Data Center Virtualization and Cloud Computing Infrastructure

Kh. Rashedul Arefin

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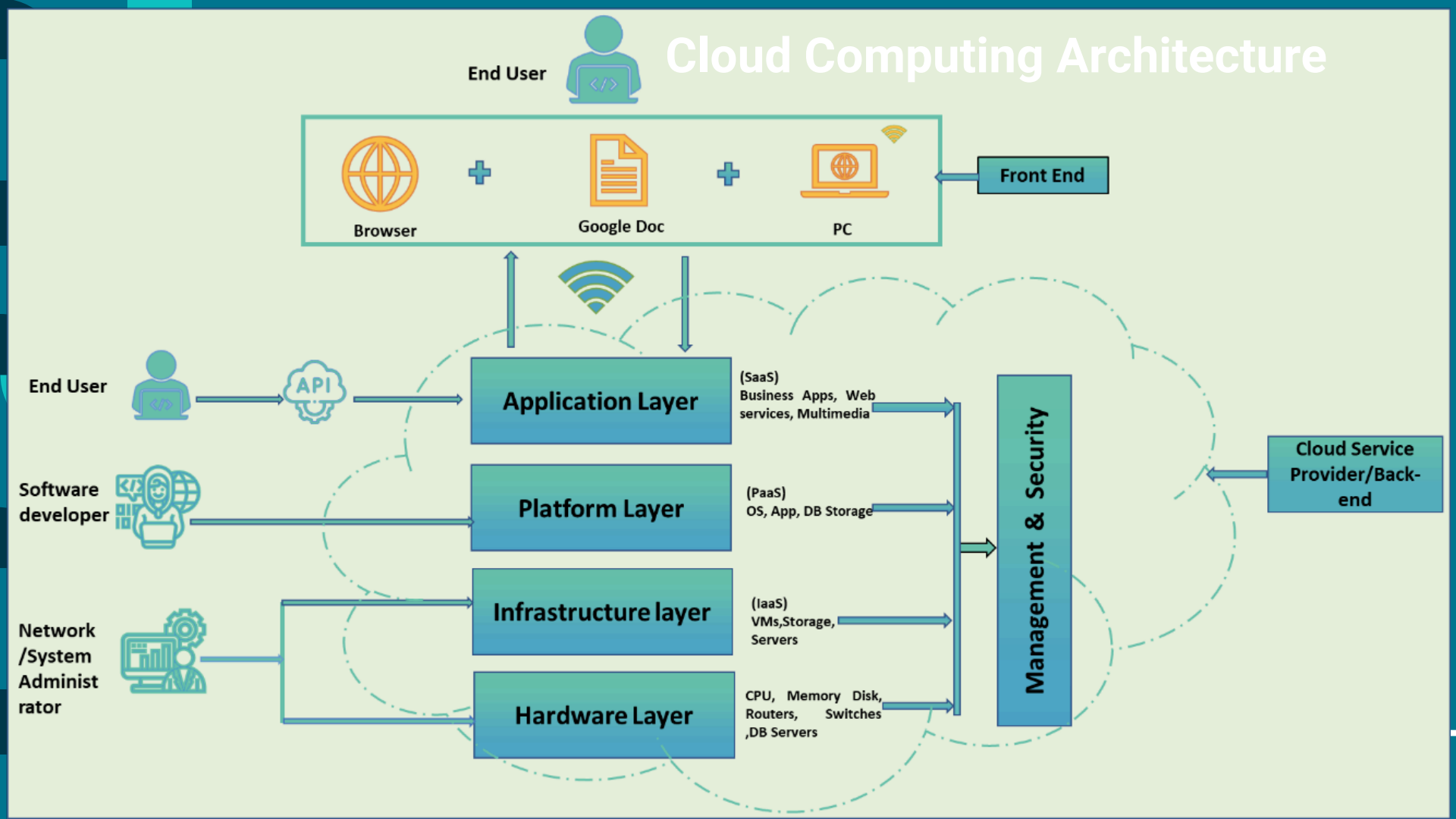
Cloud Computing Architecture



Cloud Computing and Virtualization

Virtualization

Virtualization:

Transparent emulation of IT resources producing benefits to consumers which is unavailable in physical form

- ✓ Emulation (Main Memory, Mainframe, Default Gateway IP Address etc.)
- ✓ Transparency (CPU, Mainframe Users, TCP/IP Host etc.)

Benefits:

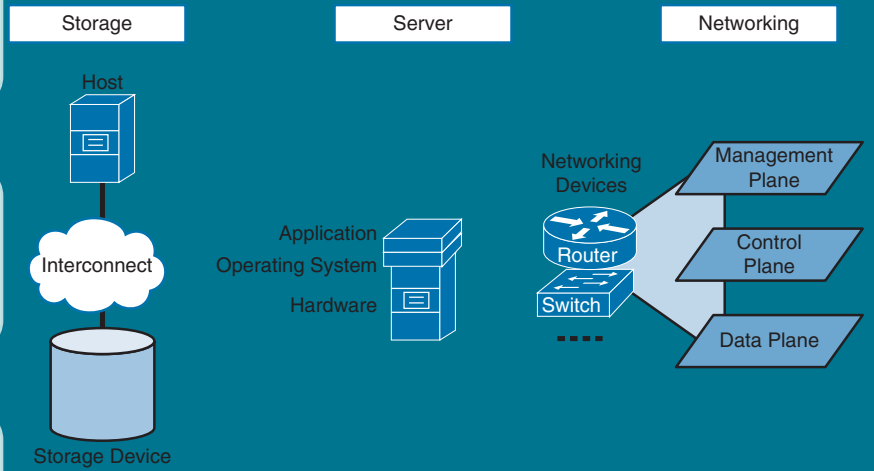
- ✓ Memory Expansion
- ✓ Resource Optimization
- ✓ High Availability

