EXPERIMENT 1
Introduction to OS and LINUX

OBJECTIVE:

- To get familiarized with the basics of operating systems
- Learn the basic commands used in Linux

BACKGROUND:

On Computer Startup:

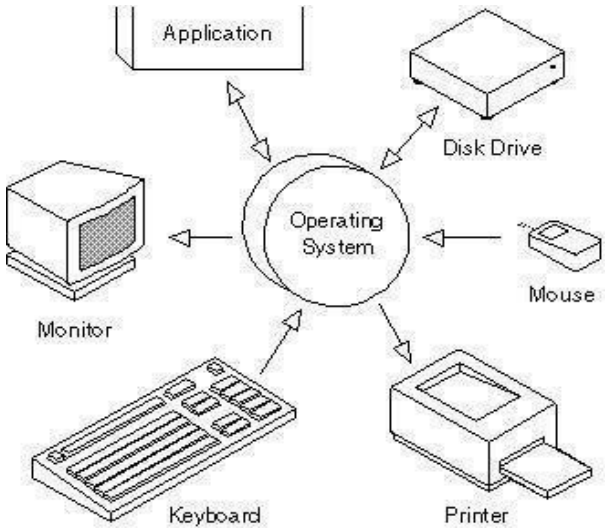
- Power-on self-test (POST) checks for errors
  - CPU
  - Memory
  - Basic input-output systems (BIOS)
- BIOS/firmware
  - Activates the computer's hard disk drives
- Bootstrap loader
  - First piece of the operating system
  - Has a single function to load the operating system into the memory

Operating System:

- What is Operating System?

Supports computer's basic functions as shown in Figure 1.1

- What tasks an OS Perform?
  - Processor management
  - Memory management
  - Device management
  - Storage management
  - Application interface
  - User interface
- Types
  - Linux
  - Windows 8, Windows 7, Vista, XP
  - Mac



OS Basic Functions Figure 1.1

What is LINUX?

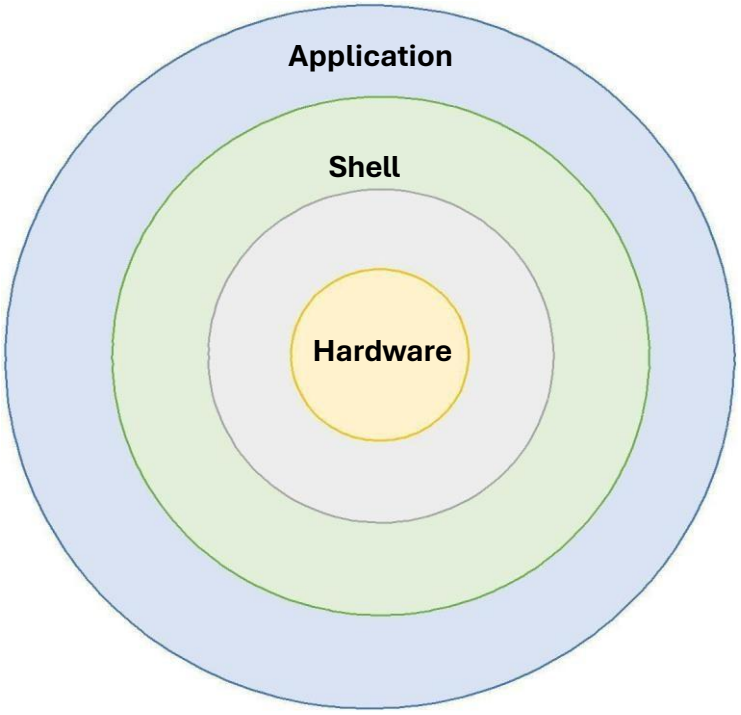
- A fully-networked 32/64-Bit Unix-like Operating System
  - Compilers Like C, C++
- Multi-user, Multitasking
- Coexists with other Operating Systems
- Includes the Source Code
- Open Source

Why is it Significant?

