

Microsoft Official Academic Course LAB MANUAL



Exam 70-412

Configuring Advanced Windows Server 2012 Services



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Configuring Advanced Windows Server® 2012 Services

Exam 70-412

Lab Manual

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LAB 1

CONFIGURING NETWORK

LOAD BALANCING

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES:

- Exercise 1.1** Installing the Network Load Balancing Feature
- Exercise 1.2** Creating a Windows Server 2012 NLB Cluster
- Exercise 1.3** Configuring DNS
- Exercise 1.4** Configuring Cluster Properties
- Exercise 1.5** Managing the Cluster Nodes
- Exercise 1.6** Removing the NLB Cluster
- Lab Challenge** Upgrading an NLB Cluster

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 1-1.

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Table 1-1
Computers Required for Lab 1

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02
Server (VM 4)	Windows Server 2012	Storage01

In addition to the computers, you will also require the software listed in Table 1-2 to complete Lab 1.

Table 1-2
Software required for Lab 1

Software	Location
Lab 1 student worksheet	Lab1_worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab01_worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Install and configure the Network Load Balancing feature
- Create and configure a NLB cluster
- Manage the cluster nodes

Estimated lab time: 85 minutes

Exercise 1.1 Installing the Network Load Balancing Feature

Overview

The Contoso Corporation has a website that must be fault tolerant. Therefore, you decide to use Network Load Balancing. In this exercise, you install the Network Load Balancing Feature on two Windows Server 2012 servers.

Completion time

25 minutes

Mindset Question: You have a website that must be fault tolerant, so you decide to use Network Load Balancing. What is required to implement Network Load Balancing?

1. Log into Server01 as **contoso\administrator** with the password of **Password01**.
2. On Server01, right-click the *Network Status* icon in the Taskbar, and click **Open Network and Sharing Center**.
3. When the Network and Sharing Center opens (as shown in figure 1-1), click **Ethernet 2**.

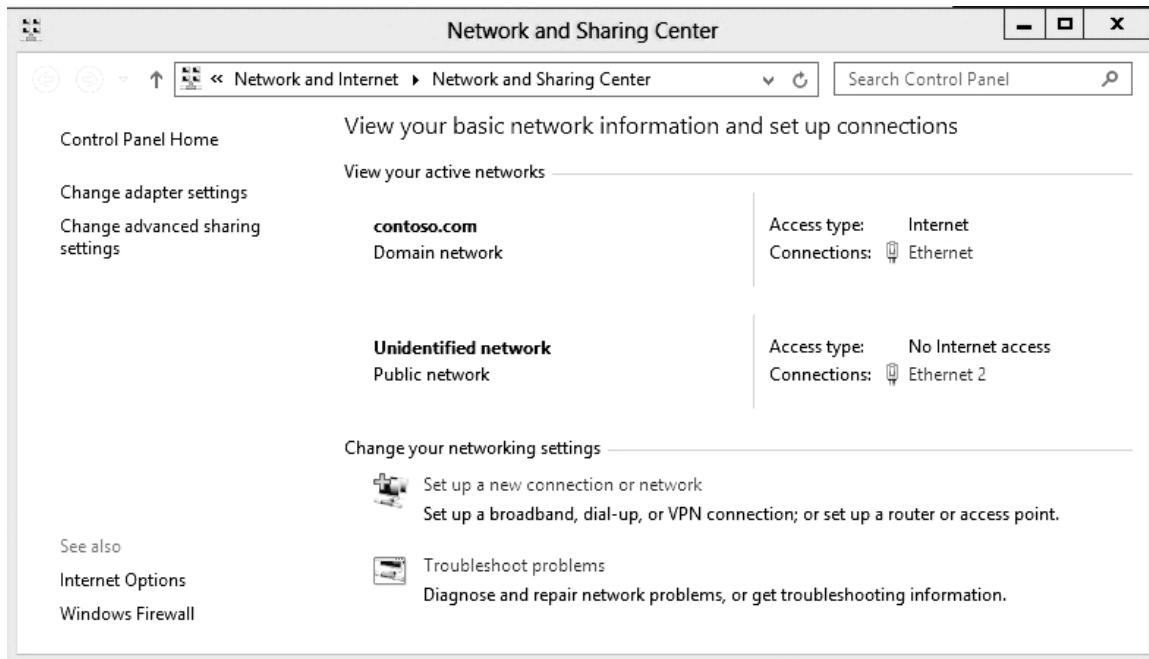


Figure 1-1
Managing network settings

4. When the Ethernet 2 Status dialog box opens, click **Properties**. The Ethernet 2 Properties dialog box opens.
5. Double-click **Internet Protocol Version 4 (TCP/IPv4)**. The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
6. Configure the following settings and click **OK**:
 - IP address: 192.168.1.61
 - Subnet mask: 255.255.255.0
7. Click **OK** to close the Ethernet 2 Properties dialog box.
8. Click **Close** to close the Ethernet 2 Status. Close Network and Sharing Center.

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9. Log into Server02 as **contoso\administrator** with the password of **Password01**. Right-click the Network Status icon in the Taskbar and click Open Network and Sharing Center.
10. When the Network and Sharing Center opens, click **Ethernet 2**.
11. When the Ethernet 2 Status dialog box opens, click **Properties**. The Ethernet 2 Properties dialog box opens.
12. Double-click **Internet Protocol Version 4 (TCP/IPv4)**. The Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
13. Configure the following settings and click **OK**:
IP address: 192.168.1.71
Subnet mask: 255.255.255.0
14. Click **OK** to close the Ethernet 2 Properties dialog box.
15. Click **Close** to close the Ethernet 2 Status. Close Network and Sharing Center.
16. On Server01, using the **Server Manager** console, open the **Manage** menu and click **Add Roles and Features**.
17. When the Add Roles and Features Wizard starts, click **Next**.
18. On the Select installation type page, click **Next**.
19. On the Select destination server page, click **Next**.
20. On the Select server roles page, click **Next**.
21. On the Select features page, click to select the **Network Load Balancing**. When it asks you to add features required for NLB, click **Add Features**. Click **Next**.
22. On the Confirm installation selections page, click **Install**.
23. When the installation is complete, click **Close**.
24. Using the same procedure that you used for Server01, install the Network Loading Balancing feature on Server02.

End of exercise. Keep the Server Manager open for the next exercise.

Exercise 1.2 Creating a Windows Server 2012 NLB Cluster

Overview

During this exercise, you will create the NLB Cluster using Server01 and Server02.

Completion time

15 minutes

ADDING THE FIRST NODE

1. On Server01, using **Server Manager**, click **Tools > Network Load Balancing Manager**. The Network Load Balancing Manager opens.
2. Right-click **Network Load Balancing Clusters** and click **New Cluster**, as shown in figure 1-2. The New Cluster: Connect Wizard opens as shown in figure 1-3.

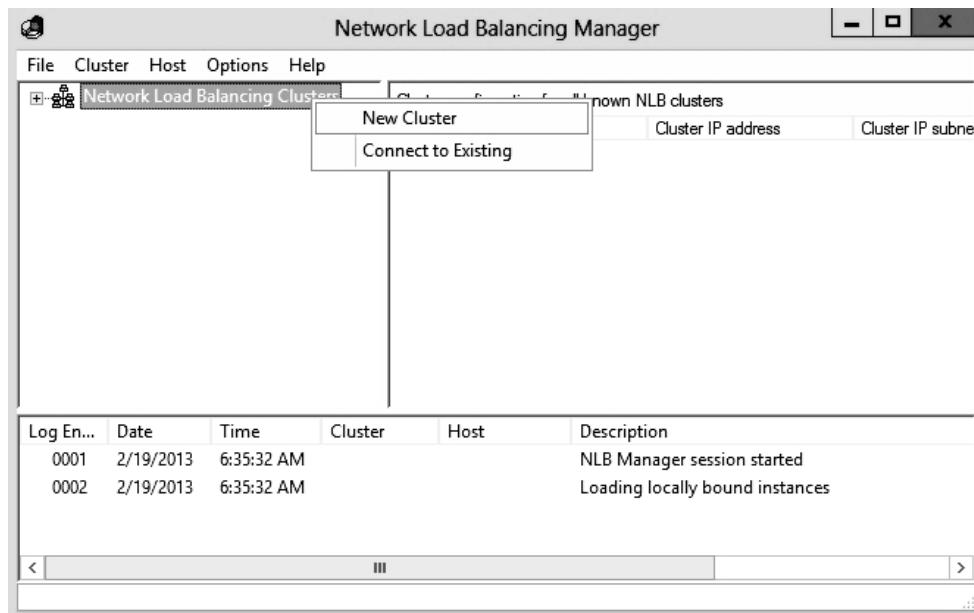


Figure 1-2

Creating a new NLB cluster

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Figure 1-3
Adding a host to the cluster

3. In the Host text box, type **Server01** and click **Connect**.
4. The interface hosts the virtual IP address and receives the client traffic to load balance. Click **Ethernet 2** and click **Next**.
5. On the Host parameters page, you select a value in the Priority (unique host identifier) drop-down list.

Question 1	<i>What is the default priority?</i>
---------------	--------------------------------------

6. In the Dedicated IP addresses section, verify that the dedicated IP address from the chosen interface is visible in the list and click **Next**.
7. On the New Cluster: Cluster IP Addresses page, click **Add**. The Add IP Address dialog box opens as shown in figure 1-4.

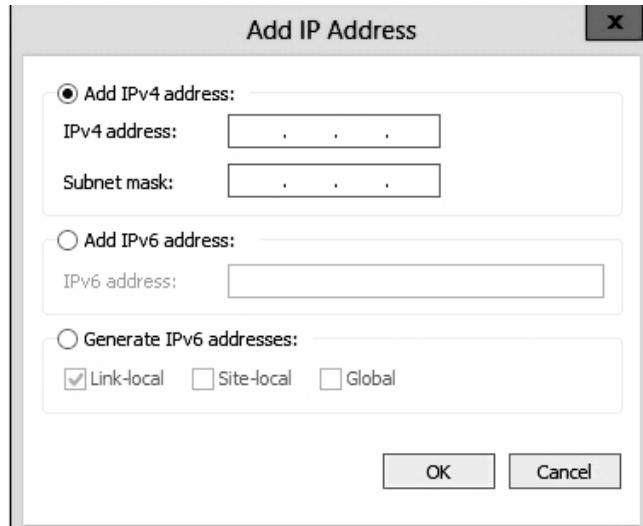


Figure 1-4
Specifying cluster IP address

8. Enter the following information and click **OK**.

IPv4 address: 192.168.1.65

Subnet mask: 255.255.255.0

9. Back at the New Cluster: Cluster IP Addresses page, click **Next**.
10. On the New Cluster: Cluster Parameters page (as shown in figure 1-5), type **web.contoso.com** in the Full Internet name text box.

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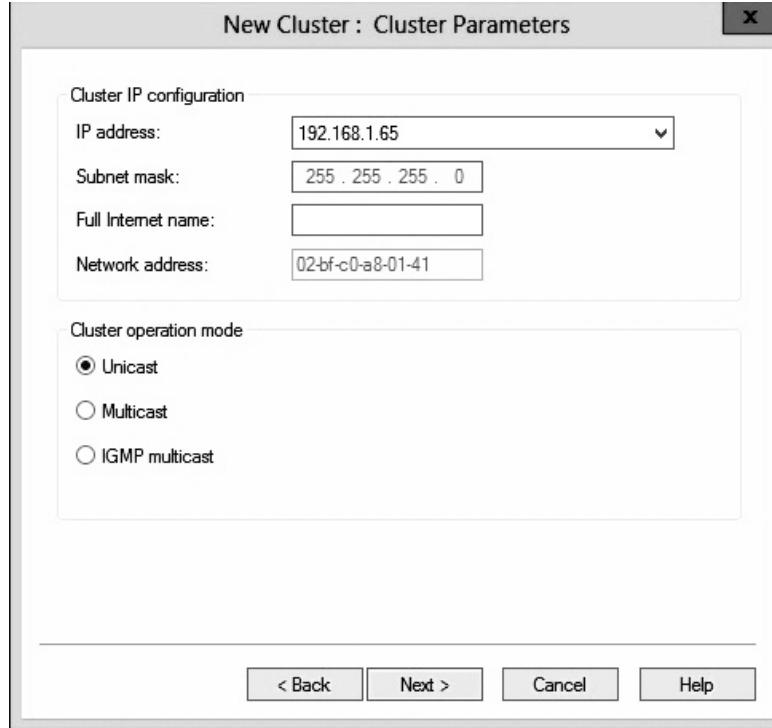


Figure 1-5
Configuring cluster parameters

Question 2	<i>What is the default cluster operation mode?</i>
-----------------------	--

11. Click **Next**.
12. On the New Cluster: Port Rules page, click **Edit** to open the Add/Edit Port Rule dialog box, as shown in Figure 1-6.

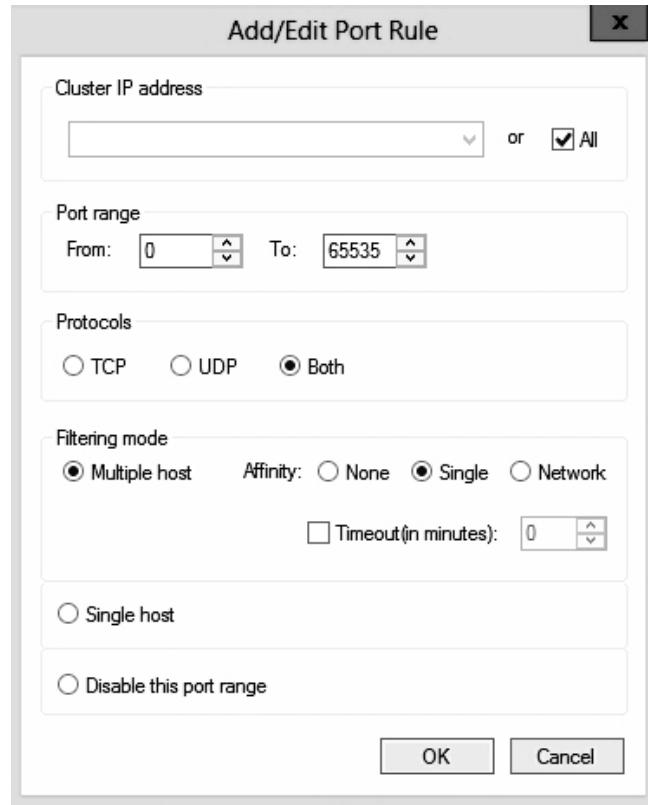


Figure 1-6
Configuring cluster parameters

Question 3	<i>What is the filtering mode set to?</i>
---------------	---

13. Click **OK** to close the Add/Edit Port Rule.
14. Click **Finish**.
15. Take a screen shot of the Network Load Balancing Manager by pressing Alt+Prt Scr and then paste it into your Lab 1 worksheet file in the page provided by pressing Ctrl+V.

ADDING THE SECOND NODE

1. On Server01, using Network Load Balancing Manager, right-click **web.contoso.com**, and click **Add Host to Cluster**.
2. When the Add Host to Cluster dialog box opens, type **server02**, and click **Connect**.
3. When the interfaces are displayed, click **Ethernet 2**, and click **Next**.

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4. On the Add Host to Cluster: Host Parameters page, click **Next**.
5. On the Add Host to Cluster: Port Rules page, click **Finish**.
6. Watch Network Load Balancing Manager until both nodes are converged. You may need press **F5** to refresh the console.
7. Take a screen shot of the Network Load Balancing Manager by pressing Alt+Prt Scr and then paste it into your Lab 1 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. Keep the Network Load Balancing Manager open for later exercises.

Exercise 1.3 Configuring DNS

Overview

Users will need to find the clusters. Therefore, during this exercise, you will configure DNS resource records.

Completion time

10 minutes

Mindset Question: **There are two things still missing. First, you will need to install IIS, and deploy the websites on Server01 and Server02. So when you are ready to go live, what are the last steps needed so that users can reach the websites?**

1. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
2. When Server Manager opens, open the **Tools** menu and click **DNS**.
3. When the DNS Manager console opens, expand **RWDC01**, expand **Forward Lookup Zones**, and click **contoso.com**.
4. Right-click **contoso.com**, and click **New Host (A or AAAA)**.
5. When the New Host dialog box opens, enter the following:

Name: **web**

IP address: **192.168.1.65**

6. Click to select **Create associated pointer (PTR) record**, and click **Add Host**.
7. Click OK and then click **Done** to close the New Host dialog box..
8. Right-click **contoso.com**, and click **New Alias (CNAME)**.
9. When the New Resource Record dialog box opens, type the following and click **OK**:

Alias name: **www**

Fully qualified domain name FQDN) for target host: **web.contoso.com**

- 10.** Click **OK** then close the DNS Manager console.

End of exercise. Close the DNS Manager.

Exercise 1.4 Configuring Cluster Properties	
Overview	Currently, the port rules allow all TCP and UDP ports. During this exercise, you will redefine the port rules for only the ports that you need.
Completion time	10 minutes

Mindset Questions: As mentioned earlier, the cluster is meant to support a website. What ports will you need to support the websites?

1. On Server01, using Network Load Balancing Manager, right-click **web.contoso.com** and click **Cluster Properties**.
2. When the Web.contoso.com Properties dialog box opens, click the **Port Rules** tab. The Port Rules tab is shown in figure 1-7.

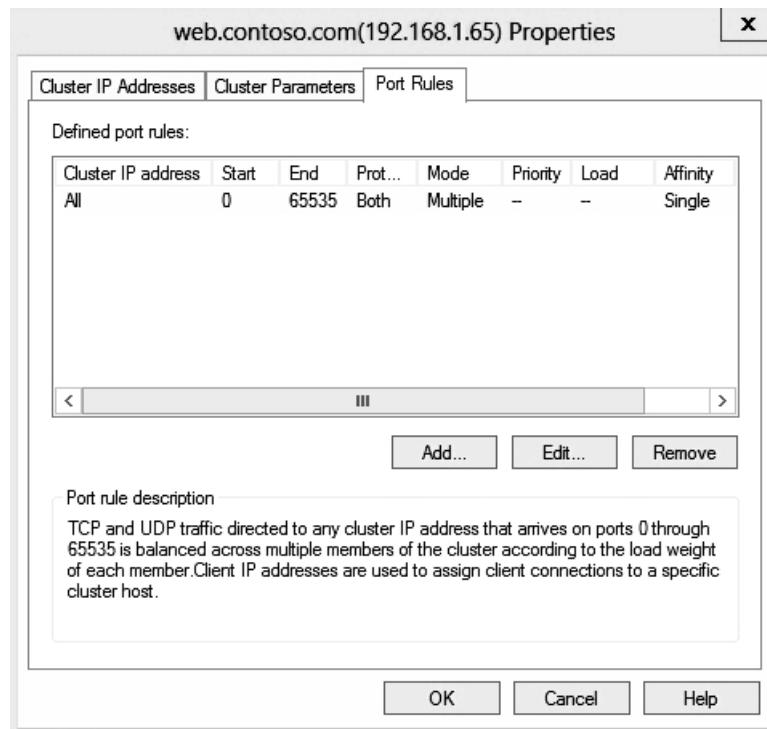


Figure 1-7
Configuring cluster parameters

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3. Click the current rule and click **Remove**.
4. Click **Add**. The Add/Edit Port Rule dialog box opens.

Question 4	<i>What filtering mode is selected and what affinity is selected?</i>
-----------------------	---

Question 5	<i>Why would you need to use single affinity?</i>
-----------------------	---

5. Change the protocols to **TCP**.
6. Change the port range to the following and click **OK**:

From: 80

To: 80

7. Click **Add**. The Add/Edit Port Rule dialog box opens.
8. Change the protocols to **TCP**.
9. Change the port range to the following and click **OK**:

From: 443

To: 443

10. Click **OK** to close the Properties dialog box.
11. Watch Network Load Balancing Manager until both nodes are converged. You may need to press **F5** to refresh the console

End of exercise. Keep the Load Balancing Manager open for the next exercise.

Exercise 1.5 Managing the Cluster Nodes

Overview	You need to do maintenance on the nodes. At this time, you need to stop one of the nodes, and then bring the node back online.
Completion time	5 minutes

1. On Server01, using Network Load Balancing Manager, right-click **SERVER01**, click **Control Host**, and click **Drainstop**.

Question 6	<i>What does drainstop do?</i>
-------------------	--------------------------------

2. Take a screen shot of the Network Load Balancing Manager by pressing Alt+Prt Scr and then paste it into your Lab 1 worksheet file in the page provided by pressing Ctrl+V.
3. Click **web.contoso.com**.

Question 7	<i>What is the status of the Server01 node?</i>
-------------------	---

4. Right-click **Server01**, click **Control Host**, and click **Start**.
5. Right-click **Server01**, click **Control Host**, and click **Stop**.
6. Right-click **Server01**, click **Control Host**, and click **Start**.
7. Watch Network Load Balancing Manager until both nodes are Enabled. You may need to press **F5** to refresh the console

End of exercise. Leave the Network Load Balancing Manager open for the next exercise.

Exercise 1.6 Removing the NLB Cluster

Overview	During the first part of the exercise, you will delete the cluster. During the second part, you will remove the Network Load Balance feature so that it will not interfere with future lessons.
----------	---

Completion time	5 minutes
-----------------	-----------

1. On Server01, using Network Load Balancing Manager, right-click **web.contoso.com**, and click **Delete Cluster**. Click Yes to remove NLB.
2. Close **Network Load Balancing Manager**.
3. Using **Server Manager**, click **Manage**, and click **Remove Roles and Features**.
4. When the Remove Roles and Features Wizard opens, click **Next**.
5. On the Select destination server page, click **Next**.
6. On the Remove server roles page, click **Next**.
7. On the Remove features page, click to deselect **Network Load Balancing**.
8. When a dialog box asks you to remove features, click **Remove Features**.

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9. Back on the Remove features page, click **Next**.
10. On the Confirm removal selections page, click **Remove**.
11. When the feature is removed, click **Close**.
12. Reboot Server01.
13. Go to Server02, and repeat the process in steps 3 through 11 to remove its Network Load Balancing feature.
14. Reboot Server02.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 1.1, when you installed NLB, was it a role or a feature?
2. In Exercise 1.2, what mode (multicast or unicast) should you use if you have two network cards?
3. In Exercise 1.2, if you did choose to use multicast mode, what MAC addresses are assigned to the NLB network adapter?
4. In Exercise 1.3, what is the advantage of using an alias resource record.
5. In Exercise 1.4, what filter mode would you select if you want one server to be the primary web server, and the other node wait until the primary server goes down.
6. In Exercise 1.5, what would happen if you do not use drainstop to stop a node?

Lab Challenge Adding Drivers to a Windows Image	
Overview	To complete this challenge, you will describe how to add drivers to a Windows image by writing the high-level steps of processing network policies.
Completion time	10 minutes

You have a NLB cluster running on two servers running Windows Server 2008 R2. What would you do to upgrade the cluster to Windows Server 2012?/

End of lab.

LAB 2

CONFIGURING FAILOVER

CLUSTERING

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

- Exercise 2.1** Configuring the iSCSI Client
- Exercise 2.2** Installing the Failover Clustering Feature
- Exercise 2.3** Creating a Failover Cluster
- Exercise 2.4** Configuring the Quorum
- Exercise 2.5** Implementing Cluster Aware Updating
- Lab Challenge** Upgrading a Failover Cluster

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 2-1.

Table 2-1
Computers required for Lab 2

<i>Computer</i>	<i>Operating System</i>	<i>Computer Name</i>
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02
Server (VM 4)	Windows Server 2012	Storage01

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In addition to the computers, you will also require the software listed in Table 2-2 to complete Lab 2.

Table 2-2
Software required for Lab 2

Software	Location
Lab 2 student worksheet	Lab2 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab02 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Install and configure a fail-over cluster
- Configure quorum
- Implement Cluster Aware Updating
- Upgrade a cluster

Estimated lab time: 115 minutes

Exercise 2.1 Configuring the iSCSI Client	
Overview	For a failover cluster to function, you need to have a shared drive. Storage01 is an iSCSI target, which has iSCSI drives that can be used by Server01 and Server02. During this exercise, you will connect to the iSCSI drives using the built-in iSCSI client software that comes with Windows Server 2012.
Completion time	25 minutes

Mindset Question: **Why do failover cluster nodes need to connect to a SAN?**

1. Log into Server01 as **contoso\administrator** with the password of **Password01**. Server Manager opens.
2. With Server Manager, open the **Tools** menu and click **iSCSI Initiator**.

3. When it says that the Microsoft iSCSI service is not running, click **Yes to start it..**
4. When the iSCSI Initiator Properties dialog box opens, type **storage01.contoso.com** in the Target: text box (as shown in figure 2-1) and click **Quick Connect**.

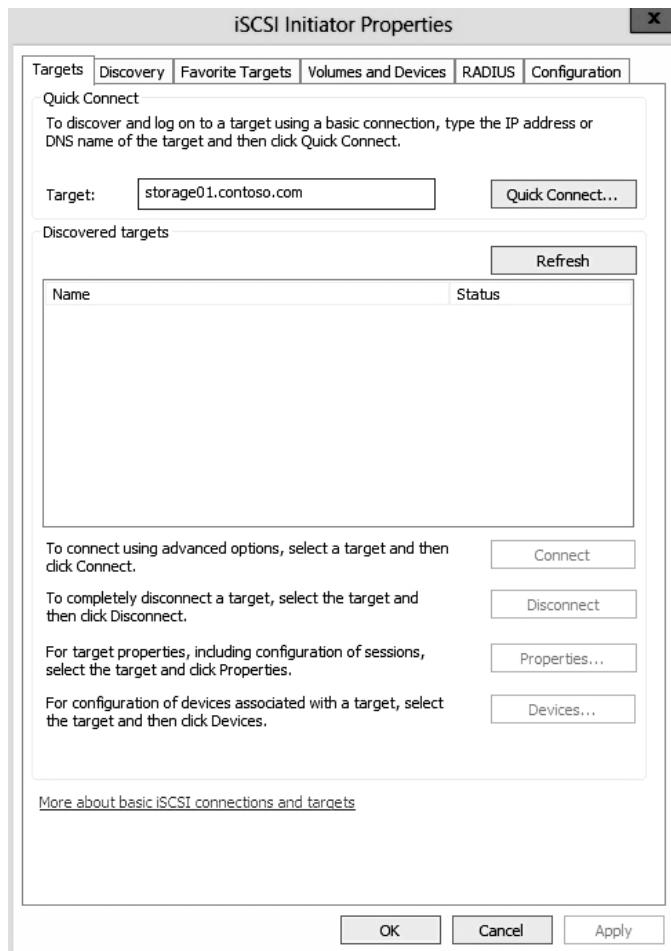


Figure 2-1
Using the Quick Connect

Question 1	<i>What is the iqn of the target?</i>
-----------------------	---------------------------------------

5. To close the Quick Connect dialog box, click **Done**.
6. Click **OK** to close to the iSCSI Initiator Properties dialog box.
7. Using Server Manager, open the **Tools** menu and click **Computer Management**.
8. When the Computer Management console opens, under the **Storage** node, click **Disk Management**.

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Question 2

How many unknown disks do you see?

9. Right-click **Disk 1**, and click **Online**, as shown in figure 2-2.

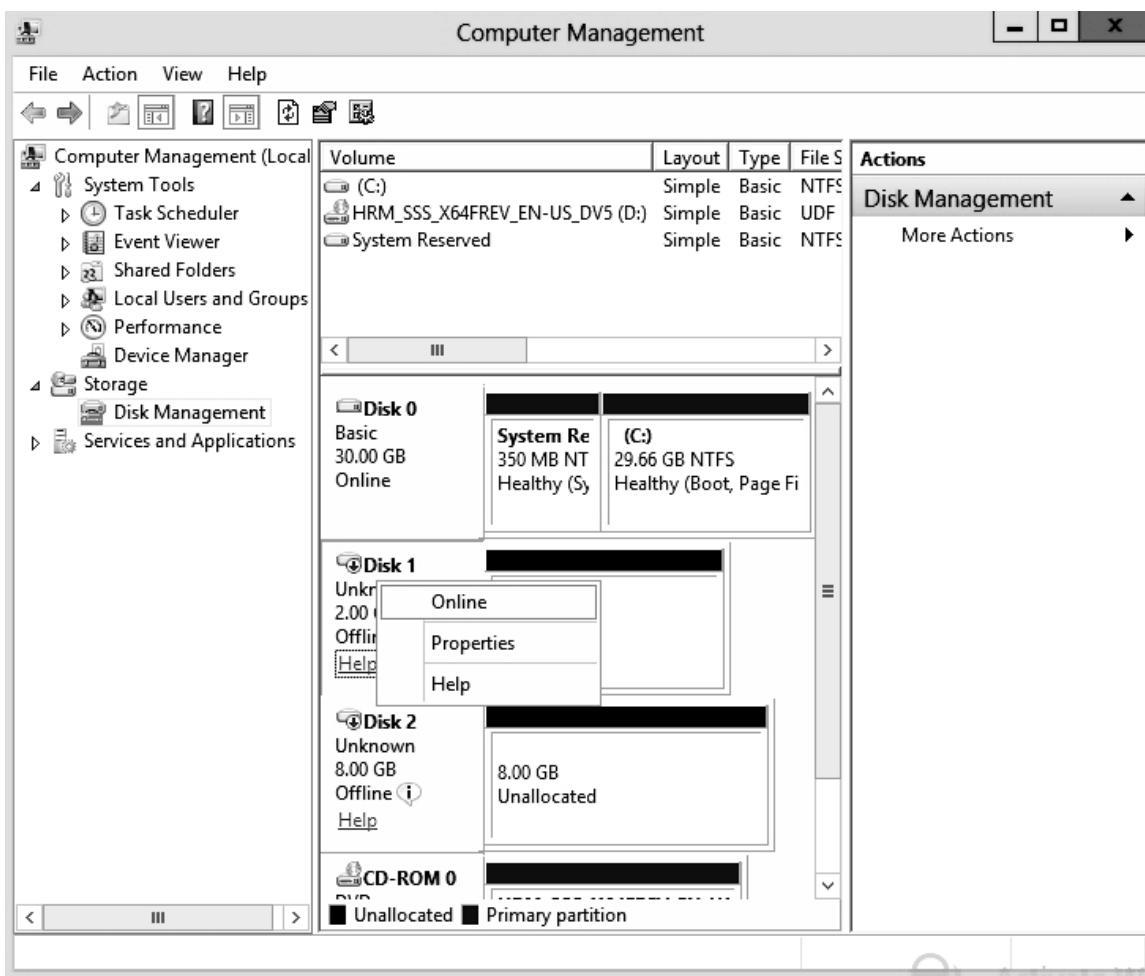


Figure 2-2
Initializing a Disk

10. Right-click the **Disk 1**, and click **Initialize Disk**.
11. When the Initialize Disk dialog box opens, click **OK**.
12. Right-click the unallocated volume on Disk 1, and click **New Simple Volume...**
13. When the New Simple Volume Wizard opens, click **Next**.
14. On the Specify Volume Size page, click **Next**.
15. On the Assign Drive Letter or Path page, click **Next**.

16. On the Format Partition, change the Volume Label to **SharedDisk**. Click **Next**.
17. When the new Simple Volume Wizard completes, click **Finish**.
18. Right-click the **Disk 2**, and click **Online**.
19. Right-click the **Disk 2**, and click **Initialize Disk**.
20. When the Initialize Disk dialog box opens, click **OK**.
21. Right-click the unallocated volume on Disk 2, and click **New Simple Volume...**
22. When the New Simple Volume Wizard opens, click **Next**.
23. On the Specify Volume Size page, click **Next**.
24. On the Assign Drive Letter or Path page, click **Next**.
25. On the Format Partition, change the Volume Label to **QuorumDisk**. Click **Next**.
26. When the wizard is done, click **Finish**.
27. Take a screen shot of Computer Management by pressing Alt+Prt Scr and then paste it into your Lab 2 worksheet file in the page provided by pressing Ctrl+V.
28. Close **Computer Management**. If you have any dialog boxes to format a disk, click **Cancel**.
29. Log into Server02 as **contoso\administrator** with the password of **Password01**. Server Manager opens.
30. With Server Manager, open the **Tools** menu and click **iSCSI Initiator**.
31. When it says that the Microsoft iSCSI service is not running, click **Yes**.
32. When the iSCSI Initiator Properties dialog box opens, type **storage01.contoso.com** and click **Quick Connect**.
33. On the Quick Connect dialog box, click **Done**.
34. Click the **Volumes and Devices** tab.
35. Click Auto Configure button.
36. Click **OK** to close to the iSCSI Initiator Properties dialog box.

End of exercise. You can leave the Server Manager open for the next exercise.

Exercise 2.2 Installing the Failover Clustering Feature

Overview

Before you can create a failover cluster, you must first install the Failover Clustering feature.

Completion time

15 minutes

1. On Server01, using the **Server Manager** console, open the **Manage** menu and click **Add Roles and Features**.
2. When the Add Roles and Features Wizard starts, click **Next**.
3. On the Select installation type page, click **Next**.
4. On the Select destination server page, click **Next**.
5. On the Select server roles page, click **Next**.
6. On the Select features page, click to select the **Failover Clustering**. When it asks you to add features required for NLB. Click **Add Features** and click **Next**.
7. On the Select features page, click **Next**.
8. On the Confirm installation selections page, click **Install**.
9. When the installation is complete, click **Close**.
10. Using the same procedure that you used for Server01, install the Failover Clustering feature on Server02.

End of exercise. You can leave the Server Manager open for the next exercise.

Exercise 2.3 Creating a Failover Cluster

Overview

During this exercise, you will create a failover cluster using two virtual machines running Windows Server 2012.

Completion time

25 minutes

Mindset Question: **What are the requirements to create a failover cluster using two servers?**

1. On Server01, right-click the **Network Status** icon on the Taskbar, and click **Open Network and Sharing Center**.
2. When the Network and Sharing Center dialog box open, click **Ethernet 2**.

3. When the Ethernet 2 Status dialog box opens, click **Properties**.
4. Scroll down and double-click **Internet Protocol Version 4 (TCP/IPv4)**.
5. Configure the following and click **OK**:

IP address: 192.168.5.1

Subnet Mask: 255.255.255.0

6. Click **OK** to close Ethernet 2 Properties.
7. Click **Close** to close Ethernet 2 Status.
8. Close **Network and Sharing Center**.
9. On Server02, right-click the Network Status icon, and click Open **Network and Sharing Center**.
10. When the Network and Sharing Center opens, click **Ethernet 2**.
11. When the Ethernet 2 Status dialog box opens, click **Properties**.
12. Scroll down and double-click **Internet Protocol Version 4 (TCP/IPv4)**.
13. Configuring the following and click **OK**:

IP address: 192.168.5.2
Subnet Mask: 255.255.255.0
14. Click **OK** to close Ethernet 2 Properties.
15. Click **Close** to close Ethernet 2 Status.
16. Close **Network and Sharing Center**.
17. On Server01, using **Server Manager**, open the **Tools** menu, and click **Failover Cluster Manager**. The Failover Cluster Manager console opens, as shown in figure 2-3.

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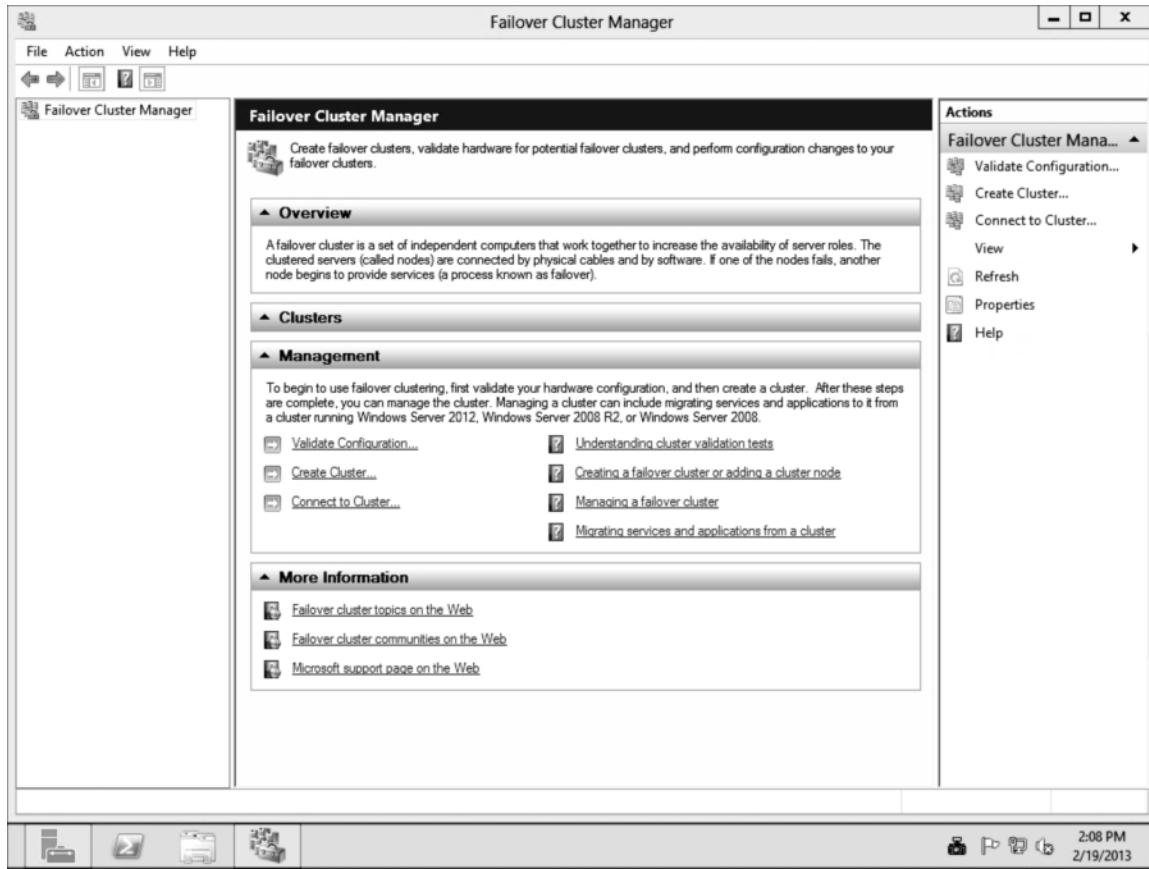


Figure 2-3
Opening the Failover Cluster Manager console

18. In the Actions pane, click **Validate Configuration**.
19. When the Validate a Configuration Wizard opens, click **Next**.
20. On the Select Servers or a Cluster page (as shown in figure 2-4), type **Server01** in the Enter name text box. Click **Add**.

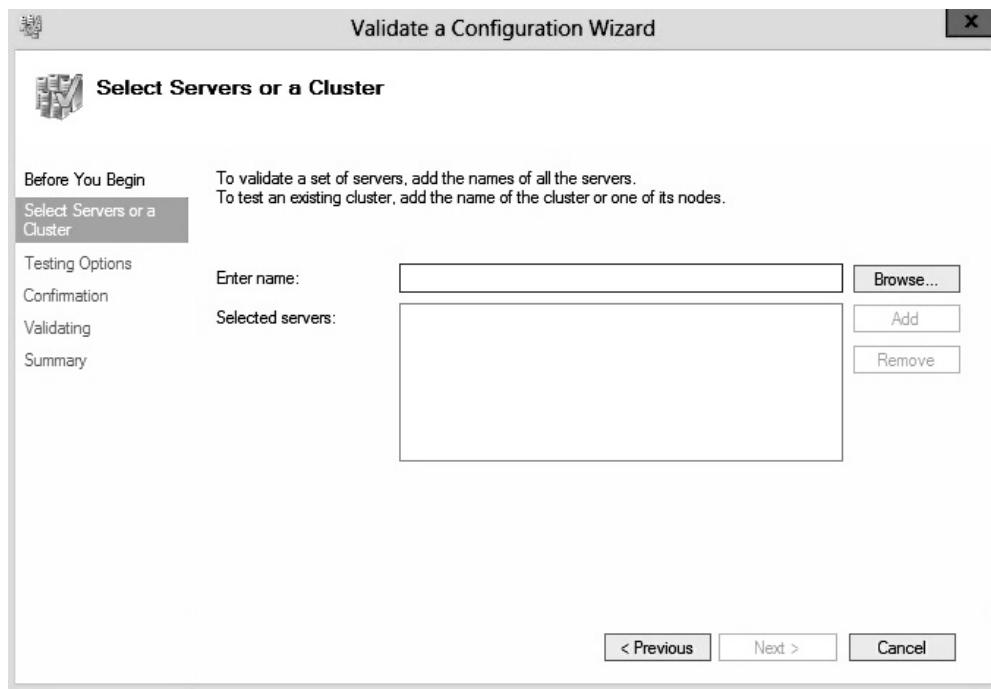


Figure 2-4
Adding cluster nodes

21. Type **Server02** in the Enter name text box. Click **Add**. Click **Next**.
22. On the Testing Options page, **Run all tests (recommended)** is already selected. Click **Next**.
23. On the Confirmation page, click **Next**.
24. When the Summary is done, scroll through to verify that everything passed.

NOTE

You will get two warnings: Validate IP Configuration and Validate network. This is caused by not having a usable adapter with a defined default gateway.

25. Take a screen shot of the Validate a Configuration Wizard window by pressing Alt+Prt Scr and then paste it into your Lab 2 worksheet file in the page provided by pressing Ctrl+V.
26. Create the cluster now using the validated nodes already selected. Click **Finish**.
27. When the Create Cluster wizard opens, click **Next**.

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28. On the Cluster Name, type **Cluster1**. In the Address column. Uncheck the check box next to 192.168.5.0/24.
29. Next to 192.168.1.0/24, click **Click here to type an address**, and type **192.168.1.52** and click **Next**, as shown in figure 2-5.

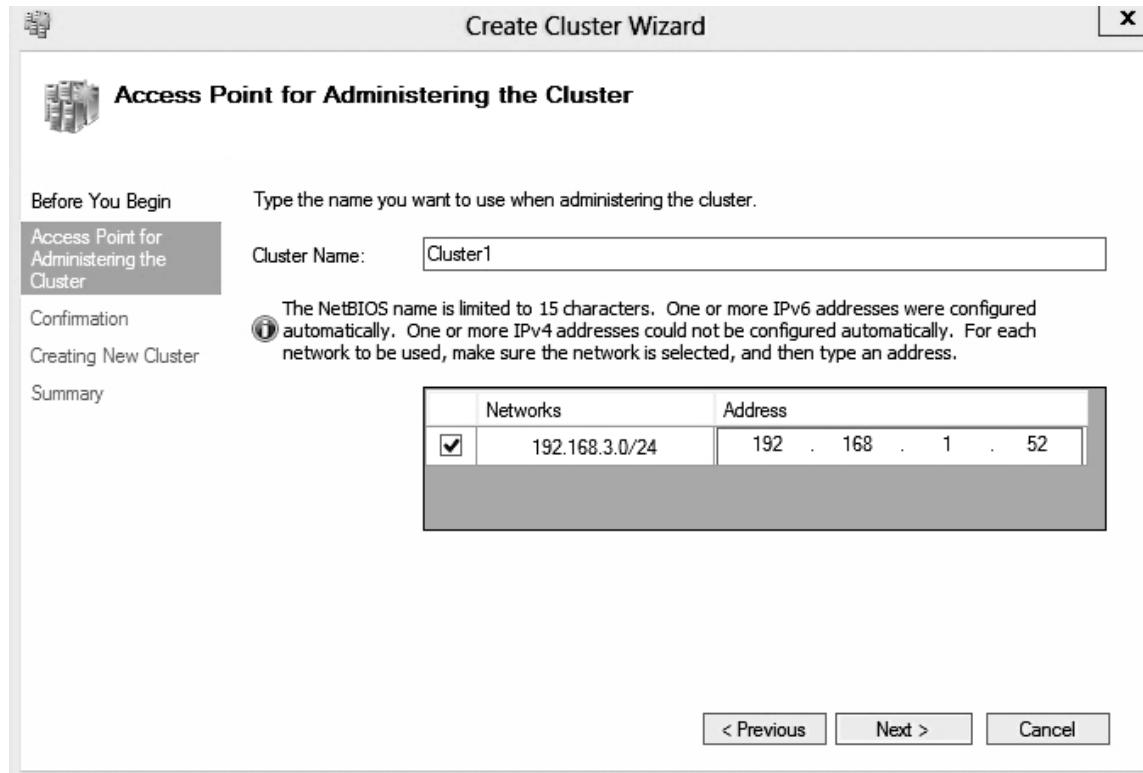


Figure 2-5
Specifying the cluster address

30. On the Confirmation page, Add all eligible storage to the cluster is already selected. Click **Next**.
31. When the wizard is completed, click **Finish**.
32. In the Failover Cluster Manager, expand **cluster1.contoso.com**.
33. Take a screen shot of the Failover Cluster Manager window by pressing Alt+Prt Scr and then paste it into your Lab 2 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. You can leave the Failover Cluster Manager open for the next exercise.

Exercise 2.4 Configuring the Quorum

Overview In this exercise, since you only have two nodes, you will create a quorum using a disk witness.

Completion time 10 minutes

Mindset Question: When would you need to have a quorum when creating a failover cluster?

1. On Server01, with Failover Cluster Manager, click the **Nodes** node. You should see Server01 and Server02.

2. Expand **Storage**, and click **Disks**.

Question 3

What disks do you have and how are the disks assigned?

3. Right-click **Cluster1.contoso.com**, click More **Actions**, and click **Configure Cluster Quorum Settings**.
4. When the Configure Cluster Quorum Wizard opens, click **Next**.
5. On the Select Quorum Configuration Option page, click **Advanced quorum configuration and witness selection** and click **Next**.
6. On the Select Voting Configuration page, click **Next**.
7. On the Configure Quorum Management page, Allow cluster to dynamically manage the assignment of node votes (recommended) is already selected. Click **Next**.

Question 4

Which configuration is recommended for our configuration?

8. On the Select Quorum Witness page, With Configure a disk witness already selected, click **Next**.
9. On the Configure Storage Witness page, The smaller shared disk (2 GB) disk (Cluster Disk 2) is already selected. If you cannot tell, expand the option. Click **Next**.
10. On the Confirmation page, click **Next**.
11. When the wizard is complete, click **Finish**.
12. Take a screen shot of the Failover Cluster Manager pressing Alt+Prt Scr and then paste it into your Lab 2 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 2.5 Implementing Cluster Aware Updating

Overview	In this exercise, you will install and enable cluster aware updating.
Completion time	20 minutes

Mindset Question: **Why is Cluster Aware Updating important to clusters?**

1. Log into Storage01 as **contoso\administrator** with the password of **Password01**.
2. On Storage01, using the Server Manager console, open the **Manage** menu and click **Add Roles and Features**.
3. When the Add Roles and Features Wizard starts, click **Next**.
4. On the Select installation type page, click **Next**.
5. On the Select destination server page, click **Next**.
6. On the Select server roles page, click **Next**.
7. On the Select features page, click to select the **Remote Server Administration Tools**. When it asks you to add features, click **Add Features**. Expand Remote Server Administration Tools, expand Feature Administration Tools, and expand Failover Cluster Tools.
8. Select **Failover Cluster Management Tools**, **Failover Cluster Module for Windows PowerShell**, **Failover Cluster Automation Server**, and **Failover Cluster Command Interface**. Click **Next**.
9. On the Web Server Role (IIS) page, click **Next**.
10. On the Select role services page, click **Next**.
11. On the Confirm installation selections page, click **Install**.
12. When the installation is complete, click **Close**.
13. On Storage01, using **Server Manager**, open the **Tools** menu and click **Cluster-Aware Updating**.
14. When the Cluster-Aware Updating dialog box opens (as shown in figure 2-6), type **cluster1**, and click **Connect**.

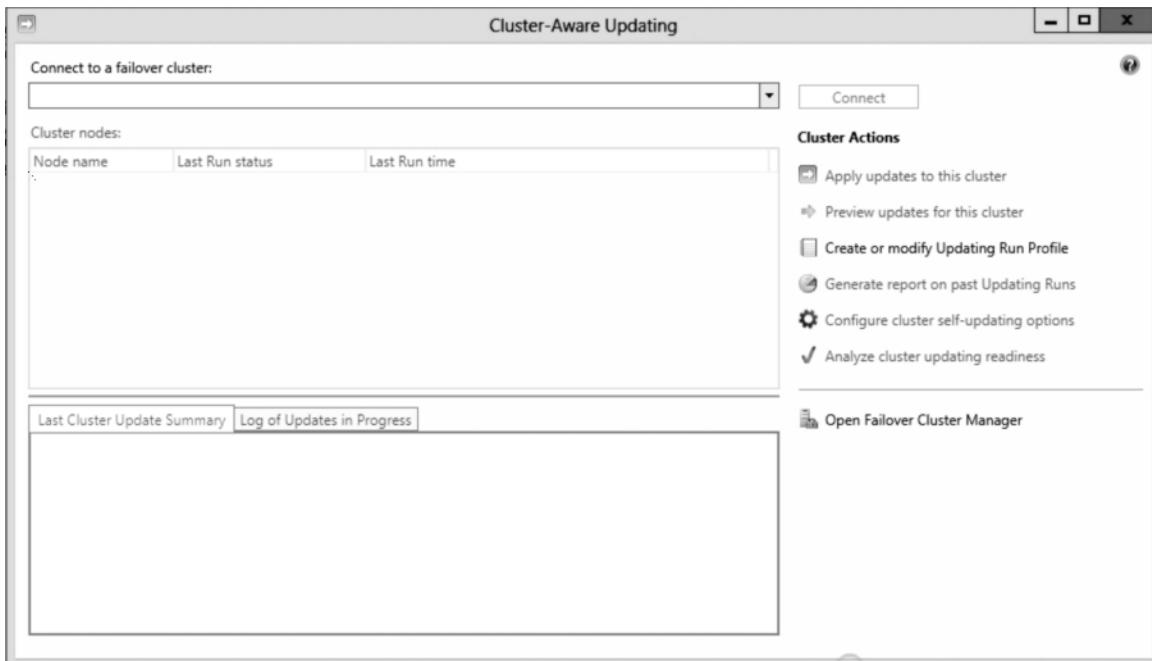


Figure 2-6
Specifying the cluster address

15. After a minute or so, click **Configure cluster self-updating options**.
16. When the Configure Self-Updating Options Wizard opens, click **Next**.
17. Select the **Add the CAU clustered role, with self-updating mode enabled, to this cluster**. click **Next**.

**Question
5**

By default, how often does it schedule updates for a cluster?

18. On the Specify self-updating schedule page, click **Next**.
19. On the Advanced Options page, click **Next**.
20. On Additional Update Options page, click **Next**.
21. On the Confirmation page, click **Apply**.
22. When the wizard is complete, click **Close**.
23. Close **Cluster-Aware Updating**.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 2.1, what was used to connect to an iSCSI target?
2. In Exercise 2.2, how is failover clustering defined in Server Manager, a role or a feature?
3. In Exercise 2.3, before creating the failover cluster, what should you do first to make sure that your servers will support the failover clustering?
4. In Exercise 2.4, why was the 2 GB volume used when configuring the quorum?
5. In Exercise 2.5, what is used to install updates to nodes in a failover cluster?
6. In Exercise 2.5, in which group of features do you find the Cluster Aware Updating?

Lab Challenge Upgrading a Failover Cluster

Overview

To complete this challenge, you will describe to perform upgrade a failover cluster writing the high-level steps of upgrading a failover cluster.

Completion time 10 minutes

You have a failover cluster running on Windows Server 2008 R2. You want to upgrade the cluster to Windows Server 2012. What method would you use to upgrade the cluster to clean servers running Windows Server 2012?

End of lab.

LAB 3

MANAGING FAILOVER

CLUSTERING

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

- Exercise 3.1** Deploying the General Use File Server Role
- Exercise 3.2** Deploying Scale-Out File Server
- Exercise 3.3** Configuring Fail-over and Preference Settings
- Exercise 3.4** Managing the Cluster
- Exercise 3.5** Destroying a Cluster
- Lab Challenge** Configuring VM Monitoring

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 3-1.

Table 3-1
Computers required for Lab 3

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02
Server (VM 4)	Windows Server 2012	Storage01

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In addition to the computers, you will also require the software listed in Table 3-2 to complete Lab 3.

Table 3-2
Software required for Lab 3

Software	Location
Lab 3 student worksheet	Lab3_worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab03_worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Deploy a General Use File Server role
- Deploy a Scale-Out File Server
- Configure failover and preferences settings.
- Manage the cluster and nodes

Estimated lab time: 90 minutes

Exercise 3.1 Deploying the General Use File Server Role	
Overview	To demonstrate using a failover cluster in this exercise, create a General Use File Server using the cluster that was created in Lab2, along with a shared iSCSI drive.
Completion time	25 minutes

Mindset Question: **What are the advantages of a General Use File Server over a Scale-Out File Server?**

1. Log into Server01 as **contoso\administrator** with the password of **Password01**. Server Manager opens.
2. On Server01, using the **Server Manager** console, open the **Manage** menu and click **Add Roles and Features**.

3. When the Add Roles and Features Wizard starts, click **Next**.
4. On the Select installation type page, click **Next**.
5. On the Select destination server page, click **Server01.contoso.com**, click **Next**.
6. On the Select server roles page, expand **File and Storage Services**, and expand **File and iSCSI Services**. Click to select **File Server**. Click **Next**.
7. On the Select features page, click **Next**.
8. On the Confirm installation selections page, click **Install**.
9. When the installation is complete, click **Close**.
10. Log in to Server02 as Contoso\administrator, using the **Server Manager** console, open the **Manage** menu, and click **Add Roles and Features**.
11. When the Add Roles and Features Wizard starts, click **Next**.
12. On the Select installation type page, click **Next**.
13. On the Select destination server page, click **Server02.contoso.com**, click **Next**.
14. On the Select server roles page, expand **File and Storage Services**, and expand **File and iSCSI Services**. Click to select **File Server**. Click **Next**.
15. On the Select features page, click **Next**.
16. On the Confirm installation selections page, click **Install**.
17. When the installation is complete, click **Close**.
18. On Server01, using **Server Manager**, click **Tools**, and click **Failover Cluster Manager**. The Failover Cluster Manager opens.
19. On the Failover Cluster Manager, expand **Cluster1.contoso.com** and, right-click **Roles** and click **Configure Role**.
20. When the High Availability Wizard opens, click **Next**.
21. On the Select Role page (as shown in figure 3-1), click **File Server** and then click **Next**.

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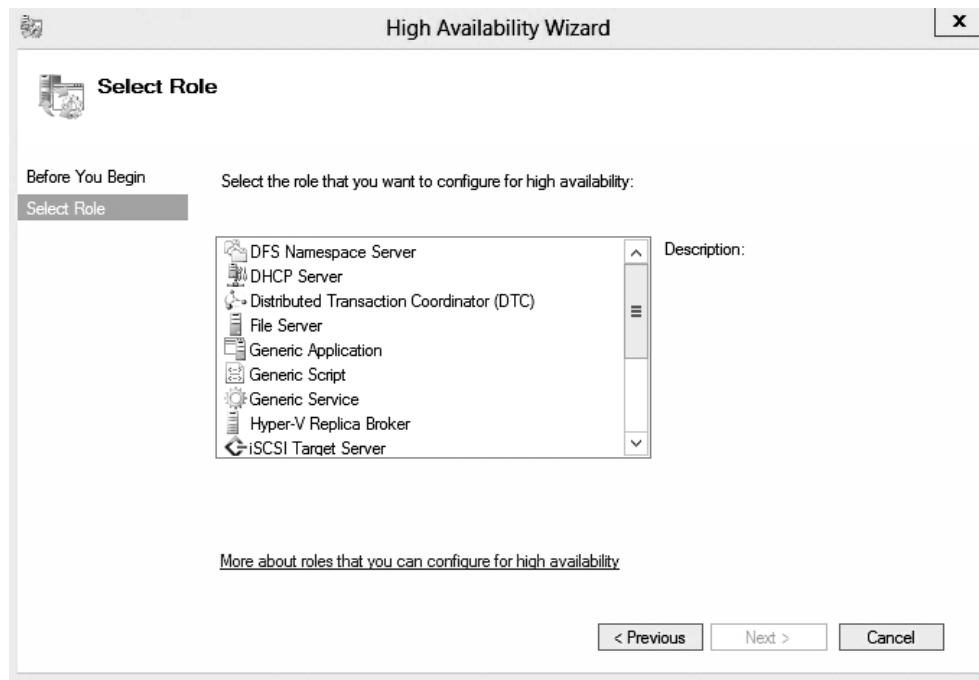


Figure 3-1
Selecting a role for the failover cluster

22. On the File Server Type page, click **File Server for general use**, and then click **Next**.
23. On the Client Access Point page, type **FileServer** in the Name text box. Next, type **192.168.1.63** in the Address column (as shown in figure 3-2). Click **Next**.

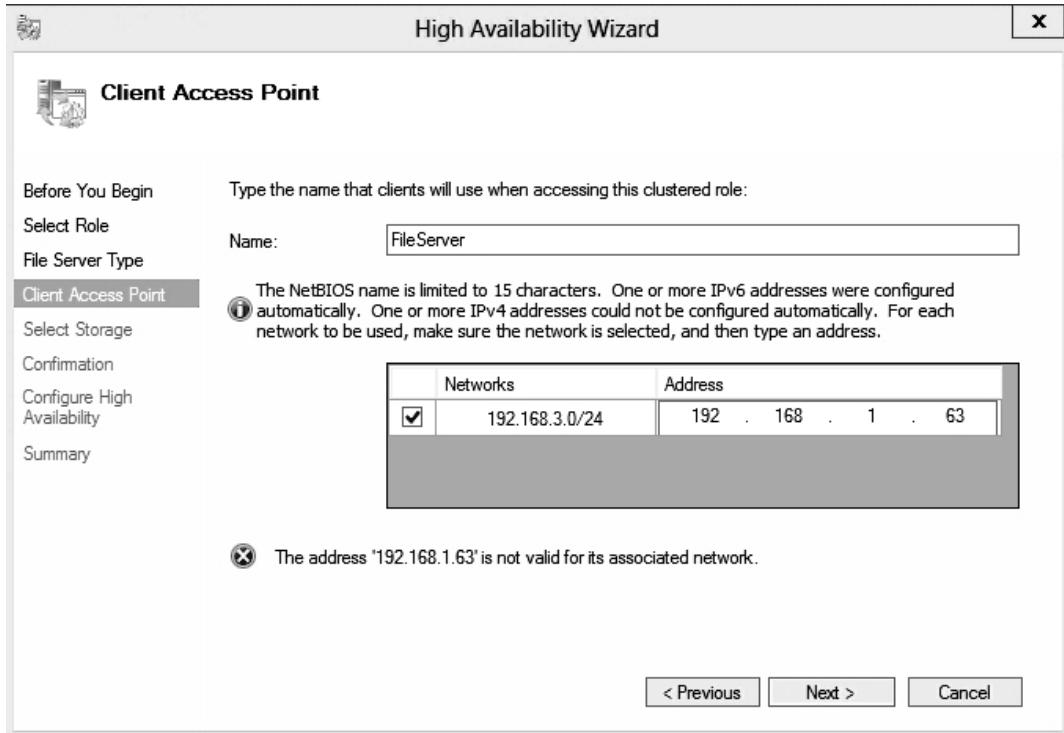


Figure 3-2
Selecting a role for the failover cluster

24. On the Select Storage page (as shown in figure 3-3), click to select the **Cluster Disk 2**, and click **Next**.

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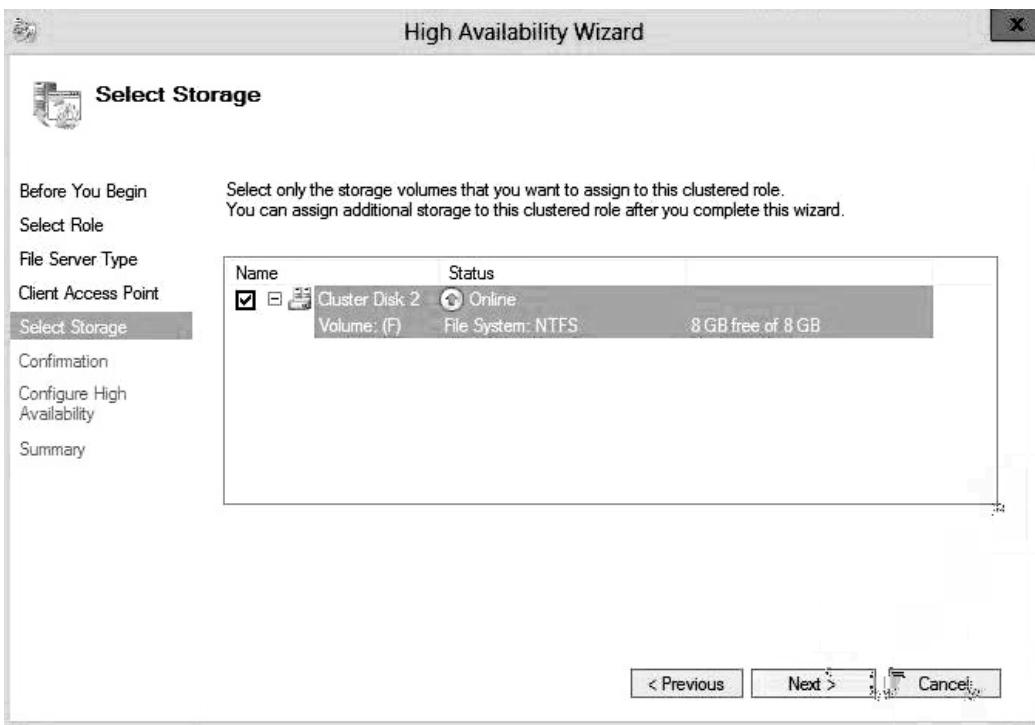


Figure 3-3
Selecting Storage to use for the file server role

25. On the Confirmation page, click **Next**.
26. On the Summary page, click **Finish**.
27. In the Failover Cluster Manager, click **Roles**, if it is not already selected or highlighted.
28. Take a screen shot of the Failover Cluster Manager by pressing Alt+Prt Scr and then paste it into your Lab 3 worksheet file in the page provided by pressing Ctrl+V.
29. Click **Cluster1.contoso.com**. If the Current Host Server is Server02, right-click **Cluster1.contoso.com**, click **More Actions**, click **Move Core Cluster Resources**, and click **Select Node**. When the Move Cluster Resources dialog box opens, click **Server01**, and click **OK**.
30. Click the **Roles** node. If the Owner node is Server02, right-click File Server, click **Move**, and click **Select Node**. When the Move Clustered Role dialog box opens, click **Server01**, and click **OK**.
31. Wait two minutes to allow time for the DNS entry to be created for FileServer.
32. To create a file share, right-click the **File Server** role, and click **Add File Share** (as shown in figure 3-4). If you get a Client Access Point is not ready to be used for share creation error message, the DNS entry for FileServer has not been created. Click **OK**, wait a couple of minutes, and try again.

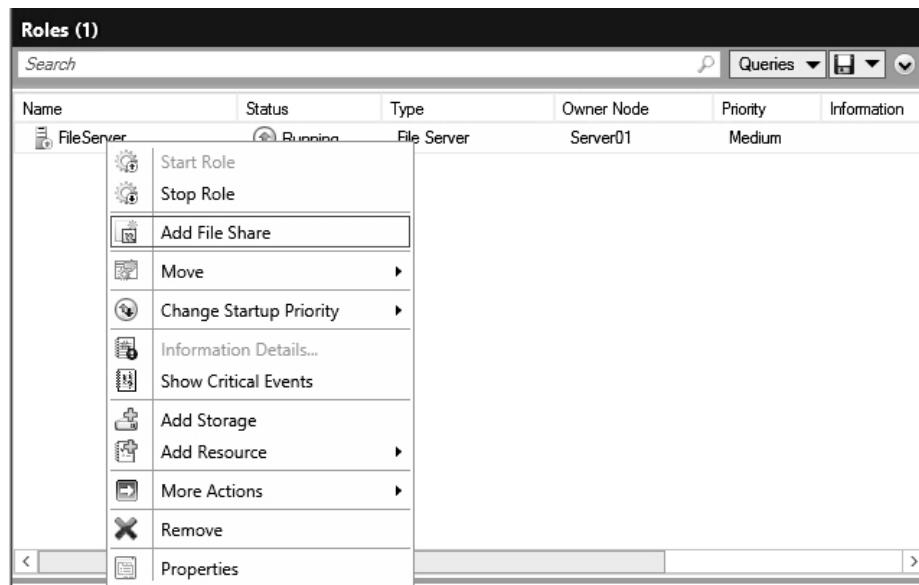


Figure 3-4
Creating a file share

33. When the New Share Wizard opens, click **SMB Share-Quick** and click **Next** (see figure 3-5).

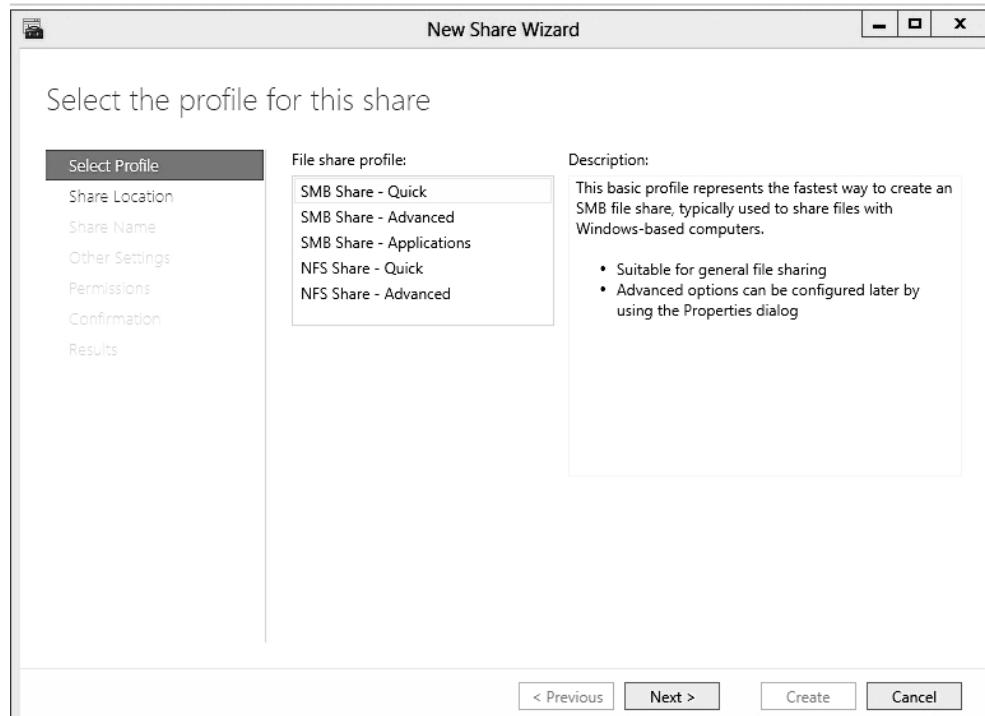


Figure 3-5
Selecting the profile for the share

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34. On the Share Location page, be sure that the File Server cluster role is selected. Then with the Type a custom path selected, type **f:\data** in the text box, as shown in figure 3-6. Click **Next**.

