

CONCEPT OF OPERATING SYSTEM

What is Operating System?

- The operating system controls and coordinates the users of the hardware with the various application programs.
- It provide easy interface to the users for working with computer.
- An Operating system acts as government; it provides an environment within which other programs can do useful work.
- Operating system acts as a resource allocator. A computer system has many resources like CPU time, memory space, file storage space, I/O devices etc.
- The operating system acts as manager of these resources and allocates them to specific programs and users as and when necessary for tasks.
- The Primary goal of operating system is convenience for the user. The operating system makes the use of system easier.

COMPONENTS OF COMPUTER SYSTEM

A Computer system can be divided into four components:

- Hardware
- Operating System
- Application Programs
- Users

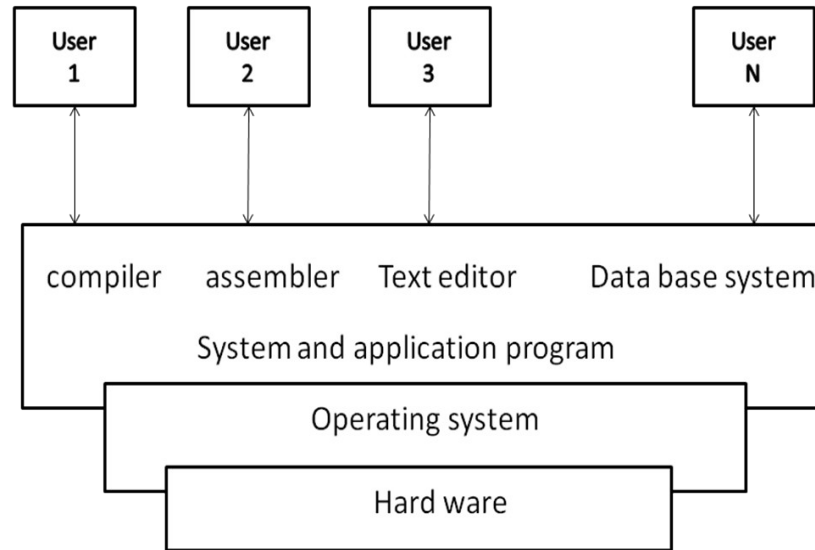


Fig :Component of Computer System

COMPONENTS OF COMPUTER SYSTEM

- **Hardware** :The **hardware** of computer system includes the **Central Processing Unit (CPU), the memory, and the input/output (I/O) devices**. They are the basic resources.
- **Application Program**: It includes compilers, database system, games, and business programs. They define the way in which the hardware resources are to be used to solve the computing problems of the users.
- **Users** :There are many different users trying to solve different problems using different application programs.
- **Operating system** :The operating system controls and coordinates the users of the hardware with the various application programs.

Functions of Operating System

Process management: Process management helps OS to create and delete processes. It also provides mechanisms for synchronization and communication among processes.

Memory management: Memory management module performs the task of allocation and de-allocation of memory space to programs in need of this resources.

File management: It manages all the file-related activities such as organization storage, retrieval, naming, sharing, and protection of files.

Device Management: Device management keeps tracks of all devices. This module also responsible for this task is known as the I/O controller. It also performs the task of allocation and de-allocation of the devices.

I/O System Management: One of the main objects of any OS is to hide the peculiarities of that hardware devices from the user.

Secondary-Storage Management: Systems have several levels of storage which includes primary storage, secondary storage, and cache storage. Instructions and data must be stored in primary storage or cache so that a running program can reference it.

Security: Security module protects the data and information of a computer system against malware threat and authorized access.

Command interpretation: This module is interpreting commands given by the and acting system resources to process that commands.

Networking: A distributed system is a group of processors which do not share memory, hardware devices, or a clock. The processors communicate with one another through the network.

Job accounting: Keeping track of time & resource used by various job and users.

Communication management: Coordination and assignment of compilers, interpreters, and another software resource of the various users of the computer systems.

