



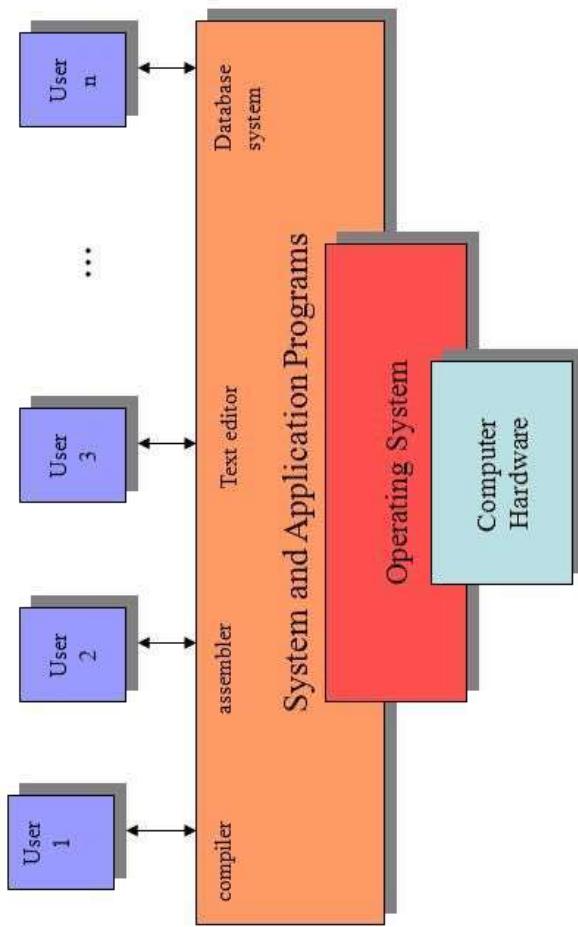
**Post Graduate Diploma in Advanced
Computing (PG-DAC)**

Subject:
Operating System

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Abstract View of System

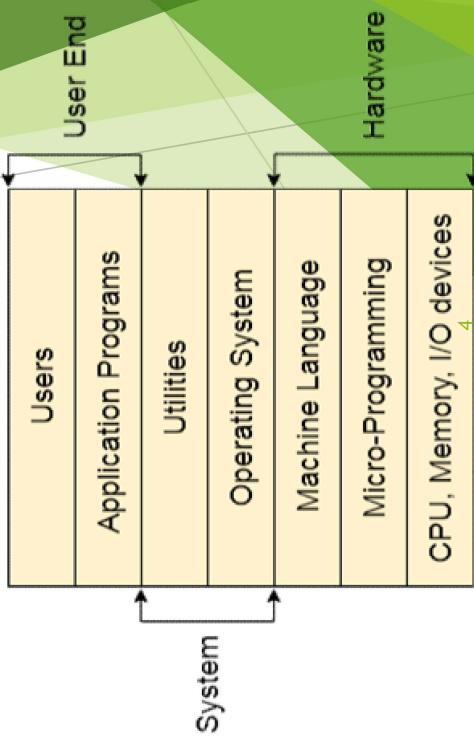


What is Operating System

- ✓ An Operating System (OS) is an interface between a computer user and computer hardware.
- ✓ It is responsible for the execution of all the processes, Resource Allocation, CPU management, File Management and many other tasks.
- ✓ The purpose of an operating system is to provide an environment in which a user can execute programs in convenient and efficient manner.

Structure of a Computer System

- Users (people who are using the computer)
- Application Programs (Compilers, Databases, Games, Video player, Browsers, etc.)
- System Programs (Shells, Editors, Compilers, etc.)
- Operating System (A special program which acts as an interface between user and hardware)
- Hardware (CPU, Disks, Memory, etc)



What does an Operating system do?

- 1) Process Management
- 2) Process Synchronization
- 3) Memory Management
- 4) CPU Scheduling
- 5) File Management
- 6) Security

- ✓ An operating system performs basic activities like recognizing keyboard input and then displaying the output.
- ✓ It also maintains track of the directories on the disk and the active files. It acts as a controller, ensuring that different programs and users stay logged in on the computer and do not conflict.
- ✓ It gives security and safety and allowing users to access the system without difficulty.
- ✓ Some examples of the operating system are **Microsoft Windows, iOS, Linux, and Ubuntu.**

What is an Application Software?

