Deploy-static-website-on-S3-bucket-and-configure-CloudFront-distribution

Case Study Problem Statement :

An organization requires a solution for hosting a static web page that ensures firewall protection, failover capabilities, geographical restrictions, and low latency access.
The current infrastructure lacks the necessary security measures, redundancy, and global accessibility, leading to potential security breaches, downtime, and slow website performance.
To address these concerns, the organization needs a comprehensive hosting solution that can provide robust firewall protection, automatic failover mechanisms, the ability to enforce geographical restrictions for access and ensure low latency access to the web page for users worldwide.

To address the challenges outlined in the problem statement, the following AWS services can be used to create a secure, resilient, and globally accessible hosting solution for a static web page:

Amazon S3: Hosts the static content of the web page and provides high durability and availability

AWS WAF (Web Application Firewall): To protect the web page from common web exploits. Protects against common web attacks by controlling incoming and outgoing traffic

Amazon CloudFront: To distribute the content globally, ensuring low latency and implementing geographical restrictions. A content delivery network (CDN) that caches content at edge locations, ensuring low latency access globally.

The key benefits of using Amazon S3, Amazon CloudFront, and AWS WAF for hosting a static web page include:

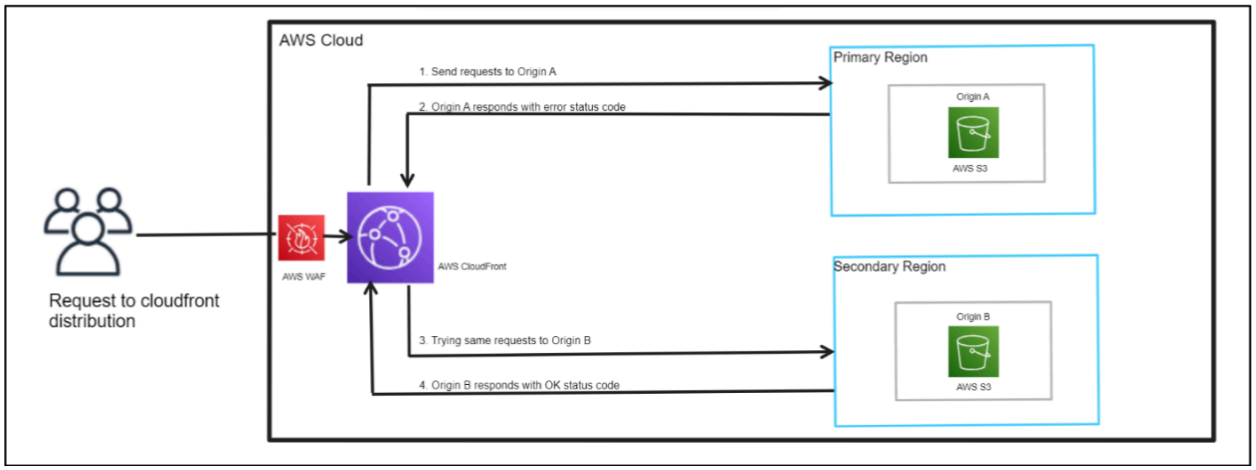
Enhanced Security: AWS WAF provides robust protection against web exploits and attacks, ensuring the integrity and confidentiality of the web page.

Improved Performance: CloudFront's global content delivery network ensures low latency and high transfer speeds for users around the world.

Increased Reliability: Amazon S3 offers high durability and availability for stored content, reducing the risk of data loss.
Cost savings are realized through:

Pay-as-you-go Pricing: You only pay for the services you use, without upfront costs, which can lead to significant savings.
Reduced Bandwidth Costs: CloudFront's data transfer efficiency can lower overall bandwidth costs.
No Need for Physical Infrastructure: Eliminating the need to maintain physical servers reduces operational expenses.

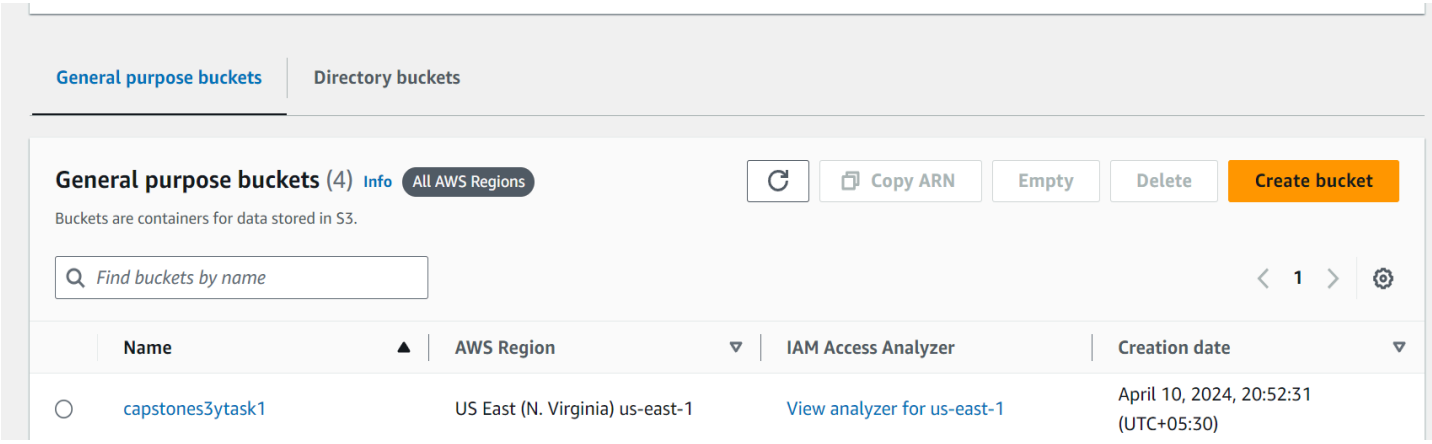
Architecture Diagram:



Task 1 - Creating S3 buckets

1. Created two buckets in 2 different regions

2. Capstones3ytask1 - Primary bucket in US East N.Virginia



3. Capstones3ytask2 -Secondary bucket in US East Ohio

General purpose buckets | Directory buckets

General purpose buckets (5) Info All AWS Regions

Buckets are containers for data stored in S3.

Copy ARN | Empty | Delete | Create bucket

Find buckets by name

Name	AWS Region	IAM Access Analyzer	Creation date
capstones3ytask1	US East (N. Virginia) us-east-1	View analyzer for us-east-1	April 10, 2024, 20:52:31 (UTC+05:30)
capstones3ytask2	US East (Ohio) us-east-2	View analyzer for us-east-2	April 10, 2024, 20:55:11 (UTC+05:30)

4. Created an index.html page for the static website and uploaded the same file in 2 buckets

Index	10-04-2024 20:57	Chrome HTML Docu...

