9.3.3 Virtualization Facts

Virtualization is the ability to install and run multiple operating systems simultaneously on a single physical machine.

Virtualization Components

Virtualization typically includes the following components:

Component	Description
Physical Machine	A physical machine (also known as the host operating system) has the actual hardware in place on the machine (hard disk drive(s), optical drive, RAM, motherboard).
Hypervisor	A *hypervisor* is thin layer of software that resides between the virtual operating system(s) and the hardware. A hypervisor allows virtual machines to interact with the hardware without going through the host operating system. A hypervisor also manages access to the following system resources: ▪ CPU ▪ Storage ▪ RAM There are several different types of hypervisor software. ▪ VMware Workstation and ESXi (made by VMware) ▪ Hyper-V (made by Microsoft) ▪ XEN (open source)
Virtual Machine	A *virtual machine* is a software implementation of a computer that executes programs like a physical machine. The virtual machine appears to be a self-contained and autonomous system.
Virtual Hard Disk (VHD)	A *virtual hard disk* is a file created within the host operating system that simulates a hard disk for the virtual machine.

Virtualization Types

Types of virtualization include the following:

Type	Description
Full	In full virtualization, the virtual machine completely simulates a real physical host. This allows most operating systems and applications to run within the virtual machine without being modified in any way.
Partial	In partial virtualization, only some of the components of the virtual machine are virtualized. ▪ The guest operating systems use some virtual components and some real physical hardware components in the actual device where the hypervisor is running. ▪ Operating systems or applications must be modified before they can run in a partial virtualization environment.
Paravirtualization	In paravirtualization, the hardware is not virtualized. ▪ All of the guest operating systems running on the hypervisor directly access various hardware resources in the physical device; components are not virtual. ▪ The guest operating systems run in isolated domains on the same physical hardware. ▪ Operating systems or applications must be modified before they can run in a paravirtualization environment.