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# **UNDERSTANDING THE BOOT PROCESS**

# OVERVIEW OF THE BOOT PROCESS

BIOS

MBR

GRUB

KERNEL

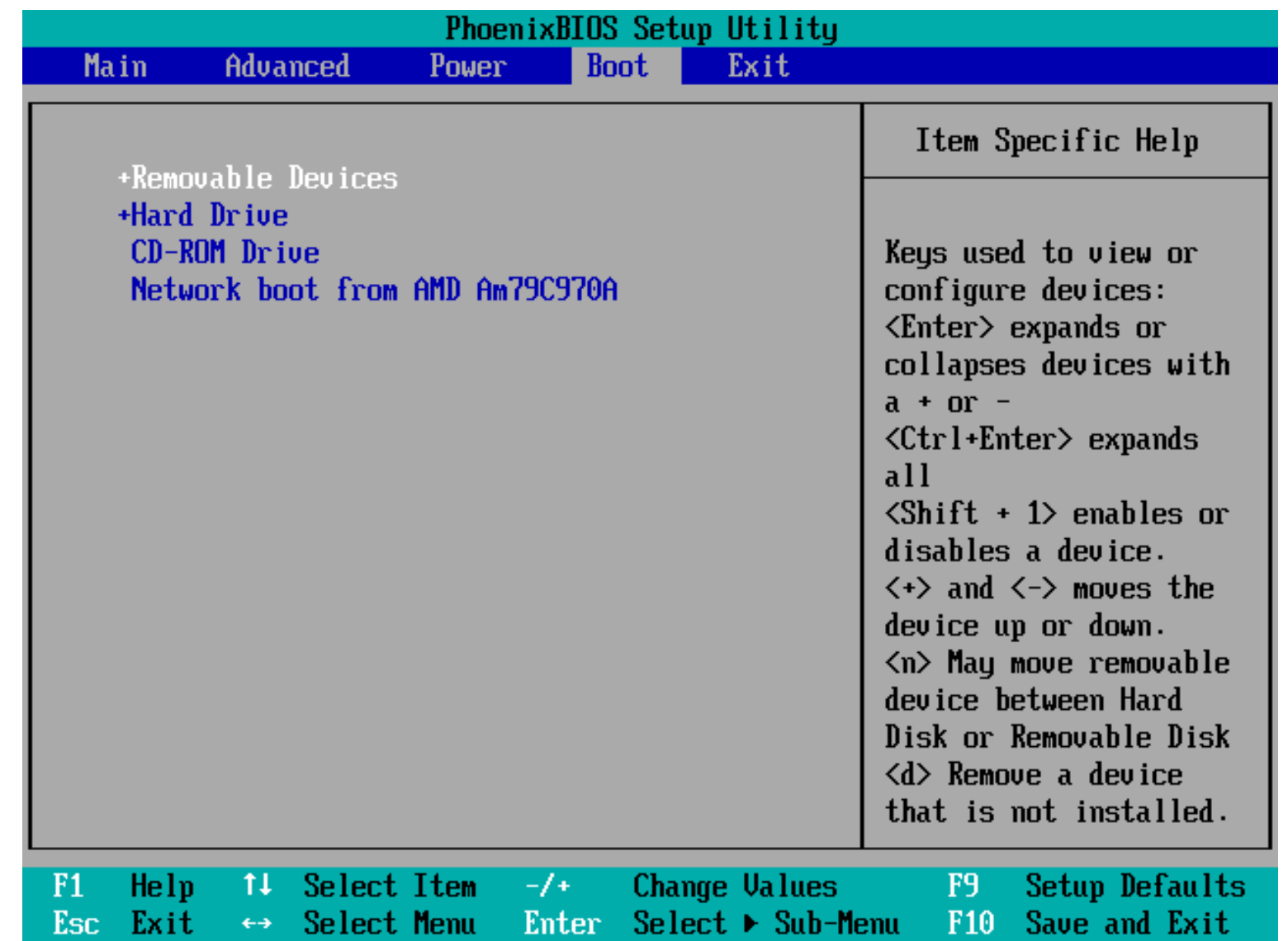
SYSTEMD

RUNLEVEL

