Lesson ~~7~~ 8: Installing and Configuring Hyper-V

MOAC 70-740: Installation, Storage and Compute with Windows Server 2016

Microsoft Official Academic Course

WILEY

Overview

Objective 3.1 – Install and configure Hyper-V.

- Determine hardware and compatibility requirements for installing Hyper-V
- Install Hyper-V
- Install management tools
- Upgrade from existing versions of Hyper-V
- Delegate virtual machine management
- Perform remote management of Hyper-V hosts
- Configure virtual machines using Windows PowerShell Direct
- Implement nested virtualization

Objective 3.2 – Configure virtual machine (VM) settings;

- Move and convert VMs from previous versions of Hyper-V to Windows Server 2016 Hyper-V

Installing and Configuring Hyper-V

- By using ***virtual machine*** technology, you can run multiple operating systems concurrently on a single machine, which allows separation of services while keeping cost to a minimum.
- It can also be used to create Windows test systems in a safe, self-contained environment.
- 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.

Installing and Configuring Hyper-V

- ***Hyper-V*** is a hardware virtualization server role that enables you to create and manage virtual machines (VMs) using a virtual switch.
- Server virtualization in Windows Server 2016 is based on a module called a hypervisor.
- Sometimes called a ***Virtual Machine Monitor (VMM)***, the hypervisor is responsible for abstracting the computer's physical hardware and creating multiple virtualized hardware environments, called virtual machines (VMs).

Installing and Configuring Hyper-V

With each release of Windows Server, Hyper-V has been updated with new features and functionality. These updated features and functionality include:

- **Host resource protection**: Prevents a virtual machine from hogging all the resources on a Hyper-V host so that other virtual machines have sufficient resources to function.
- **Hyper-V Manager improvements**: Allows you to use alternate credentials when connecting to a Hyper-V host.
- **Nested virtualization**: Allows you to install and configure a Hyper-V role on a virtual machine running Windows Server 2016.
- **Rolling Hyper-V cluster upgrade**: Allows you to upgrade a Windows Server 2012 R2 cluster to Windows Server 2016 by adding Windows Server 2016 nodes on an existing cluster. You can then move the load to the Windows Server 2016 nodes, and retire the Windows Server 2012 R2 nodes.

(continued)

Installing and Configuring Hyper-V

- **Shielded virtual machines**: Secures a virtual machine by encrypting the virtual machine, which can only be accessed by the administrators of the virtual machine. This can also be used to prevent access from Hyper-V host administrators.
- **Start order priority**: Allows you to specify a specific startup order for virtual machines.
- **Storage Quality of Service (QoS)**: Improves storage performance by allowing you to create and assign storage QoS policies on a Scale-Out File Server. This can be used to limit or reserve an amount of storage throughput.
- **Windows PowerShell Direct**: Allows you to run Windows PowerShell cmdlets on a virtual machine from the Hyper-V host.

Determining Hardware & Compatibility

Requirements for Installing Hyper-V

To run Hyper-V, you need the following:

- A 64-bit processor that incorporates second level address translation (SLAT) technology
- A minimum of 4 GB of memory (running more than one VM at a time requires more)
- Intel Virtualization Technology (Intel VT) or AMD Virtualization (AMD-V) enabled
- Hardware-enforced Data Execution Prevention (DEP) Enabled (Intel DX and AMD NX bit)

