Chapter 2

Preparing the computer to run linux:

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About Linux

Linux is an open source computer operating system, initially developed on and for Intel x86-based personal computers. It has been subsequently ported to an astoundingly long list of other hardware platforms, from tiny embedded appliances to the world's largest supercomputers.

History:

Linus Torvalds was a student in Helsinki, Finland, in 1991, when he started a project: writing his own operating system **kernel**. He also collected together and/or developed the other essential ingredients required to construct an entire operating system with his kernel at the center. It wasn't long before this became known as the Linux kernel.

In 1992, Linux was re-licensed using the **General Public License** (**GPL**) by **GNU** (a project of the Free Software Foundation or FSF, which promotes freely available software), which made it possible to build a worldwide community of developers. By combining the kernel with other system components from the GNU project, numerous other developers created complete systems called Linux distributions in the mid-90's.

The Linux distributions created in the mid-90s provided the basis for fully free (in the sense of freedom, not zero cost) computing and became a driving force in the open source software movement. In 1998, major companies like IBM and Oracle announced their support for the Linux platform and began major development efforts as well.

Today, Linux powers more than half of the servers on the Internet, the majority of smartphones (via the Android system, which is built on top of Linux), and all of the world's most powerful supercomputers.

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LINUS TORVALDS
LINUX CREATOR

Linux Philosophy

Linux borrows heavily from the well-established UNIX operating system. It was written to be a free and open source system to be used in place of UNIX, which at the time was designed for computers much more powerful than PCs and was quite expensive. Files are stored in a hierarchical filesystem, with the top node of the system being the **root** or simply "**/**". Whenever possible, Linux makes its components available via files or objects that look like files. Processes, devices, and network sockets are all represented by file-like objects, and can often be worked with using the same utilities used for regular files. Linux is a fully multitasking (i.e. multiple threads of execution are performed simultaneously), multiuser operating system, with built-in networking and service processes known as daemons in the UNIX world.

Note: Linux was inspired by UNIX, but it is not UNIX.

Linux Community

The Linux community is a far-reaching ecosystem consisting of developers, system administrators, users and vendors who use many different forums to connect with one another. Among the most popular are:

- Internet Relay Chat (IRC) software (such as WeeChat, HexChat, Pidgin and XChat)
- Online communities and discussion boards including Linux User Groups (both local and online)
- Many collaborative projects hosted on services such as GitHub

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- Newsgroups and mailing lists, including the Linux Kernel Mailing List
- Community events, e.g. Hackathons, Install Fests, Open Source Summits and Embedded Linux Conferences.

A portal to one of the most powerful online user communities can be found at linux.com. This site is hosted by The Linux Foundation and serves over one million unique visitors every month. It has active sections on:

- News
- Community discussion threads
- Free tutorials and user tips.

Linux Terminologies:

1. **Kernel:** brain of the Linux operating system. Controls the hardware and makes the hardware interact with the applications. Eg: linux kernel
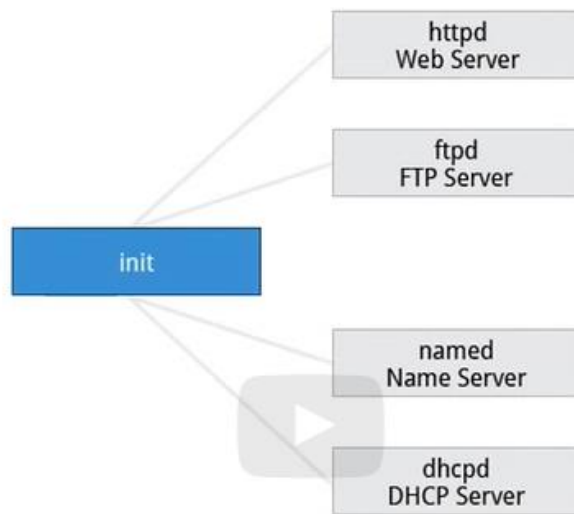

