Al-Hamdaniya University

College of Education

Computer Science

Stage: 4th

Operating System (OS)

What are Operating Systems?

A program that manages the computer hardware. Therefore, it acts as an intermediary between a user of a computer and the computer hardware.

Why we need an Operating system?

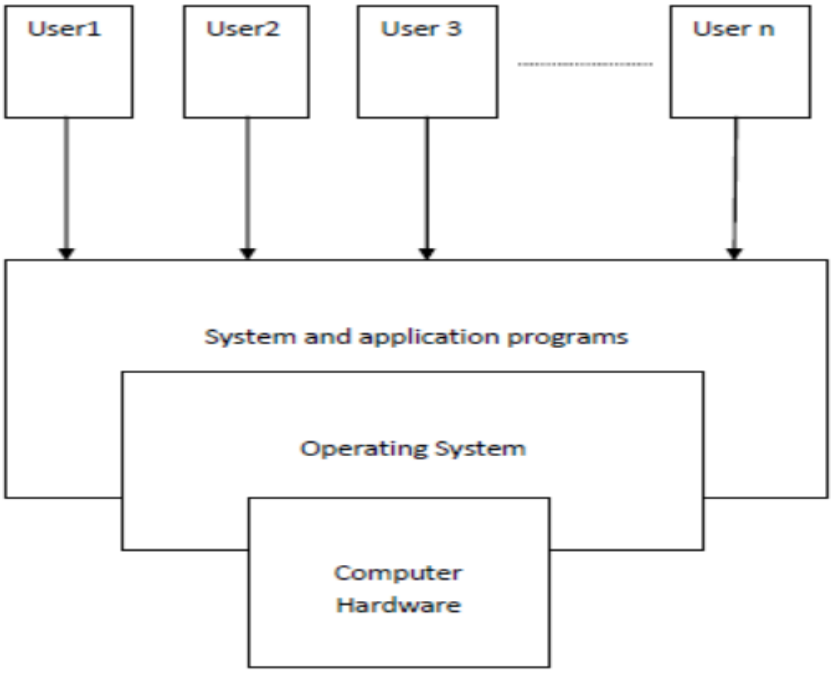
Generally, an operating system is needed for the following reasons:

- Execute user programs and make solving user problems easier.
- Make the computer system convenient to use.
- Use the computer hardware in an efficient manner.

Computer systems

Computer systems can be divided into four components:

- Hardware –provides basic computing resources CPU, memory, I/O devices.
- Operating system-Controls and coordinates use of hardware among various applications and users.
- Application programs –Define the ways in which the system resources are used to solve the computing problems of the users Word processors, compilers, web browsers, database systems, video games.
- Users, People, machines, other computers.



Computer Structure

- **System view**

  From the computer's point of view, the OS is a

  - ***Resource allocator***

  Manages all resources and decides between conflicting requests for efficient and fair resource use.

  - ***Control program***

  Controls execution of programs to prevent errors and improper use of the computer.

Types of Computer System :

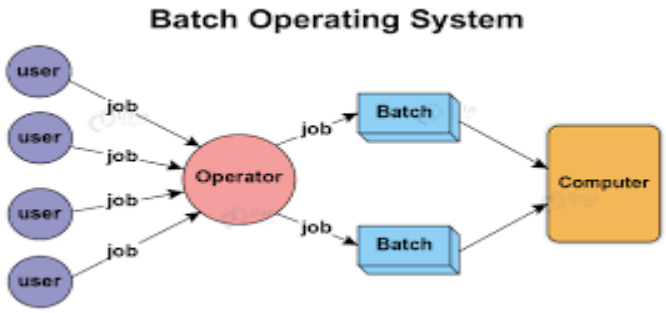
➢ Mainframe systems

Mainframe systems grow on three stages:

- ***Batch systems***

In this type of computer systems, the operator batch together jobs with similar needs and ran through the computer as group.

The operating system was simple and its major task was to transfer control automatically from one job to the next.

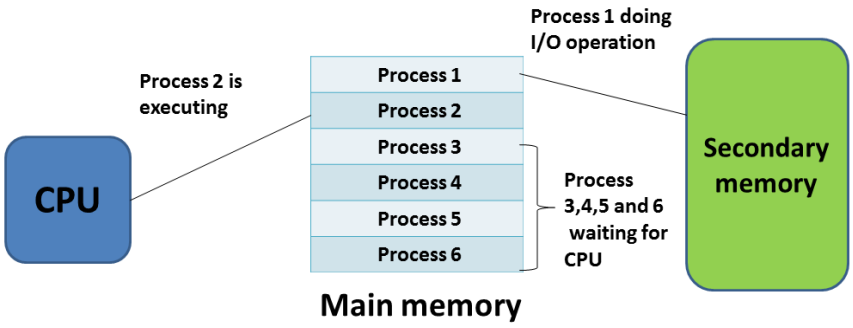


- ***Multiprogrammed systems***

The operating system keeps several jobs in memory simultaneously.

Operating systems for the Multiprogrammed is the first one, which make a decision for the users. Making this decision is called job scheduling.

Multiprorammed system

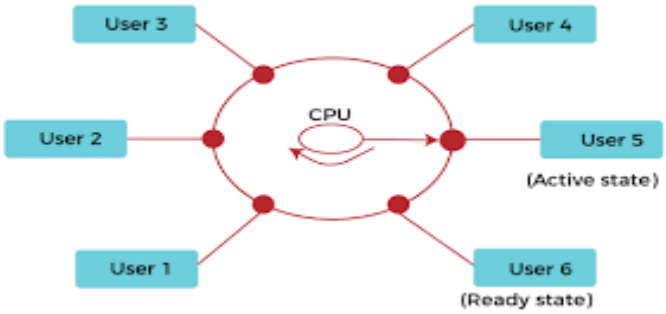


- ***Time_shared systems***

  The CPU executes multiple jobs by switching among them, but the switches occurred so frequently the users can interact with each program while it is running.

  A Time-shared operating systems allows many user programs (processes) to share the computer simultaneously. The CPU executes multiple jobs by switching among them, but the switches occurred so frequently the users can interact with each program while it is running.

Time_Shared system



➢ Multiprocessor Systems (Parallel systems or tightly coupled systems)

Such systems have more than one processor in close communication sharing the computer bus, the clock, and sometimes memory and peripheral devices.

Multiprocessor systems have three main advantages:

1- Increase throughput.

2- Economy of scale.

3- Increased reliability.

➢ Distributed Systems

A network is a communication path between two or more systems. Distributed systems depend on networking for their functionality. Using communicates, distributed systems are able to share computational tasks, and provide a rich set of set of feature to users.

- client-server systems
- peer-to-peer systems

Some operating system benefits from ideas of networking and distributed systems in build network operating system.

➢ Clustered Systems

Like parallel systems, clustered systems gather multiple CPUs to accomplish computational work; they composed of two or more systems that are individual coupled together. The general accepted definition is that clustered computers share storage and is closely linked via LAN networking. Clustering is usually performed to provide high availability.

➢ Real-Time Systems

Special purpose operating system, it is used when there are rigid time requirements on the operation of a processor or the flow of data, thus it is often used as a control device in dedicated application.

Real time system need that the processing must be done within the defined time constraints or the system will fail.

There are two flavors of real time system:

- Hard real-time system
- Soft real time system

➢ Handheld Systems

Handheld systems include personal digital assistants (PDAs). Developers of handheld systems and applications face many challenges (due to the limited size of such devices) such as speed of processor, limited size of memory, and small display screen