Storage and RAID

Introduction and/or Background

Tx-Rig would like to begin securing their files and folders in case of disaster or accidental deletion.

Objectives

In this project/lab the student will:

- Create RAID volumes for redundant storage

Equipment/Supplies Needed

- VMWare Workstation Pro
- Windows Server 2019 Virtual Machine

Assessment Criteria

- Take a screenshot of your new simple volume (PrtScr#1)
- Take a screenshot of your new volume MountPoint (PrtScr#2)
- Take a screenshot of your new Mirrored volume (PrtScr#3)
- Take a screenshot of your new broken mirrored volume (PrtScr#4)
- Take a screenshot of your new RAID0 volume (PrtScr#5)
- Take a screenshot of your new RAID5 volume (PrtScr#6)
- Answer reflection questions in a text file

Assignment

Part 1

Purpose of Activity: In this activity, you will create the virtual hard drives in VMWare.

1. Log onto your host computer.
2. Open VMWare workstation and click the tab for your Server VM, but do not start it.
3. Select **Edit virtual machine Settings**, then click **Add**.
4. Select **Hard Disk** and click **Next**.
5. Disk type is **SCSI**, click **Next**.

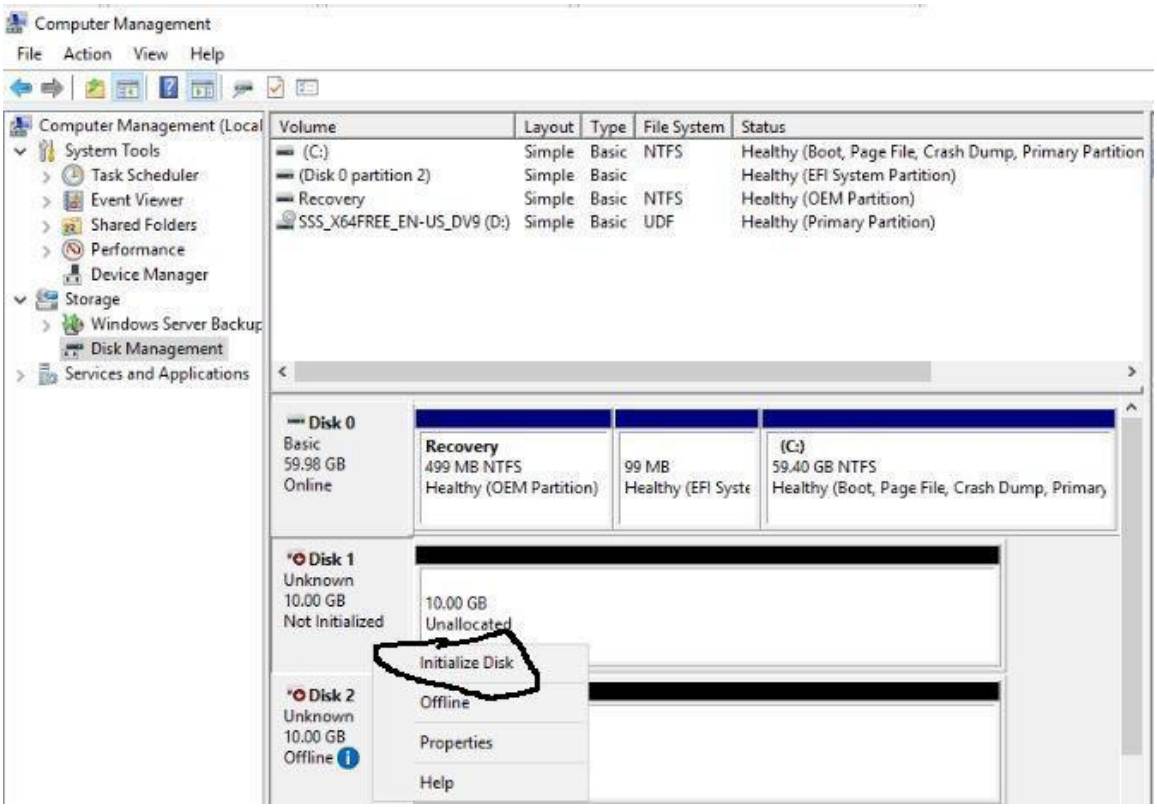
6. **Create a new virtual disk**, click **Next.**
7. Set **Maximum disk Size** to **10GB** and select **Store disk as a single file**, then click **Next.**
8. Accept the default file name and click **Finish.**
9. Repeat steps 3 – 8 to create two more 10GB disks.
10. Click **OK** on the Virtual Machine Settings screen.
11. The hardware summary should show you have three new 10GB hard drives.

Part 2

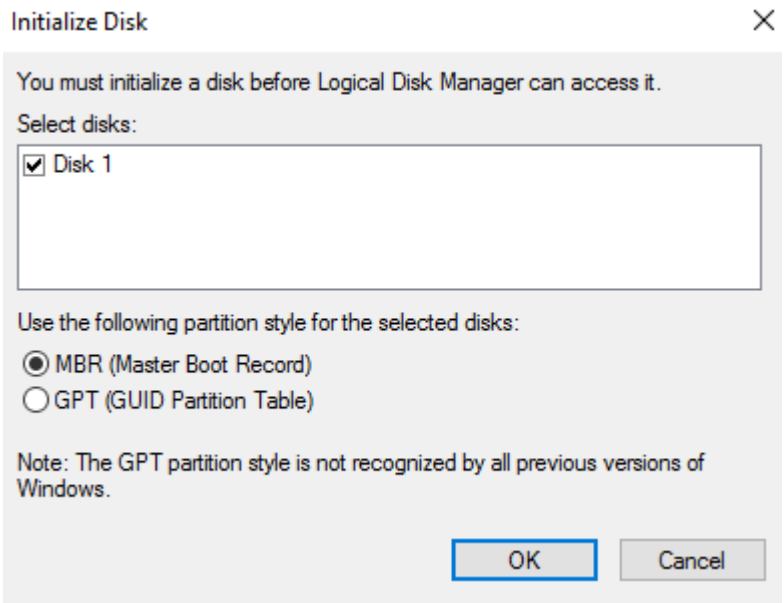
Purpose of Activity: In this activity, you will use the Disk Management Console to create and format a partition on the Windows Server operating system.

1. Power on your Windows Server 2019 VM.
2. Log onto your server as ***Administrator***.
3. Open the **Computer Management** console from the **Tools** menu if it is not already open.
4. In the left pane, select **Disk Management.**
5. Right-click **Disk 1** and select **Online.**

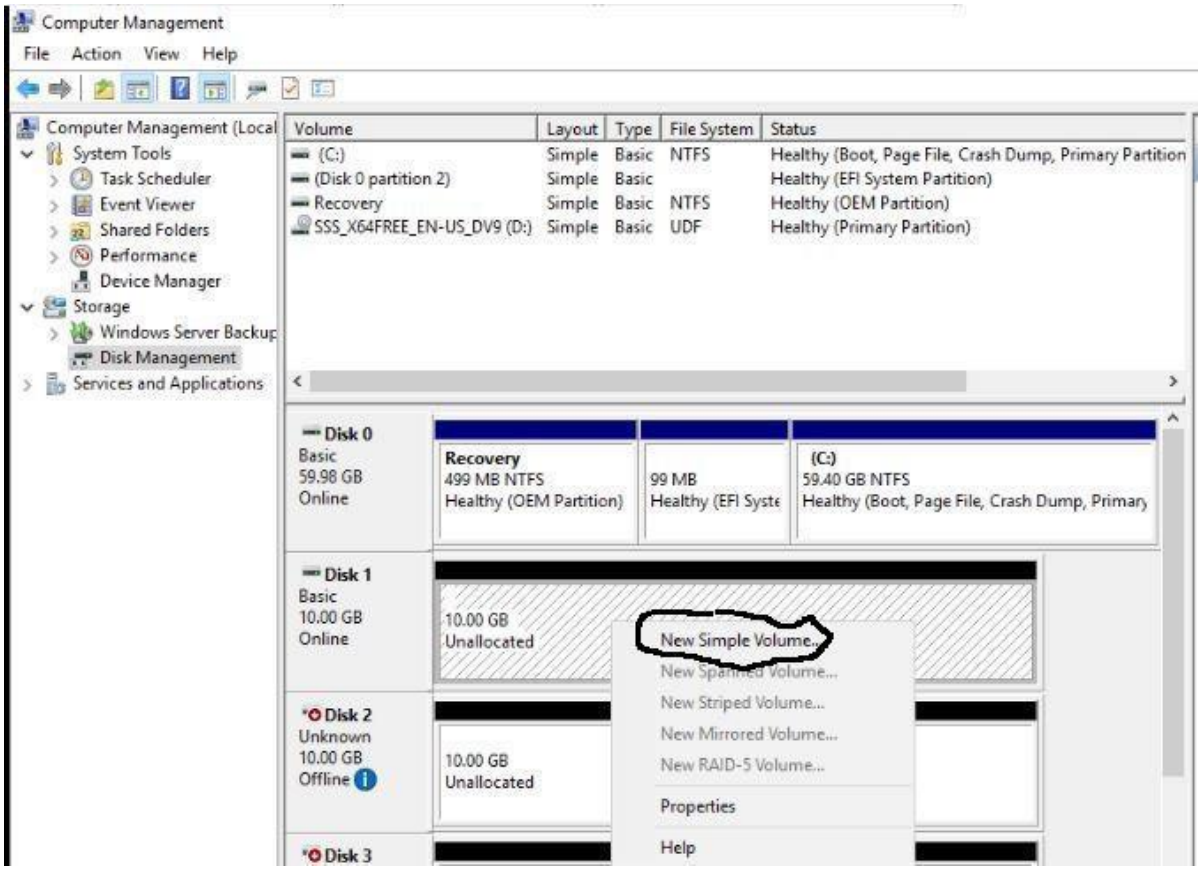
6. Right-click **Disk 1** and select **Initialize Disk.**



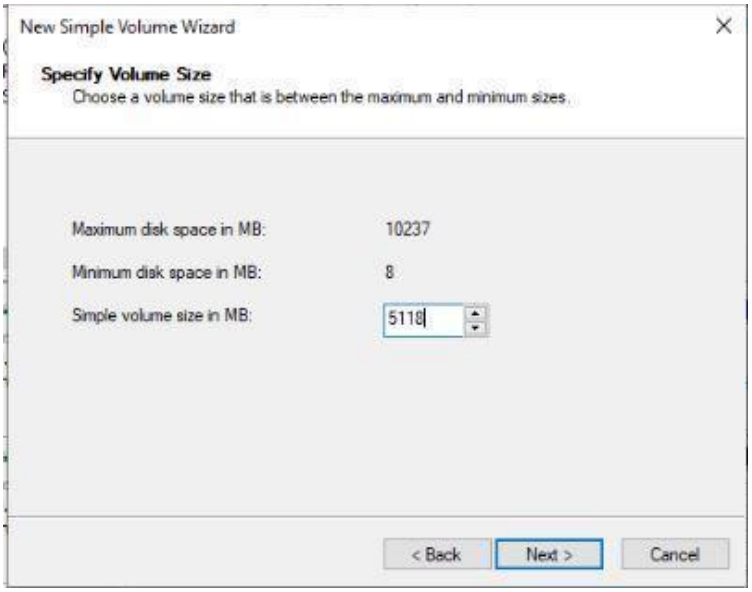
7. On the **Initialize Disk** pop-up box, make sure **Disk 1** is checked and **MBR (Master Boot Record)** is selected and click **OK**.