Installing Hyper-V

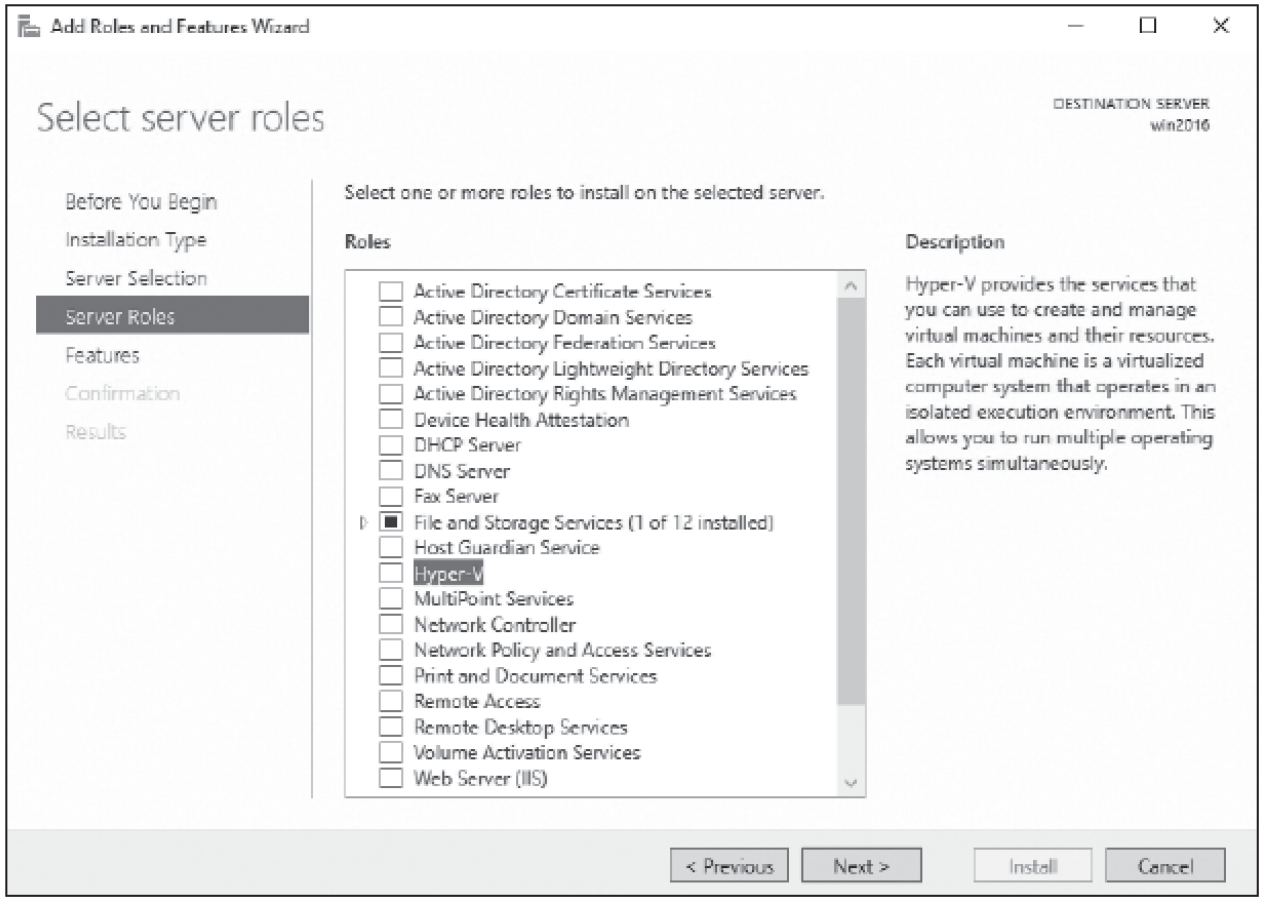
- Before installing Hyper-V, ensure that the host running Windows Server 2016 is installed with all necessary drivers and updates.
- You can then install the Hyper-V server role by using Server Manager or the Windows PowerShell Install-WindowsFeature cmdlet.
- To install Hyper-V using Server Manager on Windows Server 2016, you must have the Windows Server 2016 Standard or Datacenter edition.
- You will also need to have administrative permissions for the host.

Install the Hyper-V Role

GET READY. To install the Hyper-V Role, perform the following steps.

1. Open **Server Manager**.
2. In the Server Manager window, open the **Manage** menu and click **Add Roles and Features**.
3. In the Add Roles and Features Wizard, on the Before You Begin page, click **Next**.
4. On the Installation Type page, Role-based or feature-based installation is already selected. Click **Next**.
5. On the Select Destination Server page, select the server on which you want to install Hyper-V and then click **Next**. The Select Server Roles page appears, as shown on next slide.

