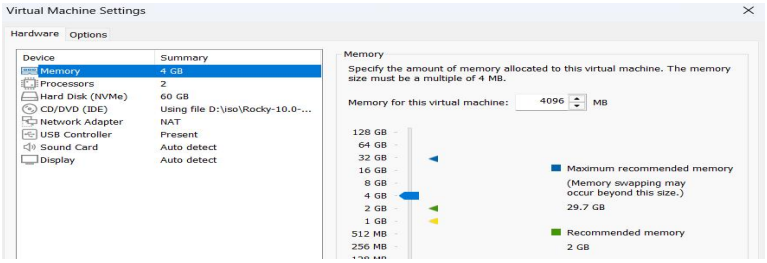
Storage Management
Using parted
GPT

The parted command in Linux is a command-line utility used for managing disk partitions. It allows users to create, delete, resize, move, and copy partitions on various storage devices. parted supports multiple partition table formats, including MS-DOS (MBR) and GPT (GUID Partition Table).

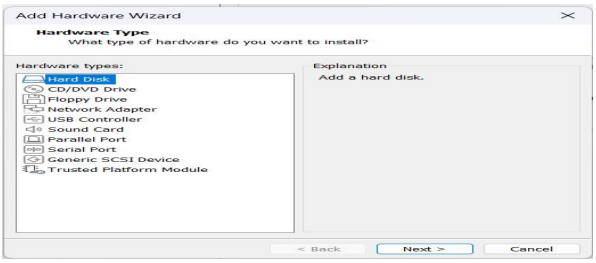
In this document we will create partitions using parted utility. Format them and mount them.

This lab makes use of a virtual machine installed with any Linux operating system.

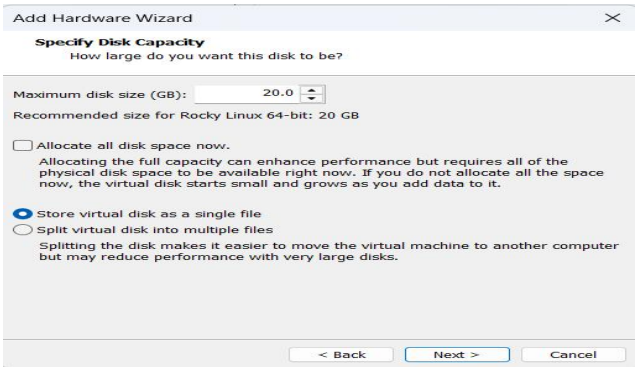
First go to the settings of the virtual machine.



Click Add button.



Select Hard Disk and click Next. Keep the recommended option as it is. Click Next.
Keep create a New Virtual Hard Disk option selected and click Next.
On the next screen keep the Disk size as 20GB. Make sure this disk size is different that the original hard disk on which Linux OS is installed. Select Store virtual disk as a single file.



Click Next. Click Finish. Click Ok to close the virtual machine settings page.

Now start the virtual machine.

Creating Partitions on the new hard disk

1. Once the virtual machine starts, log in with a user who has sudo permissions.

First you need to check how Linux OS has detected the new hard disk. For this use following command.

sudo parted -l

The output may show multiple devices. You need to find the device that shows 20 GB capacity as shown below.

```
[admin@demosrv ~]$ sudo parted -l
[sudo] password for admin:
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n1: 64.4GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags: pmbr_boot

Number  Start   End     Size    File system  Name  Flags
 1      1049kB  2097kB  1049kB                     bios_grub
 2      2097kB  1076MB  1074MB  xfs                bls_boot
 3      1076MB  64.4GB  63.3GB                     lvm


Warning: Unable to open /dev/sr0 read-write (Read-only file system).  /dev/sr0
has been opened read-only.
Error: /dev/sr0: unrecognised disk label
Model: NECVMWar VMware IDE CDR10 (scsi)
Disk /dev/sr0: 7660MB
Sector size (logical/physical): 2048B/2048B
Partition Table: unknown
Disk Flags:

Error: /dev/nvme0n2: unrecognised disk label
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n2: 21.5GB
Sector size (logical/physical): 512B/512B
Partition Table: unknown
Disk Flags:

[admin@demosrv ~]$ _
```

Here the disk /dev/nvme0n2 is shown with a capacity of 20 GiB. In your case the hard disk name may be different. Thus use the device name as per your system. Also this disk is not showing any partitions. This is the hard disk on which we will create partitions.

Here we want to create GPT partitions. Thus we will create 3 partitions. The first partition will be of 8 GB. The second partition will be of 7 GB and the third partition will be 5 GB. All the partitions will be primary.

