

AWS
**CLOUD
PRACTITIONER
ESSENTIALS**



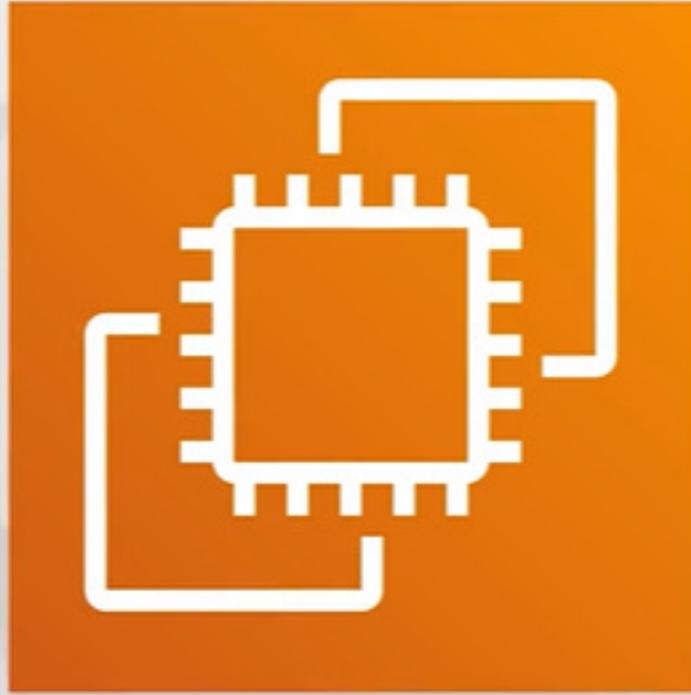
AWS service offerings

- Robot development
- Video production
- Orbit
- Blockchain
- Machine learning
- Artificial intelligence



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Amazon Elastic Compute Cloud
(Amazon EC2)



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PUMPKIN
MONSTER
SPICE



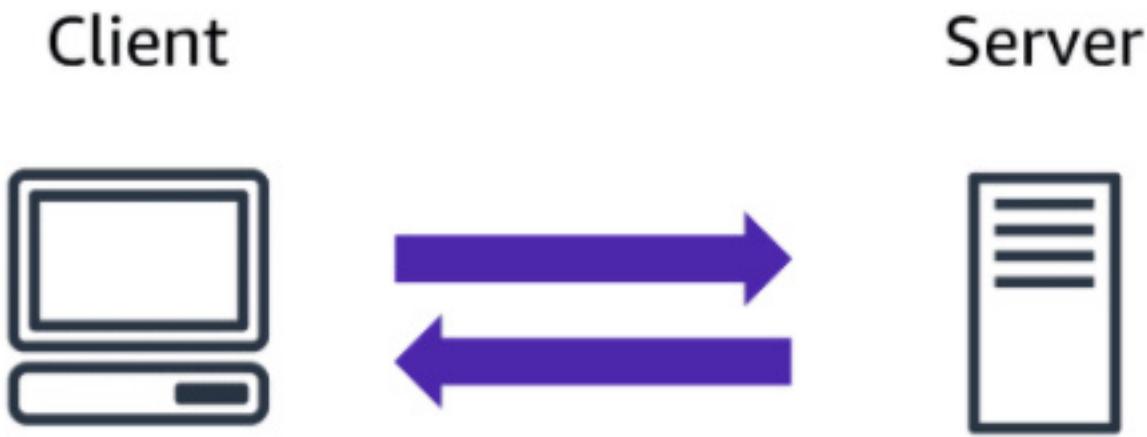


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SPICE

What is a client-server model?

You just learned more about AWS and how almost all of modern computing uses a basic client-server model. Let's recap what a client-server model is.

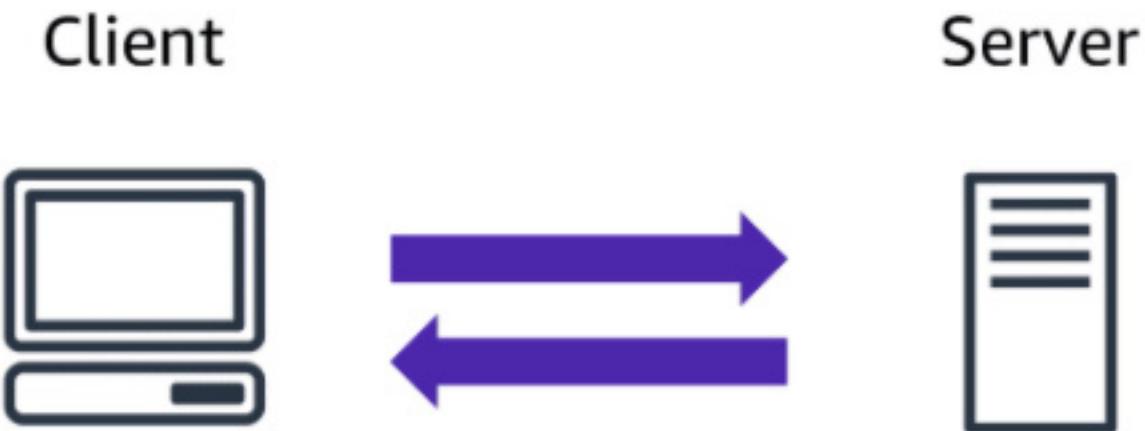


In computing, a **client** can be a web browser or desktop application that a person interacts with to make requests to computer servers. A **server** can provide services such as Amazon Elastic Compute Cloud (Amazon EC2), a type of virtual server.

For example, suppose that a client makes a request for a news article, the score in an online game, or a funny video. The server evaluates the details of this request and fulfills it by returning the information to the client.

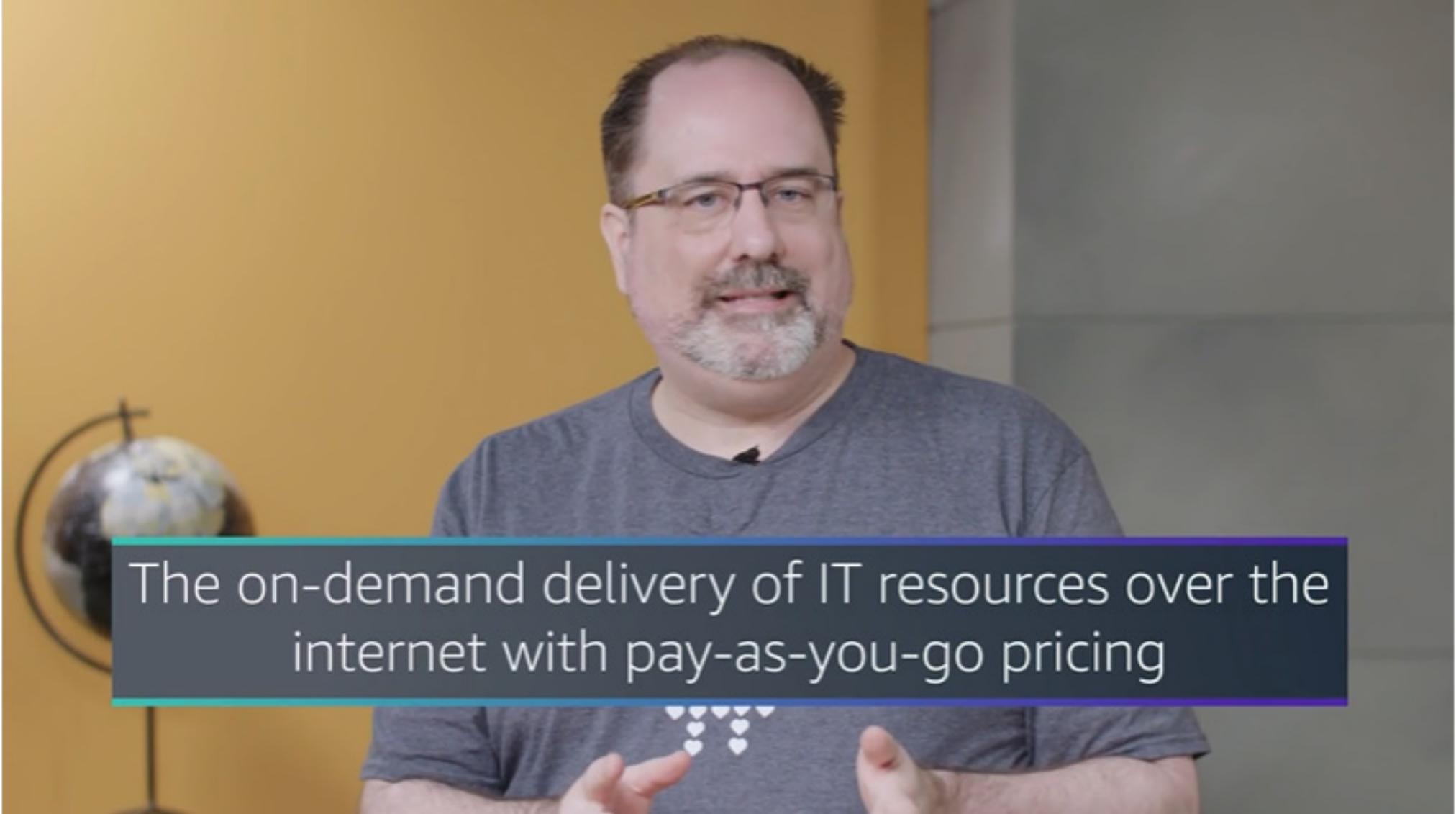
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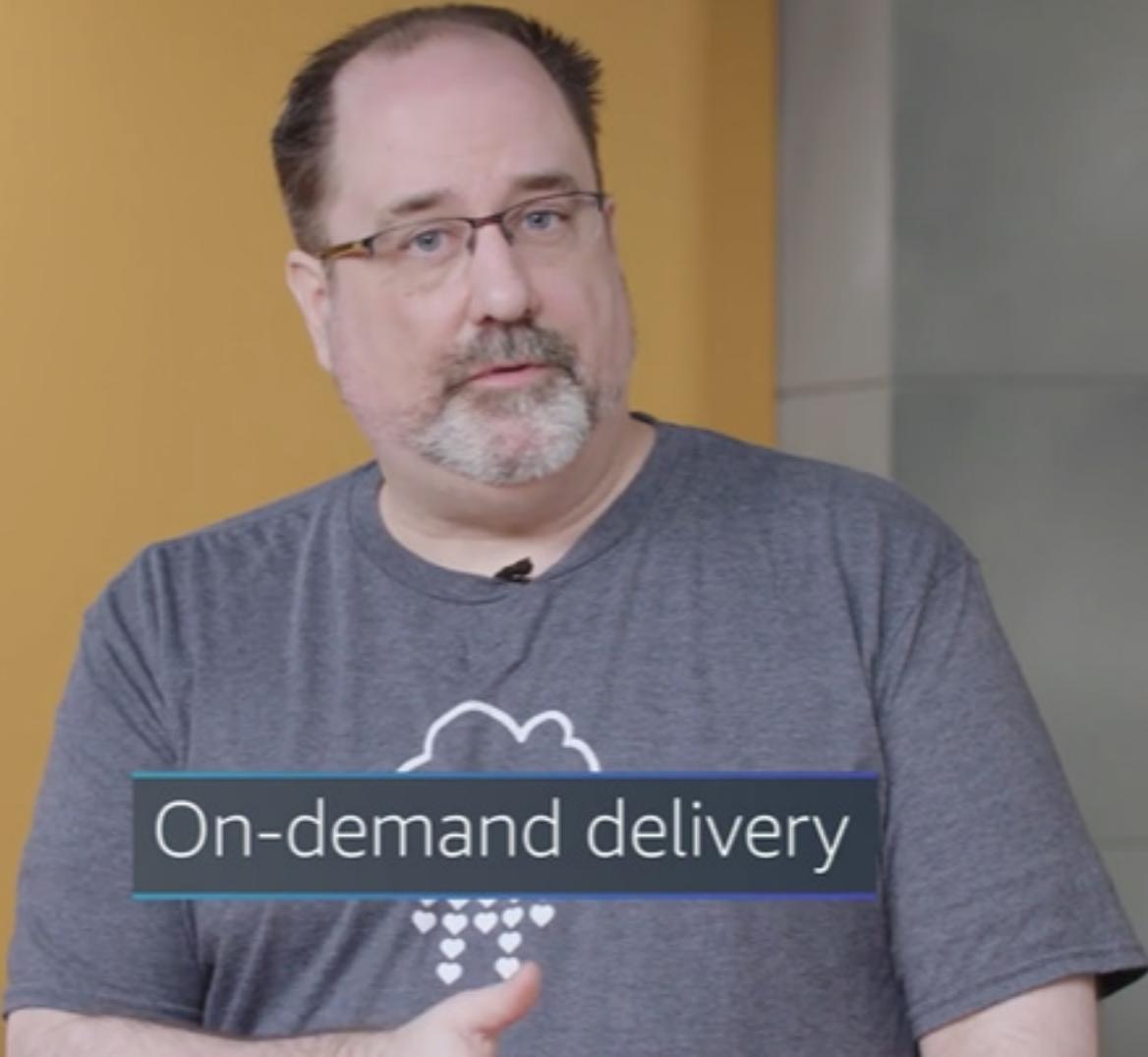


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A middle-aged man with dark hair, a beard, and glasses is speaking. He is wearing a grey t-shirt. Behind him is a yellow wall and a globe on a stand to his left.

The on-demand delivery of IT resources over the internet with pay-as-you-go pricing



On-demand delivery

Select each tab to learn about each category.

CLOUD-BASED DEPLOYMENT

ON-PREMISES DEPLOYMENT

HYBRID DEPLOYMENT

- Run all parts of the application in the cloud.
- Migrate existing applications to the cloud.
- Design and build new applications in the cloud.

In a **cloud-based deployment** model, you can migrate existing applications to the cloud, or you can design and build new applications in the cloud. You can build those applications on low-level infrastructure that requires your IT staff to manage them. Alternatively, you can build them using higher-level services that reduce the management, architecting, and scaling requirements of the core infrastructure.

For example, a company might create an application consisting of virtual servers, databases, and networking components that are fully based in the cloud.

Deployment models for cloud computing

When selecting a cloud strategy, a company must consider factors such as required cloud application components, preferred resource management tools, and any legacy IT infrastructure requirements.

The three cloud computing deployment models are cloud-based, on-premises, and hybrid.

Select each tab to learn about each category.

CLOUD-BASED DEPLOYMENT

ON-PREMISES DEPLOYMENT

HYBRID DEPLOYMENT

- Run all parts of the application in the cloud.
- Migrate existing applications to the cloud

CLOUD-BASED DEPLOYMENT

ON-PREMISES DEPLOYMENT

HYBRID DEPLOYMENT

- Deploy resources by using virtualization and resource management tools.
- Increase resource utilization by using application management and virtualization technologies.

On-premises deployment is also known as a *private cloud* deployment. In this model, resources are deployed on premises by using virtualization and resource management tools.

For example, you might have applications that run on technology that is fully kept in your on-premises data center. Though this model is much like legacy IT infrastructure, its incorporation of application management and virtualization technologies helps to increase resource utilization.

CLOUD-BASED DEPLOYMENT

ON-PREMISES DEPLOYMENT

HYBRID DEPLOYMENT

- Connect cloud-based resources to on-premises infrastructure.
- Integrate cloud-based resources with legacy IT applications.

In a **hybrid deployment**, cloud-based resources are connected to on-premises infrastructure. You might want to use this approach in a number of situations. For example, you have legacy applications that are better maintained on premises, or government regulations require your business to keep certain records on premises.

For example, suppose that a company wants to use cloud services that can automate batch data processing and analytics. However, the company has several legacy applications that are more suitable on premises and will not be migrated to the cloud. With a hybrid deployment, the company would be able to keep the legacy applications on premises while benefiting from the data and analytics services that run in the cloud.

Benefits of cloud computing

Consider why a company might choose to take a particular cloud computing approach when addressing business needs.

Trade upfront expense for variable expense

Upfront expense refers to data centers, physical servers, and other resources that you would need to invest in before using them. Variable expense means you only pay for computing resources you consume instead of investing heavily in data centers and servers before you know how you're going to use them.

By taking a cloud computing approach that offers the benefit of variable expense, companies can implement innovative solutions while saving on costs.

Stop spending money to run and maintain data centers

Computing in data centers often requires you to spend more money and time managing infrastructure and servers.

A benefit of cloud computing is the ability to focus less on these tasks and more on your applications and customers.

Stop guessing capacity

With cloud computing, you don't have to predict how much infrastructure capacity you will need before deploying an application.

For example, you can launch Amazon EC2 instances when needed, and pay only for the compute time you use. Instead of paying for unused resources or having to deal with limited capacity, you can access only the capacity that you need. You can also scale in or scale out in response to demand.

Benefit from massive economies of scale

By using cloud computing, you can achieve a lower variable cost than you can get on your own.

Because usage from hundreds of thousands of customers can aggregate in the cloud, providers, such as AWS, can achieve higher economies of scale. The economy of scale translates into lower pay-as-you-go prices.

Increase speed and agility

The flexibility of cloud computing makes it easier for you to develop and deploy applications.

This flexibility provides you with more time to experiment and innovate. When computing in data centers, it may take weeks to obtain new resources that you need. By comparison, cloud computing enables you to access new resources within minutes.

Go global in minutes

The global footprint of the AWS Cloud enables you to deploy applications to customers around the world quickly, while providing them with low latency. This means that even if you are located in a different part of the world than your customers, customers are able to access your applications with minimal delays.

Later in this course, you will explore the AWS global infrastructure in greater detail. You will examine some of the services that you can use to deliver content to customers around the world.

Additional resources

To learn more about the concepts that were explored in Module 1, review these resources.

- [AWS glossary](#)
- [Whitepaper: Overview of Amazon Web Services](#)
- [AWS Fundamentals: Overview](#)
- [What is cloud computing?](#)
- [Types of cloud computing](#)
- [Cloud computing with AWS](#)

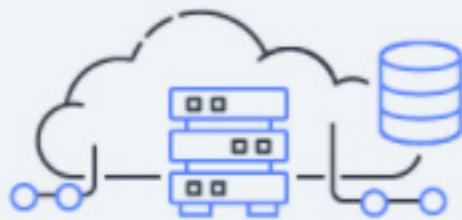
Types of Cloud Computing

Cloud computing is providing developers and IT departments with the ability to focus on what matters most and avoid undifferentiated work like procurement, maintenance, and capacity planning. As cloud computing has grown in popularity, several different models and deployment strategies have emerged to help meet specific needs of different users. Each type of cloud service, and deployment method, provides you with different levels of control, flexibility, and management. Understanding the differences between Infrastructure as a Service, Platform as a Service, and Software as a Service, as well as what deployment strategies you can use, can help you decide what set of services is right for your needs.



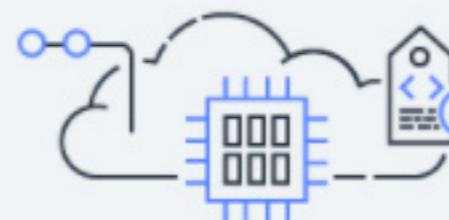
Cloud Computing Models

There are three main models for cloud computing. Each model represents a different part of the cloud computing stack.



Infrastructure as a Service (IaaS)

Infrastructure as a Service, sometimes abbreviated as IaaS, contains the basic building blocks for cloud IT and typically provide access to networking features, computers (virtual or on dedicated hardware), and data storage space. Infrastructure as a Service provides you with the highest level of flexibility and management control over your IT resources and is most similar to existing IT resources that many IT departments and developers are familiar with today.



Platform as a Service (PaaS)

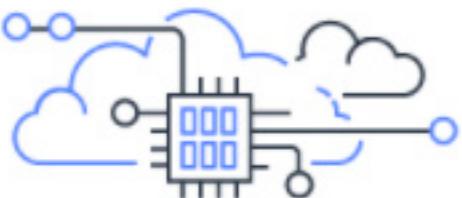
Platforms as a service remove the need for organizations to manage the underlying infrastructure (usually hardware and operating systems) and allow you to focus on the deployment and management of your applications. This helps you be more efficient as you don't need to worry about resource procurement, capacity planning, software maintenance, patching, or any of the other undifferentiated heavy lifting involved in running your application.



Software as a Service (SaaS)

Software as a Service provides you with a completed product that is run and managed by the service provider. In most cases, people referring to Software as a Service are referring to end-user applications. With a SaaS offering you do not have to think about how the service is maintained or how the underlying infrastructure is managed; you only need to think about how you will use that particular piece of software. A common example of a SaaS application is web-based email where you can send and receive email without having to manage feature additions to the email product or maintaining the servers and operating systems that the email program is running on.

Cloud Computing Deployment Models



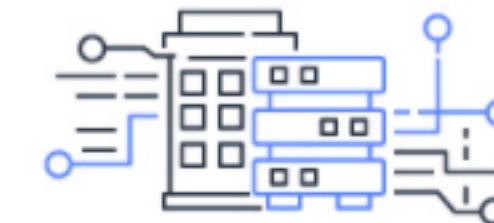
Cloud

A cloud-based application is fully deployed in the cloud and all parts of the application run in the cloud. Applications in the cloud have either been created in the cloud or have been migrated from an existing infrastructure to take advantage of the [benefits of cloud computing](#). Cloud-based applications can be built on low-level infrastructure pieces or can use higher level services that provide abstraction from the management, architecting, and scaling requirements of core infrastructure.



Hybrid

A hybrid deployment is a way to connect infrastructure and applications between cloud-based resources and existing resources that are not located in the cloud. The most common method of hybrid deployment is between the cloud and existing on-premises infrastructure to extend, and grow, an organization's infrastructure into the cloud while connecting cloud resources to internal system. For more information on how AWS can help you with your hybrid deployment, please visit [our hybrid page](#).



On-premises

Deploying resources on-premises, using virtualization and resource management tools, is sometimes called "private cloud". On-premises deployment does not provide many of the benefits of cloud computing but is sometimes sought for its ability to provide dedicated resources. In most cases this deployment model is the same as legacy IT infrastructure while using application management and virtualization technologies to try and increase resource utilization.

What is cloud computing?

- Backing up files that are stored on desktop and mobile devices to prevent data loss
- Deploying applications connected to on-premises infrastructure
- Running code without needing to manage or provision servers
- On-demand delivery of IT resources and applications through the internet with pay-as-you-go pricing

What is another name for on-premises deployment?



Private cloud deployment



Cloud-based application



Hybrid deployment



AWS Cloud



Correct

The correct response option is **Private cloud deployment**.

The other response options are incorrect because:

- Cloud-based applications are fully deployed in the cloud and do not have any parts that run on premises.
- A hybrid deployment connects infrastructure and applications between cloud-based resources and existing resources that are not in the cloud, such as on-premises resources. However, a hybrid deployment is not equivalent to an on-premises deployment because it involves resources that are located in the cloud.
- The AWS Cloud offers three cloud deployment models: cloud, hybrid, and on-premises. This response option is incorrect because the AWS Cloud is not equivalent to only an on-premises deployment.

The correct response option is **On-demand delivery of IT resources and applications through the internet with pay-as-you-go pricing.**

The other response options are incorrect because:

- It is possible to back up files to the cloud, but this response option does not describe cloud computing as a whole.
- Deploying applications connected to on-premises infrastructure is a sample use case for a hybrid cloud deployment. Remember that cloud computing also has cloud and on-premises (or private cloud) deployment models.
- AWS Lambda is an AWS service that lets you run code without needing to manage or provision servers. This description does not describe cloud computing as a whole. AWS Lambda is explained in greater detail later in the course.

How does the scale of cloud computing help you to save costs?



You do not have to invest in technology resources before using them.



The aggregated cloud usage from a large number of customers results in lower pay-as-you-go prices.



Accessing services on-demand helps to prevent excess or limited capacity.



You can quickly deploy applications to customers and provide them with low latency.



Correct

The correct response option is **The aggregated cloud usage from a large number of customers results in lower pay-as-you-go prices.**

This answer describes how customers can benefit from massive economies of scale in cloud computing.

The other response options are incorrect because:

- Not having to invest in technology resources before using them relates to *Trade upfront expense for variable expense*.
- Accessing services on-demand to prevent excess or limited capacity relates to *Stop guessing capacity*.
- Quickly deploying applications to customers and providing them with low latency relates to *Go global in minutes*.

Module 2 introduction

Learning objectives

In this module, you will learn how to:

- Describe the benefits of Amazon EC2 at a basic level.
- Identify the different Amazon EC2 instance types.
- Differentiate between the various billing options for Amazon EC2.
- Summarize the benefits of Amazon EC2 Auto Scaling.
- Summarize the benefits of Elastic Load Balancing.
- Give an example of the uses for Elastic Load Balancing.
- Summarize the differences between Amazon Simple Notification Service (Amazon SNS) and Amazon Simple Queue Service (Amazon SQS).
- Summarize additional AWS compute options.



Introduction to Amazon EC2

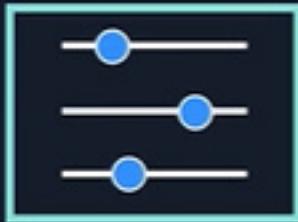
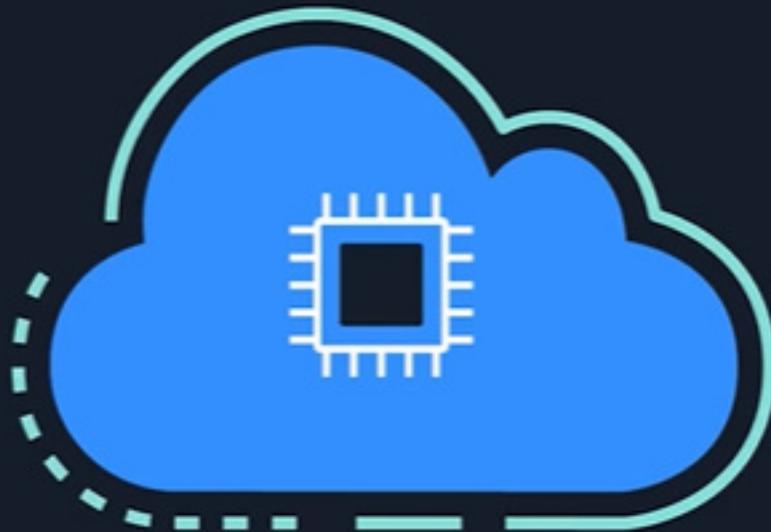


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Highly flexible

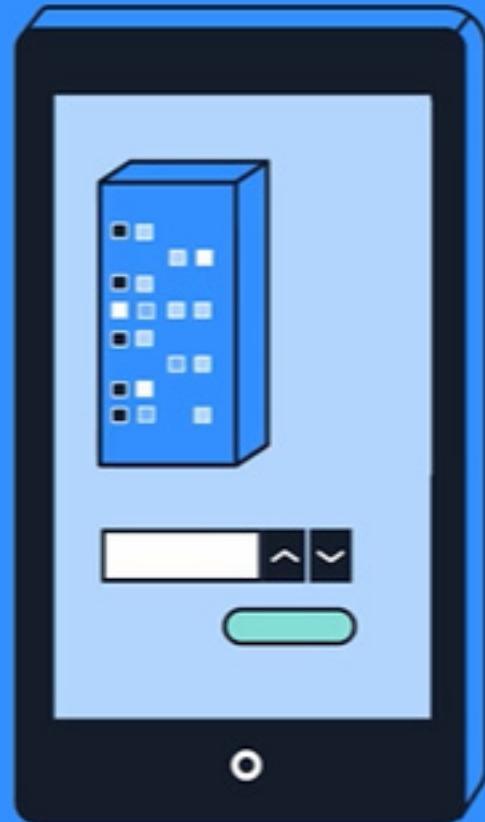


Cost-effective



Quick















Amazon EC2: getting started

- AWS built datacenters.
- AWS secured datacenters.



Amazon EC2: getting started

- AWS built datacenters.
- AWS secured datacenters.
- AWS purchased servers.
- AWS installed servers.
- The servers are online and ready to use.

Amazon EC2 configurations

Windows

Linux



Amazon EC2 configurations

- Windows
- Linux
- Internal business apps
- Web apps
- Databases
- Third-party software



Amazon Elastic Compute Cloud (Amazon EC2)

[Amazon Elastic Compute Cloud \(Amazon EC2\)](#) provides secure, resizable compute capacity in the cloud as Amazon EC2 instances.

Imagine you are responsible for the architecture of your company's resources and need to support new websites. With traditional on-premises resources, you have to do the following:

- Spend money upfront to purchase hardware.
- Wait for the servers to be delivered to you.
- Install the servers in your physical data center.
- Make all the necessary configurations.

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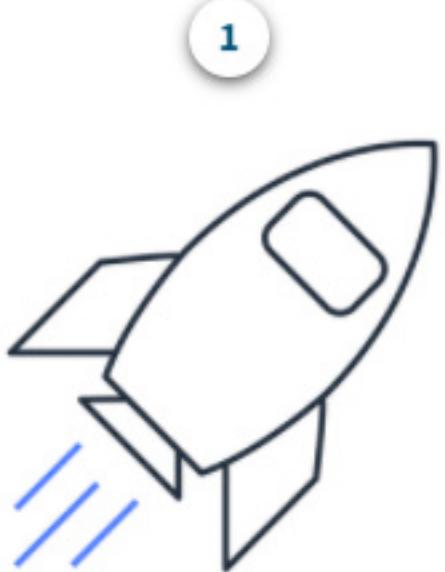
- Spend money upfront to purchase hardware.
- Wait for the servers to be delivered to you.
- Install the servers in your physical data center.
- Make all the necessary configurations.

By comparison, with an Amazon EC2 instance you can use a virtual server to run applications in the AWS Cloud.

- You can provision and launch an Amazon EC2 instance within minutes.
- You can stop using it when you have finished running a workload.
- You pay only for the compute time you use when an instance is running, not when it is stopped or terminated.
- You can save costs by paying only for server capacity that you need or want.

How Amazon EC2 works

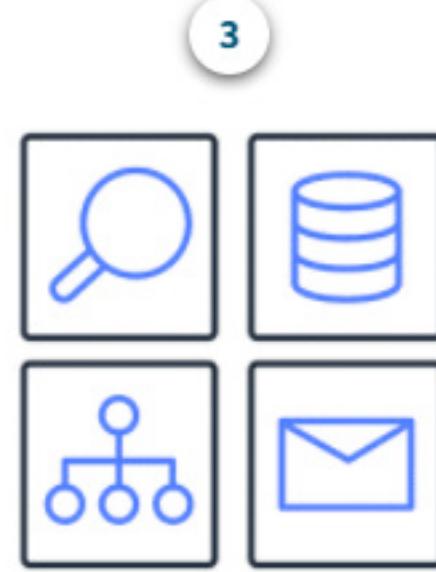
To learn more, select each marker.



1



2



3

Launch

Connect

Use

How Amazon EC2 works

To learn more, select each marker.

1

Launch



Launch

First, you launch an instance. Begin by selecting a template with basic configurations for your instance. These configurations include the operating system, application server, or applications. You also select the instance type, which is the specific hardware configuration of your instance.

As you are preparing to launch an instance, you specify security settings to control the network traffic that can flow into and out of your instance. Later in this course, we will explore Amazon EC2 security features in greater detail.

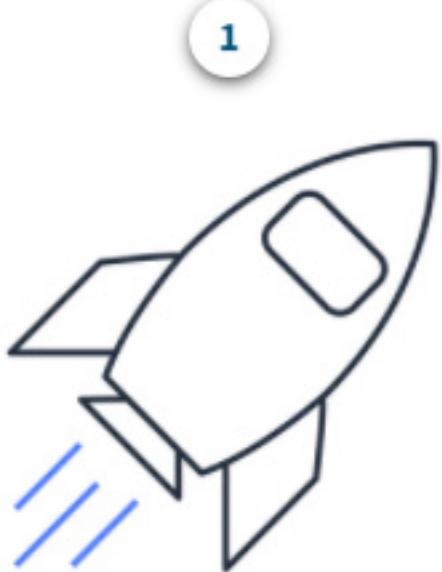
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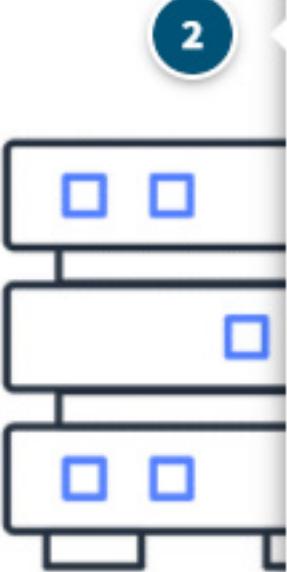
Use

How Amazon EC2 works

To learn more, select each marker.



Launch



Connect

Connect

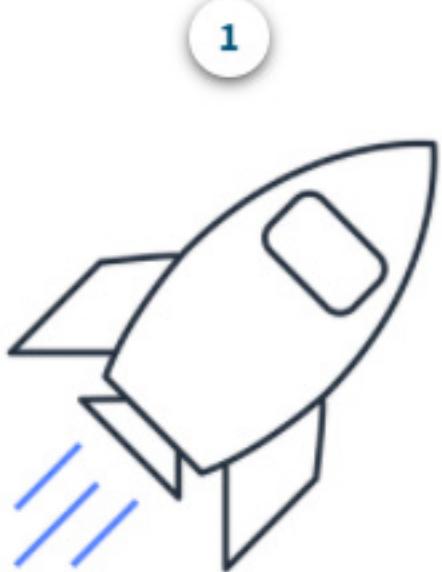
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Next, connect to the instance. You can connect to the instance in several ways. Your programs and applications have multiple different methods to connect directly to the instance and exchange data. Users can also connect to the instance by logging in and accessing the computer desktop.

Use

How Amazon EC2 works

To learn more, select each marker.



Launch



Connect

Connect

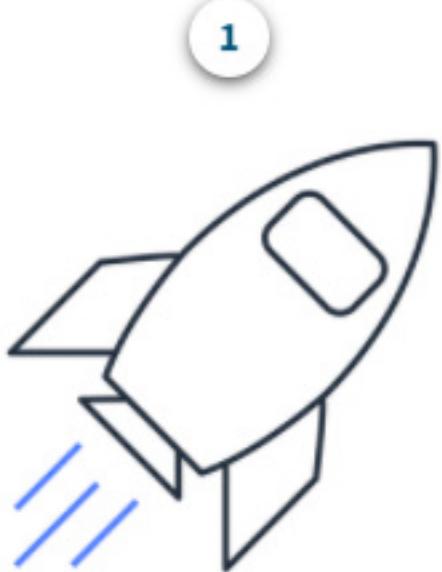
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1

Launch

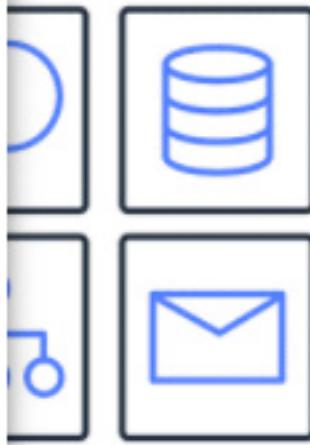
Launch

Use

After you have connected to the instance, you can begin using it. You can run commands to install software, add storage, copy and organize files, and more.

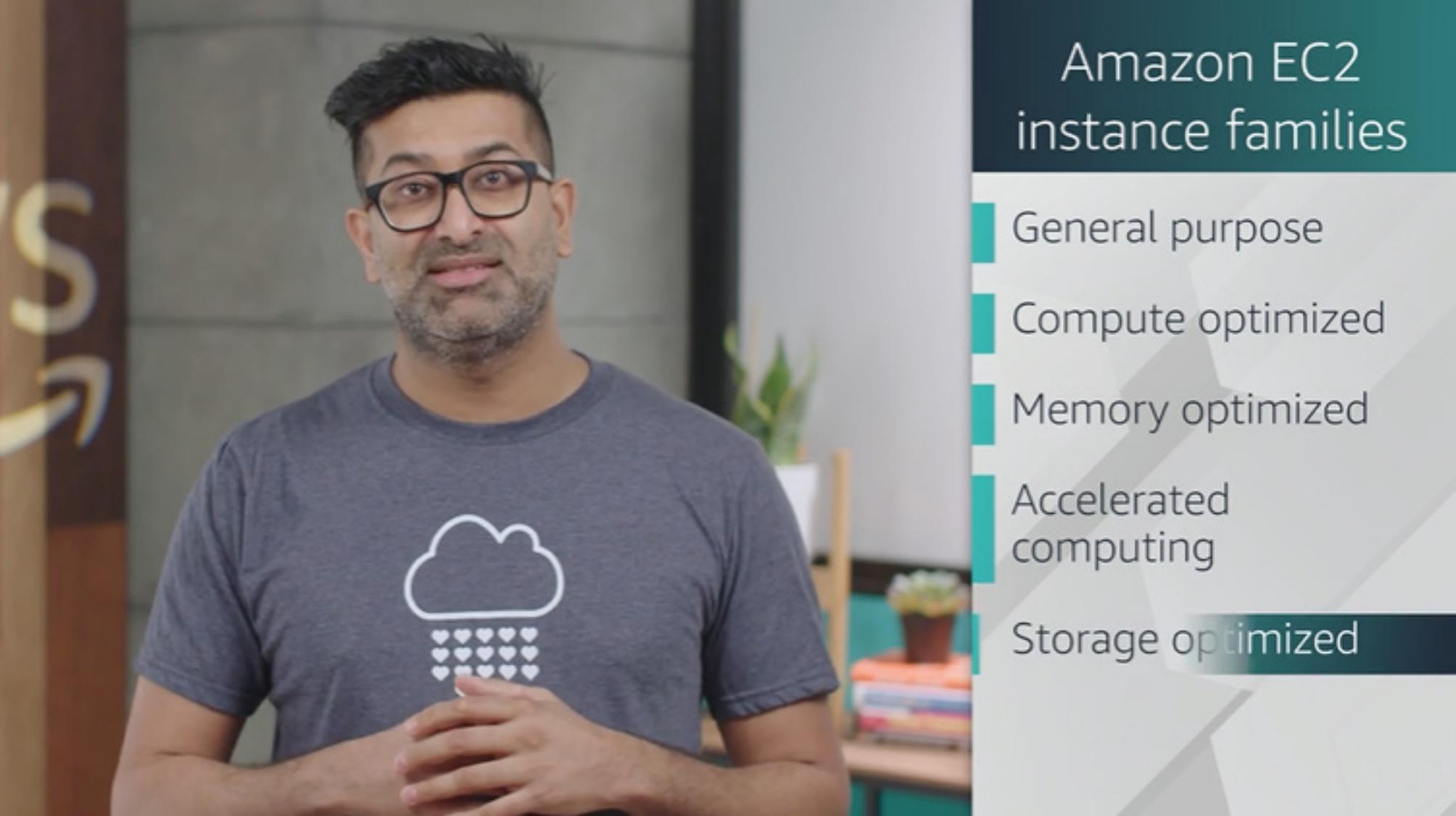
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3



Connect

Use



Amazon EC2 instance families

- General purpose
- Compute optimized
- Memory optimized
- Accelerated computing
- Storage optimized

General purpose

- Balanced resources
- Diverse workloads
- Web servers
- Code repositories



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Compute optimized

Compute intensive tasks

Gaming servers

High performance computing (HPC)



Compute optimized

Compute intensive tasks

Gaming servers

High performance computing (HPC)

Scientific modeling



Memory
optimized

Memory intensive
tasks



Accelerated
computing

Floating point
number calculations



Accelerated computing

Floating point number calculations

Graphics processing

Data pattern matching

Accelerated computing

Floating point number calculations

Graphics processing

Data pattern matching

Utilize hardware accelerators





Storage
optimized

High performance
for locally stored
data

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Amazon EC2 Instance Types

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instance types comprise varying combinations of CPU, memory, storage, and networking capacity and give you the flexibility to choose the appropriate mix of resources for your applications. Each instance type includes one or more instance sizes, allowing you to scale your resources to the requirements of your target workload.

General Purpose

General Purpose

Compute Optimized

General purpose instances provide a balance of compute, memory and networking resources, and can be used for a variety of diverse workloads. These instances are ideal for applications that use these resources in equal proportions such as web servers and code repositories.

Memory Optimized

| | Mac | T4g | T3 | T3a | T2 | M6g | M6i | M5 | M5a | M5n | M5zn | M4 | A1 |
|--|-----|-----|----|-----|----|-----|-----|----|-----|-----|------|----|----|
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Accelerated Computing

Mac instances are powered by Apple Mac mini computers and built on the AWS Nitro System. This EC2 family gives developers access to macOS so they can develop, build, test, and sign applications that require the Xcode IDE.

Storage Optimized

General purpose instances

—

General purpose instances provide a balance of compute, memory, and networking resources. You can use them for a variety of workloads, such as:

- application servers
- gaming servers
- backend servers for enterprise applications
- small and medium databases

Suppose that you have an application in which the resource needs for compute, memory, and networking are roughly equivalent. You might consider running it on a general purpose instance because the application does not require optimization in any single resource area.

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Compute optimized instances

Compute optimized instances are ideal for compute-bound applications that benefit from high-performance processors. Like general purpose instances, you can use compute optimized instances for workloads such as web, application, and gaming servers.

However, the difference is compute optimized applications are ideal for high-performance web servers, compute-intensive applications servers, and dedicated gaming servers. You can also use compute optimized instances for batch processing workloads that require processing many transactions in a single group.

Memory optimized instances

Memory optimized instances are designed to deliver fast performance for workloads that process large datasets in memory. In computing, memory is a temporary storage area. It holds all the data and instructions that a central processing unit (CPU) needs to be able to complete actions. Before a computer program or application is able to run, it is loaded from storage into memory. This preloading process gives the CPU direct access to the computer program.

Suppose that you have a workload that requires large amounts of data to be preloaded before running an application. This scenario might be a high-performance database or a workload that involves performing real-time processing of a large amount of unstructured data. In these types of use cases, consider using a memory optimized instance. Memory optimized instances enable you to run workloads with high memory needs and receive great performance.

Storage optimized instances

Storage optimized instances are designed for workloads that require high, sequential read and write access to large datasets on local storage. Examples of workloads suitable for storage optimized instances include distributed file systems, data warehousing applications, and high-frequency online transaction processing (OLTP) systems.

In computing, the term input/output operations per second (IOPS) is a metric that measures the performance of a storage device. It indicates how many different input or output operations a device can perform in one second. Storage optimized instances are designed to deliver tens of thousands of low-latency, random IOPS to applications.

You can think of input operations as data put into a system, such as records entered into a database. An output operation is data generated by a server. An example of output might be the analytics performed on the records in a database. If you have an application that has a high IOPS requirement, a storage optimized instance can provide better performance over other instance types not optimized for this kind of use case.

Match each description to an Amazon EC2 instance type.



Ideal for high-performance databases

Memory optimized



Suitable for data warehousing applications

Storage optimized



Balances compute, memory, and networking resources

General purpose



Offers high-performance processors

Compute optimized



Amazon EC2 purchase options

On-Demand

Amazon EC2 purchase options

- On-Demand
- Savings Plans
- Reserved Instances

Amazon EC2 purchase options

- On-Demand
- Savings Plans
- Reserved Instances
- Spot Instances
- Dedicated Hosts

Amazon EC2 pricing

With Amazon EC2, you pay only for the compute time that you use. Amazon EC2 offers a variety of pricing options for different use cases. For example, if your use case can withstand interruptions, you can save with Spot Instances. You can also save by committing early and locking in a minimum level of use with Reserved Instances.

To learn more, select the + symbol next to each category.

On-Demand

On-Demand Instances are ideal for short-term, irregular workloads that cannot be interrupted. No upfront costs or minimum contracts apply. The instances run continuously until you stop them, and you pay for only the compute time you use.

Sample use cases for On-Demand Instances include developing and testing applications and running applications that have unpredictable usage patterns. On-Demand Instances are not recommended for workloads that last a year or longer because these workloads can experience greater cost savings using Reserved Instances.

Amazon EC2 Savings Plans

AWS offers Savings Plans for several compute services, including Amazon EC2. **Amazon EC2 Savings Plans** enable you to reduce your compute costs by committing to a consistent amount of compute usage for a 1-year or 3-year term. This term commitment results in savings of up to 66% over On-Demand costs.

Any usage up to the commitment is charged at the discounted plan rate (for example, \$10 an hour). Any usage beyond the commitment is charged at regular On-Demand rates.

Later in this course, you will review AWS Cost Explorer, a tool that enables you to visualize, understand, and manage your AWS costs and usage over time. If you are considering your options for Savings Plans, AWS Cost Explorer can analyze your Amazon EC2 usage over the past 7, 30, or 60 days. AWS Cost Explorer also provides customized recommendations for Savings Plans. These recommendations estimate how much you could save on your monthly Amazon EC2 costs, based on previous Amazon EC2 usage and the hourly commitment amount in a 1-year or 3-year plan.

Reserved Instances

Reserved Instances are a billing discount applied to the use of On-Demand Instances in your account. You can purchase Standard Reserved and Convertible Reserved Instances for a 1-year or 3-year term, and Scheduled Reserved Instances for a 1-year term. You realize greater cost savings with the 3-year option.

At the end of a Reserved Instance term, you can continue using the Amazon EC2 instance without interruption. However, you are charged On-Demand rates until you do one of the following:

- Terminate the instance.
- Purchase a new Reserved Instance that matches the instance attributes (instance type, Region, tenancy, and platform).

Spot Instances

Spot Instances are ideal for workloads with flexible start and end times, or that can withstand interruptions. Spot Instances use unused Amazon EC2 computing capacity and offer you cost savings at up to 90% off of On-Demand prices.

Suppose that you have a background processing job that can start and stop as needed (such as the data processing job for a customer survey). You want to start and stop the processing job without affecting the overall operations of your business. If you make a Spot request and Amazon EC2 capacity is available, your Spot Instance launches. However, if you make a Spot request and Amazon EC2 capacity is unavailable, the request is not successful until capacity becomes available. The unavailable capacity might delay the launch of your background processing job.

After you have launched a Spot Instance, if capacity is no longer available or demand for Spot Instances increases, your instance may be interrupted. This might not pose any issues for your background processing job. However, in the earlier example of developing and testing applications, you would most likely want to avoid unexpected interruptions. Therefore, choose a different EC2 instance type that is ideal for those tasks.

Dedicated Hosts

Dedicated Hosts are physical servers with Amazon EC2 instance capacity that is fully dedicated to your use.

You can use your existing per-socket, per-core, or per-VM software licenses to help maintain license compliance. You can purchase On-Demand Dedicated Hosts and Dedicated Hosts Reservations. Of all the Amazon EC2 options that were covered, Dedicated Hosts are the most expensive.

Knowledge check

What is the difference between Amazon EC2 Savings Plans and Spot Instances?

Select each flashcard to flip it.

Amazon EC2 Savings Plans

Spot Instances

Click to flip 

Knowledge check

What is the difference between Amazon EC2 Savings Plans and Spot Instances?

Select each flashcard to flip it.

Amazon EC2 Savings Plans are ideal for workloads that involve a consistent amount of compute usage over a 1-year or 3-year term.

With Amazon EC2 Savings Plans, you can reduce your compute costs by up to 72% over On-Demand costs.

Spot Instances are ideal for workloads with flexible start and end times, or that can withstand interruptions. With Spot Instances, you can reduce your compute costs by up to 90% over On-Demand costs.

Unlike Amazon EC2 Savings Plans, Spot Instances do *not* require contracts or a commitment to a consistent amount of compute usage.



Scalability and Elasticity

CUSTOMERS (K)

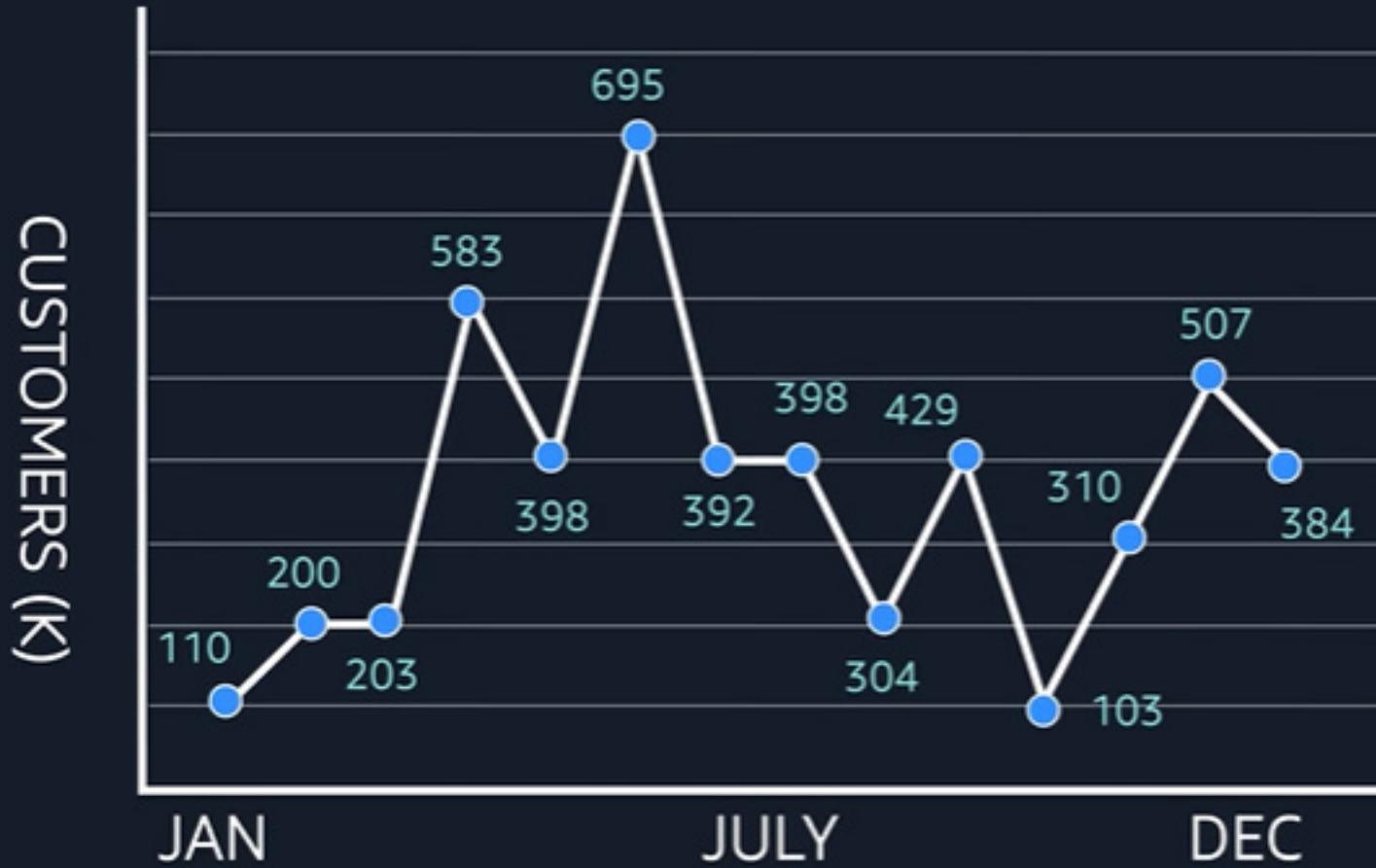
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12 AM

12 PM

CUSTOMERS (K)



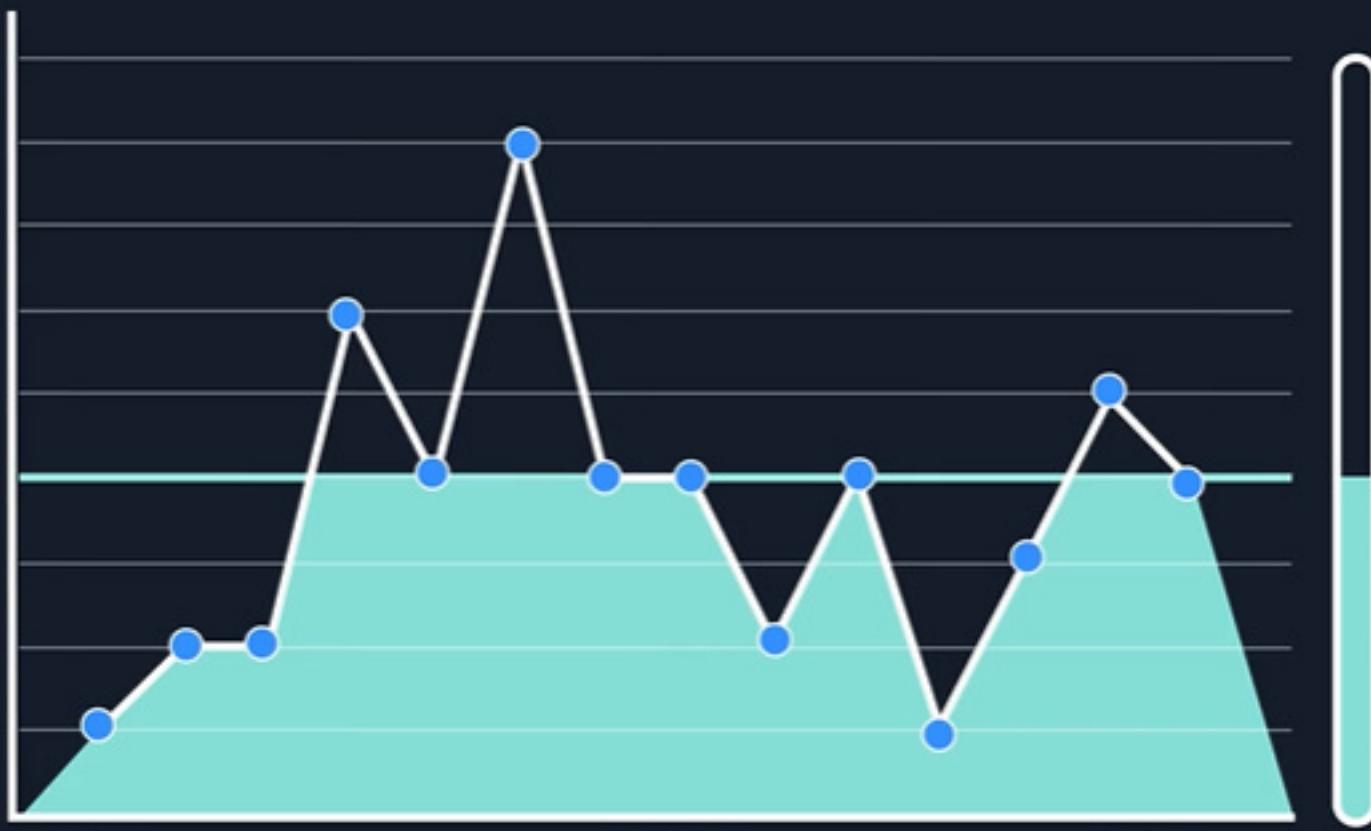


CUSTOMERS (K)

JAN

JULY

DEC

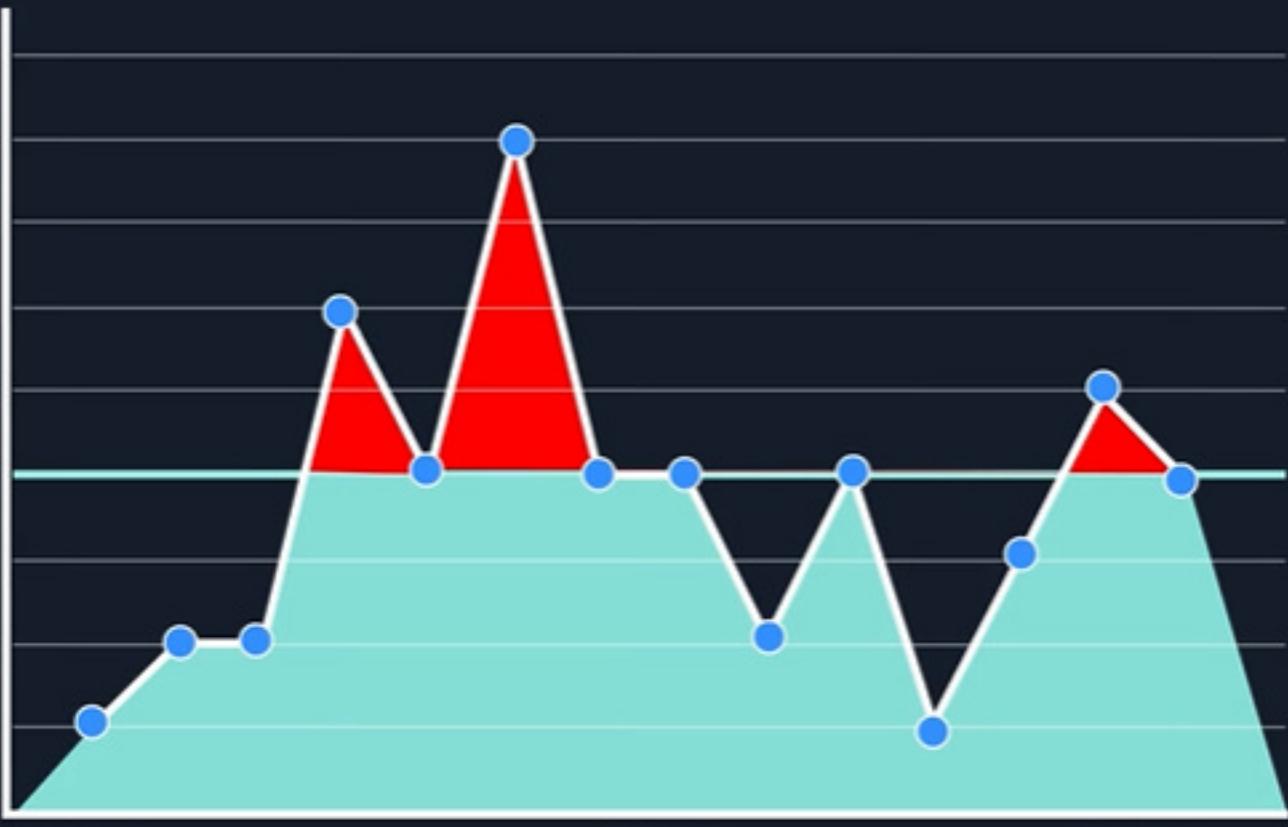


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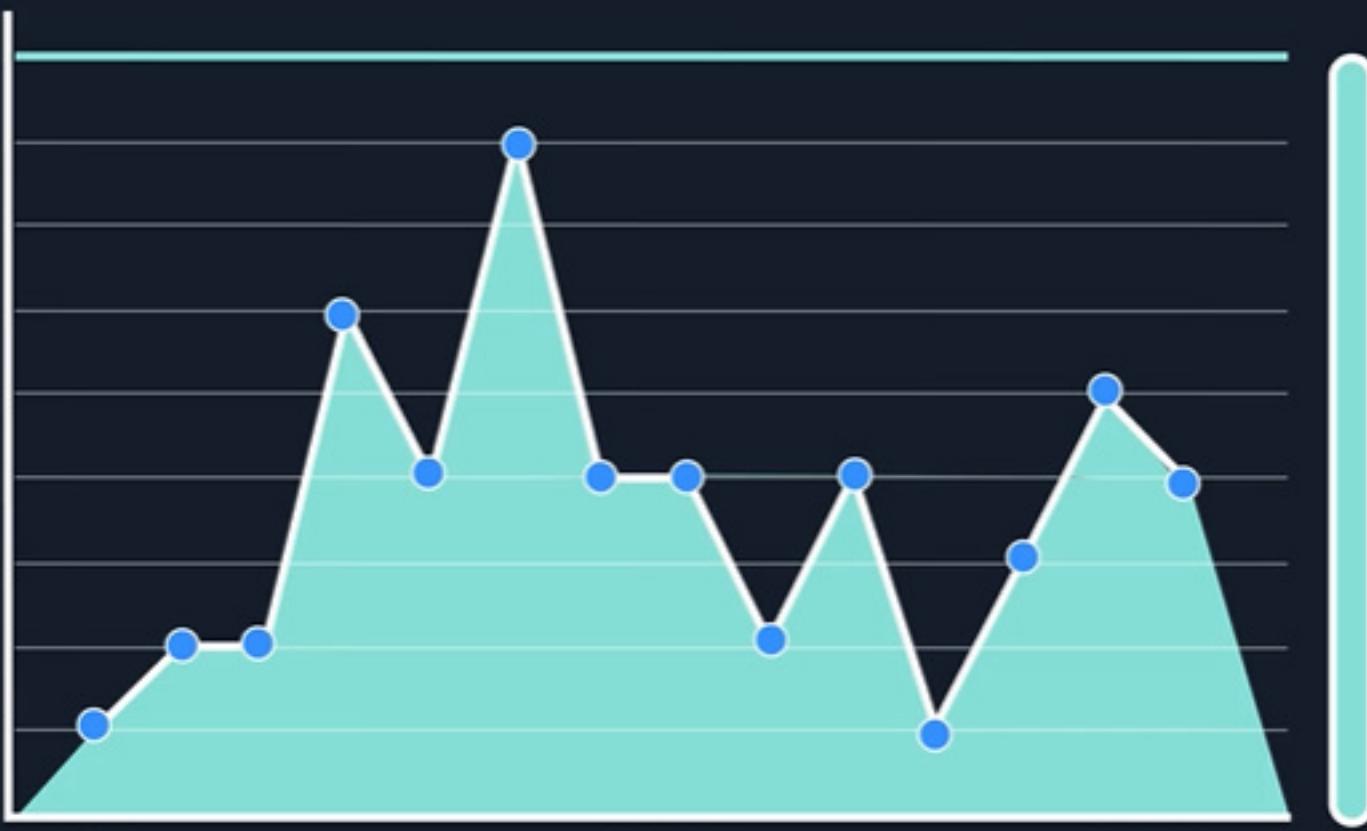


CUSTOMERS (K)

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CUSTOMERS (K)

12 AM

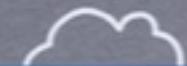
12 PM





ORDER
HERE





"Everything fails all the time,
so plan for failure and nothing fails."
- Werner Vogels



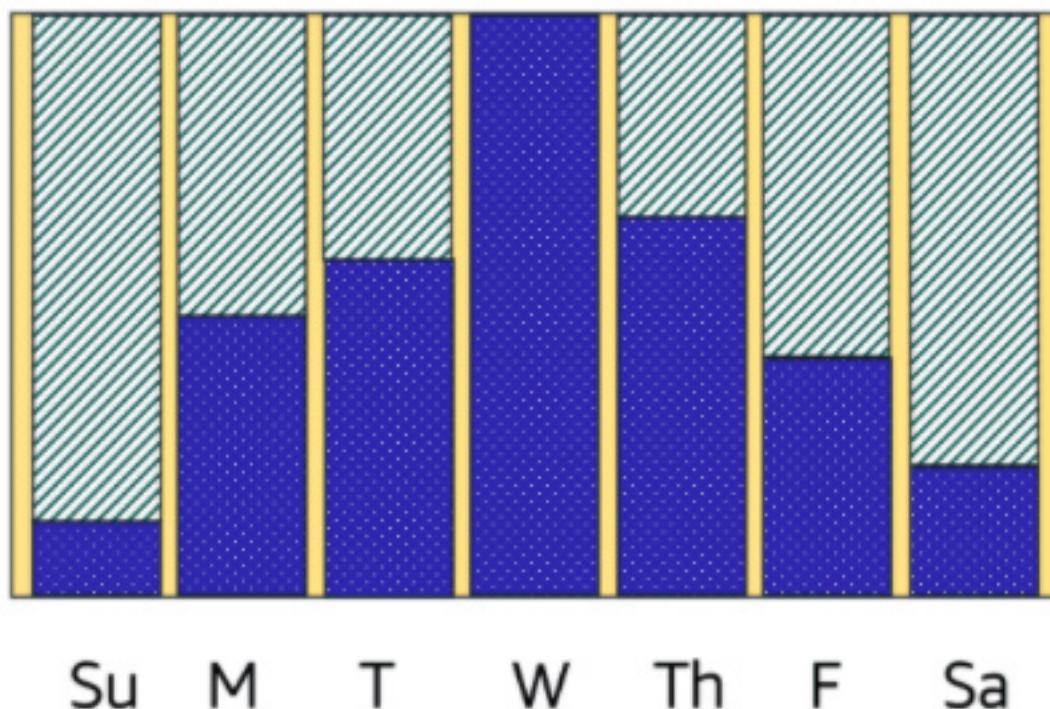
Scalability

Scalability involves beginning with only the resources you need and designing your architecture to automatically respond to changing demand by scaling out or in. As a result, you pay for only the resources you use. You don't have to worry about a lack of computing capacity to meet your customers' needs.

If you wanted the scaling process to happen automatically, which AWS service would you use? The AWS service that provides this functionality for Amazon EC2 instances is **Amazon EC2 Auto Scaling**.

Amazon EC2 Auto Scaling

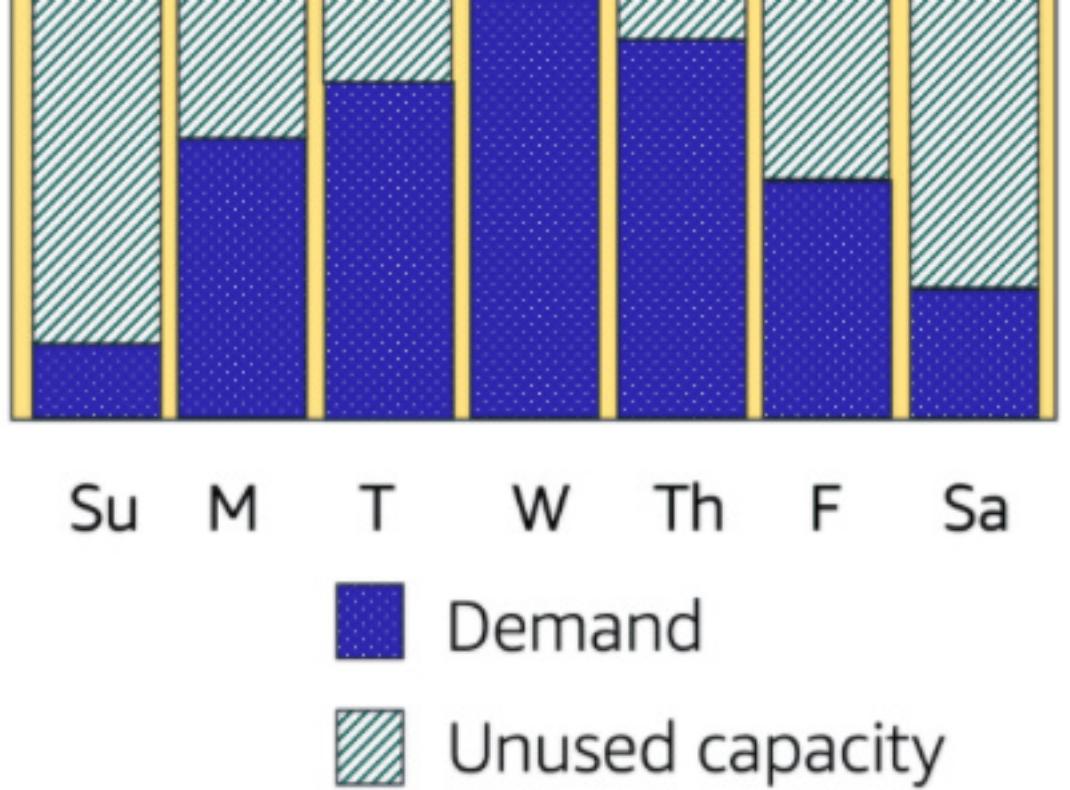
If you've tried to access a website that wouldn't load and frequently timed out, the website might have received more requests than it was able to handle. This situation is similar to waiting in a long line at a coffee shop, when there is only one barista present to take orders from customers.



Amazon EC2 Auto Scaling enables you to automatically add or remove Amazon EC2 instances in response to changing application demand. By automatically scaling your instances in and out as needed, you are able to maintain a greater sense of application availability.

Within Amazon EC2 Auto Scaling, you can use two approaches: dynamic scaling and predictive scaling.

- *Dynamic scaling* responds to changing demand.



automatically scaling your instances in and out as needed, you are able to maintain a greater sense of application availability.

Within Amazon EC2 Auto Scaling, you can use two approaches: dynamic scaling and predictive scaling.

- *Dynamic scaling* responds to changing demand.
- *Predictive scaling* automatically schedules the right number of Amazon EC2 instances based on predicted demand.



To scale faster, you can use dynamic scaling and predictive scaling together.



-144

1x





ORDER
HERE



ORDER
HERE

Organic

**ORDER
HERE**



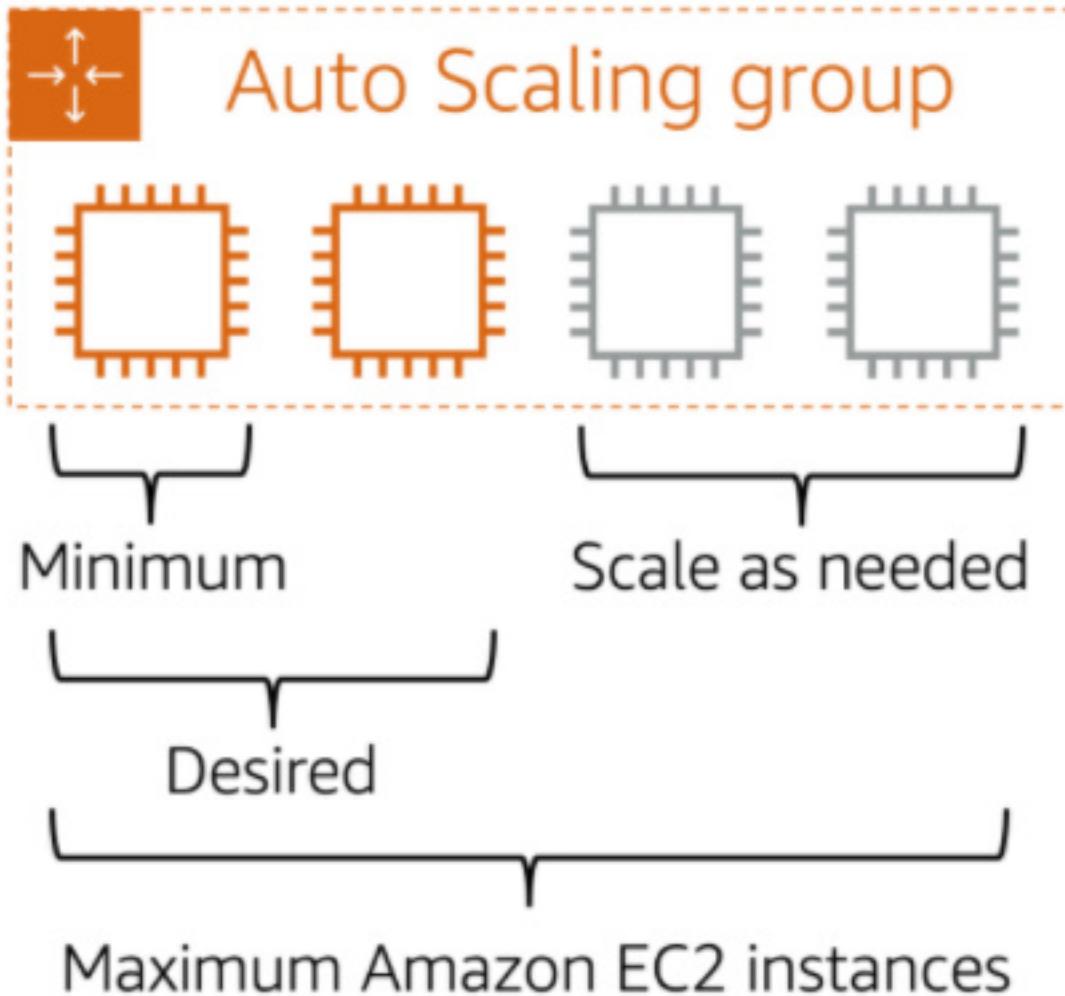


Example: Amazon EC2 Auto Scaling

In the cloud, computing power is a programmatic resource, so you can take a more flexible approach to the issue of scaling. By adding Amazon EC2 Auto Scaling to an application, you can add new instances to the application when necessary and terminate them when no longer needed.

Suppose that you are preparing to launch an application on Amazon EC2 instances. When configuring the size of your Auto Scaling group, you might set the minimum number of Amazon EC2 instances at one. This means that at all times, there must be at least one Amazon EC2 instance running.

running.



When you create an Auto Scaling group, you can set the minimum number of Amazon EC2 instances. The **minimum capacity** is the number of Amazon EC2 instances that launch immediately after you have created the Auto Scaling group. In this example, the Auto Scaling group has a minimum capacity of one Amazon EC2 instance.

Next, you can set the **desired capacity** at two Amazon EC2 instances even though your application needs a minimum of a single Amazon EC2 instance to run.

- (i) If you do not specify the desired number of Amazon EC2 instances in an Auto Scaling group, the desired capacity defaults to your minimum capacity.

The third configuration that you can set in an Auto Scaling group is the **maximum capacity**. For example, you might configure the Auto Scaling group to scale out in response to increased demand, but only to a maximum of four Amazon EC2 instances.

Because Amazon EC2 Auto Scaling uses Amazon EC2 instances, you pay for only the instances you use, when you use them. You now have a cost-effective architecture that provides the best customer experience while reducing expenses.

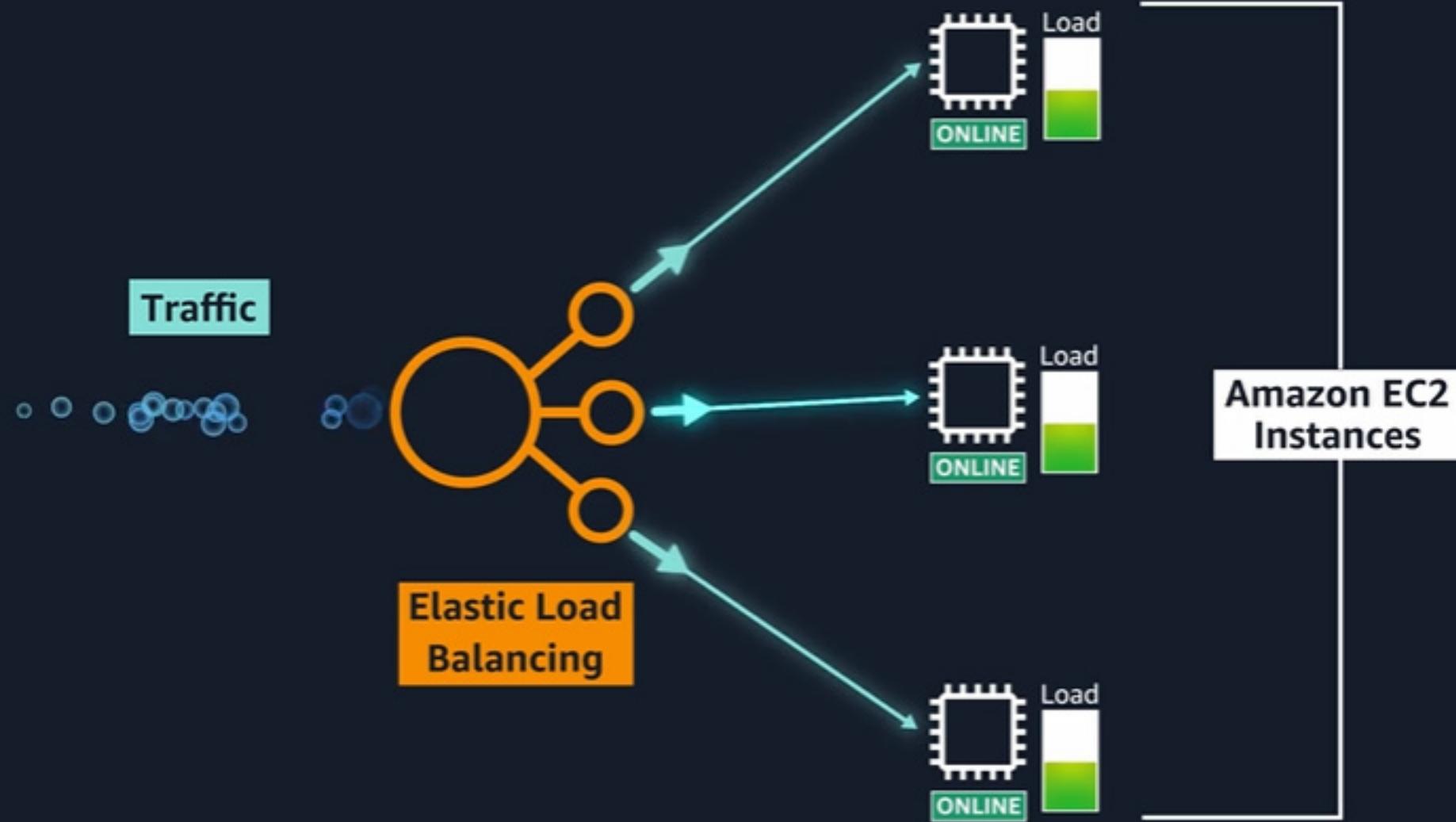
A middle-aged man with dark hair, a beard, and glasses is speaking. He is wearing a grey t-shirt with a white graphic of a cloud above a cluster of hearts.

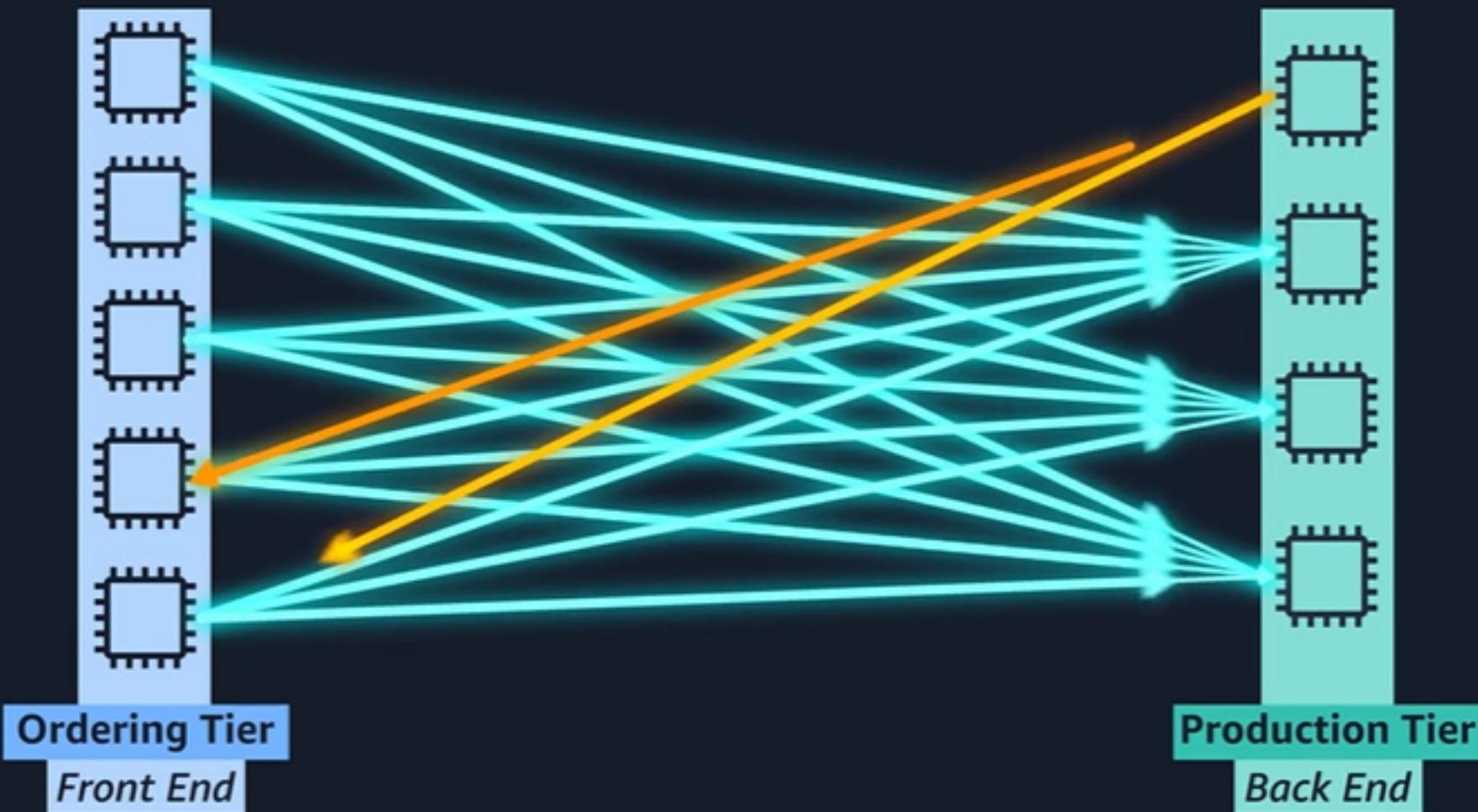
Properly distribute traffic

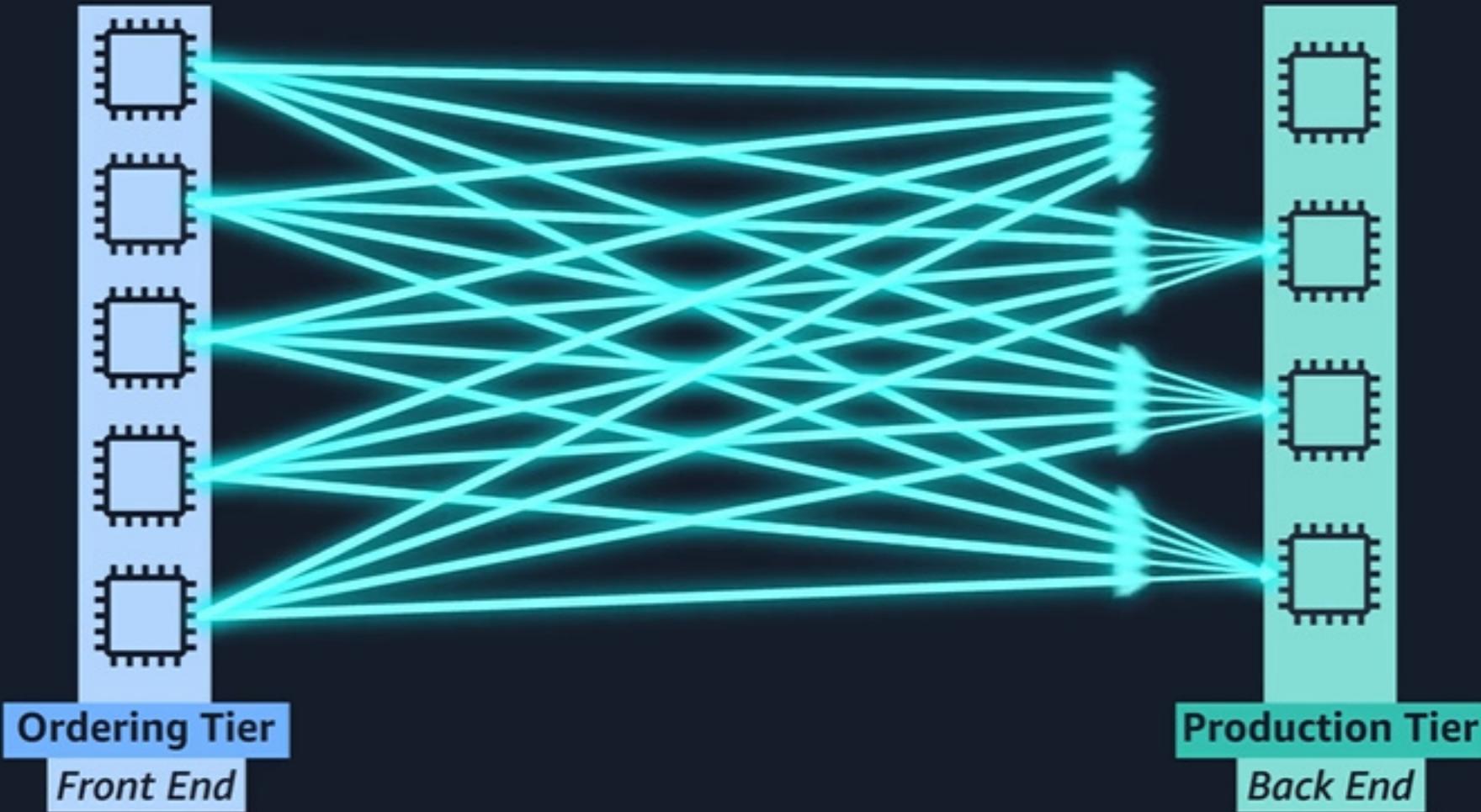
- High performance
- Cost-efficient
- Highly available
- Automatically scalable

