
# Pentesting AWS

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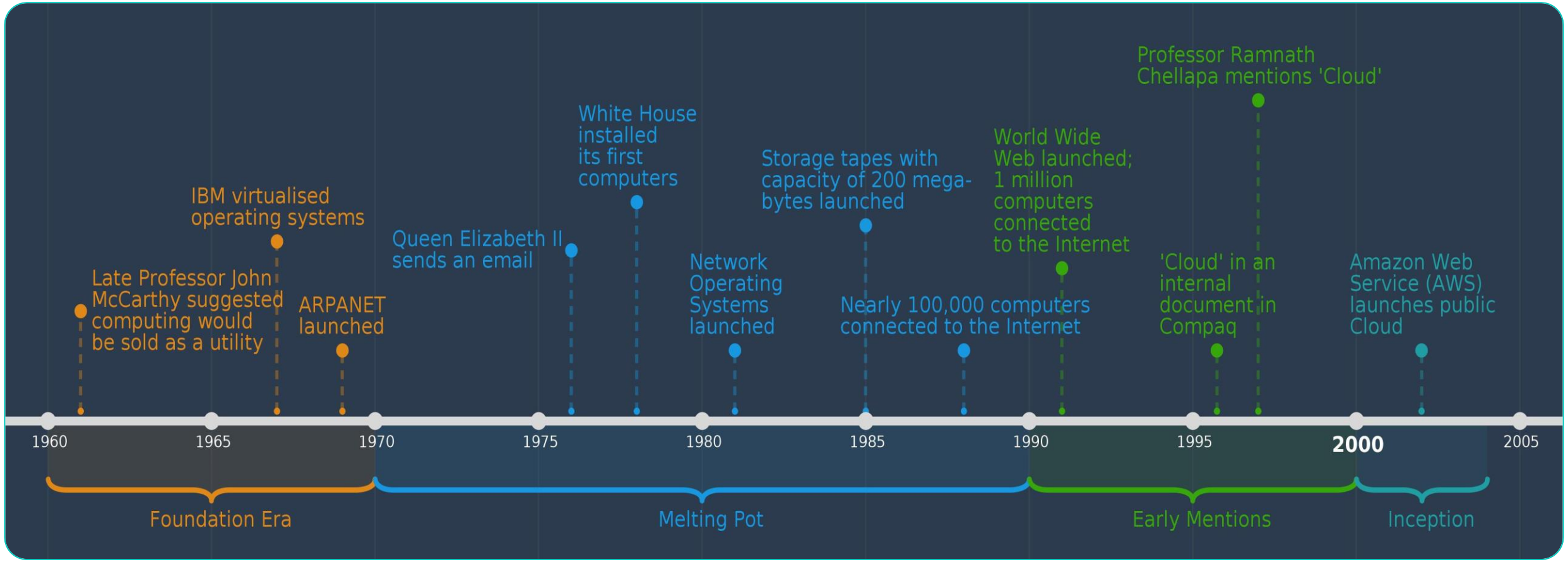
# Disclaimer

- I am **NOT** being compensated by AWS or my employer to give this talk. I am expressing my own opinions here.
- I'm sharing what I have learned. There are many others who know more about AWS than I do.

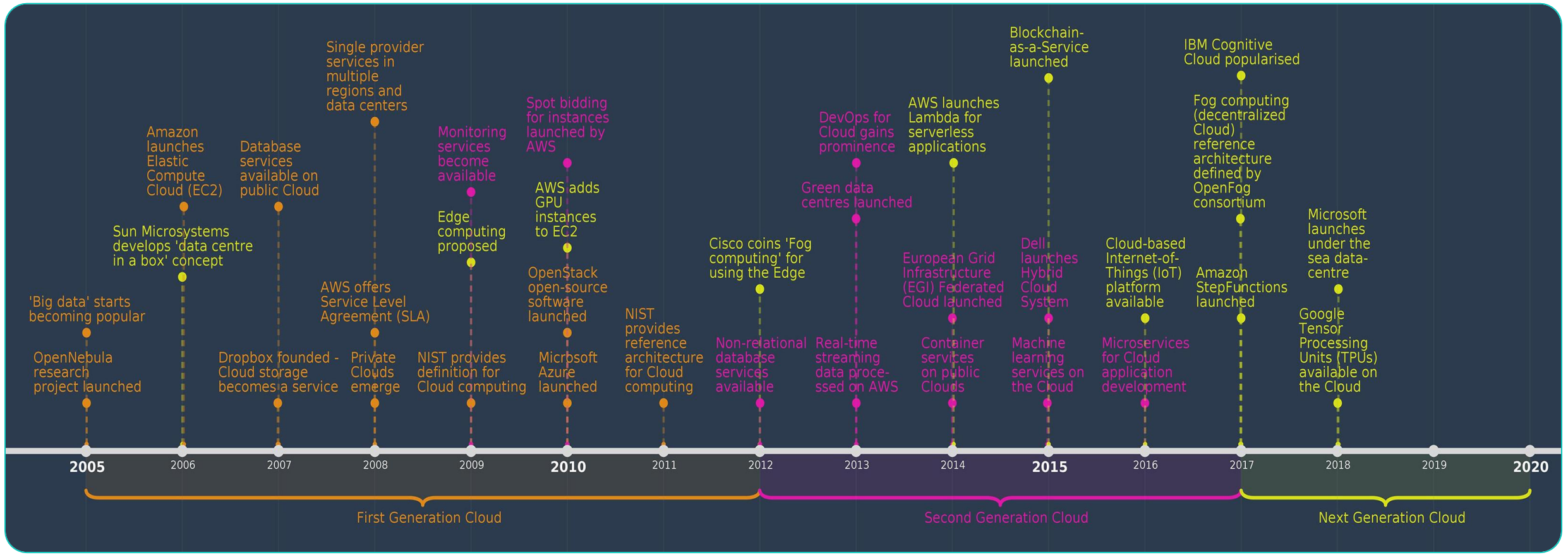
# Agenda ~ 45 mins

- Evolution of Cloud
- About AWS
- Key AWS concepts
- Cloud Breaches
- Demo - Scenario 1
- Demo - Scenario 2
- Using AWS to secure AWS
- QnA

