



Class Notes

Published Date: November, 2022

PPS: UNIT-1

Introduction to Components of a Computer System

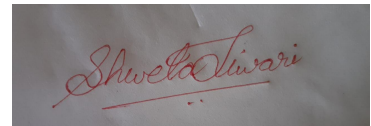
FALL SEMESTER, YEAR (I/II sem, 1st yr)

FALL SESSION (2022-23)

(PPS)

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Published Date: November, 2022



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TOPIC On : UNIT-1: Types of Operating Systems

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Under On: Introduction to Components of a Computer System

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TOPIC On : UNIT-1: Types of Operating Systems



There are various types of operating systems used today depending on the device, manufacturer, and user preferences, and it is essential to know about these if you are working or wish to work in the field of IT. The operating system is used to run different software on a computer.

All operating systems have one common goal- *to manage and organize the resources and processes of a computer*. These resource managers include processes, threads, files, devices, and networks. Operating systems evolved in response to technological advances and changed over time as new hardware was developed.

What is an operating system?

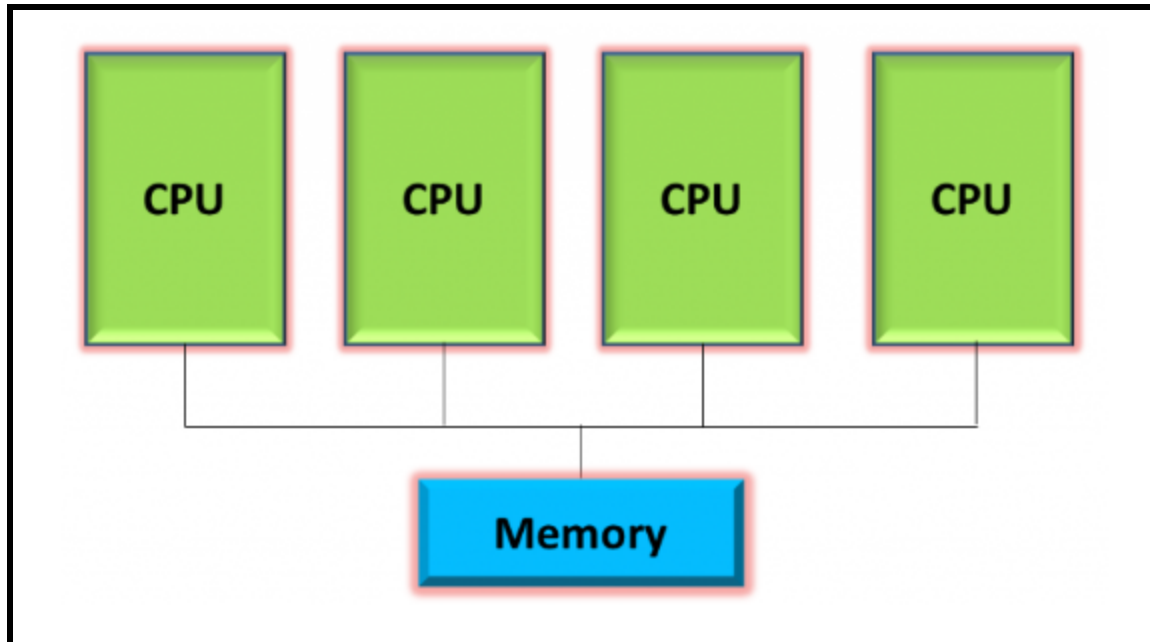
An intermediary between a user and computer hardware, and provides an environment needed for different programs to execute effectively.

An operating system is system software that ensures users can control the activities of both the software and hardware and make use of the resources of the computer. Network operating systems are the software that allows several computers to communicate and share files and hardware devices amongst themselves. The operating system helps manage resources such as RAM, ROM, hard disks, etc. It also allows users to perform directed tasks like arithmetic calculations, data processing, etc. The OS allows users to perform various tasks like data input, processing operations, and accessing output. Examples of Operating systems include Microsoft Windows, macOS, Linux, Unix, etc.

Types of operating system

1. Multiprocessor OS

A multiprocessor operating system is an operating system that uses multiple processors to improve performance. This operating system is commonly found on computer systems with more than one CPU. Multiprocessor systems improve system performance by allowing the execution of tasks on multiple processors simultaneously. Overall reduces the time it takes to complete specific tasks.



