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AWS CLOUD PRACTITIONER

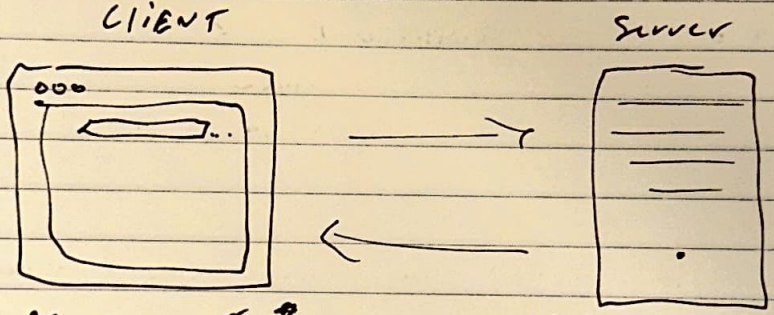
Almost all modern computing revolves around a

Client SERVER MODEL

→ Client makes request to the server, with permissions
→ Amazon Server called Amazon Elastic Compute Cloud (Amazon EC2) instance (virtual server)

Key Value: You Only Pay for what you use

A better term on premise data center as you
- don't have to worry about capacity constraints
- don't have to pre-pay for anything



* WEB BROWSER or desktop application a user interacts with to make requests

* Services like EC2 (Elastic compute cloud) that validate any Field requests

Cloud Computing

"The on demand delivery of IT resources over the internet with pay as you go pricing"

- On demand delivery
  → Aws has the resources you need, when you need them. No advance notices. Don't need them anymore and stop paying instantly.

- IT resources consist of many offerings

- The "undifferentiated repetitiveness of IT" are tasks that require load but don't set two otherwise identical businesses a part. Tasks AWS helps with.

- Over the internet
  implies access to resources through secure webpage or programatically

- Pay as you go pricing

DEPLOYMENT MODELS FOR CLOUD COMPUTING

CLOUD BASED DEPLOYMENT
- run all parts of the application in the cloud
- Migrate existing applications to the cloud
- Design and build new applications in the cloud

ON PREMISE DEPLOYMENT *on premise data centers*
- Deploy resources by using virtualization and resource management tools
- Increase resource management by using application management and virtualization technologies

Hybrid DEPLOYMENT
- Connect cloud based resources to on premises infrastructure
- Integrate cloud based resources with legacy IT applications

ex: Work better maintained on prem, gov contracts

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BENEFITS OF CLOUD COMPUTING

1. Trade upfront costs to variable expenses
2. STOP spending money to run and maintain data centers
3. Stop guessing capacity
4. Benefit from massive economies of scale
5. Increase speed and agility
6. Go global in minutes

MODULE 2: COMPUTE IN THE CLOUD

INTRODUCTION TO EC2 (Amazon elastic compute cloud)

1. Highly flexible 2. Cost effective 3. Quick
When compared to on-prem solutions

STEPS AWS saves you from doing:
1. BUID/RENT datacenter
2. Secured to datacenters
3. Purchase servers
4. Install servers
5. Setup and get ready for use

Multitenancy

The concept of sharing underlying hardware

Hypervisor - manages the virtual machines and serves them as individuals.
↓
Virtual machine

Configurations
→ Software

OS
- Windows
- Linux

Software
- internal business apps
- Web apps
- Databases
- Third party software

Vertically Scaling

Make an instance bigger or smaller depending on needs. ex: increase memory, change endurance, etc.

Networking Control

full control of networking

Caas : Compute as a service model

TYPES OF EC2 INSTANCES

* Each type is grouped under an instance family*

EC2 INSTANCE FAMILIES
- General purpose
- Compute optimized
- Memory optimized
- Accelerated computing
- Storage optimized

General purpose
- balanced resources for
- diverse workload like
  - web servers
  - code repositories

Compute optimized
- Compute intensive tasks like
  - gaming servers
  - high performance computing (HPC)
  - scientific modeling

Memory Optimized
- memory intensive tasks
- Ideal for high performance databases

Accelerated Computing
- floating point number calculations
- graphics processing
- data pattern matching
- utilize hardware accelerators

Storage Optimized
- high performance for locally stored data
- data warehousing applications

EC2 BILLING/PRICING

ON DEMAND
- only pay for duration of instance is running for

Savings plans
- lower prices for committed use in $ per hour for a 1 or 3 yr term
~ save up to 72%

