

# **AWS (Amazon web services):**

AWS or Amazon Web Services is a cloud computing platform that offers on-demand computing services such as virtual servers and storage that can be used to build and run applications and websites. AWS is known for its security, reliability, and flexibility, which makes it a popular choice for organizations that need to store and process sensitive data.

## **What Is AWS And Why Is It Used?**

AWS stands for Amazon Web Services, It is an expanded cloud computing platform provided by Amazon Company. AWS provides a wide range of services with a pay-as-per-use pricing model over the Internet such as Storage, Computing power, Databases, Machine Learning services, and much more. AWS facilitates for both businesses and individual users with effectively hosting the applications, storing the data securely, and making use of a wide variety of tools and services improving management flexibility for IT resources.

## **How AWS Works?**

AWS comes up with its own network infrastructure on establishing the datacenters in different regions mostly all over the world. Its global Infrastructure acts as a backbone for operations and services provided by AWS. It facilitates the users on creating secure environments using Amazon VPCs ( Virtual Private Clouds ). Essential services like Amazon EC2 and Amazon S3 for utilizing the compute and storage service with elastic scaling. It supports the dynamic scaling of the applications with the services such as Auto Scaling and Elastic Load Balancing ( AWS ELB ). It provides a good user-friendly AWS Management Console facilitating seamless configuration and management of AWS services to the Users.

## **AWS Fundamentals:**

In the Journey of AWS, understanding the key concepts such as Regions, Availability Zones, Global Network Infrastructure, etc is crucial. The

fundamentals of AWS keep on maintaining the applications reliable and scalable with services globally with coming to a strategic deployment of resources for optimal performance and resilience. The following are the some of the main fundamentals of AWS:

**Regions:** AWS provide the services with respective division of regions. The regions are divided based on geographical areas/locations and will establish data centers. Based on need and traffic of users, the scale of data centers is depended to facilitate users with low-latencies of servcies.

**Availability Zones (AZ):** To prevent the Data centers for the Natural Calamities or any other disasters. The Datacenters are established as sub sections with isolated locations to enhance fault tolerance and disaster recovery management.

**Global Network Infrastructure:** AWS ensures the reliability and scalability of services through setting up its own AWS Network Infrastructure globally. It helps in better management of data transmissions for optimized performance and security reliance.

### **Top AWS Services**

In the rapid revolution of Cloud Computing, AWS facilitates with wide variety of services respect to the fields and needs. The following are the top AWS services that are in wide usage:

**Amazon EC2(Elastic Compute Cloud) :** It provides the Scalable computing power via cloud allowing the users to run applications and manage the workloads over their remotely.

**Amazon S3 (Simple Storage Service):** It offers scalable object Storage as a Service with high durability for storing and retrieving any amount of data.

**AWS Lambda:** It is a service in Serverless Architecture with Function as a Service facilitating serverless computing i.e., running the code on response to the events, the background environment management of servers is handled by aws automatically. It helps the developers to completely focus on the logic of code build.

Amazon RDS (Relational Database Service): This is an AWS service that simplifies the management of database providing high available relational databases in the cloud.

Amazon VPC (Virtual Private Cloud): It enables the users to create isolated networks with option of public and private exposure within the AWS cloud, providing safe and adaptable configurations of their resources.

## **AWS Cloud Computing Models**

There are three cloud computing models available on AWS.

Infrastructure as a Service (IaaS): It is the basic building block of cloud IT. It generally provides access to data storage space, networking features, and computer hardware (virtual or dedicated hardware). It is highly flexible and gives management controls over the IT resources to the developer. For example, VPC, EC2, EBS.

Platform as a Service (PaaS): This is a type of service where AWS manages the underlying infrastructure (usually operating system and hardware). This helps the developer to be more efficient as they do not have to worry about undifferentiated heavy lifting required for running the applications such as capacity planning, software maintenance, resource procurement, patching, etc., and focus more on deployment and management of the applications. For example, RDS, EMR, ElasticSearch.

Software as a Service (SaaS): It is a complete product that usually runs on a browser. It primarily refers to end-user applications. It is run and managed by the service provider. The end-user only has to worry about the application of the software suitable to its needs. For example, Salesforce.com, Web-based email, Office 365.

