

## UNIT-IV

## Cloud Platforms & Cloud Applications

### \* Amazon Web Services -

- • Amazon Web Services (AWS) is a cloud computing platform from Amazon that provides customers with wide range of cloud services.
- Amazon launched Aws to allow different organizations to take advantage of reliable IT infrastructure
- It provides different services such as IaaS, PaaS and SaaS.

#### ■ Features of AWS:

- i) Flexibility
- ii) Cost-effective
- iii) Scalable and elastic
- iv) Secure
- v) Experienced.

#### ■ Advantages of Aws :

- i) Aws allows organizations to use already familiar programming models, OS, databases, etc.
- ii) It is cost-effective service that allows you to pay only for what you use
- iii) You don't require money for running & maintaining data centers.

i) You can access cloud quickly with limitless capacity

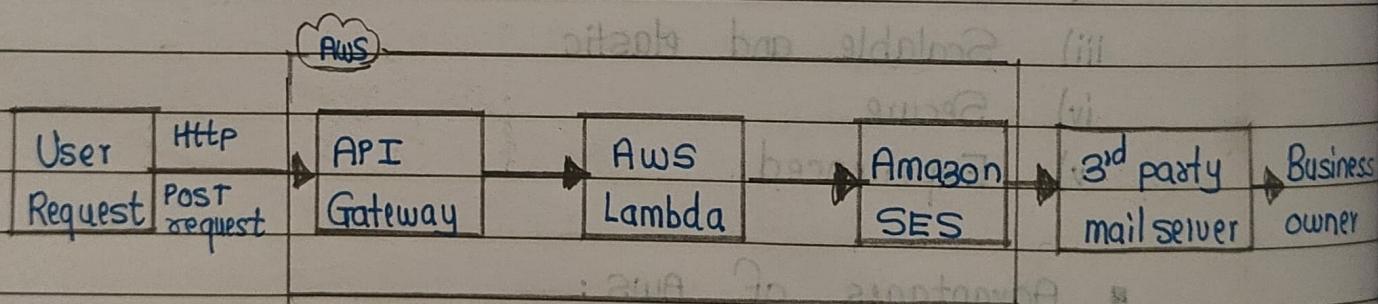
v) Allows you to deploy your application in multiple regions around world.

#### ■ Disadvantages -

- Aws charges you for immediate support.
- Security Limitations.

#### ★ Components of Aws -

- • Aws architecture diagram :



- Aws consists of many cloud services that you can use in combination with business & organizational needs

- The user request to servex by method such as email / register domain.

- The request which includes all the information will be sent to Amazon API Gateway
- API Gateway is front-door to access data, business logic & functionality
- API Gateway will transfer the collected information to AWS Lambda Function
- AWS Lambda function will generate an E-mail & forward it to 3<sup>rd</sup> party mail server using Amazon SES (Simple Email Service)
  - AWS Lambda :
    - It is a compute service that runs your back-end code and responds to events such as object uploads to Amazon S3, Dynamo DB, etc.
  - Amazon SES :
    - It is integrated with AWS management console so that you can monitor your sending activity.

## \* Services offered by AWS -

- AWS offers number of cloud services in separate domains.

### I) Networking -

- All networking related services are included in this, such as security, fast access, etc.

- Eg, Virtual Private Cloud

### II) Database -

- This domain is used to provide reliable relational & non-relational database.

- Eg, Amazon Simple DB, RDS

### III) Management Tools -

- The services that are used to maintain & monitor AWS instances are included in this.

- Eg, Amazon Cloud Watch

### IV) Storage and Content Delivery -

- Storage is used to store cloud data & content delivery is about data caching at nearby place/location.

- Eg, S3, Amazon CloudFront

## IV) Application Services -

- Simple services like emailing, queueing & notifications are included in this services.

Eg, Amazon SES, SQS.

### \* Steps for configuring Amazon EC2 VM Instance -

#### → Step I) Signup for AWS:

- When you signup for AWS, your AWS account is automatically signed up for all services in AWS, including Amazon EC2

#### Step II) Create an IAM user:

- Services in AWS, such as Amazon EC2, require that you provide credentials when you access them, so that service can determine whether you have permissions to access resources.

