

3140702
Operating System

Unit – 10
Virtualization
Concepts



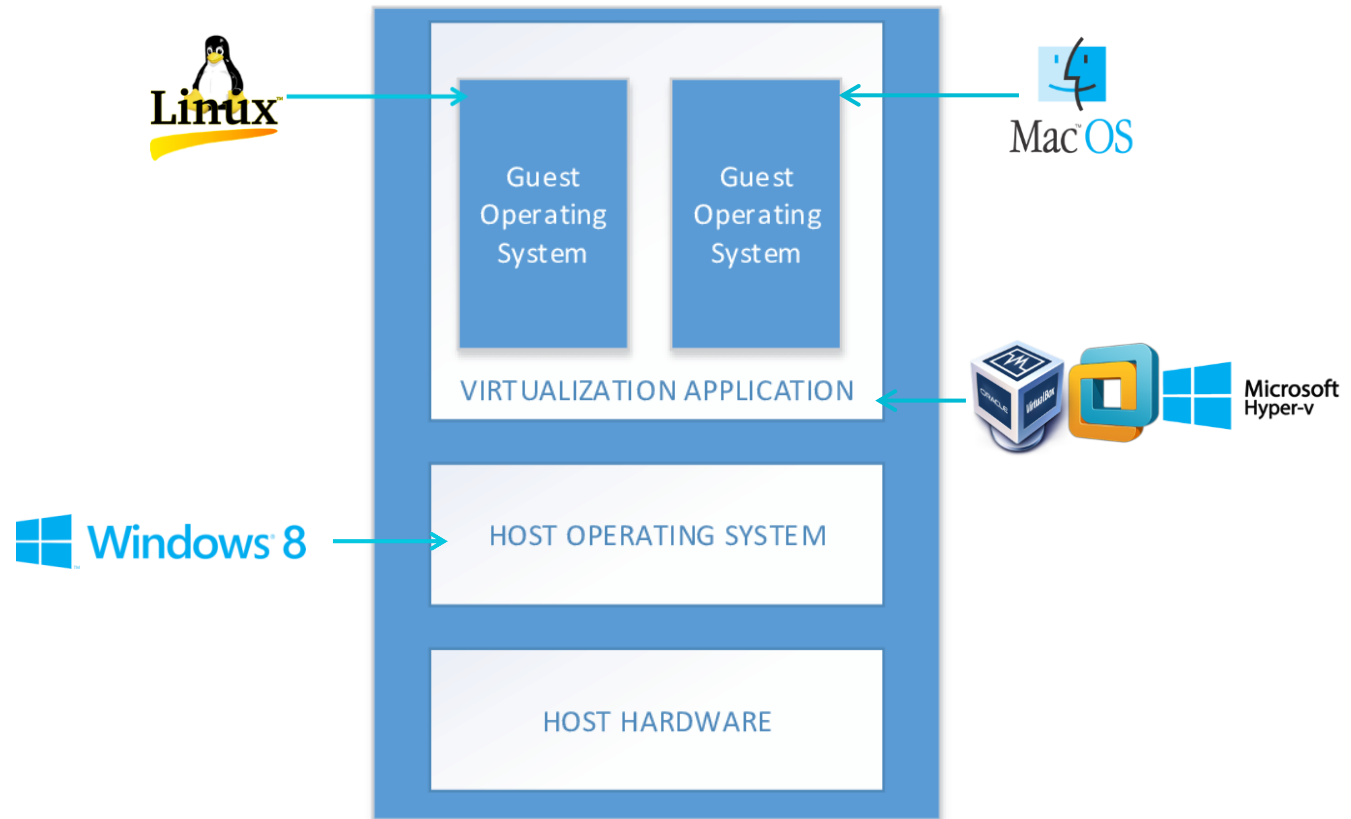
Outline

- Virtualization
- Virtual Machines
- VM Advantages & Dis-advantages
- Virtual Machine Application
- Type of Virtual Machine
- VirtualBox
- VMware Workstation
- Microsoft Hyper – V
- Uses of Virtual Machine

What is Virtualization?

- **Virtualization** is the process of creating a software-based, or virtual, representation of something, such as virtual applications, servers, storage and networks.
- It is the single most effective way to reduce IT expenses while boosting efficiency and agility for all size businesses.
- Benefits of **Virtualization**:
 - Reduced capital and operating costs.
 - Increased IT productivity, efficiency, agility and responsiveness.
 - Faster provisioning of applications and resources.
 - Greater business continuity.
 - Simplified data centre management.

Virtualization Structure



Virtual Machine

- **Virtual Machine** is a separate individual operating system installation on your usual operating system.
- It is implemented by software emulation and hardware virtualization.



Virtual Machine – Cont.

