

# Part1

- Using Loop devices, create 4 PVs
- create VG and add 3 on PVs to it
- create LV which has size of 250M
- format LV using ext4
- mount LV into /mnt directory
- extend VG with the remaining PV
- extend LV with +50M
- resize2fs LV with the 50M extra

```
omar@omar-VirtualBox:~$ cd /tmp
omar@omar-VirtualBox:/tmp$ sudo losetup -f
[sudo] password for omar:
omar@omar-VirtualBox:/tmp$ dd if=/dev/zero of=disk1.disk bs=1024 count=100000
100000+0 records in
100000+0 records out
102400000 bytes (102 MB, 98 MiB) copied, 0.223974 s, 457 MB/s
omar@omar-VirtualBox:/tmp$ dd if=/dev/zero of=disk2.disk bs=1024 count=100000
100000+0 records in
100000+0 records out
102400000 bytes (102 MB, 98 MiB) copied, 0.233189 s, 439 MB/s
omar@omar-VirtualBox:/tmp$ dd if=/dev/zero of=disk3.disk bs=1024 count=50000
50000+0 records in
50000+0 records out
51200000 bytes (51 MB, 49 MiB) copied, 0.138545 s, 370 MB/s
omar@omar-VirtualBox:/tmp$ dd if=/dev/zero of=disk4.disk bs=1024 count=50000
50000+0 records in
50000+0 records out
51200000 bytes (51 MB, 49 MiB) copied, 0.104511 s, 490 MB/s
omar@omar-VirtualBox:/tmp$ losetup -f
losetup: cannot find an unused loop device: Permission denied
omar@omar-VirtualBox:/tmp$ sudo losetup -f
/dev/loop19
omar@omar-VirtualBox:/tmp$ sudo losetup /dev/loop19 disk1.disk
omar@omar-VirtualBox:/tmp$ sudo losetup /dev/loop20 disk2.disk
losetup: disk2.disk: failed to set up loop device: Device or resource busy
omar@omar-VirtualBox:/tmp$ sudo losetup /dev/loop21 disk2.disk
omar@omar-VirtualBox:/tmp$ sudo losetup /dev/loop22 disk3.disk
omar@omar-VirtualBox:/tmp$ sudo losetup /dev/loop23 disk4.disk
omar@omar-VirtualBox:/tmp$ losetup -f
losetup: cannot find an unused loop device: Permission denied
omar@omar-VirtualBox:/tmp$ sudo losetup -f
/dev/loop24
```

Processing triggers for man-db (2.10.2-1) ...

```
omar@omar-VirtualBox:/tmp$ pvcreate /dev/loop19
WARNING: Running as a non-root user. Functionality may be unavailable.
/run/lock/lvm/P_global:aux: open failed: Permission denied
omar@omar-VirtualBox:/tmp$ sudo pvcreate /dev/loop19
Physical volume "/dev/loop19" successfully created.
omar@omar-VirtualBox:/tmp$ sudo pvcreate /dev/loop21
Physical volume "/dev/loop21" successfully created.
omar@omar-VirtualBox:/tmp$ sudo pvcreate /dev/loop22
Physical volume "/dev/loop22" successfully created.
omar@omar-VirtualBox:/tmp$ sudo pvcreate /dev/loop23
Physical volume "/dev/loop23" successfully created.
omar@omar-VirtualBox:/tmp$
```

```

omar@omar-VirtualBox:/tmp$ sudo lvcreate -L 250M VG1
[sudo] password for omar:
Rounding up size to full physical extent 252.00 MiB
Volume group "VG1" has insufficient free space (59 extents): 63 required.
omar@omar-VirtualBox:/tmp$ sudo lvdisplay
omar@omar-VirtualBox:/tmp$ lvdisplay
WARNING: Running as a non-root user. Functionality may be unavailable.
/run/lock/lvm/P_global:aux: open failed: Permission denied
omar@omar-VirtualBox:/tmp$ sudo lvdisplay
omar@omar-VirtualBox:/tmp$ vgdisplay
WARNING: Running as a non-root user. Functionality may be unavailable.
/run/lock/lvm/P_global:aux: open failed: Permission denied
omar@omar-VirtualBox:/tmp$ sudo vgdisplay
--- Volume group ---
VG Name                VG1
System ID
Format                 lvm2
Metadata Areas         3
Metadata Sequence No   1
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                 0
Open LV                 0
Max PV                 0
Cur PV                 3
Act PV                 3
VG Size                236.00 MiB
PE Size                4.00 MiB
Total PE               59
Alloc PE / Size        0 / 0
Free PE / Size         59 / 236.00 MiB
VG UUID                pgvGMf-0eR6-yd5u-h0aH-wGrh-NKvv-fjKnCi

