Day 13-Storage

Storage and LVM

Block Devices

- Block devices represent storage hardware like HDDs and SSDs.
- They appear under /dev directory (e.g., /dev/sda, /dev/sdb).
- Data is read and written in blocks.
- View block devices:
  - `lsblk`
  - `ls -l /dev | grep "^b"`

Partition Tables

- Partition information is saved in a partition table.
- View partition table:
  - `sudo fdisk -l /dev/sda`
- Partition Types:
  - Primary partition: Directly bootable; limited to 4 in MBR.
  - Extended partition: Holds multiple logical partitions.
  - Logical partition: Created within an extended partition.

Partition Schemes

- MBR (Master Boot Record):
  - Max 4 primary partitions.
  - Disk size limit of 2TB.
- GPT (GUID Partition Table):
  - Supports 128 partitions (RHEL) or more.
  - No size limitation.

Creating a Partition

- Start partitioning:
  - `gdisk /dev/sdb`
- Create new partition:
  - `n`
- Specify size and partition type:
  - Hex code `8300` for Linux filesystem
  - `L` to list codes
- Save changes:
  - `w`

File Systems

Partitioning alone is not enough. We must create a filesystem and mount it.

Common Filesystems:

- EXT2:
  - 2TB file size, 4TB volume size
  - Supports compression
  - Long crash recovery
- EXT3:
  - Journaling added for faster recovery
  - 2TB file size, 4TB volume size
- EXT4:
  - 16TB file size, 1 Exabyte volume size
  - Journaling with checksum
  - Better performance

Create Filesystem and Mount

- Format partition:
  - `mkfs.ext4 /dev/sdb1`
- Create mount point:
  - `mkdir /mnt/ext4`
- Mount disk:
  - `mount /dev/sdb1 /mnt/ext4`
- Check mount:
  - `mount | grep /dev/sdb1`

Make Mount Persistent

- Add an entry to /etc/fstab:
  - `/dev/sdb1 /mnt/ext4 ext4 defaults,relatime,errors=panic 0 1`
- fstab fields:
  - device name
  - mount point
  - filesystem type
  - mount options
  - dump (0 = no dump)
  - pass (0/1/2 for fsck order)

LVM (Logical Volume Management)

LVM is a flexible way to manage storage. It allows resizing disks, creating snapshots, and pooling storage across multiple physical devices.

Uses the following key terms:

- Physical Volume (PV): Physical disks or partitions (e.g., /dev/sdb1)
- Volume Group (VG): A Pool of physical volumes
- Logical Volume (LV): Usable disk space carved out from a volume group

Steps to Set Up LVM:

- Install LVM tools if not already installed:

    - `sudo apt install lvm2`
- Create a physical volume:
    - `pvcreate /dev/sdb1`
- Create a volume group:
    - `vgcreate myvg /dev/sdb1`
- Create a logical volume:
    - `lvcreate -n mylv -L 5G myvg`
- Format the logical volume:
    - `mkfs.ext4 /dev/myvg/mylv`
- Create mount point and mount:
    - `mkdir /mnt/lvm`
    - `mount /dev/myvg/mylv /mnt/lvm`
- Make persistent by adding to /etc/fstab:
    - `/dev/myvg/mylv /mnt/lvm ext4 defaults 0 0`

Useful LVM Commands

- List physical volumes:
    - `pvs`
- List volume groups:
    - `vgs`
- List logical volumes:
    - `lvs`
- Extend a logical volume:
    - `lvextend -L +2G /dev/myvg/mylv`
    - `resize2fs /dev/myvg/mylv`
- Reduce a logical volume:
    - `lvreduce -L 3G /dev/myvg/mylv`
    - `resize2fs /dev/myvg/mylv`