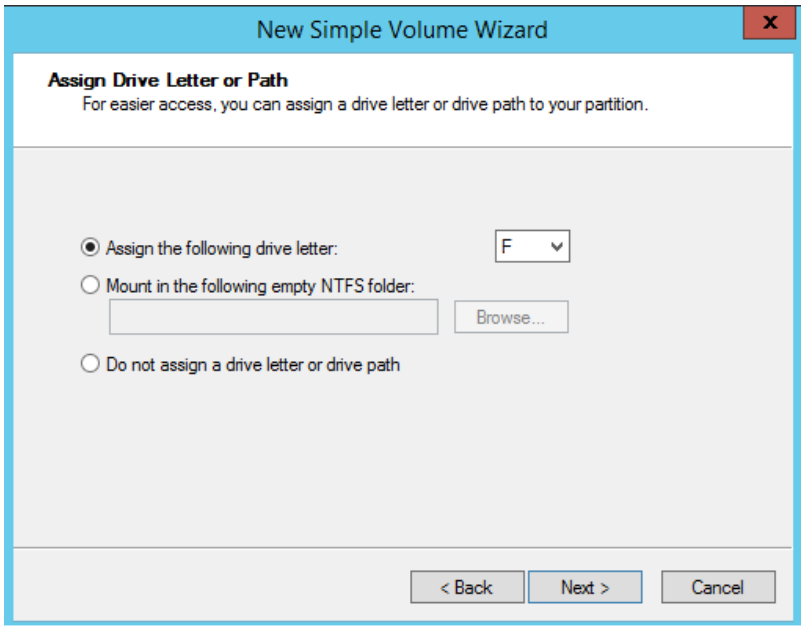
8. Right-click on the unallocated portion of **Disk 1** and select **New Simple Volume.**



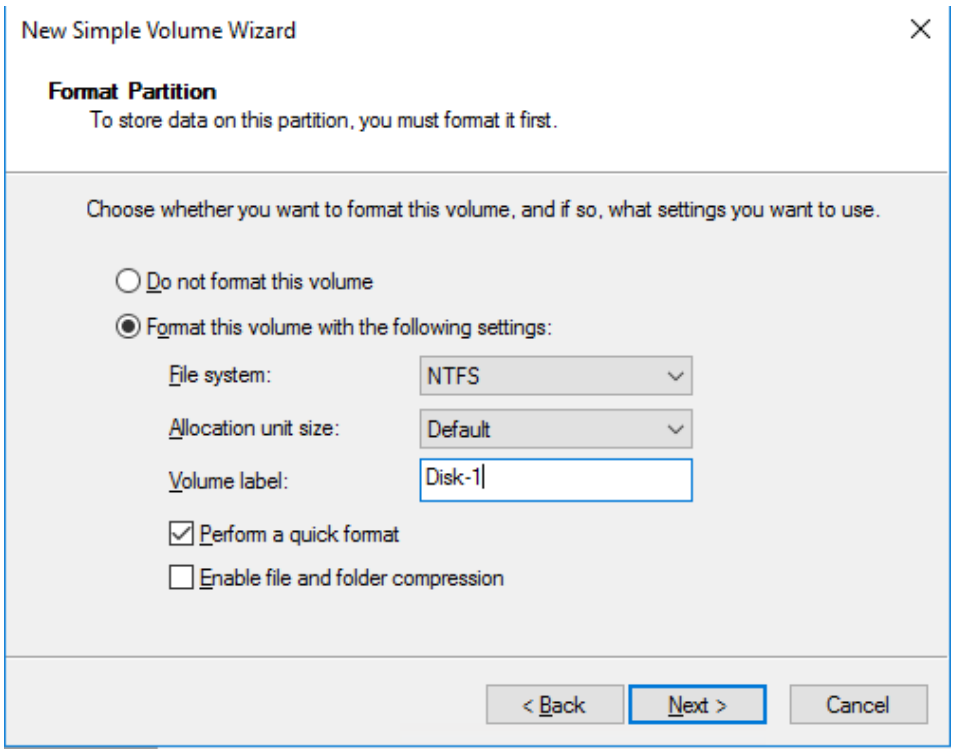
9. Click **Next** on the **Welcome** screen.
10. On the **Specify Volume Size** screen, use **½** of the default size (**5118**) and click **Next.**



11. On the **Assign Drive Letter or Path** screen, select drive **F** and click **Next.**

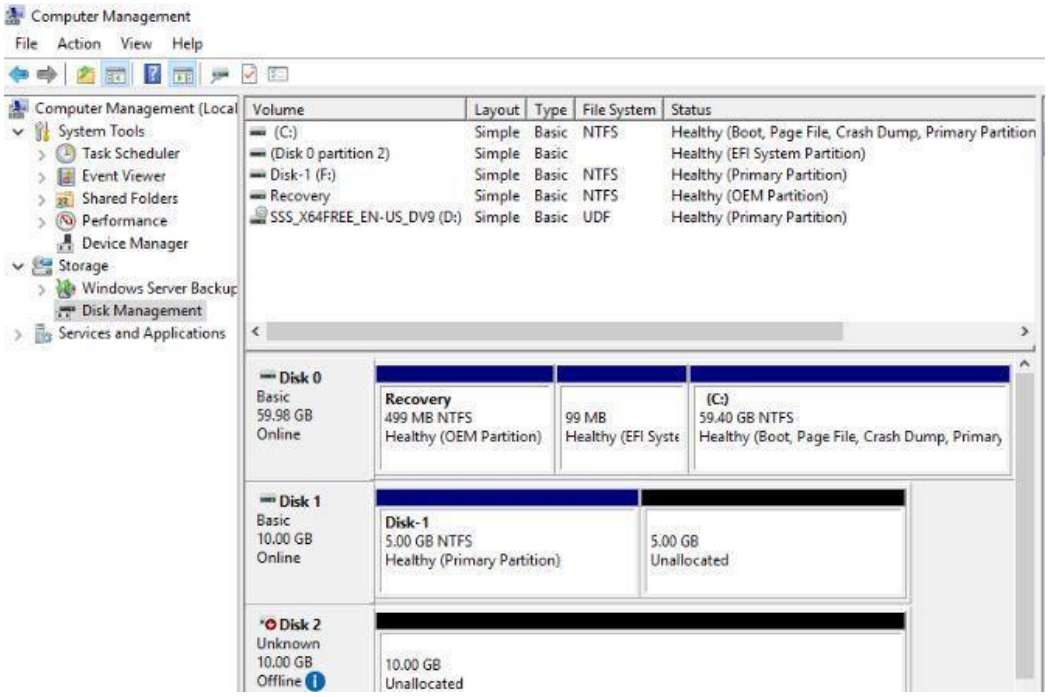


12. On the **Format Partition** screen, make sure **Format this volume with the following settings** is selected change the **Volume Label** to **Disk-1** and select **Perform a quick format**. Click **Next** to continue.



13. On the next screen, click **Finish**. The formatting will take a minute or longer depending on the size of the partition. If you had not chosen **Quick format**, the

formatting could take up to several hours.



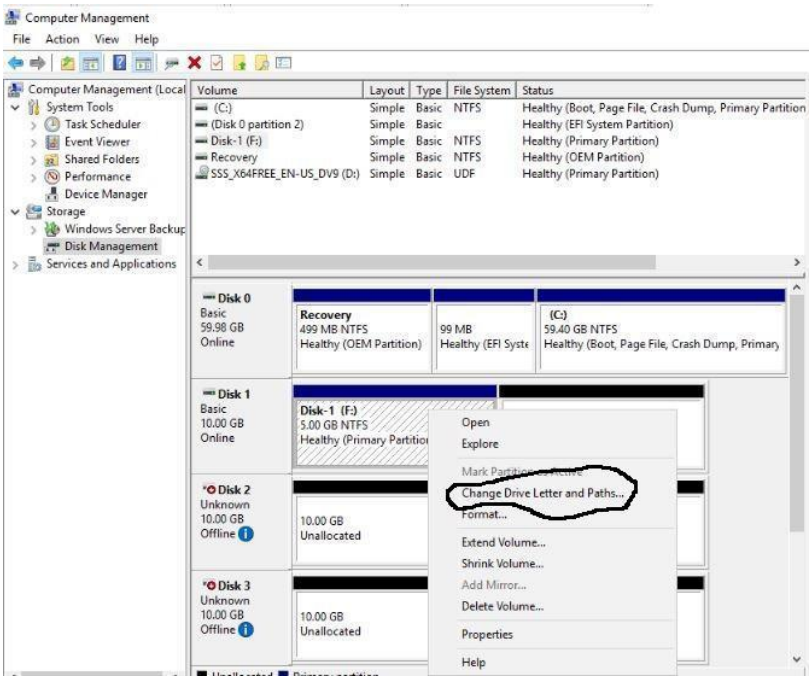
14. In Disk Management, take a **screenshot** of your new simple volume (PrtScr#1).
15. Minimize the command prompt window but leave the Computer Management console open for the next activity.

Part 3

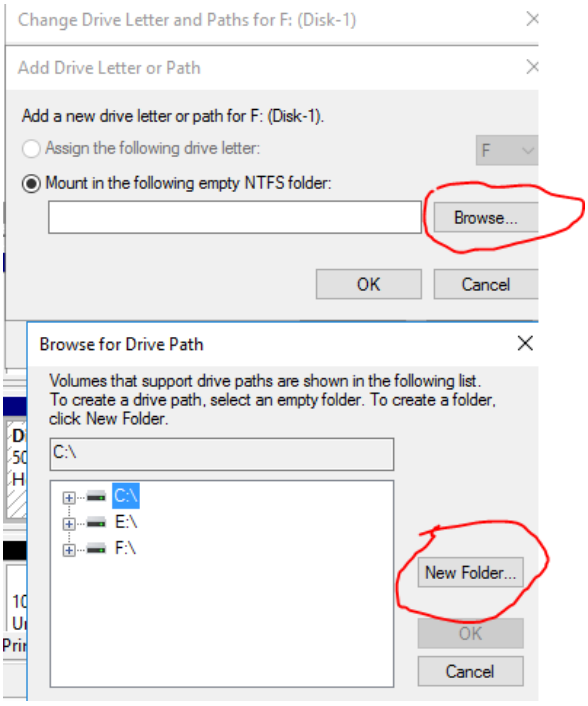
Purpose of Activity: In this activity, you will use the Disk Management Console to create a Volume Mount Point on the Windows Server operating system.

1. Log on as ***Administrator***.
2. Open **Disk Management** if it is not already open.

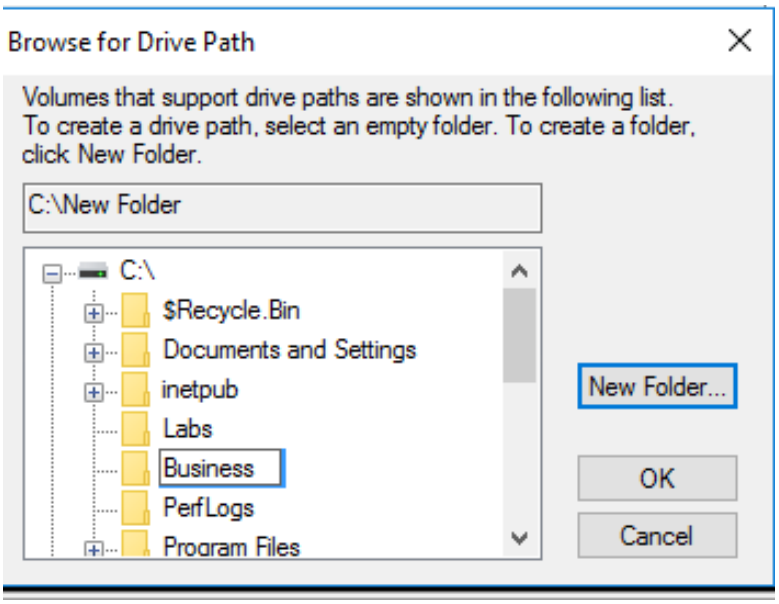
3. Right-click the **Disk-1** volume and click **Change Drive Letter and Paths**.