Uploaded index.html in both the storage buckets

capstones3ytask1 Info

Objects | Properties | Permissions | Metrics | Management | Access Points

Objects (1) Info

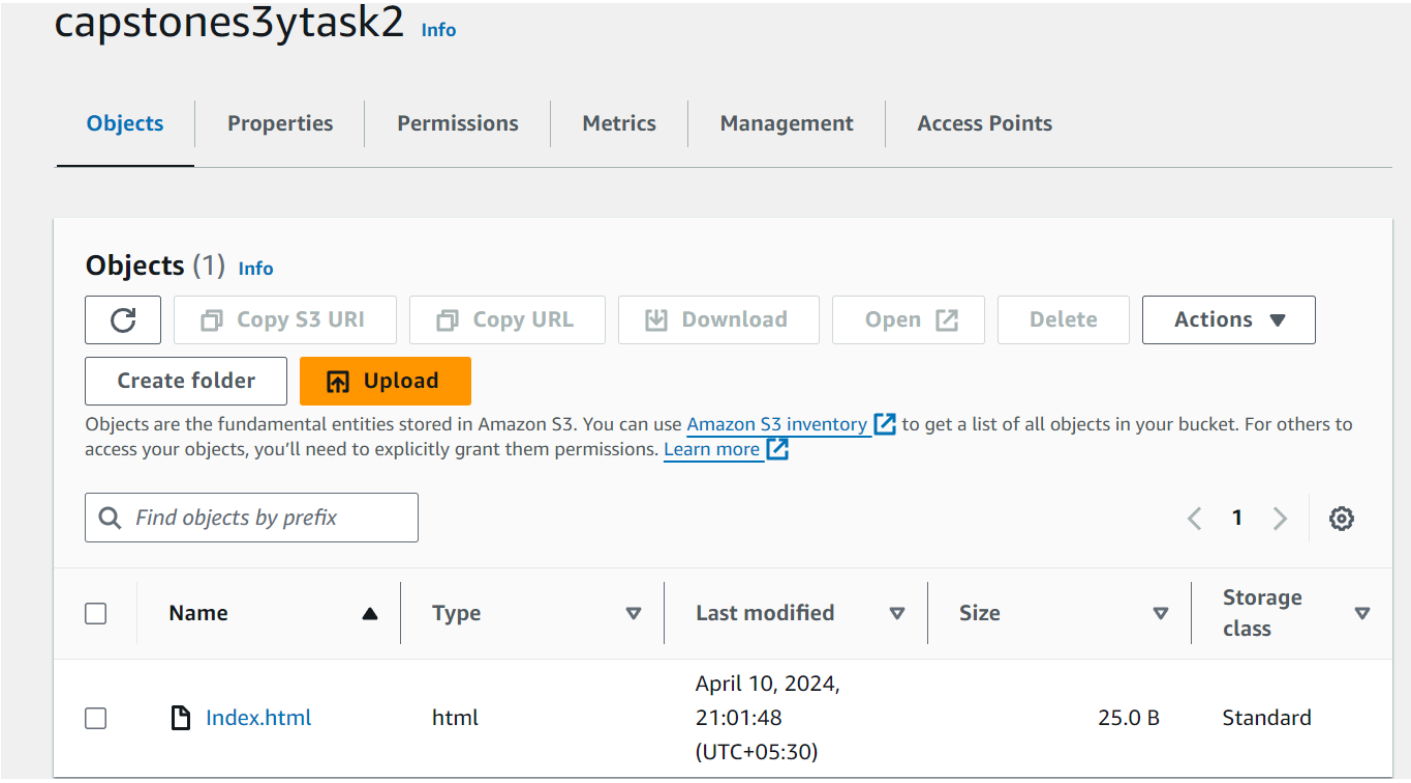
Copy S3 URI | Copy URL | Download | Open | Delete | Actions

Create folder | Upload

Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more

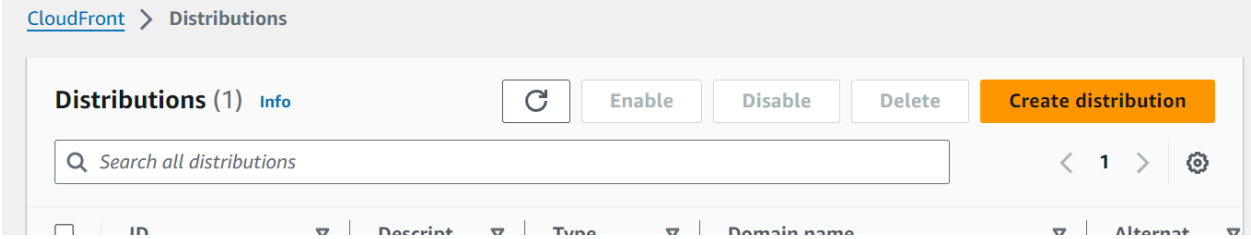
Find objects by prefix

Name	Type	Last modified	Size	Storage class
Index.html	html	April 10, 2024, 21:01:20 (UTC+05:30)	25.0 B	Standard

