

Introduction to the Computer System & Operating System



A computer system is a set of interconnected components that work together to process data and perform tasks



Computer System Components

Hardware

The physical components of a computer system that you can see and touch or handle

Software

The programs and data used by the computer to perform tasks and manage resources. There are two main categories: system software and application software.

Hardware

CPU

A computer's central processing unit (CPU) carries out the instructions of a computer program.

RAM

Random-access memory (RAM) is a form of computer memory that can be accessed randomly, allowing the CPU to quickly access data that is frequently used.

Storage

A computer's storage device is used to store data and programs when not in use.

Motherboard

The motherboard is the main printed circuit board of a computer. It connects all the components of a computer together.

Input/Output Devices

Devices through which information/data is input into or output from the computer system. Mouse, keyboard, scanner are input devices while output include printer, monitor etc

Software

Application Software

Designed to perform specific tasks or functions for users, such as word processing, graphics editing, or database management. Examples include Microsoft Office, Adobe Photoshop, and QuickBooks.

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System Software

Designed to manage and control the hardware and provide a platform for running other software applications. Examples include operating systems, device drivers, and utilities.

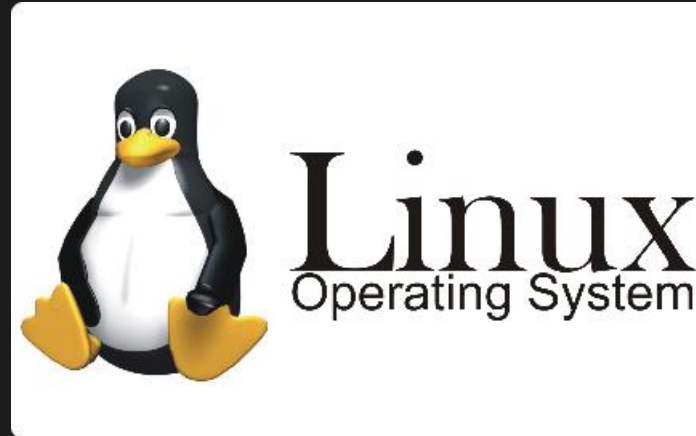
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Computer Operating Systems



Windows

One of the most widely used operating systems for personal computers, created by Microsoft.



Linux

A free and open-source operating system that runs on a wide range of platforms, with many different distributions or "distros".



macOS

An operating system for Apple's Macintosh line of computers, known for its user-friendly interface and elegant design.



Android

A popular mobile operating system developed by Google, designed for smartphones and tablets.



iOS

An Operating System for apple mobile phones, Tablets and devices.

Types of Operating Systems

1 Single-User Systems

An operating system that allows only one user to run programs and applications at a time, common in personal computers.

2 Multi-User Systems

An operating system that allows multiple users to access the same computer and share resources, common in large organizations and institutions.

3 Real-Time Systems

An operating system that processes data and events as they occur in real-time, typically used in industrial automation and robotics.

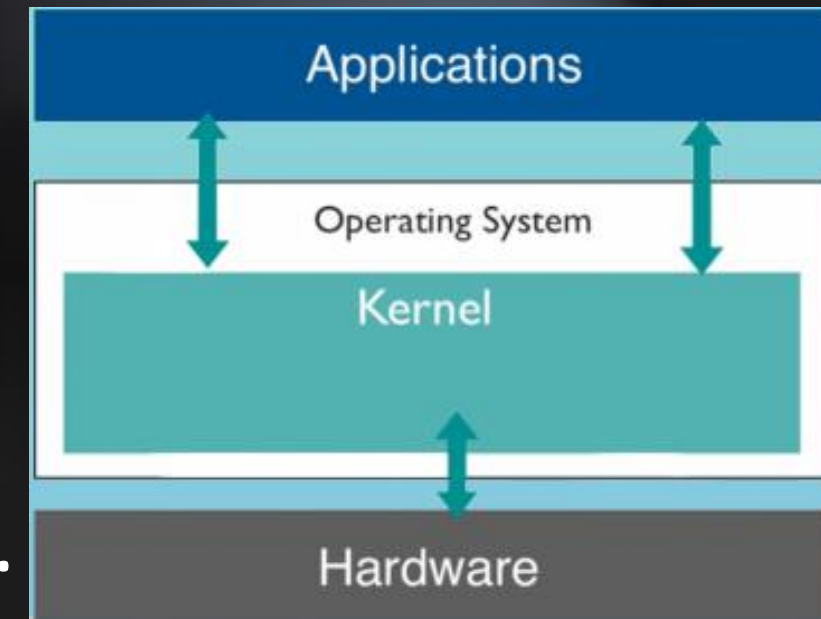
4 Distributed Systems

An operating system that manages a network of independent computers and allows them to function as a single system, common in cloud computing and web services.