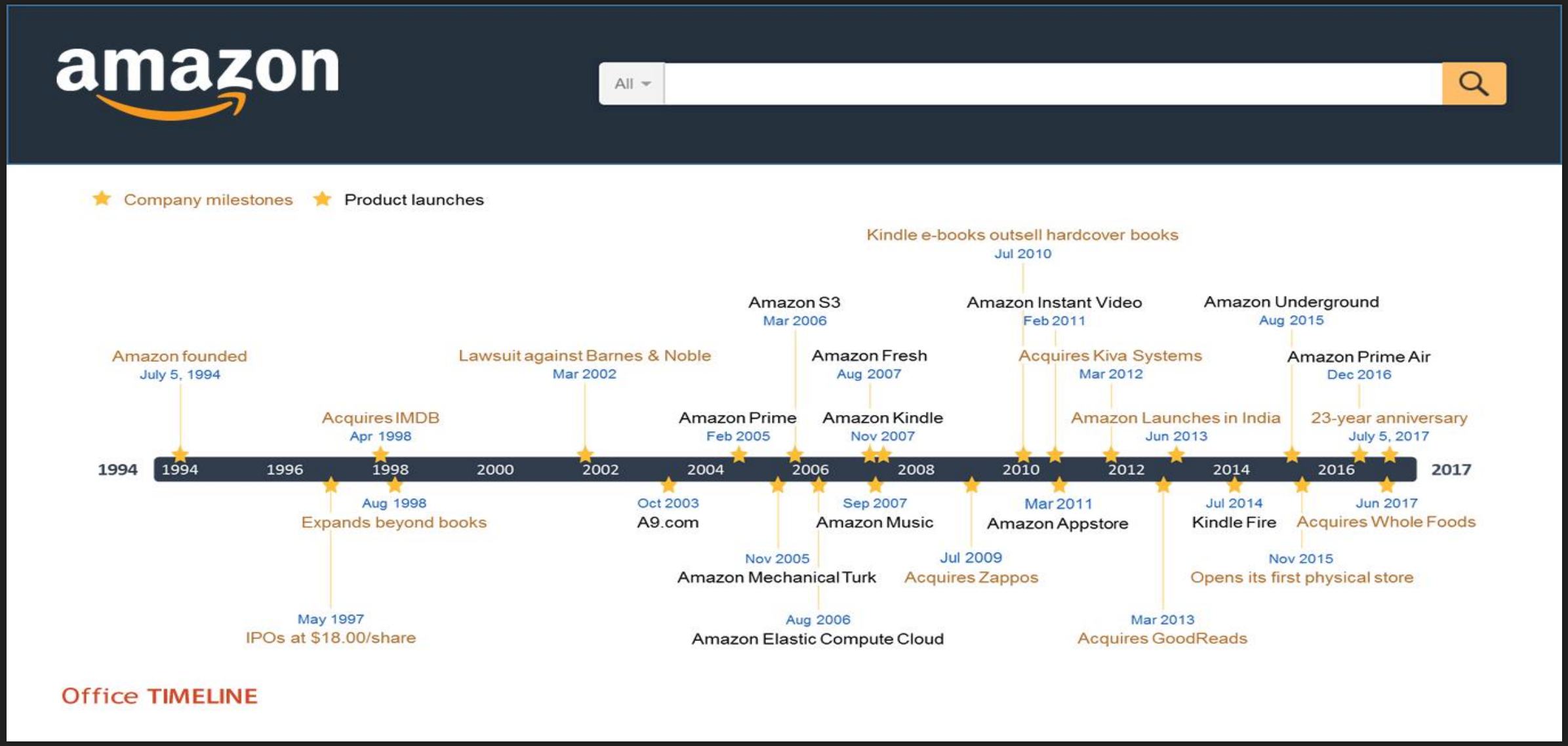
# Evolution of cloud



# Evolution of cloud



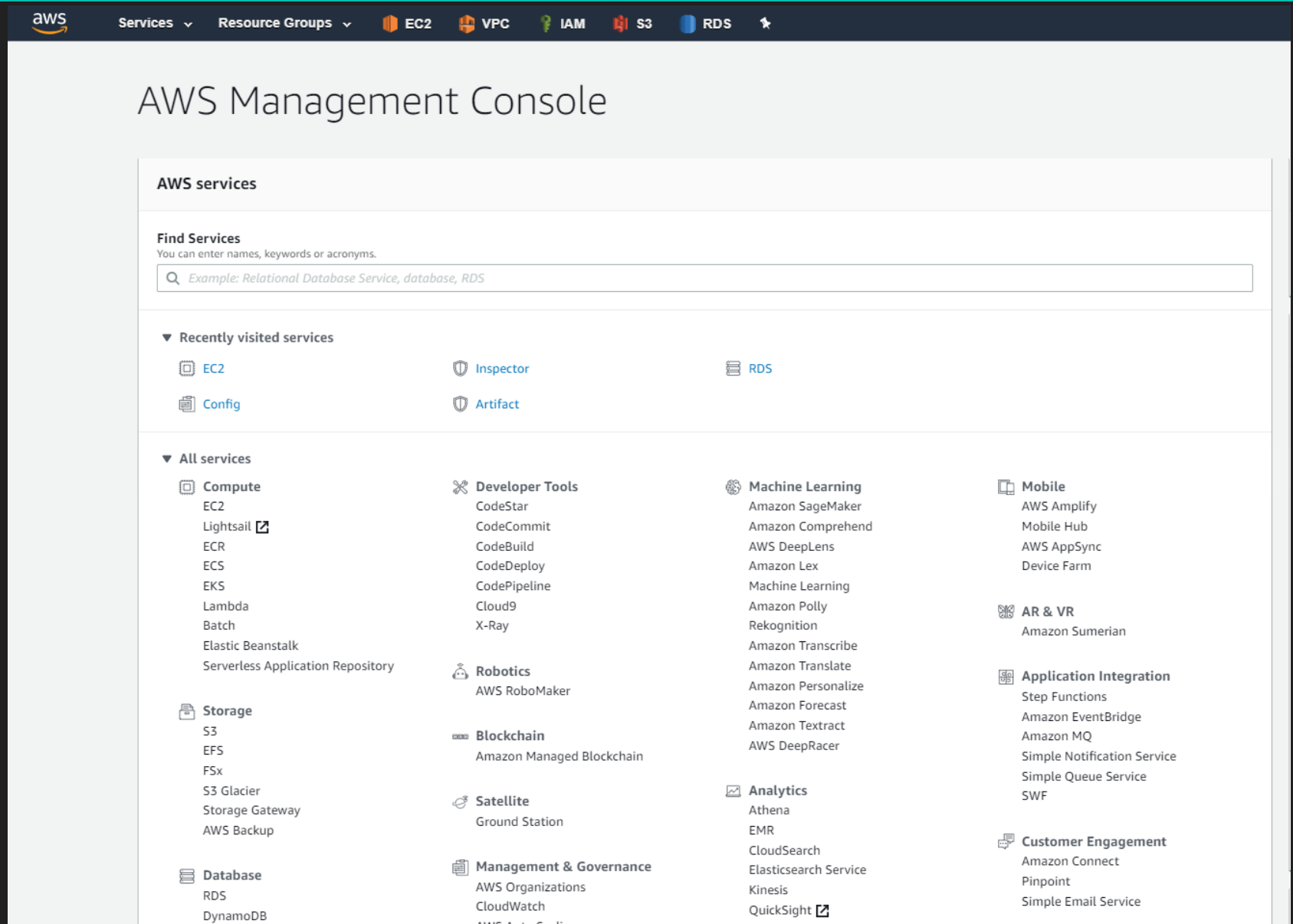
# Evolution of Amazon



# What is Cloud?

# About AWS

- **A**mazon **W**eb **S**ervices
- Here services are terms used for various products