

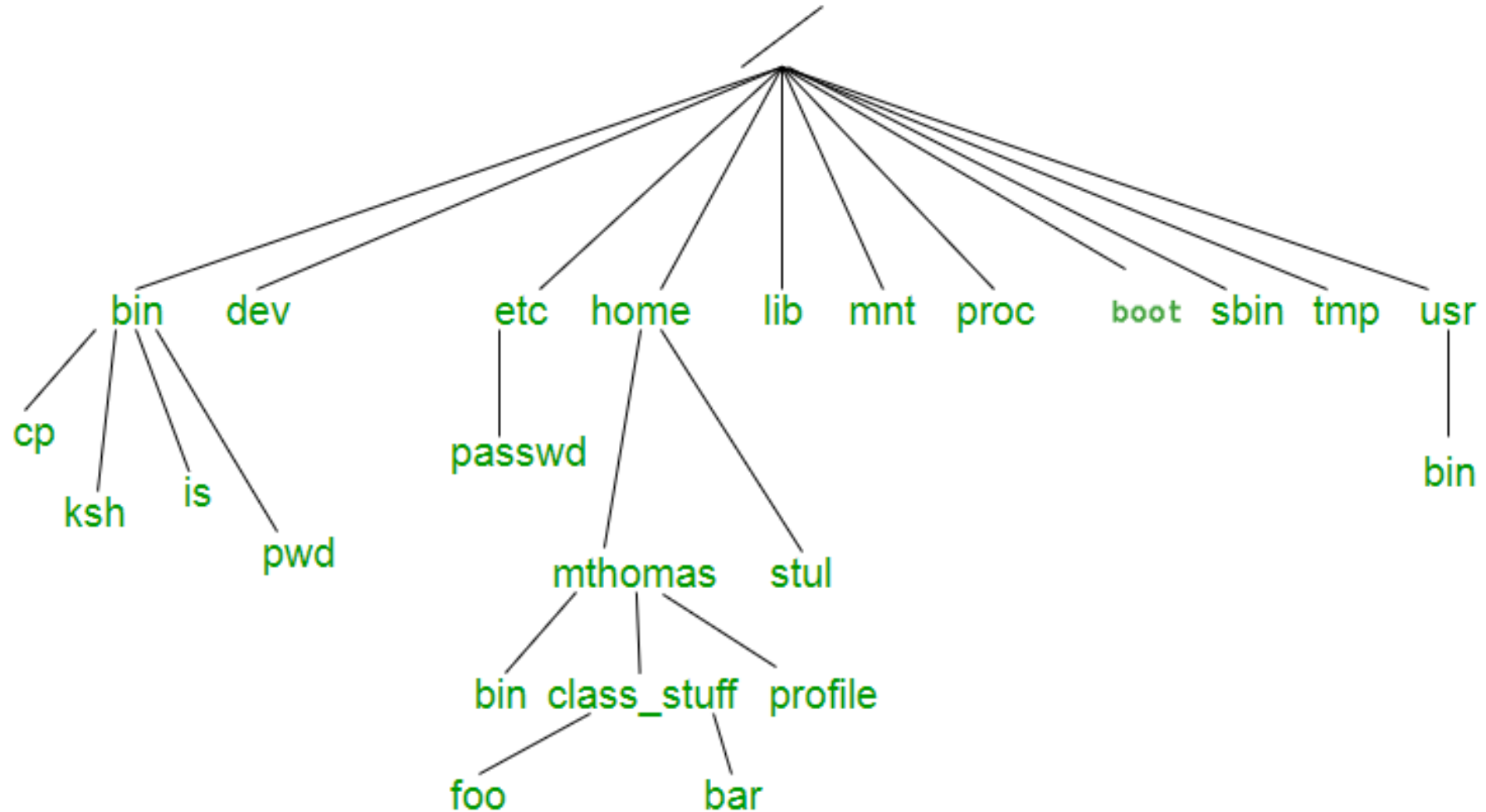


# The Unix File System

# The Unix File System - Introduction

- A file system is a logical method of **organizing and storing** large amounts of information in a way that makes it easy to manage.
- A file is a smallest unit in which the information is stored.
- All data in Unix is organized into files.
- All files are organized into directories.

# Hierarchical File System



# File Structure

■ **/** : denotes the root of the files ystem tree.

