AWS Solution Architect

TECHNOLOGY

AWS Overview

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A Day in the Life of a Cloud Architect

You are working as a Cloud Architect in an organization, and you have been asked to implement a solution in AWS cloud. As a beginner in AWS, you must focus on AWS core services, such as compute, storage, database, networking services, and more. You must set up an AWS account and AWS CLI to interact with the AWS services and resources.

Additionally, you must learn how to securely regulate access to AWS resources using AWS Identity and Access Management (IAM).

To achieve all of the above, along with some additional concepts, we would be learning a few concepts in this lesson that will help you find a solution for the given scenario.

Learning Objectives

By the end of this lesson, you will be able to:

- Set up an AWS account
- Configure billing alerts to monitor AWS charges
- Delegate access using the IAM role
- Set up an AWS CLI

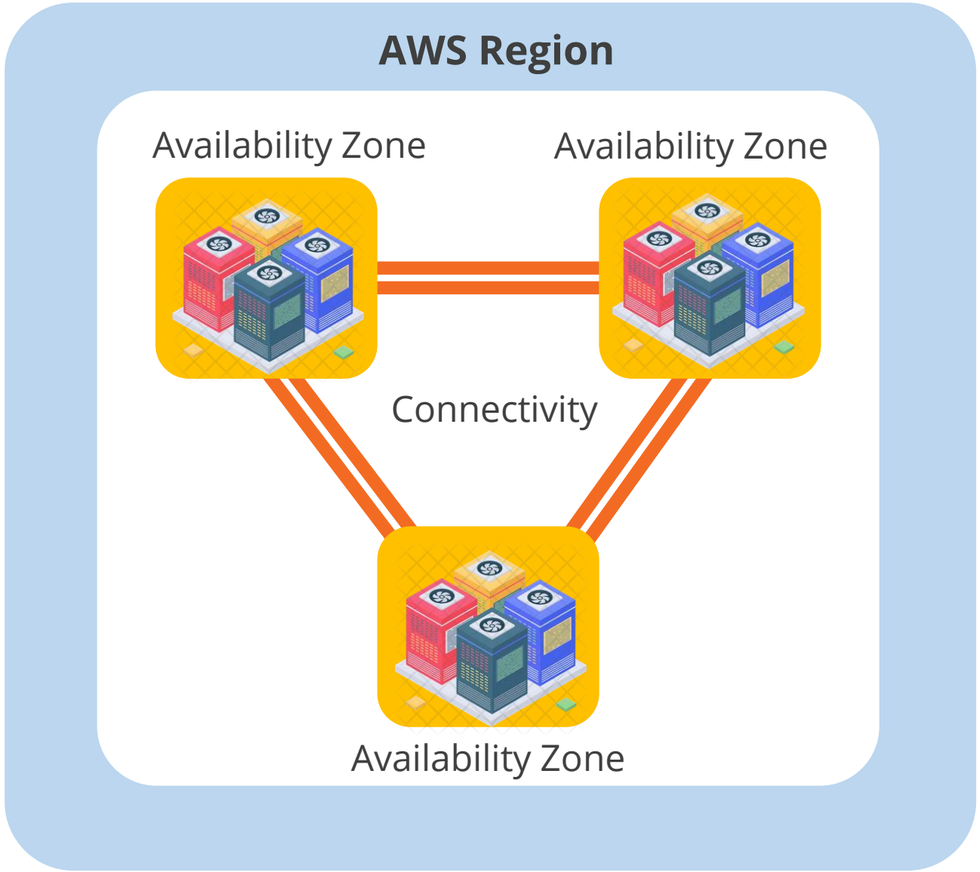
AWS Infrastructure

AWS Infrastructure

The AWS Global Cloud infrastructure is the most secure, extensive, and reliable cloud platform, providing over 200 fully-featured services from data centers globally.

AWS Infrastructure

Availability Zones and AWS Regions form the foundation of the AWS Cloud infrastructure.



- An **AWS Region** is a geographical region in which there are multiple Availability Zones.
- **Availability Zones** include one or more distinct data centers with redundant power, networking, and connectivity located in separate facilities.

AWS Infrastructure

Magic Quadrant for Cloud Infrastructure and Platform Services

AWS was recognized as a Leader by Gartner on both axes of measurement, Ability to Execute and Completeness of Vision.

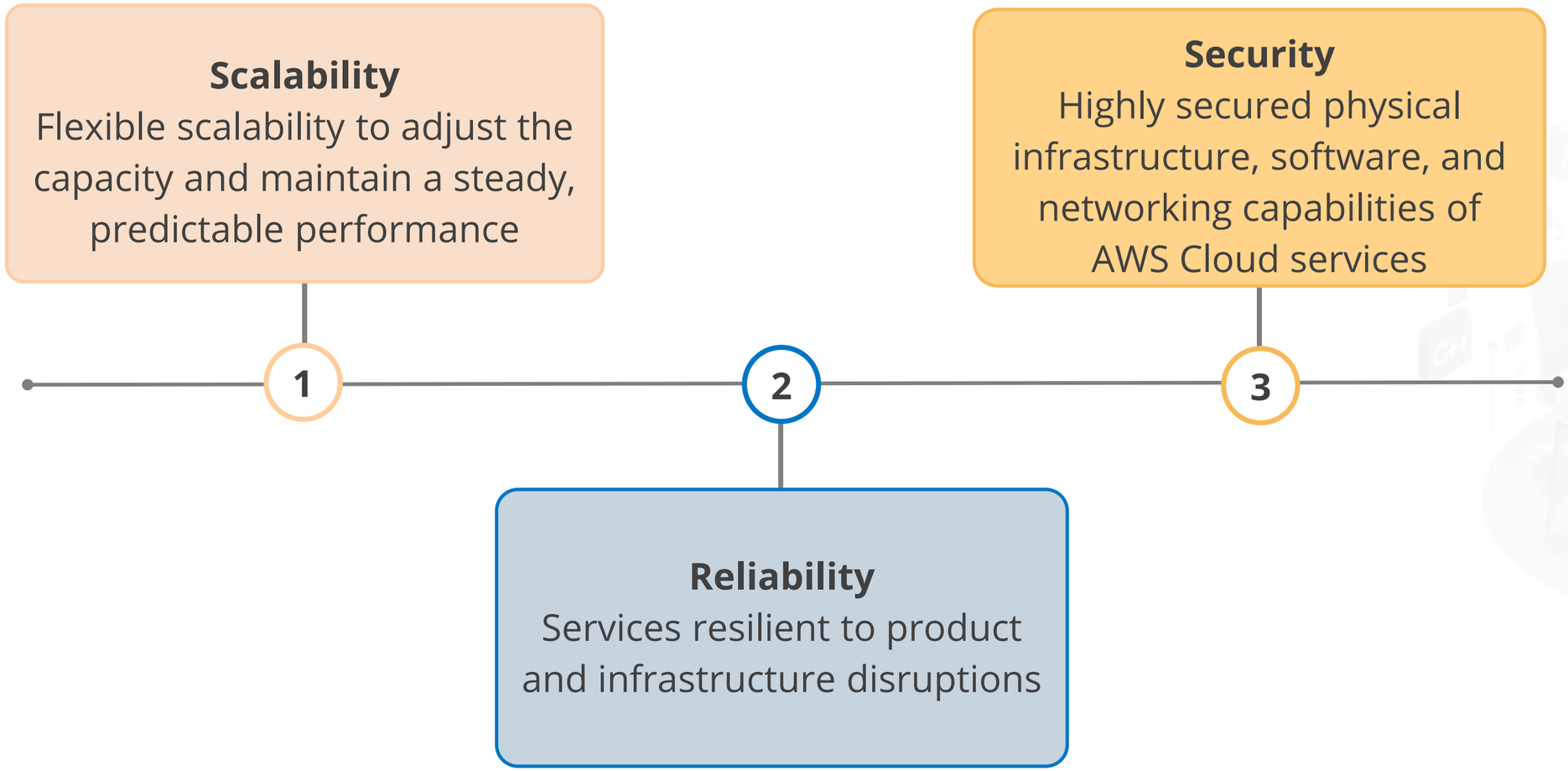
Source: https://pages.awscloud.com/Gartner-Magic-Quadrant-for-Infrastructure-as-a-Service-Worldwide.html

AWS Infrastructure

The AWS Cloud encompasses 99 Availability Zones across 31 geographic areas worldwide.

