



# INTRODUCTION TO LINUX

SOFTWARE ENGINEERING

# CONTENTS

- What is Linux?
- Why use Linux?
- Linux Distributions
- History of Linux
- Command Line & Basic Commands
- Directory Structure

# LINUX?

- Linux has been around since the mid-1990s and has since reached a user base that spans the globe. Linux is actually everywhere: It's in your phones, your thermostats, in your cars, refrigerators, and televisions. It also runs most of the Internet, all of the world's top 500 supercomputers, and the world's stock exchanges.



# WHAT IS LINUX?

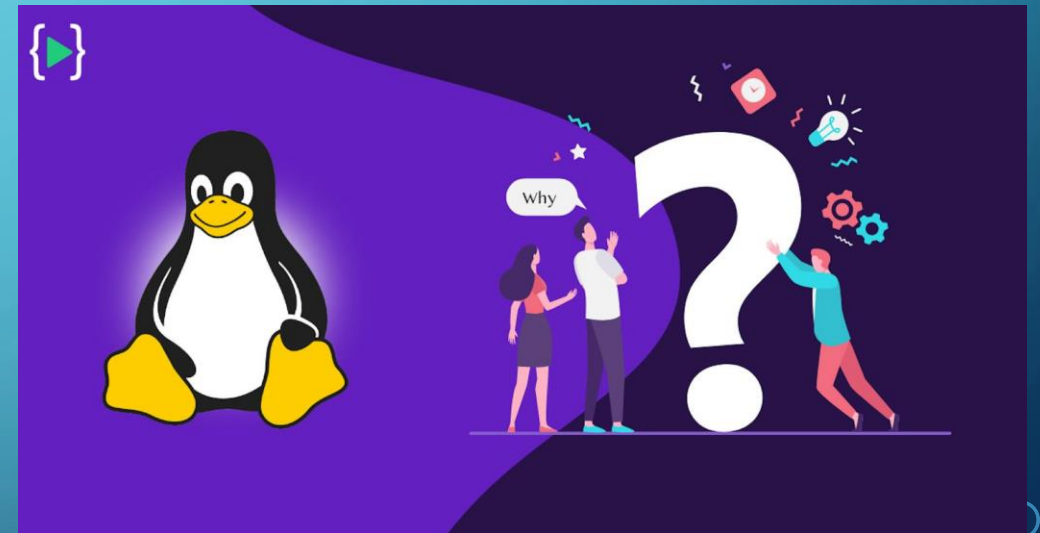


- Just like Windows, iOS, and Mac OS, Linux is an operating system. In fact, one of the most popular platforms on the planet, Android, is powered by the Linux operating system.
- An operating system is software that manages all of the hardware resources associated with your desktop or laptop. To put it simply, the operating system manages the communication between your software and your hardware. Without the operating system (OS), the software wouldn't function.

