

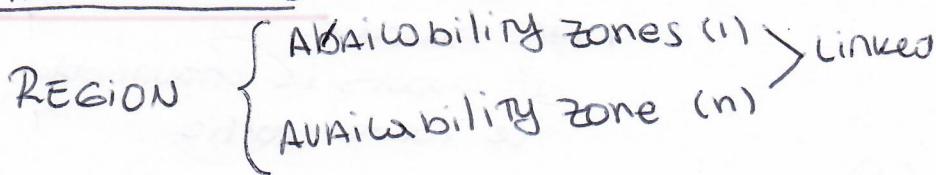
# Cloud Computing

28/06

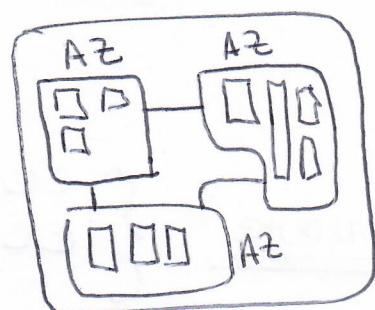
- low cost - pay for what you use - elastic.
- secure

AWS.M01

## Infrastructure



REGION



- AZ ARE ISOLATED FROM ONE ANOTHER

## Edge Locations (HOSTS CDN) continuous delivery NETWORK

- Ensure quick connections due to data replicated on Edge location.

## PROS

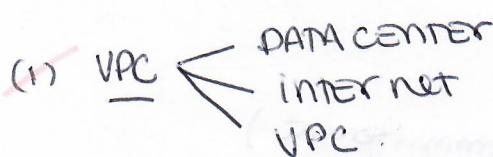
- low-cost → no infrastructure update nor maintenance.
- 

AWS M02

## AWS Main Services

### Networking

- |                                   |
|-----------------------------------|
| AMAZON VPC → VPN IN THE CLOUD (1) |
| AWS Direct Connect → (2)          |
| AMAZON Route 53 → DNS (3)         |



### Benefits

- elastic - flexible customizable - secure low cost

### (2) AWS Direct Connect

- Establish a dedicated connection from premises and AWS
- private connectivity between AWS and datacenter, office...

### Benefits

- reduce bandwidth - elastic - consistent



### (3) AMAZON Route 53

- Scalable domain name server.
- Low latency DNS resolution
- Pay \$ for request.

#### Routing policies

##### + Weighted Round Robin

(specify % to # servers where your source is located)

##### + DNS Failover.

If resource is unavailable, re-route traffic.



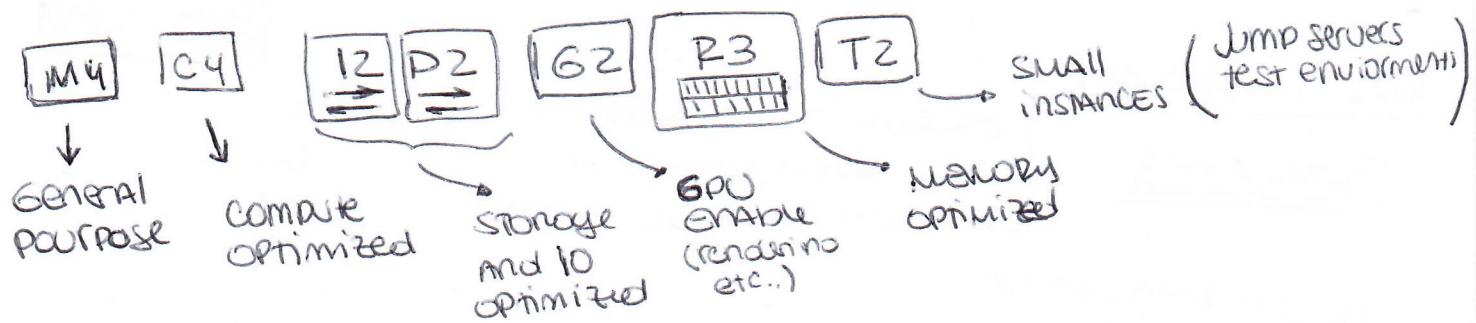
### (1) EC2

- Dedicated Virtual Servers (instantly)
- Remote access.

#### AMI (Amazon Machine Image)

To install to your server.