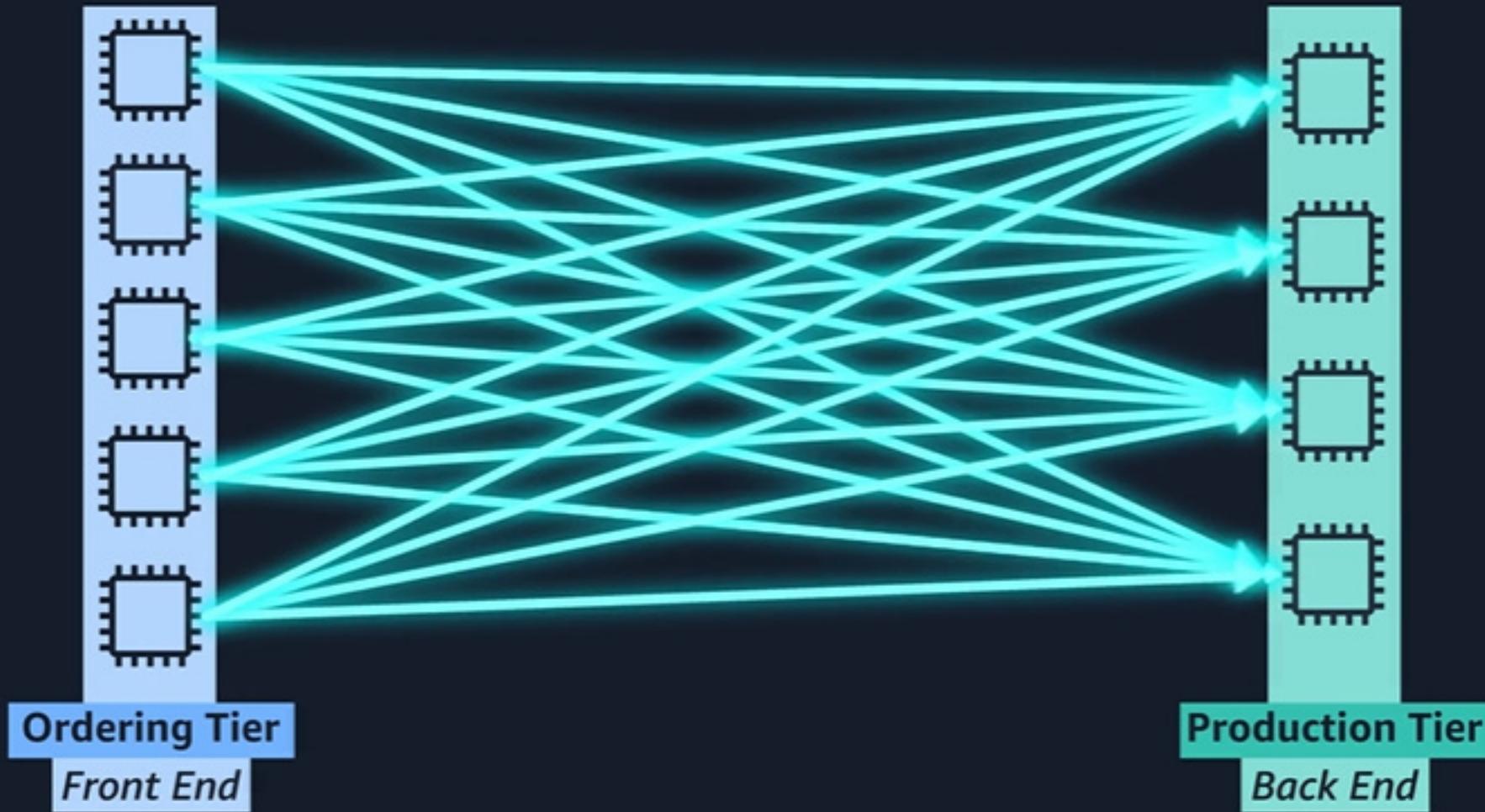


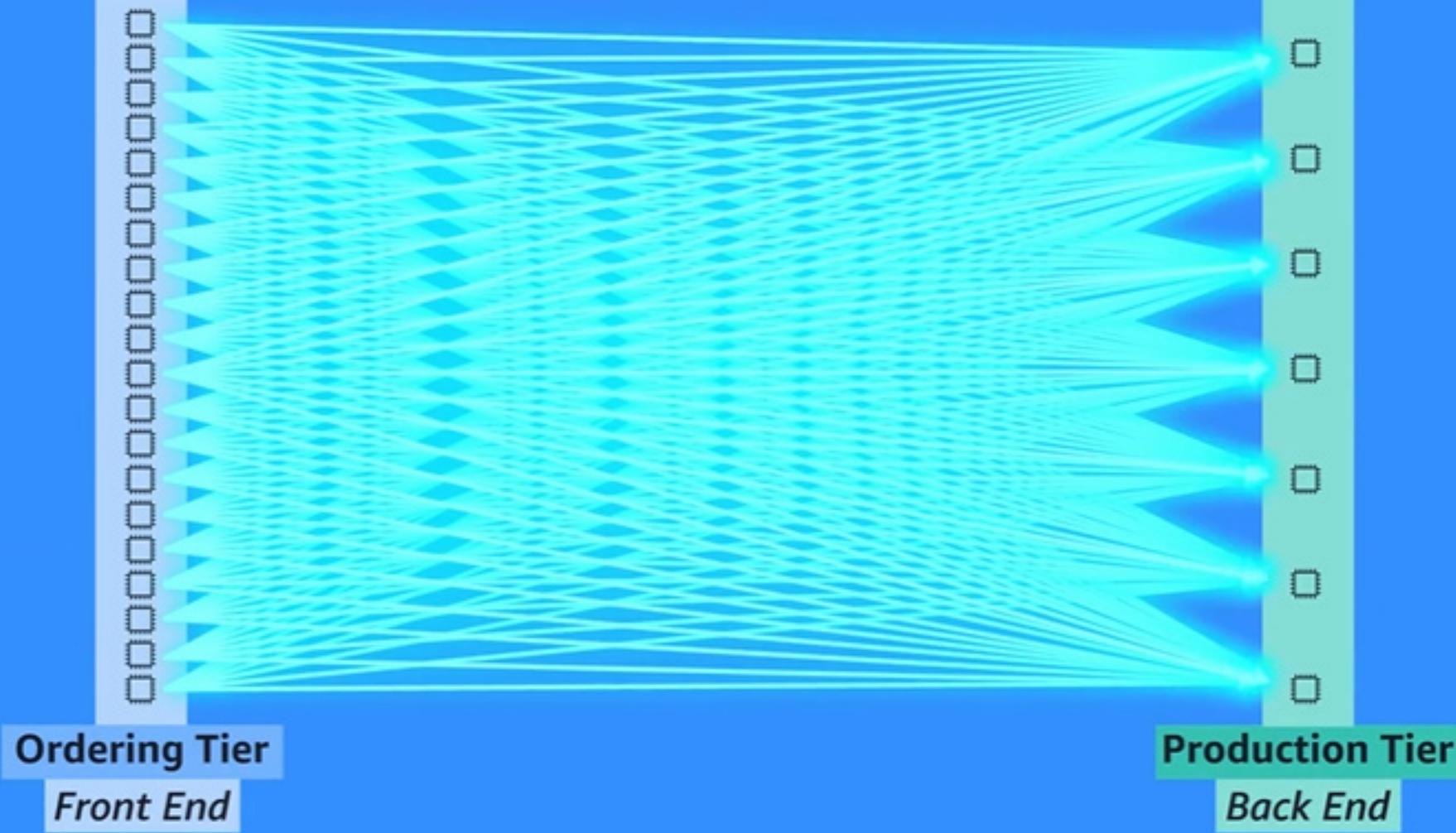
Elastic Load Balancing

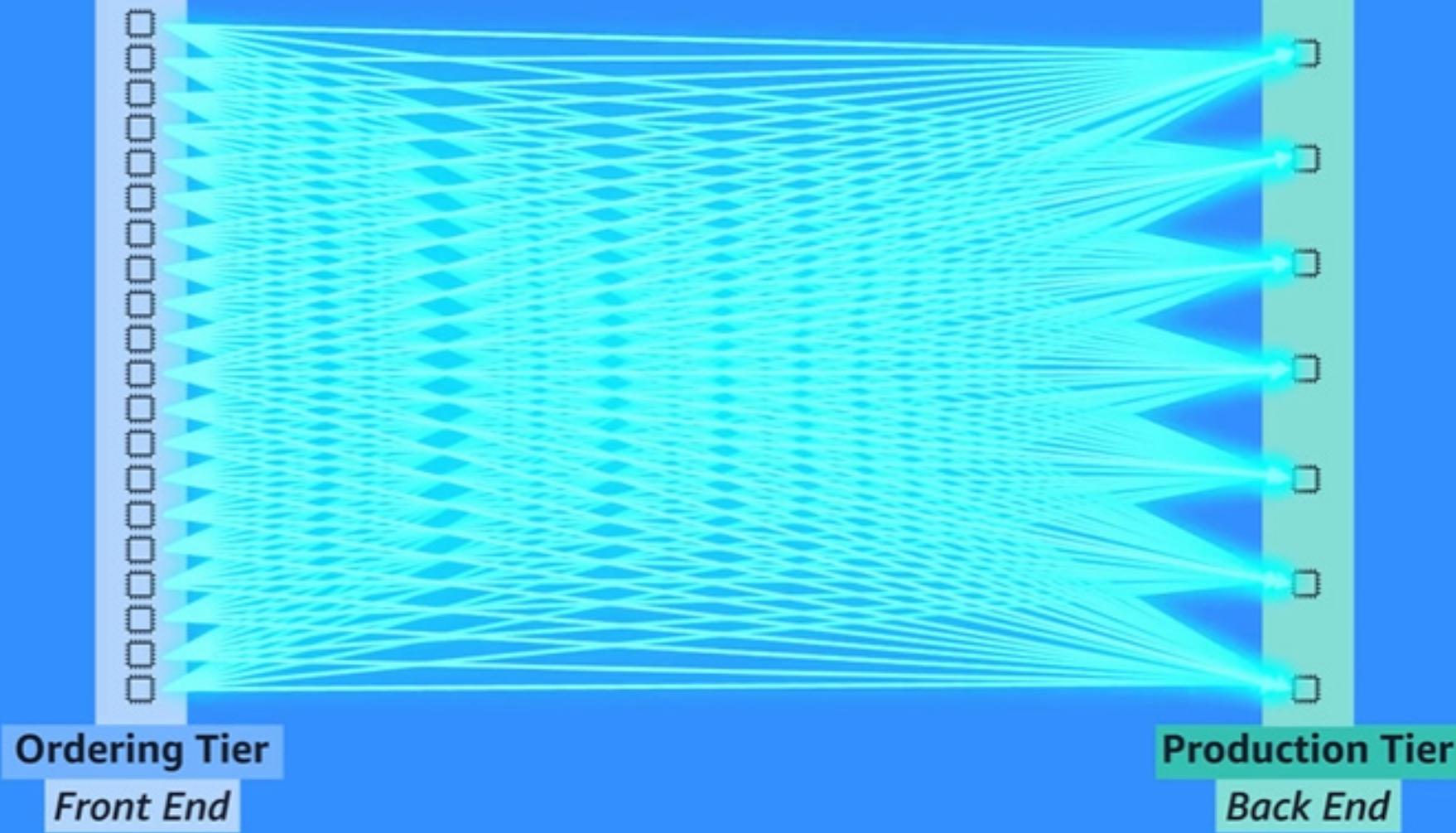


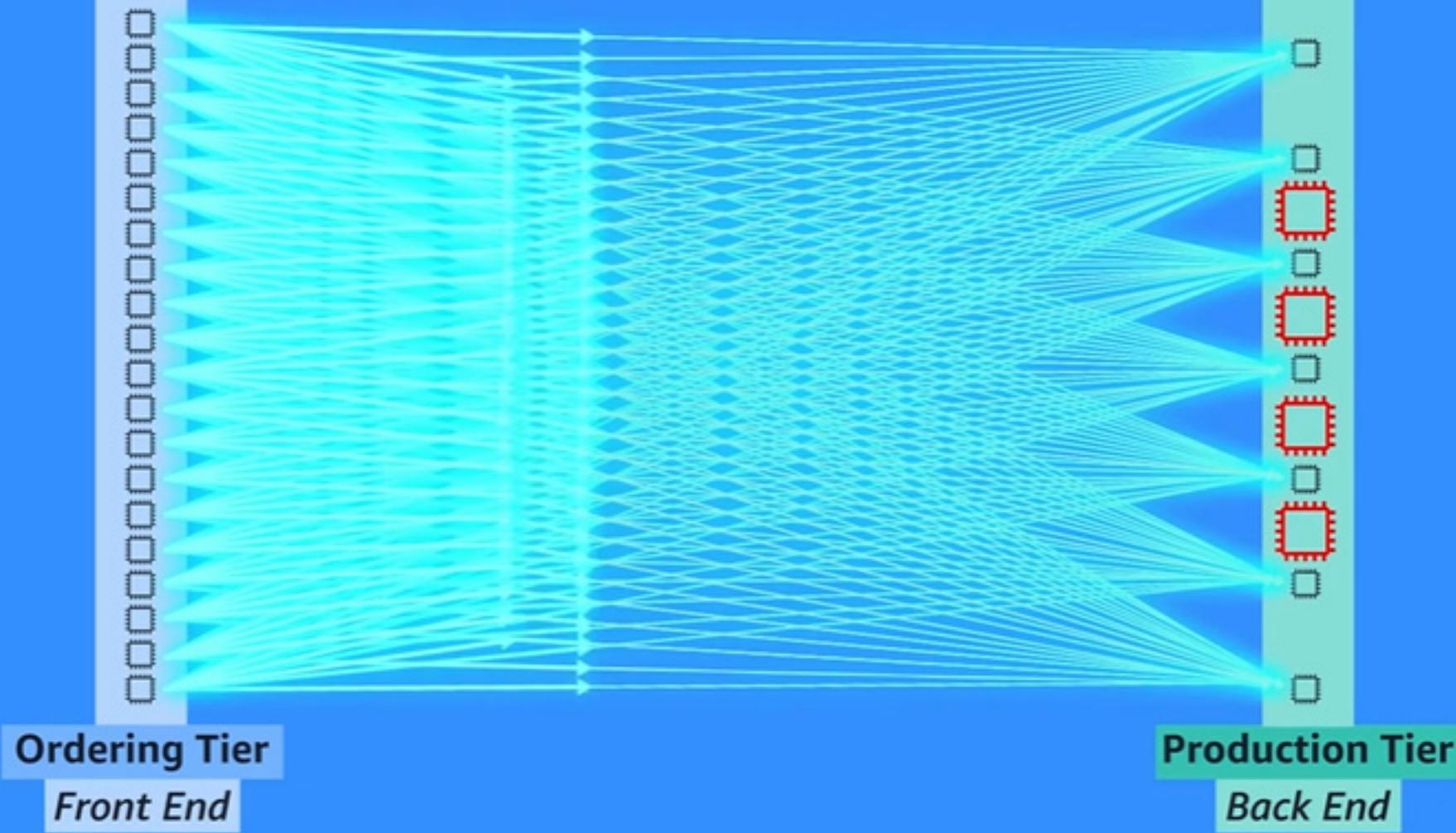


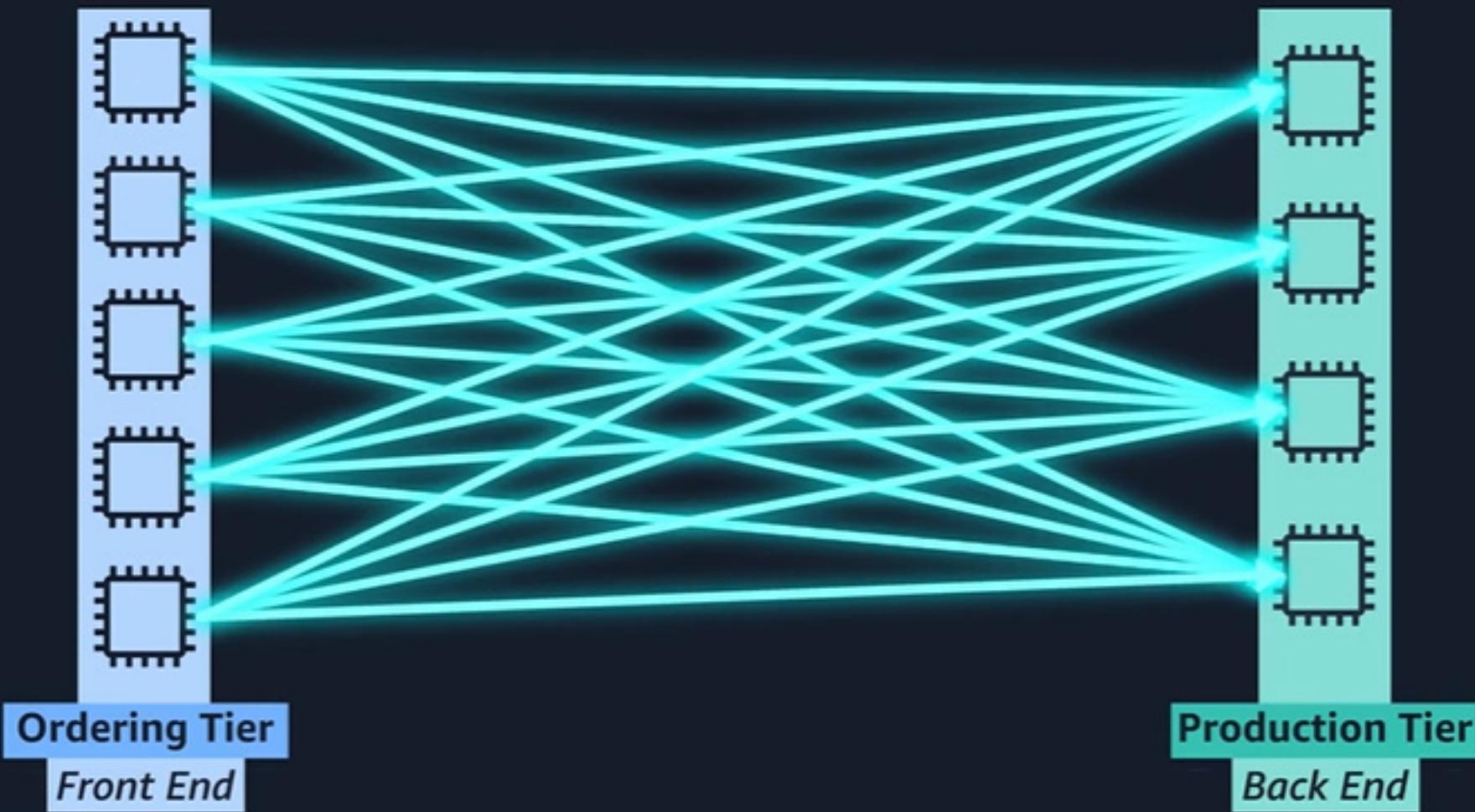




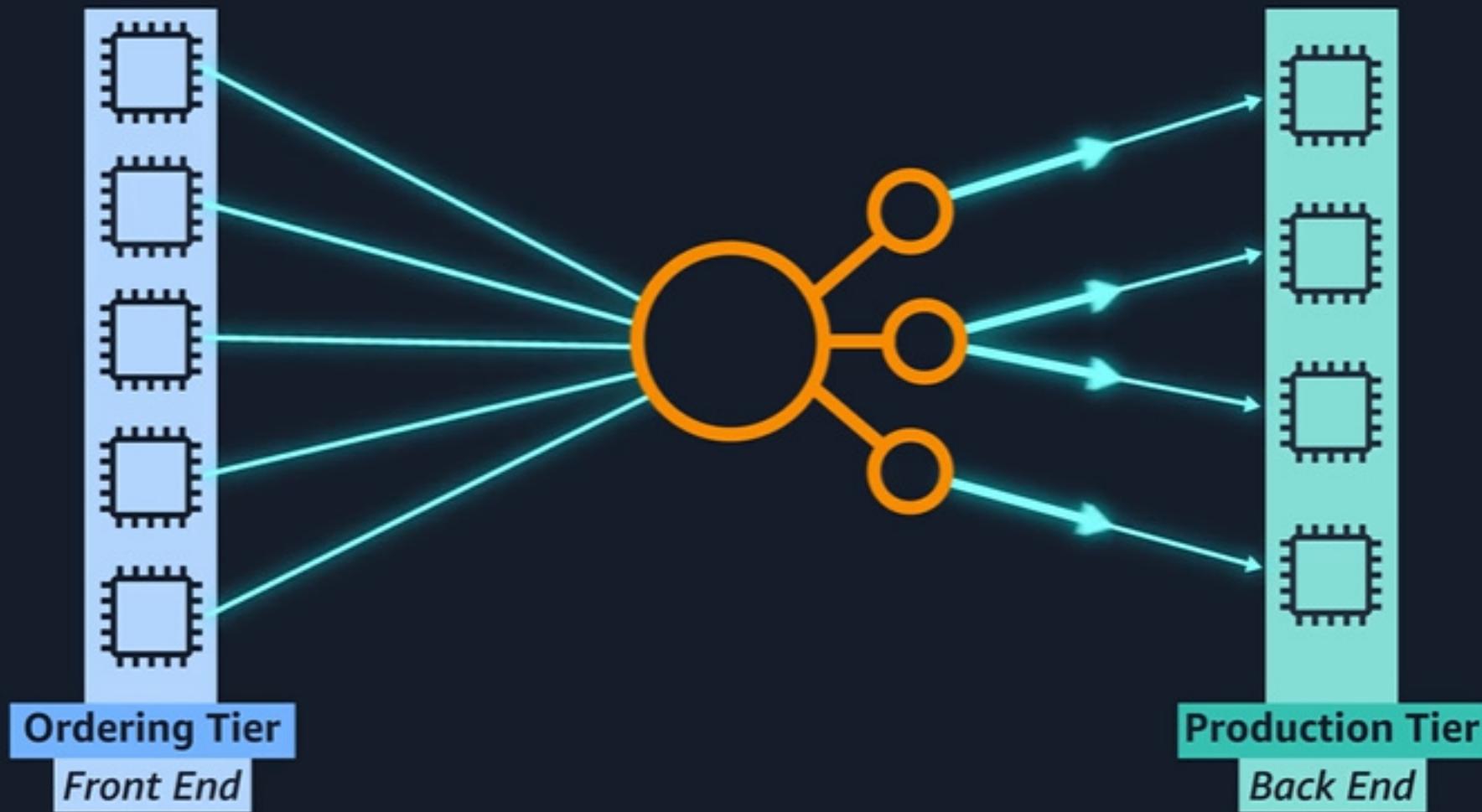


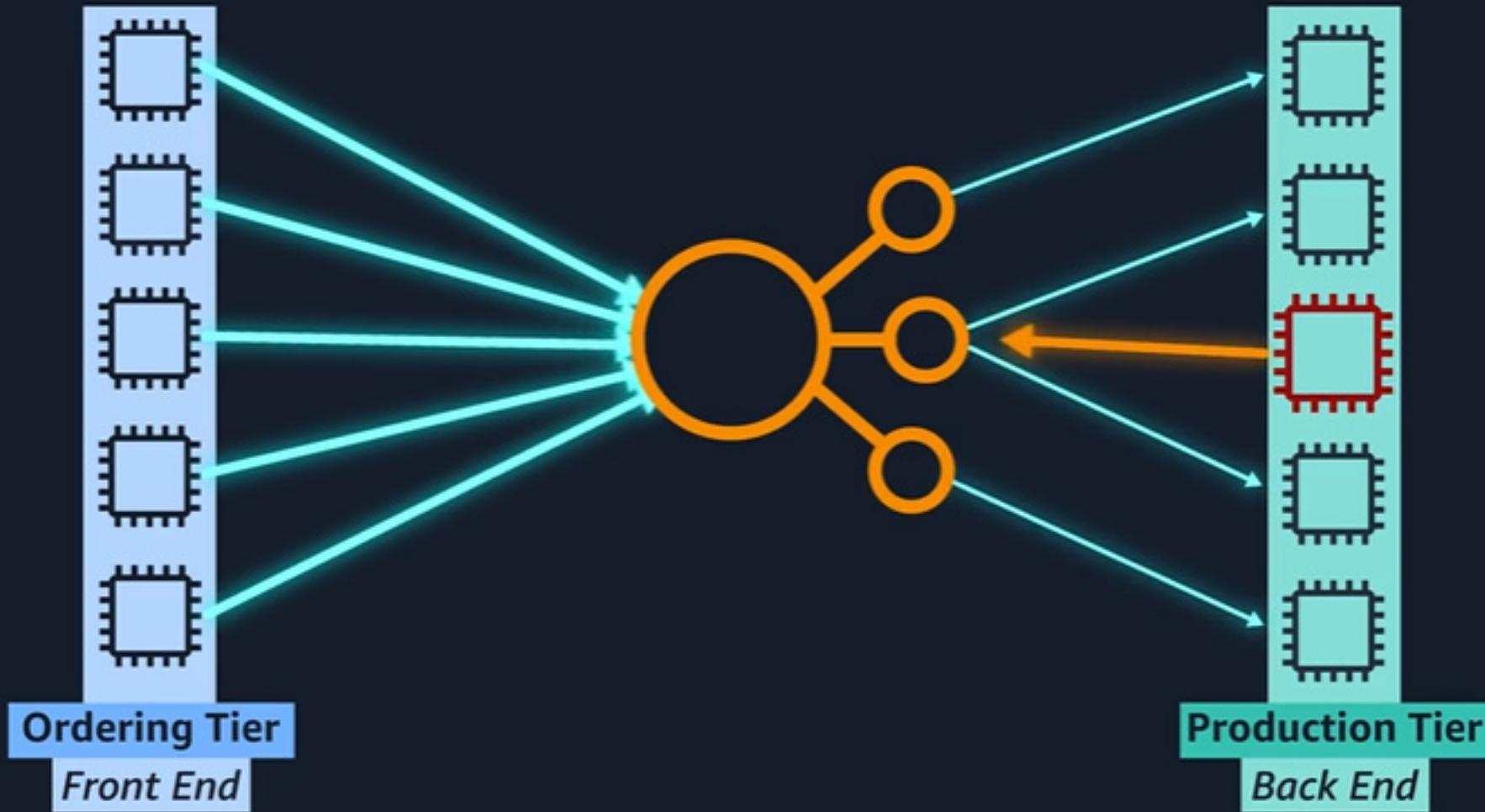












Elastic Load Balancing

Elastic Load Balancing is the AWS service that automatically distributes incoming application traffic across multiple resources, such as Amazon EC2 instances.

A load balancer acts as a single point of contact for all incoming web traffic to your Auto Scaling group. This means that as you add or remove Amazon EC2 instances in response to the amount of incoming traffic, these requests route to the load balancer first. Then, the requests spread across multiple resources that will handle them. For example, if you have multiple Amazon EC2 instances, Elastic Load Balancing distributes the workload across the multiple instances so that no single instance has to carry the bulk of it.

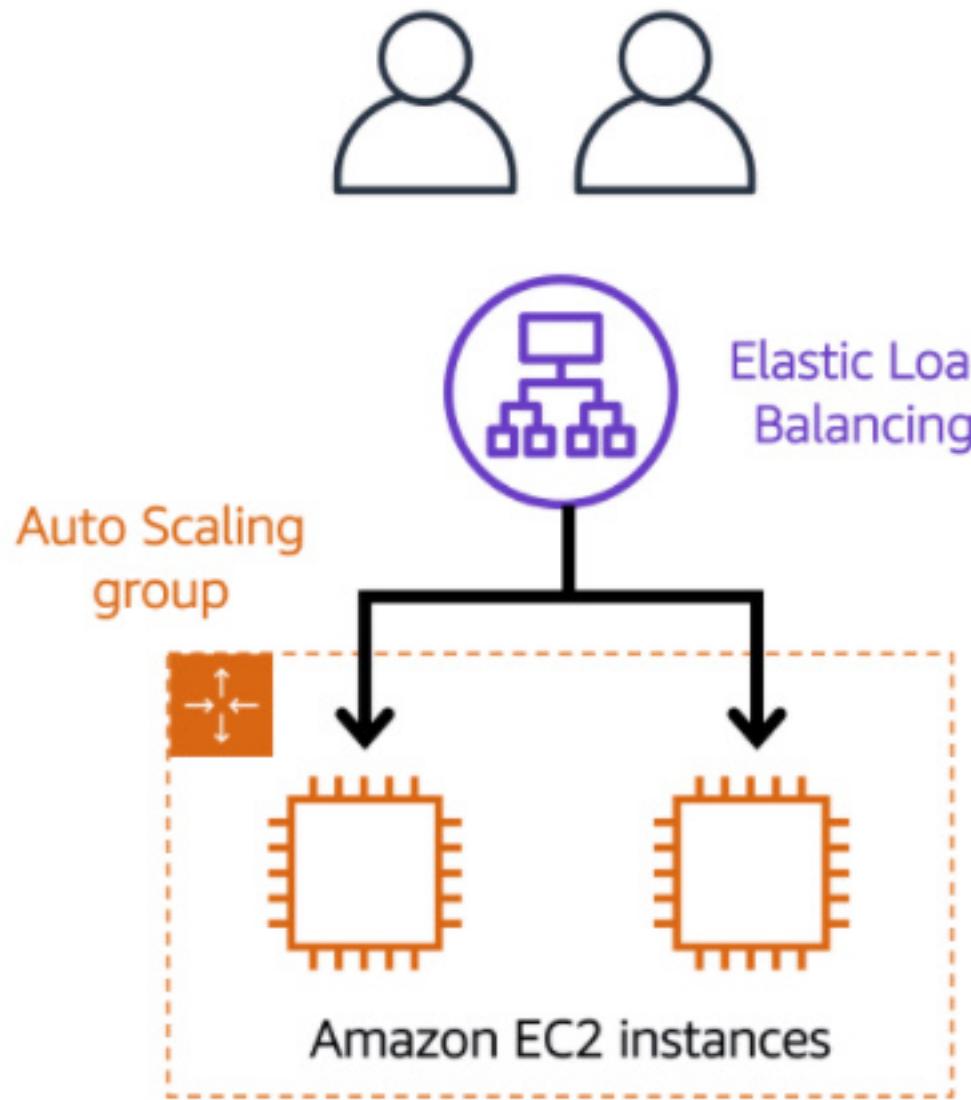
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Although Elastic Load Balancing and Amazon EC2 Auto Scaling are separate services, they work together to help ensure that applications running in Amazon EC2 can provide high performance and availability.

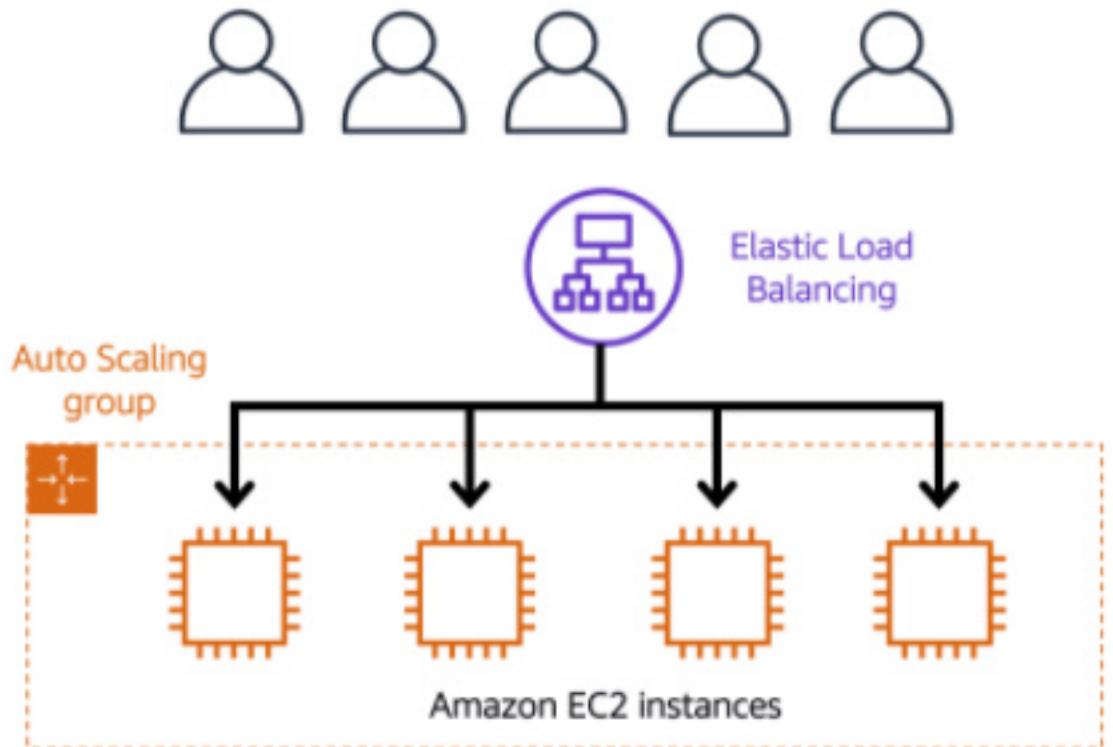
Example: Elastic Load Balancing



Low-demand period

Here's an example of how Elastic Load Balancing works. Suppose that a few customers have come to the coffee shop and are ready to place their orders.

If only a few registers are open, this matches the demand of customers who need service. The coffee shop is less likely to have open registers with no customers. In this example, you can think of the registers as Amazon EC2 instances.

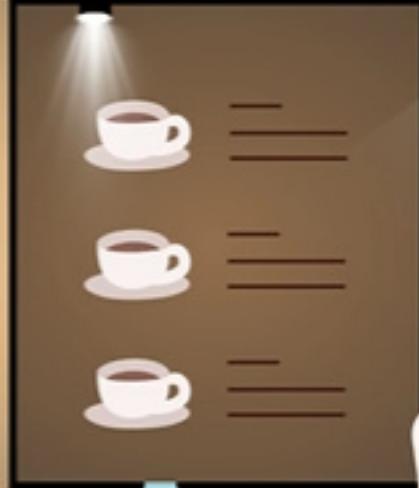


High-demand period

Throughout the day, as the number of customers increases, the coffee shop opens more registers to accommodate them. In the diagram, the Auto Scaling group represents this.

Additionally, a coffee shop employee directs customers to the most appropriate register so that the number of requests can evenly distribute across the open registers. You can think of this coffee shop employee as a load balancer.

**ORDER
HERE**





Application **A**



Application **B**



Application **A**



Application **B**



Loosely coupled architecture:
Single failure won't cause cascading failures



-3:09

1.5x





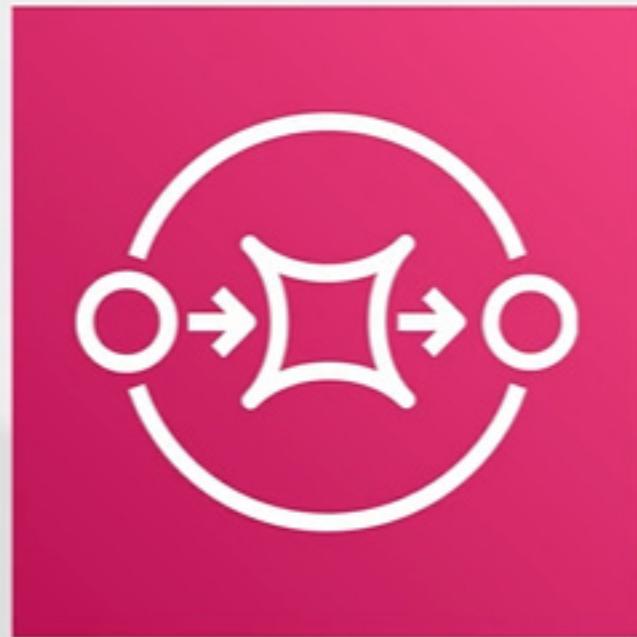
Application **A**



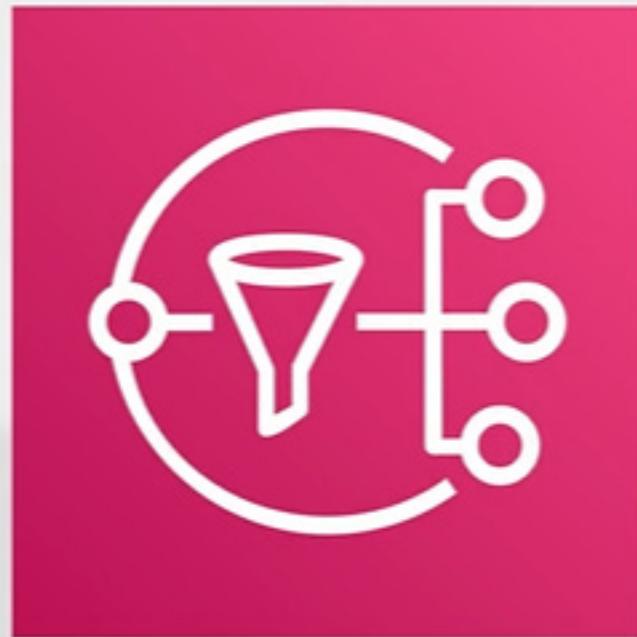
Message **Queue**



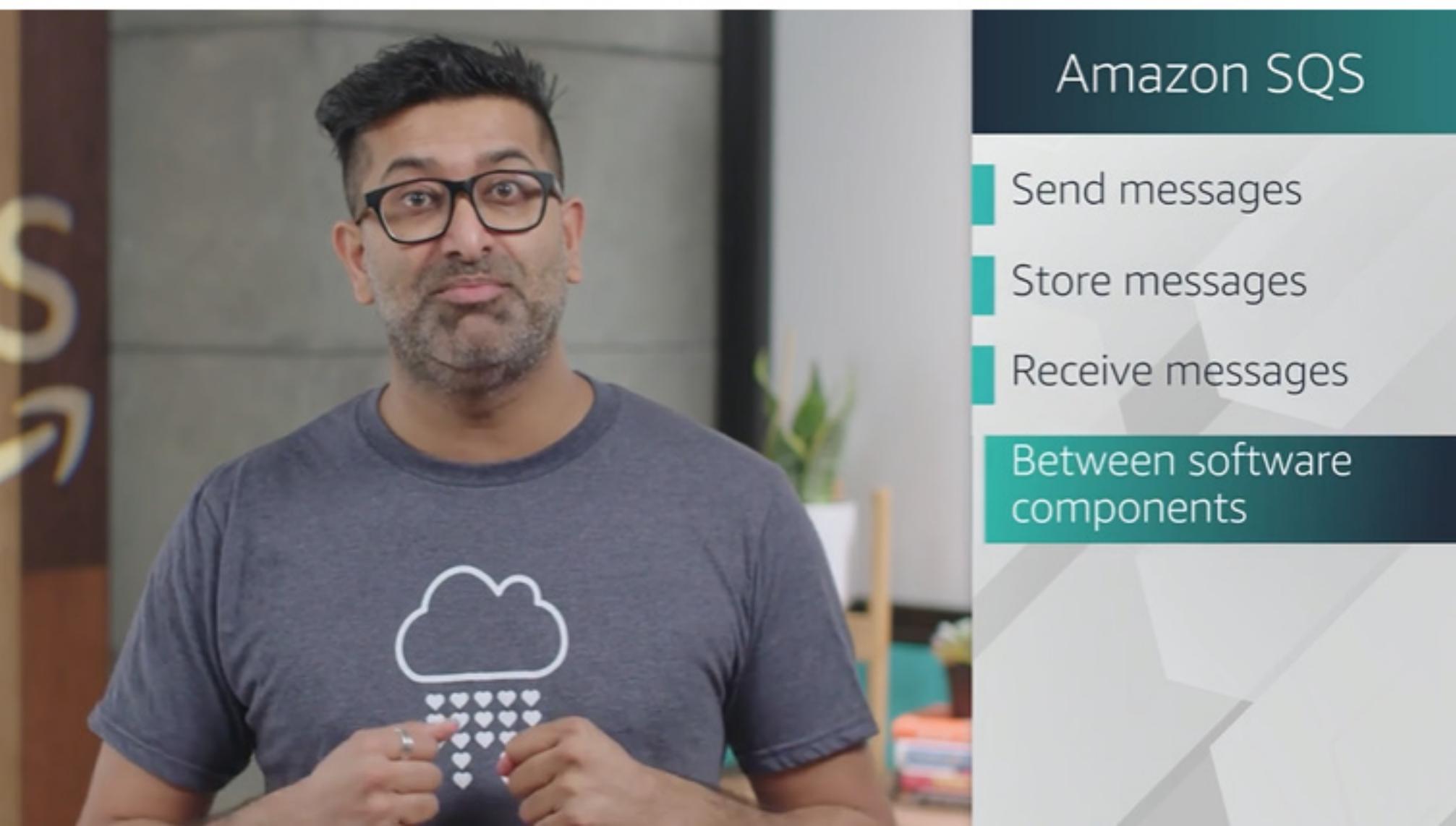
Application **B**



Amazon Simple Queue Service
(Amazon SQS)



Amazon Simple Notification Service
(Amazon SNS)



Amazon SQS

- Send messages
 - Store messages
 - Receive messages
- Between software components

A medium shot of a man with dark hair and glasses, wearing a grey t-shirt with a white cloud icon containing hearts. He is gesturing with his hands while speaking.

Amazon SQS

- Send messages
- Store messages
- Receive messages
- Between software components

At any volume

**ORDER
HERE**





Payload:
Data contained within a message

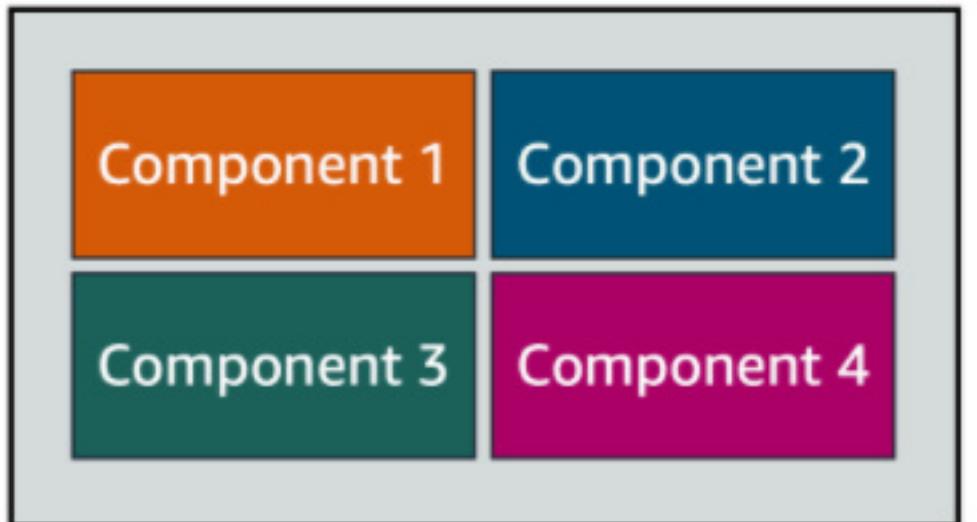


Amazon SQS queues:
Where messages are placed until they are processed



Monolithic applications and microservices

Monolithic application

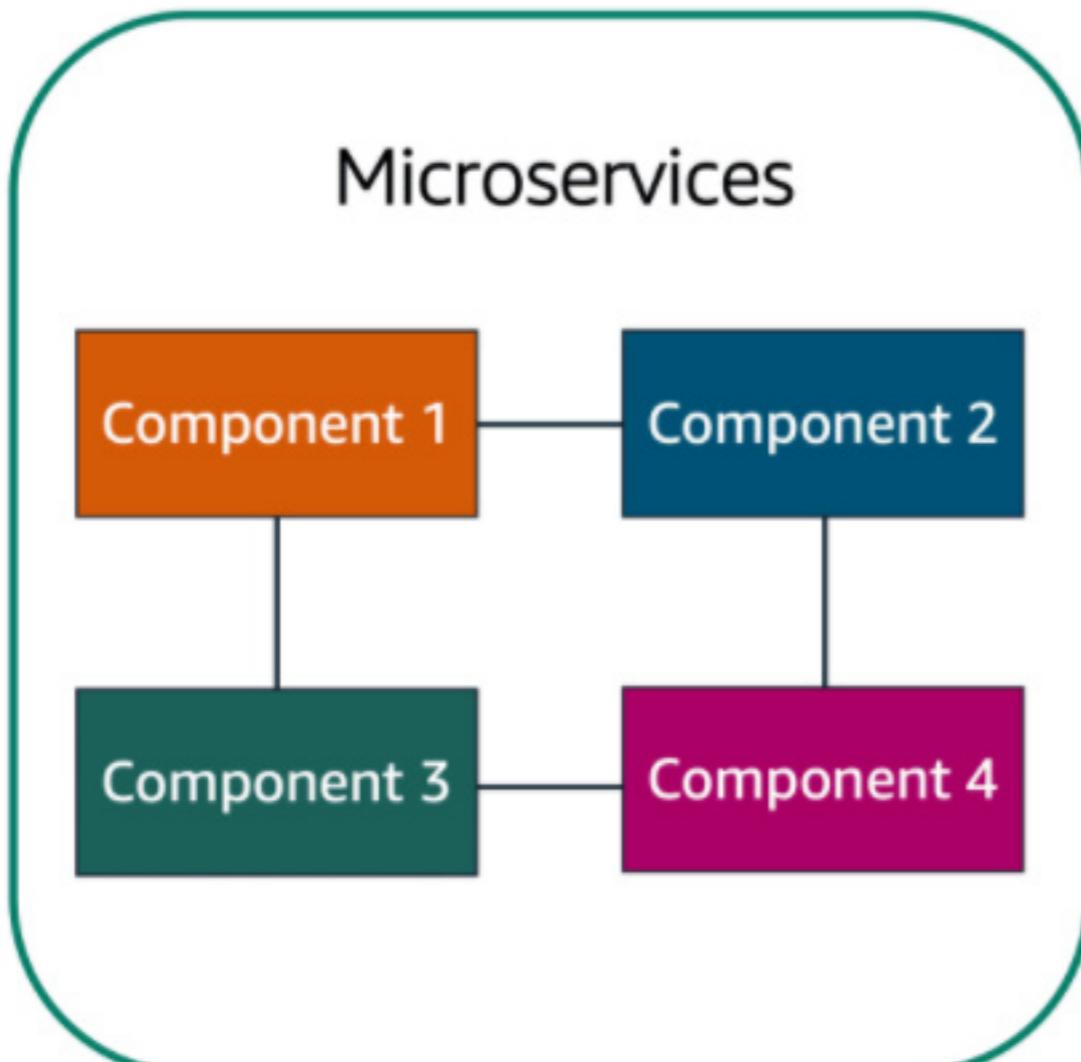


Applications are made of multiple components. The components communicate with each other to transmit data, fulfill requests, and keep the application running.

Suppose that you have an application with tightly coupled components. These components might include databases, servers, the user interface, business logic, and so on. This type of architecture can be considered a **monolithic application**.

In this approach to application architecture, if a single component fails, other components fail, and possibly the entire application fails.

To help maintain application availability when a single component fails, you can design your application through a **microservices** approach.



In a microservices approach, application components are loosely coupled. In this case, if a single component fails, the other components continue to work because they are communicating with each other. The loose coupling prevents the entire application from failing.

When designing applications on AWS, you can take a microservices approach with services and components that fulfill different functions. Two services facilitate application integration: Amazon Simple Notification Service (Amazon SNS) and Amazon Simple Queue Service (Amazon SQS).

Amazon Simple Notification Service (Amazon SNS)

Amazon Simple Notification Service (Amazon SNS) is a publish/subscribe service. Using Amazon SNS topics, a publisher publishes messages to subscribers. This is similar to the coffee shop; the cashier provides coffee orders to the barista who makes the drinks.

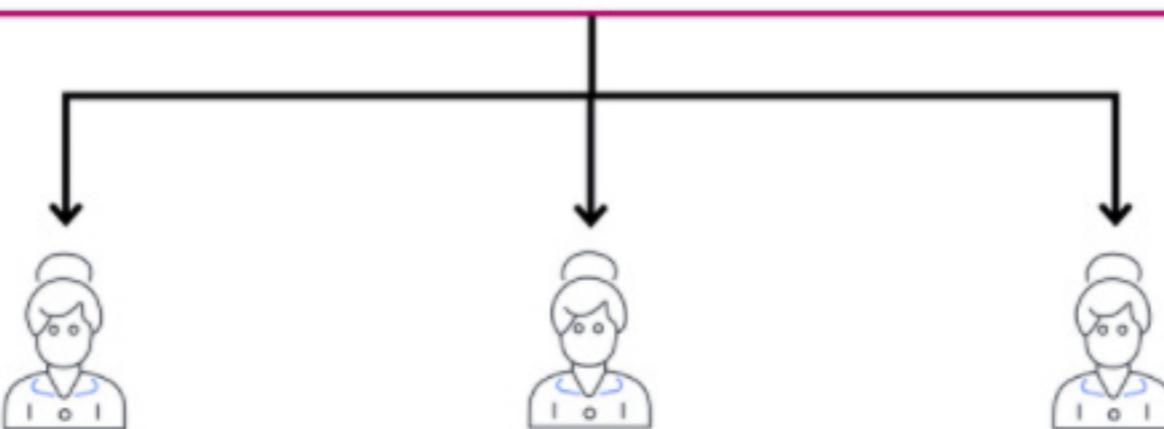
In Amazon SNS, subscribers can be web servers, email addresses, AWS Lambda functions, or several other options.



In the next lesson, you will learn more about AWS Lambda.

Publishing updates from a single topic

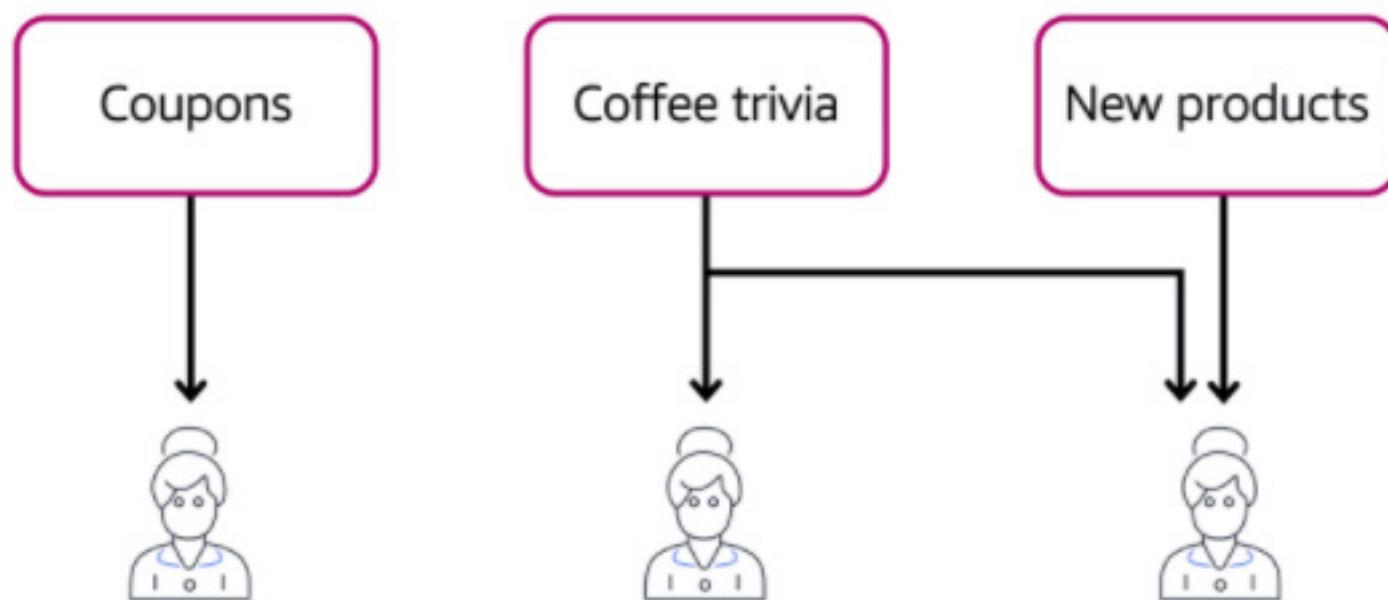
Coupons, coffee trivia, and new products



Suppose that the coffee shop has a single newsletter that includes updates from all areas of its business. It includes topics such as coupons, coffee trivia, and new products. All of these topics are grouped because this is a single newsletter. All customers who subscribe to the newsletter receive updates about coupons, coffee trivia, and new products.

After a while, some customers express that they would prefer to receive separate newsletters for only the specific topics that interest them. The coffee shop owners decide to try this approach.

Publishing updates from multiple topics



Now, instead of having a single newsletter for all topics, the coffee shop has broken it up into three separate newsletters. Each newsletter is devoted to a specific topic: coupons, coffee trivia, and new products.

Subscribers will now receive updates immediately for only the specific topics to which they have subscribed.

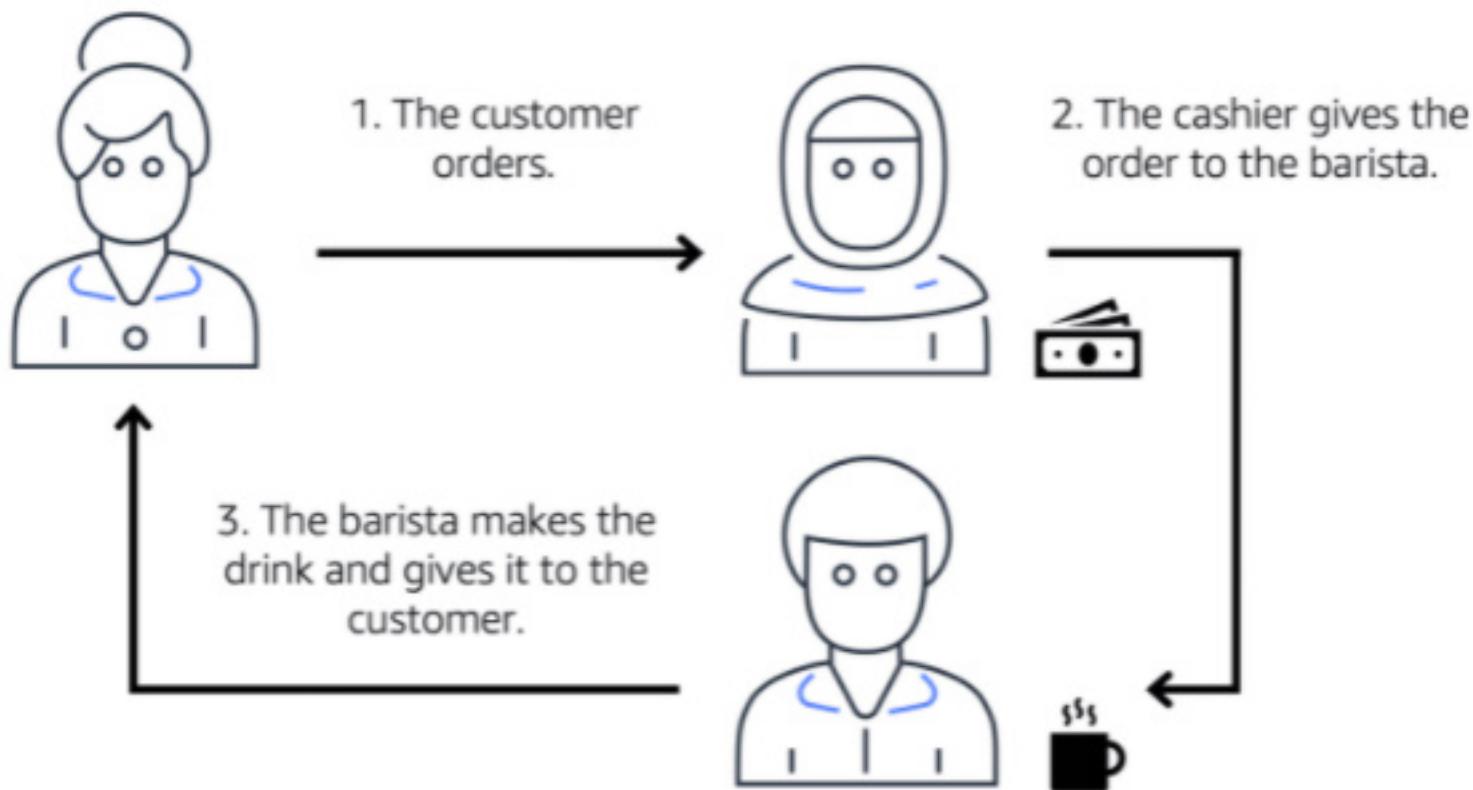
It is possible for subscribers to subscribe to a single topic or to multiple topics. For example, the first customer subscribes to only the coupons topic, and the second subscriber subscribes to only the coffee trivia topic. The third customer subscribes to both the coffee trivia and new products topics.

Example: Amazon SQS

To review an example of how to use Amazon SQS, select **Start**.

START >

Example: Fulfilling an order



Suppose that the coffee shop has an ordering process in which a cashier takes orders, and a barista makes the orders. Think of the cashier and the barista as two separate components of an application.

First, the cashier takes an order and writes it down on a piece of paper. Next, the cashier delivers the paper to the barista. Finally, the barista makes the drink and gives it to the customer.

Suppose that the coffee shop has an ordering process in which a cashier takes orders, and a barista makes the orders. Think of the cashier and the barista as two separate components of an application.

First, the cashier takes an order and writes it down on a piece of paper. Next, the cashier delivers the paper to the barista. Finally, the barista makes the drink and gives it to the customer.

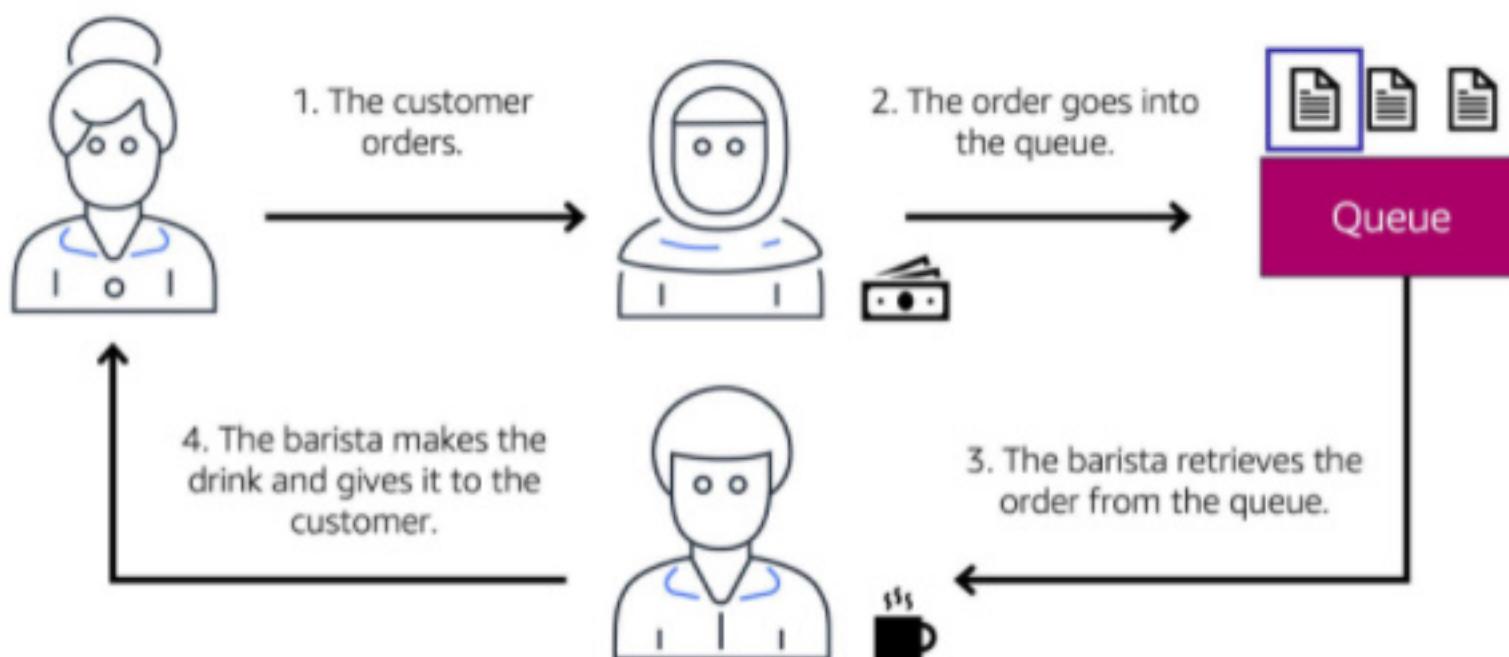
When the next order comes in, the process repeats. This process runs smoothly as long as both the cashier and the barista are coordinated.

What might happen if the cashier took an order and went to deliver it to the barista, but the barista was out on a break or busy with another order? The cashier would need to wait until the barista is ready to accept the order. This would cause delays in the ordering process and require customers to wait longer to receive their orders.

As the coffee shop has become more popular and the ordering line is moving more slowly, the owners notice that the current ordering process is time consuming and inefficient. They decide to try a different approach that uses a queue.

Step 2

Example: Orders in a queue



Recall that the cashier and the barista are two separate components of an application. A message queuing service such as Amazon SQS enables messages between decoupled application complements.

In this example, the first step in the process remains the same as before: a customer places an order with the cashier.



Recall that the cashier and the barista are two separate components of an application. A message queuing service such as Amazon SQS enables messages between decoupled application complements.

In this example, the first step in the process remains the same as before: a customer places an order with the cashier.

The cashier puts the order into a queue. You can think of this as an order board that serves as a buffer between the cashier and the barista. Even if the barista is out on a break or busy with another order, the cashier can continue placing new orders into the queue.

Next, the barista checks the queue and retrieves the order.

The barista prepares the drink and gives it to the customer.

The barista then removes the completed order from the queue.

While the barista is preparing the drink, the cashier is able to continue taking new orders and add them to the queue.

Which AWS service is the best choice for publishing messages to subscribers?



Amazon Simple Queue Service (Amazon SQS)



Amazon EC2 Auto Scaling



Amazon Simple Notification Service (Amazon SNS)



Elastic Load Balancing



The correct response option is **Amazon Simple Notification Service (Amazon SNS)**.

Amazon SNS is a publish/subscribe service. Using Amazon SNS topics, a publisher publishes messages to subscribers.

The other response options are incorrect because:

- Amazon Simple Queue Service (Amazon SQS) is a message queuing service. It does not use the message subscription and topic model that is involved with Amazon SNS.
- Amazon EC2 Auto Scaling enables you to automatically add or remove Amazon EC2 instances in response to changing application demand.
- Elastic Load Balancing is the AWS service that automatically distributes incoming application traffic across multiple resources, such as Amazon EC2 instances.

Learn more:

Amazon Simple Notification Service

Fully managed pub/sub messaging, SMS, email, and mobile push notifications

[Complete Sign Up](#)

FEATURED

AWS Certification

Explore the resources available to help you prepare for your AWS Certification.

Amazon Simple Notification Service (Amazon SNS) is a fully managed messaging service for both application-to-application (A2A) and application-to-person (A2P) communication.

The A2A pub/sub functionality provides topics for high-throughput, push-based, many-to-many messaging between distributed systems, microservices, and event-driven serverless applications. Using Amazon SNS topics, your publisher systems can fanout messages to a large number of subscriber systems including Amazon SQS queues, AWS Lambda functions and HTTPS endpoints, for parallel processing, and Amazon Kinesis Data Firehose. The A2P functionality enables you to send messages to users at scale via SMS, mobile push, and email.

Amazon EC2

Flexible

Reliable

Scalable





AWS Lambda





Trigger



Lambda **function**



AWS Lambda







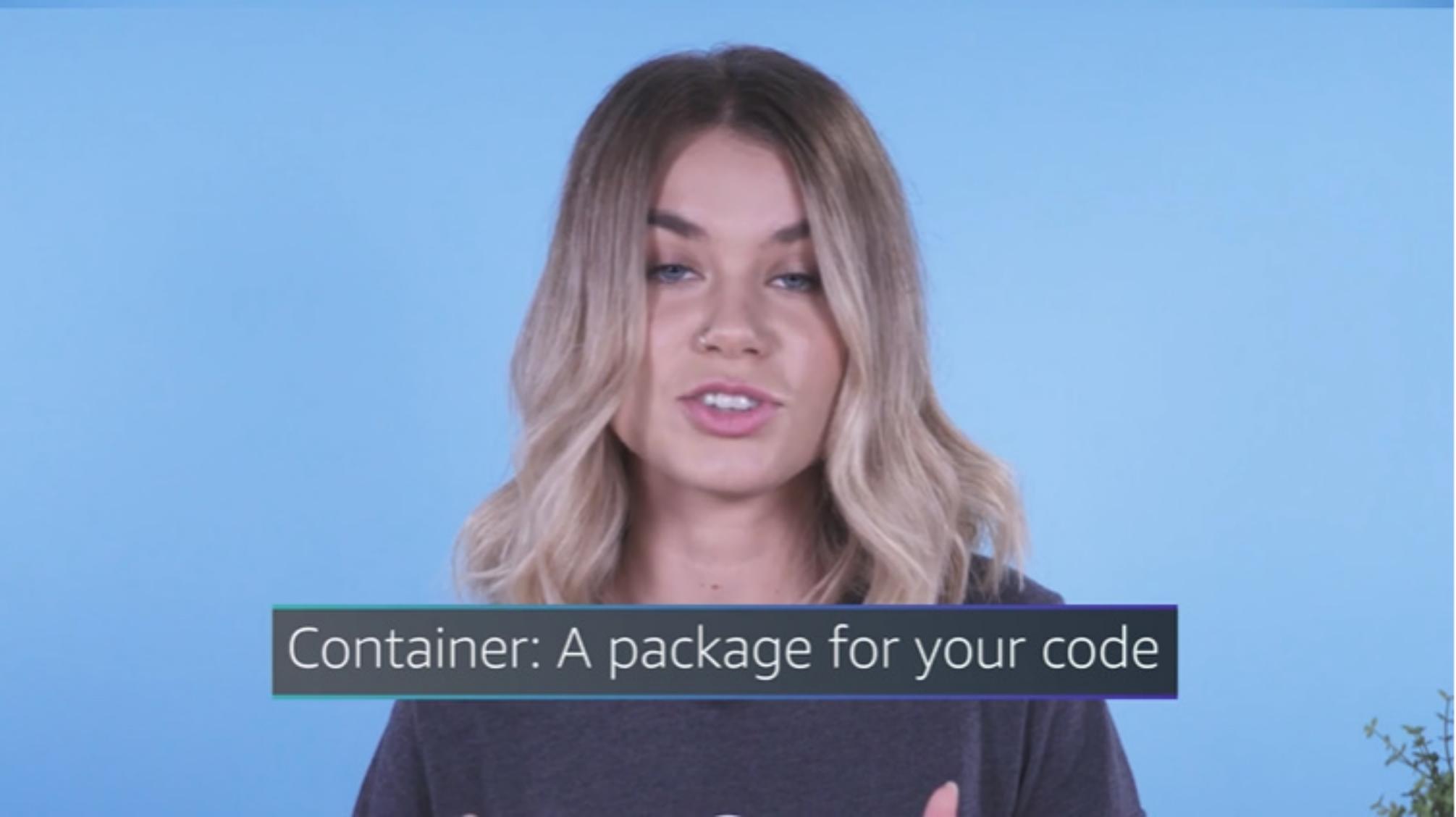
Run time < 15 minutes



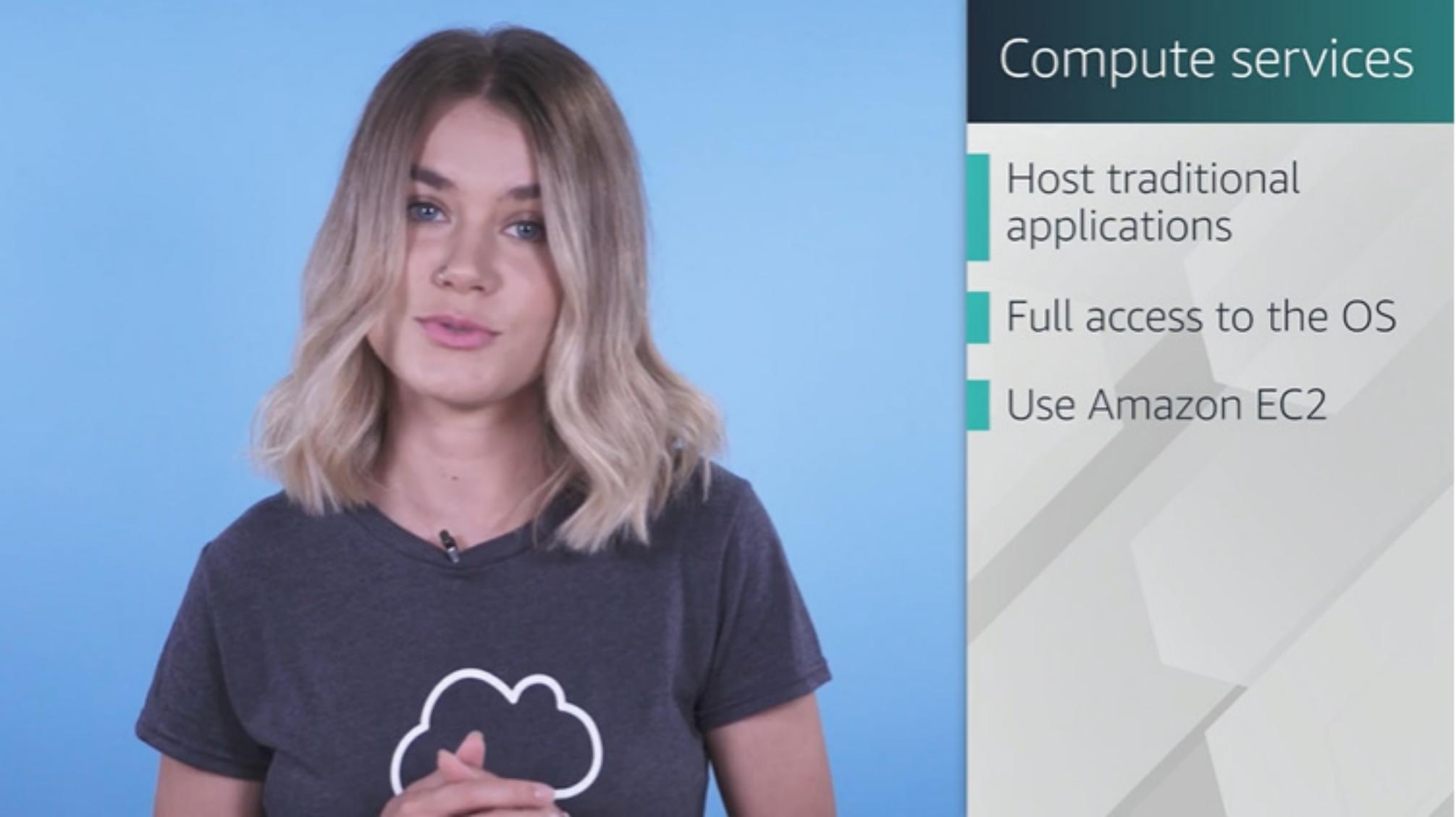
Amazon Elastic Container Service
(Amazon ECS)



Amazon Elastic Kubernetes Service
(Amazon EKS)

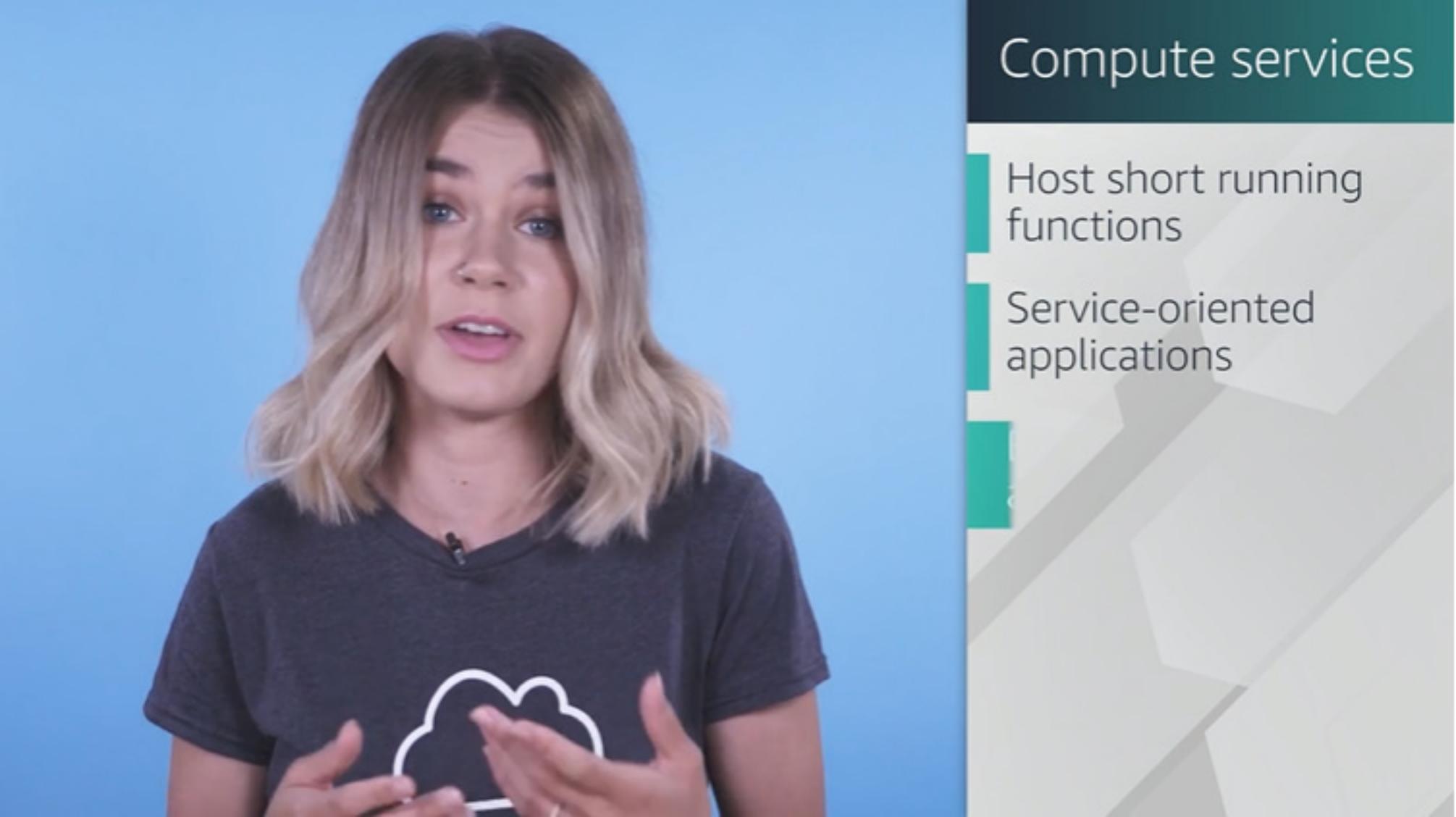


Container: A package for your code



Compute services

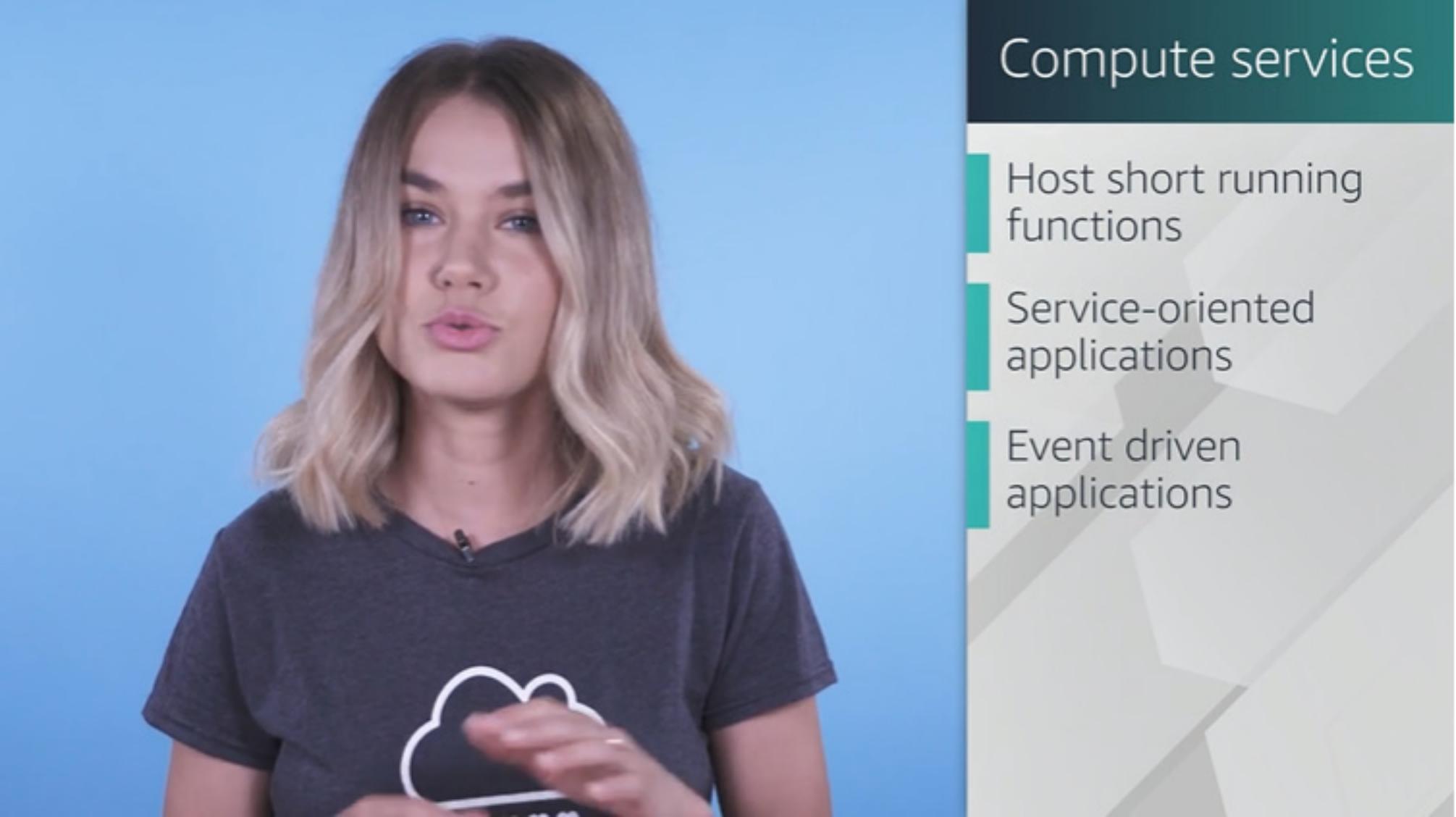
- Host traditional applications
- Full access to the OS
- Use Amazon EC2



Compute services

Host short running functions

Service-oriented applications

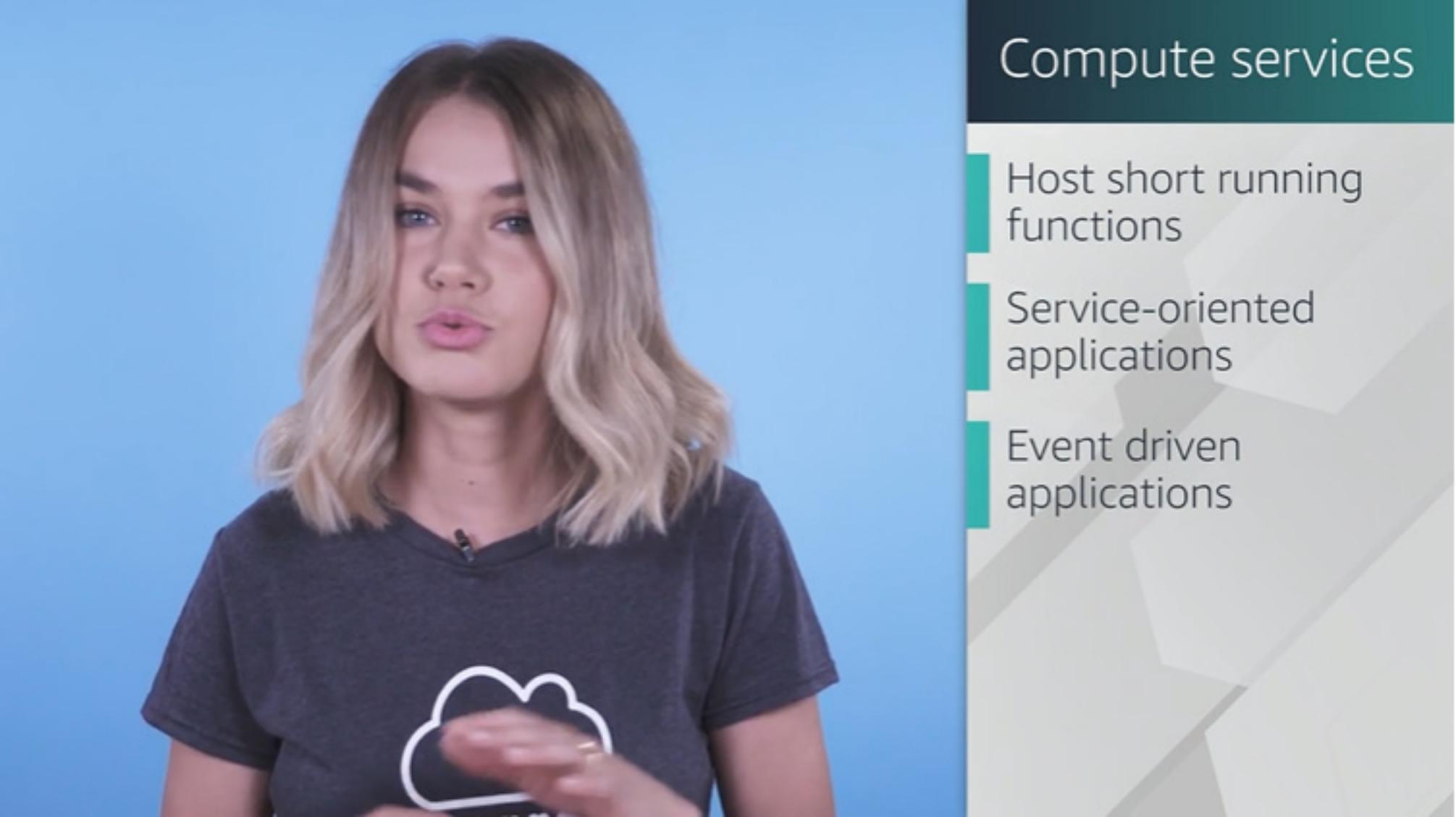


Compute services

Host short running functions

Service-oriented applications

Event driven applications

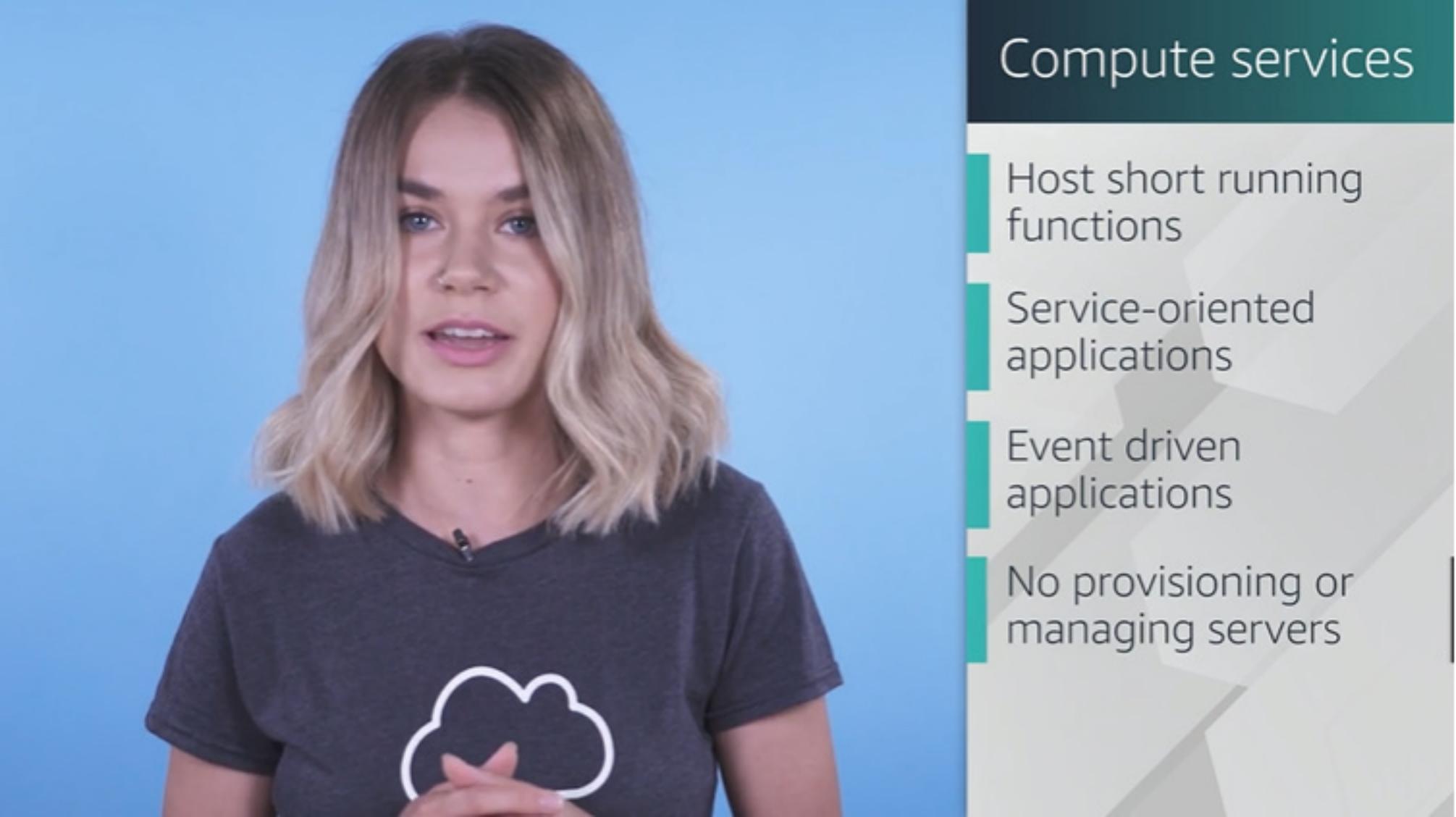


Compute services

Host short running functions

Service-oriented applications

Event driven applications



Compute services

Host short running functions

Service-oriented applications

Event driven applications

No provisioning or managing servers



Compute services

Host short running functions

Service-oriented applications

Event driven applications

No provisioning or managing servers

AWS Lambda



Compute services

Run Docker container-based workloads on AWS

Amazon ECS or Amazon EKS



Surit Aryal in Karat

Compute services



Run Docker container-based workloads on AWS

Amazon ECS or Amazon EKS

Amazon EC2 that you manage

AWS Fargate managed for you

Serverless computing

Earlier in this module, you learned about Amazon EC2, a service that lets you run virtual servers in the cloud. If you have applications that you want to run in Amazon EC2, you must do the following:

- 1 Provision instances (virtual servers).
- 2 Upload your code.
- 3 Continue to manage the instances while your application is running.

Computing with virtual servers



Serverless computing



The term "serverless" means that your code runs on servers, but you do not need to provision or manage these servers. With serverless computing, you can focus more on innovating new products and features instead of maintaining servers.

Another benefit of serverless computing is the flexibility to scale serverless applications automatically. Serverless computing can adjust the applications' capacity by modifying the units of consumptions, such as throughput and memory.

An AWS service for serverless computing is **AWS Lambda**.

Computing with virtual servers



Serverless computing



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An AWS service for serverless computing is **AWS Lambda**.

AWS Lambda

[**AWS Lambda**](#) is a service that lets you run code without needing to provision or manage servers.

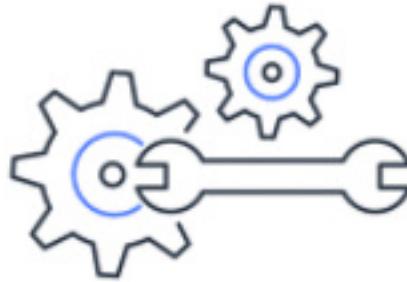
While using AWS Lambda, you pay only for the compute time that you consume. Charges apply only when your code is running. You can also run code for virtually any type of application or backend service, all with zero administration.

For example, a simple Lambda function might involve automatically resizing uploaded images to the AWS Cloud. In this case, the function triggers when uploading a new image.

How AWS Lambda works



Upload code to Lambda.



Set code to trigger from an event source.



Code runs only when triggered.



Pay only for the compute time you use.

- 1 You upload your code to Lambda.
- 2 You set your code to trigger from an event source, such as AWS services, mobile applications, or HTTP endpoints.
- 3 Lambda runs your code only when triggered.
- 4 You pay only for the compute time that you use. In the previous example of resizing images, you would pay only for the compute time that you use when uploading new images. Uploading the images triggers Lambda to run code for the image resizing function.

In AWS, you can also build and run **containerized** applications.

Containers

Containers provide you with a standard way to package your application's code and dependencies into a single object. You can also use containers for processes and workflows in which there are essential requirements for security, reliability, and scalability.

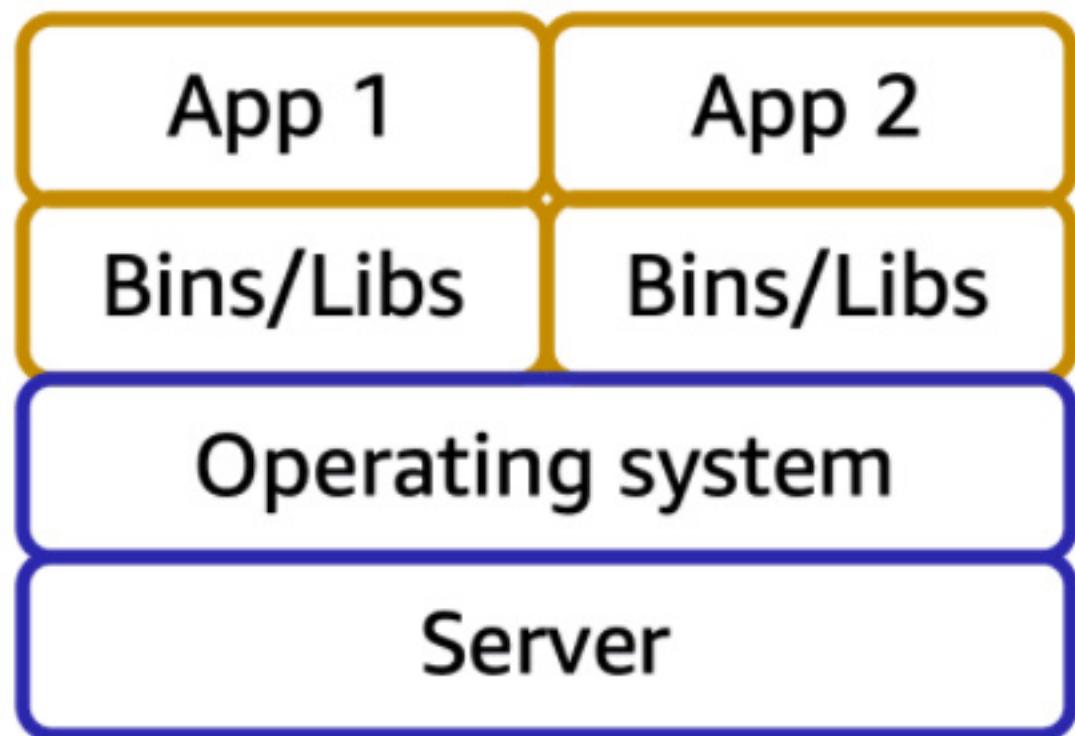
Example: Containers

To review an example that can help you to understand how containers work,
select **Start**.

START >



One host with multiple containers



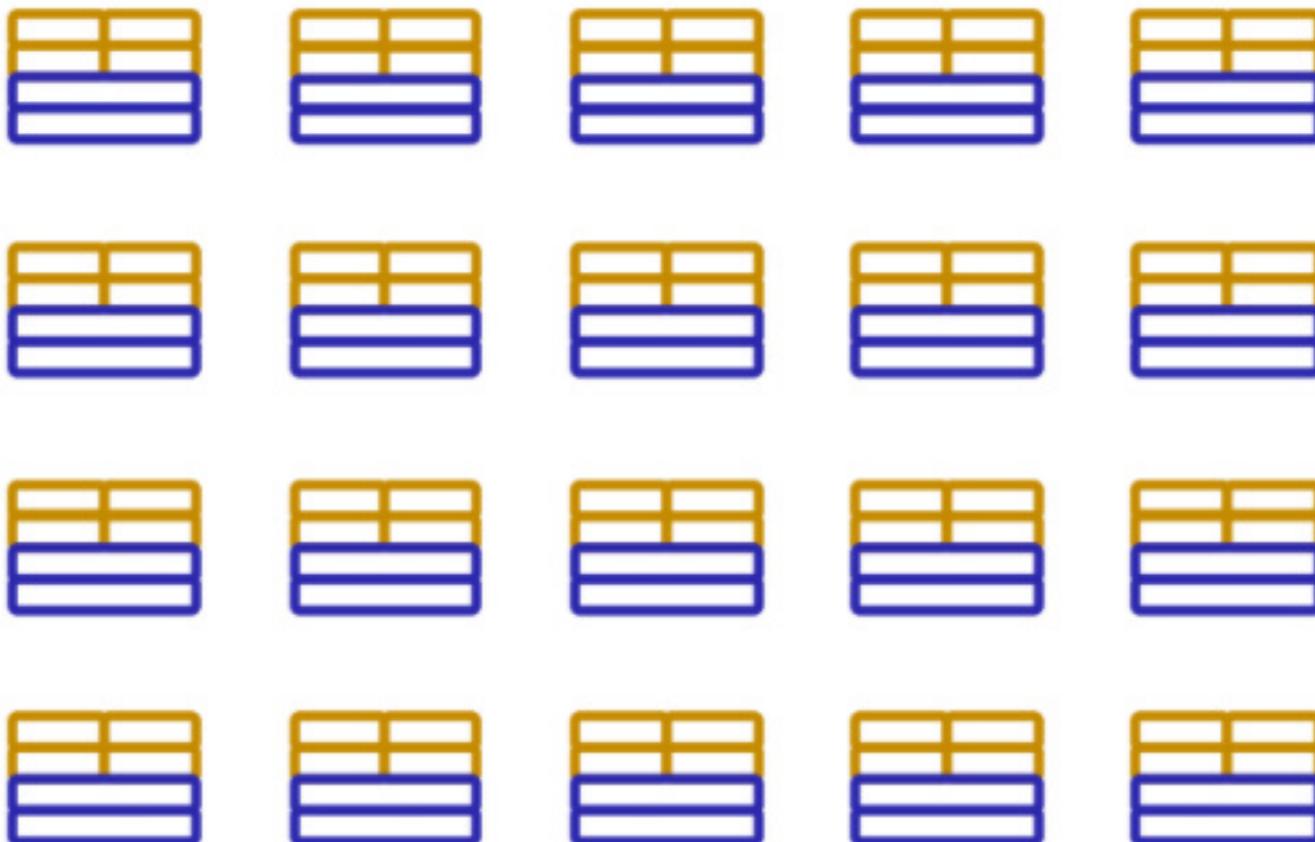
Suppose that a company's application developer has an environment on their computer that is different from the environment on the computers used by the IT operations staff. The developer wants to ensure that the application's environment remains consistent regardless of deployment, so they use a containerized approach. This helps to reduce time spent debugging applications and diagnosing differences in computing environments.

1

2

✓

Tens of hosts with hundreds of containers



When running containerized applications, it's important to consider scalability. Suppose that instead of a single host with multiple containers, you have to manage tens of hosts with hundreds of containers. Alternatively, you have to manage possibly hundreds of hosts with thousands of containers. At a large scale, imagine how much time it might take for you to monitor memory usage, security, logging, and so on.

Amazon Elastic Container Service (Amazon ECS)

[Amazon Elastic Container Service \(Amazon ECS\)](#) is a highly scalable, high-performance container management system that enables you to run and scale containerized applications on AWS.

Amazon ECS supports Docker containers. [Docker](#) is a software platform that enables you to build, test, and deploy applications quickly. AWS supports the use of open-source Docker Community Edition and subscription-based Docker Enterprise Edition. With Amazon ECS, you can use API calls to launch and stop Docker-enabled applications.

Amazon Elastic Kubernetes Service (Amazon EKS)

[Amazon Elastic Kubernetes Service \(Amazon EKS\)](#) is a fully managed service that you can use to run Kubernetes on AWS.

[Kubernetes](#) is open-source software that enables you to deploy and manage containerized applications at scale. A large community of volunteers maintains Kubernetes, and AWS actively works together with the Kubernetes community. As new features and functionalities release for Kubernetes applications, you can easily apply these updates to your applications managed by Amazon EKS.

Amazon EKS.

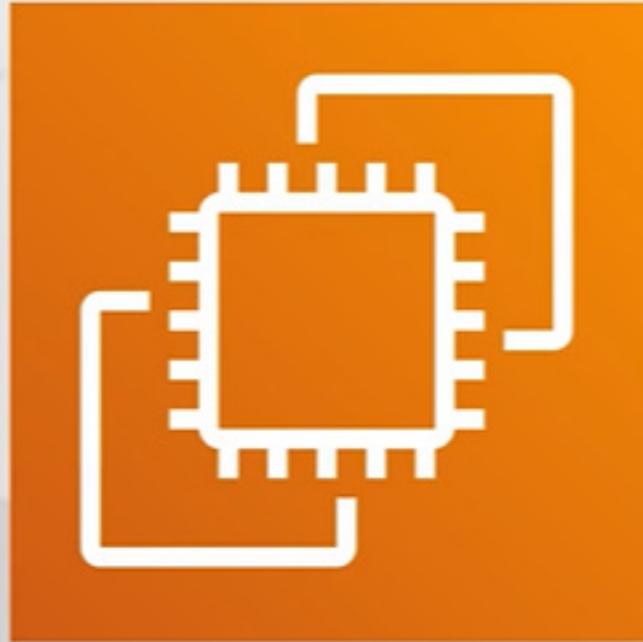
AWS Fargate

[AWS Fargate](#) is a serverless compute engine for containers. It works with both Amazon ECS and Amazon EKS.

When using AWS Fargate, you do not need to provision or manage servers. AWS Fargate manages your server infrastructure for you. You can focus more on innovating and developing your applications, and you pay only for the resources that are required to run your containers.

Cloud computing

The on-demand delivery of IT resources over the internet with pay-as-you-go pricing



Amazon Elastic Compute Cloud
(Amazon EC2)

Amazon EC2 instance families

- General purpose
- Compute optimized
- Memory optimized
- Accelerated computing
- Storage optimized





Amazon EC2 Auto Scaling:
Automated horizontal scaling



Elastic Load Balancing
(ELB)

Amazon EC2 billing options

- On-Demand
- Spot Instances
- Reserved Instances
- Savings Plans



Additional resources

To learn more about the concepts that were explored in Module 2, review these resources.

- [Compute on AWS](#)
- [AWS Compute Blog](#)
- [AWS Compute Services](#)
- [Hands-On Tutorials: Compute](#)
- [Category Deep Dive: Serverless](#)
- [AWS Customer Stories: Serverless](#)

You want to use an Amazon EC2 instance for a batch processing workload. What would be the best Amazon EC2 instance type to use?



General purpose



Memory optimized



Compute optimized



Storage optimized

You want to use an Amazon EC2 instance for a batch processing workload. What would be the best Amazon EC2 instance type to use?



General purpose



Memory optimized



Compute optimized



Storage optimized

The correct response option is **Compute optimized**.

The other response options are incorrect because:

- General purpose instances provide a balance of compute, memory, and networking resources. This instance family would not be the best choice for the application in this scenario. Compute optimized instances are more well suited for batch processing workloads than general purpose instances.
- Memory optimized instances are more ideal for workloads that process large datasets in memory, such as high-performance databases.
- Storage optimized instances are designed for workloads that require high, sequential read and write access to large datasets on local storage. The question does not specify the size of data that will be processed. Batch processing involves processing data in groups. A compute optimized instance is ideal for this type of workload, which would benefit from a high-performance processor.

What are the contract length options for Amazon EC2 Reserved Instances? (Select TWO.)

1 year

2 years

3 years

4 years

You have a workload that will run for a total of 6 months and can withstand interruptions. What would be the most cost-efficient Amazon EC2 purchasing option?



Reserved Instance



Spot Instance



Dedicated Instance



On-Demand Instance

The correct response option is **Spot Instance**.

The other response options are incorrect because:

- Reserved Instances require a contract length of either 1 year or 3 years.
The workload in this scenario will only be running for 6 months.
- Dedicated Instances run in a virtual private cloud (VPC) on hardware
that is dedicated to a single customer. They have a higher cost than the
other response options, which run on shared hardware.
- On-Demand Instances fulfill the requirements of running for only 6
months and withstanding interruptions. However, a Spot Instance would
be the best choice because it does not require a minimum contract
length, is able to withstand interruptions, and costs less than an On-
Demand Instance.

Which process is an example of Elastic Load Balancing?



Ensuring that no single Amazon EC2 instance has to carry the full workload on its own



Removing unneeded Amazon EC2 instances when demand is low



Adding a second Amazon EC2 instance during an online store's popular sale



Automatically adjusting the number of Amazon EC2 instances to meet demand

The correct response option is **Ensuring that no single Amazon EC2 instance has to carry the full workload on its own.**

Elastic Load Balancing is the AWS service that automatically distributes incoming application traffic across multiple resources, such as Amazon EC2 instances. This helps to ensure that no single resource becomes overutilized.

The other response options are all examples of Auto Scaling.

Learn more:

- [Elastic Load Balancing](#)
- [Amazon EC2 Auto Scaling](#)

You want to deploy and manage containerized applications. Which service should you use?



AWS Lambda



Amazon Simple Notification Service (Amazon SNS)



Amazon Simple Queue Service (Amazon SQS)



Amazon Elastic Kubernetes Service (Amazon EKS)

The correct response option is **Amazon Elastic Kubernetes Service (Amazon EKS)**.

Amazon EKS is a fully managed Kubernetes service. Kubernetes is open-source software that enables you to deploy and manage containerized applications at scale.

The other response options are incorrect because:

- AWS Lambda is a service that lets you run code without provisioning or managing servers.
- Amazon Simple Queue Service (Amazon SQS) is a service that enables you to send, store, and receive messages between software components through a queue.
- Amazon Simple Notification Service (Amazon SNS) is a publish/subscribe service. Using Amazon SNS topics, a publisher publishes messages to subscribers.

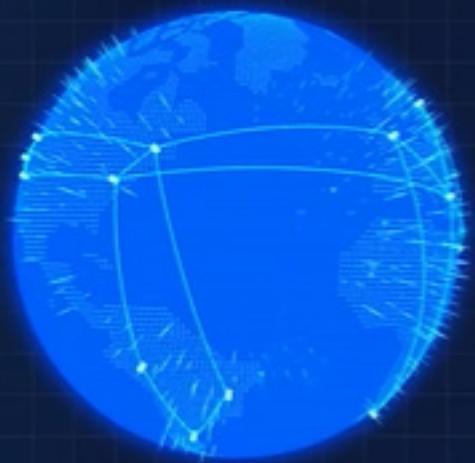
- Compare different methods for provisioning AWS services.



