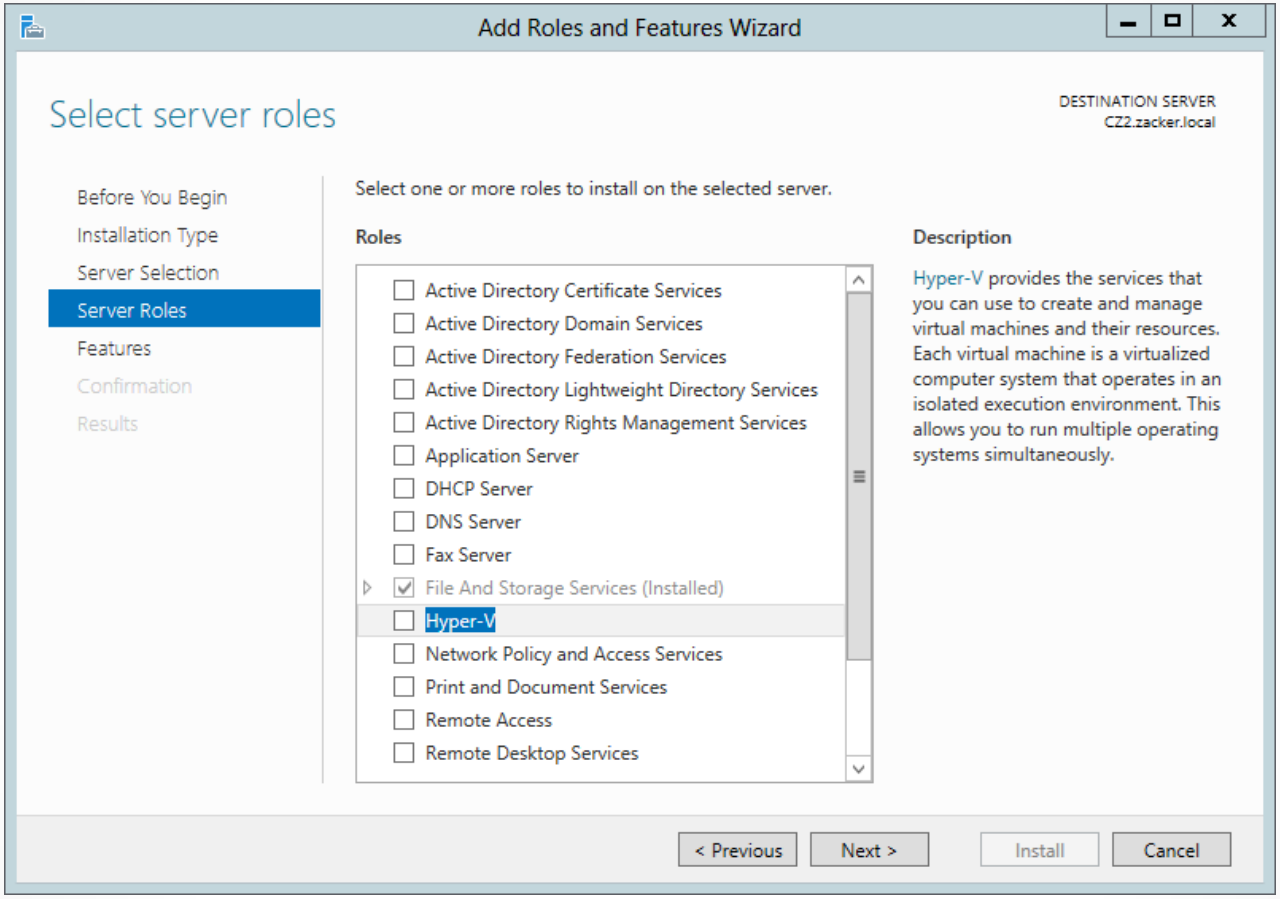
Installing Hyper-V

- Installing the Hyper-V role installs the hypervisor software and Hyper-V Manager (GUI only)
- Recommendations:
  - Use Hyper-V role on the host without any other roles
  - Put other roles on VMs
  - Use Server Core installation

Hyper-V Hardware Requirements

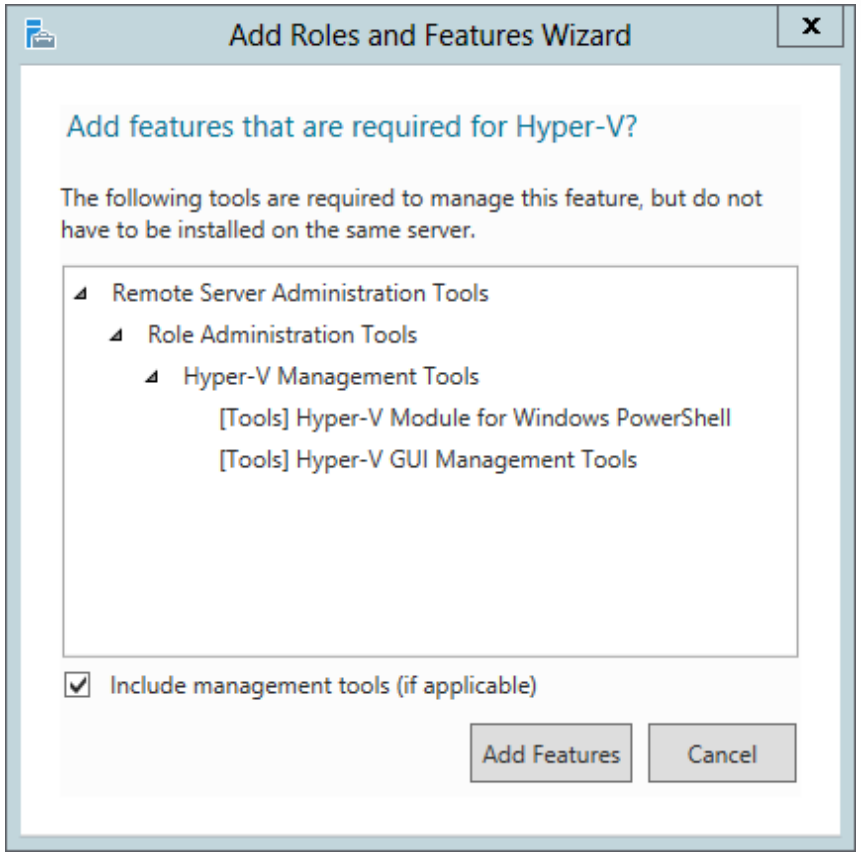
- 64-bit processors that include hardware-assisted virtualization.
- A system BIOS that supports the virtualization hardware, on which the virtualization feature has been enabled.
- Hardware-enforced Data Execution Prevention (DEP), which Intel describes as eXecuted Disable (XD) and AMD describes as No eXecute (NS).

Install the Hyper-V Role



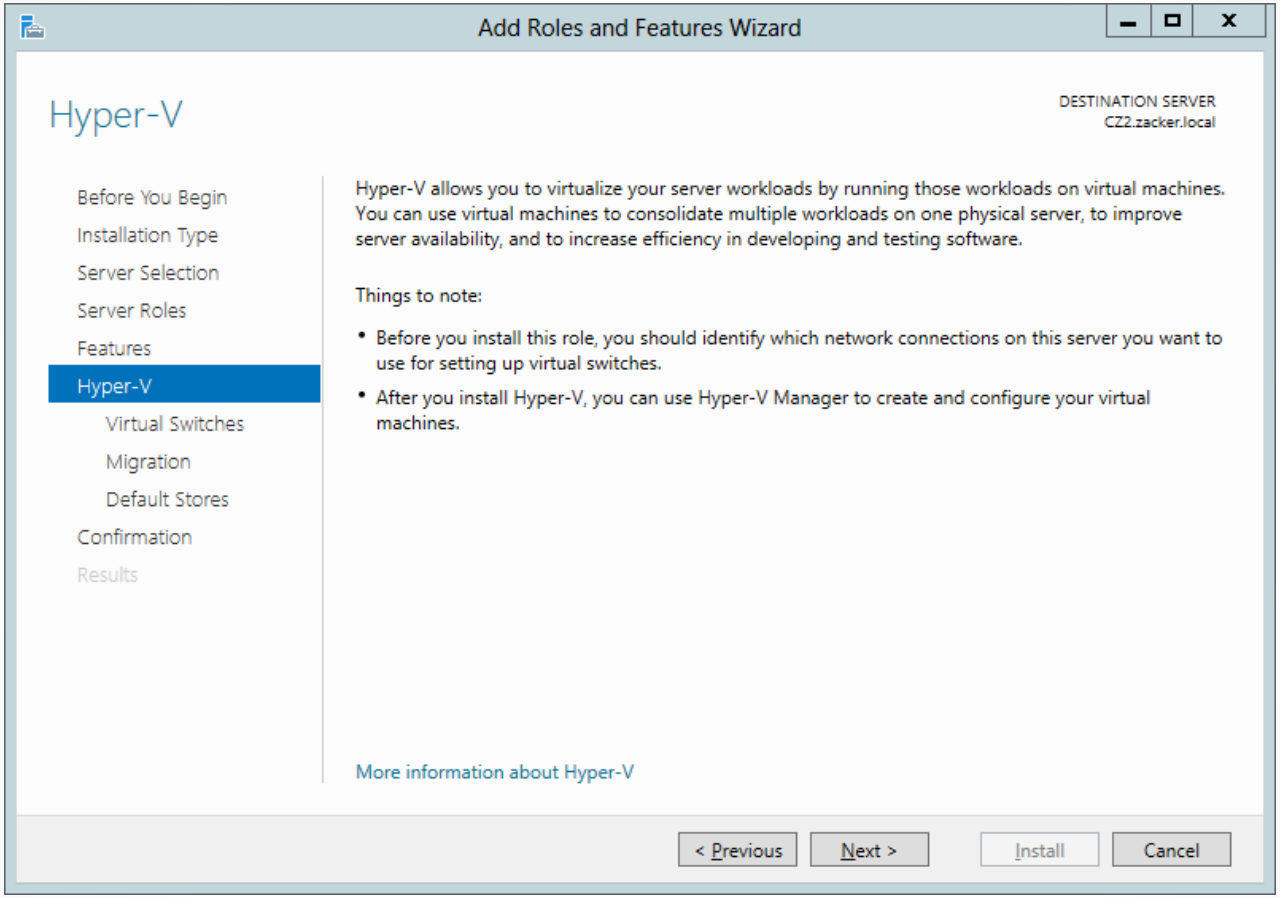
The Select Server Roles page of the Add Roles and Features Wizard

