Module 1

Operating System

- An operating system (OS) is system software that manages computer hardware and software resources and provides common services for computer programs.
- OS as a Middle Layer / Bridge
- The OS acts as a bridge between the computer and the user.
- It provides a user interface and controls the computer hardware so that software can function effectively.

Types of Operating Systems

1. Desktop Operating Systems – Windows, macOS, and Linux (e.g., Ubuntu).
2. Server Operating Systems – Windows Server, CentOS, Red Hat Enterprise Linux.
3. Mobile Operating Systems – Android, iOS.
4. Embedded Operating Systems – Used in routers, smart TVs, and automobiles.
5. Real-Time Operating Systems – Used in medical equipment, aerospace, defense, network firewalls, and home security systems.

What is Linux?

- Linux is a free and open-source operating system.
- It is popular for its stability, security, and flexibility.
- It can be modified and distributed by anyone.
- Its open-source nature means that a community of developers continues to contribute to its development.

Importance of Linux

- Widely used in servers and cloud computing.
- Supports the free software philosophy.
- Has a strong command-line interface.
- Faster processing compared to some other OS.
- Enhanced security due to fewer vulnerabilities.
- Highly customizable because of its open nature.

History of Linux

Before Linux

UNIX was developed in the 1970s at AT&T Bell Labs by Ken Thompson and Dennis Ritchie.

In 1983, Richard Stallman launched the GNU Project to create a free UNIX-like OS.

Birth of Linux

In 1991, a 21-year-old Finnish student, Linus Torvalds, created Linux.

August 25, 1991 – Linus announced the project on the Minix newsgroup.

September 1991 – Version 0.01 was released.

Later in 1991 – Version 0.02 was released.

1994 – Linux 1.0 was launched.

2000s – Linux saw significant adoption in the server market.

2007 – Google introduced Android OS, which is based on Linux.

UNIX vs Linux

Feature	Feature	Linux
Developer	Developed by AT&T, GE, and MIT in 1970 at Bell Labs	Developed by Linus Torvalds in 1991
File System Support	Supports fewer file systems	Supports a wide range of file systems
Hardware Compatibility	Can be installed on specific hardware	Can be installed on a wide range of devices

Linux Distributions (Flavors)

A Linux distribution is a version of Linux bundled with various software and package managers.

Popular Linux Distributions:

- Ubuntu (by Canonical Ltd.)

- Fedora (by Red Hat)

- Debian

- Red Hat Enterprise Linux (by Red Hat)

- CentOS

- Arch Linux

- OpenSUSE

- Linux Mint

- Gentoo Linux

- Slackware Linux

- Alpine Linux

- Kali Linux

Linux vs Windows

Feature	Linux	Windows
Source Type	Open-source	Proprietary software
Cost	Free	Paid
User Interface	Multiple desktop environments (GNOME, KDE, XFCE)	Standard UI across versions
Command Line	Core feature (Bash, Terminal)	Uses Command Prompt and PowerShell
Software Installation	Uses package managers like APT, YUM, Pacman	Uses .exe installers
Security	More secure with fewer malware threats	More vulnerable to malware
Performance	Known for stability and performance	Can slow down over time
File Systems	Supports ext4, XFS, Btrfs	Uses NTFS, FAT32