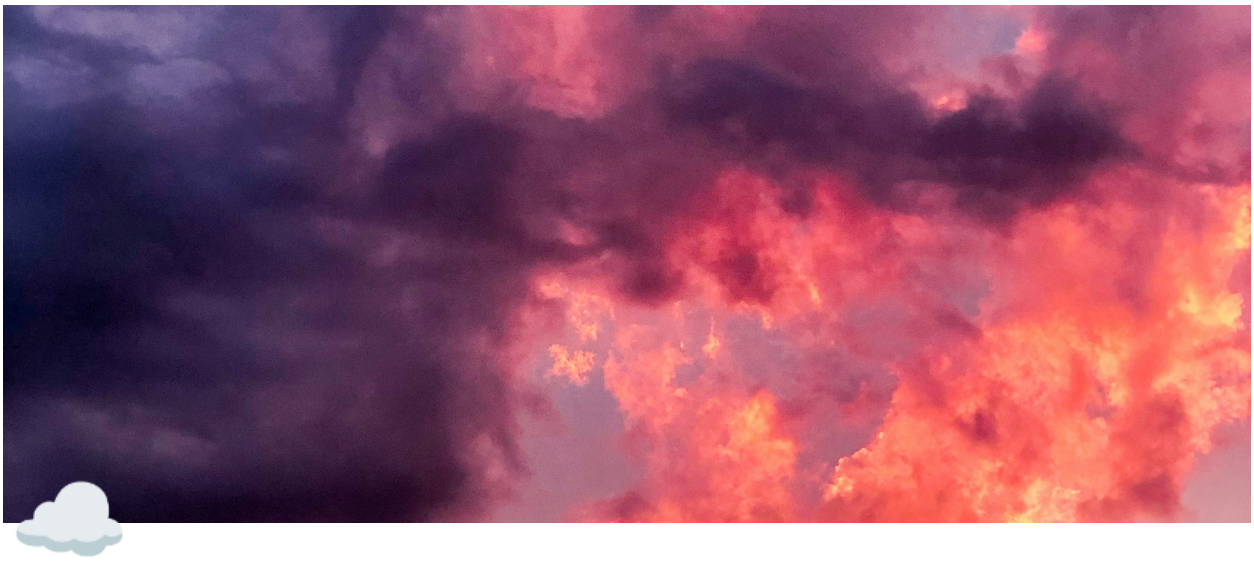


AWS CLOUD

▼ WHAT IS CLOUD COMPUTING?

▼ TRADITIONAL IT OVERVIEW

- CLIENTS HAVE IP ADDRESSES
- SERVERS HAVE IP ADDRESSES

▼ WHAT IS SERVER COMPOSED OF ?

COMPUTE:CPU

MEMORY:RAM

Will form BRAIN,Retain the Imformation

STORAGE:DATA

DATABASE TO STORE DATA IN A STRUCTURED WAY

ROUTERS,SWITCH,DNS SERVER

IT TERMINOLOGY:

- Network: Cables routers connected with each other

- Router:A networking device that forwards data packets between computer networks they know where to send packets on the Internet
- SWITCH:Takes a packet and send it to the correct server /client of your network

▼ TRADITIONAL ARCHITECTURE:

HOME TO GARAGE—> OFFICE—>DATA CENTRE

- Pay for the rent for data centre
- Pay for Power supply,cooling maintained e
- Adding and replacing hardware takes time
- Scaling is Limited
- Hire 24/7 Team to infrastructure

CAN WE EXTERNALISE THIS?

It forms the cloud

▼ CLOUD COMPUTING:

- Cloud Computing is on demand delivery of compute power database storage applications and other IT resources
- Through a Cloud Services platform with PAY AS YOU GO pricing
- You can Provision Exactly the type and size of Computing Resources you need
- Can acces these resources instantly as many resources as possible
- Simple way to access servers,storage databases and set of application Services
- Owns and maintains the network connected hardware required for these application Services while you Provision and use what you need via web Application

EXAMPLE OF CLOUDS:

GMAIL:EMAIL CLOUD SERVICES

PAY FOR ONLY YOUR EMAILS STORED

DROPBOX:Cloud Storage Service

Originally built on AWS

NETFLIX:BUILT ON AWS

Video on Demand

▼ DEPLOYMENT MODELS OF THE CLOUD :

▼ PRIVATE CLOUD:

- Cloud Services used by Single Organisation not exposed to the public
- Complete Control
- Security for Sensitive Applications
- Meet Specific Business Needs
- ROCKSPACE

▼ PUBLIC CLOUD:

- Cloud Resources owned and operated by a third party cloud Service provider delivered over the Internet
- Six Advantages of Cloud Computing

▼ HYBRID CLOUD:

- Keep Some servers on Premises and extend some capabilities of the cloud
- Control over sensitive assets in your Private Infrastructure

▼ CHARACTERSTICS OF CLOUD COMPUTING:

▼ ON DEMAND SELF SERVICE

- Users can Provision Resources and use them without human interaction from the service Provider

▼ BROAD NETWORK ACCESS

Resources Availaible over the Network and can be accessed by diverse Client Platforms

▼ MULTI-TENANCY AMD RESOURCE POOLING

- Multiple Customers can share the same Infastructure and applications with security and Privacy
- Multiple Customers are serviced from the same Physical Resources

▼ RAPID ELASTICITY AND SCALABILITY

- Automatically and quickly Acquire and dispose Resources when Needed
- Quickly and Easily scale Based on Demand

▼ ADVANTAGES OF CLOUD COMPUTING

▼ TRADE CAPITAL EXPENSE(CAPEX) for Operational Expense(OPEX)

- Pay-On-Demand:Dont Own Hardware
- Reduced Total Cost of Ownership(TCO) and Operational Expense(OPEX)

▼ BENEFITS FROM MASSIVE ECONOMIES OF SCALE

- Prices are Reduced as AWS is more Efficent due to large Scale

▼ STOP GUESSING CAPACITY

- Scale based on actual measured Usage

▼ INCREASE SPEED AND AGILITY

▼ STOP SPENDING MONEY RUNNING AND MAINTAINING DATA CENTERS

▼ GO GLOBAL IN MINUTES

▼ PROBLEMS SOLVED BY THE CLOUD

▼ FLEXIBILITY

- Change Resource Types when Needed

▼ COST EFFECTIVENESS

- Pay as you go for what you use

▼ SCALABILITY

- accommodate larger Roads by making Hardware Stronger or adding Additional Nodes

▼ ELASTICITY

- Ability to scale out and scale in when Needed

▼ HIGH AVAILAIBILITY AND FAULT TOLERANCE

- Build Across Data Centres

▼ AGILITY

- Rapidly Develop,test and launch Software applications

▼ DIFFERENT TYPES OF CLOUD COMPUTING:

▼ INFRASTRUCTURE AS A SERVICE(IAAS)

- Provide Building Blocks for Cloud IT
- Provides Networking,Computers,data Storage Space in raw format
- Highest Level of Flexibilty
- Easy Parellel with Traditional-On-Premises IT

▼ PLATFORM AS A SERVICE(PaaS)

