

```
mirror_mod = modifier_ob.  
# Add mirror object to mirror_mod  
mirror_mod.mirror_object = mirror_ob  
# operation == "MIRROR_X":  
mirror_mod.use_x = True  
mirror_mod.use_y = False  
mirror_mod.use_z = False  
# operation == "MIRROR_Y":  
mirror_mod.use_x = False  
mirror_mod.use_y = True  
mirror_mod.use_z = False  
# operation == "MIRROR_Z":  
mirror_mod.use_x = False  
mirror_mod.use_y = False  
mirror_mod.use_z = True  
  
# selection at the end -add  
mirror_ob.select= 1  
modifier_ob.select=1  
context.scene.objects.active = mirror_ob  
print("Selected" + str(modifier_ob.name) + " on " + str(mirror_ob.name))  
mirror_ob.select = 0  
bpy.context.selected_objects = [mirror_ob]  
data.objects[one.name].select = 1  
  
print("please select exactly one mirror object")  
  
--- OPERATOR CLASSES ---  
  
bpy.types.Operator:  
    def execute(self, context):  
        # Add X mirror to the selected object  
        object.mirror_mirror_x = True  
        print("X mirror added to " + str(object.name))  
  
    def invoke(self, context):  
        if context.active_object is not None:
```

# Linux & Shell Programming

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# Linux Overview

Linux was first developed by Linus Torvalds, a student in Finland, in 1991.

Linux is the most famous free and open-source Operating system.

You can make changes to the source code of Linux as per your requirements.

You can also distribute this modified OS.

Many flavors are available of Linux such as Red Hat Enterprise Linux and its derivatives like Fedora & CentOS, Debian and its derivatives like Ubuntu and Linux Mint, Linspire, PCLinux.

# Features of Linux

## Free and open-source software:

Open source means Linux is available with its source code

Free means users have the freedom to make changes in source code according to their requirements and redistribute the modified OS.

Most of the Linux flavors are either totally free or costs very less compared to other OS.

# Features of Linux

## Flexibility in Usage

Linux can be used for high performance server applications, desktop applications and embedded systems.

## Multi-User System

Linux is a multi-user operating system as it allows multiple users to work simultaneously on the same system.

Different users can login from different machines into same machine by using programs like 'TELNET'.

# Features of Linux

## Multi-tasking System

Linux is a multi-tasking operating system which allows multiple programs to run simultaneously.

## High Performance and Reliability

Linux provides high performance with minimum requirements of hardware compared to other operating systems.

System crashes, hangs, virus attacks are almost absent from the Linux world.

# Features of Linux



## The Building-block Approach



Linux uses the building-block approach to perform complex tasks.



It provides a few hundred commands each of which can perform one simple job.



To perform complex tasks, such simple commands can be combined using pipes and filters.

# Features of Linux

## Flexible Interface

Linux supports both GUI (Graphical User Interface) and CLI (Command Line Interface)

User can choose any interface according to their convenience and expertise.

## File System Support

Linux supports a wide range of file systems such as ext, ext2, ext3, ext4, XFS, JFS, etc.

It also supports file systems supported by other OS such as NTFS, so that linux users can access files managed by those operating systems.

# Features of Linux

## Programming facility

The Linux shell is also a programming language which supports all the programming features such as variables, control structures, loops and so on.

