LVM Tutorial - Linux

1. Key Concepts

Term	Description
PV (Physical Volume)	Actual disk initialized for LVM (`pvcreate`)
VG (Volume Group)	Pool of PVs combined to form storage area (`vgcreate`)
LV (Logical Volume)	Virtual volume carved from VG (`lvcreate`)
Device Mapper	Kernel framework mapping logical volumes to physical storage (`/dev/mapper/<vg>-<lv>`)

2. LVM Commands and Steps

Step 1: Install LVM tools

```
sudo apt update
sudo apt install lvm2
```

Step 2: Initialize Physical Volume

```
sudo pvcreate /dev/sdb
sudo pvs
```

Step 3: Create Volume Group

```
sudo vgcreate myvg /dev/sdb
sudo vgs
```

Step 4: Create Logical Volume

```
sudo lvcreate -L 6G -n mylv myvg
sudo lvs
```

Step 5: Format and Mount LV

```
sudo mkfs.ext4 /dev/myvg/mylv
sudo mkdir /mnt/mylv
sudo mount /dev/myvg/mylv /mnt/mylv
```

Step 6: Fill Disk and Monitor

```
yes "hello" >> /mnt/mylv/a.txt
watch df -h /mnt/mylv
```

Step 7: Extending LV

```
sudo lvextend -L +2G /dev/myvg/mylv
sudo resize2fs /dev/myvg/mylv
```

Step 8: Remove LVM

```
sudo umount /mnt/mylv
sudo lvremove /dev/myvg/mylv
sudo vgremove myvg
sudo pvremove /dev/sdb
```

3. Summary of Commands

Command	Purpose
`pvcreate`	Initialize disk for LVM
`vgcreate`	Create volume group from PV
`lvcreate`	Create logical volume
`lvextend`	Expand LV
`resize2fs`	Resize filesystem after LV expansion
`mkfs.ext4`	Format LV
`mount`	Mount LV
`umount`	Unmount LV
`lvremove`	Remove LV
`vgremove`	Remove VG
`pvremove`	Remove PV
`yes "hello" >> file`	Fill disk with test data
`watch df -h`	Monitor disk usage

