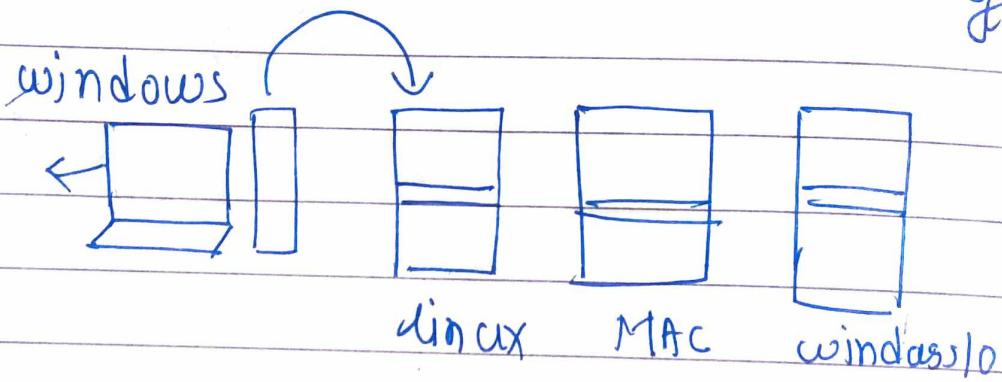


## Types of Virtualization in Cloud Computing

- physical machine has CPU, memory, hard disk, NIC and connection
- physical computer is called host.
- virtualization is the process of using special software on physical machine to create virtual machine.
- this special software is called Hypervisor.
- Virtual machine is called guest.



three and sun no.of

- 1) We can create as many as virtual machines if the host machines CPU, RAM and other resources allow.

RAM is always the limiting factor. all the virtual machines shares all the resources of host. Yet each virtual machine works independantly.

- 2) A virtual machine is little more than a file sitting on hard drive, but to user, a virtual machine appears and act no. differently from physical computer.
- 3) A virtual machine can be configured to use not only a different operating system, but also a different type of CPU, storage drive or NIC than its host.

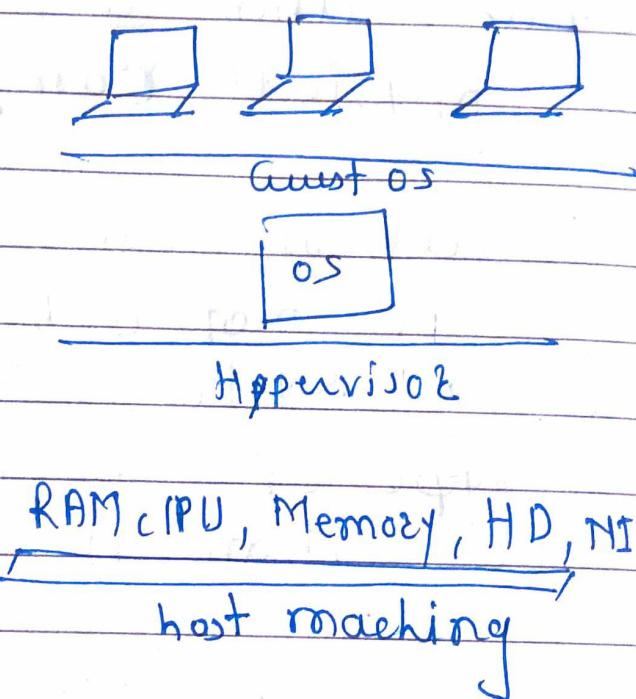
## Two types of Hypervisor

- { type - 1  
2) type - 2

Type 1 :- Type 1 hypervisor run directly on top of the host's h/w. They control the h/w & manage virtual machine.

Type-1 hypervisors act just like operating systems.

