

H1 Acronyms & Full forms

Acronym	Description
CloudFront	Amazon Cloud Front services enable caching of content at the nearest Edge Locations for fast distribution to customers.
Cloud Formation	Models & provisions a collection of related AWS resources & 3rd party resources so you can launch & configure them together as a stack. Uses Infrastructure as code.
AWS	Amazon Web Service
AVM	Amazon Vending Machine - uses Service Catalogue template to setup Multi-accounts
AMI	Amazon Machine Image - Save a copy of your server
RI	Reserved Instances
SSD	Solid State Device
AZ(s)	Availability Zones
SNS	Simple Notification Service
EC2	Elastic Compute Cloud
EBS	Elastic Block Storage
S3	Simple Storage Service
SSM	Simple Systems Manager (Roles assigned to developers)
VPC	Virtual Private Cloud
IAM	Identity & Access Management
MFA	Multi Factor Authentication
RDS	Relational Database Service (PostgreSQL like DB)
Amazon DynamoDB	AWS Managed NoSQL Database

Amazon DocumentDB	MongoDB compatibility AWS managed Database
Amazon Redshift	Fast, simple, cost-effective data warehousing
ASG	Auto Scaling Group - Group multiple servers
ELB	Elastic Load Balancer - puts a load balancer in front of the instances.
Web ACL	Web Access Control List
AWS WAF	Web application firewall (WAF) A web application firewall (WAF) helps protect your web applications from common web exploits that could affect application availability, compromise security, or consume excessive resources.
TCO	Total Cost of Ownership

H1 AWS Global Infrastructure

H2 Features

- 69 Availability zones
- 22 Geographic regions
- More Edge locations than AZs
- Low latency
- High Availability
- **Regions** - Physical location in the world with multiple **Availability Zones (AZ)**
- **Availability Zones (AZ)** - one or more discrete data-centres
- **Edge Locations** - data-centre owned by a trusted partner of AWS

H2 Regions

! A **geographically distinct** location which has multiple data-centres (AZs)

- Each region has atleast **2 Availability Zones (AZs)**
- Every **region** is **physically isolated** & **independent** to every other region in terms of - location, power, water supply
- ! AWS largest region is **US-EAST** (ie., North Virginia)
- ! Services almost always available first in **US-EAST**
- Not all services are available in all regions
- ! **US-EAST-1** is the region where you see all your billing information
- 5 new regions - under progress
- [AWS regional Endpoints](#)
- [3D world Model - AWS Regions](#)

H2 Availability Zones (AZs)

! An AZ is a datacenter owned & operated by AWS in which their services run

- Each region has atleast **2 Availability Zones (AZs)**
- ! AZs are represented by a Region Code, followed by a letter identifier

```
# a - availability zone 'a'
us-east-1a
# North Virginia has 6 Availability Zones
us-east-1a
us-east-1b
us-east-1c
us-east-1d
us-east-1e
us-east-1f
```

- **Multi-AZ:** Distributing your instances across multiple AZs allows failover configuration for handling requests when one goes down
- <10ms latency between AZs in a region

H2 Edge Locations

An Edge location is a datacenter owned by a **partner trusted by AWS** which has a direct connection to the AWS network.

- ! These locations serve requests for **CloudFront** & **Route 53**.
- Requests going to these services will be routed to the nearest edge location automatically
- ! **S3 Transfer Acceleration** & **API Gateway** endpoint traffic also use the AWS Edge Network
- This allows for **Low latency** no matter where the end user is geographically situated

H2 GovCloud (US)

AWS GovCloud Regions allow customers to host sensitive **Controlled Unclassified Information** & other types of regulated workloads.

Useful If you want to build something to a Government or Government related industry.

- ! **Only** operated by employees who are U.S citizens, on U.S soil
- ! **Only** accessible to U.S entities & root account holders who pass a screening test
- Customers can architect secure cloud solutions which comply with
 - FedRAMP High baseline
 - DOJ's Criminal Justice Information Systems (CJIS) Security policy

- U.S International Traffic in Arms Regulations (ITAR)
- Export Administration Regulations (EAR)
- Department of Defence (DoD) Cloud computing security requirements guide

H1 Getting Started

! You cannot use AWS services without Credit Card

H2 Billing Preferences, Budgets & Alarms

- Billing Metrics always exist in **us-east-1**
- You need to select **CloudWatch** service for billing alarms
- You get 10 free alarms as part of your basic account
- **SNS** - Simple Notification Service - Basic Email Alert

