AWS Solutions Architect Associate

Session 101

Exploration of Cloud and AWS

July/2024

About Me

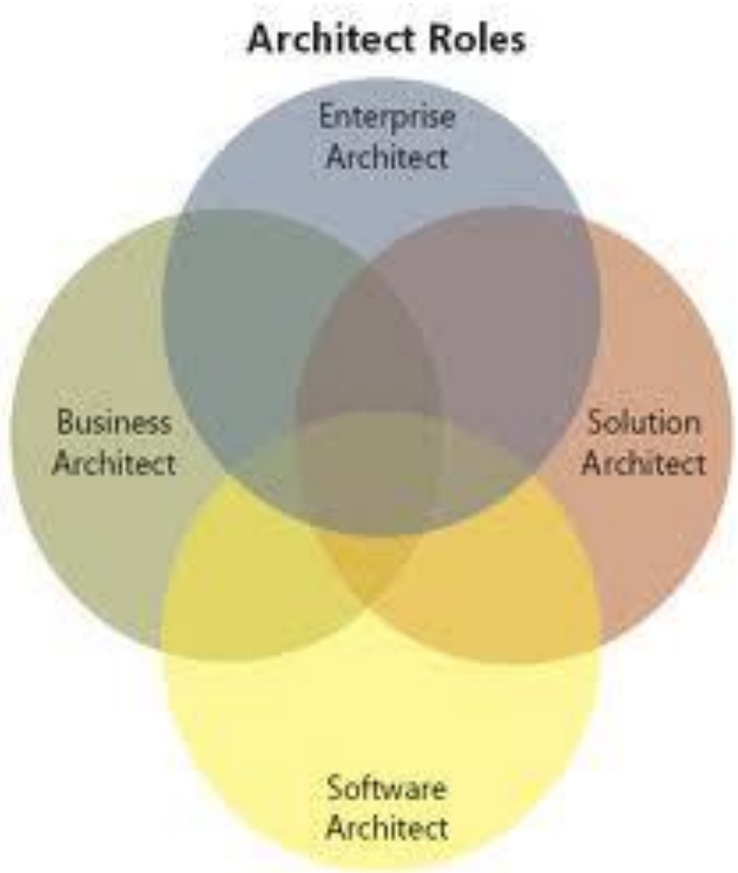
- **Comms Engineer**, M.Sc., University of York, UK. **Electronic** Engineer, U Javeriana.
- {Enterprise, Solutions, Software} **Architect**, **DevOps** Engineer, Low-Level **Developer**.
- 16 years of working experience on massive transport, financial companies (Banks and **Transactional Platforms**) and software companies (Current).
- 20+ Cloud Certifications. On AWS: 2x Pro, 2x Assoc, 1 AAI

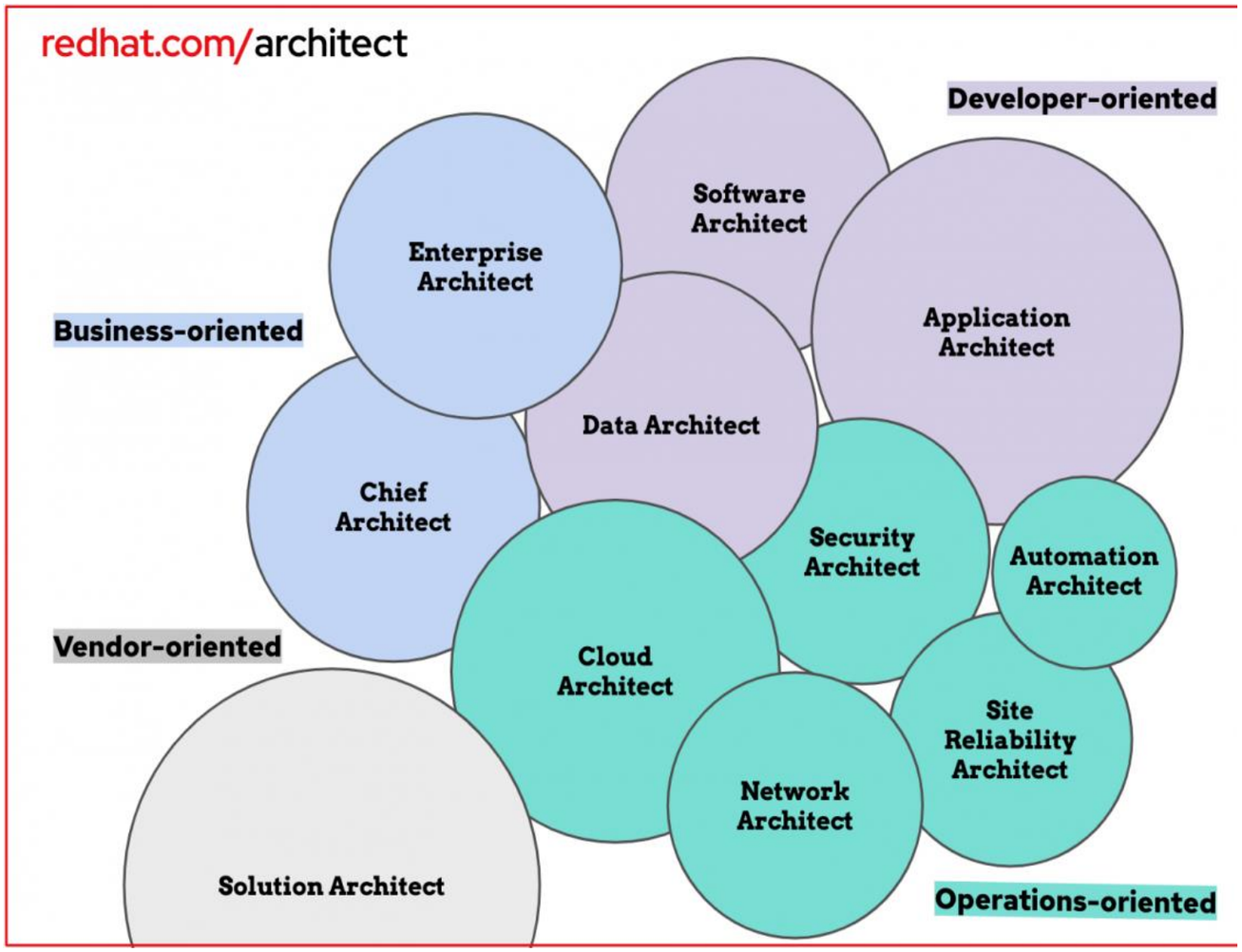
/in/fmorenod - fmorenod@gmail.com

Course Methodology

- Estimated Length 2h: 60m for presentations, break, 30m for review/continue and 30 for the lab -optional-.
- As trainee, you have to prepare the class: Review your knowledge gaps and research on the web
- Review the presentation and links
- Bring your own questions
- Requirements:
  - Install tools (CLI/jq/terraform) on your computer
  - Review access for corporate AWS Account

Architect Types





Guide Implementation →
Measure trade-offs to take decisions

Deliver blueprint/diagram
Describe added business value.

