Module 3: Implementing enterprise storage solutions

Lab: Planning and configuring storage technologies and components

(VMs: LON-DC1, LON-SVR1)

Exercise 1: Planning storage requirements

Task 1: Read the supporting documentation

• Read the supporting documentation in the lab exercise scenario.

Task 2: Record your planned course of action

1. **You plan to evaluate iSCSI, Fibre Channel, and InfiniBand solutions to meet the requirements. Which solution do you expect to select?**

You would not use InfiniBand because the requirements call for reasonable performance and low cost. InfiniBand is for high-performance solutions, and it is expensive. Meanwhile, of the two remaining choices, iSCSI most closely matches the low cost and reasonable performance requirements that you expect. You should deploy an iSCSI solution to each of the geographic locations that has an IT infrastructure and that requires storage.

2. **Which storage type do you plan to implement for the SQL databases, block-level storage or file-level storage?**

Based on the requirements alone, you could use either type, because each has advantages and disadvantages. SQL databases can run SMB file shares since the release of SMB 3.0, and the overall performance is similar to that of block-level storage. The answer might depend on whether you have
an existing highly available SMB file server infrastructure and whether the server team or the storage team will manage the storage.

3. **How will your solution minimize administrative overhead for the storage administrators?**

By selecting iSCSI, you avoid the complexities of Fibre Channel and InfiniBand solutions. In addition, an iSCSI solution requires less hardware and less software. All these choices reduce the administrative overhead for the storage administrators.

4. **Which server role(s) do you plan to use for the provisioning of VMWare ESX/ESXi virtual machines?**
You can use the Server for NFS role to create NFS file shares that VMWare ESX/ESXi virtual machines support.

5. **Will you run the Hyper-V in Windows Server 2012 virtual machines on NFS or SMB?**
The Hyper-V virtual machines can run on SMB, but NFS does not support them. As a result, you will need to run the virtual machines on SMB.

6. **Which file sharing protocol will you use for UNIX clients that require access?**
Historically, NFS was the protocol of choice for UNIX clients to access file shares. However, today most UNIX clients equally support NFS and SMB natively. Therefore, you can use either of the technologies.
If you have an existing NFS file sharing deployment, you would likely choose NFS. If you have an existing SMB file sharing deployment, you would likely choose SMB.

7. **How do you plan to disable legacy SMB access for existing SMB file shares?**
a. First, you need to locate all the existing file servers that have legacy SMB shares. You can check for legacy shares on the current host by using the following command at a Windows PowerShell prompt:
Get-SmbServerConfiguration | Select EnableSMB1Protocol
You also can create a Windows PowerShell script to check for legacy shares on all the file servers.
b. After you have located all of the existing file servers that have legacy SMB shares, you need to disable the SMB access. You can disable the SMB 1 protocol on each server by using the following command:
Set-SmbServerConfiguration -EnableSMB1Protocol $false
You also can create a Windows PowerShell script to disable legacy SMB access across all of your servers.

Results*: After completing this exercise, you should have successfully planned a storage solution that will meet your organization's requirements.*

Exercise 2: Configuring iSCSI storage

Task 1: Install the iSCSI target feature

1. On **LON-DC1**, in Server Manager, click the **Manage** menu, and then click **Add Roles and Features**.
2. In the **Add Roles and Features Wizard**, on the **Before you begin** page, click **Next**.
3. On the **Select installation type** page, click **Next**.
4. On the **Select destination server** page, ensure that **Select a server from the server pool** is selected, and then click **Next**.
5. On the **Select server roles** page, expand **File and Storage Services (2 of 12 Installed)**, expand **File and iSCSI Services (1 of 11 Installed)**, select the **iSCSI Target Server** check box, and then click **Next**.
6. On the **Select features** page, click **Next**.
7. On the **Confirm installation selections** page, click **Install**.
8. When the installation completes, click **Close**.

Task 2: Create and configure an iSCSI target

1. On **LON-DC1**, in Server Manager, in the navigation pane, click **File and Storage Services**.
2. In the **File and Storage Services** pane, click **iSCSI**.
3. In the **iSCSI VIRTUAL DISKS** pane, click **TASKS**, and then click **New iSCSI Virtual Disk**.
4. In the **New iSCSI Virtual Disk Wizard**, on the **Select iSCSI virtual disk location** page, under **Storage location**, click volume **C:**, and then click **Next**.
5. On the **Specify iSCSI virtual disk name** page, in the **Name** text box, type ***iSCSIDisk1*** and then click **Next**.
6. On the **Specify iSCSI virtual disk size** page, in the **Size** text box, type ***5***, ensure that **GB** is selected, and then click **Next**.
7. On the **Assign iSCSI target** page, ensure that the **New iSCSI target** option is selected, and then click **Next**.
8. On the **Specify target name** page, in the **Name** box, type ***LON-DC1*** and then click **Next**.
9. On the **Specify access servers** page, click **Add**.
10. In the **Select a method to identify the initiator** dialog box, click **Enter a value for the selected type**, in the **Type** list, click **IP Address**, in the **Value** text box, type ***10.100.100.3*** and then click **OK**.
11. On the **Specify access servers** page, click **Add**.

