By Maha Rana

CS505P Current Papers Solved

1. Benefits of Type 2 Hypervisor

Easy to install on an existing OS

Suitable for software development and testing

Supports multiple OS on a single host

Cost-effective for small-scale use

Good for personal and educational purposes

2. 5 Reasons to Use Virtualization

Resource Optimization: Efficient use of hardware resources

Cost Savings: Reduces hardware and maintenance costs

Scalability: Easily scale up or down as needed

Security: Isolates applications and prevents malware spread

Disaster Recovery: Enables quick system recovery and backups

3. 5 Benefits of Virtual Machines

Hardware Independence: VMs can run on any host machine

Multiple OS on One Machine: Run different operating systems simultaneously

Security & Isolation: Each VM operates independently, reducing security risks

Easier Backups & Recovery: Snapshots and cloning allow quick restoration

Cost-Efficient: Reduces the need for multiple physical servers

4. Steps of Creating a New Machine on VMware Workstation

Open ***VMware Workstation***

Click ***"Create a New Virtual Machine"***

Choose ***installation type*** (ISO image or install later)

Select ***guest OS*** (Windows/Linux, etc.)

Allocate ***CPU, RAM, and disk space***

Configure ***network settings***

Finish and start the ***Virtual Machine***

5. Table: Container vs. Virtual Machine (Match the Term to the Correct Category)

Virtual Machine: Uses Hypervisor, Includes OS, Heavier, Takes more time to boot

Container: Uses Container Engine, Shares OS Kernel, Lightweight, Faster startup

6. Diagram: Physical Data Center Labeling

Servers: Physical machines running applications

Network Switches: Connects different devices

Storage Devices: Hard drives, SAN, NAS

Power Supply: UPS and backup power

Cooling System: Maintains temperature

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1. NoSQL Database

NoSQL databases store data in a ***non-relational format*** and are used for handling ***large-scale, unstructured, or semi-structured data***. They include key-value, document-based, columnar, and graph databases.
Examples: MongoDB, Cassandra, CouchDB, Redis

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2. 5 Reasons to Use Virtualization

Resource Optimization – Maximizes hardware utilization
Cost Savings – Reduces hardware and maintenance costs
Scalability & Flexibility – Easily scale resources as needed
Improved Security – Isolates applications to prevent breaches
Disaster Recovery – Quick backups and restoration

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3. 5 Benefits of Virtual Machines (VMs)

Hardware Independence – VMs run on any host machine
Run Multiple OS – Supports different operating systems on one machine
Security & Isolation – Prevents system crashes and malware spread
Easy Backup & Recovery – Snapshots enable quick restoration
Cost-Efficient – Reduces the need for multiple physical servers

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4. Main Purpose of Network Virtualization

By Maha Rana

Network virtualization creates ***virtual network components*** (switches, routers, firewalls) using software, making networks more ***flexible, scalable, and secure***. It allows multiple virtual networks to run on a ***single physical network*** without interference.

Key Benefits:

Easier network management
Faster provisioning of new networks
Better security and isolation
Cost savings on physical infrastructure

1. What is a Virtual Machine?

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

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2. What is a Virtual Switch in Hyper-V?

A ***Virtual Switch*** in ***Hyper-V*** is a ***software-based network switch*** that allows Virtual Machines (VMs) to ***communicate with each other and the physical network***.

Types of Virtual Switches in Hyper-V:

External vSwitch – Connects VMs to the physical network
Internal vSwitch – Connects VMs with each other and the host machine

- ***Private vSwitch*** – Connects only VMs within the same Hyper-V host

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3. 5 Reasons to Use Virtualization

Better Resource Utilization – Maximizes hardware efficiency

Cost Savings – Reduces need for physical servers and maintenance

Scalability & Flexibility – Easily create or remove VMs as needed

Improved Security – Isolates applications to prevent security risks

Disaster Recovery – Enables quick system backups and recovery

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4. 5 Steps to Install a Virtual Machine Using VirtualBox

