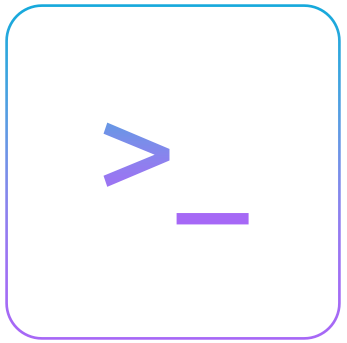
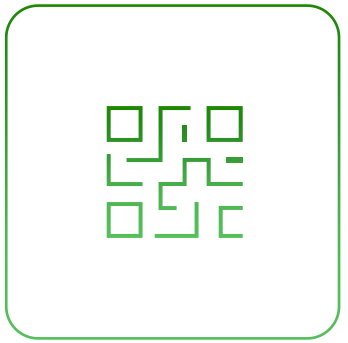
KodeKloud

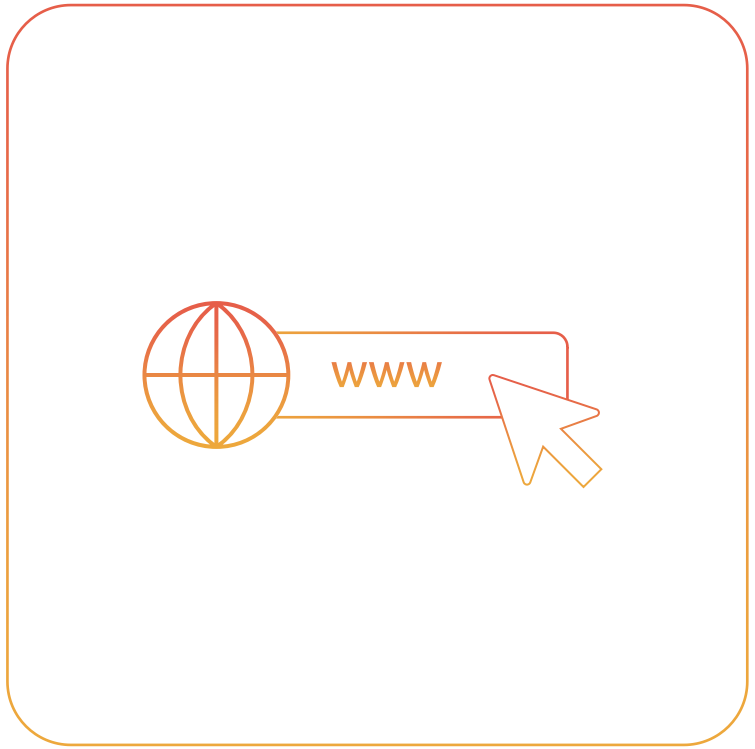
Methods of Deployment

Deployment Methods

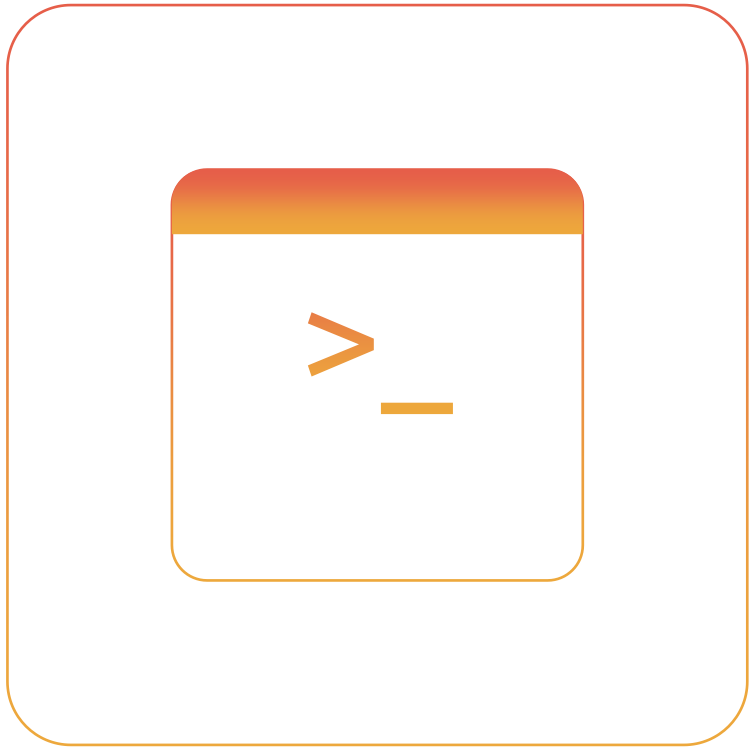




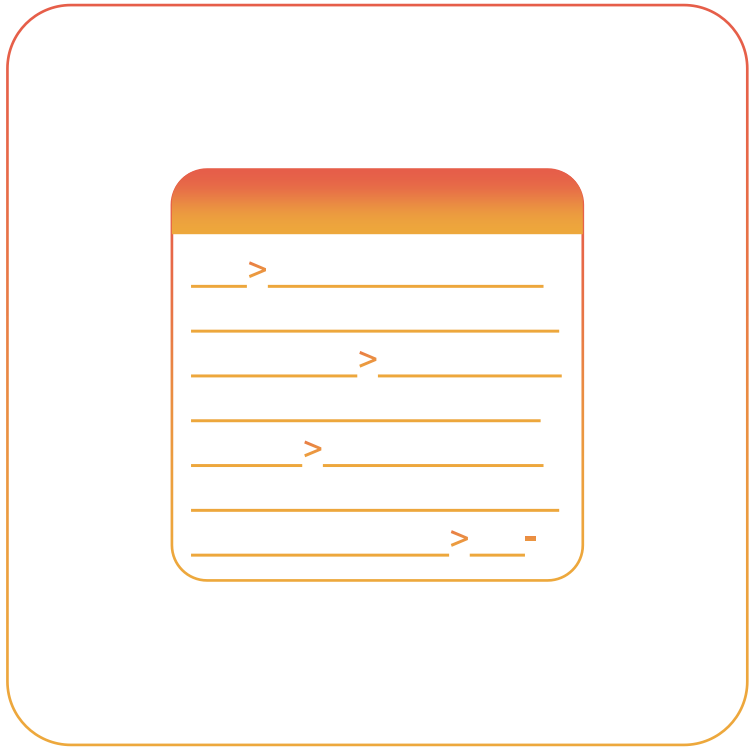
Console



Command Line Interface

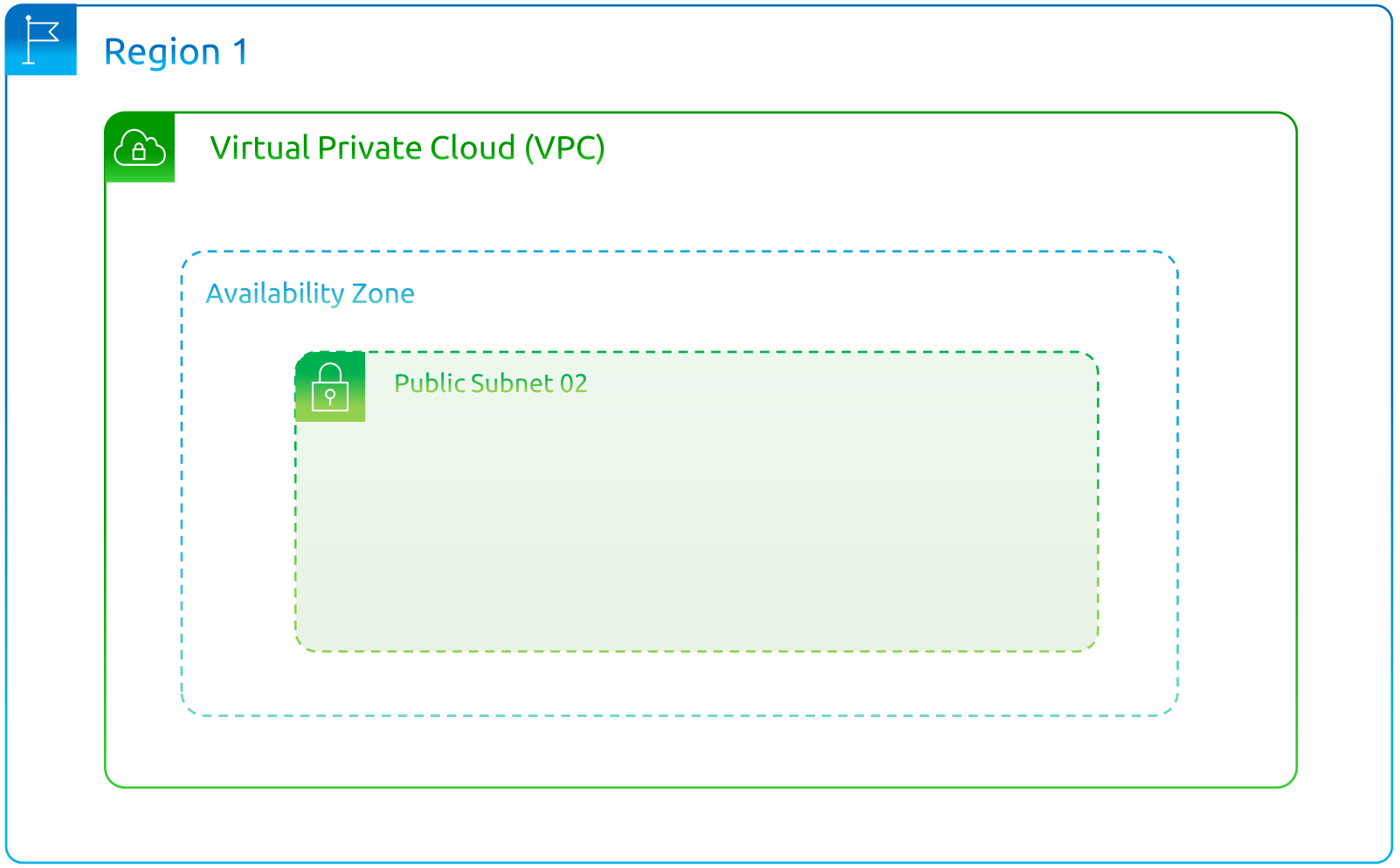


AWS SDK



Global Infrastructure

Global Infrastructure

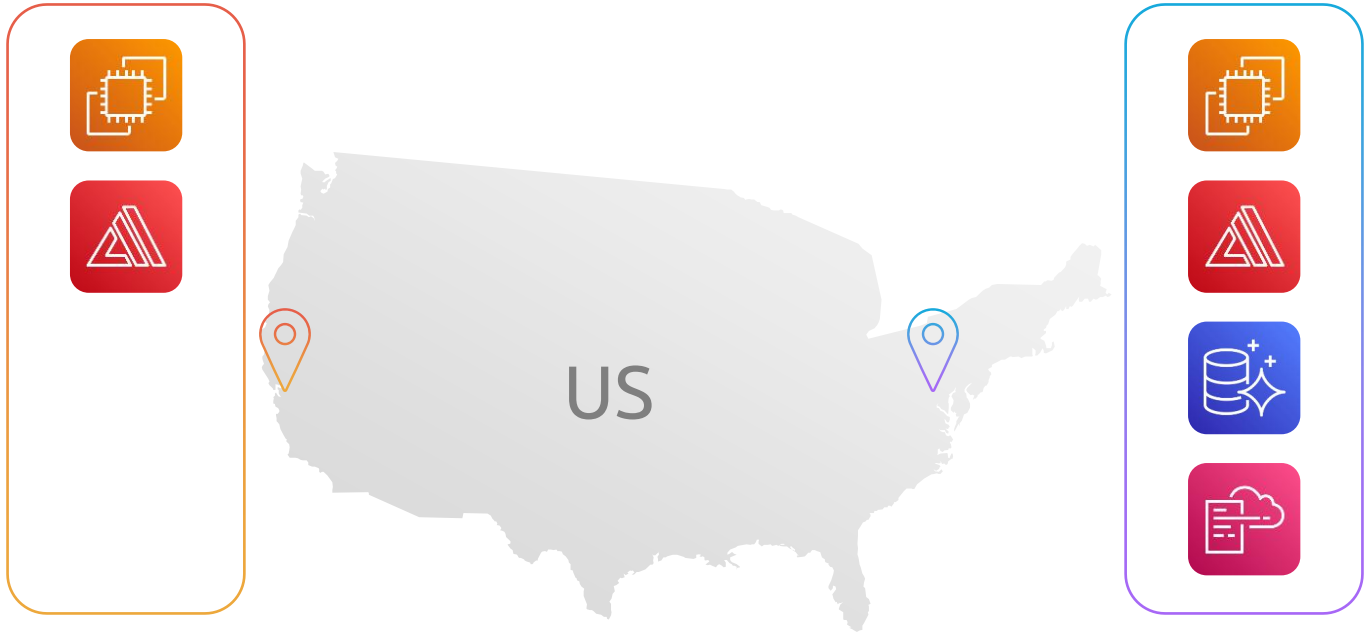


Regions

- An AWS Region is a geographic location where resources can be deployed
- Each region is designed to be isolated from other regions
  - Fault tolerance
  - Stability

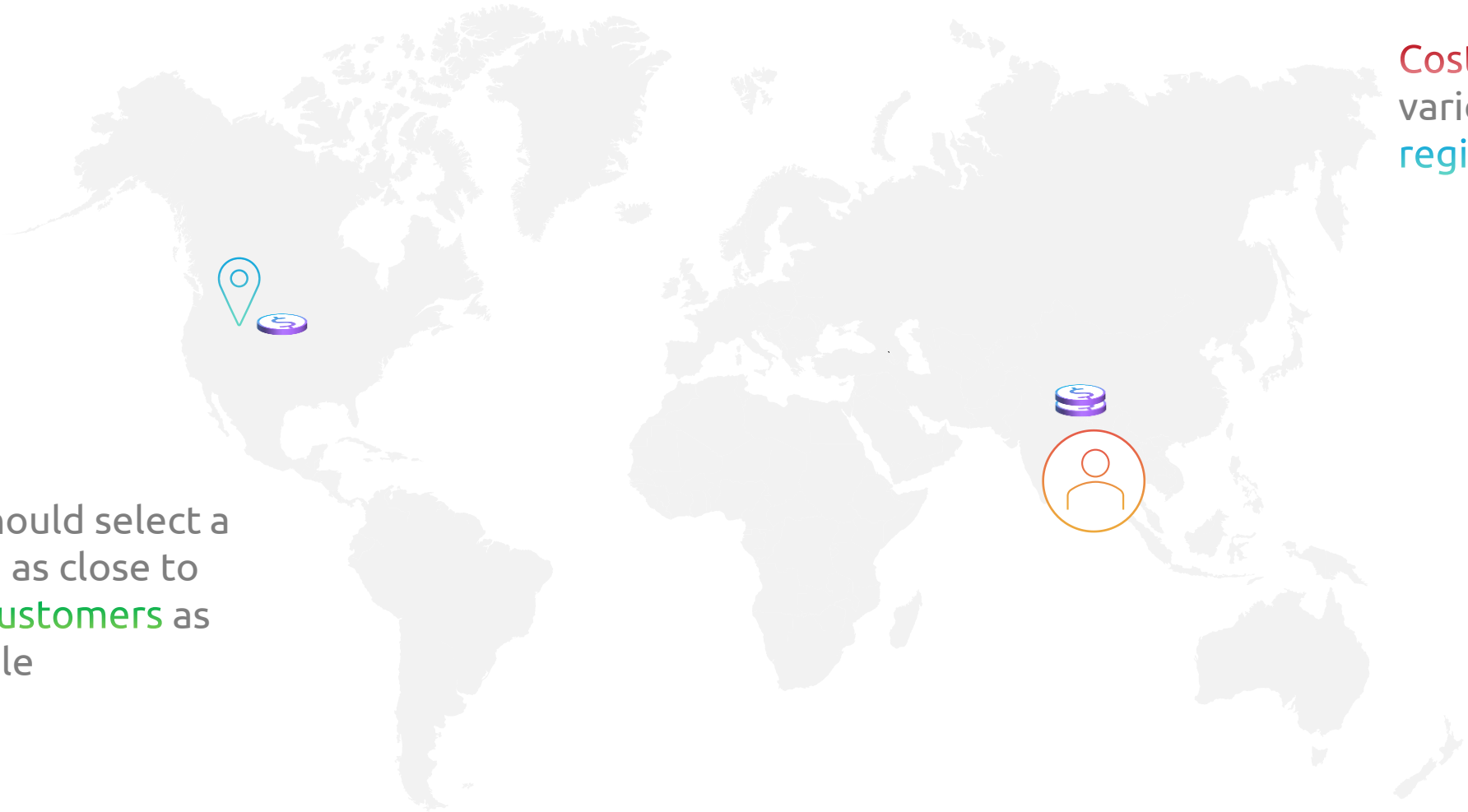
Regions

Selecting a Region



- All regions are not the same
- Not all services are available in all regions
- GovCloud regions designed for U.S. Government and customers who need to meet regulatory and compliance requirements

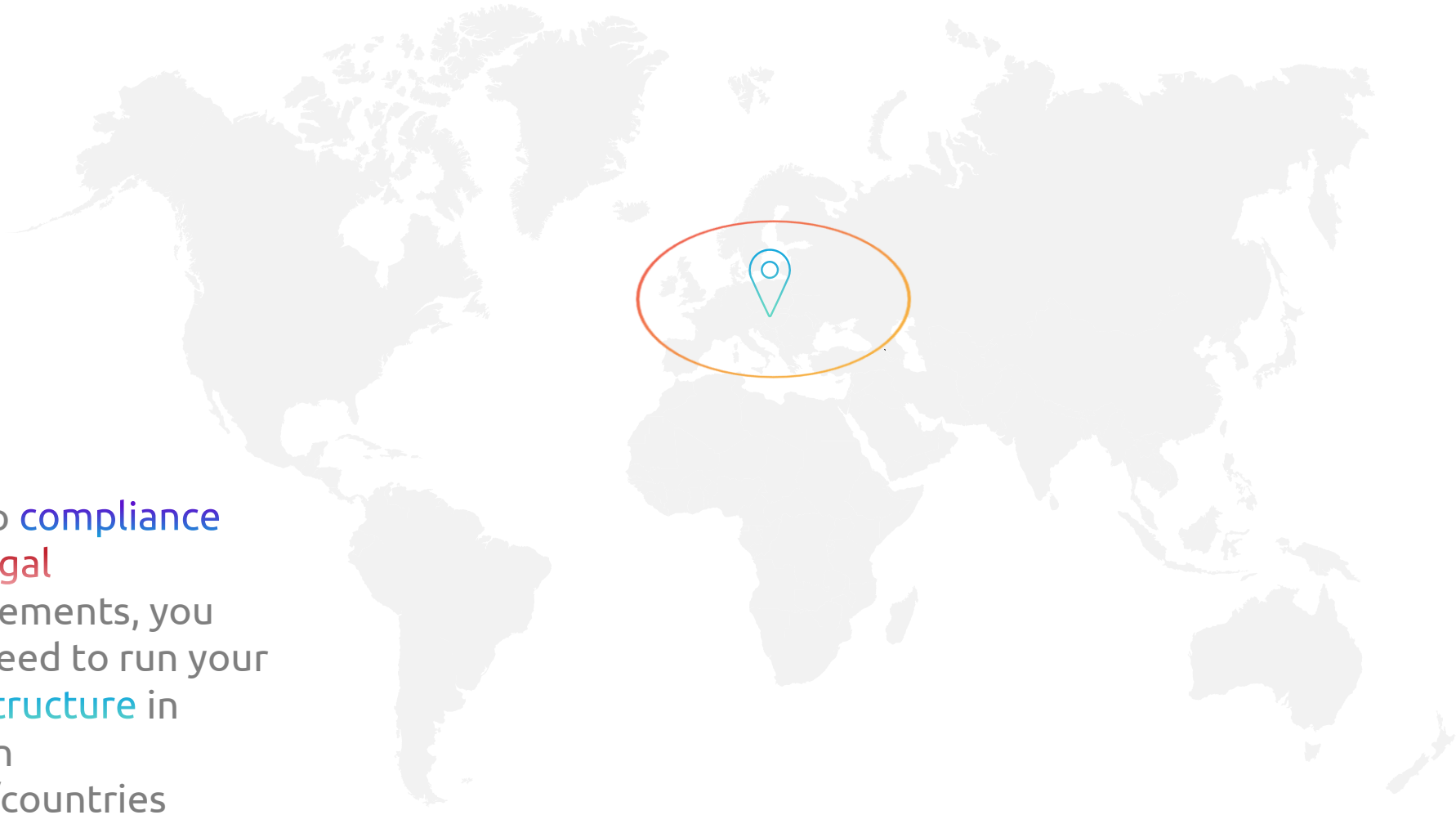
Selecting a Region



Cost of services varies from region to region

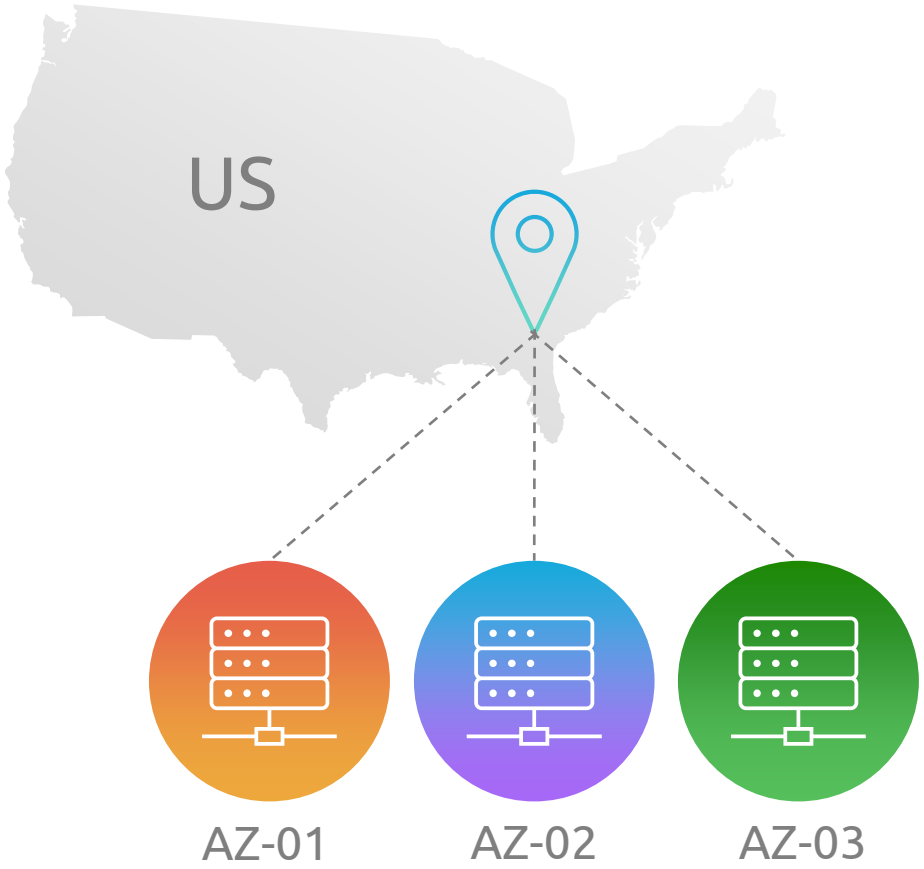
You should select a region as close to your customers as possible

Selecting a Region



Due to compliance and legal requirements, you may need to run your infrastructure in certain areas/countries

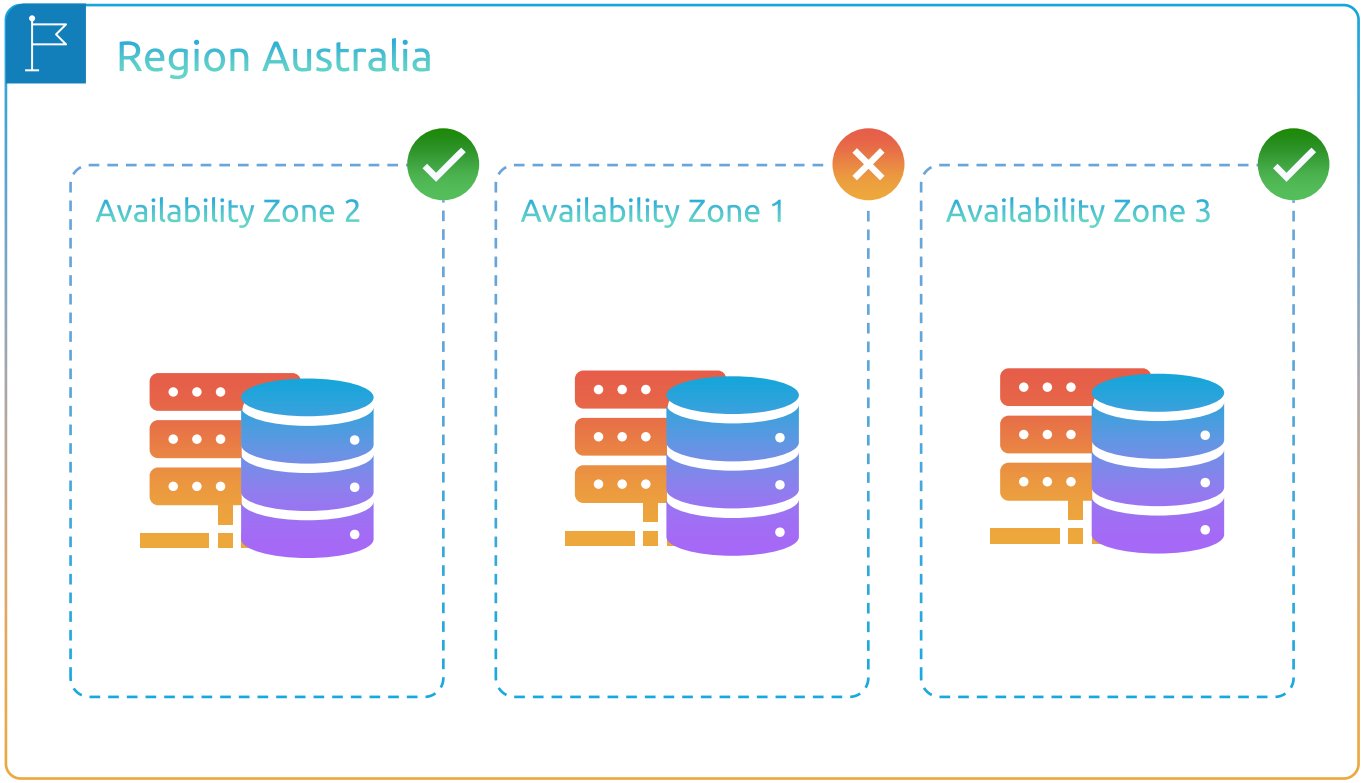
Availability Zones (AZ)



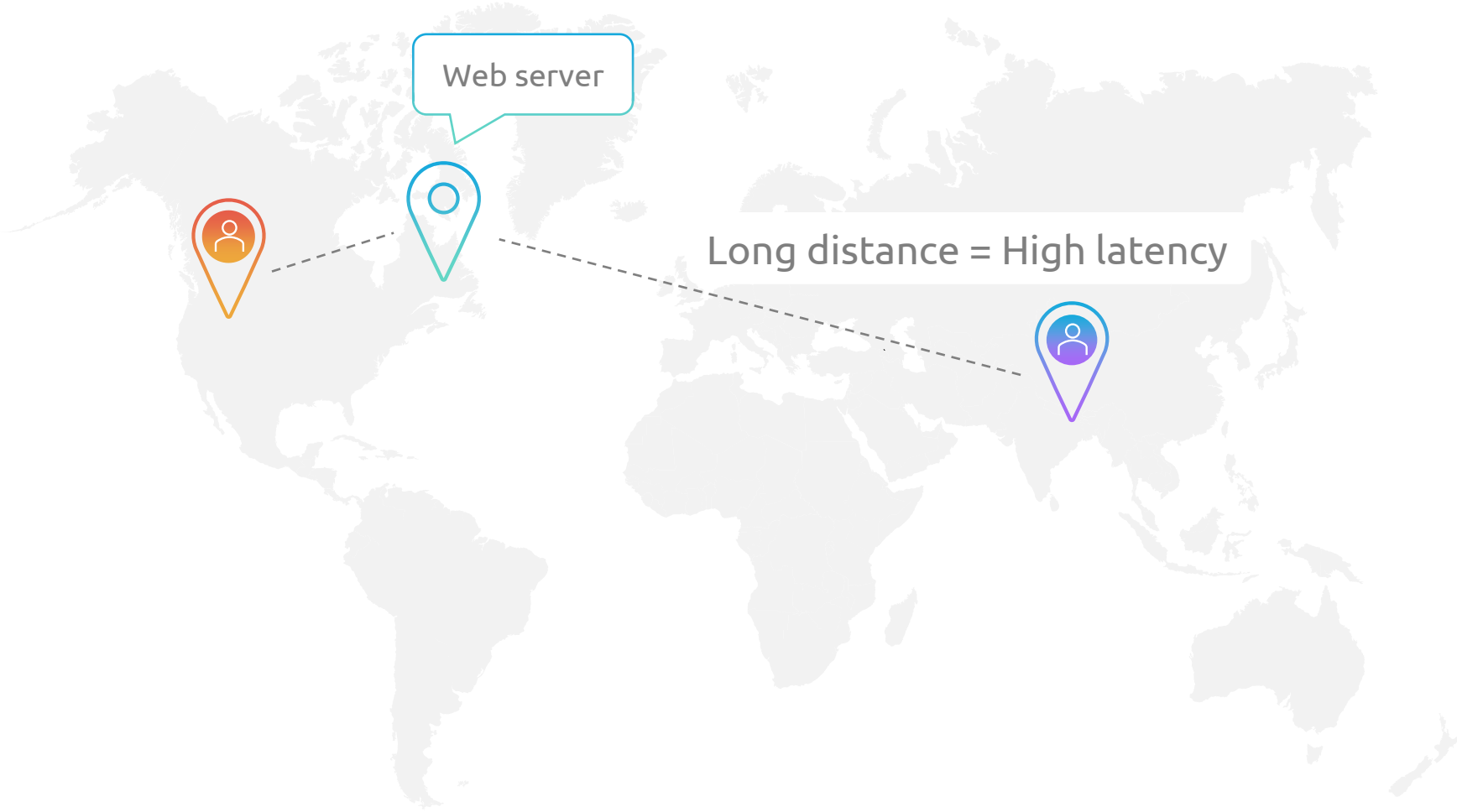
- Within a region, there are multiple availability zones
- An Availability Zone (AZ) is one or more discrete data centers with redundant power, networking, and connectivity in an AWS region
- Availability zones provide redundancy within a region

Availability Zones (AZ)