## **What is Elastic Compute Cloud (EC2)?**

EC2 stands for Elastic Compute Cloud. EC2 is an on-demand computing service on the AWS cloud platform. Under computing, it includes all the services a computing device can offer to you along with the flexibility of a virtual environment. It also allows the user to configure their instances as per their

requirements i.e. allocate the RAM, ROM, and storage according to the need of the current task. Even the user can dismantle the virtual device once its task is completed and it is no more required.

Amazon Web Service EC2 is a web service which is provided by the AWS cloud which is secure, resizable, and scalable. These virtual machines are pre-configured with the operating systems and some of the required software. Instead of managing the infrastructure AWS will do that so you can just launch and terminate the EC2 instance whenever you want. You can scale up and down the EC2 instance depending on the incoming traffic. The other advantage of AWS EC2 is that you need to pay only for how much you use it is like the pay-as-you-go model.

Amazon Web service offers EC2 which is a short form of Elastic Compute Cloud (ECC) it is a cloud computing service offered by the Cloud Service Provider AWS. You can deploy your applications in EC2 servers without any worrying about the underlying infrastructure. You configure the EC2-Instance in a very secure manner by using the VPC, Subnets, and Security groups. You can scale the configuration of the EC2 instance you have configured based on the demand of the application by attaching the autoscaling group to the EC2 instance. You can scale up and scale down the instance based on the incoming traffic of the application.

### **Use Cases of Amazon EC2 (Elastic Compute Cloud)**

**Deploying Application:** In the AWS EC2 instance, you can deploy your application like .jar, .war, or .ear application without maintaining the underlying infrastructure.

**Scaling Application:** Once you deployed your web application in the EC2 instance know you can scale your application based upon the demand you are having by scaling the AWS EC2-Instance.

**Deploying The ML Models:** You can train and deploy your ML models in the EC2-instance because it offers up to 400 Gbps), and storage services purpose-built to optimize the price performance for ML projects.

**Hybrid Cloud Environment:** You can deploy your web application in EC2-Instance and you can connect to the database which is deployed in the on-premises servers.

Cost-Effective: Amazon EC2-instance is cost-effective so you can deploy your gaming application in the Amazon EC2-Instances.

### **The AWS EC2 Instance Types are as follows:**

General Purpose Instances

Compute Optimized Instances

Memory-Optimized Instances

Storage Optimized Instances

Accelerated Computing Instances

### **Pricing of AWS EC2 (Elastic Compute Cloud) Instance**

The pricing of AWS EC2-instance is mainly going to depend upon the type of instance you are going to choose. The following are the pricing charges on some of the EC2-Instances.

On-Demand Instances: The On-Demand instance is like a pay-as-you-go model where you have to pay only for the time you are going to use if the instance is stopped then the billing for that instance will be stopped when it was in the running state then you are going to be charged. The billing will be done based on the time EC2-Instance is running.

Reserved Instances: Reserved Instance is like you are going to give the commitment to the AWS by buying the instance for one year or more than one year by the requirement to your organization. Because you are giving one year of Commitment to the AWS they will discount the price on that instance.

Spot Instances: You have to bid the instances and who will win the bid they are going to get the instance for use but you can't save the data which is used in this type of instance.

## **Introduction to AWS Simple Storage Service (AWS S3)**

AWS offers a wide range of storage services that can be configured depending on your project requirements and use cases. AWS comes up with different types of storage services for maintaining highly confidential data, frequently accessed data, and often accessed storage data. You can choose from various storage service types such as Object Storage as a Service(Amazon S3), File Storage as a Service (Amazon EFS), Block Storage as a Service (Amazon EBS), backups, and data migration options.

What is Amazon S3?

Amazon S3 is a Simple Storage Service in AWS that stores files of different types like Photos, Audio, and Videos as Objects providing more scalability and security to. It allows the users to store and retrieve any amount of data at any point in time from anywhere on the web. It facilitates features such as extremely high availability, security, and simple connection to other AWS Services.

Amazon S3 is used for various purposes in the Cloud because of its robust features with scaling and Securing of data. It helps people with all kinds of use cases from fields such as Mobile/Web applications, Big data, Machine Learning and many more. The following are a few Wide Usage of Amazon S3 service.