Advantages

- It allows the system to run multiple programs simultaneously.
- Beneficial for tasks that need to use all of the processor's resources, such as games, scientific calculations, and financial simulations.

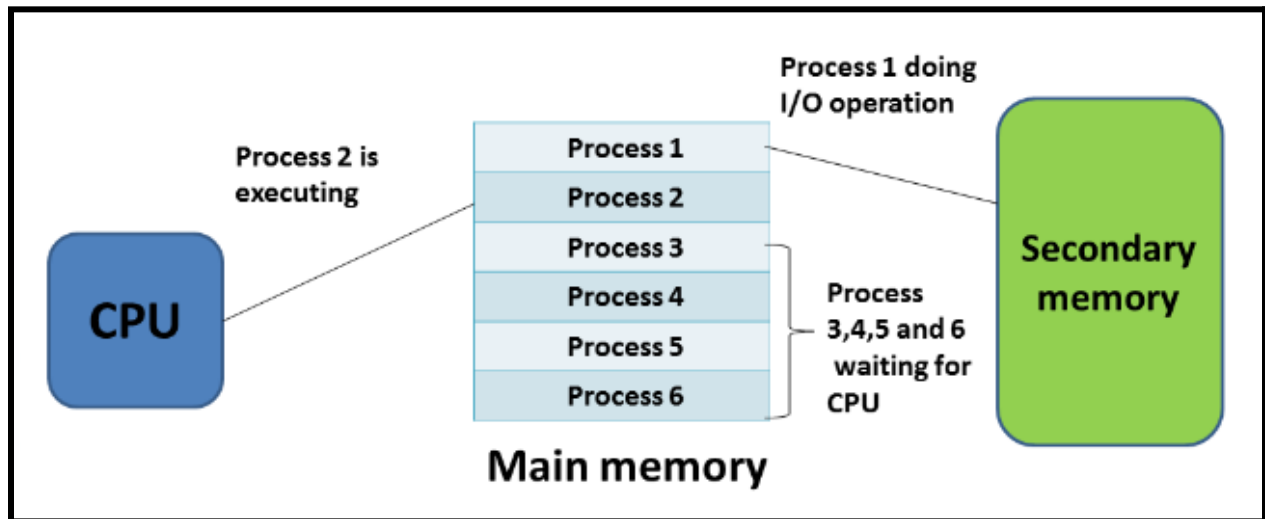
Disadvantages

- They require additional hardware, such as processors and memory, making a system more expensive.

2. Multiprogramming OS

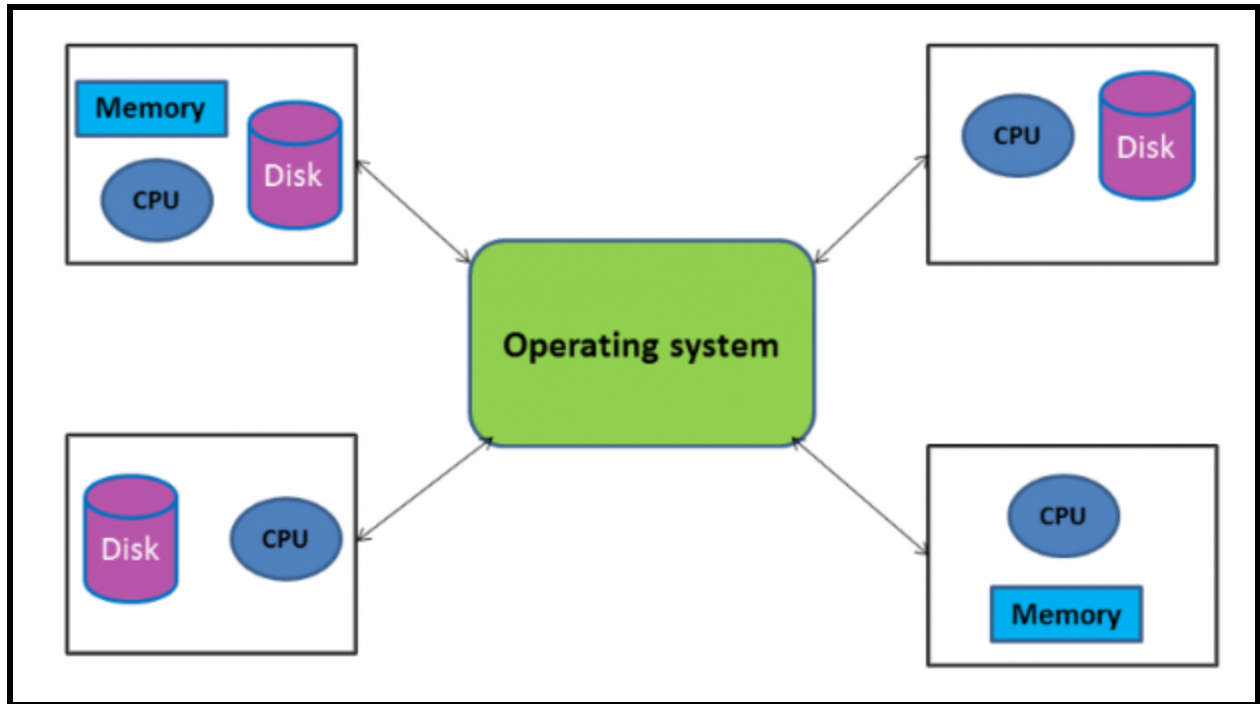
The operating system which can run multiple processes on a single processor is called a multiprogramming operating system. There are different programs that want to get executed. So these programs are kept in the ready queue. And are assigned to the CPU one by one. If one process gets blocked then other processes from the ready queue are assigned to the CPU. The aim of this is optimal resource utilization and more CPU utilization. In the