Reserved Instances
- Steady state workloads and predictable use times.
~ 75% discount
- Qualify after committing to 1 or 3 year terms w/ 3 payment options Need to specify: instance family and size, platform description, tenancy, region
  1. all upfront
  2. partial upfront (portion when committing)
  3. No upfront

SPOT INSTANCES
- Allow to request spare compute instance for ~ 90% off on demand price

* Aws can reclaim the instance when needed at a 2 min warning to save
- Good for batch workload

Dedicated host
- physical hosts dedicated to your use. no one else will share tenancy of that host

Scaling Amazon EC2 : Scalability & Elasticity

- Have busier weeks than others, hours than others, and datacenters with too much capacity. - ON PREM

Amazon instance auto scaling
- automatically adds amazon instances when traffic needed

DIRECTING TRAFFIC WITH ELASTIC LOAD BALANCING

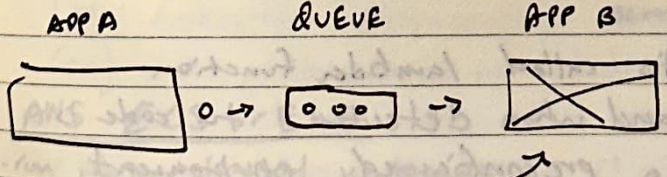
- Ensure an even distribution of workloads across instances

ELASTIC LOAD BALANCING (ELB)
- A regional construct.
- Directing traffic between front end and backend
"Decoupled architecture"

MESSAGING AND QUEUEING

As the client sends request, funneled into a queue

best to use 'loosely coupled architecture' that ensures a single failure won't cascade failures



while B is offline, A is still able to send out requests

AWS SOLUTIONS:

Amazon Simple Queue Service
(SQS)

Amazon Simple Notification Service
(SNS)

Amazon SQS

- Send, receive and store messages at any volume between software components

Payload: data stored within a message that is protected

Amazon SNS

- Similar, send out messages to users
- Also sends out notifications to users with a pub-sub model. Create SNS TOPIC that's a channel for messages to be delivered, configure subscribers to that topic, and publish messages for those subscribers

"subscribers" can also be end points
↳ HTTPS / HTTP web hooks
↳ AWS Lambda Functions
↳ SQS Queues

Can also fan out to end users, with mobile push, or email

Additional Compute Services

Serverless compute options
- Serverless means you can't see or access the underlying infrastructure (instances hosting application)

- AWS LAMBDA
  - Upload code into what's called lambda function
  - configure a trigger and when detected the code is automatically run in a preconfigured environment
  - Built for running code in < 15 min. Quick processing (each invocation < 15)
  - Scale as many triggers as necessary

① UPLOAD CODE
② SET CODE TO TRIGGER FROM EVENT SOURCE
③ CODE RUNS ONLY WHEN TRIGGERED
④ PAY ONLY FOR THE COMPUTE TIME YOU USE

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IF you don't need/want serverless yet...

- AWS Elastic Container Service ECS
- AWS Elastic Kubernetes Service EKS

Docker Container orchestration tools

Container: package for your code, Run on top of EC2 instances and in isolation from each other.
ie: each container can be thought of as a vm and the instance is the host (EC2)

Cluster: Processes to start, stop, run, monitor docker containers across a number of EC2 instances together.
→ use orchestration tools (ECS & EKS)

AWS Fargate

Don't want to use EC2 for hosting as you don't need access to OS, or manage instances

- Serverless compute platform for ECS & EKS

AWS EC2	AWS Lambda
- host traditional apps	- host short-running functions
- full access to OS	- service oriented applications
-	- event driven applications
	- No provisioning & managing servers

AWS ECS or EKS

- run docker based workloads
- choose platform:
  EC2: You manage
  Fargate: serverless, managed for you
  & more

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MODULE 3: GLOBAL INFRASTRUCTURE > RELIABILITY

AWS GLOBAL INFRASTRUCTURE

AWS BUILT REGIONS THAT hold data centers

Data centers are connected via fiber optic.

When setting up a server, choose region & the data will stay in that region unless you transfer it

ex: financial info cannot leave a certain region as stated by gov.

