What is cloud computing?

Cloud computing refers to the delivery of computing services, including storage, processing power, and software, over the internet. Instead of relying on a local server or a personal computer to handle applications, users can access these services remotely through the internet. Cloud computing eliminates the need for organizations and individuals to invest in and maintain their own physical infrastructure.

Key characteristics of cloud computing include:

1. **\*\*On-Demand Self-Service:\*\***

Users can provision and manage computing resources as needed, without requiring human intervention from service providers.

1. **\*\*Broad Network Access:\*\***

Cloud services are accessible over the internet from a variety of devices, such as laptops, smartphones, and tablets.

1. **\*\*Resource Pooling:\*\***

Cloud providers pool computing resources to serve multiple customers. Resources are dynamically assigned and reassigned according to demand.

1. **\*\*Rapid Elasticity:\*\***

Cloud resources can be quickly scaled up or down to accommodate changing workloads. Users can easily scale their computing resources to meet increased demand or release resources during periods of lower demand.

**5.** **\*\*Measured Service:\*\***

Cloud computing resources are metered, and users pay only for the resources they consume. . This allows for cost optimization and efficient resource utilization

Cloud computing is typically categorized into three main service models and four deployment models:

### Service Models:

1. **\*\*Infrastructure as a Service (IaaS):\*\***

Provides virtualized computing resources over the internet. Users can rent virtual machines, storage, and networking components.

1. **\*\*Platform as a Service (PaaS):\*\***

Offers a platform allowing customers to develop, run, and manage applications without dealing with the complexities of infrastructure. It includes tools and services for application development.

3**. \*\*Software as a Service (SaaS):\*\***

Delivers software applications over the internet on a subscription basis. Users can access the software through a web browser without needing to install or maintain it locally.

### Deployment Models:

1. **\*\*Public Cloud:\*\***

Services are provided over the internet and are available to the general public. Examples include Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP).

1. **\*\*Private Cloud:\*\***

Computing resources are used exclusively by a single organization. Private clouds can be hosted on-premises or by a third-party provider.

3. **\*\*Hybrid Cloud:\*\***

Combines elements of both public and private clouds. It allows data and applications to be shared between them.

4 **.\*\*Community Cloud:\*\***

Shared by several organizations with similar requirements and concerns, such as regulatory compliance.

Cloud computing has become a fundamental technology in the modern IT landscape, offering flexibility, scalability, and cost-effectiveness for businesses and individuals alike.

AWS and it’s components

Amazon Web Services (AWS) is a comprehensive and widely used cloud computing platform provided by Amazon. AWS offers a vast array of services that cater to different computing needs, allowing businesses and individuals to build and scale applications and services without the need to invest in and manage physical hardware. Here are some key components and services offered by AWS:

**1**. **\*\*Compute Services:\*\***

**- \*\*Amazon EC2 (Elastic Compute Cloud):\*\***

Provides scalable compute capacity in the cloud, allowing users to run virtual servers.

**- \*\*Amazon Lambda:\*\***

A serverless computing service that lets you run your code without provisioning or managing servers.

**2**. **\*\*Storage Services:\*\***

**- \*\*Amazon S3 (Simple Storage Service):\*\***

Object storage service for storing and retrieving any amount of data.

**- \*\*Amazon EBS (Elastic Block Store):\*\***

Provides persistent block-level storage volumes for use with Amazon EC2 instances.

**3. \*\*Database Services:\*\***

**\*\*Amazon RDS (Relational Database Service):\*\***

Managed relational database service supporting various database engines such as MySQL, PostgreSQL, Oracle, and Microsoft SQL Server.

**\*\*Amazon DynamoDB:\*\***

A managed NoSQL database service.

**4.** **\*\*Networking Services:\*\***

**\*\*Amazon VPC (Virtual Private Cloud):\*\***

Allows you to provision a logically isolated section of the AWS Cloud where you can launch AWS resources.

**\*\*Amazon Route 53:\*\***

A scalable domain name system (DNS) web service designed to route end-user requests to globally distributed endpoints.

**5. \*\*Content Delivery and CDN:\*\***

**\*\*Amazon CloudFront:\*\***

A content delivery network (CDN) service that securely delivers data, videos, applications, and APIs to customers globally.

**6. \*\*Analytics and Big Data:\*\***

**\*\*Amazon Redshift:\*\***

Fully managed data warehouse service.

**\*\*Amazon EMR (Elastic MapReduce):\*\***

A cloud-based big data platform for processing vast amounts of data quickly.

