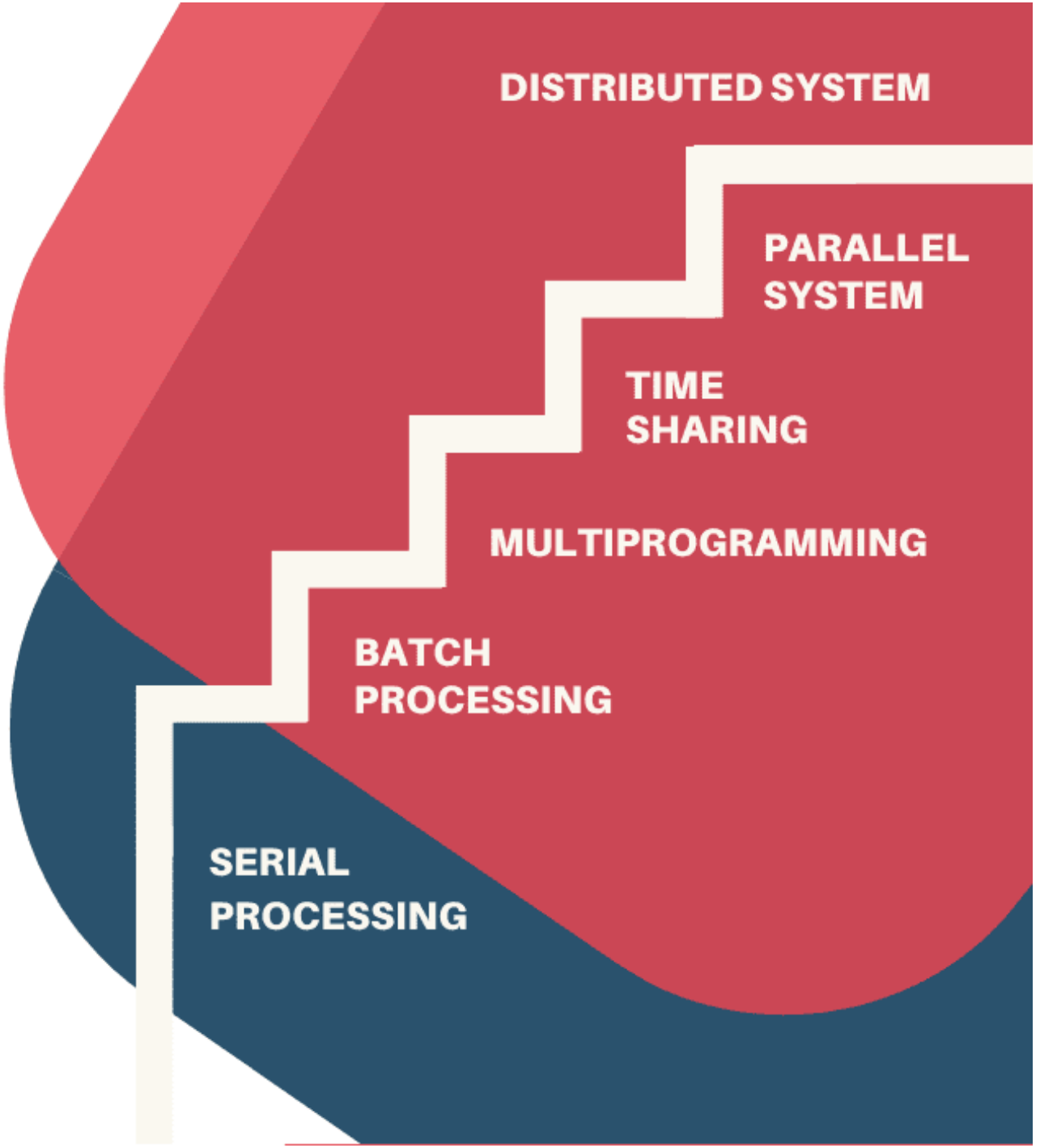
OPERATING SYSTEM: CSET209

WHAT DOES AN OPERATING SYSTEM DO? : FUNCTIONS

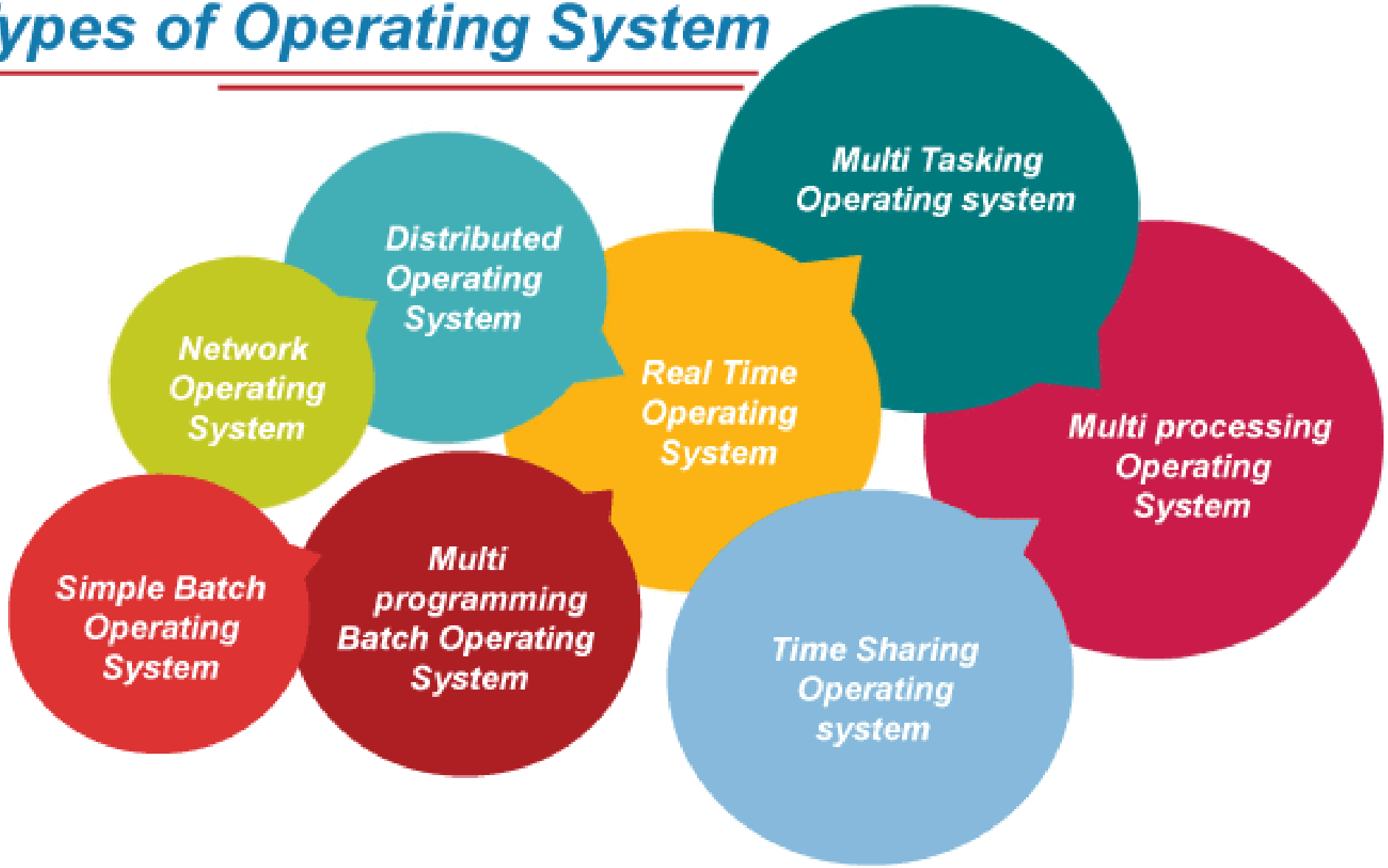
- **Process management:** A process is a program in execution. OS takes care of scheduling, communication, and deadlock handling etc.
- **Memory Management:** To improve CPU utilization, several processes must be kept in the memory. Effectiveness of the scheme depends on the situation.
- **File Management:** 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. 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 with the help of device drivers and a general device driver interface.
- **Protection and Security:** Process must be protected from one another's activity. Controlling the access of programs to computer system resources. E.g. User account control settings in Windows.