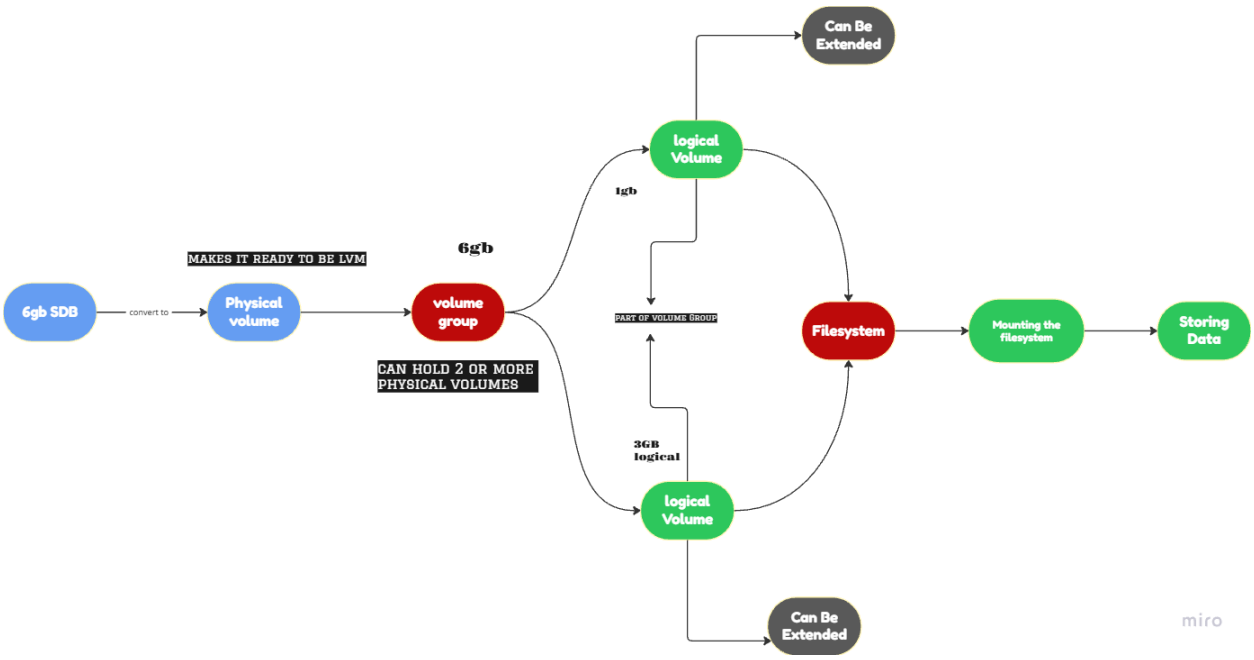

Figure : Example 1 Diagram

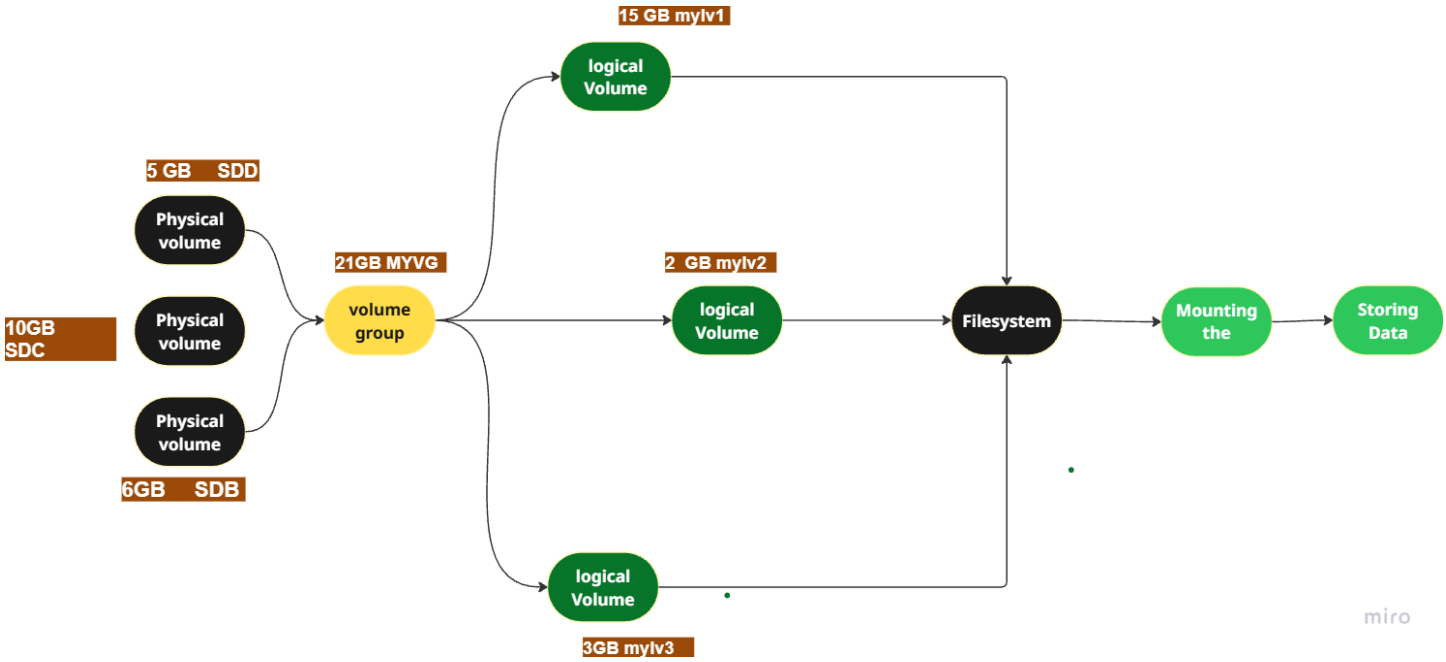

Figure : Example 2 Diagram

4. Device Mapper Definition

Device Mapper:

A Linux kernel framework that **creates virtual block devices** and translates

all read/write operations from logical volumes to the correct physical extents on the disks.

All read/write operations on LVs pass through the device mapper.