H2 Change IAM Users Sign-in Link

H3 Customize Account Alias

! This is an important security step when you first setup your account


Generally you should not always use your root account to login and setup AWS services. Also you should not share your root account credentials with developers

- [Youtube Link - Change IAM Users sign-in link](#)
- In the Dashboard page, search for - **IAM**
- Click **customise** for - *IAM users sign-in link*
- Provide an **Account alias** - **raysiti-aws**

H3 Activate MFA on Root Account

The **Multi-Factor Authentication (MFA)** on your AWS root account adds another layer of protection to keep your account secure.

There are 3 different types of MFA device that you can assign to your root account

-  **Virtual MFA device** - An Authenticator App installed on your mobile or computer.
 - Select **Google Authenticator** - which reads QR code to authenticate
 - Scan the QR code with your mobile using the **Google Authenticator** app.
 - It provides to **MFA numbers** that you need to enter
- **U2F security key** - Yubikey
- **Other hardware MFA device** - Gemalto token

H3 Create Individual IAM user accounts

- Select the Accordion - Click on **Manage Users**
- Follow the - [steps to create a new User](#)

H3 Setup a Password Policy

- Select the Accordion - Click on Setup a Password policy
- Follow the instructions provided - [in the link](#)

H1 Pricing Models

There are 4 models of payment when it comes to using AWS services

1. On-Demand Instances - Least Commitment

When you launch an EC-2 instance, it is by default On-Demand pricing.

1. **!** no upfront payment
2. **!** no long-term commitment
3. low cost & flexible
4. only pay per hour
5. perfect for short-term, spiky, unpredictable loads
6. cannot be interrupted
7. for first-time apps

2. Reserved Instances - RI - upto 75% off

1. steady state or predictable state
2. commit to EC2 over 1 or 3 year term
3. can resell unused reserved instances

3. Spot Instances - upto 90% savings

1. request spare computing capacity
2. flexible start & end dates
3. can handle interruptions (server randomly stopping & starting)
4. For non critical background jobs

4. Dedicated Host Instances - Most expensive

1. you get Dedicated servers
2. can be on-demand or reserved (upto 70% off)
3. when you need a guarantee of isolated hardware
4. for enterprise requirements

H2 1. On Demand Instances / Pricing

! Least Commitment

When you first start / create an EC2 instance, it is by default on, **On-Demand**

H2 2. Reserved Instances / Pricing - RI

! Best Long term value

These type of instances are designed for applications that have a steady-state, predictable usage or require "reserved capacity".

$$\text{reduced pricing} = \text{term} * \text{class offering} * \text{payment option}$$

- **Class Offering** - Standard, Convertible, Scheduled
 - **Term** - You commit to a 1 year or 3 year contract. Longer the term, greater savings
 - **Payment options** - All, Partial or No - upfront payment
1. Reserved Instances can be shared between multiple accounts within the organization
 2. Unused RI can be sold in **Reserved Instance Marketplace** .

H2 3. Spot Instances - SI

! upto 90% off (when it comes to savings) but can be interrupted

AWS has **unused compute capacity** that they want to utilise the max capacity of their idle servers. So they came up with **Spot Instances**

- These instance provide the most savings - upto 90% compared to **On-Demand Pricing**.
- Can be interrupted / terminated
- These instances **can be terminated** if the **compute capacity is needed by on-demand customers**
- **AWS Batch** is an easy & convenient way to use **Spot-Pricing**
- Useful for **Load-balancing** servers, Starting / Stopping, testing, can be spun up and stopped.
- If AWS terminate your instances, you wont be charged for the partial hours that you used.
- But if You terminated these Spot-instances, you will be charged for the number of hours they were used.

H2 4. Dedicated Host Instances

! Most expensive pricing

- Designed to meet regulatory requirements
- When you have strict **server-bound license** that won't support multi-tenancy or cloud deployments
- Perfect for Enterprise or Large Organizations
- Enterprises / Large Organizations may have security concerns or obligations against sharing the same hardware with other AWS customers
- Comes in 2 flavours - both Reserved & On-Demand (70% off on-demand pricing)

Multi tenant	Single Tenant
Multiple customers are running workloads on the same hardware	Single customer has been dedicated to the hardware
Virtual Isolation separates these customers (like a virtual apartment)	Physical isolation is what separates customers (think individual housing)
Eg: On-Demand, Reserved, Spot instances	Eg: Dedicated VPC

H1 Billing & Pricing

This module talks about billing & pricing when it comes to using AWS services












H2 Free Services


The Free Services

Certain services are free themselves, but the resources they setup will cost you.

