Ex No: 10   **Creation of VHD on Windows and restoring on different host**

22/09/25

AIM:

To create a VHD on Windows and restore it on a different host.

THEORY:

- VHD (Virtual Hard Disk) is a file that emulates a physical hard disk.
- It can store entire file systems, partitions, and data like a real disk.
- Used for virtual machines, backups, and testing environments.
- Can be mounted on Windows to access data without a VM.
- Supports portability: a VHD created on one host can be restored on another.
- Two types: VHD (older, ≤ 2 TB) and VHDX (newer, ≥ 2 TB, more resilient).
- Can be dynamic (grows as used) or fixed (preallocated size).

PROCEDURE:

Step 1: Creating a VHD
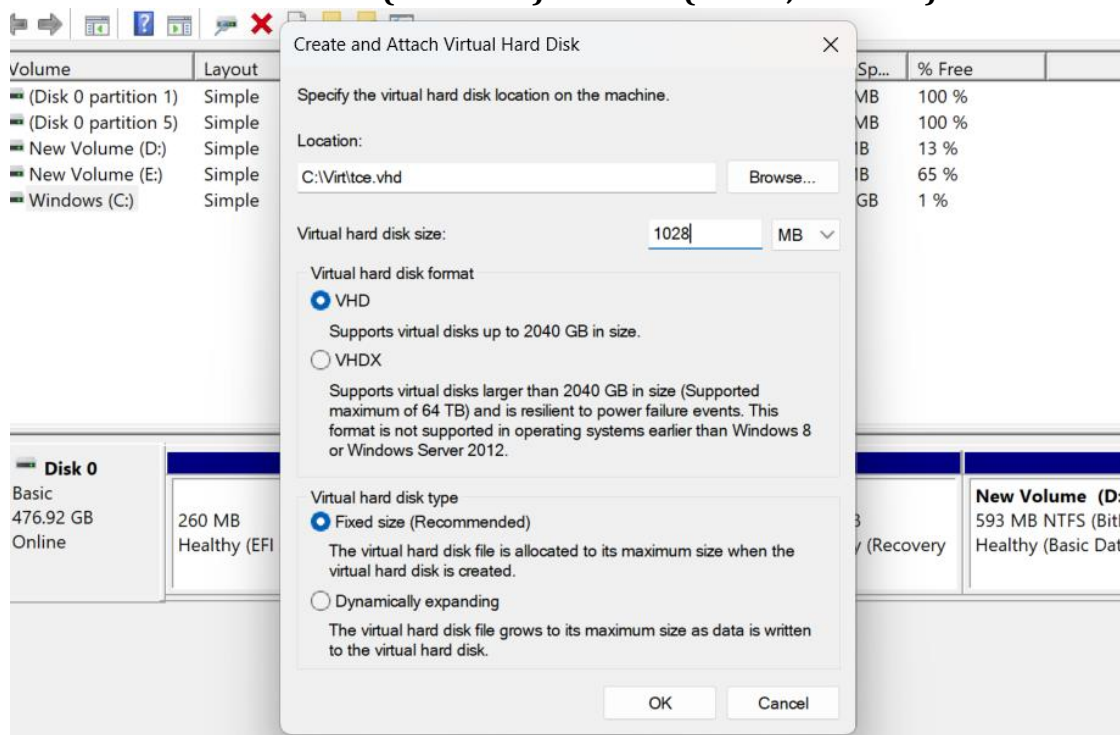
1. Press Win + R, type *diskmgmt.msc,* press Enter.
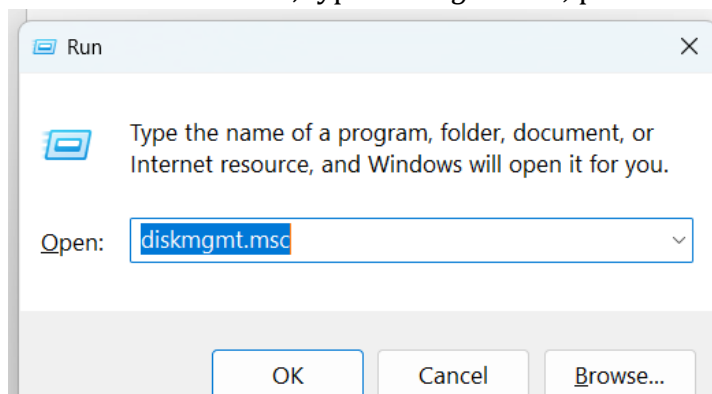
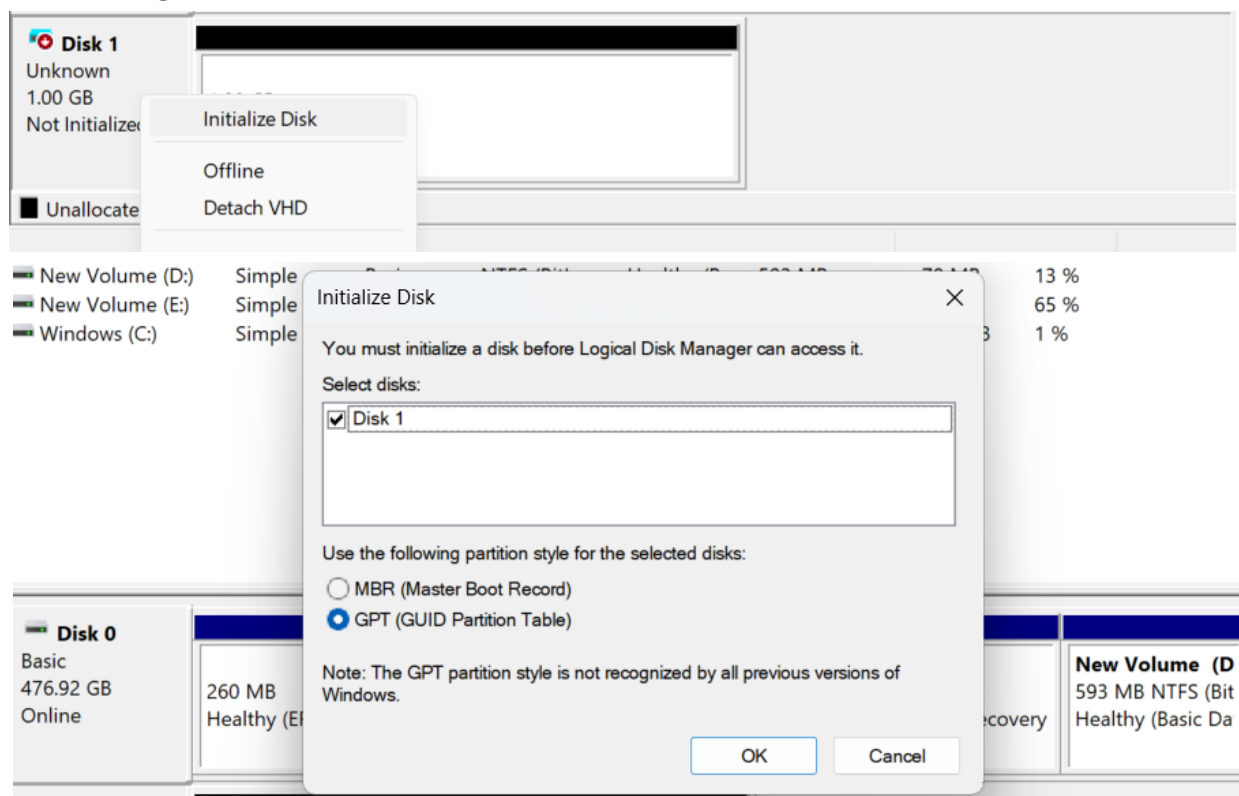2. Click **Action → Create VHD**.
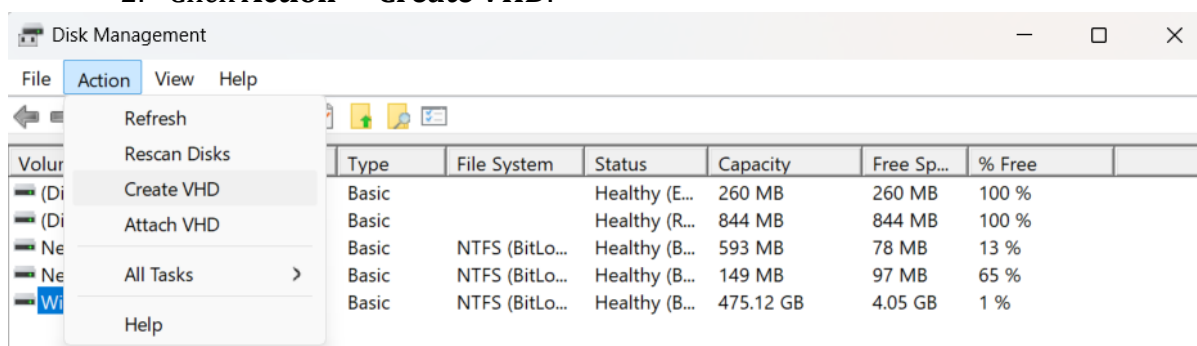
3. In the dialog:
   - Specify **location** to save the .vhd file.
   - Specify **size** (e.g., 1024 MB).
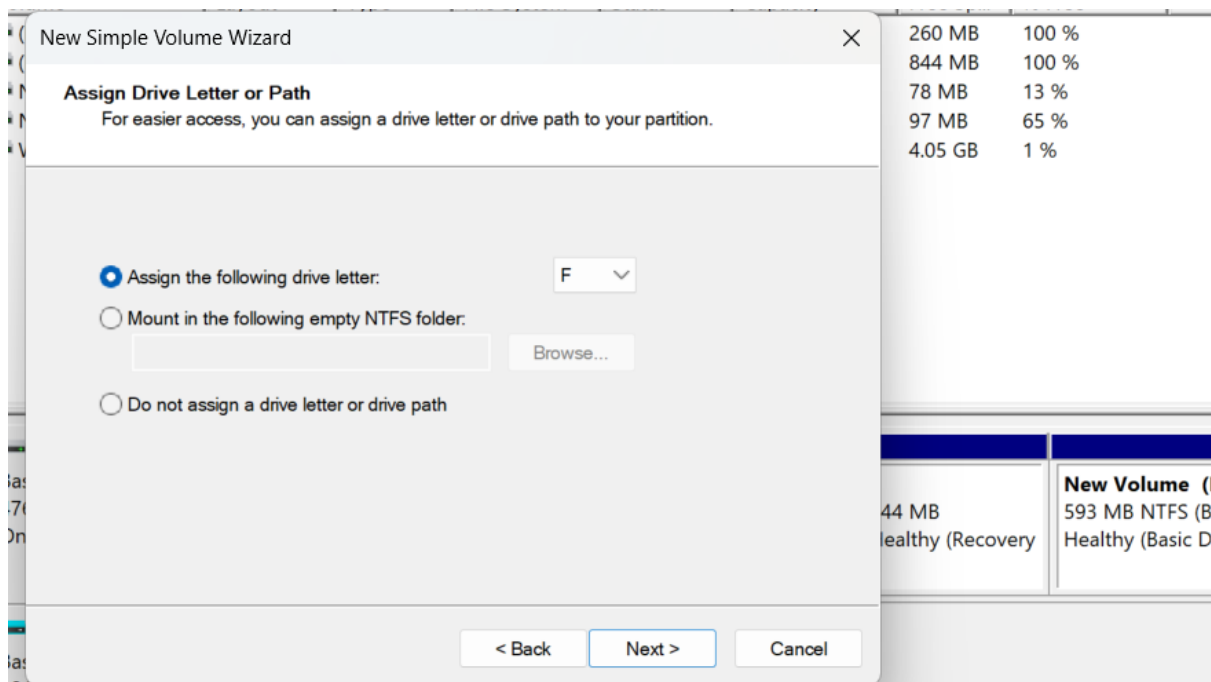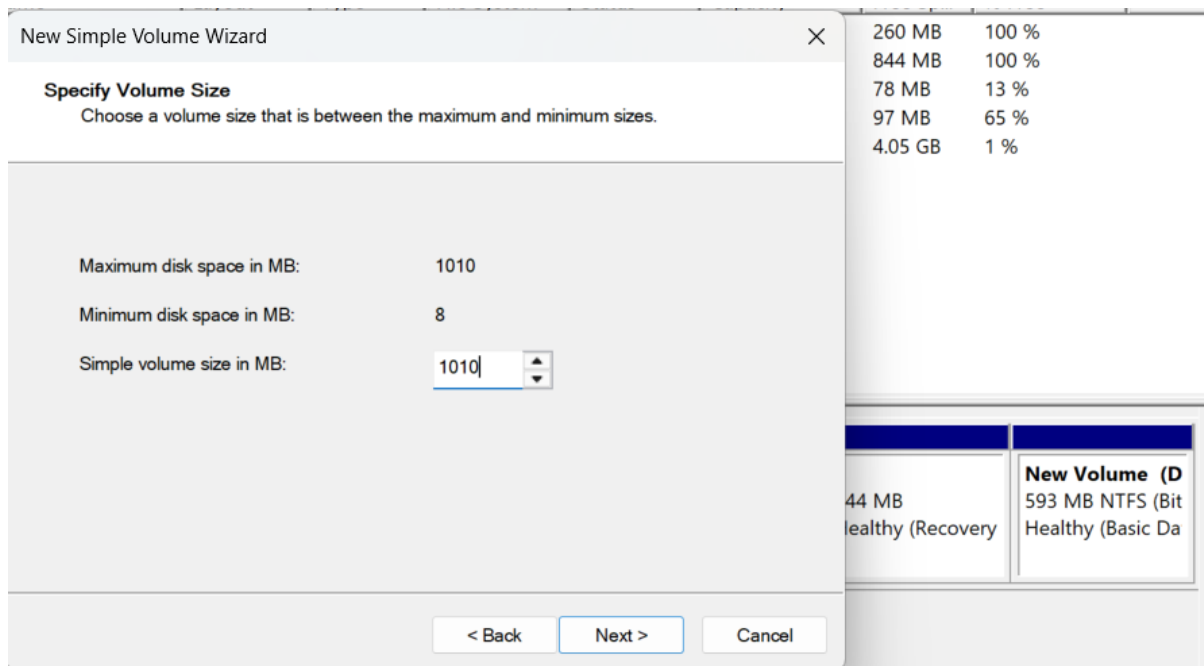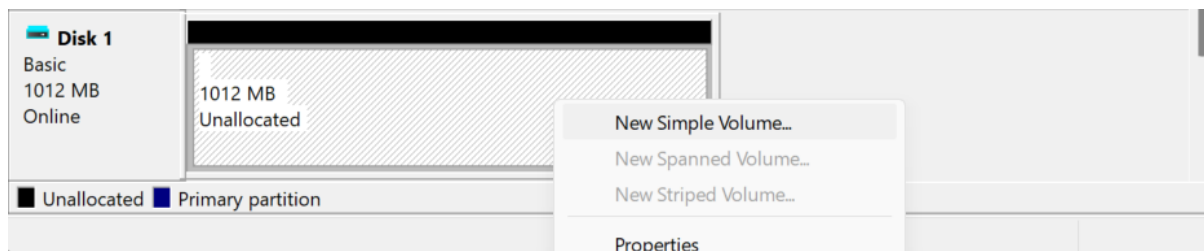   - Choose **VHD (fixed size)** or **VHDX (better, resilient)**.
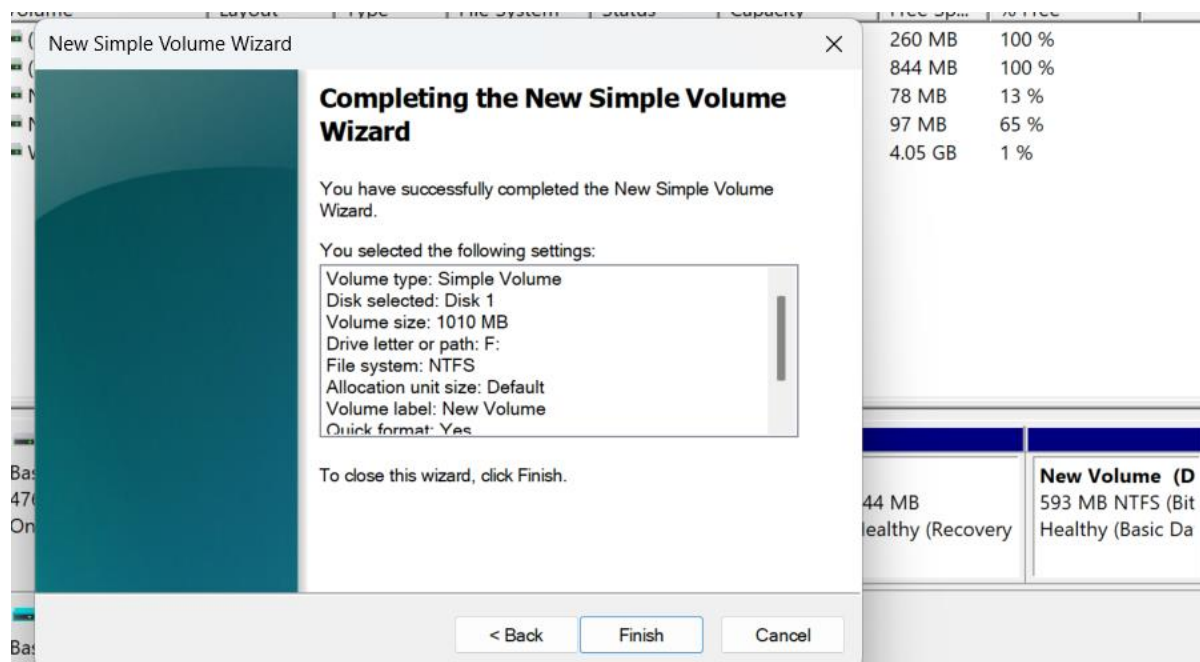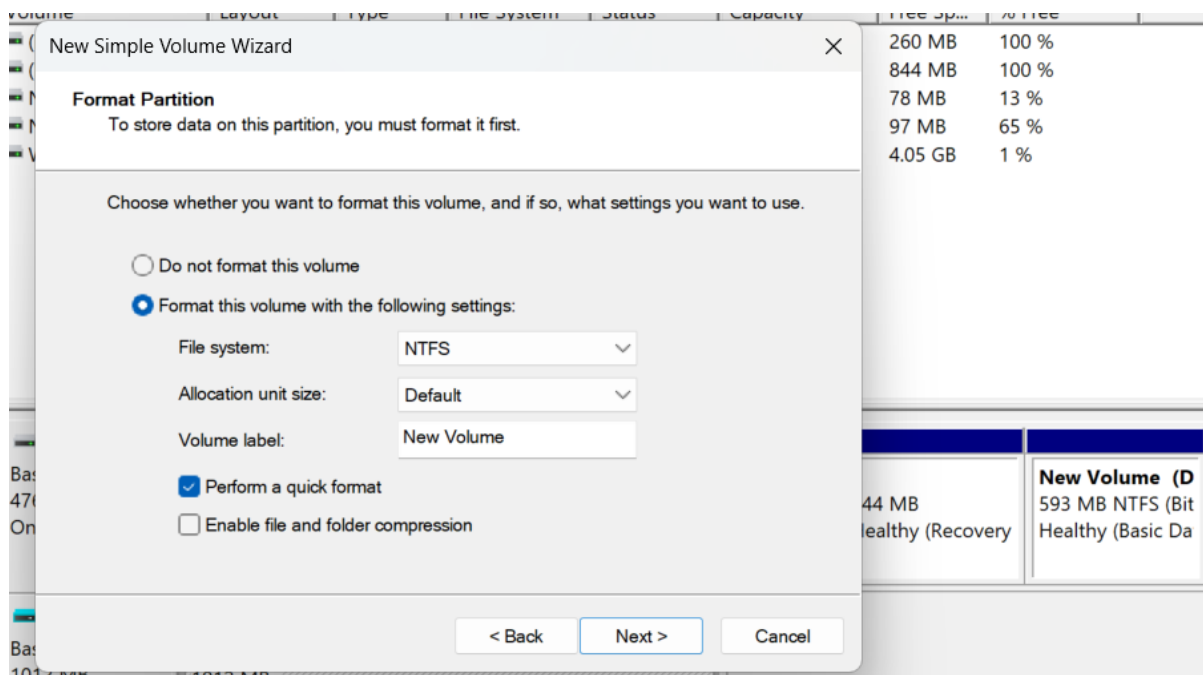