# BIOS

## BASIC INPUT OUTPUT SYSTEM

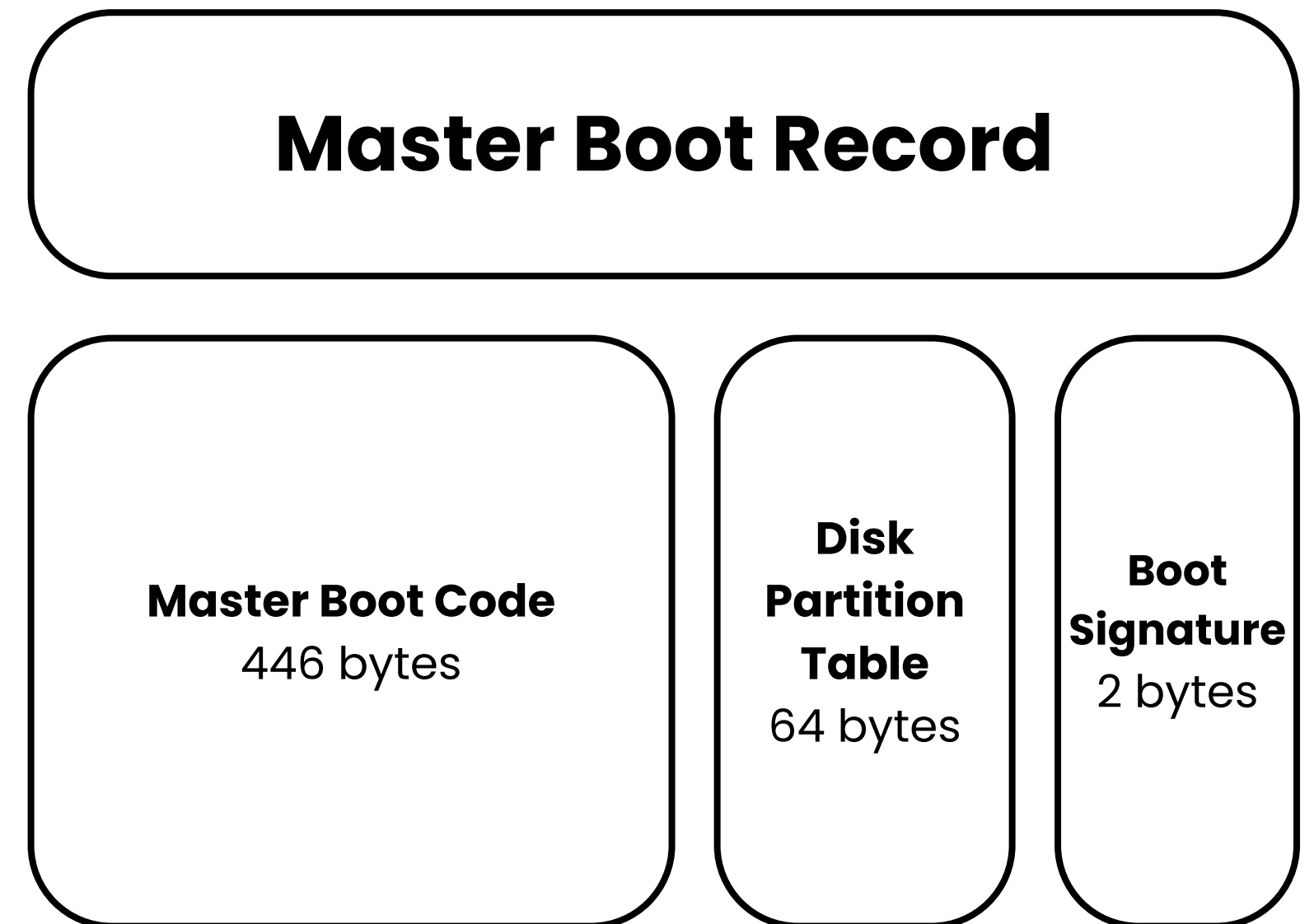
- Perform the **POST** (Power-on self-test).
- Run from **ROM** and **INDEPENDENT** from the OS.
- Searches, loads, and executes the **MBR** to boot the OS.