CHOOSING A REGION

① Compliance
- check compliance requirements

② Proximity
- consider choosing a location for majority of customers

③ Feature Availability
- sometimes the closest region doesn't have the features you want
- continuously building out offerings

④ Pricing
- some locations are more expensive to operate in
ex: Brazil has tax structures setup so more expensive to

AVAILABILITY ZONES

Regions aren't just one location (datacenter)

each datacenter(s) is called an availability zone (AZ)

AZ are not built next to each other to protect against natural disasters.

To make redundant, have multiple instances at different AZ's w/in 10's of miles of each other to keep at 0.000's latency.

A region is 3 or more AZ's

Some services are regioned and run across the region, not at 1 datacenter. Elastic Load Balancing is one example.

EDGE LOCATIONS

ex: CUSTOMERS all over the world

Content Delivery Networks: caching data/content at different locations From the host. CDN's are networks that deliver edge content to users based on their geo location.

↳ **AWS Amazon Cloudfront**

- service that helps deliver data to customers around the world through Edge locations.

AWS Amazon Route 53

- DNS (domain name service) that helps route customers to correct web locations with low efficiency

AWS OUTPOSTS

- Install aws functionality in a data center isolated in your datacenter building

PROVISIONING AWS RESOURCES

Everything in AWS is an API call

[API: Application Programming Interface]

Tools to interact with AWS APIS

- AWS Management Console
- AWS command line interface
- AWS software development kits
- Various other tools

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AWS Management console

- Browser based

Useful for

- Test envs
- View AWS bills
- View monitoring
- Work with non-technical resources

AWS (CLI)

- Make api calls on terminal
- Makes actions scriptable / repeatable
  - less susceptible to human error
- Have scripts run automatically
- Automate

AWS SDK's

- Interact w/ AWS resources through various programming languages

AWS ELASTIC BEANSTOCK

Service that helps you provision amazon EC2 based environments

① Prepare code and desired configurations

② Send into Elastic Beanstock and it builds an EC2 environment for you

- Save and re-deploy if needed

AWS Cloudformation

Infrastructure as code tool that is used to define a wide variety of AWS resources through declarative JSON or YAML based text documents / templates

Supports:

Storage, databases, analytics, machine learning, more

MODULE 4 : NETWORKING

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Amazon Virtual Private Cloud (VPC)

Isolated section of AWS cloud that allows for provisioned AWS resources in virtual network that you define

- Public facing subnets
  - access to internet
  - ↳ interact with customers
- Private facing subnets
  - ↳ no access to outside connections

Connectivity to AWS

VPC => private network in AWS

Place services (EC2, etc) within VPC subnets

Subnets: chunks of IP addresses in VPC that allow you to group resources together

- Private
- Public

PUBLIC facing Resources

- Attach internet gateway (IGW) that is open to public / closed

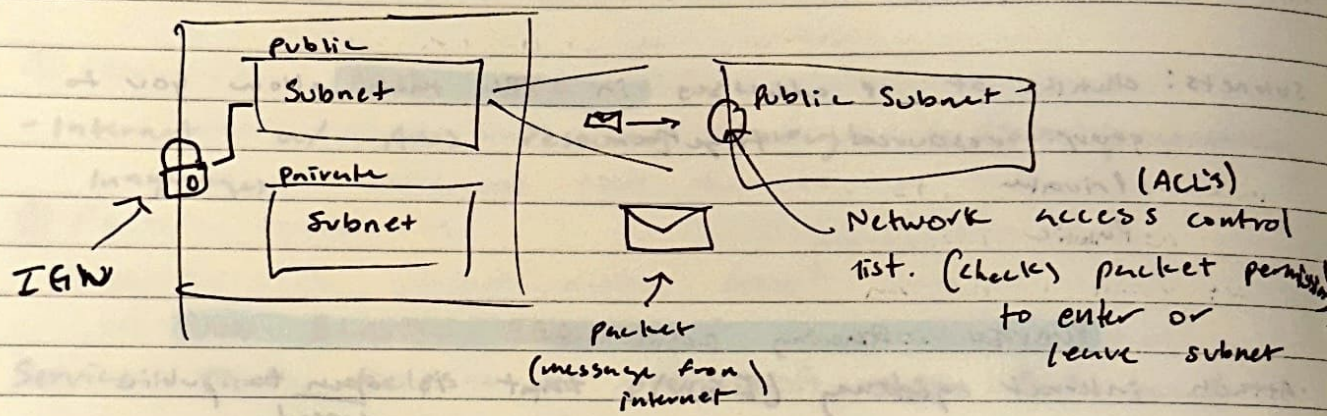
- Private gateway => allows incoming requests/traffic from approved network
  - ↳ Virtual private gateway and allows in VPN's, Attaches to VPC. This is over the internet and thus accessible to bandwidth