4. Click **OK**.
5. The VHD appears as an uninitialized disk.
6. Right-click the new disk → **Initialize Disk** → choose GPT or MBR.

7. Right-click unallocated space → **New Simple Volume** → assign drive letter → format as NTFS.

Disk 1
Basic
1012 MB
Online

1012 MB
Unallocated

New Simple Volume...
New Spanned Volume...
New Striped Volume...

Properties

■ Unallocated ■ Primary partition

New Simple Volume Wizard ✕

Specify Volume Size
Choose a volume size that is between the maximum and minimum sizes.

260 MB 100 %
844 MB 100 %
78 MB 13 %
97 MB 65 %
4.05 GB 1 %

Maximum disk space in MB: 1010

Minimum disk space in MB: 8

Simple volume size in MB: 1010

New Volume (D
44 MB 593 MB NTFS (Bit
lealthy (Recovery Healthy (Basic Da

< Back   Next >   Cancel

New Simple Volume Wizard ✕

Assign Drive Letter or Path
For easier access, you can assign a drive letter or drive path to your partition.

260 MB 100 %
844 MB 100 %
78 MB 13 %
97 MB 65 %
4.05 GB 1 %

◉ Assign the following drive letter: F ˅
○ Mount in the following empty NTFS folder:
                                          Browse...
○ Do not assign a drive letter or drive path

New Volume (
44 MB 593 MB NTFS (B
lealthy (Recovery Healthy (Basic D

< Back   Next >   Cancel

New Simple Volume Wizard

Format Partition
To store data on this partition, you must format it first.

