

Module -2

1-What is virtualization and virtualization type?

- Virtualization is the process of creating a virtual version of something, such as hardware, storage devices, or networks.

Types of Virtualization:

- Hardware Virtualization: Virtualizes the physical hardware, enabling multiple operating systems to run on the same hardware. It uses a hypervisor to manage these virtual machines (VMs).
- Operating System Virtualization: Involves virtualizing the OS to run multiple instances of an OS on the same physical machine (e.g., Docker containers).
- Storage Virtualization: Combines physical storage from multiple devices into a single virtual storage pool, making management easier.
- Network Virtualization: Abstracts network resources to create a virtual network that can be managed independently of physical hardware.
- Application Virtualization: Allows an application to run on an OS without being installed on the device, essentially decoupling the application from the operating system.
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2-Type of hypervisor and how to manage it?

- Bare-metal Hypervisor: Runs directly on the host machine's hardware without requiring a host OS. Examples VMware ESXi, Microsoft Hyper-V, and Xen.
- Hosted Hypervisor: Runs on top of a host OS. It is easier to set up but may have lower performance. Examples VMware Workstation, Oracle VirtualBox, and Parallels
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3-Roles of virtualization in cloud computing?

- Resource Optimization: Virtualization helps cloud providers maximize resource utilization by running multiple virtual machines on the same physical infrastructure.
- Scalability: Virtualization allows resources to be easily scaled up or down, depending on demand, providing flexible cloud services.
- Isolation: It provides security and isolation between different users or tenants in a cloud environment, allowing multiple workloads to run concurrently without interference.
- Cost Efficiency: Virtualization reduces hardware requirements, leading to lower operational costs for both cloud providers and users.

4-What is container?

- It is software package that contains everything needed to run an application in any environment. It includes application's code, configuration files, libraries and dependencies.

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

- High Availability (HA): HA refers to the ability of a system to continue functioning in the event of hardware failure or unexpected disruptions. In virtualization, it means that virtual machines (VMs) will automatically failover to another host if the current one fails, ensuring minimal downtime.
- Live Migration: Live migration is the process of moving a running virtual machine from one host to another without downtime. It allows for load balancing, maintenance, and resource optimization without affecting the services running on the VM.

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

- Block Storage: Divides data into fixed-size blocks, which are stored in a storage device. Each block is treated as an independent unit, making it suitable for databases and applications requiring high performance. Examples: AWS EBS, Azure Disk Storage.
- File Storage: Stores data as files in a hierarchical structure (directories, folders), making it more user-friendly. It is often used for shared file systems. Examples: NFS (Network File System), SMB (Server Message Block).
- Object Storage: Stores data as objects (files with metadata), which is ideal for storing unstructured data like images, videos, or backups. It scales well and is highly durable. Examples: AWS S3, Google Cloud Storage
- DAS (Direct Attached Storage): Storage that is directly connected to a computer or server, often through USB, SATA, or SAS. It's simple but lacks scalability and shared access.
- NAS (Network Attached Storage): A dedicated file storage device connected to a network, allowing multiple users or devices to access files. It is ideal for file sharing but can have performance bottlenecks if not properly configured.
- SAN (Storage Area Network): A high-performance, dedicated network that provides block-level storage access to servers. It allows for faster data access and is scalable, making it suitable for large enterprise environments.

6-Describe storage allocation and provisioning. Storage Allocation

- Storage Allocation: This is the process of reserving a certain amount of storage capacity for a specific purpose, such as creating a new virtual machine or setting up an application. In a virtualized environment, storage can be allocated dynamically based on the workload's needs.
- Storage Provisioning: This refers to the process of allocating and configuring storage resources so that they can be used by servers or virtual machines. It can be either:
 - Thin Provisioning: Allocates storage dynamically as data is written, reducing waste but potentially leading to over-commitment.
 - Thick Provisioning: Allocates all the required storage up front, ensuring that the full capacity is available, which might lead to underutilization.