

Chapter 22

Virtualization



Episode: **Understanding Virtualization**

Objective(s):

Core 1: 3.4 Given a scenario, install and configure motherboards, central processing units (CPUs), and add-on cards.

Core 1: 4.2 Summarize aspects of client-side virtualization.



Episode Description

A+

In the first virtualization episode, Mike explores the concepts behind virtual machines. He discusses virtualization vs. emulation, how modern VMs work, and the differences between Type 1 and Type 2 hypervisors (the different hosts for virtual machines).

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Key Terms

A+

- 1:07 - Objective term - Virtual machine (VM)
- 1:27 - Virtualization
- 1:55 - Emulation
- 2:14 - Objective term - CPUs must be able to support virtualization
- 2:52 - Hypervisor
- 5:49 - Virtual machines can be used to run multiple websites on one powerful machine

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Key Terms

A+

- 6:15 - Objective term - For security, virtual machines can be quickly shut down and backed up from an image file
- 6:53 - Objective term - Virtual machines are great for sandbox testing and cross-platform virtualization
- 7:10 - Type 1 hypervisor
- 7:35 - VMware ESXi, Microsoft Hyper-V, KVM

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Type 1 (Bare Metal) Hypervisors

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- VMWare ESXi
 - <https://www.vmware.com/in/products/esxi-and-esx.html>
- Microsoft Hyper-V
 - <https://learn.microsoft.com/en-us/virtualization/hyper-v-on-windows/about/>
- KVM
 - <https://www.linux-kvm.org/page/Downloads>

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Type 2 Hypervisors

A+

- Oracle VM VirtualBox
 - <https://www.virtualbox.org/>
- VMWare Workstation Player
 - <https://www.vmware.com/products/workstation-player.html>
- Windows Sandbox
 - Available on Windows 10 and 11 Pro, Enterprise, or Education
 - It's a temporary VM, so nothing is saved once you close out of the sandbox
 - <https://learn.microsoft.com/en-us/windows/security/threat-protection/windows-sandbox/windows-sandbox-overview>

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Quick Review

- Virtual machines (VMs) are self-contained computers running on a host machine
- Hypervisors support multiple VMs
- A type 1 hypervisor runs directly on top of the hardware as an OS
- A type 2 hypervisor runs as an app in an OS



Episode: **Your First Virtual Machine**

Objective(s): Core 1: 4.2 Summarize aspects of client-side virtualization.



Episode Description

A+

In this episode, Mike walks the viewer through the process of setting up a new virtual machine. The host OS is Windows 10; Oracle VM VirtualBox is the type 2 hypervisor. The VM Mike installs runs Ubuntu Linux. During the setup, Mike explains details specific to VirtualBox and Ubuntu, and details that apply to any virtual machine installation.

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Key Terms

A+

- 0:19 - Objective term - Virtual machines are great for cross-platform virtualization
- 2:52 - Objective term - Different operating systems have different resource requirements in VMs
- 2:37 - Objective term - VMs are also good to run legacy software and OSes (like Windows 7)

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Download Ubuntu ISO

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- Must have a hypervisor installed (see previous episode)
- Check out www.ubuntu.com for download options
- Currently, here are the most up-to-date versions of Ubuntu you can download
 - 22.04 release, requires 64-bit OS, 4 GB RAM, 25 GB storage space, long-term support guaranteed until April 2027
 - <https://ubuntu.com/download/desktop>
 - Older 20.04 release, requires 64-bit OS, 1 GB RAM, 3.6 GB storage space
 - <https://releases.ubuntu.com/20.04/>

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Quick Review

- Setting up a new VM takes a few steps:
- Install a hypervisor, like Oracle VirtualBox
- Create a virtual machine in the hypervisor
- Download and install an operating system, like Ubuntu Linux



Episode: **Advanced Virtualization Setup**

Objective(s): Core 1: 4.2 Summarize aspects of client-side virtualization.



