Linux Theory

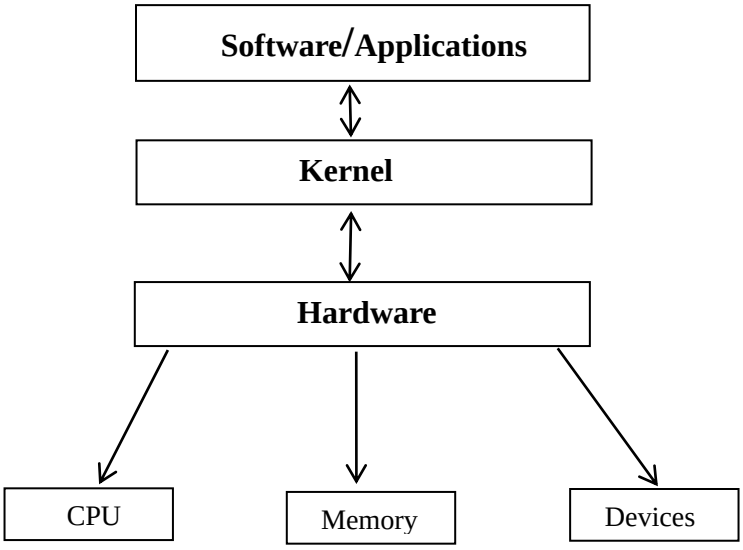
What is Linux?

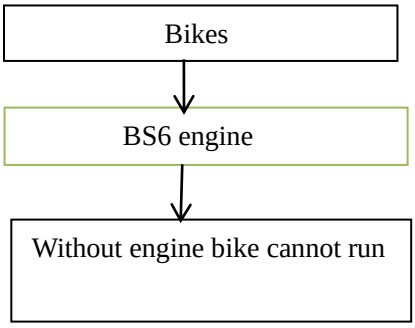
Linux is a free and open-source operating system kernel that was created by Linus Torvalds in 1991. It's a popular alternative to Windows and macOS, known for flexibility, stability, and security.

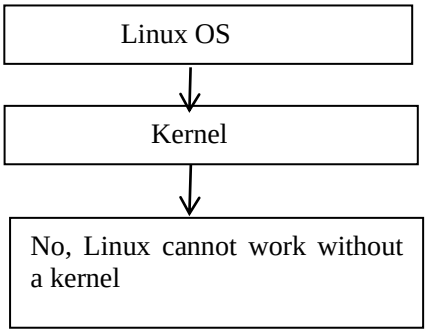
What is kernel ?

The Linux kernel is the core component of the Linux operating system. It serves as the bridge between the hardware and software, managing the system's resources and allowing applications to interact with the hardware.

Architecture of Linux ?







File system hierarchy in Linux ?

Root Directory (/): The top-level directory in the Linux file system is denoted by a forward slash (/). All other directories and files are organized under this root directory.
/bin: This directory contains essential executable binary files that are required for the system to boot and function properly. It holds fundamental commands and utilities used by both the system administrator and regular users. Examples include commands like "ls," "cp," "mv," and "cat."

/sbin: Similar to the /bin directory, /sbin contains essential system binaries, but these are mainly used by the system administrator for system maintenance tasks. These commands typically require administrative privileges (root access) to execute. Examples include "ifconfig" for network configuration and "fdisk" for managing disk partitions.

/etc: The /etc directory stores system-wide configuration files. These files control various aspects of the operating system, services, and applications. It contains configuration files for the network, user authentication, software repositories, and more.

/tmp: The /tmp directory is a temporary directory where programs and users can store temporary files. The contents of this directory are often cleared on system reboot or periodically to free up space.

/usr/bin: This directory holds executable binary files for various user applications and commands. Unlike /bin, these binaries are not essential for system booting and are typically provided by installed software packages.

/usr/share: The /usr/share directory contains architecture-independent data files used by applications. This can include documentation, icon sets, graphics, and other non-executable files that are shared among multiple applications.

/home: Each user on the system is typically assigned a home directory within /home. This is where users store their personal files and configurations. For example, if a user "john" exists, their home directory would be /home/john.

/root: This is the home directory for the root user, which is the superuser or system administrator. Unlike regular users, the root user has full access to the entire system and can perform administrative tasks.

