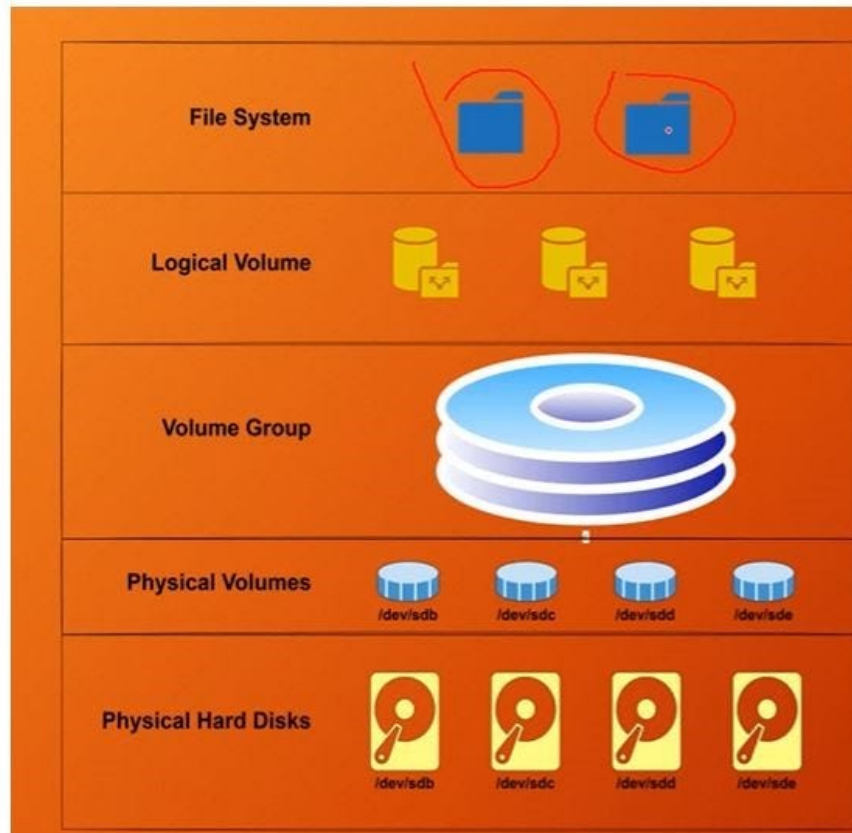


Let's briefly understand (LVM) Logical volume manage in Linux.



LVM

1. Why is LVM used in Linux?

LVM (Logical Volume Manager) is used in Linux for several reasons:

Disk Management: LVM allows you to manage storage devices more flexibly by providing a layer of abstraction between the operating system and the physical storage devices. With LVM, you can manage multiple disks, partitions, and file systems as a single logical unit, which makes it easier to allocate, resize, and move storage as needed.

Resizing and Migration: LVM enables you to resize volumes while they are in use, which means you can add or remove storage capacity without needing to reboot the system or unmount the file system.

Additionally, LVM allows you to migrate data between physical disks without downtime, which makes it a helpful tool for maintaining high availability.

Snapshots and Backups: LVM provides snapshot functionality, which enables you to take a point-in-time copy of a volume without impacting the original data. This feature is particularly useful for backups or testing, as it enables you to take a snapshot of a live system and back up the snapshot instead of the original data.

Overall, LVM provides a more flexible, scalable, and secure way to manage storage in Linux systems.

2. Creating Physical Volume from Physical Hard disk!!

To Check available HD Brief View type the below command!

mpn@manikanta:~\$ lsblk

```
mpn@manikanta:~$ lsblk
```

NAME	MAJ:MIN	RM	SIZE	RO	TYPE	MOUNTPOINTS
loop0	7:0	0	63.2M	1	loop	/snap/core20/1623
loop1	7:1	0	63.3M	1	loop	/snap/core20/1822
loop2	7:2	0	135.7M	1	loop	/snap/lxd/23680
loop3	7:3	0	142.4M	1	loop	/snap/lxd/24483
loop4	7:4	0	49.8M	1	loop	/snap/snapd/18357
sda	8:0	0	20G	0	disk	
├─sda1	8:1	0	1M	0	part	
├─sda2	8:2	0	1.8G	0	part	/boot
├─sda3	8:3	0	18.2G	0	part	
└─ubuntu--vg-ubuntu--lv	253:0	0	10G	0	lvm	/
sdb	8:16	0	5G	0	disk	
sdc	8:32	0	5G	0	disk	
sdd	8:48	0	5G	0	disk	

