AWS Cloud Practitioner Essentials –Study Deck

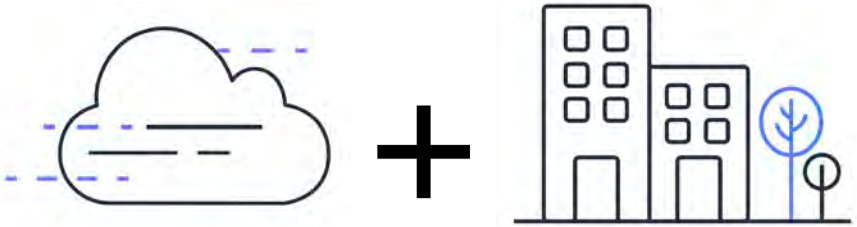
aws training and certification

Cloud computing deployment models

aws training and certification

Cloud

On premises



Hybrid

Cloud-based deployment

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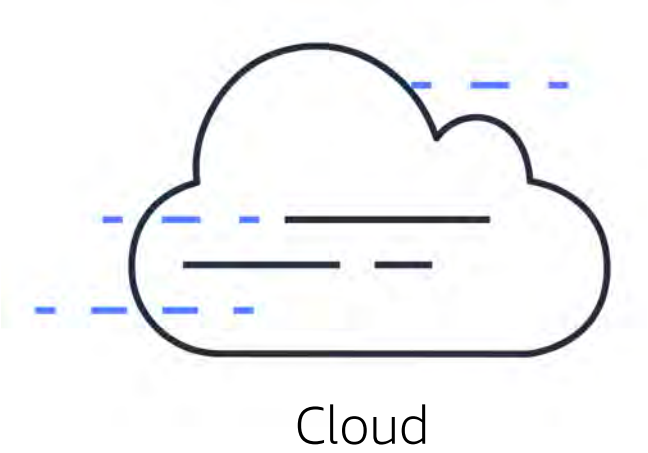
- Run all parts of the application in the cloud
- Migrate existing applications to the cloud
- Design and build new applications in the cloud



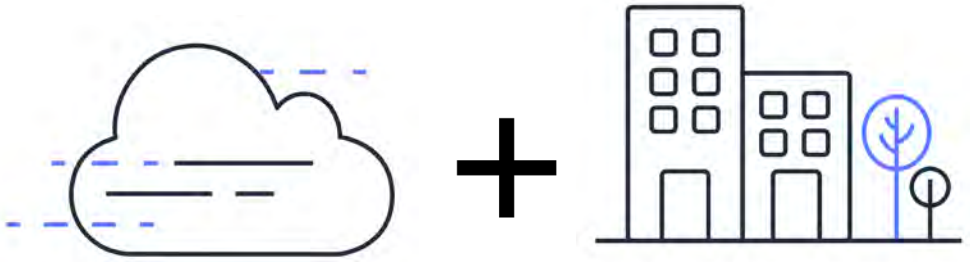
On-premises deployment

- Use virtualization and resource management tools to deploy resources
- Use application management and virtualization technologies to increase resource usage

On premises

Hybrid deployment

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



Hybrid

Cloud computing benefits

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Variable expenses

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Upfront expenses

Invest in technology resources before using them

Variable expenses

Pay only for what you use

Cost optimization

Run data centers

Focus on applications and customers

Investment

Capacity

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Stop guessing on your infrastructure capacity needs

Scale in and scale out as needed

Economies of scale

aws training and certification

Smaller scale

Pay higher prices based on only your own usage

Economies of scale

Benefit from customers' aggregated usage

Speed and agility

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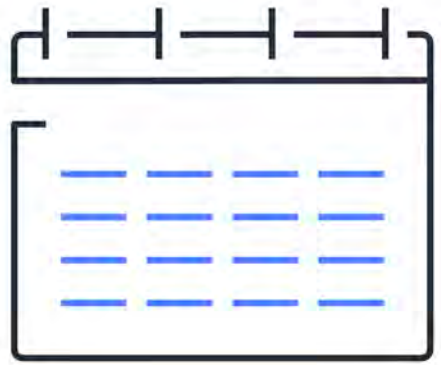
Data centers



Weeks between wanting resources and having resources

Cloud computing

Minutes between wanting resources and having resources

Global in minutes

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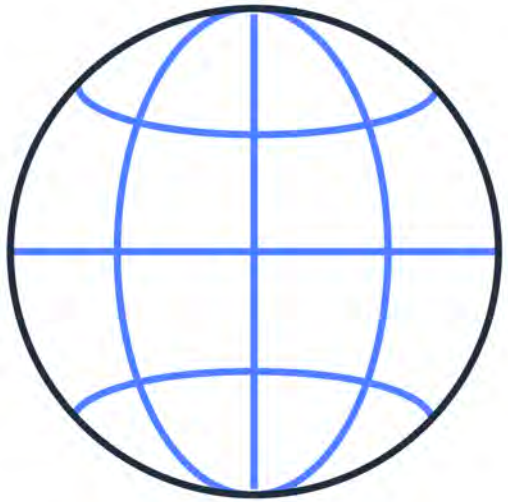
Quickly deploy applications worldwide



Use the AWS global infrastructure.

Knowledge check question 1

What is cloud computing?

A. Backing up files that are stored on desktop and mobile devices to prevent data loss

B. Deploying applications that are connected to an on-premises infrastructure

C. Using on-demand delivery of IT resources and applications through the internet

D. Running code without needing to manage or provision servers

Knowledge check answer 1

What is cloud computing?

A. Backing up files that are stored on desktop and mobile devices to prevent data loss

B. Deploying applications that are connected to an on-premises infrastructure

C. **Using on-demand delivery of IT resources and applications through the internet (correct)**

D. Running code without needing to manage or provision servers

Knowledge check question 2

What is another name for on-premises deployment?

A. Cloud-based application
B. Hybrid deployment
C. Private cloud deployment
D. AWS Cloud

Knowledge check answer 2

What is another name for on-premises deployment?

A. Cloud-based application

B. Hybrid deployment

C. Private cloud deployment (correct)

D. AWS Cloud

Knowledge check question 3

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

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

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

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

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

Knowledge check answer 3

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

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

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

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

Amazon Elastic Compute Cloud (Amazon EC2)

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Amazon EC2 instance types

aws training and certification

General purpose

- Balances compute, memory, and networking resources
- Suitable for a broad range of workloads

Compute optimized

- Offers high-performance processors
- Ideal for compute-intensive applications and batch processing workloads

Memory optimized

- Delivers fast performance for memory-intensive workloads
- Well suited for high-performance databases

Amazon EC2 instance types (cont.)

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Accelerated computing

- Uses hardware accelerators to expedite data processing
- Ideal for application streaming and graphics workloads

Storage optimized

- Offers low latency and high input/output operations per second (IOPS)
- Suitable for workloads such as distributed file systems and data warehousing applications

Match: Amazon EC2 instance types

aws training and certification

1. Ideal for high-performance databases	A. General purpose
2. Suitable for data warehousing applications	B. Compute optimized
3. Balances compute, memory, and networking resources	C. Memory optimized
4. Offers high-performance processors	D. Storage optimized

Match: Amazon EC2 instance types

aws training and certification

1. Ideal for high-performance databases
2. Suitable for data warehousing applications
3. Balances compute, memory, and networking resources
4. Offers high-performance processors

A. General purpose

B. Compute optimized

C. Memory optimized

D. Storage optimized

Match: Amazon EC2 instance types

aws training and certification

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Match: Amazon EC2 instance types

aws training and certification

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Match: Amazon EC2 instance types

aws training and certification

1. Ideal for high-performance databases
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A. General purpose

B. Compute optimized

C. Memory optimized

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Amazon EC2 pricing

aws training and certification

Amazon EC2 instance pricing options

aws training and certification

On-Demand

- No upfront costs or minimum contracts
- Ideal for short-term, irregular workloads

Spot

- Ideal for workloads with flexible start and end times
- Offers savings over On-Demand prices

Amazon EC2 instance pricing options

aws training and certification

Reserved

- Provides a billing discount over On-Demand pricing
- Requires a 1-year or 3-year term commitment

Compute Savings Plan

- Offers up to 72% savings over On-Demand costs for a consistent amount of compute usage
- Requires a 1-year or 3-year term commitment

Amazon EC2 dedicated computing

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Dedicated Instance

- An EC2 *instance* that runs in a VPC on hardware for a single customer
- Higher cost compared to standard Amazon EC2 instances

Dedicated Host

- A *physical server* with EC2 instance capacity for a single customer
- Most expensive Amazon EC2 option

Knowledge check question

What is the difference between Compute Savings Plans and Spot Instances?

Knowledge check answer

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

- Spot Instances are ideal for workloads with flexible start and end times, or that can withstand interruptions.

Amazon EC2 Auto Scaling

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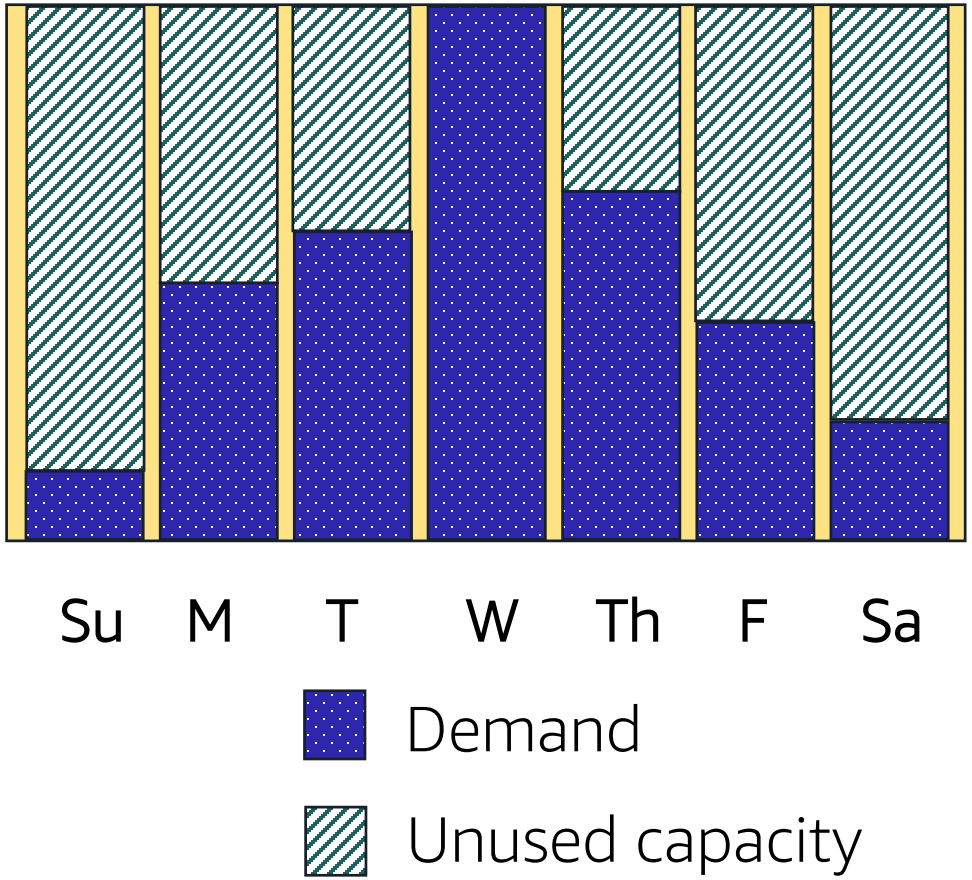
Amazon EC2 Auto Scaling

aws training and certification

- Scale capacity as computing requirements change
- Use dynamic scaling and predictive scaling



Elastic Load Balancing

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Elastic Load Balancing

aws training and certification

- Automatically distributes traffic across multiple resources
- Provides a single point of contact for your Auto Scaling group

Elastic Load Balancing

Scalability and load balancing

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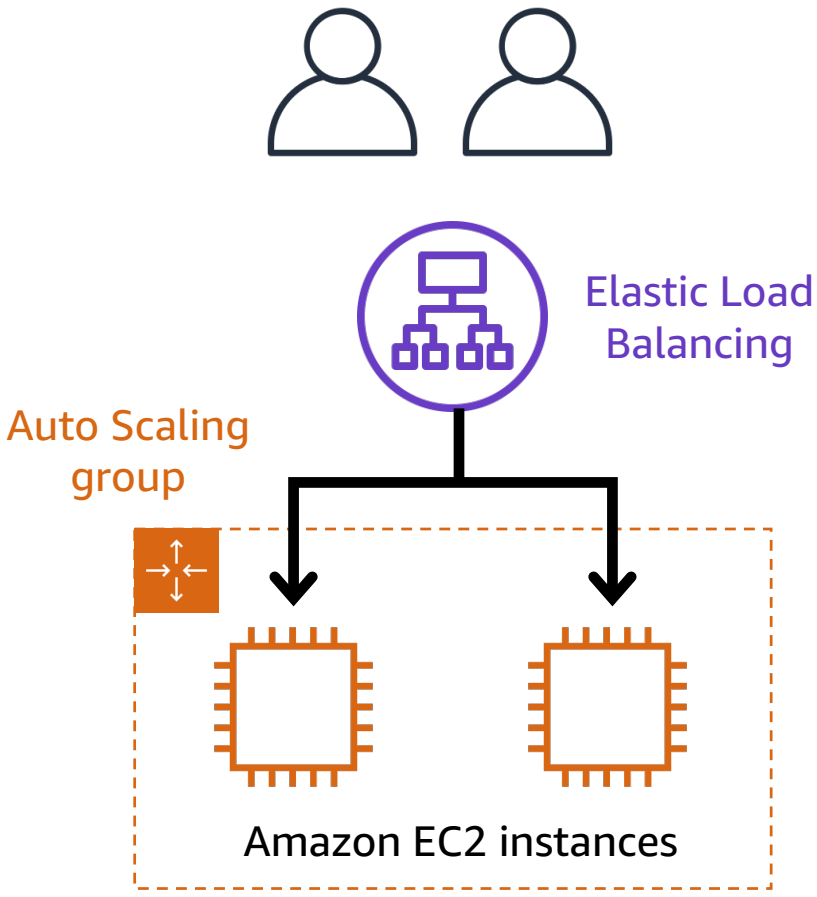
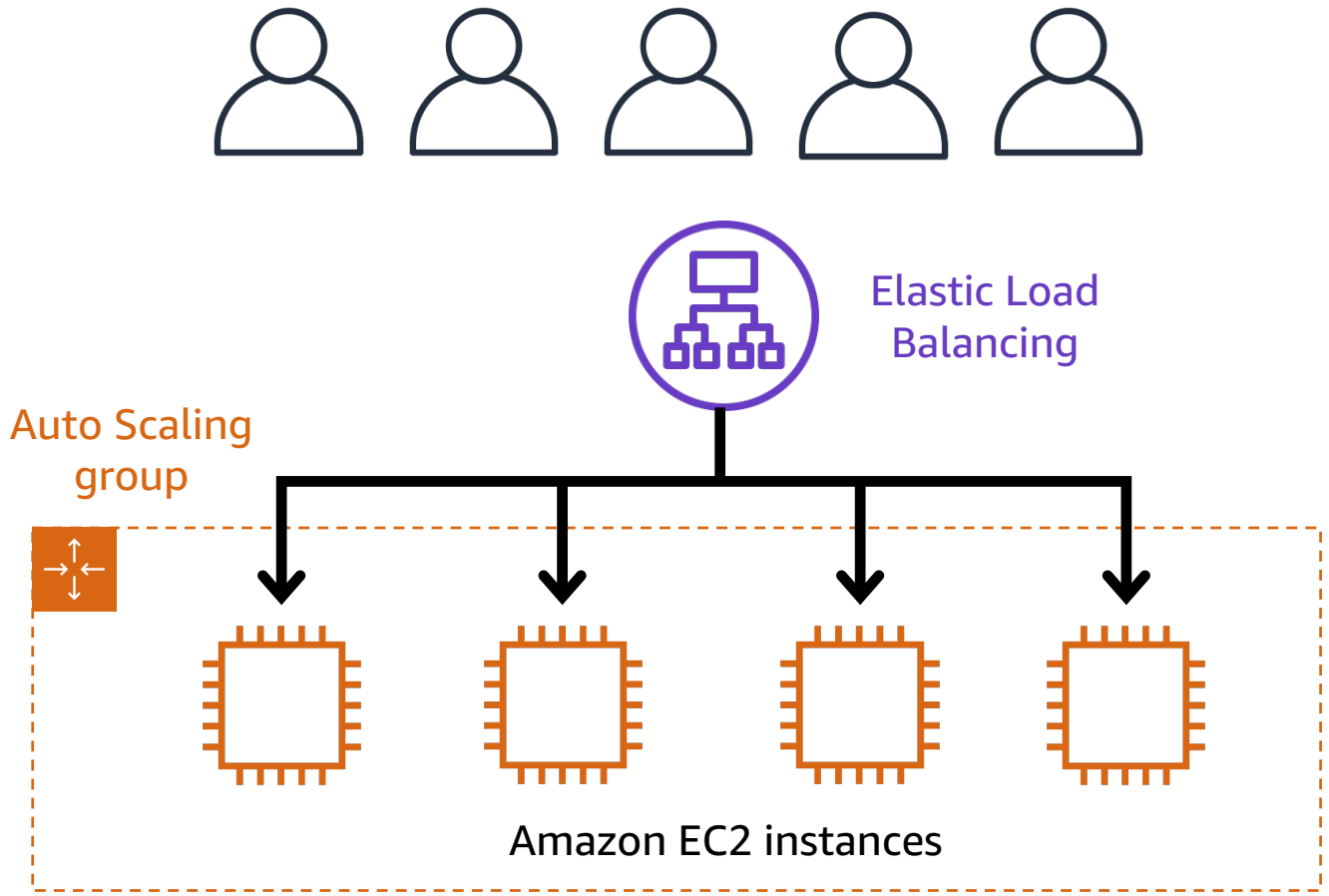
Low-demand period



