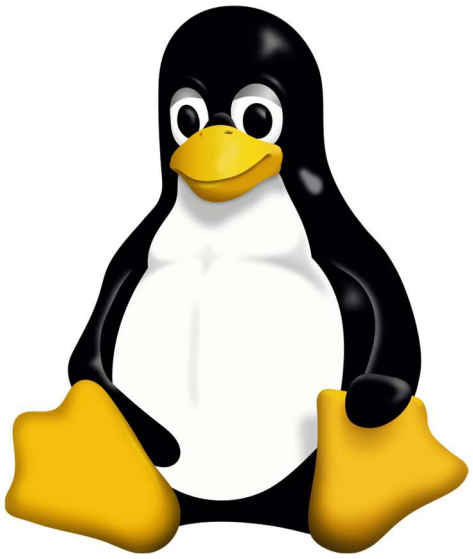
CHAPTER 3

LINUX

3.1 LINUX OPERATING SYSTEM

- A University of Helsinki student named Linus Torvalds began coding his own code in 1991 with the intention of creating a free academic version of UNIX. Later, this undertaking evolved into the Linux kernel.
- He specifically created this application for his personal PC since he desperately wanted to utilise a Unix 386 Intel machine but couldn't afford one. On MINIX and the GNU C compiler, he completed it. Although alternative compilers, such as the Intel C compiler, are also used, the GNU C compiler is still the preferred option for creating Linux code.



- He started it as a hobby and ended up with such a huge undertaking. It was later renamed to " **Linux** " from the original name, " **Freax** ".
- Under his own license, he released the Linux kernel with limitations on its usage in business. The majority of the tools used by Linux are GNU products and are protected by GNU copyright. He distributed the kernel under the GNU General Public License in 1992.
- Structure of Linux Operating System :

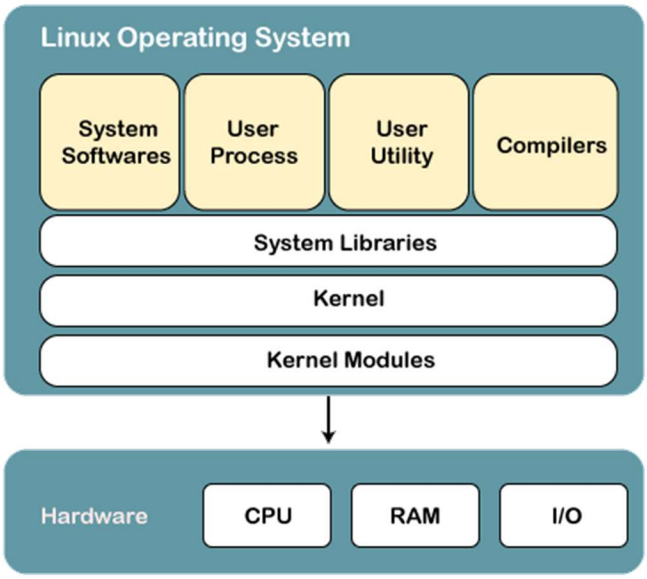


Figure 3.1: Linux Operating System Structure

3.2 LINUX COMMAND

- A utility for the Linux operating system is the Linux command. Any basic or complex task may be accomplished with commands. The ***Linux terminal*** is used to execute the commands. Similar to the command prompt in the Windows operating system, the terminal is a command-line interface for interacting with the system. Commands in Linux are ***case – sensitive***.
- Linux terminals are user-friendly because they include a range of help options. Press " **CTRL + ALT + T** " to open the Linux terminal. Click the " **ENTER** " key to type a command.
- Approx. 150 commands were implemented in the three sessions and the various editors were learnt and tried to have familiar with editor. We have divided these commands into following sections so that you can easily identify their usage:
  - Linux Directory Commands
  - Linux File Commands
  - Linux File Content Commands
  - Linux User Commands
  - Linux Filter Commands
  - Linux Utility Commands
  - Linux Networking Commands

Linux Directory Commands

3.2.1 pwd Command

- The pwd command is used to display the location of the current working directory.
- **Output :**

```
javatpoint@javatpoint-Inspiron-3542:~$ pwd
/home/javatpoint
```