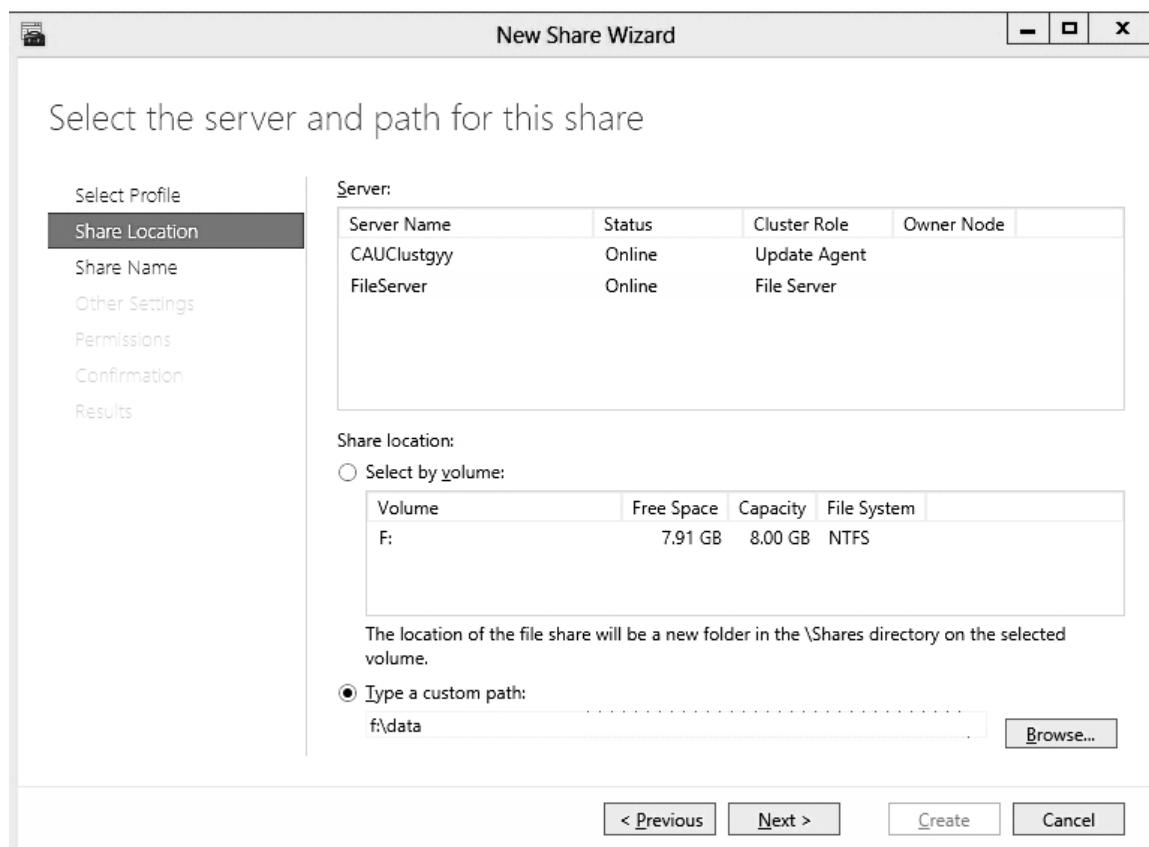


Figure 3-6
Specifying the share location

35. On the Share Name page, the Share name is already set to data. Click **Next**. When it says the local path you entered does not exist, click **OK**.
36. On the Other settings page, as shown in figure 3-7, select **Enable access-based enumeration** and click **Next**.

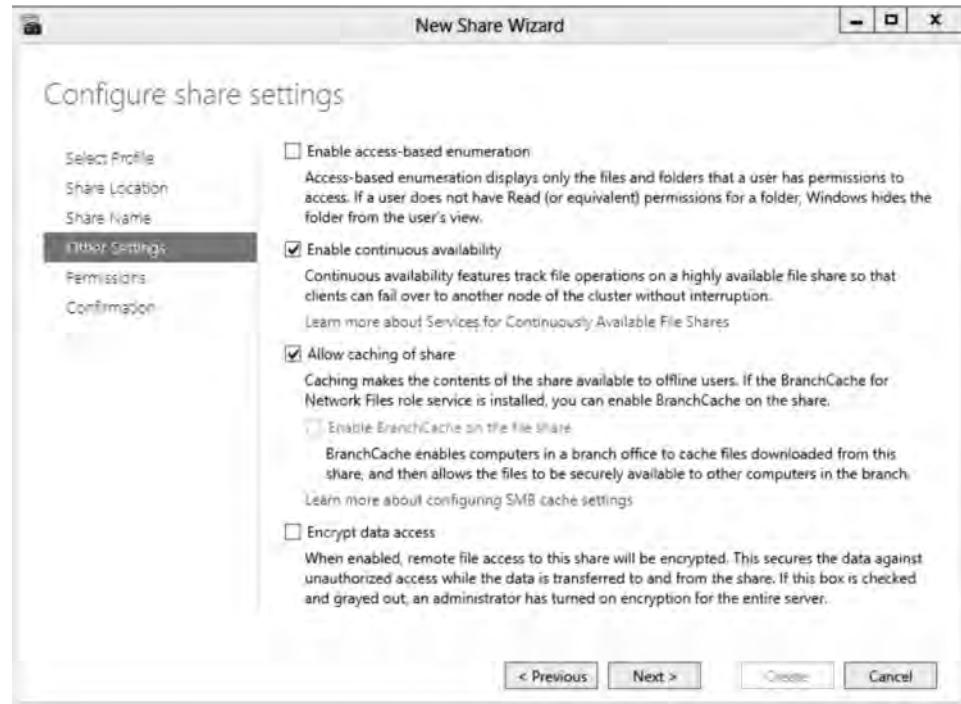


Figure 3-7
Configure share settings

Question 1	<i>What does access-based enumeration do?</i>
-------------------	---

37. On the Permissions page, view the current permissions. When done, click **Next**.
38. On the Confirmation page, click **Create**.
39. When the installation is complete, click **Close**.
40. With the FileServer role selected, click the **Resources** tab at the bottom of the console.
41. Take a screen shot of the Failover Cluster Manager by pressing Alt+Prt Scr and then paste it into your Lab 3 worksheet file in the page provided by pressing Ctrl+V.
42. Click the **Shares** tab.
43. Take a screen shot of the Failover Cluster Manager by pressing Alt+Prt Scr and then paste it into your Lab 3 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. You can leave the Failover Cluster Manager open for the next exercise.

Exercise 3.2 Deploying Scale-Out File Server

Overview	During this exercise, remove the General Use File Server and install a Scale-Out File Server.
----------	---

Completion time	20 minutes
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Mindset Question: How does a Scale-Out File Server differ from a General Use File Server?

1. On Server01, using Failover Cluster Manager, right-click the **FileServer** role, and click **Remove**. When it asks if you are sure, click **Yes**.
2. Expand the **Storage** node, and click **Disks**. Right-click **Cluster Disk 2 (Available Storage)**, and click Add to **Cluster Shared Volumes**. Notice that it is now assigned to Cluster Shared Volume.
3. Right-click **Roles** and click **Configure Role**.
4. When the High Availability Wizard opens, click **Next**.
5. On the Select Role page, click **File Server** and click **Next**.
6. On the File Server Type page, click **Scale-Out File Server for application data**, and click **Next**.
7. On the Client Access Point page, type **FileServer** in the Name text box. Click **Next**.
8. On the Confirmation page, click **Next**.
9. On the Summary page, click **Finish**.
10. Wait two minutes so that DNS entries have time to be created.
11. Click the **Roles** node. If the Owner node is Server02, right-click **File Server**, click **Move**, and click **Select Node**. When the Move Clustered Role dialog box opens, click **Server01**, and click **OK**.
12. Click **Roles**. Right-click the **FileServer** role, and click **Add File Share**. If you get a *Client Access Point is not ready to be used for share creation* error message, the DNS entry for FileServer has not been created. Click **OK**, wait a couple of minutes, and try again.
13. When the New Share Wizard opens, click **SMB Share – Quick**, and then click **Next**.
14. On the Share Location page, click the **FileServer**, and note that **Select by volume: C:\ClusterStorage\Volume1** is already selected. Click **Next**.
15. On the Share Name page, type **Data** in the Share name text box, and click **Next**.

16. On the Other Settings page, click to select **Enable access-based enumeration**, and then click **Next**.
17. On the Permissions page, click **Next**.
18. On the Confirm selections page, click **Create**.
19. When the installation is complete, click **Close**.
20. With the **FileServer** highlighted, click the **Shares** tab at the bottom of Failover Cluster Manager.
21. Take a screen shot of the Failover Cluster Manager by pressing Alt+Prt Scr and then paste it into your Lab 3 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. You can leave the Failover Cluster Manager open for the next exercise.

Exercise 3.3 Configure Fail-over and Preference Settings

Overview	During this exercise, you will configure how the failover cluster will respond to failover and how it recovers from failover.
Completion time	10 minutes

1. On Server01, using Failover Cluster Manager, click **Roles**.
2. Right-click the **FileServer** role, and click **Properties**. The Properties dialog box opens, as shown in figure 3-8.

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Figure 3-8
Configure share settings

3. On the General tab, to make the Server01 the preferred owner, click to select **Server01**.
4. Click the **Failover** tab.

**Question
2**

What is the maximum failures in the specified period, and what is the period:

**Question
3**

Is the cluster allowed to failback to a preferred owner, if the preferred owner is restored?

5. Click **OK** to close the Properties dialog box.
6. Right-click the **FileServer** role again, and click **Properties**.
7. On the General tab, uncheck **Server01** as the preferred owner.
8. Click **OK** to close the Properties dialog box.

End of exercise. You can leave the Failover Cluster Manager open for the next exercise.

Exercise 3.4 Managing the Cluster**Overview**

During this exercise, you will manage the cluster and cluster nodes.

Completion time

15 minutes

1. On Server01, using Failover Cluster Manager, click **Cluster1.contoso.com**

**Question
4**

Which is the current host server?

2. Right-click **Cluster1.contoso.com**, and click **More Actions**, click **Move Core Cluster Resources**, and click **Select Node**.
3. When the Move Cluster Resources dialog box opens, Server02 is already selected. Click **OK**.

**Question
5**

Which is the current destination node?

4. Click **Roles**.

**Question
6**

Which is the owner for the FileServer role?

5. Take a screen shot of the Failover Cluster Manager by pressing Alt+Prt Scr and then paste it into your Lab 3 worksheet file in the page provided by pressing Ctrl+V.
6. Right-click the **FileServer** role, and click **Move**, and click **Select Node**.
7. Click **Server02**, and click **OK**.

**Question
7**

Which is the owner for the FileServer role?

8. Reboot Server02.
9. Watch the **Failover Cluster Manager** on **Server01** and see how it responds. Wait until Server02 finishes rebooting.

**Question
8**

Which is the owner for the FileServer role after Server02 comes back?

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10. To gracefully shut down Server01, right-click the **Server01** under the Nodes node, and click **Pause**, and click **Drain Roles**. Observe that Server02 replaces Server01 as the Owner Node.
11. Right-click **Server01**, and click **Resume**, and click **Fail Roles Back**. Observe that Server01 regains Owner Node status.

End of exercise. You can leave the Failover Cluster Manager open for the next exercise.

Exercise 3.5 Destroying a Cluster

Overview	During this exercise, you will manage the cluster and cluster nodes.
Completion time	10 minutes

1. On Server01, using the Failover Cluster Manager, expand **Cluster1.contoso.com**, and click **Roles**.
2. Right-click the **FileServer** role, and click **Remove**. When you are asked if you are sure, click **Yes**.
3. Right-click **Cluster1.contoso.com**, click **More Actions** and click **Destroy Cluster**. When you are asked if you want to permanently destroy the cluster, click **Yes**.
4. Close Failover Cluster Manager.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 5 minutes

1. In Exercise 3.1, what console did you use to create the File Server for the cluster?
2. In Exercise 3.3, how did you configure the preferred owner?
3. In Exercise 3.3, what tab would you use to specify that fallback to occur only at night?
4. In Exercise 3.4, what option did you click to drain the roles?
5. In Exercise 3.5, what had to be removed first before you could destroy the cluster?

Lab Challenge**Configuring VM Monitoring****Overview**

To complete this challenge, you will describe how to configure monitoring of a failover cluster that is running within Hyper-V.

Completion time

5 minutes

You have created a failover using two VMs on a host running Hyper-V. How would you configure monitoring of the failover cluster?

End of lab.

LAB 4

MANAGING VM

MOVEMENT

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

- Exercise 4.1** Moving a VM Storage Location
- Exercise 4.2** Moving a VM to Another Host
- Exercise 4.3** Copying a VM
- Exercise 4.4** Exporting and Importing a VM
- Lab Challenge** Configuring Computers for Live Migration

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 4-1.

Table 4-1
Computers required for Lab 4

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02

In addition to the computers, you will also require the software listed in Table 4-2 to complete Lab 4.

Table 4-2

Software required for Lab 4

Software	Location
Lab 4 student worksheet	Lab4_worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab04_worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Move a virtual machine file to a different location.
- Move a virtual machine to another host.
- Make a copy of a virtual machine
- Export and import a virtual machine

Estimated lab time: 65 minutes

Exercise 4.1 Moving a VM Storage Location

Overview

In this exercise, you will use the Hyper-V console to create a virtual machine, and move the storage location of a virtual machine to another storage location.

Completion time 20 minutes

Mindset Question: **Hyper-V supports three types of migration. What are the three types of migration and when would you use each one?**

1. Log into Server02 as **contoso\administrator** with the password of **Password01**. Server Manager opens.
2. On Server02, using **Server Manager**, open the **Tools** menu, and click **Hyper-V Manager**. The Hyper-V Manager opens.
3. On Hyper-V Manager, right-click **Server02**, click **New**, and click **Virtual Machine**.
4. When the New Virtual Machine Wizard starts, click **Next**.

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5. On the Specify Name and Location, Type **TestVM**. Then click to select the Store the virtual machine in a different location. In the Location text box, type **C:\VM**, as shown in Figure 4-1. Click **Next**.

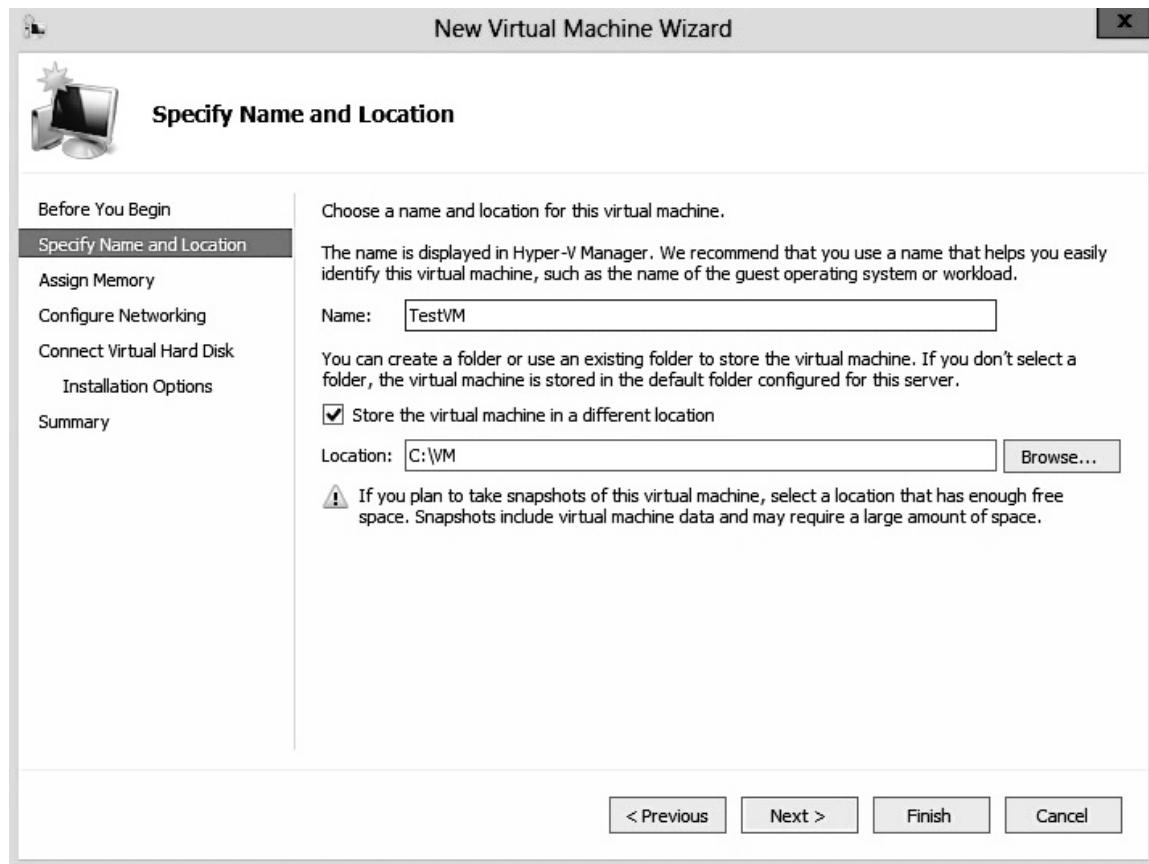


Figure 4-1
Selecting images to use

6. On the Assign Memory page, specify **256 MB** startup memory, click to select **Use Dynamic Memory for this virtual machine**. If you get an Out of Bounds message (caused by the amount of memory available), ignore the error. Click **Next**.
7. On the Configure Networking page, click **Next**.
8. On the Connect virtual hard disk page, type **TestVM.vhdx** in the Name: text box and specify **5 GB** for the size (as shown in Figure 4-2) and click **Next**.

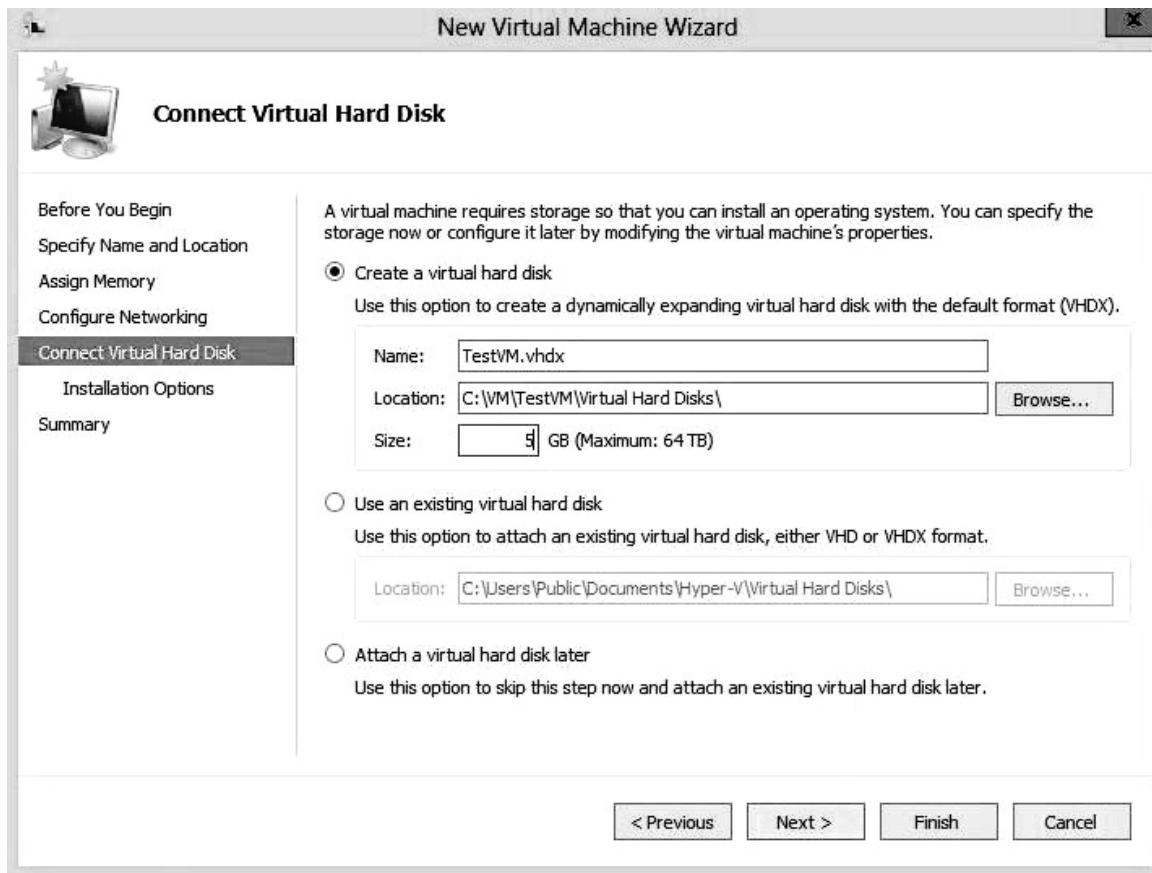


Figure 4-2
Specifying the Virtual hard disk parameters

9. On the Installation Options page, since this VM is to be used only for VM manipulation, and not to actually run Windows (virtual machines cannot run on Hyper-V that is running on a virtual machine), leave the **Install an operating system later** option selected, and click **Next**.
10. When the wizard is complete, click **Finish**.
11. In the Virtual machines section, click Server02, right-click **TestVM**, and click **Move**.
12. When the Move Wizard starts, click **Next**.
13. On the Choose Move Type page (as shown in figure 4-3), click **Move the virtual machine's storage** and click **Next**.

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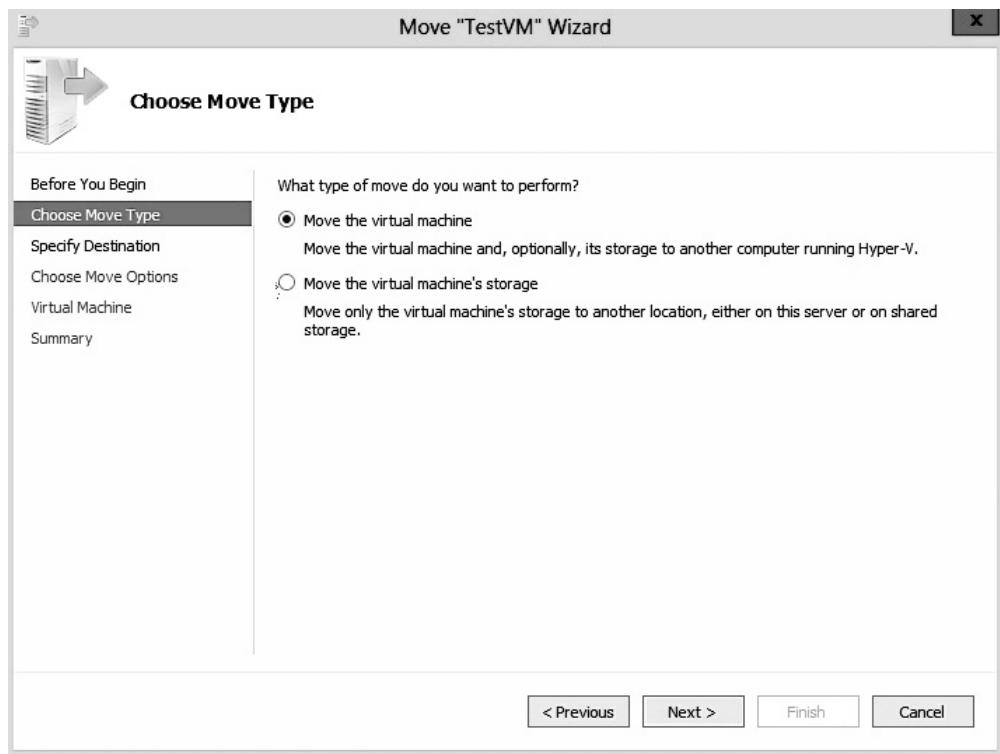


Figure 4-3
Selecting images to use

14. On the Choose Options for Moving Storage dialog wizard, Move all of the virtual machine's data to a single location is already selected. Click **Next**.
15. On the Choose a new location for virtual machine page, in the Folder page, type **C:\VM2** and click **Next**.
16. When the wizard is complete, click **Finish**.
17. Right-click the **TestVM**, and click **Settings**.
18. When the Settings for TestVM on Server02 dialog box opens, click **Hard Drive** (located under IDE Controller 0).
19. Take a screenshot showing the location of the virtual hard disk by pressing **Alt+Prt Scr** and then paste it into your Lab 4 worksheet file in the page provided by pressing **Ctrl+V**.
20. Click **OK** to close the Settings for TestVM on Server02 dialog box.

End of exercise. Leave the Hyper-V Manager open for the next exercise.

Exercise 4.2 Move a VM to Another Host

Overview In this exercise, you will use the storage migration to move a VM to a second Hyper-V host.

Completion time 15 minutes

1. On Server02, using Hyper-V Manager, right-click **Server02**, and click **Hyper-V Settings**.
2. When the Hyper-V Settings dialog box opens, in the server section, click **Live Migrations**.
3. In the Incoming live migrations, select **Use any available network for live migration**.
4. Click **OK** to close the Hyper-V Settings dialog box.
5. Log into Server01 as **contoso\administrator** with the password of **Password01**. Server Manager opens.
6. Using Server01, open **Hyper-V Manager** from the **Tools** menu.
7. Using Hyper-V Manager, right-click **Server01**, and click **Hyper-V Settings**.
8. When the Hyper-V Settings dialog box opens, in the server section, click **Live Migrations**.
9. In the Incoming live migrations, select **Use any available network for live migration**.
10. Click **OK** to close the Hyper-V Settings dialog box.
11. On Server02, In the Virtual machines section, right-click **TestVM**, and click **Move**.
12. When the Move Wizard starts, click **Next**.
13. On the Choose Move Type page opens, the Move the virtual machine is already selected. Click **Next**.
14. On the Specify Destination Computer page, type **Server01** in the Name text box and click **Next**.

**Question
1**

What is the most important thing that you have to check when moving a VM to another host?

15. On the Chose Move Options page, Move the virtual machine's data to a single location is already selected. Click **Next**.
16. On the Choose a new location for virtual machine, and type **C:\VM** in the Folder text box and click **Next**.

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17. When the wizard is complete, click **Finish**.
18. On Server01, using **Hyper-V Manager**, click **Server01**. TestVM should appear in the Virtual Machines section.

End of exercise. You can leave the Hyper-V Manager open for the next exercise.

Exercise 4.3 Copy a VM

Overview In this exercise, you will export and import a virtual machine using Hyper-V.

Completion time 10 minutes

Mindset Question:

You are working with another partner company, which created a virtual machine running Windows Server 2012, which has several customized programs and services that you would like to implement at your company. Instead of going through the actual installation and configuration, you would like to implement a copy of the VM on your Hyper-V Host. What should you do?

1. On Server01, using **Hyper-V Manager**, right-click **TestVM**, and click **Export**.
2. When the Export Virtual Machine dialog box opens (as shown in figure 4-4), type **C:\BAK** and click **Export**.

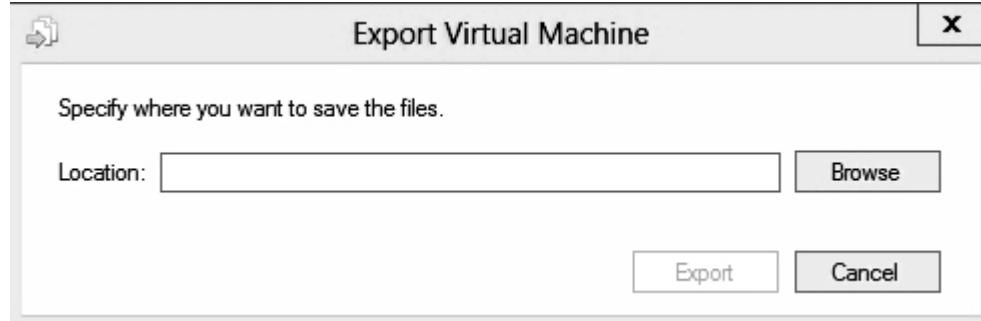


Figure 4-4
Specifying location to save the virtual machine

3. Right-click **Server01**, and click **Import Virtual Machine**.
4. When the Import Virtual Machine wizard starts, click **Next**.
5. On the Location Folder page, type **C:\Bak\TestVM** in the Folder text box and click **Next**.

6. On the Select Virtual Machine page (as shown in figure 4-5), the **TestVM** is already selected. Click **Next**.

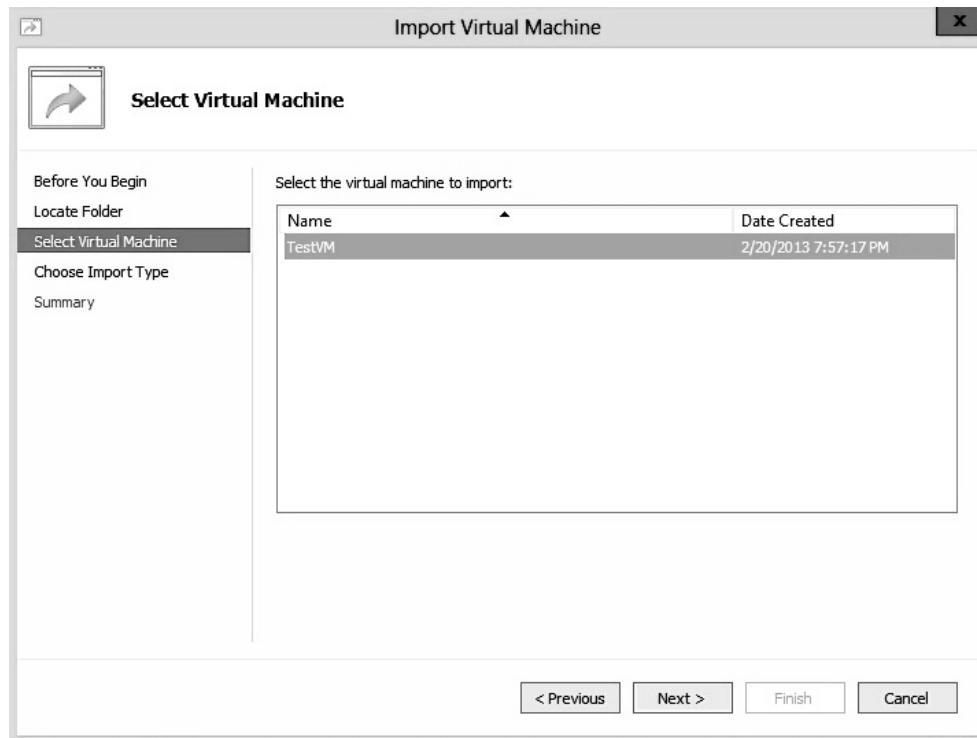


Figure 4-5
Selecting the VM to import

7. On the Choose Import Type page (as shown in figure 4-6), click **Copy the virtual machine (create a new unique ID)**, and click **Next**.

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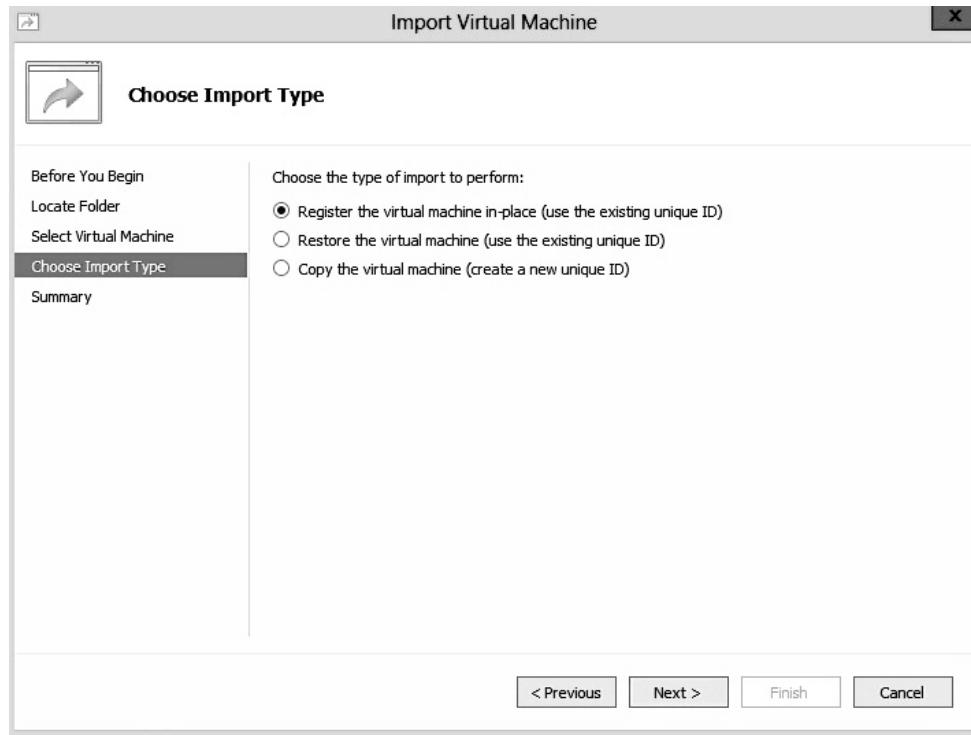


Figure 4-6
Selecting the Import type

**Question
2**

Which option would you use if you want to import a VM multiple times?

8. On the Choose Folders for Virtual Machine Files page (as shown in figure 4-7), click to select the **Store the virtual machine in a different location**. In the Virtual machine configuration folder text box, Snapshot store text box, and Smart Paging folder textbox, type **C:\VM2**, and click **Next**.

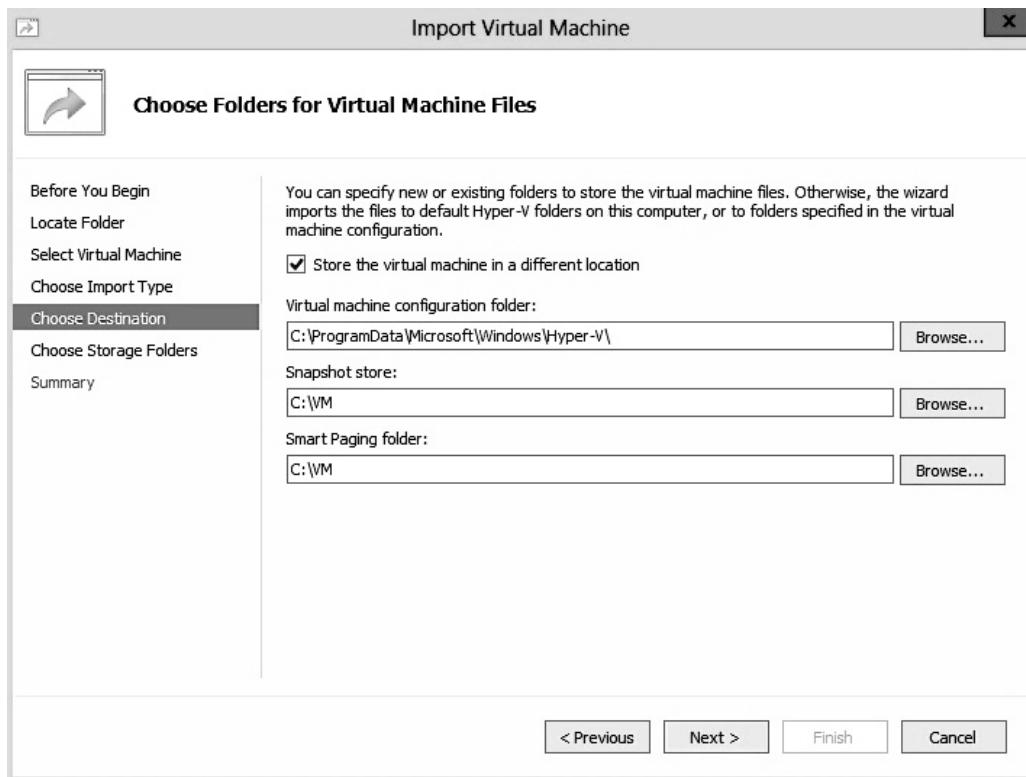


Figure 4-7
Specifying where to save the new VM

9. On the Choose Folders to Store Virtual Hard Disk page, type **C:\VM2** in the Location text box, and click **Next**.
10. On the Completing Import Wizard, click **Finish**.
11. Take a screenshot showing Hyper-V Manager with both virtual machines TestVM by pressing Alt+Prt Scr and then paste it into your Lab 4 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 5 minutes

1. In Exercise 4.1, which migration option did you use when you had to move a VM from one drive to another drive?

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2. In Exercise 4.3, which option is used to take an existing set of VM files and recreate the exact same VM?
3. In Exercise 4.3, which option is used when importing a virtual machine that just allows Hyper-V to bring in the virtual machine as is?

Lab Challenge		Configuring Computers for Live Migration
Overview	To complete this challenge, you will explain how to configure computers for live migration by writing the necessary high-level steps.	
Completion time	15 minutes	

You have two Hyper-V hosts that are clustered together. How would you configure the source and destination computers for live migration?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 5

CONFIGURING

ADVANCED FILE

SOLUTIONS

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

- Exercise 5.1** Creating an NFS Shared Folder
- Exercise 5.2** Installing and Configuring BranchCache
- Exercise 5.3** Using File Classification
- Exercise 5.4** Configuring File Access Auditing
- Lab Challenge** Creating an NFS Shared Folder on a Cluster

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 5-1.

Table 5-1
Computers required for Lab 5

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02

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In addition to the computers, you will also require the software listed in Table 5-2 to complete Lab 5.

Table 5-2
Software required for Lab 5

Software	Location
Lab 5 student worksheet	Lab5_worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab05_worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Create an NFS shared folder.
- Enable and configure BranchCache.
- Configure file classification using File Server Resource Manager.
- Enable and configure file access auditing

Estimated lab time: 110 minutes

Exercise 5.1 Creating an NFS Shared Folder

Overview	In this exercise, install the Sever for NFS role. You will then share a folder so that it can be used by NFS clients.
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Completion time	20 minutes
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Mindset Question: **How does NFS differ from SMB?**

1. Log into Server01 as **contoso\administrator** with the password of **Password01**.
2. When Server Manager opens, click **Manage** and click **Add Roles and Features**. The Add Roles and Feature Wizard opens.
3. On the Before you begin page, click **Next**.
4. Select Role-based or feature-based installation and then click **Next**.

5. On the Select destination server page, click **Server01.contoso.com**, and click **Next**.
6. On the Select server roles page, expand **File and Storage Services**, expand **File and iSCSI Services**, and click to select **Server for NFS**. Click **Next**.
7. When you are asked to add features required for Server for NFS, click **Add Features**. Click **Next** on the Select server roles page.
8. On the Select features page, click to select **Client for NFS** and click **Next**.
9. On the Confirm installation selections page, click **Install**.
10. When the installation is complete, click **Close**.
11. On Server01, using Server Manager, open the **Tools** menu and click **Services for Network File System (NFS)**. The Services for Network File System console opens.
12. Right-click the **Services for NFS** node and, click **Properties**. The Services for NFS Properties dialog box opens, as shown in Figure 5-1.

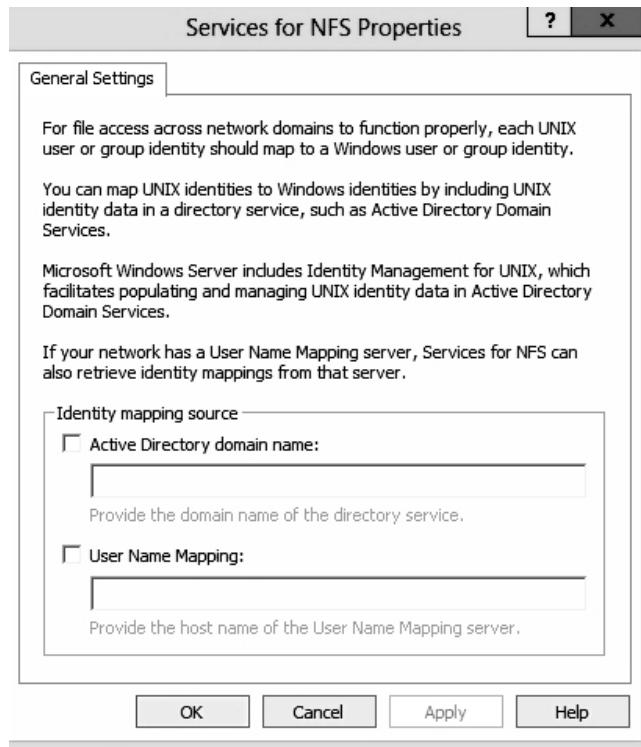


Figure 5-1
Configuring Services for NFS

13. Click to select **Active Directory domain name**. In the Active Directory domain name text box, type **contoso.com**.

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14. Click **OK** to close the Services for NFS Properties dialog box.
15. Open the File Explorer by clicking the **File Explorer** icon on the taskbar.
16. Click the Local Disk (C:) and create the **C:\Data** folder.
17. Right-click **C:\Data**, and click **Properties**. The Properties dialog box opens.
18. Click the **NFS Sharing** tab.
19. Click **Manage NFS Sharing**. The NFS Advanced Sharing dialog box appears as shown in figure 5-2.

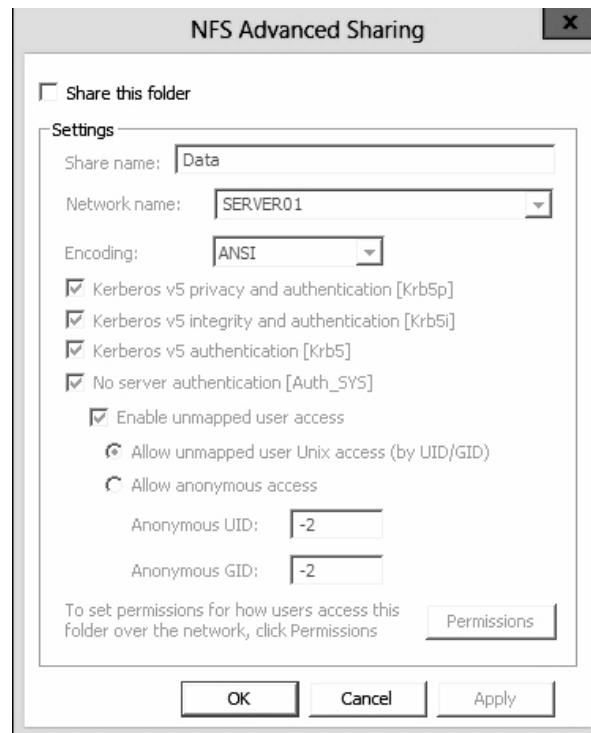


Figure 5-2
Sharing a folder for NFS

20. Select the **Share this folder** check box.
21. In the NFS Advanced Sharing dialog box, click **Permissions**. The NFS Share Permissions dialog box appears as shown in figure 5-3.

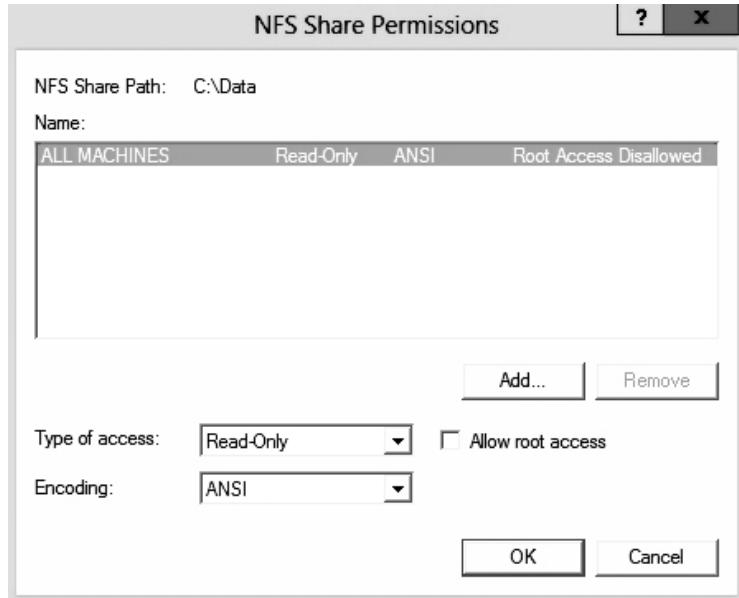


Figure 5-3
Configure NFS permissions

**Question
1**

What type of access is available for a NFS share?

22. Click **OK** to close the NFS Share Permissions dialog box.
23. Click **OK** to close the NFS Advanced Sharing dialog box.
24. Click **Close** to close the Data Properties dialog box.
25. Close **File Explorer**.
26. Close Services for Network File System.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 5.2 Installing and Configuring BranchCache

Overview	In this exercise, you will install and configure BranchCache so that it can be used with websites and file shares.
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Completion time	30 minutes
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Mindset Question: What do you need to use to enable a website to be cached by BranchCache and what do you need to enable a shared folder to be cached by BranchCache?

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1. On Server01, using Server Manager, click **Manage** and click **Add Roles and Features**.
The Add Roles and Feature Wizard opens.
2. When the Add Roles and Features Wizard opens, click **Next**.
3. On the Select Installation Type page, make sure that **Role-based or feature-based installation** is selected, and then click **Next**.
4. On the Select destination server page, click **Server01.contoso.com**, and then click **Next**.
5. In Select Server Roles, under Roles, expand **File and Storage Services**, and expand **File and iSCSI Services**. Click to select the check box for **BranchCache for Network Files**. Click **Next**.
6. In Select features, click **BranchCache**, and then click **Next**.
7. On the Confirm installation selections page, click **Install**. When installation is complete, click **Close**.
8. Login into RWDC01 as **contoso\administrator** with the password of **Password01**.
9. On RWDC01, when Server Manager opens, open the **Tools** menu and click **Active Directory Users and Computers**.
10. When the Active Directory Users and Computers console open, right-click **contoso.com**, click **New**, and click **Organizational Unit**.
11. When the New Object – Organization Unit dialog box opens, type **Servers** in the Name text box. Click **OK**.
12. Close **Active Directory Users and Computers**.
13. On RWDC01, using Server Manager, open the **Tools** menu and click **Group Policy Management**. The Group Policy Management console opens.
14. Navigate to and right-click the **Servers** OU, and click **Create a GPO in this domain, and Link it here**.
15. When the New GPO dialog box opens, type **BranchCache for Servers** in the Name text box.
16. Click **OK** to close the New GPO dialog box.
17. Expand the **Servers** OU, and right-click the **BranchCache for Servers** GPO and click **Edit**.
18. When the Group Policy Management Editor opens, expand the following path: **Computer Configuration, Policies, Administrative Templates, Network**. Under **Network**, click **Lanman Server**.

Question 2	<i>What must all servers in a BranchCache infrastructure have?</i>
-------------------	--

19. Double-click **Hash Publication for BranchCache**. The Hash Publication for BranchCache dialog box opens as shown in figure 5-4.

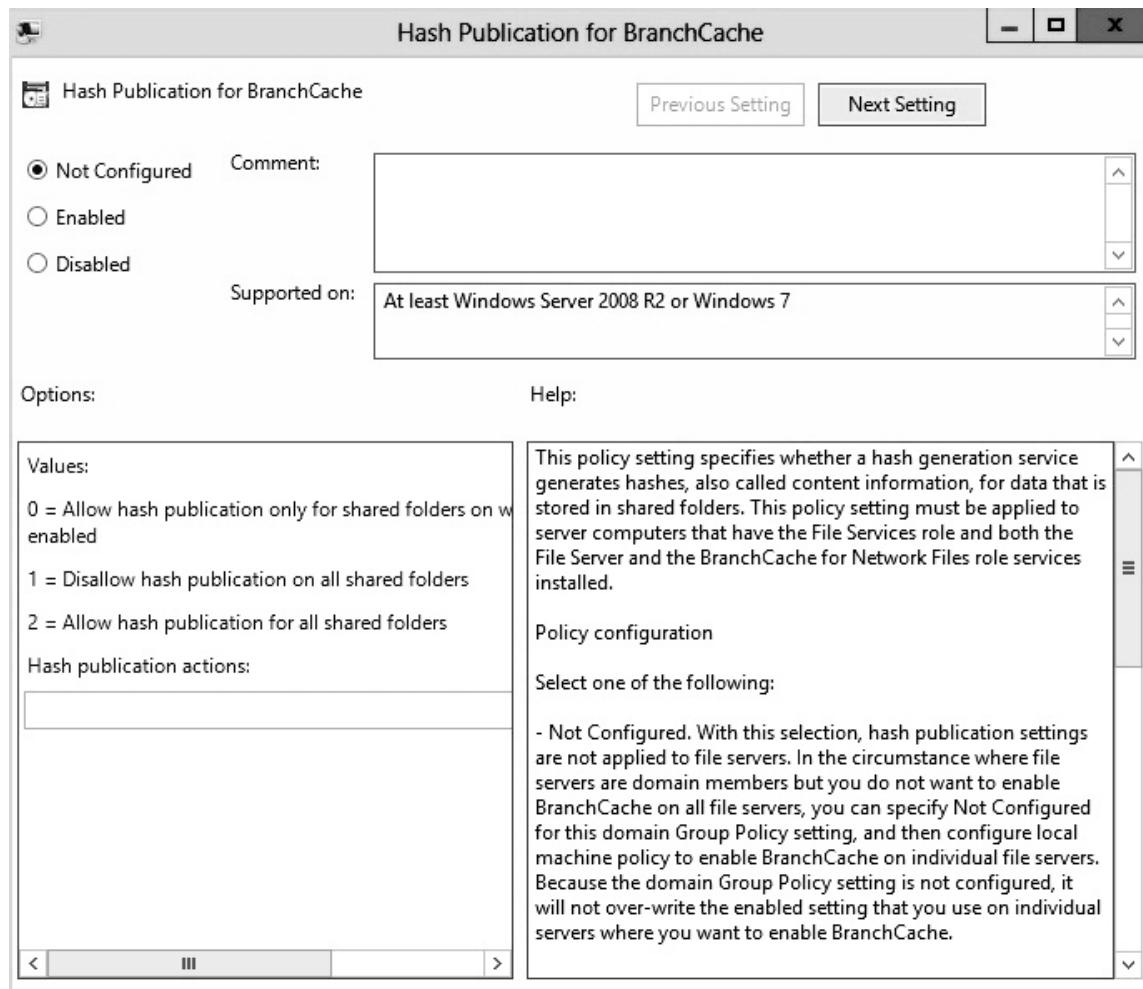


Figure 5-4
Enabling hash publication for BranchCache

20. In the Hash Publication for BranchCache dialog box, click **Enabled**.
21. In Options, **Allow hash publication for all shared folders** is already selected. To enable hash publication for all shared folders in all file servers that you add to the OU, click **Allow hash publication for all shared folders**.
22. Click **OK** to close the Hash Publication for BranchCache dialog box.
23. Close **Group Policy Management Editor**.

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24. On Server01, open File Explorer by clicking the **File Explorer** icon on the task bar.
25. Create a folder called **C:\SharedFolder**.
26. Right-click the **C:\SharedFolder** and click **Properties**.
27. Click the **Sharing** tab.
28. Click **Advanced Sharing**.
29. Click **Share this folder**, and click **OK** to close the Advanced Sharing dialog box.
30. Click **Close** to close the SharedFolder Properties dialog box.
31. Close **File Explorer**.
32. On Server01, using **Server Manager**, click **Tools > Computer Management**.
33. When the Computer Management console opens, under **System Tools**, expand **Shared Folders**, and click **Shares**.
34. In the details pane, right-click **SharedFolder**, and then click Properties. The share's Properties dialog box opens, as shown in figure 5-5.



Figure 5-5
Viewing the SharedFolder properties

35. In the Properties dialog box, on the General tab, click **Offline Settings**. The Offline Settings dialog box opens (see Figure 5-6).

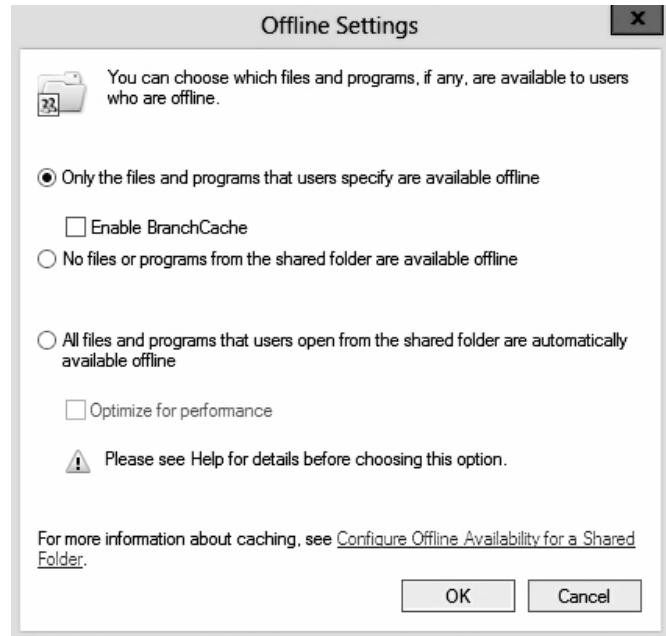


Figure 5-6
Configuring offline settings

36. Ensure that **Only the files and programs that users specify are available offline** is selected, and then click **Enable BranchCache**.
37. Click **OK** twice.
38. Close **Computer Management**.
39. On RWDC01, using Group Policy Management, expand **Group Policy Objects**, right-click **Default Domain Policy**, and click **Edit**.

Question 3	<i>By default, which BranchCache cache mode is used by Windows 8 machines?</i>
-----------------------	--

40. When the Group Policy Management Editor opens, navigate to the **Computer Configuration > Policies > Administrative Templates > Network** node and click **BranchCache** (see Figure 5-7).

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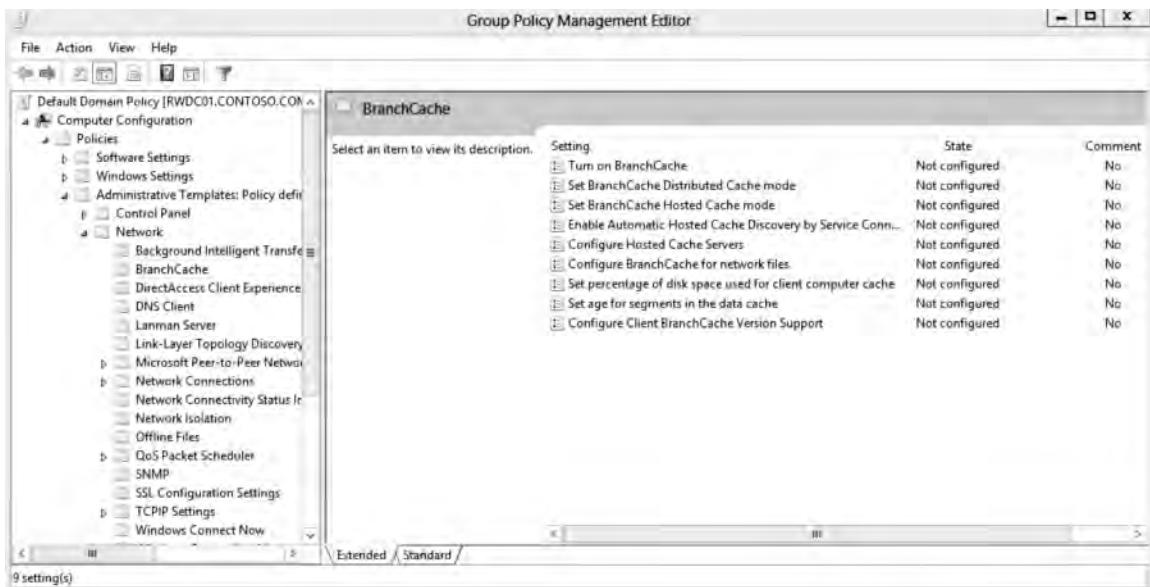


Figure 5-7
Viewing BranchCache settings in a GPO

41. Double-click **Set BranchCache Distributed Cache mode**.
42. When the **Set BranchCache Distributed Cache mode** dialog box opens, click **Enabled**.
43. Click **OK** to close the Set BranchCache Distributed Cache mode.
44. Close **Group Policy Management Editor**.
45. Close **Group Policy Management**.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 5.3 Using File Classification

Overview	In this exercise, you use File Server Resource Manager to classify files in a folder.
Completion time	25 minutes

Mindset Question: What are the two components needed to classify a file?

1. On Server01, open the File Explorer by clicking the **File Explorer** icon on the Taskbar.
2. When File Explorer opens, navigate to and open the **C:\SharedFolder**.
3. Right-click the empty white space of the **C:\SharedFolder**, click **New**, and click **Rich Text Document**.

4. Name the document **Doc1** and press the **Enter** key.
5. Close **Windows Explorer**.
6. On Server01, using **Server Manager**, click **Manage** and click **Add Roles and Features**.
7. When the Add Roles and Feature Wizard opens, click **Next**.
8. Select Role-based or feature-based installation and then click **Next**.
9. Click **Select a server from the server pool**, click **Server01.contoso.com**, and then click **Next**.
10. Scroll down and expand **File and Storage Services** and expand **File and iSCSI Services**. Select **File Server Resource Manager**.
11. When you are asked to add features, click **Add Features**.
12. On the Select server roles page, click **Next**.
13. On the Select features page, click **Next**.
14. On the Confirm installation selections, click **Install**.
15. When the installation is complete, click **Close**.
16. On Server01, using **Server Manager**, click **Tools > File Server Resource Manager**.
17. When the File Server Resource Manager opens, expand **Classification Management**. When you are done, the File Resource Manager should look like figure 5-8.

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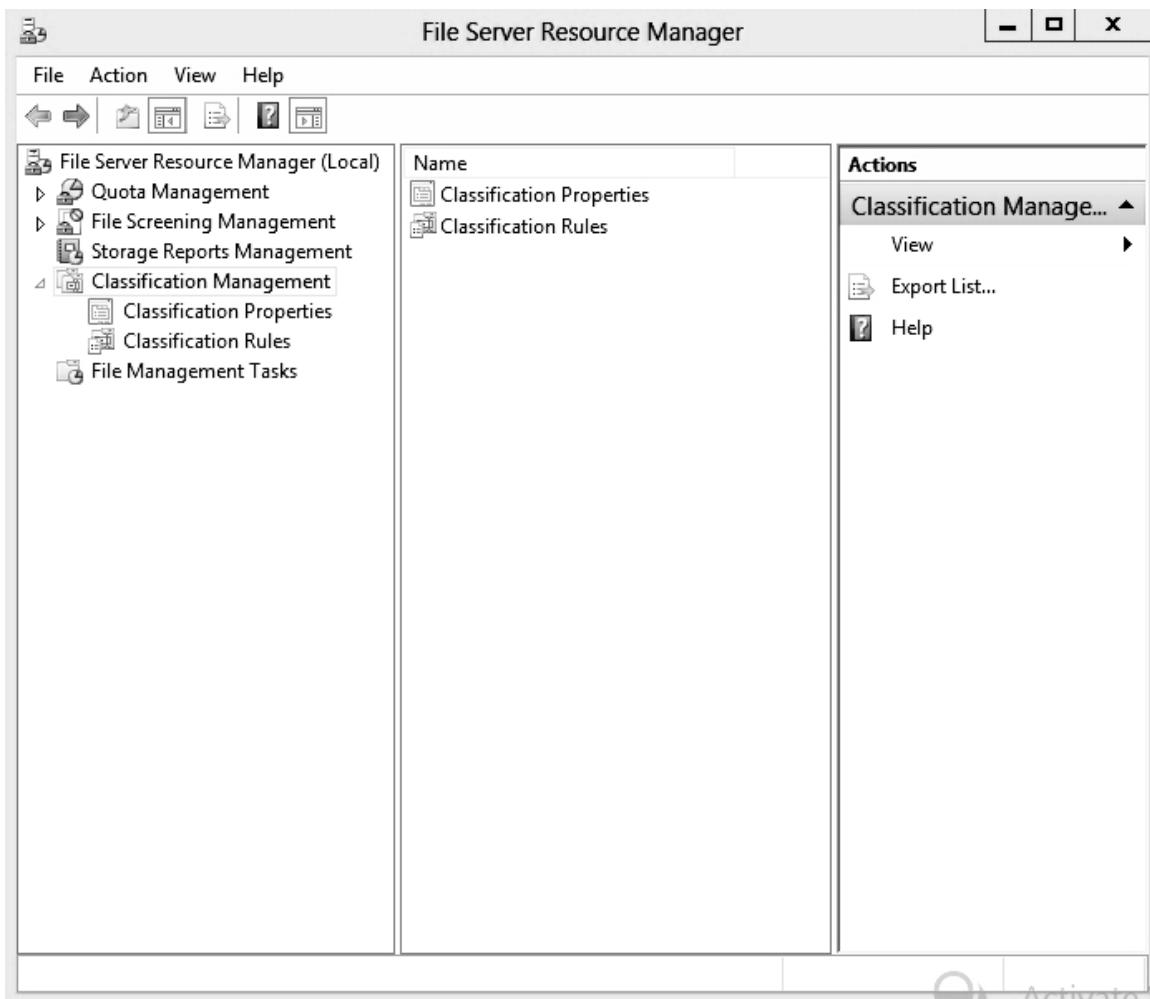


Figure 5-8
Opening the File Server Resource Manager

18. Click **Classification Properties**.
19. Right-click **Classification Properties** and click **Create Local Property**. The Create Local Classification Property dialog box opens (see Figure 5-9).

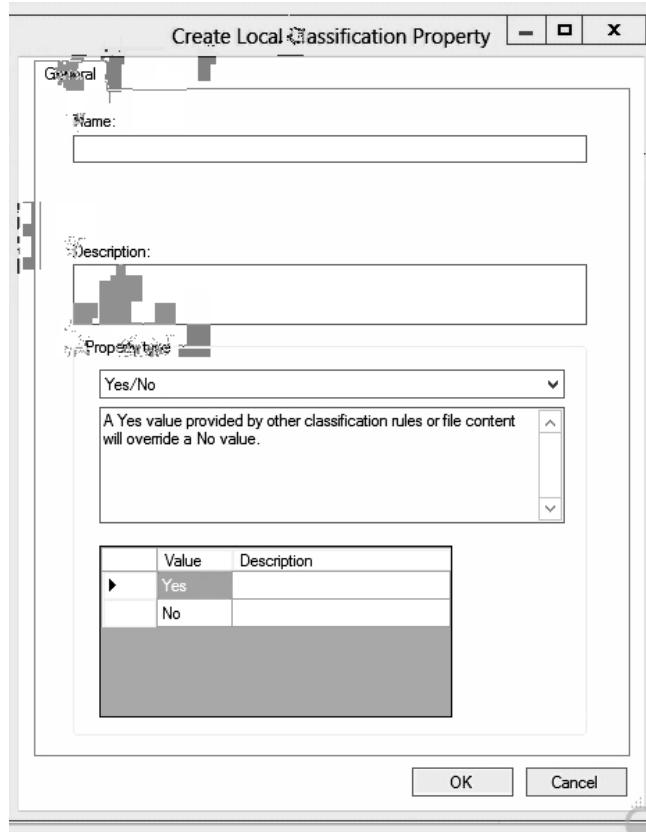


Figure 5-9
Creating a local classification property

20. In the **General** tab, Type **FileClass** in the Name text box.
21. For the Property type, select **Yes/No**, and click **OK**.
22. Click **Classification Rules**.
23. Right-click **Classification Rules**, and click **Create Classification Rule**. The Create Classification Rule dialog box opens.
24. In the General tab, type **ClassRule** in the Rule name text box. Make sure the rule is enabled.
25. Click the **Scope** tab.
26. Click the **Add** button. Navigate to the **C:\SharedFolder** and click **OK**.
27. Click the **Classification** tab. The classification tab is shown in figure 5-10.