To create the partitions use following command.

sudo parted

Following prompt is displayed.

```
[admin@demosrv ~]$ sudo parted
[sudo] password for admin:
GNU Parted 3.6
Using /dev/nvme0n1
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) _
```

Type **help** to get all the commands that you can execute in this parted prompt.

```
(parted) help
  align-check TYPE N                        check partition N for TYPE(min|opt) alignment
  help [COMMAND]                            print general help, or help on COMMAND
  mklabel,mktable LABEL-TYPE                create a new disklabel (partition table)
  mkpart PART-TYPE [FS-TYPE] START END      make a partition
  name NUMBER NAME                          name partition NUMBER as NAME
  print [devices|free|list,all]             display the partition table, or available devices, or free
        space, or all found partitions
  quit                                      exit program
  rescue START END                          rescue a lost partition near START and END
  resizepart NUMBER END                     resize partition NUMBER
  rm NUMBER                                 delete partition NUMBER
  select DEVICE                             choose the device to edit
  disk_set FLAG STATE                       change the FLAG on selected device
  disk_toggle [FLAG]                        toggle the state of FLAG on selected device
  set NUMBER FLAG STATE                     change the FLAG on partition NUMBER
  toggle [NUMBER [FLAG]]                    toggle the state of FLAG on partition NUMBER
  type NUMBER TYPE-ID or TYPE-UUID          type set TYPE-ID or TYPE-UUID of partition NUMBER
  unit UNIT                                 set the default unit to UNIT
  version                                   display the version number and copyright information of GNU
        Parted
(parted) _
```

Use **print** command to display the partition information.

```
(parted) print
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n1: 64.4GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags: pmbr_boot

Number  Start   End     Size    File system  Name  Flags
 1      1049kB  2097kB  1049kB                     bios_grub
 2      2097kB  1076MB  1074MB  xfs                bls_boot
 3      1076MB  64.4GB  63.3GB                     lvm

(parted) _
```

By default parted selects the first hard disk. In our case this is the hard disk that contains Linux operating system. Thus the partitions displayed above are from this hard disk.

Thus to display all the storage devices present in the system use **print devices** command.

```
(parted) print devices
/dev/nvme0n1 (64.4GB)
/dev/sr0 (7660MB)
/dev/nvme0n2 (21.5GB)
(parted)
```

From the output confirm the name of the new hard disk attached. Here it is /dev/nvme0n2. As the capacity shown is 20 GB. **In your case the hard disk name may be different**.

Inform parted to use this new hard disk. So that we can create partitions. For this give the command **select /dev/nvme0n2**. **Make sure you specify your hard disk device name**. Or from the command prompt you can give the command **sudo parted /dev/nvme0n2**.

```
(parted) select /dev/nvme0n2
Using /dev/nvme0n2
(parted)
```

First we need to specify how the disk will be initialized - MBR or GPT. Here we are going to use GPT option. This is specified using **mklabel or mktable** command.

The GNU parted utility supports several disk label (partition table) types, including aix, amiga, bsd, dvh, gpt, loop, mac, msdos (for MBR), pc98, and sun. You can see the available types by running **help mklabel** or **help mktable** within the parted interactive prompt.

Thus to initialize the hard disk as GPT type the command **mklabel gpt** at the parted prompte.

```
(parted) mklabel gpt
(parted)
```

Before creating partitions give the command **unit GiB**. This will take all partition sizes in GB.

```
(parted) unit GiB
```

Next will create a 8GB primary partition. It is recommended to start the first partition from 2048 sector. In the following command 2048s informs parted that is it sector number. The 8 will taken as 8 GB. Type the command **mkpart primary 2048s 8.** Give **print** command to verify**.**

```
(parted) mkpart primary 2048s 8
(parted) print
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n2: 20.0GiB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start     End       Size      File system  Name     Flags
 1      0.00GiB   8.00GiB   8.00GiB                primary

(parted)
```

The second partition will be of 7 GB. It will start where the first partition has ended thus the start will be 8GB and end will be 15 GB (8GB + 7 GB). This will create a 7GB partition.

Use the command **mkpart primary 8 15** . Verify using **print** command.

```
(parted) mkpart primary 8 15
(parted) print
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n2: 20.0GiB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start    End      Size     File system  Name     Flags
 1      0.00GiB  8.00GiB  8.00GiB                primary
 2      8.00GiB  15.0GiB  7.00GiB                primary

(parted) _
```

The third and the last partition will consume the remaining free space on the hard disk. It will start at 15GB as the second partition ended there. Specify the end point as the capacity of the hard disk which is 20 GB. However you may get an error as shown below as some space at the end of the hard disk is also reserved.

```
(parted) mkpart primary 15 20
Error: The location 20 is outside of the device /dev/nvme0n2.
```

Thus use the command **mkpart primary 15 19.5** . Verify with **print** command.

```
(parted) mkpart primary 15 19.5
(parted) print
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n2: 20.0GiB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start    End      Size     File system  Name     Flags
 1      0.00GiB  8.00GiB  8.00GiB                primary
 2      8.00GiB  15.0GiB  7.00GiB                primary
 3      15.0GiB  19.5GiB  4.50GiB                primary
```

This is how we created 3 partitions on the hard disk.