3.2.2 mkdir Command

- The mkdir command is used to create a new directory under any directory.
- **Syntax :**

```
mkdir < Directory_name >
```

- **Output :**

```
javatpoint@javatpoint-Inspiron-3542:~$ mkdir new_directory
javatpoint@javatpoint-Inspiron-3542:~$
```

3.2.3 rmdir Command

- The rmdir command is used to delete a directory.
- **Syntax :**

```
rmdir < Directory_name >
```

- **Output :**

```
javatpoint@javatpoint-Inspiron-3542:~$ rmdir new_directory
javatpoint@javatpoint-Inspiron-3542:~$
```

3.2.4 ls Command

- The ls command is used to display a lists of content of a directory.
- **Syntax :**

```
ls
```

- **Output :**

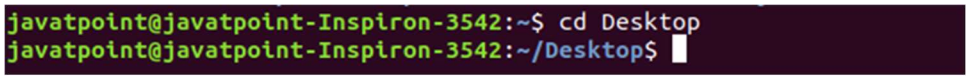
```
javatpoint@javatpoint-Inspiron-3542:~$ rmdir new_directory
javatpoint@javatpoint-Inspiron-3542:~$
```

3.2.5 *cd Command*

- The cd command is used to change the current directory.
- **Syntax :**

```
cd < Directory_name >
```

- **Output :**



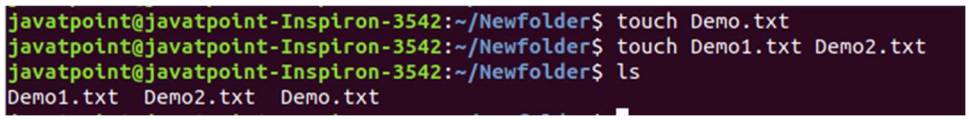
Linux File Commands

3.2.6 *touch Command*

- The touch command is used to create empty files. We can create multiple files by executing it once.
- **Syntax :**

```
1. touch < File_name >
2. touch < File1 > < File2 >
```

- **Output :**



3.2.7 *cat Command*

- The cat command is a multi – purpose utility in the Linux system. It can be used to create a file, display content of the file, copy the content of one file to another file, and more.
- **Syntax :**

```
1. cat [ Opiton ] .... [ File ] ...
```

To create a file, execute it as follow :

```
1. cat > < File_name >
2. // Enter file content
```

Press " **CTRL + D** " keys to save the file. To display the content of the file, execute it as follows :

```
1. cat < File_name >
```

- **Output :**

```
javatpoint@javatpoint-Inspiron-3542:~/Newfolder$ cat > Demo.txt
This is a text file.
javatpoint@javatpoint-Inspiron-3542:~/Newfolder$ cat Demo.txt
This is a text file.
```

3.2.8 rm Command

- The rm command is used to remove a file.
- **Syntax :**

```
rm < File_name >
```

- **Output :**

```
javatpoint@javatpoint-Inspiron-3542:~/Newfolder$ rm Demo.txt
javatpoint@javatpoint-Inspiron-3542:~/Newfolder$ rm Demo1.txt Demo2.txt
```

3.2.9 cp Command

- The cp command is used to copy a file or directory.
- **Syntax :**

```
cp < Existing File_name > < New File_name >
```

- **Output :**

```
javatpoint@javatpoint-Inspiron-3542:~$ cp demo.txt demo1.txt
javatpoint@javatpoint-Inspiron-3542:~$ cp demo.txt Documents
```

3.2.10 mv Command

- The mv command is used to move a file or a directory from one location to another location.
- **Syntax :**

```
mv < File_name > < Directory_path >
```

- **Output :**

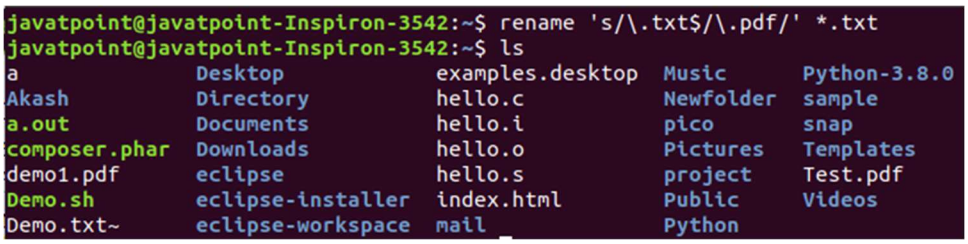
```
javatpoint@javatpoint-Inspiron-3542:~$ mv demo.txt Directory
```

