

Chapter 9: Virtualization and Cloud Computing

Instructor Materials

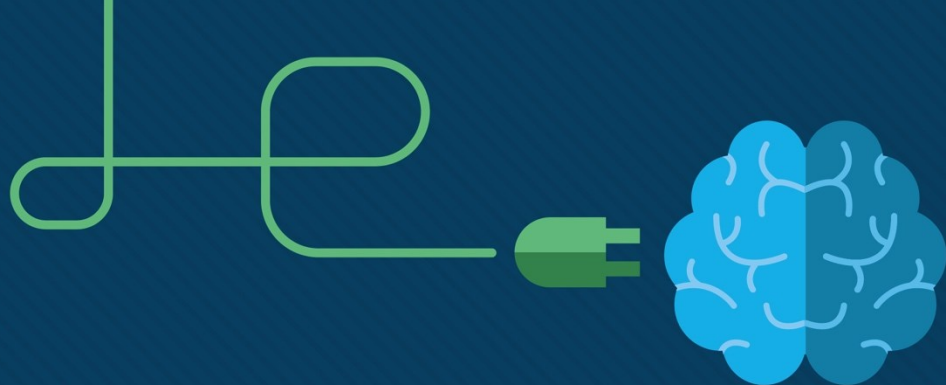
IT Essentials 7.0



Chapter 9: Virtualization and Cloud Computing

IT Essentials 7.0 Planning Guide

Chapter 9: Virtualization and Cloud Computing



Chapter 9 - Sections & Objectives

- 9.1 Virtualization
 - Install a virtual machine on a computer.
 - Explain server virtualization.
 - Install virtualization software on a computer.
- 9.2 Cloud Computing
 - Compare cloud computing concepts.
 - Describe the uses of the cloud.
 - Explain characteristics of public, private, hybrid and community cloud computing.

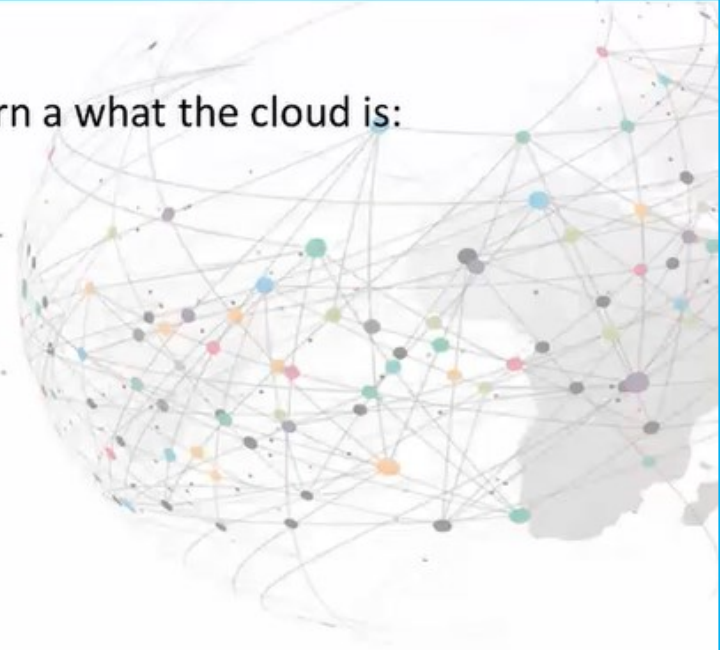
9.1 Virtualization

Video Explanation – What is the cloud?

Video Explanation: What is the Cloud?

