**Linux began in 1991** as a personal project by [Linus Torvalds](https://en.wikipedia.org/wiki/Linus_Torvalds)

to create a new free operating system kernel.

***Linux is not an operating system it is a kernel.***

|  |  |
| --- | --- |
| [Written in](https://en.wikipedia.org/wiki/Programming_language) | [C](https://en.wikipedia.org/wiki/C_(programming_language)), [assembly languages](https://en.wikipedia.org/wiki/Assembly_language) |

|  |  |
| --- | --- |
| Linux | Unix |
| Linux is Open Source, and a large number of programmers work together online and contribute to its development. | Unix was developed by AT&T Labs, different commercial vendors, and non-profit organizations. |
| It is an open-source operating system which is freely accessible to everyone. | It is an operating system which can be only utilized by its copywriters. |
| Threat recognition and solution is very fast because Linux is mainly community-driven. So, if any Linux client posts any sort of threat, a team of qualified developers starts working to resolve this threat. | Unix clients require longer hold up time, to get the best possible bug fixing patch. |
| It supports more file system than Unix. | It also supports file system however lesser than Linux. |
| It is used everywhere from servers, PCs, smartphones, tablets to mainframes. | It is used in servers, workstations, and PCs. |
| The default interface is BASH (Bourne Again Shell). | It initially used Bourne shell. But is also compatible with other GUIs. |
| Anybody can use Linux whether a home client, developer or a student. | Developed mainly for servers, workstations, and mainframes. |
| The source is accessible to the general public. | The source is not accessible to the general public. |
| It has about 60-100 viruses listed till date. | It has about 85-120 viruses listed till date (rough estimate). |
| Some Linux versions are Ubuntu, Debian GNU, Arch Linux, etc. | Some Unix versions are SunOS, Solaris, SCO UNIX, AIX, HP/UX, ULTRIX, etc. |

# Architecture



1. **Kernel:-**

[Kernel](https://www.geeksforgeeks.org/kernel-i-o-subsystem-in-operating-system/) is **core component** of an operating system.

It manages operations of computer and hardware, it basically **manages operations of memory and CPU time**.

Kernel acts as a **bridge** between applications and data processing performed at hardware level using inter-process communication and system calls.

Kernel **loads first into memory when an operating system is loaded and remains into memory until operating system is shut down again**.

It is **responsible** for various tasks such as **disk management, task management, and memory management.**

It decides which process should be allocated to processor to execute and which process should be kept in main memory to execute.

The major aim of kernel is to manage communication between software i.e. user-level applications and hardware i.e., CPU and disk memory.

There are some of the important kernel types which are mentioned below:

* Monolithic Kernel | Micro kernels | Exo kernels |Hybrid kernels

**2. System Libraries: -** These libraries can be specified as some special functions. These are applied for implementing the operating system's functionality and don't need code access rights of the modules of kernel.

**3. System Utility Programs: -** It is responsible for doing specialized level and individual activities. Utility software is a software program to help to analyse, configure, optimize or maintain a computer

Types- System Utilities | storage device management system | file management utilities | Miscellaneous utilities.

**4. Hardware layer:-** Linux operating system contains a hardware layer that consists of several peripheral devices like CPU | HDD | [RAM](https://www.javatpoint.com/ram)

**5. Shell:-** It is an interface among the kernel and user. It can afford the services of kernel. It can take commands through the user and runs the functions of the kernel. The shell is available in distinct types of OS. These operating systems are categorized into two different types, which are the **graphical shells** and **command-line shells**.

