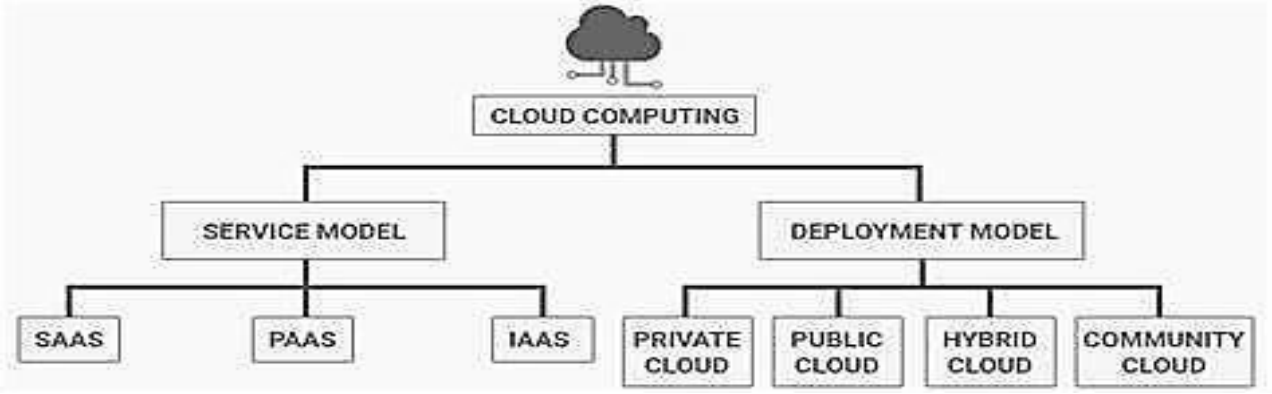
UNIT-2

Service Models of Cloud Computing/gamut of cloud solution

Cloud computing has three models to fulfil the needs of different users. Each of these models come with different levels of management, control, and flexibility.

Service Models are the reference models on which the Cloud Computing is based. These can be categorized into three basic



Service models as listed below:

1. Infrastructure as a Service (IaaS)
2. Platform as a Service (PaaS)
3. Software as a Service (SaaS)

1. Infrastructure as a Service (IaaS)

IaaS is a form of cloud computing that delivers fundamental compute, network, and storage resources to consumers on-demand, over the internet and on a pay as you go basis.

- The first cloud computing type is infrastructure-as-a-service (IaaS), which is used for Internet-based access to storage and computing power.
- Infrastructure as a Service (IAAS) offers access to networking features, data storage space, and different computers.
- IaaS is the delivery of technology infrastructure as an on demand scalable service.
- The difference is that the cloud service provider hosts, manages and maintains the hardware and computing resources in its own datacenters. IaaS customers use the hardware via an internet connection.

- The most basic category of cloud computing types, IaaS lets you rent IT infrastructure - servers and virtual machines, storage, networks, and operating systems - from a cloud provider on a pay-as-you-go basis.

  Example - Amazon Web Services, Google Cloud, IBM Cloud, Microsoft Azure

Benefits/advantages of IaaS

1. Scalability

The Cloud is available for 24 hours and can access from anywhere which makes it scalable.

2. Pay-as-you-go

The Cloud service is economical and the customer charge only for what they have used. This saves the extra cost and expands the business very quickly.

3. Secure

The data stored is secured as the snapshots of the data are stored in many places so if in case a disaster takes place the data can retrieve from other places. Moreover, the data is secure and can access by the allotted authorities only.

4. Save time and cost

The customer is burden-free as the hardware maintenance and management is done by the company providing service. This saves the overall cost and the time too.

2. Platform as a Service (PaaS)

Platform as a service is a model developer essentially rent everything they need to build an application, relying on a cloud provider for development tools, infrastructure, and operating systems.

- The second cloud computing type is platform-as-a-service (PaaS) that gives developers the tools to build and host web applications. PaaS is designed to give users access to the components they require to quickly develop and operate web or mobile applications over the Internet, without worrying about setting up or managing the underlying infrastructure of servers, storage, networks, and databases.
- Platforms as a Service is responsible for allowing organizations to focus on managing and deploying applications.
- PaaS provides the runtime environment for applications, development & deployment tools,

etc.

- PaaS provides all the facilities required to support the complete life cycle of building and delivering web applications and services entirely from the Internet. Typically, applications must be developed with a particular platform in mind
- Ex: Google Application Engine, Microsoft's Azure, Salesforce.com, force.com.
- The primary benefit of PaaS is having software development and deployment capability based entirely in the cloud — hence, no management or maintenance efforts are required for the infrastructure.
- Multiuser environments
- Highly scalable multi-tier architecture.

Advantages/Benefits of PaaS

1. Reduces the Coding Time

With the help of Platform as a Service, the coding time reduces as the time it takes to code new apps with pre-coded application parts design into the platform, like workflow, directory services, security measures, search then on.

2. Enhances the Development Capabilities

Platform as Service parts will provide your development team new capabilities while you don't need to add workers having the specified skills.

3. Available at Multiple platforms

It can access from anywhere and from many devices such as mobile, tabs, and laptops. In addition, some service suppliers offer development choices for multiple platforms like computers and browsers creating cross-platform apps faster and easier to develop.

4. Tools at economical costs

PaaS provides pay-as-you-go service which makes it potential for people or organizations to use subtle development package and business intelligence and analytics tools that they may not afford to get outright.

3. Software as a Service (SaaS)

It is a cloud-based software delivery model that allows end users to access software application over internet.

- Software as a Service refers to end-user applications that are run and managed by service providers.
- SaaS model allows to use software applications as a service to end users. SaaS is a software delivery methodology that provides licensed multi-tenant access to software and its functions remotely as a Web-based service.
- The third cloud computing type is software-as-a-service (SaaS) which is used for web-based applications. SaaS is a method for delivering software applications over the Internet where cloud providers host and manage the software applications making it easier to have the same application on all your devices at once by accessing it in the cloud.
- SaaS (sometimes called cloud application services) is cloud-hosted, ready-to- use application software. Users pay a monthly or annual fee to use a complete application from within a web browser, desktop client or mobile app. The application and all of the infrastructure required to deliver it - servers, storage, networking, middleware, application software, data storage - are hosted and managed by the SaaS vendor.
- Example: Zoom, Google Docs, Netflix, Gmail, Adobe Suite, Ms Office.

Benefits of Software as a Service

1. Scalable

The service of Software as a Service (SaaS) is very scalable and provides various features to the customers as per their demand.

2. Flexible

SaaS eliminates the cost to purchase. The pay-as-you-go service helps to reduce the cost. This allows business to exercise better and more predictable budgeting. The customer can stop using the service and the cost will be limited.

3. Up to Date

With new updates, the SaaS is gradually improving. This reduces the burden of the staff and provides a better service.

4. Ease of access

The SaaS applications can access with the help of the internet from anywhere. This makes it flexible for the customers and is easily available.


On-Premises
IaaS
Infrastructure as a Service
PaaS
Platform as a Service
SaaS
Software as a Service
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
bmc
You Manage
Other Manages

Difference Between IaaS, PaaS, SaaS.

BASIS	IAAS	PAAS	SAAS
Denotes	Infrastructure as a service.	Platform as a service.	Software as a service.
Users	It is widely used by network architects.	It is widely used by developers.	It is commonly used by end-users.
Model	Provides visual computing resources over the internet.	A cloud computing model that delivers the essentials and tools used in developing software and applications.	A cloud computing model that hosts software and makes it available for clients
Knowledge required	Technical knowledge.	Basic knowledge required for basic setup.	No technical knowledge required.
Access	Gives access to resources like virtual storage virtual machines.	Gives access to an environment that helps in deployment and development tools for application.	Gives access to the end users.
Cloud services	Amazon Web Services, sun, vCloud Express	Google Search Engine, and Facebook.	Google Apps, Microsoft web apps, Facebook.
User controls	Runtime, Middleware, Operating System, Application data	Data of the application	Nil
Outsourced cloud services	Salesforce	Force.com, Gigaspaces	AWS, Terremark
Enterprise services	AWS virtual private cloud.	Microsoft Azure.	IBM cloud analysis.
Popular among	Developers and researchers.	Developers of apps and scripts.	Consumers and companies.

CLOUD STATERGIES/TECHNOLOGY

- Cloud strategy is the plan an organization follows to host its IT infrastructure in a cloud environment. By outlining the clouds architecture, development plans & governance model, cloud strategies help ensure effective performance of the infrastructure workload and applications hosted in the cloud.
- Cloud strategy also supports cloud management by defining cost, functionality, service levels.
- This phase defines the business strategy for adoption of cloud, its design, development and implementing.
- It links the business to adopt with IT requirements for the applications made enabled on cloud.

Key steps in cloud implementation planning include:

1. **Understand technology**- It's very important to know the cloud architecture or cloud as a whole before the implementation of it. Based upon the business strategies analysing the components, existing application helps in the better understanding of the cloud environment.

2. **Define cloud application requirements** – Requirements regarding the services or service models differ from each and every organization or company. Defining the clear requirements to the provider helps in the proper decision making and adapting the required services for the business

3. **Acceses cloud readiness** – As per the requirements specified, it is also important to check for the readiness of the cloud or how well equipped are the cloud providers to fulfil the requirements of the company.

4. **Choose the right cloud model** -Depending upon the cloud strategy a complete description of the development of an application should be specified and appropriate service model has to be chooses as per the strategy.

5. **Identifying changes in management requirements** -The requirement changes according to the up scaling or down scaling of business strategies The management should be flexible to adopt the changes in the requirements.