	260 MB	100 %
	844 MB	100 %
	78 MB	13 %
	97 MB	65 %
	4.05 GB	1 %

Choose whether you want to format this volume, and if so, what settings you want to use.

○ Do not format this volume

● Format this volume with the following settings:

File system:	NTFS ▾
Allocation unit size:	Default ▾
Volume label:	New Volume

☑ Perform a quick format
☐ Enable file and folder compression

[< Back] [Next >] [Cancel]

New Volume (D
593 MB NTFS (Bit
Healthy (Basic Da

44 MB
ealthy (Recovery

New Simple Volume Wizard ✕

Completing the New Simple Volume Wizard

You have successfully completed the New Simple Volume Wizard.

You selected the following settings:

Volume type: Simple Volume
Disk selected: Disk 1
Volume size: 1010 MB
Drive letter or path: F:
File system: NTFS
Allocation unit size: Default
Volume label: New Volume
Quick format: Yes

To close this wizard, click Finish.

[< Back] [Finish] [Cancel]

	260 MB	100 %
	844 MB	100 %
	78 MB	13 %
	97 MB	65 %
	4.05 GB	1 %

New Volume (D
593 MB NTFS (Bit
Healthy (Basic Da

44 MB
ealthy (Recovery

Disk Management — □ ✕

File   Action   View   Help

Volume	Layout	Type	File System	Status	Capacity	Free Sp...	% Free	
(Disk 0 partition 1)	Simple	Basic		Healthy (E...	260 MB	260 MB	100 %	
(Disk 0 partition 5)	Simple	Basic		Healthy (R...	844 MB	844 MB	100 %	
New Volume (D:)	Simple	Basic	NTFS (BitLo...	Healthy (B...	593 MB	78 MB	13 %	
New Volume (E:)	Simple	Basic	NTFS (BitLo...	Healthy (B...	149 MB	97 MB	65 %	
New Volume (F:)	Simple	Basic	NTFS	Healthy (B...	1010 MB	995 MB	99 %	
Windows (C:)	Simple	Basic	NTFS (BitLo...	Healthy (B...	475.12 GB	4.05 GB	1 %	

Now your VHD is ready and can be used like a normal drive.
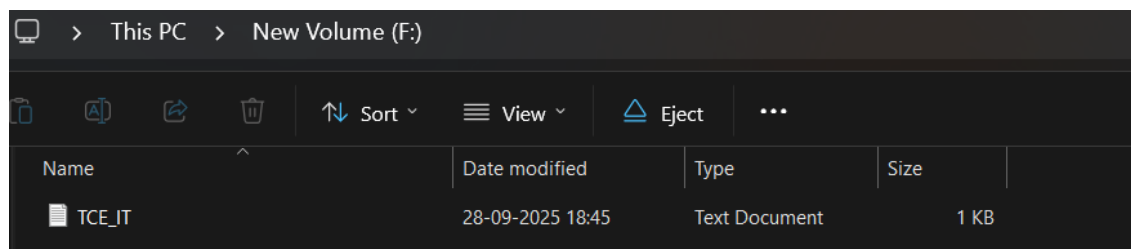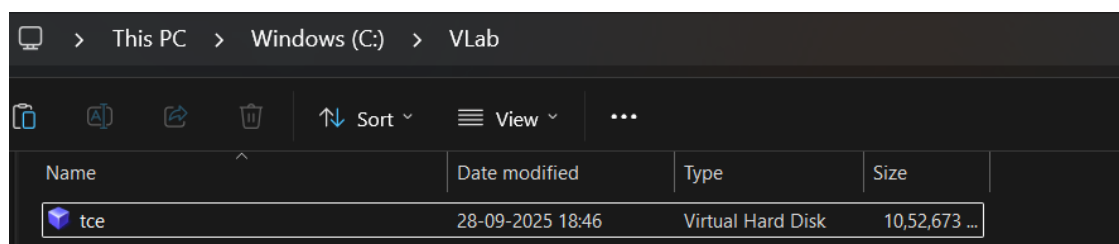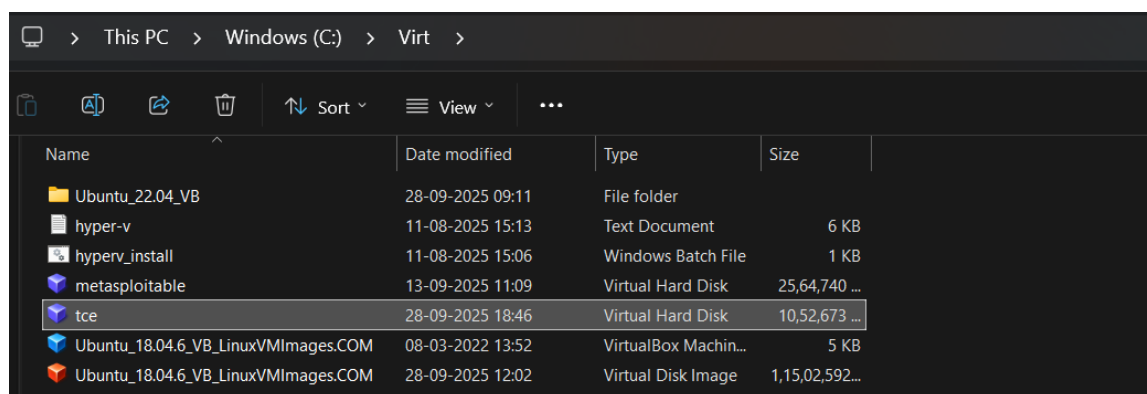

