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S Thenmozhi

Department of Computer Applications

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Cloud Computing Essentials

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Concepts

- Virtualization
- Load Balancing
- Scalability & Elasticity
- Deployment
- Replication
- Monitoring
- Identity and access management

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Virtualization

- Partitioning the resources of a physical system into multiple virtual resources
- Key technology of cloud computing
- Allows pooling of resources
- Serve multiple users using multi-tenancy
- Physical resources are virtualized
- Allows multiple OS to run on same underlying resource

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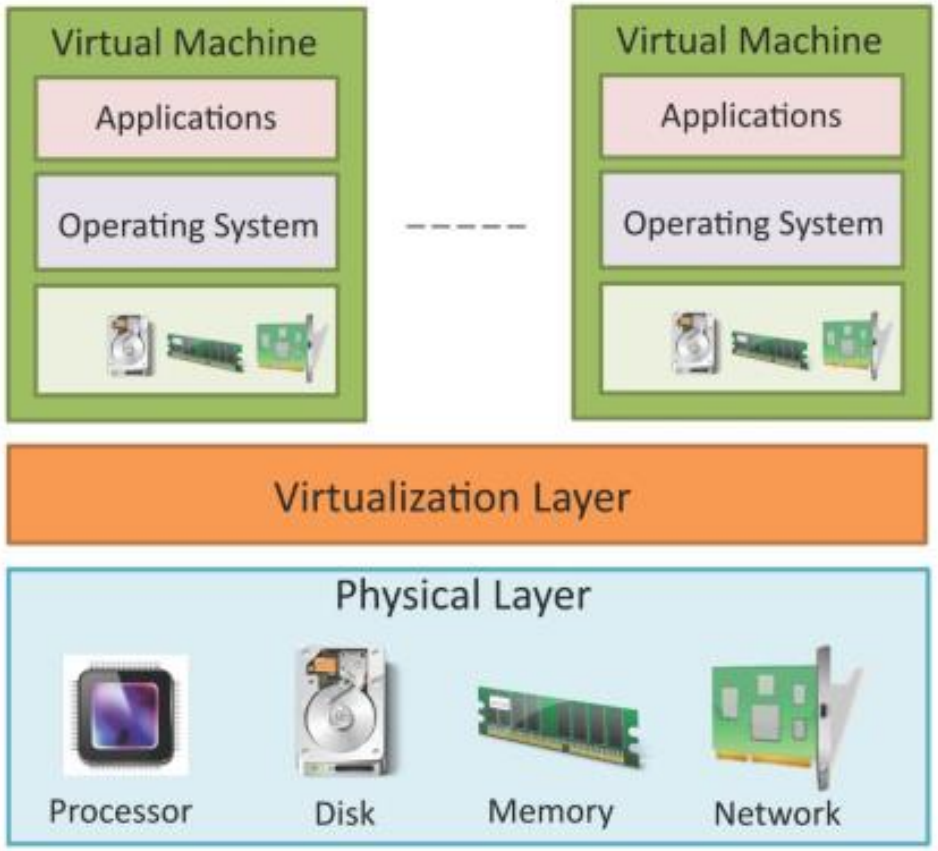
Virtualization



Hypervisor

- The Virtualization layer consists of a Hypervisor or Virtual Machine Monitor(VMM)
- Hypervisor presents a virtual operating platform for the Guest OS
- **Type 1 or Native Hypervisor**

  - Runs directly on the host hardware, controls the hardware and monitor the Guest OS
- **Type 2 or Hosted Hypervisor**

  - Runs on top of host OS and monitor the Guest OS

Virtualization

- Virtual machines are files that recreate the computing environment of a physical computer.
- A hypervisor is software that runs these files.
- Hypervisors allocate hardware resources to virtual machines and ensure they remain independent from one another, thereby maintaining the system.