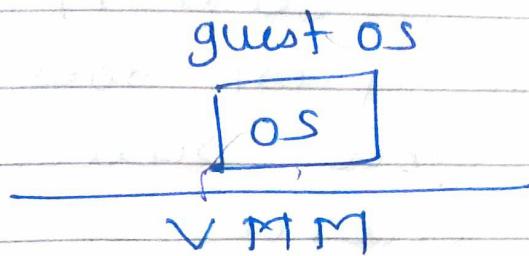
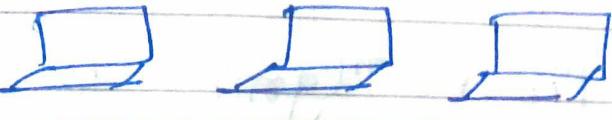
ex : Xen, VMware ESXi,  
Microsoft Hyper-V, ... etc



## Type - 2

The type 2 hosted hypervisor, most frequently referred to as Virtual Machine Monitor (VMM). is like an application program running on top of a conventional operating system. Such as windows, linux, MAC. Virtual machines are created & managed by both Virtual machine Monitor through the host os.

ex : VMware Workstation , virtualBox  
Parallel Desktop for MAC .



MAC , or Linux , or Windows

host OS

RAM , CPU , memory , DD , NIC

Hardware (Host)

### Advantages :-

- Saving money
- without visualization , we might buy several different physical servers in our data centers.
- with visualization we can place multiple virtual machines on servers or workstations. on single physical machine .
- with visualization we also reduce

device storage space & electrical power use substantially.

- 2) Simplified Mgmt. is another advantage.
- 3) Threat isolation — the problem with one guest does not affect the other (cyber security lab)
- 4) System Recovery
- 5)

### Disadvantages

- 1) Compromise performance
- 2) increased complexity.
- 3) single point of failure - if host machine is fail the virtual machine is also fail. (risk)
- 4) license cost.

Host Virtualization



Memory Virtualization

Storage Virtualization

Desktop Virtualization

Server Virtualization

types

Types of Virtualization

- Network Virtualization

N/w virtualization is the process of combining H/w & s/w N/w resources & N/w functionality into a single s/w based administrative entity, a virtual N/w.

Two categorized

- External N/w viz.

It combines many N/cs or part of N/cs into a virtual unit.

- Internal N/w viz

It provides N/w like functionality to s/w containers on a single N/c server

VMware NSX data center is a N/w virtualization platform, delivering N/wing & security entirely in one s/w, abstracted from underlying physical infrastructure.

