



Welcome to Lunch & Learn

Global Wealth DevOps Team

Global Wealth DevOps Team
June 14, 2019.

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Agenda

1. Introduction to Cloud Computing
2. Advantage and Benefits of Cloud Computing
3. AWS Global, Core Infrastructure and Services
4. AWS Networking and Compute Essentials
5. Summary, Resources, and Q&A

Advanced Resources

- Web sites of Knowledge Base and Workshop
- AWS Learning Path

Do You Use the Cloud?

If you use Flickr or Facebook or LinkedIn or Twitter or Backpack, or any of the app from this picture, you're using the Cloud.



Before the Cloud

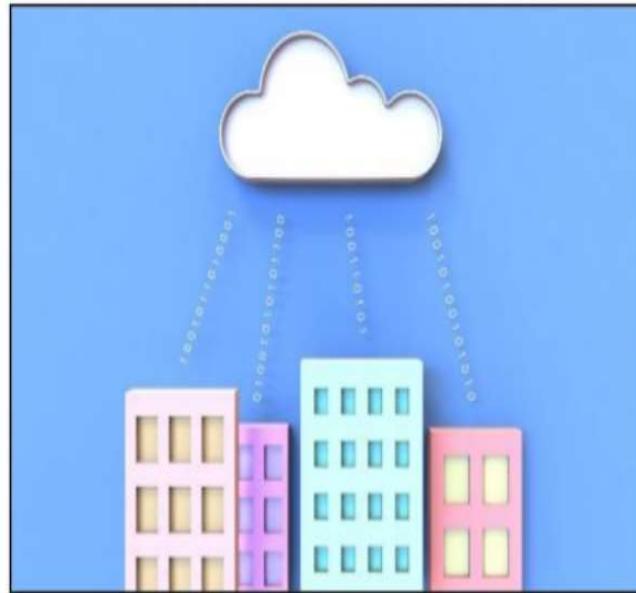
- If you wanted to start an enterprise, you needed an IT shop
- Massive costs in hardware, software, power, administrative staff
- Prohibitive cost to entry



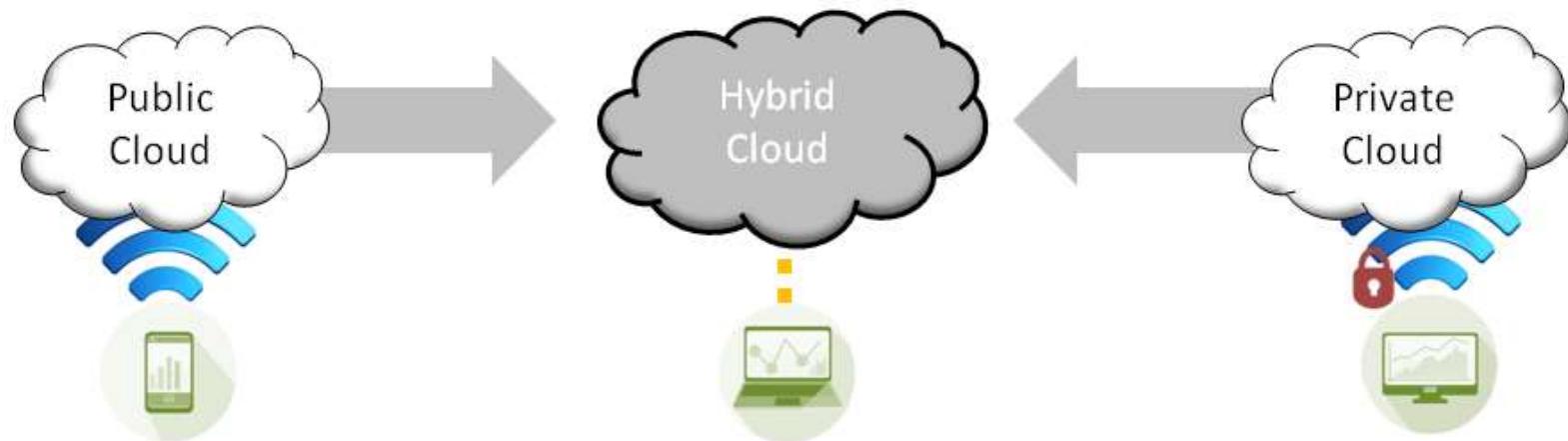
What Exactly is Cloud Computing?

Cloud is a metaphor for the internet

"Cloud computing" is a term broadly used to define the *on-demand* delivery of IT resources and applications *via the Internet*, with *pay-as-you-go* pricing.



Public, Private and Hybrid-Cloud Options for Your Business



- Connect via the Internet
- Hard to prevent loss or sharing of information
- Requires little support
- User-friendly
- Inexpensive
- Ideal for smaller companies

- Public and private systems work together
- Information moved between systems may be hacked
- Reasonably priced
- IT can control on-premises storage components

- Connect via company Intranet
- Easy to track and safeguard data
- IT department required
- High initial investment
- High security: Businesses storing sensitive information should use a private-cloud system to minimize hacks

There are basically 3 Categories in Cloud Computing:

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➤ SaaS (Software as a Service)

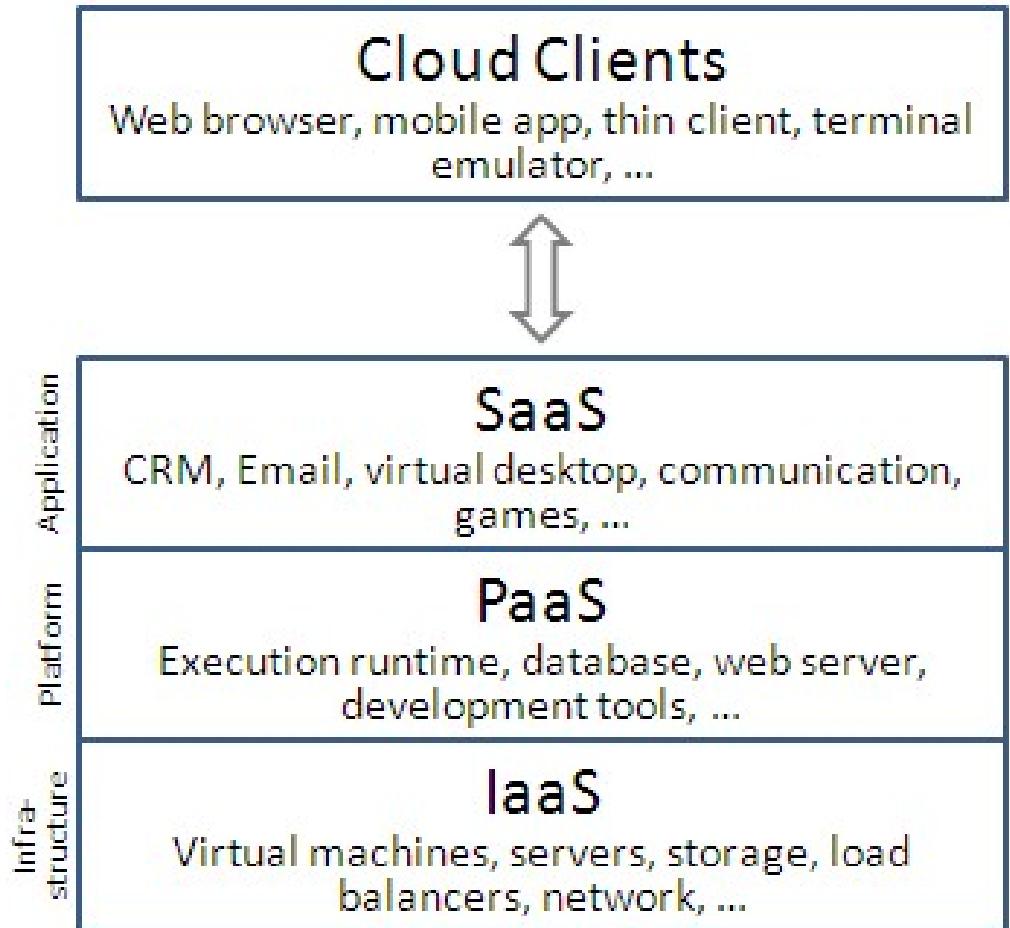
- It allows companies to use software without having to purchase them, which reduces the expenditure of the company drastically, since they are already installed on the cloud server they can be quickly deployed and therefore saves time.

➤ PaaS (Platform as a Service)

- It allows developers to build applications, collaborate on projects without having to purchase or maintain infrastructure.

➤ IaaS (Infrastructure as a Service)

- It allows companies to rent servers, storage space, etc. from a cloud provider.



Advantages of Cloud Computing



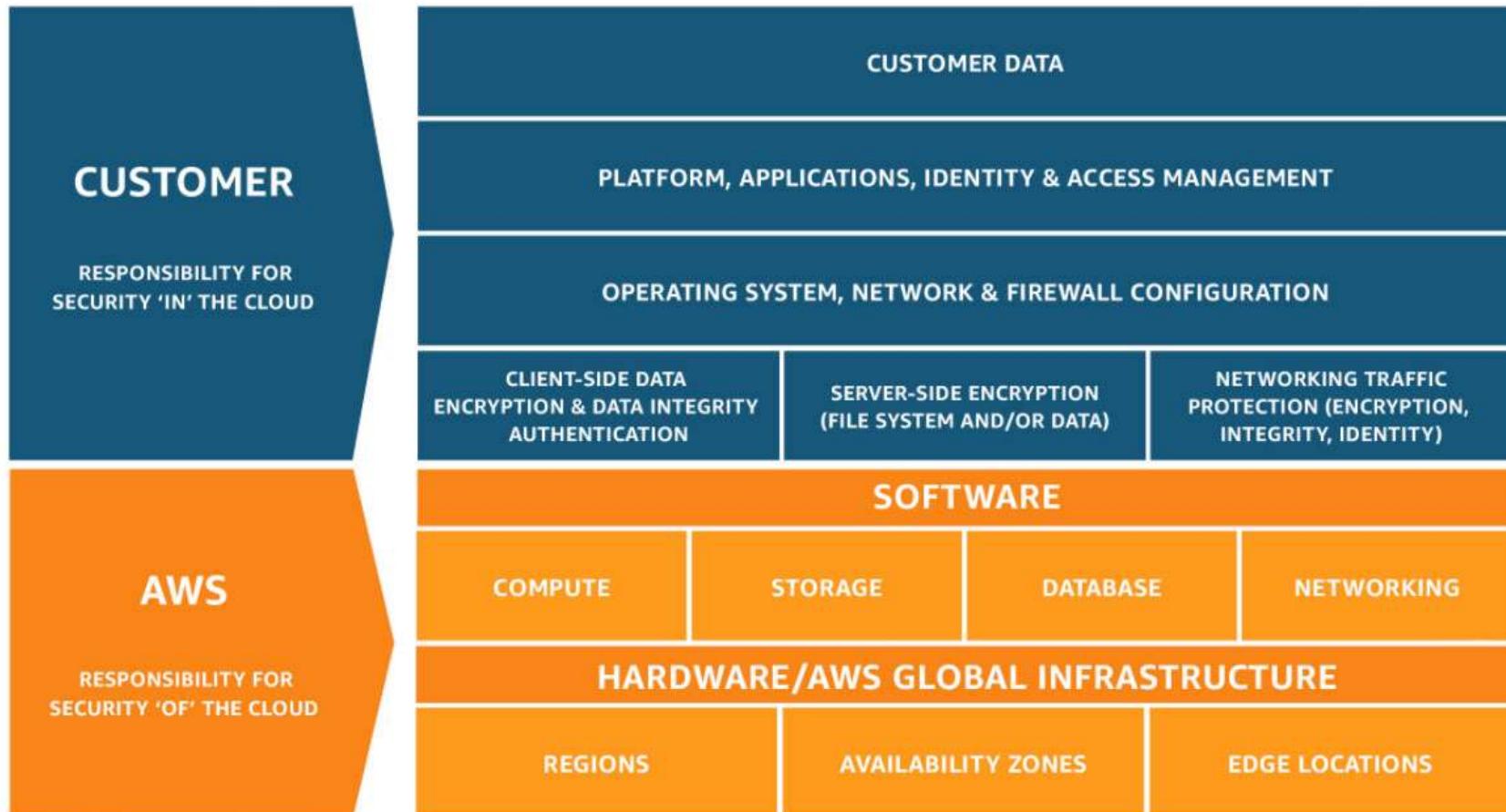
Disadvantages of Cloud Computing



Disadvantages of Cloud Computing

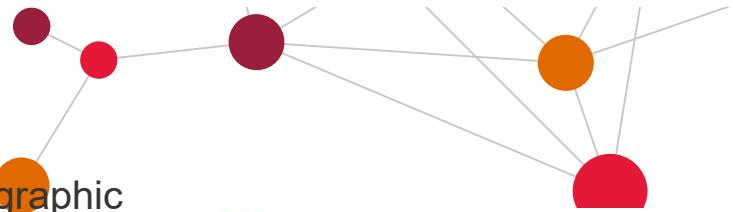


Shared Responsibility Model



AWS Global Infrastructure

The AWS Cloud spans 66 Availability Zones within 21 geographic Regions around the world, with announced plans for 12 more Availability Zones and four more Regions in Bahrain, Cape Town, Jakarta, and Milan.



Region & Number of Availability Zones

Region	Number of Availability Zones
US East	China Beijing (2), Ningxia (3)
US West	Europe Frankfurt (3), Ireland (3), London (3), Paris (3), Stockholm (3)
Asia Pacific	Mumbai (2), Seoul (2), Singapore (3), Sydney (3), Tokyo (4), Osaka-Local (1) ¹
South America	São Paulo (3)
Canada	Central (2)
GovCloud (US)	US-East (3), US-West (3)
New Region (coming soon)	Bahrain Cape Town Hong Kong SAR Milan

Regions Azure Vs AWS Vs GCP



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AWS Data Centers

- A single data center typically houses several thousands of servers.
- All data centers are online.
 - No data center is "cold".
- AWS custom network equipment:
 - Multi-ODM sourced
 - Amazon custom network protocol stack



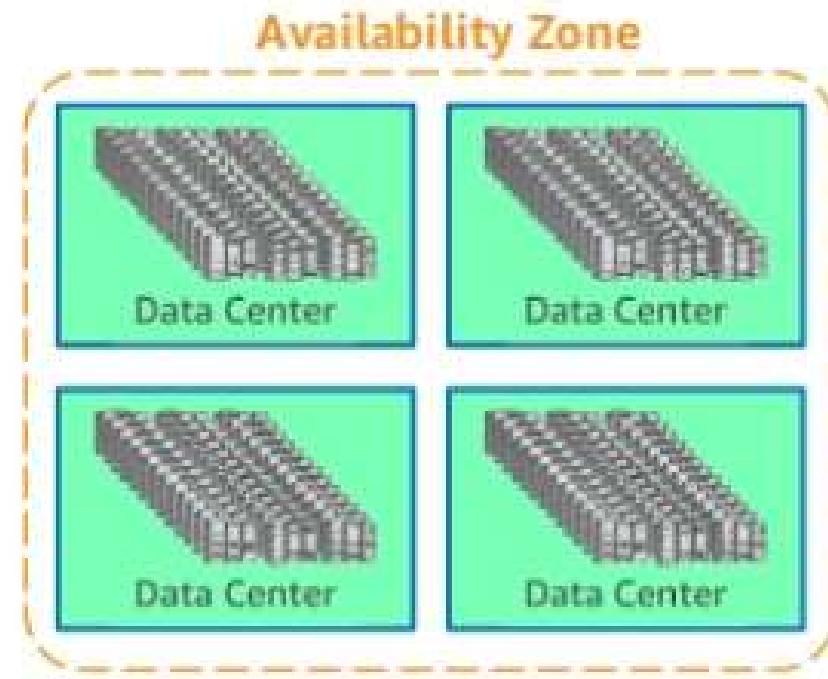
AWS Availability Zones (AZ)

Each Availability Zone is:

- ▀ Made up of **one or more** data centers.
- ▀ Designed for **fault isolation**.
- ▀ Interconnected with other Availability Zones using high-speed **private** links.

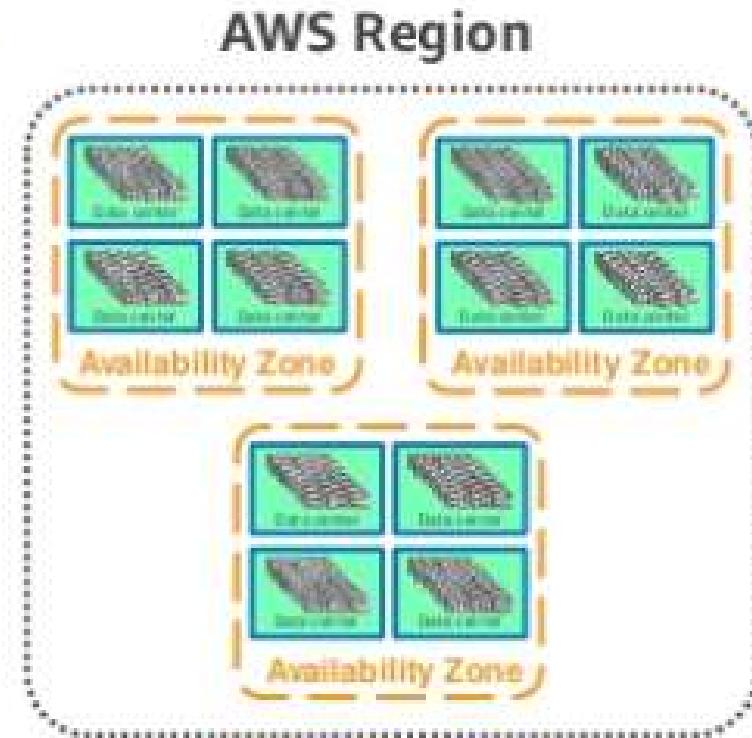
You choose your Availability Zones.

AWS recommends replicating across AZs for resiliency.