Install the Hyper-V Role



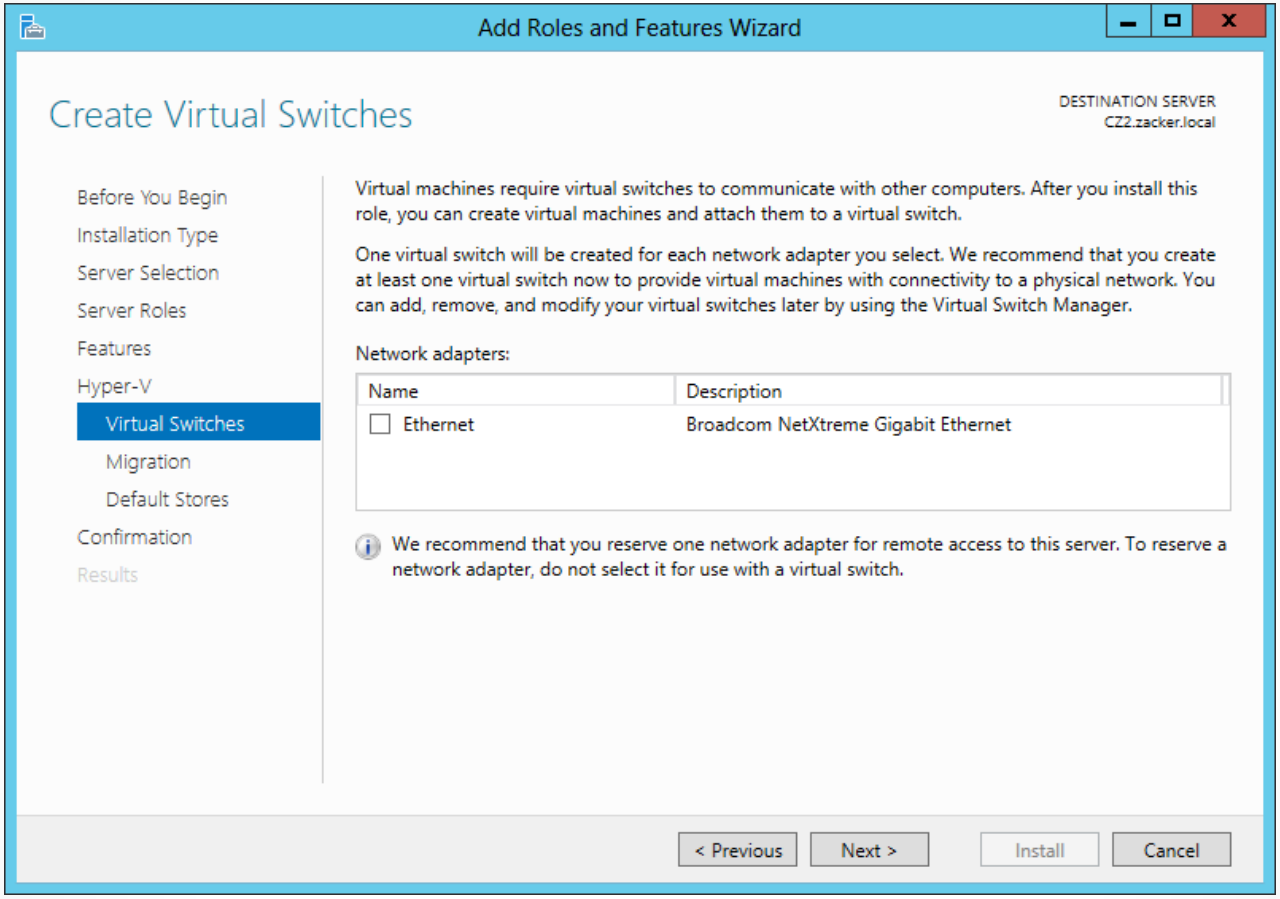
The Add features that are required for Hyper-V dialog box in the Add Roles and Features Wizard

Install the Hyper-V Role



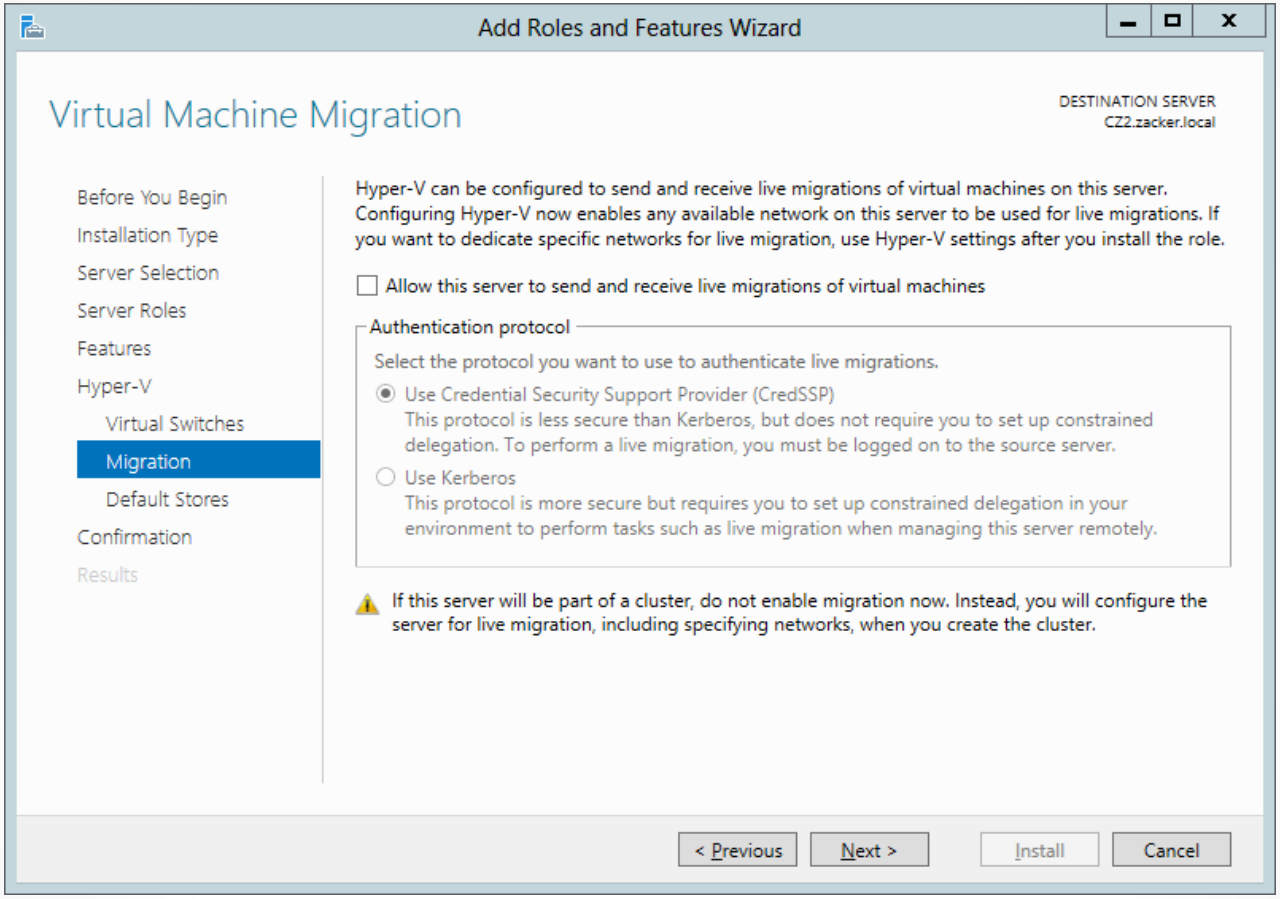
The Hyper-V page of the Add Roles and Features Wizard