- ✓ Application software is a type of software that is designed to do a certain set of tasks. It is a form of software that runs or executes on the user's request.
- ✓ It performs single tasks. These software applications are specifically developed to solve certain problems like document creation, image editing, calculation, etc.
- ✓ The application software is written in high-level languages like Java, C, and C++. It cannot be installed without an operating system.
- ✓ Some examples of Application software are VLC media player, Google Chrome, Adobe Photoshop, Mozilla Firefox, Opera, etc.

How OS is different from other application software

- ✓ An operating system is system software that acts as an interface between the user and the hardware, whereas application software is a program that performs a specific task.
- ✓ It is impossible to install the application software on a computer system without an operating system

Differences between the Operating System and Application Software

- 1) The operating system acts as the interface between the user and the system hardware. It also handles memory management, hardware device control, task scheduling, process management, and various other tasks. In contrast, application software focuses on a specific task.
- 2) Picasa is the best example of application software because it can open images in various file formats. On the other side, Microsoft Windows is the best example of an OS, which helps in the operation of a system.
- 3) The application software does not exist on the computer. It must be downloaded through the internet. On the other hand, because an operating system is an important part of the computer, it is usually preinstalled.
- 4) Users may have to pay money to obtain the original version of the operating system unless it is already included with the device. On the other hand, Application software comes in both free and paid versions, each with its own set of options.

Differences between the Operating System and Application Software

- 5) Some most popular operating systems are Microsoft, Ubuntu, and Linux. On the other hand, WhatsApp, Instagram, and Viber are some of the most popular application software.
- 6) People can use application software to do things that are not visible to the rest of the world. On the other hand, an OS helps in working a computer and performs basic tasks.
- 7) An operating system is much more expensive than application software.
- 8) Operating systems are typically written in C, C++, or Assembly. Application software can be written in different languages, including Java, Visual Basic, C, and C++.

Why Operating System is hardware dependent

Hardware Dependent Software means:

- (a) operating system kernel software;
- (b) hardware driver software; and
- (c) other software, if any, where the foregoing (a), (b) and (c) is written for specific platform hardware and operating system, according to a specification of software interface that describes and exposes the functionality as needed by the application software

Components of OS

The components of an operating system play a key role to make a variety of computer system parts work together. There are the following components of an operating system, such as:

- 1) Process Management
- 2) File Management
- 3) Network Management
- 4) Main Memory Management
- 5) Secondary Storage Management
- 6) I/O Device Management
- 7) Security Management
- 8) Command Interpreter System



Hardware and Software Requirements

Recommended Operating Systems

- **Windows:** 7 or newer
- **MAC:** OS X v10.7 or higher
- **Linux:** Ubuntu

Hardware Requirements

We strongly recommend a computer fewer than 5 years old.

- Processor: Minimum 1 GHz; Recommended 2GHz or more
- Ethernet connection (LAN) OR a wireless adapter (Wi-Fi)
- Hard Drive: Minimum 32 GB; Recommended 64 GB or more
- Memory (RAM): Minimum 1 GB; Recommended 4 GB or above
- Sound card w/speakers
- Some classes require a camera and microphone



Examples of well known OS

Mobile Operating System

- ✓ A mobile operating system allows the user to run other different application software on the mobile, tablets, etc. Moreover, we can say that it is a type of operating system which is specially designed for mobiles, tablets, smartwatches, etc.
- ✓ Furthermore, they are a mixture of computer OS with some additional features for mobiles. Also, they are comparatively light and simple.

Popular Mobile Operating System

[Android OS \(Google Inc.\)](#)

Google is the developer of Android. Moreover, it is an open source and free operating system. This OS is based on the **Linux** kernel.

[Bada](#)

Samsung is the launcher of this operating system

[Blackberry OS](#)

The developer of this operating system is **Reasearch In Motion (RIM)**. It was specifically designed for blackberry devices.

Apple iOS

After android, it is one of the most popular OS. It is designed to run on Apple devices such as iPhones, iPad tablets, etc.

Windows Mobile Operating System

The developer of this OS is **Microsoft**. It is basically designed for pocket PCs and smartphones. Moreover, it has the features of computer based Windows OS and additional features for mobile phones.

Symbian OS

Symbian Ltd. is the developer of this OS. Moreover, **Nokia** was the first to use this OS on its mobile phones. Furthermore, it provides high level integration with communication. This OS is based on java language.

