LVM and Disk Management for DevOps (Asad's Practice Guide)

1. What is LVM?

LVM (Logical Volume Manager) is a system for managing disk drives and their partitions.
It allows flexible disk management, resizing partitions without unmounting, and combining multiple physical disks into a single logical volume.
Used heavily in DevOps for flexibility and scalability.

2. Basic Terminology

- PV (Physical Volume): Actual physical disk or loop device (e.g., /dev/sdb, /dev/loop18)
- VG (Volume Group): A storage pool created from one or more PVs
- LV (Logical Volume): A partition created from a VG. This is where data is stored.

3. Useful Commands with Explanations

Create a 1GB fake disk file:

```
dd if=/dev/zero of=disk1.img bs=1M count=1000
```

Attach the file as a loop device:

```
losetup /dev/loop18 disk1.img
```

Check loop device:

```
losetup -a
```

Create Physical Volume:

```
pvcreate /dev/loop18
```

Create Volume Group:

```
vgcreate vgtest /dev/loop18
```

Create Logical Volume:

```
lvcreate -L 500M -n lvtest vgtest
```

Format Logical Volume:

```
mkfs.ext4 /dev/vgtest/lvtest
```

Mount the Logical Volume:

```
mkdir /mnt/lvtest
mount /dev/vgtest/lvtest /mnt/lvtest
```

Check mounted volumes:

```
df -h
```

4. What is Mounting?

Mounting means attaching a file system to a directory (mount point).

When you mount a disk at /mnt/lvtest, all files written to that folder are stored on the mounted disk.

5. Combining Multiple Disks

To expand storage by combining multiple disks:

```
pvcreate /dev/sdb /dev/sdc
vgcreate vgdata /dev/sdb /dev/sdc
lvcreate -L 20G -n lvstore vgdata
mkfs.ext4 /dev/vgdata/lvstore
mkdir /mnt/data
mount /dev/vgdata/lvstore /mnt/data
```

This provides a logical volume built from multiple physical disks.

6. Real System with Single Disk?

- Use loop devices to simulate disks for LVM practice.

- Servers/cloud allow multiple disks.
- Use 'lsblk' to see available real/virtual disks.

7. Important Concepts

- LVM allows storage flexibility.
- Ideal for cloud environments (EBS, GCP persistent disks).
- No need to reboot or repartition disks when using LVM.