

# Computer Software and Operating System

## Introduction

Software refers to a set of instructions or programs that are used to control the behavior of a computer or other electronic device. Software is the intangible part of a computer system that enables it to perform various tasks and functions.

There are two main categories of software: system software and application software. System software includes the programs that control the hardware and basic operations of a computer, such as the operating system, device drivers, and utilities. Application software, on the other hand, is designed for specific tasks or applications, such as word processing, spreadsheet management, graphic design, and video editing.

Software can be developed by individual programmers, software companies, or open-source communities. The development process usually involves several stages, including requirements analysis, design, implementation, testing, and maintenance. Software can be distributed in a variety of ways, including through physical media such as CDs or digital downloads. Some software is also available as a service through the internet, known as Software as a Service (SaaS).

## Categories

- **System software:** This type of software is designed to manage and control the hardware and other system resources of a computer. Examples include the operating system (such as Windows, macOS, or Linux), device drivers, firmware, and system utilities.
- **Utility software:** These are programs that provide additional functionality to a computer system, such as antivirus software, backup and recovery tools, disk defragmenters, and file compression utilities.
- **Application software:** This is software designed for a specific purpose or task, such as word processors, spreadsheets, graphic design software, video editing tools, and gaming applications.

- **Web-based software:** These are applications that run in a web browser, such as online email clients, social media platforms, and web-based project management tools.
- **Mobile apps:** These are software applications designed to run on mobile devices such as smartphones and tablets. Examples include games, productivity tools, social media apps, and e-commerce platforms.

It's worth noting that there can be some overlap between these categories, and some software can fall into multiple categories. For example, a mobile app could also be considered application software, and some system utilities may be web-based or mobile apps.

## Operating System

An Operating System (OS) is a set of programs that manage and control the hardware and software resources of a computer. It is the core component of a computer system that enables applications to run and communicate with the hardware.

The main functions of an operating system are:

1. **Resource management:** The OS manages the computer's resources, such as memory, processor, input/output devices, and disk space, to ensure that they are used efficiently and fairly.
2. **Process management:** The OS creates and manages processes, which are the running instances of programs. It schedules and prioritizes processes to maximize performance and responsiveness.
3. **Memory management:** The OS allocates and manages the computer's memory, ensuring that each process has access to the memory it needs without interfering with other processes.
4. **File management:** The OS provides file management services that allow users to create, edit, store, and retrieve files from the computer's storage devices.
5. **Security:** The OS provides security features that protect the computer and its data from unauthorized access, viruses, and other threats.

Some examples of popular operating systems include Microsoft Windows, macOS, Linux, and Android. Each operating system has its own unique features and user interface, but they all perform the same basic functions. The choice of operating

system depends on the specific requirements of the user, such as the type of computer, the applications needed, and personal preferences.

## Role of OS

The role of an operating system (OS) in a computer system is to provide a set of services that manage and control the hardware and software resources of the system. The OS acts as an intermediary between the computer hardware and the applications or programs that run on it, providing a layer of abstraction that shields the applications from the details of the hardware.

Here are some of the key roles of an operating system:

- **Resource management:** The OS manages the computer's resources, such as memory, processor, input/output devices, and disk space, to ensure that they are used efficiently and fairly. It allocates resources to running programs and manages the contention for resources among multiple programs.
- **Process management:** The OS creates and manages processes, which are the running instances of programs. It schedules and prioritizes processes to maximize performance and responsiveness.
- **Memory management:** The OS allocates and manages the computer's memory, ensuring that each process has access to the memory it needs without interfering with other processes. It also provides virtual memory, allowing programs to use more memory than is physically available.
- **File management:** The OS provides file management services that allow users to create, edit, store, and retrieve files from the computer's storage devices. It manages the organization of files on the storage media and provides facilities for controlling access to files.
- **User interface:** The OS provides a user interface that allows users to interact with the computer and its applications. The user interface can take the form of a command line interface, a graphical user interface, or a combination of both.
- **Security:** The OS provides security features that protect the computer and its data from unauthorized access, viruses, and other threats. It can include features such as user authentication, access control, and encryption.

Overall, the operating system plays a critical role in the functioning of a computer system. It provides a platform for applications to run, manages system resources, and provides a user interface for users to interact with the computer.