4. Click **Add**. Click **Browse**, click to expand the **C** drive, and then click **New Folder**.

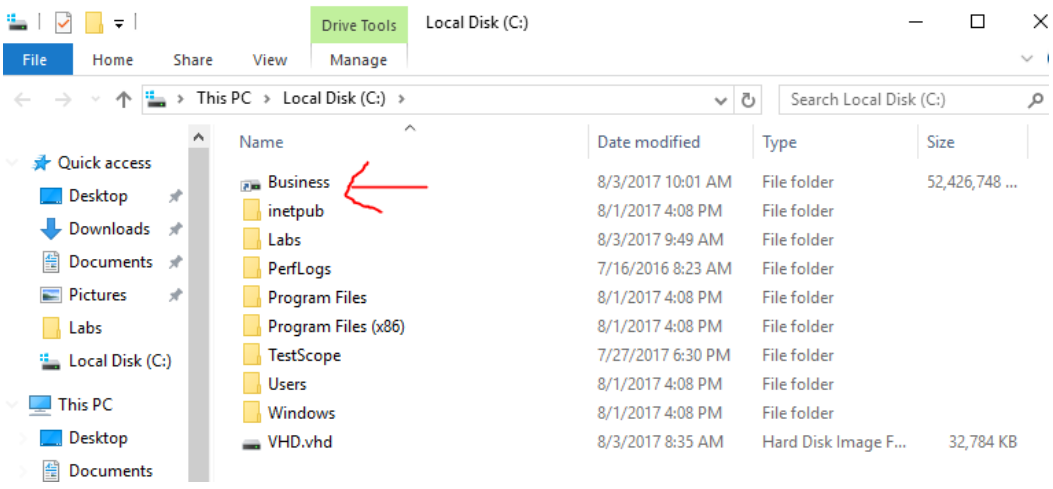


5. Type **Business** to name the folder, and then click **OK** twice.

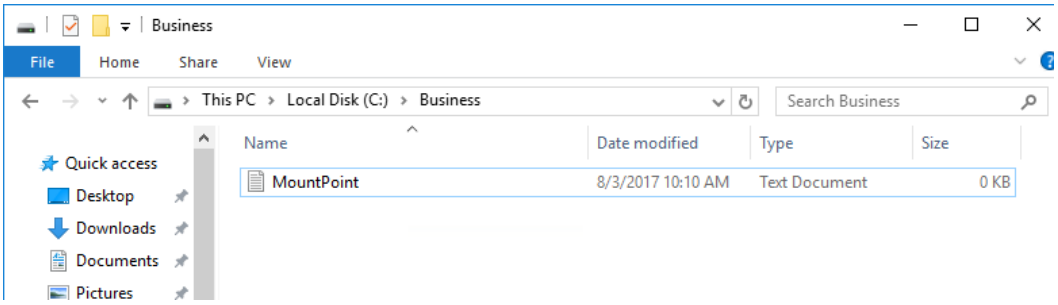


Notice that Disk-1 is still assigned the drive letter F. The drive letter can be unassigned, but as is, the Disk-1 volume can be accessed by using both the drive letter and the mount point.

6. Right-click the **C** drive and click **Explore**. Double-click the **Business** folder to verify that Disk-1 is mounted. Notice that the mount point is represented as a drive icon with a shortcut arrow.



7. Right-click anywhere in the "white space" in the right pane and select **New**, **Text Document**. Name the file **MountPoint.**



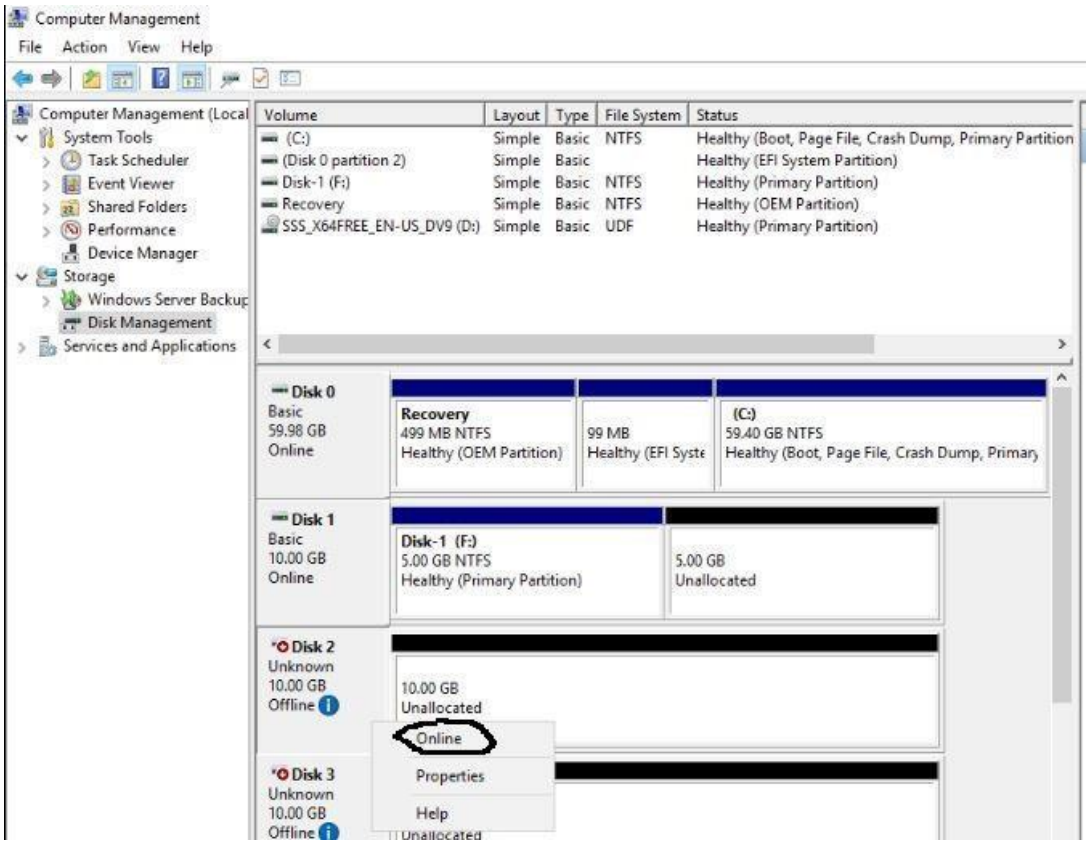
8. Take a **screenshot** (PrtScr#2).

   Minimize the command prompt window but leave the Computer Management console open for the next activity.

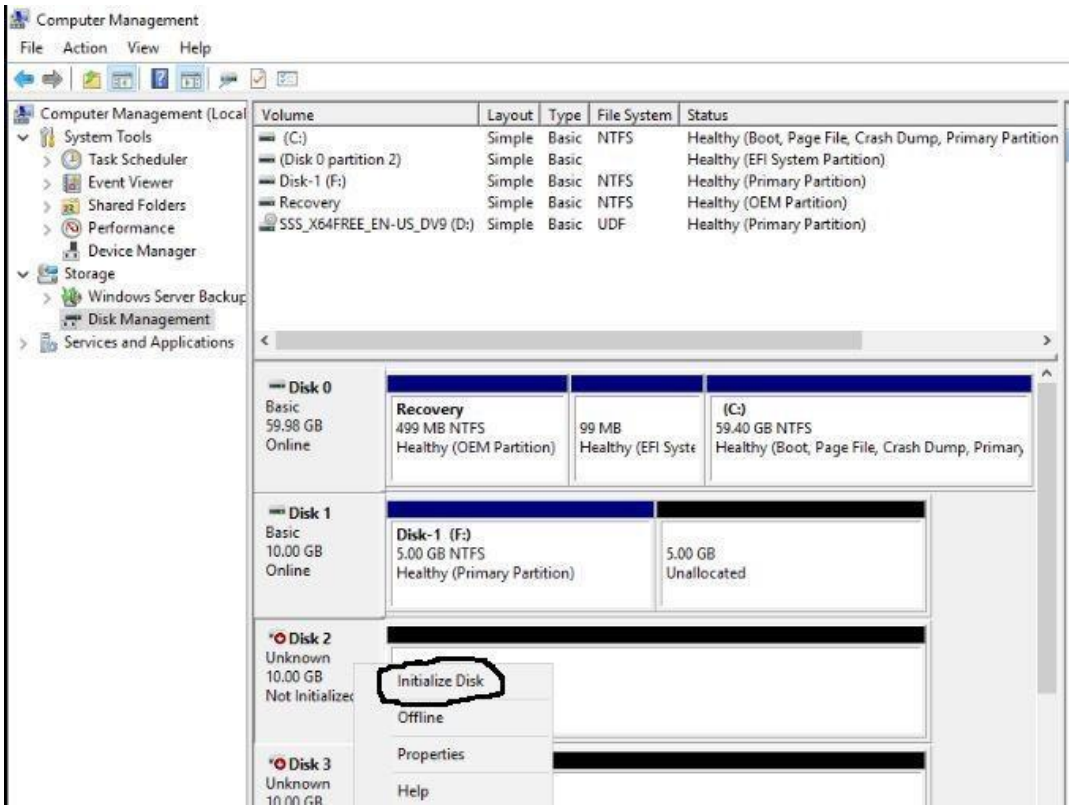
Part 4

Purpose of Activity: In this activity, you will use the Disk Management console to create a RAID 1 disk mirror for redundancy.

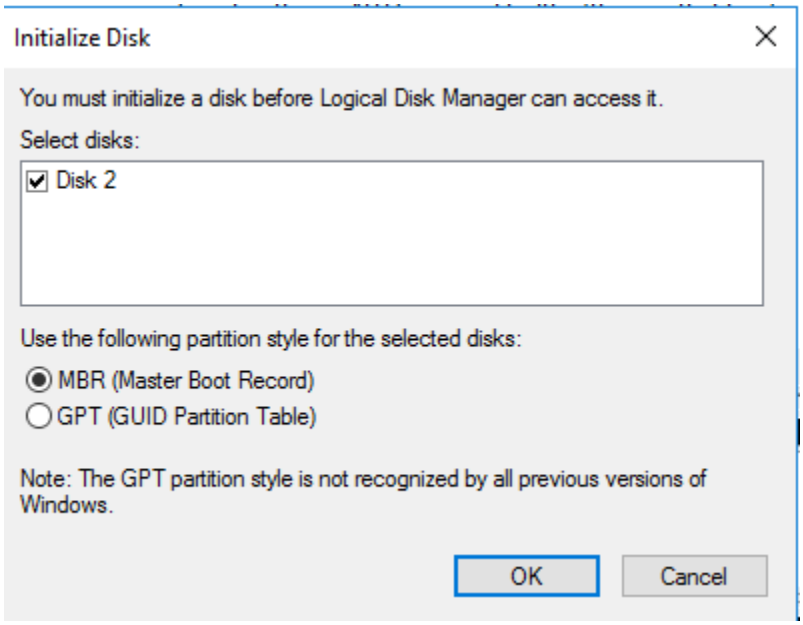
1. Log on as ***Administrator.***
2. Open **Disk Management** if it is not already open.
3. Right-click **Disk 2** and select **Online**.