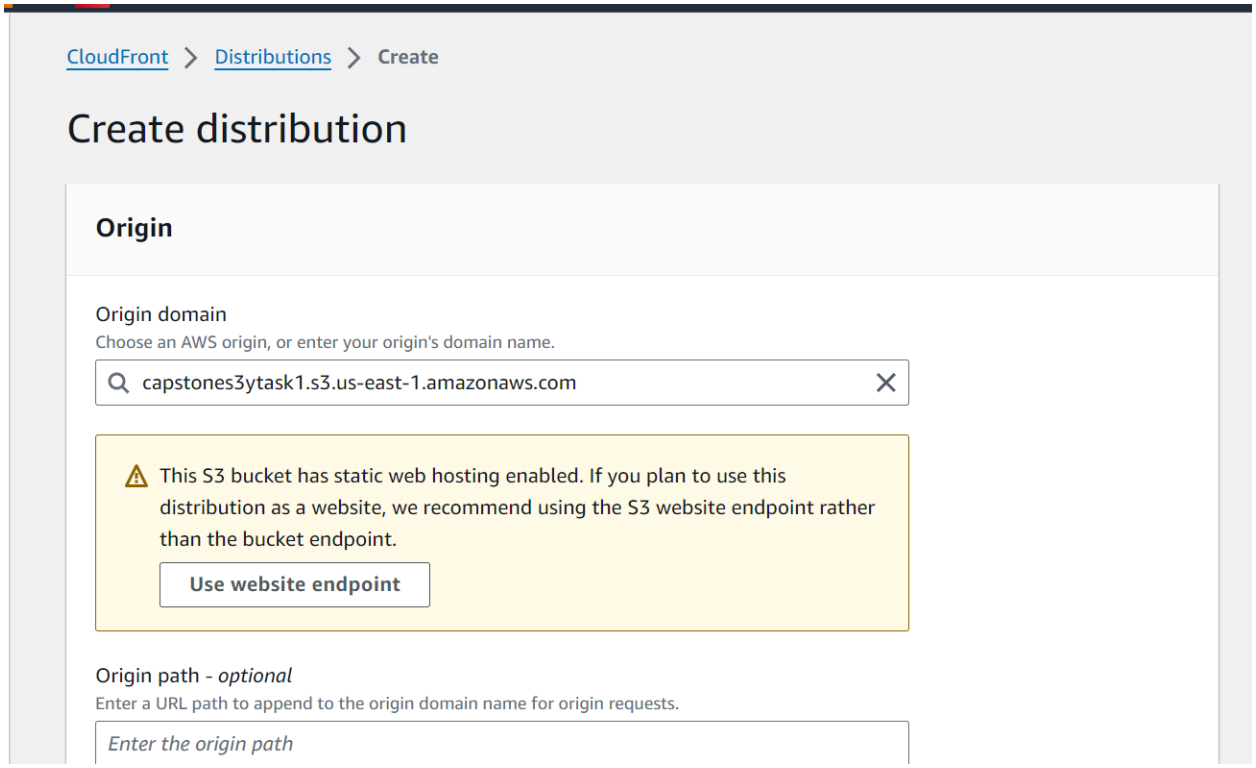


Task -2: Creating a Cloud Front distribution

1. Create distribution



2. 2. Choose primary for the origin domain



3. In Origin access, Select the OAI option and create a new OAI, Then select Yes, update bucket policy.

Name

Enter a name for this origin.

capstones3ytask1.s3.us-east-1.amazonaws.com

Origin access | Info

- ○ Public
  Bucket must allow public access.
- ○ Origin access control settings (recommended)
  Bucket can restrict access to only CloudFront.
- ◉ Legacy access identities
  Use a CloudFront origin access identity (OAI) to access the S3 bucket.

Origin access identity

Select an existing origin access identity (recommended) or create a new identity.

capstones3ytask1.s3.us-east-1.amazonaws.com ▼ | Create new OAI

Bucket policy

Update the S3 bucket policy to allow read access to the OAI.

- ○ No, I will update the bucket policy
- ◉ Yes, update the bucket policy

4. Select redirect HTTP and HTTPS

Compress objects automatically | Info

- ○ No
- ◉ Yes

Viewer

Viewer protocol policy

- ◉ HTTP and HTTPS
- ○ Redirect HTTP to HTTPS
- ○ HTTPS only

Allowed HTTP methods

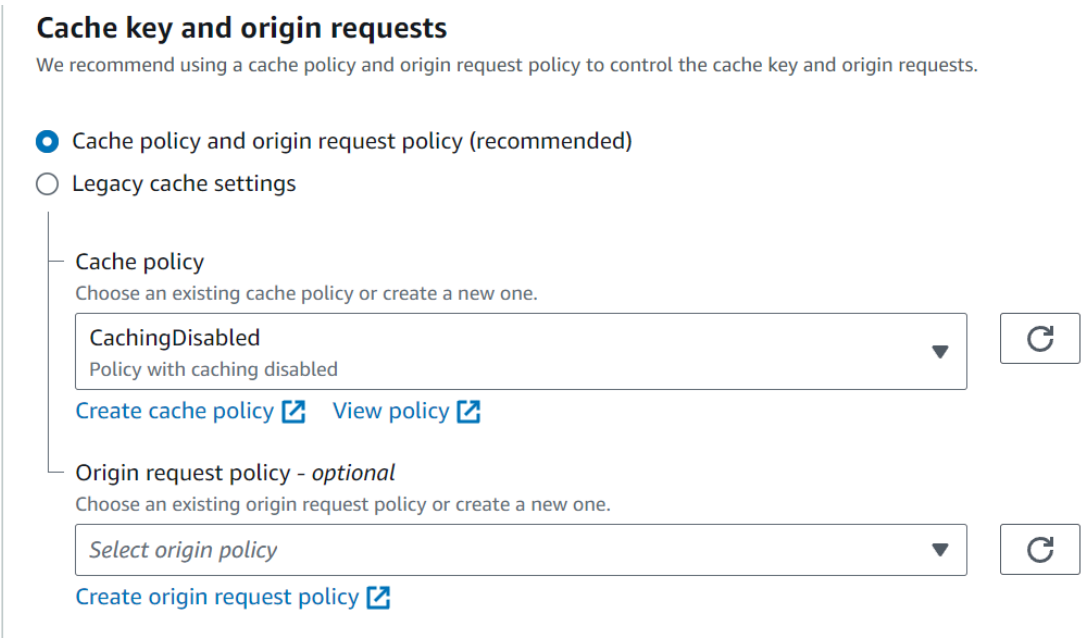
- ◉ GET, HEAD
- ○ GET, HEAD, OPTIONS
- ○ GET, HEAD, OPTIONS, PUT, POST, PATCH, DELETE

Restrict viewer access

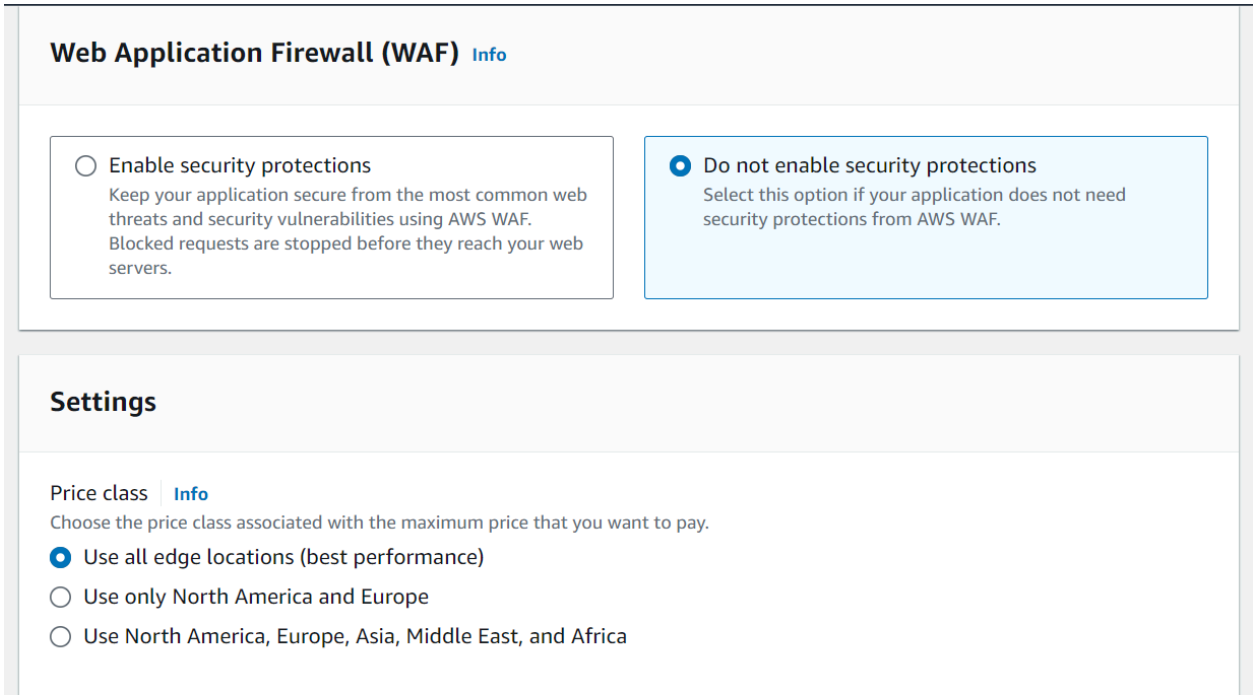
If you restrict viewer access, viewers must use CloudFront signed URLs or signed cookies to access your content.