The services are free

However they can provision AWS services which cost money

-  **IAM - Identity Access Management**
-  **Amazon VPC**
-  **Auto Scaling**
-  **CloudFormation**
-  **Elastic Beanstalk**
-  **Opsworks**
-  **Amplify**
-  **AppSync**
-  **CodeStar**
-  **Organizations & Consolidated Billing**
-  **AWS Cost Explorer**




- These services are free to use
- However they can provision other AWS services which can cost money

H2 AWS Support Plans

AWS offers 4 different support plans

- **Basic**
 - \$0 USD / month
 - Email support only
 - mainly for billing & account purposes.
 - 7 Trusted Advisor checks allowed
- **Developer**
 - \$20 USD / month
 - Tech Support via Email ~24 hours only.



- No 3rd party support (ie., no Application specific support)
- 7 Trusted Advisor checks allowed
- **Business**
 - \$100 USD / month
 - 24/7 chat & phone support.
 - Screensharing possible (includes Technical support)
 - All Trusted Advisor checks allowed
- **Enterprise**
 - \$15,000 USD / month
 - 2 dedicated resources.
 - Personal Concierge, TAM (Technical Account Manager)
 - All Trusted Advisor checks allowed

AWS Support Plans			
Basic	Developer	Business	Enterprise
Email Support only For Billing and Account	Tech Support via Email ~24 hours until reply		
	No third party support	Tech Support via Chat, Phone Anytime 24/7	
	General Guidance	< 24 hrs	
	System Impaired	< 12 hrs	
		Production System Impaired	< 4 hrs
		Production System DOWN!	< 1 hrs
			Business-Critical System DOWN! < 15m
			🧑‍💻 Personal Concierge
			🧑‍💻 TAM
7 Trusted Advisor Checks	All Trusted Advisor Checks		
\$0 USD /month	\$20 USD /month	\$100 USD / month	\$15,000 USD / month 

H2 AWS Marketplace

AWS Marketplace is a curated digital catalogue with 1000 of software listings from independent software vendors.

You can also search AWS marketplace under the context of a AWS service (for eg: EC2 service)

- Easily find, buy, test software that runs on AWS servers.
- Contains Products that are free to use / have an associated charge.
- The sales channel of ISV & Consulting partners allows you to sell your solutions to other customers.
- Has 1,361 (approx) vendors
- To see a list of Subscribed services   AWS Marketplace subscription

Products can be offered up as follows:

- Amazon Machine Images (AMIs)
- AWS cloudformation templates
- Software as a service (SAAS) offerings

- Web ACL
- AWS WAF rules

H3 What Is an Web ACL - Access Control List ?

An access control list (ACL) contains rules that grant or deny access to certain digital environments. There are two types of ACLs:

- **Filesystem ACLs:** filter access to files and/or directories. Filesystem ACLs tell operating systems which users can access the system, and what privileges the users are allowed.
- **Networking ACLs:** filter access to the network. Networking ACLs tell routers and switches which type of traffic can access the network, and which activity is allowed.

H2 AWS Trusted Advisor

This service advises you on security, saving money, performance, service limits & fault tolerance.

- Think of it as an automated checklist of AWS best practices
- On Free tiers you get 7 Trusted Advisor checks
- On Business & Enterprise tier you get all Trusted Advisor checks

This checklist can be grouped into 5 categories

- **! Cost optimization**
 - Idle Load Balancers (free)
 - Unassociated Elastic IP addresses (free)
- **Performance**
 - High Utilization Amazon EC2 instance (free)
- **! Security**
 - MFA on Root account (free)
 - IAM access key rotation (free)
- **Fault Tolerance**
 - Amazon RDS Backups (free)
- **Service Limits**
 - VPC (free)

H2 Consolidated Billing

This is a feature turned on by default when there is a Multiple member account.