AWS Infrastructure

Some of the benefits of the AWS infrastructure are as follows:



AWS Infrastructure

Some of the benefits of the AWS infrastructure are as follows:

Performance Efficiency
Run services efficiently and in a scalable manner in the cloud while handling any amount of traffic

4

Cost Optimization
Achieve business outcomes with minimum costs

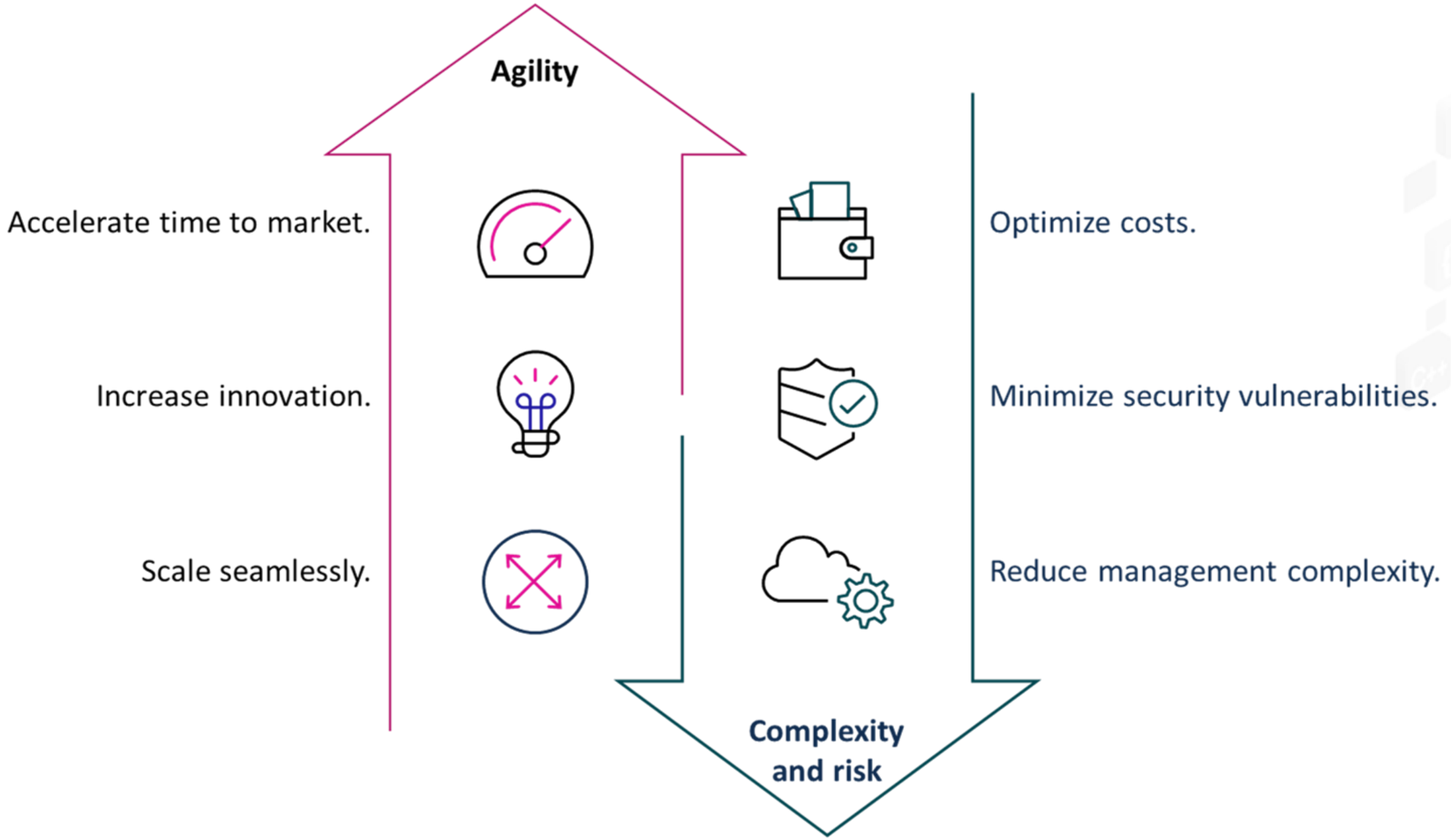
6

5

Flexibility
Provides an option to select the operating system, programming language, web application platform, and database

AWS Infrastructure

The consumers move to AWS to increase agility and reduce complexity and risk.



TECHNOLOGY

AWS Core Services

Core AWS Services

Amazon offers various services that are broadly categorized in the following categories:

Compute

Storage

Database

Analytics

Networking

Mobile

Developer tools

IoT

Security

Management tools

Enterprise applications

Compute Services

The compute services provide secure and resizable compute capacity in the cloud, which is intended to make web-scale computing easier for developers.

The features of compute services are as follows:

- Enables users to control their computing resources
- Operates under the pay-as-you-go model and only takes minutes to obtain and boot new server instances
- Allows quick scaling when computing requirements change

Compute Services

The following are some of the AWS compute services:

Amazon EC2

Amazon ECR

Amazon ECS

Amazon EKS

Amazon Lightsail

AWS Batch

AWS Elastic Beanstalk

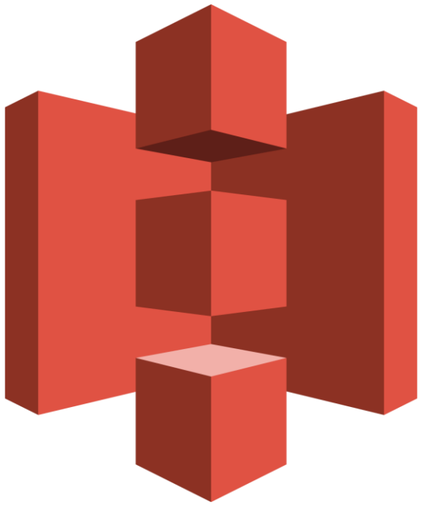
AWS Fargate

AWS Lambda

AWS Serverless Application Repository

Storage Services

The storage services provide a secure, reliable, and scalable place for the data in AWS Cloud with high efficiency, availability, durability, and performance.



The features of storage services are as follows:

- Allow users to store, access, and analyze data to reduce costs, increase agility, and accelerate innovation
- Broadly categorized into object storage, file storage, block storage, backup, and data migration.

Storage Services

The following are some of the AWS storage services:

Amazon S3

Amazon EFS

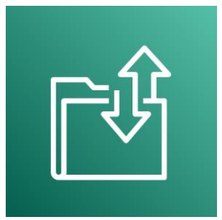
Amazon FSx

Amazon EBS

AWS Backup

AWS Storage Gateway

AWS DataSync



AWS Transfer Family

AWS Snow Family

Database Services

Amazon offers the broadest set of purpose-built databases for various application requirements. These database services are fully managed, scalable, and highly efficient.

The features of database services are as follows:

- Provides database engines from a relational, key-value, in-memory, graph, time-series, and ledger database types
- Supports multi-region, multi-master replication, and full oversight of the data

Database Services

The following are some of the Amazon database services:

Amazon
RDS

Amazon
Redshift

Amazon
DynamoDB

Amazon
ElastiCache

Amazon
DocumentDB

Amazon
Keyspaces

Amazon
Neptune

Amazon
QLDB

Networking Services

Amazon provides a broad set of networking services that provide essential security features by isolating resources, encrypting data, and connecting privately on the AWS global network.