- Growing popularity
- Powerful
  - Runs on multiple hardware platforms
  - Users like its speed and stability
  - No requirement for latest hardware
  - It is free
  - Licensed under GPL (General Public License)

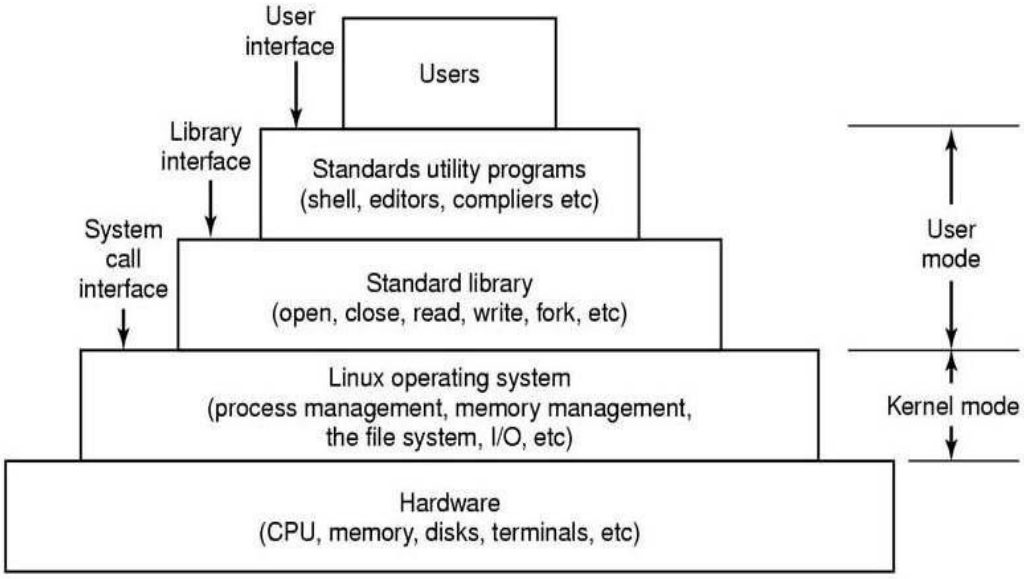
System Structure:

An operating system is a construct that allows the user application programs to interact with the system hardware. This is further divided in two layers i.e Kernel and Shell. Kernel deals with the Hardware and Shell deals with Applications as shown in Figure 1.2.



Structure of an Operating System Figure 1.2

The Linux System:
Linux is the best-known and most-used open source operating system. As an operating system, Linux is software that sits underneath all of the other software on a computer, receiving requests from those programs and relaying these requests to the computer's hardware. Linux System Structure is shown in Figure 1.3.



Linux System Structure Figure 1.3

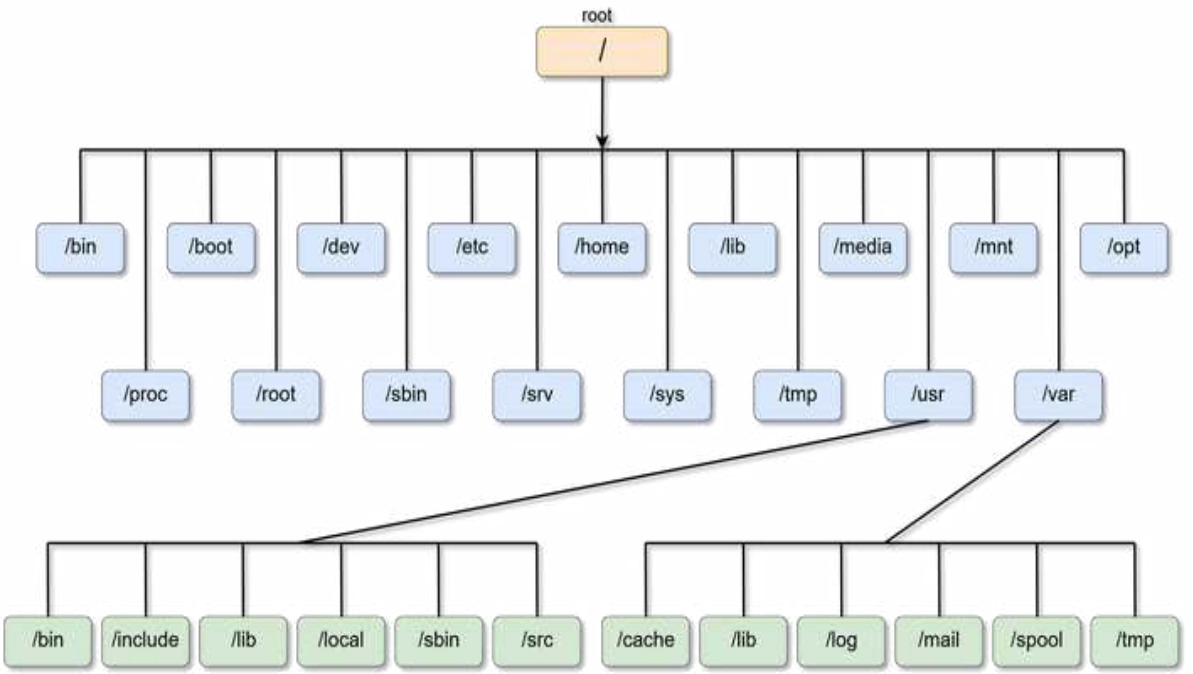
Linux Command Basics:

- To execute a command, type its name and arguments at the command line
- <command_name> <space> <options> <space> <arguments>

Editors:
Several Choices available:

- **`vi`** Standard UNIX editor
- **`the`** XEDIT like editor
- **`xedit`** X windows text editor
- **`emacs`** Extensible, Customizable Self-Documenting Display Editor
- **`pico`** Simple display-oriented text editor
- **`nedit`** X windows Motif text editor

The File system:
Unix uses a hierarchical file system structure, much like an upside-down tree, with root (/) at the base of the file system and all other directories spreading from there as can be seen from Figure 1.4. Linux differs from Windows in many ways. The comparison has been given in Table 1.5.



Linux File System Figure 1.4

Windows	LINUX
• The directories in MS-DOS path are separated by '\' • File names are case insensitive. • Where DOS/Windows had various partitions and then directories under those partitions. • An executable is one with an extension of .exe, .com or .bat. • You can set attributes to make file read only, hidden	• Paths are separated by '/'. • File names are case sensitive. • There is only a single hierarchal directory structure (resembles a tree). Everything starts from the root directory, represented by '/', and then • expands into sub-directories. • Any file whose execute permission is turned on is executable • You can set permissions on a file

Table 1 (Comparison between Windows OS and Linux OS)

Special Files:

- **/home -** all users' home directories are stored here
- **/bin, /usr/bin -** system commands
- **/etc -** all sorts of configuration files
- **/var -** logs, spool directories etc
- **/dev -** device files
- **/proc -** special system files

Virtual Machine:

- What is virtual Machine?
  - VirtualBox and VMWare
- ISO files – Ubuntu ISO file
- Ubuntu installation on VirtualBox or VMware

Installation of Linux in Virtual Machine:

a. Install VMware on your Machines.

b. Get Latest ISO file of Ubuntu distribution according to your system architecture (32bit or 64bit) from following link http://www.ubuntu.com/download/desktop.

c. Install Ubuntu from this ISO image file as guest Operating system in VMware.

Some Commands for Beginners:

- Clear the console
  - **clear**
- Changing working Directory
  - **cd Desktop**
  - **cd Home**
- List all files in directory
  - **ls**
- Copy all files of a directory within the current work directory
  - **cp dir/***
- Copy a directory within the current work directory
  - **cp -a tmp/dir1**
- Look what these commands do
  - **cp -a dir1 dir2**
  - **cp filename1 filename2**
- To make archive of existing folder or files
  - **tar cvf archive_name.tar dirname/**
  - **tar cvf alldocs.tar *.txt**
- Extract from an existing tar archive
  - **tar xvf archive_name.tar**
- View an existing tar archive
  - **tar tvf archive_name.tar**

Some more Commands:

- **ls** show files in current position
- **cd** change directory
- **cp** copy file or directory
- **mv** move file or directory
- **rm** remove file or directory
- **pwd** show current position
- **mkdir** create directory
- **rmdir** remove directory
- **less, more, cat** display file contents
- **man** read the online manual page for a command
- **whatis** give brief description of a command
- **su** switch user
- **passwd** change password
- **useradd** create new user account
- **userdel** delete user account
- **mount** mount file system
- **umount** unmount file system
- **df** show disk space usage
- **shutdown** reboot or turn off machine

Post Lab Questions:

1. **Provide details about the following commands?**
   - apt-get
   - yum
   - wget
   - gzip tar
   - rar

2. **Find and Execute following commands in Linux Shell?**
   - show architecture of machine
   - show CPU info
   - show version of the kernel
   - show system date
   - set date and time
   - show details of files and directory
   - show hidden files
   - show files and directory containing numbers
   - create a directory called 'dir1'
   - create two directories simultaneously
   - show the path of work directory
   - delete file called 'file1'
   - remove a directory called 'dir1' and contents recursively
   - delete directory called 'dir1'
   - modify timestamp of a file or directory