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Subject Code: OMC 105D

Subject Name: Cloud Computing

Programme Name: MCA

Semester: 01

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Ques① There are several types of cloud computing models each with its own significance and suitability for specific use cases. Let's explore the significance of each cloud type and its suitability for various scenarios.

① Public cloud

Public cloud are owned by & owned by third party service providers, who deliver computing resources such as virtual machines, storage & networking over the Internet. Users access these resources on a pay per use basis, typically through a web browser or an API.

Public clouds are suitable for small businesses & startups, development & testing purposes in general, web applications and websites and software as a service (SaaS).

② Private cloud

Private clouds are dedicated cloud environments operated solely for a single organization, either on premises or hosted by a third party provider. They offer great control, customization and security than ~~priva~~ public cloud but are expensive. Private clouds are used for enterprise applications, sensitive data and workload & legacy systems integrations and also High performance computing (HPC) like LLMs.

③ Hybrid cloud

Hybrid clouds combine public & private cloud environments, allowing organizations to leverage the benefits of both public & private clouds. They enable seamless integration and workload portability between on premises infrastructure & public cloud services.

Hybrid clouds are suitable for scalability & flexibility cases, like disaster recovery or backups, regulatory compliances, seasonal workloads, vendor diversification, service redundancy & service optimization.

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Ques ② A virtual appliance is a pre configured virtual machine image containing an operating system, application software and any necessary dependency packaged together for easy deployment & use. Virtual appliances offer several key characteristics that make them convinient and efficient for deployment

① Virtual Appliances are pre configured with necessary OS & software packages. Users do not need to manually install software which saves time.
② Virtual Appliances are encapsulated into single file or image which makes them highly portable.
③ They are isolated from underlying host environment.
④ They are highly scalable, easy to clone or have multiple instances.
⑤ Virtual appliances are easy to upgrade & update independently.
⑥ Virtual appliances consume resources only when they are actually running.
⑦ They simplify management tasks such as deployment, monitoring & backup.

Ease of Application deployment with virtual appliances

① Rapid Deployment : With pre configured OS and software packages the deployment becomes very fast.

② Simplified Configuration : Virtual appliances eliminate the complexity of manual installation and configuration by providing pre packaged & pre tested environments

③ Standardization : Provide standardization of software configuration at every step of deployment.

④ Lower costs : Virtual ~~servers~~ Appliances reduce the cost effectively by hardware provisioning.

⑤ Flexibility : Virtual Appliances also provide the flexibility in deployment options.

Ques ③

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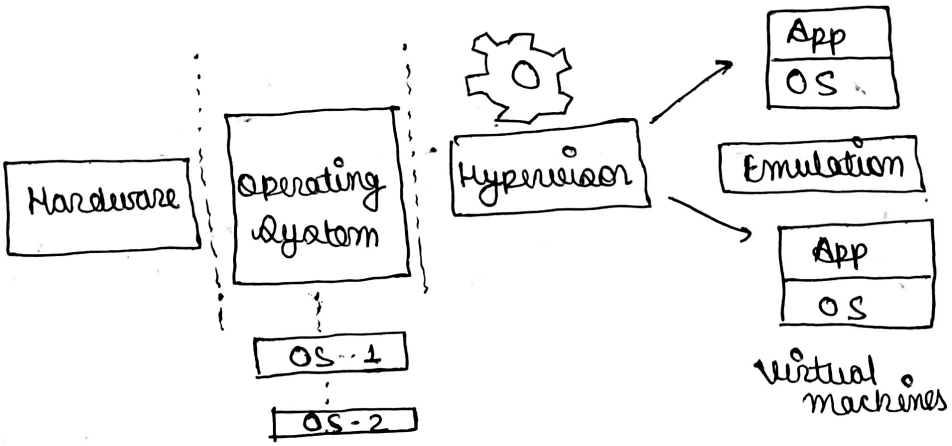
Hypervisor

A Hypervisor is also known as a virtual machine monitor (VMM), a software layer that enables the virtualization of physical hardware resources, allowing multiple VMs to run concurrently on the physical server.

key functions of Hypervisor & how it allows multiple VMs



① Resource Management : Hypervisor abstracts physical hardware resources, such as CPU, GPU, memory & storage, and allocates them to VMs as needed. It ensures efficient utilization of resources.