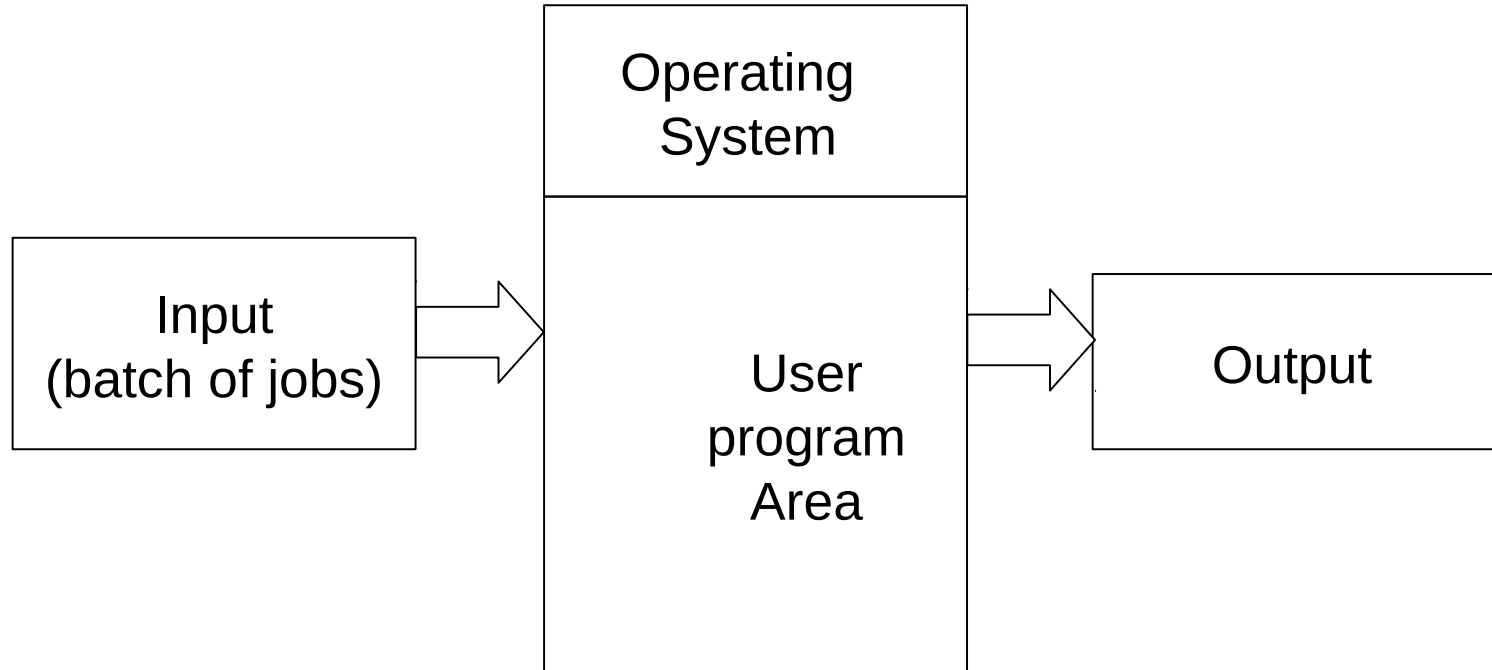
TYPES OF OS

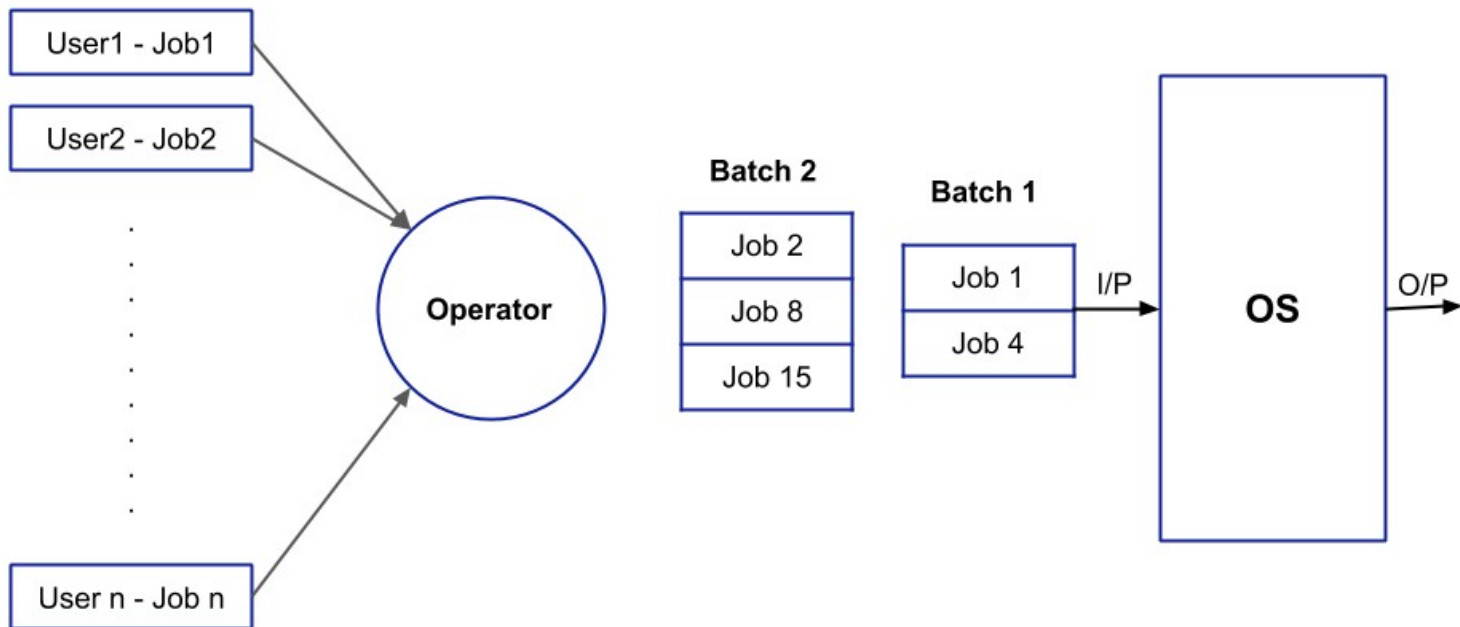
BATCH OS

- Early computers were large machines having input devices like card readers and tape drives and output devices like line printers, tape drives and card punches.
- The users of such system did not interact directly with the computer system, prepare job consisting of – data, program and control information about the job and use to submit it to computer operator.
- The batch system has no interaction between the user and the job while the job is executing. The job is prepared and submitted, and some time later the output appears.
- The CPU is often idle. This idleness occurs because the speed of the mechanical I/O devices is slower than electronic devices.
- **Advantages**
 - The use of a resident monitor improves computer efficiency as it eliminates CPU time between two jobs.
- **Disadvantages**
 - Batch processing suffers from starvation.
 - Batch Processing is not suitable for jobs that are dependent on the user's input. If a job requires the input of two numbers from the console, then it will never get it in the batch processing scenario since the user is not present at the time of execution.