```

```

omar@omar-VirtualBox:/tmp$ sudo lvdisplay
--- Logical volume ---
LV Path                /dev/VG1/lvol0
LV Name                lvol0
VG Name                VG1
LV UUID                Z0nwX2-kkcc-4PuT-BZCP-fAbk-C0z5-Q2uysN
LV Write Access        read/write
LV Creation host, time omar-VirtualBox, 2023-03-28 16:50:09 +0200
LV Status               available
# open                  0
LV Size                236.00 MiB
Current LE              59
Segments                3
Allocation              inherit
Read ahead sectors      auto
- currently set to     256
Block device            253:0

```

```
Physical volume /dev/loop23 successfully created.
omar@omar-VirtualBox:/tmp$ sudo vgcreate VG1 /dev/loop19 /dev/loop21 /dev/loop22
Volume group "VG1" successfully created
omar@omar-VirtualBox:/tmp$ vgdisk
WARNING: Running as a non-root user. Functionality may be unavailable.
/run/lock/lvm/P_global:aux: open failed: Permission denied
omar@omar-VirtualBox:/tmp$ sudo vgdisk
--- Volume group ---
VG Name                VG1
System ID
Format                 lvm2
Metadata Areas         3
Metadata Sequence No   1
VG Access               read/write
VG Status               resizable
MAX LV                 0
Cur LV                 0
Open LV                 0
Max PV                  0
Cur PV                 3
Act PV                  3
VG Size                 236.00 MiB
PE Size                 4.00 MiB
Total PE                59
Alloc PE / Size         0 / 0
Free PE / Size          59 / 236.00 MiB
VG UUID                pgvGMf-0eR6-yd5u-h0aH-wGrh-NKvv-fjKnCi

omar@omar-VirtualBox:/tmp$
```

```

omar@omar-VirtualBox:/tmp$ sudo mkfs.ext4 /dev/VG1/lvol0
mke2fs 1.46.5 (30-Dec-2021)
Discarding device blocks: done
Creating filesystem with 60416 4k blocks and 60416 inodes
Filesystem UUID: 7948a119-13fb-453c-b554-7ffbb6e6e7a3
Superblock backups stored on blocks:
    32768

Allocating group tables: done
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done

omar@omar-VirtualBox:/tmp$ sudo mount /dev/VG1/lvol0 /mnt
omar@omar-VirtualBox:/tmp$ sudo lvextend /dev/VG1/lvol0 +50M
Physical Volume "+50M" not found in Volume Group "VG1".
omar@omar-VirtualBox:/tmp$ sudo vgextend VG1 /dev/loop23
Physical volume '/dev/loop23' is already in volume group 'VG1'
Unable to add physical volume '/dev/loop23' to volume group 'VG1'
/dev/loop23: physical volume not initialized.
omar@omar-VirtualBox:/tmp$ sudo vgsdisplay
--- Volume group ---
VG Name                VG1
System ID
Format                 lvm2
Metadata Areas         4
Metadata Sequence No   3
VG Access              read/write
VG Status              resizable
MAX LV                 0
Cur LV                1
Open LV               1
Max PV                 0
Cur PV                4
Act PV                4
VG Size                280.00 MiB
PE Size                4.00 MiB
Total PE              70
Alloc PE / Size        59 / 236.00 MiB
Free PE / Size         11 / 44.00 MiB
VG UUID                pgvGMf-0eR6-yd5u-h0aH-wGrh-NKvv-fjKnCi

```

```

omar@omar-VirtualBox:/tmp$ sudo lvextend /dev/VG1/lvol0 -L +50M
Rounding size to boundary between physical extents: 52.00 MiB.