## Online help

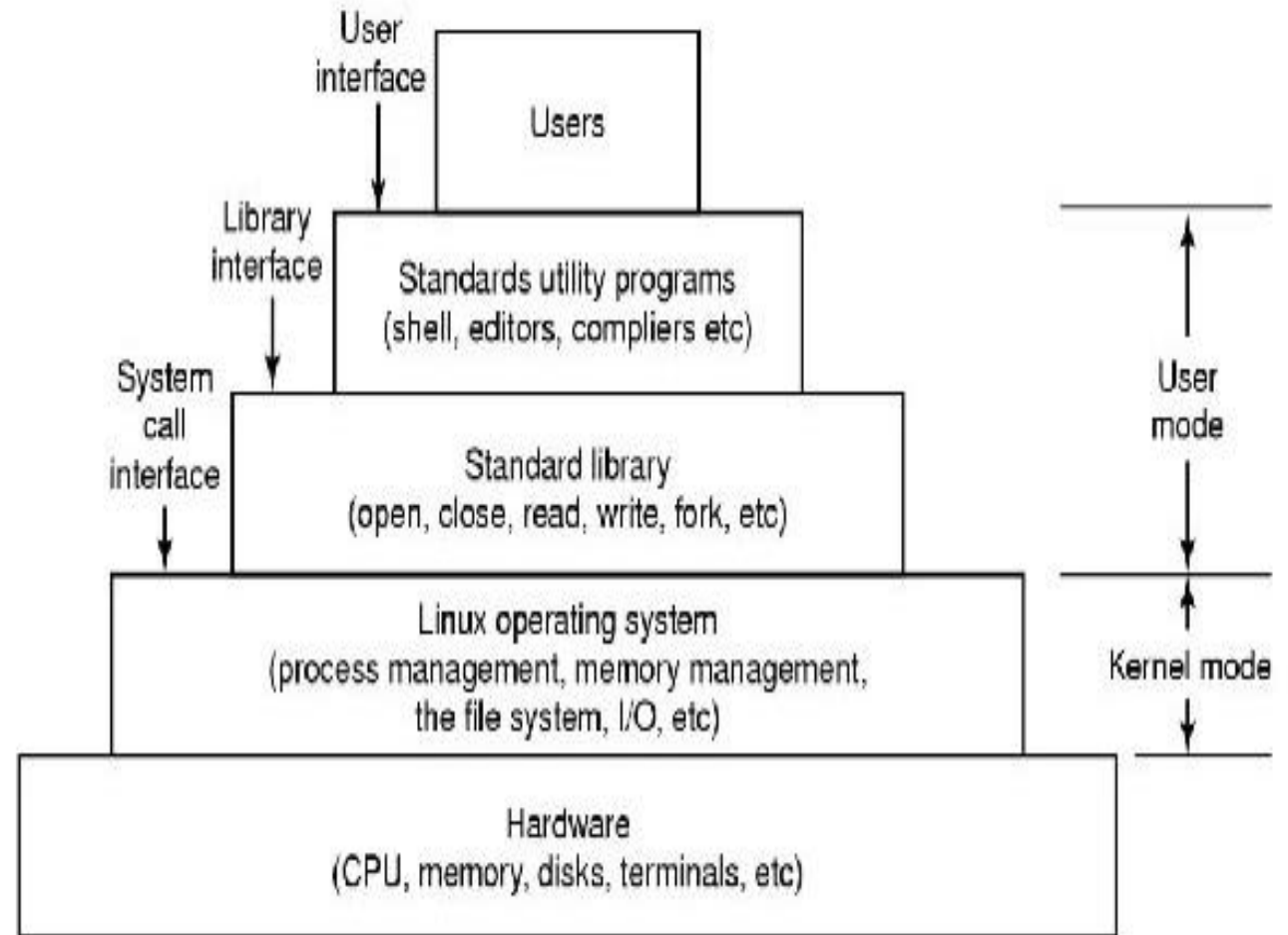
Linux provides an online help facility for all the commands using a command 'man'.

As Linux is a community driven OS, many developers and distributors work on it and there is a vast support available on internet.