TYPES OF OS

BATCH OS





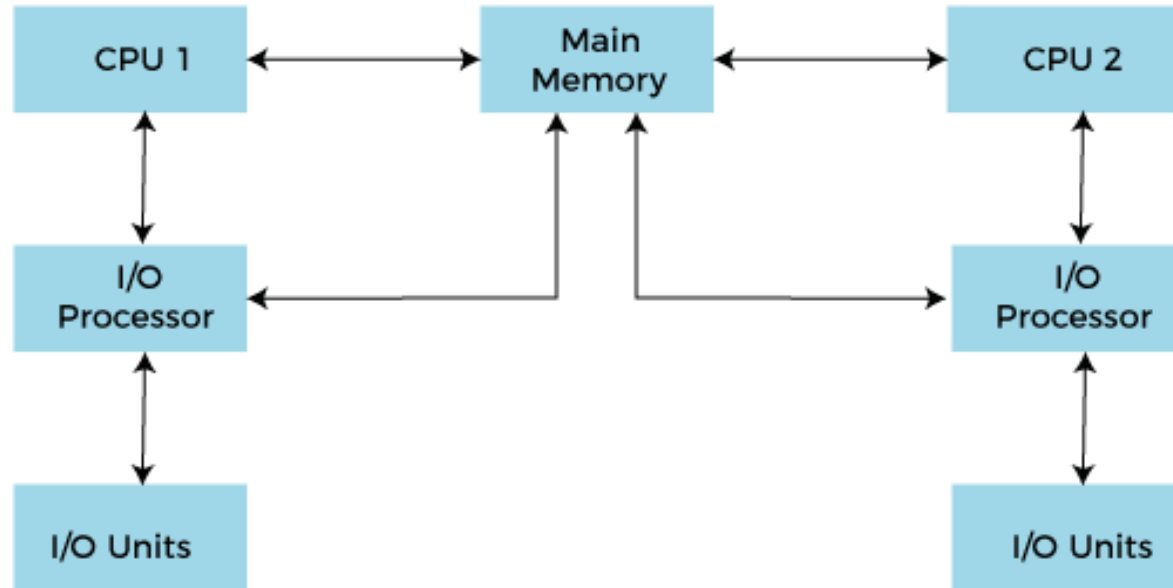
TYPES OF OS

Multi-Processor OS

- Multiprocessor system means, there are more than one processor which work parallel to perform the required operations.
- It allows the multiple processors, and they are connected with physical memory, computer buses, clocks, and peripheral devices.
- The main objective of using a multiprocessor operating system is to increase the execution speed of the system and consume high computing power.
- **Advantages**
 - Increased reliability: Due to the multiprocessing system, processing tasks can be distributed among several processors. This increases reliability as if one processor fails, the task can be given to another processor for completion.
 - Increased throughput: As several processors increase, more work can be done in less.
- **Disadvantages**
 - Multiprocessing operating system is more complex and sophisticated as it takes care of multiple CPUs simultaneously