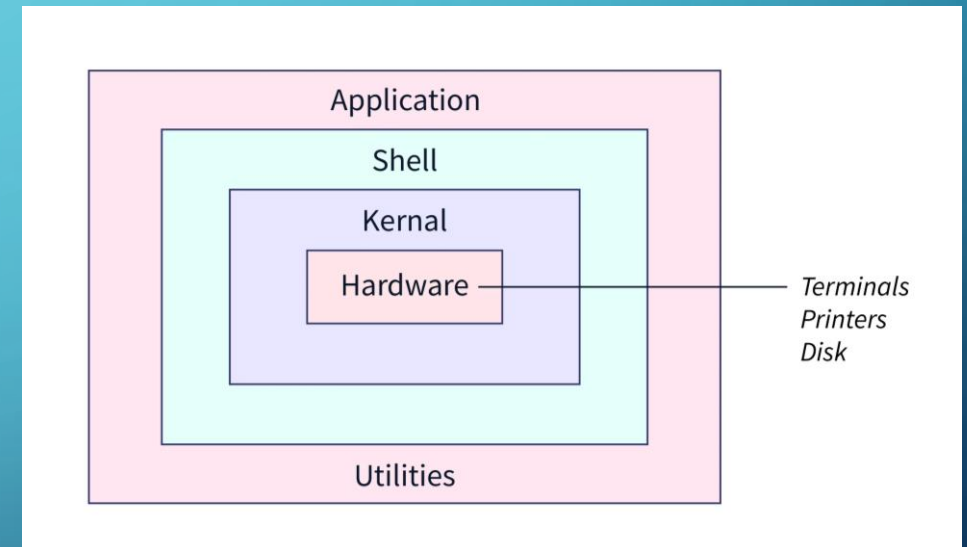
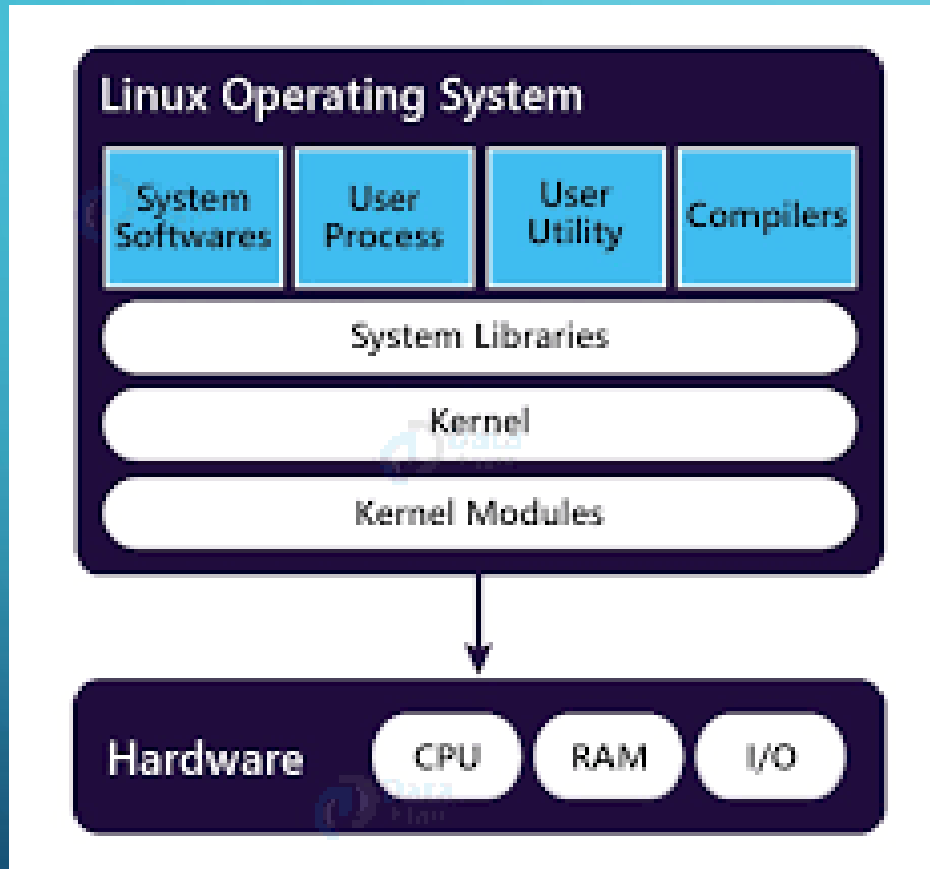
# WHY LINUX?

- Linux is considered one of the most stable, secure, and reliable operating systems and is widely used in servers, supercomputers, and enterprise environments. Today, Linux is one of the most widely used operating systems in the world because it is open-source.