- Virtual machine is a **software implementation** of a physical machine - computer - that works and executes analogically to it.
- Virtual machines are divided in two categories based on their use and correspondence to real machine.
- **System virtual machines**: It provides a complete system platform that executes complete operating system.
- **Process virtual machines**: It will run a single program.

Virtual Machine Advantages & Dis-advantages

- **VM Advantages:**

- Multiple OS environments can exist simultaneously on the same machine, separate from each other;
- Virtual machine can offer an instruction set architecture that differs from real computer.
- Easy maintenance, application provisioning, availability and convenient recovery.

Virtual Machine Advantages & Dis-advantages

- **VM Dis-advantages:**

- When multiple virtual machines are simultaneously running on a host computer, each virtual machine may introduce an unstable performance, which depends on the workload on the system by other running virtual machines.
- Virtual machine is not that much efficient as a real one when accessing the hardware.

Virtual Machine Applications

- Virtual Machine isolates the hardware of our computer such as CPU, hard drives, memory, NIC (Network Interface Card) etc, into many different execution environments as per our requirements, feel like a single computer.
- **Examples:** VirtualBox, VMWare Workstation & Microsoft Hyper-V.



Type of Virtual Machine

- **Full Virtualization:**
- Virtual machine simulates hardware to allow an unmodified guest OS to be run in isolation.
- There is two type of full virtualizations in the enterprise market.
- On both full virtualization types, guest operating system's source information will not be modified.
- Software assisted full virtualization
- Hardware-assisted full virtualization

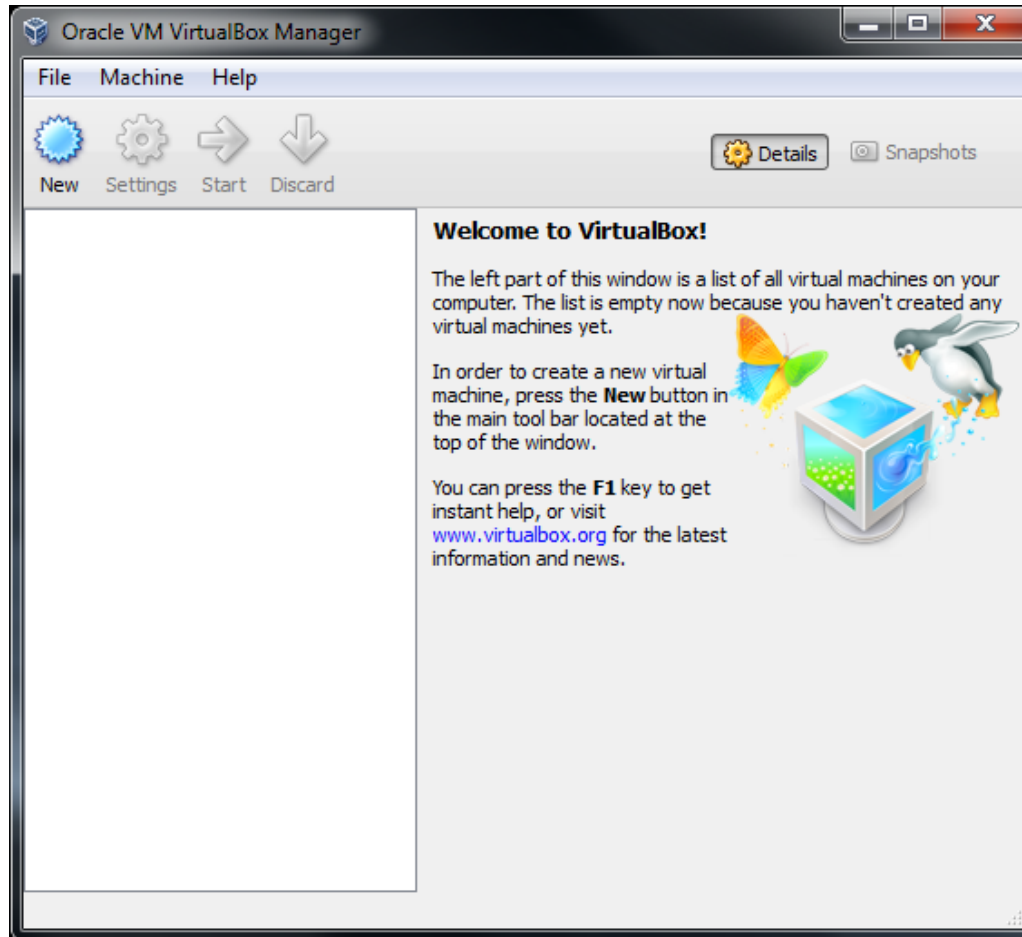
Full Virtualization

- It is also referred as **true or pure virtualization**.
- It completely relies on **binary translation** to trap and virtualize the execution of sensitive, non-virtualizable instructions sets.
- It emulates the hardware using the software instruction sets.
- Due to binary translation, it often criticized for performance issue.
- **Example:**
 - VMware Workstation
 - VirtualBox
 - Microsoft Hyper - V
 - VMware Server

VirtualBox

- VirtualBox is a great, **open-source application** that runs on Windows, macOS, and Linux.
- One of the best parts about VirtualBox is that there's no commercial version.
- This means you get all features for free, including advanced features like snapshots.
- This allows you to save a virtual machine's state and revert to that state in the future, which is great for testing.

