Operating Systems Interview Questions

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1. **What are the functions of an Operating System?**

   An Operating system is an interface between the underlying hardware and the user interacting with the computer. It is a software program that handles and manages all resources of a computer such as hardware and software. Some of the important functions performed by an operating system include:

   - Memory and Process Management
   - File and Device Management
   - Scheduling of resources and Jobs
   - Security

2. **Explain Demand paging**

   Demand paging is a method that loads pages into memory on demand. This method is mostly used in virtual memory. In this, a page is only brought into memory when a location on that particular page is referenced during execution.

3. **What is Interprocess Communication (IPC)?**

   IPC (Interprocess Communication) is a mechanism that requires the use of resources like a memory that is shared between processes or threads. With IPC, the OS allows different processes to communicate with each other. It is simply used for exchanging data between multiple threads in one or more programs or processes.

4. **What do you mean by semaphores in OS?**

   Semaphore is a signaling mechanism. It only holds one positive integer value. It is simply used to solve the problem or issue of

critical sections in the synchronization process by using two atomic operations i.e., wait() and signal().

There are **two** types of semaphores :

- Binary Semaphores - It allows various process threads to get the finite instance of the resource until resources are available.Its functions are based upon signaling mechanisms. Binary semaphores are much faster as compared to Mutex. Essentially, it is an integer.
- Mutex - It allows various process threads to get a single shared resource only at a time.Its functions are based upon a locking mechanism. Essentially, it is an object.

5. What is a Kernel? What are its main functions?

The kernel is a computer program usually considered as a central component or module of an OS. It is an interface between the underlying hardware and the operating system. It is the core of the operating system. It is responsible for handling, managing, and controlling all operations of computer systems and hardware. Whenever the system starts, the kernel is loaded first and remains in the main memory.

Functions of a kernel :

- It is responsible for managing all computer resources such as CPU, memory, files and processes, etc.
- It controls and manages the all primary tasks of the OS as well as manages access and use of various peripherals connected to the computer.
- It manages RAM so that all running processes can work effectively and efficiently.

6. What is symmetric multiprocessing (SMP)?

SMP is generally referred to as computer architecture in which the processing of programs is done by multiple processors that share a common OS and memory. It simply enables any processor to work

on any of the tasks no matter where data or resources for that particular task are located in memory. These systems are more reliable than single-processor systems.

7. **What is Context Switching?**

   Context switching is basically a process of saving the context of one process and loading the context of another process. It is one of the cost-effective and time-saving measures executed by CPU because it allows multiple processes to share a single CPU.

8. **What is the difference between process and thread?**

Process	Thread
It is a computer program that is under execution.	It is the component of a process that is the smallest execution unit.
These are heavy-weight.	These are light-weight
It has its own memory space.	It uses the memory of the process it belongs to.
It requires more resources as compared to threads.	It requires fewer resources as compared to processes.
It doesn't share data.	It shares data with the peer threads.
It can be divided into multiple threads.	It can't be further subdivided.

9. **What is a deadlock in OS? What are the necessary conditions for a deadlock?**

   Deadlock is generally a situation where a set of processes are blocked as each process is holding resources and waits to acquire resources held by another process. In this situation, two or more

processes simply try to execute simultaneously and wait for each to finish their execution because they are dependent on each other.

Necessary conditions for a deadlock to occur:

- Mutual Exclusion
- Hold and wait
- No pre-emption
- Circular wait

10. What do you mean by Belady's anomaly?

In the Operating System, process data is loaded in fixed-sized chunks and each chunk is referred to as a page. The processor loads these pages in fixed-sized chunks of memory called frames. Belady's Anomaly is a phenomenon in which if we increase the number of frames in memory, then the number of page faults also increases. It is generally experienced when we use FIFO (First In First Out) page replacement algorithm.

11. What are the different 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.

12. What is virtual memory? How is it implemented?

Virtual memory creates an illusion that each user has one or more contiguous address spaces, each beginning at address zero. The sizes of such virtual address spaces is generally very high. The idea of virtual memory is to use disk space to extend the RAM. Running processes don't need to care whether the memory is from RAM or disk. The illusion of such a large amount of memory is created by subdividing the virtual memory into smaller pieces,

which can be loaded into physical memory whenever they are needed by a process.

13. What is thrashing?

Thrashing is a situation when the performance of a computer degrades or collapses. Thrashing occurs when a system spends more time processing page faults than executing transactions. While processing page faults is necessary to in order to appreciate the benefits of virtual memory, thrashing has a negative affect on the system. As the page fault rate increases, more transactions need processing from the paging device. The queue at the paging device increases, resulting in increased service time for a page fault.

14. What are the different types of operating systems?

- Batched OS (Example: Payroll System, Transactions Process, etc.)
- Multiprogrammed OS (Example: Windows O/S, UNIX O/S, etc.)
- Time Sharing OS
- Distributed OS
- Real-Time OS

15. What are the benefits of a multiprocessor system?

A Multiprocessor system is a type of system that includes two or more CPUs. It involves the processing of different computer programs at the same time mostly by a computer system with two or more CPUs that are sharing single memory.

Benefits:

- Such systems are used widely nowadays to improve performance in systems that are running multiple programs concurrently.

- One also gets a considerable increase in throughput and is cost-effective also as all processors share the same resources.