Types of Virtualization Technology

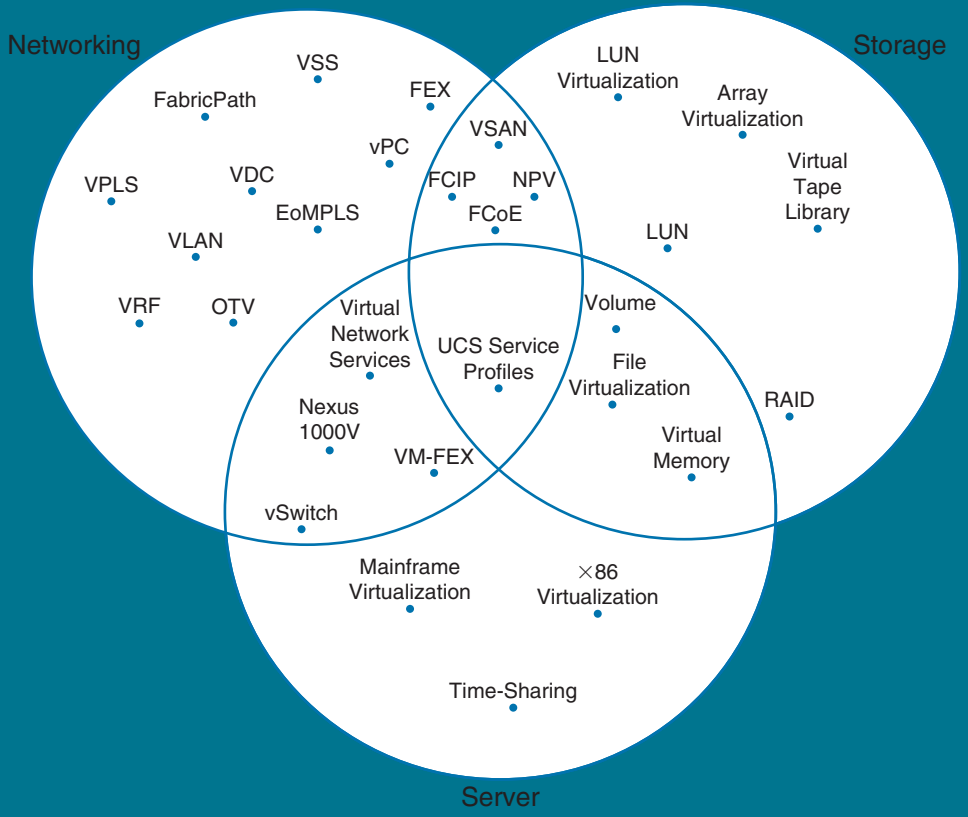
Pooling	Abstraction	Partitioning
❖Homogeneous ❖Heterogeneous	❖Address Remapping ❖Structural	❖Resource Allocation ❖No Resource Allocation

Area of Data Center Virtualization

Compute / Server	• Hardware • Operating System • Application
Network	• Data Plane • Control Plane • Management Plane
Storage	• Storage Device • Host • Interconnect

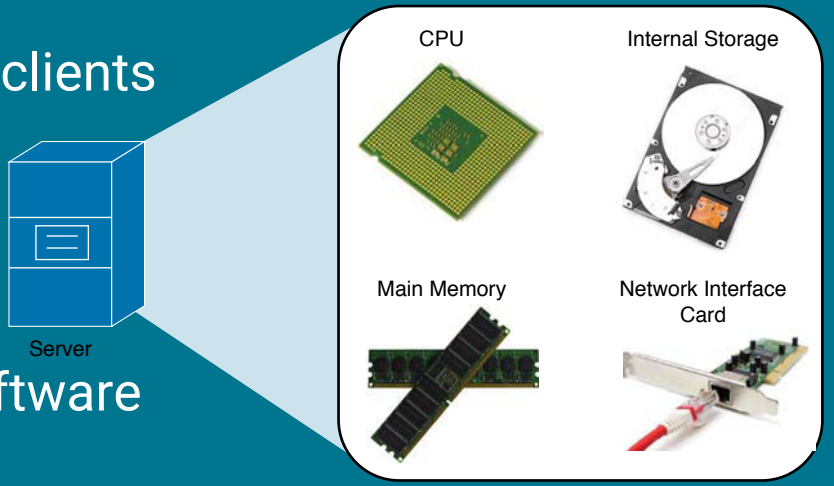


Virtualization Technology Area



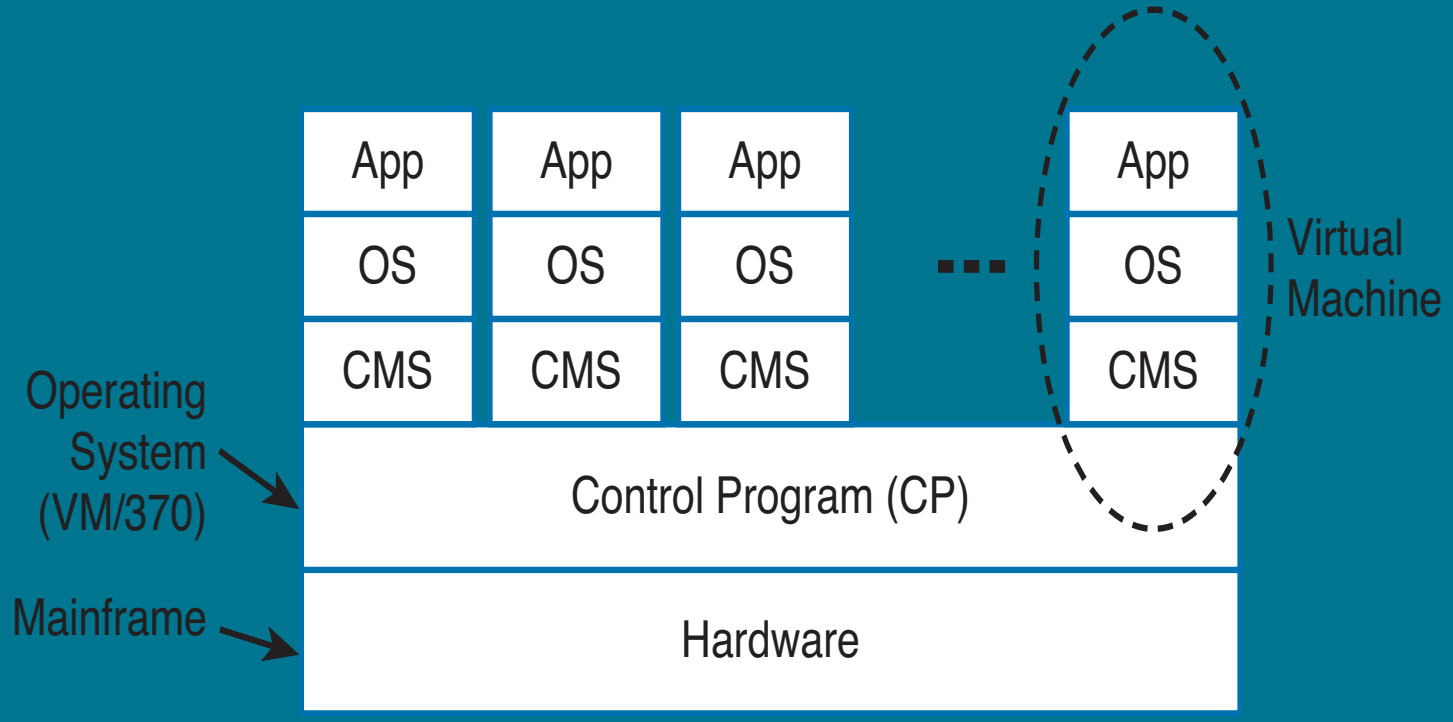
Introduction to Server

- Software Component
- Accept request from multiple clients
- Process clients' request
- Provide suitable Response