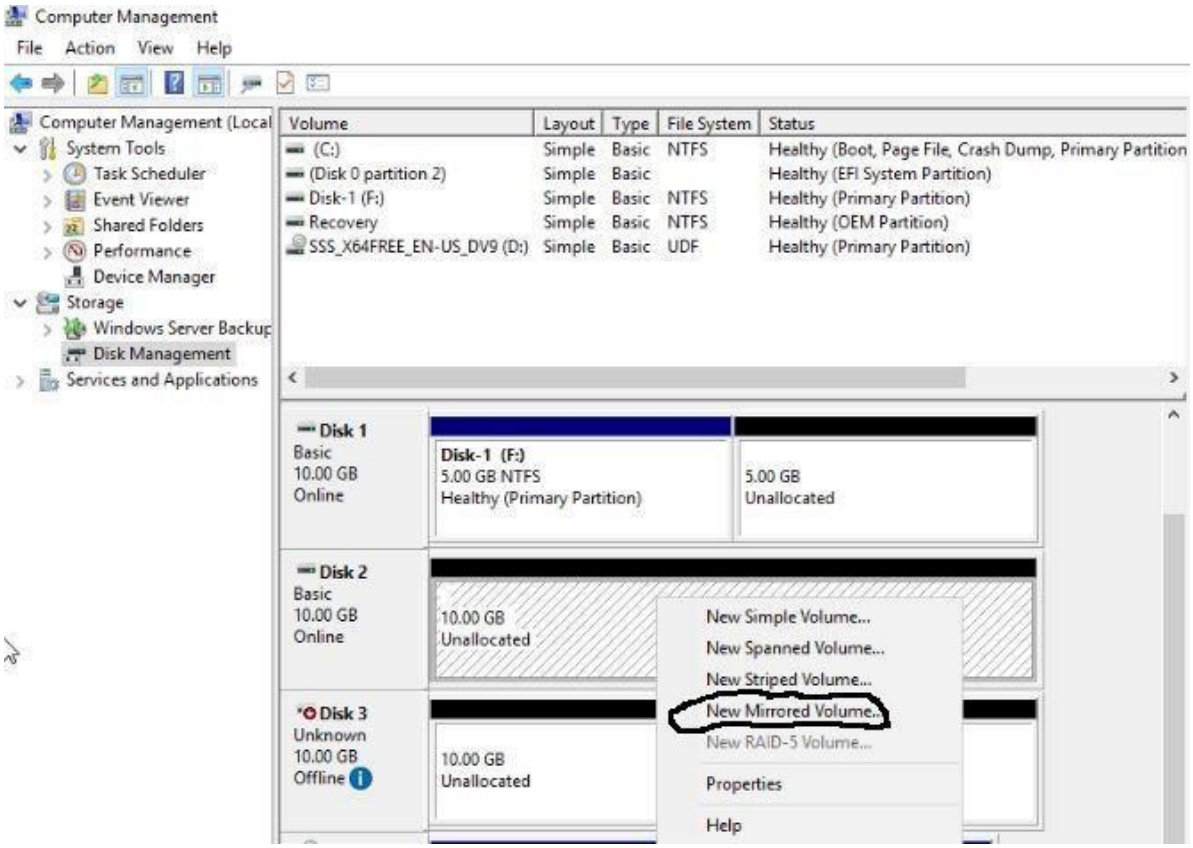
4. Right-click **Disk 2** and select **Initialize Disk**



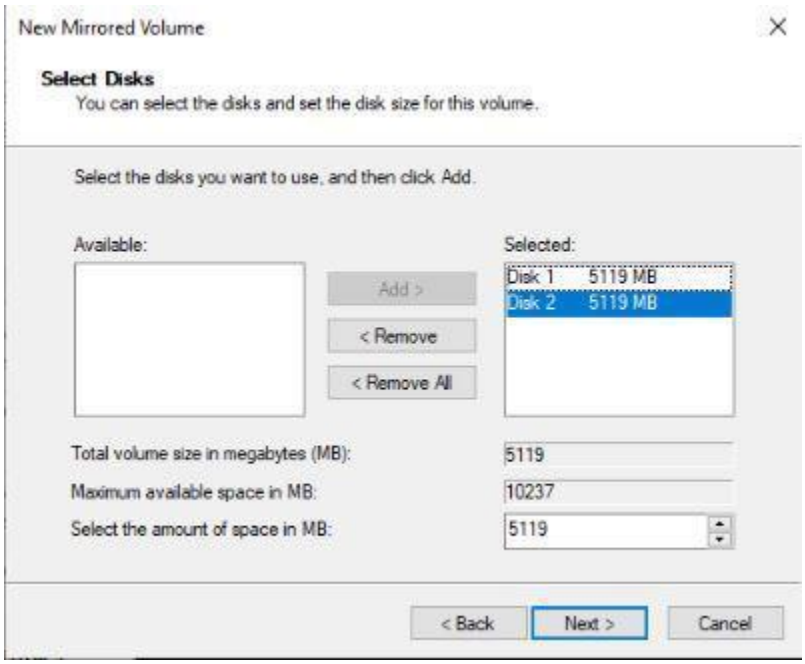
5. Make sure **Disk 2** is selected and that **MBR (Master Boot Record)** is selected and click **OK**



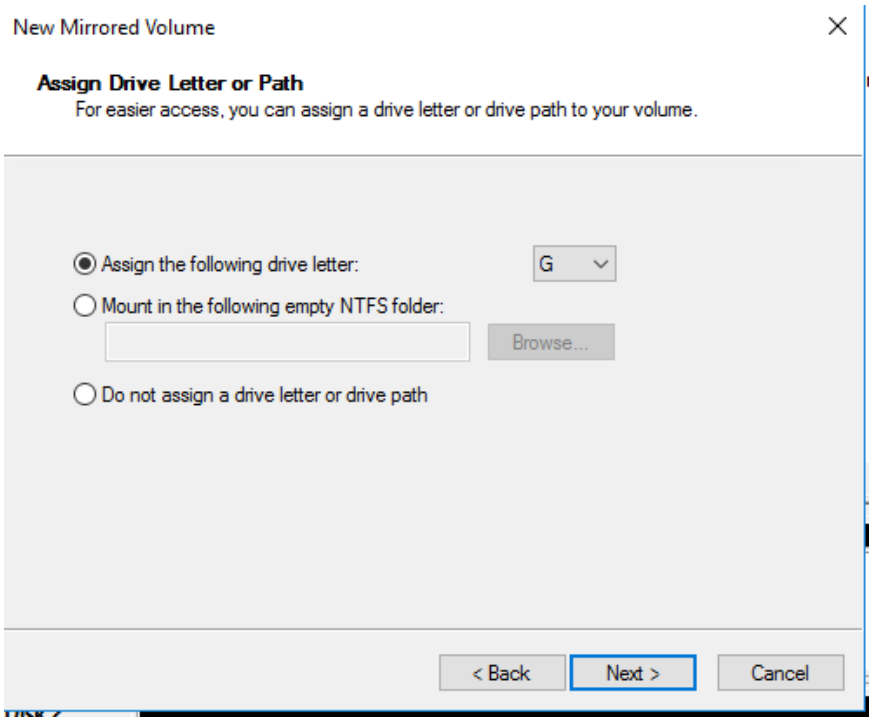
6. Right-click the **Unallocated** space in **Disk 2** and select **New Mirrored Volume**.



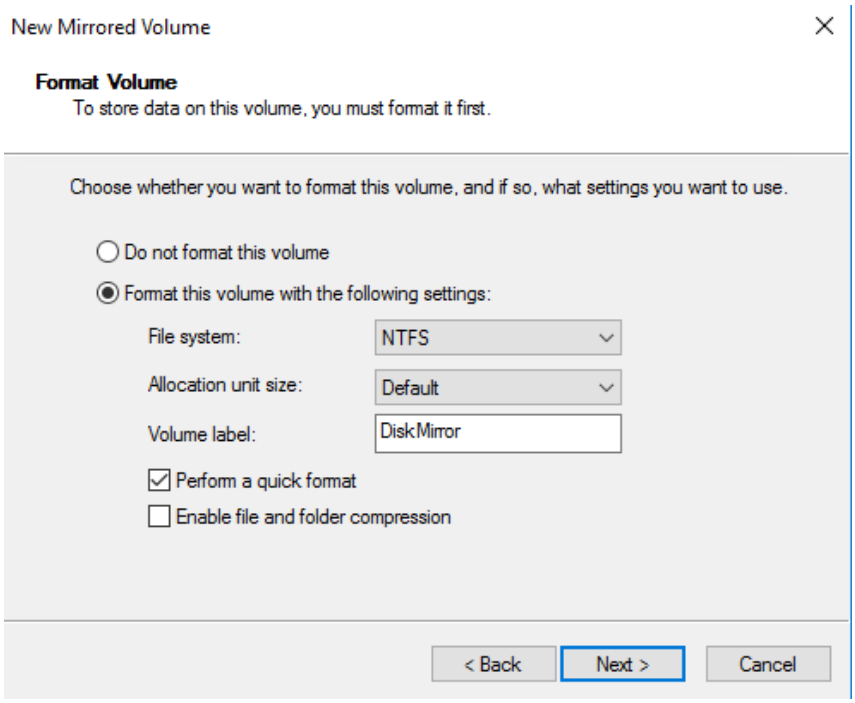
7. On the **Welcome** screen, click **Next**.
8. On the **Select Disks** screen, select **Disk 1** and click **Add** then click **Next**.



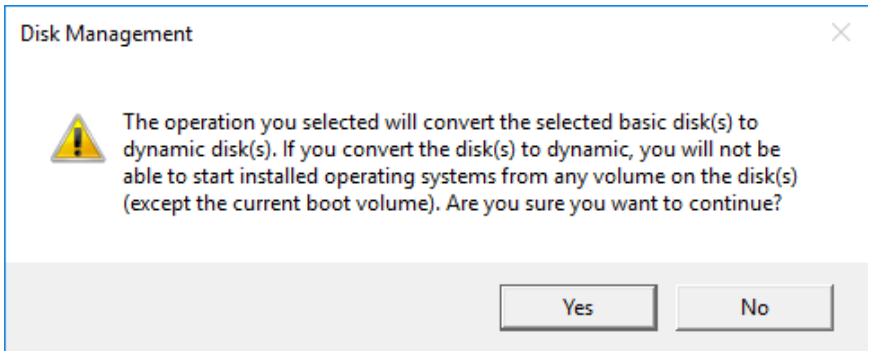
9. Assign drive letter **G** and click **Next**.



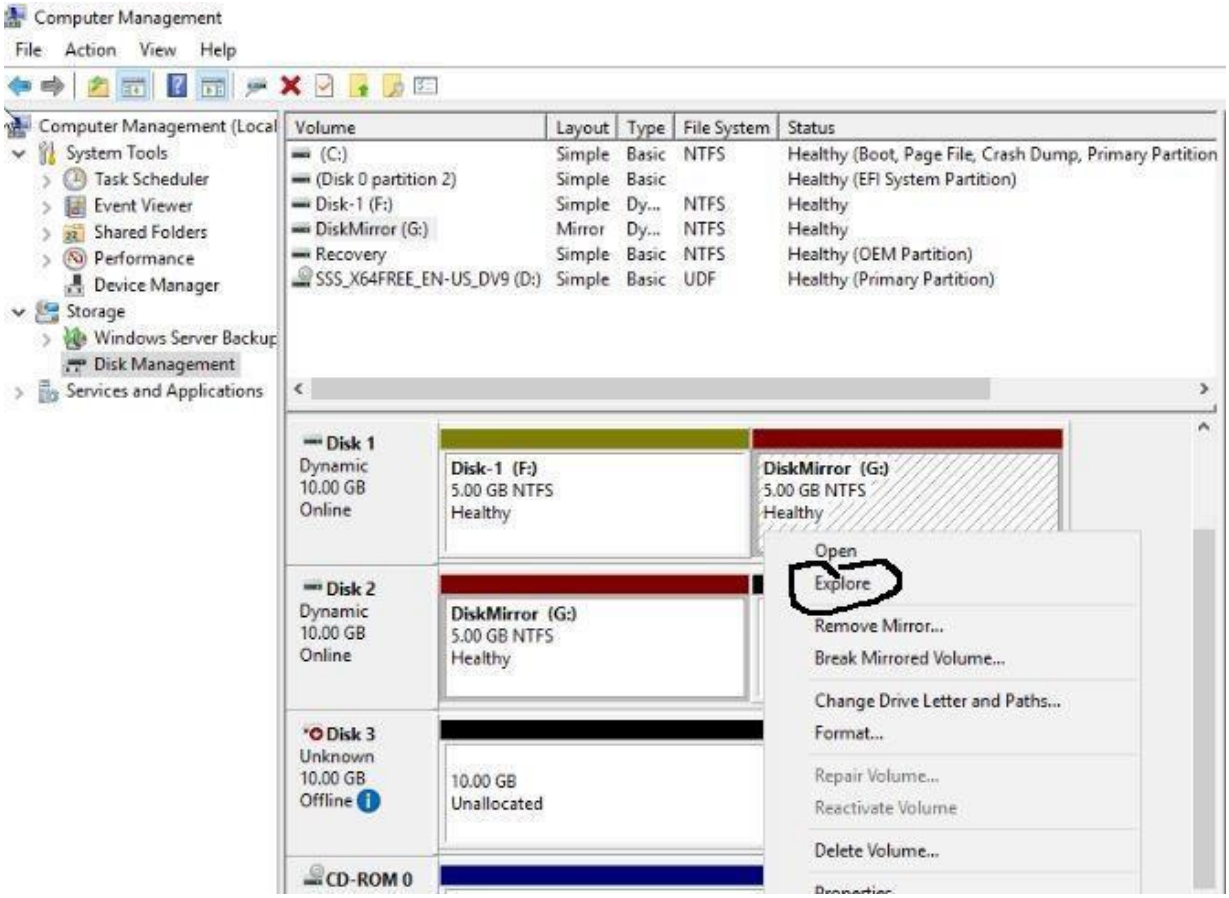
10. On the **Format Partition** screen, make sure **Format this volume with the following settings** is selected change the **Volume Label** to **DiskMirror** and select **Perform a quick format**. Click **Next** to continue then **Finish**.