12. In the **Select a method to identify the initiator** dialog box, click **Enter a value for the selected type**, in the **Type** list, click **IP Address**, in the **Value** text box, type ***10.200.100.3*** and then click **OK**.
13. On the **Specify access servers** page, click **Next**.
14. On the **Enable Authentication** page, click **Next**.
15. On the **Confirm selections** page, click **Create**.
16. On the **View results** page, wait until the virtual disk is created, and then click **Close**.
17. In the **iSCSI VIRTUAL DISKS** pane, click **TASKS**, and then click **New iSCSI Virtual Disk**.
18. In the **New iSCSI Virtual Disk Wizard**, on the **Select iSCSI virtual disk location** page, under **Storage location**, click volume **C:** and then click **Next**.
19. On the **Specify iSCSI virtual disk name** page, in the **Name** box, type ***iSCSIDisk2*** and then click **Next**.
20. On the **Specify iSCSI virtual disk size** page, in the **Size** box, type ***5***, ensure that **GB** is selected, and then click **Next**.
21. On the **Assign iSCSI target** page, click **lon-dc1** and then click **Next**.
22. On the **Confirm selections** page, click **Create**.
23. On the **View results** page, wait until the virtual disk is created, and then click **Close**.

Task 3: Configure MPIO

1. On **LON-SVR1**, click **Start**, and then click **Server Manager**.
2. In Server Manager, click the **Manage** menu, and then 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, click **Multipath I/O**, and then click **Next**.
8. On the **Confirm installation selections** page, click **Install**.
9. When installation is complete, click **Close**.
10. Restart **LON-SVR1**, and then sign in as **Adatum\Administrator** with the

password **Pa55w.rd**.
11. Click **Start**, and then click **Server Manager**.
12. In Server Manager, on the menu bar, click **Tools**, and then click **iSCSI Initiator**.
13. In the **Microsoft iSCSI** dialog box, click **Yes**.
14. In the **iSCSI Initiator Properties** dialog box, on the **Targets** tab, in the **Target** box, type ***10.100.100.2*** and then click **Quick Connect**.
15. In the **Quick Connect** box, click **Done**.
16. In the **iSCSI Initiator Properties** dialog box, to close the dialog box, click **OK**.
17. In Server Manager, on the menu bar, click **Tools**, and then click **MPIO**.
18. In the **MPIO Properties** dialog box, on the **Discover Multi-Paths** tab, select **Add support for iSCSI devices**, and then click **Add**.
19. When you are prompted to restart the computer, click **Yes**.
20. After the computer restarts, sign in to **LON-SVR1** as **Adatum\Administrator** with the password **Pa55w.rd**.
21. Click **Start**, and then click **Server Manager**.
22. In Server Manager, on the menu bar, click **Tools**, and then click **MPIO**.
23. In the **MPIO Properties** dialog box, on the **MPIO Devices** tab, notice that **Device Hardware Id MSFT2005iSCSIBusType_0x9** has been added to the list.
24. In the **MPIO Properties** dialog box, to close the dialog box, click **OK**.

Task 4: Connect to the iSCSI target

1. On **LON-SVR1**, in Server Manager, on the menu bar, click **Tools**, and then click **iSCSI Initiator**.
2. In the **iSCSI Initiator Properties** dialog box, on the **Targets** tab, click **Disconnect**.
3. In the **Disconnect From All Sessions** dialog box, click **Yes**.
4. In the **iSCSI Initiator Properties** dialog box, on the **Targets** tab, click **Connect**.
5. In the **Connect To Target** dialog box, select the **Enable multi-path** check box, verify that the **Add this connection to the list of Favorite Targets** check box is selected, and then click **Advanced**.
6. In the **Advanced Settings** dialog box, on the **General** tab, change the **Local adapter** from **Default**
to **Microsoft iSCSI Initiator**.
7. In the **Initiator IP** list, select **10.100.100.3**.
8. In the **Target portal IP** list, click **10.100.100.2 / 3260**.
9. In the **Advanced Settings** dialog box, click **OK**.