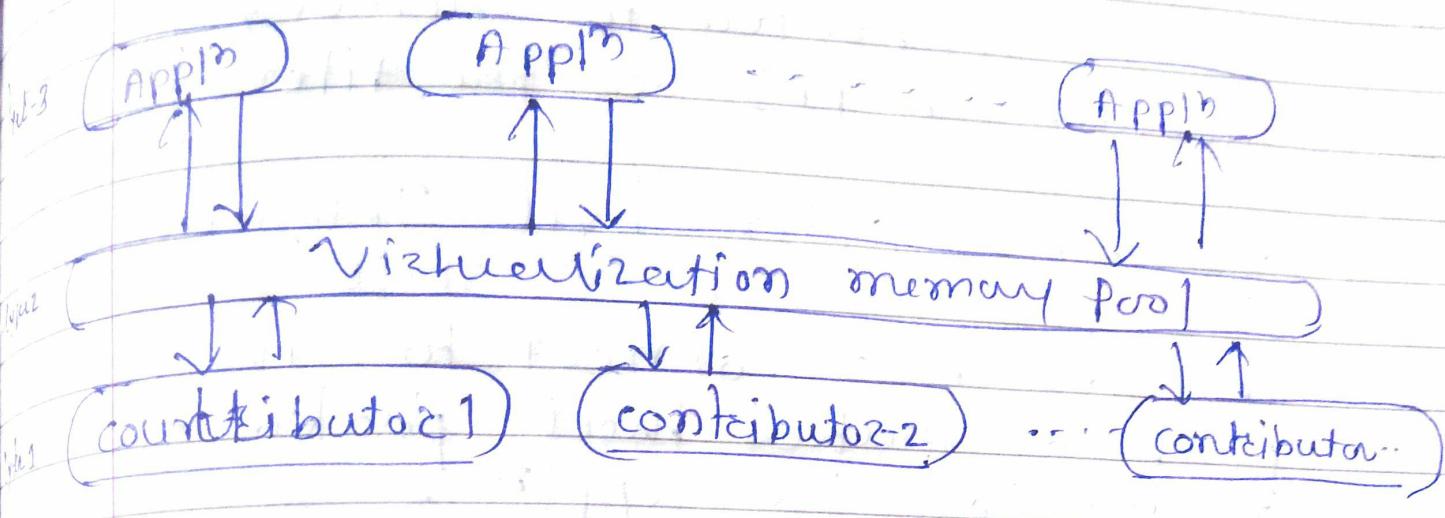
## Components of N/w Virtualization

- > 1) N/w hardware such as switches & N/w adapters also known as NIC.
- 2) Firewalls & load balancers
- 3) N/w such as Virtual LANs and containers such as virtual machines
- 4) N/w storage devices
- 5) N/w machine-to-machine elements such as telecommunication devices
- 6) N/w mobile elements such as laptops, tablets, smart phones
- 7) N/w media such as ethernet & fibre channel.

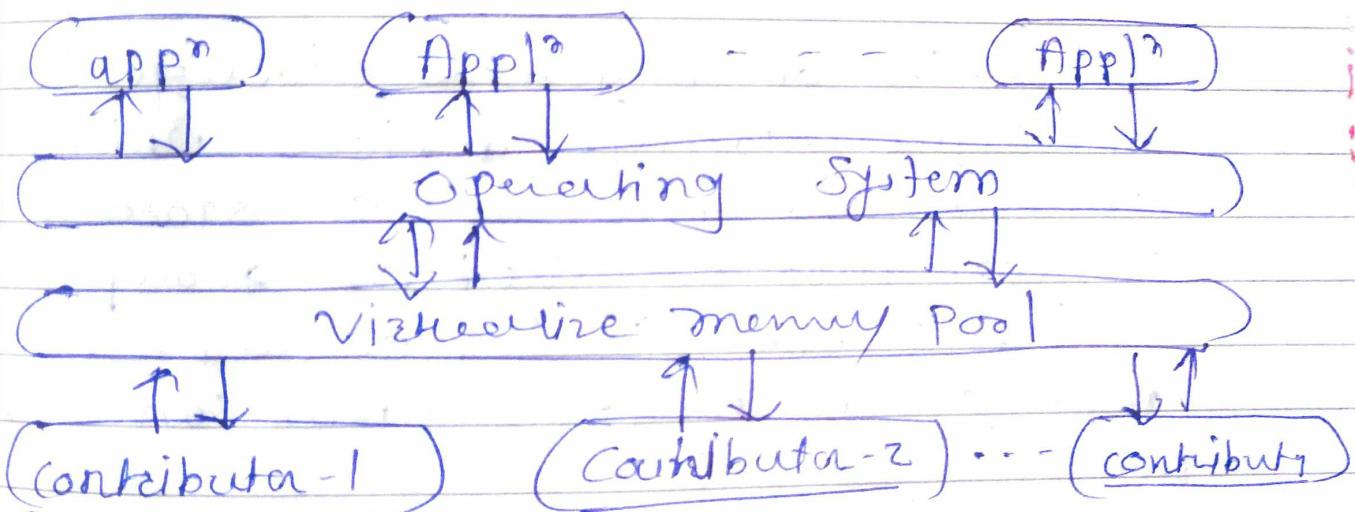
## Memory Virtualization :-

- Appn level integration : }
- OS level integration : .. }

## App1^n level integration



## OS level integration



Memory Virtualization is process of aggregating & Pooling the complete RAM resources from the N/w grid or cluster into single memory pool.

## App'l level integration

Application running on disconnected computer directly connected to memory pool through an API or the file system

## Operating system level Integration

The OS first connects to the memory pool & makes that pooled memory available to app'n.

## Storage Virtualization :-

is sharing of physical storage into multiple storage devices which further appears to be a single storage device. It can also be called as group of available storage device which simply manages from a central consol.

Benefits are

- easy back up
- recovery of data.

It classified into two categories

- Block - it replaces controllers and take over at disk level & work

(drive partition)

before the file system exist.

file :- The server that uses the storage must have the s/w installed on it in order to enable file level usage.