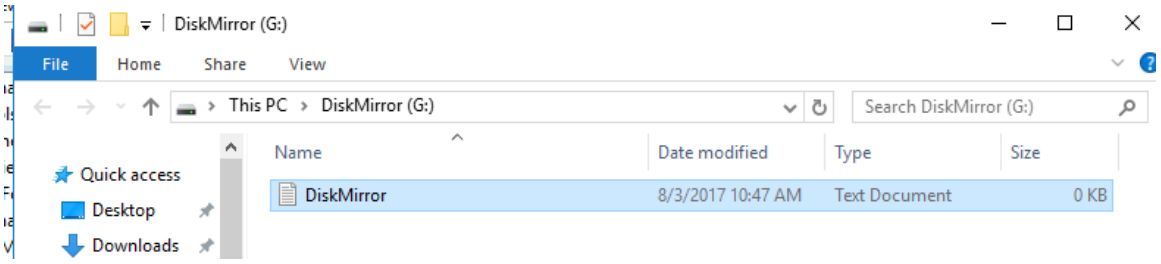
11. On the Disk Management pop-up dialog box, click Yes to continue.



12. Right-click anywhere on **DiskMirror (G:)** and select **Explore**.



13. Create a new text document named **DiskMirror**.



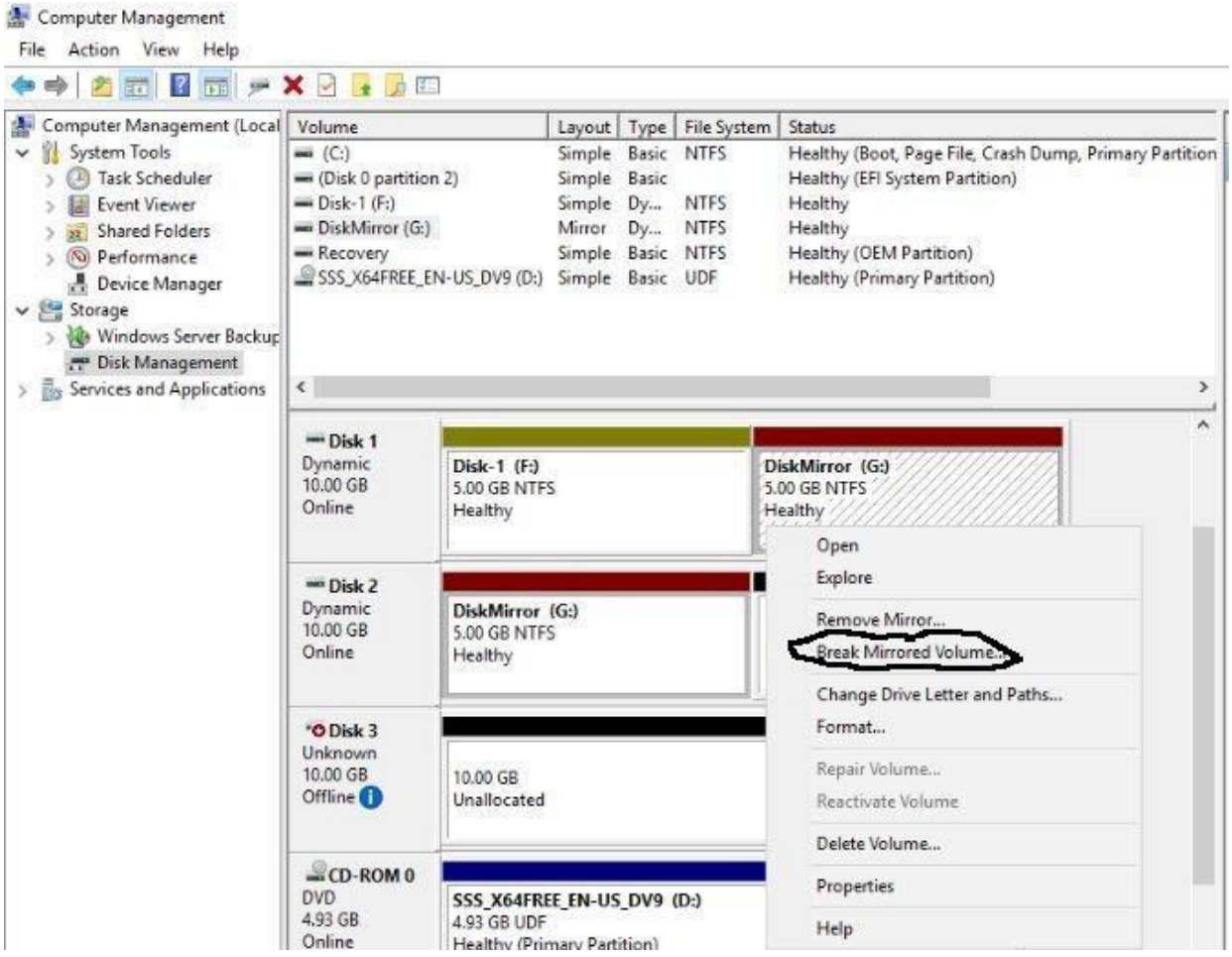
14. In Disk Management, take a **screenshot** of your new RAID1 mirrored volume (PrtScr#3).

15. Minimize the command prompt window and close File Explorer and return to the Disk Management console for the next activity.

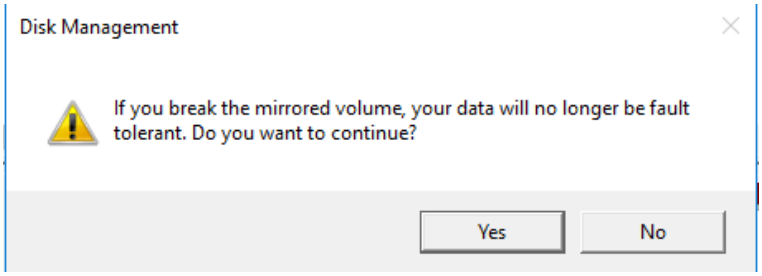
Part 5

Purpose of Activity: In this activity, you will use the Disk Management console to create a RAID 0 disk stripe for speed.

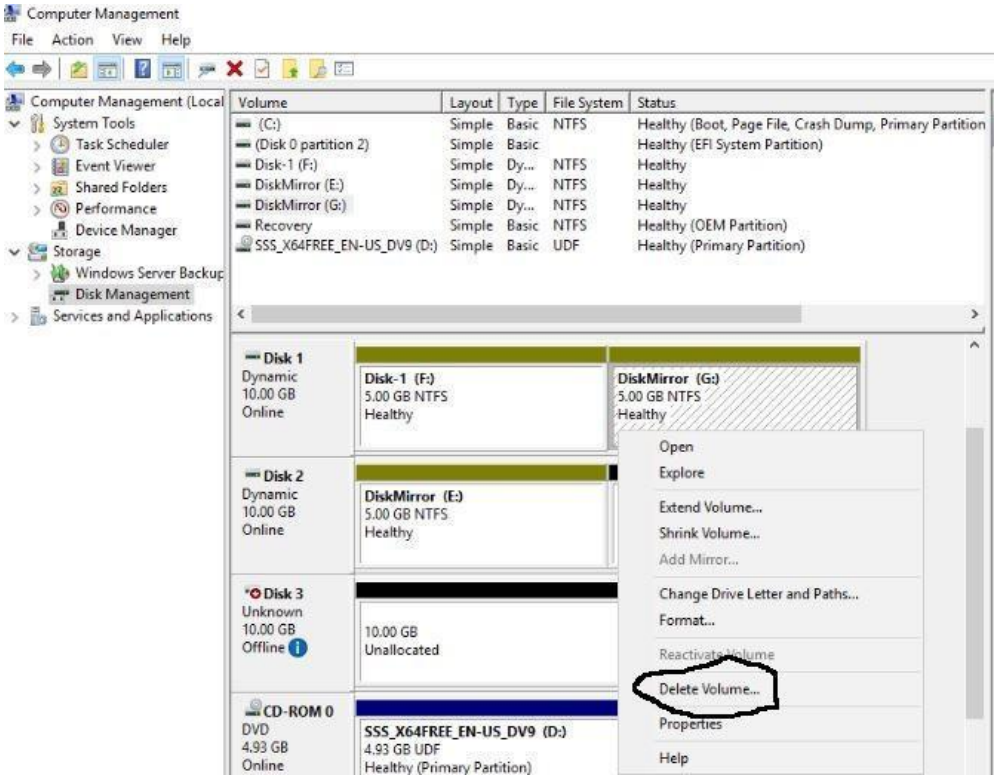
1. Log on as ***Administrator***.
2. Open the **Disk Management** snap-in if it is not already open.
3. Right-click anywhere within the **DiskMirror** volume and select **Break Mirrored Volume …**



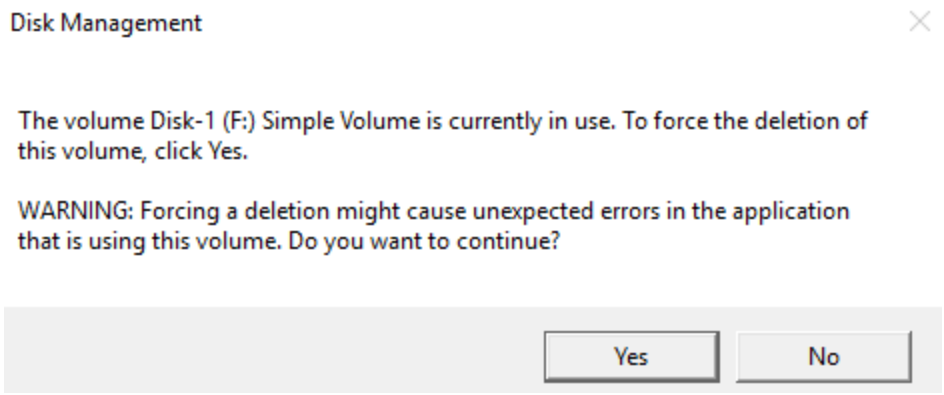
4. Read the Disk Management warning and click **Yes.**