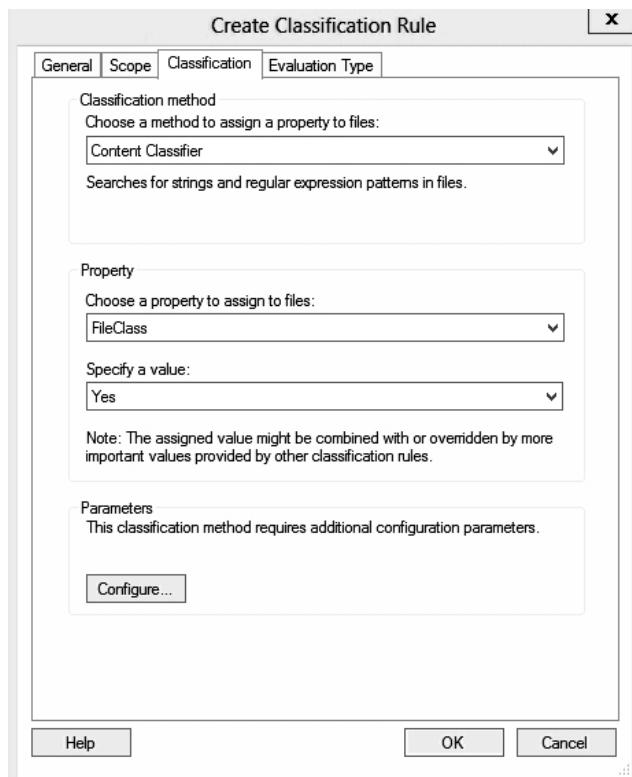


Figure 5-10
Creating a classification rule

28. In the Classification method section, select **Folder Classifier**.
29. Under Property, **FileClass**, and **Yes** should already be selected in the Property section.
30. Click the **Evaluation Type** tab.
31. Click to select the **Re-evaluate existing property values**. Aggregate the values should already be selected.
32. Click **OK** to close the Create Classification Rule dialog box.
33. In File Server Resource Manager, under Actions, click **Run Classification with All Rules Now**.
34. When the Run Classification dialog box opens, click **Wait for classification to complete**. Click **OK**.
35. If you get a Windows Internet Explorer 10 dialog box, click **Don't use recommended settings**, and click **OK**.
36. When the classification is complete, the Automatic Classification Report opens. You should see one file is classified.

37. Take a screenshot showing the Automatic Classification Report by pressing Alt+Prt Scr and then paste it into your Lab 5 worksheet file in the page provided by pressing Ctrl+V.

38. Close the **Automatic Classification Report**.

39. Close **File Server Resource Manager**.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 5.4 Configuring File Access Auditing

Overview

In this exercise, you will use a group policy to enable file object auditing. You will then enable auditing in a folder.

Completion time

20 minutes

Mindset Question: **What are the components that must be configured to enable auditing of a folder or file?**

- 1.** On RWDC01, using **Server Manager**, click **Tools > Group Policy Management**.
- 2.** When the Group Policy Management console opens, expand the **Domain Controllers** to show the Default Domain Controllers Policy. Then right-click **the Default Domain Controllers Default Policy** and click **Edit**.
- 3.** When the Group Policy Management Editor appears, expand **Computer Configuration, Policies, Windows Settings, Security Settings, Advanced Audit Policy Configuration, Audit Policies**, and click **Audit Policies** (as shown in figure 5-11).

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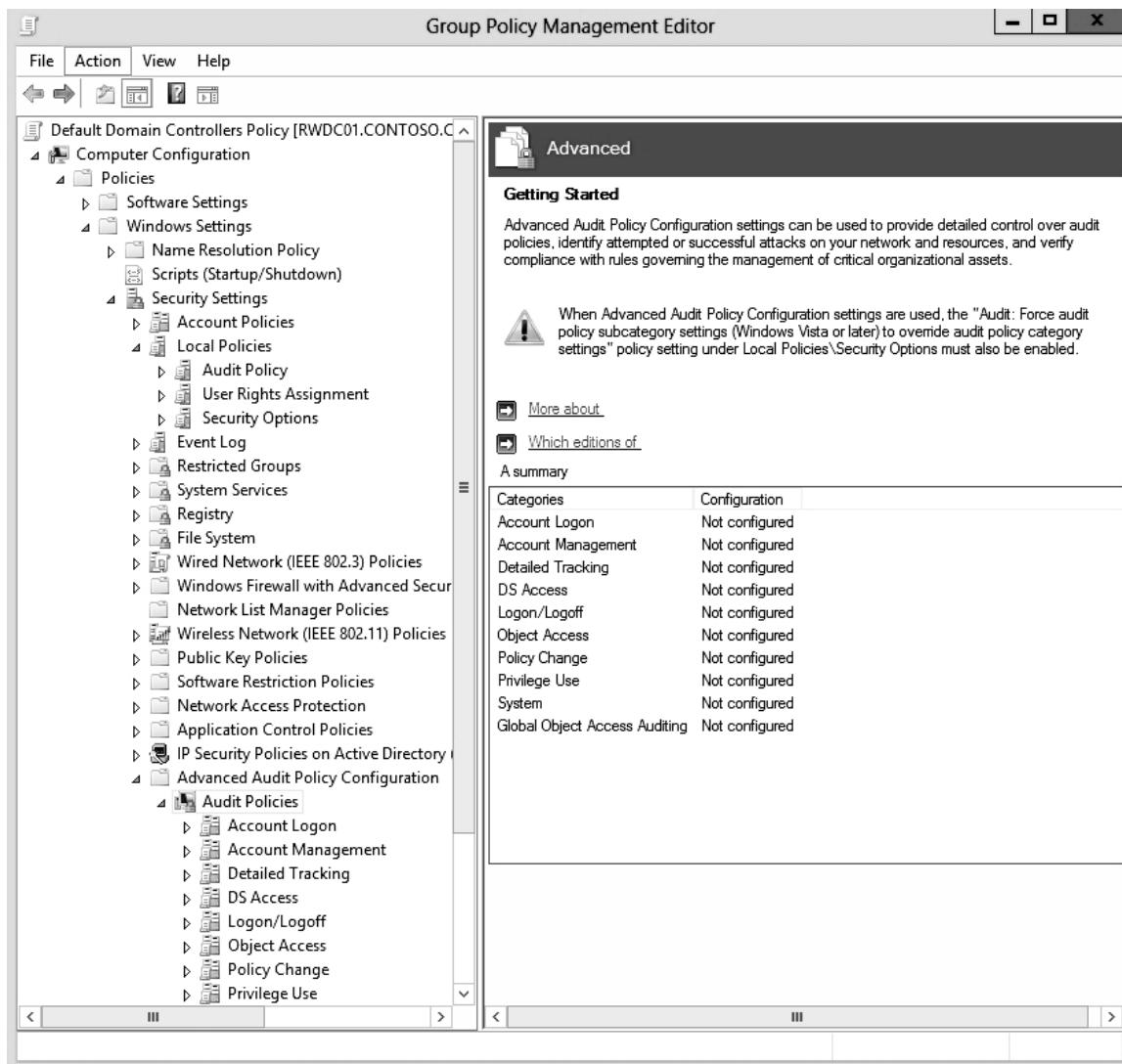


Figure 5-11
Configuring an audit policy

Question 4	<i>Which audit policies are defined by default?</i>
-----------------------	---

4. In the left pane, click **Object Access** and double-click **Audit File System**, The Audit File Share Properties dialog box should open as shown in figure, 5-12.

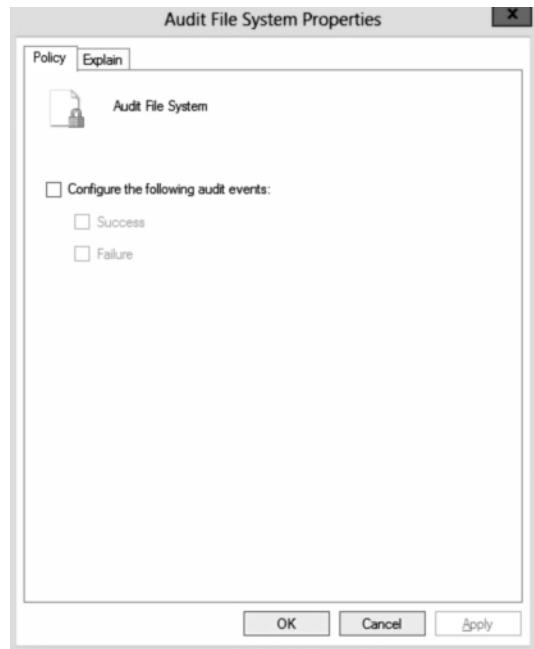


Figure 5-12

Configuring audit file system properties

5. On the Audit File System Properties dialog box, click to select **Configure the following audit events** and click to select **Success** and **Failure**.
6. Click **OK** to close the Audit File System Properties dialog box.
7. Close the **Group Policy Management Editor**.
8. Close **Group Policy Management**.
9. On Server01, open the File Explorer by clicking the **File Explorer** icon on the taskbar.
10. Navigate to and right-click **C:\SharedFolder** folder, click Properties, and then click the **Security** tab.
11. Click the **Advanced** button. The Advanced Security Settings for SharedFolder dialog box opens.
12. In the Advanced Security Settings for Updates dialog box, click the **Auditing** tab, as shown in figure 5-13.

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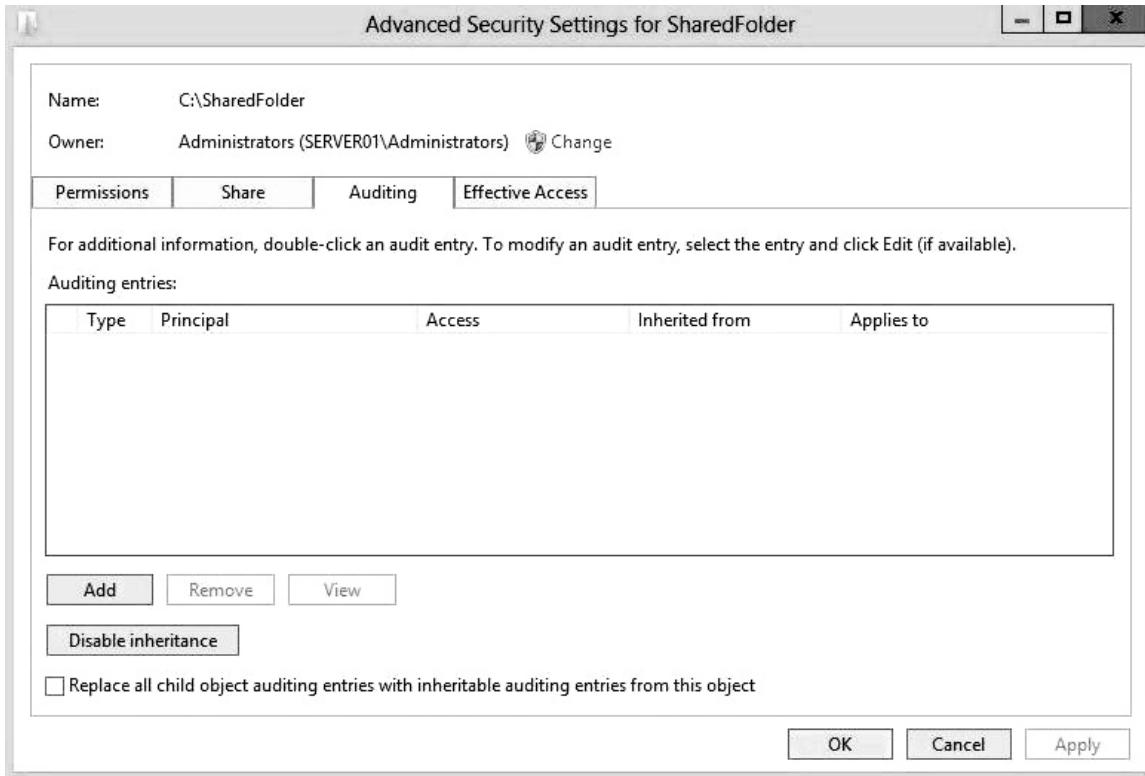


Figure 5-13
Enabling auditing for a folder

13. To add an auditing entry, click **Add**. The Auditing Entry for Data dialog box opens.
14. To specify a user or group, click **Select a principal**.
15. When the Select User, Computer, Service Account, or Group dialog box opens, type **domain users** in the text box, and then click **OK**.
16. For Type, select **All**.
17. For the Permissions, click **Full Control**.
18. Click **OK** to close the Auditing Entry for SharedFolder dialog box.
19. On the Advanced Security Settings for SharedFolder dialog box, select to enable **Replace all child object auditing entries with inheritable auditing entries from this object**.
20. Click **OK** to close the Advanced Security Settings for SharedFolder dialog box.
21. Click **OK** to close the SharedFolder Properties dialog box.
22. Open a command prompt and execute the following command:

```
gpupdate /force
```

- 23.** Close the Command prompt.
- 24.** On Server01, using **File Explorer**, navigate to and open the C:\SharedFolder folder.
- 25.** Right-click **Doc1**, and click **Delete**.
- 26.** On Server01, using **Server Manager**, open the **Tools** menu and click **Event Viewer**.
- 27.** Expand **Windows logs** and click **Security**.
- 28.** Look for entries that indicate that someone tried to delete a file or actions that involve the Recycle Bin.
- 29.** Take a screen shot of the Event Viewer by pressing Alt+Prt Scr and then paste it into your Lab 5 worksheet file in the page provided by pressing Ctrl+V.
- 30.** Close the **Event Viewer**.
- 31.** Close **Windows Explorer**.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 5.1, what is used to enable NFS sharing for AIX and Linux users?
2. In Exercise 5.2, how do you enable a hosted cache mode on a server running Windows Server 2012?
3. In Exercise 5.2, what is the path to the hash publication policy in a GPO?
4. In Exercise 5.3, what do you need to do after you change or create classification properties or classification rule?
5. In Exercise 5.4, what type of audit policy did you use to enable auditing of only files and folders?

Lab Challenge	Creating an NFS Shared Folder on a Cluster
Overview	To complete this challenge, you will create an NFS shared folder on a cluster.
Completion time	5 minutes

List the general steps you used to create an NFS shared folder on a cluster.

End of lab

LAB 6

IMPLEMENTING

DYNAMIC ACCESS

CONTROL

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

Exercise 6.1 Using Dynamic Access Control

Exercise 6.2 Implementing a Central Access Policy

Lab Challenge Performing Access-Denied Remediation

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 6-1.

Table 6-1
Computers required for Lab 6

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01

In addition to the computers, you will also require the software listed in Table 6-2 to complete Lab 6.

Table 6-2

Software required for Lab 6

<i>Software</i>	<i>Location</i>
Lab 6 student worksheet	Lab6 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab06 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Enable and configure Dynamic Access Control (DAC)
- Create and implement a Central Access Policy
- Enable Access-Denied Assistant

Estimated lab time: 90 minutes

Exercise 6.1 Using Dynamic Access Control	
Overview	In this exercise, you will configure Dynamic Access Control by enabling KDC support for claims and creating a resource property and resource rule.
Completion time	40 minutes

Mindset Question: **How does Dynamic Access Control allow you to secure files for an organization?**

1. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
2. When Server Manager opens, open the **Tools** menu and click **Group Policy Management**.
3. When the Group Policy Management console opens, expand **contoso.com**, and expand **Domain Controllers**. Then, right-click Default Domain Controllers Policy and select Edit.

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4. When the Group Policy Management Editor opens, navigate to **Computer Configuration\Policies\Administrative Templates\System\KDC** and double-click **KDC support for claims, compound authentication, and Kerberos Armoring**.
5. Click **Enabled**. Under Options, Supported is already selected.
6. Take a screen shot of the *KDC support for claims, compound authentication and Kerberos Armoring* dialog box by pressing Alt+Prt Scr and then paste it into your Lab 6 worksheet file in the page provided by pressing Ctrl+V.
7. Click **OK** to close the KDC support for claims, compound authentication, and Kerberos armoring dialog box.
8. Close **Group Policy Management Editor**.
9. Close **Group Policy Management**.
10. On RWDC01, using **Server Manager**, click **Tools > Active Directory Administrative Center**. The Active Directory Administrative Center opens.
11. Navigate to the **Dynamic Access Control** node and click the **Claim Types** container, as shown in figure 6-1.

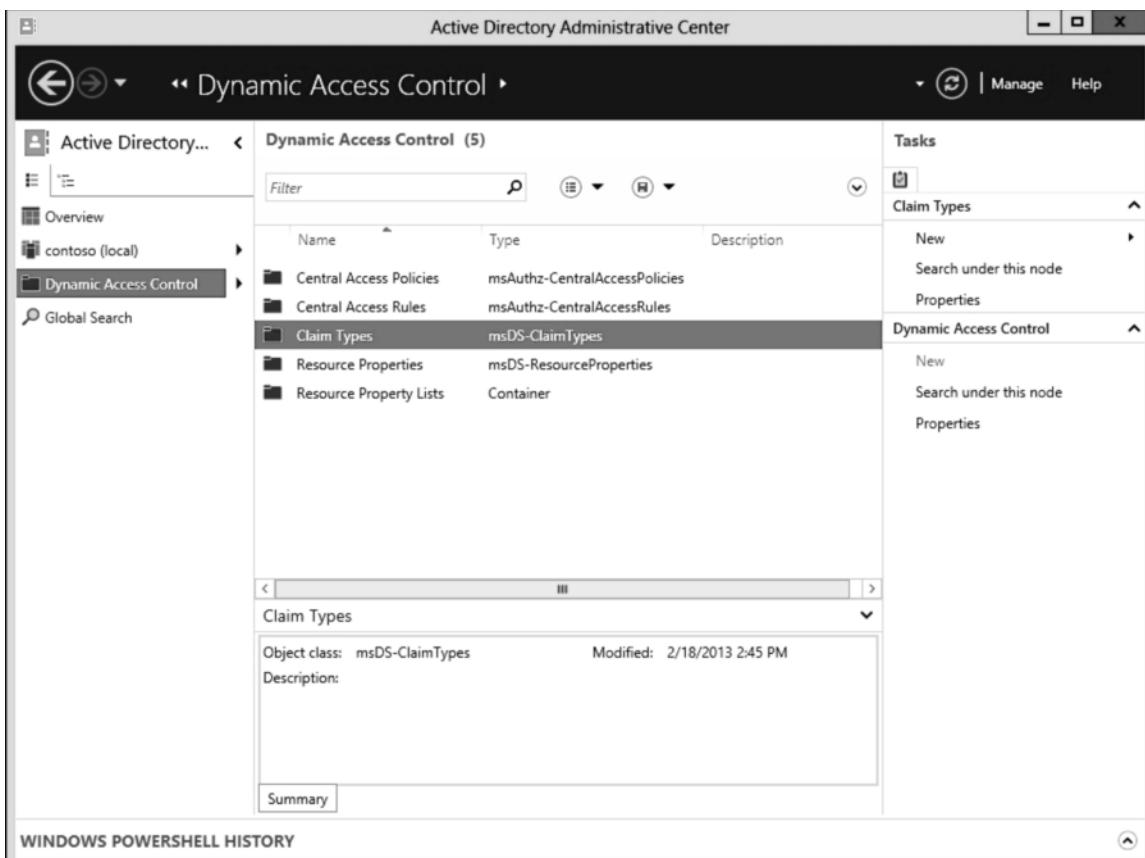


Figure 6-1
Opening Dynamic Access Control

12. In the Tasks pane, under Claim Types, click **New**, and then click **Claim Type**. The Create Claim Type dialog box opens (see Figure 6-2).

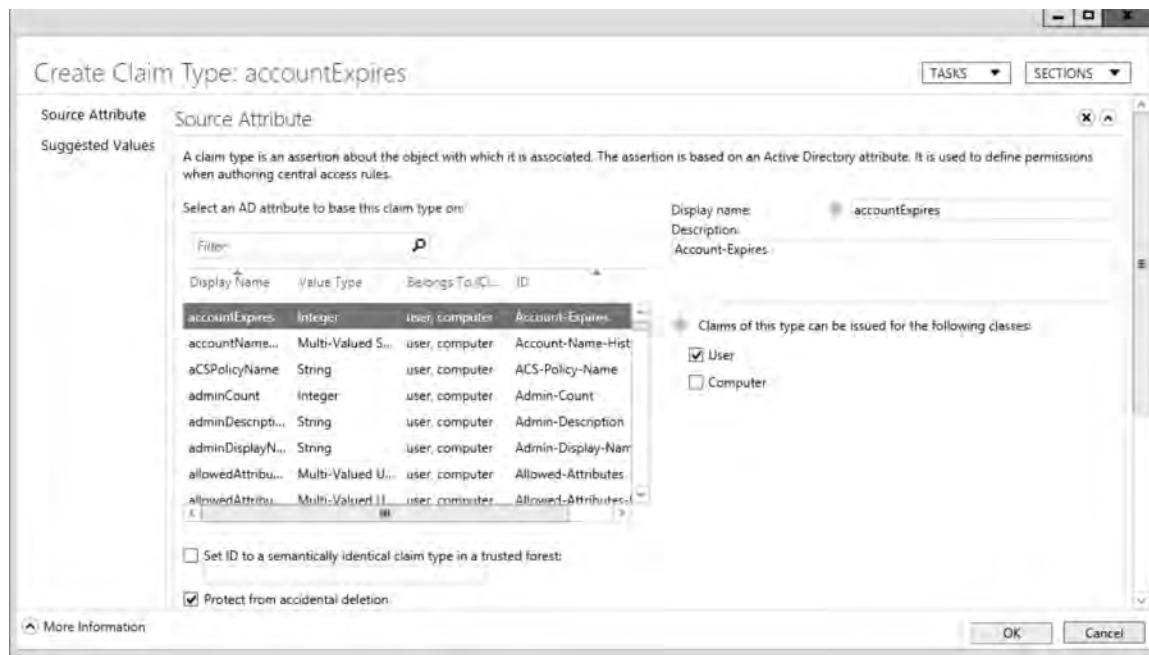


Figure 6-2
Creating a claim type

13. With User already selected on the right side of the dialog box, under Source Attribute, scroll down and click **department**.

Question 1	<i>What is the default display name?</i>
-----------------------	--

14. Click **OK** to close the Create Claim Type dialog box.
15. In the Tasks pane, under Claim Types, click **New**, and then click **Claim Type**.
16. Under Source Attribute, scroll down and click **description**.
17. Click to deselect **User** and click to select **Computer**.
18. Click **OK** to close the Create Claim Type dialog box.
19. With Active Directory Administrative Center, click the **Dynamic Access Control** node and double-click **Resource Properties**. The Resource Properties are shown in figure 6-3.

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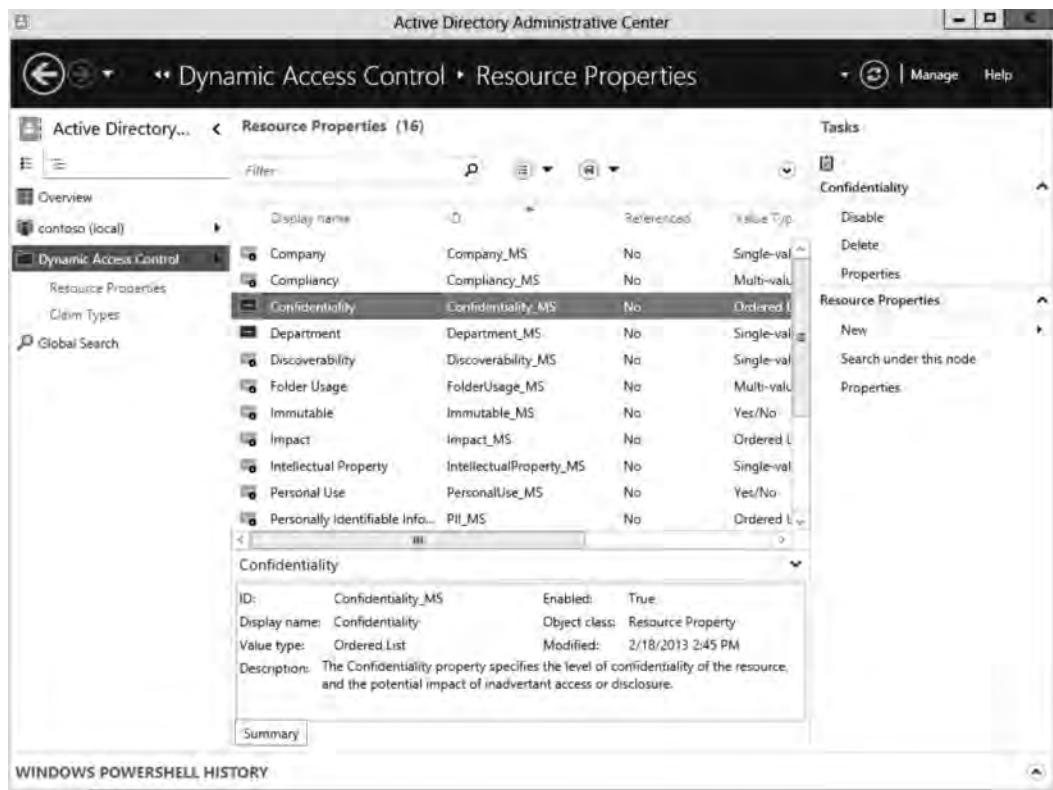


Figure 6-3
Viewing resource properties

20. To enable the Department resource property, under Resource Properties, right-click **Department**, and click **Enable**.
21. To enable the Confidentiality resource property, under Resource Property, right-click **Confidentiality**, and click **Enable**. Close Resource Properties.
22. Close **Active Directory Administrative Center**.
23. Log into Server01 as **contoso\administrator** with the password of **Password01**.
24. Open the **File Explorer** icon on the **Taskbar**.
25. Navigate to and open the **C:\SharedFolder**.
26. Right-click the empty white space of the **SharedFolder** window, click **New**, and click **Rich Text Document**.
27. For the name of the document, type **Doc1** and press the **Enter** key.
28. On Server01, using **Server Manager**, open the **Tools** menu and click **File Server Resource Manager**.

29. When File Server Resource Manager opens, expand **Classification Management**, and click **Classification Properties**.
30. Right-click **Classification Properties** and click **Refresh**. The Confidentiality and Department appear with a Global scope.

Question 2	<i>What are the two classifications properties that have a global scope?</i>
-------------------	--

31. Click **Classification Rules**.
32. Right-click **Classification Rules** and click **Create Classification Rule**. The Create Classification Rule dialog box opens.
33. In the General tab, type **Confidentiality** in the Rule name text box.
34. Click the **Scope** tab.
35. At the bottom of the dialog box, click **Add**. Browse to the **C:\SharedFolder** folder and click **OK**.
36. Click the **Classification** tab. The Classification tab is shown in figure 6-4.

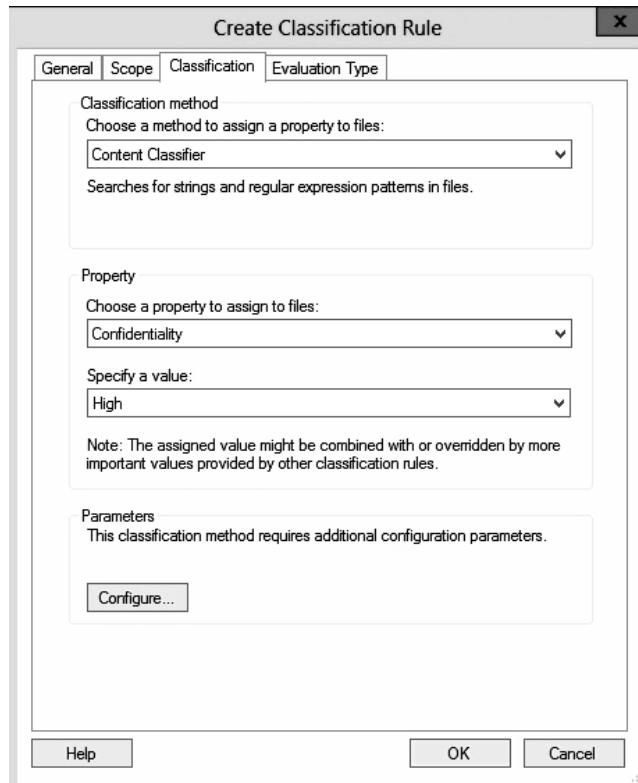


Figure 6-4
Creating a classification rule

37. The Classification method should already be Content Classifier, the Confidentiality and High are set under Property. To configure the Classification parameter, under Parameters, click **Configure**. The Classification Parameters dialog box opens.
38. Change the Regular expression to **String**. Under Expression, type **HR**, as shown in figure 6-5. This means that if any of the documents have the string **HR**, it will be automatically be tagged as High confidentiality.

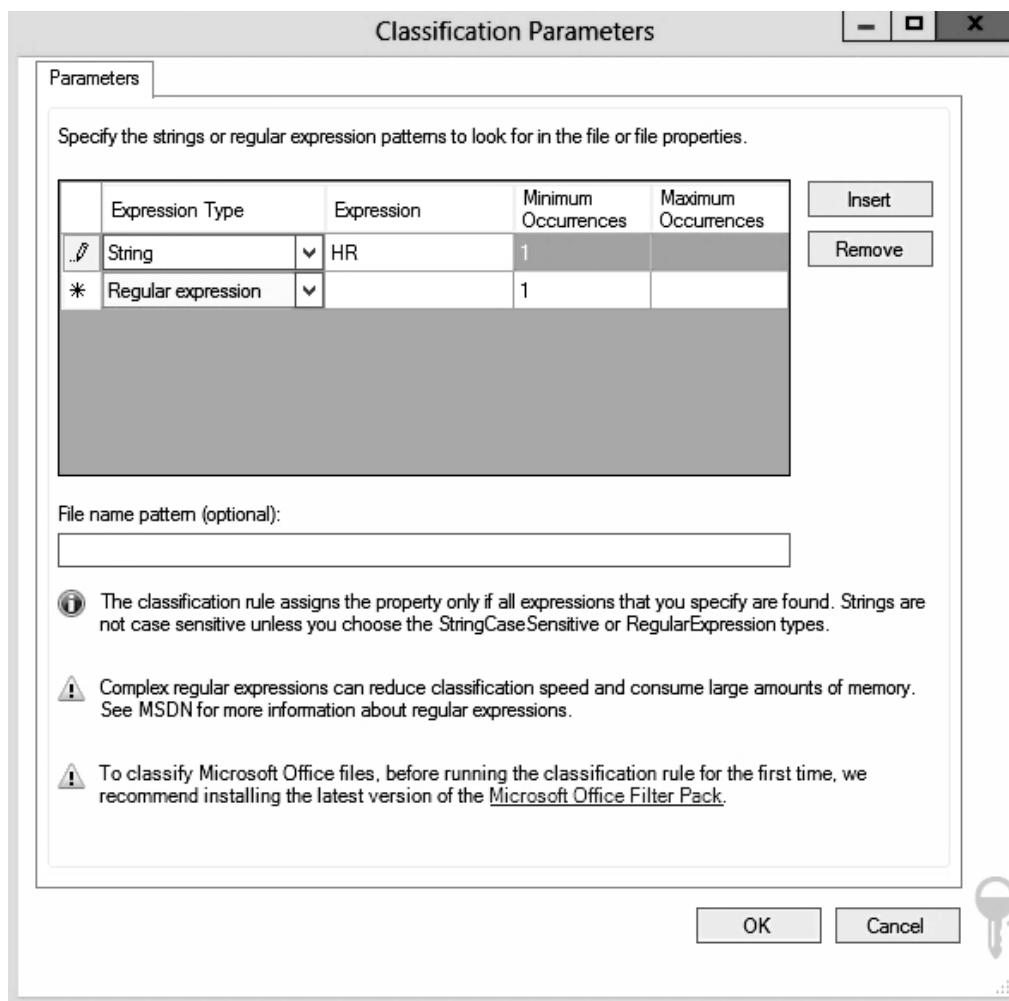


Figure 6-5
Defining a classification parameter

39. Click **OK** to close the Classification Parameters dialog box.
40. Click **Evaluation Type** tab.
41. Click to select **Re-evaluate existing property values**. Then select **Overwrite the existing value**.

42. Click **OK** to close the Create Classification Rule dialog box.
43. With File Server Resource Manager, under the Actions pane, click **Run Classification with All Rules Now**. When asks how you want to run the classification rules, click **Wait for classification to complete**.
44. Take a screen shot of File Server Resource Manager with the Run Classification dialog box by pressing Alt+Prt Scr and then paste it into your Lab 6 worksheet file in the page provided by pressing Ctrl+V.
45. Click **OK**.
46. When the Automatic Classification Report opens, review the results and close the report.

Question 3	<i>How many files and properties does the report show?</i>
-----------------------	--

47. Go to the **C:\SharedFolder** folder and double-click the **Doc1** document. When the Doc1 opens with WordPad, type **HR** and close WordPad. When it asks you to save the document, click **Save**.
48. Go back to **File Server Resource Manager**, click **Run Classification with All Rules Now**. When asks how you want to run the classification rules, click **Wait for classification to complete** and click **OK**.
49. When the Automatic Classification Report opens, review the results and close the report.

Question 4	<i>How many files and properties does the report show?</i>
-----------------------	--

50. Go back to the **C:\SharedFolder** folder. Right click **Doc1**, and click **Properties**.
51. Click the **Classification** tab.

Question 5	<i>What is the Confidentiality set to?</i>
-----------------------	--

52. Take a screen shot of the File Server Resource Manager by pressing Alt+Prt Scr and then paste it into your Lab 6 worksheet file in the page provided by pressing Ctrl+V.
53. Click **OK** to close the Properties dialog box.
54. Close **File Server Resource Manager**. Close all other open windows.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 6.2

Implementing a Central Access Policy

Overview

In this exercise, you will create and deploy a Central Access Policy, which is eventually applied using group policies.

Completion time

30 minutes

1. On Server01, open the **File Explorer** icon on the Taskbar.
2. Right-click the **C:\SharedFolder** folder and click **Properties**. The Properties dialog box opens.
3. Click the **Security** tab.
4. Click the **Advanced** button. The Advanced Security Settings dialog box opens.
5. Click **Add**. The Permission Entry for SharedFolder dialog box opens.
6. Click **Select a principal**. When the Select User, Computer, Service Account, or Group dialog box opens, type **domain users** and click **OK**.

**Question
6**

What are the default basic permissions?

7. At the bottom of the dialog box, click **Add a condition**.
8. For the condition, you can then configure the following:

Resource > Confidentiality > Equals > Value > High

When you are done, it should look like figure 6-6. Click **OK**.

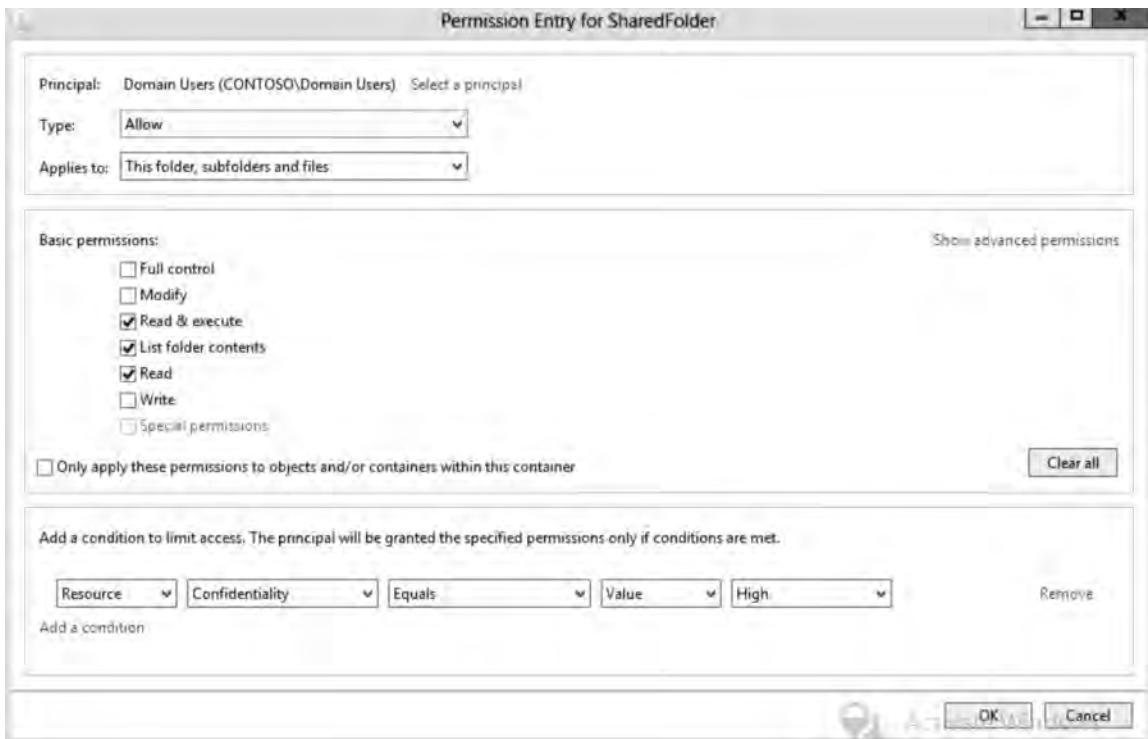


Figure 6-6
Define permissions based on a resource

**Question
7**

How is the condition displayed on the Advanced Security Settings for SharedFolder dialog box?

9. Click **OK** to close the Advanced Security Settings for SharedFolder dialog box.
10. Click **OK** to close the Properties dialog box.
11. On RWDC01, using Server Manager, open the **Tools** menu and click **Active Directory Administrative Center**.
12. On RWDC01, when the Active Directory Administrative Center opens, navigate to and click the **Dynamic Access Control** node.
13. Double-click **Central Access Policies**. The Central Access Policies opens as shown in figure 6-7.

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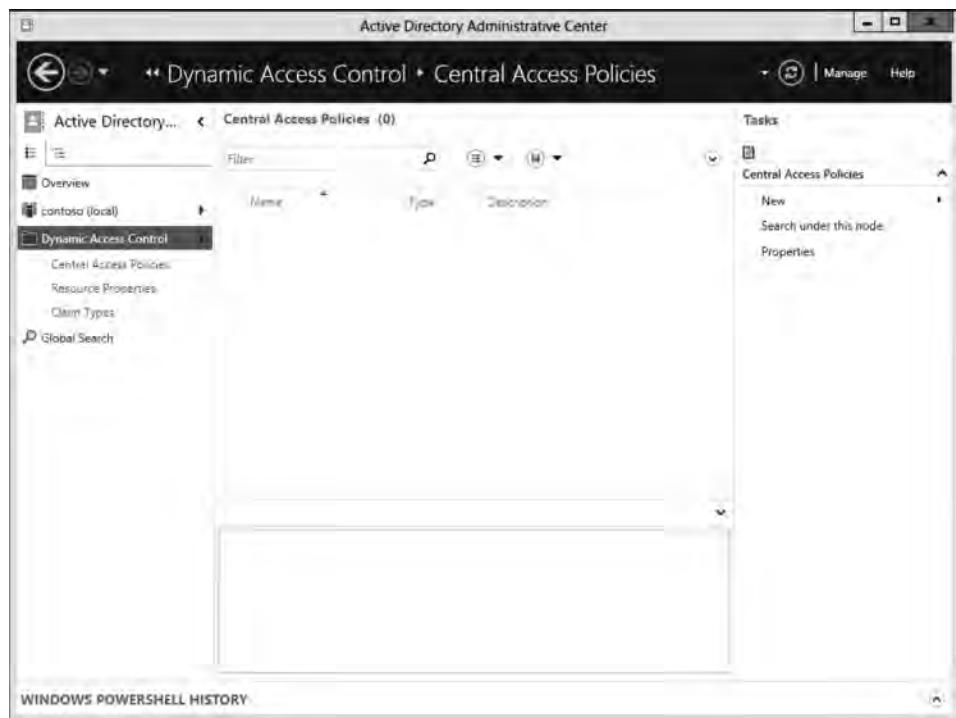


Figure 6-7
Viewing Central Access Policies.

- Under Tasks, click **New**, and click **Central Access Policy**. The Central Access Policy dialog box opens as shown in figure 6-8.

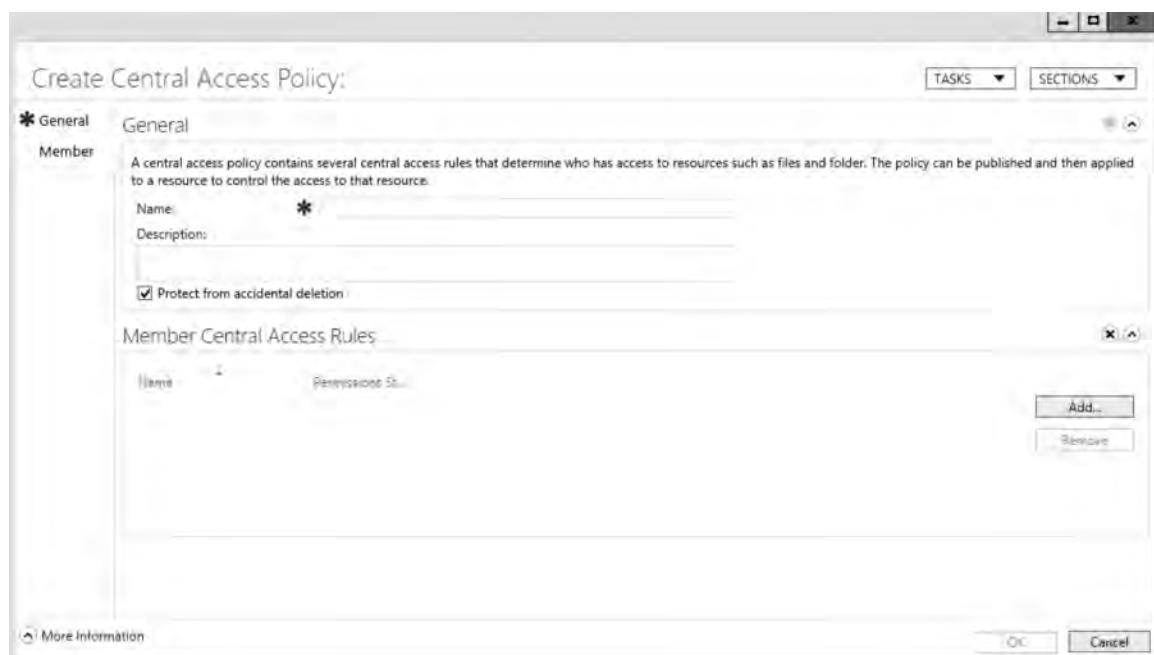


Figure 6-8
Creating a Central Access Policies

15. In the name text box, type a **CentralAccessPolicy1**.
16. Under the Member Central Access Rules section, click **Add**.
17. When the Add Central Access Rules dialog box opens, click **Add a new central access rule**.
18. When the Create Central Access Rules dialog box opens as shown in Figure 6-9, In the Name text box, type **CentralAccessRule1**.

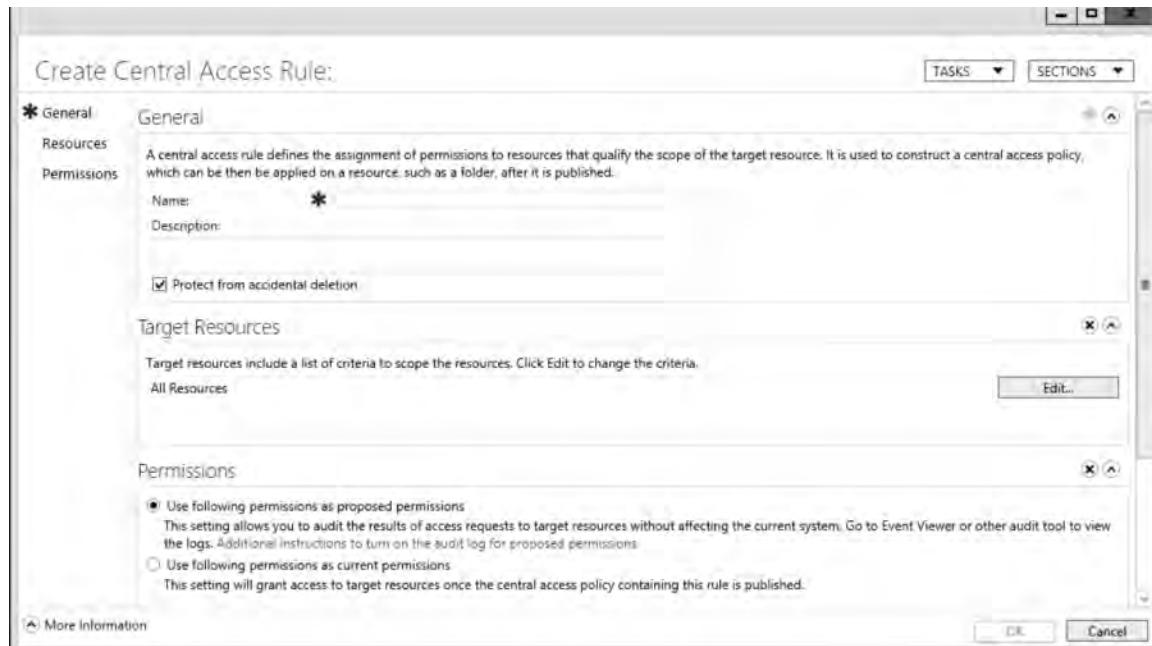


Figure 6-9
Creating Central Access Rule

19. Under Target Resources, click **Edit**. The Central Access Rule dialog box opens.

20. Click **Add a condition**.

21. For the condition, specify the following:

Resource > Confidentiality > Equals > Value > High

22. Click **OK** to close the Central Access Rule dialog box.
23. Click **OK** to close the Create Central Access Rule dialog box. Click Yes to save the changes.
24. Click **OK** to close the Add Central Access Rules dialog box.
25. Click **OK** to close the Create Central Access Policy dialog box.

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26. Close the Active Directory Administrative Center.
27. On RWDC01, using **Server Manager**, open the **Tools** menu and click **Group Policy Management**.
28. When the Group Policy Management console opens, right-click the **Default Domain Policy** and click **Edit**.
29. Navigate to **Computer Configuration\Policies\Windows Settings\Security Settings** and expand **File System**.
30. Right-click **Central Access Policy**, and then click **Manage Central Access Policies**.
31. When the Central Access Policies Configuration dialog box opens as shown in figure 6-10, click **CentralAccessPolicy1**, click **Add**. Click **OK**.

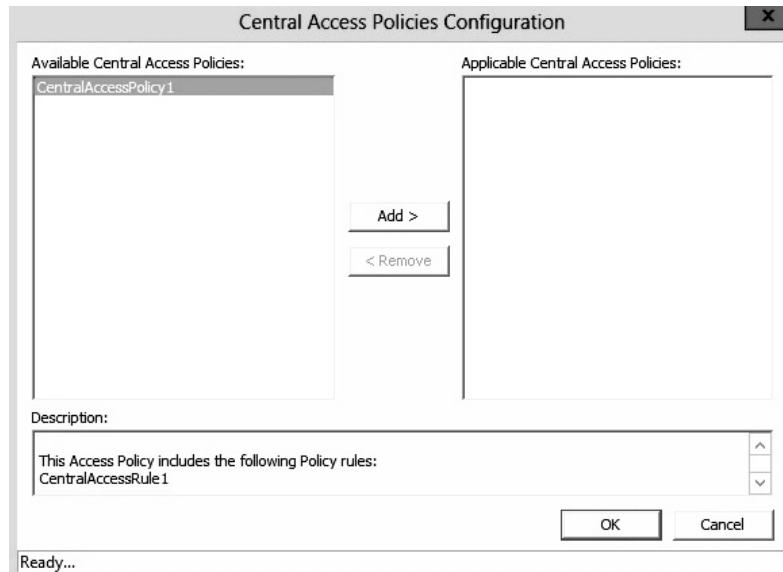


Figure 6-10
Deploying Central Access Policies

32. On Server01, right-click the **Start** menu, and click **Command Prompt (Admin)**.
33. At the command prompt, execute the `gpupdate /force` command.
34. Close the Command Prompt.
35. Open the **File Explorer** icon on the taskbar.
36. Navigate to the **C:\SharedFolder**.
37. Right-click **Doc1**, and click **Properties**.

38. Click the **Security** tab and click the **Advanced** button.
39. Click the **Central Policy** tab.
40. On the Central Policy tab (as shown in figure 6-11), select **CentralAccessPolicy1** in the drop-down box, then click Change.

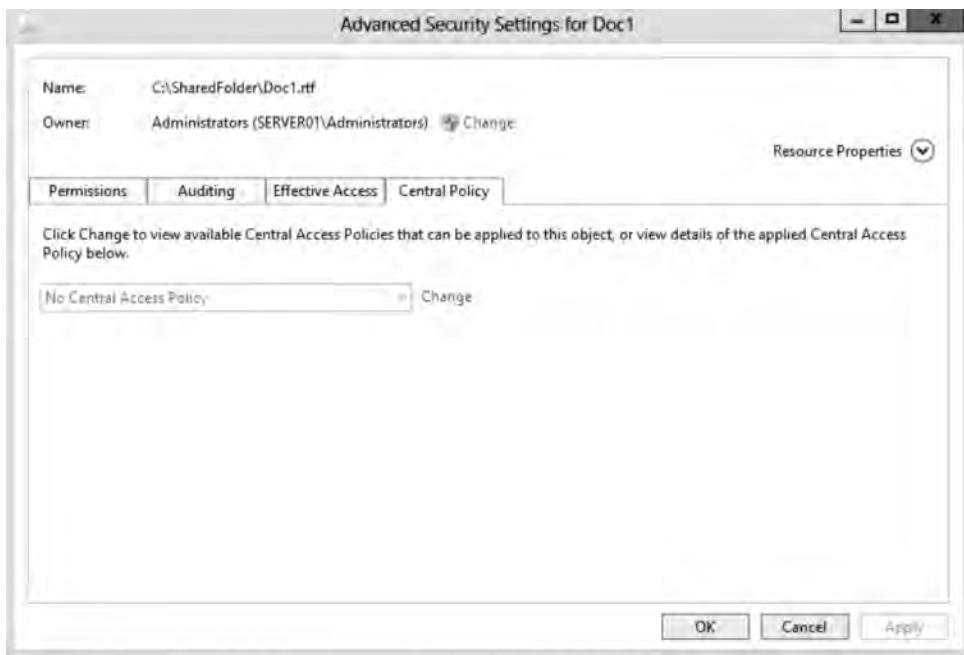


Figure 6-11
Configuring a Central Access Policy

41. Click **OK** to close the Advanced Security Settings dialog box.
42. Click **OK** to close the Doc1 Properties dialog box. Close the SharedFolder.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 6.1, how is KDC enabled to support for claims?
2. In Exercise 6.1, what tool can be used to create and manage Dynamic Access Control?
3. In Exercise 6.1, to use Dynamic Access Control, what two components did you create?

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4. In Exercise 6.1, what Windows component did you use to see how the classification rules were applied to a folder?
5. In Exercise 6.2, what program did you use to create a Central Access Policy?
6. In Exercise 6.2, what is used to apply the Central Access Policy?

Lab Challenge	Performing Access Denied Remediation
Overview	To complete this challenge, you will describe how to enable access-denied remediation by writing the steps for the following scenario.
Completion time	10 minutes

You have just established a Central Access Policy that identifies human resource documents and assign certain permissions to the documents. What steps would you use to enable Access-Denied Assistance so that when a user is denied access to a message, a customized message is displayed for the user to call the help desk for further assistance?

Write out the steps you performed to complete the challenge.

End of lab

LAB 7

CONFIGURING AND

OPTIMIZING STORAGE

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

- Exercise 7.1** Removing an iSCSI Target
- Exercise 7.2** Creating and Configuring an iSCSI Target
- Exercise 7.3** Configuring iSCSI Initiator
- Exercise 7.4** Using Features on Demand
- Lab Challenge** Implementing Thin Provisioning

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 7-1.

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Table 7-1
Computers required for Lab 7

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02
Server (VM 4)	Windows Server 2012	Storage01

In addition to the computers, you will also require the software listed in Table 7-2 to complete Lab 7.

Table 7-2
Software required for Lab 7

Software	Location
Lab 7 student worksheet	Lab7 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab07 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Configure an iSCSI target.
- Configure an iSCSI Initiator.
- Use Features on Demand.
- Implement thin provisioning

Estimated lab time: 105 minutes

Exercise 7.1

Removing an iSCSI Target

Overview

There is already an iSCSI Target on Storage01. You will remove the iSCSI target from Storage01, so that it can be recreated in the following exercises.

Completion time

25 minutes

1. Logon into Server01, as **contoso\administrator** with the password of **Password01**.
2. On Server01, when Server Manager opens, open the **Tools** menu and click **iSCSI Initiator**.
3. When the iSCSI Initiator Properties dialog box opens, as shown in figure 7-1, click the listed discovered target, and click **Disconnect**. When you are asked to disconnect all sessions, click **Yes**.

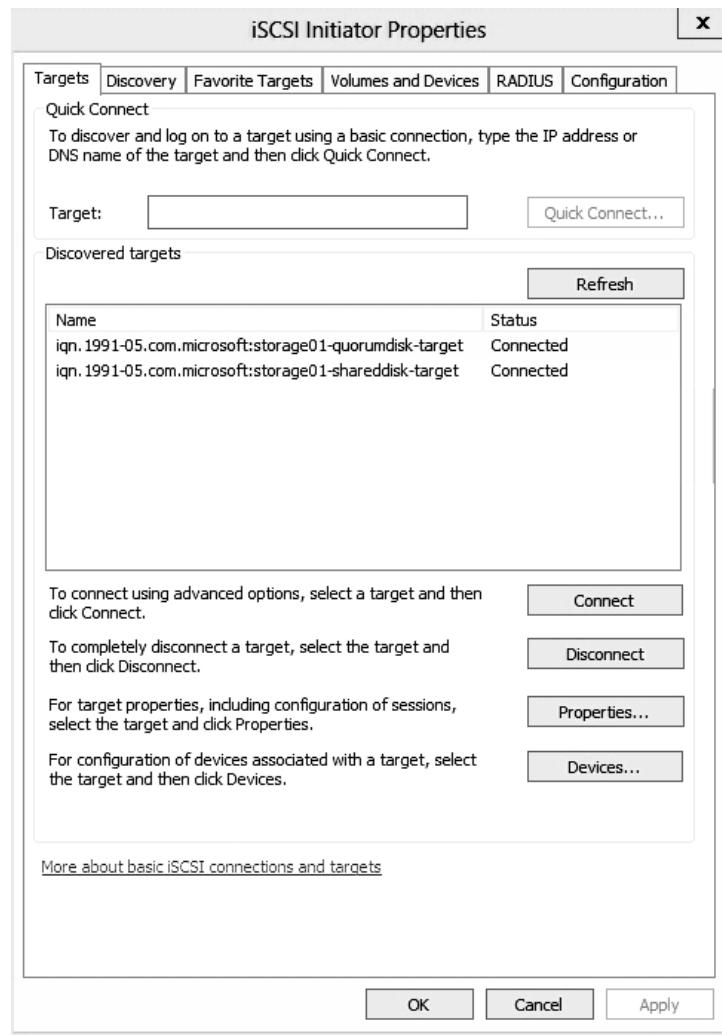


Figure 7-1
Viewing current iSCSI discovered targets

4. Click the **Discovery** tab.
5. Click the **Storage01.contoso.com** target portal and click **Remove**.
6. Click **OK** to close the iSCSI Initiator Properties dialog box.

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7. Logon into Server02, as **contoso\administrator**, with the password of **Password01**.
8. When Server Manager opens, open the **Tools** menu and click **iSCSI Initiator**.
9. Similar to what you did with Server01, disconnect the iSCSI target on Server02.
10. Click the **Discovery** tab.
11. Click the **Storage01.contoso.com** target portal and click **Remove**.
12. Click **OK** to close the iSCSI Initiator Properties dialog box.
13. Logon into Storage01, as **contoso\administrator**, with the password of **Password01**.
14. On Storage01, when Server Manager opens, click **File and Storage Services**.
15. When Server Manager shows the Servers page (as shown in figure 7-2), click **iSCSI**.

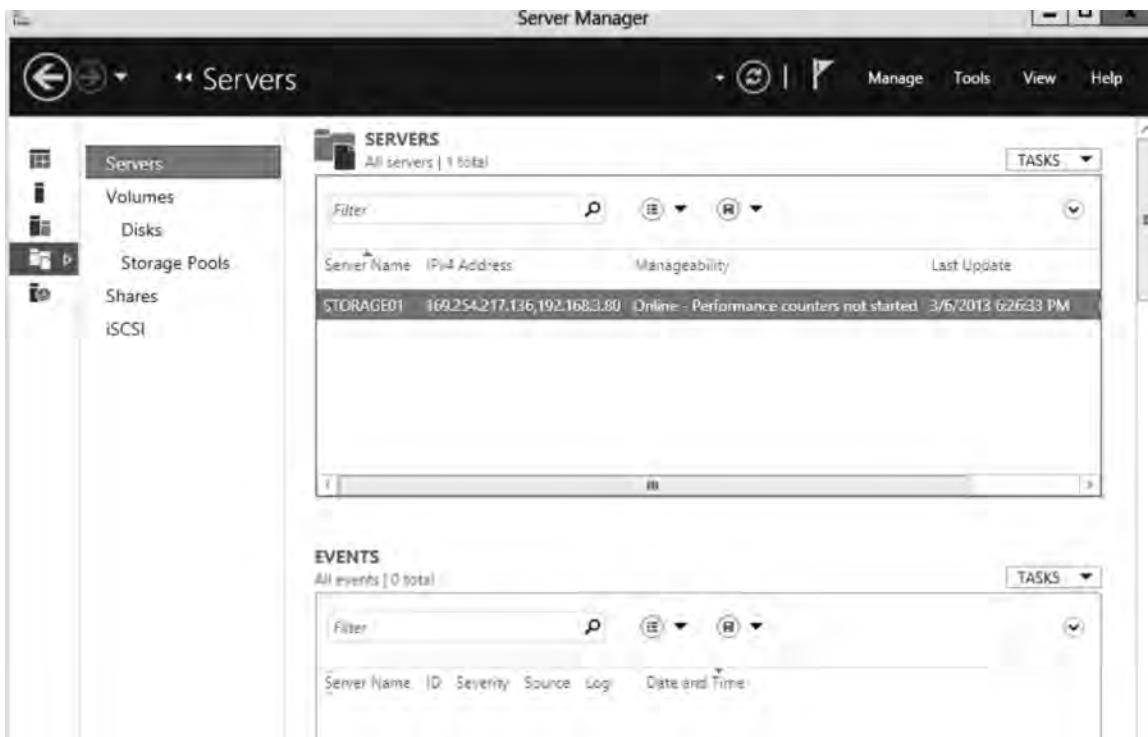


Figure 7-2
Viewing the Server page in Server Manager

16. When the iSCSI page is displayed (as shown in figure 7-3), right-click the first drive listed, and click **Remove iSCSI Virtual Disk**.

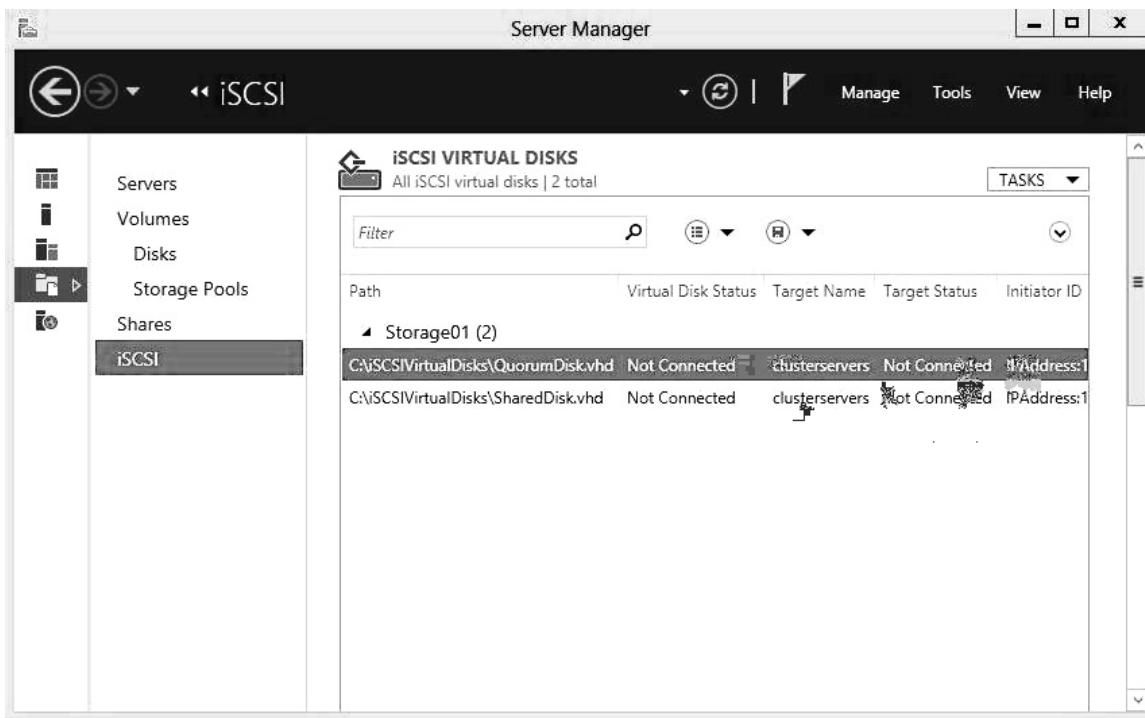


Figure 7-3
Viewing the iSCSI disks

17. When it asks if you are sure, click to select the **Delete the iSCSI virtual disk file from the disk** and click **OK**.
18. Remove the second iSCSI Virtual Disk using the same steps as deleting the first iSCSI virtual disk.

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19. Scroll down on the iSCSI page so that the iSCSI Targets section is as shown in figure 7-4.

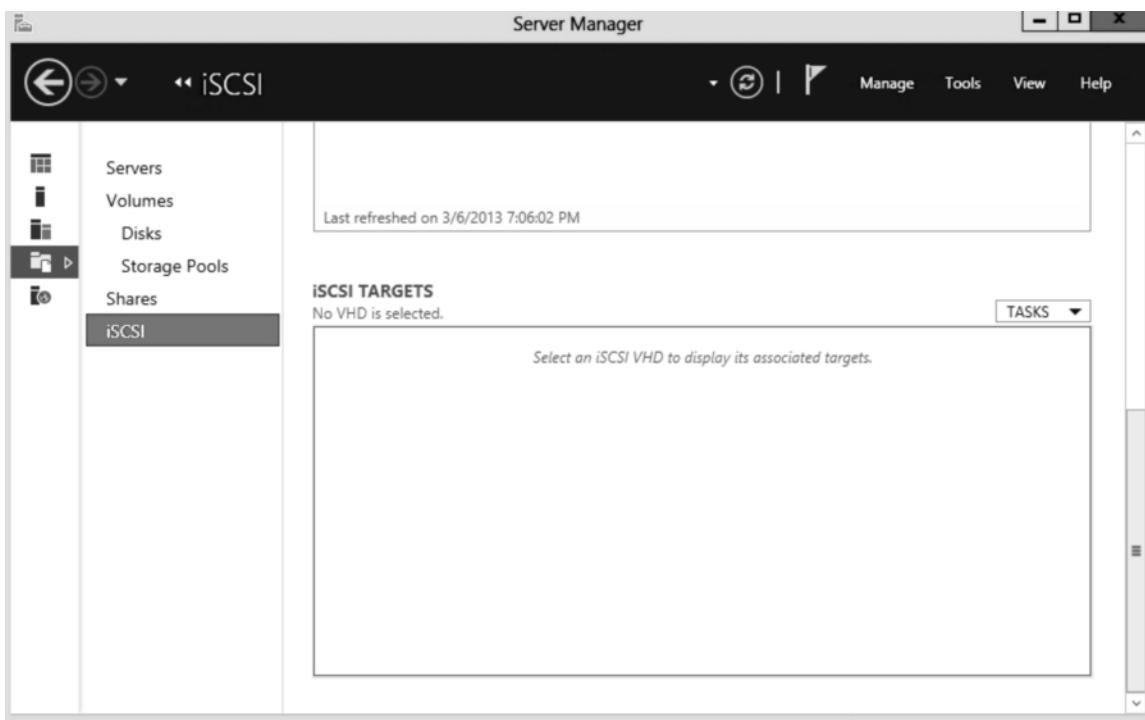


Figure 7-4
Viewing the iSCSI Targets section

20. Take a screen shot of the Server Manager by pressing Alt+Prt Scr and then paste it into your Lab 7 worksheet file in the page provided by pressing Ctrl+V.
21. In the iSCSI Targets section, open the **Tasks** menu and click **View All Targets**.

22. When the iSCSI Targets dialog box opens, as shown in figure 7-5, right-click the iSCSI target and click **Remove Target**. When it asks if you are sure, click **Yes**.