OS Evolution

Operating System



Types of Operating System



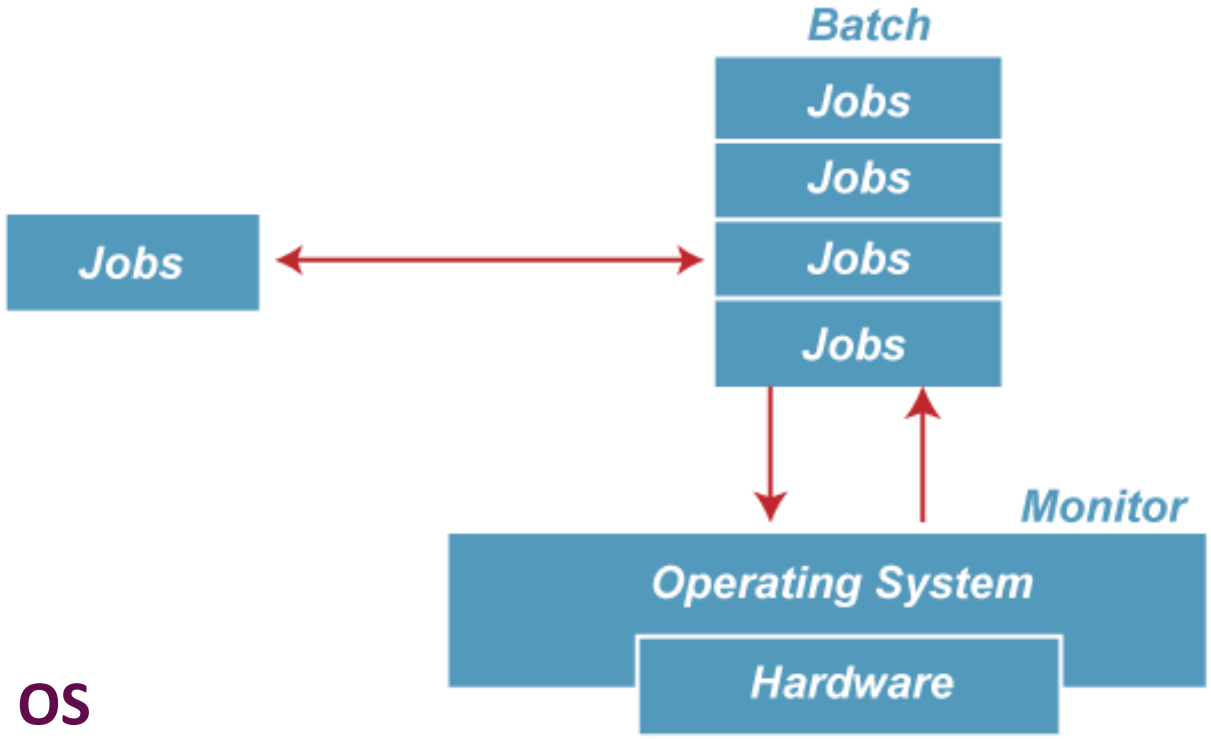
SERIAL PROCESSING OPERATING SYSTEM

- History of the operating system started in 1950.
- Before 1950, the programmers directly interact with the hardware there was no operating system at that time. If a programmer wishes to execute a program on those days, the following serial steps are necessary.
- Type the program on punched card.
- Convert the punched card to a card reader.
- submit to the computing machine, is there any errors, the error was indicated by the lights.
- The programmer examined the register and main memory to identify the cause of an error
- Take outputs on the printers.
- Then the programmer ready for the next program

BATCH OPERATING SYSTEM

- In the 1970s, Batch processing was very popular. In this technique, similar types of jobs were batched together and executed in time. People were used to having a single computer which was called a mainframe.
- In Batch operating system, access is given to more than one person; they submit their respective jobs to the system for the execution.
- The system put all of the jobs in a queue on the basis of first come first serve and then executes the jobs one by one. The users collect their respective output when all the jobs get executed

BATCH OPERATING SYSTEM



Advantages of Batch OS

The use of a resident monitor improves computer efficiency as it eliminates CPU time between two jobs.

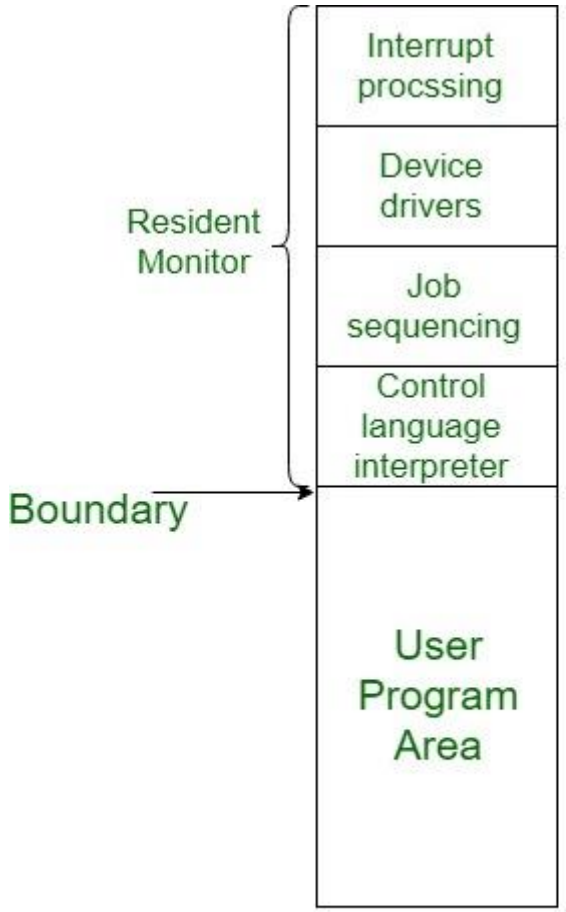
BATCH OPERATING SYSTEM

- The Resident Monitor is a code that runs on Bare Machines. The resident monitor works like an operating system that controls the instructions and performs all necessary functions. It also works like job sequencer because it also sequences the job and sends them to the processor.

- After scheduling the job Resident monitors loads the programs one by one into the main memory according to their sequences. One most important factor about the resident monitor is that when the program execution occurred there is no gap between the program execution and the processing is going to be faster.

The Resident monitors are divided into 4 parts as:

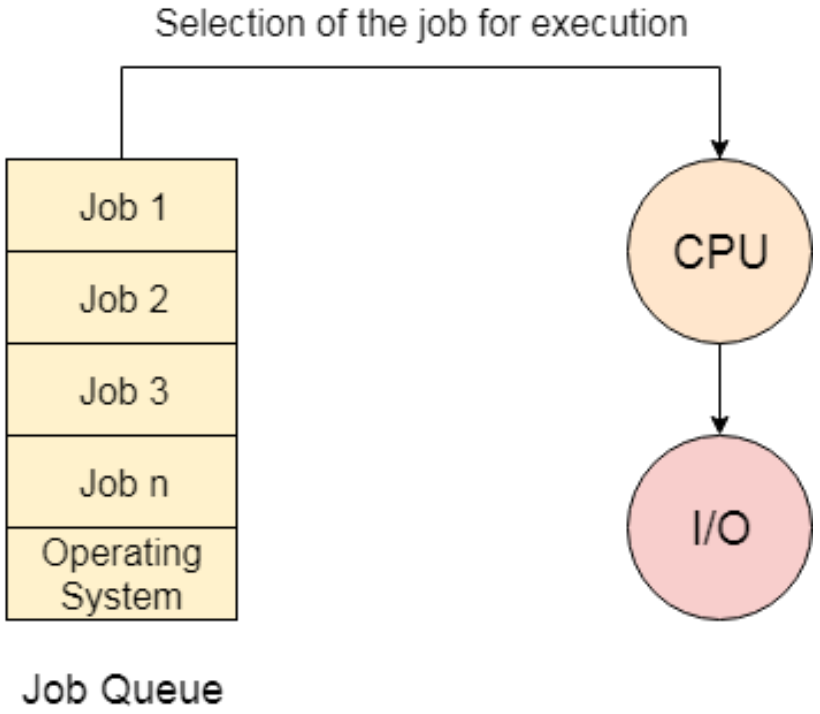
1. Control Language Interpreter
2. Loader
3. Device Driver
4. Interrupt Processing



Memory Layout of Resident Monitor

BATCH OPERATING SYSTEM

Disadvantages of Batch OS



1. Starvation

- **Batch processing suffers from starvation.**

There are five jobs J1, J2, J3, J4, and J5, present in the batch. If the execution time of J1 is very high, then the other four jobs will never be executed, or they will have to wait for a very long time. Hence the other processes get starved.

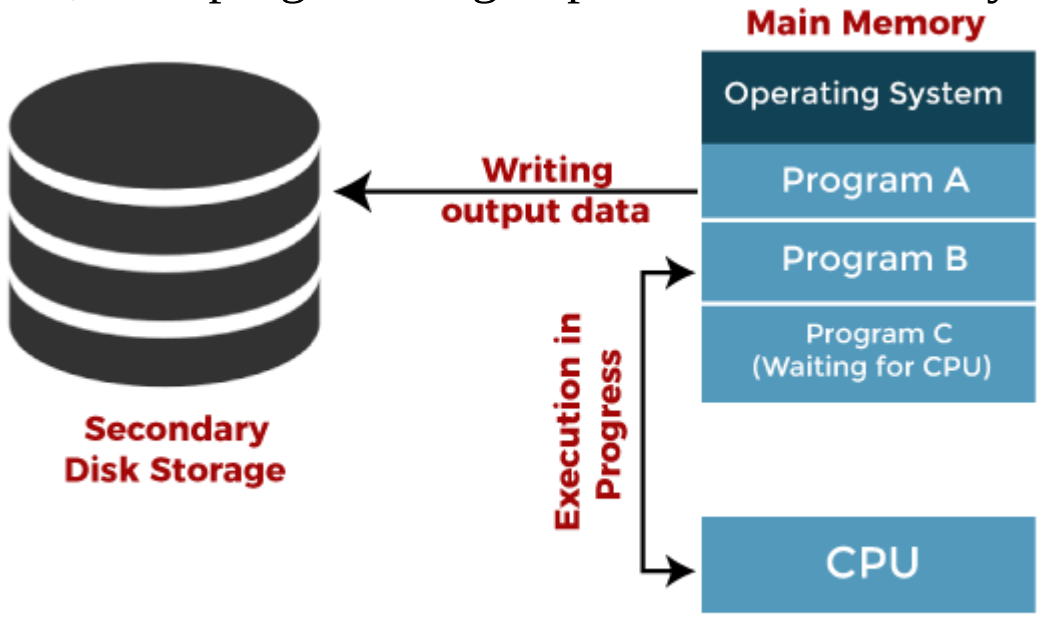
2. Not Interactive

- 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

MULTIPROGRAMMING OPERATING SYSTEM

- Multiprogramming is an extension to batch processing where the CPU is always kept busy. Each process needs two types of system time: CPU time and IO time.

- In a multiprogramming environment, when a process does its I/O, The CPU can start the execution of other processes. Therefore, multiprogramming improves the efficiency of the system.



Jobs in multiprogramming system

MULTIPROGRAMMING OPERATING SYSTEM

Advantages of Multiprogramming OS

- Throughput of the system is increased as the CPU always had one program to execute.
- Response time can also be reduced.