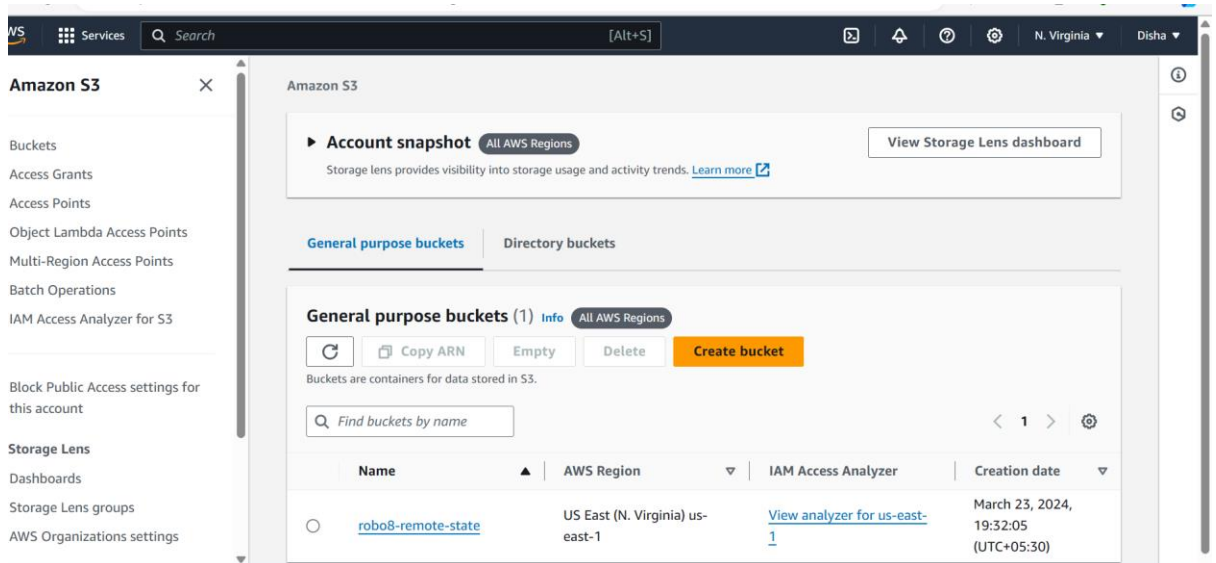
**Data Storage:** Amazon s3 acts as the best option for scaling both small and large storage applications. It helps in storing and retrieving the data-intensive applications as per needs in ideal time.

**Backup and Recovery:** Many Organizations are using Amazon S3 to backup their critical data and maintain the data durability and availability for recovery needs.

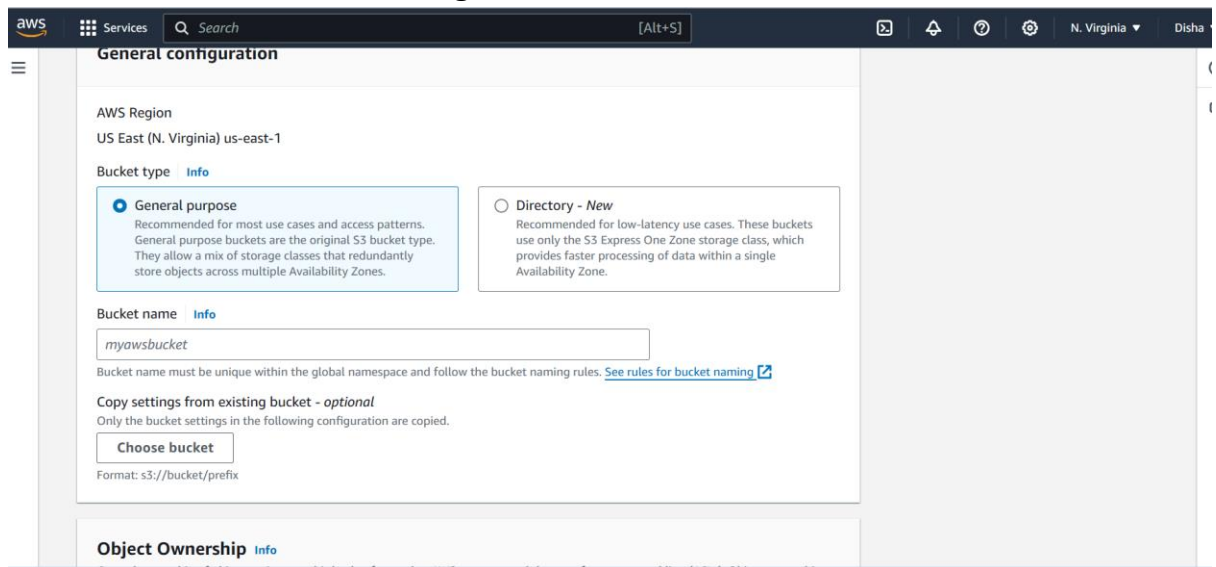
**Hosting Static Websites:** Amazon S3 facilitates in storing HTML, CSS and other web content from Users/developers allowing them for hosting Static Websites benefiting with low-latency access and cost-effectiveness. To know more detailing refer this Article – [How to host static websites using Amazon S3](#)