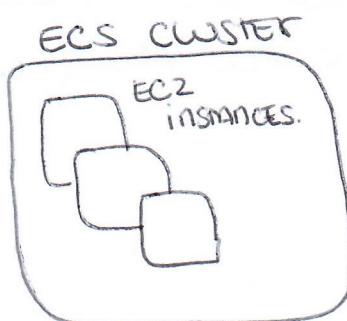
#### INSTANCE TYPE



Pay by hour depending on use (no long term commitment)

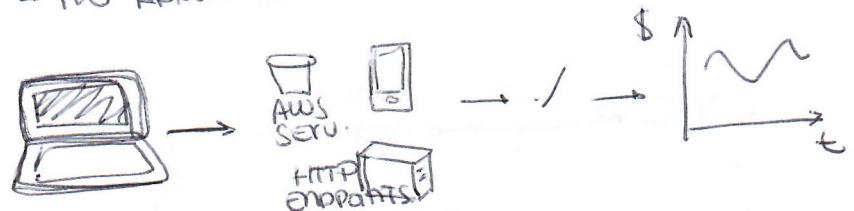
### (2) ECS (EC2 Container Service)

- supports Docker containers
- lets you run app on an ECS cluster of EC2 instances



### (3) AWS Lambda

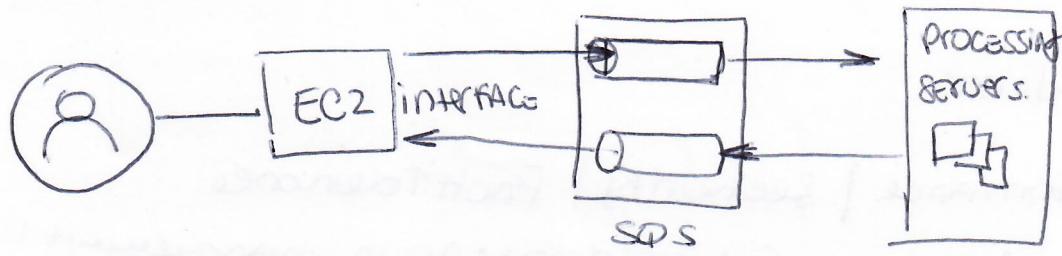
- Run code in response to events
- only pay for compute consume
- no administration



(2) Scalable

## simple queue service.

- point and click interface
- stores messages
- Highly scalable! ←



## AMAZON WORK SPACES

- Cloud base VIRTUAL DESKTOP

## HOW TO ACCESS AWS

### Online Access

- AWS Management console (online GUI)  
console.aws.amazon.com
  - AWS CLI
  - SDK's
  - Query APIs
- (NOT every service is available through out this method)

## Cloud Architectures And Solutions

AWS MO3

## DevOps on AWS

- I - Continuous Integration And Delivery
  - II - Micro services
  - IV - Monitoring and Logging
  - V - Version control
  - VI - Platform As A Service.
- (III) Infrastructure As Code

- (2) CloudFormation
- Automates the creation of AWS cloud and environments
  - Deploy AWS resources with a simple JSON-formatted template
  - Templates for creation

### (3) Trusted Advisor

cost | Performance | Security | Fault Tolerance.

Security and Identity { AWS identity access management (1)  
AWS WAF (2)

#### (1) AWS IAM

- Groups and Permissions
- Integrates with Active Directories and other directories
- Use IAM Roles for EC2 instances.
- Has one Master User
- Groups control

| - Password safe alike practices

#### (2) AWS WAF . (Web Application Firewall)

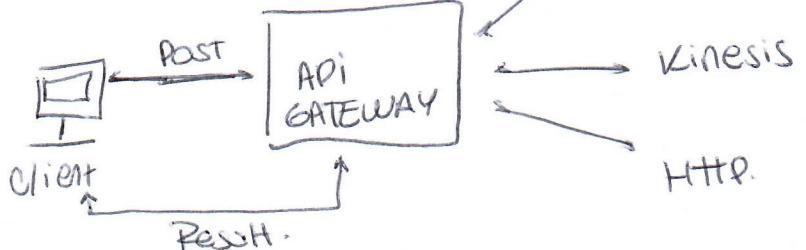
Analytics { EMR (WEBSERVICE) (1)  
Kinesis (2)

#### (1) web service to process DATA

(2) Platform for streaming DATA (standard SQL)

APPLICATION SERV  
API GATEWAY { API GATEWAY (1)  
SQS (2)

#### (1) API GATEWAY.



## Continuous integration (CI)

- Find and address bug quickly
- Reduce time to validate and release updates

### AWS Pipelines

(codepipelines)

PRIVATE GIT HOSTING.  
(AWS code) commit

①

Deployment AUTOMATION  
(AWS CodeDeploy)

②

SOFTWARE RELEASE ORCHESTRATION  
(AWS CodePipeline)

③

① AMAZON GIT REPOSITORIES (GIT)