AWS DATA CENTERS



HIGH SPEED FIBER NETWORK



-5:20

1.5x

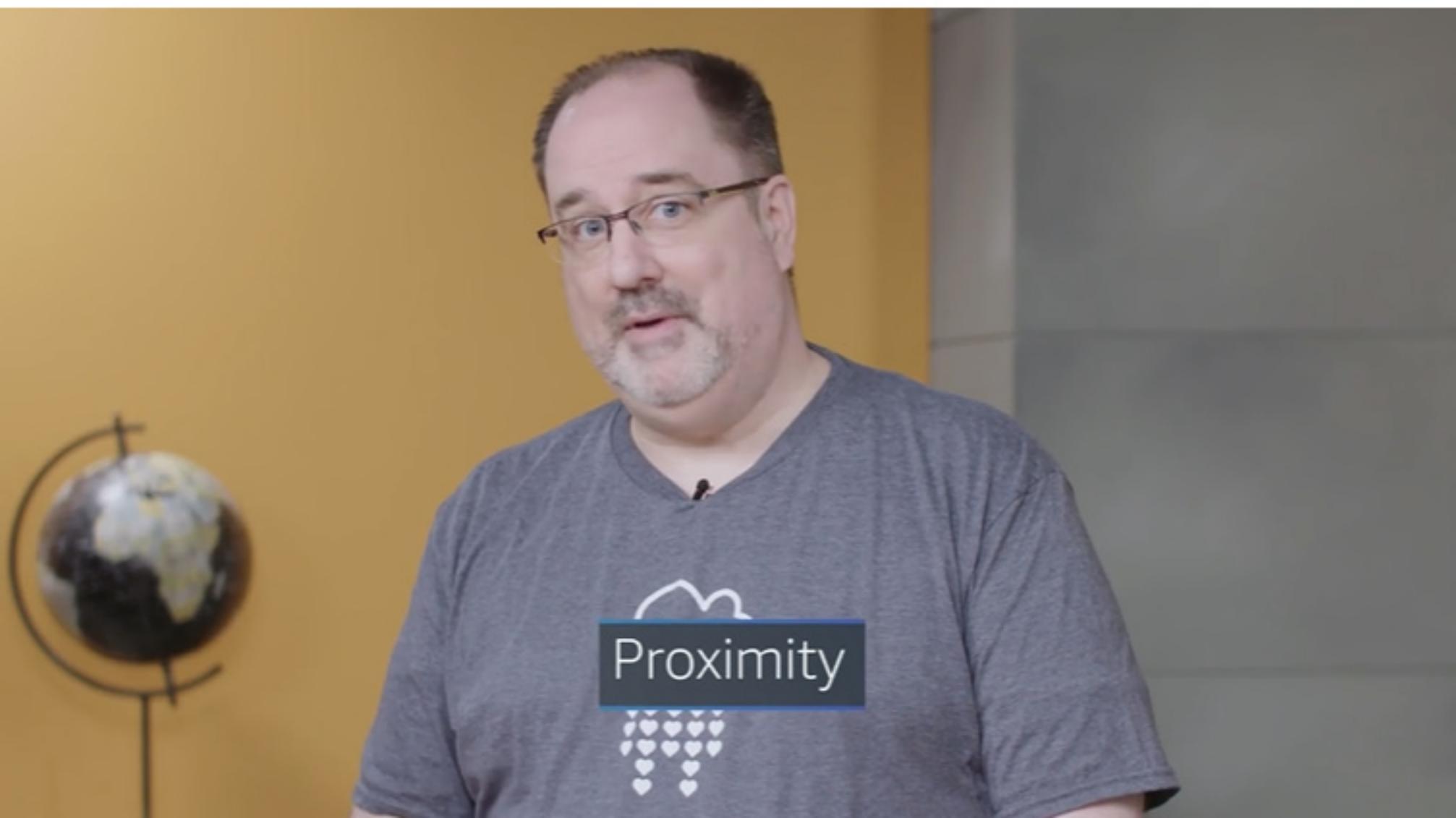


aws



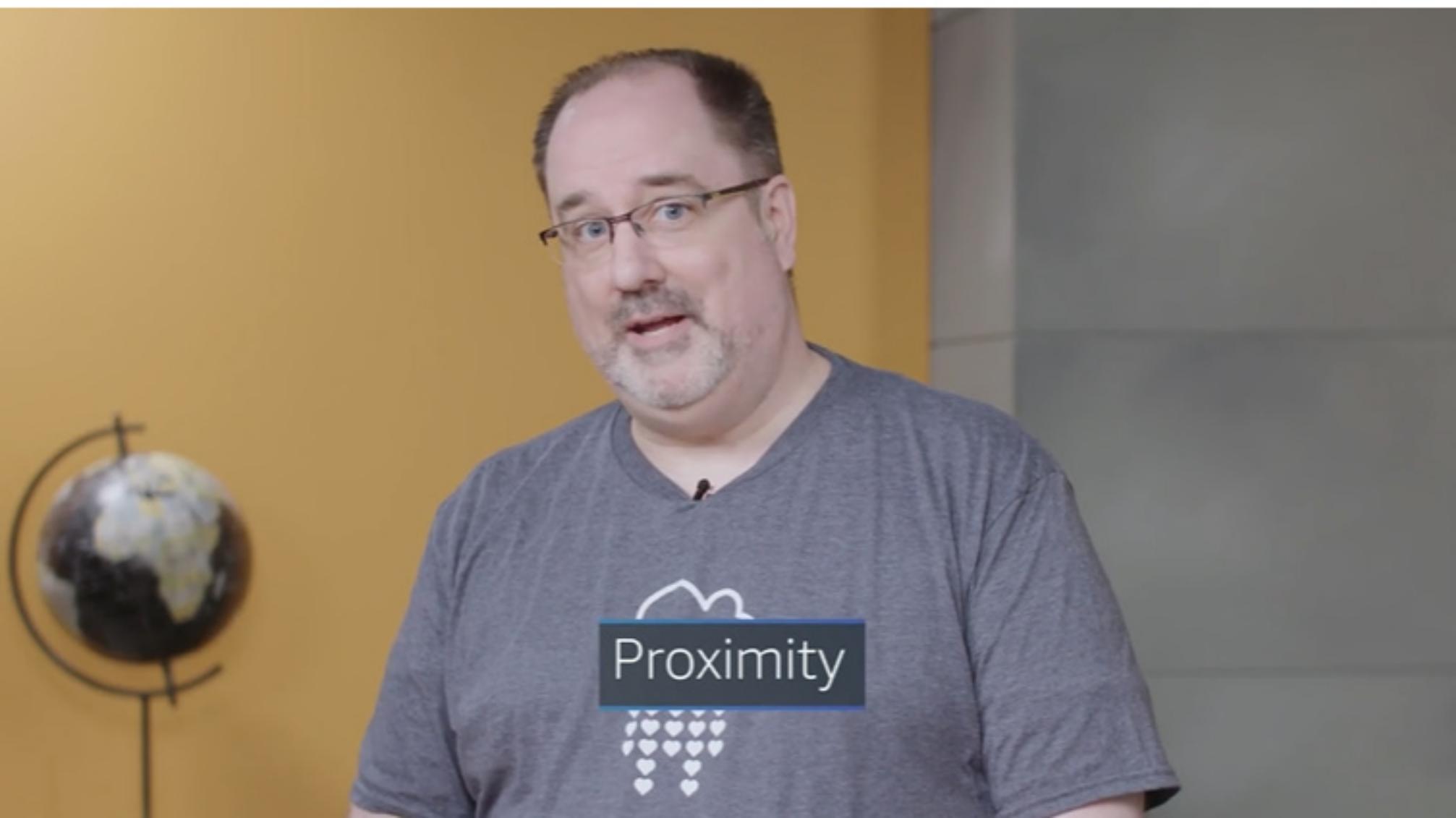
Compliance



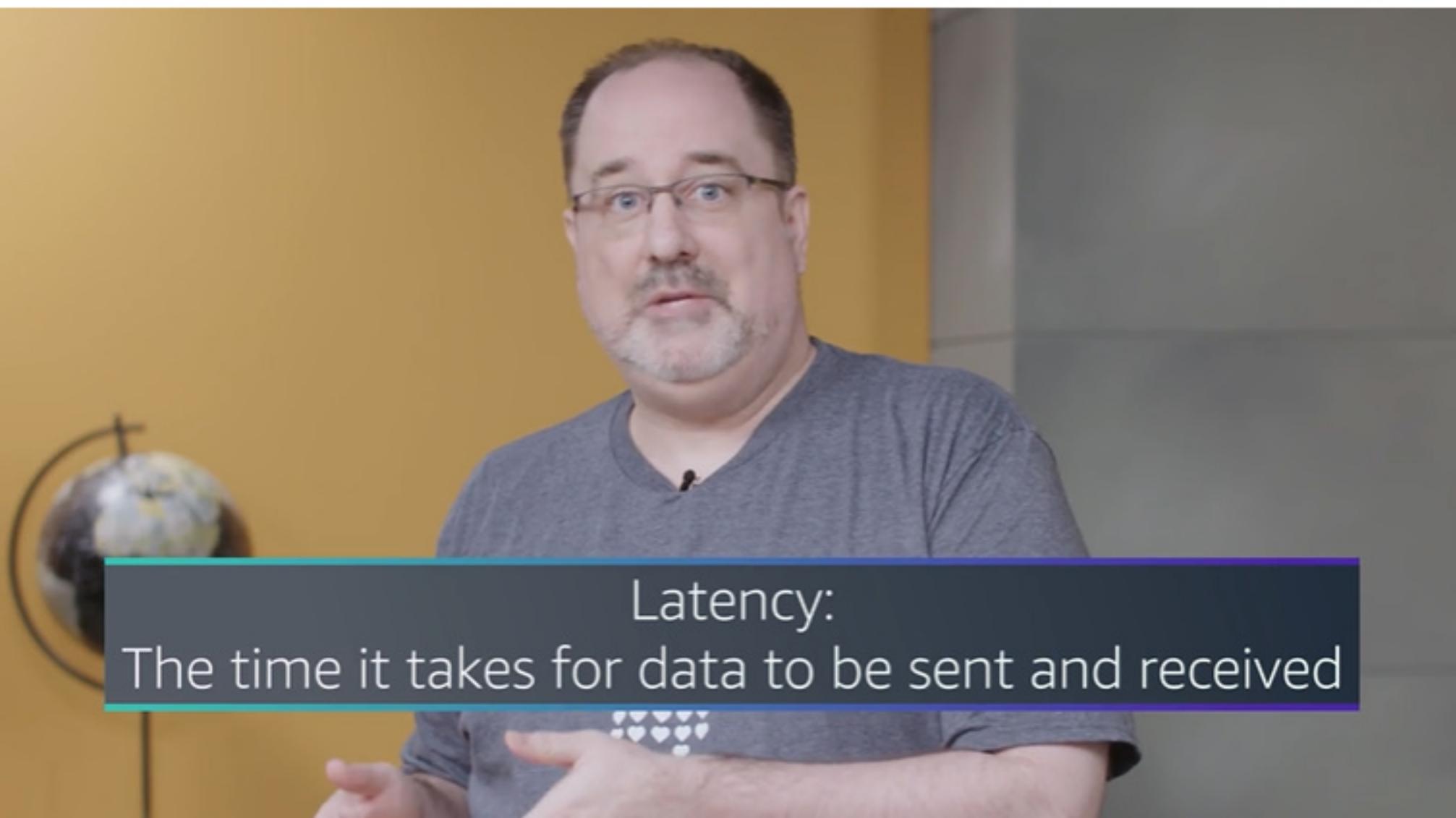


Proximity





Proximity

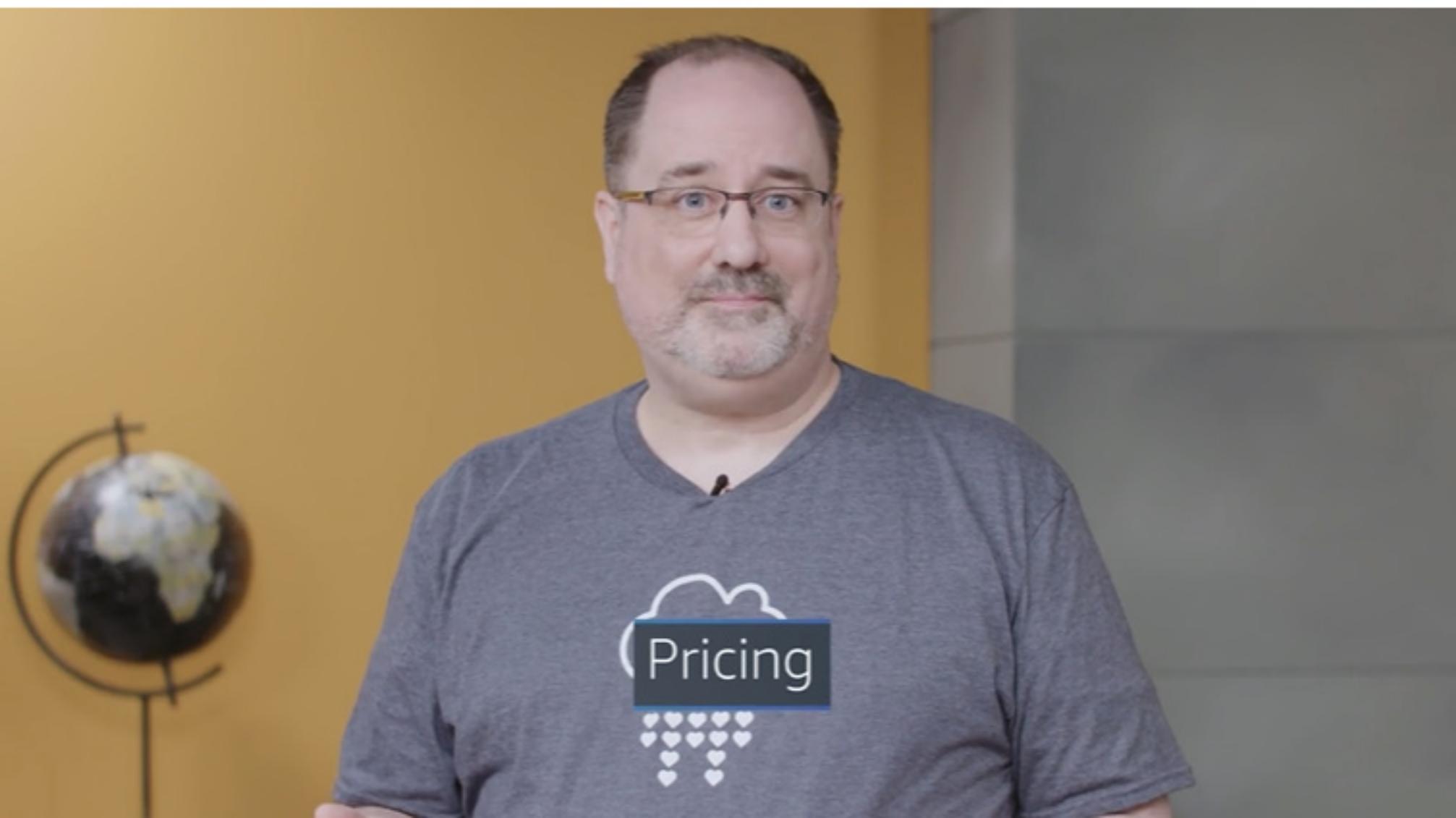


Latency:
The time it takes for data to be sent and received

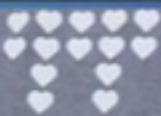
The AWS logo, featuring the word "aws" in white lowercase letters above a yellow curved arrow.

Feature availability





Pricing





Key business factors

Compliance

Proximity

Feature availability

Pricing

Selecting a Region

When determining the right Region for your services, data, and applications, consider the following four business factors.

To learn more, select the + symbol next to each category.

Compliance with data governance and legal requirements +

Proximity to your customers +

Available services within a Region +

Pricing +

Selecting a Region

When determining the right Region for your services, data, and applications, consider the following four business factors.

To learn more, select the + symbol next to each category.

Compliance with data governance and legal requirements +

Proximity to your customers +

Available services within a Region +

Pricing +

Compliance with data governance and legal requirements

Depending on your company and location, you might need to run your data out of specific areas. For example, if your company requires all of its data to reside within the boundaries of the UK, you would choose the London Region.

Not all companies have location-specific data regulations, so you might need to focus more on the other three factors.

Proximity to your customers

Selecting a Region that is close to your customers will help you to get content to them faster. For example, your company is based in Washington, DC, and many of your customers live in Singapore. You might consider running your infrastructure in the Northern Virginia Region to be close to company headquarters, and run your applications from the Singapore Region.

Available services within a Region

Sometimes, the closest Region might not have all the features that you want to offer to customers. AWS is frequently innovating by creating new services and expanding on features within existing services. However, making new services available around the world sometimes requires AWS to build out physical hardware one Region at a time.

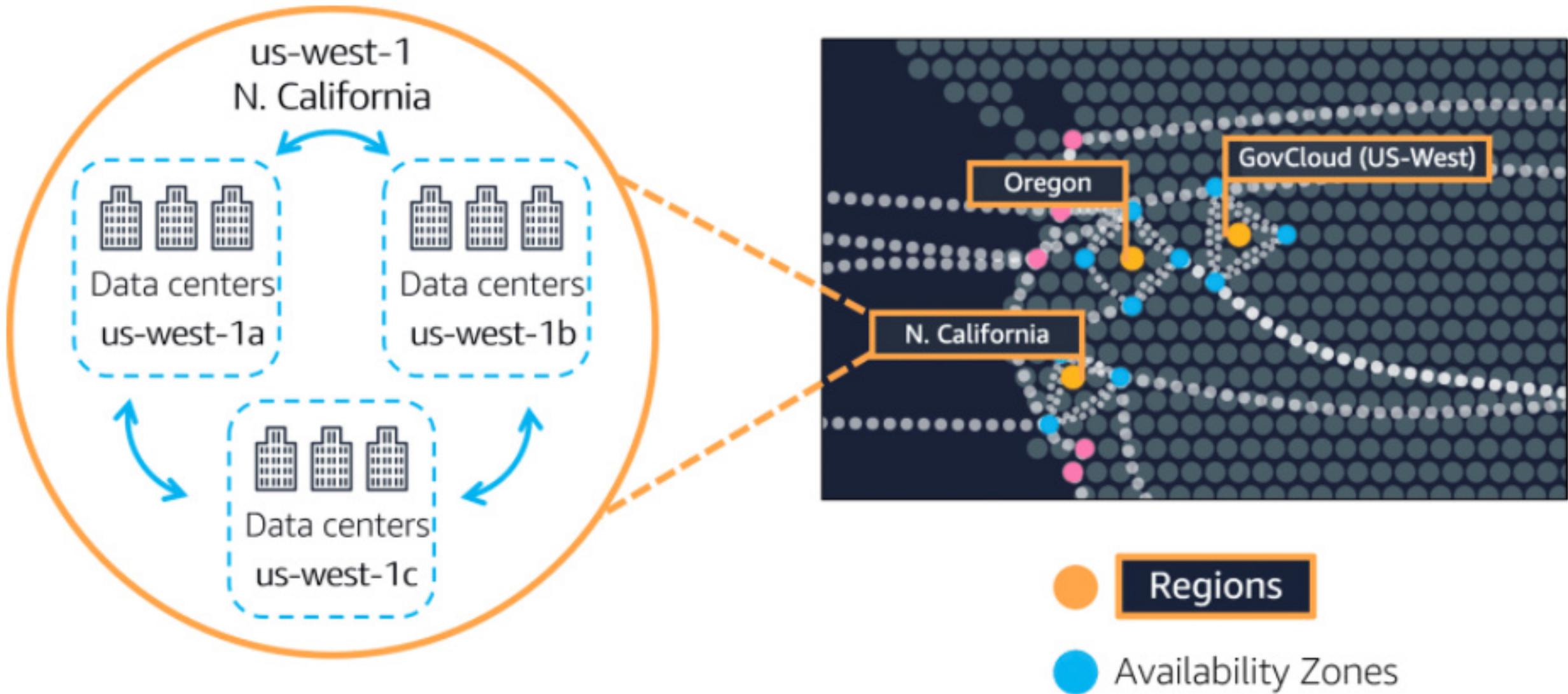
Suppose that your developers want to build an application that uses Amazon Braket (AWS quantum computing platform). As of this course, Amazon Braket is not yet available in every AWS Region around the world, so your developers would have to run it in one of the Regions that already offers it.

Pricing



Suppose that you are considering running applications in both the United States and Brazil. The way Brazil's tax structure is set up, it might cost 50% more to run the same workload out of the São Paulo Region compared to the Oregon Region. You will learn in more detail that several factors determine pricing, but for now know that the cost of services can vary from Region to Region.

Availability Zones



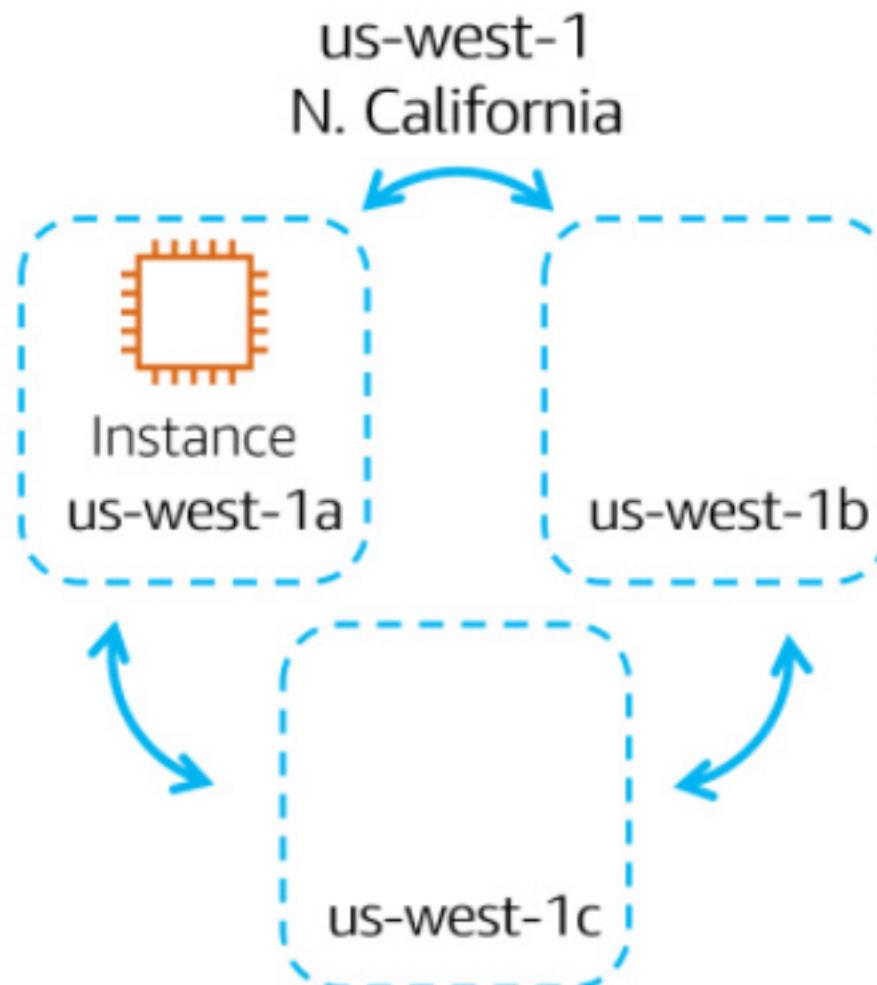
An **Availability Zone** is a single data center or a group of data centers within a Region. Availability Zones are located tens of miles apart from each other. This is close enough to have low latency (the time between when content requested and received) between Availability Zones. However, if a disaster occurs in one part of the Region, they are distant enough to reduce the chance that multiple Availability Zones are affected.

Running Amazon EC2 instances in multiple Availability Zones

To review examples of running an Amazon EC2 instance in one or more Availability Zones, select **Start**.

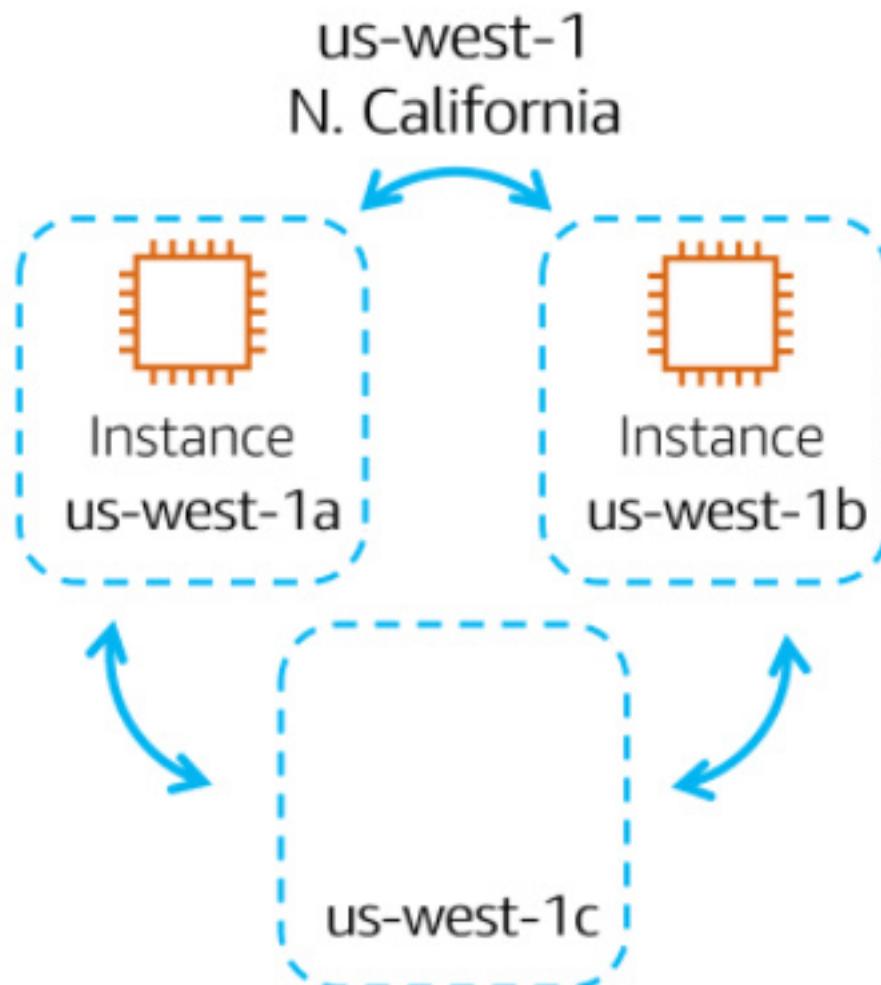
START >

Amazon EC2 instance in a single Availability Zone



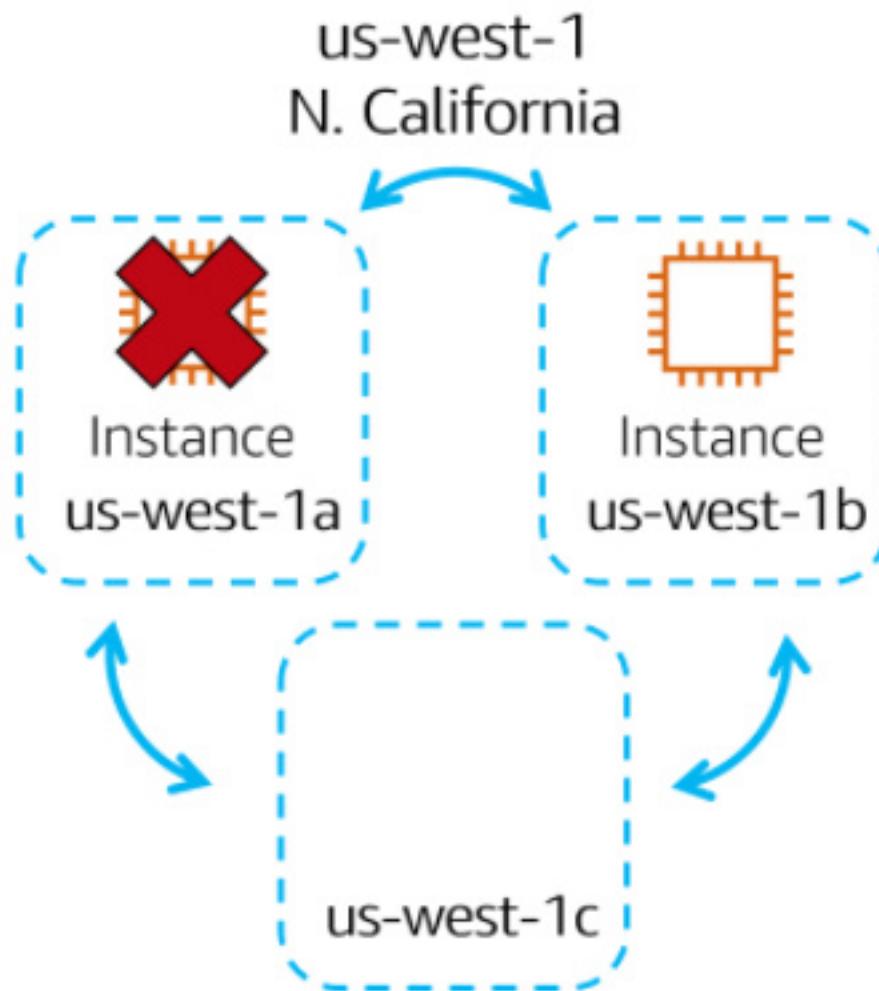
Suppose that you're running an application on a single Amazon EC2 instance in the Northern California Region. The instance is running in the us-west-1a Availability Zone. If us-west-1a were to fail, you would lose your instance.

Amazon EC2 instances in multiple Availability Zones



A best practice is to run applications across at least two Availability Zones in a Region. In this example, you might choose to run a second Amazon EC2 instance in **us-west-1b**.

Availability Zone failure



If us-west-1a were to fail, your application would still be running in us-west-1b.

Which statement best describes an Availability Zone?



A geographical area that contains AWS resources



A single data center or group of data centers within a Region



A data center that an AWS service uses to perform service-specific operations



A service that you can use to run AWS infrastructure within your own on-premises data center in a hybrid approach

The correct response option is **A single data center or group of data centers within a Region.**

The other response options are incorrect because:

- A Region is a geographical area that contains AWS resources.
- An edge location is a data center that an AWS service uses to perform service-specific operations. Edge locations are examined in the next section of this module.
- AWS Outposts is a service that you can use to run AWS infrastructure, services, and tools in your own on-premises data center in a hybrid approach. AWS Outposts is explored later in this module.

Learn more:

- [AWS global infrastructure](#)
- [Regions and Availability Zones](#)

Which statement best describes an Availability Zone?



A geographical area that contains AWS resources



A single data center or group of data centers within a Region



A data center that an AWS service uses to perform service-specific operations



A service that you can use to run AWS infrastructure within your own on-premises data center in a hybrid approach

The correct response option is A single data center or group of data centers within a Region.

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- A Region is a geographical area that contains AWS resources.
- An edge location is a data center that an AWS service uses to perform service-specific operations. Edge locations are examined in the next section of this module.
- AWS Outposts is a service that you can use to run AWS infrastructure, services, and tools in your own on-premises data center in a hybrid approach. AWS Outposts is explored later in this module.

Learn more:

- [AWS global infrastructure](#)
- [Regions and Availability Zones](#)

Key points

Regions are geographically isolated areas.

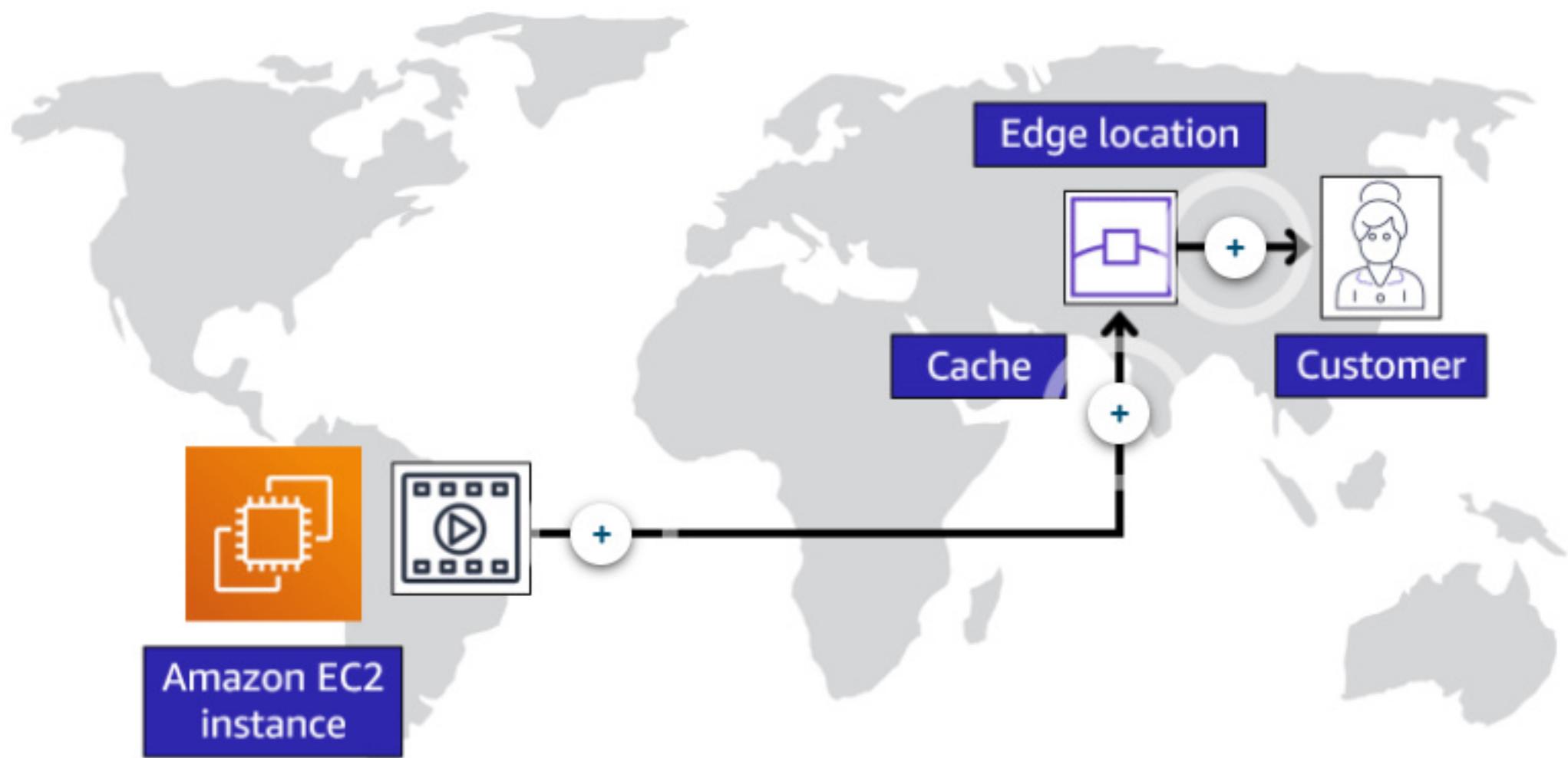
Regions contain Availability Zones.



Edge locations

An **edge location** is a site that Amazon CloudFront uses to store cached copies of your content closer to your customers for faster delivery.

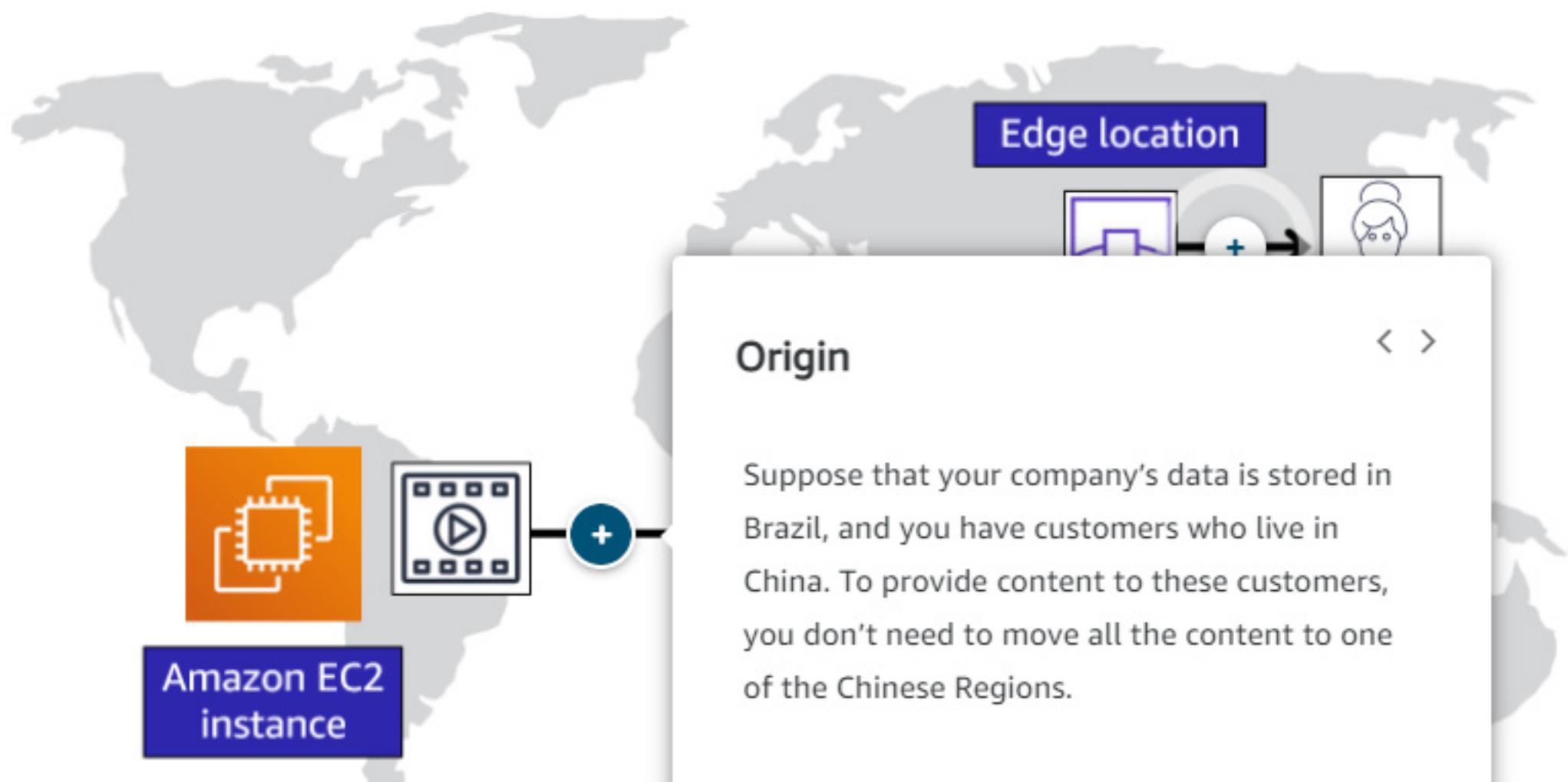
Select each marker to learn more.



Edge locations

An **edge location** is a site that Amazon CloudFront uses to store cached copies of your content closer to your customers for faster delivery.

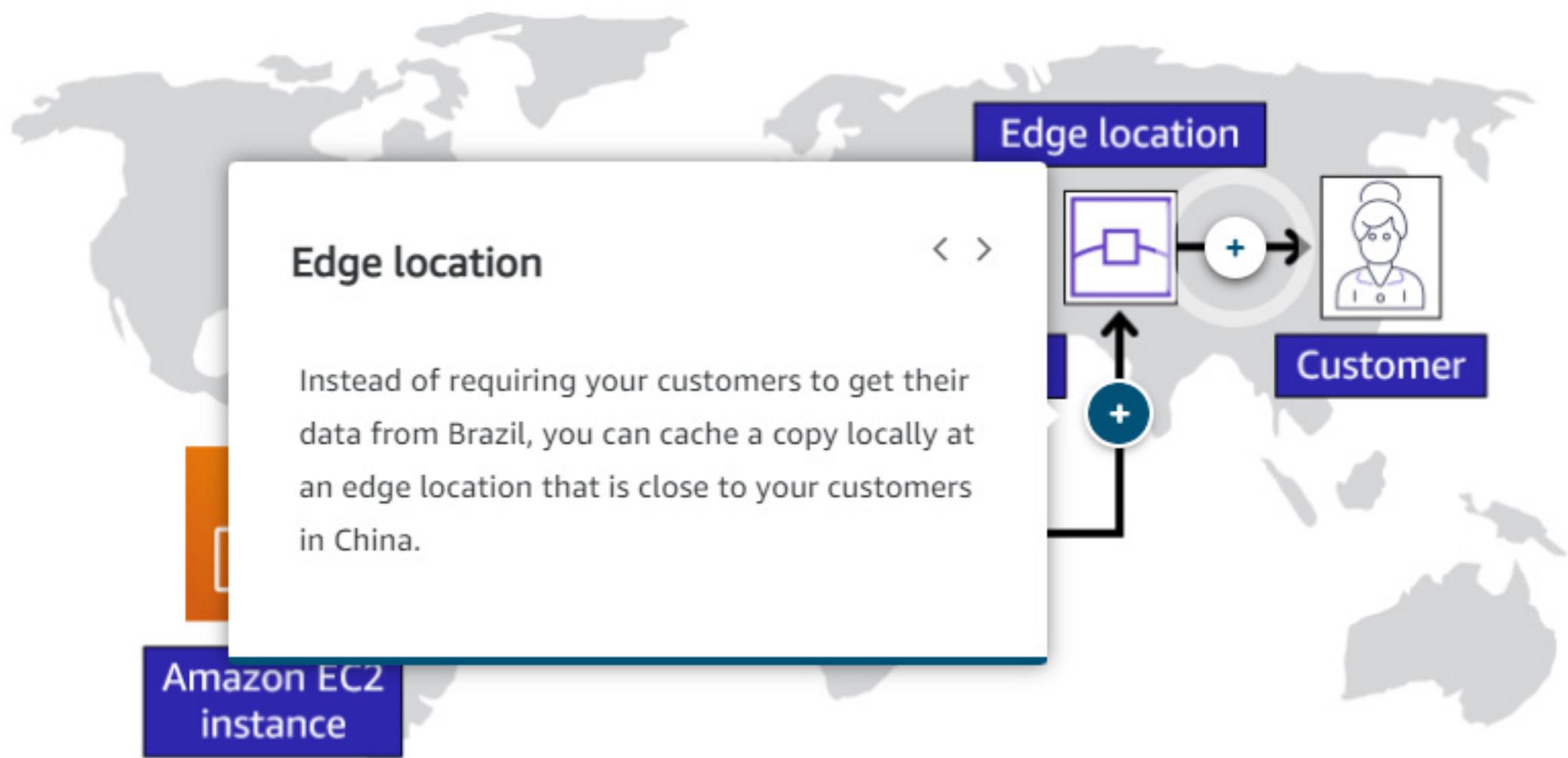
Select each marker to learn more.



Edge locations

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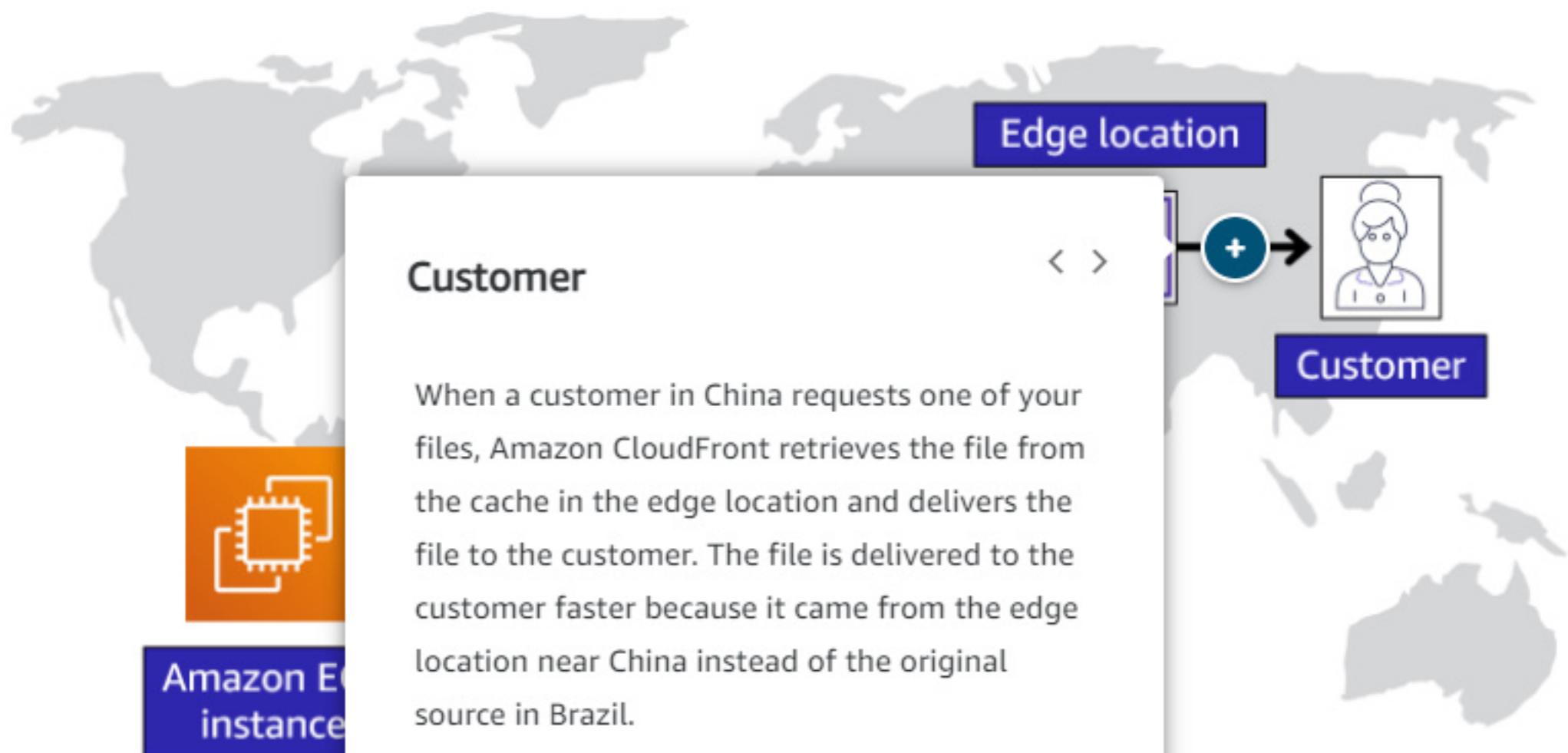
Select each marker to learn more.

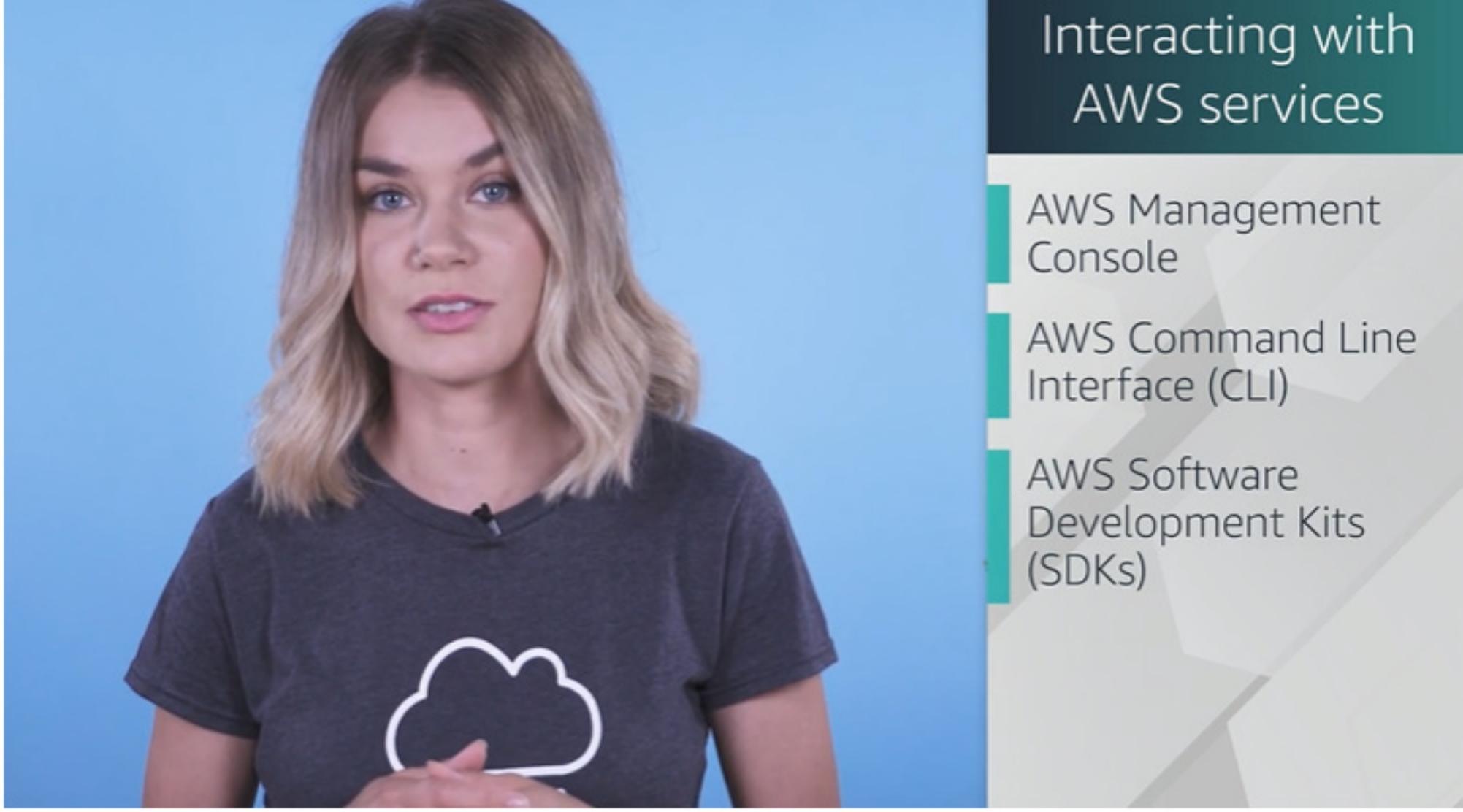


Edge locations

An **edge location** is a site that Amazon CloudFront uses to store cached copies of your content closer to your customers for faster delivery.

Select each marker to learn more.





Interacting with AWS services

AWS Management Console

AWS Command Line Interface (CLI)

AWS Software Development Kits (SDKs)

Interacting with AWS services



AWS Management Console

AWS Command Line Interface (CLI)

AWS Software Development Kits (SDKs)

Various other tools

AWS Management Console

us-east-2.console.aws.amazon.com/console/home?region=us-east-2

Services ▾ Resource Groups ▾

History

Console Home

EC2

Trusted Advisor

RDS

Route 53

WorkMail

Compute

- Amazon Managed Blockchain
- Satellite
- Ground Station
- Amazon Braket

Storage

- S3
- EFS
- FSx
- S3 Glacier
- Storage Gateway
- AWS Backup

Database

- RDS

Blockchain

Analytics

- Athena
- EMR
- CloudSearch
- Elasticsearch Service
- Kinesis
- QuickSight
- Data Pipeline
- AWS Data Exchange
- AWS Glue
- AWS Lake Formation
- MSK

Business Applications

- Alexa for Business
- Amazon Chime
- WorkMail
- Amazon Honeycode

End User Computing

- WorkSpaces
- AppStream 2.0
- WorkDocs
- WorkLink

Management & Governance

- AWS Organizations
- CloudWatch
- AWS Auto Scaling
- CloudFormation
- CloudTrail
- Config
- OpsWorks
- Service Catalog
- Systems Manager

Security, Identity, & Compliance

- IAM
- Resource Access Manager
- Cognito
- Secrets Manager
- GuardDuty
- Inspector
- Amazon Macie

Internet Of Things

- IoT Core
- FreeRTOS
- IoT 1-Click
- IoT Analytics
- IoT Device Defender
- IoT Device Management
- IoT Events

Find a service by name or feature (for example, EC2, S3 or VM, storage).

Group A-Z

▲ close

https://us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2

Amazon Braket

Amazon Macie

EC2 Management Console

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#Instances:

AWS Services Resource Groups

New EC2 Experience Tell us what you think X

EC2 Dashboard New

Events New

Tags

Limits

▼ Instances

Instances

- Instance Types
- Launch Templates
- Spot Requests
- Savings Plans
- Reserved Instances
- Dedicated Hosts New
- Capacity Reservations

▼ Images

AMIs

▼ Elastic Block Store

Volumes

Snapshots

Lifecycle Manager

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AWS Management Console



AWS Management Console

Test environments

View AWS bills

View monitoring

Work with
non-technical
resources



Instances | EC2 Management

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#InstancesInstanceState=running;sort=instanceId

AWS Services Resource Groups

Launch Templates

Spot Requests

Savings Plans

Reserved Instances

Dedicated Hosts New

Capacity Reservations

Images

AMIs

Elastic Block Store

Volumes

Snapshots

Lifecycle Manager

Network & Security

Security Groups New

Elastic IPs New

Placement Groups New

Key Pairs New

Network Interfaces

Load Balancing

Load Balancers

Launch Instance Connect Actions

Instance State : Running Add filter

Name Instance ID Instance Type Availability Zone Instance State Status Checks Alarm Status Public DNS (IPv4) IPv4 Publ

WebApp i-016da39dc3e464c03 t2.medium us-east-2c running 2/2 checks... None ec2-18-191-4-169.us-e... 18.191.4.1

Instance: i-016da39dc3e464c03 (WebApp) Public DNS: ec2-18-191-4-169.us-east-2.compute.amazonaws.com

| Description | Status Checks | Monitoring | Tags |
|-----------------------|---|-------------------|---|
| Instance ID | i-016da39dc3e464c03 | Public DNS (IPv4) | ec2-18-191-4-169.us-east-2.compute.amazonaws.com |
| Instance state | running | IPv4 Public IP | 18.191.4.169 |
| Instance type | t2.medium | IPv6 IPs | - |
| Finding | Opt-in to AWS Compute Optimizer for recommendations. Learn more | Elastic IPs | |
| Private DNS | ip-172-31-36-140.us-east-2.compute.internal | Availability zone | us-east-2c |
| Private IPs | 172.31.36.140 | Security groups | launch-wizard-1 , view inbound rules, view outbound rules |
| Secondary private IPs | | Scheduled events | No scheduled events |
| VPC ID | vpc-6d2e7905 | AMI ID | amzn2-ami-hvm-2.0.20200722.0-x86_64-gp2 (ami-07c8bc5c1ce9598c3) |
| Subnet ID | subnet-4b34d307 | Platform details | Linux/UNIX |
| Network interfaces | eth0 | User operation | RunInstances |

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Launch instance wizard | EC2 | X

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#LaunchInstanceWizard:

AWS Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 1: Choose an Amazon Machine Image (AMI)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace; or you can select one of your own AMIs.

Search for an AMI by entering a search term e.g. "Windows"

Search by Systems Manager parameter

Quick Start

< < 1 to 40 of 40 AMIs > >

| Image | Name | Description | Select |
|-------|---|---|--|
| | Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-07c0bc5c1ce9598c3 (64-bit x86) / ami-09a67037138f86e67 (64-bit Arm) | Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. Root device type: ebs Virtualization type: hvm ENA Enabled: Yes | <input checked="" type="button"/> Select <input type="radio"/> 64-bit (x86) <input type="radio"/> 64-bit (Arm) |
| | Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type - ami-02b0c55eeae6d5096 | The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages. Root device type: ebs Virtualization type: hvm ENA Enabled: Yes | <input type="button"/> Select <input checked="" type="radio"/> 64-bit (x86) |
| | Red Hat Enterprise Linux 8 (HVM), SSD Volume Type - ami-0a54aeff4ef3b5f881 (64-bit x86) / ami-0ffd59b53e6797671 (64-bit Arm) | Red Hat Enterprise Linux version 8 (HVM), EBS-General Purpose (SSD) Volume Type Root device type: ebs Virtualization type: hvm ENA Enabled: Yes | <input type="button"/> Select <input checked="" type="radio"/> 64-bit (x86) <input type="radio"/> 64-bit (Arm) |

Launch instance wizard | EC2 | X

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#LaunchInstanceWizard:

AWS Services Resource Groups

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Search for an AMI by entering a search term e.g. "Windows"

Search by Systems Manager parameter

Quick Start

My AMIs

Amazon Linux Free tier eligible

Community AMIs

Free tier only (1)

Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-07c0bc5c1ce9598c3 (64-bit x86) / ami-09a67037138fb6e67 (64-bit Arm)

Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras.

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

Select 64-bit (x86) 64-bit (Arm)

Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type - ami-02b0c55eeaae6d5096

The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages.

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

Select 64-bit (x86)

Red Hat Enterprise Linux 8 (HVM), SSD Volume Type - ami-0a54aeff4ef3b5f881 (64-bit x86) / ami-0ffd59b53e6797671 (64-bit Arm)

Red Hat Enterprise Linux version 8 (HVM), EBS-General Purpose (SSD) Volume Type

Root device type: ebs Virtualization type: hvm ENA Enabled: Yes

Select 64-bit (x86) 64-bit (Arm)

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Launch instance wizard | EC2 | X

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#LaunchInstanceWizard:

AWS Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. [Learn more](#) about instance types and how they can meet your computing needs.

Filter by: All instance types Current generation Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

| | Family | Type | vCPUs | Memory (GiB) | Instance Storage (GB) | EBS-Optimized Available | Network Performance | IPv6 Support |
|-------------------------------------|-----------------|---|-------|--------------|-----------------------|-------------------------|---------------------|--------------|
| <input type="checkbox"/> | General purpose | t2.nano | 1 | 0.5 | EBS only | - | Low to Moderate | Yes |
| <input checked="" type="checkbox"/> | General purpose | t2.micro <small>Free tier eligible</small> | 1 | 1 | EBS only | - | Low to Moderate | Yes |
| <input type="checkbox"/> | General purpose | t2.small | 1 | 2 | EBS only | - | Low to Moderate | Yes |
| <input type="checkbox"/> | General purpose | t2.medium | 2 | 4 | EBS only | - | Low to Moderate | Yes |
| <input type="checkbox"/> | General purpose | t2.large | 2 | 8 | EBS only | - | Low to Moderate | Yes |
| <input type="checkbox"/> | General purpose | t2.xlarge | 4 | 16 | EBS only | - | Moderate | Yes |
| <input type="checkbox"/> | General purpose | t2.2xlarge | 8 | 32 | EBS only | - | Moderate | Yes |

Cancel Previous Review and Launch Next: Configure Instance Details

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Services

Resource Groups



Ohio Support

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances

1

Launch into Auto Scaling Group

Purchasing option

 Request Spot instances

Network

vpc-6d2e7905 (default)

Create new VPC

Subnet

No preference (default subnet in any Availability Zone)

Create new subnet

Auto-assign Public IP

Use subnet setting (Enable)

Placement group

 Add instance to placement group

Capacity Reservation

Open

IAM role

None

Create new IAM role

Shutdown behavior

Stop

Stop - Hibernate behavior

 Enable hibernation as an additional stop behavior

Enable termination protection

 Protect against accidental termination

Monitoring

 Enable CloudWatch detailed monitoring

Cancel

Previous

Review and Launch

Next: Add Storage

Launch instance wizard | EC2 | X

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#LaunchInstanceWizard:

AWS Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances: 1 [Launch into Auto Scaling Group](#)

Purchasing option: Request Spot instances

Network: **vpc-6d2e7905 (default)** [Create new VPC](#)

Subnet: No preference (default subnet in any Availability Zone) [Create new subnet](#)

Auto-assign Public IP: Use subnet setting (Enable)

Placement group: Add instance to placement group

Capacity Reservation: Open

IAM role: None [Create new IAM role](#)

Shutdown behavior: Stop

Stop - Hibernate behavior: Enable hibernation as an additional stop behavior

Enable termination protection: Protect against accidental termination

Monitoring: Enable CloudWatch detailed monitoring

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Add Storage](#)

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Launch instance wizard | EC2 | X

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#LaunchInstanceWizard:

AWS Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances: 1 [Launch into Auto Scaling Group](#)

Purchasing option: Request Spot instances

Network: vpc-6d2e7905 (default) [Create new VPC](#)

Subnet: No preference (default subnet in any Availability Zone) [Create new subnet](#)

Auto-assign Public IP: Use subnet setting (Enable) [Create new subnet](#)

Placement group: [Open](#)

Capacity Reservation: [Open](#)

IAM role: None [Create new IAM role](#)

Shutdown behavior: Stop

Stop - Hibernate behavior: Enable hibernation as an additional stop behavior

Enable termination protection: Protect against accidental termination

Monitoring: Enable CloudWatch detailed monitoring

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Add Storage](#)

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Launch instance wizard | EC2 | X

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#LaunchInstanceWizard:

AWS Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 3: Configure Instance Details

Configure the instance to suit your requirements. You can launch multiple instances from the same AMI, request Spot instances to take advantage of the lower pricing, assign an access management role to the instance, and more.

Number of instances: 1 [Launch into Auto Scaling Group](#)

Purchasing option: Request Spot instances

Network: vpc-6d2e7905 (default) [Create new VPC](#)

Subnet: No preference (default subnet in any Availability Zone) [Create new subnet](#)

Auto-assign Public IP: Enable

Placement group: Add instance to placement group

Capacity Reservation: Open

IAM role: None [Create new IAM role](#)

Shutdown behavior: Stop

Stop - Hibernate behavior: Enable hibernation as an additional stop behavior

Enable termination protection: Protect against accidental termination

Monitoring: Enable CloudWatch detailed monitoring

[Cancel](#) [Previous](#) [Review and Launch](#) [Next: Add Storage](#)

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Launch instance wizard | EC2 | X | +

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#LaunchInstanceWizard:

AWS Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click Launch to assign a key pair to your instance and complete the launch process.

AMI Details

Amazon Linux 2 AMI (HVM), SSD Volume Type - ami-07c8bc5c1ce9598c3

Free tier eligible

Amazon Linux 2 comes with five years support. It provides Linux kernel 4.14 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras.

Root Device Type: ebs Virtualization type: hvm

[Edit AMI](#)

Instance Type

[Edit instance type](#)

| Instance Type | ECUs | vCPUs | Memory (GiB) | Instance Storage (GB) | EBS-Optimized Available | Network Performance |
|---------------|----------|-------|--------------|-----------------------|-------------------------|---------------------|
| t2.micro | Variable | 1 | 1 | EBS only | - | Low to Moderate |

Security Groups

[Edit security groups](#)

| Type | Protocol | Port Range | Source | Description |
|-----------------------------------|----------|------------|--------|-------------|
| This security group has no rules. | | | | |

Cancel Previous **Launch**

Launch instance wizard | EC2 | X

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#LaunchInstanceWizard:

AWS Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click Launch to assign a key pair to your instance and complete the launch process.

AMIs Details

Amazon Linux 2 AMI (HVM), SSD Vol

Free tier eligible

Amazon Linux 2 comes with five years support packages through extras.

Root Device Type: ebs Virtualization type: hvm

Instance Type

| Instance Type | ECUs | vCPUs |
|---------------|----------|-------|
| t2.micro | Variable | 1 |

Security Groups

Security group name: launch-wizard-3
Description: launch-wizard-3 created

Type: Protocol:

Select an existing key pair or create a new key pair

A key pair consists of a public key that AWS stores, and a private key file that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Choose an existing key pair: Select a key pair: test

I acknowledge that I have access to the selected private key file (test.pem), and that without this file, I won't be able to log into my instance.

Cancel Launch Instances

This launch will incur one hour of usage.

Cancel Previous Launch

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Launch instance wizard | EC2 | X

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#LaunchInstanceWizard:

AWS Services Resource Groups

1. Choose AMI 2. Choose Instance Type 3. Configure Instance 4. Add Storage 5. Add Tags 6. Configure Security Group 7. Review

Step 7: Review Instance Launch

Please review your instance launch details. You can go back to edit changes for each section. Click Launch to assign a key pair to your instance and complete the launch process.

AMI Details

Amazon Linux 2 AMI (HVM), SSD Vol

Free tier eligible

Amazon Linux 2 comes with five years support packages through extras.

Root Device Type: ebs Virtualization type: hvm

Instance Type

| Instance Type | ECUs | vCPUs |
|---------------|----------|-------|
| t2.micro | Variable | 1 |

Security Groups

Security group name: launch-wizard-3
Description: launch-wizard-3 created by AWS

Type: All traffic
Protocol: TCP

Select an existing key pair or create a new key pair

A key pair consists of a public key that AWS stores, and a private key file that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. Learn more about [removing existing key pairs from a public AMI](#).

Choose an existing key pair: Select a key pair: test

I acknowledge that I have access to the selected private key file (test.pem), and that without this file, I won't be able to log into my instance.

Cancel Launch Instances

This launch will incur charges upon instance creation.

Cancel Previous Launch

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Launch Status



Initiating Instance Launches

Please do not close your browser while this is loading

Creating security groups...



Launch Status

- ✓ Your instances are now launching

The following instance launches have been initiated: i-01d00f34b40533336 [View launch log](#)

- ℹ Get notified of estimated charges

Create [billing alerts](#) to get an email notification when estimated charges on your AWS bill exceed an amount you define (for example, if you exceed the free usage tier).

How to connect to your instances

Your instances are launching, and it may take a few minutes until they are in the [running](#) state, when they will be ready for you to use. Usage hours on your new instances will start immediately and continue to accrue until you stop or terminate your instances.

Click [View Instances](#) to monitor your instances' status. Once your instances are in the [running](#) state, you can [connect](#) to them from the Instances screen. [Find out](#) how to connect to your instances.

▼ Here are some helpful resources to get you started

- [How to connect to your Linux instance](#)
- [Learn about AWS Free Usage Tier](#)
- [Amazon EC2: User Guide](#)
- [Amazon EC2: Discussion Forum](#)

While your instances are launching you can also

- [Create status check alarms](#) to be notified when these instances fail status checks. (Additional charges may apply)
- [Create and attach additional EBS volumes](#) (Additional charges may apply)
- [Amazon CloudWatch Metrics](#)

Instances | EC2 Management

us-east-2.console.aws.amazon.com/ec2/v2/home?region=us-east-2#Instances:search=i-01d00f34b40533336;sort=instanceId

AWS Services Resource Groups

Launch Templates

Spot Requests

Savings Plans

Reserved Instances

Dedicated Hosts New

Capacity Reservations

Images

AMIs

Elastic Block Store

Volumes

Snapshots

Lifecycle Manager

Network & Security

Security Groups New

Elastic IPs New

Placement Groups New

Key Pairs New

Network Interfaces

Load Balancing

Load Balancers

Launch Instance Connect Actions

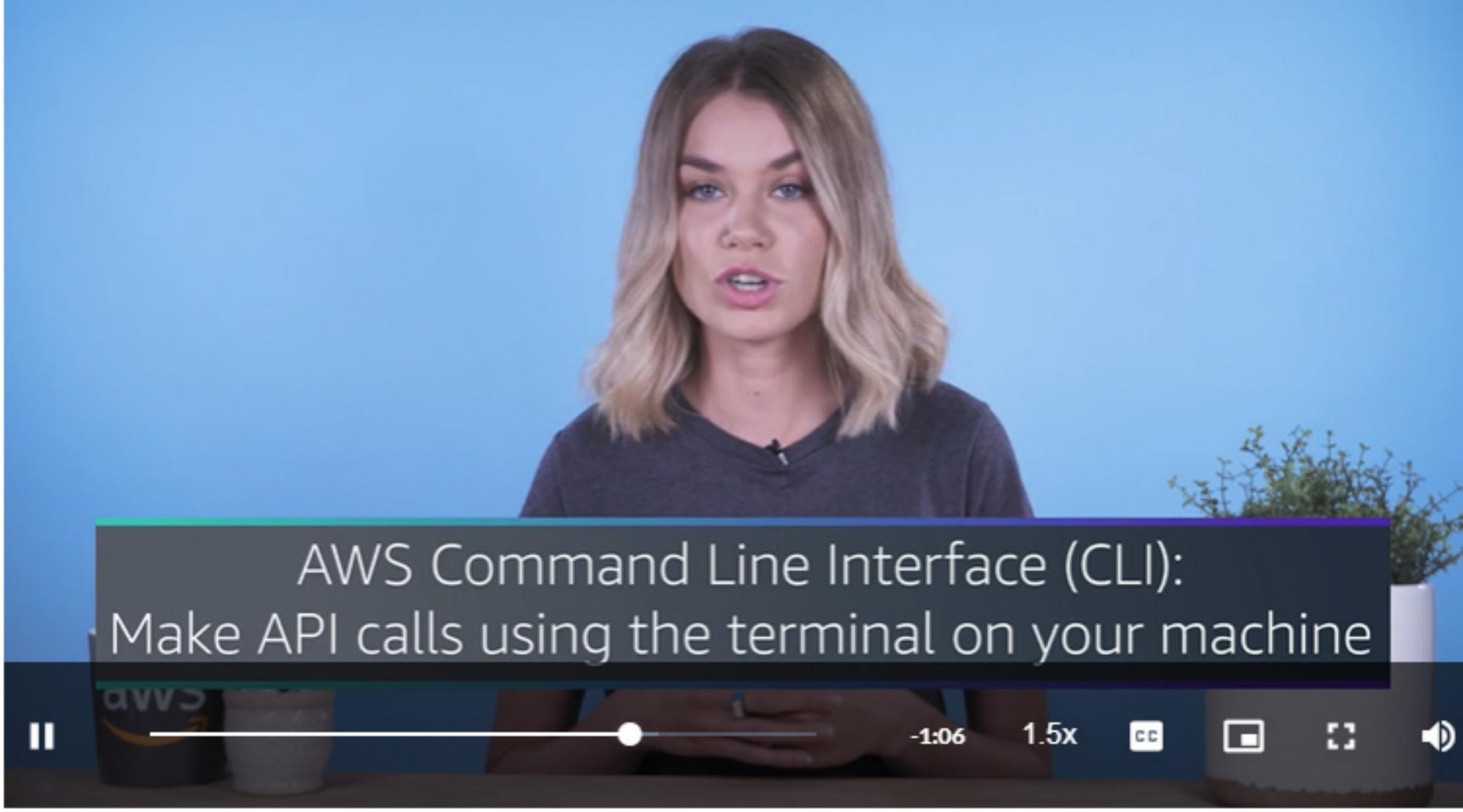
search : i-01d00f34b40533336 Add filter

1 to 1 of 1

| Name | Instance ID | Instance Type | Availability Zone | Instance State | Status Checks | Alarm Status | Public DNS (IPv4) | IPv4 Public IP |
|------|---------------------|---------------|-------------------|----------------|---------------|--------------|--|----------------|
| | i-01d00f34b40533336 | t2.micro | us-east-2b | pending | Initializing | Loading... | ec2-3-15-37-23.us-east-2.compute.amazonaws.com | 3.15.37.23 |

Instance: i-01d00f34b40533336 Public DNS: ec2-3-15-37-23.us-east-2.compute.amazonaws.com

| Description | Status Checks | Monitoring | Tags |
|-----------------------|---|-------------------|---|
| Instance ID | i-01d00f34b40533336 | Public DNS (IPv4) | ec2-3-15-37-23.us-east-2.compute.amazonaws.com |
| Instance state | pending | IPv4 Public IP | 3.15.37.23 |
| Instance type | t2.micro | IPv6 IPs | - |
| Finding | Opt-in to AWS Compute Optimizer for recommendations. Learn more | Elastic IPs | - |
| Private DNS | ip-172-31-24-117.us-east-2.compute.internal | Availability zone | us-east-2b |
| Private IPs | 172.31.24.117 | Security groups | launch-wizard-3, view inbound rules, view outbound rules |
| Secondary private IPs | | Scheduled events | - |
| VPC ID | vpc-6cd2e7905 | AMI ID | amzn2-ami-hvm-2.0.20200722.0-x86_64-gp2 (ami-07c8bc5cfce9598c3) |
| Subnet ID | subnet-6189341b | Platform details | Linux/UNIX |
| Network interfaces | eth0 | User action | RunInstances |



AWS Command Line Interface (CLI):
Make API calls using the terminal on your machine



-1:06

1.5x



```
willismt — aws ec2 run-instances --image-id ami-07c8bc5c1ce9598c3 --count 1 --instance-type t2.micro --key-name test --security-group-ids sg-00bffea801ebc0a5f --subnet-id subnet-6189341b --profile cpe
```

```
{  
    "AmiLaunchIndex": 0,  
    "ImageId": "ami-07c8bc5c1ce9598c3",  
    "InstanceId": "i-0c3cb79288a665722",  
    "InstanceType": "t2.micro",  
    "KeyName": "test",  
    "LaunchTime": "2020-08-17T19:32:53+00:00",  
    "Monitoring": {  
        "State": "disabled"  
    },  
    "Placement": {  
        "AvailabilityZone": "us-east-2b",  
        "GroupName": "",  
        "Tenancy": "default"  
    },  
    "PrivateDnsName": "ip-172-31-19-141.us-east-2.compute.internal",  
    "PrivateIpAddress": "172.31.19.141",  
    "ProductCodes": [],  
    "PublicDnsName": "",  
    "State": {  
        "Code": 0,  
        "Name": "pending"  
    }  
}
```

```
8c85907f7d4a:~ willismt$ aws ec2 run-instances --image-id ami-07c8bc5c1ce9598c3  
--count 1 --instance-type t2.micro --key-name test --security-group-ids sg-00bffea801ebc0a5f  
--subnet-id subnet-6189341b --profile cpe
```

0:39

1.5x



```
willismt — less - aws ec2 run-instances --image-id ami-07c8bc5c1ce9598c3 --count 1 --instance-type t2.micro --key-name test --security-group-ids sg-00bffe801ebc0a5f --subnet-id...
```

```
{
    "Groups": [],
    "Instances": [
        {
            "AmiLaunchIndex": 0,
            "ImageId": "ami-07c8bc5c1ce9598c3",
            "InstanceId": "i-013842095c0d2aa55",
            "InstanceType": "t2.micro",
            "KeyName": "test",
            "LaunchTime": "2020-08-17T19:32:59+00:00",
            "Monitoring": {
                "State": "disabled"
            },
            "Placement": {
                "AvailabilityZone": "us-east-2b",
                "GroupName": "",
                "Tenancy": "default"
            },
            "PrivateDnsName": "ip-172-31-19-30.us-east-2.compute.internal",
            "PrivateIpAddress": "172.31.19.30",
            "ProductCodes": [],
            "PublicDnsName": "",
            "State": {

```

```
:|
```



AWS Software Development Kits (SDKs):
Interact with AWS resources through various
programming languages

Ways to interact with AWS services

To learn about each category, select each tab.

AWS MANAGEMENT CONSOLE

AWS COMMAND LINE
INTERFACE

SOFTWARE DEVELOPMENT
KITS

The **AWS Management Console** is a web-based interface for accessing and managing AWS services. You can quickly access recently used services and search for other services by name, keyword, or acronym. The console includes wizards and automated workflows that can simplify the process of completing tasks.

You can also use the AWS Console mobile application to perform tasks such as monitoring resources, viewing alarms, and accessing billing information. Multiple identities can stay logged into the AWS Console mobile app at the same time.

AWS MANAGEMENT CONSOLE

AWS COMMAND LINE
INTERFACE

SOFTWARE DEVELOPMENT
KITS

To save time when making API requests, you can use the **AWS Command Line Interface (AWS CLI)**. AWS CLI enables you to control multiple AWS services directly from the command line within one tool. AWS CLI is available for users on Windows, macOS, and Linux.

By using AWS CLI, you can automate the actions that your services and applications perform through scripts. For example, you can use commands to launch an Amazon EC2 instance, connect an Amazon EC2 instance to a specific Auto Scaling group, and more.

AWS MANAGEMENT CONSOLE

AWS COMMAND LINE
INTERFACE

SOFTWARE DEVELOPMENT
KITS

Another option for accessing and managing AWS services is the **software development kits (SDKs)**. SDKs make it easier for you to use AWS services through an API designed for your programming language or platform. SDKs enable you to use AWS services with your existing applications or create entirely new applications that will run on AWS.

To help you get started with using SDKs, AWS provides documentation and sample code for each supported programming language. Supported programming languages include C++, Java, .NET, and more.

Interacting with AWS

AWS Management Console

CLI



Interacting with AWS

AWS Management Console

CLI

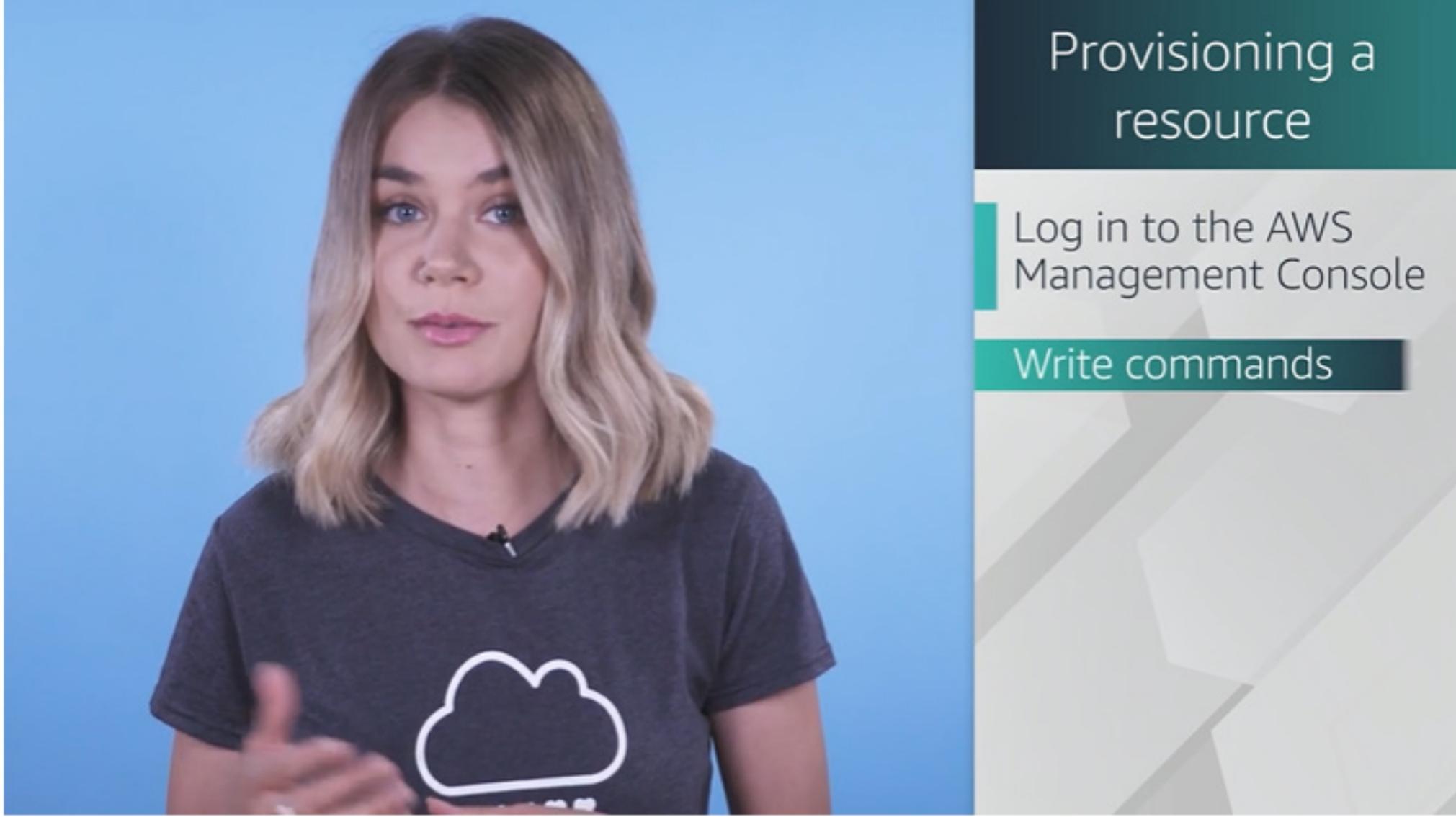




Interacting with AWS

AWS Management Console

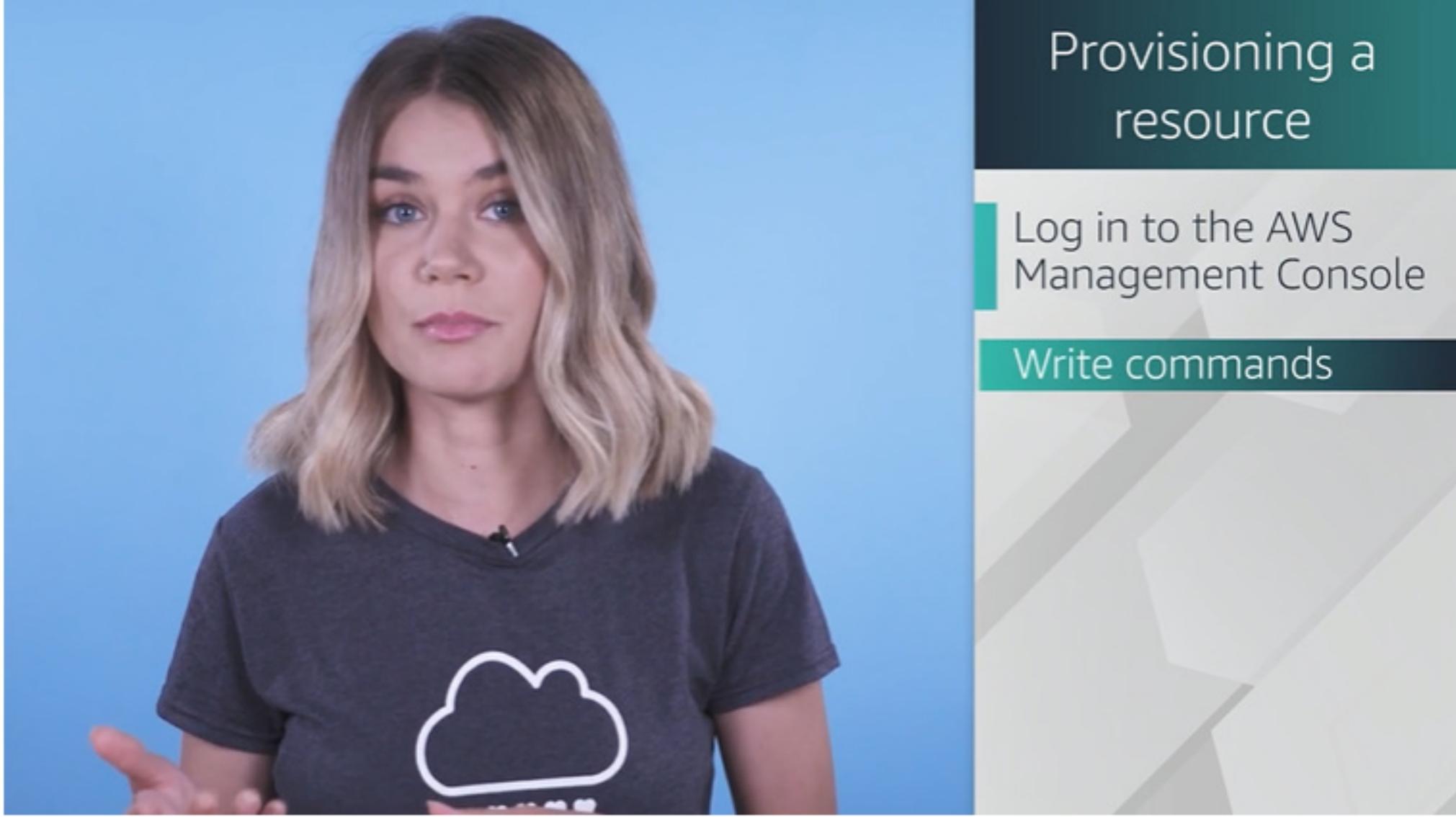
CLI

A woman with blonde hair, wearing a dark t-shirt with a white cloud icon, is speaking to the camera. She is positioned on the left side of the frame against a solid blue background.

Provisioning a resource

Log in to the AWS Management Console

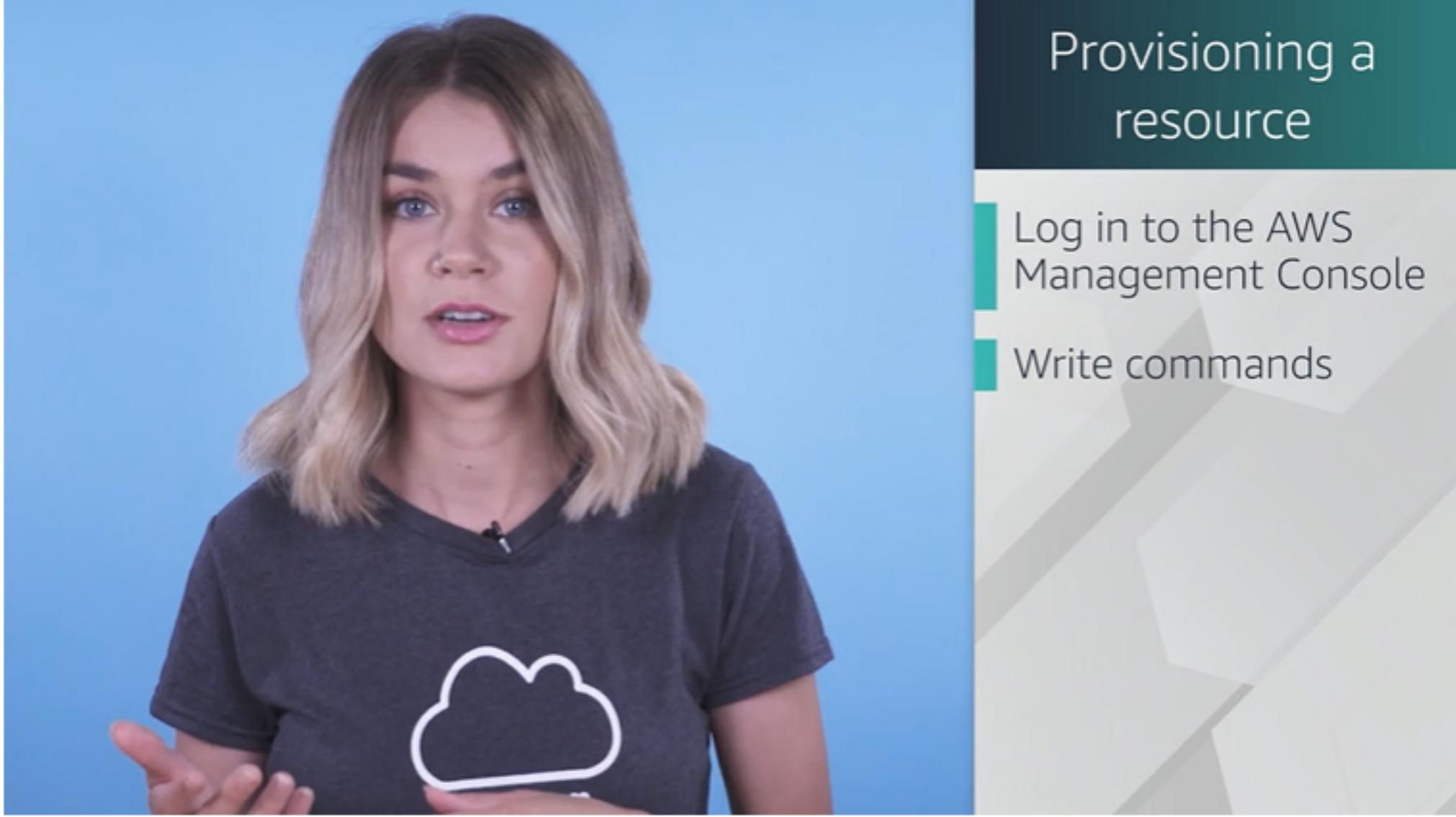
Write commands



Provisioning a resource

Log in to the AWS Management Console

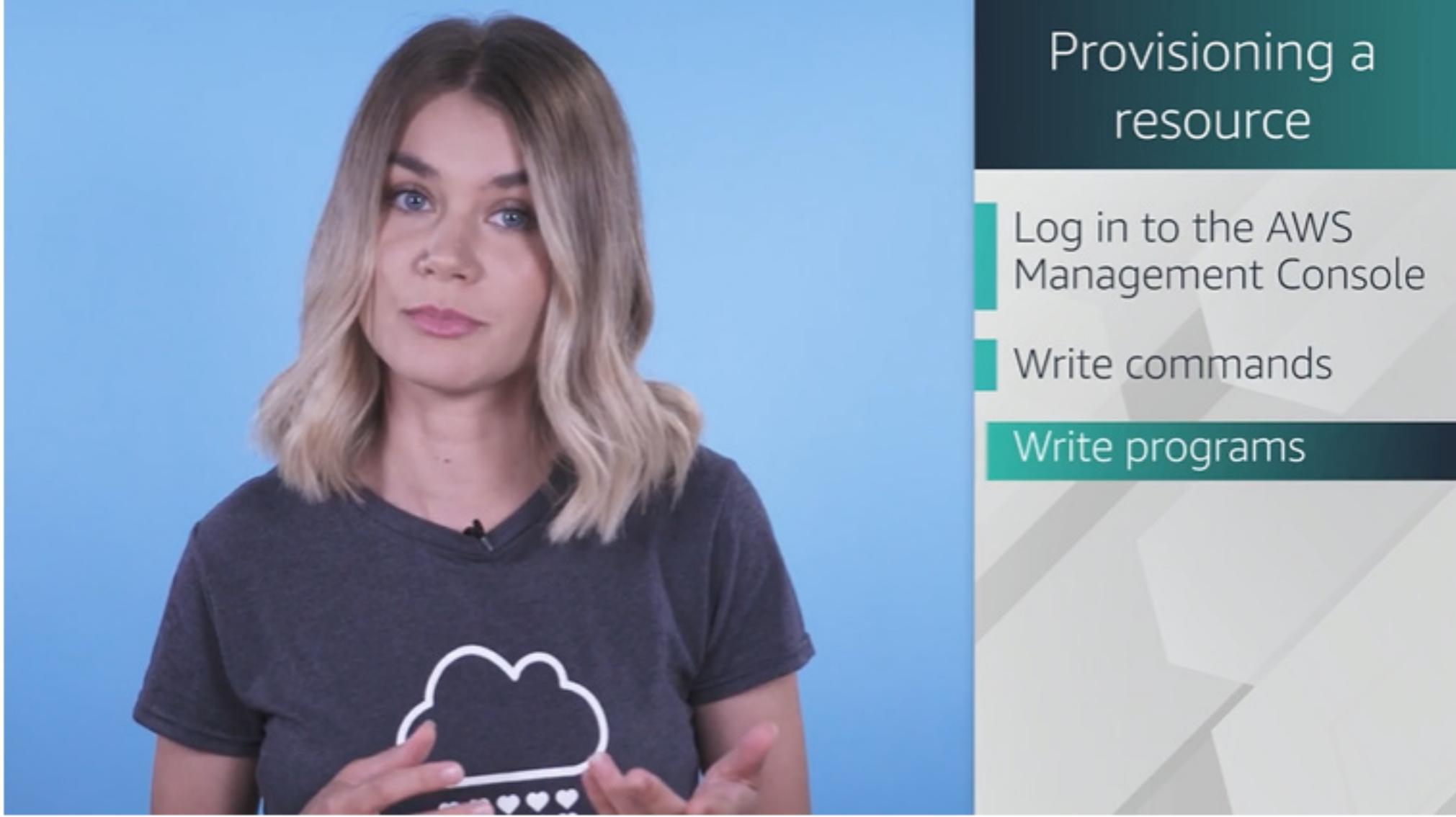
Write commands



Provisioning a resource

Log in to the AWS Management Console

Write commands



Provisioning a resource

Log in to the AWS Management Console

Write commands

Write programs



AWS Elastic Beanstalk



**Application code and
desired configurations**



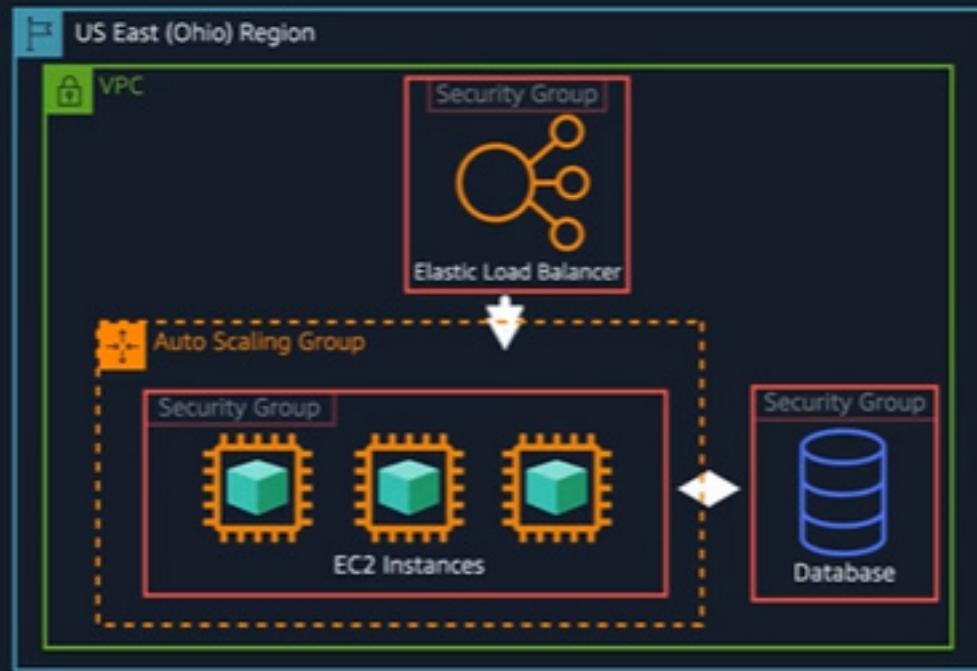
**Application code and
desired configurations**



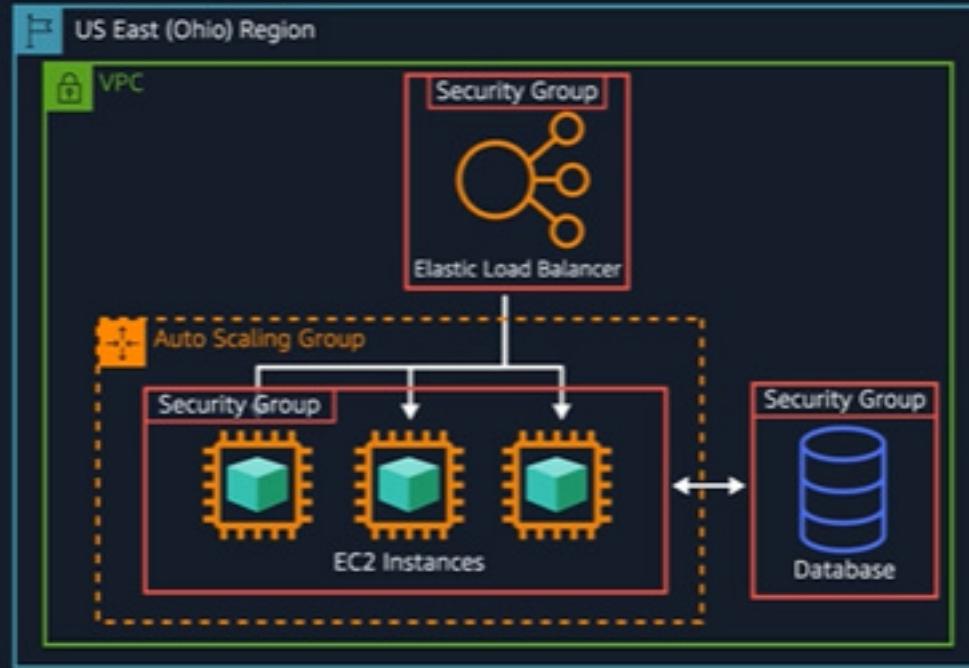
AWS Elastic Beanstalk



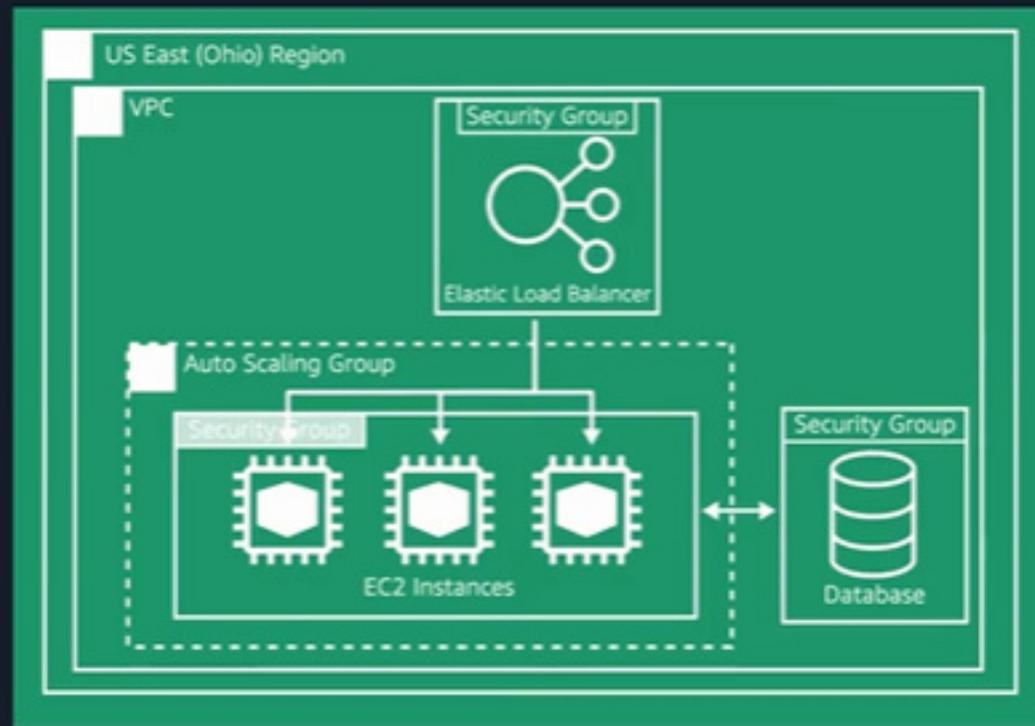
AWS Elastic Beanstalk



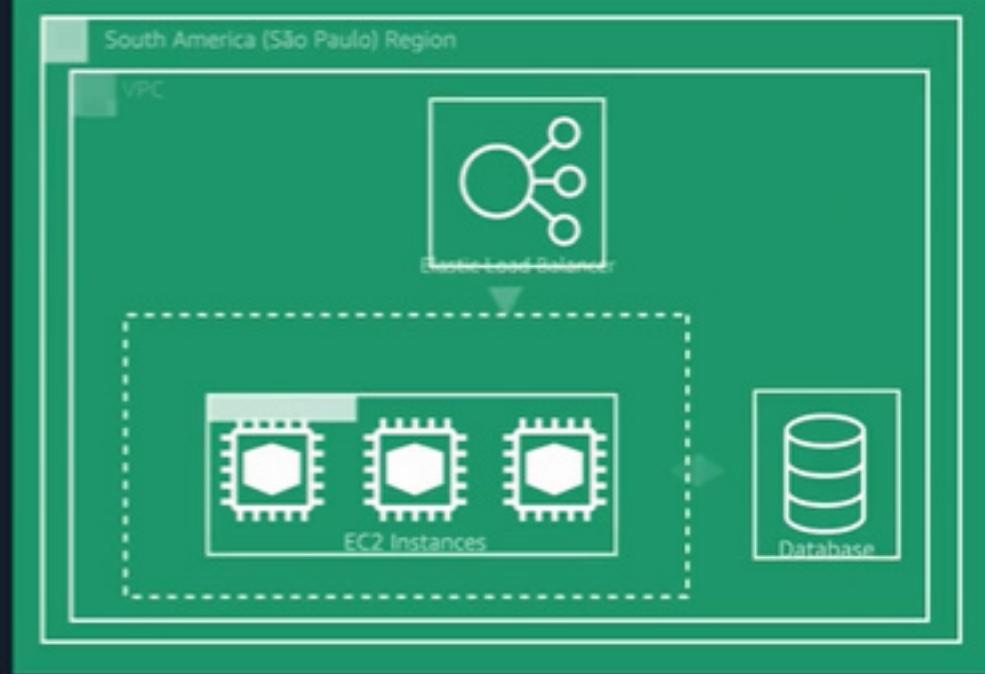
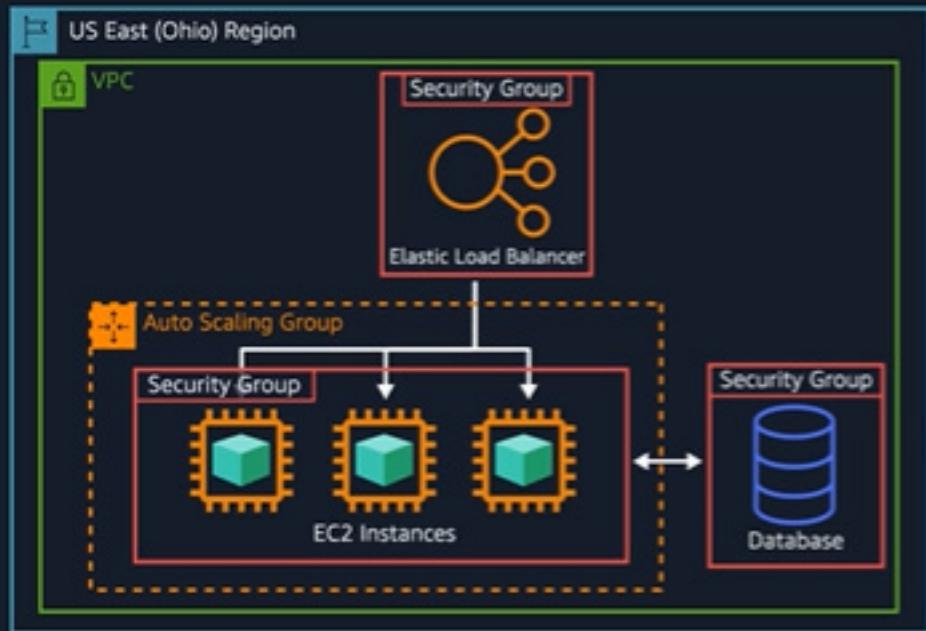
AWS Elastic Beanstalk