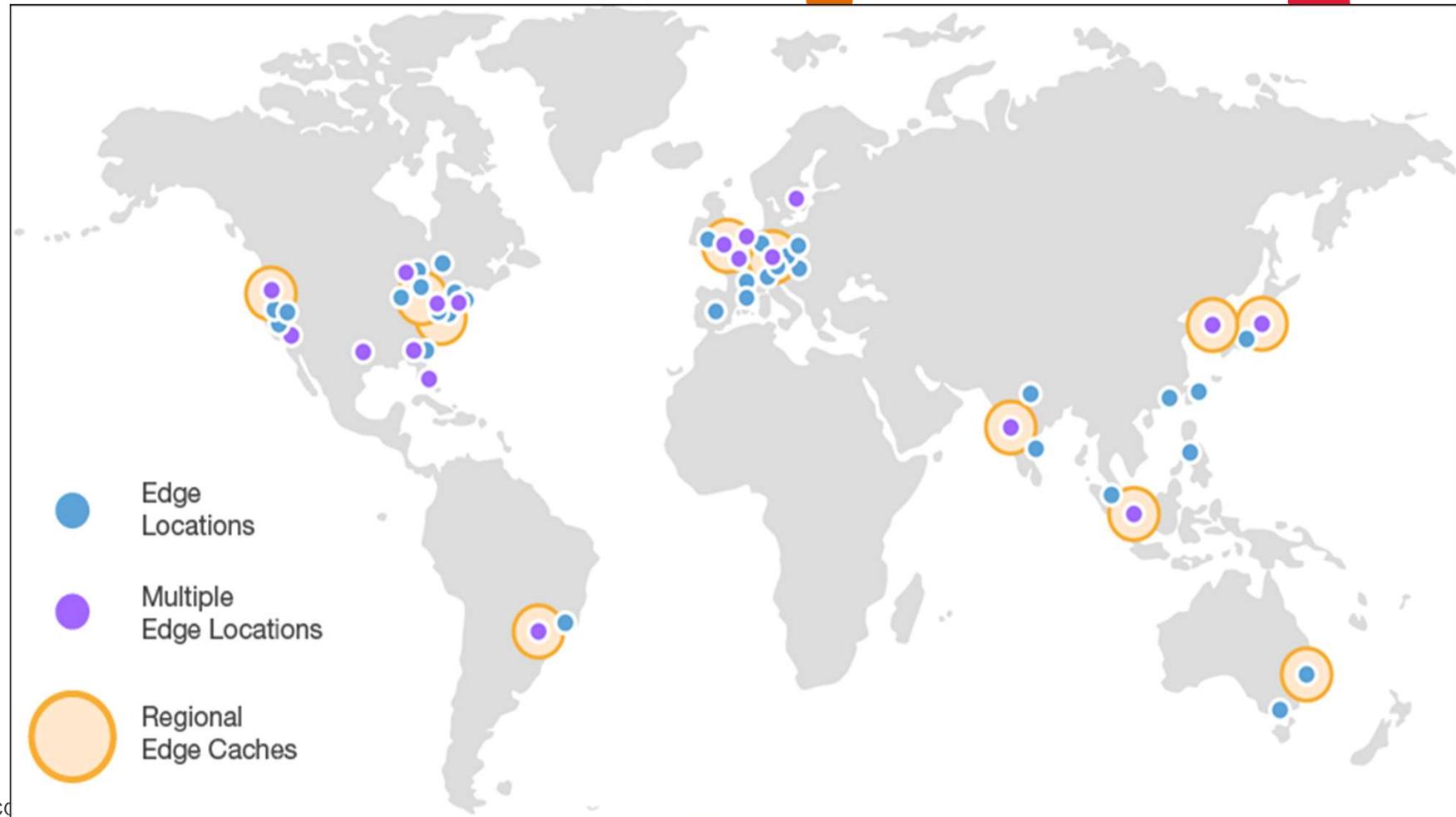
AWS Regions

- Each region is made up of **two or more Availability Zones**.
- AWS has **20 regions** worldwide.
- You enable and control **data replication** across regions.
- Communication between regions uses **AWS backbone network** connections infrastructure.



AWS Global Infrastructure: Edge Locations

The AWS Cloud spans 155 Edge Locations, 11 Regional Caches and 65 Cities in 29 Countries.



AWS Global Infrastructure: Edge Locations



💡 Local points of presence that support AWS services like:

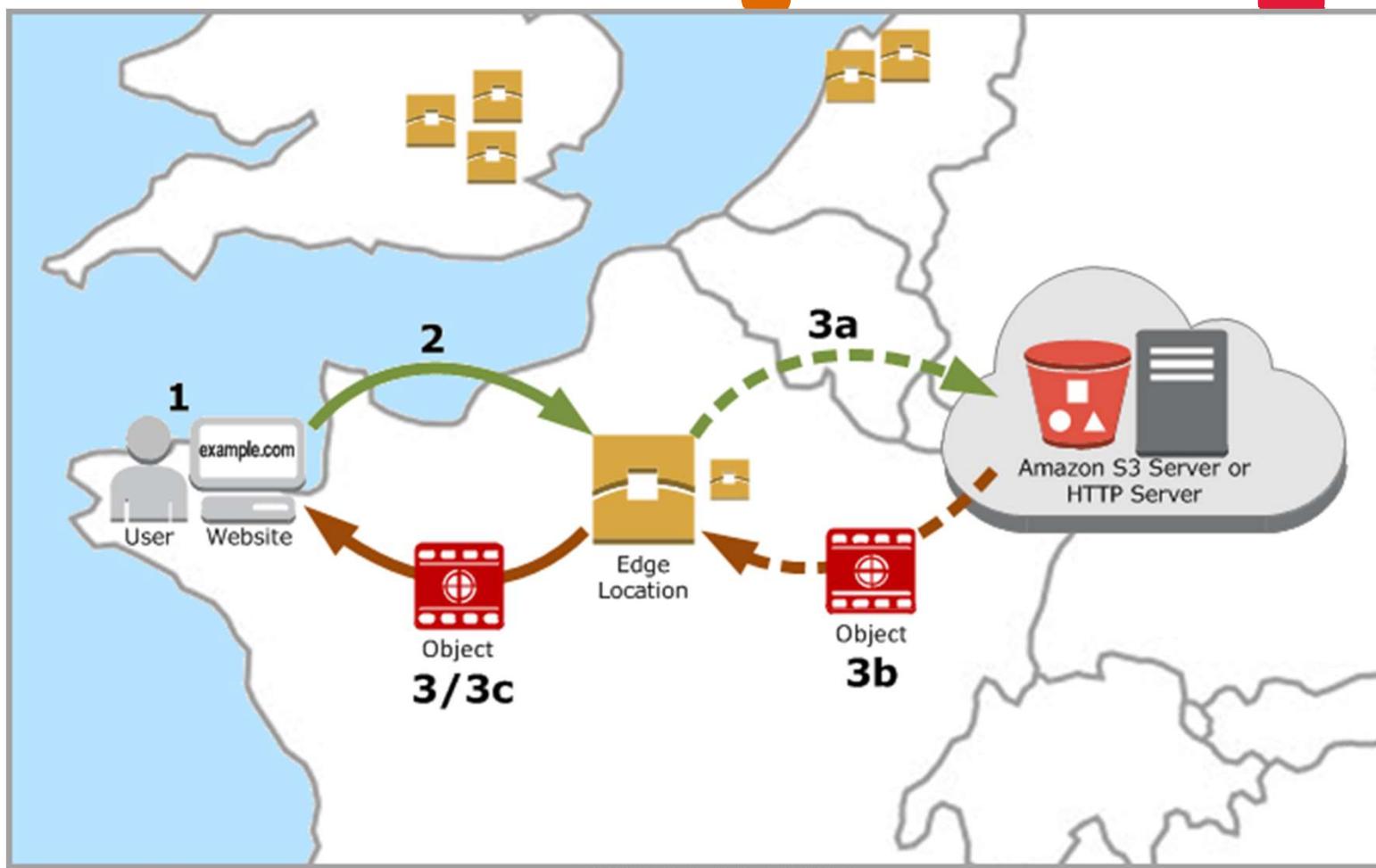
✚ Amazon Route 53 (DNS)

📦 Amazon CloudFront (Content Delivery Network)

⬇ AWS Web Application Firewall (WAF)

🛡 AWS Shield (Anti-DDoS)

AWS Global Infrastructure Edge Locations Example:



Regions

An independent collection of AWS resources in a defined geography

A solid foundation for meeting location dependant privacy and compliance requirements

Availability Zones

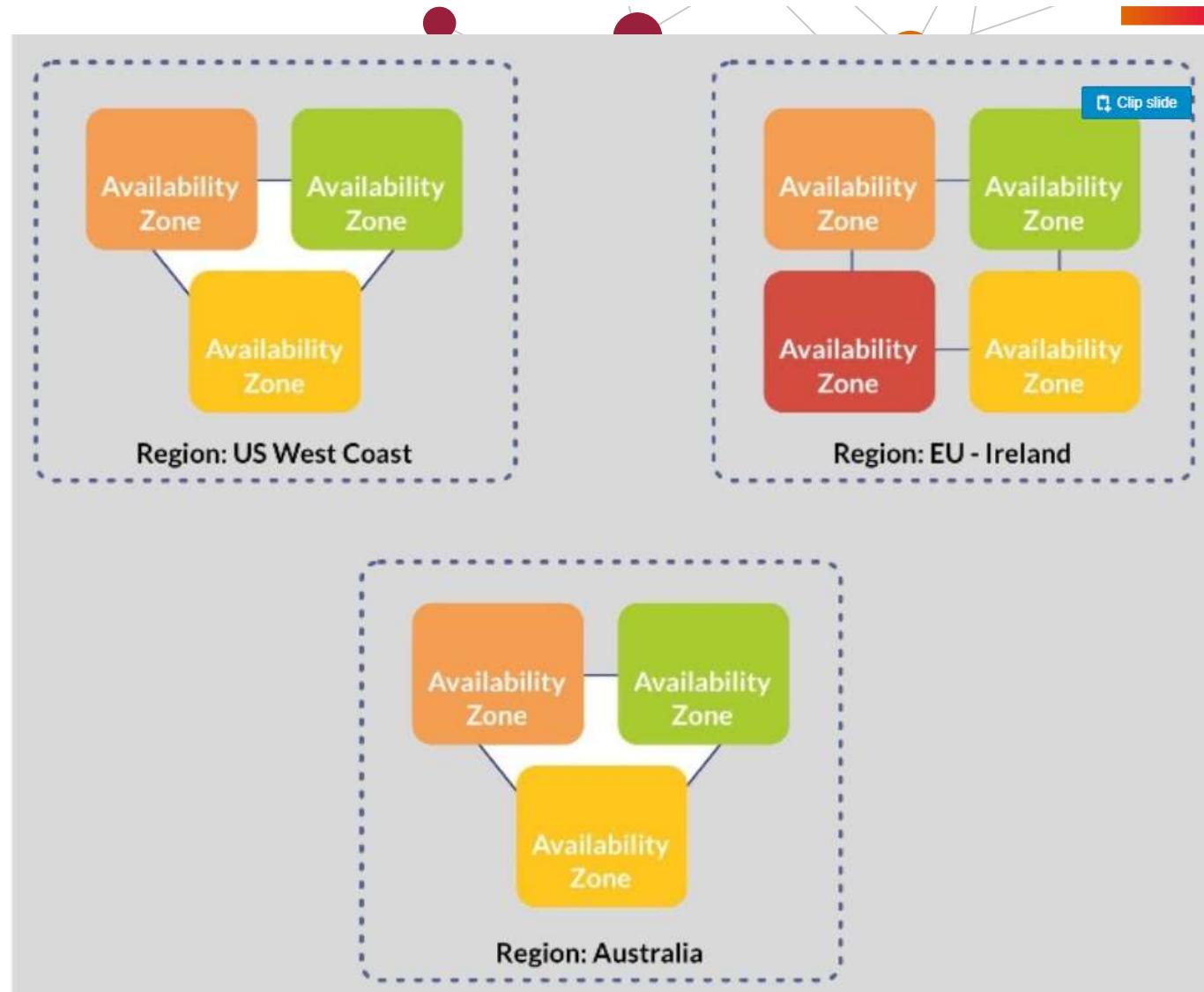
Designed as Independent failure zones

Physically separated with a typical metropolitan region

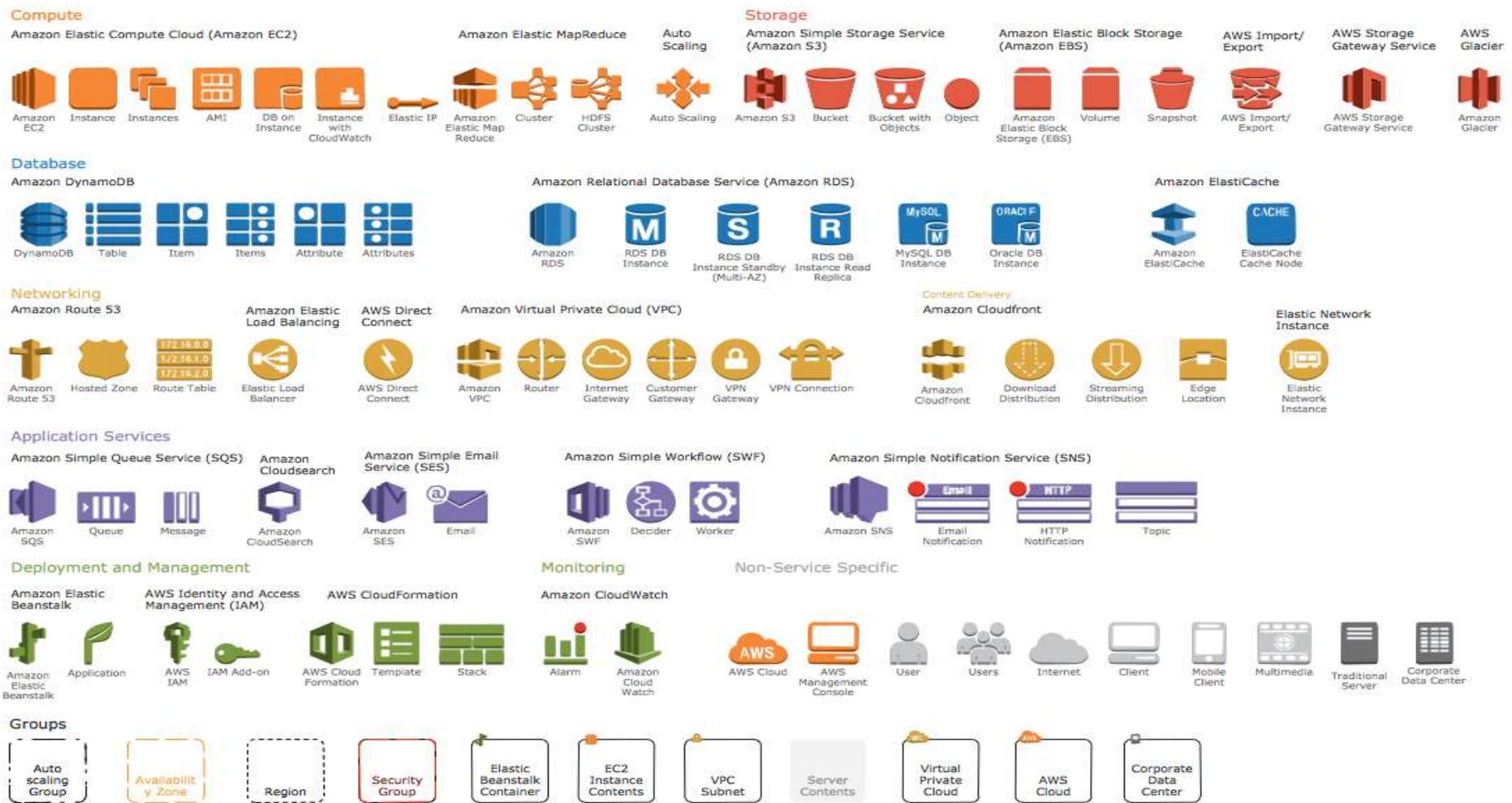
Edge Locations

To deliver content to end users with lower latency

Supports global DNS infrastructure (Route 53) and CloudFront CDN



Core Infrastructure and Services



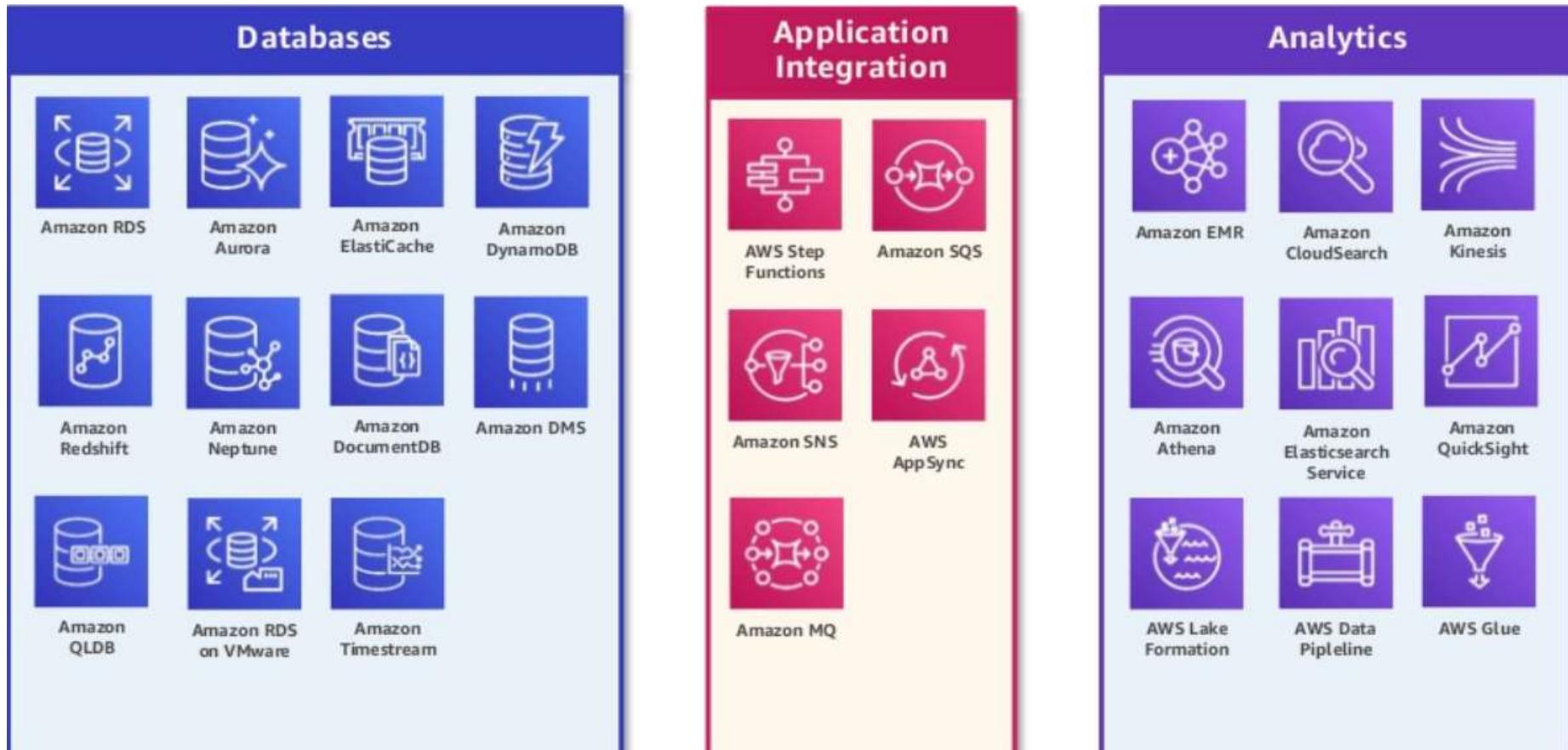
AWS Foundation Services (1 of 2)