2. **Distribution:** aka Distros is a collection of programs combined with the linux kernel to make up a Linux based operating system. Eg: red hat enterprise Linux, fedora, ubuntu, gentoo.
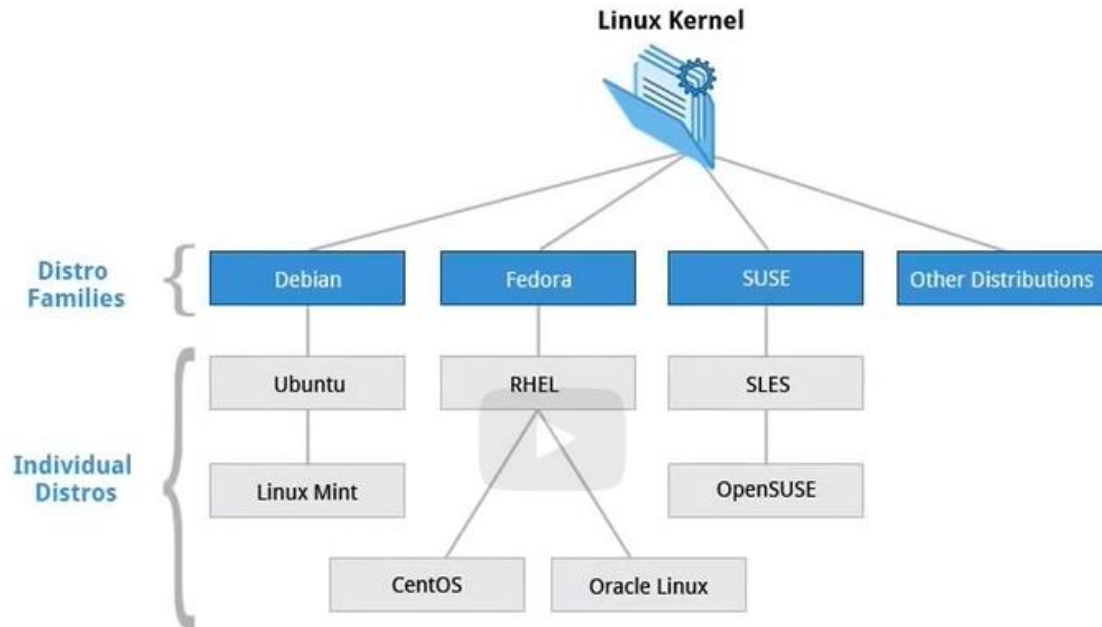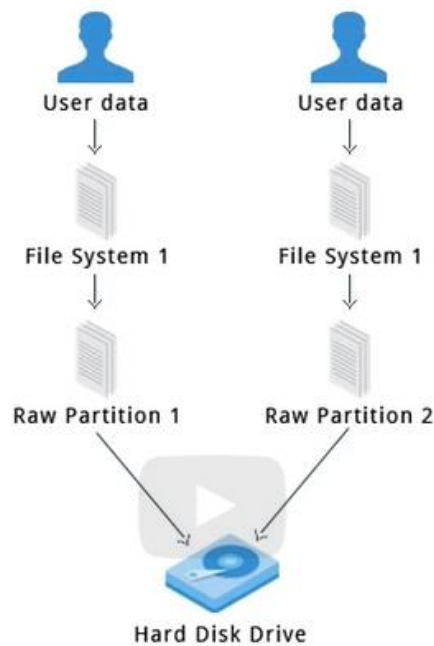
3. **Boot loader:** is a program that boots the operating system. Eg: GRUB, ISOLINUX.
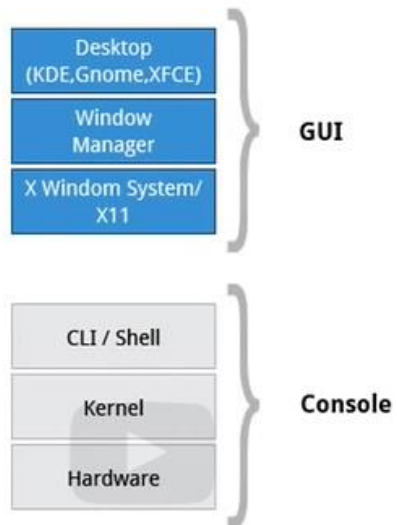

4. **Service:** program that runs as a background process. Eg: httpd, nfsd, ntpd, ftpd and named.

5. **File System:** method for storing and organizing files in Linux. Eg: ext3, ext4, FAT, XFS, Btrfs.

6. **X Window System:** provides the standard toolkit and protocol to build graphical user interfaces on nearly all linux systems.

7. **Desktop environment:** graphical user interface on top of the operating system. Eg: GNOME, KDE, xfce, fluxbox.

8. **Command line:** interface for typing commands on top of the operating system