- To avoid bandwidth issues and establish a dedicated fiber connection from your data center to AWS

Subnets and Network access control lists

AWS SECURITY OFFERINGS
- Network Hardening
- Application Security
- User identity
- Authentication and authorization
- Distributed denial of service prevention (DDOS)
- Data integrity
- Encription

NETWORK HARDENING



- Network ACL's check packet permissions at the subnet level, but subnets can have multiple EC2 instances or services that may require further security checks/splits.

Security groups

- Solve instance level network security. by default, an EC2 instance comes with its own security group and all ports are blocked.

↳ can modify to allow set traffic requests (HTTPS, OS, Admin, etc)

↳ by default, all traffic is allowed out

Security Group vs Network ACL

- Stateful: memory with who to allow in/out & if you were allowed in, can leave without a check → when packet returns to original security group is remembered and let in w/out check

- Stateless, no memory. checks every packet regardless of circumstances
- By default allows all inbound/outbound traffic

AWS ROUTE 53

- Highly scalable DNS service
- Directs traffic to IP addresses where sites are located [Translates domain name to IP address]

Routing Policies

- latency based routing
- Geolocation DNS
- Geoproximity routing
- weighted round robin

- Use for buying & registering domain names

AWS CloudFront can also speed up delivery to customers by caching content closer to users.

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MODULE 5: Storage → Databases

Instance Stores & Amazon Elastic Block Store

Block level storage
- series of bytes that are stored in blocks on a disc (FILES)

- When a file is updated, the only updates are made to the pieces that change
- Hard drive is block level storage
- Efficient storage typ for
  - databases
  - enterprise software
  - file systems

EC2's have instance store volumes that hold temporary info/data that will be lost after start/stop of instance as the instance can swap hosts where the hard drive will then not be attached.

Amazon Elastic Block store

Create virtual hard drives called EBS volumes that attach to an EC2 instance. Persists through start/stops of EC2 instance

DEFINE
- Size
- Type
- Configuration

Attach to EC2 instance & configure application to write to EBS.

SNAPSHOTS

Incremental backups of data. Important to take regular snapshots.

Amazon Simple Storage Solution service (S3)

Data store that allows you to store and retrieve an unlimited amount of data.

- Store data as objects in buckets
  (file) ↑ (directory) ↑
- Max object size of 5 tb
- Version control objects to protect from deletion/bad changes

Storage Classes

S3 Standard
- 11 9's of durability (99.999999999%)
probability to remain in tact after 1 year
- Multiple copies reside across locations

S3 static website hosting
- Collection of HTML files, static web assets, etc in a bucket.
- check box to host as static website
- Enter buckets url & there's a website

S3 Standard Infrequent Access
- Used for data accessed less frequently but requires rapid access when needed
- Backups, long term storage objects

S3 Glacier Flexible Retrival
- Store/archive data for long periods of time. Primarily used for audits.
- Create vaults & populate with archives
- Can Lock vaults
- WORM Lock (write once, read many)

AWS Lifecycle Policies
- Policies you can create to automatically move data between tiers.

Other classes:
- S3 1 zone infrequent access
- S3 glacier instant retrival
- S3 glacier deep archive

DATUM/DATE **Comparing EBS & S3**

EBS

- up to 16 TiB
- Solid state by default
- HDD options

S3

- Unlimited storage
- Individual objects up to 5 TB's
- Write once / read many (WORM)
- 99.9x11 % durable

① Ex: Photo analyzing website where a user uploads a photo of themselves & the app finds an animal that looks like them.

need millions+ storage of photos & users to look at many or all at once

☑ Amazon S3 ⟹ - Web enabled already (control access rights)
☐ Amazon EBS - Regionally distributed (no need to worry ab backup)
- Cost savings better than EBS
- Serverless, no EC2 instances needed

② 80 gb video file that you're making edits to

Object Storage	Block Storage
- treats any file as a complete, discrete object. - Good for files that get uploaded and consumed as entire objects. - When there's a change made, you must re-upload the entire file	- breaks files/objects down to components/parts (blocks) - When an update is made to a scene in the 80 gb movie file, the engine only updates the blocks where those bits live.