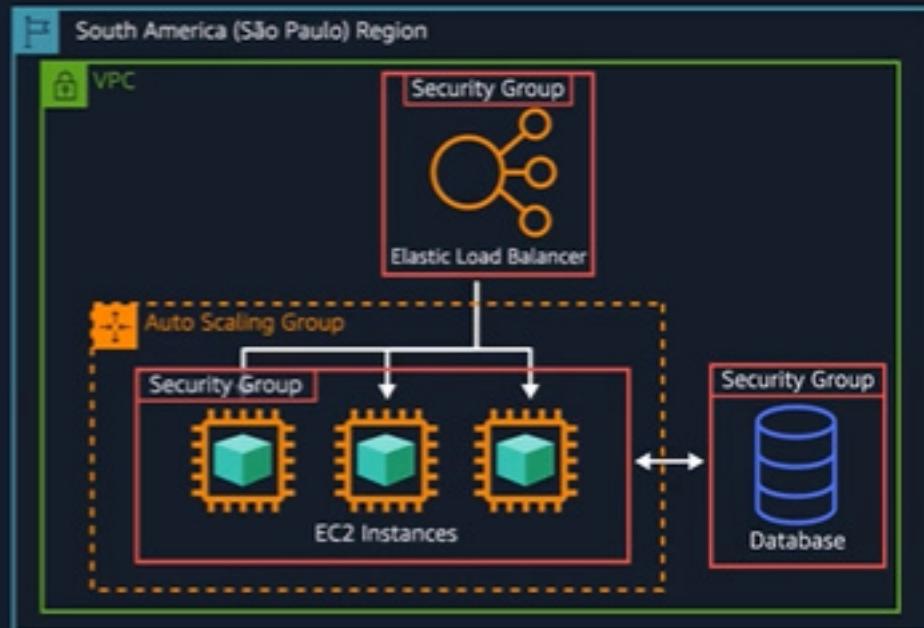
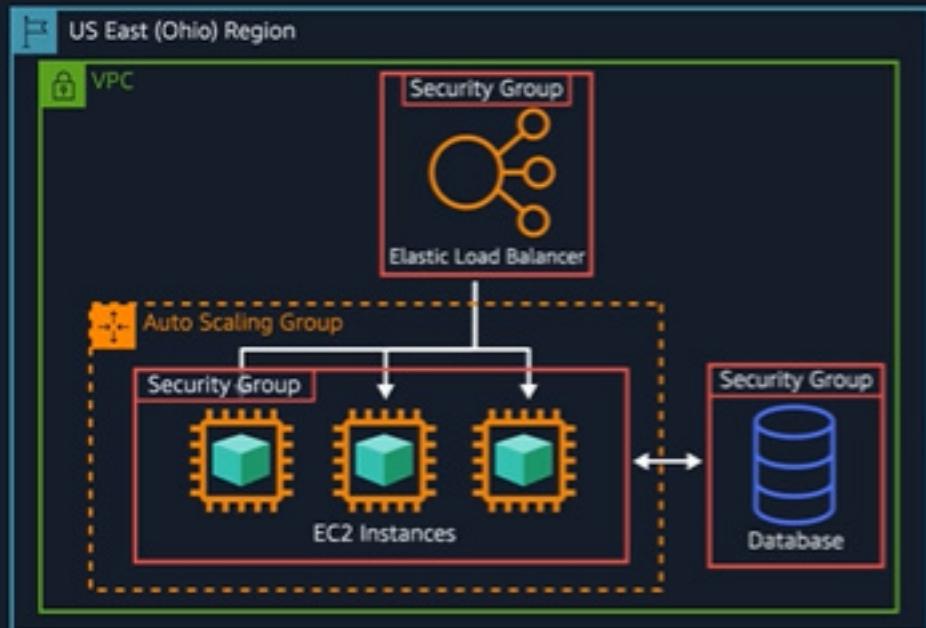
AWS Elastic Beanstalk



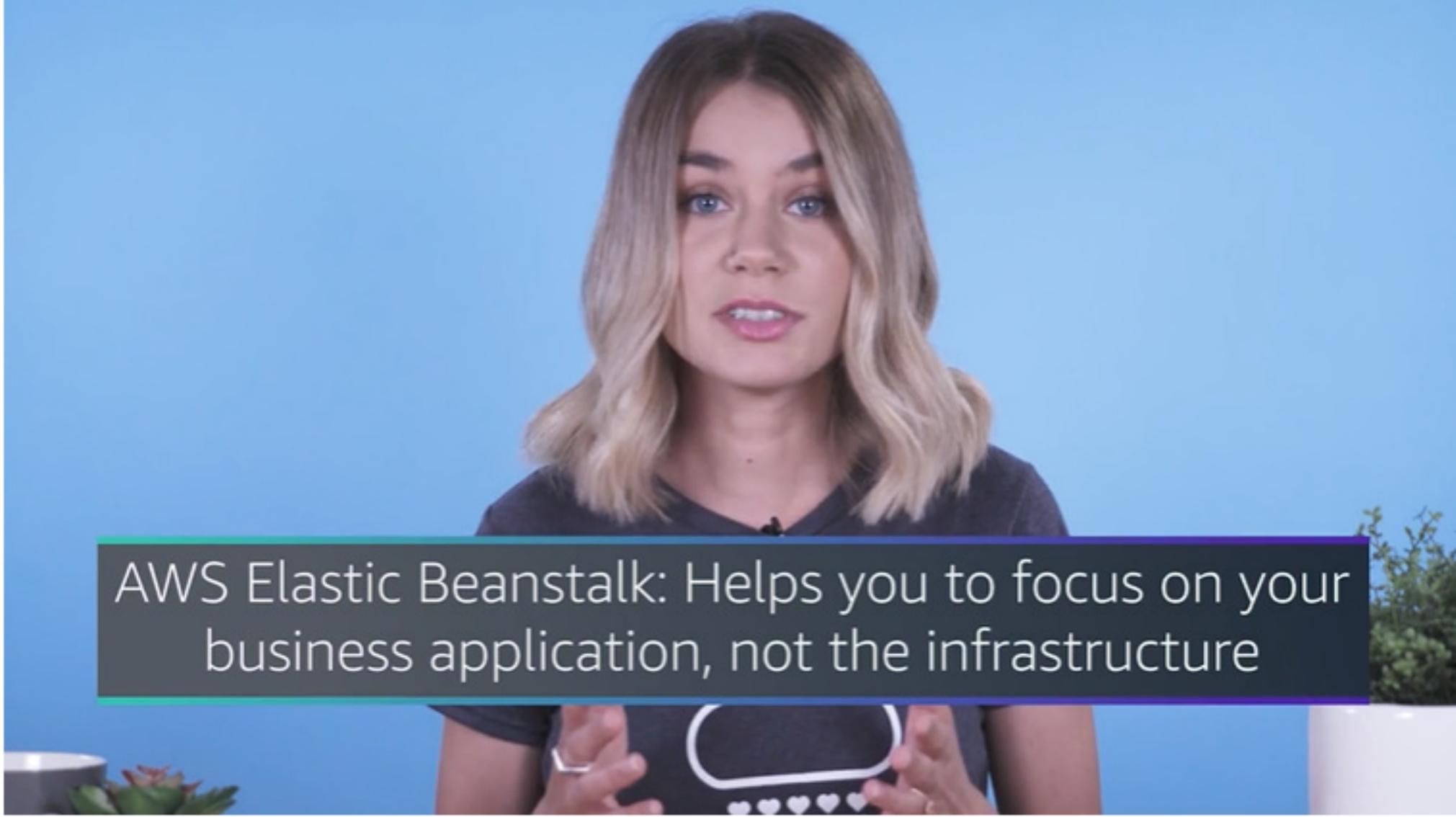
AWS Elastic Beanstalk



AWS Elastic Beanstalk



AWS Elastic Beanstalk



AWS Elastic Beanstalk: Helps you to focus on your business application, not the infrastructure



AWS CloudFormation



AWS CloudFormation: Infrastructure as code tool used to define a wide variety of AWS resources





AWS CloudFormation
template

AWS CloudFormation

Storage

Database

Analytics

Machine learning



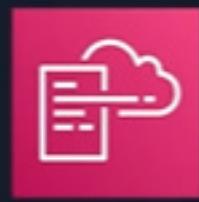
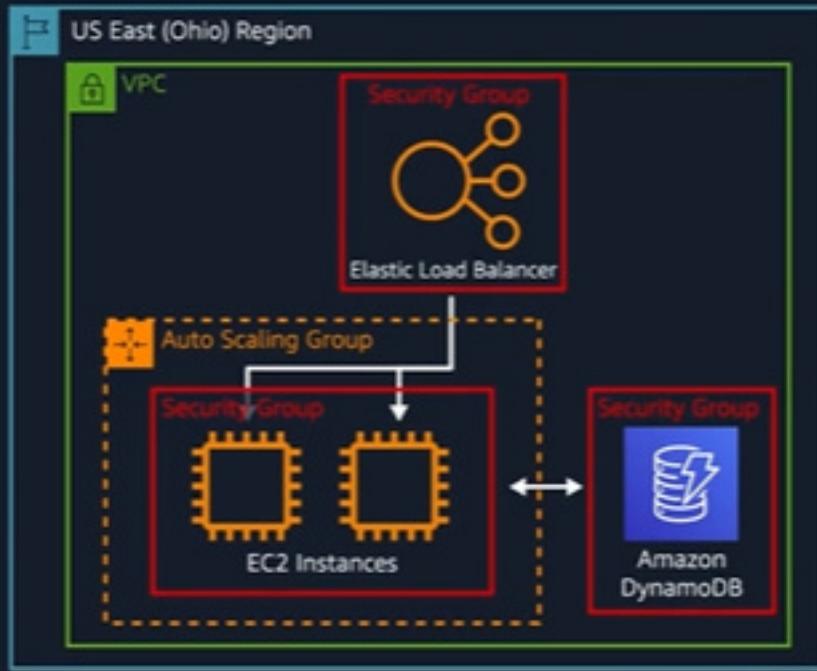




AWS CloudFormation
template



AWS CloudFormation



AWS CloudFormation



AWS CloudFormation

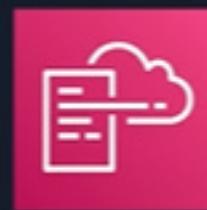


AWS **API's**



Account **A**

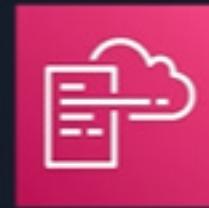
Account **B**



AWS CloudFormation

Account **A**

Account **B**



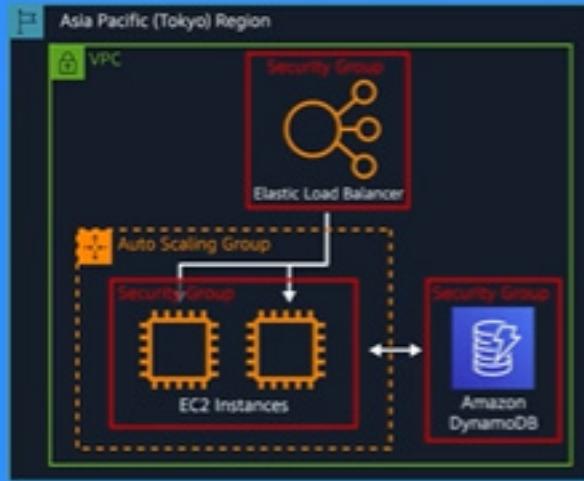
AWS CloudFormation

Asia Pacific (Tokyo) Region

Middle East (Bahrain) Region

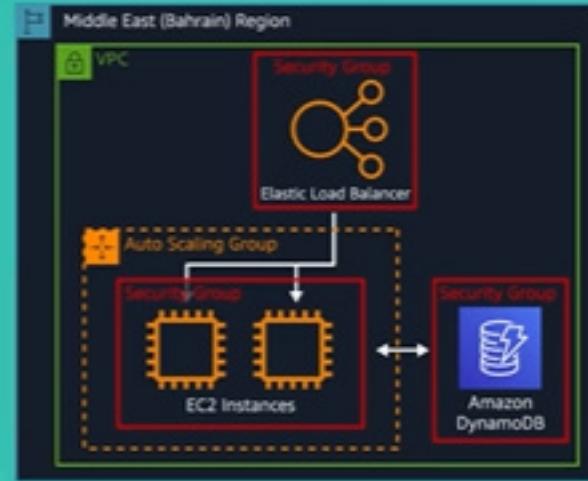


Asia Pacific (Tokyo) Region

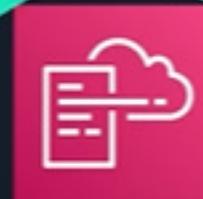


Account A

Middle East (Bahrain) Region



Account B



AWS CloudFormation

AWS Elastic Beanstalk

With **AWS Elastic Beanstalk**, you provide code and configuration settings, and Elastic Beanstalk deploys the resources necessary to perform the following tasks:

- Adjust capacity
- Load balancing
- Automatic scaling
- Application health monitoring

AWS CloudFormation

With **AWS CloudFormation**, you can treat your infrastructure as code. This means that you can build an environment by writing lines of code instead of using the AWS Management Console to individually provision resources.

AWS CloudFormation provisions your resources in a safe, repeatable manner, enabling you to frequently build your infrastructure and applications without having to perform manual actions. It determines the right operations to perform when managing your stack and rolls back changes automatically if it detects errors.

A medium shot of a man with dark hair and a beard, wearing black-rimmed glasses and a dark grey t-shirt featuring a white cloud icon with small hearts underneath. He is gesturing with his hands while speaking. To his left, a vertical sign with the letters 'S' and 'T' is visible.

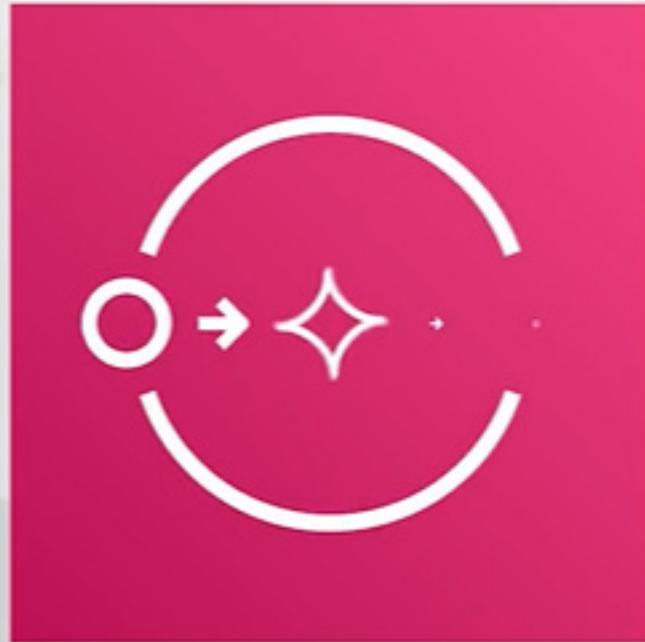
AWS Global Infrastructure

Availability Zones

Regions



Elastic Load Balancing



Amazon Simple Queue Service
(Amazon SQS)



Amazon Simple Notification Service
(Amazon SNS)

A medium shot of a man from the chest up. He has dark hair, wears black-rimmed glasses, and has a light beard. He is wearing a grey short-sleeved t-shirt with a white graphic of a cloud with vertical lines of hearts underneath it. He is looking directly at the camera with his hands clasped together.

AWS Global Infrastructure

- Availability Zones
- Regions
- Deploy infrastructure across at least 2 Availability Zones
- Edge locations

AWS Global Infrastructure

Availability Zones

Regions

Deploy infrastructure across at least 2 Availability Zones

Edge locations

AWS Outposts



Which statement is TRUE for the AWS global infrastructure?

- A Region consists of a single Availability Zone.
- An Availability Zone consists of two or more Regions.
- A Region consists of two or more Availability Zones.
- An Availability Zone consists of a single Region.



Surit Aryal
dont sign now

Which factors should be considered when selecting a Region? (Select TWO.)



Compliance with data governance and legal requirements



Proximity to your customers



Access to 24/7 technical support



Ability to assign custom permissions to different users



Access to the AWS Command Line Interface (AWS CLI)

The correct two response options are:

- Compliance with data governance and legal requirements
- Proximity to your customers

Two other factors to consider when selecting a Region are pricing and the services that are available in a Region.

The other response options are incorrect because:

- The level of support that you choose is not determined by Region. AWS Support plans are explored later in this course.
- Assigning custom permissions to different users is a feature that is possible in all AWS Regions.
- The AWS Command Line Interface (AWS CLI) is available in all AWS Regions.

Learn more:

- [Choosing Regions and Availability Zones](#)

Which statement best describes Amazon CloudFront?

- A service that enables you to run infrastructure in a hybrid cloud approach
- A serverless compute engine for containers
- A service that enables you to send and receive messages between software components through a queue
- A global content delivery service

The correct response option is **A global content delivery service**.

Amazon CloudFront is a content delivery service. It uses a network of edge locations to cache content and deliver content to customers all over the world. When content is cached, it is stored locally as a copy. This content might be video files, photos, webpages, and so on.

The other response options are incorrect because:

- AWS Outposts is a service that enables you to run infrastructure in a hybrid cloud approach.
- AWS Fargate is a serverless compute engine for containers.
- Amazon Simple Queue Service (Amazon SQS) is a service that enables you to send, store, and receive messages between software components through a queue.

Learn more:

- [Amazon CloudFront](#)

Which site does Amazon CloudFront use to cache copies of content for faster delivery to users at any location?



Region



Availability Zone



Edge location



Origin



Correct

The correct response option is **Edge location**.

The other response options are incorrect because:

- A Region is a separate geographical location with multiple locations that are isolated from each other.
- An Availability Zone is a fully isolated portion of the AWS global infrastructure.
- An origin is the server from which CloudFront gets your files. Examples of CloudFront origins include Amazon Simple Storage Service (Amazon S3) buckets and web servers. **Note:** Amazon S3 is explored later in this course.

Learn more:

- [Amazon CloudFront infrastructure](#)

Which action can you perform with AWS Outposts?

- Automate actions for AWS services and applications through scripts.
- Access wizards and automated workflows to perform tasks in AWS services.
- Develop AWS applications in supported programming languages.
- Extend AWS infrastructure and services to your on-premises data center.

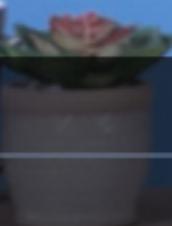
The correct response option is **Extend AWS infrastructure and services to your on-premises data center.**

The other response options are incorrect because:

- The AWS Command Line Interface (AWS CLI) is used to automate actions for AWS services and applications through scripts.
- The AWS Management Console includes wizards and workflows that you can use to complete tasks in AWS services.
- Software development kits (SDKs) enable you to develop AWS applications in supported programming languages.

Learn more:

- [AWS Outposts](#)



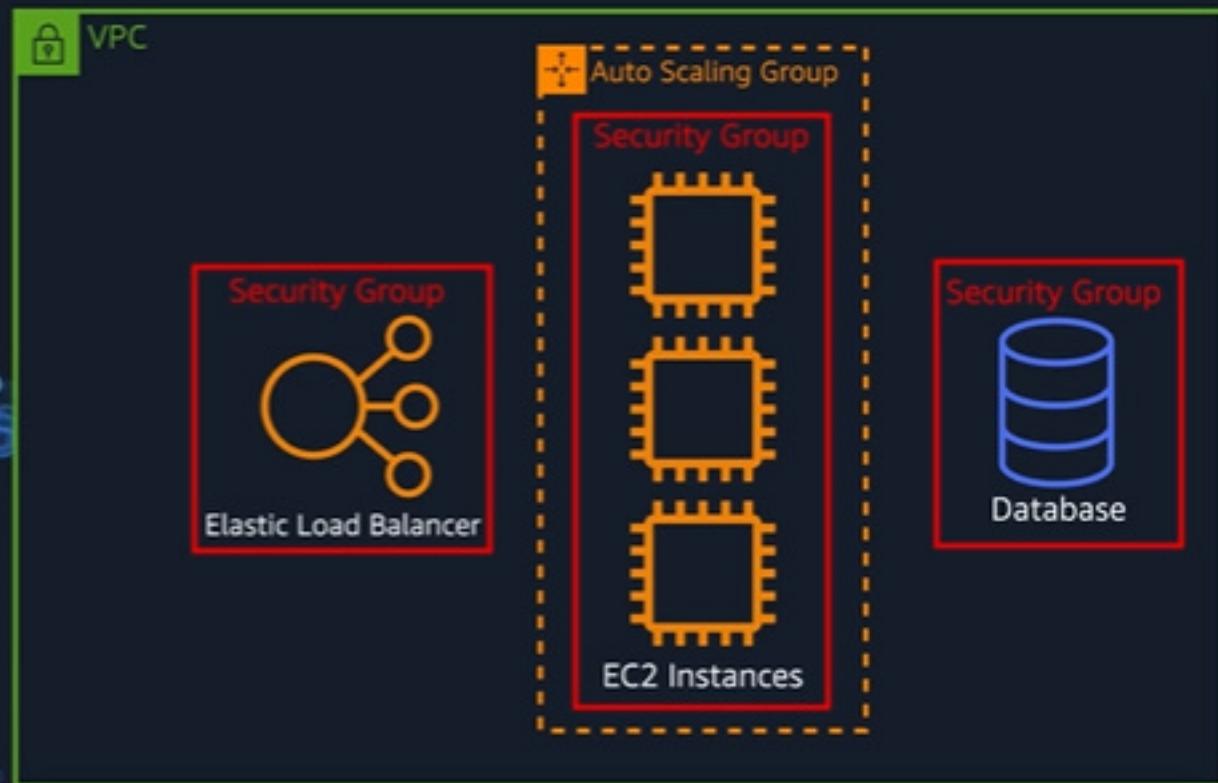
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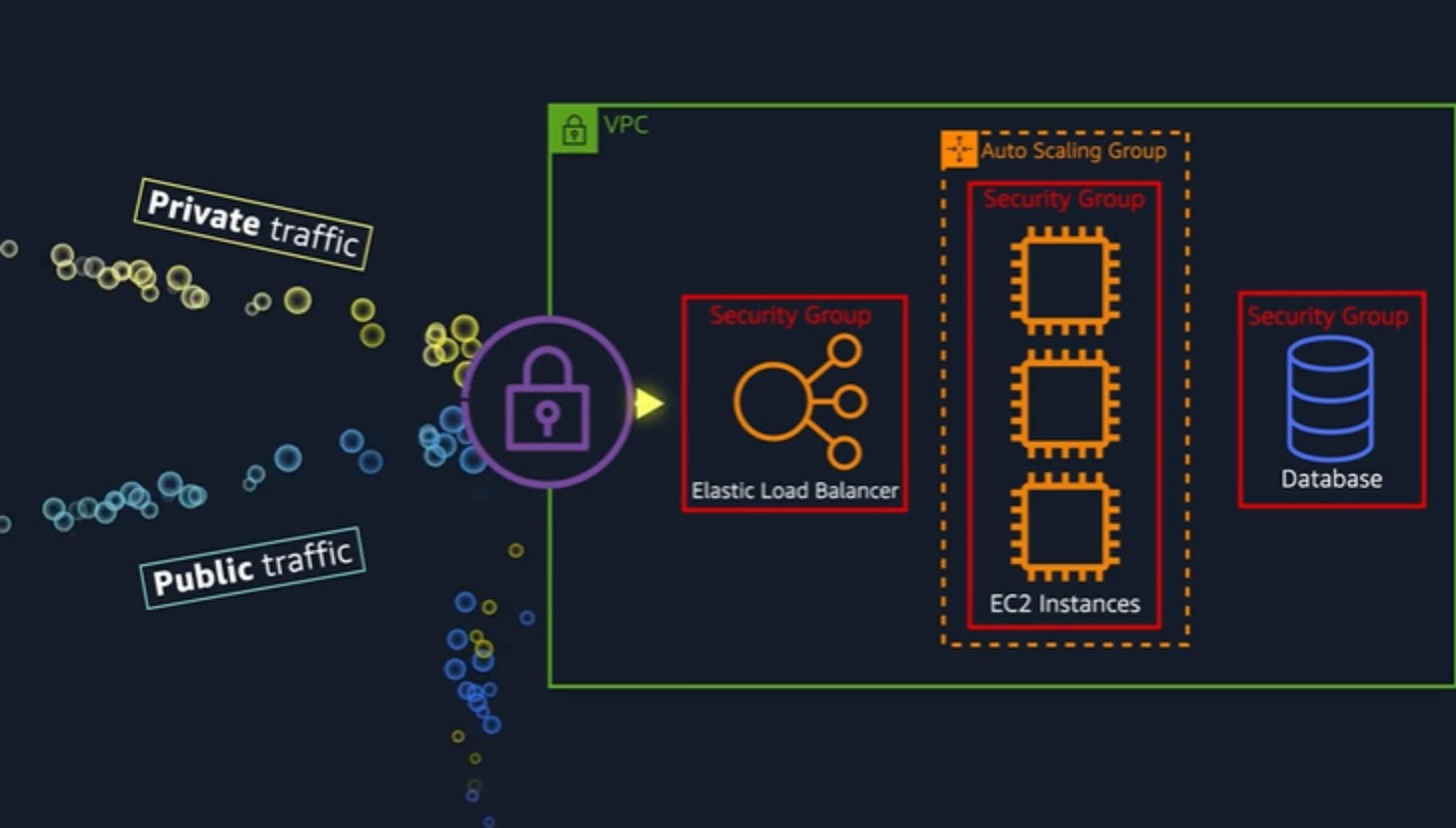
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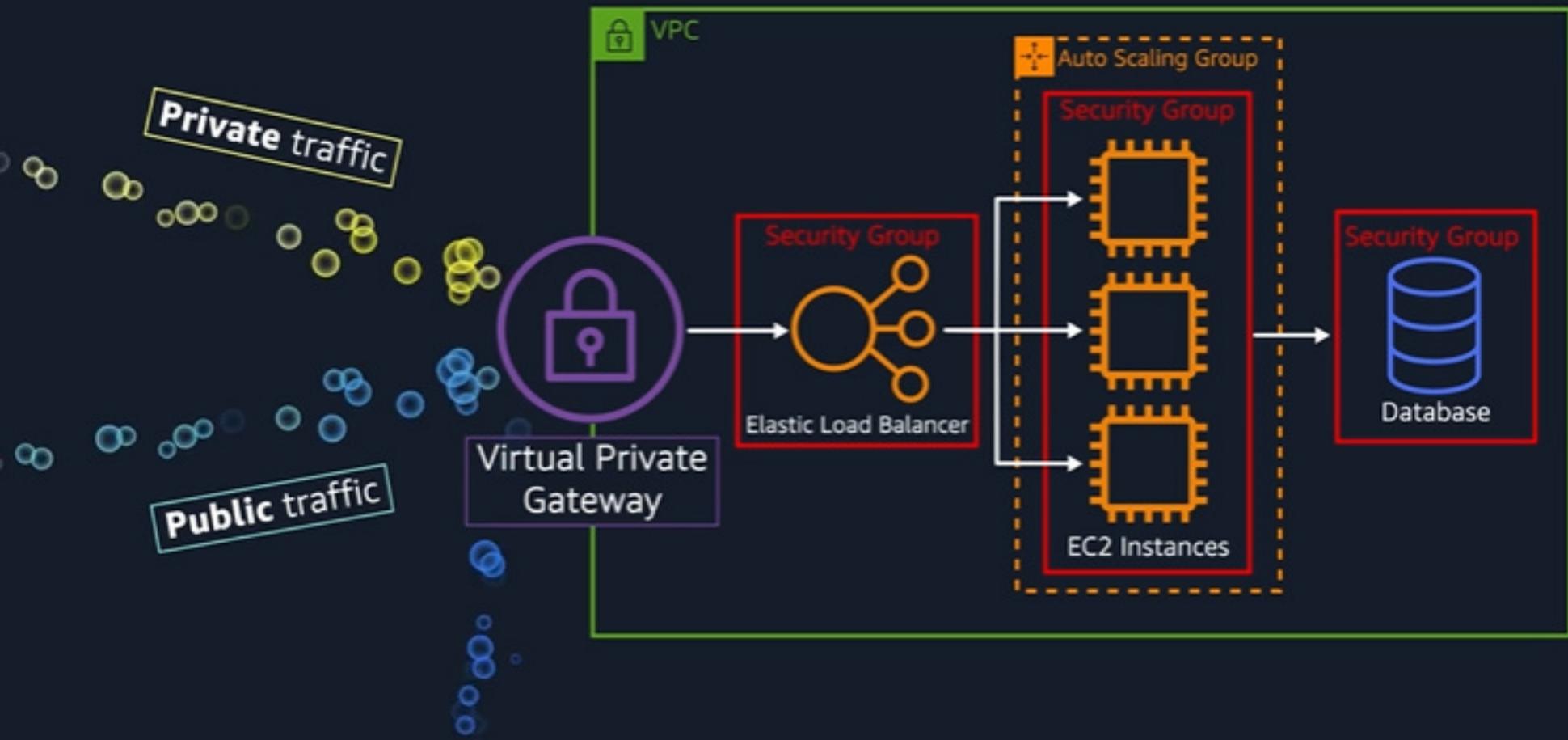


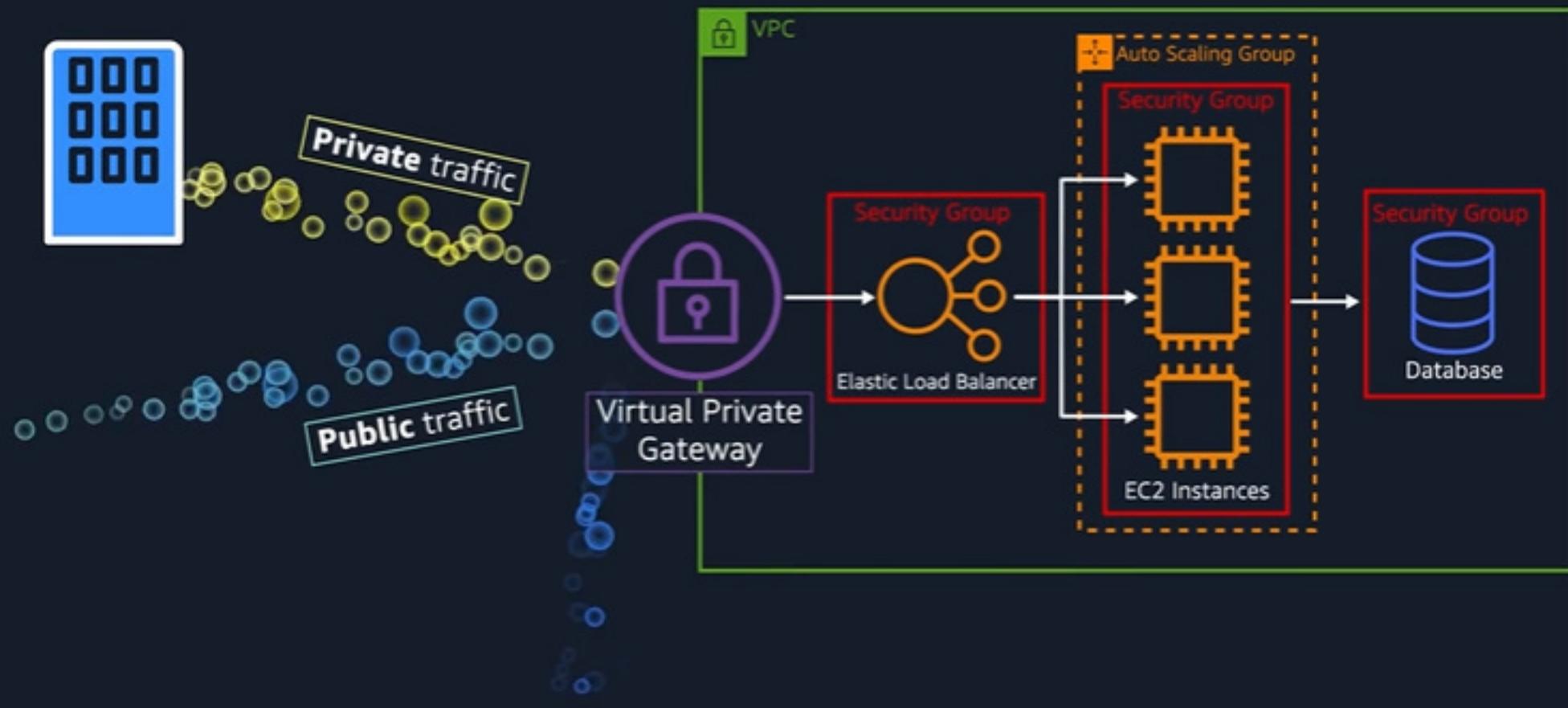


Public traffic



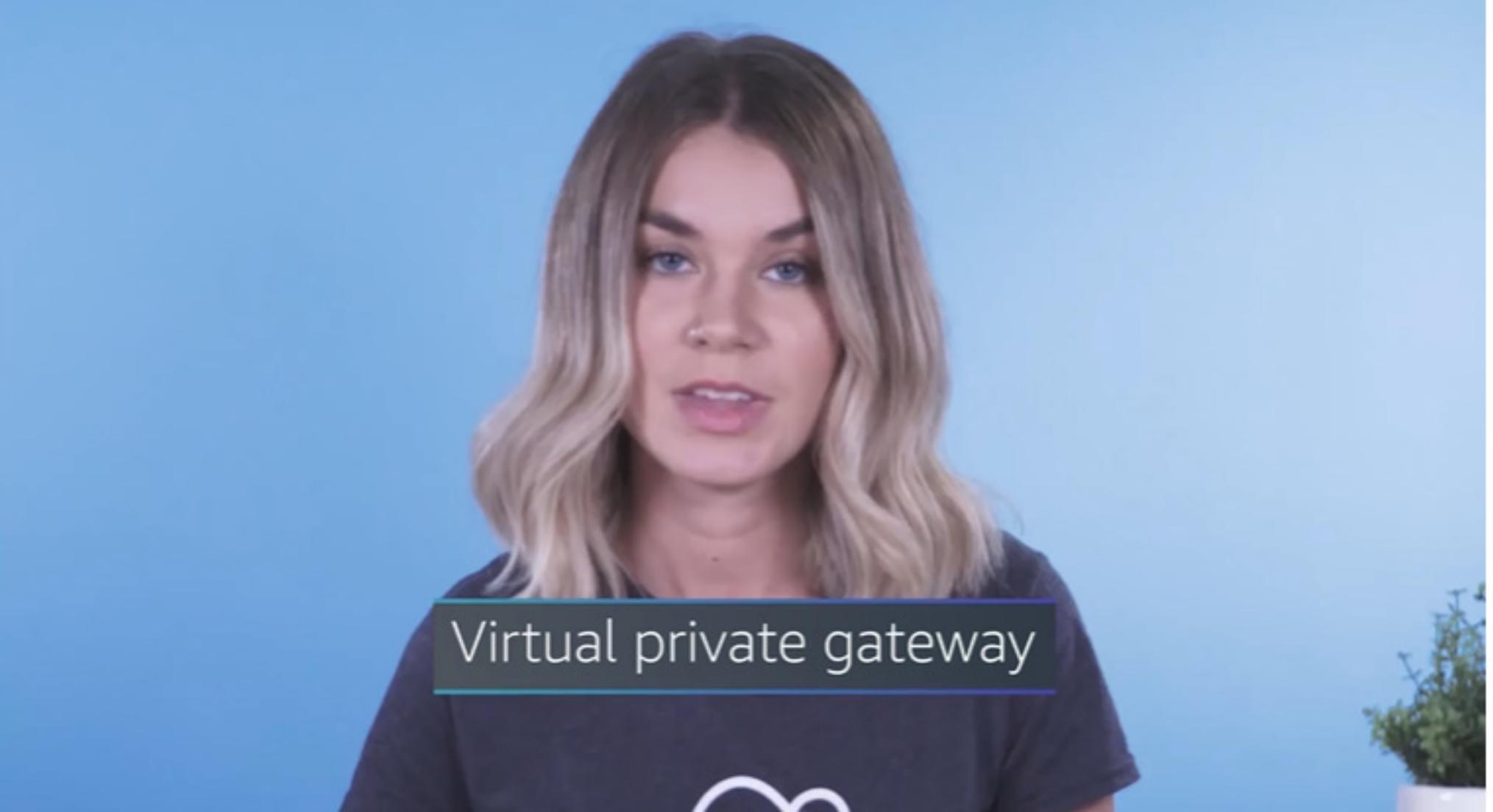




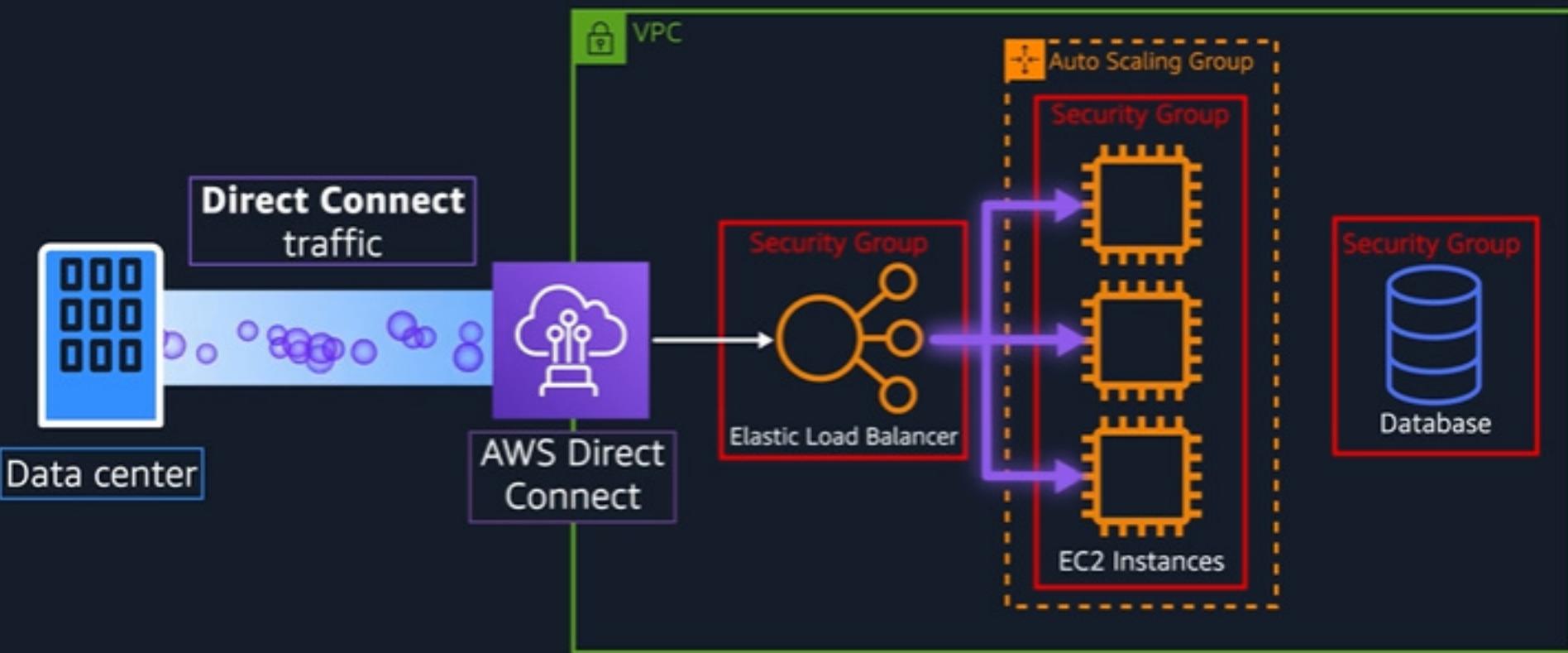


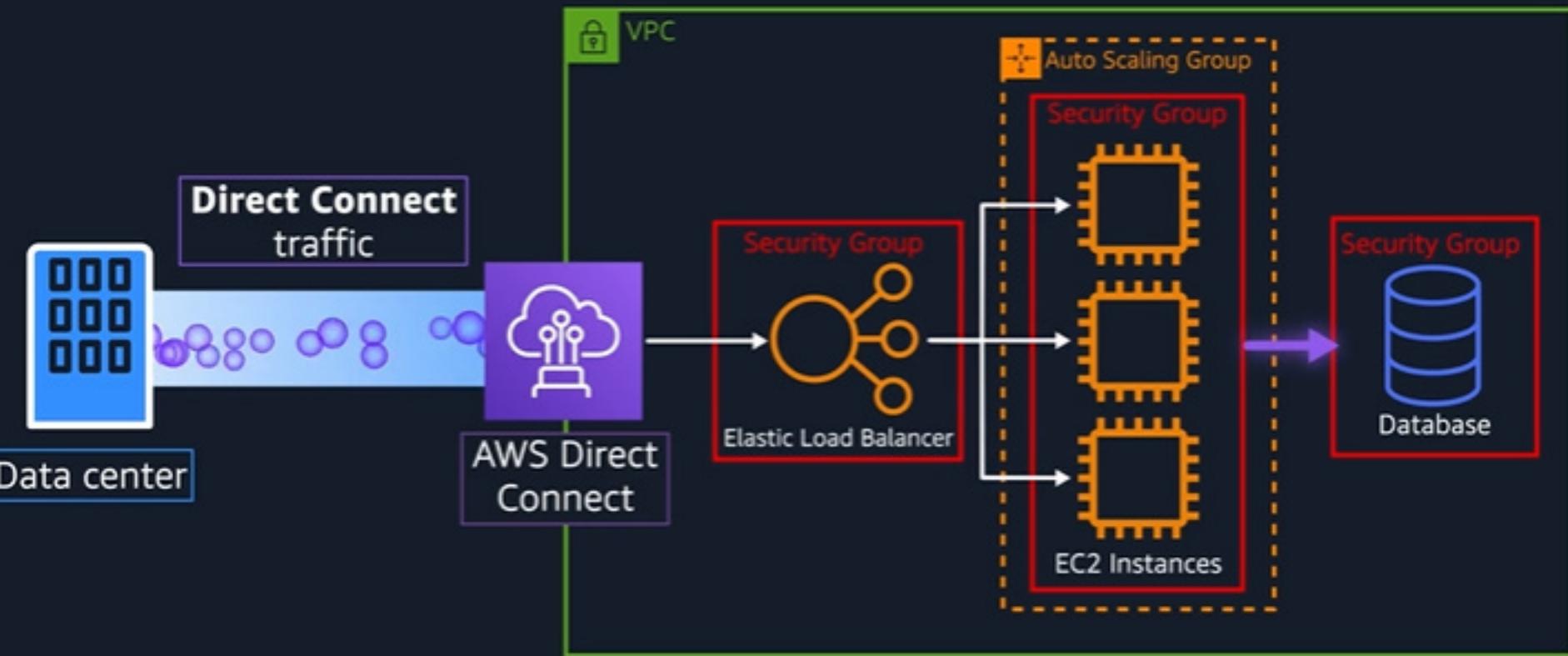
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Virtual private gateway





Amazon Virtual Private Cloud (Amazon VPC)

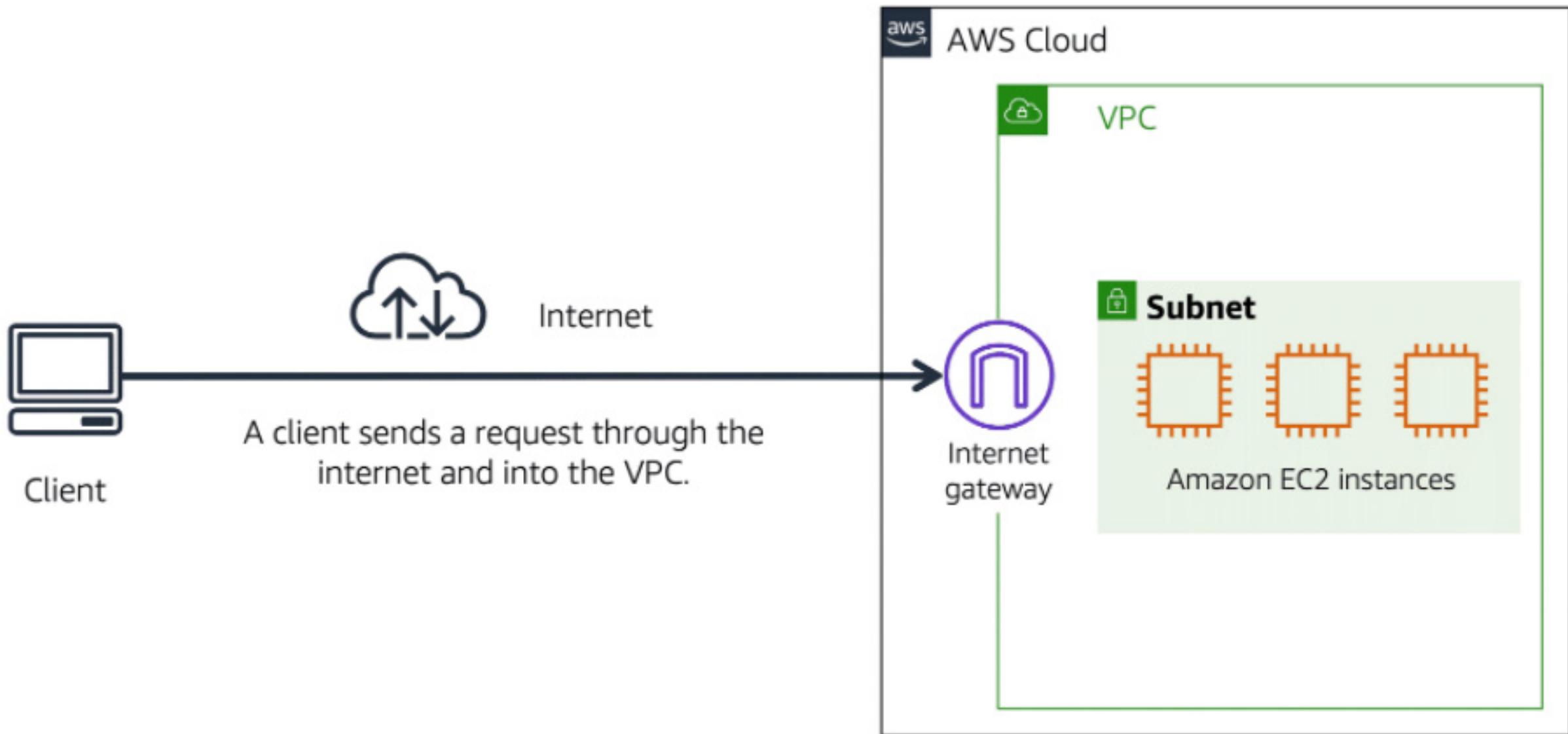
Imagine the millions of customers who use AWS services. Also, imagine the millions of resources that these customers have created, such as Amazon EC2 instances. Without boundaries around all of these resources, network traffic would be able to flow between them unrestricted.

A networking service that you can use to establish boundaries around your AWS resources is [Amazon Virtual Private Cloud \(Amazon VPC\)](#).

Amazon VPC enables you to provision an isolated section of the AWS Cloud. In this isolated section, you can launch resources in a virtual network that you define. Within a virtual private cloud (VPC), you can organize your resources into subnets. A **subnet** is a section of a VPC that can contain resources such as Amazon EC2 instances.

Internet gateway

To allow public traffic from the internet to access your VPC, you attach an **internet gateway** to the VPC.



An internet gateway is a connection between a VPC and the internet. You can think of an internet gateway as being similar to a doorway that customers use to enter the coffee shop. Without an internet gateway, no one can access the resources within your VPC.

What if you have a VPC that includes only private resources?

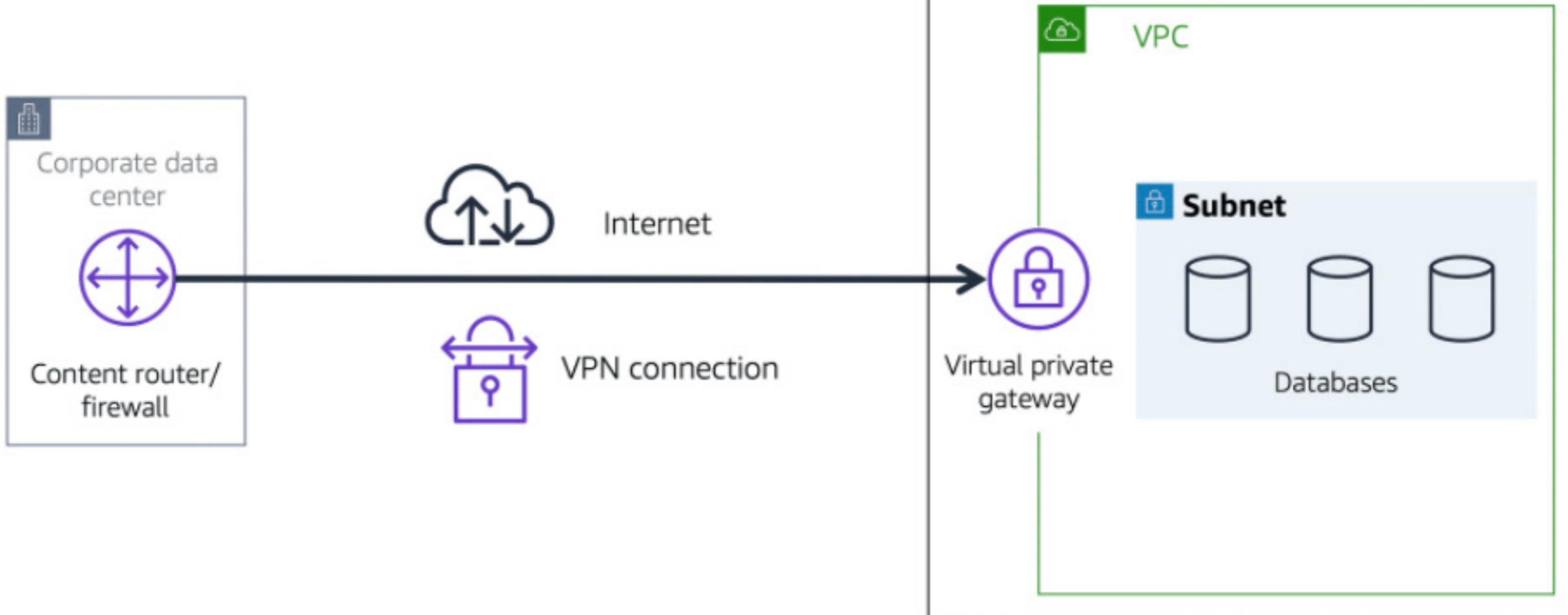
Virtual private gateway

To access private resources in a VPC, you can use a **virtual private gateway**.

Here's an example of how a virtual private gateway works. You can think of the internet as the road between your home and the coffee shop. Suppose that you are traveling on this road with a bodyguard to protect you. You are still using the same road as other customers, but with an extra layer of protection.

The bodyguard is like a virtual private network (VPN) connection that encrypts (or protects) your internet traffic from all the other requests around it.

The virtual private gateway is the component that allows protected internet traffic to enter into the VPC. Even though your connection to the coffee shop has extra protection, traffic jams are possible because you're using the same road as other customers.



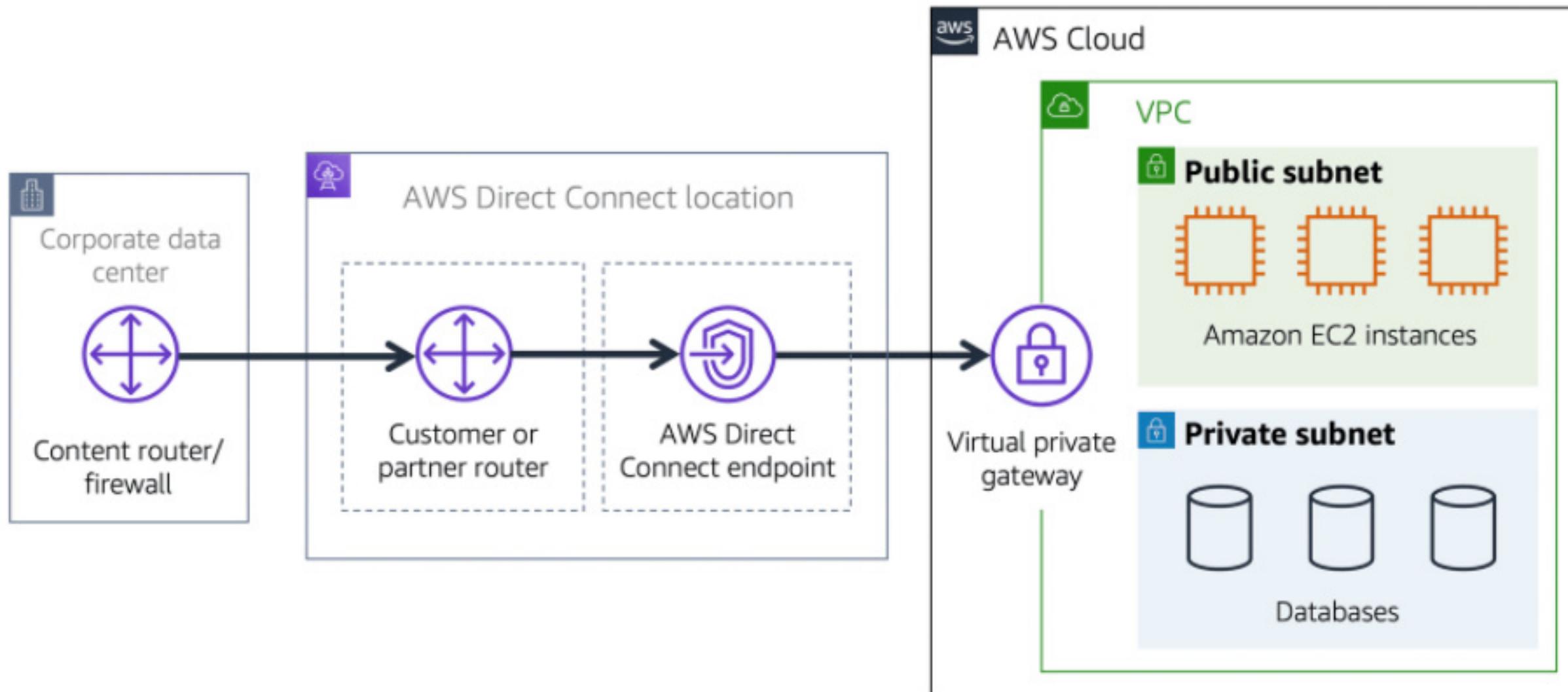
A virtual private gateway enables you to establish a virtual private network (VPN) connection between your VPC and a private network, such as an on-premises data center or internal corporate network. A virtual private gateway allows traffic into the VPC only if it is coming from an approved network.

AWS Direct Connect

[AWS Direct Connect](#) is a service that enables you to establish a dedicated private connection between your data center and a VPC.

Suppose that there is an apartment building with a hallway directly linking the building to the coffee shop. Only the residents of the apartment building can travel through this hallway.

This private hallway provides the same type of dedicated connection as AWS Direct Connect. Residents are able to get into the coffee shop without needing to use the public road shared with other customers.



The private connection that AWS Direct Connect provides helps you to reduce network costs and increase the amount of bandwidth that can travel through your network.



Network hardening

Application security

User identity

Authentication and
authorization



Network hardening

Application security

User identity

Authentication and
authorization

Distributed denial of
service prevention



Network hardening

Application security

User identity

Authentication and
authorization

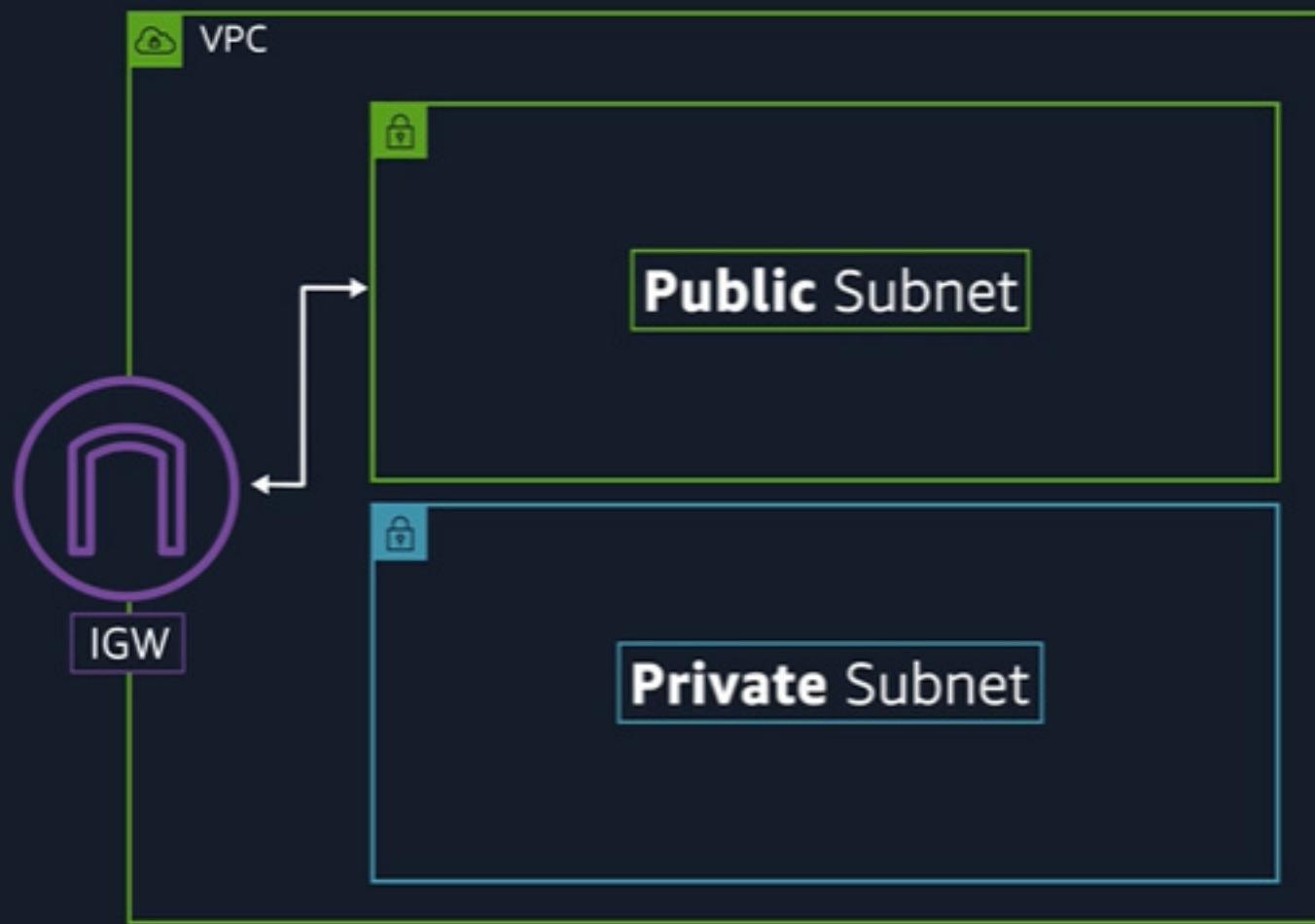
Distributed denial of
service prevention

Data integrity



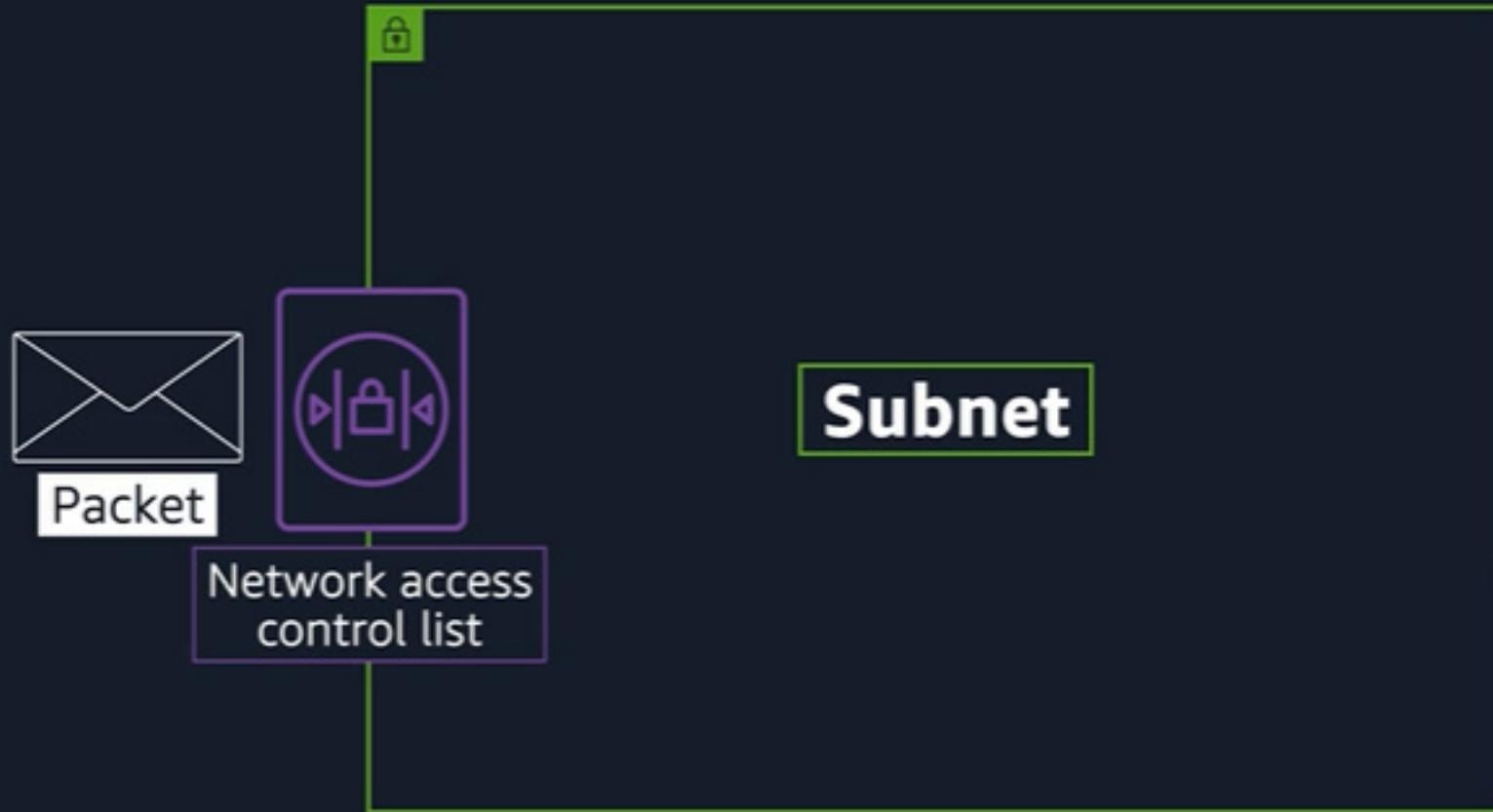
- Network hardening
- Application security
- User identity
- Authentication and authorization
- Distributed denial of service prevention
- Data integrity
- Encryption

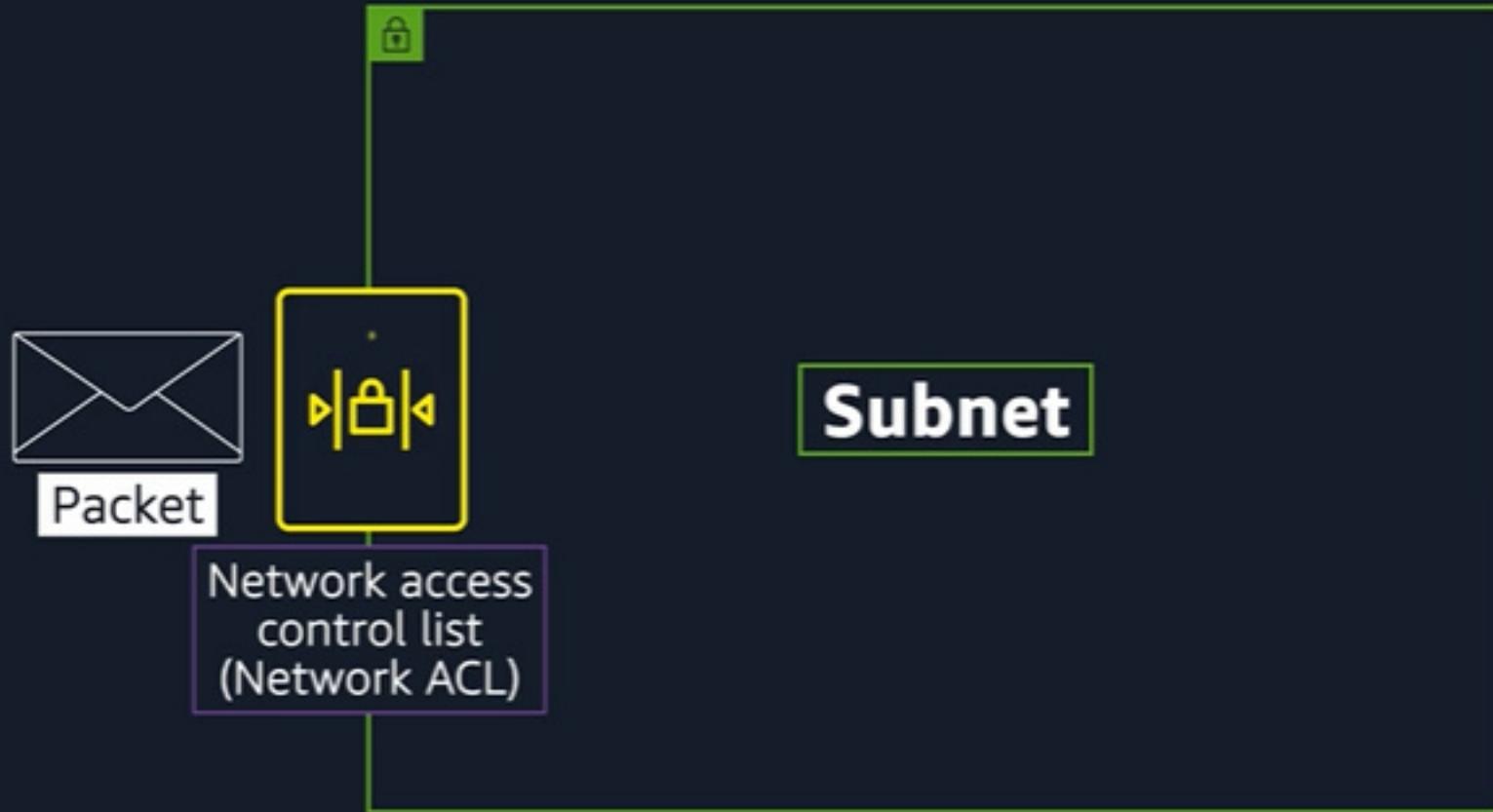






Packet







Dropped



Packet

Subnet

Network access
control list
(Network ACL)

Subnet



aws

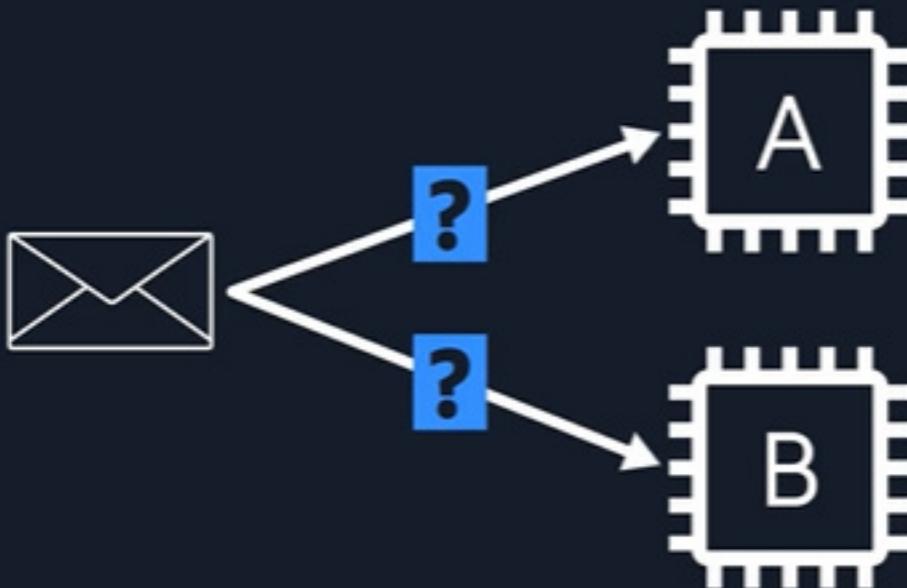




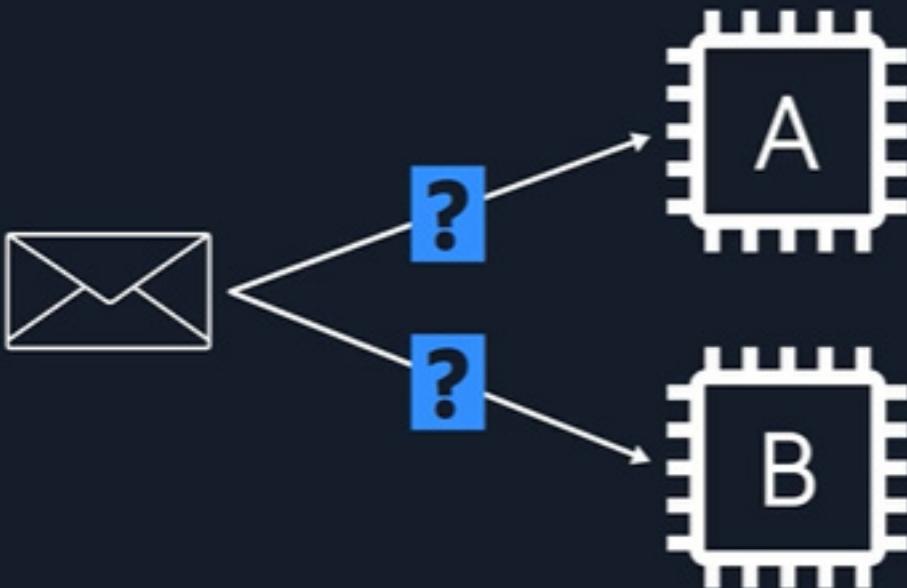
Subnet



 Subnet



 Subnet





Subnet

Security Group



Security Group





Subnet



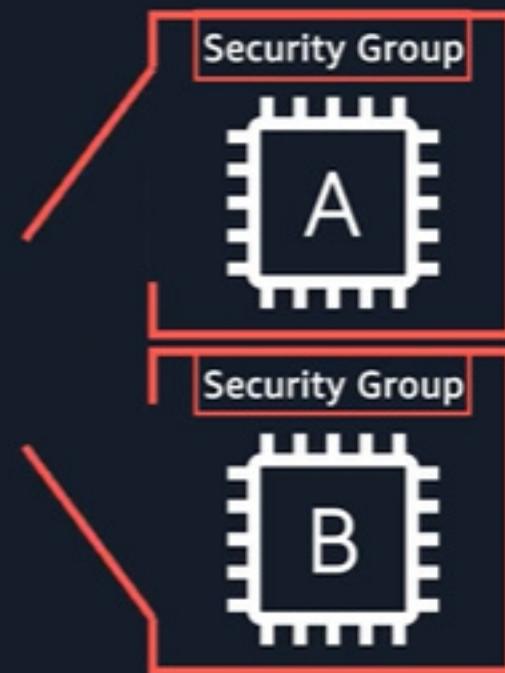
Security Group



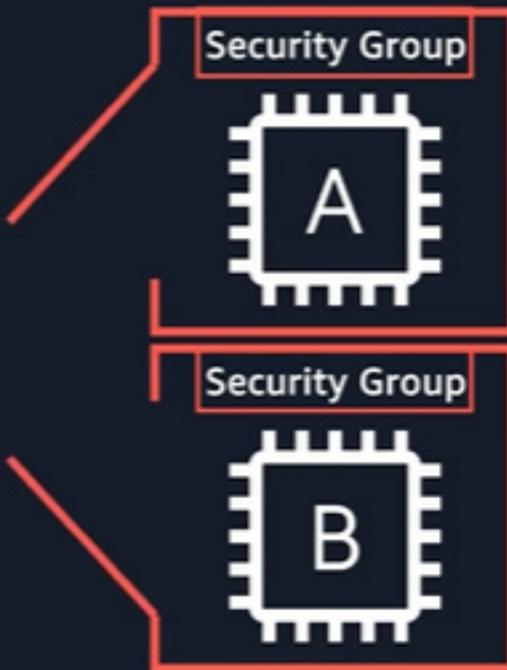
Security Group

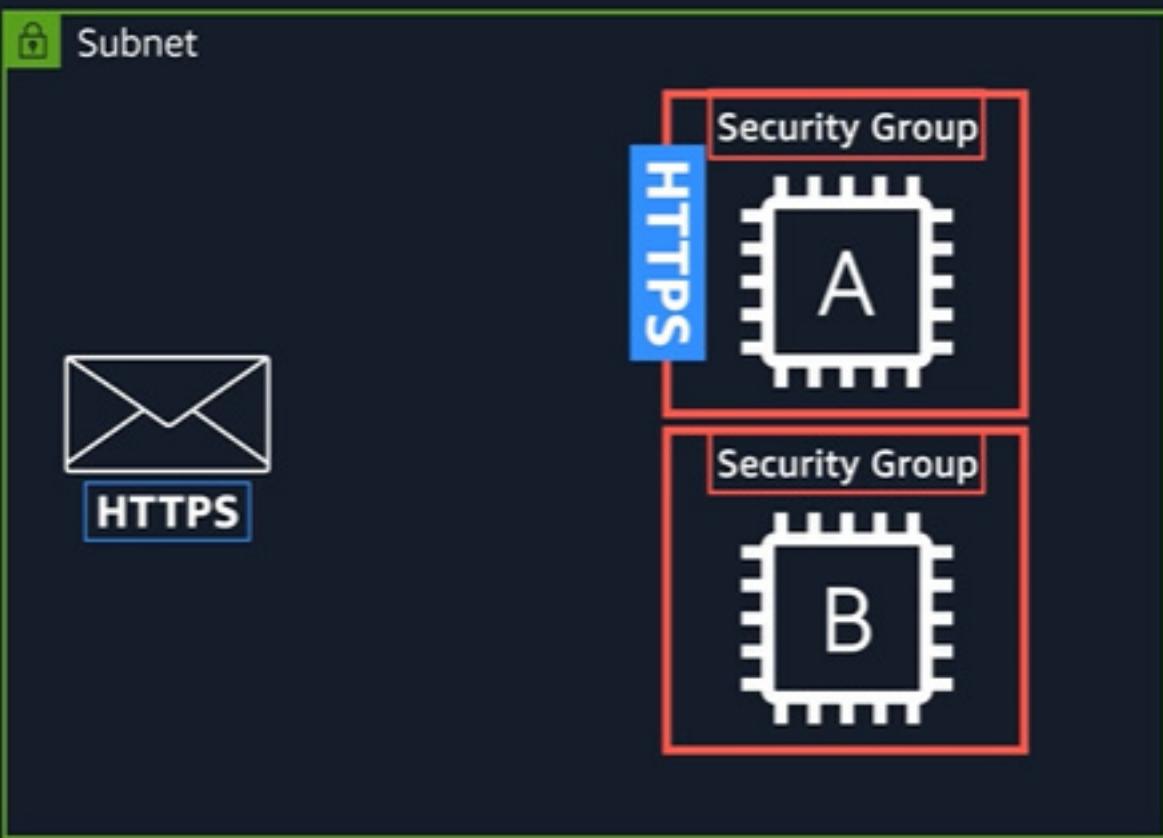


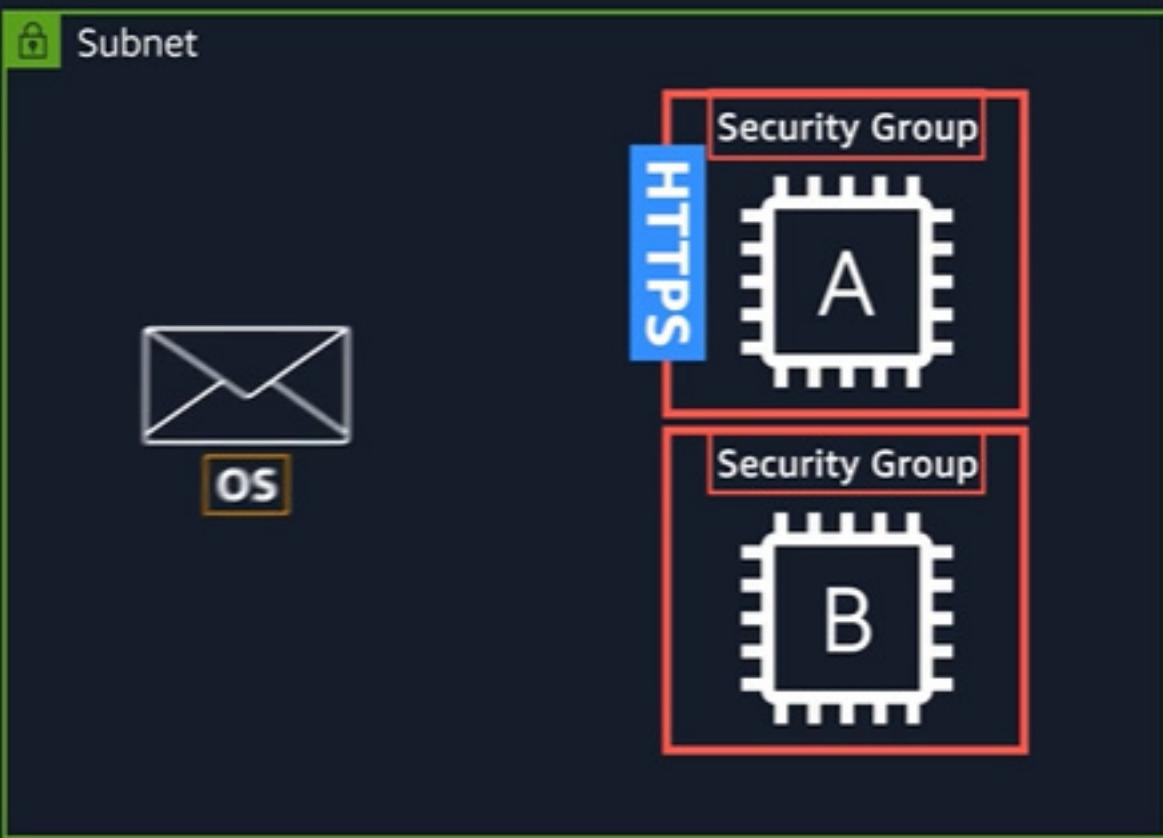
 Subnet



 Subnet





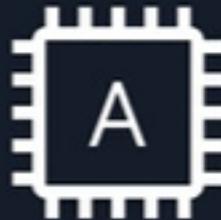




Subnet

HTTPS

Security Group

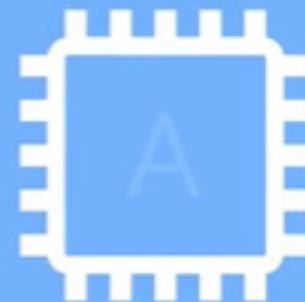


Security Group



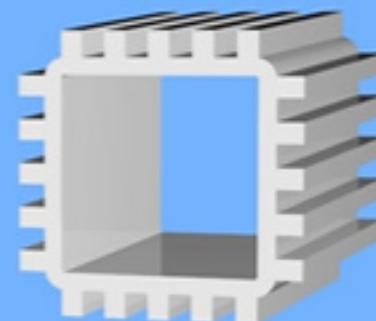
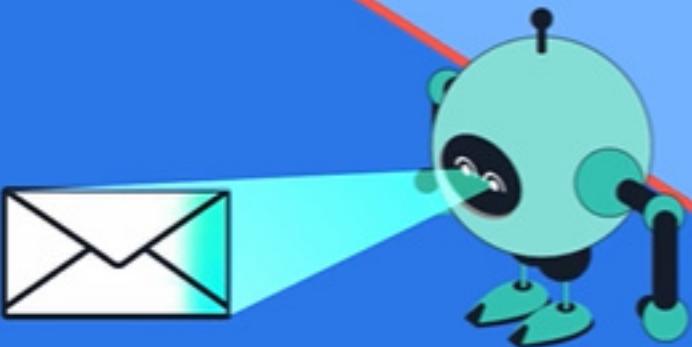
Security Group

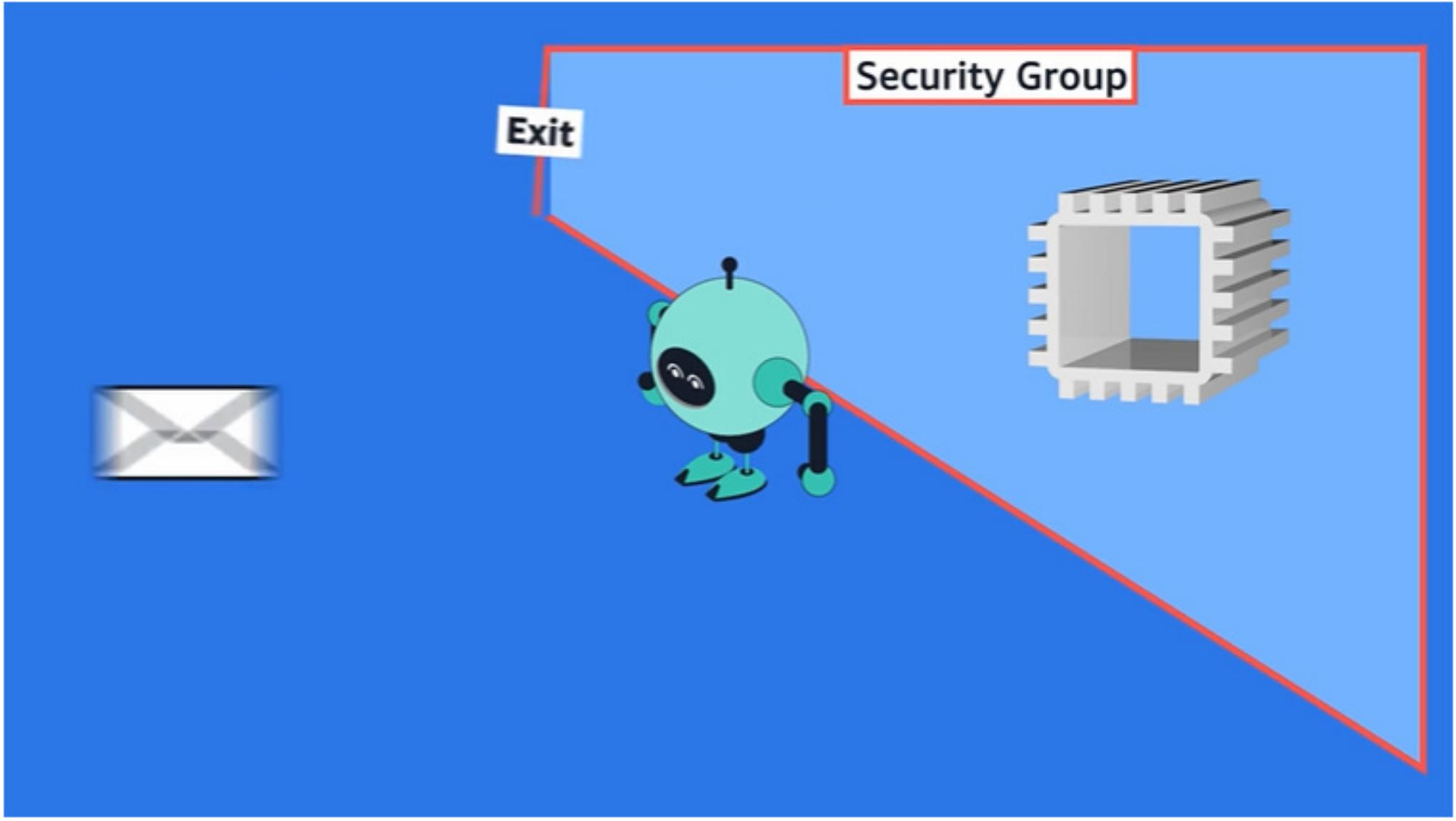
Exit



Security Group

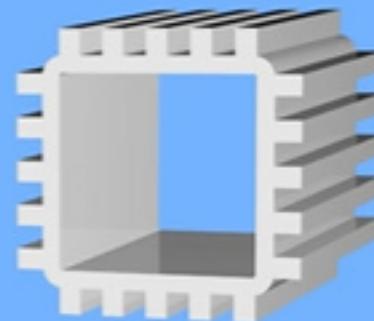
Exit





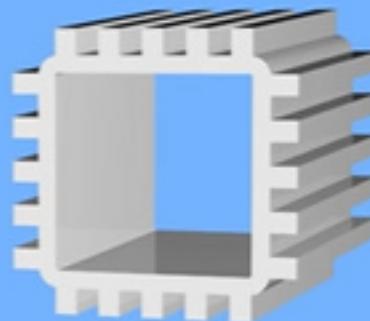
Security Group

Exit

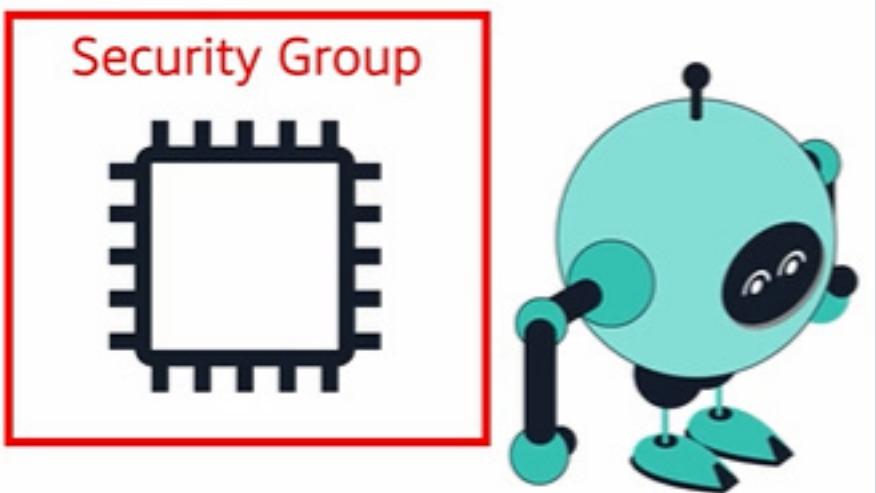


Exit

Security Group



Security Group

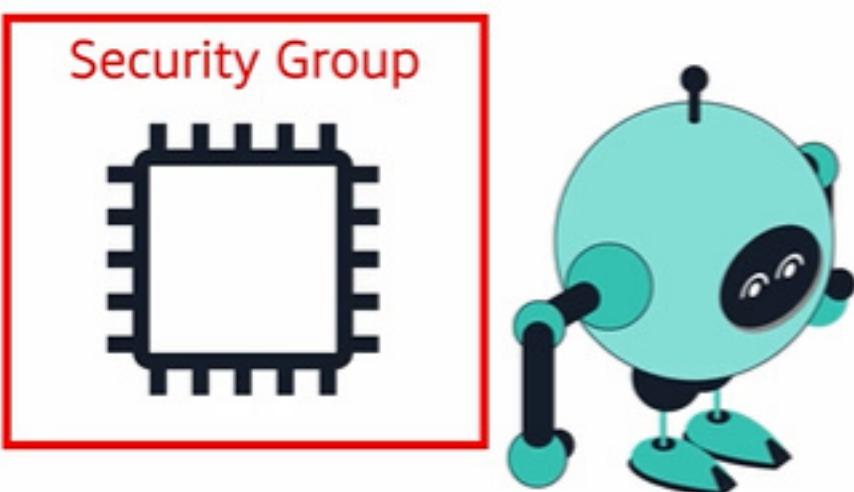


Network ACL



Security Group

Stateful



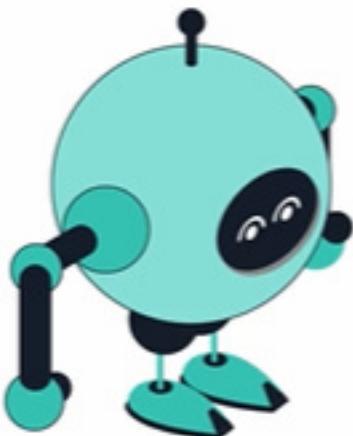
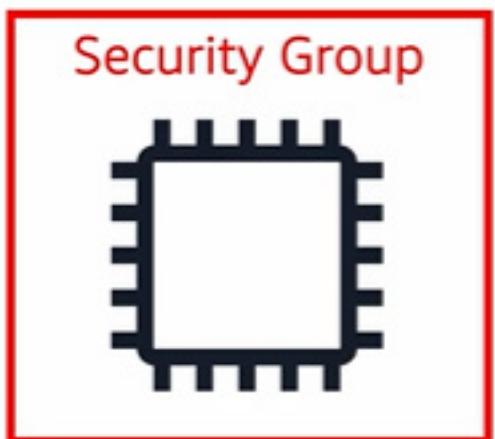
Network ACL

Stateless



Security Group

Stateful



Network ACL

Stateless



SUBNET 1

EC2 Instance A



SUBNET 2

EC2 Instance B



SUBNET 1

EC2 Instance A



SUBNET 2

EC2 Instance B

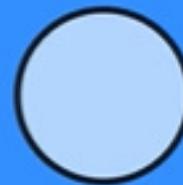


SUBNET 1



SUBNET 2

EC2 Instance B



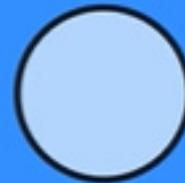
SUBNET 1

EC2 Instance A



SUBNET 2

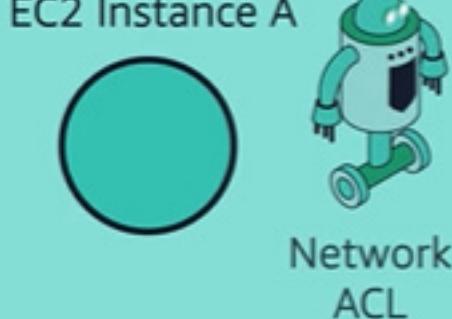
EC2 Instance B



SUBNET 1



SUBNET 2



EC2 Instance B



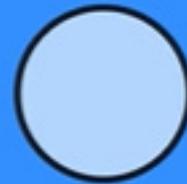
SUBNET 1

EC2 Instance A



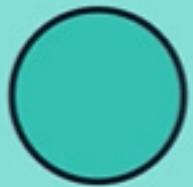
SUBNET 2

EC2 Instance B



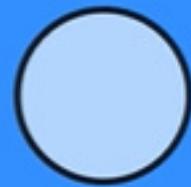
SUBNET 1

EC2 Instance A



SUBNET 2

EC2 Instance B



SUBNET 1

EC2 Instance A



SUBNET 2

EC2 Instance B



Security group



SUBNET 1

EC2 Instance A



SUBNET 2

EC2 Instance B



SUBNET 1

EC2 Instance A



SUBNET 2

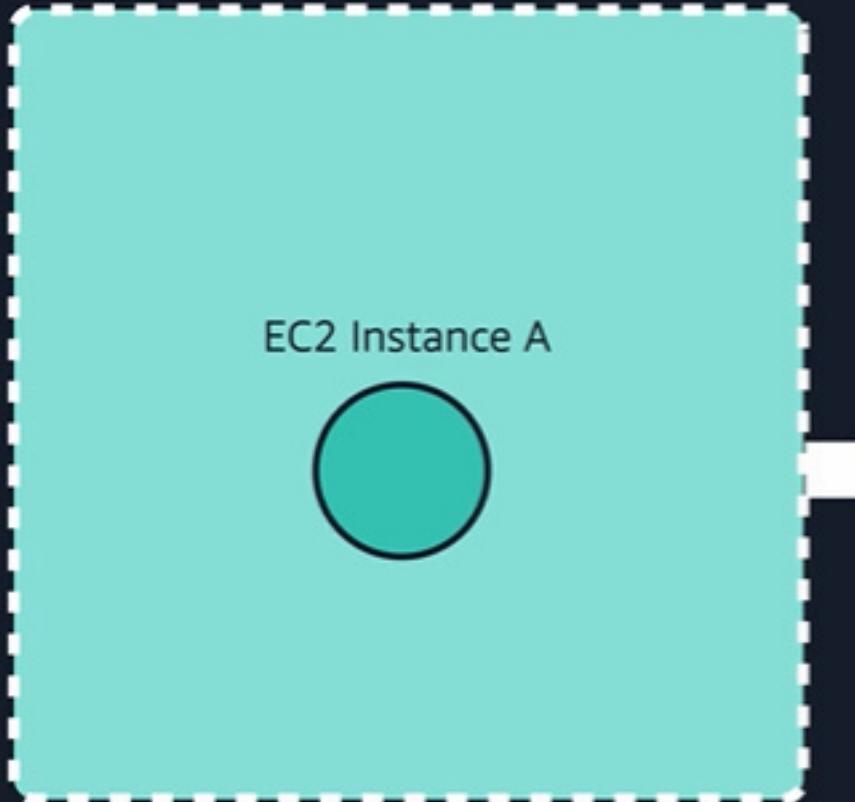
EC2 Instance B



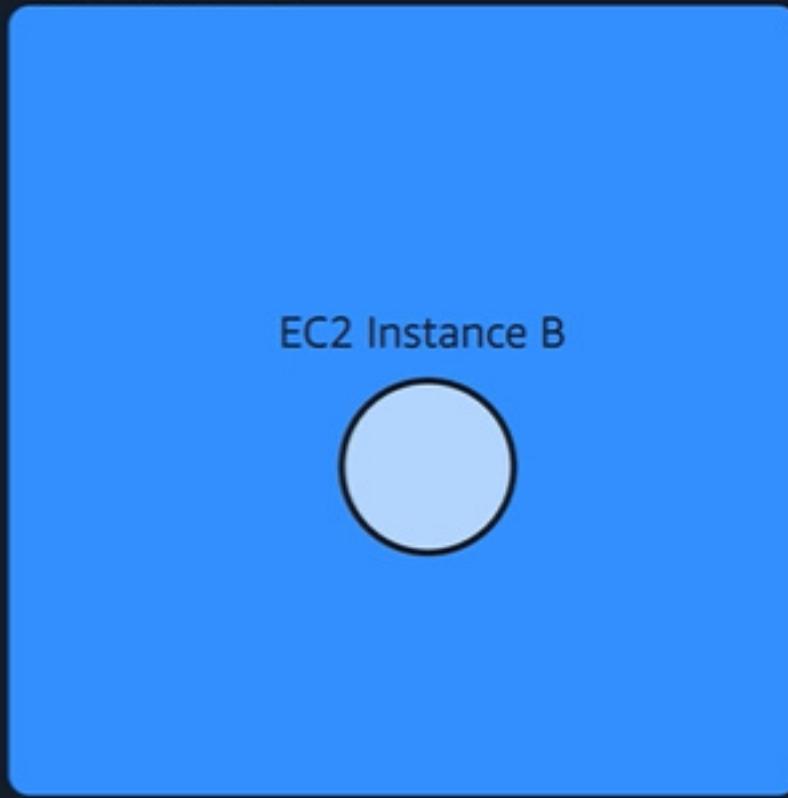
Network
ACL



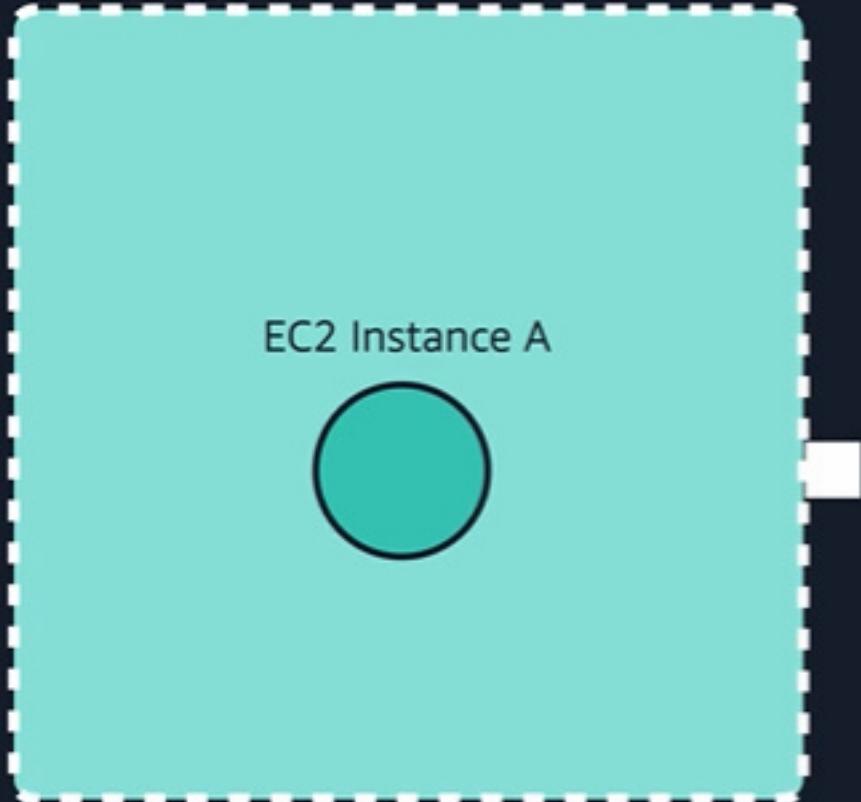
SUBNET 1



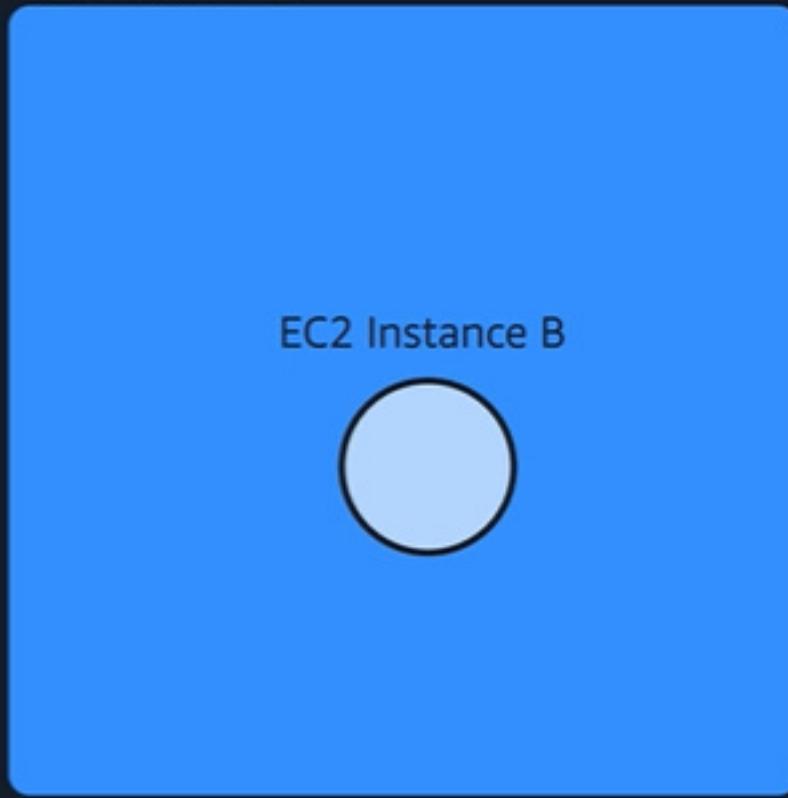
SUBNET 2



SUBNET 1



SUBNET 2

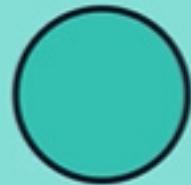


SUBNET 1



SUBNET 2

EC2 Instance A



Network
ACL

EC2 Instance B

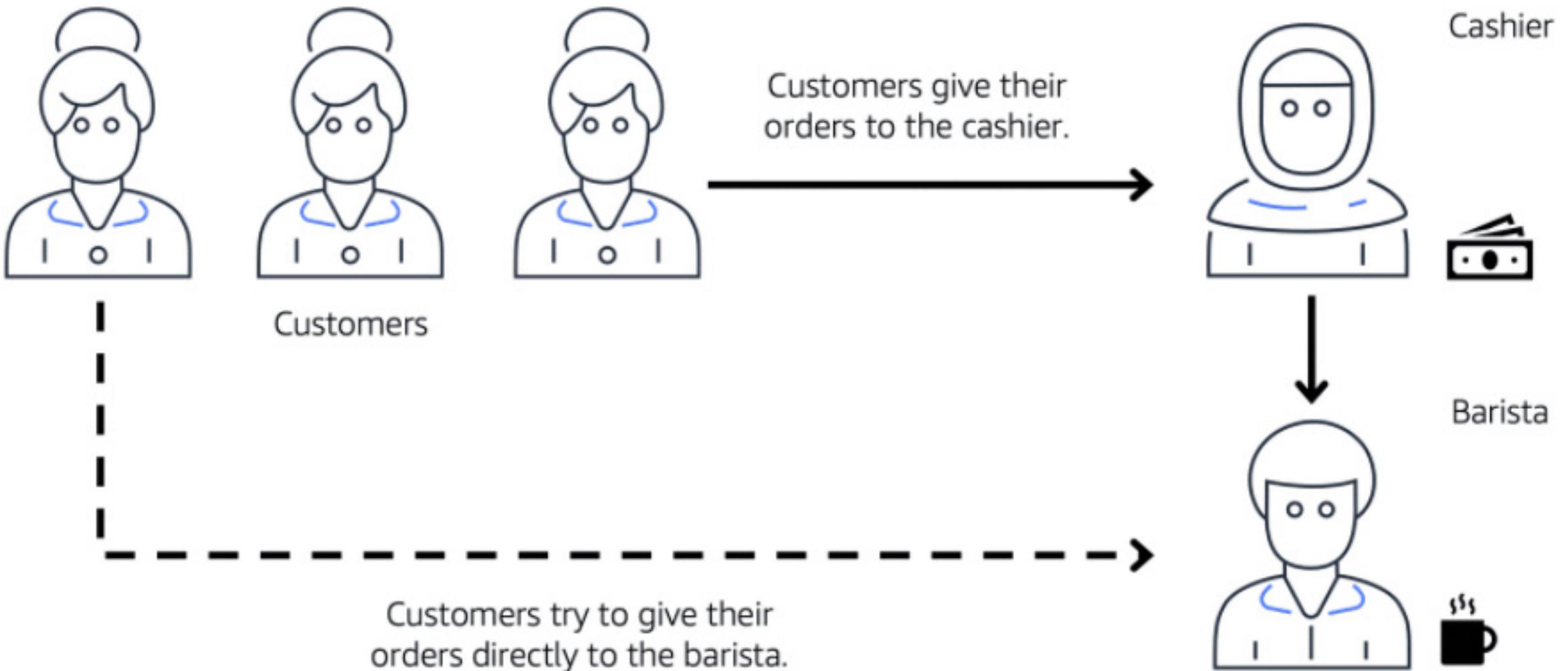


To learn more about the role of subnets within a VPC, review the following example from the coffee shop.

