Virtualization

What is Virtualization

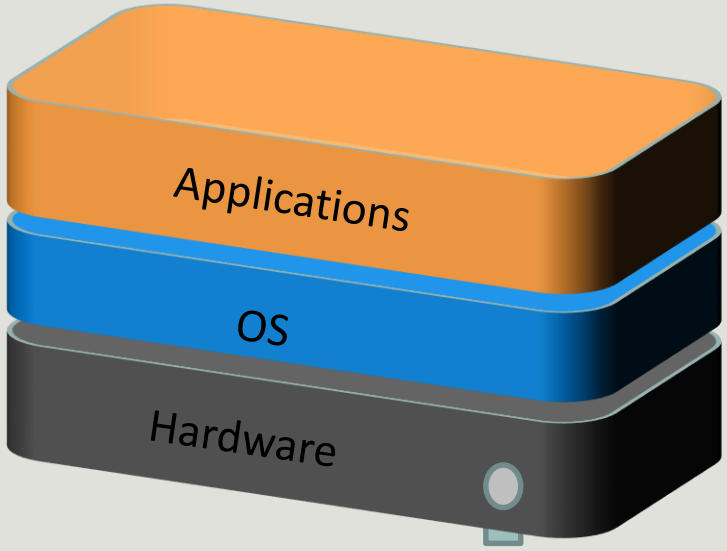
Virtualization is one of the hardware reducing, cost saving and energy saving technology that is rapidly transforming the IT landscape and fundamentally changing the way that people compute.

Virtualization is the process of creating a software-based, or virtual, representation of something, such as virtual applications, servers, storage and networks.

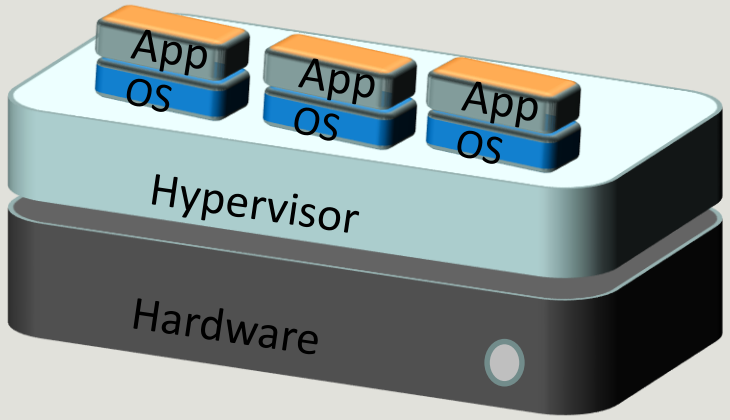
Virtualization uses software to create an abstraction layer over computer hardware that allows the hardware elements of a single computer—processors, memory, storage and more—to be divided into multiple virtual computers, commonly called virtual machines (VMs).

For e.g., Windows and Linux both can run on the same machine at the same time

Traditional Vs Virtual Architecture



Traditional Architecture



Virtual Architecture

Hypervisor

- A **hypervisor** (or virtual machine monitor, VMM) is computer software, firmware or hardware that creates and runs virtual machines.
- The **hypervisor** presents the guest operating systems with a virtual operating platform and manages the execution of the guest operating systems.

Some terminology

- **Host operating system (Host OS).**
  - – This is the operating system of the physical computer on which Hypervisor was installed.
- **Guest operating system (Guest OS).**
  - – This is the operating system that is running inside the virtual machine.
- **Virtual machine (VM).**
  - – This is the special environment that Hypervisor creates for your guest operating system while it is running. In other words, you run your guest operating system “in” a VM.
- **Guest Additions.**
  - – This refers to special software packages which are shipped with Hypervisor but designed to be installed *inside a VM to improve performance of the guest OS and to* add extra features.

Types of Virtualization

- Desktop Virtualization
- Application Virtualization
- Server Virtualization
- Network Virtualization
- Storage Virtualization
- Process virtualization
- Device virtualization

And so on..