High-demand period



Auto Scaling and Elastic Load Balancing

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Are these examples of Auto Scaling or Elastic Load Balancing?

1. Removes unneeded Amazon EC2 instances when demand is low

Auto Scaling

2. Adds a second Amazon EC2 instance during an online store's popular sale

Auto Scaling

3. Distributes a workload across several Amazon EC2 instances

Elastic Load Balancing

4. Ensures that no single EC2 instance has to carry the full workload on its own

Elastic Load Balancing

5. Automatically adjusts the number of Amazon EC2 instances to match demand

Auto Scaling

6. Provides a single point of contact for traffic into an Auto Scaling group

Elastic Load Balancing

Amazon Simple Notification Service

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- Messages are published to topics.
- Subscribers immediately receive messages for their topics.

Amazon Simple Notification Service (Amazon SNS)

Amazon Simple Queue Service

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- Send, store, and receive messages between software components
- Queue messages without requiring other services to be available

Amazon Simple Queue Service (Amazon SQS)

AWS Lambda

- Run code without provisioning or managing servers
- Pay only for compute time while code is running
- Use other AWS services to automatically trigger code

AWS Lambda

How AWS Lambda works

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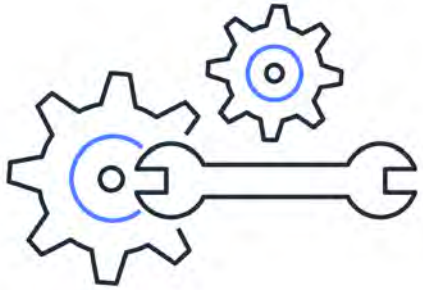

Upload code to Lambda.

Set code to trigger from an event source.

Code runs only when triggered.

Pay only for the compute time you use.

AWS container orchestration services

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Amazon Elastic Container Service (Amazon ECS)

- Run and scale containerized applications
- Use simple API calls to control Docker-enabled applications

Amazon Elastic Kubernetes Service (Amazon EKS)

- Run and scale Kubernetes applications
- Readily update applications with new features

AWS Fargate

- Run serverless containers with Amazon ECS or Amazon EKS
- Pay only for the resources you use

AWS Fargate

Select a Region

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Determine the right Region for your services, data, and applications based on:

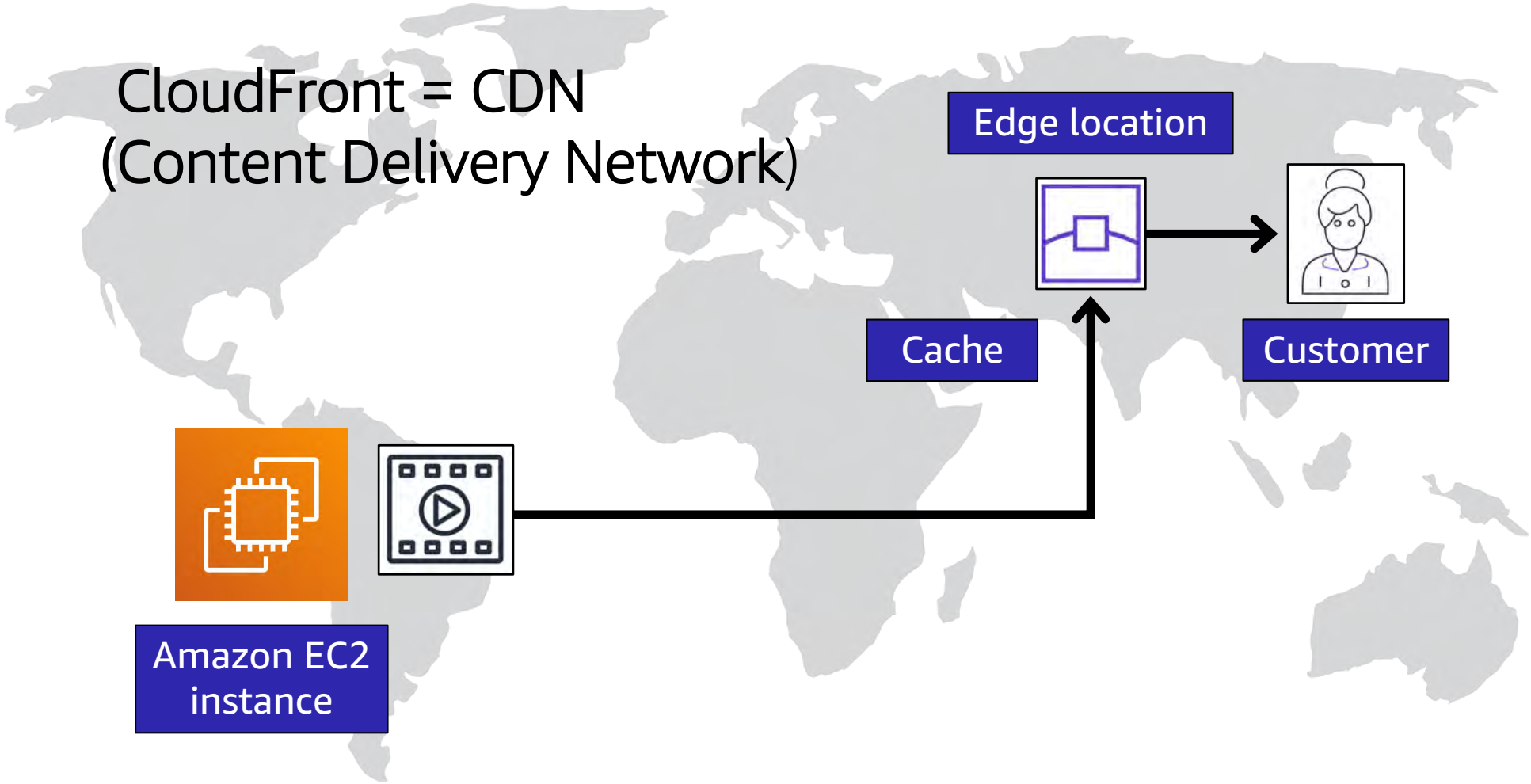
Compliance with data governance and legal requirements

Proximity to your customers

Available services within a Region

Pricing

Amazon CloudFront delivers content



AWS Outposts

AWS Outposts

Extend AWS infrastructure and services to your on-premises data center

Module 4

Networking

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Amazon VPC

An IP subnet within the AWS network

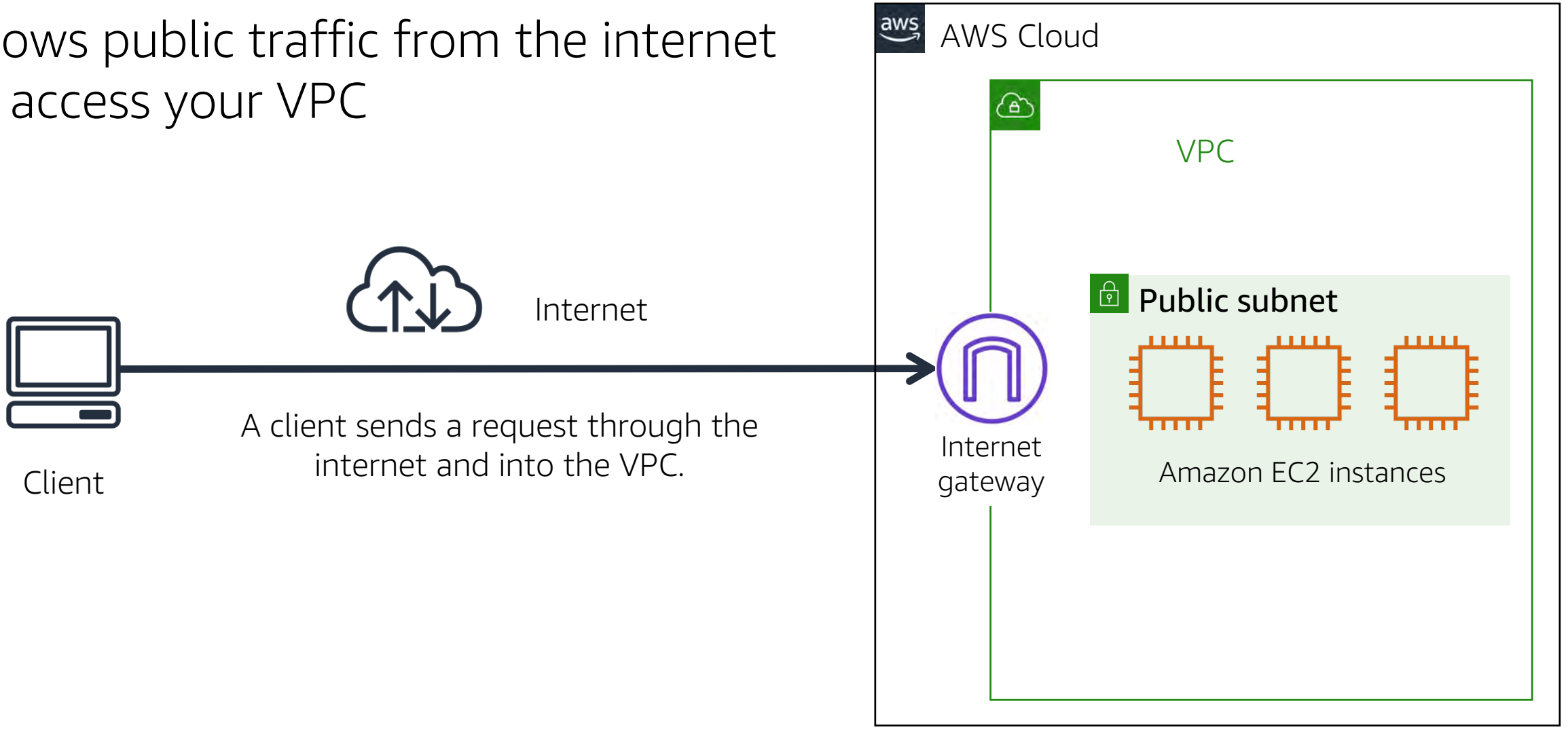
Assigned to a customer

Customers can have one or several VPCs

Amazon Virtual Private Cloud (Amazon VPC) enables you to launch resources in a virtual network that you define.

