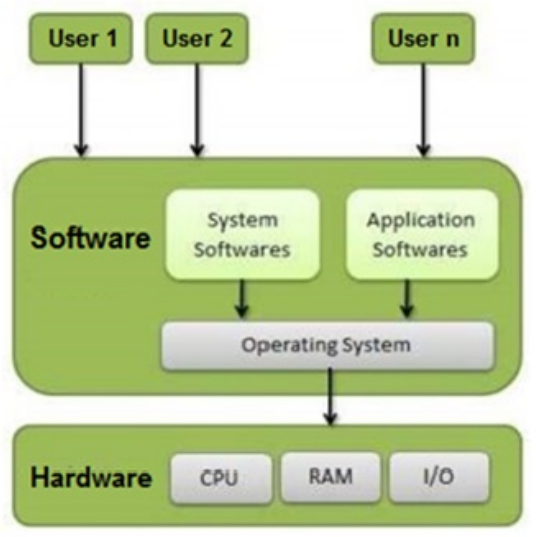
Prathmesh Borade

LINUX OPERATING SYSTEM
Unit I

1) Explain Operating System with its structure.

An Operating System is an interface between a computer user and a computer hardware. An Operating System is a software which performs all the tasks; file management, memory management, process management, handling input and output, controlling peripheral devices such as disks and drivers.



i) Process Management :- Memory management refers to management of main memory. Main memory provides fast storage that can be accessed directly by the CPU.

ii) Process Management :- Operating System decides which process gets the processor when and for how much time. This function is called process scheduling.

iii) File Management :- A file system is normally organized into directories may contains file or other directories and allocates and deallocates resources

2) Explain History of GNU Project.

i) The GNU Project is an initiative for the development of free software.

ii) The original purpose of the GNU Project was the creation of a free operating system.

iii) It was developed on 27 sept 1983 by Richard Stallman at MIT.

iv) It has the ability of anyone who wishes to Run, Copy, Distribute, Study, Change and Improve
the Software.

v) The GNU Project was Started to create a UNIX-like Operating System created with source code that could be copied, modified and distributed.

vi) According to the GNU Linux Project, the Kernel of the Linux OS is Linux but all other

elements of the operating system are GNU.

3) Enlist Distribution of Linux Operating System and Explain Three Distros.

i) A complete Linux System Package is called a Distribution. Most distributions are available to meet computing requirements.

ii) The Different Linux Distributions are divided into :-

a) Full core linux distributions
b) Specialized distributions
c) LiveCD test Distributions

a) Full core linux distributions :-

A core linux contains a kernel, one or more graphical desktop environments. In early days of linux distribution was released as a set of floppy disks.
Example: Slackware, Red Hat, Fedora, Debian

b) Specialized distributions :-

Specialized distributions are specialized for a particular task. Most of them are small, since limiting the functionally can also limit the size.
Example: CentOS, Ubuntu, PCLinux, MintOS, Puppy Linux

c) LiveCD test Distributions :-

A live distribution is a Linux distribution that can be booted from removable storage media such as optical discs or USB flash drives, instead of being installed on and booted from a hard disk drive.

4) Define Linux Operating System.

Linux is a Unix-like, open source and community-developed operating system (OS) for computers, servers, mainframes, mobile devices and embedded devices. It is supported on almost every major computer platform, including x86 and ARM, making it one of the most widely supported operating systems.
Example: CentOS, Ubuntu, Slackware, Red Hat, Fedora, Debian, PCLinux, MintOS

5) Difference between Windows and Linux.

Sr. No.	Key	Linux	Windows
1	Open Source	Linux is Open Source and is free to use.	Windows is not open source and is not free to use.
2	Case sensitivity	Linux file systems are case sensitive.	Windows file system is case insensitive.
3	kernel type	Linux uses a monolithic kernel.	Windows uses a micro kernel.
4	Efficiency	Linux is more efficient in operations as compared to Windows.	Windows is less efficient in operations.
5	Path Separator	Linux uses forward slash as path separator between directories.	Windows uses backward slash as a path separator.
6	Security	Linux is highly secure as compared to Windows.	Windows provides less security as compared to Linux.

6) Difference between UNIX and Linux.