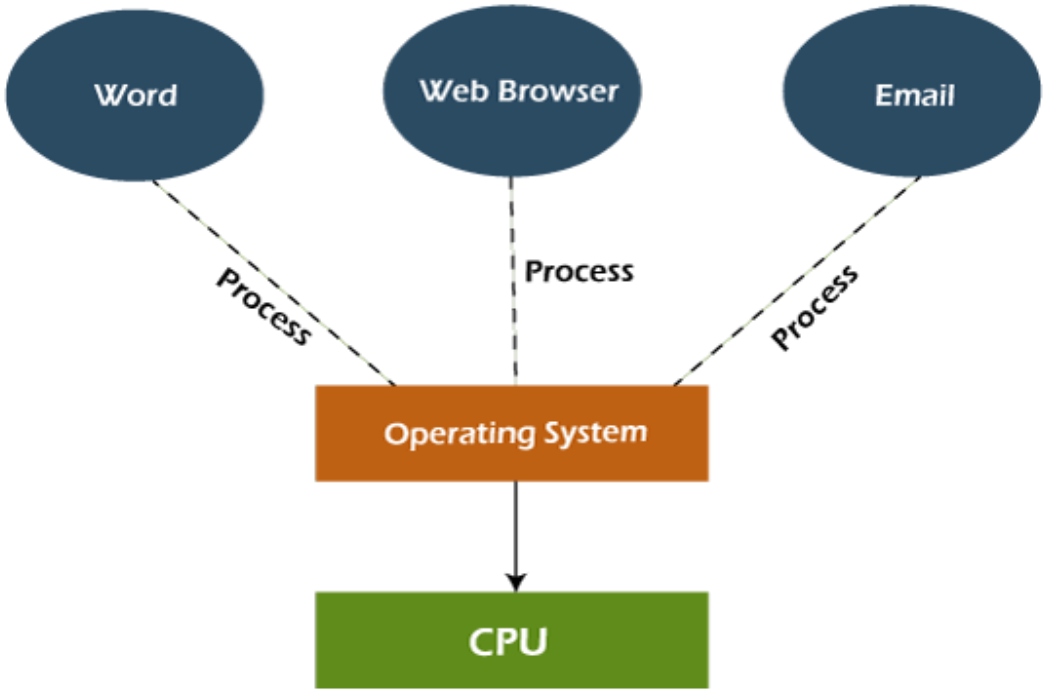
Disadvantages of Multiprogramming OS

- Multiprogramming systems provide an environment in which various systems resources are used efficiently, but they do not provide any user interaction with the computer system

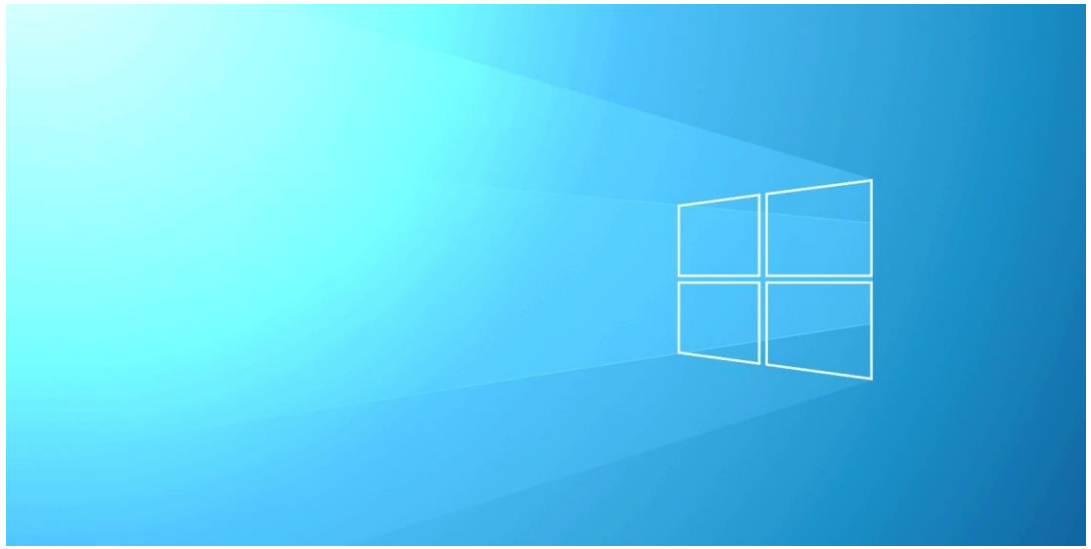
MULTITASKING OPERATING SYSTEM

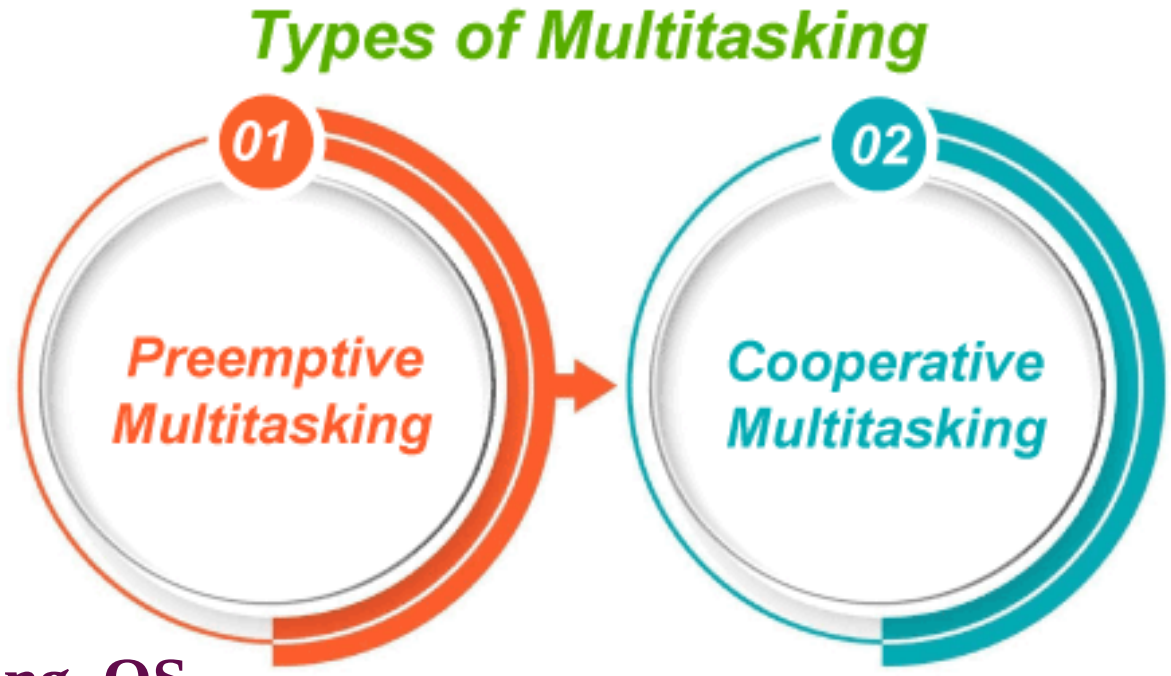
- The multitasking operating system is a logical extension of a multiprogramming system that enables multiple programs simultaneously. It allows a user to perform more than one computer task at the same time.