Check it OUT!: <https://github.com/torvalds/linux>



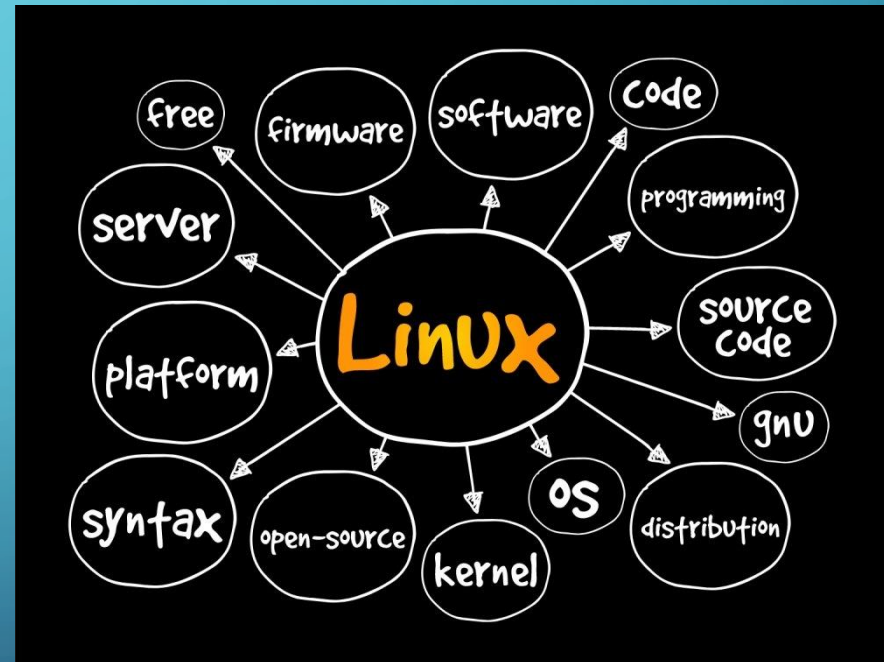
# LINUX OS COMPONENTS





# LINUX IS OPEN SOURCE

- The freedom to run the program, for any purpose.
- The freedom to study how the program works, and change it to make it do what you wish.
- The freedom to redistribute copies so you can help your neighbour.
- The freedom to distribute copies of your modified versions to others.



# LINUX DISTRIBUTIONS

Ubuntu

Fedora

Arch

Plasma

KDE

Mint

Manjaro





# LINUX DISTRIBUTIONS

- Basic: Linux Mint, Ubuntu, Elementary OS or Deepin.
- Above-average: Debian or Fedora
- Challenging: Gentoo

# HISTORY OF LINUX

- **1970s: Unix development**, Unix was developed as a multi-user, multi-tasking operating system and has been widely used in science and research.
- **1980s: Minix is born**, computer science professor Andrew S. Tanenbaum created a small Unix-like operating system called Minix.
- **1991**: 21-year-old student named Linus Torvalds began working on a new operating system he named Linux.



# HISTORY OF LINUX CTD

- **September 1991: Release of Linux 0.01:** Linus released the first version of his Linux called Linux 0.01. It was a command-line operating system and was freely distributed on the Internet.
- **Linux community development:** In the years that followed, Linux quickly gained popularity among programmers and enthusiasts.
- **Enterprise Adoption:** In the late 1990s and early 2000s, the open-source nature of Linux made it more flexible, cost-effective, and more secure than proprietary operating systems such as Windows, making it a popular choice for enterprises and businesses.