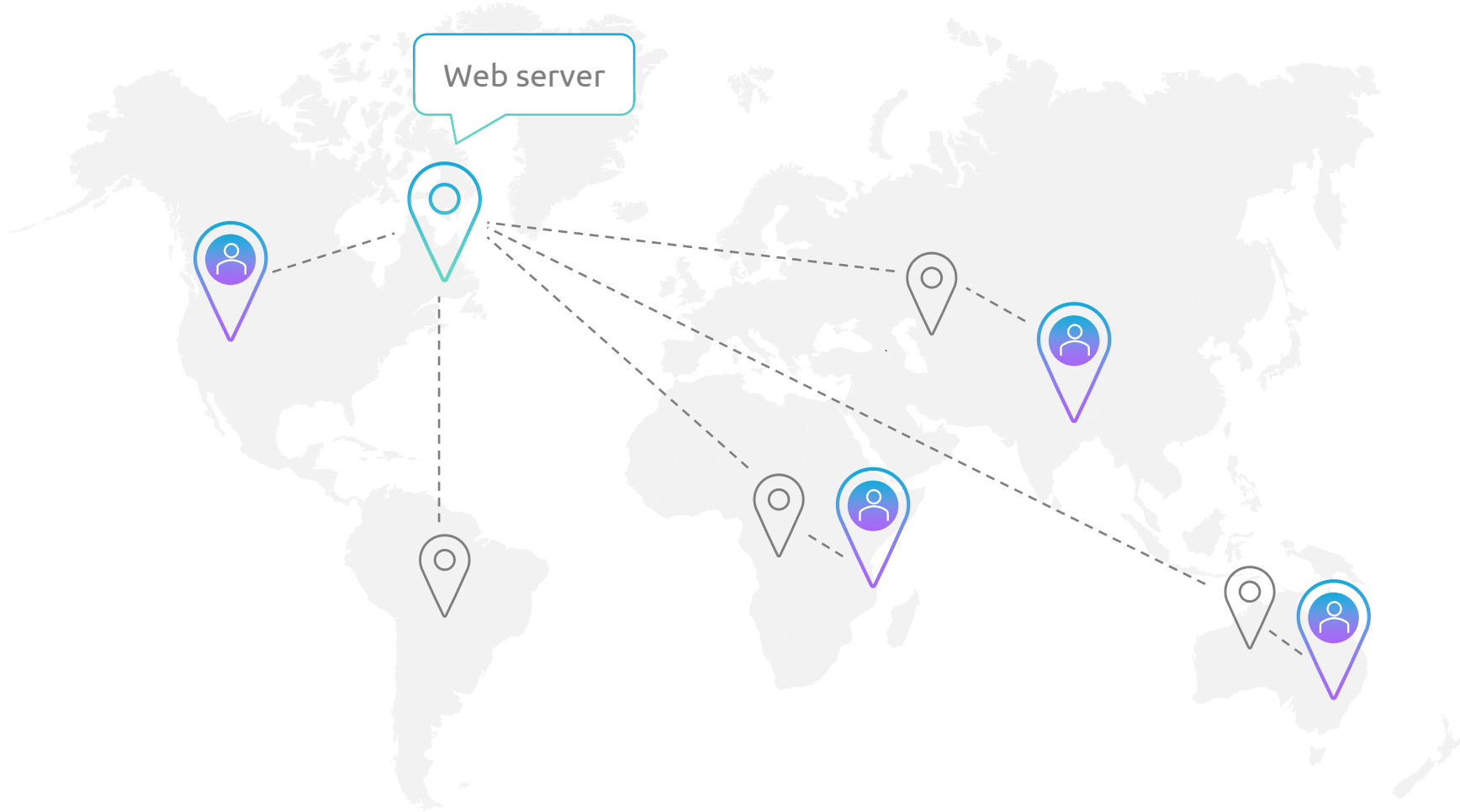
If you have an application deployed in only one AZ, then the entire region is affected in case of a failure in that AZ



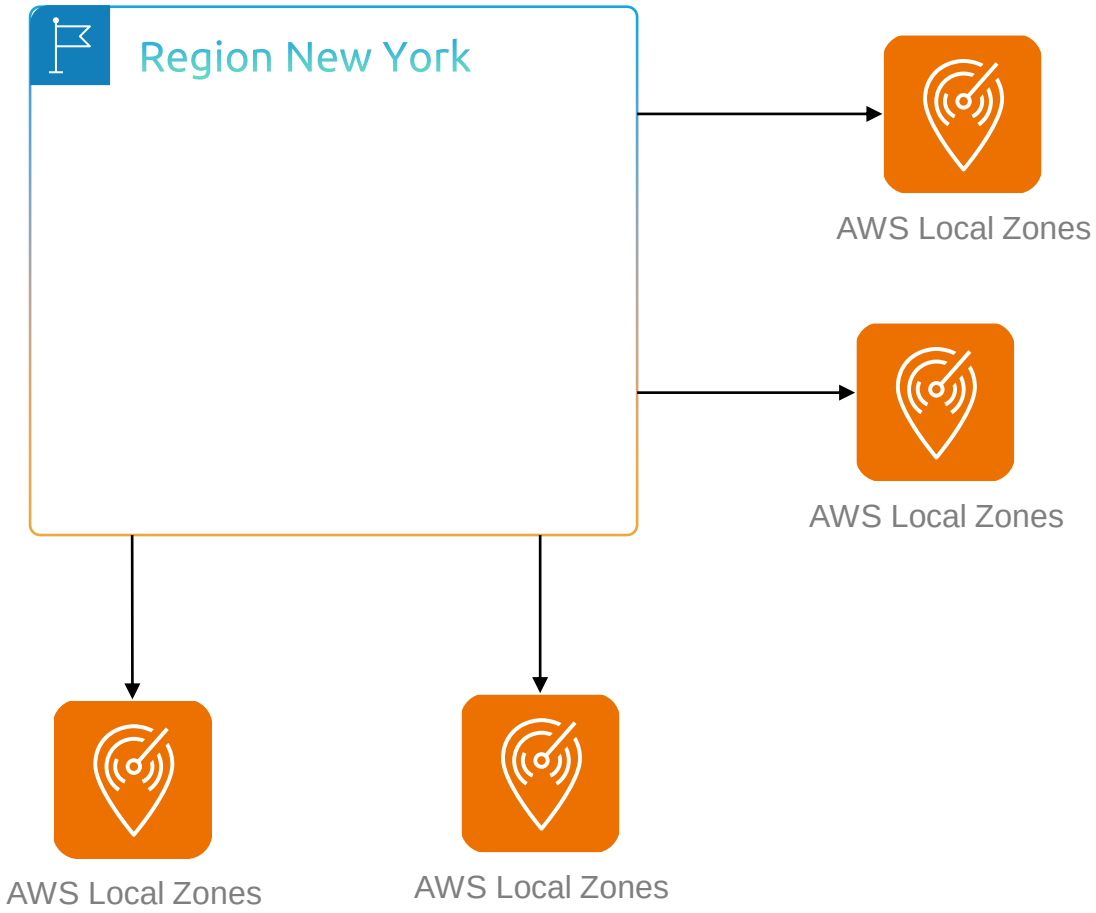
Global Content Delivery & Edge Locations



Global Content Delivery & Edge Locations

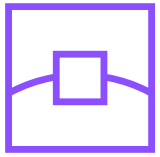


Local Zones



- Local Zones are extensions of an AWS Region
- Local Zones allow you to use select AWS services, like compute, and storage closer to end-users
- Local Zones provide high-bandwidth, secure connection to parent AWS region
- Great for low latency applications like real-time gaming, live streaming, and virtual workstations for the local city

Edge Locations vs Local Zones



Edge location

AWS Local Zones

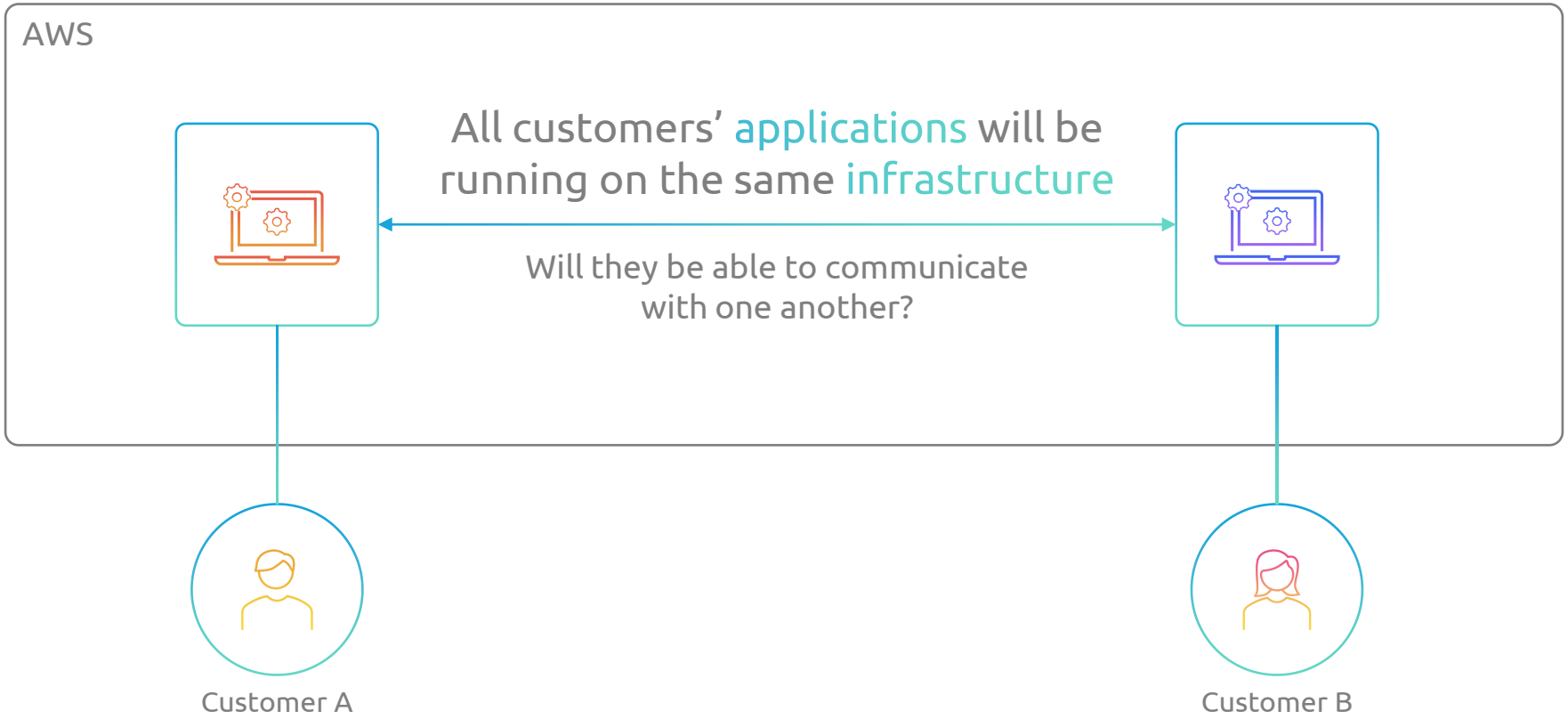
- Both help get services closer to end-users to improve user experience and minimize latency
- Local Zones are extensions of a regions physically located in major cities across the world
- Local Zones have their own isolated infrastructure but are connected to the parent AWS region through a high bandwidth network link
- Local Zones Provides access to subset of services like EC2 & EBS
- Edge Locations are small geographically dispersed compute sites that primarily support services like CloudFront(content delivery network), Route 53, AWS WAF
- Edge Locations are limited to mostly CDN services and do not provide full compute services
- There are hundreds of Edge Locations as they are not full sized datacenters; there are over 20+ local zones

Global Infrastructure - Summary

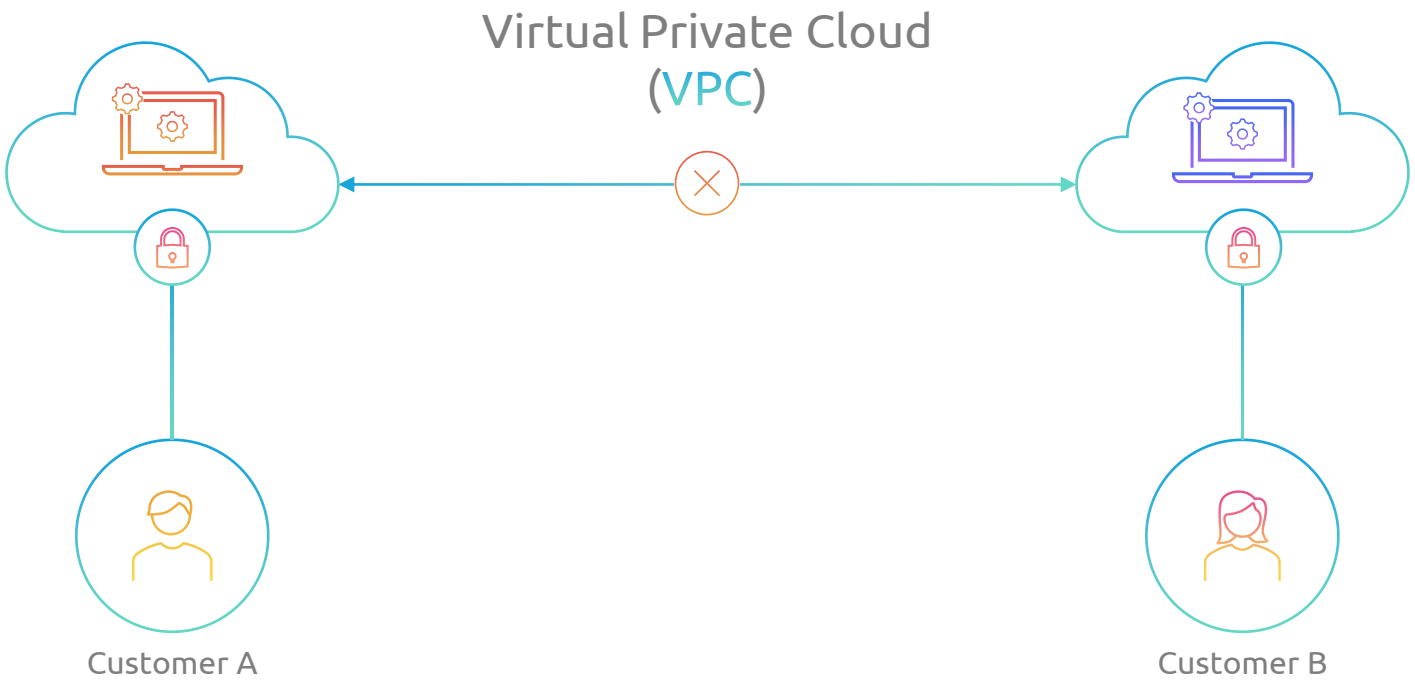
- Regions are locations to which certain services can be deployed
- Not all services are available in all Regions
- Availability Zones (AZ) are isolated and independent datacenters inside Regions
- Edge locations are smaller Points of Presence where services are run closer to customers
- Local Zones are extensions of AWS regions located near users in select metropolitan areas

Core AWS Services
Networking

AWS Networking



AWS



What Is a VPC?

Virtual private cloud (VPC) is a secure, isolated network segment hosted within AWS

VPC isolates computing resources from other computing resources available in the cloud

It gives the customer full control of the networking in the cloud

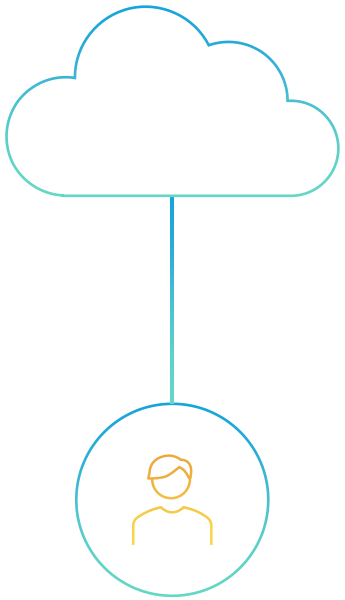
Subnetting (IP address)

Routing (Route tables)

Firewalls
(NACLs and Security groups)

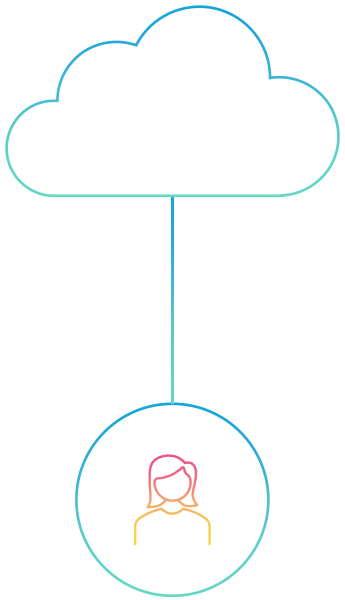
Gateways

One VPC per Customer?



Customer A

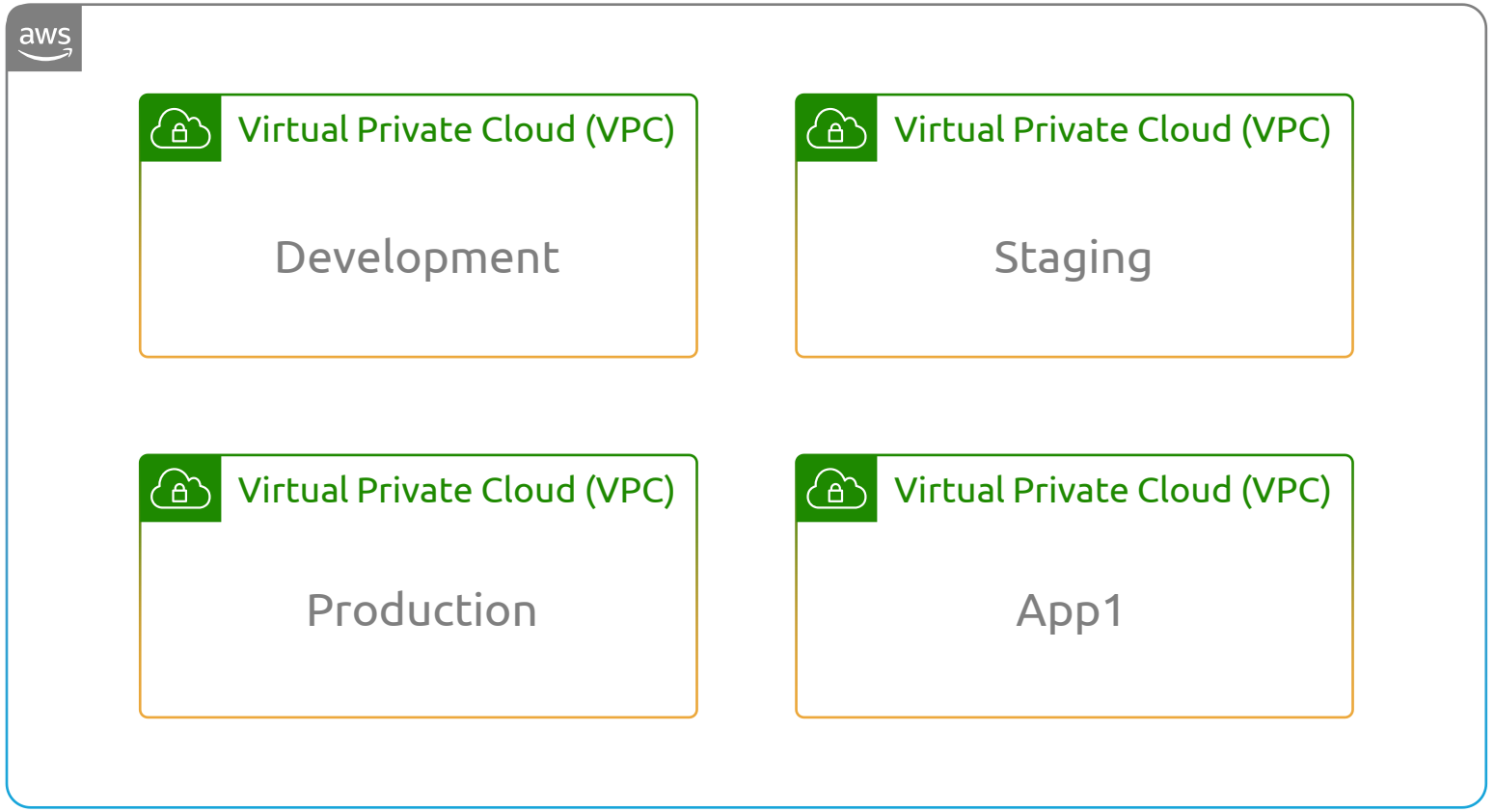
Does that mean every customer gets one VPC?