**Steps to create S3 bucket:**

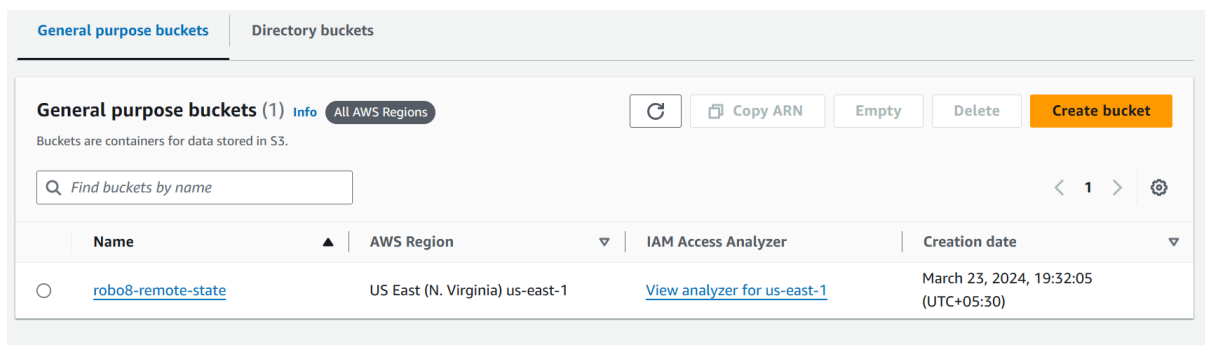
- Go to S3 service in AWS console.



- Click on create a bucket. And give bucket name .



- Click on create, than bucket will create as shown in below.



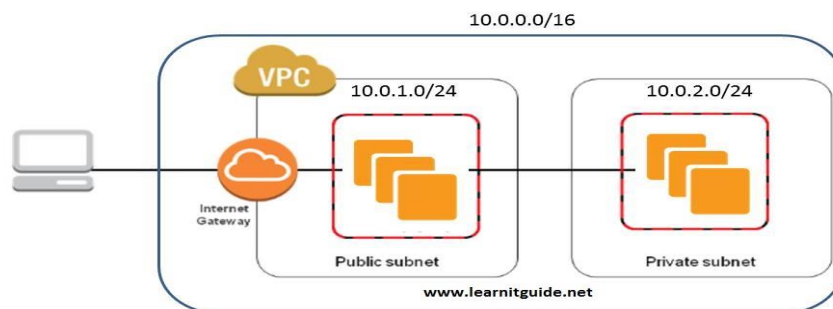
## What is Amazon VPC(Virtual Private Cloud)?

Amazon VPC can be referred to as the private cloud inside the cloud. It is a logical grouping of servers in a specified network. The servers that you are going to deploy in the Virtual Private Cloud(VPC) will be completely isolated from the other servers that are deployed in the Amazon Web Services. You can have complete control of the IP address to the virtual machines and route tables and gateways to the VPC. With the help of security groups and network access control lists, you can protect your application more.

### Amazon VPC (Virtual Private Cloud) Architecture

The basic architecture of a properly functioning VPC consists of many distinct services such as Gateway, Load Balancer, Subnets, etc. Altogether, these resources are clubbed under a VPC to create an isolated virtual environment. Along with these services, there are also security checks on multiple levels.