- In time-sharing systems, the CPU executes multiple jobs by switching among them, but the switches occur so frequently that the users can interact with each program while it is running.



QUIZ TIME! WHAT KIND OF OS IS WINDOWS 10?





Advantages of Multitasking OS

- This operating system is more suited to supporting multiple users simultaneously.
- The multitasking operating systems have well-defined memory management.

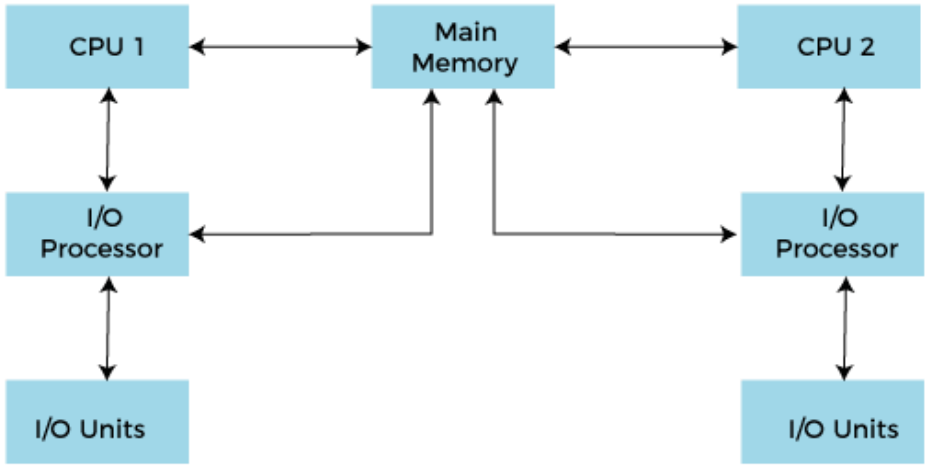
Disadvantages of Multitasking OS

- The multiple processors are busier at the same time to complete any task in a multitasking environment, so the CPU generates more heat.

Preemptive Multitasking	Cooperative Multitasking
Preemptive multitasking is a task used by the OS to decide for how long a task should be executed before allowing another task to use the OS.	Cooperative multitasking is a type of computer multitasking in which the operating system never initiates a context switch from a running process to another process.
It interrupts applications and gives control to other processes outside the application's control.	In cooperative multitasking, process scheduler never interrupts a process unexpectedly.
The operating system can initiate context switch from a running process to another process.	The operating system does not initiate a context switch from a running process to another process.
A malicious program initiates an infinite loop, it only hurts itself without affecting other programs or threads.	A malicious program can bring the entire system to a halt by busy waiting or running an infinite loop and not giving up control.
Preemptive multitasking forces applications to share the CPU whether they want to or not.	In cooperative multitasking, all programs must cooperate for it to work. If one program does not cooperate, it can hog the CPU.
UNIX, Windows 95, Windows NT operating systems are examples of preemptive multitasking .	Macintosh OS version 8.0-9.2.2 and Windows 3.x operating systems are examples of cooperative multitasking.

MULTIPROCESSING OPERATING SYSTEM

- In Multiprocessing, Parallel computing is achieved.
- There are more than one processors present in the system which can execute more than one process at the same time. This will increase the throughput of the system



Working of Multiprocessor System

- In Multiprocessing, Parallel computing is achieved.
- More than one processor present in the system can execute more than one process simultaneously, which will increase the throughput of the system.

MULTIPROCESSING OPERATING SYSTEM

Advantages of Multiprocessing OS

- 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.