3.2.11 rename Command

- The rename command is used to rename files. It is useful for renaming a large group of files.
- **Syntax :**

```
rename ' s/old-name/new-name/ ' files
```

- **Output :**



LINUX FILE CONTENT COMMANDS

3.2.12 head Command

- The head command is used to display the content of a file. It displays the first 10 lines of a file.
- **Syntax :**

```
head < File_name >
```

- **Output :**

3.2.13 tail Command

- The tail command is similar to the head command. The difference between both commands is that it displays the last ten lines of the file content. It is useful for reading the error message.
- **Syntax :**

```
tail < File_name >
```

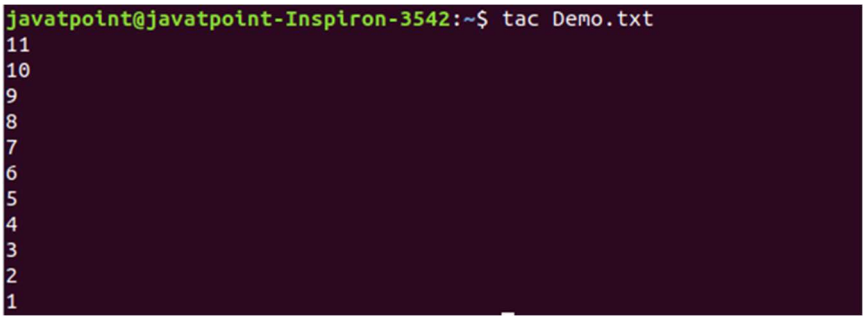
- **Output :**

3.2.14 tac Command

- The tac command is the reverse of cat command, as its name specified. It displays the file content in the reverse order (from the last line).
- **Syntax :**

```
tac < File_name >
```

- **Output :**



3.2.15 more Command

- The more command is quite similar to the cat command, as it is useful to display the file content in the same way that the cat command does. The only difference between both commands is that, in case of larger files, the more command displays screenful output at a time.
- In more command, the followings keys are used to scroll the page :

  ENTER key : To scroll down page by line.

  Space bar : To move to the next page.

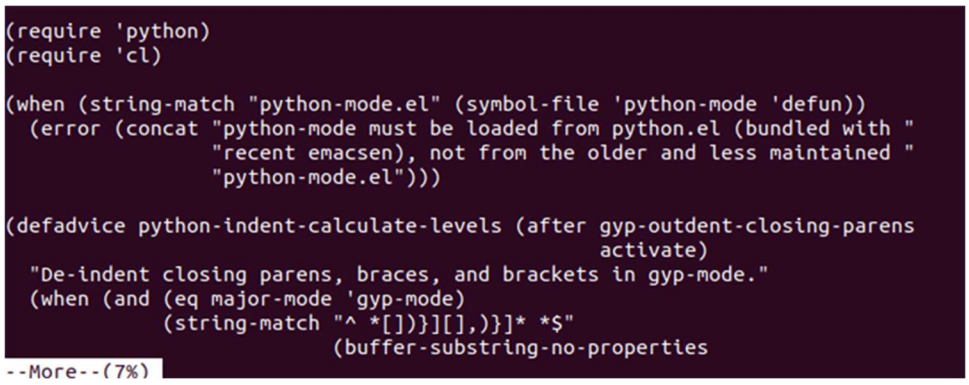
  b key : To move to the previous page.

  / key : To search the string.