☐ Amazon S3
☑ Amazon EBS

Amazon Elastic file system (EFS)

- managed file system

- keep existing file systems in place

- Allows you to have multiple instances that can access the data in EFS at the same time
- Scales up and down as needed automatically

Amazon EBS	vs	Amazon EFS
- Volumes attach to EC2 instances - EC2 and EBS must be in same AZ to connect ↳ AZ level resource - Volumes do not automatically scale - Physical hard drive		- Multiple instances reading and writing simultaneously - Not blank hard drive, rather true linux file system - Regional resource, any EC2 in region can write to EFS - Automatically scales

Amazon Relational Database Service (RDS)

Relational Database Management System (RDMS)

- Use SQL to query relational datasets/tables. Through keys

Aws supported databases
- MySQL
- PostgreSQL
- Oracle
- Microsoft SQL Server
- More...

- Move in house db to cloud through a 'lift-and-shift' migration that copies os, storage capacity, etc

Amazon Relational Database Service

- Alternative option to previously mentioned db's

Automatically Managed features
- Automated Patching
- Backups
- Redundancy
- Failover
- Disaster recovery

Amazon Aurora

Easy way to run database workloads on the cloud

Supports
- MySQL
- PostgreSQL

Is 1/10th the cost of commercial databases

- Data is replicated for 6 copies at any given time
- Deploy up to 15 read replicas to offload reads, and scale performance.
- Continuous backup to S3
- Point in time recovery to recover data from a specific period

Amazon Dynamo DB

- Serverless database. Don't need to manage servers/infrastructure
- Create tables to store and query data
- Tables consist of items that have attributes
  Item: coffee Atributes: himalayan, latte, 20% milk
- Automatically scales up or down
- Stores data across availability zones (AZ's) and across mirrored drives automatically

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~1 ms

- Highly performant: ~~0.001 ms~~ response time

- Doesn't use SQL: Non-relational database that consists of simple schema. Good for datasets with some variation item to item as items can have different attributes)

- Write queries based on small subset of attributes denoted as keys

Amazon RDS
- Automatic high availability, recovery provided
- Customer ownership of data, schema, and network control

vs

Amazon DynamoDB
- key/value
- Massive throughput capabilities
- PB size potential
- Granular API access

① Sales supply chain management system you have to analyze for weakspots

☑ RDS
☐ DynamoDB

- Need relational joins
- Built for business analytics

② Any thing else...

☐ RDS
☒ DynamoDB

- Eliminates overhead from complex relational datasets/tables when they're unnessary in most all use cases

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Amazon Redshift

When your data becomes too big for a traditional data store like a relational db, you can use a data warehouse

- Good solution for business intelligence questions looking in the past
  ex: What were the sales across all our stores last week?

AWS Redshift is a scalable warehouse
- common to have petabytes in nodes
- 10x higher performance to traditional warehouses

AWS Database Migration Services (DMS)

Migrate existing databases to AWS From source → target

- source DB remains fully operational during the transfer
  ↳ downtime is minimized for applications relying on that database
- source and target DB's don't have to be the same type

For DB source & target of the same type...
Called Homogenous databases

MYSQL → Amazon RDS MySQL

MsFt Sql server → Amazon RDS for sql server

Oracle → Amazon RDS For Oracle

- Straightforward transfer for homogenous dB

On premise EC2/RDS → cloud EC2 / RDS
↑
Migration Task

When source of a db is different than the target db
-> Heterogenous databases

STEP 1 Convert using AWS schema conversion tool to target type. Changes schema & code

STEP 2 DMS to transfer

Additionally, DMS can assist with

1- Development and test database migrations
2- Database consolidation
3- Continuous ~~ass~~ database replication

1 When you want to test against production data without affecting users. Use DMS to transfer a copy of production to dev or test environments.
.once -continuously

2 Have several databases that you want consolidated into a single DB

3 Use DMS to perform continuous data replication.
ex: disaster recovery, geolocation

Additional DB services

Choosing the right database. No one size fits all.

Amazon DocumentDB (w/ mongodb compatibility)
- Content management system, catalogs, user profiles.

