

AWS

Cloud Practitioner Essentials

Arindra
Mishra

Amazon EC2 configurations

- Windows
- Linux
- Internal business apps
- Web apps
- Databases
- Third-party software

Amazon EC2 instance families

Balanced Resources



General purpose

Memory intensive task



Compute optimized

Compute intense task (Gaming Servers)

Memory optimized

Accelerated computing

Graphic processing

Storage optimized

High performance for locally stored data

Amazon EC2 purchase options

pay for what you use

consume a particular memory measured in \$/hr

Spare EC2 instances can be reclaimed anytime
2 min warning

On-Demand

Savings Plans

Reserved Instances

Spot Instances

Dedicated Hosts

→ have to pay prior
→ full
→ partial
→ no

no body shares the host

⇒ Load Balancing

Elastic Load Balancing

↓
directs the request to backend having least outstanding request

Properly distribute traffic

High performance

Cost-efficient

Highly available

Automatically scalable

⇒ Tightly Coupled Architecture

↳ Two application directly communicate with each other

⇒ Loosely Coupled Architecture [Queues]

→ SQS (Simple Queue Service)
→ SNS

↑ a package for your code

AWS ECS → Elastic Container Service
EKS → Kubernetes

⇒ AWS Fargate

Serverless Compute Platform
for ECS & EKS

⇒ Regions [may have many availability zones]

→ Compliance [restricted]

→ Proximity [how close are servers to your customer region]

→ Feature Availability

→ Pricing

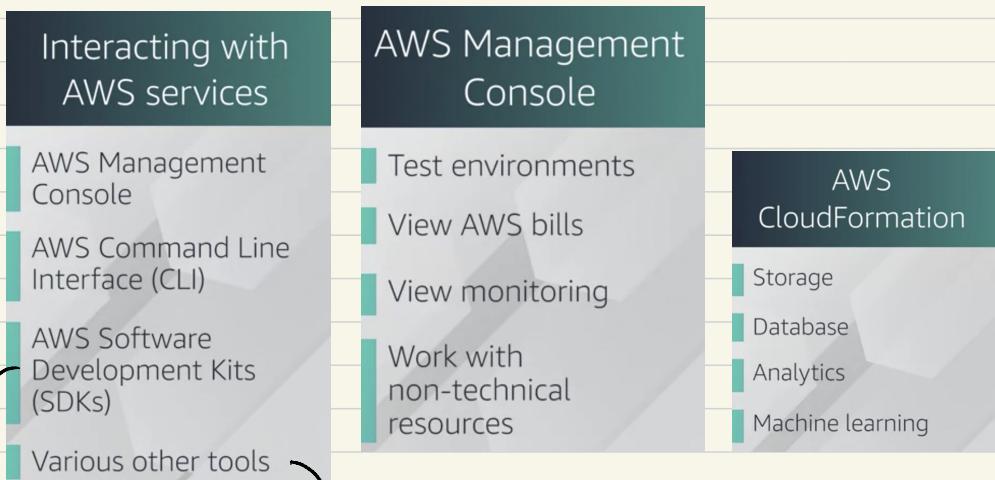
Amazon SQS	
Send messages	
Store messages	
Receive messages	
Between software components	
At any volume	

Amazon CloudFront

→ Edge locations [Runs Amazon Route 53]

⇒ AWS Outpost

→ If someone wants to build data center within the same building



interact
with various
AWS resources
with programming languages

Cloud Formation
AWS Elastic Beanstalk

AWS Elastic Beanstalk

With **AWS Elastic Beanstalk**, you provide code and configuration settings, and Elastic Beanstalk deploys the resources necessary to perform the following tasks:

- Adjust capacity
- Load balancing
- Automatic scaling
- Application health monitoring

AWS CloudFormation

With **AWS CloudFormation**, you can treat your infrastructure as code. This means that you can build an environment by writing lines of code instead of using the AWS Management Console to individually provision resources.

AWS CloudFormation provisions your resources in a safe, repeatable manner, enabling you to frequently build your infrastructure and applications without having to perform manual actions or write custom scripts. It determines the right operations to perform when managing your stack and rolls back changes automatically if it detects errors.