6. **Develop roadmap and implementation Plan**-Able to develop a blueprint of the entire project or business and implement it according to real time world requirements.

These key points help deploy the cloud deployment with following Benefits:

- Reduced risk and faster deployment
- Improve Service
- Lower Cost

History of AWS

- **2003**: In 2003, Chris Pinkham and Benjamin Black presented a paper on how Amazon's own internal infrastructure should look like. They suggested to sell it as a service and prepared a business case on it. They prepared a six-page document and had a look over it to proceed with it or not. They decided to proceed with the documentation.

- **2004**: SQS stands for "Simple Queue Service" was officially launched in 2004. A team launched this service in Cape Town, South Africa.

- **2006**: AWS (Amazon Web Services) was officially launched.

- **2007**: In 2007, over 180,000 developers had signed up for the AWS.

- **2010**: In 2010, amazon.com retail web services were moved to the AWS, i.e., amazon.com is now running on AWS.

- **2011**: AWS suffered from some major problems. Some parts of volume of EBS (Elastic Block Store) was stuck and were unable to read and write requests. It took two days for the problem to get resolved.

- **2012**: AWS hosted a first customer event known as re:Invent conference. First reinvent conference occurred in which new products were launched. In AWS, another major problem occurred that affects many popular sites such as Pinterest, Reddit, and Foursquare.

- **2013**: In 2013, certifications were launched. AWS started a certifications program for software engineers who had expertise in cloud computing.

- **2014**: AWS committed to achieve 100% renewable energy usage for its global footprint.

- **2015**: AWS breaks its revenue and reaches to $6 Billion USD per annum. The revenue was growing 90% every year.

- **2016**: By 2016, revenue doubled and reached $13Billion USD per annum.

- **2017**: In 2017, AWS re: invent releases a host of Artificial Intelligence Services due to which revenue of AWS doubled and reached $27 Billion USD per annum.

- **2018**: In 2018, AWS launched a Machine Learning Speciality Certs. It heavily focussed on automating Artificial Intelligence and Machine learning.

Introduction to AWS

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 account 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 bared by the AWS that saves a fortune for the enterprises.

Amazon Web Services(AWS) is a cloud service from Amazon, which provides services in the form of building blocks, these building blocks can be used to create and deploy any type of application in the cloud.

Or

Amazon Web Services is a loosely coupled collection of "cloud" infrastructure services that allows customers to "rent" computing resources. What this means is that using AWS, you as the client are able to flexibly provision various computing resources on a "**pay as you go**" pricing model.

These services or building blocks are designed to work with each other, and result in applications that are sophisticated and highly scalable.

Each type of service in this “What is AWS” blog, is categorized under a domain, the few domains which are widely used are:

1. Compute
2. Storage
3. Database
4. Migration
5. Network and Content Delivery
6. Management Tools
7. Security & Identity Compliance
8. Messaging

1.Compute Services

- **AWS compute** is an Infrastructure As A Service (IAAS). Put simply, AWS compute is the means to provision and manage infrastructure (virtual machines/containers) for your use case. AWS provides many flexible computing services so as to meet the requirements of business organizations like Amazon Elastic Compute Cloud (EC2).
- The **Compute** domain includes services related to compute workloads; it includes the services some of them are listed below.
- **ELB (Elastic Load Balancing):** All requests to compute resources go through ELB. ELB distributes request load between underlying server instances.
- **ECR (Elastic Container Registry):** Efficient an easy way to store, manages, and deploys container images. This compute service is a regional service.

2.Storage Services

- Amazon Simple Storage Service (Amazon S3) is the most widely used object storage service and used by most of the companies, even startups to enterprise-level because of its scalability, data availability, security and performance any data stored over S3 is protected, secure and always available no matter what amount of data for a range of use cases, such as websites, mobile applications that generate lots of data, backups for applications, IoT devices, and big data analytics and all these at a very minimal cost with 99.9% of durability, S3 is used as storage for many other AWS services like code commit, Streaming service, and many others.
- The **Storage** domain includes services related data storage, it includes services some are listed below:

- **S3 (Simple Storage Service):** Amazon S3 is an object storage service that stores data of any type and size. It can store data for any business such as web applications, mobile applications, backup, archive, analytics.
- **Elastic Block Storage (EBS):** EBS provides block storage which is similar to hard drives to store any kind of data persistently. This can be attached to any EC2 instance and used as block storage, which even allows you to install any operating system.
- **Elastic File System (EFS):** EFS is a managed network file system that is easy to set up right from the amazon console or CLI. When you have multiple EC2 instances needed to access the same file system EFS helps in providing just that

3.Database Services

The **Database** AWS fully managed database services provide continuous monitoring, self- healing storage, and automated scaling to help you focus on application development. Amazon Aurora**.**

- **Amazon RDS:** Amazon RDS is a managed relational database service for MySQL, PostgreSQL, MariaDB, Oracle BYOL, or SQL Server.
- **Amazon DynamoDB:** A serverless database for applications that need high performance at any scale. NoSQL Database Service.
- **Amazon RedShift:** Amazon Redshift uses SQL to analyze structured and semi-structured data across data warehouses, operational databases, and data lakes, using AWS-designed hardware and machine learning to deliver the best price performance at any scale.

4.Migration Services

The **Migration** domain is used for transferring data to or from the AWS Infrastructure, it includes the following services:

- **AWS Database Migration Service:** AWS Database Migration Service (AWS DMS) is a managed migration and replication service that helps move your database and analytics workloads to AWS quickly, securely, and with minimal downtime and zero data loss. AWS DMS supports migration between 20-plus database and analytics engines.
- **AWS Snowball**: uses physical storage devices to transfer large amounts of data between Amazon Simple Storage Service (Amazon S3) and your onsite data storage location at faster-than-internet speeds

5.Networking and Content Delivery Services

The **Networking and Content Delivery** domain is used for isolating your network infrastructure, and content delivery is used for faster delivery of content. It includes the following services:

- **Amazon Route 53:** Amazon Route 53 is a highly available and scalable Domain Name System (DNS) web service. Route 53 connects user requests to internet applications running on AWS or on-premises.
- **AWS CloudFront:** A globally-distributed network offered by Amazon Web Services, which securely transfers content such as software, SDKs, videos, etc., to the clients, with high transfer speed

6.Management Tools

The **Management Tools** domain consists of services which are used to manage other services in AWS, it includes the following services:

- AWS CloudWatch
- AWS CloudFomation
- AWS CloudTrail

7.Security & Identity, Compliance Services

The **Security & Identity, Compliance** domain consist of services which are used to manage to authenticate and provide security to your AWS resources. It consists of the following services:

- AWS IAM
- AWS KMS
- AWS Shield

8.Messaging Services

The **Messaging** domain consists of services which are used for queuing, notifying or emailing messages. It consists of the following domains:

- Amazon SQS
- Amazon SNS
- Amazon SES
- Amazon Pinpoint

AWS Use Cases:

Businesses of any size and sector may create complex applications with AWS, from hyper-scale web applications to big data analytical apps. Here are a few of the typical AWS applications:

1. **Storage and backup –** For organizations, Amazon's cloud storage is a convenient and practical offering. It can save important data and gives a variety of storage options based on needs. AWS provides storage, operating essential business applications, file indexing functionality, high-performance writing or reading, and archiving.
2. **Enterprise IT –** Amazon cloud services provide the perfect remedy for the cumbersome pace of enterprise IT. AWS makes it possible to build, test, and run auxiliary processes quickly in the cloud. It quickens the project's launch and gives it an advantage over rivals.

3. **Mobile, Web, and Social Applications –** Unlike other cloud services, AWS can create and scale a wide range of applications, including SaaS, mobile, and e-commerce ones. On serverless platforms, new applications can be created without the use of an operating system or other systems. Scalable apps can also be developed on AWS using API-driven programming.

4. **Big Data –** AWS's scalable storage makes it possible to conduct more frequent analytics. It is ideal for creating data lakes or warehouses because it doesn't take up much space or require much work to index. Together, AWS and Big Data provide the strength and infrastructure required to support sophisticated intelligent applications.

5. **Websites –** The AWS cloud can be used to host websites. Additionally, it works well for hosting domains, DNS, and CDNs.

6. **Gaming –** Online connectivity and a lot of processing power are needed for gaming applications. AWS makes it simple to access for the global gaming network and offers players the best global online gaming experience.

Advantages of AWS

- **Easy to use**

AWS is made to enable suppliers, ISVs, and application providers to swiftly and securely host your apps, whether they are SaaS-based or not. To access AWS's application hosting platform, use the AWS Management Console or well-documented web services APIs.

- **Flexible**

You can choose the web application platform, programming language, operating system, database, and other services you require with AWS. You get a virtual environment through AWS that you may fill with the programs and services your application needs. As a result, existing applications can be more easily migrated while still having alternatives for developing new solutions.

- **Cost-Effective**

There are no long-term contracts or upfront payments; you simply pay for the computing power, storage, and other resources that you really utilize. Visit the AWS Economics Center for further details on comparing the expenses of other hosting options with those of AWS.

- **Reliable**

You can benefit from a scalable, reliable, and secure global computing infrastructure with AWS, which serves as the virtual foundation for Amazon.com's multi-billion dollar online company and has been refined for more than ten years.

- **Scalable and high-performance**

Your application can scale up or down depending on demand using AWS technologies like Auto Scaling and Elastic Load Balancing. You get immediate access to computation and storage resources thanks to Amazon's extensive infrastructure.

- **Secure**

Physical, operational, and software safeguards are all used by AWS to secure and harden our infrastructure. The AWS Security Center has more details.

