

Module 8: Implementing failover clustering

Lab A: Implementing failover clustering

(VMs: LON-DC1, LON-SVR1, LON-SVR2, LON-SVR3, LON-CL1, LON-SVR4)

Exercise 1: Creating a failover cluster

Task 1: Connect cluster nodes to iSCSI shared storage

Configure the iSCSI targets

1. On **LON-SVR1**, on the taskbar, click **Start**, and then click **Server Manager**.
2. In Server Manager, in the **navigation** pane, click **File and Storage Services**.
3. In the **File and Storage Services** pane, click **iSCSI**.
4. In the **iSCSI VIRTUAL DISKS** pane, click **TASKS**, and then, in the **TASKS** drop-down list, select **New iSCSI Virtual Disk**.
5. In the **New iSCSI Virtual Disk Wizard**, on the **Select iSCSI virtual disk location** page, under **Storage location**, click **C:**, and then click **Next**.
6. On the **Specify iSCSI virtual disk name** page, in the **Name** text box, type **iSCSIDisk1** and then click **Next**.
7. On the **Specify iSCSI virtual disk size** page, in the **Size** text box, type **5** ensure that **GB** is selected in the drop-down list, and then click **Next**.
8. On the **Assign iSCSI target** page, click **New iSCSI target**, and then click **Next**.
9. On the **Specify target name** page, in the **Name** text box, type **lon-svr1** and then click **Next**.
10. On the **Specify access servers** page, click **Add**.
11. In the **Select a method to identify the initiator** dialog box, click **Enter a value for the selected type**, and in the **Type** drop-down list, select **IP Address**. In the **Value** text box, type **172.16.0.22** and then click **OK**.
12. On the **Specify access servers** page, click **Add**.
13. In the **Select a method to identify the initiator** dialog box, click **Enter a value for the selected type**, and then, in the **Type** drop-down list, select **IP Address**. In the **Value** box, type **172.16.0.23** and then click **OK**.
14. On the **Specify access servers** page, click **Next**.
15. On the **Enable Authentication** page, click **Next**.
16. On the **Confirm selections page**, click **Create**.
17. On the **View results** page, wait until creation is complete, and then click **Close**.
18. In the **iSCSI VIRTUAL DISKS** pane, click **TASKS**, and then, in the **TASKS** drop-

down list, select **New iSCSI Virtual Disk**.

19. In the **New iSCSI Virtual Disk Wizard**, on the **Select iSCSI virtual disk location** page, under **Storage location**, click **C:**, and then click **Next**.

20. On the **Specify iSCSI virtual disk name** page, in the **Name** text box, type **iSCSIDisk2** and then click **Next**.

21. On the **Specify iSCSI virtual disk size** page, in the **Size** text box, type **5**, ensure that **GB** is selected in the drop-down list, and then click **Next**.

22. On the **Assign iSCSI target** page, click **lon-svr1**, and then click **Next**.

23. On the **Confirm selections** page, click **Create**.

24. On the **View results** page, wait until the creation is completed, and then click **Close**.

25. In the **iSCSI VIRTUAL DISKS** pane, click **TASKS**, and then, in the **TASKS** drop-down list, select **New iSCSI Virtual Disk**.

26. In the **New iSCSI Virtual Disk Wizard**, on the **Select iSCSI virtual disk location** page, under **Storage location**, click **C:**, and then click **Next**.

27. On the **Specify iSCSI virtual disk name** page, in the **Name** text box, type **iSCSIDisk3** and then click **Next**.

28. On the **Specify iSCSI virtual disk size** page, in the **Size** text box, type **5**, ensure that **GB** is selected in the drop-down list, and then click **Next**.