In this video explanation, you will learn a what the cloud is:

- Why do we need the cloud?
- What is the cloud used for?
- Data storage and sharing
- Cloud services
- Advantages of the cloud



Cloud Computing and Virtualization

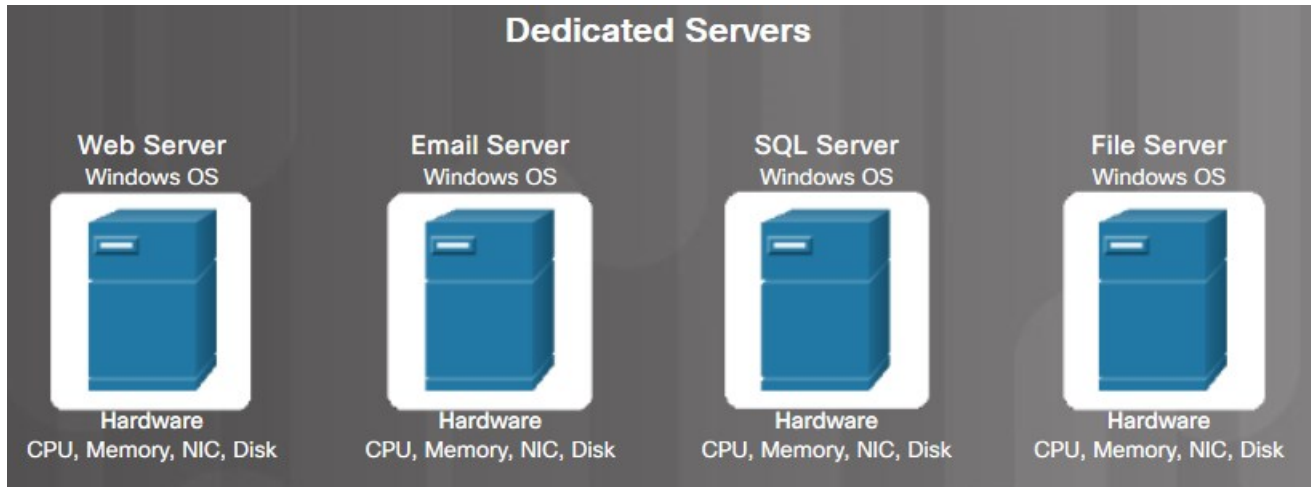
- Virtualization enables a single computer to host multiple independent virtual computers called virtual machines (VM) that share the host computer hardware.
 - Virtualization software separates the actual physical hardware from the VM instances.
 - An image of a VM can be saved as a file and then be re-started when required.
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- Cloud computing separates the applications from the hardware.
 - Service providers such as Amazon Web Services (AWS) own and manage the cloud infrastructure.

Virtualization is the foundation which supports cloud computing.



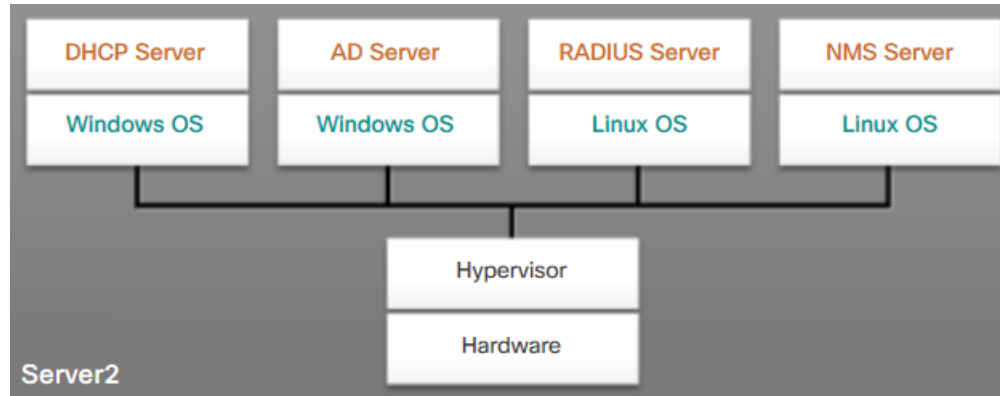
Traditional Server Deployment

- Traditionally, organizations delivered applications and services using powerful dedicated servers.
- These dedicated servers are equipped with large amounts of RAM, powerful CPUs, and multiple large storage devices.
- Disadvantages include: wasted resources, single-point of failure, and server sprawl.



