Lab A: Creating and Managing Virtual Hard Disks and Virtual Machines

Scenario

A. Datum Corporation is continuing with its pilot virtualization project. You have deployed the virtualization hosts by installing Hyper-V on Windows Server 2012 R2 in one of the subsidiaries. The next step is to deploy virtual machines on these hosts.

Because the virtualization platform is new to A. Datum, you need to spend some time familiarizing yourself with the Hyper-V features and components. To do this, you decide to deploy and evaluate different hard disk types and virtual machine configurations.

Objectives

After completing this lab, you will be able to:

- Create and manage virtual hard disks.
- Create and manage virtual machines.

Lab Setup

Estimated Time: 70 minutes

Virtual machines: 20409B-LON-HOSTx, 20409B-LON-CLx, 20409B-LON-DC1, 20409B-LON-SS1

User name: **Adatum\Administrator**

Password: **Pa$$w0rd**

For this lab, you will use the available virtual machine environment. Before you begin the lab, you must complete the following steps:

1. Sign in to the LON-HOSTx computer as **Adatum\Administrator** with the password of **Pa$$w0rd**.
2. On LON-HOST1, start **Hyper-V Manager**.
3. In Hyper-V Manager, click **20409B-LON-DC1**, and in the Actions pane, click **Start**.
4. In the Actions pane, click **Connect**. Wait until the virtual machine starts.
5. Sign in by using the following credentials:
    - User name: **Adatum\Administrator**
    - Password: **Pa$$w0rd**
6. Repeat steps 3 and 4 for **20409B-LON-SS1**.
7. Repeat steps 3 through 5 for **20409B-LON-CLx**. The letter x is 1 for the first student in the team, and 2 for the second student in the team.

 **Note:** Because you will be using the same virtual machines in the next lab, do not revert the virtual machines. You will be working in pairs. Communicate clearly with your lab partner, and cooperate fully with each other during this lab.

Exercise 1: Creating and Managing Virtual Hard Disks

Scenario

In this exercise, you will create different types of virtual hard disks. You will use Hyper-V Manager and Windows PowerShell to create the virtual hard disks and to explore the differences between them. You will confirm that differencing virtual hard disks can already have some content when created, while a fixed-size disk allocates its full size on the storage when created. You will also confirm that the differencing virtual hard disk expands when you add data to it. You will add virtual disks to the virtual machine and expand them while the virtual machine is running. You will also see how you can add a directly attached disk to the virtual machine.

The main tasks for this exercise are as follows:

1. Create virtual hard disks.
2. Explore different virtual hard disk types.
3. Manage virtual hard disks.
4. Add a directly attached disk.

▶ Task 1: Create virtual hard disks

1. On LON-HOSTx, use the **Set-VMHost** cmdlet to set the virtual hard disk path to **C:\Shares\VHDs**, and to set the virtual machine path to **C:\Shares**.
2. Use the New Virtual Hard Disk Wizard in Hyper-V Manager to confirm that the default disk type for VHD hard disk is **Fixed size**, and that the maximum size is **2,040 GB**.
3. Use Hyper-V Manager to create a new virtual hard disk with the following settings:
   - Format: **VHDX**
   - Type: **Dynamically expanding**
   - Name: **Dynamic.vhdx**
   - Size: **100 GB**
4. Use Hyper-V Manager to create a new virtual hard disk with the following settings:
   - Format: **VHD**
   - Type: **Differencing**
   - Name: **Differencing.vhd**
   - Parent: **E:\Program Files\Microsoft Learning\base\Base14A-WS12R2.vhd**

 **Note:** The actual drive letter on which base images are stored can be different and, it depends on the physical server configuration. Drive E is used in the instructions, but you should use the drive on which base images are stored in your environment.

5. In Windows PowerShell, use the **New-VHD** cmdlet to create a new virtual hard disk with the following settings:
   - Path: **C:\Shares\VHDs\Fixed.vhdx**
   - Size: **1 GB**
   - Type: **Fixed size**

▶ Task 2: Explore different virtual hard disk types

1. On LON-HOSTx, in File Explorer, browse to **C:\Shares\VHDx**, and then confirm that Fixed.vhdx allocates 1 GB disk space, while Dynamic.vhdx and Differencing.vhd allocates much less disk space.
2. Use Hyper-V Manager to add **Fixed.vhdx** as a SCSI disk to **LON-CLx**.
3. Use the Windows PowerShell **Add-VMHardDiskDrive** cmdlet twice to add both **Dynamic.vhdx** and **Differencing.vhd** as SCSI disks to **20409B-LON-CLx**.
4. On LON-CLx, use Disk Management to confirm the following:
   - The computer now has multiple disks.
   - The last three disks have **1023 MB** (1 GB), **100 GB**, and **127 GB**.
   - The last disk has two partitions, which are assigned letters **E:** and **F:**.
   - The first two disks have only unallocated space.