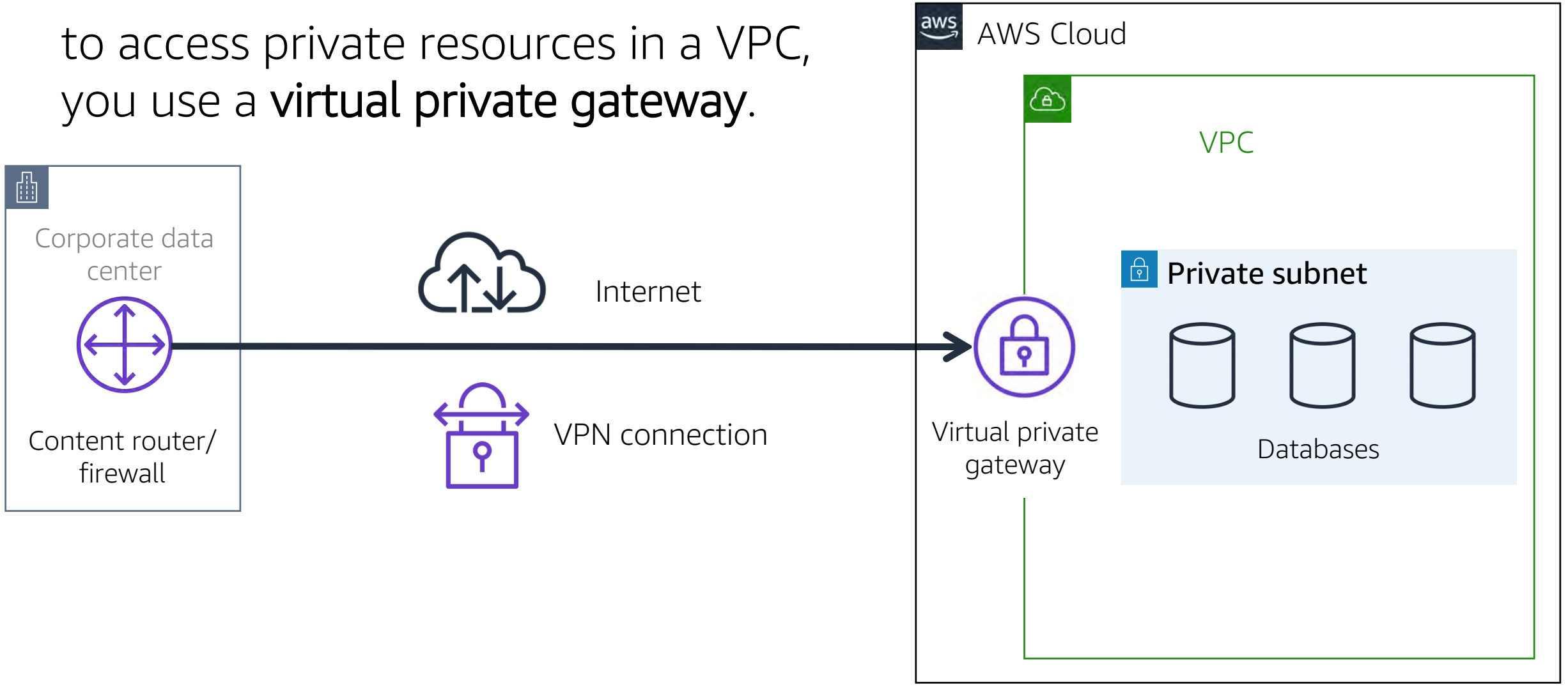
Internet gateway

allows public traffic from the internet to access your VPC



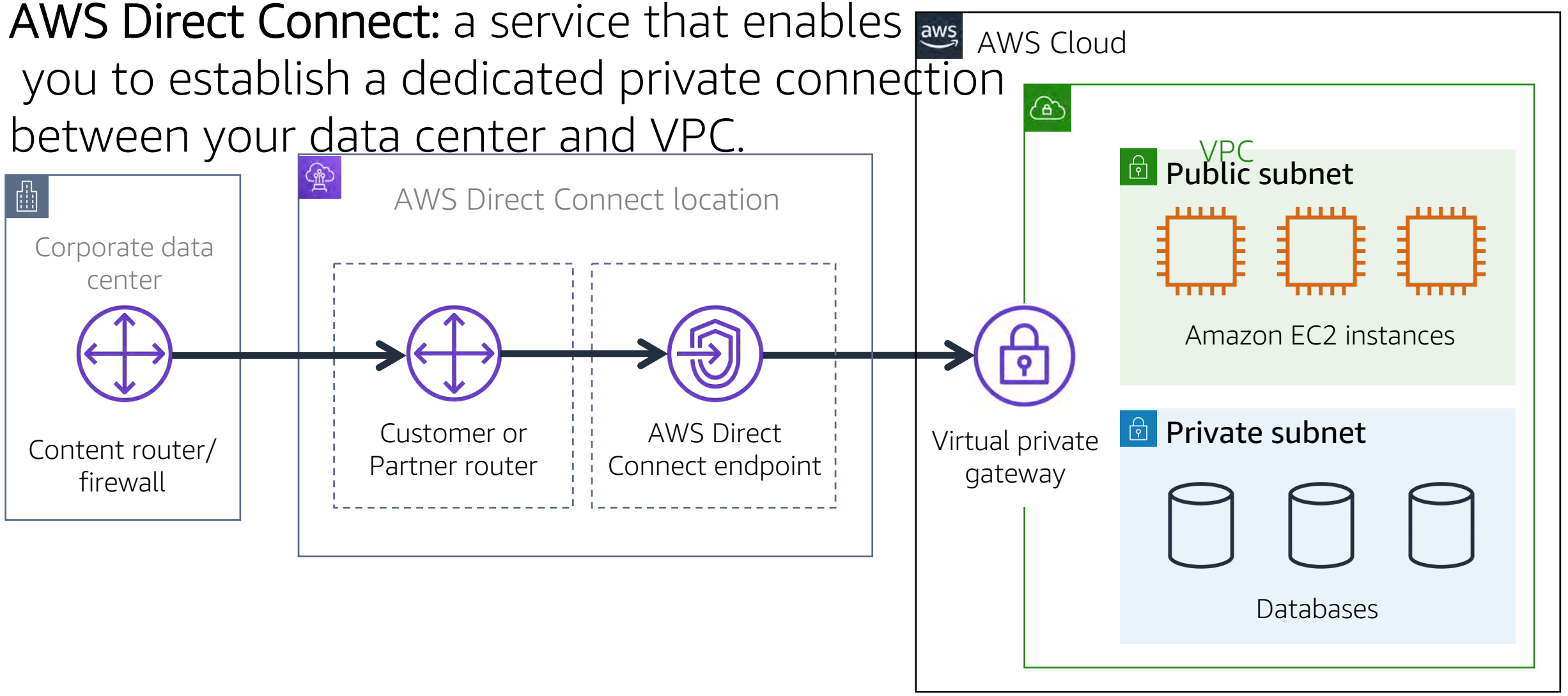
Virtual private gateway

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



AWS Direct Connect

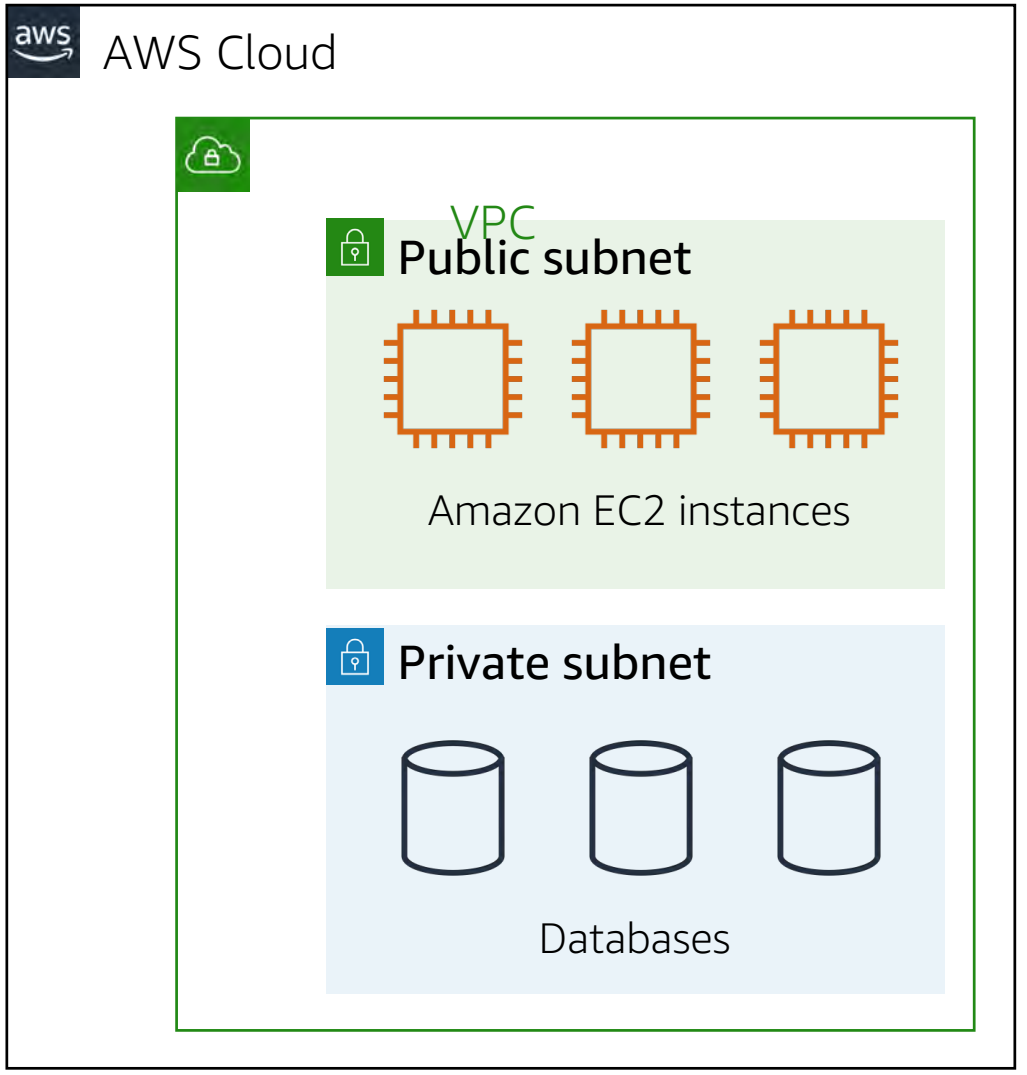
AWS Direct Connect: a service that enables you to establish a dedicated private connection between your data center and VPC.



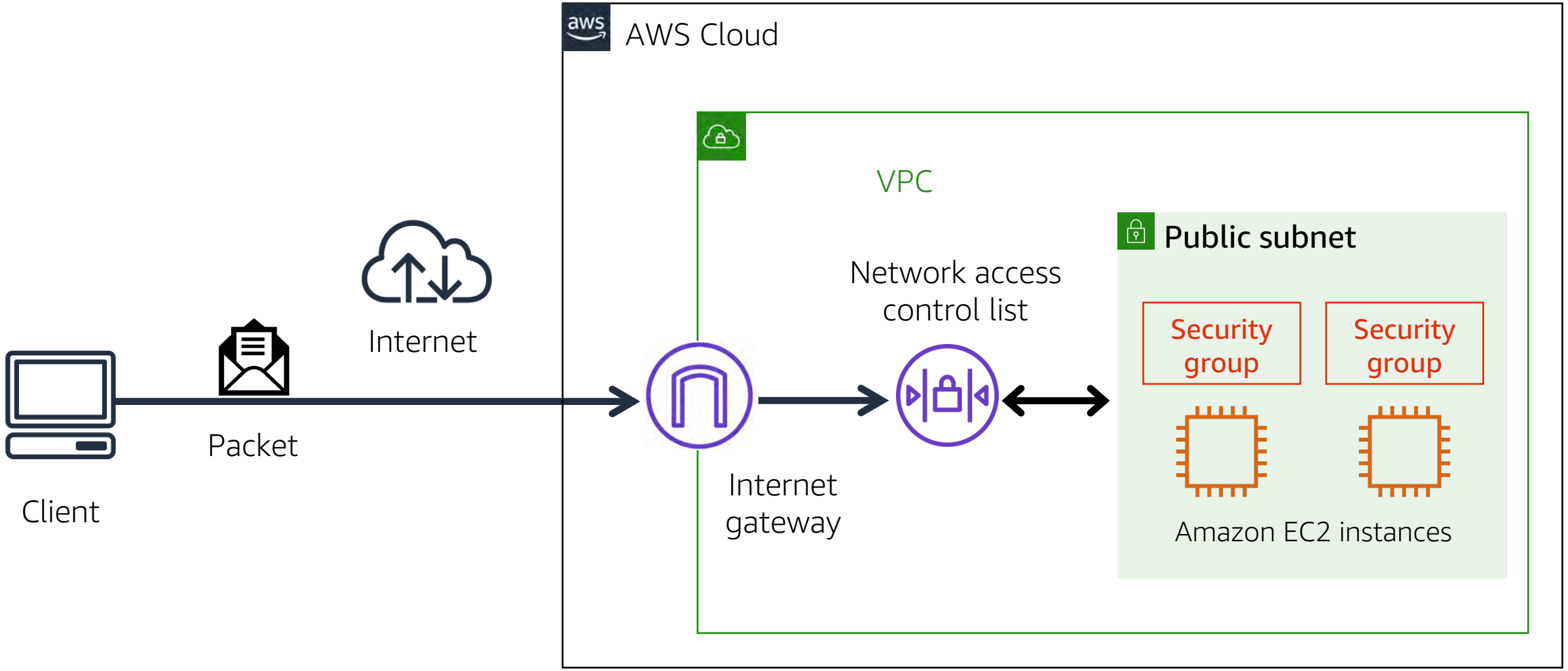
Subnets

A **subnet** is a section in a VPC in which you can place groups of isolated resources.

A subnet can be public or private.



Network traffic in a VPC



Network access control lists

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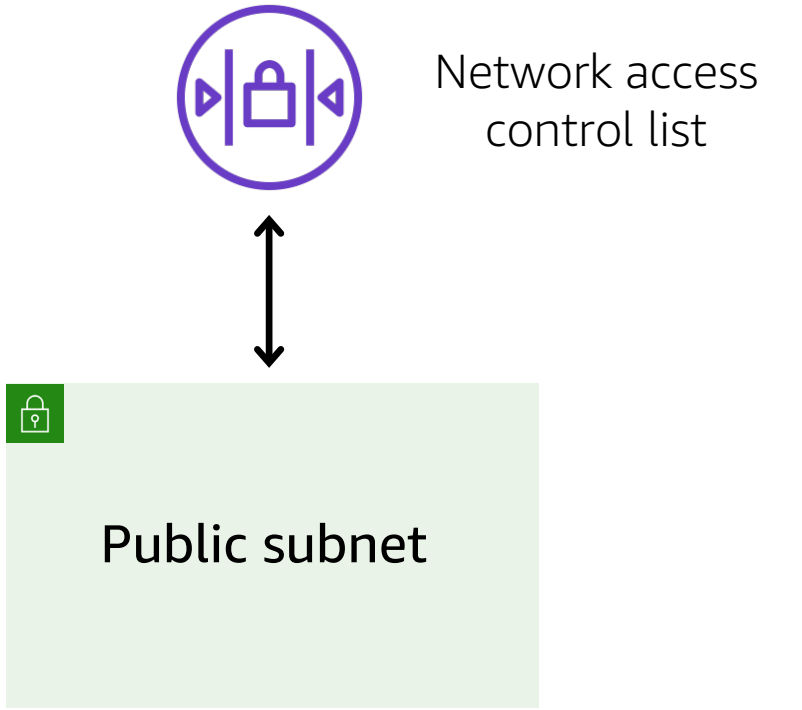
A **network access control list (network ACL)** is a virtual firewall for a subnet. By default:

- The default network ACL allows all inbound and outbound traffic.
- Custom network ACLs deny all inbound and outbound traffic.



Stateless packet filtering

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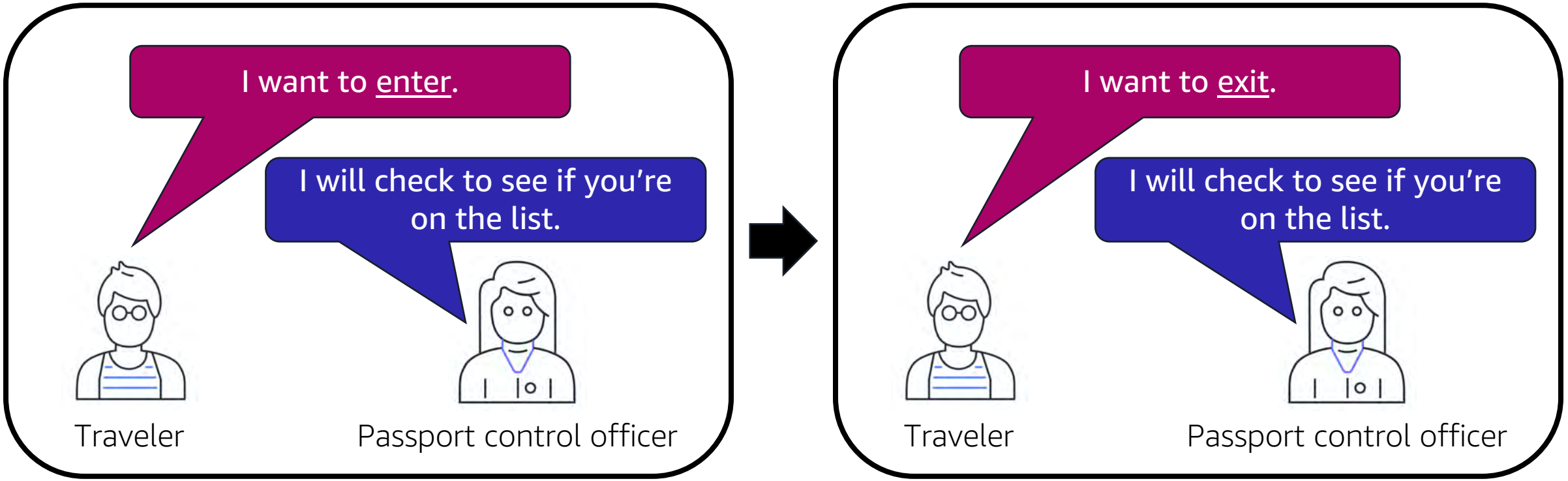
- Network ACLs perform **stateless** packet filtering.
- Before a packet can exit a subnet, it must be checked against the outbound rules.