· *To create a Physical Volume command*

root@manikanta:/home/mpn# pvcreate /dev/sdb

· *To check the Physical volume command*

root@manikanta:/home/mpn# pvs or use PVS -v and pvdisplay

```

root@manikanta:/home/mpn# pvcreate /dev/sdb
Physical volume "/dev/sdb" successfully created.
root@manikanta:/home/mpn# pvcreate /dev/sdc
Physical volume "/dev/sdc" successfully created.
root@manikanta:/home/mpn# pvs

```

PV	VG	Fmt	Attr	PSize	PFree
/dev/sda3	ubuntu-vg	lvm2	a--	18.22g	8.22g
/dev/sdb		lvm2	---	5.00g	5.00g
/dev/sdc		lvm2	---	5.00g	5.00g

```

root@manikanta:/home/mpn# pvs -v

```

```

root@manikanta:/home/mpn# pvs -v

```

PV	VG	Fmt	Attr	PSize	PFree	DevSize	PV UUID
/dev/sda3	ubuntu-vg	lvm2	a--	18.22g	8.22g	<18.23g	8ZBs6f-hoo0-PbjD-a9xx-5wWq-GRSL-9nHkiJ
/dev/sdb		lvm2	---	5.00g	5.00g	5.00g	oYgYh4-MdbX-WuXu-FncI-1Ufi-1NMr-bJnHXM
/dev/sdc		lvm2	---	5.00g	5.00g	5.00g	t0qzMF-5DeL-GW6f-xjMd-y2NT-ecAD-SwhN5P

```

root@manikanta:/home/mpn# pvdisplay

```

```

"/dev/sdb" is a new physical volume of "5.00 GiB"
--- NEW Physical volume ---
PV Name                /dev/sdb
VG Name
PV Size                5.00 GiB
Allocatable            NO
PE Size                0
Total PE               0
Free PE                0
Allocated PE           0
PV UUID                oYgYh4-MdbX-WuXu-FncI-1Ufi-1NMr-bJnHXM

"/dev/sdc" is a new physical volume of "5.00 GiB"
--- NEW Physical volume ---
PV Name                /dev/sdc
VG Name
PV Size                5.00 GiB
Allocatable            NO
PE Size                0
Total PE               0
Free PE                0
Allocated PE           0
PV UUID                t0qzMF-5DeL-GW6f-xjMd-y2NT-ecAD-SwhN5P

```

3. Creating Volume Group from Physical Volumes.

```

root@manikanta:/home/mpn# vgcreate vg_1 /dev/sdb /dev/sdc

```

```

root@manikanta:/home/mpn# vgs

```

```
root@manikanta:/home/mpn# vgs -v
```

```
root@manikanta:/home/mpn# pvs
PV          VG      Fmt Attr PSize PFree
/dev/sda3   ubuntu-vg  lvm2 a-- 18.22g 8.22g
/dev/sdb          lvm2 ---  8.00g 8.00g
/dev/sdc          lvm2 ---  8.00g 8.00g
root@manikanta:/home/mpn# vgcreate vg_1 /dev/sdb /dev/sdc
Volume group "vg_1" successfully created
root@manikanta:/home/mpn# vgs
VG          #PV #LV #SN Attr   VSize VFree
ubuntu-vg   1   1   0 wz--n- 18.22g 8.22g
vg_1        2   0   0 wz--n- 15.99g 15.99g
root@manikanta:/home/mpn# vgs -v
VG          Attr Ext  #PV #LV #SN VSize VFree VG UUID                                VProfile
ubuntu-vg   wz--n- 4.00m 1   1   0 18.22g 8.22g RrflWR-aaAb-DtSS-kSwP-Pkso-bB83-cAp9Dc
vg_1        wz--n- 4.00m 2   0   0 15.99g 15.99g exFeh9-yJ1I-h6Br-mhsX-NOHQ-gNjM-q17Kxj
```