below figure, different processes are there in RAM(main memory). Some processes are waiting for the CPU, and process 2(which was previously executing) is now doing I/O operations. So the CPU shifted to execute process 1.



3. Distributed OS

A distributed operating system is an operating system that is designed to operate on a network of computers. Distributed systems are usually used to distribute software applications and data. Distributed systems are also used to manage the resources of multiple computers. Users could be at different sites. Multiple computers are connected via a single communication channel. Every system has its own processor and memory. Resources like disk, computer, CPU, network interface, nodes, etc are shared among different computers at different locations. It increases data availability in the entire system.



Advantages

- It is more reliable as a failure of one system will not impact the other computers or the overall system.
- All computers work independently.
- Resources are shared so there is less cost overall.
- The system works at a higher speed as resources are shared
- The host system has less load.
- Computers can be easily added to the system.

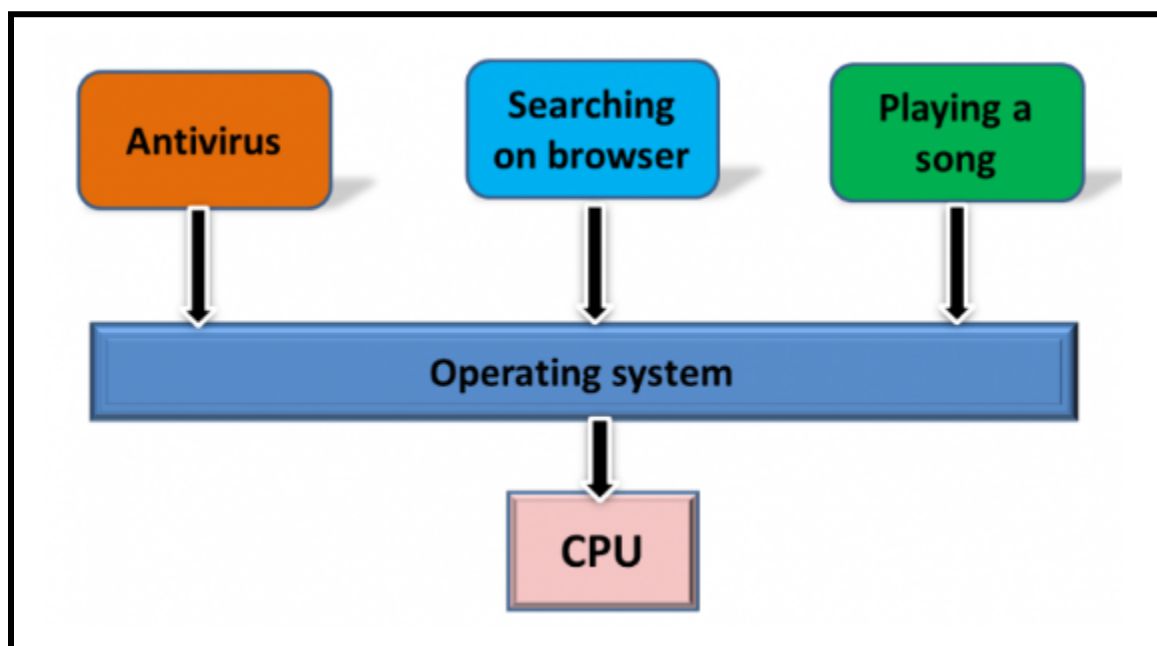
Disadvantages

- Costly setup.
- If the server fails, then the whole system will fail.
- Complex software is used for such a system

