NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

CDN & Availability Zones

Cloud Infrastructure Engineering

Nanyang Technological University
& Skills Union - 2022/2023

Course Content

- Quick Check-In
- Dive into the basics of CDN & Availability Zones
- Explore what CDN is
- Explore what Availability Zones are
- Explore the Availability Zones’ use cases
- Explore CDN’s use cases

Time	What	How or Why
7:15pm - 7:40pm	Part 1 - Presentation	CDN
7:40pm - 8:05pm	Part 2 - Activity	CDN
8:00pm - 8:10pm	Break	
8:10pm - 8:35pm	Part 3 - Presentation	Availability Zones
8:35pm - 8:50pm	Part 4 - Activity	Choosing Regions and Availability Zones for Your System
8:40pm - 9:00pm	Part 5 - Activity	Deployment Strategies Activity
9:00pm - 10:00pm	Summary & Assignments	

Recap

- AWS Deployment Services
  - CodeBuild, CodeDeploy, CodePipeline, CodeCommit
  - Elastic Beanstalk
  - CloudFormation
  - OpsWork
- AWS Deployments Strategies
  - Basic, Rolling, Blue-Green, Canary

Self Study Check-In

Q1) What is the benefit of a CDN?

Q2) Example use cases when you are using CDN on your system?

Content Delivery Network (CDN)

What Is CDN?

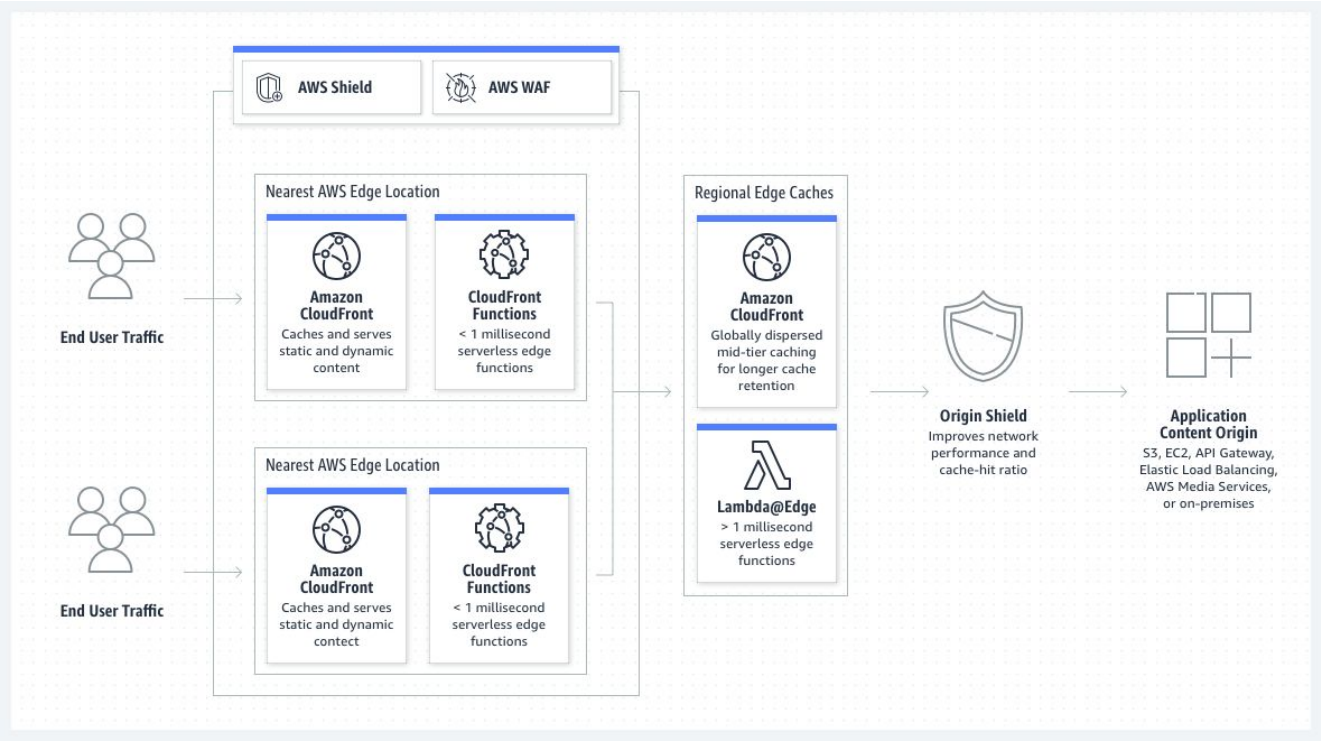
A network of interconnected servers that **speeds up webpage loading** for data-heavy applications.