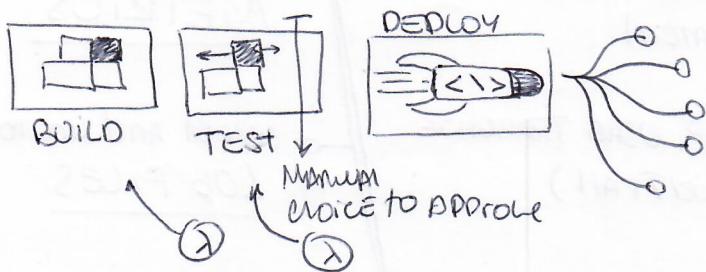
- Encryption
- Scalable
- Permissions (who, how, where, when)

- WORK with git tools.
- SMS, email triggered by ② Lambda function
- PAY FOR ②

② Deployment AUTOMATION - Deploy automatically across EC2 instances

③ Pipelines

- GRAPHIC user interface OR CLI
- AUTOMATED tests.
- PART OF the Deployment
- common Pipelines but it has the AWS on it.! (wow!)
- DEFINE how AND where code is TESTED.



## continuous delivery (CD)

- developers will always have deployment ready build ARTIFACT that was PASSED TESTING.

II

## MICROSERVICES II

- Design approach that build an application AS A SET OF microservices.
- Build And Deploy ~~an~~ A MICROSERVICE within a CONTAINER
- Serverless compute

② Lambda



## PROVISION DOCKER PLATFORM (AMAZON ECS)

EC2 container services.

- container management service that supports Docker containers.

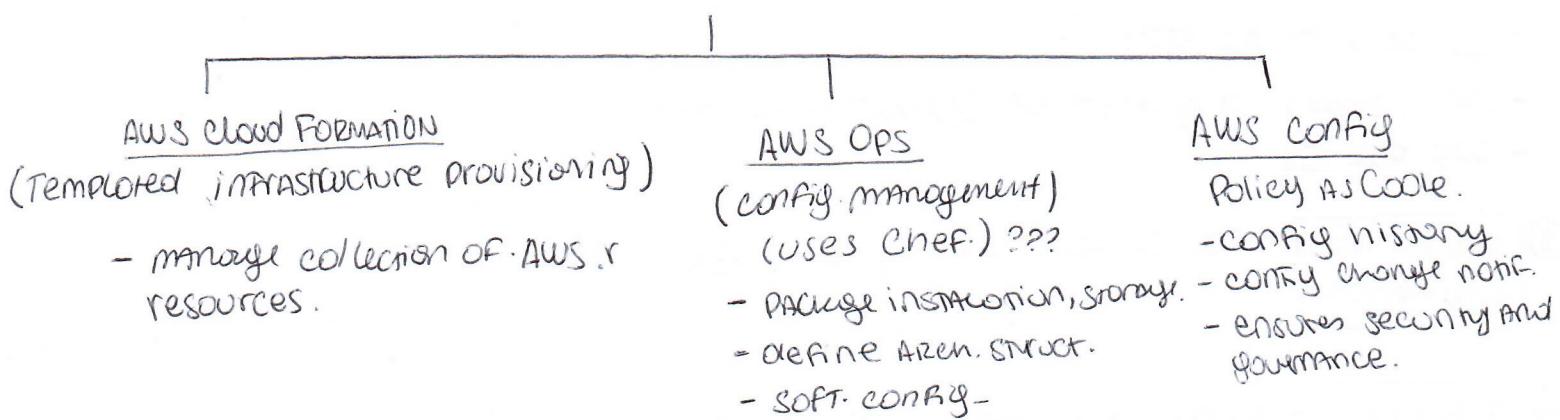
## SERVLESS COMPUTING.

- Run code without provisioning or managing servers.