# MBR

## MASTER BOOT RECORD

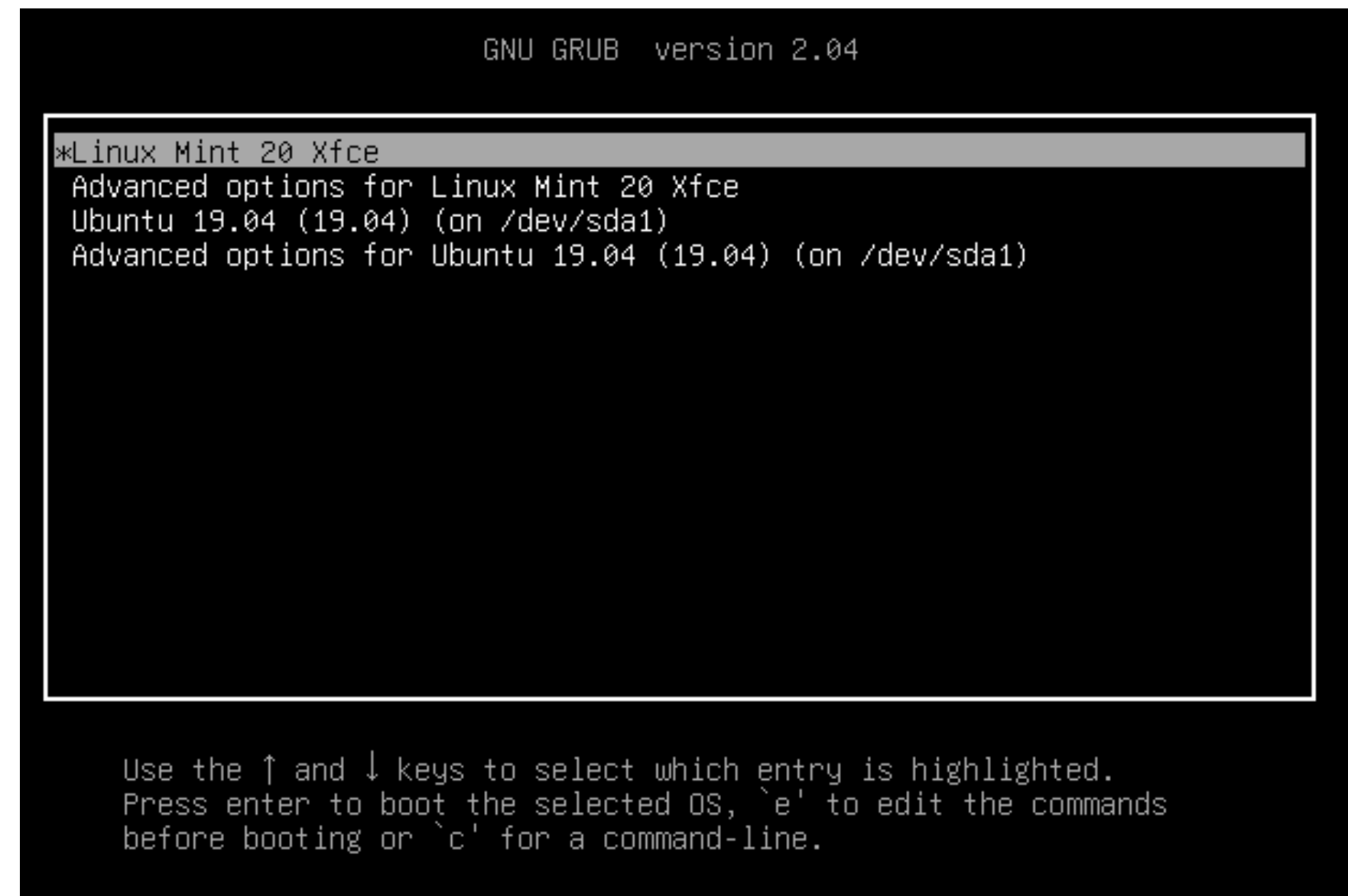
- Responsible for loading and executing the **GRUB** boot loader.
- Located in the **1st** sector of the boot device.
- Is **512 bytes** in size.
- Contains the **GRUB** program and informations about the disk partitions.