Episode Description

A+

Mike describes the process of changing one or more VMs, such as modifying the number and size of mass storage available. You can use a VM to explore the many options available in Disk Management with multiple drives. The episode also covers networking with VMs, via bridging, NAT, and NAT network options.

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Key Terms

A+

- 4:11 - Bridged adapter
- 5:15 - Network Address Translation (NAT)
- 6:07 - NAT Network
- 8:47 - Internal Network
- 8:59 - Host-only Adapter
- 9:08 - Generic Driver
- 10:11 - Objective term - Security requirements

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Quick Review

- You can modify virtual hardware easily, such as adding a “drive”
- Bridge a VM to connect to the same network (and DHCP server) as the host OS
- Use NAT to put a VM in a unique network ID
- Use NAT Network to put multiple VMs into a single network ID
- Be sure to consider the same security best practices with VMs as you do with any other operating system



Episode: **Cloud Computing**

Objective(s): Core 1: 4.1 Summarize cloud-computing concepts.



Episode Description

A+

In this episode, Mike looks at the benefits of cloud computing (or moving virtual machines out onto the Internet). The cloud VMs enable benefits such as rapid elasticity and on-demand scaling, so you can quickly support any Internet application that needs it. Mike also describes the functions behind the buzzwords Infrastructure-as-a-Service, Platform-as-a-Service, and Software-as-a-Service.

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Key Terms

A+

- 0:25 - Objective term - The Cloud
- 1:15 - Objective term - Rapid elasticity
- 1:56 - On-demand (which enables high availability, less downtime, and less crashes)
- 2:46 - Objective term - Resource pooling/shared resources
- 3:48 - Objective term - Infrastructure as a Service (IaaS)
- 5:41 - Objective term - Platform as a Service (PaaS)
- 6:08 - Heroku
- 6:49 - Objective term - Software as a Service (SaaS)

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Quick Review

- Cloud computing moves the VMs out onto a server somewhere, but makes them easily accessible through the Internet
- Cloud computing enables rapid elasticity, on-demand scaling, high availability, and resource pooling
- Infrastructure as a Service (IaaS) moves network tasks such as firewalls into the Cloud
- Platform as a Service (PaaS) enables quick deployment of code and app management
- Software as a Service (SaaS) moves apps to the Cloud, such as Google Docs or Office365



Episode: **Cloud Ownership**

Objective(s): Core 1: 4.1 Summarize cloud-computing concepts.



Episode Description

A+

In this episode, Mike looks at concepts of security, ownership, and access to cloud resources. Specifically, he explores the differences among public, private, hybrid, and community cloud computing.

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Key Terms

A+

- 0:20 - Objective term - Private cloud
- 0:43 - Objective term - Public cloud
- 1:16 - Objective term - Hybrid cloud
- 1:37 - Objective term - Community cloud

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Quick Review

- Private clouds are owned and used only by a single organization
- Public clouds are privately owned but are available for public use, usually at a cost
- Hybrid clouds have both private and public aspects
- Community clouds are owned by multiple organizations for their own private use for cost sharing



Episode: **Cloud-Based Applications**

Objective(s): Core 1: 4.1 Summarize cloud-computing concepts.



Episode Description

A+

In this episode, Mike looks at applications in the cloud. Cloud-based storage enables access to files from any connected device. Cloud-based applications enable easy configuration and management. Virtual desktops create a consistent workspace online. And virtual application streaming gives you the programs you need without local installation.

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Key Terms

A+

- 0:39 - Objective term - Cloud storage and file synchronization
- 2:21 - Conflicted copy
- 4:05 - Objective term - Virtual desktops and virtual desktop infrastructure (VDI)
- 4:26 - Objective term - Virtual desktops can be access on-premises or in the cloud
- 4:41 - Streaming applications

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Quick Review

- Cloud storage enables access to synchronized saved files from any device
- Cloud-based applications move management to the Cloud for e-mail and more
- Virtual desktops and virtual desktop infrastructure (VDI) provide a consistent workspace in the Cloud accessible from any device
- Virtual application streaming provides access to apps without installing them locally