TYPES OF OS

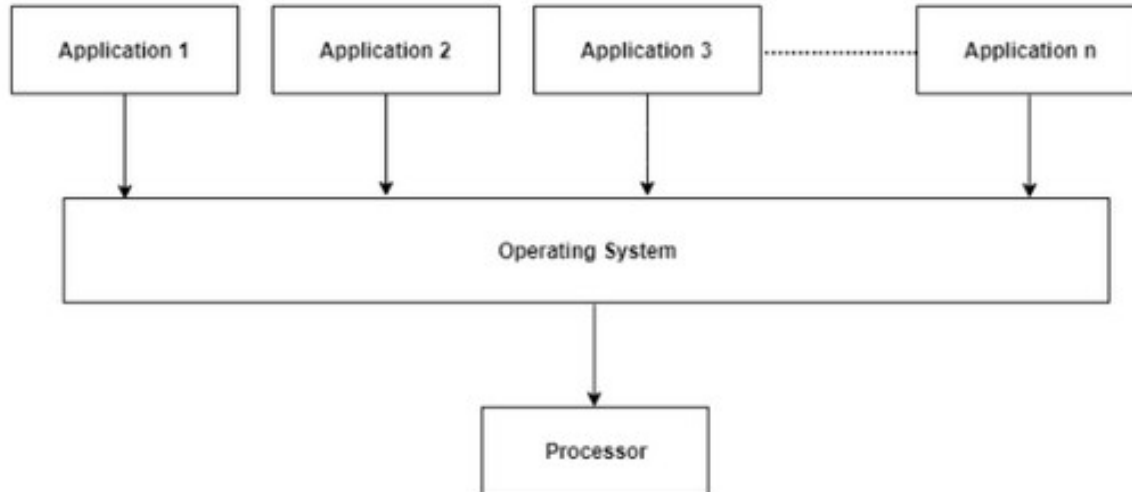
Multi-Processor OS



TYPES OF OS

Single Processor OS

- A single processor system contains only one processor. So only one process can be executed at a time and then the process is selected from the ready queue. Most general purpose computers contain the single processor systems as they are commonly in use.



TYPES OF OS

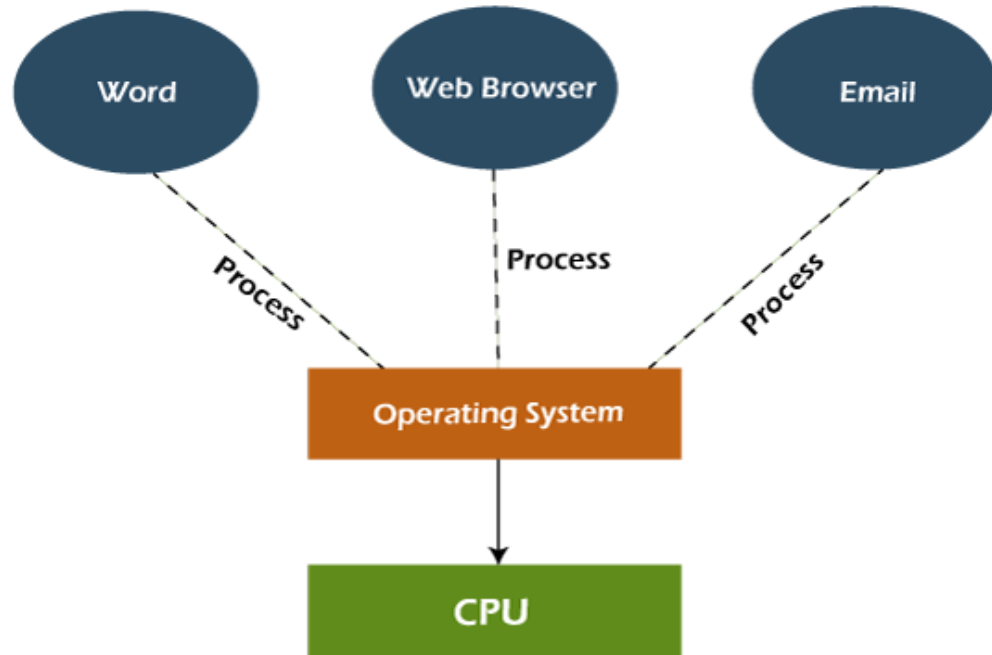
Multi-Tasking OS

- The multitasking operating system is a logical extension of a multiprogramming system that enables multiple programs simultaneously. It allows a user to perform more than one computer task at the same time.

- **Advantages**
 - This operating system is more suited to supporting multiple users simultaneously.
 - The multitasking operating systems have well-defined memory management.
- **Disadvantages**
 - The multiple processors are busier at the same time to complete any task in a multitasking environment, so the CPU generates more heat.

