

Practical - 1

AIM : Introduction AWS Platform and Services.



Amazon Web Services (AWS), a subsidiary of Amazon.com, has invested billions of dollars in IT resources distributed across the globe. These resources are shared among all the AWS account holders across the globe. These accounts themselves are entirely isolated from each other. AWS provides on-demand IT resources to its account holders on a pay-as-you-go pricing model with no upfront cost. Amazon Web Services offers flexibility because you can only pay for services you use or you need. Enterprises use AWS to reduce capital expenditure of building their own private IT infrastructure (which can be expensive depending upon the enterprise's size and nature). AWS has its own Physical fiber network that connects with Availability zones, regions and Edge locations. All the maintenance cost is also borne by the AWS that saves a fortune for the enterprises.

Security of cloud is the responsibility of AWS but Security in the cloud is Customer's Responsibility. The Performance efficiency in the cloud has four main areas:-

- Selection
- Review
- Monitoring
- Tradeoff

AWS Global Infrastructure

The AWS global infrastructure is massive and is divided into geographical regions. The geographical regions are then divided into separate availability zones. While selecting the geographical regions for AWS, three factors come into play

- Optimizing Latency
- Reducing cost

- Government regulations (Some services are not available for some regions)

Each region is divided into at least two availability zones that are physically isolated from each other, which provides business continuity for the infrastructure as in a distributed system. If one zone fails to function, the infrastructure in other availability zones remains operational. The largest region North Virginia (US-East), has six availability zones. These availability zones are connected by high-speed fiber-optic networking.

There are over 100 edge locations distributed all over the globe that are used for the CloudFront (content delivery network). Cloudfront can cache frequently used content such as images and videos(live streaming videos also) at edge locations and distribute it to edge locations across the globe for high-speed delivery and low latency for end-users. It also protects from DDOS attacks.

AWS Management Console

The AWS management console is a web-based interface to access AWS. It requires an AWS account and also has a smartphone application for the same purpose. So When you sign in for first time, you see the console home page where you see all the services provided by AWS. Cost monitoring is also done through the console.

AWS resources can also be accessed through various Software Development Kits (SDKs), which allows the developers to create applications as AWS as its backend. There are SDKs for all the major languages(e.g., JavaScript, Python, Node.js, .Net, PHP, Ruby, Go, C++). There are mobile SDKs for Android, iOS, React Native, Unity, and Xamarin. AWS can also be accessed by making HTTP calls using the AWS-API. AWS also provides a Command Line Interface (CLI) for remotely accessing the AWS and can implement scripts to automate many processes. This Console is also available as an app for Android and iOS. For mobile apps, you can simply download AWS console app.

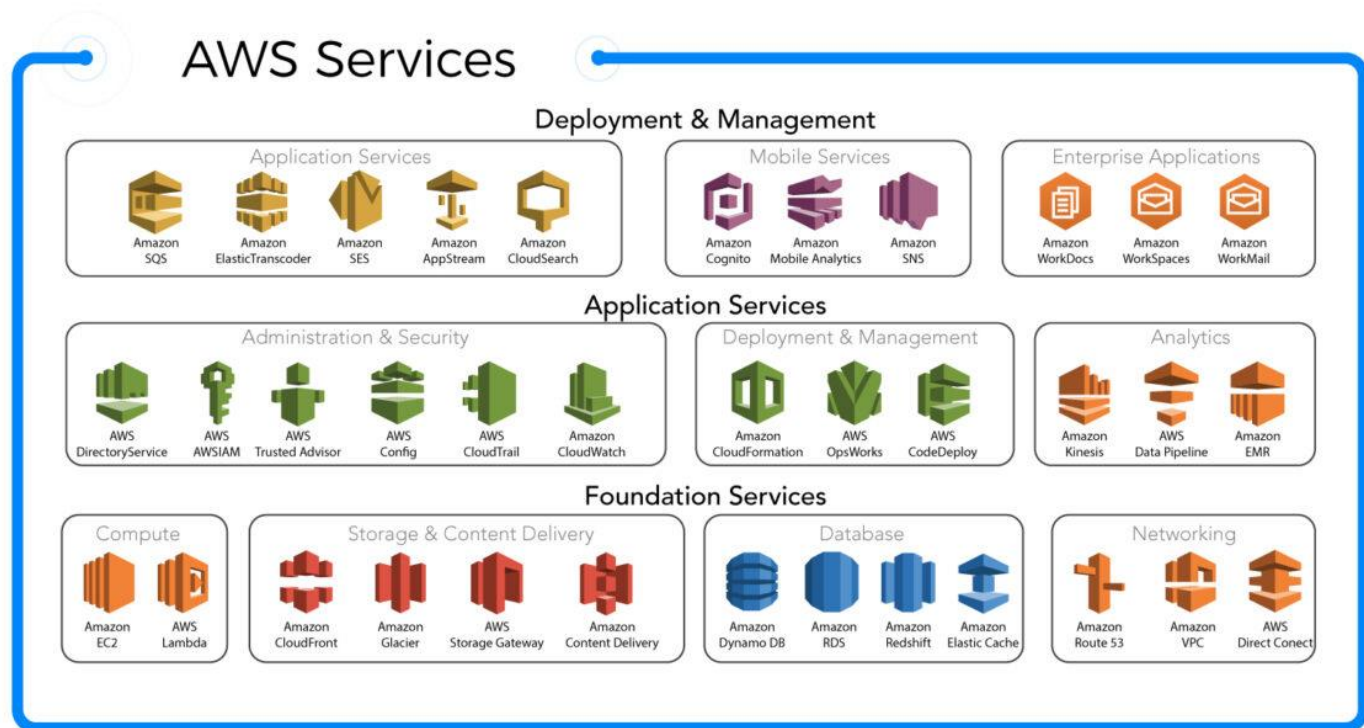
AWS Cloud Computing Models

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 .