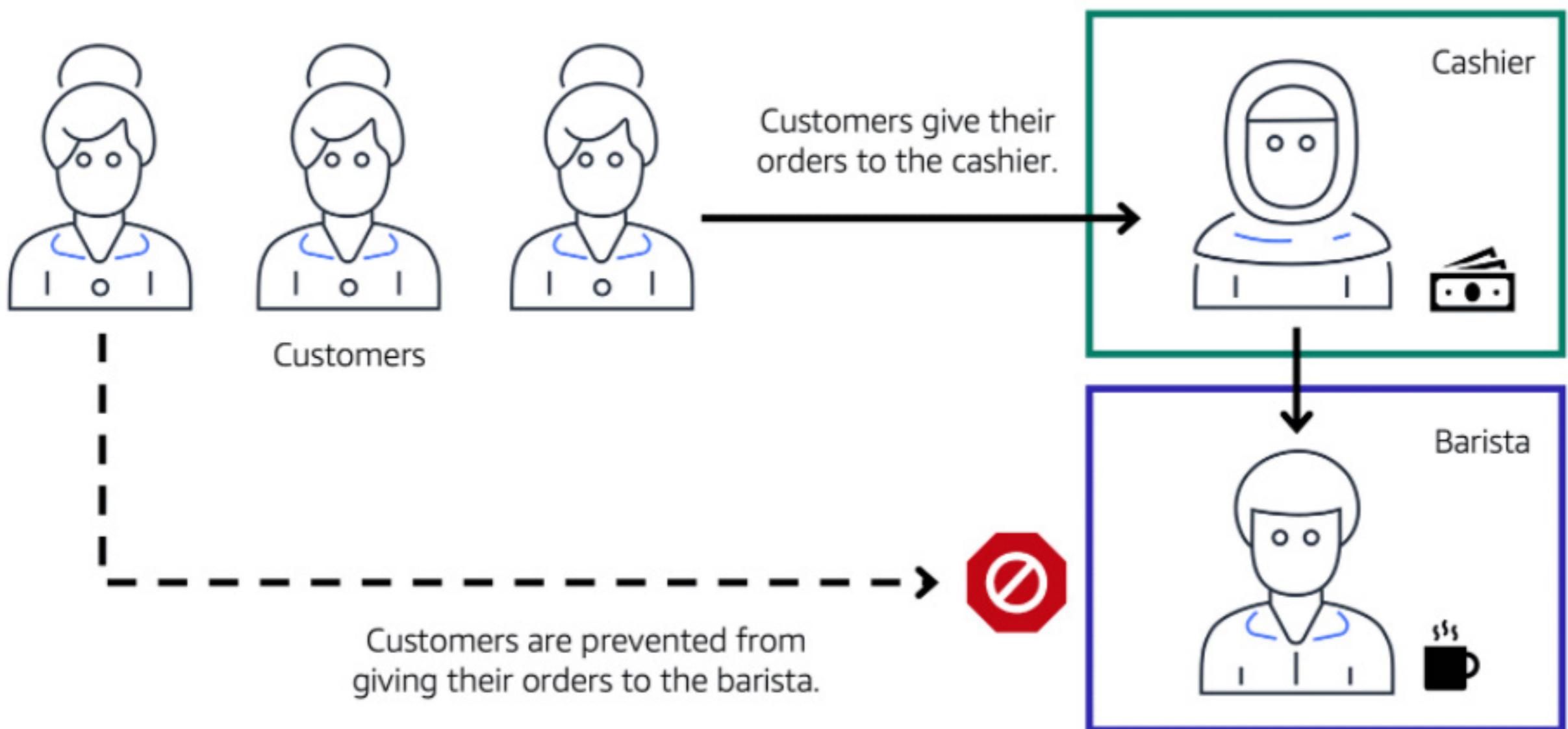
First, customers give their orders to the cashier. The cashier then passes the orders to the barista. This process allows the line to keep running smoothly as more customers come in.

Suppose that some customers try to skip the cashier line and give their orders directly to the barista. This disrupts the flow of traffic and results in customers accessing a part of the coffee shop that is restricted to them.

shop that is restricted to them.



To fix this, the owners of the coffee shop divide the counter area by placing the cashier and the barista in separate workstations. The cashier's workstation is public facing and designed to receive customers. The barista's area is private. The barista can still receive orders from the cashier but not directly from customers.



This is similar to how you can use AWS networking services to isolate resources and determine exactly how network traffic flows.

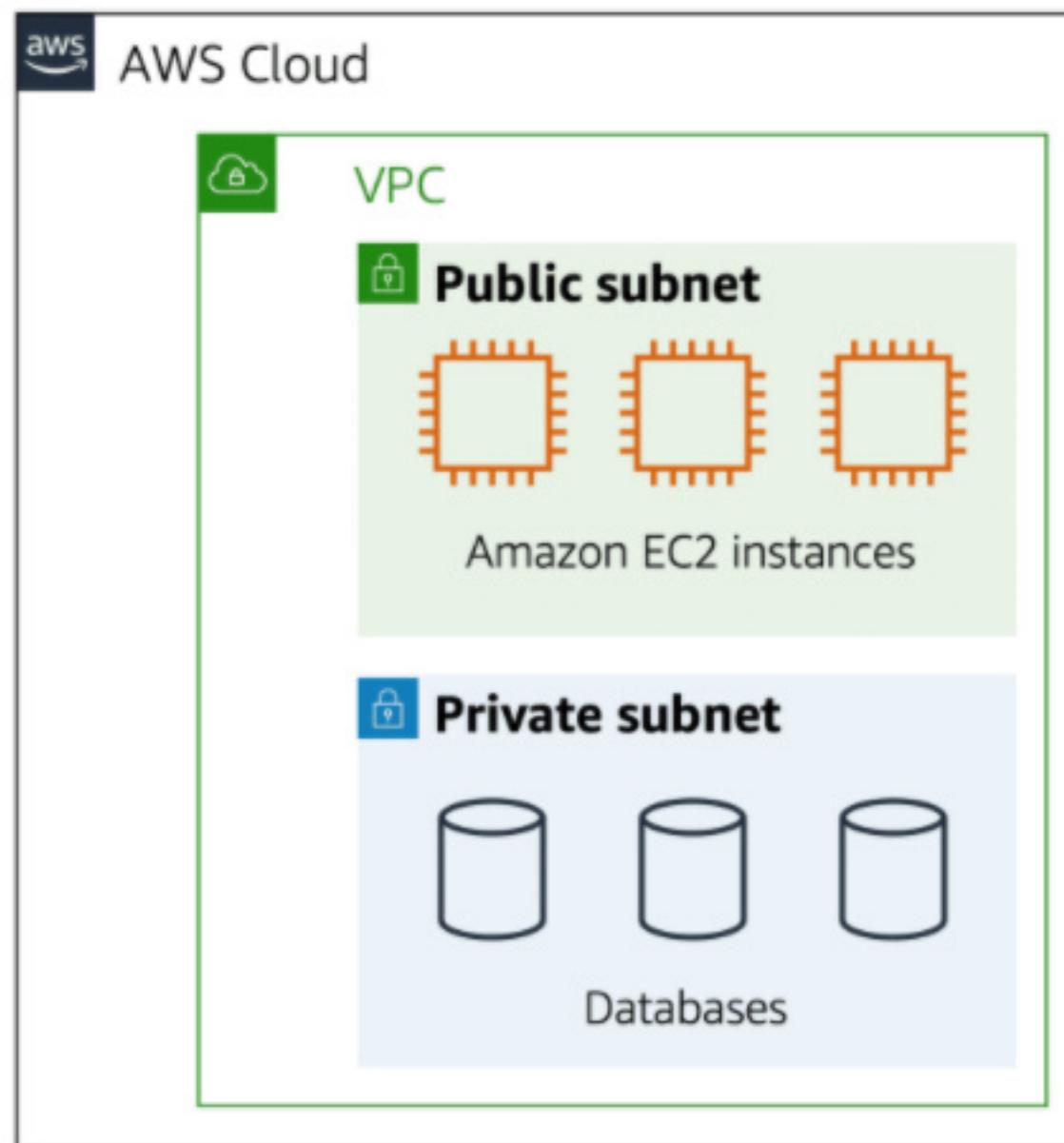
In the coffee shop, you can think of the counter area as a VPC. The counter area divides into two separate areas for the cashier's workstation and the barista's workstation. In a VPC, **subnets** are separate areas that are used to group together resources.

Subnets

A subnet is a section of a VPC in which you can group resources based on security or operational needs. Subnets can be public or private.

Subnets

A subnet is a section of a VPC in which you can group resources based on security or operational needs. Subnets can be public or private.



Public subnets contain resources that need to be accessible by the public, such as an online store's website.

Private subnets contain resources that should be accessible only through your private network, such as a database that contains customers' personal information and order histories.

In a VPC, subnets can communicate with each other. For example, you might have an application that involves Amazon EC2 instances in a public subnet communicating with databases that are located in a private subnet.

Network traffic in a VPC

When a customer requests data from an application hosted in the AWS Cloud, this request is sent as a packet. A **packet** is a unit of data sent over the internet or a network.

It enters into a VPC through an internet gateway. Before a packet can enter into a subnet or exit from a subnet, it checks for permissions. These permissions indicate who sent the packet and how the packet is trying to communicate with the resources in a subnet.

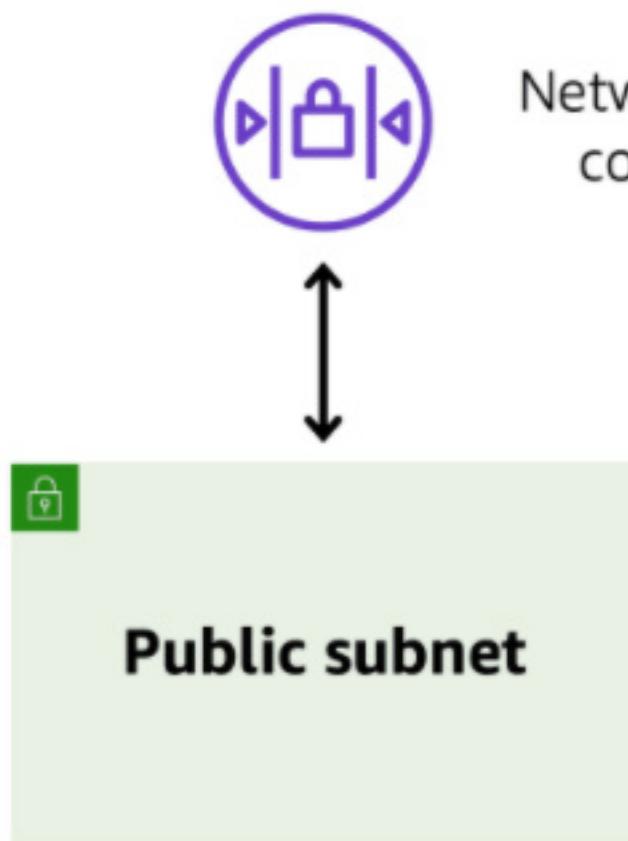
The VPC component that checks packet permissions for subnets is a [network access control list \(ACL\)](#).

Network access control lists (ACLs)

A network access control list (ACL) is a virtual firewall that controls inbound and outbound traffic at the subnet level.

For example, step outside of the coffee shop and imagine that you are in an airport. In the airport, travelers are trying to enter into a different country. You can think of the travelers as packets and the passport control officer as a network ACL. The passport control officer checks travelers' credentials when they are both entering and exiting out of the country. If a traveler is on an approved list, they are able to get through. However, if they are not on the approved list or are explicitly on a list of banned travelers, they cannot come in.

approved list, they are able to get through. However, if they are not on the approved list or are explicitly on a list of banned travelers, they cannot come in.



Each AWS account includes a default network ACL.

When configuring your VPC, you can use your account's default network ACL or create custom network ACLs.

By default, your account's default network ACL allows all inbound and outbound traffic, but you can modify it by adding your own rules. For custom network ACLs, all inbound and outbound traffic is denied until you add rules to specify which traffic to allow.

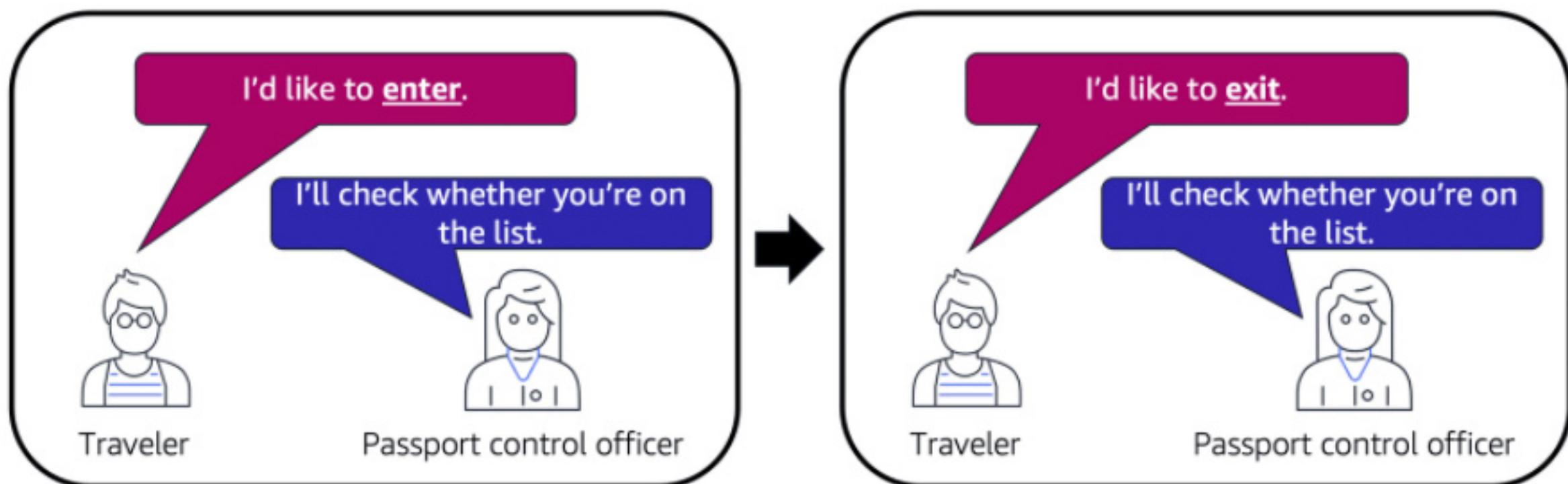
Additionally, all network ACLs have an explicit deny rule. This rule ensures that if a packet doesn't match any of the other rules on the list, the packet is denied.

Stateless packet filtering

Network ACLs perform **stateless** packet filtering. They remember nothing and check packets that cross the subnet border each way: inbound and outbound.

Recall the previous example of a traveler who wants to enter into a different country. This is similar to sending a request out from an Amazon EC2 instance and to the internet.

When a packet response for that request comes back to the subnet, the network ACL does not remember your previous request. The network ACL checks the packet response against its list of rules to determine whether to allow or deny.



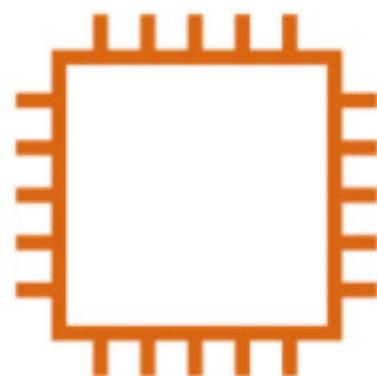
After a packet has entered a subnet, it must have its permissions evaluated for resources within the subnet, such as Amazon EC2 instances.

The VPC component that checks packet permissions for an Amazon EC2 instance is a security group.

Security groups

A security group is a virtual firewall that controls inbound and outbound traffic for an Amazon EC2 instance.

Security group



Amazon EC2 instance

By default, a security group denies all inbound traffic and allows all outbound traffic. You can add custom rules to configure which traffic to allow or deny.

For this example, suppose that you are in an apartment building with a door attendant who greets guests in the lobby. You can think of the guests as packets and the door attendant as a security group. As guests arrive, the door attendant checks a list to ensure they can enter the building. However, the door attendant does not check the list again when guests are exiting the building.

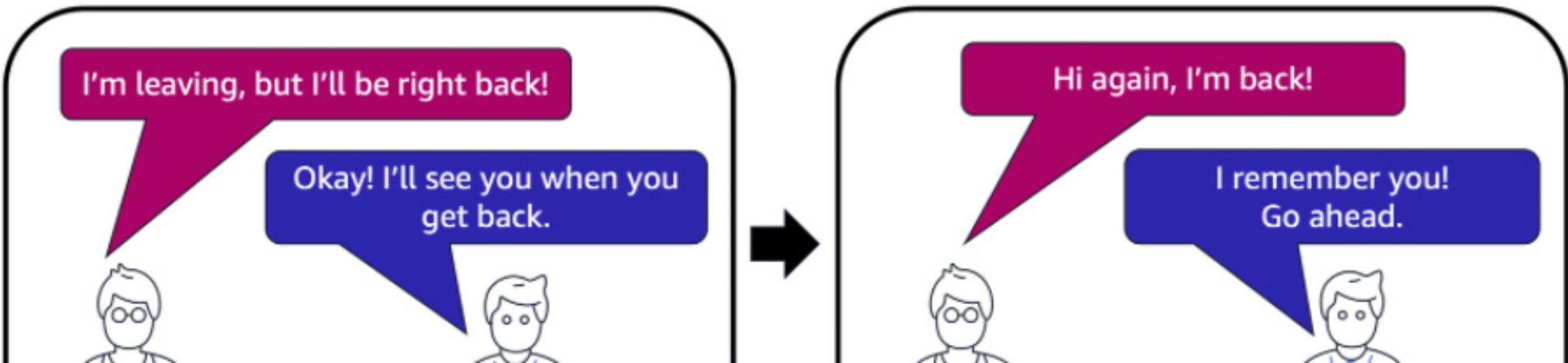
If you have multiple Amazon EC2 instances within a subnet, you can associate them with the same security group or use different security groups for each instance.

Stateful packet filtering

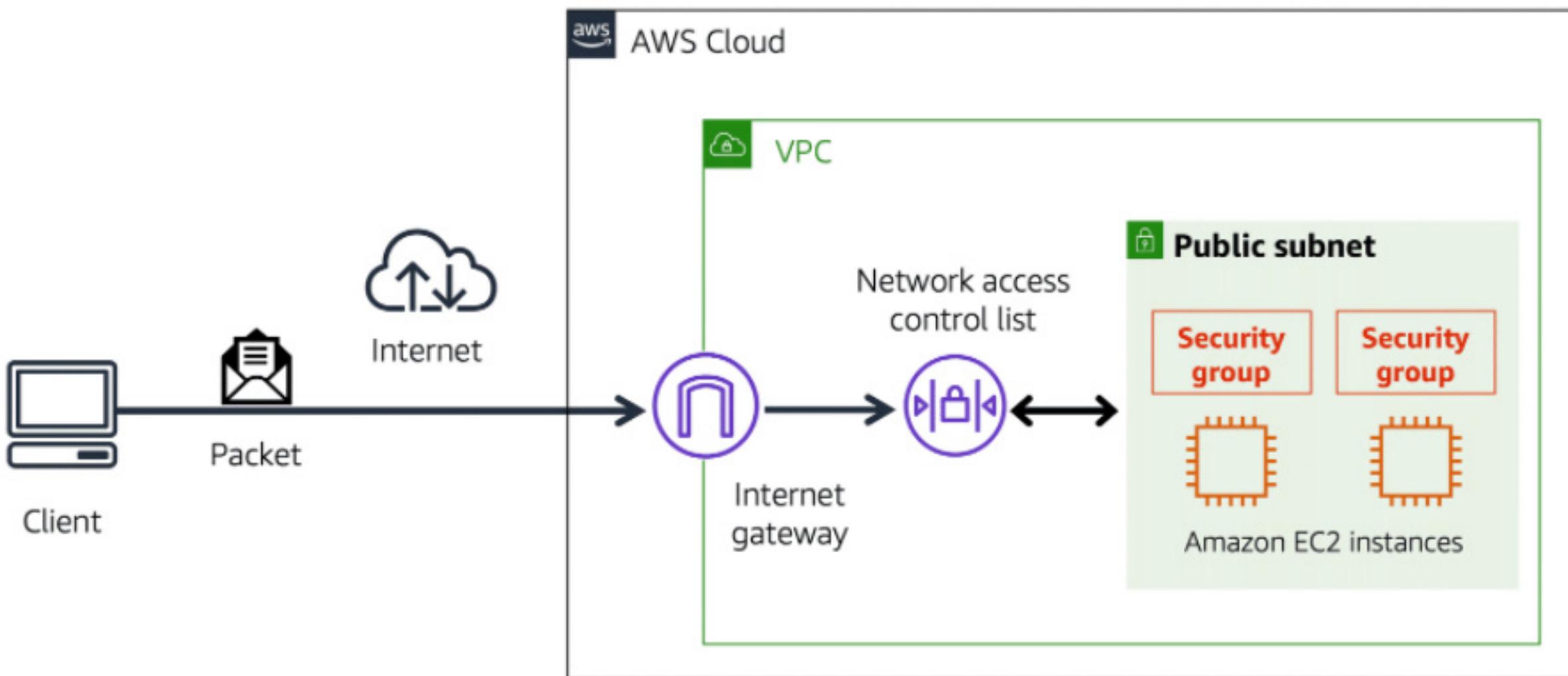
Security groups perform **stateful** packet filtering. They remember previous decisions made for incoming packets.

Consider the same example of sending a request out from an Amazon EC2 instance to the internet.

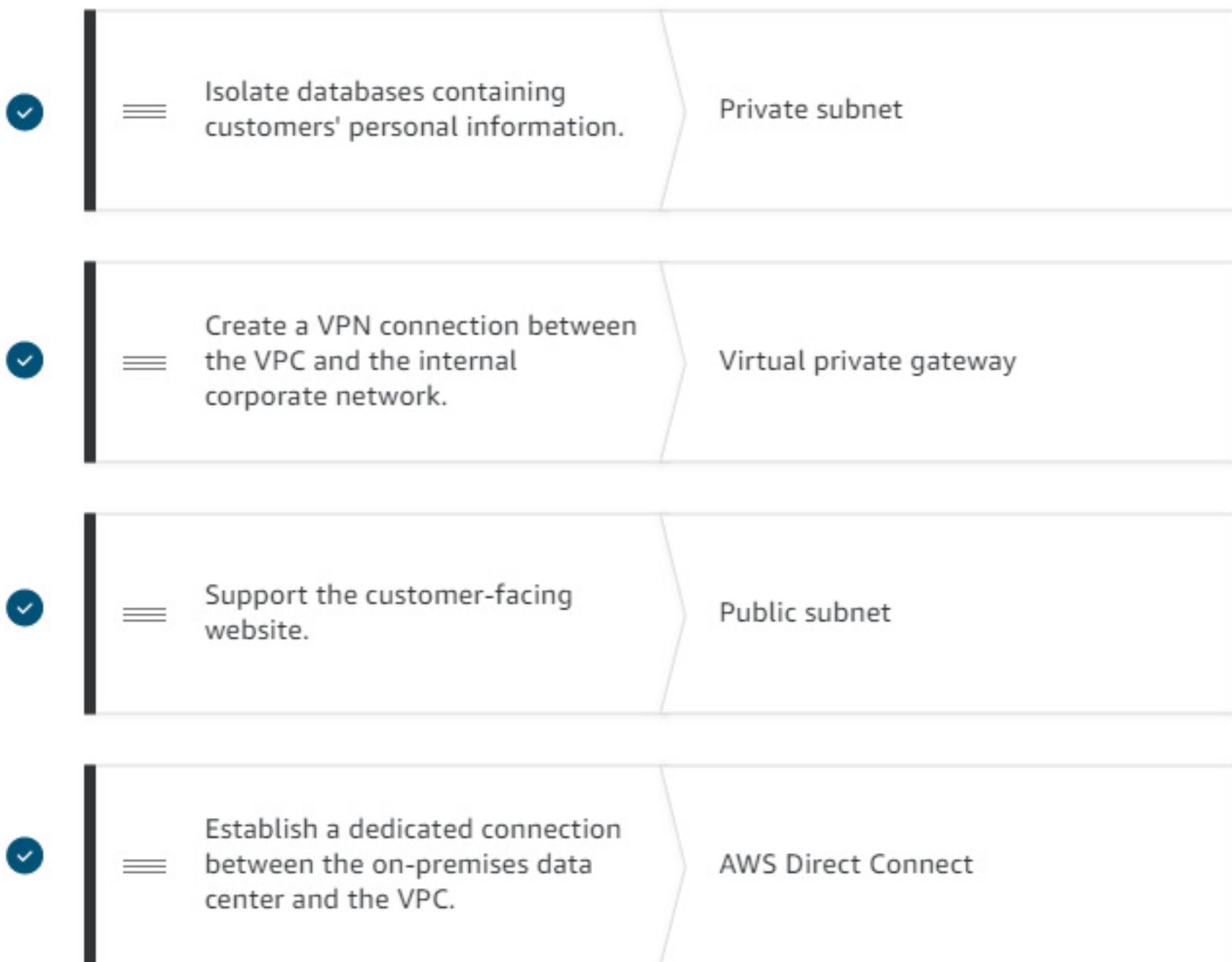
When a packet response for that request returns to the instance, the security group remembers your previous request. The security group allows the response to proceed, regardless of inbound security group rules.



Both network ACLs and security groups enable you to configure custom rules for the traffic in your VPC. As you continue to learn more about AWS security and networking, make sure to understand the differences between network ACLs and security groups.



In the following, match each part of the application to the correct VPC component.



Which statement best describes an AWS account's default network access control list?



It is stateless and denies all inbound and outbound traffic.



It is stateful and allows all inbound and outbound traffic.



It is stateless and allows all inbound and outbound traffic.



It is stateful and denies all inbound and outbound traffic.

The correct response option is **It is stateless and allows all inbound and outbound traffic.**

Network access control lists (ACLs) perform **stateless** packet filtering. They remember nothing and check packets that cross the subnet border each way: inbound and outbound.

Each AWS account includes a default network ACL. When configuring your VPC, you can use your account's default network ACL or create custom network ACLs.

By default, your account's default network ACL allows all inbound and outbound traffic, but you can modify it by adding your own rules. For custom network ACLs, all inbound and outbound traffic is denied until you add rules to specify which traffic should be allowed. Additionally, all network ACLs have an explicit deny rule. This rule ensures that if a packet doesn't match any of the other rules on the list, the packet is denied.

Learn more:

- [Network ACLs](#)



Amazon Route 53



Amazon Route 53 routing policies

- Latency-based routing
- Geolocation DNS
- Geoproximity routing
- Weighted round robin



Amazon CloudFront



Content delivery network (CDN):
A network that delivers edge content to users
based on their geographic location





-0:20

1.5x



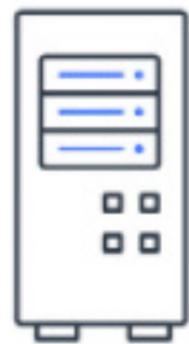
Domain Name System (DNS)

Suppose that AnyCompany has a website hosted in the AWS Cloud. Customers enter the web address into their browser, and they are able to access the website. This happens because of **Domain Name System (DNS)** resolution. DNS resolution involves a customer DNS resolver communicating with a company DNS server.

You can think of DNS as being the phone book of the internet. DNS resolution is the process of translating a domain name to an IP address.



Customer and PC



Customer DNS
resolver

What is the IP address
for AnyCompany's
website?



Company DNS
server

192.0.2.0

For example, suppose that you want to visit AnyCompany's website.

- 1 When you enter the domain name into your browser, this request is sent to a customer DNS resolver.
- 2 The customer DNS resolver asks the company DNS server for the IP address that corresponds to AnyCompany's website.
- 3 The company DNS server responds by providing the IP address for AnyCompany's website, 192.0.2.0.

Amazon Route 53

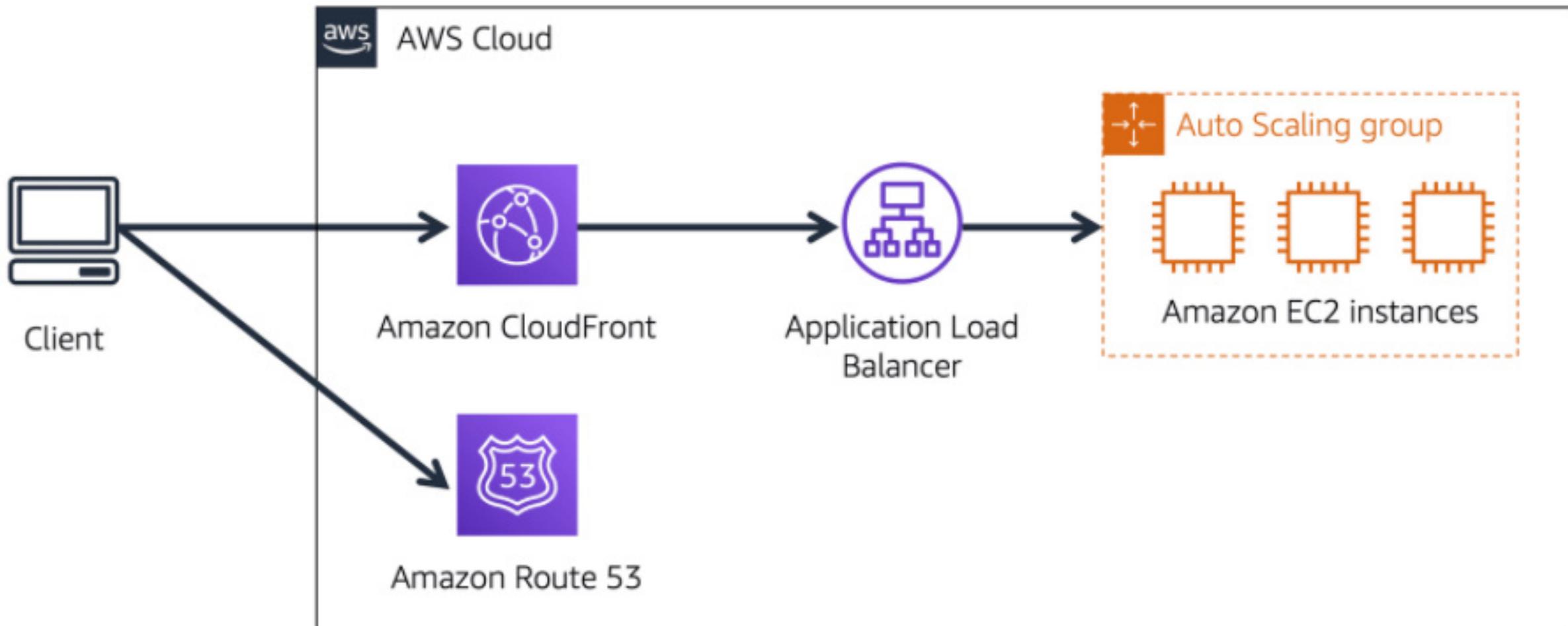
[**Amazon Route 53**](#) is a DNS web service. It gives developers and businesses a reliable way to route end users to internet applications hosted in AWS.

Amazon Route 53 connects user requests to infrastructure running in AWS (such as Amazon EC2 instances and load balancers). It can route users to infrastructure outside of AWS.

Another feature of Route 53 is the ability to manage the DNS records for domain names. You can register new domain names directly in Route 53. You can also transfer DNS records for existing domain names managed by other domain registrars. This enables you to manage all of your domain names within a single location.

In the previous module, you learned about Amazon CloudFront, a content delivery service. The following example describes how Route 53 and Amazon CloudFront work together to deliver content to customers.

Example: How Amazon Route 53 and Amazon CloudFront deliver content



Suppose that AnyCompany's application is running on several Amazon EC2 instances. These instances are in an Auto Scaling group that attaches to an Application Load Balancer.

- 1 A customer requests data from the application by going to AnyCompany's website.
- 2 Amazon Route 53 uses DNS resolution to identify AnyCompany.com's corresponding IP address, 192.0.2.0. This information is sent back to the customer.
- 3 The customer's request is sent to the nearest edge location through Amazon CloudFront.
- 4 Amazon CloudFront connects to the Application Load Balancer, which sends the incoming packet to an Amazon EC2 instance.

Which statement best describes DNS resolution?

- Launching resources in a virtual network that you define
- Storing local copies of content at edge locations around the world
- Connecting a VPC to the internet
- Translating a domain name to an IP address



Incorrect

The correct response option is **Translating a domain name to an IP address**.

For example, if you want to visit AnyCompany's website, you enter the domain name into your PC and this request is sent to a DNS server. Next, the DNS server asks the web server for the IP address that corresponds to AnyCompany's website. The web server responds by providing the IP address for AnyCompany's website, 192.0.2.0.

Learn more:

- [Amazon Route 53](#)



Module summary

Amazon Virtual Private Cloud

Gateways,
Network ACLs, and
security groups



Module summary

Amazon Virtual Private Cloud

Gateways,
Network ACLs, and
security groups

VPN and Direct
Connect



Module summary

Amazon Virtual Private Cloud

Gateways,
Network ACLs, and
security groups

VPN and Direct
Connect



Module summary

- Edge locations
- Route 53 for DNS
- Amazon CloudFront

Your company has an application that uses Amazon EC2 instances to run the customer-facing website and Amazon RDS database instances to store customers' personal information. How should the developer configure the VPC according to best practices?



Place the Amazon EC2 instances in a private subnet and the Amazon RDS database instances in a public subnet.



Place the Amazon EC2 instances in a public subnet and the Amazon RDS database instances in a private subnet.



Place the Amazon EC2 instances and the Amazon RDS database instances in a public subnet.



Place the Amazon EC2 instances and the Amazon RDS database instances in a private subnet.

The correct response option is **Place the Amazon EC2 instances in a public subnet and the Amazon RDS databases instances in a private subnet.**

A **subnet** is a section of a VPC in which you can group resources based on security or operational needs. Subnets can be public or private.

Public subnets contain resources that need to be accessible by the public, such as an online store's website.

Private subnets contain resources that should be accessible only through your private network, such as a database that contains customers' personal information and order histories.

Learn more:

- [Amazon VPC](#)
- [VPCs and subnets](#)

Which component or service can be used to establish a private dedicated connection between your company's data center and AWS?



Private subnet



DNS



AWS Direct Connect



Amazon CloudFront

The correct response option is AWS Direct Connect.

The other response options are incorrect because:

- A private subnet is a section of a VPC in which you can group resources that should be accessed only through your private network. Although it is private, it is not used for establishing a connection between a data center and AWS.
- DNS stands for Domain Name System, which is a directory used for matching domain names to IP addresses.
- Amazon CloudFront is a content delivery service. You can use CloudFront to store cached copies of your content at edge locations that are close to your customers.

Learn more:

- [AWS Direct Connect](#)

Which statement best describes security groups?



They are stateful and deny all inbound traffic by default.



They are stateful and allow all inbound traffic by default.



They are stateless and deny all inbound traffic by default.



They are stateless and allow all inbound traffic by default.

The correct response option is **Security groups are stateful and deny all inbound traffic by default.**

Security groups are stateful. This means that they use previous traffic patterns and flows when evaluating new requests for an instance.

By default, security groups deny all inbound traffic, but you can add custom rules to fit your operational and security needs.

Learn more:

- [Security groups for your VPC](#)

Which component is used to connect a VPC to the internet?

- Public subnet
- Edge location
- Security group
- Internet gateway

The correct response option is **Internet gateway**.

The other response options are incorrect because:

- A public subnet is a section of a VPC that contains public-facing resources.
- An edge location is a site that Amazon CloudFront uses to store cached copies of your content for faster delivery to customers.
- A security group is a virtual firewall that controls inbound and outbound traffic for an Amazon EC2 instance.

Learn more:

- [Internet gateways](#)

Which service is used to manage the DNS records for domain names?

Amazon Virtual Private Cloud

AWS Direct Connect

Amazon CloudFront

Amazon Route 53

The correct response option is **Amazon Route 53**.

Amazon Route 53 is a DNS web service. It gives developers and businesses a reliable way to route end users to internet applications that host in AWS.

Another feature of Route 53 is the ability to manage the DNS records for domain names. You can transfer DNS records for existing domain names managed by other domain registrars. You can also register new domain names directly in Route 53.

The other response options are incorrect because:

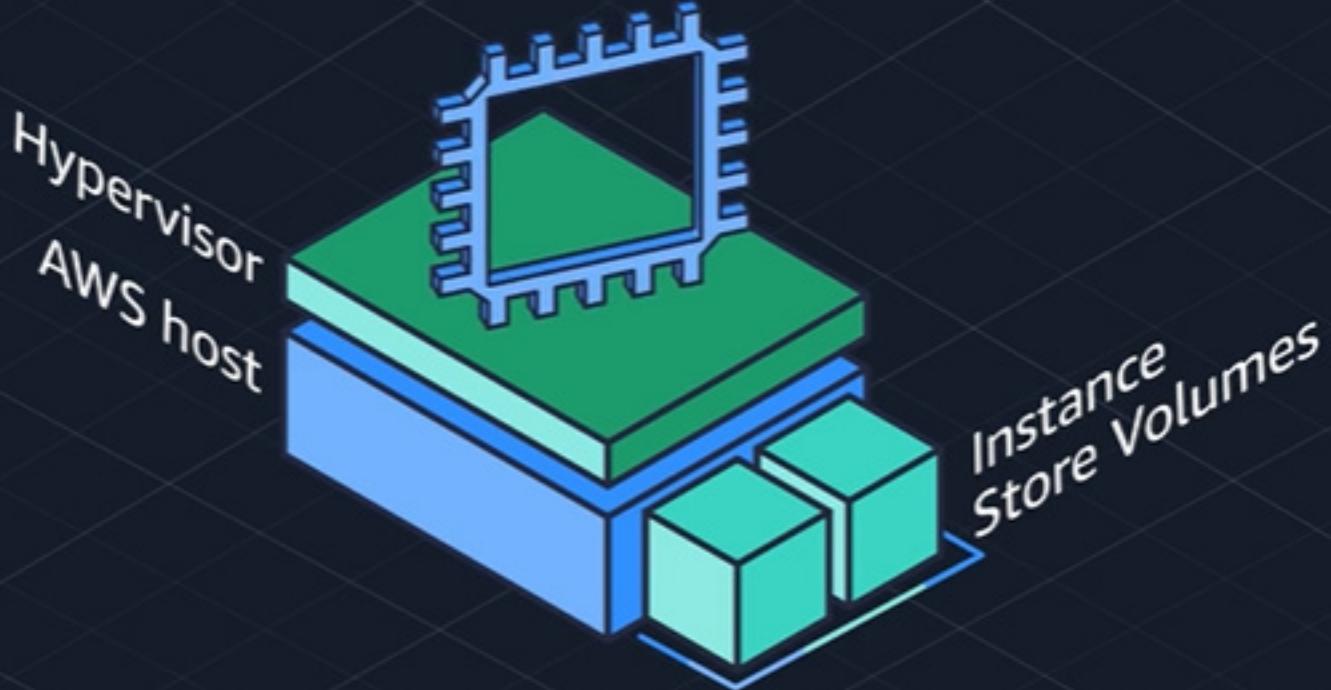
- Amazon Virtual Private Cloud (Amazon VPC) is a service that enables you to provision an isolated section of the AWS Cloud. In this isolated section, you can launch resources in a virtual network that you define.
- AWS Direct Connect is a service that enables you to establish a dedicated private connection between your data center and VPC.
- Amazon CloudFront is a content delivery service. It uses a network of edge locations to cache content and deliver content to customers all over the world.

Learn more:

- [Amazon Route 53](#)



Instance
Store Volumes

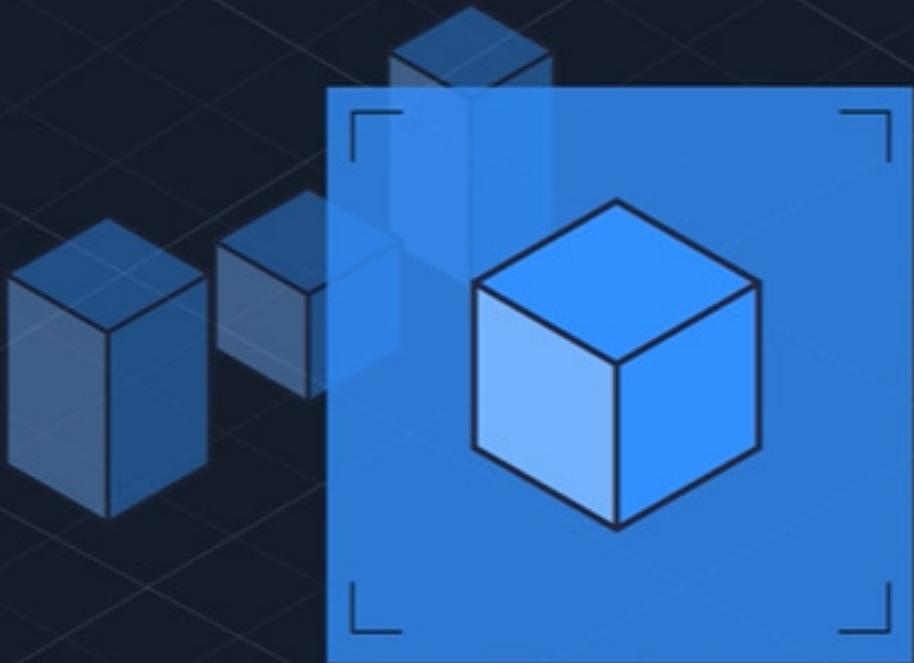




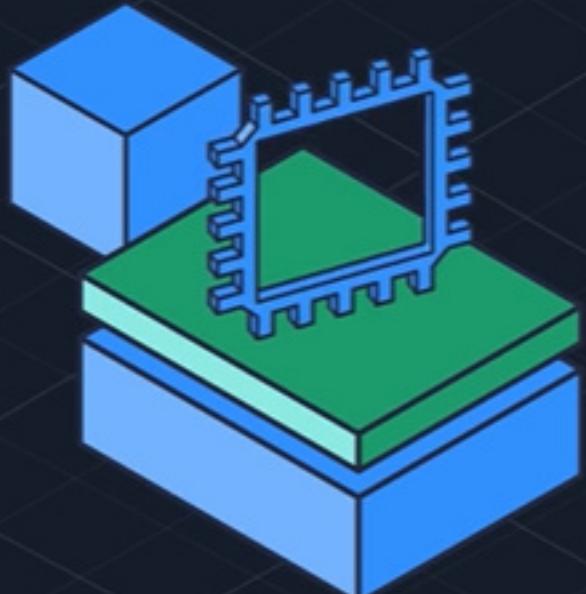
Amazon Elastic Block Store
(Amazon EBS)

EBS volumes

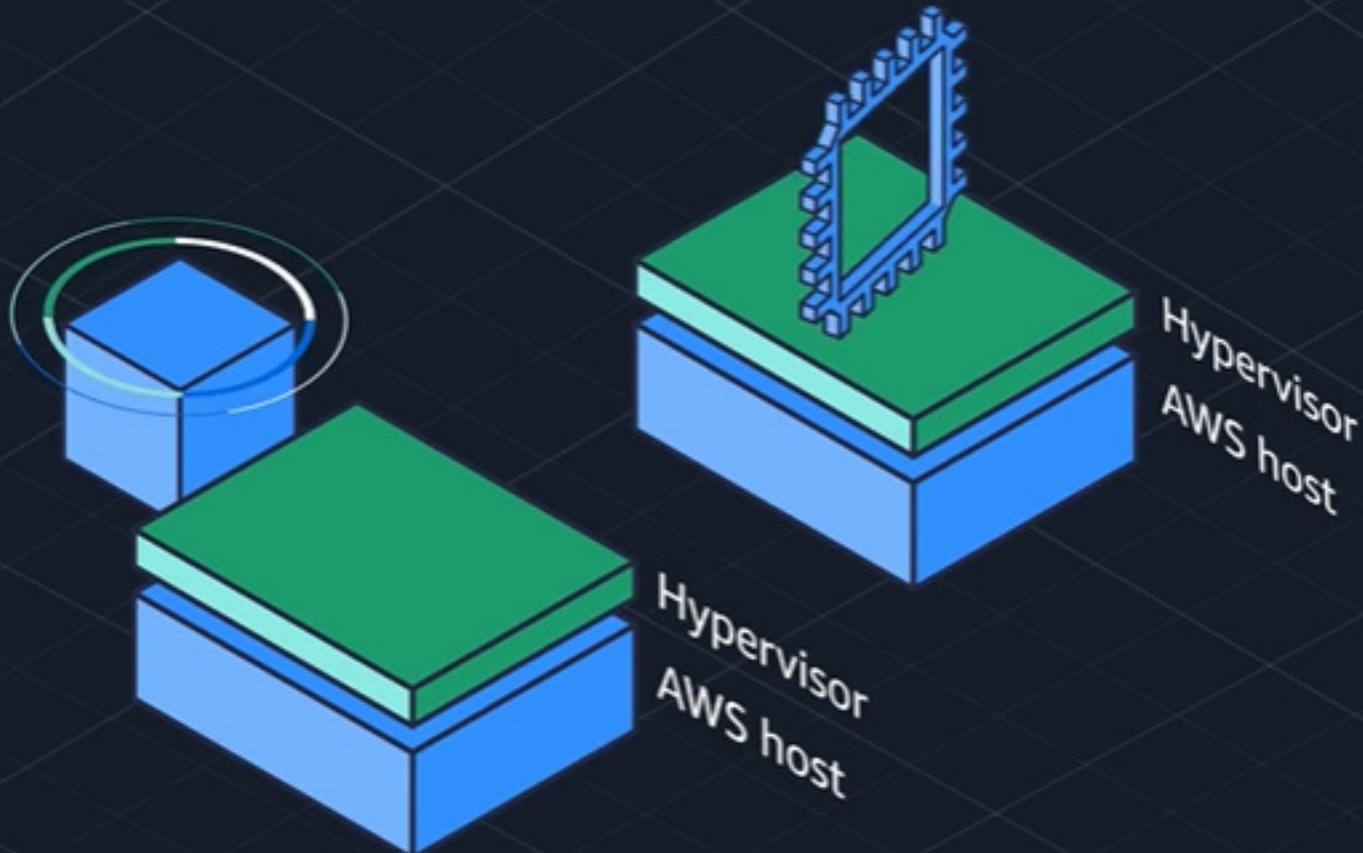




- Size
- Type
- Configurations



Hypervisor
AWS host



Instance stores

Block-level storage volumes behave like physical hard drives.

An [instance store](#) provides temporary block-level storage for an Amazon EC2 instance. An instance store is disk storage that is physically attached to the host computer for an EC2 instance, and therefore has the same lifespan as the instance. When the instance is terminated, you lose any data in the instance store.

Instance stores

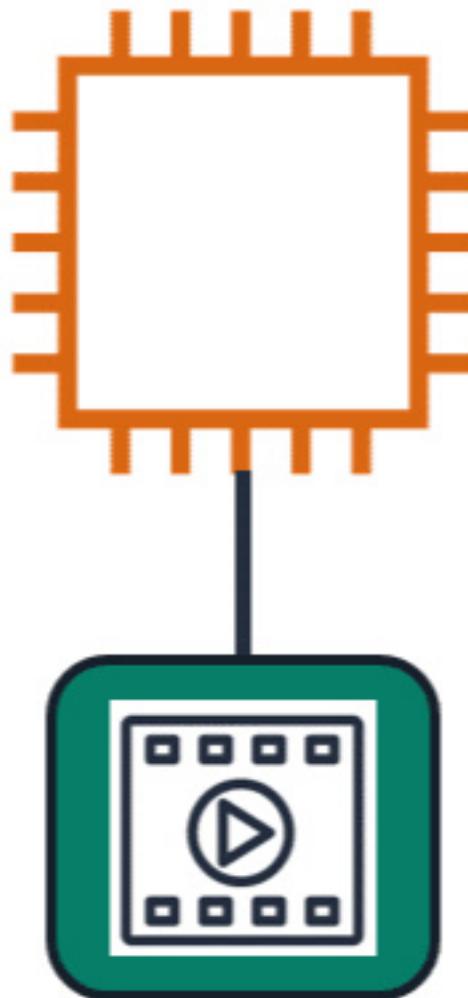
To review an example of how instance stores work, select **Start**.

START >

An Amazon EC2 instance with an attached instance store is running.

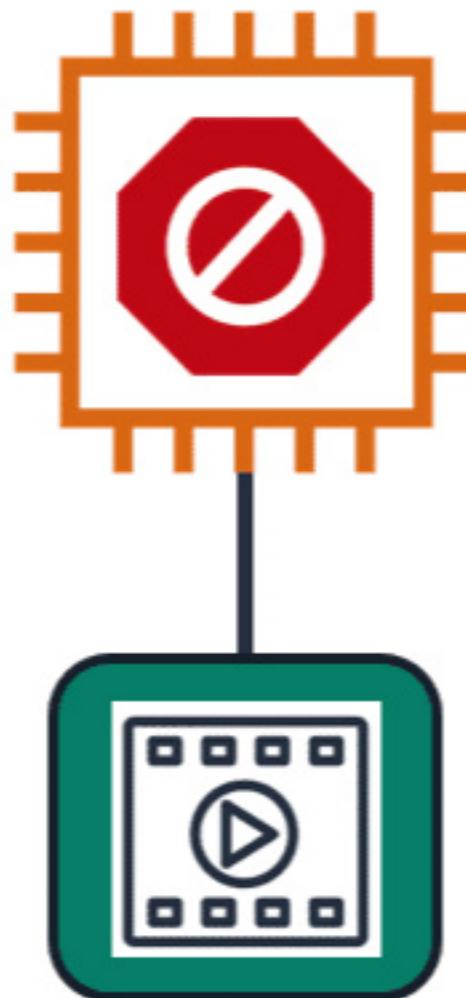
Amazon EC2
instance

Instance store
with data



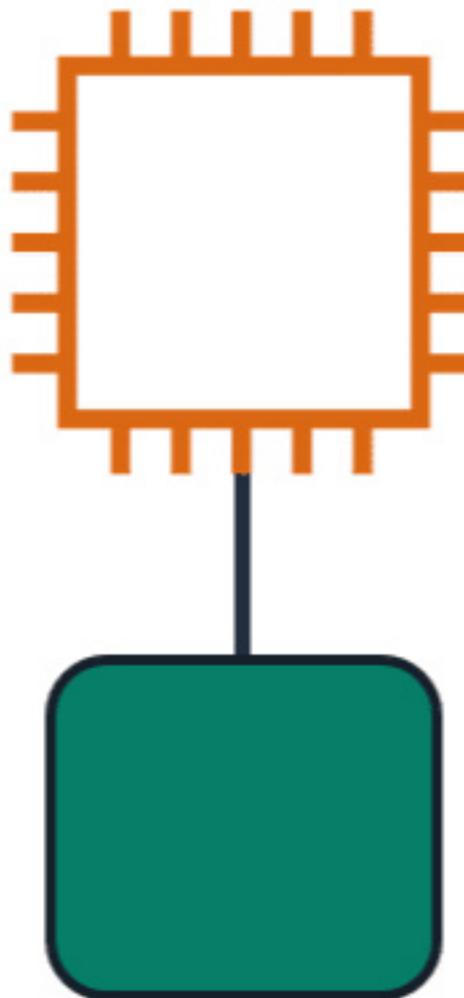
The instance is stopped or terminated.

Amazon EC2
instance



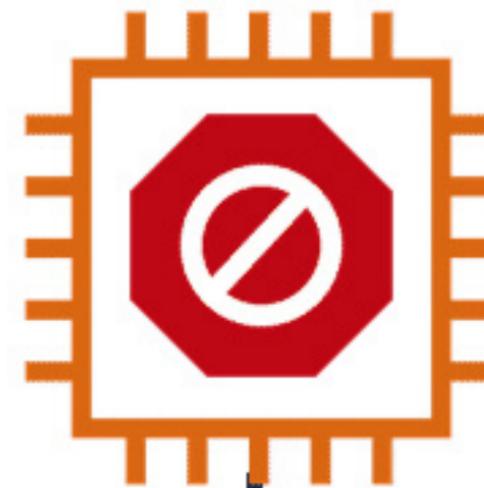
All data on the attached instance store is deleted.

Amazon EC2
instance



Instance store
without data

Amazon EC2
instance



EBS volume
with data

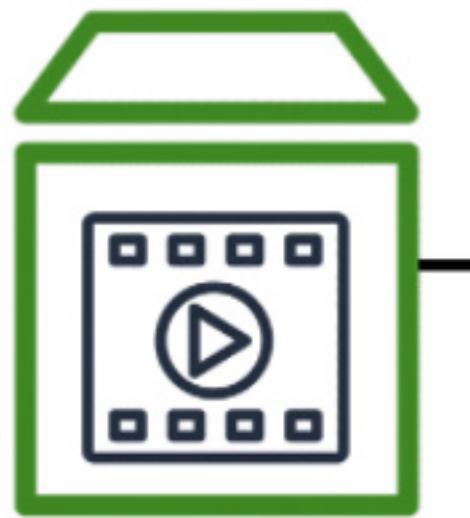


[**Amazon Elastic Block Store \(Amazon EBS\)**](#) is a service that provides block-level storage volumes that you can use with Amazon EC2 instances. If you stop or terminate an Amazon EC2 instance, all the data on the attached EBS volume remains available.

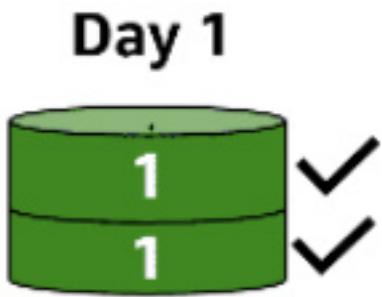
To create an EBS volume, you define the configuration (such as volume size and type) and provision it. After you create an EBS volume, it can attach to an Amazon EC2 instance.

Because EBS volumes are for data that needs to persist, it's important to back up the data. You can take incremental backups of EBS volumes by creating Amazon EBS snapshots.

Amazon EBS snapshots



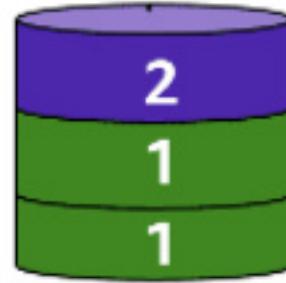
EBS volume
(Source data)



All data is backed up.

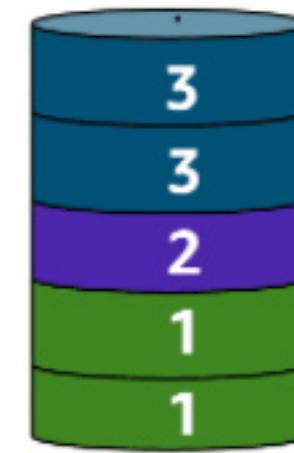
EBS snapshots

Day 2



Only data that has changed since the most recent snapshot is backed up.

Day 3



An [EBS snapshot](#) is an incremental backup. This means that the first backup taken of a volume copies all the data. For subsequent backups, only the blocks of data that have changed since the most recent snapshot are saved.

Incremental backups are different from full backups, in which all the data in a storage volume copies each time a backup occurs. The full backup includes data that has not changed since the most recent backup.



Amazon S3:

Store and retrieve an unlimited amount of data

Amazon S3

- Store data as objects.
- Store objects in buckets.
- Upload a maximum object size of 5 TB.
- Version objects.



Amazon S3

- Store data as objects.
- Store objects in buckets.
- Upload a maximum object size of 5 TB.
- Version objects.
- Create multiple buckets.





Amazon S3 Standard-Infrequent Access
(S3 Standard-IA)



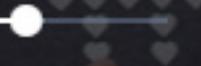
Amazon S3 Glacier



Write once/read many (WORM)



Amazon S3 Lifecycle management:
Move data automatically between tiers

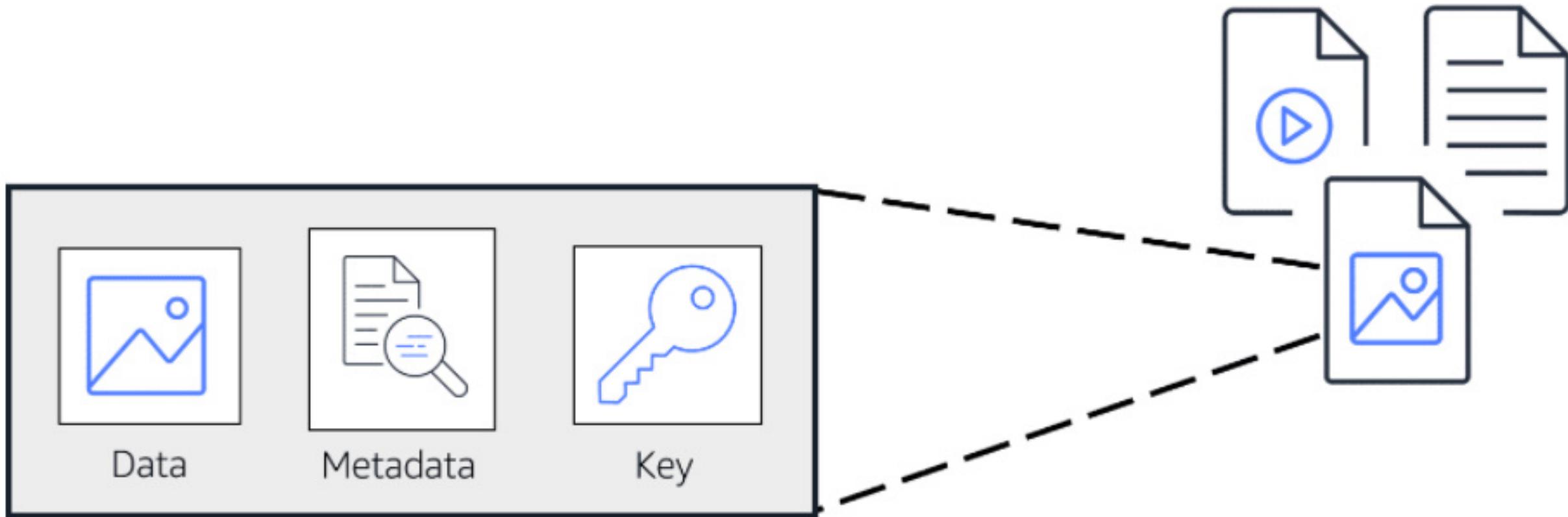


-0:46

1.5x



Object storage



In **object storage**, each object consists of data, metadata, and a key.

The data might be an image, video, text document, or any other type of file. Metadata contains information about what the data is, how it is used, the object size, and so on. An object's key is its unique identifier.



Recall that when you modify a file in block storage, only the pieces that are changed are updated. When a file in object storage is modified, the entire object is updated.

Amazon Simple Storage Service (Amazon S3)

[Amazon Simple Storage Service \(Amazon S3\)](#) is a service that provides object-level storage.

Amazon S3 stores data as objects in buckets.

You can upload any type of file to Amazon S3, such as images, videos, text files, and so on. For example, you might use Amazon S3 to store backup files, media files for a website, or archived documents. Amazon S3 offers unlimited storage space. The maximum file size for an object in Amazon S3 is 5 TB.

When you upload a file to Amazon S3, you can set permissions to control visibility and access to it. You can also use the Amazon S3 versioning feature to track changes to your objects over time.

Amazon S3 storage classes

With Amazon S3, you pay only for what you use. You can choose from [a range of storage classes](#) to select a fit for your business and cost needs. When selecting an Amazon S3 storage class, consider these two factors:

- How often you plan to retrieve your data
- How available you need your data to be

To learn more about the Amazon S3 storage classes, select the + symbol next to each category.

Amazon S3 storage classes

With Amazon S3, you pay only for what you use. You can choose from [a range of storage classes](#) to select a fit for your business and cost needs. When selecting an Amazon S3 storage class, consider these two factors:

- How often you plan to retrieve your data
- How available you need your data to be

To learn more about the Amazon S3 storage classes, select the + symbol next to each category.

S3 Standard

- Designed for frequently accessed data
- Stores data in a minimum of three Availability Zones

S3 Standard provides high availability for objects. This makes it a good choice for a wide range of use cases, such as websites, content distribution, and data analytics. S3 Standard has a higher cost than other storage classes intended for infrequently accessed data and archival storage.

S3 Standard-Infrequent Access (S3 Standard-IA)

- Ideal for infrequently accessed data
- Similar to S3 Standard but has a lower storage price and higher retrieval price

S3 Standard-IA is ideal for data infrequently accessed but requires high availability when needed. Both S3 Standard and S3 Standard-IA store data in a minimum of three Availability Zones. S3 Standard-IA provides the same level of availability as S3 Standard but with a lower storage price and a higher retrieval price.

S3 One Zone-Infrequent Access (S3 One Zone-IA)

- Stores data in a single Availability Zone
- Has a lower storage price than S3 Standard-IA

Compared to S3 Standard and S3 Standard-IA, which store data in a minimum of three Availability Zones, S3 One Zone-IA stores data in a single Availability Zone. This makes it a good storage class to consider if the following conditions apply:

- You want to save costs on storage.
- You can easily reproduce your data in the event of an Availability Zone failure.

S3 Intelligent-Tiering

- Ideal for data with unknown or changing access patterns
- Requires a small monthly monitoring and automation fee per object

In the S3 Intelligent-Tiering storage class, Amazon S3 monitors objects' access patterns. If you haven't accessed an object for 30 consecutive days, Amazon S3 automatically moves it to the infrequent access tier, S3 Standard-IA. If you access an object in the infrequent access tier, Amazon S3 automatically moves it to the frequent access tier, S3 Standard.

S3 Glacier

- Low-cost storage designed for data archiving
- Able to retrieve objects within a few minutes to hours

S3 Glacier is a low-cost storage class that is ideal for data archiving. For example, you might use this storage class to store archived customer records or older photos and video files.

S3 Glacier Deep Archive

- Lowest-cost object storage class ideal for archiving
- Able to retrieve objects within 12 hours

When deciding between Amazon S3 Glacier and Amazon S3 Glacier Deep Archive, consider how quickly you need to retrieve archived objects. You can retrieve objects stored in the S3 Glacier storage class within a few minutes to a few hours. By comparison, you can retrieve objects stored in the S3 Glacier Deep Archive storage class within 12 hours.

You want to store data that is infrequently accessed but must be immediately available when needed. Which Amazon S3 storage class should you use?

S3 Intelligent-Tiering

S3 Glacier Deep Archive

S3 Standard-IA

S3 Glacier

The correct response option is **S3 Standard-IA**.

The S3 Standard-IA storage class is ideal for data that is infrequently accessed but requires high availability when needed. Both S3 Standard and S3 Standard-IA store data in a minimum of three Availability Zones. S3 Standard-IA provides the same level of availability as S3 Standard but at a lower storage price.

The other response options are incorrect because:

- In the S3 Intelligent-Tiering storage class, Amazon S3 monitors objects' access patterns. If you haven't accessed an object for 30 consecutive days, Amazon S3 automatically moves it to the infrequent access tier, S3 Standard-IA. If you access an object in the infrequent access tier, Amazon S3 automatically moves it to the frequent access tier, S3 Standard.
- S3 Glacier and S3 Glacier Deep Archive are low-cost storage classes that are ideal for data archiving. They would not be the best choice for this scenario, which requires high availability. You can retrieve objects stored in the S3 Glacier storage class within a few minutes to a few hours. By comparison, you can retrieve objects stored in the S3 Glacier Deep Archive storage class within 12 hours.

EBS



Amazon Elastic Block Store

Sizes up to 16 TiB



Survive termination
of their EC2 instance



Solid state by default



HDD options



Amazon Simple Storage Service

Unlimited storage



Individual objects
up to 5 TBs



Write once/read many



99.999



S3



Amazon Simple Storage Service

Unlimited storage



Individual objects
up to 5 TBs



Write once/read many



99.999



S3



Amazon Simple Storage Service

Unlimited storage



Individual objects
up to 5 TBs



Write once/read many



99.999



S3



Amazon Simple Storage Service

Unlimited storage



Individual objects
up to 5 TBs



Write once/read many



99.99999



S3



Amazon Simple Storage Service

Unlimited storage



Individual objects
up to 5 TBs



Write once/read many



99.99999999%
durability



S3



Amazon Simple Storage Service

Unlimited storage



Individual objects
up to 5 TBs



Write once/read many



99.99999999%
durability



S3



Amazon Simple Storage Service

Unlimited storage



Individual objects
up to 5 TBs



Write once/read many



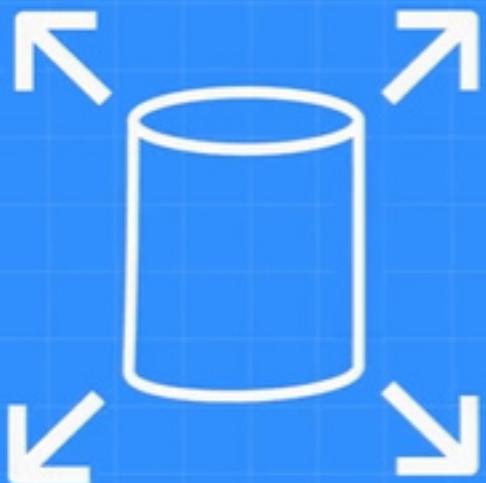
99.99999999%
durability



S3



Amazon Elastic Block Store ★★★★



EBS

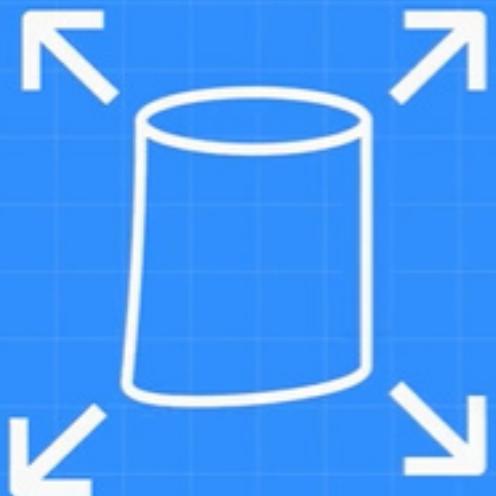
VS

Amazon Simple Storage Service ★★★★



S3

Amazon Elastic Block Store ★★★★



EBS

VS

Amazon Simple Storage Service ★★★★



S3



Amazon S3

- Web enabled
- Regionally distributed
- Offers cost savings
- Serverless

Round one. Let's say you're running a photo analysis website where users upload a photo of themselves, and your application finds the animals that look just like them. You have potentially millions of animal pictures that all need to be indexed and possibly viewed by thousands of people at once. This is the perfect use case for S3. S3 is already web enabled. Every object already has a URL that you can control access rights to who can see or manage the image. It's regionally distributed, which means that it has 11 nines of durability, so no need to worry about backup strategies. S3 is your backup strategy. Plus the cost savings is substantial overrunning the same storage load on EBS. With the additional advantage of being serverless, no Amazon EC2 instances are needed. Sounds like S3 is the judge's winner here for this round.

But wait, round two, you have an 80-gigabyte video file that you're making edit corrections on. To know the best storage class here, we need to understand the difference between object storage and block storage. Object storage treats any file as a complete, discreet object. Now this is great for documents, and images, and video files that get uploaded and consumed as entire objects, but every time there's a change to the object, you must re-upload the entire file. There are no delta updates. Block storage breaks those files down to small component parts or blocks. This means, for that 80-gigabyte file, when you make an edit to one scene in the film and save that change, the engine only updates the blocks where those bits live. If you're making a bunch of micro edits, using EBS, elastic block storage, is the perfect use case. If you were using S3, every time you saved the changes, the system would have to upload all 80 gigabytes, the whole thing, every time. EBS clearly wins round two.

This means, if you are using complete objects or only occasional changes, S3 is victorious. If you are doing complex read, write, change functions, then, absolutely, EBS is your knockout winner. Your winner depends on your individual workload. Each service is the right service for specific needs. Once you understand what you need, you will know which service is your champion!



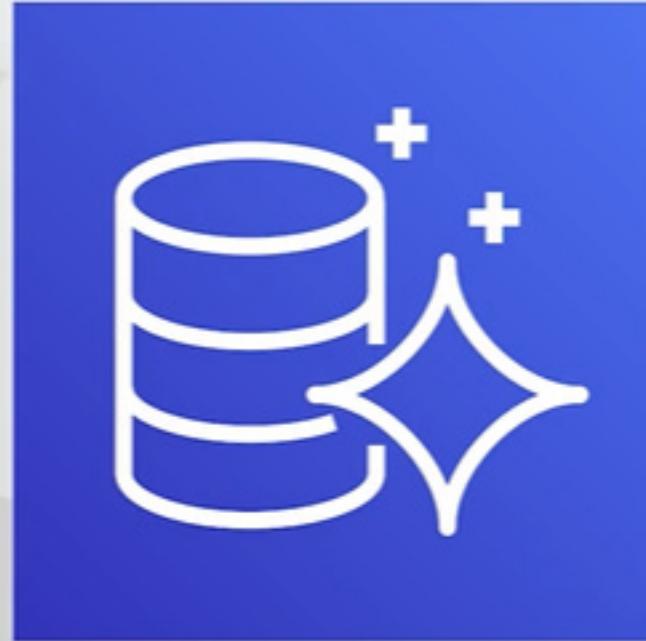
Amazon RDS

- Automated patching
- Backups
- Redundancy
- Failover
- Disaster recovery

-1:12

1.5x





Amazon Aurora



Amazon Aurora

Amazon Aurora

MySQL

PostgreSQL





Amazon Aurora

MySQL

PostgreSQL

1/10th the cost of
commercial databases

A portrait of a man with dark hair, a beard, and glasses, wearing a grey t-shirt with a white cloud and heart graphic. He is holding a small white cloud-shaped object in his hands. The background shows a modern interior with a plant and a wooden chair.

Amazon Aurora

MySQL

PostgreSQL

1/10th the cost of
commercial databases

Data replication

A medium shot of a man with dark hair, a beard, and glasses, wearing a grey t-shirt with a white cloud and heart graphic. He is gesturing with his hands while speaking.

Amazon Aurora

MySQL

PostgreSQL

1/10th the cost of
commercial databases

Data replication

Up to 15 read replicas

A medium shot of a man with dark hair, glasses, and a beard, wearing a grey t-shirt with a white cloud icon containing hearts. He is gesturing with his hands while speaking. In the background, there's a wooden pillar with the letters "AWS" and a small shelf with books and a potted plant.

Amazon Aurora

Continuous backup to
Amazon S3

Relational databases

In a **relational database**, data is stored in a way that relates it to other pieces of data.

An example of a relational database might be the coffee shop's inventory management system.

Each record in the database would include data for a single item, such as product name, size, price, and so on.

Relational databases use **structured query language (SQL)** to store and query data. This approach allows data to be stored in an easily understandable, consistent, and scalable way. For example, the coffee shop owners can write a SQL query to identify all the customers whose most frequently purchased drink is a medium latte.

Example of data in a relational database:

Example of data in a relational database:

| ID | Product name | Size | Price |
|----|----------------------------|--------|--------|
| 1 | Medium roast ground coffee | 12 oz. | \$5.30 |
| 2 | Dark roast ground coffee | 20 oz. | \$9.27 |

Amazon Relational Database Service

[**Amazon Relational Database Service \(Amazon RDS\)**](#) is a service that enables you to run relational databases in the AWS Cloud.

Amazon RDS is a managed service that automates tasks such as hardware provisioning, database setup, patching, and backups. With these capabilities, you can spend less time completing administrative tasks and more time using data to innovate your applications. You can integrate Amazon RDS with other services to fulfill your business and operational needs, such as using AWS Lambda to query your database from a serverless application.

Amazon RDS provides a number of different security options. Many Amazon RDS database engines offer encryption at rest (protecting data while it is stored) and encryption in transit (protecting data while it is being sent and received).

on encryption at rest (protecting data while it is stored) and encryption in transit (protecting data while it is being sent and received).

Amazon RDS database engines

Amazon RDS is available on six database engines, which optimize for memory, performance, or input/output (I/O). Supported database engines include:

- Amazon Aurora
- PostgreSQL
- MySQL
- MariaDB
- Oracle Database
- Microsoft SQL Server

Amazon Aurora

[**Amazon Aurora**](#) is an enterprise-class relational database. It is compatible with MySQL and PostgreSQL relational databases. It is up to five times faster than standard MySQL databases and up to three times faster than standard PostgreSQL databases.

Amazon Aurora helps to reduce your database costs by reducing unnecessary input/output (I/O) operations, while ensuring that your database resources remain reliable and available.

Consider Amazon Aurora if your workloads require high availability. It replicates six copies of your data across three Availability Zones and continuously backs up your data to Amazon S3.

ITEM

coffee



ATTRIBUTES

arabica coffee beans

latte

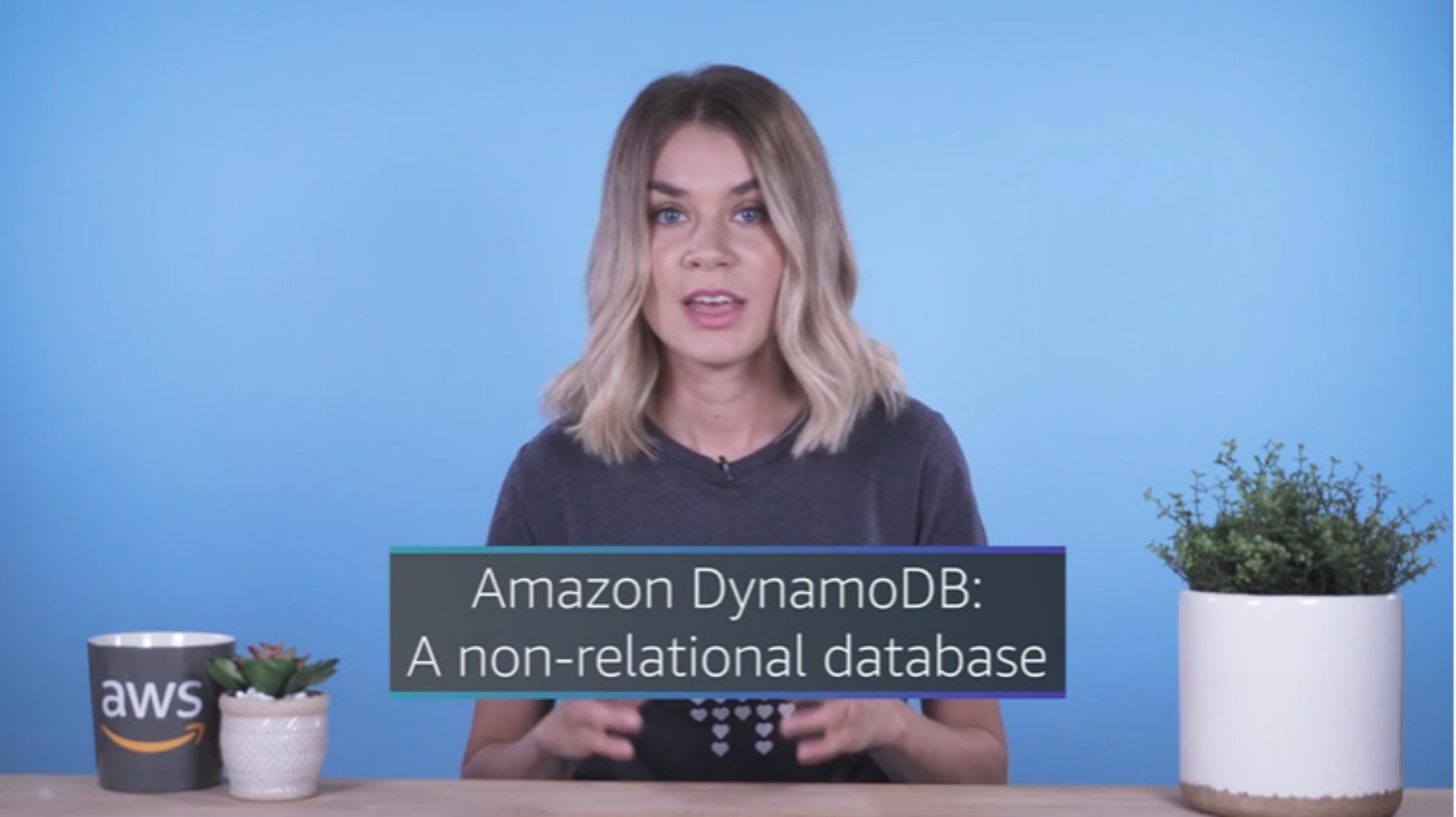
20% milk



-3:26

1x





Amazon DynamoDB: A non-relational database

Amazon DynamoDB

Non-relational,
NoSQL database

Purpose built

Millisecond response
time



Amazon DynamoDB

Non-relational,
NoSQL database

Purpose built

Millisecond response
time

Fully managed



Amazon DynamoDB

Non-relational,
NoSQL database

Purpose built

Millisecond response
time

Fully managed

Highly scalable



Nonrelational databases

In a **nonrelational database**, you create tables. A table is a place where you can store and query data.

Nonrelational databases are sometimes referred to as "NoSQL databases" because they use structures other than rows and columns to organize data. One type of structural approach for nonrelational databases is key-value pairs. With key-value pairs, data is organized into items (keys), and items have attributes (values). You can think of attributes as being different features of your data.

Nonrelational databases are sometimes referred to as "NoSQL databases" because they use structures other than rows and columns to organize data. One type of structural approach for nonrelational databases is key-value pairs. With key-value pairs, data is organized into items (keys), and items have attributes (values). You can think of attributes as being different features of your data.

In a key-value database, you can add or remove attributes from items in the table at any time. Additionally, not every item in the table has to have the same attributes.

Example of data in a nonrelational database:

Example of data in a nonrelational database:

| Key | Value |
|-----|-------------------------------------|
| 1 | Name: John Doe |
| | Address: 123 Any Street |
| | Favorite drink: Medium latte |
| 2 | Name: Mary Major |
| | Address: 100 Main Street |
| | Birthday: July 5, 1994 |

Amazon DynamoDB

[Amazon DynamoDB](#) is a key-value database service. It delivers single-digit millisecond performance at any scale.

To learn about features of DynamoDB, select each **flashcard** to flip it.

Amazon DynamoDB

[Amazon DynamoDB](#) is a key-value database service. It delivers single-digit millisecond performance at any scale.

To learn about features of DynamoDB, select each flashcard to flip it.

Serverless

Automatic scaling

Amazon DynamoDB

[Amazon DynamoDB](#) is a key-value database service. It delivers single-digit millisecond performance at any scale.

To learn about features of DynamoDB, select each flashcard to flip it.

DynamoDB is serverless, which means that you do not have to provision, patch, or manage servers.

You also do not have to install, maintain, or operate software.

As the size of your database shrinks or grows, DynamoDB automatically scales to adjust for changes in capacity while maintaining consistent performance.

This makes it a suitable choice for use cases that require high performance while scaling.

Amazon RDS



Automatic high availability;
recovery provided



Customer ownership of data



Customer ownership of
schema



Customer control of network



Amazon DynamoDB

Key-value



Massive throughput capabilities



PB size potential



Granular API access



Amazon RDS ★★★★



VS

*Amazon
DynamoDB* ★★★★



What are the scenarios in which you should use Amazon Relational Database Service (Amazon RDS)? (Select TWO.)



Running a serverless database



Using SQL to organize data



Storing data in a key-value database



Scaling up to 10 trillion requests per day



Storing data in an Amazon Aurora database

The two correct response options are:

- Using SQL to organize data
- Storing data in an Amazon Aurora database

The other three response options are scenarios in which you should use Amazon DynamoDB.

Amazon Redshift

[**Amazon Redshift**](#) is a data warehousing service that you can use for big data analytics. It offers the ability to collect data from many sources and helps you to understand relationships and trends across your data.



Amazon Database Migration Service
(Amazon DMS)

AWS DMS

The source database remains fully operational during the migration.

AWS DMS

- The source database remains fully operational during the migration.
- Downtime is minimized for applications that rely on that database.

T
t

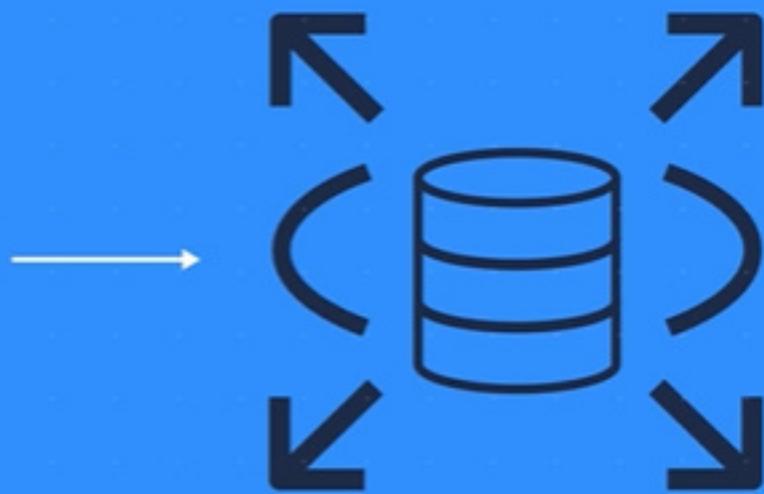
AWS DMS

- The source database remains fully operational during the migration.
- Downtime is minimized for applications that rely on that database.
- The source and target databases don't have to be of the same type.