Customer B

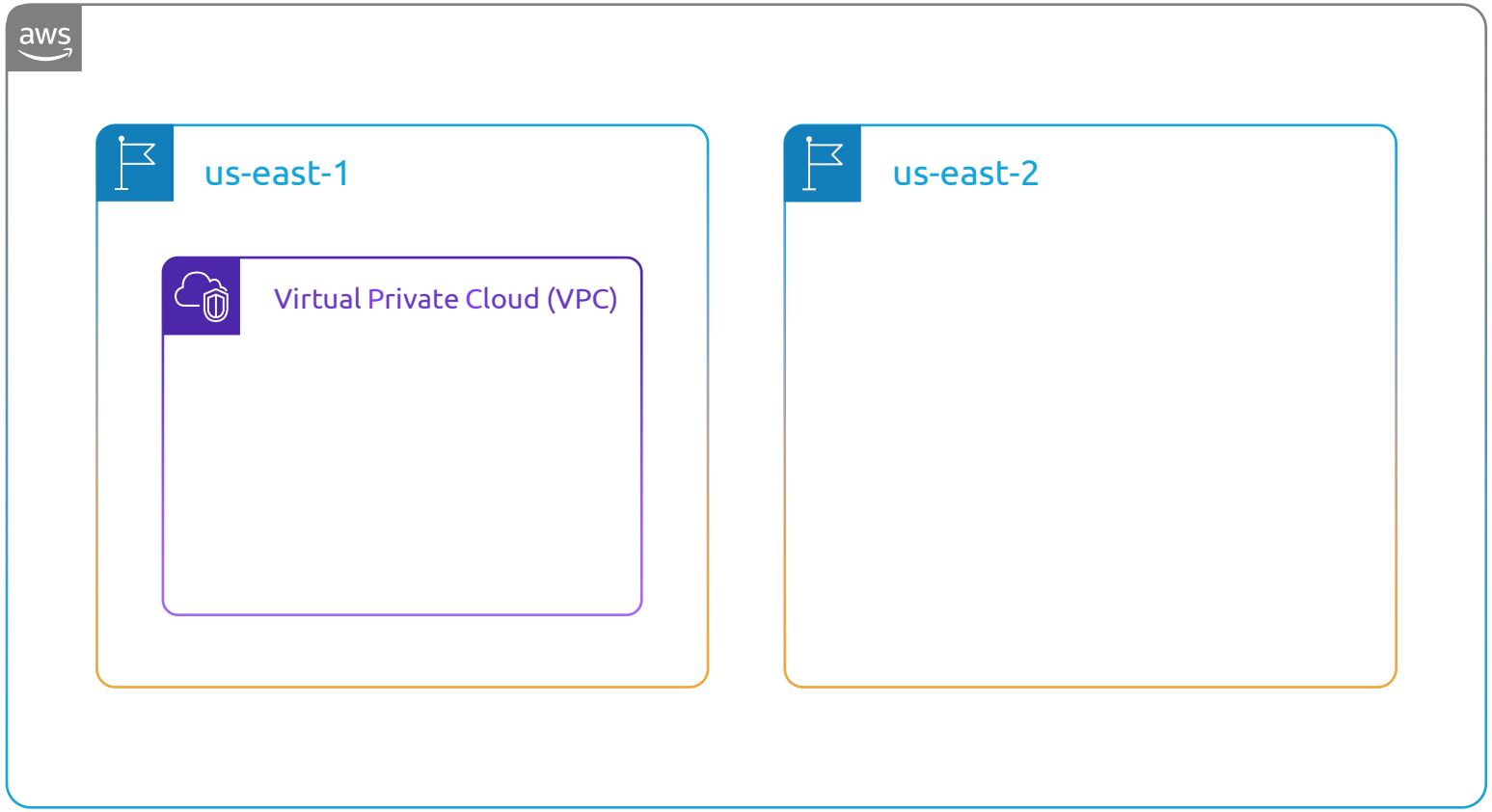
Multiple VPCs

Customer A



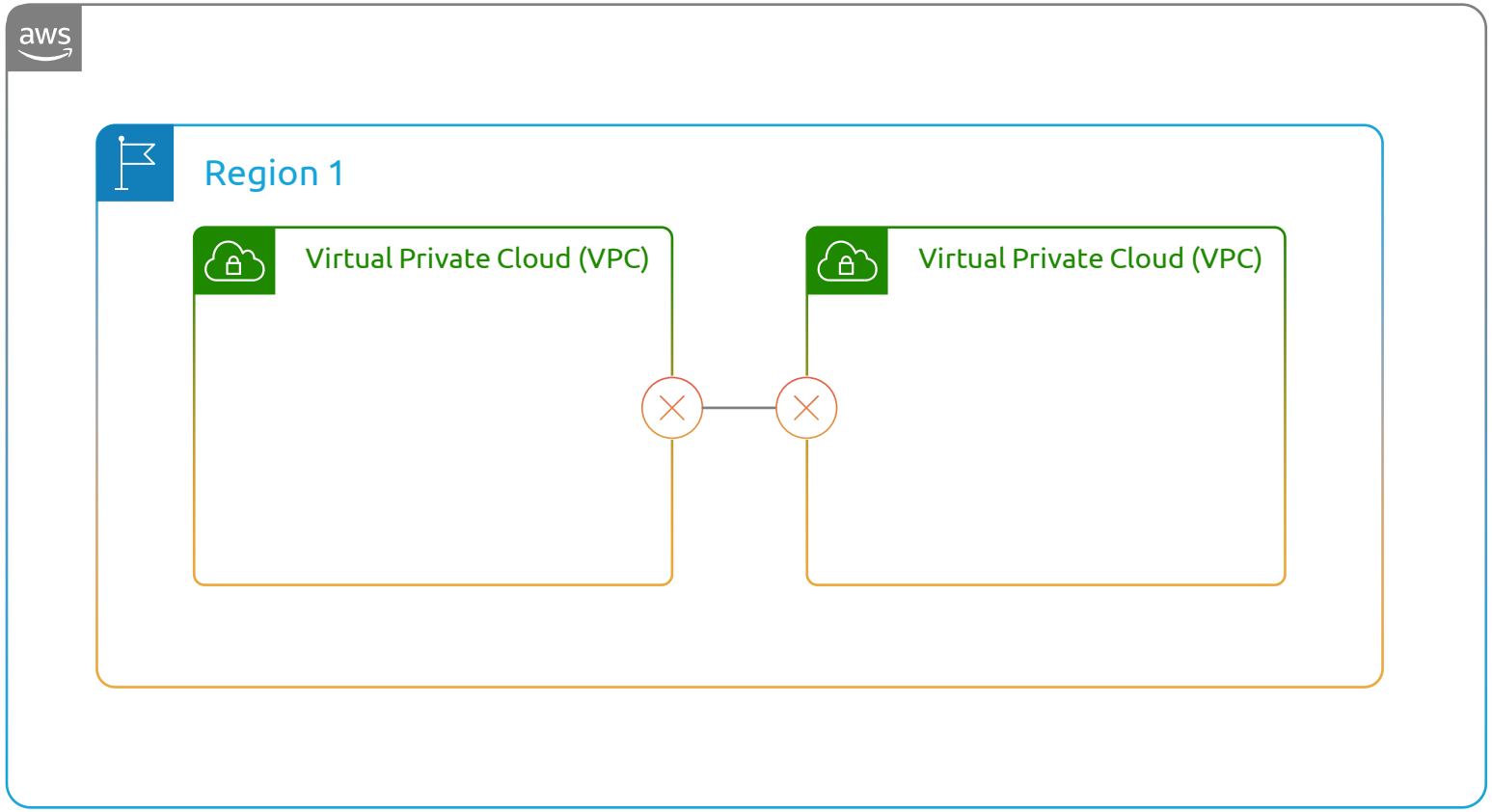
VPCs and Regions

A VPC is specific to a single region



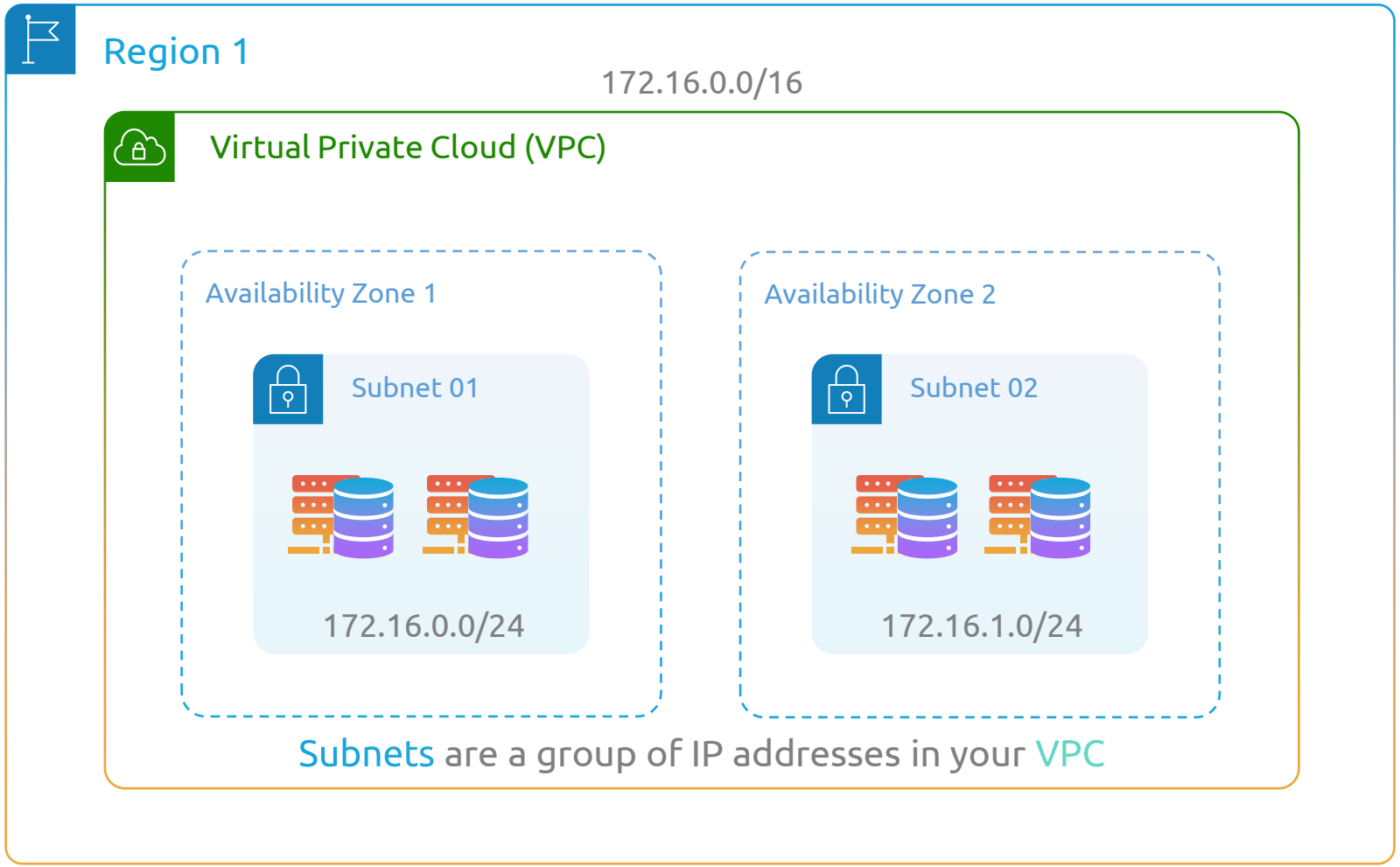
VPC

VPC acts as a network boundary



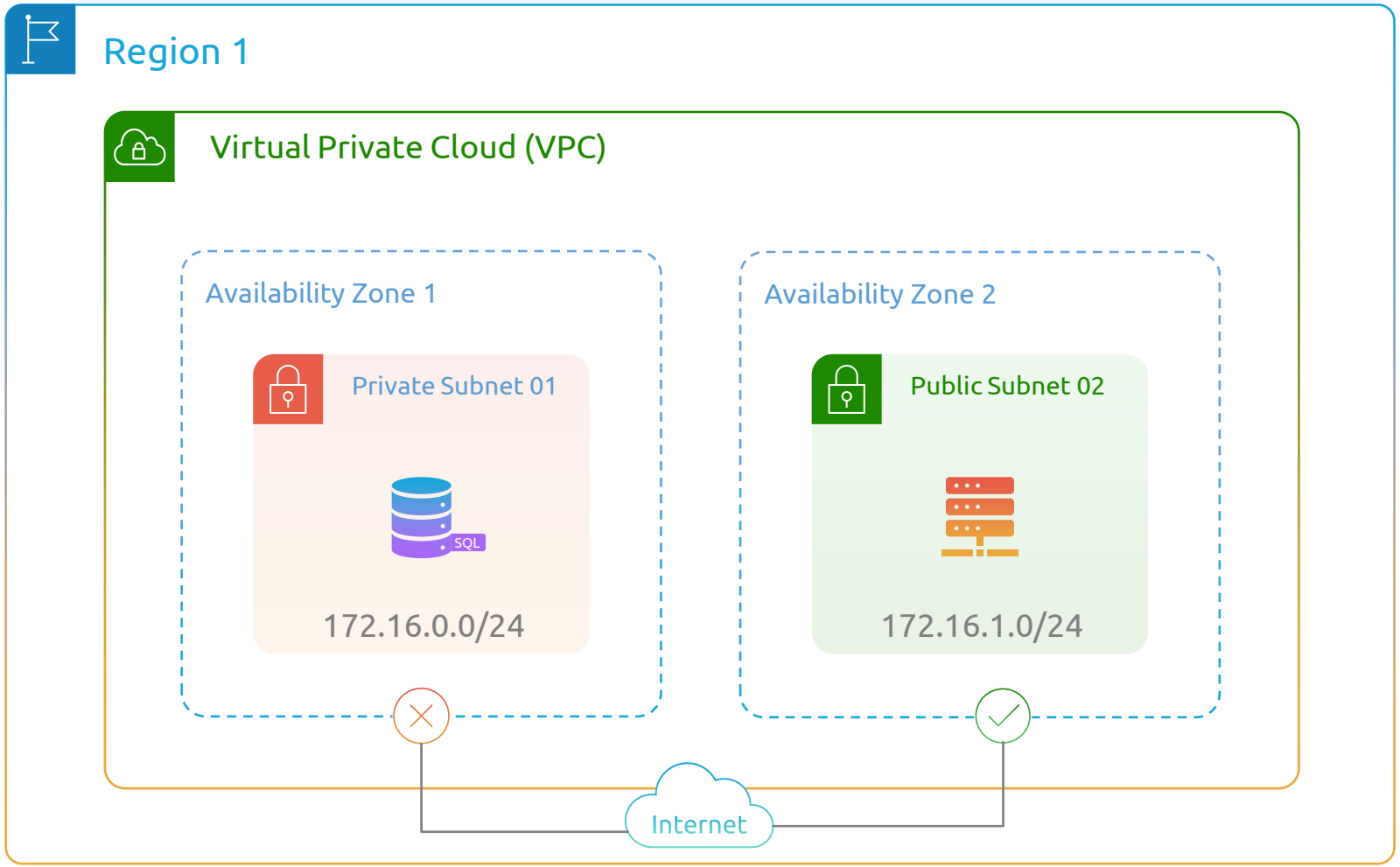
Subnets

A subnet resides within a single availability zone



Subnets

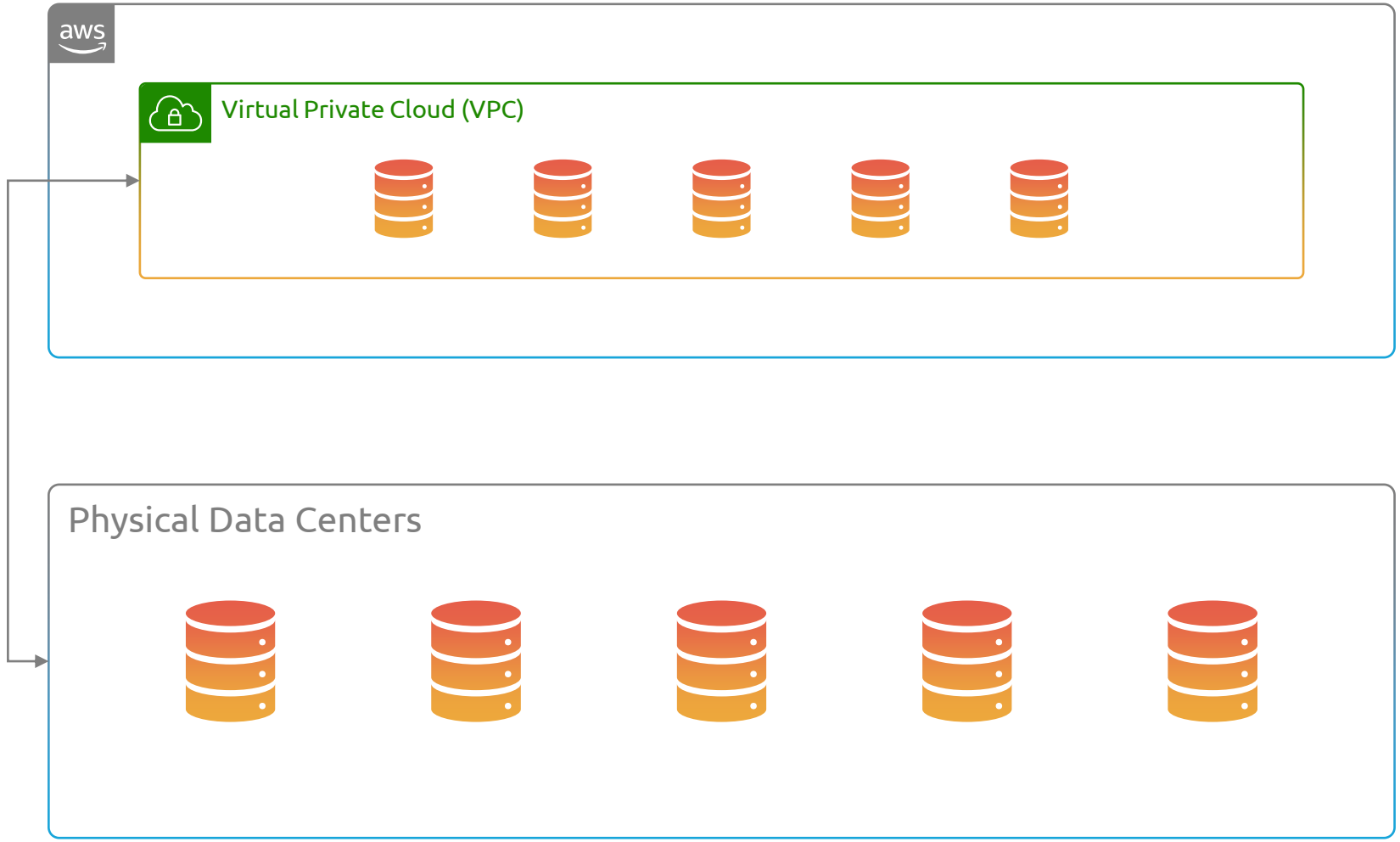
Subnets can be made public or private to allow external access to resources within them



VPC

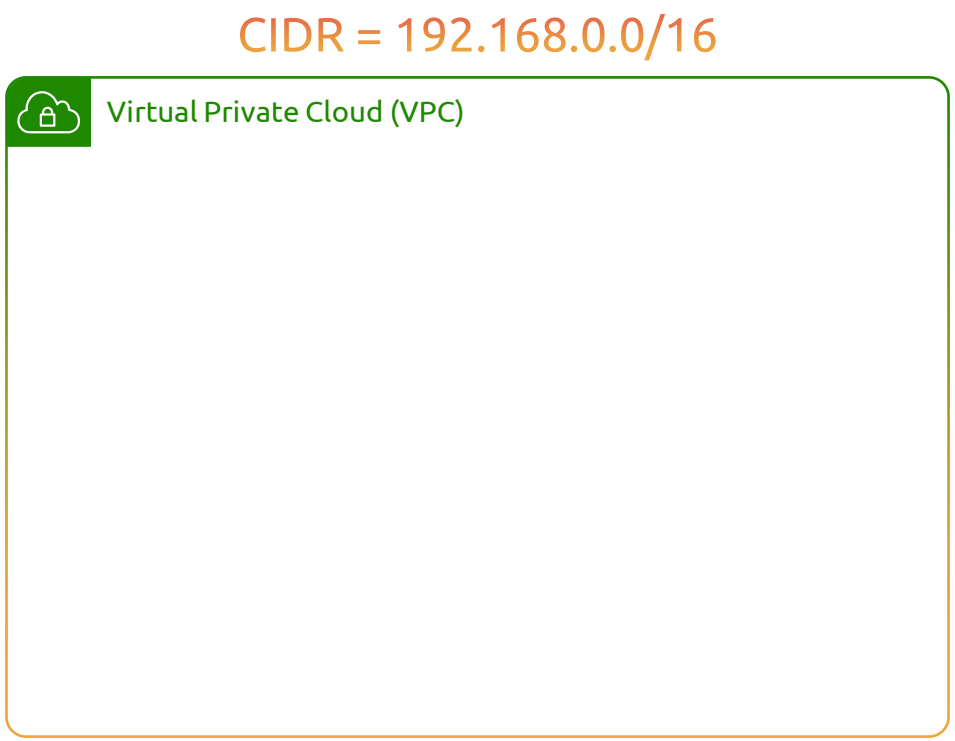
VPN can be used to connect physical data center to your VPC

AWS cloud acts as an extension of your data center



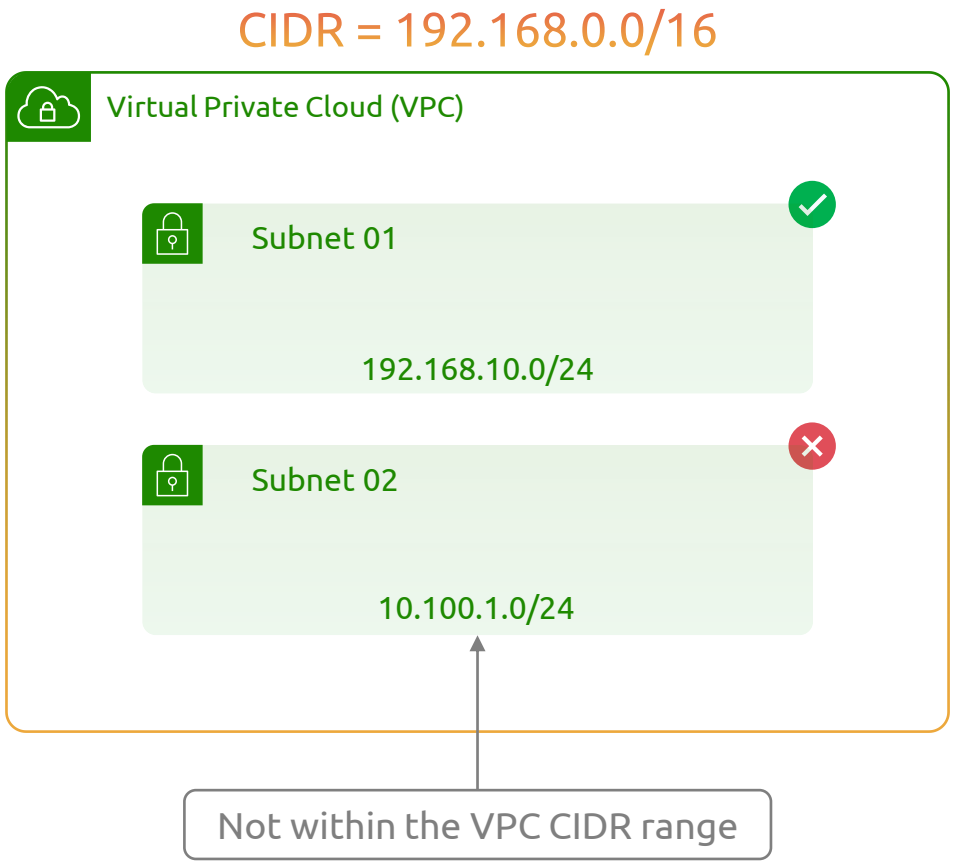
VPC

- Every VPC has a range of IP addresses assigned to it called the CIDR block
- A CIDR block defines the IP addresses that resources in the VPC can use
- A CIDR block size can be anywhere from a /16 to a /28
- 192.168.0.0/16:
  192.168.0.0 – 192.168.255.255



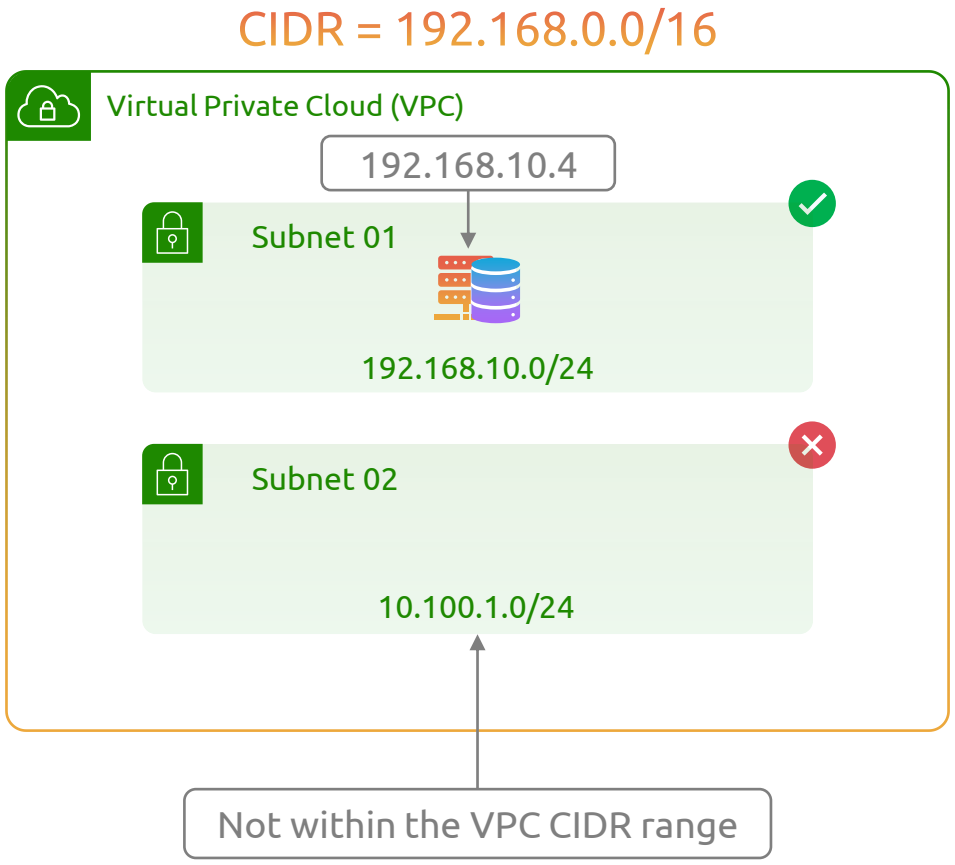
VPC

- Subnets within a VPC must be within the CIDR range
- Subnet block size must be between a /16 and a /28



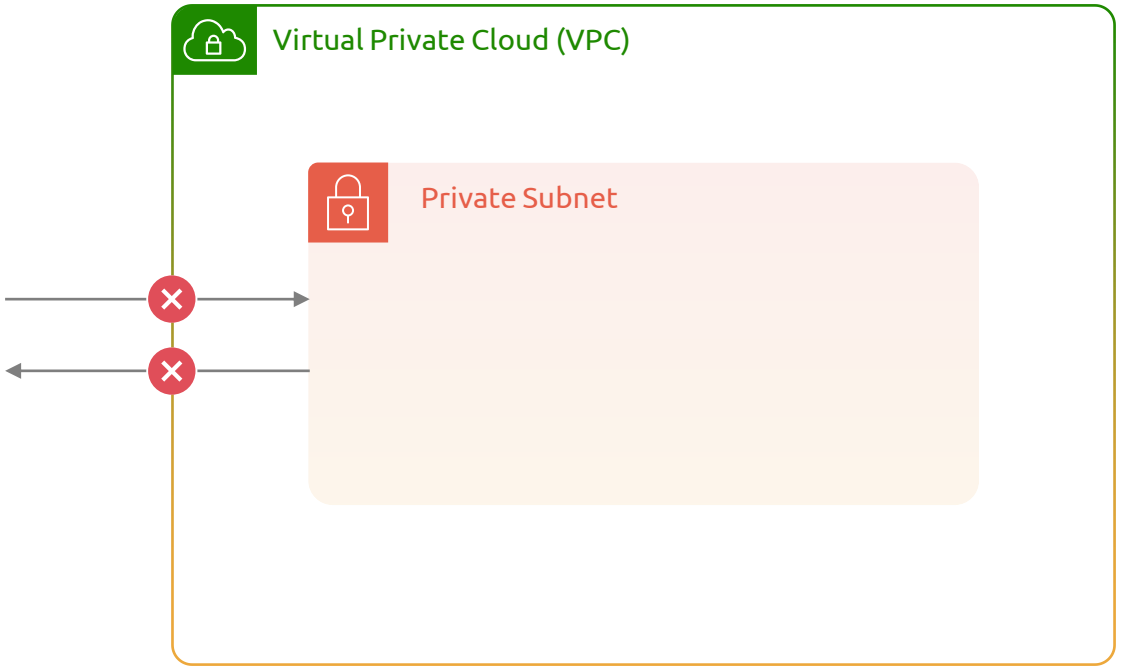
VPC

- The first 4 IP addresses of a subnet are reserved and cannot be used
  - 192.168.10.0: Network address
  - 192.168.10.1 – 192.168.10.3: Reserved for AWS
- The last IP address of a subnet is reserved as the broadcast address
  - 192.168.10.255



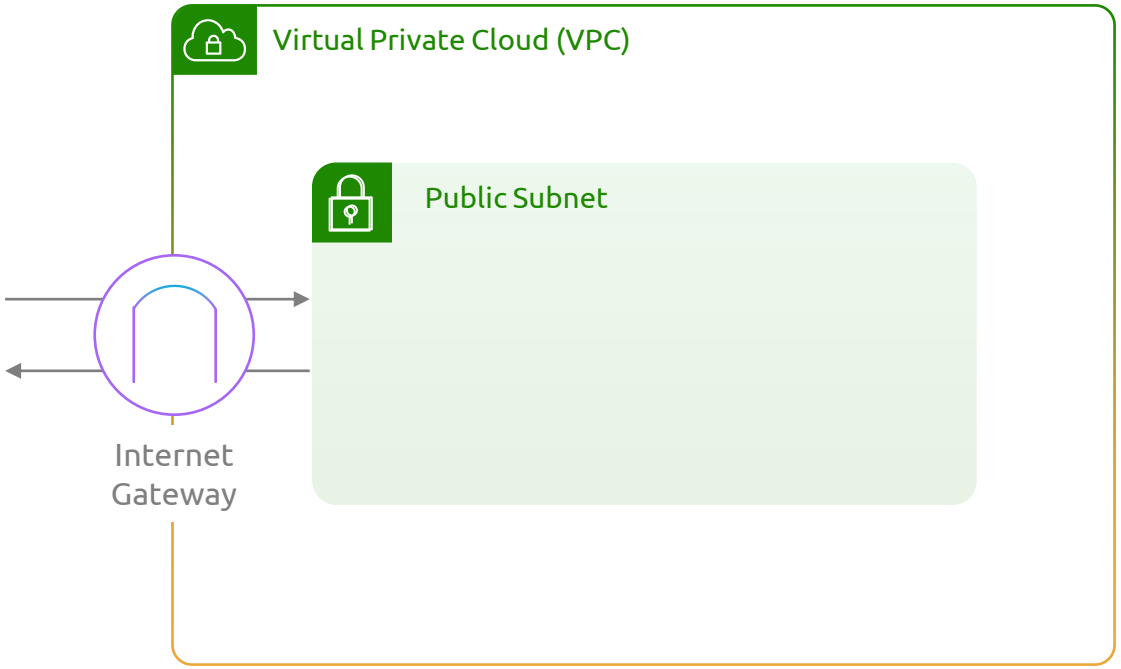
VPC External Connectivity

Subnets when first created are private and not exposed to the internet



Internet Gateway

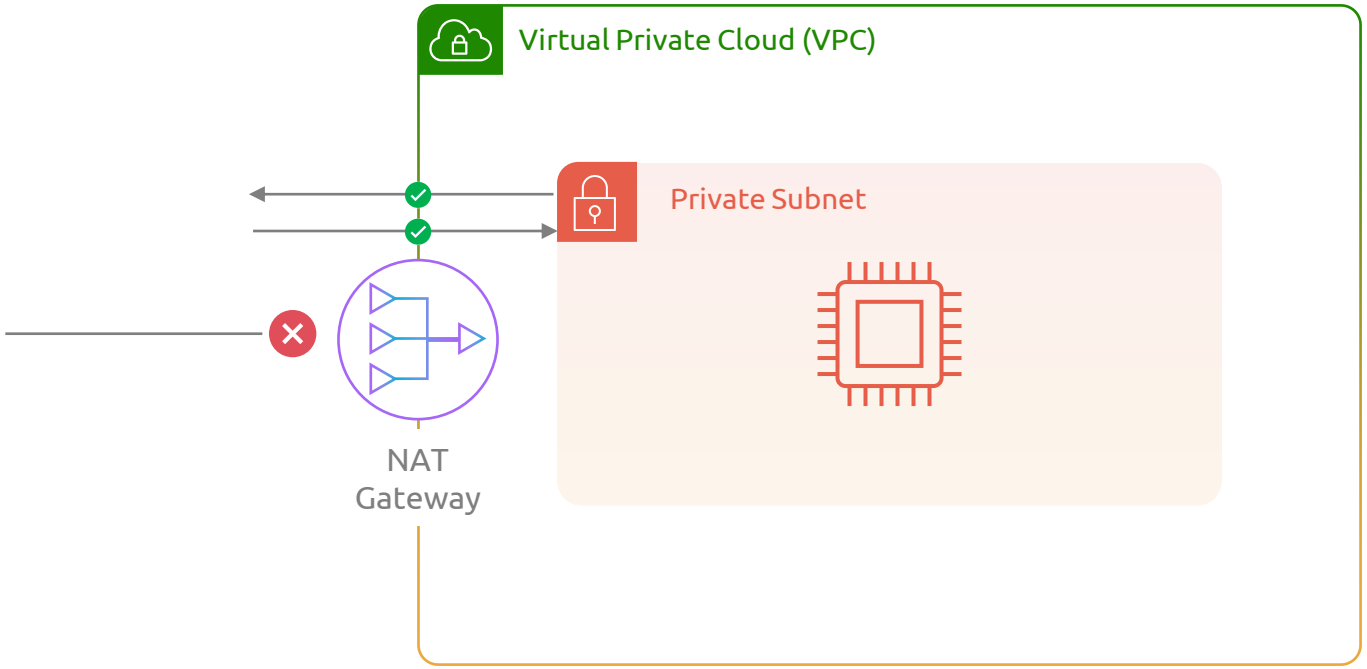
Internet gateway allows subnets in a VPC to communicate with the Internet and vice versa



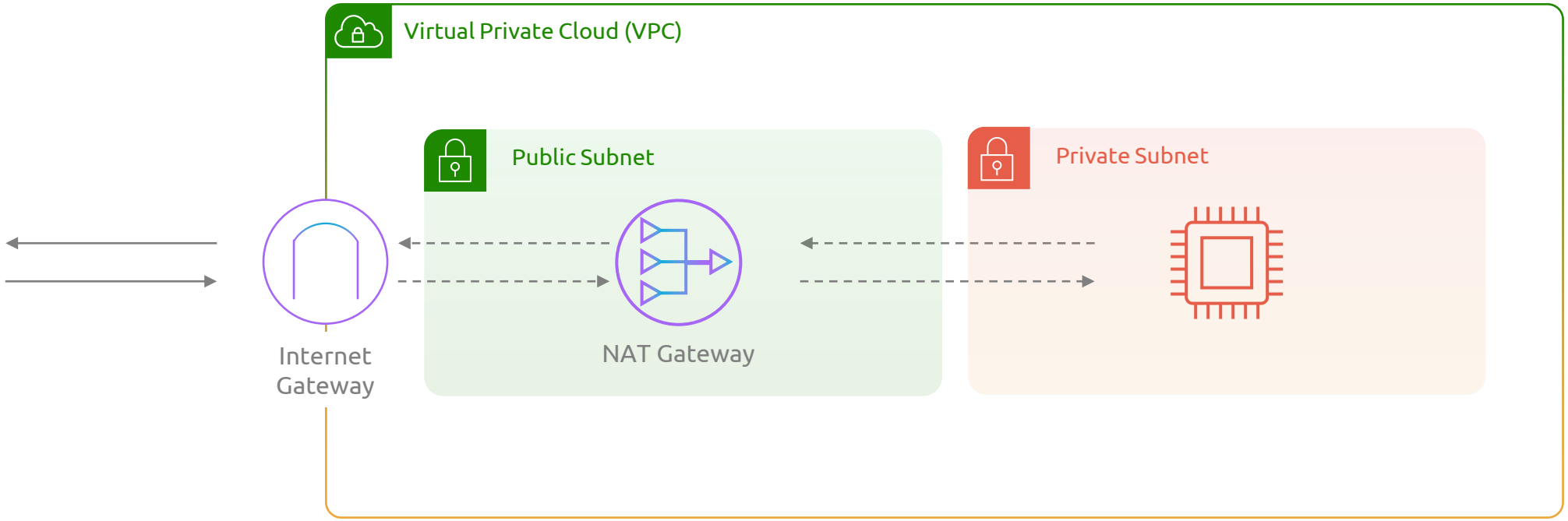
Access to Internet gateway determines whether a subnet is public or private

NAT Gateway

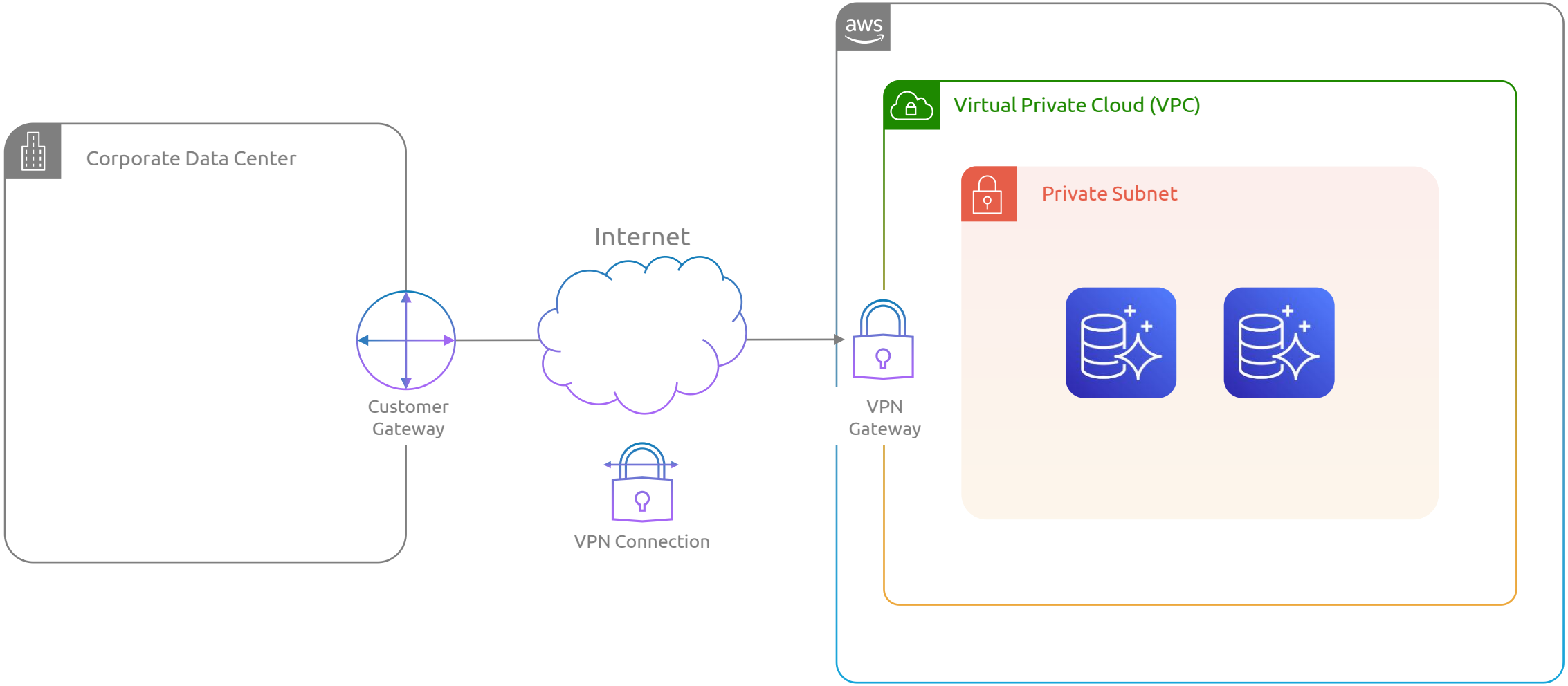
With NAT Gateway,
a connection must be
initiated from within the VPC