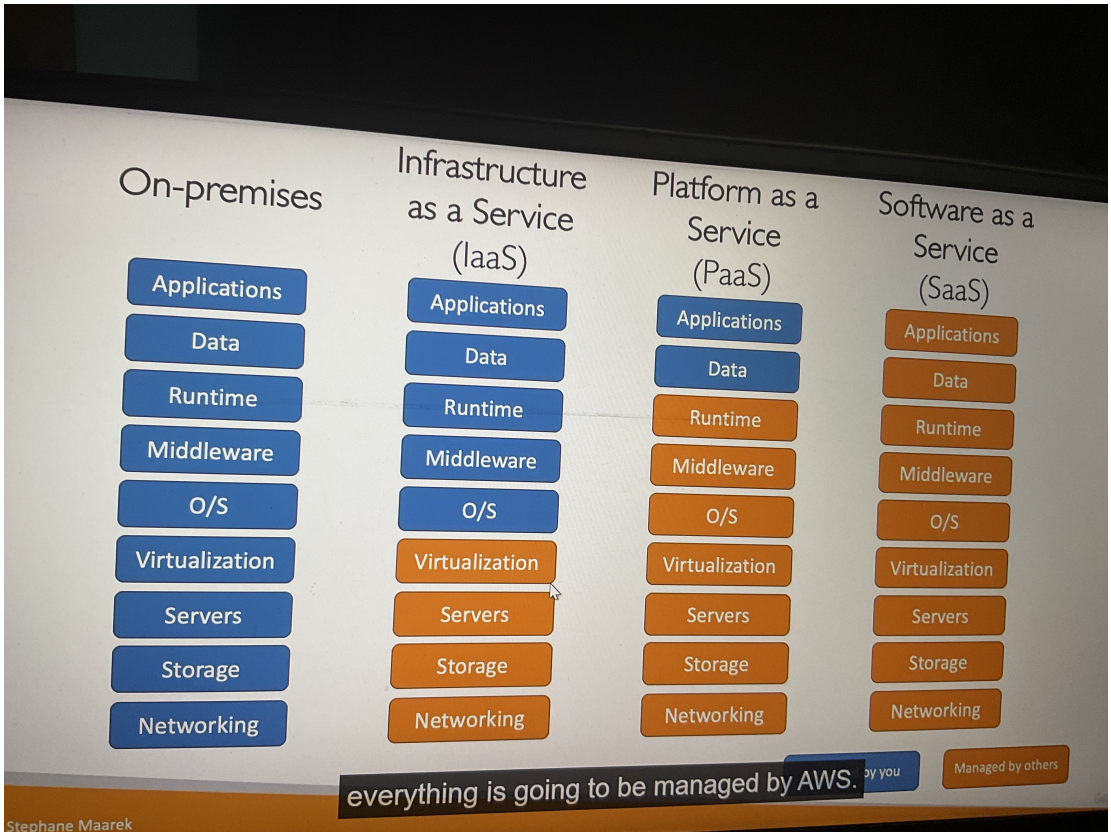
- Remove the need for your Organisation to manage the Underlying Infrasture

- Focus on the Deployment and management of your Applications

▼ SOFTWARE AS A SERVICE(SaaS)

- Completed Product that is run and managed by the service Provider

EXAMPLE:



EXAMPLE:

▼ EXAMPLE:

▼ IAAS:

- Amazon EC2(on AWS)
- GCP,Azure,Rackspace,Digital Ocean,Linode

▼ PAAS:

- Elastic BeanStalk(On AWS)
- Hero ki,Google app Engine,Windows azure

▼ SAAS:

- Many AWS services(Rekognition)
- Google Apps(Gmail),Dropbox,zoom

▼ PRICING OF THE CLOUD:

3 Pricing Fundamentals:

▼ Compute:

- Pay for Compute Time

▼ Storage:

- Pay for data stored in the Cloud

▼ NETWORKING:

- Data transfer IN is Free

Solves the Expensive issue of Traditional IT

▼ AWS

▼ AWS CLOUD HISTORY:

1. Launched in 2002
2. It for other people
3. Launched SQS
4. Relaunched EC2 S3,SQS
5. Launched in Europe

Examples:Netflix

Amazon Web Services

Enables you to build Sophisticated scalable Applications

- Backup and Storage,Big Data Analytics

▼ GLOBAL INFASTRUCTURE:

- AWS REGIONS
- Availaibility Zones

Check availaibility at infastructure.aws

▼ AWS REGIONS:

US-EAST-1 and many others

A region is cluster of Data Centres

Most AWS services are region Scoped

▼ HOW TO CHOOSE AWS REGION:

- **COMPLIANCE:**
  - With Data Governance and legal Requirements data never leaves a region without Explicit Permission
- **PROXIMITY:**
  - To Customers:Reduced Latency
- **AVAILAIBLE SERVICES:**
  - Within a Region:New Services and new Features are not availaible in every Region
- **PRICING:**
  - Pricing varies region to region and is Transparent in the Services Pricing Page

▼ AWS AVAILAIBILITY ZONES:

- Each Region has many Availaiblity zones(Usually **3** min is 2 max=6)
- ap-1a,ap-1b,ap-1c
- Each Availaibility zones is 1 or more data centres with redundant Power,Networking and Connectivity

- Seperate from Each Other,so that they are Isolated from Disasters
- Connected with High Bandwidth ultra low latency Networking

▼ AWS HAS GLOBAL SERVICES:

- Identity and Access Management(IAM)
- Route 53(DNS SERVICE)
- Cloud Front(Content Delivery Network)
- WAF(Web Application Firewall)

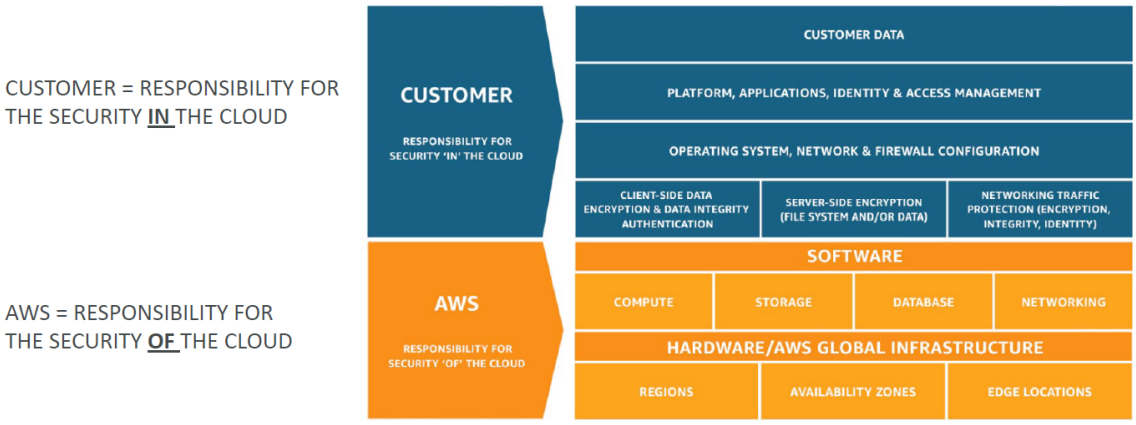
▼ AWS SERVICES AS REGION SCOPED:

- AMAZON EC2(IAAS)
- ELASTIC BEANSTALK(PAAS)
- LAMBDA(FAAS)
- Rekognition(SaaS)

Region Table Check link also Availaible

- Use Global Infastructure

Shared Responsibility Model diagram



https://aws.amazon.com/compliance/shared-responsibility-model/

▼ ACCESS MANAGEMENT

▼ IAM SERVICE

▼ IAM SERVICE:

- Identity and Access Management ,Global Service
- Root account created by default should not be used or shared
- Users are People within your Organization and can be grouped
- Groups inside groups cannot be created

▼ PERMISSIONS:

- Users and Groups can be Assigned JSON documents called Policies
- These Policies define the Permissions of the Users
- In AWS apply LEAST PREVILEGE PRINCIPLE dont give Permissions than a user Needs

PRACTICE ON CREATING USERS AND GROUPS

▼ IAM POLICIES INHERITANCE:

- 1 policy in group gives policies to everyone in group
- Singler User can have inline policies
- will get both when in both structure

▼ POLICIES STRUCTURE:

Consists of :

- Version:Policy language Version,always Include”2012-10-17”
- Id:an idetifier for the Policy
- Statement:One or more Indivisual Statements(Required)
  - Sid:An Identifier for the Statement(OPTIONAL)

- Effect:whether the statement allows or denies access(allow,deny)
- Principle:account/user/role to which this Policy is Applied to
- Action:List of Actions this policy allows or Denies
- Resource:List of Resources to which actions applied to
- Conditions: Conditions for when this Policy is in Effect

▼ IAM PASSWORD POLICY:

▼ Strong Passwords=

Higher Security for your Account

We can Also Setup Password Policy:

- Set Minimum Password Length
- Required Specific Character Types:
  - Including Uppercase Letters
  - LowerCase Letters
  - Numbers
  - Non-alphanumeric Characters
- Allow all IAM users to change their Own Passwords
- Require Users to change their Password after Some time(password Expiration)
- Prevent Password Reuse