Homogenous databases



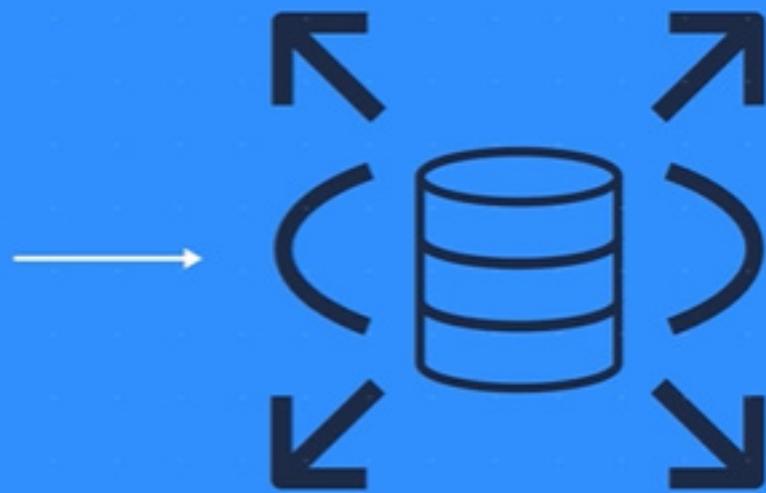
MySQL



Amazon RDS
for MySQL



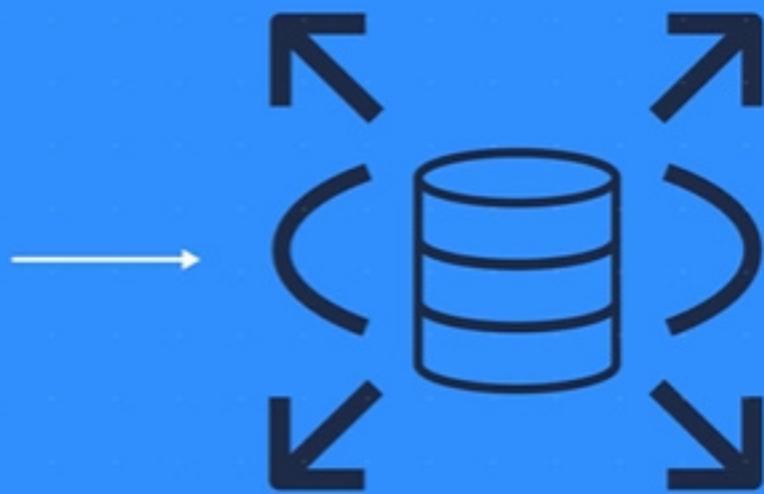
Microsoft
SQL Server



Amazon RDS
for MySQL



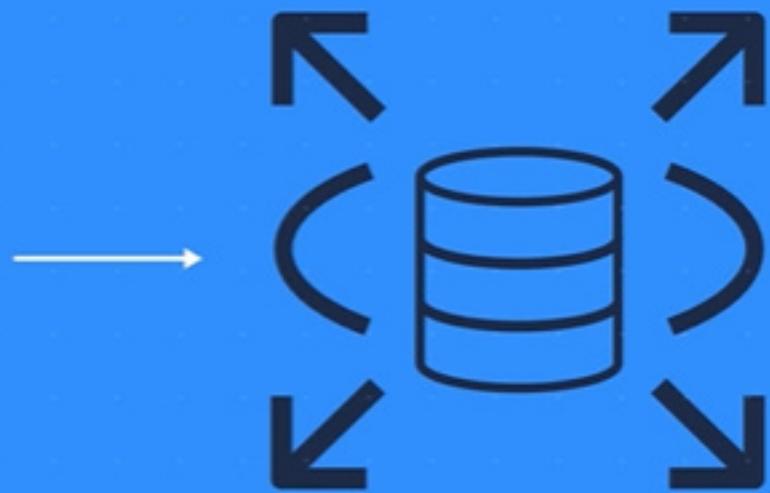
Microsoft
SQL Server



Amazon RDS
for SQL Server



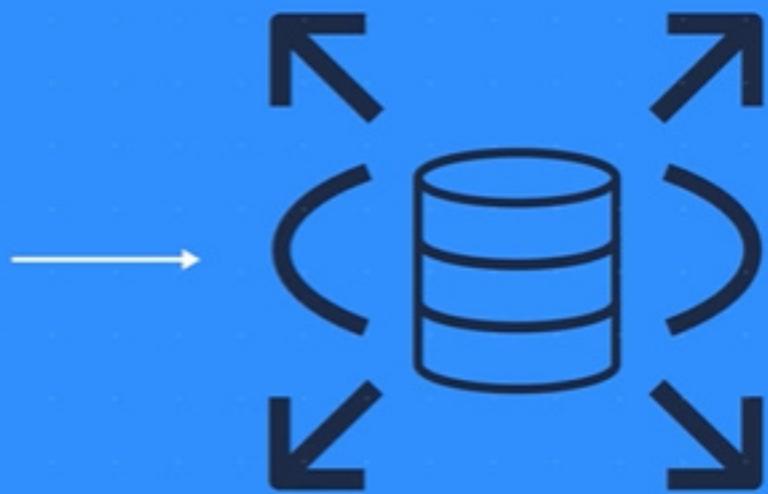
Oracle



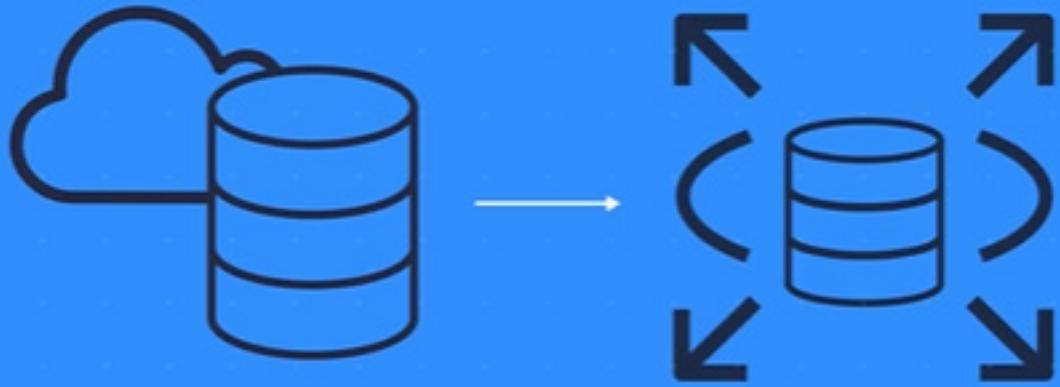
Amazon RDS
for SQL Server



Oracle



Amazon RDS
for Oracle



✓ Schema structures



✓ Schema structures

✓ Data types



- ✓ Schema structures
- ✓ Data types
- ✓ Database code



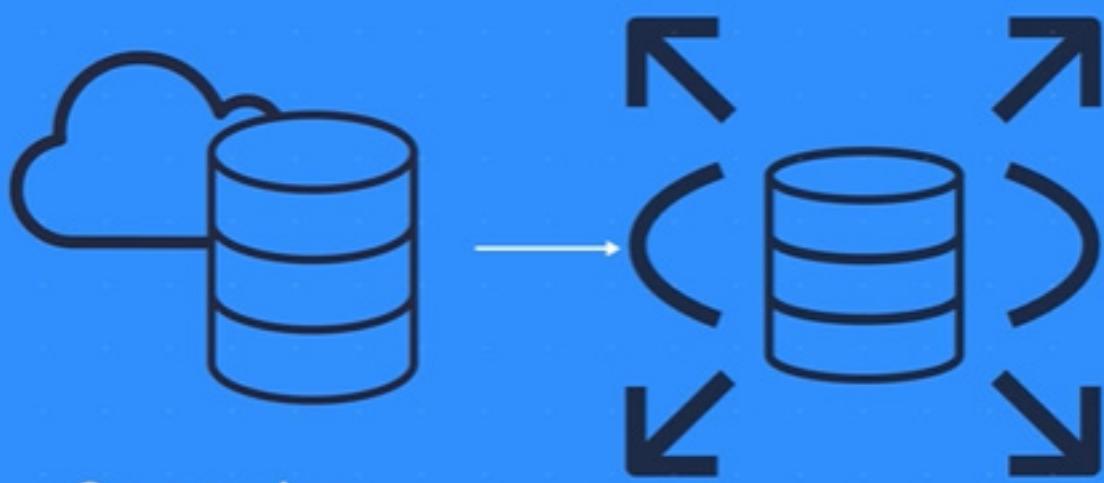
On-premises



On-premises

Amazon EC2

Amazon RDS



On-premises

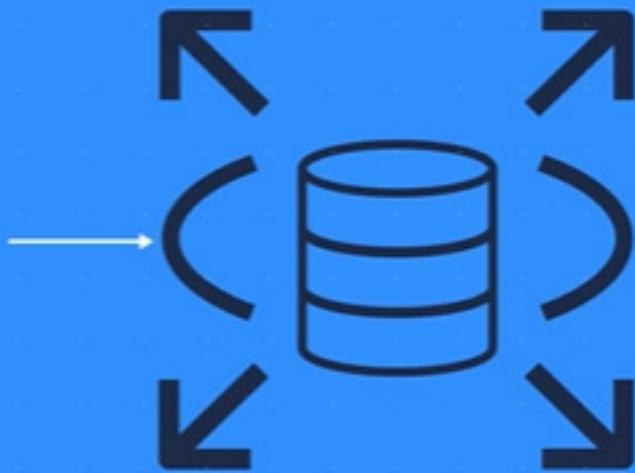
Amazon EC2

Amazon RDS

Amazon EC2

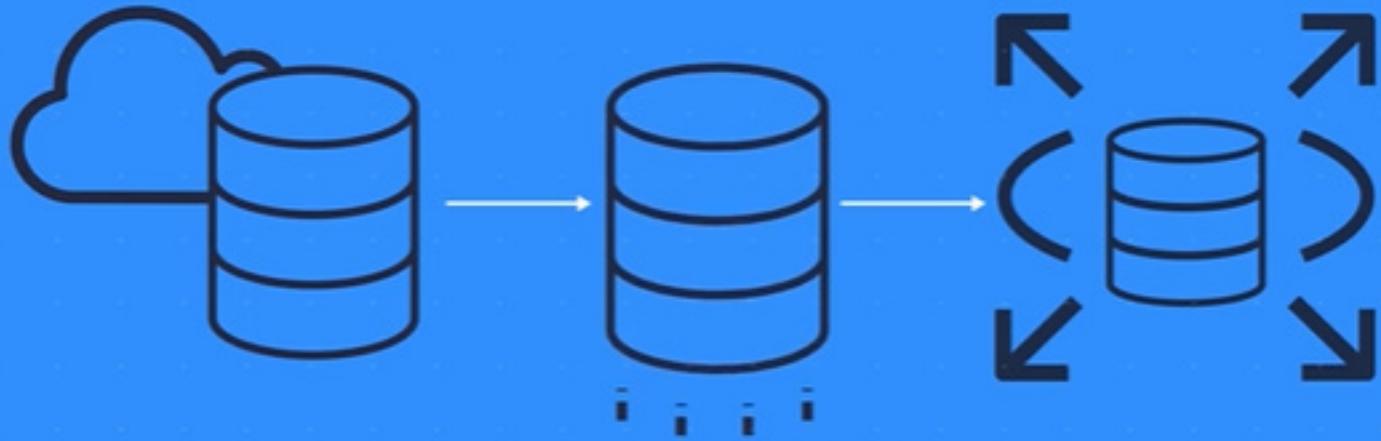


On-premises
Amazon EC2
Amazon RDS



Amazon EC2
Amazon RDS





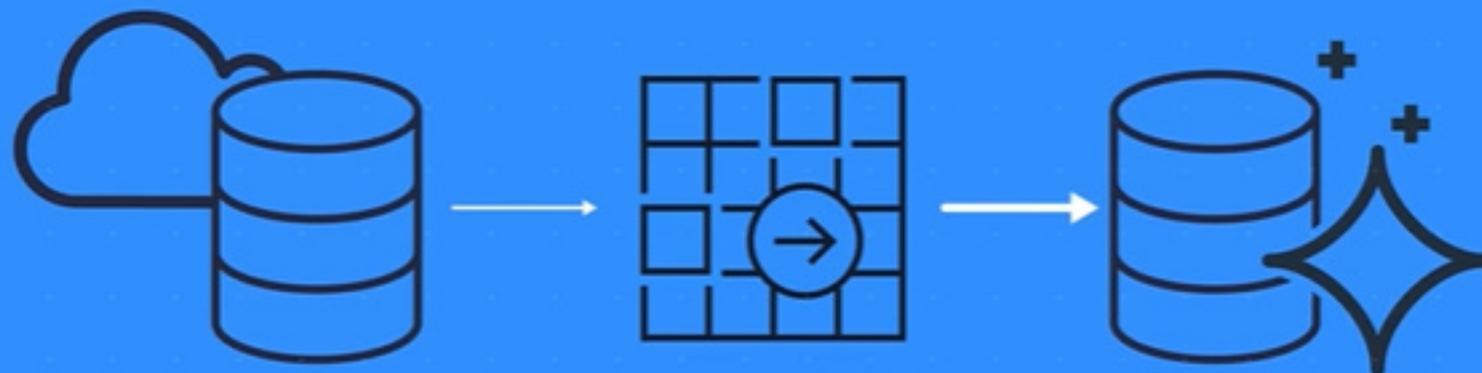
AWS Database
Migration Service

Heterogeneous databases

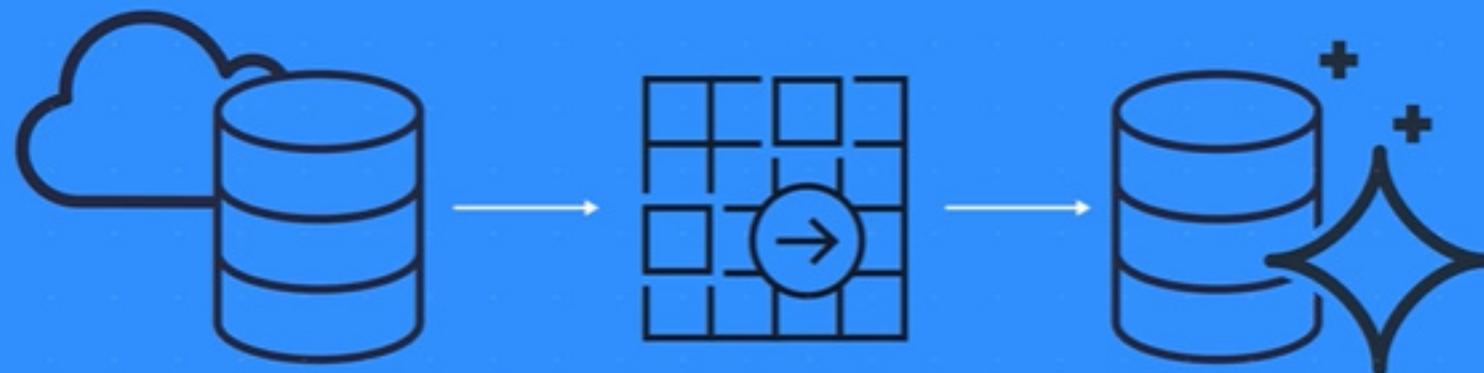
2-step process



- ⓧ Schema structures
- ⓧ Data types
- ⓢ Database code



- ✖ Schema structures
- ✖ Data types
- ✖ Database code



- ✓ Schema structures
- ✗ Data types
- ✓ Database code



Development and test database migrations

Development and test database migrations

Database consolidation

Continuous database replication



Development and test database migrations



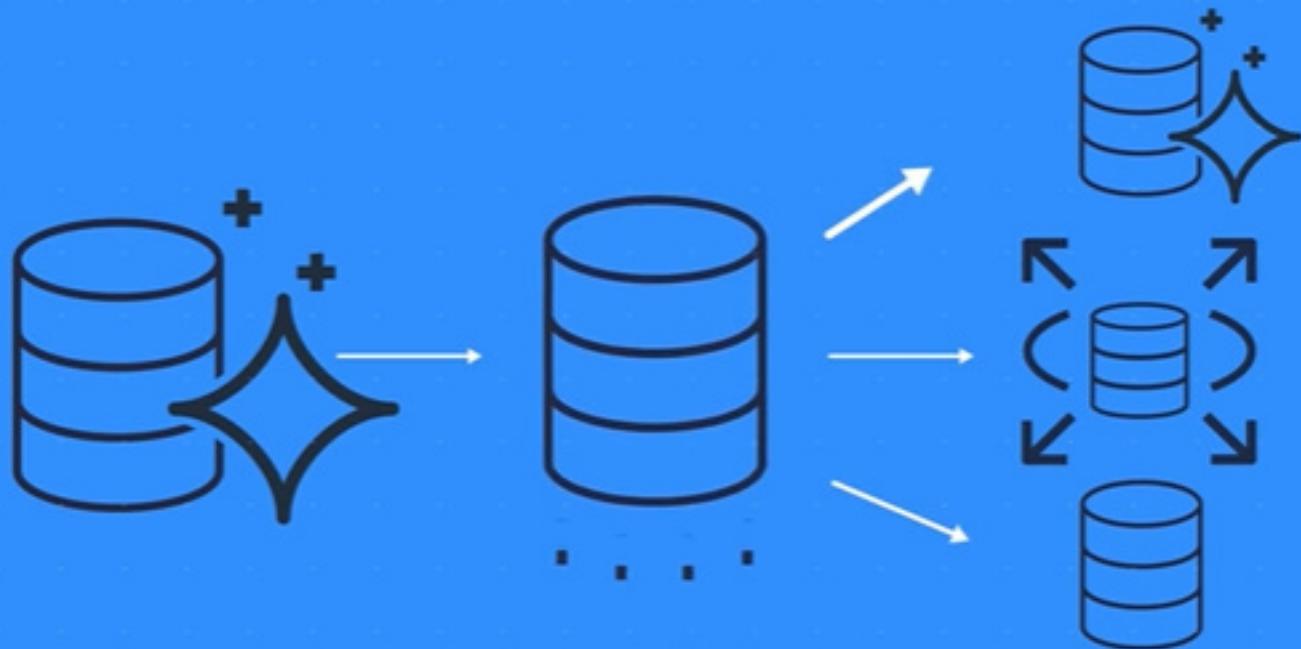
Development and test database migrations



Development and test database migrations



Database consolidation



Continuous database replication



Continuous database replication



Continuous database replication

AWS Database Migration Service (AWS DMS)

[AWS Database Migration Service \(AWS DMS\)](#) enables you to migrate relational databases, nonrelational databases, and other types of data stores.

With AWS DMS, you move data between a source database and a target database. [The source and target databases](#) can be of the same type or different types. During the migration, your source database remains operational, reducing downtime for any applications that rely on the database.

For example, suppose that you have a MySQL database that is stored on premises in an Amazon EC2 instance or in Amazon RDS. Consider the MySQL database to be your source database. Using AWS DMS, you could migrate your data to a target database, such as an Amazon Aurora database.

Other use cases for AWS DMS

Select each card to flip it.

Development
and test
database
migrations

Click to flip 

Database
consolidation



Continuous
replication



Other use cases for AWS DMS

Select each card to flip it.

Enabling developers to test applications against production data without affecting production users

Combining several databases into a single database

Sending ongoing copies of your data to other target sources instead of doing a one-time migration

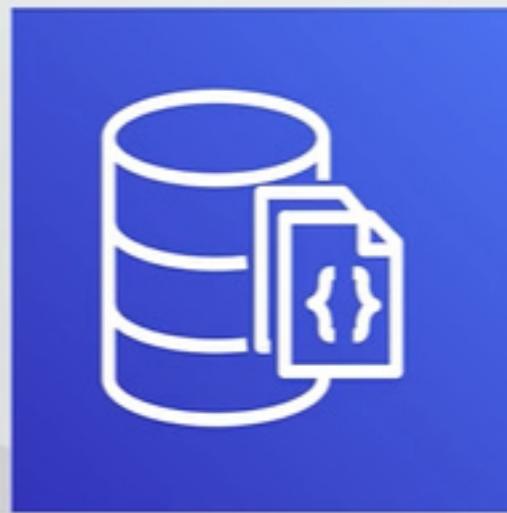
Other use cases for AWS DMS

Select each card to flip it.

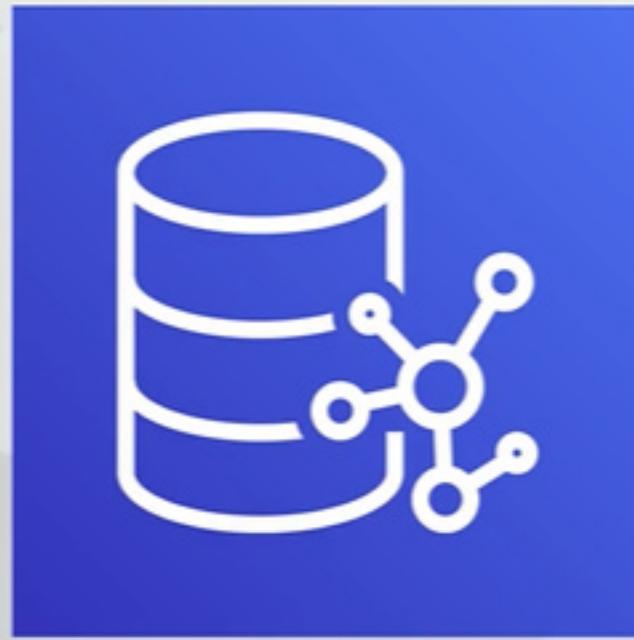
Enabling developers to test applications against production data without affecting production users

Combining several databases into a single database

Sending ongoing copies of your data to other target sources instead of doing a one-time migration



Amazon DocumentDB
(with MongoDB compatibility)



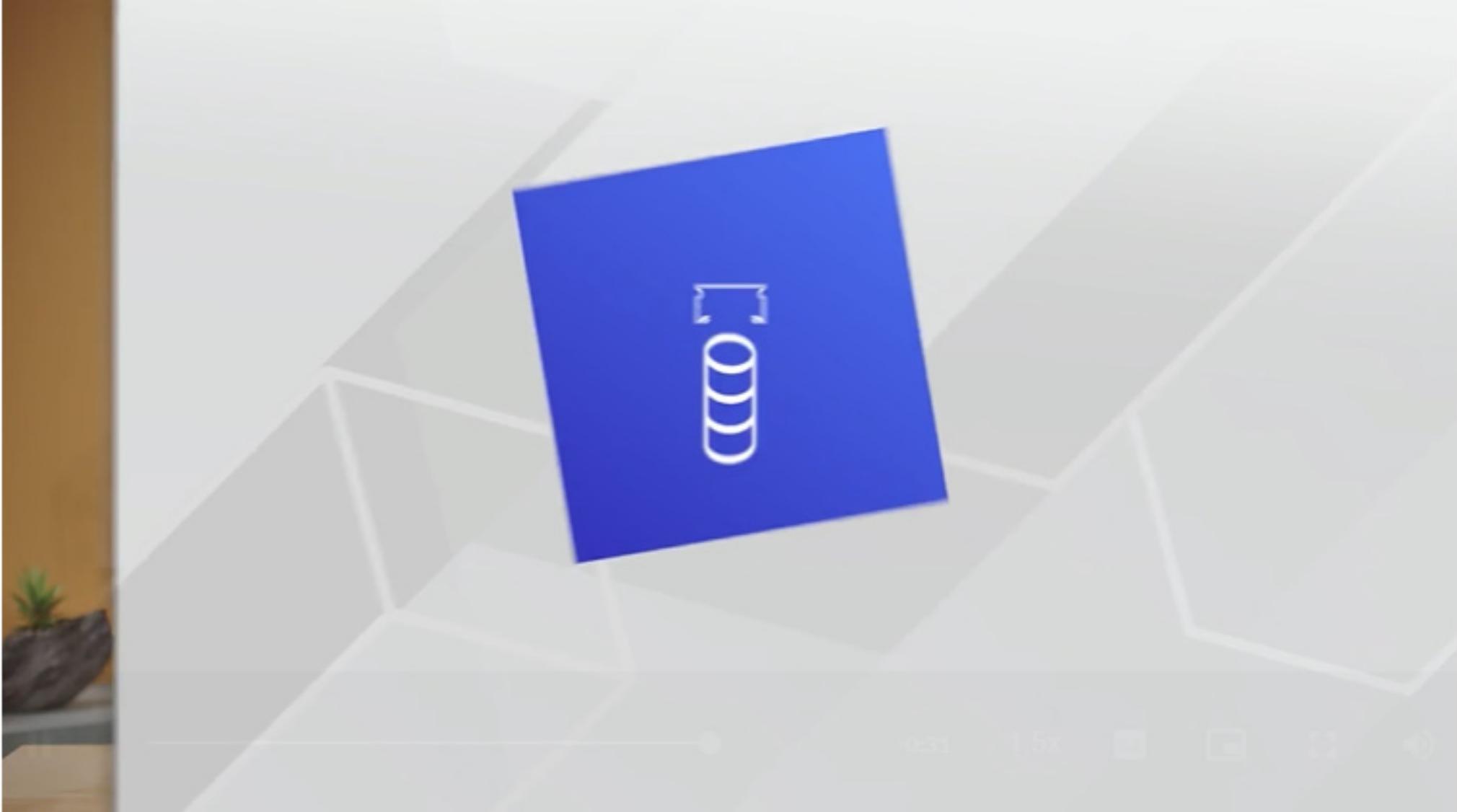
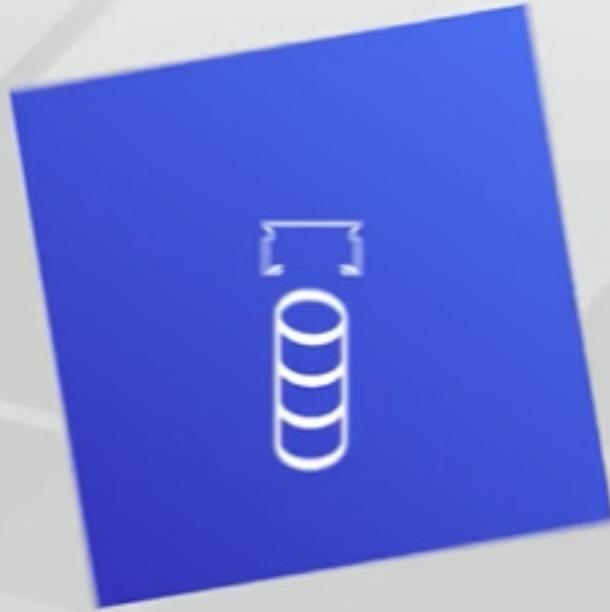
Amazon Neptune



Amazon Managed
Blockchain



Amazon Quantum
Ledger Database
(Amazon QLDB)





Amazon DynamoDB
Accelerator (DAX)

Additional database services

To learn more, select the + symbol next to each category.

Amazon DocumentDB



Amazon Neptune



Amazon Quantum Ledger Database (Amazon QLDB)



Amazon Managed Blockchain



Amazon ElastiCache



Amazon DynamoDB Accelerator



Amazon DocumentDB

[Amazon DocumentDB](#) is a document database service that supports MongoDB workloads.
(MongoDB is a document database program.)

Amazon Neptune

[Amazon Neptune](#) is a graph database service.

You can use Amazon Neptune to build and run applications that work with highly connected datasets, such as recommendation engines, fraud detection, and knowledge graphs.

Amazon Quantum Ledger Database (Amazon QLDB)

[Amazon Quantum Ledger Database \(Amazon QLDB\)](#) is a ledger database service.

You can use Amazon QLDB to review a complete history of all the changes that have been made to your application data.

Amazon Managed Blockchain

[**Amazon Managed Blockchain**](#) is a service that you can use to create and manage blockchain networks with open-source frameworks.

Blockchain is a distributed ledger system that lets multiple parties run transactions and share data without a central authority.

Amazon ElastiCache

[**Amazon ElastiCache**](#) is a service that adds caching layers on top of your databases to help improve the read times of common requests.

It supports two types of data stores: Redis and Memcached.

It supports two types of data stores: Redis and Memcached.

Amazon DynamoDB Accelerator

[Amazon DynamoDB Accelerator \(DAX\)](#) is an in-memory cache for DynamoDB.

It helps improve response times from single-digit milliseconds to microseconds.

Additional resources

To learn more about the concepts that were explored in Module 5, review these resources.

- [Cloud Storage on AWS](#)
- [AWS Storage Blog](#)
- [Hands-On Tutorials: Storage](#)
- [AWS Customer Stories: Storage](#)
- [AWS Database Migration Service](#)
- [Databases on AWS](#)
- [Category Deep Dive: Databases](#)
- [AWS Database Blog](#)
- [AWS Customer Stories: Databases](#)

Which Amazon S3 storage classes are optimized for archival data? (Select TWO.)



S3 Standard



S3 Glacier



S3 Intelligent-Tiering



S3 Standard-IA



S3 Glacier Deep Archive

The correct two response options are:

- S3 Glacier
- S3 Glacier Deep Archive

Objects stored in the S3 Glacier storage class can be retrieved within a few minutes to a few hours. By comparison, objects that are stored in the S3 Glacier Deep Archive storage class can be retrieved within 12 hours.

The other response options are incorrect because:

- S3 Standard is a storage class that is ideal for frequently accessed data, not archival data.
- S3 Intelligent-Tiering monitors access patterns of objects and automatically moves them between the S3 Standard and S3 Standard-IA storage classes. It is not designed for archival data.
- S3 Standard-IA is ideal for data that is infrequently accessed but requires high availability when needed.

Learn more:

- [Amazon S3 storage classes](#)

Which statement or statements are TRUE about Amazon EBS volumes and Amazon EFS file systems?



EBS volumes store data within a single Availability Zone. Amazon EFS file systems store data across multiple Availability Zones.



EBS volumes store data across multiple Availability Zones. Amazon EFS file systems store data within a single Availability Zone.



EBS volumes and Amazon EFS file systems both store data within a single Availability Zone.



EBS volumes and Amazon EFS file systems both store data across multiple Availability Zones.

The correct response option is: **EBS volumes store data within a single Availability Zone. Amazon EFS file systems store data across multiple Availability Zones.**

An EBS volume must be located in the same Availability Zone as the Amazon EC2 instance to which it is attached.

Data in an Amazon EFS file system can be accessed concurrently from all the Availability Zones in the Region where the file system is located.

Learn more:

- [Amazon EBS volumes](#)
- [Amazon EFS: How it works](#)

You want to store data in an object storage service. Which AWS service is best for this type of storage?



Amazon Managed Blockchain



Amazon Elastic File System (Amazon EFS)



Amazon Elastic Block Store (Amazon EBS)



Amazon Simple Storage Service (Amazon S3)

The correct response option is **Amazon Simple Storage Service (Amazon S3)**.

The other response options are incorrect because:

- Amazon Managed Blockchain is a service that you can use to create and manage blockchain networks with open-source frameworks. Blockchain is a distributed ledger system that lets multiple parties run transactions and share data without a central authority.
- Amazon Elastic File System (Amazon EFS) is a scalable file system used with AWS Cloud services and on-premises resources. It does not store data as object storage.
- Amazon Elastic Block Store (Amazon EBS) is a service that provides block-level storage volumes that you can use with Amazon EC2 instances.

Learn more:

- [Amazon S3](#)

Which statement best describes Amazon DynamoDB?

- A service that enables you to run relational databases in the AWS Cloud
- A serverless key-value database service
- A service that you can use to migrate relational databases, nonrelational databases, and other types of data stores
- An enterprise-class relational database

Which statement best describes Amazon DynamoDB?



A service that enables you to run relational databases in the AWS Cloud



A serverless key-value database service



A service that you can use to migrate relational databases, nonrelational databases, and other types of data stores



An enterprise-class relational database

The correct response option is A serverless key-value database service.

Amazon DynamoDB is a key-value database service. It is serverless, which means that you do not have to provision, patch, or manage servers.

The other response options are incorrect because:

- A service that enables you to run relational databases in the AWS Cloud describes Amazon Relational Database Service (Amazon RDS).
- A service that you can use to migrate relational databases, nonrelational databases, and other types of data stores describes AWS Database Migration Service (AWS DMS).
- An enterprise-class relational database describes Amazon Aurora.

Learn more:

- [Amazon DynamoDB](#)

Which service is used to query and analyze data across a data warehouse?



Amazon Redshift



Amazon Neptune



Amazon DocumentDB



Amazon ElastiCache

The correct response option is **Amazon Redshift**.

Amazon Redshift is a data warehousing service that you can use for big data analytics. Use Amazon Redshift to collect data from many sources and help you understand relationships and trends across your data.

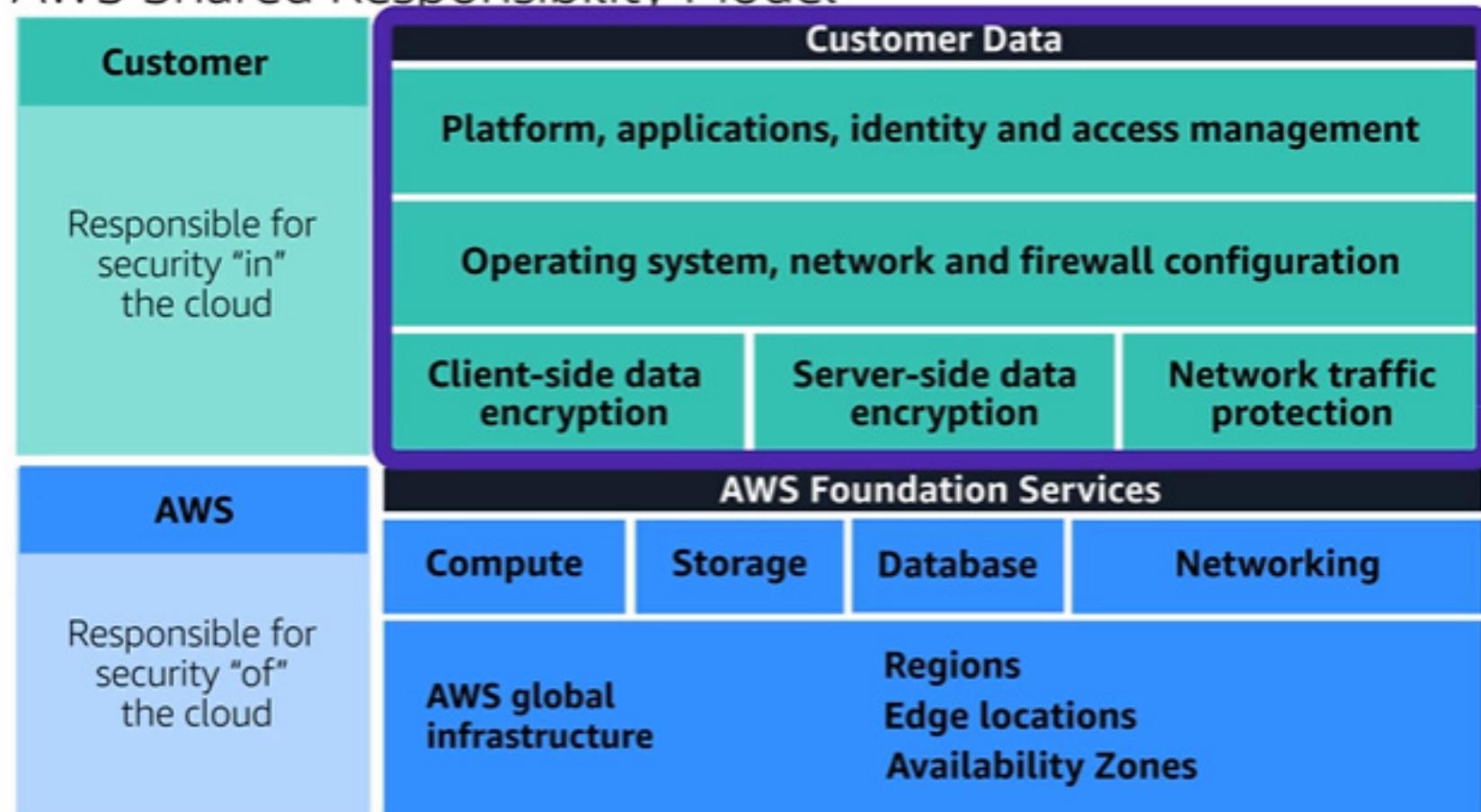
The other response options are incorrect because:

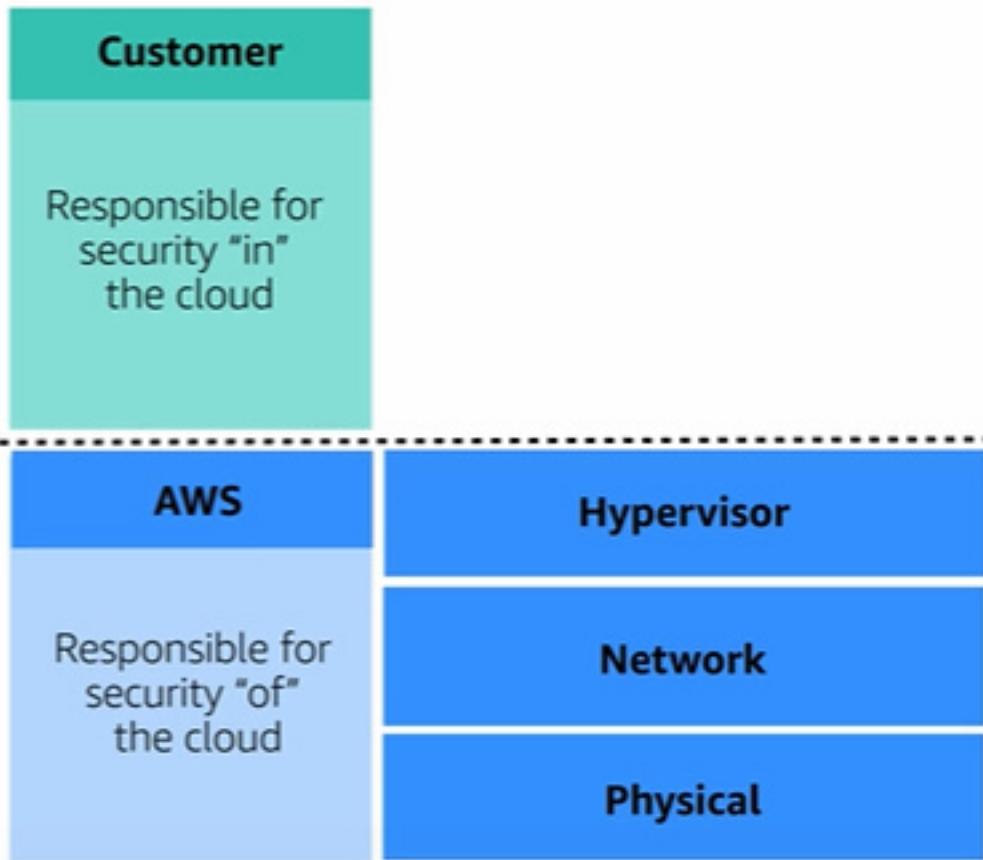
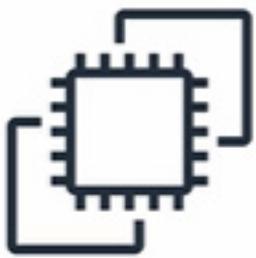
- Amazon Neptune is a graph database service. You can use Amazon Neptune to build and run applications that work with highly connected datasets, such as recommendation engines, fraud detection, and knowledge graphs.
- Amazon DocumentDB is a document database service that supports MongoDB workloads.
- Amazon ElastiCache is a service that adds caching layers on top of your databases to help improve the read times of common requests.

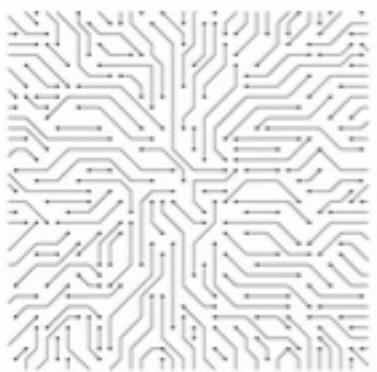
Learn more:

- [Amazon Redshift](#)

AWS Shared Responsibility Model







| AWS | Hypervisor |
|---|------------|
| Responsible for security "of" the cloud | |
| Network | |
| Physical | |

The AWS shared responsibility model

Throughout this course, you have learned about a variety of resources that you can create in the AWS Cloud. These resources include Amazon EC2 instances, Amazon S3 buckets, and Amazon RDS databases. Who is responsible for keeping these resources secure: you (the customer) or AWS?

The answer is both. The reason is that you do not treat your AWS environment as a single object. Rather, you treat the environment as a collection of parts that build upon each other. AWS is responsible for some parts of your environment and you (the customer) are responsible for other parts. This concept is known as the shared responsibility model.

The shared responsibility model divides into customer responsibilities (commonly referred to as "security in the cloud") and AWS responsibilities (commonly referred to as "security of the cloud").

The shared responsibility model divides into customer responsibilities (commonly referred to as "security in the cloud") and AWS responsibilities (commonly referred to as "security of the cloud").

| | | | | |
|-----------|--|--------------------|------------------------|-------------------------------|
| CUSTOMERS | CUSTOMER DATA | | | |
| | PLATFORM, APPLICATIONS, IDENTITY AND ACCESS MANAGEMENT | | | |
| | OPERATING SYSTEMS, NETWORK AND FIREWALL CONFIGURATION | | | |
| | CLIENT-SIDE DATA ENCRYPTION | | SERVER-SIDE ENCRYPTION | NETWORKING TRAFFIC PROTECTION |
| AWS | SOFTWARE | | | |
| | COMPUTE | STORAGE | DATABASE | NETWORKING |
| | HARDWARE/AWS GLOBAL INFRASTRUCTURE | | | |
| | REGIONS | AVAILABILITY ZONES | | EDGE LOCATIONS |

You can think of this model as being similar to the division of responsibilities between a homeowner and a homebuilder. The builder (AWS) is responsible for constructing your house and ensuring that it is solidly built. As the homeowner (the customer), it is your responsibility to secure everything in the house by ensuring that the doors are closed and locked.

To learn more, select the + symbol next to each category.

Customers: Security in the cloud



AWS: Security of the cloud



To learn more, select the + symbol next to each category.

Customers: Security in the cloud

Customers are responsible for the security of everything that they create and put *in* the AWS Cloud.

When using AWS services, you, the customer, maintain complete control over your content. You are responsible for managing security requirements for your content, including which content you choose to store on AWS, which AWS services you use, and who has access to that content. You also control how access rights are granted, managed, and revoked.

The security steps that you take will depend on factors such as the services that you use, the complexity of your systems, and your company's specific operational and security needs. Steps include selecting, configuring, and patching the operating systems that will run on Amazon EC2 instances, configuring security groups, and managing user accounts.

AWS is responsible for security of the cloud.

AWS operates, manages, and controls the components at all layers of infrastructure. This includes areas such as the host operating system, the virtualization layer, and even the physical security of the data centers from which services operate.

AWS is responsible for protecting the global infrastructure that runs all of the services offered in the AWS Cloud. This infrastructure includes AWS Regions, Availability Zones, and edge locations.

AWS manages the security of the cloud, specifically the physical infrastructure that hosts your resources, which include:

- Physical security of data centers
- Hardware and software infrastructure
- Network infrastructure
- Virtualization infrastructure

Although you cannot visit AWS data centers to see this protection firsthand, AWS provides several reports from third-party auditors. These auditors have verified its compliance with a variety of computer security standards and regulations.

Which tasks are the responsibilities of customers? (Select TWO.)



Maintaining network infrastructure



Patching software on Amazon EC2 instances



Implementing physical security controls at data centers



Setting permissions for Amazon S3 objects



Maintaining servers that run Amazon EC2 instances

```
{  
  "version": "2012-10-17",  
  "Statement": {  
    "Effect": "Allow",  
    "Action": "s3>ListBucket",  
    "Resource": "arn:aws:s3:::coffee_shop_reports"  
  }  
}
```



AWS IAM



- Root user
- Users
- Groups
- Policies

AWS IAM

- Root user
- Users
- Groups
- Policies
- Roles



AWS Identity and Access Management (IAM)

[AWS Identity and Access Management \(IAM\)](#) enables you to manage access to AWS services and resources securely.

IAM gives you the flexibility to configure access based on your company's specific operational and security needs. You do this by using a combination of IAM features, which are explored in detail in this lesson:

- IAM users, groups, and roles
- IAM policies
- Multi-factor authentication

You will also learn best practices for each of these features.

AWS account root user

When you first create an AWS account, you begin with an identity known as the [root user](#).

The root user is accessed by signing in with the email address and password that you used to create your AWS account. You can think of the root user as being similar to the owner of the coffee shop. It has complete access to all the AWS services and resources in the account.



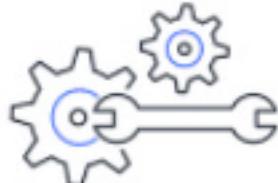
Create an AWS account.
This establishes your
root user identity.



Create your first IAM user
and give it permissions to
create other users.



Log in as the
new IAM user
and continue
to create
other users.



Only access
the root user
for a limited
number of
tasks.



Best practice:

Do not use the root user for everyday tasks.

Instead, use the root user to create your first IAM user and assign it permissions to create other users.

Then, continue to create other IAM users, and access those identities for performing regular tasks throughout AWS. Only use the root user when you need to perform a limited number of tasks that are only available to the root user. Examples of these tasks include changing your root user email address and changing your AWS support plan.

An **IAM user** is an identity that you create in AWS. It represents the person or application that interacts with AWS services and resources. It consists of a name and credentials.

By default, when you create a new IAM user in AWS, it has no permissions associated with it. To allow the IAM user to perform specific actions in AWS, such as launching an Amazon EC2 instance or creating an Amazon S3 bucket, you must grant the IAM user the necessary permissions.



Best practice:

We recommend that you create individual IAM users for each person who needs to access AWS.

Even if you have multiple employees who require the same level of access, you should create individual IAM users for each of them. This provides additional security by allowing each IAM user to have a unique set of security credentials.

IAM policies

An **IAM policy** is a document that allows or denies permissions to AWS services and resources.

IAM policies enable you to customize users' levels of access to resources. For example, you can allow users to access all of the Amazon S3 buckets within your AWS account, or only a specific bucket.



Best practice:

Follow the security principle of **least privilege** when granting permissions.

By following this principle, you help to prevent users or roles from having more permissions than needed to perform their tasks.

For example, if an employee needs access to only a specific bucket, specify the bucket in the IAM policy. Do this instead of granting the employee access to all of the buckets in your AWS account.

Example: IAM policy

Here's an example of how IAM policies work. Suppose that the coffee shop owner has to create an IAM user for a newly hired cashier. The cashier needs access to the receipts kept in an Amazon S3 bucket with the ID: AWSDOC-EXAMPLE-BUCKET.

```
{  
  "Version": "2012-10-17",  
  "Statement": [  
    {"Effect": "Allow",  
     "Action": ["s3>ListObject", "s3GetObject"],  
     "Resource": ["arn:aws:s3::: awsdoc-example-bucket",  
                 "arn:aws:s3::: awsdoc-example-bucket/*"]  
    }  
  ]  
}
```

This example IAM policy allows permission to view a list of objects in the Amazon S3 bucket with ID *awsdoc-example-bucket*, and also access them.

In this example, the IAM policy is allowing specific actions within Amazon S3: `ListObject` and `GetObject`. The policy also mentions a specific bucket ID: *awsdoc-example-bucket*. When the owner attaches this policy to the cashier's IAM user, it will allow the cashier to view a list of the objects in the *awsdoc-example-bucket* bucket and also access them.

If the owner wants the cashier to be able to access other services and perform other actions in AWS, the owner must attach additional policies to specify these services and actions.

Now, suppose that the coffee shop has hired a few more cashiers. Instead of assigning permissions to each individual IAM user, the owner places the users into an [IAM group](#).

IAM groups

An IAM group is a collection of IAM users. When you assign an IAM policy to a group, all users in the group are granted permissions specified by the policy.

Here's an example of how this might work in the coffee shop. Instead of assigning permissions to cashiers one at a time, the owner can create a "Cashiers" IAM group. The owner can then add IAM users to the group and then attach permissions at the group level.



Assigning IAM policies at the group level also makes it easier to adjust permissions when an employee transfers to a different job. For example, if a cashier becomes an inventory specialist, the coffee shop owner removes them from the "Cashiers" IAM group and adds them into the "Inventory Specialists" IAM group. This ensures that employees have only the permissions that are required for their current role.

What if a coffee shop employee hasn't switched jobs permanently, but instead, rotates to different workstations throughout the day? This employee can get the access they need through [IAM roles](#).

IAM roles

In the coffee shop, an employee rotates to different workstations throughout the day. Depending on the staffing of the coffee shop, this employee might perform several duties: work at the cash register, update the inventory system, process online orders, and so on.

When the employee needs to switch to a different task, they give up their access to one workstation and gain access to the next workstation. The employee can easily switch between workstations, but at any given point in time, they can have access to only a single workstation. This same concept exists in AWS with IAM roles.

An IAM role is an identity that you can assume to gain temporary access to permissions.

Before an IAM user, application, or service can assume an IAM role, they must be granted permissions to switch to the role. When someone assumes an IAM role, they abandon all previous permissions that they had under a previous role and assume the permissions of the new role.

Example: IAM roles

To review an example of how IAM roles could be used in the coffee shop,
select **Start**.

START >



Step 1



First, the owner grants the employee permissions to switch to a role for each workstation in the coffee shop.



"Cashier" role

The employee begins their day by assuming the "Cashier" role. This grants them access to the cash register system.



"Cashier" role



"Inventory" role

Later in the day, the employee needs to update the inventory system. They assume the "Inventory" role.

This grants the employee access to the inventory system and also revokes their access to the cash register system.

Multi-factor authentication

Have you ever signed in to a website that required you to provide multiple pieces of information to verify your identity? You might have needed to provide your password and then a second form of authentication, such as a random code sent to your phone. This is an example of [multi-factor authentication](#).

In IAM, multi-factor authentication (MFA) provides an extra layer of security for your AWS account.

How multi-factor authentication works

To review the steps involved with multi-factor authentication, select **Start**.

START >



IAM user ID: AIDACKCEVSQ6C2EXAMPLE

Password:

First, when a user signs in to an AWS website, they enter their IAM user ID and password.



Next, the user is prompted for an authentication response from their AWS MFA device. This device could be a hardware security key, a hardware device, or an MFA application on a device such as a smartphone.



AWS Organizations

- Centralized management
- Consolidated billing
- Hierarchical groupings of accounts



AWS Organizations

- Centralized management
- Consolidated billing
- Hierarchical groupings of accounts
- AWS service and API actions access control

AWS Organizations

Suppose that your company has multiple AWS accounts. You can use [AWS Organizations](#) to consolidate and manage multiple AWS accounts within a central location.

When you create an organization, AWS Organizations automatically creates a **root**, which is the parent container for all the accounts in your organization.

In AWS Organizations, you can centrally control permissions for the accounts in your organization by using [service control policies \(SCPs\)](#). SCPs enable you to place restrictions on the AWS services resources, and individual API actions that users and roles in each account can access.

Organizational units

In AWS Organizations, you can group accounts into organizational units (OUs) to make it easier to manage accounts with similar business or security requirements. When you apply a policy to an OU, all the accounts in the OU automatically inherit the permissions specified in the policy.

By organizing separate accounts into OUs, you can more easily isolate workloads or applications that have specific security requirements. For instance, if your company has accounts that can access only the AWS services that meet certain regulatory requirements, you can put these accounts into one OU. Then, you can attach a policy to the OU that blocks access to all other AWS services that do not meet the regulatory requirements.

Example: AWS Organizations

To review an example of how a company might use AWS Organizations,
select **Start**.

START >

Step 1

Root



AWS account 1:
Finance



AWS account 2:
IT



AWS account 3:
HR



AWS account 4:
Legal



AWS account 1:
Finance



AWS account 2:
IT



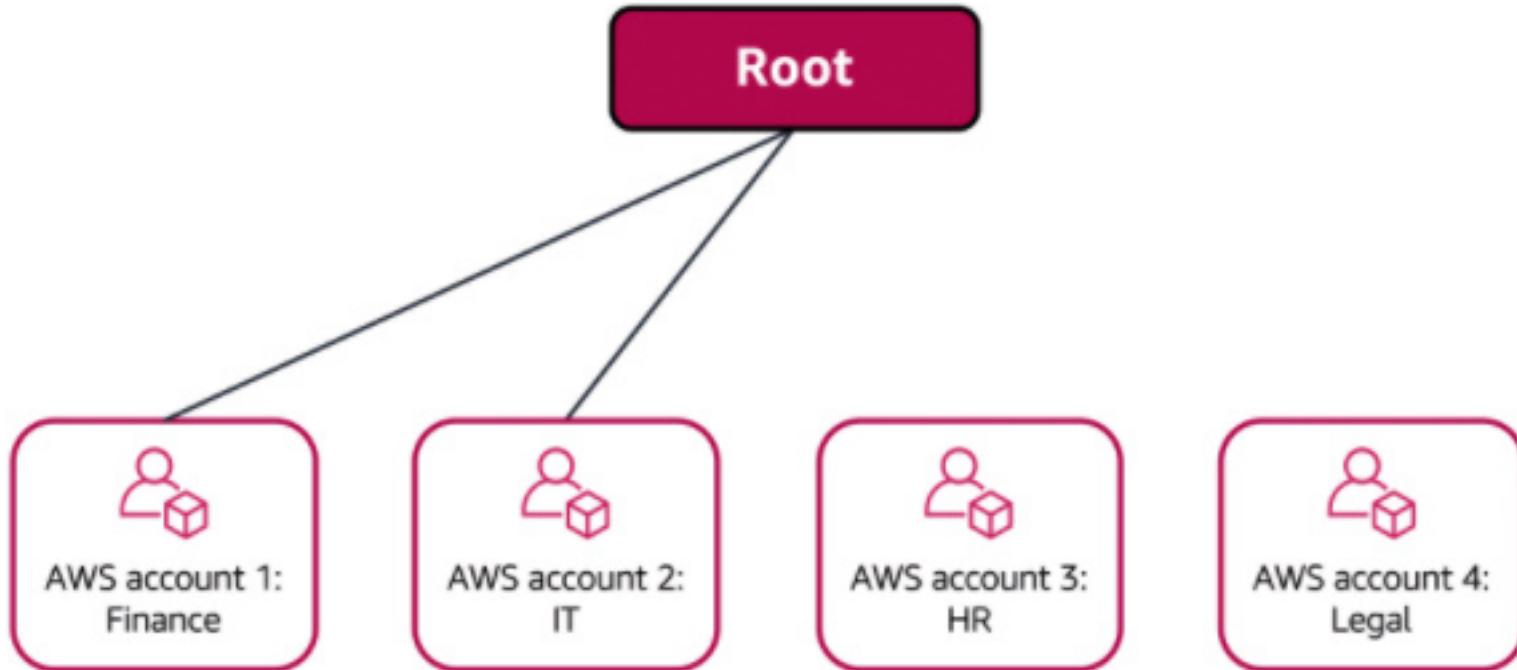
AWS account 3:
HR



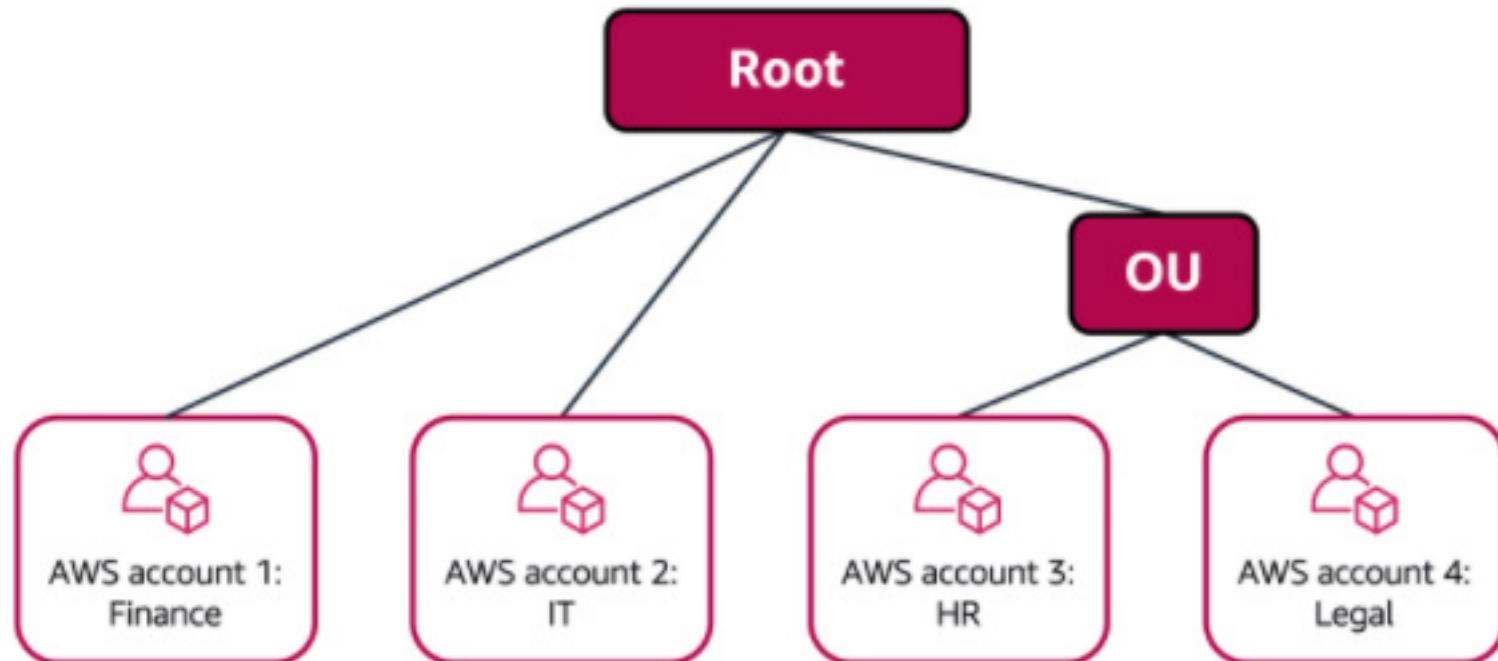
AWS account 4:
Legal

Imagine that your company has separate AWS accounts for the finance, information technology (IT), human resources (HR), and legal departments. You decide to consolidate these accounts into a single organization so that you can administer them from a central location. When you create the organization, this establishes the root.

In designing your organization, you consider the business, security, and regulatory needs of each department. You use this information to decide which departments group together in OUs.



The finance and IT departments have requirements that do not overlap with those of any other department. You bring these accounts into your organization to take advantage of benefits such as consolidated billing, but you do not place them into any OUs.



The HR and legal departments need to access the same AWS services and resources, so you place them into an OU together. Placing them into an OU enables you to attach policies that apply to both the HR and legal departments' AWS accounts.

You are configuring service control policies (SCPs) in AWS Organizations. Which identities and resources can SCPs be applied to? (Select TWO.)



IAM users



IAM groups



An individual member account



IAM roles



An organizational unit (OU)

The correct two response options are:

- An individual member account
- An organizational unit (OU)

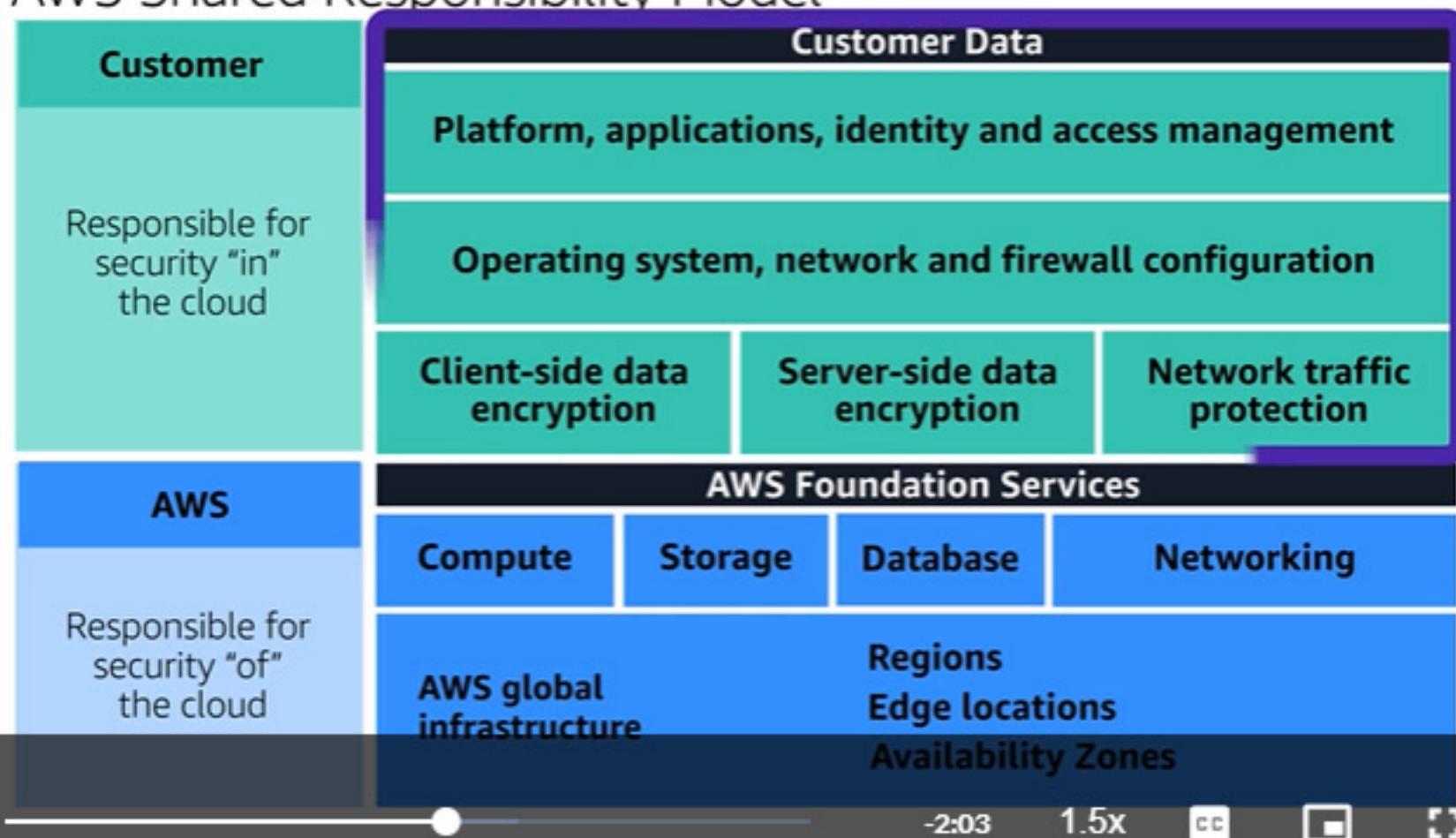
In AWS Organizations, you can apply service control policies (SCPs) to the organization root, an individual member account, or an OU. An SCP affects all IAM users, groups, and roles within an account, including the AWS account root user.

You can apply IAM policies to IAM users, groups, or roles. You cannot apply an IAM policy to the AWS account root user.

Learn more:

- [AWS Organizations](#)
- [Service control policies](#)
- [Attaching SCPs](#)

AWS Shared Responsibility Model

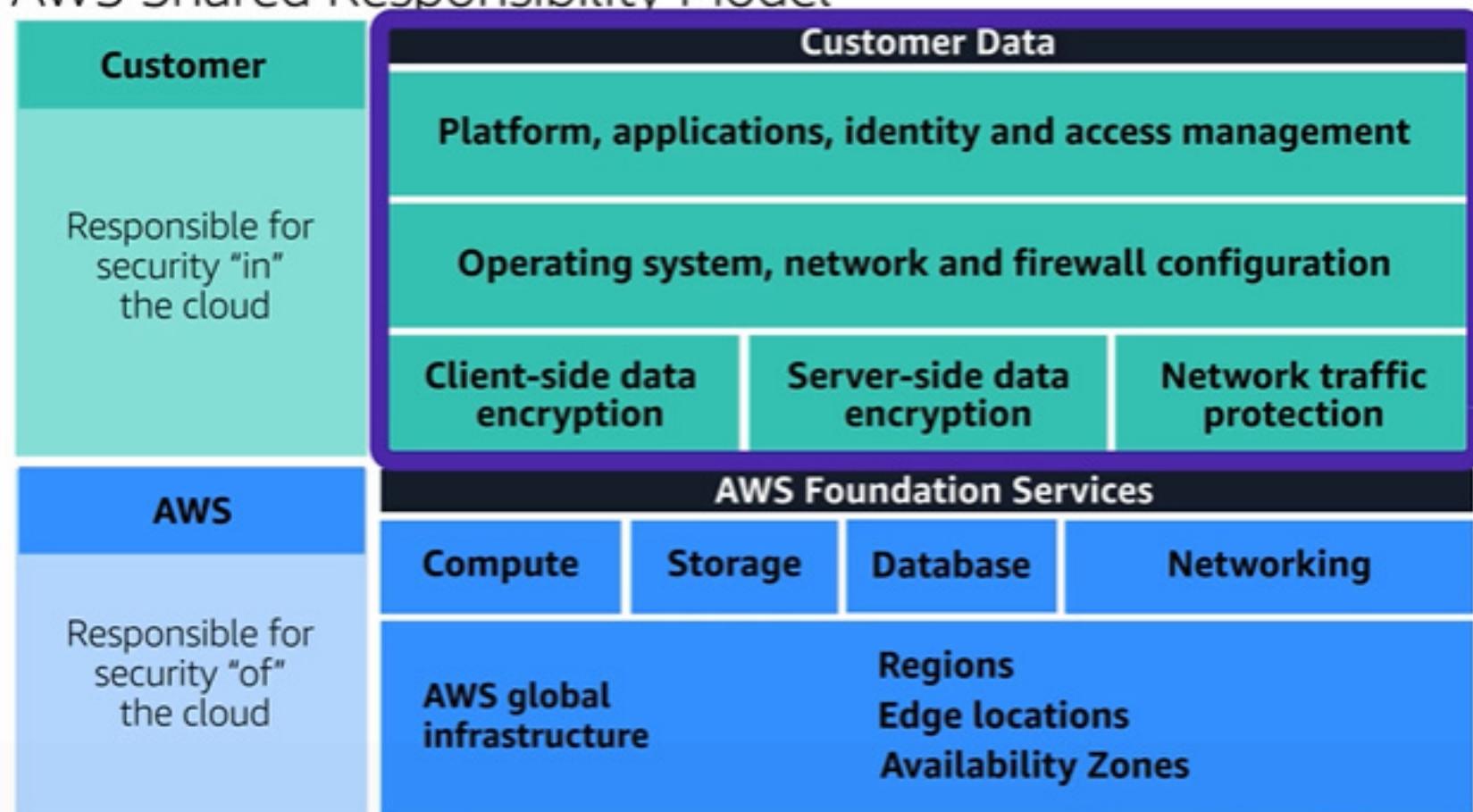


-2:03

1.5x



AWS Shared Responsibility Model



AWS Artifact

Depending on your company's industry, you may need to uphold specific standards. An audit or inspection will ensure that the company has met those standards.

[**AWS Artifact**](#) is a service that provides on-demand access to AWS security and compliance reports and select online agreements. AWS Artifact consists of two main sections: AWS Artifact Agreements and AWS Artifact Reports.

To learn more, select the + symbol next to each section.

AWS Artifact Agreements

—

Suppose that your company needs to sign an agreement with AWS regarding your use of certain types of information throughout AWS services. You can do this through **AWS Artifact Agreements**.

In AWS Artifact Agreements, you can review, accept, and manage agreements for an individual account and for all your accounts in AWS Organizations. Different types of agreements are offered to address the needs of customers who are subject to specific regulations, such as the Health Insurance Portability and Accountability Act (HIPAA).

AWS Artifact Reports

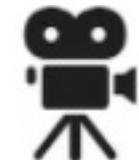
Next, suppose that a member of your company's development team is building an application and needs more information about their responsibility for complying with certain regulatory standards. You can advise them to access this information in **AWS Artifact Reports**.

AWS Artifact Reports provide compliance reports from third-party auditors. These auditors have tested and verified that AWS is compliant with a variety of global, regional, and industry-specific security standards and regulations. AWS Artifact Reports remains up to date with the latest reports released. You can provide the AWS audit artifacts to your auditors or regulators as evidence of AWS security controls.

Global



USA



Europe



Asia Pacific



Customer Compliance Center

The [Customer Compliance Center](#) contains resources to help you learn more about AWS compliance.

In the Customer Compliance Center, you can read customer compliance stories to discover how companies in regulated industries have solved various compliance, governance, and audit challenges.

You can also access compliance whitepapers and documentation on topics such as:

- AWS answers to key compliance questions
- An overview of AWS risk and compliance
- An auditing security checklist

- An overview of AWS risk and compliance
- An auditing security checklist

Additionally, the Customer Compliance Center includes an auditor learning path. This learning path is designed for individuals in auditing, compliance, and legal roles who want to learn more about how their internal operations can demonstrate compliance using the AWS Cloud.

Which tasks can you complete in AWS Artifact? (Select TWO.)



Access AWS compliance reports on-demand.



Consolidate and manage multiple AWS accounts within a central location.



Create users to enable people and applications to interact with AWS services and resources.



Set permissions for accounts by configuring service control policies (SCPs).



Review, accept, and manage agreements with AWS.

The correct two response options are:

- Access AWS compliance reports on-demand.
- Review, accept, and manage agreements with AWS.

The other response options are incorrect because:

- Consolidate and manage multiple AWS accounts within a central location- This task can be completed in *AWS Organizations*.
- Create users to enable people and applications to interact with AWS services and resources- This task can be completed in *AWS Identity and Access Management (IAM)*.
- Set permissions for accounts by configuring service control policies (SCPs)- This task can be completed in *AWS Organizations*.

Learn more:

- [AWS Artifact](#)

Customers can call the coffee shop to place their orders. After answering each call, a cashier takes the order and gives it to the barista.

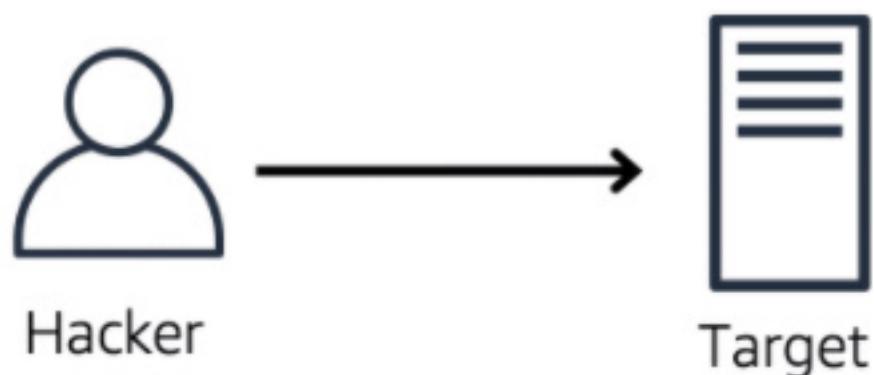
However, suppose that a prankster is calling in multiple times to place orders but is never picking up their drinks. This causes the cashier to be unavailable to take other customers' calls. The coffee shop can attempt to stop the false requests by blocking the phone number that the prankster is using.

In this scenario, the prankster's actions are similar to a **denial-of-service attack**.

Denial-of-service attacks

A **denial-of-service (DoS) attack** is a deliberate attempt to make a website or application unavailable to users.

Denial-of-service attack



The attack originates from a **single** source.

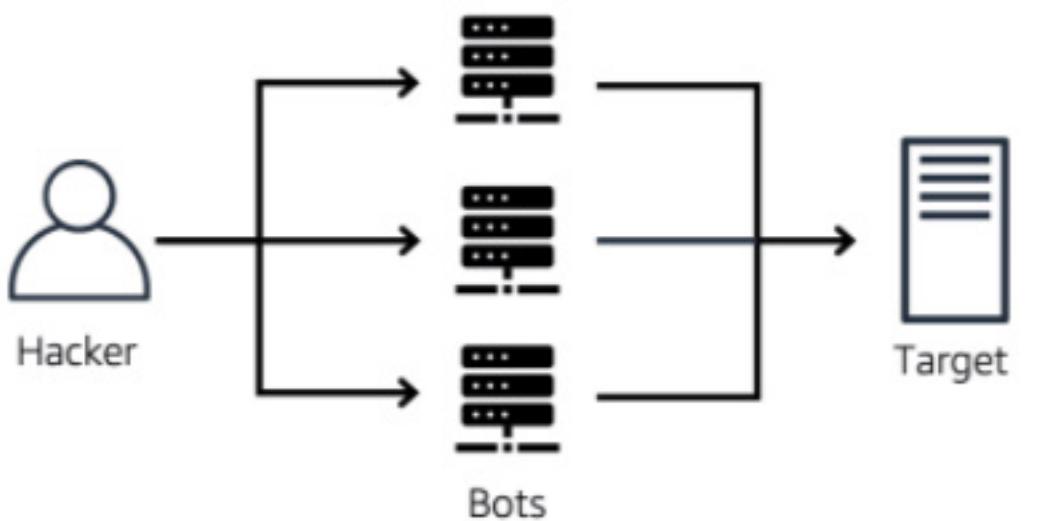
For example, an attacker might **flood** a website or application with excessive network traffic until the targeted website or application becomes overloaded and is no longer able to respond. If the website or application becomes unavailable, this denies service to users who are trying to make legitimate requests.

Distributed denial-of-service attacks

Now, suppose that the prankster has enlisted the help of friends.

The prankster and their friends repeatedly call the coffee shop with requests to place orders, even though they do not intend to pick them up. These requests are coming in from different phone numbers, and it's impossible for the coffee shop to block them all. Additionally, the influx of calls has made it increasingly difficult for customers to be able to get their calls through. This is similar to a **distributed denial-of-service attack**.

Distributed denial-of-service attack



The attack originates from **multiple** sources.

In a distributed denial-of-service (DDoS) attack, multiple sources are used to start an attack that aims to make a website or application unavailable. This can come from a group of attackers, or even a single attacker. The single attacker can use multiple infected computers (also known as "bots") to send excessive traffic to a website or application.

To help minimize the effect of DoS and DDoS attacks on your applications, you can use [AWS Shield](#).

AWS Shield

AWS Shield is a service that protects applications against DDoS attacks. AWS Shield provides two levels of protection: Standard and Advanced.

To learn more, select the + symbol next to each service.

AWS Shield Standard



AWS Shield Standard automatically protects all AWS customers at no cost. It protects your AWS resources from the most common, frequently occurring types of DDoS attacks.

As network traffic comes into your applications, AWS Shield Standard uses a variety of analysis techniques to detect malicious traffic in real time and automatically mitigates it.

AWS Shield Advanced

AWS Shield Advanced is a paid service that provides detailed attack diagnostics and the ability to detect and mitigate sophisticated DDoS attacks.

It also integrates with other services such as Amazon CloudFront, Amazon Route 53, and Elastic Load Balancing. Additionally, you can integrate AWS Shield with AWS WAF by writing custom rules to mitigate complex DDoS attacks.

DynamoDB table

| | |
|---|----------|
| 9 | kwnnmm |
| : | uwkpi |
| ; | m{xzm{{w |
| < | mi |

DynamoDB table

9

kwnnmm

:

uwkpi

;

m{xzm{{w

<

|mi



AWS Key Management Service (AWS KMS)

| DynamoDB table | |
|----------------|----------|
| 9 | kwnnmm |
| : | uwkpi |
| ; | m{xzm{{w |
| < | mi |



DynamoDB **table**

| | |
|---|----------|
| 1 | coffee |
| 7 | owkpa |
| ; | m{xzm{{w |
| < | mi |



AWS service



Client



AWS **service**



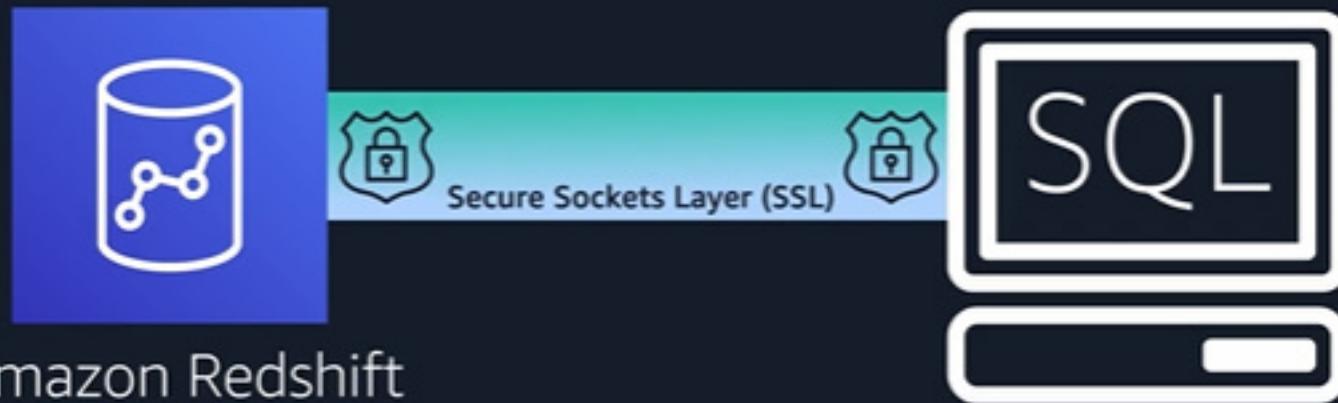
Other AWS service

□

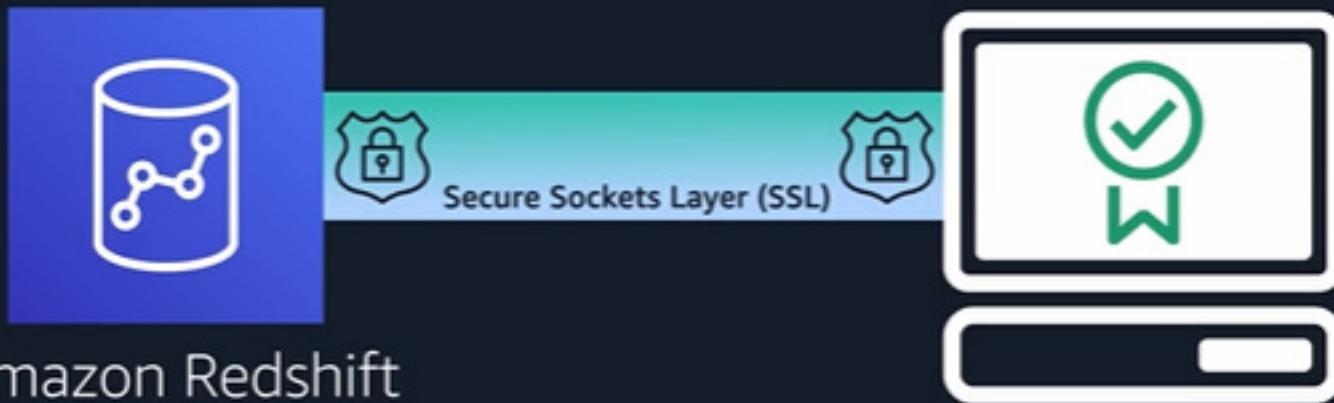
-



Anavonogenesis



Amazon Redshift



Amazon Redshift



A medium shot of a man with dark hair and glasses, wearing a grey t-shirt with a white cloud and heart graphic. He is looking towards the camera with his hands clasped. The background is blurred, showing some yellow text.

Amazon Inspector

Network configuration
reachability piece

Amazon agent

Security assessment
service



Services

Resource Groups



Ohio

Support

Dashboard

Assessment targets

Assessment templates

Assessment runs

Findings

Amazon Inspector

Amazon Inspector enables you to analyze the behavior of your AWS resources and helps you identify potential security issues. [Learn more](#).



[Help me create an Assessment](#)

Notable findings

[Important findings](#)

[Recent findings](#)

Assessment status

[Assessments running](#)

[Assessment run completed](#)

[Assessment runs failed](#)

Account settings

[Manage Amazon Inspector Service-Linked Role](#)

Recent Assessment Runs (Last 10)

| Name | Date Run | Status |
|--|--------------------------|-------------------|
| Run - Assessment-Template-Default-All-Rules - 2020-08-20T16:30:43.717Z | Today at 9:30 AM (GMT-7) | Analysis complete |

Welcome to Amazon Inspector

Amazon Inspector assessments check for security exposures and vulnerabilities in your EC2 instances. Learn more about [how Inspector functions](#).

Inspector uses a Service-linked Role to describe your EC2 instances and network configuration.

Assessment Setup

You can use the options below to get the following assessments on all of your EC2 instances in this AWS region. Click **Run weekly** for the assessment to run at this time once a week starting now; **Run once** for a one-time assessment, or **Advanced setup** for custom assessments.

Network Assessments (Inspector Agent is not required)

- **Assessments performed:** Network configuration analysis to cf
- **Optional Agent:** If the Inspector Agent is installed on your EC2
- **Pricing:** Pricing for [network assessments](#) is based on the mo

Host Assessments (Inspector Agent is required)

- **Assessments performed:** Vulnerable software (CVE), host ha
- **Agent Deployment:** Inspector assessments require an agent to
- **Pricing:** Pricing for [host assessments](#) is based on the monthly

Confirmation of Assessment Runs

You have chosen to run the following assessments:

Network Assessments

1. Check for ports reachable from outside the VPC

Host Assessments

1. Check for vulnerabilities in software (CVE)
2. Host hardening benchmarks (CIS)
3. Security best practices for configuration

The assessment will start now.

Agent Deployment: Inspector assessments require an agent to be installed on your EC2 instances. We will automatically install the agent for instances that allow [System Manager Run Command](#). Learn more about [Inspector Agent](#) and [how to manually install agent](#).

Pricing: Pricing is based on the monthly volume of usage. [Learn more](#)

Cancel

OK

ssessed weekly, the monthly cost would be around \$61/month. Learn more

spector Agent and [how to manually install agent](#).

weekly, the monthly cost would be around \$120/month. Learn more

weekly (recommended)

Run once

Advanced setup

Cancel



Welcome to Amazon Inspector

Amazon Inspector assessments check for security exposures and vulnerabilities in your EC2 instances. Learn more about [how Inspector functions](#).

Inspector uses a [Service-linked Role](#) to describe your EC2 instances and network configuration.

Assessment Setup

You can use the options below to get the following assessments on all of your EC2 instances in this AWS region. Click [Run weekly](#) for the assessment to run at this time once a week starting now, [Run once](#) for a one-time assessment, or [Advanced setup](#) for custom assessments.

Network Assessments (Inspector Agent is not required)

- **Assessments performed:** Network configuration analysis to checks for ports reachable from outside the VPC. [Learn more](#)
- **Optional Agent:** If the Inspector Agent is installed on your EC2 instances, the assessment also finds processes reachable on port. Learn more about [Inspector Agent](#)
- **Pricing:** Pricing for [network assessments](#) is based on the monthly volume of instance-assessments, where an instance-assessment denotes a successful assessment of an instance. For example, for 100 instances assessed weekly, the monthly cost would be around \$61/month. [Learn more](#)

Host Assessments (Inspector Agent is required)

- **Assessments performed:** Vulnerable software (CVE), host hardening (DIS benchmarks), and security best practices. [Learn more](#)
- **Agent Deployment:** Inspector assessments require an agent to be installed on your EC2 instances. We will automatically install the agent for instances that allow [System Manager Run-Command](#). Learn more about [Inspector Agent](#) and how to manually install agent.
- **Pricing:** Pricing for [host assessments](#) is based on the monthly volume of agent-assessments, where an agent-assessment denotes a successful assessment of an instance. For example, for 100 instances assessed weekly, the monthly cost would be around \$120/month. [Learn more](#)

[Run weekly \(recommended\)](#)

[Run once](#)

[Advanced setup](#)

[Cancel](#)



Services

Resource Groups

Ohio Support



Amazon Inspector - J...



Dashboard

Assessment targets

Assessment templates

Assessment runs

Findings

Amazon Inspector - J...

An assessment template allows you to sp...

[Create](#)[Run](#)[Delete](#)[Filter](#)

SUCCESS

- Assessment template already exists: Assessment-Template-Default-All-Rules
- Run command successfully issued to install the Amazon Inspector Agent. You can check the agent status by choosing the Preview Target button or by viewing the Systems Manager Run Command console for more details.
- Assessment target already exists: Assessment-Target-All-Instances-All-Rules

updated on August 20, 2020 9:59:10 AM (0m ago)



Viewing 1-1 of 1

| Name | Duration | Target name | Last run | All runs |
|---------------------------------------|----------|---|-------------------|----------|
| Assessment-Template-Default-All-Rules | 1 Hour | Assessment-Target-All-Instances-All-Rules | Analysis complete | 1 |

Max records per page

25

refresh browser to reflect change



Services

Resource Groups



Ohio

Support

Dashboard

Assessment targets

Assessment templates

Assessment runs

Findings

Amazon Inspector - Assessment Templates

An assessment template allows you to specify various properties for an assessment run, including rules packages, duration, SNS notifications, and how to label any findings. [Learn more](#).

[Create](#)[Run](#)[Delete](#)[Clone](#)[Create Assessment Events](#)

Last updated on August 20, 2020 9:59:10 AM (0m ago)



Viewing 1-1 of 1

| Name | Duration | Target name | Last run | All runs |
|---------------------------------------|----------|---|-------------------|----------|
| Assessment-Template-Default-All-Rules | 1 Hour | Assessment-Target-All-Instances-All-Rules | Analysis complete | 1 |

Max records per page

* refresh browser to reflect change



Services

Resource Groups



Ohio

Support



Dashboard

Assessment targets

Assessment templates

Assessment runs

Findings

Severity Filter

High

Medium

Low

Informational

Amazon Inspector - Findings

Findings are potential security issues discovered after Amazon Inspector runs an assessment against a specified assessment target. Learn more.

Add/Edit attributes

Loading...



Filter:



Severity



Date



Finding

Target

Template

Rules Package



Medium

Today at 9:3...

Assessment.Targe...

Assessment.Temp...

Network Reachability-1.1

Viewing 1-1 of 1

Max records per page

25

* refresh browser to reflect change



Services

Resource Groups



Ohio

Support



Dashboard

Assessment targets

Assessment templates

Assessment runs

Findings

Severity Filter

High

Medium

Low

Informational

Amazon Inspector - Findings

Findings are potential security issues discovered after Amazon Inspector runs an assessment against a specified assessment target. Learn more.

[Add/Edit attributes](#)

Last updated on August 20, 2020 9:59:19 AM (0m ago)



Viewing 1-3 of 3

| Severity | Date | Finding | Target | Template | Rules Package |
|---------------|-----------------|---|---------------------|---------------------|--------------------------|
| Medium | Today at 9:3... | Amazon Inspector detected 100 potential security issues across 100 resources. | Assessment-Targe... | Assessment-Templ... | Network Reachability-1.1 |
| Low | Today at 9:3... | Amazon Inspector detected 100 potential security issues across 100 resources. | Assessment-Targe... | Assessment-Templ... | Network Reachability-1.1 |
| Informational | Today at 9:3... | Amazon Inspector detected 100 potential security issues across 100 resources. | Assessment-Targe... | Assessment-Templ... | Network Reachability-1.1 |

Max records per page: 25

* refresh browser to reflect change



Dashboard

Assessment targets

Assessment templates

Assessment runs

Findings

Severity Filter

High

Medium

Low

Informational

Amazon Inspector - Findings

Findings are potential security issues discovered after Amazon Inspector runs an assessment against a specified assessment target. Learn more.

[Add/Edit attributes](#)

Last updated on August 20, 2020 9:59:19 AM (0m ago)



Viewing 1-3 of 3



Severity



Medium



Today at 9:30 AM



Assessment-Target-All-Instances-All-Rules



Assessment-Template-Default-All-Rules



Network Reachability-1.1



arn:aws:inspector:us-east-2:

ARN

Run name

Target name

Template name

Start

End

Status

Rules package

AWS agent ID

Finding

Severity

Description

Recommendation

On instance [REDACTED] TCP port 22 which is associated with 'SSH' is reachable from the internet.

Medium

On this instance, TCP port 22, which is associated with SSH, is reachable from the internet. You can install the Inspector agent on this instance and re-run the assessment to check for any process listening on this port. The instance [REDACTED] is located in VPC [REDACTED] and has an attached ENI [REDACTED] which uses network ACL [REDACTED]. The port is reachable from the internet through Security Group [REDACTED] and IGW [REDACTED].

You can edit the Security Group [REDACTED] to remove access from the internet on port 22.



Services

Resource Groups



Ohio

Support



Dashboard

Assessment targets

Assessment templates

Assessment runs

Findings

Severity Filter

None

Medium

Low

Informational

Amazon Inspector - Findings

Findings are potential security issues discovered after Amazon Inspector runs an assessment against a specified assessment target. Learn more.

[Add/Edit attributes](#)

Last updated on August 20, 2020 9:59:19 AM (0m ago)



Filter:



Severity



Date



Finding

Target

Template

Rules Package



Medium

Today at 9:30 AM

On instance [REDACTED] located in VPC [REDACTED]

Assessment-Targe...

Assessment-Temp...

Network Reachability-1.1



Viewing 1-3 of 3



Finding for assessment target 'Assessment-Target-All-Instances-All-Rules' and template 'Assessment-Template-Default-All-Rules'

ARN: arn:aws:inspector:us-east-2:[REDACTED]

Run name: Run - Assessment-Template-Default-All-Rules - 2020-08-20T16:30:43.717Z

Target name: Assessment-Target-All-Instances-All-Rules

Template name: Assessment-Template-Default-All-Rules

Start: Today at 9:30 AM (GMT-7) (26 minutes ago)

End: Today at 9:31 AM (GMT-7) (26 minutes ago)

Status: Analysis complete

Rules package: Network Reachability-1.1

AWS agent ID: [REDACTED]

Finding: On instance [REDACTED] TCP port 22 which is associated with 'SSH' is reachable from the internet.

Severity: Medium

Description: On this instance, TCP port 22, which is associated with SSH, is reachable from the internet. You can install the Inspector agent on this instance and re-run the assessment to check for any process listening on this port. The instance [REDACTED] is located in VPC [REDACTED] and has an attached ENI [REDACTED] which uses network ACL [REDACTED]. The port is reachable from the internet through Security Group [REDACTED] and IGW [REDACTED].

Recommendation: You can edit the Security Group [REDACTED] to remove access from the internet on port 22.







Amazon GuardDuty

AWS Key Management Service (AWS KMS)

The coffee shop has many items, such as coffee machines, pastries, money in the cash registers, and so on. You can think of these items as data. The coffee shop owners want to ensure that all of these items are secure, whether they're sitting in the storage room or being transported between shop locations.

In the same way, you must ensure that your applications' data is secure while in storage (**encryption at rest**) and while it is transmitted, known as **encryption in transit**.

[**AWS Key Management Service \(AWS KMS\)**](#) enables you to perform encryption operations through the use of **cryptographic keys**. A cryptographic key is a random string of digits used for locking (encrypting) and unlocking (decrypting) data. You can use AWS KMS to create, manage, and use cryptographic keys. You can also control the use of keys across a wide range of services and in your applications.

With AWS KMS, you can choose the specific levels of access control that you need for your keys. For example, you can specify which IAM users and roles are able to manage keys. Alternatively, you can temporarily disable keys so that they are no longer in use by anyone. Your keys never leave AWS KMS, and you are always in control of them.

AWS WAF

[AWS WAF](#) is a web application firewall that lets you monitor network requests that come into your web applications.

AWS WAF works together with Amazon CloudFront and an Application Load Balancer. Recall the network access control lists that you learned about in an earlier module. AWS WAF works in a similar way to block or allow traffic. However, it does this by using a [web access control list \(ACL\)](#) to protect your AWS resources.

Here's an example of how you can use AWS WAF to allow and block specific requests.

Here's an example of how you can use AWS WAF to allow and block specific requests.



Suppose that your application has been receiving malicious network requests from several IP addresses. You want to prevent these requests from continuing to access your application, but you also want to ensure that legitimate users can still access it. You configure the web ACL to allow all requests except those from the IP addresses that you have specified.

When a request comes into AWS WAF, it checks against the list of rules that you have configured in the web ACL. If a request did not come from one of the blocked IP addresses, it allows access to the application.

Malicious request from a hacker

I'd like to access the application.

You are coming from an IP address that has been blocked. You cannot enter.



Packet



AWS WAF

However, if a request came from one of the blocked IP addresses that you have specified in the web ACL, it is denied access.

Amazon Inspector

Suppose that the developers at the coffee shop are developing and testing a new ordering application. They want to make sure that they are designing the application in accordance with security best practices. However, they have several other applications to develop, so they cannot spend much time conducting manual assessments. To perform automated security assessments, they decide to use [Amazon Inspector](#).

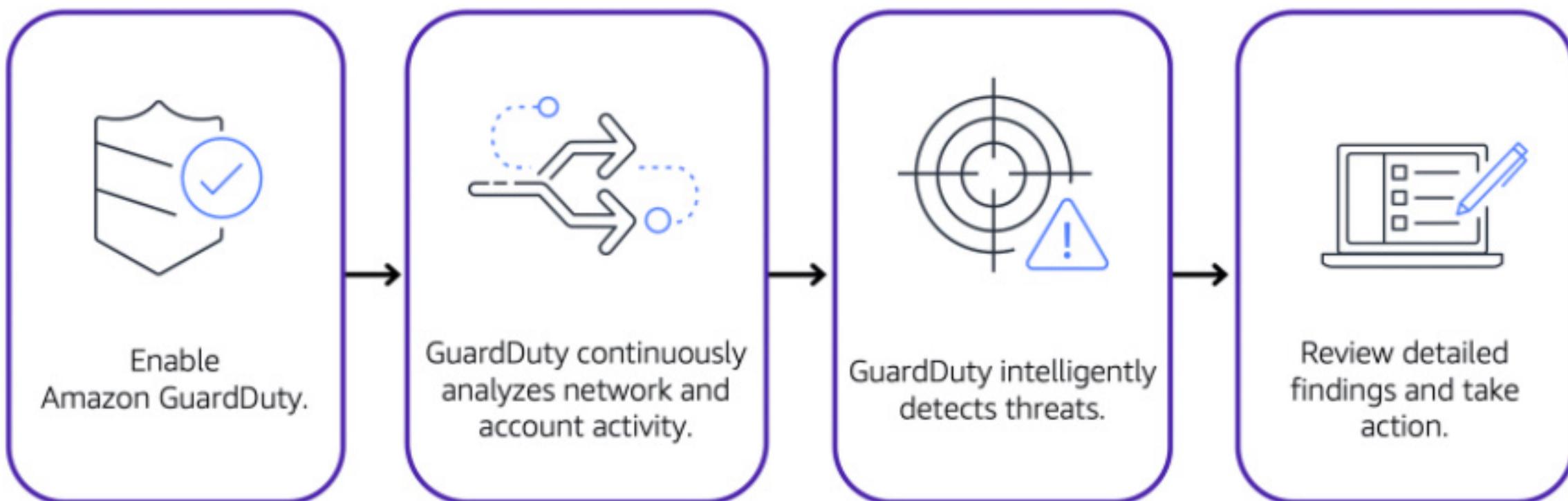
Amazon Inspector helps to improve the security and compliance of applications by running automated security assessments. It checks applications for security vulnerabilities and deviations from security best practices, such as open access to Amazon EC2 instances and installations of vulnerable software versions.

After Amazon Inspector has performed an assessment, it provides you with a list of security findings. The list prioritizes by severity level, including a detailed description of each security issue and a recommendation for how to fix it. However, AWS does not guarantee that following the provided recommendations resolves every potential security issue. Under the shared responsibility model, customers are responsible for the security of their applications, processes, and tools that run on AWS services.

processes, and tools that run on AWS services.

Amazon GuardDuty

[Amazon GuardDuty](#) is a service that provides intelligent threat detection for your AWS infrastructure and resources. It identifies threats by continuously monitoring the network activity and account behavior within your AWS environment.



After you have enabled GuardDuty for your AWS account, GuardDuty begins monitoring your network and account activity. You do not have to deploy or manage any additional security software. GuardDuty then continuously analyzes data from multiple AWS sources, including VPC Flow Logs and DNS logs.

If GuardDuty detects any threats, you can review detailed findings about them from the AWS Management Console. Findings include recommended steps for remediation. You can also configure AWS Lambda functions to take remediation steps automatically in response to GuardDuty's security findings.



- Users
- Groups
- Roles
- Policies
- Identity federation



- Users
- Groups
- Roles
- Policies
- Identity federation
- Multi-factor authentication (MFA)

Additional resources

To learn more about the concepts that were explored in Module 6, review these resources.

- [Security, Identity, and Compliance on AWS](#)
- [Whitepaper: Introduction to AWS Security](#)
- [Whitepaper: Amazon Web Services - Overview of Security Processes](#)
- [AWS Security Blog](#)
- [AWS Compliance](#)
- [AWS Customer Stories: Security, Identity, and Compliance](#)

Which statement best describes an IAM policy?



An authentication process that provides an extra layer of protection for your AWS account



A document that grants or denies permissions to AWS services and resources



An identity that you can assume to gain temporary access to permissions

The correct response option is: A document that grants or denies permissions to AWS services and resources.

IAM policies provide you with the flexibility to customize users' levels of access to resources. For instance, you can allow users to access all the Amazon S3 buckets in your AWS account or only a specific bucket.

The other response options are incorrect because:

- Multi-factor authentication (MFA) is an authentication process that provides an extra layer of protection for your AWS account.
- An IAM role is an identity that you can assume to gain temporary access to permissions.
- The root user identity is the identity that is established when you first create an AWS account.

Learn more:

- [AWS IAM: Policies and permissions](#)

An employee requires temporary access to create several Amazon S3 buckets.

Which option would be the best choice for this task?



AWS account root user



IAM group



IAM role



Service control policy (SCP)

An IAM role is an identity that you can assume to gain temporary access to permissions. When someone assumes an IAM role, they abandon all permissions that they had under a previous role and assume the permissions of the new role. IAM roles are ideal for situations in which access to services or resources needs to be granted temporarily instead of long-term.

The other response options are incorrect because:

- The AWS account root user is established when you first create an AWS account. As a best practice, do not use the root user for everyday tasks.
- Although you can attach IAM policies to an IAM group, this would not be the best choice for this scenario because the employee only needs to be granted temporary permissions.
- Service control policies (SCPs) enable you to centrally control permissions for the accounts in your organization. An SCP is not the best choice for granting temporary permissions to an individual employee.

Learn more:

- [IAM roles](#)

Which statement best describes the principle of least privilege?



Adding an IAM user into at least one IAM group



Checking a packet's permissions against an access control list



Granting only the permissions that are needed to perform specific tasks



Performing a denial of service attack that originates from at least one device

The correct response option is: **Granting only the permissions that are needed to perform specific job tasks.**

When you grant permissions by following the principle of least privilege, you prevent users or roles from having more permissions than needed to perform specific job tasks. For example, cashiers in the coffee shop should be given access to the cash register system. As a best practice, grant IAM users and roles a minimum set of permissions and then grant additional permissions as needed.

Learn more:

- [Security best practices in IAM](#)

TAKE AGAIN



Which service helps protect your applications against distributed denial-of-service (DDoS) attacks?



Amazon GuardDuty



Amazon Inspector



AWS Artifact



AWS Shield

The correct response option is **AWS Shield**.

As network traffic comes into your applications, AWS Shield uses a variety of analysis techniques to detect potential DDoS attacks in real time and automatically mitigates them.

The other response options are incorrect because:

- Amazon GuardDuty is a service that provides intelligent threat detection for your AWS infrastructure and resources. It identifies threats by continuously monitoring the network activity and account behavior within your AWS environment.
- Amazon Inspector checks applications for security vulnerabilities and deviations from security best practices, such as open access to Amazon EC2 instances and installations of vulnerable software versions.
- AWS Artifact is a service that provides on-demand access to AWS security and compliance reports and select online agreements.

Learn more:

- [AWS Shield](#)

Which task can AWS Key Management Service (AWS KMS) perform?



Configure multi-factor authentication (MFA).



Update the AWS account root user password.



Create cryptographic keys.



Assign permissions to users and groups.

The correct response option is: **Create cryptographic keys.**

AWS Key Management Service (AWS KMS) enables you to perform encryption operations through the use of cryptographic keys. A cryptographic key is a random string of digits used for locking (encrypting) and unlocking (decrypting) data. You can use AWS KMS to create, manage, and use cryptographic keys. You can also control the use of keys across a wide range of services and in your applications.

The other response options are incorrect because:

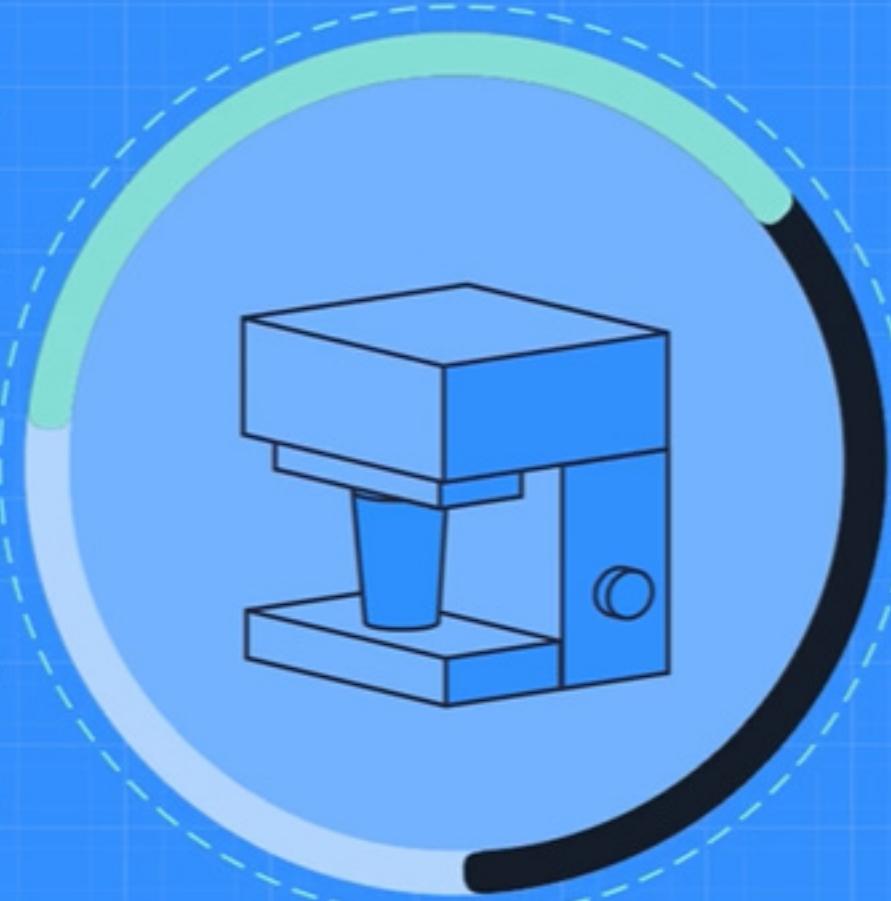
- You can configure multi-factor authentication (MFA) in *AWS Identity and Access Management (IAM)*.
- You can update the AWS account root user password in *the AWS Management Console*.
- You can assign permissions to users and groups in *AWS Identity and Access Management (IAM)*.