29. On the **Assign iSCSI target** page, click **lon-svr1**, and then click **Next**.

30. On the **Confirm selections** page, click **Create**.

31. On the **View results** page, wait until the creation is complete, and then click **Close**.

Connect nodes to the iSCSI targets

1. On **LON-SVR2**, open Server Manager, click **Tools**, and then click **iSCSI Initiator**.

2. In the **Microsoft iSCSI** dialog box, click **Yes**.

3. In the **iSCSI Initiator Properties** window, click the **Discovery** tab, and then click **Discover Portal**.

4. In the **IP address or DNS name** text box, type **172.16.0.21** and then click **OK**.

5. Click the **Targets** tab, and then click **Refresh**.

6. In the **Targets** list, click **iqn.1991-05.com.microsoft:lon-svr1-lon-svr1-target**, and then click **Connect**.

7. Ensure that **Add this connection to the list of Favorite Targets** is selected, and then click **OK** two times.

8. On **LON-SVR3**, open **Server Manager**, click **Tools**, and then click **iSCSI Initiator**.
9. In the **Microsoft iSCSI** dialog box, click **Yes**.
10. In the **iSCSI Initiator Properties** window, click the **Discovery** tab, and then click **Discover Portal**.
11. In the **IP address or DNS name** text box, type **172.16.0.21** and then click **OK**.
12. Click the **Targets** tab, and then click **Refresh**.
13. In the **Targets** list, click **iqn.1991-05.com.microsoft:lon-svr1-lon-svr1-target**, and then click **Connect**.
14. Ensure that the **Add this connection to the list of Favorite Targets** check box is selected, and then click **OK** two times.
15. On **LON-SVR2**, in **Server Manager**, click **Tools**, and then click **Computer Management**.
16. Expand **Storage**, and then click **Disk Management**.
17. Right-click **Disk 4**, and then click **Online**.
18. Right-click **Disk 4**, and then click **Initialize Disk**.
19. In the **Initialize Disk** dialog box, click **OK**.
20. Right-click the unallocated space next to **Disk 4**, and then click **New Simple Volume**.
21. On the **Welcome** page, click **Next**.
22. On the **Specify Volume Size** page, click **Next**.
23. On the **Assign Drive Letter or Path** page, click **Next**.
24. On the **Format Partition** page, in the **Volume Label** text box, type **Data1**. Select the **Perform a quick format** check box, and then click **Next**.
25. Click **Finish**.

Note: If a dialog box appears with a prompt to format the disk, click **Cancel**.

26. Repeat steps 17 through 25 for **Disk 5** and **Disk 6**, using **Data2** and **Data3**, respectively, for volume labels.
27. Close the **Computer Management** window.
28. On **LON-SVR3**, in **Server Manager**, click **Tools**, and then click **Computer Management**.
29. Expand **Storage** and click **Disk Management**.
30. Select and right-click **Disk Management**, and then click **Refresh**.
31. Right-click **Disk 3**, and then click **Online**.
32. Right-click **Disk 4**, and then click **Online**.

33. Right-click **Disk 5**, and then click **Online**.
34. Close the **Computer Management** window.

Task 2: Install the Failover Cluster feature

1. On **LON-SVR2**, if Server Manager is not open, click the **Server Manager** icon.
2. Click **Add roles and features**.
3. In the **Add roles and features Wizard**, on the **Before You Begin** page, click **Next**.
4. On the **Select installation type** page, click **Next**.
5. On the **Select destination server** page, ensure that **Select a server from the server pool** is selected, and then click **Next**.
6. On the **Select server roles** page, click **Next**.
7. On the **Select features** page, in the **Features** list, select **Failover Clustering**.
8. In the **Add features that are required for Failover Clustering** window, click **Add Features**, and then click **Next**.
9. On the **Confirm installation selections** page, click **Install**.
10. When installation completes and you receive the **Installation succeeded on LON-SVR2.Adatum.com** message, click **Close**.
11. On **LON-SVR3** and **LON-SVR4**, repeat steps 1 through 10.
12. When installation completes and you receive the **Installation succeeded on LON-SVR3.Adatum.com** message, click **Close**.

Task 3: Validate the servers for failover clustering

1. On **LON-SVR2**, in Server Manager, click **Tools**, and then click **Failover Cluster Manager**.
2. In Failover Cluster Manager, in the **Actions** pane, click **Validate Configuration**.
3. In the **Validate a Configuration Wizard**, click **Next**.
4. In the **Enter Name** text box, type **LON-SVR2** and then click **Add**.
5. In the **Enter Name** text box, type **LON-SVR3**
6. Click **Add**, and then click **Next**.
7. Verify that **Run all tests (recommended)** is selected and click **Next**.
8. On the **Confirmation** page, click **Next**.
9. Wait for the validation tests to finish, which might take between 5 and 7 minutes, and then on the **Summary** page, scroll through the report. Verify that all tests completed without errors. Some warnings are expected.
10. On the **Summary** page, click **Finish**.

