Session - 39

Linux Booting Process (Step-by-Step)

1. BIOS / UEFI

- **Function:** Initializes hardware (keyboard, RAM, disk, etc.).
- **Role:** Searches for a **bootable device**.
- **Output:** Loads the **bootloader** from MBR (Legacy BIOS) or EFI partition (UEFI).

2. Bootloader (GRUB, LILO)

- **Function:** Loads the Linux **kernel** and **initramfs/initrd** into memory.
- **Example:** GRUB menu lets you select an OS or kernel version.
- **Output:** Passes control to the kernel.

3. Linux Kernel

- **Function:**
    - Initializes hardware via drivers.
    - Mounts initramfs or initrd as a temporary root filesystem.
- **Output:** Starts the first process: **init** (or systemd, PID 1).

4. Init / systemd

- **Function:** Starts user-space processes and services.
    - In older systems: /sbin/init
    - In modern systems: **systemd**

- **Reads config from:** /etc/inittab or systemd unit files.

5. Runlevel / Target Reached

- **Function:**
    - Starts necessary services (network, login, GUI).
    - Mounts filesystems.
- **Systemd targets:**
    - multi-user.target (non-GUI)
    - graphical.target (GUI)

6. Login Prompt

- **Function:** User logs in via terminal (getty) or graphical login (GDM, LightDM).
- **Output:** Shell or desktop environment starts.

🔁 **Full Boot Flow Summary**

BIOS/UEFI → Bootloader (GRUB) → Kernel → Init/systemd → Services/Targets → Login Prompt