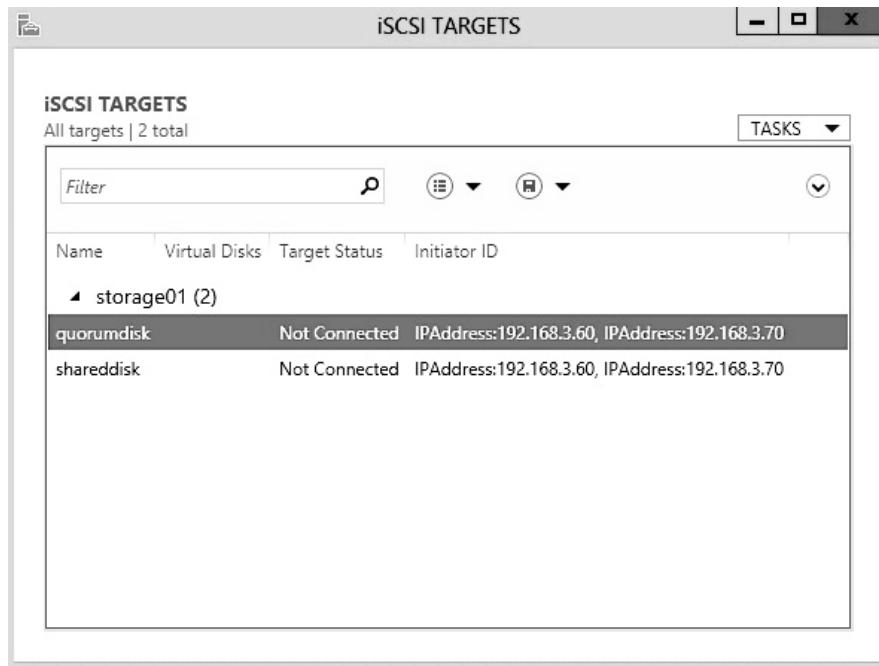


Figure 7-5
Viewing current iSCSI targets

23. Close the iSCSI Targets dialog box.
24. On Server01, using Server Manager, open the **Tools** menu, and click **Computer Management**.
25. When the Computer Management console opens, under **Storage**, click **Disk Management**.

Question 1	<i>How many disks are displayed and what are the disks?</i>
---------------	---

26. Close the Computer Management console.
27. Close Server Manager.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 7.2 Creating and Configuring an iSCSI Target

Overview	In this exercise, you will create and configure two iSCSI targets.
Completion time	20 minutes

Mindset Question: To support an iSCSI Target, what roles must be installed?

1. On Storage01, open Server Manager. Click File and Storage Services, and then click iSCSI.
2. On the iSCSI page (as shown in 7-6), click the **To create an iSCSI virtual disk, start the New iSCSI Virtual Disk Wizard** link.

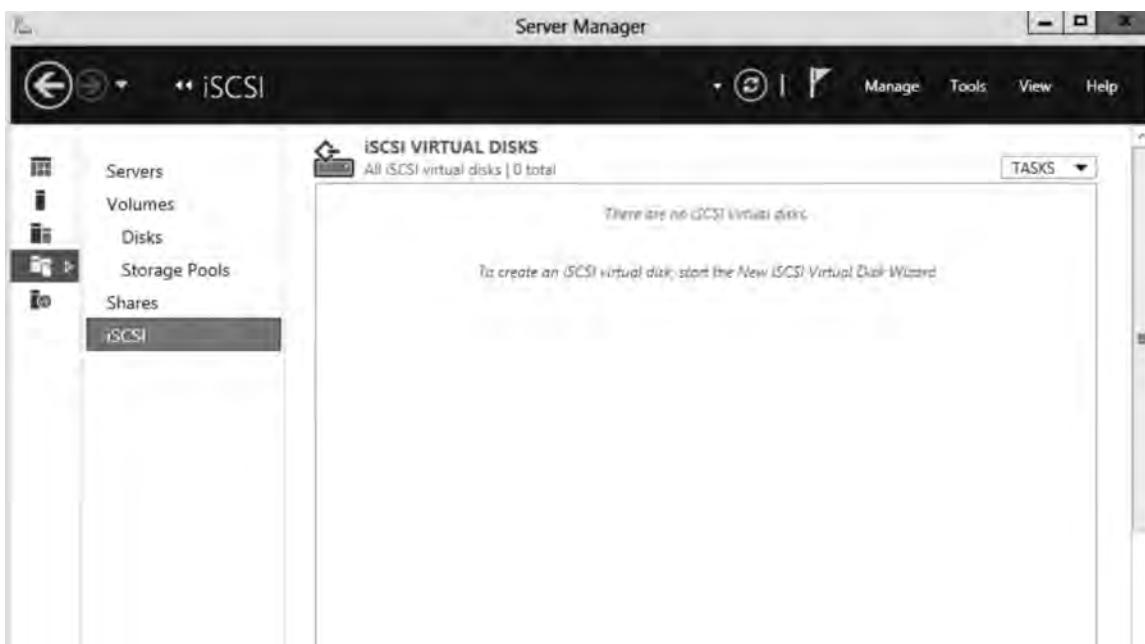


Figure 7-6
Viewing the iSCSI virtual disks section

3. On the Select iSCSI virtual disk location page, Select by volume is already selected. Answer the following question, and click **Next**.

**Question
2**

With the default settings, what folder would the iSCSI virtual disk be saved in?

4. For the iSCSI Virtual Disk Location, type **QuorumDrive** in the Name textbox and click **Next**.
5. On the Specify iSCSI virtual disk size page, specify **2 GB**, and click **Next**.

6. On the Assign iSCSI target page, New iSCSI target is already selected. Click **Next**.
7. On the Target Name and Access page, type **ClusterGroup1** in the Name text box and click **Next**.
8. On the Specify access servers page, click **Add** to open the Add initiator ID dialog box as shown in figure 7-7.

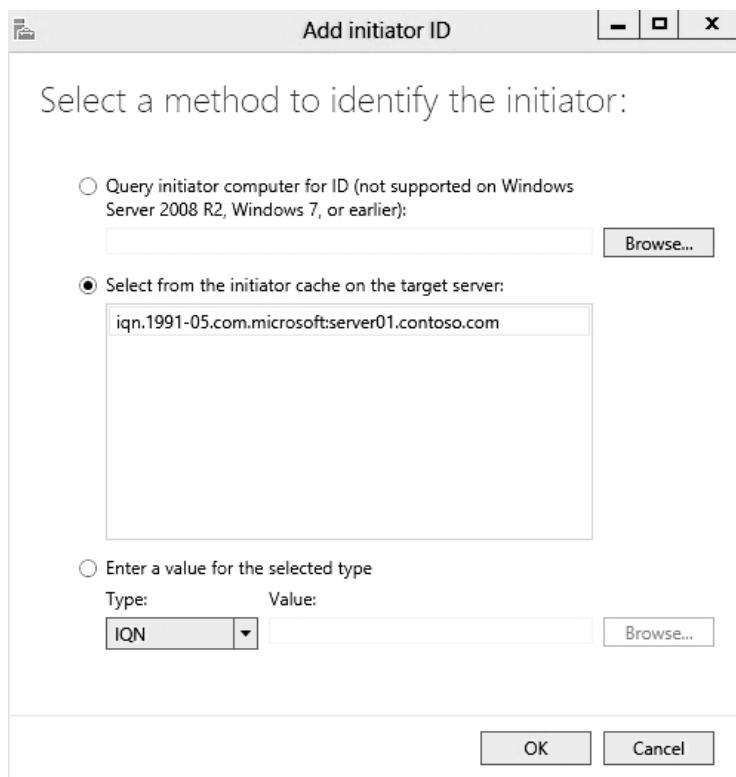


Figure 7-7
Adding an initiator ID

9. Click to select **Enter a value for the selected type**.
10. For the Type, select **IP address**. In the Value type **192.168.1.60** and click **OK**.
11. Click **Add** again to open another Add initiator ID dialog box.
12. Click to select **Enter a value for the selected type**.
13. For the Type, select **IP address**. In the Value type **192.168.1.70** and click **OK**.
14. Back on the Specify access servers page, click **Next**.
15. On the Enable Authentication page, click **Next**.

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16. On the Confirmation page, click **Create**.
17. When the iSCSI virtual disk is created, click **Close**.
18. On the iSCSI page, open the **Tasks** menu and click **New iSCSI Virtual Disk**.
19. On the Select iSCSI virtual disk location page, Select by volume is already selected. Click **Next**.
20. For the iSCSI Virtual Disk Name, type **DataDrive** in the Name textbox and click **Next**.
21. On the Specify iSCSI virtual disk size, specify **8 GB**, and click **Next**.
22. On the Assign iSCSI target page, Existing iSCSI target and clustergroup1 are already selected. Click **Next**.
23. On the Confirmation page, click **Create**.
24. When the iSCSI virtual disk is created, click **Close**.

Question 3	<i>What is the status of the virtual disks?</i>
-----------------------	---

25. Take a screen shot of the iSCSI page by pressing Alt+Prt Scr and then paste it into your Lab 7 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. You can keep Server Manager open.

Exercise 7.3 Configuring iSCSI Initiator	
Overview	In this exercise, you will configure a server to connect to the iSCSI target that you have just created in Exercise 7.2 and prepare the drive for usage.
Completion time	25 minutes

1. On Server01, using the Server Manager console, open the **Tools** menu and click **iSCSI Initiator**.
2. When the iSCSI Initiator properties opens, click the **Discovery** tab.

3. On the Discovery tab (as shown in figure 7-8), click the **Discover Portal** button.

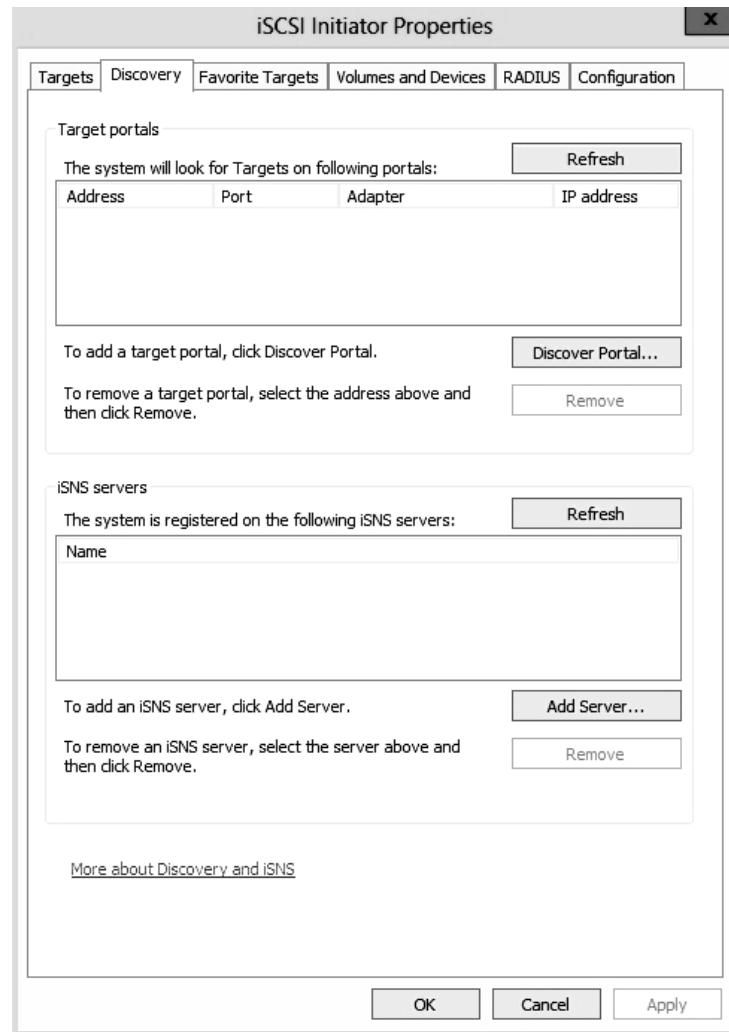


Figure 7-8
Discovery iSCSI targets

4. When the Discover Target Portal dialog box opens, type **192.168.1.80** in the IP address or DNS name text box.

Question 4	<i>What is the default port for iSCSI?</i>
---------------	--

5. Click **OK** to close the Discover Target Portal.
6. On the iSCSI Initiator Properties dialog box, click the **Targets** tab, click the Inactive discovered target, and click the **Connect** button.

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7. When the Connect To Target dialog box opens, click **OK**.
8. On the iSCSI Initiator Properties dialog box, Click the **Volumes and Devices** tab.
9. Click the **Auto Configure** button.

Question 5	<i>How many volumes are displayed</i>
-----------------------	---------------------------------------

10. Take a screen shot of the Volumes and Devices tab window by pressing Alt+Prt Scr and then paste it into your Lab 7 worksheet file in the page provided by pressing Ctrl+V.
11. Click **OK** to close the iSCSI Initiator Properties dialog box.
12. On Server01, using Server Manager, click the **Tools** menu and click **Computer Management**.
13. Under Storage, click **Disk Management**.

Question 6	<i>How many disks are displayed now?</i>
-----------------------	--

14. Right-click Disk 1 and click **Online**. Right-click Disk 1 and click Initialize Disk. When the Initialize Disk dialog box opens, click **OK**.

Question 7	<i>What partition style was used?</i>
-----------------------	---------------------------------------

Question 8	<i>What type of disk is Disk 1?</i>
-----------------------	-------------------------------------

15. Right-click the 2.00 GB unallocated volume and click **New Simple Volume**.
16. When the Welcome to the New Simple Volume Wizard opens, click **Next**.
17. On the Specify Volume Size, click **Next**.
18. On the Assign Drive Letter or Path page, click **Next**.
19. On the Format Partition page, click **Next**.
20. When the wizard is complete, click **Finish**.
21. Using the previous steps, initialize, partition, and format Disk 2.

22. Take a screen shot of the Computer Management console showing the newly created disks by pressing Alt+Prt Scr and then paste it into your Lab 7 worksheet file in the page provided by pressing Ctrl+V.
23. Close **Computer Management**.
24. If you see any dialog boxes to format a drive, click Cancel.
25. Close **Server Manager**.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 7.4 Using Features on Demand

Overview	In this exercise, you will reduce the amount of disk space used by Windows by using Feature on Demand.
Completion time	10 minutes

1. On Server01, open the Windows PowerShell window by clicking the **Windows PowerShell** icon on the task bar.
2. On Server01, execute the following command at the PS prompt

`Get-WindowsFeature`

3. Scroll up and find **BitLocker Drive Encryption**.

**Question
9**

What is the status of BitLocker Drive Encryption?

4. Take a screen shot of the Windows PowerShell window by pressing Alt+Prt Scr and then paste it into your Lab 7 worksheet file in the page provided by pressing Ctrl+V.

5. To remove the BitLocker binaries, execute the following command at the PS prompt:

`uninstall-WindowsFeature Bitlocker -Remove`

6. Take a screen shot of the Windows PowerShell window by pressing Alt+Prt Scr and then paste it into your Lab 7 worksheet file in the page provided by pressing Ctrl+V.

7. Execute the following command at the PS prompt

`Get-WindowsFeature`

**Question
10**

What is the status of BitLocker Drive Encryption?

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8. Close the Windows PowerShell window.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 7.1, what did you have to do before you deleted the iSCSI targets?
2. In Exercise 7.2, what tool did you use to manage the iSCSI targets?
3. In Exercise 7.2, what are the different ways to identify which clients can connect to an iSCSI target?
4. In Exercise 7.3, what port did you use to connect to the iSCSI target?
5. In Exercise 7.4, what Windows PowerShell command did you use to view the current Windows features that were available on a computer running Windows Server 2012.
6. In Exercise 7.5, what Windows PowerShell cmdlet did you use to remove the binaries of a Windows feature?

Lab Challenge	Implementing Thin Provisioning
Overview	To complete this challenge, you will describe how to implement thin provisioning by writing the steps for the following scenario.
Completion time	10 minutes

You are an administrator for the Contoso Corporation. You have several Hyper-V hosts that connect to a central Storage Area Network (SAN). You are close to running out of disk space on a couple of LUNS. What are the steps that you would perform to switch a disk that is thick provisioned to a disk that is thin provisioned?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 8

CONFIGURING AND

MANAGING BACKUPS

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

- Exercise 8.1** Installing the Windows Server Backup Feature
- Exercise 8.2** Performing a Manual Backup of a Local Volume to a Remote Share
- Exercise 8.3** Backing up the System State
- Exercise 8.4** Managing VSS Settings
- Exercise 8.5** Enabling Shadow Copies for Shared Volumes
- Lab Challenge** Using Hyper-V Snapshots

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 8-1.

Table 8-1
Computers required for Lab 8

<i>Computer</i>	<i>Operating System</i>	<i>Computer Name</i>
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02
Server (VM 4)	Windows Server 2012	Storage01

In addition to the computers, you will also require the software listed in Table 8-2 to complete Lab 8.

Table 8-2
Software required for Lab 8

<i>Software</i>	<i>Location</i>
Lab 11 student worksheet	Lab8 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab08 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Install the Windows Server Backup feature
- Backup files and the system state using Windows Server Backup
- Manage VSS settings using VSSAdmin
- Enable Shadow Copies for shared volumes.

Estimated lab time: 90 minutes

Exercise 8.1

Installing the Windows Server Backup Feature

Overview

In this exercise, you will install the Windows Server Backup feature, which will be used in the following exercises.

Completion time

10 minutes

Mindset Question: **What is the best method for data recovery?**

1. Log into Server02 as **contoso\administrator** with the password of **Password01**.
2. When Server Manager opens, open the **Manage** menu and click **Add Roles and Features**.
3. When the Add Roles and Features Wizard starts, click **Next**.
4. On the Select installation type page, click **Next**.
5. On the Select destination server page, click Server02.contoso.com, and click **Next**.
6. Click **Next** on the Select server roles screen.
7. Select **Windows Server Backup** and click **Next**.
8. On the Confirm installation selections page, click **Install**.
9. When the installation is complete, click **Close**.

End of exercise. You can leave Server Manager open.

Exercise 8.2 **Performing a Manual Backup of Local Folders to a Remote Share**

Overview	In this exercise, you will back up a data folder using Windows Server Backup
Completion time	15 minutes

Mindset Question: **How often should you backup a data folder that contains user data files?**

1. Log into Storage01 as **contoso\administrator** with the password of **Password01**.
2. Open the **File Explorer** icon on the taskbar.
3. Navigate to Local Disk (C:) and create a **C:\BAK** folder.
4. Right-click the **BAK** folder and click **Properties**.
5. When the Properties dialog box opens, click the **Sharing** tab.

6. Click the **Advanced Sharing** button.
7. When the Advanced Sharing dialog box opens, click to select the **Share this folder** option.
8. Click the **Permissions** button.
9. When the Permissions dialog box opens, with Everyone already selected, click the **Allow Change** box as shown in figure 8-1.

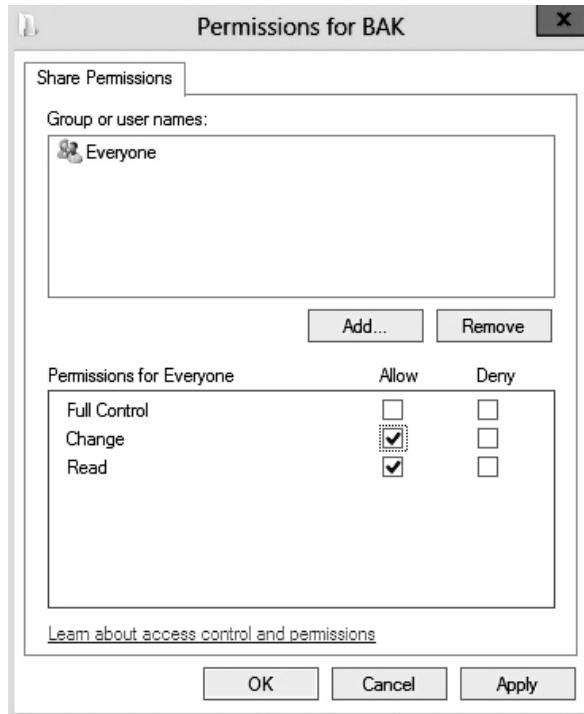


Figure 8-1
Configuring a shared folder

10. Click **OK** to close the Permissions dialog box.
11. Click **OK** to close the Advanced Sharing dialog box.
12. Click **Close** to close the BAK Properties dialog box.
13. In File Explorer, create **C:\BAK\BAK1** and **C:\BAK\BAK2** folders.
14. On Server02, using Server Manager, click **Tools > Windows Server Backup**.
15. When the wbadmin window opens, click **Local Backup**. The wbadmin window is shown in figure 8-2.

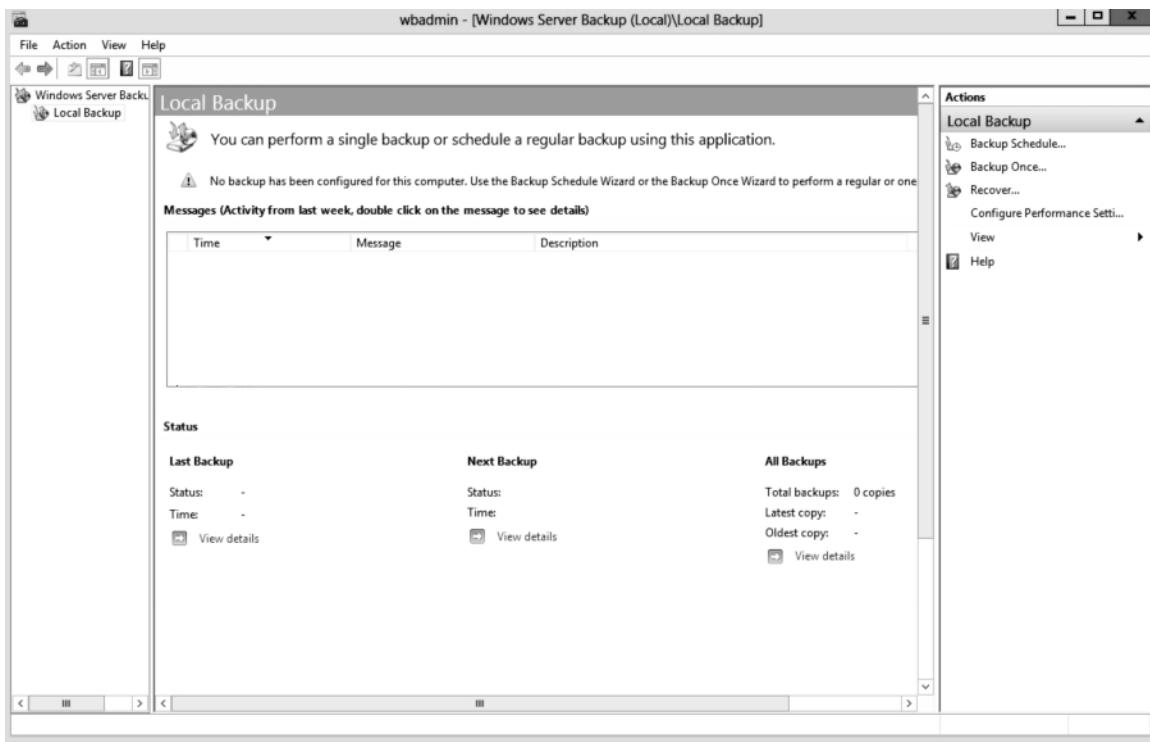


Figure 8-2
Opening Windows Server Backup

16. Click **Backup Once** from the Actions panel.
17. Click **Different Options** when prompted to select a Backup option and click **Next**.
18. Click **Custom** for the backup configuration and click **Next**.
19. On the Select Items for Backup page, click **Add Items**, Expand the C drive. Click to select the **Users** folder and the **ProgramData** folder (as shown in figure 8-3), and then click **OK**.

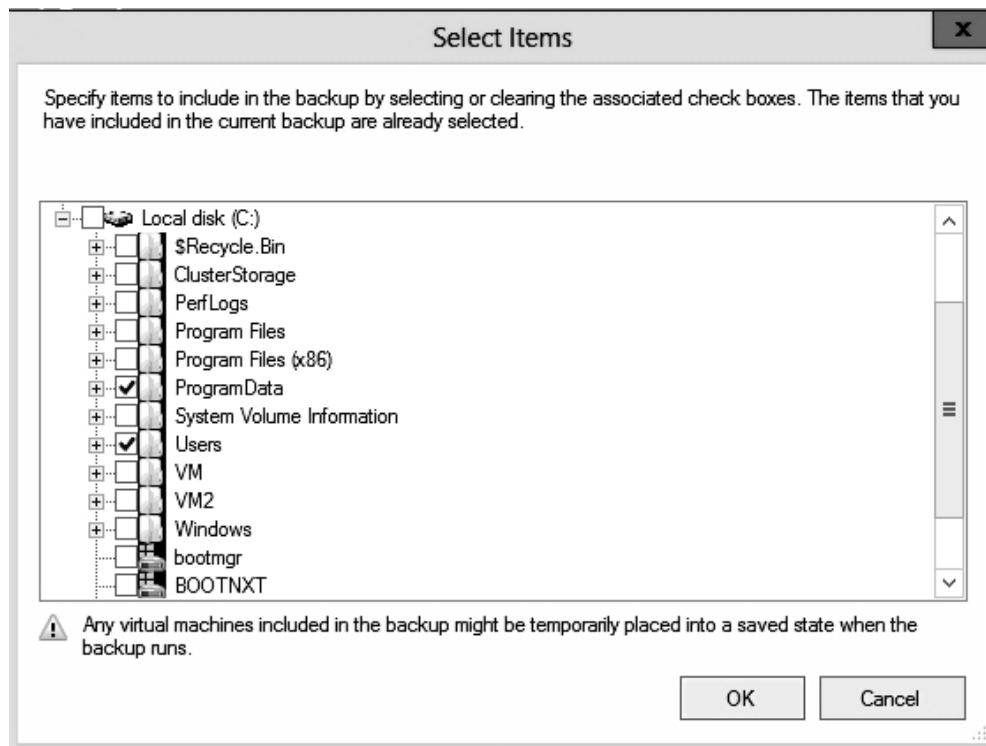


Figure 8-3
Selecting items to backup

Question 1	<i>What is the ProgramData folder used for?</i>
-----------------------	---

20. Click **Next** to continue.
21. On the Specify Destination Type page, click the **Remote shared folder**, and then click **Next**.
22. On the Specify Remote Folder dialog box, enter the location **\storage01\BAK\BAK1**. Click **Next** to continue.
23. On the Confirmation page, click **Backup**.
24. When the backup is complete, take a screen shot of wbadmin window by pressing Alt+Prt Scr and then paste it into your Lab 8 worksheet file in the page provided by pressing Ctrl+V.
25. Click **Close**.
26. Leave Wbadmin open for the next exercise.

Exercise 8.3 Backing Up the System State

Overview	In this exercise, you back up the system state of a server.
Completion time	20 minutes

Mindset Question: Why is it important to back up the system state?

1. On Server02, using Wbadmin, select **Backup Once** from the Actions pane.
2. Select **Different Options** when prompted to select a Backup option and click **Next**.
3. Click **Custom** for the backup configuration and click **Next**.
4. On the Select Items dialog box, click **Add Items** and select the **Bare metal recovery**.

**Question
2**

What items were selected when you selected Bare metal recovery?

5. Click to deselect the **Bare metal recovery**, **System Reserved drive**, and the **Local Disk (C:)**. Click **OK**.
6. Click **Next**.
7. On the Specify Destination Type page, click **Remote shared folder** for the storage location, and then click **Next**.
8. On the Specify Remote Folder dialog box, enter the location `\storage01\BAK\BAK2`. Click **Next** to continue.
9. Confirm the settings and click **Backup**.
10. When the backup is complete, take a screen shot of the Backup Once Wizard by pressing Alt+Prt Scr and then paste it into your Lab 8 worksheet file in the page provided by pressing Ctrl+V.
11. Click **Close**.
12. Close Wbadmin.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 8.4 Managing VSS Settings

Overview

In this exercise, you will use VSSAdmin to manage VSS including identifying VSS writer and VSS provider.

Completion time

10 minutes

Mindset Question: **What advantage does VSS give you when performing backups?**

1. On Server02, right-click the **Start menu** and click **Command Prompt (Admin)**.
2. When the Administrator: Command Prompt dialog box opens, type the following to see a list of commands supported with vssadmin:

```
vssadmin /?
```

3. Type the following to see a list of VSS writers on Server02 and their current state.

```
vssadmin list writers
```

**Question
3**

How many VSS writers do you have?

4. Type the following to see a list of VSS providers on Server02:

```
vssadmin list providers
```

**Question
4**

What are the VSS providers?

5. Type the following to see a list of existing volume shadow copies:

```
vssadmin list shadows
```

6. To list the volumes that are eligible for shadow copies, enter the following:

```
vssadmin list volumes
```

**Question
5**

How many shadows did you have?

7. To view used, allocated, and maximum shadow copy storage space, type the following:

```
vssadmin list shadowstorage
```

8. Take a screen shot of the Command Prompt window by pressing Alt+Prt Scr and then paste it into your Lab 8 worksheet file in the page provided by pressing Ctrl+V.
9. Close the Administrator: Command Prompt window.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 8.5 Enabling Shadow Copies for Shared Volumes

Overview	In this exercise, you will enable and configure shadow copies to automatically back up shared folders.
----------	--

Completion time	15 minutes
-----------------	------------

Mindset Question: What does Shadow Copies allow you to do?

1. Log into Server01 as **contoso\administrator** with the password of **Password01**.
2. Using **File Explorer**, create a folder called **C:\CorpDocs**.
3. Share the **C:\CorpDocs** folder. Configure so that **Everyone** has **Allow Change** share permission.
4. Open the **C:\CorpDocs** folder.
5. Create a text file in the CorpDocs folder named **Agenda.txt**, type your name in the **Agenda.txt** file, and then save and close the text file.
6. On Server01, using Server Manager, and select **Tools > Computer Management**.
7. When Computer Management opens, expand the **Storage** node and click **Disk Management**.
8. Right-click **C** drive, and click **Properties**.
9. Select the **Shadow Copies** tab.
10. Click to select the **C:** drive (as shown in figure 8-4) , and click **Enable**.

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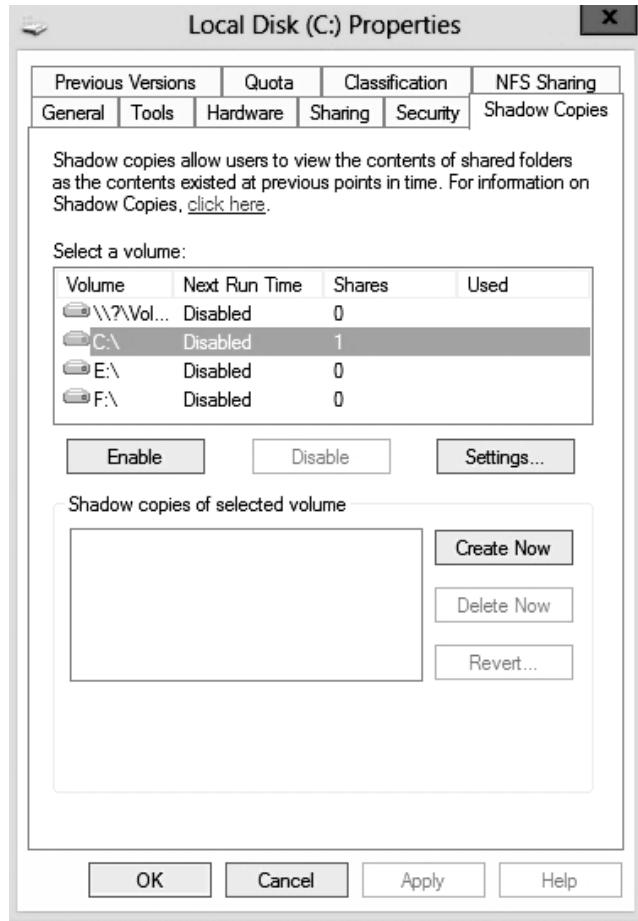


Figure 8-4
Configuring shadow copies

11. When the Enable Shadow Copies dialog box opens, click **Yes** to confirm you want to enable shadow copies on the volume.
12. Take a screen shot of the Properties window by pressing Alt+Prt Scr and then paste it into your Lab 8 worksheet file in the page provided by pressing Ctrl+V.
13. Click **Create Now** to create a second snapshot of the selected volume.
14. Click **Settings**.
15. When the Settings dialog box opens, click **Schedule**.

**Question
6**

How often are shadow copies created and at what time?

16. Click **OK** to close the C:\ dialog box.
17. Click **OK** to close the Settings dialog box
18. Click **OK** to close the Local Disk (C:) Properties dialog box.
19. Close Computer Management.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 8.1, was Windows Server Backup a role or a feature?
2. In Exercise 8.3, what Windows PowerShell command did you use to list VSS writers?
3. In Exercise 8.3, what command is used to list the shadow copies?
4. In Exercise 8.4, where did you enable the shadow copies for a shared folder?

Lab Challenge	Using Hyper-V Snapshots
----------------------	--------------------------------

Overview	To complete this challenge, you describe how to create Hyper-V snapshots by writing the steps for the following scenario.
----------	---

Completion time	10 minutes
-----------------	------------

You are ready to perform a major upgrade to a critical application on Server01. You need to make sure that you can undo the changes if the upgrade does not go well. What should you do?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 9

RECOVERING SERVERS

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

- Exercise 9.1** Restoring a folder using Windows Server Backup
- Exercise 9.2** Restoring the System State of a System
- Exercise 9.3** Restoring a File Using Shadow Copy
- Exercise 9.4** Booting Into Safe Mode
- Exercise 9.5** Using Command Prompt Repair Tools
- Lab Challenge** Performing an Authoritative Restore

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 9-1.

Table 9-1

Computers required for Lab 9

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02
Server (VM 4)	Windows Server 2012	Storage01

In addition to the computers, you will also require the software listed in Table 9-2 to complete Lab 9.

Table 9-2

Software required for Lab 9

Software	Location
Lab 9 student worksheet	Lab9_worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab09_worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Restore items using Windows Server Backup.
- Restore files using shadow copy.
- Boot the server into Safe mode.
- Boot the server into the command prompt and use basic troubleshooting tools to fix boot problems.

Estimated lab time: 90 minutes

Exercise 9.1 Restoring a Folder Using Windows Server Backup

Overview	In this exercise, you pick up where you left off in the last exercise by restoring a folder that you backed up.
----------	---

Completion time	15 minutes
-----------------	------------

1. Log into Server02 as **contoso\administrator** with the password of **Password01**.
2. Open the **File Explorer** icon on the taskbar.
3. Navigate to and open the **C:\Users** folder and delete the **Public** folder.
4. On Server02, using Server Manager, open the **Tools** menu and click **Windows Server Backup**.
5. When Windows Server Backup opens, click **Local Backup**.
6. Under the Actions pane, click **Recover**.
7. When the Recovery Wizard opens, This server (Server02) is already selected. Click **Next**.
8. When the Select Backup Date opens (as shown in figure 9-1), on the calendar, click the date of the first backup that you performed in the last lesson. Then in the Time pull-down menu, click the time of the first backup that you performed. The Location should show **\storage01\Bak\Bak1**. Click **Next**.

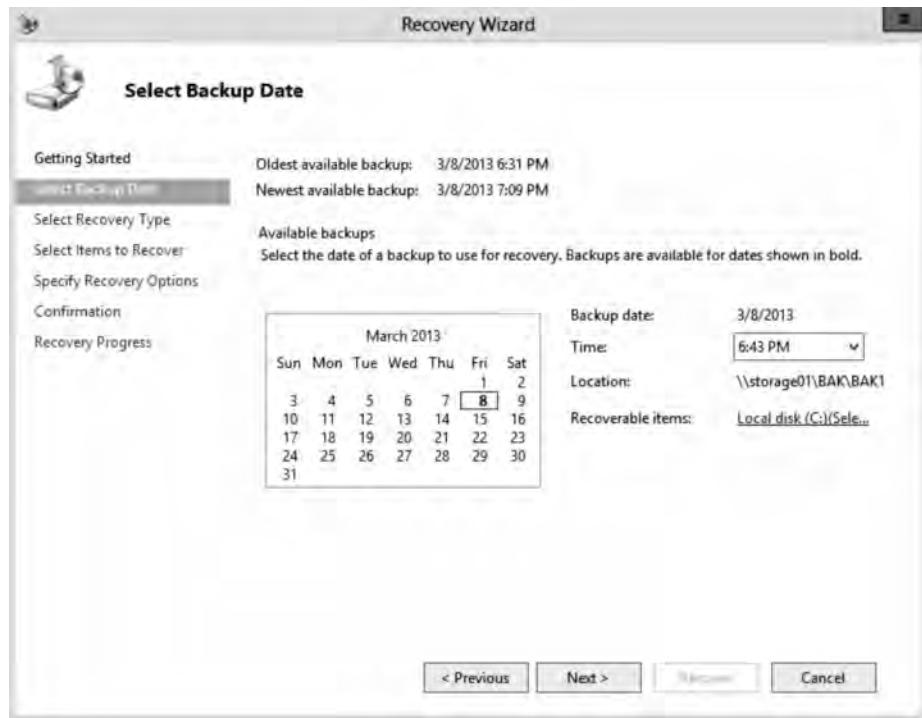


Figure 9-1
Specifying which backup to restore

9. On the Select Recovery Type page, Files and folders is already selected. Click Next.
10. On the Select Items to Recover page, under Available items, expand **Server02**, expand **Local disk (C:)**, expand **Users**, and click **Public**. Click Next.
11. On the Specify Recovery Options page, click Next.
12. On the Confirmation page, click **Recover**.
13. When the files have been recovered, take a screen shot of the Properties window by pressing Alt+Prt Scr and then paste it into your Lab 9 worksheet file in the page provided by pressing Ctrl+V.
14. Click **Close**.
15. Using File Explorer, verify that the **C:\Public** folder has been restored.
16. Close **File Explorer**.
17. Leave Windows Server Backup open for the next exercise.

Exercise 9.2 Restoring the System State of a System

Overview In this exercise, restore the system state that was backed up during the last exercise.

Completion time 20 minutes

1. On Server02, using Windows Server Backup, under the Actions pane, click **Recover**.
2. When the Recovery wizard opens, This server (Server02) is already selected. Click **Next**.
3. When the Select Backup Date opens, on the calendar, click the date of the second backup that you performed in the last lesson. Then in the Time pull-down menu, click the time of the second backup that you performed. The Location should show \\storage01\Bak\Bak2. Click **Next**.
4. On the Select Recovery Type page, click **System State**. Click **Next**.
5. On the Select Location for System State Recovery page, Original location is already selected, click **Next**.
6. When it asks if you want to continue, click **OK**.
7. On the Confirmation page, click **Recover**.
8. When it asks if you want to continue, click **Yes**. When performing the restore, be patient. The backup will take up to 15 minutes to perform the restore, and the backup program may stop responding during this time.
9. If the computer does not reboot by itself, click **Close**, and reboot the server.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 9.3 Restoring a File Using Shadow Copy

Overview In this exercise, you access the previous versions of files that were saved with shadow copy, and restore those files.

Completion time 10 minutes

1. Log into Server01 as **contoso\administrator** with the password of **Password01**.
2. Open the **File Explorer** icon on the taskbar.

3. Using File Explorer, right-click the C:\CorpDocs folder, and click **Properties**.
4. When the Properties dialog box opens, click the **Previous Versions** tab. Figure 9-2 shows the Previous Versions tab.

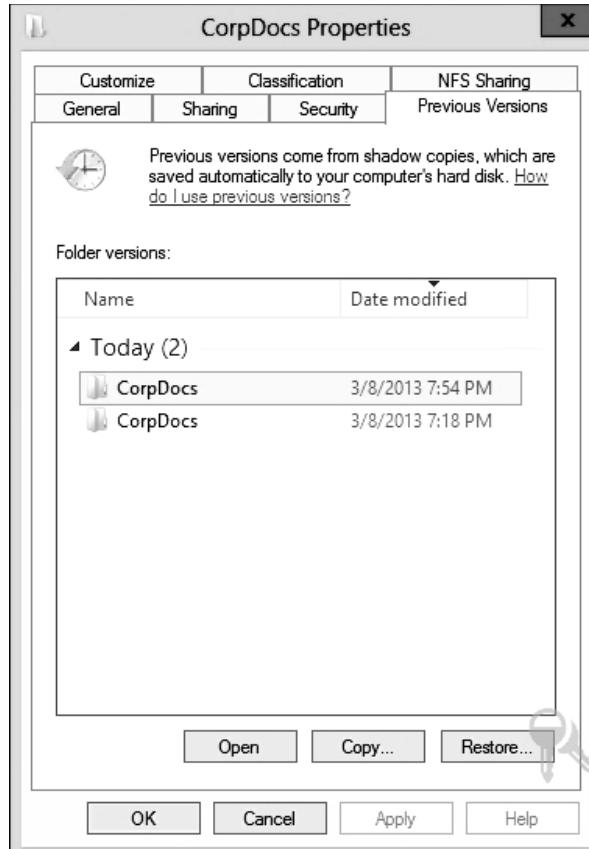


Figure 9-2
Viewing previous versions of files

5. Click the first **CorpDocs** folder and click **Copy**.
6. When the Copy Items dialog box opens, click **Desktop**, and click **Copy**.
7. Click **OK** to close the CorpDocs Properties dialog box.
8. Open the **CorpDocs** folder on the Desktop and verify that the **Agenda.txt** text file is there.
9. When the file has been recovered, take a screen shot of the CorpDocs window by pressing Alt+Prt Scr and then paste it into your Lab 9 worksheet file in the page provided by pressing Ctrl+V.
10. Close the **CorpDocs** folder.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 9.4 Booting into Safe Mode

Overview	In this exercise, boot to safe mode, and look at the various tools that are available in safe mode that can be used to troubleshoot Windows.
Completion time	15 minutes

Mindset Question: **You are trying to troubleshoot a computer that will not boot Windows. So how can you start Windows RE if you cannot start Windows?**

1. Log into Server02 as **contoso\administrator** with the password of **Password01**.
2. If you get an error message saying the trust relationship between this workstation and the primary domain failed, it is caused because the backup of the system state was done long ago and the computer machine account and its password do not match the domain database. This occurs when the machine account has been updated since the system state backup was done. Therefore, you will need to add the computer back to the domain by using the following steps:
 - a. Login as the local **Server02\administrator** (**not** the Contoso\administrator) with the password of **Password01**.
 - b. When you receive the message that the system state has been successfully completed, press the **Enter** key.
 - c. Right-click the **Start** button and click **System**.
 - d. When the System window opens, click **Change settings** in the Computer name, domain, and workgroup settings section.
 - e. When the System Properties dialog box opens, click **Change**.
 - f. When the Computer Name/Domain Changes dialog box opens, click **Workgroup**, and type **WG** in the Workgroup text box. Click **OK**.
 - g. When you get a warning saying you will need to know the password of the local administrator account, click **OK**.
 - h. When the Welcome to the WG workgroup message appears, click **OK**.
 - i. When it says that you must restart the computer, click **OK**.
 - j. In the System Properties dialog box, click **Change** again.
 - k. When the Computer Name/Domain Changes dialog box opens, click **Domain**.

- l. In the Domain text box, type **Contoso.com** and click **OK**.
 - m. When the Windows Security dialog box appears, login as **Administrator** with the password of **Password01**.
 - n. When the Welcome to the contoso.com domain appears, click **OK**.
 - o. When it says that you must restart your computer, click **OK**.
 - p. Click **Close** to close the System Properties dialog box.
 - q. Click **Restart Now**.
 - r. Login as **contoso\administrator** with the password of **Password01**.
3. If you have not had to add the computer back to the domain, when you receive the message that the system state has been successfully completed, press the **Enter** key.
 4. On Server02, enter the following at a command prompt:
shutdown /r /o
 5. Click **Close** when prompted. The system will shut down in less than a minute.
 6. Click the **Troubleshoot** tile (as shown in figure 9-3).

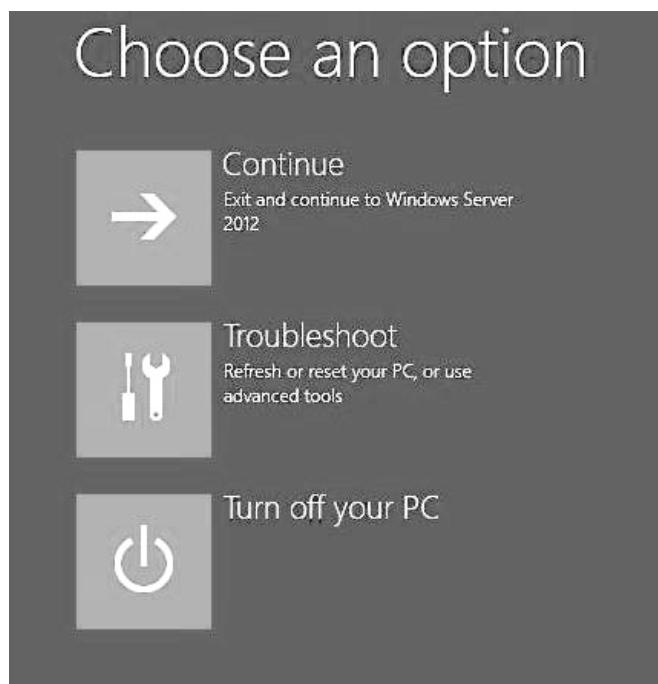


Figure 9-3
Choosing a boot option

7. Click the **Startup Settings** tile (as shown in figure 9-4).

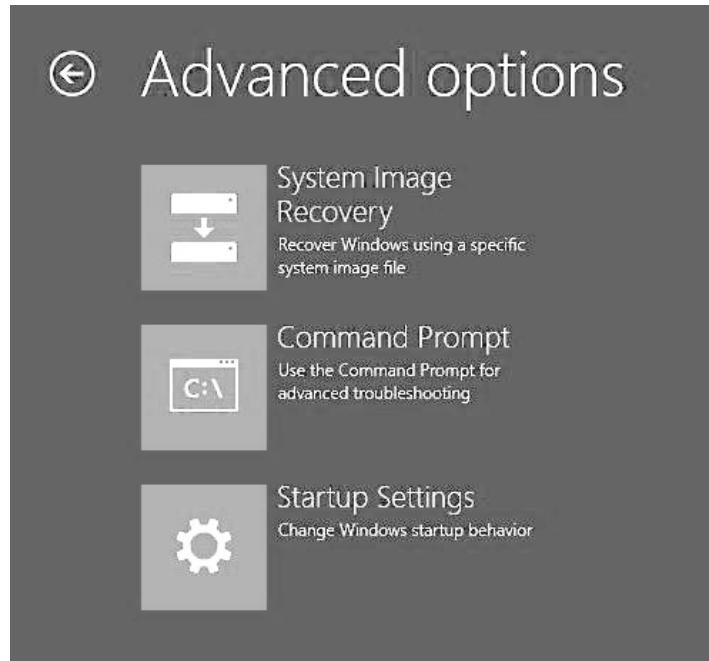


Figure 9-4
Selecting Advanced options

8. Select **Restart**.
9. When the Advanced Options menu opens (as shown in figure 9-5) Select **Safe Mode** and press **Enter**.



Figure 9-5
Selecting a boot option from Advanced Boot Options

10. After Server02 reboots, log in as Contoso\administrator.
11. Close the Windows Help and Support window.
12. Confirm your system is now in safe mode. The word “safe mode” should appear on each corner of your desktop as shown in figure 9-6.

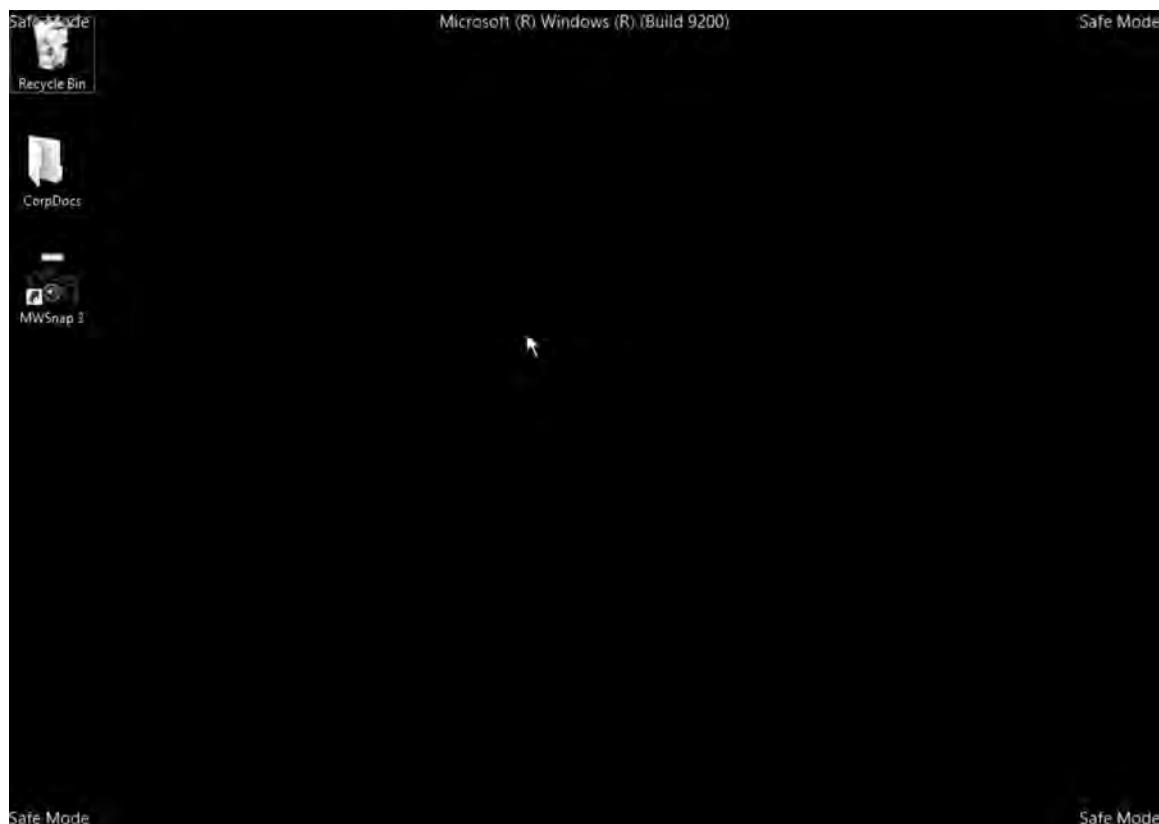


Figure 9-6
Booting to Safe mode

13. Click the **Start button**, then type **msconfig** (as shown in figure 9-7) and click **System Configuration**.

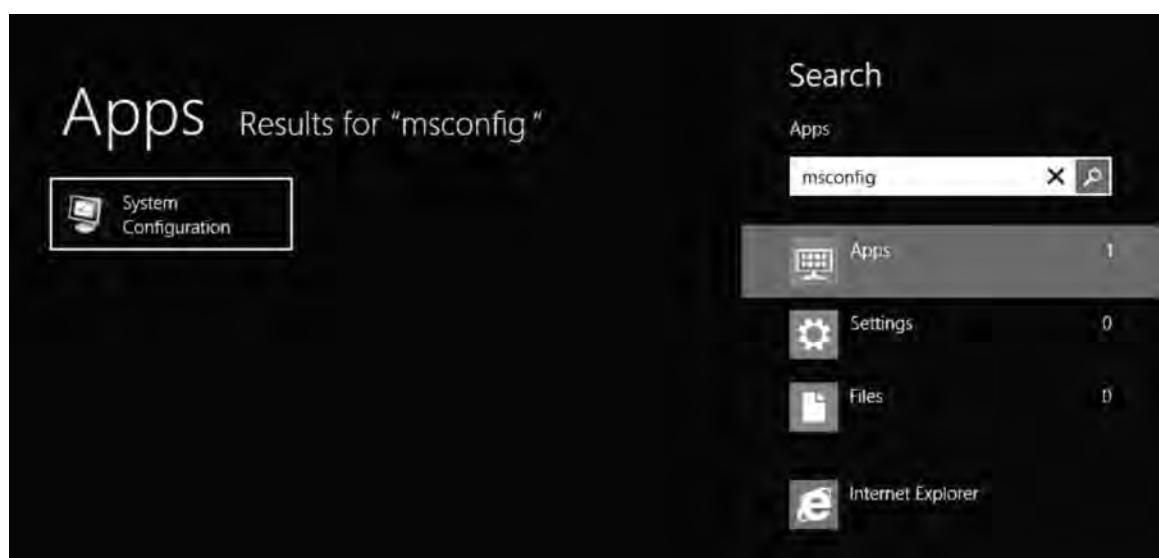


Figure 9-7
Searching for an application

14. Take a screen shot of the System Configuration Boot tab by pressing Alt+Prt Scr and then paste it into your Lab 9 worksheet file in the page provided by pressing Ctrl+V.

15. Click the **Boot** tab.

Question 1	<i>What is the boot entry that you have?</i>
---------------	--

16. Click the **Services** tab.

Question 2	<i>How many services are running?</i>
---------------	---------------------------------------

17. Click to select the **Hide all Microsoft services**.

Question 3	<i>How many non-Microsoft services do you have?</i>
---------------	---

18. Click OK to close **System Configuration**.

19. Click the **Start** button, then type **compmgmt.msc** and click **Computer Management**.

Question 4	<i>What did compmgmt open?</i>
---------------	--------------------------------

20. Expand **Event Viewer > Windows logs** and review the **System** and **Application** logs. If you actually had a problem, you would look for events that would help you troubleshoot the problem.

21. Close the Computer Management console.

22. Use File Explorer to navigate to **c:\Windows** folder and locate the **ntbtlog.txt** file.

23. Open the **ntbtlog.txt** file to view its contents.

24. Take a screen shot of the ntbtlog file by pressing Alt+Prt Scr and then paste it into your Lab 9 worksheet file in the page provided by pressing Ctrl+V.

25. Close the ntbtlog.txt file.

26. Use Settings in the right pop-up bar to restart the server.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 9.5 Using Command Prompt Repair Tools

Overview

In this exercise, you will boot to a command prompt and execute several command prompt tools that can be used to fix boot problems.

Completion time

15 minutes

1. Log into Server02 as **contoso\administrator** with the password of **Password01**.

2. On Server02, enter the following at a command prompt:

shutdown /r /o

3. Click Close when prompted. The system will shut down in less than a minute.

4. Click the **Troubleshoot** tile.

5. Click the **Command Prompt** tile.

6. Click **Administrator**.

7. Type the **Password01** password in the Enter the Password for this account text box and click **Continue**.

8. At the command prompt, execute the following command:

bootrec

9. Take a screen shot of the command prompt window by pressing Alt+Prt Scr and then paste it into your Lab 9 worksheet file in the page provided by pressing Ctrl+V.

**Question
5**

Which option is used to fix the boot sector?

10. At the command prompt, execute the following command:

```
bootrec /FixMbr
```

11. Execute the following command:

```
diskpart
```

12. At the DISKPART> command prompt, execute the following command:

```
?
```

13. At the DISKPART> command prompt, execute the following commands:

```
list disk
```

```
list volume
```

14. At the DISKPART command prompt, execute the following

```
exit
```

15. The default boot time to display the boot menu on multi-boot system is 30 seconds. To change that to 10 seconds, execute the following command:

```
bcdedit /timeout 10
```

16. To export the BcdStore to the C:\ drive, execute the following command:

```
bcdedit /export C:\BcdStore
```

17. Execute the following command:

```
bcdedit /?
```

**Question
6**

What option is used to change the /default operating system?

18. To rebuild the BCD, execute the following command:

```
bootrec /rebuildbcd
```

19. To close the command prompt, execute the following command:

```
exit
```

20. When it asks you to choose an option, click **Continue**.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 9.1, what program was used to restore files from backup?
2. In Exercise 9.3, how did you access previous versions of files and folders?
3. In Exercise 9.4, what command did you use to reboot the computer into the Advanced Boot options menu
4. In Exercise 9.4, what program would you use to stop a service from starting during the Windows boot?
5. In Exercise 9.4, what command did you use to rebuild the BCD?

Lab Challenge Performing an Authoritative Restore

Overview To complete this challenge, you will describe how to perform an authoritative restore by writing the high-level steps for the following scenario.

Completion time 5 minutes

You need to perform an authoritative restore of Active Directory using the backup of the system state so that you can restore a user that was accidentally deleted. What steps would you need to perform to perform the authoritative restore?

End of lab.

LAB 10

CONFIGURING SITE-LEVEL FAULT TOLERANCE

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES:

Exercise 10.1 Configuring and Enabling Hyper-V Replication

Exercise 10.2 Configuring Replication for a VM

Lab Challenge Configuring Multi-Site Failure Cluster

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 10-1.

Table 10-1

Computers required for Lab 10

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02
Server (VM 4)	Windows Server 2012	Storage01

In addition to the computers, you will also require the software listed in Table 10-2 to complete Lab 10.

Table 10-2

Software required for Lab 10

Software	Location
Lab 10 student worksheet	Lab10_worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab10_worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Configure and enable Hyper-V Replication
- Configure replication for a VM

Estimated lab time: 65 minutes

Exercise 10.1 Configuring and Enabling Hyper-V Replication

Overview	In this exercise, you will enable Hyper-V replication on the Server01 and Server02 Hyper-V host.
----------	--

Completion time	25 minutes
-----------------	------------

Mindset Question: As an administrator, you want to create a backup site in case the primary site goes down. What is the best way to ensure that key virtual machines are available in the backup site?

1. Log into Server01 as **contoso\administrator** with the password of **Password01**.
2. On Server01, when Server Manager opens, open the **Tools** menu and click **Hyper-V Manager**.
3. When the Hyper-V Manager console opens, right-click the **Server01**, and click **Hyper-V Settings**.
4. When the Hyper-V Settings dialog box opens, click **Replication Configuration**.
5. In the Replication Configuration section (see Figure 10-1), click to enable the **Enable this computer as a Replica server** option. \
6. To enable Kerberos authentication, click to select **Use Kerberos (HTTP)**.

Question 1	<i>What port is used with Kerberos (HTTP) authentication?</i>
-----------------------	---

7. In the Authorization and storage section, click to select **Allow replication from any authenticated server**, and then click **Browse**.
8. Navigate to the C:\ drive. Click **New folder**. In the Name text box, type **VMReplica**, and then press Enter.
9. Select the **C:\VMReplica** folder, and then click **Select Folder**.
10. Click **OK** to close the Hyper-V Settings dialog box.
11. At the Inbound traffic needs to be allowed in the Firewall prompt, click **OK**.
12. Click the **Start menu** button, and click **Control Panel**.

132 Configuring Advanced Windows Server 2012 Services

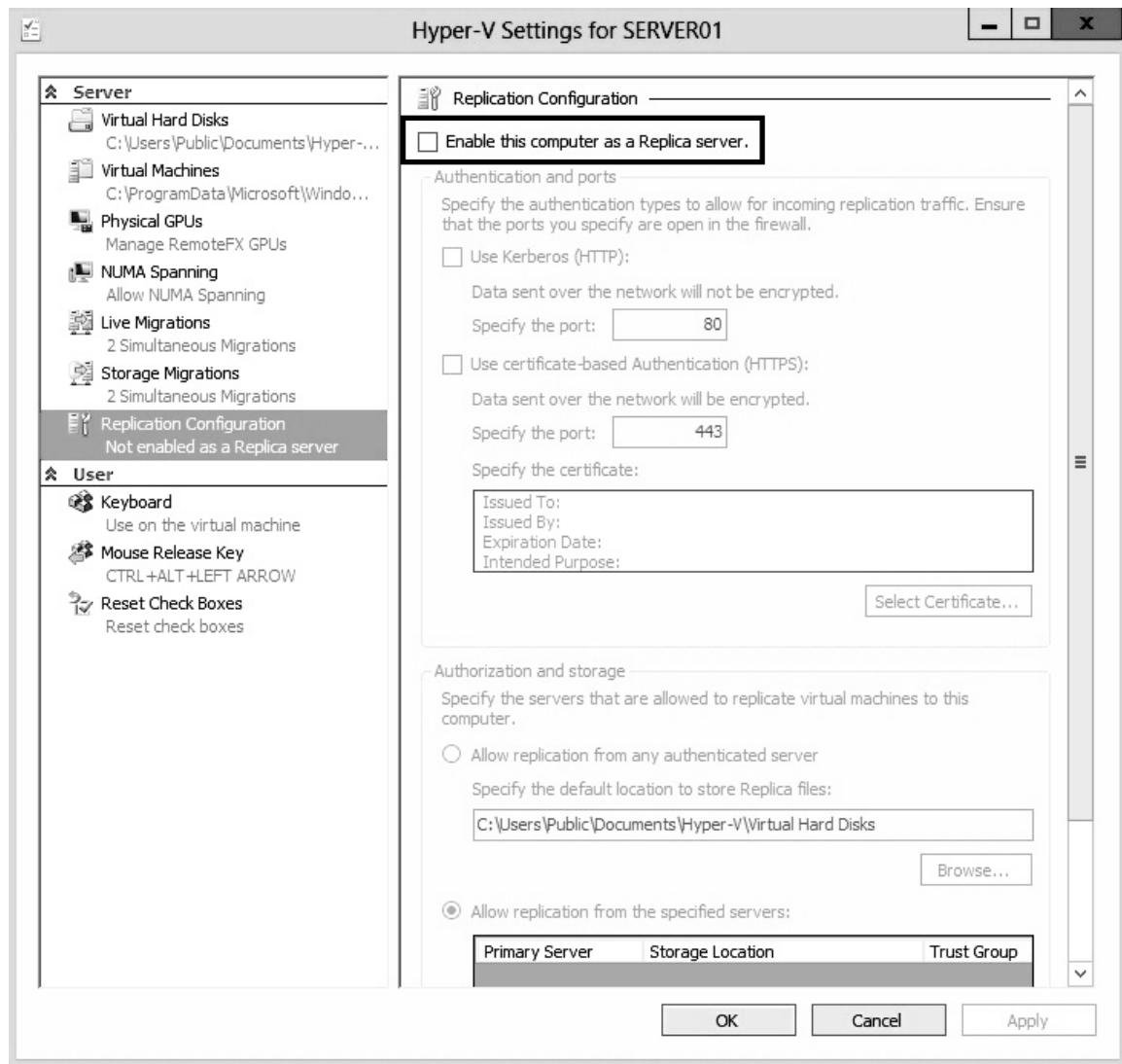


Figure 10-1
Configuring replication

13. When the Control Panel opens, click **System and Security**, and then click **Windows Firewall**.
14. Click **Advanced settings**.
15. When the Windows Firewall with Advanced Security console opens (as shown in figure 10-2), click **Inbound Rules**.

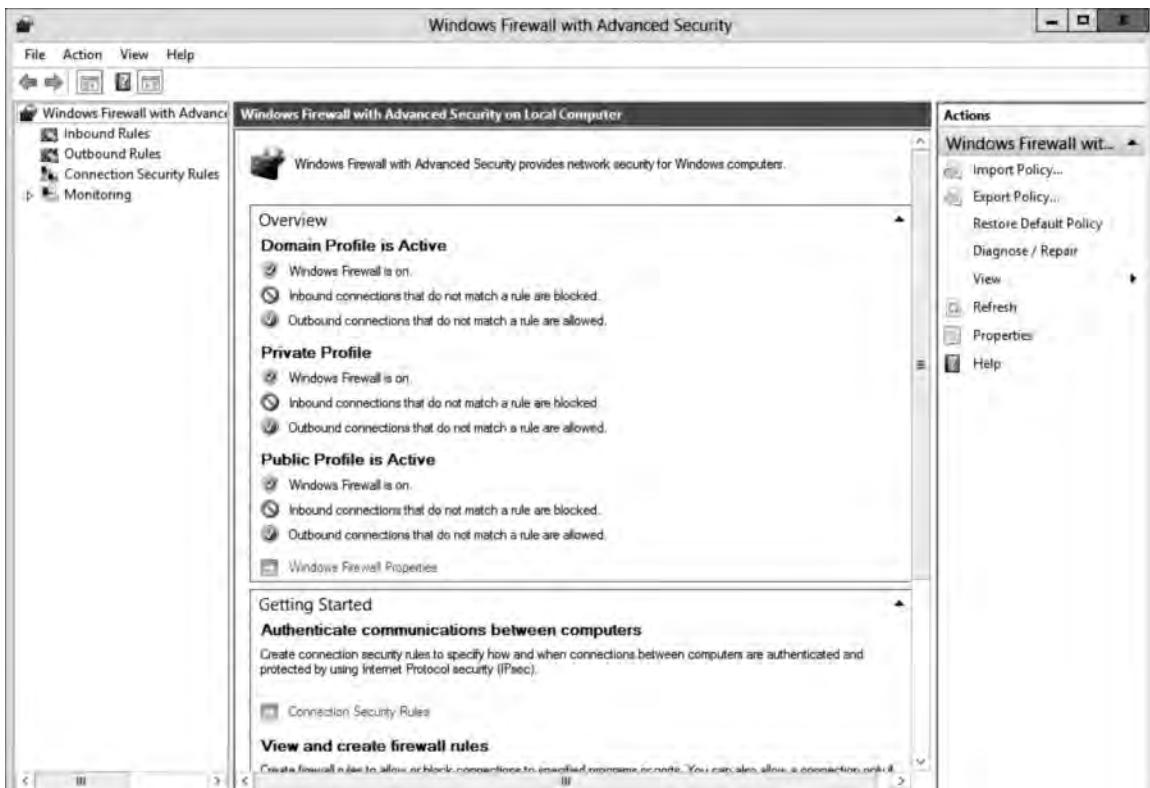


Figure 10-2
Opening Windows Firewall with Advanced Security

16. In the center pane, in the Inbound Rules list, right-click **Hyper-V Replica HTTP Listener (TCP-In)**, and then click **Enable Rule**.
17. Close the Windows Firewall with Advanced Security console, and then close Windows Firewall.
18. Log into Server02 as **contoso\administrator** with the password of **Password01**.
19. On Server02, when Server Manager opens, open the **Tools** menu and click **Hyper-V Manager**.
20. When the Hyper-V Manager console opens, right-click the **Server02**, and click **Hyper-V Settings**.
21. When the Hyper-V Settings dialog box opens, click **Replication Configuration**.
22. In the Replication Configuration section, click to enable the **Enable this computer as a Replica server** option.
23. To enable Kerberos authentication, click to select **Use Kerberos (HTTP)**.
24. In the Authorization and storage section, click to select **Allow replication from any authenticated server**, and then click **Browse**.