Step 2: Copying the VHD to Another Host

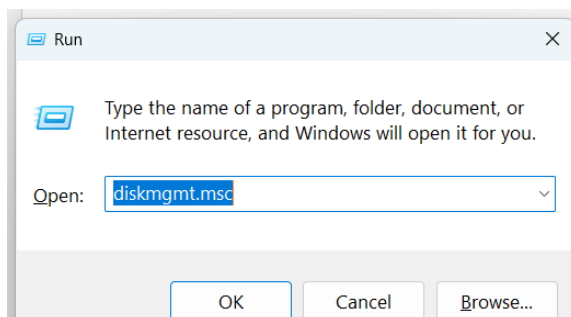1. Ensure the VHD file is **detached/unmounted**
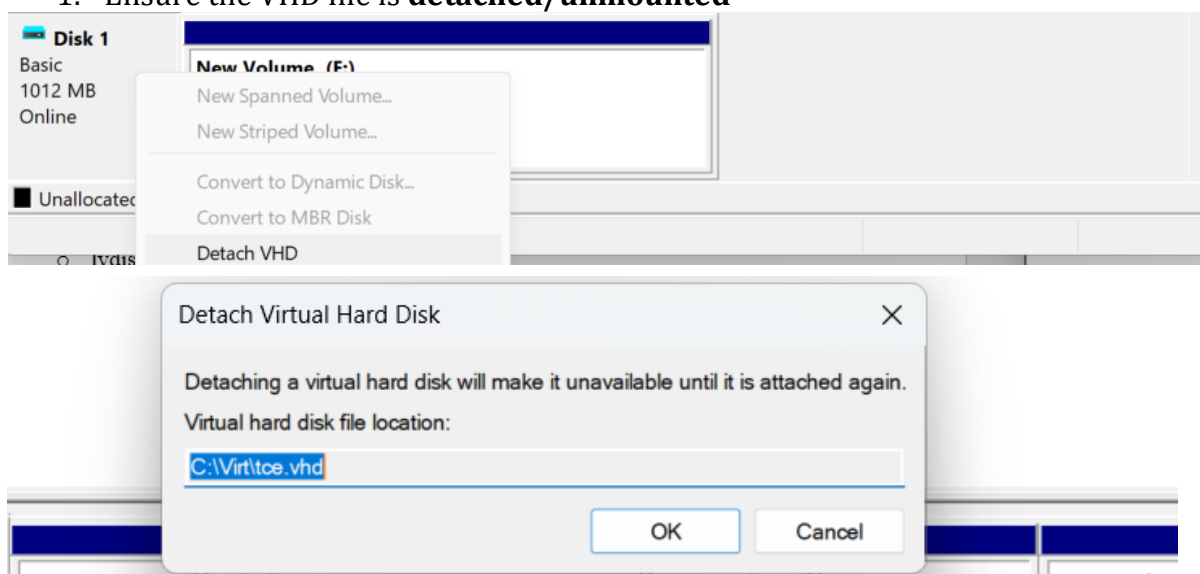
2. Copy the .vhdx (or .vhd) file to the destination host via:
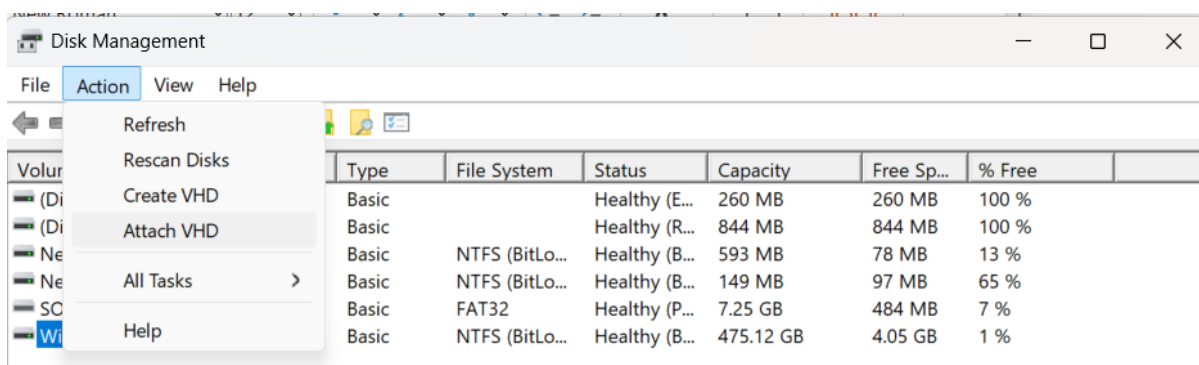   External USB / Network share /Cloud storage

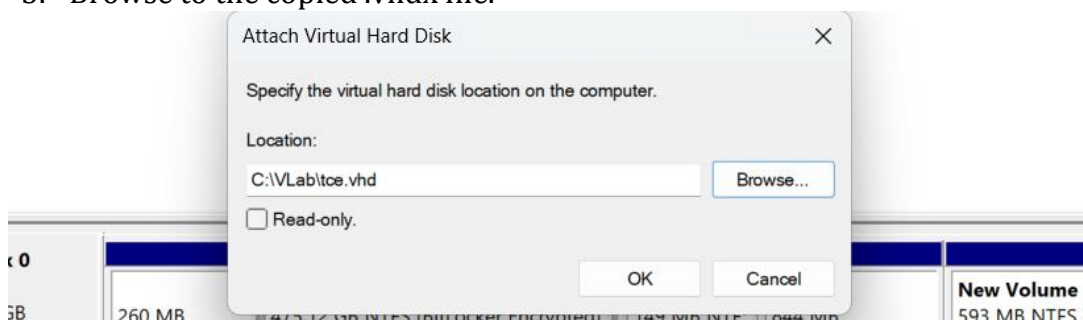**Step 3: Restoring / Mounting the VHD on a Different Host**
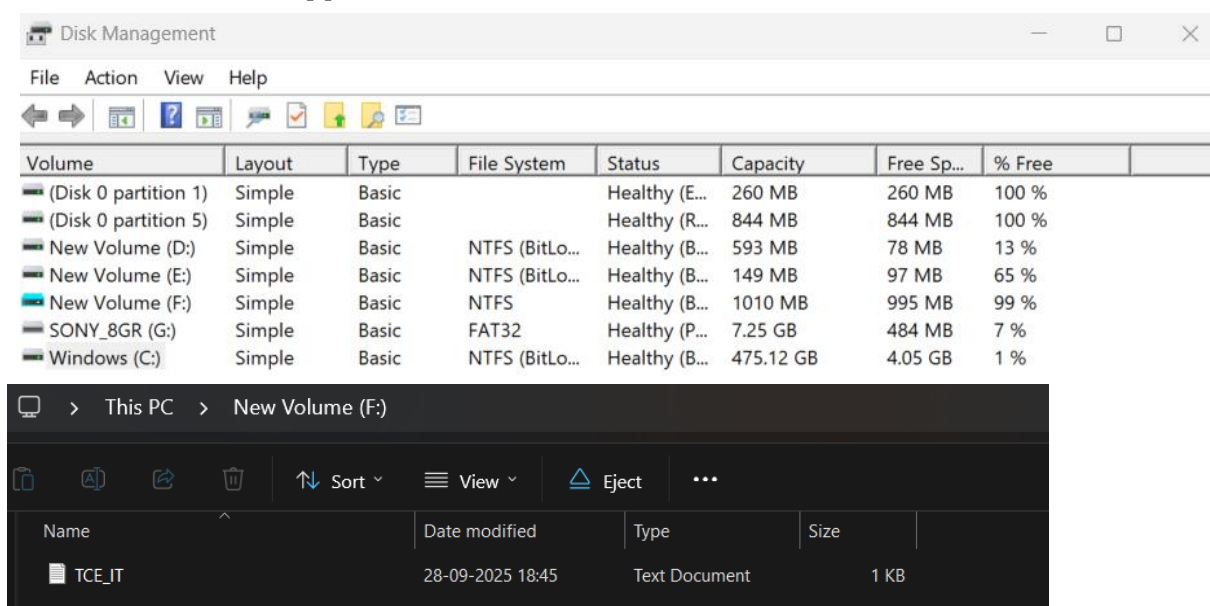1. On the destination host, open **Disk Management** (diskmgmt.msc).