- **Syntax :**

```
more < File_name >
```

- **Output :**



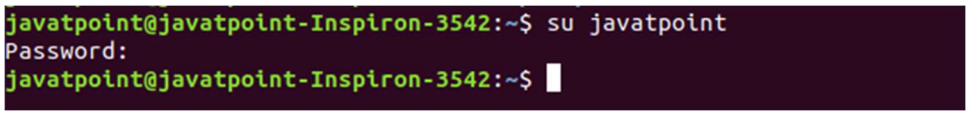
LINUX USER COMMANDS

3.2.16 su Command

- The su command provides administrative access to another user. In other words, it all of the Linux shell to another user.
- **Syntax :**

```
su < User_name >
```

- **Output :**



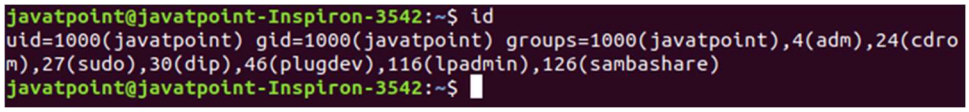
3.2.17 id Command

- The id command is used to display the user ID (UID) and group ID (GID).

- **Syntax :**

```
id
```

- **Output :**

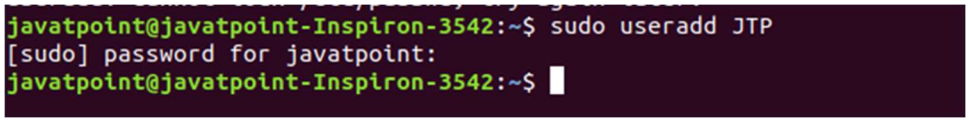


3.2.18 useradd Command

- The useradd command is used to add or remove a user on a Linux server.
- **Syntax :**

```
useradd < User_name >
```

- **Output :**



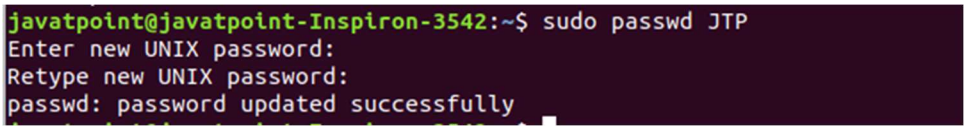
3.2.19 passwd Command

- The passwd command is used to create and change the password for a user.

- **Syntax :**

```
passwd < User_name >
```

- **Output :**

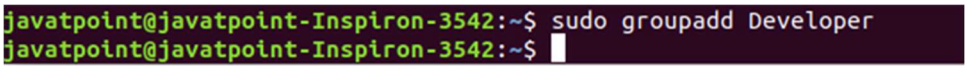


3.2.20 groupadd Command

- The groupadd command is used to create a user group.
- **Syntax :**

```
groupadd < Group_name >
```

- **Output :**



LINUX FILTER COMMANDS

3.2.21 cat Command

- The cat command is also used as a filter. To filter a file, it is used inside pipes.
- **Syntax :**

```
cat < File_name > | cat or tac | | cat or tac | ...
```

- **Output :**

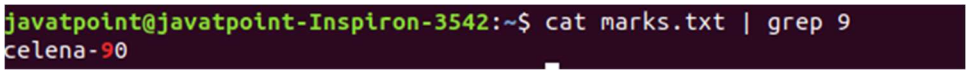
3.2.22 grep Command

- The grep is the most powerful and used filter in a Linux system. The ‘ grep ’ stands for “ **Global regular expression print** ”. It is useful for searching the content from a file. Generally, it is used with the pipe.

- **Syntax :**

```
< command > | grep < Search_word >
```

- **Output :**

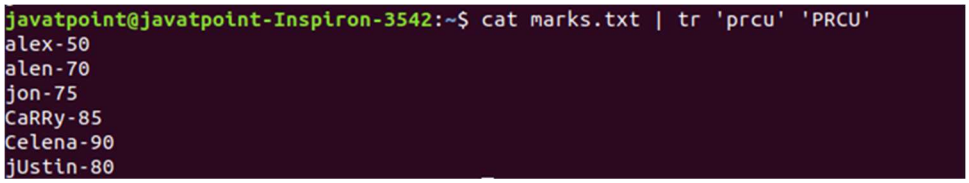


3.2.23 tr Command

- The tr command is used to translate the file content like from lower case to upper case.
- **Syntax :**

```
< command > | tr < ' Old ' > < ' New ' >
```