Security groups

A **security group** is a virtual firewall for an Amazon EC2 instance.

By default, a security group denies all inbound traffic and allows all outbound traffic.

Stateful packet filtering

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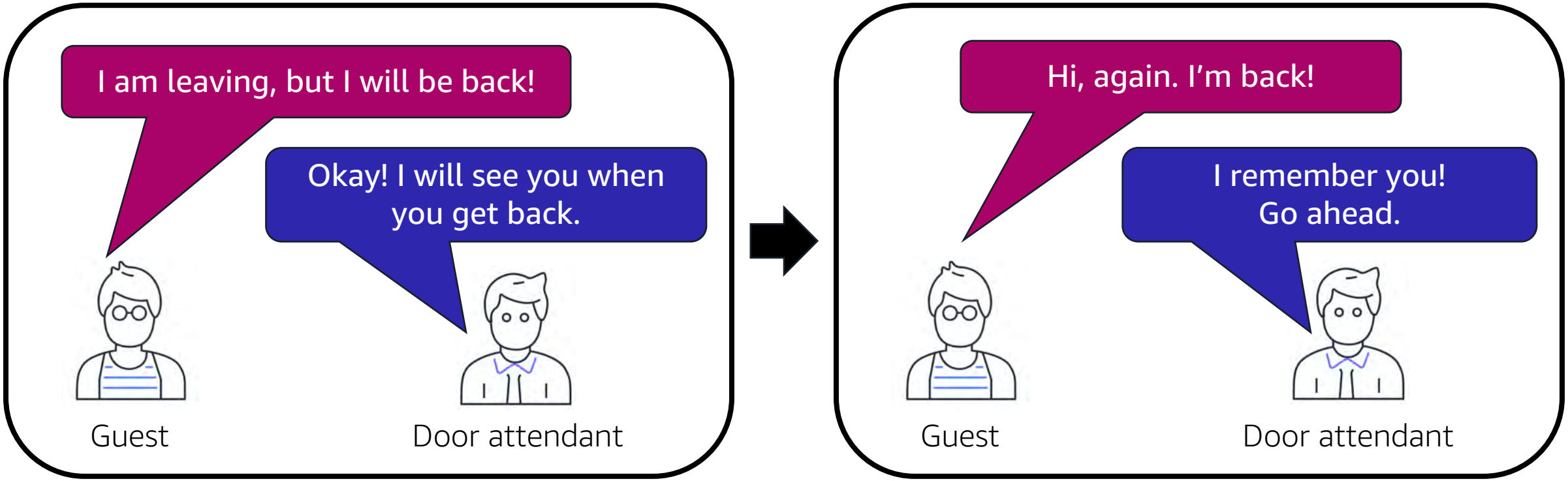
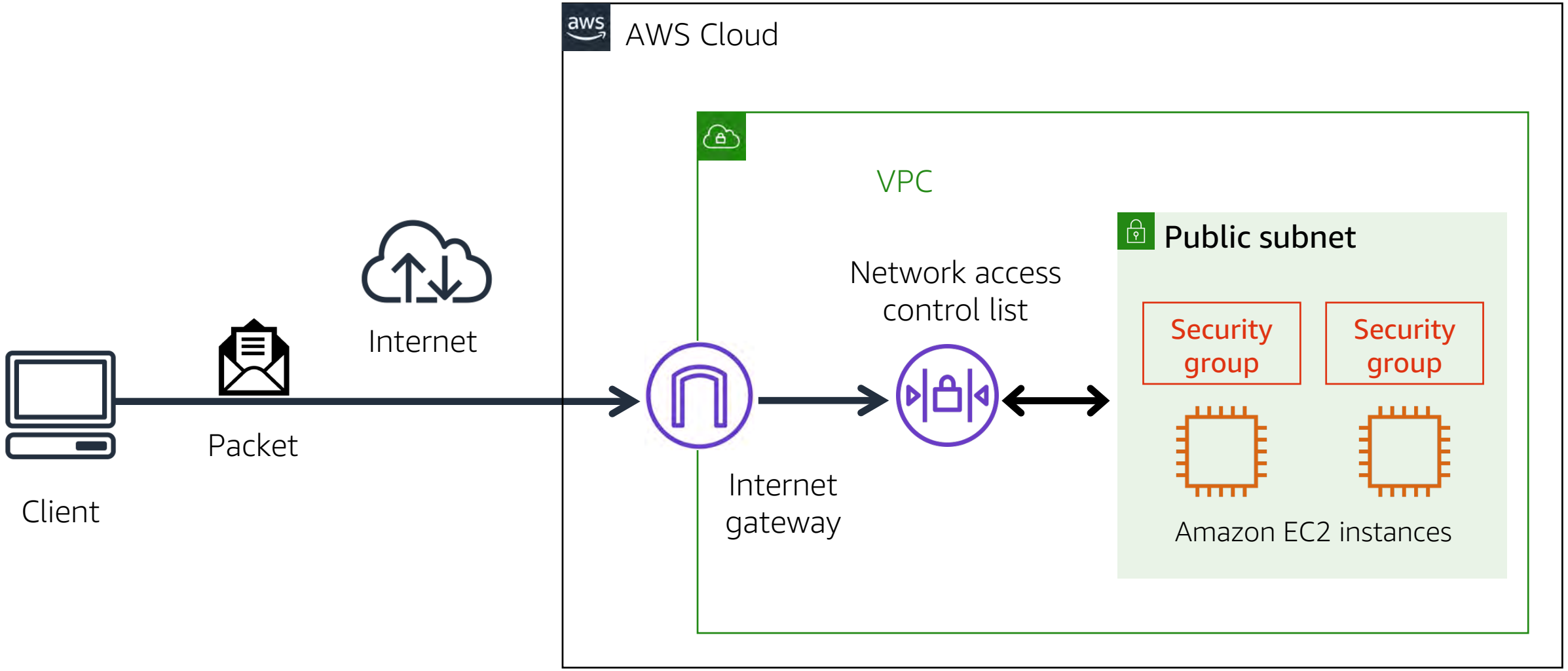
- Security groups perform **stateful** packet filtering.
- They remember previous decisions that were made for incoming packets.



Network traffic in a VPC



Amazon Route 53

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Amazon Route 53 is a DNS web service. It provides a reliable way to route end users to internet applications hosted in AWS.

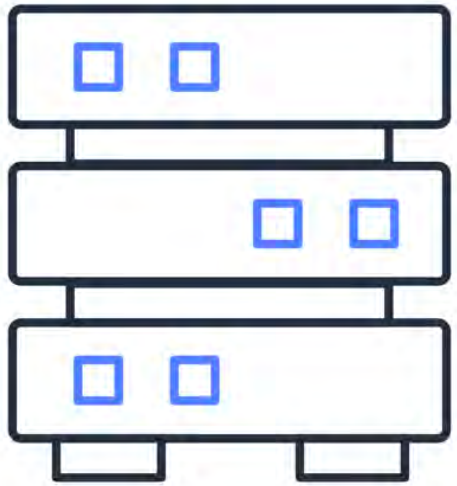
Route users to internet applications

Connect user requests to infrastructure in AWS and outside of AWS

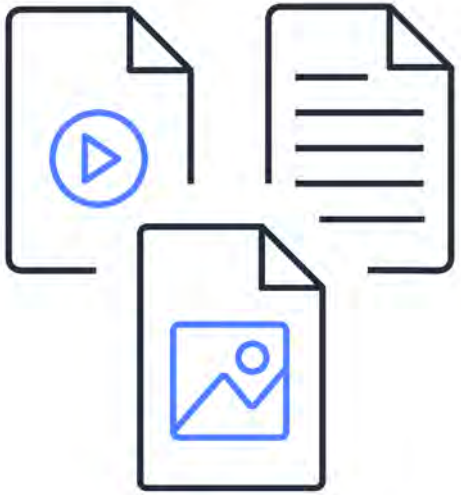
Manage DNS records for domain names

AWS storage types

aws training and certification



Block storage

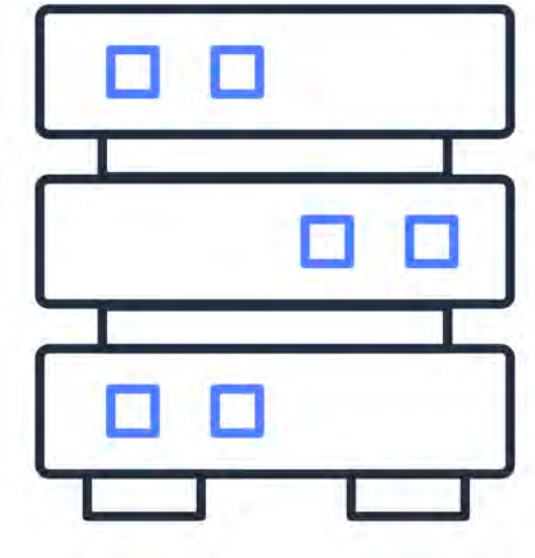


Object storage

File storage

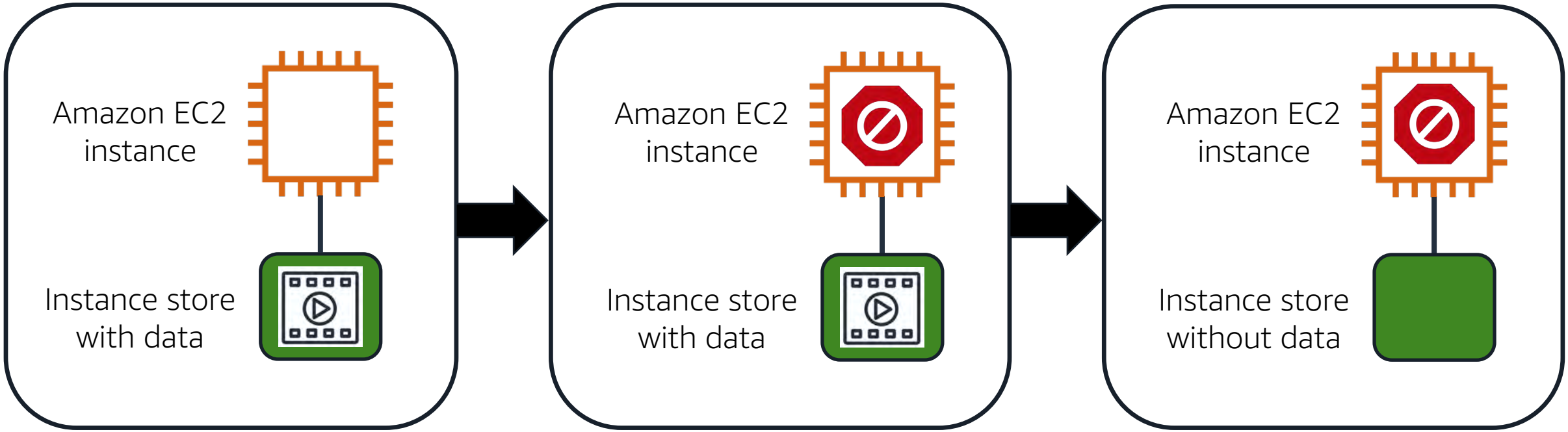
Block storage

- In **block storage**, files are separated into equal-sized pieces (blocks) of data.
- Block storage is used for applications that run on Amazon EC2 instances.



Block storage

Default Virtual Instance store



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

The instance is stopped or terminated.

All data on the attached instance store is deleted.

Use EBS volume for PERSISTENT EC2 Instance Storage

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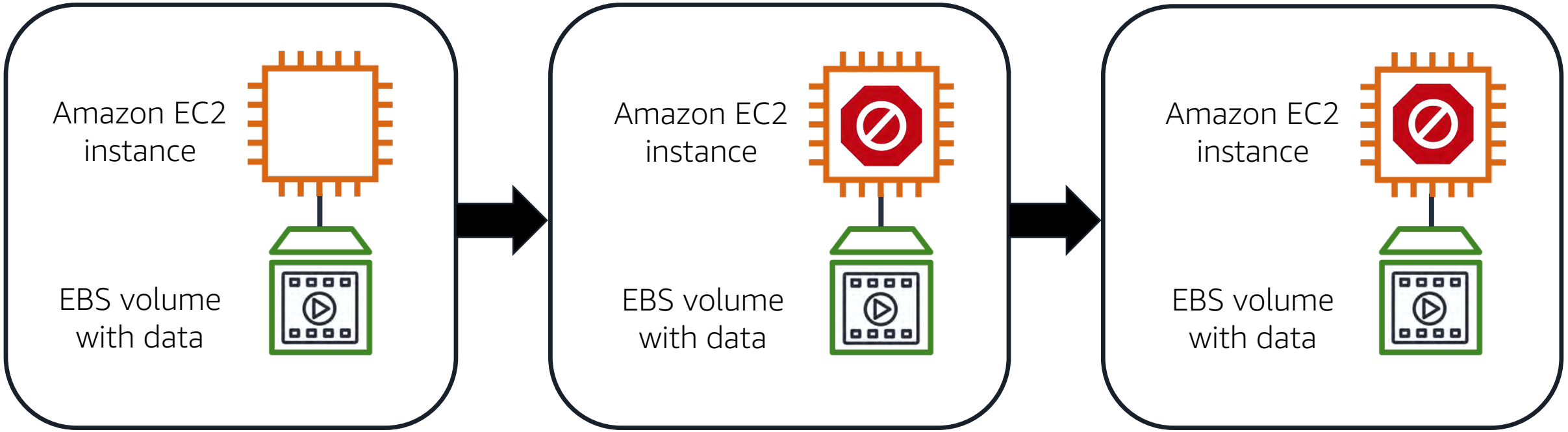
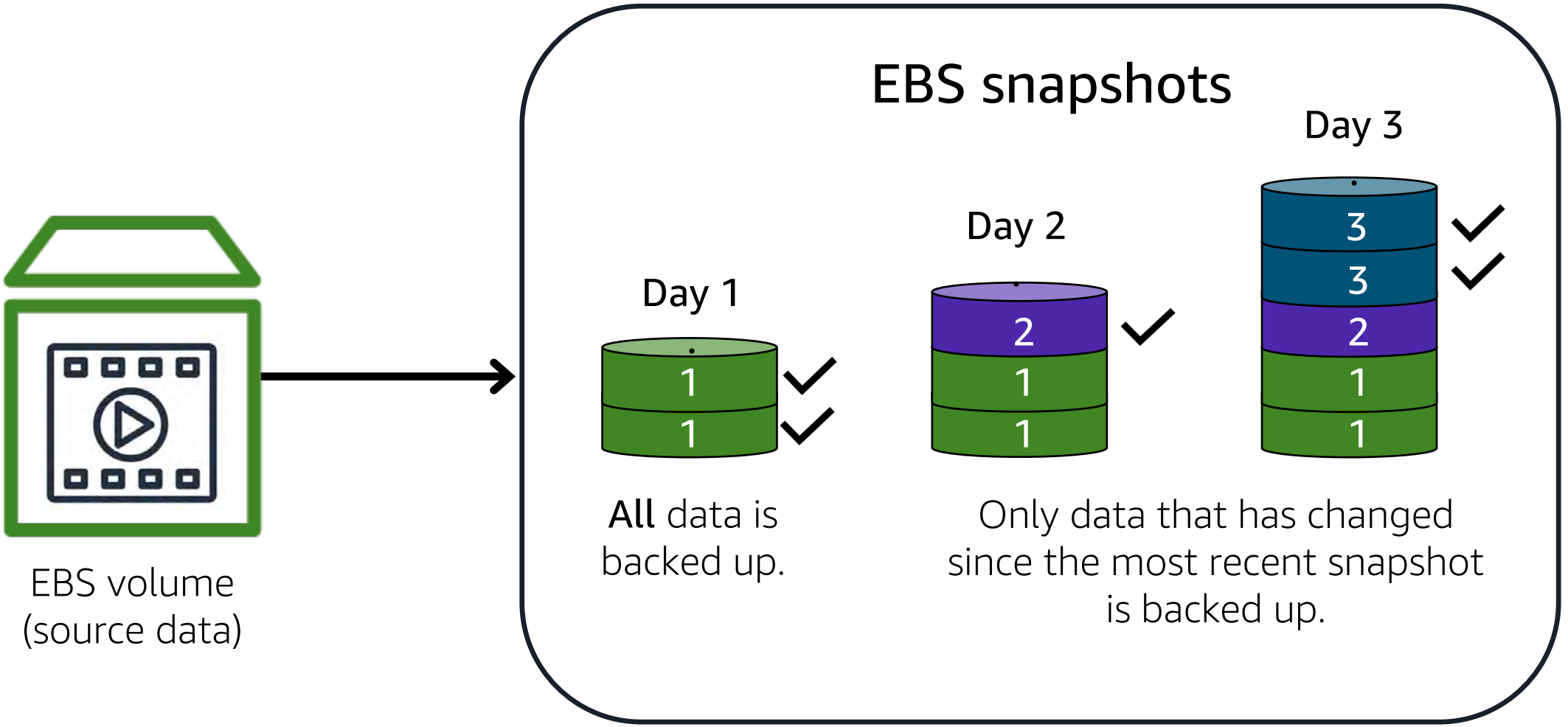