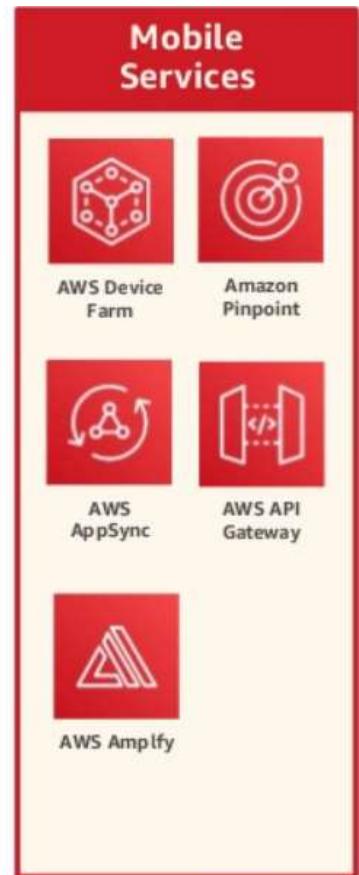
AWS Foundation Services (2 of 2)



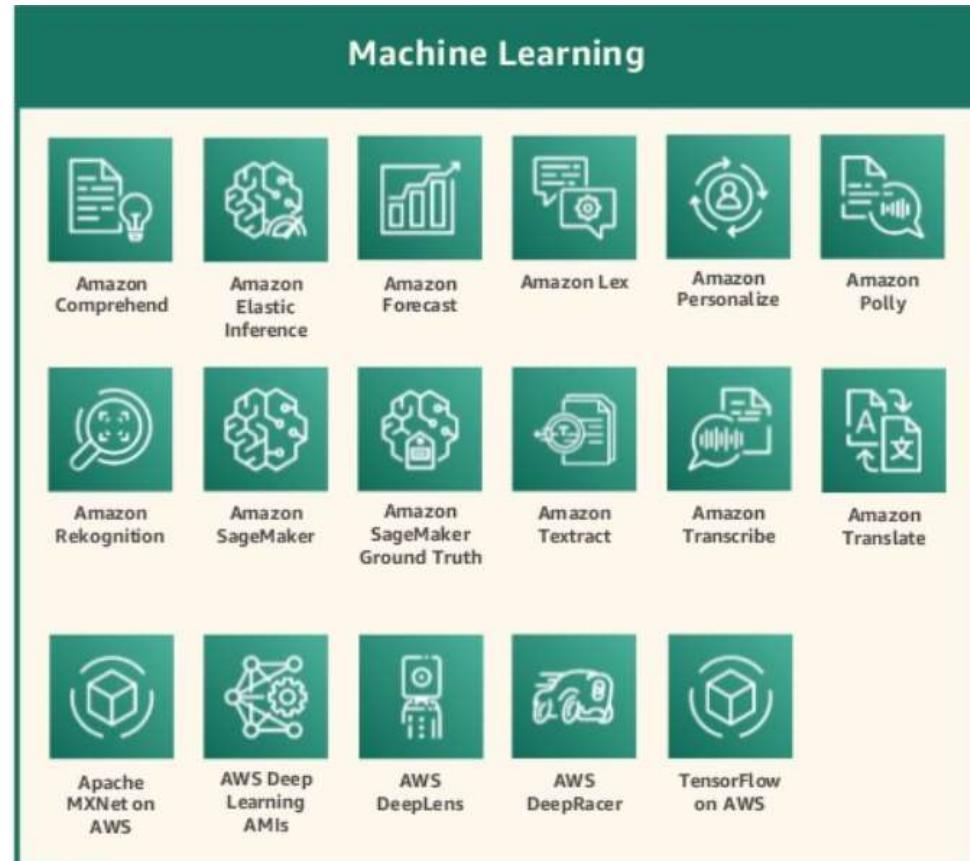
AWS Platform Services (1 of 5)



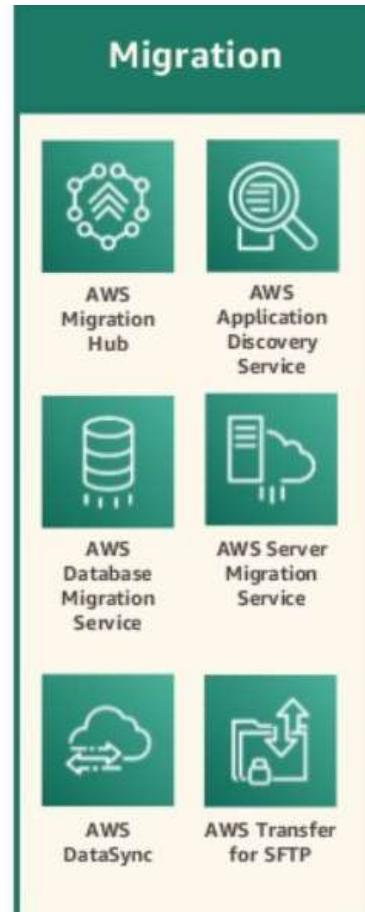
AWS Platform Services (2 of 5)



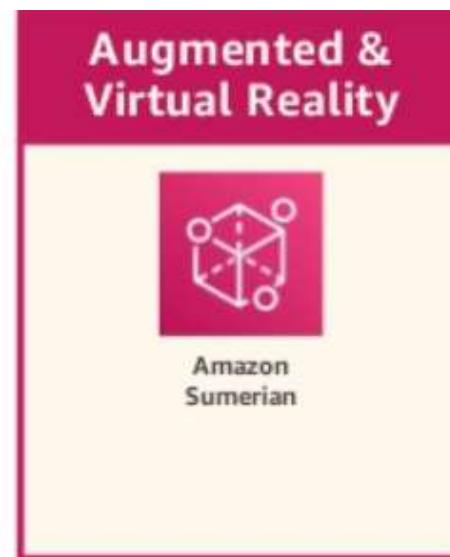
AWS Platform Services (3 of 5)



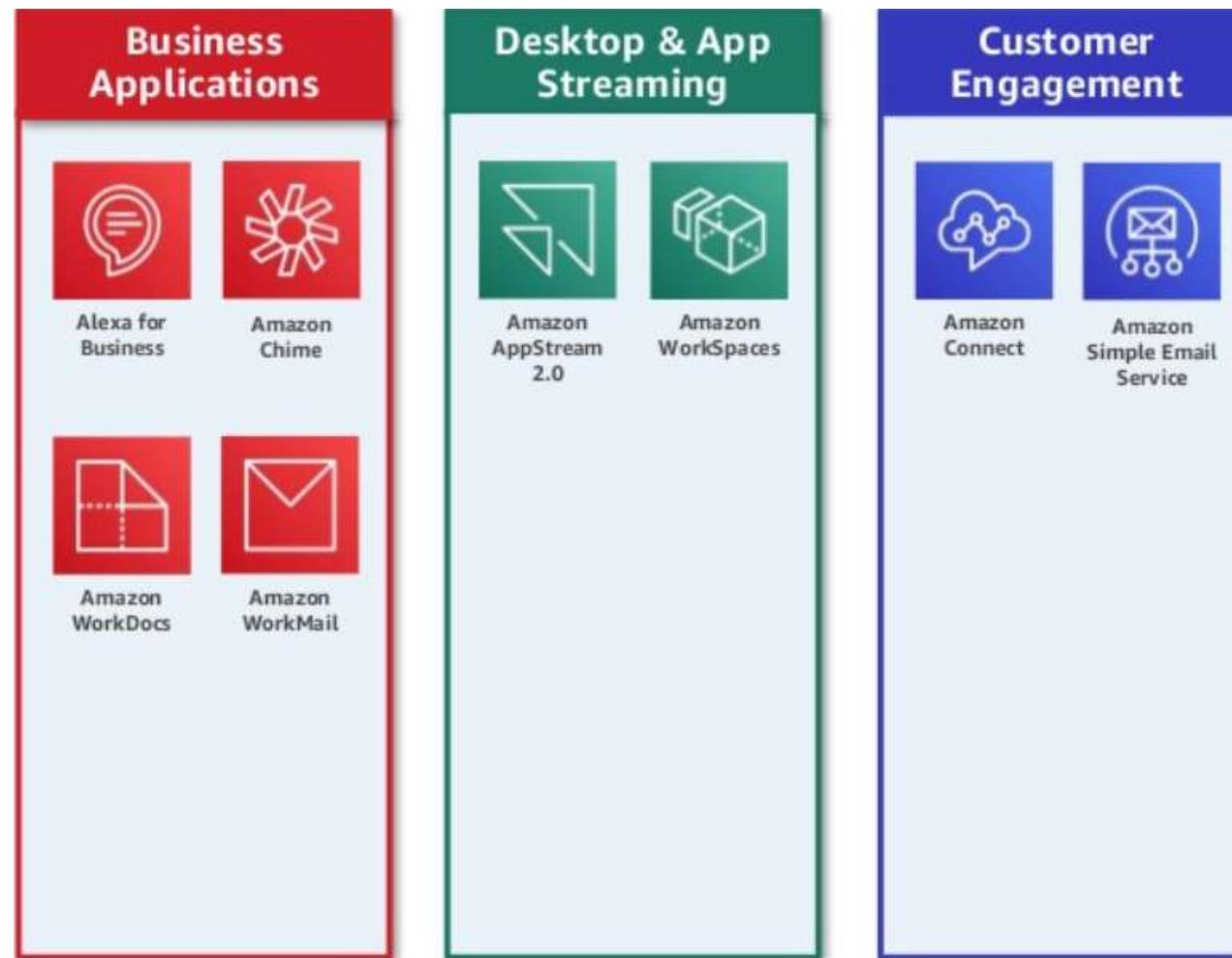
AWS Platform Services (4 of 5)



AWS Platform Services (5 of 5)



AWS Enterprise Applications



AWS Networking and Compute Essentials.

A Few Definitions First



VPC

What it is?

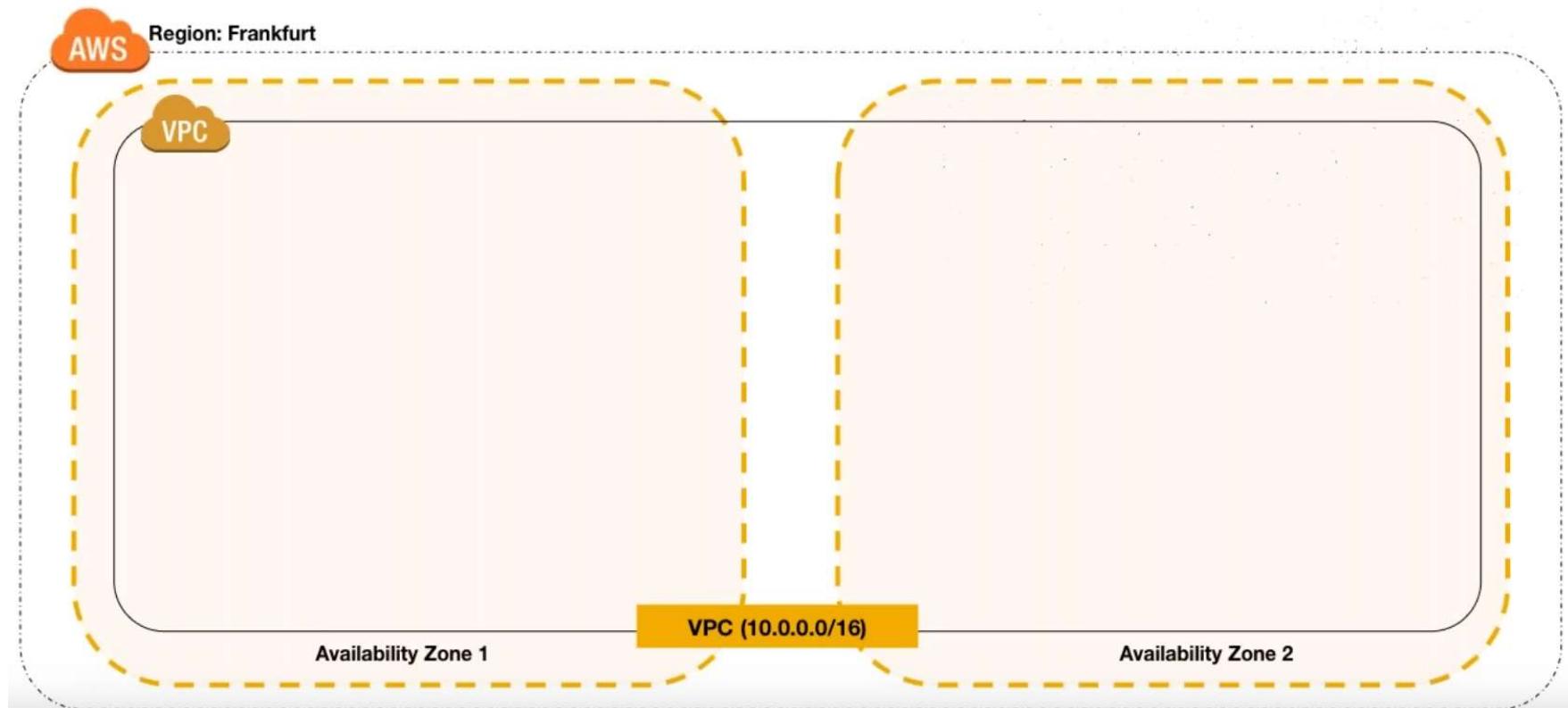
- Private isolated section of the AWS Cloud
 - Complete control of your networking
- ...Or just think of it as a virtual data center in the cloud.

What can you do with a VPC?

