Practical 3 – Managing Disks and Data Storage

Lab Requirements:

a) Windows server 2016 ***NYP-DC1*** virtual machine.
b) Add 5 more extra virtual hard disks to NYP-DC1, each 20 GB.
c) Start NYP-DC1 and Login as Administrator.
d) Launch **Disk Management** (Right-click Start and select it).
e) Initialize the new disks and configure them as basic disk.

Practice 1

Objectives:

1. Use the Disk Management node of the Computer Management tool to view the properties of a hard disk and partition.

Tasks:

1. On NYP-DC1, log on using your Administrator account.
2. Right-click **Start** and select **Disk Management**.
3. In the top pane of the Disk Management node window, right-click on drive C: and click **Properties**. The Properties window for drive C: will open.
4. Review the information and settings available on the General tab. Notice that this tab provides an easy way to determine both the capacity and available free space for the partition. Click the Tools tab.
5. Review the descriptions of the tools available on this tab. Click the Hardware tab.
6. The Hardware tab provides a list of the drives installed in your server, and provides access to both the properties of the drive and a troubleshooting tool.
7. Click the **Security** tab. The Security tab allows NTFS permissions to be configured for the partition or volume, with settings inherited by subfolders and files.
8. Click the **Shadow Copies** tab. The Shadow Copies tab is used to configure the new Shadow Copies feature of Windows Server.
9. Click the **Quota** tab. The Quota tab allows an administrator to configure disk space quotas for users on individual volumes or partitions. Click the **Cancel** button.
10. In the lower-right pane of the Disk Management node window, right-click on **Disk 0** and click **Properties**. This opens the property pages for the disk drive.
11. Review the information available on the General tab, noting that it also provides access to a troubleshooting tool.
12. Click the **Policies** tab. The Policies tab is used to configure write caching and safe removal settings for a disk. Review the default settings and available options, and then click the **Volumes** tab.
13. The Volumes tab lists all available partitions (or volumes) currently configured on this disk. Clicking on a partition or volume and then clicking Properties opens the

same property sheets for a partition or volume explored at the beginning of this activity. Click the **Driver** tab.

14. The Driver tab allows an administrator to view details about the currently installed driver for the disk, update the driver, roll back the driver, and uninstall the driver, if necessary. Click the Cancel button.
15. Leave the Disk Management window open.

Practice 2

Objectives:

1. Create a new Simple volume.

Tasks:

1. Continue from practice 1 above.
2. In Disk Management, right-click the unallocated space on **Disk 1** and then click **New Simple Volume**.
3. Click **Next**.
4. In the **Select volume size in MB** box, type **50**, and then click **Next**.
5. Change the drive letter to **F:** and click **Next.**
6. Select the **Perform a quick format** check box and then click **Next** to format the volume as NTFS. Click **Next**.
7. Click **Finish**. (Note: there may another window asking you to format it. You can cancel it)

Practice 3

Objectives:

1. Create an Extended volume.

Tasks:

1. Right-click **New Volume (F:)** and then click **Extend Volume**.
2. Click **Next**.
3. Click **Remove All** and then double-click **Disk 1**.
4. In the **Select the amount of space in MB** box, type **10**, and then click **Next**.
5. Click **Finish**.
6. You may be prompted to convert the disk from Basic to Dynamic. Click **Yes**.
7. Delete the volume F:

Practice 4

Objectives:

1. Create and format two Simple volumes in disk 1.

Tasks:

1. Create a Simple volume in disk 1, size=50 MB and NTFS format. Assign it as M: drive.
2. Create another Simple volume in disk 1, size=40MB and NTFS format. Assign it as N: drive.

Practice 5

Objectives:

1. Change the drive letter of a disk.

Tasks:

1. Login to NYP-DC1 as Administrator and open **Disk Management**
2. Change drive letter of CD-ROM 0.
3. Right-click the CD-ROM 0 device (found after the last Disk) and select **Change Drive Letter and Paths…**
4. Click Change and select a new alphabet for it.
5. Click **OK** and **Yes**.