- All billing charges are sent to the Master account
- Consolidates your billing & payment methods across multiple AWS accounts into one bill
- For Billing - AWS treats all accounts UNDER one organization as if they were one account

- This service is free of cost
- use **Cost explorer** to visualize your consolidated billing

H3 Volume Discounts

- AWS has volume discounts for many services
- The more you use, the more you save
- Consolidated Billing lets you take advantage of Volume discounts

Data Transfer	Price
First 10 TB	\$0.17 per GB
Next 40 TB	\$0.13 per GB

H2 AWS Cost Explorer

Allows you to **visualize, understand & manage** your AWS costs & usages over time.

- Default reports - Cost driver & Usage trends
- Use forecasting to get ideas on future workload & costs
- Visualize - daily or monthly level

H2 AWS Cost and Usage Report

Generate a detail spreadsheet to help you analyse & understand your AWS costs

- Places reports on S3 bucket
- Uses Athena to generate the report
- Use QuickSight to generate graphs

H2 AWS Budgets

Think of AWS Budgets as - *billing alarms on steroids!*

AWS Budgets allow you to setup alerts if you are nearing / exceeding your defined budgets.

- Create Cost, Usage & Reservation budgets
- First 2 budgets are free of charge
- When you use AWS Budgets - Each budget is \$0.02 per day OR ~ \$0.60 USD / month
- 20,000 budget limit
- Plan your service usage, service costs & instance reservations
- Track - monthly, quarterly or yearly levels
- Get notified via - Email, Chatbot

H2 TCO Calculator

TCO Calculator stands for - Total Cost of Ownership Calculator

It estimates HOW MUCH YOU WOULD SAVE when moving from on-premise to AWS cloud.

- Generates detailed set of reports for presentation
- Built on underlying calculation which generate fair assessment of value
- Helps by reducing the need to invest on large capital expenditures
- The tool is for approximation purposes only!

H2 AWS Landing Zones

Helps "Enterprise" level users quickly setup a secure, AWS multi-account architecture.

- Very expensive upfront cost
- Provides you with a baseline environment to get started with multi-account architecture
- Uses **Amazon Vending Machine (AVM)** which uses a **Service Catalogue Template** for setting multi-accounts
- Automatically services login and Single Sign On for customers
- Implement account baselines using Landing Zone configuration and pipeline

H2 AWS Quickstarts

Prebuilt Templates by AWS & AWS Partners to help you deploy your popular stacks on AWS.

- Reduce hundreds of manual procedures into few simple steps
- Composed of 3 parts
 - Reference architecture for the deployment
 - AWS Cloudformation template which automate & configure the deployment
 - Deployment guide explaining the architecture & implementation in detail

H2 Resource Groups & Tagging

H3 Tags

Words or Phrases that act as metadata for organizing your AWS resources

H3 Resource Groups

Collection of AWS resources that share one or more tags. can display based on -

- Metrics
- Alarms
- Configuration Settings

While creating a Resource Group, you can create 2 types





- Tag Based

- Cloud Formation based

H1 Question & Answers





H3 Question 01

Which of the following statements are true ? (Choose two)

- Amazon **Cloud Front** services enable caching of content at the nearest Edge Locations for fast distribution to customers 
- There are more Availability Zones than Edge Locations, & more Edge Locations than regions in the world 
- There are more Edge Locations than Availability Zones, & more Availability Zones than Regions in the world 
- There are more Regions than Availability Zones, & more Availability Zones than Edge Locations in the world 





H3 Question 02

Which of the following is one of the design principles related to "**Reliability**" in cloud

- Protect data on transit & on rest 
- Automatically recover from failure 
- Perform operations as code 
- Go global in minutes 



H3 Question 03

Which of the following is an - Amazon Domain Name System (DNS) web service ?


- Amazon Route 53 
- Amazon Lightsail 
- AWS Snowball 
- AWS Direct connect 

H3 Question 04

Which of the following statements are true ? (Choose two)





- "Enterprise" AWS support plan includes Infrastructure Event Management with additional fee 
- "Enterprise" AWS support plan includes Infrastructure Event Management without additional fee 
- "Business" AWS support plan includes Infrastructure Event Management with

additional fee 

- "Business" AWS support plan does not include Infrastructure Event Management at all. 




H3 Question 05

Under AWS shared responsibility model, which of the following is the responsibility of AWS

- Firewall Configuration 
- Physical security of Infrastructure 
- Patching guest operating systems 
- Security groups configuration 

H3 Question 06

Which of the following helps secure an AWS account

- Use Cloudwatch logs insight 
- Enable AWS Organizations 
- Activate Multi-Factor Authentication (MFA) 
- Enable AWS config 