Taken from: https://www.redhat.com/architect/what-type-it-architect-are-you (27/05/2020)

Advantages of Architecting

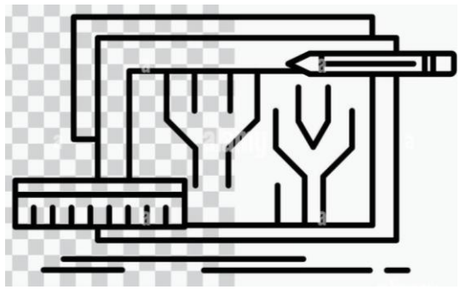
Guide implementation

- Don't reinvent the wheel – Proven tools and similar projects/reference architecture center
- Reduce launch times
- Reduce risk and costs
- Protects the installed base
- Strengthen innovation
- Create good/best/unique practices
- Supports Open Standards and Services
- Build trust by having secure government and constant monitoring
- Gives transparency

EFFICIENCY

Time
Costs
Trained staff

IMPLEMENTATION



Design
Constant change
Open

AWS Certifications

US$300

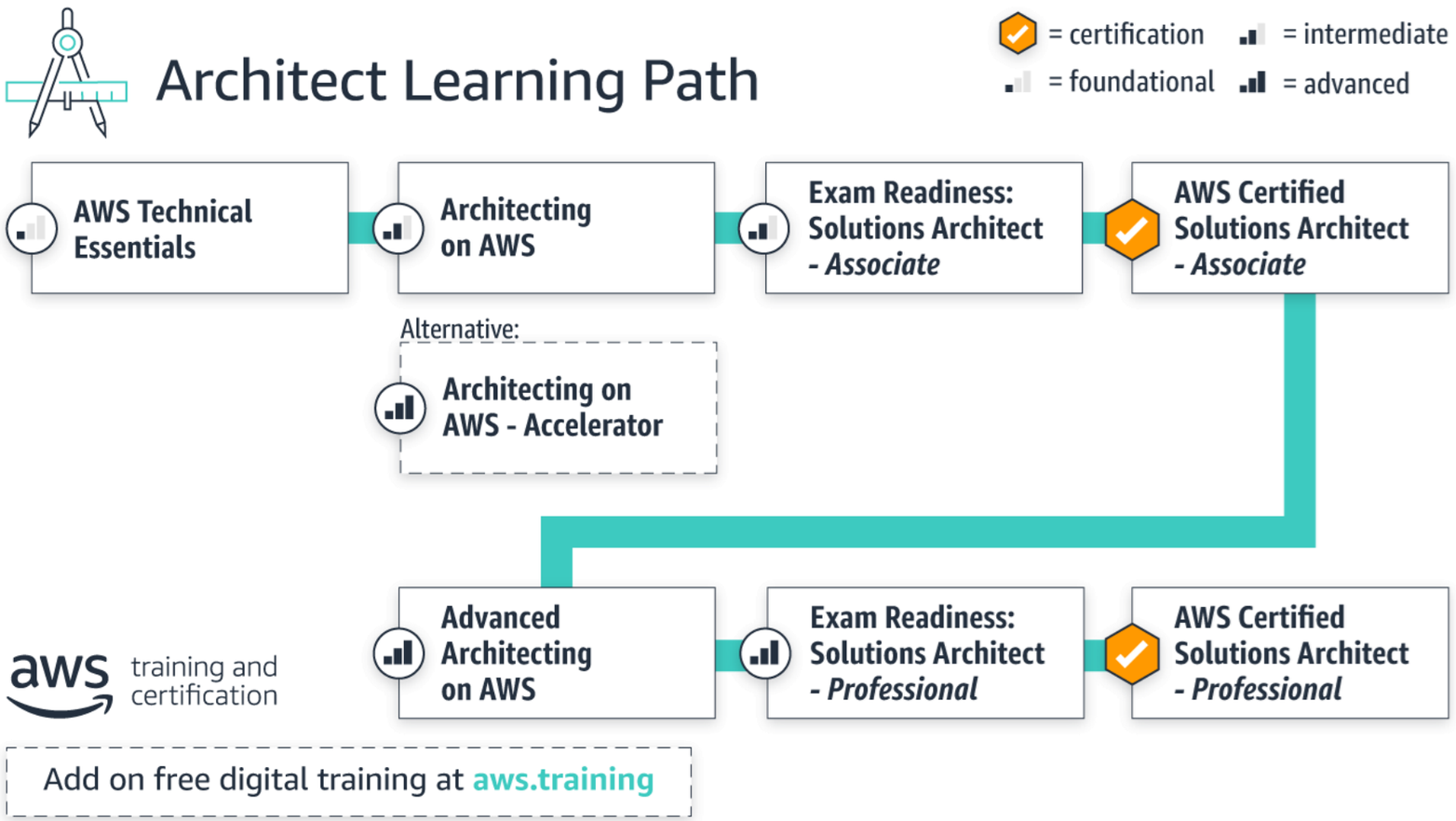
US$150

US$100

Taken from: https://aws.amazon.com/certification/ (01/07/2024) and https://aws.amazon.com/blogs/big-data/upgrade-your-resume-with-the-aws-certified-big-data-specialty-certification/ (20/09/2020)

Examen Coverage and Learning Path

fmorenod.co



Exam overview

Level: Associate
Length: 130 minutes to complete the exam
Cost: 150 USD. Visit Exam pricing for additional cost information, including foreign exchange rates
Format: 65 questions, either multiple choice or multiple response.
Delivery method: Pearson VUE testing center or online proctored exam.

Schedule an exam

Aprox. 2 mins per question

SAA-C03

Domain	% of Exam
Domain 1: Design Secure Architectures	30%
Domain 2: Design Resilient Architectures	26%
Domain 3: Design High-Performing Architectures	24%
Domain 4: Design Cost-Optimized Architectures	20%
TOTAL	**100%**

Validity: 3 year
Centers: PSI or Pearson Vue
Minimum score: 720+/1000

15 questions unscored, e.g. Last Re:Invent

Benefits:

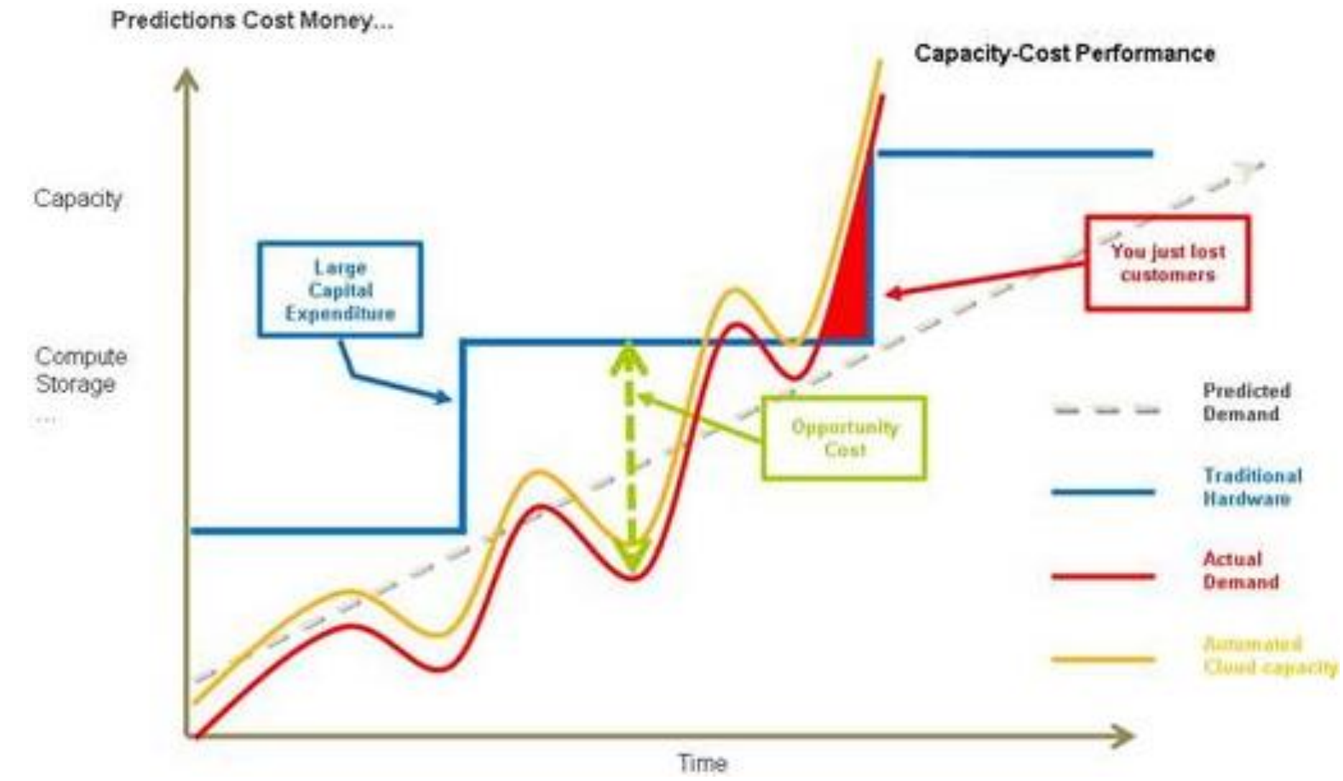
- 50% Next Exam if you have a valid one.
- First approach: Cloud Practitioner, then SAA

Taken from: https://aws.amazon.com/certification/certified-solutions-architect-associate/?nc1=h_ls (01/07/2024) and https://pages.awscloud.com/rs/112-TZM-766/images/T&C-Overview-Brochure_Mar-2020_digital-2020.pdf (01/07/2024)

Cloud Costs

- Infrastructure Costs: CAPEX and OPEX

- Capacity Expenditure (CAPEX): license? Upgrades?
- Operational Expenditure (OPEX)
- Total Cost of Ownership - Both (TCO) defined on a Business Case
  - Include: Salaries, Hardware, Space, Cooling, Datacenter Contract
- Introduction to (AWS) Economy
- Cloud Economics Center



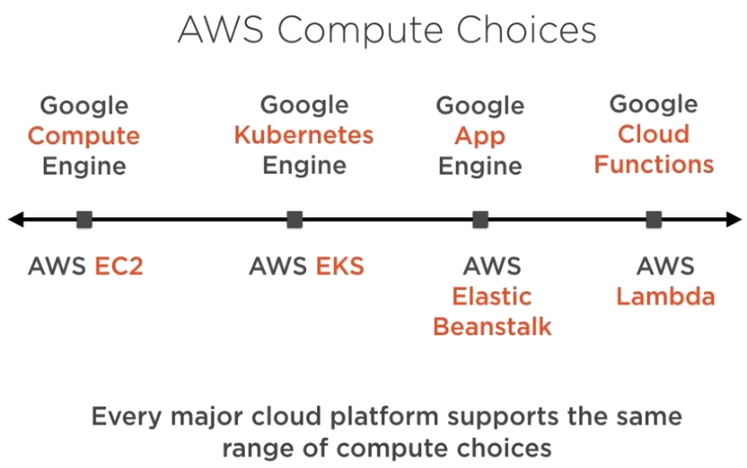
Key Terms

- Scalable vs Elasticity
- Elasticity out (More machines)
  - Scale In, Scale Out
- Elasticity up (More resources)
  - Scale Up, Scale Down

- How does Cloud take the decision ?
  - Datapoints, Timestamp, Metrics, Dimensions.
- Which method can work better?
  - Reactive or Proactive (Predictive) Actions

- Other Terms:
  - Fault Tolerance
  - High Availability (HA): LB, AS and CDN
  - Disaster Recovery Plan – DRP or Business Continuity Plan.

	Scalability	Elasticity
What is it?	**Scalability** is the ability of a system to uphold its functionality when the size or volume changes	**Elasticity** is the ability to dynamically manage available resources for addressing the size or volume
Use case	To meet the static increase in the workload	To meet the dynamic increase in the workload
Type	Strategic operation	Tactical approach
Focuses on	Design/architecture	Operations
Resource provisioning	To exceed future demands	To meet the present demand
Consideration	Medium- and long-term predictions	Short-term demand
Execution by	Typically scheduled	Typically triggered by automation



AWS Position

Figure 1: Magic Quadrant for Strategic Cloud Platform Services

Evaluation Criteria

1. Market share.
2. Number of clients
3. Installed base
4. Types of products/services
5. Target market
6. Other defining features

Timeline: 2019, 2020, 2021, 2022 and 2023

Taken from: https://aws.amazon.com/blogs/aws/read-the-2023-gartner-magic-quadrant-for-strategic-cloud-platform-services/ (01/07/2024) and https://www.gartner.com/doc/reprints?id=1-271OE4VR&ct=210802&st=sb (26/05/22)

Re:Invent

AWS re:Invent

- https://reinvent.awsevents.com/
- Cost: US$2099
- 2-6 Dec, 2024@Las Vegas.
- New Services/Features
- Service Optimization

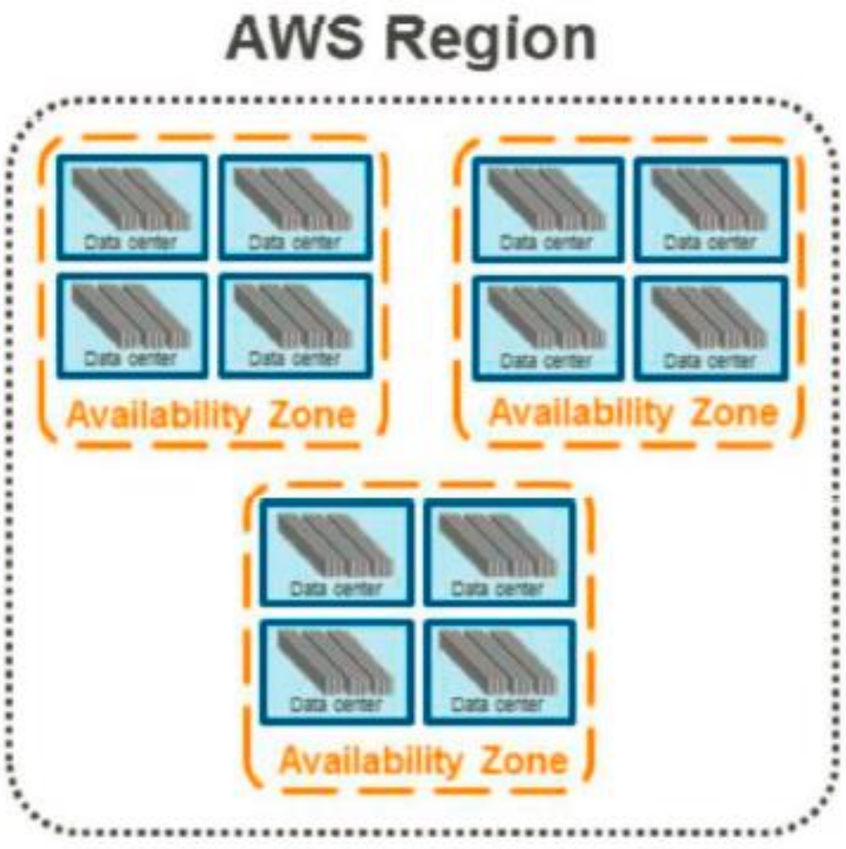
aws SUMMIT BOGOTÁ

- https://aws.amazon.com/es/events/summits/bogota/
- 18 July, 2024 @Bogota

Cloud definition

(..) a model for enabling **ubiquitous**, **convenient**, **on-demand** network access to a **shared pool** of **configurable** computing resources (e.g., networks, servers, storage, applications, and services) that can be **rapidly provisioned** and released with **minimal management** effort or service provider interaction.
NIST Definition. SP 800-145