25. Navigate to the C:\ drive. Click **New folder**. In the Name text box, type **VMReplica**, and then press Enter.
26. Select the C:\VMReplica\ folder, and then click **Select Folder**.
27. Click **OK** to close the Hyper-V Settings dialog box.
28. At the Inbound traffic needs to be allowed in the Firewall prompt, click **OK**.
29. Click the **Start menu** button, and click **Control Panel**.
30. When the Control Panel opens, click **System and Security**, and then click **Windows Firewall**.
31. Click **Advanced settings**.
32. When the Windows Firewall with Advanced Security console opens, click **Inbound Rules**.
33. In the center pane, in the Inbound Rules list, right-click **Hyper-V Replica HTTP Listener (TCP-In)**, and then click **Enable Rule**.
34. Close the Windows Firewall with Advanced Security console, and then close Windows Firewall.

End of exercise. You can leave any windows open for the next exercise.

Exercise 10.2 Configuring Replication for a VM

Overview

In this exercise, you will continue with the last exercise by configuring replication of a VM between two Hyper-V hosts.

Completion time

15 minutes

1. On Server01, using Hyper-V Manager, right-click the first TestVM and click **Enable Replication**.
2. When the Enable Replication Wizard begins, click **Next**.
3. On the Specify Replica Server page, type **Server02** in the Replica server text box. Click **Next**.
4. On the Specify Connection Parameters dialog box, click **Next**.
5. On the Choose Replication VHDs page, the virtual hard disk is already selected. Click **Next**.

6. On the Configure Recovery History page, the Only the latest recovery point is already selected. Click **Next**.
7. On the Choose Initial Replication Methods page, Send initial copy over the network and Start replication immediately are already selected. Click **Next**.
8. On the Summary page, take a screen shot of the Summary page by pressing Alt+Prt Scr and then paste it into your Lab 10 worksheet file in the page provided by pressing Ctrl+V.
9. Click **Finish**.
10. Go to the C:\VMReplica folder on the Server02, and see if the server has been replicated after a few minutes.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 10.1, what was the first step performed when replicating a virtual machine from one Hyper-V host to another Hyper-V host?
2. In Exercise 10.1, for replication to function, what did you have to configure at the end of the exercise?
3. In Exercise 10.2, how did you enable replication of a VM?

Lab Challenge Configuring Multi-Site Failover Cluster	
Overview	To complete this challenge, you will describe how to configure multi-site failover cluster by writing the steps for the following scenario.
Completion time	15 minutes

You have a corporate office in New York and a failover site in Las Vegas. You want to configure multi-site cluster. What would you need to do to enable multi-site clustering?

Write out the general steps you performed to complete the challenge.

End of lab.

LAB 11

IMPLEMENTING AN ADVANCED DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP) SOLUTION

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES:

- Exercise 11.1** Creating a Vendor Class
- Exercise 11.2** Creating a DHCP Policy
- Exercise 11.3** Creating and Configuring a Superscope
- Exercise 11.4** Creating and Configuring Multicast Scopes
- Exercise 11.5** Implementing DHCPv6 Scopes
- Exercise 11.6** Configuring DHCP Name Protection
- Lab Challenge** Creating a DHCP Split-Scope

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 11-1.

Table 11-1
Computers required for Lab 11

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01

In addition to the computers, you will also require the software listed in Table 11-2 to complete Lab 11.

Table 11-2
Software required for Lab 11

Software	Location
Lab 11 student worksheet	Lab11_worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab11_worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Create a vendor class
- Create a DHCP policy
- Create a DHCP superscope
- Create a multicast scope
- Create a DHCPv6 scope
- Configure DHCP name protection
- Configure a split scope

Estimated lab time: 90 minutes

Exercise 11.1 Creating a Vendor Class

Overview In this exercise, you will create a vendor class, which can be used when creating and defining DHCP policies.

Completion time 10 minutes

Mindset Question: You have an IP phone system that you want to connect to the network. The IP phone system will have its own DHCP settings, while the computers on the subnet will have other settings. What should you do?

1. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
2. On RWDC01, using Server Manager, open the **Tools** menu, and click **DHCP**. The DHCP console opens.
3. In the DHCP console, expand **rwdc01.contoso.com**, right-click **IPv4**, and click **Define Vendor Classes...**
4. When the DHCP Vendor Classes dialog box opens, click **Add**. The New Class dialog box opens (see Figure 11-1).



Figure 11-1
Creating a new DHCP vendor class

5. In the Display name text box, type **Nortel Phones**. In the Description text box, type **Desk phone**.
6. Click under the ASCII field name and type **Nortel-i 2004-A**, as shown in figure 11-2. Click **OK**.

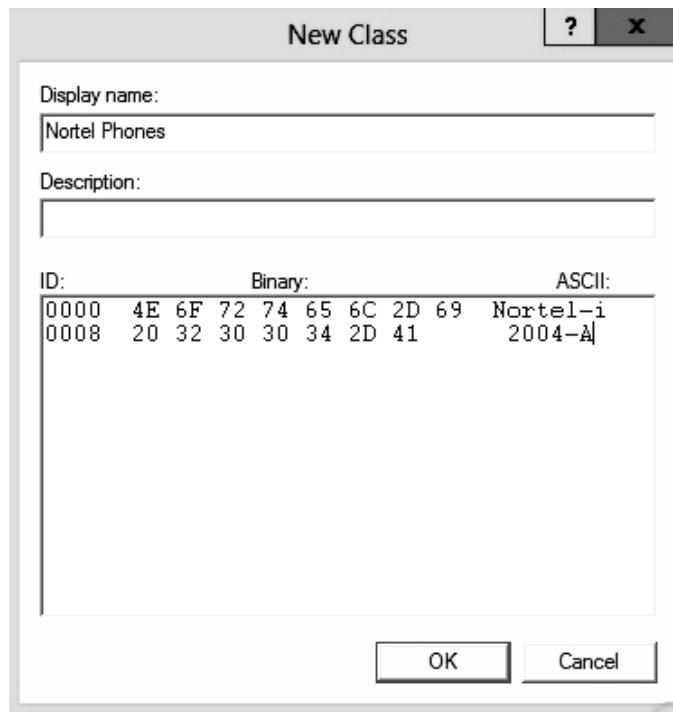


Figure 11-2
Specifying the ASCII value

7. Click **Add** again.
8. In the Display name, type **HP Printer**.
9. Click under the ASCII field and type **Hewlett-Packard JetDirect**. Click **OK**.
10. Click **Close** to close the DHCP Vendor Classes dialog box.
11. Keep the DHCP console open for the next exercise.

Exercise 11.2 Creating a DHCP Policy

Overview

In this exercise, you will continue with the last exercise to create a DHCP scope and assign a DHCP policy to the scope.

Completion time

15 minutes

1. On RWDC01, using the DHCP console, right-click IPv4 and click **New Scope**.
2. When the New Scope Wizard starts, click **Next**.

3. When the Scope Name page opens, type **NormalScope** in the Name text box and click **Next**.
4. On the IP address range, type **172.24.25.50** for the Start IP address and type **172.24.25.200** for the End IP address. For the subnet mask, type **255.255.255.0**. Click **Next**.
5. On the Add Exclusions and Delay page, click **Next**.
6. On the Lease Duration page, answer the following question and click **Next**.

Question 1	<i>What is the default lease duration?</i>
-----------------------	--

7. On the Configure DHCP Options page, click **Next**.
8. On the Router (Default Gateway) page, type **172.24.25.20** for the IP address and click **Add**. Click **Next**.
9. On the Domain Name and DNS Servers page, remove any IP addresses. Then type **192.168.1.50** in the IP address text box and click **Add**. Wait for DNS Validation. Click **Next**.
10. On the WINS Servers page, click **Next**.
11. On the Activate Scope page, click **Next**.
12. When the wizard is complete, click **Finish**.
13. Expand the IPv4 node and expand the Scope [172.24.25.0] NormalScope.
14. Right-click the **Policies** node under the NormalScope scope, and click **New Policy**.

Question 2	<i>Where do you define a DHCP policy?</i>
-----------------------	---

15. When the DHCP Policy Configuration Wizard starts, type **Policy1** for the policy name, and click **Next**.
16. On the Configure Conditions for the policy page, click **Add**.

17. When the Add/Edit Condition dialog box opens, select the following (as shown in figure 11-3) and click **Add**:

Criteria: Vendor Class

Operator: Equals

Value: Nortel Phones

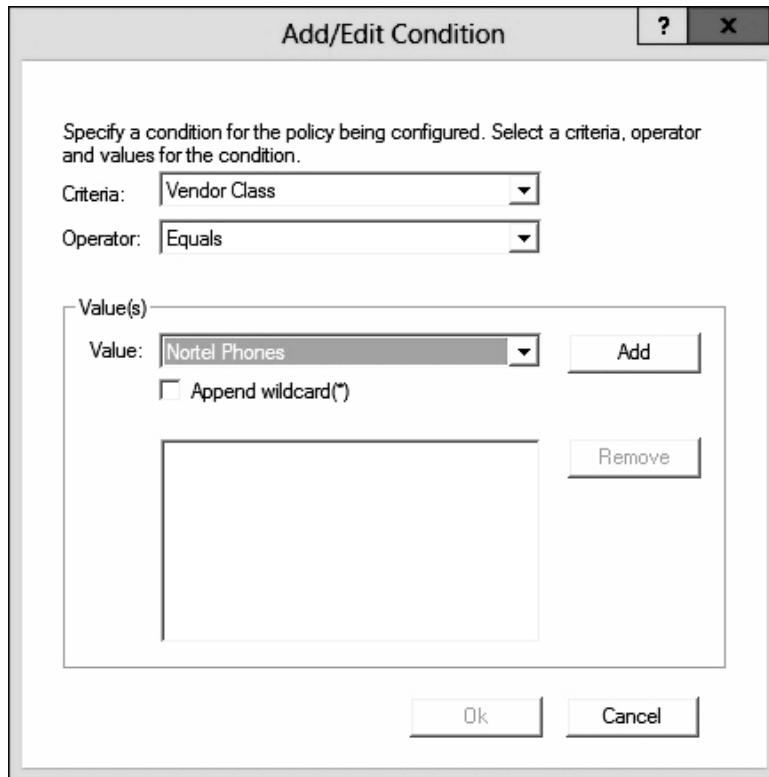


Figure 11-3
Specifying the condition used in a DHCP policy

18. Click **OK** to close the Add/Edit Condition dialog box.
19. Back on the Configure Conditions for the policy page, click **Next**.
20. On the Configure settings for the policy page, type **172.24.25.50** for the Start IP address and **172.24.25.99** for the End IP address. Click **Next**.
21. If you need different options for the Nortel Phones, you would specify them. For now, click **Next**.
22. On the Summary page, click **Finish**.
23. Right-click **Policy1**, and click **Properties**.

24. When the Policy1 Properties dialog box opens, click to select the **Set lease duration for the policy** option.
25. Change the lease time to **7** days.
26. Take a screen shot of the Properties dialog box by pressing Alt+Prt Scr and then paste it into your Lab11 worksheet file in the page provided by pressing Ctrl+V.
27. Click **OK**.
28. Keep the DHCP console open for the next exercise.

Exercise 11.3 Creating and Configuring a Superscope

Overview	In this exercise, you will take two normal DHCP scopes to create a superscope.
Completion time	20 minutes

Mindset Question: You have an IPv4 DHCP scope that is close to running out of addresses. How can you add more addresses to the pool that is assigned to the hosts on the subnet?

1. On RWDC01, using the DHCP console, right-click **IPv4**, and then click **New Scope**.
2. When the New Scope Wizard opens, click **Next**.
3. In the Name text box, type **Scope1**, and click **Next**.
4. In the IP address range, set the Start IP address to **172.24.20.50** and End IP address to **172.24.20.240**. For the Subnet mask, type **255.255.255.0**. Click **Next**.
5. On the Add Exclusions and Delay page, click **Next**.
6. On the Lease Duration page, change the duration to **3** days, and click **Next**.
7. On the Configure DHCP Options page, click **Next**.
8. On the Router (Default Gateway) page, type the address of **172.24.20.20**, and click **Add**. Click **Next**.
9. On the Domain name and DNS Servers page, the Parent domain should already be set to contoso.com. Remove the current address, and add **192.168.1.50**. Wait for DNS Validation. Click **Next**.

10. On the WINS Servers page, click **Next**.
11. On the Activate Scope page, click **Next**.
12. When the wizard is complete, click **Finish**.
13. Right-click IPv4, and then click **New Scope**.
14. When the New Wizard opens, click **Next**.
15. In the Name text box, type **Scope2**, and click **Next**.
16. In the IP address range, set the Start IP address to **172.24.21.50** and End IP address to **172.24.21.240**. For the Subnet mask, type **255.255.255.0**. Click **Next**.
17. On the Add Exclusions and Delay page, click **Next**.
18. On the Lease Duration page, change the duration to **3** days, and click **Next**.
19. On the Configure DHCP Options, click **Next**.
20. On the Router (Default Gateway) page, type the address of **172.24.21.20**, and click **Add**. Click **Next**.
21. On the Domain name and DNS Servers page, the Parent domain should already be set to contoso.com. Remove the current address, and add **192.168.1.50**. Wait for DNS Validation. Click **Next**.
22. On the WINS Servers page, click **Next**.
23. On the Activate Scope page, click **Next**.
24. When the wizard is complete, click **Finish**.
25. Right-click IPv4, and click **New Superscope**.
26. When the New Superscope Wizard begins, click **Next**, type **Super1** in the Superscope Name text box, and then click **Next**.
27. On the Select Scopes page, press the **Control key** and hold it down. Then click **Scope1** and **Scope2**. Release the **Control key**. When done, the Select Scopes page looks like figure 11-4. Click **Next**.

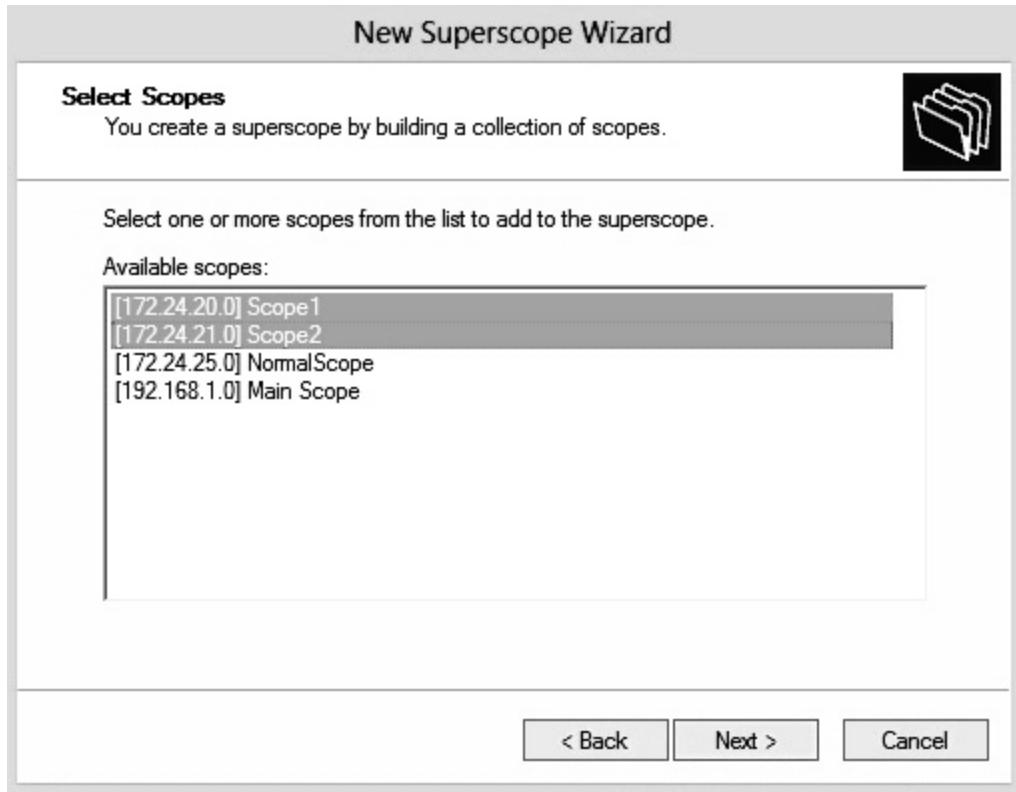


Figure 11-4
Specifying the scopes to use in a DHCP Superscope

28. Click **Finish**. The superscope shows in the DHCP console.
29. Take a screen shot of the DHCP console showing the Superscope Super1 by pressing Alt+Prt Scr and then paste it into your Lab11 worksheet file in the page provided by pressing Ctrl+V.
30. Keep the DHCP console open for the next exercise.

Exercise 11.4 Creating and Configuring Multicast Scopes

Overview	In this exercise, you will create a multicast scope.
Completion time	10 minutes

Mindset Question: You work for a large corporation. The quarterly status meeting is shown to all employees via their different sites. What infrastructure mechanism do you need to put in place so that the video stream can be sent to all users while minimizing traffic generated on the network?

1. On RWDC01, using the DHCP console, right-click IPv4, and then click **New Multicast Scope**.
2. When the New Multicast Scope Wizard opens, click **Next**.
3. In the Name text box, type **Multicast Scope1**, and click **Next**.
4. In the IP address range, set the Start IP address to **224.0.0.0** and End IP address to **224.255.255.255**. Click **Next**.

Question 3	<i>What class are multicast scopes assigned?</i>
-----------------------	--

5. On the Add Exclusions page, click **Next**.
6. On the Lease Duration page, and click **Next**.
7. On the Activate Multicast Scope page, click **Next**.
8. When the installation is complete, click **Finish**.
9. Keep the DHCP console open for the next exercise.

Exercise 11.5 Implementing DHCPv6 Scopes

Overview	In this exercise, you will create a DHCPv6 scope.
----------	---

Completion time	10 minutes
-----------------	------------

Mindset Question: You are migrating your company to IPv6. What properties do you need to define when you create an IPv6 DHCP scope?

1. On RWDC01, using the DHCP console, right-click **IPv6**, and click **New Scope**.
2. When the New Scope Wizard starts, click **Next**.

3. Type **IPv6Scope1** in the Name text box. Click **Next**.
4. In the Scope Prefix page, type **FEC0::** in the prefix text box, as shown in figure 11-5. Click Next.

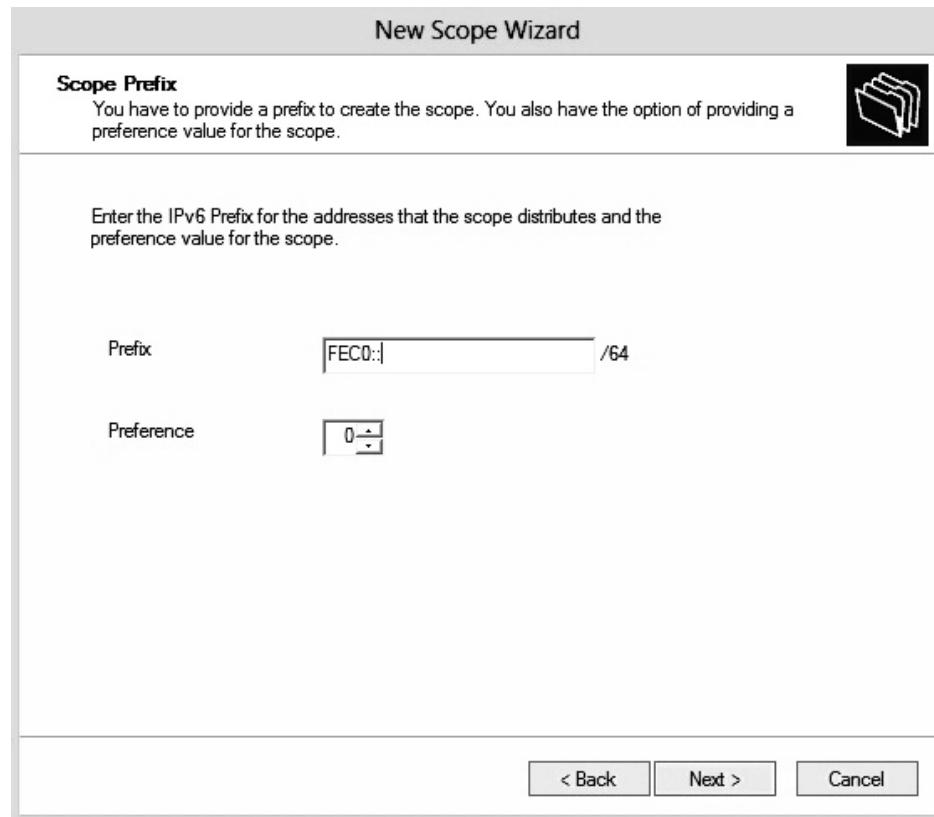


Figure 11-5
Specifying the scope prefix

5. On the Add Exclusions page, click **Next**.
6. On the Scope Lease page, change the Preferred Life Time to **1** day, and the Valid Life Time to **10** days. Click **Next**.
7. When the New Scope Wizard is complete, Yes is already selected to activate the scope now. Click **Finish**.
8. Keep the DHCP console open for the next exercise.

Exercise 11.6 Configuring DHCP Name Protection

Overview In this exercise, to help protect against non-Microsoft systems from overwriting systems that use static addresses, you are going to enable DHCP Name Protection.

Completion time 5 minutes

1. On RWDC01, using the DHCP console, right-click **IPv4**, and click **Properties**.
2. When the Properties dialog box opens, click the **DNS** tab.
3. Click the **Configure** in the Name Protection section. The Name Protection dialog box opens.
4. Click to select the **Enable Name Protection** option.
5. Take a screen shot of the DHCP console showing the Name Protection dialog box by pressing Alt+Prt Scr and then paste it into your Lab11 worksheet file in the page provided by pressing Ctrl+V.
6. Click **OK** to close the Name Protection dialog box and click **OK** to close the Properties dialog box.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 11.1, what did you use to identify different DHCP hosts?
2. In Exercise 11.2, what created a DHCP policy, what was used to determine if a policy would be applied to a host?
3. In Exercise 11.4, what is the beginning address of the multiscope address that you can assign?
4. In Exercise 11.5, how many bits is an IPv6 address?
5. In Exercise 11.5, how many bits are used for the network bits of the IPv6 scope?
6. In Exercise 11.6, what tab was the DHCP Name Protection settings found under?

Lab Challenge	Creating a DHCP Split-Scope
Overview	To complete this challenge, you will describe how to create a DHCP split scope by writing the steps for the following scenario.
Completion time	10 minutes

You decide to use two DHCP servers. The primary DHCP server will have the 80% of the addresses, while the secondary DHCP server will have 20% of the addresses. How would you configure the address split?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 12

IMPLEMENTING AN ADVANCED DNS SOLUTION

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES:

- Exercise 12.1** Configuring DNSSEC
- Exercise 12.2** Enabling DNS Cache Locking
- Exercise 12.3** Configuring DNS Logging
- Exercise 12.4** Disabling Recursion
- Exercise 12.5** Configuring Netmask Ordering
- Exercise 12.6** Configuring A GlobalNames Zone
- Lab Challenge** Delegating DNS Administration

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 12-1.

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Table 12-1
Computers required for Lab 12

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01

In addition to the computers, you will also require the software listed in Table 12-2 to complete Lab 12.

Table 12-2
Software required for Lab 12

Software	Location
Lab 12 student worksheet	Lab12 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab12 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Configure security for DNSSEC and Cache Locking
- Configure DNS logging.
- Disabling DNS recursion
- Configure Netmask ordering
- Enable and configure a GlobalNames zone.

Estimated lab time: 75 minutes

Exercise 12.1 Configuring DNSSEC

Overview In this exercise, you will configure DNSSEC for a DNS zone.

Completion time 15 minutes

Mindset Question: **What resource records are created when you sign a zone?**

1. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
2. When Server Manager opens, open the Tools menu and click **DNS**.
3. When the DNS console opens, Expand **RWDC01 (if necessary)** and expand the **Forward Lookup Zones**.
4. Right-click the **Contoso.com** zone, click **DNSSEC**, click **Sign the Zone**.
5. When the Zone Signing Wizard opens, click **Next**.
6. On the Signing Options page (as shown in figure 12-1), ensure the **Customize zone signing parameters** is selected, and then click **Next**.

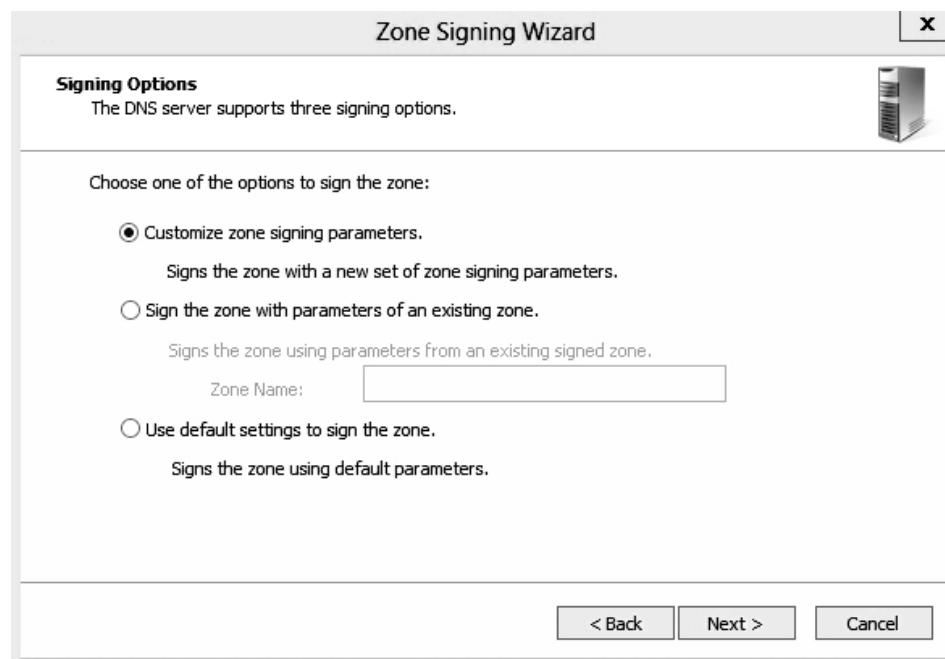


Figure 12-1
Configuring signing options

7. On the Key Master page, click **Next**.

Question 1	<i>What is the key signing key used for?</i>
-----------------------	--

8. On the Key Signing Key (KSK) page, click **Next**.
9. In the Key Signing Key (KSK) dialog box (see Figure 12-2), click **Add**.

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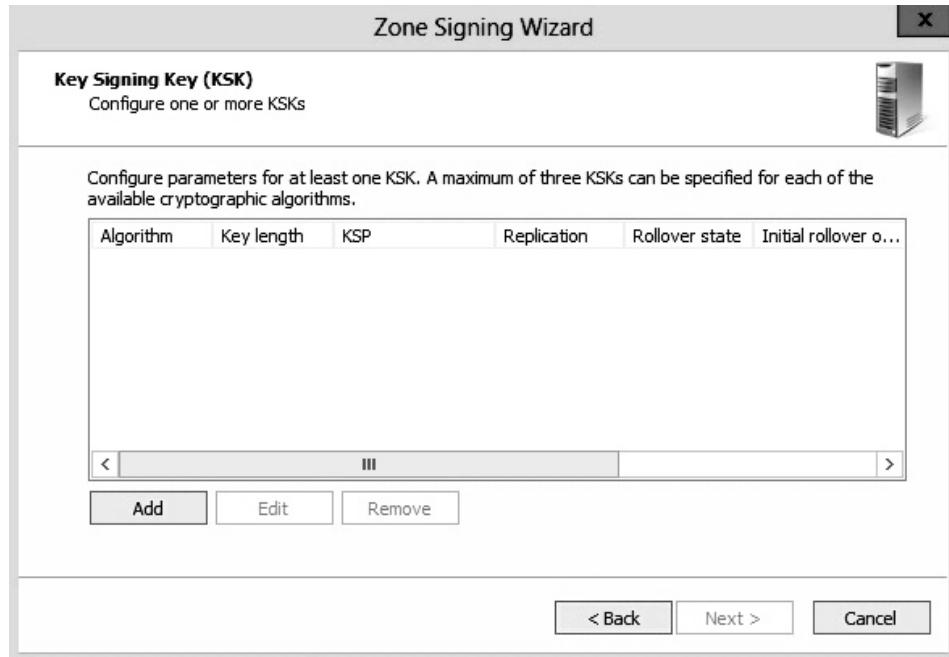


Figure 12-2
Configuring key signing key

- When the New Key Signing Key (KSK) dialog box opens (as shown in figure 12-3), click OK.



Figure 12-3
Adding a new key signing key

11. Back on the Key Signing Key (KSK) page, click **Next**.

Question 2	<i>What is the zone signing key used for?</i>
-----------------------	---

12. On the Zone Signing Key (ZSK) page, click **Next**.
13. When the Zone Signing Key (ZSK) dialog box opens, click **Add**.
14. When the New Zone Signing Key (ZSK) dialog box opens (as shown in figure 12-4), click **OK**.



Figure 12-4
Adding a new zone signing key

15. Back on the Zone Signing Key (ZSK) page, click **Next**.
16. On the Next Secure (NSEC) page, click **Next**.
17. On the Trust Anchors (TAs) page, click **Next**.
18. On the Signing and Polling Parameters page, click **Next**.
19. On the DNS Security Extension (DNSSEC) page, click **Next**.
20. When the zone has been successfully signed, click **Finish**.
21. With the contoso.com domain highlighted, press the **F5** key to refresh the list.

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22. Take a screen shot of the DNS Manager console window by pressing Alt+Prt Scr and then paste it into your Lab12 worksheet file in the page provided by pressing Ctrl+V.
23. Leave the DNS console open for later exercises.

Exercise 12.2 Enabling DNS Cache Locking

Overview

In this exercise, you will enable DNS cache locking.

Completion time

10 minutes

Mindset Question: When you configure DNS Cache locking, what is the optimum setting?

1. On RWDC01, right-click the **Start Menu** button, and click **Command Prompt (Admin)**.
2. When the command prompt window opens, execute the following command:

```
DnsCmd /Config /CacheLockingPercent 100
```

3. Execute the following command:

```
Net stop DNS
```

4. Execute the following command:

```
Net start DNS
```

5. Take a screen shot of the Command Prompt window by pressing Alt+Prt Scr and then paste it into your Lab12 worksheet file in the page provided by pressing Ctrl+V.
6. Close the Command prompt window.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 12.3 Configuring DNS Logging

Overview	In this exercise, you will enable DNS Debug Logging.
Completion time	5 minutes

- | | |
|-----------------|-----------|
| Completion time | 5 minutes |
|-----------------|-----------|
1. On RWDC01, using the DNS Manager console, right-click the **RWDC01** server., and click **Properties**.
 2. When the Properties dialog box opens, click the **Debug Logging** tab.
 3. Click to enable **Log Packets for debugging** check box.

**Question
3**

Which packets based on packet content are logged?

4. Take a screen shot of the DNS Manager console with the RWDC01 Properties dialog box by pressing Alt+Prt Scr and then paste it into your Lab12 worksheet file in the page provided by pressing Ctrl+V.
5. Click **OK** to close the Properties dialog box.
6. Leave the DNS console open for the next exercise.

Exercise 12.4 Disabling Recursion

Overview	In this exercise, you will disable recursion.
Completion time	5 minutes

1. On RWDC01, using the DNS Manager console, right-click the **RWDC01** server., and click **Properties**.
2. When the Properties dialog opens, click the Advanced tab.
3. Click to select the **Disable recursion** check box.

**Question
4**

What else gets disabled when you disable recursion?

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4. Take a screen shot of the DNS Manager console with the RWDC01 Properties dialog box by pressing Alt+Prt Scr and then paste it into your Lab12 worksheet file in the page provided by pressing Ctrl+V.
5. Click **OK** to close the Properties dialog box.
6. Leave the DNS console open for next exercises.

Exercise 12.5 Configuring Netmask Ordering

Overview	In this exercise, will configure Netmask ordering.
Completion time	5 minutes

Mindset Question: You have 3 sites with 3 web servers (one located at each site), that respond to the same name. You want to ensure that when users visit the website by name, the user will connect to the local web server. What option would you enable?

1. On RWDC01, using the DNS Manager console, right-click the **RWDC01** server., and click **Properties**.
2. When the Properties dialog opens, click the **Advanced** tab.
3. Make sure that the **Enable netmask ordering** check box is enabled.
4. Click **OK** to close the Properties dialog box.
5. Leave the DNS console open for the next exercise.

Exercise 12.6 Configuring a GlobalNames Zone

Overview	In this exercise, you will enable and configure GlobalNames Zone to provide single name support.
Completion time	15 minutes

Mindset Questions: What service is GlobalNames designed to replace?

1. On RWDC01, right-click the **Start Menu** button, and click **Command Prompt (Admin)**.

2. When the command prompt window opens, execute the following command:

```
dnscmd rwdc01 /Config /EnableGlobalnamessupport 1
```

3. Take a screen shot of the Command Prompt window by pressing Alt+Prt Scr and then paste it into your Lab12 worksheet file in the page provided by pressing Ctrl+V.
4. Close the command window.
5. On RWDC01, using the DNS Manager console, right-click **RWDC01** and click **New Zone**.
6. When the New Zone wizard opens, click **Next**.
7. On the Zone Type page opens, click **Next**.
8. On the Active Directory Zone Replication scope, click **Next**.
9. On the Forward or Reverse Lookup Zone page, click **Next**.
10. On the Zone Name page, type **GlobalNames** in the Zone name text box. Click **Next**.
11. On the Dynamic Update page, select **Do not allow dynamic updates**. Click **Next**.
12. When the wizard is complete, click **Finish**.
13. Right-click the **GlobalNames** zone, and click **New Host (A or AAAA)**.
14. In the Name text box, type **Server01**.
15. In the IP address text box, type **192.168.1.60**.
16. Click the **Add Host** button.
17. When the record is created, click **OK**.
18. Click **Done** to close the New Host dialog box.
19. On RWDC01, right-click the **Start Menu** button, and click **Command Prompt (Admin)**.
20. When the command prompt window opens, execute the following command:

```
ping server01
```

Question 5	<i>What name and address did it ping?</i>
-----------------------	---

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21. When the command prompt window opens, execute the following command:

```
ping server01. /4
```

Question 6	<i>What name and address did it ping?</i>
-----------------------	---

22. Close the command prompt window.

23. Close the DNS Manager window.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 12.1, what did you configure to allow DNS clients with proof of identity of DNS records and verified denial of existence.
2. In Exercise 12.1, what were the two types of keys that you and create when using DNSSEC?
3. In Exercise 12.2, how did you configure DNS cache locking?
4. In Exercise 12.3, how do you enable and configure DNS Logging?
5. In Exercise 12.6, how did you enable GlobalNames support?

Lab

| Challenge |
| **Delegating DNS Administration** |
| Overview |
| To complete this challenge, you will describe how to delegate DNS Administration by writing the steps for the following scenario. |
| Completion time |
| 10 minutes |

You want to grant DNS control to the help desk for the company DNS forward lookup zone. So how can you grant access to the help desk personnel without granting access to all DNS zones?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 13

DEPLOYING AND MANAGING IPAM

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

Exercise 13.1 Installing an IPAM on a Member Server

Exercise 13.2 Configuring IPAM

Lab Challenge Migrating to IPAM

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 13-1.

Table 13-1
Computers required for Lab 13

<i>Computer</i>	<i>Operating System</i>	<i>Computer Name</i>
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01

In addition to the computers, you will also require the software listed in Table 13-2 to complete Lab 13.

Table 13-2
Software required for Lab 13

Software	Location
Lab 13 student worksheet	Lab13 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab13 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Install and configure IPAM

Estimated lab time: 50 minutes

Exercise 13.1 Installing IPAM on a Member Server	
Overview	In this exercise, you will install the IPAM feature on a server.
Completion time	10 minutes

Mindset Question: **What tool was added to Windows Server 2012 to plan, manage, track and audit IP addresses?**

1. Log into Server01 as **contoso\administrator** with the password of **Password01**.
2. Using the Server Manager console, open the **Manage** menu and click **Add Roles and Features**.
3. When the Add Roles and Features Wizard starts, click **Next**.
4. On the Select installation type page, click **Next**.
5. On the Select destination server page, click Server01.**contoso.com**, click **Next**.
6. On the Select server roles page, click **Next**.

7. On the Select features page, click to select **IP Address Management (IPAM) Server**. When it asks to add additional features, click **Add Features**.
8. Back on the Select features page, click **Next**.
9. When the Confirm installation selections page opens, click **Install**.
10. Take a screen shot of the IPAM installation by pressing Alt+Prt Scr and then paste it into your Lab 13 worksheet file in the page provided by pressing Ctrl+V.
11. When the installation is complete, click **Close**.

End of exercise. You can leave Server Manager open for the next exercise.

Exercise 13.2 Configuring IPAM	
Overview	In this exercise, you will configure and enable IPAM so that it can scan and manage IP addresses.
Completion time	40 minutes

Mindset Question: **To plan, manage, track and audit IP addresses, what servers must be accessed to gather the necessary information?**

1. On Server01, open Windows PowerShell by clicking the **Windows PowerShell** icon on the taskbar.
2. Execute the following command on the Windows PowerShell window:

```
Invoke-IpamGpoProvisioning -Domain contoso.com
-GpoPrefixName IPAM1 -IpamServerFqdn server01.contoso.com
```

When it asks to perform this action, type **Y** and press the Enter key.

3. Close the Windows PowerShell window.
4. On Server01, using Server Manager, click **IPAM**. If IPAM is not shown, press the F5 key. The IPAM overview is displayed as shown in figure 13-1.

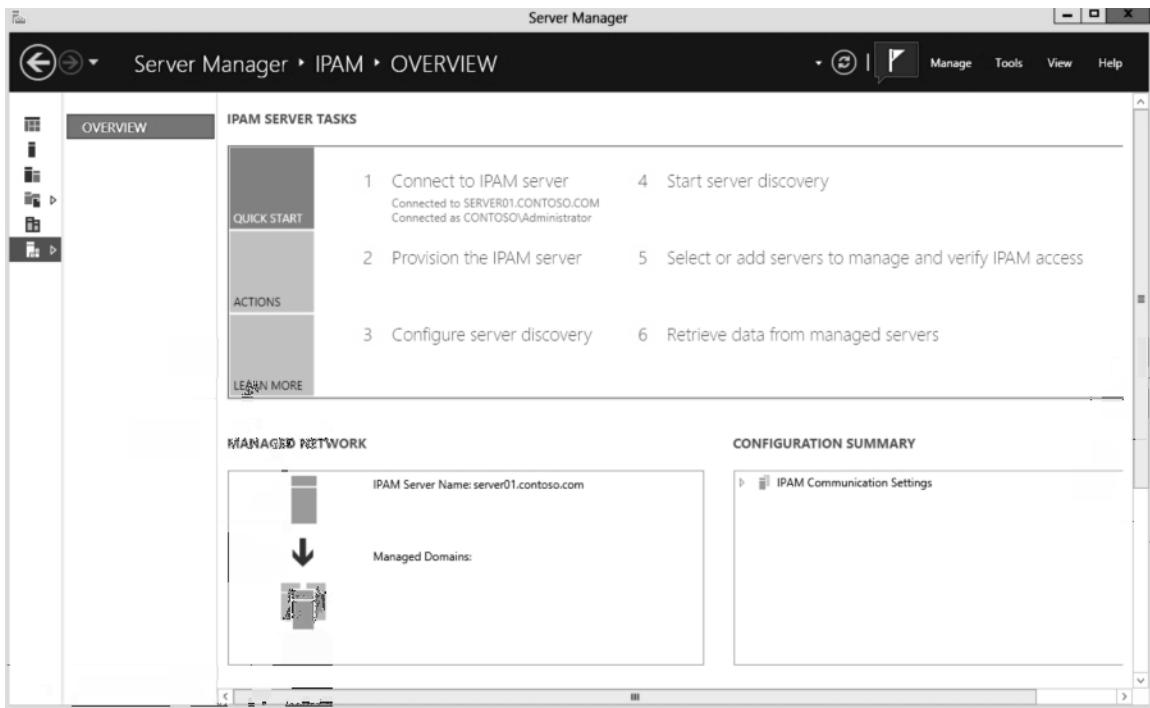


Figure 13-1
Viewing the IPAM Overview

5. Since the IPAM server is already connected to Server01, click step 2, **Provision the IPAM server**.
6. When the Provision IPAM wizard starts, click **Next**.
7. On the Select provisioning method page, Group Policy Based is already selected. Type **IPAM1** in the GPO name prefix text box, and click **Next**.
8. On the Summary page, click **Apply**.
9. When IPAM has been provisioned, click **Close**.
10. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
11. On RWDC01, when the Server Manager opens, open the **Tools** menu and click **Group Policy Management**.
12. When the Group Policy Management console opens, expand the **Forest: contoso.com**, expand **Domains**, and expand **contoso.com**.

**Question
1**

What three GPOs were added for IPAM?

13. Close Group Policy Management console.
14. On RWDC01, when the Server Manager opens, open the **Tools** menu and click **Active Directory Users and Computers**.
15. Expand **contoso.com** and click the **Users** container.
16. Double-click the **IPAMUG** group.

Question 2	<i>What type of group is IPAMUG?</i>
-----------------------	--------------------------------------

17. Click the **Members** tab.

Question 3	<i>What member is in the IPAMUG group?</i>
-----------------------	--

18. Click **Member Of** tab.
19. Click the **Add** button. In the text box, type **Enterprise admin; Event Log Readers** and click **OK**. Click OK to close IPAMUG Properties.
20. Close Active Directory Users and Computers.
21. Reboot RWDC01. Wait until RWDC01 finishes booting.
22. On Server01, On the IPAM Overview screen, click step 3: **Configure server discovery**.
23. When the Configure Server Discovery dialog box opens, the root domain (contoso.com) is already selected. Click **Add**. Figure 13-2 shows the Configure Server Discovery dialog box.

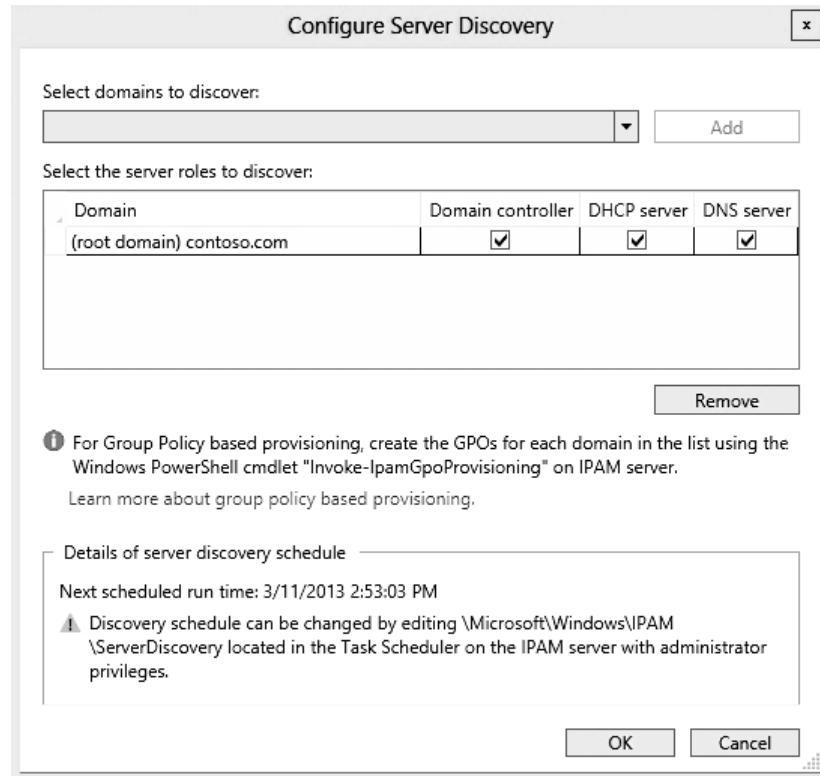


Figure 13-2
Configuring server discovery

24. Click **OK** to close the Configure Server Discovery dialog box.
25. On the IPAM Overview screen, click step 4: **Start server discovery**. Wait until Server Discovery is done. Its status should display Ready, under Scheduled Tasks at the bottom of the screen (as shown in figure 13-3). This may take 5-10 minutes.

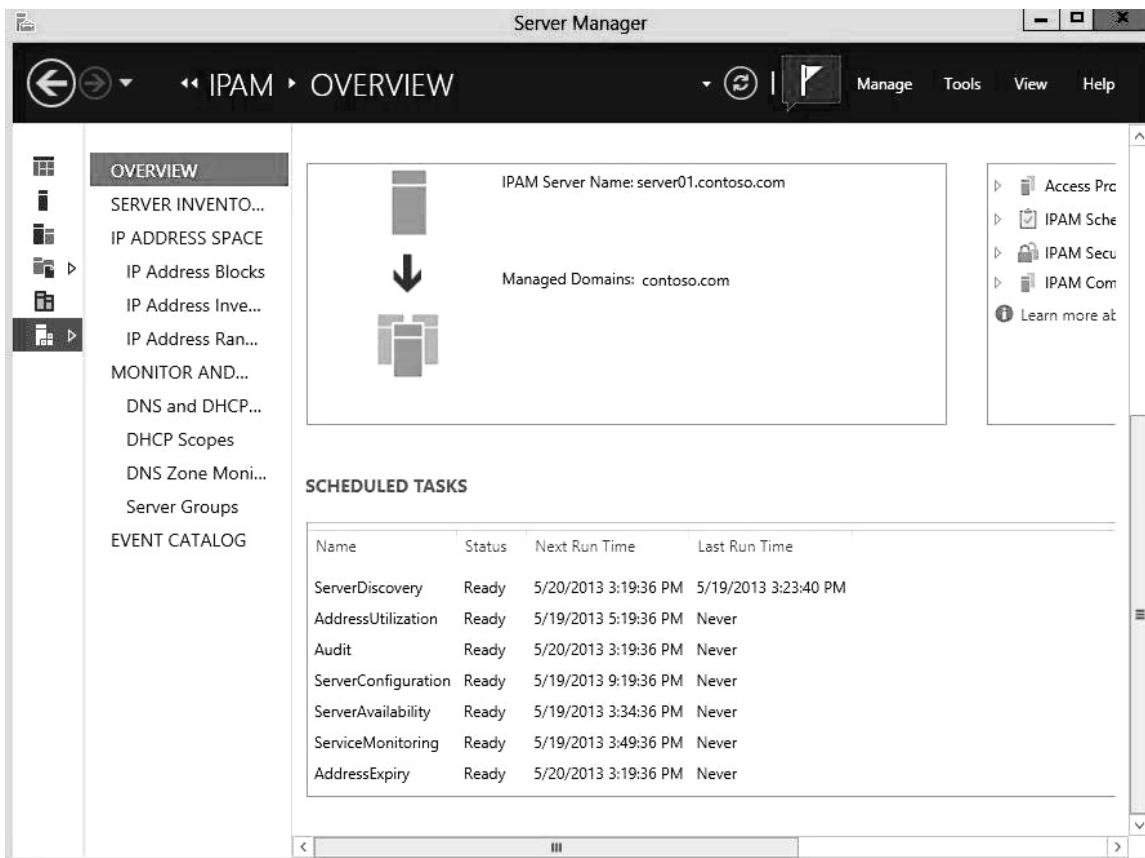


Figure 13-3
Viewing the IPAM scheduled tasks

26. On the IPAM Overview screen, click step 5: **Select or add servers to manage and verify IPAM access.**
27. On the IPv4 page, rwdc01 is blocked. Right-click RWDC01, and click **Edit Server**.
28. On the Add or Edit Server page, change the Manageability status Unspecified to **Managed**. Also, make sure **DC**, **DNS server**, and **DHCP server** is selected, as shown in figure 13-4. Click **OK**.

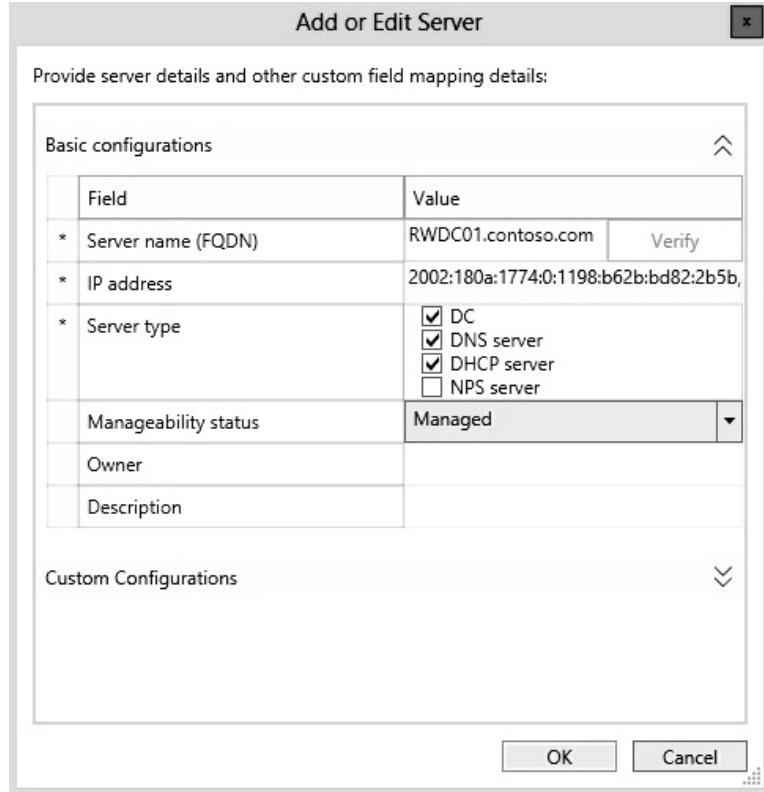


Figure 13-4
Editing server parameters

29. Right-click the **RWDC01** server, and select **Refresh Server Access Status**. If it gives a status dialog box, click **OK**. When the list is refreshed, click **F5** key to refresh the screen. If the IPAM Access is Blocked, right-click the **RWDC01** server and click **Retrieve All Server Data**. When the retrieve all server data is complete (after a couple of minutes), right-click the **RWDC01** and click **Refresh Server Access Status** once more, followed by pressing **F5** again. By then, the RWDC01 should indicate IPAM Access Unblocked, as shown in figure 13-5.



Figure 13-5
Showing the RWDC01 is Unblocked

30. Take a screen shot of the IPv4 page of IPAM by pressing Alt+Prt Scr and then paste it into your Lab 13 worksheet file in the page provided by pressing Ctrl+V.
31. Click **Overview** again in the left pane.
32. Click Step 6: **Retrieve data from managed servers**. Again, this may take a couple of minutes.
33. Using Server Manager, and click **IPAM> IP Address Blocks**. Figure 13-6 shows the IP Address Block page.



Figure 13-6
Viewing IP address blocks

**Question
4**

What address block was already added?

34. Open the **Tasks** menu and click **Add IP Address Range**. The Add or Edit IPv4 Address Range dialog box opens as shown in figure 13-7.

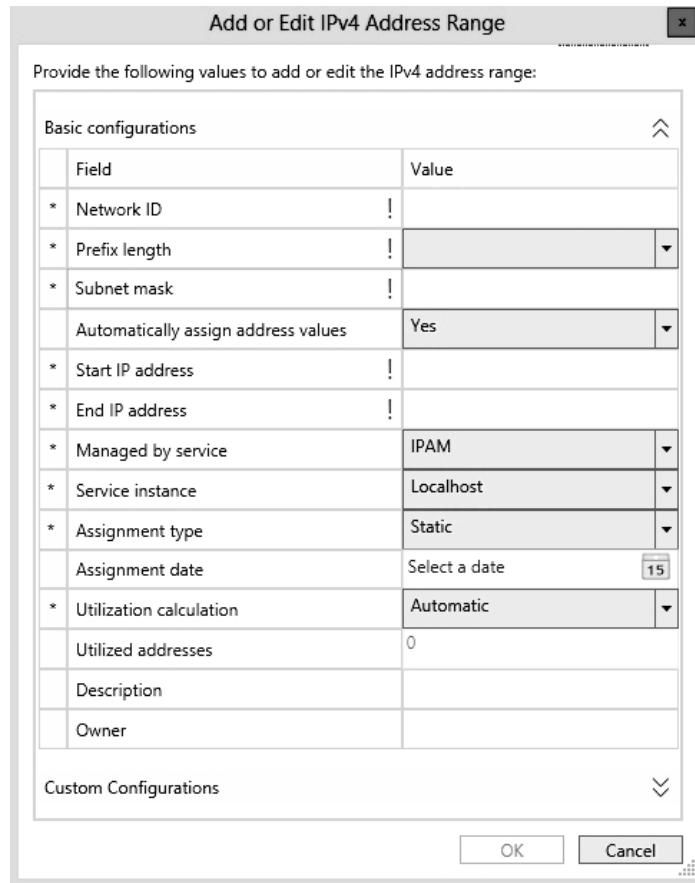


Figure 13-7
Adding an IP address range.

35. Complete the dialog box fields with the required Basic IP Range configuration data with the following information and click **OK**.

Network ID: **192.168.1.0** and select **24** for **Prefix length**.

36. Under IP ADDRESS SPACE, click **IP Address Inventory**, which is shown in figure 13-8.

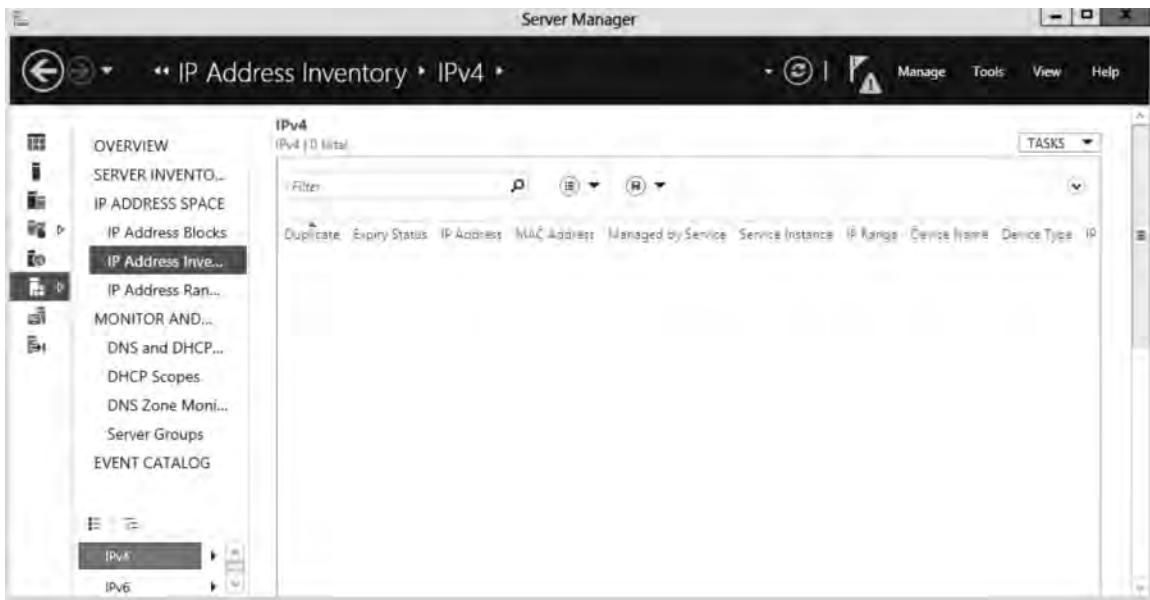


Figure 13-8
Viewing IP address inventory

37. Open the Tasks menu and click **Retrieve Address Space Data**.
38. Under MONITOR AND MANAGE, click **DNS and DHCP Servers**.
39. Under MONITOR AND MANAGE, click **DHCP Scopes**
40. Under MONITOR AND MANAGE, click **DNS Zone Monitoring**.
41. Close Server Manager.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 5 minutes

1. In Exercise 13.1, is IPAM a role or feature?
2. In Exercise 13.2, besides running provisioning IPAM, how did you provision the GPOs?
3. In Exercise 13.2, what group is used to manage the resources of IPAM
4. In Exercise 13.2, what information were you able to retrieve when IPAM was configured?

Lab Challenge	Migrating to IPAM
Overview	To complete this challenge, you will describe how to migrate to IPAM by writing the steps for the following scenario.
Completion time	5 minutes

You have installed and configured IPAM, including performing the provisioning and discovery?. What must you do to import IP address data from spreadsheets and text files?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 14

CONFIGURING A

DOMAIN AND FOREST

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

- Exercise 14.1** Creating a Child Domain
- Exercise 14.2** Demoting a Domain Controller
- Exercise 14.3** Installing a New Forest
- Exercise 14.4** Raising the Domain and Forest Functional Level
- Exercise 14.5** Configuring Multiple UPN Suffixes
- Lab Challenge** Performing an Upgrade Installation

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 14-1.

Table 14-1
Computers required for Lab 14

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 4)	Windows Server 2012	Storage01

In addition to the computers, you will also require the software listed in Table 14-2 to complete Lab 14.

Table 14-2
Software required for Lab 14

Software	Location
Lab 14 student worksheet	Lab14 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab14 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Create a new child domain
- Create a new forest domain forest
- Upgrade the domain and forest functional levels
- Configure multiple principal name (UPN) suffixes

Estimated lab time: 90 minutes

Exercise 14.1 Creating a Child Domain

Overview	In this exercise, you will use the Storage01 server to create a child domain that is placed under contoso.com.
----------	--

Completion time	30 minutes
-----------------	------------

Mindset Question: How do users from a child domain access resources on a parent domain?

1. Log into Storage01 as **contoso\administrator** with the password of **Password01**.
2. Click the **Start Menu** button and click **Control Panel**.
3. When the Control Panel opens, click **System and Security**.
4. Click **See the name of this computer** under System.
5. When the System page opens, click **Change settings**.
6. When the System Properties dialog opens, click **Change**.
7. When the Computer Name/Domain Changes dialog opens, click **Workgroup**, and type **Workgroup** in the text box. Click **OK**.
8. When it asks if you want to continue, click **OK**.
9. When a welcome to the WORKGROUP workgroup message appears, click **OK**.
10. Click **OK** to restart the computer.
11. Click **Close** on the System Properties dialog box.
12. When it says that you must restart your computer to apply these changes, click **Restart Now**.
13. Log into Storage01 as local **administrator** with the password of **Password01**.
14. When Server Manager opens, open the **Manage** menu, and click **Add Roles and Features**.
15. When the Add Roles and Features Wizard opens, click **Next**.
16. On the Select installation type page, click **Next**.
17. On the Select destination server page, click **Next**.
18. On the Select server roles, click **Active Directory Domain Services**. When it asks to add some features, click **Add Features**.
19. Back on the Select server roles page, click **Next**.
20. On the Select features page, click **Next**.
21. On the Active Directory Domain Services page, click **Next**.
22. On the Confirm installation selections page, click **Install**.

23. When Active Directory Domain Services is installed, click **Close**.
24. On Server Manager, click the yellow triangle with the black exclamation point, and click **Promote this server to a domain controller**.
25. When the Active Directory Domain Services Configuration Wizard opens, on the Deployment Configuration, click **Add a new domain to an existing forest**.
26. In the Parent domain name, type **contoso.com**.
27. In the New domain name text box, type **Child**.
28. Click the **Change** button. When prompted for the username credentials, type **contoso\administrator** and **Password01**. Click **OK**. Click, **Next**.
29. On the Domain Controllers Options page, type **Password01** in both the Password and the Confirm password text boxes. Click **Next**.
30. On the DNS Options page, answer the following question, and click **Next**.

Question 1	<i>What option is already selected?</i>
---------------	---

31. On the Additional Options page, after CHILD appears in the NetBIOS domain name text box, click **Next**.
32. On the Paths page, click **Next**.
33. On the Review Options page, answer the following question, then click **Next**.

Question 2	<i>What roles will this server have?</i>
---------------	--

34. On the Prerequisites Check page, click **Install**.
35. On Storage01, when Windows reboots, login as **child\administrator** with the password of **Password01**.
36. When Server Manager opens, open the **Tools** menu and click **Active Directory Users and Computers**.
37. When Active Directory Users and Computers console opens, right-click **Child.contoso.com** and click **Raise domain functional level**. The Raise domain functional level dialog box opens.

Question 3	<i>What domain functional level is the child domain and why was it set at that level?</i>
-----------------------	---

38. Click **Close** to close the Raise domain functional level dialog box.

39. Close Active Directory Users and Computers.

End of exercise. You can leave Server Manager open for the next exercise.

Exercise 14.2 Demoting a Domain Controller

Overview	In this exercise, you will demote the Storage01 domain controller so that you can use it in future exercises.
Completion time	10 minutes

1. On Storage01, using Server Manager, open the **Manage** menu and click **Remove Roles and Features**.
2. When the Remove Roles and Features wizard starts, click **Next**.
3. On the Server destination server page, click **Next**.
4. On the Remove server roles, deselect **Active Directory Domain Services**. When a message displays saying that you have to remove features, click **Remove Features**.
5. When the Remove Roles and Features Wizard shows a Validation Results dialog box (as shown in figure 14-1), click **Demote this domain controller**.

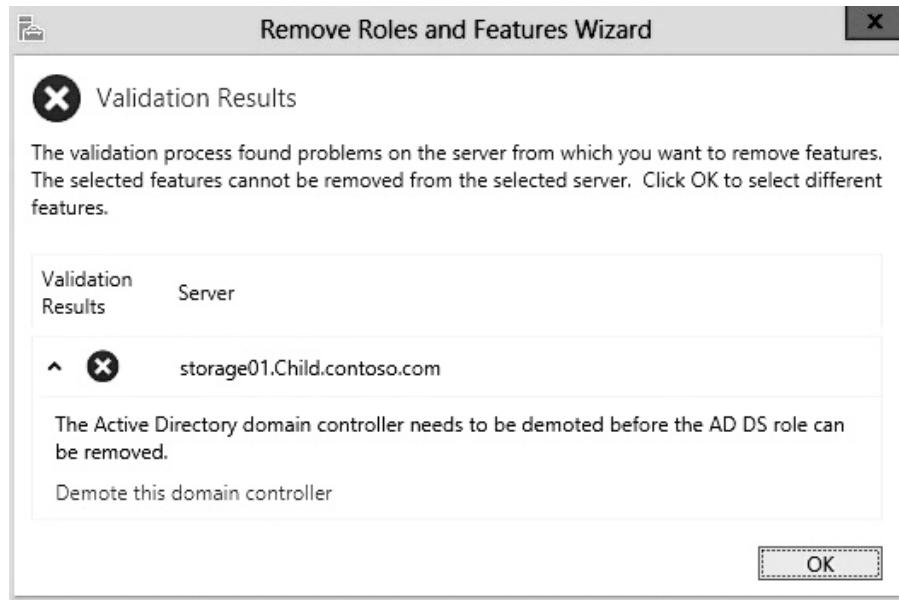


Figure 14-1
Demoting a domain controller

6. On the Credentials page (as shown in figure 14-2), click to select **Force the removal of this domain controller**, and click **Next**.
7. When it says that the current roles include Domain Name System (DNS) Server and Global Catalogs, click to select the **Proceed with removal**, and click **Next**.
8. On the New Administrator Password page, type **Password01** in the Password and Confirm password text boxes. Click **Next**.

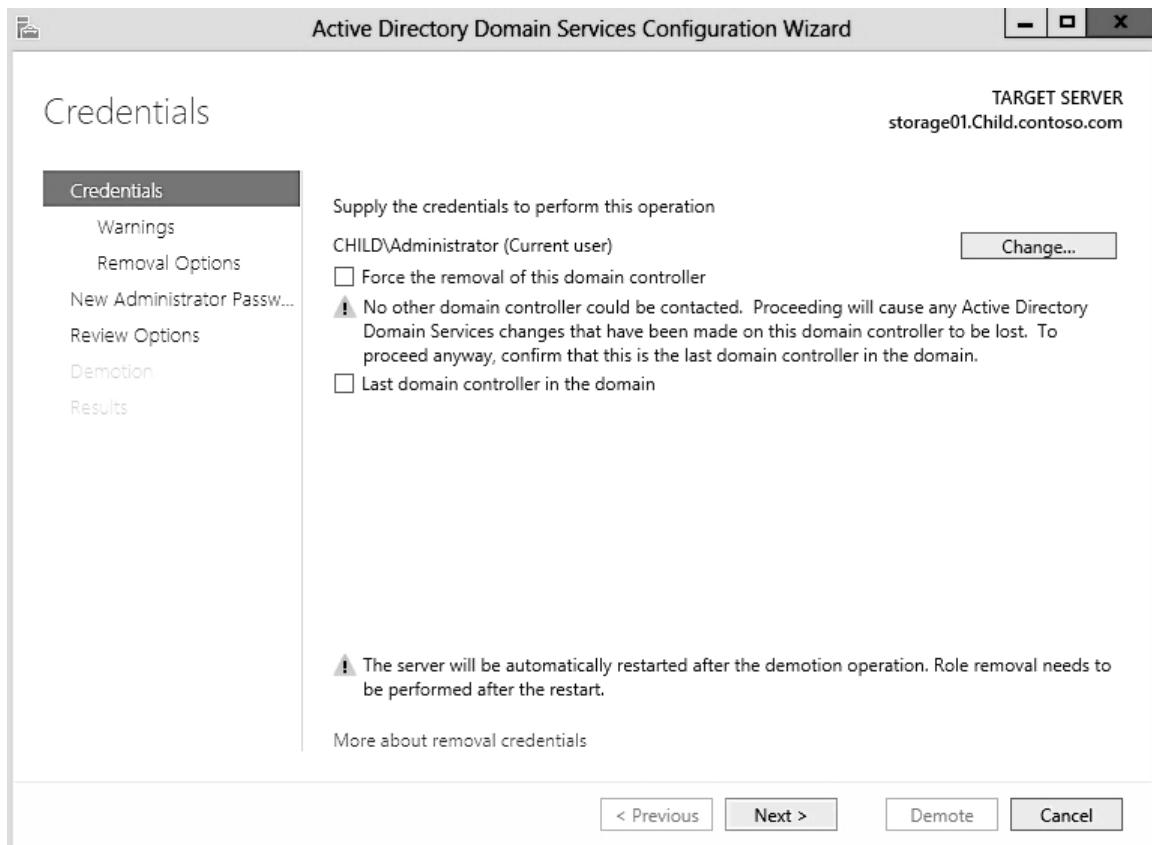


Figure 14-2
Showing options to remove a domain controller

- On the Remove options page, click **Demote**. Windows will reboot when done.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 14.3 Installing a New Forest

Overview	In this exercise, you will create a new forest and domain called adatum.com using Storage01.
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Completion time	10 minutes
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- Login to Storage01 as Administrator with the password of **Password01**.
- On Server Manager, click the yellow triangle with the black exclamation point, and click **Promote this server to a domain controller**.
- On the Deployment Configuration, click **Add a new forest**.