When a user visits a website, data from that website's server has to travel across the internet to reach the user's computer.

If the user is located far from that server, it will take a long time to load a large file, such as a video or website image.

Instead, the **website content is stored on CDN servers geographically closer to the users** and reaches their computers much faster.

CDN - CloudFront



Summary of Benefits

- Improve webpages' load times
- Reducing bandwidth costs
- Increasing content availability and redundancy
- Improving website security

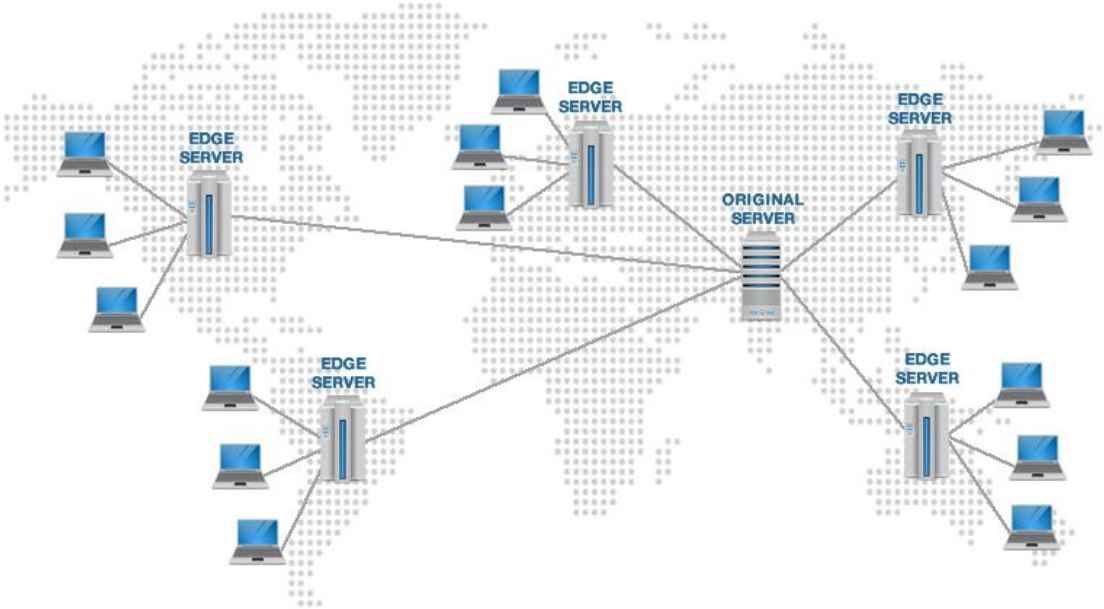
Improve Webpages' Load Times

By distributing content closer to website visitors by using a **nearby CDN server** (among other optimizations), visitors experience faster page loading times.

As visitors are more inclined to click away from a slow-loading site, a CDN can **reduce bounce rates and increase the amount of time that people spend on the site**.

In other words, a faster a website means more visitors will stay and stick around longer.

Improve Webpages' Load Times



Reducing Bandwidth Cost

Bandwidth consumption costs for website hosting is a primary expense for websites.

Through caching and other optimizations, CDNs are able to **reduce the amount of data an origin server must provide**, thus reducing hosting costs for website owners.