An Amazon EC2 instance with an attached EBS volume is running.

The instance is stopped or terminated. (If terminated, the EBS volume is removed by default.)

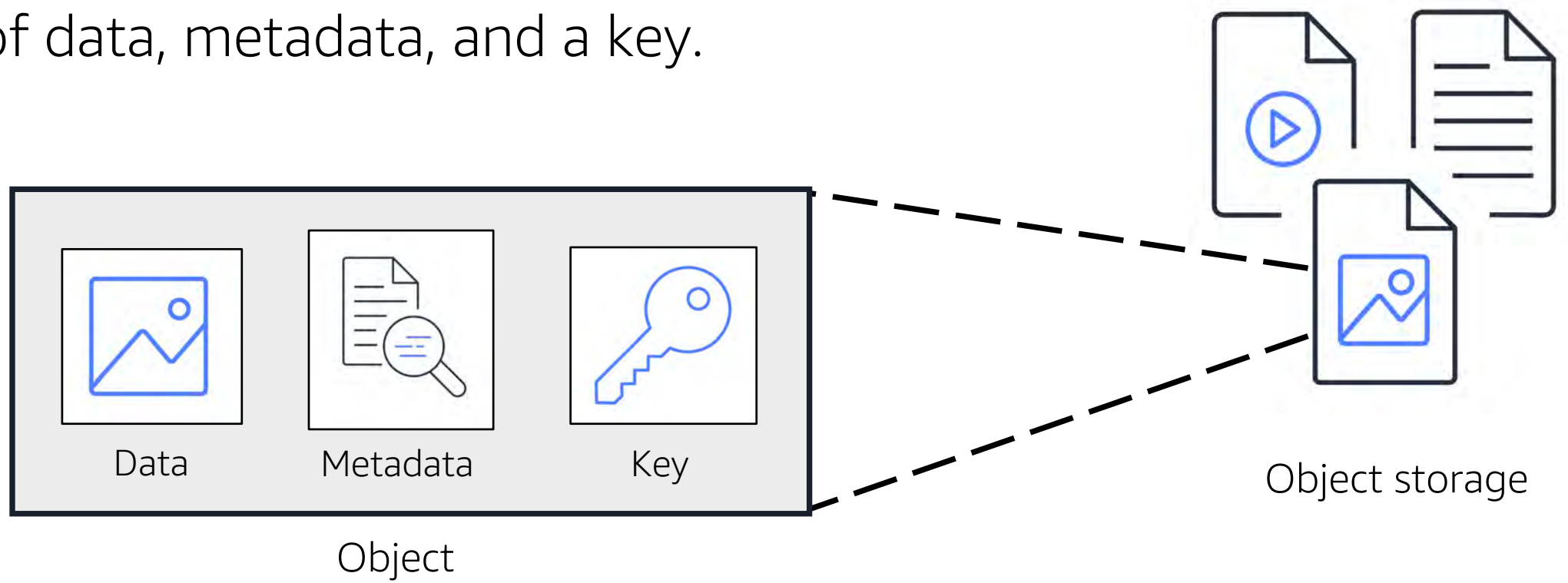
All data on the attached EBS volume remains available.

Amazon EBS snapshots for Incremental Backup



Object storage

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



Amazon Simple Storage Service

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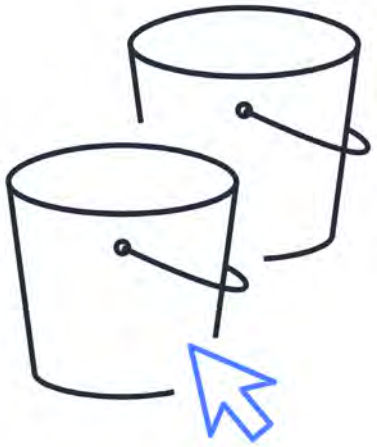

Store objects in buckets

Set permissions to control access to objects

Choose from a range of storage classes for different use cases

Amazon S3 storage classes

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S3 Standard

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

S3 Standard-IA

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

S3 One Zone-IA

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

Amazon S3 storage classes

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S3 Intelligent-Tiering

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

S3 Glacier

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

S3 Glacier Deep Archive

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

File storage

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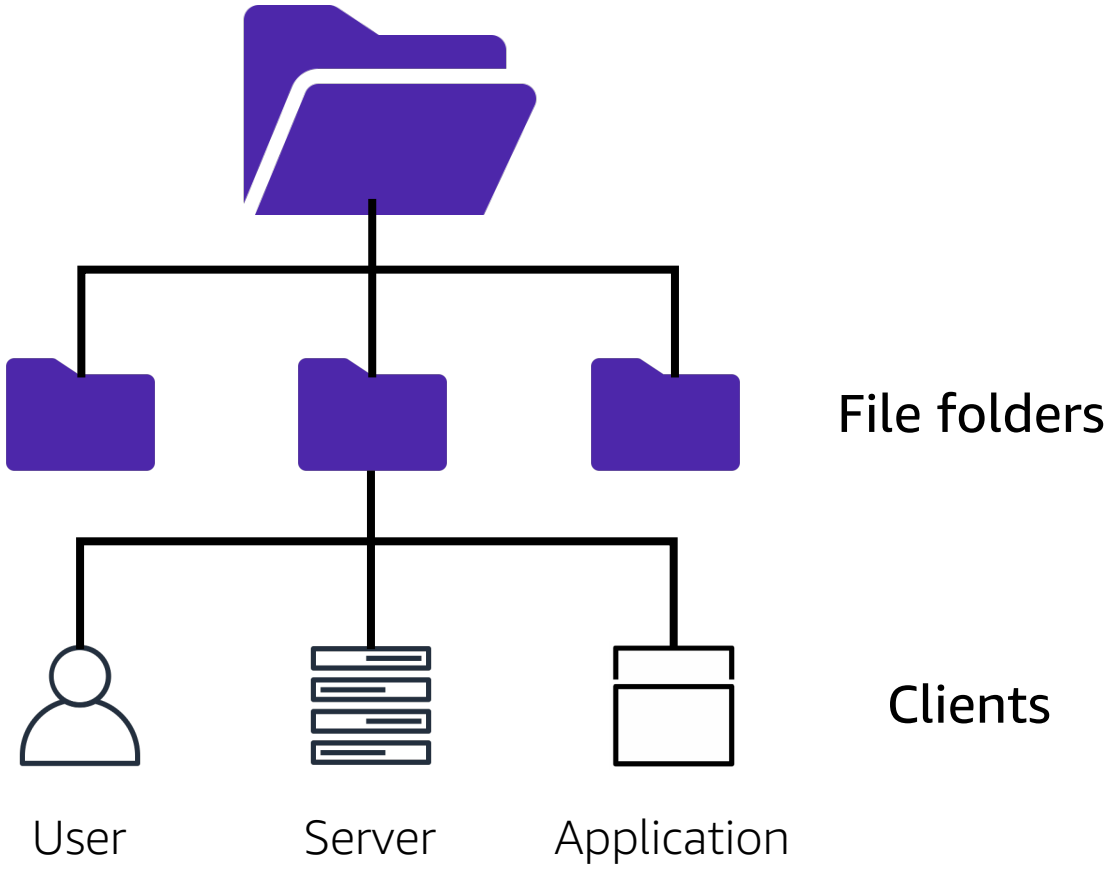
In **file storage**, multiple clients can access data that is stored in shared file folders.



Amazon Elastic File System

Store data in a scalable file system

Provide data to thousands of Amazon EC2 instances concurrently

Store data in and across multiple Availability Zones

Database types

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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

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

Relational databases

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- In a **relational database**, data is stored in a way that relates it to other pieces of data.
- Relational databases use **structured query language (SQL)** to store and query data.

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

Example of data in a relational database

Amazon Relational Database Service

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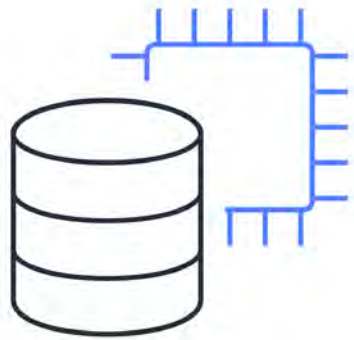

Operate and scale a relational database in the AWS Cloud

Automate time-consuming administrative tasks

Store and transmit data securely

RDS supported database engines

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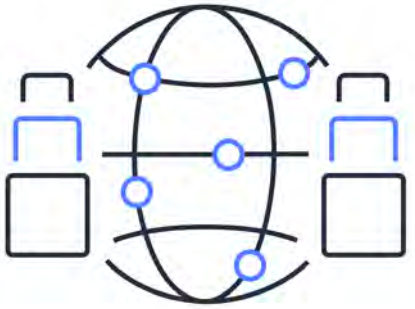
- Amazon Aurora
- PostgreSQL
- MySQL
- MariaDB
- Oracle Database
- Microsoft SQL Server

Amazon RDS

Amazon Aurora

Store data in an enterprise-class relational database

Reduce database costs by eliminating unnecessary input/output (I/O) operations



Replicate six copies of data across three Availability Zones

Nonrelational databases

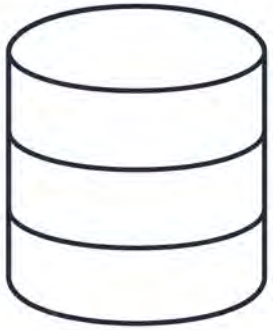
aws training and certification

- A **nonrelational database** uses structures other than rows and columns to organize data.
- For example, with **key-value pairs**, data is organized into items (keys), and items have attributes (values).

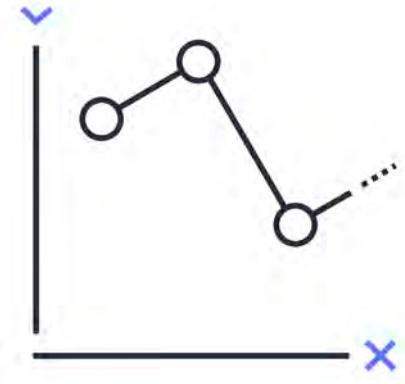
Key	Value
1	**Name:** John Doe **Address:** 123 Any Street **Favorite drink:** Medium latte
2	**Name:** Mary Major **Address:** 100 Main Street **Birthday:** July 5, 1994

Example of data in a nonrelational database

Amazon DynamoDB



Amazon DynamoDB is a serverless key-value database.



It automatically scales to adjust for capacity changes and maintain consistent performance.

It is designed to handle over 10 trillion requests per day.

AWS Database Migration Service

aws training and certification

Migrate relational databases, nonrelational databases, and other types of data stores

Example

MySQL database
(Source)

AWS Database Migration Service (AWS DMS)

Amazon Aurora
(Target)

Additional database services

aws training and certification

Amazon Redshift

Query and analyze data across a data warehouse

Amazon DocumentDB

Run MongoDB workloads in a document database service

Amazon Neptune

Run applications that use highly connected datasets

Amazon QLDB

Review a complete history of changes to your application data

Additional database services

aws training and certification

Amazon Managed Blockchain

Run a decentralized ledger database

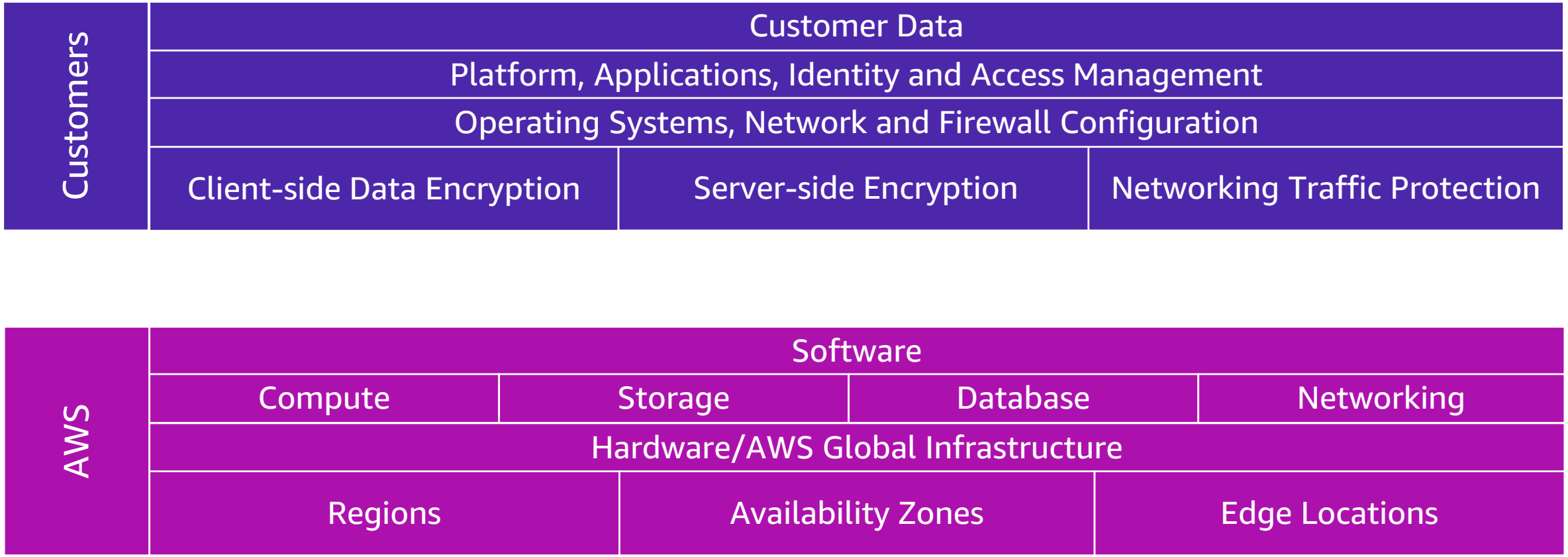
Amazon ElastiCache

Add caching layers to improve database read times

Amazon DynamoDB Accelerator

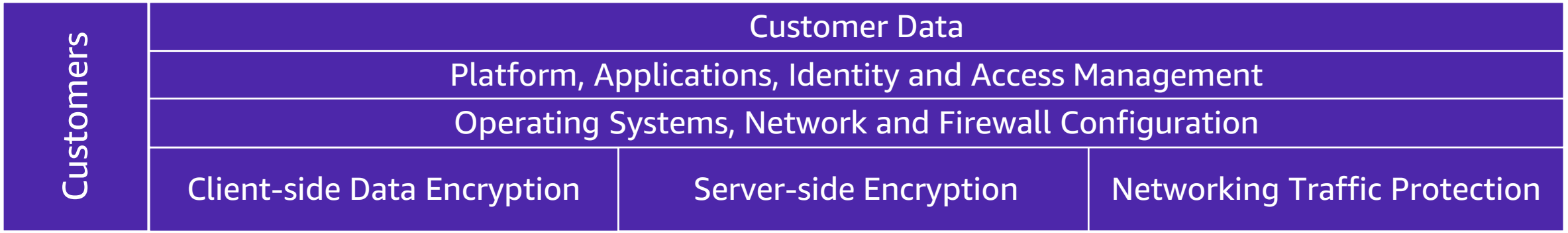
Improve DynamoDB response times from single-digit milliseconds to microseconds