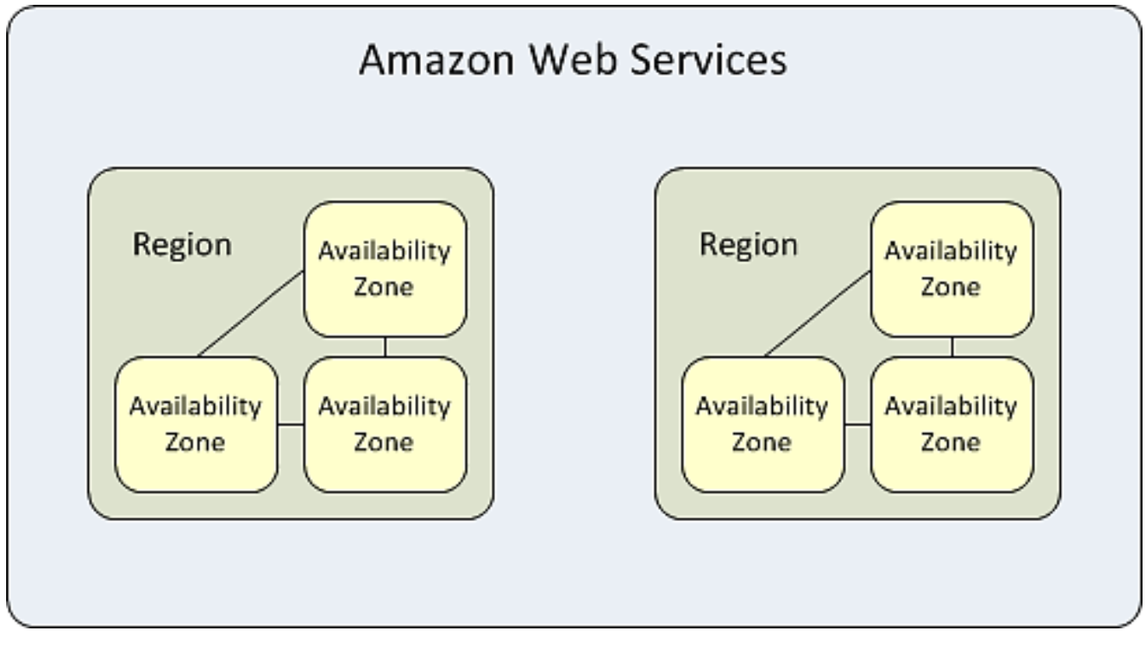
1. **Scalable/Fit**
2. **Available**
3. **To be automatic**



Think as Availability Zone (AZ) as Datacenter, independent physical- and logically; but under Region logical administration.
Low-Latency and high-throughput connection between AZ.

Region

- Complete isolation between region, so High Availability and Fault Tolerant is fulfilled.
- You have to choose which region apply and then you can see what resources you get. There are some exceptions: i.e. IAM



Taken from: https://aws.amazon.com/about-aws/global-infrastructure/regional-product-services/?nc1=h_ls (05/05/2020)

Regions and AZ

The AWS Cloud spans 105 (21**-2025) Availability Zones within 33 (7-2025) geographic Regions**, 41 Local Zone and 29 Wavelength Zones. Those are deployed on 245 countries

Taken from: https://aws.amazon.com/about-aws/global-infrastructure/?p=ngi&loc=1 (01/07/2024)

Regions

Region - Name definition

<country>-<subregion>-<counter>

The costs depends on region, i.e.
sa-east-1 vs us-east-1

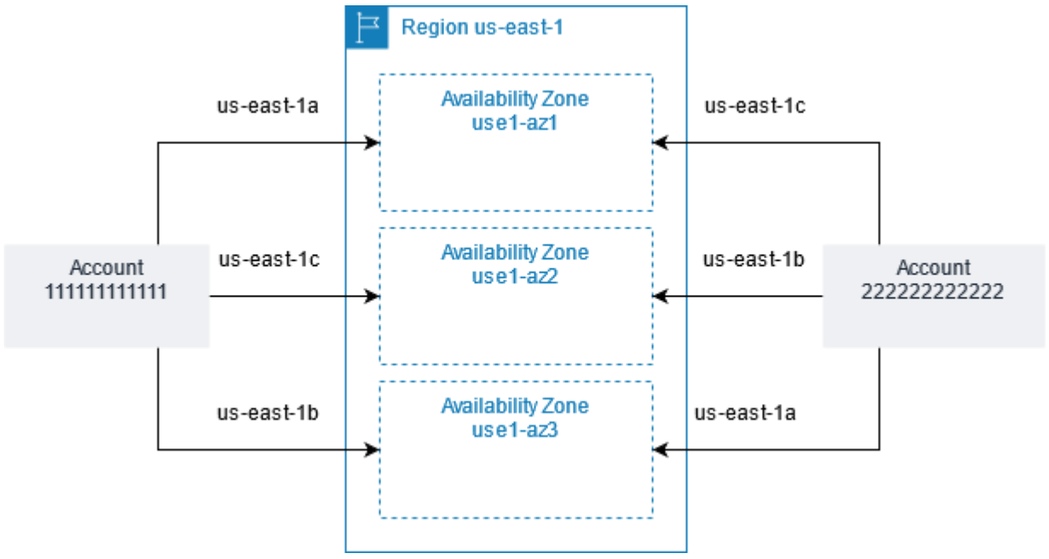
AZ – Name definition

<region>-<subregion>-<counter><letter>

Letter should be sequential from a to f, however there are some cases.

Scarcity of Resources/Distributions: Different AZ name between accounts.

Need to be same: Use AZ IDs.



