

1-Using Loop devices, create 4 PVs

```
samar@samar-VirtualBox:~$ cd /tmp
samar@samar-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, 1.79079 s, 57.2 MB/s
samar@samar-VirtualBox:/tmp$ ^C
samar@samar-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, 2.64675 s, 38.7 MB/s
samar@samar-VirtualBox:/tmp$ dd if=/dev/zero of=disk3.disk bs=1024 count=100000
100000+0 records in
100000+0 records out
102400000 bytes (102 MB, 98 MiB) copied, 1.69463 s, 60.4 MB/s
samar@samar-VirtualBox:/tmp$ dd if=/dev/zero of=disk4.disk bs=1024 count=100000
100000+0 records in
100000+0 records out
102400000 bytes (102 MB, 98 MiB) copied, 1.06499 s, 96.2 MB/s
samar@samar-VirtualBox:/tmp$ sudo losetup -f
[sudo] password for samar:
/dev/loop12
samar@samar-VirtualBox:/tmp$ sudo losetup /dev/loop12 disk1.disk
samar@samar-VirtualBox:/tmp$ sudo losetup /dev/loop13 disk2.disk
samar@samar-VirtualBox:/tmp$ sudo losetup /dev/loop14 disk3.disk
samar@samar-VirtualBox:/tmp$ sudo losetup /dev/loop15 disk4.disk
samar@samar-VirtualBox:/tmp$
```

```
samar@samar-VirtualBox:/tmp$ sudo losetup | grep tmp
/dev/loop15      0      0      0 0 /tmp/disk4.disk
/dev/loop6       0     512      0 0 /tmp/disk.img
/dev/loop13      0      0      0 0 /tmp/disk2.disk
/dev/loop14      0      0      0 0 /tmp/disk3.disk
/dev/loop12      0      0      0 0 /tmp/disk1.disk
samar@samar-VirtualBox:/tmp$
```

2-create VG and add 3 on PVs to it

```
samar@samar-VirtualBox:/tmp$ sudo apt install lvm2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  dmeventd libaio1 libdevmapper-event1.02.1 liblvm2cmd2.03
  thin-provisioning-tools
The following NEW packages will be installed:
  dmeventd libaio1 libdevmapper-event1.02.1 liblvm2cmd2.03 lvm2
  thin-provisioning-tools
0 upgraded, 6 newly installed, 0 to remove and 248 not upgraded.
Need to get 2,395 kB of archives.
After this operation, 8,959 kB 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 libaio1 amd64 0.3.11
2-13build1 [7,176 B]
Get:2 http://eg.archive.ubuntu.com/ubuntu jammy/main amd64 libdevmapper-event1.
02.1 amd64 2:1.02.175-2.1ubuntu4 [12.6 kB]
Get:3 http://eg.archive.ubuntu.com/ubuntu jammy/main amd64 liblvm2cmd2.03 amd64
2.03.11-2.1ubuntu4 [756 kB]
Get:4 http://eg.archive.ubuntu.com/ubuntu jammy/main amd64 dmeventd amd64 2:1.0
2.175-2.1ubuntu4 [38.4 kB]
Get:5 http://eg.archive.ubuntu.com/ubuntu jammy/main amd64 lvm2 amd64 2.03.11-2
.1ubuntu4 [1,154 kB]
Get:6 http://eg.archive.ubuntu.com/ubuntu jammy/main amd64 thin-provisioning-to
ols amd64 0.9.0-2ubuntu1 [426 kB]
Fetched 2,395 kB in 2s (965 kB/s)
Selecting previously unselected package libaio1:amd64.
(Reading database ... 175429 files and directories currently installed.)
```

```
samar@samar-VirtualBox:/tmp$ sudo pvcreate /dev/loop12
Physical volume "/dev/loop12" successfully created.
samar@samar-VirtualBox:/tmp$ sudo pvcreate /dev/loop13
Physical volume "/dev/loop13" successfully created.
samar@samar-VirtualBox:/tmp$ sudo pvcreate /dev/loop14
Physical volume "/dev/loop14" successfully created.
samar@samar-VirtualBox:/tmp$ sudo pvcreate /dev/loop15
Physical volume "/dev/loop15" successfully created.
samar@samar-VirtualBox:/tmp$
```

```
samar@samar-VirtualBox:/tmp$ sudo vgcreate VG1 /dev/loop12 /dev/loop13 /dev/loop14
Volume group "VG1" successfully created
```