it is offering like S3, EC2, RDS, Lamda, Polly, SNS, SQS etc.
- There are 150+ services and are being added frequently



# Definitions : Regions & AZ's

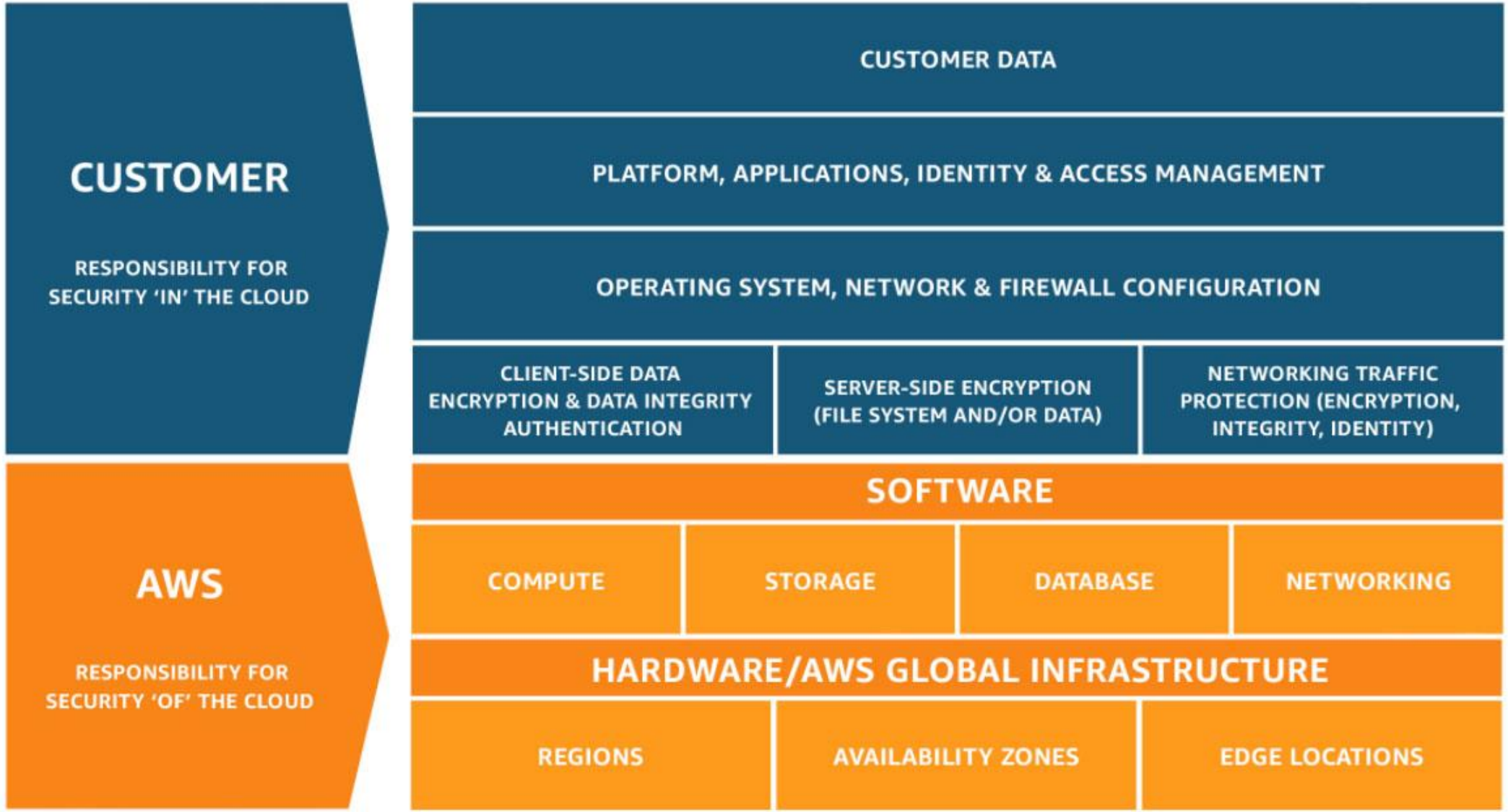
**Region**: A geographical area designed to be isolated from all other Regions