4. Creating Logical Volume from Volume Group!

```
root@manikanta:/home/mpn# lvcreate -L 5g -n lv_1 vg_1
```

```
root@manikanta:/home/mpn# lvs
```

```
root@manikanta:/home/mpn# lvcreate -L 5g -n lv_1 vg_1
Logical volume "lv_1" created.
root@manikanta:/home/mpn# lvs
LV          VG      Attr   LSize   Pool Origin Data%  Meta%   Move Log Cpy%Sync Convert
ubuntu-lv   ubuntu-vg -wi-ao---- 10.00g
lv_1        vg_1    -wi-a----- 5.00g
```

```
root@manikanta:/home/mpn# mkfs.ext4 /dev/vg_1/lv_1
```

```
root@manikanta:/home/mpn# mkfs.ext4 /dev/vg_1/lv_1
mke2fs 1.46.5 (30-Dec-2021)
Creating filesystem with 1310720 4k blocks and 327680 inodes
Filesystem UUID: 7789e614-b609-421d-8627-8098506f8e9b
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736

Allocating group tables: done
Writing inode tables: done
Creating journal (16384 blocks): done
Writing superblocks and filesystem accounting information: done
```

5. Creating a File System for Volume Group

```
root@manikanta:/home/mpn# partprobe
```

```
root@manikanta:/home/mpn# mount /dev/vg_1/lv_1
/home/mpn/testfolder/
```

```

root@manikanta:/home/mpn# partprobe
root@manikanta:/home/mpn# mount /dev/vg_1/lv_1 /home/mpn/testfolder/
mount: /home/mpn/testfolder: /dev/mapper/vg_1-lv_1 already mounted on /home/mpn/testfolder.

```

```

root@manikanta:/home/mpn# df -h

```

Filesystem	Size	Used	Avail	Use%	Mounted on
tmpfs	195M	1.3M	193M	1%	/run
/dev/mapper/ubuntu--vg-ubuntu--lv	9.8G	5.8G	3.5G	63%	/
tmpfs	971M	0	971M	0%	/dev/shm
tmpfs	5.0M	0	5.0M	0%	/run/lock
/dev/sda2	1.8G	268M	1.4G	17%	/boot
tmpfs	195M	4.0K	195M	1%	/run/user/1000
/dev/mapper/vg_1-lv_1	4.9G	24K	4.6G	1%	/home/mpn/testfolder

Extending Logical Volume :

watch df -h /dev/mapper/vg_1-lv_1

```

Every 2.0s: df -h /dev/mapper/vg_1-lv_1

```

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/mapper/vg_1-lv_1	4.9G	24K	4.6G	1%	/home/mpn/testfolder

To increase the folder size for the real-time use case.

```

root@manikanta:/home/mpn# cat /dev/zero >
/home/mpn/testfolder/junk.txt

```

```

root@manikanta:/home/mpn# cat /dev/zero > /home/mpn/testfolder/junk.txt
cat: write error: No space left on device

```

```

root@manikanta:/home/mpn# lvextend -L+5G /dev/vg_1/lv_1

```

```

root@manikanta:/home/mpn# lvextend -L+5G /dev/vg_1/lv_1
Size of logical volume vg_1/lv_1 changed from 5.00 GiB (1280 extents) to 10.00 GiB (2560 extents).
Logical volume vg_1/lv_1 successfully resized.

```

```

root@manikanta:/home/mpn# lvs

```

```

root@manikanta:/home/mpn# lvs

```

LV	VG	Attr	LSize	Pool	Origin	Data%	Meta%	Move	Log	Cpy%	Sync	Convert
ubuntu-lv	ubuntu-vg	-wi-ao----	10.00g									
lv_1	vg_1	-wi-ao----	10.00g									

```

root@manikanta:~# resize2fs /dev/mapper/vg_1-lv_1

```



```

root@manikanta:~# resize2fs /dev/mapper/vg_1-lv_1
resize2fs 1.46.5 (30-Dec-2021)
Filesystem at /dev/mapper/vg_1-lv_1 is mounted on /home/mpn/testfolder; on-line resizing required
old_desc_blocks = 1, new_desc_blocks = 2
The filesystem on /dev/mapper/vg_1-lv_1 is now 2621440 (4k) blocks long.

root@manikanta:~# df -h
Filesystem                Size      Used Avail Use% Mounted on
tmpfs                     195M        1.4M  193M   1% /run
/dev/mapper/ubuntu--vg-ubuntu--lv 9.8G      5.8G   3.5G  63% /
tmpfs                     971M         0   971M   0% /dev/shm
tmpfs                     5.0M         0   5.0M   0% /run/lock
/dev/sda2                 1.8G      268M   1.4G  17% /boot
tmpfs                     195M        4.0K   195M   1% /run/user/1000
/dev/mapper/vg_1-lv_1     9.8G      4.9G   4.5G  52% /home/mpn/testfolder
root@manikanta:~#