Sr. No.	Key	Linux	Unix
1	Development	Linux is open source and is developed by the Linux community of developers.	Unix was developed by AT&T Bell labs and is not open source.
2	Cost	Linux is free to use.	Unix is a licensed OS.
3	GUI	Linux uses KDE and Gnome. Other GUI supported are LXDE, Xfce, Unity, Mate.	Unix was initially a command based OS. Most of the unix distributions now have Gnome.
4	Usage	Linux is used in wide varieties from desktop, servers, smartphones to mainframes.	Unix is mostly used on servers, workstations or PCs.
5	Default Shell	Bash (Bourne Again SHell) is the default shell for Linux.	Bourne Shell is the default shell for Unix.
6	Example	Ubuntu, Debian GNU, Arch Linux, etc.	SunOS, Solaris, SCO UNIX, AIX, HP/UX, ULTRIX etc.

7) Enlist Linux based Application Software.

i) Text and Word Processing Applications :- LibreOffice

ii) Browser :- Mozilla Firefox, Opera

iii) Communication :- Thunderbird, Telegram, Skype

iv) Media :- VLC Media Player, Rhythmbox

v) Editors :- GIMP, Audacity, Openshot

vi) Programming IDE :- Visual Studio Code, Android Studio

8) Describe Linux based programming languages.

Linux Programming is compatible with C, C++, Java, Python, Perl and OtherProgramming Languages.

a) Python:- Python is a general purpose open-source programming language and also provides a number of frameworks and libraries. Python has popularity because of its simplicity, easy syntax and user friendly environment.

b) Java:- Java is an Object Oriented class based concurrent, secured and general purpose computer programming language. Java was developed by Sun-microsystems in 1995. It is used in all kinds of applications like Mobile application, desktop application, web application and client server application.

c) C:- C is an important language in UNIX like Operating Systems. The kernel of most of the commands and tools we use are written in C language.

d) Perl:- Perl is a general purpose programming language and originally developed for text manipulation and now used for a wide range of tasks like system administration, web development, GUI development and Network programming.

9) Explain Applications of Linux Operating System.

Applications of Linux Operating System:-

a) Text and Word Processing Application in addition to commercial word processing software such as WordPerfect, StarOffice and Applixware Linux offers powerful tools for editing text files.

b) A wide variety of programming and scripting languages and tools are available for Linux.

c) X Windows is UNIX's answer to the Graphical User Interface (GUI). It is a highly flexible and configurable GUI Environment.

d) Internet Tools: Linux provides a wide range of Internet softwares including character-based and graphical multi-reading applications.

e) Databases: Linux provides a robust platform for running client-server database applications from its earliest days. Powerful free databases such as SQL and Postgres have been available for Linux.

f) Linux also supports some DOS and Windows compatible softwares.

10) Explain the role of the Linux Operating System as a server.

i) A Linux Server is an efficient and powerful variant of the Linux open-source operating system.

ii) It is built to address the ever-increasing requirements of business applications like system and network administration, web service and database management.

iii) Each flavor of linux server is designed with different uses:-

a) If you are running a web server, chances are it is running on CentOS.

b) If your application server has thousands of users or more you will want something designed to handle that kind of volume such as red hat enterprise, Ubuntu server.

Application	HTTP, FTP, SMTP
Presentation	JPEG, PNG
Session	Connection Management
Transmission	TCP, UDP
Network	IP
Datalink	MAC
Physical	Data encoding/ decoding

11) Explain tools in the Linux Operating System.

a) Anonymizer:- It is a tool that attempts to make activity on the internet untraceable. It is a proxy server computer that acts as an intermediate and privacy shield between a client computer and the rest of the internet and servers.

b) Backup:- This tool is intended for backup of files using a desktop GUI part image . Part Linux, a Linux Partition backup utility, allows you to save partitions in many file formats.

c) Browser:- KONQUEROR, is a tool which combines browser and file management for KDE.

d) Chart:- X-chart is a popular utility. It supports multiple channels and file transfer; it is also available for windows.

e) Convertor:- aiken, AODC(Open Document Converter) is a program that converts between RedHat, Debian, Slackware and Solarize package format.

f) Emulator:- **While** is an open-source implementation of Windows API on top of Linux and UNIX.

g) Media Player:- **XMMS** is a multimedia player which is mainly used for audio in the UNIX operating system.
h) Partitioning Tools:- **QTParted** is a clone of partition magic. It is capable of handling NTFS Partitions.
i) Security:- Anti Rootkit - **chkrootkit** is a tool that allows you to look for unwanted files on your machine like malicious data.
j) Firewall:- Firewall is a lightweight and powerful tool based on cisco, it supports upto 10 network cards, 10 modems, 5 printers.
k) Intrusion Prevention:- **AppArmor**- it is an application security framework,
Snort- It is a very popular open-source network intrusion detection and prevention software.

