MULTIPROGRAMMING OS

Multiprogramming OS is an ability of an operating system that executes more than one program using a single processor machine.
More than one task or program or jobs are present inside the main memory at one point of time.

Buffering and spooling can overlap I/O and CPU tasks to improve the system performance but it has some limitations that a single user cannot always keep CPU or I/O busy all the time.
To increase resource utilization, multiprogramming approaches.

Operating System
Job1
Job2
- - -
Job N
Empty space

The OS could pick and start the execution of one of the jobs in memory, whenever the jobs does not need CPU that means the job is working with I/O at that time the CPU is idle at that time the OS switches to another job in memory and CPU executes a portion of it till the job issues a request for I/O and so on.

Let's P1 and P2 are two programs present in the main memory. The OS picks one program and starts executing it.

During execution if the P1 program requires I/O operation, then the OS will simply switch over to P2 program. If the p2 program requires I/O then again it switches to P3 and so on.

If there is no other program remaining after P3 then the CPU will pass its control back to the previous program.

Advantages

The advantages of multiprogramming operating system are as follows −

- CPU utilization is high because the CPU is never goes to idle state.
- Memory utilization is efficient.
- CPU throughput is high and also supports multiple interactive user terminals.

Disadvantages

The disadvantages of multiprogramming operating system are as follows −

- CPU scheduling is compulsory because lots of jobs are ready to run on CPU simultaneously.
- User is not able to interact with jobs when it is executing.
- Programmers also cannot modify a program that is being executed.

If several jobs are ready in main memory and if there is not enough space for all of them, then the system has to choose them by making a decision, this process is called job scheduling.

When the operating system selects a job from the group of jobs and loads that job into memory for execution, therefore it needs memory management, if several such jobs are ready then it needs CPU scheduling.

➢ MULTITASKING OS :

Multitasking operating system provides the interface for executing the multiple program tasks by single user at a same time on the one computer system. For example, any editing task can be performed while other programs are executing concurrently. Other example, user can open Gmail and Power Point same time.

- **Types of Multitasking Operating System**

True Multitasking

True multitasking is the capable for executing and process multiple tasks concurrently without taking delay instead of switching tasks from one processor to other processor. It can perform couple of tasks in parallel with underlying the H/W or S/W.

Preemptive Multitasking

Preemptive multitasking is special task that is assigned to **computer operating system**, in which it takes decision that how much time spent by one task before assigning other task for using the operating system. Operating system has control for completing this entire process, so it is known as “Preemptive”.

Cooperative Multitasking

Cooperative multitasking is known as “Non-Preemptive Multitasking”. Main goal of Cooperative multitasking is to run currently task, and to release the CPU to allow another task run. This task is performed by calling taskYIELD().Context-switch is executed when this function is called.

- **Advantages of Multitasking Operating System**

Time Shareable

In which, all tasks are allocated specific piece of time, so they do not need for waiting time for CPU.

Manage Several Users

This **operating system** is more comfort for handling the multiple users concurrently, and several programs can run smoothly without degradation of system’s performance.

Secured Memory

Multitasking operating system has well defined memory management, because this operating system does not provide any types of permissions of unwanted programs to wasting the memory.

Great Virtual Memory

Multitasking operating system contains the best virtual memory system. Due to virtual memory, any program do not need long waiting g time for completion their tasks, if this problem is occurred then those programs are transferred to virtual memory.

Background Processing

Multitasking operating system creates the better environment to execute the background programs. These background programs are not transparent for normal users, but these programs help to run other programs smoothly such as firewall, antivirus software, and more.

Good Reliability

Multitasking operating system provides the several flexibilities for multiple users, and they are more satisfied to them. On which, every users can operate single or multiple programs with smoothly.

Use Multiple Programs

Users can operate multiple programs such as internet browser, PowerPoint, MS Excel, games, and other utilities concurrently.

Optimize Computer Resources

Multitasking operating system is able to handle smoothly multiple **computers' resources** such as RAM, **input/output devices**, CPU, hard disk, and more.

- **Disadvantages of Multitasking Operating System**

Memory Boundation

Computer can get slow performance, due to run multiple programs at a same time because **main memory** gets more load while loading multiple programs. CPU is not able to provide separate time for every program, and its response time gets increase. Main reason of occurring this problem is that it uses to less capacity RAM. So, for getting solution can be increased the RAM capacity.

Processor Boundation

Computer can run programs slowly due to slow speed of their processors, and its response time can increase while handling multiple programs. Need better processing power, to overcome this problem.

CPU Heat up

Multiple processors become busier at a time for executing any task in multitasking nature, So CPU produces more heat.

Examples of Multitasking Operating System

There are some **examples of multi tasking OS** like as –

- Windows XP ,Windows Vista,Windows 7,Windows 8,Windows 10,Windows 2000
- IBM's OS/390,Linux,UNIX