By Maha Rana

CS505 Midterm Subjective Solved

Short Questions:

1. Define SDDC (Software-Defined Data Center)

A ***Software-Defined Data Center (SDDC)*** is a ***fully virtualized data center*** where ***compute, storage, and networking*** are controlled through software instead of physical hardware. It allows for ***automation, scalability, and better resource management***.

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2. Benefits of SDDC

1. ***Automation*** – Reduces manual work and improves efficiency.
2. ***Cost Savings*** – Uses virtualization to lower hardware and operational costs.
3. ***Scalability*** – Easily scales resources up or down as needed.
4. ***Flexibility*** – Supports cloud integration and hybrid IT environments.
5. ***Improved Security*** – Centralized management enhances data protection.

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3. Limitations of Application Virtualization

1. ***Single Point of Failure*** – If the ***virtualization server fails***, all applications stop working.
2. ***High Bandwidth Requirements*** – Streaming apps require ***fast internet*** for smooth performance.
3. ***Compatibility Issues*** – Some applications ***require system drivers*** and cannot be virtualized.
4. ***Initial Cost & Complexity*** – Setting up an application virtualization infrastructure can be ***expensive and complex***.
5. ***Limited Performance*** – Some ***resource-intensive applications*** (like heavy graphics software) may ***not perform well*** in a virtualized environment.

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4. Benefits of Virtualization

1. ***Better Resource Utilization*** – Maximizes hardware efficiency.
2. ***Cost Savings*** – Reduces hardware, maintenance, and power costs.
3. ***Disaster Recovery*** – Enables quick system backups and recovery.
4. ***Security & Isolation*** – Each VM operates separately, reducing risks.
5. ***Scalability & Flexibility*** – Easily add or remove virtual machines as needed.

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5. Components of vSphere

VMware vSphere is a ***virtualization management platform*** that includes:

1. ***VMware ESXi*** – A ***Type 1 Hypervisor*** for running virtual machines.
2. ***vCenter Server*** – A centralized management tool for multiple ESXi hosts.

3. ***vMotion*** – Enables ***live migration*** of virtual machines without downtime. 4. ***VMFS (Virtual Machine File System)*** – A high-performance file system for VM storage.
5. ***Distributed Resource Scheduler (DRS)*** – Automatically balances workloads across hosts.

Other Virtualization-Related Questions:

6. What is ESXi?

VMware ***ESXi*** is a ***Type 1 Hypervisor*** that runs directly on physical hardware, allowing multiple virtual machines to operate on a single server. It is used for ***enterprise-level server virtualization***.

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7. What is a Virtual Machine (VM)?

A ***Virtual Machine (VM)*** is a ***software-based computer*** that runs an ***operating system (OS)*** and applications independently from the physical hardware. It uses ***virtualized resources*** like vCPU, vRAM, and vDisk.

Example: Running ***Windows on a Linux machine*** using VMware or VirtualBox.

Short Questions:

1. Benefits of Virtualization

1. ***Efficient Resource Utilization*** – Maximizes hardware efficiency by running multiple VMs on a single machine.
2. ***Cost Savings*** – Reduces hardware, power, and maintenance costs.
3. ***Scalability & Flexibility*** – Easily adds or removes VMs as needed.
4. ***Improved Security*** – VMs are isolated, preventing malware from spreading.
5. ***Disaster Recovery & Backup*** – Enables quick recovery through snapshots and cloning.

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2. Is It Possible to Build Multiple Servers on a Physical Data Center?

Yes, multiple servers can be created in a ***physical data center*** by using ***server virtualization***.

Hypervisors (e.g., VMware ESXi, Microsoft Hyper-V) allow multiple virtual servers to run on a ***single physical machine***, improving efficiency and reducing costs.

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3. Xen Server Hypervisor Type

Xen Server is a ***Type 1 (Bare-Metal) Hypervisor***.

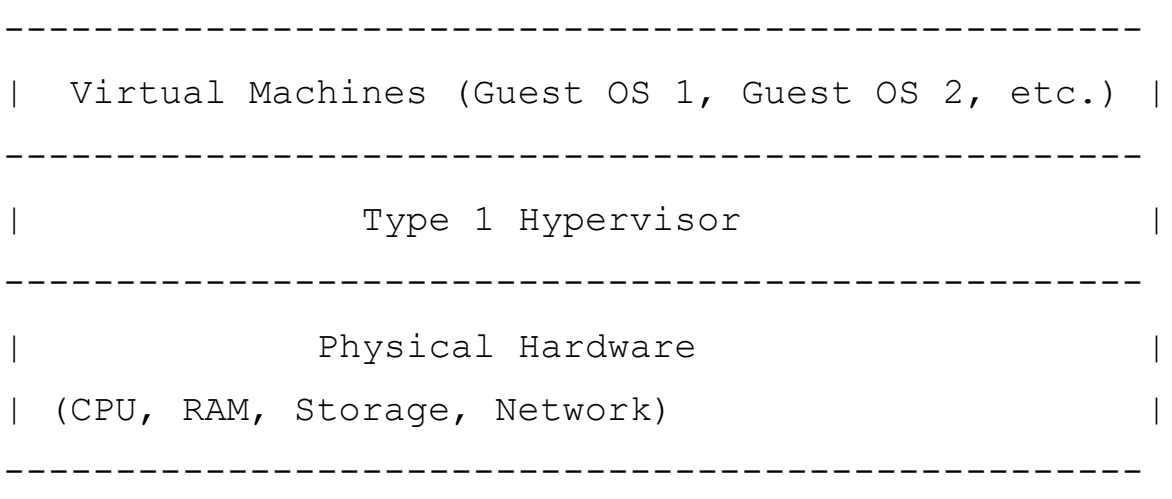
It runs directly on hardware, providing ***efficient virtualization with minimal overhead***.

