Cloud Networking

1-What is virtualization and virtualization type?

ANS :

Virtualization

Virtualization is a technology that allows you to create multiple virtual environments (or machines) on a single physical hardware system.
Each virtual machine (VM) runs its own operating system and applications independently, even though they share the same physical resources.

Example:
Running both Windows and Linux operating systems on the same computer using virtualization software like VMware or VirtualBox.

Types of Virtualization:

1. Hardware Virtualization:

    o Uses a hypervisor to divide physical hardware into multiple virtual machines.

    o Example: VMware, Hyper-V.

2. Operating System (OS) Virtualization:

    o Runs multiple isolated user spaces on a single OS.

    o Example: Docker, LXC.

3. Server Virtualization:

    o Divides one physical server into several virtual servers for better resource use.

4. Storage Virtualization:

    o Combines multiple physical storage devices into a single virtual storage unit.

    o Example: Storage Area Network (SAN).

5. Network Virtualization:

    o Creates multiple virtual networks on the same physical network hardware.

    o Example: VLANs (Virtual Local Area Networks).

6. Desktop Virtualization:

- o Allows users to access their desktop environment remotely from any device.
- o Example: Virtual Desktop Infrastructure (VDI).

2-Type of hypervisor and how to manage it?

ANS :

Types of Hypervisors:

A hypervisor is software that creates and manages virtual machines (VMs) by dividing physical hardware resources among them.
There are two main types of hypervisors:

1. Type 1 – Bare-Metal Hypervisor:

- Installed directly on the physical hardware (no need for a host operating system).
- Offers better performance, efficiency, and security.
- Commonly used in data centers and enterprise environments.

Examples:

- VMware ESXi
- Microsoft Hyper-V
- Citrix XenServer
- KVM (Kernel-based Virtual Machine)

Advantages:

- High performance
- More secure
- Efficient resource utilization

2. Type 2 – Hosted Hypervisor:

- Installed on top of an existing operating system.
- Easier to set up and suitable for personal or testing use.

Examples:

- Oracle VirtualBox

- VMware Workstation

- Parallels Desktop

Advantages:

- User-friendly

- Good for development and testing environments

How to Manage a Hypervisor:

1. Using Management Software:

   o Tools like VMware vCenter, Microsoft System Center, or oVirt help manage multiple virtual machines and hosts.

2. Command Line Interface (CLI):

   o Use commands to create, start, stop, or configure VMs directly.

3. Web-Based Console:

   o Many hypervisors (like ESXi or Proxmox) provide a web dashboard for easy management.

4. APIs and Scripts:

   o Administrators can use automation tools and scripts (like PowerShell or Python) to manage VMs efficiently.

3-Roles of virtualization in cloud computing?

ANS :

Roles of Virtualization in Cloud Computing:

Virtualization plays a key role in enabling cloud computing by allowing efficient use of hardware and providing flexibility, scalability, and resource management.

Here are the main roles:

1. Efficient Resource Utilization:

   o Virtualization allows multiple virtual machines (VMs) to run on a single physical server.

   o This maximizes hardware usage and reduces waste.

2. Cost Reduction:

   o By running multiple virtual servers on one machine, organizations save money on hardware, energy, and maintenance.

3. Scalability and Flexibility:

   o Virtual machines can be easily created, modified, or deleted based on demand — helping cloud providers scale quickly.

4. Isolation:

   o Each VM operates independently, meaning one VM's failure doesn't affect others.

   o This ensures better security and stability.

5. Disaster Recovery and Backup:

   o Virtual machines can be easily backed up and restored, improving reliability in case of system failure.

6. Faster Deployment:

   o Virtual environments can be created in minutes, speeding up software testing and deployment in the cloud.

7. Platform Independence:

   o Virtualization allows different operating systems to run on the same hardware, supporting diverse user needs.

4-What is container?

ANS :

A container is a lightweight, portable unit that packages an application and all its dependencies (libraries, configurations, and code) so it can run reliably across different environments.

- Containers share the host operating system's kernel but run in isolated user spaces.

- They start faster and use fewer resources than virtual machines.

Example: Docker, Kubernetes, Podman.

Benefits:

- Fast deployment

- Easy portability

- Efficient resource use

5-What is high availability and live migration in virtualization?

ANS :

High Availability (HA):

- Ensures that virtual machines and services remain continuously available even if hardware or software failures occur.

- It uses clustering and failover mechanisms to automatically move workloads to healthy servers.

- Goal: Minimize downtime and maintain service reliability.

Live Migration:

- A process of moving a running virtual machine from one physical host to another without shutting it down.

- This ensures no interruption to users or applications.

- Commonly used for load balancing and maintenance tasks.

6-Storage configuration –describe block storage, file storage and object storage---DAS NAS and SAN

ANS :

Block Storage:

- Data is stored in fixed-size blocks.

- Each block acts like a hard drive and can be managed by the operating system.

- Best for: Databases, virtual machines, and high-performance applications.

- Example: SAN (Storage Area Network).

File Storage:

- Data is stored and organized in folders and files (like on a computer).

- Best for: Shared file access, user directories, and backups.

- Example: NAS (Network Attached Storage).

Object Storage:

- Data is stored as objects with metadata and a unique identifier.

- Best for: Large unstructured data like images, videos, or backups.

- Example: Cloud storage like Amazon S3 or Google Cloud Storage.

7-Describe storage allocation and provisioning. Storage Allocation

ANS:

Storage Allocation:

- The process of assigning a specific amount of storage space to users, applications, or virtual machines.

- Ensures that each system or user has enough space to operate efficiently.

- Can be done manually or automatically using management software.

Storage Provisioning:

- The process of making allocated storage available for use.

- It includes creating volumes, assigning storage to servers or VMs, and setting access permissions.

Types of Provisioning:

1. Thick Provisioning: Allocates all storage space upfront.

2. Thin Provisioning: Allocates space on demand as data grows — more efficient for cloud systems.