- Isolated for fault tolerance and stability
- AWS has Global Services (like IAM) that apply to all Regions
- AWS also has Region-based Services

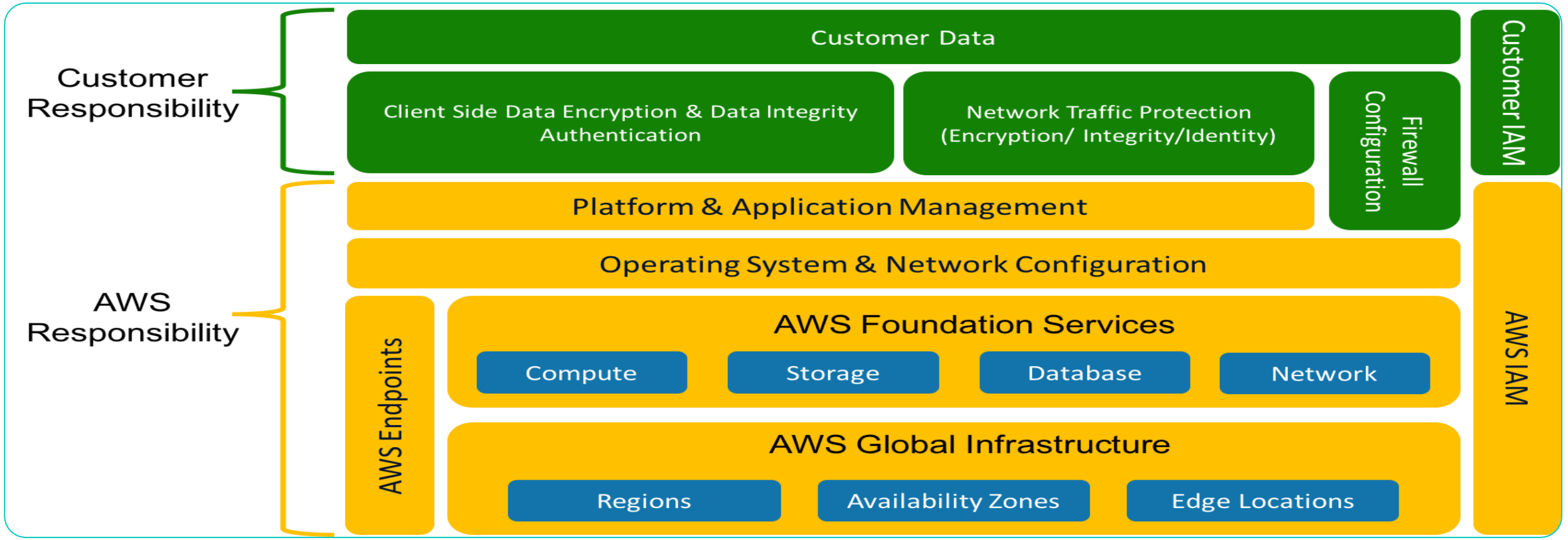
**Availability Zones** are separate locations within the Region

