Cyber Security - Virtualization and Cloud Basics

1.What is cloud computing?

ANS: Cloud computing is a technology that delivers computing services—such as servers, storage, databases, networking, software, and analytics—over the internet ("the cloud") instead of using local servers or personal devices.
It allows users to access resources on-demand, pay only for what they use, and scale easily.

Example: Google Drive, Amazon Web Services (AWS), Microsoft Azure

2.Describe cloud computing deploy model.

ANS: Cloud computing can be deployed in different ways depending on the organization's needs:

Model	Description	Example
Public Cloud	Services are offered over the public internet and shared across multiple users (tenants).	AWS, Google Cloud, Azure
Private Cloud	Infrastructure is used by a single organization, offering greater control and security.	VMware vSphere, OpenStack
Hybrid Cloud	Combination of public and private clouds, allowing data and applications to move between them.	AWS Outposts, Azure Stack
Community Cloud	Shared by several organizations with common requirements (e.g., healthcare or education).	Government community clouds

3.What are components of cloud computing?

ANS:

- **Client Devices:** Laptops, mobile phones, etc., used to access cloud services.
- **Datacentre:** Physical servers and storage systems hosting cloud services.
- **Cloud Service Models:**
  IaaS (Infrastructure as a Service) – Provides virtual machines and storage.
  PaaS (Platform as a Service) – Provides development platforms and tools.
  SaaS (Software as a Service) – Provides software applications over the internet.
- **Cloud Management Software:** Handles resource allocation, virtualization, and billing.
- **Network:** The Internet or private connections linking clients and data centres.

4.cloud computing advantage and disadvantage Advantages of Cloud Computing

ANS:

Advantages:

- Cost-effective (pay-as-you-go model)
- Scalability and flexibility
- Accessibility from anywhere
- High reliability and availability
- Automatic updates and maintenance
- Data backup and disaster recovery

Disadvantages:

- Requires internet connectivity
- Data security and privacy issues
- Limited control over infrastructure
- Possible downtime or outages
- Vendor lock-in problems

4.What is virtualization and virtualization type?

ANS: Virtualization is the creation of a virtual version of computing resources such as servers, storage devices, networks, or operating systems.

Types of Virtualization:

a) **Server Virtualization** – Multiple virtual servers run on one physical server.

b) **Storage Virtualization** – Combines multiple physical storage devices into one.

c) **Network Virtualization** – Combines network resources to act as a single network.

d) **Desktop Virtualization** – Provides virtual desktops to users remotely.

e) **Application Virtualization** – Applications run in isolated environments.

5.Type of hypervisor and how to manage it?

ANS: Hypervisor: Software layer that creates and manages virtual machines (VMs).

Types:

Type 1 (Bare-Metal Hypervisor):

- Runs directly on physical hardware.
- Examples: VMware ESXi, Microsoft Hyper-V, Xen Server.

Type 2 (Hosted Hypervisor):

- Runs on top of an existing operating system.
- Examples: Oracle VirtualBox, VMware Workstation.

Management Tools:
vCenter (VMware), Hyper-V Manager, oVirt, or KVM management tools.

6.Roles of virtualization in cloud computing?

ANS:

- Enables resource pooling and on-demand allocation.
- Improves hardware utilization and scalability.
- Supports quick provisioning and deployment of resources.
- Allows isolation of applications and systems.
- Essential for implementing IaaS in cloud environments.

7.What is container?

ANS: A **container** is a lightweight, portable unit that packages an application and its dependencies together so it runs consistently across environments.
Unlike virtual machines, containers share the host operating system kernel.

Examples: Docker, Kubernetes, Podman.

8.What is high availability and live migration in virtualization?

ANS:

- **High Availability (HA):**
  Ensures continuous operation and minimal downtime by automatically restarting VMs on another host in case of failure.
- **Live Migration:**
  Moving a running virtual machine from one physical host to another without shutting it down.
  Used for load balancing and maintenance.

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

ANS: (a) Block Storage:

- Data stored in fixed-size blocks.
- Used for databases and virtual machine disks.
- Example: iSCSI, Fibre Channel.

(b) File Storage:

- Data stored as files in folders, accessed via file systems.
- Example: Network File System (NFS), SMB/CIFS.

(c) Object Storage:

- Data stored as objects with metadata and unique IDs.
- Scalable and ideal for unstructured data (images, videos).
- Example: Amazon S3, OpenStack Swift.

Types of Storage Systems:

Type	Full Form	Description
DAS	Direct Attached Storage	Connected directly to a single computer/server.
NAS	Network Attached Storage	File-level storage shared over a network.
SAN	Storage Area Network	High-speed network providing block-level storage to servers.

10.Describe storage allocation and provisioning

ANS:

- **Storage Allocation:** Assigning a specific amount of storage to a system, VM, or application.
- **Storage Provisioning:** The process of configuring and managing storage resources.

Types:

- **Thick Provisioning:** All storage is allocated upfront.
- **Thin Provisioning:** Storage is allocated dynamically as needed, improving efficiency.