**1. What is Amazon EC2 and what are its key features?**

Amazon EC2 (Elastic Compute Cloud) is a web service that provides resizable computer capacity in the cloud. It allows users to launch and manage virtual servers (instances) on-demand.

Key Features:

* Scalability: Easily scale capacity up or down.
* Flexible instance types: Choose based on CPU, memory, storage, and networking.
* Elastic IPs: Static IPs for dynamic cloud computing.
* Custom AMIs: Launch instances with pre-configured settings.
* Security Groups: Act as firewalls to control traffic.
* Integration: Works seamlessly with AWS services like EBS, S3, IAM, etc.

**2. How does S3 ensure data durability and availability?**

Amazon S3 (Simple Storage Service) ensures durability and availability through:

* 11 9’s durability (99.999999999%) by automatically replicating data across multiple devices and facilities within an AWS Region.
* Versioning: Protects against accidental deletions.
* Cross-Region Replication (CRR): Optional for high availability across geographic locations.
* Lifecycle policies: Automate data transition to cheaper storage tiers or deletion.
* Redundant infrastructure: Designed to withstand concurrent device failures.

**✅ 3. What is the difference between a Security Group and a Network ACL in AWS?**

| Feature | Security Group | Network ACL |
| --- | --- | --- |
| Scope | Instance-level | Subnet-level |
| Type | Stateful | Stateless |
| Rules | Only allow rules | Allow and deny rules |
| Evaluation | Automatically remembers previous traffic | Evaluates each request independently |

In short:

* Security Groups act as firewalls for EC2 instances.
* Network ACLs provide traffic control at the subnet level.

**✅ 4. What is IAM in AWS, and why is it important?**

IAM (Identity and Access Management) lets you securely manage access to AWS services and resources.

Importance:

* Controls who (users, roles) can access what (resources).
* Supports multi-factor authentication (MFA).
* Enforces least privilege principle.
* Allows for granular permissions using policies (JSON-based).

**✅ 5. What are the different types of storage offered by AWS?**

* Amazon S3: Object storage for unstructured data.
* Amazon EBS: Block storage for EC2 instances.
* Amazon EFS: Shared file storage (Linux-based).
* Amazon FSx: Managed file systems for Windows and Lustre.
* Amazon S3 Glacier: Archival cold storage.
* AWS Storage Gateway: Hybrid storage between on-prem and cloud.

**✅ 6. Explain the Shared Responsibility Model in AWS.**

This model defines who is responsible for what between AWS and the customer.

* AWS: Responsible for security of the cloud (hardware, networking, software, data centers).
* Customer: Responsible for security in the cloud (data, apps, identity, OS patches, etc).

Example:  
AWS secures the physical server; you configure firewall rules and encrypt your data.

**✅ 7. What is Auto Scaling and how does it work in AWS?**

Auto Scaling automatically adjusts the number of EC2 instances based on demand.

How it works:

* You define scaling policies (e.g., CPU > 70%).
* Auto Scaling adds or removes EC2 instances accordingly.
* Ensures high availability and cost-efficiency.

Types:

* Dynamic Scaling: Responds to real-time metrics.
* Scheduled Scaling: Based on predictable traffic patterns.

**✅ 8. What is the difference between RDS and DynamoDB?**

| Feature | Amazon RDS | Amazon DynamoDB |
| --- | --- | --- |
| Type | Relational (SQL) | NoSQL (Key-Value, Document) |
| Structure | Fixed schema | Schema-less |
| Use Case | Traditional apps needing joins, transactions | Fast, scalable apps needing low-latency access |
| Scaling | Vertical + some horizontal (Aurora) | Horizontal (auto-scaling) |
| Management | More setup (DB engine, tuning) | Fully managed (serverless) |

**✅ 9. How does AWS CloudFront work and what are its use cases?**

Amazon CloudFront is a content delivery network (CDN) that delivers data to users with low latency.

How it works:

* Distributes content to edge locations globally.
* Caches frequently accessed data closer to users.
* Pulls from S3, EC2, or custom origin.

Use Cases:

* Accelerating websites, APIs, or media delivery.
* Securing content via signed URLs or geo-restrictions.
* Reducing load on the original server.

**✅ 10. What is AWS Lambda and when would you use it over EC2?**

AWS Lambda is a serverless computer service that runs your code in response to events, automatically managing the infrastructure.

Use it over EC2 when:

* You need event-driven execution (e.g., S3 upload triggers).
* You want auto-scaling and zero management.
* You’re running short-lived tasks or microservices.
* You want to pay only for actual execution time.

Avoid Lambda when:

* You need full OS control.
* You require persistent background processes.