Virtual Machine & Hypervisor

What is Virtualization ?

- Virtualization is a technology that helps us to install different Operating Systems on a hardware.
- They are completely separated and independent from each other. **“In computing, virtualization is a broad term that refers to the abstraction of computer resources”.**
- Virtualization hides the physical characteristics of computing resources from their users, their applications or end users.
- This includes making a single physical resource (such as a server, an operating system, an application or a storage device) appear to function as multiple virtual resources.
- It can also include making multiple physical resources (such as storage devices or servers) appear as a single virtual resource…”

Virtual Machines

- A virtual machine (VM) is a software program or operating system that not only exhibits the behavior of a separate computer, but is also capable of performing tasks such as running applications and programs like a separate computer.The end user has the same experience on a virtual machine as they would have on dedicated hardware.
- **Virtual Machine** abstracts the hardware of our personal computer such as CPU, disk drives, memory, NIC (Network Interface Card) etc, into many different execution environments as per our requirements, giving us a feel that each execution environment is a single computer.
- For example, VirtualBox.

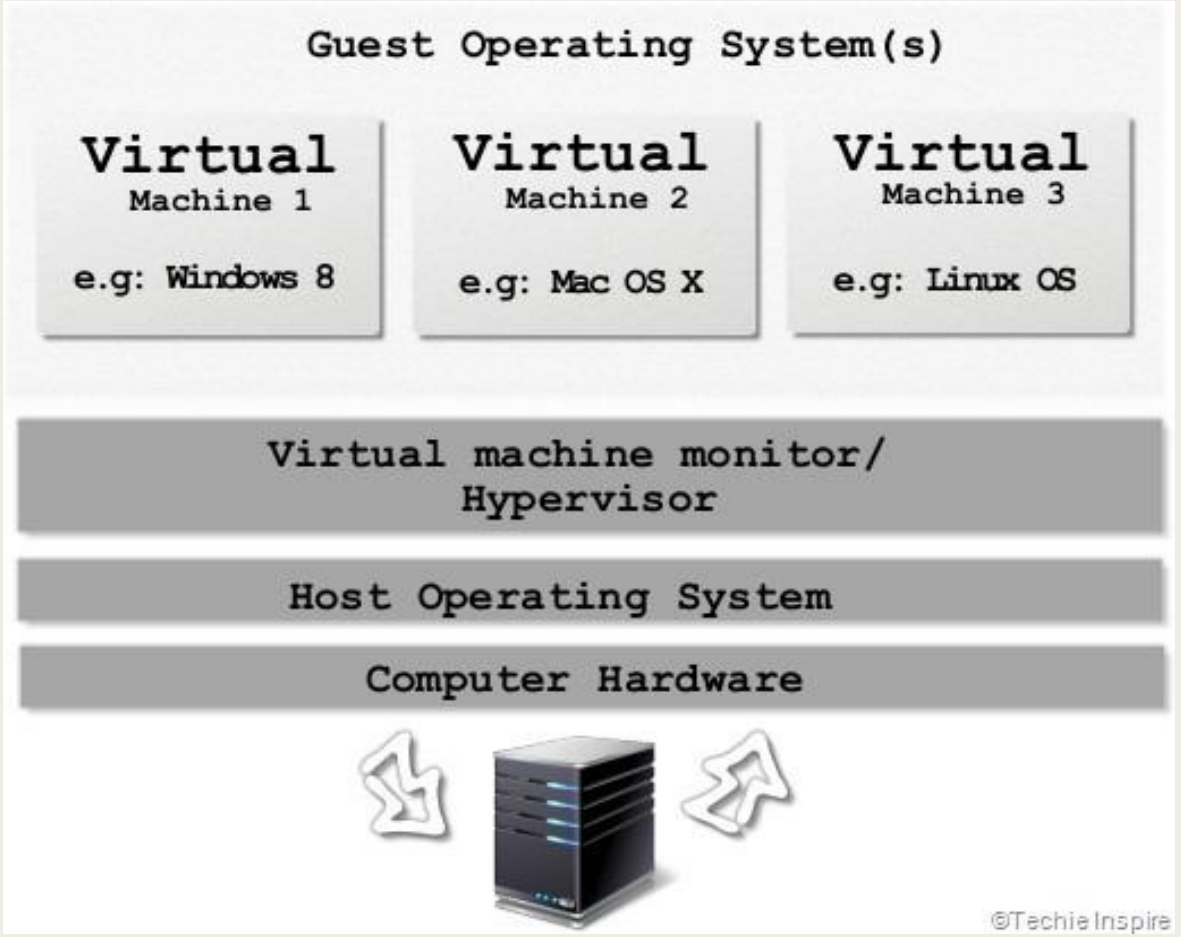
Virtual Machines

- A virtual machine, usually known as a guest is created within another computing environment referred as a "host." Multiple virtual machines can exist within a single host at one time.
- Virtual machines are implemented by software emulation methods or hardware virtualization techniques. Depending on their use and level of correspondence to any physical computer, virtual machines can be divided into two categories:
- **System Virtual Machines:** A system platform that supports the sharing of the host computer's physical resources between multiple virtual machines, each running with its own copy of the operating system. The virtualization technique is provided by a software layer known as a hypervisor, which can run either on bare hardware or on top of an operating system.

