AWS Cloud Practitioner Certification Bootcamp

Week - 4

Session 4 - IAM, Database, Billing & Cost Management

5th Feb, Saturday
7:00 PM to 8:30 PM IST

aws USER GROUP
BANGLADESH

AWS
User Groups

Speakers

Sanchit Jain

Lead Architect - AWS at Quantiphi

AWS APN Ambassador

Agenda

Re-cap of
Last session

AWS IAM

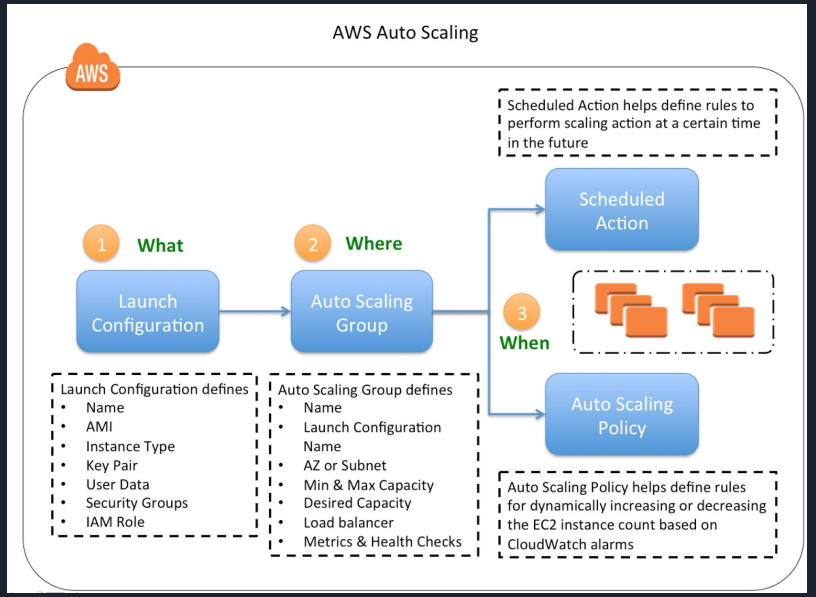
AWS Database

AWS Billing & Cost
Management

Re-cap of Last session

Ec2 AutoScaling Overview

- In real-life, the load on your websites and application can change
- In the cloud, you can create and get rid of servers very quickly
- The goal of an Auto Scaling Group (ASG) is to:
  - Scale out (add EC2 instances)
  - Scale in (remove EC2 instances)
  - Ensure we have a min and a max number of machines running
  - Automatically register new instances to a load balancer
  - Replace unhealthy instances



- Cost Savings: only run at an optimal capacity (principle of the cloud)

Type of Elastic Load Balancer

	ALB	**NLB**	**GLB**	**CLB**
OSI model layer	7	4	3	7 and 4
Protocol supported	HTTP, HTTPS	TCP, UDP, TLS	GENEVE	HTTP, HTTPS, TCP
Supports static IP for ELB	No, only DNS name	Yes	No	No, only DNS name
SSL offloading	Yes	Yes (TLS termination)	No	Yes
SNI support	Yes	Yes	No	No
Authentication offloading	Yes	No	No	No
End to end encryption	No if using SSL offloading	Yes	No	Yes
Sticky sessions	Yes	Yes	Yes	Yes
Path patterns	Yes			
Cross zone load balancing	Enabled by default	Yes	Yes	Disabled. Enable it manually
Type of registered targets	Instance, Lambda, IP	Instance, IP	Instance, IP	Instance,IP
Use cases	Websites, web applications	Application requiring low latency load balancing	Load balancing or scaling virtual appliances for IDP, firewall etc.	Web applications.

AWS ECS or AWS EKs

	Amazon ECS	Amazon EKS
Open source	No - AWS proprietary	Yes - Kubernetes
Atomic Container Term	Task	Pod
Deployment Effort	Easy (AWS Dashboard)	Medium (AWS plus Kubernetes knowledge required)
Security (IAM)	Comes with the service	Requires addon software and additional configuration
Security (ENI support)	Yes - per task (single container)	Yes - per Pod (which can serve multiple containers)
Per VM Container Limit	Up to 120	Up to 750 Pods (which can host multiple containers)
System Service Cost	Used resources	Used resources plus ~$75 per cluster per month
Multi-cloud integration	No - AWS specific	Yes - Public and Private cloud integration.

What is serverless?

What is Serverless?

a cloud-native platform

for

short-running, stateless computation

and

event-driven applications

which

scales up and down instantly and automatically

and

charges for actual usage at a millisecond granularity

Greater Agility

Less Overhead

Better Focus

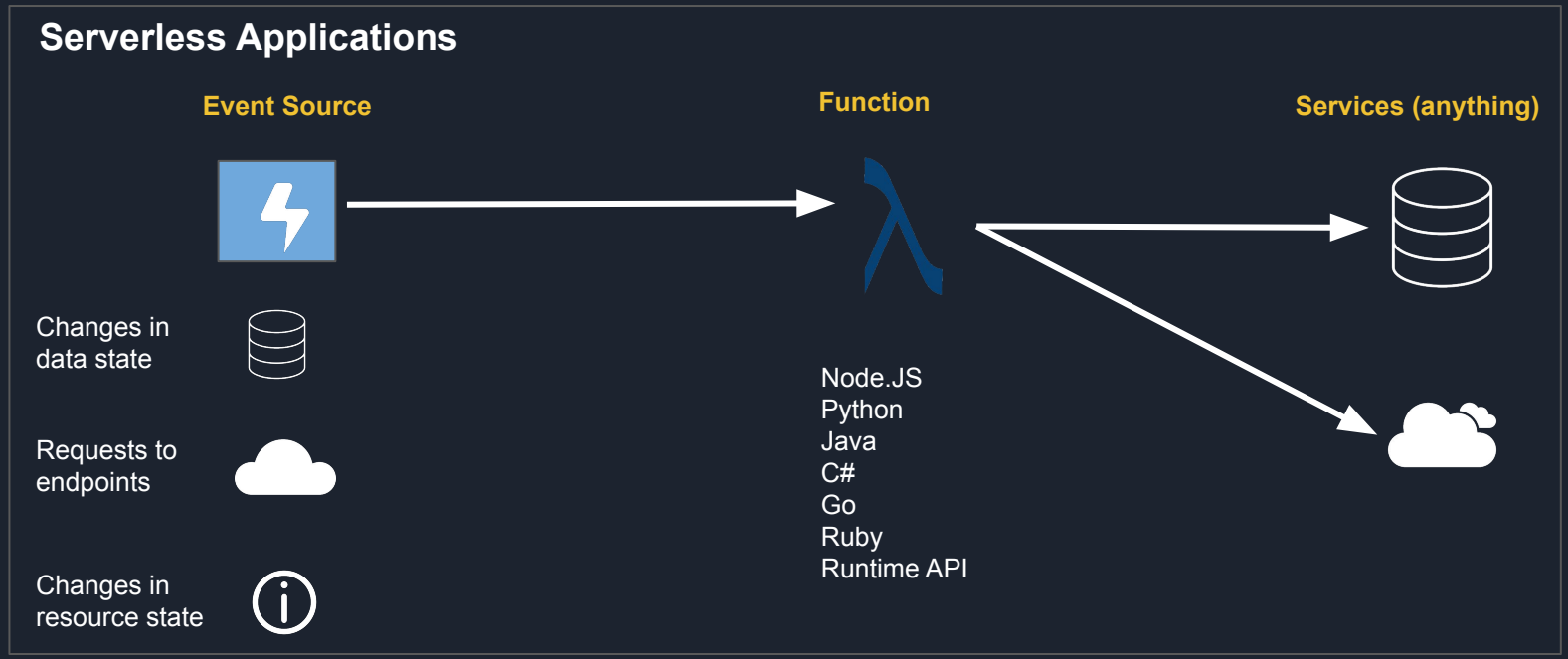
Increased Scale

More Flexibility

Faster Time To Market

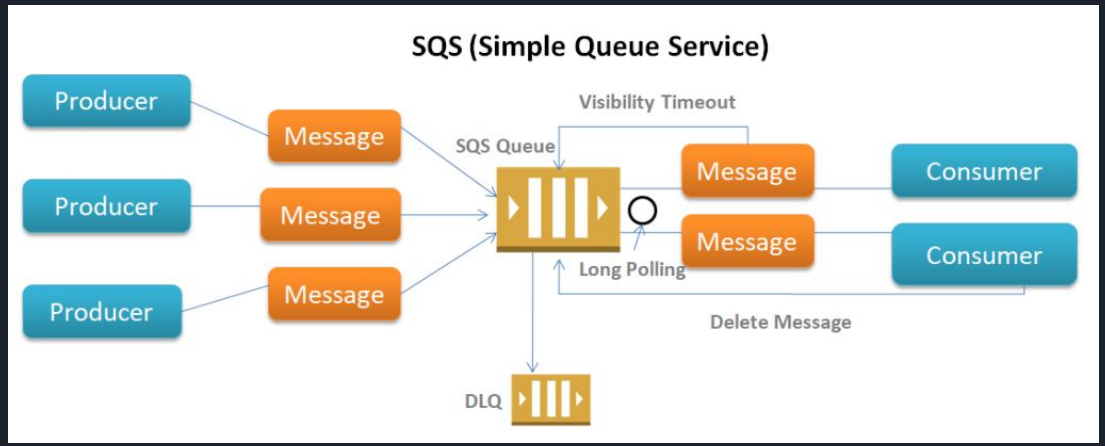
What triggers code execution?

- Runs code in response to events
- Event-programming model



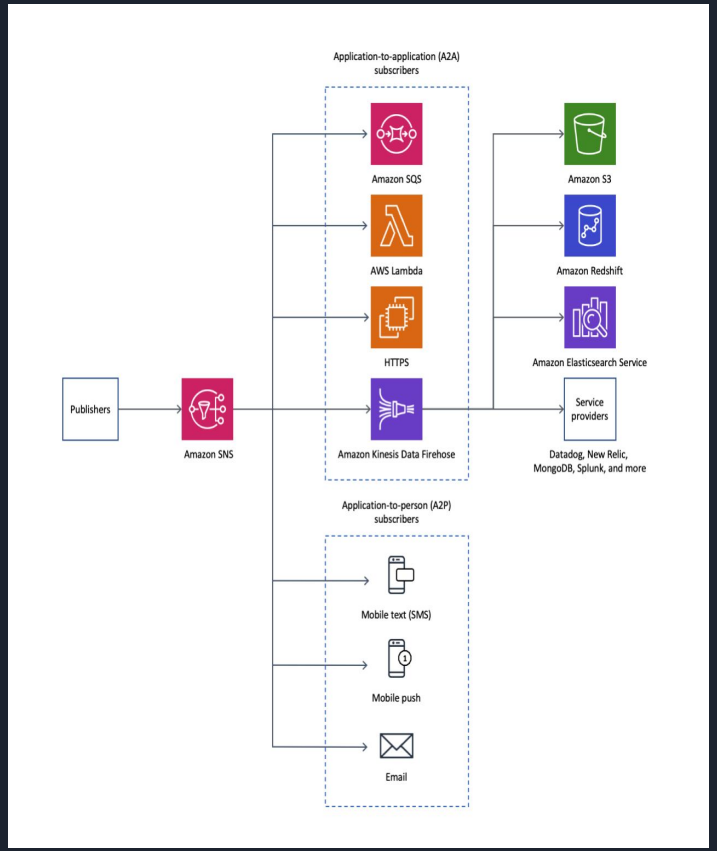
What is AWS SQS?