Public Traffic $\xrightarrow[\text{Internet gateway}]$ VPC

Virtual Private Cloud (VPC)

Virtual Private Gateway

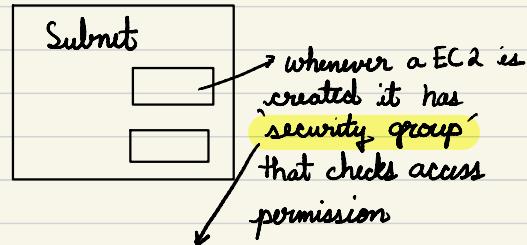
They are private, and they are encrypted, but they still use a regular Internet connection that has bandwidth that is being shared by many people using the Internet.

⇒ AWS Direct Connect → establish a private connection

⇒ One VPC might have multiple type of gateways attached for multiple type of resources.

- Network hardening
- Application security
- User identity
- Authentication and authorization
- Distributed denial of service prevention
- Data integrity
- Encryption

(Stateless)
Network Access Control List



(Statefull)
→ don't check the outgoing request

Global Networking

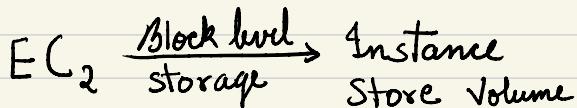
- Amazon Route 53 [DNS Service]
- Amazon CloudFront

Content delivery network (CDN):
A network that delivers edge content to users
based on their geographic location

Amazon Route 53 routing policies

- Latency-based routing
- Geolocation DNS
- Geoproximity routing
- Weighted round robin

→ We can deploy static content on cloud front, so the user can access the service at higher rate [edge location]



Amazon Elastic Block Store [EBS]

→ When we delete a EC₂ the data stored in it gets deleted. So we use EBS

⇒ Size ⇒ Type ⇒ Configurations

⇒ Snapshots : Incremental Backups

Amazon S3 (Simple Storage Service)

Object storage → Store & retrieve an unlimited amount of data unique identifier
Each object consists of data, metadata & a key

any time there is change we have the upload complete file

how a data is, how is it used.

How often you plan to retrieve your data

How available you need your data to be

S3 Standard

- 99.9999999% of durability
 - Static website hosting
- data stored in min. 3 centers

S3 Standard - Infrequent Access

- Store backups
- Long term storage

Amazon S3 Glacier

- WORM (Write Once Read Many)
- Lock policy for future edits

★ Amazon S3 Lifecycle Management:

Move data automatically between tiers

There are other storage classes like S3 infrequent access one zone and S3 glacier deep archive,

EBS (Elastic Block Storage)

Block Storage ⇒ When there is a change the engine only uploads the blocks where those changes are made

Elastic File System (EFS)

Amazon EFS

- Multiple instances reading and writing simultaneously
- Linux file system
- Regional resource
- Automatically scales

→ Lift & Shift

Amazon Relational Database Service (RDS)

AWS supported databases	Amazon RDS
MySQL	Automated patching
PostgreSQL	Backups
Oracle	Redundancy
Microsoft SQL Server	Failover
	Disaster recovery

Amazon Aurora

- MySQL
- PostgreSQL
- 1/10th of other commercial databases
- Data replication
- Deploy upto 15 replicas
- Continuous Backup to Amazon S3
- Point in time recovery

Amazon Dynamo DB (NoSQL)

← Millisecond response time
↳ Data stored in tables

↓
Data is organised into items
↓
attributes

Amazon Redshift for handling the real time ingestion and queries [relational databases can't handle]

Data warehouses → to handle large datasets

It offers the ability to collect data from many sources and helps you to understand relationships and trends across your data.

↓
quantity & volume

Amazon Migration Service (AWS DMS)

AWS DMS

- The source database remains fully operational during the migration.
- Downtime is minimized for applications that rely on that database.
- The source and target databases don't have to be of the same type.