Site: https://infrastructure.aws/

# About AWS : Shared Responsibility Model



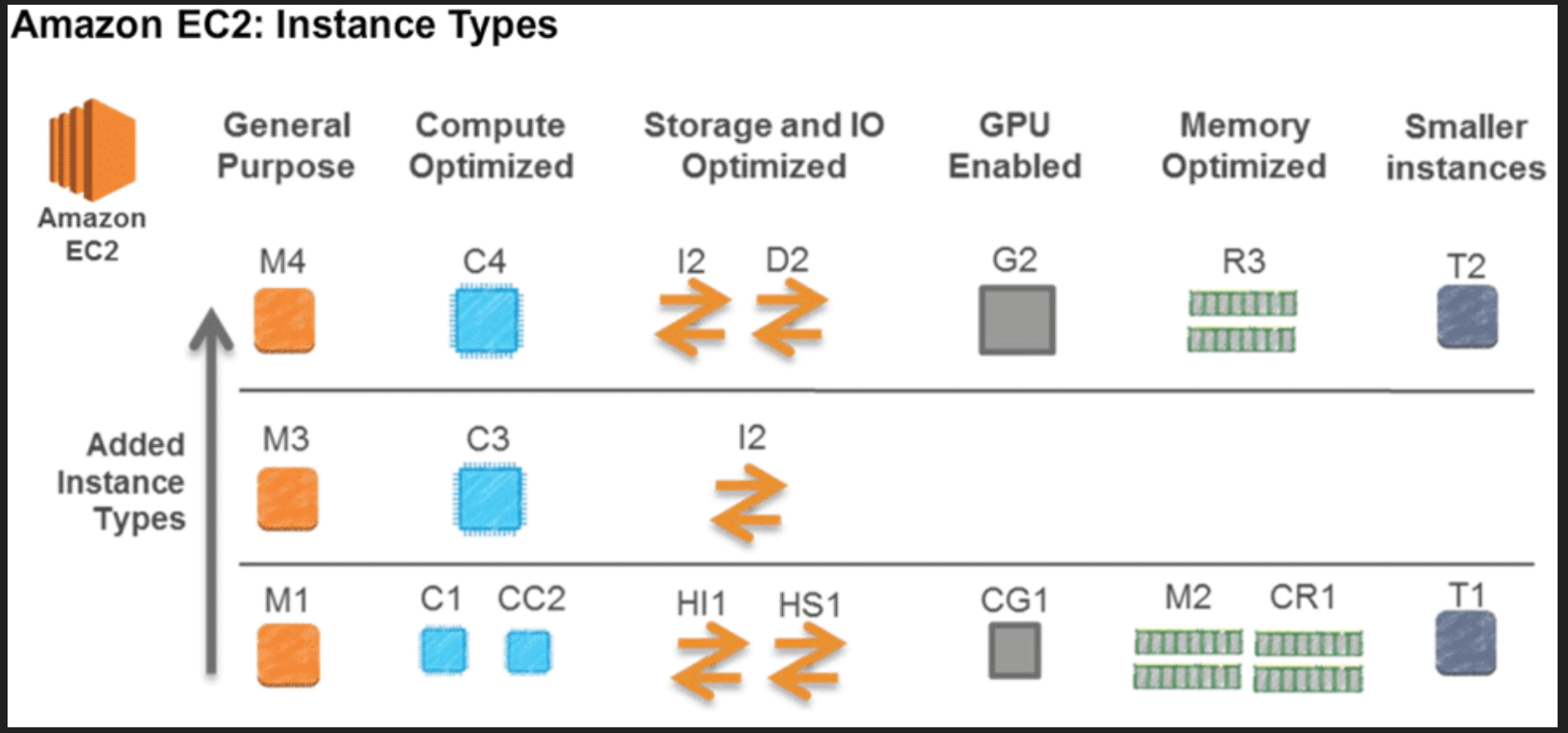
# About AWS : Shared Responsibility Model




https://cloudacademy.com/blog/aws-shared-responsibility-model-security/

# Key Services : Elastic Cloud Compute(EC2)

- EC2 instance are traditional virtual servers present on cloud
- **AMI:** Amazon Machine Image : Golden images to create Instances
- There are **Security Groups**, **Auto scaling groups**, **Elastic Ips**.