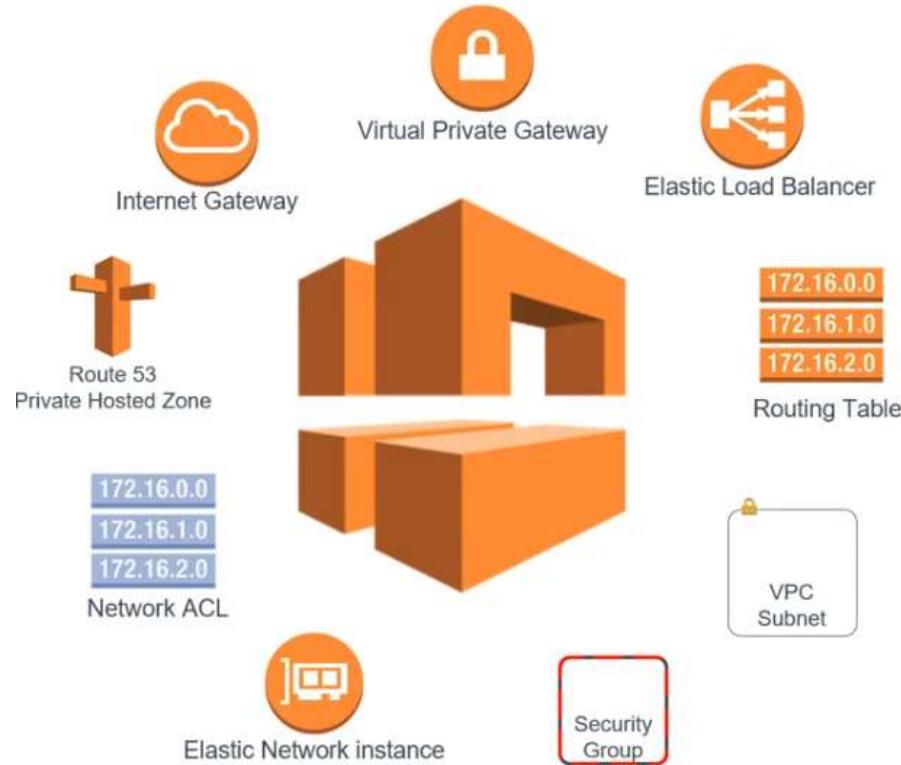
- **Launch instances (Virtual Machines)** into a subnet
- Assign **custom IP addresses** in each subnet
- Configure **route tables** between subnets
- Create **internet gateway** and attach it to VPC
- Create **better security** over AWS resources



VPC – Virtual Private Cloud



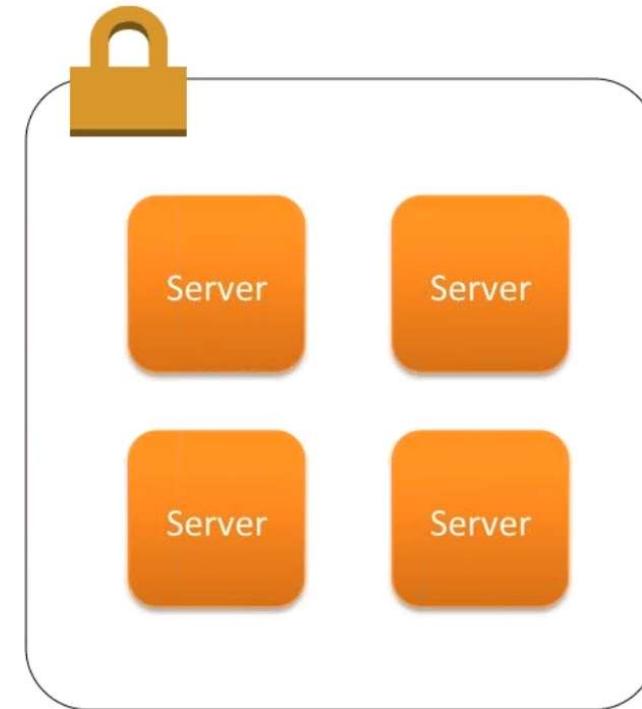
Common Networking Concepts



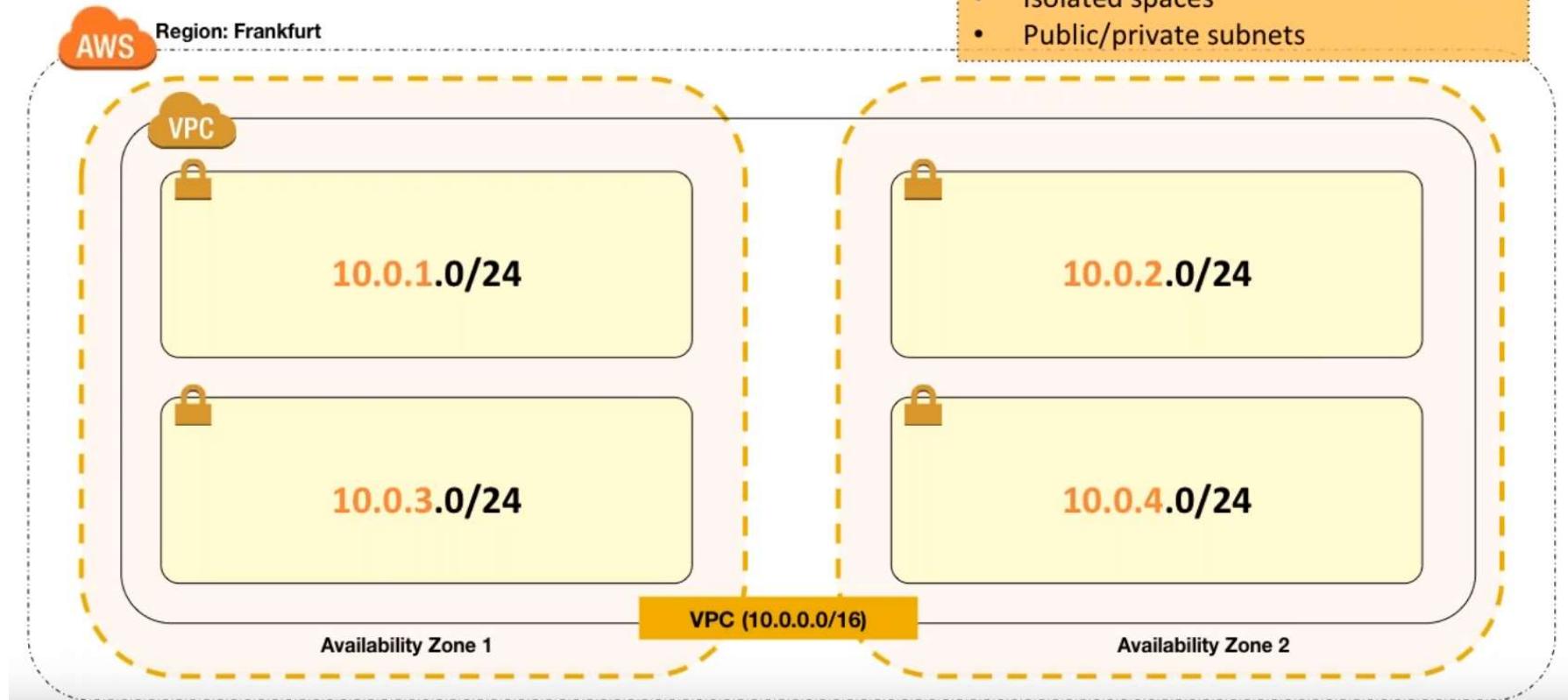
Step: Create subnets



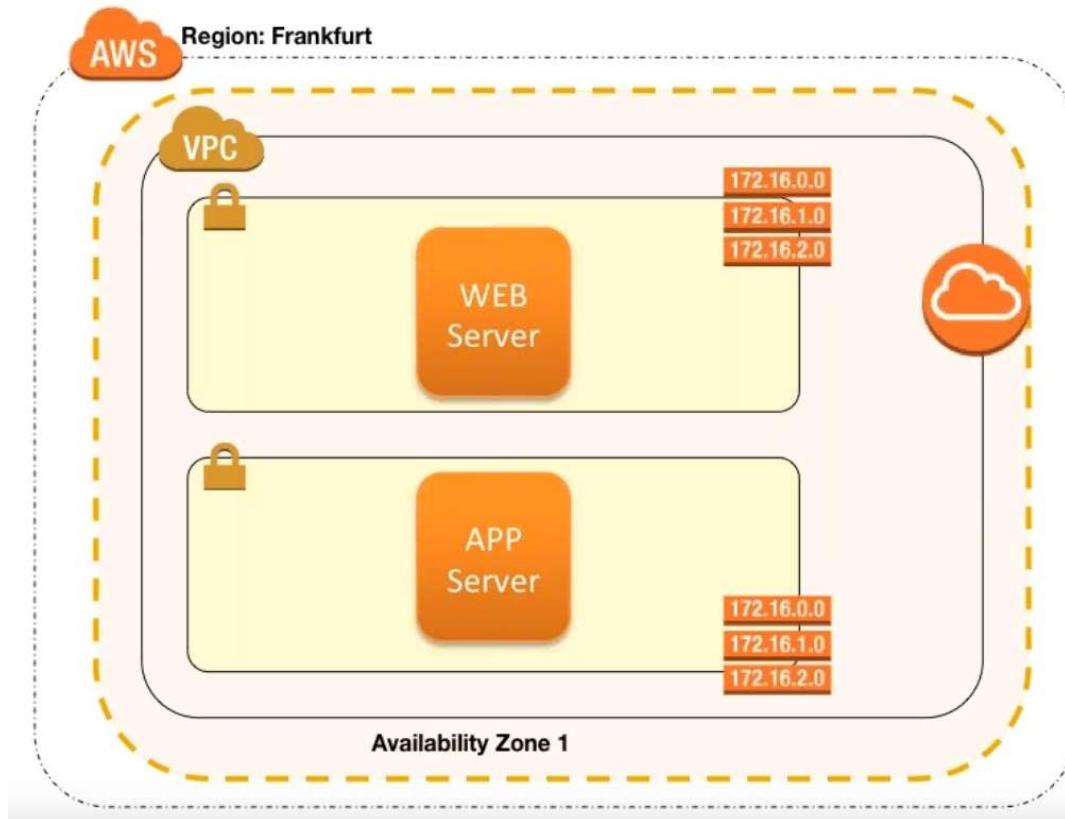
- A place where servers will be hosted
- A part of VPC
- IP range from VPC range
- Belongs to single AZ
- Design for HA!



Multiple Subnets



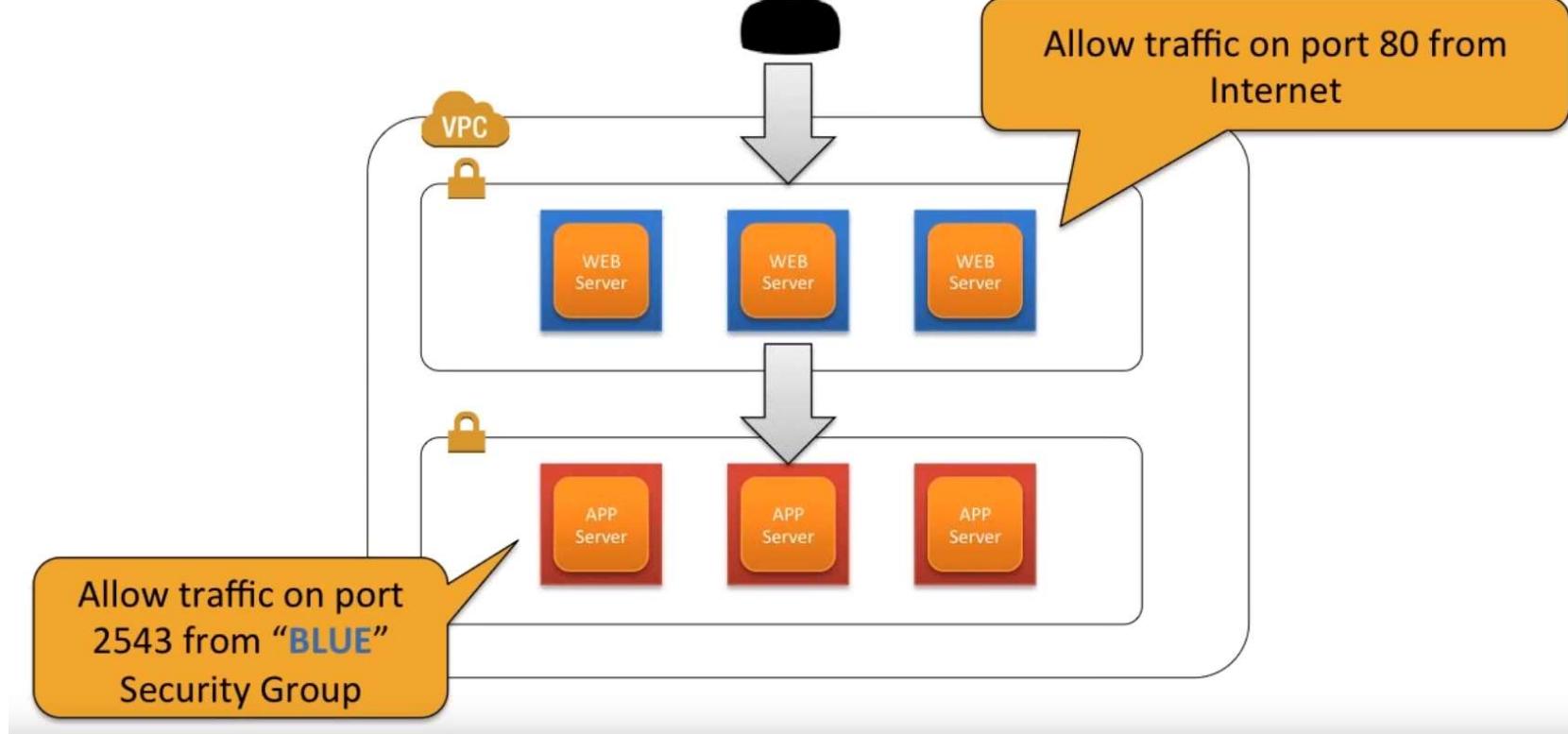
Routing Tables



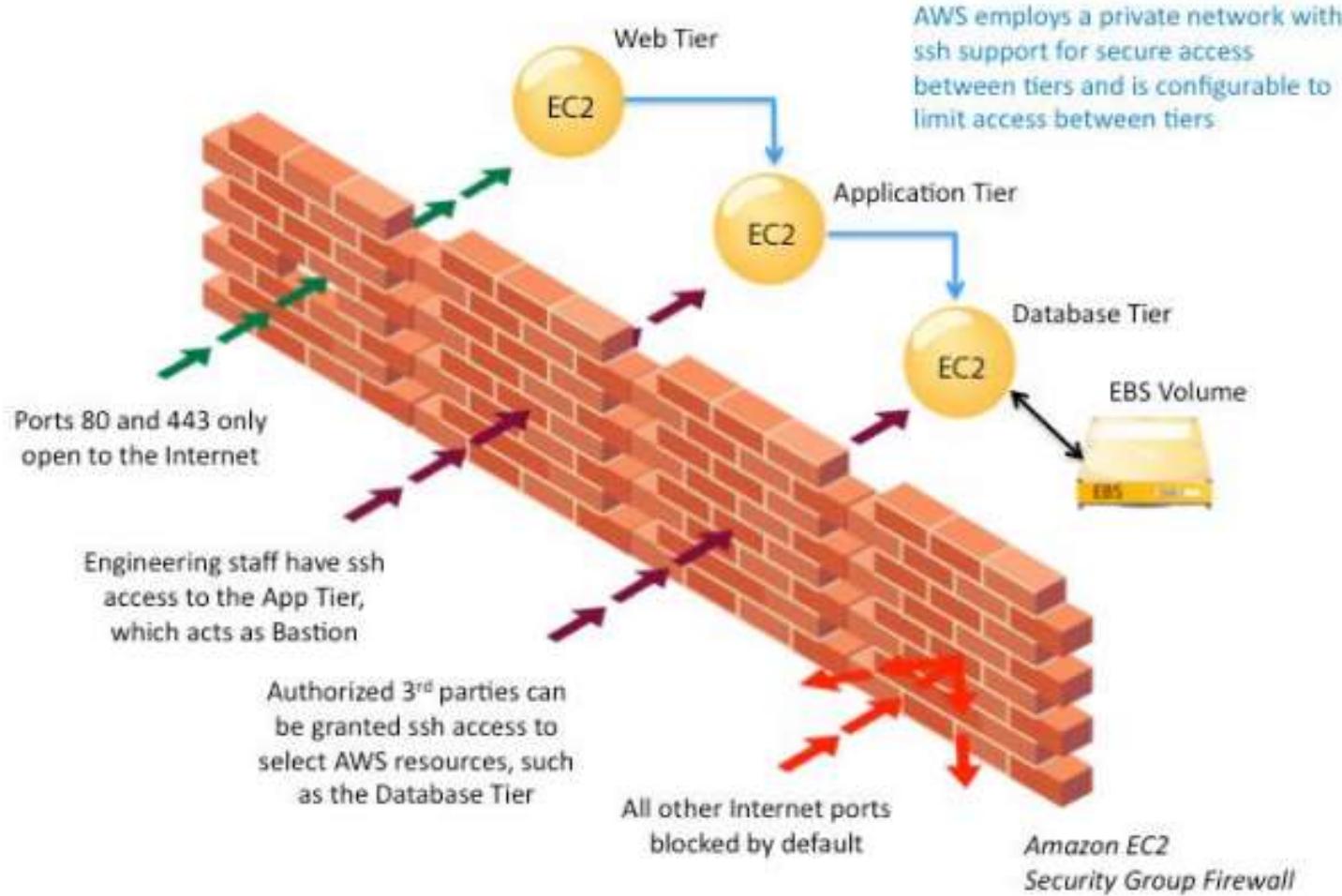
Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No
0.0.0.0/0	igw-97cea5fe	Active	No

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No

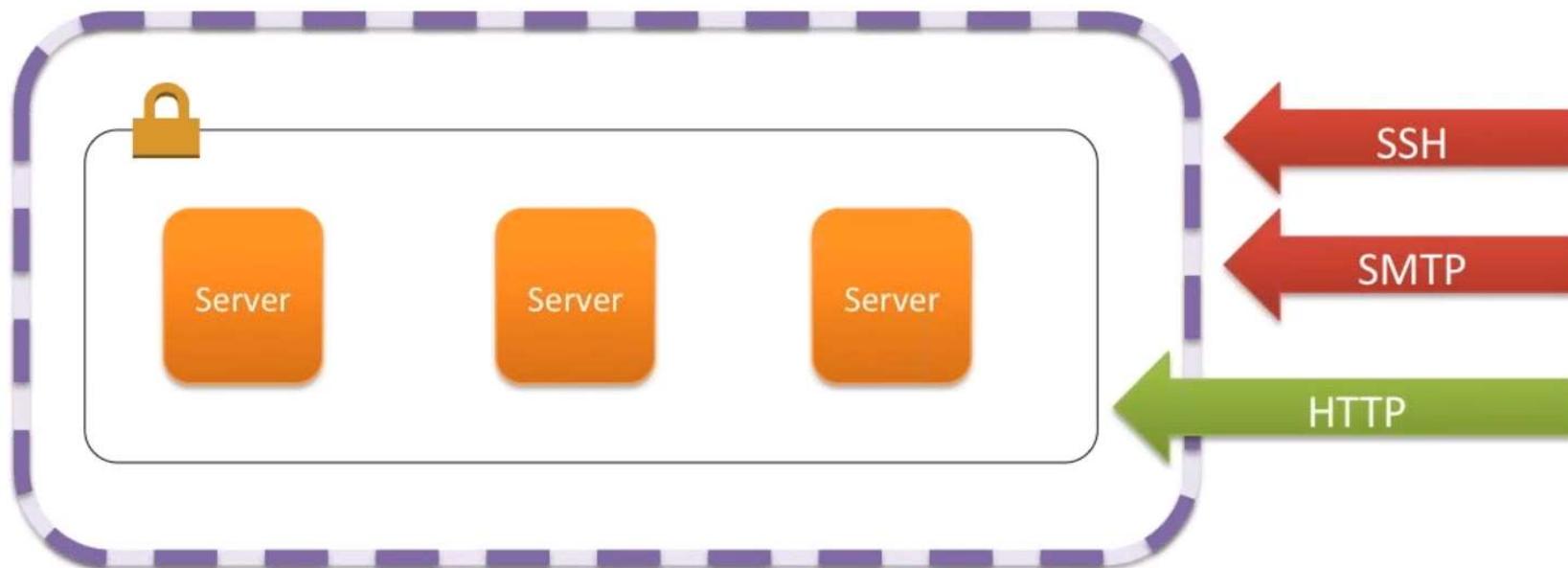
Security Groups



Security Group Firewall



Network ACLs



Network ACLs: Stateless firewalls

Can be applied on a subnet basis

The screenshot shows the AWS Network ACL configuration page. At the top, there is a search bar and filters for Name, Network ACL ID, Associated Subnets, and VPC. A single ACL named 'acl-5cc5b539' is listed, which is associated with 3 subnets and belongs to VPC 'vpc-327d1857 (172)'. Below this, the detailed view for 'acl-5cc5b539' shows the following rules:

Rule #	Type	Protocol	Port Range	Source	Allow / Deny
100	ALL Traffic	ALL	ALL	0.0.0.0/0	ALLOW
*	ALL Traffic	ALL	ALL	0.0.0.0/0	DENY
*	ALL Traffic	ALL	ALL	0.0.0.0/0	DENY

English translation: Allow all traffic in

Rules are evaluated starting with the lowest numbered rule.