Install the Hyper-V Role



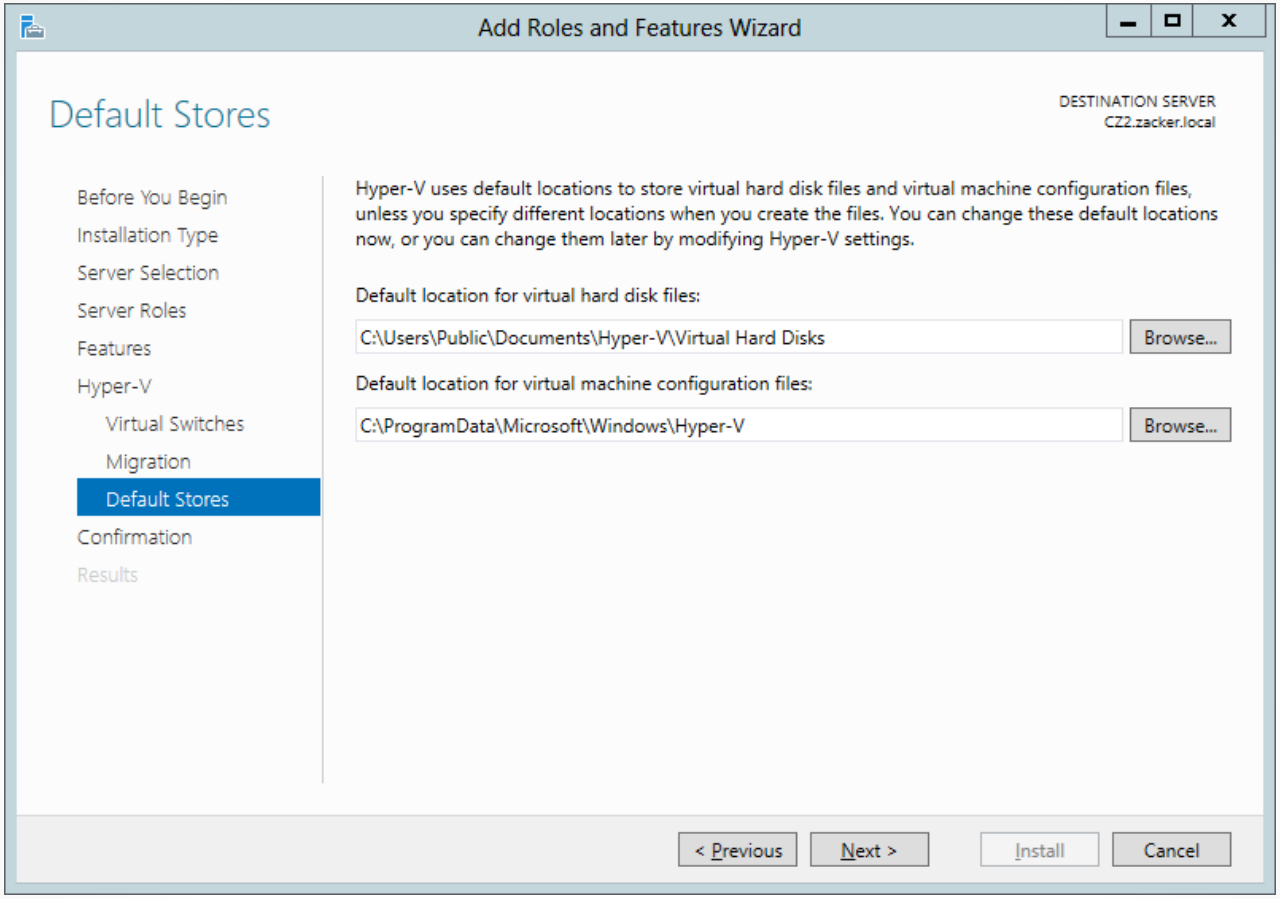
The Create Virtual Switches page of the Add Roles and Features Wizard

Install the Hyper-V Role



The Virtual Machine Migration page of the Add Roles and Features Wizard

Install the Hyper-V Role



The Default Stores page of the Add Roles and Features Wizard

Using Hyper-V Manager

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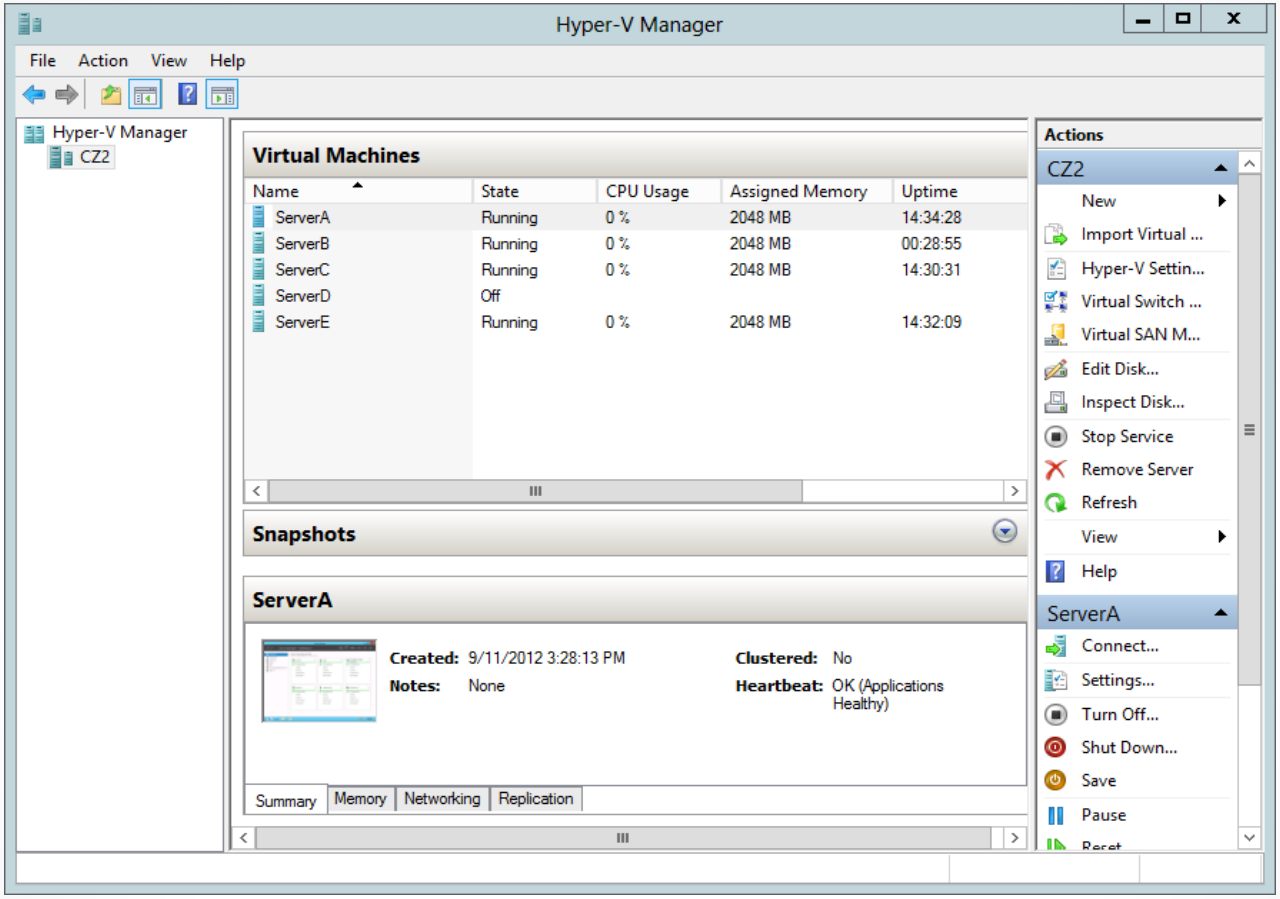
Using Hyper-V Manager

- The primary graphical tool for creating and managing VMs
- Can be used to manage VMs on multiple servers
- Installed with the Hyper-V Role, or you can install the Hyper-V Management Tools feature, or RSAT package for Windows 8