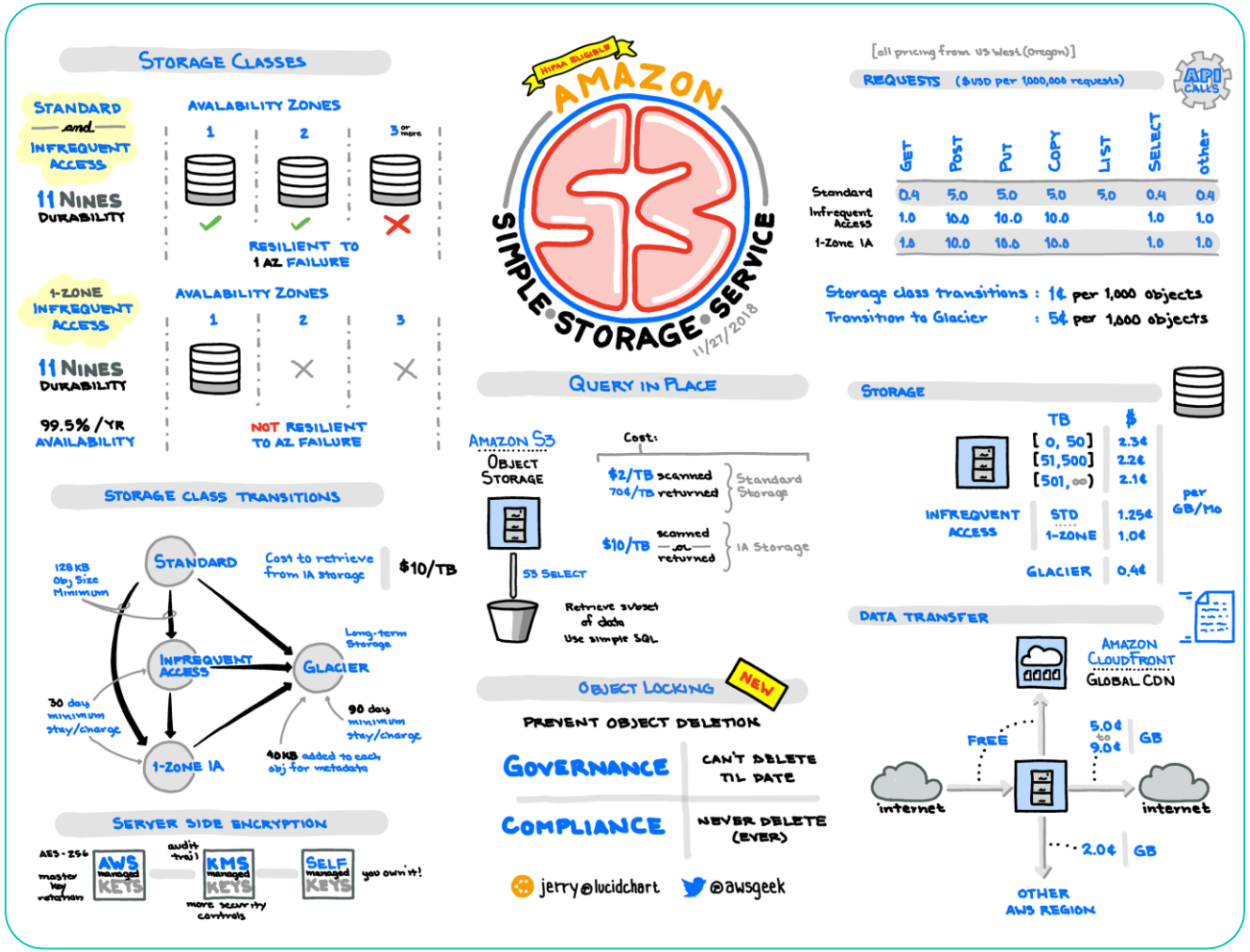

https://microage.com/blog/aws-ec2-pricing-models/

# Key Services : VPCs, Security Groups

- **Security Groups** are individual enclaves bordered with stateful firewalls
  - Can specify separate (or even multiple) Security Groups for each host
  - Filtering rules can be set up for inbound and outbound traffic
    - Can specify allowed source/destination IPs and ports
    - If not otherwise specified, all outbound traffic is permitted
    - Implicit DENY of all traffic not explicitly ALLOWed
  - **VPCs** are like VLANs, a private network
  - **VPC Endpoints** : VPC Endpoints allow private connections between the AWS back-end and your VPC

# Key Services : Simple Storage Service S3

- S3 is a Object based storage service where you can practically store unlimited files
- They have a bad reputation because, people leave them world readable