Code	Name
us-east-1	US East (N. Virginia)
us-east-2	US East (Ohio)
us-west-1	US West (N. California)
us-west-2	US West (Oregon)
ca-central-1	Canada (Central)
eu-west-1	EU (Ireland)
eu-central-1	EU (Frankfurt)
eu-west-2	EU (London)
ap-northeast-1	Asia Pacific (Tokyo)
ap-northeast-2	Asia Pacific (Seoul)
ap-southeast-1	Asia Pacific (Singapore)
ap-southeast-2	Asia Pacific (Sydney)
ap-south-1	Asia Pacific (Mumbai)
sa-east-1	South America (São Paulo)

Taken from: https://docs.aws.amazon.com/ram/latest/userguide/working-with-az-ids.html (01/07/2024)

Edge Locations

To deliver content to end users with lower latency, Amazon CloudFront uses a global network of 600+ Points of Presence with 300 Edge Locations and 13 Regional Edge Caches in 100+ cities and 50+ countries. Amazon CloudFront Edge locations are located in:

Taken from: https://aws.amazon.com/cloudfront/features/?whats-new-cloudfront.sort-by=item.additionalFields.postDateTime&whats-new-cloudfront.sort-order=desc (01/07/2024)

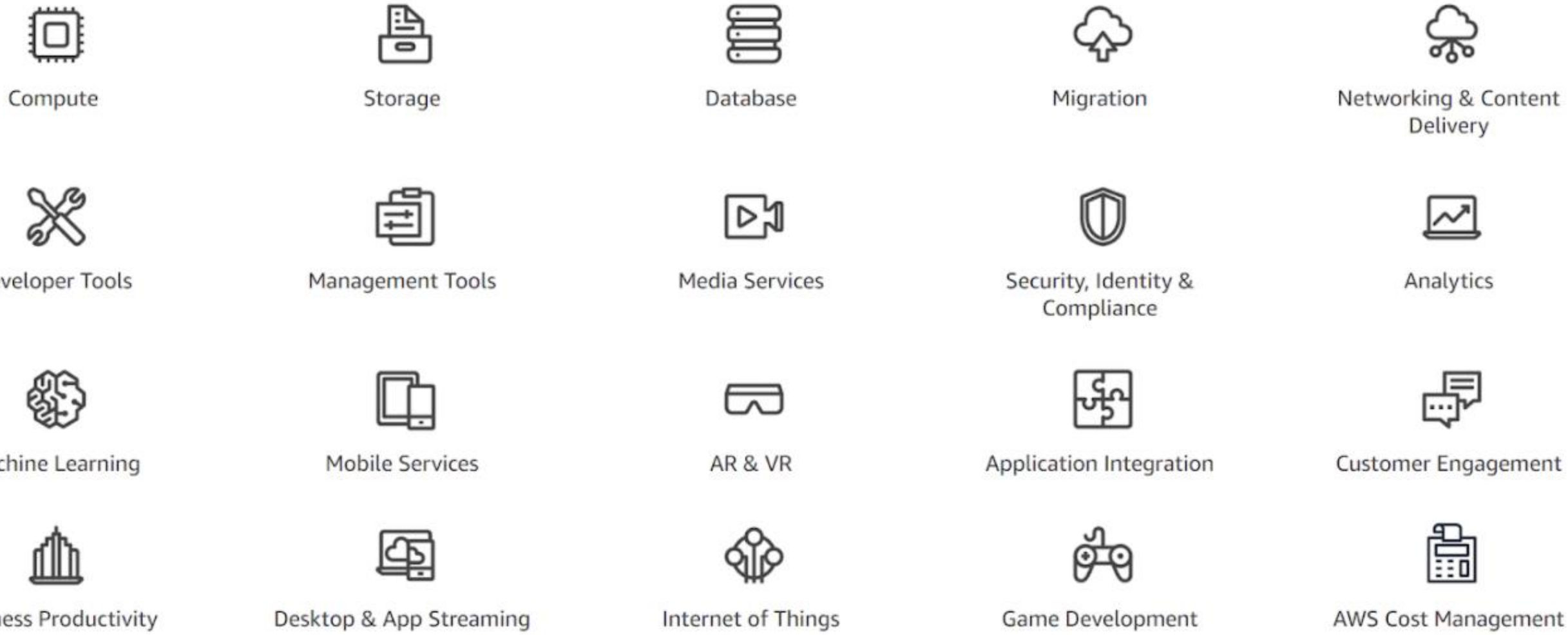
Cloud-Platform Overview

Enterprise Applications	**Virtual Desktops**			**Sharing and Collaboration**	
Platform Services	Databases Relational NoSQL Caching	Analytics Hadoop Real-Time Data Warehouses Data Workflows	App Services Queuing Orchestration App Streaming Transcoding Email Search	Deployment and Management Containers DevOps Tools Resources Templates Usage Tracking Monitoring and Logs	Mobile Services Identity Syns Mobile Analytics Notifications
Foundation Services	Compute (VMs. Auto Scaling and load Balancing)	Storage (Object, Block and Archive)	Security and Access Control	Networking	
Infrastructure	Regions	Availability Zones	Content Delivery Networks and Points of Presence		

Taken from: BARON, John and Others. AWS Certified Solutions Architect, Official Study Guide, Sybex, 2017. and https://www.quora.com/How-many-AWS-services-are-there (22/02)