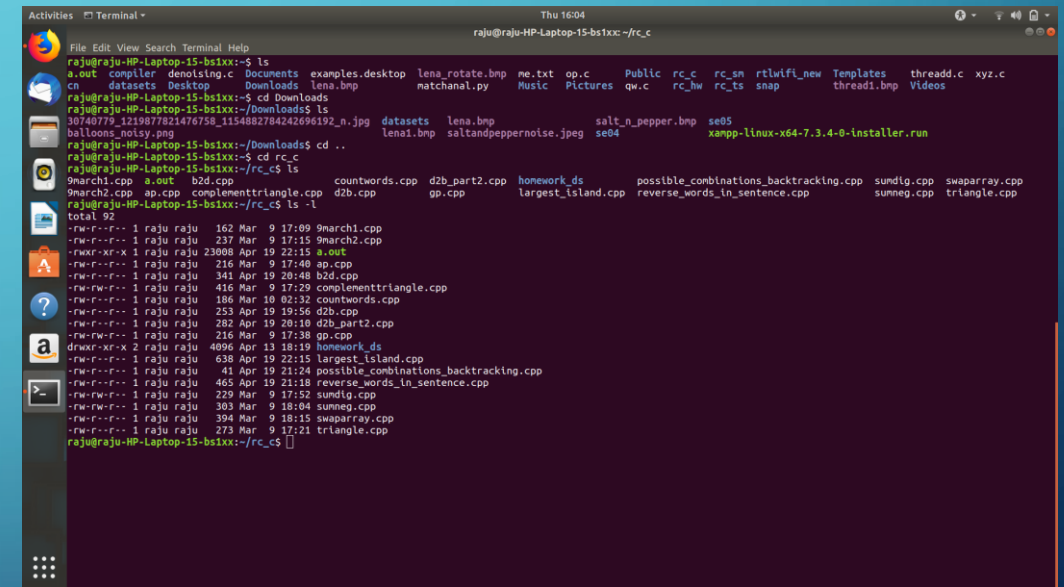
# OFFICIAL MASCOT OF LINUX



- The official **Linux mascot** is a **penguin** named **Tux**. Created by artist **Larry Ewing** in **1996**.
- Tux was chosen as the mascot because the **penguin** is a **rare animal** found in the wild in Antarctica, just as Linux is a **unique** and **powerful** operating system. The name **Tux** comes from the short form "**Torvalds Unix**", in honour of the creator of Linux, Linus Torvalds.

# LINUX COMMAND LINE

- The Linux command line is a text interface to your computer. Often referred to as the shell, terminal, console, prompt, or various other names.
- Flexible to copy and paste commands
- Shell is a program that manages the kernel that manages the drivers
- Using the shell the user interfaces with the kernel
- CTRL ALT T



The screenshot shows a Linux terminal window titled 'Terminal' with the user 'raju' on a machine named 'raju@raju-HP-Laptop-15-bs1xx'. The terminal displays the following commands and outputs:

```
raju@raju-HP-Laptop-15-bs1xx:~$ ls
a.out  compiler  denoising.c  Documents  examples.desktop  lena_rotate.bmp  me.txt  op.c  Public  rc_c  rc_sn  rtlwifi_new  Templates  thread.c  xyz.c
cn      datasets  Desktop      Downloads  lena.bmp          matchanal.py    Music  Pictures  qw.c  rc_hw  rc_ts  snap  thread1.bmp  Videos
raju@raju-HP-Laptop-15-bs1xx:~$ cd Downloads
raju@raju-HP-Laptop-15-bs1xx:~/Downloads$ ls
30740779_1219877821476758_1154882784242696192_n.jpg  datasets  lena.bmp  salt_n_pepper.bmp  se05