4. Multitasking OS

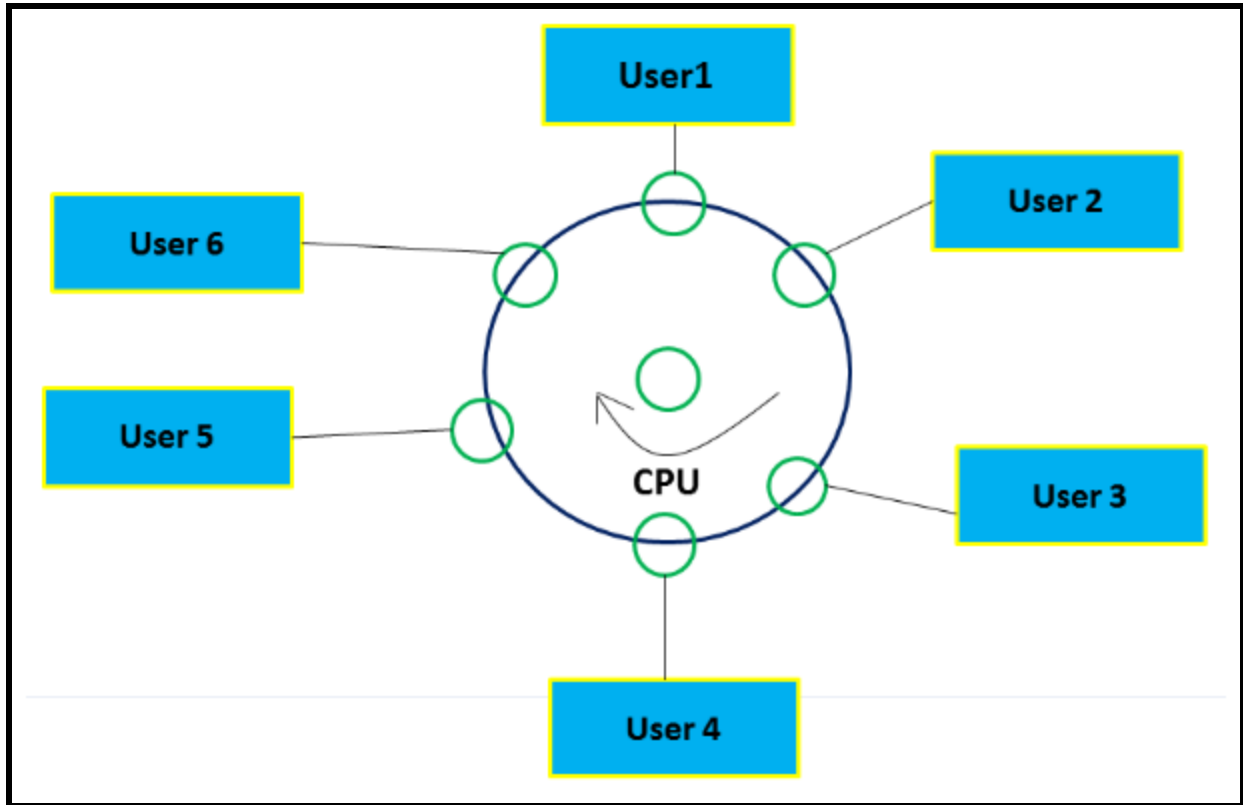
Multi-tasking operating systems are designed to enable multiple applications to run simultaneously. Multi-tasking operating systems allow multiple users to work on the same document or application simultaneously.

For example, a user running antivirus software, searching the internet, and playing a song simultaneously. Then the user is using a multitasking OS.



