

Introduction to the Linux Operating System

CYBERSMARTS

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GNU Project was started in 1984 by Richard Stallman

Many GNU Project utilities are used via command line

The GNU Project had almost everything needed for an operating system except a kernel, and that's where Linus Tarvalds came in with Linux in 1994

The Bash shell is the first GNU software package which most users experience first

The Birth of Linux

Development began in 1993 as a free alternative to the Unix operating system

Linux Kernel 1.0 was released on March 14, 1994

Developed by Linus Torvalds

Originally developed for Intel 80x86 processors yet now supports other processors and can be found running on a plethora of other devices: embedded devices, servers, etc.

Linux Distributions

Consist of the Linux kernel and a collection of applications packaged for that distro's user base/use case: (i.e. Parrot, and Kali for security; Tsurugi for digital forensics, and reverse engineering; Ubuntu for desktops, home, and enterprise servers.)

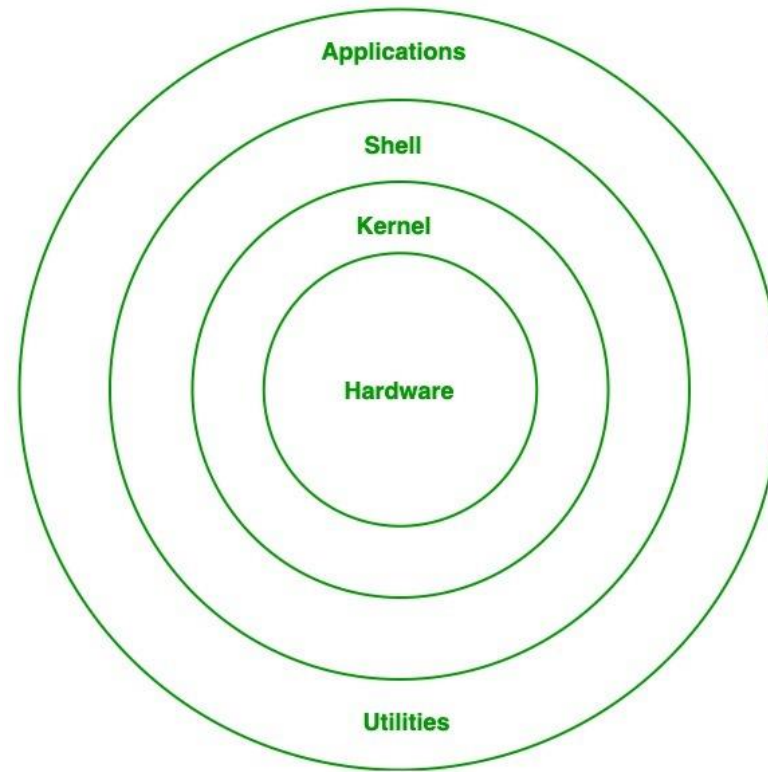
Most distros come with: X Windows, the GUI: GNOME or KDE; The OS source-code

The kernel is the core of the operating system, much like a cell's nucleus.

Version numbering:

- Each kernel release has its own version number
- Each distro release has its own version number
- `major_version_number.minor_version_number.patch_version_number`

Linux Architecture



Linux Architecture (Kernel)

Kernel: Kernel is the core of the Linux based operating system. It virtualizes the common hardware resources of the computer to provide each process with its virtual resources. This makes the process seem as if it is the sole process running on the machine. The kernel is also responsible for preventing and mitigating conflicts between different processes. Different types of the kernel are:

- Monolithic Kernel
- Hybrid kernels
- Exo kernels
- Micro kernels

Linux Architecture

System Library: Is the special types of functions that are used to implement the functionality of the operating system.

Shell: It is an interface to the kernel which hides the complexity of the kernel's functions from the users. It takes commands from the user and executes the kernel's functions.

Hardware Layer: This layer consists all peripheral devices like RAM/ HDD/ CPU etc.

System Utility: It provides the functionalities of an operating system to the user.

Versioning Explained

Each version of Linux has specific versions of the kernel and versions of packaged applications will be specific to that version release

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Ubuntu 20.10.3 was released in October of the year 2020, and is at its third patch update/upgrade

Versioning Continued

As the distro versions are maintained, they're available to the general public as three types of releases:

- Unstable
- Stable
- Testing

Advantages of Linux

- It is an open-source operating system. This means the source code is easily available for everyone and you are allowed to contribute, modify and distribute the code to anyone without any permissions.
- In terms of security, Linux is more secure than any other operating system. It does not mean that Linux is 100 percent secure it has some malware for it but is less vulnerable than any other operating system.
- The software updates in Linux are easy and frequent.
- Various Linux distributions are available so that you can use them according to your requirements or according to your taste.

More Advantages

- Linux is freely available to use on the internet.
- It has large community support.
- It provides high stability. It rarely slows down or freezes and there is no need to reboot it after a short time.
- It maintains the privacy of the user.
- The performance of the Linux system is much higher than other operating systems. It allows a large number of people to work at the same time and it handles them efficiently.
- It is network friendly.

Even MORE Advantages

- The flexibility of Linux is high. There is no need to install a complete Linux suit; you are allowed to install only required components.
- Linux is compatible with a large number of file formats.
- It is fast and easy to install from the web. It can also install on any hardware even on your old computer system.
- It performs all tasks properly even if it has limited space on the hard disk.

Disadvantages of Linux

- It is not very user-friendly. So, it may be confusing for beginners.
- It has small peripheral hardware drivers as compared to windows.
- Poor support for games.
- No standard edition.
- Lack of technical support.

About Open-Source

Open-source allows access to the software and the right to distribute the software without restrictions.

There are many open-source licenses available: Apache License 2.0, Mozilla Public License 2.0, MIT, GPL(GNU General Public License), LGPL(Lesser General Public License)

Source code consists of the code(high-level language instructions) to get the operating system to do what the developer programs it to

Notice Regarding Google's Android

Android, Google's operating system, is under the Apache License 2.0, which isn't strict about the freeness of the product licensed.

The only GNU component of the Android operating system is the kernel, so it's not truly GNU/Linux

Live OS

Also known as Live CD

Allows the end-user to boot and run Linux from a USB device such as a flash-drive, CD, or DVD

Welcome to the Shell!

The shell is a command-interpreter which runs programs that are typed in:

- Examples: `grep`, `vim`, `ifconfig`, `ipconfig`, `diff`, `gdb`, etc.