4. On the Root domain name, type **adatum.com** in the Root domain name text box. Click **Next**.
5. On the Domain Controller Options page, select **Windows Server 2008 R2** for the Forest function level and the domain functional level, as shown in figure 14-3. In the Password and Confirm password text boxes, type **Password01**. Click **Next**.

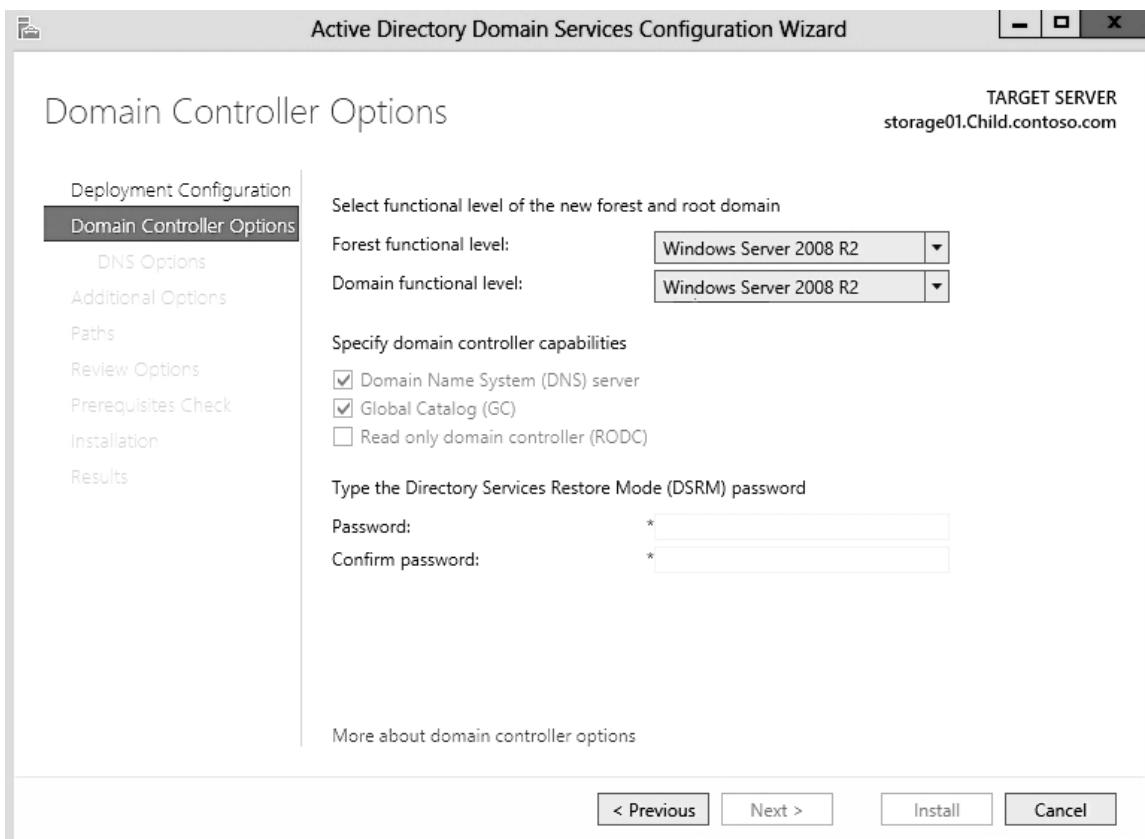


Figure 14-3
Configuring the functional level for a domain and forest

6. On the DNS Options page, click **Next**.
7. On the Additional Options page, click **Next**.
8. On the Paths page, click **Next**.
9. On the Review Options page, click **Next**.
10. On the Prerequisites page, click **Install**. After a few minutes, Windows will reboot.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 14.4 Raising the Domain and Forest Functional Level

Overview	In this exercise, you will raise the domain and forest functional level of the adatum.com forest and domain.
Completion time	10 minutes

Mindset Question: If you have a forest functional level Windows Server 2008 R2, what are the domain functional levels can exist on the forest?

1. Log into Storage01 as **adatum\administrator** with the password of **Password01**.
2. On Storage01, when Server Manager opens, open the **Tools** menu, and click **Active Directory Users and Computers**.
3. When Active Directory Users and Computers opens, right-click **Adatum**, and click **Raise domain functional level**.
4. When the Raise domain functional level dialog box opens, Windows Server 2012 is already selected. Click **Raise**.
5. When a warning appears that you may not be able to reverse this process, click **OK**.
6. When the functional level has been raised, click **OK**.
7. Close Active Directory users and Computers.
8. Using Server Manager, open the **Tools** menu and click **Active Directory Domains and Trusts**.
9. When the Active Directory Domains and Trusts console opens, right-click **Active Directory Domains and Trusts**, and click **Raise Forest Functional Level**.
10. When the Raise forest functional level dialog box opens, Windows Server 2012 is already selected. Click **Raise**.
11. When a warning appears that you may not be able to reverse the process, click **OK**.
12. When the functional level has been raised, click **OK**.
13. Close Active Directory Domains and Trusts.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 14.5 Configuring Multiple UPN Suffixes

Overview	In this exercise, you will create define multiple UPN suffixes so that different logins can be used with the same user.
Completion time	10 minutes

Mindset Question: What are the two formats that a user can use when logging in?

1. On Storage01, using Server Manager, open the **Tools** menu, and click **Active Directory Domains and Trusts**.
2. Right-click **Active Directory Domains and Trusts**, and then click **Properties**.
3. On the Alternative UPN suffixes (as shown in figure 14-4), type **litware.com** and click **Add**.

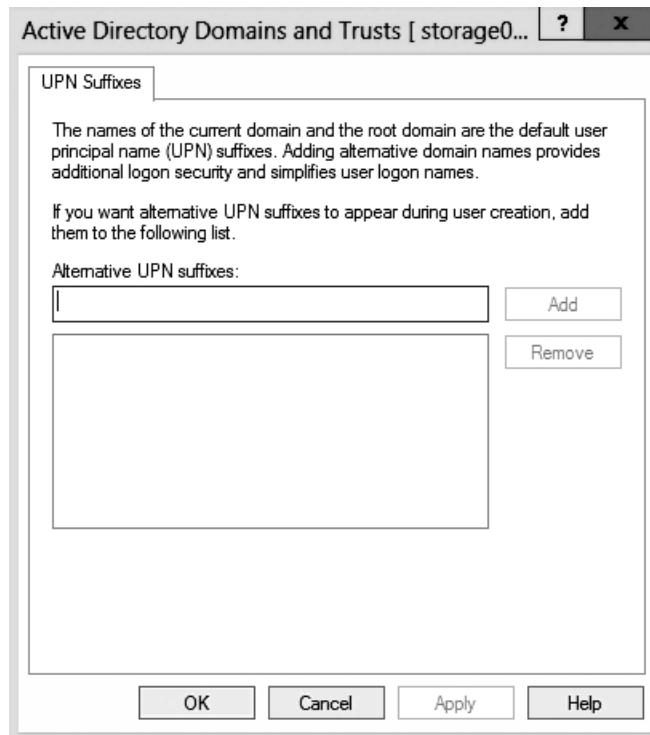


Figure 14-4
Configuring the UPN suffixes

4. On the Alternative UPN suffixes, type **adatum.contoso.com** and click **Add**.
5. Click the **OK** button.
6. Close **Active Directory Domains and Trusts**.

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End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time	10 minutes
------------------------	-------------------

1. In Exercise 14.1, how did you promote a member server to a domain controller?
2. In Exercise 14.2, how did you demote a domain controller to a member server?
3. In Exercise 14.3, which forest functional levels were available?
4. In Exercise 14.4, what tool did you use to raise the domain functional level?
5. In Exercise 14.4, what tool did you use to raise the forest functional level?
6. In Exercise 14.5, what tool did you use to add alternative UPN suffixes?

Lab	Challenge	Performing an Upgrade Installation
Overview	To complete this challenge, you will describe how to perform an upgrade installation by writing the steps for the following scenario.	
Completion time	10 minutes	

You have a server and domain controller running Windows Server 2008 R2. You want to upgrade to Windows Server 2012. How would you perform the upgrade?

Write out the steps you performed to complete the challenge.

End of lab

LAB 15

CONFIGURING TRUSTS

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES:

- Exercise 15.1** Creating and Configuring a One-Way External Trust
- Exercise 15.2** Creating and Configuring a Two-Way Forest Trust
- Exercise 15.3** Validating and Testing the Trust
- Lab Challenge** Configuring Selective Authorization between two Trusted Domains

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 15-1.

Table 15-1
Computers required for Lab 15

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 4)	Windows Server 2012	Storage01

In addition to the computers, you will also require the software listed in Table 15-2 to complete Lab 15.

Table 15-2
Software required for Lab 15

Software	Location
Lab 15 student worksheet	Lab15_worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab15_worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Create and configure a one-way external trust.
- Create and configure a two-way forest trust
- Validate and test the trust
- Configure selective authorization between trusted domains

Estimated lab time: 80 minutes

Exercise 15.1 Creating a One-Way External Trust	
Overview	In this exercise, you will create a one-way external trust between the contoso.com and the adatum.com domains.
Completion time	25 minutes

Mindset Question: Your company, contoso.com, has teamed up with another company, adatum.com. You want users from the adatum.com to access resources in the contoso.com domain. What should you do to allow this?

1. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
2. When Server Manager opens, open the **Tools** menu and click **DNS**.
3. When the DNS Manager console opens, right-Click **Conditional Forwarders** and click **New Conditional Forwarder**.

4. When the New Conditional Forwarder opens, type **Adatum.com** in the DNS Domain text box.
5. Click the **Click here to add** text, type **192.168.1.80** (as shown in figure 15-1) and press the Enter key. Click OK.

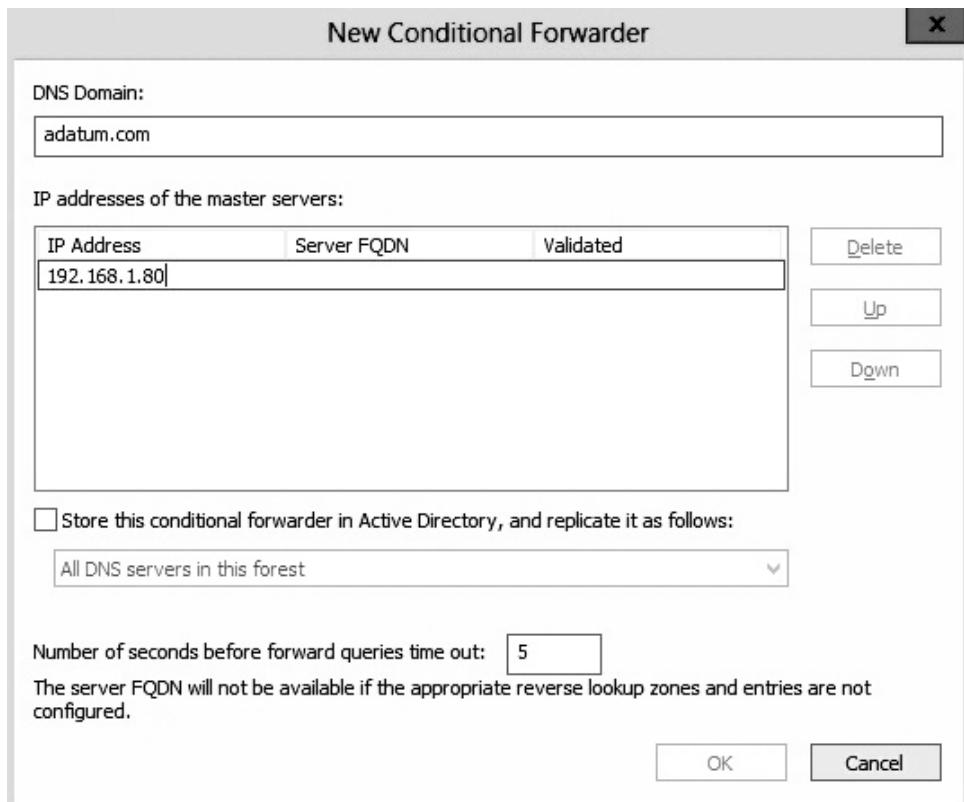


Figure 15-1
Creating a conditional forwarder zone

6. Close DNS Manager.
7. Log in to Storage01 as **adatum\administrator** with the password of **Password01**.
8. When Server Manager opens, open the **Tools** menu and click **DNS**.
9. When the DNS Manager console opens, expand **Storage01**.
10. Right-Click **Conditional Forwarders** and click **New Conditional Forwarder**.
11. When the New Conditional Forwarder opens, type **contoso.com** in the DNS Domain text box.
12. Click the **Click here to add** text, type **192.168.1.50** and press the Enter key. Click **OK**.

13. Close DNS Manager.
14. On RWDC01, using **Server Manager**, open the **Tools** menu, and click **Active Directory Domains and Trusts**.
15. On RWDC01, with Active Directory Domains and Trusts, right-click **contoso.com**, and click **Properties**.
16. When the Properties dialog box open, click the **Trusts** tab, which is shown in figure 15-2.

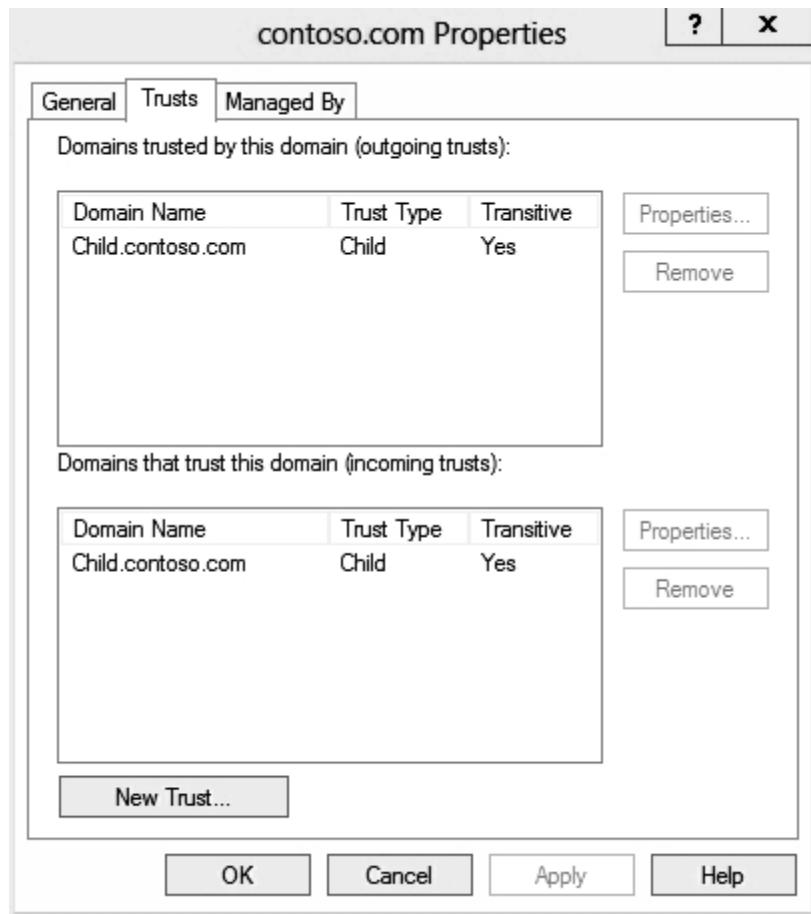


Figure 15-2
Opening the Trusts tab

Question 1	<i>What trust is already there and how was it created</i>
-------------------	---

17. Click the **New Trust** button.
18. When the New Trust Wizard opens, click **Next**.

19. On the Trust Name page, in the Name text box (as shown in figure 15-3), type **adatum.com**. Click **Next**.

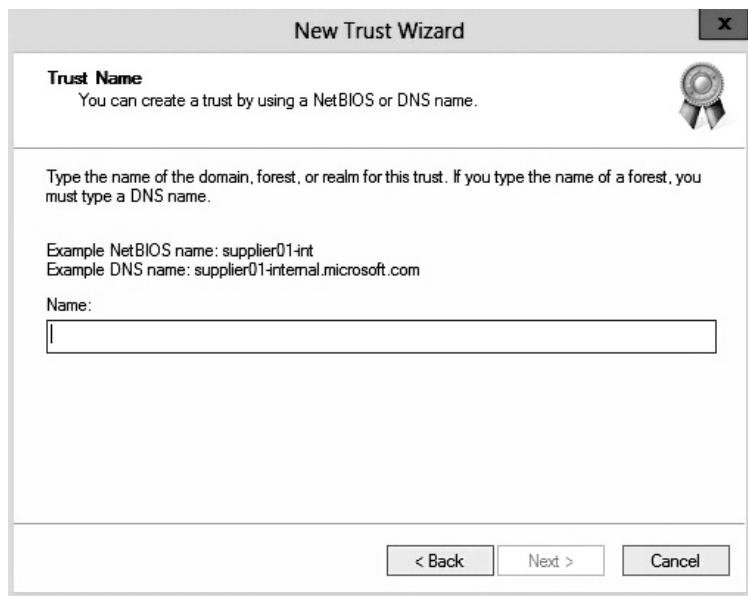


Figure 15-3
Defining the trust name

20. On the Trust Type page, External trust is already selected. Answer the next question and click **Next**.

Question 2	<i>What type of trust is an external trust?</i>
---------------	---

21. Select the direction **One-way: outgoing option** (see Figure 15-4), and then click **Next**.

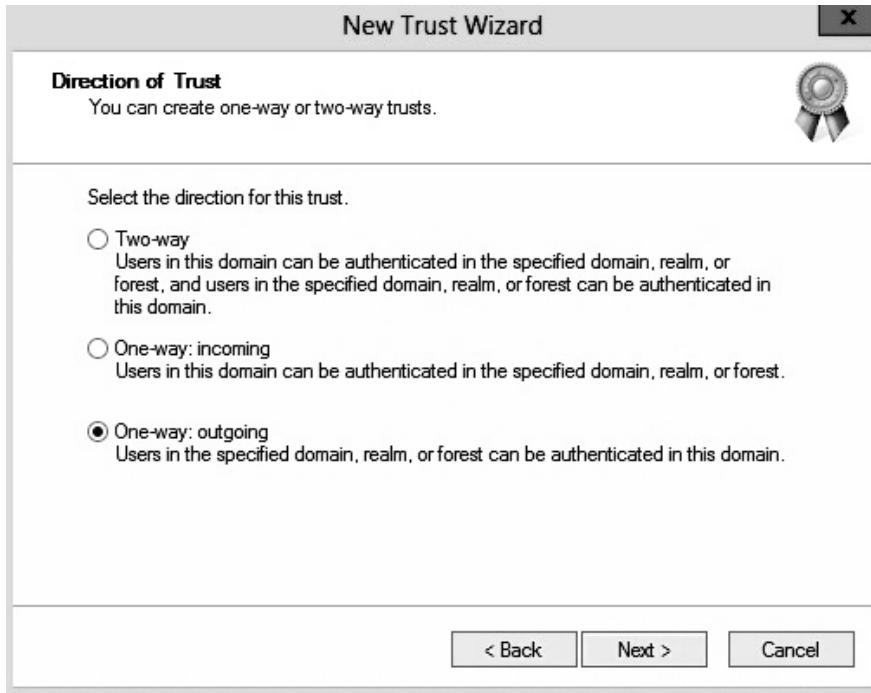


Figure 15-4
Specifying the direction of the trust

22. Select the **Both this domain and the specified domain** option, and then click the **Next** button.
23. On the User Name and Password page, type the following:

User name: **adatum\administrator**
Password: **Password01**
24. Click Next, choose the **Domain-wide authentication** option, and then click **Next**.
25. The Trust Selections Complete prompt displays. Click **Next** to create the trust.
26. On success, this displays the Trust Creation Complete prompt. Click **Next**.
27. To confirm the trust, select the Yes, confirm the outgoing trust tab, and then click **Next**.
28. Verify that the trust was successfully created, and then click **Finish**.
29. When the SID Filtering information box opens, click **OK**. The adatum.com appears in the outgoing trusts.

30. Take a screen shot of the contoso.com Properties dialog box by pressing Alt+Prt Scr and then paste it into your Lab 15 worksheet file in the page provided by pressing Ctrl+V.

31. Click **OK** to close the Properties dialog box.

End of exercise. You can leave the Active Directory Domains and Trusts console open for the next exercise.

Exercise 15.2 Creating a Two-Way Forest Trust

Overview

In this exercise, you will delete the trust you created in the last exercise, and create a two-way forest trust between contoso.com and adatum.com.

Completion time

20 minutes

1. On RWDC01, on Active Directory Domains and Trusts, right-click **contoso.com**, and click **Properties**.
2. When the Properties dialog box open, click the **Trusts** tab.
3. Click **adatum.com** in the Domains trusted by this domain,, and click **Remove**.
4. When the Active Directory Domain Services dialog box opens, click Yes, remove the trust from both the local domain and the other domain. Then specify the following information and click OK.

User name: adatum\administrator

Password: Password01

5. When it asks if you are sure to remove the outgoing trust, click **Yes**.
6. On the Properties dialog box, click the **New Trust** button.
7. When the New Trust Wizard opens, click **Next**.
8. On the Trust Name page, in the Name text box, type **adatum.com**. Click **Next**.
9. On the Trust Type page, click **Forest trust**. Answer the next question and click **Next**.

Question
3

What type of trusts is an external trust?

10. On the Direction of Trust page, select the direction **Two-way**, and then click **Next**.
11. On the Sides of Trust page, click **Both this domain and the selected domain** option, and then click the **Next** button.
12. On the User Name and Password page, type the following and click **Next**:
User name: adatum\administrator
Password: Password01
13. On the Outgoing Trust Authentication Level-Local Forest page, click **Forest-wide authentication**, and click **Next**.
14. On the Outgoing Trust Authentication Level-Specified Forest page, click **Forest Wide authentication**, and click **Next**.
15. The Trust Selections Complete prompt displays. Click **Next**.
16. On the Routed Name Suffixes – Specified forest page, as shown in figure 15-5, click **Next**.



Figure 15-5
Specifying the routed name suffixes used in the trust

17. On success, this displays the Trust Creation Complete prompt. Click **Next**.
18. On the Confirm Outgoing Trust, To confirm the trust, select the **Yes, confirm the outgoing trust**, and then click **Next**.

19. On the Confirm Incoming Trust, To confirm the trust, select the **Yes, confirm the incoming trust**, and then click **Next**.
20. When the wizard is complete, click **Finish**.
21. Take a screen shot of the contoso.com Properties dialog box by pressing Alt+Prt Scr and then paste it into your Lab 15 worksheet file in the page provided by pressing Ctrl+V.
22. Click **OK** to close the Properties dialog box.

End of exercise. You can leave the Active Directory Domains and Trusts console open for the next exercise.

Exercise 15.3 Validating and Testing the Trust

Overview

In this exercise, you will validate a trust that you just created. In addition, you will access a shared folder from one domain to another domain using the trust.

Completion time

20 minutes

1. On RWDC01, On Active Directory Domains and Trusts, right-click **contoso.com**, and click **Properties**.
2. Right-click **contoso.com** and click **Properties**.
3. When the Properties dialog box opens, click the **Trusts** tab.
4. Under Domains trusted by this domain (outgoing trusts), click **adatum.com**, and click **Properties**.
5. When the adatum.com Properties dialog box opens, click **Validate**.
6. When the Active Directory Domain Services dialog box opens, click **Yes, validate the incoming trust**.
7. Specify the following and click **OK**.

Username: adatum\administrator

Password: Password01

8. Click **OK**, again. When the Active Directory Domain Services dialog box appears asking to update the name suffix routing for this trust, click **No**.

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9. Take a screen shot of the adatum.com Properties window by pressing Alt+Prt Scr and then paste it into your Lab 15 worksheet file in the page provided by pressing Ctrl+V.
10. To close the adatum.com Properties dialog box, click **OK**.
11. To close the contoso.com Properties dialog box, click **OK**.
12. On RWDC01, open the File Explorer by clicking the **File Explorer** icon on the taskbar.
13. Create the **C:\Data** folder.
14. Create a text file in the C:\Data folder called **test.txt**.
15. Right-click the **Data** folder and click **Properties**.
16. When the Properties dialog box opens, click the **Sharing** tab.
17. Click the **Advanced Sharing** button.
18. When the Advanced Sharing dialog box opens, click to select the **Share this folder**.
19. Click the **Permissions** button.
20. When the Permissions dialog box opens, grant **Allow Full Control** to Everyone.
21. Click **OK** to close Permissions dialog box..
22. Click **OK** to close the Advanced Sharing dialog box.
23. On the Properties dialog box, click the **Security** tab.

Question 4	<i>What users can access the Data Properties</i>
-----------------------	--

24. Click the **Edit** button.
25. When the Permissions dialog box opens, click **Add**.
26. When the Select Users, Computers, Service Accounts, or Groups dialog box opens, click **Locations** button.
27. When the Locations dialog box opens (as shown as figure 15-6), click **adatum.com** and click **OK**.

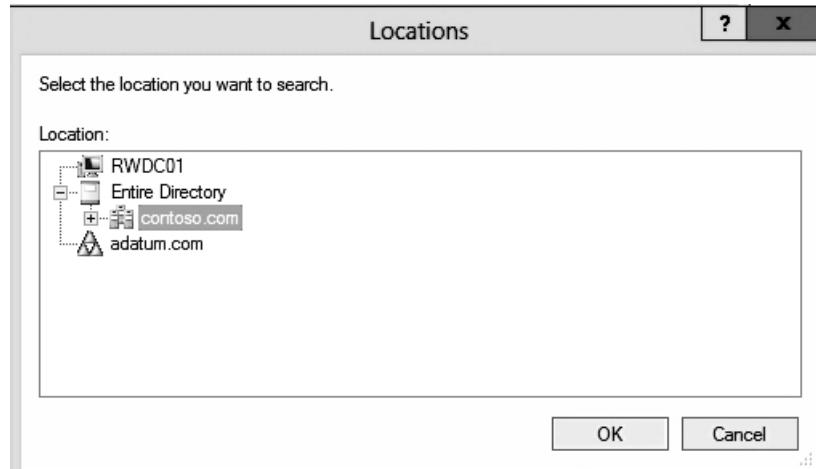


Figure 15-6
Selecting a domain when accessing remote resources

28. In the Enter the object names to select text box, type **domain users**, then click OK to close select Users, etc. dialog box.
29. Click **OK** to close the Permissions dialog box.
30. Click **Close** to close the Data Properties dialog box.
31. On Storage01, open the File Explorer by clicking the **File Explorer** button on the task bar.
32. Type **\rwdc01\data** in the Location box and press the Enter key (see Figure 15-7). You should see the test.txt file.

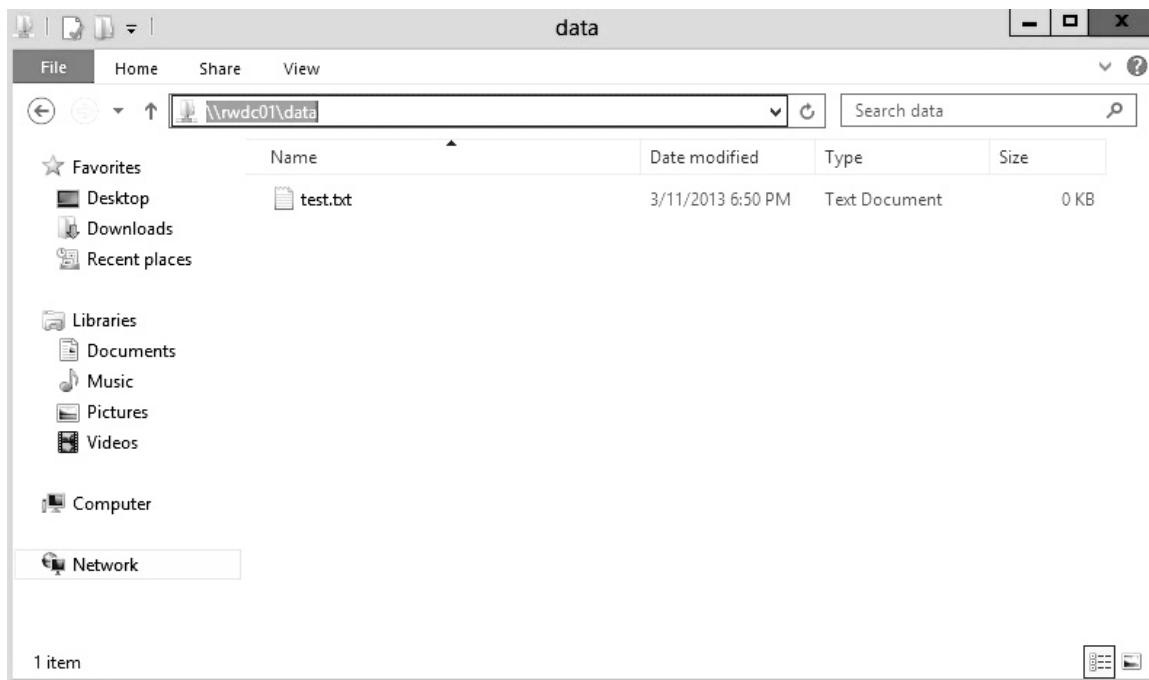


Figure 15-7

Accessing the \\rwdc01\data shared folder

- 33.** Close File Explorer.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 15.1, what tool did you use to create a trust relationship between two domains?
2. In Exercise 15.1, you need to define that a domain is trusted by another domain. Which type of trust would this be, outgoing or incoming?
3. In Exercise 15.1, what type of trust is defined between a parent domain and a child domain?
4. In Exercise 15.2, what type of trust was created when you created a two-way forest trust
5. You have three domains. Domain A trusts domain B, Domain B trusts domain C. Therefore, domain A trusts domain C. What type of trust is this?

6. In Exercise 15-3, how did you validate a trust between two domains?

Lab Challenge	Configuring Selective Authentication Between Two Trusted Domains
Overview	To complete this challenge, you will describe how to configure selective authentication between two trusted domains by writing the steps for the following scenario.
Completion time	10 minutes

You have two domains (contoso.com and adatum.com) that have an external share between the two domains. You want to configure selective authentication. What should you do?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 16

CONFIGURING SITES

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES

Exercise 16.1 Adding Sites and Subnets

Exercise 16.2 Configuring a Bridgehead Server

Exercise 16.3 Creating a Site Link

Exercise 16.4 Modifying the Replication Interval and Replication Schedule

Lab Challenge Working with DNS SRV Records

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 16-1.

Table 16-1
Computers required for Lab 16

<i>Computer</i>	<i>Operating System</i>	<i>Computer Name</i>
Server (VM 1)	Windows Server 2012	RWDC01

In addition to the computers, you will also require the software listed in Table 16-2 to complete Lab 16.

Table 16-2
Software required for Lab 16

Software	Location
Lab 16 student worksheet	Lab16_worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab16_worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Create and configure site and subnets.
- Create a site link.
- Move domain controllers between sites
- Manage registration of SRV records

Estimated lab time: 40 minutes

Exercise 16.1 Adding Sites and Subnets	
Overview	In this exercise, you will add a site and a subnet to Active Directory. In addition, you will move a domain controller from one site to another site.
Completion time	15 minutes

Mindset Question: **Why is it important to define sites and subnets in Active Directory?**

1. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
2. On RWDC01, when Server Manager opens, open the **Tools** menu and click **Active Directory Sites and Services**.
3. When the Active Directory Sites and Services console opens, expand the **Sites** folder.

Question 1	<i>What site is already created?</i>
-----------------------	--------------------------------------

4. Right-click the **Sites** folder, and click **New Site**.
5. When the New Object – Site dialog box opens, answer the following question.

Question 2	<i>What site link already exists?</i>
-----------------------	---------------------------------------

6. In the Name text box, type **Corporate** and click **DEFAUTLIPSITELINK**. Click **OK**.
7. When the site has been created, answer the following question. Then click **OK**.

Question 3	<i>What else needs to be done when creating a site?</i>
-----------------------	---

8. Right-click the Subnets container and select **New Subnet**.
9. When the New Object – Subnet dialog box (as shown in figure 16-1), type **192.168.1.0/24** in the Prefix text box.

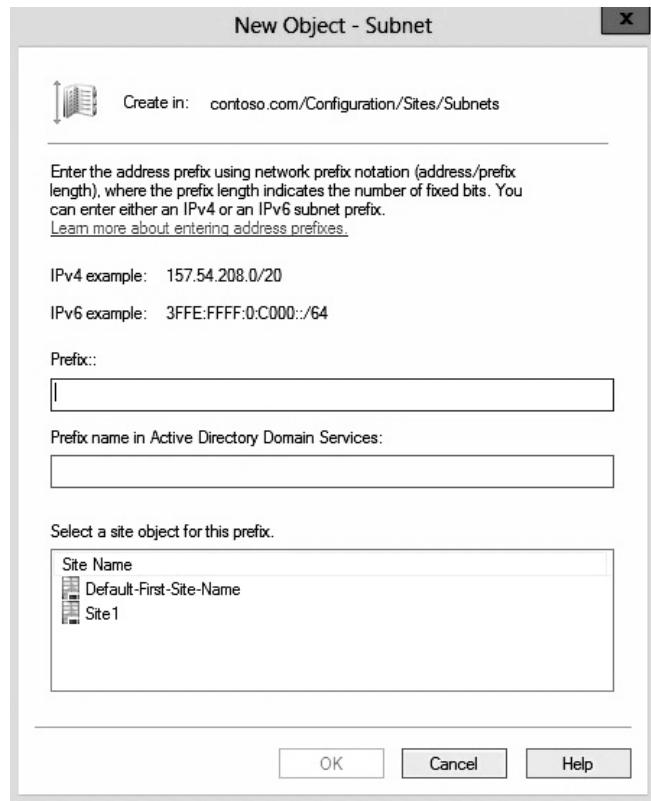


Figure 16-1
Creating a new subnet

10. Under Select a site object for this prefix, click **Corporate**, and click **OK**.
11. Expand Subnets, and confirm the **192.168.1.0/24** subnet is listed.
12. Expand the **Default-First-Site-Name**, and expand **Servers**.
13. Right-click **RWDC01**, and click **Move**.
14. When the Move Server dialog box opens, click **Corporate**, and click **OK**.
15. Expand the **Corporate** site, and expand **Servers**. RWDC01 should be listed.
16. Take a screen shot of the Active Directory Sites and Services console by pressing Alt+Prt Scr and then paste it into your Lab 16 worksheet file in the page provided by pressing Ctrl+V.
17. Leave the Active Directory Sites and Services console open for the next exercise.

Exercise 16.2 Configuring a Bridgehead Server

Overview

In this exercise, you will create a bridgehead server.

Completion time

5 minutes

Mindset Question: **What is a bridgehead server and how can it make data replication more efficient?**

1. On RWDC01, using Active Directory Sites and Services, navigate to **Sites\Corporate\Servers**, right-click **RWDC01**, and click **Properties**.
2. On the Properties dialog box, on the General tab (as shown in figure 16-2) under the Transports available for inter-site transfer section, click **IP** and click **Add >>**. Then click **SMTP**, and click **Add>>**.

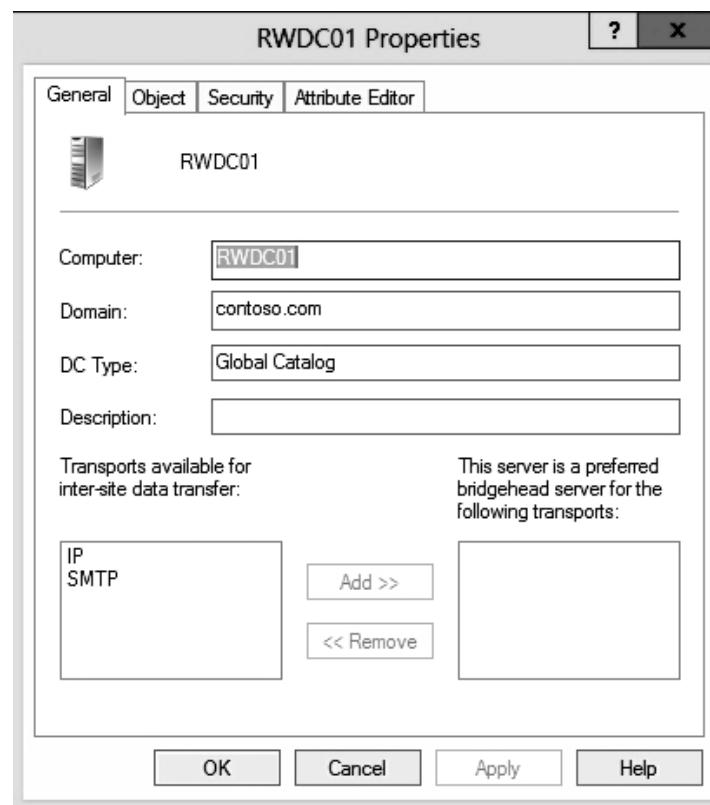


Figure 16-2
Configuring a bridgehead server

3. Click **OK** to close the Properties dialog box.
4. Leave the Active Directory Sites and Services console open for the next exercise.

Exercise 16.3 Creating a Site Link

Overview In this exercise, you will create a site link.

Completion time 5 minutes

1. On RWDC01, using Active Directory Sites and Services, navigate to **Sites\Inter-Site Transports**, right-click **IP** container, and click **New Site Link**.
2. When the New Object – Site Link dialog box opens, type **SiteLinkBridge** in the Name text box.
3. Corporate and Default-First-Site-Name is already added to the Sites in this site link section as shown in figure 16-3. Click **OK**.

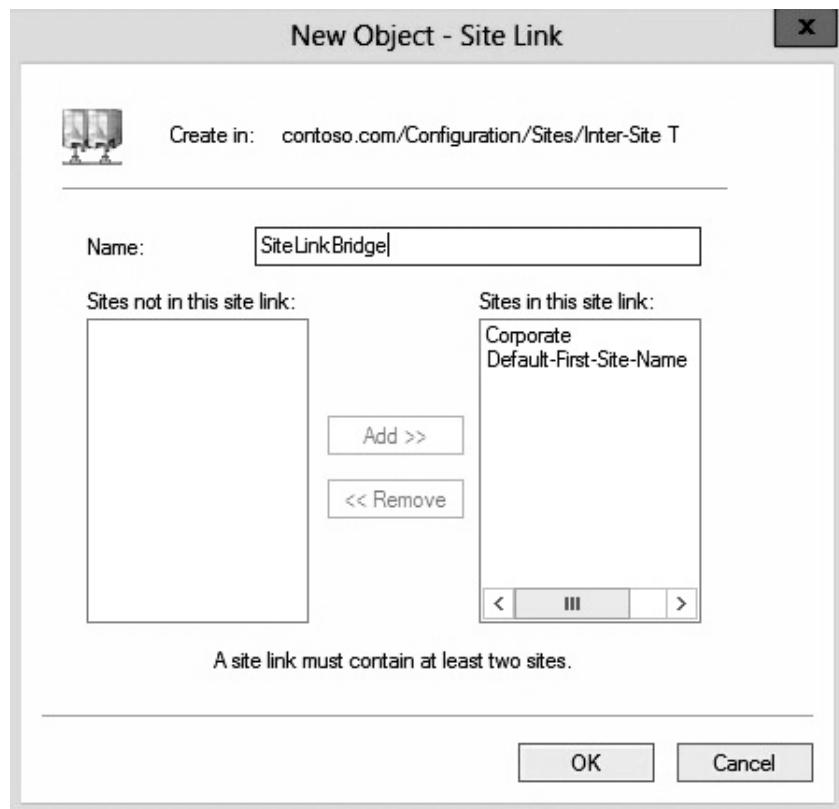


Figure 16-3
Creating a new site link

4. Leave the Active Directory Sites and Services console open for the next exercise.

Exercise 16.4**Modifying the Replication Interval and Replication Schedule****Overview**

In this exercise, you will modify the replication interval and replication schedule of a site link.

Completion time

10 minutes

Mindset Question: **What can you use to force replication traffic to go over a particular site link when two sites have multiple site links connecting them?**

1. On RWDC01, using Active Directory Sites and Services, navigate to **Sites**, expand **\Inter-Site Site Transports**, and click the **IP** folder.

**Question
4**

There is the DEFAULTIPSITELINK and SiteLinkBridge in the IP folder. What is the cost and replication interval of these two links?

2. Right-click the **SiteLinkBridge**, and click **Properties**.
3. When the Properties dialog box opens, change the Replicate every setting to **60** minutes.
4. Click the **Change Schedule** button.
5. When the Schedule dialog box opens (as shown in figure 16-4), click and drag from Monday 10 AM through Friday 2 PM and click **Replication Not Available** (as shown in figure 16-5).

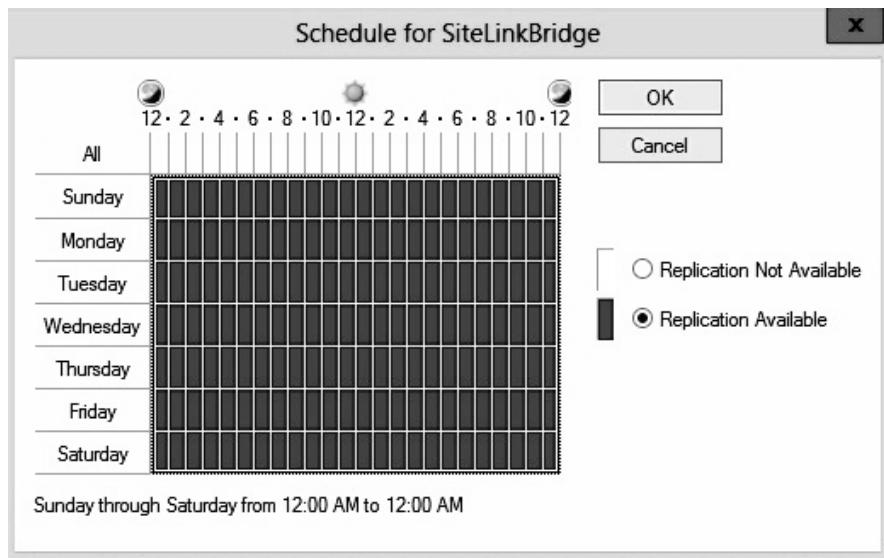


Figure 16-4
Showing the default scheduling

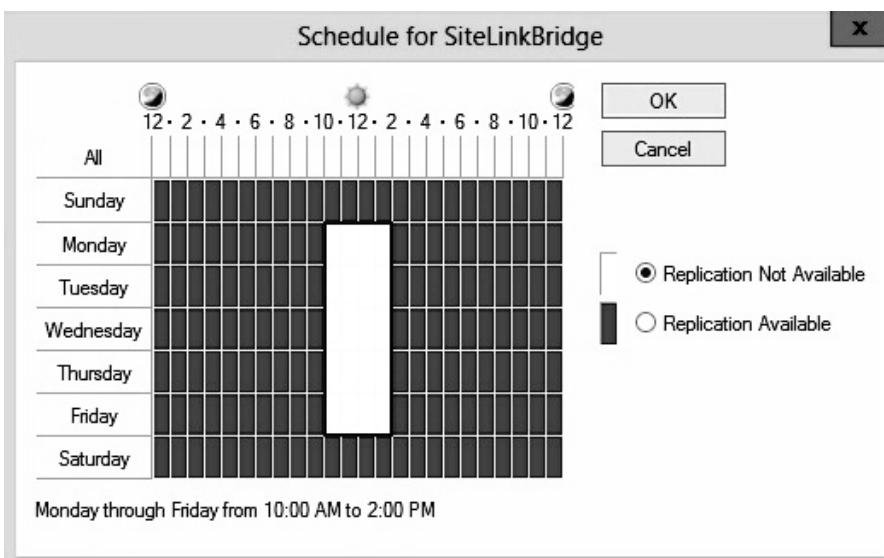


Figure 16-5
Changing the scheduling

6. Click **OK** to close the Schedule dialog box.
7. Click **OK** to close Properties dialog box.
8. Take a screen shot of the Active Directory Sites and Services console by pressing Alt+Prt Scr and then paste it into your Lab 16 worksheet file in the page provided by pressing Ctrl+V.

- 9.** Close the Active Directory Sites and Services console.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 5 minutes

- 1.** In Exercise 16.1, what tool is used to create sites and subnets?
- 2.** In Exercise 16.1, what tool is used to move domain controllers between sites?
- 3.** In Exercise 16.2, what transport protocols does a bridgehead server use?

Lab Challenge Working with SRV Records	
Overview	To complete this challenge, you will describe how to restore SRV records by writing the steps for the following scenario.
Completion time	10 minutes

You recently discovered that a junior admin deleted some of the SRV records, which caused some users to have problems logging in. What is the best way to re-create the SRV records?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 17

MANAGING ACTIVE DIRECTORY AND SYSVOL REPLICATION

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES:

- Exercise 17.1** Demoting a Domain Controller
- Exercise 17.2** Promoting a Domain Controller
- Exercise 17.3** Replicating with Active Directory Sites and Services
- Exercise 17.4** Using REPADMIN
- Exercise 17.5** Configuring Password Replication Policies for an RODC
- Lab Challenge** Upgrading SYSVOL Replication to DFSR

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 17-1.

Table 17-1
Computers required for Lab 17

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 4)	Windows Server 2012	Storage01

In addition to the computers, you will also require the software listed in Table 17-2 to complete Lab 17.

Table 17-2
Software required for Lab 17

Software	Location
Lab 17 student worksheet	Lab17 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab17 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Monitor and manage Active Directory replication
- Upgrade SYSVOL replication to DFSR

Estimated lab time: 115 minutes

Exercise 17.1 Demoting a Domain Controller

Overview	In this exercise, you will remove the adatum.com domain so that you can use Storage01 as a second domain controller for the contoso.com domain.
----------	---

Completion time	15 minutes
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1. Log in to Storage01 as adatum\administrator. Using Server Manager, open the **Manage** menu and click **Remove Roles and Features**.
2. When the Remove Roles and Features wizard starts, click **Next**.

3. On the Select destination server page, click **Next**.
4. On the Remove server roles, deselect **Active Directory Domain Services**. When a message displays saying that you have to remove features, click **Remove Features**.
5. When the Remove Roles and Features Wizard shows a Validation Results dialog box, click **Demote this domain controller**.
6. On the Credentials page, click to select **Force the removal of this domain controller**.
7. Take a screen shot of the Credentials page by pressing Alt+Prt Scr and then paste it into your Lab 17 worksheet file in the page provided by pressing Ctrl+V.
8. Click **Next**.
9. On the Warnings page, click to select the **Proceed with removal**, and click **Next**.
10. On the New Administrator Password page, type **Password01** in the Password and Confirm password text boxes. Click **Next**.
11. On the Review options page, click **Demote**. Windows will reboot when done.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 17.2 Promoting a Domain Controller

Overview	In this exercise, you will promote Storage01 as a second domain controller for contoso.com.
Completion time	20 minutes

1. Login to Storage01, as local **Administrator** with the password of **Password01**.
2. On Storage01, right-click the **Network Status** icon on the task bar and click **Open Network and Sharing Center**.
3. When the Open Network and Sharing Center opens, click **Ethernet 1**.
4. When the Ethernet 1 Status dialog box opens, click **Properties**.
5. Double-click **Internet Protocol Version 4 (TCP/IPv4)**.
6. When the Internet Protocol Version 4 TCP/IPv4 Properties dialog box, change the Preferred DNS server to **192.168.1.50**.

7. Take a screen shot of the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box by pressing Alt+Prt Scr and then paste it into your Lab 17 worksheet file in the page provided by pressing Ctrl+V.
8. Click **OK** to close Internet Protocol Version 4 (TCP/IPv4) Properties.
9. Click **OK** to close the Ethernet 1 Properties dialog box.
10. Click **Close** to close the Ethernet 1 Status dialog box.
11. Close the Network and Sharing Center window.
12. Using Server Manager, click the yellow triangle with the black exclamation point (!), and click **Promote this server to a domain controller**.
13. When the Active Directory Domain Services Configuration wizard opens, Add a domain controller to an existing domain is already selected. Type **contoso.com** in the Domain text box.
14. Click **Change**. In the Windows Security dialog box, specify the following and click **OK**:

User name: contoso\administrator

Password: Password01
15. Back on the Deployment Configuration page, click **Next**.
16. On the Domain Controller Options page, Corporate is already selected for the site name. Type **Password01** in the Password and Confirm password text boxes, and click **Next**.
17. On the DNS Options page, click **Next**.
18. On the Additional Options page, click **Next**.
19. On the Paths page, click **Next**.
20. On the Review Options page, click **Next**.
21. On the Prerequisite Check page, click **Install** when the check is finished.
22. After a couple of minutes, Windows will reboot.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 17.3 Replicating with Active Directory Sites and Services

Overview	In this exercise, you will replicate Active Directory between two domain controllers using the Active Directory Sites and Services console.
Completion time	10 minutes

Mindset Question: **What is used to determine how Active Directory is replicated between domain controllers?**

1. Logon to RWDC01 as **contoso\administrator** with the Password of **Password01**.
2. When Server Manager opens, open the **Tools** menu and click **Active Directory Sites and Services**.
3. When Active Directory Sites and Services opens, expand **Sites**, expand **Corporate**, and expand **Servers**.
4. Expand **Storage01**, and click **NTDS Settings**.

Question 1	<i>What replication connection is already made for Storage01 and how is the connection generated?</i>
-------------------	---

5. Right-click the **RWDC01** in the right pane and click **Replicate Now**. When the dialog box opens, click **OK**. If RWDC01 is not available, go on to the next step.
6. Right-click the **NTDS Settings** under Storage01, and click **New**, and click **Connection**.
7. When the Find Active Directory Domain Controllers dialog box opens, click **RWDC01**, and click **OK**. If it states that there is already a connection and asks if you want to create another connection, click **Yes**.
8. On the New Object – Connection dialog box, click **OK**.
9. Close Active Directory Sites and Services.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 17.4 Using REPADMIN

Overview	In this exercise, you will use REPADMIN to replicate Active Directory and monitoring replication.
----------	---

Completion time	10 minutes
-----------------	------------

1. On RWDC01, right-click the **Start Menu** button, and click **Command Prompt (Administrator)**.
2. When the Administrator: Command Prompt window opens, execute the following command:

REPADMIN /SyncAll /APed

3. When the command is executed, look for errors, and press the Enter key.
4. To see a replication summary, execute the following command:

REPADMIN.EXE /ReplSummary

5. To display the current inbound connections, execute the following command:

REPADMIN.EXE /Queue

6. Close the Command Prompt window.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 17.5 Configuring Password Replication Policies for an RODC

Overview	In this exercise, you will configure the password replication policies for Read-Only domain controllers (RODC).
----------	---

Completion time	30 minutes
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Mindset Question: Why should you configure a password replication policy for RODCs?

1. On RWDC01, using Server Manager, open the **Tools** menu and click **Active Directory Users and Computers**.
2. When Active Directory Users and Computers opens, right-click the **Computers** container, click **New**, and click **Computer**.

3. When the New Object – Computer dialog box opens, type **Computer01** in the Computer name text box. Click **OK**.
4. Right-click the **Users** container, click **New**, and click **User**.
5. When the New Object – User dialog box, type the following; and click **Next**.

First Name: **User01**

User logon name: **User01**

6. In the Password, and Confirm password text boxes, type **Password01**.
7. Click to select **Password never expires**. When the Active Directory Domain Services dialog box opens, click **OK**.
8. Click **Next**.
9. When the wizard is complete, click **Finish**.
10. Right-click on the **Domain Controllers** OU and select **Pre-create Read-only Domain Controller Account**.
11. When the Active Directory Domain Services Installation Wizard opens, click **Next**.
12. On the Network Credentials page, click **Next**.
13. On the Specify Computer Name page, type **RODC01** in the Computer name text box, and click **Next**.
14. On the Select a site page, click **Corporate**, and click **Next**.
15. On the Additional Domain Controller Options page, verify that DNS Server and Global catalog are selected, and click **Next**.
16. On the Delegation of RODC Installation and Administration page, click **Next**.
17. On the Summary window, review the selections and click **Next**.
18. On the Completing the Active Directory Domain Services Installation Wizard window, click **Finish**.
19. From the Active Directory Users and Computers tool, click the **Domain Controllers** OU.

**Question
2**

What is the status of the RODC01, as indicated by the icon?

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20. Within the Domain Controllers OU, double-click the first **RODC01**.
21. From the RODC01 Properties window, click the **Password Replication Policy** tab, as shown in figure 17-1.

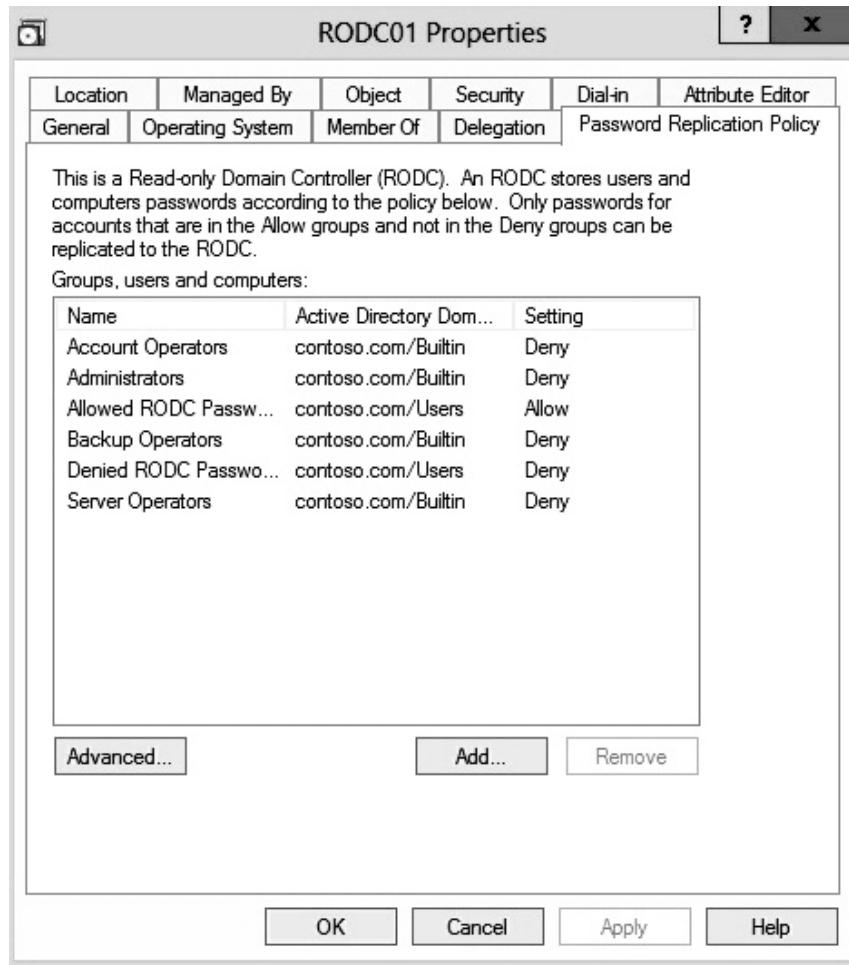


Figure 17-1
Viewing the current Password Replication Policy

Question 3	<i>What group is allowed password replication?</i>
-----------------------	--

22. Double-click **Allowed RODC Password Replication Group**.
23. When the Allowed RODC Password Replication Group Properties dialog box opens, click the **Members** tab, as shown in figure 17-2.

**Figure 17-2**

The members being applied to the RODC password replication policy

24. Within the Members tab, click **Add**.
25. When Select Users, Contacts Computers, Service Accounts window appears, click **Object Types**. Click to select Computers, and click **OK**.
26. In the text box, type **user01; computer01**. Click **OK**.
27. Click **OK** to close the Allowed RODC Password Replication Group.
28. On the RODC01 Properties dialog box, click the **Advanced** button.
29. When the Advanced Password Replication Policy for RODC01 dialog box appears (as shown in figure 17-3), click the **Prepopulate Passwords** button.

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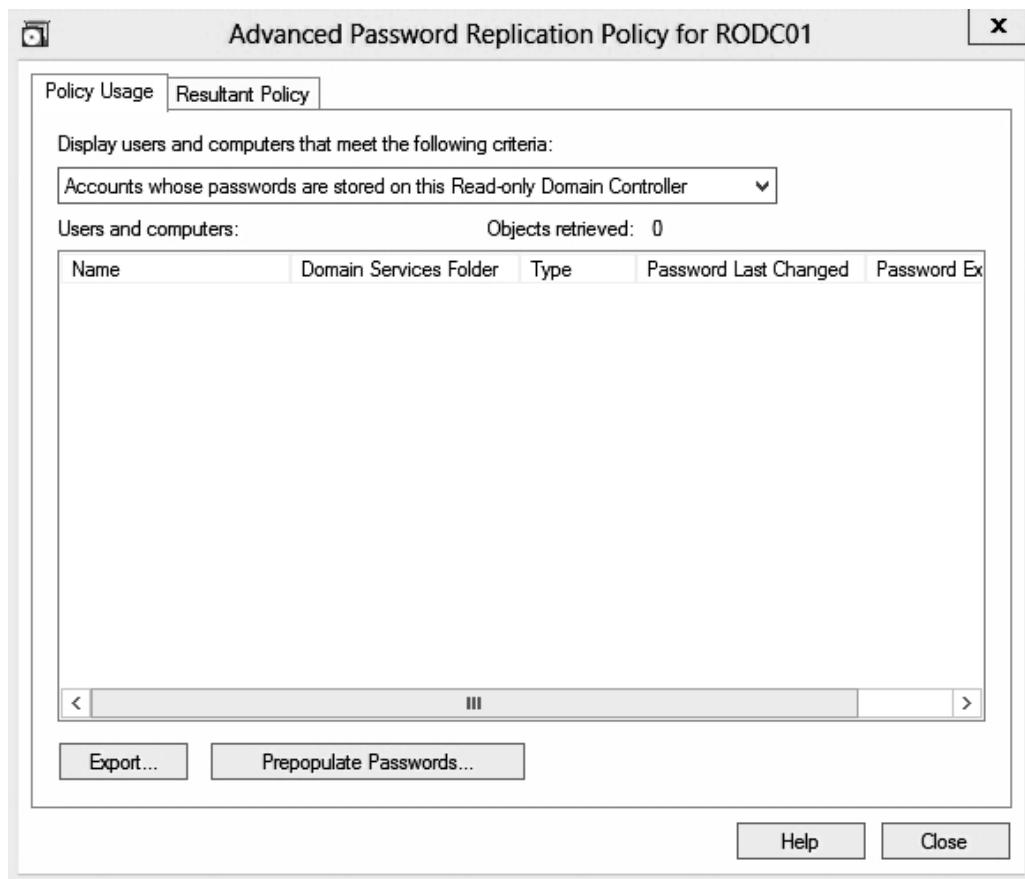


Figure 17-3
Selecting images to use

30. When the Select Users or Computers account, type **user01;computer01**, and click **OK**.
31. When it asks if you wish to send the current passwords for these accounts to this read-only domain controller now, click **Yes**.

Question 4	Why did it fail?
---------------	------------------

32. Click **OK** to close the error.
33. Click **Close** to close the Advanced Password Replication Policy for RODC01.
34. To close the RODC01 Properties dialog box, click **OK**.
35. Right-click on the first **RODC01**, and click **Delete**.
36. When you are asked if you want to delete the account, click **Yes**.

- 37.** When the Deleting Domain Controller dialog box opens, deselect the **Export this list of accounts that were cached on this Read-Only Domain Controllers to this file**, and click **Delete**.
- 38.** When the Delete Domain Controller dialog opens, click **OK**.
- 39.** When it asks to continue with the deletion, click **Yes**.
- 40.** Close the Active Directory Users and Computers tool.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

- 1.** In Exercise 17.3, what tool did you use to replicate between two domain controllers?
- 2.** In Exercise 17.4, what tool did you use to force Active Directory replication?
- 3.** In Exercise 17.4, what tool did you use to check the status of Active Directory replication?
- 4.** In Exercise 17.5, how did you configure Password Replication Properties

Lab Challenge	Upgrading SYSVOL Replication to DFSR
Overview	To complete this challenge, you will describe how to implement thin provisioning by writing the steps for the following scenario.
Completion time	10 minutes

A year ago, you upgraded a domain controller from Windows Server 2003 to Windows Server 2008, and then to Windows Server 2008 R2. Last week, you upgrade the domain controller to Windows Server 2012. However, the server is still using File Replication Services (FRS) for the SYSVOL folder. How would you upgrade SYSVOL to use Distributed File System Replication (DFSR)?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 18

IMPLEMENTING

ACTIVE DIRECTORY

FEDERATION SERVICES

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES:

- Exercise 18.1** Installing the Active Directory Federation Services
- Exercise 18.2** Creating a standalone Federation Server
- Exercise 18.3** Creating and Configuring a Sample WIF Application
- Exercise 18.4** Implementing Relying Party Trusts
- Exercise 18.5** Configuring the Active Directory Claims Provider Trust
- Lab Challenge** Adding an Attribute Store

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 18-1.

Table 18-1
Computers required for Lab 18

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02

In addition to the computers, you will also require the software listed in Table 18-2 to complete Lab 18

Table 18-2
Software required for Lab 18

Software	Location
Lab 18 student worksheet	Lab18 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab18 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Install and configure Active Directory Federation Services
- Configure Relying Party Trusts
- Configure AD Claims Provider Trust Rules
- Configure attribute store

Estimated lab time: 120 minutes

Exercise 18.1

Installing the Active Directory Federation Services

Overview

In this exercise, you will install Active Directory Federation Services.

Completion time

15 minutes

Mindset Question: **What is Active Directory Federation Services used for?**

1. Logon to Server01 as contoso\administrator with the password of Password01.
2. On Server01, when the Server Manager opens, click **Manage** and click **Add Roles and Features**. The Add Roles and Feature Wizard opens.
3. On the Before you begin page, click **Next**.
4. Select Role-based or feature-based installation and then click **Next**.
5. On the Select destination server page, click **Server01.contoso.com** and click **Next**.
6. On the Select server roles page, click **Active Directory Federation Services** checkbox.
7. When the Add Roles and Features dialog box opens, click **Add Features**.
8. Back on the Select server roles page, click **Next**.
9. On the Select features page, click **Next**.
10. On the Active Directory Federation Services (AD FS) page, click **Next**.
11. On the role services page, click **Next**.
12. On the Web Server Role (IIS) page, click **Next**.
13. On the Select role services page, click **Next**.
14. On the Confirm installation selections page, click **Install**.
15. When the installation is complete, take a screen shot of the Add Roles and Features Wizard by pressing Alt+Prt Scr and then paste it into your Lab 18 worksheet file in the page provided by pressing Ctrl+V.
16. Click **Close**.

End of exercise. You can leave Server Manager open for the next exercise.

Exercise 18.2 Creating a Standalone Federation Server

Overview

In this exercise, you will first create a self-signed digital certificate using IIS. You will then use the AD FS Management to create a stand-alone federation server.

Completion time

10 minutes

1. On Server01, using Server Manager, open the **Tools** menu, and click **Internet Information Services (IIS) Manager**.
2. When the Internet Information Services (IIS) Manager console opens, click Server01. If you get a message that prompts you to get started with Microsoft Web Platform and stay connected with the latest Web Platform Components, click **No**.
3. Scroll down the middle pane, and click **Server Certificates** (as shown in figure 18-1). Double-click **Server Certificates**.