Shared responsibility model



Customers: Security **IN** the cloud

aws training and certification

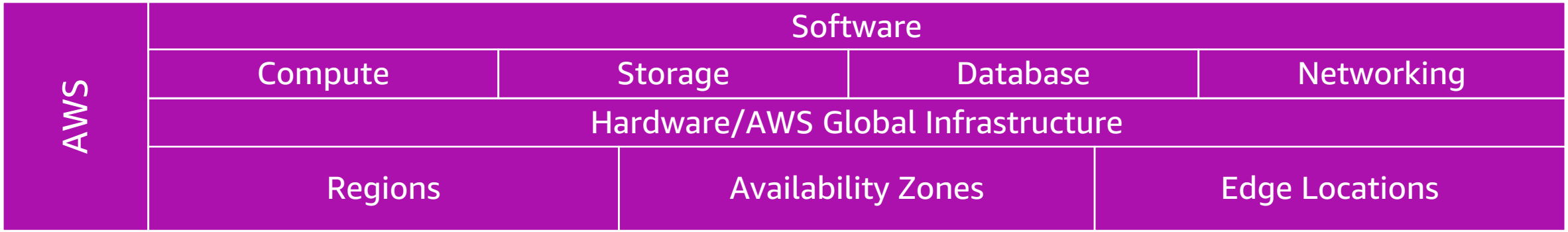


Examples of customer responsibilities include:

- Instance operating system
- Applications
- Security groups
- Host-based firewalls
- Account management

AWS: Security **OF** the cloud

aws training and certification



Examples of AWS responsibilities include:

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

IAM

AWS Identity and Access Management (IAM) allows you to manage access to AWS services and resources.

IAM features

- IAM user
- IAM policy
- IAM group
- IAM role
- Multi-factor authentication (MFA)

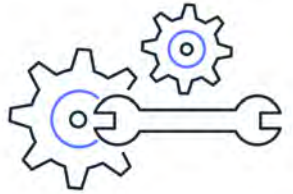
AWS account root user

aws training and certification

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.

IAM users

An **IAM user** is an identity that represents a person or application that interacts with AWS services and resources.

Best practice: Create individual IAM users for each person who needs to access AWS.

IAM user

IAM policies

aws training and certification

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

Best practice: Follow the security principle of least privilege.

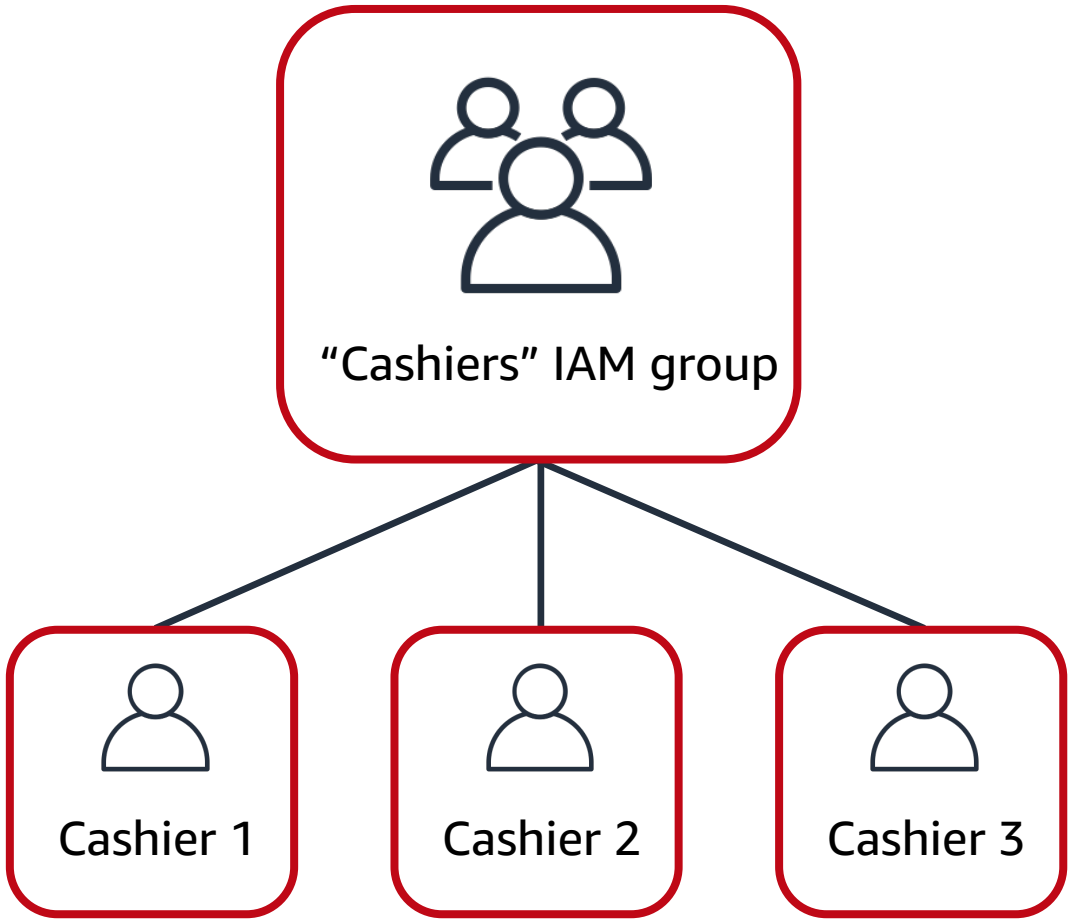
IAM policy

IAM groups

An **IAM group** is a collection of IAM users.

Best practice: Attach IAM policies to IAM groups, rather than to individual IAM users.

Members inherit the policies assigned to the group.

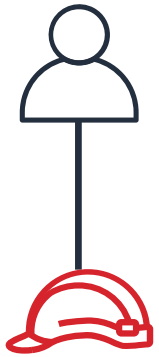


IAM roles

aws training and certification

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

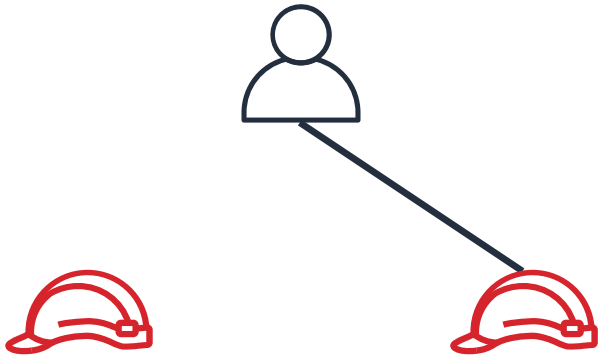
The owner gives the employee permissions to switch to specific roles.



"Cashier" role

The employee assumes the "Cashier" role.

This grants them access to the cash register system.



"Cashier" role **"Inventory" role**

The employee assumes the "Inventory" role.

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

Multi-factor authentication

aws training and certification

Multi-factor authentication provides an extra layer of protection for your AWS account.

IAM user ID: AIDACKCEVSQ6C2EXAMPLE

Password: **********

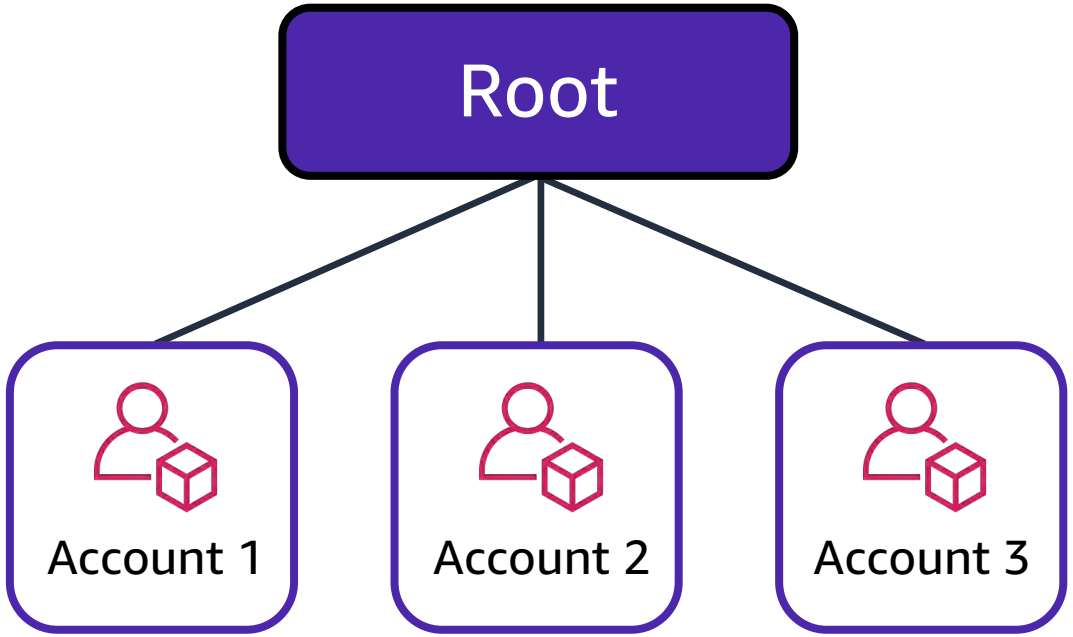
To sign in to an AWS website, a user enters their IAM user ID and password.

The user is prompted to provide an authentication response from their AWS MFA device.

The user is successfully authenticated and can access the requested AWS services or resources.

AWS Organizations

- **AWS Organizations** helps customers consolidate and manage multiple AWS accounts in a central location.
- Use **service control policies (SCPs)** to centrally control permissions for the accounts in your organization.

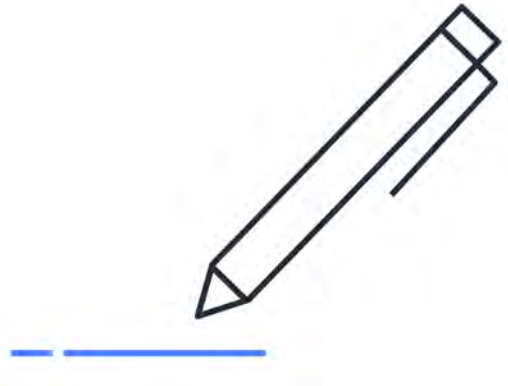


AWS Artifact

aws training and certification

AWS Artifact provides on-demand access to security and compliance reports and select online agreements.