Using Hyper-V Manager



The Hyper-V Manager console

Creating a Virtual Machine

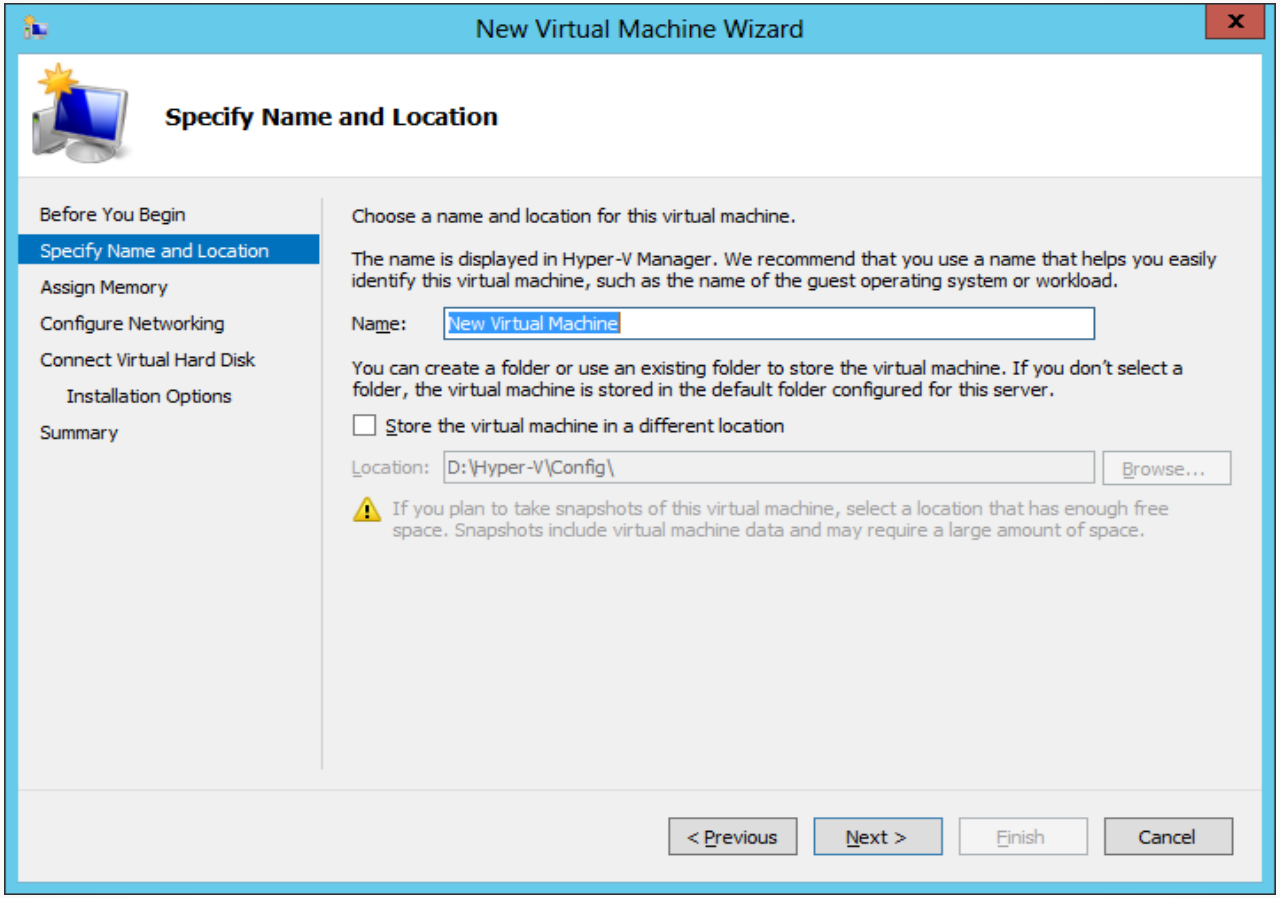
- To create a virtual machine (VM), you define the hardware resources that the system should allocate to them:
  - Number of processors
  - Memory
  - Virtual network adapters
  - Virtual disks

Creating a Virtual Machine

Each virtual machine uses the following files:

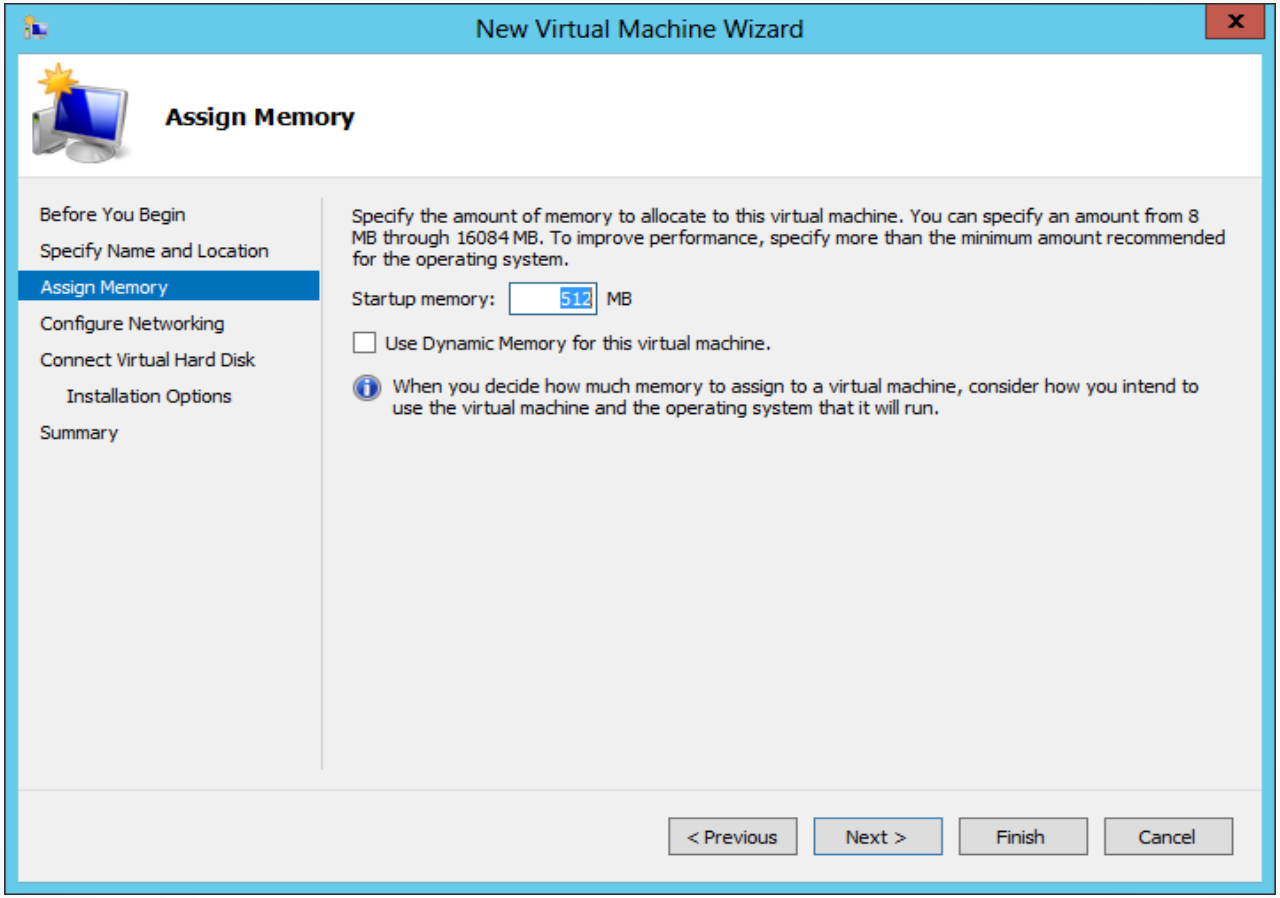
- **Virtual machine configuration (.vmc) file:** This file in XML format contains the VM configuration information, including all settings for the VM.
- **Virtual hard disk (.vhd or .vhdx) files:** One or more files used to store the guest operating system, applications, and data for the VM.
- **Saved-state (.vsv) file:** The VM may use this if it has been placed into a saved state.

Creating a Virtual Machine



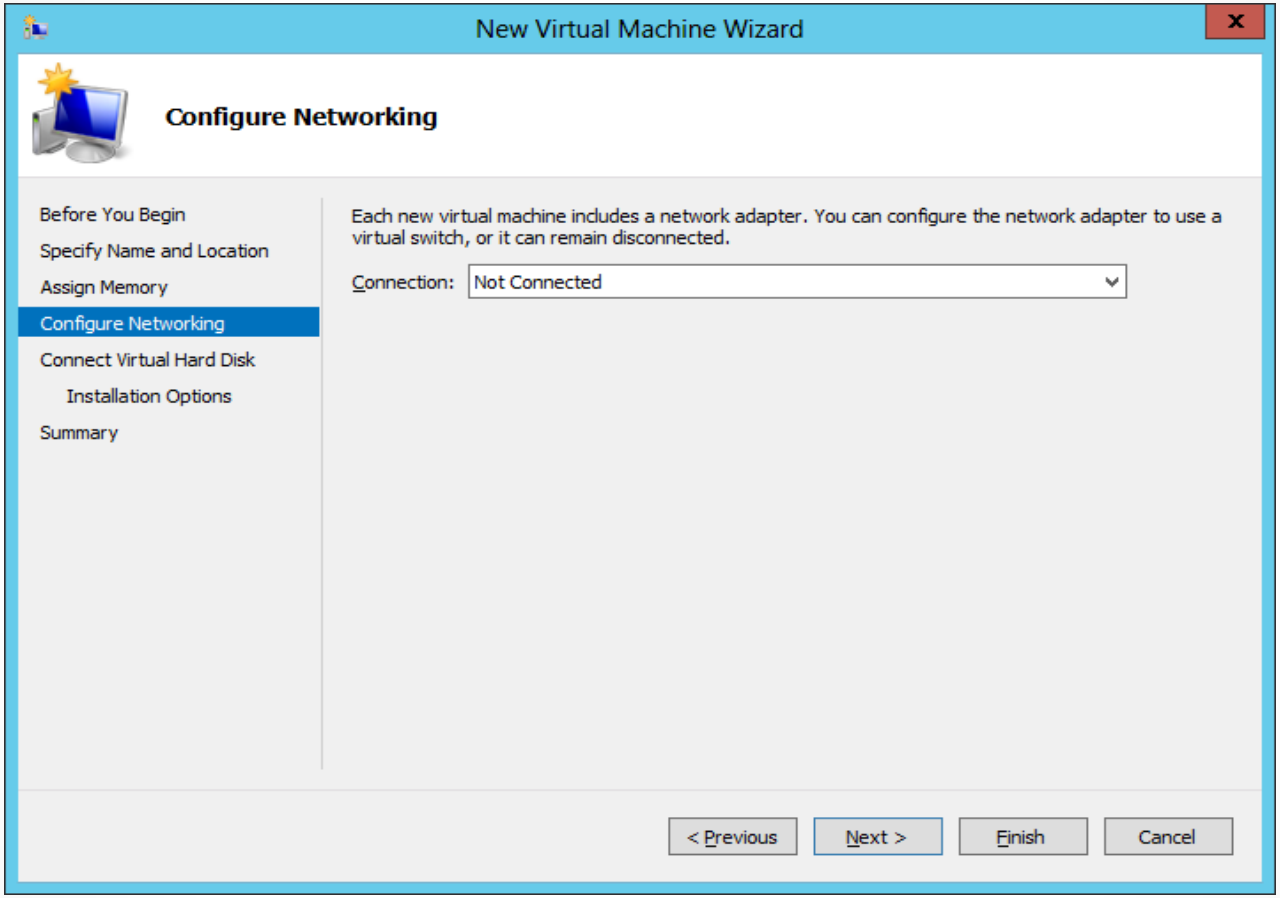
The Specify Name and Location page of the New Virtual Machine Wizard