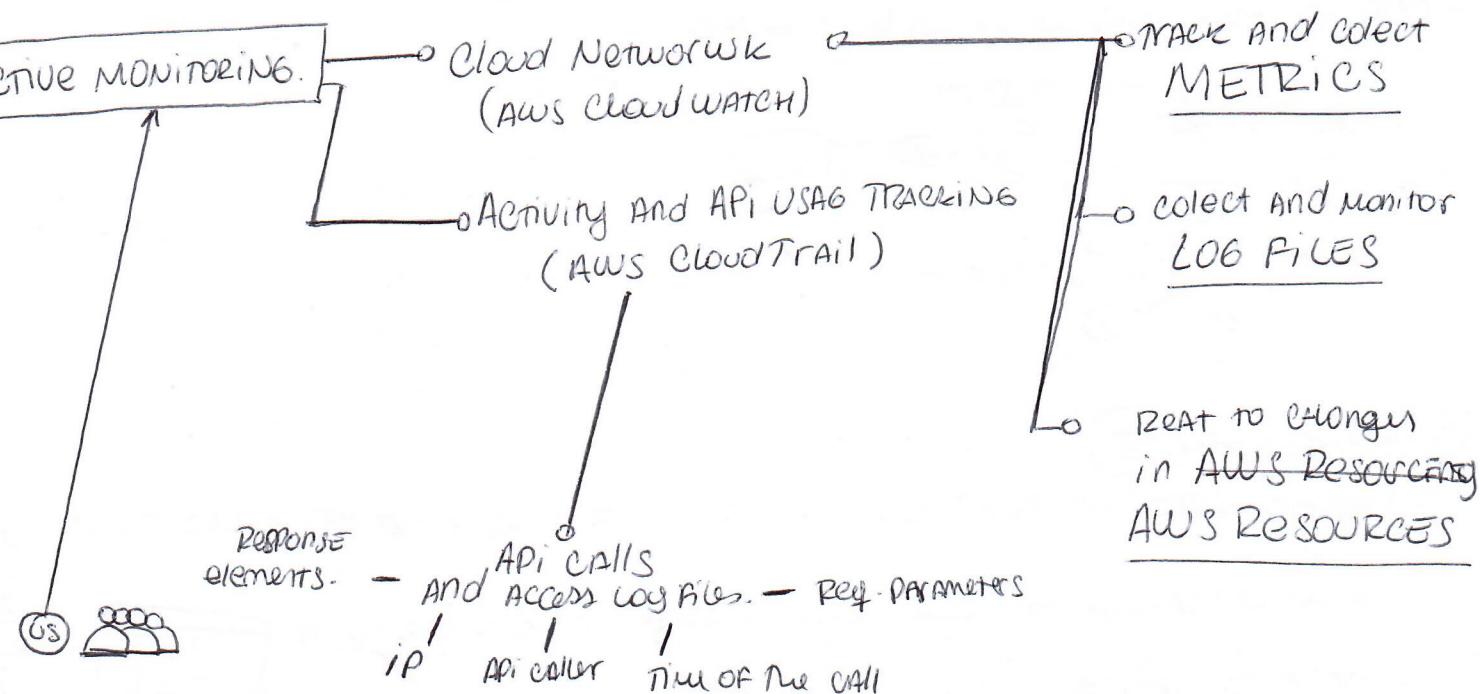
## INFRASTRUCTURE AS CODE (III)

- PRACTICE in which INFRASTRUCTURE is provisionated and manage using software dev. techniques.

- Don't need TO SETUP RESOURCES



## MONITORING AND LOGGING (IV)



## DATABASE

- { RDS (1)
- DynamoDB (2)
- AWS Database Migration Service (3)
- Amazon Redshift (4)

### (1) RDS (Relational Database Service)

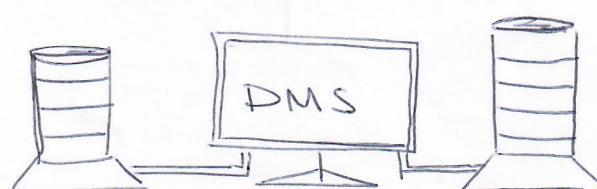
- SQL
- MySQL
- Oracle
- PostgreSQL
- Monogment
- FAST, IOPS
- INTEGRATED
- Elastic
- Low-cost
- Flexible
- Secure

### (2) Dynamo DB

- FAST, Flexible (NoSQL) DATABASE

mode for AdTech, Gaming, IoT

### (3) Database Migration Service



- SUPPORTS HOMOGENEOUS/HETEROGENEOUS MIGRATION
- CONSOLIDATION IN PETABYTE-SIZES

### (4) Amazon Red Shift

- SCALE, manage, set up and operate DATA AT A Petabyte-SCALE.
- Monitor nodes and drive AUTOMATICALLY
- Scale without Downtime.
- JDBC → exec query
- ODBC → Access ANY DATA.
- PostgreSQL driver
- Network Isolation
- Encryption
- Audit And Compliance

## Management Tools

- { CloudWatch (1)
- CloudFormation (2)
- AWS Trusted Advisor. (3)

### (1) CloudWatch

- Monitor DATA (Alarms, Auto-Action, ...)
- Metrics (CPU usage, disk reads)
- Software Development Kits

VIA:

AWS Management console

# Storage And Content Delivery

## (1) Amazon EBS (Elastic Block Storage)

- 1 GB to 16 TB
- use it as a harddrive
- multiple volumes on the same EC2
- suited for
  - databases
  - file system
  - block-level storage

### 3 types

- [ ] Standard
- [ ] Provisioned IOPS
- [ ] General Purpose

{  
Amazon EBS (1)  
Amazon S3 (2)  
Glacier (3)  
AWS Snowball (4)  
CloudFront (5)}

### Durability and Backup.

- automatic replications within its AZ
- snapshots backups to Amazon S3

## (2) S3 (Simple Storage Service)

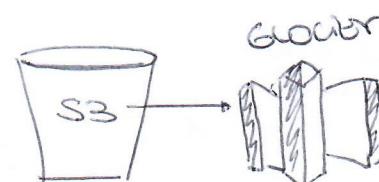


- static website content
- backups
- data

## (3) Glacier

DATA STORAGE FOR ARCHIVING AND BACKUP

- \$0.01 per GB / month
- durability 99.9999..

