OPERATING SYSTEM DESIGN

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Department of Computer Applications

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OS Structures & Kernel Programming

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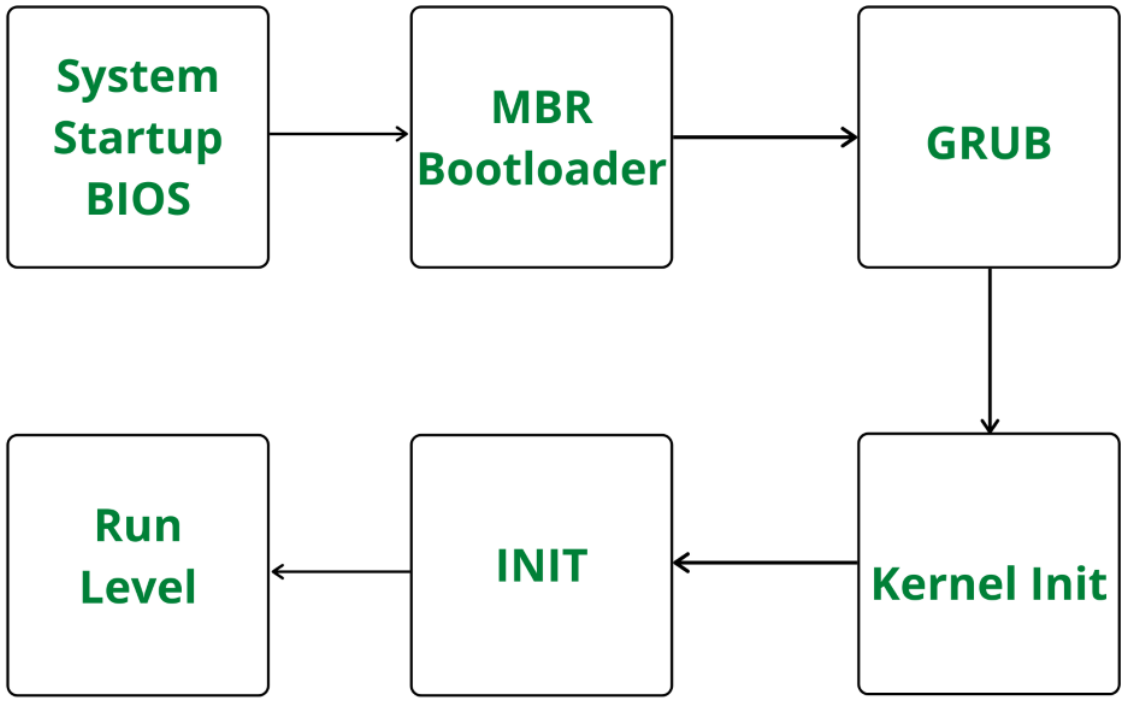
System Boot

- Many processes starts running when we power on the system
- Stages of Linux Boot Process



System Boot

- BIOS
  - Basic Input-Output System
  - It performs the basic integrity checks on HDD or SDD
  - It search and find the MBR
- MBR
  - Master Boot Record.
  - Responsible for loading and executing the GRUB loader
  - Sometimes MBR could be CD-ROM or USB stick
  - MBR is located in the 1st sector of bootable disk

System Boot

- Grub
  - Grand Unified Boot Loader
  - It displays the first splash screen we see on the computer while booting
  - It has a simple menu where you can select some options
  - If you have multiple kernel images installed, you can use your keyboard to select the one you want your system to boot with.
  - Grub configuration file is found at /etc/grub.conf or

    /boot/grub/grub.conf

System Boot

Simple grub.conf file

```
#boot=/dev/sda
default=0
timeout=5
splashimage=(hd0,0)/boot/grub/splash.xpm.gz
hiddenmenu
title CentOS (2.6.18-194.el5PAE)
      root (hd0,0)
      kernel /boot/vmlinuz-2.6.18-194.el5PAE ro root=LABEL=/
      initrd /boot/initrd-2.6.18-194.el5PAE.img
```

System Boot

- Kernel
  - It has complete control over everything in your system
  - The kernel that was selected by GRUB first mounts the root file system that's specified in the grub.conf file
  - The kernel initializes the devices and their drivers
  - Kernel then establishes a temporary root file system using Initial RAM Disk (initrd) until the real file system is mounted. (initrd – initial ram disk)
  - Then it executes the /sbin/init program

System Boot

- Init
  - first process started from /etc/inittab
  - Its pid is always 1. Check with following command

    # ps –ef | grep init
  - It executes the runlevel programs
- Run level
  - Determines which program to run after OS Boot up
  - Default run levels varies from each distribution
  - Each run levels are from different directories
  - Check the default runlevel using grep initdefault /etc/inittab

System Boot

Run Level	Mode	Action
0	Halt.	Shuts down system
1	Single-user text mode.	Does not configure network interfaces, start daemons, or allow non-root logins
2	Not used (user-definable)	Does not configure network interfaces or start daemons.
3	Full multi-user text mode.	Starts the system normally.
4	Not used (user-definable)	Not used/User-definable
5	Full multi-user graphical mode (with an X-based login screen)	As run level 3 + display manager(X)
6	Reboot.	Reboots system

Commands:
To know your runlevel - $runlevel
To change to runlevel - $sudo telinit 3 (changes to runlevel 3)

System Boot

- BIOS – Basic Input/Output System executes MBR
- MBR – Master Boot Record execute GRUB
- GRUB – Grand Unified Bootloader executes Kernel
- Kernel – Kernel executes /sbin/init
- Init – Init executes runlevel programs
- Runlevel – Runlevel programs are executed from /etc/rc.d/rc*.d/

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THANK YOU

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