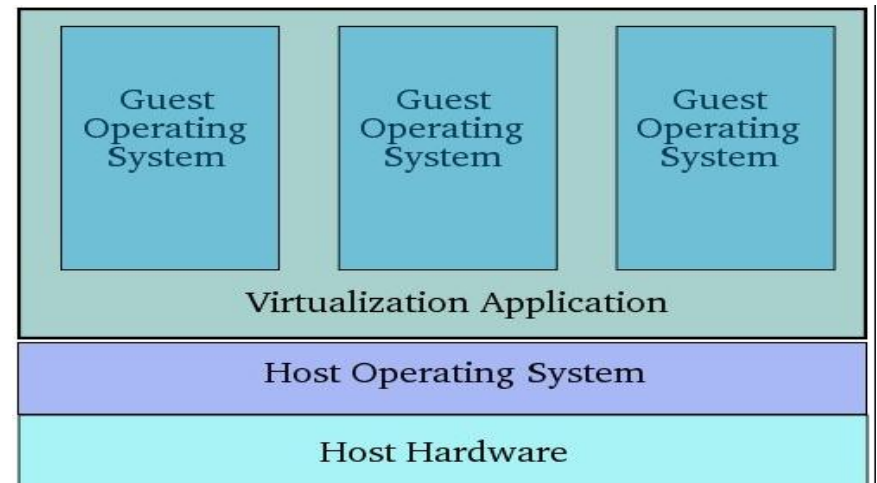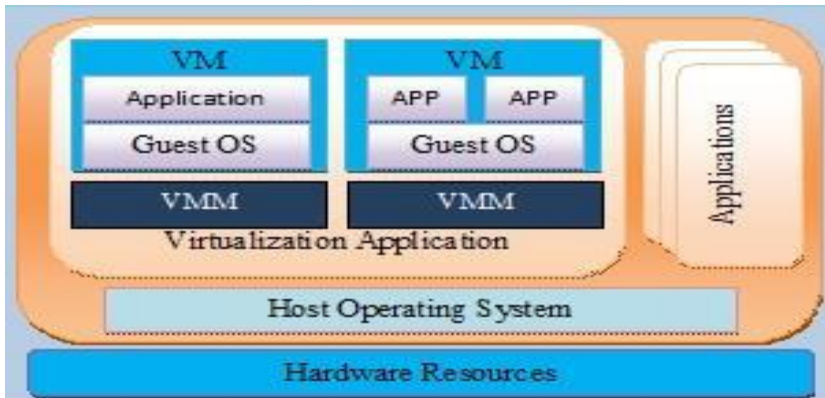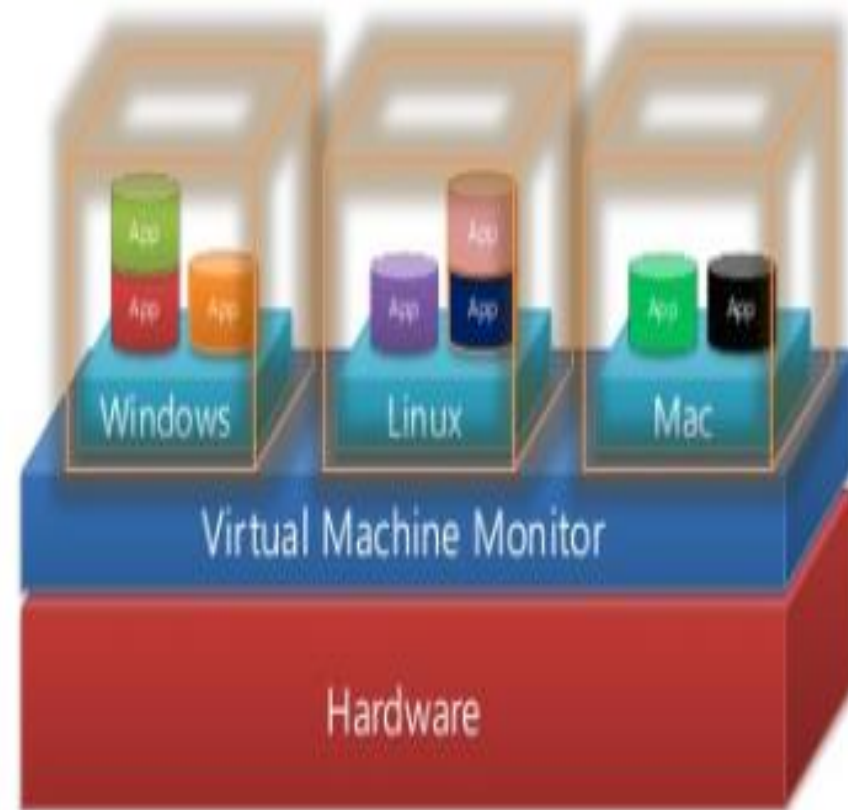# CHAPTER -10
VIRTUALIZATION CONCEPTS

VIRTUALIZATION

- Simulation of the software and/or hardware upon which other software runs. This simulated environment is called virtual machine.