The features of networking services are as follows:

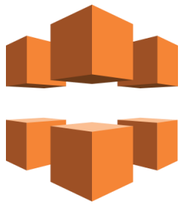
- Offers the highest network availability, with very few downtime hours from networking issues
- Provides global coverage of 31 AWS Regions and 99 Availability Zones

Networking Services

The following are some of the Amazon networking services:

Amazon VPC

Amazon API Gateway



Amazon CloudFront

Amazon Route 53

AWS VPN

AWS Direct Connect

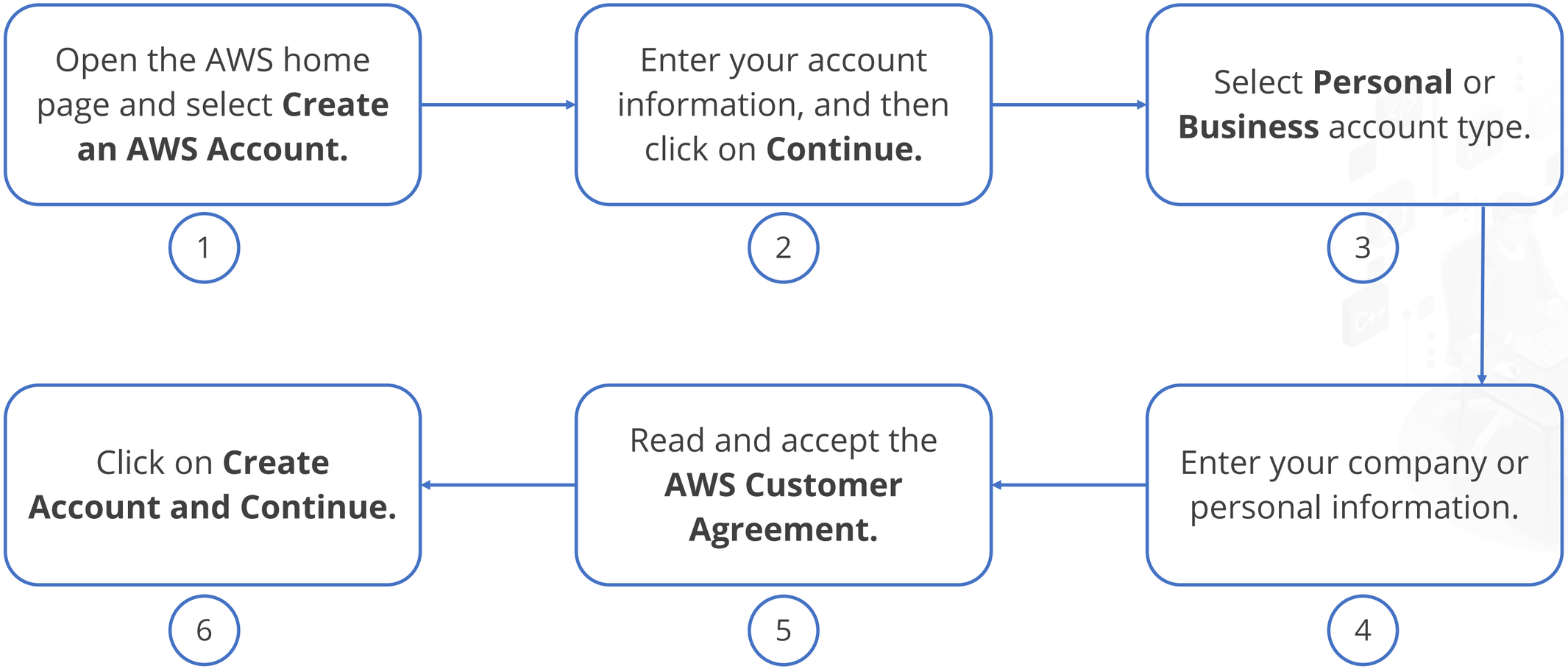
AWS Cloud Map

AWS App Mesh

AWS Account Set Up

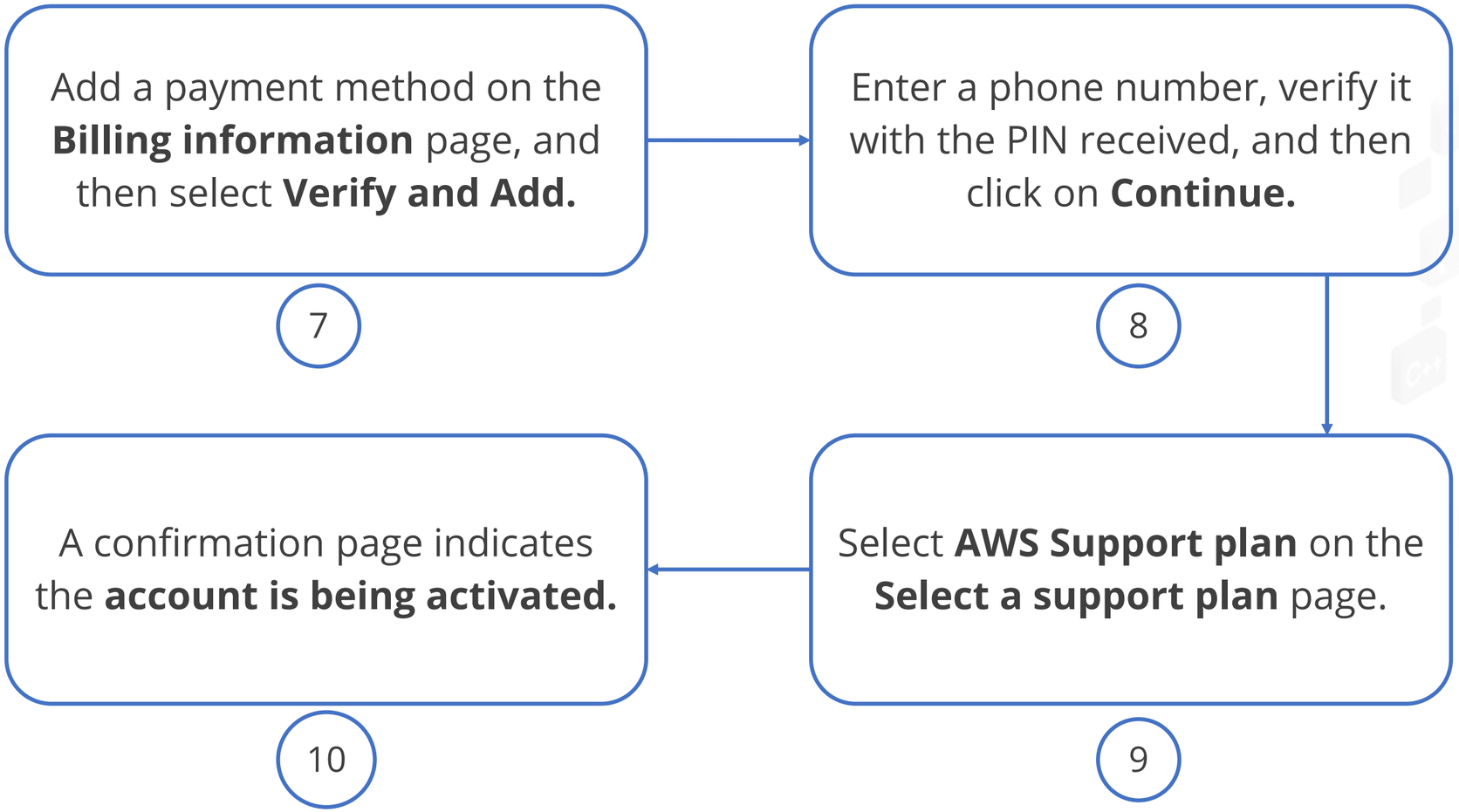
AWS Sign Up

The following are the steps to set up an AWS Account:



AWS Sign Up

The following are the steps to set up an AWS Account:



AWS Free Tier

AWS Free Tier

The AWS Free Tier allows the users to try several AWS services for free under certain usage limits.

- Users are automatically signed up for the AWS Free Tier for 12 months when they create an AWS account.
- Users will receive 750 Amazon EC2 Linux micro instance hours across all the regions and 5 GB of Amazon S3 standard storage for free.

AWS Free Tier

The AWS Free Tier provides three types of offers:

12-month free tier

Always free offer

Short term trials

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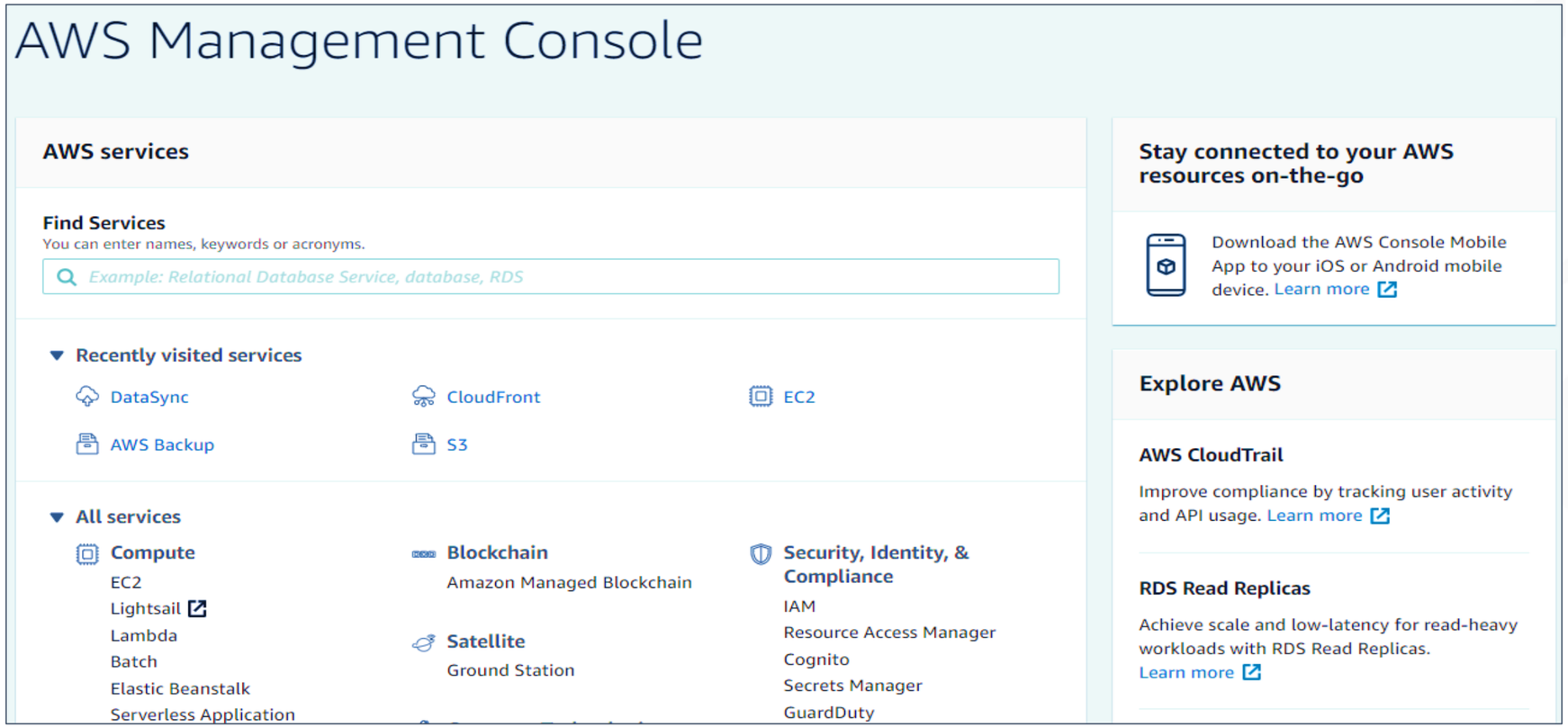
Introduction to AWS Management Console

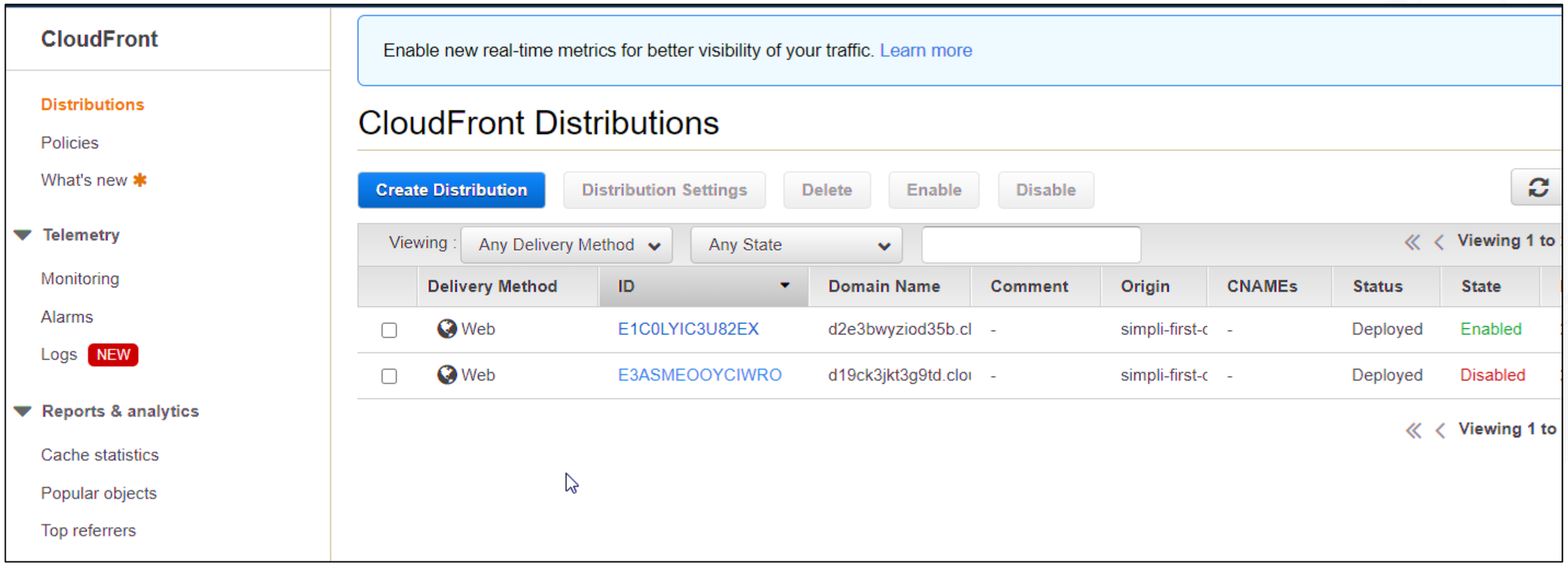
AWS Management Console

AWS Management Console is a web application consisting of a wide collection of service consoles for managing Amazon Web Services.



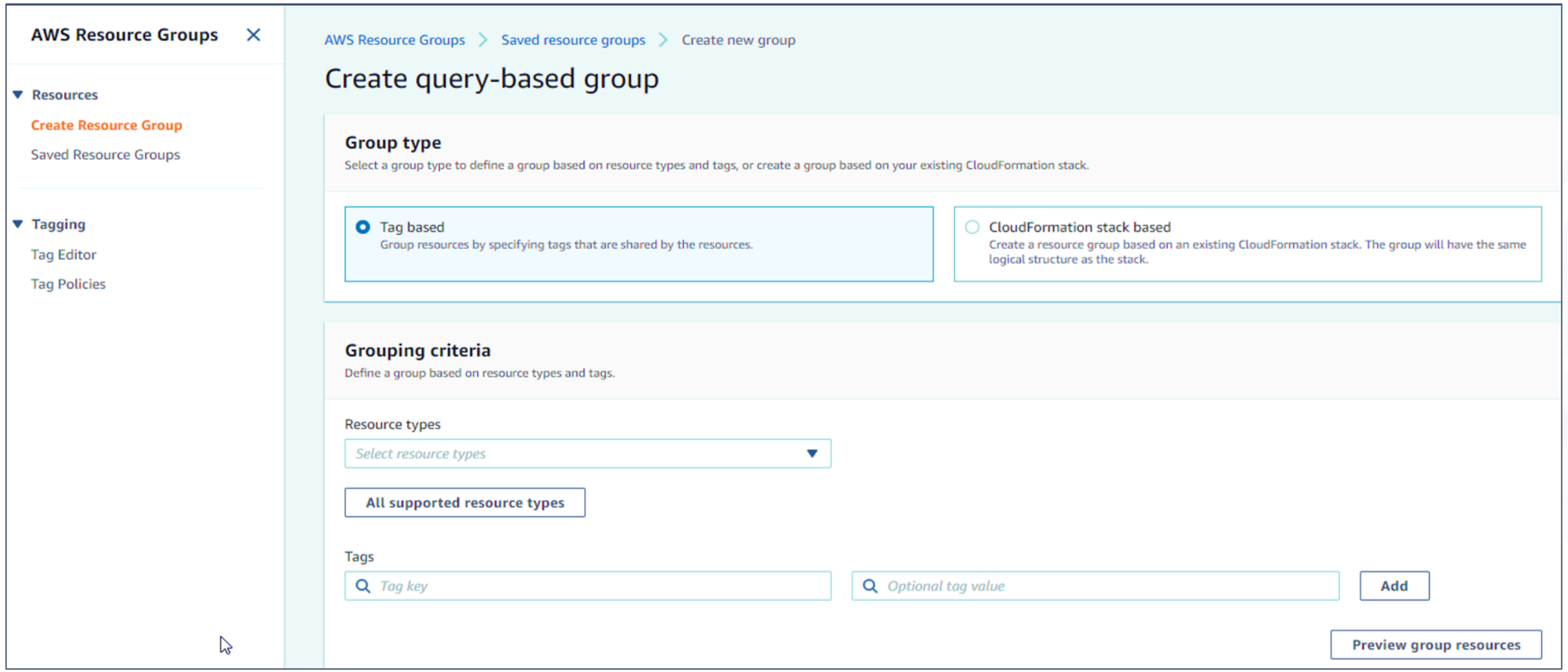
AWS Management Console

AWS Management Console home page provides access to each service console that offers tools for working with services such as Amazon S3, EC2, CloudFront, and so on.



