

- Display the network interface information using `ip` command

```

valid_lft forever preferred_lft forever
mahmoud@mahmoud-Virtual-Machine:~/Desktop$ ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000
    link/ether 00:15:5d:2c:88:05 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.12/24 brd 192.168.1.255 scope global dynamic noprefixroute eth0
        valid_lft 86271sec preferred_lft 86271sec
    inet6 fe80::a0be:a4d3:cb13:74d8/64 scope link noprefixroute
        valid_lft forever preferred_lft forever

```

- Display currently active TCP connections on your OS using `netstat` command

```

mahmoud@mahmoud-Virtual-Machine:~/Desktop$ netstat -a
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp        0      0 localhost:domain        0.0.0.0:*               LISTEN
tcp        0      0 localhost:ipp           0.0.0.0:*               LISTEN
tcp6       0      0 ip6-localhost:ipp      [::]:*                 LISTEN
tcp6       0      0 [::]:http               [::]:*                 LISTEN
udp        0      0 0.0.0.0:46930           0.0.0.0:*
udp        0      0 0.0.0.0:45929           0.0.0.0:*

```

- Display currently open ports on your system using `nmap` command (install it using `apt`)

```

Nmap done: 1 IP address (1 host up) scanned in 4.74 seconds
mahmoud@mahmoud-Virtual-Machine:~/Desktop$ nmap 192.168.1.12
Starting Nmap 7.80 ( https://nmap.org ) at 2023-03-28 12:38 EET
Nmap scan report for mahmoud-Virtual-Machine (192.168.1.12)
Host is up (0.00014s latency).
Not shown: 999 closed ports
PORT      STATE SERVICE
80/tcp    open  http

Nmap done: 1 IP address (1 host up) scanned in 0.14 seconds

```

- Using Loop devices, create 4 PVs

```

mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo pvcreate /dev/loop8
Physical volume "/dev/loop8" successfully created.
mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo pvcreate /dev/loop17
Physical volume "/dev/loop17" successfully created.
mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo pvcreate /dev/loop18
WARNING: Not using device /dev/loop19 for PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU.
WARNING: PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU prefers device /dev/loop17 because device was seen first.
Physical volume "/dev/loop18" successfully created.
mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo pvcreate /dev/loop20
WARNING: Not using device /dev/loop19 for PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU.
WARNING: PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU prefers device /dev/loop17 because device was seen first.
Physical volume "/dev/loop20" successfully created.
mahmoud@mahmoud-Virtual-Machine:~/Desktop$
Physical volume "/dev/loop20" successfully created.
mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo pvscan
WARNING: Not using device /dev/loop19 for PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU.
WARNING: PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU prefers device /dev/loop17 because device was seen first.
PV /dev/loop8                lvm2 [ <9.77 MiB]
PV /dev/loop17               lvm2 [ <9.77 MiB]
PV /dev/loop18               lvm2 [ <9.77 MiB]
PV /dev/loop20               lvm2 [ <9.77 MiB]
Total: 4 [39.06 MiB] / in use: 0 [0 ] / in no VG: 4 [39.06 MiB]

```

- create VG and add 3 on PVs to it

```

mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo vgcreate VG1 /dev/loop8 /dev/loop18 /dev/loop20
WARNING: Not using device /dev/loop19 for PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU.
WARNING: PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU prefers device /dev/loop17 because device was seen first.
Volume group "VG1" successfully created
mahmoud@mahmoud-Virtual-Machine:~/Desktop$

```

- create LV which has size of 250M

```

mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo lvcreate -L 20M VG1
WARNING: Not using device /dev/loop19 for PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU.
WARNING: PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU prefers device /dev/loop17 because device was seen first.
Logical volume "lvol0" created.

```

- format LV using ext4

```

mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo mkfs.ext4 /dev/VG1/lvol0
mke2fs 1.46.5 (30-Dec-2021)
Discarding device blocks: done
Creating filesystem with 5120 4k blocks and 5120 inodes

Allocating group tables: done
Writing inode tables: done
Creating journal (1024 blocks): done
Writing superblocks and filesystem accounting information: done

```

- mount LV into /mnt directory

```

mahmoud@mahmoud-Virtual-Machine:~/Desktop$ mount /dev/VG1/lvol0 /mnt
mount: /mnt: must be superuser to use mount.

```

- extend VG with the remaining PV

```
mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo vgextend VG1 /dev/loop22
WARNING: Not using device /dev/loop19 for PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU.
WARNING: Not using device /dev/loop21 for PV 4FUI0z-gNbI-dzzU-Sck8-rIvT-eBeE-gh0E04.
WARNING: PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU prefers device /dev/loop17 because device was seen first
WARNING: PV 4FUI0z-gNbI-dzzU-Sck8-rIvT-eBeE-gh0E04 prefers device /dev/loop18 because device is used by more PVs
Physical volume "/dev/loop22" successfully created.
```

- extend LV with +50M

```
mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo lvextend -L +1 /dev/VG1/lvol0
WARNING: Not using device /dev/loop19 for PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU.
WARNING: Not using device /dev/loop21 for PV 4FUI0z-gNbI-dzzU-Sck8-rIvT-eBeE-gh0E04.
WARNING: PV r8bK3b-N0gG-gijh-B9fi-5s2H-f8Ac-iILimU prefers device /dev/loop17 because device was seen first
WARNING: PV 4FUI0z-gNbI-dzzU-Sck8-rIvT-eBeE-gh0E04 prefers device /dev/loop18 because device is used by more PVs
Rounding size to boundary between physical extents: 4.00 MiB.
Size of logical volume VG1/lvol0 changed from 20.00 MiB (5 extents) to 24.00 MiB (6 extents).
```

- resize2fs LV with the 50M extra

```
mahmoud@mahmoud-Virtual-Machine:~/Desktop$ sudo resize2fs /dev/VG1/lvol0 +5
resize2fs 1.46.5 (30-Dec-2021)
resize2fs: New size smaller than minimum (1363)
```