(III) Virtualization

Defination:

Virtualization is a technique, which allows to share a single physical instance of a resource or an application among multiple customers & organization.

Explanation:

It is defined as an abstraction of computer resources. It creates a virtual form of a device or any computer resource like storage device, network, server & an operating system (OS) in which the framework partitions the resource into one or more execution environment. It is the key component of cloud computing, particularly in the infrastructure as a service (IaaS) model. It makes a single physical resource to work as a multiple virtual resource & multiple physical resources as a single virtual resource.

* **Characteristics of virtualization:**

(i) **Isolation:** Every machine is protected from viruses and crashes from any other machines because all VMs are isolated from each other.

(iii) Partitioning : This is used in virtualization to support several applications & OSs in one physical system.

(iii) Encapsulation : This protects the existing applications from interfering with each other.

* Pros of Virtualization :

(i) It allows quick provisioning and deployment, enhanced resiliency and availability ; improved workload balancing by providing the user the capability to dynamically move VMs from server to server.

(ii) Due to virtualization, companies can have the facility to use their IT resources very efficiently.

(iii) It also includes a reduction in power consumption and the need for cooling.

(iv) Disaster recovery becomes easy when the cloud is virtualized.

* Cons of Virtualization :

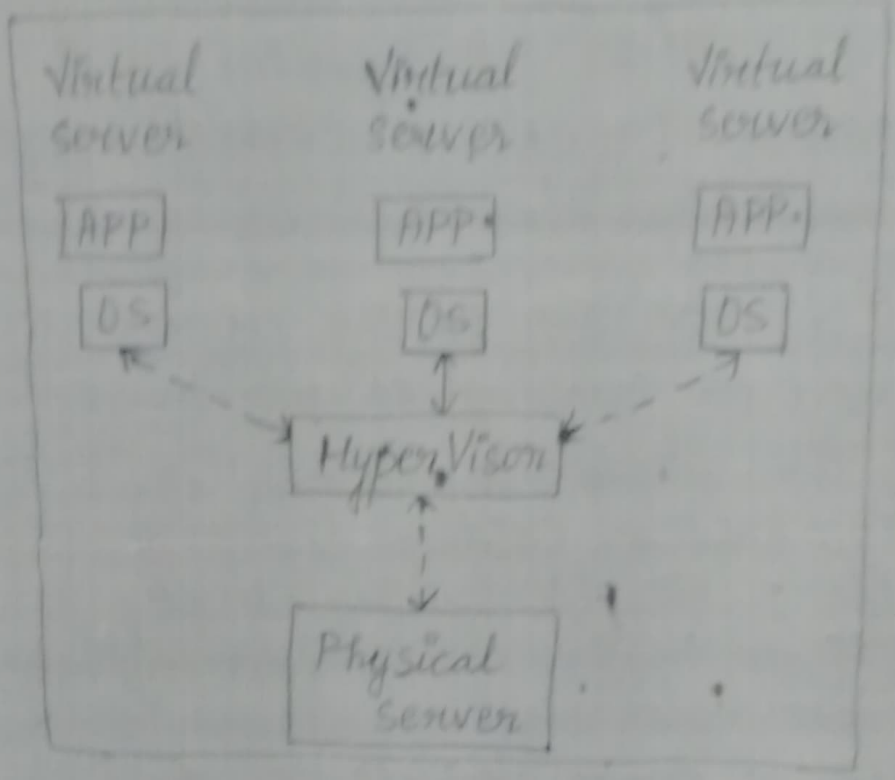
(i) The virtual storage service creates a prob. when the internet connection is lost in the middle of the work. So the connection quality must be good.

(ii) Risk in storing sensitive inf. while using virtual data storage.

loss of flexibility
If some error occurs in a virtualized system, it needs complex troubleshooting.

Types of Virtualization :

1) Server Virtualization :-



* In this, one physical machine is partitioned into many virtual servers. In simple words, the process of dividing a server into multiple small server is called server virtualization.
* The physical server is called host and the virtual servers are called guests. At the core of virtualization, the concept of hypervisor exists. The hypervisor is also called a VM monitor, which is a thin layer that intercepts the operating system's calls to the hardware. It abstracts physical resource

from the systems which are running from the tops of it.

* Hypervisors are divided into two types:

(i) Type-I : The type-1 hypervisor can also be called native or bare-metal. These are installed directly onto the hardware just like a regular OS get installed on a single server. Examples :- Microsoft's hyper-V, citrix xenserver etc.

(ii) Type-II : These run on the current OS with the guest OS running at the third level above the hardware. These are installed directly onto an existing OS environment. Examples :- SWSoft's Parallels desktop & VMware workstation etc.

* Advantages of server Virtualization :

(i) The most popular advantage of server virtualization is in the field of development, where the developers have easy access to OSs & they do not need to install operating system on their desktops.

(ii) Multiple OS technologies can be deployed on a single hardware platform.

(iii) Since every application exists within its own virtual server, collision of the applications does not exist when any changes or upgrades

made.

Disadvantages of server virtualization:

(i) Server virtualization restricts the amount of storage space because a single physical computer is partitioned into multiple servers which affect the disk space.

(ii) It is quite important to have an expert to administer a network while deploying server virtualization. But it is not easy to maintain such experts by small companies.

(iii) Storage Virtualization :-

It is the process of grouping the physical storage from multiple network storage devices so that it looks like a single storage device.

* Server virtualization is done because a single physical server can be divided into multiple servers on the demand basis & for balancing load. - Server virtualization part

* Usage :- It is mainly done for back-up & recovery purposes.

* Advantages of storage virtualization:

(i) Storage management is easy.

(ii) Easy accessibility of req. data from anywhere using storage virtualization.

(iii) less energy usage.

* Disadvantage of storage virtualization:

(i) Storage virtualization does not allow vendors to easily interoperate very frequently.
(ii) The network system is highly complicated
(iii) If a single server gets infected - the whole network is compromised.

(iii) Network Virtualization:

* The process of combining software network resources & hardware network resources into a single unit is called network virtualization. The main aim of network virtualization is to allow users & systems with secure & efficient sharing of network resources.

* It involves the running of multiple networks on the same network device, where each network runs in isolation & transparently as if each is running individually & using the entire network hardware. The best eg. is Windows Azure, virtual networking.