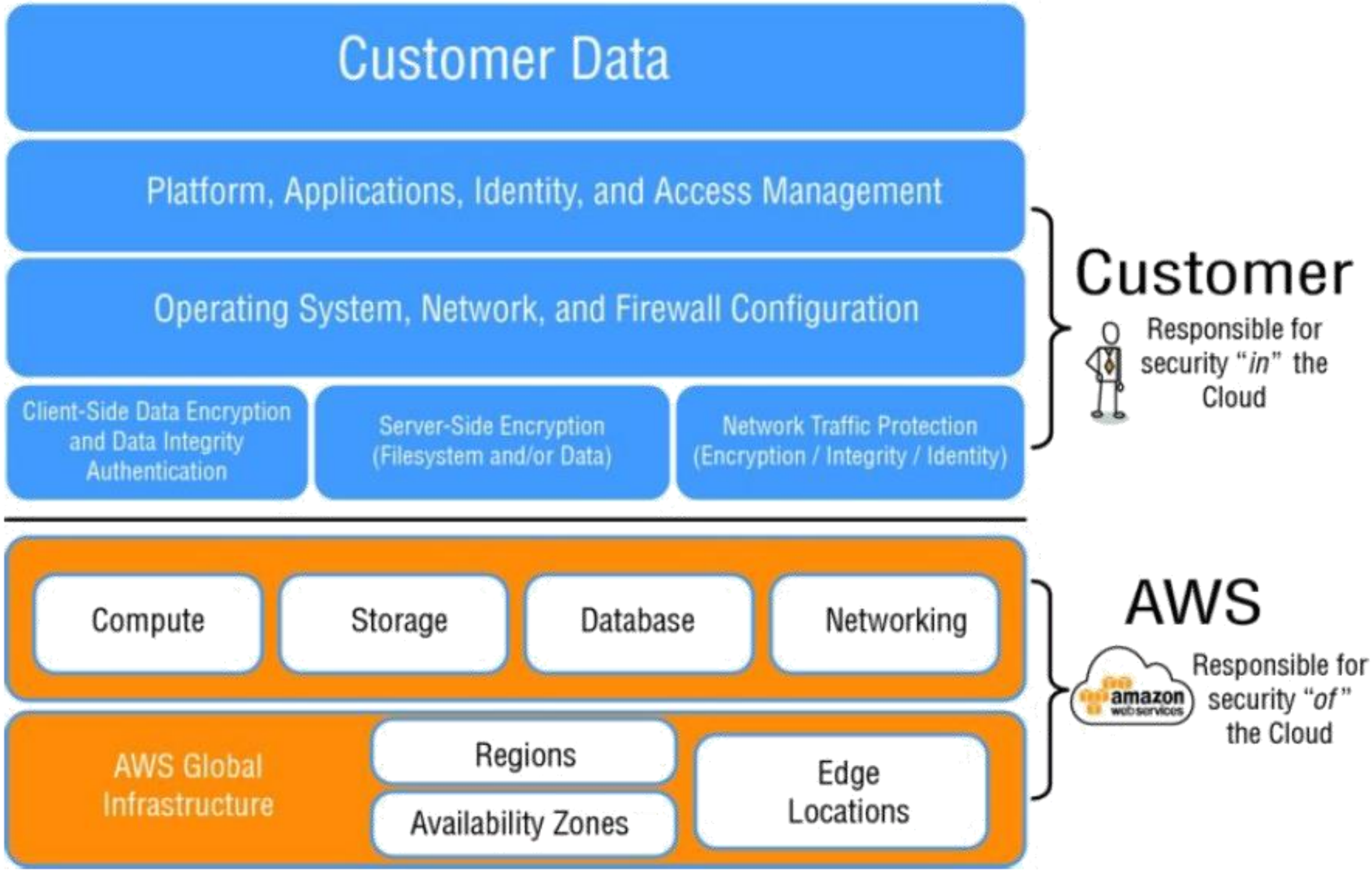
Categories

Increasing by 13% in number of services, i.e. from May/2019 to January/2020 (Namespaces vs Prefix)
Services: 140 on Web Management console, 169 y 282 in Prefix; compare it with Azure 240 and GCP 98.



Taken from: https://medium.com/cloudpegboard/how-many-aws-services-are-there-51dda44fa946 (02/05/2020) and http://virtualization24x7.blogspot.com/2018/10/aws-services-and-categories.html (27/05/2021)

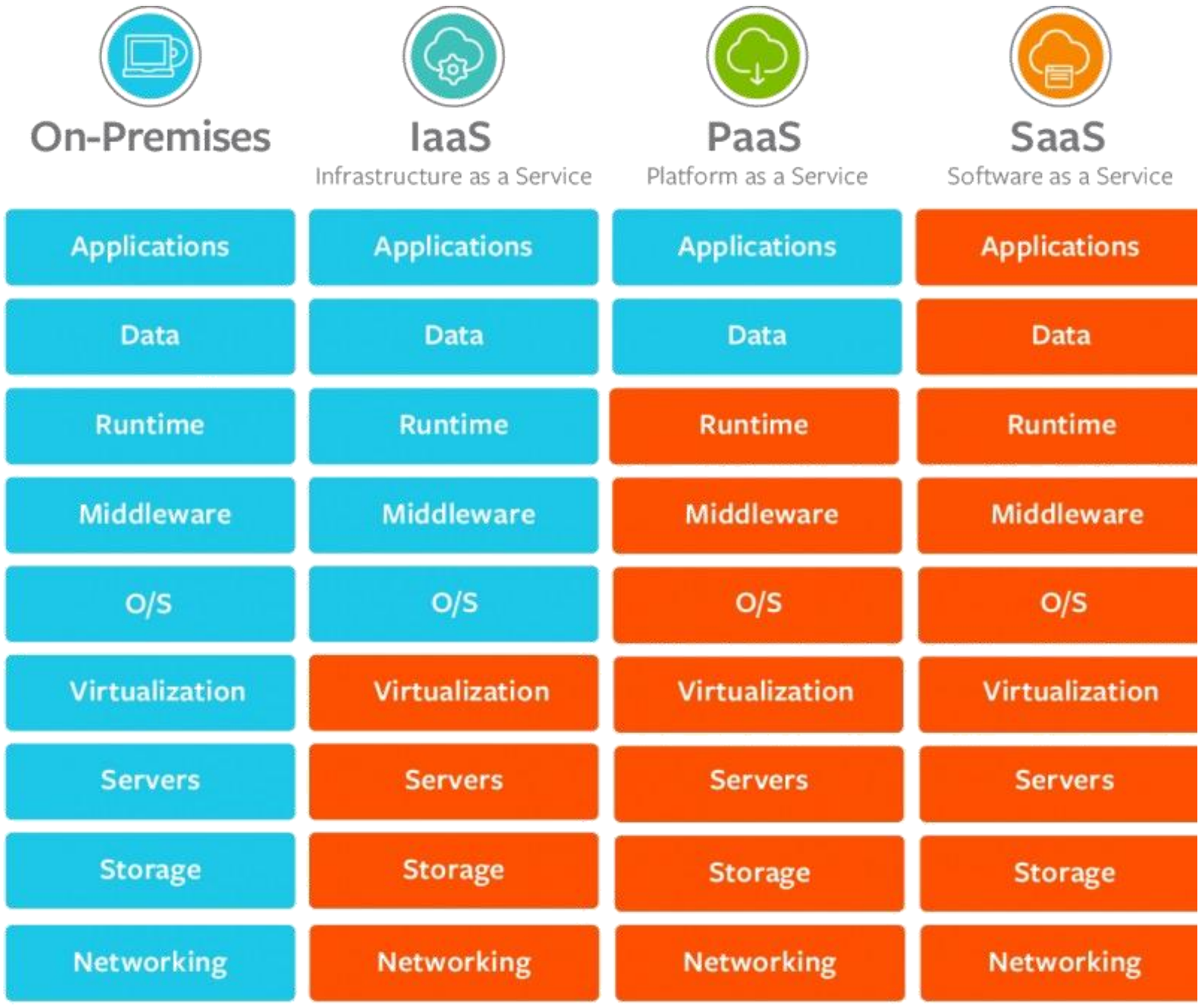
Shared-Responsibility Model



Taken from: BARON, John and Others. AWS Certified Solutions Architect, Official Study Guide, Sybex, 2017.