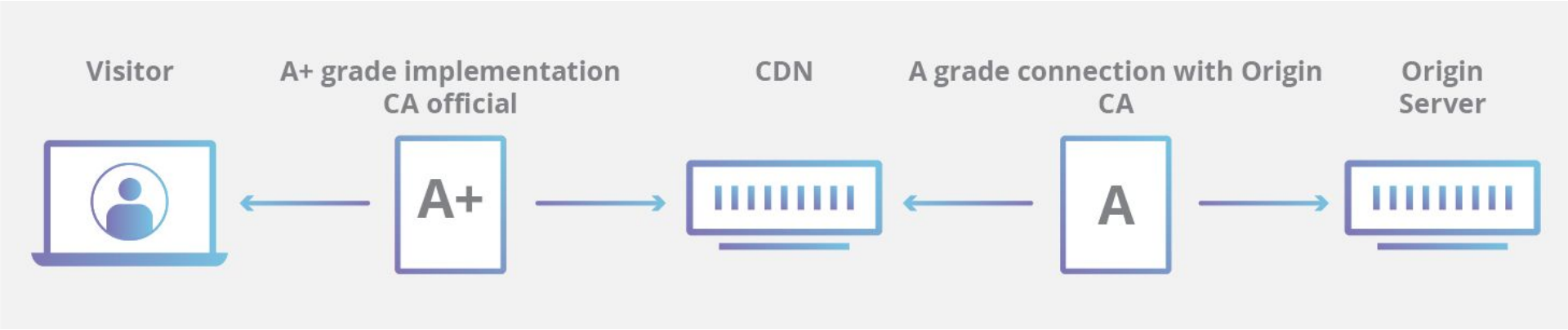
Increasing Content Availability & Redundancy

Large amounts of traffic or hardware failures can interrupt normal website function.

Thanks to their distributed nature, a CDN can **handle more traffic and withstand hardware failure better than many origin servers**.

Improve Website Security

A CDN **may** improve security by providing DDoS mitigation, improvements to security certificates, and other optimizations.



Summary of CDN Use Cases

- High-speed content delivery
- Real-time streaming
- Multi-user scaling

High Speed Content Delivery

By combining static and dynamic internet content delivery, you can use CDNs to **provide your customers with a global, high-performing, whole-site experience**.

For example, Reuters is the world's largest news wholesaler to top channels. The news media challenge for Reuters is to deliver news content promptly to customers around the globe. **Reuters uses Amazon's CDN service, Amazon CloudFront, with Amazon S3** to minimize dependence on satellite link communication and create a cheaper, highly available, and secure globally distributed network platform.

Real Time Streaming

CDNs help reliably and cost-effectively deliver rich and high-quality media files. Companies **streaming video and audio use CDNs** to overcome three challenges: **reduce bandwidth costs, increase scale, and decrease delivery time.**

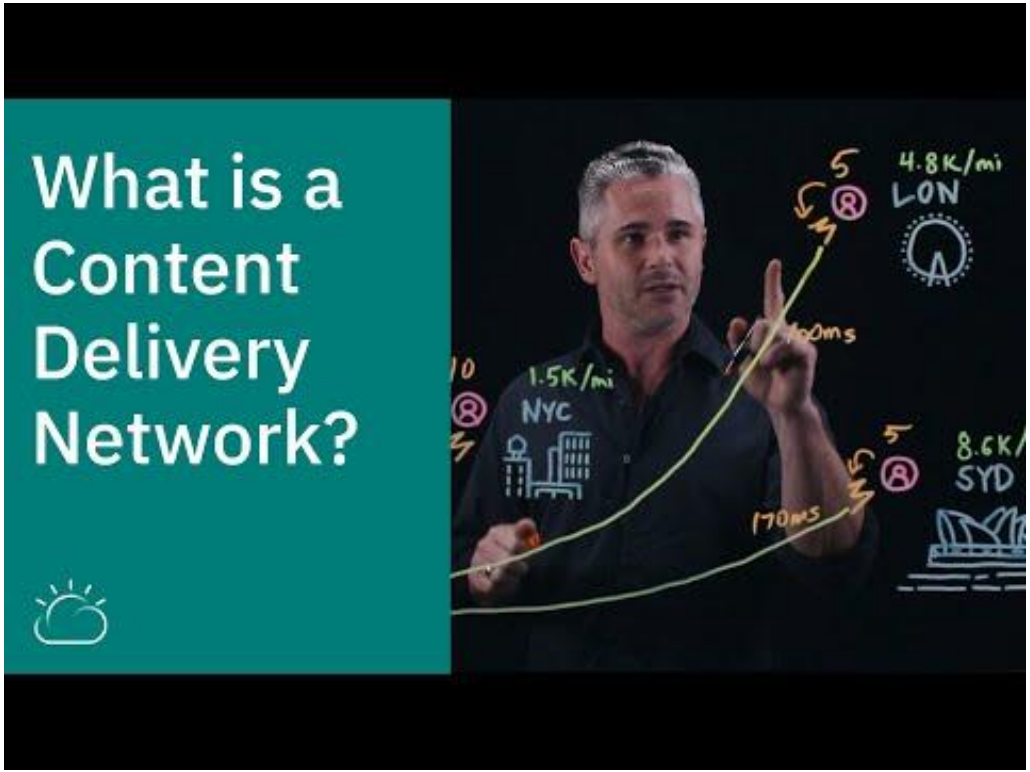
For example, Hulu is an online video streaming platform owned by the Walt Disney Company. It uses **Amazon CloudFront** to consistently stream more than 20 GBps of data to its growing customer base.