A mobile OS has the following features:

- Easy to use
- Good app store
- Good battery life
- Data usage and organization

Embedded Operating System

- ✓ An embedded operating system is a computer operating system designed for use in embedded computer systems.
- ✓ These operating systems are designed to be **small, resource-efficient, dependable**, and reduce many features that aren't required by specialized applications.
- ✓ The term "**embedded operating system**" also refers to a "**real-time operating system**". The main goal of designing an embedded operating system is to perform specified tasks for non-computer devices

Characteristics of Embedded Operating System

There are various characteristics of an embedded operating system. Some of them are as follows:

- 1.It provides real-time operations.
- 2.Direct use of interrupts
- 3.Input/Output device flexibility
- 4.Reactive operation
- ~~5.Streamlined protection mechanisms~~
- 6.Configurability

Embedded Operating Systems

eCos

It stands for '**E**mbedded **C**onfigurable **O**perating **S**ystem', and all of its components provide a wide range of configuration options. The eCos operating system may support a wide range of popular embedded CPUs.

mbed OS

It is a free and open-source embedded operating system that offers a systematic and comprehensive environment for intelligent hardware development.

VxWorks

Wind River Company firstly introduced it in **1983**. It is supported with task synchronization, memory efficiency management, and other features.

Embedded Operating System Uses

Car navigation system

Parking Metering

Medical Equipment

The navigation system of a plane

Advantages

There are various advantages of an embedded operating system. Some of them are as follows:

- 1.It is small in size and faster to load.
- 2.It is low cost.
- 3.It is easy to manage.
- 4.It provides better stability.
- 5.It provides higher reliability.
- 6.It provides some interconnections.
- 7.It has low power consumption.
- 8.It helps to increase the product quality.

Disadvantages

There are various disadvantages of an embedded operating system. Some of them are as follows:

- 1.It isn't easy to maintain.
- 2.The troubleshooting is harder.
- 3.It has limited resources for memory.
- 4.It isn't easy to take a back of embedded files.
- 5.You can't change, improve, or upgrade an embedded system once it's been developed.
- 6.If any problem occurs, you need to reset the setting.
- 7.Its hardware is limited.

Desktop/Client Operating System

- ✓ A client operating system is a computer OS that runs on desktop computers and other portable devices like laptops and smartphones. It may handle different hardware components connected to it, such as printers, monitors, and cameras.
- ✓ These OSs support a single user at a time. A client operating system may use a server operating system to acquire services. Furthermore, when compared to server operating systems, client operating systems offer multiprocessing capacity at a low cost. Client OS includes Windows, Mac, Android, etc.

Features of Client Operating System

Various features of the client operating system are as follows:

- 1) It provides support to a single user at a time.
- 2) It runs on desktop systems and portable devices.
- 3) Some client operating systems are Windows, Android, Mac, etc.

Server Operating System

- ✓ It is an operating system designed for usage on servers. It is utilized to give services to a large number of clients. It is a very advanced operating system that can serve several clients simultaneously. It is a more advanced operating system with features and capabilities needed in a client-server architecture or comparable enterprise computing environment.
- ✓ A server is a computer that makes data available to other computers. It can serve data across the Internet to systems on a LAN or a WAN
- ✓ For instance, a Web server can execute **Apache HTTP Server** or **Microsoft IIS**, which offer access to websites on the Internet.

Features of Server Operating System

Various features of the server OS are as follows:

- 1.It may access the server both in GUI and CLI.
- 2.It controls and monitors client computers and operating systems.
- 3.It installs and uses web applications and business applications.
- 4.It helps to execute most processes from the OS commands.
- 5.It offers a central interface for managing users, implementing security, and performing other administrative tasks.

Client and server OS are two different types of operating systems. The client OS runs on end-user devices like PCs and other portable devices. In contrast, server OS runs on a specific device known as a server. Therefore, the client and server both operating systems differ.

Main Function of Server Operating System

The interaction between a Web server and browser is a good example of how a server's most crucial duty is to listen in on a port for incoming network requests.

Types of Server Operating System

Windows Operating System

Linux Operating System

UNIX Operating System

Netware Operating System

Red Hat Enterprise Linux (RHEL)

Benefits of Server Operating System

Higher Efficiency

It helps in reducing dependence on physical servers, resulting in greater savings.

Future-Proofing

It ensures long-term sustainability by calculating the expected growth of the corporate network.

Higher savings with reduced downtime

Reduced downtime leads to increased savings for any organization.

Increased Performance

A network-supporting system with higher performance can support more users and storage options than another.

Differences between the Mobile and Desktop Operating System

- 1) Mobile OS handles cellular and wireless connectivity and device access. On the other hand, the desktop OS handles the software and hardware resources of the system.
- 2) Mobile OS runs on touchscreen or touchpad devices. On the other hand, the desktop OS runs through many input devices, including mouse, keyboard, etc.

