

1. Introduction to Hypervisor

Definition and Purpose: A hypervisor is a software layer that allows the creation and management of multiple virtual machines (VMs) on a single physical computer or server. It acts as an intermediary between the physical hardware and the virtual machines, providing each VM with a virtualized environment that emulates the underlying hardware components, including CPU, memory, storage, and networking devices.

How Hypervisors Work: Hypervisors manage the allocation of physical resources to virtual machines, ensuring that each VM operates independently and securely. They schedule the usage of CPU time, memory, and other resources, preventing conflicts between VMs and optimizing overall system performance.

Benefits of Using Hypervisors:

- **Server Consolidation:** Hypervisors enables the consolidation of multiple servers onto a single physical machine, reducing hardware costs and power consumption.
- **Isolation:** VMs are isolated from each other and the host system, ensuring that failures or issues in one VM do not affect others.
- **Resource Allocation:** Hypervisors allow dynamic allocation of resources to VMs, enabling efficient utilization of hardware.
- **Testing and Development:** Virtualization simplifies software testing and development by providing isolated environments for experimentation.
- **High Availability:** Hypervisors support features like live migration, which facilitates moving VMs between physical hosts without downtime, ensuring continuous operation.

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