**Amazon EC2**

1. **What is EC2 and what are its types of instances?**
   * **EC2 (Elastic Compute Cloud): A web service providing scalable compute capacity in the cloud.**
   * **Types of Instances:**
     + **General Purpose (e.g., t2, t3): Balanced workloads.  
       *Example:* Hosting a small web application or testing environment.**
     + **Compute Optimized (e.g., c5, c6g): High compute-to-memory ratio.  
       *Example:* Running scientific simulations or machine learning models.**
     + **Memory Optimized (e.g., r5, r6g): High memory-to-compute ratio.  
       *Example:* Running an in-memory database like Redis.**
     + **Storage Optimized (e.g., i3, d2): High throughput storage.  
       *Example:* Data warehouse applications requiring fast I/O operations.**
     + **Accelerated Computing (e.g., p4, g4): Tasks requiring GPUs.  
       *Example:* Training deep learning models.**
2. **Which instance is less cost?**
   * **Spot Instances: For non-critical workloads (e.g., batch processing).  
     *Example:* A startup uses Spot Instances to render videos during non-peak hours.**
   * **Reserved Instances: For predictable workloads (e.g., long-term production servers).  
     *Example:* An e-commerce site reserves instances for peak shopping seasons.**
3. **Explain different purchase options in EC2.**
   * **On-Demand: Pay-per-use, ideal for short-term tasks.  
     *Example:* Testing a new software deployment.**
   * **Reserved Instances: Upfront payment with cost savings.  
     *Example:* Hosting a company’s production database for three years.**
   * **Spot Instances: Bid for unused capacity.  
     *Example:* Running a data pipeline during non-peak hours.**
   * **Savings Plans: Flexible commitment for predictable workloads.  
     *Example:* Reducing costs for continuously running applications.**
   * **Dedicated Hosts: Physical servers for specific compliance needs.  
     *Example:* Hosting applications with software license restrictions (e.g., Oracle).**

**Storage**

1. **What is EBS, and why do we use it?**
   * **EBS (Elastic Block Store): Persistent, high-performance block storage for EC2 instances.  
     *Example:* A MySQL database uses EBS for persistent and reliable storage.**
2. **What is EFS, and when would you choose it over EBS?**
   * **EFS (Elastic File System): Scalable, shared file storage.  
     *Use Case:* A media company uses EFS for storing video files accessed by multiple rendering nodes.**
     + **EBS: For single-instance, high IOPS needs.**
     + **EFS: For multi-instance access.**
3. **What is a snapshot, and what does it store?**
   * **Incremental backups of EBS volumes stored in S3.  
     *Example:* Taking a daily snapshot of a database volume for disaster recovery.**
4. **How do you attach and mount an EBS volume?**
   * **Attach using AWS Console or CLI.**
   * **Mount using Linux commands (e.g., mount /dev/xvdf /data).  
     *Example:* Adding a 100 GB volume to store logs for an analytics application.**
5. **In which scenarios would you attach an EBS volume to instances?**
   * **When additional storage is required.  
     *Example:* Expanding a web application’s log storage by attaching a new 50 GB volume.**

**Networking and Security**

1. **What is a Security Group, and what are inbound and outbound rules?**
   * **A virtual firewall for controlling EC2 traffic.**
     + **Inbound Rules: Allow traffic (e.g., SSH on port 22).**
     + **Outbound Rules: Allow outgoing traffic (e.g., HTTP/HTTPS).  
       *Example:* Configuring a Security Group to allow only web traffic for a load balancer.**
2. **What is NACL (Network Access Control List)?**
   * **A stateless firewall at the subnet level.  
     *Example:* A company blocks all traffic from untrusted IP ranges using a NACL.**

**IAM: Roles and Policies**

1. **What is the purpose of a role in IAM, and what is a role?**
   * **Roles allow AWS resources to access other services securely.  
     *Example:* An EC2 instance uploads logs to S3 using a role.**
2. **What is the difference between a policy and a role?**
   * **Policy: Defines permissions (e.g., S3 read/write).**
   * **Role: An entity that assumes policies to perform actions.  
     *Example:* A Lambda function reads S3 objects using an attached policy.**
3. **Why do we need IAM roles?**
   * **Roles allow temporary and dynamic access.  
     *Example:* Granting a temporary vendor access to a database for auditing.**

**Snapshots and Lifecycle Management**

1. **Where are snapshots stored?**
   * **Snapshots are stored in Amazon S3.  
     *Example:* A company uses snapshots to replicate EBS volumes across regions.**
2. **How frequently do you take snapshots in your company?**
   * **Based on requirements, e.g., daily for critical workloads or weekly for less critical.  
     *Example:* Scheduling daily snapshots for a production database.**
3. **What is Lifecycle Configuration for snapshots?**
   * **Automates snapshot creation and retention.  
     *Example:* Retaining the last 7 daily snapshots and deleting older ones.**