```

6. Creating Snapshot for Logical Volume:-

```

root@manikanta:~# lvcreate -s -n lvsnapshotbacku -L 1G
/dev/mapper/vg_1-lv_1

```

```

root@manikanta:~# lvcreate -s -n lvsnapshotbacku -L 1G /dev/mapper/vg_1-lv_1
Logical volume "lvsnapshotbacku" created.
root@manikanta:~#

```

```

root@manikanta:~# lvs

```

```

root@manikanta:~# lvcreate -s -n lvsnapshotbacku -L 1G /dev/mapper/vg_1-lv_1
Logical Volume "lvsnapshotbacku" already exists in volume group "vg_1"
root@manikanta:~# lvs
LV                VG      Attr      LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
ubuntu-lv         ubuntu-vg -wi-ao--- 10.00g
lv_1              vg_1    owi-aos--- 10.00g
lvsnapshotbacku   vg_1    swi-a-s--- 1.00g    lv_1   0.01

```

7. Retrieving deleted data from LV after merging the snapshot.

```

root@manikanta:~# cd /home/mpn/testfolder/
root@manikanta:/home/mpn/testfolder# ll
total 8
drwxr-xr-x 2 root root 4096 Mar  6 12:30 ./
drwxr-x--- 5 mpn  mpn  4096 Mar  6 11:40 ../
-rw-r--r-- 1 root root    0 Mar  6 12:30 file.txt
-rw-r--r-- 1 root root    0 Mar  6 12:30 imp
-rw-r--r-- 1 root root    0 Mar  6 12:30 very
root@manikanta:/home/mpn/testfolder# rm -rf *
root@manikanta:/home/mpn/testfolder# rm -rf *
root@manikanta:/home/mpn/testfolder# ll
total 8
drwxr-xr-x 2 root root 4096 Mar  6 12:48 ./
drwxr-x--- 5 mpn  mpn  4096 Mar  6 11:40 ../
root@manikanta:/home/mpn/testfolder#

```

```

root@manikanta:~# lvs

```

```
root@manikanta:~# lvconvert --mergesnapshot  
/dev/vg_1/lvsnapshotbacku
```

```
root@manikanta:~# lvs
```

```
root@manikanta:~# lvs
LV          VG      Attr      LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
ubuntu-lv   ubuntu-vg -wi-ao---- 10.00g
lv_1        vg_1      owi-aos--- 10.00g
lvsnapshotbacku vg_1      swi-a-s--- 1.00g          lv_1  0.01
root@manikanta:~# lvconvert --mergesnapshot /dev/vg_1/lvsnapshotbacku
Delaying merge since origin is open.
Merging of snapshot vg_1/lvsnapshotbacku will occur on next activation of vg_1/lv_1.
root@manikanta:~# lvs
LV          VG      Attr      LSize   Pool Origin Data%  Meta%  Move Log Cpy%Sync Convert
ubuntu-lv   ubuntu-vg -wi-ao---- 10.00g
lv_1        vg_1      0wi-aos--- 10.00g
root@manikanta:~#
```

```
root@manikanta:~# lvchange -ay /dev/mapper/vg_1-lv_1
```

```
root@manikanta:~# mount /dev/mapper/vg_1-lv_1  
/home/mpn/testfolder/
```

```
root@manikanta:~# lvchange -ay /dev/mapper/vg_1-lv_1
root@manikanta:~# mount /dev/mapper/vg_1-lv_1 /home/mpn/testfolder/
mount: /home/mpn/testfolder: /dev/mapper/vg_1-lv_1 already mounted on /home/
dmesg(1) may have more information after failed mount system call.
root@manikanta:~# ls -l /home/mpn/testfolder/
total 0
-rw-r--r-- 1 root root 0 Mar 6 12:30 file.txt
-rw-r--r-- 1 root root 0 Mar 6 12:30 imp
-rw-r--r-- 1 root root 0 Mar 6 12:30 very
root@manikanta:~#
```

Happy Learning :-).