File and Directory Operations:

ls: List files and directories in the current directory.
ls -l: List files and directories in long format (displays detailed information like permissions, owner, group, size, modification time, etc.).
ls -a: List all files and directories, including hidden ones (files starting with a dot ".").
ls -R: Recursively list files and directories in the current directory and its sub directories.
ls -t: List files and directories sorted by modification time (most recently modified first).
ls -r: Reverse the order of the listing.
ls -al: To see all the files & dir with information.

ls -alrt: lists files and directories in a specified location, including hidden ones, with detailed information, sorted by modification time in reverse order.
ls -l dir/subdir: by using that command we can see content of a dir/subdir without going inside that dir by cd.

mkdir <dir name> : To Create a Directory
Ex -> mkdir abc1

mkdir <dir name> <dir name > <dir name> : To make more than one directory at a same time
mkdir -p dir/subdir/subdir : To create directory & sub directory together

cd: To change directory
Ex - >$ cd dir1
cd dir/subdir/subdir1: To change more than one directory
cd .. : To go back to previous directory
cd ../../.. : To go back to previous directory more than one

pwd: Print the working directory.
echo: Display a Text Message on terminal

echo "hello" > file.txt: add the whiten content on terminal inside file also the file got created. But the file got override If I again write echo "hi" > file.txt
echo "everyone" >> file.txt: now here the file content got append inside the file

touch <filename>: To create any empty file
touch foldername/filename : To create a empty file inside a folder

rm: To remove a file
Ex- > rm file1.txt file2.txt file3.txt
rmdir: To remove a empty directory
rm -r: To remove file or directory forcefully
rm -r *.txt: Remove all text files extension of .txt

cp <filename> <traget directory>: To copy the file
cp <filename> <traget directory/subdir> : To copy the file in sub directory
cp <directory name> -r <target directory>: To copy directory
cp -r folderone foldertwo: This will copy the content of folderone to foldertwo.(Use this command to copy a directory to other directory).
cp file1.txt file2.txt file3.txt file4.txt /path/to/destination/: copy multiple files

mv <directory> <target directory> : To move a directory
mv <file name> <target directory> : To move a file
mv <filename / dir name> <newfile name / new directory name > : To rename a file or directory
mv old_file_name new_file_name: To rename a file

head <filename> : To see the top 10 lines of a file
tail <filename> : To see bottom 10 lines of a file
head -n <filename> : To see the top n lines of a file
Ex->$head -2 file48.txt
tail -8 <filename> : To see the bottom n lines of a file

Install gedit -> Ubuntu and Debian-based distributions:
sudo apt update: update link
sudo apt install gedit: install gedit

gedit filename.txt : To open a specific file with Gedit, simply provide the filename as an argument

All windows ms word key same work here.
Ctrl + S : to save a file
Ctrl + Shift + S : file save as
Ctrl + W : close gedit

cat filename: Display the contents of a file named "filename" on the terminal.
cat > filename: To create a new text file under Ubuntu, use the cat
cat file1 file2: Concatenate the contents of "file1" and "file2" and display the result on the terminal.
cat file1 file2 > newfile: Concatenate the contents of "file1" and "file2" and save the output to a new file called "newfile".

cat file1 >> file2: Append the contents of "file1" to "file2" (Add "file1" at the end of "file2").
ctrl + D: To save the changes
cat >> <filename> : To add the content in file.
cat dir/subdir/filename: we can see the content of a file without going inside that directory.

Super user mode and exit and packages

sudo su : To become a root user
sudo apt-get update: update package list (URL's)
sudo apt upgrade: update all installed software
sudo apt install <packagename>: install a perticular package
Ex:->$sudo apt install gedit

which <package>: To check the package file location
<package> --version: To check the detail of package
Ex->$gedit --version
w : To check the current user logged in
hostname : It will print the hostname on terminal
uname -a : It will show the basic detail of OS
exit : To exit the root user

man <command>: To see the manual of a command
--help: ou can view a summary of the command's usage, available options, and other useful information.
Ex:-> $ls --help

history: To see the history of the command we used
Clear: To clear the terminal screen
Find and grep
grep <keyword> <filename> : To search a keyword in file
Ex->$ grep are dir5/file1.txt

find [path] [expression]: Find files by name:
Ex - > find /path/to/directory -name "filename"

Suppose we copied -> cp file48.txt dir2/dir1
Now check copied or not or find it:-> find dir2/dir1 -name file48.txt

File and directory permissions

chmod: Change file permissions.
Ex-> $chmod 752 <filename>
ls -l: Check permission of a file

USER	GROUP	OTHERS
4 Read ✅	4 Read ✅	4 Read
2 Write ✅	2 Write	2 Write ✅
1 Execute ✅	1 Execute ✅	1 Execute
Total 7	Total 5	Total 2

chmod u=rwx file.txt : To grant "rwx" permissions to the owner of the file
chmod u=rwx my_directory: To grant "rwx" permissions to the owner of a directory
chmod a=rwx file.txt: To grant "rwx" permissions to the owner, group, and others
u: user
g: group
o: others
a: all

df: Display disk space usage.
df -h: disk spaced used and available in human readable format
du: Estimate file and directory space usage.
du -h filename: Display disk space usage in kilobytes (KB) with human-readable format:

User and Group Management

- **who:** Show who is logged on.
- **users:** List users currently logged in.
- **useradd username:** Create a new user.
- **passwd username:** Set a Password to any user.