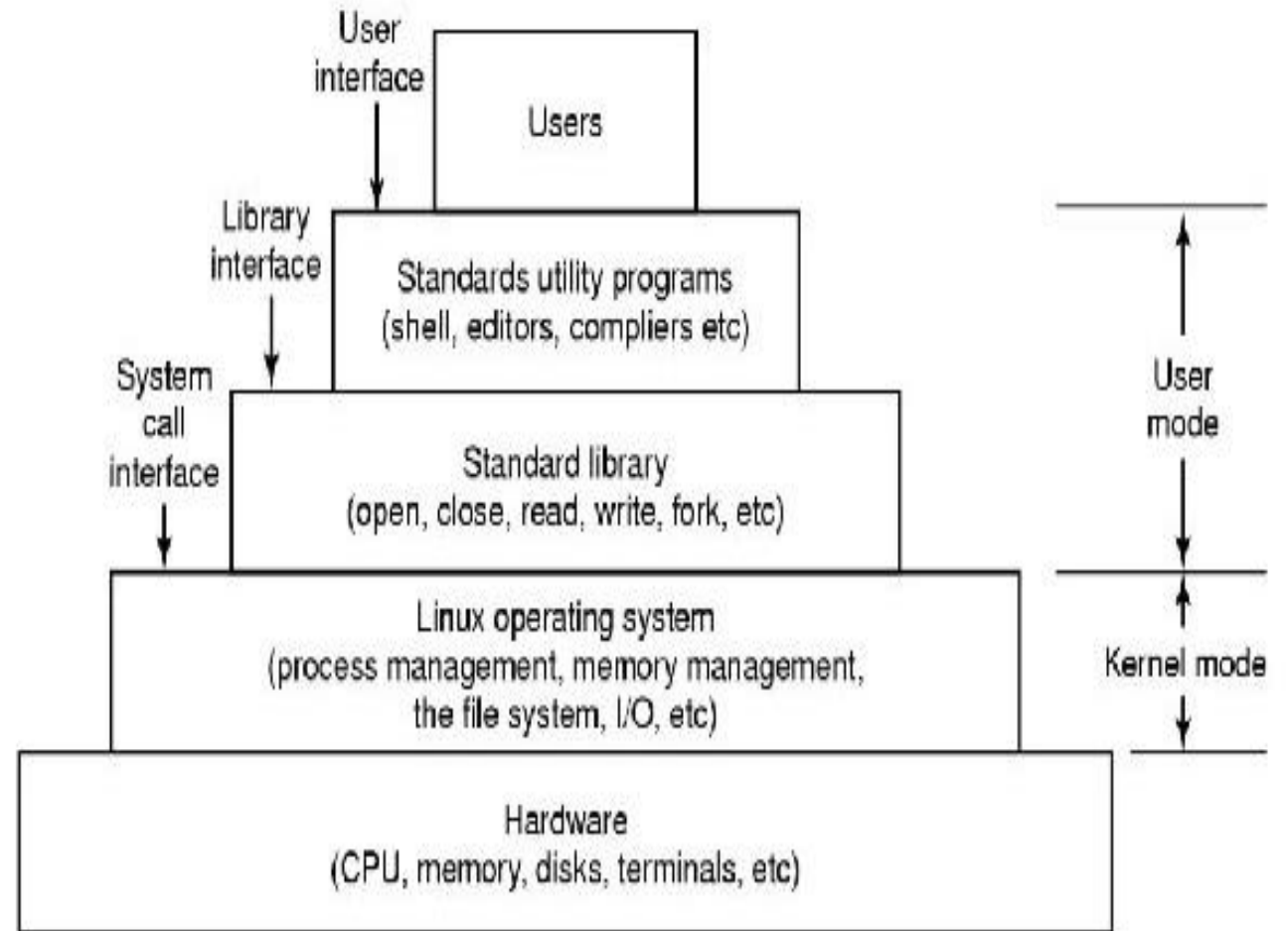
# The Linux Architecture

- Linux architecture is also known as the layered structure of the Linux.
- As Linux is a UNIX like OS, its architecture resembles to that of UNIX.
- The various layers depicted in Linux architecture are as shown in the figure.