**Launch Configurations and Templates**

1. **What are EC2 Launch Configurations?**
   * **Static configurations for Auto Scaling Groups.  
     *Example:* A fixed configuration for scaling web servers.**
2. **What are EC2 Launch Templates?**
   * **Flexible, versioned configurations.  
     *Example:* A versioned template for scaling database instances with different instance types.**

**Other Key Concepts**

1. **What is AMI (Amazon Machine Image)?**
   * **A pre-configured image containing OS and software.  
     *Example:* An AMI with a LAMP stack for deploying web servers.**
2. **What is user data in EC2?**
   * **A script passed during instance launch for automation.  
     *Example:* Automatically installing Apache using:**

**bash**

**Copy code**

**#!/bin/bash**

**yum install -y httpd**

**service httpd start**

1. **What are tags in AWS?**
   * **Metadata labels for resources.  
     *Example:* Tagging EC2 instances with Environment: Production for cost allocation.**
2. **What is a key pair in AWS?**
   * **A pair of private and public keys for secure access.  
     *Example:* Using an RSA key pair to SSH into an EC2 instance.**

**Cloud Computing and AWS Regions**

1. **What is cloud computing?**
   * **On-demand delivery of IT resources over the internet.  
     *Example:* Deploying scalable applications without hardware investments.**
2. **What are AZs (Availability Zones) and Regions in AWS?**
   * **AZs are isolated data centers within a region.  
     *Example:* Deploying a multi-AZ setup for high availability.**
3. **Explain different AWS regions in India:**
   * **Mumbai: ap-south-1.**
   * **Hyderabad: ap-south-2.  
     *Example:* A company in India uses the Mumbai region for low latency.**

**Additional Topics**

1. **What is a group in AWS?**
   * A collection of IAM users sharing the same permissions.
2. **What is an Identity Provider in AWS?**
   * A third-party service enabling federated access to AWS resources.
3. **Use cases for EBS and EFS:**
   * **EBS:** For block-level storage and high-performance transactional applications.
   * **EFS:** For shared file storage across multiple instances.

**mazon EC2**

1. **What is EC2 Lifecycle?**
   * **States:** Pending → Running → Stopping → Stopped → Terminating.
   * **Example:** Scaling out a web application involves launching new instances (Pending → Running).
2. **Different EC2 Purchase Options:**
   * **On-Demand:** Pay-per-use, flexible.
   * **Reserved:** Cost savings for long-term use.
   * **Spot Instances:** Discounts for flexible workloads.
   * **Savings Plans:** Pay upfront for predictable usage.
   * **Dedicated Hosts:** Meet compliance or licensing needs.
3. **What is AMI?**
   * An AMI (Amazon Machine Image) is a pre-configured image with OS and application setups.
   * **Example:** Custom AMI for a LAMP stack to deploy web servers.
4. **Difference Between Launch Configurations and Launch Templates:**
   * **Launch Configurations:** Static, no updates.
   * **Launch Templates:** Flexible, support versioning.
   * **Example:** A team uses Launch Templates to create different configurations for their testing and production environments.

**Storage: EBS and EFS**

1. **What is EBS, and why do we use it?**
   * EBS (Elastic Block Store) provides block-level storage for EC2.
   * **Use Case:** Persistent storage for a MySQL database.
2. **Can the size of an EBS volume be increased without detaching it?**
   * Yes, modify the volume in the AWS Console or CLI, then resize the filesystem using tools like resize2fs.
3. **How to Attach an EBS Volume to an Instance?**
   * Use AWS Management Console or CLI (attach-volume).
   * **Example:** Adding storage to handle a large log file increase.
4. **How to Mount an EBS Volume?**
   * Format using mkfs, then mount using mount /dev/xvdf /data.
5. **Use Cases for EBS and EFS in Projects:**
   * **EBS:** Block-level storage for transactional databases.  
     *Example:* Storing metadata in a NoSQL database for analytics.
   * **EFS:** Shared access for multiple instances.  
     *Example:* A rendering application uses EFS to store files shared across EC2 instances.
6. **What is a Snapshot, and Where is it Stored?**
   * A point-in-time backup of EBS volumes stored in S3.
   * **Example:** Daily snapshots of a production database for disaster recovery.
7. **What is the Size of a Snapshot for a 10GB Volume?**
   * Initially, snapshots store only the data used. Incremental changes are added later.