Commandline of OpenSUSE | Commandline of Ubuntu | Commandline of CentOS
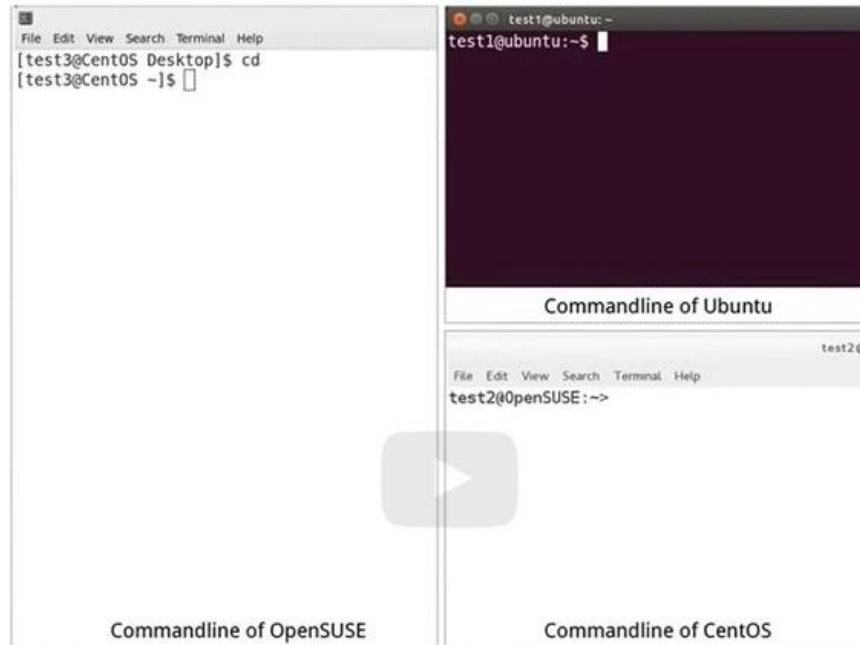
9. **Shell:** command line interpreter that interprets the command line input and instructs the operating system to perform any necessary tasks and commands. Eg: bash, tcsh, zsh.


Shell of OpenSUSE | Shell of Ubuntu | Shell of CentOS
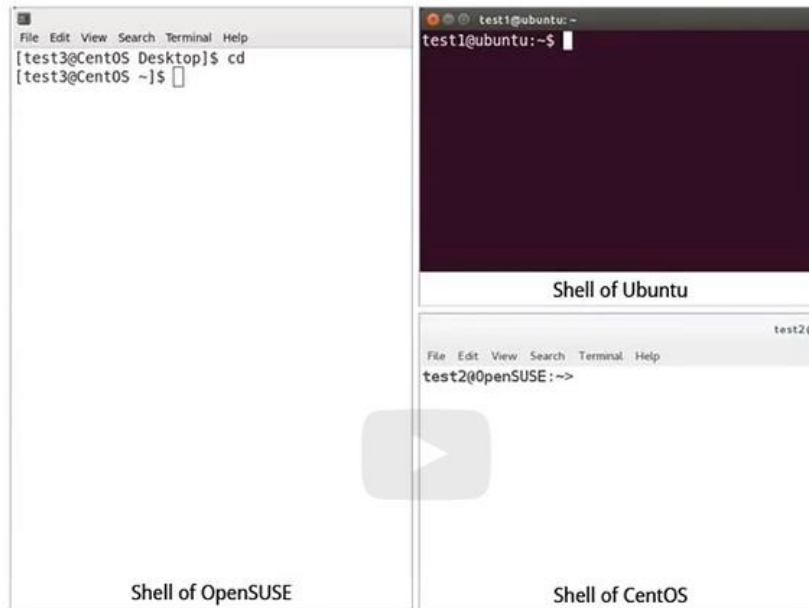
Linux Distributions:

The Linux kernel is the core of the operating system. A full Linux distribution consists of the kernel plus a number of other software tools for file-related operations, user management, and software package management. Each of these tools provides a part of the complete system. Each tool is often its own separate project, with its own developers working to perfect that piece of the system.

While the most recent Linux kernel (and earlier versions) can always be found in The Linux Kernel Archives, Linux distributions may be based on different kernel versions. For example, the very popular RHEL 7 distribution is based on the 3.10 kernel, which is not new, but is extremely stable. Other distributions may move more quickly in adopting the latest kernel releases. It is important to note that the kernel is not an all or nothing proposition, for example, RHEL 7/CentOS 7 have incorporated many of the more recent kernel improvements into their older versions, as have Ubuntu, openSUSE, SLES, etc.

