Basics of Linux

→ Linux is a Kernel

[kernel H interface to communicate to hardware of computer]

e:g

→ Parrot OS, Ubuntu and many others are as built on Linux.

[NOTE]

All the commands in linux is a file.

Commands

1. pwd — display the current working directory

2. ls — list [shows all files in a directory]

3. cd file_name — Changes directory [to more into Particular directory]

4. cd .. — used to go previous directory [even to root]

5. cd → by default moves to "home".

6. whoami → tells the name of user.

7. cat → displays content of a file. [concatenate]

8. man — provides Manual for all commands

9. cp & → copys the file

Copying a file

Sudo CP old-file new-file

10. rm → remove file

Sudo rm file-name

Linux fundamentals

1. Linux Structure

-) Linux is a kernel

-) Open source / Source code can be modified

-) Started by Finnish student `Linux Torralds`.

e-g of O:S based on Linux kernal

Ubuntu, Debian, Fedora, Open SUSE, Linux mint, Red Hat

-) More secure

-) Android OS runs based on Linux kernel.

philosophy [5 principles]

1- Everything is a file [All cards are stored a file]

2. Small, single-purpose programs — [tools can be combined]

3. Ability to chain programs and perform complex task — [because of this, complex tasks can be solved]

4. Avoid Captive UI — Mainly work with Shell [or terminal]
[like GUI restricting user to navigate freely]

5. Configuration data   /etc/passwd file stores all
   Stored in txt file.   users registered on system

Components

Bootloader

A piece of code to guide booting process to start O.S

NOTE: GRUB Bootloader used in Parrotos Linux

OS Kernel

→ main component of OS

→ Manages resources for systems I/o devices at Hardware level
i.e ensures each process gets its resources to function.

Daemons

→ Background Services (without direct user interaction)
→ load after we boot or log in to Computer.
→ ensures Scheduling, Printing, multimedia

OS Shell

→ Command line is interface between OS and user
→ Helps user to tell OS what to do
eg Bash, Zsh, Fish.

Graphic Server

Provides graphical Sub-System "X" or "X-Server" to run graphical programs

Window manager

→ Also known as GUI. / desktop environment

→ GNOME, KDE, MATE, Unity, Cinnamon.

Utility

→ They're applications that Perform Particular function.