Server Virtualization

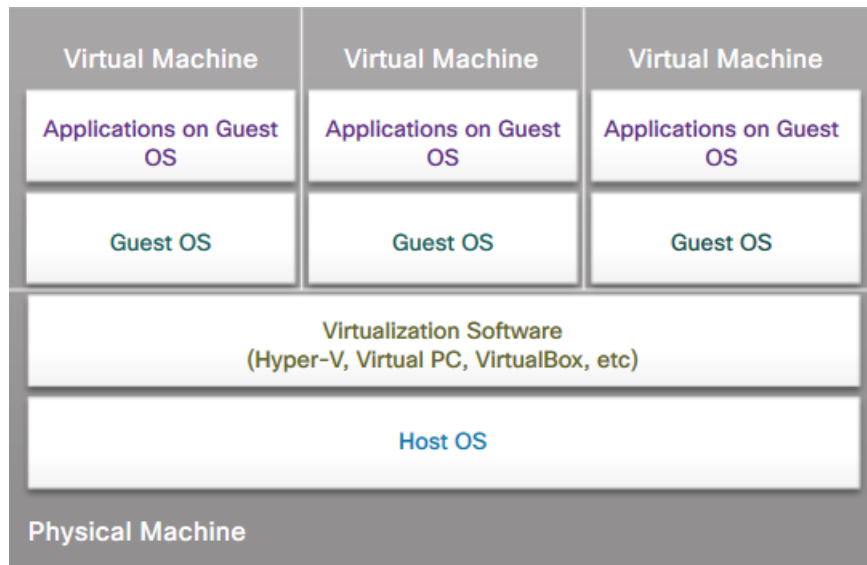
- Server virtualization takes advantage of idle resources to reduce the number of servers required.
- A program called the **hypervisor** is used to manage the computer resources and various VMs.
- It provides VMs access to the hardware in the physical machine such as CPUs, memory, disk controllers, and NICs.
- Each VM runs a complete and separate operating system.



Advantages of Server Virtualization

- Better use of resources
- Less space required
- Less energy consumed
- Reduced cost
- Faster server provisioning
- Maximize server uptime
- Improved disaster recovery
- Support for legacy systems

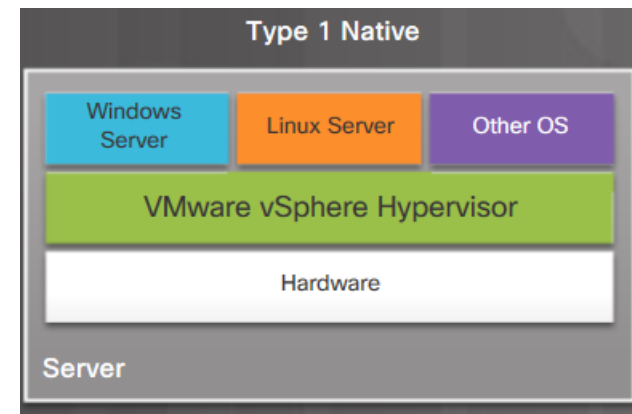
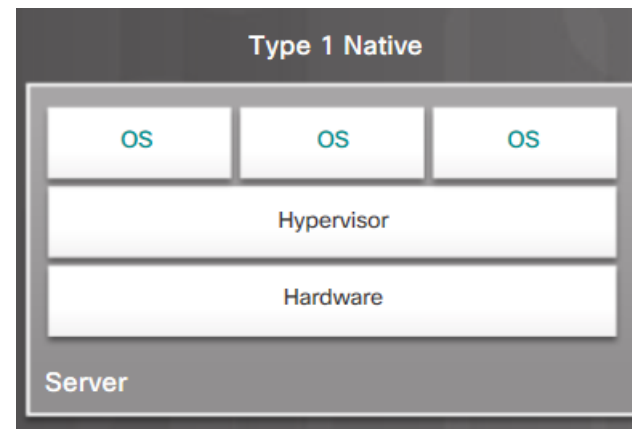
Client-Side Virtualization



- Client-side virtualization enables users to run VMs on their local computer.
- It allows users to test new operating systems, software, or to run older software.
- **Host computer** – the physical computer controlled by a user.
- **Host OS** - the operating system of the host computer.
- **Guest OS** - the operating system that is running in the VM.