- Oldest AWS offering (over 10 years old)
- Fully managed service, use to decouple applications
- Scales from 1 message per second to 10,000s per second, and Low latency (<10 ms on publish and receive)
- Default retention of messages: 4 days, maximum of 14 days
- No limit to how many messages can be in the queue, and messages are deleted after they’re read by consumers
- Consumers share the work to read messages & scale horizontally



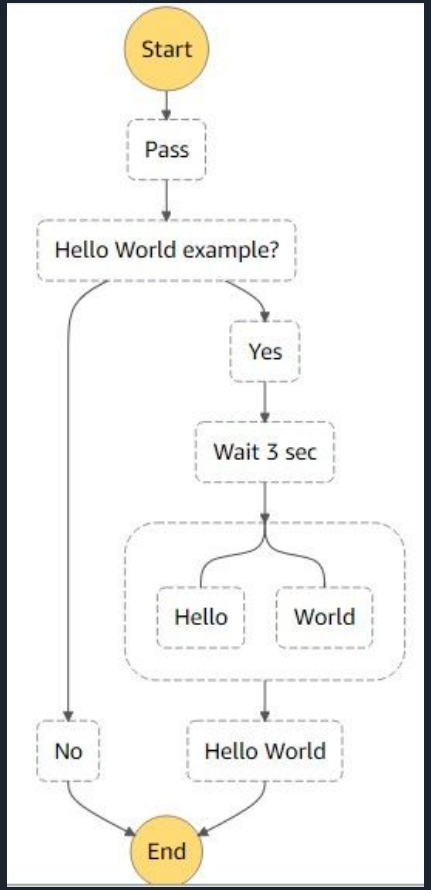
What is AWS SNS?

- Publishers sends message to a SNS topic and multiple subscribers listen to the SNS topic notifications
- Each subscriber to the topic will get all the messages
- Up to 10,000,000 subscriptions per topic, 100,000 topics limit
- SNS Subscribers can be:
  - HTTP / HTTPS (with delivery retries – how many times)
  - Emails,SMS messages,Mobile Notifications
  - SQS queues (fan-out pattern), Lambda Functions (write-your-own integration)



What is AWS Step Functions?

- AWS Step Function is a serverless orchestration service that allows integrating multiple AWS services to collate & design an enterprise-critical application or workflow with advance conditional branching and error handling
- ASL consist of three things
  - **State Machine Structure** - State machines are declared using JSON text and represents a structure consists of Comment, TimeoutSeconds, Version, StartAt, States
  - **Intrinsic functions** - Intrinsics are constructs like in programming languages, and can be leveraged to manipulate the data going to and from Task Resources
  - **Common State Fields** - Common State Fields consists of Comment, InputPath, OutputPath, Type, Next, End



AWS Identity and Access Management (IAM)

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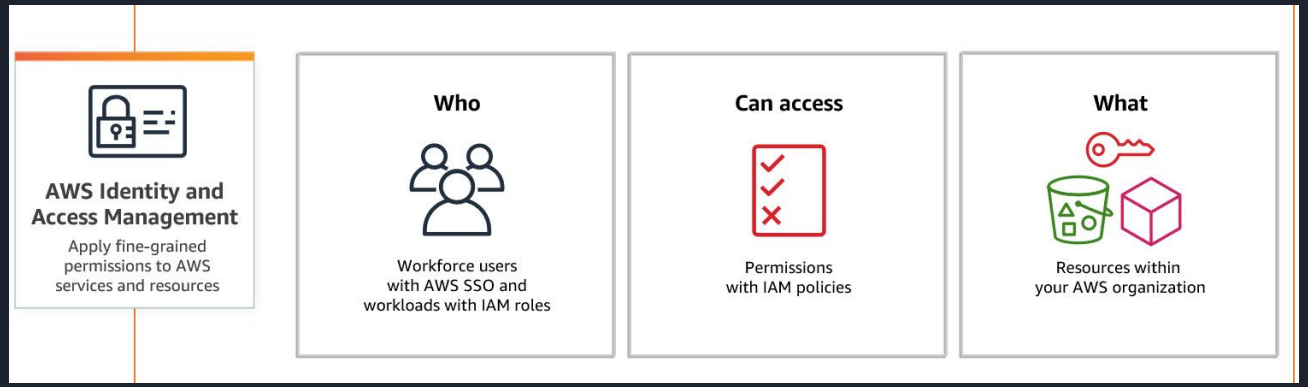
AWS IAM Overview

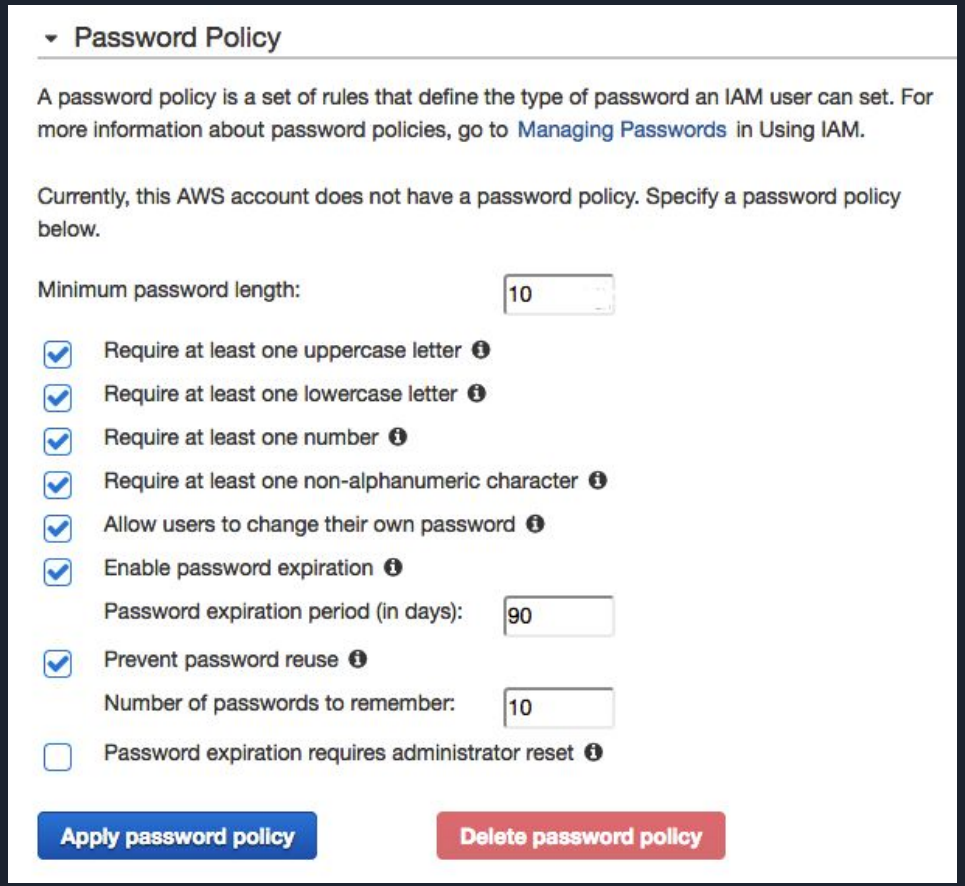
- AWS Identity and Access Management (IAM) provides fine-grained access control across all of AWS.
- With IAM,
  - you can specify who can access which services and resources, and under which conditions.
  - you manage permissions to ensure least-privilege permissions.
- IAM is a **Global** feature of your AWS account and is offered at **no additional charge**.



AWS IAM - Users and Groups

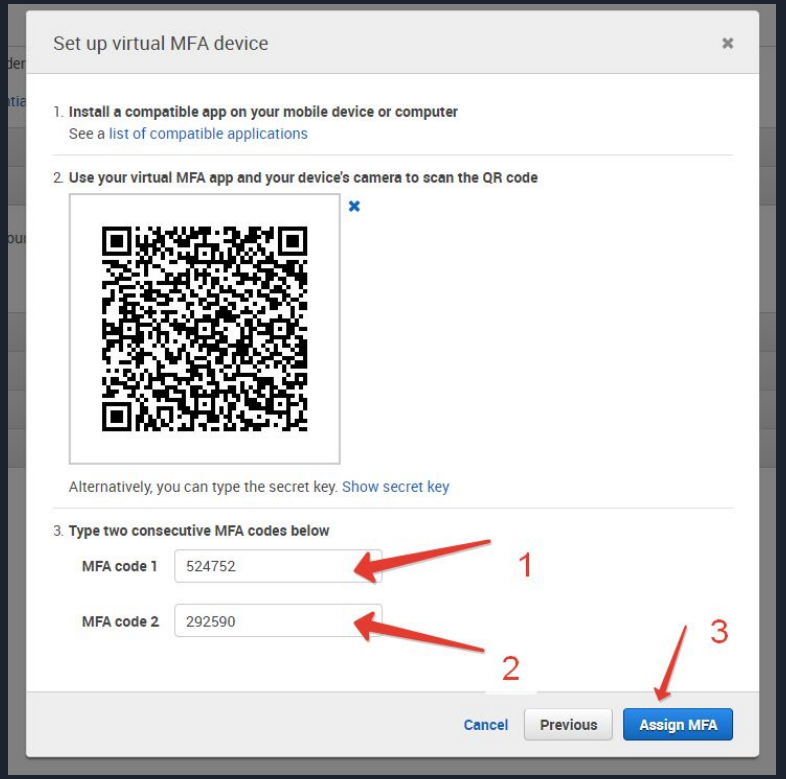
- Root account created by default, shouldn’t be used or shared as it as Administrative privileges.
- An **IAM user** is an entity that you create in AWS to represent the person or application that uses it to interact with AWS. A user in AWS consists of a name and credentials.
- Users performing same tasks with the same resources can be added to a Group.

IAM – Password Policy



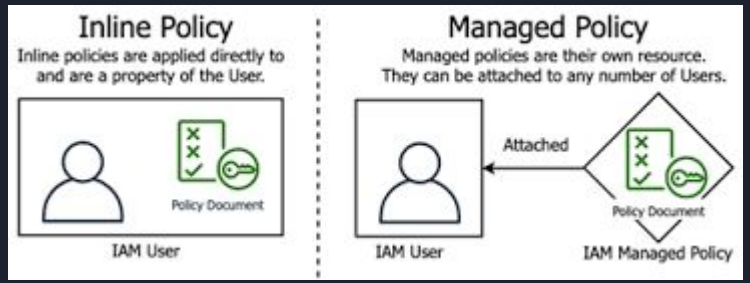
Multi Factor Authentication - MFA

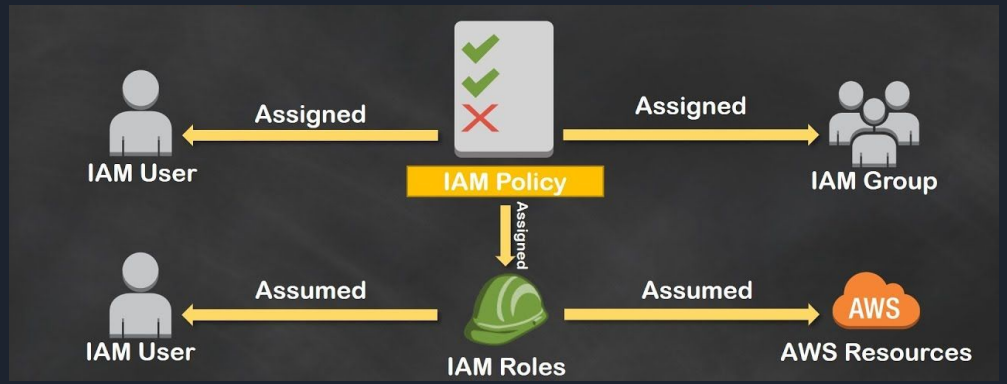
- You want to protect your Accounts and IAM users
- MFA = password you know + security device you own
- Supported MFA Devices :
  - Virtual MFA device
  - Universal 2nd Factor (U2F) Security Key
  - Hardware Key Fob MFA Device



AWS IAM - Policy

- You manage access in AWS by creating JSON based policies and attaching them to IAM identities (users, groups of users, or roles) or AWS resources.
- In AWS you apply the least privilege principle.
- **AWS managed policies** – Managed policies that are created and managed by AWS.
- **Customer managed policies** – Managed policies that you create and manage in your account.
- **Inline policies** – Policies that you add directly to a single user, group, or role.