▼ MULTI FACTOR AUTHENTICATION:MFA:

- Users have access to your account and can possibly change configurations or delete resources in your AWS account

- You want to protect your Root Accounts and IAM users
- **MFA:**Password you Know+ Security Device you own
- Main Benefit: If password is Stolen or Hacked,the Account is not Compromised

▼ MFA DEVICES OPTIONS IN AWS:

Virtual MFA Device:

Google Authenticaor,Authy

Support for multiple Tokens on a Single Device

Universal 2nd Factor (U2F) Security Key(YUBI KEY):

- Support for Multiple Root and IAM Users using a single Security Key

HARDWARE KEY FOB MFA DEVICE:

HARDWARE KEY FOB MFA DEVICE FOR AWS GOVCLOUD(US)

▼ HOW USERS ACCESS AWS:

- To access AWS you have 3 Options
  - AWS MANAGEMENT CONSOLE(Protected by Password +MFA)
  - AWS COMMAND LINE INTERFACE(CLI):Protected by Access KEYS
  - AWS SOFTWARE DEVELOPER KIT(SDK)- for code:Protected by Access Keys
- Access keys generated through AWS CONSOLE
- Users manage their Own Access Keys
- Access keys are secret just like Password Dont share them

▼ IAM ROLES FOR SERVICES:

- Some AWS SERVICE will need to perform actions on your behalf

- Assign Permissions to AWS Services with IAM Roles
  - Common Roles:
    - EC2 Instance Roles

▼ IAM SECURITY TOOLS:

- IAM CREDENTIALS REPORT(ACCOUNT LEVEL)
  - A report that that lists all your accounts’s users and the status of their various credentials
- IAM ACCESS ADVISOR:
  - Access Advisor shows the service Permissions granted to a user and when those services were last Accessed
  - Use this Imformation to revise your Policies

▼ IAM GUIDELINES AND BEST PRACTICES:

- Dont use the root account except for AWS account Setup
- One Physical User=One AWS user
- Assign users to Groups and assign permissions to groups
- Create a strong Password Policy
- Use and Enforce the use of MFA
- Create and use Roles for giving Permissions to AWS SERVICES
- User Access Keys for Programmatic Access(CLI/SDK)
- Audit Permissions of your Account with the IAM Credentials Report
- Never Share IAM Users and Access Keys

COMPARE:

▼ AWS:

- Infasturucture(GLOBAL NETWORK SECURITY)
- CONFIGURATION AND VULNERABILITY ANALYSIS
- Compliance Validation

▼ YOU:

- Users,Groups,Roles,Policies Management and Monitoring
- Enable MFA on all Accounts
- Rotate all your Keys Often
- Use IAM Tools to apply Appropriate Permissions
- Analyze Access Patterns and Review Permissions

IAM Section – Summary

- **Users:** mapped to a physical user, has a password for AWS Console
- **Groups:** contains users only
- **Policies:** JSON document that outlines permissions for users or groups
- **Roles:** for EC2 instances or AWS services
- **Security:** MFA + Password Policy
- **AWS CLI:** manage your AWS services using the command-line
- **AWS SDK:** manage your AWS services using a programming language
- **Access Keys:** access AWS using the CLI or SDK
- **Audit:** IAM Credential Reports & IAM Access Advisor

▼ FILE MANAGEMENT

▼ EFS

- EBS have Limited Performance
- for higher Power Performance use EC2 Instance store
- Better I/O Performace
- EC2 instance store lose their Storage if Stopped

- Good for Buffer/cache/Scratch Data/Temp Content
- Risk of data loss if hardware fails
- Backups and Replication are your Responsibility

EFS-ELASTIC FILE SYSTEM

- Managed NFS(Network File System) can be mouted on 100s of EC2
- EFS works with Linux EC2 instances in Multi-AZ
- Higly Availaible,scalable,expensive,pay per use,No capacity Planning

▼ EFS INFREQUENT ACCESS(EFS-IA)

- Storage Class that is class Optimized for Files not accessed every day with lifeCycle Policy
- example:Move files that are not accessed for 60 days to EFS-IA
- Transparent to the applications accessing EFA

SHARED RESPONSIBILITY:

▼ AWS

- Infrastructue
- Replication for data for EBS Volumes and EFS drives
- Replacing Faulty Hardware
- Ensuring their Employees cannot access your Data

▼ YOU

- Setting up Backup/snapshot Procedures

- Setting up Data Encryption
- Responsibility of any data on the drives
- Understanding the riskof using EC2 Instance Store

AMAZON FSx-OverView

- Launch 3rd Party high Performance file systems on AWS
- Fully Managed Service

/head
AMAZON FSx for WIndows File server

- Windows Native Shared File System
- Built on Windows File Server
- Support SMB Protocol and Windows NTFS
- Integrated with microsoft Active Directry
- Can be Accessed from AWS or your On-Premises Infastructure

AMAZON FSx for Lustre:

- A fully managed High Performance,Scalable File Storage for High Performance Computing(HPC)
- The Name is Linux and Clustre
- Machine Learning,Analytics,Video Processing,Financial Modelling
- Scales up to 100Gb/s,Million of IOPS,sub-ms latencies

▼ ELASTIC LOAD BALANCING AUTO SCALING GROUPS:

SCALABILITY AND AVAILAIBILITY:

- can handle Greater Loads by adapting

- Vertical and Horizontal Scalibility
- Linked to High Availaiblity but **DIFFERENT**

VERTICAL SCALABILITY:

- Increasing the Size of the Instance
- Difference between Junior And Senior operator as Example
- runs on t2.micro changed to t2.large
- For **NON_DISTRIBUTED SYSTEMS** such as Database
- Hardware Limit

HORIZONTAL SCALABILITY:

- Increasing No. of Instances for the Application
- more No. of Junior Operators
- Common for Web Applications

HIGH AVALAIBILITY:

- running your application system in at least 2 **AS**
- Goal is to Survive a Data Centre Loss

SCALABILTY: Ability to accomodate a large load by making the hardware stronger or by adding Nodes(Scale OUT)

ELASTICITY: Auto Scaling Ability so that system can scale based on the load. Pay per Use

AGILITY: To reduce time to make those resources availible to the developers from weeks to just Minutes

▼ ELB(ELASTIC LOAD BALANCING

Load Balancing:

- Servers that forward Internet Traffic to Multiple Servers downstream
- Spread load across Multiple Downstream Instances

- Seamlessly Handle Failures of Downstream Instances
- Expose single POint of Acess(DNS)
- Handle Failures and Regular checks also giives SSL TERMINATION
- High Availaibilty Across Zones
- Managed by AWS,Upgrades,High Availaibility
- Less cost but too much effort

3 kinds LOAD BALANCER:

- **Application Load Balancer**
- **Network Load Balancer**(ultra high Performance,allows for TCP)-Layer 4
- **Classic Load Balancer**—> Layer4 and 7

AUTO SCALING GROUP:

- add or delete EC2 instances to match INCREASED or DECREASED LOAD
- Automatically register new Instances to LOAD BALANCER
- Replace Unhealthy Instances
- Cost Saving:Run at Optimal Capacity
- Works with **LOAD BALANCER**

MANUAL SCALING:

Update Sizze of ASG manually

DYNAMIC SCALING:

Respond to changing Demand

- SIMPLE:
    - when Cloud Watch Alarm is triggered (>70) then add 2 units

    - when less then 30 % remove 1
- TARGET TRACKING SCALING:
    - Average ASG CPU to stay around 40 %
- SCHEDULED SCALING:
    - Anticipate scaling based on known Usage Patterns
    - increase min Capacity to 10 at 5pm on Fridays
- PREDICTIVE SCALING:
    - Uses ML to predict Future Traffic ahead of time
    - Automatically provision right no. of EC2 Instances in Advance

useful when load has predictable Time Patterns

▼ AMAZON S3

- INFINITELY SCALING STORAGE
- backbone for many websites
- AWS SERVICES uses it as an INTEGRATION as well

▼ USE CASES

- BACKUP AND STORAGE
- DISASTER RECOVERY
- ARCHIVE
- HYBRID CLOUD STORAGE
- APPLICATION HOSTING
- MEDIA HOSTING
- DATA KAJES and BIG DATA
- SOFTWARE DELIVERY
- STATIC WEBSITE