- **Output :**

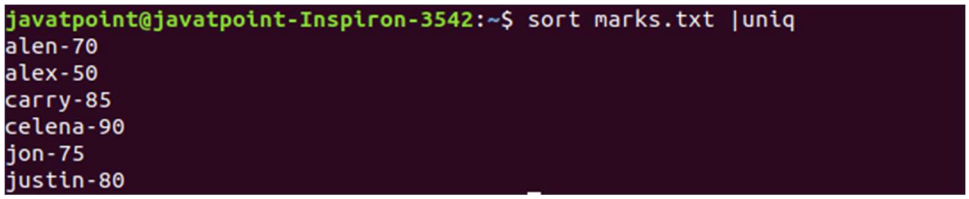


3.2.24 uniq Command

- The uniq command is used to form a sorted list in which every word will occur only once.
- **Syntax :**

```
command < File_name > | uniq
```

- **Output :**

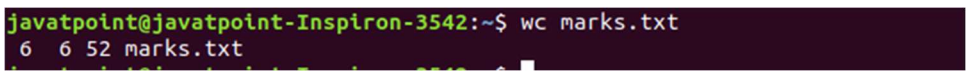


3.2.25 wc Command

- The wc command is used to count the lines, words, and characters in file.
- **Syntax :**

```
wc < File_name >
```

- **Output :**



3.2.26 sort Command

- The sort command is used to sort files in alphabetical order.
- **Syntax :**

```
sort < File_name >
```

- **Output :**

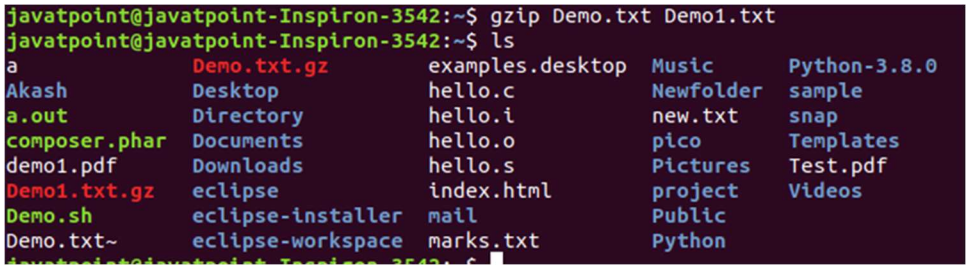
3.2.27 gzip Command

- The gzip command is used to truncate the file size. It is compressing tool. It replace the original file by the compressed file having ‘ .gz ’ extension.

- **Syntax :**

```
gzip < File1 > < File2 > < File3 >
```

- **Output :**

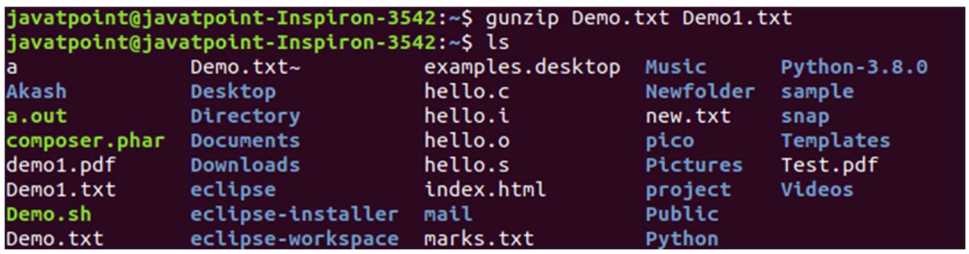


3.2.28 gunzip Command

- The gunzip command is used to decompress a file. It is a reverse operation of gzip command.
- **Syntax :**

```
gunzip < File1 > < File2 > < File3 >
```