- ◉ No

5. Change the cache policy to caching disabled

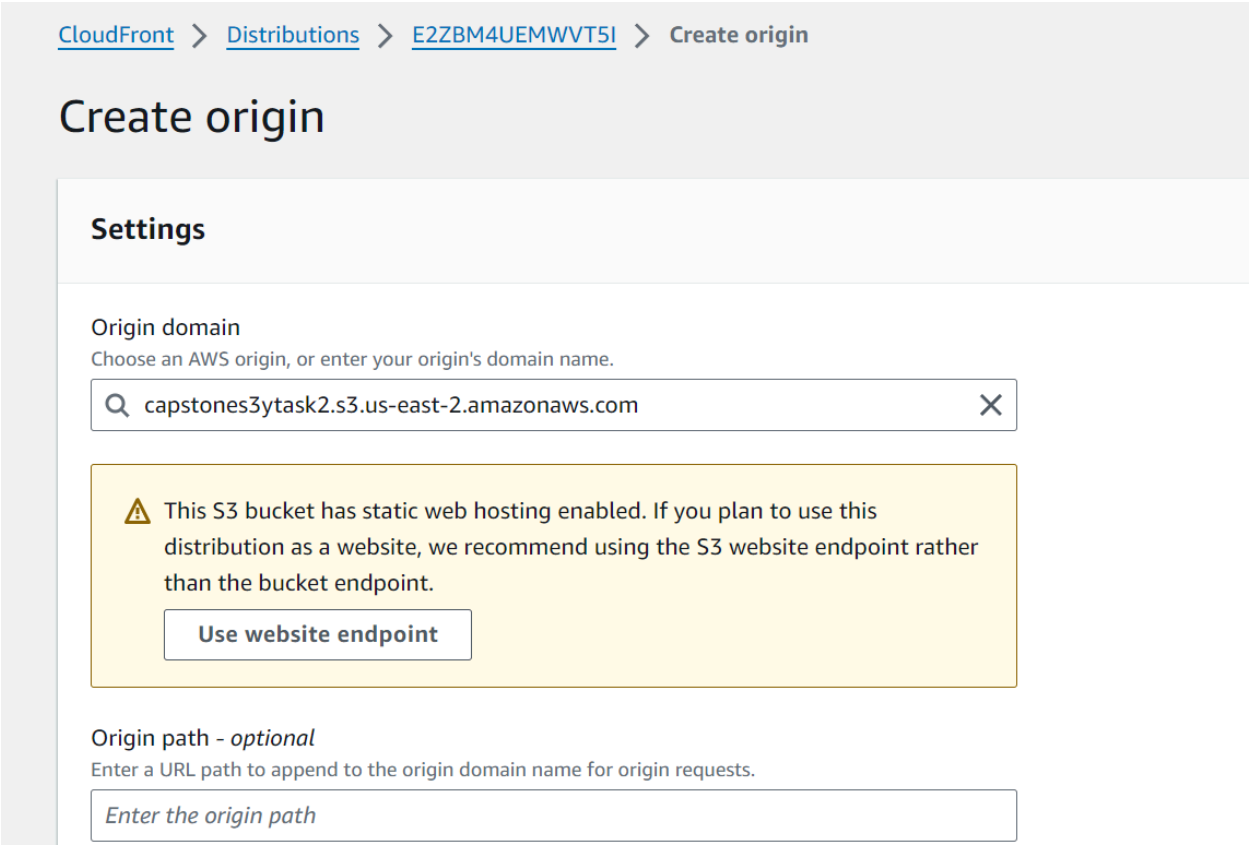


6. DO not enable WAF and leave the remaining by default, save.



Task 3 - Configuring CloudFront for failover

Create Origin



Select Secondary Bucket, select OAI, create OAIa nd yes, update policy

Name

Enter a name for this origin.

capstones3ytask2.s3.us-east-2.amazonaws.com

Origin access Info

- ○ Public
  Bucket must allow public access.
- ○ Origin access control settings (recommended)
  Bucket can restrict access to only CloudFront.
- ◉ Legacy access identities
  Use a CloudFront origin access identity (OAI) to access the S3 bucket.

Origin access identity

Select an existing origin access identity (recommended) or create a new identity.

capstones3ytask1.s3.us-east-1.amazonaws.com ▼ | Create new OAI

Bucket policy

Update the S3 bucket policy to allow read access to the OAI.