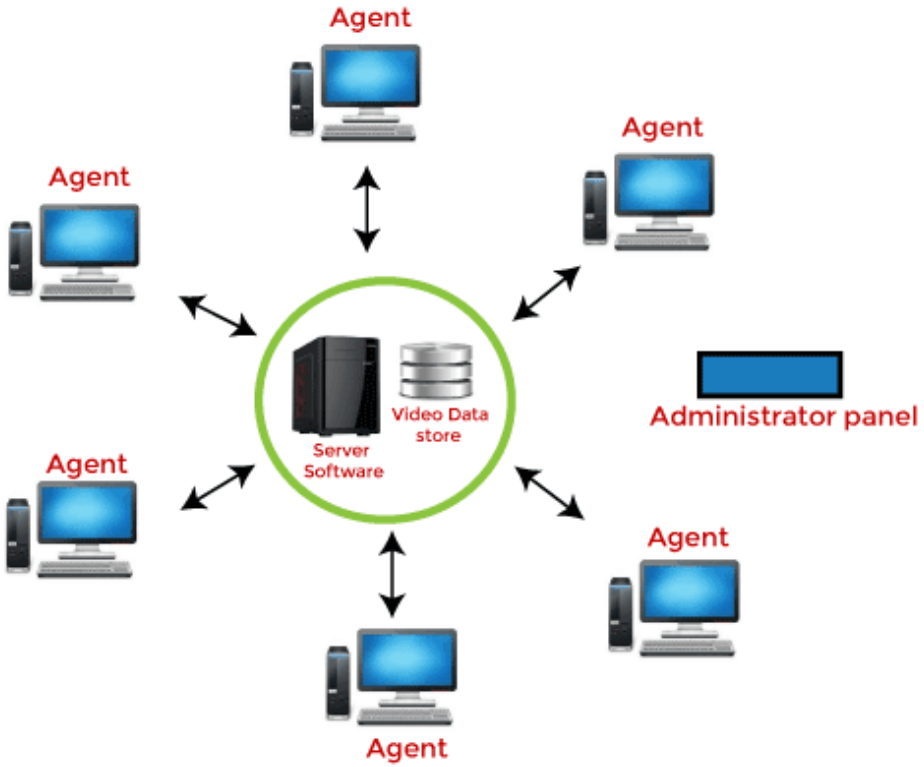
- Increased throughout: As several processors increase, more work can be done in less.

Disadvantages of Multiprocessing OS

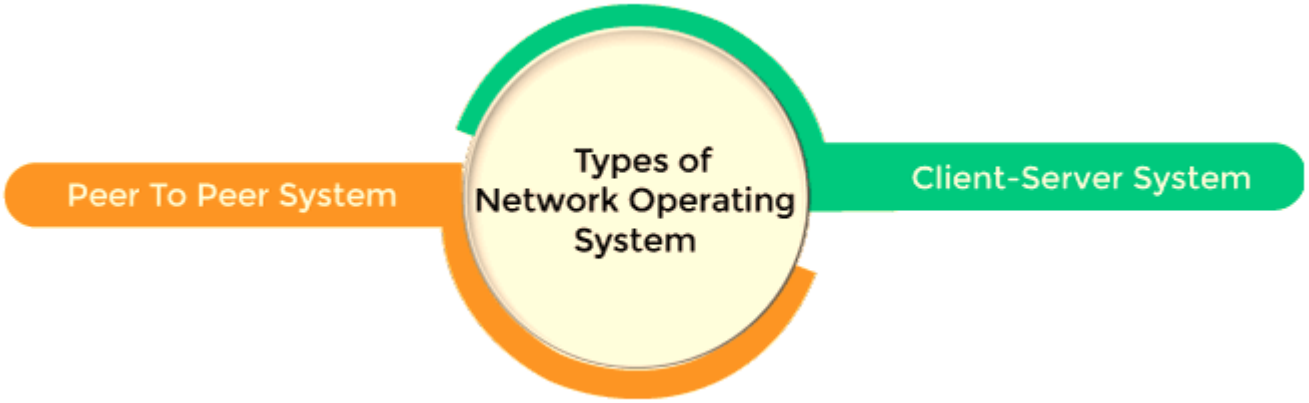
- Multiprocessing operating system is more complex and sophisticated as it takes care of multiple CPUs simultaneously.

NETWORK OPERATING SYSTEM

- 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.