- AWS Identity & Access Management (IAM) is recommended rather than using your own account credentials.

- Create an IAM user then add user to an IAM group with administrative permissions.

### Step III) Create a Key Pair -

- AWS uses public-key cryptography to secure the login information for your instance.
- You can use key pairs to log in to your instance securely.

### Step IV) Create a Virtual Private Cloud (VPC) -

- Amazon VPC enables you to launch AWS resources into virtual network that you've defined, known as VPC.

### Step V) Create a security group -

- Security groups act as a firewall for associated instances, controlling both inbound & outbound traffic at instance level.

### Step VI) Launch an Instance -

- You can launch an instance using AWS management console.

### Step VII) Connect to your Instance -

- You can connect to your instance through various OS like Linux, Windows, etc.

## Step VIII) Cleanup your Instance -

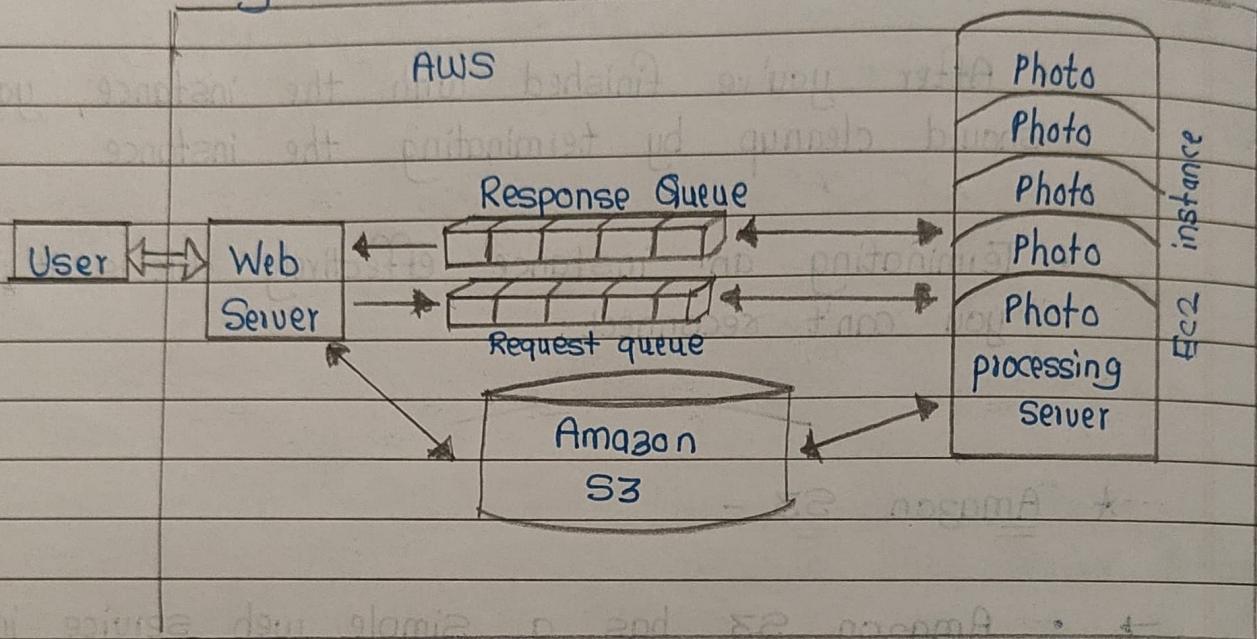
- After you've finished with the instance, you should cleanup by terminating the instance
- Terminating an instance effectively deletes it; you can't reconnect.

## \* Amazon S3 -

→ • Amazon S3 has a simple web service interface that you can use to store & retrieve any amount of data, at any time & from anywhere on web.

- Features -
  - i) Unlimited Storage
  - ii) Highly Scalable
  - iii) Reliable : Stores redundant data in multiple facilities
  - iv) Secure : Flexibility to control who/ how/ when/ where to access data
  - v) Performance : Choose region to optimize costs.

### ■ Working -



### ■ Procedure -

- i) Web server receives request from user
- ii) It puts request message in request queue
- iii) The pictures are stored in S3
- iv) Multiple EC2 instances run photo processing
- v) The response is put back in response queue

- Amazon S3 also provides easy access control management for all specific requirements of user.