- ○ No, I will update the bucket policy
- ◉ Yes, update the bucket policy

Leave rest as default and create Origin

CloudFront > Distributions > E2ZBM4UEMWVT5I

E2ZBM4UEMWVT5I | View metrics

General | Security | Origins | Behaviors | Error pages | Invalidations | Tags

Origins | Edit | Delete | Create origin

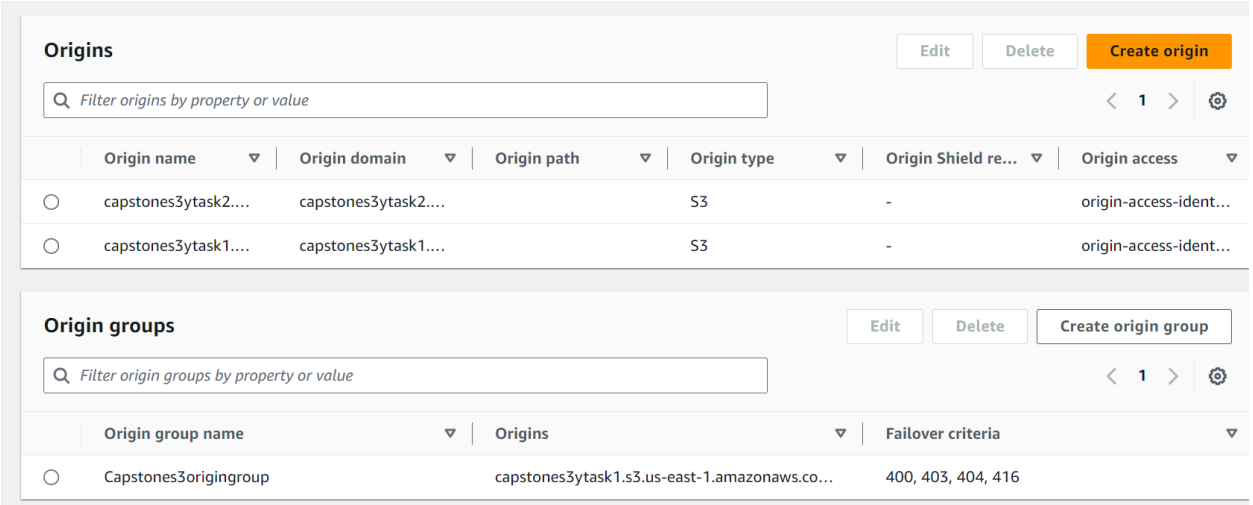
Filter origins by property or value

1

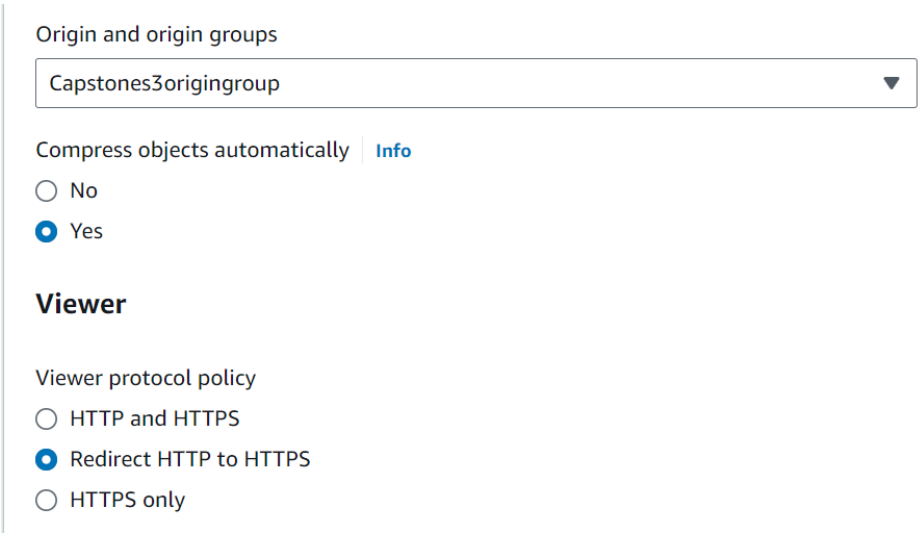
	Origin name	Origin domain	Origin path	Origin type	Origin Shield re...	Origin access
○	capstones3ytask2....	capstones3ytask2....		S3	-	origin-access-ident...
○	capstones3ytask1....	capstones3ytask1....		S3	-	origin-access-ident...

Create Origin Group

Capstones3origingroup - Origin Group name

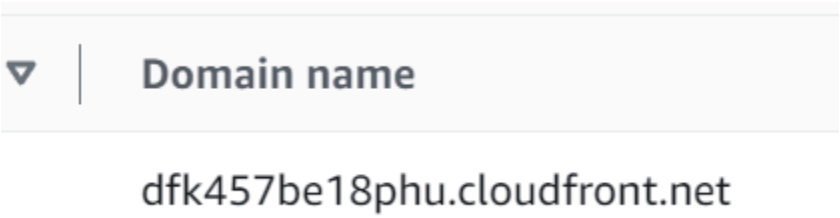


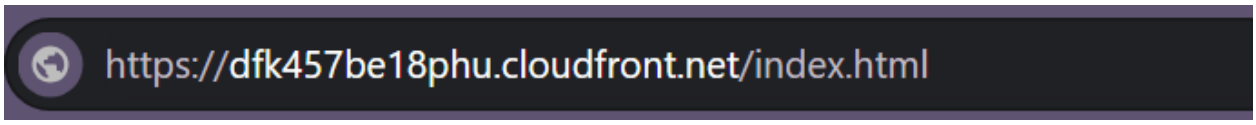
Edit the default behavior, choose the origin group name and save