10. In the **Connect To Target** dialog box, click **OK**.
11. In the **iSCSI Initiator Properties** dialog box, on the **Targets** tab, click **Connect**.
12. In the **Connect To Target** dialog box, click **Enable multi-path**, verify that the **Add this connection to the list of Favorite Targets** check box is selected, and then click **Advanced**.
13. In the **Advanced Settings** dialog box, on the **General** tab, change the **Local adapter** from **Default** to **Microsoft iSCSI Initiator**.
14. In the **Initiator IP** list, select **10.200.100.3**.
15. In the **Target portal IP** list, select **10.200.100.2 / 3260**.
16. In the **Advanced Settings** dialog box, click **OK**.
17. In the **Connect To Target** dialog box, click **OK**.
18. In the **iSCSI Initiator Properties** dialog box, on the **Volumes and Devices** tab, click **Auto Configure**.
19. In the **iSCSI Initiator Properties** dialog box, on the **Targets** tab, in the **Targets** list, select **iqn.1991-05.com.microsoft:lon-dc1-lon-dc1-target**, and then click **Devices**.
20. In the **Devices** dialog box, click **MPIO**.
21. Verify that in **Load balance policy**, **Round Robin** is selected.
22. Under **This device has the following paths**, notice that two paths are listed. Select the first path, and then click **Details**.
23. Note the IP address of the source and target portals, and then click **OK**.
24. Select the second path, and then click **Details**.
25. Verify that this path is using another network, and then click **OK**.
26. In the **Device Details** dialog box, click **OK**.
27. In the **Devices** dialog box, click **OK**.
28. In the **iSCSI Initiator Properties** dialog box, click **OK**.

<u>Task 5: Initialize the iSCSI disks</u>

1. On **LON-SVR1**, in Server Manager, click **File and Storage Services**, and then in the left pane, click **Disks**.
2. In the right pane, right-click an offline disk with a bus type of **iSCSI**, and then click **Bring Online**.
3. In the **Bring Disk Online** dialog box, click **Yes** to bring the disk online.
4. Right-click the iSCSI disk that you brought online, and then click **New Volume**.
5. In the **New Volume Wizard**, on the **Before you begin** page, click **Next**.

6. On the **Select the server and disk** page, ensure that your iSCSI disk is selected, and then click **Next**.
7. In the **Offline or Uninitialized Disk** dialog box, to initialize the disk as a GPT disk, click **OK**.
8. On the **Specify the size of the volume** page, to accept the default of using the entire disk size for the volume, click **Next**.
9. On the **Assign to a drive letter or folder** page, in the **Drive letter** list, select **J**, and then click **Next**.
10. On the **Select file system settings** page, in the **Volume label** text box, type ***SMBShares*** and then click **Next**.
11. On the **Confirm selections** page, to finish creating the volume, click **Create**.
12. After the volume is created, on the **Completion** page, click **Close**.
13. In Server Manager, in the right pane, right-click the remaining offline disk with a bus type of iSCSI, and then click **Bring Online**.
14. In the **Bring Disk Online** dialog box, to bring the disk online, click **Yes**.
15. Right-click the iSCSI disk that you brought online, and then click **New Volume**.
16. In the **New Volume Wizard**, on the **Before you begin** page, click **Next**.
17. On the **Select the server and disk** page, ensure that your iSCSI disk is selected, and then click **Next**.
18. In the **Offline or Uninitialized Disk** dialog box, to initialize the disk as a GPT disk, click **OK**.
19. On the **Specify the size of the volume** page, click **Next** to accept the default of using the entire disk size for the volume.
20. On the **Assign to a drive letter or folder** page, in the **Drive letter** list, select **K**, and then click **Next**.
21. On the **Select file system settings** page, in the **File system** box, select **NTFS**.
22. In the **Volume label** text box, type ***NFSShares*** and then click **Next**.
23. On the **Confirm selections** page, to finish creating the volume, click **Create**.
24. After the volume is created, on the **Completion** page, click **Close**.
25. On the taskbar, click **File Explorer**, browse to **This PC**, and then verify that the **SMBShares** and **NFSShares** volumes are displayed.

Results*: After completing this exercise, you should have successfully configured an iSCSI target that uses MPIO for redundancy.*

