Interview Questions - Introduction to Cloud

1. Explain the difference between a cloud and the traditional IT solutions that organisations used to employ?

Traditionally, an organisation used to buy all the IT infrastructure, and all the physical servers and data centres were present on its premises. The organisation would have to pay an upfront cost to buy all these resources. Upgrading and maintaining the infrastructure was also its responsibility. The organisation would also need human resources to manage these resources. These ultimately resulted in increased organisational expenses.

With cloud, the organisation can get these resources easily delivered over the internet as and when needed. The upfront cost involved with the traditional approach is also now negated as cloud follows the pay-as-you-go model. Resource maintenance is also taken care of by the cloud service providers. This further helps the organisation save costs. Ultimately using cloud, the organisation would need to spend less on the IT infrastructure than it would have done earlier with the traditional approach.

2. List down some of the advantages of cloud computing?

Some of the advantages of cloud computing are as follows:

- **Reduced costs:** With cloud computing, you no longer have to buy all the infrastructure. You can just rent these resources, which will lead to significant savings. Also, cost is saved on resource maintenance as cloud service providers take care of it.
- **Enhanced performance:** Cloud service providers are responsible for updating the hardware and software resources, thus helping to achieve greater efficiency.
- **Security:** Cloud service providers ensure that strict policies are in place to make the infrastructure, application and data more secure.
- **Easy to scale:** Using cloud computing, you can easily scale up when needed. During peak periods, more resources can be provisioned and in case of less traffic or less demand for the resources, it can be automatically scaled down.
- **Quickly get access to resources:** You can quickly spin up new resources and start working using the dashboard or management console of the cloud service providers.
- **Increased productivity:** This enables organisations to be more productive as they can focus more on business development and do not need to worry about managing IT resources.

3. **What do you understand by service models? What are its different types? Explain in brief about each of the service models along with examples.**

Service models depend on which resources are self-managed and which ones are managed by the cloud service providers. The different service models are as follows:

- **Infrastructure-as-a-Service (IaaS):** In this model, the infrastructure is rented, and all the hardware is cloud-managed. You need to manage the runtime, OS, application and data. You can add and remove resources as and when required. The billing for this model depends on the number of resources used. Examples of this model are Amazon EC2 and Google Compute Engines.
- **Platform-as-a-Service (PaaS):** This model provides you with an on-demand environment with hardware, software and development tools. In this model, the entire hardware, runtime and OS are cloud-managed, and you only need to manage the data and the application. You can develop, run and manage applications without worrying about infrastructure and other setups. You are billed for the number of features used and the number of hours they are used for. Examples of this model are AWS Elastic Beanstalk and Heroku.
- **Software-as-a-Service (SaaS):** In this model, all the resources are cloud-managed. These can be accessed using web browsers or mobile applications, and the billing model here is subscription-based. Cloud service providers take full responsibility for the hardware, software, storage and security. Examples of this model include Netflix, Facebook and Google Apps.

4. **Name the different types of deployment models in cloud computing? Explain each model in brief.**

The different deployment models in cloud computing are private, public, hybrid and multi-cloud.

A private cloud is owned completely by a single organisation and is similar to an on-premise service model. It caters mostly to a single customer only. The entire cloud is located in the customer's on-premise data centre offering high control over data security and confidentiality.

In the **public cloud** model, the entire cloud service is owned by the cloud service provider. All the hardware and infrastructure are also located in different parts of the world. The cloud resources are shared by multiple customers, and you can access these resources using a web console provided by the cloud service provider over the public internet.

A hybrid cloud is a combination of a private cloud and a public cloud. The organisation manages some parts of the infrastructure and the rest is managed by the cloud service provider. This enables easy movement between the clouds as per the requirements. In most cases, the organisation takes care of the storage while the server and the application are managed by the

cloud service provider. It also allows us to move between different clouds depending on the business requirements.

In the **multi-cloud** model, organisations turn to multiple cloud service providers. It offers flexibility in choosing the right cloud service provider for the right use case and also allows organisations to choose the cloud service provider that offers them the lowest price for the services.

5. What is a multi-cloud strategy?

When organisations start using cloud, they generally tend to start with one cloud service provider. Eventually, after using the services provided by the provider, they start to get a little too concerned about being dependent on a single provider. So, they start entertaining the use of another provider. Using cloud services from multiple providers give organisations the ability to have different types of resources. If some of the resources they need are not available with the first cloud service provider, they could turn to the second or third cloud service provider to avail that service. If any service is offered by multiple cloud service providers, organisations could turn to the provider who offers them a cheaper rate.

