

# Linux para Ingeniería:

## Linux Runlevels, and Start and Shutdown Sequence

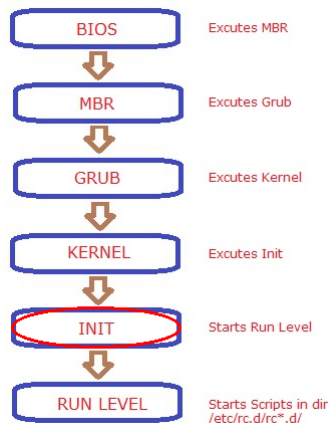
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# Linux's boot process



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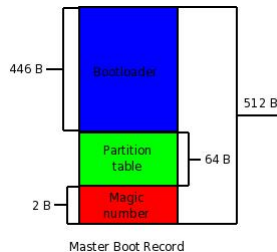
The Linux boot process is the name given to the startup procedures/order that your system goes through to load its operating system.

# BIOS - Basic Input Output System

- ▶ When an x86 computer is booted your system will look for a program called "BIOS", Basic Input output System.
- ▶ The BIOS code is a piece of read only code.
- ▶ The BIOS is responsible for initiating the first steps of the boot **process**.
- ▶ When the BIOS code is executed,
  - ✓ it will look for any peripherals present,
  - ✓ it will then look for a drive to use for the booting of the system.
- ▶ Normally you can press 'F12' or 'F2' to enter your BIOS and change the boot sequence order.
- ▶ Once a valid boot loader has been found and loaded into memory, full control is then passed.
- ▶ **In simple terms, the BIOS loads and executes the MBR (Master Boot Record).**

# MBR - Master Boot Record

- ▶ The Master Boot Record is generally found on the first sector of the bootable disk (less than 512 bytes in size).
- ▶ This will probably be `"/dev/sda"` or `"/dev/hda"` on older systems.
- ▶ The master boot record can be broken down into three sections:
  - ✓ The Primary Bootloader which takes up the first 446 bytes of information.
  - ✓ Next is the Partition Table which takes the next 64 bytes of information.
  - ✓ The last 2 bytes are taken by the MBR validation check.
- ▶ The MBR contains information about your boot loader.
  - ✓ On older systems this was: "Lilo" and on newer systems this is "GRUB" (Grand Unified Bootloader).



# GRUB - The Grand Unified Bootloader

- ▶ GRUB is one of the most commonly used bootloader on Linux systems.
- ▶ There are currently two versions in use:
  - ✓ GRUB 1.0 which is still in use on older supported systems and
  - ✓ GRUB 2.0 which normally ships with most new systems.
- ▶ Using GRUB gives you the ability to load the kernel image of choice if you have more than one on your system,
  - ✓ otherwise the default option will be loaded.
- ▶ GRUB configuration files are normally located within the following locations:
  - ✓ GRUB 1.0 - OpenSUSE/Debian - `"/boot/grub/menu.lst"`
  - ✓ GRUB 2.0 - Debian - `"/boot/grub/grub.conf"` or `"/boot/grub/grub.cfg"`
- ▶ Other systems such as Fedora often provide a symbolic link from `"/etc/grub.conf"` which points to `"/boot/grub/grub.conf"`

# Example of GRUB config file

- GRUB 2.0 - Debian - `"/boot/grub/grub.conf"` or `"/boot/grub/grub.cfg"`

```
[root@centos ~]# cat /etc/grub.conf
# grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this file
# NOTICE:  You have a /boot partition.  This means that
#           all kernel and initrd paths are relative to /boot/, eg.
#           root (hd0,0)
#           kernel /vmlinuz-version ro root=/dev/mapper/vg_centos-lv_root
#           initrd /initrd-[generic-]version.img
#boot=/dev/sda
default=0
timeout=5
splashimage=(hd0,0)/grub/splash.xpm.gz
hiddenmenu
title CentOS (2.6.32-279.el6.i686)
    root (hd0,0)
    kernel /vmlinuz-2.6.32-279.el6.i686 ro root=/dev/mapper/vg_centos-lv_root no
    initrd /initramfs-2.6.32-279.el6.i686.img
```