Multi-User Scaling

CDNs help **support a large number of concurrent users**. Website resources can manage only a limited number of client connections at a time. CDNs can **rapidly scale** this number by **taking some of the load from the application server**.

For instance, King is a gaming company that builds socially connected, cross-platform games that can be played anytime, anywhere, and from any device. King has over 350 million players at any time, and they play 10.6 billion games a day on the platform.

Summarising CDN



Summarising CloudFront

Further Reading

Explore About AWS CloudFront:

https://aws.amazon.com/cloudfront/

Break Time

Regions, Availability Zones & Edge Locations

Regions

AWS has the concept of a **Region**, which is a **physical location around the world where we cluster data centers**.

We call each **group of logical data centers an Availability Zone**. Each AWS Region consists of **multiple**, **isolated**, and **physically separate AZs** within a geographic area.

Unlike other cloud providers, who often define a region as a single data center, the multiple AZ design of every AWS Region offers advantages for customers.

Regions

Each AZ has **independent power, cooling, and physical security** and is connected via **redundant**, **ultra-low-latency networks.**

AWS customers focused on **high availability** can design their applications to run in multiple AZs to achieve even greater fault-tolerance.

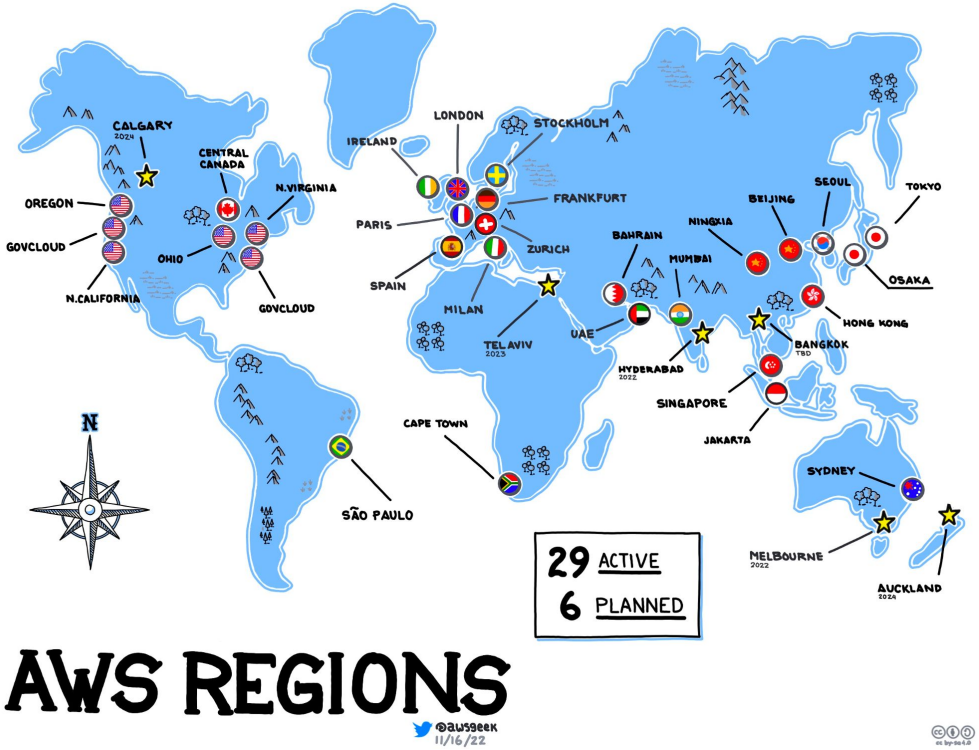
AWS infrastructure Regions meet the **highest levels of security, compliance, and data protection**.