Connecting VPC with Data Centers

- **VPN Connectivity**

Connect tunnels between on premises and AWS

- **AWS Direct Connect**

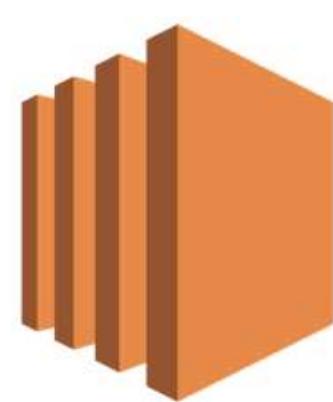
Establish a private network connection between On Prem network and one of the AWS Regions

Amazon Elastic Compute Cloud (VMs)

Amazon EC2 is a web service that provides secure, resizable compute capacity in the cloud. It is designed to make web-scale cloud computing easier for developers.

Benefits

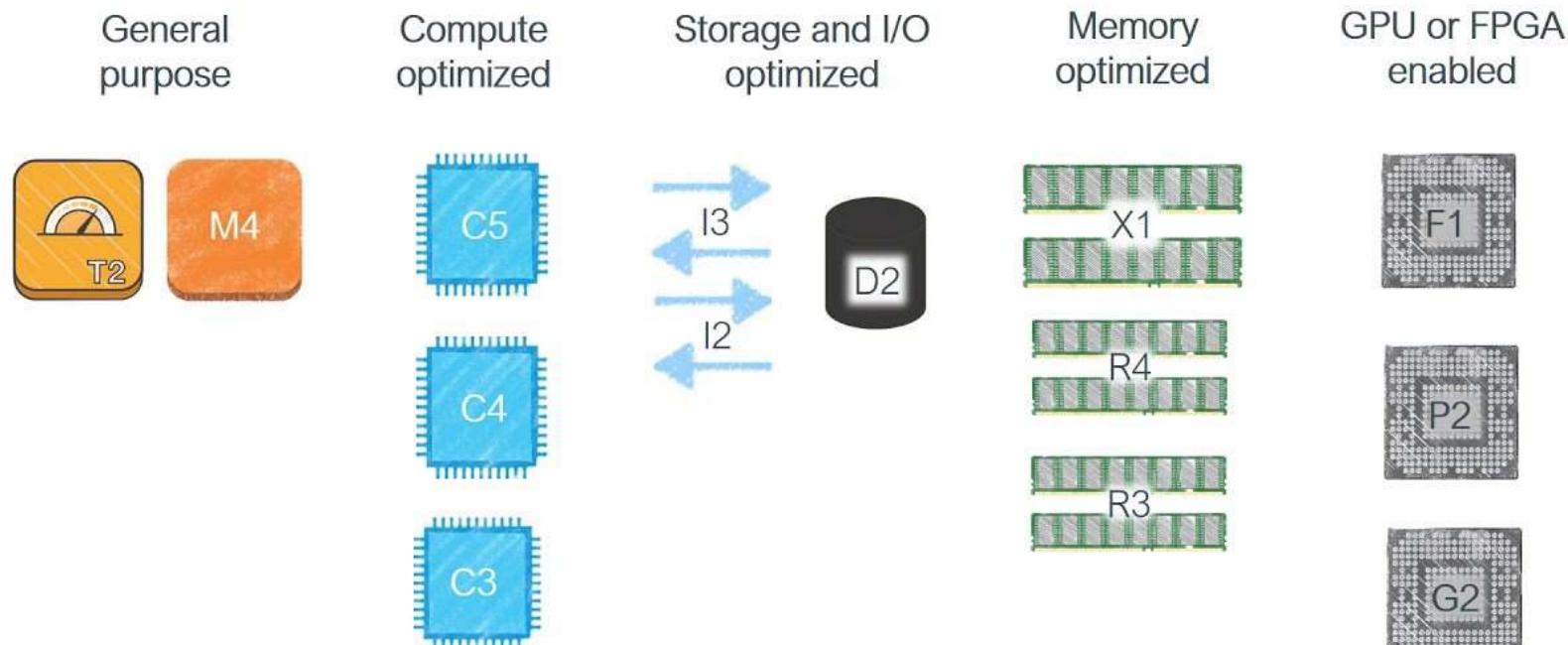
- Elastic Web-scale Computing: Increase or decrease capacity within minutes
- Completely Controlled: You have complete control of your instances including root access and the ability to interact with them as you would any machine.
- Flexible Cloud Hosting Services: You have the choice of multiple instance types, operating systems, and software packages.
- Integrated: with most AWS services such as S3, RDS, and VPC.
- Reliable: Replacement instances can be rapidly and predictably commissioned
- Inexpensive: Financial benefits of Amazon's scale
- Easy To Start: Several ways to get started with Amazon EC2. You can use the AWS Console, the AWS CLI, or AWS SDKs





EC2 Instant Category

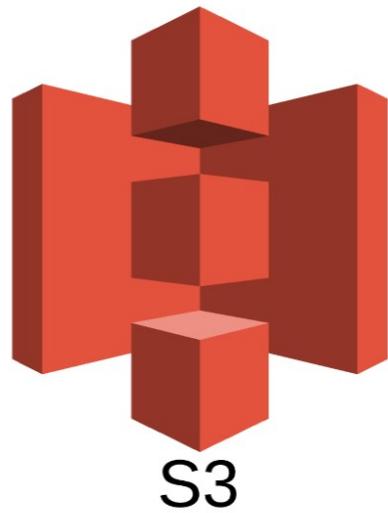
EC2: Instance Types



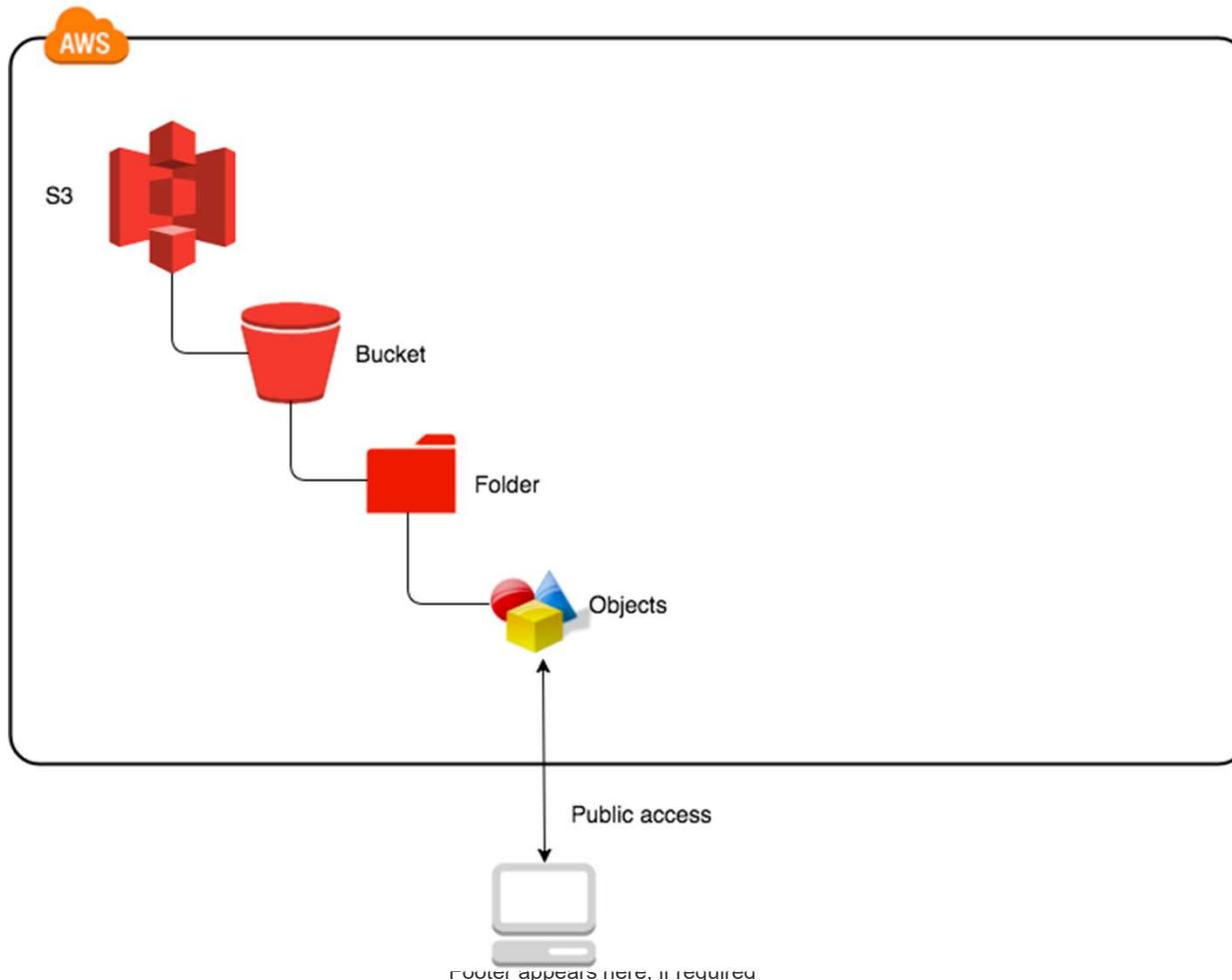
EC2 Instant Category

Instance Family	Current Generation Instance Types
General purpose	t2.nano t2.micro t2.small t2.medium t2.large m4.large m4.xlarge m4.2xlarge m4.4xlarge m4.10xlarge m3.medium m3.large m3.xlarge m3.2xlarge
Compute optimized	c4.large c4.xlarge c4.2xlarge c4.4xlarge c4.8xlarge c3.large c3.xlarge c3.2xlarge c3.4xlarge c3.8xlarge
Memory optimized	r3.large r3.xlarge r3.2xlarge r3.4xlarge r3.8xlarge
Storage optimized	i2.xlarge i2.2xlarge i2.4xlarge i2.8xlarge d2.xlarge d2.2xlarge d2.4xlarge d2.8xlarge
GPU instances	g2.2xlarge g2.8xlarge

Amazon Simple Storage Service S3



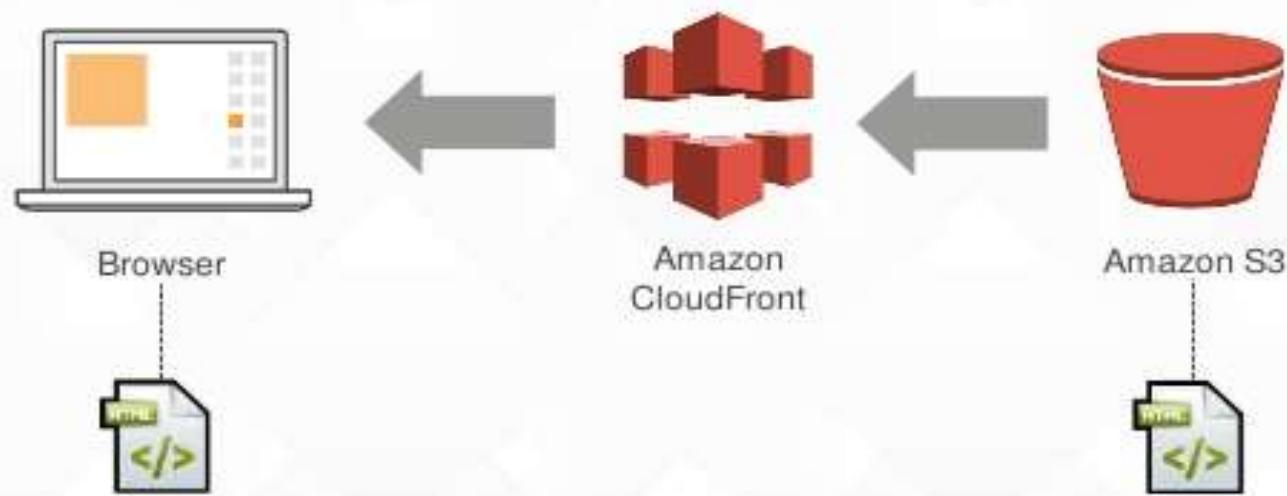
AWS S3 Block Storage Service.



S3 Static Web Site Hosting

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Static Website Hosting on S3 & CloudFront

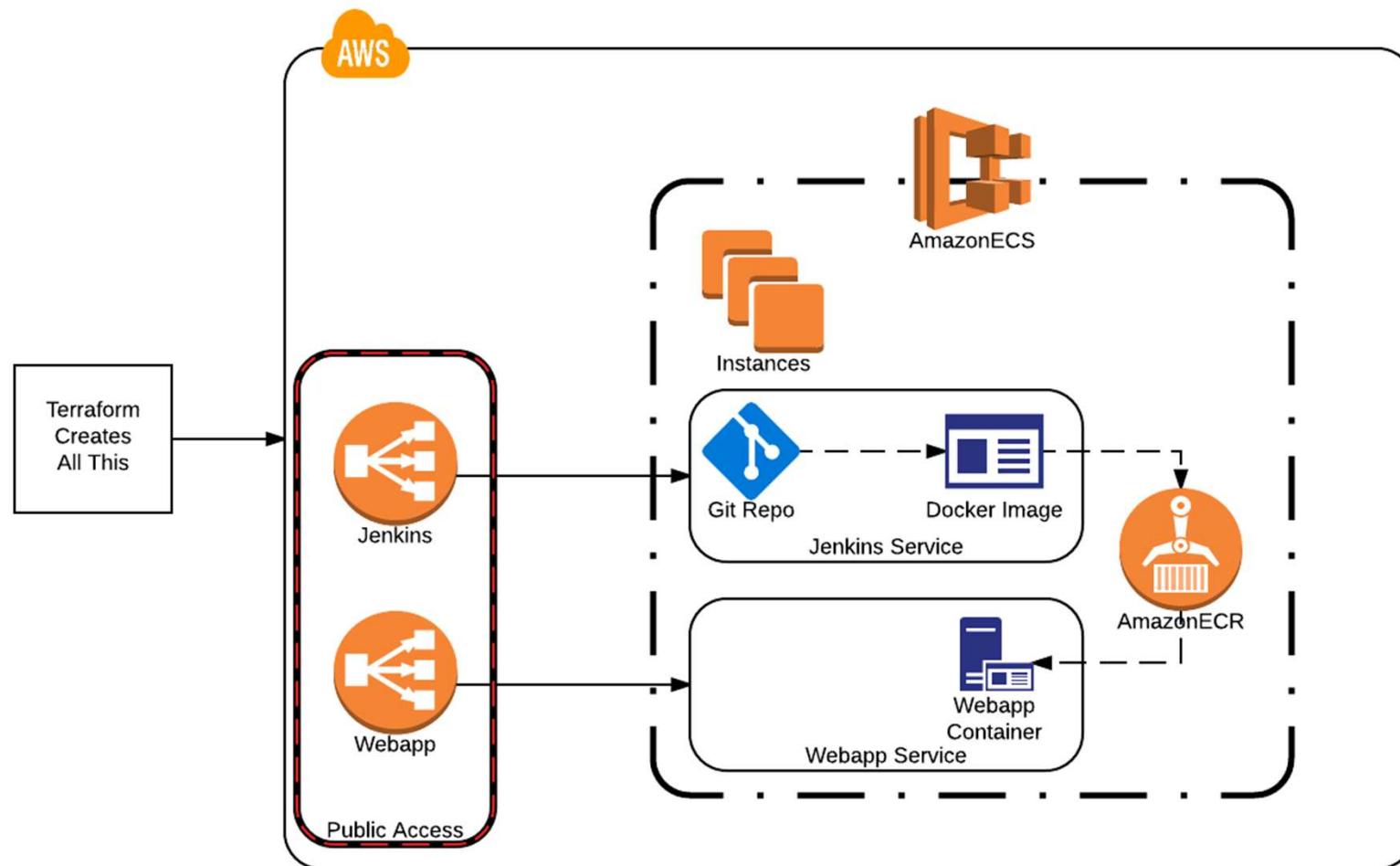


AWS Storage Classes

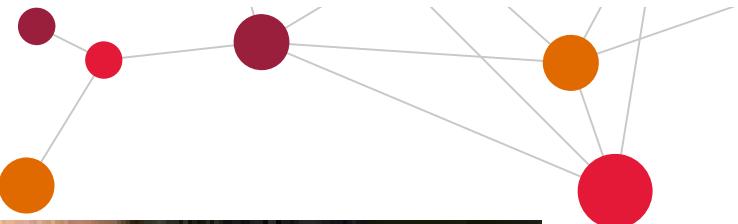
Features	S3-Standard	S3-Standard IA	S3 One Zone IA	S3 - RRS	Glacier
Durability	99.999999999%	99.999999999%	99.999999999% (Single AZ)	99.99%	99.999999999%
Availability	99.99%	99.9%	99.5%	99.99%	NA
Availability Zones	>=3	>=3	1	1	>=3
Minimum Storage Duration	Unlimited	30 Days	30 Days	Unlimited	90 Days
Access Speed (Latency)	Miliseconds	Miliseconds	Miliseconds	Miliseconds	1 min to 12 hrs
Data Retrieval Fee	Nil	Per GB Data Retrieved	Per GB Data Retrieved	Nil	Per GB Data Retrieved
Minimum Billable Object Size	NA	128 KB (the smaller objects will be charged for 128KB)	128 KB (the smaller objects will be charged for 128KB)	NA	NA
Type of Storage	Object	Object	Object	Object	Object
Lifecycle Management Policies	Available	Available	Available	Available	Available
SSL Support	Yes	Yes	Yes	Yes	Yes
Amazon S3 SLA Backing	99.9%	99%	99%	Data Not Available	NA