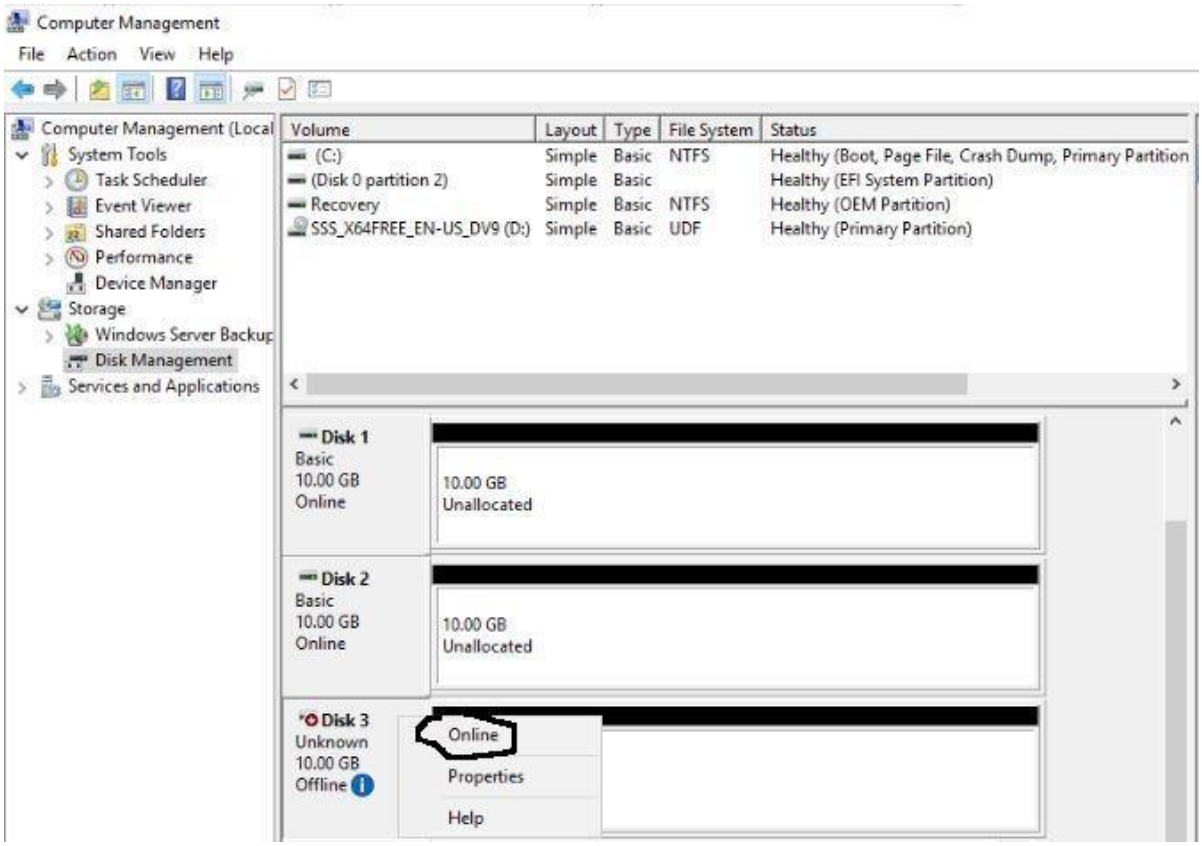
5. Open a command prompt window and type: **dir g:** and press **Enter**. You will notice that DiskMirror.txt is still there on the G: drive. Although you broke the mirror, it did not delete the data, it just removed the redundancy. If you type dir h:\, you will probably see another copy of the DiskMirror.txt file.
6. Take a **screenshot** (PrtScr#4).
7. Return to the Disk Management console and right-click **DiskMirror** on Disk 2 and select **Delete Volume …**



8. Click on **Yes** to confirm the deletion.
9. Repeat **Step 8** on **Disk 1** to delete **Disk-1** volume and the **DiskMirror** volume. If you receive a warning message about deleting the Disk-1 volume, click **Yes**.

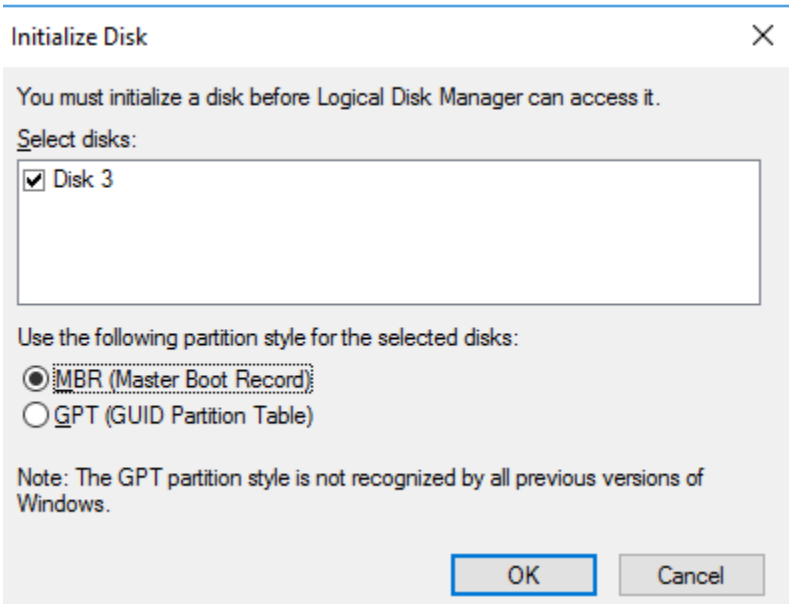


10. Right-click Disk 3 and select **Online.**

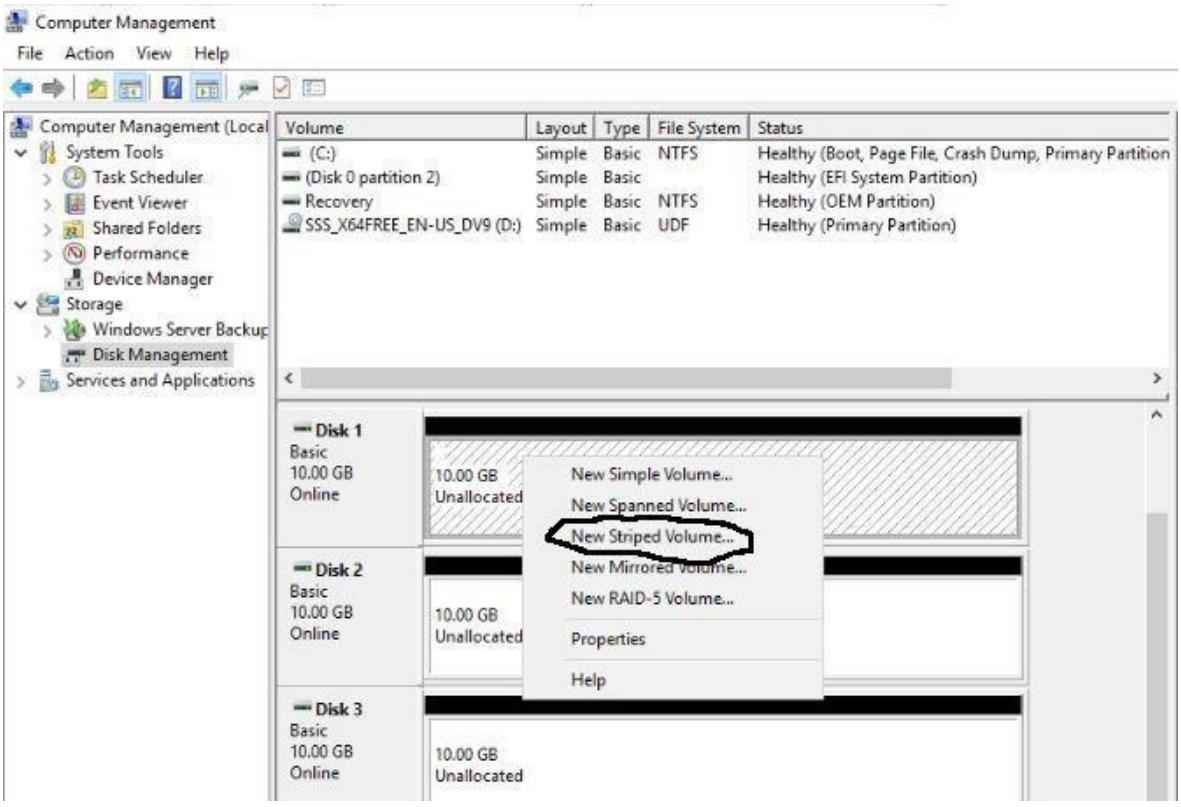


11. Right-click **Disk 3** and select **Initialize Disk**.

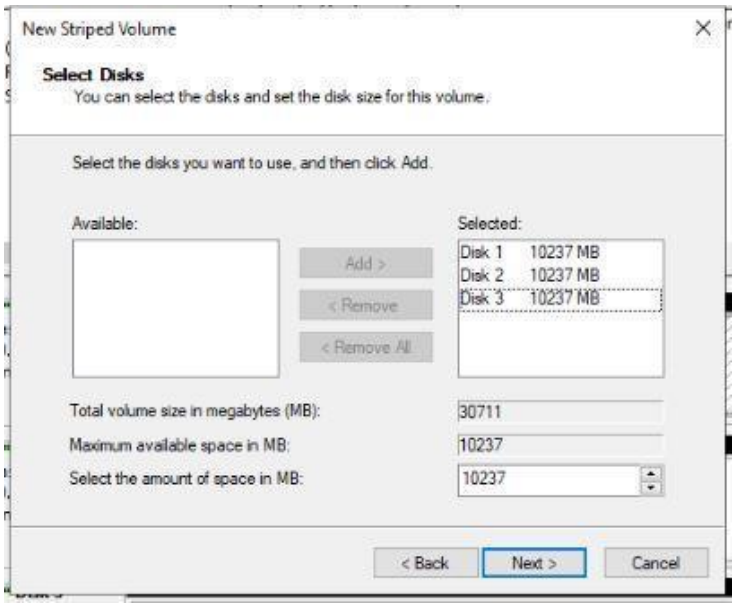
12. In the initialize Disk pop-up dialog box, select **MBR (Master Boot Record)** and click **OK.**



13. Scroll up and right-click in the **Unallocated** space of **Disk 1** and select **New Striped Volume**. Click **Next** on the Welcome screen.