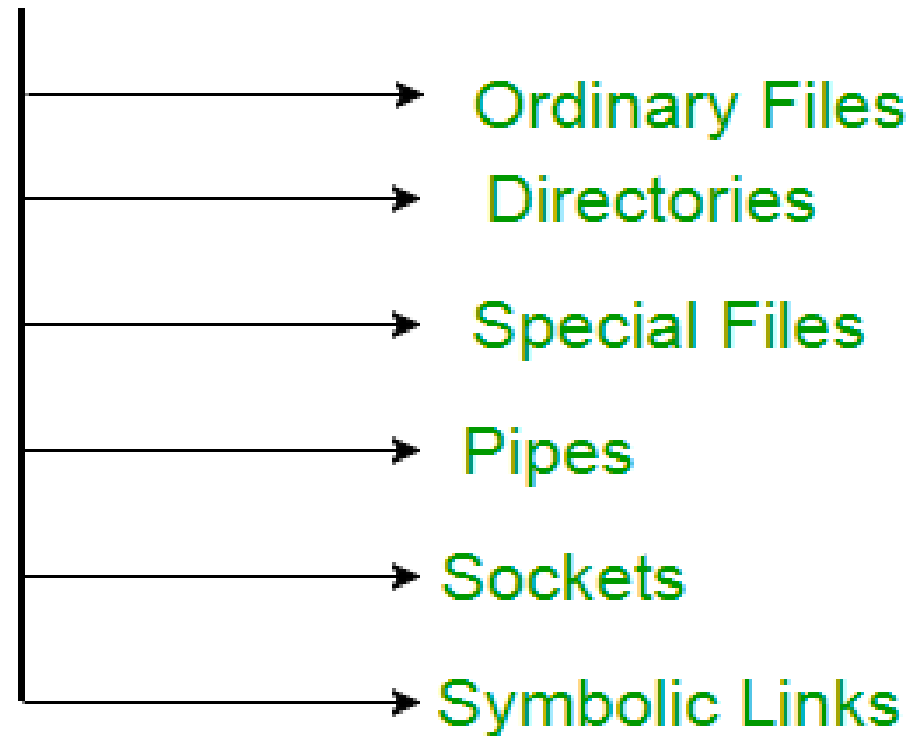
- **/bin** : Contains binary executable of fundamental utilities, such as ls or cp, which are generally needed by all users.
- **/boot** : Contains all the files that are required for successful booting process.
- **/dev** : Stands for “devices”. Contains file representations of peripheral devices.
- **/etc** : Contains system-wide configuration files and system databases.
- **/home** : Contains the home directories for the users.
- **/lib** : Contains system libraries, and some critical files such as kernel modules or device drivers.

# File Structure

- **/media** : Default mount point for removable devices, such as USB sticks, media players, etc.
- **/mnt** : Stands for “mount”. Contains files ystem mount points.
- **/proc** : virtual files system showing information about processes.
- **/root** : The home directory for the super user “root” – that is, the system administrator.
- **/tmp** : Temporary directory for storing temporary files

# Unix File Types

## Classification of Unix File System :



# Ordinary Files

```
nima@nima-VirtualBox:~$ ls -l
total 104
-rwxrwxr-x 1 nima nima 17144 Nov  9 22:20 a.out
drwxr-xr-x 2 nima nima 4096 Oct 21 09:14 Desktop
drwxr-xr-x 2 nima nima 4096 Jul 28 22:11 Documents
drwxr-xr-x 3 nima nima 4096 Oct 28 12:01 Downloads
drwxr-xr-x 8 nima nima 4096 Jun  9 2022 eclipse
drwxrwxr-x 3 nima nima 4096 Aug 22 11:55 eclipse-workspace
-rw-rw-r-- 1 nima nima 191 Oct 28 11:31 graph.plt
drwxr-xr-x 2 nima nima 4096 Jul 28 22:11 Music
drwxrwxr-x 7 nima nima 4096 Aug  4 13:58 ns-allinone-3.34
drwxr-xr-x 2 nima nima 4096 Oct  7 12:43 Pictures
-rw-rw-r-- 1 nima nima 1167 Nov  9 22:13 producer.c
```

- An ordinary file is a file on the system that contains data, text, or program instructions.
- Always located within / under a directory file.
- In long-format output of `ls -l`, this type of file is specified by the “-” symbol.