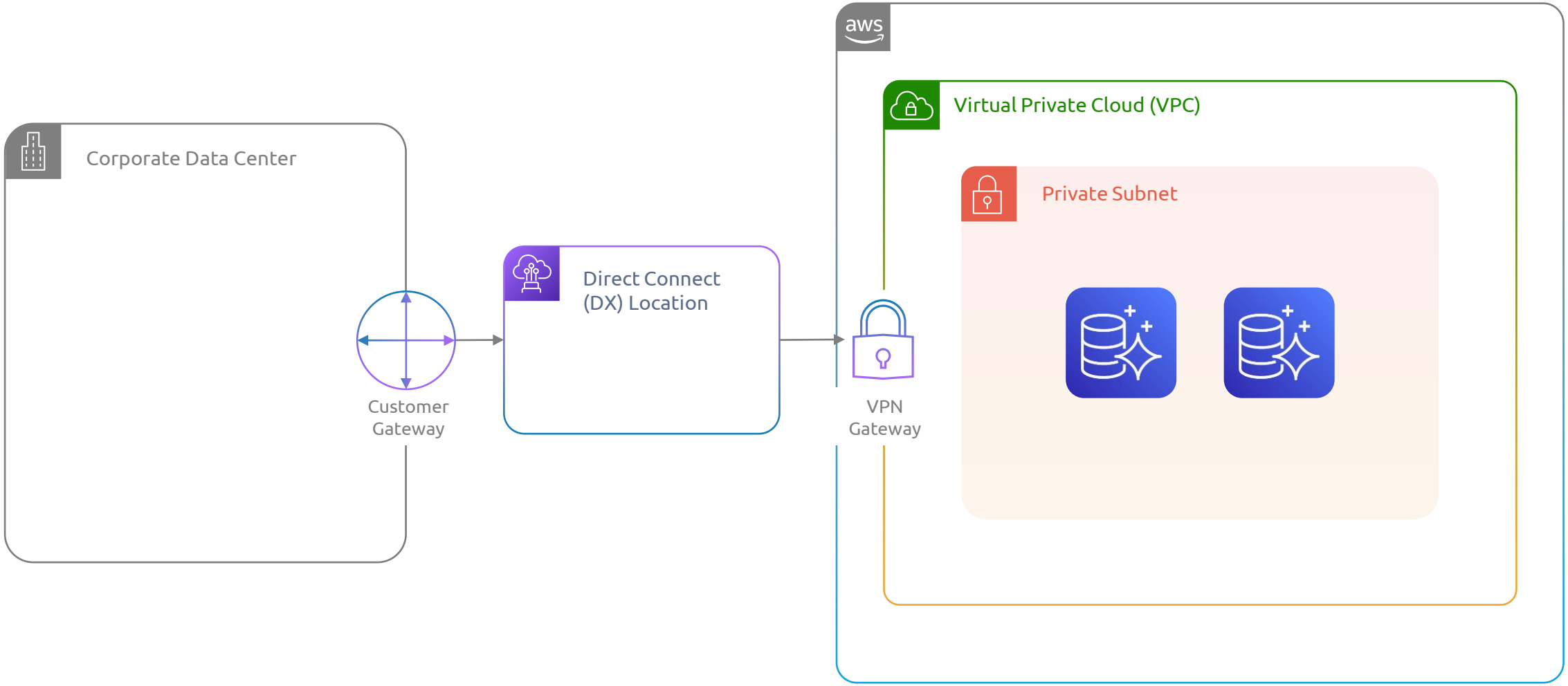
NAT Gateway



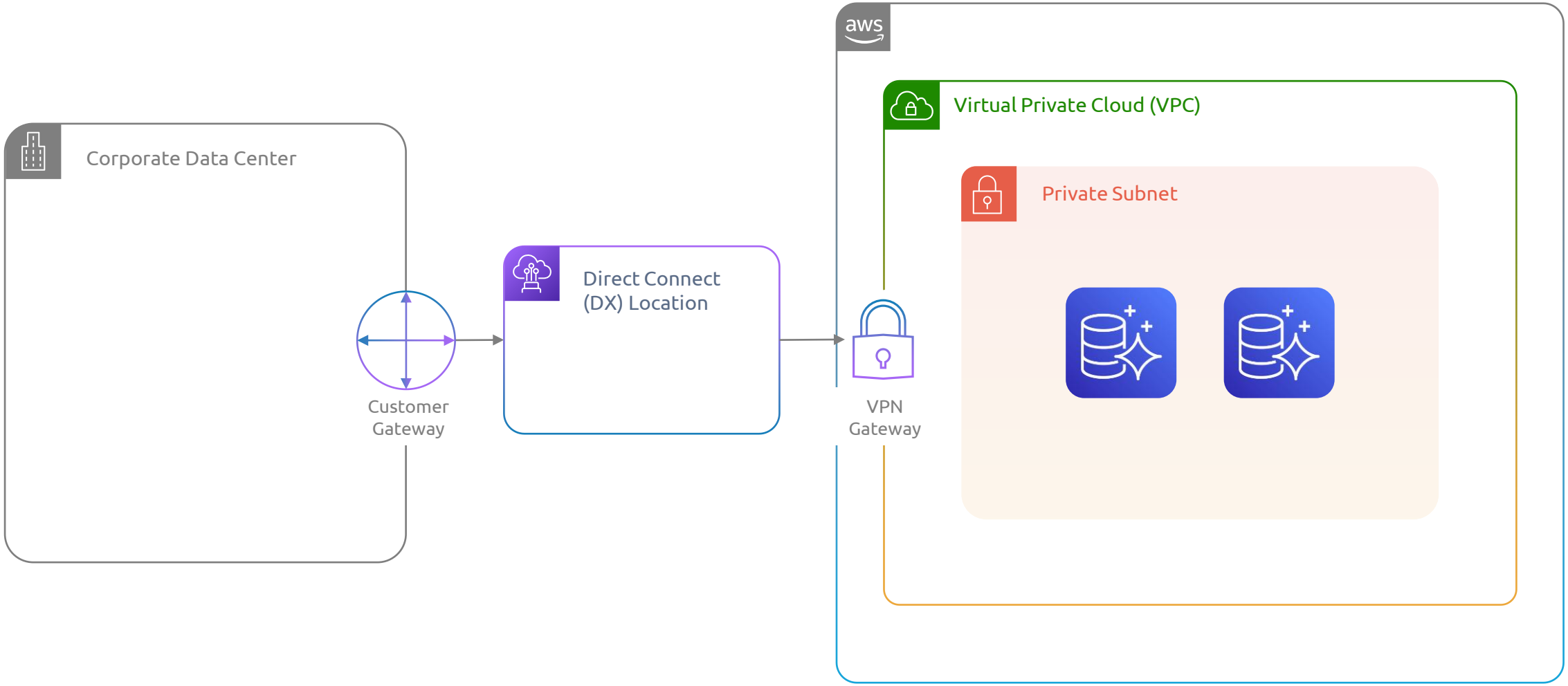
Virtual Private Gateway

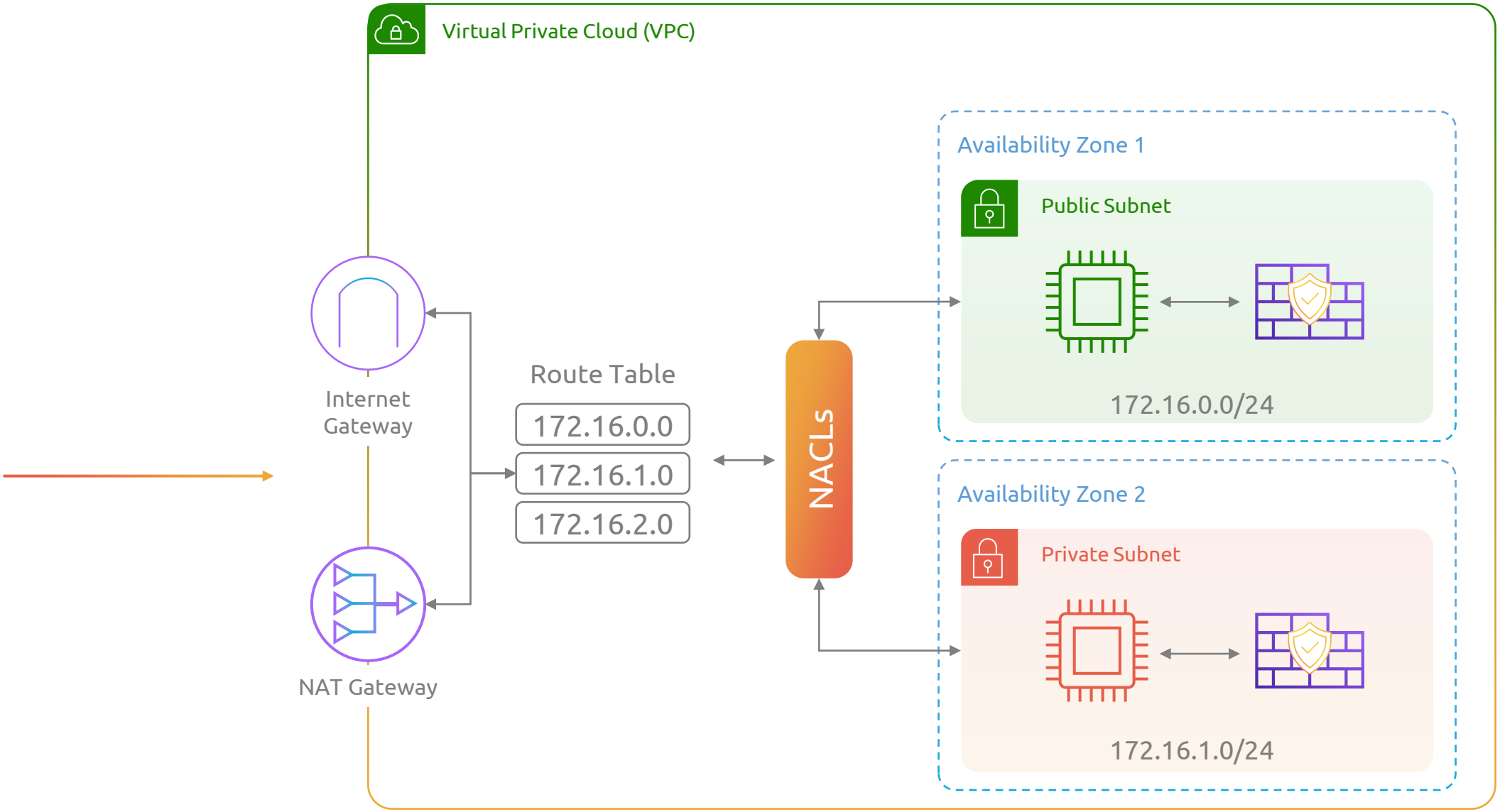


Direct Connect



Direct Connect





AWS Networking - Summary

- VPC isolates computing resources from other computing resources available in the cloud
- VPCs are isolated to a region
- VPC CIDR block defines the IP addresses a VPC can use
- Subnets are a range of IP addresses within a VPC
- Subnets reside within a single Availability Zone

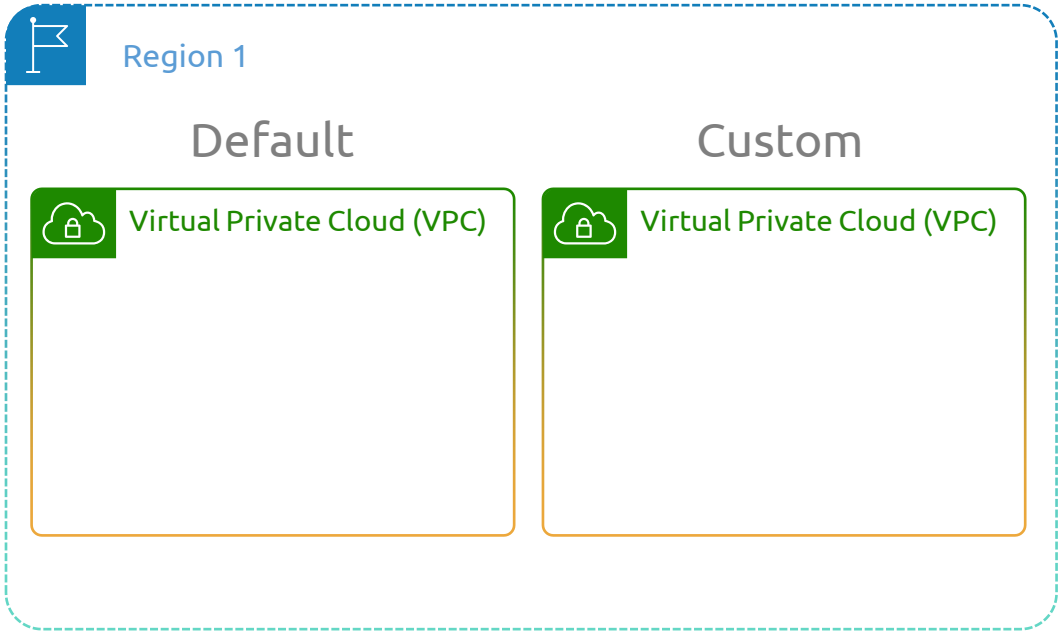
AWS Networking - Summary

- Subnets can be made public/private using Internet Gateways & Nat Gateways
- Internet Gateways allow subnets to communicate with internet & vice versa
- NAT Gateways allow subnets to talk to the internet but connections must be initiated from within the VPC
- Virtual Private Gateway enable secure access to private resources over the internet
- Direct Connect(DX) is a direct connection into an AWS regions that provide low latency + high speeds

Default VPC

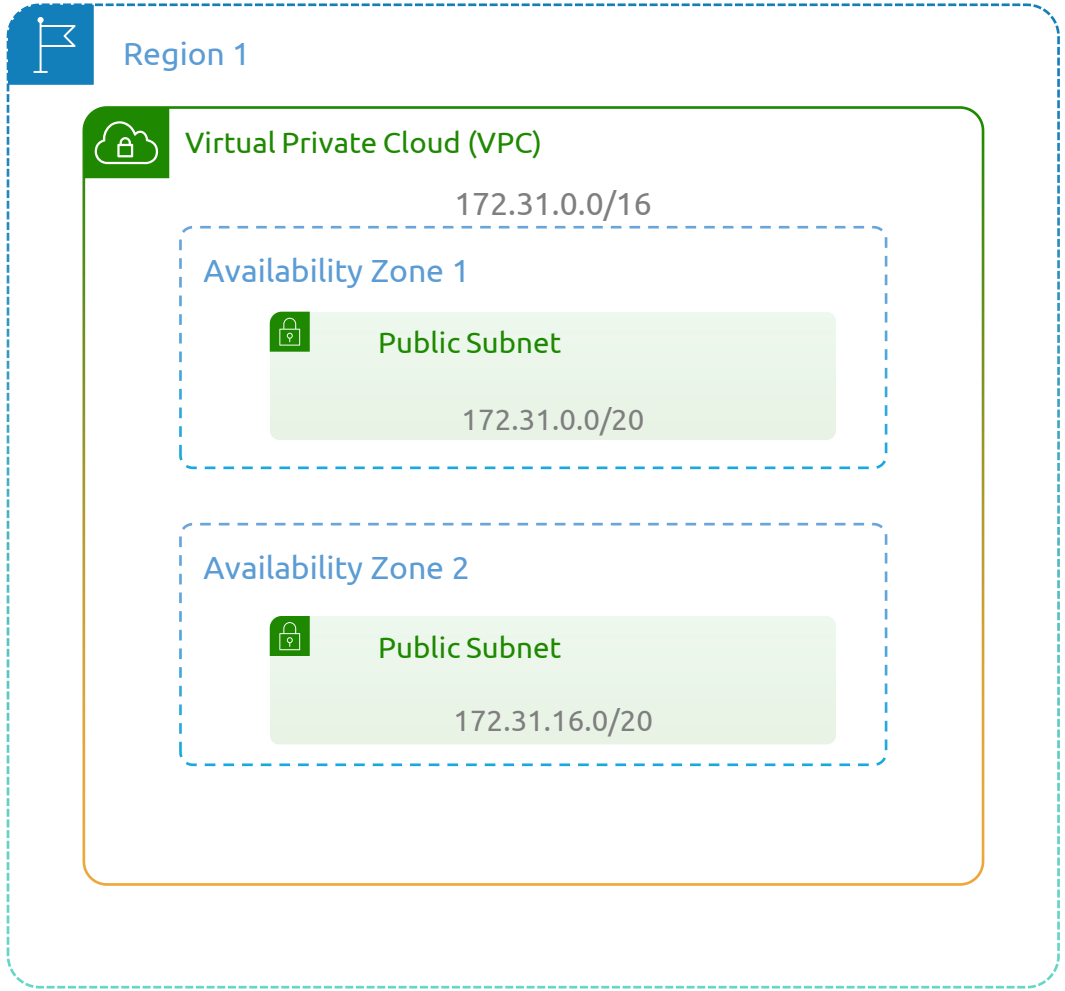
VPCs

- VPCs are of two types
  - Default
  - Custom
- Every account has a default VPC in each region
- Default VPCs have configurations defined by AWS
- Custom VPCs allow you to create/modify all configurations associated with the VPC



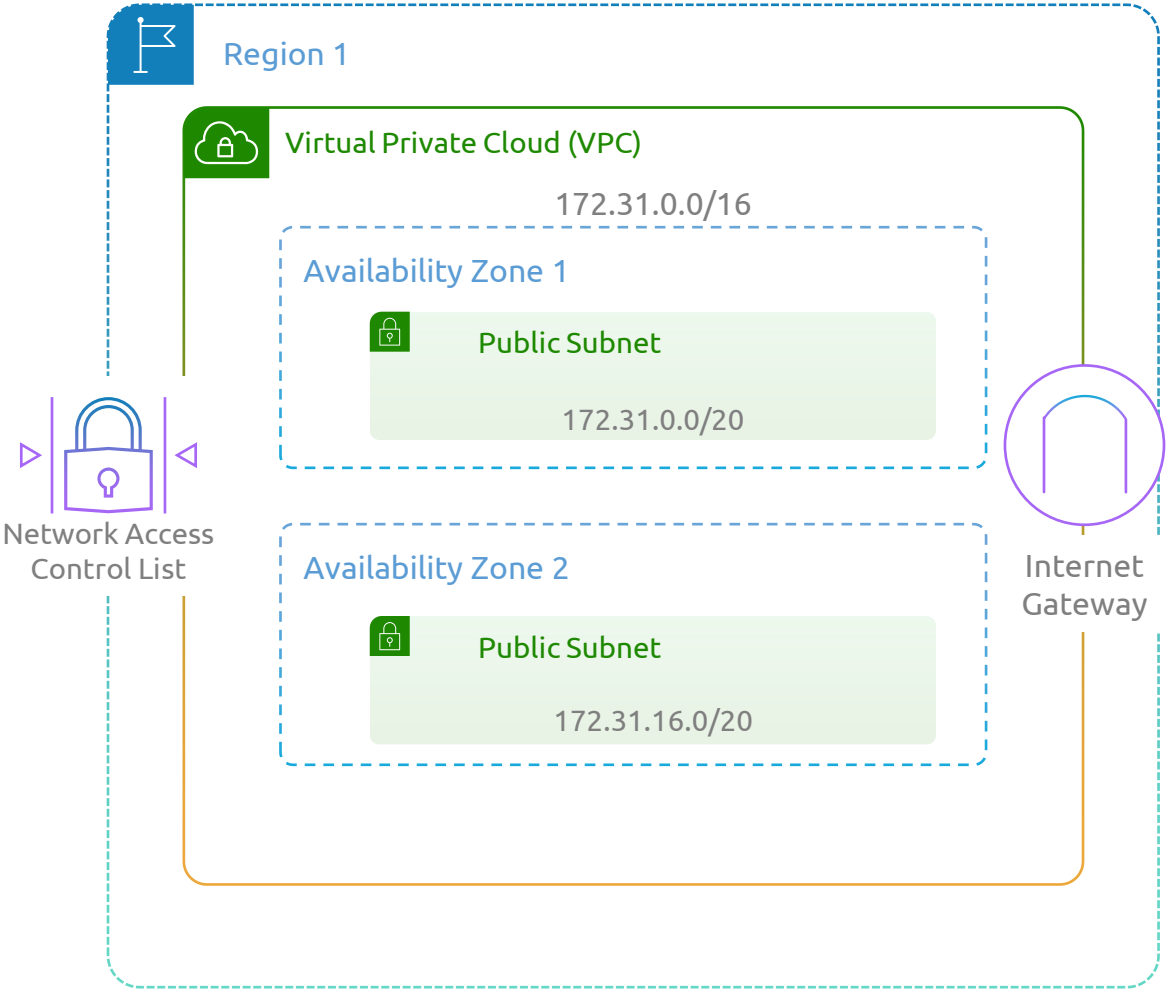
Default VPC

- One default VPC per region
- /16 IPv4 CIDR block 172.31.0.0/16 (65,536 addresses)
- /20 default subnet in each Availability Zone (4,096 addresses)



Default VPC

- Internet gateway attached to the VPC
- A route that points all traffic (0.0.0.0/0) to the internet gateway
  - Devices in these default subnets will be accessible from the internet
- Default security group
- Default network access control list

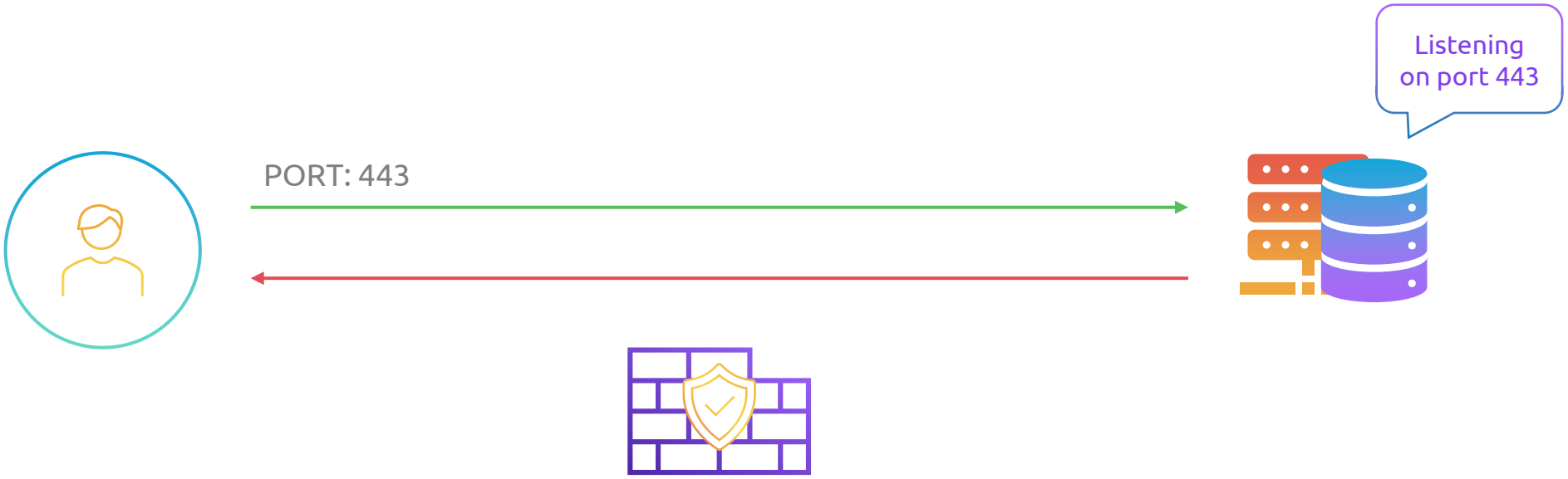


Default VPC - Summary

- Every region has a Default VPC with default subnets, Security Groups, and NACLs
- The CIDR block for the Default is 172.31.0.0/16
- The Default VPC and its subnets have outbound access to the Internet by default.
- One default subnet in each Availability Zone
- The Security Groups allow outbound and the NACLs are open in both inbound and outbound directions.

Firewalls

Stateless Firewalls



Firewalls monitor traffic and only allow traffic permitted by a set of predefined rules

Stateless Firewalls

Firewall rules are broken down into inbound and outbound rules

IP/Port	Action
443	Allow
1024-65535	Allow

PORT: 443

Inbound

Listening on port 443

Outbound

PORT: 80

Stateless firewalls must be configured to allow both inbound & outbound traffic

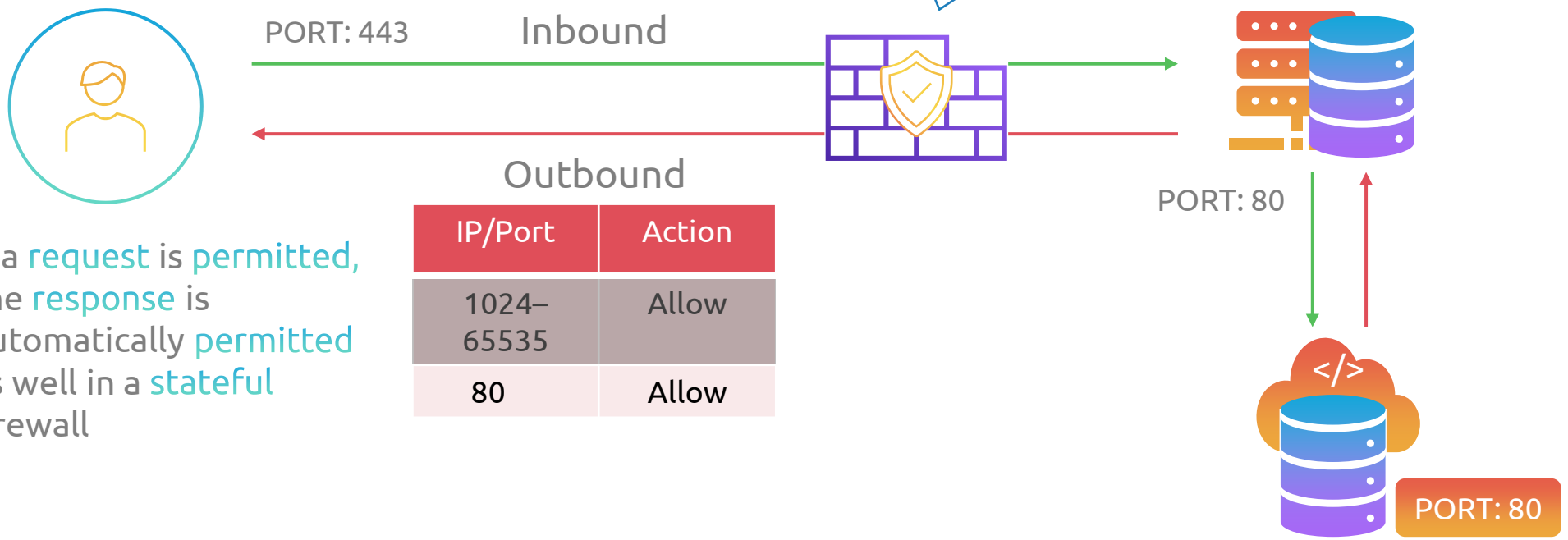
IP/Port	Action
1024–65535	Allow
80	Allow

PORT: 80

Stateful Firewalls

Stateful firewalls are intelligent enough to understand which request and response are part of the same connection

IP/Port	Action
443	Allow
1024-65535	Allow



If a request is permitted, the response is automatically permitted as well in a stateful firewall

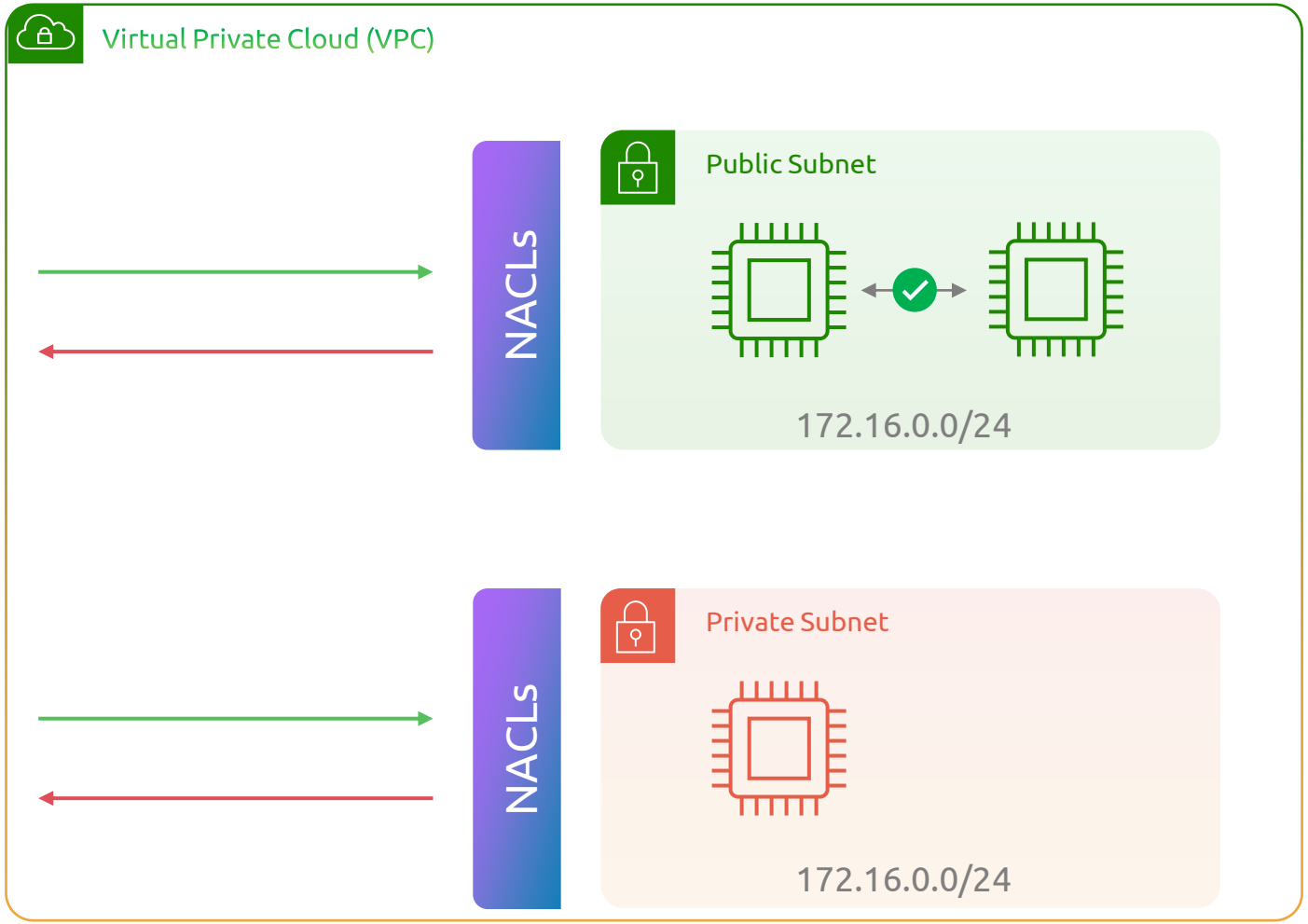
IP/Port	Action
1024–65535	Allow
80	Allow

Network Access Control List (NACL)

NACLs filter traffic entering and leaving a subnet

NACLs do not filter traffic within a subnet.