 **Note:** Those are fixed, dynamically expanding, and differencing virtual hard disks that you added in this task.

5. Create a **Simple Volume** with default values on **Disk 1**.
6. Create a **Simple Volume** with default values on **Disk 2**.
7. Use File Explorer to confirm that there are multiple folders on volume **F:**.
8. Copy folder **C:\Windows\Inf** to volumes **F:**, **G:**, and **H:**.
9. On LON-HOSTx, in File Explorer, browse to **C:\Shares\VHDx**, and then confirm that Fixed.vhdx still allocates 1 GB of disk space, while the size of Dynamic.vhdx and Differencing.vhd has increased. This is because you copied content to them, but they are still allocating less space than Fixed.vhdx.

▶ Task 3: Manage virtual hard disks

1. On LON-HOSTx, use the Edit Virtual Hard Disk Wizard to expand **Fixed.vhdx** to **2 GB**.
2. Use the Edit Virtual Hard Disk Wizard to expand **Dynamic.vhdx** to **200 GB**.
3. On LON-CLx, use Disk Management to confirm that Disk 1 and Disk 2 have expanded and now have 1 GB and 100 GB of unallocated space. Note that Hyper-V expanded the virtual hard disks while the virtual machine was running.
4. On LON-HOSTx, use the Windows PowerShell cmdlet **Remove-VMHardDiskDrive** twice to remove SCSI disks on locations **0** and **1** from **20409B-LON-CLx**.
5. Use the Edit Virtual Hard Disk Wizard to convert **Dynamic.vhdx** to **VHD** format, and then save it as **C:\Shares\VHDs\Converted.vhd**.
6. On LON-HOSTx, use File Explorer to confirm that Converted.vhd is created, and that that size of Fixed.vhdx is now 2 GB.

▶ Task 4: Add a directly attached disk

1. On LON-HOSTx, use the iSCSI Initiator to connect to the target with **Lab3** in the name, on the iSCSI target with IP address **172.16.0.14**.
2. Use Disk Management to confirm that the disk is added to LON-HOSTx, and that it has a status of Offline. Make note of its size.

Note: Two disks are added on LON-HOST1. One disk is added on LON-HOST2.

3. In the **Settings for LON-CLx** virtual machine, modify the settings of the **SCSI Hard Disk** to use **Physical hard disk**.
4. On LON-CLx, use Disk Management to confirm that Disk 1 displays that it has the same size as the disk that was added to LON-HOSTx, and that it is not initialized. This is directly attached disk that was added to LON-CLx.
5. Create **Simple Volume** with default values on **Disk 1**.
6. On LON-HOSTx, use the Windows PowerShell cmdlet **Remove-VMHardDiskDrive** to remove the SCSI virtual hard disks from **20409B-LON-CLx**.
7. On LON-CLx, use Disk Management to confirm that Disk 1 no longer displays.
8. On LON-HOSTx, use the iSCSI Initiator to disconnect the existing iSCSI target.

Results: After completing this exercise, you should have created and managed virtual hard disks.

Exercise 2: Creating and Managing Virtual Machines

Scenario

You were asked to create and demonstrate the differences between Generation 1 and Generation 2 virtual machines. You first will create the virtual machines by using different administrative tools, and then you will review this configuration and modify it. You will also explore how to enable dynamic memory and how virtual machines use it. You will also see how to configure storage for QoS. In the last task, you will configure Integration Services for virtual machines and explore how the time synchronization service works.

The main tasks for this exercise are as follows:

1. Create virtual machines.
2. Manage virtual machines.
3. Work with dynamic memory.
4. Work with storage Quality of Service management.
5. Configure Integration Services.