balloons_noisy.png                                   lena1.bmp  saltandpeppernoise.jpeg  se04          xampp-linux-x64-7.3.4-0-installer.run
raju@raju-HP-Laptop-15-bs1xx:~/Downloads$ cd ..
raju@raju-HP-Laptop-15-bs1xx:~$ cd rc_c
raju@raju-HP-Laptop-15-bs1xx:~/rc_c$ ls
9march1.cpp  a.out  b2d.cpp  countwords.cpp  d2b_part2.cpp  homework_ds  possible_combinations_backtracking.cpp  sundig.cpp  swaparray.cpp
9march2.cpp  ap.cpp  complementtriangle.cpp  d2b.cpp        gp.cpp        largest_island.cpp  reverse_words_in_sentence.cpp  sunneg.cpp  triangle.cpp
raju@raju-HP-Laptop-15-bs1xx:~/rc_c$ ls -l
total 92
-rw-r--r-- 1 raju raju 162 Mar 9 17:09 9march1.cpp
-rw-r--r-- 1 raju raju 237 Mar 9 17:15 9march2.cpp
-rwxr-xr-x 1 raju raju 23008 Apr 19 22:15 a.out
-rw-r--r-- 1 raju raju 216 Mar 9 17:40 ap.cpp
-rw-r--r-- 1 raju raju 341 Apr 19 20:48 b2d.cpp
-rw-r--r-- 1 raju raju 416 Mar 9 17:29 complementtriangle.cpp
-rw-r--r-- 1 raju raju 186 Mar 10 02:32 countwords.cpp
-rw-r--r-- 1 raju raju 253 Apr 19 19:56 d2b.cpp
-rw-r--r-- 1 raju raju 282 Apr 19 20:10 d2b_part2.cpp
-rw-r--r-- 1 raju raju 216 Mar 9 17:38 gp.cpp
-rwxr-xr-x 2 raju raju 4096 Apr 13 10:15 homework_ds
-rw-r--r-- 1 raju raju 638 Apr 19 22:15 largest_island.cpp
-rw-r--r-- 1 raju raju 41 Apr 19 21:24 possible_combinations_backtracking.cpp
-rw-r--r-- 1 raju raju 465 Apr 19 21:18 reverse_words_in_sentence.cpp
-rw-r--r-- 1 raju raju 229 Mar 9 17:52 sundig.cpp
-rw-r--r-- 1 raju raju 303 Mar 9 18:04 sunneg.cpp
-rw-r--r-- 1 raju raju 394 Mar 9 18:15 swaparray.cpp
-rw-r--r-- 1 raju raju 273 Mar 9 12:21 triangle.cpp
raju@raju-HP-Laptop-15-bs1xx:~/rc_c$
```