AWS IAM - Policy Structure

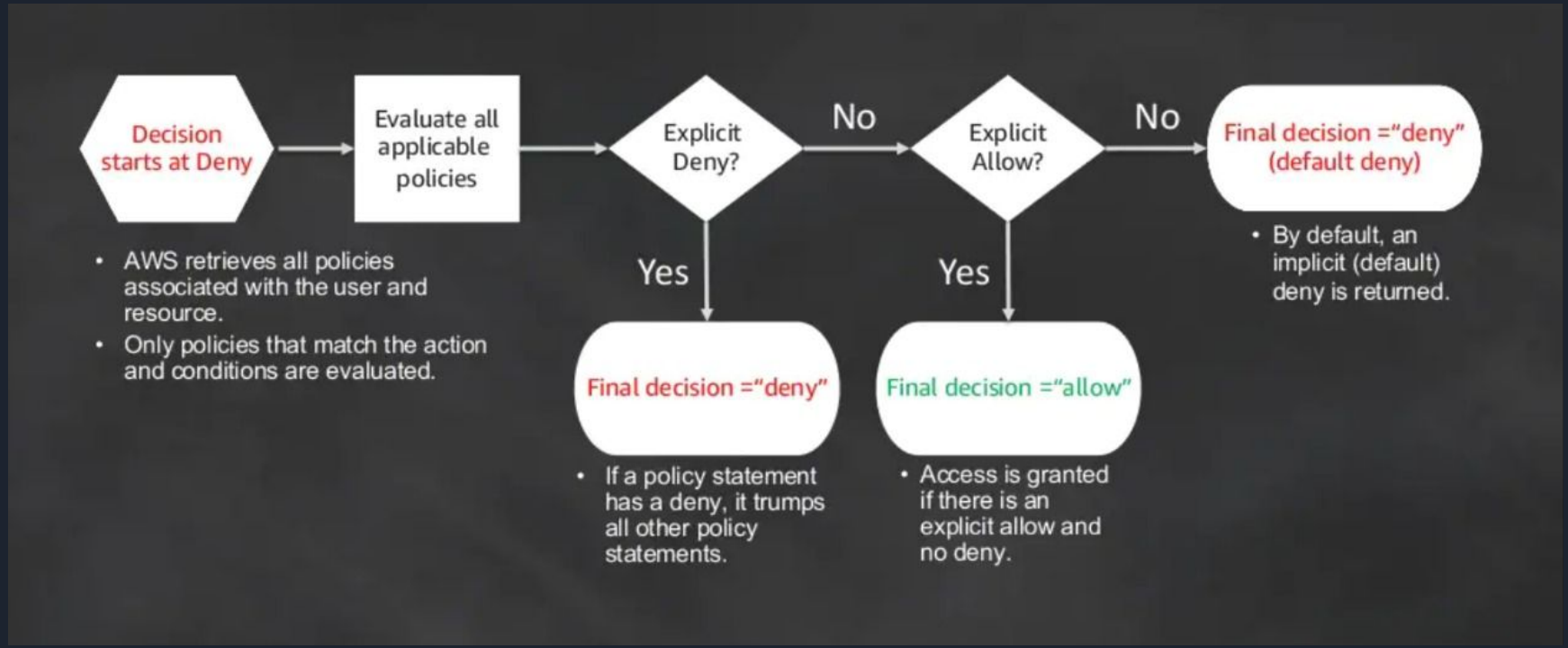
A Policy Statement Consists of -

- ➔ The **Who** aka "Principal"
- ➔ The **What** aka "Action"
- ➔ The **Which** aka "Resource"
- ➔ The **When** aka "Condition"
- ➔ "Not" Versions in Policies

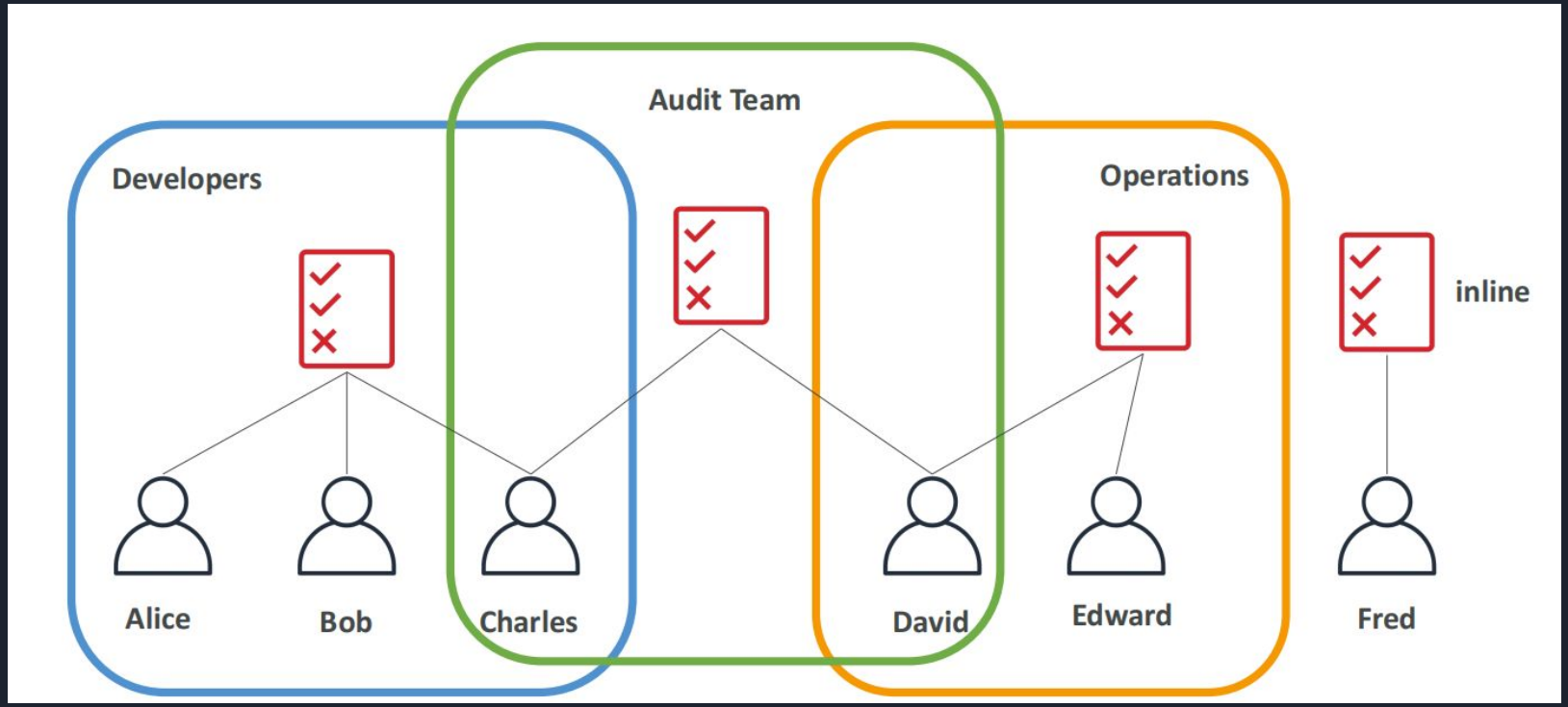
```
"Effect": "Allow",
"NotAction": "s3:DeleteBucket",
"Resource": "arn:aws:s3:::*",
```

```
{
    "Version": "2012-10-17",
    "Id": "S3-Account-Permissions",
    "Statement": [
        {
            "Sid": "1",
            "Effect": "Allow",
            "Principal": {
                "AWS": ["arn:aws:iam::123456789012:root"]
            },
            "Action": [
                "s3:GetObject",
                "s3:PutObject"
            ],
            "Resource": ["arn:aws:s3:::mybucket/*"]
        }
    ]
}
```

IAM policy Evaluation Logic



AWS IAM - Policy Inheritance



AWS IAM Roles for Services

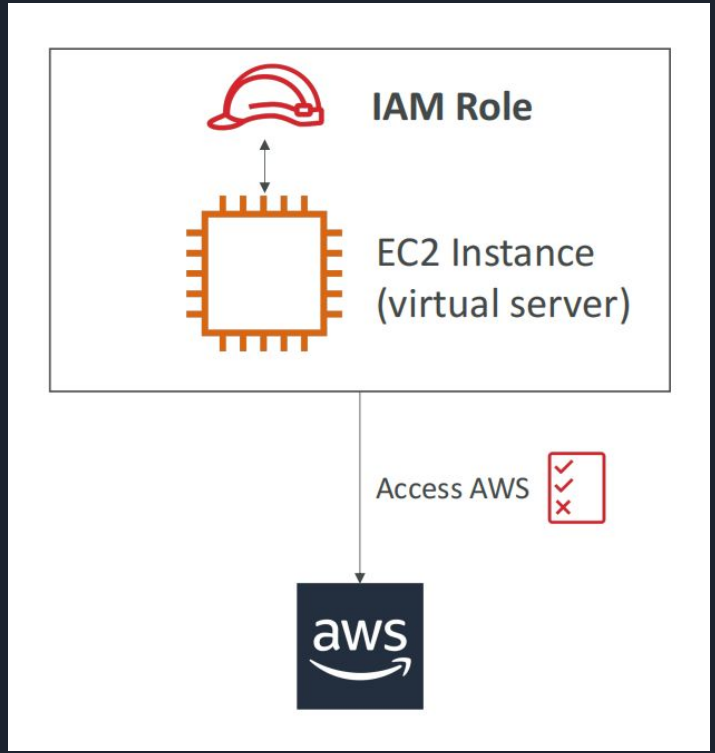
Some AWS service will need to perform actions on your behalf