- Virtualization is a Technology that transforms hardware into software.

- Virtualization allows to run multiple operating systems as virtual machines.
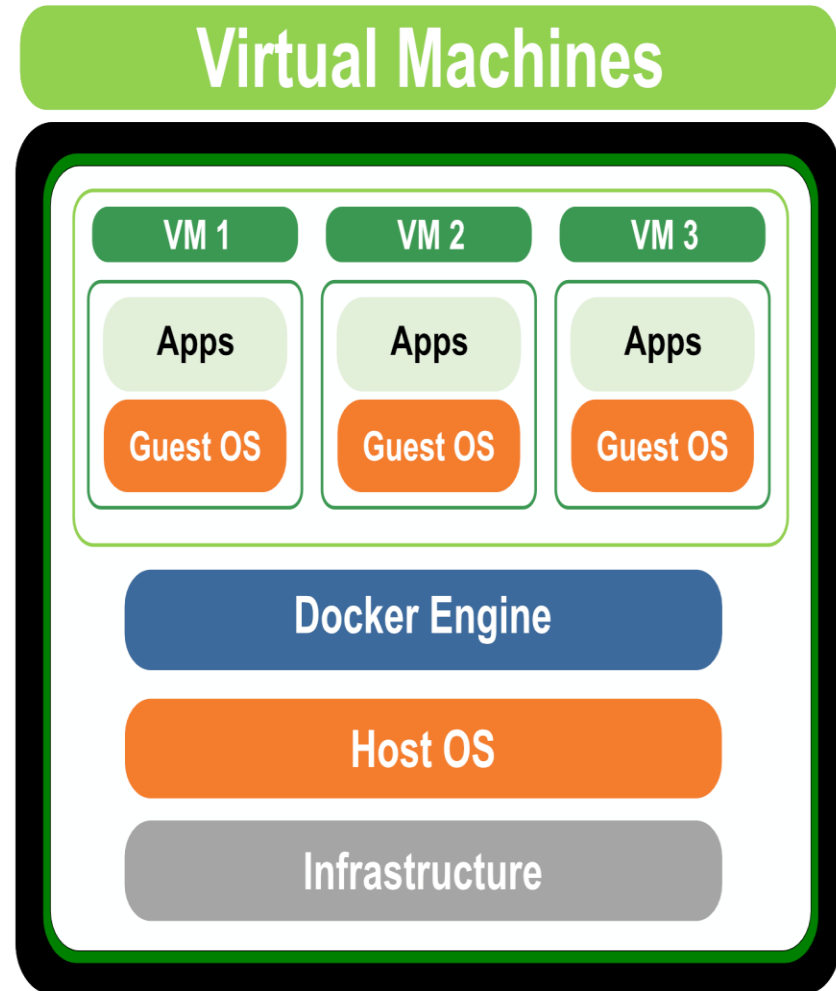
VIRTUALIZATION

- Each VM can run its own operating systems and applications as if it were in a physical machine.

- Each copy of an operating system is installed in to a virtual machine.

- software to allow system hardware to run multiple instances of different operating systems concurrently