#1. Compute

Services under the computing domain in AWS are all about high-end servers that are used to host a website, process backend data, etc.

Let us have a look at some of the essential services under compute domain:

- i. EC2: AWS EC2 (Elastic Compute Cloud) offers you a server with desired OS, RAM, and processor where you have full control of OS to perform any operation.
- ii. Lambda: Under lambda service, the user does not have full access to the OS and cannot host a website. It is used only for backend processing where it can receive the request, process it, and send back the result.
- iii. Elastic Beanstalk : In AWS Elastic Beanstalk, the user gets a dashboard to upload websites. It is a Platform as a service, so the user does not have full access to the OS.
- iv. Elastic Load Balancer : AWS load balancer balances the load among servers that are deployed at a particular instance. There are three types of load balancers -
 - Classic load balancer: balances traffic among servers
 - Application load balancer: balances traffic based on URL of applications
 - Network load balancer: Balances traffic based on web protocol (HTTP, FTP, etc.)

v. Autoscaling : Autoscaling helps to increase or decrease the number of servers needed based on requirements for operation such as CPU usage, memory usage, network throughput, etc.

#2. Storage

AWS offers storage plenty of choices to users for backing up information, archiving, and disaster recovery. Let us have a look at the list of the main services available under the storage domain on the AWS Cloud.

- i. S3 : Amazon Simple Storage Service (S3) stores files in the form of objects with a maximum size of 5 TB each.
- ii. Glacier : AWS Glacier provides low-cost, flexible, durable, secure storage for data backup and archival where customers can store data for as little as \$0.004 per GB per month.
- iii. Cloudfront : Amazon CloudFront speeds up the distribution of static and dynamic web content and delivers it through data centers called edge locations with the lowest latency.
- iv. Elastic File System :AWS EFS (Elastic File System) is used to mount shared drives among multiple servers in real-time.
- v. Storage Gateway : AWS Storage Gateway helps users to access or store data on AWS with the lowest latency possible.

#3. Database

In this domain, AWS provides services that can help you monitor and manage your databases in the AWS infrastructure for better productivity. Services under Database are-

- i. RDS : Amazon RDS (relational database service) is a service that manages your relational databases and keeps your information updated.
- ii. DynamoDB : DynamoDB supports key-value and document data along with point-in-time recovery and on-demand backup.
- iii. ElasticCache : AWS ElastiCache improves the performance of the application by caching the frequently required or queried data.
- iv. RedShift :Amazon Redshift is a data warehouse service that offers mission-critical analysis for companies.

#4. Migration

This domain deals with the transferring of data to and from the AWS infrastructure. There is a service called snowball used when you need to transfer your considerable data to the AWS infrastructure physically. For this, you will receive a physical device sent by AWS to your location, and you have to upload your data on it and send it back to the AWS office.

#5. Networking and content delivery

AWS offers the highest network availability amongst all cloud service providers to increase throughput with on-time content delivery and reduced network latency.

- i. VPC : AWS VPC (Virtual private Cloud) allows users to launch their AWS resources into a virtual network.
- ii. Direct Connect : AWS direct connect makes it easier to establish a network connection from the user's premises to AWS that reduces network costs and increases bandwidth throughput.
- iii. Route 53 :Amazon Route 53 is a scalable cloud DNS web service designed to offer a reliable way to route users to internet applications.

#6. Management Tools

Using these tools, you can manage all of your AWS resources on AWS infrastructure. There are some of the services given below that users can use to control and secure their data from getting into unauthorized hands.

- i. CloudWatch : AWS CloudWatch is a monitoring service that helps in monitoring the AWS account and resources in it.
- ii. CloudFormation : AWS CloudFormation allows us to create a bunch of AWS resources through a single click. Using this tool, we can create a large architecture with a few clicks.
- iii. CloudTrail : AWS CloudTrail provides event history on each and every AWS account-related activity along with auditing, compliance monitoring, and governance,
- iv. OpsWorks : AWS OpsWorks helps in managing and configuring servers on AWS using Chef and Puppet.

#7. Security and Identity Compliance

This domain deals with user rights and authenticity. Services under this domain will help you manage what access should be given to which person in your organization or team. With the below-given services, a user can give needed access to the employees and secure his/her data.

- i. IAM : AWS IAM (Identity and Access Management) allows users to access the resources in the AWS ecosystem.
- ii. KMS : AWS KMS (Key Management System) helps users to create and manage security keys to keep their data safe and secure.