Different Types of storage applies virtualization

- Host based - all the virtualization & mgmt is done at host level with the help of s/w & physical storage. It can be any device or array.

- N/w based storage Virtualization

Devices such as smart switches or server connect to all the storage device in a fiber channel storage n/w & present the storage as a virtual pool.

- Array Based storage Virtualization.  
Here the storage array provider different types of storage which are physical & used as a storage tiers. The s/w is available to manage the storage tiers.

## Desktop Virtualization :-

It enables us to remotely access data from anywhere & anytime through any device. It provides safe and secure data as it is stored at centralized location.

## App' Server Virtualization :-

- also referred as 'Advanced Load Balancing' that enables IT department to balance workloads of an app' in an easy way.
- it gives better n/w security because only one server is visible to the public while rest are hidden behind a reverse proxy. N/w security affiliation.

## VMware :-

VMware is a product that enables user to set up virtual machine on a single physical machine. & use them simultaneously along with the actual machine.

In simple words it enables its user to install a virtual operating system within an operating system & use them both at the same time.

Difference bet'n VMware & cloud computing

- Cloud computing is done via the internet, it is set of hardware, software & integrated & NW internet infrastructure. VMware is used in reference to the product of company <sup>called</sup> VMware Inc. & provide new IT services that drive business growth.

VMware is a publicly operated software virtualization company founded in 1998. It created a strong phase for virtualization which empowered the digital workspace. It provides cloud computing & different SW & appln for virtualization.

VMware Products are classified into two types

- VMware Desktop appln.
- VMware Server appln.
- VMware Desktop Appln

Desktop appln have compatibility with major OS's. It provides three desktop appln.

- VMware Workstation

This appln allow user to install & run multiple copies of instances of same OS or different operating system on the same computer.

- VMware Player

This is specially design for mac users - it provides additional compatibility for all the VM products.

### VMware fusion:-

This product give an opportunity for those who do not have licensed VMware Products. This is freeware - which is meant for personal usage.

### VM server appln

VMware s/w hypervisors meant for servers are metal embedded hypervisors that can run on servers without the need of additional primary operating system.

### following are server s/w appln

#### - VMware ESX server :-

This is an enterprise level soln. This helps in less system overhead, it is integrated with Vcenter, which help in the consistency of server Apps.

## VMware ESXi Server

It is similar to the ESX server, the only difference is the Service console is replaced with `BusyBox` installation.

## VMware Server

It's a freeware sw which can be used over an existing OS.

## Microsoft HyperV :-

Hyper-V is a Microsoft freeware virtualization product. It lets us create & run a software version of a computer, called a virtual machine. Each virtual machine acts like a complete computer, running an operating system & program.

Virtual machine gives a more efficient way to use h/w than just running one OS on physical h/w.

HyperV runs each virtual machine in its own isolated space.

which means you can run more than one virtual machine on the same h/w at the same time. You might want to do this to avoid problems such as crash affecting the other workload.

## Features of Hyper-V

- Computing environment
- Disaster Recovery & backup
- Optimization
- Portability
- Remote Connectivity
- Security

## How Hyper-V works

Hyper-V is a hypervisor-based virtualization technology. Hyper-V uses the windows hypervisor, which requires a physical processor with specific features.

In most cases the hypervisor manages the interaction bet'n the h/w and the virtual machine.

This Hypervisor-controlled access

to the h/w gives virtual machines the isolated environment in which they run. In some configurations a virtual machine or the operating system running in virtual machine has direct access to graphics, memory or storage h/w;

### What Hyper-V consists of :-

HyperV has 8equized parts that work together so you can create & run virtual machines. Together, these parts are called the virtualization platform. They are installed as a set ~~of~~ when you installed the Hyper-V role.

- The 8equized parts include
  - windows hypervisor
  - Hyper-V virtual Machine Mgmt service
  - The virtual WMI provider
  - The virtual machine bus (VMBus)
  - Virtualization Service Provider(VSP)
  - Virtual interRasTecture driver (VID)