Features/Services in the AWS Free Usage Tier

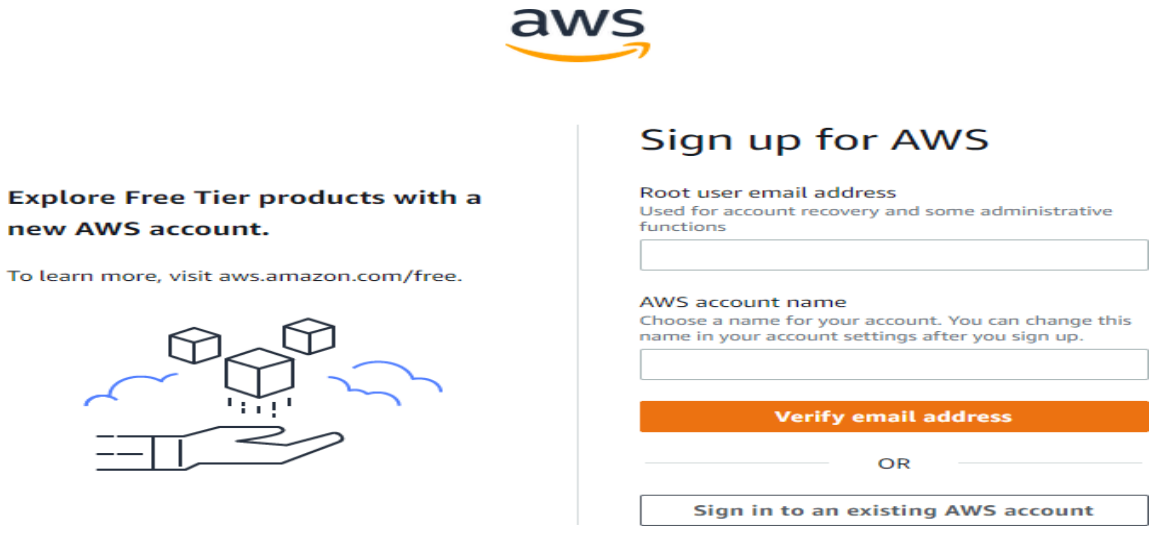
- Amazon S3 data storage infrastructure with a standard storage of 5 GB facilitating 20,000 Get Requests, and 2,000 Put Requests.
- Amazon EC2, for resizing computing capacity in the cloud, with 750 hours per month each of Linux, RHEL, or SLES t2.
- Amazon DynamoDB with 25 units each of Read and Write capacity, and 25GB storage. It does not expire at the end of 12 months.

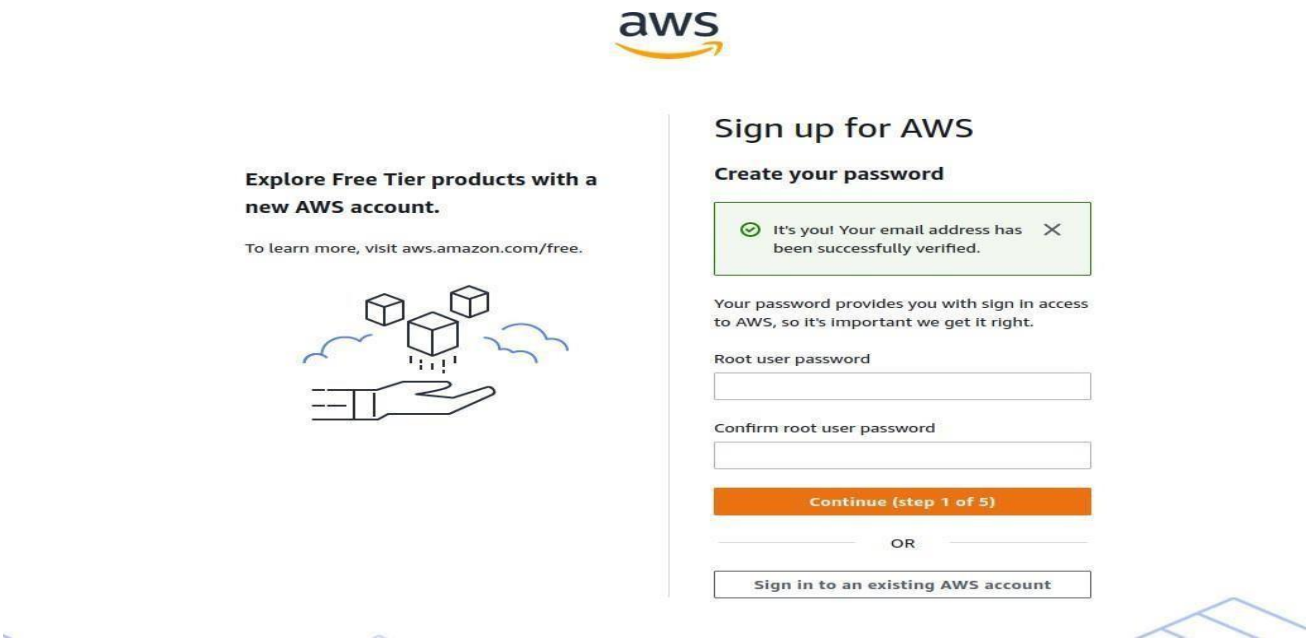
- AWS IoT, device to cloud connector, that can publish and/or deliver 250,000 messages every month.
- Amazon EC2 Container Registry, that facilitates storage and retrieval of Docker images with a storage capacity of 500MB per month.
- 750 hours of Amazon EC2 Linux or RHEL or SLES t2.micro instance usage (1 GiB of memory and 32-bit and 64-bit platform support) – enough hours to run continuously each month.
- 750 hours of an Elastic Load Balancer plus 15 GB data processing.
- 750 hours of Amazon RDS Single-AZ Micro DB Instances, running MySQL, MariaDB, PostgreSQL, Oracle BYOL or SQL Server Express Edition – enough hours to run a DB Instance continuously each month. You also get 20 GB of database storage and 20 GB of backup storage
- 30 GB of Amazon Elastic Block Storage in any combination of General Purpose (SSD) or Magnetic, plus 2 million I/Os (with EBS Magnetic) and 1 GB of snapshot storage
- 1,000 Amazon SWF workflow executions can be initiated for free. A total of 10,000 activity tasks, signals, timers and markers, and 30,000 workflow-days can also be used for free
- 100,000 Requests of Amazon Simple Queue Service**.**

Limitations of AWS Free Usage Tier

- The benefits of the AWS Free Tier can be availed by the user for 12 months after first signing up.
- Any leftover free monthly usage limit does not roll over to the next month.
- Once this free usage period expires, you will be required to Pay-As-You-Go, as per the standard usage rates.
- If you exceed the free limit for a month, you Pay-As-You-Go, as per standard rates.
- If you opt for Consolidated Billing, although it is spread across multiple accounts, the entry is only for one free usage account.

Creating an AWS account





- **Log on to Sign Up page**—Here, you have to enter your email, password and account name. I am using my college email here; you can use any of your emails.
  Choose a **strong password** and enter your name in the account name field, then click on ―Continue‖ button.
- **Enter your Contact Information** ―Now you will be asked to enter your contact information. If you are working somewhere you may want choose ―Professional‖ as your account type, otherwise, you can always choose ―Personal‖ account.
  Enter your information, check the checkbox. If interested, read the AWS customer agreement and click on ―Create Account and Continue‖ button.
- **Enter your Payment Information**―To use AWS you must enter your Debit or Credit card details. Don't worry, your card details will be secured with AWS and you won't be charged unless you go out of Free Tier.

AWS charges a very little amount from your card to verify it and you will get a refund within 3–5 business days once verified. In my articles, if I ever go out of Free Tier, I will highlight it. After filling out your card details click. Secure Submit‖, you will be redirected to your bank's website to authorize the transaction.

- **4.Upload your Pan card &Verify your Phone Number—**Now, you have to verify your phone number. Select your country code, enter your phone number and the given security code and click on—Call Me Now‖ button. After you have verified your phone number, you will see the following success message

Sign up for AWS

Confirm your identity

Verify code

5462

Continue (step 4 of 5)

Having trouble? Sometimes it takes up to 10 minutes to retrieve a verification code. If it's been longer than that, return to the previous page and try again.

The One Time Password has been sent to the below registered Mobile Number. Please use the OTP and authenticate the transaction.

Not Your Contact Number?Please contact your Home Branch
Recently changed your Mobile Number? Click Here to Refresh

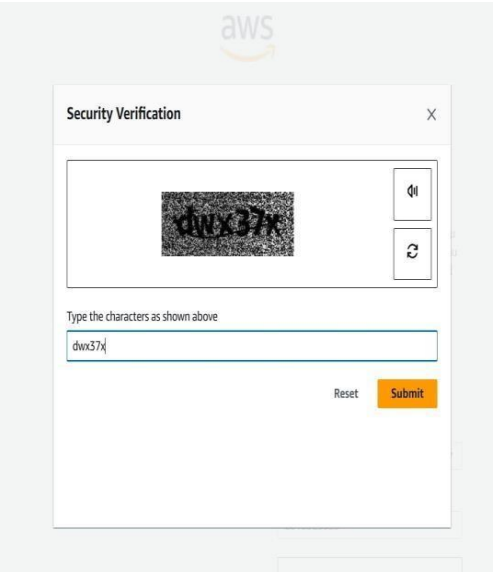
Date	:	08-Mar-2025
Card Number	:	6523 xxxx xxxx 4782
Mobile Number	:	X1XXXXXX5XX5
Merchant Name	:	AMAZON
Amount	:	2.00INR

OTP
(One Time Password)

Resend OTP

Enter OTP

Submit Cancel



- **Select a Support Plan—**Select the Basic Plan by clicking on the —Free‖ button.