UNIT II

1) Explain Partition with its types.

i) Partitioning is the process of dividing a disk into one or more Logical areas on which the User can work separately.

ii) Ubuntu Linux partitions also come in Primary and Logical.

iii) Your first partition will always be your install partition on a primary partition. This partition will sometimes be called the Root of the partition or will be shown as a /.

iv) You will make several other partitions, depending on how you want to use and configure your Linux install.

v) While you can create these partitions and give them a size, a file format and a purpose. They will usually need to be mounted to the / of this partition to function.

vi) Ubuntu Linux further separates these partitions into two categories:

a) Data partitions

These are partitions like the boot partition in that they hold directories and files or normal Linux system data. These are the files which start and run the system.

b) Swap partitions

These are partitions that expand the PC's physical memory by using the partition as a cache.

PARTITION NAME	DESCRIPTION
/	The slash / alone stands for the root of the filesystem tree.
/bin	This stands for binaries and contains the fundamental utilities that are needed by all users.
/boot	This contains all the files that are needed for the booting process.
/dev	This stands for devices, which contain files for peripheral devices and pseudo devices.
/home	This holds all the home directories for the users.
/lib	This is the system libraries and has files like the kernel modules and device drivers.
/root	This is the home location for the system administrator root. This accounts home directory is usually the root of the first partition.
/swap	The swap partition is where you extend the system memory by dedicating part of the hard drive to it.

2) Explain File System.

File System

A file system is a process that manages how and where data on a storage disk is stored, accessed and managed. It is a logical disk component that manages internal operations as it relates to a computer and is abstract to a human user.

Linux File System

i) Linux File System has a hierarchical file structure as it contains a root directory and its sub-directories.

ii) All File Systems need to provide namespace i.e. naming and organization methodology. This defines how the file can be named, specifically the length of the filename and the subset of characters.

3) Compare ext2, ext3, ext4 File Systems.

	ext2	**ext3**	**ext4**
1	Ext2 stands for second extended file system	Ext3 stands for third extended file system	Ext4 stands for fourth extended file system
2	It was introduced in 1991 developed by Remy Card	It was introduced in 2001 developed by Stephen Tweedie	It was introduced in 2008
3	This was developed to overcome the limitations of the original ext file system	Starting from Linux kernel 2.4.15 ext3 was available	Starting from Linux Kernel ext4 was available
5	Ext2 does not have journaling feature	The main benefit of ext3 that it allows journaling	Supports huge individual files and overall file system size.
5	Maximum individual file size can be from 16GB to 2TB	Maximum individual file size can be from 16GB to 2TB	Maximum individual file size can be from 16GB to 16TB
7	Overall ext2 file system size can be from 2TB to 32TB	Overall ext2 file system size can be from 2TB to 32TB	Overall ext2 file system size can be 1EB (exabyte)

4) Explain Disk Partitioning in detail.

i) Disk Partitioning is the process of dividing a disk into one or more Logical areas on which the User can work separately.

ii) If a partition is created the disk will store the information about location and size of partitions in the partition table.

iii) Each partition can appear to the Operating System as a logical disk and the user can read and write data on those disks.

iv) Ubuntu Linux further separates these partitions into two categories:

a) Data partitions

These are partitions like the boot partition in that they hold directories and files or normal Linux system data. These are the files which start and run the system.

b) Swap partitions

These are partitions that expand the PC's physical memory by using the partition as a cache.

5) Explain Installation steps of Linux Operating System.