3-create LV which has size of 250M

```
samar@samar-VirtualBox:/tmp$ sudo lvcreate -L 250M VG1
Rounding up size to full physical extent 252.00 MiB
Logical volume "lvol0" created.
samar@samar-VirtualBox:/tmp$ sudo lvdisplay
--- Logical volume ---
LV Path                /dev/VG1/lvol0
LV Name                 lvol0
VG Name                VG1
LV UUID                e3Cx3T-fK7C-azV2-FCww-5ibY-0Xld-543uJI
LV Write Access        read/write
LV Creation host, time samar-VirtualBox, 2023-03-30 12:12:20 +0200
LV Status               available
# open                  0
LV Size                 252.00 MiB
Current LE              63
Segments                3
Allocation              inherit
Read ahead sectors     auto
- currently set to     256
Block device            253:0
```

4-format LV using ext4

```
samar@samar-VirtualBox:/tmp$ sudo mkfs.ext4 /dev/VG1/lvol0
mke2fs 1.46.5 (30-Dec-2021)
Discarding device blocks: done
Creating filesystem with 64512 4k blocks and 64512 inodes
Filesystem UUID: 74a4363f-4ffd-4bad-920e-d19d43e8e702
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
```

5-mount LV into /mnt directory

```
samar@samar-VirtualBox:/tmp$ sudo mount /dev/VG1/lvol0 /mnt
samar@samar-VirtualBox:/tmp$ sudo df -h /mnt
Filesystem                Size  Used Avail Use% Mounted on
/dev/mapper/VG1-lvol0    220M   24K  203M   1% /mnt
```

6-extend LV with +50M

```
samar@samar-VirtualBox:/tmp$ sudo lvextend -L +50M /dev/VG1/lvol0
Rounding size to boundary between physical extents: 52.00 MiB.
Insufficient free space: 13 extents needed, but only 9 available
samar@samar-VirtualBox:/tmp$ sudo lvextend -L +20M /dev/VG1/lvol0
Size of logical volume VG1/lvol0 changed from 252.00 MiB (63 extents) to 272.00 MiB (68 extents).
Logical volume VG1/lvol0 successfully resized.
```

7-resize2fs LV with the 50M extra

```
samar@samar-VirtualBox:/tmp$ sudo resize2fs /dev/VG1/lvol0 +50M
resize2fs 1.46.5 (30-Dec-2021)
Filesystem at /dev/VG1/lvol0 is mounted on /mnt; on-line resizing required
resize2fs: On-line shrinking not supported
samar@samar-VirtualBox:/tmp$ sudo resize2fs /dev/VG1/lvol0 +20M
resize2fs 1.46.5 (30-Dec-2021)
resize2fs: New size smaller than minimum (8217)

samar@samar-VirtualBox:/tmp$ sudo lvdisplay
--- Logical volume ---
LV Path                /dev/VG1/lvol0
LV Name                 lvol0
VG Name                 VG1
LV UUID                 e3Cx3T-fK7C-azV2-FCww-5ibY-OXld-543uJI
LV Write Access         read/write
LV Creation host, time samar-VirtualBox, 2023-03-30 12:12:20 +0200
LV Status                available
# open                  1
LV Size                 272.00 MiB
Current LE               68
Segments                3
Allocation               inherit
Read ahead sectors      auto
- currently set to     256
Block device            253:0
```

8-Display the network interface information using `ip` command

```
samar@samar-VirtualBox:/tmp$ 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: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:91:9f:40 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 80358sec preferred_lft 80358sec
    inet6 fe80::c1c0:3deb:e67d:4009/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
samar@samar-VirtualBox:/tmp$
```

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

```
samar@samar-VirtualBox:/tmp$ sudo apt install net-tools
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  net-tools
0 upgraded, 1 newly installed, 0 to remove and 248 not upgraded.
Need to get 204 kB of archives.
After this operation, 819 kB of additional disk space will be used.
Get:1 http://eg.archive.ubuntu.com/ubuntu jammy/main amd64 net-tools amd64 1.60+git20181103.0eebece-1ubuntu5 [204 kB]
Fetched 204 kB in 1s (230 kB/s)
Selecting previously unselected package net-tools.
(Reading database ... 175656 files and directories currently installed.)
Preparing to unpack .../net-tools_1.60+git20181103.0eebece-1ubuntu5_amd64.deb ...
Unpacking net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Setting up net-tools (1.60+git20181103.0eebece-1ubuntu5) ...
Processing triggers for man-db (2.10.2-1) ...
```

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

```
samar@samar-VirtualBox:/tmp$ snap install nmap # 7.93
nmap 7.93 from Maximiliano Bertacchini (maxiberta) installed
samar@samar-VirtualBox:/tmp$ nmap 10.0.2.15
Starting Nmap 7.93 ( https://nmap.org ) at 2023-03-30 12:32 EET
Nmap scan report for samar-VirtualBox (10.0.2.15)
Host is up (0.00024s latency).
Not shown: 999 closed tcp ports (conn-refused)
PORT      STATE SERVICE
80/tcp    open  http

Nmap done: 1 IP address (1 host up) scanned in 0.51 seconds
```