2. Click **Action → Attach VHD**.

3. Browse to the copied .vhdx file.

4. The VHD will appear as a new drive with the same data.
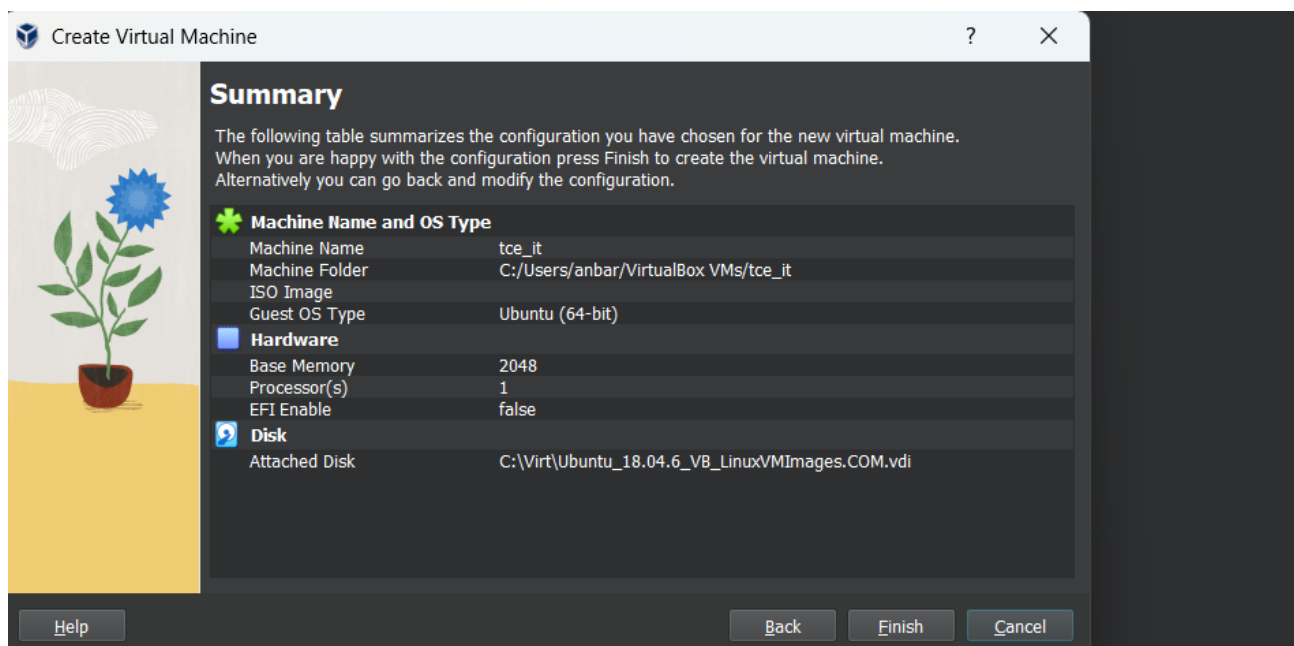
Storage Virtualization

Step 1: Create a VM and Add Additional Storage
➢ **Create a Linux VM**
- Open **VirtualBox** → Click **New** → Enter VM Name, Type = Linux, Version = ubuntu.
- Allocate **RAM** (e.g., 2–4 GB).
- **Hard Disk**: Select **"Use an existing virtual hard disk file"**.
- Browse and select your **VDI file**.
- Click **Finish**.

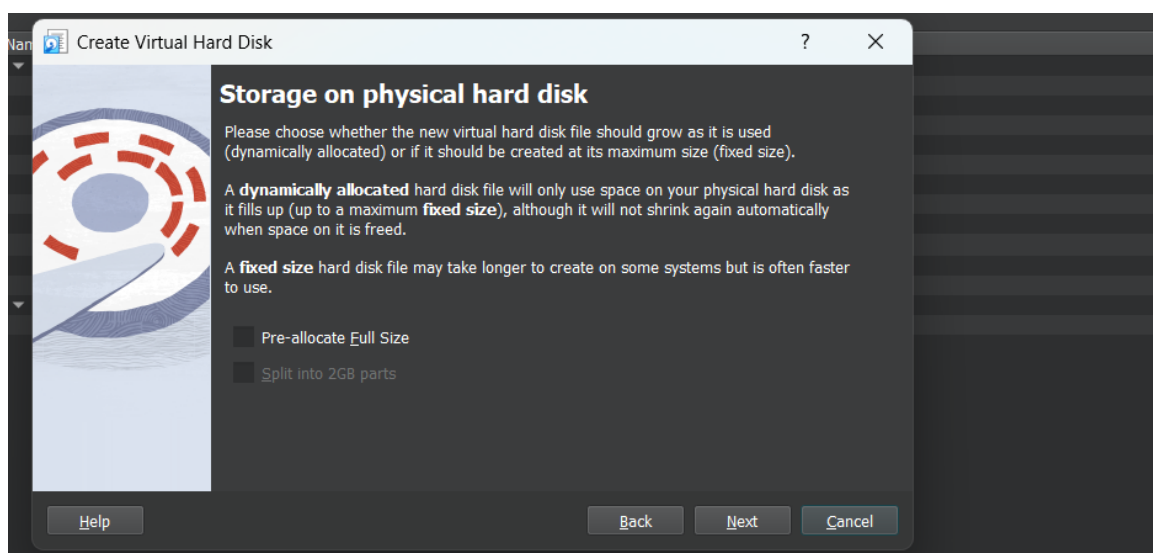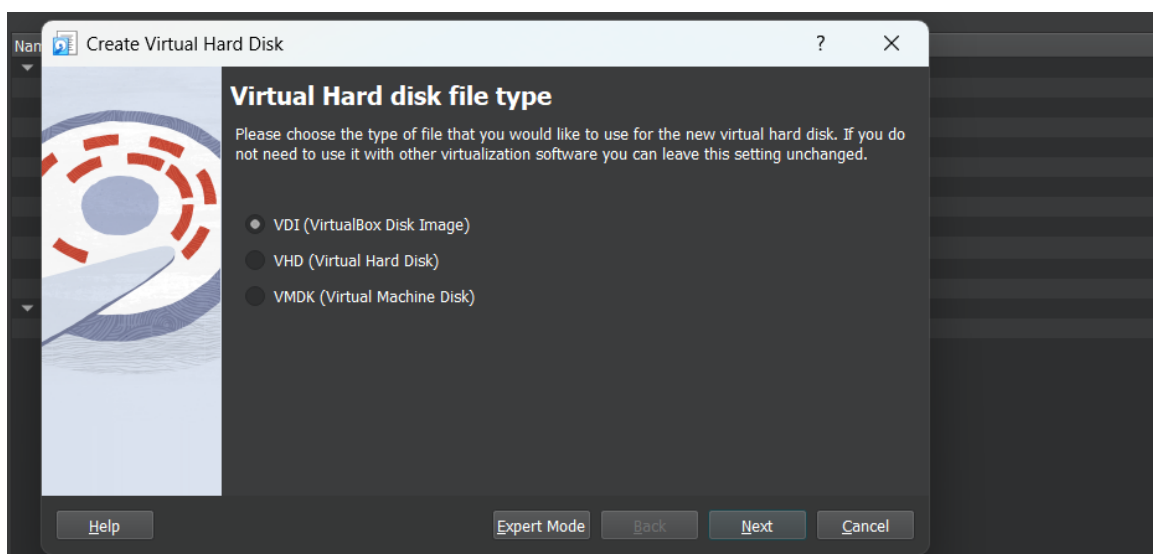➢ **Add an Additional Virtual Disk**
- This disk will be used for extending storage via LVM.
- In **VirtualBox**:
  1. Select the VM → **Settings → Storage**.
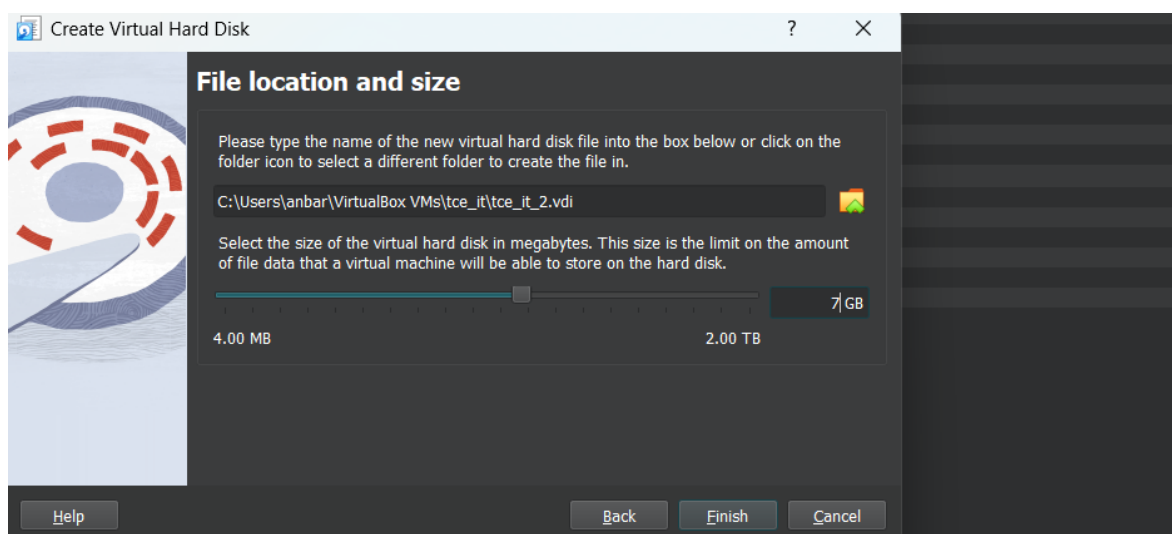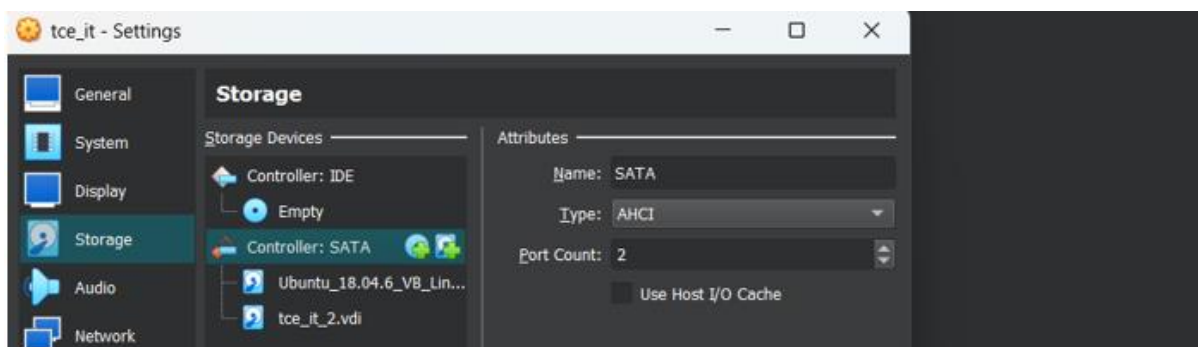 2. Click the **Controller: SATA → Add Hard Disk → Create New Disk**.
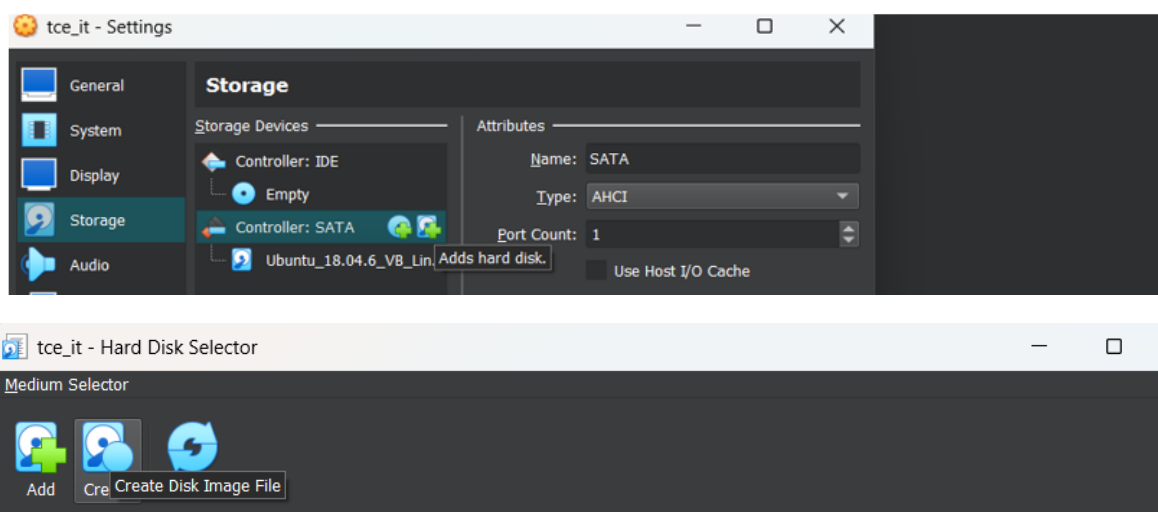
3. Choose **VDI** (VirtualBox Disk Image), **Dynamically allocated**, size = 7 GB.