TYPES OF OS

Multi-Tasking OS



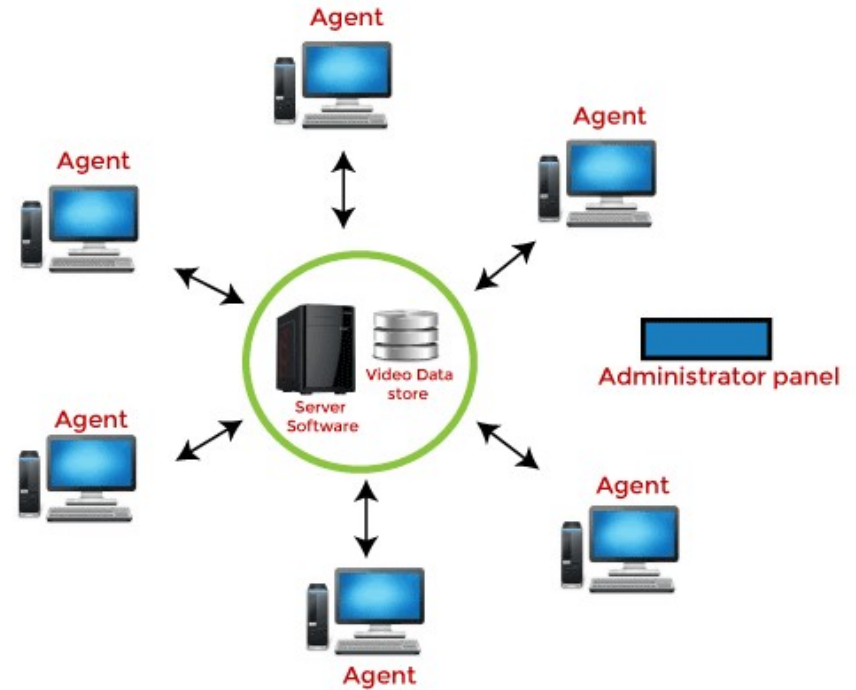
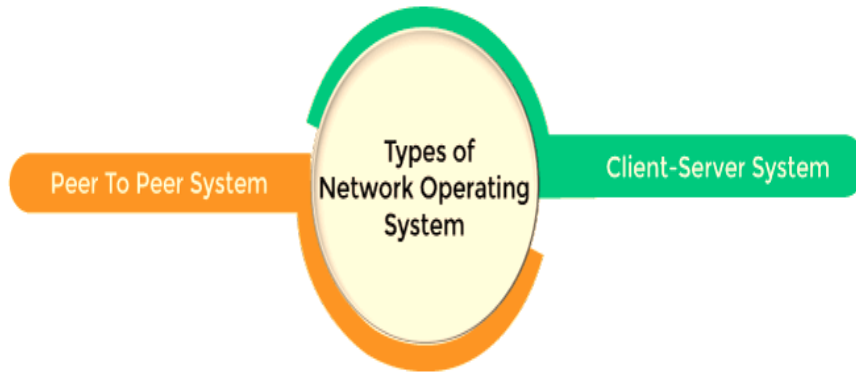
TYPES OF OS

Networking OS

- An Operating system, which includes software and associated protocols to communicate with other computers via a network conveniently and cost-effectively, is called Network Operating System.
- **Advantages**
 - In this type of operating system, network traffic reduces due to the division between clients and the server.
 - This type of system is less expensive to set up and maintain.
- **Disadvantages**
 - In this type of operating system, the failure of any node in a system affects the whole system.
 - Security and performance are important issues. So trained network administrators are required for network administration.

TYPES OF OS

Networking OS



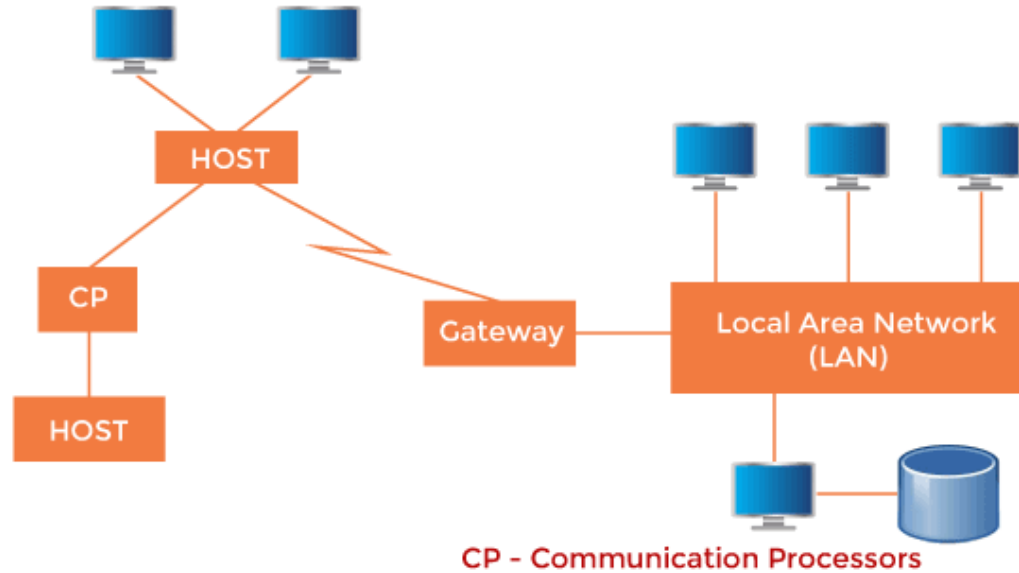
TYPES OF OS

Distributed OS

- The Distributed Operating system is not installed on a single machine, it is divided into parts, and these parts are loaded on different machines. A part of the distributed Operating system is installed on each machine to make their communication possible.
- Distributed Operating systems are much more complex, large, and sophisticated than Network operating systems because they also have to take care of varying networking protocols.
- **Advantages**
 - The distributed operating system provides sharing of resources.
 - This type of system is fault-tolerant.
- **Disadvantages**
 - Protocol overhead can dominate computation cost.