To do so, we will assign permissions to AWS services with IAM Roles

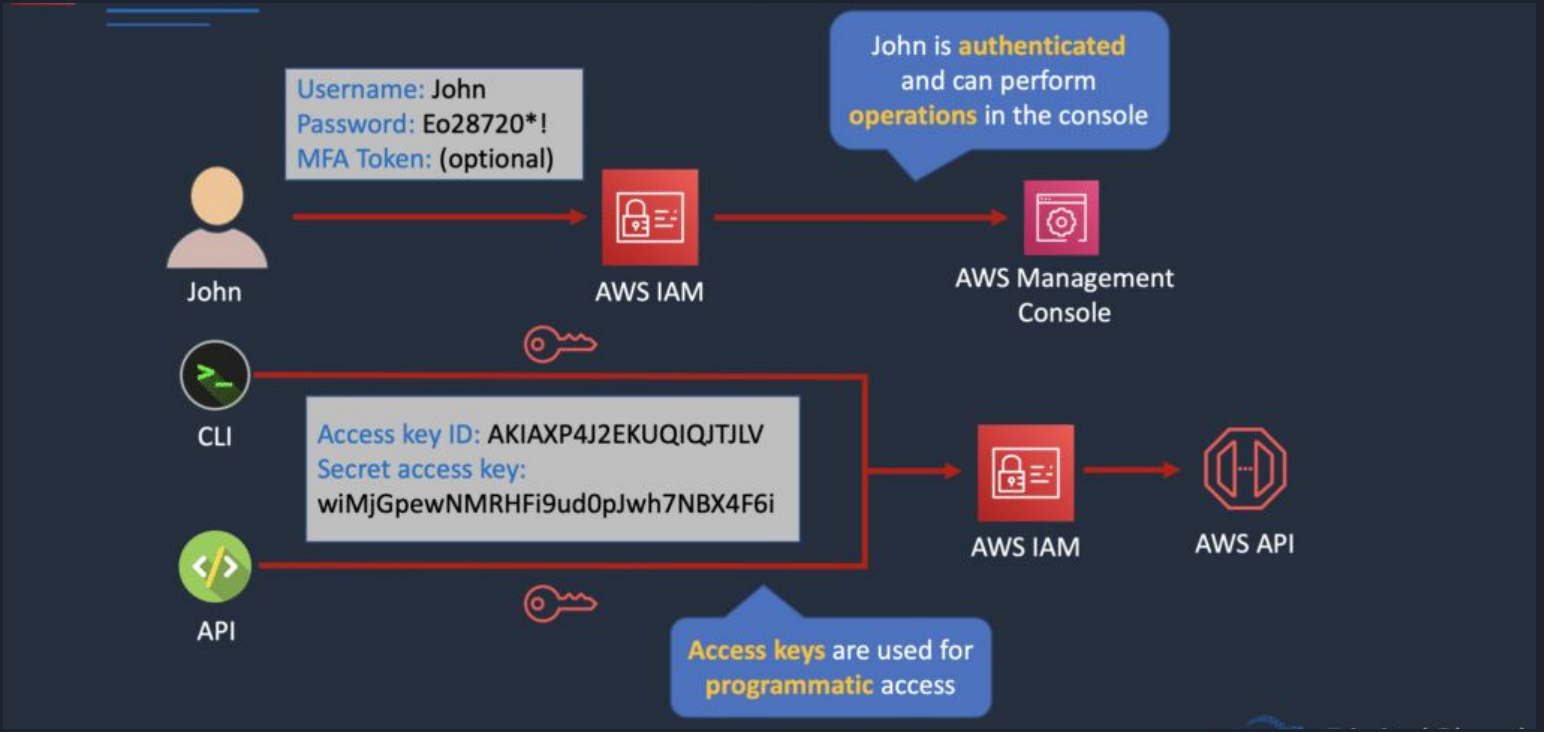
Some Common roles:

- EC2 Instance Roles
- Lambda Function Roles
- Roles for CloudFormation

DEMO



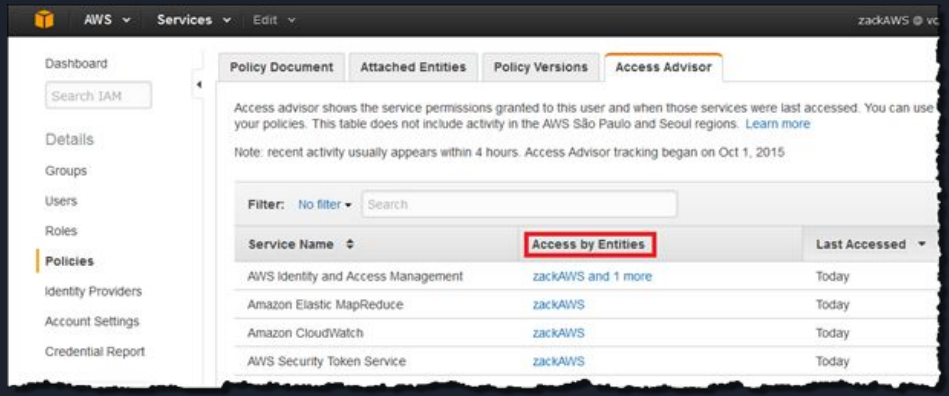
AWS IAM Authentication Methods



AWS IAM Security Tools

IAM Access Advisor (user-level)

- Access advisor shows the service permissions granted to a user and when those services were last accessed.
- You can use this information to revise your policies.



IAM Credentials Report (account-level)

- a report that lists all your account's users and the status of their various Credentials

AWS IAM Credential Report

1 Root Account

Ensure: no usage since last check, multi-factor authentication is enabled, and no access keys exist.

	A	B	C	D	E	F	G	H	I
1	user	user_creation_time	password_enabled	password_last_used	password_last_changed	mfa_active	access_key_1_active	access_key_1_last_rotated	access_key_1_last_used_date
2	<root_account>	2019-07-15T14:44:33	not_supported	2019-07-17T04:49:39	not_supported	TRUE	FALSE	N/A	N/A
3	pam_beasly	2019-11-13T18:32:34	FALSE	N/A	N/A	TRUE	TRUE	2020-06-18T12:12:27	2021-02-06T05:37:00
4	darryl_philbin	2021-01-25T19:12:26	FALSE	N/A	N/A	TRUE	TRUE	2021-11-25T16:11:26	N/A
5	dwight_schrute	2021-01-25T19:10:51	TRUE	2021-02-02T19:12:52	2021-01-25T19:10:51	TRUE	TRUE	2021-02-02T19:12:26	2021-02-02T03:31:00
6	kelly_kapoor	2021-01-25T19:13:23	TRUE	no_information	2021-01-25T19:13:23	FALSE	FALSE	N/A	N/A
7	ryan_howard	2021-01-25T19:26:22	TRUE	no_information	2021-01-25T19:26:22	FALSE	FALSE	N/A	N/A

2 Users should have access keys or passwords, not both.

3 Delete user accounts that have never been used.

4 Password's should be changed based on company policy.

5 Enable MFA for all users.

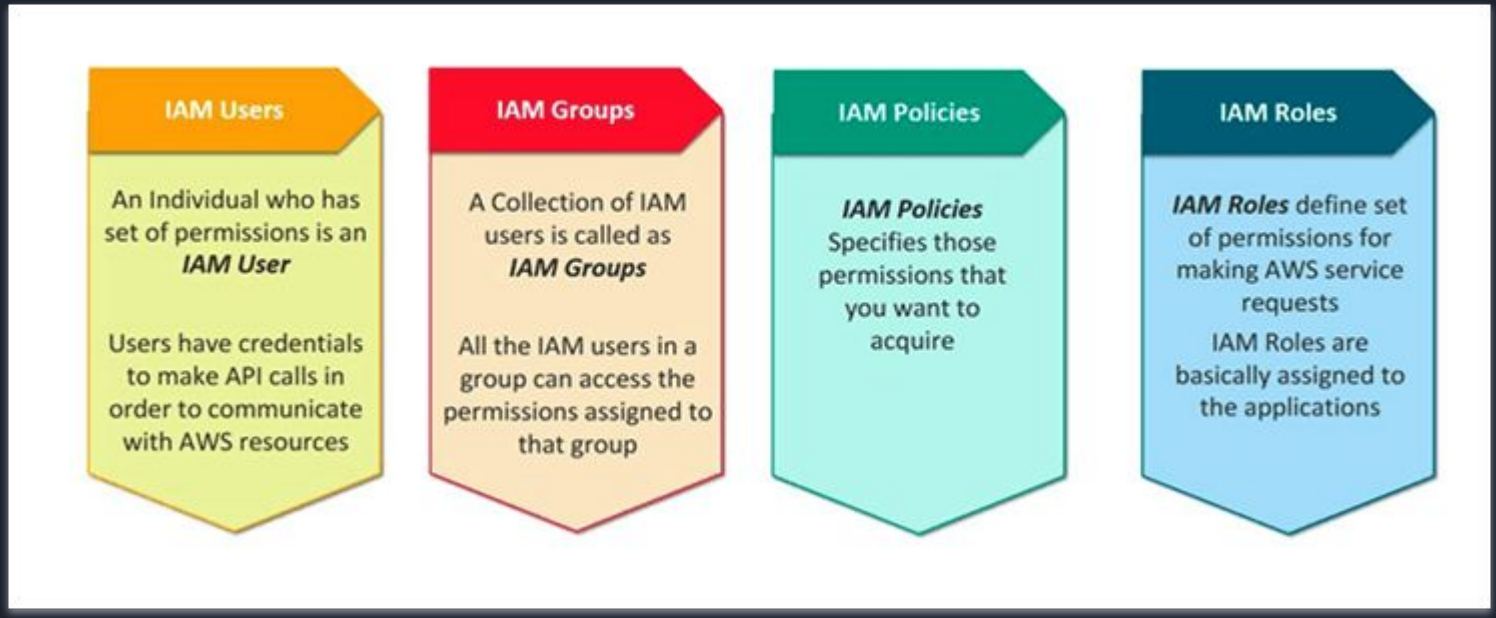
6 Rotate old access keys.

7 Delete unused access keys.

IAM: Guidelines & Best Practices

- Lock away your AWS account root user access keys
- Create individual IAM users
- Assign users to groups and assign permissions to groups
- Grant least privilege
- Configure a strong password policy for your users
- Use and enforce the use of Multi Factor Authentication (MFA)
- Create and use Roles for giving permissions to AWS services
- Never share IAM users & Access Keys
- Rotate credentials regularly
- Remove unnecessary credentials
- Use policy conditions for extra security
- Audit permissions of your account with the IAM Credentials Report

AWS IAM – Summary



AWS Database & Warehouse Services

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Amazon RDS - Introduction

- Easier to set up, operate, and scale a relational database. Provides cost-efficient, resizable capacity for an industry-standard relational database and manages common database administration tasks

- Focus on your application and your users. Amazon RDS is recommended over Amazon EC2 as your default choice for most database deployments.

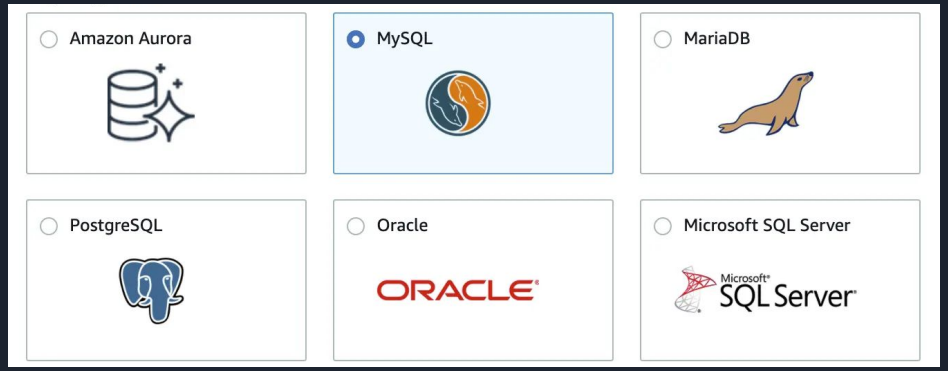
  Note: You cannot SSH into an RDS instance

Feature	Amazon EC2 management	Amazon RDS management
Application optimization	Customer	Customer
Scaling	Customer	AWS
High availability	Customer	AWS
Database backups	Customer	AWS
Database software patching	Customer	AWS
Database software install	Customer	AWS
OS patching	Customer	AWS
OS installation	Customer	AWS
Server maintenance	AWS	AWS
Hardware lifecycle	AWS	AWS
Power, network, and cooling	AWS	AWS

Image Ref: AWS Docs

Amazon RDS - Instances

- No special handling required. Just point to the new Instance
- A *DB instance class* determines the computation and memory capacity of a DB instance.
- Amazon RDS currently supports the following *DB engines*:

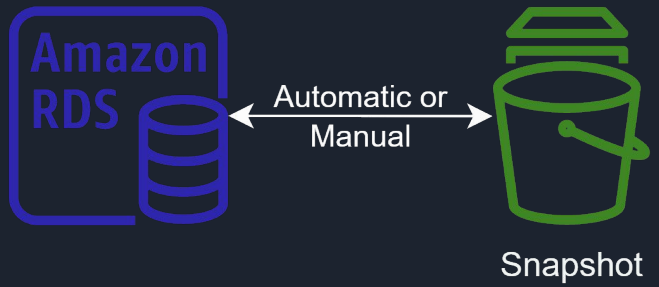


- Each DB engine has a set of parameters in a *DB parameter group* that control the behavior of the databases that it manages.