## Terminologies used in OS

Here are some definitions of key operating system terminology:

- **Multiprogramming:** Multiprogramming is a technique used by operating systems to maximize the use of the computer's resources. With multiprogramming, the OS can load multiple programs into memory and switch between them as needed, allowing multiple programs to run concurrently.
- **Multitasking:** Multitasking is a technique used by operating systems that allows multiple tasks to run concurrently on a single processor. The OS uses scheduling algorithms to allocate processor time to each task, allowing them to make progress even though only one task can be executing at any given time.
- **Multiprocessing:** Multiprocessing is a technique used by operating systems to use multiple processors to execute tasks. With multiprocessing, the OS can divide a task into multiple subtasks and execute them simultaneously on different processors, allowing for faster and more efficient processing.
- **Distributed:** A distributed operating system is one that runs on multiple computers that are connected over a network. The operating system provides a unified view of the resources available across all the computers, allowing users to access resources and run programs on any of the connected computers.

In summary, multiprogramming allows multiple programs to run concurrently on a single processor, multitasking allows multiple tasks to run concurrently on a single processor, multiprocessing uses multiple processors to execute tasks, and a distributed operating system runs on multiple connected computers.

# Windows

Windows is a popular operating system (OS) developed and sold by Microsoft. It is used on a wide range of devices, including desktop and laptop computers, tablets, and smartphones. Here are some key features of Windows:

- **Graphical user interface:** Windows provides a user-friendly interface with a graphical user interface (GUI), making it easy to navigate and use the system.
- **Software compatibility:** Windows is compatible with a vast array of software applications, including productivity suites, games, and design software.
- **Device compatibility:** Windows supports a wide range of hardware devices, including printers, scanners, and external storage devices.
- **Security features:** Windows provides various security features to protect the system against malware and other threats, including built-in antivirus software, a firewall, and regular security updates.
- **Productivity tools:** Windows includes various built-in productivity tools, such as Microsoft Office, that allow users to create and edit documents, spreadsheets, and presentations.
- **File management:** Windows provides a file management system that allows users to create, organize, and access files and folders on the computer.
- **Customizability:** Windows allows users to customize the appearance and behavior of the system, including desktop backgrounds, screen savers, and window styles.
- **Updates:** Microsoft regularly releases updates and new versions of Windows, which include security patches, bug fixes, and new features.

Overall, Windows is a popular and widely used operating system that provides a range of features and functionality for users of all skill levels.

## Open-Source Systems

Open source refers to software that is developed in a collaborative, public manner, with its source code made available for anyone to access, use, and modify. Mobile operating systems (OS) are a type of operating system that is specifically designed for mobile devices, such as smartphones and tablets. Here's how open source is related to mobile operating systems:

- **Open-Source Mobile Operating Systems:** There are several open-source mobile operating systems available, including Android, which is developed and maintained by the Open Handset Alliance (OHA), and LineageOS, which is a community-driven fork of the Android OS.
- **Advantages of Open-Source Mobile OS:** Open-source mobile operating systems provide a range of advantages, such as being free to use and modify, having a large developer community, and providing more flexibility and control for device manufacturers.
- **Android OS:** Android is the most widely used mobile operating system in the world and is based on the Linux kernel, which is an open-source operating system. Android provides a range of features, such as a customizable interface, a wide range of apps, and integration with Google services.
- **App Development:** Mobile operating systems provide a platform for developers to create apps that can be used on mobile devices. Open-source mobile operating systems provide a greater degree of flexibility and customization options for developers, which can lead to the development of more innovative and unique apps.
- **Open-Source Libraries:** Mobile operating systems also provide developers with access to a range of open-source libraries, frameworks, and development tools that can be used to build and test apps.

In summary, open-source mobile operating systems provide a range of advantages, such as being free and customizable, and can be used to develop a wide range of apps for mobile devices. Android is the most widely used mobile operating system and is based on the Linux kernel, which is an open-source operating system.

## Linux and Unix

Linux and Unix are two popular operating systems used in the computing industry. While they share some similarities, there are also some significant differences between them. Here's a brief introduction to Linux and Unix:

### Unix:

Unix is a family of operating systems developed in the 1970s by AT&T Bell Labs. It is designed to be a multi-user, multitasking operating system that is widely used in business and academic environments. Unix is known for its stability, security, and reliability, as well as its command-line interface.

## **Linux:**

Linux is an open-source operating system based on Unix that was developed in the early 1990s by Linus Torvalds. It is designed to be a flexible, customizable, and free operating system that can run on a wide range of hardware devices. Linux is known for its reliability, security, and flexibility, as well as its command-line interface and graphical user interface (GUI).