Install the Hyper-V Role



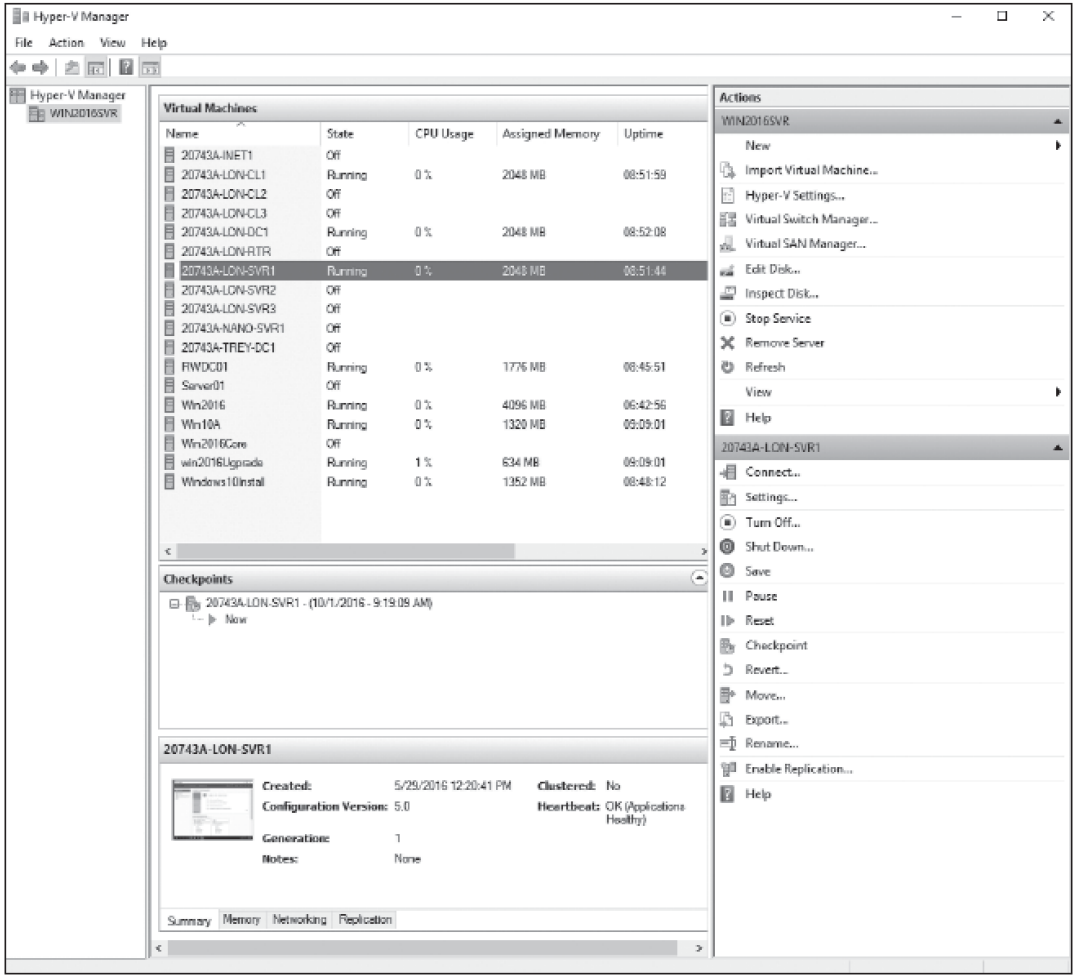
Install the Hyper-V Role

6. Select the **Hyper-V** role. When you are prompted to add features, click the **Add Features** button. Click **Next**.
7. On the Hyper-V page, click **Next**.
8. On the Create Virtual Switches page, select the check box for a network adapter and click **Next**.
9. On the Virtual Machine Migration page, click **Next**.
10. On the Default Stores page, specify alternatives to the default locations for virtual hard disk and virtual machine configuration files, if desired, and click **Next**.
11. On the Confirm Installation Selections page, select **Restart the destination server automatically if required** and then click **Yes**. Click **Install**. The host may restart several times as the system is rebooted.

Installing Management Tools

- Hyper-V is managed using the Hyper-V Manager or Windows PowerShell with the Hyper-V Module for Windows PowerShell.
- Typically, when you install Hyper-V on Windows Server 2016, the additional features that are installed include the Hyper-V GUI Management Tools and Hyper-V Module for Windows PowerShell.
- The Hyper-V Manager (as shown on next slide) is the administrative tool to create, change, and delete virtual machines and virtual switches, and it allows you to manage virtual storage.