Practice 6

Objectives:

1. Create a Mounted volume/drive.

Tasks:

1. Login to NYP-DC1 as Administrator and create a folder called **BigApp** in **C:**
2. Open **Disk Management**.
3. Right-click the unallocated space on **Disk 1** and then click **New Simple Volume**.
4. Click **Next**.
5. In the **Simple volume size in MB** box, type **30**, and then click **Next**.
6. Click **Mount in the following empty NTFS folder**, type **C:\BigApp** in the box**,** and then click **Next**.
7. In the **Volume label** box, type **Mount**, select the **Perform a quick format** check box, and then click **Next**.

8. Click **Finish**.
9. Close Disk Management.
10. View the folder **C:\BigApp** in Windows Explorer. Notice the icon that is used to indicate a mount point. Open its **Properties** to confirm.
11. Close Windows Explorer.

Practice 7

Objectives:

1. Document disk properties

Tasks:

1. Login to NYP-DC1 as Administrator and open **Disk Management**.
2. Right-click **Disk 1** and then click **Properties**.
3. Click the **Volumes** tab.
4. Record the following information:
   Disk number: _____
   Disk type: _____
   Partition style: _____
   Drive capacity: _____
   Number of volumes: _____
   Capacity of M: _____
   Capacity of N: _____
5. Click **Cancel**.
6. Close Disk Management.

Practice 8

Objectives:

1. Convert a Basic disk to a Dynamic disk

Tasks:

1. Login to NYP-DC1 as Administrator and open **Disk Management**.
2. Make sure your Disk 2 is Basic type (if not, right click Disk 2 and convert it to Basic type).
3. Create a simple volume on Disk 2 with size=50 MB. Copy some files into the simple volume (eg. copy C:\Windows\cursors files).
4. Right-click **Disk 2** and then click **Convert to Dynamic Disk**.
5. Click **OK**.
6. After **Disk 2** has been converted to **Dynamic Disk**, right click it. Notice you cannot re-convert it back to **Basic** type. Are the files intact?

7. Close Disk Management.
8. Right-click **Start** and select **Command Prompt (Admin)**.
9. Type **diskpart** and then press ENTER.
10. Type **list disk** and then press ENTER.
11. Type **select disk 1** and then press ENTER.
12. Type **convert dynamic** and then press ENTER.
13. Type **Exit** and then press ENTER.

Practice 9

Objectives:

1. Create a Spanned volume

Tasks:

1. Login to NYP-DC1 as Administrator and open **Disk Management**.
2. Right-click **New Volume M: in disk 1** and then click **Extend Volume**.
3. Click **Next**.
4. Click **Remove All** and then double-click **Disk 2**.
5. In the **Select the amount of space in MB** box, type **50**, and then click **Next**.
6. Click **Finish**.
7. Notice the volume M: now spans two disks (1 & 2).

Practice 10

Objectives:

1. Extend an existing volume using the **DISKPART** command.

Tasks:

1. Login to NYP-DC1 as Administrator and Right-click **Start** and select **Command Prompt (Admin)**.
2. At the command line, type ***diskpart*** and press Enter.
3. At the DISKPART prompt, type ***list volume*** and press Enter.
4. From the list of available volumes, determine the volume number assigned to drive **N**: in the Volume ### column, and review the volume numbers and letters assigned to other drives.
5. At the DISKPART prompt, type ***select volume X***, where X is the number assigned to drive **N**: on your system. Press Enter.
6. At the DISKPART prompt, type ***extend size=50*** and press Enter. This extends the size of drive **N**: by 50MB on the same disk.
7. Type ***list volume*** to confirm it.

8. At the DISKPART prompt, type ***exit*** and press Enter. Close the command prompt window.
9. Open **Disk Management**.
10. Right-click on drive **N**: and click Properties. On the General tab, confirm that the size of drive **N**: is approximately 90MB, based on the original size of 40MB, and the extension by another 50MB.
11. Click Cancel, and then close all windows.

Practice 11

Objectives:

1. Create a Striped volume (RAID 0)

Tasks:

1. Login to NYP-DC1 as Administrator and open **Disk Management**.
2. Right-click the unallocated space on **Disk 1** and then click **New Striped Volume**.
3. Click **Next**.
4. In the Select Disks section, add both **Disk 1** and **Disk 2** to the **Selected** box.
5. In the **Amount of space in MB** box, type 50, and then click **Next**. Notice that this takes 50MB from each disk selected.
6. Assign the default drive letter to G and Click **Next**.
7. In the **Volume Label** box, type **Striped**, select the **Perform a quick format** check box, and then click **Next**.
8. Click **Finish**.
9. Close Disk Management.

