**1. What is virtualization, and how does it differ from traditional computing?**

Virtualization is the process of creating a virtual version of computing resources such as servers, storage, or networks. It allows multiple operating systems and applications to run on a single physical machine by abstracting hardware resources.  
**Difference from traditional computing:**

* Traditional computing runs one OS per physical machine.
* Virtualization enables multiple virtual machines (VMs) on the same hardware, improving resource utilization and flexibility.

**2. What is the difference between Type 1 and Type 2 hypervisors?**

* **Type 1 (Bare-metal):** Runs directly on the physical hardware without an underlying OS. Examples: VMware ESXi, Microsoft Hyper-V.
* **Type 2 (Hosted):** Runs on top of an existing operating system. Examples: VMware Workstation, Oracle VirtualBox.  
  **Key difference:** Type 1 offers better performance and is used in enterprise environments, while Type 2 is common for personal or development use.

**3. What is the purpose of virtualization in data centers?**

Virtualization in data centers helps:

* **Optimize resource utilization** by running multiple workloads on fewer physical servers.
* **Reduce costs** (hardware, power, cooling).
* **Improve scalability and flexibility** for deploying applications.
* **Enable disaster recovery** and high availability through VM migration and snapshots.

**4. What is the role of virtualization in cloud computing?**

Virtualization is the foundation of cloud computing. It allows cloud providers to:

* **Create virtualized resources** (compute, storage, network) for customers.
* **Enable multi-tenancy** where multiple users share the same physical infrastructure securely.
* **Support elasticity** by scaling resources up or down on demand.

**5. Explain the difference between vSphere, ESXi, and vCenter?**

* **ESXi:** A Type 1 hypervisor developed by VMware that runs directly on physical servers to host virtual machines.
* **vSphere:** VMware’s suite of virtualization products, which includes ESXi and vCenter.
* **vCenter:** A centralized management platform for vSphere environments, used to manage multiple ESXi hosts and VMs.

**6. What is ESXi? What are the pre-requisites to install VMware ESXi server?**

* **ESXi:** VMware ESXi is a Type 1 hypervisor that runs directly on physical hardware to create and manage virtual machines.
* **Pre-requisites:**
  + 64-bit x86 processor with hardware virtualization support (Intel VT-x or AMD-V).
  + Minimum 4 GB RAM (recommended 8 GB or more).
  + Supported storage (local disk, SAN, or NAS).
  + Network interface card (NIC) for connectivity.
  + Access to VMware ESXi ISO image for installation.

**7. What is a Datastore in VMware?**

A **Datastore** is a storage container used by VMware to hold virtual machine files, templates, and ISO images. It can be backed by local disks, SAN, or NAS storage and is managed through ESXi or vCenter.

**8. What is VMware vSphere? What are the main components of VMware vSphere?**

* **VMware vSphere:** A suite of virtualization products that provides a complete platform for virtualized infrastructure.
* **Main Components:**
  + **ESXi:** Hypervisor for running VMs.
  + **vCenter Server:** Centralized management tool.
  + **vSphere Client:** Interface for managing ESXi and vCenter.
  + **vSphere Distributed Switch:** Advanced networking.
  + **vSphere Storage:** Datastore and storage policies.

**9. What is the role of the vSphere Distributed Services Engine?**

The **vSphere Distributed Services Engine** offloads certain networking and security services to hardware accelerators (DPUs), improving performance, scalability, and security in virtualized environments.

**10. What is the difference between vSphere and vCenter Server?**

* **vSphere:** The overall virtualization platform that includes ESXi, vCenter, and related components.
* **vCenter Server:** A centralized management application within vSphere used to manage multiple ESXi hosts, clusters, and resources.

**11. What is a Resource Pool?**

A **Resource Pool** is a logical abstraction that allows you to allocate CPU and memory resources to a group of virtual machines. It helps in resource management and prioritization.

**12. What is a Cluster in VMware vSphere?**

A **Cluster** is a group of ESXi hosts that work together to provide features like High Availability (HA), Distributed Resource Scheduler (DRS), and Fault Tolerance. It enables load balancing and failover capabilities.