TYPES OF OS

Distributed OS



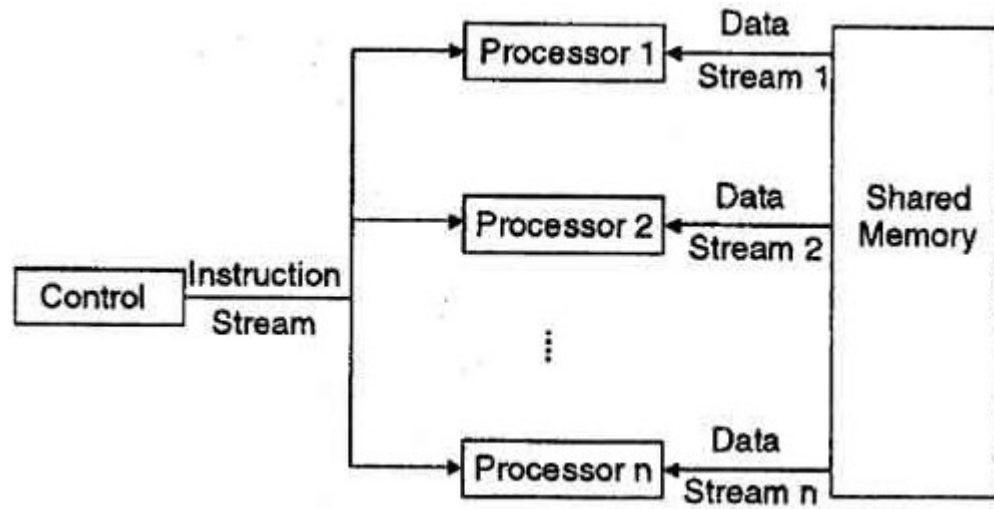
TYPES OF OS

Parallel OS

- Parallel systems are the systems that can process the data simultaneously, and increase the computational speed of a computer system.
- Parallel systems work with the simultaneous use of multiple computer resources which can include a single computer with multiple processors.
- **Advantages**
 - Tasks are performed with a more speedy process.
 - These systems share a memory, clock, and peripheral device.
- **Disadvantages**
 - This type of system include the additional complexity in design and debugging.

TYPES OF OS

Parallel OS



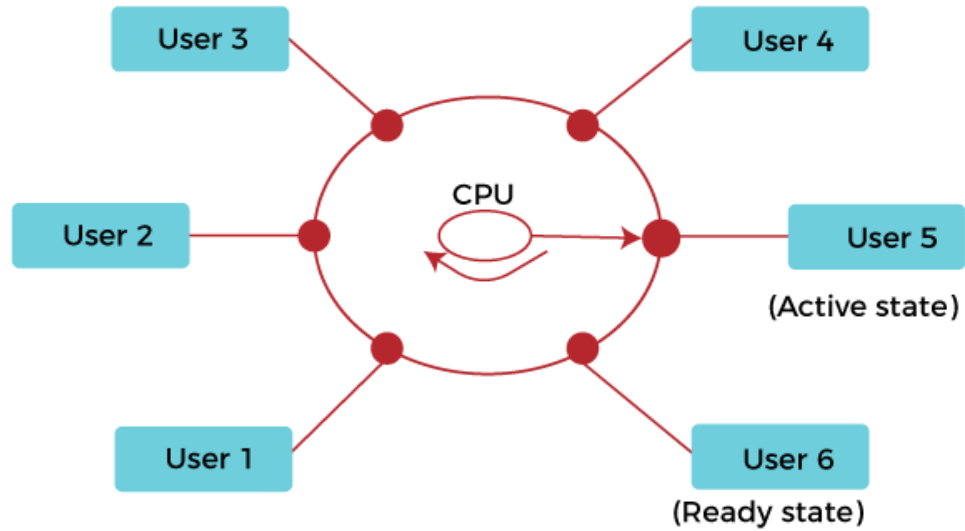
TYPES OF OS

Time Sharing OS

- Time-sharing enables many people, located at various terminals, to use a particular computer system at the same time.
- Processor's time is shared among multiple users simultaneously is termed as time-sharing.
- **Advantages**
 - It provides the advantage of quick response.
 - This type of operating system avoids duplication of software.
 - It reduces CPU idle time.
- **Disadvantages**
 - Time sharing has problem of reliability.
 - Question of security and integrity of user programs and data can be raised.

TYPES OF OS

Time Sharing OS



TYPES OF OS

Embedded OS

- All Embedded Systems are task specific. They mostly do a particular task on loop/repeatedly for their entire lifetime. These systems are designed to execute their task within a particular time interval, and thus they have to be fast enough to be up to their time limit.
- They have little or no user interface like a fully automatic washing machine does its task fully once its programmed is set and stops after its work is finished with almost no user interface.
- They are built to achieve a particularly good efficiency level. They are very small in size operating system, need little power.
- These systems can't at all be upgraded or updated. Thus, they must be really high on efficiency and reliability as they can't be updated.