Virtual Machine

- **Process Virtual Machine**: Designed to provide a platform-independent programming environment that masks the information of the underlying hardware or operating system and allows program execution to take place in the same way on any given platform.

Virtual Machines



Advantages & Disadvantages of Virtual Machines

Advantages:

- There are no protection problems because each virtual machine is completely isolated from all other virtual machines.
- Virtual machine can provide an instruction set architecture that differs from real computers.
- Easy maintenance, availability and convenient recovery.

Disadvantages:

- They are not as efficient as a physical computer because the hardware resources are distributed in an indirect way.
- Multiple VMs running on a single physical machine can deliver unstable performance

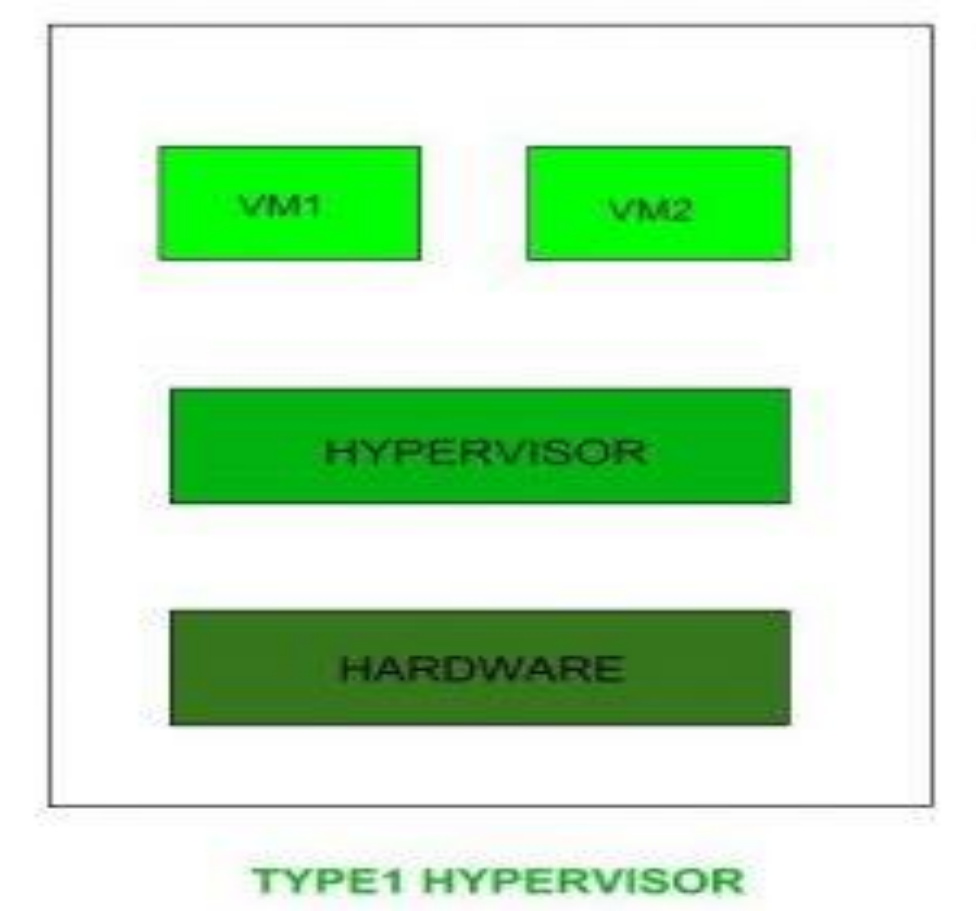
Hypervisor

- Hypervisor is a hardware virtualization technique that allows multiple guest operating systems (OS) to run on a single host system at the same time.
- A hypervisor is sometimes also called a virtual machine manager(VMM).
- Hypervisor is a form of virtualization software used in Cloud hosting to divide and allocate the resources on various pieces of hardware.
- The program which provide partitioning, isolation or abstraction is called virtualization hypervisor.
- Hypervisor are currently classified in2 types : type-1 & type-2

TYPE-1 Hypervisor

- Hypervisor runs directly on underlying host system.
- It is also known as “Native Hypervisor” or “Bare metal hypervisor”.
- It dose not require any base server operating system.
- It has direct access to hardware resources.
- Examples of Type 1 hypervisors include VMware ESXi, Citrix XenServer and Microsoft Hyper-V hypervisor.

TYPE-1 Hypervisor



TYPE-2 Hypervisor

- A Host operating system runs on underlying host system.
- It is also known as ‘Hosted Hypervisor”.
- Basically a software installed on an operating system. Hypervisor asks operating system to make hardware calls.
- Example of Type 2 hypervisor include VMware Player or Parallels Desktop. Hosted hypervisors are often found on endpoints like PCs.

TYPE-2 Hypervisor