There are a few types of these shells which are categorized as follows:

* Korn shell | Bourne shell | C shell | POSIX shell

# Commands

**pwd** – print working directory | present working directory

**cd** – change directory to go straight to the home folder

**cd c:/csm\_classes** – change to a specific path

**cd ..** – change to parent directory | move one directory back

**cd -**-to move to your previous directory

**cd /** - to jump into root directory

**cd ~** - to jump into user directory

**d:** to change the drive from C => D

**ls** – list

**ls -l** – list with details

**ls -R** - will list all the files in the sub-directories as well

**ls -a** – list hidden files

**ls -al** - list the files and directories with detailed information like the permissions, size, owner, etc.

? = reflect single character | \* = 0 or more characters

**ls num?9\*** [num2956, num99…]

**head fileName**– display first 10 lines

**head -n 5 filename -** display first 5 lines

**tail fileName**– display last 10 lines

**mv SourcePath DestinationPath** – move file

**cp SourcePath DestinationPath**– copy file

**rm filename** – remove file

**rm -r** -alternative to rmdir(with content)

**locate** – search globally

**find** – search within a directory

**mkdir** – make directory (i.e, folder)

**rmdir** – remove only empty directory

**wc** – word count (number of lines, words, char)

**wc -w** - only words

**cat filename** – to display file content in console

**cat file1 file2 > file3** - joins two files (1 and 2) and stores the output of them in a new file (3)

**cat filename | tr a-z A-Z >output.txt -** to convert a file to upper or lower case

**echo Hello, saranj>> name.txt – to insert data in a file**

**To create a file**

touch filename

cat > filename

using text editors (Vim, vi, pico, nano …)

**sudo** – (super user do) used for admin right task

**grep content filename** - to search for content in a file (case sensitive)

**df** – report on disk space usage

**du** – disk usage (space a file or a directory takes)

**diff file1 file2** – difference (display only difference among files)

**tar** – to archive multiple files into tarball(file formate similar to zip)

**chmod** – to chage read(r), write(w) and execute(x) permissions (admin | group | public)

Environment Variables $PWD, $USER

**history** – to see previous executed commands

**<command name> -- help** – to get detail about the command

**uname** – username

**hostname** – get hostname

**ping <ipAddress>** - connected device speed

**clear** – to clear terminal

**top** – task manager

**htop** – task manager with better interface

**wget <link>–** to get anything from internet

**jobs** – to display current job

**ifconfig** – to see all the connected devices (display all ip address)

**man <commandName>** - display comman manual

**clear** – to clean the terminal

**zip** – to zip a file

**unzip** – to unzip a file

**apt-get update** – for update

**apt-get upgrade** – for upgrade

**apt-get update && apt-get upgrade**

**In Terminal**

~# = user directories (bin, etc, boot…)

/# = root directories (desktop, downloads…)

TAB button – to autofill

**Ctrl+C** will stop and terminate the command

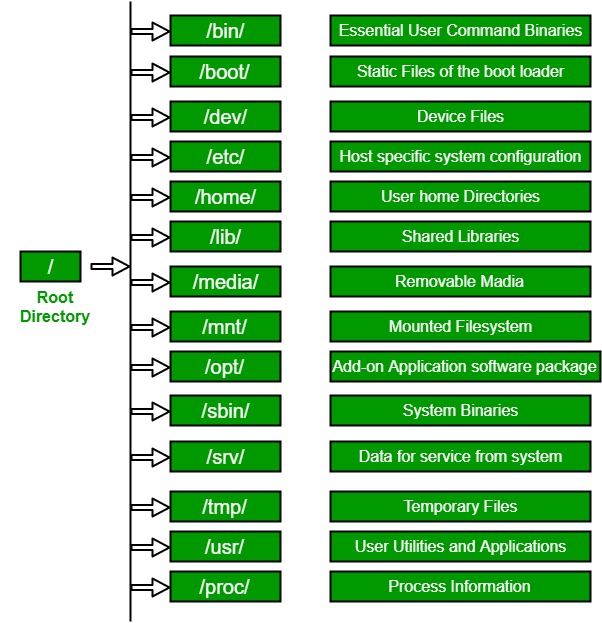
**Ctrl+Z** will simply pause the command.

If you accidental freeze your terminal by using **Ctrl+S**,

simply undo this with the unfreeze **Ctrl+Q**.

**Ctrl+A** moves you to the beginning of the line while **Ctrl+E** moves you to the end.

Run multiple commands in one single command by using the “**;**” to separate them. For example **Command1; Command2; Command3.**Or use **&&** if you only want the next command to run when the first one is successful.



Linux File Hierarchy Structure