

Operating System Notes

CSE - 309, Semester - 9

Written by Md. Rakibur Rahman

BSc. in CSE, Dhaka International University

1. What is an Operating System?

An operating system (OS) is a program that acts as an intermediary between a user of a computer and the computer hardware to make all the tasks easier.

2. What are the goals of an operating system?

- I. Execute user programs and make solving user problems easier
- II. Make the computer system convenient to use
- III. Use the computer hardware in an efficient manner

3. Why OS is required in computer system?

An operating system (OS) manages all of the software and hardware on the computer. Most of the time, there are several different computer programs running at the same time, and they all need to access the computer's central processing unit (CPU), memory, and storage. The operating system coordinates all of this to make sure each program gets what it needs. It also allows us to communicate with the computer without knowing the computer's language. Without an operating system, a computer is useless.

4. What are the functions of an Operating System?

A separate module of operating system software performs each of the functions:

- **Process management:** The process management module takes care of the creation and deletion of processes, and providing mechanisms for synchronization and communication among processes.
- **Memory management:** The memory management module takes care of the allocation and de-allocation of memory space to programs in need of these resources.
- **File management:** It takes care of file-related activities such as organization storage, retrieval, naming, sharing, and protection of files.
- **Security:** The security module protects the resources and information of a computer system against destruction and unauthorized access.
- **Command interpretation:** The command interpretation module takes care of interpreting user commands, and directing system resources to process the commands.

5. Classify of Operating System based on user.

Operating systems can also be classified as:

- **Single User Systems:** They are popularly associated with Desktop operating system which run on standalone systems where no user accounts are required. Example: DOS.
- **Multi User Systems:** Provides regulated access for a number of users by maintaining a database of known users. Refers to computer systems that support two or more simultaneous users. Example: Unix, Microsoft Windows NT.

6. Define Kernel with types.

The kernel is a computer program which is the central module of an operating system (OS). It loads first (after the bootloader), and it remains in main memory. So, the one program running at all times on the computer is called kernel.

It handles the rest of start-up as well as input/output requests from software, translating them into data-processing instructions for the central processing unit. It handles memory and peripherals like keyboards, monitors, printers, and speakers. There are two types of kernels:

Microkernel Kernel: Microkernel Kernel only contains basic functionality.

Monolithic Kernel: Monolithic Kernel contains many device drivers.

7. Write short notes on timesharing and multiprogramming.

Multiprogramming (Batch system): It is needed for efficiency.

- A single user cannot keep CPU and I/O devices busy at all times
- Multiprogramming organizes jobs (code and data) so the CPU always has one to execute
- A subset of total jobs in the system is kept in memory
- One job selected and run via job scheduling
- When it has to wait (for I/O for example), OS switches to another job

Timesharing (multitasking): Timesharing is a logical extension in which the CPU switches jobs so frequently that users can interact with each job while it is running, creating interactive computing

- Response time should be < 1 second
- Each user has at least one program executing in the memory process
- If several jobs ready to run at the same time CPU scheduling
- If processes don't fit in memory, swapping moves them in and out to run
- Virtual memory allows the execution of processes not completely in memory

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