To save just type quit or q to save and exit from the parted utility.
To verify use **sudo parted -l** or **sudo fdisk -l** or **lsblk** commands

```
[admin@demosrv ~]$ sudo parted -l
[sudo] password for admin:
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n1: 64.4GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags: pmbr_boot

Number  Start   End     Size    File system  Name  Flags
 1      1049kB  2097kB  1049kB                     bios_grub
 2      2097kB  1076MB  1074MB  xfs                bls_boot
 3      1076MB  64.4GB  63.3GB                     lvm


Warning: Unable to open /dev/sr0 read-write (Read-only file system).  /dev/sr0
has been opened read-only.
Error: /dev/sr0: unrecognised disk label
Model: NECVMWar VMware IDE CDR10 (scsi)
Disk /dev/sr0: 7660MB
Sector size (logical/physical): 2048B/2048B
Partition Table: unknown
Disk Flags:

Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n2: 21.5GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start   End     Size    File system  Name     Flags
 1      1049kB  8590MB  8589MB               primary
 2      8590MB  16.1GB  7516MB               primary
 3      16.1GB  20.9GB  4832MB               primary


[admin@demosrv ~]$
```

```
[admin@demosrv ~]$ lsblk
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINTS
sr0          11:0    1  7.1G  0 rom
nvme0n1     259:0    0   60G  0 disk
├─nvme0n1p1 259:2    0    1M  0 part
├─nvme0n1p2 259:3    0    1G  0 part /boot
└─nvme0n1p3 259:4    0   59G  0 part
  ├─rl-root 253:0    0   37G  0 lvm  /
  ├─rl-swap 253:1    0  3.9G  0 lvm  [SWAP]
  └─rl-home 253:2    0 18.1G  0 lvm  /home
nvme0n2     259:1    0   20G  0 disk
├─nvme0n2p1 259:5    0    8G  0 part
├─nvme0n2p2 259:6    0    7G  0 part
└─nvme0n2p3 259:7    0  4.5G  0 part
[admin@demosrv ~]$ _
```

Now you can format these partitions using mkfs.ext4 , mkfs.ext2 or mkfs.xfs command.
Then you can mount them in the respective directories as per the requirements.
Do not forget to add mounting entries to the fstab file.

Removing partitions using parted.

To delete the partition first give the command

sudo parted /dev/nvme0n2 # make sure you provide your system hard disk device name.

Also type **print** command at the parted prompt to find the number of partitions present.

```
[admin@demosrv ~]$ sudo parted /dev/nvme0n2
[sudo] password for admin:
GNU Parted 3.6
Using /dev/nvme0n2
Welcome to GNU Parted! Type 'help' to view a list of commands.
(parted) print
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n2: 21.5GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start   End     Size    File system  Name     Flags
 1      1049kB  8590MB  8589MB               primary
 2      8590MB  16.1GB  7516MB               primary
 3      16.1GB  20.9GB  4832MB               primary

(parted) _
```

To delete partitions type rm and the number of the partition that you want to delete.

Command **rm 1** will delete the partition 1.

```
(parted) rm 1
(parted) print
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n2: 21.5GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start   End     Size    File system  Name     Flags
 2      8590MB  16.1GB  7516MB               primary
 3      16.1GB  20.9GB  4832MB               primary
```

To delete remaining partitions give **rm 2** and then **rm 3** command.

```
(parted) rm 2
(parted) rm 3
(parted) print
Model: VMware Virtual NVMe Disk (nvme)
Disk /dev/nvme0n2: 21.5GB
Sector size (logical/physical): 512B/512B
Partition Table: gpt
Disk Flags:

Number  Start  End  Size  File system  Name  Flags

(parted)
```

Thus all the partitions are deleted. Type **q** or **quit** to save and exit the utility.

Now lsblk will not show any partition on this 20 GB hard disk.

```
[admin@demosrv ~]$ lsblk
NAME          MAJ:MIN RM   SIZE RO TYPE MOUNTPOINTS
sr0            11:0    1   7.1G  0 rom
nvme0n1       259:0    0    60G  0 disk
├─nvme0n1p1   259:2    0     1M  0 part
├─nvme0n1p2   259:3    0     1G  0 part /boot
└─nvme0n1p3   259:4    0    59G  0 part
  ├─rl-root   253:0    0    37G  0 lvm  /
  ├─rl-swap   253:1    0   3.9G  0 lvm  [SWAP]
  └─rl-home   253:2    0  18.1G  0 lvm  /home
nvme0n2       259:1    0    20G  0 disk
[admin@demosrv ~]$ _
```

Shut down the virtual machine and remove the 20GB hard disk.