**Differences:** One of the main differences between Unix and Linux is that Unix is a proprietary operating system, while Linux is an open-source operating system. Unix is also generally more expensive than Linux and is often used in larger businesses and government organizations. Linux is more widely used in smaller businesses, home computing, and academic environments.

**Features:** Both Unix and Linux share many features, including multitasking, multi-user capabilities, security, and command-line interfaces. Linux, however, has a larger developer community, which leads to faster updates and bug fixes. Linux also has a wider range of software options and is generally more customizable than Unix.

**Applications:** Unix and Linux are widely used in a variety of applications, including servers, desktops, embedded systems, and mobile devices. They are both popular choices for web servers, databases, and scientific computing, among other things.

Overall, both Linux and Unix are highly regarded operating systems that offer a wide range of features and capabilities. They are both used in a variety of industries and applications and are known for their reliability, security, and flexibility.

## **Linux Distributions**

A Linux distribution, or simply "distro," is a version of the Linux operating system that is packaged with various software applications, tools, and a desktop environment. There are many different Linux distributions available, each with its own set of features, design, and purpose. Here are some popular Linux distributions:

- **Ubuntu:** Ubuntu is a popular and widely used Linux distribution based on Debian. It is known for its ease of use, stability, and community support. Ubuntu is available in several editions, including a desktop version and a server version.

- **Metis Linux:** Metis Linux is an Artix Linux based OS, started as a hobby project by a 17 y/o Nepalese teen Nabeen Tiwaree with his fellow friends Yogesh Lamichhane and Safal Piya.
- **Debian:** Debian is a stable and reliable Linux distribution that is popular among developers and server administrators. It is known for its strict adherence to free software principles and is the basis for several other Linux distributions, including Ubuntu and Linux Mint.
- **Fedora:** Fedora is a community-driven Linux distribution sponsored by Red Hat. It is known for its focus on cutting-edge technology and is often used by developers and tech enthusiasts.
- **Linux Mint:** Linux Mint is a user-friendly Linux distribution based on Ubuntu and Debian. It is known for its attractive and customizable desktop environment and is popular among new Linux users.
- **Arch Linux:** Arch Linux is a lightweight and highly customizable Linux distribution that is designed for experienced Linux users. It is known for its simplicity and minimalist design.
- **CentOS:** CentOS is a Linux distribution that is based on the Red Hat Enterprise Linux (RHEL) source code. It is known for its stability, security, and long-term support.
- **openSUSE:** openSUSE is a Linux distribution that is sponsored by SUSE. It is known for its user-friendly interface and is often used by both desktop and server users.

These are just a few of the many Linux distributions available. Each distribution has its own unique features, software packages, and community support, so it's important to research and choose the one that best fits your needs and experience level.

## Mobile OS:

There are several mobile operating systems available in the market, but the most popular ones are:

- **Android:** Developed by Google, Android is an open-source mobile operating system based on the Linux kernel. It is widely used in smartphones, tablets, and other mobile devices. Android is known for its flexibility, customization options, and a vast library of applications available in the Google Play Store.



- **iOS:** Developed by Apple, iOS is a proprietary mobile operating system designed specifically for Apple's iPhone, iPad, and iPod Touch devices. It is known for its user-friendly interface, stability, and security, as well as its closed system which provides a curated, high-quality app store experience.
- **Windows Mobile:** Developed by Microsoft, Windows Mobile is a mobile operating system that runs on Windows-based smartphones and pocket PCs. It is known for its integration with Microsoft Office, Exchange, and other Microsoft products, as well as its touch-friendly interface.
- **Blackberry OS:** Developed by BlackBerry Limited, BlackBerry OS is a proprietary mobile operating system designed for BlackBerry smartphones. It is known for its secure messaging and email capabilities, as well as its physical keyboard and trackpad.
- **Tizen:** Developed by the Linux Foundation and Samsung, Tizen is an open-source mobile operating system based on the Linux kernel. It is designed for smartphones, wearables, and other IoT devices. Tizen is known for its fast and responsive interface and compatibility with various hardware devices.
- **KaiOS:** Developed by KaiOS Technologies, KaiOS is a lightweight mobile operating system based on the Linux kernel. It is designed for feature phones and low-end smartphones, offering basic smartphone features such as internet connectivity, app store access, and social media.

Each mobile operating system has its own set of features, pros, and cons, and choosing the right one largely depends on the user's needs, preferences, and budget.