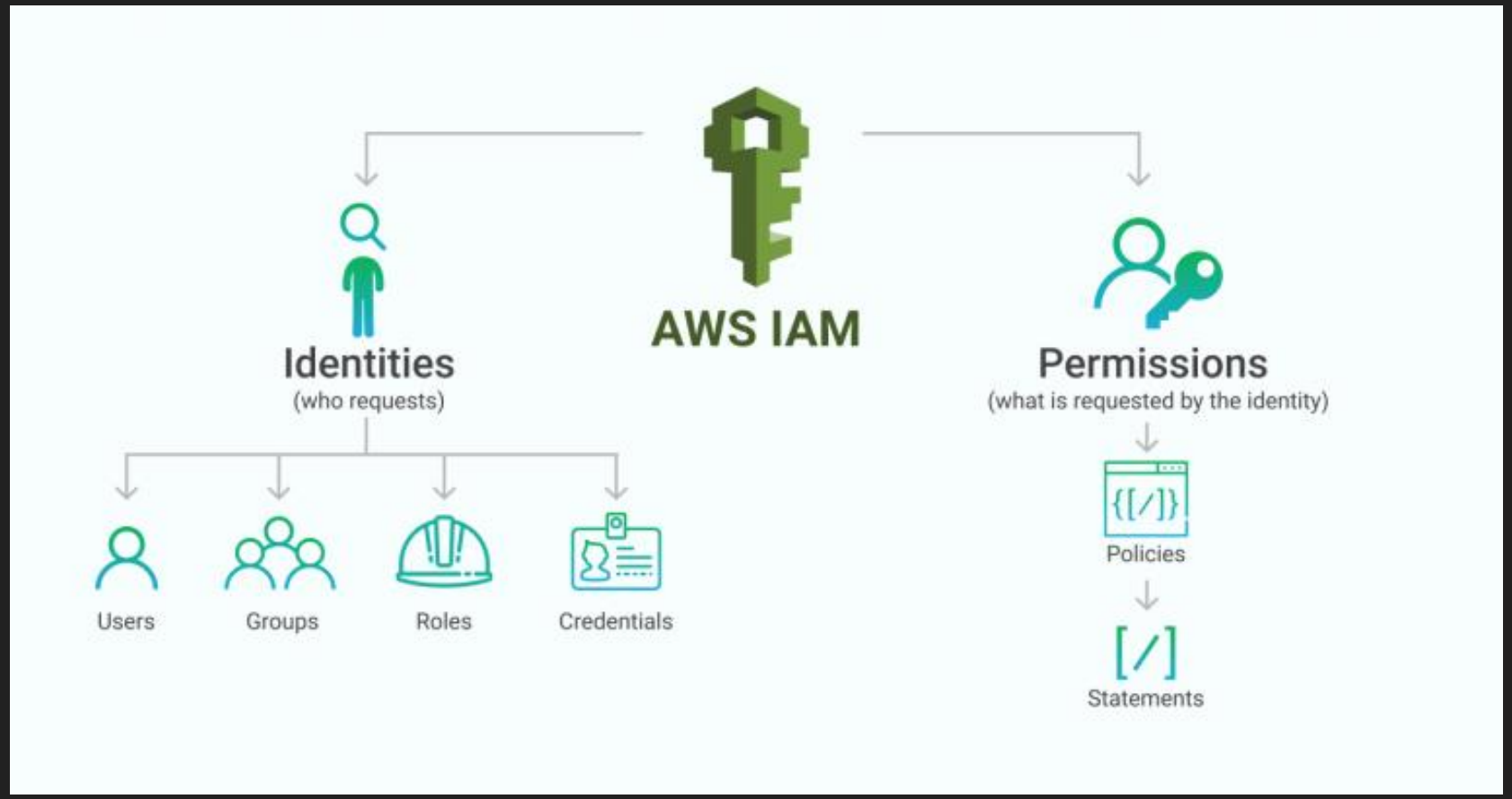



https://www.awsgeek.com/images/Amazon-S3.png

# Key Services : CloudTrail vs CloudWatch

- **CloudTrail** is a webservice recording all the API activity, where as **CloudWatch** is monitoring service for aws resources and applications.
- **CloudTrail/Watch** gets enabled by default, for CloudWatch supports certain services and basic monitoring is free, for detailed one you will need to pay
- **CloudTrail** helps you in ensure compliance & regulatory requirements, **CloudWatch** logs details which provides information on what happens with data.
- **CloudTrail :** Deliver events within 15mins of API Call
- **CloudWatch :** for basic monitoring delivers data in 5 mins, for detailed monitoring 1 mins.

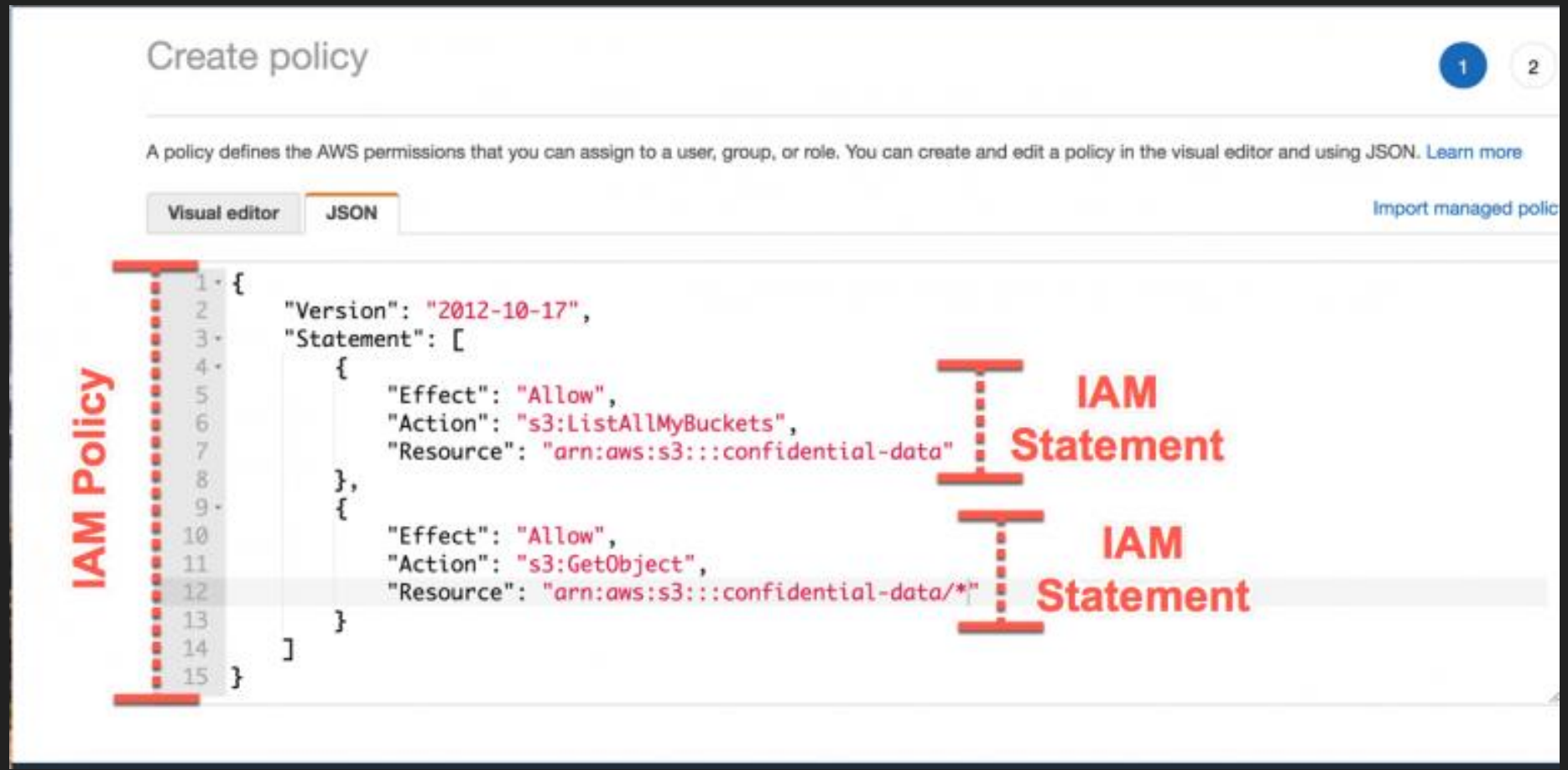
# Key Services : Identity & Access Management




https://www.cloudberrylab.com/resources/wp-content/uploads/2018/10/scheme-2-768x406.png

