

Fundamentals of Operating system

1)SCHEDULING

Schedulers are special system software which handles process scheduling. Their main task is to select the jobs to be submitted into the system. There are six popular process scheduling algorithms

- First-Come, First-Served (FCFS) Scheduling
- Shortest-Job-Next (SJN) Scheduling
- Priority Scheduling
- Shortest Remaining Time
- Round Robin(RR) Scheduling
- Multiple-Level Queues Scheduling

First comes first served

- Jobs are executed on first come, first serve basis.
- It is a non-pre-emptive, pre-emptive scheduling algorithm.
- Its implementation is based on FIFO queue.
- Poor in performance as average wait time is high. Shortest Job Next (SJN)

Shortest job first

- This is a non-preemptive, pre-emptive scheduling algorithm.
- Best approach to minimize waiting time.
- Easy to implement in Batch systems where required CPU time is known in advance.
- Impossible to implement in interactive systems where required CPU time is not known.
- The processer should know in advance how much time process will take.

Priority scheduling

- Priority scheduling is a non-pre-emptive algorithm and one of the most common scheduling algorithms in batch systems.
- Each process is assigned a priority. Process with highest priority is to be executed first and so on.
- Processes with same priority are executed on first come first served basis.

Shortest remaining time

- Shortest remaining time (SRT) is the pre-emptive version of the SJN algorithm.
- The processor is allocated to the job closest to completion but it can be pre-empted by a newer ready job with shorter time to completion.

Round Robin Scheduling

- Round Robin is the preemptive process scheduling algorithm.
- Each process is provided a fix time to execute, it is called a **quantum**.
- Once a process is executed for a given time period, it is pre-empted and other process executes for a given time period.

Multiple-Level Queues Scheduling

- Multiple-level queues are not an independent scheduling algorithm. They make use of other existing algorithms to group and schedule jobs with common characteristics.
- Multiple queues are maintained for processes with common characteristics.
- Each queue can have its own scheduling algorithms.
- Priorities are assigned to each queue.

2) TYPES OF OS

Batch operating system

The users of a batch operating system do not interact with the computer directly. Each user prepares his job on an off-line device like punch cards and submits it to the computer operator. To speed up processing, jobs with similar needs are batched together and run as a group. The programmers leave their programs with the operator and the operator then sorts the programs with similar requirements into batches.

The problems with Batch Systems are as follows –

- Lack of interaction between the user and the job.
- CPU is often idle, because the speed of the mechanical I/O devices is slower than the CPU.
- Difficult to provide the desired priority.

Time-sharing operating systems

Time-sharing is a technique which enables many people, located at various terminals, to use a particular computer system at the same time. Time-sharing or multitasking is a logical extension of multiprogramming. Processor's time which is shared among multiple users simultaneously is termed as time-sharing.

The main difference between Multi programmed Batch Systems and Time-Sharing Systems is that in case of Multi programmed batch systems, the objective is to maximize processor use, whereas in Time-Sharing Systems, the objective is to minimize response time.

Distributed operating System

Distributed systems use multiple central processors to serve multiple real-time applications and multiple users. Data processing jobs are distributed among the processors accordingly.

The processors communicate with one another through various communication lines (such as high-speed buses or telephone lines). These are referred to as **loosely coupled systems** or distributed system.

Network operating System

A Network Operating System runs on a server and provides the server the capability to manage data, users, groups, security, applications, and other networking functions. The primary purpose of the network operating system is to allow shared file and printer access among multiple computers in a network.

Real time operating system

A real-time system is defined as a data processing system in which the time interval required to process and respond to inputs is so small that it controls the environment. The time taken by the system to respond to an input and display of required updated information is termed as the **response time**.

3)Types of shell (CUI)

In Unix, there are two major types of shells –

- Bourne shell – If you are using a Bourne-type shell, the \$ character is the default prompt.

- C shell – If you are using a C-type shell, the % character is the default prompt.

The Bourne Shell has the following subcategories –

- Bourne shell (sh)

Bourne shell is known as the first shell to be introduced, it is represented by “sh”. This shell got popular because of its quite compact nature. It was made the default shell for the SOLARIS operating system and was used as a Solaris administration script. It has very high-speed operations.

- Korn shell (ksh)

This shell was developed by David Korn in AT & T bells lab, this was introduced as an improved version or superset of the Bourne shell. It is represented by “ksh”. It has all the features and functionalities of Bourne Shell and also provides some new functionalities to the users. Korn shell has in-built support for arithmetic operations.

- Bourne Again shell (bash)

It is also known as Bash Shell, This shell combines features of the Korn shell and C shell. This shell was designed as an extended version of the Bourne shell. Bourne Again Shell can automatically load previously used commands and can be edited with the help of the arrow keys of the keyboard.

- POSIX shell (sh)

The different C-type shells follow –

- C shell (csh)

The C shell was designed with the purpose of supporting programming languages. It was specifically designed to support in-built features like solving arithmetic operations and syntax of programming languages like C. Unlike Bourne and other Linux shells, the C shell can maintain and history of previously used commands, and those commands can be used whenever required.

- TENEX/TOPS C shell (tcsh)

4) **Stack memory allocation** takes place on contiguous blocks of memory. The compiler calculates how much memory to allocate for each type of variable specified in the program. When the function call is completed, the memory for the variables is released. All of this is accomplished through the use of specified procedures in the compiler. A developer does not have to worry about stack memory allocation and deallocation.

Heaps memory is allocated during the execution of programmers' instructions. It is crucial to highlight that the name heap has nothing to do with the heap data structure. It is termed a heap because it is a collection of memory space that programmers can allocate and deallocate