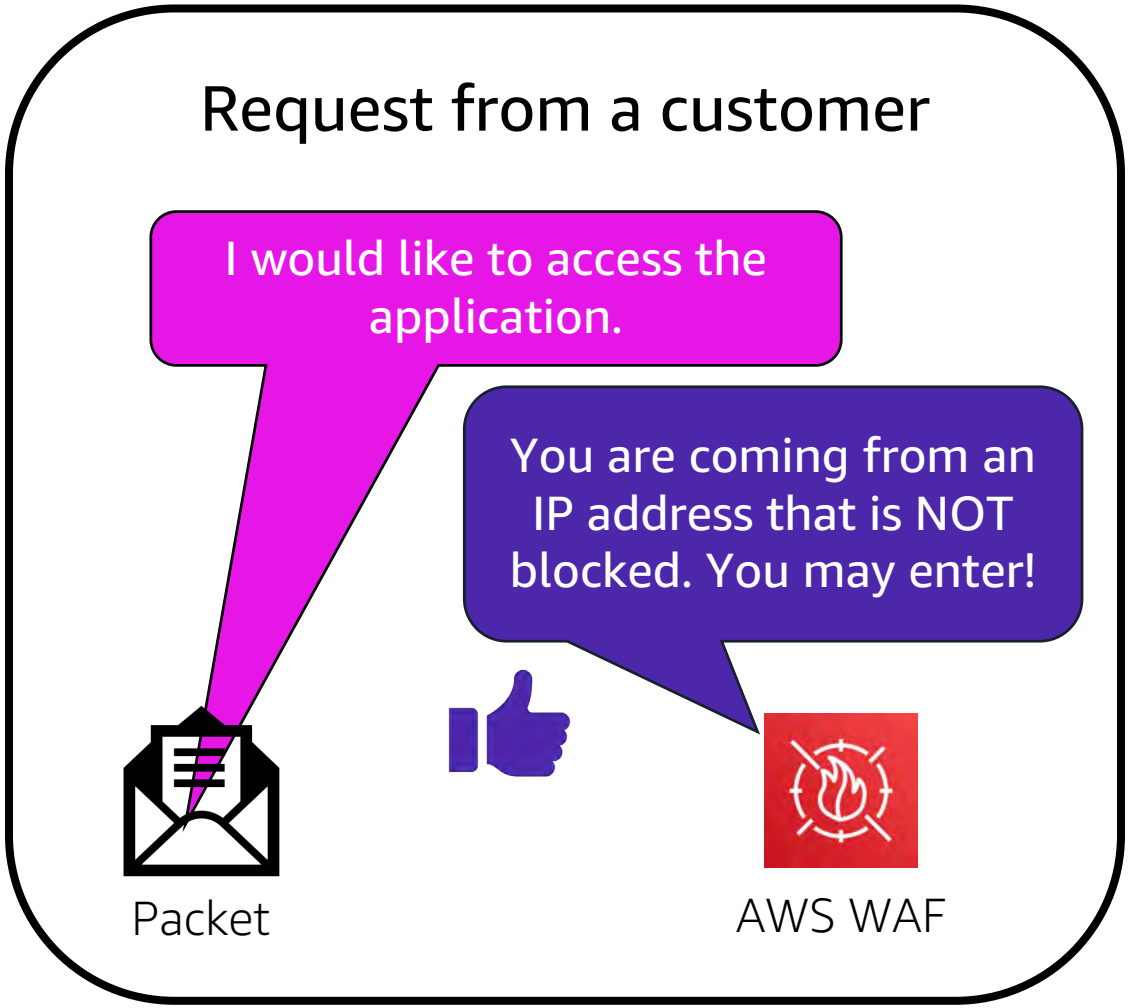
Access AWS compliance reports on demand

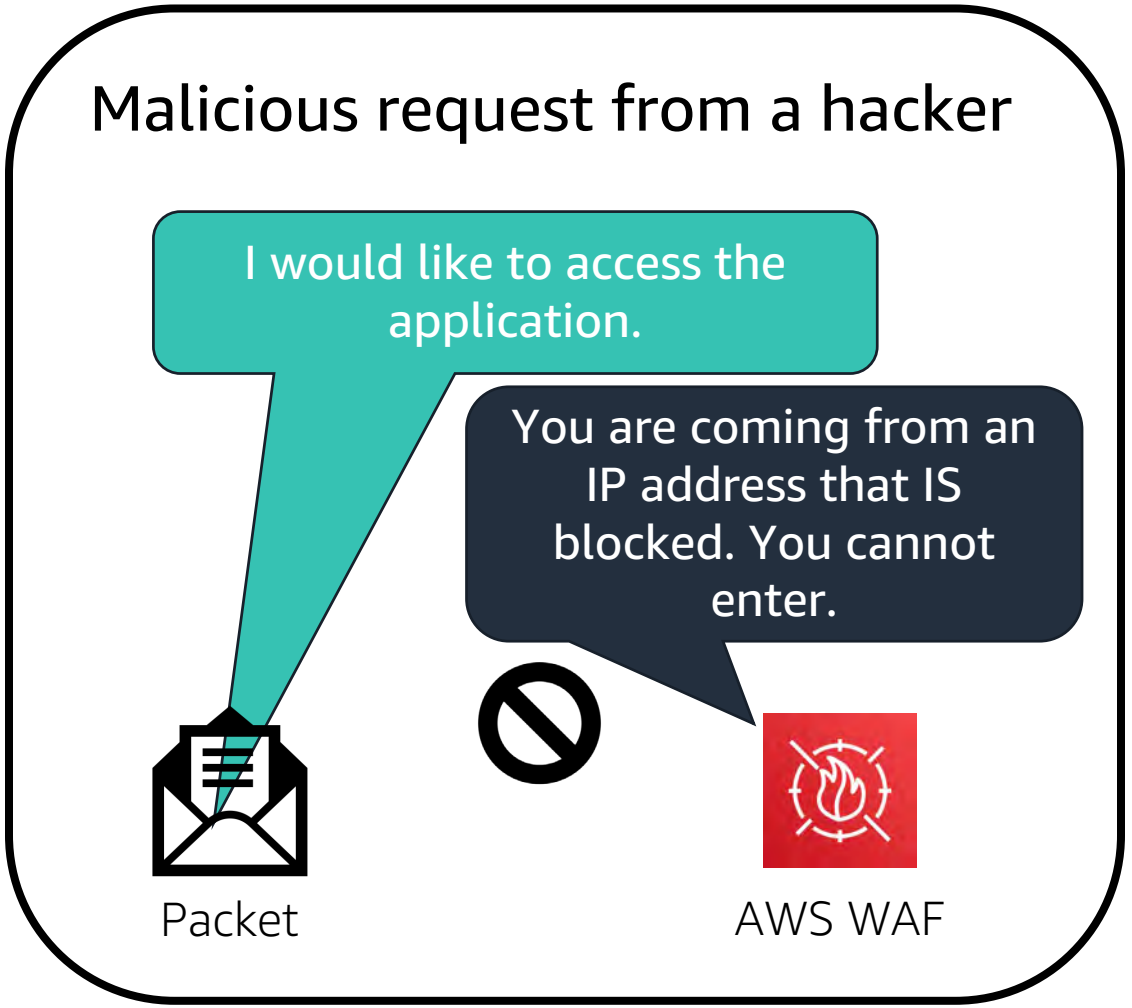


Review, accept, and manage agreements with AWS

Access compliance reports from third-party auditors

AWS WAF





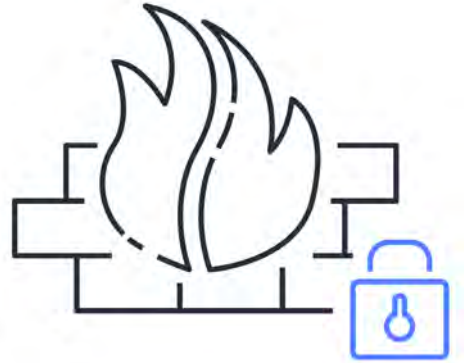
AWS Shield

aws training and certification

AWS Shield provides protection against distributed denial of service (DDoS) attacks.

Protect applications against DDoS attacks

Integrate AWS Shield Advanced with other AWS services



Write custom web ACL rules with AWS WAF to mitigate complex DDoS attacks

Amazon Inspector

aws training and certification

Amazon Inspector allows you to perform automated security assessments on your applications.

Automatically conduct application security assessments

Identify security vulnerabilities and deviations from best practices

Receive recommendations for how to fix security issues

AWS Key Management Service

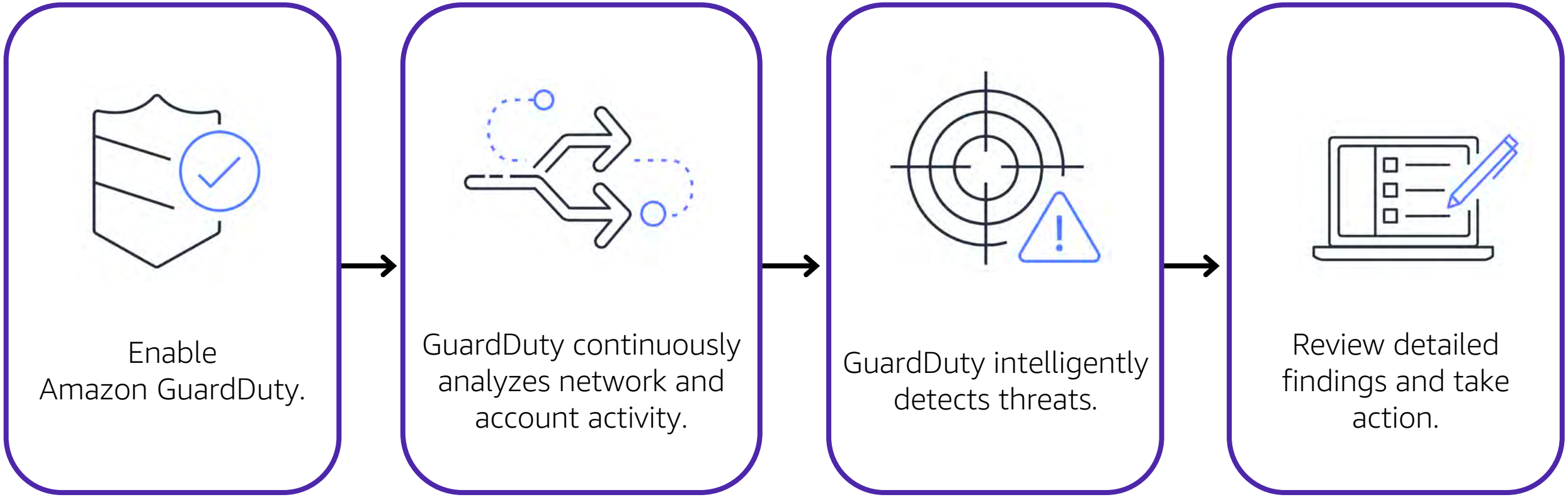
- **AWS Key Management Service (AWS KMS)** helps customers perform encryption operations through the use of cryptographic keys.
- You can choose the specific levels of access control that you need for your keys.

AWS KMS

Amazon GuardDuty

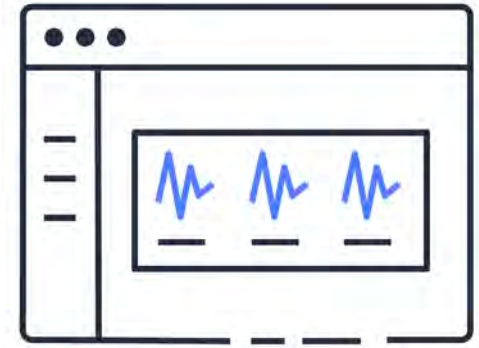
aws training and certification

Amazon GuardDuty provides intelligent threat detection for AWS products and services.



Amazon CloudWatch

aws training and certification



Monitor your AWS and on-premises infrastructure and resources in real time

Access all of your metrics from a single location

Configure automatic alerts and actions in response to metrics

AWS CloudTrail

aws training and certification

Track user activities and API requests throughout your AWS infrastructure

Filter logs generated by API calls to assist with operational analysis and troubleshooting

Automatically detect unusual account activity

AWS CloudTrail event

What happened?	New IAM user (Mary) created 
Who made the request?	IAM user John 
When did this occur?	January 1, 2021 at 9:00 AM 
How was the request made?	Through the AWS Management Console 

AWS Trusted Advisor

aws training and certification

Receive real-time guidance for improving your AWS environment

Compare your infrastructure to AWS best practices in five categories

Evaluate and implement guidance at all stages of deployment

AWS Trusted Advisor dashboard

aws training and certification

Number of items for which **no problems** have been detected

Number of recommended **investigations**

Number of recommended **actions**

AWS Free Tier categories

aws training and certification

Always free

12 months free

Trials

AWS pricing concepts

aws training and certification

Pay as you go

Pay only for the resources that you use without provisioning capacity in advance

Pay less when you reserve

Reduce costs by reserving capacity in services such as Amazon Elastic Compute Cloud (Amazon EC2) and Amazon Relational Database Service (Amazon RDS)

Pay less with volume-based discounts

Receive savings through volume-based discounts as your usage increases

AWS Pricing Calculator

aws training and certification

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 provide estimates by cost center.

AWS Lambda pricing

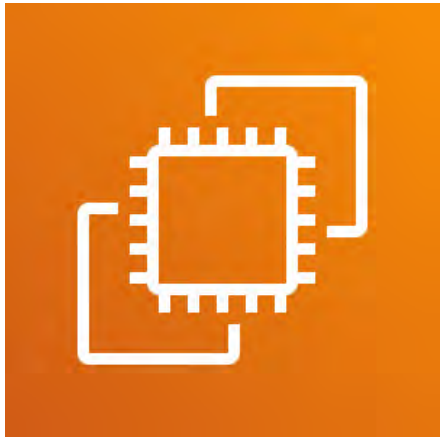
- Pay only for the compute time you use
- Pay for the number of requests for your functions
- Save by signing up for a Compute Savings Plan

AWS Lambda

Amazon EC2 pricing

aws training and certification

- Pay only for the time that your On-Demand Instances run
- Reduce costs by using Spot Instances for recommended use cases
- Save by signing up for a Compute Savings Plan



Amazon Elastic Compute Cloud

Amazon S3 pricing

aws training and certification

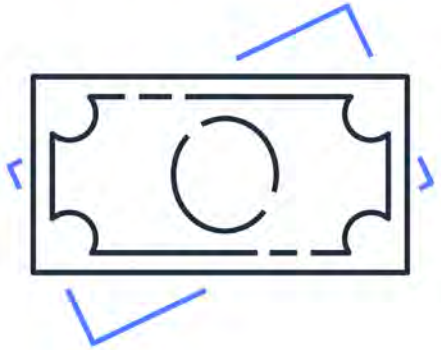
Amazon S3 pricing is based on four factors:

- Storage
- Requests and data retrievals
- Data transfer
- Management and replication

Amazon Simple Storage Service

Consolidated billing

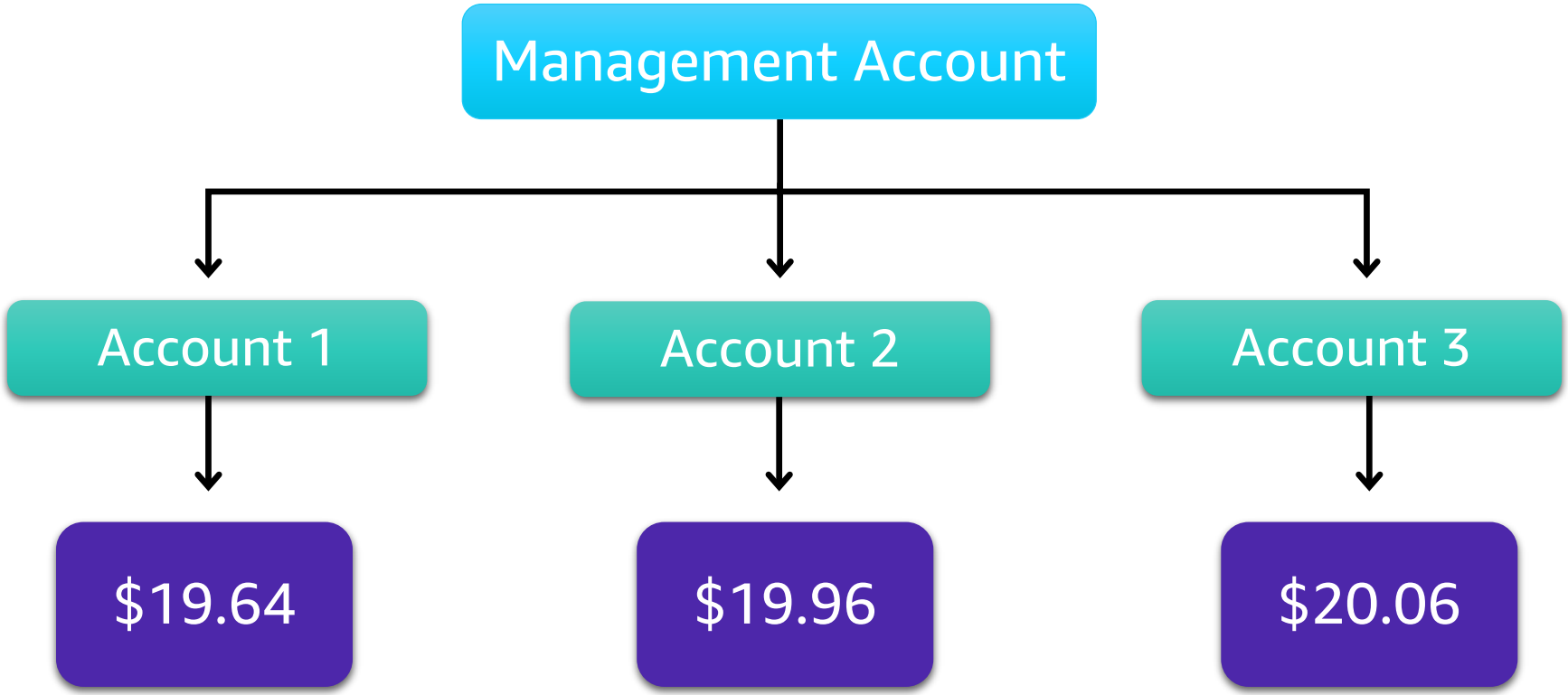
Receive a single bill for all the AWS accounts in your organization