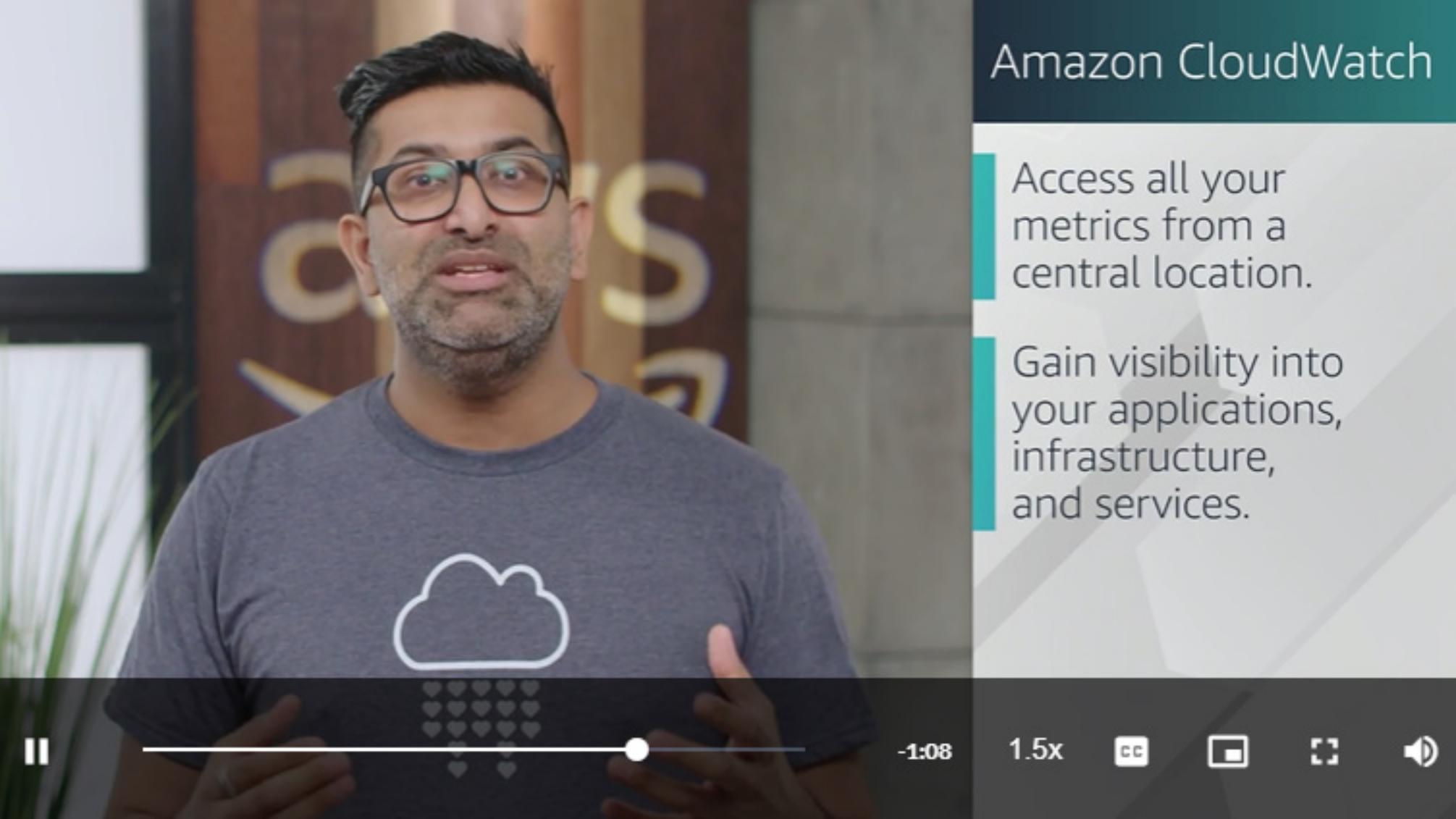
Learn more:

- [AWS KMS](#)



Amazon CloudWatch





Amazon CloudWatch

Access all your metrics from a central location.

Gain visibility into your applications, infrastructure, and services.

-1:08

1.5x



Amazon CloudWatch

Drive insights to optimize applications and operational resources.



A medium shot of a man with dark hair, a beard, and glasses, wearing a grey t-shirt with a white cloud and heart graphic. He is gesturing with his hands while speaking. In the background, there's a wooden wall with large yellow letters spelling "aws" and some green plants on the left.

Amazon CloudWatch

Drive insights to optimize applications and operational resources.

Amazon CloudWatch

[Amazon CloudWatch](#) is a web service that enables you to monitor and manage various metrics and configure alarm actions based on data from those metrics.

CloudWatch uses [metrics](#) to represent the data points for your resources. AWS services send metrics to CloudWatch. CloudWatch then uses these metrics to create graphs automatically that show how performance has changed over time.

CloudWatch alarms

With CloudWatch, you can create [alarms](#) that automatically perform actions if the value of your metric has gone above or below a predefined threshold.

For example, suppose that your company's developers use Amazon EC2 instances for application development or testing purposes. If the developers occasionally forget to stop the instances, the instances will continue to run and incur charges.

In this scenario, you could create a CloudWatch alarm that automatically stops an Amazon EC2 instance when the CPU utilization percentage has remained below a certain threshold for a specified period. When configuring the alarm, you can specify to receive a notification whenever this alarm is triggered.

CloudWatch dashboard

CloudWatch dashboard

Amazon RDS metrics



Amazon EC2 metrics

Various units

105

52.6

0

16:30

16:45

17:00

17:15

■ NetworkPacketsIn ■ NetworkPacketsOut ■ CPUUtilization

Amazon EBS metrics

5.62 k

891

■ VolumeReadOps

■ VolumeWriteOps

The CloudWatch [dashboard](#) feature enables you to access all the metrics for your resources from a single location. For example, you can use a CloudWatch dashboard to monitor the CPU utilization of an Amazon EC2 instance, the total number of requests made to an Amazon S3 bucket, and more. You can even customize separate dashboards for different business purposes, applications, or resources.

AWS CloudTrail

[**AWS CloudTrail**](#) records API calls for your account. The recorded information includes the identity of the API caller, the time of the API call, the source IP address of the API caller, and more. You can think of CloudTrail as a “trail” of breadcrumbs (or a log of actions) that someone has left behind them.

Recall that you can use API calls to provision, manage, and configure your AWS resources. With CloudTrail, you can view a complete history of user activity and API calls for your applications and resources.

Events are typically updated in CloudTrail within 15 minutes after an API call. You can filter events by specifying the time and date that an API call occurred, the user who requested the action, the type of resource that was involved in the API call, and more.

Example: AWS CloudTrail event

Suppose that the coffee shop owner is browsing through the AWS Identity and Access Management (IAM) section of the AWS Management Console. They discover that a new IAM user named Mary was created, but they do not know who, when, or which method created the user.

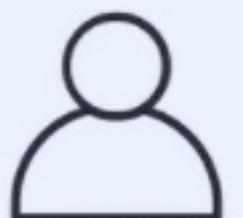
What happened?

A new IAM user (Mary) was created.



Who made the request?

IAM user John



When did this occur?

January 1, 2020 at 9:00 AM



How was the request made?

Through the AWS Management Console



In the CloudTrail Event History section, the owner applies a filter to display only the events for the "CreateUser" API action in IAM. The owner locates the event for the API call that created an IAM user for Mary. This event record provides complete details about what occurred:

On January 1, 2020 at 9:00 AM, IAM user John created a new IAM user (Mary) through the AWS Management Console.

CloudTrail Insights

Within CloudTrail, you can also enable [CloudTrail Insights](#). This optional feature allows CloudTrail to automatically detect unusual API activities in your AWS account.

For example, CloudTrail Insights might detect that a higher number of Amazon EC2 instances than usual have recently launched in your account. You can then review the full event details to determine which actions you need to take next.

Which tasks can you perform using AWS CloudTrail? (Select TWO.)



Monitor your AWS infrastructure and resources in real time



Track user activities and API requests throughout your AWS infrastructure



View metrics and graphs to monitor the performance of resources



Filter logs to assist with operational analysis and troubleshooting



Configure automatic actions and alerts in response to metrics



Correct

The correct two response options are:

- Track user activities and API requests throughout your AWS infrastructure
- Filter logs to assist with operational analysis and troubleshooting

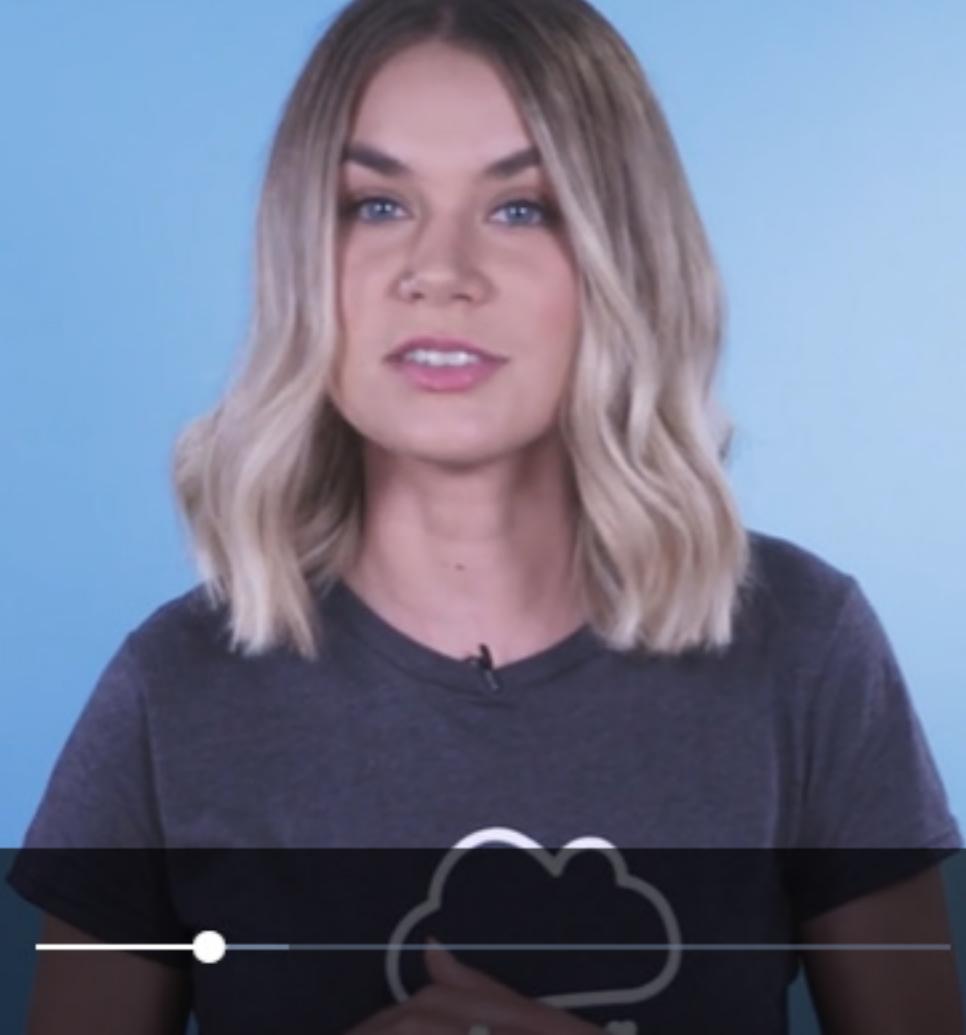
The other response options are tasks that you can perform in Amazon CloudWatch.

Learn more:

- [AWS CloudTrail](#)

AWS Trusted Advisor

- Cost optimization
- Performance
- Security
- Fault tolerance
- Service limits



-4:40

1.5x



AWS Management Console

AWS services

Find Services

You can enter names, keywords or acronyms.

▼ Recently visited services

AWS Cost Explorer

API Gateway

IAM

EC2

Trusted Advisor

▼ All services

Compute

EC2

Lightsail

Lambda

Batch

Elastic Beanstalk

Serverless Application Repository

AWS Outposts

Blockchain

Amazon Managed Blockchain

Satellite

Ground Station

Quantum Technologies

Amazon Braket

Security, Identity, & Compliance

IAM

Resource Access Manager

Cognito

Secrets Manager

GuardDuty

Inspector

Amazon Macie

Stay connected to your AWS resources on-the-go



Download the AWS Console Mobile App to your iOS or Android mobile device. [Learn more](#)

Explore AWS

Amazon Elasticsearch Service

Fully managed Elasticsearch for log analytics, without the operational overhead.

[Learn more](#)

Free Digital Training

Get access to 350+ self-paced online courses covering AWS products and services.

[Learn more](#)

Amazon CodeCommit

Dashboard

Cost Optimization

Performance

Security

Fault Tolerance

Service Limits

Preferences

Cost Optimization



11 ✓ 3 ▲ 0 ⓘ
\$241.48

Potential monthly savings

Filter by tag

Tag Key

Tag Value

Apply filter

Reset

View

All checks

▼

Cost Optimization Checks



Amazon EC2 Reserved Instances Optimization

Refreshed: an hour ago



A significant part of using AWS involves balancing your Reserved Instance (RI) usage and your On-Demand instance usage.

Estimated monthly savings with one year RI term: \$47.53 (37.0%). Estimated monthly savings with three year RI term: \$74.65 (58.0%)



Low Utilization Amazon EC2 Instances

Refreshed: a few seconds ago



Checks the Amazon Elastic Compute Cloud (Amazon EC2) instances that were running at any time during the last 14 days and alerts you if the daily CPU utilization was 10% or less and network I/O was 5 MB or less on 4 or more days.

11 of 11 Amazon EC2 instances have low average daily utilization. Monthly savings of up to \$174.96 might be available by minimizing underutilized instances.



Underutilized Amazon EBS Volumes

Refreshed: a few seconds ago



Checks Amazon Elastic Block Store (Amazon EBS) volume configurations and warns when volumes appear to be underutilized.

Trusted Advisor Management X +

console.aws.amazon.com/trustedadvisor/home?#/category/cost-optimizing

Cost Optimization Checks

▶ Amazon EC2 Reserved Instances Optimization Refreshed: an hour ago

A significant part of using AWS involves balancing your Reserved Instance (RI) usage and your On-Demand instance usage. Estimated monthly savings with one year RI term: \$47.53 (37.0%). Estimated monthly savings with three year RI term: \$74.65 (58.0%)

▶ Low Utilization Amazon EC2 Instances Refreshed: a few seconds ago

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11 of 11 Amazon EC2 instances have low average daily utilization. Monthly savings of up to \$174.96 might be available by minimizing underutilized instances.

▶ Underutilized Amazon EBS Volumes Refreshed: a few seconds ago

Checks Amazon Elastic Block Store (Amazon EBS) volume configurations and warns when volumes appear to be underused.

9 of 22 EBS volumes appear to be underutilized. Monthly savings of up to \$19.00 are available by minimizing underused EBS volumes.

▶ Amazon EC2 Reserved Instance Lease Expiration Refreshed: an hour ago

Checks for Amazon EC2 Reserved Instances that are scheduled to expire within the next 30 days or have expired in the preceding 30 days.

0 Reserved Instances have expired or will soon expire. Monthly savings compared to on-demand rates of up to \$0 are available if you renew them.

▶ Amazon ElastiCache Reserved Node Optimization Refreshed: a minute ago

Checks your usage of ElastiCache and provides recommendations on purchase of Reserved Nodes to help reduce costs incurred from using ElastiCache On-Demand.

▶ Amazon Elasticsearch Reserved Instance Optimization Refreshed: a minute ago

Checks your usage of Elasticsearch and provides recommendations on purchase of Reserved Instances to help reduce costs incurred from using Elasticsearch On-Demand.

Dashboard

Cost Optimization

Performance

Security

Fault Tolerance

Service Limits

Preferences

Performance



10 0 0

Filter by tag

Tag Key

Tag Value

Apply filter

Reset

View

All checks

▼

Performance Checks



Amazon EBS Provisioned IOPS (SSD) Volume Attachment Configuration

Refreshed: an hour ago



Checks for Provisioned IOPS (SSD) volumes that are attached to an Amazon EBS-optimized Amazon Elastic Compute Cloud (Amazon EC2) instance that is not EBS-optimized.

0 of 0 EBS Provisioned IOPS volumes are attached to an EC2 instance that is not EBS-optimized.



Amazon EC2 to EBS Throughput Optimization

Refreshed: a minute ago



Checks for Amazon EBS volumes whose performance might be affected by the maximum throughput capability of the Amazon EC2 instance they are attached to.

0 of 0 EBS-optimized EC2 instances had EBS volume usage that exceeded 95% of the instance maximum throughput for more than half of the preceding day.



Amazon Route 53 Alias Resource Record Sets

Refreshed: an hour ago



AWS Trusted Advisor

[**AWS Trusted Advisor**](#) is a web service that inspects your AWS environment and provides real-time recommendations in accordance with AWS best practices.

Trusted Advisor compares its findings to AWS best practices in five categories: cost optimization, performance, security, fault tolerance, and service limits. For the checks in each category, Trusted Advisor offers a list of recommended actions and additional resources to learn more about AWS best practices.

The guidance provided by AWS Trusted Advisor can benefit your company at all stages of deployment. For example, you can use AWS Trusted Advisor to assist you while you are creating new workflows and developing new applications. Or you can use it while you are making ongoing improvements to existing applications and resources.

AWS Trusted Advisor dashboard

Cost Optimization



0 ✓ 9 ▲ 0 !

\$7,516.85

Potential monthly savings

Performance



3 ✓ 7 ▲ 0 !

Security



2 ✓ 4 ▲ 11 !

Fault Tolerance



0 ✓ 15 ▲ 5 !

Service Limits



37 ✓ 0 ▲ 1 !

When you access the Trusted Advisor dashboard on the AWS Management Console, you can review completed checks for cost optimization, performance, security, fault tolerance, and service limits.

For each category:

- The green check indicates the number of items for which it detected **no problems**.
- The orange triangle represents the number of recommended **investigations**.
- The red circle represents the number of recommended **actions**.

Additional resources

To learn more about the concepts that were explored in Module 7, review these resources.

- [Management and Governance on AWS](#)
- [Monitoring and Observability](#)
- [Configuration, Compliance, and Auditing](#)
- [AWS Management & Governance Blog](#)
- [Whitepaper: AWS Governance at Scale](#)



#ive-dialogue



Martín Massera 06:14 PM

@channel Anyone can

Which actions can you perform using Amazon CloudWatch? (Select TWO.)



Monitor your resources' utilization and performance



Receive real-time guidance for improving your AWS environment



Compare your infrastructure to AWS best practices in five categories



Access metrics from a single dashboard



Automatically detect unusual account activity

The two correct response options are:

- Monitor your resources' utilization and performance
- Access metrics from a single dashboard

The other response options are incorrect because:

- Receiving real-time recommendations for improving your AWS environment can be performed by AWS Trusted Advisor.
- Comparing your infrastructure to AWS best practices in five categories can be performed by AWS Trusted Advisor.
- Automatically detecting unusual account activity can be performed by AWS CloudTrail.

Learn more:

- [Amazon CloudWatch](#)

Which service enables you to review the security of your Amazon S3 buckets by checking for open access permissions?

Amazon CloudWatch

AWS CloudTrail

AWS Trusted Advisor

Amazon GuardDuty

The correct response option is AWS Trusted Advisor.

AWS Trusted Advisor is a web service that inspects your AWS environment and provides real-time recommendations in accordance with AWS best practices. The inspection includes security checks, such as Amazon S3 buckets with open access permissions.

The other response options are incorrect because:

- Amazon CloudWatch is a web service that enables you to monitor and manage various metrics for the resources that run your applications.
- AWS CloudTrail is a web service that enables you to review details for user activities and API calls that have occurred within your AWS environment.
- Amazon GuardDuty is a service that provides intelligent threat detection for your AWS environment and resources. It identifies threats by continuously monitoring the network activity and account behavior within your AWS environment.

Learn more:

- [AWS Trusted Advisor](#)

Which categories are included in the AWS Trusted Advisor dashboard? (Select TWO.)



Reliability



Performance



Scalability



Elasticity



Fault tolerance

The two correct response options are:

- Performance
- Fault tolerance

AWS Trusted Advisor continuously inspects your AWS environment and provides best practice recommendations across five categories: cost optimization, performance, security, fault tolerance, and service limits.

Learn more:

- [AWS Trusted Advisor](#)

A medium shot of a man with dark hair, a beard, and glasses, wearing a grey t-shirt with a white cloud and heart graphic. He is gesturing with his hands while speaking.

AWS Free Tier

Always free

12 months free

Trials



AWS Lambda allows for 1 million free invocations per month.

A medium shot of a man with dark hair, a beard, and glasses, wearing a grey t-shirt. He is gesturing with his right hand while speaking. The background shows a wooden wall with large letters spelling 'AWS' and some green plants.

Amazon S3 is free for 12 months
for up to 5 GB of standard storage.



-0:49

1.5x



AWS Free Tier

The [AWS Free Tier](#) enables you to begin using certain services without having to worry about incurring costs for the specified period.

Three types of offers are available:

- Always Free
- 12 Months Free
- Trials

For each free tier offer, make sure to review the specific details about exactly which resource types are included.

A medium shot of a man with dark hair and glasses, wearing a grey t-shirt with a white cloud and a grid of hearts graphic. He is gesturing with his hands while speaking. The background is an indoor setting with a potted plant and a shelf.

AWS Free Tier services

- Amazon SageMaker
- Amazon Comprehend Medical
- Amazon DynamoDB
- Amazon SNS
- Amazon Cognito

1.5x



Always Free

These offers do not expire and are available to all AWS customers.

For example, AWS Lambda allows 1 million free requests and up to 3.2 million seconds of compute time per month. Amazon DynamoDB allows 25 GB of free storage per month.

12 Months Free

These offers are free for 12 months following your initial sign-up date to AWS.

Examples include specific amounts of Amazon S3 Standard Storage, thresholds for monthly hours of Amazon EC2 compute time, and amounts of Amazon CloudFront data transfer out.

Trials



Short-term free trial offers start from the date you activate a particular service. The length of each trial might vary by number of days or the amount of usage in the service.

For example, Amazon Inspector offers a 90-day free trial. Amazon Lightsail (a service that enables you to run virtual private servers) offers 750 free hours of usage over a 30-day period.

The AWS Free Tier includes offers that are available to new AWS customers for a certain period of time following their AWS sign-up date. What is the duration of this period?



3 months



6 months



9 months



12 months

The correct response option is **12 months**.

The AWS Free Tier consists of three types of offers that allow customers to use AWS services without incurring costs: Always free, 12 months free, and Trials.

For 12 months after you first sign up for an AWS account, you can take advantage of offers in the **12 Months Free** category. Examples of offers in this category include specific amounts of Amazon S3 Standard Storage, thresholds for monthly hours of Amazon EC2 compute time, and amounts of Amazon CloudFront data transfer out.

Learn more:

- [AWS Free Tier](#)

How AWS pricing works

AWS offers a range of cloud computing services with pay-as-you-go pricing.

To learn more, select the + symbol next to each category.

Pay for what you use.

For each service, you pay for exactly the amount of resources that you actually use, without requiring long-term contracts or complex licensing.

Pay less when you reserve.

—

Some services offer reservation options that provide a significant discount compared to On-Demand Instance pricing.

For example, suppose that your company is using Amazon EC2 instances for a workload that needs to run continuously. You might choose to run this workload on Amazon EC2 Instance Savings Plans, because the plan allows you to save up to 72% over the equivalent On-Demand Instance capacity.

Pay less with volume-based discounts when you use more.

—

Some services offer tiered pricing, so the per-unit cost is incrementally lower with increased usage.

For example, the more Amazon S3 storage space you use, the less you pay for it per GB.

AWS Pricing Calculator

The [AWS Pricing Calculator](#) lets you explore AWS services and create an estimate for the cost of your use cases on AWS. You can organize your AWS estimates by groups that you define. A group can reflect how your company is organized, such as providing estimates by cost center.

When you have created an estimate, you can save it and generate a link to share it with others.

Suppose that your company is interested in using Amazon EC2. However, you are not yet sure which AWS Region or instance type would be the most cost-efficient for your use case. In the AWS Pricing Calculator, you can enter details such as the kind of operating system you need, memory requirements, and input/output (I/O) requirements. By using the AWS Pricing Calculator, you can review an estimated comparison of different EC2 instance types across AWS Regions.

Suppose that your company is interested in using Amazon EC2. However, you are not yet sure which AWS Region or instance type would be the most cost-efficient for your use case. In the AWS Pricing Calculator, you can enter details such as the kind of operating system you need, memory requirements, and input/output (I/O) requirements. By using the AWS Pricing Calculator, you can review an estimated comparison of different EC2 instance types across AWS Regions.

For Amazon S3 pricing, consider the following cost components:

- **Storage** - You pay for only the storage that you use. You are charged the rate to store objects in your Amazon S3 buckets based on your objects' sizes, storage classes, and how long you have stored each object during the month.
- **Requests and data retrievals** - You pay for requests made to your Amazon S3 objects and buckets. For example, suppose that you are storing photo files in Amazon S3 buckets and hosting them on a website. Every time a visitor requests the website that includes these photo files, this counts towards requests you must pay for.
- **Data transfer** - There is no cost to transfer data between different Amazon S3 buckets or from Amazon S3 to other services within the same AWS Region. However, you pay for data that you transfer into and out of Amazon S3, with a few exceptions. There is no cost for data transferred into Amazon S3 from the internet or out to Amazon CloudFront. There is also no cost for data transferred out to an Amazon EC2 instance in the same AWS Region as the Amazon S3 bucket.

AMAZON S3 PRICING

PRICING EXAMPLE

The AWS account in this example has used Amazon S3 in two Regions: Northern Virginia and Ohio. For each Region, itemized charges are based on the following factors:

- The number of requests to add or copy objects into a bucket
- The number of requests to retrieve objects from a bucket
- The amount of storage space used

All the usage for Amazon S3 in this example is under the AWS Free Tier limits, so the account owner would not have to pay for any Amazon S3 usage in this month.

| | | |
|---|------------------|--------|
| - Simple Storage Service | | \$0.00 |
| - US East (N. Virginia) | | \$0.00 |
| Amazon Simple Storage Service Requests-Tier1 | | \$0.00 |
| \$0.00 per request - PUT, COPY, POST, or LIST requests under the monthly global free tier | 185.000 Requests | \$0.00 |
| Amazon Simple Storage Service Requests-Tier2 | | \$0.00 |
| \$0.00 per request - GET and all other requests under the monthly global free tier | 923.000 Requests | \$0.00 |
| Amazon Simple Storage Service TimedStorage-ByteHrs | | \$0.00 |
| \$0.000 per GB - storage under the monthly global free tier | 0.159 GB-Mo | \$0.00 |
| - US East (Ohio) | | \$0.00 |
| Amazon Simple Storage Service USE2-Requests-Tier2 | | \$0.00 |
| \$0.00 per request - GET and all other requests under the monthly global free tier | 4.000 Requests | \$0.00 |
| Amazon Simple Storage Service USE2-TimedStorage-ByteHrs | | \$0.00 |
| \$0.000 per GB - storage under the monthly global free tier | 0.000001 GB-Mo | \$0.00 |

Billing dashboard

AWS Management Console

AWS services

Find Services

You can enter names, keywords or acronyms.

Example: Relational Database Service, database, RDS

▼ Recently visited services



Billing



Amazon Transcribe



S3



AWS Organizations

► All services

Build a solution

Get started with simple wizards and automated workflows.

Launch a virtual machine

With EC2

2-3 minutes



Build a web app

With Elastic Beanstalk

6 minutes



Build using virtual servers

With Lightsail

1-2 minutes



Stay connected to your AWS resources on-the-go



Download the AWS Console Mobile App to your iOS or Android mobile device. [Learn more](#)

Explore AWS

Amazon DocumentDB (with MongoDB compatibility)

New role-based access control support helps you enforce least privilege access and build multi-tenant applications. [Learn more](#)

Introducing Amazon EFS for AWS Lambda

Simplify file storage for serverless, and securely read, write and persist large data volumes at virtually any scale. [Learn more](#)

Amazon SageMaker Autopilot

Get hands-on with AutoML. [Get started](#)

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AWS Management Console

AWS services

Find Services

You can enter names, keywords or acronyms.



Billing

Access, analyze, and control your AWS costs and usage.

Mobile Hub

Build, Test, and Monitor Mobile Apps

AWS Amplify

AWS Amplify is a complete platform—frameworks & tools and app services—for developing, building, testing, and running mobile and web apps

AWS AppSync

Real-Time Data Sync Using GraphQL for Mobile & Web Apps, Online or Offline

AWS Snow Family

Large Scale Data Transport

AWS Well-Architected Tool

Use AWS Well-Architected Tool to learn best practices, measure, and improve your workloads

Amazon GameLift

Deploy and Scale Session-based Multiplayer Games

Amazon Honeycode

Build mobile and web apps without programming

Amazon Lex

Build Voice and Text Chatbots

Amazon Macie

Amazon Macie classifies and secures your business-critical content

Amazon Sumerian

Build VR, AR, and 3D applications

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Amazon SageMaker Autopilot

Get hands-on with AutoML. [Get started](#)

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Get access to 350+ self-paced online courses

AWS Management Console

AWS services

Find Services
You can enter names, keywords or acronyms.

X

Billing
Access, analyze, and control your AWS costs and usage.

▼ Recently visited services

| | |
|---|---|
|  Billing |  Amazon Transcribe |
|  S3 |  AWS Organizations |

▶ All services

Build a solution

Get started with simple wizards and automated workflows.

| | | |
|--|---|--|
| Launch a virtual machine With EC2 2-3 minutes  | Build a web app With Elastic Beanstalk 6 minutes  | Build using virtual servers With Lightsail 1-2 minutes  |
|--|---|--|

[Register an account](#) [Contact us for education](#) [Start education to AWS](#)

Stay connected to your AWS resources on-the-go

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Explore AWS

Amazon DocumentDB (with MongoDB compatibility)
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Amazon SageMaker Autopilot
Get hands-on with AutoML. [Get started](#)

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Get access to 350+ self-paced online courses

Cost Management
Cost Explorer
Budgets
Budgets Reports
Savings Plans
Cost & Usage Reports
Cost Categories
Cost allocation tags

Billing

Bills

Orders and Invoices

Credits

Preferences

Billing preferences

Payment methods

Consolidated billing

Tax settings



Getting Started with AWS Billing & Cost Management

- Manage your costs and usage using [AWS Budgets](#)
 - Visualize your cost drivers and usage trends via [Cost Explorer](#)
 - Dive deeper into your costs using the [Cost and Usage Reports with Athena integration](#)
 - Learn more: Check out the [AWS What's New webpage](#)
- Do you have Reserved Instances (RIs)?
- Access the RI Utilization & Coverage reports—and RI purchase recommendations—via [Cost Explorer](#).

Month-to-Date Spend by Service

Bill Details

The chart below shows the proportion of costs spent for each service you use.



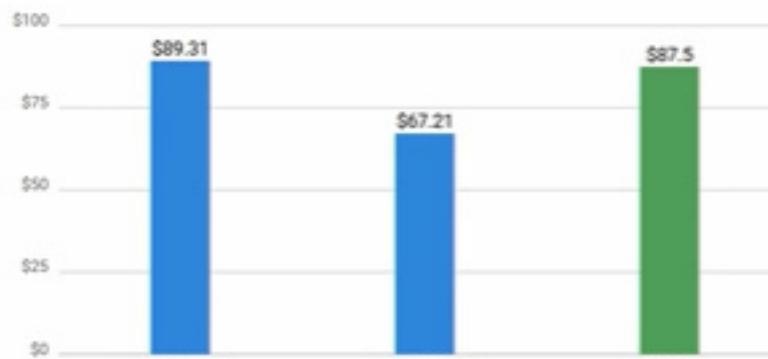
Spend Summary

Cost Explorer

Welcome to the AWS Billing & Cost Management console. Your last month, month-to-date, and month-end forecasted costs appear below.

Current month-to-date balance for June 2020

\$67.21



| | |
|----------------|----------------|
| EC2 | \$47.89 |
| Kinesis | \$8.37 |
| GuardDuty | \$2.66 |
| Lightsail | \$2.62 |
| Other Services | \$5.67 |
| Tax | \$0.00 |
| Total | \$67.21 |

Cost Management
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Getting Started with AWS Billing & Cost Management

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- Visualize your cost drivers and usage trends via [Cost Explorer](#)
- Dive deeper into your costs using the [Cost and Usage Reports with Athena integration](#)
- Learn more: Check out the [AWS What's New webpage](#)

Do you have Reserved Instances (RIs)?

- Access the RI Utilization & Coverage reports—and RI purchase recommendations—via [Cost Explorer](#).

Spend Summary

Cost Explorer

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Current month-to-date balance for June 2020

\$67.21



Month-to-Date Spend by Service

Bill Details

The chart below shows the proportion of costs spent for each service you use.



| | |
|----------------|----------------|
| EC2 | \$47.89 |
| Kinesis | \$8.37 |
| GuardDuty | \$2.66 |
| Lightsail | \$2.62 |
| Other Services | \$5.67 |
| Tax | \$0.00 |
| Total | \$67.21 |

[Cost Explorer](#)[Budgets](#)[Budgets Reports](#)[Savings Plans](#)[Cost & Usage Reports](#)[Cost Categories](#)[Cost allocation tags](#)[Billing](#)[Bills](#)[Orders and invoices](#)[Credits](#)[Preferences](#)[Billing preferences](#)[Payment methods](#)[Consolidated billing](#)[Tax settings](#)

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Month-to-Date Spend by Service

[Bill Details](#)

The chart below shows the proportion of costs spent for each service you use.



Spend Summary

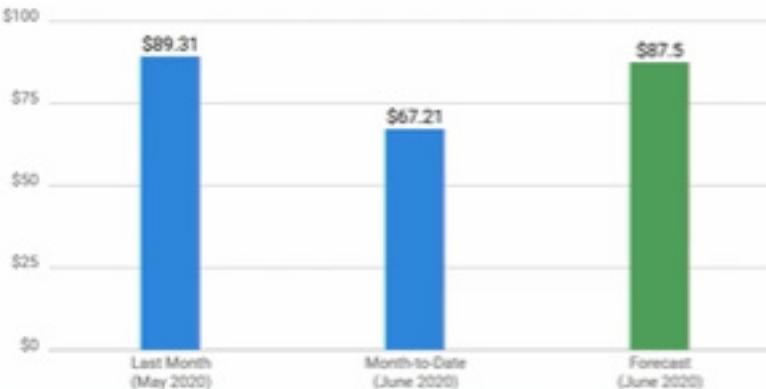
[Cost Explorer](#)

Welcome to the AWS Billing & Cost Management console. Your last month, month-to-date, and month-end forecasted costs appear below.



Current month-to-date balance for June 2020

\$67.21



[Important Information about these Costs](#)



► Important Information about these Costs

Top Free Tier Services by Usage

[View all](#)

D

| Service | Free Tier usage limit | Month-to-date usage |
|------------------------------------|--|--------------------------------------|
| AWS Key Management Service | 20,000 free requests per month for AWS Key Management Service | 2.25% (449.00/20,000 Requests) |
| AmazonCloudWatch | 5 GB of Log Data Archive for Amazon Cloudwatch | 0.10% (0.00/5 GB Mo) |
| Amazon Simple Notification Service | 1,000,000 Requests for Amazon Simple Notification Service (USW2) | 0.01% (120.00/1,000,000 Requests) |
| Amazon Simple Queue Service | 1,000,000 Requests of Amazon Simple Queue Service | 0.01% (69.00/1,000,000 Requests) |
| Amazon Simple Notification Service | 1,000,000 Requests for Amazon Simple Notification Service (EU) | 0.00% (24.00/1,000,000 Requests) |

Alerts & Notifications

- 1 AWS Budgets allows you to create custom cost and usage budgets that alert you when you exceed (or are forecasted to exceed) your budget thresholds. [Create and Manage Your Budgets](#).
- 1 To ensure that we calculate your taxes correctly or apply the correct exemptions, please enter or update your tax settings [here](#).

Billing & Cost Management Dashboard

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Getting Started with AWS Billing & Cost Management

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- Visualize your cost drivers and usage trends via [Cost Explorer](#)
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Do you have Reserved Instances (RIs)?

- Access the RI Utilization & Coverage reports—and RI purchase recommendations—via [Cost Explorer](#).

Spend Summary

[Cost Explorer](#)

Welcome to the AWS Billing & Cost Management console. Your last month, month-to-date, and month-end forecasted costs appear below.

Current month-to-date balance for June 2020

\$67.21

\$100

\$75

\$50

\$89.31

\$67.21

\$87.5

Month-to-Date Spend by Service

The chart below shows the proportion of costs spent for each service.


 EC2

 Kinesis

 GuardDuty

 Lightsail

 Other Services

 Tax

 Total

Cost Management

Date: June 2020

Download CSV

Print

Cost Explorer

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Estimated Total \$67.21

Your invoiced total will be displayed once an invoice is issued.

+ Expand All

Details

AWS Service Charges \$67.21

| | |
|--------------------------|---------|
| ▶ Budgets | \$0.00 |
| ▶ CloudTrail | \$0.00 |
| ▶ CloudWatch | \$0.25 |
| ▶ CloudWatch Events | \$0.00 |
| ▶ Config | \$0.01 |
| ▶ Data Transfer | \$0.00 |
| ▶ DynamoDB | \$0.00 |
| ▶ Elastic Compute Cloud | \$47.89 |
| ▶ Elastic File System | \$0.00 |
| ▶ Glue | \$0.00 |
| ▶ GuardDuty | \$2.66 |
| ▶ IoT | \$0.00 |
| ▶ IoT 1 Click | \$0.75 |
| ▶ Key Management Service | \$1.56 |
| ▶ Kinesis | \$8.37 |
| ▶ Lambda | \$0.00 |

| | | |
|----------------------|-----------------------------|---------|
| Billing preferences | CloudWatch Events | \$0.00 |
| Payment methods | Config | \$0.01 |
| Consolidated billing | US West (Oregon) | \$0.01 |
| Tax settings | Data Transfer | \$0.00 |
| | DynamoDB | \$0.00 |
| | Elastic Compute Cloud | \$47.89 |
| | Elastic File System | \$0.00 |
| | Glue | \$0.00 |
| | GuardDuty | \$2.66 |
| | IoT | \$0.00 |
| | IoT 1 Click | \$0.75 |
| | Key Management Service | \$1.56 |
| | Kinesis | \$8.37 |
| | Lambda | \$0.00 |
| | Lightsail | \$2.62 |
| | QuickSight | \$0.00 |
| | Rekognition | \$0.00 |
| | Relational Database Service | \$0.15 |
| | Route 53 | \$2.00 |
| | Global | \$2.00 |
| | Simple Notification Service | \$0.00 |
| | Simple Queue Service | \$0.00 |
| | Simple Storage Service | \$0.95 |
| | Sumerian | \$0.00 |
| | WorkSpaces | \$0.00 |

Use the [AWS Billing & Cost Management dashboard](#) to pay your AWS bill, monitor your usage, and analyze and control your costs.

- Compare your current month-to-date balance with the previous month, and get a forecast of the next month based on current usage.
- View month-to-date spend by service.
- View Free Tier usage by service.
- Access Cost Explorer and create budgets.
- Purchase and manage Savings Plans.
- Publish [AWS Cost and Usage Reports](#).

Consolidated billing

Simplifies billing
process

Share savings across
accounts

Free fe



-0:03

1.5x



Consolidated billing

In an earlier module, you learned about AWS Organizations, a service that enables you to manage multiple AWS accounts from a central location. AWS Organizations also provides the option for [consolidated billing](#).

The consolidated billing feature of AWS Organizations enables you to receive a single bill for all AWS accounts in your organization. By consolidating, you can easily track the combined costs of all the linked accounts in your organization. The default maximum number of accounts allowed for an organization is 4, but you can contact AWS Support to increase your quota, if needed.

On your monthly bill, you can review itemized charges incurred by each account. This enables you to have greater transparency into your organization's accounts while still maintaining the convenience of receiving a single monthly bill.

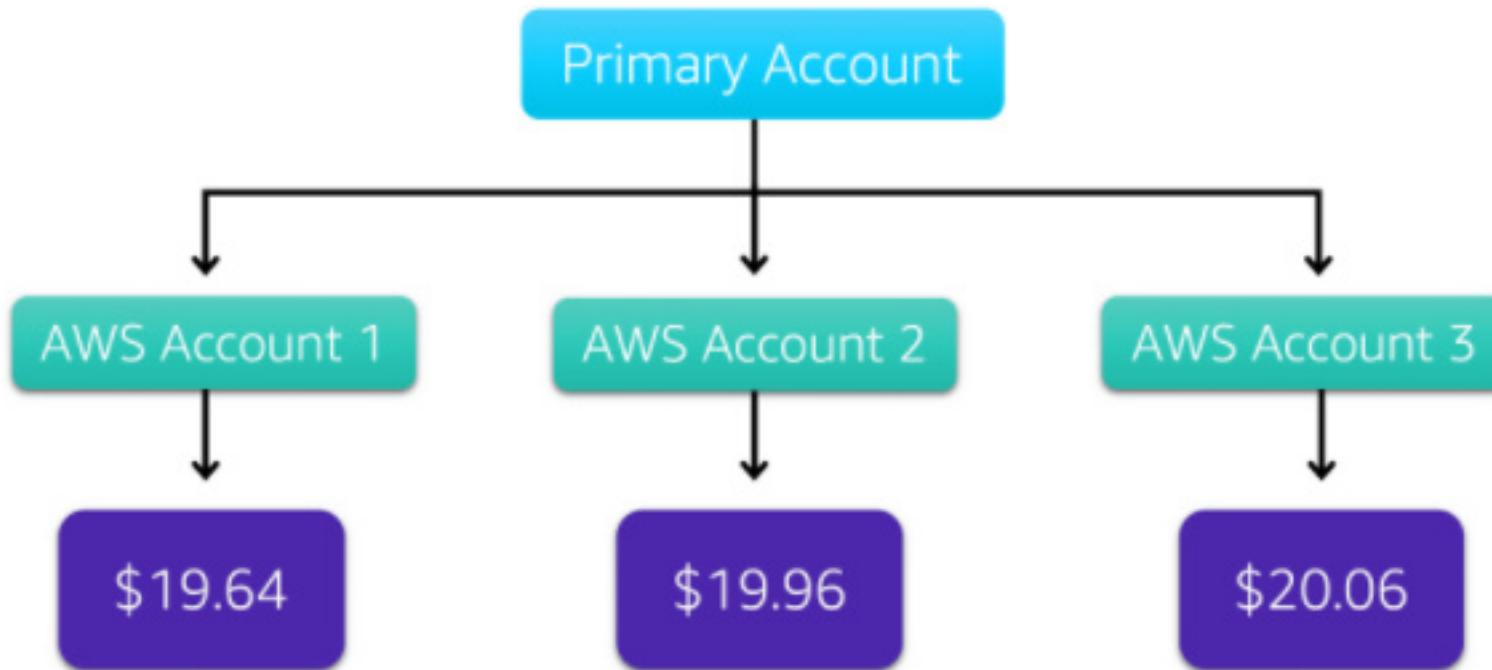
convenience of receiving a single monthly bill.

Another benefit of consolidated billing is the ability to share bulk discount pricing, Savings Plans, and Reserved Instances across the accounts in your organization. For instance, one account might not have enough monthly usage to qualify for discount pricing. However, when multiple accounts are combined, their aggregated usage may result in a benefit that applies across all accounts in the organization.

Example: Consolidated billing

To review an example of consolidated billing, select **Start**.

START >

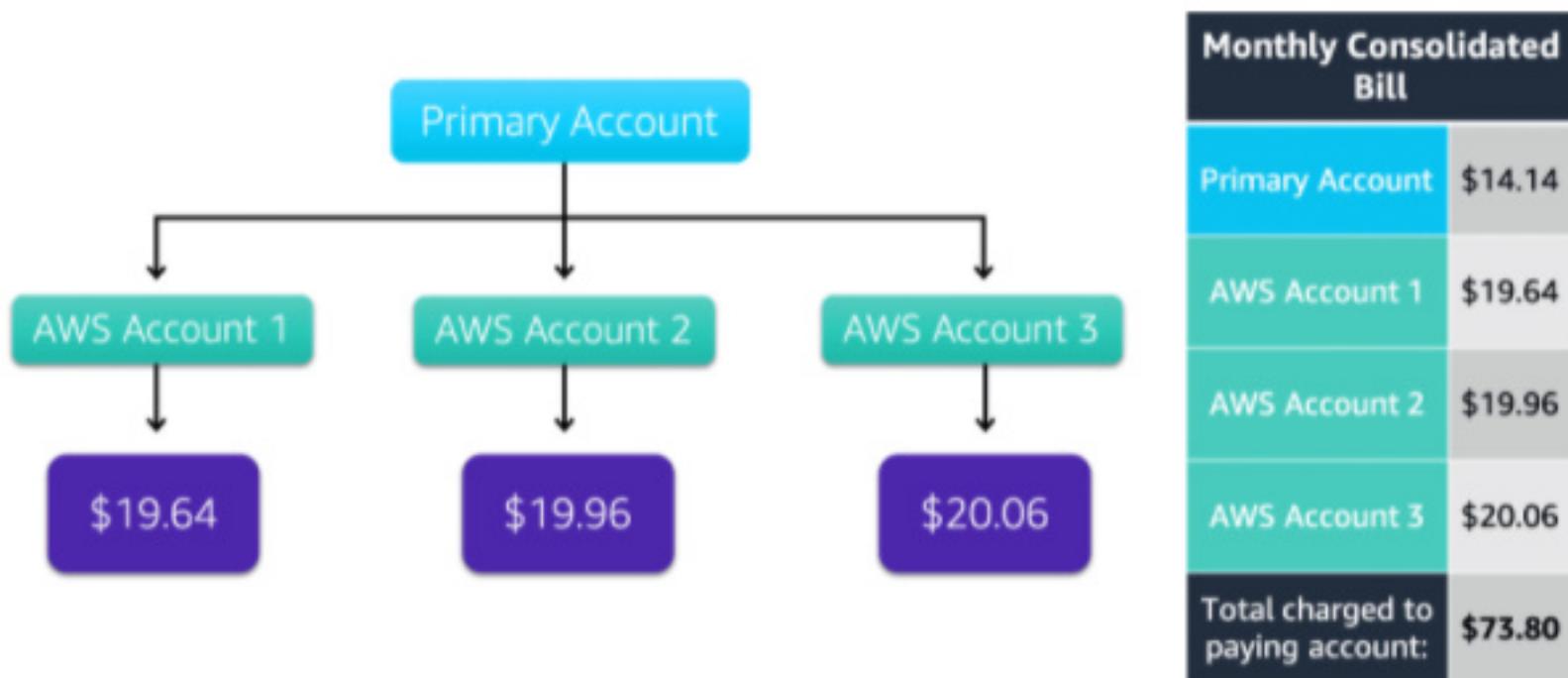


Suppose that you are the business leader who oversees your company's AWS billing.

Your company has three AWS accounts used for separate departments. Instead of paying each location's monthly bill separately, you decide to create an organization and add the three accounts.

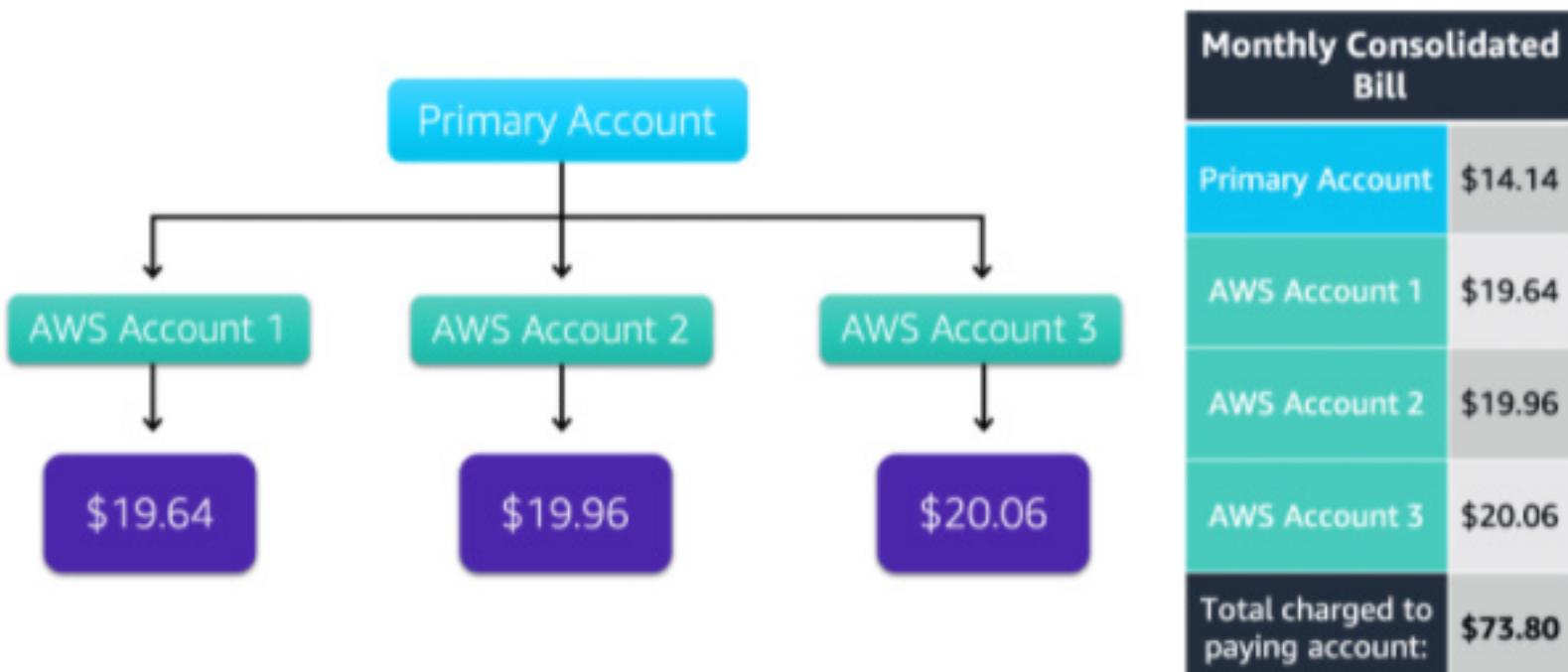
You manage the organization through the primary account.

Step 2



Each month, AWS charges your primary payer account for all the linked accounts in a consolidated bill. Through the primary account, you can also get a detailed cost report for each linked account.

The monthly consolidated bill also includes the account usage costs incurred by the primary account. This cost is not a premium charge for having a primary account.

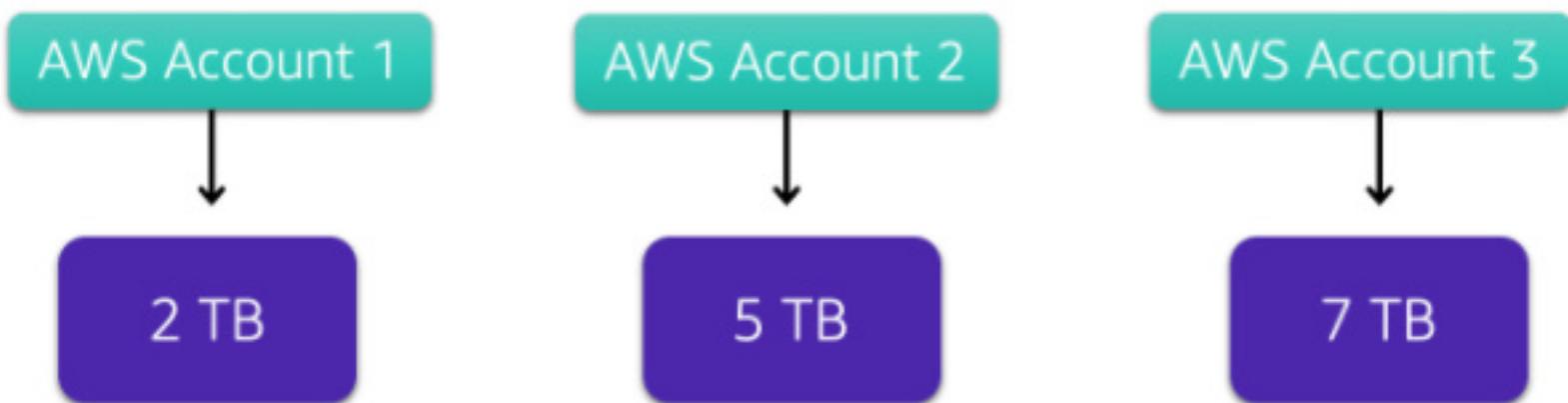


Each month, AWS charges your primary payer account for all the linked accounts in a consolidated bill. Through the primary account, you can also get a detailed cost report for each linked account.

The monthly consolidated bill also includes the account usage costs incurred by the primary account. This cost is not a premium charge for having a primary account.

The consolidated bill shows the costs associated with any actions of the primary account (such as storing files in Amazon S3 or running Amazon EC2 instances).

Step 3



Consolidated billing also enables you to share volume pricing discounts across accounts.

Some AWS services, such as Amazon S3, provide volume pricing discounts that give you lower prices the more that you use the service. In Amazon S3, after customers have transferred 10 TB of data in a month, they pay a lower per-GB transfer price for the next 40 TB of data transferred.

In this example, there are three separate AWS accounts that have transferred different amounts of data in Amazon S3 during the current month:

per-GB transfer price for the next 40 TB of data transferred.

In this example, there are three separate AWS accounts that have transferred different amounts of data in Amazon S3 during the current month:

- Account 1 has transferred 2 TB of data.
- Account 2 has transferred 5 TB of data.
- Account 3 has transferred 7 TB of data.

Because no single account has passed the 10 TB threshold, none of them is eligible for the lower per-GB transfer price for the next 40 TB of data transferred.

AWS Management Console

AWS services

Find Services

You can enter names, keywords or acronyms.

 Example: Relational Database Service, database, RDS

▼ Recently visited services



53



AWS Organizations

► All services

Build a solution

Get started with simple wizards and automated workflows.

Launch a virtual machine

With EC2

2-3 minutes



Build a web app

With Elastic Beanstalk

6 minutes



Build using virtual servers

With Lightsail

1-2 minutes



Stay connected to your AWS resources on-the-go



Download the AWS Console Mobile App to your iOS or Android mobile device. [Learn more](#)

Explore AWS

Free Digital Training

Get access to 350+ self-paced online courses covering AWS products and services. [Learn more](#)

Host Static Web Apps in Minutes

AWS Amplify offers a simple Git-based workflow for deploying static web apps on AWS. [Learn more](#)

Amazon SageMaker Autopilot

Get hands-on with AutoML. [Get started](#)

Amazon DocumentDB (with MongoDB compatibility)

New role-based access control support helps you

[Cost Management](#)[Cost Explorer](#)[Budgets](#)[Budgets Reports](#)[Savings Plans](#)[Cost & Usage Reports](#)[Cost Categories](#)[Cost allocation tags](#)[Billing](#)[Bills](#)[Orders and invoices](#)[Credits](#)[Preferences](#)[Billing preferences](#)[Payment methods](#)[Consolidated billing](#)[Tax settings](#)

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[Getting Bill Information...](#)[Getting Free Tier Information...](#)

Alerts & Notifications

AWS Budgets allows you to create custom cost and usage budgets that alert you when you exceed (or are forecasted to exceed) your budget thresholds. [Create and Manage Your Budgets](#).

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Month-to-Date Spend by Service

[Bill Details](#)

The chart below shows the proportion of costs spent for each service you use.

[Getting Top Services...](#)

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| | | |
|---------------------------------------|----------------|----------------|
| ■ | EC2 | \$47.89 |
| ■ | Kinesis | \$8.37 |
| ■ | GuardDuty | \$2.66 |
| ■ | Lightsail | \$2.62 |
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| | Tax | \$0.00 |
| | Total | \$67.21 |

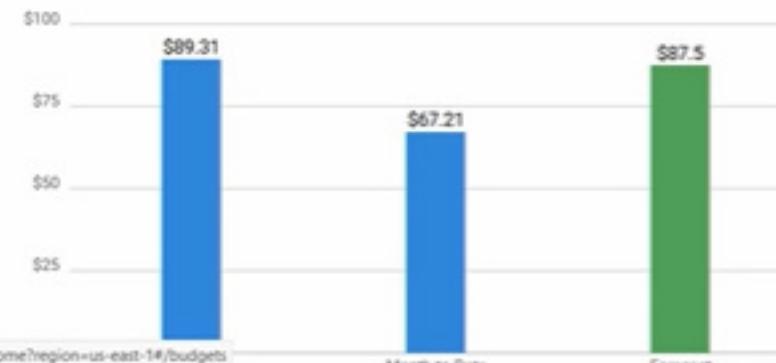
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[Cost Explorer](#)

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Current month-to-date balance for June 2020

\$67.21



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Q Filter by budget name

Download CSV

Create budget

| All budgets (1) | Cost budgets (1) | Usage budgets (0) | Reservation budgets (0) | Savings Plans budgets (0) | | | |
|-----------------|------------------|-------------------|-------------------------|---------------------------|--|--|-----|
| Budget name | Type | Current | Budgeted | Forecasted | Current vs. budgeted | Forecasted vs. budgeted | ... |
| Budget | Cost | \$67.21 | \$1,000.00 | \$86.56 | <div style="width: 6.72%; background-color: #0070C0;"></div> 6.72% | <div style="width: 8.66%; background-color: #0070C0;"></div> 8.66% | ... |



Step 1
Select budget type



Step 2
Set your budget



Step 3
Configure alerts



Step 4
Confirm budget

Select which type of budget you would like to create.

Cost budget

Monitor your costs against a specified amount and receive alerts when your user-defined thresholds are met.

Usage budget

Monitor your usage of one or more specified usage types or usage type groups and receive alerts when your user-defined thresholds are met.

Reservation budget

Track the RI Utilization or RI Coverage associated with your reservations. These budgets support Amazon EC2, RDS, Redshift, ElastiCache and Elasticsearch reservation models.

Savings Plans budget

Track the utilization and coverage associated with your Savings Plans.

Cancel

Set your budget >

Step 1

Select budget type

Step 2

Set your budget

Step 3

Configure alerts

Step 4

Confirm budget

Select which type of budget you would like to create.

Cost budget

Monitor your costs against a specified amount and receive alerts when your user-defined thresholds are met.

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Track the RI Utilization or RI Coverage associated with your reservations. These budgets support Amazon EC2, RDS, Redshift, ElastiCache and Elasticsearch reservation models.

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Track the utilization and coverage associated with your Savings Plans.

Cancel

Set your budget >

- Step 1
Select budget type
- Step 2
Set your budget
- Step 3
Configure alerts
- Step 4
Confirm budget

Set your budget details, including your budgeted amount. From there, you can refine your budget using the optional budget parameters.

Budget details

Name

Period

Budget effective dates

Recurring budgets will renew on the first day of every monthly billing period. Expiring budgets will stop renewing on the last day of the expiration month.

- Recurring Budget
 Expiring Budget

Start Month

Budget amount

Fixed

Create a budget that tracks against a single monthly budgeted amount.

Monthly Budget Planning

Specify your budgeted amount for each budget period.

Budgeted amount

Last month's cost \$89.35



Budgeted amount is blank

Please enter a budgeted amount.

Budget parameters (optional)

- Step 1
Select budget type
- Step 2
Set your budget
- Step 3
Configure alerts
- Step 4
Confirm budget

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Last month's cost \$89.35



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Budget parameters (optional)

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 Expiring Budget

Start Month

Budget amount

 Fixed

Create a budget that tracks against a single monthly budgeted amount.

 Monthly Budget Planning

Specify your budgeted amount for each budget period.

Budgeted amount

\$1,000

Last month's cost \$89.35



Budgeted amount is blank

Please enter a budgeted amount.

Budget parameters (optional)

▼ Filtering

Service

Include all

Linked Account

Include all

Region

Include all

Unblended costs (\$)

[View in AWS Cost Explorer](#)

Feedback



English (US)

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Budget effective dates

Recurring budgets will renew on the first day of every monthly billing period. Expiring budgets will stop renewing on the last day of the expiration month.

- Recurring Budget
- Expiring Budget

Start Month

 Jun 2020 ▾

Budget amount

Fixed

Create a budget that tracks against a single monthly budgeted amount.

Monthly Budget Planning

Specify your budgeted amount for each budget period.

Budgeted amount

10

Last month's cost \$89.35

Budget parameters (optional)

▼ Filtering

| | |
|------------------|-----------------------------|
| Service | Include all |
| Linked Account | Include all |
| Region | Include all |
| Instance Type | Include all |
| Usage Type | Include all |
| Usage Type Group | Include all |
| Cost Category | Include all |
| Tag | Include all |
| API Operation | Include all |

Unblended costs (\$)

[View in AWS Cost Explorer](#)



Feedback



English (US)

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▼ Filtering

| | |
|------------------|-------------|
| Service | Include all |
| Linked Account | Include all |
| Region | Include all |
| Instance Type | Include all |
| Usage Type | Include all |
| Usage Type Group | Include all |
| Cost Category | Include all |
| Tag | Include all |
| API Operation | Include all |

[More filters ▾](#)

▼ Advanced Options

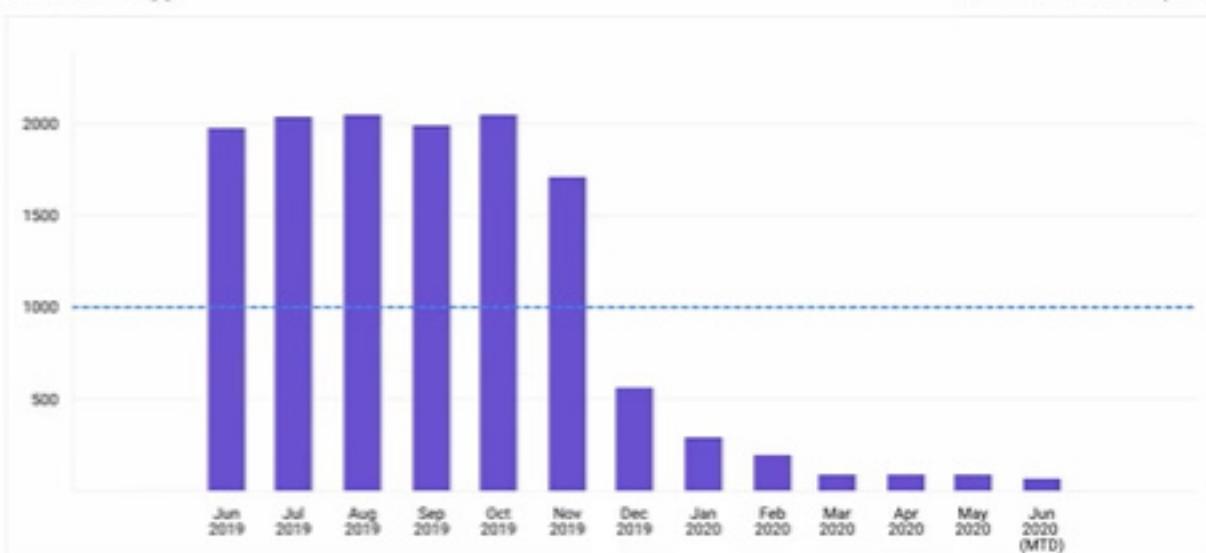
Aggregate costs by

Unblended costs

Include costs related to

- Refunds
- Credits
- Upfront reservation fees
- Recurring reservation charges
- Other subscription costs
- Taxes
- Support charges
- Discounts

Unblended costs (\$)



Cancel

< Select budget type

Configure alerts >

▼ Filtering

| | |
|------------------|-------------|
| Service | Include all |
| Linked Account | Include all |
| Region | Include all |
| Instance Type | Include all |
| Usage Type | Include all |
| Usage Type Group | Include all |
| Cost Category | Include all |
| Tag | Include all |
| API Operation | Include all |

[More filters ▾](#)

▼ Advanced Options

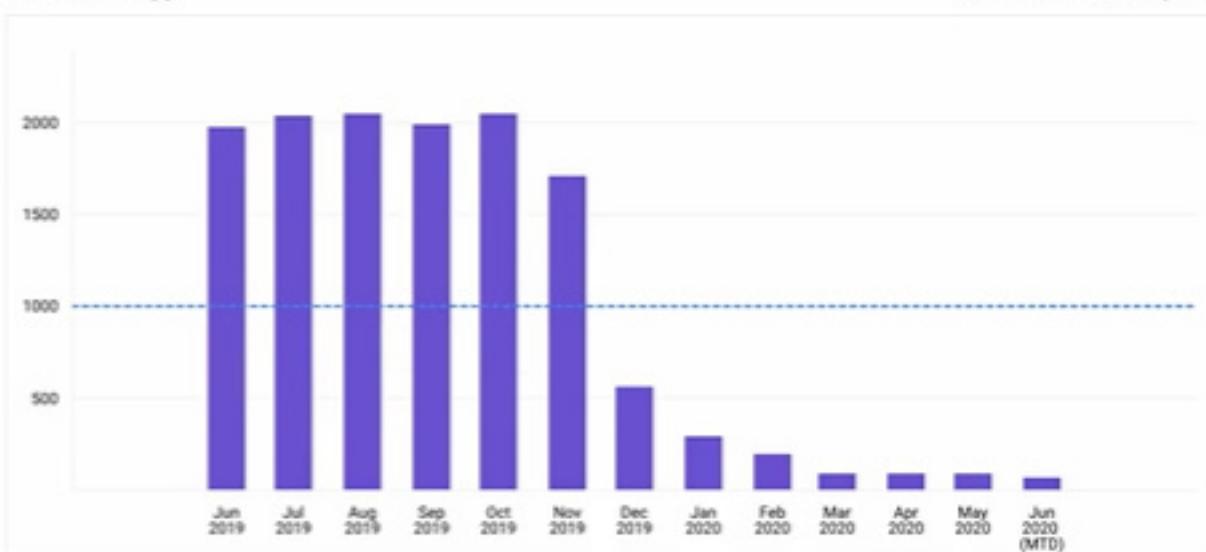
Aggregate costs by

Unblended costs

Include costs related to

- Refunds
- Credits
- Upfront reservation fees
- Recurring reservation charges
- Other subscription costs
- Taxes
- Support charges
- Discounts

Unblended costs (\$)



Cancel

< Select budget type

Configure alerts >

- Step 1
Select budget type
- Step 2
Set your budget
- Step 3
Configure alerts
- Step 4
Confirm budget

You can send budget alerts via email and/or Amazon Simple Notification Service (Amazon SNS) topic. To send a budget alert, you must provide at least one email contact or valid SNS topic ARN.

Budgeted amount [Edit](#)

\$1,000

Alert 1

Send alert based on:

- Actual Costs
- Forecasted Costs

Alert threshold

80

% of budgeted amount ▾



Notify the following contacts when **Actual Costs** is **Greater than -- (-)**

Email contacts

example@domain.com

[Add email contact](#)

Notify via Amazon Simple Notification Service (SNS) topic [Learn more](#)

AWS Chatbot Notifications - Optional [Learn more](#)

AWS customers can send notifications to Chime or Slack by simply mapping an AWS SNS topic to a chat room. To receive alerts via the AWS Chatbot, you will need to create and configure an Amazon SNS topic (instructions above). To manage your AWS Chatbot configuration, please click [here](#).

[Add new alert](#)

[Cancel](#)

[Set up your budget](#)

[Confirm budget](#)



[Feedback](#)

English (US)

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- Step 1 Select budget type
- Step 2 Set your budget
- Step 3 Configure alerts
- Step 4 Confirm budget

You can send budget alerts via email and/or Amazon Simple Notification Service (Amazon SNS) topic. To send a budget alert, you must provide at least one email contact or valid SNS topic ARN.

Budgeted amount [Edit](#)

\$1,000

Alert 1

Send alert based on:

Actual Costs

Forecasted Costs

Alert threshold

80

% of budgeted amount ▾

Notify the following contacts when **Actual Costs** is **Greater than 80% (\$800.00)**

Email contacts

[Add email contact](#)

Notify via Amazon Simple Notification Service (SNS) topic [Learn more](#)

AWS Chatbot Notifications - Optional [Learn more](#)

AWS customers can send notifications to Chime or Slack by simply mapping an AWS SNS topic to a chat room. To receive alerts via the AWS Chatbot, you will need to create and configure an Amazon SNS topic (instructions above). To manage your AWS Chatbot configuration, please click [here](#).

[+ Add new alert](#)

[Cancel](#)

[◀ Set up your budget](#)

[Confirm budget ▶](#)

-0:16

1.5x



- Step 1
Select budget type
- Step 2
Set your budget
- Step 3
Configure alerts
- Step 4
Confirm budget

Please review your budget details and alerts settings. Then select Create to finish creating your budget.

Cost budget

Edit

Monitor your costs against a specified amount and receive alerts when your user-defined thresholds are met.

Budget details

Edit

Name

Budget123

Period

Monthly

Start Date

Jun 1, 2020

End Date

-

Budgeted amount

\$1,000

Advanced Options

Aggregate costs by: Unblended costs

Include costs related to: Taxes, Support charges, Other subscription costs, Recurring reservation charges, Upfront reservation fees, Discounts

Exclude costs related to: Credits, Refunds

Alerts

Edit

Alert 1



Actual Costs | Greater than 80% (\$800) | 1 contact

Cancel

< Configure alerts

Create



ⓘ Your budget has been successfully created.

Q Filter by budget name

Download CSV

Create budget

Cost Management

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| All budgets (2) | Cost budgets (2) | Usage budgets (0) | Reservation budgets (0) | Savings Plans budgets (0) | | | | |
|-----------------|------------------|-------------------|-------------------------|---------------------------|--|--|-----|-----|
| Budget name | Type | Current | Budgeted | Forecasted | Current vs. budgeted | Forecasted vs. budgeted | | |
| Budget | Cost | \$67.21 | \$1,000.00 | \$86.56 | <div style="width: 6.72%;">6.72%</div> | <div style="width: 8.66%;">8.66%</div> | ... | ... |
| Budget123 | Cost | - | \$1,000.00 | - | - | - | ... | ... |

AWS Budgets

In [AWS Budgets](#), you can create budgets to plan your service usage, service costs, and instance reservations.

The information in AWS Budgets updates three times a day. This helps you to accurately determine how close your usage is to your budgeted amounts or to the AWS Free Tier limits.

In AWS Budgets, you can also set custom alerts when your usage exceeds (or is forecasted to exceed) the budgeted amount.

Example: AWS Budgets

Suppose that you have set a budget for Amazon EC2. You want to ensure that your company's usage of Amazon EC2 does not exceed \$200 for the month.

In AWS Budgets, you could set a custom budget to notify you when your usage has reached half of this amount (\$100). This setting would allow you to receive an alert and decide how you would like to proceed with your continued use of Amazon EC2.

To learn more, select each marker.

AWS Budgets

Filter by budget name

All budgets (7)

Cost b

Budget name

Project Nemo Cost

Budget

Eastern US Regional

Budget

Total Monthly Cost

Budget

Total EC2 Cost

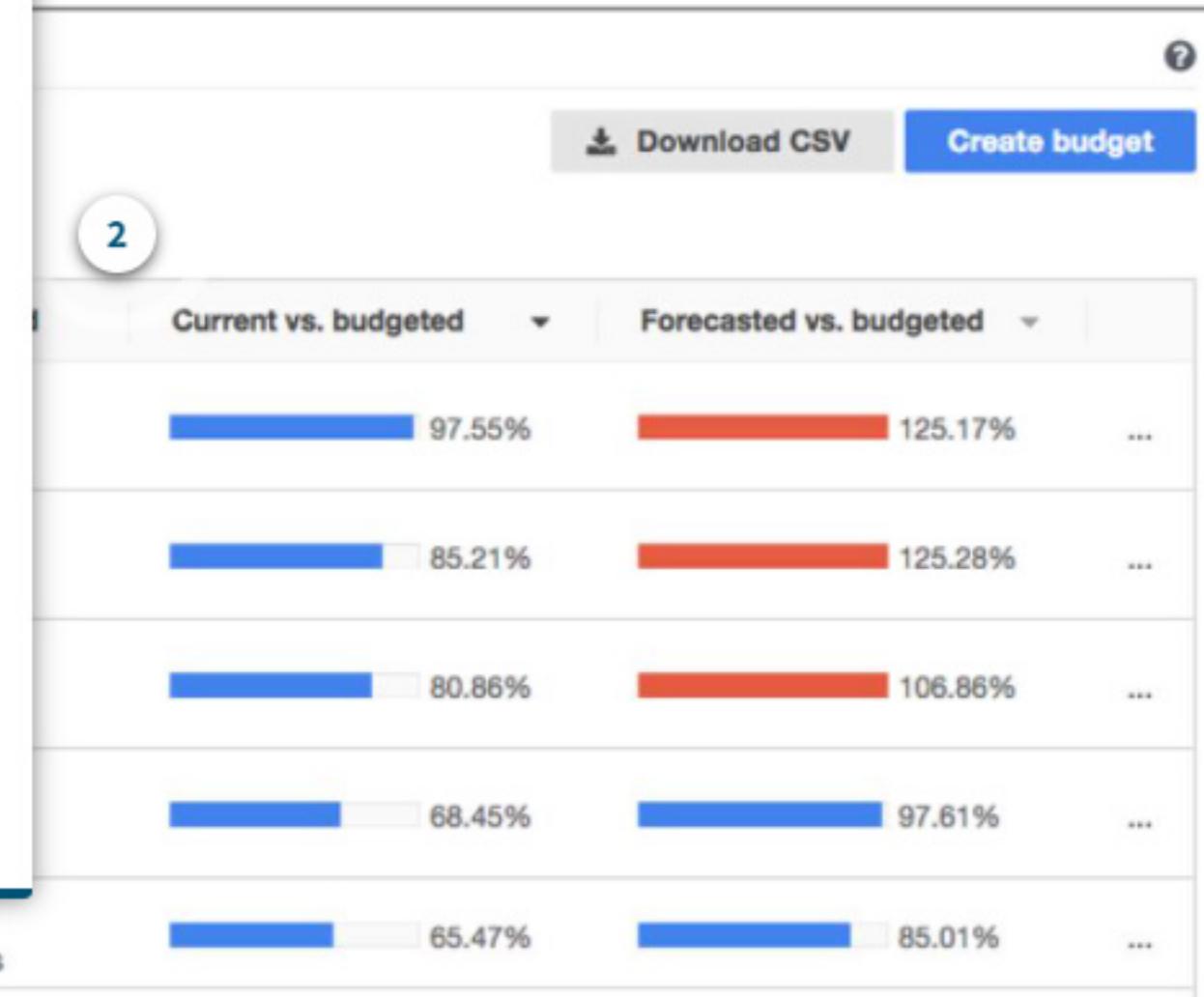
Budget

1

In this sample budget, you can review the following important details:

- The current amount that you have incurred for Amazon EC2 so far this month (\$136.90)
- The amount that you are forecasted to spend for the month (\$195.21), based on your usage patterns.

< >



AWS Budgets



Filter by budget name

All budgets (7)

Cost b

Budget name

Project Nemo Cost

Budget

Eastern US Regional

Budget

Total Monthly Cost

Budget

Total EC2 Cost

1

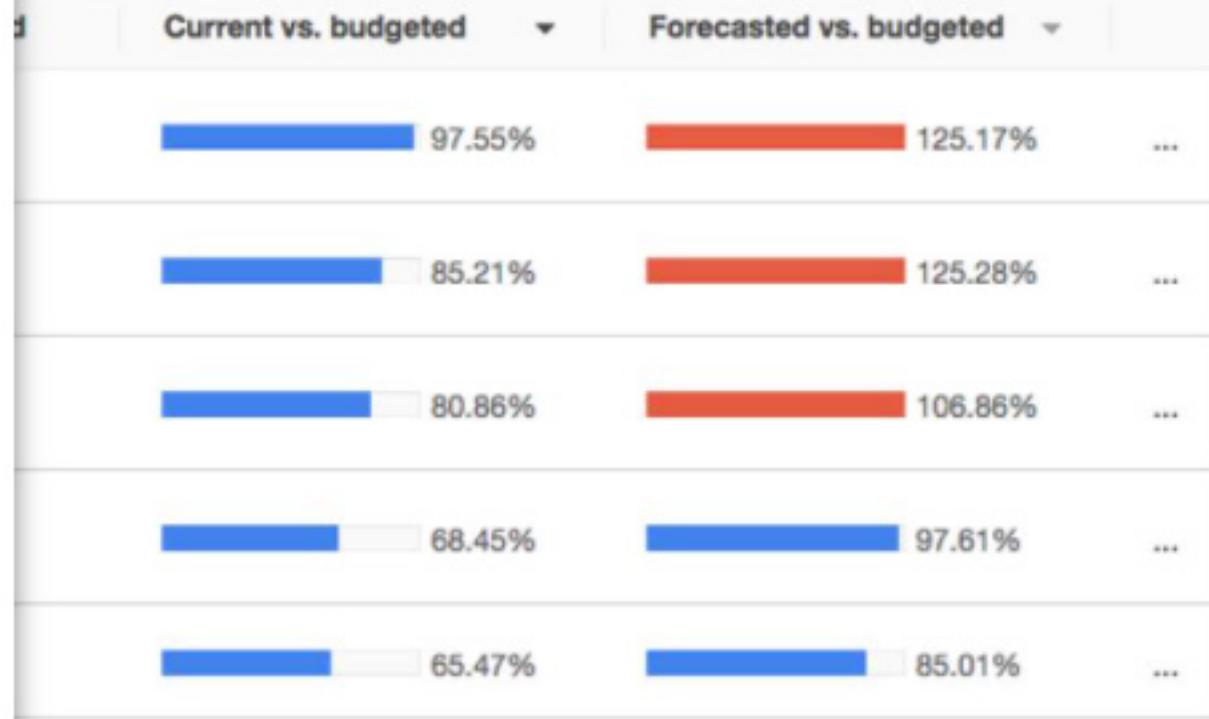
Budget

S3 Usage Budget

You can also review comparisons of your current vs. budgeted usage, and forecasted vs. budgeted usage.

For example, in the top row of this sample budget, the forecasted vs. budgeted bar is at 125.17%. The reason for the increase is that the forecasted amount (\$56.33) exceeds the amount that had been budgeted for that item for the month (\$45.00).

2



AWS Budgets

?

Filter by budget name

Download CSV

Create budget

| All budgets (7) | Cost budgets (5) | Usage budgets (2) | Reservation budgets (0) | | 2 | | |
|----------------------------|------------------|-------------------|-------------------------|-------------------|--|--|-----|
| Budget name | Budget type | Current | Budgeted | Forecasted | Current vs. budgeted | Forecasted vs. budgeted | |
| Project Nemo Cost Budget | Cost | \$43.90 | \$45.00 | \$56.33 | <div style="width: 97.55%; background-color: #0072bc; height: 10px;"></div> 97.55% | <div style="width: 125.17%; background-color: #e74c3c; height: 10px;"></div> 125.17% | ... |
| Eastern US Regional Budget | Cost | \$85.21 | \$100.00 | \$125.28 | <div style="width: 85.21%; background-color: #0072bc; height: 10px;"></div> 85.21% | <div style="width: 125.28%; background-color: #e74c3c; height: 10px;"></div> 125.28% | ... |
| Total Monthly Cost Budget | Cost | \$141.50 | \$175.00 | \$187.00 | <div style="width: 80.86%; background-color: #0072bc; height: 10px;"></div> 80.86% | <div style="width: 106.86%; background-color: #e74c3c; height: 10px;"></div> 106.86% | ... |
| Total EC2 Cost Budget | Cost | \$136.90 | \$200.00 | \$195.21 | <div style="width: 68.45%; background-color: #0072bc; height: 10px;"></div> 68.45% | <div style="width: 97.61%; background-color: #0072bc; height: 10px;"></div> 97.61% | ... |
| S3 Usage Budget | Usage | 3,601 Requests | 5,500 Requests | 4,675.75 Requests | <div style="width: 65.47%; background-color: #0072bc; height: 10px;"></div> 65.47% | <div style="width: 85.01%; background-color: #0072bc; height: 10px;"></div> 85.01% | ... |

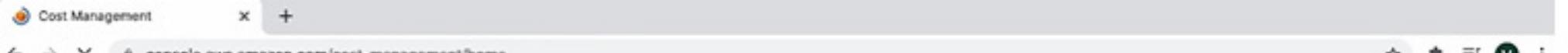
You only pay for what you use.



-2:48

1.5x





AWS Cost Management

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[Coverage report](#)

AWS Cost Management > Home

Current month costs

\$519.63

↑ 23%
Over last month

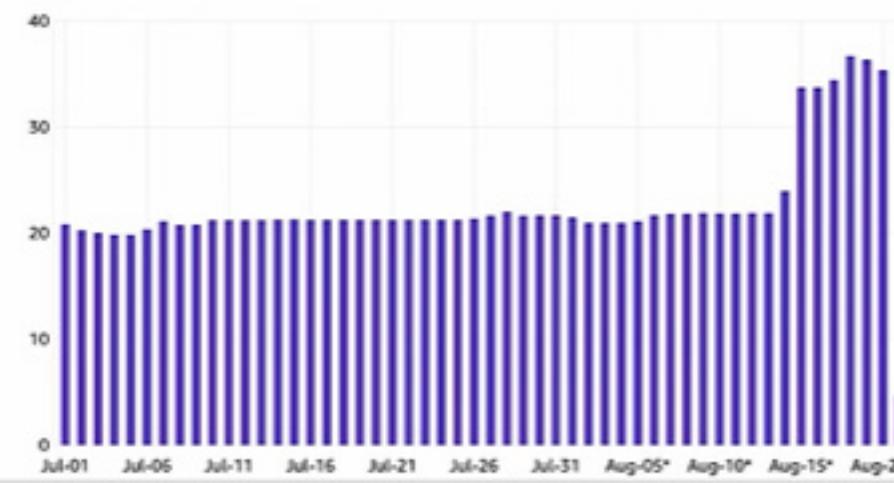
Forecasted month end costs

\$785.46

↑ 20%
Over last month

Daily unblended costs (\$)

[Explore costs](#)



August trends

[View all trends](#)

Service usage

Amazon Relational Database Service costs are up \$73.19 (74,630%)

Amazon API Gateway costs are up \$4.26 (79%)

Amazon Elastic Compute Cloud - Compute costs are up \$17.21 (22%)

t2.micro costs are up \$15.29 (290%)

Account usage

buildingmodernapps (302211264422) costs are up \$9.21 (65%)

Morgan Willis (832211724792) costs are up \$87.77 (21%)

Region usage

us-east-2 costs are up \$8.41 (566%)

us-west-2 costs are up \$5.53 (48%)

us-east-1 costs are up \$82.95 (20%)

Recently accessed reports

[View all reports](#)

| Report name | Report type | Time granularity | Last accessed |
|-------------|-------------|------------------|---------------|
|-------------|-------------|------------------|---------------|

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- Recommendations

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 - Cart (0)

- ▼ Reservations
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AWS Cost Management > Cost Explorer

Current month costs

\$519.63

↑ 23%
Over last month

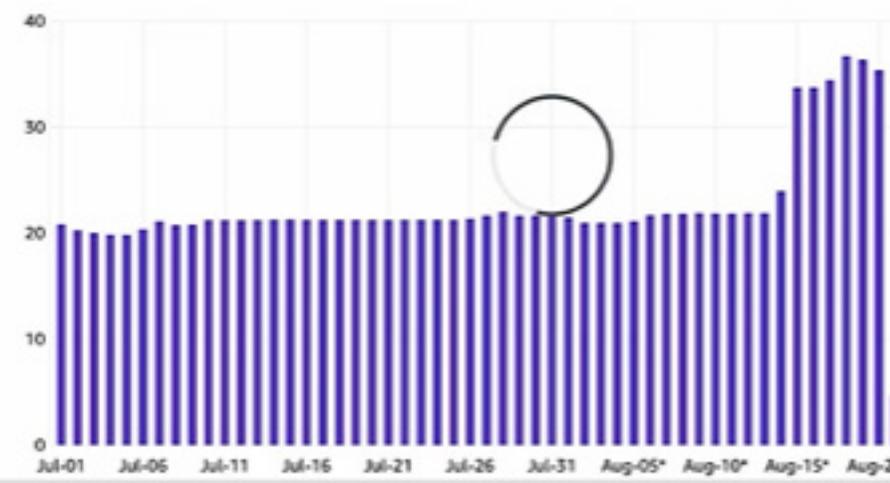
Forecasted month end costs

\$785.46

↑ 20%
Over last month

Daily unblended costs (\$)

Explore costs



August trends

[View all trends](#)

Service usage

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Last 6 Months

Monthly

From 01/01/2020

To 07/31/2020

Clear Selections

In Bar

< June 2020 >

July 2020

Mo Tu We Th Fr Sa Su

1 2 3 4 5 6 7

8 9 10 11 12 13 14

15 16 17 18 19 20 21

22 23 24 25 26 27 28

29 30

Mo Tu We Th Fr Sa Su

1 2 3 4 5

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

27 28 29 30 31

Auto-select: 1D 7D Current Month 3M 6M 1Y MTD YTD +3M +12M

Cancel

Apply

Feb 2020

Mar 2020

Apr 2020

May 2020



Jun 2020



Jul 2020

Managed Blockchain EC2-Instances EC2-Other EC2 Container Service EC2-ELB

Others

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

FILTERS

CLEAR ALL

Service

Include all

Linked Account

Include all

Region

Include all

Instance Type

Include all

Usage Type

Include all

Usage Type Gr...

Include all

Resource

Include all

Cost Category

Include all

Tag

Include all

More filters

ADVANCED OPTIONS

Show costs as

Unblended costs

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AWS Cost Management > Cost Explorer

Save as...

Recent reports

New report

Dec 01, 2019 - Dec 01, 2020

Monthly

In Bar

From 12/01/2019

To 12/01/2020

Clear Selections

< December 2019

January 2020 >

Mo Tu We Th Fr Sa Su

Mo Tu We Th Fr Sa Su

| | | | | | | |
|----|----|----|----|----|----|----|
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | | | | | |

| | | | | | | |
|----|----|----|----|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

Auto-select: 1D 7D Current Month 3M 6M 1Y MTD YTD +3M +12M

Cancel

Apply

Others

Usage Type

Resource

More



Jun 2020



Jul 2020

FILTERS

CLEAR ALL

Service

Include all

Linked Account

Include all

Region

Include all

Instance Type

Include all

Usage Type

Include all

Usage Type Gr...

Include all

Resource

Include all

Cost Category

Include all

Tag

Include all

More filters

ADVANCED OPTIONS

1

Show costs as

1

Unblended costs

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

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Dec 01, 2019 - Aug 01, 2020

Monthly

In Bar

From 12/01/2019

To 08/01/2020

Clear Selections

< July 2020 >

Mo Tu We Th Fr Sa Su

1 2 3 4 5

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

27 28 29 30 31

Mo Tu We Th Fr Sa Su

1 2

3 4 5 6 7 8 9

10 11 12 13 14 15 16

17 18 19 20 21 22 23

24 25 26 27 28 29 30

31

Auto-select: 1D 7D Current Month 3M 6M 1Y MTD YTD +3M +12M

Cancel

Apply

Usage Type

Resource

More

July 2020

August 2020

Mo Tu We Th Fr Sa Su

1 2

3 4 5 6 7 8 9

10 11 12 13 14 15 16

17 18 19 20 21 22 23

24 25 26 27 28 29 30

31



Jun 2020

Jul 2020

Managed Blockchain

EC2-Instances

EC2-Other

EC2 Container Service

EC2-ELB

Others

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

FILTERS

CLEAR ALL

Service

Include all

Linked Account

Include all

Region

Include all

Instance Type

Include all

Usage Type

Include all

Usage Type Gr...

Include all

Resource

Include all

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Include all

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Stack

Group by: Region

Service

Linked Account

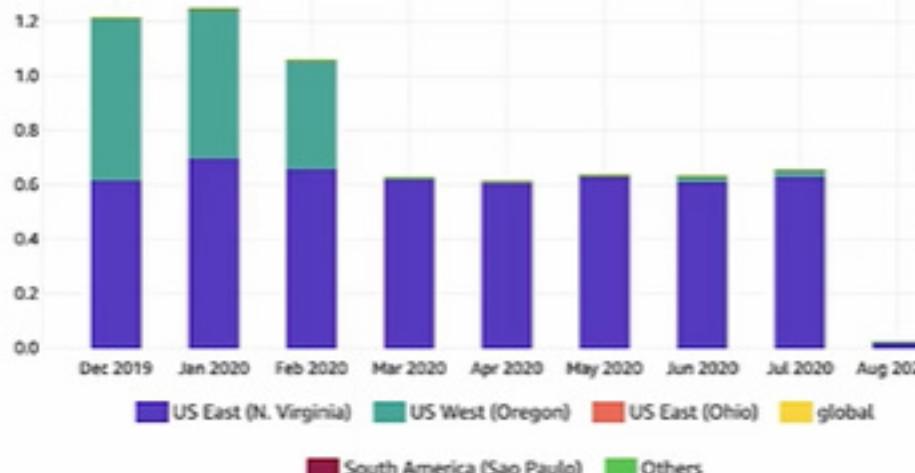
Instance Type

Usage Type

Resource

More

Costs (\$ in thousands)



FILTERS

CLEAR ALL

Service

Include all

Linked Account

Include all

Region

Include all

Instance Type

Include all

Usage Type

Include all

Usage Type Gr...

Include all

Resource

Include all

Cost Category

Include all

Tag

Include all

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Show costs as

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Dec 01, 2019 - Aug 01, 2020 Monthly i

Group by: Region Service Linked Account Instance Type Usage Type Resource More i

Costs (\$ in thousands)

| Month | US East (N. Virginia) | US West (Oregon) | US East (Ohio) | global | Total |
|-----------|-----------------------|------------------|----------------|--------|-------|
| Dec 2019 | ~0.6 | ~0.6 | 0 | 0 | ~1.2 |
| Jan 2020 | ~0.7 | ~0.6 | 0 | 0 | ~1.3 |
| Feb 2020 | ~0.6 | ~0.5 | 0 | 0 | ~1.1 |
| Mar 2020 | ~0.6 | 0 | 0 | 0 | ~0.6 |
| Apr 2020 | ~0.6 | 0 | 0 | 0 | ~0.6 |
| May 2020 | ~0.6 | 0 | 0 | 0 | ~0.6 |
| Jun 2020 | ~0.6 | ~0.05 | 0 | 0 | ~0.65 |
| Jul 2020 | ~0.6 | ~0.05 | 0 | 0 | ~0.65 |
| Aug 2020* | ~0.05 | 0 | 0 | 0 | ~0.05 |

Legend: US East (N. Virginia), US West (Oregon), US East (Ohio), global, South America (Sao Paulo), Others

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

i Stack i FILTERS CLEAR ALL

| | |
|--|-------------|
| Service | Include all |
| Cost Category | Include all |
| Tags i | Include all |
| API Operation | Include all |
| Availability Zone | Include all |
| Platform | Include all |
| Purchase Option | Include all |
| Tenancy | Include all |
| Database Engine | Include all |
| Billing Entity | Include all |
| Legal Entity | Include all |

Tag i More filters i

i ADVANCED OPTIONS i

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Stack

▲ FILTERS

CLEAR ALL

Group by:

Region

Service

Linked Account

Instance Type

Usage Type

Resource

More

Costs (\$ in thousands)



US East (N. Virginia) US West (Oregon) US East (Ohio) global

South America (Sao Paulo) Others

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

more filters ▾

▲ ADVANCED OPTIONS

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Unblended costs

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- [Coverage report](#)

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Dec 01, 2019 - Aug 01, 2020 [Monthly](#) [Stack](#)

Group by: Tag:lambda:createdBy Service Linked Account Region Instance Type More

Costs (\$ in thousands)

| Month | Cost (\$ in thousands) |
|-----------|------------------------|
| Dec 2019 | ~1.2 |
| Jan 2020 | ~1.2 |
| Feb 2020 | ~1.05 |
| Mar 2020 | ~0.6 |
| Apr 2020 | ~0.6 |
| May 2020 | ~0.6 |
| Jun 2020 | ~0.6 |
| Jul 2020 | ~0.65 |
| Aug 2020* | ~0.05 |

No Tagkey: lambda:createdBy SAM

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

[Download CSV](#)

FILTERS [CLEAR ALL](#)

- Service [Include all](#)
- Linked Account [Include all](#)
- Region [Include all](#)
- Instance Type [Include all](#)
- Usage Type [Include all](#)
- Usage Type Gr... [Include all](#)
- Resource [Include all](#)
- Cost Category [Include all](#)
- Tag [Include all](#)

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Group by: Tag:lambda:createdBy

Service

Linked Account

Region

Instance Type

More

FILTERS

CLEAR ALL

Service

Include all

Linked Account

Include all

Region

Include all

Instance Type

Include all

Usage Type

Include all

Usage Type Gr...

Include all

Resource

Include all

Cost Category

Include all

Tag

Include all

More filters

ADVANCED OPTIONS

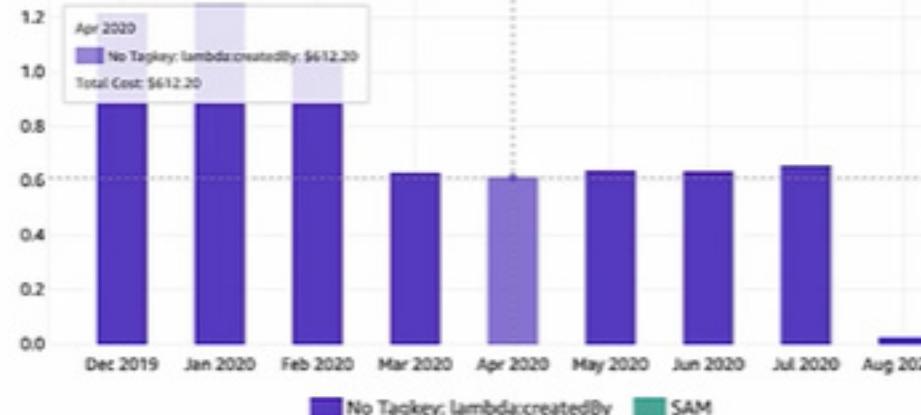
1

Show costs as

1

Unblended costs

Costs (\$ in thousands)



To see usage data, filter by "Usage Type" or "Usage Type Group" Filters with matching units (e.g., hours).

Download CSV

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Group by: Service

Linked Account

Region

Instance Type

Usage Type

Resource

More

FILTERS

CLEAR ALL

Service

Include all

Linked Account

Include all

Region

Include all

Instance Type

Include all

Usage Type

Include all

Usage Type Gr...

Include all

Resource

Include all

Cost Category

Include all

Tag

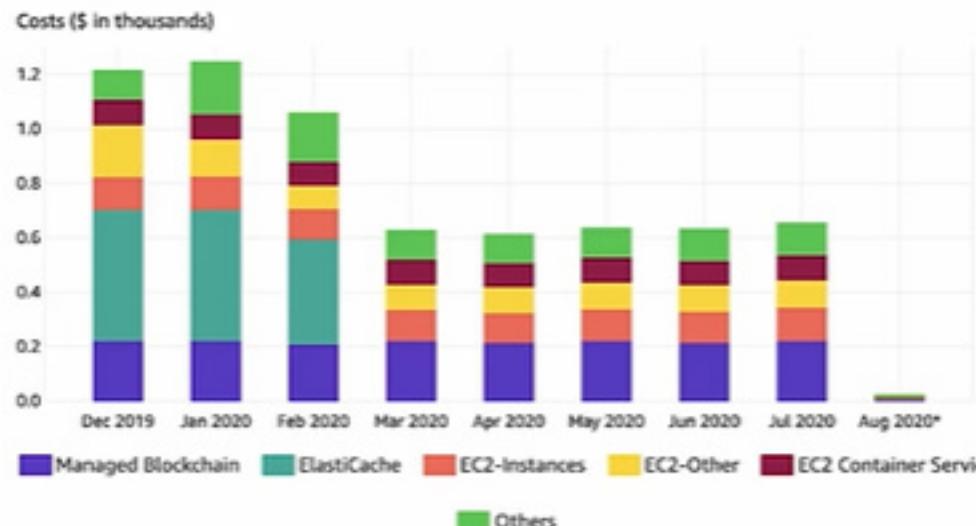
Include all

More filters

ADVANCED OPTIONS

Show costs as

Unblended costs



To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

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Select a report type

Cost and usage (recommended)

The cost and usage report visualizes your aggregate costs across all AWS services. Use the filter dimensions to analyze all aspects of your AWS costs and usage.