Installing Management Tools

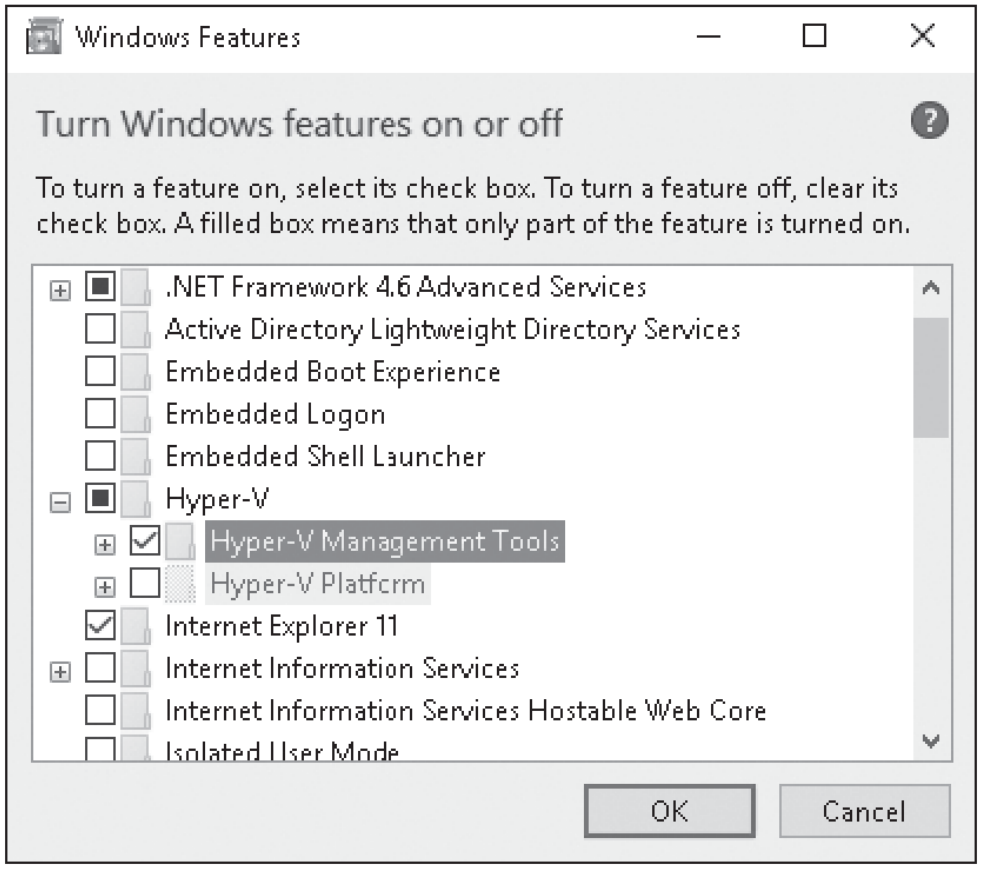


Install the Hyper-V Management Tools on a Client Running Windows 10

GET READY. To install the Hyper-V management tools, perform the following steps.

1. Log on to administrator access, such as **name.dawson.zlocal\administrator** with the password of **Password01**.
2. Right-click **Start** and choose **Programs and Features**.
3. In the Control Panel Programs and Features window, click the **Turn Windows features on or off** option.
4. In the Windows a client running Windows 10 with Features dialog box, expand the **Hyper-V** node and select the **Hyper-V Management Tools**, as shown on next slide. Click **OK**.
5. When the installation is complete, click **Close**.

Install the Hyper-V Management Tools on a Client Running Windows 10



Performing Remote Management of Hyper-V Hosts

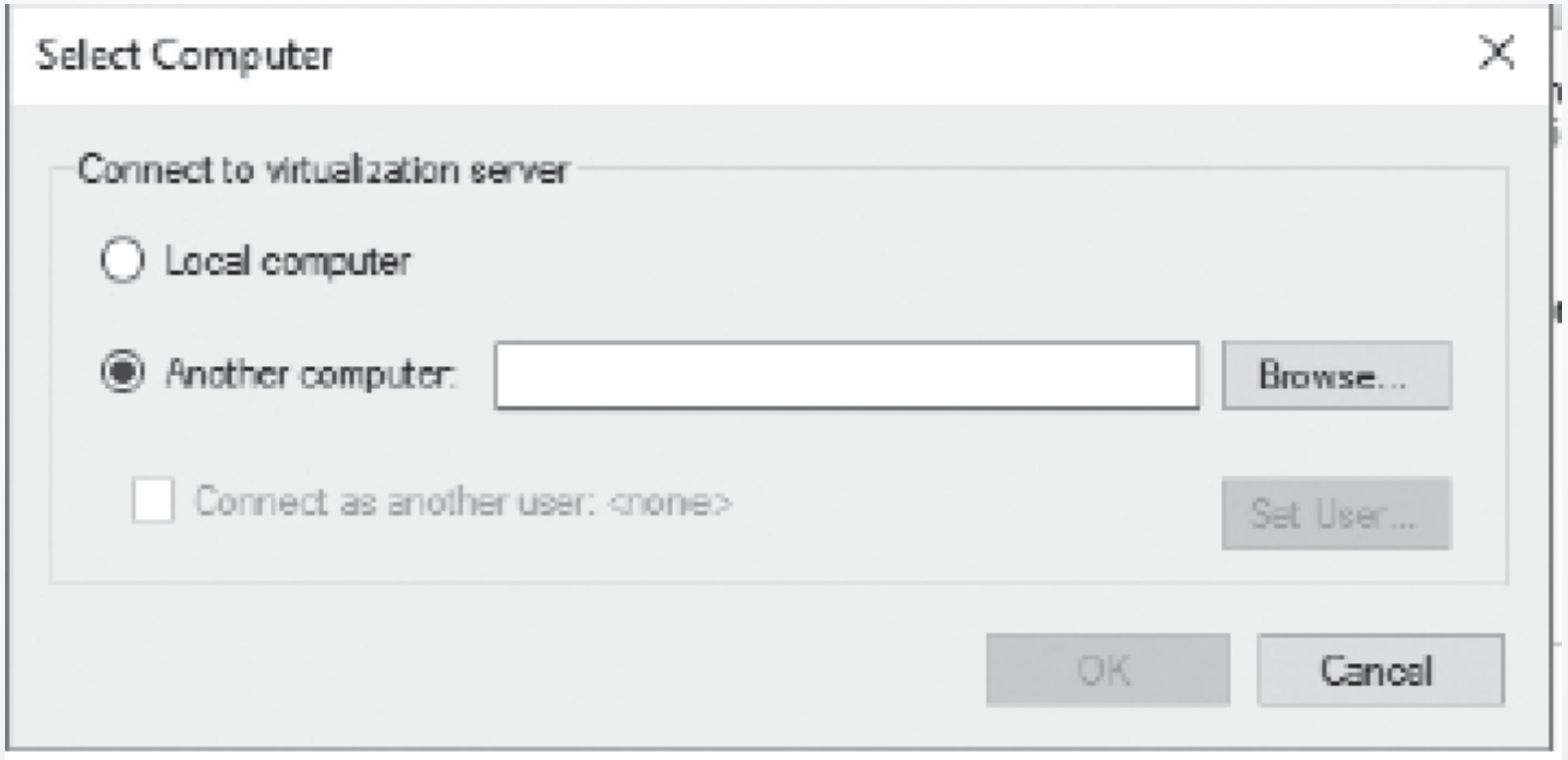
- After you install the Hyper-V Management Tools, you can manage Hyper-V hosts locally or remotely.
- Because the Hyper-V hosts are in a server room or data center, you can manage your VMs remotely from your office desk or home through a virtual private network (VPN) tunnel.
- In addition, you can manage multiple Hyper-V hosts using a single instance of Hyper-V Manager.
- When you open Hyper-V Manager on a Hyper-V host, the local host will already be added to the console.
- To manage other hosts or remote hosts, just add the other hosts to Hyper-V Manager.