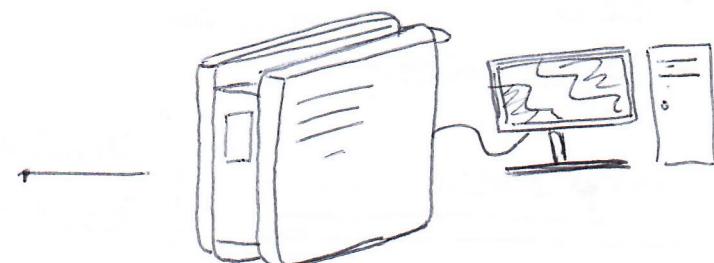


## (4) AWS Import/Export Snowball

- petabyte-scale data transport solution
- transfer in and out AWS cloud



- Snowball appliances shipped



## (5) CloudFront

- CDN for global content
- dynamic, static, streaming and interactive content using global edge locations

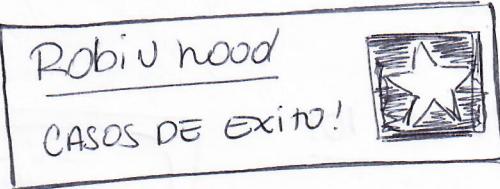
## Platform AS A Service VI

Deploy APPS sin preocuparte por los recursos que tienes  
corriendo en tu aplicación.

AWS Elastic Beanstalk

## Version Control II

- Scalable PRIVATE GIT Repositories.



## Cloud Migration

Formula : Number of DAYS =  $\frac{\text{TOTAL bytes}}{24 \text{hrs} \times \text{Mb/sec} \times 125 \times 1000 \times \text{Network Utilization} \times 60 \text{sec} \times 60 \text{min}}$

- Security : - snowball  
- Kinesis  
- Direct connect.  
- ...

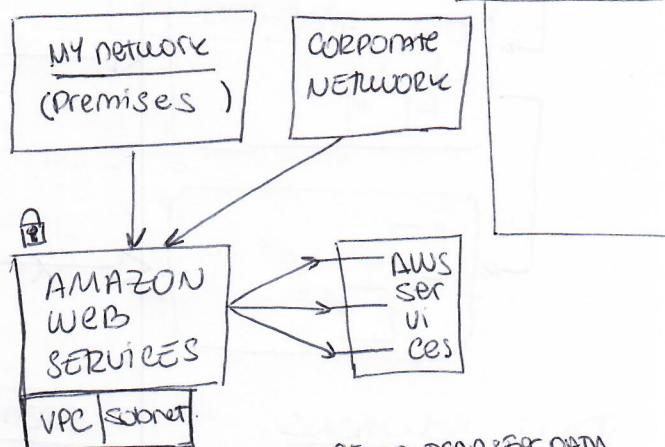
AWS MIGRATION TOOLS

### CASES

- one-time massive migration
- ongoing migration (Hybrid)
- continuing streaming ingestion

### optimize :

#### ⊕ DIRECT CONNECT



### Unmanaged Mig.

- rsync
- S3 CLI
- Glacier CLI

### Managed Mig.

- GATEWAYS
- Firehose Kinesis
- Tech PARTNERSHIPS
- Direct connect
- snowball
- S3



#### ⊕ S3 TRANSF ACCELERATION

MÁX AVAILABLE BANDWIDTH.