- **Output :**



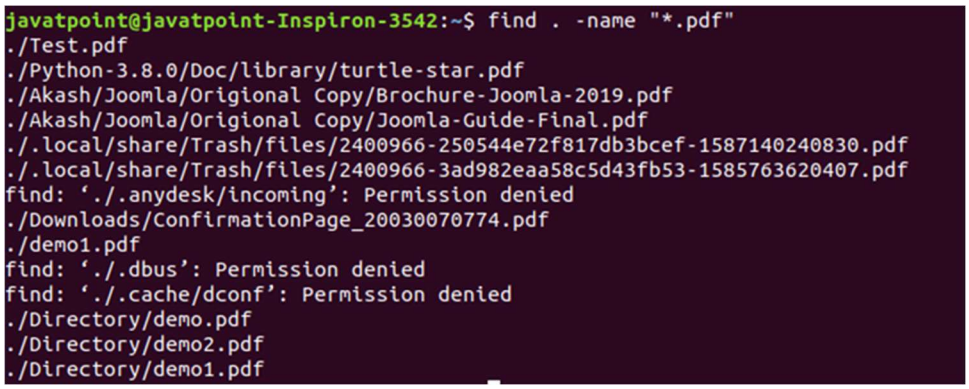
LINUX UTILITY COMMANDS

3.2.29 find Command

- The find command is used to find a particular file within a directory. It also supports various options to find a file such as by name, by type, by date and more.
- The following symbols are used after the find command :
  (.) : For current directory name
  (/) : For root
- **Syntax :**

```
find . -name " *.pdf "
```

- **Output :**

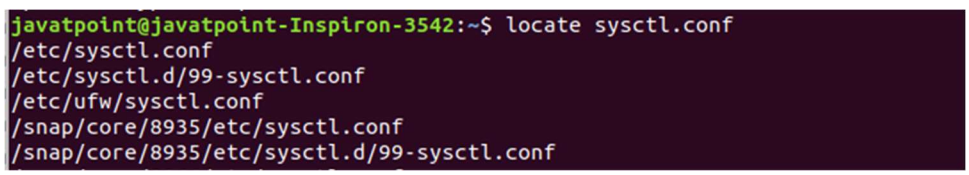


3.2.30 locate Command

- The locate command is used to search a file by filename. It is quite similar to find command; the difference is that it is a background process. It searches the file in the database, whereas the find command searches in the file system. It is familiar than the find command. To find the file with the locates command, keep your database updated.
- **Syntax :**

```
locate < File_name >
```

- **Output :**

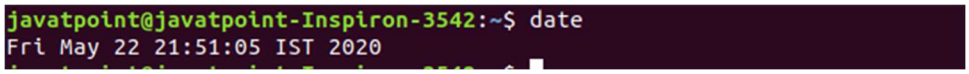


3.2.31 date Command

- The date command is used to display date, time, time zone, and more.
- **Syntax :**

```
date
```

- **Output :**

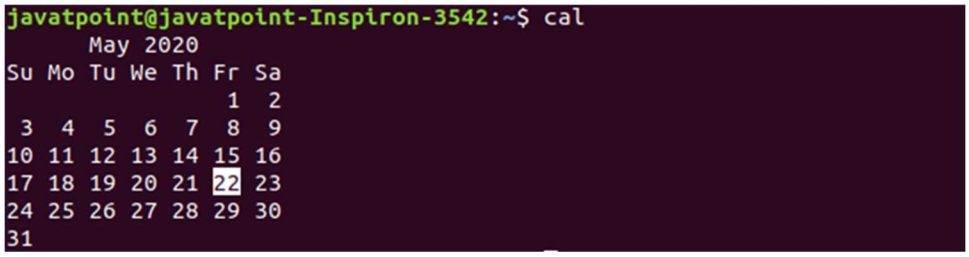


3.2.32 cal Command

- The cal command is used to display the current month's calendar with the current date highlighted.
- **Syntax :**

```
cal
```

- **Output :**

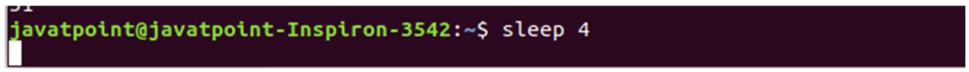


3.2.33 sleep Command

- The sleep command is used to hold the terminal by specified amount of time. By default, it takes time in second.
- **Syntax :**

```
Sleep < time >
```

- **Output :**



3.2.34 time Command

- The time command is used to display the time to execute a command.
- **Syntax :**

```
time
```

- **Output :**

```
javatpoint@javatpoint-Inspiron-3542:~$ time

real    0m0.000s
user    0m0.000s
sys     0m0.000s
```

3.3 LINUX FILE SYSTEM

- In Linux, files are put in a directory. All directories are in a hierarchical structure (Tree structure).
- User can put and remove any directories on the tree. The Top directory is " / ", which is called slash or root.
- Users have the own directory which is called home directory.

