## II TYPES OF VIRTUAL MACHINES

Virtual Machine is like fake computer system operating on your hardware. It partially uses the hardware of your system (like CPU, RAM, disk space, etc.) but its space is completely separated from your main system. Two virtual machines don't interrupt in each other's working and functioning nor they can access each other's space which gives an illusion that we are using totally different hardware system. More detail at Virtual Machine.

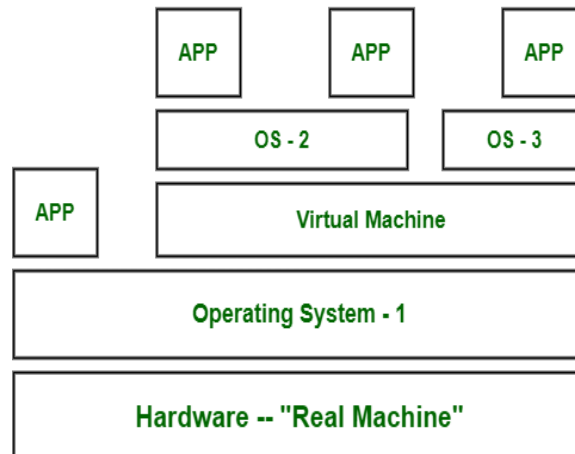**Types of Virtual Machines :** Virtual machines are classified into two types:

1. **System Virtual Machine:** These types of virtual machines gives us complete system platform and gives the execution of the complete virtual operating system. Just like virtual box, system virtual machine is providing an environment for an OS to be installed completely. We can see in below image that our hardware of Real Machine is being distributed between two simulated operating systems by Virtual machine monitor. And then some programs, processes are going on in that distributed hardware of simulated machines separately.
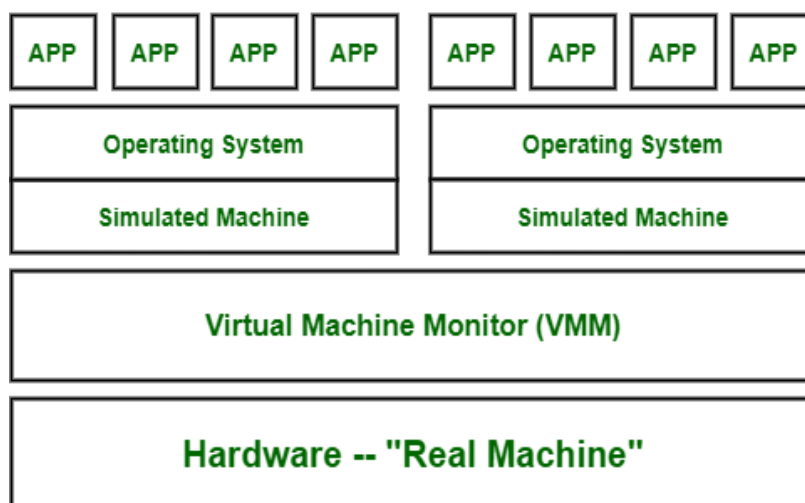
2. **Process Virtual Machine :** While process virtual machines, unlike system virtual machine, does not provide us with the facility to install the virtual operating system completely. Rather it creates virtual environment of that OS while using some app or program and this environment will be destroyed as soon as we exit from that app. Like in below image, there are some apps running on main OS as well some virtual machines are created to run other apps. This shows that as those programs required different OS, process virtual machine provided them with that for the time being those programs are running. **Example –** Wine software in Linux helps to run Windows applications.

Process Virtual Machine

Virtual Machine Language : It's type of language which can be understood by different operating systems. It is platform-independent. Just like to run any programming language (C, python, or java) we need

Types of VMs – Type 0 Hypervisor

Old idea, under many names by HW manufacturers

- "partitions","domains"
- A HW feature implemented by firmware
- OS need to nothing special, VMM is in firmware
- Smaller feature set than other types
- Each guest has dedicated HW
- I/O a challenge as difficul to have enough devices, controlers to dedicate to each guest
- Sometimes VMM implements a **control partition** running daemons that other guests communicate with for shared I/O
- Can provide virtualization-within-virtualization(guest itself can be a VMM with guests
- Other types have difficulty in doing this.

A **virtual machine (VM)** is a virtual environment which functions as a virtual computer system with its own CPU, memory, network interface, and storage, created on a physical hardware system.

Types of VMs – Type 1 Hypervisor

Commonly found in company data centers

- Special purpose operating systems that run natively on HW
- Rather than providing system call interface, creater unand manage guest OSes.
- Can run on Type0 hypervisors but not on other Type1s
- Run in kernel mode
- Guests generally don't know they are running in a VM
- Implement device drivers for host HW because no other component can
- Also provide other traditional OS services like CPU and memory management

Types of VMs – Type 2 Hypervisor

- Very little OS involvement in virtualization

- VMM is simply another process, run and managed by host

- Even the host doesn't know they are a VMM running guests

  - Tend to have poorer overall performance because can take advantage of some HW features

  - But also a benefit because require no changes to host OS

    - Student could have Type2 hypervisor on native host, run

    - Multiple guests, all on standard host OS such as Windows, Linux, MacOS

Solaris 10 with Two Zones