10.5.2 Virtualization Facts

Virtualization is the ability to install and run multiple operating systems concurrently on a single physical machine. Most virtualization solutions include the following components:

Component	Description
Physical Machine	A *physical machine* contains the actual system hardware, such as the hard disk drive(s), optical drive, RAM, processors, etc.
Hypervisor	A *hypervisor* is a 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 manages access to system resources such as: ▪ CPU ▪ Storage ▪ RAM Commonly used hypervisor types include: ▪ VMware Workstation and ESX (made by VMware) ▪ Hyper-V (made by Microsoft) ▪ XEN (open source) ▪ Oracle VirtualBox ▪ Kernel-based Virtual Machine (KVM)
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* (VHD) is a file that is created within the host operating system and that simulates a hard disk for the virtual machine. Different hypervisors use different virtual hard disk file formats: ▪ Virtual Disk Image (VDI): Oracle VirtualBox ▪ Virtual Machine Disk (VMDK): VMware products ▪ Virtual Hard Disk (VHD): Microsoft Hyper-V

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. Be aware of the following: ▪ The operating system uses some virtual components and some real physical hardware components in the actual device where the hypervisor is running. ▪ The operating system or application must be modified to run in a partial virtualization environment.
Para-virtualization	In para-virtualization, the hardware is not virtualized. Be aware of the following: ▪ 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. ▪ The operating system or application must be modified before they can run in a para-virtualization environment.

If necessary, virtual machines can be moved from one host to another. Follow these guidelines when moving virtual machines:

- Before moving a virtual machine, make backup copies of the virtual machine directory and all associated files.
- If you are moving a virtual machine (guest) to a new virtual host that differs from the original host in platform or architecture, be aware of these options and limitations:
  - A guest can be successfully moved from a 32-bit host to a 64-bit host.
  - A guest that is moved from a 64-bit host to a 32-bit host will probably not work correctly. If the guest is a 64-bit virtual machine, it probably won't start up at all on the 32-bit host.
  - If the original host and the new host both use similar architectures but are from different manufacturers, you usually cannot resume a suspended virtual machine; it must be rebooted. For example, if the original host and new host both have virtualization-enabled 64-bit processors, such as one using an AMD-V and the other using an Intel VT-x CPU, a suspended virtual machine will work after being moved and rebooted.