Task 4: Create the failover cluster

1. On **LON-SVR2**, in the Failover Cluster Manager, in the **Actions** pane, click **Create Cluster**.
2. On the **Before you begin** page, click **Next**.
3. On the **Select Servers** page, in the **Enter server name** box, type **LON-SVR2** and then click **Add**.
4. In the **Enter server name** box, type **LON-SVR3** click **Add**, and then click **Next**.
5. On the **Access Point for Administering the Cluster** page, in the **Cluster Name** text box, type **Cluster1**
6. In the **Address** text box, type **172.16.0.125** and then click **Next**.
7. On the **Confirmation** page, click **Next**.
8. On the **Summary** page, click **Finish**.

Task 5: Add the file-server application to the failover cluster

1. On **LON-SVR2**, in the **Failover Cluster Manager** console, expand **Cluster1.Adatum.com**, expand **Storage**, and then click **Disks**.
2. Ensure that three disks named **Cluster Disk 1**, **Cluster Disk 2**, and **Cluster Disk 3** are present and online.
3. Right-click **Roles**, and then click **Configure Role**.
4. On the **Before You Begin** page, click **Next**.
5. On the **Select Role** page, click **File Server**, and then click **Next**.
6. On the **File Server Type** page, click **File Server for general use**, and then click **Next**.
7. On the **Client Access Point** page, in the **Name** text box, type **AdatumFS**. In the **Address** text box, type **172.16.0.130** and then click **Next**.
8. On the **Select Storage** page, select the **Cluster Disk 2** check box, and then click **Next**.
9. On the **Confirmation** page, click **Next**.
10. On the **Summary** page, click **Finish**.

Task 6: Add a shared folder to a highly available file server

1. On **LON-SVR3**, in the **Server Manager** console, click **Tools**, and then click **Failover Cluster Manager**.
2. Expand **Cluster1.Adatum.com**, click **Roles**, right-click **AdatumFS**, and then click **Add File Share**.
3. In the **New Share Wizard**, on the **Select the profile for this share** page, click

SMB Share – Quick, and then click **Next**.

4. On the **Select the server and the path for this share** page, click **Next**.
5. On the **Specify share name** page, in the **Share name** text box, type **Docs** and then click **Next**.
6. On the **Configure share settings** page, review the available options but do not make any changes, and then click **Next**.
7. On the **Specify permissions to control access** page, click **Next**.
8. On the **Confirm selections** page, click **Create**.
9. On the **View results** page, click **Close**.

Task 7: Configure failover and failback settings

1. On **LON-SVR3**, in the **Failover Cluster Manager** console, click **Roles**, right-click **AdatumFS**, and then click **Properties**.
2. In the **AdatumFS Properties** dialog box, click the **Failover** tab, and then click **Allow failback**.
3. Click **Failback between** and set the values to **4** and **5** hours.
4. Click the **General** tab.
5. Select both **LON-SVR2** and **LON-SVR3** as preferred owners.
6. Select **LON-SVR3** and click **Up** so that it is first in the preferred owners list.
7. To close the **AdatumFS Properties** dialog box, click **OK**.

Task 8: Validate the highly available file-server deployment

1. On **LON-DC1**, open **File Explorer**. In the address bar, type **\\AdatumFS** and then press Enter.
2. Verify that you can access the location and that you can open the **Docs** folder.
3. Create a text document inside this folder named **test.txt**.
4. On **LON-SVR2**, switch to **Failover Cluster Manager**.
5. In the **Failover Cluster Manager** console, expand **Cluster1.Adatum.com**, and then click **Roles**.
6. In the **Owner Node** column, note the current owner of **AdatumFS**.

Note: The owner will be **LON-SVR2** or **LON-SVR3**.

7. Right-click **AdatumFS**, click **Move**, and then click **Select Node**.
8. In the **Move Clustered Role** dialog box, select the cluster node (it will be either **LON-SVR2** or **LON-SVR3**), and then click **OK**.
9. Verify that **AdatumFS** has moved to a new owner.

10. Switch to **LON-DC1**.

11. To verify that you can still access the **\\AdatumFS** location, open **File Explorer**, and in the address bar, type **\\AdatumFS** and then press Enter.

Task 9: Validate the failover and quorum configuration for the File Server role

1. On **LON-SVR2**, in the **Failover Cluster Manager** console, click **Roles**.

2. In the **Owner Node** column, verify the current owner for the **AdatumFS** role.

Note: The owner will be **LON-SVR2** or **LON-SVR3**.

3. Click **Nodes**, and then select the node that is the current owner of the **AdatumFS** role.

4. Right-click the node, click **More Actions**, and then click **Stop Cluster Service**.

5. In the **Failover Cluster Manager** console, click **Roles**, and verify that **AdatumFS** is running.

Note: This confirms that **AdatumFS** has moved to another node.