Amazon RDS - Backups & Snapshots

- Backups
  - Retention period - 0 to 35 days (7 days default)
  - Transaction logs are backed-up by RDS every 5 mins
  - Restore to any point in time of backup

- Snapshots
  - Snapshots don't expire - no retention period
  - Snapshot schedule - Automated Snapshots
  - First snapshot contains the data for the full DB instance.
  - Subsequent snapshots are incremental

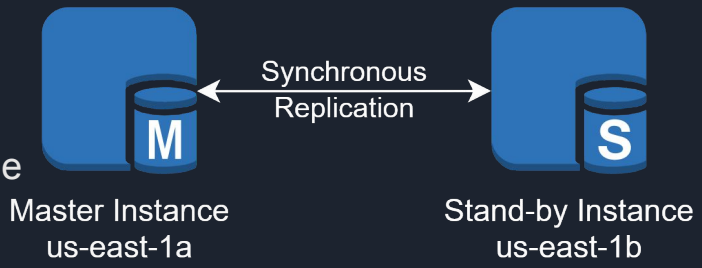


Amazon RDS - Scalability & Availability

- Scales up the storage size if the available storage falls below 10% and this is true for at-least 5 minutes. Can be controlled by setting a maximum storage capacity.

- Read Replicas - Scalability in same AZ, Multi-AZ or Cross-Regions.
  - Asynchronous Replication (Eventually consistent replicas)
  - Each replica can be upgraded to a database in itself (Multi-AZ useful for DR)
  - Max 5 replicas per instance
  - Helps to reduce the read network latency by keeping data near to global users.
  - Cross region replication is chargeable. Multi-AZ replication is free within same region.

- Multi-AZ - High Availability in same Region.
  - Not used for Scalability but rather Disaster Recovery(DR) procedures
  - No additional cost for replication. Multi-AZ replication is free within same region.



Amazon Aurora Databases

- Fully managed relational database engine compatible with **MySQL and PostgreSQL**. Includes high-performance distributed storage across AZs.
- Aurora maintains 6 copies of data across 3 AZs for Backup and Recovery.
- Has a master node and Read Replicas(upto 15). Replicas can Auto Scale based on Requests
- Aurora Endpoints
  - Writer endpoint - Points to master node
  - Reader endpoint - Common endpoint for all read-replica(s)
  - Custom endpoints - User defined, for offloading specific heavy analytical tasks

Amazon Aurora Serverless

- Configuring capacity correctly in advance isn't always possible with the provisioned model. It can also result in higher costs if you overprovision and have capacity that you don't use.

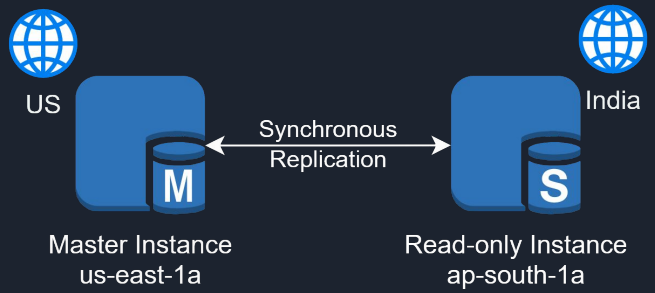
- Checkout Serverless - Create a database endpoint without specifying the DB instance class or size !?

- Auto-Multi-AZ Failover, Always encrypted database

INFINITE POWER!

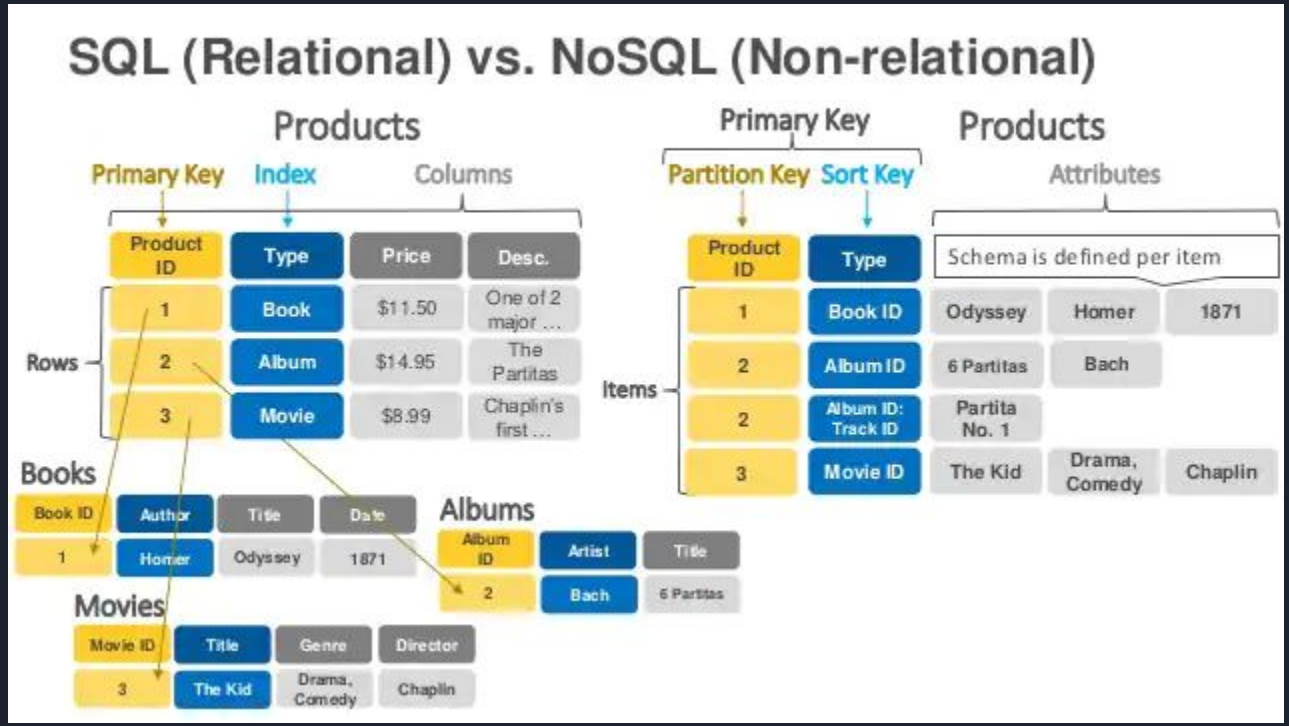
Amazon Aurora Global

- Enables low latency global reads and fast recovery from the rare outage that affect an entire AWS Region.



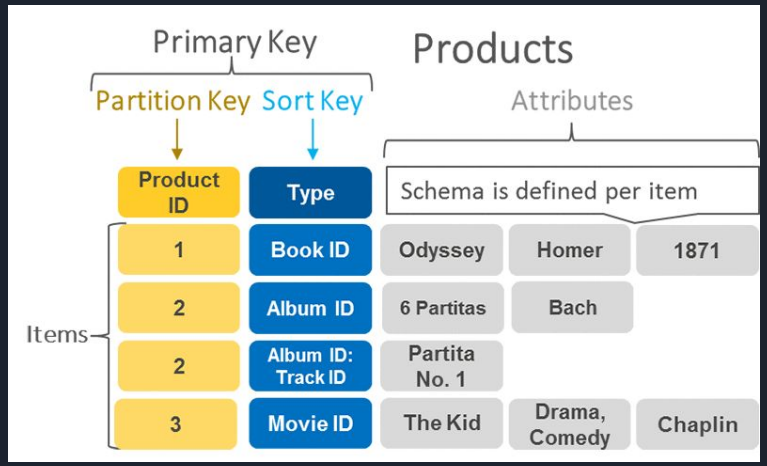
- The secondary cluster is read-only, so it can support up to 16 read-only Aurora Replica instances. Note you cannot auto-scale the read-replicas here

SQL (Relational) vs. NoSQL (Non-Relational)



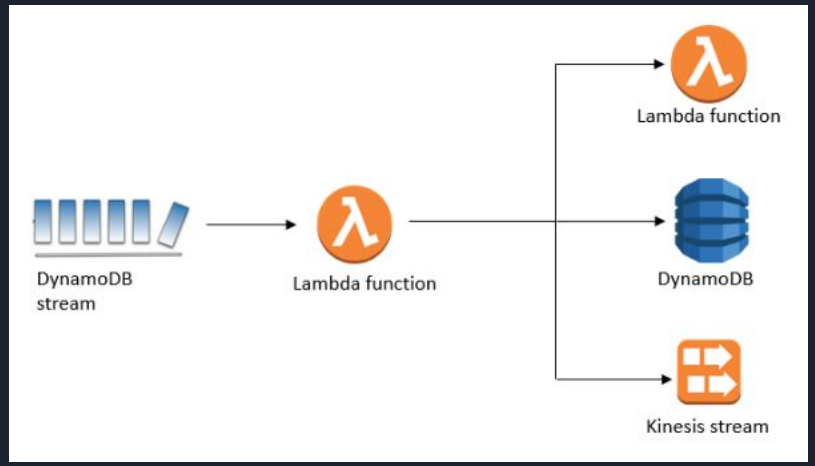
DynamoDB - Introduction

- Fully managed, fast NoSQL key-value database service
- No hardware provisioning, setup and configuration, replication, software patching, or cluster scaling required
- Allows to delete expired items from tables automatically to help reduce storage usage using TTL



DynamoDB Table Structure

Image Ref: AWS Blogs

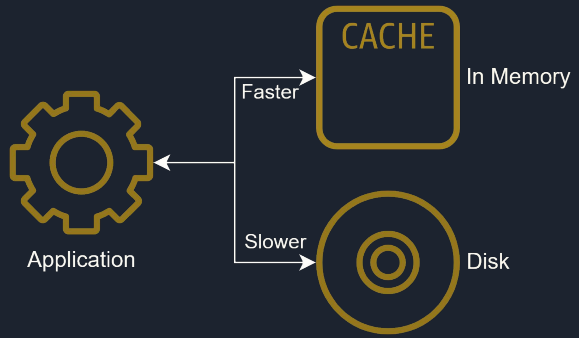


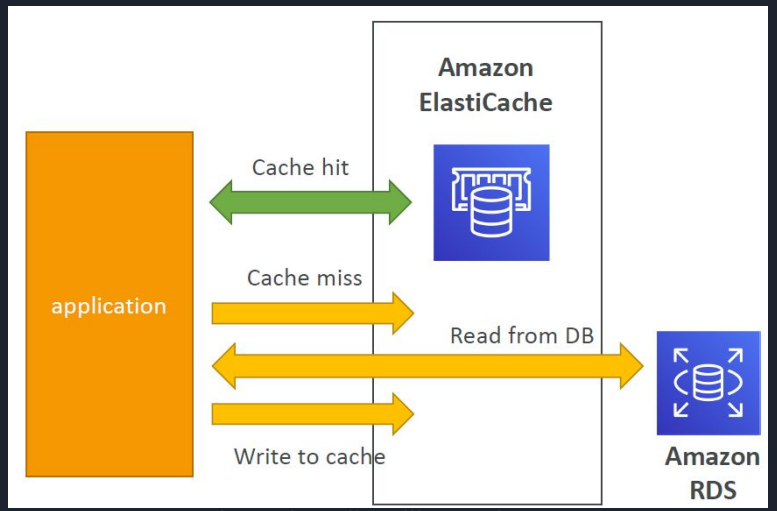
Streams Illustration

Image Ref: AWS Blogs

Elasticache - Introduction

- Provides a high-performance, scalable, and cost-effective caching solution and removes the complexity associated with deploying & managing a distributed cache environment.