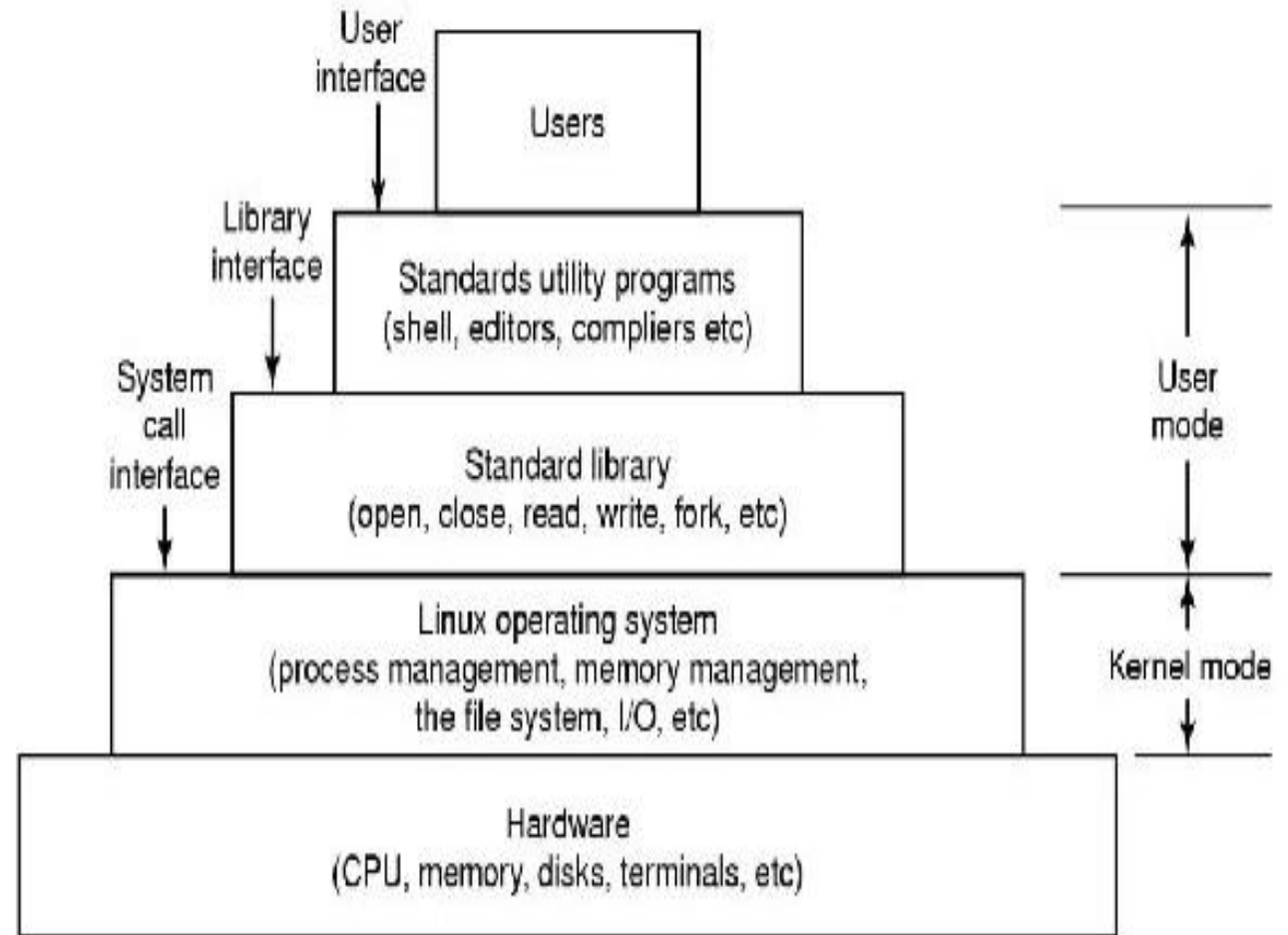
# The Linux Architecture

- **Hardware**
- The bottom layer is hardware which consists of various physical devices such as CPU, memory, disks, monitors, printers, etc.