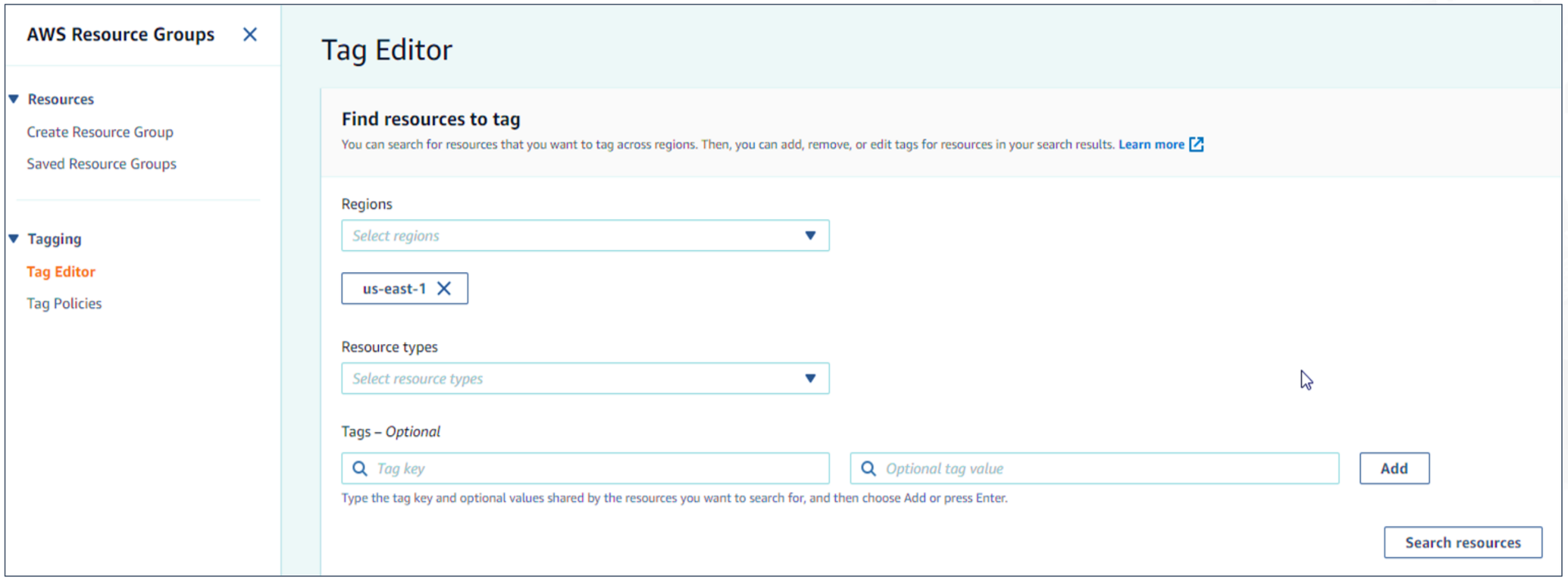
AWS Management Console

Resource Groups menu manages the AWS resources, such as an EC2 instance or S3 bucket as a group.



AWS Management Console

Resource Groups menu can also be used to start Tag Editor, a tool for managing and applying labels or tags to organize the resources.



AWS Billing

AWS Billing

The AWS Billing console includes tools for:

1. Paying the AWS bills
2. Organizing and reporting the AWS costs and consumption
3. Managing the consolidated billing if the users are a member of AWS Organizations

Features of Billing

1. Managing an AWS account

This includes changing the default currency, adding or removing Regions, altering the tax information, and closing the AWS account.

2. Viewing the bill

This section describes how to view the bills, generate PDF copies of the charges, and set up monthly email notifications to receive the invoices.

Features of Billing

3. Managing the payments

This enables viewing estimated bills and paying AWS invoices in the desired currency by setting a payment currency.

4. Managing the purchase orders

This allows self-service management of AWS purchase orders by handling multiple purchase orders in one place.

Features of Billing

5. Managing the costs

This includes how to manage AWS costs with AWS Cost Categories by classifying the cost and usage into meaningful categories.

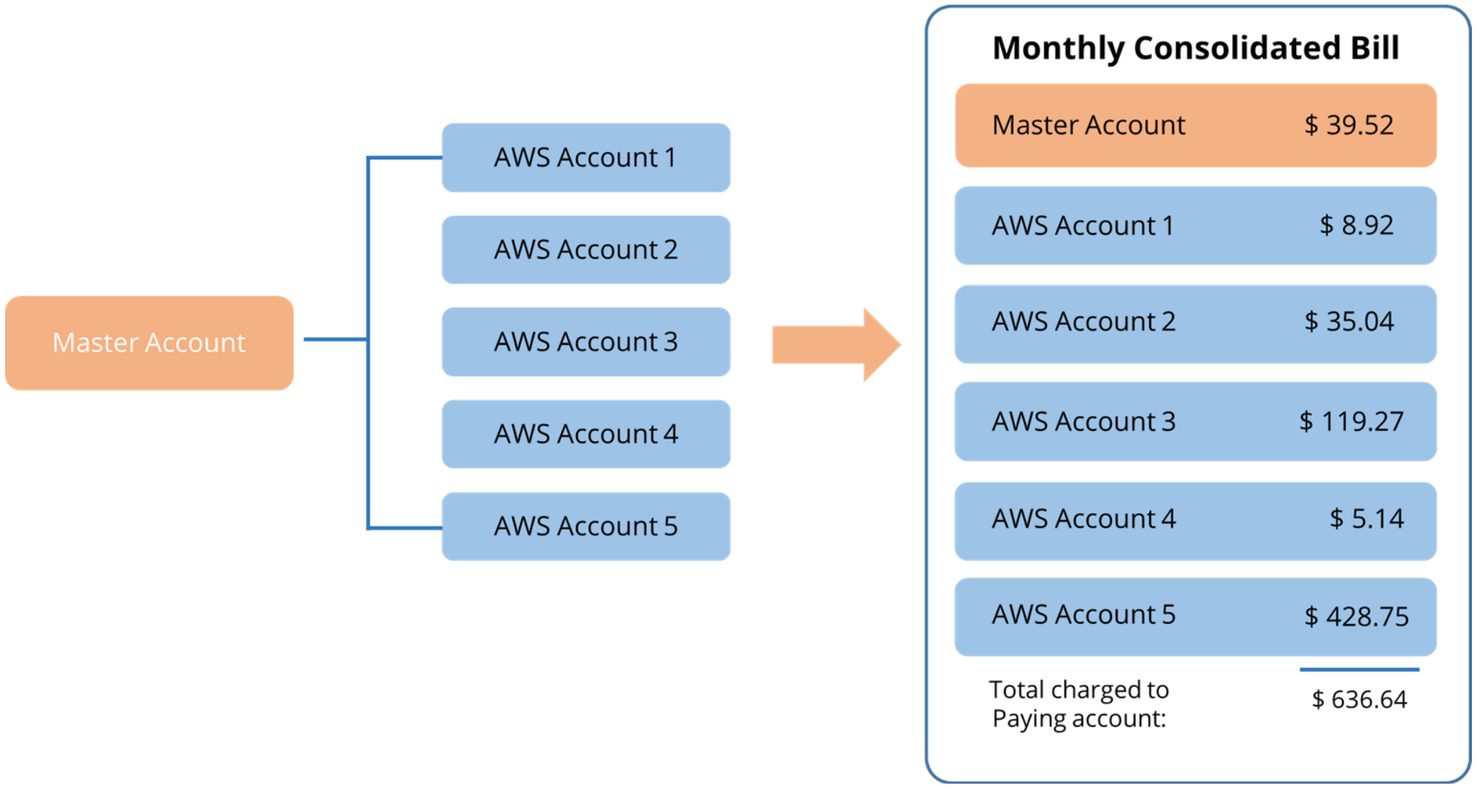
6. Managing the payment profiles

This allows users to utilize payment profiles to assign multiple payment methods to their automatic payments.

Features of Billing

7. Consolidate billing for AWS Organizations

This enables users to use the AWS Organizations consolidated billing feature to consolidate billing and payment for numerous AWS accounts or multiple Amazon Internet Services Pvt. Ltd (AISPL) accounts.