NOT TO TRANSFER DATA  
BUT YOU CAN



## AWS App Discovery Service

- DISCOVER APPS
- MAP DEPENDENCIES
- MEASURE PERFORMANCE

## AWS Server Migration Services

AWS MIGRATION SERVICES

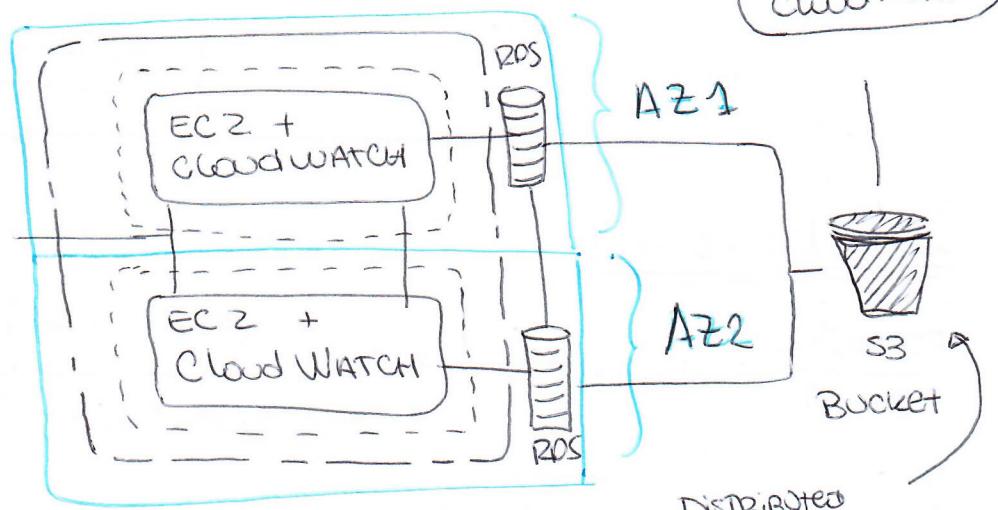
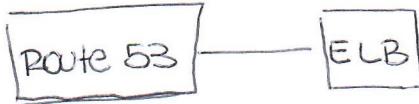
- USES FOR WEB, MOBILE, IOT AND BIG DATA

AWS M04

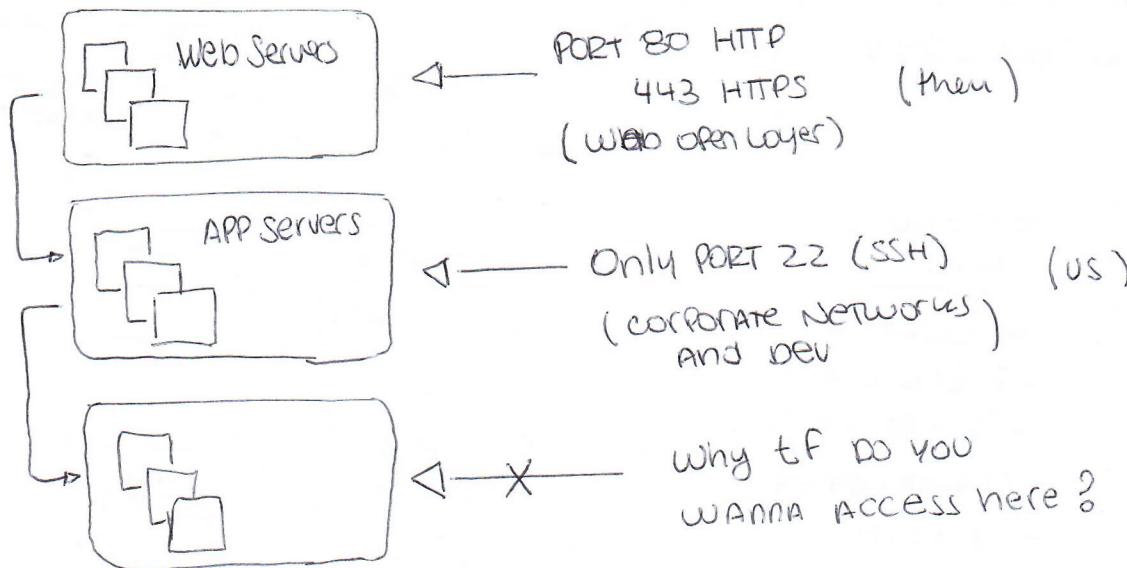
- AWS PRICING TOOLS

## Web, Mobile and IoT

### AWS WEB ARCHITECTURE

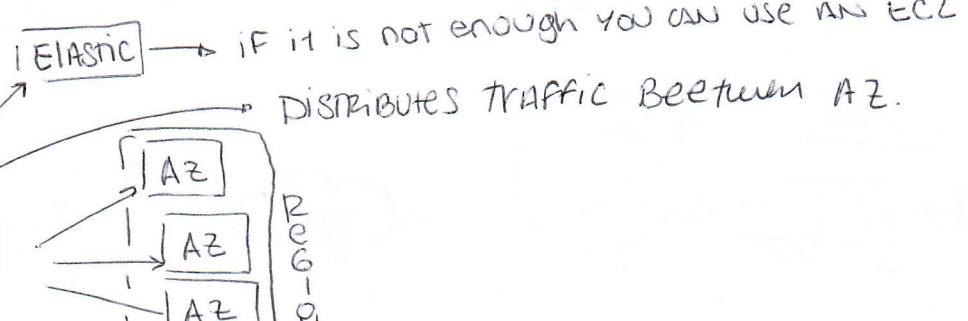
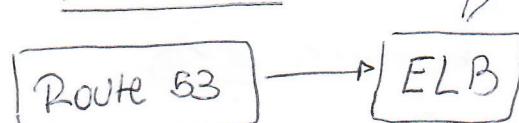


## Security Groups



## DNS Solutions

### DNS SERVER



## AWS Cloud Trail

- Log files
- Time
- Identity
- IP Address Source
- Req. Param.
- Response elements.