Exercise 3: Configuring and managing the share infrastructure

Task 1: Create an SMB share on iSCSI storage

1. On **LON-SVR1**, in Server Manager, in the navigation pane, click **File and Storage Services**, and then click **Shares**.
2. In the **SHARES** area, click **TASKS**, and then click **New Share**.
3. In the **New Share Wizard**, on the **Select the profile for this share** page, in the **File share profile** box, click **SMB Share – Quick**, and then click **Next**.
4. On the **Select the server and path for this share** page, select **LON-SVR1**, click **Select by volume**, click **J:**, and then click **Next**.
5. On the **Specify share name** page, in the **Share name** box, type ***Data*** and then click **Next**.
6. On the **Configure share settings** page, select the **Enable access-based enumeration** check box, and then click **Next**.
7. On the **Specify permissions to control access** page, click **Customize permissions**.
8. In the **Advanced Security Settings for Data** window, on the **Permissions** tab, click **Add**.
9. In the **Permission Entry for Data** window, click **Select a principal**, type ***Domain Users*** and then click **OK**.
10. In the **Basic permissions** area, select the **Modify** check box, and then click **OK**.
11. In the **Advanced Security Settings for Data** window, click **OK**.
12. On the **Specify permissions to control access** page, click **Next**.
13. On the **Confirm selections** page, click **Create**.
14. When the creation of the share is complete, click **Close**.

Task 2: Create an NFS share on iSCSI storage

1. On **LON-SVR1**, in the **SHARES** area, click **TASKS**, and then click **New Share**.
2. In the **New Share Wizard**, on the **Select the profile for this share** page, in the **File share profile** box, click **NFS Share – Quick**, and then click **Next**.
3. On the **Select the server and path for this share** page, click **LON-SVR1**, click **Select by volume**, click **K:**, and then click **Next**.
4. On the **Specify share name** page, in the **Share name** box, type ***LinuxData*** and then click **Next**.
5. On the **Specify authentication methods** page, select **Kerberos v5 authentication(Krb5)**, and then click **Next**.

6. On the **Specify the share permissions** page, click **Add**.
7. In the **Add Permissions** window, click **All Machines**.
8. In the **Share permissions** box, select **Read / Write**, and then click **Add**.
9. On the **Specify the share permissions** page, click **Next**.
10. On the **Specify permissions to control access** page, click **Next**.
11. On the **Confirm selections** page, click **Create**.
12. On the **View results** page, click **Close**.

Task 3: Use Windows PowerShell to view share information

1. On **LON-DC1**, on the taskbar, click **File Explorer**.
2. In File Explorer, in the address bar, type ***\\LON-SVR1\Data*** and then press Enter.
3. Click the **Home** tab, click **New item**, and then click **Text Document**.
4. Type ***NewFile*** and then press Enter to rename the document.
5. Double-click **NewFile.txt** to open it in Notepad.
6. Leave Notepad open for later in the task.
7. On **LON-SVR1**, right-click **Start**, and then click **Windows PowerShell (Admin)**.
8. At the Windows PowerShell prompt, type the following command, and then press Enter: ***Get-NfsShare***
9. Type the following command, and then press Enter:
Get-NfsShare LinuxData | FL *
10. Type the following command, and then press Enter: ***Get-SmbShare***
11. Type the following command, and then press Enter:
Get-SmbShare Data | FL *
12. Type the following command, and then press Enter: ***Get-SmbSession***
13. Type the following command, and then press Enter:
Get-SMBSession -ClientUserName Adatum\Administrator | FL *
14. Type the following command, and then press Enter: ***Get-SmbOpenFile***

Note: *There are two entries for* ***Adatum\Administrator****. File Explorer creates one, and Notepad creates the other. If* ***NewFile.txt*** *is not included, it is because the file connection is maintained only for brief periods when you open the file initially or save it. If you do not see two entries, switch to* ***LON-DC1****, close Notepad, and then double-click* ***NewFile.txt****. Then, on* ***LON-SVR1****, repeat step 14.*

15. Leave the Windows PowerShell prompt open for the next task.

Task 4: Disable the legacy SMB1 protocol

1. On **LON-SVR1**, at the **Windows PowerShell** prompt, type the following command, and then press Enter:

Set-SmbServerConfiguration -AuditSmb1Access $true

2. Type ***Y*** to confirm, and then press Enter.
3. Type the following command, and then press Enter:

Get-SmbServerConfiguration | FL enable*

4. Type the following command, and then press Enter:

Set-SmbServerConfiguration -EnableSMB1Protocol $false

5. Type ***Y*** to confirm, and then press Enter.
6. Type the following command, and then press Enter:

Get-WindowsFeature *SMB*

7. Type the following command, and then press Enter:

Remove-WindowsFeature FS-SMB1

8. Close the Windows PowerShell prompt.

Task 5: Prepare for the next module

After you finish the lab, revert the virtual machines to their initial state by completing the following steps:

1. On the host computer, switch to the **Hyper-V Manager** console.
2. In the **Virtual Machines** list, right-click **20740B-LON-DC1**, and then click **Revert**.
3. In the **Revert Virtual Machine** dialog box, click **Revert**.
4. Repeat steps 2 and 3 for **20740B-LON-SVR1**.

Results*: After completing this exercise, you should have successfully created SMB and NFS shares.*