- For e.g., Windows and Linux both can run on the same laptop at the same time.
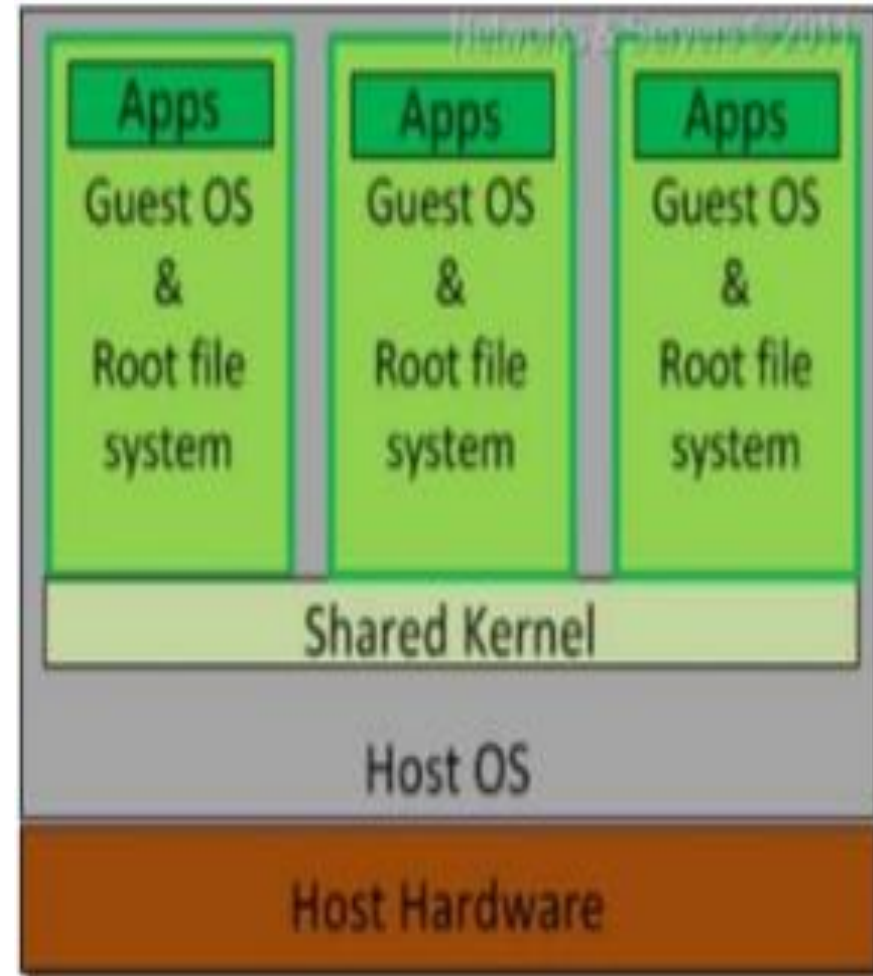
VIRTUAL MACHINE

- hardware of our personal computer such as CPU, disk drives, memory into many different execution environments as per our requirements.
- A virtual machine is a program that acts as a virtual computer.
- A virtual machine is a virtual representation, or emulation, of a physical computer. They are often referred to as a guest while the physical machine they run on is referred to as the host.

Virtual Machines

VM 1 | VM 2 | VM 3
Apps | Apps | Apps
Guest OS | Guest OS | Guest OS

Docker Engine

Host OS

Infrastructure

VIRTUALIZATION TECHNIQUES
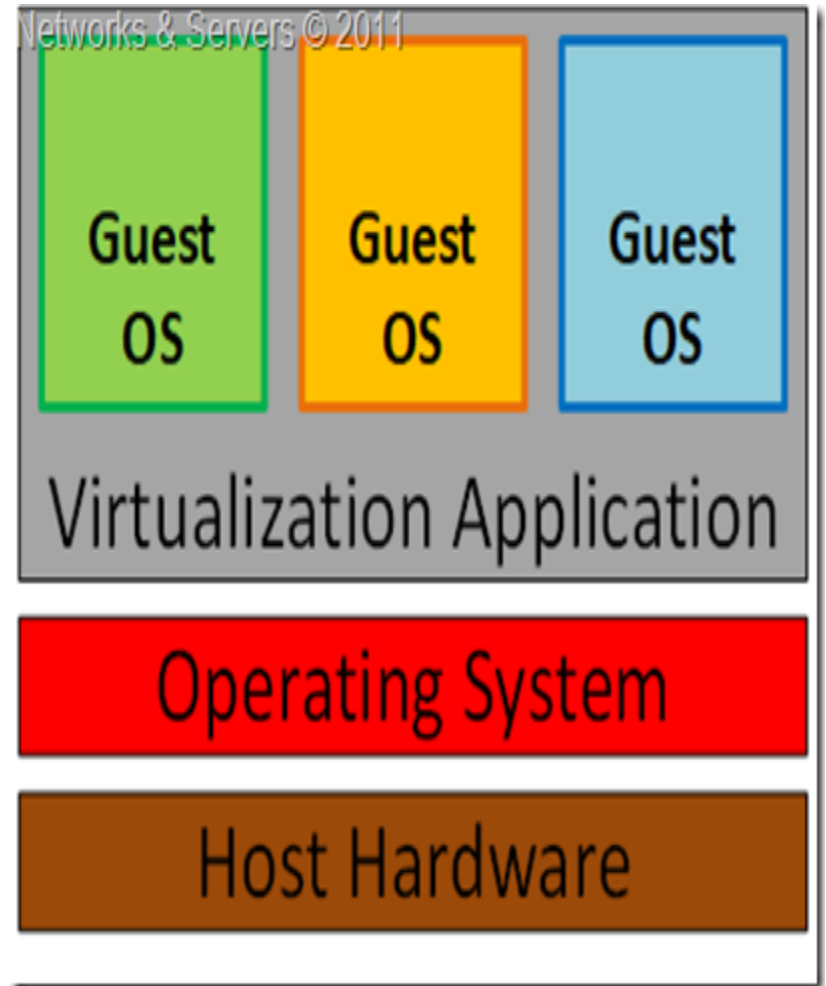
- **Full virtualization:**
- Virtual machine simulates hardware to allow an unmodified guest OS to be run in isolation.
- There is two type of Full virtualizations:
- Software assisted full virtualization
- Hardware-assisted full virtualization