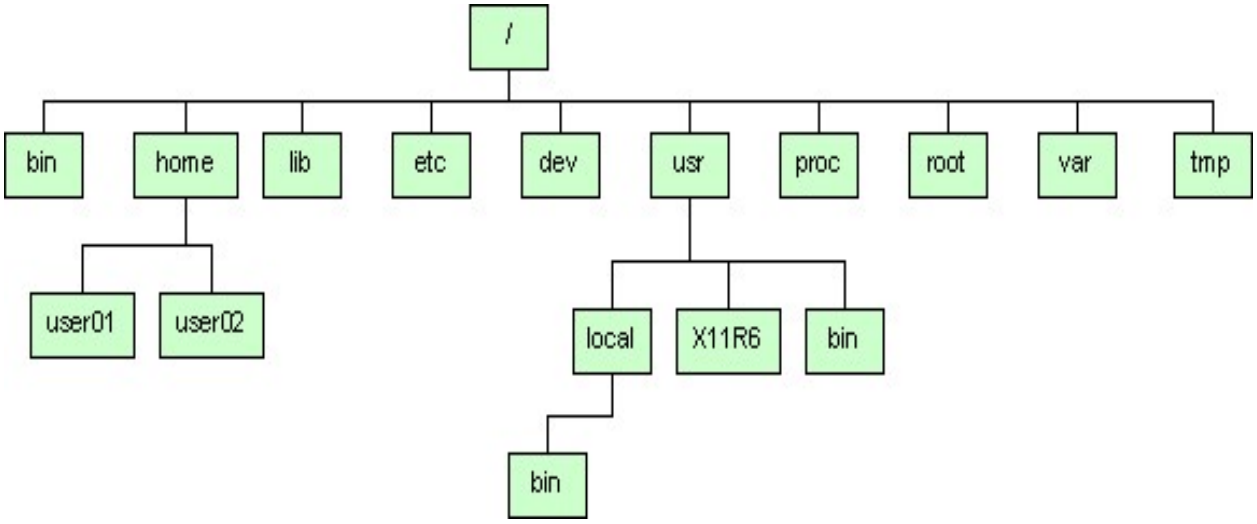


Figure 3.2 : Linux File System

Directory	**Description**
/	The root directory. Where everything begins.
/bin	Contains binaries (programs) that must be present for the system to boot and run.
/lost + found	Each formatted partition or device using a Linux file system. Such as ext3, will have this directory. It is used in the case of a partial recovery from a file system corruption event. Unless something really bad has happened to your system, this directory will remain empty.

/boot	Contains the Linux kernel, initial RAM disk image (for drivers needed at boot time), and the boot loader. Interesting Files : • **/boot/grub/grub.conf** or **menu.lst**, which are used to configure the boot loader. • **/boot/vmlinuz**, the Linux kernel.
/dev	This is a special directory which contains *devices nodes*. " Everything is a file " also applies to devices. Here is where the kernel maintains a list of all the devices it understands.
/home	In normal configurations, each user is given a directory in **/home**. Ordinary users can only write files in their home directories. This limitation protects the system from errant user activity.
/etc	The **/etc** directory contains all of the system – wide configuration files. It also contains a collection of shell scripts which start each of system services at boot time. Everything in this directory should be readable text. Interesting Files : While everything in **/etc** is interesting, here are some of my all – time favorites : • **/etc/crontab**, a file that defines when automated jobs will run. • **/etc/fstab**, a table of storage devices and their associated mount points. • **/etc/passwd**, a list of the user accounts.
/lib	Contains shared library files used by the core system programs. These are similar to DLLs in Windows.
/media	On modern Linux System the /media directory will contain the mount points for removable media such as USB drivers, CD – ROMs, etc. that are mounted automatically at insertion.
/mnt	On older Linux systems, the **/mnt** directory contains mount points for removable devices that have been mounted manually
/opt	The /opt directory is used to install " optional " software. This mainly used to hold commercial software products that may be installed on your system.

Table 3.1: Linux Directories