- Not granting access to any services, user will be allowed to stare at the screen

# Key Services : Identity & Access Management




https://www.cloudberrylab.com/resources/wp-content/uploads/2018/10/image4-1-768x378.png

# Key Services : More Services

- **Tag**: a metadata key (value is optional) that can be attached to AWS resources.
  - Limit access to resources based on Tags:

    "Secrets manager:ResourceTag/Project": "${aws:PrincipalTag/Project}"
- **API Access : AWS CLI, AWS Provided Libraries**
  - **Access Key ID**
  - **Secret Access Key**
- **Cloud Formation :** "Infrastructure as a code" , another example is "Terraform"

# Common Failures : Accessible API Keys, Excessive Permissions

- Your AWS API keys allow people to impersonate you, get access to your resources, and use your AWS account to mine for bitcoin.
- There are tools like truffleHog and git-secrets are available to audit any GitHub repositories to find AWS Keys, passwords, and other sensitive data.
- Public buckets: not even once, Until authorized by management
- Use bucket lifecycles for data retention.
- "Authenticated Users" group means anyone who has logged in to **any** AWS account, not just yours!
- Set your S3 buckets to be encrypted by default. It has zero impact on your workflow and makes your auditors happy.
- While encrypting take care of "Old Data" and all previous versions

"Demo"

# Demo -1 Poorly configured S3 buckets

flAWS.cloud

# Demo -2 Poorly configured IAM Policies

Excessive permission can lead to …

# Demo – 3 misconfigured EC2 instance

Who can access “meta-data”

# Cloud Breaches

## Former AWS Engineer Arrested as Capital One Admits Massive Data Breach

## Over 540 million Facebook records found on exposed AWS servers

Leak originated at two third-party companies that had collected Facebook data on their own servers.

By Catalin Cimpanu for Zero Day | April 3, 2019 -- 18:32 GMT (00:02 IST) | Topic: Security

### AWS Data Leaks Persist

In addition to the aforementioned Microsoft data leak, several Amazon Web Services (AWS) data leaks recently were discovered, including:

- **Alteryx:** Misconfigured AWS cloud storage, exposing personal information from 123 million U.S. households.
- **Verizon:** Suffered two AWS-related leaks: a Verizon Wireless leak and a second exposure in which 14 million Verizon records were leaked.
- **Time Warner Cable:** Leaked 4 million customer records.
- **WWE:** Exposed 3 million customer records.

JUN 28, 2019

## Ford, TD Bank Affected by Cloud Data Breach

BY CHRIS BRUNAU

Cybersecurity

by Dan Kobialka • May 1, 2019

An unprotected Microsoft cloud server database has exposed sensitive data from more than 80 million American households, hacktivists Noam Rotem and Ran Locar told vpnMentor. Microsoft has notified the database owner, and the database has been removed.

# Cloud Breach – Capital One

- On July 29th, a story broke about a hacker who extracted data from CapitalOne's infrastructure, Credit card application data from 2005-2019 was taken.

- There were 140,000 Social Security Numbers and 80,000 bank numbers included in this data.

- The source of the data was an S3 bucket, but this was not a public S3 bucket.

Facts : WAF IAM role from accessible ec2 instance with having access "sync" S3 buckets

- The report to the Law enforcement agency contains details about WAF IAM role being used to infiltrate the data from an EC2 instance

# Cloud Breach – EBS Public Snapshots

- At **DEFCON**, *Ben Morris* from Bishop Fox announced that he had discovered that many Elastic Block Store (EBS) snapshots are set to public.
  - Elastic Block Store is a virtual hard drive for your EC2 Instances.
  - Backups of these virtual hard drives are done via Snapshots.
- I f Snapshots are in Public mode, they are open to everyone.
- Anything that might be on your system might be in an EBS Snapshot (Code, AWS Keys, log data, company confidential information).
- You can audit your snapshots to figure out if they're Public or not via the Console or the AWS CLI, or set up AWS Config rules to audit and enforce Private snapshots

# Using AWS to secure AWS

- Make use of **Trusted Advisor** at least for public S3, any to any traffic present in **SG.**
- Make separate accounts for infrastructure like **Production, SIT, UAT , Staging, Test, Hacking etc.,**
- Make use of **AWS Organizations , AWS Control Tower**
- **Least Privileges, IAM Hygiene, Restricted IAM Roles**
- Make use of **AWS Systems Manager**
- Make use of **AWS Config, Amazon Macie as well as Guard Duty**
- **Do not rely on your bill** to know which resources you are/were using. Have **inventory**

# References

- For demo purpose I have used the following:
  - http://flAWS.cloud
  - Cloudgoat by Rhino security labs
- Tools reference link:
  - https://github.com/0xVariable/AWS-Security-Tools

Questions?

Thank you !

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