Creating a Virtual Machine



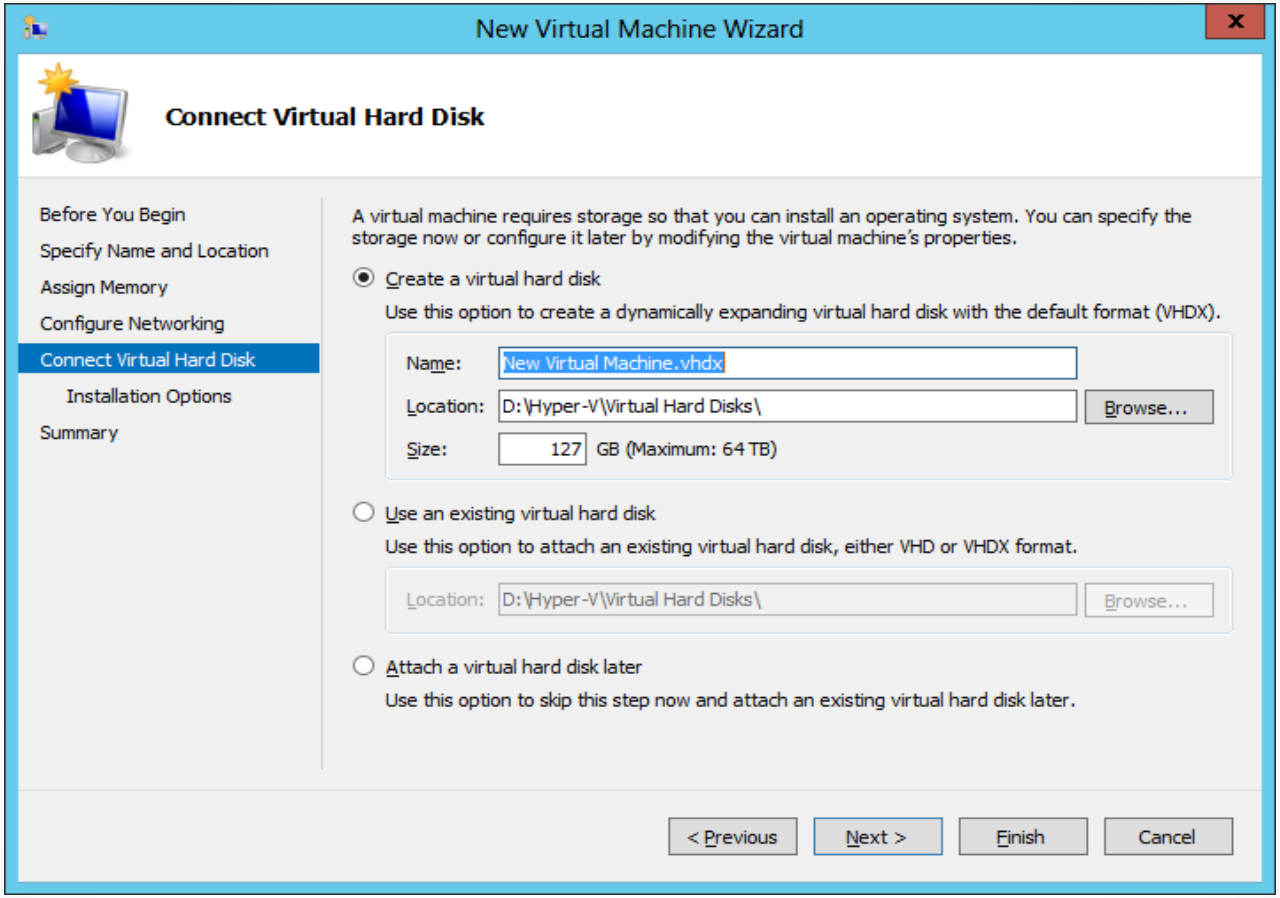
The Assign Memory page of the New Virtual Machine Wizard

Creating a Virtual Machine



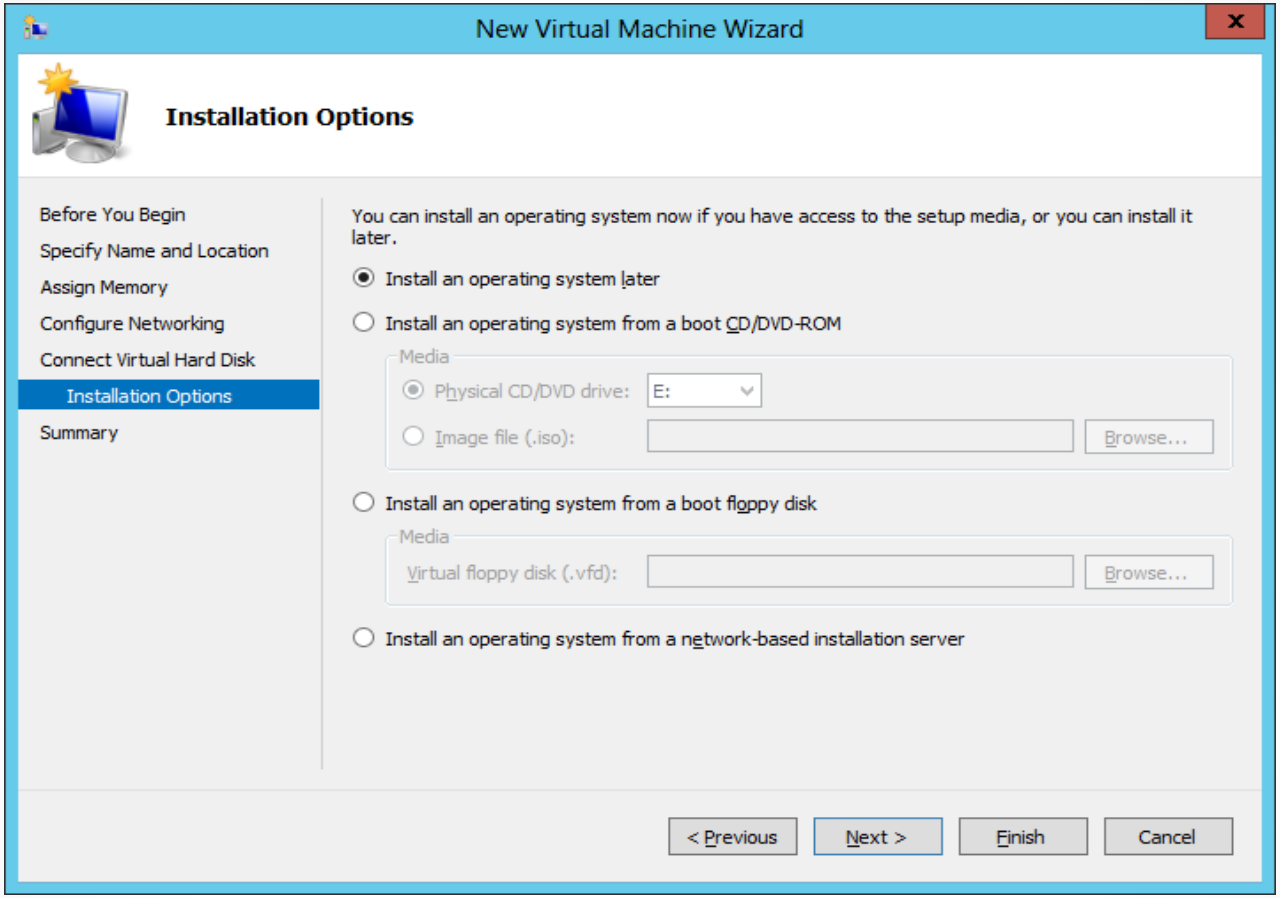
The Configure Networking page of the New Virtual Machine Wizard