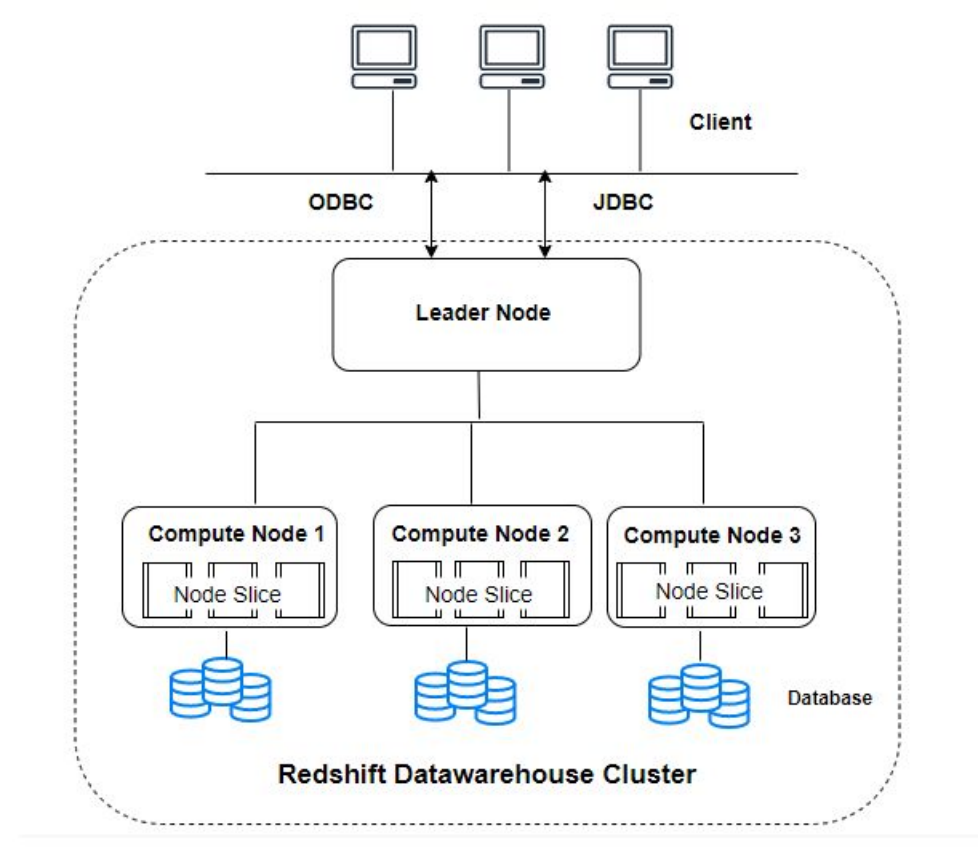
Lazy Loading Illustration

Image Ref. DataCumulus

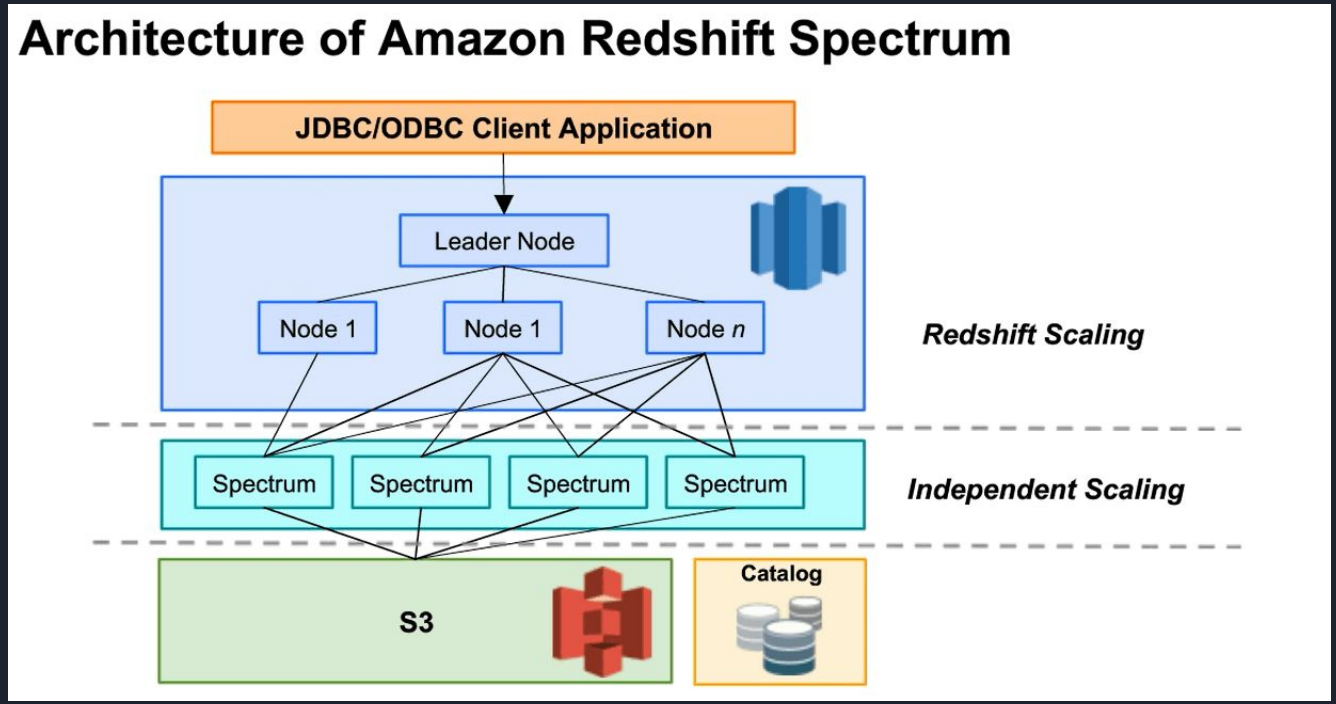
Redshift - Introduction

- Fully managed, petabyte-scale data warehouse service.
- An Amazon Redshift cluster is a set of nodes, which consists of a leader node and one or more compute nodes.
- Based on PostgreSQL but not used for OLTP workloads but rather used for OLAP (warehouse).
- Columnar storage, Massively Parallel Query Execution(MPP)
- COPY command helps to load data from S3 and similarly UNLOAD helps to offload data into S3.

Redshift

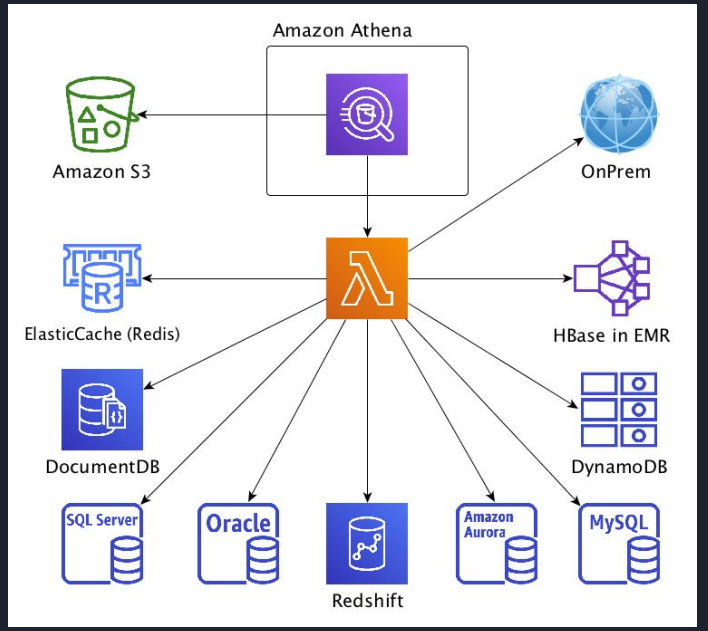

Client
ODBC
JDBC
Leader Node
Compute Node 1
Node Slice
Compute Node 2
Node Slice
Compute Node 3
Node Slice
Database
Redshift Datawarehouse Cluster

Redshift - Spectrum



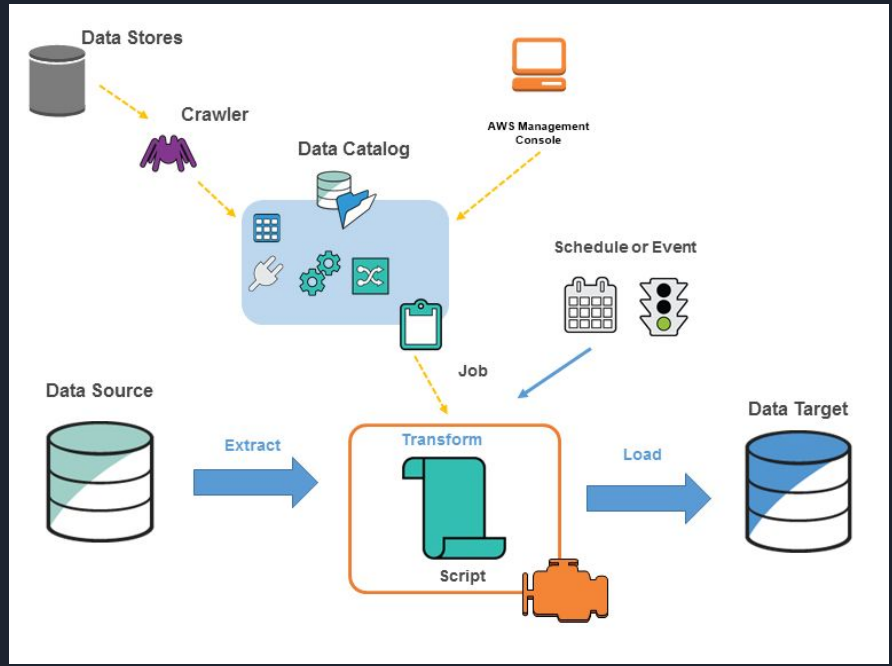
Amazon Athena

- Serverless query service to perform analytics against S3 objects
- Uses standard SQL language to query the files
- Supports CSV,JSON,ORC,Avro,and Parquet(builtonPresto)
- Pricing: $5.00 per TB of data scanned
- Use compressed or columnar data for cost-savings (less scan)
- Use cases: Business intelligence / analytics, analyze & query VPC Flow Logs, ELB Logs, CloudTrail trails, etc...
- Exam Tip: analyze data in S3 using serverless SQL, use Athena