Manage Remote Hyper-V Hosts

GET READY. To manage remote Hyper-V hosts on a server running Windows Server 2016, perform the following steps.

1. Log on to a computer running Windows Server 2016 with an administrator account, such as **name.dawson.zlocal\administrator** with the password of **Password01**.
2. If Server Manager does not open, click **Start** > **Server Manager**.
3. Click **Tools** > **Hyper-V**.
4. In Server Manager, right-click the **Hyper-V Manager** node and choose **Connect to Server**.
5. In the Select Computer dialog box (see next slide), with Another computer option already selected, in the Another computer text box, type the name of the server, such as **SVR1**, and click **OK**.

Manage Remote Hyper-V Hosts



Upgrading from Existing Versions of Hyper-V

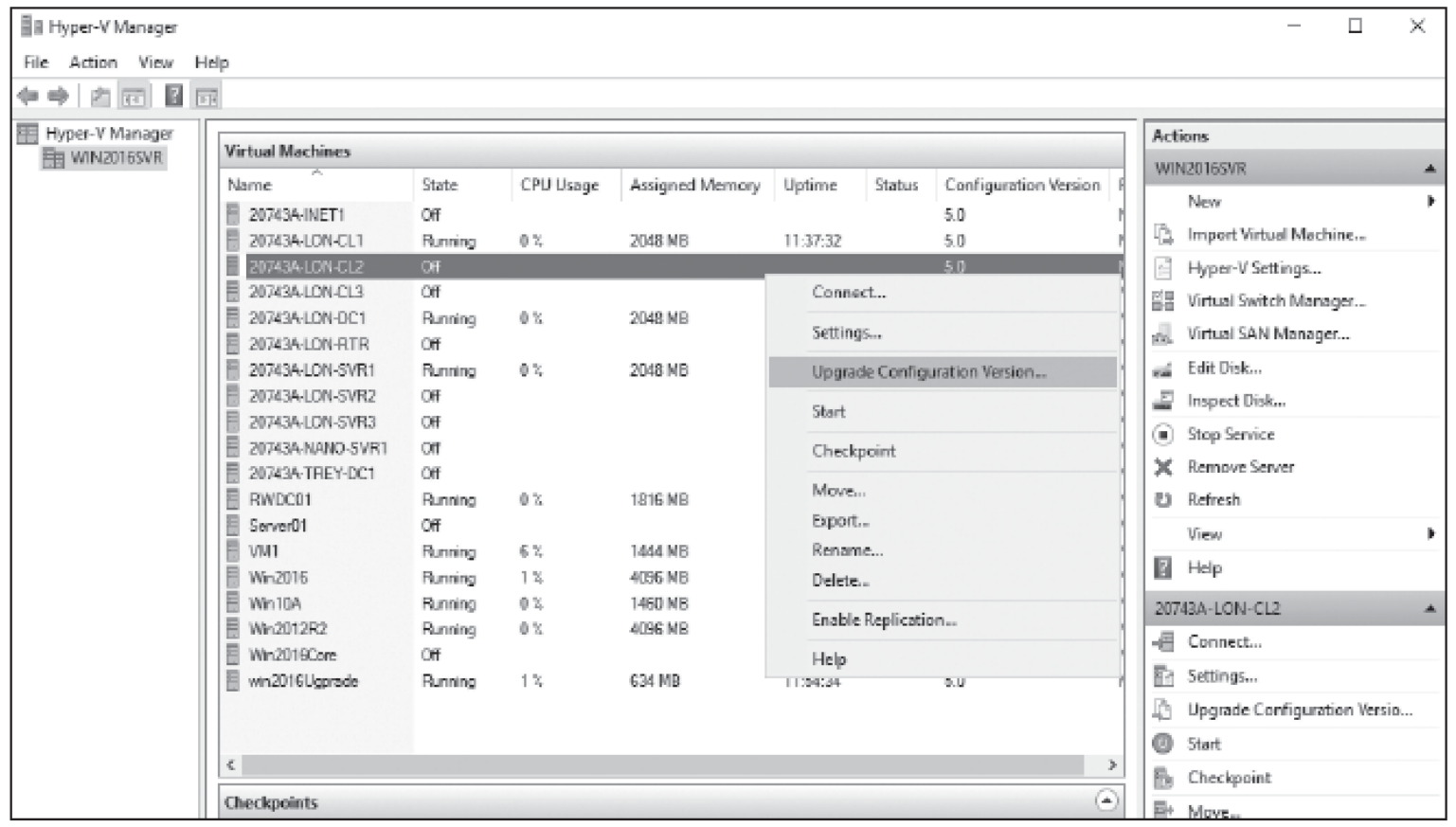
- To upgrade Windows Server 2012 R2 running Hyper-V, simply insert the Windows Server 2016 installation disc, access the disk, and double-click the setup program to start the upgrade.
- The upgrade process was discussed in Lesson 2.
- When you have Windows Server 2012 R2 running Windows Server 2012 or 2012 R2 virtual machines, you can mount the ISO file on each VM and then access the virtual disk to upgrade Windows.
- When you create a virtual machine, the configuration file will be a specific ***VM configuration version*** based on the host operating system.