Creating a Virtual Machine



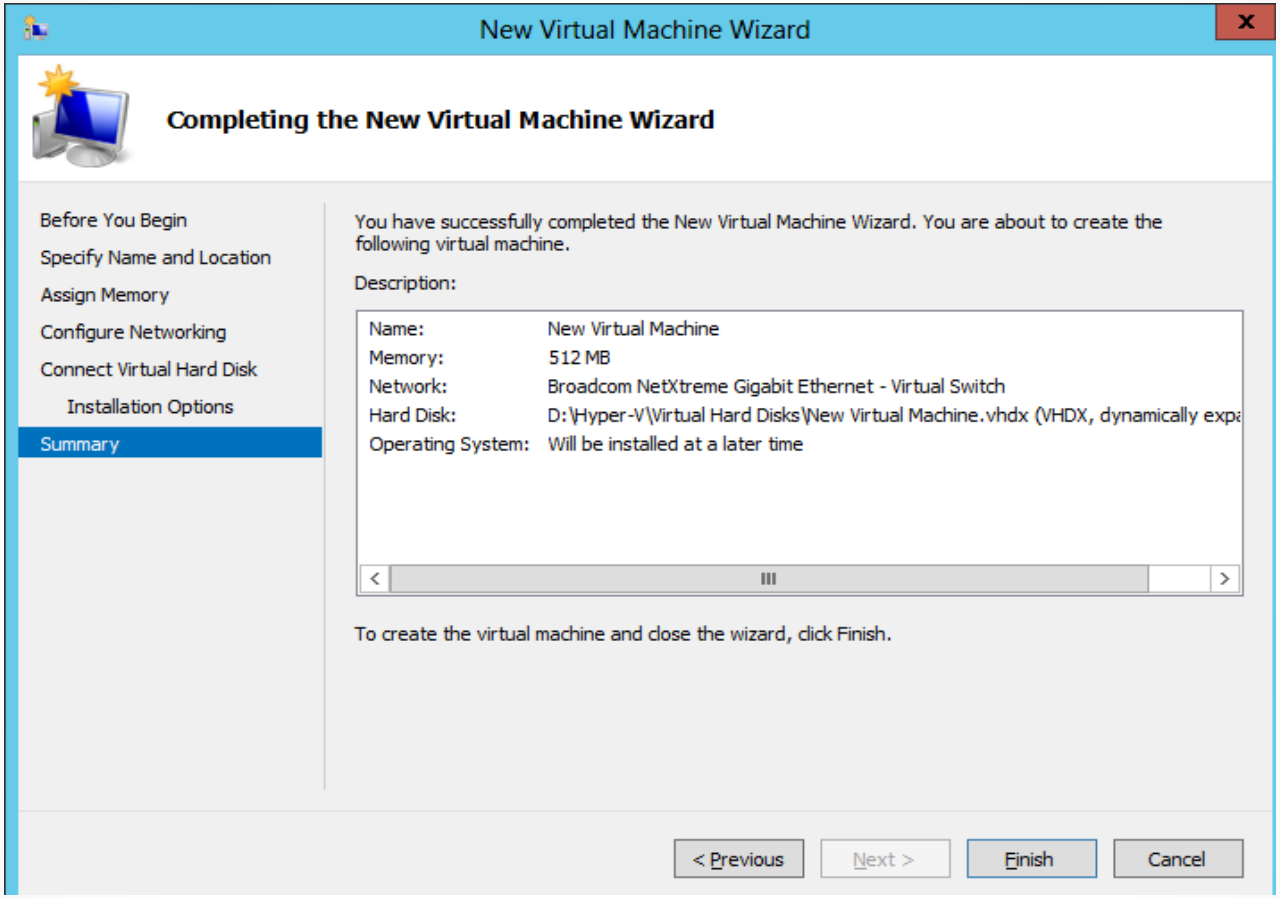
The Connect Virtual Hard Disk page of the New Virtual Machine Wizard

Creating a Virtual Machine



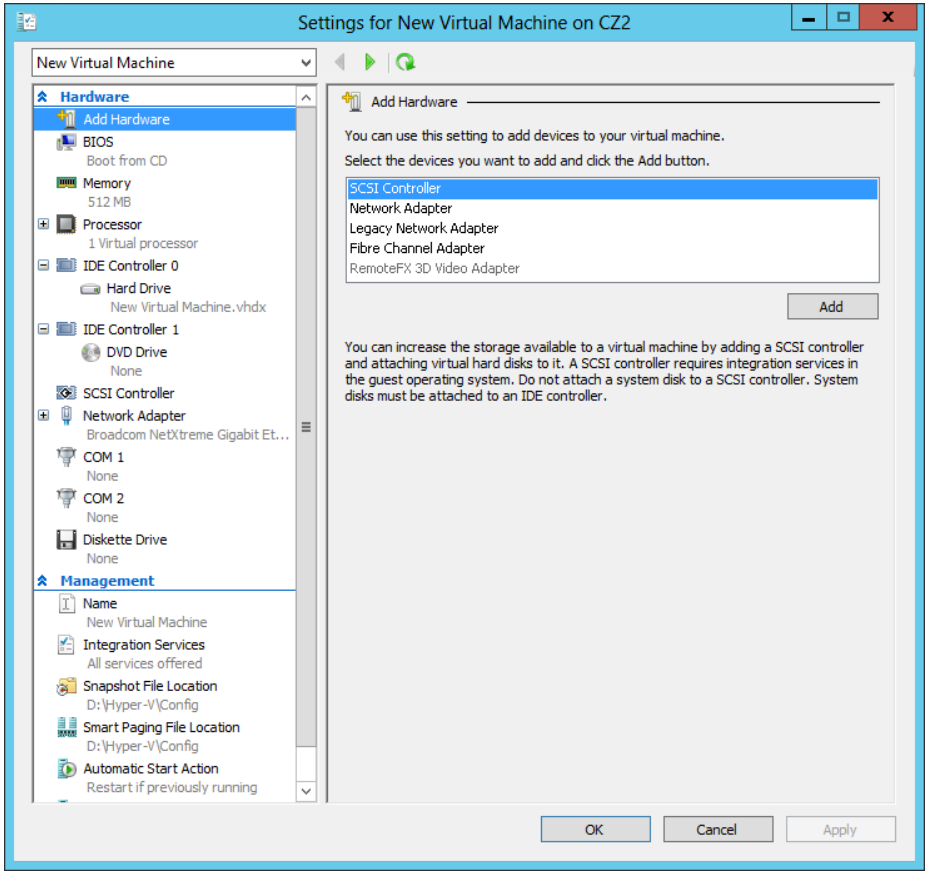
The Installation Options page of the New Virtual Machine Wizard

Creating a Virtual Machine



The Completing the New Virtual Machine Wizard page of the New Virtual Machine Wizard

Creating a Virtual Machine



The Settings dialog box for a virtual machine

Installing an Operating System

Hyper-V in Windows Server 2012 supports the following as operating systems you can install in virtual machines:

- Windows Server 2012
- Windows Server 2008 R2
- Windows Server 2008
- Windows Home Server 2011
- Windows Small Business Server 2011
- Windows Server 2003 R2
- Windows Server 2003 SP2
- Windows 8
- Windows 7 Enterprise and Ultimate
- Windows Vista Business, Enterprise, and Ultimate SP2
- Windows XP Professional SP3
- Windows XP x64 Professional SP2
- CentOS 6.0–6.2
- Red Hat Enterprise Linux 6.0–6.2
- SUSE Linux Enterprise Server 11 SP2

Installing an Operating System

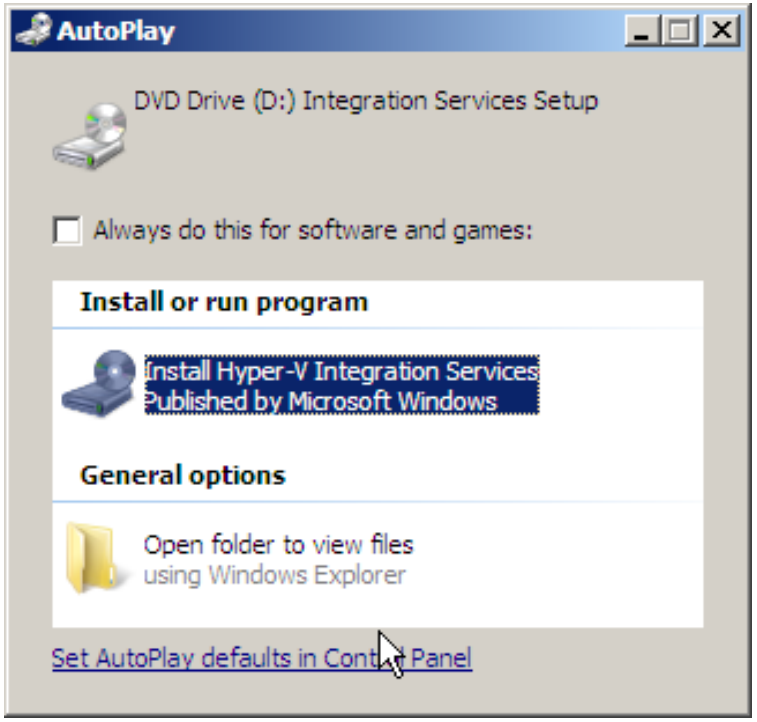
- To start an installation from a DVD, or image file, you must configure the VM's virtual DVD drive in the Settings dialog box. Enter one of the following options:
  - **None**: The equivalent of a drive with no disk inserted.
  - **Image file**: Points to a disk image file with an .iso extension stored on one of the host computer's drives or on a shared network drive.
  - **Physical CD/DVD drive**: Links the virtual DVD drive to one of the physical DVD drives in the host computer.