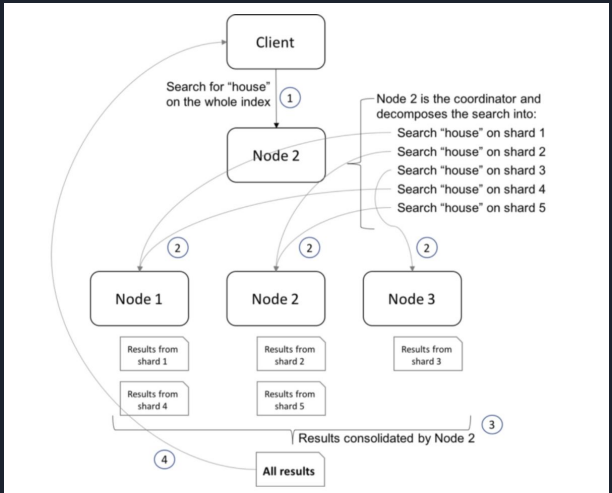
AWS Glue

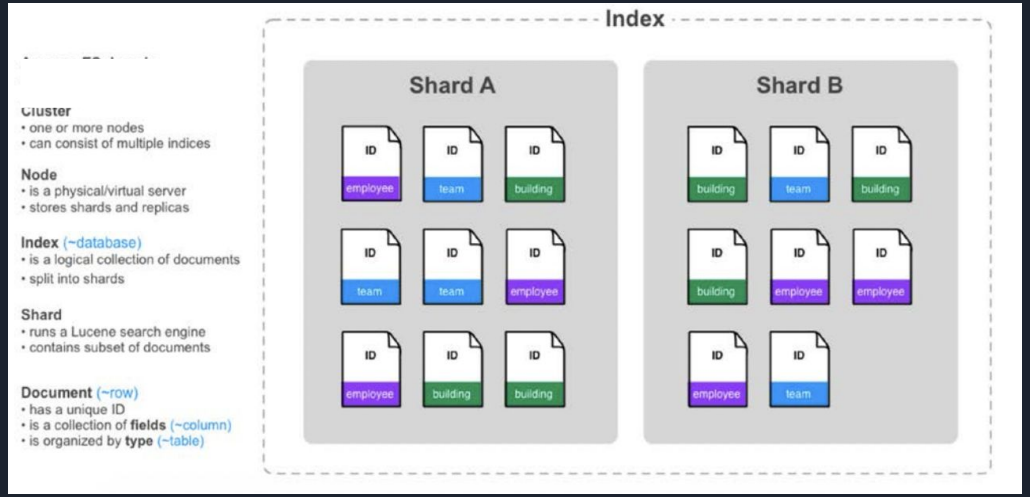
- Fully managed serverless ETL service
- Serverless; runs on a fully managed, auto-scaling Spark environment.
- Glue Components
    - Databases - Tables and Connections
    - Data Catalog - Crawler and Classifiers
    - ETL - Jobs and Triggers



OpenSearch

- Fully open-source search and analytics engine for use cases such as log analytics, real-time application monitoring, and clickstream analysis
- Data visualization using OpenSearch Dashboards (the successor to Kibana)
- Also works on pattern matching(like)/partial matches of data quite fast.



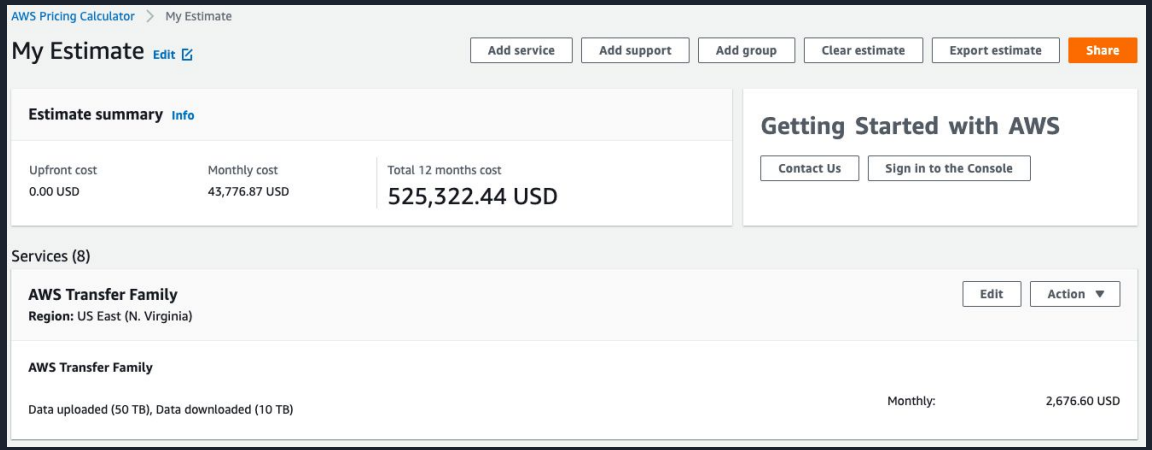


AWS Billing & Cost Management

AWS
User Groups

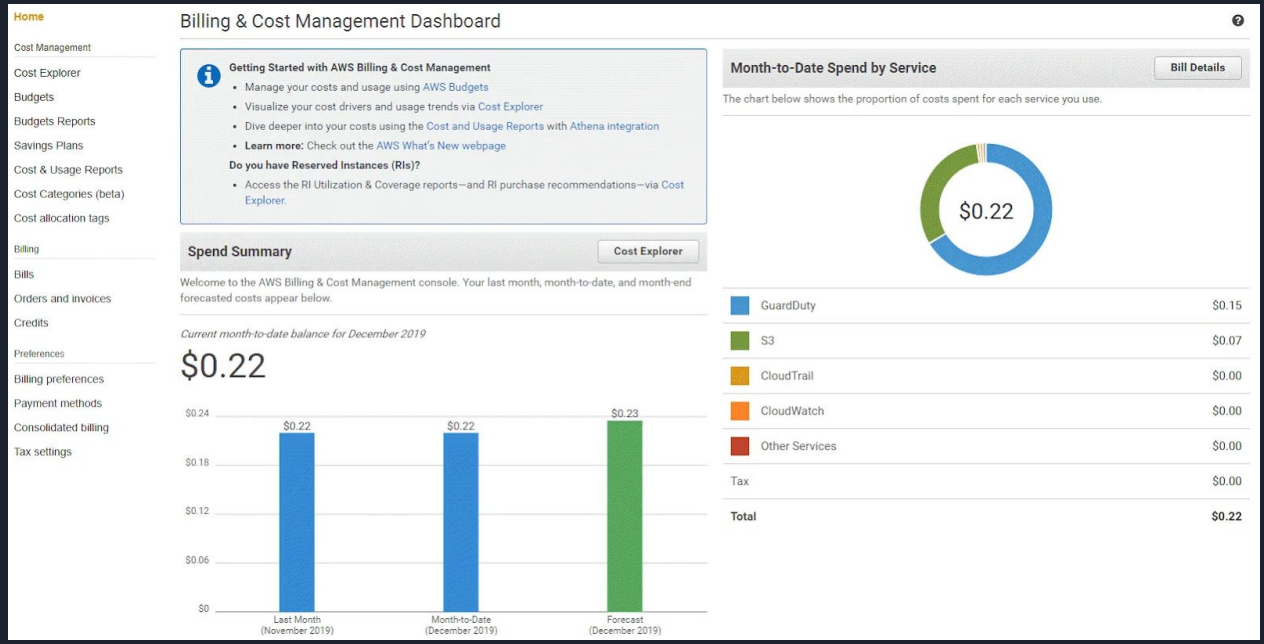
Cost Estimation: AWS Pricing Calculator

- AWS Pricing Calculator is a web based service that we can use to create cost estimates to suit your AWS use cases.
- AWS Pricing Calculator is useful both for people who have never used AWS and for those who want to reorganize or expand their usage
- AWS Pricing Calculator is free for use. It provides an estimate of your AWS fees and charges. The estimate doesn't include any taxes that might apply to the fees and charges.
- AWS Pricing Calculator provides a console interface at https://calculator.aws/#/



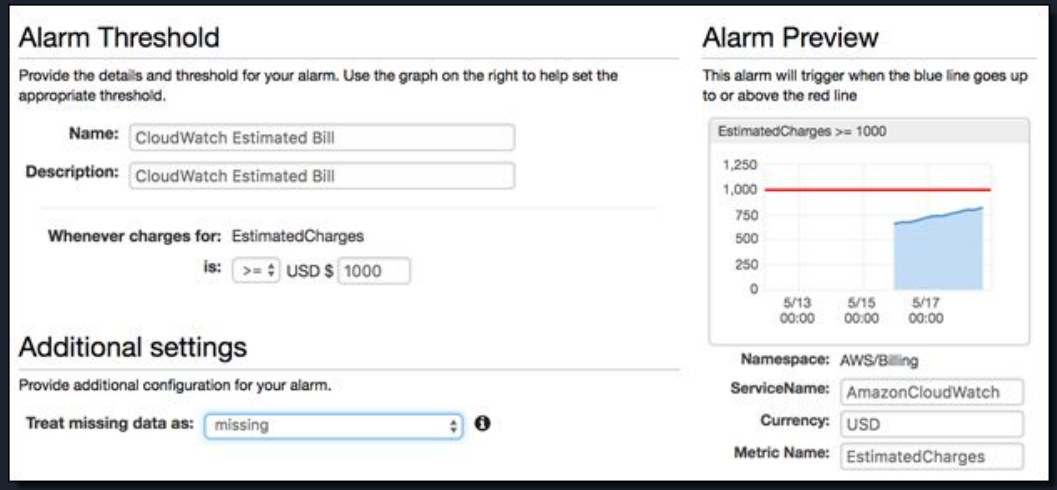
Cost Tracking: Billing Dashboard

- Billing & Cost Management Dashboard can we accessed from the AWS Console, and from there, we can access AWS Budgets, AWS Cost Explorer, and the AWS Cost & Usage Report.



Cost Tracking: Billing Alarm

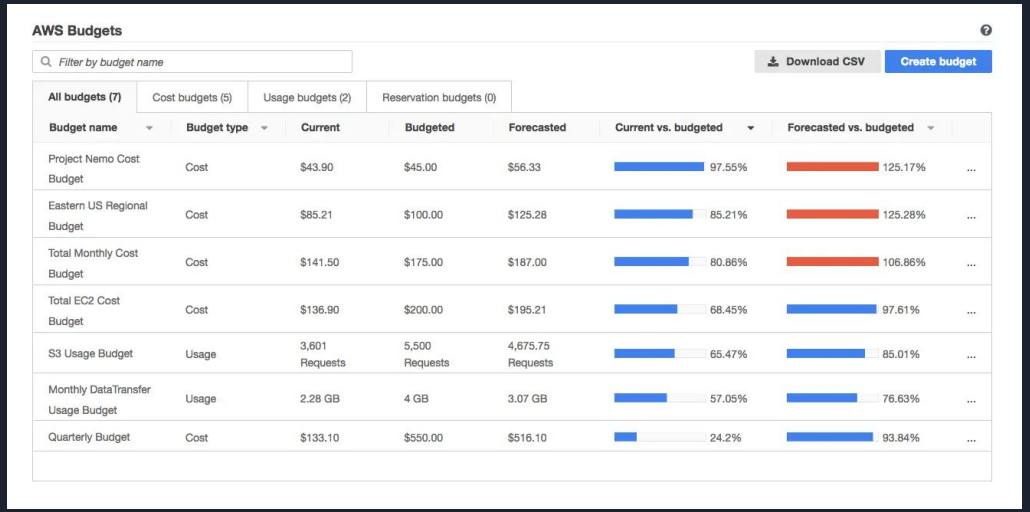
- We can monitor the estimated AWS charges by using Amazon CloudWatch. When you enable the monitoring of estimated charges for your AWS account, the estimated charges are calculated and sent several times daily to CloudWatch as metric data.
- Billing metric data is stored in the **US East (N. Virginia) Region** and represents worldwide charges. This data includes the estimated charges for every service in AWS that you use, in addition to the estimated overall total of your AWS charges.
- The alarm triggers when your account billing exceeds the threshold you specify. It triggers only when actual billing exceeds the threshold. It doesn't use projections based on your usage so far in the month



Cost Tracking: Budgets

- The AWS Budgets Dashboard is your hub for creating, tracking, and inspecting your budgets with more granularity and visibility. It enables you to create several types of budgets.
  - Cost budgets to monitor costs against a specified dollar amount.
  - Usage budgets to monitor usage of one or more specified usage types.
  - Reservation budgets to track Reserved Instance utilization and coverage.
  - Savings Plans budgets to track Savings Plans utilization and coverage.