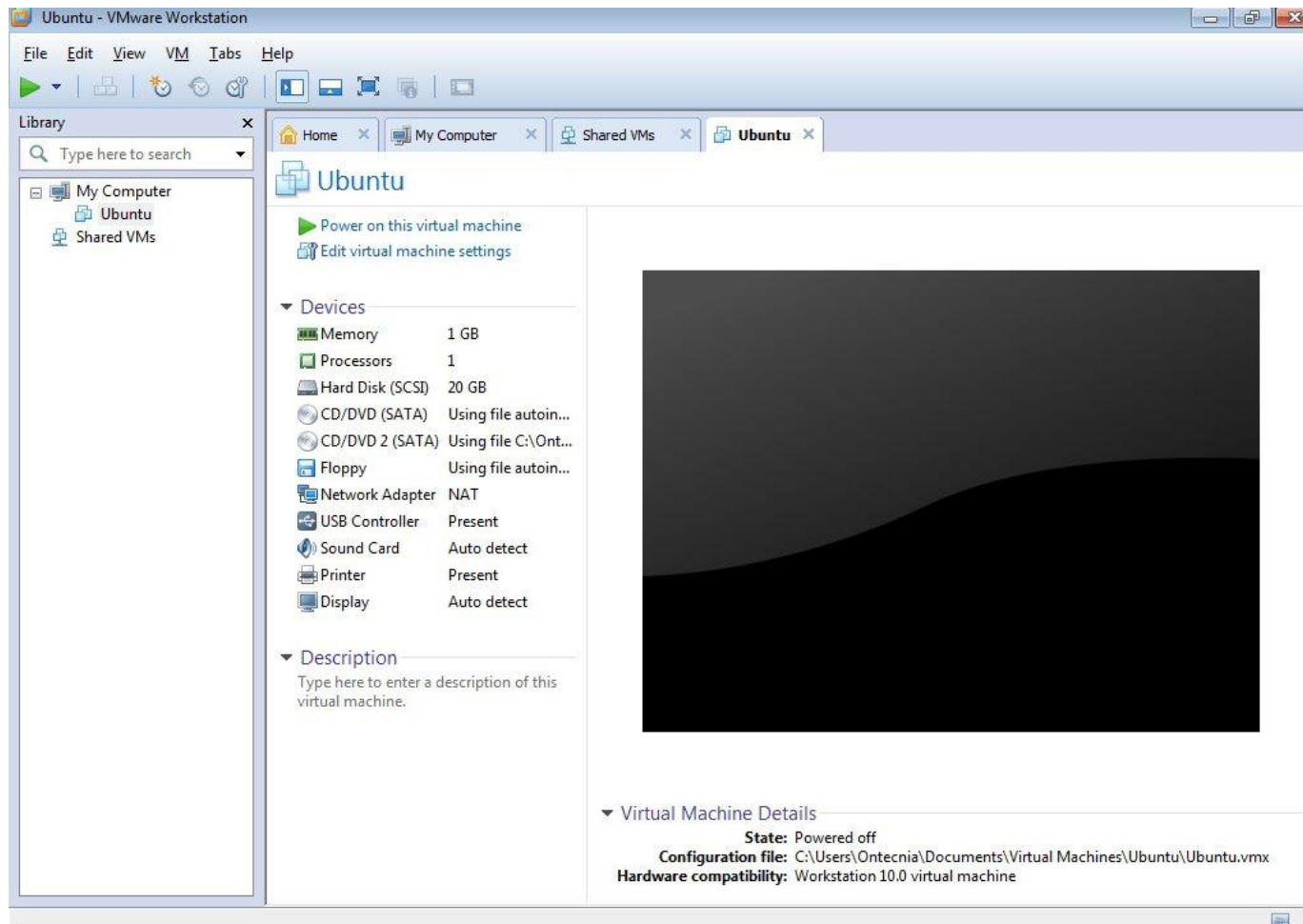
VirtualBox Software



VMware Workstation

- VMware Workstation allows for the installation of **multiple instances** of different operating systems, including **client and server** operating systems.
- It helps the **network or system administrators** to check, test and verify the client server environment.
- Administrator can also switch between different virtual machines at same time.
- VMware Workstation has its limitations, including hardware support, operating system issues, and network protocols hurdles.

