The Benefits Of Virtualization | IBM

Task 1 Read link above and Add your notes and 11 pictures from demo 1

Task 1b watch 2 links below and Add your notes and 13 pictures from video

https://youtu.be/_u8qTN3cCnQ

https://youtu.be/wX75Z-4MEoM

Task 2 Read below Add your chat gpt notes for types of virt and 5 picsof your demo1 for Monday 1pm

Read 5 pages below for your 14 slide power point for wed 2pm?

Task 3 think of 20 questions to ask in exam

1.

History of Computer Virtualisation Technology: Virtualisation began in the 1960s with IBM's CP-40 and CP-67 projects, which allowed multiple users to share a single

mainframe. This evolved through the 1970s and 1980s with the development of virtual machines (VMs) and hypervisors, leading to modern virtualisation technologies in the 2000s, such as VMware and Hyper-V.

Types of Virtualisation Technology:

1. **Hardware Virtualisation**: Uses hypervisors to create virtual machines.
2. **Software Virtualisation**: Includes application virtualisation and OS virtualisation.
3. **Network Virtualisation**: Combines hardware and software network resources.
4. **Storage Virtualisation**: Pools physical storage from multiple devices.
5. **Desktop Virtualisation**: Runs desktop environments on a central server.

Fundamental Concepts of Hardware Virtualisation: Hardware virtualisation involves creating virtual machines that act like real computers with an operating system. The hypervisor, or virtual machine monitor (VMM), manages these VMs and allocates resources from the host hardware.

Server and Client Virtualisation:

1. **Server Virtualisation**: Multiple server instances run on a single physical server, improving resource utilization and reducing costs.
2. **Client Virtualisation**: Involves running client operating systems on a central server, allowing users to access their desktops remotely.

Configurable Resources for Virtualised OS: When creating a virtualised OS, you need to configure CPU, memory, storage, and network resources. These settings determine the performance and capacity of the virtual machine.

Constructing and Configuring Server Virtualisation Components: Using platforms like VMware vSphere or Microsoft Hyper-V, you can create and manage virtual servers. This involves setting up VMs, configuring virtual networks, and managing storage.

Designing a Virtual Network with Multiple Virtual Servers: A virtual network can be designed using virtual switches and routers to connect multiple VMs. This setup can include VLANs for network segmentation and security.

Successful Virtualisation Implementation and Deployment: Implementation involves planning, setting up the virtual environment, and migrating workloads. Deployment includes testing, monitoring, and optimizing the virtual infrastructure.

Resource Management and Monitoring in a Virtual Environment: Tools like VMware vCenter or Microsoft System Center help manage and monitor resources. Key metrics include CPU usage, memory allocation, storage I/O, and network traffic.

Guest OS vs. Host OS:

1. **Host OS**: The operating system installed on the physical hardware.
2. **Guest OS**: The operating system running inside a virtual machine.

Benefits and Limitations of Virtualisation:

1. **Benefits**: Improved resource utilization, cost savings, scalability, and disaster recovery.
2. **Limitations**: Performance overhead, complexity, and potential security risks.
2.

Basic Concepts and Current Trends: Virtualisation involves creating virtual versions of physical components. Current trends include containerisation (e.g., Docker), cloud computing, and edge computing, which extend virtualisation to new environments and use cases.

Reduced Physical Hardware: By consolidating multiple virtual machines (VMs) onto a single physical server, virtualisation reduces the number of physical servers required. This leads to lower energy consumption for powering and cooling the hardware

Let's explore the different types of virtualisation technology and their purposes:

a. Hardware Virtualisation

Definition: Hardware virtualisation involves creating virtual machines (VMs) that emulate physical hardware. This is achieved using a hypervisor, which manages the VMs and allocates resources from the host hardware. **Purpose**: It allows multiple operating systems to run on a single physical machine, improving resource utilization and reducing hardware costs.

b. Full Virtualisation

Definition: Full virtualisation uses a hypervisor to completely emulate the underlying hardware, allowing unmodified guest operating systems to run in isolation. **Purpose**: It provides strong isolation and security between VMs, making it suitable for running multiple different operating systems on the same hardware.

c. Para Virtualisation

Definition: Para virtualisation involves modifying the guest operating system to interact more efficiently with the hypervisor. **Purpose**: It improves performance by reducing the overhead associated with full virtualisation, but requires changes to the guest OS.

d. Desktop/Client Virtualisation

Definition: Desktop virtualisation involves running desktop environments on a central server, which users can access remotely. **Purpose**: It centralizes desktop management, enhances security, and allows users to access their desktops from any device.

e. Operating System Level Virtualisation

Definition: Also known as containerisation, this type of virtualisation runs multiple isolated user-space instances (containers) on a single operating system kernel. **Purpose**: It provides lightweight and efficient virtualisation, ideal for deploying applications consistently across different environments.

f. Application Virtualisation

Definition: Application virtualisation separates applications from the underlying operating system, allowing them to run in isolated environments. **Purpose**: It simplifies application deployment and management, reduces conflicts between applications, and enhances security.

g. Virtual Machines

Definition: Virtual machines are software-based emulations of physical computers, running an operating system and applications just like a physical machine. **Purpose**: They provide flexibility, allowing multiple VMs to run on a single physical server, each with its own OS and applications.

h. Mobile Virtualisation

Definition: Mobile virtualisation involves running multiple virtual environments on a single mobile device. **Purpose**: It enhances security and flexibility, allowing users to separate personal and work environments on the same device.

i. Memory Virtualisation

Definition: Memory virtualisation abstracts physical memory into a pool of resources that can be dynamically allocated to VMs. **Purpose**: It improves memory utilization and allows for more efficient management of memory resources across multiple VMs.

j. Server Virtualisation

Definition: Server virtualisation involves partitioning a physical server into multiple virtual servers, each running its own operating system and applications. **Purpose**: It maximizes server resource utilization, reduces hardware costs, and simplifies server management.

Understanding these types of virtualisation technologies helps

Optimized Resource Utilization: Virtualisation allows for better utilization of server resources. Instead of having underutilized servers, virtual machines can dynamically allocate resources based on demand, ensuring that hardware operates closer to its full capacity

Decreased Power Infrastructure Needs: With fewer physical servers, the overall power infrastructure, including power distribution units and uninterruptible power supplies (UPS), can be scaled down. This further reduces energy consumption

Improved Data Center Efficiency: Virtualisation can lead to more efficient data center operations. For instance, virtual machines can be migrated to fewer physical servers during off-peak times, allowing some servers to be powered down, thus saving energy

Enhanced Cooling Efficiency: Fewer physical servers generate less heat, which reduces the cooling requirements in data centers. This not only saves energy but also extends the lifespan of cooling equipment

Environmental Benefits: By reducing the number of physical servers and the associated energy consumption, virtualisation helps lower the carbon footprint of data centers. This contributes to more sustainable and environmentally friendly IT operations

Overall, virtualisation is a key strategy for improving energy efficiency in IT environments, leading to cost savings and reduced environmental impact. If you have any more questions or need further details, feel free to ask!