

Title : Study of boot loader like “Grub”

Aim : To understand what is GRUB boot loader and how it works..

Objective: To study following

1. GRUB Features
2. GRUB Installation Process
3. GRUB Boot Process
4. GRUB Interfaces

Theory:

The GRUB (Grand Unified Bootloader) is a bootloader available from the GNU project. A bootloader is very important as it is impossible to start an operating system without it. It is the first program which starts when the program is switched on. The bootloader transfers the control to the operating system kernel.

1. GRUB Features

GRUB is the default bootloader for many of the Linux distributions. This is because it is better than many of the previous versions of the bootloaders. Some of its features are:

- GRUB supports LBA (Logical Block Addressing Mode) which puts the addressing conversion used to find files into the firmware of the hard drive
- GRUB provides maximum flexibility in loading the operating systems with required options using a command based, pre-operating system environment.
- The booting options such as kernel parameters can be modified using the GRUB command line.
- There is no need to specify the physical location of the Linux kernel for GRUB. It only required the hard disk number, the partition number and file name of the kernel.
- GRUB can boot almost any operating system using the direct and chain loading boot methods.

2. GRUB Installation Process

GRUB automatically becomes the default loader after it is installed. The following steps are followed to install GRUB:

- It is important to use the latest GRUB package available to install GRUB. Or the GRUB package from the installation CD-ROM is used.
- The root shell prompt is opened and the command **/sbin/grub-install** is run after the GRUB package is installed. The in the command is the location where the GRUB stage 1 boot loader should be installed.
- After all this is done, the GRUB graphical boot loader menu appears before the kernel loads into memory when the system boots.

3. GRUB Boot Process

The boot process using GRUB requires the GRUB to load itself into memory. This is done in the following steps:

- The stage 1 boot loader is loaded into the memory by the BIOS. This boot loader is also known as the primary boot loader. It exists on 512 bytes or less of disk space within the master boot record. The primary boot loader can load the stage 1.5 or stage 2 boot loader if required.
- The stage 1.5 boot loader is loaded into the memory by the stage 1 boot loader if required. This may be necessary in some cases as some hardware require a middle step before moving on to the stage 2 loader.
- The secondary boot loader is also known as the stage 2 boot loader and it can be loaded into the memory by the primary boot loader. Display of the GRUB menu and command environment are functions performed by the secondary boot loader. This allows the user to look at system parameters and select the operating system to boot.
- The operating system or kernel is loaded into the memory by the secondary boot loader. After that, the control of the machine is transferred to the operating system.

4. GRUB Interfaces

There are three interfaces in GRUB which all provide different levels of functionality. The Linux kernel can be booted by the users with the help of these interfaces. Details about the interfaces are:

i. Menu Interface

The GRUB is configured by the installation program in the menu interface. It is the default interface available. It contains a list of the operating systems or kernels which is ordered by name. A specific operating system or kernel can be selected using the arrow keys and it can be booted using the enter key.

ii. Menu Entry Editor Interface

The e key in the boot loader menu is used to access the menu entry editor. All the GRUB commands for the particular menu entry are displayed there and these commands may be altered before loading the operating system.

iii. Command Line Interface

This interface is the most basic GRUB interface but it grants the most control to the user. Using the command line interface, any command can be executed by typing it and then pressing enter. This interface also features some advanced shell features.