Operating System (OS)

Introduction to Operating Systems

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

Functions of an Operating System

1. **Process Management** - Manages processes by scheduling tasks and ensuring efficient execution.
2. **Memory Management** - Allocates and deallocates memory for programs and data.
3. **File System Management** - Organizes, stores, retrieves, and manages data on storage devices.
4. **Device Management** - Controls and coordinates hardware components like printers, disks, and keyboards.
5. **Security & Access Control** - Protects data through authentication, encryption, and user permissions.
6. **User Interface** - Provides a graphical or command-line interface for user interaction.

Types of Operating Systems

1. **Batch Operating System** - Executes batches of jobs with minimal user interaction (e.g., early mainframes).
2. **Time-Sharing OS** - Allows multiple users to share system resources simultaneously (e.g., Unix, Linux).
3. **Real-Time OS** - Processes data in real-time with strict timing constraints (e.g., RTOS in embedded systems).
4. **Distributed OS** - Manages multiple computers working as a single system (e.g., cloud computing systems).
5. **Network OS** - Provides networking capabilities to communicate between computers (e.g., Windows Server, Linux Server).
6. **Mobile OS** - Designed for smartphones and tablets (e.g., Android, iOS).

Examples of Operating Systems

- **Microsoft Windows** - A widely used OS for personal computers and enterprise systems, known for its user-friendly interface and extensive software support.
- **macOS** - Developed by Apple, macOS is known for its stability, security, and seamless integration with Apple's ecosystem.
- **Linux (Ubuntu, Fedora, Debian)** - Open-source OS used in servers, desktops, and embedded systems, providing flexibility and security.
- **Android** - A mobile operating system based on Linux, developed by Google, and widely used in smartphones and tablets.
- **iOS** - Developed by Apple, iOS powers iPhones and iPads, offering a closed ecosystem with optimized performance and security.

Conclusion

An OS is essential for the functioning of any computing device. It provides a structured environment for users and applications while efficiently managing system resources.