Regions

AWS provides a **more extensive global footprint** than any other cloud provider, and to support its global footprint and ensure customers are served across the world, AWS opens new Regions rapidly.

AWS maintains multiple geographic Regions, including Regions in North America, South America, Europe, China, Asia Pacific, South Africa, and the Middle East.

Regions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Availability Zones

An Availability Zone (AZ) is **one or more discrete data centers** with redundant power, networking, and connectivity **in an AWS Region**.

AZs give customers the ability to **operate production applications and databases that are more highly available, fault tolerant, and scalable** than would be possible from a single data center.

All AZs in an AWS Region are **interconnected with high-bandwidth, low-latency networking**, over fully redundant, dedicated metro fiber providing high-throughput, low-latency networking between AZs.

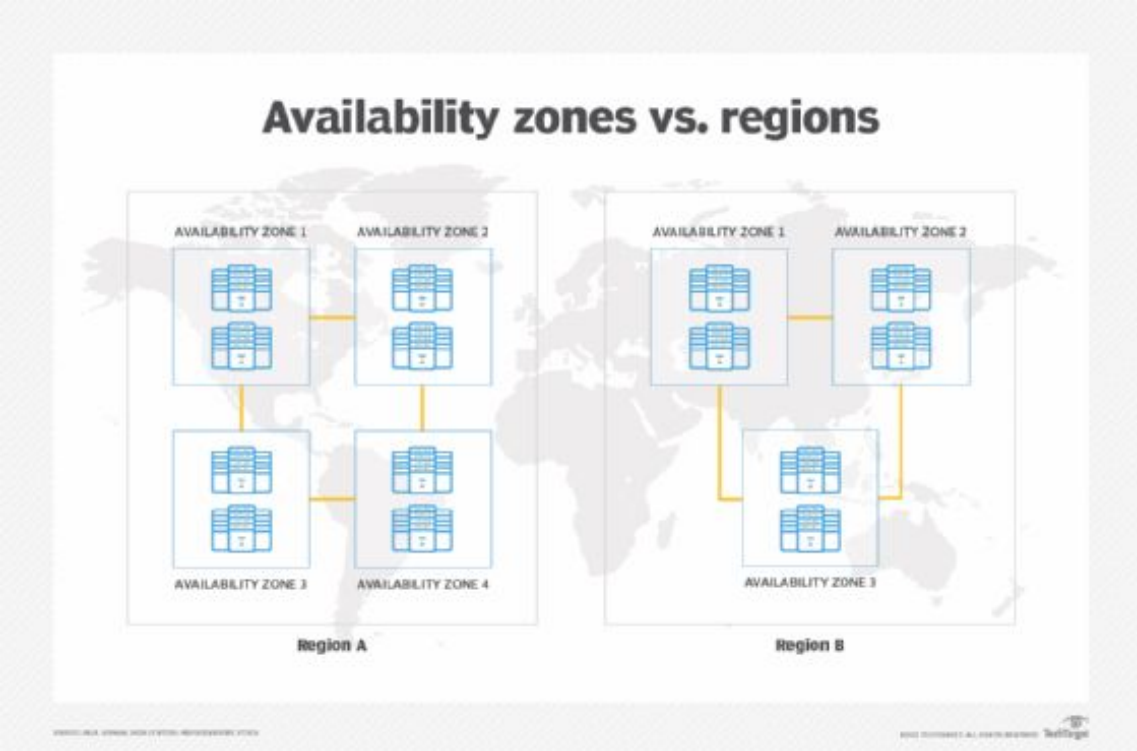
Availability Zones

All **traffic** between AZs is **encrypted**. The network performance is sufficient to accomplish synchronous replication between AZs.