NETWORK OPERATING SYSTEM



Advantages of Network OS

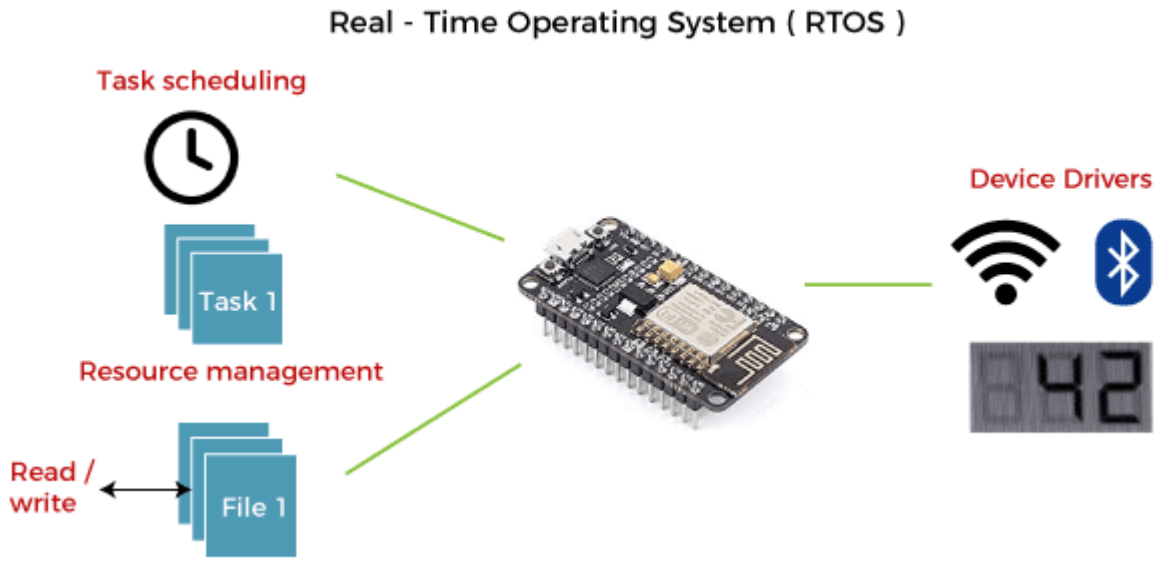
- In this type of operating system, network traffic reduces due to the division between clients and the server.
- This type of system is less expensive to set up and maintain.

Disadvantages of Network OS

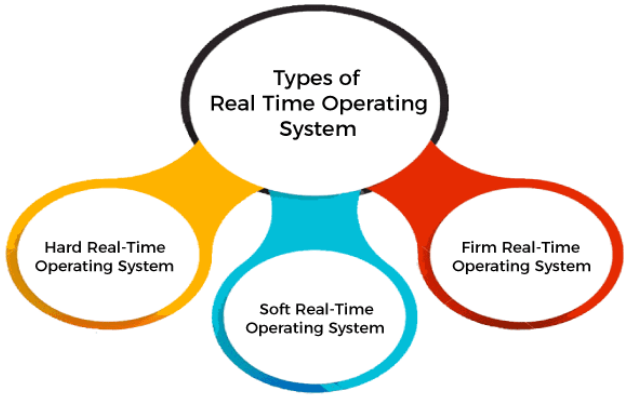
- In this type of operating system, the failure of any node in a system affects the whole system.
- Security and performance are important issues. So trained network administrators are required for network administration.

REAL TIME OPERATING SYSTEM

- In Real-Time Systems, each job carries a certain deadline within which the job is supposed to be completed, otherwise, the huge loss will be there, or even if the result is produced, it will be completely useless.
- The Application of a Real-Time system exists in the case of military applications, if you want to drop a missile, then the missile is supposed to be dropped with a certain precision.



REAL TIME OPERATING SYSTEM



Advantages of Real time OS

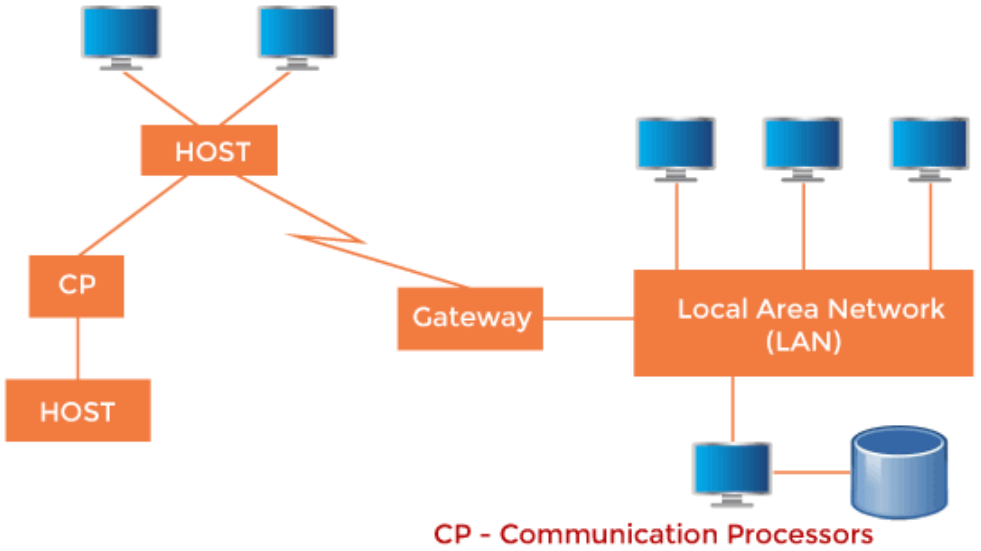
- Easy to layout, develop and execute real-time applications under the real-time operating system.
- In a Real-time operating system, the maximum utilization of devices and systems.

Disadvantages of Real time OS

- Real-time operating systems are very costly to develop.
- Real-time operating systems are very complex and can consume critical CPU cycles.

DISTRIBUTED OPERATING SYSTEM

- 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



A Typical View of a Distributed System

DISTRIBUTED OPERATING SYSTEM

Advantages of Distributed OS

- The distributed operating system provides sharing of resources.
- This type of system is fault-tolerant

Disadvantages of Distributed OS

- Protocol overhead can dominate computation cost.

THANK YOU
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