Upgrade the VM Version

GET READY. To upgrade the VM version of a virtual machine running on a Windows Server 2016 Hyper-V, perform the following steps.

1. Log on to a computer running Windows Server 2016 with an administrator account, such as **name.dawson.zlocal\administrator** with the password of **Password01**.
2. If Server Manager does not open, click **Start** > **Server Manager**.
3. Click **Tools** > **Hyper-V**.
4. You can view the Configuration version by looking in the Configuration Version. Then, to upgrade a VM configuration version, right-click the VM and choose **Upgrade Configuration Version**, as shown on the next slide.
5. When the Upgrade Configuration Version dialog box opens, click the **Upgrade** button.

Upgrade the VM Version



Configuring Virtual Machines Using PowerShell Direct

- Windows PowerShell can be used to create remote sessions to run Windows PowerShell cmdlets on a remote host.
- However, in Windows Server 2016, ***PowerShell Direct*** has been added, which allows you to connect to a virtual machine via the Hyper-V host, even if the VM does not have a network connection.

Configuring Virtual Machines Using PowerShell Direct

To use PowerShell Direct, you need the following:

- The host operating system must be Windows Server 2016 or Windows 10.
- The guest operating system must be Windows Server 2016 or Windows 10.
- You must run Windows PowerShell as an administrator.
- You must provide credentials to authenticate to the virtual machine.
- The virtual machine configuration version must be updated.
- The virtual machine must be running locally on the host.
- The virtual machine must be turned on and running with at least one configured user profile.

Manage Remote Hyper-V Hosts

GET READY. To manage remote Hyper-V hosts on a server running Windows Server 2016, perform the following steps.

1. Log on to a computer running Windows Server 2016 with an administrator account, such as **name.dawson.zlocal\administrator** with the password of **Password01**.
2. On the taskbar, click the **Windows PowerShell** tile.
3. In the Administrator: Windows PowerShell window, execute the following command:

Enter-PSSession –VMName "VM1"

4. When you receive a prompt for credentials, use **name.dawson.zlocal\administrator** as the user name and **Password01** for the password.
5. Execute the following command:

    Restart-Computer

Implementing Nested Virtualization

- Windows Server 2016 supports nested virtualization, which allows a Hyper-V guest virtual machine to become a Hyper-V host and run a Hyper-V guest operating system.
- In other words, it allows you to run a guest virtual machine in a guest virtual machine.

Implementing Nested Virtualization

To enable nested virtualization, you need the following:

- Hyper-V must be running Windows Server 2016 or Windows 10.
- The virtual memory must be 4 GB of memory or more.
- The virtual machine that is running Hyper-V must be the same build as the host.
- Disable Dynamic Memory of the virtual machine.
- Enable Virtualization Extensions of the vCPU.