Configuring Guest Integration Services

Some of the functions added to solve compatibility issues with guest operating systems (OSs):

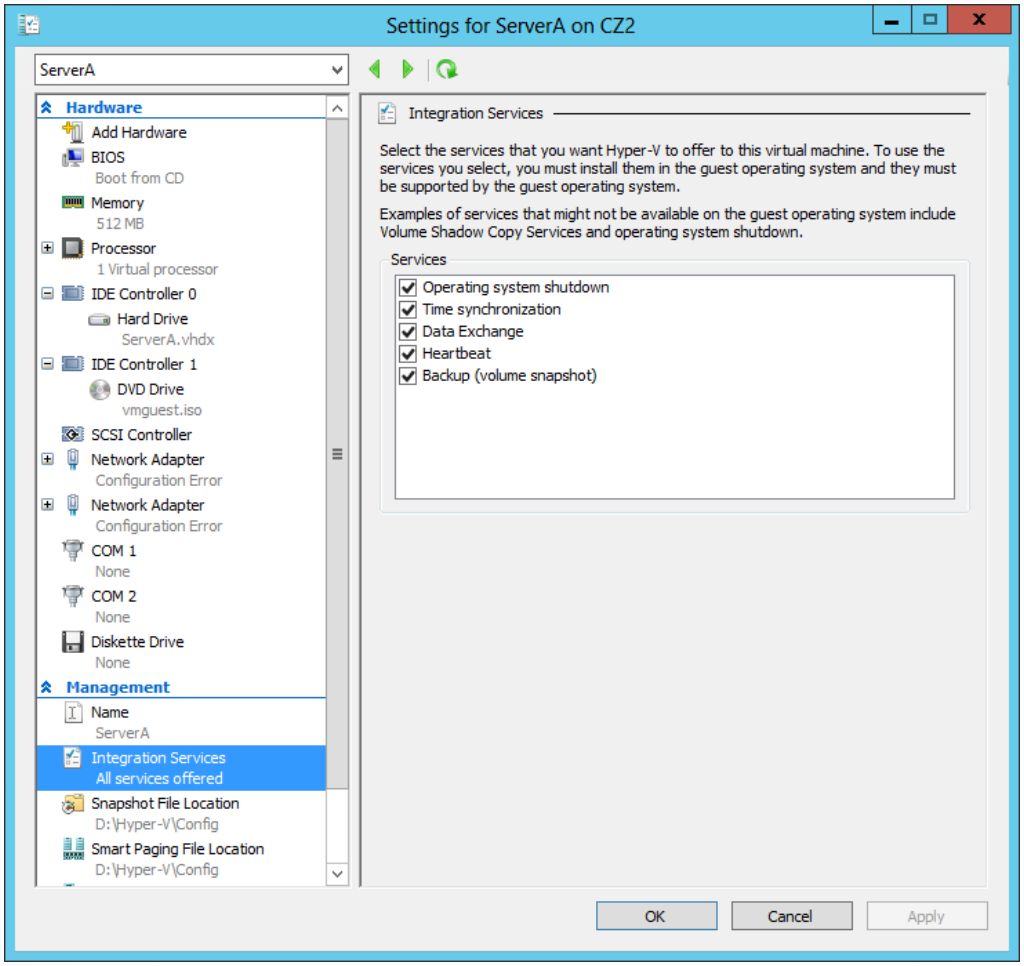
- **Operating system shutdown:** Enables the Hyper-V Manager console to remotely shut down a guest OS in a controlled manner, eliminating the need for an administrator to log on and manually shut the system down.
- **Time synchronization**: Enables Hyper-V to synchronize the OS clocks in parent and child partitions.
- **Data Exchange**: Enables the OSs on the parent and child partitions to exchange information, such as OS version information and fully qualified domain names.
- **Heartbeat**: Implements a service in which the parent partition sends regular heartbeat signals to the child partitions, which are expected to respond in kind. A failure of a child partition to respond indicates that the guest OS has frozen or malfunctioned.
- **Backup**: Allows backup of Windows VMs using Volume Shadow Copy Services.

Install Guest Integration Services



Launching Hyper-V Integration Services

Installing Guest Integration Services



Integration Services settings for a virtual machine

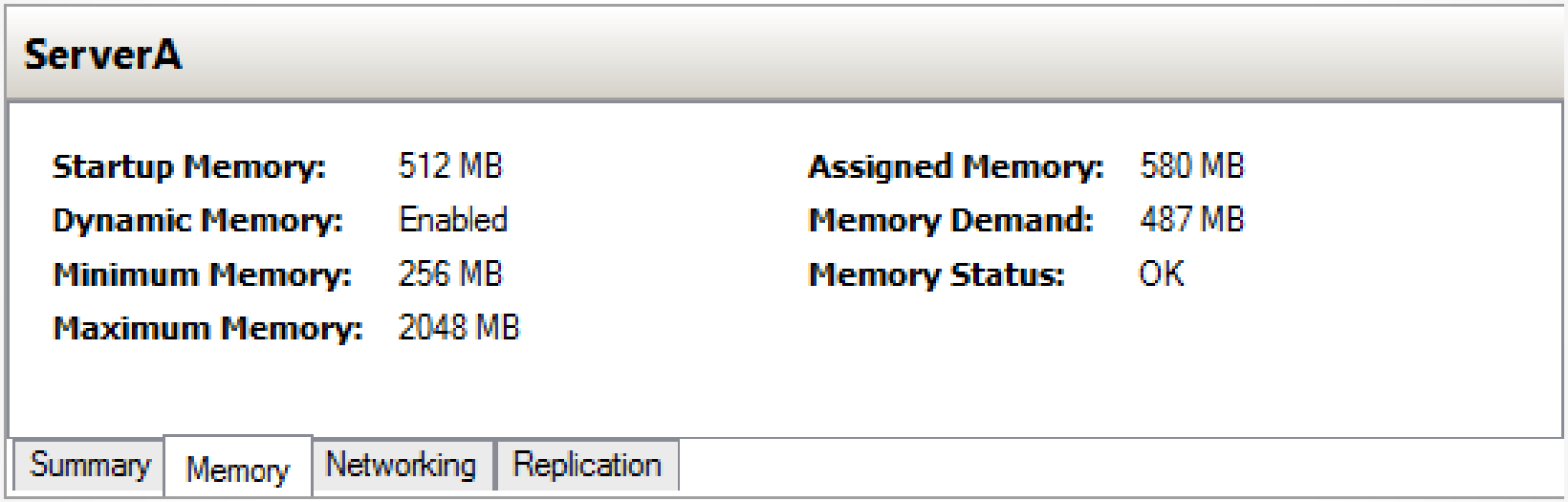
Allocating Memory

- When you create a new VM you specify the amount of memory allocated to the VM.
- Based on the amount of physical memory on the computer.
- Change the allocated memory by shutting down the VM, opening Settings, and changing the Startup Ram setting.
- Experiment to find the optimum performance.