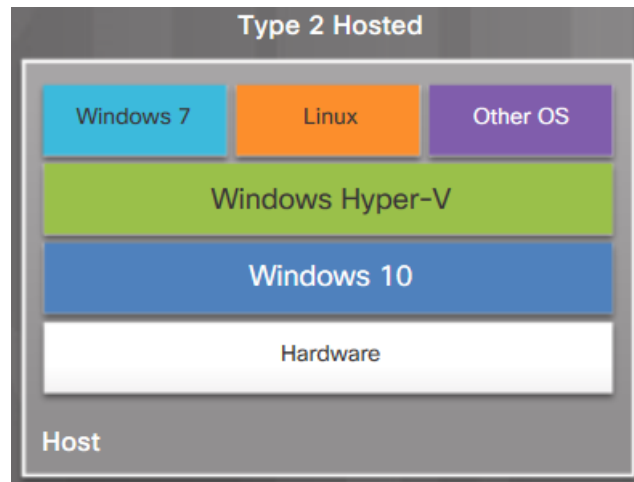
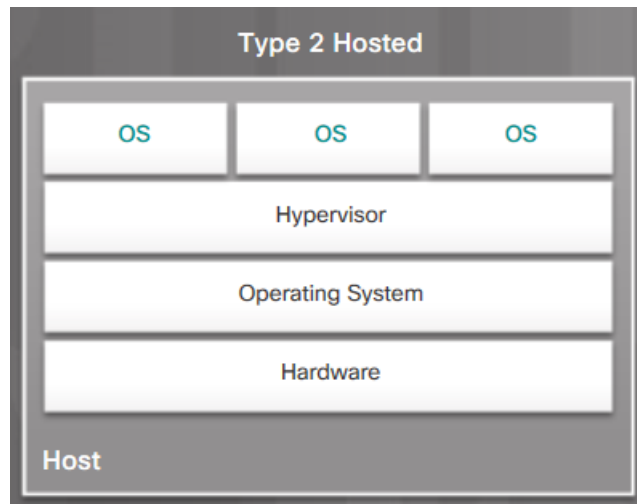
Type 1 and Type 2 Hypervisors

- Type 1 (native) hypervisor is typically used with server virtualization. For example, they are used in data centers and cloud computing.
- Type 1 hypervisors run directly on the hardware of a host, and manage the allocation of system resources to VMs.
- Type 1 hypervisors include VMware vSphere / ESXi, Xen, and Oracle VM Server.



Type 1 and Type 2 Hypervisors (Cont.)

- Type 2 (hosted) hypervisors are commonly used with client-side virtualization.
- Type 2 hypervisors work with the host computer to create and use multiple VMs.
- Type 2 hypervisors include VMware Workstation, Windows Hyper-V, and Oracle VirtualBox.



Virtual Machine Requirements

Windows Hyper-V Minimum Requirements for Windows 10	
Host OS	Windows 10 Pro or Windows Server (2012 and 2016)
Processor	64-bit CPU with Second Level Address Translation (SLAT)
BIOS	CPU support for VM Monitor Mode Extension (VT-c on Intel CPUs)
Memory	Minimum 4GB system RAM
Hard Disk Space	At least 15GB per VM

Hyper-V is included in Windows 10 Pro

Virtual Machine Requirements (Cont.)

