

Operating Systems Interview Questions and Answers

1. What is an Operating System?

An Operating System (OS) is system software that manages computer hardware, software resources, and provides common services for computer programs. It acts as an intermediary between users and the hardware.

2. What are the main functions of an Operating System?

- Process Management
- Memory Management
- File System Management
- Device Management
- Security and Access Control
- User Interface

3. What is the difference between a process and a thread?

A process is an independent program in execution with its own memory space. A thread is the smallest unit of execution within a process, sharing memory with other threads in the same process.

4. What is a kernel? What are its types?

The kernel is the core part of the OS that manages system resources.

Types:

- Monolithic Kernel: Entire OS runs in kernel space (e.g., Linux).
- Microkernel: Only essential services run in kernel space; others in user space (e.g., Minix).
- Hybrid Kernel: Combination of both (e.g., Windows NT).

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5. What is context switching?

Context switching is the process of storing the state of a process or thread so it can be resumed later, and loading the state of another. It allows multitasking by the CPU.

6. What is a zombie process? Orphan process?

- Zombie Process: A process that has completed execution but still has an entry in the process table.
- Orphan Process: A process whose parent has terminated, but it is still running.

7. What is a deadlock?

A deadlock is a situation where two or more processes are waiting for each other to release resources, and none of them can proceed.

Necessary conditions:

1. Mutual exclusion
2. Hold and wait
3. No preemption
4. Circular wait

8. What is a semaphore?

A semaphore is a synchronization tool used to control access to a common resource in concurrent programming.

Types:

- Binary Semaphore (mutex): 0 or 1
- Counting Semaphore: Non-negative integer value

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9. What is virtual memory?

Virtual memory is a memory management technique where secondary memory (like a hard disk) is used as if it were RAM. It allows systems to run larger applications than the available physical memory.

10. What is paging?

Paging is a memory management scheme where the process is divided into fixed-size pages and loaded into memory frames, enabling non-contiguous memory allocation and reducing fragmentation.