6. Explain five characteristics of cloud computing in brief.

Some of the characteristics of cloud computing are as follows:

- **Cloud computing is a measured service:** Resource utilisation is tracked for each application and each user who is availing resources from the cloud service providers. It will provide both the user and the resource provider with an account of what has been used. You are only charged for the resources you are using.
- **Rapid elasticity**: Cloud computing provides rapid elasticity. Whenever there is an increase in demand for resources, it scales up, and as the demand decreases, it scales down. Resources are allocated to the user when there is a requirement and some of the resources are removed once the requirement decreases.
- **Load balancing:** Traffic to an application is automatically distributed between different servers. This improves the performance of the application.
- **Resource pooling:** IT resources are shared across multiple applications and occupants. Multiple users are provided service from the same physical resource.
- **Fault tolerance:** Multiple replicas of each service are run so that if one of them fails, the system falls over to another replica to ensure that the application is not affected.
- **Security:** Strong preventive, detective and corrective measures are enforced by the cloud service providers to ensure that customer data is secure from unauthorised access and malicious attacks.

7. **What is virtualisation? Explain the role hypervisors play in virtualisation. Also explain in brief about the different types of hypervisors.**

Virtualisation refers to creating a virtual version of physical resources such as hardware components. A software is used to create an abstraction layer over hardware that allows to divide the hardware of a single machine into multiple virtual machines, thus enabling more efficient utilisation of the physical hardware.

A hypervisor is a lightweight software layer that helps create and run virtual machines (VMs). It coordinates between a VM and the underlying physical hardware and ensures that VMs do not interfere with each other. It allows one host to run multiple VMs on them and ensures that the VMs do not interfere with each other. Type 1 hypervisors, also called bare metal hypervisors, run directly on the physical hardware. Examples of type 1 hypervisors are VMWare v-Sphere and Oracle VM. Type 2 hypervisors run as an application within a host operating system. Examples of type 2 hypervisors are Oracle Virtual Box and Microsoft Virtual PC.

8. **What is containerisation? Explain in brief with a scenario where containerisation can be helpful.**

When a code is being written for any particular software, the same code developed on one machine might not work perfectly fine on any other machine because of various dependencies. This problem can be solved using containerisation. Containerisation is the process of packaging up the entire software code and various dependencies into a single package. This ensures that the code can run uniformly on any machine. All the related configuration files, libraries and dependencies required for a code are bundled together into a single package. Containerisation allows applications to follow the 'write once and run anywhere' principle. Portability, speed, agility, efficiency and security are some of the benefits of containerisation. Docker is one of the most commonly used open-source containerisation platforms.

9. **What is a virtual private cloud?**

 A virtual private cloud (VPC) is a private cloud-like environment within a public cloud service provider's infrastructure. It provides the ability to define isolated virtual networks and deploy cloud resources inside them. A VPC has its own logically isolated virtual network. So, all resources inside a VPC live in a secured private space that is isolated from other tenants and users of the cloud service provider. Inside a VPC, you can control the IP addresses and applications that can access particular resources. When required, you can dynamically increase or decrease the size of the virtual networks. For e.g., you can start with a small range of IP addresses for your VPC, and when the number of resources increases, or you need more IP addresses, you can expand the range. The resources inside a VPC are at reduced risk as they are isolated from other customers and applications. Within a VPC, you can further create smaller portions or subdivisions called subnets.

10. **Explain in brief about security groups, access control lists and web application firewalls.**

Security groups: A security group is a virtual firewall for your VMs. It contains a set of rules to filter the incoming and outgoing traffic for an instance or a machine. Security groups act at an instance level. If there are multiple instances in the same subnet, different security groups can be assigned to each instance.

Access control lists (ACL): ACLs are network traffic filters that can control the incoming or outgoing traffic. This is an additional layer of protection over the security groups and contains a list of 'who has what?' access to the cloud resources. ACLs are applicable at the subnet level. So, all the resources in a subnet inherit the same rules.

Web application firewall (WAF): WAF is a firewall that protects web applications by monitoring and filtering HTTP traffic from the internet. A WAF uses a set of rules or policies that aim to protect the applications from vulnerabilities by filtering out the malicious traffic.

11. **Name some of the leading public cloud service providers.**

Amazon Web Services (AWS), Microsoft Azure and Google Cloud Platform (GCP) are some of the leading cloud service providers.