## Deployment and Management follow AWS Best Practices

- Change management process
- Avoid unhandled serv. disruption, unintended
- Configurable metrics.

## Security Responsibility is Shared

- AWS EC2 instances and things you install on them.
- Accounts that access your instances
- Your sec. group.
- The VPC subnet that the instance resides within.
- THE EXTERNAL ACCESS OF YOUR S3 BUCKET.

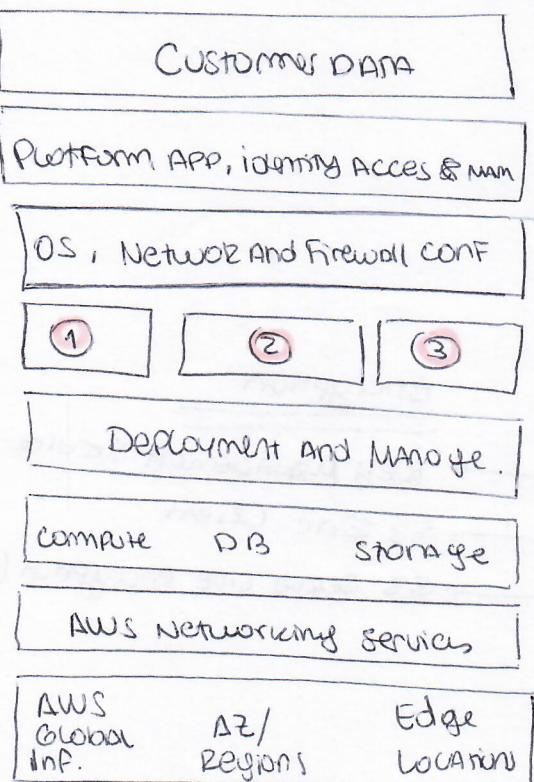
Client  
Compliances

Purchase soft.  
in AWS.

## AWS Trusted Advisor

## Master Account

- Do not use the root login.
- Use IAM to grant unique access
- IAM default



### User

Anything on  
the Infrastructure

① Client-side data enc.  
Data integrity auth

② Server-side enc.  
Data integrity auth

③ Network traffic  
Protection

AWS  
underlying  
infrastructure.

## AWS APPROACH TO SECURITY. (1 ONE PRIORITY)

### DESTROYING AND CLEANING DATA

- DoD 5220.22-M

- NIST 800-88

- Align with standards and best practices (PCI-DSS) (COBIT) (HIPAA)  
(ISO 27001) (NIST 800-53)

-

### AWS NETWORKING SERVICES

#### AMAZON VPC

PRIVATE NETWORK ADDRESS SPACE

IPsec VPN to your data center.

- Secure Network Architecture.

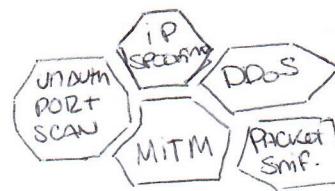
- Secure Access Points

- Transmission protection  $\leftarrow$    
 HTTP  
 HTTPS  
 TLS

- Amazon Corporate Segregation

- Fault-Tolerant Design

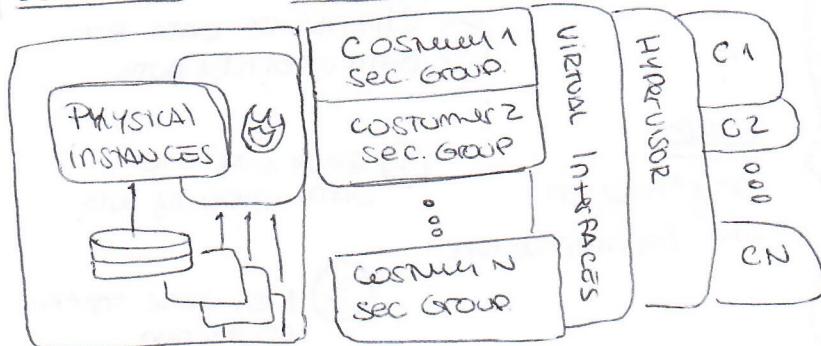
- Network Monitoring and Protection.



### AWS PRODUCTION NETWORK

Políticas de Seg. de Prod.

Compute  $\rightarrow$  Dedicated instances.  $\rightarrow$  Separated at a host-machine level.



### DATABASES $\rightarrow$ AMAZON RDS

- DB Sec. Groups
- Permissions
- SSL connection
- Automated Backup
- PB Snapshot
- Multip-AZ deploy.