Savings Plans reports

Savings Plans utilization

The Savings Plans utilization report visualizes your aggregate Savings Plans utilization and allows you to set a custom Savings Plans utilization target. This report helps you understand how well you are using your resources.

Savings Plans coverage

The Savings Plans coverage report visualizes your overall Savings Plans coverage and allows you to set a custom Savings Plans coverage target. This report helps you identify opportunities for savings.

Reservation reports

Reservation utilization

The reservation utilization report visualizes your aggregate reservation utilization and allows you to set a custom reservation utilization target. This report helps you understand how well you are using your resources.

Reservation coverage

The reservation coverage report visualizes your overall reservation coverage and allows you to set a custom reservation coverage target. This report helps you identify opportunities for savings.

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Coverage report

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Reservations

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Utilization report

Coverage report

AWS Cost Management > Cost Explorer

Save as...

Recent reports ▾

New report

lock undefined

Last 3 Months

Monthly i

Bar i

From 05/01/2020

To 07/31/2020

Clear Selections

< June 2020 >

July 2020

| Mo | Tu | We | Th | Fr | Sa | Su |
|----|----|----|----|----|----|----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | | | | | |

| Mo | Tu | We | Th | Fr | Sa | Su |
|----|----|----|----|----|----|----|
| | | | | | 1 | 2 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

Auto-select: 1D 7D Current Month 3M 6M 1Y MTD YTD +3M +12M

Cancel

Apply

0

May 2020

Jun 2020

Jul 2020

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

▲ FILTERS

CLEAR ALL

Service

Include all ▾

Linked Account

Include all ▾

Region

Include all ▾

Instance Type

Include all ▾

Usage Type

Include all ▾

Usage Type Gr...

Include all ▾

Resource i

Include all ▾

Cost Category

Include all ▾

Tag

Include all ▾

More filters ▾

▲ ADVANCED OPTIONS i

Show costs as i

Net unblended costs ▼

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- Reservations**
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Save as...

Recent reports ▾

New report

>Last 3 Months

Monthly

From 01 To 07/31/2020

Clear Selections

< June 2020 >

Mo Tu We Th Fr Sa Su

1 2 3 4 5 6 7

8 9 10 11 12 13 14

15 16 17 18 19 20 21

22 23 24 25 26 27 28

29 30

July 2020 >

Mo Tu We Th Fr Sa Su

1 2 3 4 5

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

27 28 29 30 31

Auto-select: 1D 7D Current Month 3M 6M 1Y MTD YTD +3M +12M

Cancel

Apply

0

May 2020

Jun 2020

Jul 2020

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

FILTERS

CLEAR ALL

Service

Include all

Linked Account

Include all

Region

Include all

Instance Type

Include all

Usage Type

Include all

Usage Type Gr...

Include all

Resource

Include all

Cost Category

Include all

Tag

Include all

More filters

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Net unblended costs

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▼ Reservations

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Save as...

Recent reports ▾

New report

undefined

Jan 01, 2020 - Jan 31, 2020

Monthly



Bar ▾

From 01/01/2020

To 01/31/2020

Clear Selections

◀ January 2020 ▶

| Mo | Tu | We | Th | Fr | Sa | Su |
|----|----|----|----|----|----|----|
| | | | | | 1 | 2 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

February 2020

▶

| Mo | Tu | We | Th | Fr | Sa | Su |
|----|----|----|----|----|----|----|
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | |

Auto-select: 1D 7D Current Month 3M 6M 1Y MTD YTD +3M +12M

Cancel

Apply

0

May 2020

Jun 2020

Jul 2020

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

▲ FILTERS

CLEAR ALL

Service

Include all ▾

Linked Account

Include all ▾

Region

Include all ▾

Instance Type

Include all ▾

Usage Type

Include all ▾

Usage Type Gr...

Include all ▾

Resource

Include all ▾

Cost Category

Include all

Tag

Include all

More filters ▾

▲ ADVANCED OPTIONS



Show costs as

Net unblended costs ▾

AWS Cost Management

Cost Explorer

Home Reports Budgets Recommendations

Savings Plans

Overview Inventory Recommendations Purchase Savings Plans Utilization report Coverage report Cart (0)

Reservations

Overview Recommendations Utilization report Coverage report

AWS Cost Management > Cost Explorer

Save as... Recent reports New report

undefined

Jan 01, 2020 - Jan 31, 2020 Monthly ⓘ Bar ▾

Group by: None Service Linked Account Region Instance Type Usage Type More ▾

Costs (\$ in thousands)



1.2
1.0
0.8
0.6
0.4
0.2
0.0

Jan 2020

To see usage data, filter by "Usage Type" or "Usage Type Group" filters with matching units (e.g., hours).

▲ FILTERS CLEAR ALL

Service Include all

Linked Account Include all

Region Include all

Instance Type Include all

Usage Type Include all

Usage Type Gr... Include all

Resource ⓘ Include all

Cost Category Include all

Tag Include all

More filters ▾

▲ ADVANCED OPTIONS ⓘ

Show costs as ⓘ

Net unblended costs ▾

AWS Cost Management

Home

Cost Explorer

Reports

Budgets

Recommendations

Savings Plans

Overview

Inventory

Recommendations

Purchase Savings Plans

Utilization report

Coverage report

Cart 0

Reservations

Overview

Recommendations

Utilization report

Coverage report

AWS Cost Management > Cost Explorer

Save as...

Recent reports

New report

undefined

Jan 01, 2020 - Jan 31, 2020

Daily

Stack

Group by: Service □ Linked Account Region Instance Type Usage Type Resource More □



Download CSV

FILTERS

CLEAR ALL

Service

Include all ▾

Linked Account

Include all ▾

Region

Include all ▾

Instance Type

Include all ▾

Usage Type

Include all ▾

Usage Type Gr...

Include all ▾

Resource

Include all ▾

Cost Category

Include all

Tag

Include all

More filters ▾

ADVANCED OPTIONS

Show costs as

Net unblended costs ▾

AWS Cost Management

Home

Cost Explorer

Reports

Budgets

Recommendations

Savings Plans

Overview

Inventory

Recommendations

Purchase Savings Plans

Utilization report

Coverage report

Cart (0)

Reservations

Overview

Recommendations

Utilization report

Coverage report

AWS Cost Management > Cost Explorer

Save as...

Recent reports ▾

New report

undefined

Jan 01, 2020 - Jan 31, 2020

Daily

0

Stack

Group by: Service ▾

Linked Account

Region

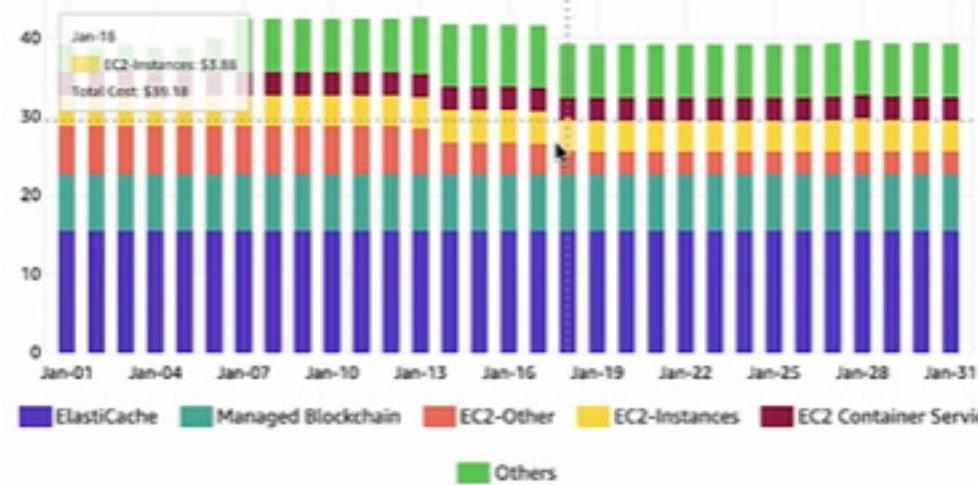
Instance Type

Usage Type

Resource

More

Costs (\$)



▲ FILTERS

CLEAR ALL

Service

Include all

Linked Account

Include all

Region

Include all

Instance Type

Include all

Usage Type

Include all

Usage Type Gr...

Include all

Resource

Include all

Cost Category

Include all

Tag

Include all

More filters

▲ ADVANCED OPTIONS

?

Show costs as

Net unblended costs

Cost Management

console.aws.amazon.com/cost-management/home#/custom?groupBy=Service&forecastTimeRangeOption=None&hasBlended=false&hasAmortized=false&excludeDiscounts=false&sortOrder=desc&sortColumn=blendedCost

AWS Services Resource Groups Global Support

AWS Cost Management

Home Cost Explorer Reports Budgets Recommendations

Savings Plans Overview Inventory Recommendations Purchase Savings Plans Utilization report Coverage report Cart (0)

Reservations Overview Recommendations Utilization report Coverage report

AWS Cost Management > Cost Explorer

Save as... Save as new report

January-2020

Group by: Costs (\$)

Cancel Save Report >

More ▾

▲ FILTERS CLEAR ALL

Service Include all ▾

Linked Account Include all ▾

Region Include all ▾

Instance Type Include all ▾

Usage Type Include all ▾

Usage Type Gr... Include all ▾

Resource Include all ▾

Cost Category Include all

Tag Include all

More filters ▾

▲ ADVANCED OPTIONS ⓘ

Show costs as ⓘ Net unblended costs ▾

Jan-01 Jan-04 Jan-07 Jan-10 Jan-13 Jan-16 Jan-19 Jan-22 Jan-25 Jan-28 Jan-31

EastiCache Managed Blockchain EC2-Other EC2-Instances EC2 Container Service Others

AWS Cost Management

Home

Cost Explorer

Reports

Budgets

Recommendations

Savings Plans

Overview

Inventory

Recommendations

Purchase Savings Plans

Utilization report

Coverage report

Cart (0)

Reservations

Overview

Recommendations

Utilization report

Coverage report

AWS Cost Management > Cost Explorer

Save as...

Recent reports ▾

New report

undefined

Jan 01, 2020 - Jan 31, 2020

Daily

0

Stack

Group by: Service ▾

Linked Account

Region

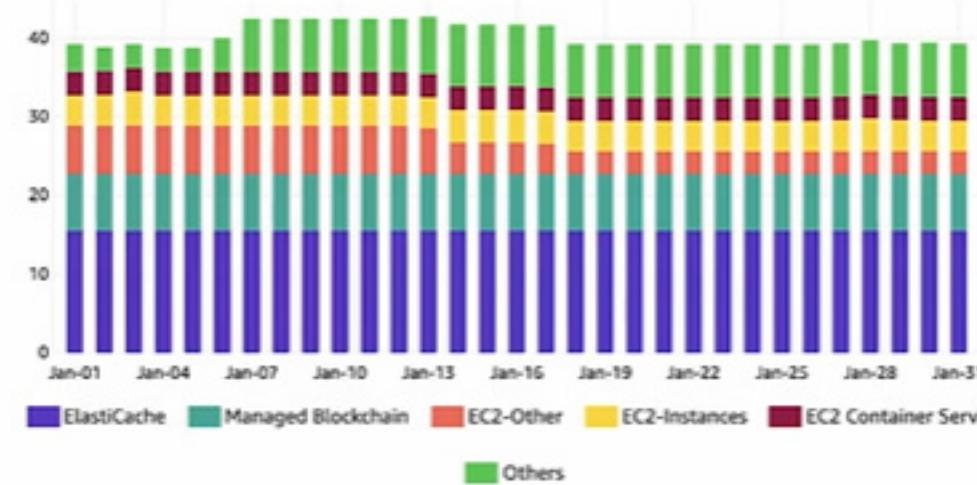
Instance Type

Usage Type

Resource

More

Costs (\$)



FILTERS

CLEAR ALL

Service

Include all

Linked Account

Include all

Region

Include all

Instance Type

Include all

Usage Type

Include all

Usage Type Gr...

Include all

Resource

Include all

Cost Category

Include all

Tag

Include all

More filters

ADVANCED OPTIONS

0

Show costs as

Net unblended costs

AWS Cost Explorer

[**AWS Cost Explorer**](#) is a tool that enables you to visualize, understand, and manage your AWS costs and usage over time.

AWS Cost Explorer includes a default report of the costs and usage for your top five cost-accruing AWS services. You can apply custom filters and groups to analyze your data. For example, you can view resource usage at the hourly level.

Monthly costs by service

Last 6 Months

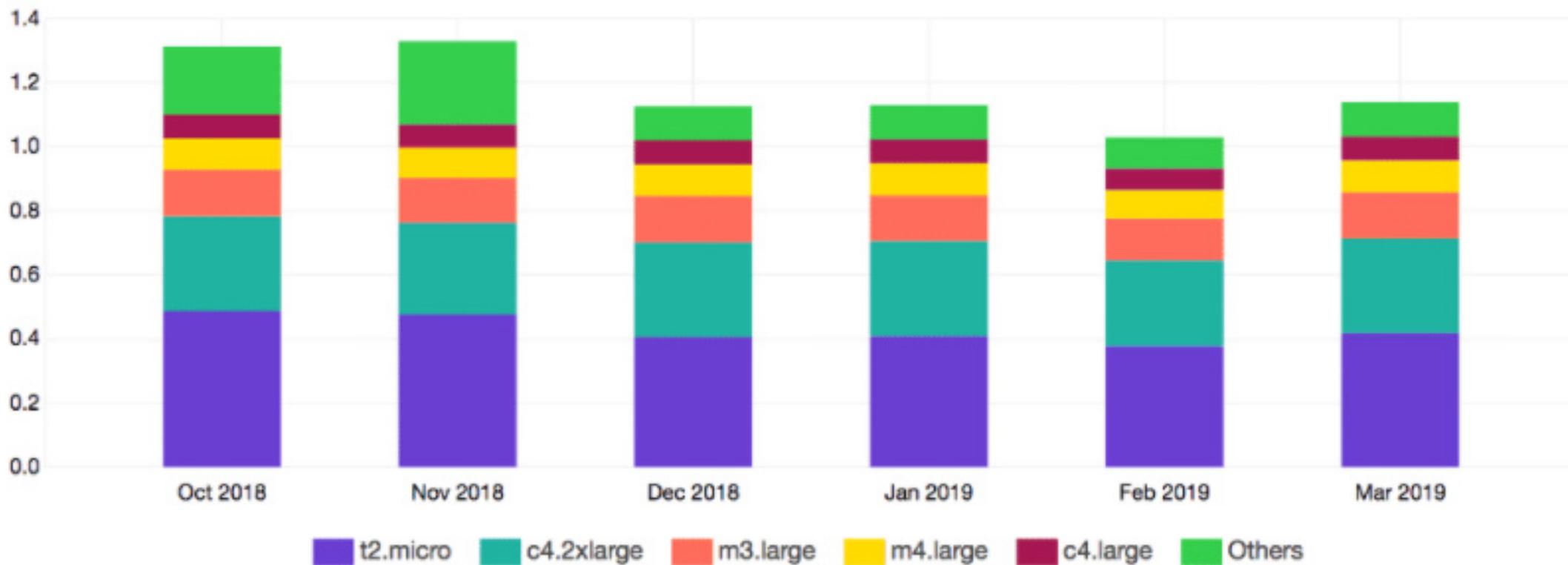
Monthly

Stack

Group by: Instance Type Instance Type X

Service Linked Account Region Usage Type Tag Tag ▼ API Operation Availability Zone More More ▼

Costs (\$ in thousands)



Download CSV

| Instance Type | Oct 1, 2018 | Nov 1, 2018 | Dec 1, 2018 | Jan 1, 2019 |
|-----------------|-------------|-------------|-------------|-------------|
| Total cost (\$) | 1,312.71 | 1,328.54 | 1,125.99 | 1,129.65 |
| t2.micro (\$) | 486.75 | 475.89 | 405.63 | 409.27 |
| c4.2xlarge (\$) | 296.11 | 286.56 | 296.11 | 296.11 |

This example of the AWS Cost Explorer dashboard displays monthly costs for Amazon EC2 instances over a 6-month period. The bar for each month separates the costs for different Amazon EC2 instance types (such as t2.micro or m3.large).

By analyzing your AWS costs over time, you can make informed decisions about future costs and how to plan your budgets.

A middle-aged man with dark hair, glasses, and a beard is speaking. He is wearing a grey t-shirt with a white graphic of a cloud above a row of hearts.

Basic support

- 24/7 customer service
- Documentation
- Whitepapers
- Support forums
- AWS Trusted Advisor
- AWS Personal Health Dashboard

A man with short brown hair, glasses, and a light beard is speaking. He is wearing a grey crew-neck t-shirt with a white graphic of a cloud with a grid of hearts underneath it. He is gesturing with his hands while speaking.

Business support

Basic and Developer support

AWS Trusted Advisor provides full set of best practice checks

A man with glasses and a beard, wearing a grey t-shirt featuring a white cloud icon with falling hearts, is speaking. He is standing in front of a large wooden wall with the AWS logo. A potted plant is visible in the foreground.

Enterprise support

Basic, Developer, and Business support

15-minute SLA for business critical workloads

Technical Account Manager (TAM)

Five pillars of the Well-Architected Framework

- Operational Excellence
- Security
- Reliability
- Performance Efficiency
- Cost Optimization

AWS Support

AWS offers four different [**Support plans**](#) to help you troubleshoot issues, lower costs, and efficiently use AWS services.

You can choose from the following Support plans to meet your company's needs:

- Basic
- Developer
- Business
- Enterprise

Basic Support

Basic Support is free for all AWS customers. It includes access to whitepapers, documentation, and support communities. With Basic Support, you can also contact AWS for billing questions and service limit increases.

With Basic Support, you have access to a limited selection of AWS Trusted Advisor checks. Additionally, you can use the **AWS Personal Health Dashboard**, a tool that provides alerts and remediation guidance when AWS is experiencing events that may affect you.

If your company needs support beyond the Basic level, you could consider purchasing Developer, Business, or Enterprise Support.

Developer, Business, and Enterprise Support

The Developer, Business, and Enterprise Support plans include all the benefits of Basic Support, in addition to the ability to open an unrestricted number of technical support cases. These three Support plans have pay-by-the-month pricing and require no long-term contracts.

The information in this course highlights only a selection of details for each Support plan. A complete overview of what is included in each Support plan, including pricing for each plan, is available on the [AWS Support](#) site.

In general, for pricing, the Developer plan has the lowest cost, the Business plan is in the middle, and the Enterprise plan has the highest cost.

To learn more, select the + symbol next to each category.

Customers in the **Developer Support** plan have access to features such as:

- Best practice guidance
- Client-side diagnostic tools
- Building-block architecture support, which consists of guidance for how to use AWS offerings, features, and services together

For example, suppose that your company is exploring AWS services. You've heard about a few different AWS services. However, you're unsure of how to potentially use them together to build applications that can address your company's needs. In this scenario, the building-block architecture support that is included with the **Developer Support** plan could help you to identify opportunities for combining specific services and features.

Business Support

Customers with a **Business Support** plan have access to additional features, including:

- Use-case guidance to identify AWS offerings, features, and services that can best support your specific needs
- All AWS Trusted Advisor checks
- Limited support for third-party software, such as common operating systems and application stack components

Suppose that your company has the Business Support plan and wants to install a common third-party operating system onto your Amazon EC2 instances. You could contact AWS Support for assistance with installing, configuring, and troubleshooting the operating system. For advanced topics such as optimizing performance, using custom scripts, or resolving security issues, you may need to contact the third-party software provider directly.

Enterprise Support

In addition to all the features included in the Basic, Developer, and Business Support plans, customers with an **Enterprise Support** plan have access to features such as:

- Application architecture guidance, which is a consultative relationship to support your company's specific use cases and applications
- Infrastructure event management: A short-term engagement with AWS Support that helps your company gain a better understanding of your use cases. This also provides your company with architectural and scaling guidance.
- A Technical Account Manager

Technical Account Manager (TAM)

The Enterprise Support plan includes access to a **Technical Account Manager (TAM)**.

If your company has an Enterprise Support plan, the TAM is your primary point of contact at AWS. They provide guidance, architectural reviews, and ongoing communication with your company as you plan, deploy, and optimize your applications.

Your TAM provides expertise across the full range of AWS services. They help you design solutions that efficiently use multiple services together through an integrated approach.

For example, suppose that you are interested in developing an application that uses several AWS services together. Your TAM could provide insights into how to best use the services together. They achieve this, while aligning with the specific needs that your company is hoping to address through the new application.

Which Support plan includes all AWS Trusted Advisor checks at the lowest cost?



Basic



Developer



Business



Enterprise

The correct response option is **Business**.

Only the Business and Enterprise Support plans include all AWS Trusted Advisor checks. Of these two Support plans, the Business Support plan has a lower cost.

Learn more:

- [Compare AWS Support plans](#)

AWS Marketplace

[AWS Marketplace](#) is a digital catalog that includes thousands of software listings from independent software vendors. You can use AWS Marketplace to find, test, and buy software that runs on AWS.

For each listing in AWS Marketplace, you can access detailed information on pricing options, available support, and reviews from other AWS customers.

You can also explore software solutions by industry and use case. For example, suppose that your company is in the healthcare industry. In AWS Marketplace, you can review use cases that software helps you to address, such as implementing solutions to protect patient records or using machine learning models to analyze a patient's medical history and predict possible health risks.

AWS Marketplace categories



Business Applications



Data & Analytics



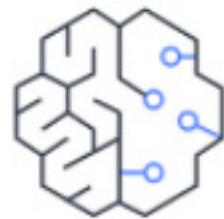
DevOps



Infrastructure Software



Internet of Things
(IoT)



Machine Learning



Migration



Security

AWS Marketplace offers products in several categories, such as Infrastructure Products, Business Applications, Data Products, and DevOps.

Within each category, you can narrow your search by browsing through product listings in subcategories. For example, subcategories in the DevOps category include areas such as Application Development, Monitoring, and Testing.

Additional resources

To learn more about the concepts that were explored in Module 8, review these resources.

- [AWS Pricing](#)
- [AWS Free Tier](#)
- [AWS Cost Management](#)
- [Whitepaper: How AWS Pricing Works](#)
- [Whitepaper: Introduction to AWS Economics](#)
- [AWS Support](#)
- [AWS Knowledge Center](#)

Which action can you perform with consolidated billing?



Review how much cost your predicted AWS usage will incur by the end of the month.



Create an estimate for the cost of your use cases on AWS.



Combine usage across accounts to receive volume pricing discounts.



Visualize and manage your AWS costs and usage over time.

The correct response option is: **Combine usage across accounts to receive volume pricing discounts.**

The other response options are incorrect because:

- Review how much cost your predicted AWS usage will incur by the end of the month - You can perform this action in *AWS Budgets*.
- Create an estimate for the cost of your use cases on AWS - You can perform this action in *AWS Pricing Calculator*.
- Visualize and manage your AWS costs and usage over time - You can perform this action in *AWS Cost Explorer*.

Learn more:

- [Consolidated billing for AWS Organizations](#)

Which pricing tool is used to visualize, understand, and manage your AWS costs and usage over time?



AWS Pricing Calculator



AWS Budgets



AWS Cost Explorer



AWS Free Tier

AWS Cost Explorer includes a default report of the costs and usage for your top five cost-accruing AWS services. You can apply custom filters and groups to analyze your data. For example, you can view resource usage at the hourly level.

The other response options are incorrect because:

- AWS Pricing Calculator enables you to create an estimate for the cost of your use cases on AWS.
- AWS Budgets enables you to create budgets to plan your service usage, service costs, and instance reservations. In AWS Budgets, you can also set custom alerts when your usage exceeds (or is forecasted to exceed) the budgeted amount.
- The AWS Free Tier is a program that consists of three types of offers that allow customers to use AWS services without incurring costs: Always free, 12 months free, and Trials.

Learn more:

- [AWS Cost Explorer](#)

Which pricing tool enables you to receive alerts when your service usage exceeds a threshold that you have defined?



Billing dashboard in the AWS Management Console



AWS Budgets



AWS Free Tier



AWS Cost Explorer

The correct response option is **AWS Budgets**.

In AWS Budgets, you can set custom alerts that will notify you when your service usage exceeds (or is forecasted to exceed) the amount that you have budgeted.

Your budget can be based on costs or usage. For example, you can set an alert that will notify you when you have incurred \$100.00 of costs in Amazon EC2 or 500,000 requests in AWS Lambda.

The other response options are incorrect because:

- From the billing dashboard in the AWS Management Console, you can view details on your AWS bill, such as service costs by Region, month to date spend, and more. However, you cannot set alerts from the billing dashboard.
- The AWS Free Tier is a program that consists of three types of offers that allow customers to use AWS services without incurring costs: Always free, 12 months free, and Trials.
- AWS Cost Explorer is a tool that enables you to visualize, understand, and manage your AWS costs and usage over time.

Learn more:

- [AWS Budgets](#)

Your company wants to receive support from an AWS Technical Account Manager (TAM). Which support plan should you choose?



Developer



Enterprise



Basic



Business

The correct response option is **Enterprise**.

A Technical Account Manager (TAM) is available only to AWS customers with an Enterprise Support plan. A TAM provides guidance, architectural reviews, and ongoing communication with your company as you plan, deploy, and optimize your applications.

Learn more:

- [Compare AWS Support plans](#)

Which service or resource is used to find third-party software that runs on AWS?



AWS Marketplace



AWS Free Tier



AWS Support



Billing dashboard in the AWS Management Console

AWS Marketplace is a digital catalog that includes thousands of software listings from independent software vendors. You can use AWS Marketplace to find, test, and buy software that runs on AWS.

The other response options are incorrect because:

- The AWS Free Tier consists of offers that allow customers to use AWS services without incurring costs. These offers are related to AWS services, not third-party software that can be used on AWS.
- AWS Support is a resource that can answer questions about best practices, assist with troubleshooting issues, help you to identify ways to optimize your use of AWS services, and so on.
- You can use the billing dashboard in the AWS Management Console to view details such as service costs by Region, the top services being used by your account, and forecasted billing costs. From the billing dashboard, you can also access other AWS billing tools, such as AWS Cost Explorer, AWS Budgets, and AWS Budgets Reports.

Learn more:

- [AWS Marketplace](#)

AWS CAF perspectives

- Business
- People
- Governance
- Platform



AWS CAF perspectives

- Business
- People
- Governance
- Platform
- Security
- Op



Six core perspectives of the Cloud Adoption Framework

At the highest level, the [AWS Cloud Adoption Framework \(AWS CAF\)](#) organizes guidance into six areas of focus, called **Perspectives**. Each Perspective addresses distinct responsibilities. The planning process helps the right people across the organization prepare for the changes ahead.

In general, the **Business**, **People**, and **Governance** Perspectives focus on business capabilities, whereas the **Platform**, **Security**, and **Operations** Perspectives focus on technical capabilities.

To learn more, select the + symbol next to each category.

The **Business Perspective** ensures that IT aligns with business needs and that IT investments link to key business results.

Use the Business Perspective to create a strong business case for cloud adoption and prioritize cloud adoption initiatives. Ensure that your business strategies and goals align with your IT strategies and goals.

Common roles in the Business Perspective include:

- Business managers
- Finance managers
- Budget owners
- Strategy stakeholders

The **People Perspective** supports development of an organization-wide change management strategy for successful cloud adoption.

Use the People Perspective to evaluate organizational structures and roles, new skill and process requirements, and identify gaps. This helps prioritize training, staffing, and organizational changes.

Common roles in the People Perspective include:

- Human resources
- Staffing
- People managers

The **Governance Perspective** focuses on the skills and processes to align IT strategy with business strategy. This ensures that you maximize the business value and minimize risks.

Use the Governance Perspective to understand how to update the staff skills and processes necessary to ensure business governance in the cloud. Manage and measure cloud investments to evaluate business outcomes.

Common roles in the Governance Perspective include:

- Chief Information Officer (CIO)
- Program managers
- Enterprise architects
- Business analysts
- Portfolio managers

Platform Perspective

The **Platform Perspective** includes principles and patterns for implementing new solutions on the cloud, and migrating on-premises workloads to the cloud.

Use a variety of architectural models to understand and communicate the structure of IT systems and their relationships. Describe the architecture of the target state environment in detail.

Common roles in the Platform Perspective include:

- Chief Technology Officer (CTO)
- IT managers
- Solutions architects

Security Perspective

The **Security Perspective** ensures that the organization meets security objectives for visibility, auditability, control, and agility.

Use the AWS CAF to structure the selection and implementation of security controls that meet the organization's needs.

Common roles in the Security Perspective include:

- Chief Information Security Officer (CISO)
- IT security managers
- IT security analysts

Operations Perspective



The **Operations Perspective** helps you to enable, run, use, operate, and recover IT workloads to the level agreed upon with your business stakeholders.

Define how day-to-day, quarter-to-quarter, and year-to-year business is conducted. Align with and support the operations of the business. The AWS CAF helps these stakeholders define current operating procedures and identify the process changes and training needed to implement successful cloud adoption.

Common roles in the Operations Perspective include:

- IT operations managers
- IT support managers

Which Perspective of the AWS Cloud Adoption Framework helps you design, implement, and optimize your AWS infrastructure based on your business goals and perspectives?



Business Perspective



Platform Perspective



Operations Perspective



People Perspective

The Platform Perspective of the AWS Cloud Adoption Framework also includes principles for implementing new solutions and migrating on-premises workloads to the cloud.

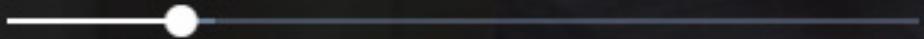
The other response options are incorrect because:

- The Business Perspective helps you to move from a model that separates business and IT strategies into a business model that integrates IT strategy.
- The Operations Perspective focuses on operating and recovering IT workloads to meet the requirements of your business stakeholders.
- The People Perspective helps Human Resources (HR) employees prepare their teams for cloud adoption by updating organizational processes and staff skills to include cloud-based competencies.

Learn more:

- [Whitepaper: An Overview of the AWS Cloud Adoption Framework](#)

aws



4:18

1.5x



6 strategies for migration

When migrating applications to the cloud, six of the most common migration strategies that you can implement are:

- Rehosting
- Replatforming
- Refactoring/re-architecting
- Repurchasing
- Retaining
- Retiring

Rehosting

-

Rehosting also known as "lift-and-shift" involves moving applications without changes. In the scenario of a large legacy migration, in which the company is looking to implement its migration and scale quickly to meet a business case, the majority of applications are rehosted.

Replatforming

—

Replatforming, also known as “lift, tinker, and shift,” involves making a few cloud optimizations to realize a tangible benefit. Optimization is achieved without changing the core architecture of the application.

Refactoring/re-architecting

–

Refactoring (also known as **re-architecting**) involves reimagining how an application is architected and developed by using **cloud-native** features. Refactoring is driven by a strong business need to add features, scale, or performance that would otherwise be difficult to achieve in the application's existing environment.

Repurchasing

—

Repurchasing involves moving from a traditional license to a software-as-a-service model.

For example, a business might choose to implement the repurchasing strategy by migrating from a customer relationship management (CRM) system to Salesforce.com.

Retaining

—

Retaining consists of keeping applications that are critical for the business in the source environment. This might include applications that require major refactoring before they can be migrated, or, work that can be postponed until a later time.

Retiring

-

Retiring is the process of removing applications that are no longer needed.

Which migration strategy involves moving to a different product?



Refactoring



Retiring



Replatforming



Repurchasing

The correct response option is Repurchasing.

Repurchasing involves replacing an existing application with a cloud-based version, such as software found in AWS Marketplace.

The other response options are incorrect because:

- Refactoring involves changing how an application is architected and developed, typically by using cloud-native features.
- Retiring involves removing an application that is no longer used or that can be turned off.
- Replatforming involves selectively optimizing aspects of an application to achieve benefits in the cloud without changing the core architecture of the application. It is also known as "lift, tinker, and shift."

Learn more:

- [6 Strategies for Migrating Applications to the Cloud](#)



A network with 1 Gbps speed moves 1 PB of data in about 100 days.

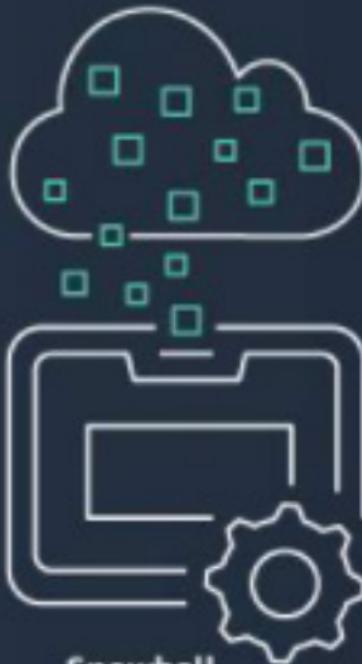
AWS Snow Family members

The [AWS Snow Family](#) is a collection of physical devices that help to physically transport up to exabytes of data into and out of AWS.

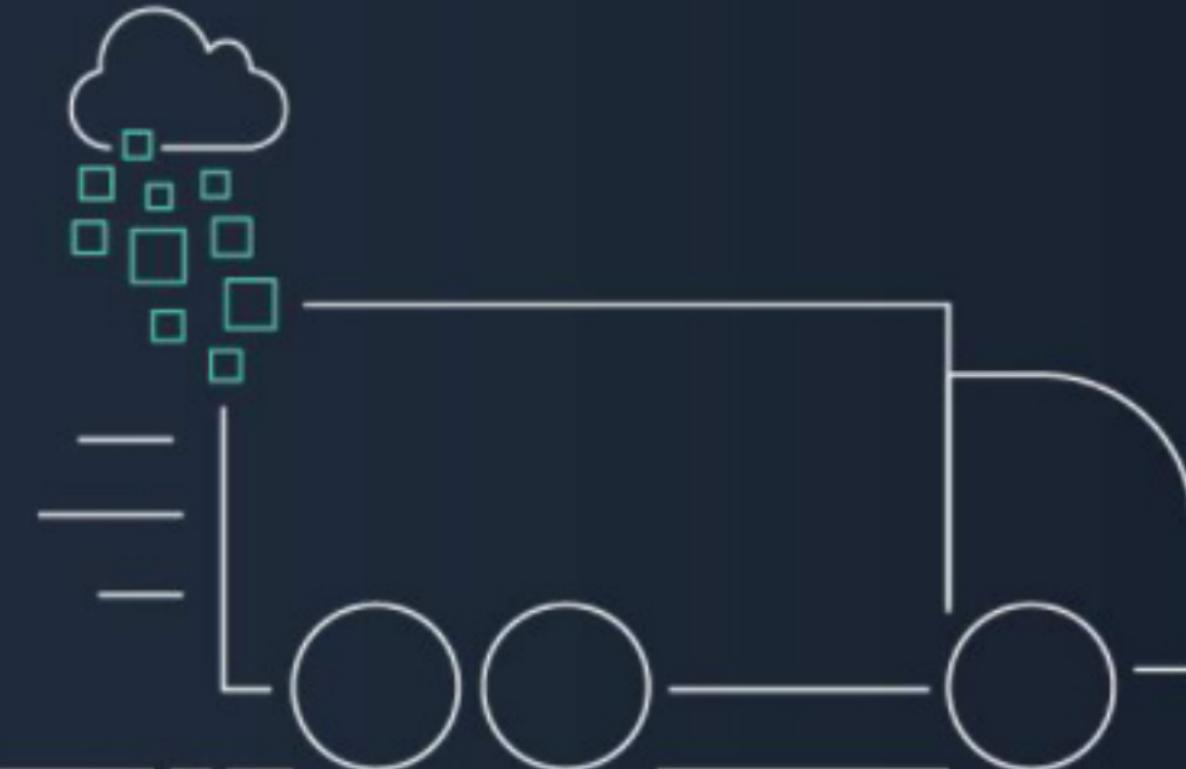
AWS Snow Family is composed of [AWS Snowcone](#), [AWS Snowball](#), and [AWS Snowmobile](#).



Snowcone



Snowball



Snowmobile

aws

These devices offer different capacity points, and most include built-in computing capabilities.

AWS owns and manages the Snow Family devices and integrates with AWS security, monitoring, storage management, and computing capabilities.

To learn about each category, select each tab.

AWS SNOWCONE

AWS SNOWBALL

AWS SNOWMOBILE

[AWS Snowcone](#) is a small, rugged, and secure edge computing and data transfer device.

It features 2 CPUs, 4 GB of memory, and 8 TB of usable storage.

[**AWS Snowball**](#) offers two types of devices:

- **Snowball Edge Storage Optimized** devices are well suited for large-scale data migrations and recurring transfer workflows, in addition to local computing with higher capacity needs.
 - Storage: 80 TB of hard disk drive (HDD) capacity for block volumes and Amazon S3 compatible object storage, and 1 TB of SATA solid state drive (SSD) for block volumes.
 - Compute: 40 vCPUs, and 80 GiB of memory to support Amazon EC2 sbe1 instances (equivalent to C5).
- **Snowball Edge Compute Optimized** provides powerful computing resources for use cases such as machine learning, full motion video analysis, analytics, and local computing stacks.
 - Storage: 42-TB usable HDD capacity for Amazon S3 compatible object storage or Amazon EBS compatible block volumes and 7.68 TB of usable NVMe SSD capacity for Amazon EBS compatible block volumes.
 - Compute: 52 vCPUs, 208 GiB of memory, and an optional NVIDIA Tesla V100 GPU. Devices run Amazon EC2 sbe-c and sbe-g instances, which are equivalent to C5, M5a, G3, and P3 instances.

AWS SNOWCONE

AWS SNOWBALL

AWS SNOWMOBILE

[AWS Snowmobile](#) is an exabyte-scale data transfer service used to move large amounts of data to AWS.

You can transfer up to 100 petabytes of data per Snowmobile, a 45-foot long ruggedized shipping container, pulled by a semi trailer truck.

What is the storage capacity of Snowball Edge Storage Optimized?



40 TB



60 TB



80 TB



100 TB

The correct response option is **80 TB**.

Snowball Edge Storage Optimized is a device that enables you to transfer large amounts of data into and out of AWS. It provides 80 TB of usable HDD storage.

Learn more:

- [AWS Snow Family](#)

Innovate with AWS Services

When examining how to use AWS services, it is important to focus on the desired outcomes. You are properly equipped to drive innovation in the cloud if you can clearly articulate the following conditions:

- The current state
- The desired state
- The problems you are trying to solve

Consider some of the paths you might explore in the future as you continue on your cloud journey.

Serverless applications

With AWS, **serverless** refers to applications that don't require you to provision, maintain, or administer servers. You don't need to worry about fault tolerance or availability. AWS handles these capabilities for you.

AWS Lambda is an example of a service that you can use to run serverless applications. If you design your architecture to trigger Lambda functions to run your code, you can bypass the need to manage a fleet of servers.

Building your architecture with serverless applications enables your developers to focus on their core product instead of managing and operating servers.

Artificial intelligence

AWS offers a variety of services powered by **artificial intelligence (AI)**.

For example, you can perform the following tasks:

- Convert speech to text with Amazon Transcribe.
- Discover patterns in text with Amazon Comprehend.
- Identify potentially fraudulent online activities with Amazon Fraud Detector.
- Build voice and text chatbots with Amazon Lex.

Machine learning

Traditional **machine learning (ML)** development is complex, expensive, time consuming, and error prone. AWS offers Amazon SageMaker to remove the difficult work from the process and empower you to build, train, and deploy ML models quickly.

You can use ML to analyze data, solve complex problems, and predict outcomes before they happen.

Which service enables you to quickly build, train, and deploy machine learning models?



Amazon Textract



Amazon Lex



AWS DeepRacer



Amazon SageMaker

With Amazon SageMaker, you can quickly and easily begin working on machine learning projects. You do not need to follow the traditional process of manually bringing together separate tools and workflows.

The other response options are incorrect because:

- Amazon Textract is a machine learning service that automatically extracts text and data from scanned documents.
- Amazon Lex is a service that enables you to build conversational interfaces using voice and text.
- AWS DeepRacer is an autonomous 1/18 scale race car that you can use to test reinforcement learning models.

Learn more:

- [Amazon SageMaker](#)

Migration and innovation

AWS Cloud Adoption Framework (AWS CAF)

6 R's of migration

Rehost, replatform, repurchase, refactor,
retire, and retain

To learn more about the concepts that were explored in Module 9, review these resources.

- [Migration & Transfer on AWS](#)
- [A Process for Mass Migrations to the Cloud](#)
- [6 Strategies for Migrating Applications to the Cloud](#)
- [AWS Cloud Adoption Framework](#)
- [AWS Fundamentals: Core Concepts](#)
- [AWS Cloud Enterprise Strategy Blog](#)
- [Modernizing with AWS Blog](#)
- [AWS Customer Stories: Data Center Migration](#)

Which Perspective of the AWS Cloud Adoption Framework helps you structure the selection and implementation of permissions?



Governance Perspective



Security Perspective



Operations Perspective



Business Perspective

The correct response option is **Security Perspective**.

The Security Perspective of the AWS Cloud Adoption Framework also helps you to identify areas on non-compliance and plan ongoing security initiatives.

The other response options are incorrect because:

- The Governance Perspective helps you to identify and implement best practices for IT governance and support business processes with technology.
- The Operations Perspective focuses on operating and recovering IT workloads to meet the requirements of your business stakeholders.
- The Business Perspective helps you to move from a model that separates business and IT strategies into a business model that integrates IT strategy.

Learn more:

- [Whitepaper: An Overview of the AWS Cloud Adoption Framework](#)

Which strategies are included in the six strategies for application migration? (Select TWO.)



Revisiting



Retaining



Remembering



Redeveloping



Rehosting

The two correct response options are:

- Retaining
- Rehosting

The application migration strategies are rehosting, replatforming, refactoring/re-architecting, repurchasing, retaining, and retiring.

Learn more:

- [6 Strategies for Migrating Applications to the Cloud](#)

What is the storage capacity of AWS Snowmobile?



40 PB



60 PB



80 PB



100 PB

The correct response option is **100 PB**.

AWS Snowmobile is a service that is used for transferring up to 100 PB of data to AWS. Each Snowmobile is a 45-foot long shipping container that is pulled by a semi trailer truck.

Learn more:

- [AWS Snow Family](#)

Which statement best describes Amazon Lex?



A service that enables you to build conversational interfaces using voice and text



A machine learning service that automatically extracts text and data from scanned documents



A document database service that supports MongoDB workloads



A service that enables you to identify potentially fraudulent online activities

The correct response option is **Amazon Lex**.

In Amazon Lex, you can quickly build, test, and deploy conversational chatbots to use in your applications.

The other response options are incorrect because:

- A machine learning service that automatically extracts text and data from scanned document describes *Amazon Textract*.
- A document database service that supports MongoDB workloads describes *Amazon DocumentDB*.
- A service that enables you to identify potentially fraudulent online activities describes *Amazon Fraud Detector*.

Learn more:

- [Amazon Lex](#)

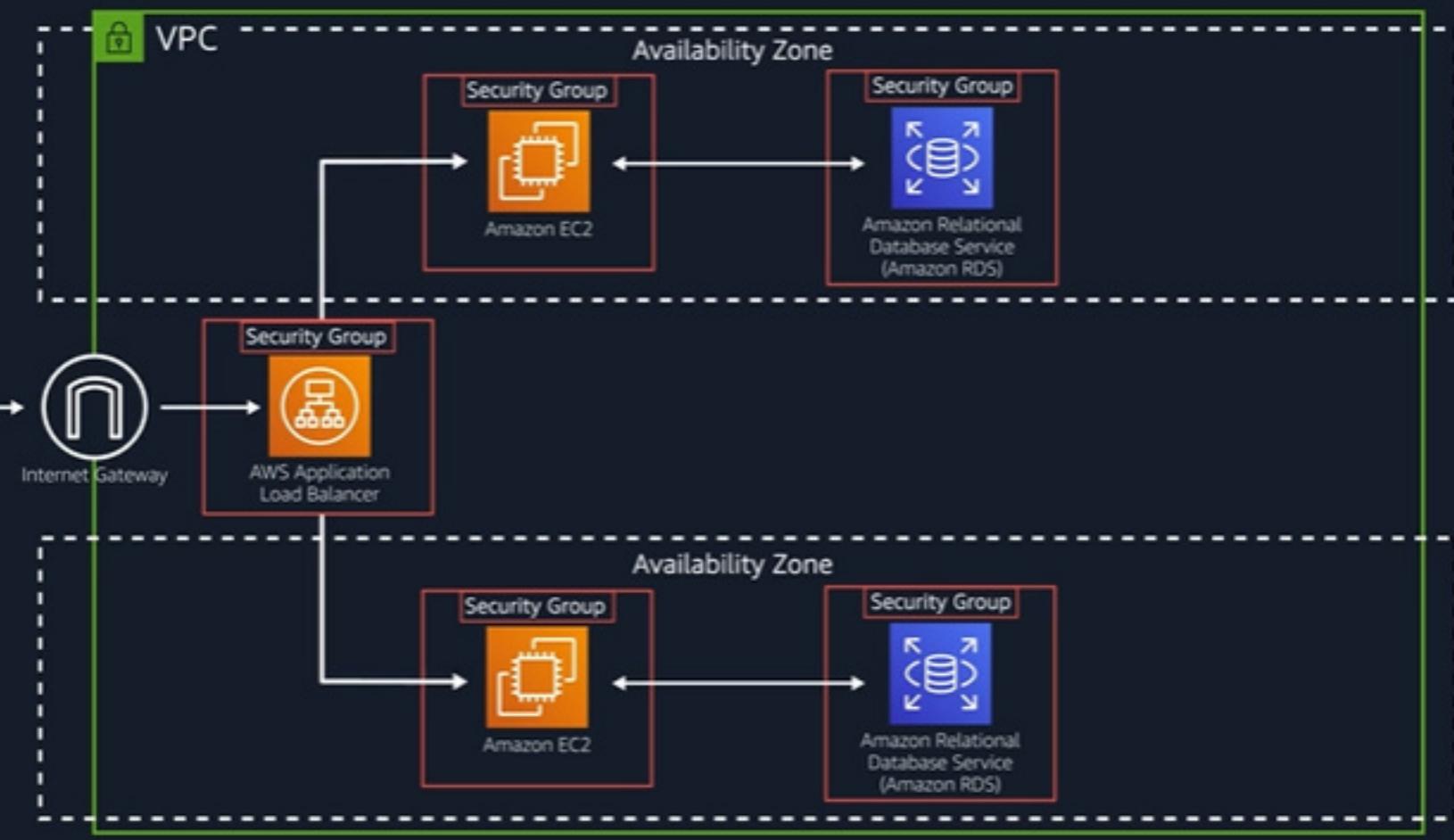
AWS Region



AWS Region



AWS Region



AWS Region





AWS Well-Architected

- Operational Excellence
- Security
- Reliability
- Performance Efficiency
- Cost Optimization

Operational
Excellence



Security



Reliability



Performance
Efficiency

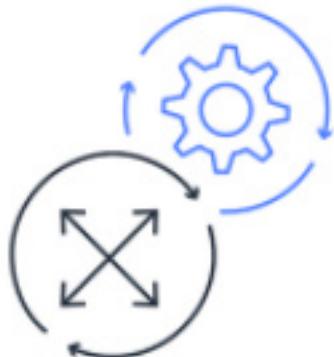


Cost
Optimization



The AWS Well-Architected Framework

The [AWS Well-Architected Framework](#) helps you understand how to design and operate reliable, secure, efficient, and cost-effective systems in the AWS Cloud. It provides a way for you to consistently measure your architecture against best practices and design principles and identify areas for improvement.



Operational
excellence



Security



Reliability



Performance
efficiency



Cost
optimization

The Well-Architected Framework is based on five pillars:

- Operational excellence
- Security
- Reliability
- Performance efficiency
- Cost optimization

To learn more, select the + symbol next to each category.

Operational excellence

—

Operational excellence is the ability to run and monitor systems to deliver business value and to continually improve supporting processes and procedures.

Design principles for operational excellence in the cloud include performing operations as code, annotating documentation, anticipating failure, and frequently making small, reversible changes.

Security

The **Security** pillar is the ability to protect information, systems, and assets while delivering business value through risk assessments and mitigation strategies.

When considering the security of your architecture, apply these best practices:

- Automate security best practices when possible.
- Apply security at all layers.
- Protect data in transit and at rest.

Reliability

Reliability is the ability of a system to do the following:

- Recover from infrastructure or service disruptions
- Dynamically acquire computing resources to meet demand
- Mitigate disruptions such as misconfigurations or transient network issues

Reliability includes testing recovery procedures, scaling horizontally to increase aggregate system availability, and automatically recovering from failure.

Performance efficiency

Performance efficiency is the ability to use computing resources efficiently to meet system requirements and to maintain that efficiency as demand changes and technologies evolve.

Evaluating the performance efficiency of your architecture includes experimenting more often, using serverless architectures, and designing systems to be able to go global in minutes.

Cost optimization

Cost optimization is the ability to run systems to deliver business value at the lowest price point.

Cost optimization includes adopting a consumption model, analyzing and attributing expenditure, and using managed services to reduce the cost of ownership.

Well-Architected Tool X

Well-Architected Tool > Workloads > Cloud Practitioner Essentials > AWS Well-Architected Framework >

AWS Well-Architected Framework

Add a link to your architectural design

PERF 2. How do you select your compute solution? [Info](#)

The optimal compute solution for a workload varies based on application design, usage patterns, and configuration settings. Architectures can use different compute solutions for various components and enable different features to improve performance. Selecting the wrong compute solution for an architecture can lead to lower performance efficiency.

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- Understand the available compute configuration options [Info](#)
- Collect compute-related metrics [Info](#)
- Determine the required configuration by right-sizing [Info](#)
- Use the available elasticity of resources [Info](#)
- Re-evaluate compute needs based on metrics [Info](#)
- None of these [Info](#)

Notes - optional

Improvements for this question are in progress.

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One of the best ways to understand how your compute systems are performing is to record and track the true utilization of various resources. This data can be used to make more accurate determinations about resource requirements.

Determine the required configuration by right-sizing

Analyze the various [performance](#) characteristics of

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Operational Excellence 6/11 Security 6/10 Reliability 6/13 Performance Efficiency 8/8

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AWS Well-Architected Framework

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PERF 1. How do you select the best performing architecture?

PERF 2. How do you select your compute solution?

PERF 3. How do you select your storage solution?

PERF 4. How do you select your database solution?

PERF 5. How do you configure your networking solution?

PERF 6. How do you evolve your workload to take advantage of new releases?

PERF 7. How do you monitor your resources to ensure they are performing?

PERF 8. How do you use

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AWS Well-Architected Framework

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Well-Architected Tool

- Operational Excellence 6/11
- Security 9/10
- Reliability 9/10
- Performance Efficiency 8/8

PERF 1. How do you select the best performing architecture?

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Which pillar of the AWS Well-Architected Framework focuses on the ability of a workload to consistently and correctly perform its intended functions?



Operational Excellence



Performance Efficiency



Security



Reliability

The correct response option is Reliability.

The other response options are incorrect because:

- The Operational Excellence pillar includes the ability to run workloads effectively, gain insights into their operations, and continuously improve supporting processes to deliver business value.
- The Performance Efficiency pillar focuses on using computing resources efficiently to meet system requirements, and to maintain that efficiency as demand changes and technologies evolve.
- The Security pillar includes protecting data, systems, and assets, and using cloud technologies to improve the security of your workloads.

Learn more:

- [Whitepaper: AWS Well-Architected Framework](#)



On-premises data center costs

Physical space

Hardware

Staff for racking
and stacking



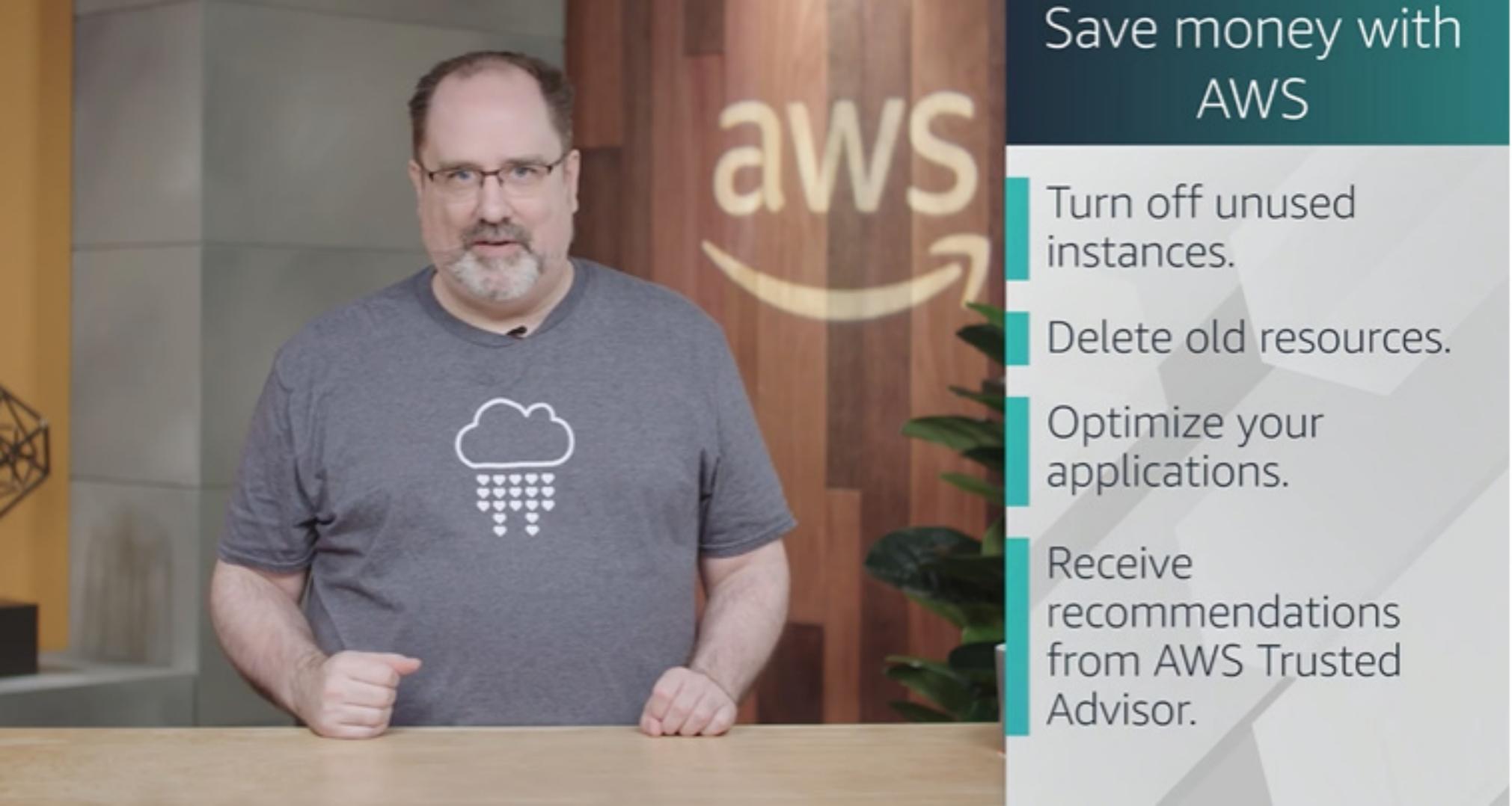
On-premises data center costs

Physical space

Hardware

Staff for racking
and stacking

Overhead for running
data center



Save money with AWS

- Turn off unused instances.
- Delete old resources.
- Optimize your applications.
- Receive recommendations from AWS Trusted Advisor.

Benefit from massive
economies of scale.

6 main benefits of using the AWS Cloud

Scaling on AWS

- Provision resources you need for the now.
- Scale up or down.
- Scaling can take minutes, not weeks or months.



Experiment on AWS

Spin up test environments.

Run experiments.



Experiment on AWS

Spin up test environments.

Run experiments.

Delete resources.



Experiment on AWS

- Spin up test environments.
- Run experiments.
- Delete resources.
- Stop incurring costs.



Stop spending money running
and maintaining data centers.

6 main benefits of using the AWS Cloud

Go global in minutes.

6 main benefits of using the AWS Cloud

Advantages of cloud computing

Operating in the AWS Cloud offers many benefits over computing in on-premises or hybrid environments.

In this section, you will learn about six advantages of cloud computing:

- Trade upfront expense for variable expense.
- Benefit from massive economies of scale.
- Stop guessing capacity.
- Increase speed and agility.
- Stop spending money running and maintaining data centers.
- Go global in minutes.

Trade upfront expense for variable expense.

—

Upfront expenses include data centers, physical servers, and other resources that you would need to invest in before using computing resources.

Instead of investing heavily in data centers and servers before you know how you're going to use them, you can pay only when you consume computing resources.

Benefit from massive economies of scale.

—

By using cloud computing, you can achieve a lower variable cost than you can get on your own. Because usage from hundreds of thousands of customers aggregates in the cloud, providers such as AWS can achieve higher economies of scale. Economies of scale translate into lower pay-as-you-go prices.

Stop guessing capacity.

—

With cloud computing, you don't have to predict how much infrastructure capacity you will need before deploying an application.

For example, you can launch Amazon Elastic Compute Cloud (Amazon EC2) instances when needed and pay only for the compute time you use. Instead of paying for resources that are unused or dealing with limited capacity, you can access only the capacity that you need, and scale in or out in response to demand.

Increase speed and agility.

-

The flexibility of cloud computing makes it easier for you to develop and deploy applications.

This flexibility also provides your development teams with more time to experiment and innovate.

Stop spending money running and maintaining data centers.

—

Cloud computing in data centers often requires you to spend more money and time managing infrastructure and servers.

A benefit of cloud computing is the ability to focus less on these tasks and more on your applications and customers.

Go global in minutes.

—

The AWS Cloud global footprint enables you to quickly deploy applications to customers around the world, while providing them with low latency.

Which process is an example of benefiting from massive economies of scale?



Deploying an application in multiple Regions around the world



Receiving lower pay-as-you-go prices as the result of AWS customers' aggregated usage of services



Paying for compute time as you use it instead of investing upfront costs in data centers



Scaling your infrastructure capacity in and out to meet demand

The correct response option is: Receiving lower pay-as-you-go prices as the result of AWS customers' aggregated usage of services.

Because usage from hundreds of thousands of customers is aggregated in the cloud, providers such as AWS can achieve higher economies of scale. The economies of scale translate into lower pay-as-you-go prices.

The other response options are incorrect because:

- Deploying an application in multiple Regions around the world: This process is an example of *Go global in minutes*.
- Paying for compute time as you use it instead of investing upfront costs in data centers: This process is an example of *Trade upfront expense for variable expense*.
- Scaling your infrastructure capacity in and out to meet demand: This process is an example of *Stop guessing capacity*.

The correct response option is: Receiving lower pay-as-you-go prices as the result of AWS customers' aggregated usage of services.

Because usage from hundreds of thousands of customers is aggregated in the cloud, providers such as AWS can achieve higher economies of scale. The economies of scale translate into lower pay-as-you-go prices.

The other response options are incorrect because:

- Deploying an application in multiple Regions around the world: This process is an example of *Go global in minutes*.
- Paying for compute time as you use it instead of investing upfront costs in data centers: This process is an example of *Trade upfront expense for variable expense*.
- Scaling your infrastructure capacity in and out to meet demand: This process is an example of *Stop guessing capacity*.

Learn more:

- [Six advantages of cloud computing](#)

In Module 10, you learned about the following concepts:

- The five pillars of the AWS Well-Architected Framework:
 - Operational excellence
 - Security
 - Reliability
 - Performance efficiency
 - Cost optimization
- Six advantages of cloud computing:
 - Trade upfront expense for variable expense.
 - Benefit from massive economies of scale.
 - Stop guessing capacity.
 - Increase speed and agility.
 - Stop spending money running and maintaining data centers.
 - Go global in minutes.

Additional resources

To learn more about the concepts that were explored in Module 10, review these resources.

- [AWS Well-Architected](#)
- [Whitepaper: AWS Well-Architected Framework](#)
- [AWS Architecture Center](#)
- [Six Advantages of Cloud Computing](#)
- [AWS Architecture Blog](#)

Which pillar of the AWS Well-Architected Framework includes the ability to run workloads effectively and gain insights into their operations?



Cost Optimization



Operational Excellence



Performance Efficiency



Reliability

The correct response option is **Operational Excellence**.

The other response options are incorrect because:

- The Cost Optimization pillar focuses on the ability to run systems to deliver business value at the lowest price point.
- The Performance Efficiency pillar focuses on using computing resources efficiently to meet system requirements and to maintain that efficiency as demand changes and technologies evolve.
- The Reliability pillar focuses on the ability of a workload to consistently and correctly perform its intended functions.

Learn more:

- [Whitepaper: AWS Well-Architected Framework](#)

The two correct response options are:

- Increase speed and agility.
- Stop spending money running and maintaining data centers.

The six advantages of cloud computing are:

- Trade upfront expense for variable expense.
- Benefit from massive economies of scale.
- Stop guessing capacity.
- Increase speed and agility.
- Stop spending money running and maintaining data centers.
- Go global in minutes.

Learn more:

- [Six advantages of cloud computing](#)

The correct response option is **Amazon Elastic Kubernetes Service (Amazon EKS)**.

Amazon EKS is a fully managed service that you can use to run Kubernetes on AWS. Kubernetes is open-source software that enables you to deploy and manage containerized applications at scale.

Containers provide you with a standard way to package your application's code and dependencies into a single object. Containers are frequently used for processes and workflows in which there are essential requirements for security, reliability, and scalability.

The other response options are incorrect because:

- Amazon SageMaker is a service that enables you to quickly build, train, and deploy machine learning models.
- Amazon Aurora is an enterprise-class relational database.
- Amazon Redshift is a data warehousing service that you can use for big data analytics.

Learn more:

- [Amazon EKS](#)

Which action can you perform in Amazon CloudFront?

- Run infrastructure in a hybrid cloud approach.
- Provision an isolated section of the AWS Cloud to launch resources in a virtual network that you define.
- Deliver content to customers through a global network of edge locations.
- Provision resources by using programming languages or a text file.

The correct response is **Deliver content to customers through a global network of edge locations.**

Amazon CloudFront is a content delivery service.

It uses a network of edge locations to cache content and deliver content to customers all over the world. When content is cached, it is stored locally as a copy. This content might be video files, photos, webpages, and so on.

The other response options are incorrect because:

- Run infrastructure in a hybrid cloud approach - This action can be performed with *AWS Outposts*.
- Provision resources by using programming languages or a text file - This action can be performed in *AWS CloudFormation*.
- Provision an isolated section of the AWS Cloud to launch resources in a virtual network that you define - This action can be performed in *Amazon Virtual Private Cloud (Amazon VPC)*.

Learn more:

- [Amazon CloudFront](#)

Which Perspective of the AWS Cloud Adoption Framework focuses on recovering IT workloads to meet the requirements of your business stakeholders?

- People Perspective
- Business Perspective
- Governance Perspective
- Operations Perspective

The correct response option is **Operations Perspective**.

The Operations Perspective of the AWS Cloud Adoption Framework also includes principles for operating in the cloud by using agile best practices.

The other response options are incorrect because:

- The Business Perspective helps you to move from a model that separates business and IT strategies into a business model that integrates IT strategy.
- The People Perspective helps Human Resources (HR) employees prepare their teams for cloud adoption by updating organizational processes and staff skills to include cloud-based competencies.
- The Governance Perspective helps you understand how to update the staff skills and organizational processes that are necessary to ensure business governance in the cloud.

Learn more:

- [Whitepaper: An Overview of the AWS Cloud Adoption Framework](#)

You are running an Amazon EC2 instance and want to store data in an attached resource. Your data is temporary and will not be kept long term. Which resource should you use?



Amazon S3 bucket



Subnet



Amazon Elastic Block Store (Amazon EBS) volume



Instance store

The correct response option is **instance store**.

Instance stores are ideal for temporary data that does not need to be kept long term.

When an Amazon EC2 instance is stopped or terminated, all the data that has been written to the attached instance store is deleted.

The other response options are incorrect because:

- Amazon EBS volumes are ideal for data that needs to be retained.
When an Amazon EC2 instance is stopped or terminated, all of the data on the attached EBS volume is still available.
- Amazon S3 buckets cannot be attached to Amazon EC2 instances.
- A subnet is a section of a virtual private cloud (VPC) in which you can group resources based on security or operational needs.

Learn more:

- [Amazon EC2 instance store](#)

The correct response option is **instance store**.

Instance stores are ideal for temporary data that does not need to be kept long term.

When an Amazon EC2 instance is stopped or terminated, all the data that has been written to the attached instance store is deleted.

The other response options are incorrect because:

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- Amazon S3 buckets cannot be attached to Amazon EC2 instances.
- A subnet is a section of a virtual private cloud (VPC) in which you can group resources based on security or operational needs.

Learn more:

- [Amazon EC2 instance store](#)

Which migration strategy involves changing how an application is architected and developed, typically by using cloud-native features?

Replatforming

Repurchasing

Refactoring

Rehosting

Which migration strategy involves changing how an application is architected and developed, typically by using cloud-native features?

Replatforming

Repurchasing

Refactoring

Rehosting

The correct response option is Refactoring.

The other response options are incorrect because:

- Repurchasing involves replacing an existing application with a cloud-based version, such as software found in AWS Marketplace.
- Rehosting involves moving an application to the cloud with little to no modifications to the application itself. It is also known as "lift and shift."
- Replatforming involves selectively optimizing aspects of an application to achieve benefits in the cloud without changing the core architecture of the application. It is also known as "lift, tinker, and shift."

Learn more:

- [6 Strategies for Migrating Applications to the Cloud](#)

06/30

You want to store data in a key-value database. Which service should you use?

Amazon DocumentDB

Amazon DynamoDB

Amazon RDS

Amazon Aurora

06/30

You want to store data in a key-value database. Which service should you use?

Amazon DocumentDB

Amazon DynamoDB

Amazon RDS

Amazon Aurora

The correct response option is **Amazon DynamoDB**.

Amazon DynamoDB is a key-value database service. A key-value database might include data pairs such as "Name: John Doe," "Address: 123 Any Street," and "City: Anytown".

In a key-value database, you can add or remove attributes from items in the table at any time. Additionally, not every item in the table has to have the same attributes.

The other response options are incorrect because:

- Amazon Relational Database Service (Amazon RDS) and Amazon Aurora use structured query language (SQL) to store and query data. They are not key-value databases.
- Amazon DocumentDB is a document database service that supports MongoDB workloads.

Learn more:

- [Amazon DynamoDB](#)

07/30

Which statement best describes Elastic Load Balancing?

- A service that distributes incoming traffic across multiple targets, such as Amazon EC2 instances
- A service that enables you to set up, manage, and scale a distributed in-memory or cache environment in the cloud
- A service that monitors your applications and automatically adds or removes capacity from your resource groups in response to changing demand
- A service that provides data that you can use to monitor your applications, optimize resource utilization, and respond to system-wide performance changes

The correct response option is A service that distributes incoming traffic across multiple targets, such as Amazon EC2 instances.

A load balancer acts as a single point of contact for all incoming web traffic to your Auto Scaling group. This means that as Amazon EC2 instances are added or removed in response to the amount of incoming traffic, these requests are routed to the load balancer first and then spread across multiple resources that will handle them.

The other response options are incorrect because:

- A service that monitors your applications and automatically adds or removes capacity from your resource groups in response to changing demand - This response option describes *AWS Auto Scaling*.
- A service that provides data that you can use to monitor your applications, optimize resource utilization, and respond to system-wide performance changes - This response option describes *Amazon CloudWatch*. Although Elastic Load Balancing does optimize resource utilization by distributing incoming traffic across available resources, this would not be the best response option because Elastic Load Balancing does not provide all the other listed features.
- A service that enables you to set up, manage, and scale a distributed in-memory or cache environment in the cloud - This response option describes *Amazon ElastiCache*.

The correct response option is A service that distributes incoming traffic across multiple targets, such as Amazon EC2 instances.

A load balancer acts as a single point of contact for all incoming web traffic to your Auto Scaling group. This means that as Amazon EC2 instances are added or removed in response to the amount of incoming traffic, these requests are routed to the load balancer first and then spread across multiple resources that will handle them.

The other response options are incorrect because:

- A service that monitors your applications and automatically adds or removes capacity from your resource groups in response to changing demand - This response option describes *AWS Auto Scaling*.
- A service that provides data that you can use to monitor your applications, optimize resource utilization, and respond to system-wide performance changes - This response option describes *Amazon CloudWatch*. Although Elastic Load Balancing does optimize resource utilization by distributing incoming traffic across available resources, this would not be the best response option because Elastic Load Balancing does not provide all the other listed features.
- A service that enables you to set up, manage, and scale a distributed in-memory or cache environment in the cloud - This response option describes *Amazon ElastiCache*.

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- A service that enables you to set up, manage, and scale a distributed in-memory or cache environment in the cloud - This response option describes *Amazon ElastiCache*.

Learn more:

- [Elastic Load Balancing](#)

In the S3 Intelligent-Tiering storage class, Amazon S3 moves objects between a frequent access tier and an infrequent access tier. Which storage classes are used for these tiers? (Select TWO.)



S3 Standard



S3 Glacier Deep Archive



S3 One Zone-IA



S3 Standard-IA



S3 Glacier

The two correct response options are:

- S3 Standard
- S3 Standard-IA

In the S3 Intelligent-Tiering storage class, Amazon S3 monitors objects' access patterns. If you haven't accessed an object for 30 consecutive days, Amazon S3 automatically moves it to the infrequent access tier, S3 Standard-IA. If you access an object in the infrequent access tier, Amazon S3 automatically moves it to the frequent access tier, S3 Standard.

Learn more:

- [Amazon S3 storage classes](#)

09/30

Which service enables you to consolidate and manage multiple AWS accounts from a central location?

- AWS Key Management Service (AWS KMS)
- AWS Organizations
- AWS Artifact
- AWS Identity and Access Management (IAM)

The correct response option is **AWS Organizations**.

In AWS Organizations, you can centrally control permissions for the accounts in your organization by using service control policies (SCPs). Additionally, you can use the consolidated billing feature in AWS Organizations to combine usage and receive a single bill for multiple AWS accounts.

The other response options are incorrect because:

- AWS Identity and Access Management (IAM) is a service that you can use to manage access to AWS services and resources.
- AWS Artifact is a service that enables you to access AWS security and compliance reports and special online agreements.
- AWS Key Management Service (AWS KMS) enables you to create, manage, and use cryptographic keys.

Learn more:

- [AWS Organizations](#)

The correct response option is **AWS Snowmobile**.

AWS Snowmobile is a service that is used for transferring up to 100 PB of data to AWS. Each Snowmobile is a 45-foot long shipping container that is pulled by a semi-trailer truck.

The other response options are incorrect because:

- Amazon Neptune is a graph database service. You can use Amazon Neptune to build and run applications that work with highly connected datasets, such as recommendation engines, fraud detection, and knowledge graphs.
- Amazon CloudFront is a content delivery service.
- AWS DeepRacer is an autonomous 1/18 scale race car that you can use to test reinforcement learning models.

Learn more:

- [AWS Snow Family](#)

Which AWS Trusted Advisor category includes checks for your service limits and overutilized instances?

Security

Fault Tolerance

Cost Optimization

Performance

The correct response option is **Performance**.

In this category, AWS Trusted Advisor also helps improve the performance of your services by providing recommendations for how to take advantage of provisioned throughput.

The other response options are incorrect because:

- The Security category includes checks that help you to review your permissions and identify which AWS security features to enable.
- The Cost Optimization category includes checks for unused or idle resources that could be eliminated and provide cost savings.
- The Fault Tolerance category includes checks to help you improve your applications' availability and redundancy.

Learn more:

- [AWS Trusted Advisor](#)

The correct response option is **Performance**.

In this category, AWS Trusted Advisor also helps improve the performance of your services by providing recommendations for how to take advantage of provisioned throughput.

The other response options are incorrect because:

- The Security category includes checks that help you to review your permissions and identify which AWS security features to enable.
- The Cost Optimization category includes checks for unused or idle resources that could be eliminated and provide cost savings.
- The Fault Tolerance category includes checks to help you improve your applications' availability and redundancy.

Learn more:

- [AWS Trusted Advisor](#)

Question

12/30

You want to send and receive messages between distributed application components. Which service should you use?

Amazon ElastiCache

AWS Snowball

Amazon Route 53

Amazon Simple Queue Service (Amazon SQS)

The correct response option is **Amazon Simple Queue Service (Amazon SQS)**.

Amazon SQS is a message queuing service. Using Amazon SQS, you can send, store, and receive messages between software components at any volume size, without losing messages or requiring other services to be available.

In Amazon SQS, an application sends messages into a queue. A user or service retrieves a message from the queue, processes it, and then deletes it from the queue.

The other response options are incorrect because:

- AWS Snowball is a device that enables you to transfer large amounts of data into and out of AWS.
- Amazon ElastiCache is a service that adds caching layers on top of your databases to help improve the read times of common requests.
- Amazon Route 53 is a DNS web service. It gives developers and businesses a reliable way to route end users to internet applications that are hosted in AWS. Additionally, you can transfer DNS records for existing domain names that are currently managed by other domain registrars or register new domain names directly in Amazon Route 53.

In Amazon SQS, an application sends messages into a queue. A user or service retrieves a message from the queue, processes it, and then deletes it from the queue.

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Learn more:

- [Amazon SQS](#)

Which actions can you perform in Amazon Route 53? (Select TWO.)

- Monitor your applications and respond to system-wide performance changes.
- Connect user requests to infrastructure in AWS and outside of AWS.
- Automate the deployment of workloads into your AWS environment.
- Access AWS security and compliance reports and select online agreements.
- Manage DNS records for domain names.

The correct two response options are:

- Connect user requests to infrastructure in AWS and outside of AWS.
- Manage DNS records for domain names.

Amazon Route 53 is a DNS web service. It gives developers and businesses a reliable way to route end users to internet applications that are hosted in AWS.

Additionally, you can transfer DNS records for existing domain names that are currently managed by other domain registrars, or register new domain names directly within Amazon Route 53.

The other response options are incorrect because:

- Monitor your applications and respond to system-wide performance changes - These actions can be performed in *Amazon CloudWatch*.
- Access AWS security and compliance reports and special online agreements - This action can be performed in *AWS Artifact*.
- Automate the deployment of workloads into your AWS environment - This action can be performed with *AWS Quick Starts*.

Learn more:

- [Amazon Route 53](#)

14/30

Which tool enables you to visualize, understand, and manage your AWS costs and usage over time?



AWS Pricing Calculator



AWS Budgets



AWS Cost Explorer



AWS Artifact

The correct response option is **AWS Cost Explorer**.

With AWS Cost Explorer, you can quickly create custom reports to analyze your AWS cost and usage data.

The other response options are incorrect because:

- AWS Budgets lets you set custom alerts that will notify you when your service usage exceeds (or is forecasted to exceed) the amount that you have budgeted.
- AWS Pricing Calculator lets you explore AWS services and create an estimate for the cost of your use cases on AWS. In the AWS Pricing Calculator, you can enter details for your cloud computing requirements and then receive a detailed estimate that can be exported and shared.
- AWS Artifact is a service that enables you to access AWS security and compliance reports and special online agreements.

Learn more:

- [AWS Cost Explorer](#)

You want to store data in a volume that is attached to an Amazon EC2 instance.
Which service should you use?

- Amazon ElastiCache
- Amazon Elastic Block Store (Amazon EBS)
- Amazon Simple Storage Service (Amazon S3)
- AWS Lambda

The correct response option is **Amazon Elastic Block Store (Amazon EBS)**.

Amazon EBS provides block-level storage volumes that you can use with Amazon EC2 instances. If you stop or terminate an Amazon EC2 instance, all the data on the attached EBS volume remains available.

The other response options are incorrect because:

- Amazon Simple Storage Service (Amazon S3) is a service that provides object-level storage. Amazon S3 stores data as objects within buckets.
- AWS Lambda is a service that lets you run code without provisioning or managing servers.
- Amazon ElastiCache is a service that adds caching layers on top of your databases to help improve the read times of common requests.

Learn more:

- [Amazon EBS](#)

16/30

Which service enables you to review details for user activities and API calls that have occurred within your AWS environment?

Amazon Inspector

AWS CloudTrail

Amazon CloudWatch

AWS Trusted Advisor

The correct response option is **AWS CloudTrail**.

With CloudTrail, you can view a complete history of user activity and API calls for your applications and resources.

Events are typically updated in CloudTrail within 15 minutes after an API call was made. You can filter events by specifying the time and date that an API call occurred, the user who requested the action, the type of resource that was involved in the API call, and more.

The other response options are incorrect because:

- Amazon CloudWatch is a service that provides data that you can use to monitor your applications, optimize resource utilization, and respond to system-wide performance changes.
- Amazon Inspector is a service that checks applications for security vulnerabilities and deviations from security best practices.
- AWS Trusted Advisor is an online tool that inspects your AWS environment and provides real-time guidance in accordance with AWS best practices.

Learn more:

- [AWS CloudTrail](#)

17/30

Which service enables you to build the workflows that are required for human review of machine learning predictions?

- Amazon Aurora
- Amazon Augmented AI
- Amazon Lex
- Amazon Textract

The correct response option is **Amazon Augmented AI**.

Amazon Augmented AI (Amazon A2I) provides built-in human review workflows for common machine learning use cases, such as content moderation and text extraction from documents. With Amazon A2I, you can also create your own workflows for machine learning models built on Amazon SageMaker or any other tools.

The other response options are incorrect because:

- Amazon Textract is a machine learning service that automatically extracts text and data from scanned documents.
- Amazon Lex is a service that enables you to build conversational interfaces using voice and text.
- Amazon Aurora is an enterprise-class relational database.

Learn more:

- [Amazon Augmented AI](#)

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- [Amazon Augmented AI](#)

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Learn more:

- [Amazon Augmented AI](#)

Question

18/30

You want Amazon S3 to monitor your objects' access patterns. Which storage class should you use?



S3 Intelligent-Tiering



S3 Glacier



S3 One Zone-IA



S3 Standard-IA

The correct response option is **S3 Intelligent-Tiering**.

In the S3 Intelligent-Tiering storage class, Amazon S3 monitors objects' access patterns. If you haven't accessed an object for 30 consecutive days, Amazon S3 automatically moves it to the infrequent access tier, S3 Standard-IA. If you access an object in the infrequent access tier, Amazon S3 automatically moves it to the frequent access tier, S3 Standard.

The other response options are incorrect because:

- S3 Glacier is a low-cost storage class that is ideal for data archiving. You can retrieve objects stored in the S3 Glacier storage class within a few minutes to a few hours.
- The S3 Standard-IA storage class is ideal for data that is infrequently accessed but requires high availability when needed. Both S3 Standard and S3 Standard-IA store data in a minimum of three Availability Zones. S3 Standard-IA provides the same level of availability as S3 Standard but at a lower storage price.
- S3 One Zone-IA is ideal for infrequently accessed data that does not require high availability.

Learn more:

- [Amazon S3 storage classes](#)

Which component or service enables you to establish a dedicated private connection between your data center and virtual private cloud (VPC)?

Virtual private gateway

Internet gateway

Amazon CloudFront

AWS Direct Connect

Which component or service enables you to establish a dedicated private connection between your data center and virtual private cloud (VPC)?

Virtual private gateway

Internet gateway

Amazon CloudFront

AWS Direct Connect

The correct response option is **AWS Direct Connect**.

AWS Direct Connect is a service that enables you to establish a dedicated private connection between your data center and VPC.

The private connection that AWS Direct Connect provides helps you to reduce network costs and increase the amount of bandwidth that can travel through your network.

The other response options are incorrect because:

- Amazon CloudFront is a content delivery service. It uses a network of edge locations to cache content and deliver content to customers all over the world.
- A virtual private gateway enables you to establish a virtual private network (VPN) connection between your VPC and a private network, such as an on-premises data center or internal corporate network. A virtual private gateway allows traffic into the VPC only if it is coming from an approved network.
- An internet gateway is a connection between a VPC and the internet. It allows public traffic from the internet to access a VPC.

Learn more:

- [AWS Direct Connect](#)

The correct response option is **AWS Direct Connect**.

AWS Direct Connect is a service that enables you to establish a dedicated private connection between your data center and VPC.

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- An internet gateway is a connection between a VPC and the internet. It allows public traffic from the internet to access a VPC.

Learn more:

- [AWS Direct Connect](#)

Which service is used to quickly deploy and scale applications on AWS?



AWS Snowball



AWS Elastic Beanstalk



AWS Outposts



Amazon CloudFront

The correct response option is **AWS Elastic Beanstalk**.

You upload your application, and Elastic Beanstalk automatically handles the deployment details of capacity provisioning, load balancing, auto-scaling, and application health monitoring.

The other response options are incorrect because:

- AWS Outposts is a service that enables you to run infrastructure in a hybrid cloud approach.
- Amazon CloudFront is a content delivery service.
- AWS Snowball is a device that enables you to transfer large amounts of data into and out of AWS.

Learn more:

- [AWS Quick Starts](#)

Which Support plans include access to all AWS Trusted Advisor checks? (Select TWO.)



AWS Free Tier



Business



Enterprise



Developer



Basic

The two correct response options are:

- Enterprise
- Business

The other response options are incorrect because:

- The Basic and Developer Support plans provide access to a limited selection of AWS Trusted Advisor checks.
- The AWS Free Tier is not a Support plan. It is a program that consists of three types of offers that allow customers to use AWS services without incurring costs: Always free, 12 months free, and Trials.

Learn more:

- [AWS Trusted Advisor](#)

22/30

Which statement best describes an Availability Zone?

- A site that Amazon CloudFront uses to cache copies of content for faster delivery to users at any location
- A fully isolated portion of the AWS global infrastructure
- A separate geographical location with multiple locations that are isolated from each other
- The server from which Amazon CloudFront gets your files

The correct response option is **A fully isolated portion of the AWS global infrastructure.**

An Availability Zone is a single data center or a group of data centers within a Region.

Availability Zones are located tens of miles apart from each other. This helps them to provide interconnectivity to support the services and applications that run within a Region.

The other response options are incorrect because:

- A separate geographical location with multiple locations that are isolated from each other - This response option describes a *Region*.
- The server from which Amazon CloudFront gets your files - This response option describes an *origin*.
- A site that Amazon CloudFront uses to cache copies of content for faster delivery to users at any location - This response option describes an *Edge location*.

Learn more:

- [AWS global infrastructure](#)
- [Regions and Availability Zones](#)

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Learn more:

- [AWS global infrastructure](#)
- [Regions and Availability Zones](#)

Question

23/30

Which tasks are the responsibilities of AWS? (Select TWO.)



Configuring AWS infrastructure devices



Maintaining virtualization infrastructure



Creating IAM users and groups



Training company employees on how to use AWS services



Configuring security groups on Amazon EC2 instances

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The two correct response options are:

- Maintaining virtualization infrastructure
- Configuring AWS infrastructure devices

The other three response options are tasks that are the responsibilities of customers.

Learn more:

- [AWS shared responsibility model](#)

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- Maintaining virtualization infrastructure
- Configuring AWS infrastructure devices

The other three response options are tasks that are the responsibilities of customers.

Learn more:

- [AWS shared responsibility model](#)

Which statement best describes AWS Marketplace?

- A resource that provides guidance, architectural reviews, and ongoing communication with your company as you plan, deploy, and optimize your applications
- An online tool that inspects your AWS environment and provides real-time guidance in accordance with AWS best practices
- A digital catalog that includes thousands of software listings from independent software vendors

The correct response option is A digital catalog that includes thousands of listings from independent software vendors.

You can use AWS Marketplace to find, test, and buy software that runs on AWS.

The other response options are incorrect because:

- A resource that can answer questions about best practices and assist with troubleshooting issues - This response option describes AWS *Support*.
- A resource that provides guidance, architectural reviews, and ongoing communication with your company as you plan, deploy, and optimize your applications - This response option describes a *Technical Account Manager (TAM)*.
- An online tool that inspects your AWS environment and provides real-time guidance in accordance with AWS best practices - This response option describes AWS *Trusted Advisor*.

Learn more:

- [AWS Marketplace](#)

Which statement best describes Amazon GuardDuty?

- A service that helps protect your applications against distributed denial-of-service (DDoS) attacks
- A service that provides intelligent threat detection for your AWS infrastructure and resources
- A service that checks applications for security vulnerabilities and deviations from security best practices
- A service that lets you monitor network requests that come into your web applications

The correct response option is A service that provides intelligent threat detection for your AWS infrastructure and resources.

AWS GuardDuty identifies threats by continually monitoring the network activity and account behavior within your AWS environment.

The other response options are incorrect because:

- A service that helps protect your applications against distributed denial-of-service (DDoS) attacks - This response option describes AWS *Shield*.
- A service that checks applications for security vulnerabilities and deviations from security best practices - This response option describes *Amazon Inspector*.
- A service that lets you monitor network requests that come into your web applications - This response option describes AWS WAF.

Learn more:

- [Amazon GuardDuty](#)

Question

25/30

Which statement best describes Amazon GuardDuty?



A service that helps protect your applications against distributed denial-of-service (DDoS) attacks



A service that provides intelligent threat detection for your AWS infrastructure and resources



A service that checks applications for security vulnerabilities and deviations from security best practices

Which pillar of the AWS Well-Architected Framework focuses on using computing resources in ways that meet system requirements?

- Security
- Performance Efficiency
- Operational Excellence
- Reliability

The correct response option is **Performance Efficiency**.

The Performance Efficiency pillar focuses on using computing resources efficiently to meet system requirements, and to maintain that efficiency as demand changes and technologies evolve.

The other responses are incorrect because:

- The Operational Excellence pillar includes the ability to run workloads effectively, gain insights into their operations, and continuously improve supporting processes to deliver business value.
- The Security pillar focuses on protecting data, systems, and assets. It also focuses on using cloud technologies to improve the security of your workloads.
- The Reliability pillar focuses on the ability of a workload to consistently and correctly perform its intended functions.

Learn more:

- [AWS Well-Architected Framework](#)

The correct response option is **Performance Efficiency**.

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Learn more:

- [AWS Well-Architected Framework](#)

Question

27/30

Which compute option reduces costs when you commit to a consistent amount of compute usage for a 1-year or 3-year term?

Spot Instances

Savings Plans

Reserved Instances

Dedicated Hosts

The correct response option is **Savings Plans**.

Amazon EC2 Savings Plans enable you to reduce your compute costs by committing to a consistent amount of compute usage for a 1-year or 3-year term. This results in savings of up to 72% over On-Demand Instance costs. Any usage up to the commitment is charged at the discounted Savings Plan rate (for example, \$10 an hour). Any usage beyond the commitment is charged at regular On-Demand Instance rates.

The other response options are incorrect because:

- Reserved Instances are a billing discount that is applied to the use of On-Demand Instances in your account. You can purchase Standard Reserved and Convertible Reserved Instances for a one-year or three-year term, and Scheduled Reserved Instances for a one-year term. Unlike Savings Plans, Reserved Instances do not require you to commit to a consistent amount of compute usage over the duration of the contract.
- Spot Instances are ideal for workloads with flexible start and end times or that can withstand interruptions. Spot Instances leverage unused EC2 computing capacity and offer you cost savings at up to 90% of On-Demand Instance prices.

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- Spot Instances are ideal for workloads with flexible start and end times or that can withstand interruptions. Spot Instances leverage unused EC2 computing capacity and offer you cost savings at up to 90% of On-Demand Instance prices.
- Dedicated Hosts are physical servers with EC2 instance capacity that is fully dedicated to your use.

You can use your existing per-socket, per-core, or per-VM software licenses to help maintain license compliance. You can purchase On-Demand Dedicated Hosts or Reserved Dedicated Hosts. Of all the Amazon EC2 options that were covered in this course, Dedicated Hosts are the most expensive.

Learn more:

- [Savings Plans](#)

NEXT

Question

28/30

Which statement is TRUE for AWS Lambda?

- The first step in using AWS Lambda is provisioning a server.
- To use AWS Lambda, you must configure the servers that run your code.
- Before using AWS Lambda, you must prepay for your estimated compute time.
- You pay only for compute time while your code is running.



Incorrect

The correct response option is **You pay only for compute time while your code is running.**

AWS Lambda is a service that lets you run code without needing to provision or manage servers.

While using AWS Lambda, you pay only for the compute time that you consume. You are charged only when your code is running. With AWS Lambda, you can run code for virtually any type of application or backend service, all with zero administration.

Learn more:

- [AWS Lambda](#)

Which tool is used to automate actions for AWS services and applications through scripts?

AWS Command Line Interface

Amazon QLDB

Amazon Redshift

AWS Snowball

The correct response option is **AWS Command Line Interface**.

The AWS Command Line Interface (AWS CLI) enables you to control multiple AWS services directly from the command line within one tool. For example, you can use commands to start an Amazon EC2 instance, connect an Amazon EC2 instance to a specific Auto Scaling group, and more. The AWS CLI is available for users on Windows, macOS, and Linux.

The other response options are incorrect because:

- Amazon Redshift is a data warehousing service that you can use for big data analytics. It offers the ability to collect data from many sources and help you to understand relationships and trends across your data.
- Amazon Quantum Ledger Database (Amazon QLDB) is a ledger database service. You can use Amazon QLDB to review a complete history of all the changes that have been made to your application data.
- AWS Snowball is a device that enables you to transfer large amounts of data into and out of AWS.

Learn more:

- [AWS Command Line Interface](#)

Which virtual private cloud (VPC) component controls inbound and outbound traffic for Amazon EC2 instances?

Network access control list

Internet gateway

Security group

Subnet

The correct response option is **security group**.

A security group is a virtual firewall that controls inbound and outbound traffic for an Amazon EC2 instance.

By default, a security group denies all inbound traffic and allows all outbound traffic. You can add custom rules to configure which traffic should be allowed or denied.

The other response options are incorrect because:

- A subnet is a section of a VPC in which you can group resources based on security or operational needs.
- A network access control list (ACL) is a virtual firewall that controls inbound and outbound traffic at the subnet level.
- An internet gateway is a connection between a VPC and the internet. It allows public traffic from the internet to access a VPC.

Learn more:

- [Security groups for your VPC](#)

Which domains are included on the AWS Certified Cloud Practitioner exam? (Select TWO.)

Strategy: Think back to the exam domains that were reviewed earlier in this module.

Based on the domains that you recall learning about, which response options do you think that you can eliminate as incorrect?



Security and Compliance



Automation and Optimization



Monitoring and Reporting



Billing and Pricing

Read the full question.

—

First, make sure that you read each question in full. Key words or phrases in the question that, if left unread, could result in you selecting an incorrect response option.

Predict the answer before reviewing the response options.

Next, try to predict the correct answer before looking at any of the response options.

This strategy helps you to draw directly from your knowledge and skills without distraction from incorrect response options. If your prediction turns out to be one of the response options, this can be helpful for knowing whether you're on the right track. However, make sure that you review all the other response options for that question.

Eliminate incorrect response options.

—

Before selecting your response to a question, eliminate any options that you believe to be incorrect.

This strategy helps you to focus on the correct option (or options, for multiple-response questions) and ensure that you have fulfilled all the requirements of the question.

In the S3 Intelligent-Tiering storage class, Amazon S3 moves objects between a frequent access tier and an infrequent access tier. Which storage classes are used for these tiers? (Select TWO.)



S3 Glacier



S3 Standard



S3 Glacier Deep Archive



S3 One Zone-IA



S3 Standard-IA



Incorrect

The two correct response options are:

- S3 Standard
- S3 Standard-IA

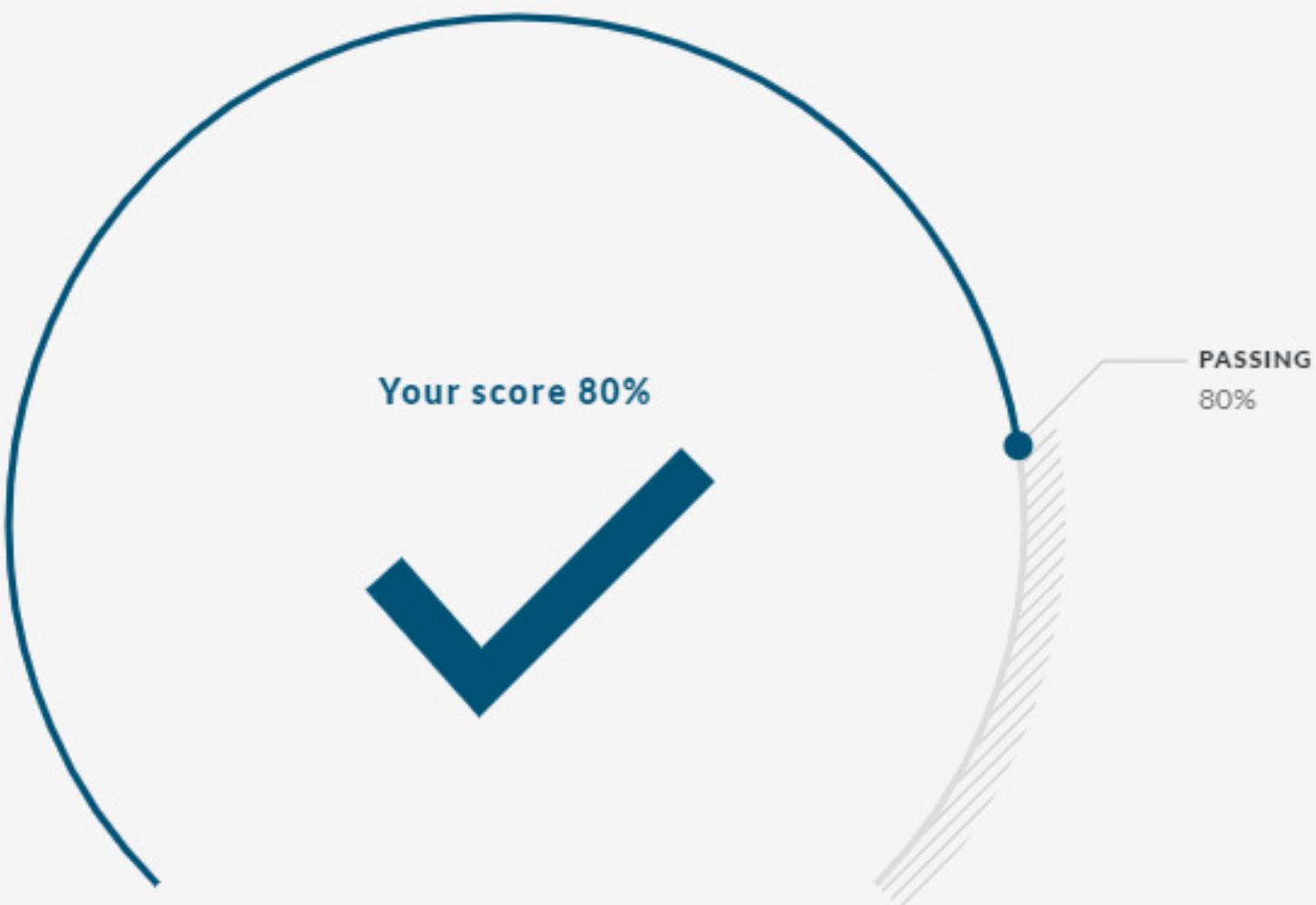
In the S3 Intelligent-Tiering storage class, Amazon S3 monitors objects' access patterns. If you haven't accessed an object for 30 consecutive days, Amazon S3 automatically moves it to the infrequent access tier, S3 Standard-IA. If you access an object in the infrequent access tier, Amazon S3 automatically moves it to the frequent access tier, S3 Standard.

Learn more:

- [Amazon S3 storage classes](#)

NEXT

Quiz Results





Certificate of Completion
Hem Bahadur Gurung

Has successfully completed
AWS Cloud Practitioner Essentials

A handwritten signature in black ink that reads "Hem Bahadur Gurung".

Director, Training and Certification

6 hours

25 September, 2021

Duration

Completion Date