5. Time-sharing OS

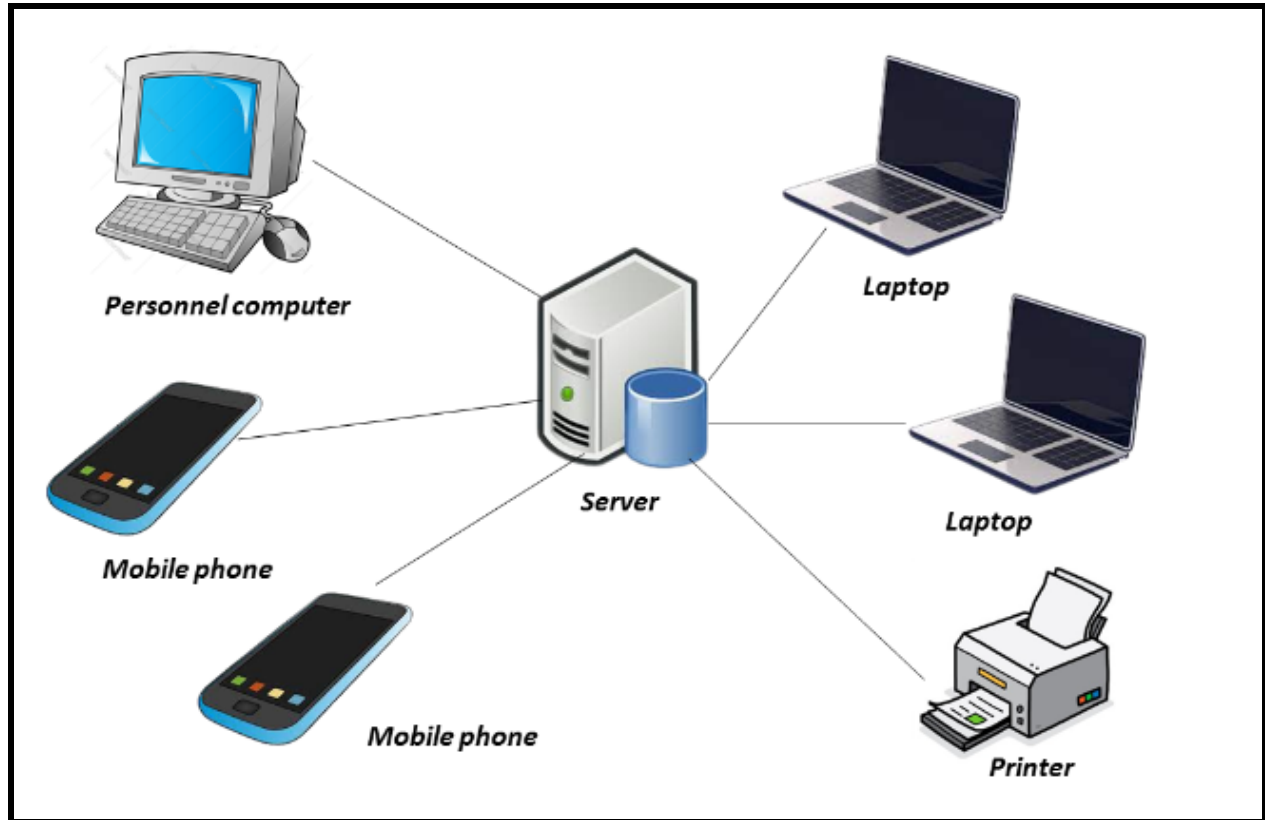
A time-sharing operating system is an application that provides a shared user interface with multiple users logged in simultaneously. It allows multiple users to access the same resources, such as files and applications, as long as they are logged in simultaneously. This type of operating system is most commonly used in businesses, especially those that involve a high number of simultaneous users. Time-sharing operating systems enable users to finish their jobs on a system at once. The time-sharing OS is the latest advancement in the computer science world; it is being accepted worldwide, also at an increasing rate.



6. Client/server network OS

Client/server network operating systems are those networks that contain two types of nodes, the servers, and clients. The servers host the applications or services for users while clients use these applications. In a client/server system, both the server and client computers must have certain software installed to connect to each other securely over a network connection.

Client-server networks are a type of computer network in which two or more computer systems are linked through a telecommunications network. Clients are the computers that use the network to access services provided by the server. Servers are the computers that provide the services to the network. Client/server networks are commonly used in business and government applications.