Amazon Neptune
- Graph database
- Social network webs, reccomendation engines. Fraud detection

Amazon Managed Blockchain
- blockchain, decentralized

Amazon Quantum ledger Database (QLDB)

- Immutable system of entry where they can never be removed from the audits
- Good for financial records as it isn't decentralized but still secure and immutable

Database Accelerators

- Adding caching layers on top of db's. improve freq. requests from miliseconds to microseconds

Amazon Elasticache
- memcached
- redis

Amazon DynamoDB accelerator (DAX)
- native caching layer for dynamodb

MODULE 6 : Security

"Shared responsibility model"

- Aws controls security of the cloud, customers control/are responsible for security in the cloud.

Customer's Responsibilities	Customer Data • Platform, Applications, identity, and access management • OS, network, and firewall configuration • Client-side data encription • Server-side data encription • Network traffic protection
Aws Responsibilities	Aws foundation Services • Compute • Storage • Database • Networking • Aws global infrastructure • Regions, Edge locations, availability zones

User Permissions and Access

- AWS Account root user. Has full admin controls. Can access and control any ~~service~~ resource in the account.
  - turn on MFA

AWS Identity and Access Management (IAM)

- By default user has no permissions. Must explicitly allow any action
  - Least privileged principle
- Make an IAM policy which is a JSON document that describes what a user can and cannot do. (API calls) the user can make.

- The "Effect" on a policy can be either allow or deny
- "Action" can be any AWS API call
- "Resource" is which ~~API call the resource is~~ resource the api call is for

IAM GROUPS

- groups that have set permissions you can organize users into. Make an IAM policy for each group.

IAM ROLES

- ~~when to role of an employee changes and is temporary in nature~~
- ~~can be~~
- User that has associated permissions, allow or deny, assumed for temp. amounts of time, no username or password
- Identity you can use ~~to~~ with temporary permissions to gain access to aws resources to:
  - users
  - external identities
  - Applications
  - other aws services
- When an identity assumes a role, it abandons previous permissions and assumes them of that role.

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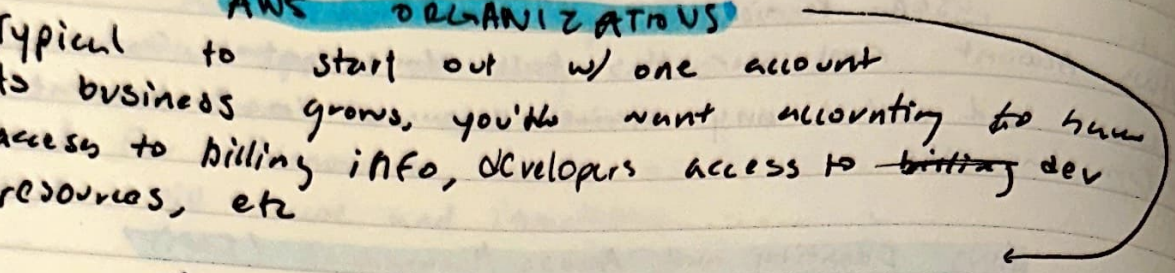
~~USER PERMISSIONS AND ACCESS~~

AWS ORGANIZATIONS

- Typical to start out w/ one account
- As business grows, you'll want accounting to have access to billing info, developers access to ~~billing~~ dev resources, etc



A central location to manage multiple aws accounts

- Centralized management for different accounts
- Consolidated billing for all member accounts
  - ↳ bulk discounts
- Hierarchical grouping of accounts
  - ↳ group accounts into organizational units
- Control over the AWS services and API actions that each account can access
  - ↳ use 'Service Control Policies' to manage maximum permissions for users in an organization (SCP's)

Compliance

- Compliance regulations depend on the business you're in, where you're located, etc.

- By default as aws is in compliance and has best practices, many compliance factors will already be met

★ YOU OWN YOUR DATA IN AWS ★

AWS ARTIFACT

- Get access to compliance reports done by third parties who have validated a wide range of compliance standards

AWS risk and security whitepaper ★★

Distributed Denial-of-service Attacks (DDOS)

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- Attack on companies infrastructure

DDOS objective → overwhelm your system to a point where it can no longer operate. To deny anyone your services

Distributed comes from other machines on the internet to unknowingly attack your infrastructure as one couldn't do it by itself.