AWS Support

AWS Support

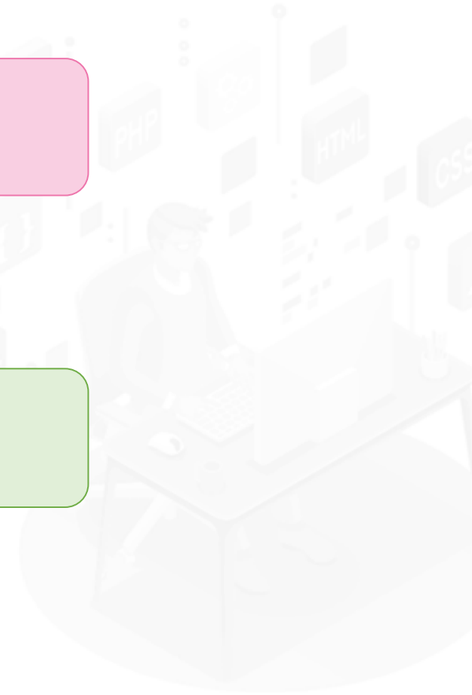
AWS Support provides a variety of plans that allow access to tools and expertise that support the success and operational health of AWS solutions.

All support plans provide 24x7 access to customer service, AWS documentation, technical papers, and support forums.

AWS Support Plans

AWS Support provides five support plans among which the users can choose a support plan that best aligns with their AWS use case:

1. Basic
2. Developer
3. Business
4. Enterprise On-Ramp
5. Enterprise



AWS Support Plans Comparison

	Developer	Business	Enterprise On-Ramp	Enterprise
AWS Trusted Advisor Best Practice Checks	Service Quota and basic Security checks	Full set of checks	Full set of checks	Full set of checks
Technical Support	• Business hours** web access to Cloud Support Associates • Unlimited cases with 1 primary contact • Prioritized responses on AWS re:Post	• 24/7 phone, web, and chat access to Cloud Support Engineers • Unlimited cases and unlimited contacts (IAM supported) • Prioritized responses on AWS re:Post • Access to AWS Support App in Slack	• 24/7 phone, web, and chat access to Cloud Support Engineers • Unlimited cases and unlimited contacts (IAM supported) • Prioritized responses on AWS re:Post • Access to AWS Support App in Slack	• 24/7 phone, web, and chat access to Cloud Support Engineers • Unlimited cases and unlimited contacts (IAM supported) • Prioritized responses on AWS re:Post • Access to AWS Support App in Slack

AWS Support Plans Comparison

	Developer	Business	Enterprise On-Ramp	Enterprise
AWS Trusted Advisor Priority	None	None	None	None
Case Severity / Response Times*	• General guidance: < 24 hours** • System impaired: < 12 hours**	• General guidance: < 24 hours • System impaired: < 12 hours • Production system impaired: < 4 hours • Production system down: < 1 hour	• General guidance: < 24 hours • System impaired: < 12 hours • Production system impaired: < 4 hours • Production system down: < 1 hour • Business-critical system down: < 30 minutes	• General guidance: < 24 hours • System impaired: < 12 hours • Production system impaired: < 4 hours • Production system down: < 1 hour • Business/Mission-critical system down: < 15 minutes

AWS Support Plans Comparison

	Developer	Business	Enterprise On-Ramp	Enterprise
Architectural Guidance	General	Contextual to your use-cases	Consultative review and guidance based on your applications (one-per-year)	Consultative review and guidance based on your applications
Programmatic Case Management	None	AWS Support API	AWS Support API	AWS Support API

AWS Support Plans Comparison

	Developer	Business	Enterprise On-Ramp	Enterprise
Third-Party Software Support	None	Interoperability and configuration guidance and troubleshooting	Interoperability and configuration guidance and troubleshooting	Interoperability and configuration guidance and troubleshooting
Proactive Programs and Self Service	Access to Support Automation Workflows with prefixes AWSSupport	• Access to Infrastructure Event Management for additional fee • Access to Support Automation Workflows with prefixes AWSSupport and AWSPremiumSupport	• Infrastructure Event Management (one-per-year) • Access to Support Automation Workflows with prefixes AWSSupport and AWSPremiumSupport	• Infrastructure Event Management • Access to proactive reviews, workshops, and deep dives • Access to Support Automation Workflows with prefixes AWSSupport and AWSPremiumSupport

AWS Support Plans Comparison

	Developer	Business	Enterprise On-Ramp	Enterprise
AWS Incident Detection and Response	None	None	None	Access to AWS Incident Detection and Response for an additional fee.
AWS Managed Services	None	Access to AWS Managed Services (AMS) for an additional fee.	Access to AWS Managed Services (AMS) for an additional fee.	Access to AWS Managed Services (AMS) for an additional fee.

AWS Support Plans Comparison

	Developer	Business	Enterprise On-Ramp	Enterprise
Technical Account Management	None	None	A pool of Technical Account Managers to provide proactive guidance, and coordinate access to programs and AWS experts	Designated Technical Account Manager (TAM) to proactively monitor your environment and assist with optimization and coordinate access to programs and AWS experts
Training	None	None	None	Access to online self-paced labs

AWS Support Plans Comparison

	Developer	Business	Enterprise On-Ramp	Enterprise
Account Assistance	None	None	Concierge Support Team	Concierge Support Team
Pricing	Greater of $29 / month*** or 3% of monthly AWS usage	• Greater of $100 / month*** or 10% of monthly AWS usage for the first $0–$10K • 7% of monthly AWS usage from $10K–$80K • 5% of monthly AWS usage from $80K–$250K • 3% of monthly AWS usage over $250K	Greater of $5,500 or 10% of monthly AWS usage	• Greater of $15,000 or 10% of monthly AWS usage for the first $0–$150K • 7% of monthly AWS usage from $150K–$500K • 5% of monthly AWS usage from $500K–$1M • 3% of monthly AWS usage over $1M

Billing Alerts

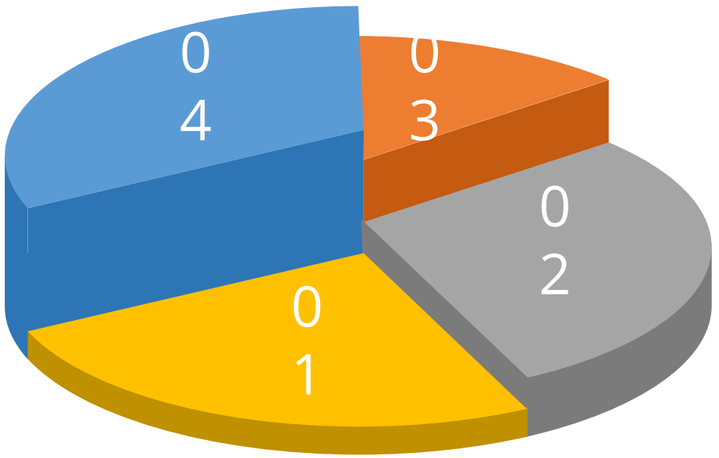
Billing Alerts

AWS billing alerts allow the users to monitor the charges on their bill.

Users can set up an alert to receive e-mail notifications when estimated charges reach a specific threshold.

Billing Alerts

The steps to enable the monitoring of estimated charges are as follows:



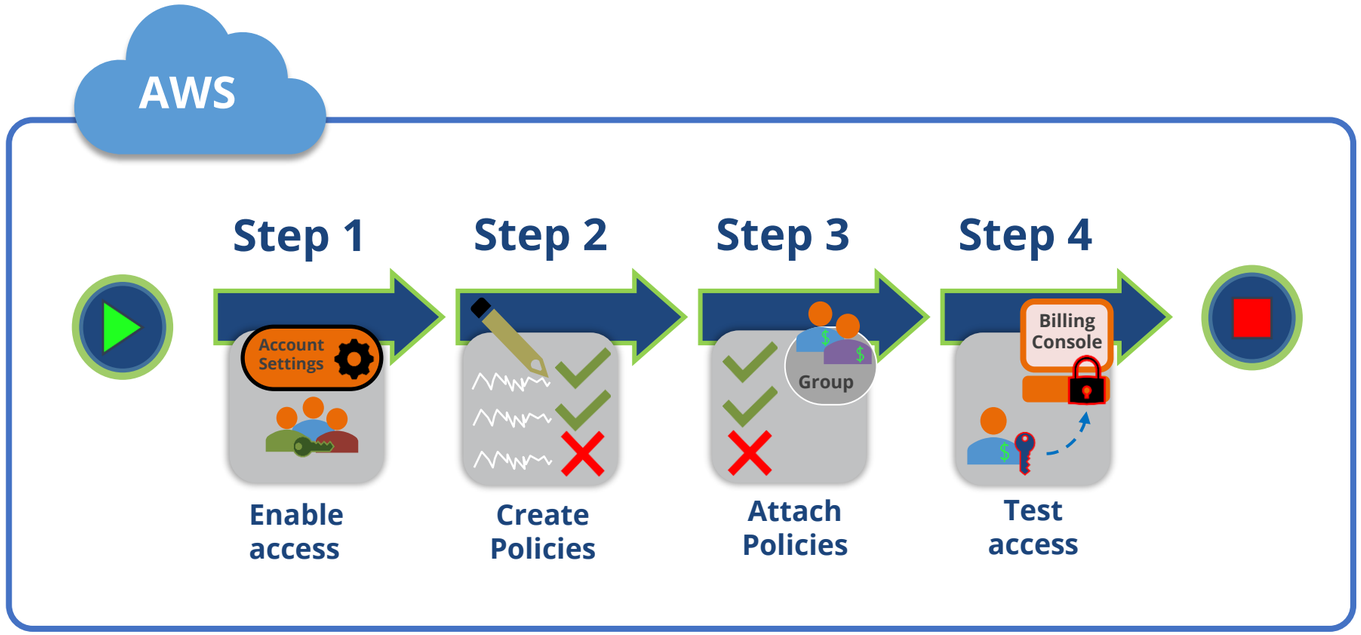
- Open the **AWS Billing** console
- Choose **Billing Preferences** in the navigation pane
- Choose **Receive Billing Alerts**
- Choose **Save preferences**

Delegate Access

Delegate Access to the Billing Console

AWS account owners can delegate access to particular IAM users that need to access or manage the AWS Billing and Cost Management data for an AWS account.

The process of delegating access to the billing console consists of four key steps:



Workflow: Delegate Access to the Billing Console

Step 1: Activate access to billing data

1. If the users create a single AWS account, only the AWS account owner has access to view and manage billing information.

2. IAM users cannot access billing data until the account owner activates IAM access and attaches policies that provide billing actions to the user or role.

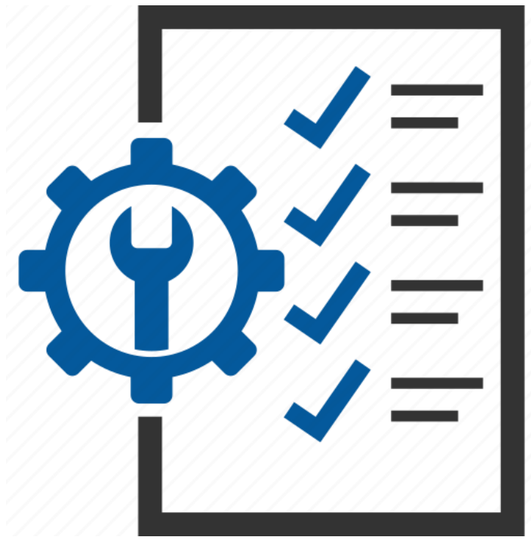
Workflow: Delegate Access to the Billing Console

Step 2: Create IAM policies

1. After enabling billing access on an account, the users must still explicitly grant access to billing data to specific IAM users or user groups.

2. The users grant this access with a customer managed policy.

Workflow: Delegate Access to the Billing Console



Step 3: Attach billing policies

1. When the users attach a policy to a user group, all members of that user group receive the complete set of access permissions associated with that policy.

2. The users attach the new billing policies to user groups containing only those users who require billing access.

Workflow: Delegate Access to the Billing Console

Step 4: Test access to the billing console

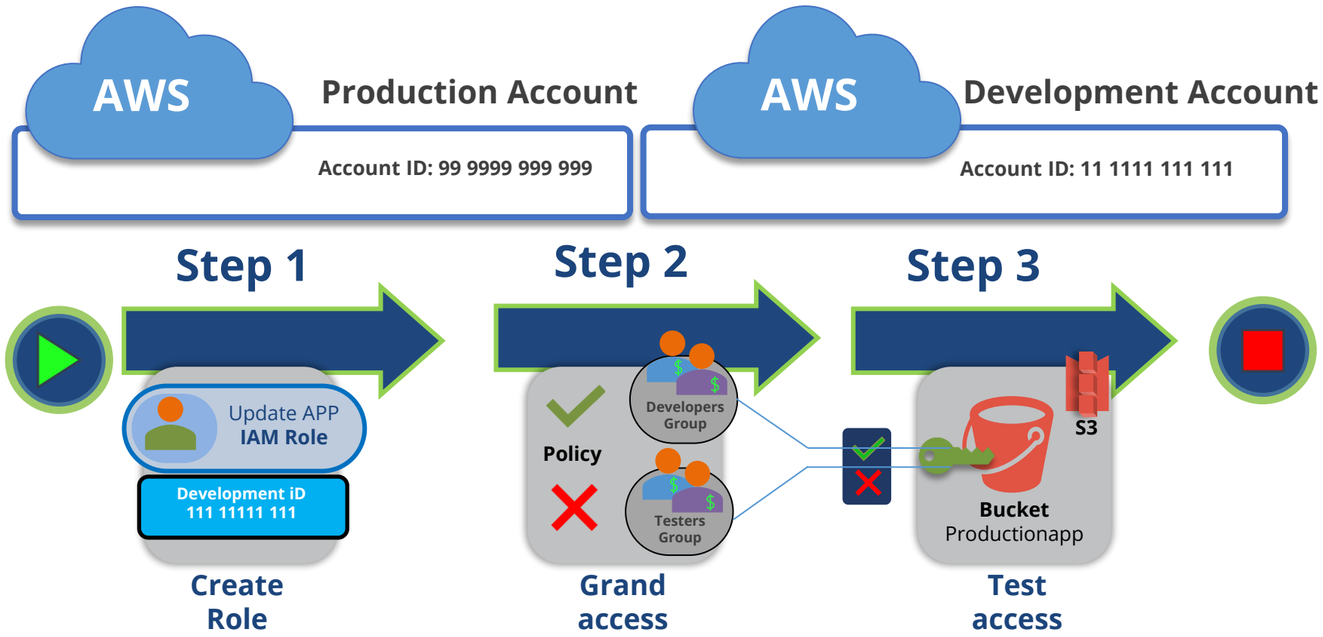
1. After completing the core tasks, the users must test the policy.

2. The policy testing verifies that the policy operates as intended.

Delegate Access Using IAM Roles

AWS account owners can use a role to delegate access to resources in different AWS accounts called **Production** and **Development**.

The process of delegating access using the IAM role consists of three key steps:



Workflow: Delegate Access Using IAM Roles

Step 1: Create a role in the Production account

The owners define the **Development** account as a trusted entity when they create the role and include a permissions policy that allows trusted users to edit the bucket in the **Production** account.

Workflow: Delegate Access Using IAM Roles

Step 2: Grant access to the role

1. AWS account owners modify the IAM user group policy to deny testers' access to the role.

2. The testers have **PowerUser** access in this scenario. Hence, the owners must explicitly deny the ability to use the role.

Workflow: Delegate Access Using IAM Roles

Step 3: Test access by switching roles

Finally, as a **Developer**, the AWS account owners use the role to update the bucket in the **Production** account.

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AWS Identity and Access Management (IAM)

IAM

AWS Identity and Access Management (IAM) is a web service that allows users to regulate access to AWS resources securely.

IAM helps to determine who is authenticated (signed in) and authorized (has permissions) to utilize resources.

IAM Features

1. Shared access to the AWS account

Users can authorize others to administer and utilize resources in their AWS account without sharing their password or access key.

2. Granular permissions

Users can assign various permissions to multiple users for different resources.

IAM Features

3. Secure access to AWS resources

The credentials for the applications running on EC2 instances can be securely provided using IAM features.

4. Multi-factor authentication (MFA)

Users can enable two-factor authentication for their accounts and individual users to increase security.

IAM Features

5. Identity federation

Users can grant temporary access to an AWS account to users who already have passwords elsewhere, such as their company network or an online identity provider.

6. Identity information for assurance

AWS CloudTrail offers log records that contain data about those who requested resources in the users' accounts.

IAM Features

7. PCI DSS compliance

IAM enables a merchant or service provider to process, store, and transmit credit card data and has been confirmed as compatible with the Payment Card Industry Data Security Standard (PCI DSS).

8. Integrated with many AWS services

There are numerous AWS services that support various IAM functions.