- **Account Successfully Created**

Congratulations! You have successfully created an AWS account.

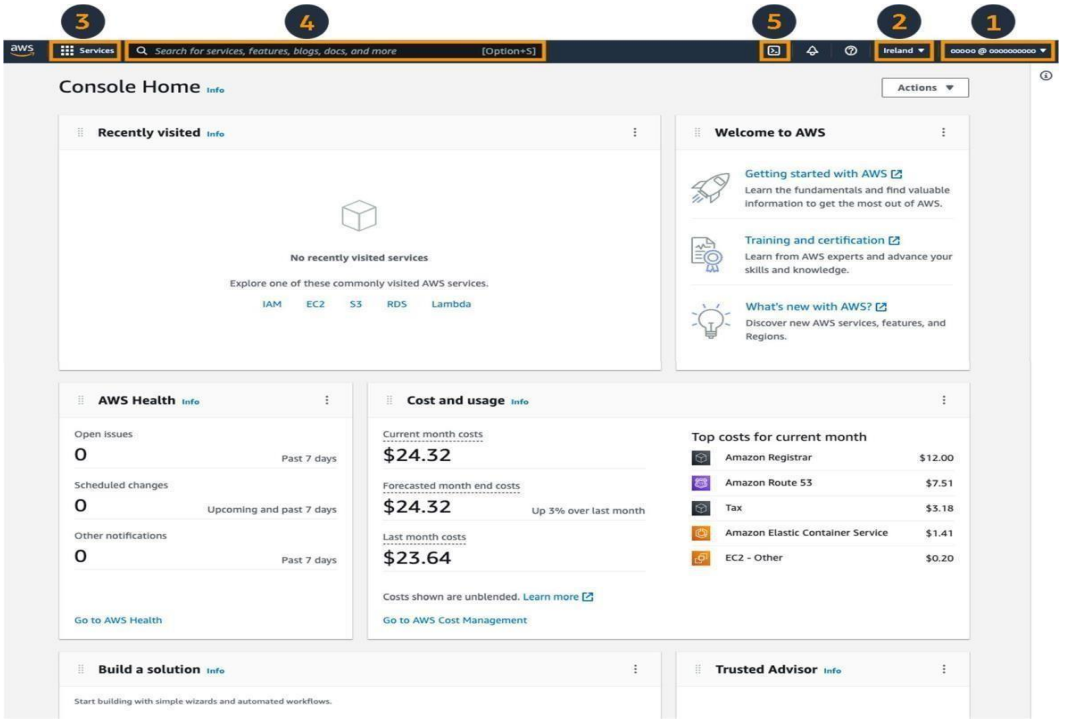
Navigating to AWS Management Console

Console Home

After signing up for a new AWS account and logging in, you will see the console dashboard. This is the starting point for interacting with the various AWS services and other important console components. The dashboard consists of a navigation bar at the top and a number of widgets in the main body of the page, which you can configure and rearrange. AWS is developing more widgets so you can further customize your console experience.

We will start by taking a look at the navigation bar at the top. In the image to the right, we have highlighted five controls within the navigation bar:

1. Account information
2. Region selector
3. Service selector
4. Search box
5. AWS Cloud Shell



1. AWS Account Information

The first highlighted menu contains information and links for your account. It displays the AWS Account ID, and the current user logged in to the console, along with links to navigate to the following pages:

- **Account** - Details about your account, including the address, contact information, billing settings, and more.
- **Organization** - AWS Organizations is an account management service that enables you to

consolidate multiple AWS accounts into an organization that you create and centrally manage.

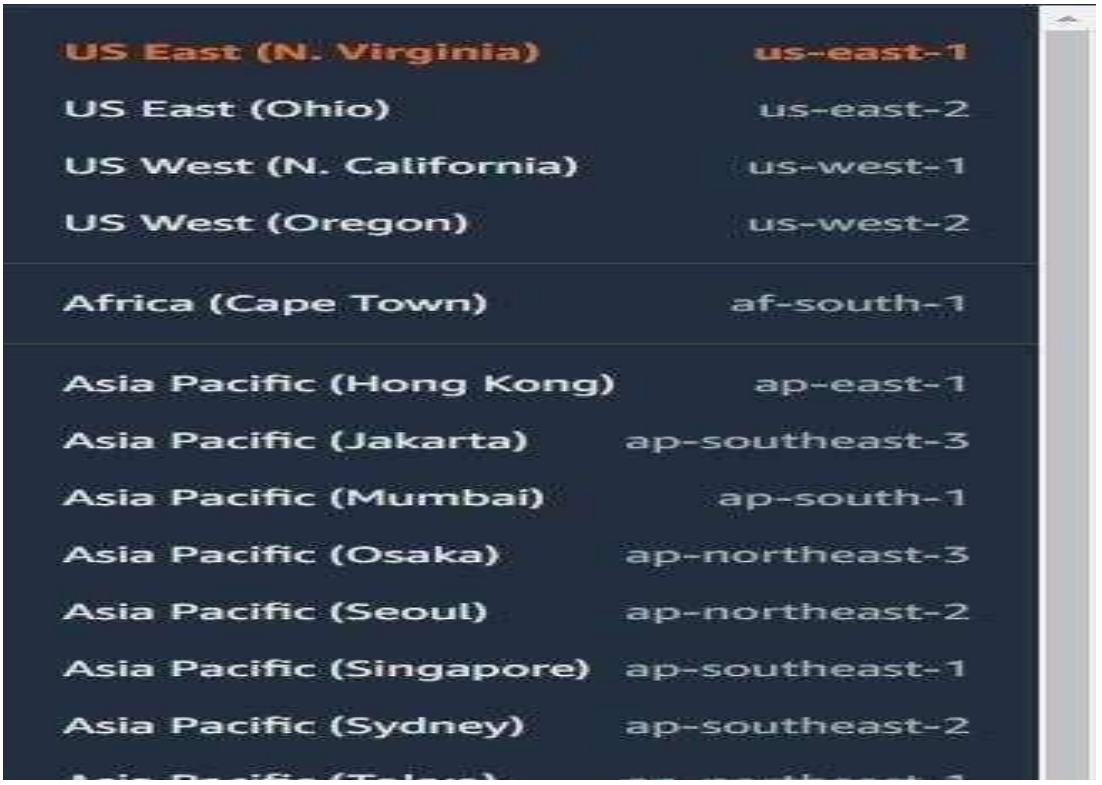
- **Service Quotas** - Quotas, also referred to as limits in AWS services, are the maximum values for the resources, actions, and items in your AWS account. When a new account is created, there are default values, such as assigning five Elastic IP addresses. These limits can be increased by logging a support ticket

- **Billing Dashboard** - You can use the dashboard page of the AWS Billing console to gain a general view of your AWS spending.
- **Security Credentials** - This link will take you to your AWS IAM user's page in the IAM part of the console where you can change your password, add 2 factor authentication, generate AWS API keys, and more.
- **Settings** - This link will take you to General Settings configuration page. From here you can manage console global settings such as default language and region as well preferences to optimize your console display experience.

2. AWS Regions

The second highlighted menu shows the currently selected AWS Region. AWS global infrastructure is grouped into Regions, and each service is hosted in a Region, unless it is a global service, such as AWS IAM or Amazon Route 53. The menu will display the currently selected Region, or "Global" when you have selected a global service. The text consists of the Region group, such as "US East"; region name, such as "N. Virginia"; and the Region string used by the AWS CLI, SDK, and other services, such as "us-east-1".

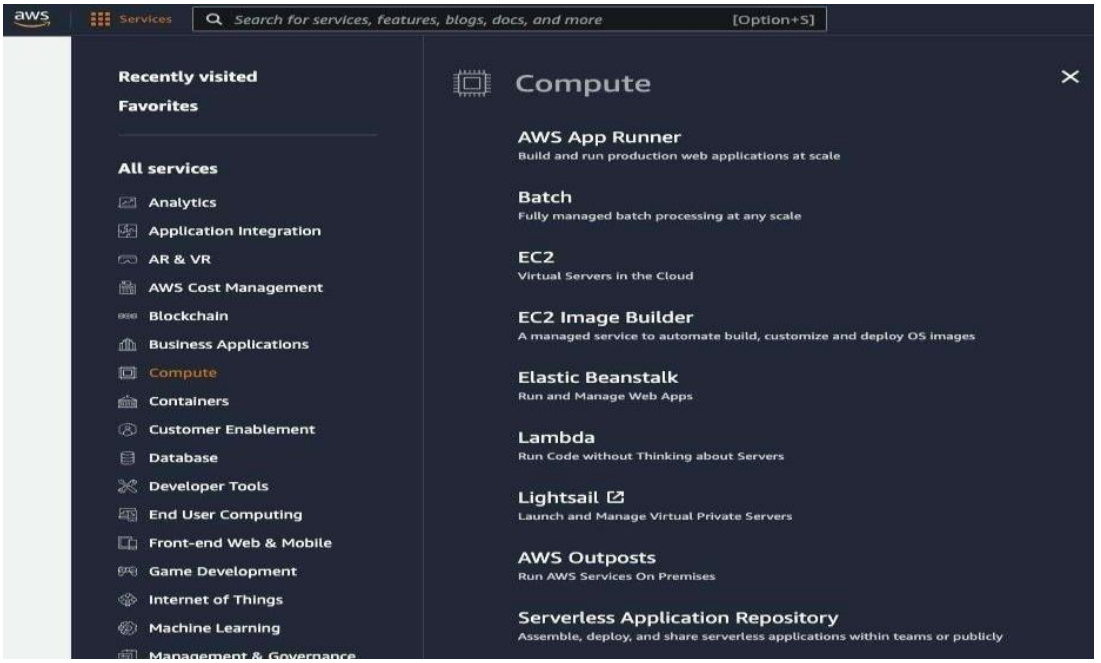
When you click on the currently selected Region, a dropdown will appear with all the available Regions, and you can switch the console to a different Region by clicking on one in the list.