Benefits of Virtualization

Virtualization helps us break the ***"one service per server"*** model

- Reduce capital and operating costs.
- Minimize or eliminate downtime.
- Increase efficiency and productivity
- Test and Development
- Run legacy software on non-legacy hardware
- Enable business continuity and disaster recovery.
- Move to be more green-friendly (organizational and environmental)
- Data Center management

Disadvantages of Virtualization

- Huge risk in physical fault
- Not supported by all applications

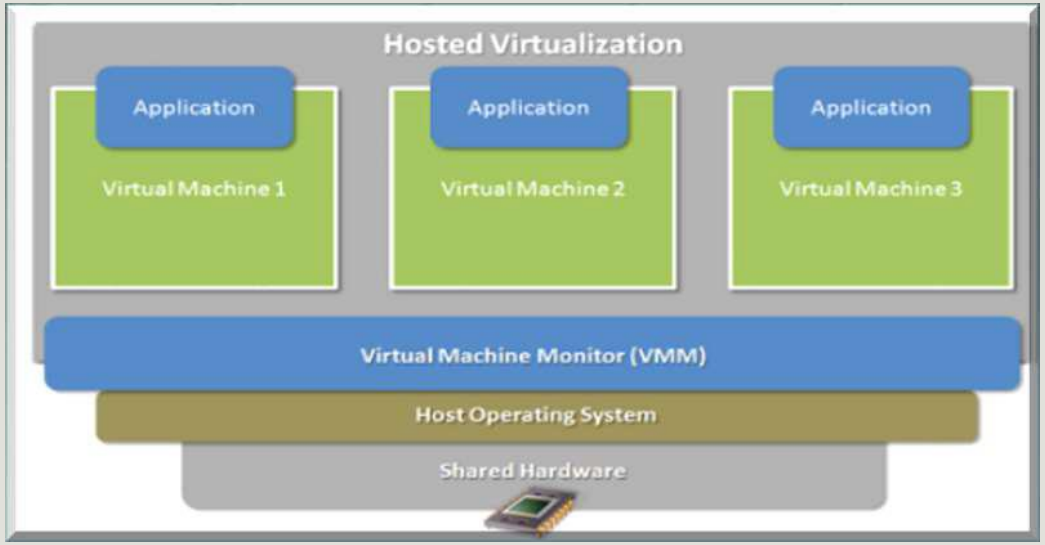
Hardware Assisted Virtualization

- Processors
  - Intel VT-x
  - AMD-V

- Check if Virtualization enabled

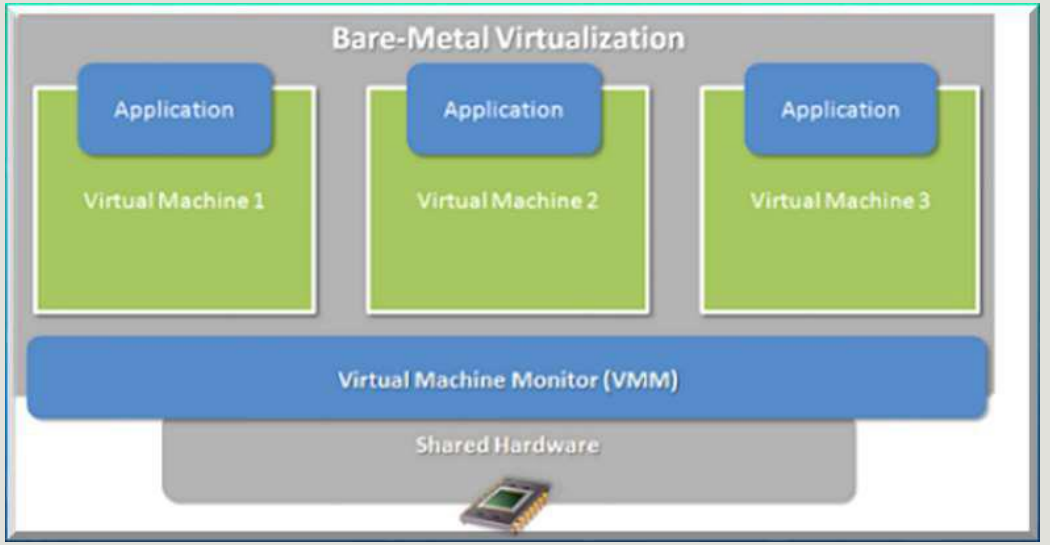
Virtualization Architecture

Hosted Architecture(Hosted/Type 2)



Hosted Virtual Machine Monitor is installed on top of host OS

Bare-Metal Architecture (Native/Type 1)



Bare-metal virtual machine monitor is installed directly on system hardware

Virtualization Architecture

Hosted Architecture(Hosted/Type 2)

- Advantages
  - ease of installation and configuration.
  - Unmodified Host OS & Guest OS.
  - run on a wide variety of pc.
- Disadvantages
  - performance degradation.
  - lack of support for real-time operating systems.

Bare-Metal Architecture (Native/Type 1)

- Advantages
  - Improved I/O Performance.
  - Support Real Time OS.
- Disadvantages
  - Difficult to install & Configure.
  - Depends upon hardware platform.

VirtualBox

- VirtualBox is a cross-platform virtualization application.
- Product from Oracle