Installation steps for Linux Operating System are as follows:

i) Creating a Bootable USB Media:-

a) Download ISO file of your desired Linux Distro for their Official webpage.
b) Download Rufus, a simple tool which is used to make bootable USB devices from their Official website.
c) Make sure you have at least 8GB size of pendrive or any other USB media.
d) Open RUFUS and connect the pendrive to the USB port.
e) Select downloaded ISO file of your Linux distro.
f) Select name of the USB Device.
g) Select the required partition scheme.
h) Finally click on the Start button and wait until your USB device gets bootable.

ii) Installing Linux and Setting up

a) Restart the Computer and press the key to access Boot Menu.
b) Select the USB Flash Drive and hit Enter.
c) Now you will see Linux is booting from your USB Device.
d) Perform a quick setup including Language, Keyboard Layout and Time Zone.
e) Select Installation type whether you could select Installing Linux over your current Operating System or also you can create manual partitioning.
f) Create Username and password for your User Account and click on the install button.
g) Copying process of setup files will be started and after copying gets done, Installation of setup will be continued.
h) Wait until it gets over and after that remove your USB Flash Drive and Reboot your PC

iii) Booting Linux

a) Now turn on your Computer
b) You will see GRUB Bootloader Menu, where you have to select whether you want to boot on linux or another installed operating system.
c) GRUB menu will only show if you have multiple operating systems installed. Otherwise BRUB skip that process.
d) After the Booting process you will successfully be able to see the login screen where you have to enter the password for your User Account which you created during Installation process.
e) And now your Linux is ready to use.

6) Explain the concept of dual booting.

i) While most PCs have a single operating system (OS) built-in, it's also possible to run two operating systems on one computer at the same time.

ii) The process is known as dual-booting, and it allows users to switch between operating systems depending on the tasks and programs they're working with.

iii) Performing a dual boot is relatively simple and can be done across Windows, Mac and Linux operating systems.

iv) A dual boot is when you run two operating systems on one computer at the same time. This can be any combination of operating systems,

v) Bootloader is responsible for the booting process.

7) Explain Gnome with its interfaces and tools.

i) Gnome is the open-source and free desktop platform for Unix-like OS.

ii) Originally, Gnome was standing for GNU Network Object Model Environment.

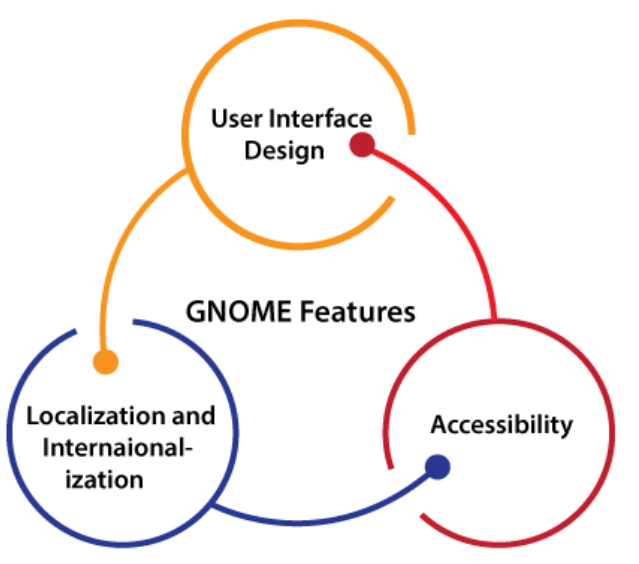
iii) Core Applications: There is a wide range of Clutter-based and GTK programs written by several authors. The GNOME Project focuses on developing a program set that accounts for the Core Applications of GNOME since the GNOME 3.0 release.

iv) Development Tools: Many programmers have specified software for providing development tools persistent with the GNOME desktop. Also, it provides the GNOME software development. GNOME Builder is a newer integrated development environment.

v) GNOME facilitates three distinct types of login sessions for a desktop which are as follows:

a) GNOME Classic
b) GNOME Flashback
c) GNOME Shell

vI) Features of GNOME:



8) Explain KDE.

i) KDE stands for K Desktop Environment. It is a desktop environment for Linux based operating systems.

ii) You can think of KDE as a GUI for Linux OS. KDE has proven Linux users to make it as easy as they use windows.

iii) KDE provides Linux users a graphical interface to choose their own customized desktop environment.

iv) Same as Windows, KDE has a Konqueror which is used to browse local files as well as it can be used as a browser to browse the web.

v) Like Microsoft office in windows KDE comes with Kword, kpresenter, Kcalc and Kontact.

vi) KDE comes with an editor like KWrite which is a default text editor of KDE and also provides a better experience than Notepad of Windows.

vii) These are some examples of Linux distros which come with KDE Plasma interface: KDE Neon, Kubuntu, Manjaro KDE, Fedora KDE, OpenSUSE, Garuda Linux, etc.