▼ BUCKETS

- Store Objects(FILES) in BUCKETS(DIRECTORIES)
- BUCKETS have globally unique name
- Buckets defined at REGION LEVEL,created in region

▼ OBJECTS

- have a **KEY**
- it is a full PATH
- PREFIX+OBJECT NAME
- Contains Content
- If more then 5gb use MULTI PART UPLOAD
- **METADATA—:** List of key value pairs
- **TAGS—:** Unicode/key value pairs for SECURITY
- **VERSION ID—:** if needed

▼ S3 SECURITY

- USER BASED
  - Using IAM POLICIES
- RESOURCE BASED
  - Bucket Policies:
    - Provide rules from S3 Console allows cross Account
  - OBJECT ACCESS CONTROL LIST
    - Finer Grain
  - Bucket Access Control List
    - Less Common

- IAM CAN ACCESS IF

- Either IAM PERMISSIONS OR RESOURCE POLICY

- ENCRYPTION
  - Using ENCRYPTION keys

▼ EXAMPLE: PUBLIC ACCESS

- From Anonymous to access S3 Bucket data

▼ S3 BUCKET POLICIES

- JSON based Policies
  - Actions:Set of API to allow or Deny
  - Effect:Allow/deny
  - Principle
- USE S3 Bucket for Policy to:
  - Grant Public Access to the bucket
  - Force Objects to be Encrypted at upload
  - Grant access to another account

▼ BUCKET SETTINGS:

- To prevent Data Leaks
- Can be set at the account level

▼ S3 WEBSITES

- S3 can host Static Websites and have them Accessible on the www

▼ S3 VERSIONING

- Version your files in S3
- Enabled at Bucket Level
- Version1,2,3 etc
- Best Practice to Version your Buckets

    - Unintended Deletes
    - Easy roll back to Previous Version

▼ S3 ACCESS LOGS

- For Audit Purpose,want to log all access to S3 Buckets

▼ S3 Replication (CRR and SRR)

- Must use Enable Versioning
- Cross Religion Replication(CRR)
- Same Religion Replication(SRR)
- Buckets can be in Different Accounts
- Copying is Asynchronous
- Must Give PERMISSIONS to S3
- CRR: compliance,Lower Latency Access,Replication across accounts
- SRR:Log Aggregation,Live Replication between Production and Test Accounts

▼ DURABILITY

- 11 9’s durability
- same for all storage Classes

▼ AVAILAIBILITY

- Measures how readily availaible a service is
- Not Availaible for 53 minutes a year

▼ STORAGE CLASSES

▼ S3 Standard

- 99.99 Avail.
- Low latency high Throuput
- Frequen access

- Data analytics,Mobile and Gaming Apllications

▼ S3 INFREQUENT ACCESS

- 99.99 % Availaibility
- disaster,Recovery

▼ GLACIER STORAGE ACCESS

- Low cost Object Storage
- Price of Storage+Object Retrieval Cost

▼ S3 Intelligent-Tiering

- Small Monthly monitoring and auto Tiering Fee
- Objects move between access tiers based on Usage
- No retrieval charges

▼ S3 Object Lock and Glacier Vault Lock

- S3 OBJECT LOCK
  - Adopt write once read many model
  - Block an Object Version deletion for Specified Amount of time
- Glacier Vault Lock
  - Adopt WORM model
  - Lock the Policy for future Edits(can no longer be changed
  - Helpful for Compliance and data retention

▼ S3 ENCRYPTION

- NO ENCRYPTION
- Server Side Encryption
  - Encrypts the file after Recieving it
- Client Side Encryption

    - User Encrypts the file and then send it

▼ SHARED RESPONSIBILITY MODEL

- AWS
    - Infastructure
    - Configuration and Vulnerability analysis
    - Compliance Validation
- USER
    - S3 VERSIONING
    - S3 Bucket Policy
    - S3 Replication Setup
    - Logging and Monitoring
    - S3 Storage Classes
    - Data Encryption at rest and in Transit

▼ AWS SNOW FAMILY

- Highly Secure devices portable to collect and process data at the edge and migrate data in and out of aws
- **DATA MIGRATION**
    - SnowCone
    - Snowball Edge
    - SnowMobile
    - For Limited Connectivity,Bandwidth,network cost,connection stability
- **EDGE COMPUTING**
    - Snow Cone
    - Snowball Edge

- **SNOWBALLL EDGE**
  - Pay per data transfer
  - Alternative to moving data over the network
  - Provide block storage
  - STORAGE OPTIMIZED
    - 80 TB of HDD CAPACITY for block Volume
  - COMPUTE OPTIMIZED
    - 42 TB of HDD CAPACITY
  - Use cases:large data cloud Migrations,DC Decompression,Disaster Recovery
- **SNOWCONE**
  - Much Smaller Device,can withstand Harsh Environment
  - Used for Edge Computing,storage and data transfer
  - 8TB of Usable Storage
  - Use Snowcone where snowball does not fit
  - can be sent offline or aws datasync
- **AWS SNOWMOBILE**
  - Transfer Exabytes of data (1 EB-1000 PB)
  - Each Snowmobile has 100 PB Capacity
  - High Security:Temperature Controlled GPS video Survelliance

▼ USAGE PROCESS

- Request Snowball devi. from AWS console for Delivery
- Install Snowball Client/AWS OpsHub on your Servers
- Connect the Snowball to your Servers and copy files using the client

- Ship Back the Device when you are done
- data will be Loaded into S3 Bucket
- Snowball Completely Wiped

▼ EDGE COMPUTING

- Process data while its being created on an edge Location
- A truck on road,ship on the sea
- Setup Edge/snowcone
- Use cases
  - Preprocess Data
  - Machine Learning at the edge
- Ship back device to AWS

SNOWCONE

- 2 Cpu,4gb of memory,wired or wireless
- Usb-c power using a cord or the optional battery

SNOWBALL EDGE-Compute Optimized

- 52 Vcpu,208 GB of RAM
- Optional GPU
- 42 TB of STorage

SNOWBALL EDGE-STORAGE OPTIMIZED

- Upto 40 Vcpus,80 Gib of RAM
- Object Storage clustering Availaible

all run EC2 Instances and AWS Lambda Functions(through IOT GreenGRASS)

AWS OPSHub

- GUI for SNow Devices
- Transferring files
- Launching Devices
- Launching AWS services on your devices

▼ HYBRID CLOUD

- Part of INfastructure is on Premises
- Part of your Infrastructure is on Cloud
- Long Cloud Migrations
- Security Requirements
- Compliance Requirements
- AWS STORAGE GATEWAY

▼ SERVER AND NETWORKING MANAGEMENT

▼ EC2 SERVICE:

- one of the most popular AWS offering
- EC2=Elastic Compute Cloud=Infastructure as a Service
- Mainly consists in the capability of:
  - Renting Virtual Machines(EC2)
  - Storing Data on Virtual Drives(EBS)
  - Distributing Load across machines(ELB)
  - Scaling the Services using auto-Scaling Group(ASG)

▼ EC2 SIZING and Configuration Options:

- Operating System(OS):Linux,Windows,Mac OS
- How much Compute Power and Cores(CPU)
- How much RAM

- How much Storage Space:
  - Network Attached(EBS and EFS)
  - Hardware attached (EC2 Instance Store)
- Network Card:Speed of the Card,Public IP address
- Firewall Rules:Security Group
- Bootstrao script(Configure at first launch):EC2 User Data

▼ SECURITY GROUPS:

- Security Groups are the fundamental of Network Security in AWS
- They control how traffic is allowd into or out of our EC2 Instanced
- They only contain allow rules
- They are FIREWALLS on EC2 Instances
- They Regulate:
  - Access to Ports
  - Authorized IP Ranges-IPv4 and IPv6
  - Control of Inbound Network(from Other to the Instance)
  - Control of Outbound Network(from Instance to other)
- Can be attached to Multiple Instances
- Locked down to a region /VPC Combination
- Does live ‘Outside; the EC2-if Traffic Blocked EC2 Instance wont see it
- Good to maintain One Seperate Security Group for SSH ACCESS
- if application is not accessible(time out) then is security Group Issue