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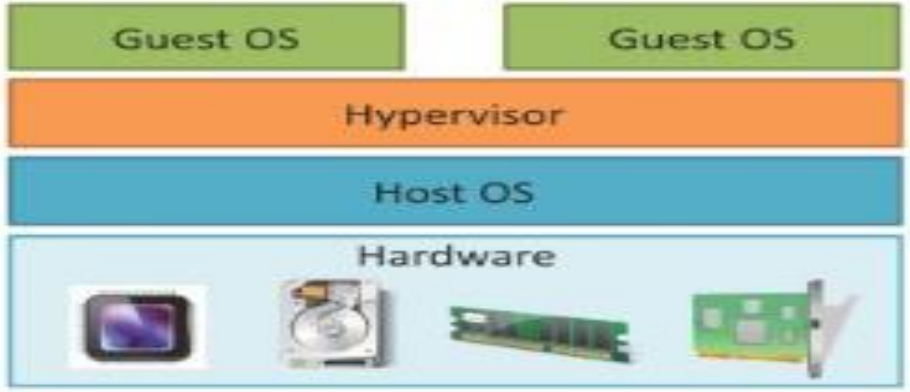
Virtualization

Type-1 Hypervisor



Type-2 Hypervisor

Examples

Hypervisor	Type
Citrix Xen Server	Type 1
Oracle VM Server	Type 1
KVM	Type 1
VMWare ESX/ESXi	Type 1
Microsoft Hyper V	Type 1
Xen Hypervisor	Type 1
VMWare Workstation	Type 2
VirtualBox	Type 2

Virtualization

Types

- Full Virtualization
- Para Virtualization
- Hardware Virtualization

Full Virtualization

- Decouples the guest OS from underlying hardware.
- Guest OS doesn't require any modification and doesn't aware that it is being virtualized
- Direct execution of user requests and binary translation of OS requests

Para Virtualization

- Guest OS kernel is modified to enable communication with the hypervisor to improve performance and efficiency.
- Hyper calls communicate with the virtualization layer hypervisor

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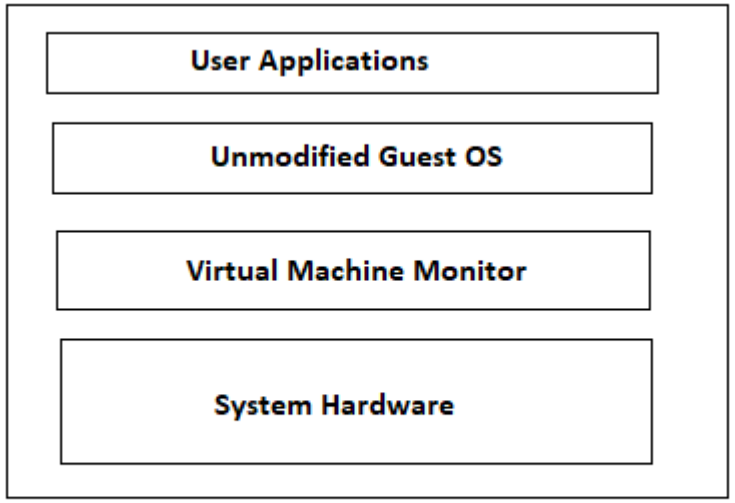
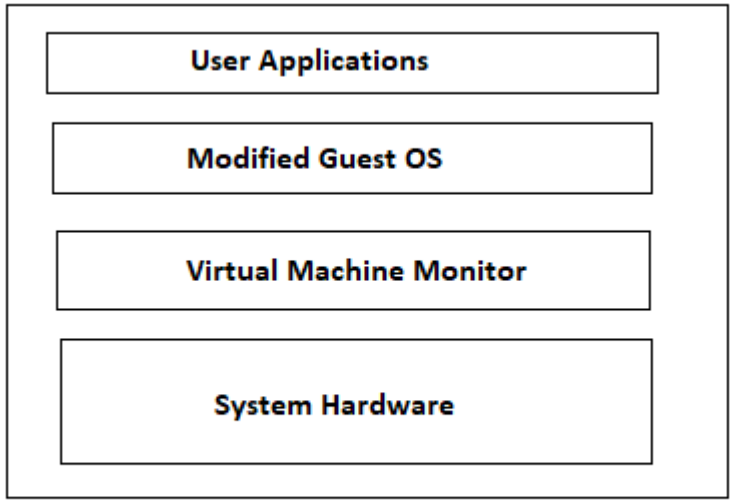
Virtualization



(a) Full Virtualization



(b) Para Virtualization

Hardware Virtualization

- Hardware assisted virtualization is enabled by hardware features such as Intel's Virtualization Technology (VT-x) and AMD's AMD-V
- Privileged and sensitive calls are set to automatically trap the hypervisor
- No need for Binary translations or para virtualizations

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THANK YOU

S Thenmozhi

Department of Computer Applications

thenmozhis@pes.edu

+91 80 6666 3333 Extn 393