**IAM: Roles and Policies**

1. **What is the Purpose of a Role in IAM?**
   * Allows AWS resources to securely access other AWS services.
   * **Example:** An EC2 instance uses a role to upload logs to S3.
2. **Difference Between Role and Policy:**
   * **Policy:** Defines permissions (e.g., S3 read access).
   * **Role:** An entity assuming policies.
   * **Example:** A Lambda function assumes a role to process data in S3.
3. **What is a Policy Structure?**
   * **Mandatory Fields:** Version, Statement, Effect, Action, Resource.
   * **Example:**

json

Copy code

{

"Version": "2012-10-17",

"Statement": [

{

"Effect": "Allow",

"Action": "s3:ListBucket",

"Resource": "arn:aws:s3:::example-bucket"

}

]

}

1. **What is an Inline Policy?**
   * A policy embedded directly into a single IAM user, group, or role.
   * **Example:** Restricting access to a specific resource for a temporary user.

**Networking and Security**

1. **What is a Security Group?**
   * A virtual firewall for controlling EC2 traffic.
   * **Example:** Allowing HTTP and HTTPS traffic for a web application.
2. **What is a NACL (Network Access Control List)?**
   * A stateless firewall for controlling subnet traffic.
   * **Example:** Blocking access from a specific IP range at the subnet level.

**Snapshots and Lifecycle Management**

1. **What is Lifecycle Configuration for Snapshots?**
   * Automates snapshot creation, retention, and deletion to manage costs.
   * **Example:** Retaining only the last 7 daily snapshots for a database.
2. **How Does Lifecycle Configuration Retain Older Versions?**
   * Rules define the number of recent snapshots to retain and delete older ones.

**Miscellaneous Topics**

1. **What is a Key Pair in AWS?**
   * A private and public key used for secure SSH access to EC2 instances.
2. **What are Tags in AWS?**
   * Metadata labels for resource organization and cost tracking.
   * **Example:** Tagging EC2 instances by environment (e.g., Environment: Production).
3. **What is AWS CLI?**
   * Command-line interface for managing AWS resources programmatically.
   * **Example:** Copy files to S3 using aws s3 cp.
4. **What is ARM in AWS?**
   * ARM-based processors (e.g., AWS Graviton) for cost-effective computing.
   * **Example:** Running web servers on Graviton for better performance at lower costs.

**Real-World Scenarios**

1. **In Which Scenario Would You Increase EBS Volume Size?**
   * When the application logs or database exceeds existing storage.
   * **Example:** A growing e-commerce application needs additional storage for transaction logs.
2. **How Would You Recover Access to an EC2 Instance if the PEM Key is Lost?**
   * Detach the root volume, attach it to another instance, update SSH keys, and reattach.
   * **Example:** Recovering access to a production server after losing the key.
3. **Difference Between Service and Resource in AWS:**
   * **Service:** Broad AWS features (e.g., EC2, S3).
   * **Resource:** Specific instances of those services (e.g., a particular EC2 instance).
4. **Jenkins: Complexity You Faced and Solutions:**
   * **Issue:** Managing multiple build pipelines.
   * **Solution:** Used pipeline-as-code (Jenkinsfile) and implemented a master-slave architecture.
5. **Jenkins: Static vs. Dynamic Agents:**
   * **Static Agents:** Predefined and always available.
   * **Dynamic Agents:** Spawned on demand.
   * **Example:** Using dynamic agents on Kubernetes for scaling CI/CD builds.
6. **AWS Regions in India:**
   * **Mumbai (ap-south-1):** High availability.
   * **Hyderabad (ap-south-2):** Emerging workloads.
7. **Use Cases for EBS and EFS in Projects:**
   * **EBS:** Persistent storage for relational databases.
   * **EFS:** Shared file system for distributed applications.

**Amazon S3**

1. **Explain S3 Bucket Storage Classes:**
   * **S3 Standard:** General-purpose, frequently accessed data.  
     *Example:* Hosting images for a website.
   * **S3 Intelligent-Tiering:** Automatically moves data to the most cost-effective storage tier.  
     *Example:* Long-term data storage with uncertain access patterns.
   * **S3 Standard-IA (Infrequent Access):** Lower cost for less frequently accessed data.  
     *Example:* Monthly logs or backup archives.
   * **S3 Glacier:** For archiving and long-term backups.  
     *Example:* Compliance records stored for 7+ years.
   * **S3 Glacier Deep Archive:** Lowest-cost storage, rarely accessed.  
     *Example:* Regulatory data stored for decades.
2. **How to Copy Files from One Server to Another?**
   * **Using scp:**

bash

Copy code

scp file.txt user@remote\_host:/path/to/destination

*Example:* Copy a config file to a remote server for deployment.