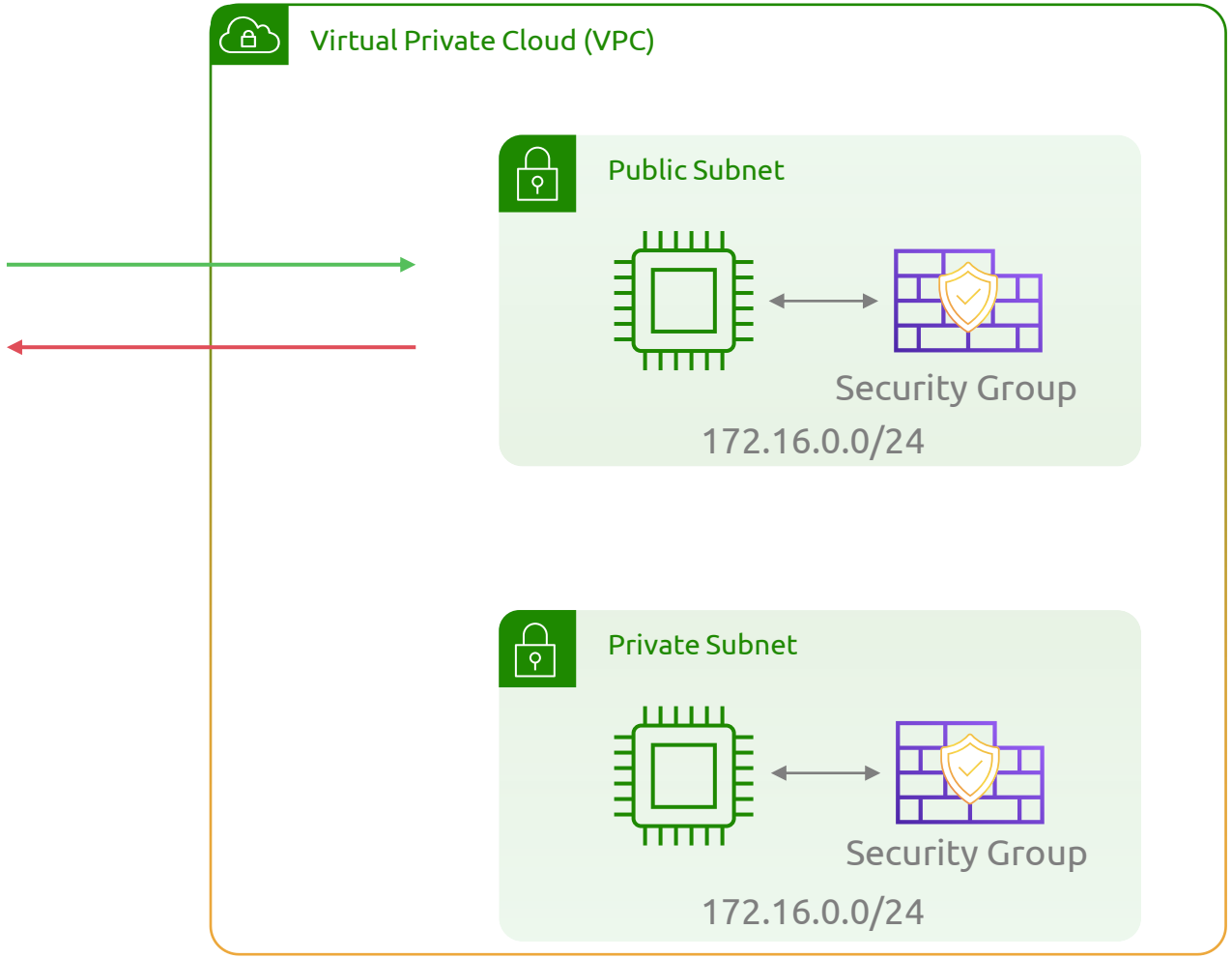
NACLs are stateless firewalls, so rules must be set for both inbound and outbound traffic



Security Group

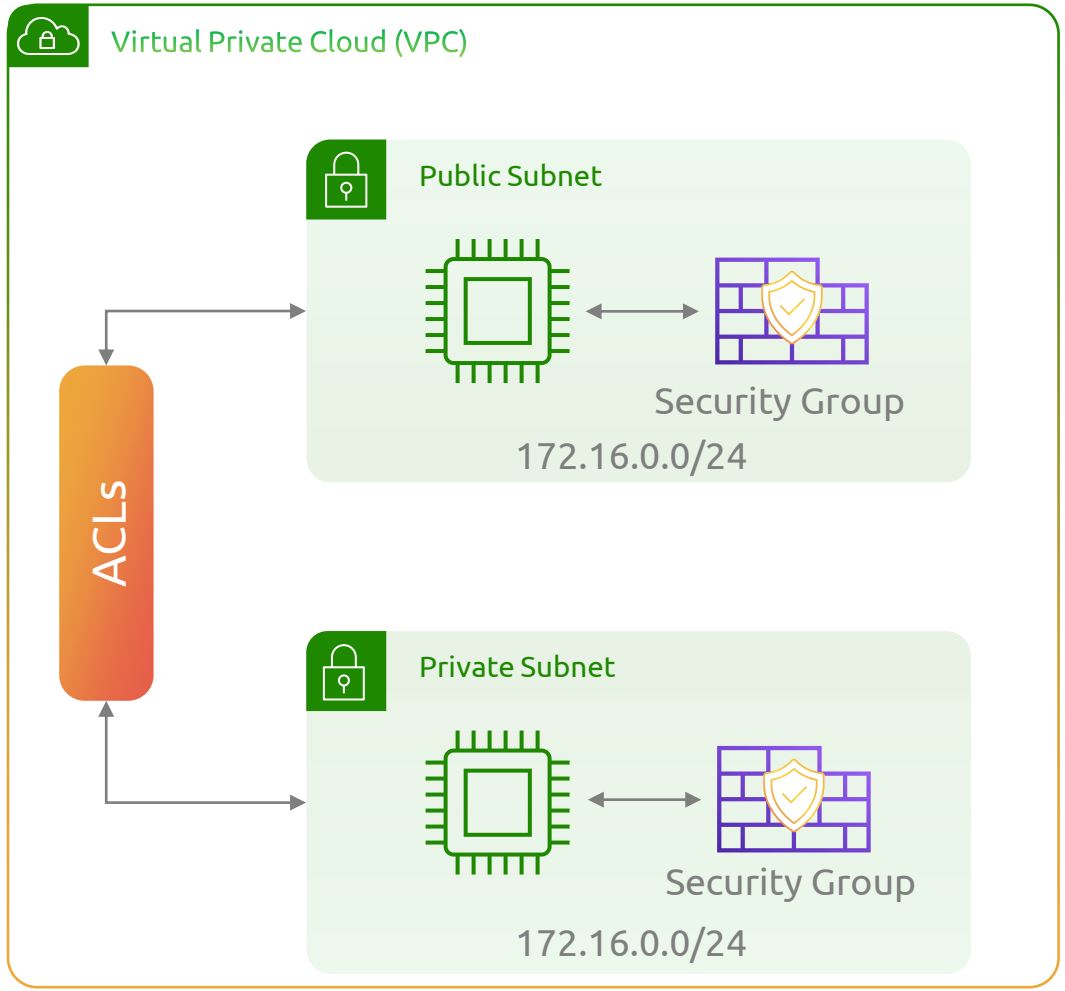
Security Groups act as firewalls for individual resources (EC2, LB, RDS)

Security Groups are stateful, so only the request needs to be allowed



NACLs vs Security Groups

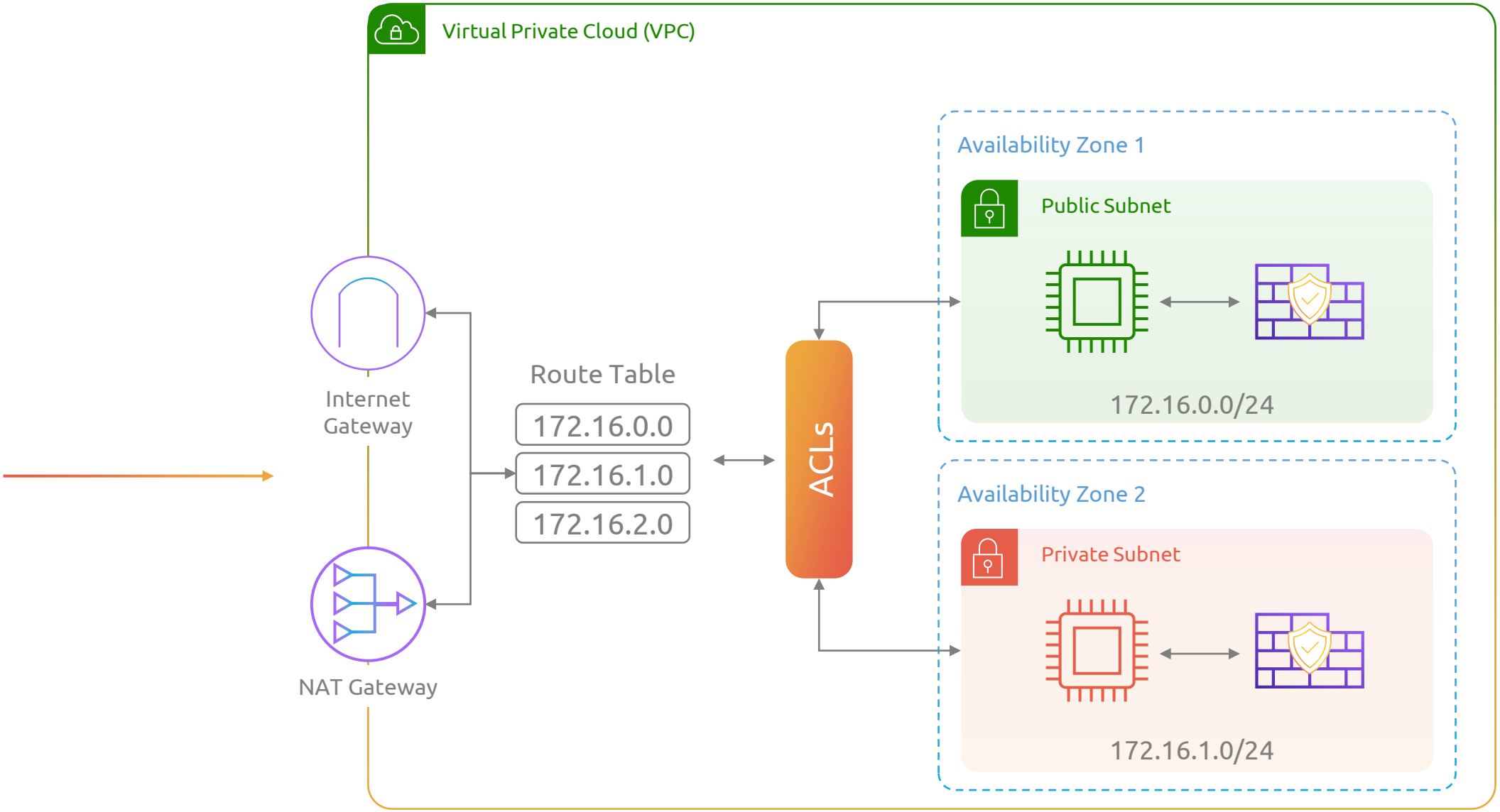
- NACLs monitor traffic entering and leaving a subnet
- NACLs are stateless firewalls
  - Traffic must be permitted in both ingress and egress directions
- Security groups act as personal firewalls for individual resources
- Security groups are stateful
  - Only the direction of the request needs to be permitted
  - The response will automatically be permitted as well



Firewalls - Summary

- Stateless firewalls require traffic to be explicitly permitted inbound & outbound
- Stateful firewalls are intelligent firewalls that track requests and allow response
- Network ACLs filter traffic entering & leaving a subnet
- Network ACLs are stateless firewalls
- Security Groups act as firewalls for individual resources such as EC2, NICs, and other network objects
- Security Groups are stateful firewalls

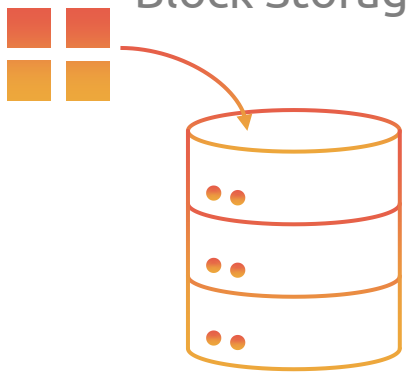
AWS Networking



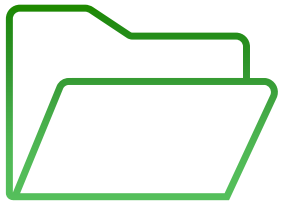
Core AWS Services
Storage

Types of Storage

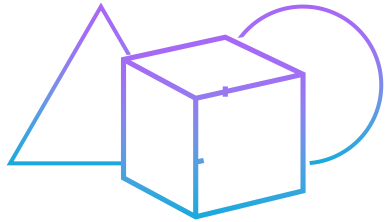
Block Storage



File Storage

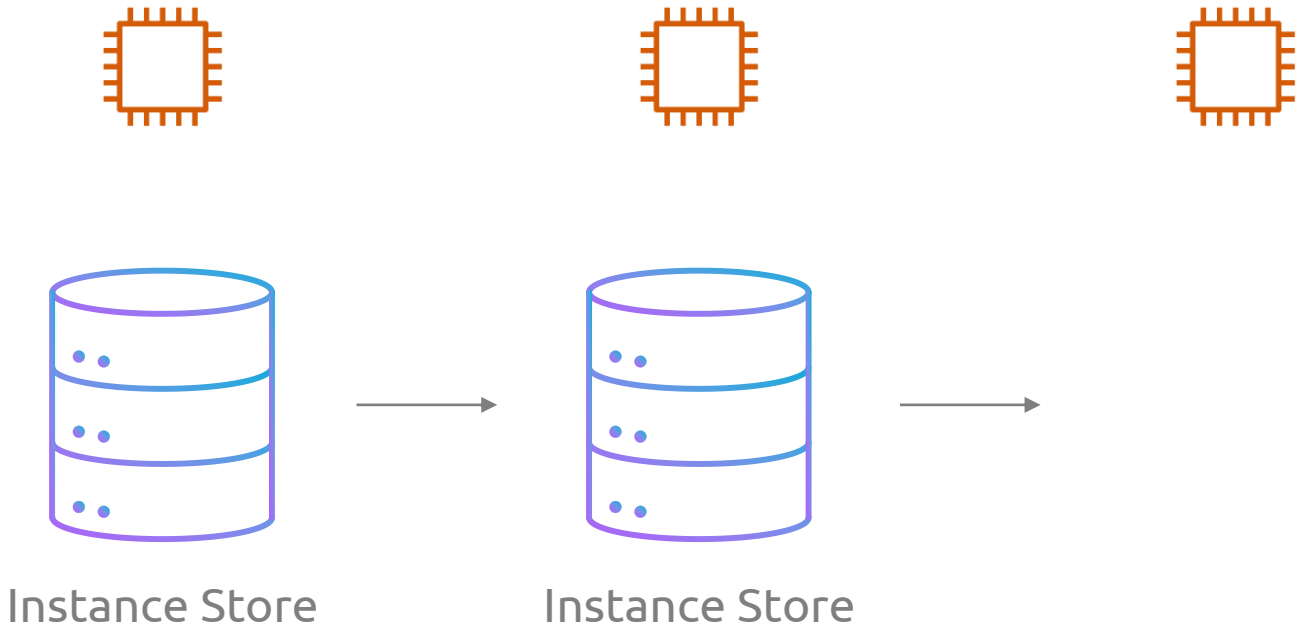


Object Storage

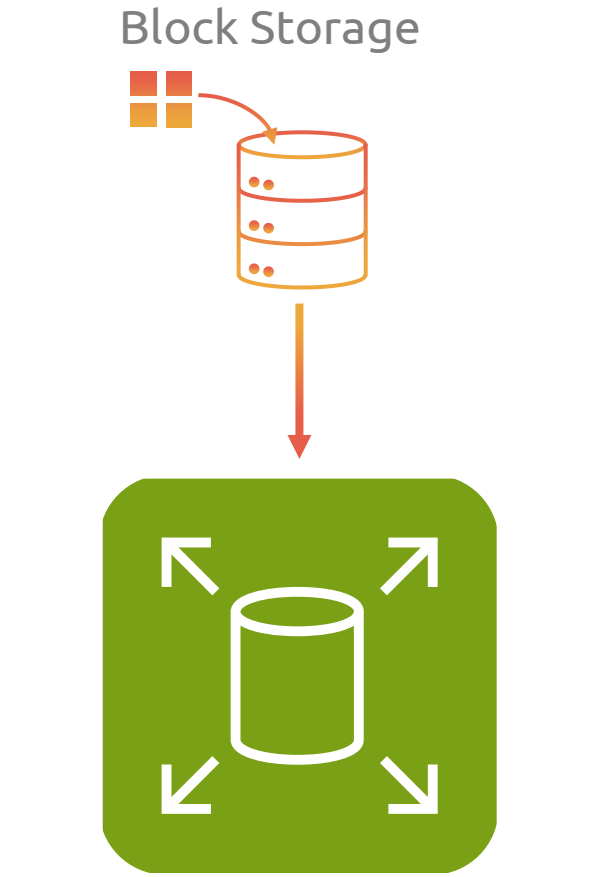


Block Storage

Instance Store



Elastic Block Store

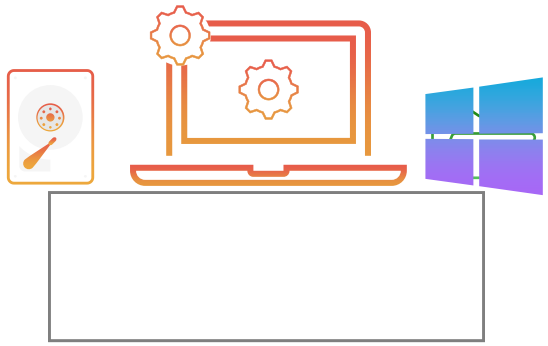


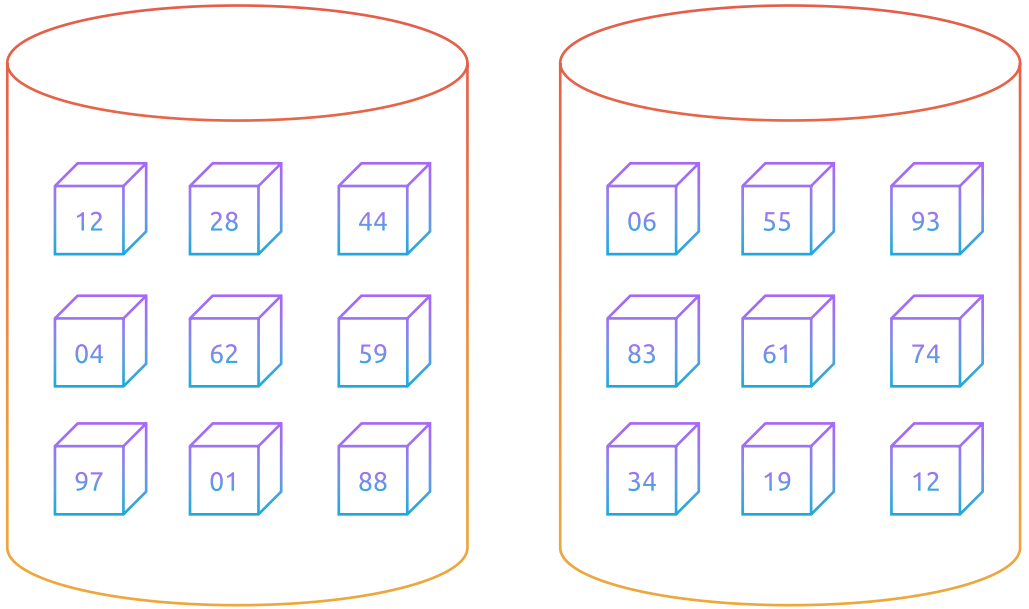
Block Storage

- Block storage breaks up data into blocks and then stores those blocks as separate pieces, each with a unique identifier

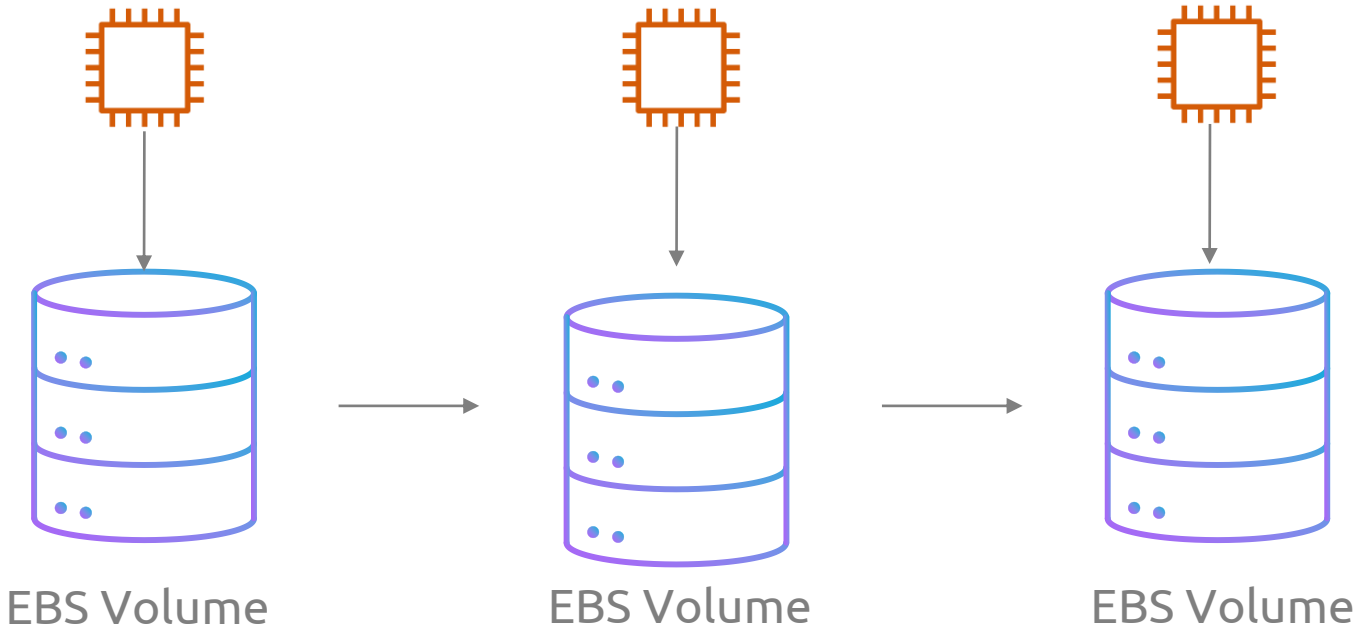
- A collection of blocks can be presented to the OS as a volume
  - The operating system then creates a filesystem on top of it

- A collection of blocks can be presented as a hard drive
  - Block storage is bootable, which means operating systems can be installed on it

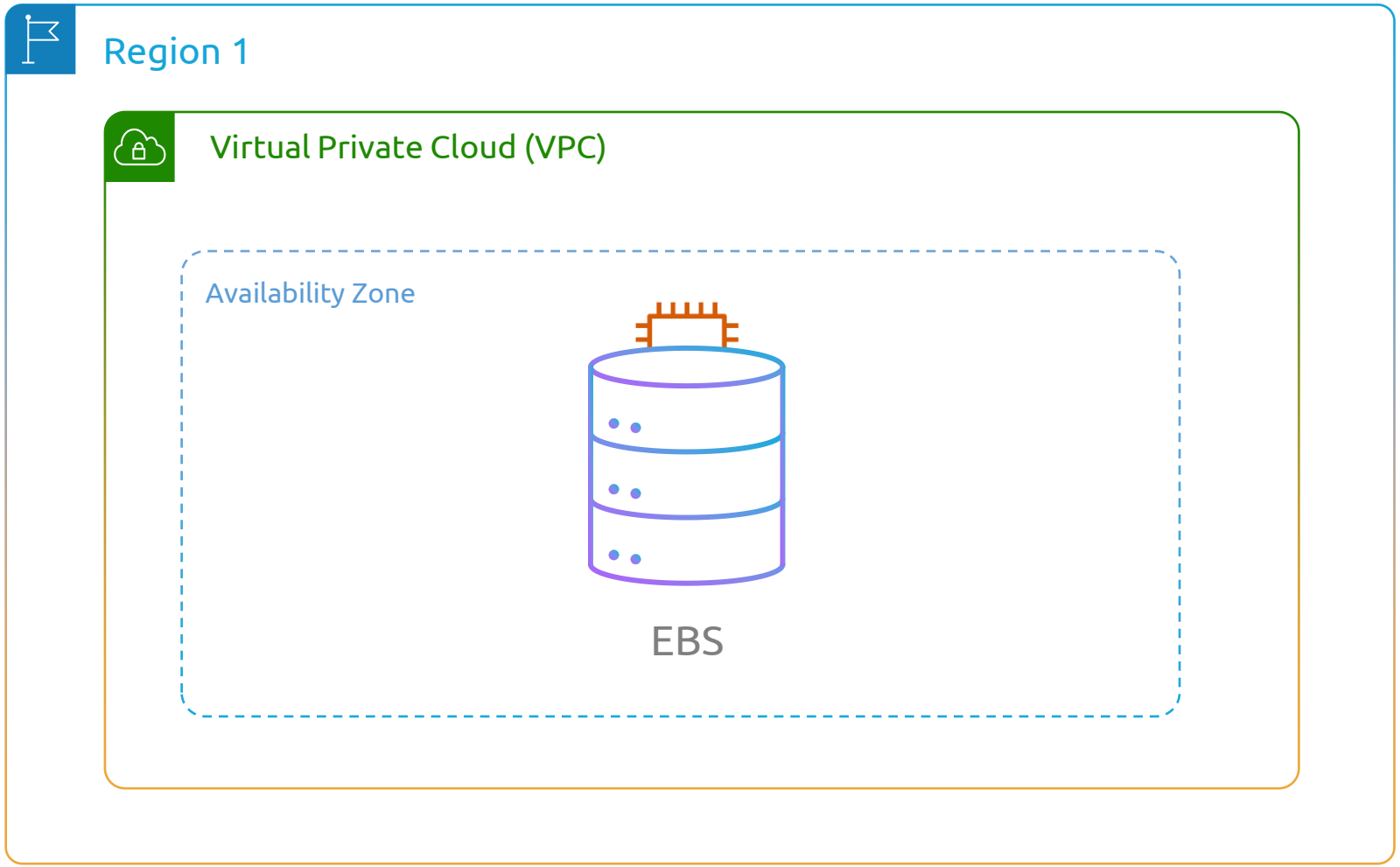




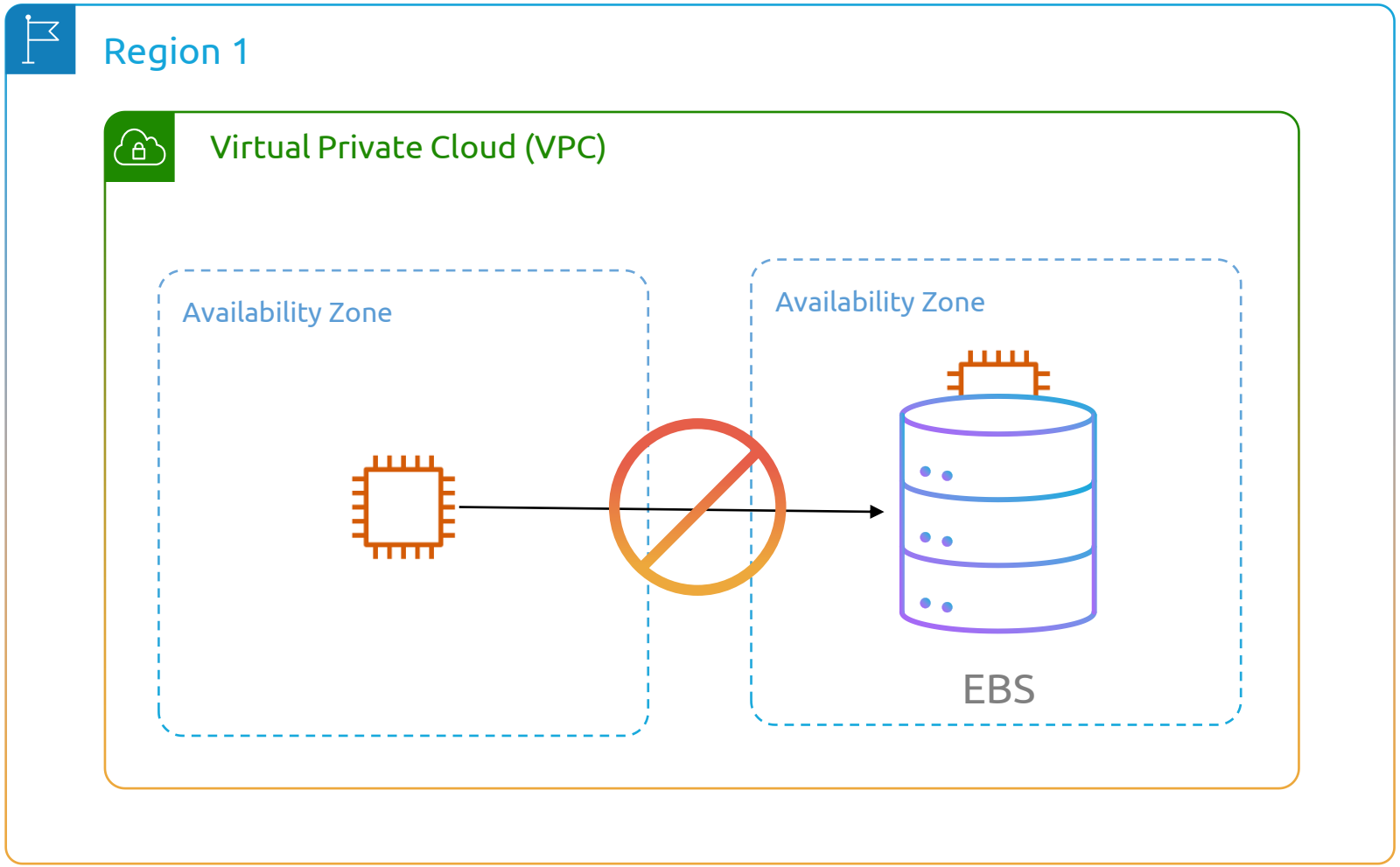
EBS Volumes



EBS Volumes



EBS Volumes



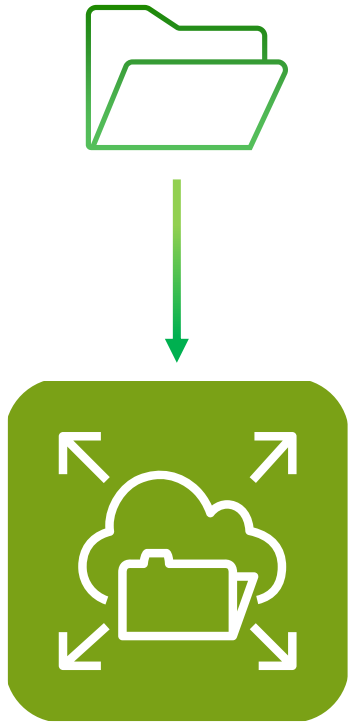
Block Storage - Summary

- A collection of blocks can be presented to the OS as a volume
- EBS Volumes can be mounted & booted
- EBS Volumes are within an Availability Zone
- Instance Stores are removed when EC2 instances are stopped/started

File Storage

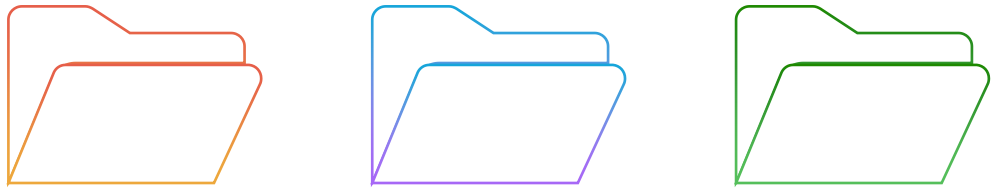
Elastic File System

File Storage

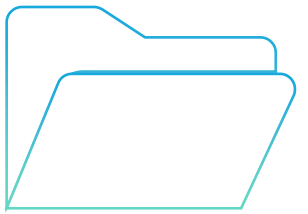


Amazon Elastic File System (Amazon EFS)

File Storage

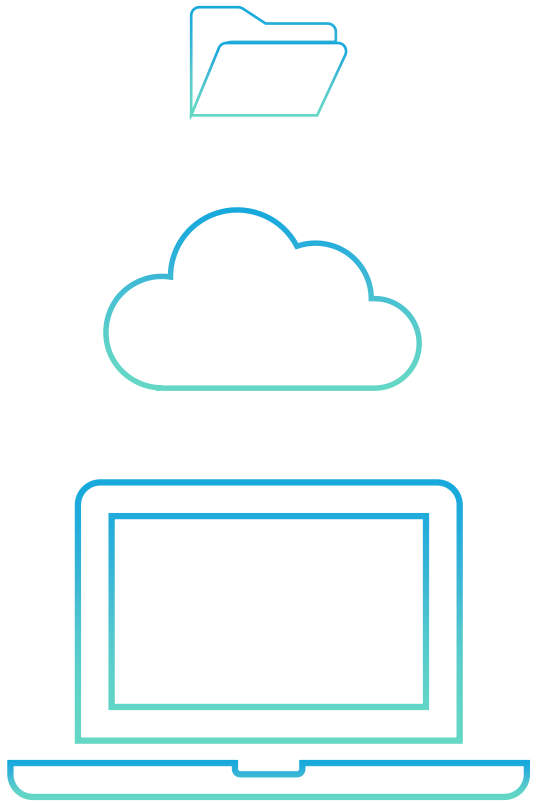


- File storage – Stores data in a hierarchical structure of files and folders
  - Similar to how your computer stores files/folders



File Storage

- File storage – Stores data in a hierarchical structure of files and folders
    - Similar to how your computer stores files/folders
- Filesystem that is accessible remotely



File Storage

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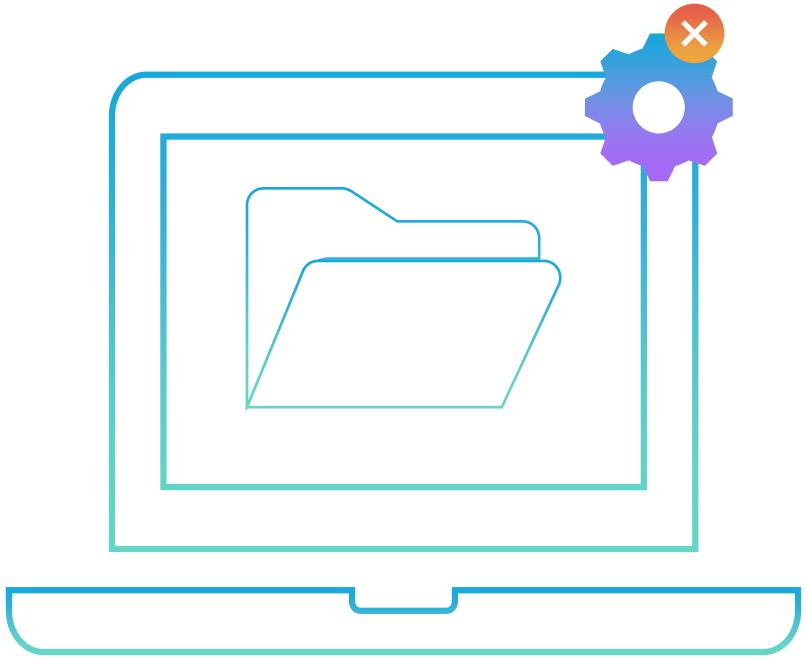
- Filesystem that is accessible remotely
  - Creates subdirectories
  - Stores and accesses files within