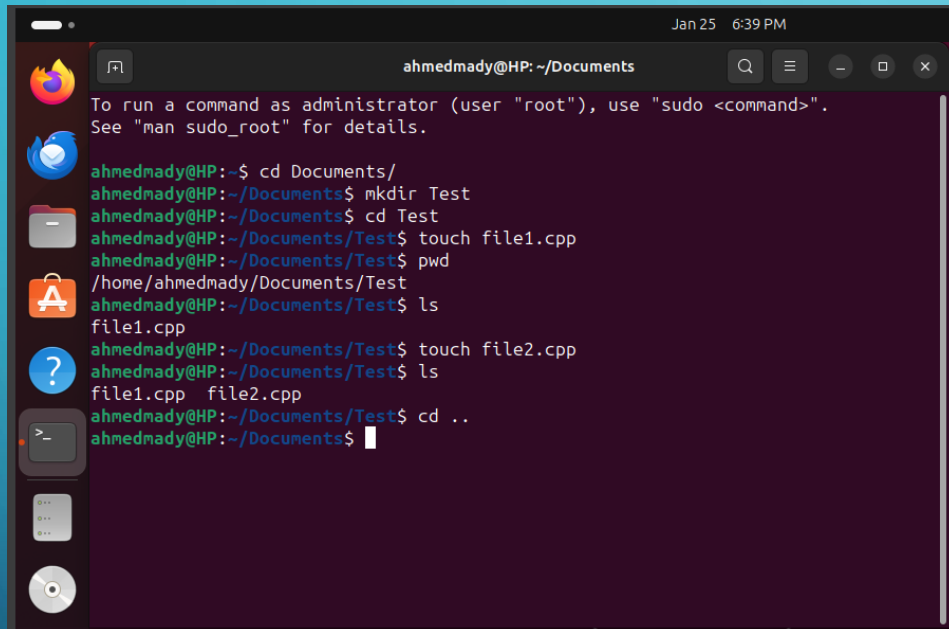


# BASIC TERMINAL COMMANDS

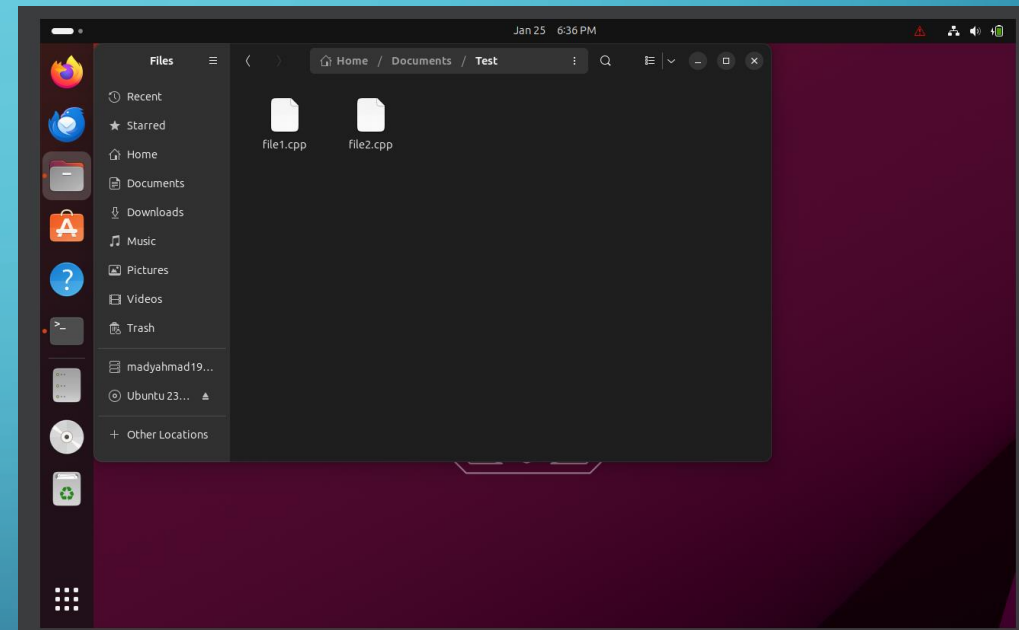
- ls: Lists a directory's content
- cd: Changes the working directory
- pwd: Shows the current working directory's path
- mkdir: Creates a new directory
- rmdir: remove a directory



# EXAMPLE

A terminal window titled 'ahmedmady@HP: ~/Documents' with a search bar and window controls. It displays a series of commands and their outputs for creating a directory and files.

```
ahmedmady@HP:~$ cd Documents/  
ahmedmady@HP:~/Documents$ mkdir Test  
ahmedmady@HP:~/Documents$ cd Test  
ahmedmady@HP:~/Documents/Test$ touch file1.cpp  
ahmedmady@HP:~/Documents/Test$ pwd  
/home/ahmedmady/Documents/Test  
ahmedmady@HP:~/Documents/Test$ ls  
file1.cpp  
ahmedmady@HP:~/Documents/Test$ touch file2.cpp  
ahmedmady@HP:~/Documents/Test$ ls  
file1.cpp  file2.cpp  
ahmedmady@HP:~/Documents/Test$ cd ..  
ahmedmady@HP:~/Documents$
```