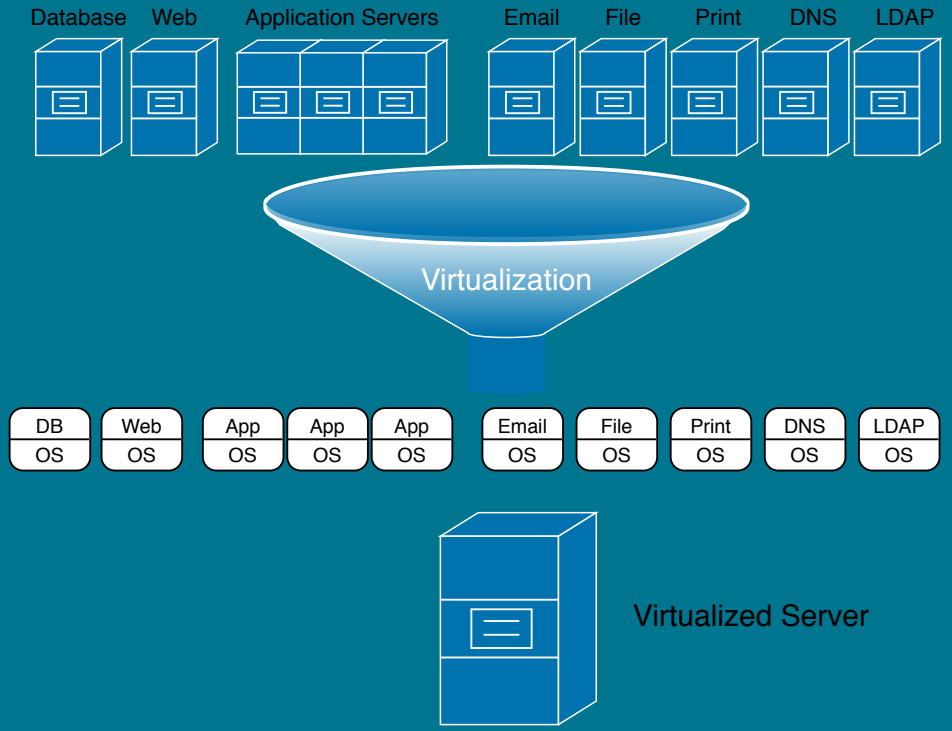


- Hardware that host Server Software

Server Virtualization Evolution



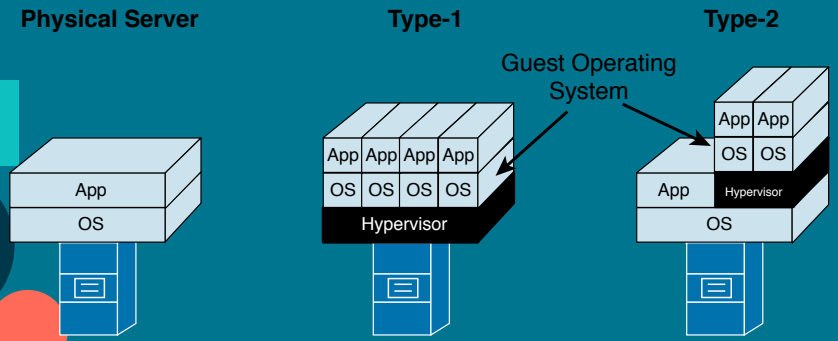
Server Virtualization



Server Virtualization

Hypervisors:

- ✓ A Software Component
- ✓ Create emulated hardware
  - CPU
  - Memory
  - Storage
  - Peripherals
- ✓ Allow to create Virtual Machine



Type - 1

- VMware ESXi
- Microsoft Hyper-V
- Linux KVM
- Red Hat Enterprise Virtualization (RHEV)
- Citrix XenServer
- Oracle VM

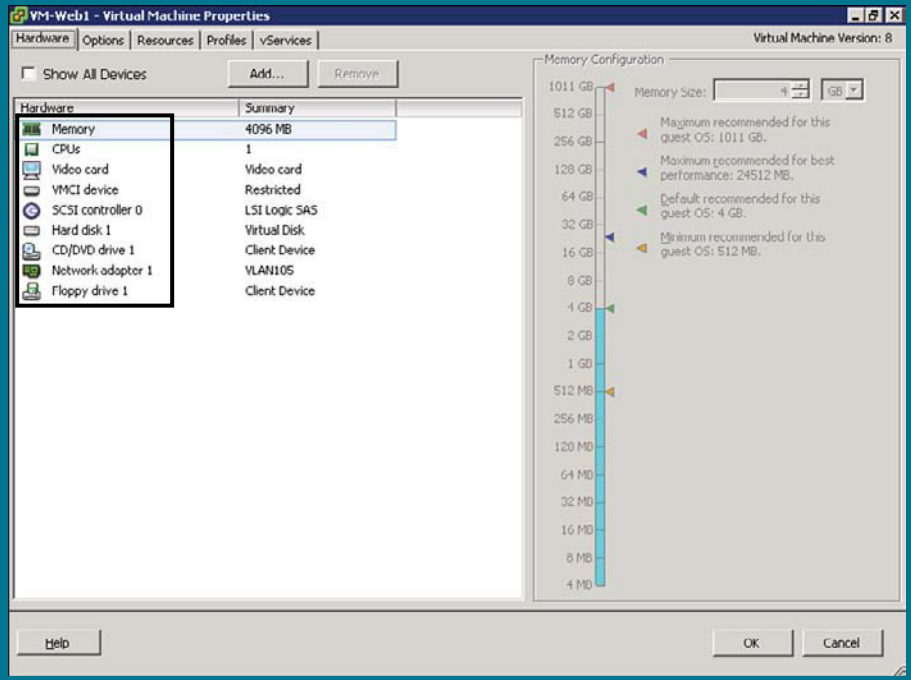
Type - 2

- VMware Workstation
- VMware Player
- VMware Fusion
- Microsoft Windows Virtual PC
- Oracle VM Virtual Box
- Parallels Desktop for Mac