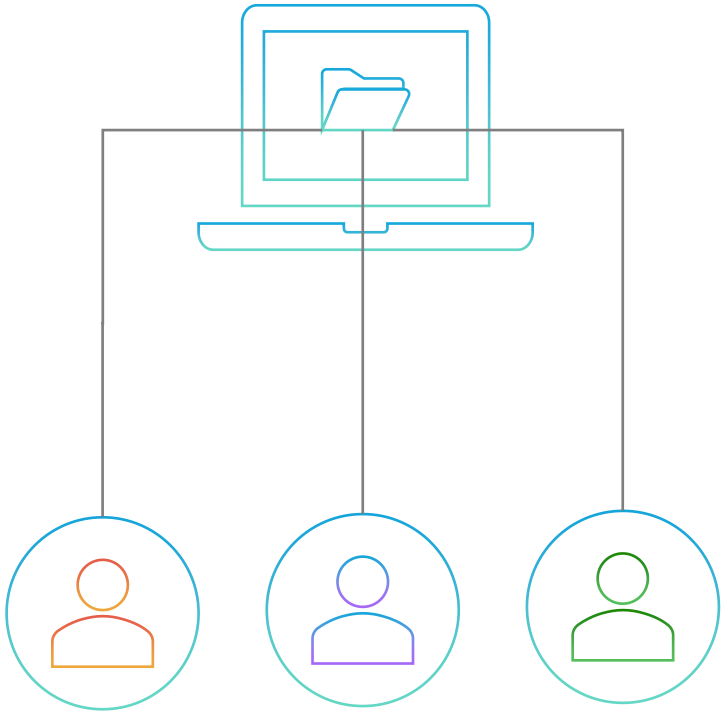
File Storage

- File storage – Stores data in a hierarchical structure of files and folders
  - Similar to how your computer stores files/folders
- Filesystem that is accessible remotely
  - Creates subdirectories
  - Stores and accesses files within
- File storage can be mounted
- Not bootable, so you cannot install an operating system on it



File Storage

- File storage is accessible over the network
- Multiple clients can access the same data

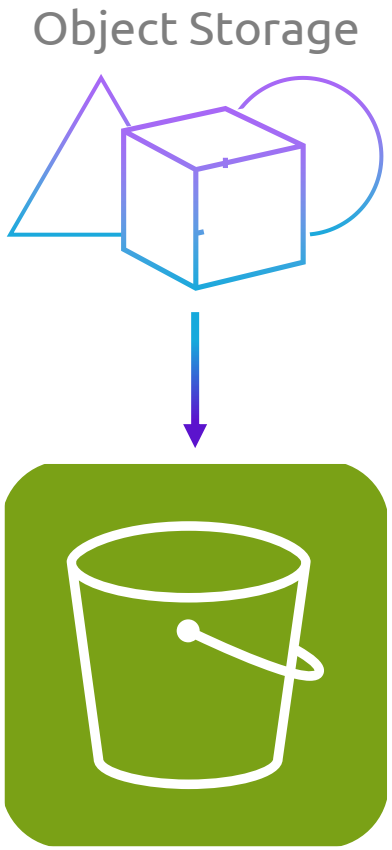


File Storage - Summary

- File Storage services like EFS store data in a hierarchical structure of files and folders
- It is accessible over the network
- EFS can be mounted as a file system inside an OS
- It cannot be used as a boot volume(can’t install OS)

Object Storage

S3 - Object Storage



S3 - Object Storage

- Object Storage – Stores objects
  - Objects are nothing more than files
  - Can store any type of file

Object Storage

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  - Flat file structure – Everything is in the same folder

Object Storage

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  - Can store any type of file
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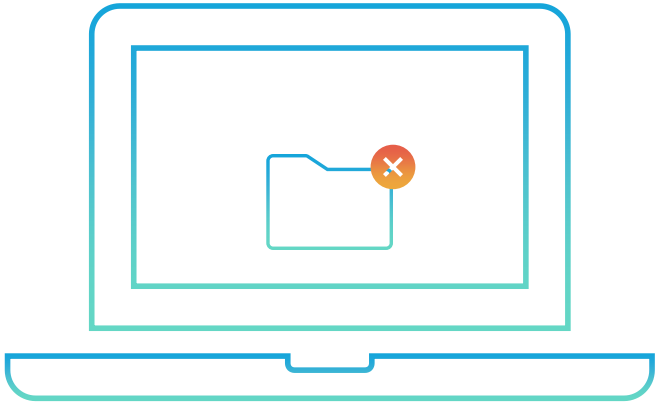
  - Flat file structure – Everything is in the same folder
- Since there is no folder structure, object storage cannot be mounted or booted



Object Storage

- Object Storage – Stores objects
  - Objects are nothing more than files
  - Can store any type of file
- Does not have a folder structure
  - Flat file structure – Everything is in the same folder
- Since there is no folder structure, object storage cannot be mounted or booted
- Great for storing logs and media files

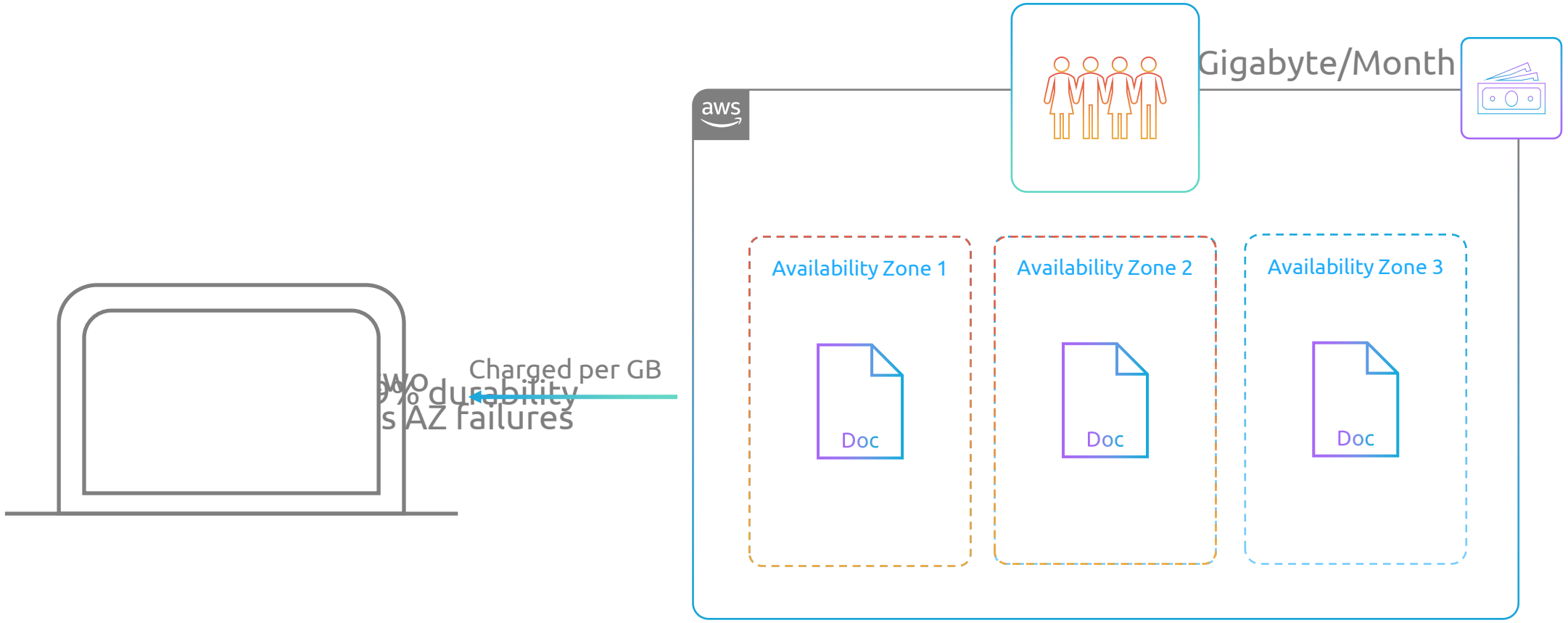
Storage Classes

Data Access

Resiliency

Cost

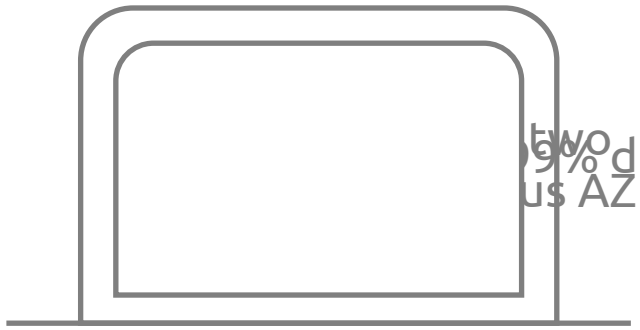
S3 Standard (default)



S3 Standard-IA

Has a retrieval fee

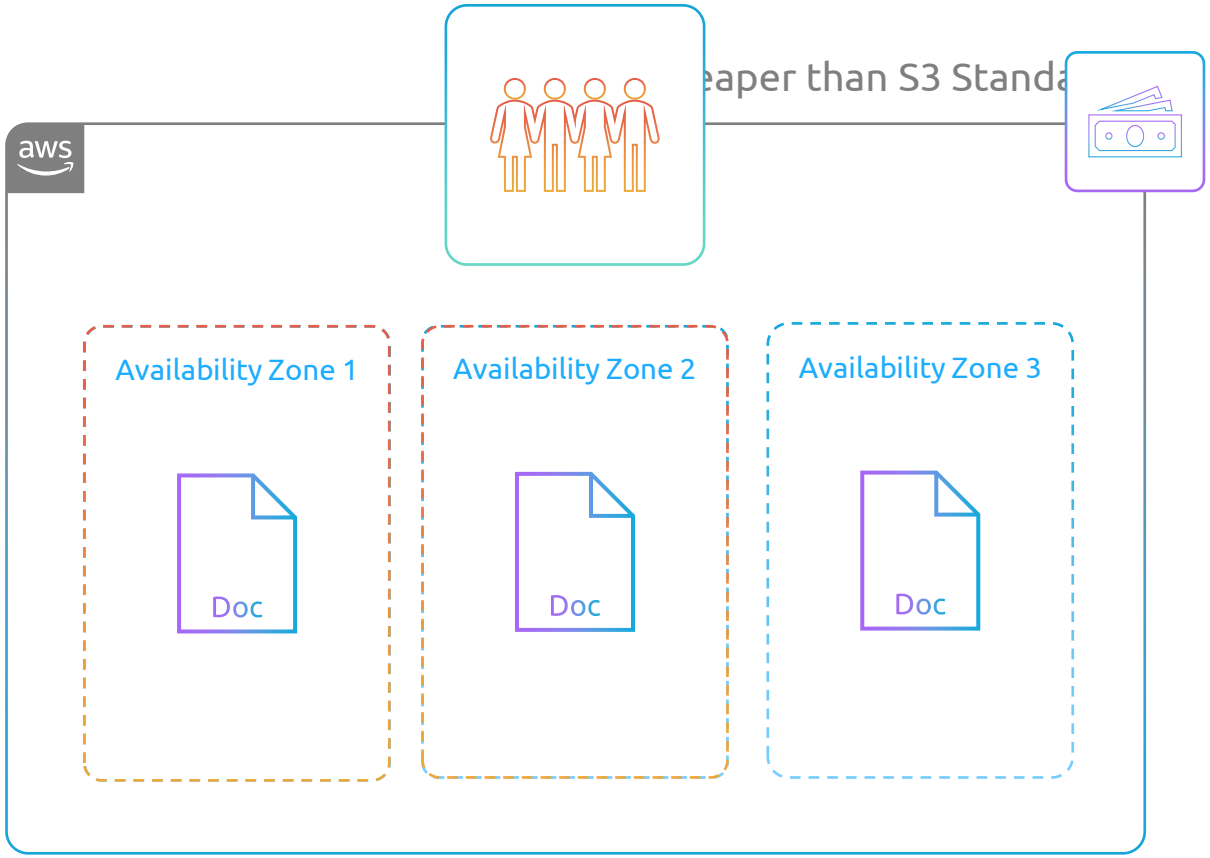
Minimum duration charge of 90 days



Charged per GB

two
9% durability
us AZ failures

Minimum size charge of 128 KB per object



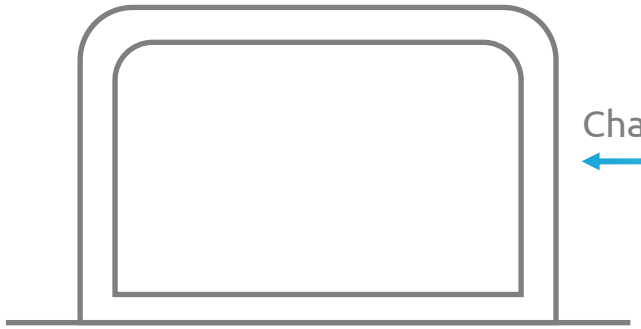
S3 One Zone-IA

Cheaper than S3 Standard and S3 St

Has a retrieval fee

Minimum duration charge of 90 days

Minimum size charge of 128 KB per object



Charged per GB

Note

Designed for IA data

Not required to handle AZ failure

Replication still occurs within AZ

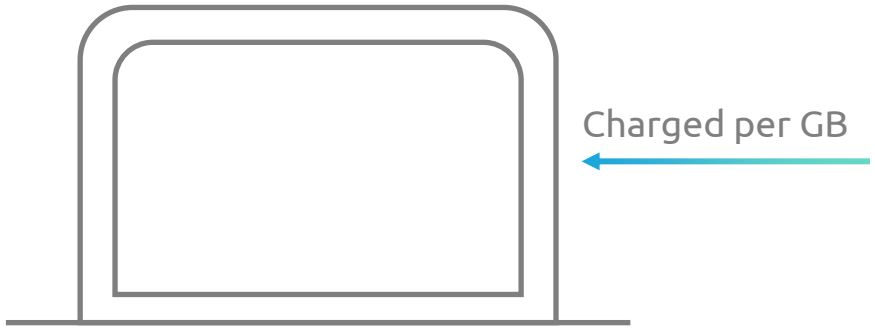
S3 Glacier-Instant

Cheaper than S3 Standard and S3 Standard-IA

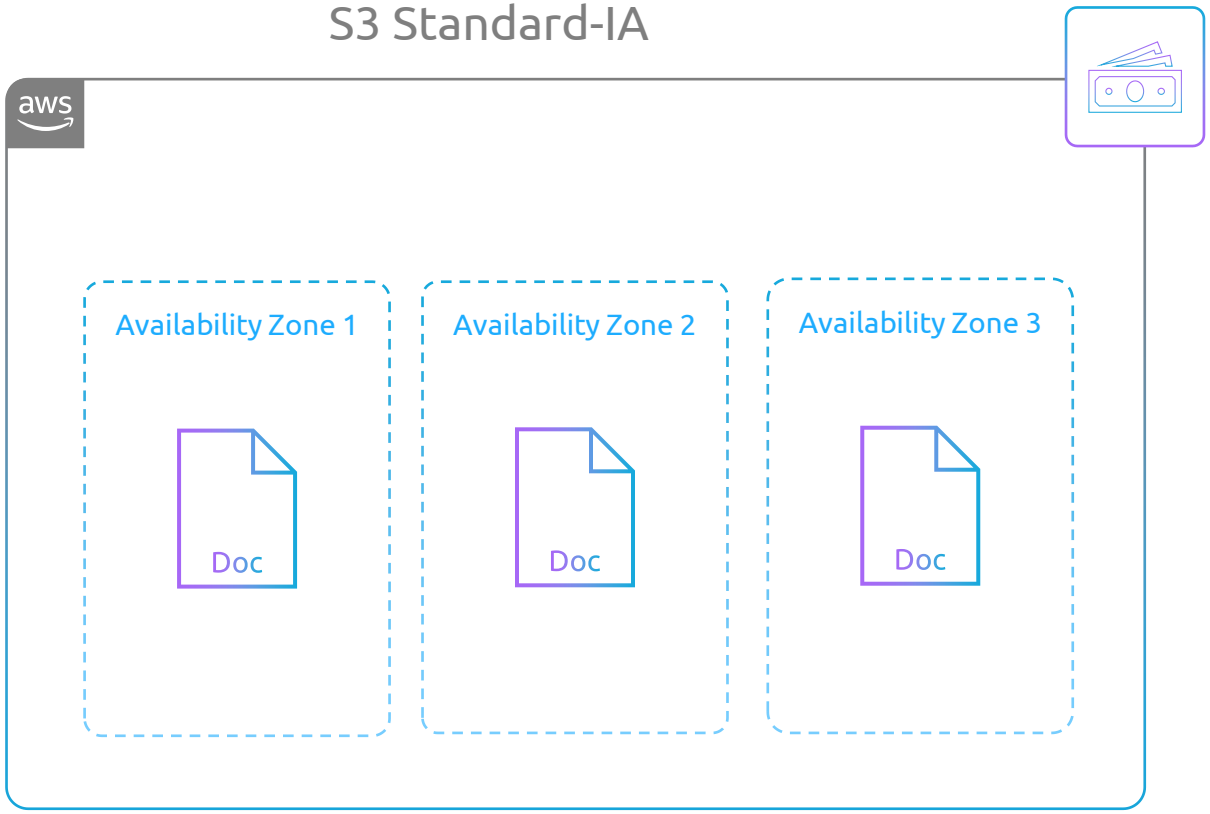
Has a retrieval fee

Minimum duration charge of 90 days

Minimum size charge of 128 KB per object



Charged per GB



Note

Low-cost option for rarely accessed data

Performance same as that of S3 standard

Summary

Very cheap storage

Higher retrieval cost

Longer minimum duration

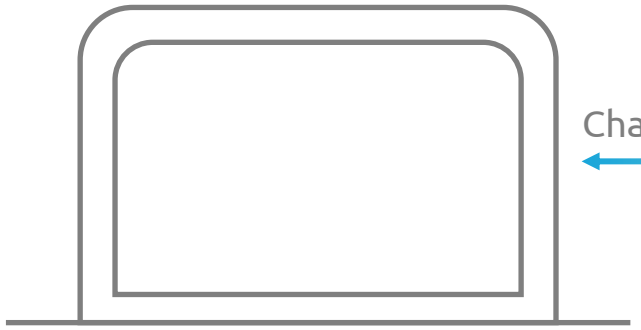
S3 Glacier-Flexible

Cheaper than S3 Standard and so on…

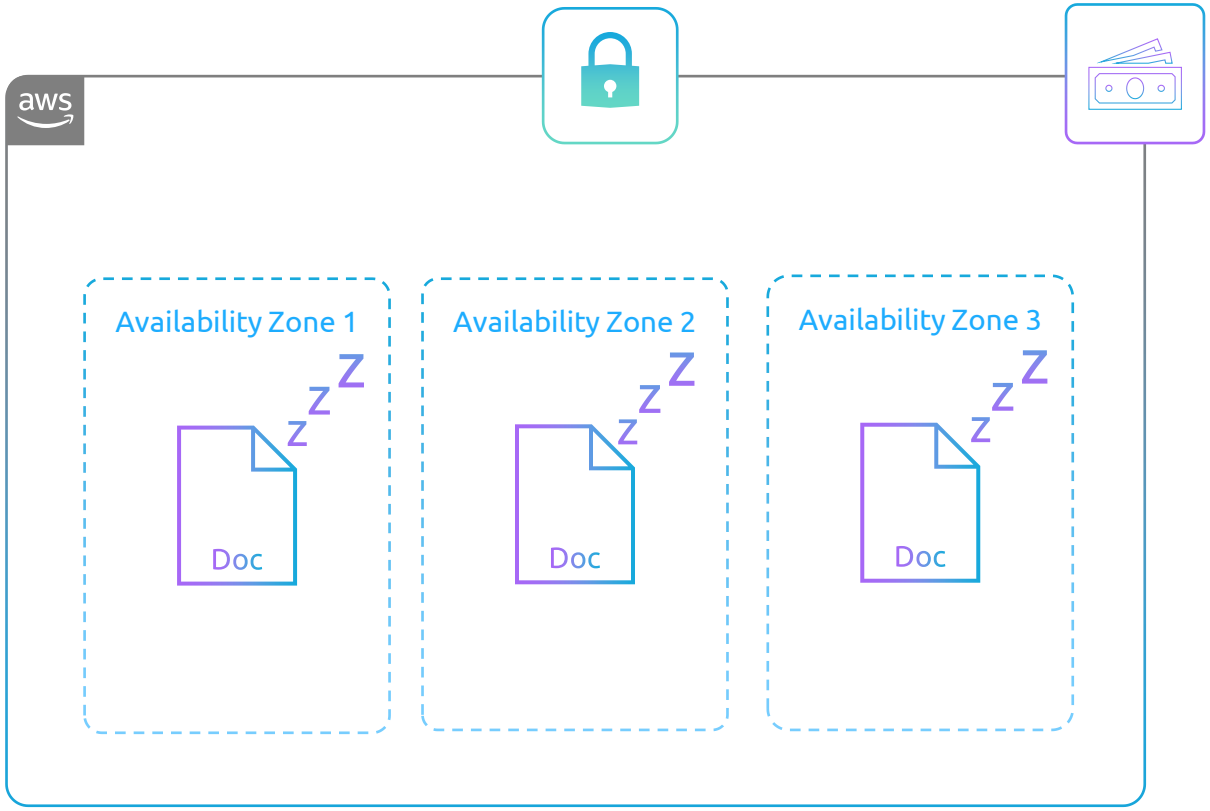
Has a retrieval fee

Minimum duration charge of 90 days

Minimum size charge of 40 KB per object



Charged per GB



Options

Bulk	:	5–12 Hours
Expedited	:	1–5 Minutes
Standard	:	3–5 Hours

During retrieval, objects are stored in S3 Standard-IA class temporarily

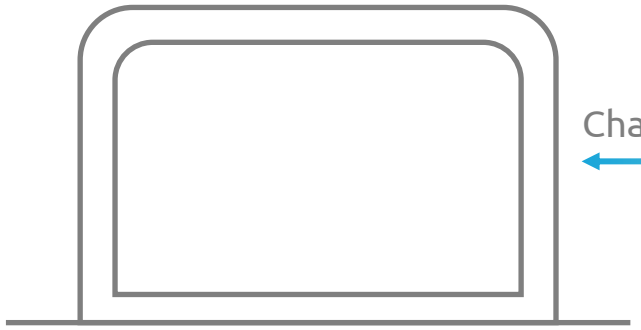
S3 Glacier Deep Archive

The cheapest storage class in S3

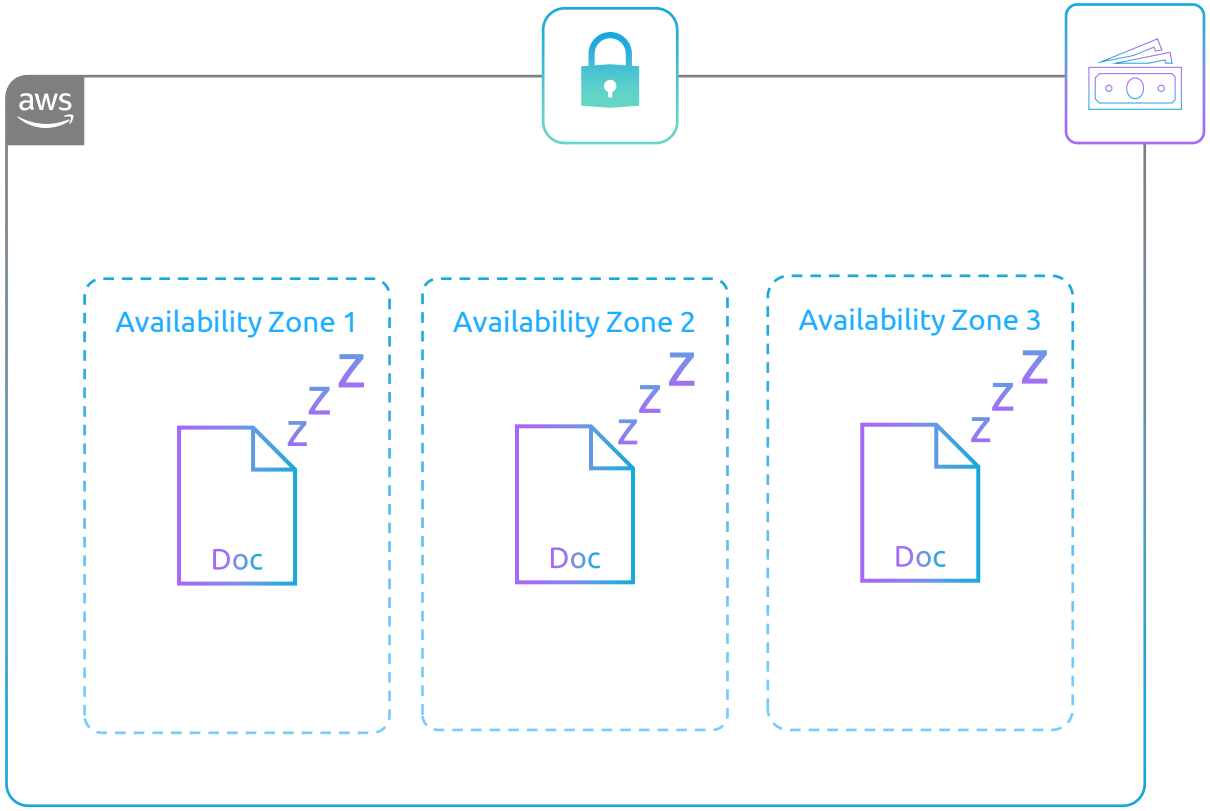
Has a retrieval fee

Minimum duration charge of 90 days

Minimum size charge of 40 KB per object



Charged per GB



Options

Standard : 12 Hours

Bulk : 48 Hours

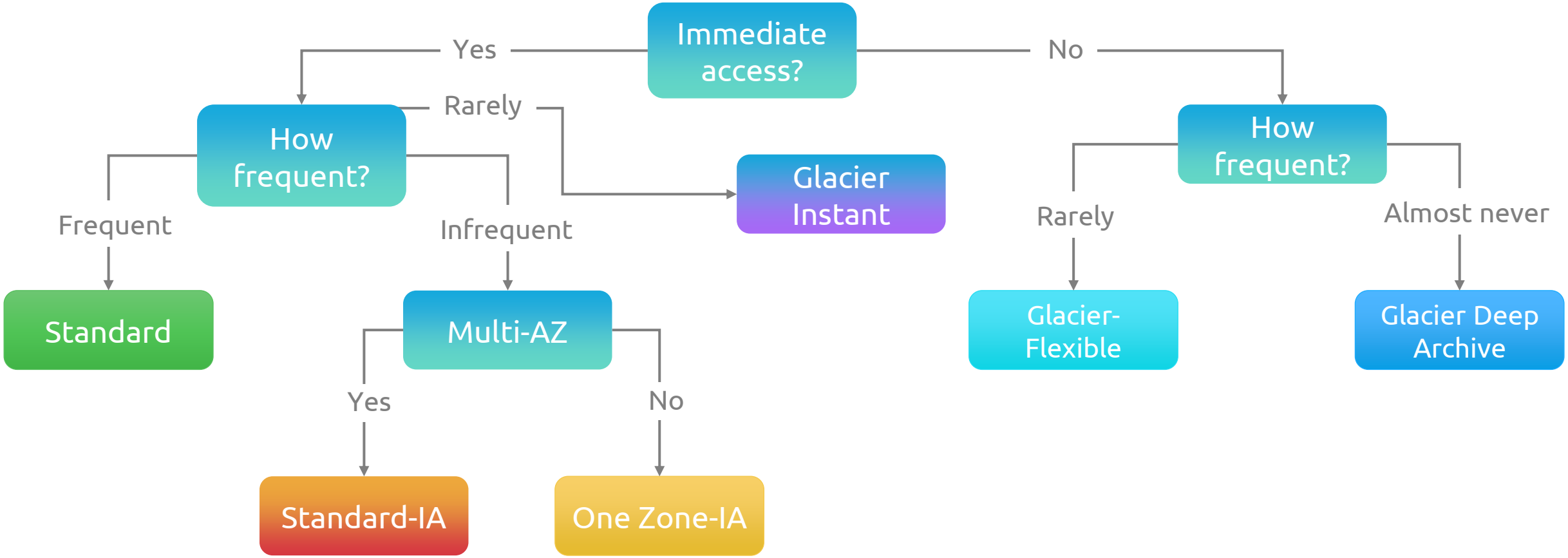
S3 Intelligent-Tiering

01

Automatically reduces storage costs by intelligently moving data to the most cost-effective access tier

02

Apart from the cost of a storage class an object gets assigned to, all objects will also incur a monitoring/automation cost per 1,000 objects



Object Storage (S3) - Summary

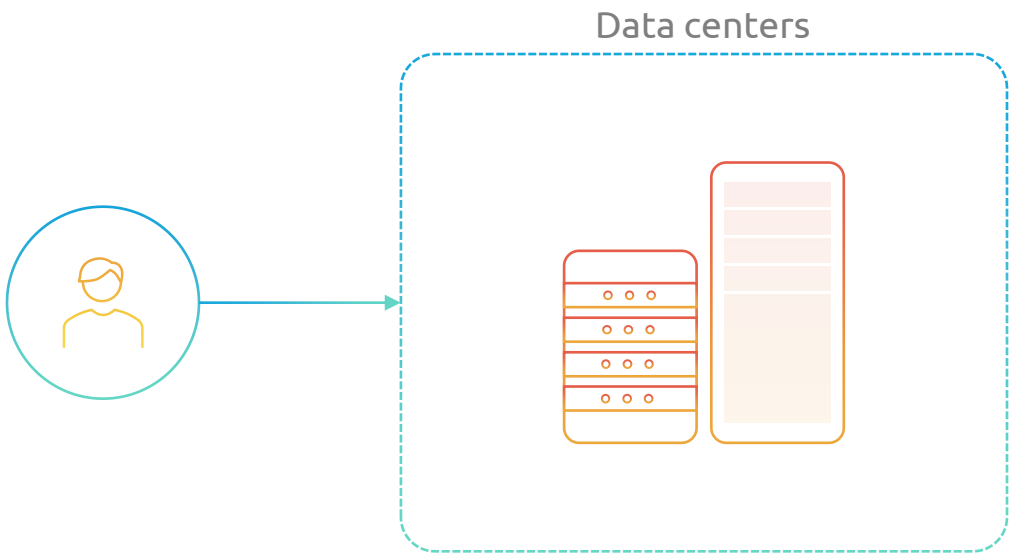
- Objects are just files
- Flat file structure (no folders); but they look like folders
- Great for storing media files, logs, audit reports or basically any file you want.
- API storage so it cannot be and should not be mounted or boot.
- Storage classes impact accessibility, resiliency, and cost

Core AWS Services
Compute

Compute

Servers are needed to run applications.