1. ***Install VirtualBox*** – Download and install it on your system
2. ***Create a New VM*** – Open VirtualBox and click "New" to create a VM
3. ***Select Operating System*** – Choose the OS type (Windows, Linux, etc.)
4. ***Allocate Resources*** – Assign CPU, RAM, and storage space
5. ***Install OS*** – Load an ISO file and complete OS installation

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5. NoSQL Database Examples

MongoDB (Document-based)

Cassandra (Column-based)

Redis (Key-value store)

CouchDB (Document-based)

- ***Neo4j*** (Graph-based)

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6. Main Purpose of Data Centers

A ***Data Center*** is a facility that houses servers and IT infrastructure to store, process, and distribute data.

Key Purposes:

Data Storage & Management – Store large volumes of data securely
Hosting Websites & Applications – Provide cloud services
Disaster Recovery – Backup critical business data
Business Continuity – Ensure 24/7 access to data and services
Cybersecurity – Protect sensitive data with advanced security

1. NoSQL

NoSQL (Not Only SQL) is a type of ***database*** designed to handle ***large-scale, unstructured, or semi-structured data***. Unlike traditional ***relational databases (SQL)***, NoSQL databases do not rely on fixed schemas or tables.

Types of NoSQL Databases:

Key-Value Stores (e.g., Redis, DynamoDB)
Document Stores (e.g., MongoDB, CouchDB)
Column-Family Stores (e.g., Cassandra, HBase)
Graph Databases (e.g., Neo4j, ArangoDB)

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2. Steps to Create a Virtual Machine Using VirtualBox

1. ***Install VirtualBox*** – Download and install it from the official website.
2. ***Open VirtualBox & Create New VM*** – Click "New" and enter VM name.
3. ***Choose OS Type*** – Select the operating system (Windows, Linux, etc.).
4. ***Assign Resources*** – Allocate RAM, CPU, and storage.
5. ***Create Virtual Hard Disk*** – Select "Create a Virtual Hard Disk Now" and choose VDI, VHD, or VMDK.
6. ***Load ISO & Install OS*** – Attach an ISO image of the OS and start the VM.
7. ***Complete Installation*** – Follow the OS installation steps.

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3. Steps to Enable Hyper-V

1. ***Open Control Panel*** → Click on ***"Programs and Features"***.
2. ***Turn Windows Features On/Off*** → Select ***"Hyper-V"*** and check all boxes.
3. ***Restart the System*** → Allow changes to apply.
4. ***Open Hyper-V Manager*** → Use Windows Search to locate it.
5. ***Create a New VM*** → Use Hyper-V Manager to create and configure Virtual Machines.

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4. What is a Virtual Machine?

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A ***Virtual Machine (VM)*** is a ***software-based simulation*** of a physical computer. It operates as an independent system using ***virtualized hardware resources***, allowing multiple OS to run on a single physical machine.

Key Features of a VM:

Runs independently within a host system
Uses ***virtualized CPU, RAM, and storage***
Supports multiple operating systems on a single hardware
Provides ***isolation and security*** for applications

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5. Components of SDDC (Software-Defined Data Center)

Software-Defined Compute (SDC) – Manages virtualization of CPU and RAM.
Software-Defined Storage (SDS) – Pools and manages storage resources virtually.
Software-Defined Networking (SDN) – Controls network infrastructure using software.
Automation & Orchestration – Automates IT processes.
Security & Compliance – Ensures data protection and access control.

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6. Application vs. Desktop Virtualization

By Maha Rana

Feature	Application Virtualization	Desktop Virtualization
Definition	Runs applications on a remote server and streams to users	Runs an entire desktop OS remotely
Isolation	Apps run separately from the OS	Users get a full desktop environment
Usage	Used for running individual apps remotely	Provides full virtual desktops
Example Technologies	Microsoft App-V, Citrix Virtual Apps	VMware Horizon, Citrix Desktop
Best For	Running legacy apps, cross-platform compatibility	Remote work, centralized desktop management

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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!