- **Para-virtualization**:
- In the Para virtualization method when a privilege command must be executed on the Guest OS.
- The hypervisor is installed on a physical server (host) and a guest OS is installed into the environment

FULL VIRTUALIZATION

- A method by which computer service requests are separated from the physical hardware that facilitates them.
- With full virtualization, operating systems and their hosted software are run on top of virtual hardware.

FULL VIRTUALIZATION – ADVANTAGES & DISADVANTAGE

- **Advantage:**
- **Secure**:
- The emulation layer isolates VMs from the host OS & other application (s).
- **Total VM portability**
- The emulating h/w interface & guest Os forms a standard package that can be ported & run in any platform.
- **Run unmodified OS**
- Guest OS do not aware of being virtualized
- **Disadvantage:**
- Performance degradation in hosted full virtualization.
- Hardware dependency in bare-metal full virtualization.

PARA VIRTUALIZATION

- The Para virtualization approach is a little different than the full virtualization technique, the guest servers in a Para virtualization system are aware of one another.
- Here is the list of products which supports par virtualization.
- Xen
- IBM LPAR
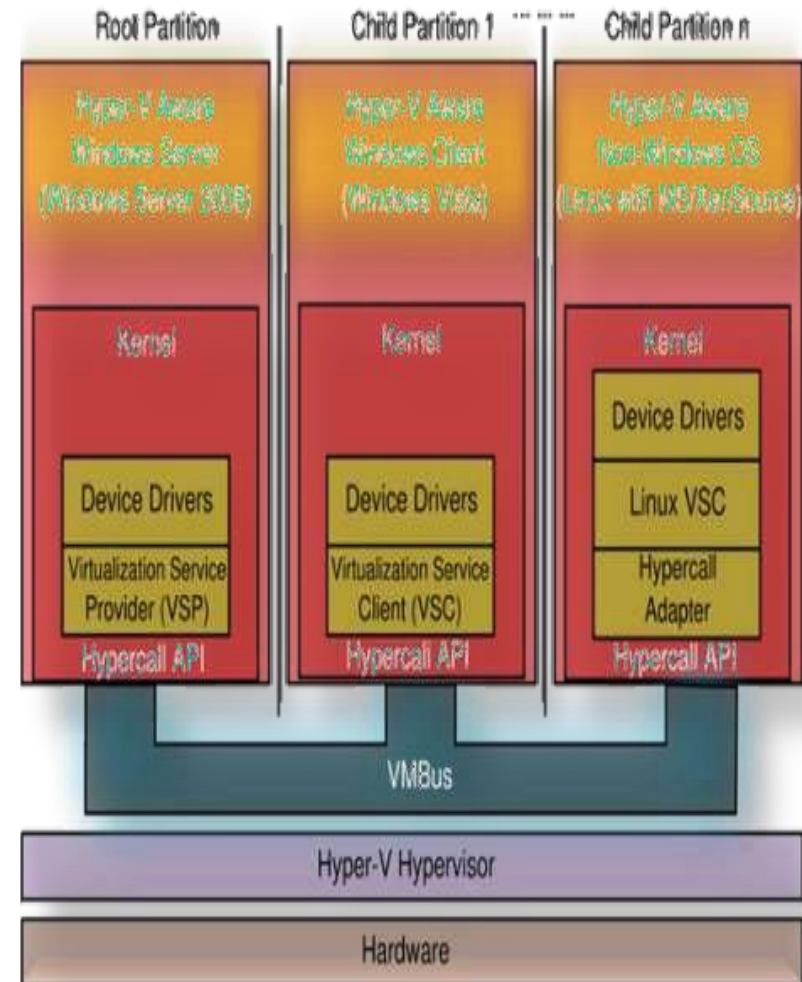
HYPERVISOR

- A **hypervisor** (or virtual machine monitor, VMM) is computer software, firmware or hardware that creates and runs virtual machines.
- A computer on which a hypervisor runs one or more virtual machines is called a host machine, and each virtual machine is called a guest machine.
- A hypervisor allows one host computer to support multiple guest VMs by virtually sharing its resources, like memory and processing.

Hardware   Hypervisor   OS

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