ASSIGNMENT

TOPIC: CLOUD AND VIRTUALIZATION CONCEPTS

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CONTENT

CLOUD AND VIRTUALIZATION CONCEPTS

The concept of virtualization offers the potential to maximize productivity by efficiently managing resources. A key benefit of virtualization is the ability to create multiple copies from an original device. Virtualization allows for the creation of multiple copies of an original device

Hardware and Software: Hardware refers to the tangible components of a computer, such as the processor, RAM, and motherboard. Software is the "brains" of our hardware, providing instructions on how the hardware should operate. Hardware cannot function without software. There are 2 types of software: system software and application software. virtualization acts as a layer of technology between hardware and the operating system, allowing for the creation of multiple virtual copies of a device.

Virtual Machine

A VM is a software computer that operates like a physical computer, running an OS and applications, but exists only in the program. Virtualization programming gathers physical hardware resources, clones them in the virtualization layer to create virtual hardware, and builds VMs with components like CPU, RAM, storage, etc. The virtualization layer, with a hypervisor hosts and manages multiple VMs, which can communicate externally but exist within the host. Virtualization improves efficiency, sustainability, and resource management in the world of technology by providing the ability to partition hardware, reduce energy consumption, and enhance isolation and portability.

Hypervisor - hypervisor is software installed on hardware to create the virtualization layer, which hosts virtual machines. The hypervisor is distinct from the operating system and transforms physical resources into virtual hardware to enable virtualization. There is 2 type of hypervisors- Type 1 Hypervisor and Type 2 Hypervisor. Type 1 hypervisor, which sits directly on the hardware, and Type 2 hypervisor, which runs on top of a host operating system. Virtualization is introduced as a cost-effective solution for businesses and individuals to maximize hardware utilization.

Virtual machines offer flexibility and mobility compared to physical systems, with the ability to adjust settings, save configurations, and export to other hosts. VMs are stored as a set of files in a directory created by the

hypervisor, simplifying file management for end users. Key VM files include log files, BIOS files, virtual disk files, snapshot files, suspend state files, and configuration files, which are crucial for adjusting settings and troubleshooting.

Snapshot - The snapshot captures the entire state of the virtual machine at the time you take the snapshot. VM snapshots allow you to save and return to the same state of a virtual machine, similar to saving a document.

Data center: Data centers serve as essential resources for cloud services, powered by virtualization. The data center performs three main functions: it processes, stores, and transmits data. This requires three main types of hardware: Compute, Storage, Network. Understanding their efficiency and scalability is crucial, and VMware's virtualization solutions play a significant role in optimizing data center operations, along with performance monitoring, security. Data centers use various types of servers, such as tower, rack-mounted, and blade, to handle different workloads efficiently. In a data center, a number of similarly configured servers can be grouped together with connections to the same network and storage to provide an aggregate set of resources in the virtual environment, called a cluster. Networks play a vital role in data centers, facilitating the communication and efficient data transfer necessary for delivering services to consumers. The network's reliability is crucial, as downtime can disrupt operations. The networking hardware are routers, switches, NICs, and Ethernet cables. Data centers require extensive and reliable storage due to the vast volume of data they handle.

To ensure availability in the data center, a type of data storage technology called RAID (Redundant Array of Independent Disks) is used. Different types of RAID are: RAID 0, 1, 4, 5, and 10.

Block level Storage-Block storage is organized into storage volumes, allowing direct access to raw storage sections, offering speed, flexibility, and reliability.

Direct Attached Storage (DAS) involves physically connecting storage devices, like external hard drives or optical drives, directly to a computer or server. DAS offers flexibility and incremental storage options.

Provisioning is the process of strategically assigning storage space to servers based on the capacity of the storage device(s), availability, and performance requirements. Storage provisioning can be performed in two ways, traditional (thick provisioning) and virtual (thin provisioning).

Virtual data center: The process of virtualizing a data center is intended to take it from a hardware-defined data center to what is called a software-defined data center (SDDC), also known as a virtual data center. In a software-defined data center, the hypervisor is the controller.
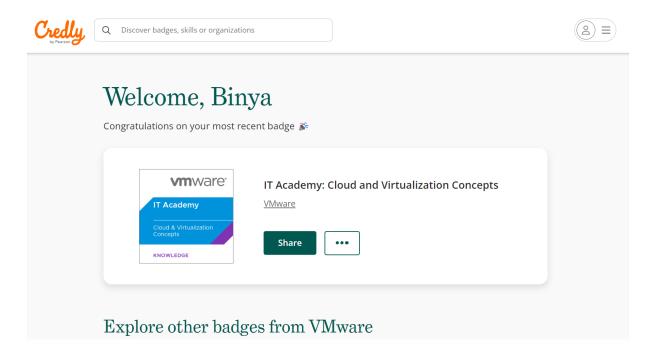
vSphere: VMware offers vSphere, a suite of virtualization technologies designed for efficient enterprise data management. Components of vSphere are: ESXi, vCenter, vSphere Client, vSphere Host Client.

Cloud computing: Cloud computing delivers computing services over the internet. Cloud computing can be categorized into private and public clouds. Cloud computing is categorized into different types or "service models". The three major types are Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS).

Container Technology: Containers, like virtual machines, aim to optimize resource efficiency for on-demand computing and scalability. Containers are particularly suitable for micro services, and Docker is a leading container technology. Kubernetes manages containers, optimizing their deployment across virtual machines for scalability and portability.

VMware Virtualization Solutions: vSphere's core components are the hypervisor (ESXi), the management server (vCenter), and user interfaces (vSphere Client and vSphere Host Client).

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