TYPES OF OS

Embedded OS

Advantages

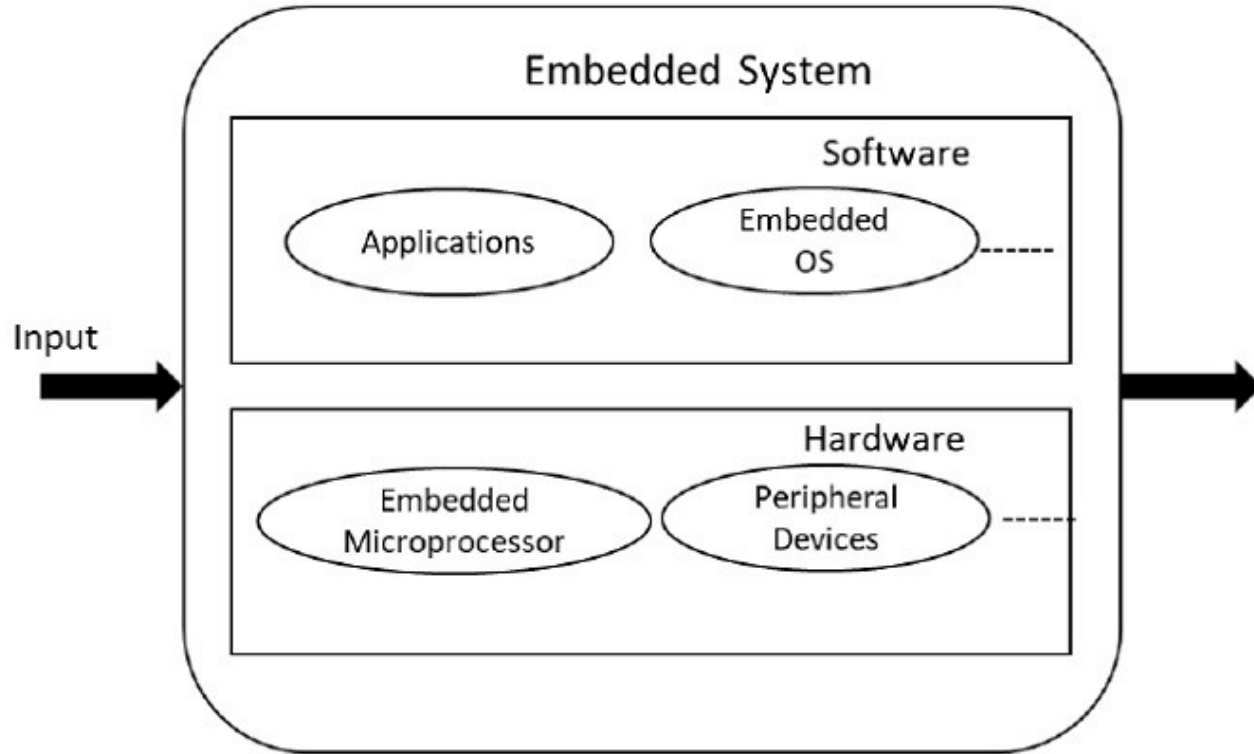
- Portable
- Much faster than other operating system
- Less Hardware requirement
- Highly Predictable

- **Disadvantages**

- Less optimization
- High modification is required
- Customization is time taking process

TYPES OF OS

Embedded OS



TYPES OF OS

Mobile OS

- A mobile operating system is an operating system that helps to run other application software on mobile devices. It is the same kind of software as the famous computer operating systems like Linux and Windows, but now they are light and simple to some extent.
- The operating systems found on smartphones include Symbian OS, iPhone OS, RIM's BlackBerry, Windows Mobile, Palm WebOS, Android, and Maemo. Android, WebOS, and Maemo are all derived from Linux.
- The iPhone OS originated from BSD and NeXTSTEP, which are related to Unix.
- It combines the beauty of computer and hand use devices. It typically contains a cellular built-in modem and SIM tray for telephony and internet connections. If you buy a mobile, the manufacturer company chooses the OS for that specific device.

TYPES OF OS

Mobile OS

Popular platforms of the Mobile OS

- ◆ **Android OS:** The Android operating system is the most popular operating system today. It is a mobile OS based on the Linux Kernel and open-source software. The android operating system was developed by Google. The first Android device was launched in 2008.
- ◆ **Bada (Samsung Electronics):** Bada is a Samsung mobile operating system that was launched in 2010. The Samsung wave was the first mobile to use the bada operating system. The bada operating system offers many mobile features, such as 3-D graphics, application installation, and multipoint-touch.