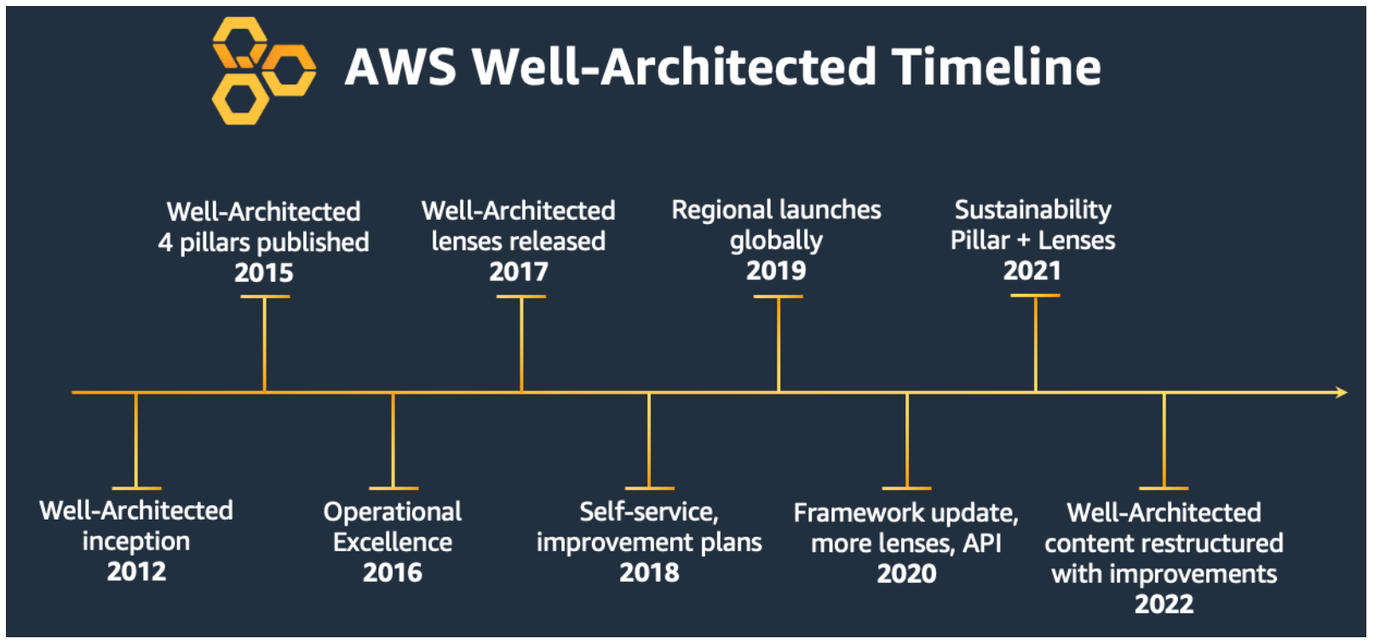
Services Models of Cloud Computing

Other additional as-a-Services:
DBaaS
LBaaS
FaaS
....



Taken from: https://comparacloud.com/servicios-clouds/iaas-paas-saas/ (01/07/2024)

Well-Architected Framework



Taken from: https://medium.com/netflix-techblog/the-netflix-simian-army-16e57fbab116 (20/07/2020) and https://aws.amazon.com/architecture/well-architected/ (01/07/2024) and https://pcg.io/aws/aws-well-architected-review/ (01/07/2024)

Question A: Multiple Choice

An application running on EC2 instances processes sensitive information stored on Amazon S3. The information is accessed over the Internet. The security team is concerned that the Internet connectivity to Amazon S3 is a security risk. Which solution will resolve the security concern?

A. Access the data through an Internet Gateway.
B. Access the data through a VPN connection.
C. Access the data through a NAT Gateway.
D. Access the data through a VPC endpoint for Amazon S3.

D

Question B: Multiple Answer

Which of the following statements are true about Amazon Route 53 resource records?

Choose 2 answers

A. Amazon Route 53 is a region-level service
B. You can register your domain name
C. Amazon Route 53 can perform health checks and failovers to a backup site in the even of the primary site failure
D. Amazon Route 53 only supports Latency-based routing.

B and C

Taken from: https://jayendrapatil.com/tag/route-53/ 27/05/2021

Access

Web Management Console

CLI (PowerShell, OS CLI)

SDK: .NET, Java, Python

Template

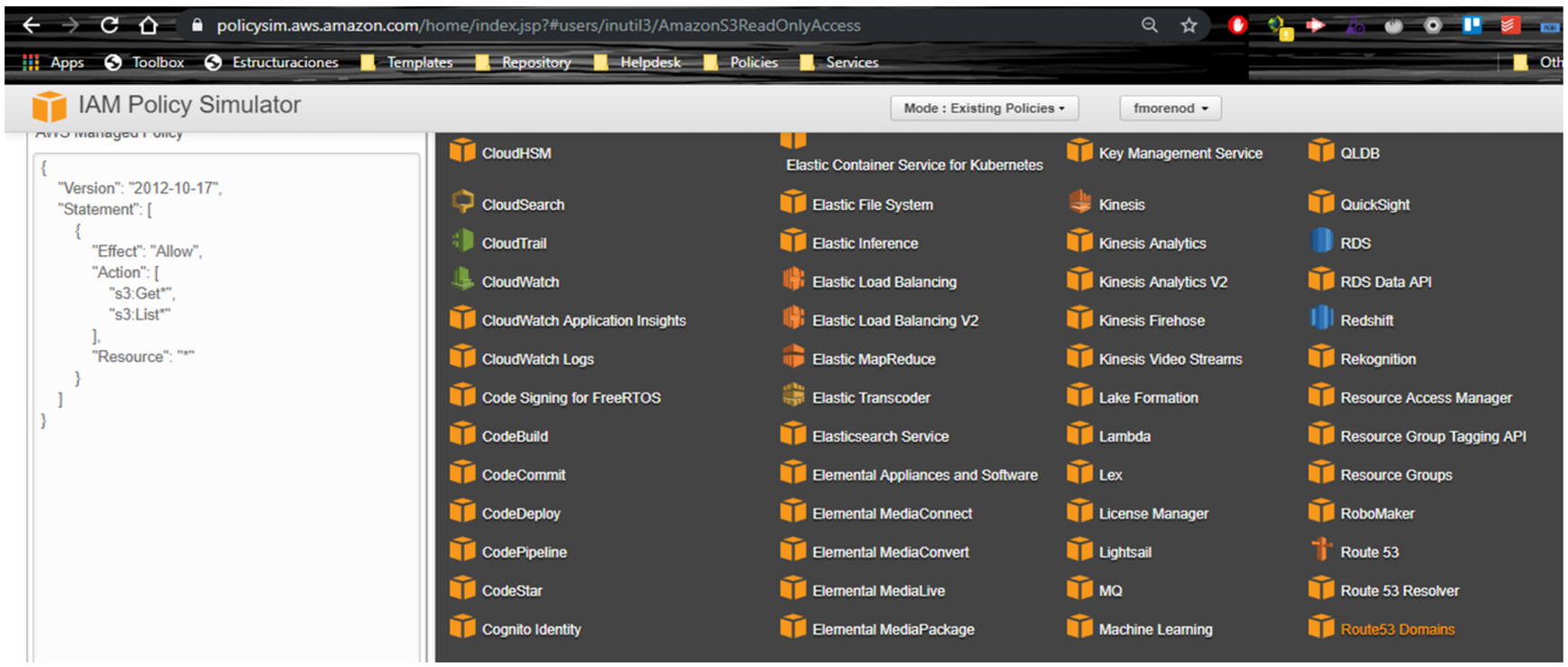
AWS:

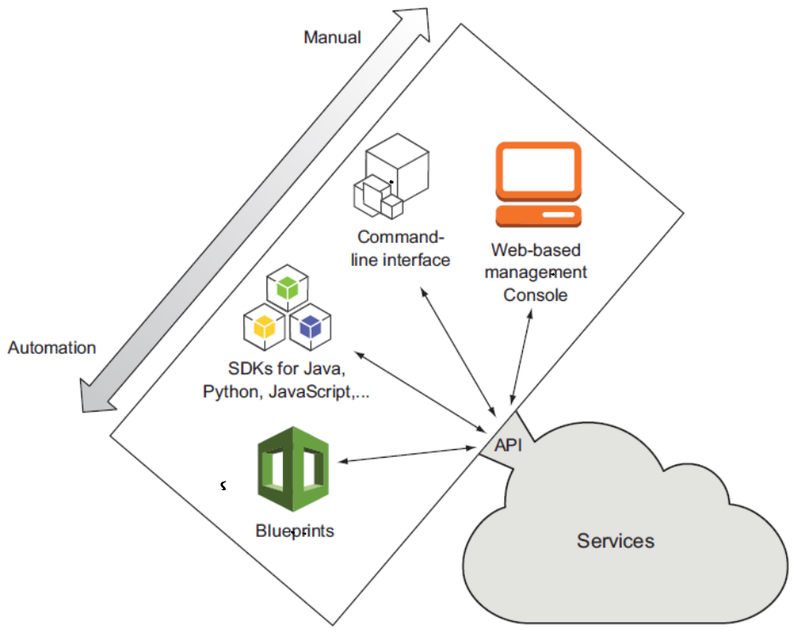
CLI: https://docs.aws.amazon.com/cli/latest/userguide/install-cliv2.html