3. AWS Service Selector

The third highlighted menu is the AWS service selector. You can use this to navigate between services grouped by top-level categories, such as Compute, which includes Amazon EC2, along with other services like AWS Elastic Beanstalk and Amazon Light sail. This is a great way to explore the various services by category, especially if you are new to AWS.

You can also mark services as favorites by selecting the star next to their names, which will pin them to the navigation bar. This can be done anywhere you see the star, including the search box.

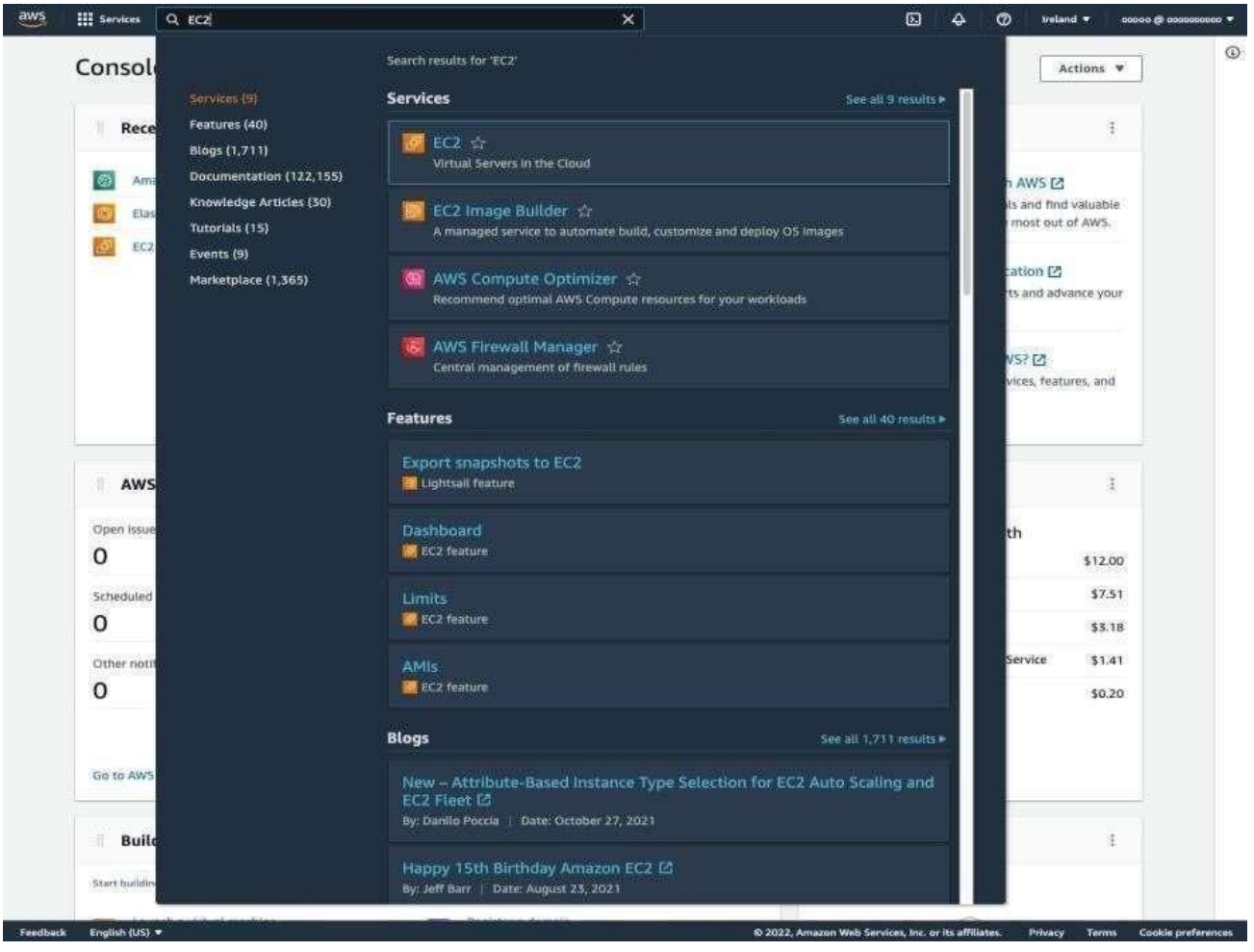


4. AWS Search

The fourth highlighted item is the search box. When you enter text into the box, the underlying search engine searches across a number of different locations to match the text that you entered. It will return matches in eight sections:

- **Services**: List of AWS services
- **Features**: List of features of AWS services
- **Blogs**: Posts from the AWS blog
- **Documentation**: AWS Documentation
- **Knowledge Articles**: AWS Premium Support Knowledge Centre
- **Tutorials**: Hands-on guides from the AWS Getting Started Resource centre
- **Events**: AWS hosted events that are upcoming, or available on-demand
- **Marketplace**: AWS Marketplace offerings that you can deploy in your AWS account

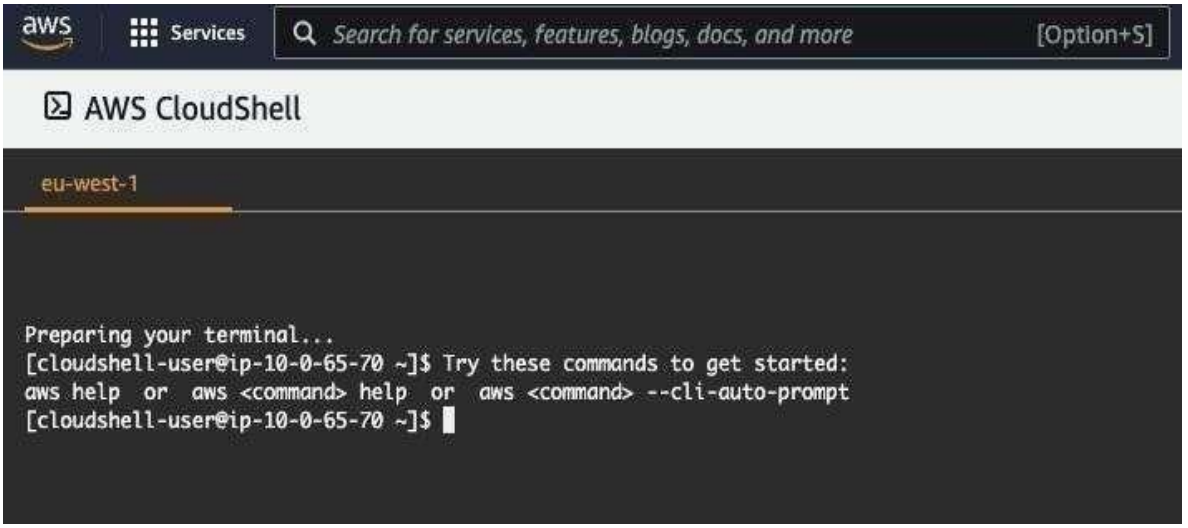
The Search is a quick way to find and navigate to services and resources that you are looking for. If the search engine is unable to find a match within one of these sections, the section will not be included in the list. You can add services to the navigation bar by selecting the star to favorite them.



5. AWS Cloud Shell

The fifth highlighted item is the AWS CloudShell icon. By selecting this icon, you will launch a browser-based shell environment that is pre-authenticated with your console credentials. Use this to execute AWS CLI commands or scripts using the AWS CDK from your browser. If you add any files to CloudShell (up to the 1GB limit), it will persist the files between sessions.