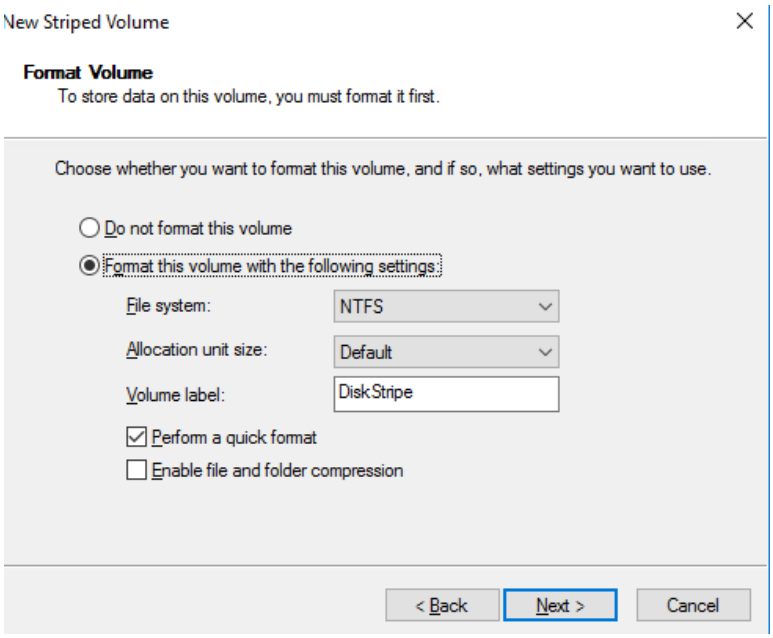


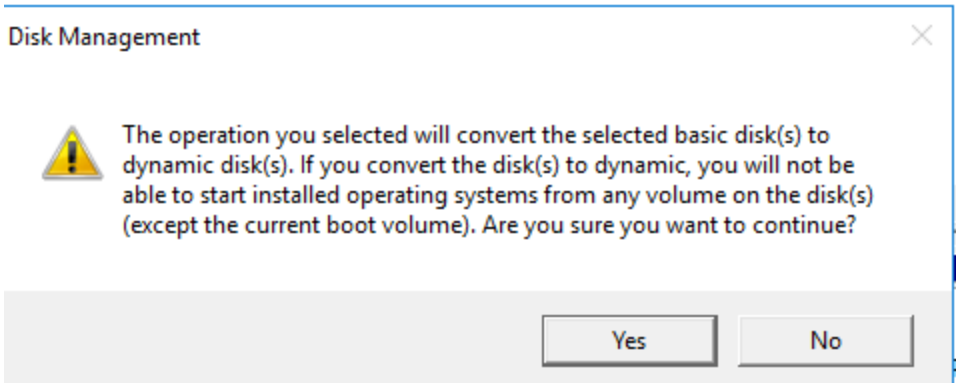
14. On the **Select Disks** screen, click on each available disk in the left pane and add them to the **Selected** column and click **Next.**



15. On the **Assign Drive Letter or Path** screen, select **F:** and click Next.

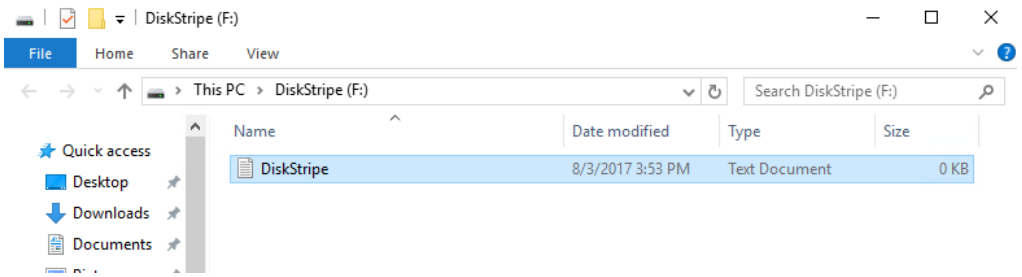
16. On the **Format Volume** screen, enter **DiskStripe** in the volume label box and check **Perform a quick format** and click **Next**. Then click **Finish**. There will be a message that will pop up stating that the disks will be converted to dynamic disks. Click **Yes** to proceed.



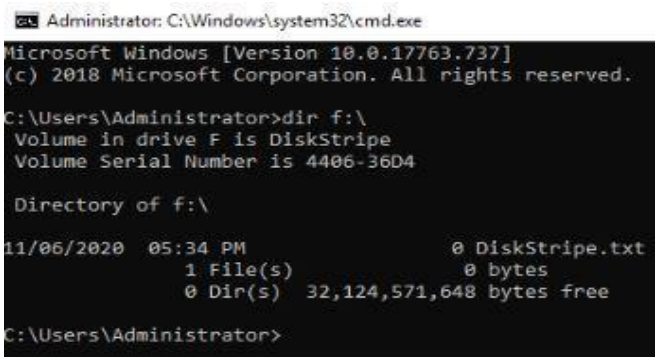


17. Click anywhere on **Disk 1, 2, or 3** and select **Explore**.

18. Create a new text file named: **DiskStripe**. Close File Explorer.



19. Open a command prompt and type: **dir f:** and press **Enter**. You should see the **DiskStripe** file you just created. If you receive an error message that says **"The system cannot find the path specified"**, return to the **Disk Management** console and determine the correct drive letter for the striped volume and try again.



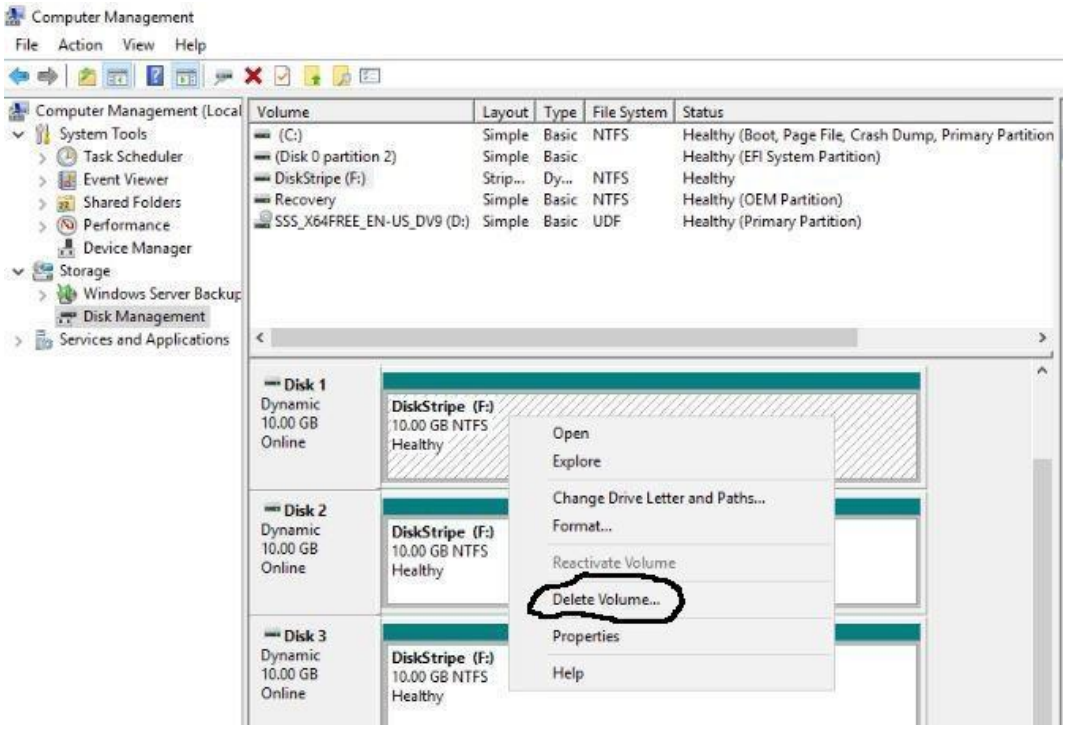
20. In Disk Management, take a **screenshot** of your new RAID0 disk stripe volume (PrtScr#5).

21. Minimize the command prompt window and close File Explorer and return to the Disk Management console for the next activity.

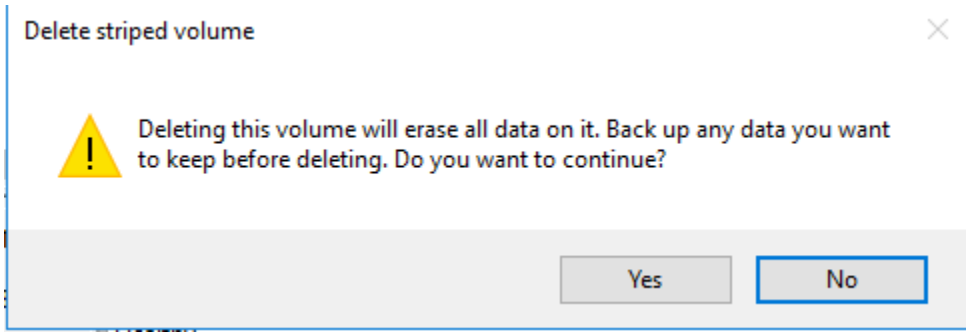
Part 6

Purpose of Activity: In this activity, you will use the Disk Management console to create a RAID-5 disk stripe for redundancy.

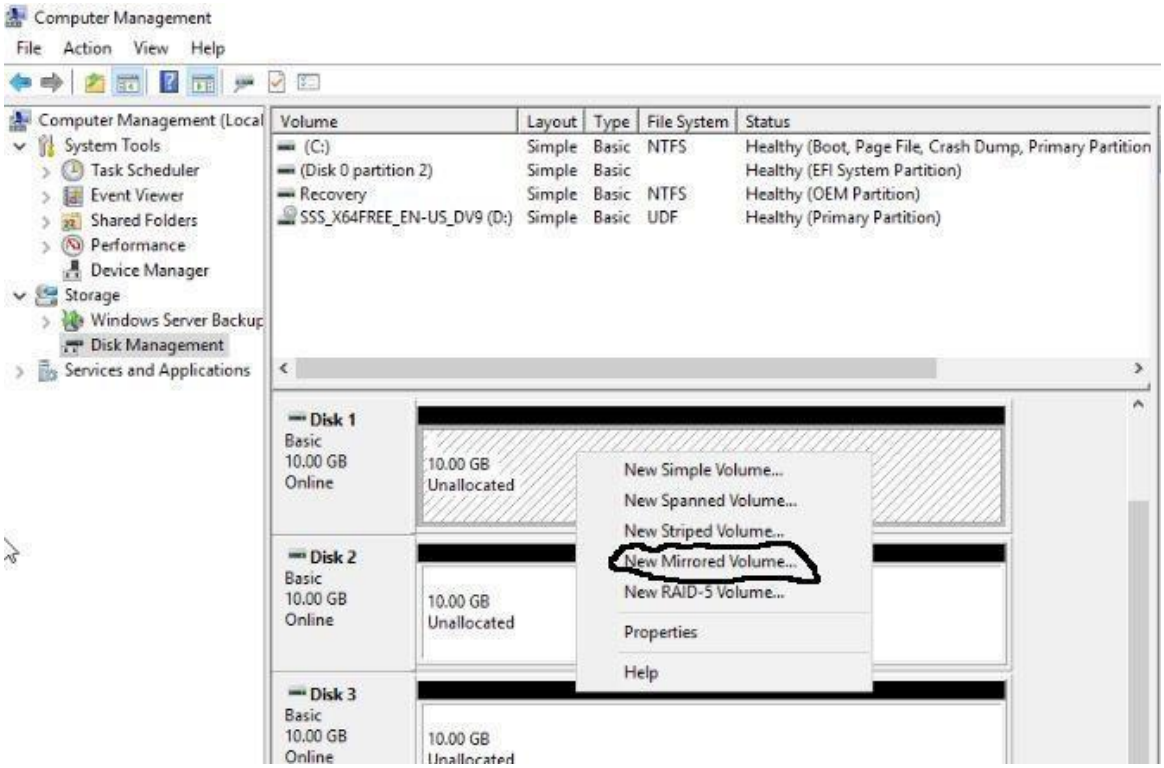
1. Log on as ***Administrator***.
2. Open the **Disk Management** snap-in if it is not already open.
3. Right-click anywhere within the **DiskStripe (F:)** volume and select **Delete Volume.**



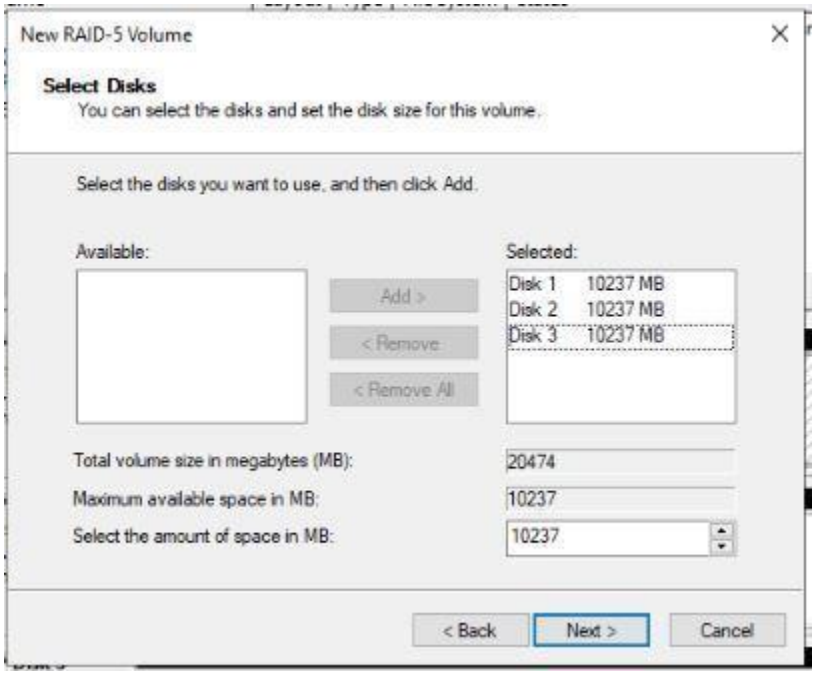
4. Click **Yes** on the pop-up warning dialog box.