### STORAGE

#### Encryption

Key Management Service (KMS)

S3 Enc. Client

S3 Server Side Encryption (SSE)

## Cloud Front

- Deliver website using a ~~web~~ network off edge locations
- Optimize performance.
- Also work with non-AWS servers that contains the last version of your files

## Hosted Databases

	RELATIONAL	No SQL
Managed Database Service	AMAZON RDS	AMAZON DYNAMO DB
Self-Managed DB. Service (you are in charge.)	Hosting a relational DBMS on an AMAZON EC2 instance	Hosting a NoSQL solution on an AMAZON EC2 instance

Storage solutions depending on the DATA

static (log, images, scripts, css) → AMAZON S3

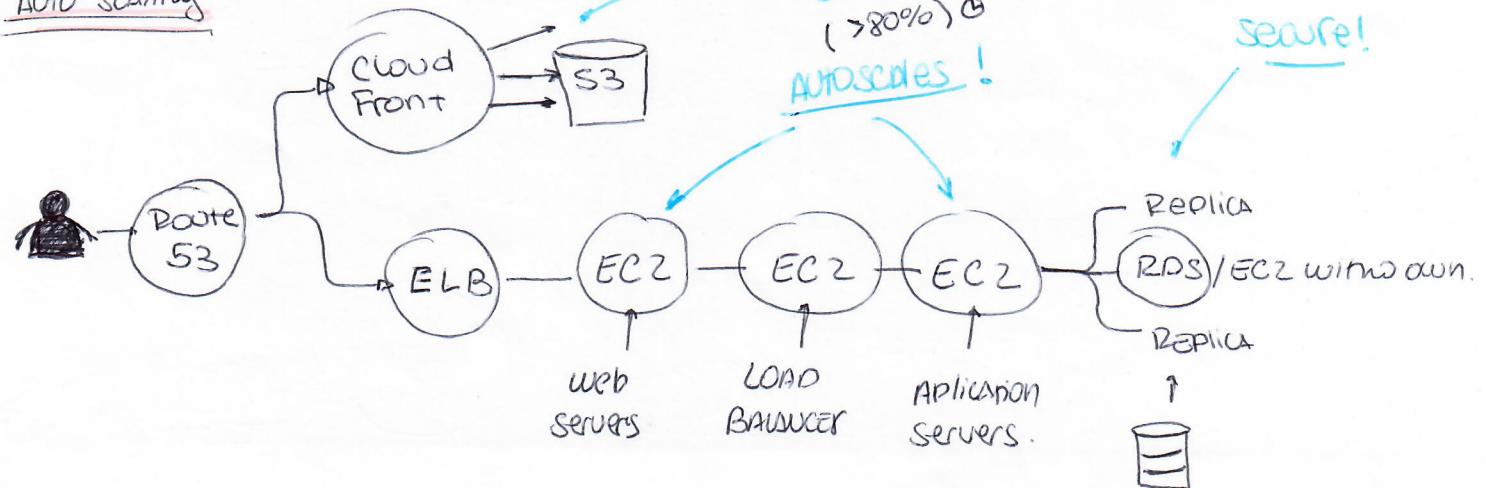
dynamically generated content (PHP, ASPx) → AMAZON RDS

session data → AMAZON DYNAMO DB

database files → EBS VOLUMES

shared storage → NETWORK file systems (Blusters FS, NFS)

AUTO scaling



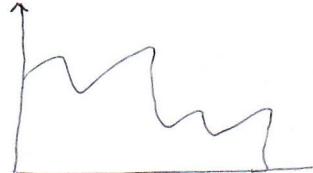
## AWS Mobile Service

## AWS DATA BIG.

TLDL

## How Pricing Work

### ① PAY AS YOU GO



PAY only what you use

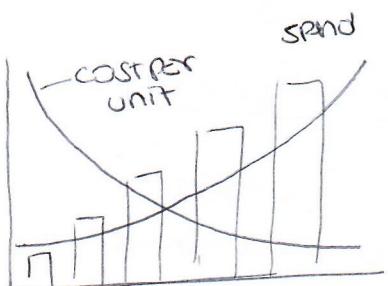
### ② RESERVING PRICING.



RESERVE UPFRONTS

## PRICING

### ③



USE more Pay less per unit

## Charges

+ Compute / hr

+ Storage / GB

+ DATA TRANSF / GB OUT. → You don't pay for incoming DATA OR FOR DATA TRANSFER WITHIN THE SAME REGION.

DATA TRANSFER BETWEEN REGIONS Charge as internet DATA TRANSFER.

Simply monthly calculate → ESTIMATE COST.

## Billing and Cost Management Console