

1. What is the kernel of an OS?

The kernel is the core component of an operating system that manages system resources and allows communication between hardware and software. It controls processes, memory, file systems, and devices, ensuring that multiple programs can run smoothly on a computer.

2. What is multiprogramming?

Multiprogramming is a technique where multiple programs are loaded into memory and executed by the CPU concurrently. It increases CPU utilization by organizing jobs so that the CPU always has one to execute, thus minimizing idle time.

3. What is a process?

A process is an instance of a program in execution. It includes the program code, its current activity, a process control block (PCB) that stores process state information, and resources like memory and I/O devices allocated to it by the operating system.

4. Explain the distinction between a real address and a virtual address.

A real (physical) address refers to the actual location in memory hardware, while a virtual address is an address generated by a program. The operating system uses a memory management unit (MMU) to map virtual addresses to physical addresses, enabling better memory management and isolation between processes.

5. Explain the difference between a monolithic kernel and a microkernel.

A monolithic kernel is a large, single-tiered kernel that manages the entire operating system, including device drivers, memory management, and system calls. All services run in kernel space, which can make it fast but less secure and stable if one component fails.

A microkernel, on the other hand, has minimal functionality, handling only essential tasks like IPC (inter-process communication) and basic scheduling. Other services, such as device drivers and file systems, run in user space, which can increase security and stability but may result in slower performance due to the overhead of communication between user space and the kernel.