- if gets ‘Connection Refused’ error then it is an application error or is not launched

▼ EC2 USER DATA:

- It is Possible to Bootstarp our instances using an EC2 user data Script.
- BootStrapping means Launching commands when a machine starts
- That script is Only run Once at the Instance first start
- EC2 user data is used to automate boot tasks such as:
  - Installig Updates
  - Installing Software
  - downloading Common files from the Internet
  - Anything you think

EC2 user data runs on with root user

7 Types of Instances :

m:Instance class

5: Generation(AWS Improve over time)

2xlarge:Size within Instance Class

▼ GENERAL PURPOSE

- Great for Diversity of Workloads such as web Servers or code Repositories
- Balance between:
  - Compute
  - Memory

- Networking

t2.micro is general purpose EC2 Instance

▼ COMPUTE OPTIMiZED

- Great for Compute Intensive Tasks that require high Performance Processors:
  - Batch Processing Workloads
  - Media Transcoding
  - High Performance Web Servers
  - High Performance Computing(HPC)
  - Scientific Modeling and Machine Learning
  - Dedicated Gaming Servers

  Start from C

▼ MEMORY OPTIMIZED

- Fast Performance for Workloads that Process large data Sets in Memory
- Use cases
  - High Performance,relational/non-relation Databases
  - Distributed Web Scale Cache Stores
  - In memory Databases optimized for Bi(Business Intelligence)
  - Applications performing real time Processng of big Unstructured Data

  R series name

▼ STORAGE OPTIMIZED

- Great for Storage Intensive tasks that Require high sequential Read and write Access to large data sets on local Storage
- Use cases
  - High Frequency Online Transaction Processing (OLTP) Systems
  - Relational and NoSQL Databases
  - Cache for In-Memory databases(for Example Redis)
  - Data Warehousing Applications

▼ CLASSIC PORTS TO KNOW:

▼ 22:

SSH(secure Shell):Login into Linux Instance

▼ 21:

FTP(File Transfer Protocol):Upload Files into File Share

▼ 22:

SFTP(Secure File Transfer Protocol):Upload Files using SSH

▼ 80:

HTTP-Access Unsecured Websites

▼ 443:

HTTPS:Access Secured Websites

▼ 3389:

RDP(Remote Desktop Control):Log into a Windows Instance

▼ EC2 PRICING OPTIONS

▼ On Demand Instances:

Short Workload,Predictable Pricing,Pay by Second

▼ RESERVED:

- **RESERVED INSTANCES:**Long Workloads
- **Convertible Reserved Instances:**Long Workloads with flexible Instances

▼ SAVING PLANS:(1 and 3 Years):

Commitment to an amount of usage,Long Workload

▼ Spot Instances:

Short Workloads,Cheap can lose Instances(Less Reliable)

▼ Dedicated Hosts:

Book an Entire Physical Server,Control Instance Placement

▼ Dedicated Instances:

No other Customers will share your Hardware

▼ EC2 Instances Purchasing Options:

▼ EC2 on Demand:

- Pay for What you use :
  - Linux or Windows-Billing Per Second,after the first Minute
- Has the Highest Cost but no Upfront Payment
- No long Term Commitement
- Recommended for short term and Un-Interrupted Work,where you cant predict how application will behave

▼ EC2 Reserved Instances:

- You Reserve specific Instance attributes(Instance Type,Region,Tenancy,OS)
- **RESERVATION PERIOD:1 year(**+Discount) or **3 Years**(+++Discount)
- **PAYMENT OPTIONS:**No Upfront(+),Partial Upfront(++),All Upfront(+++)
- **RESERVED INSTANCE'S Scope:**Regional or Zonal
- Recommended for Steady State Usage Applications(THINK DATABASE)
- You can buy and Sell in the Reserved Instance MarketPlace

▼ CONVERTABLE RESERVED INSTANCE:

- Can change EC2 Instance Type,Insatance Family,OS,Scope and Tenancy
- Up to 66 % Discount

▼ EC2 Saving Plans:

- Get a Discount based on Long Term Usage
- Commit a certain Type of Usage
- Beyond Saving Plans is billed at the On-Demand Price
- Locked to a specific Instance Family and aws Region
- flexible

▼ EC2 SPOT INSTANCES:

- Can get high discount
- You can lost it any point of time if your max price is less then the current spot price
- Most Cost-Efficient instances in AWS
- Useful for Workloads that are Resillient to Failure

    - Batch Jobs
    - Data Analysis
    - Image Processing
    - Any Distributed Workloads
    - Workloads with a flexible start and end time
- Not Suitable for Critical Jobs or Databases

▼ EC2 Dedicated Hosts:

- A Physical Server with EC2 Instance

▼ EC2 INSTANCE:

AMI(OS)InstanceSize(CPU+RAM)+Storage+Security GROUPS+EC2 USER DATA

SECURITY GROUPS:FIREWALL Attached to EC2 Instance

EC2 USER DATA: Script Launched at First start of an Instance

SSH:Start a Terminal into our EC2 Instances(Port 22)

EC2 Instance Role:Link to IAM ROLES

▼ PURCHASING OPTIONS:ABOVE MENTIONED

▼ EC2 ON DEMAND

- For **SHORT TERM** and **Uninterrupted Workloads**
- we can **Predict** how Application will behave

▼ EC2 RESERVED INSTANCES

- Reserve Instance attrivutes,Reservation Period,Payment OPtions,Scope
- Recommended for Steady-state usage Applications(Think Database)
- Can BUY AND SELL reserved Instance MarketPlace

- ▼ CONVERTIBLE
  - Can change EC2 Instance Type,Instance Family,OS,Scope and Tenancy
  - Less Discount

▼ EC2 SAVING PLANS

- Commit to Certain Type of Usage and rest on On-demand Price
- Locked to Specific Instance family and AWS Region
- Flexible on Instance Size,OS,Host,Dedicated,default

▼ EC2 Spot Instances

- Huge Discount
- Lost at any Point of Time if max Price is less then current spot Price
- For workloads resilient to Failure
  - Batch Jobs
  - Data analysis
- Not Suitable for Critical Jobs and Databases

▼ EC2 DEDICATED HOSTS

- Compliance Requirements
- Use Existing Server bound Software Licences(Per Socket,Per Core,VM)
- Most Expensive Option
- BYOL useful for that
- Who have strong Regulatory needs or compliance needs

▼ EC2 DEDICATED INSTANCES

- Dedicated hardware

- May share Hardware with Other Instances in Same Account
- No Contrl over Instance Placement

▼ EC2 Capacity Reservations

- Reserve **On-Demand**
- You always have access
- No time-Commitement,No Billing Discounts
- Can combine with others
- Charged at On-demand Rate whether you run Instances or not
- Suitable for Short term,Uninterrupted Workloads that nneds to be in Specific AZ

▼ EC2 INSTANCE STORAGE SECTION

▼ EBS VOLUME:

- Elastic Black Store
- Network Drive attached to Instances while run
- Persist Data even after Termination
- only mounted to 1 Instance
- Bound to Specific Zone
- Same as Network USB Stick
- Can be detached from an EC2 Instance and attached to another One quickly
- Locked to Some zone
- Have Provisioned Capacity
  - Preserve Root Volume when Instane is Terminated

EBS DELETE ON TERMINATION ATTRIBUTE:

▼ EBS SNAPSHOTS:

    - Make a Backup (Snapshot) of your EBS VOLUME at point in time
    - Not Neccesary to Detach but Recommended
    - Can copy snapshots across AZ or Region
- **EBS SNAPCHOT ARCHIVE**:
    - Move Snapchat to Archive Tier 75 % cheaper
    - Takes within 24 to 72 Hours for Restoring the Archive
- **RECYCLE BIN FOR EBS SNAPSHOTS:**
    - Setup Rules to Retain Deleted snapshots and Specify Retention

AMI OVERVIEW:

- Amazon Machine Image
- **Customization of an EC2 Instance:**
    - Add your Own Software,Configuration,Operating System,Monitering
    - Faster Boot/Configuration because all your software is Pre-Packaged
- AMI are built for Specific Region
- Launch EC2 Instances from:
    - A public AMI:AWS Provided
    - Your OWN AMI:you make and maintain them Yourself
    - AWS MARKETPLACE AMI:AMI Someone Else made(Potentially Sells)

AMI PROCESS(from an EC2 Instance)

- Start an EC2 Instance and Customize it
- Stop the Instance

- Build AMI:also create EBS Snapshots
- Launch Instances from other AMI
- Copy 1 Instance to OTher also with Customizing it

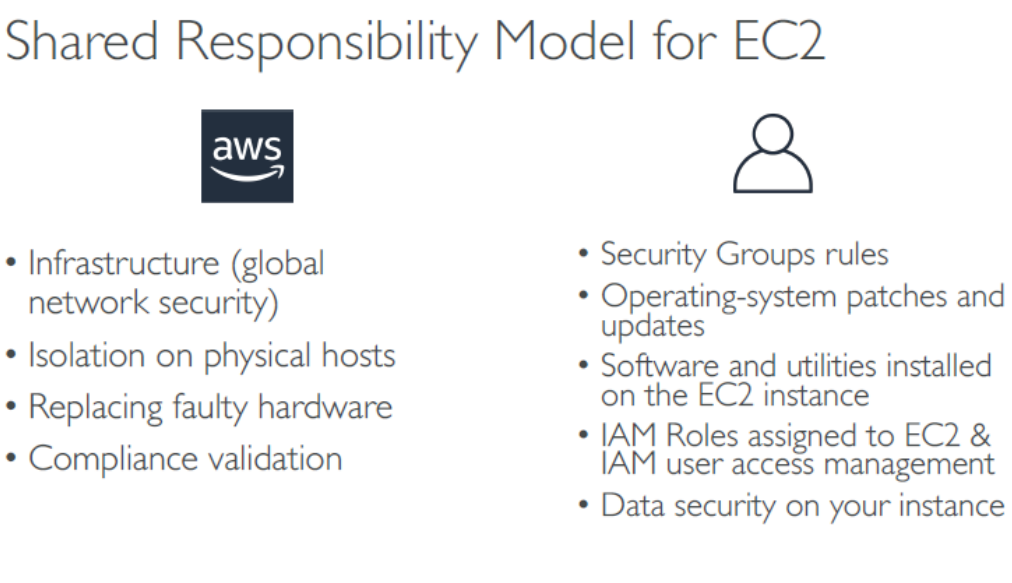
▼ EC2 IMAGE BUILDER

To automate Creation of Virtual Machines or container Images

automate creation ,maintain validate and test EC2 AMI

EC2 Image builder—> Builder EC2 Instance—>New AMI—>Test EC2 Instance—>AMI Distributed(cane be Multiple Regions)

▼ SHARED RESPONSIBILITY MODEL



▼ SUMMARY

EC2 Section – Summary

- **EC2 Instance:** AMI (OS) + Instance Size (CPU + RAM) + Storage + security groups + EC2 User Data
- **Security Groups:** Firewall attached to the EC2 instance
- **EC2 User Data:** Script launched at the first start of an instance
- **SSH:** start a terminal into our EC2 Instances (port 22)
- **EC2 Instance Role:** link to IAM roles
- **Purchasing Options:** On-Demand, Spot, Reserved (Standard + Convertible + Scheduled), Dedicated Host, Dedicated Instance

▼ COMPUTE SERVICES

▼ DOCKER

- Software development platform to deploy apps
- Apps are packaged in containers that can be run on any OS
- Run the same regardeless of where they run
- Docker Images are stored in docer Repositories

DOCKER vs VIRTUAL MACHINES

- resources shared with host⇒ many containers on one server

▼ ECS

- Elastic Container Service
- Launch Docker Container on AWS
- Maintain infastructure
- Takes care of start stop containers

- Integration with application Load Balancer

▼ FARGATE

- Launch Docker Containers on AWS
- Serverless Offering
- no Ec2 Instance to manage
- just run containers for you based on the CPU/RAM you need

▼ ECR

- For Storing Dockers
- Elastic Container Registry on AWS
- Store Docker images so they can be run by ECS or fargate

▼ SERVERLESS

- In which Dev. dont have to manage servers anymore
- They just Deploy code
- use functions
- function as a Service
- pionerred by AWS LAMBDA but now alos includes anything that is managed

▼ AWS LAMBDA

- Run on Demand
- Limited by Time
- Scaling is automated
- Virtual functions no managing
- BenefitS
- easy pricing and compute time

- Integrated with many services
- Event driven reactive type of service
- Easy monitoring and resources
- Language all and lambda container image
- SERVERLESS thumbnail creation
- SERVERLESS cron job
- Pricing pay per calls
- Pay per duration

▼ Amazon API gateway

- building SERVERLESS API
- Go through api gateway
- Proxy requests
- To easily create publish maintain monitor
- SERVERLESS and scalable
- Support restful api and web socket API

▼ AWS BATCH

- fully managed batch processing at any scale
- Efficiently run 100000 with start and end
- Dynamically launch ec2 instances or spot instances
- Defined as docker images
- Helpful for cost optimization and focusing less on the Infastructure
-

▼ AWS LIGHTSAIL

▼ DATABASE MANAGEMENT

▼ DATABASES INTRO

- Storing data has limits in file
- You can Structure the Data in databases
- Make Relation with databases
- Database are optimized for Purpose

▼ RELATIONAL DATABASES

- Links between Tables
- Using SQL

▼ No SQL Databases

- No Relational Databases
- for specific Data model and Flexible Schemaas
- Easy to evolve data model
- High Performance
- Key-value,document,graph,in MEmory

NO SQL data Example

- JSON=Java Sript Object notation
- JSON is common form of data that fits into a NoSql Model
- Data can be nested
- Fields can change over time
- Support for New Types

▼ RELATIONSHIP MODEL

- Quick Provisioning,High Availaibility,Vertical and Horizontal Scaling
- Automated Backup and Restore,Upgrades,Operations
- Operating system patcging is handled by AWS

- Monitoring ALERTING

  Many Databases technologies could be run on EC2 but you must handle Yourself the resillency,Backup and many more

▼ RDS(RELATIONAL DATABASE SERVICE)

- It is a managed DB Service for DB use SQL as Query Language
- Allows you to Create Databases in the cloud that are Managed by AWS
- Aurora(AWS PROPETIORY DATABASE)

ADVANTAGE OF USING RDS DEPLOYING ON EC2:

- RDS is Managed Service
  - OS PATCHING
  - Monitoring Dashboards
  - Read replicas for Improved Read Performance
  - Multi AZ Setup for DR(Disas. Recovery
  - Scaling Capability BOTH
- can’t SSH into your Instances

▼ READ REPLICAS

- Scale the read workload of your DB
- Data write only in main DB

▼ MULTI-AZ

- Failover in case of AZ outage(high availaibility
- only 1 other AZ

▼ MULTI-REGION

FOR READ REPLICAS

it can read in **same Database** but can write only in **main**

Replication cost

▼ AMAZON AURORA

- Propetiory Technology from AWS(not OPEN SOURCE)
- PostgreSQL,MySQL are both Supported as AURORA DB
- AWS CLOUD OPTIMIZED
- Grows in Increments of 10GB upto 64 TB
- More Efficent and Cost Effective
-

▼ AMAZON ELASTI CACHE

- In-Memory Databases with High Performance Low Latency
- Helps Reduce Load off Databases for Read Intensive Workloads
- Takes care of OS maintainence ,patching ,Monitoring,Failure Recovery and Backups

▼ DYNAMO DB

- No SQL DataBase
- Fast and Consistent In Performence
- **SERVERLESS,LOW LATENCT RETRIEVAL**
- Integrated with IAM for Security
- Low Cost and Auto Scaling Capabilities
- 100 TB OF STORAGES

KEY VALUE DATABASE

Partitionkey Sort Key ATTRIBUTES

DYNAMO DB ACCELERATOR-DAX

- Fully Managed in-memory Cache for Dynamo DB

- 10x Performance Improvement
- DAX only used for DB

GLOBAL TABLES:

- make DynamoDB table accesible with low latency in multiple Regions
- Read/write application everywhere

▼ REDSHIFT OVERVIEW

- Based on Postgre SQL,but is not used for OLTP
- Online Analytical Processing
- Load data once every hour not every second
- 10x better Performance
- Columnar Storage of data
- Massively Parallel Query Execution highly availaible
- Pay as you go
- Has SQL INTERFACE for QUERIES
- BI tools such as AWS QUICKSIGHT or TABLEAU

▼ AMAZON EMR

- Stands for Elastic MapReduce
- EMR helps Creating Hadoop Clusters(Big Data) to analyze and Process Vast amount of data
- can be hundred of EC2 Instanes
- ALso sport apache Spark
- USE
  - Data Processing
  - Machine Learning

- Web Indexing
- Big DATA

▼ AMAZON ATHENA

SERVERLESS ANALYZE SQL

- Serverless query Service to Perform analytics against S3 Objects
- Use Standard SQL Language
- Supports CSV,JSON,ORC,AVRO,Parquet(built on Presto)
- 5 dollar for 1TB of data
- USES
  - Business Intelligence/analytics/reporting,analyze,query VPC flow Logs,ELB Logs,Cloud Tral trails etc

▼ AMAZON QUICKSIGHT

- Allows creating Dashboards to visually represent Data
- fast,scalable,embeddable
- USE CASES:
  - Business Analytics
  - Building Visualizations
  - Perform Ad-hoc analysis
  - Get business insights
- Integrated with many services

▼ DOCUMENTDB

- NO SQL DATABASE
- DocumentDB is same for MongoDB(NoSql Database)
- Used to store,query and index JSON data
- Similiar to as AURORA

- Fully managed
- Automatically scales to workloads with millions

▼ NEPTUNE

- FULLY MANAGED **GRAPH** Database
- Users have Friends
- Highly Availaible Across 3 AZ
- Can store billion relations
- USES
  - Great for Knowledge Graphs,fraud Detection,recommendation Engine,social NEtworking

▼ AMAZON QLDB

- Quantum Ledger Database
- Recording Financial Transactions
- Review history of all changes made to your application data over time
- Immutable system no entry can be removed or Modified,cryptographically verfiable
- AMAZON BLOCK CHAIN
  - No decentralization Component in accourdance with financial regulation rules

▼ AMAZON BLOCKCHAIN

- Execute Transactions without need for a trusted,Central authority
- hyperledger Fabric,Ethereum,frameworks

▼ GLUE

- Managed extract,transform and load(ETL) service
- Prepare and transform data for analytics

- serverless service
- TRANSFORM DATA

▼ DMS(Database Migration Service)

- Extract data from one database and send to another database
- Remains availaible during the migration
- Homogeneous migrations:ex oracle to oracle
- Heterogeneous migration:Ex microsoft seql server to aurora

▼ SUMMARY

- RELATIONAL DATABASE
  - OLTP
    - RDS
    - AURORA
- MULTI -AZ,READ REPLICAAS,MultiRegion
- IN-MEMORY DATABASE
  - Elasti cache
- KEY/VALUE DATABASE
  - DynamoDB and DAX(cache fro DynamoDB)
- WAREHOUSE,ANALYTICAL PROCESSING
  - OLAP
  - REDHIFT
- HADOOP CLUSTER OR BIG DATA
  - EMR
- ATHENA(SERVERLESS and SQL)
  - Query Data on Amazon S3

- QUICKSIGHT
  - Dashboards on Data
- DOCUMENTDB
  - Aurora for MongoDB(NOSQL database)
- AMAZON QLDB
  - Financial Transactions Ledger(immutable journal,cryptographically verifiable)
- AMAZON MANAGED BLOCKCHAIN
  - Managed HyperLedger Fabric and Ethereum BlockChains
- GLUE
  - Extract,Transform,Load and Data Catalog Service
- DMS
  - fir datamigration
- NEPTUNE
  - Graph Database

▼ DEPLOYMENT

▼ CLOUD FORMATION- INFASTRUCTURE AS CODE

- Outline your AWS
- Security group,2 instances,S3 backet,load balancer
- Forms an cloudFormation Template
- BENEFITS
  - **Infasturcture as code**
    - No resources are manually created,which is excellent for control

        - Changes through Code
    - **COST**
        - Each resource is tagged with an identifier so how will stack cost you
        - Also Estimate cost of Resources using Cloud Formation Template
        - Create and delete resources as needed
    - **PRODUCTIVITY**
        - Ability to destroy recreate infastructure on the cloud on the fly
        - Declarative Programming
    - **DONT REINVENT WHEEL**
        - Leverage Existing Templates on web
        - Leverage Documentation
    - **ALL SERVICES SUPPORTED**
- We can see all the resourecs

▼ BEANSTALK(PAAS) limited to certain pL or Docket

- Web APP 3 Tier Architecture
    - ELB—> AVAILAIBILITY ZONE—> AUTO SCALING GROUPTS—>RDS—>ElastiCache

▼ DEVELOPER PROBLEMS

- Managing Infastructure
- Deploying Code
- Configuring all databases load balancers etc
- scaling concers
- Most web apps have same architecture
- consistent across different applications

▼ ELASTIC BEANSTALK

- Developer centric view of deploying an application of AWS
- one view thats easy to make sense of
- full control over configuration
- BeanStalk=PaaS
- free but pay per instance
- Managed Service
  - Instance Configuration is handled by beanstalk
  - Deployment strategy is configurable
  - Capacity Provisioning
- Appication code is Only Responsibility of the Developer
- 3 Architecture Models
- **FULL HEALTH MONITORING :**
  - Oush metrics to Cloud Watch
  - Check for App health,publishes health events

▼ AWS SYSTEM MANAGER-Patch configure and run commands at scale

- Manage EC2 and On-Premises systems at scale
- HYBRID AWS Service
- Patching Automation for enhanced compliance
- Run commands across an entire fleet of servers
- Store parameter configuration with SSM
- HOW IT WORKS
  - Small program running on Background on every Computer
  - Linked to both vm and Ec2 instance

    - Problem with agent
    - Can run COmmands patch and configure our Servers
- SESSION MANAGER
    - Allows you to start a secure shell on your EC2 on premisies servers
    - No SSH access or ssh keys needed
    - No port 22 needed
    - Session manager execute commands to get to IAM

▼ AWS OPSWORKS-managed Chef and Puppet in AWS

- Chef and Puppet
    - Helps Performing server configuration automatically or repetetive actions
    - Work great with EC2 and On premises VM
    - Managed Chef And Puppet
    - It is an alternative to AWS SSM
    - Only provision Standard aws services

▼ DEVELOPMENT

▼ AWS CLOUD DEVELOPMENT KIT(CDK)

- Define your cloud Infastructure using a Language
- Compiled into cloud formation Template(JSON)

▼ AWS CODE DEPLOY- Deploy and upgrade any applications onto servers

- To Deploy application Automatically
- Works with Ec2 instances
- Works with On-Premises Servers,works with EC2 instances ,On Premises Servers

- Hybrid Service
- Servers must be provisioned and configured ahead of time with code Deploy Agent,Evolve easily

▼ AWS CodeCommit

- Before pushing Application Code to servers it need to be stored somewhere
- Store code in a repository,using Git Technology
- hosts GIT based repositories
- collaborate with others on code
- BENEFITS
  - Fully Managed
  - Scalable and Highly Availaible
  - Private,Secured,Integrated with AWS

▼ AWS CODE BUILD

- Code building Service
- Compile source code,run tests and produces packages that are ready to be Deployed
- forms Artifiacts
- **BENEFITS**
  - Fully Managed,Serverless
  - Continously scalable and highly availaible
  - Secure
  - pay as you go pricing-only pay for the build time

▼ AWS CODEPIPELINE

- pipeline tool to connect code build and commit

- Build for CICD **(continous Integration and Continous Delivery)**
- BENEFITS
  - Fully managed compatible with Code Commit and other all deployment boys

▼ AWS CodeArtifact

- code depend on each other to be build and new ones are created
- Traditionally setup your own artifact management
- is secure,scalable and cost effetive artifact management for software development
- works with common management tools like pip
- Developers and code build can retrieve dependencies straight