AZs make **partitioning applications for high availability easy**. If an application is partitioned across AZs, companies are better isolated and protected from issues such as power outages, lightning strikes, tornadoes, earthquakes, and more.

AZs are **physically separated by a meaningful distance**, many kilometers, from any other AZ, although all are within 100 km (60 miles) of each other.

Availability Zones



Edge Locations

CloudFront points of presence (also known as POPs or edge locations) make sure that popular content can be served quickly to your viewers.

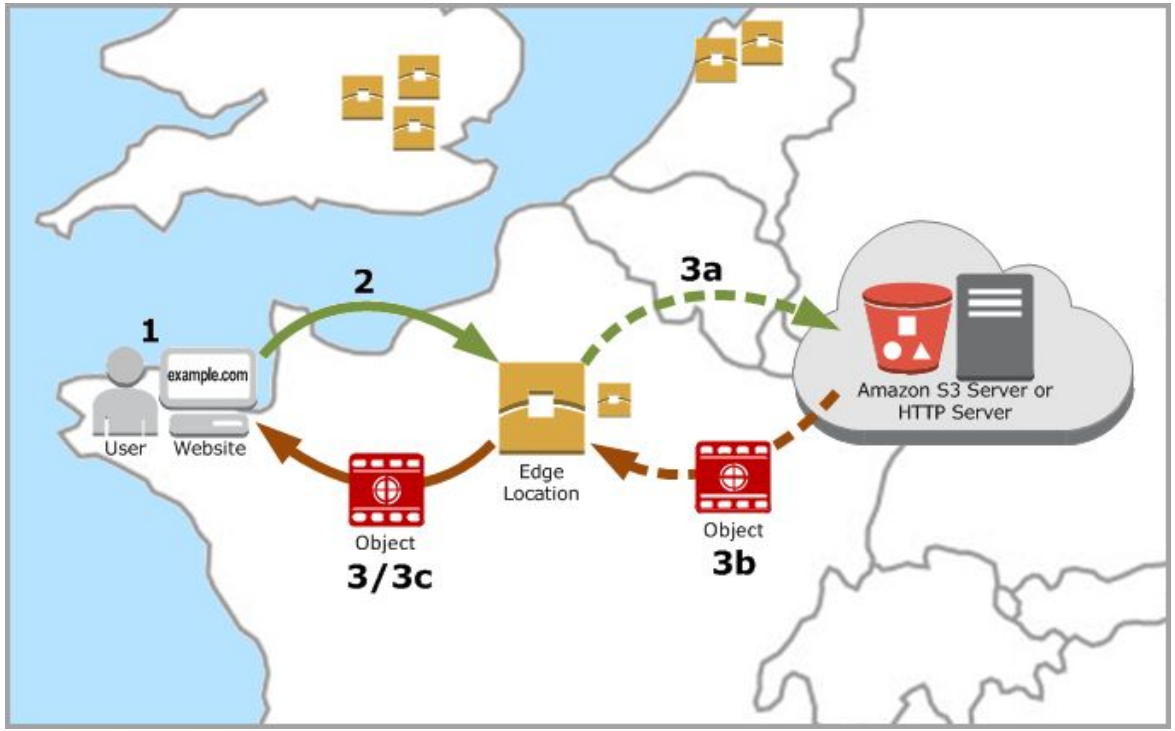
CloudFront also has **regional edge caches** that **bring more of your content closer to your viewers**, even when the content is not popular enough to stay at a POP, to **help improve performance for that content**.

Edge Locations

Regional edge caches **help with all types of content**, particularly content that tends to become less popular over time.

Examples include user-generated content, such as video, photos, or artwork; e-commerce assets such as product photos and videos; and news and event-related content that might suddenly find new popularity.

Edge Locations



Activity

Learner:

- Clean up AWS.
- Remove/delete/terminate all service/ resources that created.

Instructor

- Clean up AWS.
- Remove/delete/terminate all service/ resources that created.
- Check the AWS account after learner clean up.

What’s Next?