# Directory Files

- Directories store both special and ordinary files
- Used to organize groups of files.
- May contain ordinary files, special files or other directories.

```
nima@nima-VirtualBox:~$ ls -l
total 104
-rwxrwxr-x 1 nima nima 17144 Nov  9 22:20 a.out
drwxr-xr-x 2 nima nima 4096 Oct 21 09:14 Desktop
drwxr-xr-x 2 nima nima 4096 Jul 28 22:11 Documents
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drwxr-xr-x 2 nima nima 4096 Oct  7 12:43 Pictures
-rw-rw-r-- 1 nima nima 1167 Nov  9 22:13 producer.c
```



## Special Files

```
brw-rw---- 1 root disk 7, 1 Dec 21 10:09 loop1
brw-rw---- 1 root disk 7, 10 Dec 21 10:10 loop10
brw-rw---- 1 root disk 7, 2 Dec 21 10:09 loop2
brw-rw---- 1 root disk 7, 3 Dec 21 10:09 loop3
brw-rw---- 1 root disk 7, 4 Dec 21 10:09 loop4
brw-rw---- 1 root disk 7, 5 Dec 21 10:09 loop5
crw-rw-rw- 1 root tty 5, 0 Dec 21 10:09 tty
crw--w---- 1 root tty 4, 0 Dec 21 10:09 tty0
crw--w---- 1 root tty 4, 1 Dec 21 10:10 tty1
crw--w---- 1 root tty 4, 10 Dec 21 10:09 tty10
crw--w---- 1 root tty 4, 11 Dec 21 10:09 tty11
crw--w---- 1 root tty 4, 12 Dec 21 10:09 tty12
```

- Used to represent a real physical device such as a printer, tape drive or terminal, used for Input/Output (I/O) operations.
- **Device or special files** are used for device Input/Output(I/O) on UNIX and Linux systems.

# Pipes

```
drwxrwxr-x 7 nima nima 4096 Aug  4 13:58 ns-allinone-3.34
prw-rw-r-- 1 nima nima    0 Dec 21 10:57 p
prw-rw-r-- 1 nima nima    0 Dec 21 10:56 p1
```

- UNIX allows you to link commands together using a pipe. The pipe acts a temporary file which only exists to hold data from one command until it is read by another.
- A Unix pipe provides a one-way flow of data.

# Sockets

- A special file which allows for advanced inter-process communication.
- A Unix Socket is used in a client-server application
- **Symbolic Link** – Symbolic link is used for referencing some other file of the file system. Symbolic link is also known as Soft link.



```
nima@nima-VirtualBox:~$ ln -s f1.txt link
nima@nima-VirtualBox:~$ ls -l
total 108
-rwxrwxr-x 1 nima nima 17144 Nov  9 22:20 a.out
drwxr-xr-x 2 nima nima 4096 Oct 21 09:14 Desktop
drwxr-xr-x 2 nima nima 4096 Jul 28 22:11 Documents
drwxr-xr-x 3 nima nima 4096 Oct 28 12:01 Downloads
drwxr-xr-x 8 nima nima 4096 Jun  9 2022 eclipse
drwxrwxr-x 3 nima nima 4096 Aug 22 11:55 eclipse-workspace
-rw-rw-r-- 1 nima nima 15 Dec 21 11:11 f1.txt
-rw-rw-r-- 1 nima nima 191 Oct 28 11:31 graph.plt
lrwxrwxrwx 1 nima nima 6 Dec 21 11:14 link -> f1.txt
drwxr-xr-x 2 nima nima 4096 Jul 28 22:11 Music
drwxrwxr-x 7 nima nima 4096 Aug  4 13:58 ns-allinone-3.34
```

```
nima@nima-VirtualBox:~$
nima@nima-VirtualBox:~$ cat f1.txt
Hello World!!!
nima@nima-VirtualBox:~$ cat link
Hello World!!!
nima@nima-VirtualBox:~$ ls -l f1.txt
-rw-rw-r-- 1 nima nima 15 Dec 21 11:11 f1.txt
nima@nima-VirtualBox:~$ ls -l link
lrwxrwxrwx 1 nima nima 6 Dec 21 11:14 link -> f1.txt
nima@nima-VirtualBox:~$
```