Practice 12

Objectives:

1. Create a RAID-1 (Mirrored) volume

Tasks:

1. Login to NYP-DC1 as Administrator and open **Disk Management**.
2. Right-click the unallocated space on **Disk 1** and then click **New Mirrored Volume**.
3. Click **Next**.
4. Double-click **Disk 2** to select it.
5. In the **Select the amount of space in MB** box, type 1000, and then click **Next**.
6. Assign the default drive letter to H and click **Next**.
7. In the **Volume label** box, type **Mirrored**, select the **Perform a quick format** check box, and then click **Next**.

8. Click **Finish**.
9. Close all open windows.

Practice 13

Objectives:

1. Create a RAID-5 volume. The system must have 4 hard disks – Disk 0,1,2,3.

Tasks:

1. Login to NYP-DC1 as Administrator and open **Disk Management**.
2. Right-click the unallocated space on **Disk 1** and then click **New RAID-5 Volume**.
3. Click **Next**.
4. Double-click **Disk 2** to select it.
5. Double-click **Disk 3** to select it.
6. In the **Select the amount of space in MB** box, type 1000, and then click **Next**.
7. Assign the default drive letter to V and click **Next**.
8. In the **Volume label** box, type **Raid-5**, select the **Perform a quick format** check box, and then click **Next**.
9. Click **Finish**.
10. Close all open windows.

Practice 14

Objectives:

1. Create a 3-way Mirror volume. This requires 5 physical disks excluding Disk 0. It can tolerate a maximum of 2 disk failures.

Tasks:

1. Login to NYP-DC1 as Administrator.
2. In Disk Management, reset Disk 1 to Disk 5 to their original state (ie. delete all volumes). They should be initialized and online. Close Disk Management.
3. In Server Manager, click on **File and Storage Services** in the left panel.
4. Click Storage Pools.
5. Under the **STORAGE POOLS** section, click on **Tasks** and select **New Storage Pool..**
6. In the [Before you begin] screen, click **Next**.
7. Under Name, type **Pool1** and click **Next**.
8. Select **5** physical disks and click **Next → Create → Close**.
9. Under **VIRTUAL DISKS** section, click **Tasks → New Virtual Disk..**
10. In the [Before you begin] screen, click **Next.**
11. Ensure Pool1 is selected and click **Next**.

12. in [Specify the virtual disk name] screen, type **Mirror-3way** under **Name**, click **Next**.
13. In [Select the storage layout] screen, click **Mirror** → **Next**.
14. In [Configure the resiliency settings] screen, select **Three-way mirror** → **Next**.
15. Select **Thin** for the provisioning type → **Next**.
16. In [Specify the size of the virtual disk] enter **1** GB → **Next**.
17. Click **Create** → **Close**.
18. The **New Volume Wizard** will then run.
19. Follow the wizard to create the volume, accepting all the default settings.
20. After the wizard has ended, open **File Explorer** and you will see the new volume/drive.
21. Copy some files to the new volume.
22. Shut down NYP-DC1 and in the VM Settings, remove one of the disk (do not remove **Disk 0**).
23. Restart NYP-DC1 and check if the files in the new volume are intact.
24. Repeat steps 22 and 23 to remove a second disk.
25. How many disks are removed before the new volume disappeared?

If unable to remove Storage Pool in Windows GUI, use below commands in PowerShell:

```
Get-StoragePool –FriendlyName “poolname” | Set-StoragePool –IsReadOnly $false
Get-StoragePool –FriendlyName “poolname” | Remove-StoragePool
```

Exercise 3

Practice 14 creates a 3 Mirrors RAID that needs minimum of 5 disks and allows failure of 2 disks.
For Windows Server 2016, RAID 6 (stripping with double parity) requires 7 disks.
For RAID 10 or 1+0 (stripping with mirror), 4 disks are required.
The creation of RAID 6 and RAID 10 is similar to the 3 Mirrors RAID process.
Try create a RAID 6 and RAID 10 in your Windows Server NYP-DC1. You can create 5GB hard disks in your attempt. Storage space need hard disk of 5 GB minimum.
For the practical test, one of these RAIDs (3 Mirrors, RAID 6, RAID 10) may be tested.

/* End *\