Windows Hyper-V Minimum Requirements for Windows 8	
Host OS	Windows 8 Pro or Enterprise 64-bit OS
Processor	64-bit CPU with Second Level Address Translation (SLAT)
BIOS	BIOS-level Hardware Virtualization support
Memory	Minimum 4GB system RAM
Hard Disk Space	At least 15GB per Virtual OS

Virtual Machine Requirements (Cont.)

Windows Virtual PC Requirements in Windows 7	
Processor	1 GHz 32-bit or 64-bit Processor
Memory	2GB
Hard Disk Space	At least 15 GB per Virtual OS

Lab – Install Linux in a Virtual Machine and Explore the GUI

In this lab, you will install a Linux OS in a virtual machine using a desktop virtualization application, such as VirtualBox. After completing the installation, you will explore the GUI interface.

Objectives:

Part 1: Prepare a Computer for Virtualization

Part 2: Install a Linux OS on the Virtual Machine

Part 3: Explore the GUI

9.2 Cloud Computing

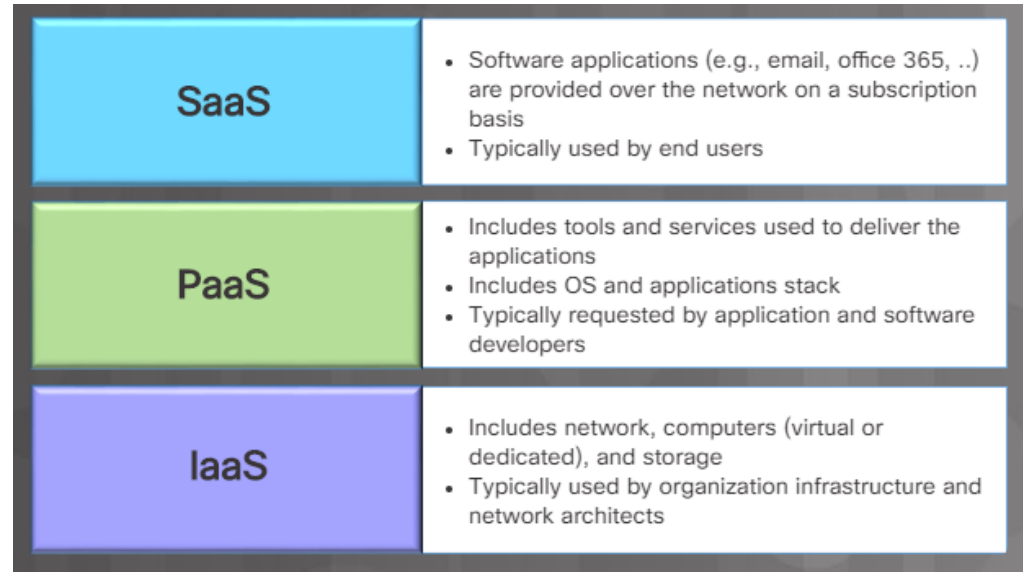
How We Use the Cloud

Cloud computing provides users with on-demand delivery of computing services over the Internet. Cloud computing services are owned and hosted by service providers. Most of us already use cloud services when you use social media applications, access an online music library, or use online storage for save photos. Organizations typically pay cloud providers a usage fee based on user access and usage of services.

Cloud Computing

Cloud Services

- Cloud service providers can provide various services tailored to meet customer requirements.
 - Software as a Service (SaaS)
 - Platform as a Service (PaaS)
 - Infrastructure as a Service (IaaS)
- Cloud service providers have extended the IaaS model to also provide IT as a service (ITaaS).



Cloud Computing Characteristics

- On-demand (self-service)
- Rapid elasticity
- Resource pooling
- Measured and metered service
- Broad network access

9.3 Chapter Summary

Chapter 9: Virtualization and Cloud Computing

- Explain server virtualization.
- Install virtualization software on a computer.
- Describe uses of the cloud.
- Explain characteristics of public, private, hybrid and community cloud computing.