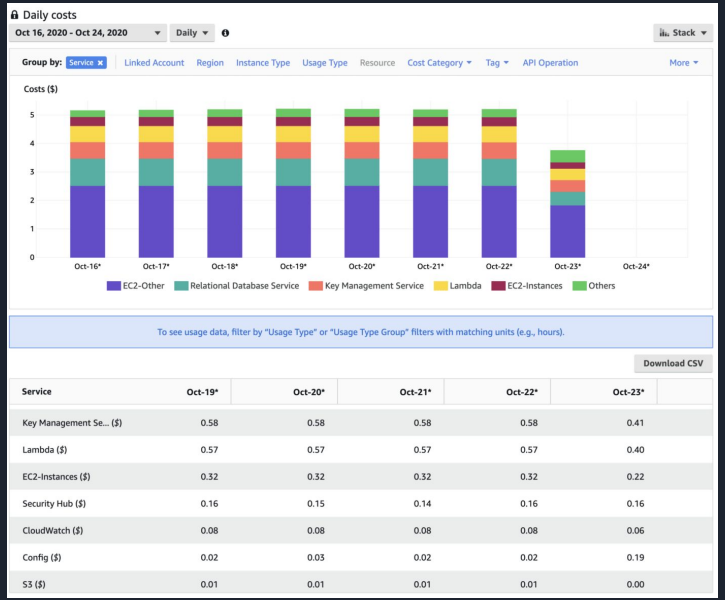
- Like the CloudWatch alarm method, you can set budgets to send alerts when you exceed (or are forecasted to exceed) your budgeted cost or usage amount.



Cost Tracking: Cost Explorer

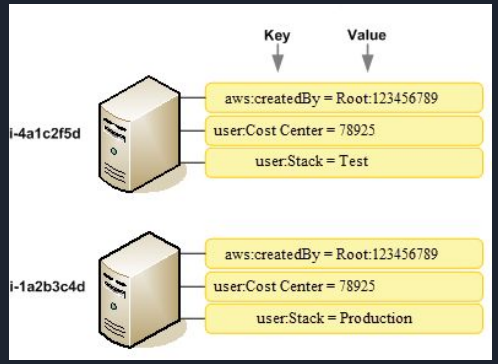
- AWS Cost Explorer enables you to view and analyze your AWS costs and usage. It provides several default reports to get started, including
  - Monthly or daily costs by service
  - Monthly EC2 running hours costs and usage
  - Reserved Instance utilization and coverage
  - Savings Plans reports

- You can choose from different types of graphs to display data visually, apply filters for granular detail, and save your custom reports.
  - With AWS Cost Explorer, you can:
  - View data for up to the last 13 months.
  - Forecast how much you're likely to spend for the next 3 months.
  - Get recommendations for Amazon EC2 rightsizing and reservation purchases.
  - Identify areas that need follow up.
  - See trends that you can use to understand your costs



Cost Tracking: Cost Allocation Tags

- A tag is a label that you or AWS assigns to an AWS resource. Each tag consists of a key and a value. For each resource, each tag key must be unique, and each tag key can have only one value
- AWS provides two types of cost allocation tags, an AWS generated tags and user-defined tags
- We can activated the AWS generated tags, createdBy before creating these resources. The **createdBy** tag tracks who created a resource. The **user-defined** tags use the user prefix, and the AWS generated tag uses the **aws: prefix**.
- After the tags are applied to AWS resources (such as Amazon EC2 instances or Amazon S3 buckets) and we can also activate the tags in the Billing and Cost Management console, AWS generates a cost allocation report as a CSV file with usage and costs grouped based on the active tags
- At the end of the billing cycle, the total charges (tagged and untagged) on the billing report with cost allocation tags reconciles with the total charges on your Bills page total and other billing reports for the same period



Total Cost	user:Owner	user:Stack	user:Cost Center	user:Application
0.95	DbAdmin	Test	80432	Widget2
0.01	DbAdmin	Test	80432	Widget2
3.84	DbAdmin	Prod	80432	Widget2
6.00	DbAdmin	Test	78925	Widget1
234.63	SysEng	Prod	78925	Widget1
0.73	DbAdmin	Test	78925	Widget1
0.00	DbAdmin	Prod	80432	Portal
2.47	DbAdmin	Prod	78925	Portal

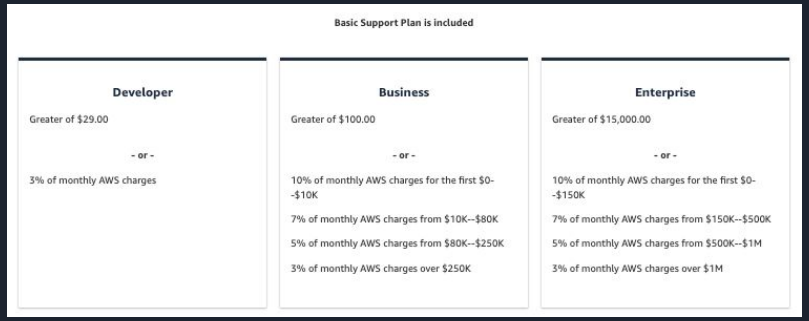
Cost Tracking: Cost and Usage Reports

- The AWS Cost and Usage Reports (AWS CUR) contains the most comprehensive set of cost and usage data available. You can use Cost and Usage Reports to publish your AWS billing reports to an Amazon Simple Storage Service (Amazon S3) bucket that you own
- AWS updates the report in your bucket once a day in comma-separated value (CSV) format
- AWS Cost and Usage Reports tracks your AWS usage and provides estimated charges associated with your account. Each report contains line items for each unique combination of AWS products, usage type, and operation that you use in your AWS account
- AWS Cost and Usage Reports can do the following:
  - Deliver report files to your Amazon S3 bucket
  - Update the report up to three times a day
  - Create, retrieve, and delete your reports using the AWS CUR API Reference

lineItem/ProductCode	lineItem/UsageType	lineItem/Operation	lineItem/AvailabilityZone	lineItem/UsageAmount	lineItem/CurrencyCode	lineItem/LineItemDescription
AmazonEC2	CW:AlarmMonitorUsage	Unknown		0.00134409	USD	$0.00 per alarm-month - first 10 alarms
AmazonS3	Requests-Tier1	ListAllMyBuckets		2	USD	$0.00 per request - PUT, COPY, POST, or LIST requests under the monthly global free tier
AmazonEC2	CW:AlarmMonitorUsage	Unknown		0.00134409	USD	$0.00 per alarm-month - first 10 alarms
AmazonEC2	APS2-EBS:VolumeUsage.gp2	CreateVolume-Gp2		0.01344086	USD	$0.00 per GB-month of General Purpose (SSD) provisioned storage under monthly free tier
AmazonEC2	APS2-EBS:VolumeUsage.gp2	CreateVolume-Gp2		0.01344086	USD	$0.00 per GB-month of General Purpose (SSD) provisioned storage under monthly free tier
AmazonEC2	USW2-BoxUsage:t2.micro	RunInstances:0002	us-west-2a	1	USD	$0.00 per Windows t2.micro instance-hour (or partial hour) under monthly free tier
AmazonEC2	USW2-USE1-AWS-Out-Bytes	PublicIP-Out		0.00000174	USD	$0.000 per GB - data transfer out under the monthly global free tier
AmazonEC2	USW2-USE1-AWS-In-Bytes	PublicIP-In		0.00000138	USD	$0.00 per GB - US West (Oregon) data transfer from US East (Northern Virginia)
AmazonEC2	USW2-USW1-AWS-In-Bytes	PublicIP-In		0.00000149	USD	$0.00 per GB - US West (Oregon) data transfer from US West (Northern California)
AmazonS3	Requests-Tier1	ListAllMyBuckets		2	USD	$0.00 per request - PUT, COPY, POST, or LIST requests under the monthly global free tier
AmazonEC2	USW2-DataTransfer-Out-Bytes	RunInstances		0.00038144	USD	$0.000 per GB - data transfer out under the monthly global free tier
AmazonEC2	USW2-USW1-AWS-Out-Bytes	PublicIP-Out		0.00000174	USD	$0.000 per GB - data transfer out under the monthly global free tier

AWS Support Plans

- Support plans are designed to give you the right mix of tools and access to expertise so that we can be successful with AWS while optimizing performance, managing risk, and keeping costs under control
- AWS Support Plans Pricing



Basic Support Plan is included

Developer	Business	Enterprise
Greater of $29.00	Greater of $100.00	Greater of $15,000.00
- or -	- or -	- or -
3% of monthly AWS charges	10% of monthly AWS charges for the first $0--$10K	10% of monthly AWS charges for the first $0--$150K
	7% of monthly AWS charges from $10K--$80K	7% of monthly AWS charges from $150K--$500K
	5% of monthly AWS charges from $80K--$250K	5% of monthly AWS charges from $500K--$1M
	3% of monthly AWS charges over $250K	3% of monthly AWS charges over $1M

- Basic Support is included for all AWS customers and includes:
  - Customer Service and Communities - 24x7 access to customer service, documentation, whitepapers, and support forums.
  - AWS Trusted Advisor - Access to the 7 core Trusted Advisor checks and guidance to provision your resources following best practices to increase performance and improve security.
  - AWS Personal Health Dashboard - A personalized view of the health of AWS services, and alerts when your resources are impacted

AWS Support Plans

- Developer Support includes all Basic Support Plan +
  - Business hours email access to Cloud Support Associates
  - Unlimited cases / 1 primary contact
  - Case severity / response times - General guidance: < 24 business hours and System impaired: < 12 business hours

- Business Support includes
  - Intended to be used if you have production workloads
  - Trusted Advisor – Full set of checks + API access
  - 24x7 phone, email, and chat access to Cloud Support Engineers
  - Unlimited cases / unlimited contacts
  - Access to Infrastructure Event Management for additional fee.
  - Case severity / response times - General guidance: < 24 business hours, System impaired: < 12 business hours, Production system impaired: < 4 hours, and Production system down: < 1 hour

- Enterprise Support includes all Business Support Plan +
  - Access to a Technical Account Manager (TAM)
  - Concierge Support Team (for billing and account best practices)
  - Infrastructure Event Management,Well-Architected & Operations Reviews
  - Case severity / response times: - Production system impaired: < 4 hours, Production system down: < 1 hour, and Business-critical system down: < 15 minutes

Thank you!

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