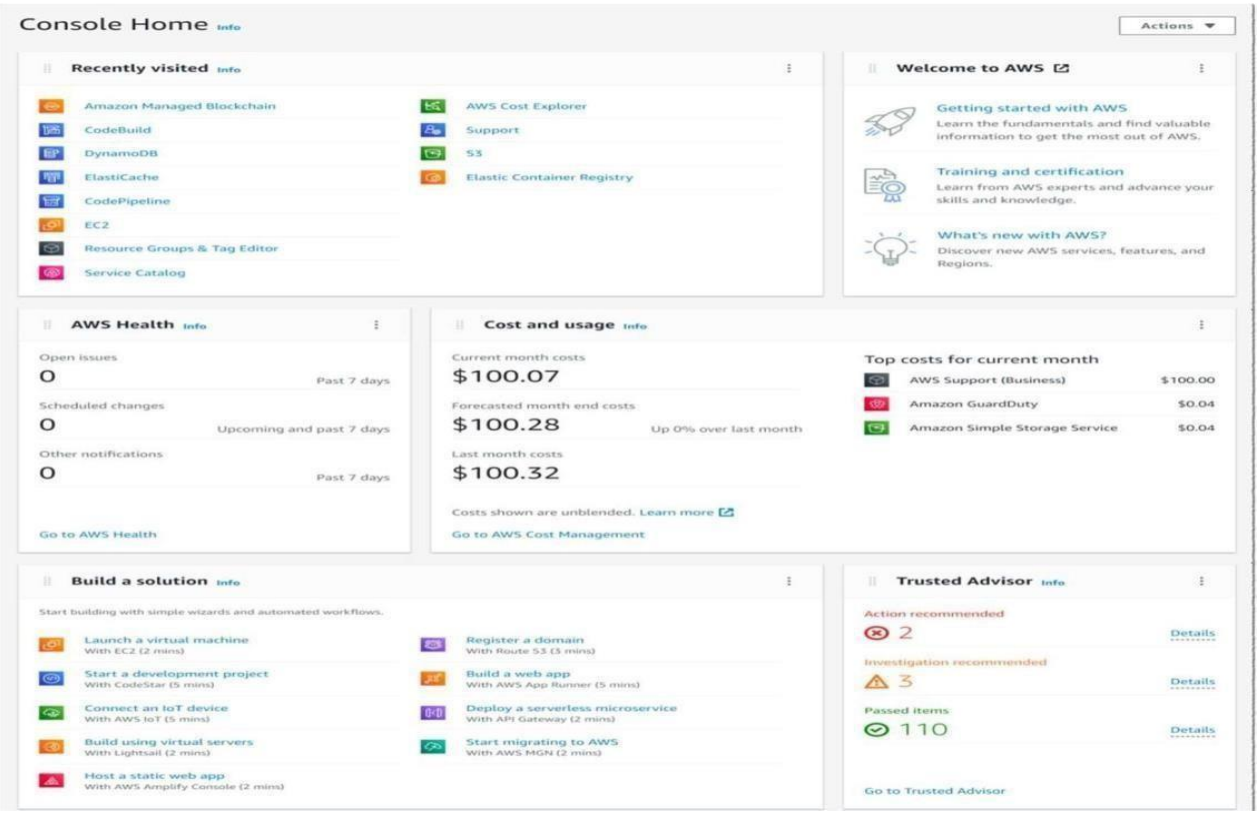
CloudShell is a useful tool for securely interacting with your AWS account, and is Region specific, so any files that you upload are specific to that Region. The current selected Region is display in orange above the terminal.



5. AWS Dashboard Widgets

The dashboard also contains a number of widgets to help you get started. We will discuss the widgets that appear by default, but you can move and resize these, or add different ones from the "Actions" dropdown. Three of the widgets provide you with static links to learn how to build a solution or to explore AWS (Welcome to AWS, build a solution, and Explore AWS). The other five are dynamic and provide important information about AWS services, your AWS costs and usage, and best practices:

- **AWS Health:** information on events that might affect your AWS infrastructure and account
- **Cost and usage:** an overview of service costs, with a breakdown by AWS service
- **Favorites:** a list of your favorite AWS services
- **Recently visited**: a list of top recently visited services
- **Trusted Advisor**: recommendations to follow AWS best practices



Key Components of AWS

1. Route53

- Route53 is a highly available, scalable, and feature rich domain name service (DNS) web service. What a DNS service does is translate a domain name like ―setfive.com‖ into an IP address like 64.22.80.79 which allows a client's computer to ―find‖ the correct server for a given domain name.
- In addition, Route53 also has several advanced features normally only available in pricey enterprise D N S solutions. Route53 would typically replace the DNS service provided by your registrar like Go Daddy or Register.com.

2. Simple Email Service

- Simple Email Service (SES) is a hosted transactional email service. It allows you to easily send highly deliverable emails using a RESTful API call or via regular SMTP without running your own email infrastructure.

3. Identity and Access Management

- Identity and access management (IAM) provides enhanced security and identity management for your AWS account. In addition, it allows you to enable ―multi factor‖ authentication to enhance the security of your AWS account.

- If you have more than 1 person accessing your AWS account using IAM will allow everyone to get a separate account with fine grained permissions.

4. Simple Storage Service

- Simple storage service (S3) is a flexible, scalable, and highly available storage web service. Think of S3 like having an infinitely large hard drive where you can store files which are then accessible via a unique URL. S3 also supports access control, expiration times, and several other useful features, Additionally, the payment model for S3 is ―pay as you go‖ so you'll only be billed for the amount of data you store and how much bandwidth you use to transfer it in and out.
- S3 is probably the most widely used AWS service because of its attractive pricing and ease of use.

5. Elastic Compute Cloud

- Elastic Compute Cloud (EC2) is the central piece of the AWS ecosystem. EC2 provides flexible, on- demand computing resources with a ―pay as you go‖ pricing model. Concretely, what this means is that you can rent‖ computing resources for as long as you need them and process any workload on the machines you've provisioned. Because of its flexibility, EC2 is an attractive alternative to buying traditional servers for unpredictable workloads.

6. Elastic Block Store

- Elastic block store (EBS) provides persist storage volumes that attach to EC2 instances to allow you to persist data past the lifespan of a single EC2. Due to the architecture of elastic compute cloud, all the storage systems on an instance are ephemeral. This means that when an instance is terminated all the data stored on that instance is lost. EBS addresses this issue by providing persistent storage that appears on instances as a regular hard drive.

7. Cloud Watch

- Cloud Watch provides monitoring for AWS resources including EC2 and EBS. Cloud Watch enables administrators to view and collect key metrics and also set a series of alarms to be notified in case of trouble. In addition, Cloud Watch can aggregate metrics across EC2 instances which provides useful insight into how your entire stack is operating.

AWS Global Infrastructure

Amazon Services can be hosted in many locations worldwide due to **AWS Global Infrastructure**. To improve speed, provide fault tolerance, high availability, and cost optimization, Amazon provides the ability to put resources and data in several locations.

AWS offers the largest and most vibrant ecosystem globally, with millions of active customers and tens of thousands of partners. Every imaginable use case is being executed on AWS by customers from practically every industry and size, including start-ups, businesses, and public sector organizations.

AWS CLOUD spans 105 availability zones within 33 geographical regions, with announced plans for 18 more Availability Zones and six more AWS Regions in Malaysia, Mexico, New Zealand, the Kingdom of Saudi Arabia, Thailand, and the AWS European Sovereign Cloud.

Regions

- Customers can use AWS to place instances and store data across regions known as Regions. Each region is a self-contained collection of AWS resources in a specific geographical area
- Each region is a distinct geographical location that is self-contained
- Each area is a geographical place with a cluster of data centers located worldwide
- Each Amazon zone is designed to be isolated from the others, allowing for the most fault tolerance and stability feasible
- Communication between regions occurs through the public Internet, and proper encryption methods should be employed to protect data
- The transmitting and receiving instances of data transfer between regions are charged at the Internet data transfer rate Unless specifically stated, resources are not copied between areas.

The global edge network currently consists of over 410 PoPs, including more than 400 edge locations, and 13 regional mid-tier caches in over 90 cities across 48 countries.

Availability Zones

- Each region comprises many segregated Availability Zones, each of which runs on its own physically unique, independent infrastructure and is designed to be very reliable
- There are various discrete Availability Zones in each region (ranging from. 2-6)
- Each AZ has its power, cooling, physical security, and redundant, ultra-low-latency networks connecting them
- Each AZ is physically isolated from the others, so a rare tragedy like a fire or an earthquake would only strike one of them
- Within the same Region, AZs are physically separated and serve as autonomous failure zones
- Multiple tier-1 transit providers are redundantly connected to AZs
- All AZs in an AWS Region are connected via high-bandwidth, low-latency networking through fully redundant, dedicated metro fiber, allowing for high-throughput, low-latency networking
- All communication between AZs is encrypted
- To achieve high availability, the Multi-AZ feature, which distributes resources across several AZs, can be utilized to distribute instances across different AZs
- By mapping Availability Zones to IDs for each account, AWS guarantees that resources are allocated throughout the Availability Zones
- The global edge network currently consists of over 410 PoPs, including more than 400 Edge Locations, and 13 regional mid-tier caches in over 90 cities across 48 countries

The AWS Cloud spans 105 Availability Zones within 33 geographic regions, with announced plans for 18 more Availability Zones and six more AWS Regions in Malaysia, Mexico, New Zealand, the Kingdom of Saudi Arabia, Thailand, and the AWS European Sovereign Cloud**.**

Edge Locations

- AWS maintains edge sites for content distribution through a global network of data centers
- These locations are located in most major cities worldwide and are used by (CDN) to distribute content to end-users to reduce latency

AWS Local Zones

- Local Zones on AWS bring computation, storage, databases, and other AWS services closer to end-users
- Highly demanding applications, including media and entertainment content creation, real-time gaming, reservoir simulations, circuit design automation, and machine learning, can now operate with single-digit millisecond latency to end-users due to AWS Local Zones
- Latency-sensitive applications can be hosted in each AWS Local Zone location, an extension of an AWS Region. AWS EC2**,** VPC, EBS, File Storage, and ELB are all AWS services used near end-users
- AWS Local Zones provide a high-bandwidth, secure connection between local workloads and AWS Region workloads, allowing you to connect to the complete spectrum of in-region services using the same APIs and toolsets

Characteristics of Region

- It is an isolated physical location or a geographical area in the world.

It is used to:

- Run applications and workloads
- Minimize the gap between request and response time, or latency for end-users
- Manage long-term commitments
- Tackle challenges to scale and manage a global infrastructure

- It consists of minimum two Availability Zones connected through low-latency links.

Characteristics of Availability Zone

- It is an isolated location with single or multiple advanced datacenters.
- The presences of multiple availability zones enable the customers to distribute their computing resources among several tier 1 Internet Service and Power providers.

VPC (Virtual Private Cloud)

- Amazon Virtual Private Cloud (Amazon VPC) provides a logically isolated area of the AWS cloud where you can launch AWS resources in a virtual network that you define.
- You have complete control over your virtual networking environment, including a selection of your IP address range, the creation of subnets, and configuration of route tables and network gateways. You can easily customize the network configuration for your Amazon Virtual Private Cloud.