4. Click **Finish**.

Step 2: Start the VM and Login as Root

```
ubuntu@ubuntu1804:~$ sudo -s
```

Step 3: Check Existing Disks and LVM
 # List all disks
fdisk -l

```
root@ubuntu1804:~# fdisk -l
Disk /dev/loop0: 2.5 MiB, 2621440 bytes, 5120 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes


Disk /dev/loop1: 65.1 MiB, 68259840 bytes, 133320 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes


Disk /dev/loop2: 61.8 MiB, 64770048 bytes, 126504 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disk /dev/sda: 512 GiB, 549755813888 bytes, 1073741824 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0x67451bf8

Device     Boot Start        End     Sectors  Size Id Type
/dev/sda1  *     2048 1073739775 1073737728  512G 8e Linux LVM


Disk /dev/sdb: 7 GiB, 7516192768 bytes, 14680064 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
```

 # List physical volumes
pvdisplay

```
root@ubuntu1804:~# pvdisplay
  --- Physical volume ---
  PV Name               /dev/sda1
  VG Name               ubuntu-vg
  PV Size               <512.00 GiB / not usable 2.00 MiB
  Allocatable           yes (but full)
  PE Size               4.00 MiB
  Total PE              131071
  Free PE               0
  Allocated PE          131071
  PV UUID               3F4Ims-mipI-J39Z-Lt6e-d2dv-a2Fz-wUzCld
```

 # List volume groups
vgdisplay

```
root@ubuntu1804:~# vgdisplay
  --- Volume group ---
  VG Name               ubuntu-vg
  System ID
  Format                lvm2
  Metadata Areas        1
  Metadata Sequence No  3
  VG Access             read/write
  VG Status             resizable
  MAX LV                0
  Cur LV                2
  Open LV               2
  Max PV                0
  Cur PV                1
  Act PV                1
  VG Size               <512.00 GiB
  PE Size               4.00 MiB
  Total PE              131071
  Alloc PE / Size       131071 / <512.00 GiB
  Free  PE / Size       0 / 0
  VG UUID               3Mvbsr-MdcR-wlWG-r4GS-nouT-AMmM-33sdPM
```