Used for ***cloud computing*** and ***enterprise virtualization*** solutions.

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Long Questions:

1. Draw Structure of Type 1 Hypervisor



- Type 1 Hypervisor runs ***directly on hardware*** and manages multiple virtual machines without needing a host OS.
- Examples: ***VMware ESXi, Microsoft Hyper-V, XenServer***.

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2. List the Limitations of Application Virtualization

1. ***Single Point of Failure*** – If the ***virtualization server crashes***, all virtualized apps stop working.
2. ***High Bandwidth Requirement*** – Streaming applications require ***strong network connectivity***.
3. ***Compatibility Issues*** – Some applications that require ***system drivers*** may not work well in a virtualized environment.
4. ***High Initial Cost*** – Setting up an application virtualization infrastructure ***requires investment in software and hardware***.

5. ***Performance Issues*** – Certain ***resource-intensive applications (e.g., graphics-heavy apps)*** may perform poorly in a virtualized setup.

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3. Table: Identify User Level, Operating System, and Hardware

Component	Category
Web Browser	User-Level
CPU	Hardware
RAM	Hardware
Kernel	Operating System
File System	Operating System
Application Software	User-Level

Short Questions:

1. Is It Possible to Create Multiple Virtual Machines Without the Presence of a Hypervisor?

No, it is ***not possible*** to create multiple virtual machines without a ***hypervisor layer*** because:

- The ***hypervisor is responsible for managing virtual machines (VMs)*** and allocating system resources (CPU, RAM, storage, etc.).
- Without a hypervisor, ***there would be no software layer to isolate and manage VMs***, leading to conflicts and inefficient resource usage.
- ***Hypervisors create, run, and manage multiple VMs on a single physical machine*** by virtualizing the hardware.

Example: VMware ESXi, Microsoft Hyper-V, VirtualBox

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2. Difference Between Hardware-Defined Data Center (HDDC) and Software-Defined Data Center

Feature	Hardware-Defined Data Center (HDDC)	Software-Defined Data Center (SDDC)
Management	Managed manually with physical hardware	Managed using software and automation
Resource Allocation	Fixed and hardware-dependent	Dynamic and virtualized
Scalability	Difficult to scale	Easily scalable with automation
Cost	Higher due to hardware dependency	Lower due to virtualization
Examples	Traditional data centers with physical servers	VMware vSphere, Microsoft Azure, AWS

4. Four Benefits of Application Virtualization

1. ***Cross-Platform Compatibility*** – Allows applications to run on different operating systems without modification (e.g., running Windows apps on Linux).
2. ***Easier Management*** – Applications can be centrally managed without being installed on individual devices.
3. ***Security Isolation*** – Virtualized apps are ***isolated from the host OS***, reducing security risks.
4. ***Faster Deployment*** – Applications can be ***instantly streamed*** to user devices without manual installation.

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5. Two Examples of Type 1 Hypervisors

VMware ESXi – A ***bare-metal hypervisor*** widely used in data centers.

Microsoft Hyper-V – A ***Type 1 Hypervisor*** built into Windows Server for enterprise virtualization.

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6. Three Benefits of a Virtualized Environment

1. ***Cost Savings*** – Reduces the need for multiple physical servers, lowering hardware and maintenance costs.
2. ***Scalability*** – Virtual machines can be easily created, modified, or deleted as needed.
3. ***Disaster Recovery*** – VMs can be backed up, cloned, and restored quickly in case of system failures.

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Note!

May Allah grant you success, ease your efforts, and bless you with wisdom and perseverance. Keep your faith strong, for with prayer, every challenge becomes an opportunity. And please remember us in your prayers. I hope this file helps you a lot; I have tried my best to find the most relevant and authenticated answers for the questions. However, in some cases, the questions might slightly differ from the ones in your slides. I recommend that every student kindly verify the answers on their own before using them. I am not responsible for any discrepancies.

Best wishes for Mids!