Or

- (VPC) allows the users to use AWS resources in a virtual network. The users can customize their virtual networking environment as they like, such as selecting own IP address range, creating subnets, and configuring route tables and network gateways.
- Amazon VPC offers you the facility to logically detached section of aws cloud and then introduced the required aws resources in your defined virtual network. Amazon VPC adds a network security layer to your data instances.

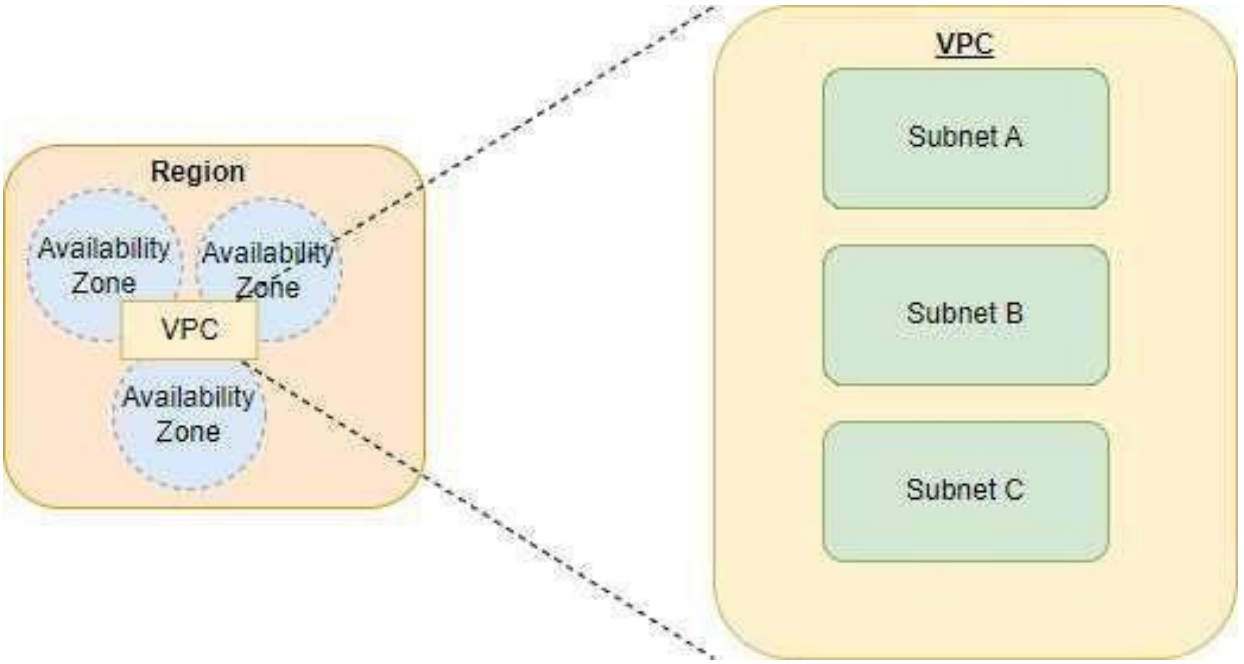
- Example, you can create a public-facing subnet for web servers that can access to the internet and can also place your backend system such as databases or application servers to a private-facing subnet. You can provide multiple layers of security, including security groups and network access control lists, to help control access to Amazon EC2 instances in each subnet. VPC Peering is a networking connection that allows you to connect one VPC with another VPC through a direct network route using private IP addresses.

Subnets:

A subnet is a range of IP addresses in your VPC. You launch AWS resources, such as Amazon EC2 instances, into your subnets. You can connect a subnet to the internet, other VPCs, and your own data centers, and route traffic to and from your subnets using route tables.

Or

A subnet is a range of IP addresses in your VPC. You can launch AWS resources into a specified subnet. Use a public subnet for resources that must be connected to the internet, and a private subnet for resources that won't be connected to the internet.



Types of VPC

1. **Default VPCs**

If your account supports the EC2-VPC platform only, it comes with a default VPC that has a default subnet in each Availability Zone. If you have a default VPC and don't specify a subnet when you launch an instance, the instance is launched into your default VPC. You can launch instances into your default VPC without needing to know anything about Amazon VPC.

2. **Non default VPCs**

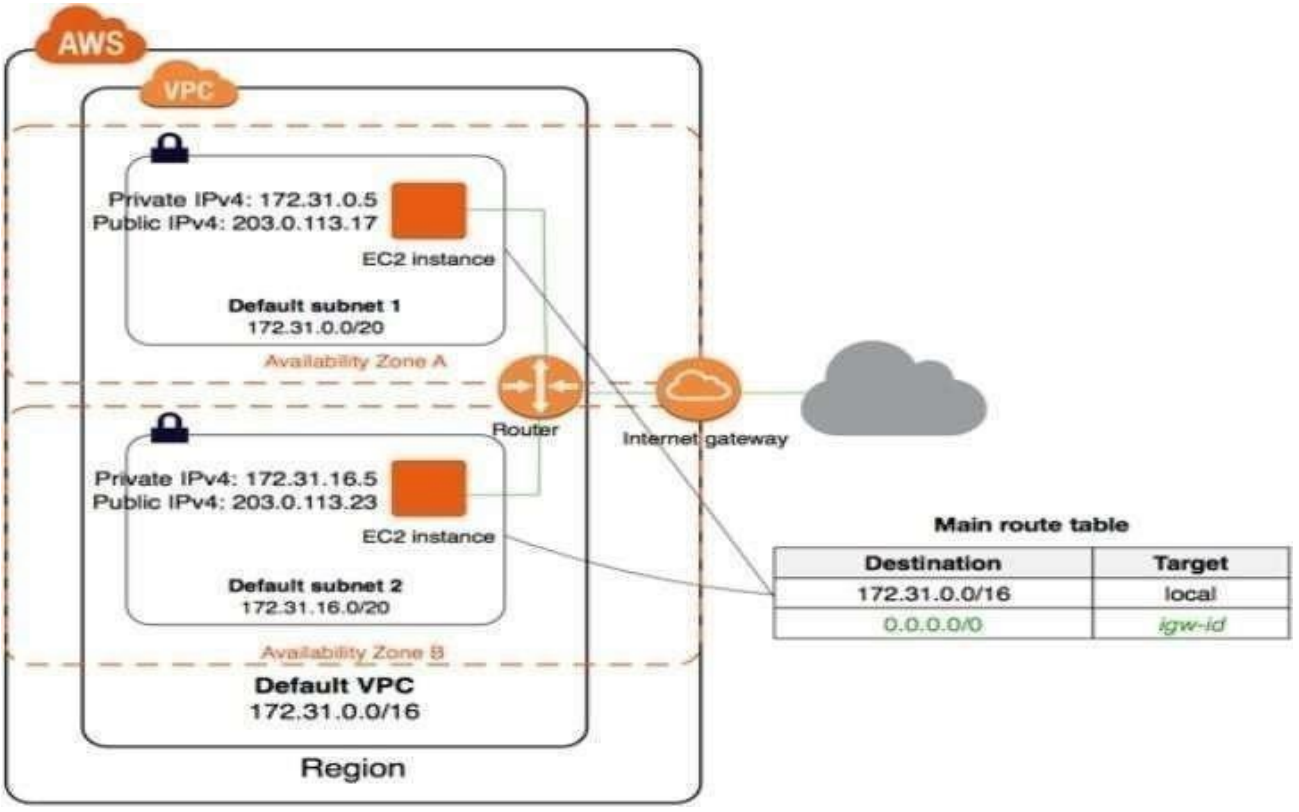
Regardless of which platforms your account supports, you can create your own VPC, and configure it as you need. This is known as a nondefault VPC. Subnets that you create in your nondefault VPC and additional subnets that you create in your default VPC are call

Features of VPC

Many connectivity options − There are various connectivity options that exist in Amazon VPC.

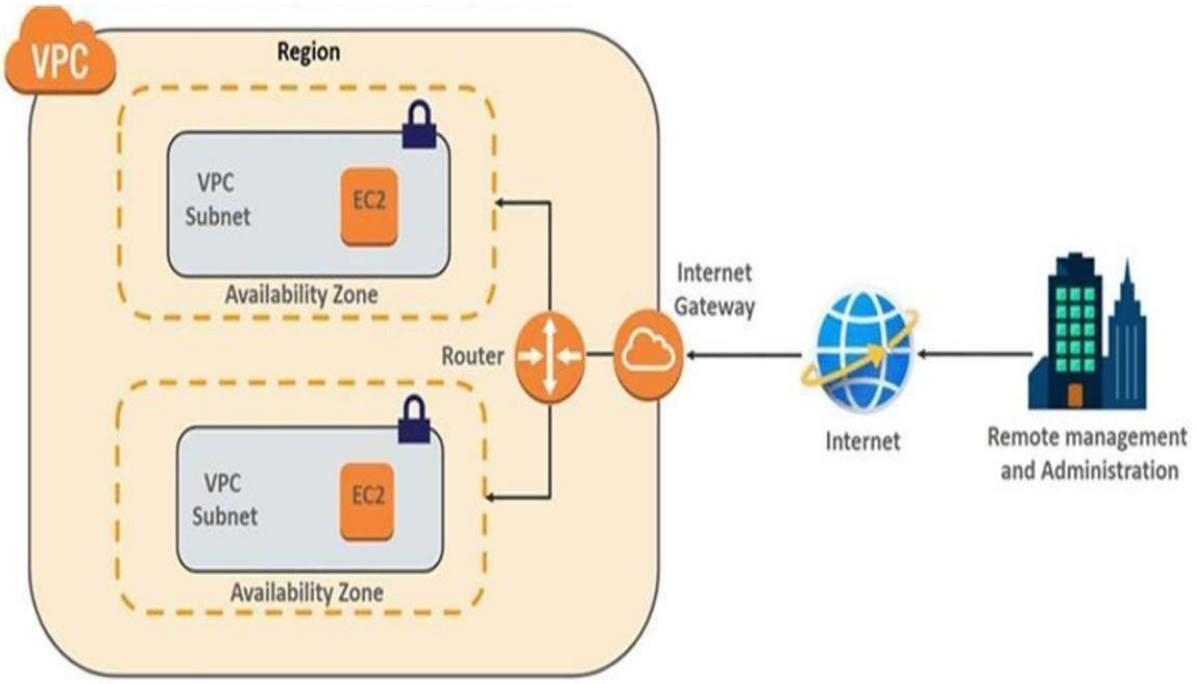
- Connect VPC directly to the Internet via public subnets.
- Connect to the Internet using Network Address Translation via private subnets.
- Connect securely to your corporate datacentre via encrypted IPsec hardware VPN connection.
- Connect privately to other VPCs in which we can share resources across multiple virtual networks through AWS account.
- Connect to Amazon S3 without using an internet gateway and have good control over S3 buckets, its user requests, groups, etc.
- Combine connection of VPC and datacentre is possible by configuring Amazon VPC route tables to direct all traffic to its destination