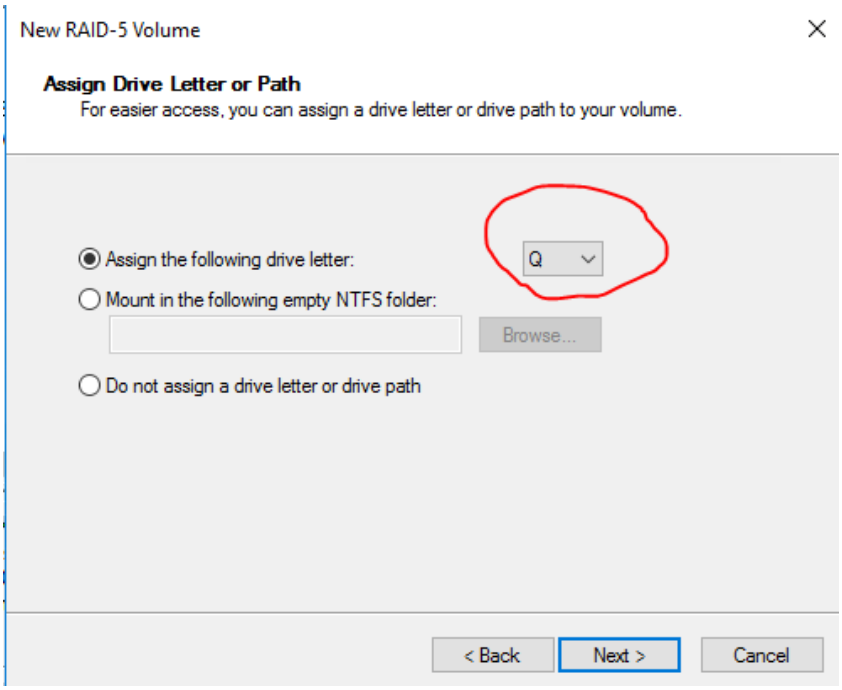
5. Scroll up and right-click in the **Unallocated** space of **Disk 1** and select **New RAID-5 Volume**. Click **Next** on the Welcome screen.



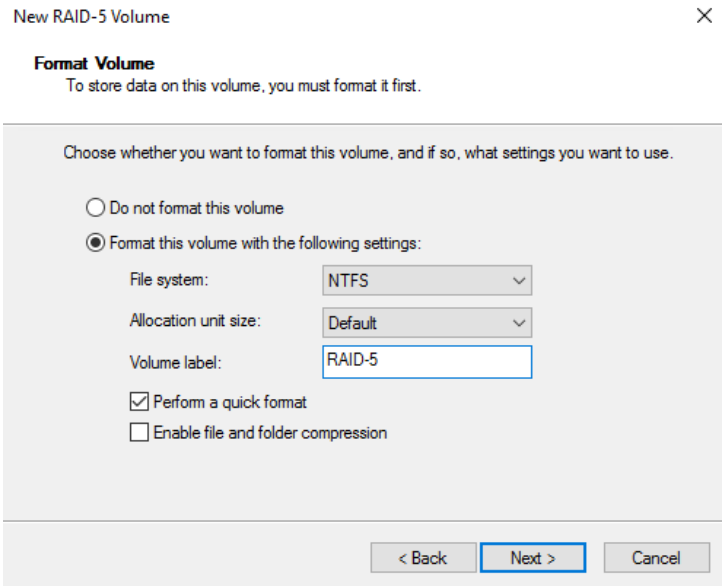
6. On the **Select Disks** screen, click on each available disk in the left pane and add them to the **Selected** column and click **Next.**

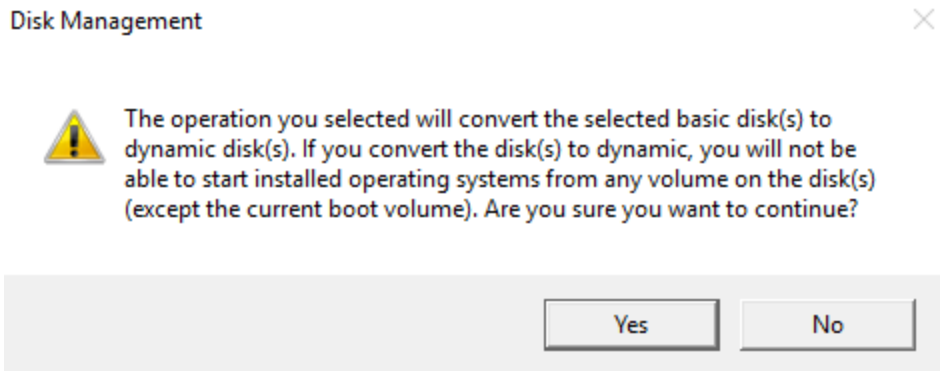


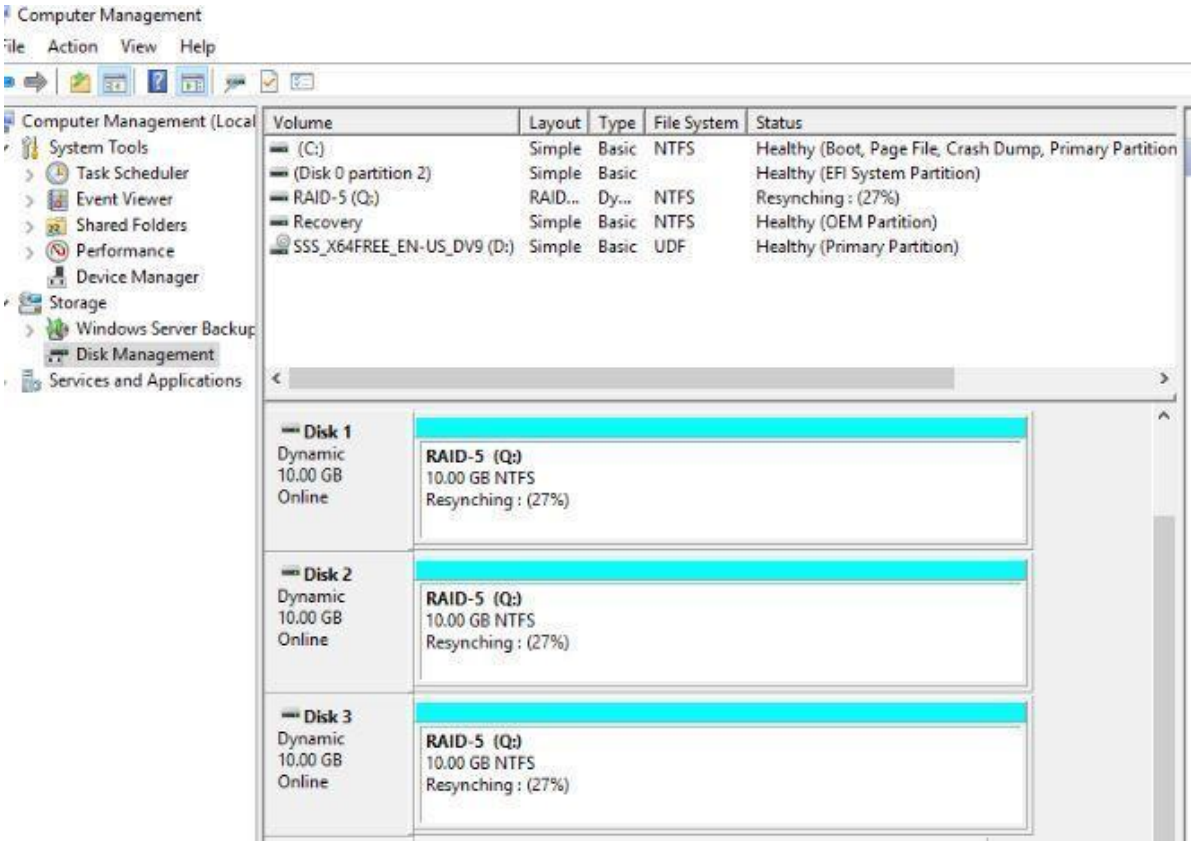
7. On the **Assign Drive Letter or Path** screen, pull down the drive letter down arrow and select drive **Q** and click **Next**.



8. On the **Format Volume** screen, enter **RAID-5** in the volume label box and check **Perform a quick format** and click **Next**. Then click **Finish**. There will be a message that will pop up stating that the disks will be converted to dynamic disks. Click **Yes** to proceed. The disks will format and then start **Resynching** which may take quite some time to complete.



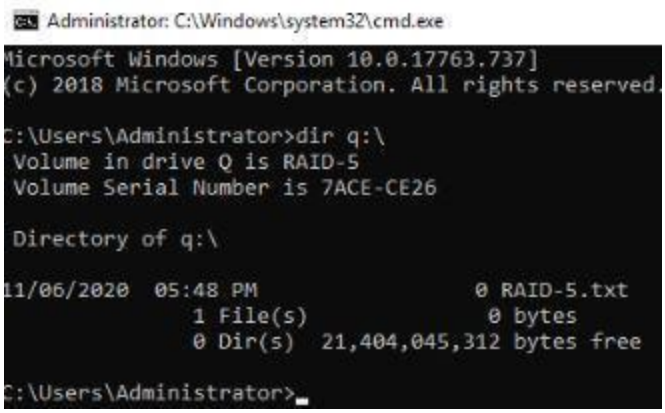




9. While the drives are still resynching, click anywhere on **Disk 1, 2, or 3** and select **Explore**.

10. Create a new text file named: **RAID-5**. Close File Explorer.

11. Open a command prompt and type: **dir Q:** and press **Enter**. You should see the **RAID-5** file you just created.



12. In Disk Management, take a **screenshot** of your new RAID5 volume (PrtScr#6). Upload all screenshots.

13. Close all open windows and sign out.

Reflection

- Is RAID0 fault tolerant?
- Which is better, hardware or software RAID? (Hint: Google the question)

Rubric

Checklist/Single Point Mastery

Concerns Working Towards Proficiency	Criteria Standards for This Competency	Accomplished Evidence of Mastering Competency
	Criteria #1: In Disk Management, take a screenshot of your new simple volume (PrtScr#1) (15 points)	
	Criteria #2: Take a screenshot of your new volume MountPoint (PrtScr#2) (15 points)	
	Criteria #3: In Disk Management, take a screenshot of your new RAID1 Mirrored volume (PrtScr#3) (15 points)	
	Criteria #4: Take a screenshot of your new broken mirrored volume (PrtScr#4) (15 points)	
	Criteria #5: In Disk Management, take a screenshot of your new RAID0 disk stripe volume (PrtScr#5) (15 points)	

	Criteria #6: In Disk Management, take a screenshot of your new RAID5 volume (PrtScr#6) (15 points)	
	Criteria #7: Answer reflection questions in a text file (10 points)	