* + **Using rsync:**

bash

Copy code

rsync -avz file.txt user@remote\_host:/path/to/destination

*Example:* Synchronizing a large directory efficiently.

1. **How to Delete a File in Linux?**

bash

Copy code

rm file.txt

*Example:* Remove temporary logs after a successful backup.

1. **What is $\* in Linux?**
   * Represents all positional parameters as a single string.  
     *Example:* Passing multiple arguments to a script:

bash

Copy code

./script.sh arg1 arg2

1. **How Can I Get Which Process is Consuming More Memory?**
   * Use the top or htop command.  
     *Example:* Identify a memory-intensive Java application running on an EC2 instance.

**CI/CD Pipelines**

1. **Pipeline with Multiple Stages: How to Skip a Particular Stage?**
   * Use conditional statements or parameters in the pipeline script.  
     *Example in Jenkins:*

groovy

Copy code

stage('Test') {

when {

expression { params.SKIP\_TEST != true }

}

steps {

echo 'Running tests...'

}

}

1. **Sort Prime Numbers, Calculate Sum, and Subtract Non-Primes:**
   * **Python Code Example:**

python

Copy code

numbers = [2, 3, 4, 5, 6, 7, 8]

primes = [n for n in numbers if all(n % i != 0 for i in range(2, int(n\*\*0.5) + 1))]

non\_primes = [n for n in numbers if n not in primes]

prime\_sum = sum(primes)

result = prime\_sum - sum(non\_primes)

print(f"Primes: {primes}, Result: {result}")

**AWS CloudWatch and Alarms**

1. **What is a Metric in AWS CloudWatch?**
   * A metric is a data point representing the performance of a resource.  
     *Example:* CPU utilization of an EC2 instance.
2. **What is a CloudWatch Alarm?**
   * Monitors metrics and triggers actions based on thresholds.  
     *Example:* Triggering an email when CPU utilization exceeds 80%.
3. **What is the "In Alarm" State?**
   * Indicates that the monitored metric has breached the defined threshold.
4. **How to Configure Email Notifications Using SNS Connectivity?**
   * Create an SNS topic → Subscribe an email → Attach to a CloudWatch Alarm.  
     *Example:* Notify the admin when a DynamoDB table exceeds read capacity.
5. **What is a Topic in SNS?**
   * A communication channel for delivering messages.  
     *Example:* An alarm triggers a message to an email topic.
6. **What is a Subscription in SNS?**
   * A subscription defines the endpoints (e.g., email) for receiving messages.
7. **What Configuration Actions are Available When an Alarm is Triggered?**
   * **Notification:** Send alerts via SNS.
   * **Auto-Scaling:** Add or remove EC2 instances.
   * **EC2 Actions:** Start/stop/reboot instances.
   * **Systems Manager Actions:** Run a predefined command.

**AWS CloudTrail**

1. **What is CloudTrail?**
   * Tracks API calls and user activities for auditing.  
     *Example:* Monitoring access to sensitive S3 buckets.
2. **Types of Events in CloudTrail:**
   * **Management Events:** API activities like creating resources.
   * **Data Events:** Data operations like S3 object access.
   * **Insight Events:** Detect anomalous activities.
3. **What is a CloudTrail Event History?**
   * Default 90-day history of API activities.

**AWS Lambda**

1. **What is AWS Lambda?**
   * A serverless compute service that runs code in response to events.  
     *Example:* Processing an S3 file upload to resize images.

**AWS SNS**

1. **What is SNS, and How Do You Add a User to an Email Chain?**
   * SNS (Simple Notification Service) sends notifications to subscribers.
   * Add a user by subscribing their email to an SNS topic.

**AWS CloudWatch Logs**

1. **What is a Log Group in CloudWatch?**
   * A container for storing logs.  
     *Example:* Logs from an EC2 application are stored in a specific log group.
2. **What are Insights Events in CloudWatch?**
   * Predefined queries for analyzing logs.

**AWS EventBridge**

1. **What is EventBridge?**
   * A serverless event bus for integrating AWS services and custom applications.  
     *Example:* Automating workflows when an S3 object is created.

**Additional AWS Topics**

1. **What is a Data Lake?**
   * A centralized repository for storing structured and unstructured data.  
     *Example:* Using S3 as a data lake for big data analytics.

**Real-World Scenarios**

1. **Use Case for CloudWatch Alarm:**
   * Monitoring application latency and scaling resources when it exceeds a threshold.
2. **Use Case for CloudTrail:**
   * Auditing access to a critical S3 bucket to ensure compliance.