Automation using CloudFormation OR Terraform

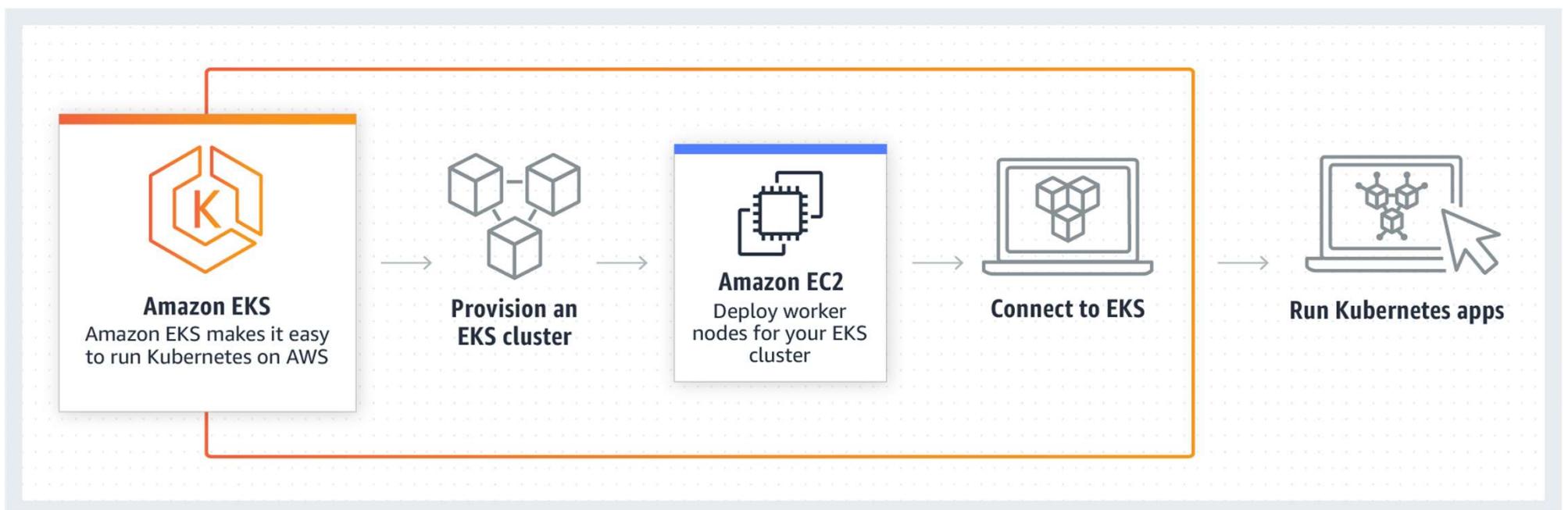
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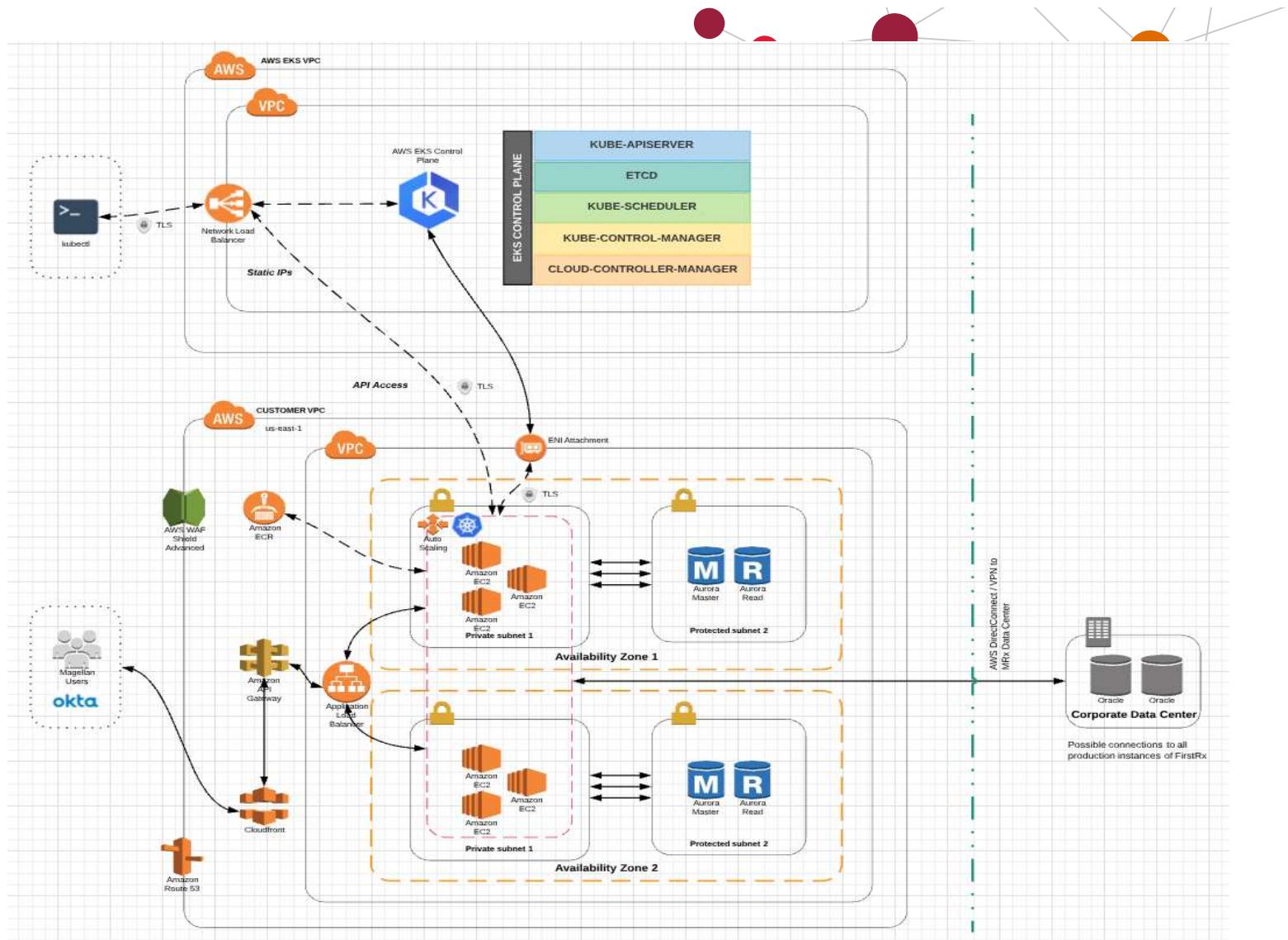


Demo



DEMO 1: Kubernetes Cluster Setup





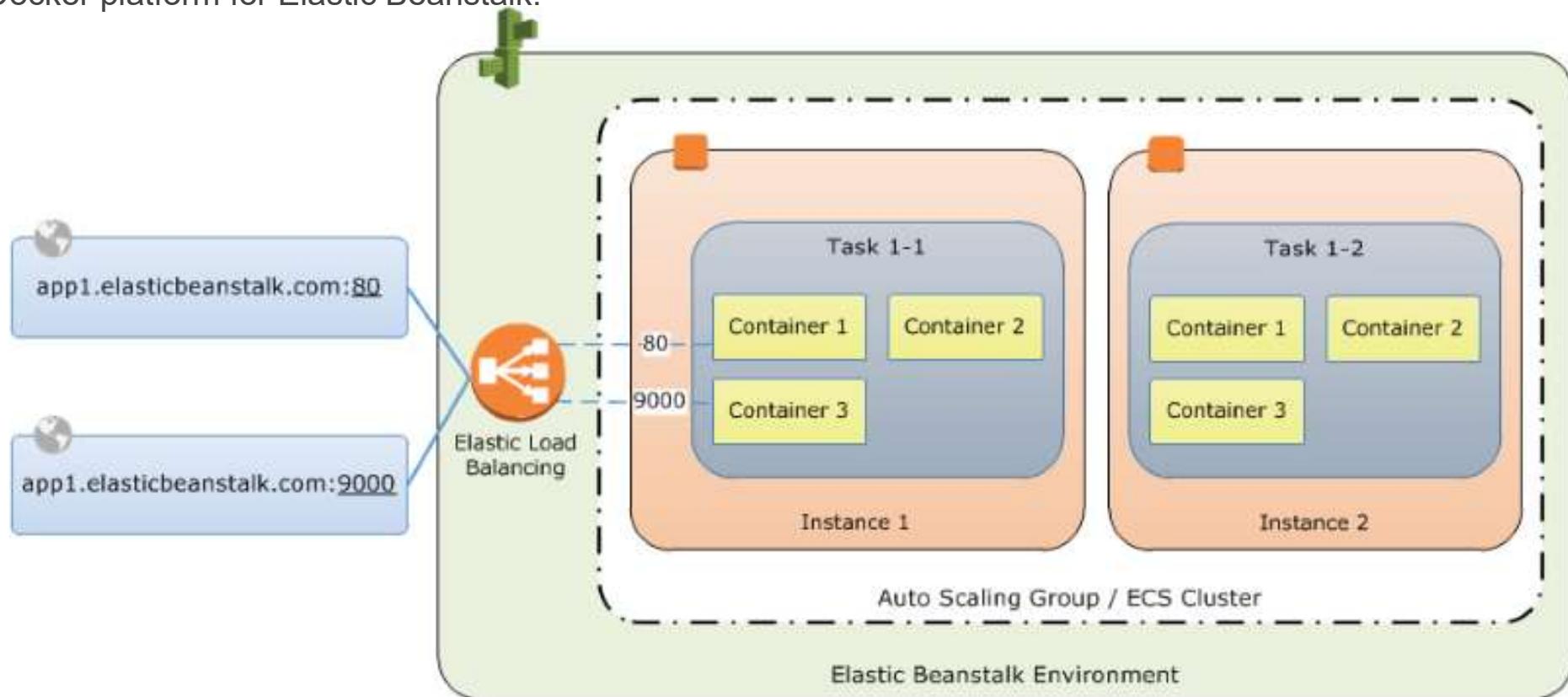
```
amer.mohammed@CA-L7GZTSQ2 MINGW64 /bin (master)
$ aws configure
AWS Access Key ID [*****7NZQ]:
AWS Secret Access Key [*****uoXP]:
Default region name [us-east-1]: us-west-2
Default output format [None]:

amer.mohammed@CA-L7GZTSQ2 MINGW64 /bin (master)
$ eksctl create cluster \
> --name prod \
> --version 1.12 \
> --nodegroup-name standard-workers \
> --node-type t2.micro \
> --nodes 3 \
> --nodes-min 1 \
> --nodes-max 4 \
> --node-ami auto
[!] using region us-west-2
[!] setting availability zones to [us-west-2d us-west-2a us-west-2c]
[!] subnets for us-west-2d - public:192.168.0.0/19 private:192.168.96.0/19
[!] subnets for us-west-2a - public:192.168.32.0/19 private:192.168.128.0/19
[!] subnets for us-west-2c - public:192.168.64.0/19 private:192.168.160.0/19
[!] nodegroup "standard-workers" will use "ami-0923e4b35a30a5f53" [AmazonLinux2/1.12]
[!] creating EKS cluster "prod" in "us-west-2" region
[!] will create 2 separate CloudFormation stacks for cluster itself and the initial nodegroup
[!] if you encounter any issues, check CloudFormation console or try 'eksctl utils describe-stacks --region=us-west-2 --name=prod'
[!] 2 sequential tasks: { create cluster control plane "prod", create nodegroup "standard-workers" }
[!] building cluster stack "eksctl-prod-cluster"
[!] deploying stack "eksctl-prod-cluster"
[!] building nodegroup stack "eksctl-prod-nodegroup-standard-workers"
[!] deploying stack "eksctl-prod-nodegroup-standard-workers"
[✓] all EKS cluster resource for "prod" had been created
[✓] saved kubeconfig as "C:\\\\Users\\\\amer.mohammed/.kube/config"
[!] adding role "arn:aws:iam::198019806592:role/eksctl-prod-nodegroup-standard-wo-NodeInstanceRole-19DJFS3LRL701" to auth ConfigMap
[!] nodegroup "standard-workers" has 0 node(s)
[!] waiting for at least 1 node(s) to become ready in "standard-workers"
[!] nodegroup "standard-workers" has 2 node(s)
[!] node "ip-192-168-52-57.us-west-2.compute.internal" is not ready
[!] node "ip-192-168-84-121.us-west-2.compute.internal" is ready
[!] kubectl command should work with "C:\\\\Users\\\\amer.mohammed/.kube/config", try 'kubectl get nodes'
[✓] EKS cluster "prod" in "us-west-2" region is ready

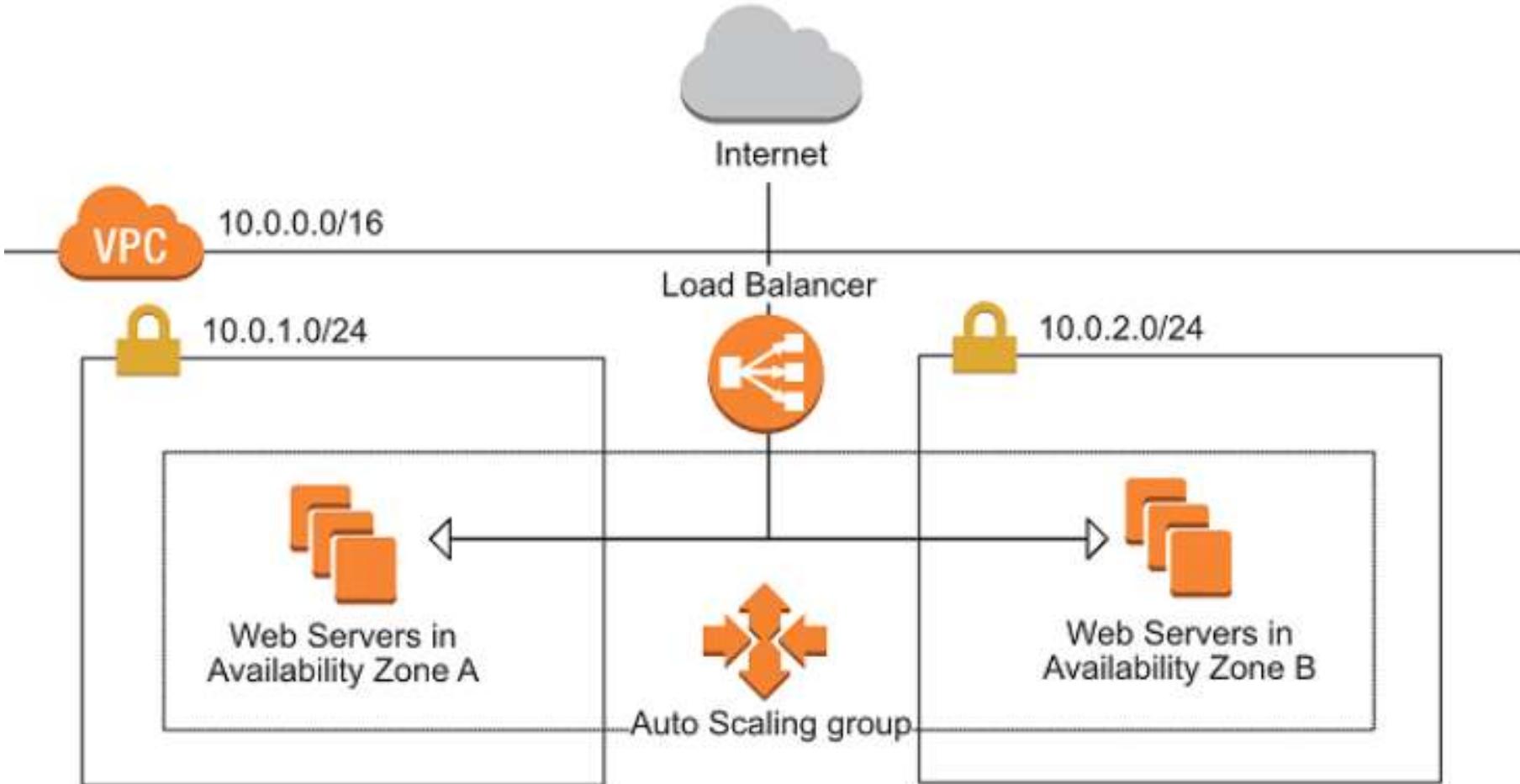
amer.mohammed@CA-L7GZTSQ2 MINGW64 /bin (master)
$ |
```

DEMO 2: Docker Container Setup Elastic Bean Stalk

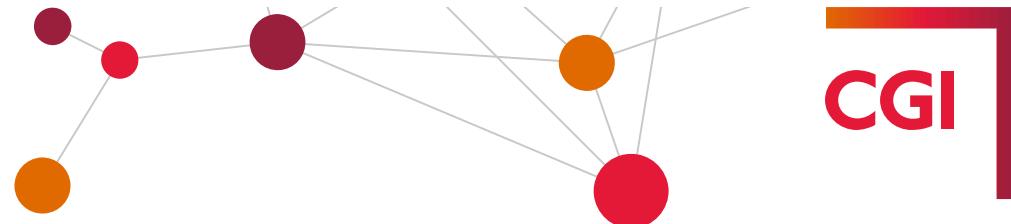
Docker environments that support multiple containers per Amazon EC2 instance with multicontainer Docker platform for Elastic Beanstalk.