⇒ Homogenous Databases [DB of same type]

⇒ Heterogeneous Databases [DB of diff type]

2 Step Process × Schema Structures
 × Data Types
 × Database code] AWS schema conversion tool

Development and test database migrations

Database consolidation

Continuous database replication

Several database which you want to consolidate into single database

Amazon Document DB → for Content Management

Amazon Neptune → A graph database [social networking]

Amazon QLDB

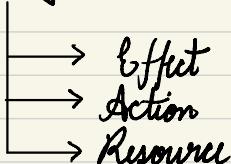
^{better} Amazon Managed Blockchain [huge decentralization]

Amazon ElasticCache Amazon DAX → for Dynamo DB Cache layer

Shared Responsibility Model

Customer		Customer Data			
Responsible for security "in" the cloud		Platform, applications, identity and access management			
		Operating system, network and firewall configuration			
		Client-side data encryption		Server-side data encryption	Network traffic protection
AWS		AWS Foundation Services			
Responsible for security "of" the cloud		Compute	Storage	Database	Networking
AWS global infrastructure			Regions Edge locations Availability Zones		

⇒ IAM policy



⇒ IAM group

⇒ Policies
⇒ Roles

⇒ Authentication & authorization as a service

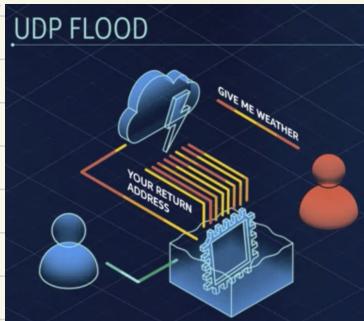
⇒ AWS Organization

AWS Organizations
Centralized management
Consolidated billing
Hierarchical groupings of accounts
AWS service and API actions access control

→ Service Control Policies (SCPs)
(You can specify man. permissions for member accounts)

Distributed Denial-of-Service (DDoS)

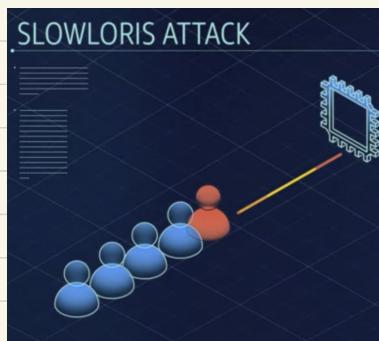
Security groups



Send useless data to the server by giving the wrong return address. So CPU gets filled with lots of useless things.



Make many request leaving less room for CPU to react to other address



Pretend to have slow internet connection, so the server has to wait for longer attack.

Elastic Load Balancer

⇒ AWS KMS

(Key Management System)

⇒ SSL (Secure Socket Layer)

⇒ Amazon Inspector

Amazon Inspector

Network configuration reachability piece

Amazon agent

Security assessment service

⇒ Amazon GuardDuty

CloudWatch

↳ Cloudwatch alarm (integrated with SNS)

We can create dashboard

Amazon CloudWatch

Access all your metrics from a central location.

Gain visibility into your applications, infrastructure, and services.

Reduce MTTR and improve TCO.

Drive insights to optimize applications and operational resources.

Total Cost of ownership

Mean time to Resolution

AWS CloudTrail

Every request gets register in CloudTrail engine.

- who made the request → which operator
- response → did change occur → Was the request denied
what is the new state
- detect security group setting changes
- has Vault LOCKS

AWS Trusted Advisor

→ Cost optimization → Performance → Security → Fault tolerance
→ Service limits

- No problem
- Investigation Recommended
- Action Recommended

AWS Free Tier

→ Always Free ⇒ AWS Lambda [1 million invocation/month]
→ 12 months free ⇒ S3 [12 months upto 5 GB]
→ Trials ⇒ Lightsail [1 month - 750 hrs]

AWS Organisations [Consolidate Billing] } Bulk Pricing
 ↘
Pay bill once for multiple account

The reserved instances in EC2 can be shared.

AWS Budget

Set custom budget for cost & usage.

Billing → Budget

⇒ AWS Cost Explorer → gives a list of cost of the resources used in the past.