# MAN KEYWORD

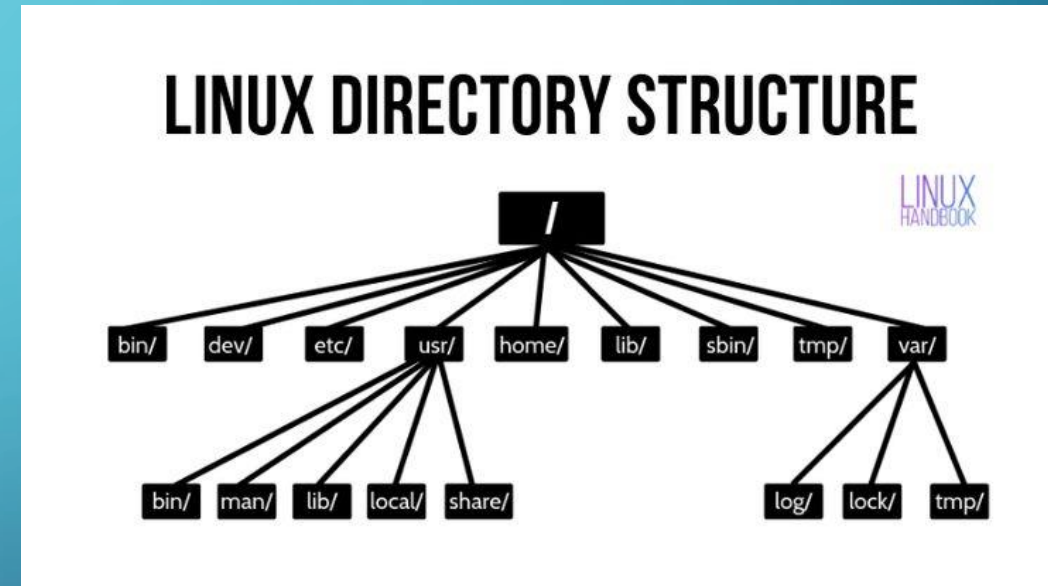
- The man command is a built-in manual for using Linux commands. It allows users to view the reference manuals of a command or utility run in the terminal. The man page (short for manual page) includes a command description, applicable options, flags, examples, and other informative sections.
- man ls, man pwd, etc...
- Press Q to exit the manual

# CD

- `cd ..` : Jumps 1 directory back
- `cd ~` : goes to the home directory

# DIRECTORY STRUCTURE IN LINUX (TREE)

- 1. General Files** – It is also called ordinary files. It may be an image, video, program, or simple text file. These types of files can be in ASCII or Binary format. It is the most commonly used file in the Linux system.
- 2. Directory Files** – It may be a directory file within a directory (subdirectory).
- 3. Device Files** – In a Windows-like operating system, devices like CD-ROM, and hard drives are represented as drive letters like F: G: H whereas in the Linux system devices are represented as files. As for example, /dev/sda1, /dev/sda2, and so on.



# DIRECTORY STRUCTURE IN LINUX

<b>/bin</b>	binary or executable programs.
<b>/etc</b>	system configuration files.
<b>/home</b>	home directory. It is the default current directory.
<b>/opt</b>	optional or third-party software.
<b>/tmp</b>	temporary space, typically cleared on reboot.
<b>/usr</b>	User related programs. <b>libraries</b>
<b>/var</b>	log files.

<b>/boot</b>	It contains all the boot-related information files and folders such as conf, grub, etc.
<b>/dev</b>	It is the location of the device files such as dev/sda1, dev/sda2, etc.
<b>/lib</b>	It contains kernel modules and a shared library.
<b>/lost+found</b>	It is used to find recovered bits of corrupted files.
<b>/media</b>	It contains subdirectories where removal media devices are inserted. ▲

<b>/mnt</b>	It contains temporary mount directories for mounting the file system.
<b>/proc</b>	It is a virtual and pseudo-file system to contains info about the running processes with a specific process ID or PID.
<b>/run</b>	It stores volatile runtime data.
<b>/sbin</b>	binary executable programs for an administrator.
<b>/srv</b>	It contains server-specific and server-related files.

**/sys**

It is a virtual file system for modern Linux distributions to store and allows modification of the devices connected to the system.



# LS

- -l Lists files and directories in long format, providing detailed information (permissions, owner, size, modification date).
- -a Includes hidden files and directories in the listing (those starting with a dot).
- -h Displays file sizes in a human-readable format (kilobytes, megabytes, gigabytes).
- -t Sort files and directories by their last modification time, displaying the most recently modified ones first.
- -r Reverses the order of the listing, displaying items in reverse alphabetical or chronological order.
- -S Sort files and directories by their sizes, listing the largest ones first.

# RESOURCES

- <https://www.linux.com/what-is-linux/>
- <https://www.geeksforgeeks.org/linux-history/>
- <https://ubuntu.com/tutorials/command-line-for-beginners#1-overview>
- <https://www.hostinger.com/tutorials/linux-commands>
- <https://contabo.com/blog/linux-navigation-and-file-management/>