DEMO 3: AutoScaling Group Of Load Balanced EC2

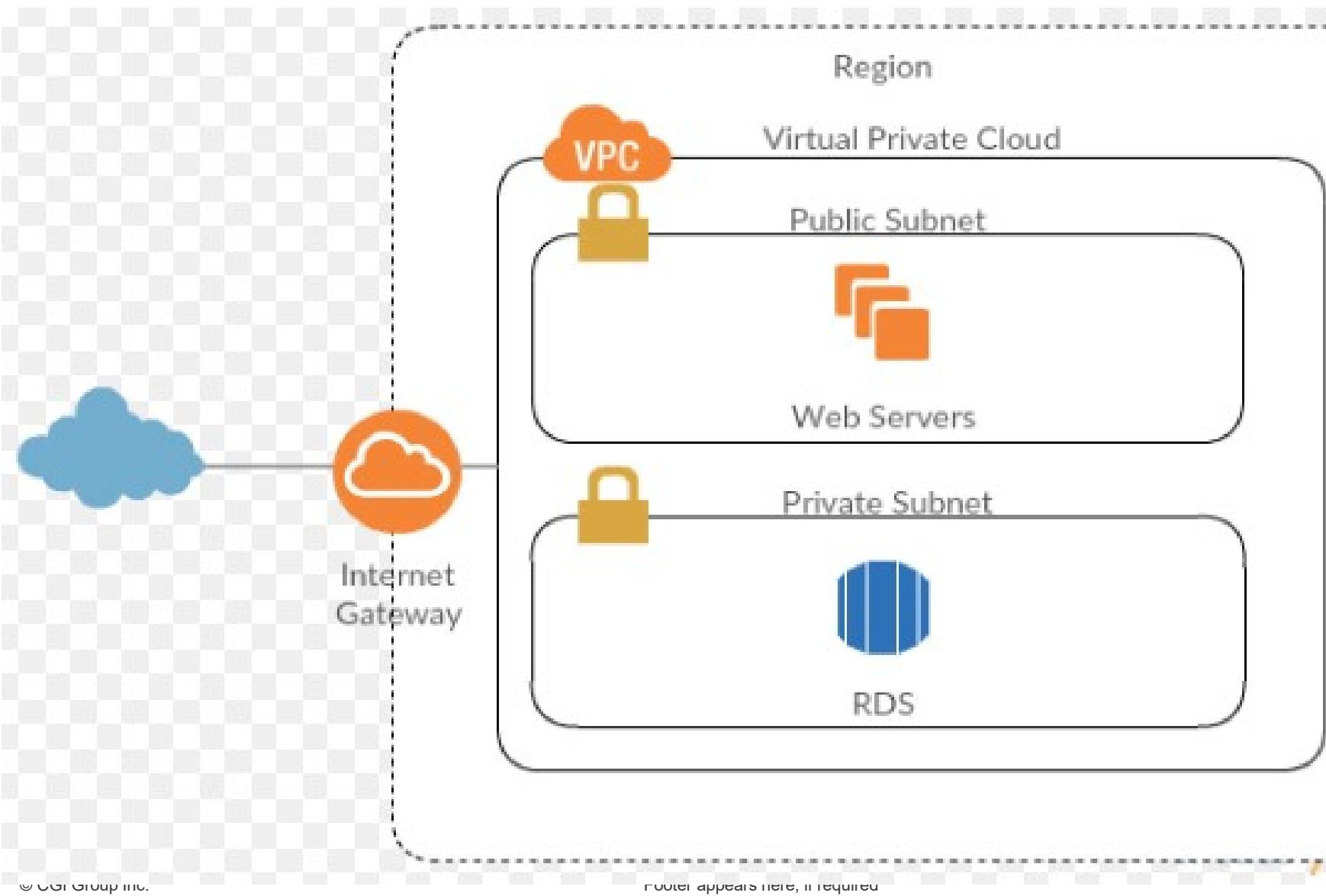


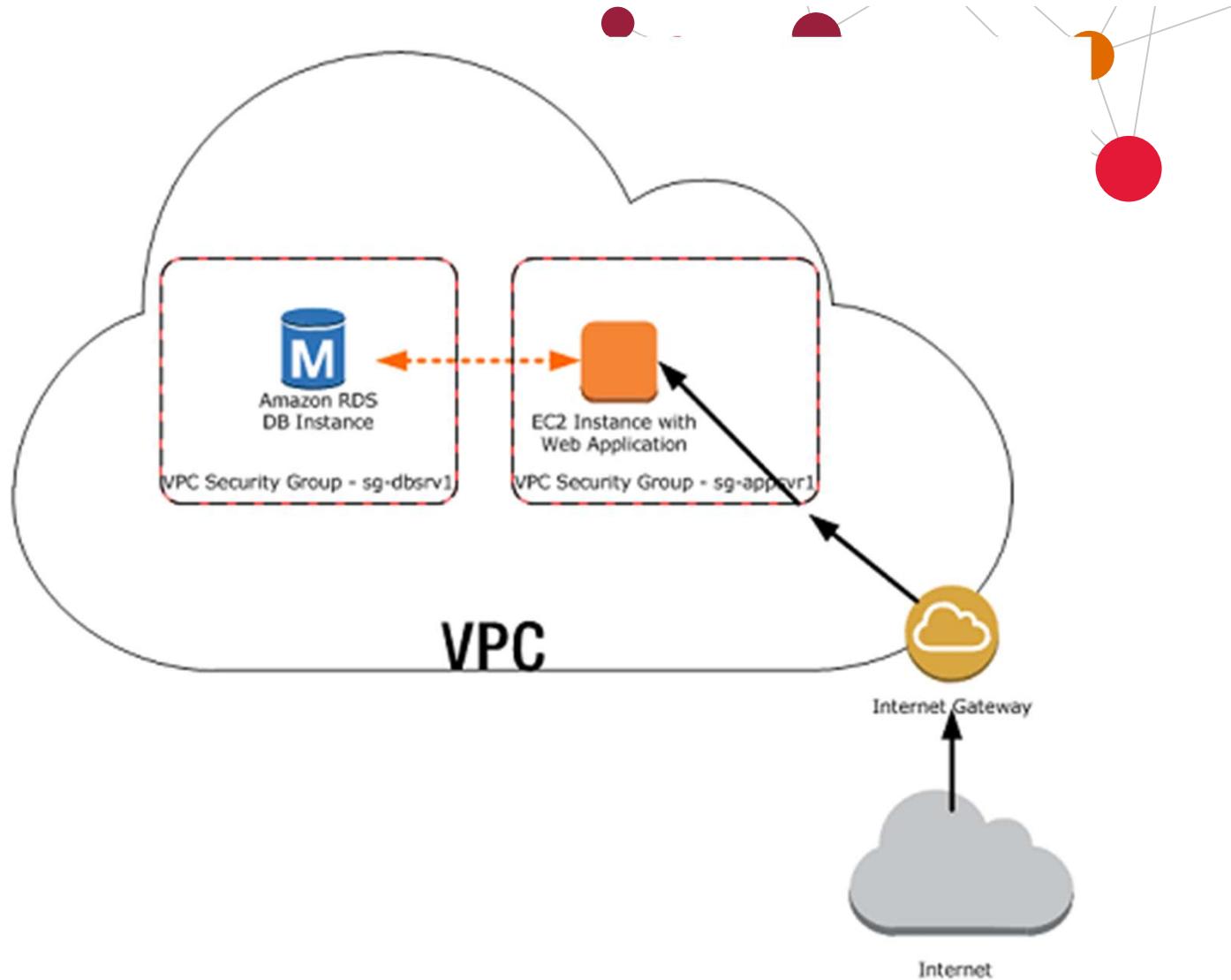
DEMO 4



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How to Build a Custom VPC With Private & Public Subnets, Route Table, Internet Gateway, Security Group and Configure Web Server in Public Subnet and RDS Database in Private Subnet





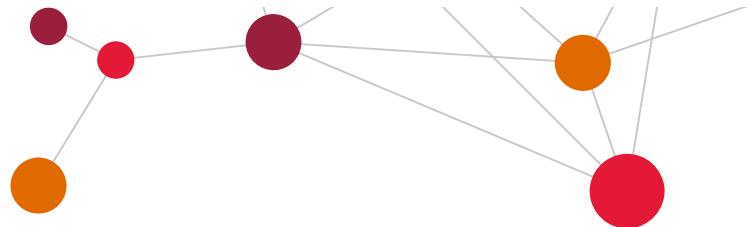
Questions and Answers

- Are there any questions?
- Thank you very much for your time.
- Feel free to contact the Global Wealth DevOps Team, if ever we can ever be of service to you.

Caren.Carkessian@cgi.com

Amer.Mohammed@cgi.com

Advanced Resources



AWS Account Creation:

<https://aws.amazon.com/resources/create-account/>

AWS Global Infrastructure

https://aws.amazon.com/about-aws/global-infrastructure/regions_az/?p=ngi&loc=2

VPC Documentation Guide:

<https://docs.aws.amazon.com/vpc/index.html>

<https://aws.amazon.com/quickstart/architecture/vpc/>

<https://docs.aws.amazon.com/vpc/latest/userguide/what-is-amazon-vpc.html>

<https://docs.aws.amazon.com/vpc/latest/userguide/amazon-vpc-limits.html>

AWS Kubernetes EKS Service:

<https://eksworkshop.com/introduction/>

<https://s3.amazonaws.com/aws-quickstart/quickstart-amazon-eks/doc/amazon-eks-architecture.pdf>

<https://aws.amazon.com/getting-started/projects/deploy-kubernetes-app-amazon-eks/>

<https://docs.aws.amazon.com/eks/latest/userguide/getting-started.html>

https://github.com/awsdocs/amazon-eks-user-guide/blob/master/doc_source/install-kubectl.md

<https://github.com/weaveworks/eksctl>

<https://medium.com/faun/learning-kubernetes-by-doing-part-1-setting-up-eks-in-aws-50dcf7a76247>

AWS AutoScaling:

<https://docs.aws.amazon.com/autoscaling/ec2/userguide/what-is-amazon-ec2-auto-scaling.html>

AWS CloudFormation:

<https://docs.aws.amazon.com/AWSCloudFormation/latest/UserGuide/Welcome.html>

Footer appears here, if required

AWS Learning Path

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AWS Learning and Certification Paths

Non-technical Management, Sales



Cloud Operations / Administration



Cloud Architecture



Cloud Development



Cloud Big Data



Cloud Data Warehousing



Cloud Security

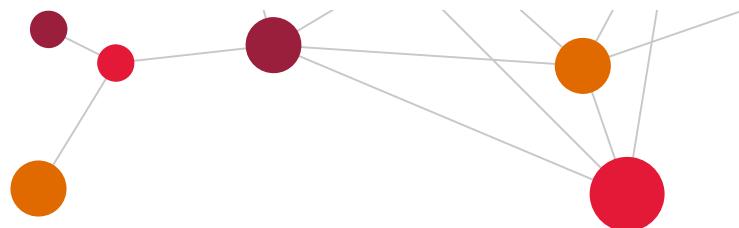


Cloud Machine Learning



Cloud Migration





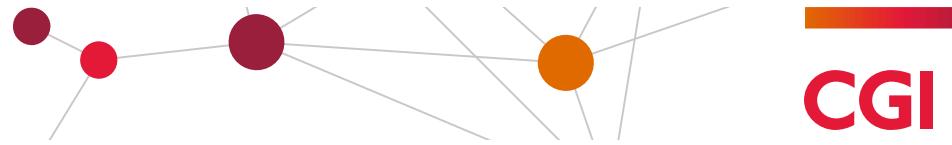
AWS Certified Cloud Practitioner

- = foundational course
- = intermediate course
- = advanced course



Add on free digital training at aws.training

 training and certification



AWS Business Professional Learning Path

 Recommended progression



 = accreditation

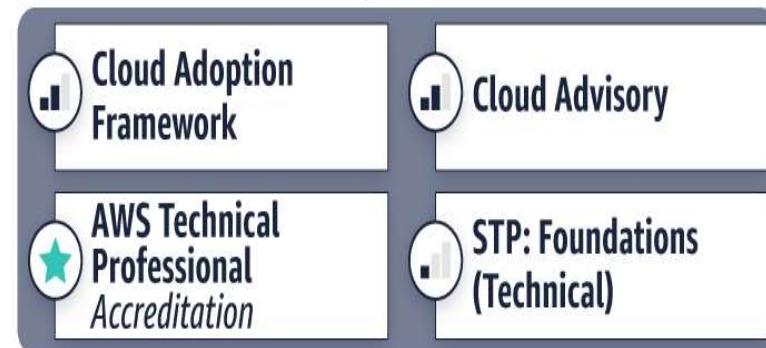
Additional training

 = certification

 = foundational course

 = intermediate course

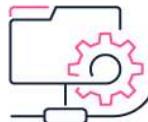
 = advanced course



Additional **Solutions Training for Partners** available by workload or solution

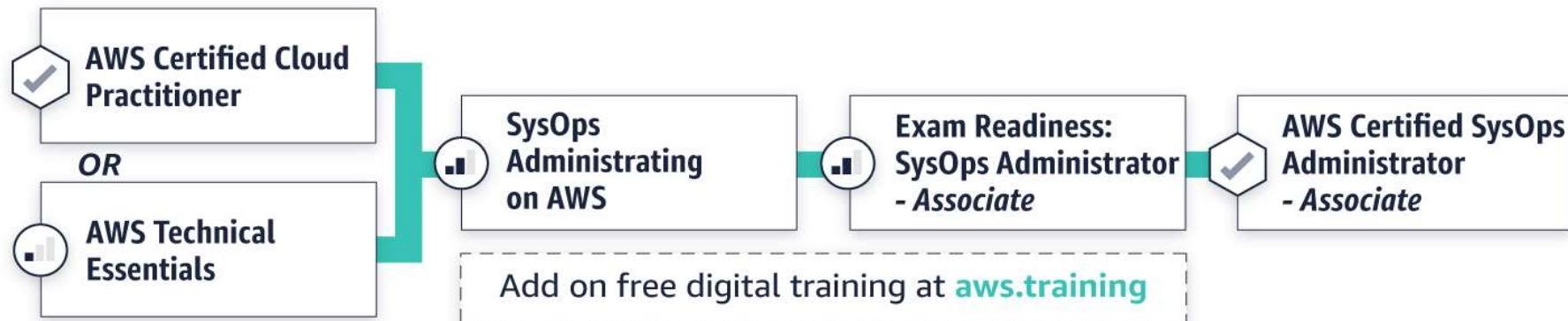
Add on free digital training at aws.training

Operations Learning Paths



AWS Certified SysOps Administrator - Associate

- = foundational course
- = intermediate course
- = advanced course

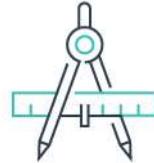


AWS Certified DevOps Engineer - Professional



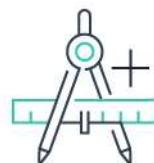
training and
certification

Architect Learning Paths

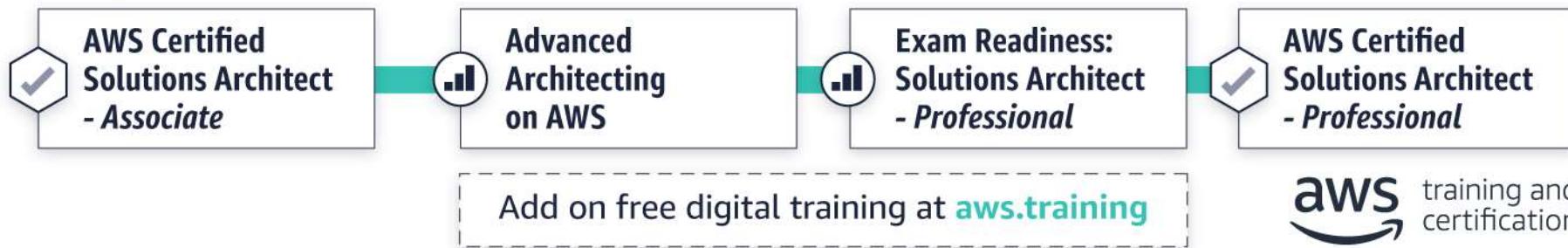


AWS Certified Solutions Architect - Associate

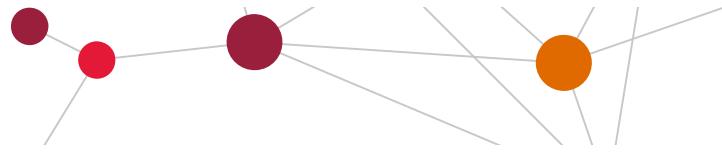
- = foundational course
- = intermediate course
- = advanced course