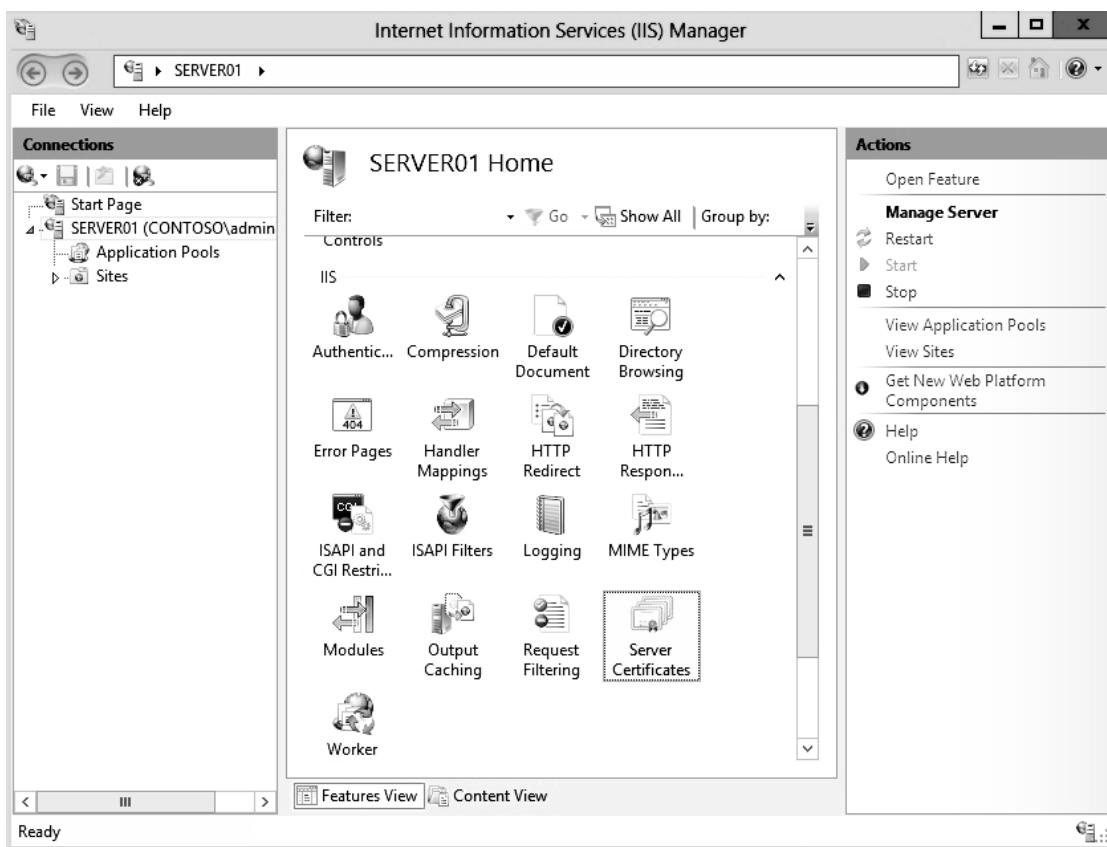


Figure 18-1
Opening Server certificates in IIS

4. Click **Create Self-Signed Certificate**.

5. On the Specify Friendly Name page, in the Specify a friendly name for the certificate text box, type **Server01.contoso.com**. Click **OK**.
6. Close Internet Information Services (IIS) Manager.
7. On Server01, using the Server Manager, open the **Tools** menu and click **AD FS Management**.
8. When the AD FS console opens (see Figure 18-2), click the **AD FS Federation Server Configuration Wizard** link.

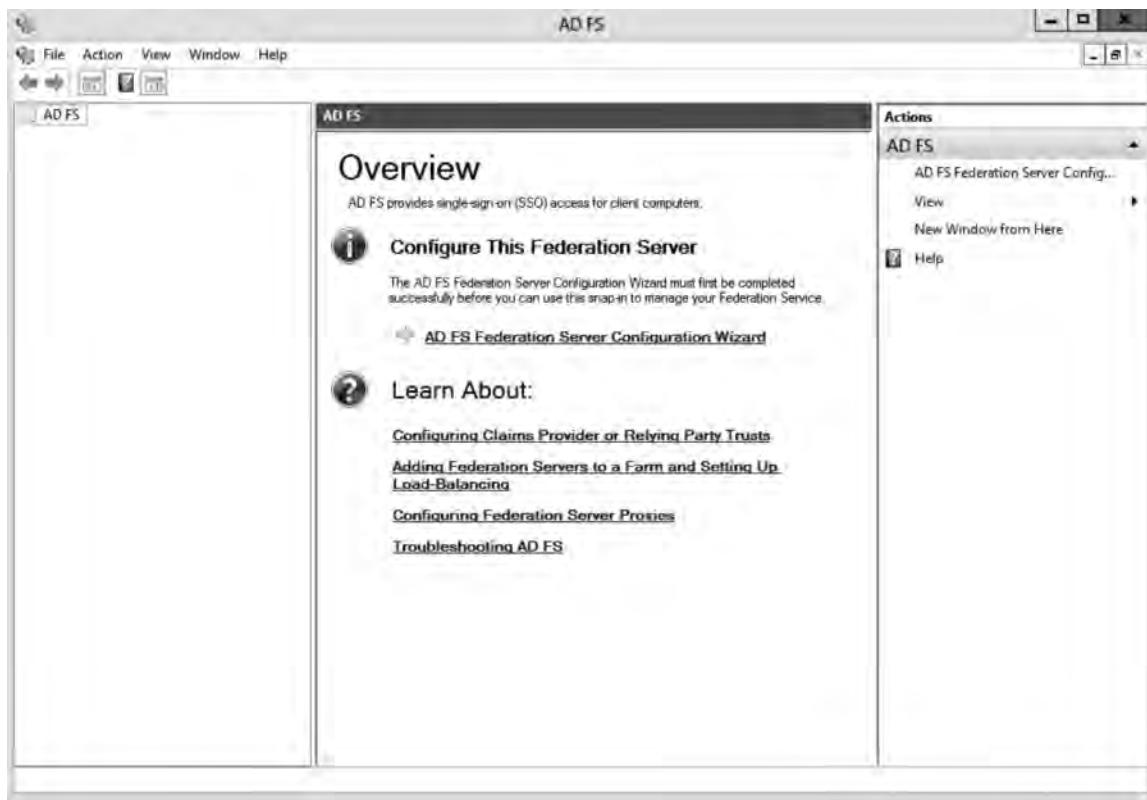


Figure 18-2
Selecting images to use

9. When the AD FS Federation Configuration Wizard starts, Create a new Federation Service will already be selected. Click **Next**.
10. On the Select Stand-Alone or Farm Deployment page, click **Stand-alone federation server**, and click **Next**.
11. On the Specify the Federation Service Name page, ensure that the SSL certificate is Server01.contoso.com, the Port is 443, and the Federation Service name is Server01.Contoso.com, and then click **Next**.

12. On the Ready to Apply Settings page, verify that the correct configuration settings are listed, and then click **Next**.
13. When the configuration is complete, take a screen shot of the Configuration Results by pressing Alt+Prt Scr and then paste it into your Lab 18 worksheet file in the page provided by pressing Ctrl+V.
14. Click **Close**.

End of exercise. You can leave the AD FS console open for the next exercise.

Exercise 18.3 Creating and Configuring a Sample WIF Application

Overview	In this exercise, you will install Windows Identity Foundation (WIF) SDK 4.0 so that you can install and configure a sample WIF application.
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Completion time	40 minutes
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1. Logon to Server02 as contoso\administrator with the password of Password01.
2. When Server Manager opens, click **Manage** and click **Add Roles and Features**. The Add Roles and Feature Wizard opens.
3. On the Before you begin page, click **Next**.
4. Select **Role-based or feature-based installation**, and then click **Next**.
5. On the Select destination server page, click **server02.contoso.com**, and click **Next**.
6. Click to select **Web Server (IIS)**. When it asks to add features, click **Add Features**.
7. Back on the Select server roles page, click **Next**.
8. On the Select features page, select the following:
 - Expand .NET Framework 4.5 Features, and select ASP.NET 4.5.
 - Select the **Windows Identity Foundation 3.5**.

NOTE	<p><i>At this time, be sure not to install .NET Framework 3.5. If you were to install .NET Framework 3.5, you will need to specify the location of Windows installation files so that the feature can be installed. If you select .NET Framework 3.5, and you do not specify the location of the Windows installation files, will cause the roles and features that are being installed at the same time also to fail installation.</i></p>
-------------	---

9. On the Web Server Role (IIS) page, click **Next**.
10. On the Select role services page, make sure the following are installed:
 - Web Server (IIS)\Management Tools\IIS 6 Management Compatibility
 - Web Server (IIS)\Application Development\.NET Extensibility 4.5
 - Web Server (IIS)\Application Development\ASP.NET 4.5When it asks to add feature, click **Add Features**.
11. Click **Next**. On the Confirm installation selections page, click **Install**.
12. When the installation is complete, click **Close**.
13. To install the Windows Identity Foundation SDK, using File Explorer, navigate to **\rwdc01\software** and double-click **WindowsIdentityFoundation-SDK-4.0.msi**. If it asks if you want to run this file, click **Run**.
14. When the Windows Identity Foundation SDK 4.0 Setup Wizard starts, click **Next**.
15. On the End-User License Agreement page, click to select the **I accept the terms in the License Agreement** option. Click **Next**.
16. On the Destination Folder page, click **Next**.
17. On the Ready to install Windows Identity Foundation SDK 4.0 page, click **Install**.
18. When the installation is complete, click **Finish**.
19. When the Welcome to the Microsoft Windows Identity Foundation page opens, if it asks you to set up Internet Explorer 10, click **Use Recommended security and compatibility settings** and click **OK**.
20. Close the **Welcome to the Microsoft Windows Identity Foundation** window.
21. Close the **\rwdc01\Software** folder.

22. Using Server Manager, open the **Tools** menu, and click **Internet Information Services (IIS) Manager**.
23. In Internet Information Services (IIS) Manager, click **Server02**.
24. When the Internet Information Services (IIS) Manager console opens, if you get the *Do you want to get started with Microsoft Web Platform to stay connected with latest Web Platform Components* prompt, click **No**.
25. Click and double-click **Server Certificates**.
26. Click **Create Self-Signed Certificate**.
27. On the Specify Friendly Name page, in the Specify a friendly name for the certificate text box, type **Server02.contoso.com**. Click **OK**.
28. In the left pane, expand **Sites** and click the **Default Web Site**.
29. Under Actions, click **Bindings** in the Edit Site section

Question 1	<i>What bindings are already defined?</i>
-------------------	---

30. When the Site Bindings page opens, click **Add**.
31. When the Add Site Binding dialog box opens, change the Type to **https**. Then under SSL certificate, select the **server02.contoso.com** (as shown in 18-3), and click **OK**.

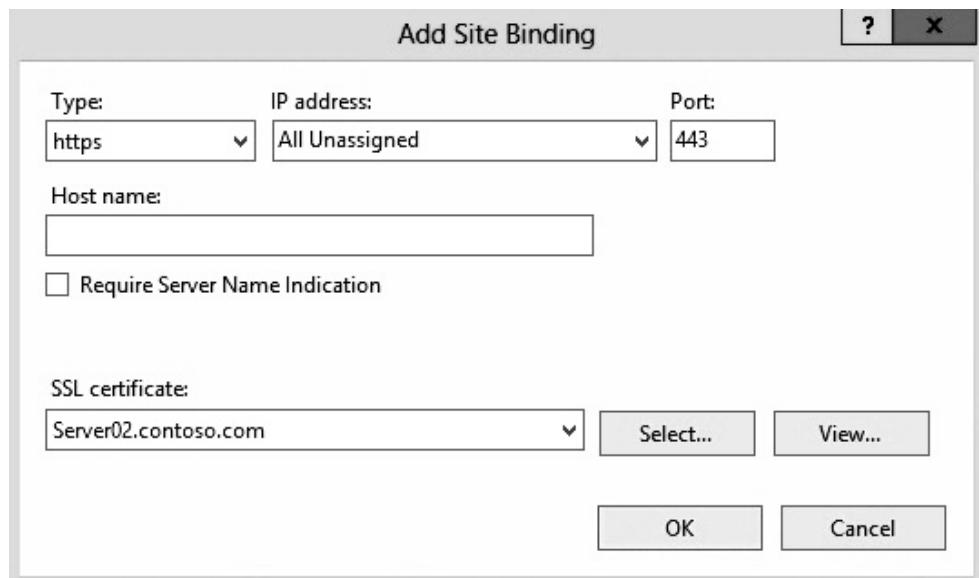


Figure 18-3
Binding a certificate to a website

32. Take a screen shot of the Site Bindings dialog box by pressing Alt+Prt Scr and then paste it into your Lab 18 worksheet file in the page provided by pressing Ctrl+V.
33. Click **Close** to close the Site Bindings dialog box.
34. On the task bar, open File Explorer and navigate to the **C:\Program Files (x86)\Windows Identity Foundation SDK\v4.0\Samples\Quick Start\Using Managed STS** folder.
35. Double-click **setup.bat**. Click **OK**. When the application has been created, press the spacebar.
36. Press the spacebar to close the command prompt window and close the File Explorer window.
37. Click the **Start menu** button and click **Windows Identity Foundation Federation Utility**.
38. When the Federation Utility Wizard opens, in the Application configuration location text box, type the following:
C:\Program Files (x86)\Windows Identity Foundation SDK\v4.0\Samples\Quick Start\Using Managed STS\ClaimsAwareWebAppwithManagedSTS\web.config
39. In Application URI, type **https://server02.contoso.com/ClaimsAwareWebAppWithManagedSTS/** to indicate the path to the sample application that will trust the incoming claims from the federation server. Click **Next** to continue.
40. On the Security Token Service page, select **Use an existing STS**, type **https://server01.contoso.com/FederationMetadata/2007-06/FederationMetadata.xml** for the STS WS-Federation metadata document location text box, and then click **Next** to continue.
41. When you get a warning because you are using a self-signed certificate, click **Yes**.
42. On the STS signing certificate chain validation error page, with Disable certificate chain validation already selected, click **Next**.
43. On the Security token encryption page, select **No encryption**, and then click **Next**.
44. On the Offered claims page, review the claims that will be offered by the federation server, and then click **Next**.
45. On the Summary page, click **Finish**.

46. When you have successfully configured the application, click **OK**.
47. Using Internet Information Services (IIS) Manager, click **Application Pools**.
48. In the Actions pane, click **Add Application Pool**.
49. When the Add Application Pool dialog box opens, in the Name text box, type **WIFSamples** and click **OK**.
50. Click **WIFSamples**, and click **Advanced Settings** under Edit Application Pool in the Actions pane.
51. Under Process Model/Generate Process Model Event Log Entry, change the Load User Profile setting from False to **True**, as shown in figure 18-4.

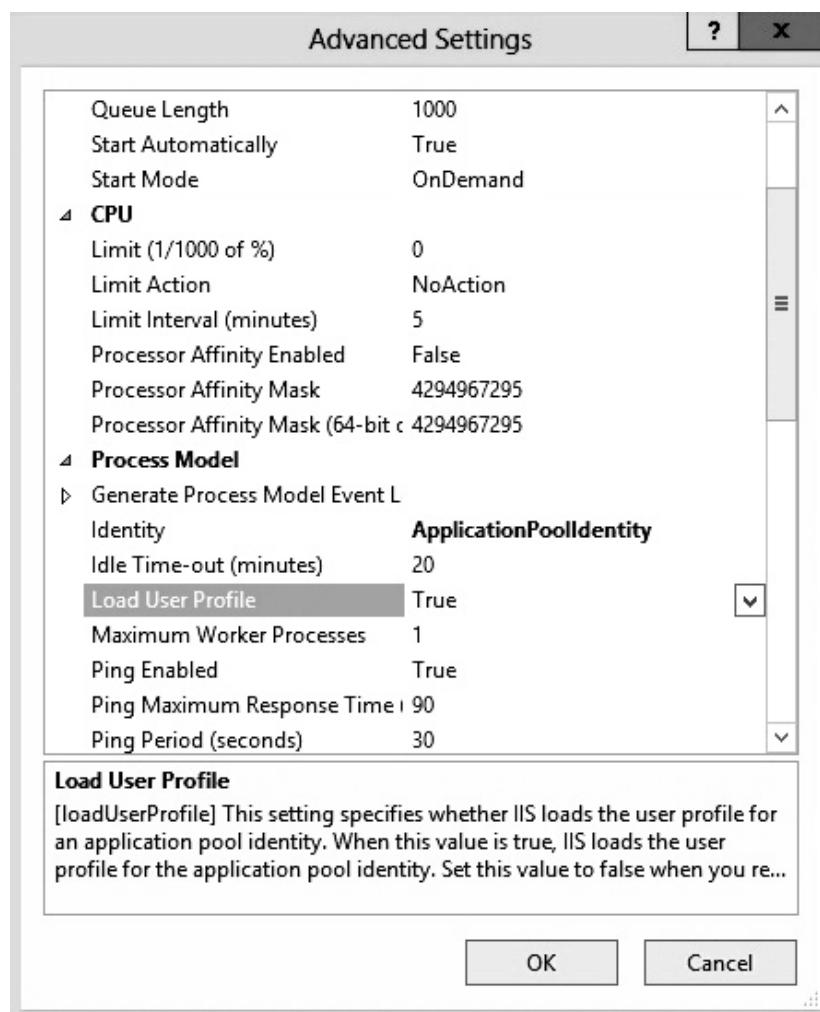


Figure 18-4
Modifying the application pool

52. Click **OK** to close the Advanced Settings dialog box.

53. In the left pane, expand **Sites**, expand **Default Web Site**, and click **ClaimsAwareWebAppWithManagedSTS**.
54. In the Actions pane, click **Basic Settings**.
55. When the Edit Application dialog box opens, click **Select**.
56. When the Select Application Pool dialog box opens, change the Application pool to **WIFSamples** and click **OK**.
57. Click **OK** to close the Edit Application dialog box.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 18.4 Implementing Relying Party Trusts

Overview	In this exercise, you will implement a relying party trust so that the AD FS server knows what sites it will be supporting.
Completion time	20 minutes

Mindset Question: What are Relying Party Trusts used for?

1. On Server01, open Internet Explorer and open the <https://server02.contoso.com/ClaimsAwareWebAppWithManagedSTS/FederationMetadata/2007-06/FederationMetadata.xml>.
2. If you get a security alert, click **OK**.
3. If you have a problem with the website's security certificate, click **Continue to this website (not recommended)**. If you get a security alert, click OK.
4. If you get the Content from the website listed below is being blocked by the Internet Explorer Enhanced Security Configuration, click **Close**.
5. Take a screen shot of the Internet Explorer window by pressing Alt+Prt Scr and then paste it into your Lab 18 worksheet file in the page provided by pressing Ctrl+V.
6. When the XML code is shown, click the white X in the red shieldlock at the top of the window and click **View certificates**.
7. When the Certificate dialog box opens, click **Install Certificate**.
8. When the Certificate Import Wizard opens, click **Local machine** and click **Next**.

9. On the Certificate Store page, click **Place all certificates in the following store**, and click **Browse**.
10. Click **Trusted Root Certification Authorities**, click **OK**.
11. Back on the Certificate Store page, click **Next**.
12. When the wizard is complete, click **Finish**. When the import has been completed, click **OK**.
13. Click **OK** to close the Certificate dialog box.
14. Close Internet Explorer, then click Close all tabs.
15. On Server01, using the AD FS Management console, click **AD FS**, expand **Trust Relationships**, and click **Relying Party Trusts**.
16. Right-click **Relying Party Trusts** (as shown in figure 18-5), and click **Add Relying Party Trust**.

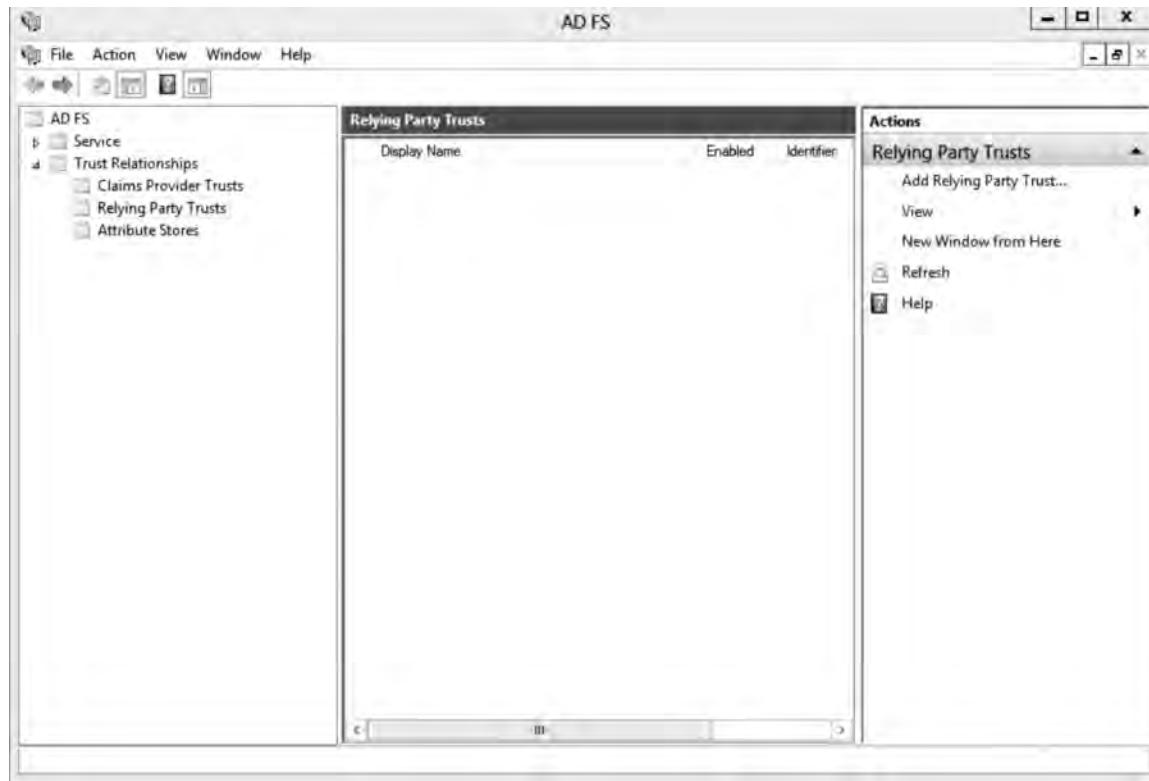


Figure 18-5
Viewing Relying Party Trusts

17. When the Add Relying Party Trust Wizard opens, click **Start**.

18. On the Select Data Source page, Import data about the relying party published online or on a local network is already selected. In the Federation metadata address (host name or URL) text box type <https://server02.contoso.com/ClaimsAwareWebAppWithManagedSTS/>, and then click **Next**.
19. On the Specify Display Name page, in the Display name text box, type **WIF Sample App**, and then click **Next**.
20. On the Choose Issuance Authorization Rules page, click **Permit all users to access this relying party**, and then click **Next**.
21. On the Ready to Add Trust page, review the relying party trust settings, and then click **Next** to save the configuration.
22. On the Finish page, click **Close** to exit the wizard.
23. Click **OK** to close the Edit Claim Rules for WIF Sample App.

End of exercise. You can keep the AD FS console open for the next exercise.

Exercise 18.5 Configuring the Active Directory Claims Provider Trust

Overview	In this exercise, you will first create an claim rule. You will then test the WIF application.
Completion time	15 minutes

Mindset Question: **What does the claims provider trust identify?**

1. On Server01, in the AD FS console, under Trust Relationships, click **Claims Provider Trusts**.

Question 2

What is the default claims provider trusts?

2. In the middle pane, right-click **Active Directory**, and then click **Edit Claim Rules**.
3. In the Edit Claims Rules for Active Directory window, on the Acceptance Transform Rules tab, click **Add Rule**.

4. When the Add Transform Claim Rule Wizard starts, in the Select Rule Template page, under Claim rule template, Send LDAP Attributes as Claims is already selected. Click **Next**.
5. On the Configure Rule page, in the Claim rule name box, type **Outbound LDAP Attributes Rule**.
6. In the Attribute Store drop-down list, select **Active Directory**.
7. In the Mapping of LDAP attributes to outgoing claim types section, select the following values for the LDAP Attribute and the Outgoing Claim Type (see Figure 18-6):
 - E-Mail-Addresses = E-Mail Address
 - User-Principal-Name = UPN
 - Display-Name = Name

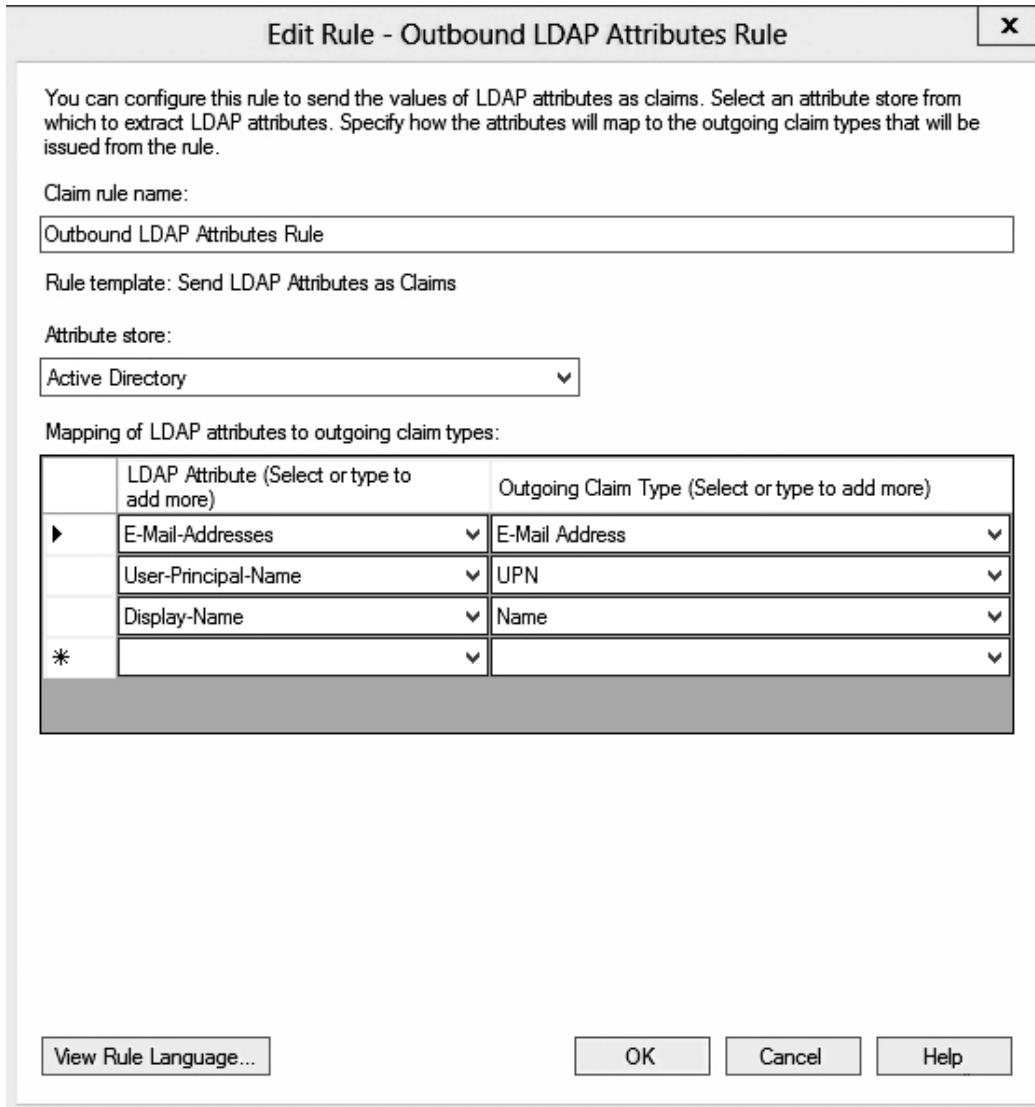


Figure 18-6
Editing a Claim Rule

8. Click **Finish**, and then click **OK**.
9. Open Internet Explorer and open <https://server02.contoso.com/ClaimsAwareWebAppwithManagedSTS>. If you get a security alert, click **OK**.
10. When you are asked to logon, type **contoso\administrator** in the User name text box, and **Password01**, in the Password text box. Click **OK**. If you get an Internet Explorer dialog box, click **Close**. If you get a script is disabled, click **Submit**.
11. Take a screen shot of the resulting window by pressing Alt+Prt Scr and then paste it into your Lab 18 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

1. In Exercise 18.2, before you created an AD FS stand-alone server, what did you have to create and install?
2. In Exercise 18.3, what was installed and used to supply an application that will use Active Directory Federation?
3. In Exercise 18.3, why was the federation application assigned its own application pool?
4. In Exercise 18.4, how did you specify the AD FS to support the WIF application?
5. In Exercise 18.5, what mapped LDAP attributes to outgoing claim types?

Lab Challenge Adding an Attribute Store

Overview To complete this challenge, you will describe how to add an attribute store to Active Directory Federation Services by writing the steps for the following scenario.

Completion time 10 minutes

You are implementing Active Directory Federation Services and you want to add an attribute store based on SQL. What should you do?

Write out the steps you performed to complete the challenge.

End of lab.

LAB 19

INSTALLING AND CONFIGURING ACTIVE DIRECTORY CERTIFICATE SERVICES

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES:

- Exercise 19.1** Installing an Enterprise Certificate Authority
- Exercise 19.2** Installing Subordinate Certificate Services Server
- Exercise 19.3** Configuring Certified Revocation List (CRL) Distribution
- Exercise 19.4** Installing the Online Responder Role
- Exercise 19.5** Performing a CA Backup
- Lab Challenge** Managing Administrative Roles

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 19-1.

Table 19-1

Computers required for Lab 19

<i>Computer</i>	<i>Operating System</i>	<i>Computer Name</i>
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01

In addition to the computers, you will also require the software listed in Table 19-2 to complete Lab 19.

Table 19-2

Software required for Lab 19

<i>Software</i>	<i>Location</i>
Lab 19 student worksheet	Lab19 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab19 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Install and configure the Active Directory Certificate Services
- Configure a CRL distribution point
- Install and configure Online Responder.
- Configure CA backup and Recovery
- Implement Administrative Role Separation

Estimated lab time: 110 minutes

Exercise 19.1 Installing an Enterprise Certificate Authority

Overview	In this exercise, install Certificate Authority and configure the server as a root enterprise CA.
----------	---

Completion time	20 minutes
-----------------	------------

Mindset Question: **What are the requirements to install an enterprise CA?**

1. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
2. When Server Manager opens, open the **Manage** menu and click **Add Roles and Features**.
3. When the Add Roles and Features Wizard opens, click **Next**.
4. On the Select installation type page, click **Next**.
5. On the Select destination server page, click **Next**.
6. On the Select server roles page, select **Active Directory Certificate Services**. When the Add Roles and Features Wizard window appears, click **Add Features**, and then click **Next**.
7. On the Select features page, click **Next**.
8. On the Active Directory Certificate Services page, click **Next**.
9. On the Select role services page, ensure that Certification Authority is selected, and then click **Next**.
10. On the Confirm installation selections page, click **Install**.
11. On the Installation progress page, after installation is successful, click **Configure Active Directory Certificate Services on the destination server**, as shown in figure 19-1.

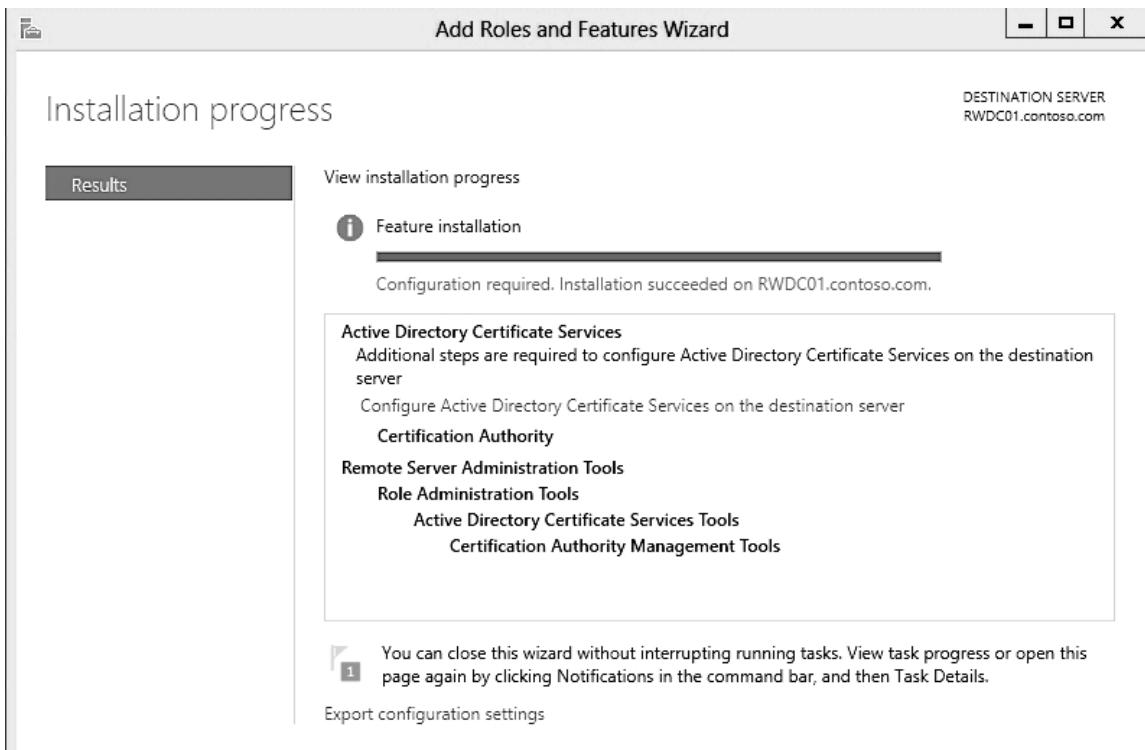


Figure 19-1
Configuring Active Directory Certificate Services after installation

12. On the Credentials page, click **Next**.
13. On the Select role services to configure page, click **Certification Authority** and click **Next**.
14. On the Setup Type page, ensure that **Enterprise CA** is selected, and then click **Next**.
15. On the CA Type page, ensure that **Root CA** is selected, and then click **Next**.
16. On the Private Key page, ensure that **Create a new private key** is selected, and then click **Next**.
17. On the Cryptography for CA page, answer the following question. Then change the Key length to **4096**, and then click **Next**.

Question 1	<i>What is the default key length?</i>
-----------------------	--

18. On the CA Name page, answer the following question, and, then click **Next**.

Question 2	<i>What is the default CA name?</i>
-----------------------	-------------------------------------

19. On the Validity Period page, answer the following question, click **Next**.

Question 3	<i>What is the default validity period?</i>
-----------------------	---

20. The CA Database page displays where the certificate database will be stored. Answer the following question, and then click **Next**.

Question 4	<i>Where is the default database and log file location and why should caution be used here?</i>
-----------------------	---

21. On the Confirmation page, click **Configure**.
22. Take a screen shot showing a successful configuration of the Active Directory Certificate Services by pressing Alt+Prt Scr and then paste it into your Lab 19 worksheet file in the page provided by pressing Ctrl+V.
23. Click **Close** to close the CA successful installation page.
24. Click Close to close the Add Roles and Features Wizard.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 19.2 Installing Subordinate Certificate Services

Overview	In this exercise, install a subordinate certificate server, which will be under the root enterprise CA you created in the first exercise.
Completion time	20 minutes

Mindset Question: **What would determine how many subordinate CAs that an organization may need?**

1. Log into Server01 as **contoso\administrator** with the password of **Password01**.
2. When Server Manager opens, open the **Manage** menu and click **Add Roles and Features**.

3. When the Add Roles and Features Wizard opens, click **Next**.
4. On the Select installation type page, click **Next**.
5. On the Select destination server page, select **Server01.contoso.com**, and click **Next**.
6. On the Select server roles page, select **Active Directory Certificate Services**. When the Add Roles and Features Wizard window appears, click **Add Features**, and then click **Next**.
7. On the Select features page, click **Next**.
8. On the Active Directory Certificate Services page, click **Next**.
9. On the Select role services page, ensure that Certification Authority is selected, and then click **Next**.
10. On the Confirm installation selections page, click **Install**.
11. On the Installation progress page, after installation is successful, click **Configure Active Directory Certificate Services on the destination server**.
12. On the Credentials page, click **Next**.
13. On the Select role services to configure page, click **Certification Authority** and click **Next**.
14. On the Setup Type page, select **Enterprise CA**, and then click **Next**.
15. On the CA Type page, ensure that Subordinate CA is selected, and then click **Next**.
16. On the Private Key page, ensure that Create a new private key is selected, and then click **Next**.
17. On the Cryptography for CA page, keep the default selections for Cryptographic Service Provider (CSP) and Hash Algorithm. For better security, change the Key length to **4096**, and then click **Next**.
18. On the CA Name page, click **Next**.
19. On the Certificate Request page, select **Send a certificate request to a parent CA**. Then with the CA name selected, click **Select**, click the CA that you installed in the previous exercise and click **OK**. See Figure 19-2. Click **Next**.

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Figure 19-2

Requesting a certificate from the parent CA

20. The CA Database page displays where the certificate database will be stored. Click **Next**.
21. On the Confirmation page, click **Configure**.
22. Take a screen shot showing a successful configuration of the Active Directory Certificate Services by pressing Alt+Prt Scr and then paste it into your Lab 19 worksheet file in the page provided by pressing Ctrl+V.
23. Click **Close** to close the CA successful installation page.
24. Click Close to close the Add Roles and Features Wizard.

End of exercise. Leave Server Manager open for the next exercise.

Exercise 19.3 Configuring Certified Revocation List (CRL) Distribution

Overview In this exercise, configure a new Certified Revocation List (CRL) distribution point.

Completion time 10 minutes

Mindset Question: **What is a CRL?**

1. On Server01, using Server Manager, open the **Tools** menu and click **Certification Authority**.
2. When the Certification Authority console opens, double-click **contoso-Server01-CA**, right-click **Revoked Certificates**, and then click **Properties**.
3. In the Revoked Certificates Properties window, answer the following question, and click **OK**.

Question 5

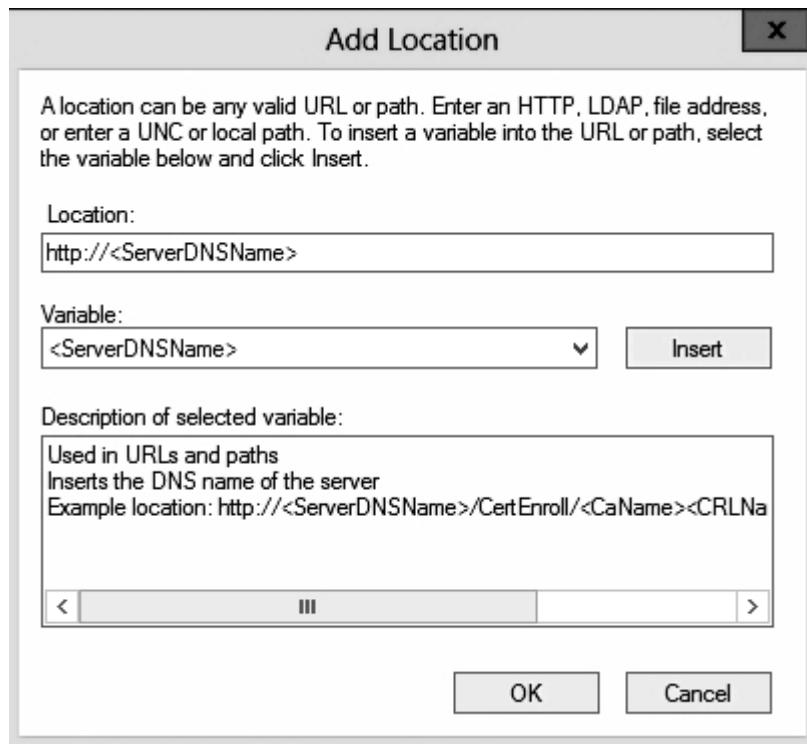
What is the CRL publication interval, and Delta CRL publication interval?

4. Right-click the **contoso-Server01-CA**, and click **Properties**.
5. When the Properties dialog box opens, click the **Extensions** tab.

Question 6

What are the four methods used to publish CRL?

6. Click the **http://<ServerDNSName>/CertEnroll/<CaName><CRLNAMESuffix><DeltaCRLAllowed>.crl** entry and click **Remove**. Click Yes to confirm its removal.
7. To add additional CRL points, click **Add**.
8. When the Add Location dialog box opens, type **http://** in the Location text box. Then select the **<ServerDNSName>** from the Variable pull-down list, and click **Insert**. So far, it should look like figure 19-3.

**Figure 19-3**

Specifying a new location for the CRL distribution

9. Add the necessary variables and text so that the Location is:

```
http://<ServerDNSName>/CertEnroll/<CaName><CRLNameSuffix><DeltaCRLAll
owed>.crl
```

10. Click **OK** to close the Add Location dialog box.
11. Click **OK** to close the Properties dialog box. If it asks you to restart the services now, click **Yes**.
12. End of exercise. Keep the Enterprise Certificate Authority console open for the next exercise.

Exercise 19.4 Installing the Online Responder Role

Overview	In this exercise, install and configure the Online Responder.
Completion time	35 minutes

Mindset Question: How is an Online Responder more efficient than a CRL?

1. On Server01, using Server Manager, open the **Manage** menu and click **Add Roles and Features**.
2. When the Add Roles and Feature Wizard opens, click **Next**.
3. On the Select installation type page, click **Next**.
4. On the Select destination page, click **Server01.contoso.com**, and click **Next**.
5. On the Select server roles page, expand **Active Directory Certificate Services (Installed)**, and then select **Online Responder**. When it asks to add features, click **Add Features**. Click **Next**.
6. On the Select Features page, click **Next**.
7. On the Confirm installation selections page, click **Install**.
8. When the message displays that installation succeeded, click **Configure Active Directory Certificate Services on the destination server**.
9. When the Credentials page opens, click **Next**.
10. On the Role Services page, click to select **Online Responder**, and then click **Next**.
11. Click **Configure**.
12. Take a screen shot showing a successful configuration of the Online Responder by pressing Alt+Prt Scr and then paste it into your Lab 19 worksheet file in the page provided by pressing Ctrl+V.
12. Click **Close** two times.
13. On Server01, using the Certification Authority console, right-click **contoso-Server01-CA**, and then click **Properties**.
14. When the Properties dialog box opens, click the **Extensions** tab.
15. In the Select extension section, select **Authority Information Access (AIA)**, answer the following question, and then click **Add**.

Question 7	<i>What is the first entry for AIA?</i>
-----------------------	---

16. When the Add Location dialog box opens, specify **http://<ServerDNSName>/ocsp**, whereas <ServerDNSName> is a variable. Click **OK**.

17. Click to select the **Include in the AIA extension of issued certificates** check box.
18. Click to select the **Include in the online certificate status protocol (OCSP) extension** check box, and then click **OK**.
19. When it asks you to restart AD CS, click **Yes**.
20. In the certsrv console, under **contoso-Server01-CA**, right-click the **Certificate Templates** folder, and then click **Manage**.
21. In the Certificate Templates console, double-click the **OCSP Response Signing** template.
22. In the OCSP Response Signing Properties dialog box, click the **Security** tab. Under Permissions for Authenticated Users, select the **Allow** check box for Enroll and Autoenroll, and then click **OK**.
23. Close the Certificate Templates console.
24. In the Certification Authority console, right-click the **Certificate Templates** folder, point to **New**, and then click **Certificate Template to Issue**.
25. In the Enable Certificate Templates dialog box, select the **OCSP Response Signing** template, and then click **OK**.
26. Using Server Manager, click **Tools**, and then click **Online Responder Management**.
27. When the ocsp console opens (as shown in figure 19-4), right-click **Revocation Configuration**, and then click **Add Revocation Configuration**.

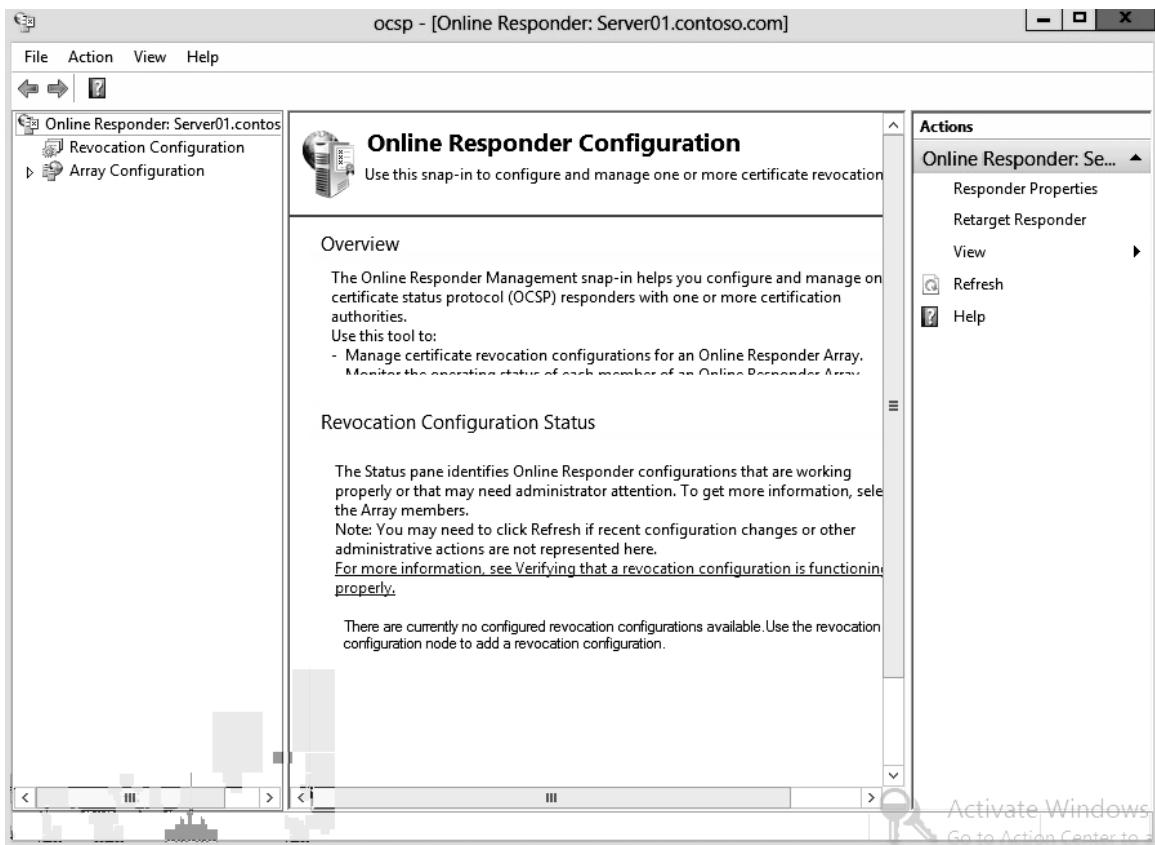


Figure 19-4
Viewing the ocsp console

28. When the Add Revocation Configuration Wizard starts, click **Next**.
29. On the Name the Revocation Configuration page, in the Name text box, type **Contoso CA Online Responder**, and then click **Next**.
30. On the Select CA Certificate Location page, Select a certificate for an Existing enterprise CA option is already selected. Click **Next**.
31. On the Choose CA Certificate page, click **Browse**, click the **contoso-Server01-CA**, and click **OK**. Then click **Next**.
32. On the Select Signing Certificate page, verify that Automatically select a signing certificate and Auto-Enroll for an OCSP signing certificate are both selected.
33. Take a screen shot of the Select Signing Certificate page by pressing Alt+Prt Scr and then paste it into your Lab 19 worksheet file in the page provided by pressing Ctrl+V.
34. Click **Next**.
35. On the Revocation Provider page, click **Finish**.

- 36.** Close the ocsp console.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 19.5 Performing a CA Backup

Overview

In this exercise, you will back up the certificate authority.

Completion time

10 minutes

Mindset Question: **What are the components that will need to be restored if you have to restore a CA?**

1. Using Server Manager on Server01, open the Certification Authority console.
2. In the console tree, right-click the name of the contoso-SERVER01-CA, click All Tasks, and click Back up CA.
3. When the Certification Authority Backup Wizard starts, click Next.
4. On the Items to Back Up page, click to select **Private key and CA certificate**, and **Certificate database and certificate database log** options.
5. In the Back up to this location text box, type **C:\BAK**. Click **Next**.
6. On the Select a Password page, type **Password01** in the Password and Confirm password text boxes to help secure the private key. Click **Next**.
7. When the wizard is complete, click **Finish**.
8. Go to C:\BAK\ and confirm the CA has been backed up.
9. Open the C:\BAK\ DataBase folder.
10. Take a screen shot of the DataBase folder by pressing Alt+Prt Scr and then paste it into your Lab 19 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS**Completion time 10 minutes**

1. In Exercise 19.1, how many enterprise root certificate authorities can you install for a domain?
2. In Exercise 19.2, how many subordinate CAs can you install for a domain?
3. In Exercise 19.3, what extension does the certificate revocation list have?
4. In Exercise 19.4, what did you install that has a similar functionality of CRL?
5. In Exercise 19.5, how did you perform a backup of the CA?

Lab Challenge Managing Administrative Roles	
Overview	To complete this challenge, you will describe how to manage Administrative Roles for Active Directory Certificate Services by writing the high-level steps for the following scenario.
Completion time	10 minutes

You installed a certificate authority for the Contoso Corporation. You need to define who will be the CA administrators and who will be the certificate managers. How do you assign these roles to your users?

End of lab.

LAB 20

MANAGING

CERTIFICATES

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

- Exercise 20.1** Importing and Exporting Digital Certificates
- Exercise 20.2** Creating a New User Certificate Template
- Exercise 20.3** Requesting a Certificate
- Exercise 20.4** Configuring Autoenrollment
- Exercise 20.5** Enabling Enrollment Agents
- Lab Challenge** Configuring the Key Recovery Agent

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 20-1.

Table 20-1
Computers required for Lab 20

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 2)	Windows Server 2012	Server01
Server (VM 3)	Windows Server 2012	Server02

In addition to the computers, you will also require the software listed in Table 20-2 to complete Lab 20.

Table 20-2
Software required for Lab 20

Software	Location
Lab 20 student worksheet	Lab20 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab20 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Manage certificate templates
- Implement and manage certificate deployment
- Manage certificate enrollment using Group Policies
- Perform key recovery

Estimated lab time: 155 minutes

Exercise 20.1 Importing and Exporting Digital Certificates

Overview	In this exercise, export a digital certificate, delete the certificate that you exported, and then restore the certificate by importing the certificate.
----------	--

Completion time	20 minutes
-----------------	------------

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1. Log into Server01 as **contoso\administrator** with the password of **Password01**.
2. On Server01, click the **Start Menu** button, then type **mmc** and press the Enter key.
Click the mmc icon.
3. When the console opens, open the **File** menu and click **Add/Remove Snap-in**.
4. When the Add or Remove Snap-ins dialog box opens, double-click **Certificates**.
On the Certificates snap-in dialog box, click **Computer account**, then
click **Next**.
5. On the Select Computer dialog box, Local computer is already selected. Click **Finish**.
6. Back on the Add or Remove Snap-ins dialog box, click **OK**.
7. Under the Console Root, expand **Certificates**, expand **Personal** and click **Certificates**
(below Personal).
8. Right-click **Server01.contoso.com**, click **All Tasks**, click **Export**.
9. When the Certificate Export Wizard starts, click **Next**.
10. In the Export Private key page, click **Yes, export the private key**. Click **Next**.
11. In the Export file format page, Personal Information Exchange –PKCS #12 (.PFX) is
already selected. Click **Next**.
12. On the Security page, click to select **Password**. Then in the Password, and confirm
password text box, type **Password01**. Click **Next**.
13. In the File to Export page, type **c:\servercert.pfx**. Click **Next**.
14. When the wizard is complete, click **Finish**.
15. When the export is successful, click **OK**.
16. In the console, right-click **Server01.contoso.com** certificate that you just exported, and
click **Delete**. When it asks if you want to delete this certificate, click **Yes**.
17. Open File Explorer by clicking the **File Explorer** icon on the task bar.
18. Navigate to the **C:** folder.
19. Double-click the **servercert** file.
20. When the Welcome to the Certificate Import Wizard opens, click **Local Machine**, and
click **Next**.
21. On the File to Import page, click **Next**.

22. On the Private key protection page, type **Password01** in the Password text box.
23. Click to select the **Mark this key as exportable** and then click **Next**.
24. On the Certificate Store page, click **Automatically select the certificate store based on the type of certificate**. Click **Next**.
25. When the wizard is complete, click **Finish**.
26. When the import is successful, click **OK**.
27. Back on the console, click **F5** to refresh the window. The Server01.contoso.com certificate should reappear.
28. Take a screen shot of the Certificates console by pressing **Alt+Prt Scr** and then paste it into your Lab 20 worksheet file in the page provided by pressing **Ctrl+V**.
29. Close the console. If it asks you to save the console, click **No**.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 20.2 Renewing a Certificate Authority Certificate

Overview	If the digital certificate expires for the certificate authority (CA), digital certificates maintained by the CA also become invalid. Therefore, during this exercise, you will renew the digital certificate for the root and subordinate CA certificates.
Completion time	10 minutes

1. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
2. On RWDC01, using Server Manager, open the **Tools** menu, and click **Certification Authority**.
3. When the Certification Authority console opens, right-click **contoso-RWDC01-CA**, click **All Tasks**, and click **Renew CA Certificate**.
4. When it asks if you want to stop Active Directory Certificate Services now, click **Yes**.
5. When the Renew CA Certificate dialog box opens and asks to generate a new public and private key pair, click **No**. Click **OK**.
6. On Server01, using Server Manager, open the **Tools** menu, and click **Certification Authority**.

7. When the Certification Authority console opens, right-click **contoso-RWDC01-CA**, click **All Tasks**, and click **Renew CA Certificate**.
8. When it asks if you want to stop Active Directory Certificate Services now, click **Yes**.
9. When the Renew CA Certificate dialog box opens, when it asks to generate a new public and private key pair, click **No**. Click **OK**.
10. When the CA Certificate Request dialog box opens, click **OK**.

End of exercise. You can keep the Certification Authority console open for the next exercise.

Exercise 20.3 Creating a New User Certificate Template

Overview	In this exercise, create a new user certificate, and make that certificate available to other users.
----------	--

Completion time	20 minutes
-----------------	------------

Mindset Question: **What permissions are required in order to request a certificate?**

1. On Server01, using the Certification Authority console, expand **contoso-Server01-CA**, right-click **Certificate Templates**, and then select **Manage**.

Question 1	<i>What version is the User template?</i>
-----------------------	---

2. When the Certificate Templates console opens, right-click the **User** template, and then click **Duplicate Template**.
3. Click the **General** tab.

Question 2	<i>What is the default validity period?</i>
-----------------------	---

4. In the Template display name field, type **Corporate User Certificate**.
5. Click the **Subject Name** tab.

6. Clear the **Include e-mail name in the subject name** and the **E-mail name** check boxes.
7. Click the **Extensions** tab.
8. Click **Application Policies**, and then click **Edit**.
9. When the Edit Application Policies Extension dialog box opens, click **Add**.
10. When the Add Application Policy dialog box opens, click **Smart Card Logon**, and then click **OK** two times.
11. Click the **Superseded Templates** tab.
12. Click **Add**. Click the **User** template, and then click **OK**.
13. Click the **Security** tab.
14. Click **Authenticated Users**, click **Allow Enroll**, and **Allow Autoenroll**, as shown in figure 20-1.
15. Click **OK** to close the Properties of New Template dialog box.
16. Close the Certification Templates console.
17. Right-click **Certificate Templates**, click **New**, and then click **Certificate Template to Issue**.

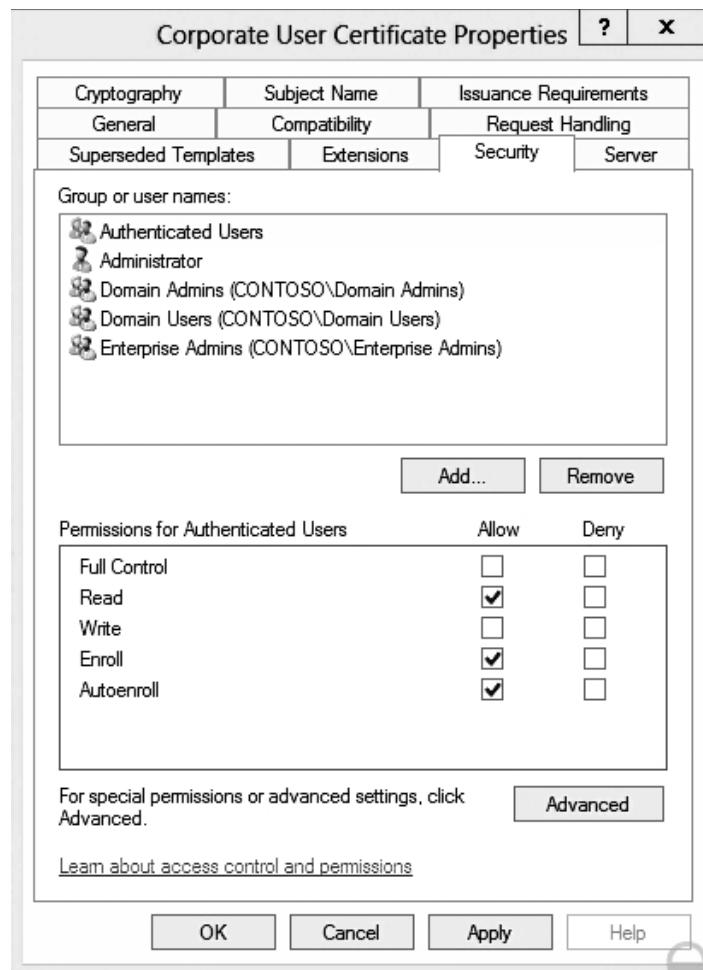


Figure 20-1
Viewing permissions of certificate template

18. In the Enable Certificate Templates window, select the **Corporate User Certificate** template, and click **OK**.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 20.4 Requesting a Certificate	
Overview	In this exercise, configure the web requests of certificate and request certificates manually and with the web interface.
Completion time	35 minutes

Mindset Question: **What are the different ways to request a certificate?**

Installing Certification Installation Roles

1. On Server01, using the Server Manager console, open the **Manage** menu and click **Add Roles and Features**.
2. When the Add Roles and Features Wizard opens, click **Next**.
3. On the Select installation type page, click **Next**.
4. On the Select destination server page, click **Server01.Contoso.com**, and click **Next**.
5. On the Select server roles page, expand **Active Directory Certificate Services (Installed)**, click to select the following and click **Next**:
 - Certificate Enrollment Policy Web Service
 - Certificate Enrollment Web Service
 - Certification Authority Web Enrollment

When it asks to add features, click **Add Features**.

6. On the Select features page, click **Next**.
7. On the Confirm installation selections page, click **Install**.
8. When the installation is complete, click **Configure Active Directory Certificate Services** on the destination server.
9. When the AD CS Configuration wizard opens, on the Credentials page, click **Next**.
10. On the Role Services page, click to select the following roles, and then click **Next**:
 - Certification Authority Web Enrollment
 - Certificate Enrollment Web Service
 - Certificate Enrollment Policy Web Service
11. On the CA for CES page, click **Next**.
12. On the Authentication Type for CES page, click **Next**.
13. On the Service Account for CES page, click **Use the built-in application pool identity** and click **Next**.
14. On the Authentication Type for CEP page, click **Next**.
15. On the Confirmation page, click **Configure**.

16. When the roles have been configured, take a screen shot of the AD CS Configuration page by pressing Alt+Prt Scr and then paste it into your Lab 20 worksheet file in the page provided by pressing Ctrl+V.
17. Click **Close**.
18. Click Close to close the Add Roles and Features Wizard.

Requesting a Certificate Using the Certificate Console

1. On Server01, click the Start Menu button, then type **mmc**. Click the mmc icon.
2. When the console opens, open the **File** menu and click **Add/Remove Snap-in**.
3. When the Add or Remove Snap-ins dialog box opens, double-click **Certificates**.
4. When the Certificates snap-in dialog box opens, click **My user account**. Click **Finish**.
5. Back on the Add or Remove Snap-ins dialog box, click **OK**.
6. Under the Console Root, expand **Certificates**, and click **Personal**.
7. Right-click **Personal**, click **All Tasks**, and click **Request New Certificate**.
8. When the Certificate Enrollment wizard starts, click **Next**.
9. On the Select Certificate Enrollment Policy page, click Next.
10. On the Request Certificates page, click to select the **Corporate User Certificate** option, and click **Enroll..**.
11. When done, click **Finish**.
12. Expand **Personal**, and click **Certificates**. You should see the Administrator user certificate. If you scroll over, you should also view the Certificate Type.

Requesting a Certificate Using the Web Interface

1. Open Internet Explorer and open the following URL:
<https://server01.contoso.com/certsrv>
If you get a security alert, click **OK**.
2. When it asks you to login, login as **contoso\administrator** with the password of **Password01**. Click **OK**.
3. When the Internet Explorer dialog box opens, click **Add**. On the Trusted sites box, click **Add**. Click **Close**.

4. On the Welcome page, click **Request a certificate**.
5. On the Advanced Certificate Request page, click **Create and submit a request to this CA**.
6. When the Web Access Confirmation dialog box opens, click **Yes**.
7. On the Advanced Certificate Request page, select the Corporate User Certificate in the Certificate Template section. At the bottom of the page, click **Submit**.
8. When the Web Access Confirmation dialog box opens, click **Yes**. When the Certificate Issued page opens, click **Install this certificate**.
9. Take a screen shot of the Internet Explorer window by pressing Alt+Prt Scr and then paste it into your Lab 20 worksheet file in the page provided by pressing Ctrl+V.
10. Close Internet Explorer when the certificate has been installed.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 20.5 Configuring Autoenrollment

Overview	In this exercise, you will configure group policies to perform autoenrollment of digital certificates.
Completion time	10 minutes

Mindset Question: Which version of digital certificate is required for autoenrollment?

1. On RWDC01, using Server Manager, open the **Tools** menu, and click **Group Policy Management**.
2. When the Group Policy Management console opens, expand **Forest: Contoso.com**, expand **Domains**, expand **Contoso.com**, right-click **Default Domain Policy**, and then click **Edit**.
3. When the Group Policy Management Editor opens, expand **User Configuration**, expand **Policies**, expand **Windows Settings**, expand **Security Settings**, and then click to highlight **Public Key Policies**.
4. In the right pane, double-click **Certificate Services Client – Auto-Enrollment**.
5. In the Configuration Model drop-down list box, click **Enabled**, as shown in Figure 20-2.

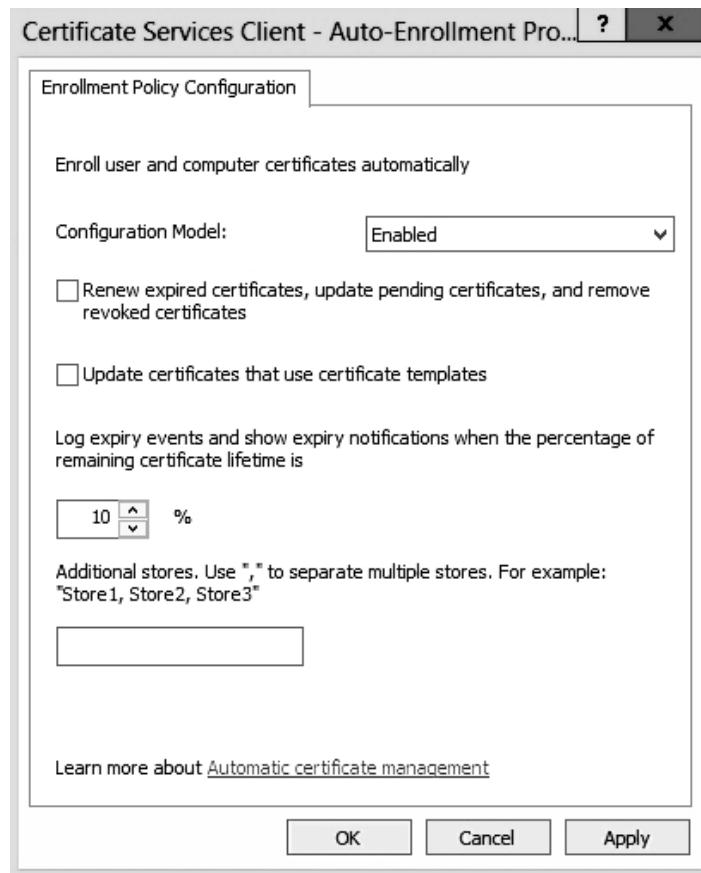


Figure 20-2
Enabling Autoenrollment

6. Click to select the **Renew expired certificates**, **Update pending certificates**, and **Remove revoked certificates** option.
7. Click to select the **Update certificates that use certificate templates** option.
8. Click **OK** to close the Properties dialog box.
9. In the right pane, double-click the **Certificate Services Client – Certificate Enrollment Policy** object.
10. On the Enrollment Policy tab, set the Configuration Model to **Enabled**, and ensure that the certificate enrollment policy list displays the Active Directory Enrollment Policy.
11. Click **OK** to close the dialog box.
12. Close the Group Policy Management Editor and Group Policy Management console.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 20.6 Enabling Enrollment Agents

Overview	In this exercise, you will configure enrollment agents, which can be used to create digital certificate for other users.
Completion time	30 minutes

Mindset Question: What is a common reason that you would use an enrollment agent?