Deploying an Application

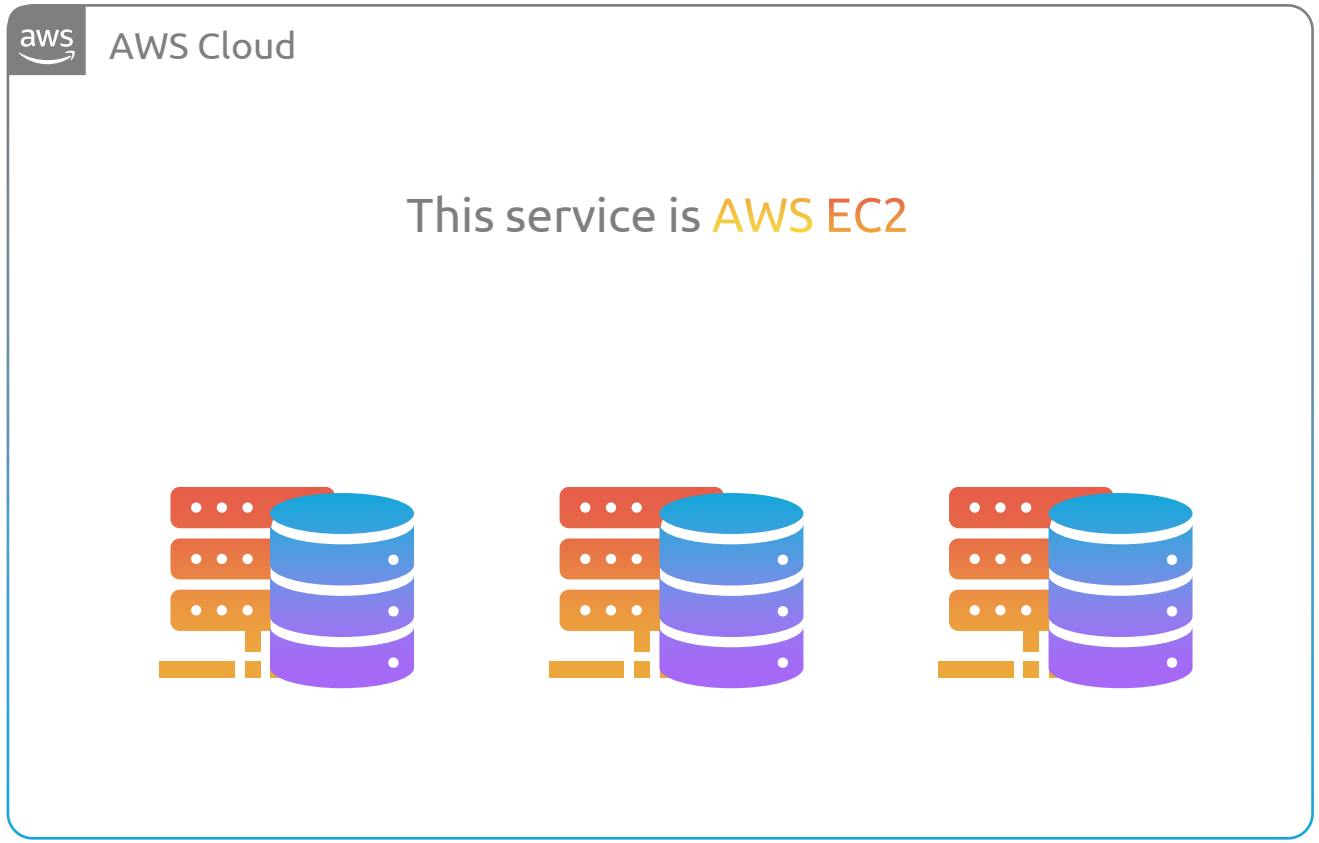


This process could take days if not weeks.

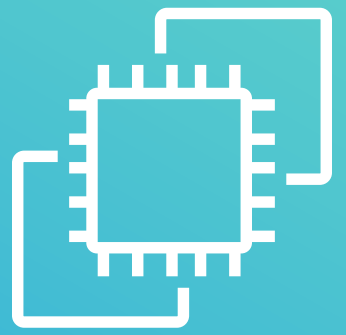
- Purchase a server
- Physically rack a server
- Install an operating system
- Handle hardware failures

EC2

Provision a server with the proper specs needed to run our application (# of CPUs, memory, storage)



- Service that provides secure, resizable compute capacity in the cloud
- EC2 allows you to provision a server on AWS within minutes

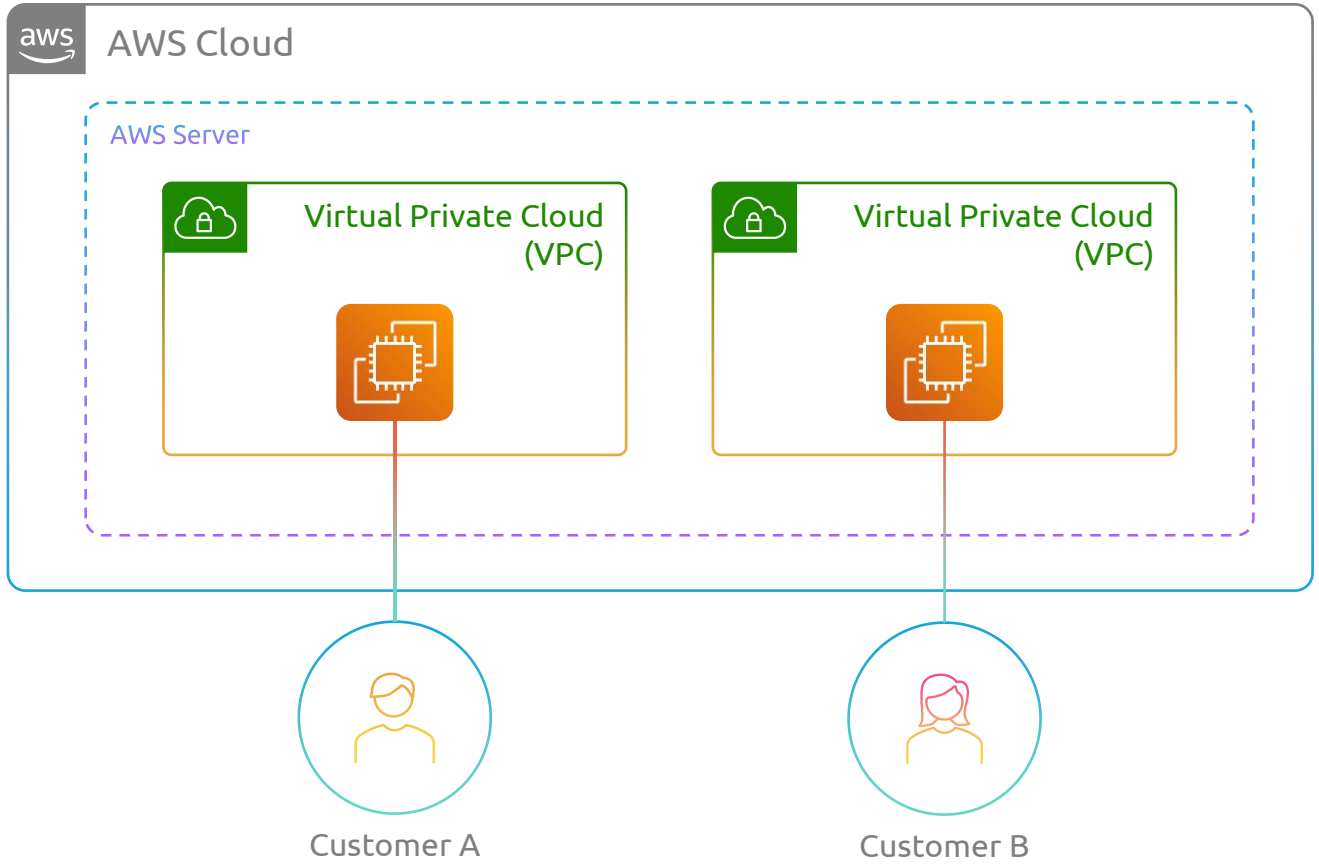


Amazon Elastic Compute Cloud (Amazon EC2)

EC2

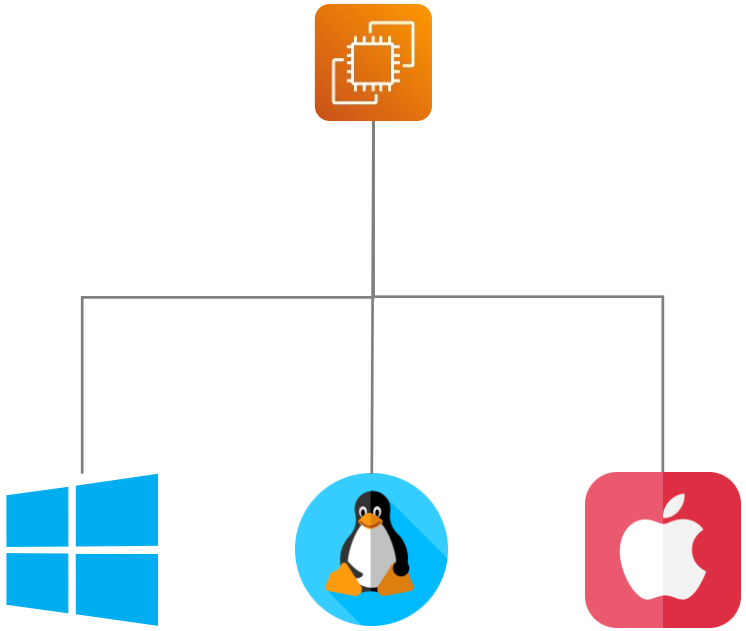
Multiple EC2 instances can be deployed on a single server using virtual machines

VPCs are used to logically isolate each customer's infrastructure



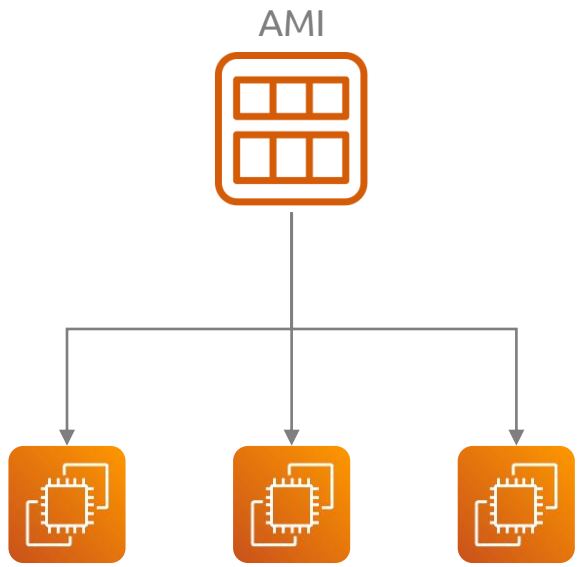
Images

How do we specify what operating system the EC2 instance will use?



Amazon Machine Image (AMI)

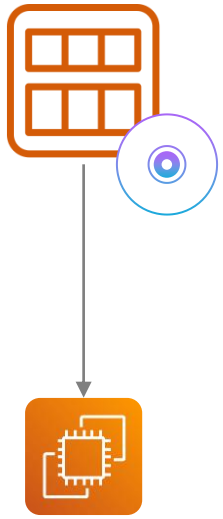
- AMI is an image that provides the information required to launch an EC2 instance
- AMI is a blueprint that contains information such as what operating system and what software/packages should be installed on an instance
- We can use this blueprint (AMI) to deploy identical EC2 instances



Amazon Machine Image (AMI)

- Think of the AMI as an installer disk used for installing a new server

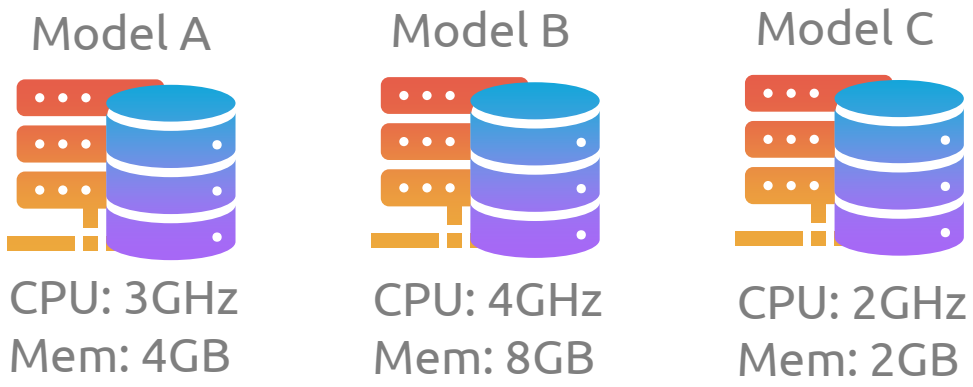
- AMIs can be fully customized to:
  - Add application source code
  - Add dependencies
  - Customize OS firewall



Instance Types

Instance Types

- EC2 provides a wide selection of instance types optimized to fit different use cases
- Instance types have varying combinations of CPU, memory, storage, and networking capacity
- Think of instance types as different types of server models to select from



Instance Types

General Purpose

- Provide a good balance of compute, memory, and networking resources
- Can be used for diverse workloads
- Ideal for applications that use resources in equal proportions

Compute Optimized

- Optimized for compute-heavy applications
- Contain high-performance CPUs
- Ideal for batch processing workloads, media transcoding, machine learning, and gaming servers

Instance Types

Memory Optimized

- Deliver fast performance for memory-intensive workloads
- Suited for databases

Storage Optimized

- Optimized for workloads that require high, sequential read & write access to large data sets on local storage
- Can deliver tens of thousands of low-latency, random I/O operations per second (IOPS)

Instance Types

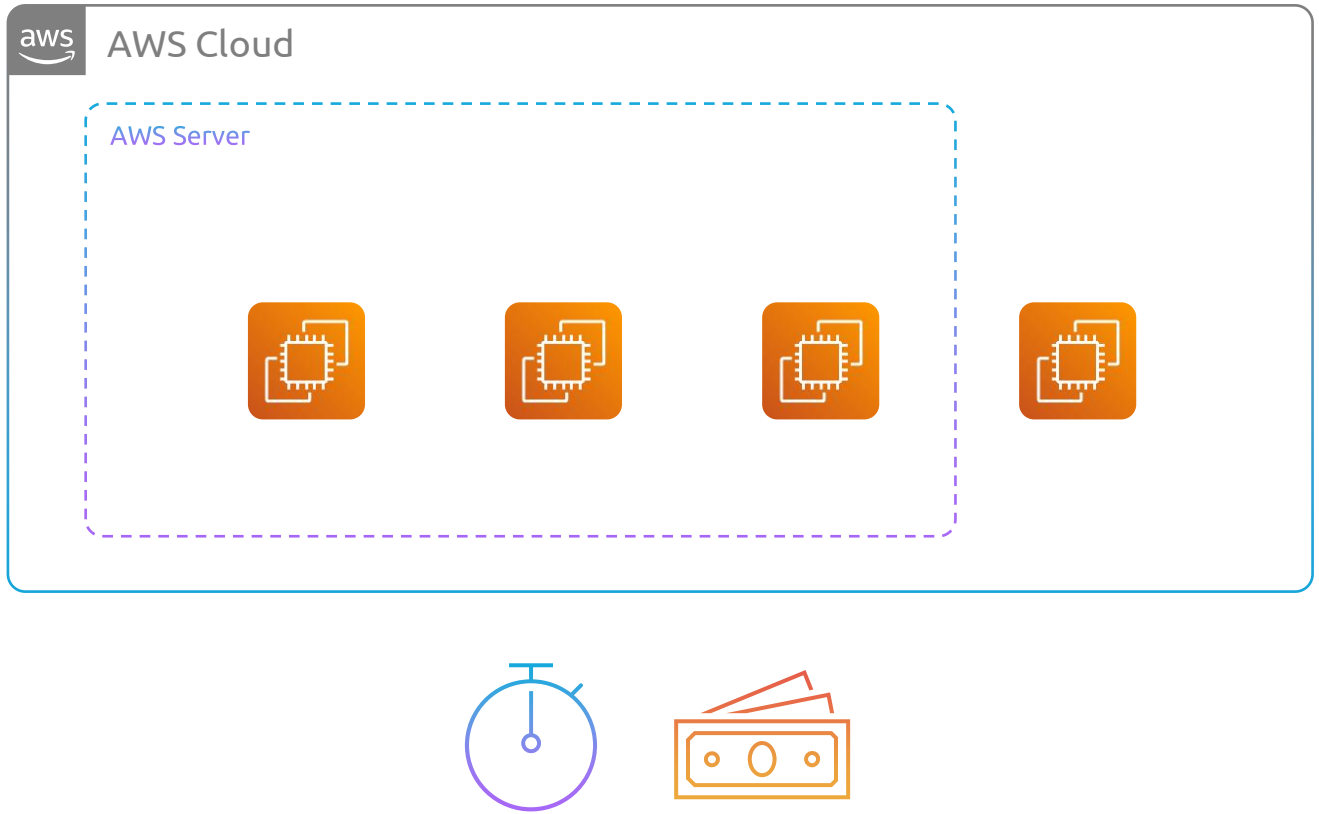
Accelerated Computing

- Utilize hardware accelerators to perform expensive calculations
- Great for graphics processing and data pattern matching

EC2 Pricing Options

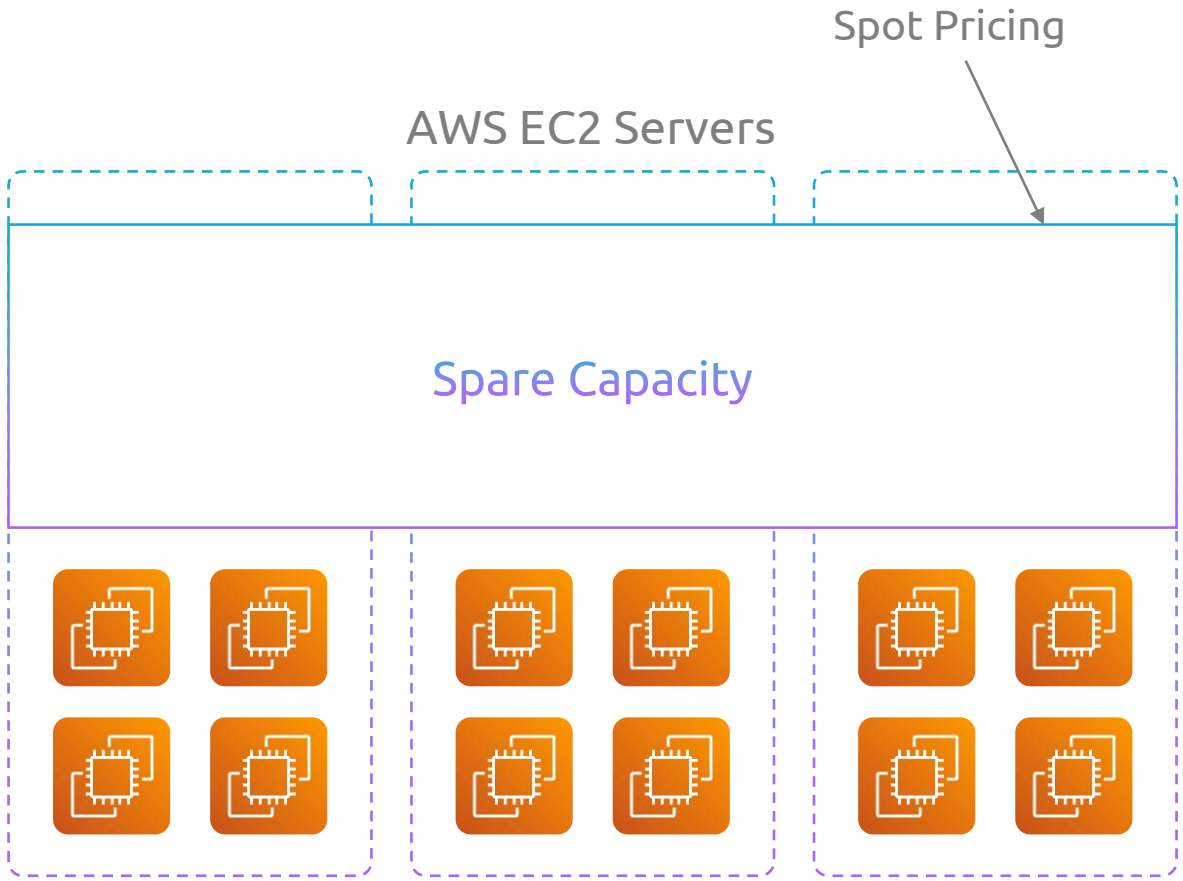
On-Demand Pricing

- Pay for compute capacity by the hour
- Only billed when instance is running
  - Still charged for storage attached to instance
- No upfront payment or long-term commitment
- Great for short-term, irregular, or unpredictable workloads
- Customer EC2 instances run on shared hosts



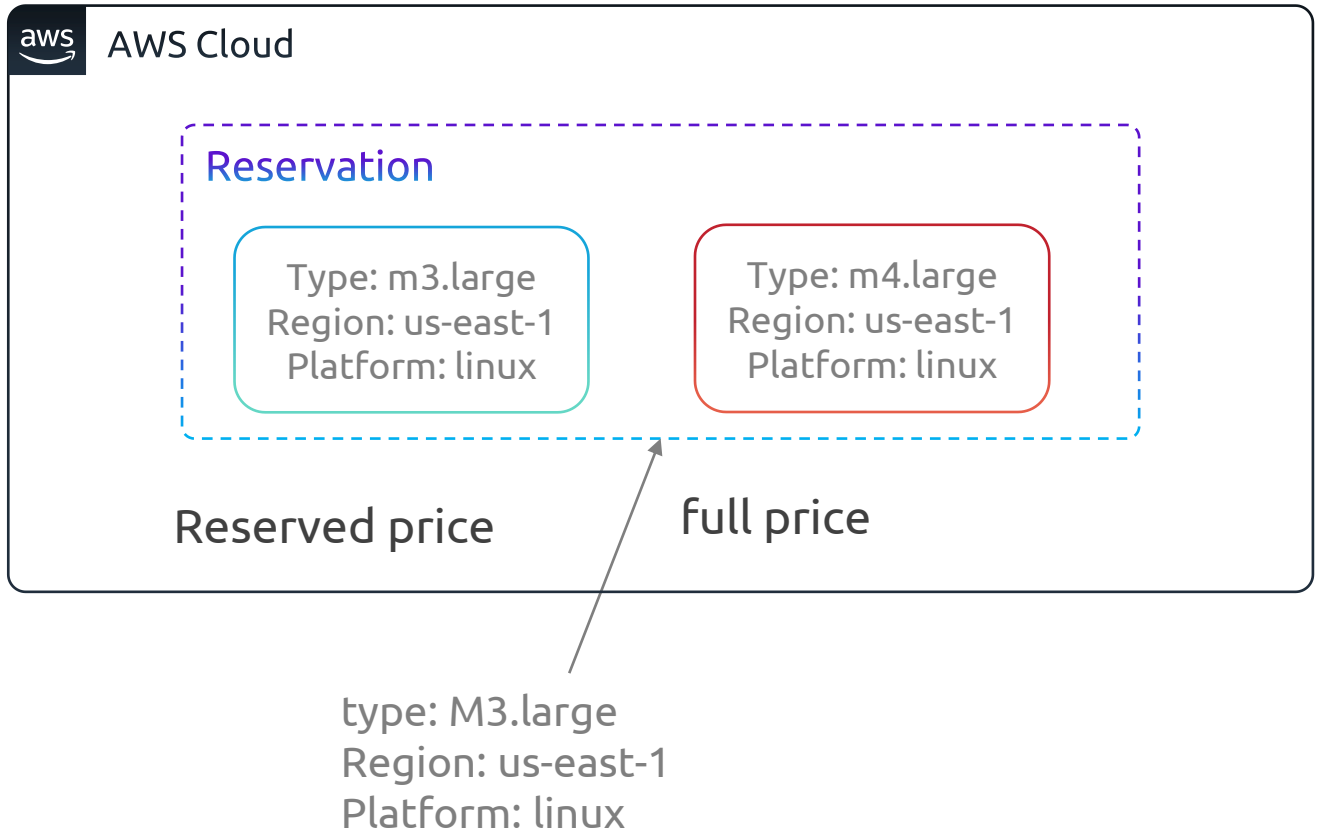
Spot Pricing

- Amazon offers spare compute capacity at discounted rates
- Spot instances are recommended for
  - Applications that have flexible start time and end time
  - Applications that need low compute prices
- Not suited for workloads that cannot tolerate interruptions



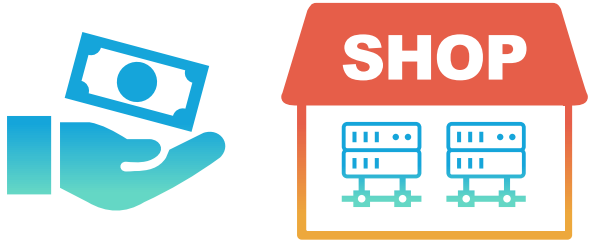
Reserve Pricing

- Reserve instance is a billing discount that allows you to save on your EC2 costs
- Offers discounted rates when reserved for a certain period (1-year or 3-year contract)
- When purchasing a reserved instance, you are not actually buying an instance
- You are merely you committing to using an on-demand instance for a long-term period
- When you deploy an on-demand instance with matching attributes as the reservation(instance type, region, platform), it will be charged at the reserved price and not the default



Reserved Pricing

Standard

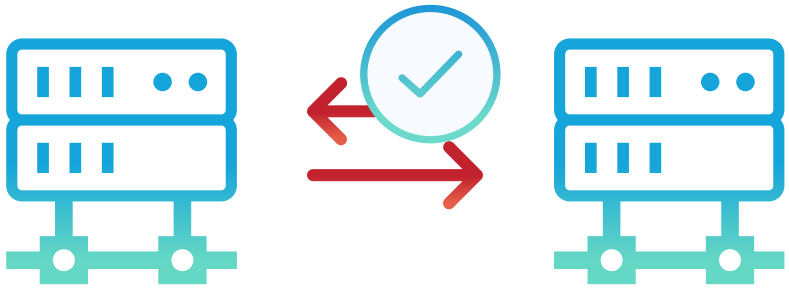


Two offering Classes

- Standard class
  - Can't be exchanged (certain attributes can be modified)
    - Stuck with one instance family
  - Can be sold in the Reserved Instance Marketplace
  - Can be bought in the Reserved Instance Marketplace
  - More savings with Standard class

Reserved Pricing

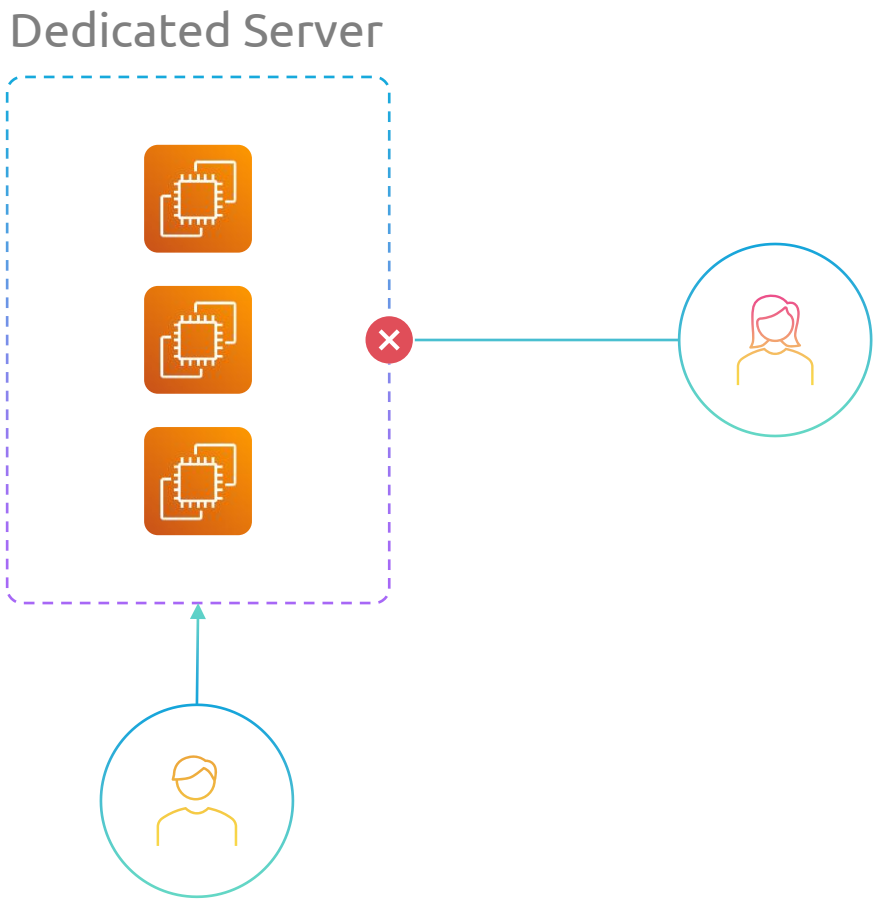
Convertible



- Convertible Class
  - Can be exchanged for another Convertible Reserved instance with a different configuration
    - Different instance family, operating system
  - Can’t be sold on Reserved Instance Marketplace
  - Can’t be bought in the Reserved Instance Marketplace

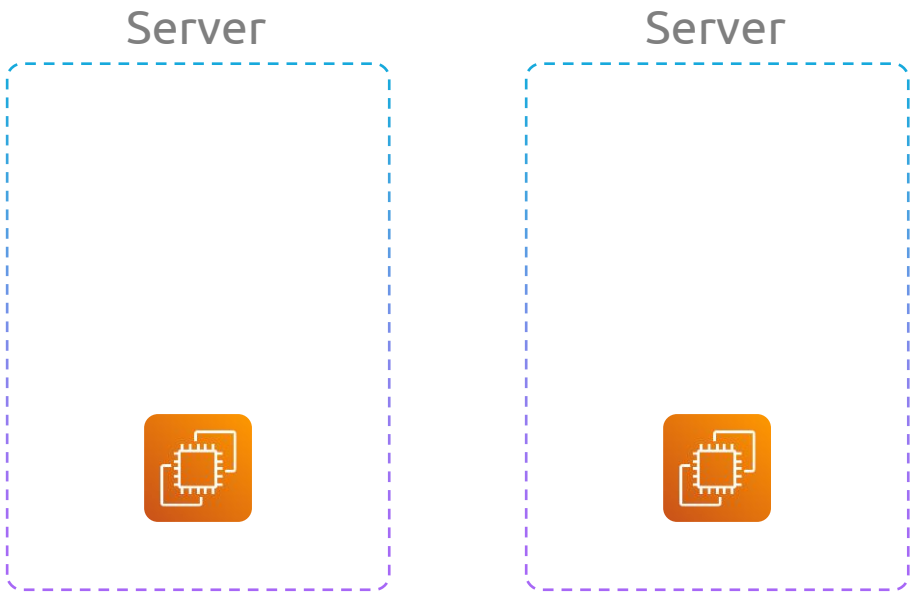
Dedicated Hosts

- A physical EC2 server is dedicated for your use
- Can help reduce costs by allowing you to use your existing server-bound software licenses (Windows server, SQL server, or SUSE Linux Enterprise)
- Can be purchased either On-Demand (hourly) or as a reservation
- Pay for the host; there is no per instance charge



Dedicated Instance

- Only your instances run on a physical server
- If an instance is stopped and then started, it could move to a different host
- With dedicated Host, you always have the same physical machine



Elastic Compute Cloud (EC2) - Summary

- EC2 allows you to provision a server in AWS within minutes
- AMIs are templates for deploying EC2 instances
- AWS has a variety of instance types to support all your computing needs(Memory, Compute, Storage optimized)
- AWS supports a wide variety of Operating Systems from RHEL, SUSE, Ubuntu, Amazon Linux and Windows
- AWS also offers a variety of processors from ARM to AMD to Intel.
- AWS marketplace has thousands of AMIs that offer a variety of prebuilt services(NGINX, Palo Alto Firewall, MongoDB)