Effect attacks

- UDP Flood

Based on the helpful parts of the internet like the weather service which, when prompted, sends ample data about the weather.

A DDOS attack using this strategy would be to submit a request but route the return data to the IP address in which they're trying to attack.

- HTTP level attacks

Look like customers interacting with your application, yet submit requests, over and over and over. Take up so much attention, regular customers can't get in.

- Slowloris Attack

Attacker pretends to have a terribly slow connection and slows down queue as the application is waiting for the packet before moving on.

Solutions

UDP floods => Security groups, as they only allow in proper request traffic.

Slowloris attacks => Elastic load balancer, as it waits for the packet befor sending to an instance for work to be done. And it scales so overwhelming won't work. at region level

AWS shield with AWS WAF (web application firewall)
- WAF filters incoming traffic for the signatures of bad actors with ML. Can detect as they evolve.

ADDITIONAL SECURITY SERVICES

Encription: securing a message or data in a way that only authorized entities can access it.

Encription at Rest

When data is idle. Being stored and not moving.
- Enabled encription for dynamo DB when at rest
- Dynamo DB encription at rest integrates w/ AWS KMS (key management service) to manage encrip key

Encription In Transit

When data is traveling from point A to point B
ex: A = AWS service
B = Client accessing service
or
Other AWS service

AWS REDSHIFT Instance ← SSL connection ← SQL Client

server certificates to validate client

Amazon Inspector

Runs automated security check against your infrastructure.
Checks for:
- deviations from best practices
- EC2 instance exposure
- vulnerabilities
- etc

Consists of three parts
1. Network configuration reachibility piece
2. Amazon agent on instance
3. Security assessment service

Amazon Guard Duty

Threat detection service that offers analyzes cont. streams of metadata generated from your account and network activity.
Runs independant of other services.

MODULE 7: MONITORING & ANALYTICS

Monitoring - observing systems, collecting metrics, and then using data to make decisions.
- Can use this to set triggers for specific actions based on metrics.

Amazon Cloudwatch

Allows you to monitor Aws infrastructure and aps applications running on Aws in real time. Works by monitoring metrics which are variables tied to your resources.

Example: create a metric in cloudwatch called "espresso count" where, when the espresso machine hits 100 mate, it triggers an action to ask a staff member to clean it.

Cloudwatch alarm - when a threshold for a metric is hit, cloudwatch will generate an alert and trigger an action.
↳ integrate with sns (for texting)

Cloudwatch dashboard - screen that lists out metrics in near real time.

Cloudwatch Benefits

- Access to all metrics from a centralized location
- Gain visibility into applications, infrastructure, and services.
- Reduce MTTR (mean time to resolution) and improve TCO (total cost of ownership)
- Drive insights to optimize applications and operational resources

AWS Cloud trail

The comprehensive API auditing tool

- Every request made to AWS gets logged in to cloud trail engine. Who made the request, when, where (IP address) it came from, state before and after, what changed. Accepted or denied.
- Save logs indefinately in S3 buckets

AWS Trusted Advisor

An automated 'advisor' resource that evaluates your infrastructure against 5 pillars: View in AWS console.

1. cost optimization
2. Performance
3. Security
4. Fault toulerance
5. Service limits

Evaluates each pillar based on AWS best practices and categorizes each item for you to look into.

- Setup email alerts

MODULE 8: PRICING & SUPPORT

AWS FREE TIER

Can be one of the following:

1. Always free - that service is always free for all AWS users
2. 12 months free
3. Trials - free trials for a period of time

Examples: -AWS Lambda - serverless compute option - 1 million free invocations per month.

- S3, object store, free for 12 months for up to 5 gb of storage
- AWS Lightsail - 1 month trial of up to 750 hrs of usage

· Sagemaker · DynamoDB, · Comprehend medical · Sns · cognito · 60+ services

Billing Dashboard

Shows breakdown of all things billing

Consolidated Billing

A feature of AWS organizations that allows one payment for all accounts throughout different organizations.

- Simplifies billing process
- Share savings across accounts
- Free feature

AWS BUDGETS

Allows you to set custom budgets for cost and usage. Receive alerts when either costs or usages are forcasted to exceed or do exceed set limits.

AWS cost explorer

As you only pay for what you use, important to drill down in your bill to see/analyze how you're spending and on what.