IAM Features

9. Consistent

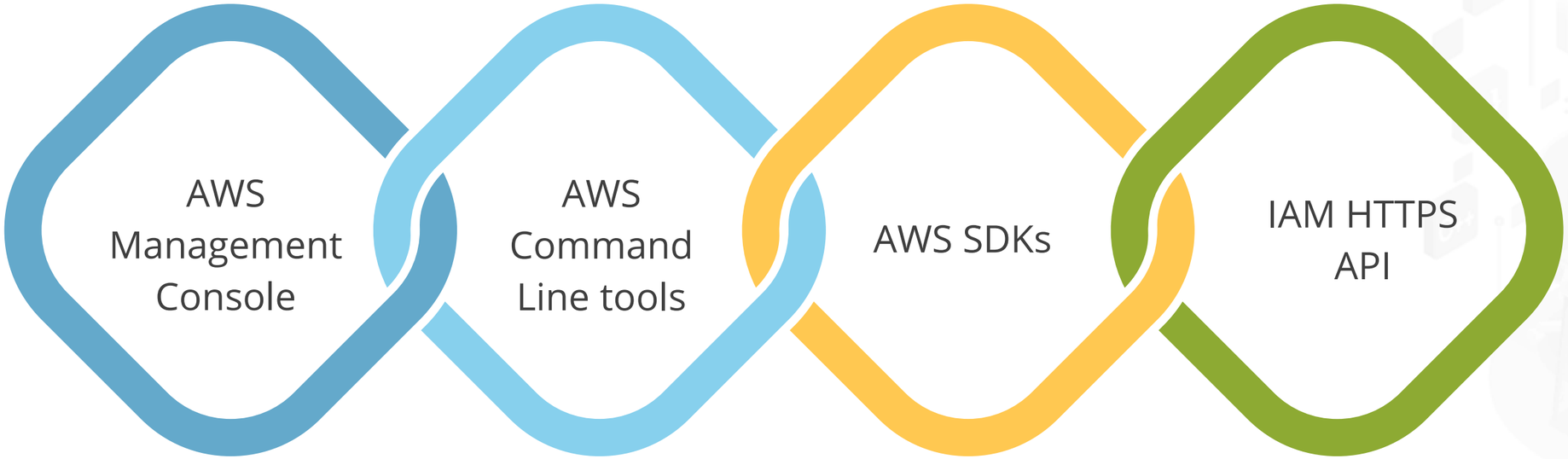
IAM achieves high availability by replicating data across numerous servers located across Amazon's global data centers.

10. Free to use

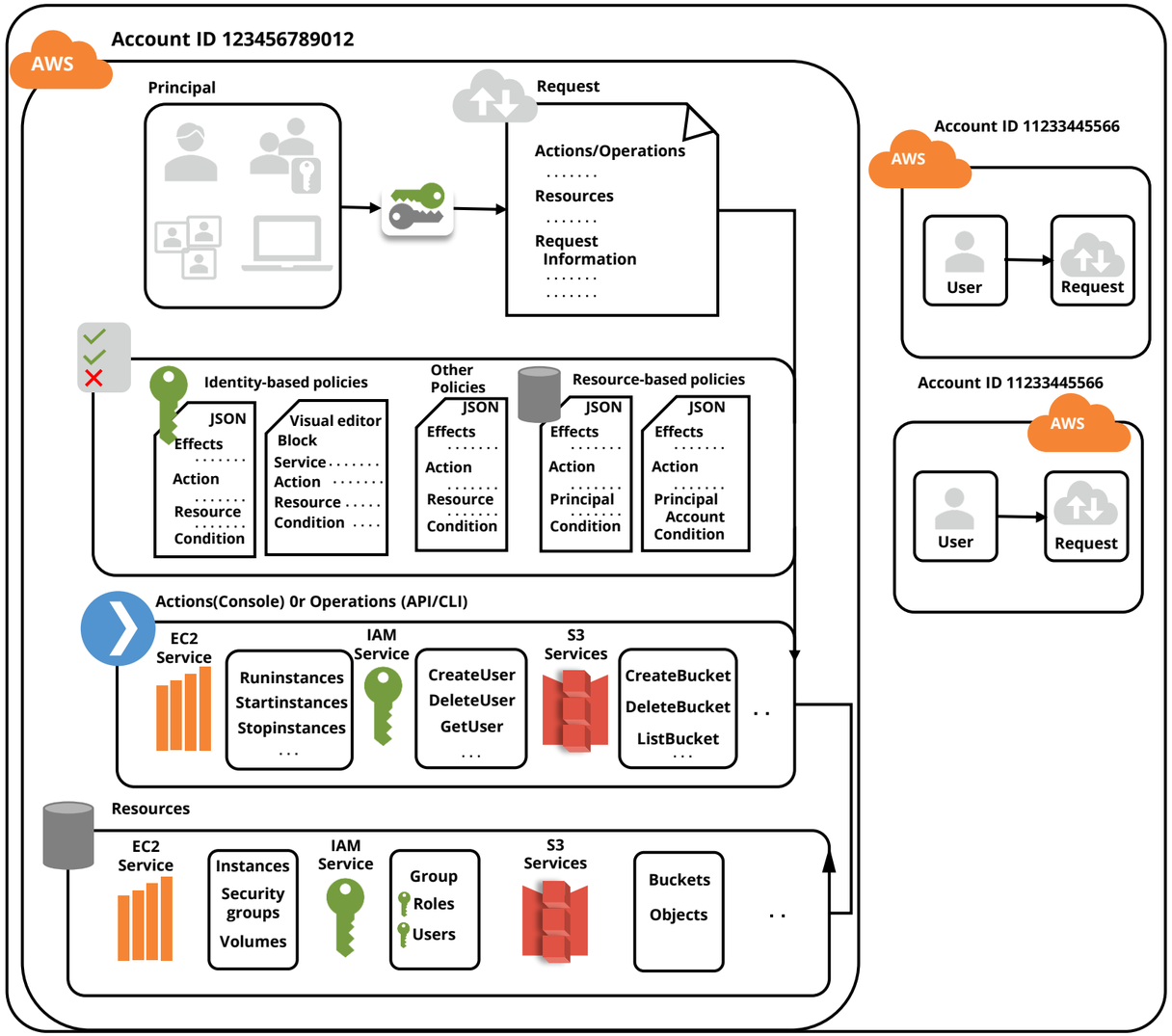
AWS Identity and Access Management (IAM) and Security Token Service (AWS STS) are features of an AWS account offered at no extra cost.

Accessing IAM

IAM can be accessed in any of the following ways:



Working of IAM



- IAM offers the infrastructure required to manage an account's authentication and authorization.
- The IAM infrastructure consists of the following components:

1. IAM identities and entities
2. Principal
3. Request
4. Authentication
5. Authorization
6. Actions or operations
7. Resources

IAM Users

IAM users are users within an account, not separate accounts. Each user can have a password to access the AWS Management Console.

- IAM users can also provide everyone with their access key, allowing them to perform programmatic requests to operate with resources in their account.
- For example, the users **Li**, **Mateo**, **DevApp1**, **DevApp2**, **TestApp1**, and **TestApp2** have been added to a single AWS account. Each user has their own set of credentials.

AWS Command Line Interface (AWS CLI)

AWS CLI

The AWS Command Line Interface (AWS CLI) is an open-source tool that allows users to communicate with AWS services using commands in their command-line shell.

The users can set up the AWS CLI using either of the following ways:

1. New configuration setup

1. Existing configuration setup

AWS CLI: New Configuration Setup

The **aws configure** command is the quickest way to set up the AWS CLI installation.

The AWS CLI prompts the users for four pieces of information which must be replaced with the user's credentials:

```
$ aws configure
AWS Access Key ID [None]: AKIAIOSFODNN7EXAMPLE
AWS Secret Access Key [None]: wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY
Default region name [None]: us-west-2
Default output format [None]: json
```

AWS CLI: Existing Configuration Setup

The AWS CLI can be used if the users already have existing configuration and credentials files.

1

To use the **config** and **credentials** files, move them to the folder named **.aws** in your home directory.

2

The users can specify a non-default location for the **config** and **credentials** files by setting the **AWS_CONFIG_FILE** and **AWS_SHARED_CREDENTIALS_FILE** environment variables to another local path.

Key Takeaways

- Availability Zones include one or more distinct data centers with redundant power, networking, and connectivity located in separate facilities.
- Users are automatically signed up for the AWS Free Tier for 12 months when they create an AWS account.
- The credentials for the applications running on EC2 instances can be securely provided using IAM features.
- Users can enable two-factor authentication for their accounts and specific users to increase security.

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Thank You

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