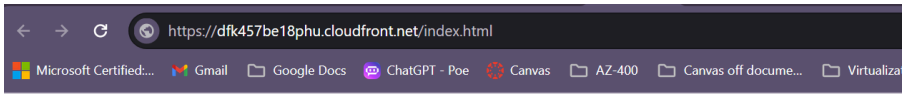
Task 4: Testing Failover

Go to Distribution, copy the Domain name



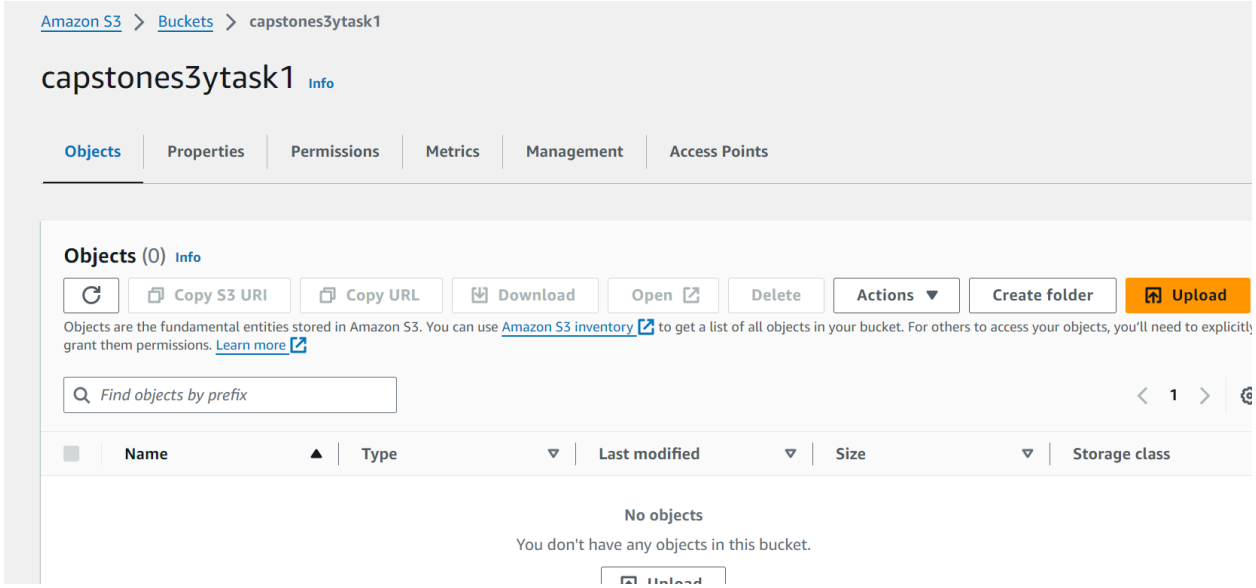


2. Paste domain name in browser and add /index.html in front of domain name.
You will observe website

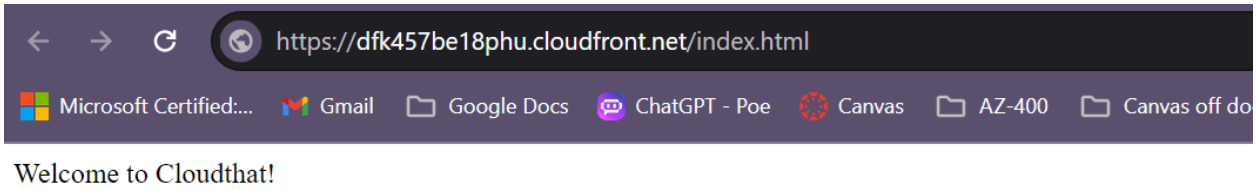


Welcome to Cloudthat!