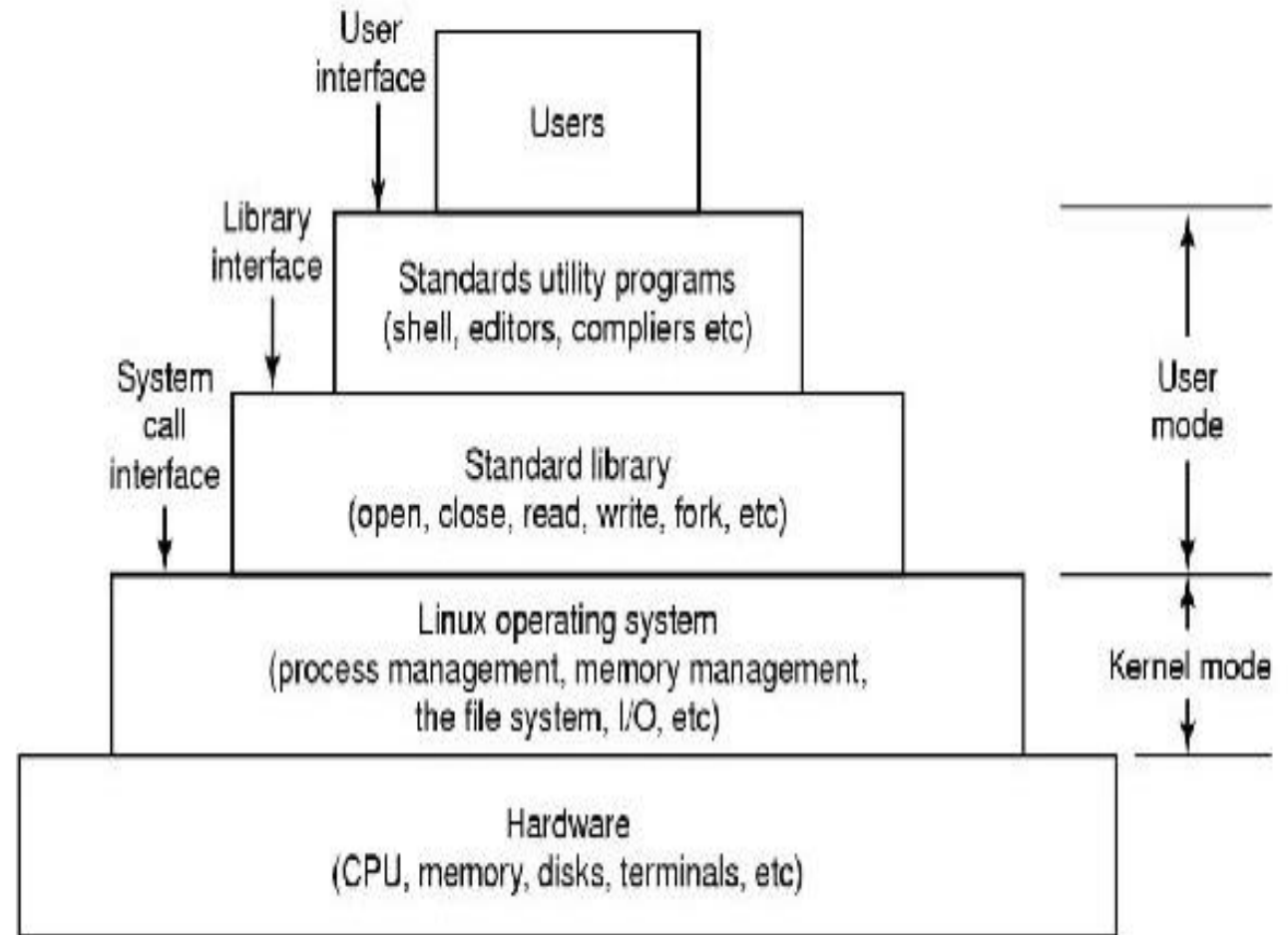
# The Linux Architecture

- **Linux Kernel**
- The next higher layer is Linux Kernel which represents the core of the OS.
- It manages all the underlying hardware.
- It directly interacts with the hardware and provides user programs required services, hiding all the complex details of the hardware.