Default VPC (Accessing the Internet)

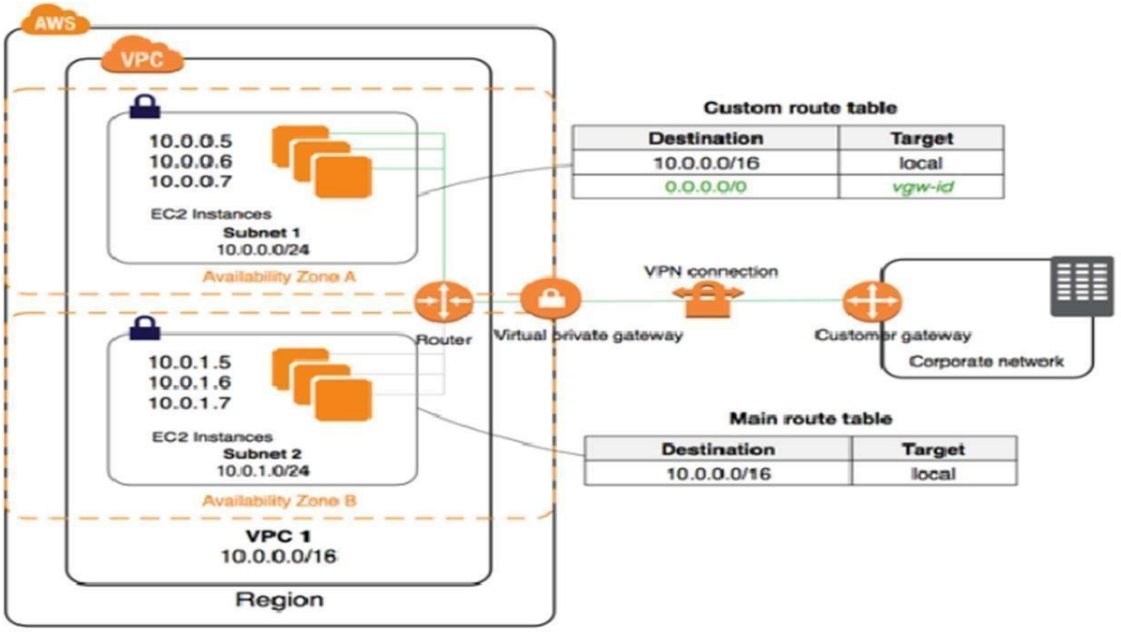


- Your default VPC includes an internet gateway, and each default subnet is a public subnet. Each instance that you launch into a default subnet has a private IPv4 address and a public IPv4 address. These instances can communicate with the internet through the internet gateway. An internet gateway enables your instances to connect to the inter net through the Amazon EC2 network edge.

(for your understanding refer below diagram)



Accessing a Corporate or Home Network



-

- You can optionally connect your VPC to your own corporate datacenter using an IPsec AWS Site-to- Site VPN connection, making the AWS Cloud an extension of your data center. A Site-to-Site VPN connection consists of a virtual private gateway attached to your VPC and a customer gateway located in your data center. A virtual private gateway is the VPN concentrator on the Amazon side of the Site- to-Site VPN connection. A customer gateway is a physical device or software appliance on your side of the Site-to-Site VPN connection.

Resource	Default limit
VPCs per Region	5
Subnets per VPC	200
IPV4 CIDR blocks per VPC	5
IPV6 CIDR blocks per VPC	5

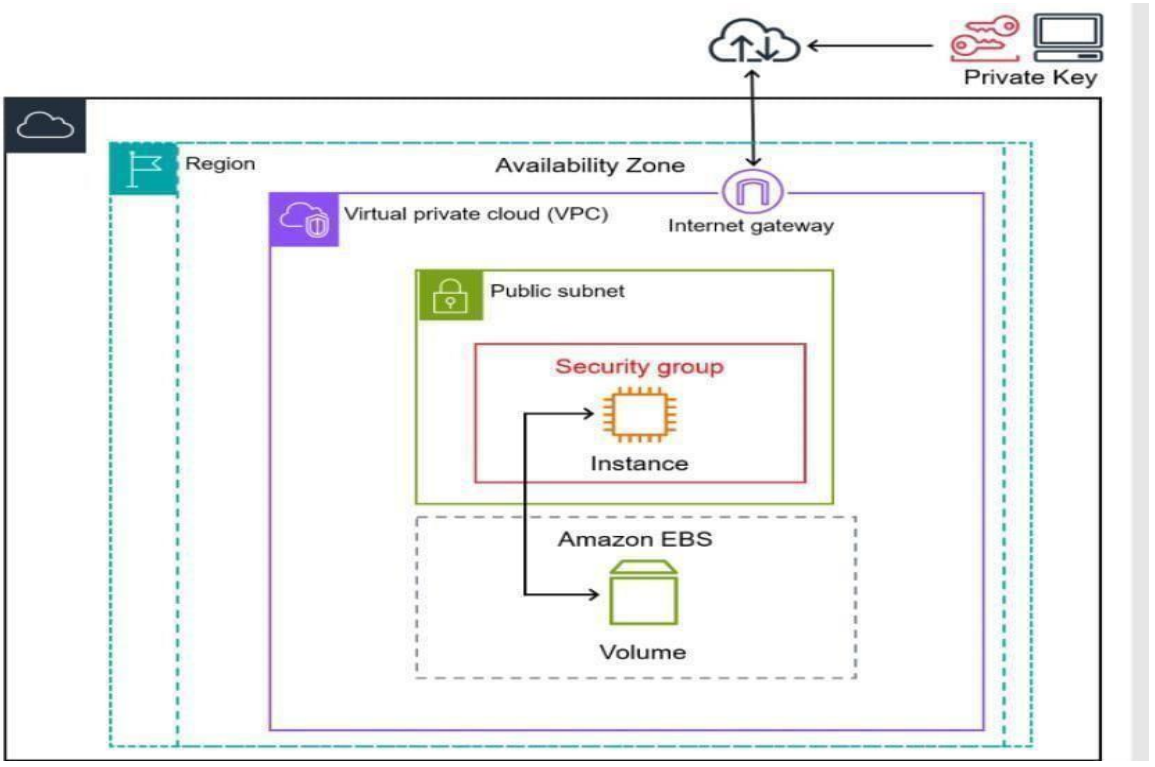
Benefits of VPC

- Easy to use − Ease of creating a VPC in very simple steps by selecting network set-ups as p requirement. Click "Start VPC Wizard", then Subnets, IP ranges, route tables, and security groups will be automatically created.
- Easy to backup data − Periodically backup data from the datacentre into Amazon EC2 instances by using Amazon EBS volumes.
- Easy to extend network using Cloud − Move applications, launch additional web servers and increase storage capacity by connecting it to a VPC.

Amazon EC2

Amazon EC2 (Elastic Compute Cloud) is a web service interface that provides resizable compute capacity in the AWS cloud. It is designed for developers to have complete control over web-scaling and computing resources.

EC2 instances can be resized and the number of instances scaled up or down as per our requirement. These instances can be launched in one or more geographical locations or regions, and Availability Zones (AZs). Each region comprises of several AZs at distinct locations, connected by low latency networks in the same region.



Features of EC2:

- Eliminates the upfront payment for the hardware.
- On-demand instances are charged by the hour or second. No long-term commitments are required. This pricing plan is suitable for users who need to use Amazon EC2 without having to make upfront payments as well as for applications that have unpredictable workloads or are being developed on EC2 for the first time.
- Facilitates faster development and deployment of software applications.
- Introduces thousands of server instances in minutes.
- Manages storage and configures networking and security parameters.
- Multiple storage options. Users can select from multiple storage options including block level storage (Amazon EBS), instance storage and object storage (Amazon Simple Storage Service 3)
- Scales capacity and tracks requirement changes
- Ensures easy and scalable cloud computing. `
- Amazon EC2 Auto Scaling automatically adds or removes capacity from Amazon EC2 virtual servers in response to application demand.

Savings plans- This pricing model is suitable for users looking to save money or need compute offerings for committed and steady-state usage. It can help users to reduce their EC2 bills compared to the on-demand plan.