Deleted index file in primary bucket

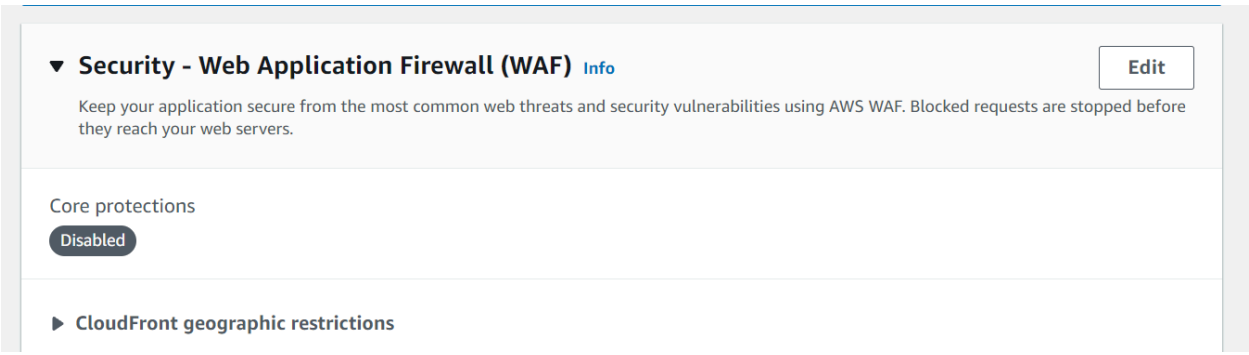


Try accessing the website again and see the results

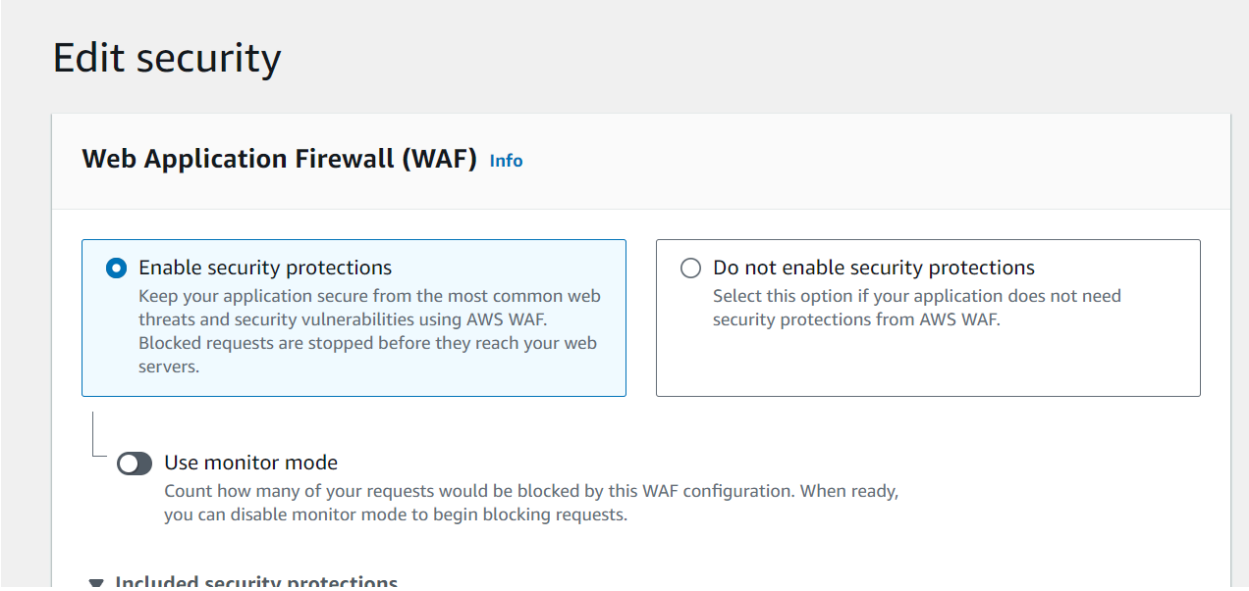


Task 5: Adding WAF to CloudFront

1. In your distribution -> go to the general tab -> In settings, click Edit.

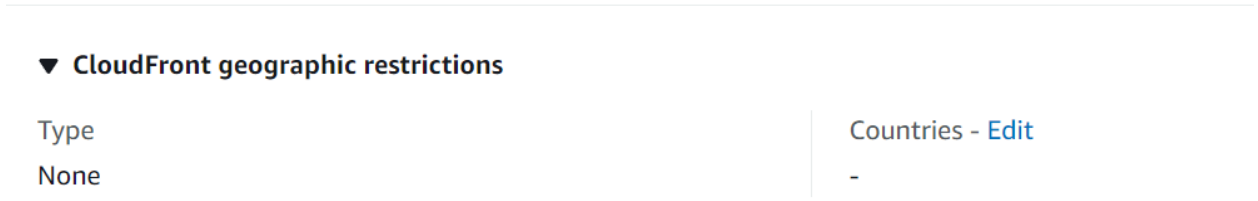


2. Enable WAF then Save changes.

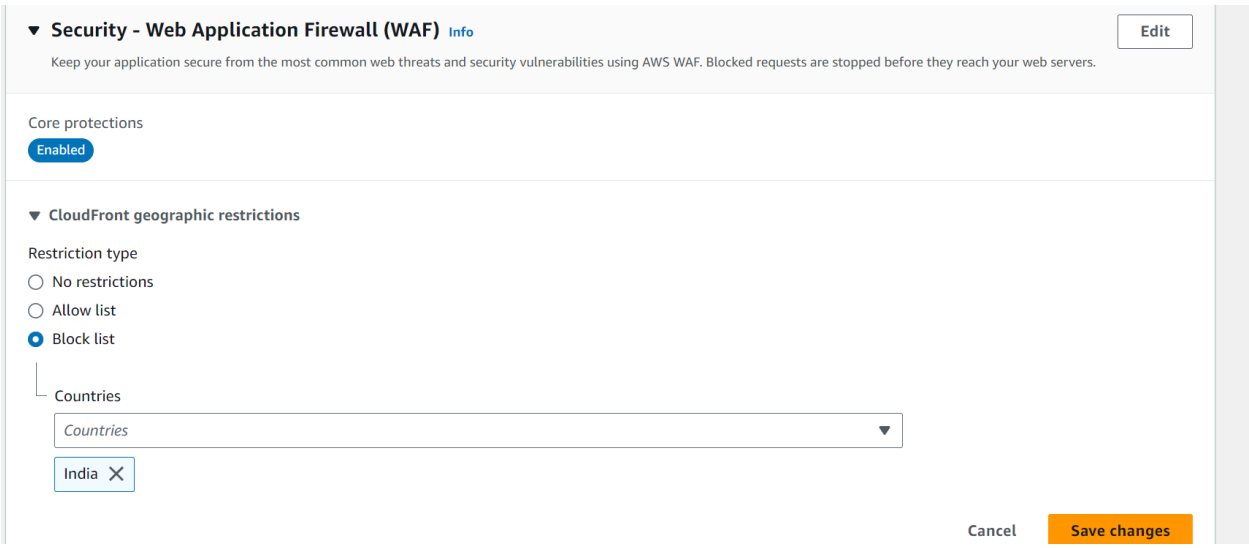


Task 6: Implementing Geo restriction

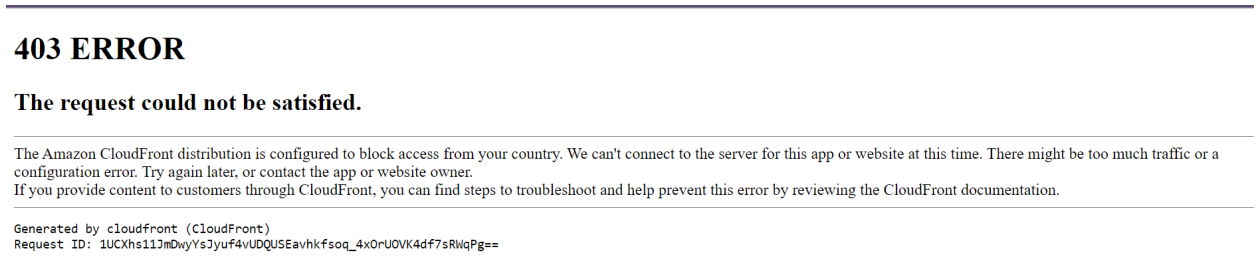
1. In your distribution -> go to the geographic restriction tab -> click Edit.



