Grub 2 - The Basics.

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Grub2 Menu Mode.
If you have only one OS installed then to enter Menu Mode hold down 'Shift' key during boot.
From the Menu press enter to boot selected OS,
or 'e' to edit, 'c' for the 'CLI Mode' or 'Esc' to return to Menu.
Note: Grub's CLI and Linux's CLI are different and distinct beasts. Grub has its own set of CLI commands that can only be executed from the Grub command line. Linux CLI commands can-not be executed from the Grub CLI

Some important Grub2 Files.
The install image files
`boot.img` is a 512-byte file eauivalent to Grub1 stage 1 and is installed in LBA 0 (the MBR).
there is no stage 1.5 in GRUB 2.
`core.img` takes the place of Grub 1 stages 1.5/2 and is normally installed starting from LBA 1
core.img is built dynamically when <u>Linux</u> '*grub-install*' is invoked.
core.img incorporates basic Grub code, plus one or more linked-in modules, including the filesystem driver module needed to read the filesystem /boot/grub. (these linked-in modules are also available in `/boot/grub`, under their normal names eg "ext2.mod").

The /boot/grub/*.mod modules
GRUB 2 puts many facilities in dynamically loaded modules (`*.mod`), allowing `core.img` to be smaller and be built in more flexible ways.

The Grub2 configuration file (replaces menu.lst or grub.conf)
`/boot/grub/grub.cfg` is a *bash-like* script file executed by grub2 bootloader.
Under normal circumstances **you should not modify grub.cfg directly.**

Format of `grub.cfg`
- Each line is treated as a separate command except;
    > Blank lines are ignored
    > Lines starting with a "#" sign are comment lines, and are also ignored
- Command arguments are usually available in two form : a short form, with single dash like `-h`, and a long form with two dash like `--version`.
- A `--` signals the end of options and disables further option processing. Any arguments after the -- are treated as arguments, not as an option.

`grub.cfg` instructions are either built-in to Grub, or are in the form of `*.mod` files, which have to be loaded using the <u>Grub</u> command `'insmod'` before use.

The Linux Command update-grub
On most distributions, the file `grub.cfg` is built and updated by `update-grub`, which uses the content of `/etc/defaults/grub` and `/etc/grub.d/*grub_scripts`.

File path names.
In the <u>Grub</u> environment, a file path is written as `(hd0,1)/path/to/filename.`
Note: drive numbers start from zero (0) but partition numbers start from one (1), examples
`(hd0)` First Hard-disk drive, <u>seen by the BIOS</u>. Linux 'sda'.
`(hd0,1)` First partition of the First Hard-disk drive. Linux 'sda,1'

Menu Entries in grub.cfg
Each menu option in `grub.cfg` is declared by the command `menuentry`. and is executed when the user selects that particular menu option from the menu.

Environment variables
Grub2 has environment variables, that can be used with `$`. e.g. `echo ${root}`.
The following are Grub2 environment commands. note that variable names are case sensitive.
`set` List all the environment variables in use.
`set var=varvalue` Set the environment variable var equal to varvalue.

`unset` Remove (unset) an environment variable.
`export var` Export a variable.
`read VAR` Set the variable VAR with user input.
The `root` *variable* is used to contain grub's root partition (like `hd0,1`). This variable is prepended to pathname when disk is omitted.

GRUB2 $prefix
The Grub2 stores a variable - "`$prefix`" - which contains the path name of the '**grub**' directory..e.g. `(hd0,1)/boot/grub`.

The Problem If you change the layout of your hard drive partitions `$prefix` may finish up pointing to the wrong location and 'break' the boot process.

The Fix . reinstall GRUB2 using a live CD to the correct partition number.

Removing Old Kernels.

In a terminal window enter the following command
`uname -r`
This diplays the version number of the Linux kernel currently running. It will look something like:
`2.6.32-28-generic`
Open the Synaptic package manager. Click the "Search" button on the tool bar and search for `linux-image-2` The results will show all the available kernels including the installed kernels. A green box on the left indicates an installed package. The only linux-image(s) you want installed is the latest one (and perhaps the previous one). Uninstall the old kernels by clicking their green boxes and selecting "Mark for Removal" and then click the "Apply" button. Execute `update-grub.`
Caution! Don't remove the current kernel, or you will break your system.

UEFI - Unified Extensible Firmware Interface (**UEFI**) is a modern replacement for BIOS. Originally proposed by Intel, and subsequently adopted by other h/w & s/w manufacturers.

UUID - universally unique identifier (**UUID**) is a set of identifiers, standardised by the Open Software Foundation (OSF)

GUID - Globally Unique Identifier is a 32-character hexadecimal string UUID preferred by Microsoft et al.

GPT - GUID Partition Table is the partition table format for a UEFI hard disk. It can also be employed on some BIOS systems booted by Grub/Linux.

References:
GNU Grub manual
http://www.gnu.org/software/grub/manual/
A Grub 2 mine-of-info
http://people.apache.org/~skitching/MineOfInformation/linux/Booting_Linux_on_x86_with_Grub2.html
Ubuntu Grub2 Documentation
https://help.ubuntu.com/community/Grub2
Kubuntu Grub2 Cocumentation
http://kubuntuforums.net/forums/index.php?topic=3106368.0
Linux Grub commands and how to's for GRUB2
http://members.iinet.net/~herman546/p20/GRUB2%20Bash%20Commands.html