6. Switch to **LON-DC1**.

7. On **LON-DC1**, to verify that you can still access the **\\AdatumFS** location, open **File Explorer**. In the address bar, type **\\AdatumFS** and then press Enter.

8. Switch to **LON-SVR2**.

9. In the **Failover Cluster Manager** console, click **Nodes**, right-click the stopped node, click **More Actions**, and then click **Start Cluster Service**.

10. Expand **Storage**, and then click **Disks**.

11. In the center pane, find the disk that is assigned to **Disk Witness in Quorum**.

Note: You can view this in the **Assigned To** column.

12. Right-click the disk, click **Take Offline**, and then click **Yes**.

13. Switch to **LON-DC1**.

14. On **LON-DC1**, to verify that you can still access the **\\AdatumFS** location, open **File Explorer**, and in the address bar, type **\\AdatumFS** and then press Enter.

Note: This verifies that the cluster is running even if the witness disk is offline.

15. Switch to **LON-SVR2**.

16. In the **Failover Cluster Manager** console, expand **Storage**, click **Disks**, right-click the disk that is in **Offline** status, and then click **Bring Online**.

17. Right-click **Cluster1.Adatum.com**, click **More Actions**, and then click **Configure Cluster Quorum Settings**.
18. On the **Before You Begin** page, click **Next**.
19. On the **Select Quorum Configuration Option** page, click **Advanced quorum configuration**, and then click **Next**.
20. On the **Select Voting Configuration** page, review the available settings.

***Note:** Notice that you can select a node or nodes that will, or will not, have a vote in the cluster.*

21. Do not make any changes, and then click **Next**.
22. On the **Select Quorum Witness** page, ensure that **Configure a disk witness** is selected, and then click **Next**.
23. On the **Configure Storage Witness** page, click **Cluster Disk 3**, and then click **Next**.
24. On the **Confirmation** page, click **Next**.
25. On the **Summary** page, click **Finish**.

***Results:** After completing this exercise, you should have created a failover cluster successfully, configured a highly available file server, and tested the failover scenarios.*

Exercise 2: Verifying quorum settings and adding a node

Task 1: Remotely connect to a cluster

1. If necessary, sign in to **LON-CL1** with the username **Adatum\Administrator** and the password **Pa55w.rd**.
2. Click **Start**, click **Windows Administrative Tools**, and then click **Failover Cluster Manager**.
3. In Failover Cluster Manager, right-click **Failover Cluster Manager**, and then click **Connect to Cluster**.
4. In the **Select Cluster** dialog box, in the **Cluster name** box, type **Cluster1.Adatum.com** and click **OK**.
5. Expand **Cluster1.Adatum.com**, and then click **Roles**.

Task 2: Check the assigned votes in the Nodes section

1. On **LON-SVR2**, right-click **Start**, and then click **Windows PowerShell (Admin)**.
2. In the **Windows PowerShell** console, run following cmdlet to check the

assigned votes: *Get-ClusterNode | select name, nodeweight, ID, state*

3. Verify that the **NodeWeight** property of a cluster node has value **1**, which means that the quorum vote of the node is assigned and that the cluster is managing it.

Task 3: Verify the status of the disk witness

On **LON-SVR2**, in the **Windows PowerShell** console, type the following command, and then press Enter:

Get-ClusterQuorum | Select Cluster, QuorumResource, QuorumType

Task 4: Add a node in the cluster

1. On **LON-SVR2**, in the Failover Cluster Manager, click **Nodes**.
2. In the **Actions** pane, click **Add Node**.
3. On the **Before You Begin** page, click **Next**.
4. On the **Select Servers** page, in the **Enter server name** box, type **LON-SVR4** click **Add**, and then click **Next**.
5. On the **Validation Warning** page, click **Next**.
6. Complete the validation by using the defaults.
7. On the **Summary** page of the **Validate a Configuration Wizard**, click **Finish**.
8. In the **Add Node Wizard**, on the **Confirmation** page, click **Next**.
9. On the **Summary** page, click **Finish**.

Task 5: Verify the assigned votes

1. On **LON-SVR2**, in the **Windows PowerShell** console, type following cmdlet, and then press Enter: *Get-ClusterNode | select name, nodeweight, ID, state*
2. Verify that the **NodeWeight** property of a cluster node has value **1** which means that the quorum vote of the node is assigned and that the cluster is managing it.

Task 6: Prepare for the next lab

When you finish the lab, leave the virtual machines running for the subsequent lab.