# GRUB

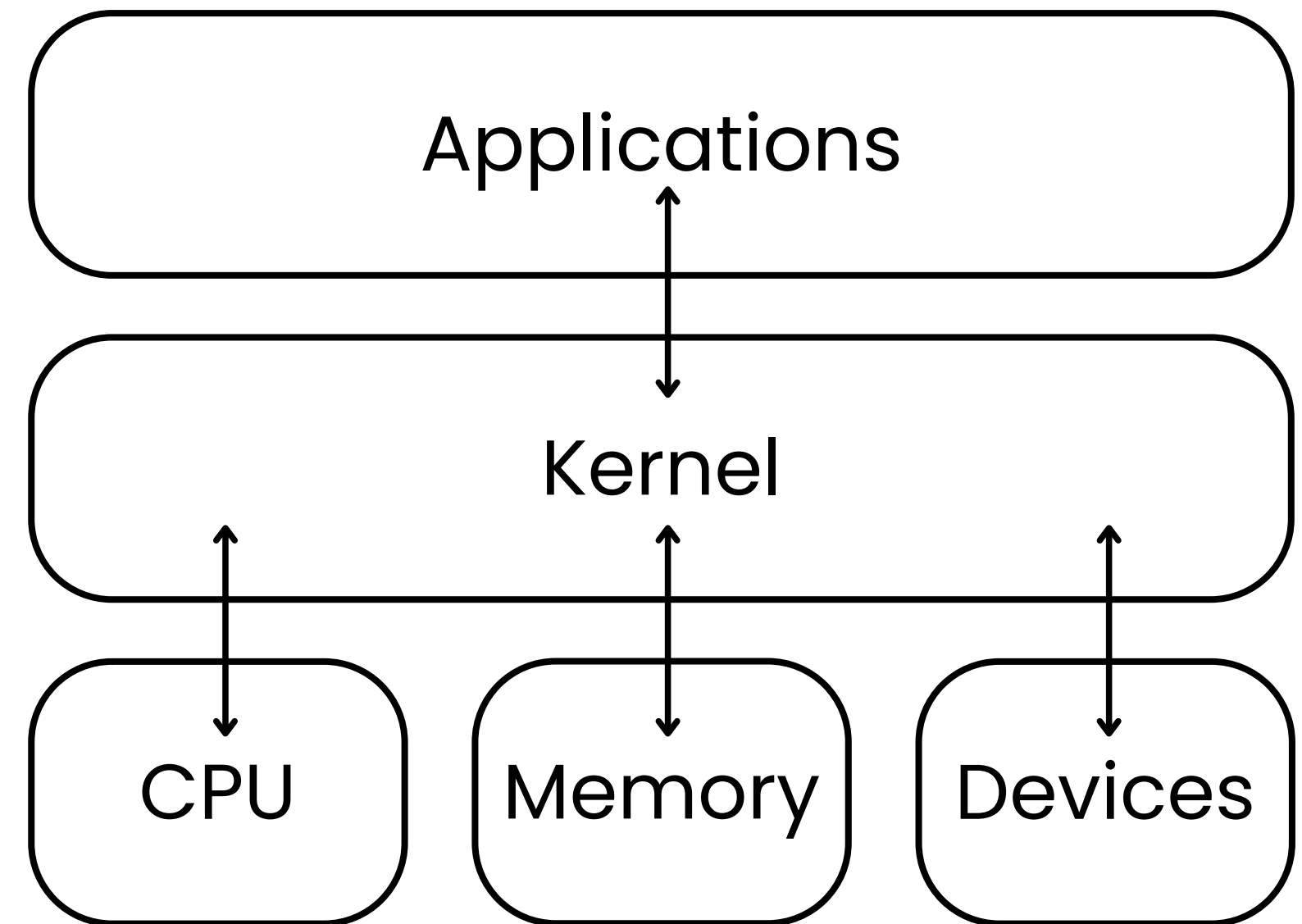
## GRAND UNIFIED BOOTLOADER

- **LILO** (Linux Loader) in very old system.
- Displays a splash screen to choose which kernel image installed to be executed.
- **GRUB** configuration file is located:
  - **/boot/grub/grub.conf**
  - **/etc/grub.conf**
- Load kernel into memory.



# KERNEL

- **Core** of the OS and has total control over the OS.
- Mounts the root file system as specified in the **grub.conf**.
- Follow predefined procedures:
  - a. decompress itself in place (**vmlinux** vs **vmlinux**).
  - b. perform hardware checks.
  - c. gain access to vital peripheral hardware.
  - d. run the **init process**.



# SYSTEMD

## PID 1

- The parent process initiated by the **kernel's init process**.
- Previously known as **SysVinit** process.
- Performs a range of tasks:
  - a. probe all remaining hardware
  - b. mount filesystems
  - c. initiate and terminate services
  - d. manage essential system processes like user login
  - e. run a desktop environment
- Lastly, decide the **target** or **state** the linux system boots into.



# RUNLEVEL

## CURRENT STATE OF THE OS

- Defining which system services are running.
- Previously, **SysVinit** identified run levels by number.
- **.target files** now replace run levels in **Systemd**.

Let's check our default target:

```
$ sudo systemctl get-default
```

To change boot target :

```
$ sudo systemctl set-default <target>
```

# RUNLEVEL

- You can change the target (run level) while the system runs.

For example, to switch to run level 3 from run level 5, we can run the following command:

**\$ sudo systemctl isolate multi-user.target**

Then, to take the system to run level 5, let's run the command:

**\$ sudo systemctl isolate graphical.target**

poweroff.target	run level 0	turn off (shut down) the computer
rescue.target	run level 1	initiate a rescue shell process
multi-user.target	run level 3	configure the system as a non-graphical (console) multi-user environment
graphical.target	run level 5	establish a graphical multi-user interface with network services
reboot.target	run level 6	restart the machine