Examples of other essential tools and ingredients provided by distributions include the C/C++ compiler, the gdb debugger, the core system libraries applications need to link with in order to run, the low-level interface for drawing graphics on the screen, as well as the higher-level desktop environment, and the system for installing and updating the various components, including the kernel itself. And all distributions come with a rather complete suite of applications already installed.
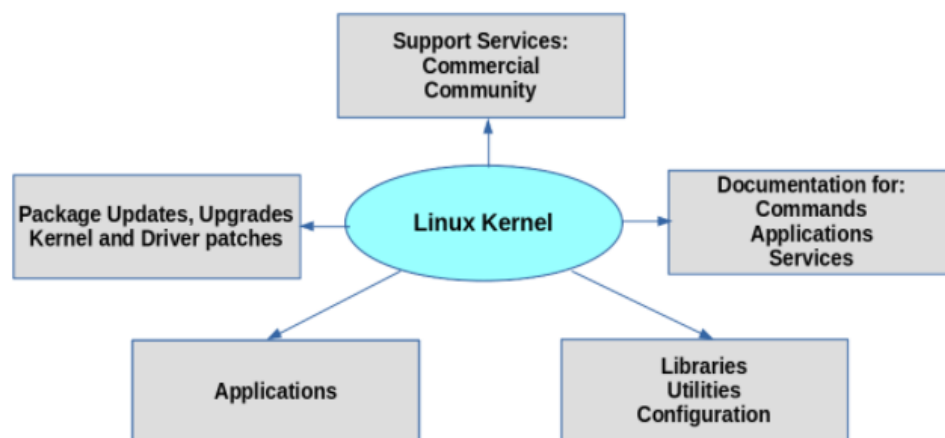

Services associated with distributions:

The vast variety of Linux distributions are designed to cater to many different audiences and organizations, according to their specific needs and tastes. However, large organizations, such as companies and governmental institutions and other entities, tend to choose the major commercially-supported distributions from Red Hat, SUSE, and Canonical (Ubuntu).

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CentOS is a popular free alternative to Red Hat Enterprise Linux (RHEL) and is often used by organizations that are comfortable operating without paid technical support. Ubuntu and Fedora are widely used by developers and are also popular in the educational realm. Scientific Linux is favored by the scientific research community for its compatibility with scientific and mathematical software packages. Both CentOS and Scientific Linux are binary-compatible with RHEL; i.e. in most cases, binary software packages will install properly across the distributions.

Many commercial distributors, including Red Hat, Ubuntu, SUSE, and Oracle, provide long term fee-based support for their distributions, as well as hardware and software certification. All major distributors provide update services for keeping your system primed with the latest security and bug fixes, and performance enhancements, as well as provide online support resources.
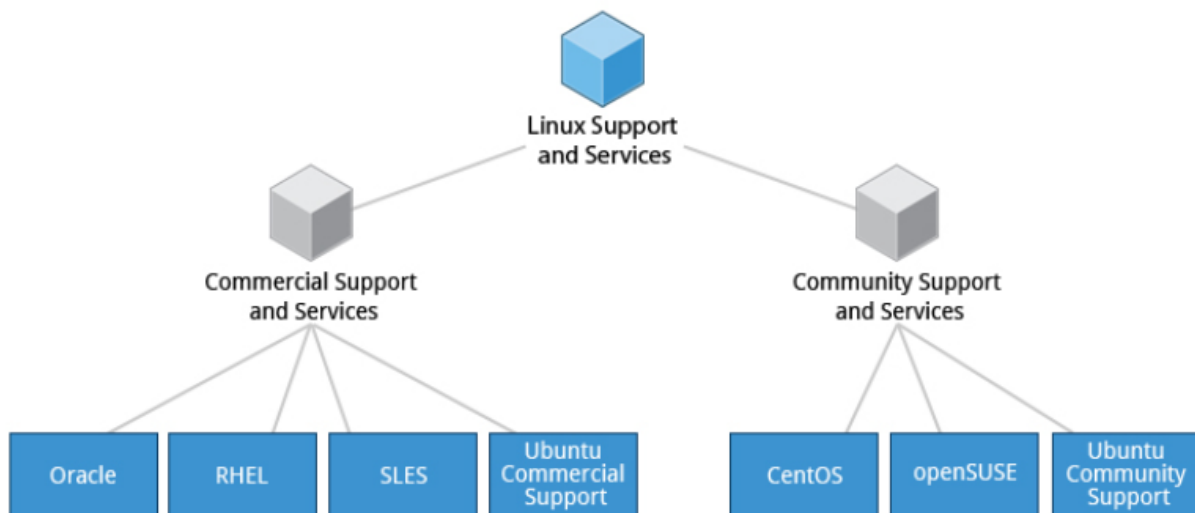
Summary:

- Linux borrows heavily from the UNIX operating system, with which its creators were well-versed.

- Linux accesses many features and services through files and file-like objects.

- Linux is a fully multi-tasking, multi-user operating system, with built-in networking and service processes known as daemons.

- Linux is developed by a loose confederation of developers from all over the world, collaborating over the Internet, with Linus Torvalds at the head. Technical skill and a desire to contribute are the only qualifications for participating.

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- The Linux community is a far reaching ecosystem of developers, vendors, and users that supports and advances the Linux operating system.

- Some of the common terms used in Linux are: **kernel**, **distribution**, **boot loader**, **service**, **filesystem**, **X Window system**, **desktop environment**, and **command line**.

- A full Linux distribution consists of the kernel plus a number of other software tools for file-related operations, user management, and software package management.