TYPES OF OS

Mobile OS

Popular platforms of the Mobile OS

- ◆ **Blackberry OS:** The BlackBerry operating system is a mobile operating system developed by Research In Motion (RIM). This operating system was designed specifically for BlackBerry handheld devices. This operating system is beneficial for the corporate users because it provides synchronization with Microsoft Exchange, Novell GroupWise email, Lotus Domino, and other business software when used with the BlackBerry Enterprise Server.
- ◆ **IOS:** The iOS was developed by the Apple inc for the use on its device. The iOS operating system is the most popular operating system today. It is a very secure operating system. The iOS operating system is not available for any other mobiles.

TYPES OF OS

Mobile OS

Popular platforms of the Mobile OS

- ◆ **Symbian OS:** Symbian operating system is a mobile operating system that provides a high-level of integration with communication. The Symbian operating system is based on the java language. It combines middleware of wireless communications and personal information management (PIM) functionality. The Symbian operating system was developed by Symbian Ltd in 1998 for the use of mobile phones. Nokia was the first company to release Symbian OS on its mobile phone at that time.
- ◆ **Windows OS:** The window mobile OS is a mobile operating system that was developed by Microsoft. It was designed for the pocket PCs and smart mobiles.

TYPES OF OS

Mobile OS

Popular platforms of the Mobile OS

- ◆ **Palm OS:** The palm operating system is a mobile operating system that was developed by Palm Ltd for use on personal digital assistants (PADs). It was introduced in 1996. Palm OS is also known as the Garnet OS.
- ◆ **Harmony OS:** The harmony operating system is the latest mobile operating system that was developed by Huawei for the use of its devices. It is designed primarily for IoT devices.
- ◆ **WebOS (Palm/HP):** The WebOS is a mobile operating system that was developed by Palm. It based on the Linux Kernel. The HP uses this operating system in its mobile and touchpads.

TYPES OF OS

Cloud OS

- The cloud OS is a browser-based operating system that works for real-time support.
- It is developed for visualization in cloud computing.
- It helps to manage the machines, processes of virtual servers, execution, and infrastructure. It also manages software and back-end hardware resources.
- It is a lightweight OS that stores data and connects to a remote server to access web-based apps. Cloud OS include Google Chrome operating system and Microsoft Windows Azure.
- A cloud operating system improves productivity by allowing greater utilization of resources such as storage, processing, and a network of data centers. At the same time, it boosts employee productivity by delivering applications faster and more effectively across all clouds, including public, private, and hybrid. Additionally, it improves security and compliance.

TYPES OF OS

Cloud OS

Advantages

- Cost-Effective
- No risk of viruses
- Easy Software upgrades
- High Speed

• **Disadvantages**

- It provides limited features.
- Cloud operating system hardware failure may cause a loss in data.
- It needs an internet connection continuously.
- It doesn't perform on a low-speed connection.

TYPES OF OS

Cloud OS

Top Cloud Operating Systems

- Netvibes
- CloudMe
- Amoeba OS
- EyeOS
- Ghost OS
- OSv
- Joli OS
- Slap OS
- Slive OS
- LucidLink OS

TYPES OF OS

Open Source Operating System

- The term "open source" refers to computer software or applications where the owners or copyright holders enable the users or third parties to use, see, and edit the product's source code.
- The source code of an open-source OS is publicly visible and editable.
- The usually operating systems such as Apple's iOS, Microsoft's Windows, and Apple's Mac OS are closed operating systems.
- Open-Source Software is licensed in such a way that it is permissible to produce as many copies as you want and to use them wherever you like.
- The open-source operating system allows the use of code that is freely distributed and available to anyone and for commercial purposes.
- Being an open-source application or program, the program source code of an open-source OS is available.

TYPES OF OS

Open Source Operating System

- The user may modify or change those codes and develop new applications according to the user requirement.
- Some basic examples of the open-source operating systems are Linux, Open Solaris, Free RTOS, Open BDS, Free BSD, Minix, etc.
- In 1997, the first Open-Source software was released.
- Thanks to technological developments and innovations, many Open-Source Operating Systems have been developed since the dawn of the 21st century.

TYPES OF OS

How does Open Source Operating System works?

- It works similarly to a closed operating system, except that the user may modify the source code of the program or application. There may be a difference in function even if there is no difference in performance.
- For instance, the information is packed and stored in a proprietary (closed) operating system. In open-source, the same thing happens. However, because the source code is visible to you, you may better understand the process and change how data is processed.
- While the former operating system is secure and hassle-free, and the latter requires some technical knowledge, you may customize these and increase performance. There is no specific way or framework for working on the open-source OS, but it may be customized on the user requirements.

TYPES OF OS

Example of Open Source Operating System

- Linux Kernel
- Linux Lite
- Linux Mint
- Fedora
- React OS
- Solas OS
- Chrome OS

TYPES OF OS

Advantage of Open Source Operating System

- Reliable and Efficient
- Cost Effective
- Flexibility

Disadvantage of Open Source Operating System

- Complicated
- Security Risk
- No Support