 # List logical volumes
lvdisplay

```
root@ubuntu1804:~# lvdisplay
  --- Logical volume ---
  LV Path               /dev/ubuntu-vg/root
  LV Name               root
  VG Name               ubuntu-vg
  LV UUID               gDvWb8-E4oV-ogjV-UDT7-wx2V-gbCk-Z0FRjv
  LV Write Access       read/write
  LV Creation host, time ubuntu, 2022-03-07 23:20:07 -0500
  LV Status             available
  # open                1
  LV Size               <511.04 GiB
  Current LE            130826
  Segments              1
  Allocation            inherit
  Read ahead sectors    auto
  - currently set to    256
  Block device          253:0
```

```
--- Logical volume ---
LV Path                /dev/ubuntu-vg/swap_1
LV Name                swap_1
VG Name                ubuntu-vg
LV UUID                PL8auK-uz9c-Wzlf-mCYt-Xcnl-SLki-7qcjWu
LV Write Access        read/write
LV Creation host, time ubuntu, 2022-03-07 23:20:07 -0500
LV Status              available
# open                 2
LV Size                980.00 MiB
Current LE             245
Segments               1
Allocation             inherit
Read ahead sectors     auto
- currently set to     256
Block device           253:1
```

Step 4: Create Physical Volume

pvcreate /dev/sdb

```
root@ubuntu1804:~# pvcreate /dev/sdb
  Physical volume "/dev/sdb" successfully created.
```

Initializes the new disk for LVM.

Step 5: Extend the Volume Group

vgextend ubuntu-vg /dev/sdb

```
root@ubuntu1804:~# vgextend ubuntu-vg /dev/sdb
  Volume group "ubuntu-vg" successfully extended
```

Replace cloud-vg with your existing Volume Group name.
This adds the new PV to your VG.

Step 6: Extend the Logical Volume (Root)

lvresize --size +3G /dev/ubuntu-vg/root

- +3G → amount of space to add
- /dev/cloud-vg/root → your logical volume

```
root@ubuntu1804:~# lvresize --size +3G /dev/ubuntu-vg/root
  Size of logical volume ubuntu-vg/root changed from <511.04 GiB (130826 extents) to <514.04 GiB
(131594 extents).
  Logical volume ubuntu-vg/root successfully resized.
```

Alternative:
lvextend -L +3G /dev/ubuntu-vg/root

Step 7: Check Current Disk Usage

df -h
Shows current available space on /.

```
root@ubuntu1804:~# df -h
Filesystem                 Size  Used Avail Use% Mounted on
udev                       969M     0  969M   0% /dev
tmpfs                      199M  1.6M  198M   1% /run
/dev/mapper/ubuntu--vg-root 503G  5.9G  471G   2% /
tmpfs                      994M     0  994M   0% /dev/shm
tmpfs                      5.0M  4.0K  5.0M   1% /run/lock
tmpfs                      994M     0  994M   0% /sys/fs/cgroup
/dev/loop0                 2.5M  2.5M     0 100% /snap/gnome-system-monitor/163
/dev/loop3                 768K  768K     0 100% /snap/gnome-characters/741
/dev/loop1                  66M   66M     0 100% /snap/gtk-common-themes/1515
```

```
/dev/loop2                    62M   62M    0 100% /snap/core20/1081
/dev/loop4                   219M  219M    0 100% /snap/gnome-3-34-1804/77
/dev/loop6                   2.5M  2.5M    0 100% /snap/gnome-calculator/884
/dev/loop7                   640K  640K    0 100% /snap/gnome-logs/106
/dev/loop8                    56M   56M    0 100% /snap/core18/2284
/dev/loop9                   242M  242M    0 100% /snap/gnome-3-38-2004/70
/dev/loop10                  219M  219M    0 100% /snap/gnome-3-34-1804/72
/dev/loop12                  128K  128K    0 100% /snap/bare/5
/dev/loop11                  249M  249M    0 100% /snap/gnome-3-38-2004/99
/dev/loop13                  2.7M  2.7M    0 100% /snap/gnome-system-monitor/174
/dev/loop14                  2.7M  2.7M    0 100% /snap/gnome-calculator/920
/dev/loop15                   44M   44M    0 100% /snap/snapd/14978
/dev/loop16                   66M   66M    0 100% /snap/gtk-common-themes/1519
/dev/loop17                   62M   62M    0 100% /snap/core20/1361
/dev/loop18                  768K  768K    0 100% /snap/gnome-characters/726
tmpfs                        199M   28K 199M   1% /run/user/121
tmpfs                        199M   40K 199M   1% /run/user/1000
/dev/loop19                   56M   56M    0 100% /snap/core18/2952
/dev/loop20                   51M   51M    0 100% /snap/snapd/25202
```

Step 8: Resize the Filesystem

resize2fs /dev/mapper/cloud--vg-root

```
root@ubuntu1804:~# resize2fs /dev/mapper/ubuntu--vg-root
resize2fs 1.44.1 (24-Mar-2018)
Filesystem at /dev/mapper/ubuntu--vg-root is mounted on /; on-line resizing required
old_desc_blocks = 64, new_desc_blocks = 65
The filesystem on /dev/mapper/ubuntu--vg-root is now 134752256 (4k) blocks long.
```

Resizes the filesystem to use the newly added space.

Step 9: Verify Disk Space

df -h

```
root@ubuntu1804:~# df -h
Filesystem                    Size  Used Avail Use% Mounted on
udev                          969M     0  969M   0% /dev
tmpfs                         199M  1.6M  198M   1% /run
/dev/mapper/ubuntu--vg-root   505G  5.9G  474G   2% /
tmpfs                         994M     0  994M   0% /dev/shm
tmpfs                         5.0M  4.0K  5.0M   1% /run/lock
tmpfs                         994M     0  994M   0% /sys/fs/cgroup
/dev/loop0                    2.5M  2.5M    0 100% /snap/gnome-system-monitor/163
/dev/loop3                    768K  768K    0 100% /snap/gnome-characters/741
/dev/loop1                     66M   66M    0 100% /snap/gtk-common-themes/1515
/dev/loop2                     62M   62M    0 100% /snap/core20/1081
/dev/loop4                    219M  219M    0 100% /snap/gnome-3-34-1804/77
/dev/loop6                    2.5M  2.5M    0 100% /snap/gnome-calculator/884
/dev/loop7                    640K  640K    0 100% /snap/gnome-logs/106
/dev/loop8                     56M   56M    0 100% /snap/core18/2284
/dev/loop9                    242M  242M    0 100% /snap/gnome-3-38-2004/70
/dev/loop10                   219M  219M    0 100% /snap/gnome-3-34-1804/72
/dev/loop12                   128K  128K    0 100% /snap/bare/5
/dev/loop11                   249M  249M    0 100% /snap/gnome-3-38-2004/99
/dev/loop13                   2.7M  2.7M    0 100% /snap/gnome-system-monitor/174
/dev/loop14                   2.7M  2.7M    0 100% /snap/gnome-calculator/920
/dev/loop15                    44M   44M    0 100% /snap/snapd/14978
/dev/loop16                    66M   66M    0 100% /snap/gtk-common-themes/1519
/dev/loop17                    62M   62M    0 100% /snap/core20/1361
/dev/loop18                   768K  768K    0 100% /snap/gnome-characters/726
tmpfs                         199M   28K  199M   1% /run/user/121
tmpfs                         199M   40K  199M   1% /run/user/1000
/dev/loop19                    56M   56M    0 100% /snap/core18/2952
/dev/loop20                    51M   51M    0 100% /snap/snapd/25202
root@ubuntu1804:~#
```

Confirm that the root filesystem now has **additional 3 GB**.

RESULT:

   Thus, The VHD was successfully created, transferred, and mounted on another host with all data intact.