**7. \*\*Machine Learning and AI:\*\***

**\*\*Amazon SageMaker:\*\***

A fully managed service that enables developers to build, train, and deploy machine learning models.

**\*\*Amazon Comprehend:\*\***

A natural language processing (NLP) service that extracts insights and relationships from a text.

**8. \*\*Management and Monitoring:\*\***

**\*\*Amazon CloudWatch:\*\***

A monitoring and observability service for AWS resources.

**\*\*AWS CloudTrail:\*\***

Records API calls for your account and delivers log files to your Amazon S3 bucket.

**9. \*\*Identity and Access Management:\*\***

**\*\*AWS IAM (Identity and Access Management):\*\***

Manages access to AWS services and resources securely.

**10. \*\*Developer Tools:\*\***

**\*\*AWS CodePipeline:\*\***

A continuous integration and continuous delivery (CI/CD) service.

**\*\*AWS CodeBuild:\*\***

Fully managed build service that compiles source code, runs tests, and produces software packages.

These are just a few examples, and AWS provides many more services to address various cloud computing requirements. The platform is known for its scalability, flexibility, and pay-as-you-go pricing model, making it popular among businesses of all sizes.

Ec2 and its components

Amazon Elastic Compute Cloud (Amazon EC2) is a central component of Amazon Web Services (AWS) that provides resizable compute capacity in the cloud. EC2 allows users to run virtual servers, known as instances, to host applications and services. Here are the key components of Amazon EC2:

**1. \*\*Instances:\*\***

**\*\*Amazon EC2 Instances:\*\***

Virtual servers in the cloud that you can use to run applications. EC2 offers a variety of instance types optimized for different use cases, such as compute-optimized, memory-optimized, storage-optimized, and GPU instances.

**2. \*\*Amazon Machine Images (AMIs):\*\***

**\*\*AMIs:\*\***

Pre-configured templates for instances that include the necessary information to launch an instance, such as the operating system, application server, and applications. Users can choose from existing AMIs or create their own.

**3. \*\*Key Pairs:\*\***

**\*\*Key Pairs:\*\***

EC2 instances use key pairs for secure access. Users must have the private key to connect to instances securely. AWS stores the public key, and the user stores the private key.

**4. \*\*Security Groups:\*\***

**\*\*Security Groups:\*\***

Virtual firewalls that control inbound and outbound traffic to instances. Security groups are associated with instances, and users can define rules to allow or deny traffic based on protocols, ports, and IP addresses.

**5. \*\*Elastic Load Balancing:\*\***

**\*\*Elastic Load Balancing (ELB):\*\***

Distributes incoming traffic across multiple EC2 instances to ensure that no single instance is overwhelmed. This enhances the availability and fault tolerance of applications.

**6. \*\*Amazon Elastic Block Store (EBS):\*\***

**\*\*Amazon EBS:\*\***

Provides persistent block-level storage volumes that can be attached to EC2 instances. EBS volumes can be used as primary storage for the operating system or additional storage for applications.

**7. \*\*Amazon Elastic File System (EFS):\*\***

**\*\*Amazon EFS:\*\***

A scalable file storage service that can be mounted on multiple EC2 instances simultaneously. It is suitable for use cases that require shared access to files.

**8. \*\*Placement Groups:\*\***

**\*\*Placement Groups:\*\***

Logical grouping of instances within a single Availability Zone. This can be used to influence the placement of instances to achieve low-latency communication or to fulfill hardware requirements.

**9. \*\*Auto Scaling:\*\***

**\*\*Auto Scaling:\*\***

Automatically adjusts the number of EC2 instances in a group based on defined policies. It helps ensure that the desired number of instances are running to handle the load.

**10. \*\*Amazon Virtual Private Cloud (VPC):\*\***

**\*\*Amazon VPC:\*\***

A logically isolated section of the AWS Cloud where users can launch AWS resources. EC2 instances are launched into a specified VPC, and users can configure network settings, such as IP addresses and routing tables.

**11. \*\*Amazon CloudWatch:\*\***

**\*\*Amazon CloudWatch:\*\***

A monitoring service that provides data and actionable insights for AWS resources. Users can use CloudWatch to monitor EC2 instances and set alarms based on defined thresholds.

**12. \*\*IAM Roles:\*\***

**\*\*IAM Roles:\*\***

Identity and Access Management (IAM) roles for EC2 instances allow applications running on EC2 to securely access other AWS services without the need for access keys.

These components collectively provide the foundation for running scalable, secure, and reliable applications in the cloud using EC2 instances. Users can choose the instance types, storage options, and configurations that best suit their specific requirements.