Powershell: https://docs.aws.amazon.com/powershell/latest/userguide/pstools-getting-set-up.html

Access: Console (Username & Password) or Programmatically (Credentials). Create a local file with the credentials

```
PS C:\Program Files (x86)\AWS Tools\PowerShell\AWSPowerShell> aws ec2 describe-volumes
{
    "Volumes": [
        {
            "Attachments": [
                {
                    "AttachTime": "2019-02-07T11:48:06.000Z",
                    "Device": "/dev/xvda",
                    "InstanceId": "i-0cd734e94b247df41",
                    "State": "attached",
                    "VolumeId": "vol-000232af69a28f540",
                    "DeleteOnTermination": true
                }
            ],
            "AvailabilityZone": "us-east-1d",
            "CreateTime": "2019-02-07T11:48:06.099Z",
            "Encrypted": false,
            "Size": 8,
            "SnapshotId": "snap-0ee5fbcb154b23d7e",
            "State": "in-use",
            "VolumeId": "vol-000232af69a28f540",
            "Iops": 100,
            "VolumeType": "gp2"
        }
    ]
}
PS C:\Program Files (x86)\AWS Tools\PowerShell\AWSPowerShell>
```



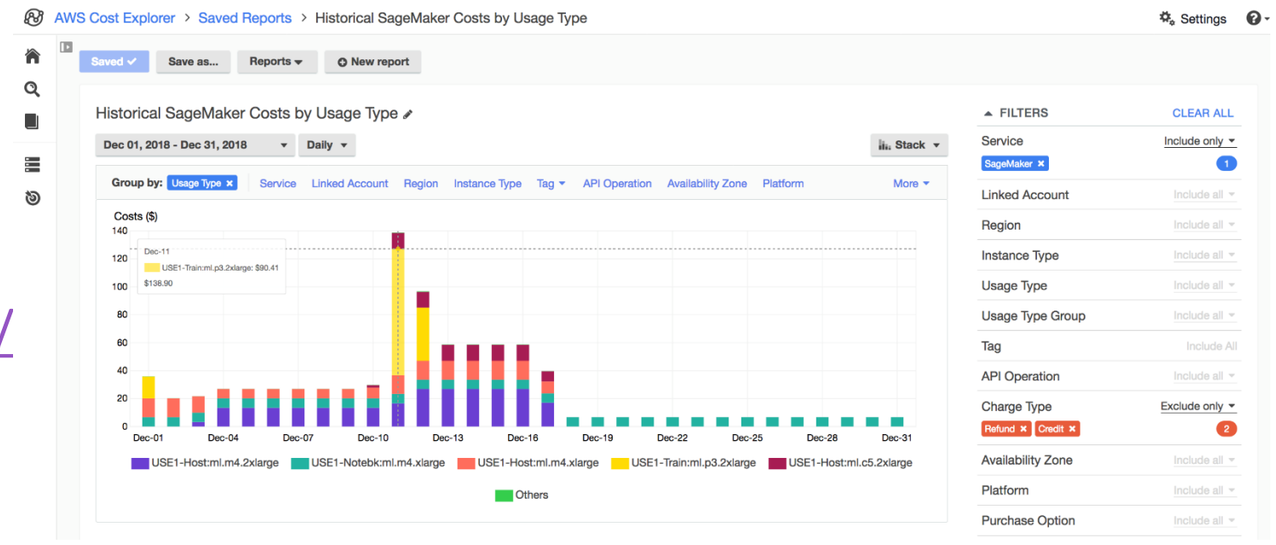


Tools in this Course

We Need:

- AWS Account on Free Tier
  https://aws.amazon.com/free/free-tier/
  https://aws.amazon.com/education/awseducate/

- We use (Labs1):
  - Controlled Budget
  - Administrative User



Lab1:
https://aws.amazon.com/getting-started/hands-on/control-your-costs-free-tier-budgets/
and
https://docs.aws.amazon.com/IAM/latest/UserGuide/getting-started_create-admin-group.html

We will use:

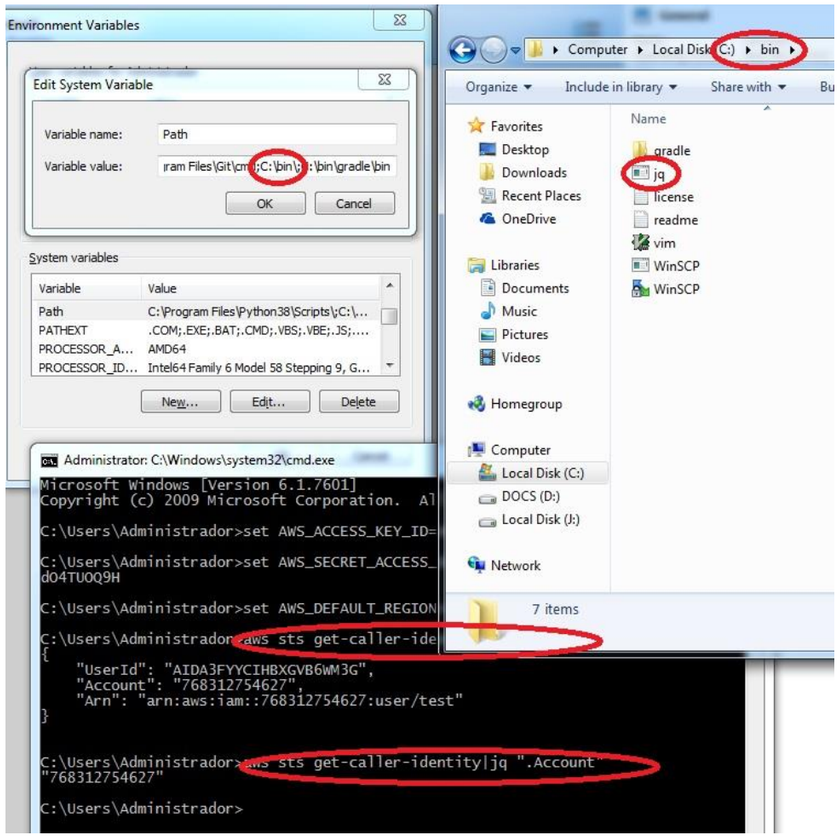
AWS CLI
- CLI
- PowerShell

jq (https://stedolan.github.io/jq/download/)

SSH Client (I recommend putty on Windows - https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html)

IaC
Terraform (https://www.terraform.io/downloads.html)

Put on your **path,** folder with those binaries!!



Taken from https://aws.amazon.com/blogs/aws-cost-management/beginners-guide-to-aws-cost-management/#:~:text=AWS%20Budgets%20gives%20you%20the,to%20exceed)%20your%20budget%20thresholds.&text=From%20there%2C%20you%20can%20dive,on%20more%20specific%20use%20cases. (02/06/2021)