▼ AWS CodeStar

- Unified UI of every code Shit together in one Place
- ‘Quick way’ to get started
- Can edit code using AWS cloud9

▼ AWS CLOUD9

- Cloud IDE
- Used within Browser
- Work on Projects in browsers
- Code Collaboration

▼ GLOBAL APPLICATIONS AWS

- Deployed in multiple Geographies
- could be Regions or edge Locations

- Decreased Latency
  - it takes time from asia to us
  - Deploy application Closer to user will experience less latency
- DISASTER RECOVERY(DR)
  - if a AWS region goes down
  - Fail over to other region
  - DR plan is Important
- Attack Protection:distributed Attack is harder to attack
- Global AWS Infastructure
  - Regions
  - Availaibility Zones
  - Edge locations
    - For Content Delivery as close to users as possible

▼ ROUTE 53==DNS

- Managed DNS(domain Name System
- IPV4
  - A Record
- IPV6
  - AAAA Record
- HOST TO HOST
  - CNAME:hostname to hostname
- HOST to AWS RESOURCE
  - Alias Record ELB,CloudFront,S3,RDS etc
- ROUTING POLICES
  - SIMPLE ROUTING POLICIES

        - No health Checks
    - WEIGHTED ROUTING POLICIES
        - Distribute Traffic across Multiple EC2 Instances
    - LATENCY ROUTING POLICY
        - Based on latency send which is closest to them
    - FAILOVER ROUTIING POLICY
        - Disaster Recovery
        - Health check on Primary

▼ CLOUD FRONT

- Cloud Delivery Network
- Improves Read Performance content is cached at the edge
- Improove users Experience
- 216 Point of Presence Globally
- DDos Protection integration with shield awsWeb Firewall

ORIGINS

- S3 Bucket
    - For Distributing files and caching them at the edge
    - Enhanced Security with cloud Front OAI
- Custom Origin(HTTP)
    - Load Balancer
    - Ec2 Insance
    - S3 Instance
    - Any HTTP Backend

▼ S3 Transfer Acceleration

- Increase Transfer Speed by transferring file to an AWS Edge Location which will forward data to S3 Bucket in the Target Region

▼ GLOBAL ACCELERATOR

- Improve Availaibility and Performance
- **Leverage the AWS Internal Network to Optimize the route to your application**
- 2 Anycast IP are created for application
- **CLOUD FRONT**
  - Content Delivery Network
  - Improves Performance for your Cacheable Content
  - Content is Served at the Edge
- **GLOBAL ACCELERATOR**
  - No Caching at the Edge to Applications running in one or more AWS Regions
  - Improves Performance for Wide Range of Applications over TCP or UDP
  - Fast Regional

▼ AWS OUTPOSTS

- used in HYBRID CLOUD
- For IT Systems:
  - AWS CONSOLE a,CLI and AWS API’s
- Server Racks that offers the same Infastructure,Services,API’s and Tools to build your own applications on Premises just as in the Cloud
- AWS will setup and Manage Outpots Racks

- wihtin your on-Premises Infastructure and yhou can start Leveraging AWS Services and can start Leveraging AWS Services
- Responsible for Its Physical Security

  Benefits

  - Low-Latency Access
  - Local Data Processing
  - data Residency
  - Easier migration from on Premises to the cloud
  - Fully managaed Service

▼ AWS WAVELENGTH

- Brings AWS services to the edge of 5g network
- Embedded with tellecommunication providerss datacentres at the edge of 5g Networks
- Ultra low latency application through 5g Networks
- Traffic does not Leave the Communication Service Providers Network
- Example EC2,EBS,VPS

▼ AWS LOCAL ZONES

- Place AWS compute Storage,database and other selected AWS services closure to end Users to run latency sensitive applications
- Extend your VPC to more Locations-
  - Extension of an AWS Region
- Compatible with EC@

▼ GLOBAL APPLICATION ARCHITECTURE

- SINGLE REGION SINGLE AZ

    - No High Availaibility
    - No Good Global Latency
    - Very simple to Setup
  - SINGLE REGION MULTI AZ
    - High Availaibility
    - No Good Global Latency
    - Little Bit Difficult
  - MULTI REGION ACTIVE-PASSIVE
    - Global Reads Latency for PASSIVE
    - But GLOBAL WRITES LATENCY STILL SAME
    - More Difficulty
  - MULTI REGION ACTIVE ACTIVE
    - Read ,Write Latency Globally Increased
    - Higher Difficulty

▼ CLOUD MONITORING

▼ CLOUD WATCH MATRICS

- Variable to Monitor
- Metrics for every services in AWS
- have Timestamps
- can create dashboard of metrics

IMPORTANT METRICS

- EC2 Instances
  - Cpu Utilization,status Checks
  - Default metrics every 5 min

        - Option for Detailed Monitoring with money
    - EBS VOLUMES
        - Disk/Read Writes
    - S3 Buckets
        - BucketSizeBytes,Number of Objects,All Requests
    - Billing
        - total Estimated Charge only in **US-EAST-1**
    - API

▼ CLOUD WATCH ALARMS

- To trigger Notifications for any metric
- Autoscaling,EC2 Actions,SNS notifications
- Various Options like sampling,max,min
- Can choose the period on which to evaluate an alarm
- can create billing alarm

▼ CLOUD INTEGRATION

- To communicate 2 applications with 1 another
- Two patterns of application communication
    - SYNCHRONOUS
        - BUYING SERVICE
        - SHIPPING
    - ASYNCHRONOUS
        - Event-Based
        - BUYING
        - QUEUE
        - SHIPPING SERVICE

▼ AMAZON SQS

- Simple Queue Service
- store messages in queue by producer and pill messages to consumer
- then deleted from the queue
- Oldest offering
- **DECOUPLE APPLICATONS**
- Low Latency

▼ AMAZON KINESIS

- Kinesis=REAL TIME BIG DATA STREAMING
- Collect process and analyze real time streaming data at any scale

▼ Amazon MQ

- Without re-engineering, we can use MQ
- Does not scale as much as SQS
- Runs on Dedicated Machine (not Serverless
- Has both topic and Queue Features

▼ AMAZON SNS

- **one Message to many receivers**
- Simple notification service
- Event Publisher only send messages to SNS Topic
- **NOTIFICATIONS,EVENT SUBSCRIBERS**

▼ CLOUD WATCH LOGS

- Collect logs from this
- Can exist in different forms

- ECS,Lambda,cloud Trail,Ec2,Route 53
- Enable Real time Monitoring
- Adjustable CloudWatch Logs Retention(Time logs)
- By default no logs from EC2 instance
- Run Cloud watch Afent to push log files you want
- Cloud Watch log can be setup on-premises too

▼ EVENT BRIDGE

- Scheduled Scripts
- After Every Hour Trigger Some Script on some Functions
- On Particular pattern to do some workm
- Any Event Scheduler Compute,S3 Event or anythin
- Custom Event Bus Also Availaible to partner with Partners
- Schema Registry Model Event Schema
- Can Archive Events sent to an Event Bus
- Ability to replay archived Events
-

▼ CLOUD TRAIL

- Provides governance compiance and audit for your AWS Account
- Enabled by Default
- Historing of events made within Accounts
- Can put logs from cloud trail into cloud Watch Logs
- If Resource is deleted in AWS,Investigate CLOUD TRAIL FIRST
- MANAGEMENT EVENTS

    - Operation that are Performed on Resources in your AWS account
    - Examples like POlicy
    - Log Managedment Events
    - Can Seperate Read Events and write Events
- DATA EVENTS
    - By default not Logged
    - seperate Read and Write Events
    - AWS LAMDA FUNCTION Activity
- CLOUD TRAIL INSIGHT EVENTS
    - Analyze Events insights to detect Unusual Activity in your Account
    - Continously analyze write Events to detect Unusual Patterns
    - Event sent to Amazon S3
    - Event Bridge event is Generated (AUTOMATION NEEDS)

CLOUD TRAIL EVENT RETENTION

- Events are stored for 90 days
- keep evenets beyond by sending to s3 and use ATHENA

Wireless Technology