Review itemized charges that have been incurred by each account

Share savings across the accounts in your organization

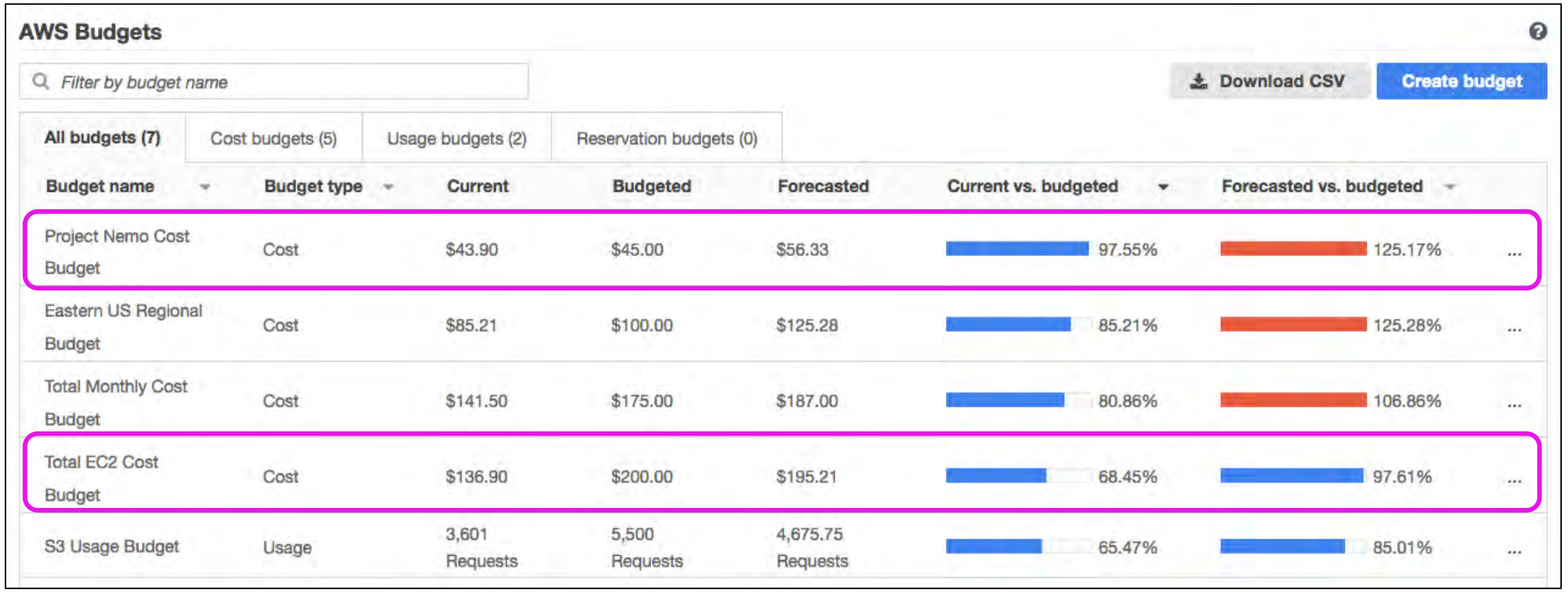
Example: Consolidated billing



Monthly Consolidated Bill	
Management Account	$14.14
Account 1	$19.64
Account 2	$19.96
Account 3	$20.06
Total charged to paying account:	**$73.80**

AWS Budgets

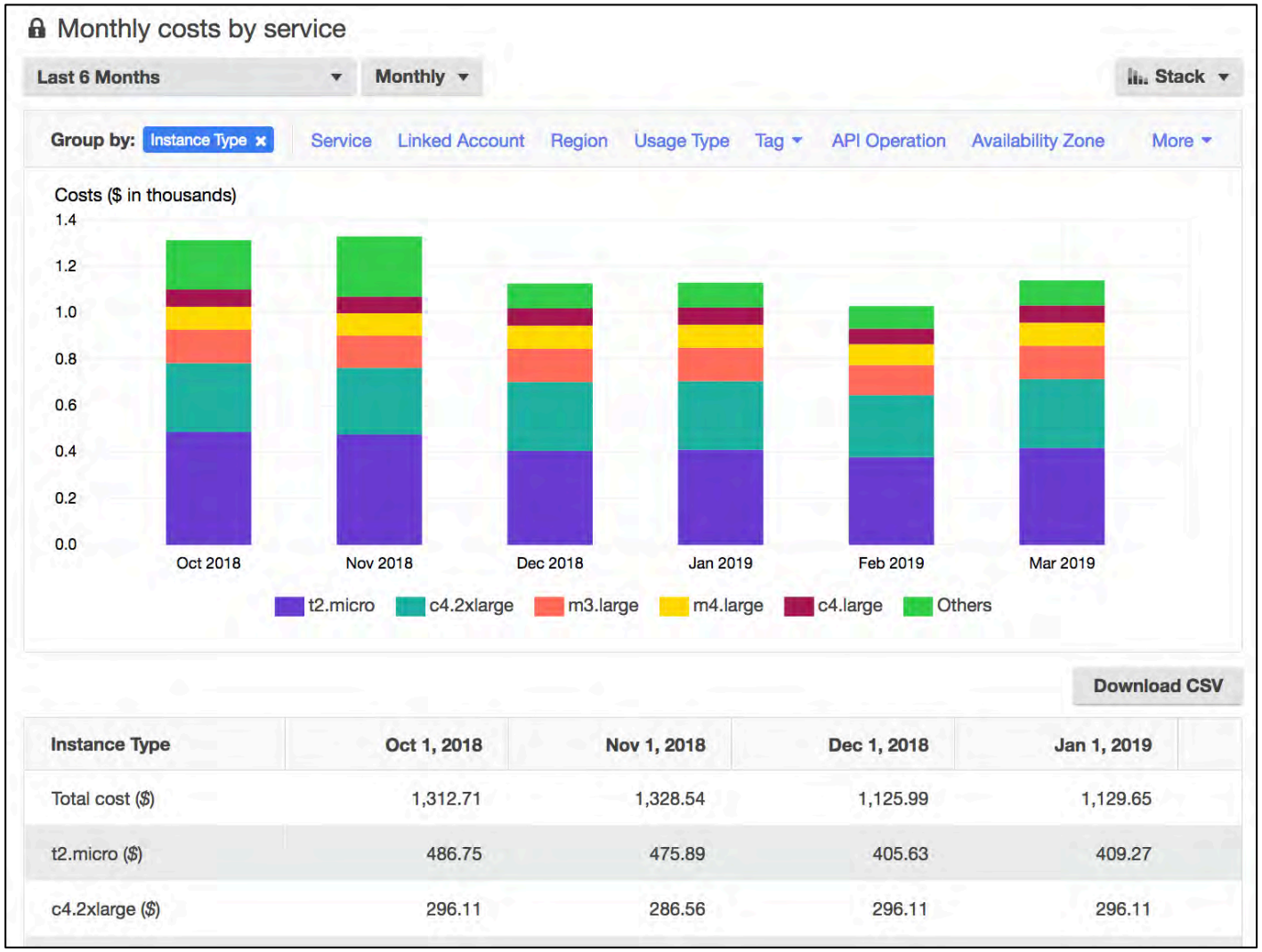
AWS Budgets is a tool that you can use to set thresholds for your AWS service usage and costs.



AWS Cost Explorer

aws training and certification

AWS Cost Explorer is a tool that you can use to visualize, understand, and manage your AWS costs and usage over time.



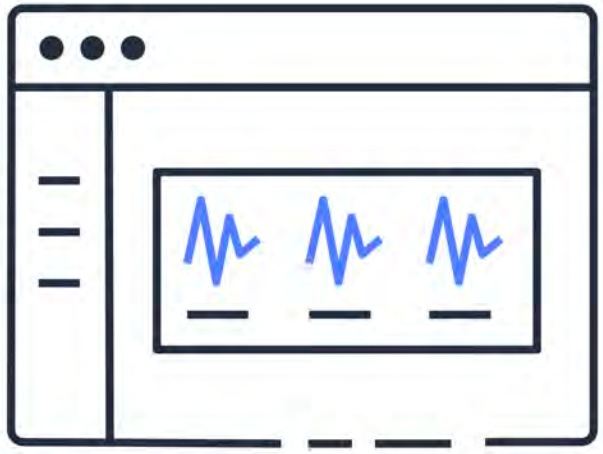
Instance Type	Oct 1, 2018	Nov 1, 2018	Dec 1, 2018	Jan 1, 2019
Total cost ($)	1,312.71	1,328.54	1,125.99	1,129.65
t2.micro ($)	486.75	475.89	405.63	409.27
c4.2xlarge ($)	296.11	286.56	296.11	296.11

Basic Support

aws training and certification

Basic Support is free for all AWS customers and includes access to:

- Technical papers, documentation, and support communities
- AWS Personal Health Dashboard
- Seven core AWS Trusted Advisor checks



AWS Support plans

aws training and certification

Developer

- Best-practice guidance
- Client-side diagnostic tools
- Building-block architecture support

Business

- Use-case guidance
- All AWS Trusted Advisor checks
- Limited support for third-party software

Enterprise

- Application architecture guidance
- Infrastructure event management
- Technical Account Manager (TAM)

Technical Account Manager (TAM)

The **Technical Account Manager** is your primary point of contact at AWS.

- Technical Account Managers are included only with the Enterprise Support plan.
- They provide guidance, technical expertise, and best practices.

AWS Marketplace

aws training and certification

AWS Marketplace is a digital catalog that provides listings of third-party software that runs on AWS.

Discover thousands of software products that run on AWS

Access detailed information and reviews for each product listing

Explore software solutions by industry and use case

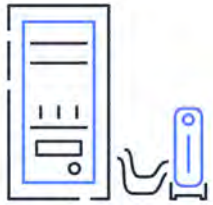
AWS Marketplace categories

aws training and certification

Business Applications

Data and Analytics

DevOps



Infrastructure Software

Internet of Things (IoT)

Machine Learning

Migration

Security

AWS Cloud Adoption Framework

aws training and certification

AWS Cloud Adoption Framework

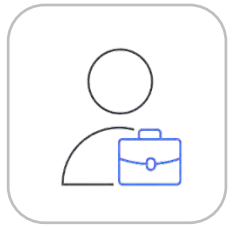
aws training and certification

- Provides advice to your company to enable a quick and smooth migration to AWS
- Organizes guidance into six areas of focus, called **perspectives**

Perspectives

aws training and certification

Business

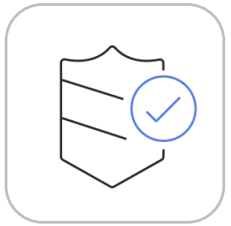


People

Governance

Business capabilities

Platform

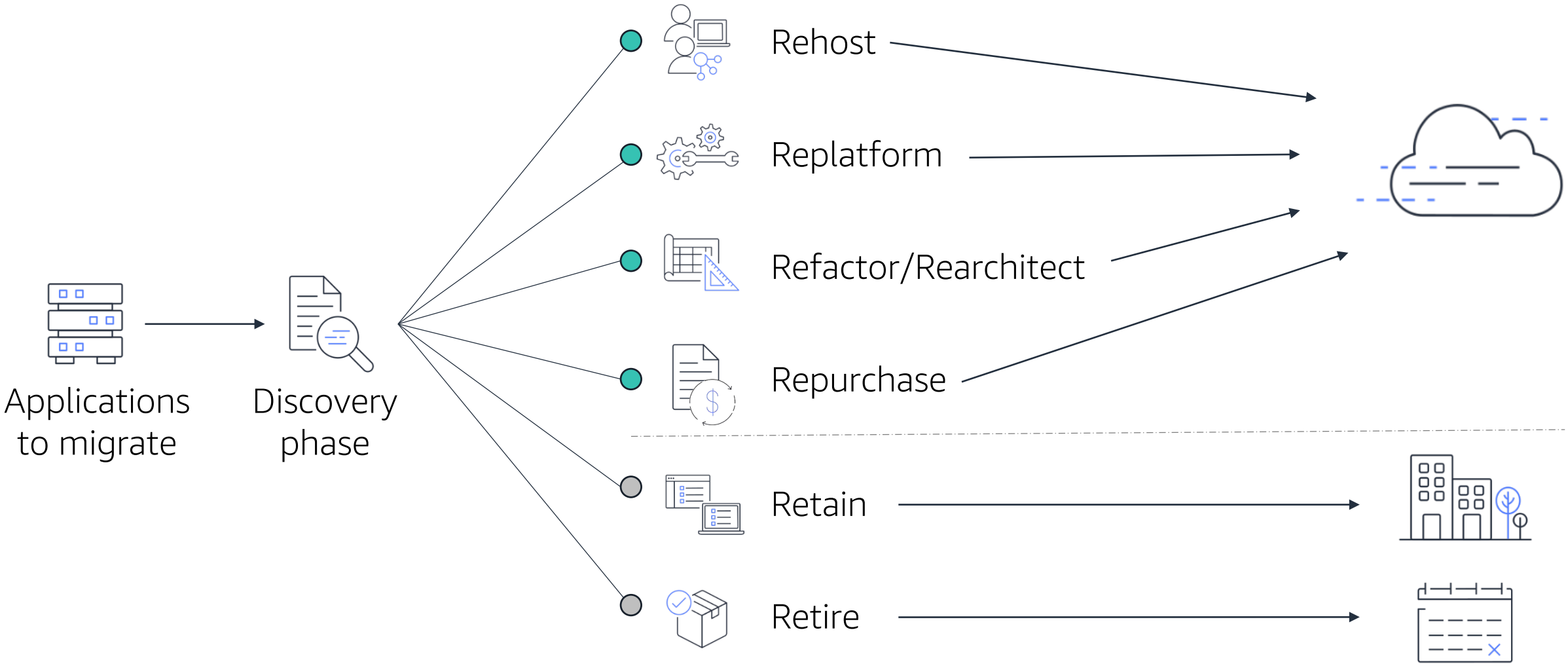


Security

Operations

Technical capabilities

Six migration strategies



AWS Snow Family

aws training and certification

AWS Snowcone

- Small, rugged, and secure edge computing and data transfer device
- Features 8 TB of usable storage

AWS Snowball devices

- AWS Snowball Edge Storage Optimized
- AWS Snowball Edge Compute Optimized

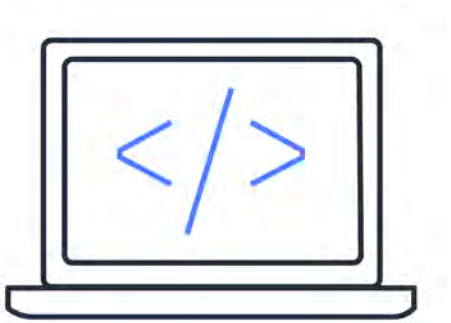
AWS Snowmobile

- Exabyte-scale data transfer service for moving large amounts of data to AWS
- Transfers up to 100 PB of data

Innovation paths

aws training and certification

Consider some of the following innovation paths as you continue on your cloud journey.



Serverless applications

Artificial intelligence (AI)

Machine learning (ML)

Well-Architected Framework

The **Well-Architected Framework** helps you understand how to design and operate reliable, secure, efficient, and cost-effective systems in the AWS Cloud.

It is based on five pillars:

- Operational excellence
- Security
- Reliability
- Performance efficiency
- Cost optimization