▶ Task 1: Create virtual machines

1. On LON-HOSTx, use Hyper-V Manager to create a new virtual machine with the following settings:
   - Name: **LON-VM2**
   - Generation: **Generation 2**
   - Startup Memory: **1024 MB**
   - Use Dynamic Memory: **Enabled**

2. Use the Windows PowerShell cmdlet **New-VM** to create a new virtual machine with the following settings:
   - Name: **LON-VM1**
   - Generation: **Generation 1**
   - Startup Memory: **1 GB**
   - Boot Device: **IDE**
3. Use the Windows PowerShell cmdlet **Add-VMHardDiskDrive** to add the **C:\Shares\VHDs\Differencing.vhd** disk to the **IDE Controller** of LON-VM1.

▶ Task 2: Manage virtual machines

1. On LON-HOSTx, use Hyper-V Manager to confirm that three types of hardware display in the **Add Hardware** section in the details pane for LON-VM2. Confirm also that no **BIOS**, **IDE Controllers**, **COM ports** and **Diskette Drive** display, but **Firmware** does displays.
2. Set **Hard Drive** as the first boot device for LON-VM2.
3. For LON-VM1, use Hyper-V Manager to confirm that you can add five hardware types to LON-VM1. Confirm also that **BIOS**, **IDE Controllers**, **COM ports**, and **Diskette Drive** display, but **Firmware** does not display.
4. Confirm that you can change Startup order, but you cannot set Secure Boot for LON-VM1. Also, confirm that LON-VM1 is not configured to use Dynamic Memory, and it has a single Network Adapter.
5. Use the Windows PowerShell cmdlet **Set-VM** to enable dynamic memory for LON-VM1.
6. Use the Windows PowerShell cmdlet **Add-VMNetworkAdapter** to add a network adapter to LON-VM1.
7. Use Hyper-V Manager to confirm that LON-VM1 is using Dynamic Memory, and that LON-VM1 has two Network Adapters.

▶ Task 3: Work with dynamic memory

1. Use Hyper-V Manager to confirm that LON-CLx is configured to use Dynamic Memory.
2. In Hyper-V Manager, make note of the currently Assigned Memory for the LON-CLx virtual machine.
3. On LON-CLx, run the following two commands:

```
C:\LabFiles\Mod03
.\TestLimit64.exe -d 400 -c 1
```

4. On LON-HOSTx, use Hyper-V Manager to confirm that LON-CLx is using more memory.
5. Wait a few minutes, and then verify that the Assigned Memory for LON-CLx has decreased.

▶ Task 4: Work with storage Quality of Service management

1. On LON-CLx, run the following command:

```
C:\LabFiles\Mod03\sqlio.exe
```

2. After the test completes, make note of the IOs/sec result.
3. On LON-HOSTx, use Hyper-V Manager to select **Enable Quality of Service management**, type **100** as Minimum and **200** as Maximum for Hard Drive under IDE Controller 0.

4. On LON-CLx, run the following command again:

```
C:\LabFiles\Mod03\sqlio.exe
```

5. After the test completes, verify the IOs/sec result, and then confirm that it is close to 200, which is the limit you set and that it is considerably lower than the first result.
6. On LON-HOSTx, in Windows PowerShell, use the cmdlet **Set-VMHardDiskDrive** to disable Quality of Service management for **IDE Hard Disk** on **20409B-LON-CLx**.

▶ Task 5: Configure Integration Services

1. On LON-CLx, open the Services console, and then confirm that Hyper-V Time Synchronization Service is running.
2. On LON-CLx, verify the local time, and set it to **11:00**.
3. On LON-CLx, verify the local time again, and then confirm that it was set back automatically to its previous value, as Integration Services automatically synchronizes the time on LON-CLx with the time on LON-HOSTx.
4. On LON-HOSTx, use Hyper-V Manager to disable the **Time synchronization Integration Service** for **LON-CLx**.
5. On LON-CLx, confirm that Hyper-V Time Synchronization Service is not running.
6. On LON-CLx, set the local time to **11:00**. Confirm that the local time is now a few seconds after **11:00**, as time on the virtual machine is no longer synchronizing with the Hyper-V host.
7. Use Device Manager to confirm that the virtual machine is using the Microsoft Hyper-V Video adapter, and several System devices with Hyper-V in their name, including Microsoft Hyper-V Dynamic Memory. All of these virtual devices are provided as part of Integration Services.
8. On LON-HOSTx, use the Windows PowerShell cmdlet **Enable-VMIntegrationService** to enable time synchronization for **20409B-LON-CLx**.
9. On LON-CLx, confirm that the time on the virtual machine is synchronized once again with the time on LON-HOSTx.

Results: After completing this exercise, you should have created and managed virtual machines.