② Isolation : Hypervisor ensures the isolation between VMs, ensuring each virtual machine runs independently of other. It prevents VMs interfering in each other's resources.

③ Hardware Emulation : The hypervisor emulates the virtual hardware components for the VMs, such as virtual CPU, GPU, RAM, VRAM etc. It presents these virtual resources to VMs allowing them to run unmodified OS & services.

④ Live Migration : Some hypervisors support live migration, allowing VMs to be moved during physical hosts without downtime. This feature facilitates load balancing, maintainence & recovery.

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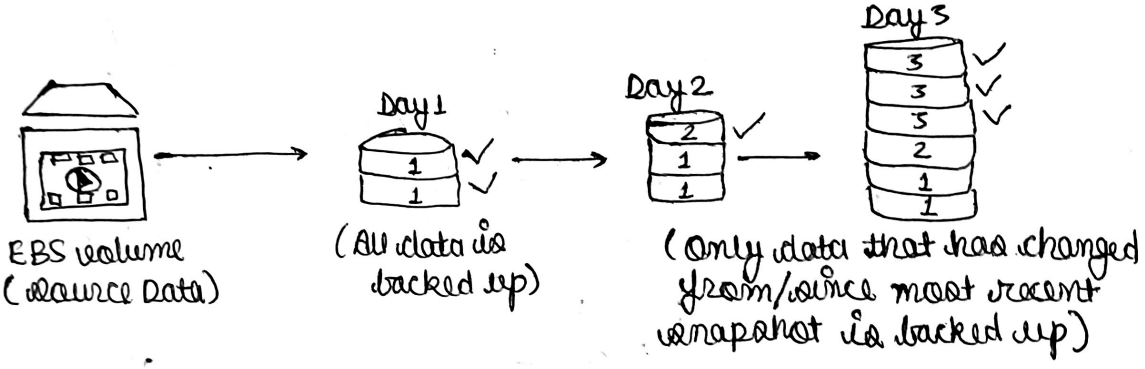
Ques④ Block storage in cloud

Block storage is a type of data storage that stores data in fixed size blocks or chunks. In the cloud, block storage services provide scalable and reliable storage volumes that can be attached to virtual servers or instances.

Working of Amazon Elastic Block Storage (EBS)



① EBS provide persistent block storage volumes that can be attached to EC2 instances. These volumes act as durable & high performance storage devices storing data.

① ② EBS volumes can be dynamically resized to meet changing storage requirements.

② ③ EBS supports snapshots for the ease of data backup & recovery. User can dynamically add or remove storage to their EC2 instances without having to stop it.

④ Durability & Availability of EBS is very strong. strong as data is replicated within single Availability Zone (AZ).

④ ⑤ EBS volumes offer different performance options to meet various workload requirements. Users can choose between gp2, gp3, io1 & io2 blockexpress or st1, sc1 based on their particular requirements.

Ques ⑦

Case Study

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As an administrator, I will do following steps to handle challanges during migration of corporate website of ABC to AWS cloud.

Access Current Workload: I would analyze current traffic patterns and resource utilization to determine scalability requirements.

Auto Scaling: I would configure AWS auto scaling groups to automatically adjust # instances as per demand.

Leverage AWS elastic load balancing: I would use AWS-ELB to distribute the incoming network traffic across multiple servers.

AWS: I would use AWS cloudfront for caching & content delivery.

AWS EC2: I would use different types of EC2 instances for different purposes, like simple EC2 instances for the landing page, but compute optimized instances for processing APIs for corporate website like form submission or contact. And GPU instances like g4x2 large for AI demos.

AWS RDS: To optimize data base configuration & website backend I would use AWS RDS for managed database services.

Implement Caching: For responsiveness and effective caching to provide better customer experience, I would use Amazon Elasticache.

Right sizing of Resources: I would analyze the workload requirements and choose appropriately sized instances to avoid over-provisioning and minimize costs.

Reserved Instances: For predictable workloads, I would use reserved instances as they are cheaper than flexible instances.

Spot Instances: I would use non critical workloads on spot instances to spare my EC2 pricing.