- S3 also allows a simple web-based file explorer to upload files, folders or delete them.

## \* Amazon Database Services & Dynamo DB -

- • Databases play a crucial role in functioning of an application.

- AWS Database Services is a set of databases offered by AWS on cloud.

### ■ Dynamo DB -

- Amazon Dynamo DB is a fast, fully managed, & flexible NoSQL database.

- With Dynamo DB, you can create database tables that can store & retrieve any amount of data.

- It also allows you to delete expired items from tables automatically, to help you reduce storage usage.

- Since DynamoDB is a NoSQL database, it doesn't require any schema.

- Features of DynamoDB:

- i) On-demand capacity mode -

DynamoDB automatically scales up/down to accommodate traffic

- ii) Built-in support for ACID transactions

- iii) On-demand Backup -

This feature allows you to create complete backup of your work at any time.

- iv) Point-in-time recovery -

This feature helps you with protection of data in case of accidents

- v) Encryption at rest -

It keeps data encrypted even when table is not in use

- Advantages of Dynamo DB:

- i) Flexible

- ii) Fully managed

- iii) Highly scalable

- iv) Event-driven programming.

## \* Microsoft Azure -

- Microsoft Windows Azure is Cloud OS built on top of Microsoft data centers infrastructure.
- It provides developers with collection of services for building applications with cloud technology.
- It supports computing, storage & networking to application connectivity, etc.
- Windows Azure is used to:
  - i) Build web application that runs & stores its data on Microsoft data centers
  - ii) Create VM to develop & test
  - iii) Offer wide range of services.

### ■ Components of Azure:

#### i) Compute -

- Azure provides hosting environment for managed code.
- It provides computation service through roles.
- It supports 3 types of roles:  
Web roles, Worker roles & VM roles.

## 2) Storage -

- Azure provides storage in cloud.
- It provides 4 different types of storage services:
  - a) Queues
  - b) Tables
  - c) BLOBs (Binary Large Objects)
  - d) Windows Azure Drives (VHD)

## 3) AppFabric -

- It provides infrastructure services for developing, deploying & managing Azure application
- It provides 5 services:  
Service Bus, Access, Caching, Integration & Composite.

## \* Google App Engine -

- • Google App Engine (GAE) is a PaaS cloud computing platform for developing and hosting web applications in Google-managed data centers.
- It is a way to write your own web applications and have them hosted on Google servers.
- GAE requires that application be written in Java / Python, store data in Google BigTable and use the Google query language.
- Features of GAE:
  - i) Automatic scaling & Load Balancing
  - ii) Authentication using Google Accounts API
  - iii) Provides dynamic web services
  - iv) Integration with other Google Cloud Services & API
  - v) Supports persistent storage, with query access & transaction management features.
- GAE provides more infrastructure than other scalable hosting services, such as Amazon EC2.

- Users can create GAE account, set up software development kit & write application code
- They can then use GAE to test and deploy the code in cloud.

## \* Cloud Computing Applications -

- • Cloud computing has many applications in different areas. Some of them are:
- i) Healthcare - ECG Analysis in Cloud
  - ii) Biology - Protein structure prediction
  - iii) Geoscience - Satellite Image processing
  - iv) Business & Consumer Application: CRM & ERP

### • Satellite Image Processing -

- Satellite Image Processing is an important field in research & consists of images of earth and satellite taken by means of artificial satellites

- Firstly, the photos are taken in digital form & later processed by computers to extract information.

- This process requires both, I/O and compute-intensive tasks.

- Large images need to be moved from ground station's storage to compute facilities.
- Cloud computing provides appropriate infrastructure to support such application scenarios.
- CRM and ERP -
  - Customer Relationship Management (CRM) is a strategy for managing all your company's relationship & interactions with your customers
  - CRM software provides high level of security & scalability to its users & can be easily used on mobile phones to access data
  - Some of major CRM vendors include Oracle Siebel, SAGE CRM, etc.
- Cloud ERP is a SaaS that allows users to access Enterprise Resource Planning (ERP) software over Internet.
- ERP software follows pay per use methodologies of payment.
- ERP vendors include Oracle, SAGE, etc.