Disks, Partitions & Filesystems (Core)

Linux Commands Course · Section 14

Goal

Learn how to inspect disks, partitions, and filesystems, check space usage, and safely mount or manage storage devices.

This section provides essential commands for storage administration.

Storage Concepts

- Disk → physical device (e.g., /dev/sda, /dev/nvme0n1)
 Partition → logical segment of a disk (e.g., /dev/sda1)
- Filesystem → structure that defines how data is stored (e.g., ext4, xfs, btrfs)

Linux uses a single unified directory tree — all disks and partitions get mounted somewhere under /.

Listing Storage Devices — lsblk

List block devices (disks, partitions, LVM volumes).

Example output:

```
MOUNTPOINT
NAME FSTYPE LABEL UUID
sda
⊢sda1 ext4 root 21f0-4c3f
⊢sda2 swap swap a1b2c3d4-e5f6-7890-1122-334455667788 [SWAP]
```

- NAME → device name
- FSTYPE → filesystem type
 MOUNTPOINT → where it's mounted

Display UUIDs and Filesystem Info — blkid

Show filesystem type and unique IDs.	
	sudo blkid
Example:	
	/dev/sda1: UUID="21f0-4c3f" TYPE="ext4" PARTLABEL="root" /dev/sda2: UUID="a1b2c3d4" TYPE="swap"
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Check Disk Usage — df -h

View mounted filesystems and their space usage.

df -h

Example:

Filesystem Size Used Avail Use% Mounted on /dev/sda1 50G 20G 28G 42% / tmpfs 2.0G 2.0M 2.0G 1% /run

-h makes sizes human-readable.

Directory Usage — du

Show how much space files and directories take.

du -sh *

- -s → summarize totals
- -h → human-readable sizes

Example output:

4.0K Documents 1.2G Downloads 400M Pictures

Great for finding large folders.

Mounting a Filesystem — mount



Persistent Mounts - /etc/fstab

/etc/fstab defines filesystems that auto-mount at boot.

View file:

cat /etc/fstab

Example entry:

UUID=21f0-4c3f /data ext4 defaults 0 2

Fields:

1. Device or UUID
2. Mount point
3. Filesystem type
4. Options (defaults, ro, noatime, etc.)

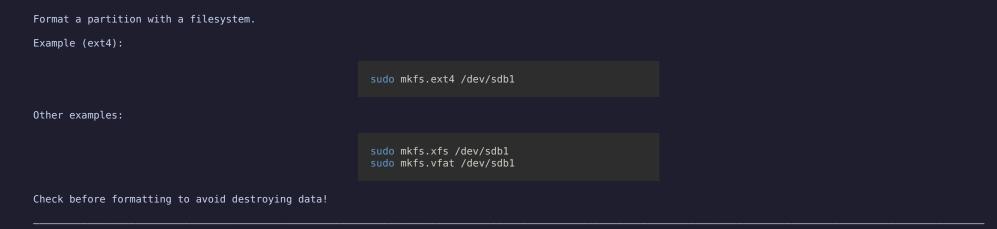
5. Dump (backup flag)

6. fsck order (1=root, 2=others)

Partitioning (Demo Only!) — fdisk and parted



Creating a Filesystem — mkfs



Filesystem Check — fsck

Scans and repairs filesystem errors.	
	sudo fsck /dev/sdb1
Run only on unmounted filesystems.	
You can auto-confirm fixes with -y:	

sudo fsck -y /dev/sdb1

Filesystem Tuning — tune2fs

View or modify filesystem parameters (ext filesystems).

sudo tune2fs -l /dev/sda1

Example adjustments:

sudo tune2fs -m 1 /dev/sda1 # reserve 1% space for root
sudo tune2fs -c 0 /dev/sda1 # disable auto-check by mount count

Resizing Filesystems - resize2fs

Resize an \boldsymbol{ext} filesystem after adjusting partition siz	e.	
Shrink (offline only):		
	sudo resize2fs /dev/sdb1 20G	
Expand to fill available space:		
	sudo resize2fs /dev/sdb1	
Run after resizing partition with fdisk or parted.		

Swap Space — Virtual Memory

Linux uses swap as overflow for RAM.		
Enable swap area:		
	sudo swapon /dev/sda2	
Disable it:		
	sudo swapoff /dev/sda2	
Show current swap usage:		
	swaponshow	
Or view via free -h.		

Creating a Swap File (Alternative)

If no swap partition exists, create one as a file.

sudo fallocate -l 2G /swapfile sudo chmod 600 /swapfile sudo mkswap /swapfile sudo swapon /swapfile swapon /swapfile sudo swapon /swapfile sudo swapon /swapfile swapon /s

Recap

- Inventory: lsblk, blkid, df -h, du -sh *
 Mounting: mount, umount, /etc/fstab
 Partitioning (demo): fdisk, parted
 Filesystems: mkfs, fsck, tune2fs, resize2fs
 Swap: swapon, swapoff, /swapfile

These commands form the foundation of disk and storage management in Linux.

Practice

- 1. List all disks and their filesystems with lsblk -f.
- 2. Check total disk usage using df -h.
- Find which directory takes the most space using du -sh *.
 Mount a USB drive to /mnt and then unmount it.
- Inspect /etc/fstab and identify all entries.
- 6. Enable or disable swap space with swapon and swapoff.

Next Up

Scheduling Tasks (Core) — automating jobs with cron and system timers.