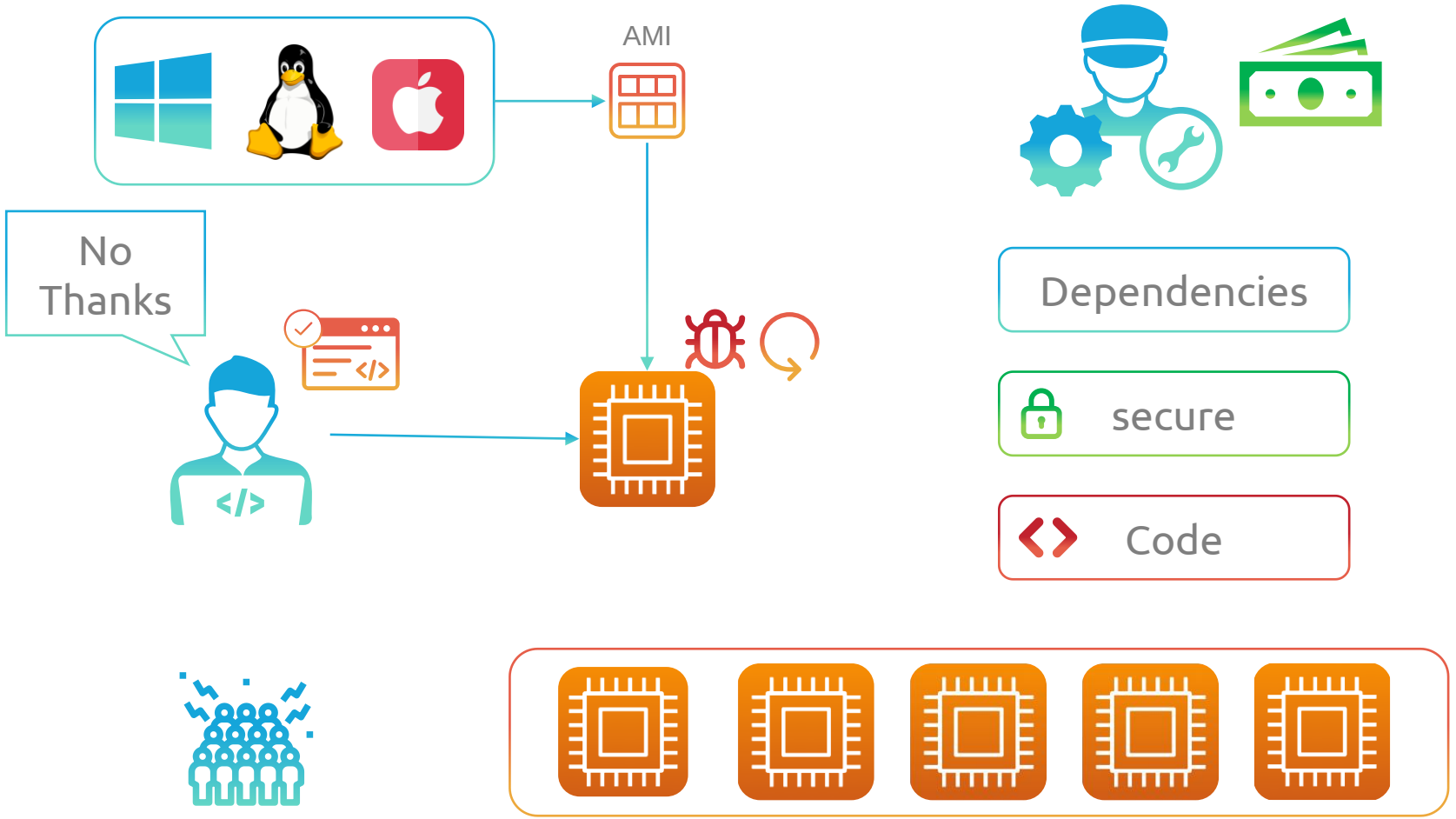
Elastic Compute Cloud (EC2) - Summary

- OnDemand Pricing – Pay for what you use, only billed when instance is running
- Spot Pricing – discounted rates when Amazon has space capacity
- Workloads on Spot Pricing need to tolerate interruptions
- Reserved Pricing – Discounted rates when reserved for long periods of time(1-3 years)
- Dedicated Host – Reserves an entire host(physical server) for you.
- Dedicated instance – Only your instances run on a server, but that server can change if instances are stopped/started

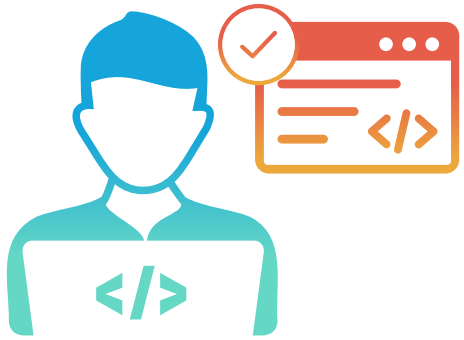
Lambda

AWS Lambda

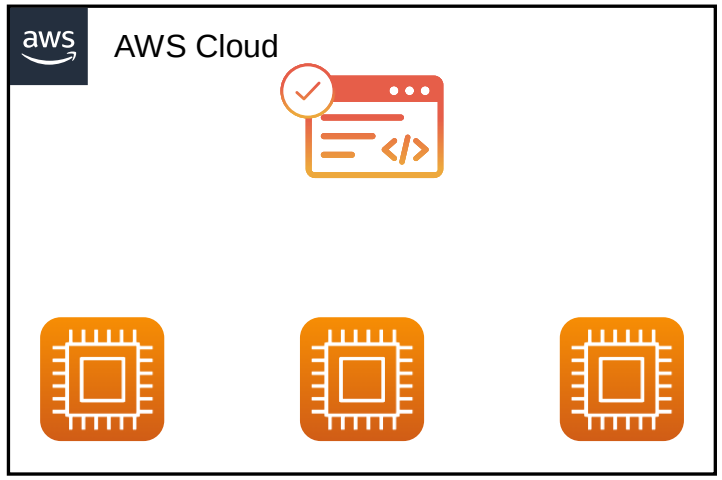
Deploying Application On AWS



Deploying applications on AWS



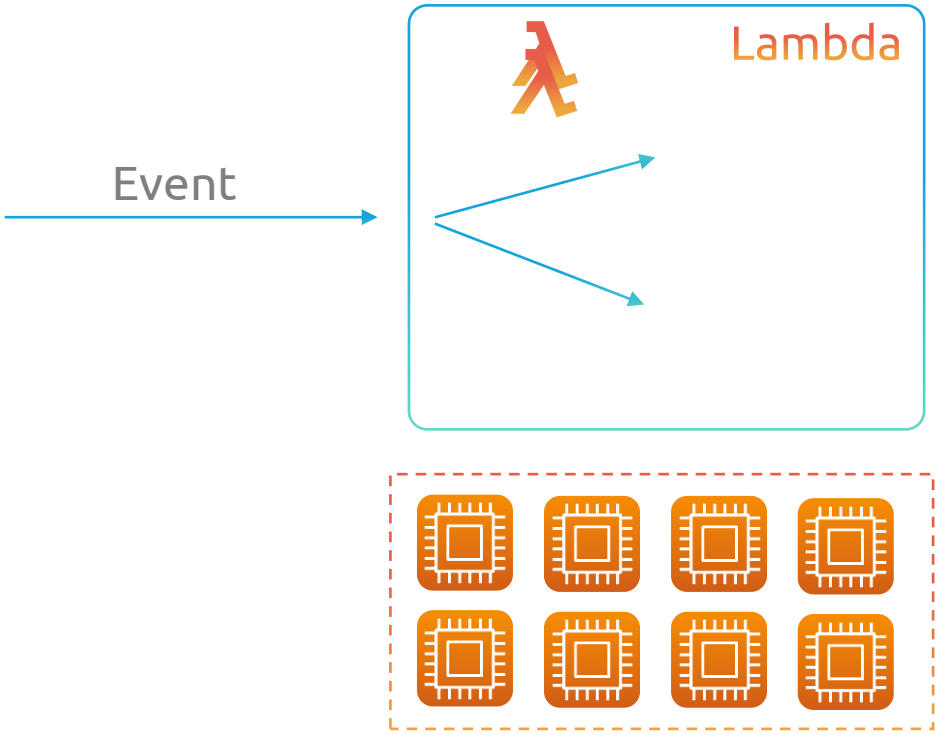
What is lambda



- AWS Lambda is a compute service that lets you run code without having to provision or manage servers

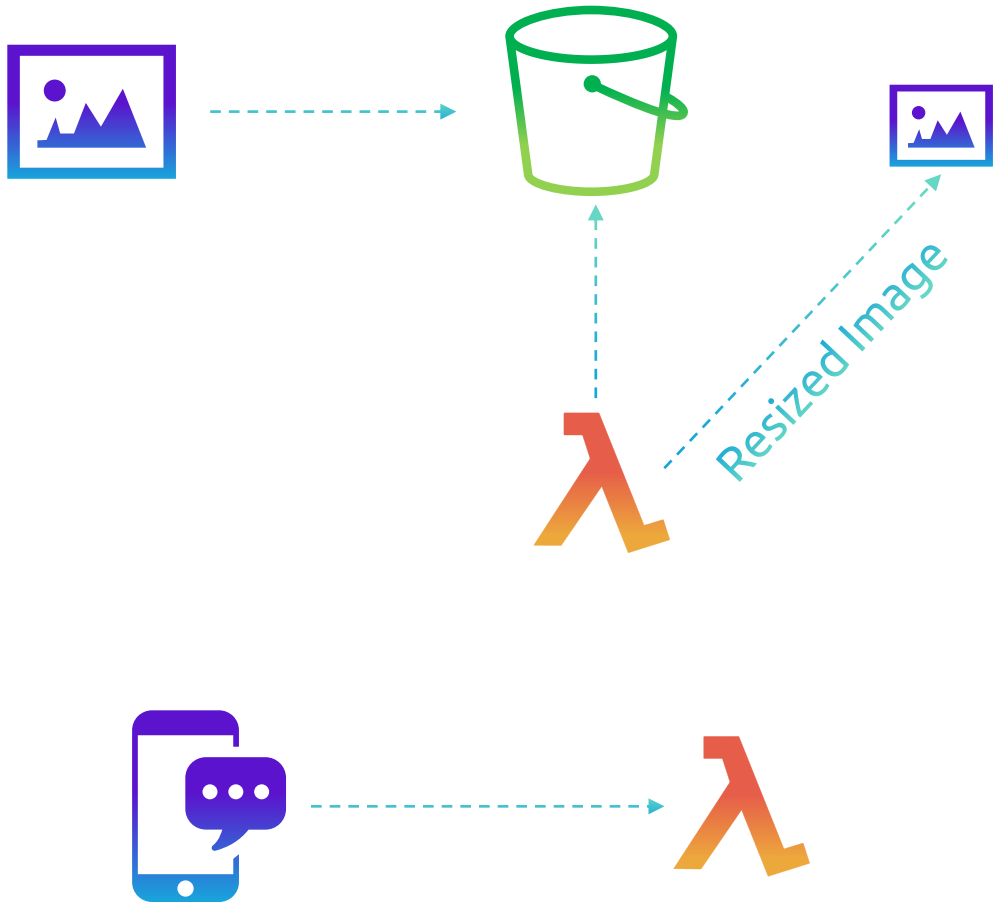
- Lambda is AWS' serverless offering
  - AWS manages the server maintenance, scaling, capacity provisioning, and logging

Serverless



- Does serverless mean there's no servers?
- No, to run an application there will always need to be a server

Lambda Use cases



- File Processing
- Stream Processing
- Web application
- Mobile/Web Backend

Lambda

Lambda Function

Terminal

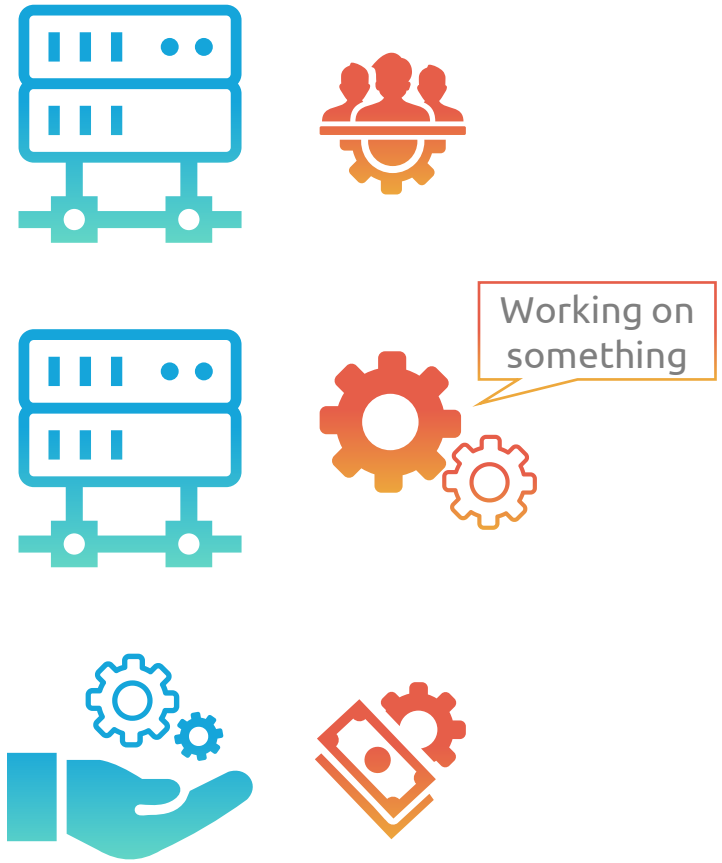
```
exports.handler = async function
(event, context) {
  console.log("Lambda function ran");
  return;
};
```

Trigger

- ✓ Upload file S3
- ✓ Request to API Gateway
- ✓ DynamoDB update

Event

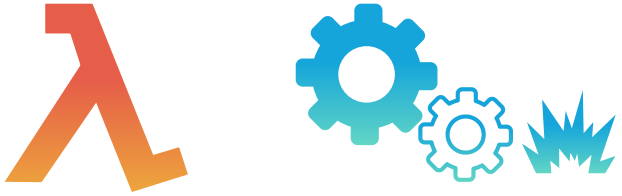
Benefits of Lambda



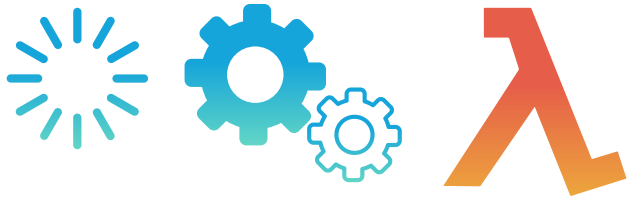
- No servers to manage
  - No need for an infra team
  - No patching/upgrading
  - Faster development
- Auto scale to handle traffic spikes
- Pay for what you use
  - Pay per invocation
  - No extra cost during low traffic

Downsides of Lambda

- No local state
  - Will need a separate database to store data that needs to persist



- Limited execution duration
  - Function can run at most for 15 minutes
  - Not good for long running tasks



- Cold starts
  - Cold starts occur due to the time it takes to initialize and load the function
  - SnapStart and provisioned concurrency helps mitigate cold starts

Lambda Pricing

- Number of times function ran
- How long did it run for
- How much memory/cpu did it require

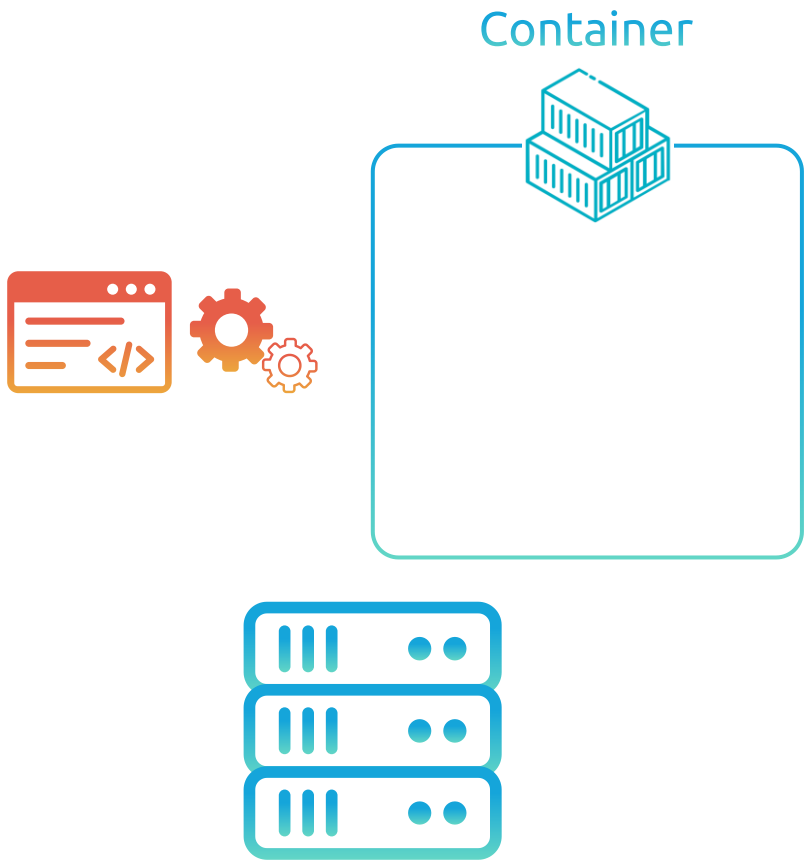
Lambda - Summary

- AWS Lambda is a compute service that lets you run code without having to provision or manage servers
- AWS manages the server maintenance, scaling, capacity provisioning, and logging
- Use cases include file processing, mobile and web backend
- Autoscales to handle spike in traffic
- Pay per invocation, only pay for what you use

Containers

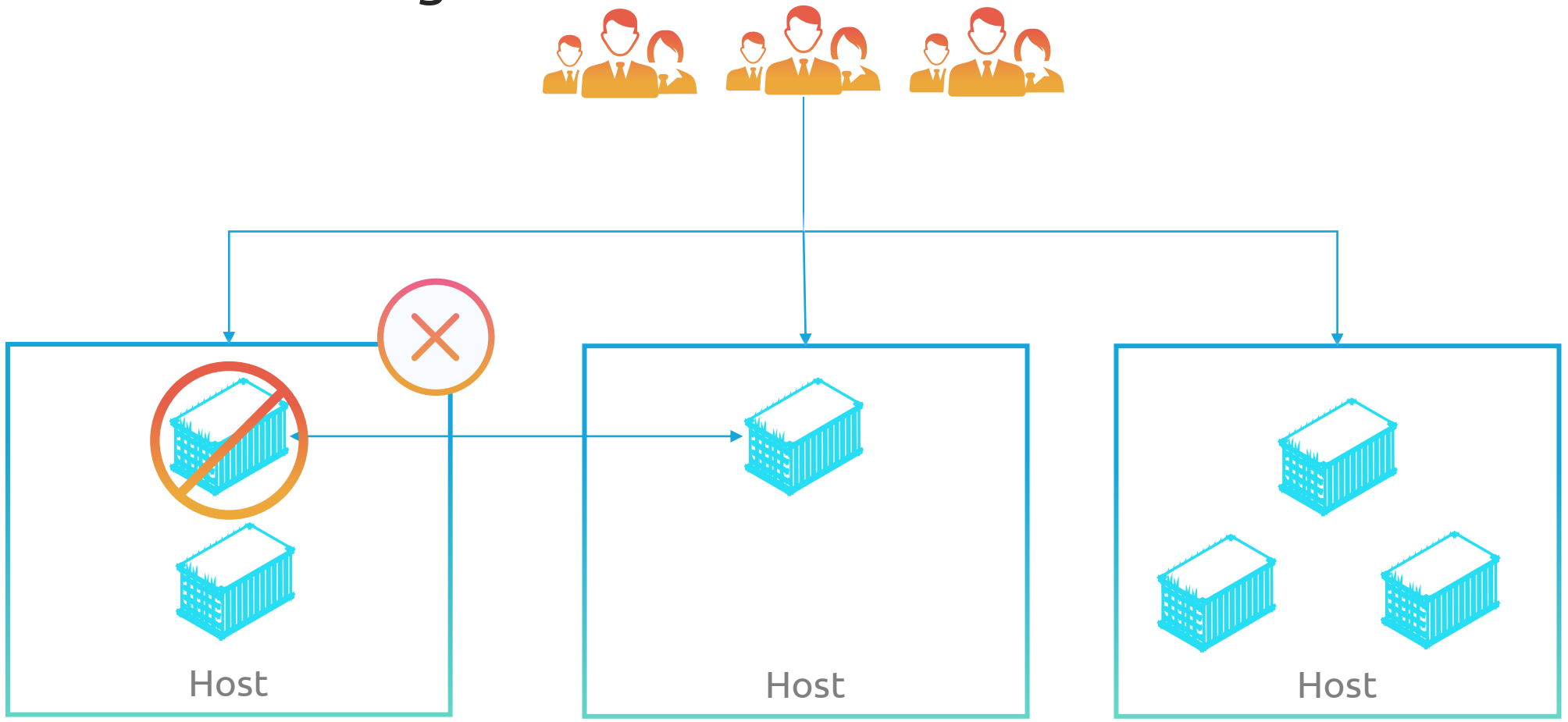
Containers with ECS & EKS

What are containers



- Containers are a tool that allows you to package an application and all of the necessary files, libraries, and dependencies the application needs to run
- Containers can be deployed on a machine and since they have everything the application needs to run there is nothing else that needs to be done
- Think of containers as small lightweight versions of virtual machines

Container Challenges



Container Orchestrators

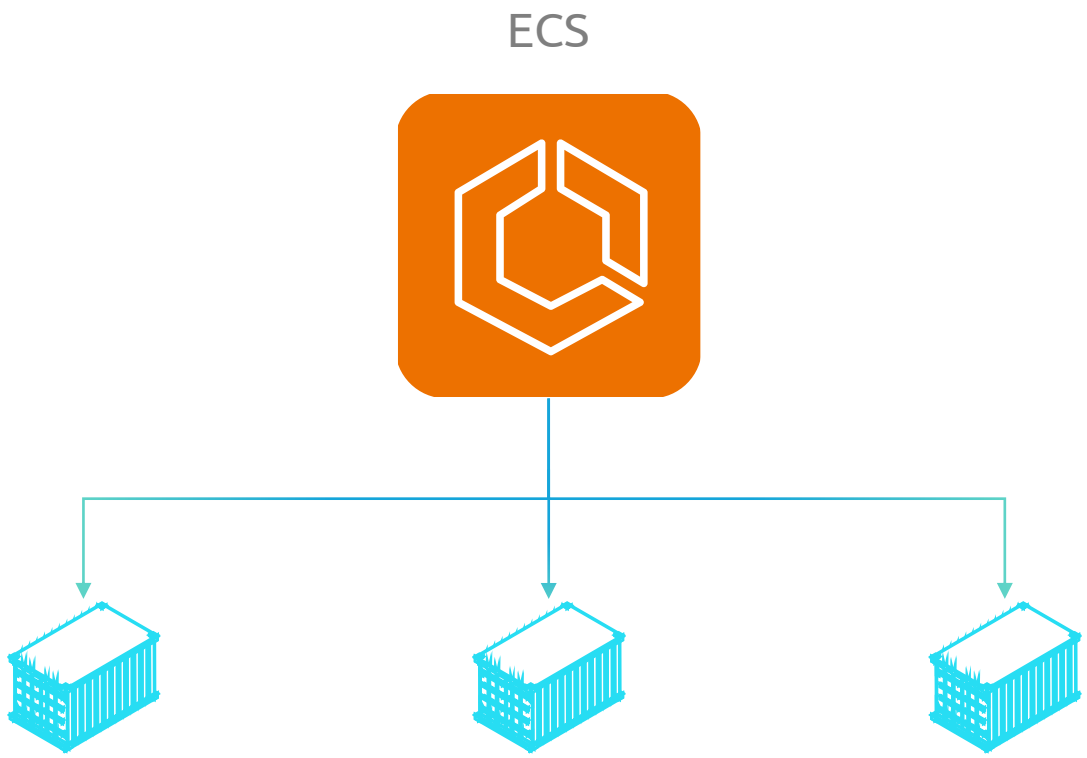
Kubernetes

Apache Mesos

ECS

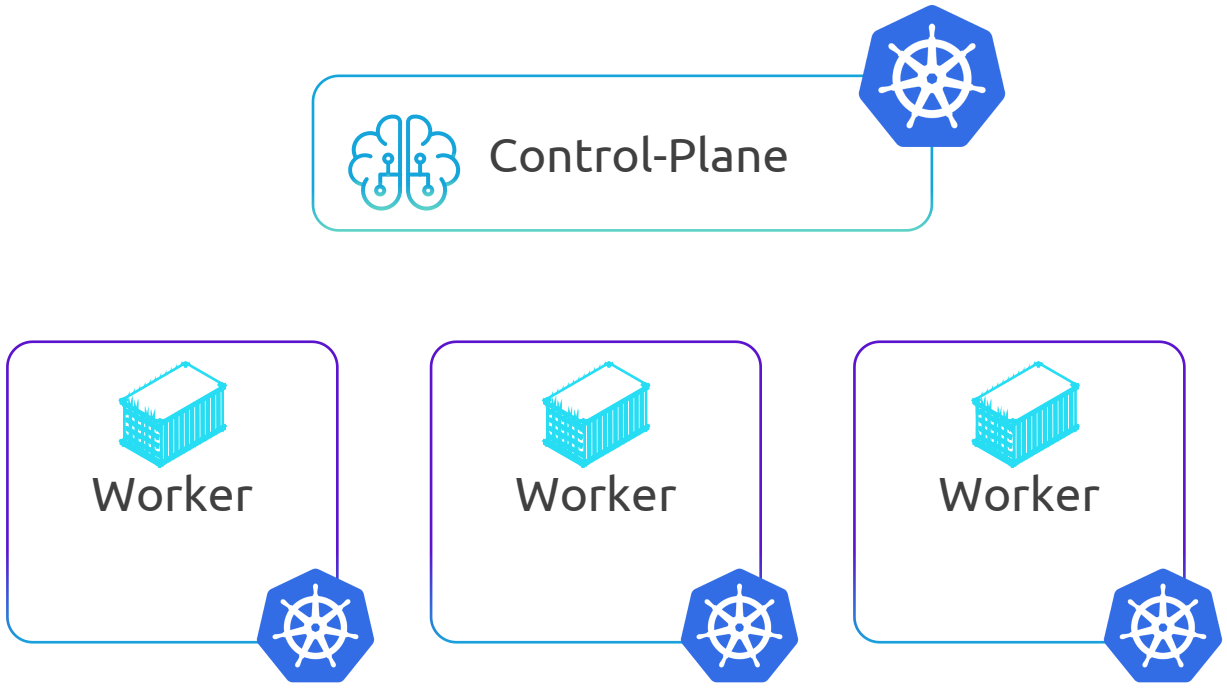
- Container orchestrators are the brains of a containerized environments
- Responsibilities include:
  - Deploying containers across all available servers
  - Load-balancing requests to containers
  - Providing container to container connectivity
  - Restarting failed containers
  - Moving containers when hosts fail

Elastic Container Service (ECS)



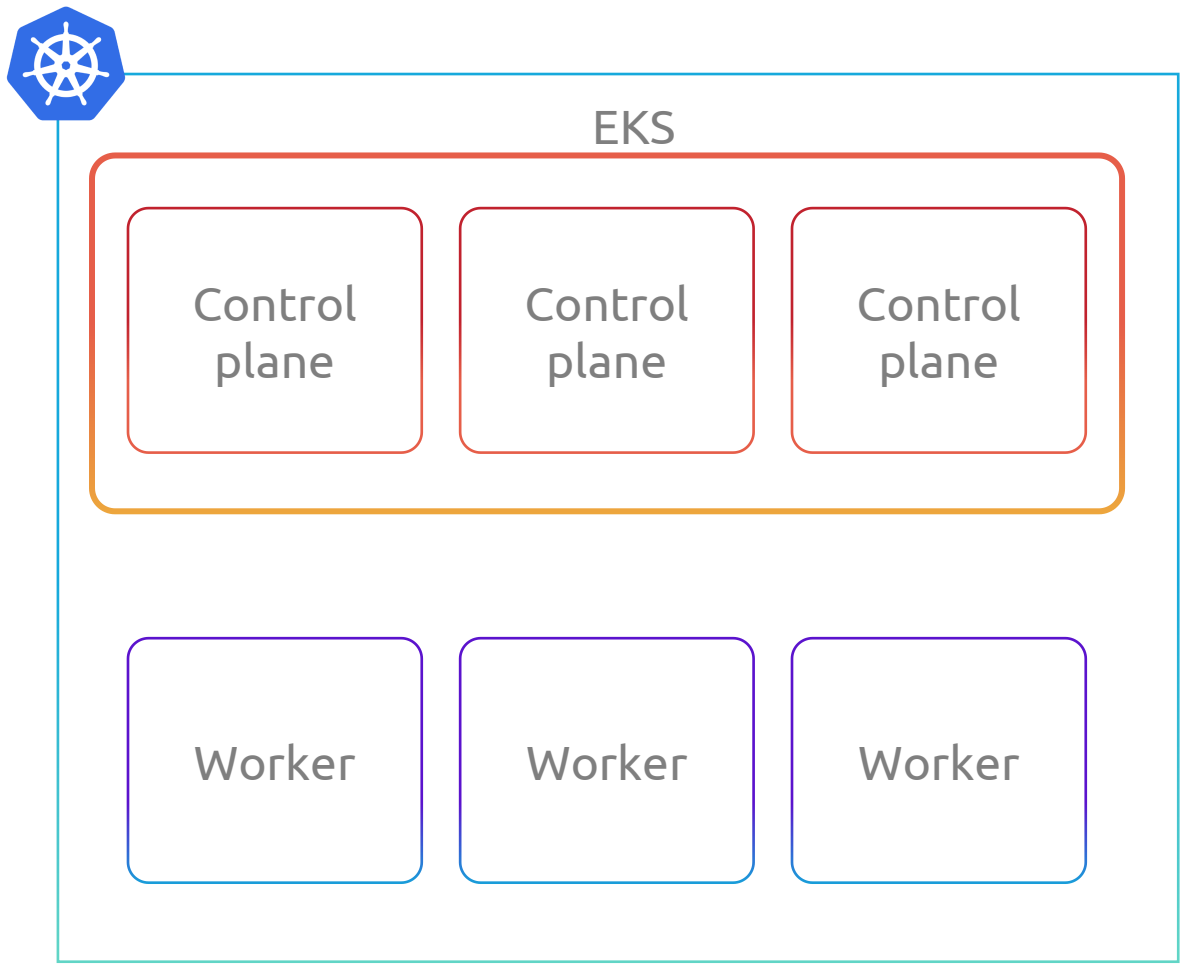
- Fully managed container orchestration service that helps manage, and scale containerized applications
  - ECS is managed by AWS
  - Containers run on EC2 instances or Fargate
- ECS is proprietary software (only available on AWS)
  - Migrating to a different cloud provider will be more difficult

Kubernetes



- Kubernetes is an open-source container orchestrator
- Kubernetes cluster has two types of nodes
  - Control-plane nodes – managers of the cluster
    - Watch over cluster and make sure cluster is kept in a working state
  - Worker nodes – responsible for actually running the containerized workloads

Elastic Kubernetes Service (EKS)



- Users are responsible for managing both the control-plane and worker nodes
- Managing control-plane/master nodes is difficult
  - Running & scaling control-plane
  - Properly securing control-plane
- AWS Elastic Kubernetes Service (EKS) is a managed Kubernetes service
  - EKS manages the control-plane for you
  - Users are still responsible for managing worker nodes
    - Unless they decide to use Fargate(AWS will manage nodes)

Benefits of EKS

- Runs & scales control-plane across multiple Availability Zones
- Scales control-plane instances based on load
- Can integrate with other AWS services
  - IAM for authentication
  - Elastic load Balancer
  - ECR for container images

AWS Identity and Access Management (IAM)

Elastic Load Balancing

Amazon Elastic Container Registry (Amazon ECR)

ECS vs EKS

- ECS is proprietary to AWS so migrating to another cloud provider can be difficult
- EKS is Kubernetes which is open source and can be run on any platform
  - Keep in mind the more aws services you configure your cluster to interact with the harder it will be to move to another provider
- ECS has a simpler architecture
  - Simpler API
  - Easier to ramp up new team members
- Kubernetes is very complex and has a steep learning curve
  - With EKS you'll have to learn Kubernetes as well as EKS specific features
- Kubernetes has a larger community
  - More support online
  - More tooling like Helm/Kustomize/ArgoCD
- ECS Pricing – no cost for control-plane, only pay for infrastructure running applications (EC2/Fargate, EBS)
- EKS Pricing – more expensive, you have to pay for control-plane and worker-nodes/Fargate

Containers – Summary

- Containers are a tool that allows you to package an application and all of the necessary files, libraries, and dependencies the application needs to run
- Container orchestrators deploy, manage, and scale containerized applications
- ECS is simple managed container orchestrator provided by AWS
- Kubernetes is an open source container orchestrator
- EKS is a managed Kubernetes service – where AWS manages the control plane for you

KodeKloud