Using Dynamic Memory

- Allows the VM to automatically reallocate memory to the VM from a shared memory pool as its demands change
- Must be enabled by selecting the Enable Dynamic Memory check box on the VM's memory page, and the following settings must be configured:
  - Startup RAM
  - Minimum RAM
  - Maximum RAM
  - Memory Buffer
  - Memory Weight

Monitor Memory Allocation

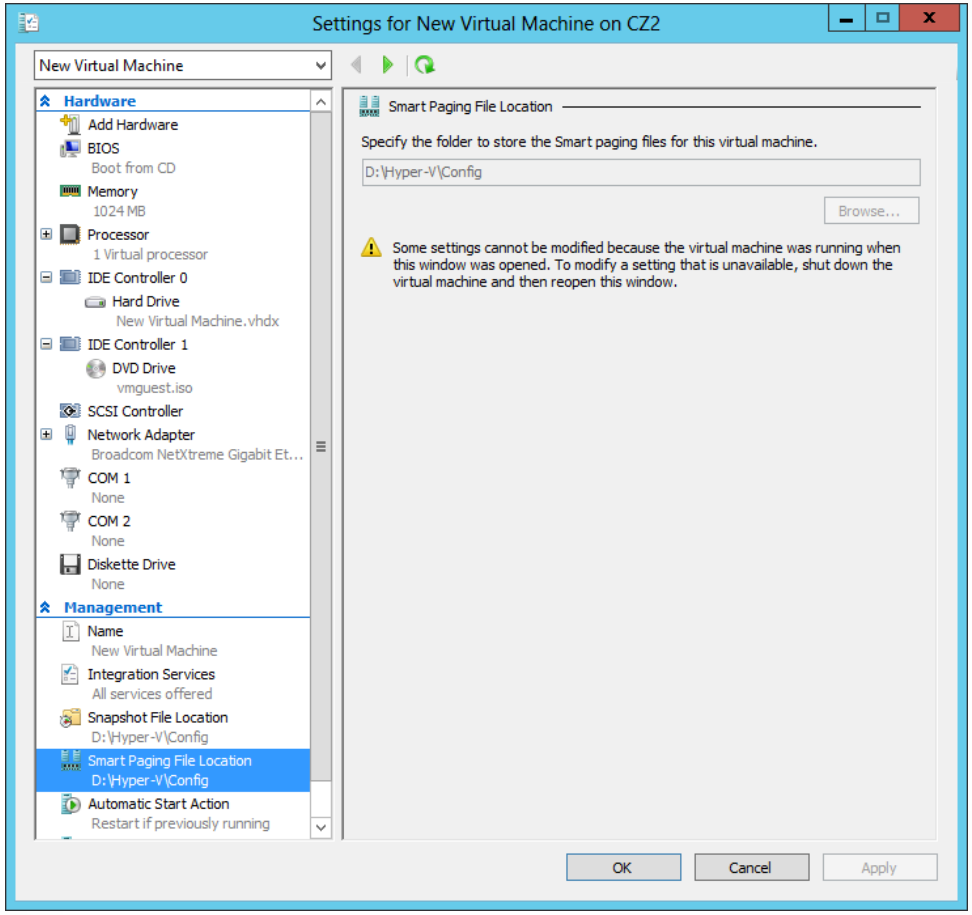


Memory statistics for a virtual machine

Configure Smart Paging

- **Smart paging** is a new feature.
- If a VM has to restart, and there is not enough memory available to allocate its Startup RAM value, the system uses hard disk space to make up the difference and begins paging memory contents to disk.
- Because of slow disk access, performance degrades.
- Select the fastest possible hard drive for the Smart Paging file.

Configure Smart Paging



The Smart Paging File Location page in a VM's Settings dialog box

Configuring Resource Metering

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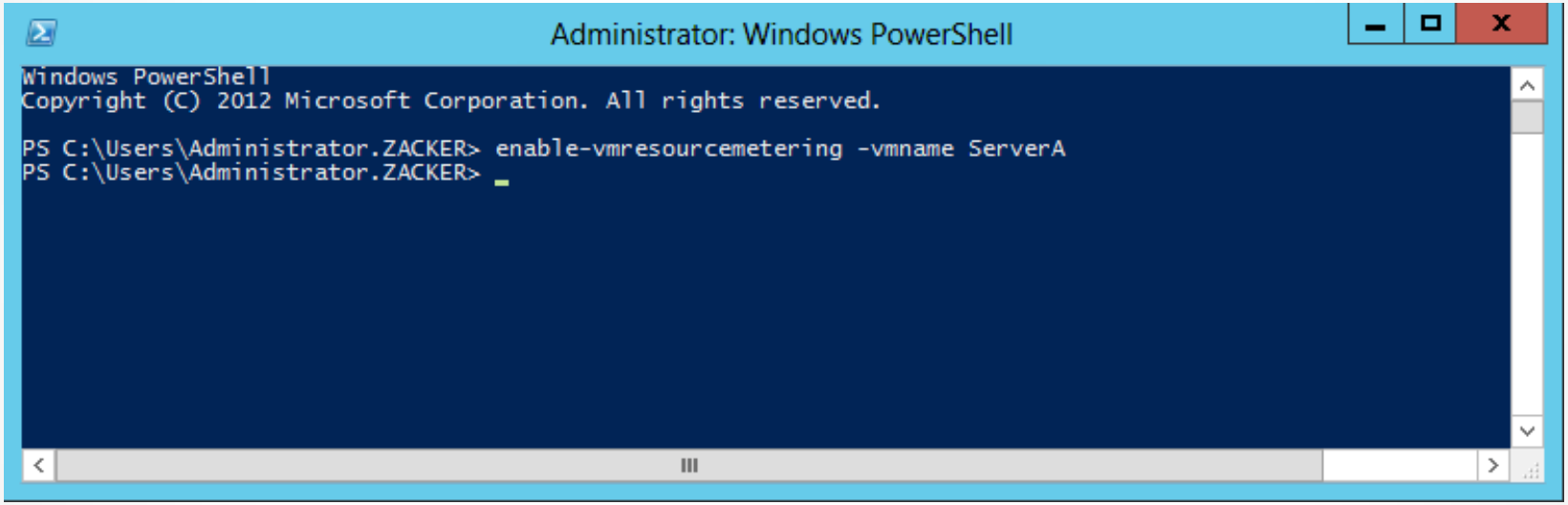
Resource Metering

Resource metering uses PowerShell cmdlets to track a variety of performance metrics for individual VMs, including:

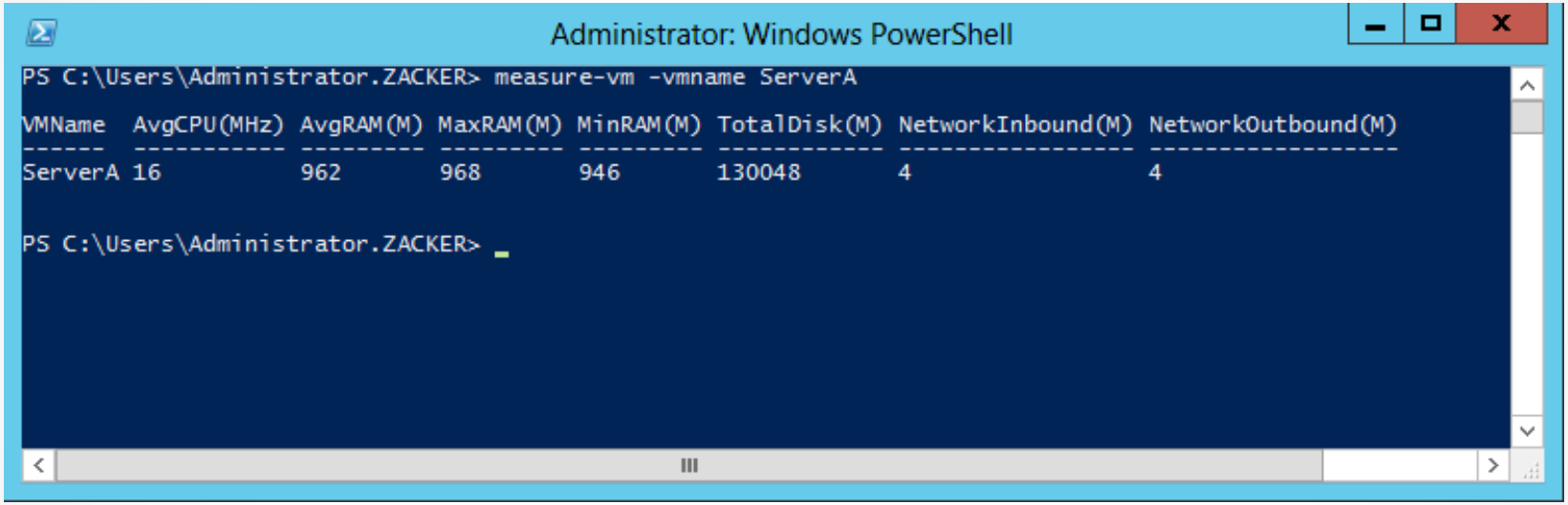
- CPU utilization
- Minimum/Maximum/Average memory utilization
- Disk space utilization
- Incoming/Outgoing network traffic

Configuring Resource Metering



Enabling Resource Metering with Windows PowerShell

Configuring Resource Metering



Displaying metering data with Windows PowerShell

Lesson Summary

- Virtualization is a process that adds a layer of abstraction between actual, physical hardware and the system making use of it. Instead of having the server access the computer's hardware directly, an intervening component called a hypervisor creates a virtual machine environment, and the server operating system runs in that environment.
- Virtualization is the process of deploying and maintaining multiple instances of an operating system, called virtual machines (VMs), on a single computer.
- Microsoft Hyper-V is a hypervisor-based virtualization system for x64 computers starting with Windows Server 2008. The hypervisor is installed between the hardware and the operating system and is the main component that manages the virtual computers.

Lesson Summary

- For licensing purposes, Microsoft refers to each virtual machine that you create on a Hyper-V server as a virtual instance. Each Windows Server 2012 version includes a set number of virtual instances; you must purchase licenses to create additional ones.
- To keep a small footprint and minimal overhead, Hyper-V Server contains only the Windows Hypervisor, Windows Server driver model, and virtualization components.