**AMAZON -EC2 : ALL about EC2, EBS,EFS**

**Amazon EC2 (Elastic Compute Cloud)** is a web service provided by **Amazon Web Services (AWS)** that allows users to rent virtual servers, known as **instances**, to run applications on the cloud. It provides scalable computing capacity, meaning users can adjust resources as needed to meet the demands of their workloads.

**Key Features of EC2:**

1. **Virtual Servers (Instances)**: EC2 instances are virtual machines that run on physical hardware. You can choose from a variety of instance types based on your specific needs, such as compute, memory, or storage optimized instances.
2. **Scalability**: EC2 is highly scalable. You can quickly scale the number of instances up or down based on demand. This is beneficial for applications with variable workloads, ensuring cost efficiency.
3. **Customizable Configurations**: EC2 instances allow you to customize CPU, memory, storage, and networking options. AWS provides different families of instances (like **T**, **M**, **C**, **R**, etc.) optimized for specific use cases.
4. **Pay-As-You-Go Pricing**: With EC2, you only pay for the computing resources you use, typically on an hourly or per-second basis. AWS offers different pricing models, such as **On-Demand**, **Reserved**, **Spot**, and **Savings Plans**.
5. **AMI (Amazon Machine Image)**: EC2 uses AMIs to launch instances. An AMI is a pre-configured template that includes an operating system, application server, applications, and related configurations.
6. **Elastic IP**: EC2 instances can be associated with static IP addresses called **Elastic IPs**. These IP addresses can be reassigned to different instances as needed.
7. **Security**: EC2 instances integrate with AWS security features such as **Security Groups** (firewall settings) and **IAM (Identity and Access Management)** for controlling access to instances.
8. **Storage Options**:
   * **EBS (Elastic Block Store)**: Provides block-level storage for EC2 instances, often used for storing data or system files.
   * **Instance Store**: Temporary, ephemeral storage that is tied to the lifetime of the instance.
   * **S3 (Simple Storage Service)**: Can be used for object storage, often as a backup for EC2 instances.
9. **Elastic Load Balancing (ELB)**: EC2 instances can be paired with ELBs to distribute traffic across multiple instances to ensure high availability and fault tolerance.
10. **Auto Scaling**: EC2 instances can be automatically added or removed from a pool based on real-time demand, which ensures efficient resource utilization.

**Common Use Cases for EC2:**

* **Web Hosting**: Running web servers for dynamic or static websites.
* **Data Processing**: Running large-scale data processing jobs like batch processing, data analytics, or scientific computing.
* **Machine Learning**: Running compute-intensive ML models using specialized instances (e.g., GPU instances).
* **Backup and Disaster Recovery**: Running replicated instances for high availability or failover in case of failure.
* **Application Hosting**: Hosting enterprise or customer-facing applications in a scalable and cost-effective manner.

**EC2 Pricing Models:**

1. **On-Demand Instances**: Pay for compute capacity by the hour or second, with no long-term commitment.
2. **Reserved Instances**: Commit to using EC2 instances for a one- or three-year term in exchange for a lower hourly rate.
3. **Spot Instances**: Purchase unused EC2 capacity at a lower price, but instances can be terminated by AWS with little notice.
4. **Savings Plans**: A flexible pricing model offering savings in exchange for a commitment to use a certain amount of compute power over a 1- or 3-year period.

**EC2 Management:**

* **Amazon EC2 Console**: A web-based interface to manage your EC2 instances.
* **AWS CLI (Command Line Interface)**: A command-line tool for managing EC2 instances and other AWS services.
* **AWS SDKs**: Software development kits for interacting programmatically with EC2 and other AWS services.