Results: *After completing this exercise, you should have added another node in the cluster successfully and changed the quorum to the witness disk.*

Lab B: Managing a failover cluster

Exercise 1: Evicting a node and verifying quorum settings

Task 1: Evict node LON-SVR4

1. On LON-SVR3, if necessary, open **Failover Cluster Manager**.
2. Expand the **Cluster1.Adatum.com** cluster, and then click **Nodes**.
3. Right-click the **LON-SVR4** node, click **More Actions**, and then click **Evict**.
4. In the **Evict node LON-SVR4** dialog box, click **Yes** to evict the node.

Task 2: Verify changes in quorum settings and the witness disk

1. On LON-SVR2, in the **Windows PowerShell** console, type following cmdlet, and then press Enter: **Get-ClusterNode | select name, nodeweight, ID, state**
2. Verify that the **NodeWeight** property of a cluster node has value **1** which means that the quorum vote of the node is assigned and is managed by the cluster.

Results: After completing this exercise, you should have evicted a node from the cluster, and verified the changes in quorum settings and witness disk.

Exercise 2: Changing the quorum from disk witness to file-share witness and defining node voting

Task 1: Get the current quorum model

On LON-SVR2, in the **Windows PowerShell** console, type the following command, and then press Enter:

Get-ClusterQuorum | Select Cluster, QuorumResource, QuorumType

Task 2: Create a file share on LON-SVR1

1. On LON-SVR1, on the taskbar, click **File Explorer**, right-click the disk **Local Disk (C:)**, click **New**, and then click **Folder**.
2. Type **FSW** and press Enter.
3. Right-click **FSW**, click **Share with**, and then click **Specific people**.
4. In the **File Sharing** dialog box, type **Everyone** and then click **Add**.
5. In the **Read** list, click **Read/Write**.
6. Click **Share**, and then click **Done**.

Task 3: Change the current quorum model to a file-share witness

On LON-SVR2, in the **Windows PowerShell** console, type the following command,

and then press Enter:

Set-ClusterQuorum -NodeAndFileShareMajority \\LON-SVR1\FSW

Task 4: Verify that the current quorum model is a file share witness

On LON-SVR2, in the **Windows PowerShell** console, type the following command, and then press Enter:

Get-ClusterQuorum | Select Cluster, QuorumResource, QuorumType

Results: After completing this exercise, you should have changed the quorum from disk witness to file share witness and defined node voting.

Exercise 3: Verifying high availability

Task 1: Simulate server failure

1. On LON-SVR2, in the **Failover Cluster Manager** console, expand **Cluster1.Adatum.com**, and then click **Roles**.
2. In the **Owner Node** column, notice the current owner of **AdatumFS**.

Note: The owner will be **LON-SVR2** or **LON-SVR3**.

3. If **LON-SVR3** is not the owner, right click **AdatumFS**, click **Move**, click **Select Node**, click **LON-SVR3**, and then click **OK**.
4. Shut down **LON-SVR3**.

Task 2: Verify functionality in Cluster1 and verify file availability

1. On LON-DC1, open **File Explorer**. In the address bar, type **\\AdatumFS** and then press Enter.
2. Verify that you can access the location and that you can open the **Docs** folder.
3. Create a test text document named **test2.txt** inside this folder.

Task 3: Validate whether the file is still available

1. Start the **LON-SVR3** virtual machine.
2. On LON-SVR2, in the **Failover Cluster Manager** console, expand **Cluster1.Adatum.com**, and then click **Roles**.
3. Right click **AdatumFS**, click **Move**, click **Select Node**, click **LON-SVR3**, and then click **OK**.
4. On LON-DC1, open **File Explorer**. In the address bar, type **\\AdatumFS** and then press Enter.
5. Verify that you can access the location and that you can open the **Docs** folder.
6. Create a test text document named **test3.txt** inside this folder.

Task 4: Prepare for the next module

When you finish the lab, revert the virtual machines (VMs) to their initial state. To do this, perform the following steps:

1. On the host computer, start **Hyper-V Manager**.
2. In the **VMs** list, right-click **20740C-LON-DC1**, and then click **Revert**.
3. In the **Revert VM** dialog box, click **Revert**.
4. Repeat steps 2 and 3 for **20740C-LON-SVR1**, **20740C-LON-SVR2**, **20740C-LON-SVR3**, **20740C-LON-SVR4**, and **20740C-LON-CL1**.

Results: *After completing this exercise, you should have tested failover cluster high availability successfully by taking a server offline and then bringing it back online.*