```

## Part2

- Display the network interface information using ip command
- Display currently active TCP connections on your OS using netstat command
- Display currently open ports on your system using nmap command (install it using apt)

```
omar@omar-VirtualBox:~$ ip addr show
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: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:77:44:8e brd ff:ff:ff:ff:ff:ff
    inet 10.0.2.15/24 brd 10.0.2.255 scope global dynamic noprefixroute enp0s3
        valid_lft 80867sec preferred_lft 80867sec
    inet6 fe80::4c51:f9b5:3f9:a7a7/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
omar@omar-VirtualBox:~$ sudo apt install nmap
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  libblas3 liblinear4 lua-lpeg nmap-common
Suggested packages:
  liblinear-tools liblinear-dev ncat ndiff zenmap
The following NEW packages will be installed:
  liblinear4 lua-lpeg nmap nmap-common
VBox_GAs_7.0.2 is already installed, 0 to remove and 202 not upgraded.
Need to get 5,973 kB of archives.
After this operation, 26.3 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://eg.archive.ubuntu.com/ubuntu jammy/main amd64 libblas3 amd64 3.10.0-2ubuntu1 [228 kB]
Get:2 http://eg.archive.ubuntu.com/ubuntu jammy/universe amd64 liblinear4 amd64 2.3.0+dfsg-5 [41.4 kB]
Get:3 http://eg.archive.ubuntu.com/ubuntu jammy/universe amd64 lua-lpeg amd64 1.0.2-1 [31.4 kB]
Get:4 http://eg.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 nmap-common all 7.91+dfsg1+really7.80+dfsg1-2ubuntu0.1 [3,9
Get:5 http://eg.archive.ubuntu.com/ubuntu jammy-updates/universe amd64 nmap amd64 7.91+dfsg1+really7.80+dfsg1-2ubuntu0.1 [1,731 kB]
Fetched 5,973 kB in 10s (602 kB/s)
Selecting previously unselected package libblas3:amd64.
(Reading database ... 204430 files and directories currently installed.)
Preparing to unpack .../libblas3_3.10.0-2ubuntu1_amd64.deb ...
Unpacking libblas3:amd64 (3.10.0-2ubuntu1) ...
Selecting previously unselected package liblinear4:amd64.
Preparing to unpack .../liblinear4_2.3.0+dfsg-5_amd64.deb ...
Unpacking liblinear4:amd64 (2.3.0+dfsg-5) ...
Selecting previously unselected package lua-lpeg:amd64.
```

```
omar@omar-VirtualBox:~$ netstat -atp
(Not all processes could be identified, non-owned process info
 will not be shown, you would have to be root to see it all.)
Active Internet connections (servers and established)
Proto Recv-Q Send-Q Local Address           Foreign Address         State       PID/Program name
tcp        0      0 localhost:ipp           0.0.0.0:*                LISTEN      -
tcp        0      0 localhost:domain        0.0.0.0:*                LISTEN      -
tcp6       0      0 ip6-localhost:ipp      [::]:*                  LISTEN      -
tcp6       0      0 [::]:http               [::]:*                  LISTEN      -
```

```
omar@omar-VirtualBox:~$ nmap 192.168.1.1
Starting Nmap 7.80 ( https://nmap.org ) at 2023-03-28 17:22 EET
Nmap scan report for 192.168.1.1
Host is up (0.015s latency).
Not shown: 997 filtered ports
PORT      STATE SERVICE
53/tcp    open  domain
80/tcp    open  http
443/tcp   open  https
```