Implementing Nested Virtualization

To enable the Virtualization Extension of the vCPU, run the following Windows PowerShell command:

- Set-VMProcessor -VMName "VMName"
  -ExposeVirtualizationExtensions $true

The following features are disabled or will fail after you enable nested virtualization:

- Virtual-based security
- Device Guard
- Dynamic Memory
- Hot add Static Memory
- Checkpoints
- Live migration
- Save or Restore state

Enable MAC Spoofing

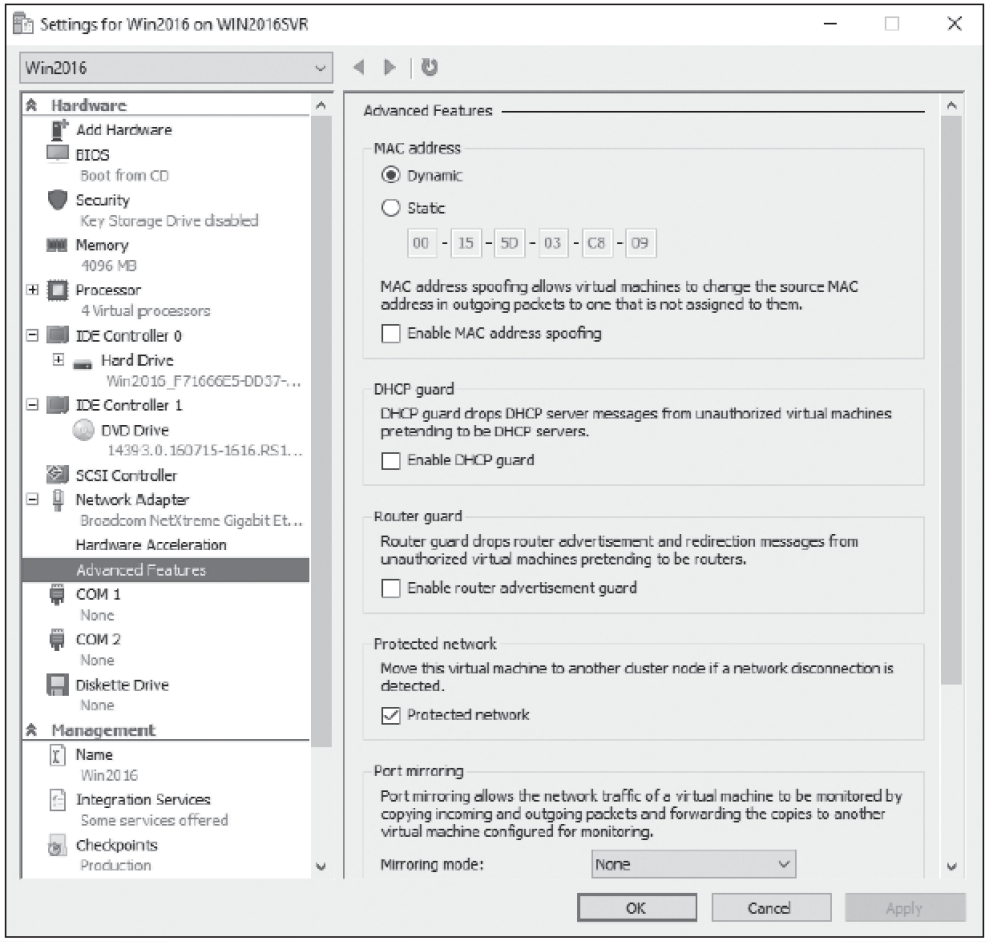
GET READY. To enable MAC spoofing for the virtual machine running Hyper-V, perform the following steps.

1. Log on to a computer running Windows Server 2016 with an administrator account, such as **name.dawson.zlocal\administrator** with the password of **Password01**.
2. If Server Manager does not open, click **Start** > **Server Manager**.
3. Click **Tools** > **Hyper-V**.
4. If the virtual machine is on, perform a shutdown of the virtual machine by right-clicking the virtual machine and choosing **Shutdown**. When you are prompted to determine whether you want to shut down the operating system, click the **Shut Down** button.

Enable MAC Spoofing

5. Right-click the virtual machine and choose **Settings**.
6. In the Settings dialog box, expand the **Network Adapter** node and select the **Advanced Features** node, as shown on the next slide.
7. Select the **Enable MAC address spoofing** option and click **OK**.
8. Right-click the virtual machine and choose **Start**.

Enable MAC Spoofing



Delegating Virtual Machine Management

- By default, Hyper-V allows the administrators group to create and manage virtual machines.
- You can grant administrative access by adding a user to the Administrators or the Hyper-V Administrators group.
- However, you can also allow a non-administrative user to create and control virtual machines by using the Authorization Manager console.
- To grant access to a user to a virtual machine or machines, use the Windows PowerShell Grant-VMConnectAccess cmdlet to grant Console Read or Console Read/Write access.
- To revoke access, use the Windows PowerShell Revoke-VMConnectAccess cmdlet.

