Directories and devices are also treated as files. The directory files are prefixed with a 'd'. The standard input device, standard output device and the standard error device are treated as files.

We shall first discuss the various directories available with LINUX when the system is booted.

The Directory Hierarchy

A file system is a data structure that resides on part of a disk. The Linux file system is also called a tree. This consists of a set of connected files. The structure allows the user to organize files so that a particular file can be located easily. Every user starts with a single directory. This in turn may contain many sub directories. Each directory contains files and other directories. The nesting of directories forms a path from a higher directory to a lower one and vice versa. The set of directories from the root forms the path name. This path name with the filename forms the absolute path of the file.

The main strength of the Linux file system is the ability to adapt to different user's needs. Files could be strategically organized for convenience and ease of use. The LINUX file structure is set up according to a document called the file hierarchy standard (FHS). This standard was established by consensus as Linux was developed.
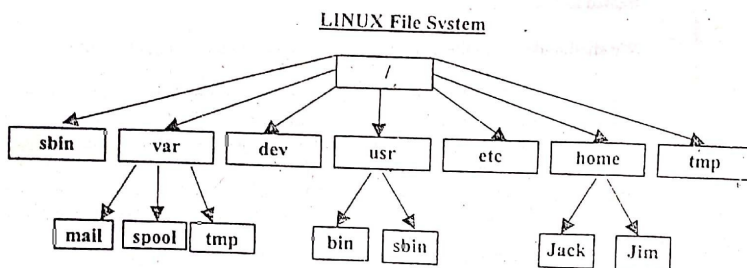
LINUX File System

Fig. 2.1

When the system starts, an ordinary file called Linux is read from the disk into the memory. Actually, the process occurs in two steps: first the file / boot is read and then / Linux is read.

The / bin directory contains the executable files for most LINUX commands. LINUX commands are either executable 'C' programs or shell scripts, which can perform a task our request. Shell scripts are a sequence of LINUX commands grouped under a single name. This can be executed by typing in the name of the Shell script. We shall deal with Shell scripts in later sessions.

The /etc directory contains other additional commands that are related to system maintenance and administration. It also contains several system files which store the relevant information about the users of the system, the terminals and devices connected to the system.

The /lib directory contains all the library functions provided by LINUX for the programmers. Programs can be written in LINUX using these library functions by making system calls.

The /dev directory stores files that are related to the devices. LINUX has a file associated with each of the I/O devices. We shall see more about this in the next part of the session.

The /usr directory is created for each user to have a private workarea where the user can store his files. This directory can be given any name. Here it is named as 'usr'. This is called the user's HOME directory. Thus every user has a HOME directory. Within the 'usr' directory, there is another directory, 'bin' which contains additional LINUX commands.

The /tmp directory is the directory into which temporary files are kept. The files stored in this directory are deleted as soon as the system is shutdown and restarted. This directory does not have that much importance when compared to the others.

Listing files

Linux provides a set of commands that perform the basic file management operations like listing, displaying, printing, copying, renaming and erasing. The cat command is used to display the contents of the file on the screen. cat stands for concatenate. The ls command will list the files and directories that are available in the current working directory. The current working directory is displayed by the pwd command.

A. Points to Ponder

State True or False

1. The File system in LINUX forms an important part of the LINUX system.
2. LINUX does not offer security to files of a user.
3. The devices are also treated as files in LINUX.

Fill in the blanks

1. The library functions provided by LINUX are contained in the _____ directory.
2. The files of the user are stored in the _____ directory.
3. The /tmp directory contains _____.

Input / Output Redirection

To understand the concept of I/O Redirection, we have to know what a Standard Input is and what a Standard Output is.

Standard Input and Standard Output Files

LINUX treats the keyboard as the Standard Input File and VDU (Visual Display Unit) as the Standard Output File as well as the Standard Error File. However, input can be taken from sources other than the Standard Input and output can be passed to any source other than the Standard Ouput. Such a process is called Redirection. This may be Input Redirection or Output Redirection.

These three streams i.e. the "Standard Input", the "Standard Output" and the "Standard Error" are denoted by the numbers 0, 1 and 2 respectively.

Streams	Device	Value
Standard Input	Keyboard	0
Standard Output	Terminal Screen	1
Standard Error	Terminal Screen	2

Redirection

Redirection changes the assignments for standard input and standard output. First let us take up Output Redirection.

Output Redirection

When output from a process is redirected to sources other than the standard output, it is called Output Redirection. The Shell command line format for redirecting output to a file is,

```
$ command > file
```

Here **file** will receive the data output from **command**. The output from the command is redirected to file instead of the Standard Output, i.e. VDU.

Example 2.1

```
$ date > today
$_
$ cat today
Thu Nov  1  10:44:49  PST  1984
$ _
```

Input Redirection

We can redirect the input for a command using input redirection. The Shell command line that allows input redirection is,

```
$ command < file
```

Here file is the source of the data for the command. If file does not exist, the shell will issue an error and abort the operation. Let us assume that we have a file called **names**.

Example 2.2

```
$ cat < names
radha
rekha
angel
$ _
```

Redirecting both Standard Input and Standard Output

The Shell may be used to redirect both the Standard Input and Standard Output for a command. The syntax is,

```
$ command <source>destination
```