2. Select the countries which you have to allow or block, -> Save changes. (In my case I have
blocked access from India)

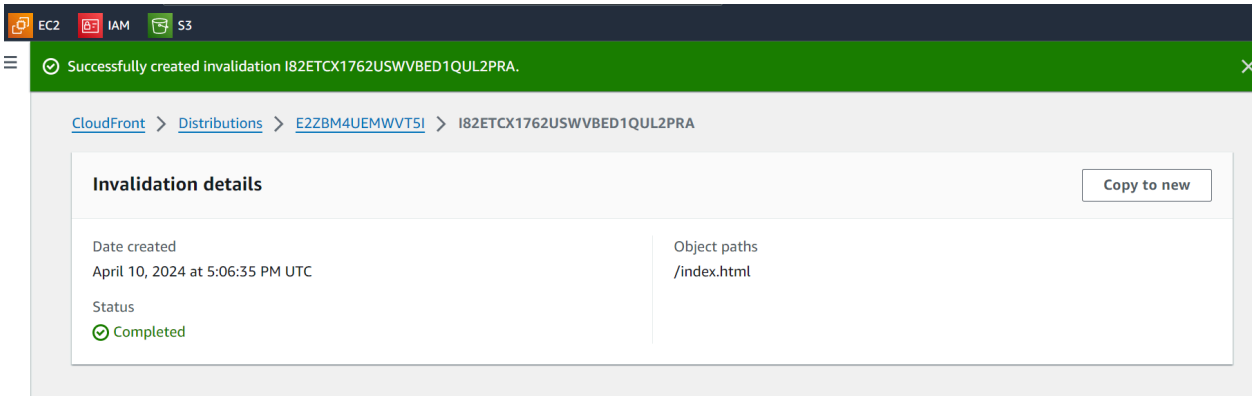


3. Copy the distribution domain name and try to access it from a blocked location (You will get 403
error message)



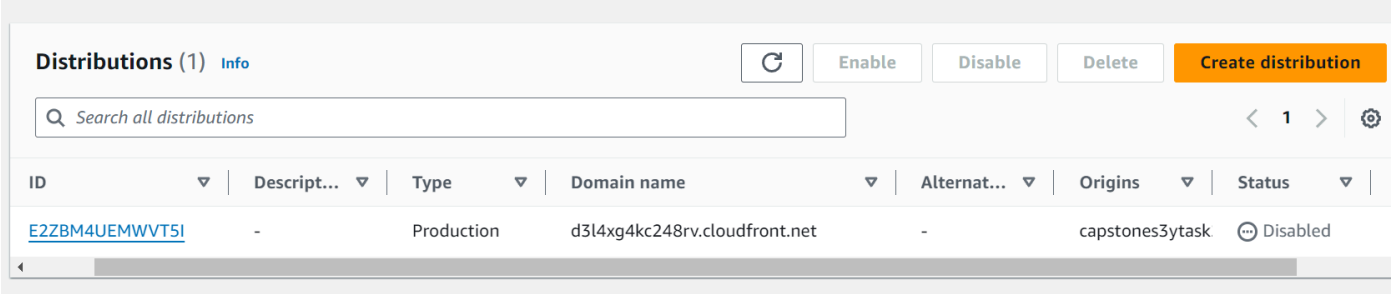
Task 7: Invalidating data in cache

Created invalidation

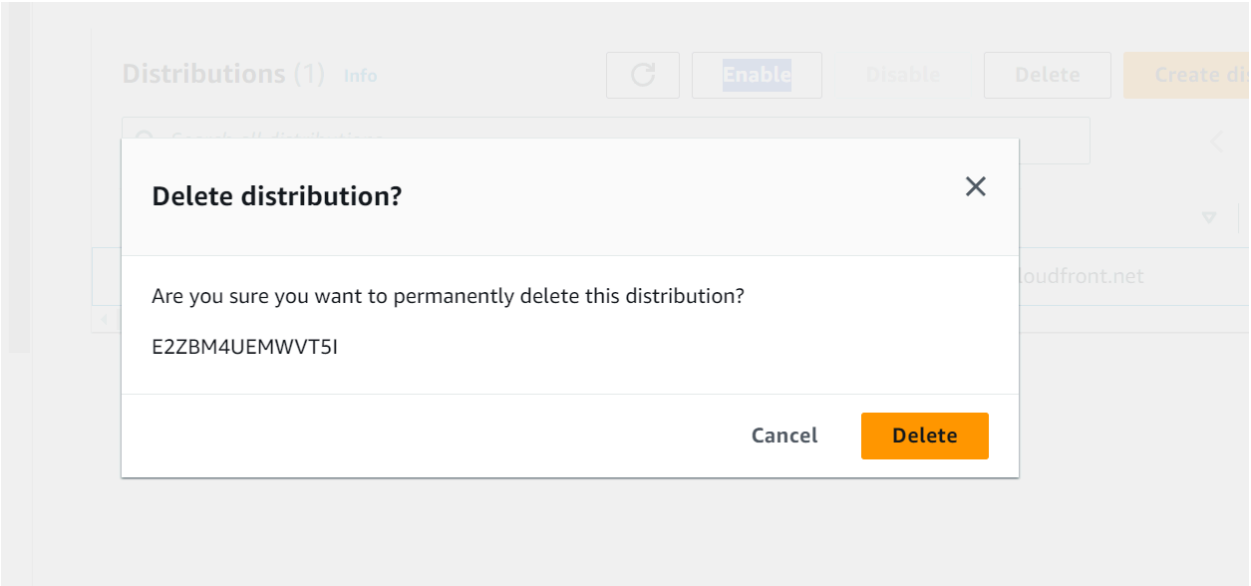


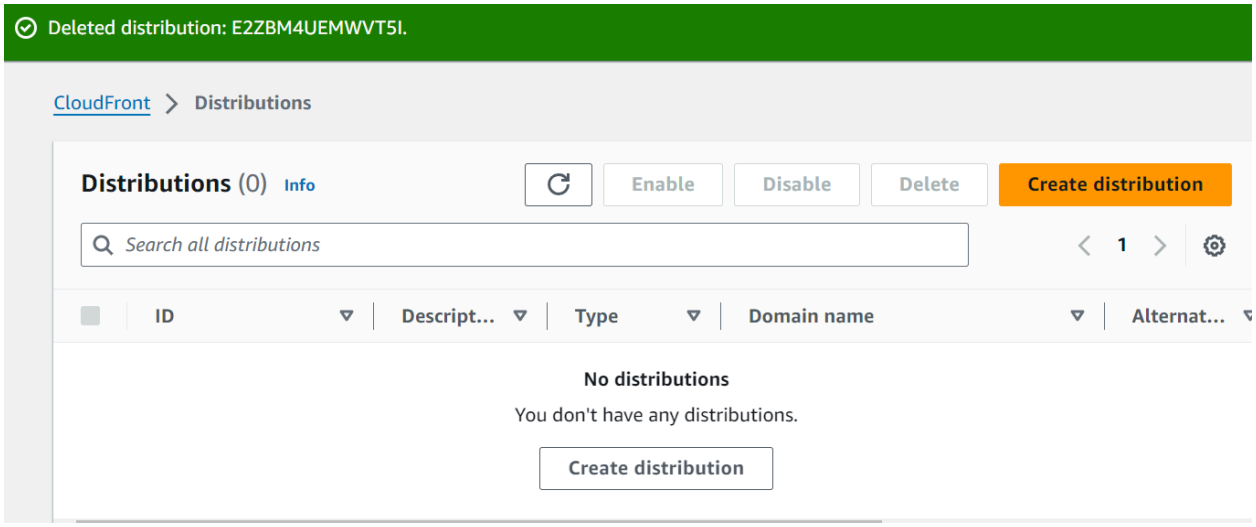
Task 8: Deleting resources:

Disable distribution

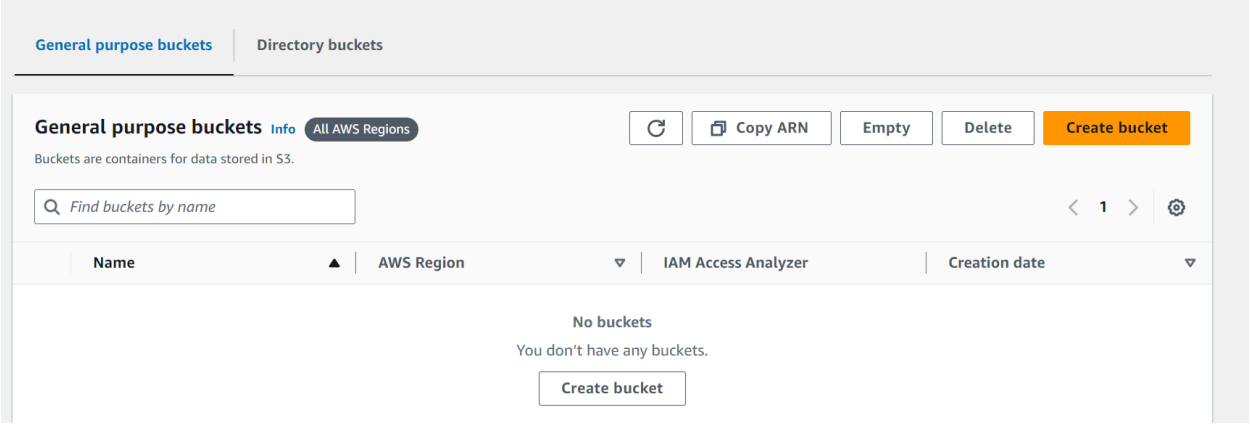


Deleted the distribution





Removed the buckets



Conclusion:

By using Amazon S3 for hosting, Amazon CloudFront for fast content delivery, and AWS WAF for security, the organization has overcome its previous challenges with a secure, reliable, and efficient web hosting solution.