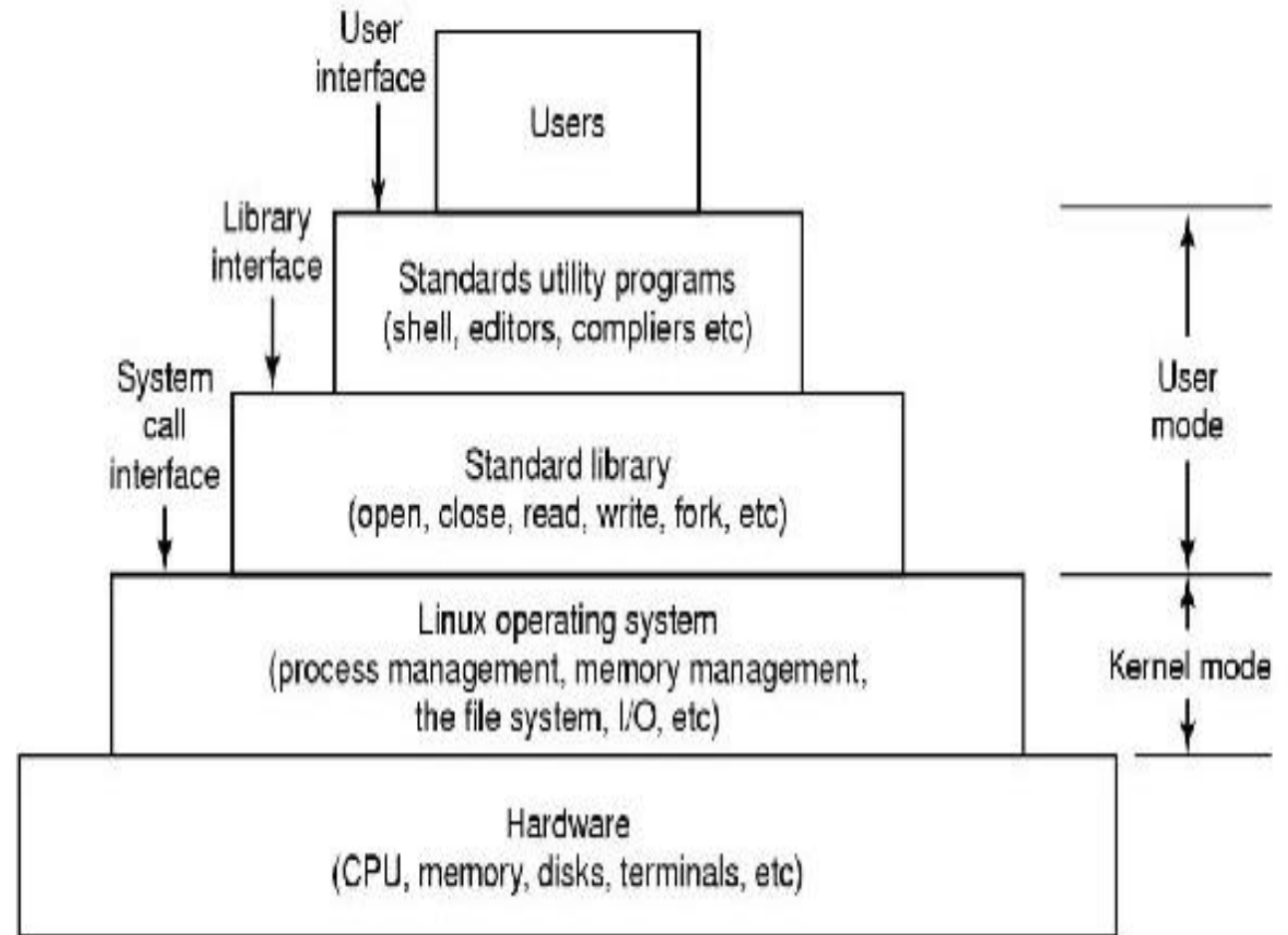
# The Linux Architecture

- **Standard Library**
- Above OS, next layer is for standard library which contains a set of procedures, one procedure per system call.
- These procedures are written in assembly language and used to involve various system calls from user programs.