It is initially divided into subnets, connected with each other via route tables along with a load balancer.



### Amazon VPC (Virtual Private Cloud) Components

#### VPC

You can launch AWS resources into a defined virtual network using Amazon Virtual Private Cloud (Amazon VPC). With the advantages of utilizing the scalable infrastructure of AWS, this virtual network closely mimics conventional



network that you would operate in your own data center. /16 user-defined address space maximum (65,536 addresses)

### **Subnets**

To reduce traffic, the subnet will divide the big network into smaller, connected networks. Up to /16, 200 user-defined subnets.

### **Route Tables**

Route Tables are mainly used to Define the protocol for traffic routing between the subnets.

### **Network Access Control Lists**

Network Access Control Lists (NACL) for VPC serve as a firewall by managing both inbound and outbound rules. There will be a default NACL for each VPC that cannot be deleted.

### **Internet Gateway(IGW)**

he Internet Gateway (IGW) will make it possible to link the resources in the VPC to the Internet.

### **Network Address Translation (NAT)**

Network Address Translation (NAT) will enable the connection between the private subnet and the internet.

### **Amazon VPC (Virtual Private Cloud) Fundamentals**

- If the subnet has internet access, then it is called Public Subnet.
- If the subnet doesn't have internet access, then it is called Private Subnet.
- A subnet must reside entirely within one Availability Zone.
- An entire subnet must be contained within a single Availability Zone.
- Access between instances is managed by VPC Security Groups for both inbound and outgoing traffic (EC2 Security Groups can only define inbound rules).
- We can specify Subnet IP Routing with the aid of the Route Table.

- If a server/instance which is in a private subnet wants to reach the internet then it must have NAT in a public subnet.

## **Identity and Access Management (IAM):**

Identity and Access Management (IAM) manages Amazon Web Services (AWS) users and their access to AWS accounts and services. It controls the level of access a user can have over an AWS account & set user, grant permission, and allows a user to use different features of an AWS account. Identity and access management is mainly used to manage users, groups, roles, and Access policies. The account we created to sign in to Amazon web services is known as the root account and it holds all the administrative rights and has access to all parts of the account. The new user created an AWS account, by default they have no access to any services in the account & it is done with the help of IAM that the root account holder can implement access policies and grant permission to the user to access certain services.

What Does IAM Do?

With the help of IAM, we perform the following:

**IAM Identities**

IAM Identities assists us in controlling which users can access which services and resources in the AWS Console and also we can assign policies to the users, groups, and roles. The IAM Identities can be created by using the Root user

**IAM Identities Classified As**

- IAM Users
- IAM Groups
- IAM Roles

**Root user**

The root user will automatically be created and granted unrestricted rights. We can create an admin user with fewer powers to control the entire Amazon account.

## **IAM Users**

We can utilize IAM users to access the AWS Console and their administrative permissions differ from those of the Root user and if we can keep track of their login information.

### **Example**

With the aid of IAM users, we can accomplish our goal of giving a specific person access to every service available in the Amazon dashboard with only a limited set of permissions, such as read-only access. Let's say user-1 is a user that I want to have read-only access to the EC2 instance and no additional permissions, such as create, delete, or update. By creating an IAM user and attaching user-1 to that IAM user, we may allow the user access to the EC2 instance with the required permissions.

## **IAM Groups**

A group is a collection of users, and a single person can be a member of several groups. With the aid of groups, we can manage permissions for many users quickly and efficiently.

## **IAM Features:**

**Shared Access to your Account:** A team working on a project can easily share resources with the help of the shared access feature.

**Free of cost:** IAM feature of the Aws account is free to use & charges are added only when you access other Amazon web services using IAM users.

**Have Centralized control over your Aws account:** Any new creation of users, groups, or any form of cancellation that takes place in the Aws account is controlled by you, and you have control over what & how data can be accessed by the user.

**Grant permission to the user:** As the root account holds administrative rights, the user will be granted permission to access certain services by IAM.

**Multifactor Authentication:** Additional layer of security is implemented on your account by a third party, a six-digit number that you have to put along with your password when you log into your accounts.