Server Virtualization

Virtual Machine Deploys Virtual Hardware Devices

- ✓ Virtual Central Processing Unit (vCPU)
- ✓ Virtual Random Access memory (vRAM)
- ✓ Virtual Hard Drive
- ✓ Virtual Storage Controller
- ✓ Virtual Network Interface Controller (vNIC)
- ✓ Virtual Video Accelerator Card
- ✓ Virtual Peripherals – CD, DVD, Floppy Disk Drive



Server Virtualization

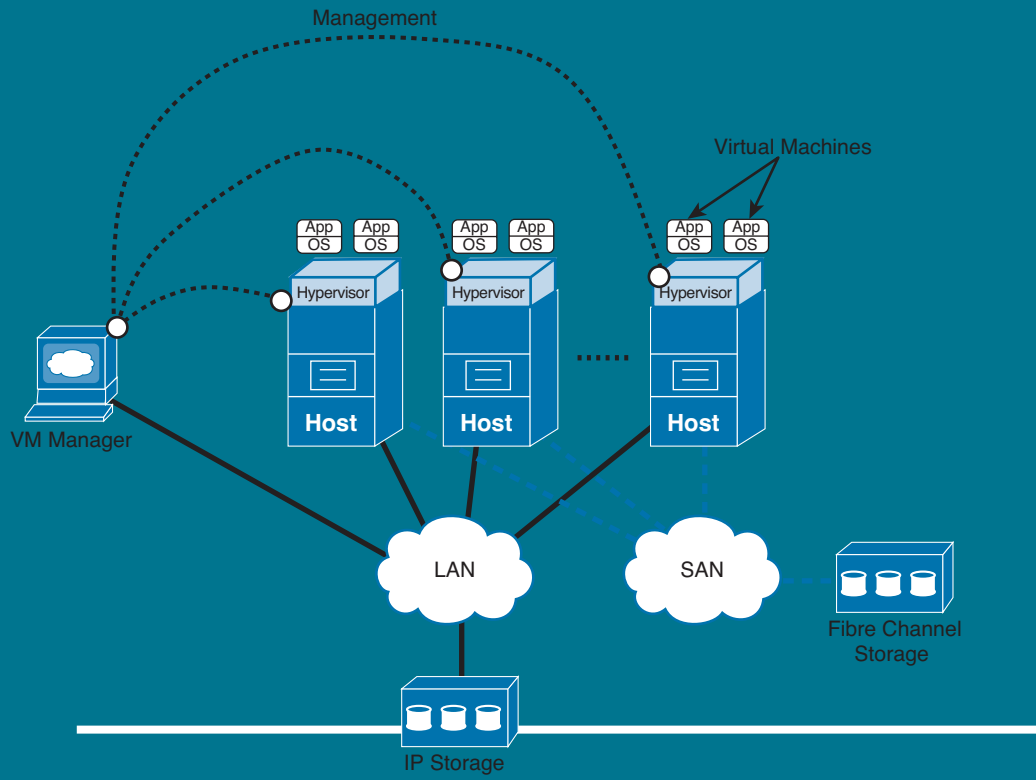
Virtual Machine is composed of a set of files which dictate how Hypervisor controls physical resources and shares them with guest OS.

File Type	File Extension	Functions
Virtual Disk	.vmdk	✓ Contains all the data ✓ VM uses as internal storage device
Swap Memory	.vswp	✓ Used as a replacement of virtual memory
Log	.log	✓ Stores all the information ✓ Used for troubleshooting purposes
Configuration	.vmx	✓ Contains all information of hardware settings ✓ vRAM Size, NIC information etc.
Nonvolatile RAM	.nvram	✓ Contains information for VM initialization ✓ Boot order, CPU usage etc.

Server Virtualization

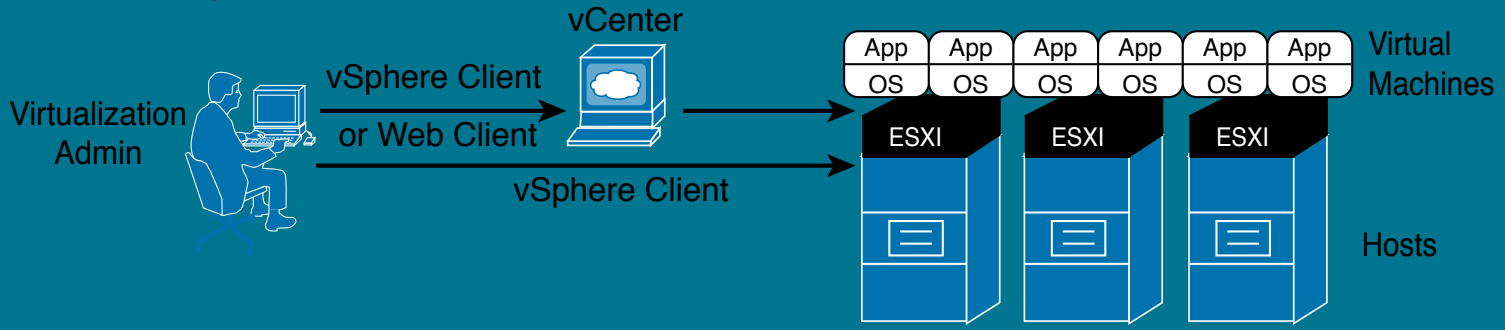
Virtual Machine Manager:

- ✓ Software Solution
- ✓ Create and Manage Virtual Machine

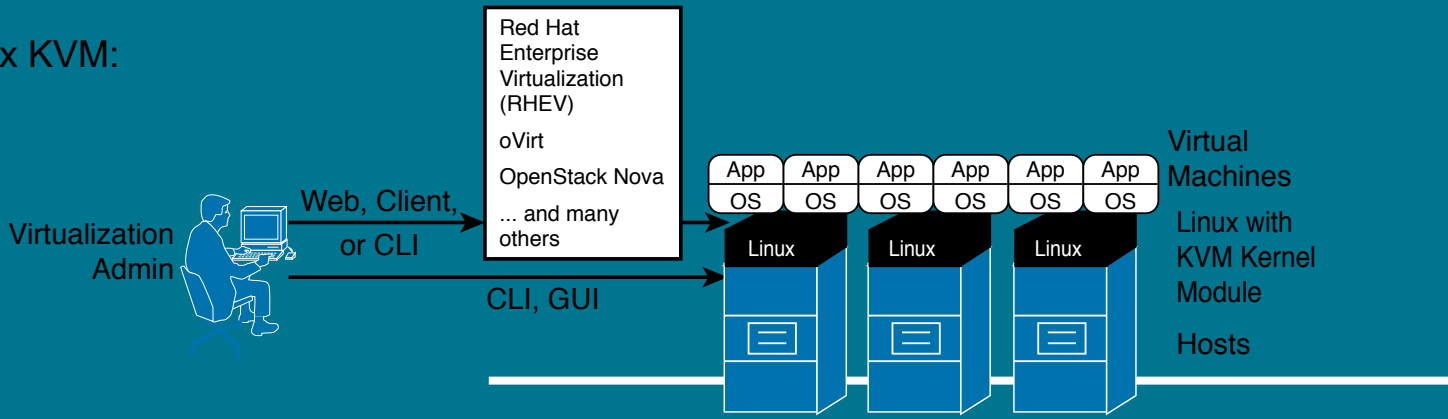


Server Virtualization

VMware vSphere:

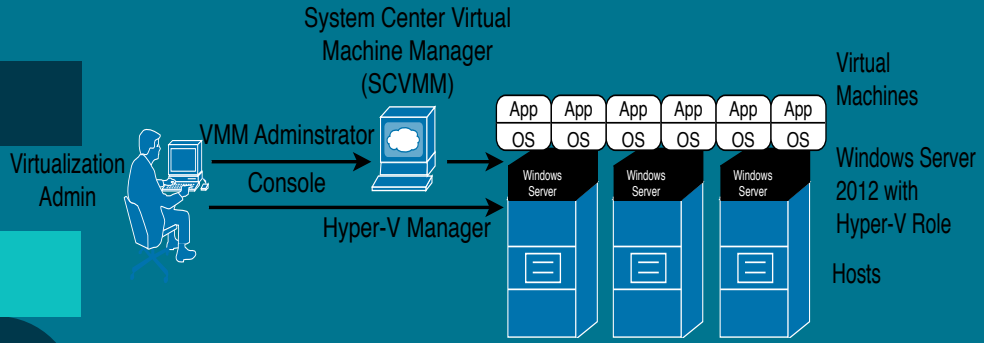


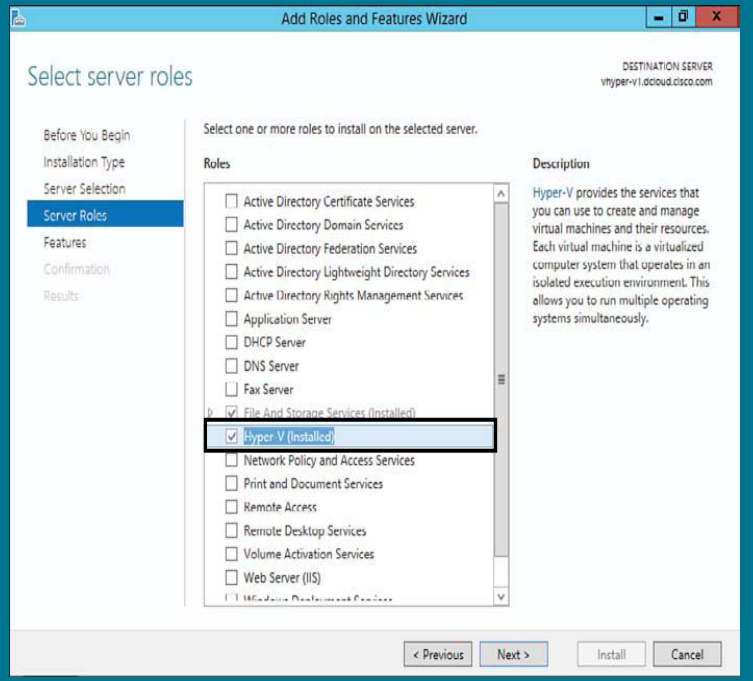
Linux KVM:



Server Virtualization

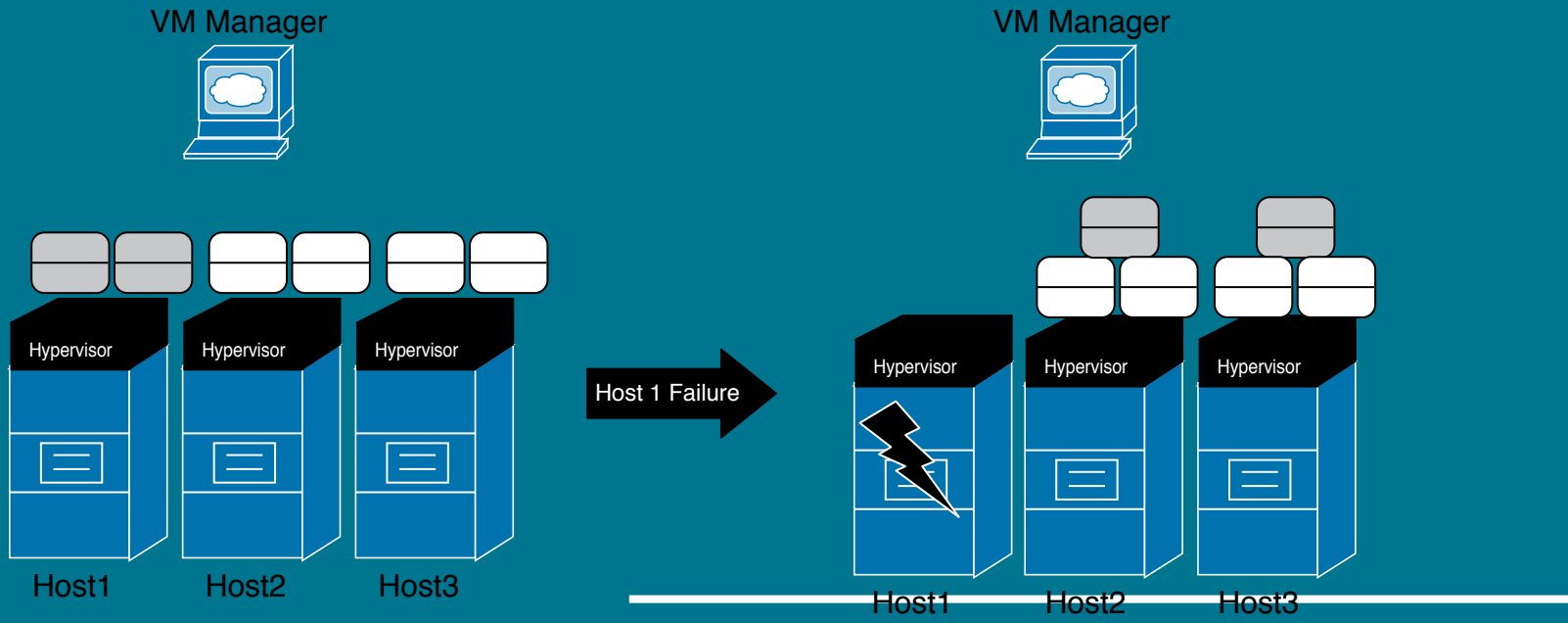
Microsoft Hyper-V:





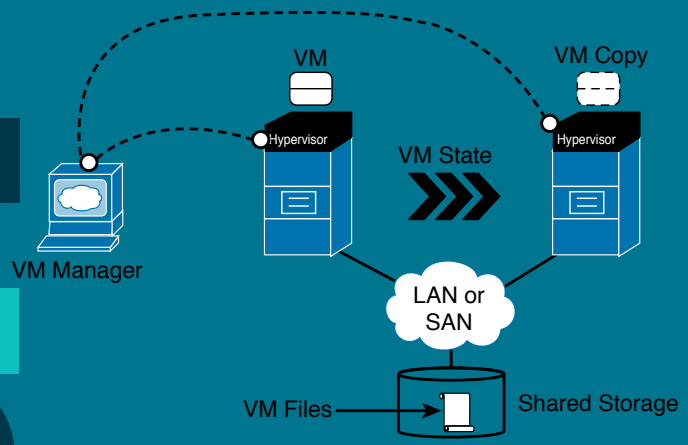
Server Virtualization Features

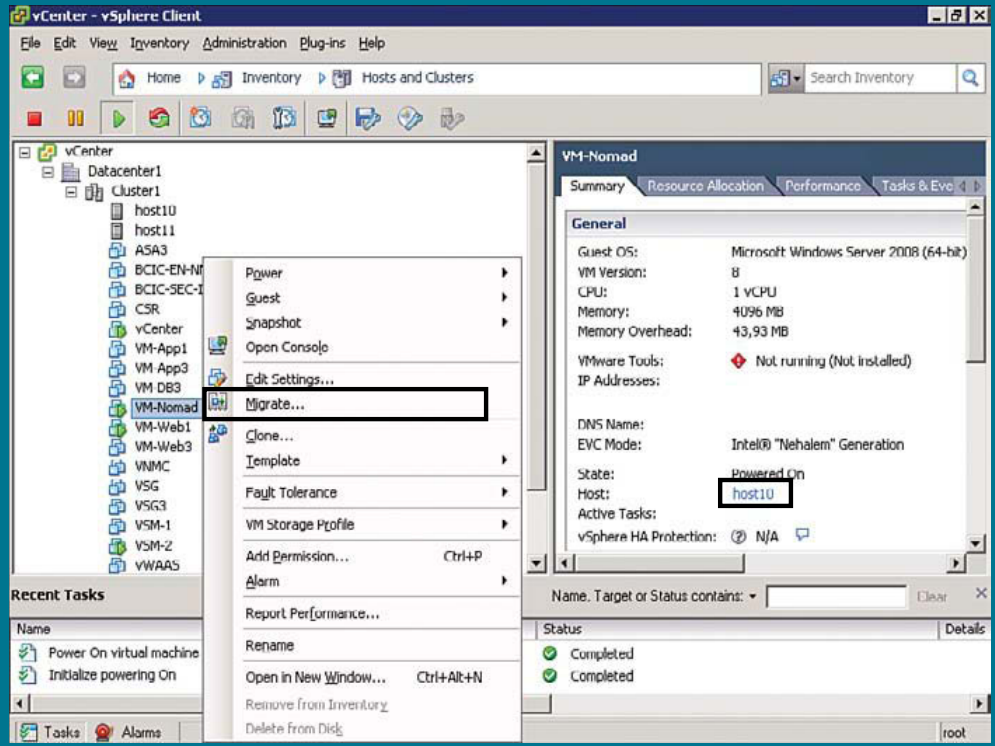
Virtualization Machine High Availability:



Server Virtualization Features

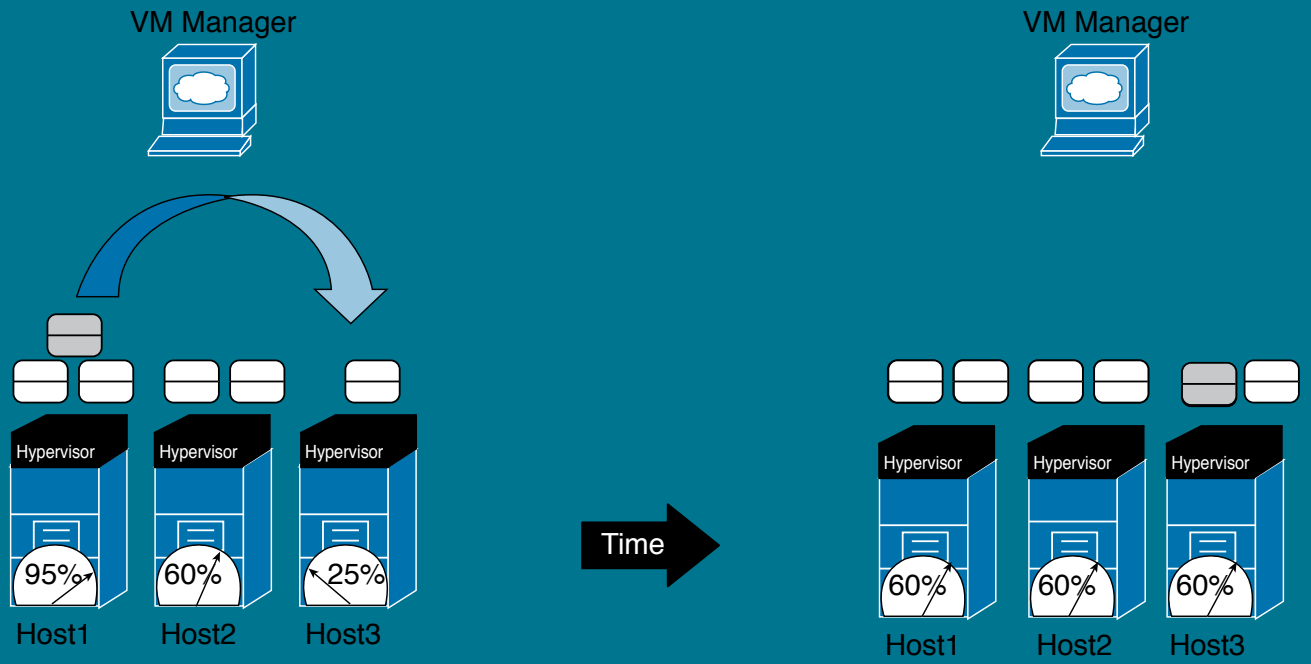
Virtualization Machine Live Migration:





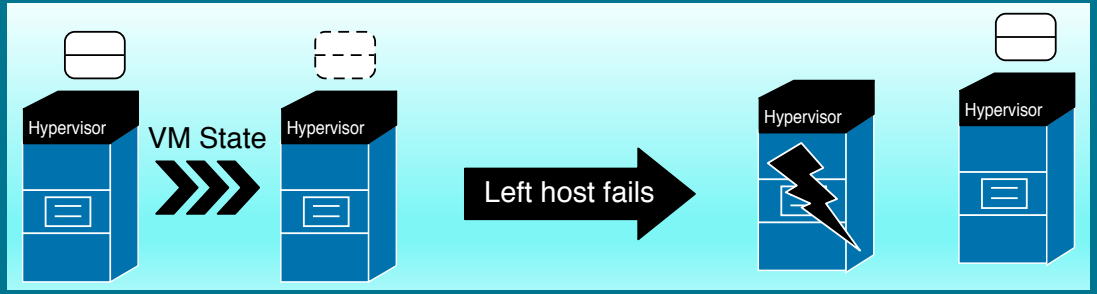
Server Virtualization Features

Resource Load Balancing:

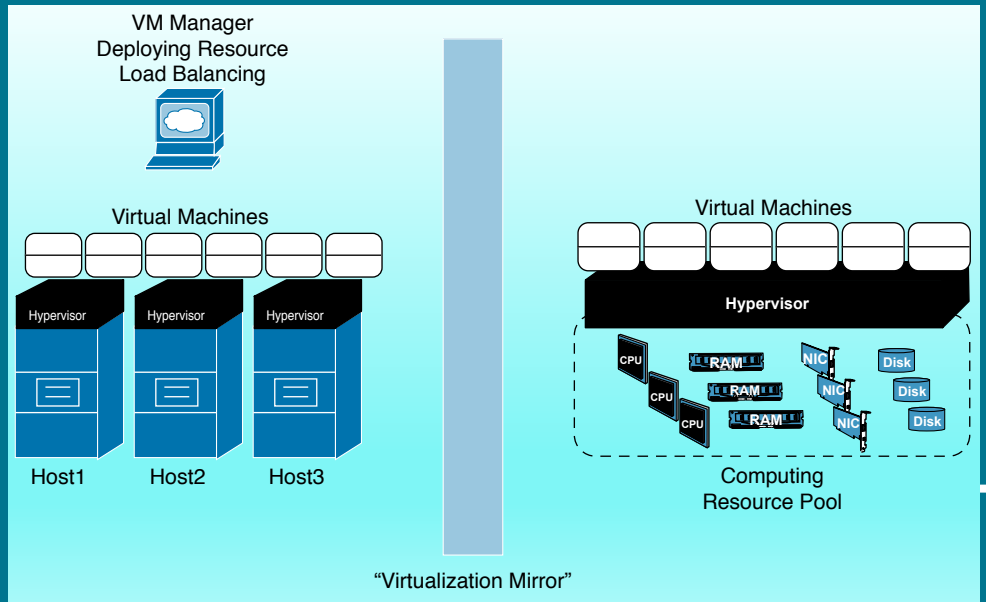


Server Virtualization Features

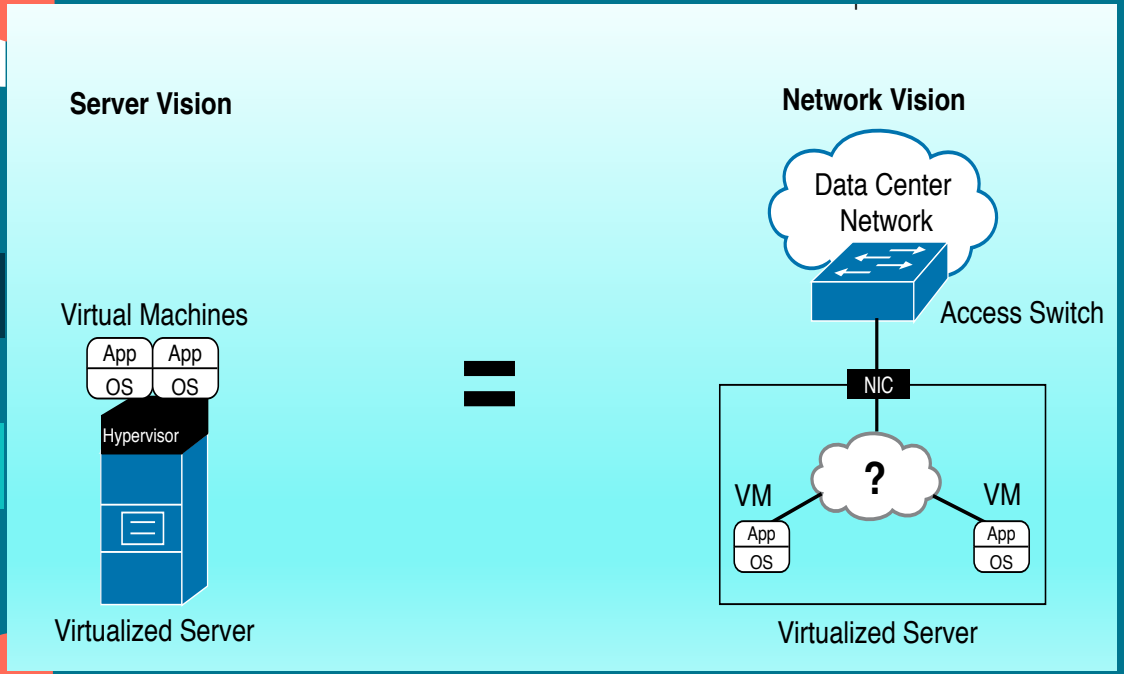
Virtual Machine Fault Tolerance:

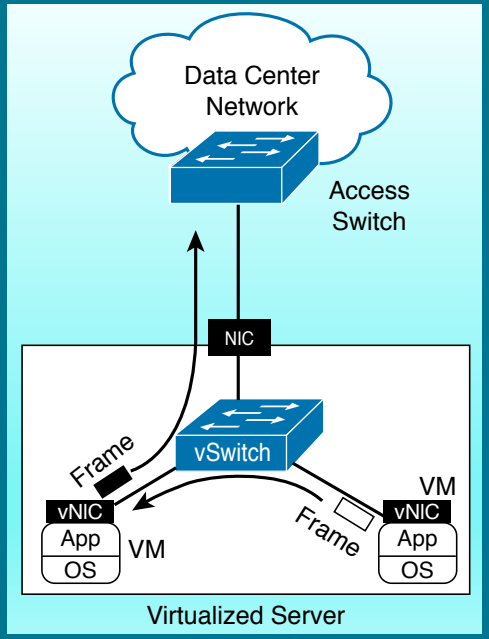


Resource Pooling:



Virtualization Technology Area





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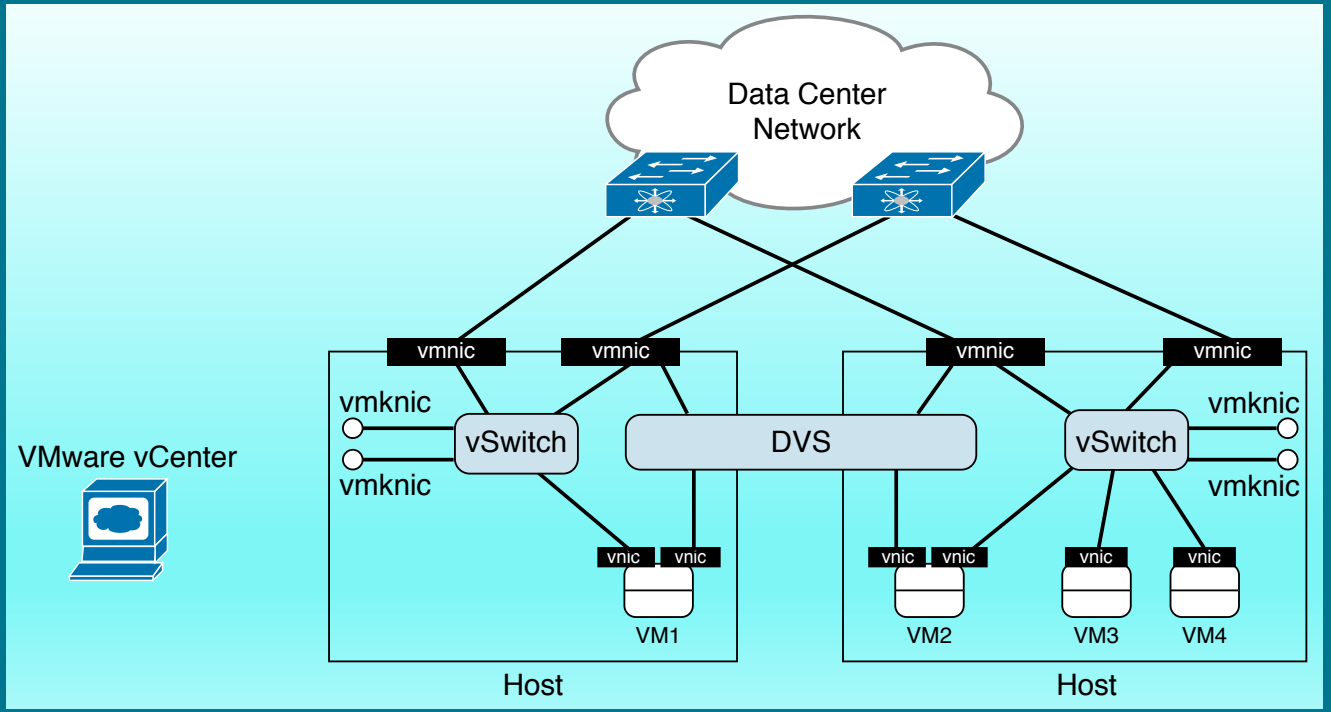
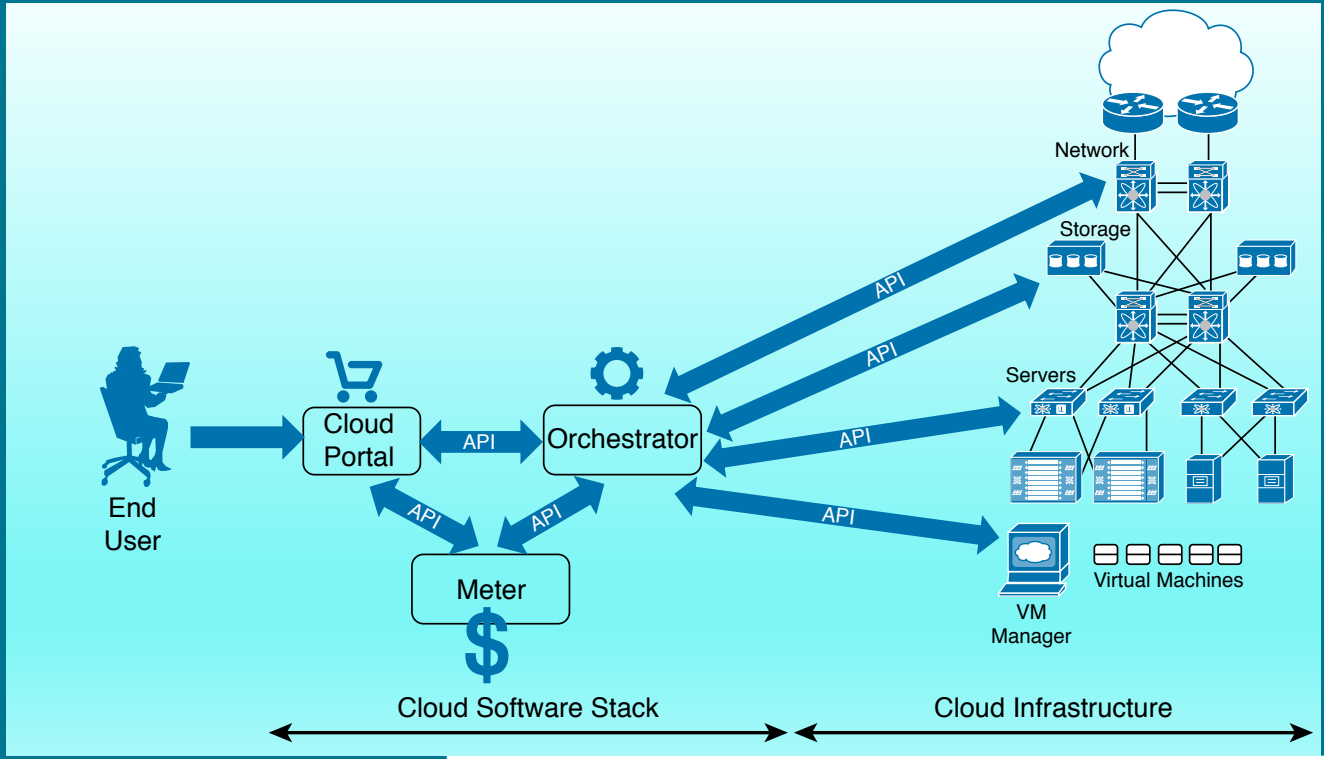


Virtualization and Cloud Computing

Cloud Computing:



Server Virtualization