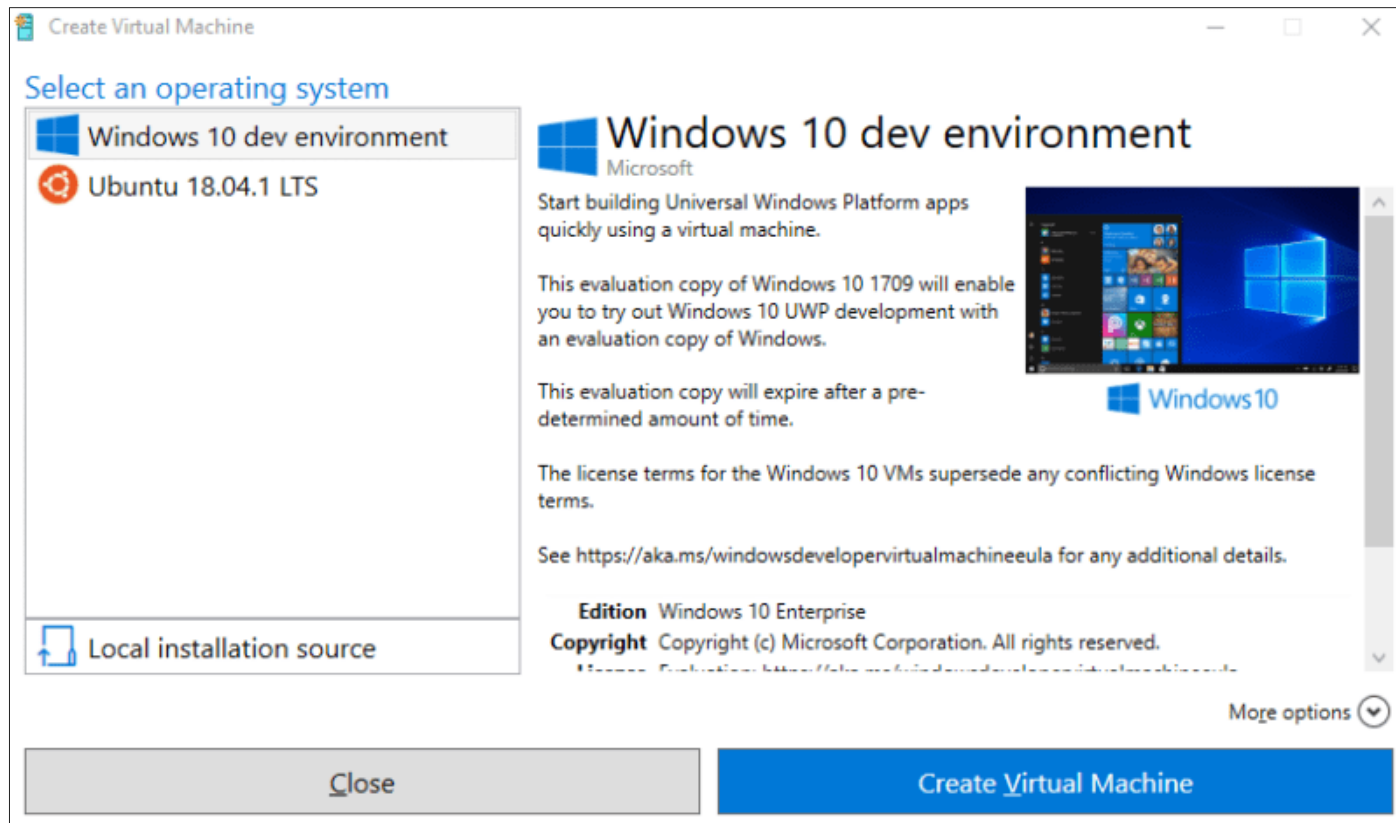
VMWare Workstation Software



Microsoft Hyper-V

- Hyper-V is **virtualization software** that virtualizes software.
- It can not only virtualize operating systems but also entire hardware components, such as hard drives and network switches. Unlike VirtualBox.
- Hyper-V is not limited to the user's device. You can use it for **server virtualization**.
- Hyper-V is available in three versions.
 1. Hyper-V for Windows Servers
 2. Hyper-V Servers
 3. Hyper-V on Windows 10

Microsoft Hyper-V Software



Uses of Virtual Machine

- Take trial on newer versions of operating systems
- Virtualization from your own desktop
- Test with different operating systems
- Utilizing software that requests an outdated operating system
- Test software on many different platforms
- Compile different servers for business use
- Safety and Security