- Reports

AWS Support Plans

Everyone by default gets AWS basic support
- 24/7 support
- AWS trusted advisor
- documentation
- whitepapers
- support forums
- AWS personal health dashboard

Next support plan: Aws developer support
- email customer support directly w/ 24 hr response time

Then: Aws business support
- AWS trusted advisor providing full set of best practice checks
- Direct phone access to cloud-support engineers

- Access to infrastructure event management like campaigns, event blitzes, etc. *Extra fee*

AWS Enterprise on-ramp support
- Built for migrating critical workloads to aws
- 30 min response time for business critical workloads
- Access to a pool of technical account managers (TAM's)

AWS Enterprise Support
- 15 minute response time for business critical workloads
- Designated TAM (technical account manager)

TAMs help out and check 6 pillars of well architected framework
1. Operational excellence
2. Security
3. Reliability
4. Performance Efficiency
5. Cost optimization
6. Sustainability

AWS Marketplace

A curated digital catalog that streamlines your steps to find, manage, and deploy third party software running in AWS architecture.

How it helps:
1. 1 click deployment. Ease of use.
2. Most allow use of AWS credits and/or pay as you go options

Enterprise focused features
1. Custom terms and pricing
2. A private marketplace
3. integration into your security systems
4. Range of cost management tools

MODULE 9: Migration & Innovation

DATUM/DATE

AWS Cloud adoption framework (CAF)

CAF exists to provide advice to your company to enable a smooth/quick migration to AWS. Through 6 areas of perspectives:

- ① Business
- ② People
- ③ Governance

} Business focus

- ④ Platform
- ⑤ Security
- ⑥ Operations

} Technical focus

- After assing your business in these areas, a CAF action plan is then created to help guide your organization for cloud migration.

Migration strategies

focus on the 6 R's

① ~~Rehost~~ Rehosting "lift and shift"

② Replatforming "lift, tweak and shift"
- limited optimizations, no new code or dev work
ex: mysql to → RDS mysql

③ Retire
- Don't bring over un-needed parts of IT

④ Retain
- Some applications don't make sense to be migrated

⑤ Repurchase
- Ending contracts, software agreements w/ older vendors

⑥ Refactoring
- Writing new code to add new ~~code~~ features, and new opportunities while being on in cloud.

AWS Snow Family

- Designed to be secured

AWS snowcone
- Physical device that holds up to 8TB of data and edge computing (EC2 instances AWS IOT greengrass)
- Ship to you, copy over data, then ship back to AWS who then copy it to your account.

AWS snowball edge
- Compute optimized or storage optimized
- Fit into server racks
- 80TB storage

AWS Snow mobile
- 100s Petabytes of storage
- Has to be moved by semi-truck, 45 feet long
- largest migrations

* 100 PB = 100,000 TB

Innovation w/ AWS

- VMware hosting options

- AWS sagemaker for ML/AI

- Amazon augmented AI (Amazon A2I)
  → leverage ML easily

- Amazon lex
  → interactive chat bots

- Amazon textract
  → extracting text

- AWS Deepracer
  → Reinforcement learning experimentation

- Internet of things

-AWS Ground station
  to pay for satellite time

MODULE 10: The cloud journey

AWS Well-Architected Framework

- operational excellence
Running and monitoring systems to deliver busines value. With that, continuously improving processes an procedures

- Security
Checking integrity of data, and protecting systems by using encryption

- Reliability
Focuses on recovery planning like a hypothetical dynamodb disruption. Also covers how you handle change to meet business and customer demand.

- Performance efficiency
Entails using IT and computing resources efficiently. Ex: using to correct EC2 type based on workload and memory requirements. Also covers making informed decisions and maintaining efficiency as business solutions evolve.

- Cost optimization
Focuses on optimizing full cost. looks at where money is spent

- Sustainability
Focuses on the environmental impact of running cloud workflows. Efficiency at the core of this pillar.

AWS well-architected tool to check for areas that should be addressed.

Benefits of the AWS Cloud

6 main benefits

1. Cost savings from on-prem datacenters as aws is variable pay as you go.
2. Benefit from economies of scale
3. Stop guessing capacity. Don't have to worry about hardware limitations from an on-prem datacenter.
4. Increased speed and agility. Try new things is easy on aws.
5. Stop spending money running and maintaining datacenters. The un-differentiated heavy lifting.
6. Go global in minutes.