Advantages

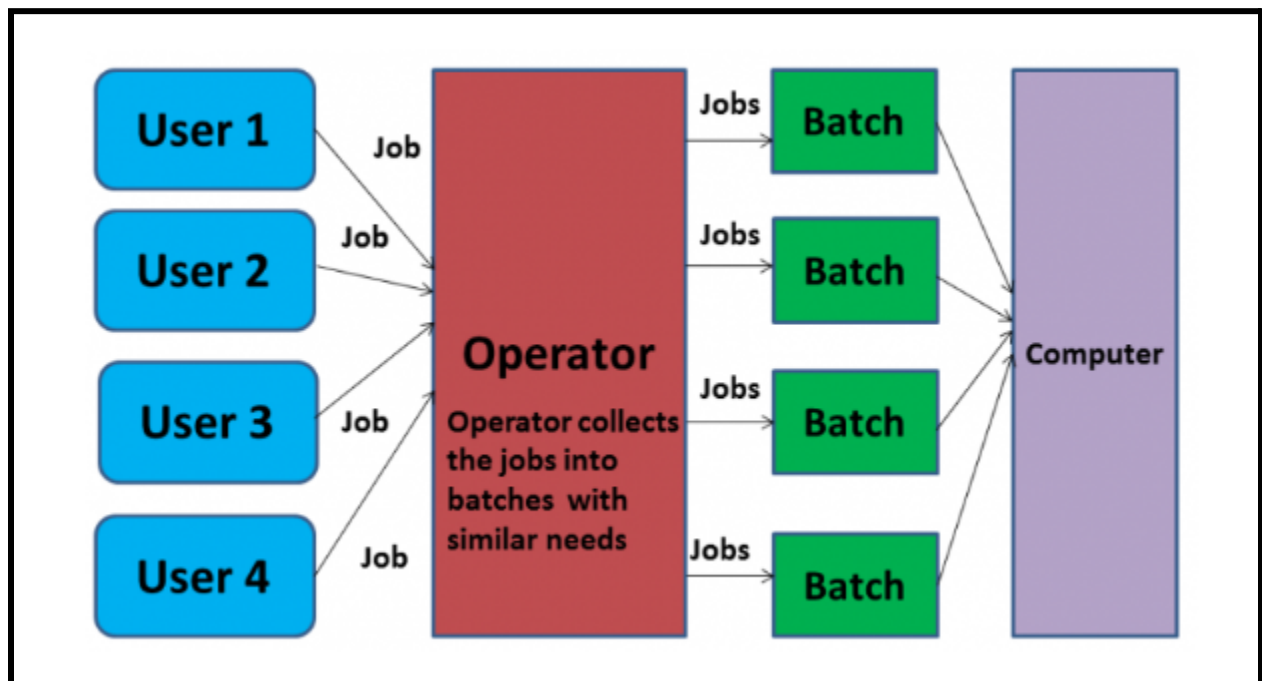
- Allows companies to scale their computing resources to handle increased demand without having to buy new hardware.
- Client-server systems can be quickly reconfigured to meet the changing needs of an organization.
- They also tend to be more reliable and easier to maintain than dedicated server systems.
- Lower operating cost.
- More reliable and easier to maintain than dedicated server systems

Disadvantages

- These OS need more sophisticated management and networking technologies, longer startup times, and increased vulnerability to attack.
- Less secure than dedicated server systems.
- More challenging to scale than dedicated server systems.

7. Batch OS

There are different users and each user prepares their work in a standalone device such as punchcards in batch operating systems and sends them to a computer operator. The various systems split and distribute similar tasks in batches to facilitate computing and faster responses. A single operator takes similar types of jobs that share similar needs and requirements, then groups them in various batches. Similar kinds of jobs that share similar needs and requirements. These types of operating systems are not used nowadays.



Advantages

- The overall time taken by the system to execute all the programs will be reduced.

- Less time to execute all programs.
- These operating systems are shared between multiple users.
- Suitable for small-scale businesses.
- It can work in offline mode also.
- Can give specific time to the computer, and when a computer is idle can process the jobs.

Disadvantages

- Sometimes manual interventions are required between two batches.
- The CPU utilization is low because the time taken in loading and unloading batches is very high compared to execution time.
- Sometimes jobs enter into an infinite loop due to some mistake.
- Meanwhile, if one job is taking too much time, other jobs have to wait.