1. On RWDC01, using Server Manager, open the **Tools** menu and click **Active Directory Users and Computers**.
2. Right-click the **Users** OU, click **New**, and click **User**.
3. When the New Object – User dialog box opens, type the following and click **Next**:

First name: **Jay**

Last name: **Bronze**

Full name: **Jay Bronze**

User logon name: **JBronze**

4. For the Password and Confirm password text boxes, type **Password01**.
5. Click to select the Password never expires. When the Active Directory Domain Services dialog box opens, click **OK**. Click **Next**.
6. When done with the wizard, click **Finish**.
7. Right-click the Jay Bronze account in the Users OU, and click **Properties**.
8. Click the **Member of** tab.
9. Click **Add**. When the Select Groups dialog box opens, type **domain admins** and click **OK**.
10. Click **OK** to close the Properties dialog box.
11. Close the Active Directory Users and Computers.
12. On Server01, if the Certification Authority is not open, using Server Manager, open the **Tools** menu and click **Certification Authority**.
13. When the certsrv console opens, expand the **contoso-SERVER01-CA**, right-click **Certificate Templates**, and then click **Manage**.

14. When the Certificate Templates console opens, right-click **Enrollment Agent**, and click **Duplicate Template**.
15. Click the **General** tab.
16. For the Template display name, type **Corporate Enrollment Agent**.
17. Click the Security tab, and then click **Add**.
18. In the Select Users, Computers, Service Accounts, or Groups window, type **Jay Bronze**, and then click **OK**.
19. On the Security tab, click **Jay Bronze**, select **Allow Read** and **Allow Enroll** permissions, and then click **OK**.
20. Close the Certificate Templates Console.
21. In the certsrv console, right-click **Certificate Templates**, point to **New**, and then click **Certificate Template to Issue**.
22. In the list of templates, click **Corporate Enrollment Agent**, and then click **OK**.
23. Login on Server02 as **Contoso\JBronze** with the password of **Password01**.
24. On Server02, click the **Start Menu** button, type **mmc**, then click the mmc icon. If you get a User Account Control dialog box, click Yes.
25. In Console1, click **File**, and then click **Add/Remove Snap-in**.
26. Click **Certificates**, and then click **Add**.
27. With **My user account** selected, click **Finish**.
28. Click **OK** to close Add or Remove Snap-ins.
29. Expand **Certificates – Current User**, expand **Personal**, expand **Personal**, and click **Certificates**.

**Question
3**

Jay Bronze has a digital certificate. What template does the certificate use and how is the certificate created for Jay Bronze?

30. Right-click **Certificates**, point to **All Tasks**, and then click **Request New Certificate**.
31. When the Certificate Enrollment Wizard starts, click **Next**.
32. On the Select Certificate Enrollment Policy page, click **Next**.

33. On the Request Certificates page, select **Corporate Enrollment Agent**, and then click **Enroll**.
34. When the certificate is installed, click **Finish**.
35. On Server01, in the Certification Authority console, right-click the **contoso-SERVER01-CA**, and then click **Properties**.
36. Click the **Enrollment Agents** tab (see Figure 20-3).

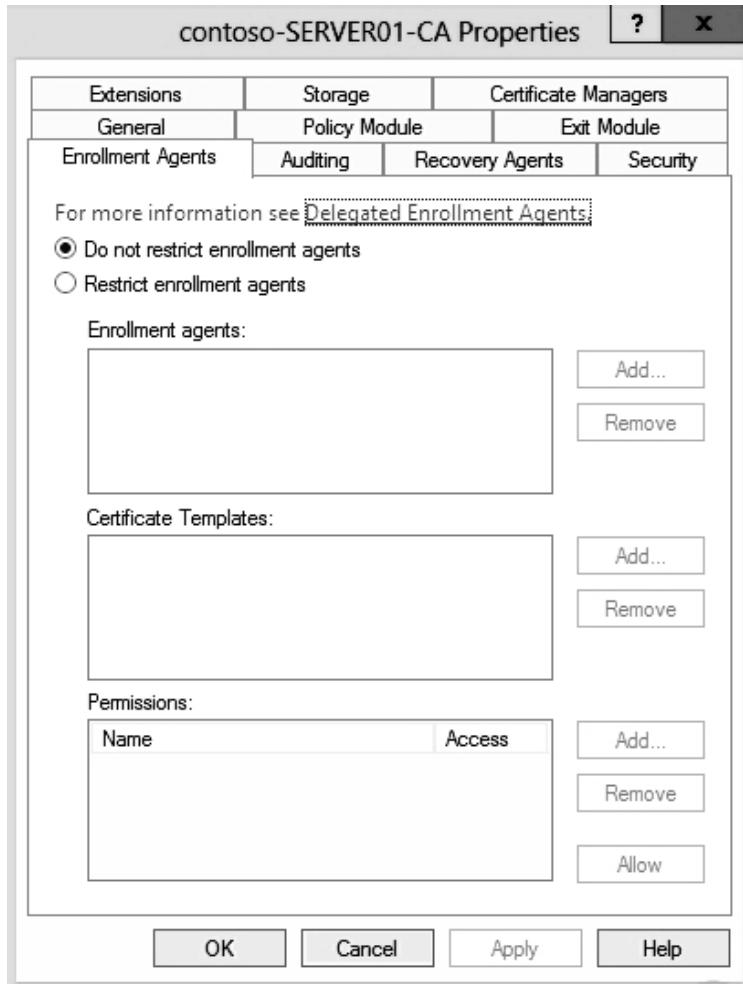


Figure 20-3
Configuring enrollment agents

37. Click **Restrict enrollment agents**.
38. When a warning states that restrictions on delegated enrollment agents can be enforced only on Windows Server 2008 CAs or later, click **OK**.
39. In the Enrollment agents section, click **Add**.

- 40.** In the Select User, Computer or Group field, type **JBronze**, click **Check Names**, and then click **OK**.
- 41.** Click **Everyone**, and then click **Remove**.
- 42.** In the certificate templates section, click **Add**.
- 43.** In the list of templates, click **Corporate User Certificate**, and then click **OK**.
- 44.** In the Certificate Templates section, click **<All>**, and then click **Remove**.
- 45.** In the Permission section, click **Add**.
- 46.** In the Select User, Computer or Group field, type domain admins, click **Check Names**, and then click **OK**.
- 47.** In the Permission section, click **Everyone**, and then click **Remove**.
- 48.** Click **OK** to close the Properties dialog box.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 10 minutes

- 1.** In Exercise 20.1, when exporting certificate, what format also exports the private key?
- 2.** In Exercise 20.2, how do you ensure that a newer template will replace the older templates?
- 3.** In Exercise 20.3, what various methods can assign a digital certificate to a user?
- 4.** In Exercise 20.4, what did you use to perform autoenrollment?
- 5.** In Exercise 20.5, how do you make a user an enrollment agent?

Lab Challenge**Configuring the Key Recovery Agent**

Overview	To complete this challenge, you will describe how to configure the Key Recovery Agent by writing the steps for the following scenario.
Completion time	10 minutes

To complete this challenge, you will describe how to configure the Key Recovery Agent by writing the steps for the following scenario.

You want to enable the Key Recovery Agent for the contoso.com domain. What are the primary steps in performing key archival and what tool do you use to perform each step. Then specify the steps to actually recover a certificate.

Write out the steps you performed to complete the challenge.

End of lab.

LAB 21

INSTALLING AND CONFIGURING ACTIVE DIRECTORY RIGHTS MANAGEMENT SERVICES

THIS LAB CONTAINS THE FOLLOWING EXERCISES AND ACTIVITIES: - - - - -

Exercise 21.1 Installing Active Directory Rights Management Service (AD RMS)

Exercise 21.2 Creating and Enabling the Super Users Group

Exercise 21.3 Exporting and Importing the TUD Certificate

Exercise 21.4 Creating Distributed Rights Policy Template

Exercise 21.5 Enabling and Configuring Application Exclusion

Lab Challenge Enabling and Configuring Federated Identity Support Settings

BEFORE YOU BEGIN

The lab environment consists of student workstations connected to a local area network, along with a server that functions as the domain controller for a domain called contoso.com. The computers required for this lab are listed in Table 21-1.

Table 21-1

Computers required for Lab 21

Computer	Operating System	Computer Name
Server (VM 1)	Windows Server 2012	RWDC01
Server (VM 3)	Windows Server 2012	Server02

In addition to the computers, you will also require the software listed in Table 21-2 to complete Lab 21.

Table 21-2

Software required for Lab 21

Software	Location
Lab 21 student worksheet	Lab21 Worksheet.docx (provided by instructor)

Working with Lab Worksheets

Each lab in this manual requires that you answer questions, shoot screen shots, and perform other activities that you will document in a worksheet named for the lab, such as Lab21 Worksheet.docx. You will find these worksheets on the book companion site. It is recommended that you use a USB flash drive to store your worksheets, so you can submit them to your instructor for review. As you perform the exercises in each lab, open the appropriate worksheet file, fill in the required information, and save the file to your flash drive.

After completing this lab, you will be able to:

- Install and configure Active Directory Rights Management Services (AD RMS)
- Manage Trusted User Domains
- Manage RMS templates
- Configure exclusion policies
- Manage Federated Identity Support

Estimated lab time: 105 minutes

Exercise 21.1**Installing Active Directory Rights Management Services (AD RMS)****Overview**

In this exercise, create the AD RMS service account, which will be needed when installing and configuring AD RMS. Also define the RMS Users group, and install the Active Directory Rights Management Service.

Completion time

40 minutes

1. Log into RWDC01 as **contoso\administrator** with the password of **Password01**.
2. On RWDC01, using Server Manager, click **Tools > Active Directory Administrative Center**.
3. On the Active Directory Administrative Center, right-click **Contoso (local)**, in the left pane, click **New**, and then click **Organizational Unit**.
4. When the Create Organizational Unit dialog box opens, type **Service Accounts** in the **Name** text box, and click **OK**.
5. Click the little arrow next to **contoso (local)** to open a list of the top level OUs and then double-click the **Service Accounts** OU
6. For the Service Accounts OU, under Tasks, click **New**, and then click **User**.
7. When the Create User dialog box opens, enter the following (as shown in figure 21-1):

First name: ADRMS_SVC

User UPN logon: ADRMS_SVC

Password and Confirm password: Password01

Password options: Other password options

Password never expires: Enabled

User cannot change password: Enabled

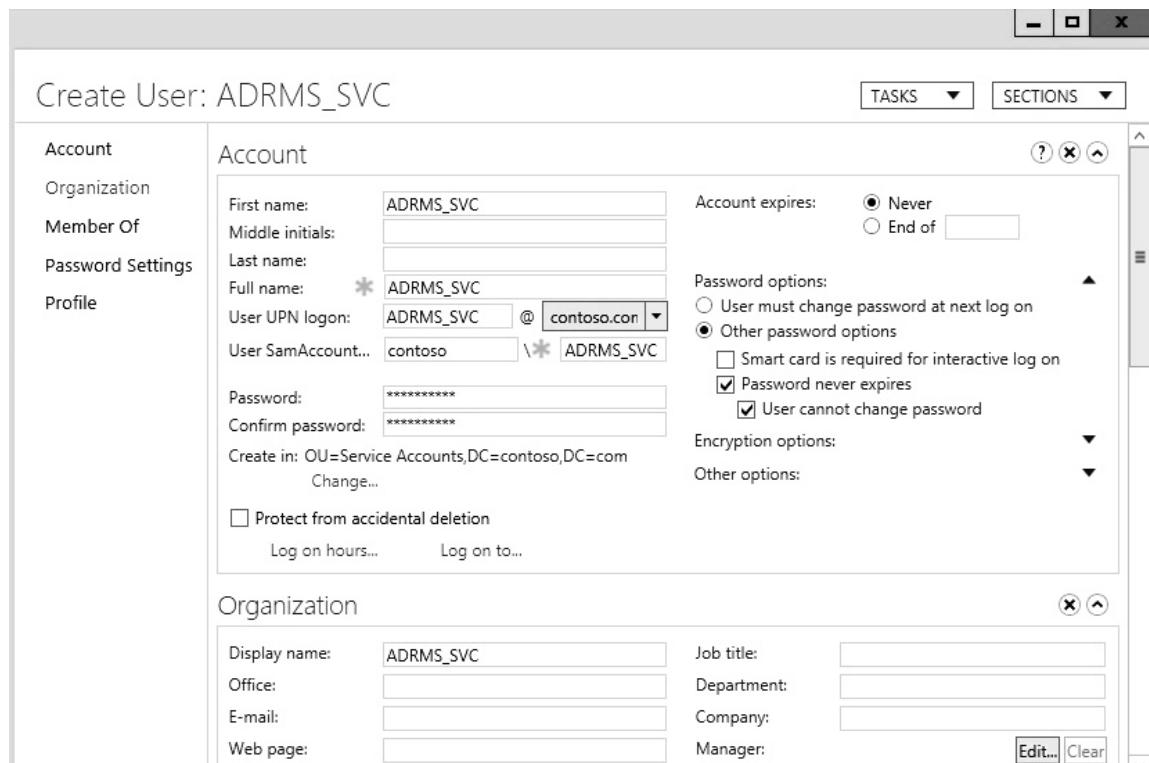


Figure 21-1
Creating an AD RMS service account

8. Click **OK** to close the Create User dialog box.
9. Click the little arrow next to **contoso (local)**, and double-click **Users**.
10. For the Users OU, under Tasks, click **New**, and then click **Group**.
11. When the Create Group dialog box opens, type the following:

Group name: **RMS Users**

E-mail: **RMSUsers@Contoso.com**
12. Scroll down to **Members**.
13. In the Members section, click **Add**. Type **Jay Bronze** and click **OK**.
14. Click **OK** to close the Create Group dialog box.
15. Close **Active Directory Administrative Center**.
16. Using Server Manager, click **Tools > DNS**.
17. In DNS Manager, under RWDC01, expand the DNS server **Forward Lookup Zones** and click **contoso.com**.

- 18.** Right-click the **contoso.com** domain and click **New Alias (CNAME)**.
- 19.** In the New Resource Record dialog box, enter the following:
 - Alias name: ADRMS
 - Fully qualified domain name (FQDN) for target host: server02.contoso.com
- 20.** Click **OK** to close the New Resource Record dialog box.
- 21.** Close DNS Manager.
- 22.** Log into Server02 as **contoso\administrator** with the password of **Password01**.
- 23.** On Server02, using Server Manager, click **Manage**, and then click **Add Roles and Features**.
- 24.** When the Add Roles and Features Wizard opens, click **Next**.
- 25.** On the Select installation type page, click **Next**.
- 26.** On the Select destination server page, click **Server02.contoso.com**, and click **Next**.
- 27.** Click to select **Active Directory Rights Management Services**. When you are asked to add features, click **Add Features**.
- 28.** Back at the Select server roles page, click **Next**.
- 29.** At the Select features page, click **Next**.
- 30.** On the Active Directory Rights Management Services page, click **Next**.
- 31.** When the Select role services page, Active Directory Rights Management Server is already selected, click **Next**.
- 32.** On the Confirm installation selections page, click **Install**.
- 33.** When the installation is complete, click **Close**.
- 34.** Using Server Manager, click the **AD RMS** node.
- 35.** At the top of the Servers section, next to Configuration required for Active Directory Rights Management Services at SERVER02 (as shown in figure 21-2), click **More**.

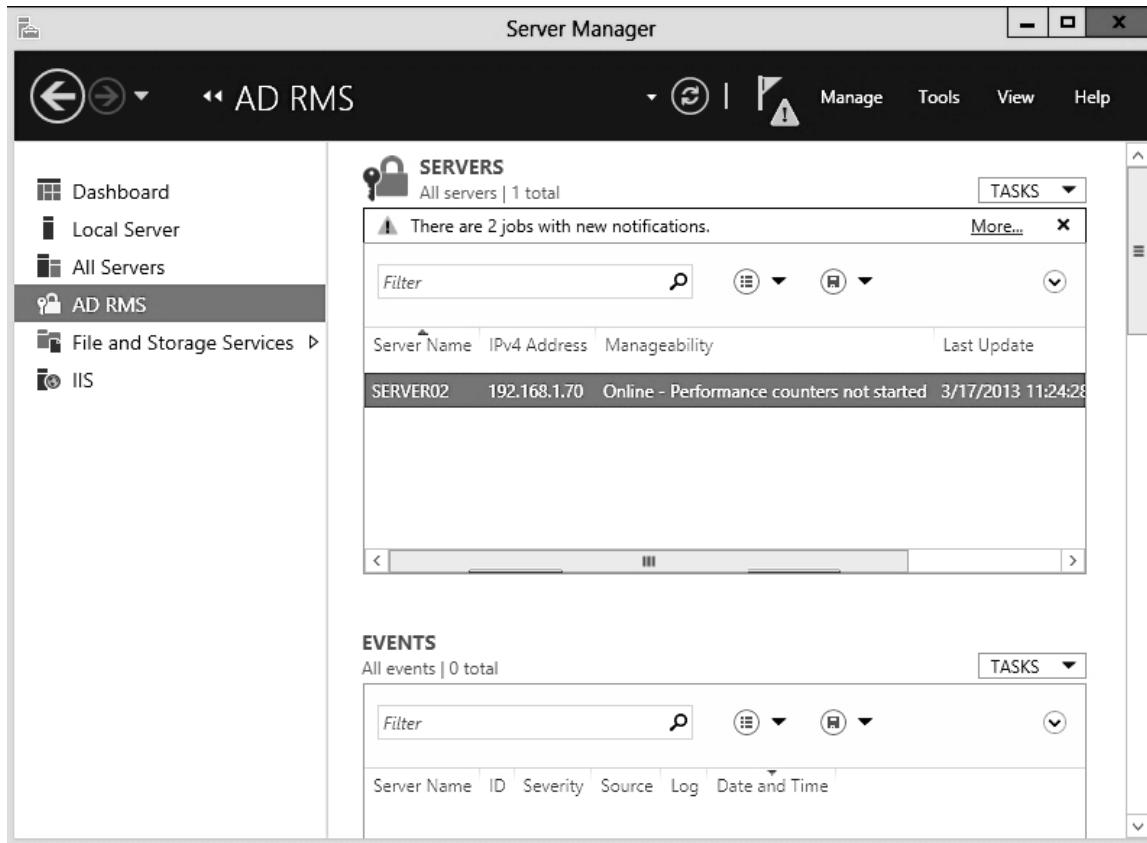


Figure 21-2
Configuring the AD RMS server

36. When the All Servers Task Details dialog box page opens, click **Perform additional configuration**.
37. When the AD RMS Configuration wizard starts, click **Next**.
38. On the AD RMS Cluster page, Create a new AD RMS root cluster is already selected. Click **Next**.
39. On the Configuration Database Server page, click **Use Windows Internal Database on this server**. Click **Next**.
40. On the Server Account page, click **Specify**.
41. In the Windows Security dialog box, enter the following details, click **OK**, and then click **Next**:
 - Username: ADRMS_SVC
 - Password: Password01

- 42.** On the Cryptographic Mode page, click **Cryptographic Mode 2**, and then click **Next**.
- 43.** On the Cluster Key Storage page, click **Use AD RMS centrally managed key storage**, and then click **Next**.
- 44.** On the Cluster Key Password page, type **Password01** in the Password and Confirm Password dialog box, and then click **Next**.
- 45.** On the Cluster Web Site page, verify that Default Web Site is selected, and then click **Next**.
- 46.** On the Cluster Address page, provide the following information, and then click **Next**:
 - Connection Type: Use an unencrypted connection (`http://`)
 - Fully Qualified Domain Name: `adrms.contoso.com`
 - Port: 80
- 47.** On the Licenser Certificate page, type **Contoso AD RMS**, and then click **Next**.
- 48.** On the SCP Registration page, click **Register the SCP now**, and then click **Next**.
- 49.** On the Confirmation page, take a screen shot of the Confirmation page by pressing `Alt+Prt Scr` and then paste it into your Lab 21 worksheet file in the page provided by pressing `Ctrl+V`.
- 50.** Click **Install**.
- 51.** When the installation is successful, click **Close**.
- 52.** To manage AD RMS, you must sign out of Windows. Therefore, click **Start > Administrator**, and then click **Sign Out**.

End of exercise. Close any open windows before you begin the next exercise.

Exercise 21.2 Creating and Enabling the Super Users Group

Overview	In this exercise, you will enable and specify the super users group.
Completion time	15 minutes

Mindset Questions: **What is the Super Users group used for?**

1. On RWDC01, using Server Manager, click **Tools > Active Directory Administrative Center**.
2. Click Users OU. Then under Tasks, click **New**, and then click **Group**.
3. When the Create Group dialog box opens, type the following:
 - Group name: **RMSSuperUsers**
 - E-mail: **RMSSuperUsers@Contoso.com**
4. Under the Group scope section, select **Universal**.
5. Click **Members**.
6. Click **Add**. Type **domain admins;Jay Bronze** and click **OK**.
7. Click **OK** to close the Create Group dialog box.
8. Close Active Directory Administrative Center.
9. Log into Server02 as **contoso\administrator** with the password of **Password01**.
10. On Server02, using the Server Manager, open the **Tools** menu, and click **Active Directory Rights Management Services**.
11. Take a screen shot of the Active Directory Rights Management Services window by pressing Alt+Prt Scr and then paste it into your Lab 21 worksheet file in the page provided by pressing Ctrl+V.
12. In the Active Directory Rights Management Services console, expand server02 (Local), and then click **Security Policies**.
13. In the Security Policies area (as shown in figure 21-3), under Super Users, click **Change super user settings**.

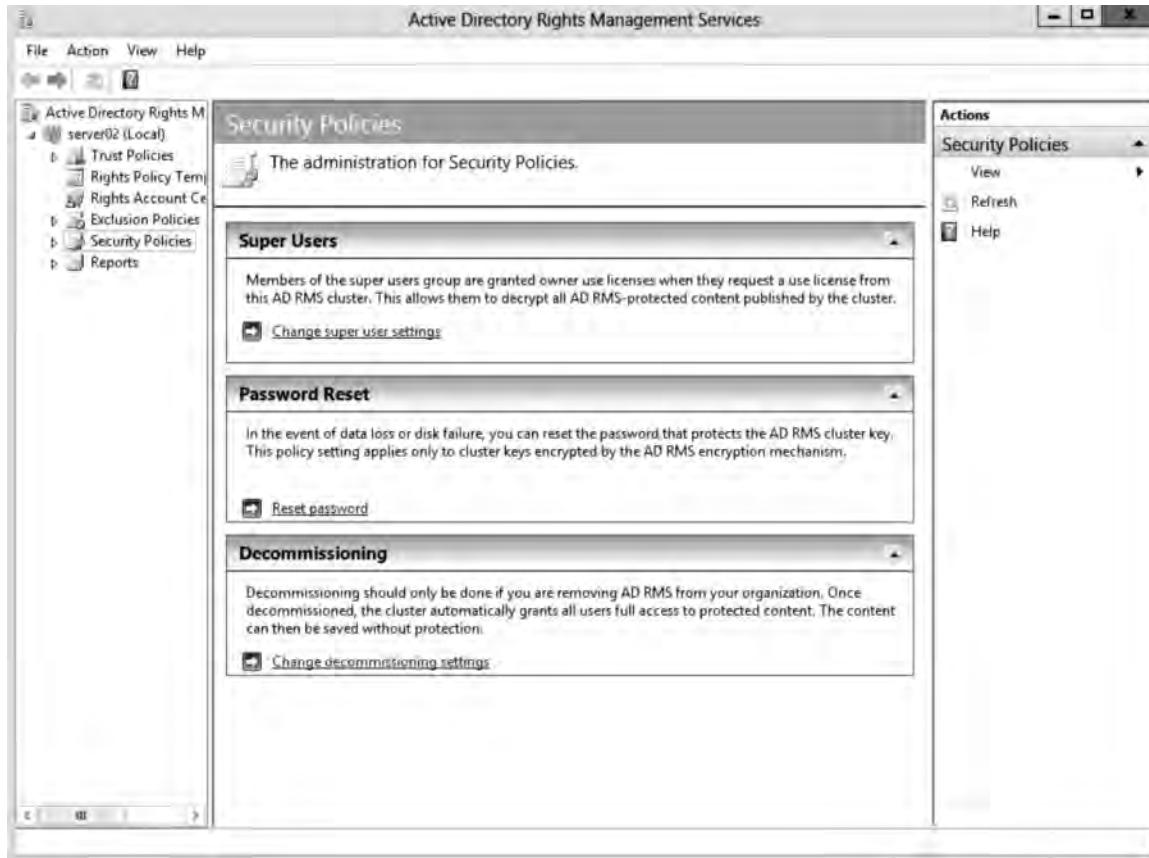


Figure 21-3
Changing super user settings

14. In the Actions pane, click **Enable Super Users**. The console shows Super users is enabled.
15. In the Super Users area, click **Change super user group**.
16. In the Super Users dialog box, click Browse. When the Select Group dialog box opens , type **RMSSuperUsers@contoso.com**, and then click **OK**.
17. When done, click **OK** to close the Super Users dialog box.
18. Take a screen shot of the Super Users configuration by pressing Alt+Prt Scr and then paste it into your Lab 21 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. You can leave the Rights Management console open for the next exercise.

Exercise 21.3 Export and Import the TUD Certificate

Overview	In this exercise, you will export, and then import the Trusted User Domain certificate.
Completion time	10 minutes

Mindset Questions: What is the trusted user domain used for?

1. On Server02, with the Active Directory Rights Management Services console, expand **Trust Policies**, and click **Trusted User Domains**.
2. In the Center pane, under the Trusted User Domain Information section, right-click the **Enterprise** certificate, and then click **Export Trusted User Domain**.
3. When the Export Trusted User Domain As dialog box opens, type **C:\EnterpriseTUD** in the File name text box, and click **Save**.
4. In the Actions pane, click **Import Trusted User Domain**.
5. In the Trusted user domain file text box, click **Browse**, and click **C:\EnterpriseTUD.bin**. Click **Open**.
6. Type **Enterprise** in the Display name text box. Click **Finish**.
7. Since the TUD certificate is already installed, you will get a dialog box saying that it is already imported and trusted. Click **OK** and click **Cancel**.

End of exercise. You can leave the Rights Management console open for the next exercise.

Exercise 21.4 Create Distributed Rights Policy Template

Overview	In this exercise, you will create a Read-Only distributed rights policy template.
Completion time	10 minutes

Mindset Questions: Why use RMS templates?

1. On Server02, using the Active Directory Rights Management Services console, and click **Rights Policy Templates**.
2. In the Actions pane, click **Create Distributed Rights Policy Template**.

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3. When the Create Distributed Rights Policy Template Wizard starts, click **Add**.
4. On the Add New Template Identification Information page, enter the following information, and then click **Add**:
 - Language: English (United States)
 - Name: Read-only template
 - Description: Read only access. No copy or print
5. Click **Next**.
6. On the Add User Rights page, click **Add**.
7. On the Add User or Group dialog box, enter **managers@contoso.com**, and then click **OK**.
8. When **managers@contoso.com** is selected, under the Rights section, click the **View** right. The Grant owner (author) full control right with no expiration is selected. Click **Next**.
9. On the Specify Expiration Policy page, choose the following settings and then click Next:
 - Content Expiration: Expires after the following duration (days): 7
 - Use license expiration: Expires after the following duration (days): 7
10. On the Specify Extended Policy page, click **Require a new use license every time content is consumed (disable client-side caching)**, and then click Next.
11. On the Specify Revocation Policy page, click **Finish**.
12. Take a screen shot of the Distributed Rights Policy Templates by pressing Alt+Prt Scr and then paste it into your Lab 21 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. You can leave the Rights Management console open for the next exercise.

Exercise 21.5 Enable and Configure Application Exclusion

Overview	In this exercise, you will create an exclusion policy that will specify which versions of PowerPoint documents to support.
Completion time	10 minutes

1. Under Server02 (Local) in the ADRMS console, click **Exclusion Policies** node.
2. Click **Manage application exclusion list** in the Application Exclusion pane.
3. In the Actions pane, click **Enable Application Exclusion**.
4. In the Actions pane, click **Exclude Application**.
5. In the Exclude Application dialog box, enter the following information, and then click **Finish**:
 - Application File name: Powerpnt.exe
 - Minimum version: 14.0.0.0
 - Maximum version: 16.0.0.0
6. To close the Exclude Application dialog box, click **Finish**.
7. Take a screen shot of the Application Exclusion by pressing Alt+Prt Scr and then paste it into your Lab 21 worksheet file in the page provided by pressing Ctrl+V.

End of exercise. Close any open windows before you begin the next exercise.

LAB REVIEW QUESTIONS

Completion time 5 minutes

1. In Exercise 21.1, what tool did you use to configure AD RMS after it was installed?
2. In Exercise 21.2, how did you define a superuser group
3. In Exercise 21.4, what did you use to identify a group when you defined groups within an AD RMS template?
4. In Exercise 21.5, what did you use to specify what version of an application will be supported by AD RMS?

Lab Challenge	Enabling and Configuring Federated Identity Support Settings
Overview	In this exercise, you will demonstrate by enabling and configuring Federated Identity Support Settings by writing out the steps needed to configure AD RMS.
Completion time	15 minutes

You decided to configure AD RMS to support federated identity support. What additional steps must you perform to enable and configure Federated Identities?

Write out the steps you performed to complete the challenge.

End of lab.

APPENDIX: LAB SETUP GUIDE

INTRODUCTION

The *Configuring Advanced Windows Server 2012 Services (Exam 70-412)* title of the Microsoft Official Academic Course (MOAC) series includes several options for delivering the course, including a lab manual. The exercises in the lab manual are designed either for a virtual machine environment or for classroom use under the supervision of an instructor or lab aide. In an academic setting, the computer lab might be used by a variety of classes each day, so you must plan your setup procedure accordingly. For example, consider automating the classroom setup procedure and using removable hard disks in the classroom. You can use the automated setup procedure to rapidly configure the classroom environment, and remove the fixed disks after teaching this class each day.

LAB CONFIGURATION

This course should be taught in a lab containing networked computers where students can develop their skills through hands-on experience with Microsoft Windows Server 2012. The exercises in the lab manual require the computers to be installed and configured in a specific manner. Failure to adhere to the setup instructions in this document can produce unanticipated results when the students perform the exercises.

The lab configuration consists of a single physical server running Microsoft Windows Server 2012 Standard and a number of Hyper-V virtual servers. The instructor server will be called Instructor. It will be assigned an IP address of 192.168.100.50.

Each student physical computer will be named Studentxx, where the xx represents the student number. The first server will be called Student01, the second server will be called Student02 and so on.

Computer will be connected to the classroom network and be assigned a 192.168.100.1xx IP address, where the xx represents the student number. Therefore, the first server will be assigned a 192.168.100.101 and the second server will be assigned a 192.168.100.102.

The lab computers are located on an isolated network, configured as an Active Directory Domain Services (AD DS) domain separate from the rest of the school or organization network. The lab server functions as an Active Directory Domain Services domain controller, as well as performing a number of other roles at various times throughout the course.

Note

For the purposes of this lab, all server and workstation passwords, for user accounts and other purposes, will be set to Password01. This is obviously not a secure practice in a real-world situation, and instructors should remind students of this at the outset.

Some of the lab exercises have dependencies on previous exercises, as noted in the lab manual and the instructor notes for each exercise. Students should perform the lab exercises in order, and might have to complete any exercises they have missed due to absence before proceeding to the next lab.

Instructor Server Requirements

Each classroom will need a server to be used by the instructor and will be called Instructor. The virtual lab environment, which is hosted on the instructor computer, will consist of three servers:

- RWDC01 (192.168.1.50)
- Server01 (192.168.1.60)
- Server02 (192.168.1.70)
- Storage01 (192.168.1.80)

All servers will have two network adapters.

The lab uses the following information for the AD DS and server configuration:

- Active Directory Domain Services domain name: contoso.com
- Fully qualified domain name (FQDN): rwdc01.contoso.com

For simplicity in a lab environment, students will use the Administrator account with the password of Password01. This document includes a setup procedure that configures the server to provide all infrastructure services required throughout the course.

Hardware Requirements

- Minimum: dual-core x64 processor or better with support for Intel Virtualization Technology (Intel VT) or Advanced Micro Devices Virtualization (AMD-V). Quad core is recommended.
- Minimum: 12 GB recommended
- Minimum: 500 GB or higher SATA drives
- DVD drive or better
- Two network interface adapter
- Minimum: Super VGA (1024x768) 17-inch display
- Keyboard
- Mouse
- Sound card/port
- Speakers
- Internet connection (highly recommended)

Software Requirements

All of the software listed below is required for this course:

- Microsoft Windows Server 2012 Standard installation disk – Evaluation edition available as a free download from Microsoft’s TechNet website.
- Windows Identity Foundation SDK 4.0 (can be downloaded from Microsoft’s Download Center website).

With the exception of the Windows Server 2012 operating system itself, the software products listed here do not have to be installed on the server. You must, however, download them and make them available to the workstation on a server share. The students will install each of these products at various points in the course.

Student Computer Requirements

Each student will need their own dedicated computer to run Windows Server 2012. Each computer will be called Studentxx, where xx is your student number.

The virtual lab environment, which is hosted on the student computer, will consist of three servers:

- RWDC01 (192.168.1.50)
- Server01 (192.168.1.60)
- Server02 (192.168.1.70)
- Storage01 (192.168.1.80)

RWDC01 will have one network adapter, and Server01 and Server02 will have two network adapters. The second network adapters are used to configure an external network when doing remote access exercises.

The lab uses the following information for the AD DS and server configuration:

- Active Directory Domain Services domain name: contoso.com
- Fully qualified domain name (FQDN): rwdc01.contoso.com

For simplicity in a lab environment, students will use the Administrator account with the password of Password01. This document includes a setup procedure that configures the server to provide all infrastructure services required throughout the course.

Hardware Requirements

- Minimum: dual-core x64 processor or better with support for Intel Virtualization Technology (Intel VT) or Advanced Micro Devices Virtualization (AMD-V). Quad core is recommended.
- Minimum: 10 GB recommended
- Minimum: 500 GB or higher SATA drives
- DVD drive or better
- Two network interface adapter
- Minimum: Super VGA (1024x768) 17-inch display
- Keyboard
- Mouse
- Sound card/port (speakers or headphones are recommended)

Software Requirements

All of the software listed below is required for this course:

- Microsoft Windows Server 2012 Standard installation disk – Evaluation edition available as a free download from Microsoft’s TechNet website.
- Microsoft Office 2013 (consumer preview can be downloaded from the Microsoft Office website)
- Windows Identity Foundation SDK 4.0 (can be downloaded from the Microsoft Download Center website)

With the exception of the Windows Server 2012 operating system itself, the software products listed here do not have to be installed on the server. You must, however, download them and make them available to the workstation on a server share. The students will install each of these products at various points in the course.

INSTRUCTOR AND STUDENT SERVER SETUP INSTRUCTIONS

Before you begin, do the following:

- Read this entire document.
- Make sure that you have the installation disk for Microsoft Windows Server 2012 Standard Edition.

Installing the Instructor and Student Servers

Using the following setup procedure, install Windows Server 2012 on Instructor and student servers. This procedure assumes that you are performing a clean installation of the Windows Server 2012 Standard evaluation edition, and that, if you have downloaded an image file, you have already burned it to a DVD-ROM disk.

Warning

By performing the following setup instructions, your computer's hard disks will be repartitioned and reformatted. You will lose all existing data on these systems.

1. Turn the instructor computer on and insert the Windows Server 2012 installation DVD into the drive.
2. Press any key, if necessary, to boot from the DVD-ROM disk. A progress indicator screen appears as Windows is loading files.

More Information

The device that a PC uses to boot is specified in its system (or BIOS) settings. In some cases, you might have to modify these settings to enable the computer to boot from the Windows Server 2012 DVD. If you are not familiar with the operation of a particular computer, watch the screen carefully as the system starts and look for an instruction specifying what key to press to access the system settings.

3. When the computer loads the Windows graphical interface and the Windows Setup page appears, select the appropriate language to install, time and currency format, and keyboard or input method. Then click **Next**.

4. Click **Install Now**. The *Select the operating system you want to install* page appears.
5. Select **Windows Server 2012 Standard (Server with GUI)** and click **Next**.
6. When the License Terms page appears, select the **I accept the license terms** checkbox and click **Next**.
7. When it asks what type of installation you want to use, since you are doing a clean installation and not an upgrade, Click **Custom: Install Windows Only (advanced)**.

Note

If the computer's hard drives are connected to a third-party controller, you will have to click the Load Driver button to load the third party driver

8. When it asks where you want to install Windows, select **Disk 0 Unallocated Space** and click **Next**. The *Installing Windows* page appears, indicating the progress of the Setup program as it installs the operating system.

Note

If there are existing partitions on the computer's hard disk, select each one in turn and delete it before proceeding.

9. After the installation completes and the computer restarts a couple of times, a message appears stating that *The user's password must be changed before logging on the first time*.
10. In the New Password and Confirm Password text boxes, type **Password01** and press the Enter key.
11. The system finalizes the installation and the Windows sign-on screen appears.

Once the installation process is finished, you must proceed to complete the following tasks to configure the server and install the necessary roles.

Completing Initial Server Configuration Tasks

Before the server will be ready, you will need to configure the following:

- Date and Time Settings
- TCP/IP Settings
- Computer Name

1. Log on to the computer using the username/password of **Administrator/Password01**.
2. By default, the Server Manager opens when you first logon after installing Windows. To click Windows settings for the Instructor server, click **Local Server** in the left pane.

3. Click the current time zone to open the Date and Time dialog box.
4. If necessary, click the **Change date and time** button to change the correct date and time using the Date and Time Settings dialog box. When done, click **OK** to close the Date and Time Settings dialog box.
5. If necessary, click the **Change time zone** button to change the current time zone using the Time Zone Settings dialog box. When done, click **OK** to close the Time Zone Settings dialog box.
6. Click **OK** to close the Date and Time dialog box.
7. Back on the Server Manager console, click the **IPv4 address assigned by DHCP, IPv6 enabled** to open the Network Connections window.
8. Double-click the **Ethernet** connection to open the Ethernet Status dialog box.
9. Click **Properties** button to open the Ethernet Properties dialog box.
10. Double-click **Internet Protocol Version 4 (TCP/IPv4)** to open the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
11. Enter the following information:

IP address: **192.168.100.50**
Subnet mask: **255.255.255.0**

If you have Internet access, add an address for the DNS server and an address for the default gateway.
12. Click **OK** to close the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
13. Click **Close** to close Ethernet Status dialog box.
14. Double-click the computer name to open the System Properties dialog box.
15. Click **Change** to open the Computer Name/Domain Changes dialog box.
16. For the instructor computer, type **Instructor** in the Computer name text box. For the student computers, type **Studentxx** in the Computer name text box, where *xx* is the student number. Click **OK** to close the Computer Name/Domain Changes dialog box.
17. When a messages stating that you must restart your computer, click **OK**.
18. Click the **Close** button to close the System Properties dialog box.
19. When it says that you must restart your computer, click **Restart Now**.

Preparing the Server File System

The student workstations in the lab do not require access to the Internet, as long as the software the students need to install as they complete the exercises is available on the lab server. To make the necessary software available to the student computers, perform the following steps.

1. Download all of the free software products listed in the Software Requirements section, earlier in this document.
2. On the Instructor or Studentxx server, open Windows Explorer and create a new folder called **C:\Software**.
3. Share the C:\Software folder using the name **Software**.
4. Assign the **Allow Full Control** share permission to the **Everyone** special identity.
5. Copy the following to the C:\Software folder:
Windows Identity Foundation SDK 4.0 (can be downloaded from Microsoft's Download Center website.)

Installing Hyper-V

The server will run Hyper-V, which will be used to run multiple virtual machines. Therefore, you will need to install Hyper-V.

1. Log on to the server using the **Administrator** account and the password **Password01**. The Server Manager console opens.
2. Open the **Manage** menu and select **Add Roles and Features**.
3. When the Add Roles and Features Wizard opens, click **Next**.
4. On the Select installation type page opens, click **Next**.
5. On the Select destination server page opens, click **Next**.
6. On the Select server roles page, click to select **Hyper-V**.
7. When the Add Roles and Features Wizard dialog box opens, click **Add Features**.
8. Back at the Select server roles page, click **Next**.
9. On the Select features page, click **Next**.
10. On the Hyper-V page, click **Next**.
11. On the Create Virtual Switches page, click to select the **Ethernet network adapter**. Click **Next**.
12. On the Virtual Machine Migration page, click **Next**.
13. On the Default Stores page, click **Next**.
14. On the Confirm installation selections page, click **Install**.
15. When the installation is complete, click the **Close** button.

Configuring the Server

Creating a VM (RWDC01)

1. Log on to the server using the **Administrator** account and the password **Password01**. The Server Manager console opens.
2. On the Server Manager console, open the **Tools** menu and click **Hyper-V Manager**. The Hyper-V Manager console opens.
3. Right-click the server name, click **New**, then click **Virtual Machine**.
4. When the New Virtual machine Wizard starts, click **Next**.

5. On the Specify Name and Location page, in the Name text box, type **RWDC01**. Click **Next**.
6. On the Assign Memory page, for the Startup memory, specify **2048**. Since this is used for a lab environment, click to enable **Use Dynamic Memory for this virtual machine**. Click **Next**.
7. On the Configure Networking page, click **Next**.
8. On the Connect Virtual Hard Disk page, Specify the size of **70 GB**.
9. Click **Next**.
10. On the Installation Options page, select **Install an operating system from a boot CD/DVD-ROM**. Then select **Image file (.iso)**.
11. Use the Browse button to select the ISO file of the Windows Server 2012 installation disk from the C:\Software folder. Click **Next**.
12. On the Summary page, click **Finish**.
13. After the VM is created, right-click the **RWDC01** in the Virtual Machines section of the Hyper-V Manager console and click **Start**.
14. Double-click the **RWDC01** in the bottom pane to open a Virtual Machine Connection window for RWDC01.
15. When the computer loads the Windows graphical interface and the Windows Setup page appears, select the appropriate language to install, time and currency format, and keyboard or input method. Then click **Next**.
16. Click **Install Now**. The Select the operating system you want to install page appears.
17. Select **Windows Server 2012 Standard (Server with GUI)** and click **Next**.
18. When the License Terms page appears, select the **I accept the license terms** checkbox and click **Next**.
19. When it asks what type of installation you want to use, since you are doing a clean installation and not an upgrade, click **Custom: Install Windows Only (advanced)**.
20. When it asks where you want to install Windows, select **Disk 0 Unallocated Space** and click **Next**. The Installing Windows page appears, indicating the progress of the Setup program as it installs the operating system.
21. After the installation completes and the computer restarts a couple of times, a message appears stating that the user's password must be changed before logging on the first time. In the New password and Confirm Password text boxes, type **Password01** and press the Enter key.
22. The system finalizes the installation and the Windows sign-on screen appears.

Configure the Server RWDC01

1. Login to RWDC01 as **Administrator**.
2. On the Server Manager console, click the **IPv4 address assigned by DHCP, IPv6 enabled** to open the Network Connections window.

3. Double-click the **Ethernet** connection to open the Ethernet Status dialog box.
4. Click **Properties** to open the Ethernet Properties dialog box.
5. Double-click **Internet Protocol Version 4 (TCP/IPv4)** to open the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
6. Enter the following information:
IP address: **192.168.1.50**
Subnet mask: **255.255.255.0**
Preferred DNS server: **192.168.1.50**
7. Click the **Advanced** button.
8. In the IP addresses section, click the **Add** button.
9. When the TCP/IP Address dialog box opens, enter the following information:
IP address: **192.168.100.55**
Subnet mask: **255.255.255.0**
10. Click **Add** to close the TCP/IP Address dialog box.
11. Click **OK** to close the Advanced TCP/IP Settings dialog box.
12. Click **OK** to close the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
13. Click **Close** to close Ethernet Status dialog box.
14. Double-click the computer name to open the System Properties dialog box.
15. Click **Change** to open the Computer Name/Domain Changes dialog box.
16. Type **RWDC01** in the Computer name text box. Click **OK** to close the Computer Name/Domain Changes dialog box.
17. When a message stating that you must restart your computer, click **OK**.
18. Click the **Close** button to close the System Properties dialog box.
19. When it says that you must restart your computer, click **Restart Now**.

Installing Active Directory and DNS

1. Login to **RWDC01** as **Administrator**.
2. On the Server Manager console, open the **Manage** menu and click **Add Roles and Features**.
3. When the Add Roles and Features Wizard starts, click **Next**.
4. On the Select installation type page, click **Next**.
5. On the Select destination server page, click **Next**.
6. On the Select server roles page, click to select **Active Directory Domain Services** and click **Next**.
7. When the Add Roles and Features Wizard dialog box opens, click **Add Features**.

8. Back on the Select server roles page, click to select **DNS Server** and click **Next**.
9. When the Add Roles and Features Wizard dialog box opens, click **Add Features**.
10. Back at the Select server roles page, click **Next**.
11. On the Select features page, click **Next**.
12. On the Active Directory Domain Services page, click **Next**.
13. On the DNS Server page, click **Next**.
14. On the Confirm installation selections page, click **Install**.
15. When the installation is complete, click **Close**.
16. On the Server Manager console, open the **Tools** menu and click **DNS**.
17. When the DNS Manager console opens, right-click **RWDC01** and click **New Zone**.
18. When the New Zone Wizard appears, click **Next**.
19. On the Zone Type page, Primary zone will already be selected. Click **Next**.
20. On the Forward or Reverse Lookup Zone page, Forward lookup zone will already be selected. Click **Next**.
21. For the Zone name, type contoso.com and click **Next**.
22. On the Zone File page, click **Next**.
23. On the Dynamic Update page, click **Next**.
24. When the wizard is completed, click **Finish**.
25. On the Server Manager console, click the Yellow Exclamation Symbol and click **Promote this server to a domain controller**.
26. When the Active Directory Domain Services Configuration Wizard starts, click **Add a new forest**.
27. In the Root domain name text box, type **contoso.com**. Click **Next**.
28. On the Domain Controllers Options page, for the Directory Services Restore Mode (DSRM) password boxes, type **Password01**. Click **Next**.
29. On the DNS Options page, click **Next**.
30. On the Additional Options page, click **Next**.
31. On the Paths page, click **Next**.
32. On the Review Options page, click **Next**.
33. On the Prerequisite Check page, click **Install**.
34. After the computer reboots itself, login to **RWDC01** as contoso\administrator with the password of **Password01**.
35. Open the **DNS Manager** console.
36. In the DNS Manager console, expand **RWDC01**, expand **Forward Lookup Zones**, and click **contoso.com**. Then right-click **contoso.com** and click **Properties**.
37. When the Contoso.com Properties dialog box opens, click the **Change** button.

38. When the Change Zone Type dialog box opens, select **Store the zone in Active Directory** and click **OK**.
39. When it asks if you want the zone to become Active Directory integrated, click **Yes**.
40. For Dynamic Updates, select **Nonsecure and secure**.
41. Click **OK** to close the contoso.com Properties dialog box.
42. Click **Reverse Lookup Zones**. Then right-click **Reverse Lookup Zones** and click **New Zone**.
43. When the wizard opens, click **Next**.
44. On the Zone Type page, click **Next**.
45. On the Active Directory Zone Replication Scope page, click **Next**.
46. On the Reverse Lookup Zone Name page, click **Next**.
47. On the Reverse Lookup Zone Name page, type **192.168.1** in the Network ID and click **Next**.
48. On the Dynamic Update page, click **Next**.
49. When the wizard is completed, click **Finish**.

Installing DHCP

1. Login to **RWDC01** as **Administrator**.
2. On the Server Manager console, open the **Manage** menu and click **Add Roles and Features**.
3. When the Add Roles and Features Wizard starts, click **Next**.
4. On the Select installation type page, click **Next**.
5. On the Select destination server page, click **Next**.
6. On the Select server roles page, click to select **DHCP** and click **Next**.
7. When the Add Roles and Features Wizard dialog box opens, click **Add Features**.
8. Back at the Select server roles page, click **Next**.
9. On the Select features page, click **Next**.
10. On the DHCP page, click **Next**.
11. On the DNS Server page, click **Next**.
12. On the Confirm installation selections page, click **Install**.
13. When the installation is complete, click **Close**.
14. Using Server Manager, open the **DHCP** console.
15. Expand the **rwdc01.contoso.com** node.
16. Right-click **IPv4** and click **New Scope**.
17. When the New Scope wizard starts, click **Next**.
18. For the Name, type **Main Scope**.
19. For the Start IP address, type **192.168.1.30**. For the End IP address, type **192.168.1.40**. Click **Next**.
20. On the Add Exclusions and Delay page, click **Next**.

21. On the Lease Duration, change the lease duration to 1 day. Click **Next**.
22. On the Configure DHCP Options page, click **Yes, I want to configure these options now**. Click **Next**.
23. On the Router (Default Gateway) page, click **Next**.
24. On the Domain Name and DNS Servers page, type **contoso.com** for the Parent domain. In the IP address, type **192.168.1.50**, and click **Add**. Click **Next**.
25. On the WINS Servers page, click **Next**.
26. On the Activate Scope, make sure **Yes, I want to activate this scope now**, and click **Next**.
27. When the wizard is complete, click **Finish**.
28. In the DHCP console, right-click **rwdc01.contoso.com** and click.
29. Close the DHCP console.

Creating a Software Folder

1. On RWDC01, create a folder called **C:\Software**.
2. Using Windows Explorer, open the following UNC:
\192.168.100.xx\Software
where *xx* is the student number.
3. Share the Software folder using the name **Software**.
4. Assign the **Allow Full Control** share permission to the **Everyone** special identity.
5. Copy all files and folders from the Software folder from the Student server to Software folder on RWDC01.
6. Copy the Windows Identity Foundation SDK 4.0 (WindowsIdentityFoundation-SDK-4.0.msi) into the Software folder.
7. Close the Explorer windows.

Creating a Second Virtual Switch

1. Open Hyper-V Manager.
2. Click the server, then under Actions, click **Virtual Switch Manager**.
3. When the Virtual Switch Manager dialog box opens click the current switch. Then change the current name of the switch to **Internal Switch**.
4. Click **New virtual network switch**.
5. In the *What type of virtual switch do you want to create* text box, click **Private**, and click **Create Virtual Switch**.
6. In the Virtual Switch Properties section, type **Private Switch** in the Name text box.
7. Click **OK**.

Installing Server01

1. Log on to the server using the **Administrator** account and the password **Password01**. The Server Manager console opens.
2. On the Server Manager console, open the Tools menu and click **Hyper-V Manager**. The Hyper-V Manager console opens.
3. Right-click the server name, click **New**, then click **Virtual Machine**.
4. When the New Virtual Machine Wizard starts, click **Next**.
5. On the Specify Name and Location page, in the Name text box, type **Server01**. Click **Next**.
6. On the Assign Memory page, for the Startup memory, specify **2048**. Since this is used for a lab environment, click to enable Use Dynamic Memory for this virtual machine. Click **Next**.
7. On the Configure Networking page, select the network connection. Click **Next**.
8. On the Connect Virtual Hard Disk page, Specify the size of **60 GB**.
9. Click **Next**.
10. On the Installation Options page, select **Install an operating system from a boot CD/DVD-ROM**. Then select **Image file (.iso)**.
11. Use the **Browse** button to select the ISO file of the Windows Server 2012 installation disk from the C:\Software folder. Click **Next**.
12. On the Summary page, click **Finish**.
13. After the VM is created, right-click the **Server01** in the Virtual Machines section of the Hyper-V Manager console and click **Start**.
14. Double-click the **Server01** in the bottom pane to open a Virtual Machine Connection window for **Server01**.
15. When the computer loads the Windows graphical interface and the Windows Setup page appears, select the appropriate language to install, time and currency format, and keyboard or input method. Then click **Next**.
16. Click **Install Now**. The Select the operating system you want to install page appears.
17. Select **Windows Server 2012 Standard (Server with GUI)** and click **Next**.
18. When the License Terms page appears, select the **I accept the license terms** checkbox and click **Next**.
19. When it asks what type of installation you want to use, since you are doing a clean installation and not an upgrade, click **Custom: Install Windows Only (advanced)**.
20. When it asks where you want to install Windows, select **Disk 0 Unallocated Space** and click **Next**. The Installing Windows page appears, indicating the progress of the Setup program as it installs the operating system.
21. After the installation completes and the computer restarts a couple of times, a message appears stating that the user's password must be changed before logging on the first time. In the New password and Confirm Password text boxes, type **Password01** and press the Enter key.

22. The system finalizes the installation and the Windows sign-on screen appears.
23. Login to **Server01** as **Administrator**.
24. On the Server Manager console, click **Local Server**, click the **IPv4 address assigned by DHCP, IPv6 enabled** to open the Network Connections window.
25. Double-click the **Ethernet** connection to open the Ethernet Status dialog box.
26. Click **Properties** to open the Ethernet Properties dialog box.
27. Double-click **Internet Protocol Version 4 (TCP/IPv4)** to open the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
28. Enter the following information:
IP address: **192.168.1.60**
Subnet mask: **255.255.255.0**
Preferred DNS server: **192.168.1.50**
29. Click **OK** to close the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
30. Click **Close** to close Ethernet Status dialog box.
31. Double-click the computer name to open the System Properties administrator dialog box.
32. Click **Change** to open the Computer Name/Domain Changes dialog box.
33. Type **Server01** in the Computer name text box.
34. Click **Domain** and type **Contoso.com** in the text box. Click **OK**.
35. When it asks for a name and password of an account with permissions to join the domain, use **contoso.com\administrator** and **Password01**. Click **OK**.
36. When it says welcome to the contoso.com domain, click **OK**.
37. When a message appears stating that you must restart your computer, click **OK**.
38. Click the **Close** button to close the System Properties dialog box.
39. When it says that you must restart your computer, click **Restart Now**.
40. Using the Hyper-V Manager, In the Virtual machines pane, right-click **Server01**, and click **Shutdown**.
41. Right-click **Server01** and click **Settings**.
42. When the settings for Server01 opens, click **Add Hardware**. Then click **Network Adapter** and click **Add**.
43. For the network adapter, click the **Private Switch** option and change from **Not connected** to the available network interface type. Click **OK**.
44. Right-click **Server01** and click **Start**.

Installing Server02

1. Log on to the Instructor server using the **Administrator** account and the password **Password01**. The Server Manager console opens.
2. On the Server Manager console, open the **Tools** menu and click **Hyper-V Manager**. The Hyper-V Manager console opens.
3. Right-click the server name, click **New**, then click **Virtual Machine**.
4. When the New Virtual Machine Wizard starts, click **Next**.
5. On the Specify Name and Location page, in the Name text box, type **Server02**. Click **Next**.
6. On the Assign Memory page, for the Startup memory, specify **2048**. Since this is used for a lab environment, click to enable Use Dynamic Memory for this virtual machine. Click **Next**.
7. On the Configure Networking page, select the network connection. Click **Next**.
8. On the Connect Virtual Hard Disk page, Specify the size of **40 GB**.
9. Click **Next**.
10. On the Installation Options page, select **Install an operating system from a boot CD/DVD-ROM**. Then select **Image file (.iso)**.
11. Use the **Browse** button to select the ISO file of the Windows Server 2012 installation disk from the C:\Software folder. Click **Next**.
12. On the Summary page, click **Finish**.
13. After the VM is created, right-click the Server02 in the Virtual Machines section of the Hyper-V Manager console and click **Start**.
14. Double-click the **Server02** in the bottom pane to open a Virtual Machine Connection window for Server02.
15. When the computer loads the Windows graphical interface and the Windows Setup page appears, select the appropriate language to install, time and currency format, and keyboard or input method. Then click **Next**.
16. Click **Install Now**. The Select the operating system you want to install page appears.
17. Select **Windows Server 2012 Standard (Server with GUI)** and click **Next**.
18. When the License Terms page appears, select the **I accept the license terms** checkbox and click **Next**.
19. When it asks what type of installation you want to use, since you are doing a clean installation and not an upgrade, Click **Custom: Install Windows Only (advanced)**.
20. When it asks where you want to install Windows, select **Disk 0 Unallocated Space** and click **Next**. The Installing Windows page appears, indicating the progress of the Setup program as it installs the operating system.
21. After the installation completes and the computer restarts a couple of times, a message appears stating that the user's password must be changed before logging on the first time. In the New password and Confirm Password text boxes, type **Password01** and press the Enter key.

22. The system finalizes the installation and the Windows sign-on screen appears.
23. Log on to the Server02 server using the **Administrator** account (local account) and the password **Password01**. The Server Manager console opens.
24. On the Server Manager console, click **Local Server**, then click **IPv4 address assigned by DHCP, IPv6 enabled** to open the Network Connections window.
25. Double-click the **Ethernet** connection to open the Ethernet Status dialog box.
26. Click **Properties** to open the Ethernet Properties dialog box.
27. Double-click **Internet Protocol Version 4 (TCP/IPv4)** to open the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
28. Enter the following information:
 - IP address: **192.168.1.70**
 - Subnet mask: **255.255.255.0**
 - Preferred DNS server: **192.168.1.50**
29. Click **OK** to close the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
30. Click **Close** to close Ethernet Status dialog box.
31. Double-click the computer name to open the System Properties administrator dialog box.
32. Click **Change** to open the Computer Name/Domain Changes dialog box.
33. Type **Server01** in the Computer name text box.
34. Click Domain and type **Contoso.com** in the text box. Click **OK**.
35. When it asks for a name and password of an account with permissions to join the domain, use **contoso.com\administrator** and **Password01**. Click **OK**.
36. When it says welcome to the contoso.com domain, click **OK**.
37. When a messages stating that you must restart your computer, click **OK**.
38. Click the **Close** button to close the System Properties dialog box.
39. When it says that you must restart your computer, click **Restart Now**.
40. Right-click **Server02** and click **Settings**.
41. When the settings for Server02 opens, click **Add Hardware**. Then click **Network Adapter** and click **Add**.
42. For the network adapter, click the **Private Switch** option and change from **Not connected** to the available network interface type. Click **OK**.

Installing Storage01

1. Log on to the Student server using the **Administrator** account and the password **Password01**. The Server Manager console opens.
2. On the Server Manager console, open the **Tools** menu and click **Hyper-V Manager**. The Hyper-V Manager console opens.
3. Right-click the server name, click **New**, then click **Virtual Machine**.
4. When the New Virtual machine Wizard starts, click **Next**.
5. On the Specify Name and Location page, in the Name text box, type **Storage**. Click **Next**.
6. On the Assign Memory page, for the Startup memory, specify **2048**. Since this is used for a lab environment, click to enable Use Dynamic Memory for this virtual machine. Click **Next**.
7. On the Configure Networking page, select the network connection. Click **Next**.
8. On the Connect Virtual Hard Disk page, Specify the size of **70 GB**.
9. Click **Next**.
10. On the Installation Options page, select **Install an operating system from a boot CD/DVD-ROM**. Then select **Image file (.iso)**.
11. Use the **Browse** button to select the ISO file of the Windows Server 2012 installation disk from the C:\Software folder. Click **Next**.
12. On the Summary page, click **Finish**.
13. After the VM is created, right-click **Storage01** in the Virtual Machines section of the Hyper-V Manager console and click **Start**.
14. Double-click **Storage01** in the bottom pane to open a Virtual Machine Connection window for Storage01.
15. When the computer loads the Windows graphical interface and the Windows Setup page appears, select the appropriate language to install, time and currency format, and keyboard or input method. Then click **Next**.
16. Click **Install Now**. The Select the operating system you want to install page appears.
17. Select **Windows Server 2012 Standard (Server with GUI)** and click **Next**.
18. When the License Terms page appears, select the **I accept the license terms** checkbox and click **Next**.
19. When it asks what type of installation you want to use, since you are doing a clean installation and not an upgrade, Click **Custom: Install Windows Only (advanced)**.
20. When it asks where you want to install Windows, select **Disk 0 Unallocated Space** and click **Next**. The Installing Windows page appears, indicating the progress of the Setup program as it installs the operating system.
21. After the installation completes and the computer restarts a couple of times, a message appears stating that The user's password must be changed before logging on the first time. In the New password and Confirm Password text boxes, type **Password01** and press the Enter key.

22. The system finalizes the installation and the Windows sign-on screen appears.
23. Log on to the Server02 server using the **Administrator** account (local account) and the password **Password01**. The Server Manager console opens.
24. On the Server Manager console, click **Local Server**, click the **IPv4 address assigned by DHCP, IPv6** enabled to open the Network Connections window.
25. Double-click the **Ethernet** connection to open the Ethernet Status dialog box.
26. Click **Properties** to open the Ethernet Properties dialog box.
27. Double-click **Internet Protocol Version 4 (TCP/IPv4)** to open the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
28. Enter the following information:
 - IP address: **192.168.1.80**
 - Subnet mask: **255.255.255.0**
 - Preferred DNS server: **192.168.1.50**
29. Click **OK** to close the Internet Protocol Version 4 (TCP/IPv4) Properties dialog box.
30. Click **Close** to close Ethernet Status dialog box.
31. Double-click the computer name to open the System Properties administrator dialog box.
32. Click **Change** to open the Computer Name/Domain Changes dialog box.
33. Type **Server01** in the Computer name text box.
34. Click Domain and type **Contoso.com** in the text box. Click **OK**.
35. When it asks for a name and password of an account with permissions to join the domain, use **contoso.com\administrator** and **Password01**. Click **OK**.
36. When it says welcome to the contoso.com domain, click **OK**.
37. When a messages stating that you must restart your computer, click **OK**.
38. Click the **Close** button to close the System Properties dialog box.
39. When it says that you must restart your computer, click **Restart Now**.

Configuring iSCSI Target on Storage01

1. Log on to the Storage01 server using the **contoso\Administrator** account and the password **Password01**. The Server Manager console opens.
2. In Server Manager, click **Manage**, and click **Add Roles and Features**.
3. When the Add Roles and Features Wizard opens, click **Next**.
4. On the Select installation type page, click **Next**.
5. On the Select destination server, click **Next**.

6. On the Select server roles page, expand **File and iSCSI Services**. Select **iSCSI Target Server** and **iSCSI Target Storage Provider (VDS and VSS)**. When it asks to add a feature, click **Add Features**. Click **Next**.
7. On the Select features page, click **Next**.
8. On the Confirm installation selections page, click **Install**.
9. When the installation is complete, click **Close**.
10. Reboot the server.
11. Log on to the Storage01 server using the **contoso\Administrator** account and the password **Password01**. The Server Manager console opens.
12. In Server Manager, click **File and Storage Services**.
13. Click **iSCSI**.
14. Click **To create an iSCSI virtual disk, start the New iSCSI Virtual Disk Wizard**.
15. When the iSCSI Virtual Disk Wizard starts, click **Next**.
16. On the Specify iSCSI virtual disk name page, type **SharedDisk** and click **Next**.
17. Specify **8 GB** and click **Next**.
18. On the Assign iSCSI target, click **New iSCSI target**, and click **Next**.
19. On the Specify target name page, type **ClusterServers** on the Name text box. Click **Next**.
20. On the Specify access servers page, click **Add** to specify the iSCSI initiators.
21. When the Add initiator ID dialog box, click **Enter a value for the selected type** and select **IP Address** for the Type.
22. In the Value text box, type **192.168.1.60**. Click **OK**.
23. When the Add initiator ID dialog box, click **Enter a value for the selected type** and select **IP Address** for the Type.
24. In the Value text box, type **192.168.1.70**. Click **OK**.
25. On the Specify access servers page, click **Next**.
26. On the Enable Authentication page, click **Next**.
27. On the Confirm selections page, click **Create**.
28. When the iSCSI virtual disk, click **Close**.
29. Back on the iSCSI page in Server Manager, open the Tasks menu, and click **New iSCSI Virtual Disk**.
30. When the iSCSI Virtual Disk Wizard starts, click **Next**.
31. On the Specify iSCSI virtual disk name page, type **QuorumDisk** and click **Next**.
32. Specify **2 GB** and click **Next**.
33. On the Assign iSCSI target page, Existing iSCSI target is already selected. Click **ClusterServers** and click **Next**.
34. On the Confirm selections page, click **Create**.
35. When the iSCSI virtual disk, click **Close**.
36. Close Server Manager.

Installing Hyper-V

1. Log on to the Server01 server using the **contoso\Administrator** account and the password **Password01**. The Server Manager console opens.
2. Right-click the Start button, and click **Command Prompt (Admin)**.
3. Execute the following two commands.

```
Dism /online /enable-feature  
/featurename:Microsoft-Hyper-V
```

When it asks you to reboot, press the **y** key.

4. Log on to the Server02 server using the **contoso\Administrator** account and the password **Password01**. The Server Manager console opens.
5. Right-click the Start button, and click **Command Prompt (Admin)**.
6. Execute the following two commands.

```
Dism /online /enable-feature  
/featurename:Microsoft-Hyper-V
```

When it asks you to reboot, press the **y** key.

7. Log on to the Server01 server using the **contoso\Administrator** account and the password **Password01**. The Server Manager console opens.
8. On Server01, using Server Manager, open the **Manage** menu and click **Add Roles and Features**.
9. When the wizard opens, click **Next**.
10. On the Select installation type page opens, click **Next**.
11. On the Select destination server page opens, click **Next**.
12. On the Select server roles page, click **Next**.
13. On the Select features page, expand **Remote Server Administration Tools**, expand **Role Administration Tools**, and click to select **Hyper-V Management Tools**. Click **Next**.
14. On the Confirm installation selections page, click **Install**.
15. When the installation is complete, click **Close**.
16. Log on to the Server02 server using the **contoso\Administrator** account and the password **Password01**. The Server Manager console opens.
17. On Server02, using Server Manager, open the **Manage** menu, and click **Add Roles and Features**.
18. When the wizard opens, click **Next**.
19. On the Select installation type page opens, click **Next**.
20. On the Select destination server page opens, click **Next**.
21. On the Select server roles page, click **Next**.
22. On the Select features page, expand **Remote Server Administration Tools**, expand **Role Administration Tools**, and click to select **Hyper-V Management Tools**. Click **Next**.
23. On the Confirm installation selections page, click **Install**.
24. When the installation is complete, click **Close**.