AWS Certified Solutions Architect - Professional



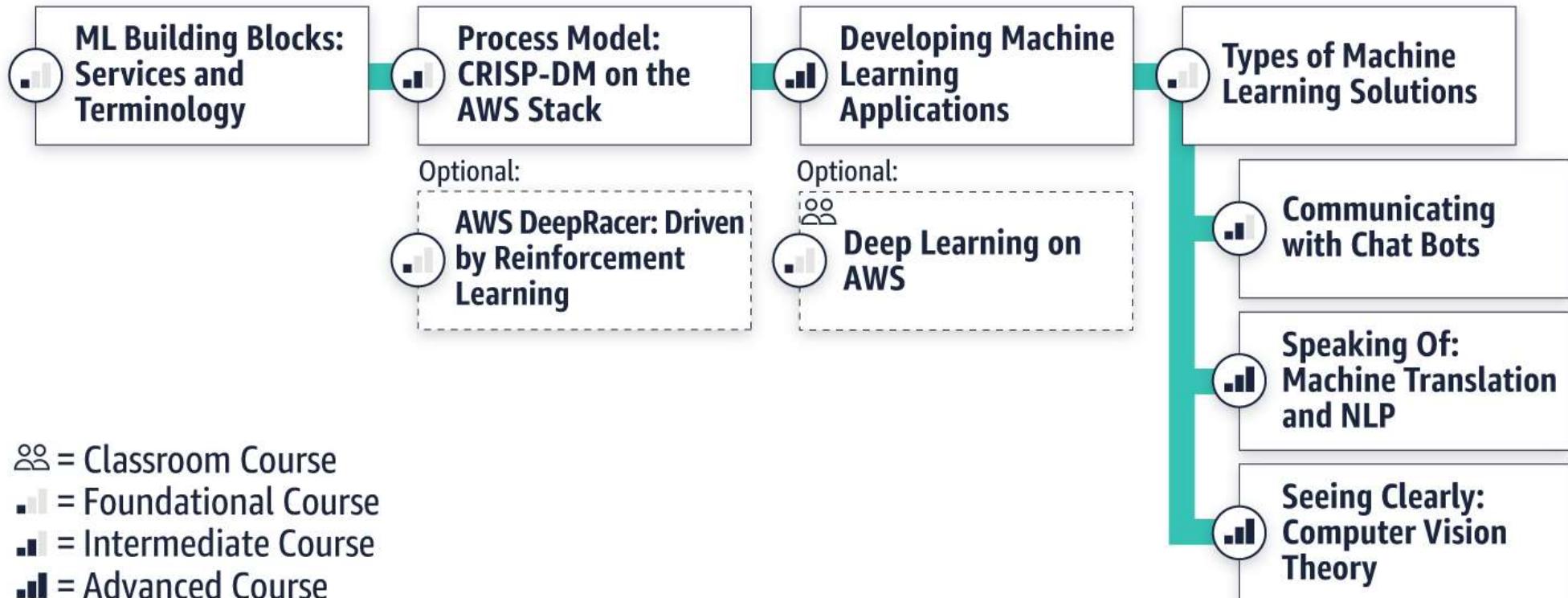
training and
certification



CGI

aws
training and certification

Machine Learning Path: Developer



people = Classroom Course

bar chart = Foundational Course

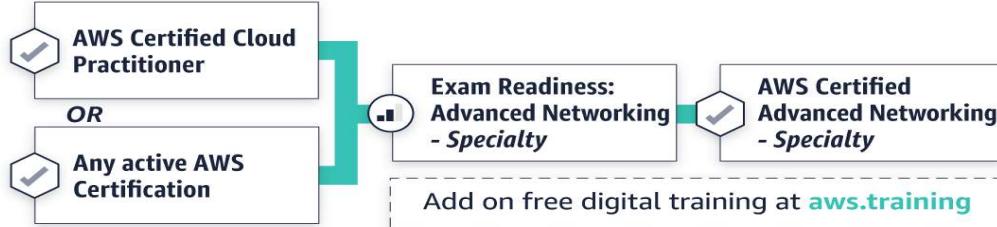
bar chart with 2 bars = Intermediate Course

bar chart with 3 bars = Advanced Course

■ = foundational course
■ = intermediate course
■ = advanced course



AWS Certified Advanced Networking - Specialty

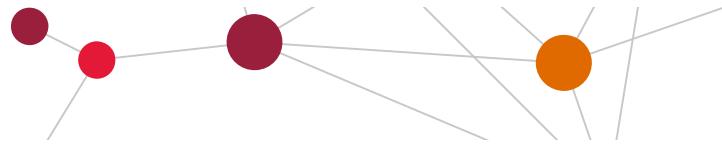


AWS Certified Big Data - Specialty



AWS Certified Security - Specialty

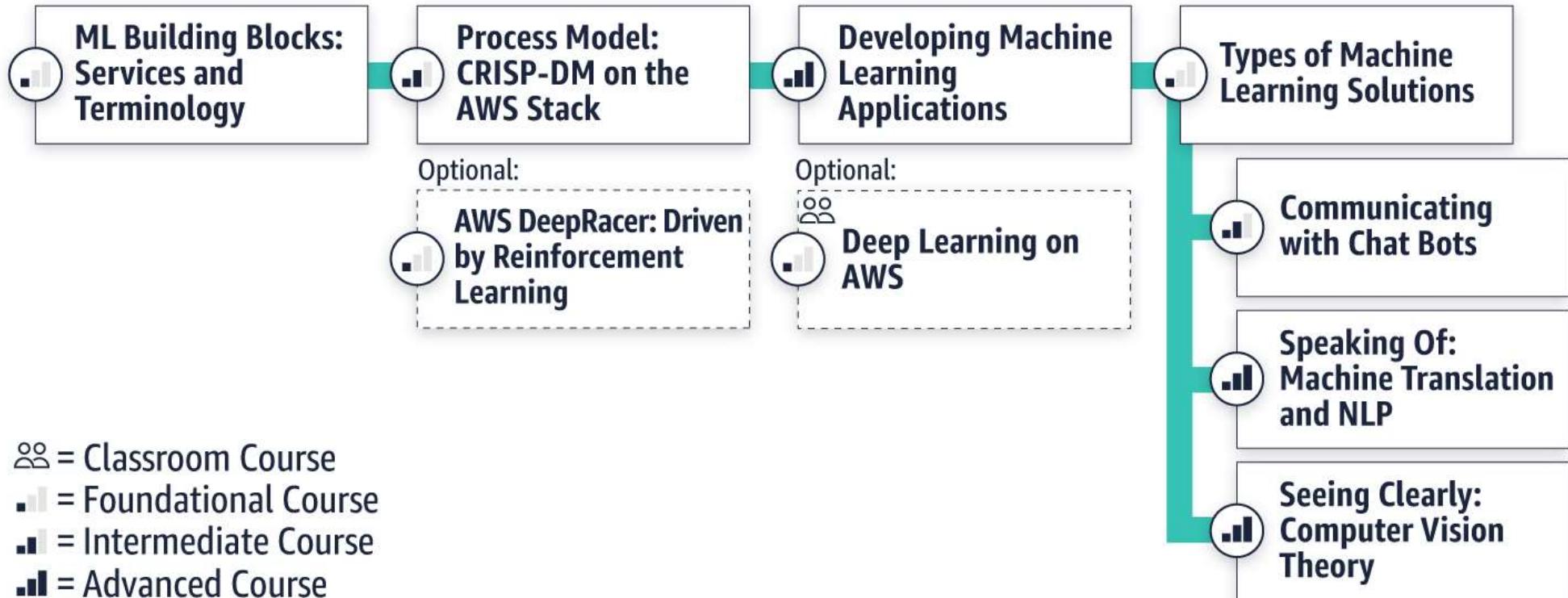


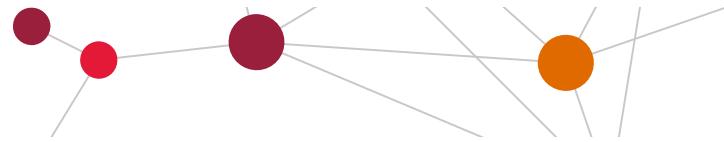


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aws
training and certification

Machine Learning Path: Developer

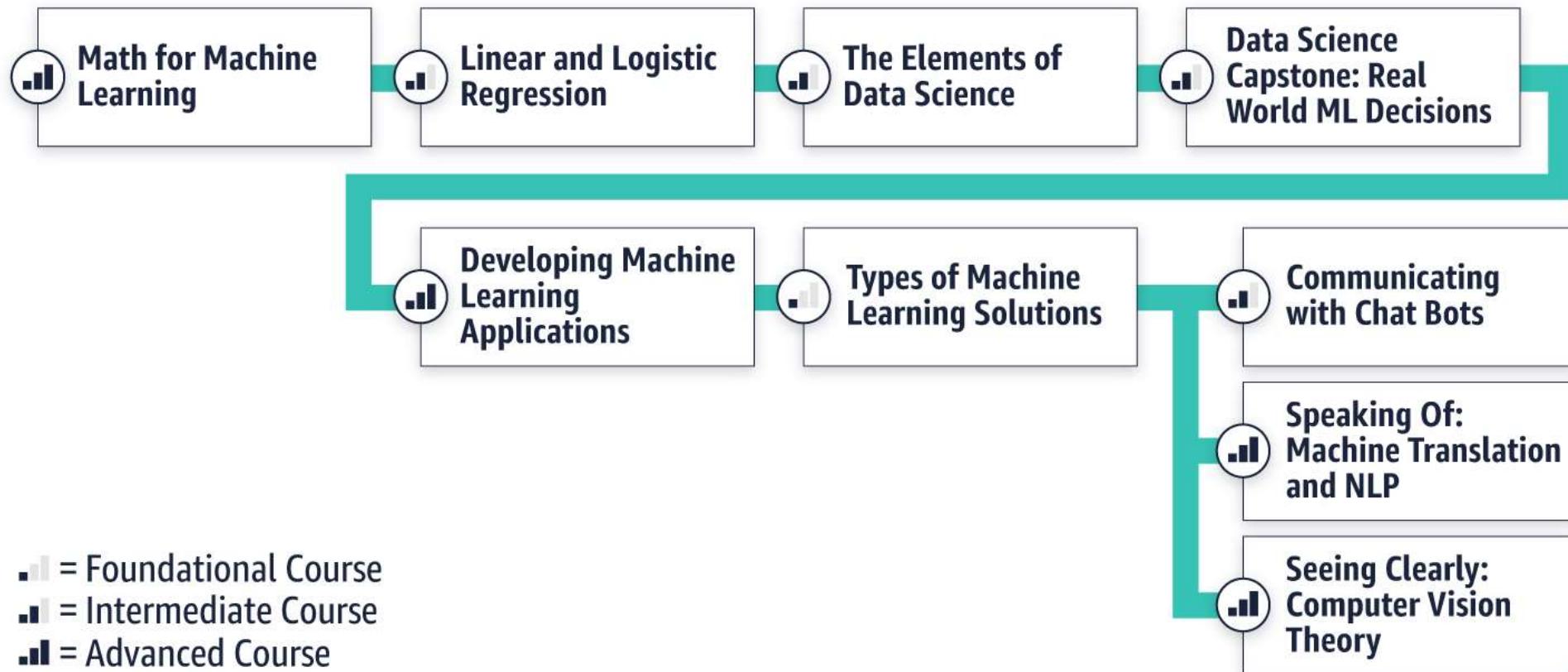




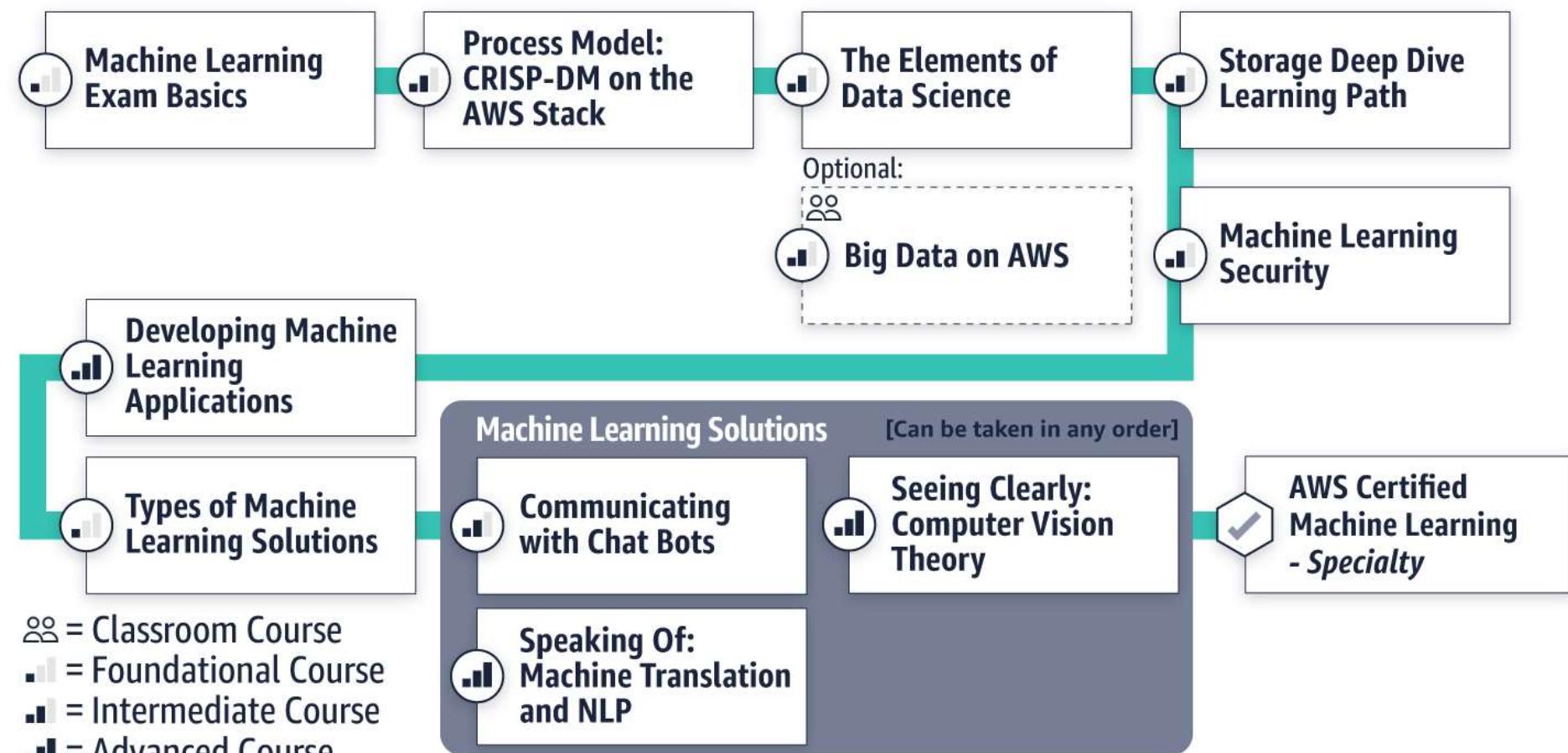
CGI

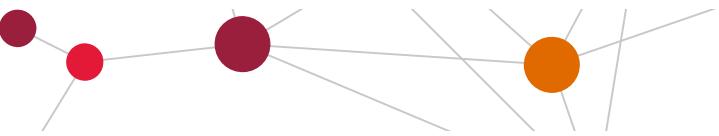
aws
training and certification

Machine Learning Path: Data Scientist

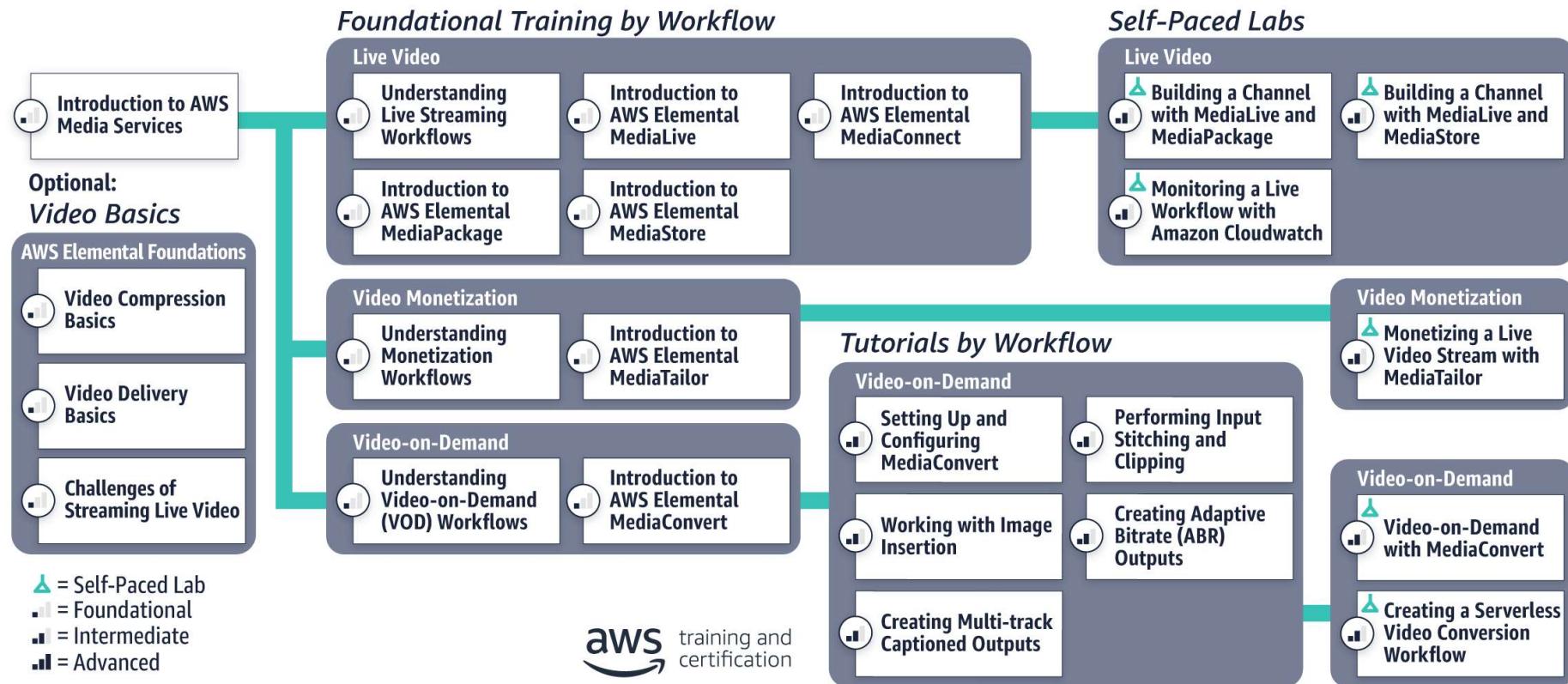


Machine Learning Path: Exam Preparation





AWS Media Services Learning Path



Thank You

aws.amazon.com