# The Linux Architecture

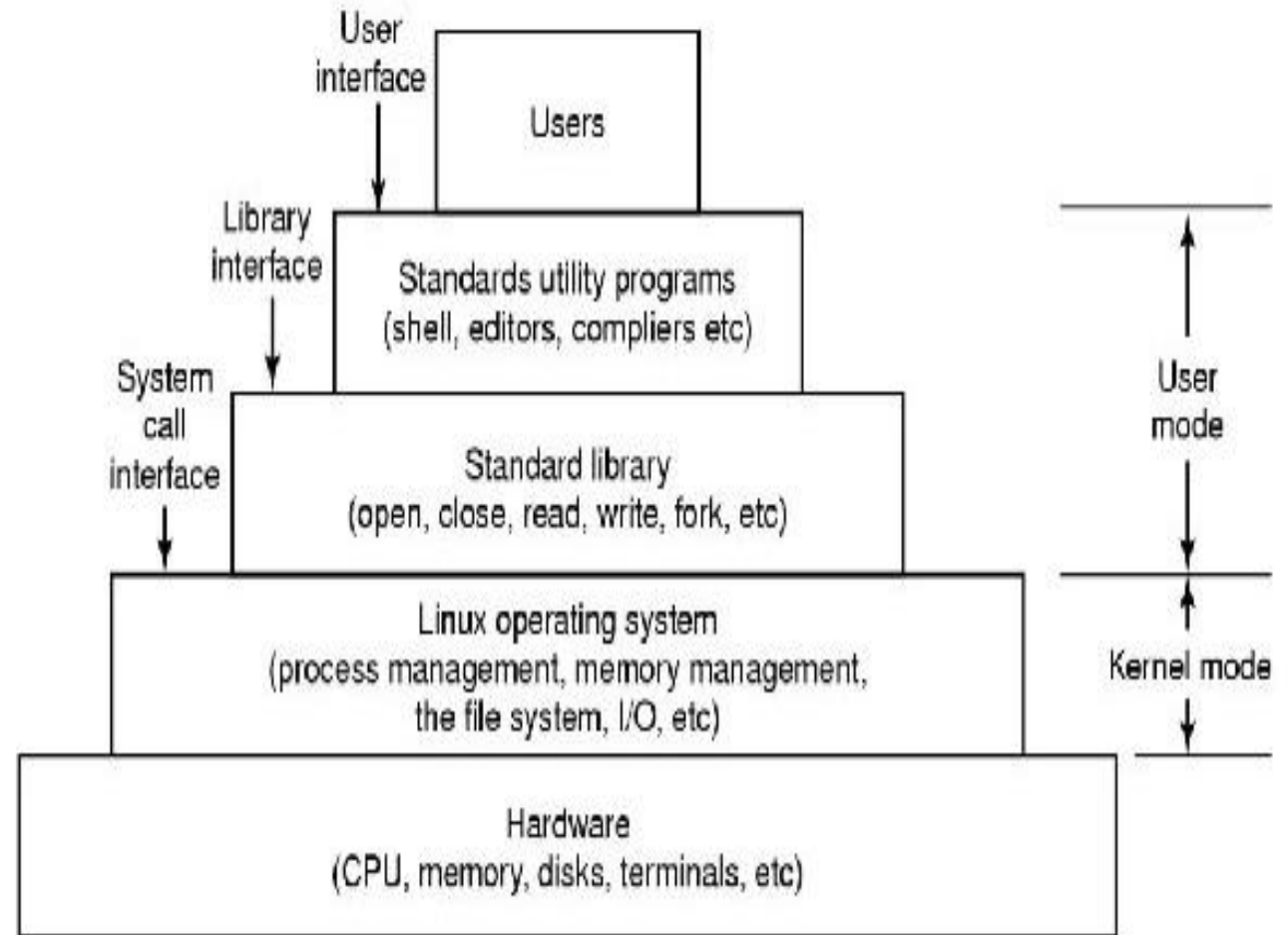
- **Standard Utility Programs**
- Standard utility programs include command processor (shell), compilers, editors, text processing programs, file manipulation utilities, a variety of commands, graphical user interfaces and so on.



# The Linux Architecture

- **Users**

- The topmost layer is of Users.
- User programs come in this layer which interact with the system either by using library procedures to invoke system calls, or by using utility programs such as shell.



# Files

File is a container for storing information.

It is used to store large amount of data permanently.

In addition to data contents, file contains other information called file attributes.

File attributes contain information such as file-names, file size, etc.

# File Types

## Regular (Ordinary) Files

These files are used to store user information.

When a file is referred in general, it belongs to this category and are used to store source programs, texts, pictures, sound, video, executable codes, etc.

They are further categorized in two parts: 1) Text files 2) Binary files



# File Types

## Directory Files

Directories are used to store files and sub-directories.

Directory files do not contain user information.

They keep some details of the files and sub-directories, such as name and unique identification number called I-node number.

They help in managing files in a well-organized manner.

# File Types

## Device Files

In Linux, various physical devices such as disks, printers, scanners, CD-ROMs, memory are considered as files also.

Kernel maintains special device files; one such file per device, to represent that device.

All operations related to that device are performed via reading or writing to such special files.

Such special files do not contain user data as do regular files.

# Directory

A directory is a container for other files and sub-directories.

Directories are used to group and organize files & sub-directories.

They provide a hierarchical file structure which helps in managing files in a well-organized manner.

A directory is a file whose data is a sequence of entries which contains a file name and a unique identification number called I-node number.

Whenever there is a need to access any file, the kernel maps the file name to its related I-node using directory entries based on the file path.

# Directory Structure

- Linux uses a hierarchical directory structure like UNIX. Here all files are organized in an inverted tree like structure.
- The top of the hierarchy is called a 'root' directory or simply a 'root'.
- Every non-leaf node in a tree is a directory.
- Every leaf node is either a directory, regular file or a device file.

