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**Basics of operating system**

**INTRODUCTION**

An operating system (OS) is the fundamental software that manages a computer's hardware and software resources and provides common servicesfor computer programs. It acts as an intermediary between the user andthehardware, allowing users to interact with the computer in a user-friendly way. Without an operating system, applications would need to directly managehardware components, a complex and error-prone task. The OS abstractsaway these complexities, providing a consistent and reliable platformfor software execution**.**

**Functions of an Operating System**

1. **Process Management:** The OS manages processes by allocating resources, scheduling execution, and ensuring synchronization among multiple processes. It also handles process creation, termination, and state transitions.
2. **Memory Management:** It allocates and deallocates memory space as needed by various applications and processes. The OS ensures efficient utilization of memory and prevents conflicts through techniques like paging and segmentation.
3. **File System Management:** The OS organizes, stores, retrieves, and secures data on storage devices through a structured file system. It maintains directories, access permissions, and file handling operations**.**
4. **Device Management:** It manages hardware devices such as printers, keyboards, and storage drives using device drivers. The OS ensures smooth communication between hardware and applications**.**
5. **Security and Access Control:** Operating systems implement security measures, including user authentication, encryption, and access control, to protect data and prevent unauthorized access**.**
6. **User Interface**: The OS provides interfaces such as Command-Line Interfaces (CLI) and Graphical User Interfaces (GUI) to enable users to interact with the system efficiently**.**

**Main Parts of an Operating System**

**Kernel –** The core part that controls everything in the computer. • Shell – The part where users give commands to the OS**.**

**• File System** – Helps store and organize files on hard drives and other storage devices.

**• Device Drivers** – Small programs that help the OS communicate with different hardware devices.

**Types of Operating Systems**

**1. Batch Operating System** - Executes batches of jobs without user interaction, often used in mainframe environments**.**

**2. Time-Sharing OS** - Allows multiple users to share system resources simultaneously by dividing CPU time efficiently among tasks.

**3. Distributed OS** - Manages multiple computers working as a single system, enhancing efficiency and resource sharing across networks.

**4. Real-Time OS -** Processes data in real-time for time-sensitive applications like medical systems, industrial control, and automotive systems.

**5. Embedded OS** - Designed for specific devices like smart appliances, ATMs, and embedded systems, ensuring optimized performance for dedicated tasks.

**Conclusion**

Operating systems are crucial for managing hardware and software resources, ensuring smooth operation and user interaction with computing devices. Different types of OS cater to various needs, from personal computing to large-scale industrial and embedded applications. Understanding their functions and classifications helps users and developers make informed decisions about system usage and development.