Functions of an Operating System



Components of an Operating System



- **Kernel:** Core of the OS, responsible for basic operations.
- **Shell:** Interface between user and kernel, interprets commands.
- **Device Drivers:** Facilitate communication with hardware devices.
- **File System:** Organizes and manages data on storage devices.

VIRTUALIZATION

Virtualization is a technology that allows multiple operating systems and applications to run on the same physical hardware simultaneously.

This is achieved by creating virtual machines (VMs) or virtual environments that mimic the functionality of a physical computer.

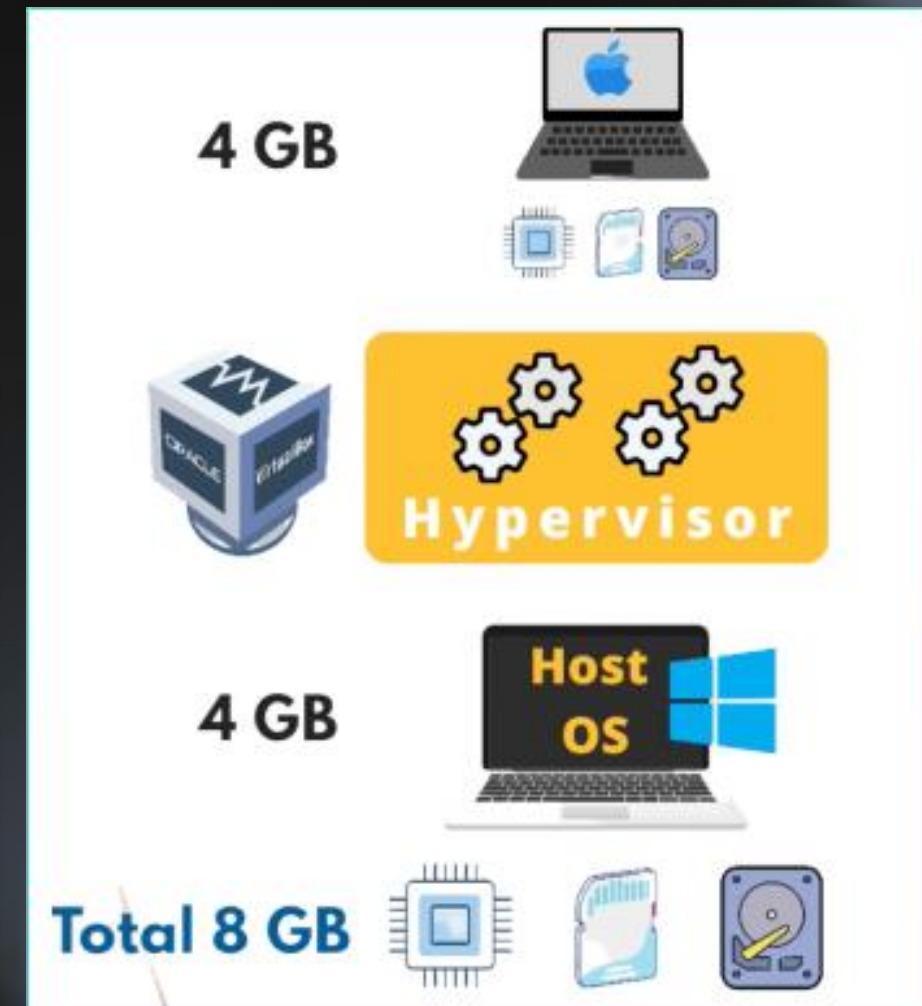
Each VM operates independently and can run its own operating system.

VIRTUALIZATION

How Virtualization Works



Oracle Virtual Box Hypervisor



Hypervisor

Hypervisor is the core of virtualization.

It is a software layer that sits between the hardware and the operating systems.

The hypervisor manages and allocates the resources of the physical machine to the virtual machines.

Examples of hypervisors include VMware, Microsoft Hyper-V and others. Virtualization has become a fundamental technology in cloud computing and other IT environments

Benefit of Virtualization

1. **Resource Utilization:** Virtualization allows for more efficient use of hardware resources, as multiple VMs can run on the same physical
2. **Isolation:** VMs are isolated from each other, providing better security and stability. If one VM crashes, it doesn't affect others.
3. **Flexibility:** Virtual machines can be easily moved and replicated, providing flexibility in managing and deploying applications.
4. **Testing and Development:** Virtualization is widely used for testing and development purposes, allowing developers to create and test software in different environments without the need for multiple physical machines.

HOST OS = The Operating System that runs on the Hardware

GUEST OS = The Operating System that runs on the virtual machine

The Guest Operating System is its own environment called the Virtual Machine (VM) and runs on the virtualization technology of the Hardware and the Host OS

You can have more than one Guest OS on the Host OS

Conclusion

Computer systems are complex and diverse, with various hardware and software components that work together to perform tasks.

Operating systems are essential to the functioning of a computer, providing a platform for running software and managing resources.

Choosing the right operating system depends on factors such as functionality, usability, and support, as well as personal preferences.