Add a User to the Hyper-V Administrators Group

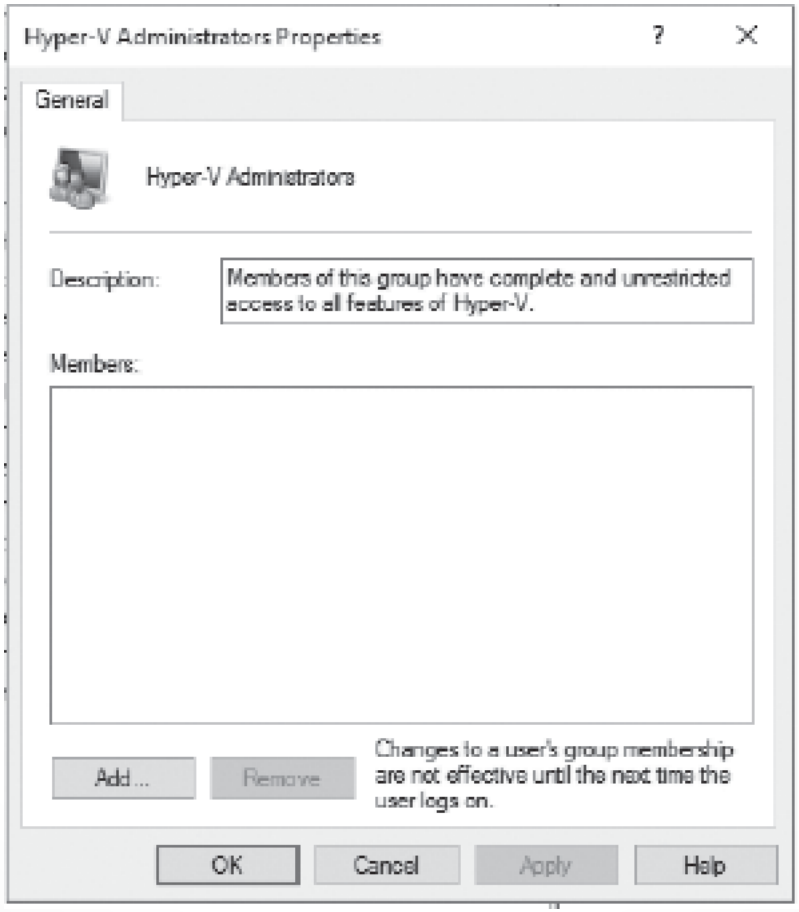
GET READY. To add a user to the Hyper-V Administrators group, perform the following steps.

1. Log on to a computer running Windows Server 2016 with an administrator account, such as **name.dawson.zlocal\administrator** with the password of **Password01**.
2. If Server Manager does not open, click **Start** > **Server Manager**.
3. Click **Tools** > **Computer Management**.
4. In the Computer Management console, expand the **Local Users and Groups** node and then click **Groups**.

Add a User to the Hyper-V Administrators Group

5. Double-click the **Hyper-V Administrators** group. The Hyper-V Administrators Properties dialog box opens, as shown on next slide.
6. Click **Add**.
7. In the Select Users dialog box, type the name of the user that you want to add and then click **OK**.
8. Close the Hyper-V Administrators Properties dialog box by clicking **OK**.

Add a User to the Hyper-V Administrators Group



Lesson Summary

- By using virtual machine technology, you can run multiple operating systems concurrently on a single machine, which allows separation of services while keeping cost to a minimum.
- It can also be used to create Windows test systems in a safe, self-contained environment.
- Hyper-V is a hardware virtualization server role that enables you to create and manage virtual machines (VMs) using a virtual switch.
- By using hardware virtualization, you can subdivide the single physical computer to be subdivided into, and allocated to, multiple virtual machines.
- The physical machine that Hyper-V and the virtual machines run on is often referred to as the host.
- Hyper-V is managed using the Hyper-V Manager or Windows PowerShell with the Hyper-V Module for Windows PowerShell.

Lesson Summary

- Typically, when you install Hyper-V on Windows Server 2016, the additional features that are installed include the Hyper-V GUI Management Tools and Hyper-V Module for Windows PowerShell.
- Windows PowerShell can be used to create remote sessions to run Windows PowerShell cmdlets on a remote host. However, in Windows Server 2016, PowerShell Direct has been added, which allows you to connect to a virtual machine via the Hyper-V host, even if the VM does not have a network connection.
- Windows Server 2016 supports nested virtualization, which allows a Hyper-V guest virtual machine to become a Hyper-V host and run a Hyper-V guest operating system.