Tag [User defined key value pairs]

Basic support	Developer support	Business support
24/7 customer service	Basic support	Basic and Developer support
Documentation	Email access to customer support	AWS Trusted Advisor provides full set of best practice checks
Whitepapers		Direct phone access to cloud support engineers
Support forums		Infrastructure event management
AWS Trusted Advisor		
AWS Personal Health Dashboard		
Enterprise support		
Basic, Developer, and Business support	<ul style="list-style-type: none"> → Well-Architected Framework ⇒ Operational Excellence ⇒ Security ⇒ Reliability ⇒ Performance Efficiency ⇒ Cost Optimization 	
15-minute SLA for business critical workloads		
Technical Account Manager (TAM)		

- Well-Architected Framework
- ⇒ Operational Excellence
- ⇒ Security
- ⇒ Reliability
- ⇒ Performance Efficiency
- ⇒ Cost Optimization

AWS Marketplace

- One-Click Deployment
- Pay as you go

Enterprise focused features
Custom terms and pricing
A private marketplace
Integration into your procurement systems
Cost management tools

AWS Cloud Adoption Framework (AWS CAF)



AWS CAF Action Plan:
Helps guide your org for cloud migration

6R [Ways to migrate]

- Rehosting [no change]
- Replatforming [perform few cloud optimization]
- Retire [no longer supported]
- Retain [Sort period still remains]
- Repurchase [Ending with old vendors]
- Refactoring [add performance]

AWS Snow Family (Secure - 256 bit)

- AWS Snowcone (8 TB)

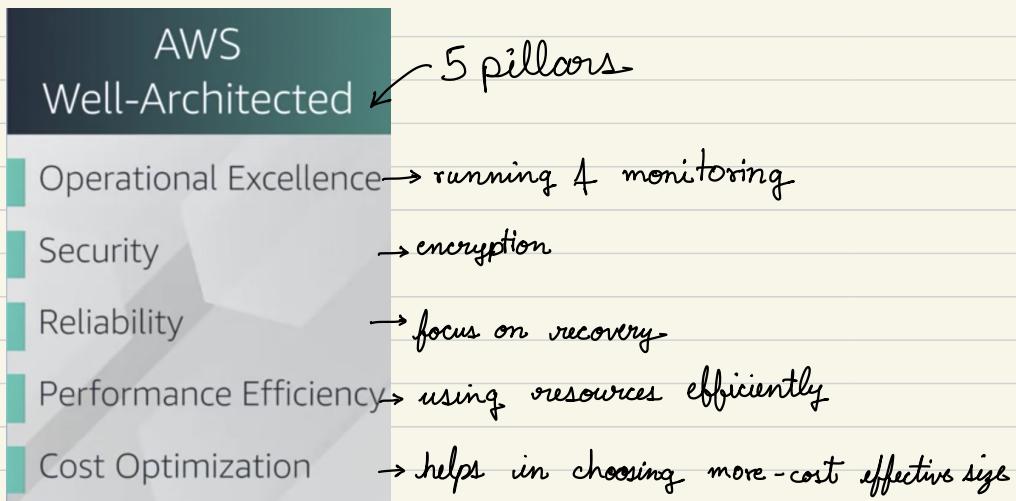
To upload data it may take lot of time. So, AWS gives devices to upload data & then we ship it back to them. To they upload it is cloud.

- AWS Snowball Edge (80 TB)
- Compute Optimised
- Storage Optimised

→ AWS Snowmobile (100 Petabytes)

- ⇒ To move huge data
- ⇒ Comes in Shipping containers
- ⇒ AWS SageMaker (Build models & deploy)
Augmented AI] Machine Learning Platform
Amazon A21
- Amazon Lex] Alexa ⇒ ChatBots
- Amazon Textract] Extract data
- Amazon DeepRacer (reinforcement learning)
- AWS Ground Station [Satellite]

⇒ AWS Well-Architected Tool



Green → Ok

Orange → Room for improvement

Red → Something is at risk

⇒ Main Benefits of AWS

- Trade fixed expense for var. expense
- [deals with prop of data center] (physical space)
- Benefit from massive economies of scale
- [as AWS purchase more storage they get at lower cost]
- Stop guessing capacity
- [we can scale the hardware]
- Increase Speed & agility
- [we can run the experiment]
- Maintaining Data Center
- Go global in minutes