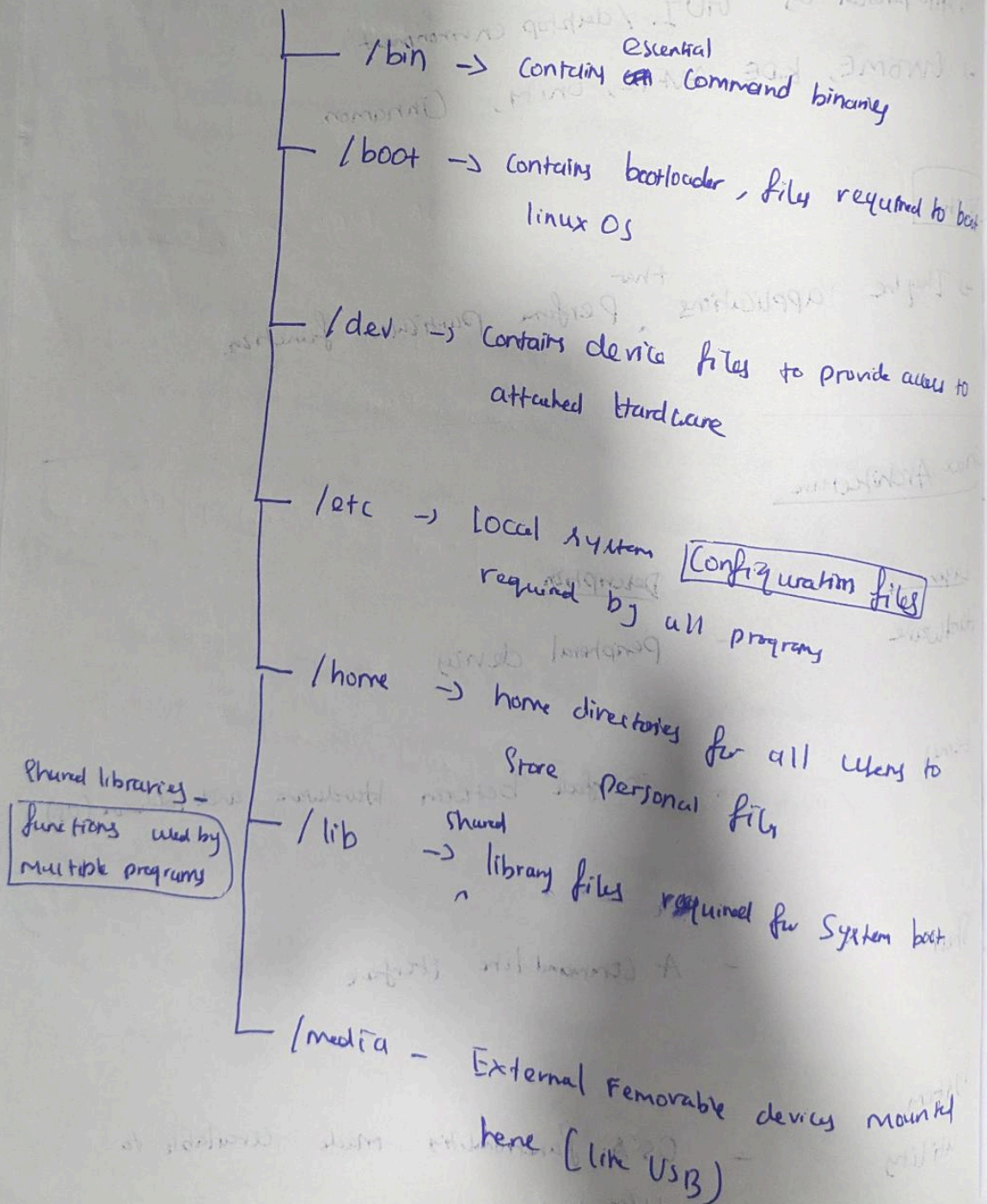## Linux Architecture

Layer	Description
Hardware	Peripheral device
Kernel	interface between Hardware and Software (OS)
Shell	A Command line interface
System Utility	OS's functionalitis made available to User.

Linux file System

Linux OS is structured in a tree-like Hierarchy
called FHS [Filesystem Hierarchy Standard]

Linux file system
/

├── /bin → Contain essential Command binaries

├── /boot → Contains bootloader, files required to boot
          linux OS

├── /dev → Contains device files to provide access to
          attached Hardware

├── /etc → Local system $\boxed{\text{Configuration files}}$
          required by all programs

├── /home → home directories for all users to
           store personal files

├── /lib → shared library files required for System boot

└── /media → External Removable devices mounted
            here (like USB)

Shared libraries -
$\boxed{\text{functions used by multiple programs}}$

→ /mnt → Here temporary file system
         can be mounted.

→ /opt → third party tools (optional files) can
         be saved here

NOTE:
There can be
only one root
user in linux

→ /root → home directory for root user.
          (superior user)

→ /sbin → Contains essential (executable) commands
          for system administration

difference btw bin and sbin

bin	sbin
* for all users	* for root user or administrator (user with privilege)
* Contains commands for system usage	* Contains for system administration (configuring system)
eg.	eg.
* ls, cp	/sbin/reboot, ifconfig

→ /tmp → Store temp. files. cleared upon reboot
         and deleted upon warning

B. /usr -> Contains (cmd) libraries, man files, etc

/var -> Contains files that frequently change.
Such as logs, caches, and spool files.

Booting Process in Computer

The kernel and OS are stored in ROM (SSD or Hard drive)

① **Power on**

When Power turned on, Power supplied to CPU,
memory and other Hardware.

② **POST [Power-on Self Test]**

The BIOS [Basic I/O System] firmware runs
POST to check Hardwares [CPU, memory] to functions properly
if not booting stops and error msg displayed

③ **BIOS initialization**

BIOS — initialize System Hardware
— Configures System Settings
— identifies bootable devices [like SSD, HD, USB]

④ **MBR/GPT and Boot loader Loading**

→ The BIOS looks for Master Boot Record (MBR) or GUID Partition Table [GPT] on Modern system to **find boot loader**.

A boot loader loads the O.S

⑤ **Boot loader Execution**

–) The Boot loader [e.g. GRUB, Windows Boot Manager] is loaded into memory and executed.

–) It allows user to Select OS or loads default OS

⑥ O-S loading

–) The bootloader loads O-S kernel into memory.

⑦ **Kernel initialization**

–) The kernel Initializes System resources

–) mounts root file System

–) starts init process

⑧ System and services startup

→ Init process initializes System services and background dae
including [networking, display Managers]

⑨ User login

Authentication happens here.

Linux Distribution

They OS based on linux kernel. Each serve for different
purposes likes like for embedded devices, servers, mobile phones and
desktop PC.

e.g. Ubuntu, Debian, RedHat Enterprise linux, Pedro, Centos

Introduction to shell

→ Shell is a text-base (I/o) interface between user and
Kernel for computer system.

→ like text-bash GUI

Most commonly used shell in linux is B
[Bourne - Again. Shell]

Why Shell ?

1. To avoid repetitive work
2. Adding new functionality.
3. Quick start

4. interactive debugging.

Alternative to Bash

Tcsh/csh , Ksh, Fish, Zsh

Shell prompt description

<username> @<hostname> < Current directory> $

eg (matharamoorthi ⒺLinux)- [/home]

Note

-> The home dire marped as [~] as default when logged in

-> When we log in to user, $ -> # [$ -> stands for user]

The prompt description can be modified using file ~/. bashrc

\u-> Current username

\H -> full hostname

\t -> Current time 24- hors

\T -> current time 12-hr

(8) Getting & help

Man Command

Syntax: man <tool>   e-g   man Curl

--help

(9) Syntax: <tool> --help   e.g Curl --help

-h

Syntax <tool> -h   e.g Curl -h

tool for searching descriptions for instances of a given key

Syn: apropos <keywords>

e.g apropos Curl

Commands for System information

Whoami — displays username

Fd   -) user's Identity

hostname -) Current host System name

Uname   -> info. of OS
                            Uname -v [version & kernel]

pwd   -) Working dir.

ifconfig -> to view address to network interface

ip-

netstat

ss

env

lsblk

Logging

-> ssh

-> s

c

-> r

ip- show or manipulate routing, network deney

netstat - show network status

ss - invetigate sockets

env - print environment

lsblk- link block device

[Logging in via SSH] -> by way we can access remote server / computer
|
different physical
address (may)

-> SSH (Secure Shell) refers to a protocol.

-> allows secure communication between twor systems
over networks. that ~~maa~~

-> remote access to servers.