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**OPERATING SYSTEM**

**CHAPTER 01**

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**OPERATING SYSTEM ROUGH WORK**

# **What is System Software**

System software is a type of computer software that is designed to manage and control the hardware and other software components of a computer system. It provides a platform for application software to run on, and performs essential tasks such as memory management, input/output management, device drivers, security, and system maintenance. Some examples of system software include operating systems, device drivers, utility programs, and programming language translators.

# **What is operating system**

An operating system (OS) is a type of system software that manages and controls the hardware and software resources of a computer system. It provides a platform for other software programs to run on, and performs essential tasks such as process management, memory management, input/output management, device management, file management, and security.

The operating system acts as an intermediary between the computer hardware and the user, providing a user interface that allows the user to interact with the computer system. It manages the allocation of resources to different processes, ensures that processes are not interfering with each other, and provides a mechanism for communication between processes. Additionally, the operating system provides a layer of security that protects the system from unauthorized access and ensures that user data is kept safe.

Some examples of popular operating systems include Windows, macOS, Linux, Android, and iOS.

# **BIOS, bootstrap, kernel, and bootloader are all important components of a computer system, and are related to the process of booting up the system.**

1. BIOS (Basic Input/Output System): BIOS is a firmware that is built into the computer's motherboard. It provides the basic low-level interface between the hardware components of the computer system and the operating system. During the boot process, the BIOS performs a power-on self-test (POST) to check that all the hardware components are functioning properly, and then searches for and loads the boot loader.
2. Bootstrap: Bootstrap is the process of starting up a computer system. It begins with the power-on sequence, where the BIOS is activated, and then proceeds to load the boot loader, which in turn loads the operating system. The bootstrap process is initiated by the computer's firmware and typically involves a series of steps that are executed in a specific order.
3. Kernel: The kernel is the core component of the operating system. It provides the essential services that enable other software programs to run on the computer system. The kernel manages the system's resources, such as memory, input/output devices, and processes, and provides a layer of abstraction between the hardware and software components of the system.
4. Boot loader: A boot loader is a small program that is loaded by the BIOS during the boot process. Its primary function is to load the operating system into memory and transfer control to it. The boot loader typically resides on a bootable storage device, such as a hard drive, USB drive, or CD-ROM.

Overall, these components work together to facilitate the process of booting up a computer system and initializing the operating system.

# Computer system architecture

Computer system architecture refers to the design and organization of the hardware components and software systems that make up a computer system. There are several different types of computer system architecture, including single processor systems, multiprocessor systems, and clustered processor systems.

1. Single Processor Systems: A single processor system is a computer system that has only one central processing unit (CPU). In this architecture, the CPU performs all the computational tasks and manages the resources of the system. Single processor systems are common in personal computers, laptops, and mobile devices.
2. Multiprocessor Systems: A multiprocessor system is a computer system that has multiple CPUs, which work together to perform computational tasks. There are several different types of multiprocessor systems, including symmetric multiprocessing (SMP) and asymmetric multiprocessing (AMP). In SMP systems, all CPUs have equal access to the system's resources and can execute any task, while in AMP systems, one CPU is designated as the primary processor and controls the system's resources, while the other CPUs are used for specific tasks.
3. Clustered Processor Systems: A clustered processor system is a computer system that consists of multiple interconnected computers, or nodes, each with its own CPU and memory. These nodes work together to perform computational tasks, with each node contributing its processing power to the overall system. Clustered processor systems are often used for high-performance computing applications, such as scientific simulations and data analysis.

Overall, the architecture of a computer system depends on the specific requirements of the applications it is designed to support. Different architectures have different advantages and disadvantages in terms of performance, scalability, and cost, and the choice of architecture depends on the specific needs of the application.

# **OPERATING SYSTEM OPERATIONS**

Operating systems perform a wide range of operations to manage the resources of a computer system and provide a platform for running applications. Here are some of the most common operations performed by operating systems:

1. Process Management: The operating system manages the execution of processes, which are programs in execution. This includes creating and terminating processes, scheduling processes for execution on the CPU, and allocating resources such as memory and I/O devices to processes.
2. Memory Management: The operating system manages the allocation and deallocation of memory resources to processes, for using the memory more efficiently.
3. File Management: The operating system provides a file system that allows users to create, read, write, and delete files on disk. This includes managing access permissions and providing interfaces for accessing files and directories.
4. Device Management: The operating system manages the allocation of resources such as input/output (I/O) devices, including keyboards, mice, displays, printers, and network interfaces. This includes providing device drivers that allow applications to communicate with devices and managing input/output requests.
5. Security: The operating system provides security mechanisms to protect the system and its resources from unauthorized access. This includes authentication and access control mechanisms to ensure that only authorized users can access system resources.
6. Interprocess Communication (IPC): The operating system provides mechanisms for processes to communicate and share resources with each other. This includes pipes, message queues, and shared memory.

# COMPUTER ENVIRONMENT

A computer environment refers to the overall set of hardware and software components that make up a computer system. It includes everything from the physical components of the computer (such as the processor, memory, storage devices, input/output devices, etc.) to the software programs and operating system that enable the computer to perform its various functions.

**There are several types of computer environments, including:**

**1. Personal Computing Environment**

The most typical sort of computing environment that people utilize for personal work is the personal computing environment. It comprises of a desktop or laptop computer running Linux, Windows, or another operating system.

**2. Client/Server Environment**  
An online network can be used to deliver services to many clients or users in a server computing environment. Servers can operate a variety of applications, including web servers, email servers, file servers, and more, and are generally situated in data centers.

**3. Cloud Computing Environment**  
A computing environment known as the cloud uses the internet to give customers access to computing resources on demand. A wide range of operations, such as hosting websites, operating apps, and storing data, can be performed in cloud computing environments.

**4. Mobile Computing Environment**

A mobile computing environment is one that is built for use with portable electronics like smartphones and tablets. The processing and storage capabilities of mobile computing environments are often lower than those of traditional desktop or server settings.

**5. Peer to Peer Computing Environment**

Peer-to-peer (P2P) is a sort of network architecture where individual computers (referred to as peers) interact and exchange files or resources with one another directly without the need for a centralized server or authority. As a result, every computer connected to the network has the ability to function as both a client and a server and to both offer and consume resources.

**6. Virtual Computing Environment**

This type of environment uses virtualization technology to create multiple virtual machines on a single physical machine, allowing users to run multiple operating systems or applications on the same hardware

**7. Embedded Computing Environment**

This category of environment describes computer systems that are built into other items or devices, including automobiles, home appliances, medical gadgets, and industrial machinery.

**8. Scientific Computing Environment**

Environments of this kind are utilized in science and engineering for activities including simulations, modeling, data analysis, and numerical calculations. To tackle difficult jobs, it might be necessary to use specialized hardware, software, and algorithms.

**9. Gaming Computing Environment**

This category of environment includes computers or video game consoles with high-performance input devices, graphics, and sound that are customized to support video games.

**10. Home Entertainment Computing Environment**

This category of environment comprises PCs, media centers, and set-top boxes that are used to stream music, movies, or other forms of entertainment in a living room or home theater.