

Content Delivery Networks

A **CDN (Content Delivery Network)** is a network of servers distributed across different locations to **store and deliver** web content (such as images, videos, stylesheets, JavaScript files, and webpages) **faster and more efficiently** to users.



Types of Content Delivered by CDNs

1

Static Content

Images such as logos, banners, and product photos, CSS files for website styling, and JavaScript files for interactive elements are efficiently delivered through CDNs like Akamai and Cloudflare. Often used with Cloud Front and S3 Bucket.

2

Dynamic Content

Personalized recommendations, real-time stock quotes, and user-specific data from e-commerce platforms are cached and delivered close to the user for optimal performance. CDNs like Akamai, Cloudflare, and Fastly are used for this.

3

Streaming Media

Live sports events, on-demand movies, music, and webinars are streamed with minimal buffering and high quality thanks to CDNs like Akamai, Cloudflare, and Fastly distributed network. Often used with Cloud Front and S3 Bucket.

CDNs efficiently handle static, dynamic, and streaming media content, ensuring optimal performance and user experience regardless of location.





CDN Architecture and Components



Edge Servers

Geographically distributed servers that store cached content close to users, reducing latency and improving delivery speed.



Origin Server

The central server where the original version of the content is stored. Edge servers retrieve content from the origin server when it's not already cached.



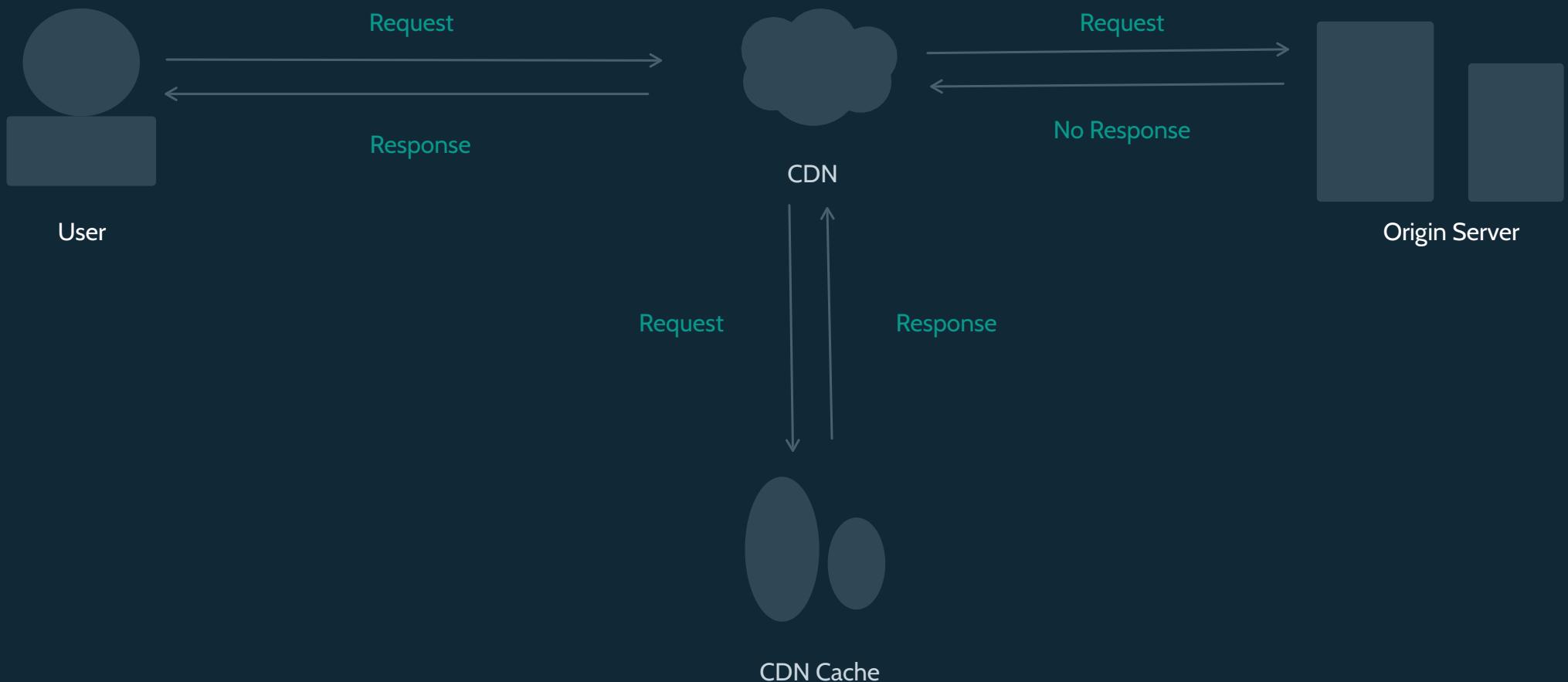
Monitoring

Continuously tracks CDN performance, server health, and traffic patterns. Alerts administrators to potential issues, ensuring uptime and optimal performance.

Key components include edge servers, the origin server, and the monitoring systems, working together to ensure efficient and reliable content delivery.

How CDNs Work: Technical Overview

1. User Requests Content:- A user visits a website, or streams a video.
2. CDN POP (Edge Server) Checks cache :- The nearest CDN edge server checks if the requested content is already cached.
 - Cache Hit - The content is served directly from the CDN
 - Cache Miss - The request is forwarded to the origin server (Original source of content)
3. Origin Server Responds:- If not cached the content is fetched from the origin(eg:- AWS S3 , Azure)
4. CDN caches content :- The CDN stores the content for future requests
5. User receives optimized content :- The user gets content with reduced latency and faster loading





Key Benefits of Using a CDN

Improved Performance

Reduces latency and speeds up loading times by 20-50%.

Enhanced Experience

Faster content delivery increases user engagement.

Reduced Costs

Offloads traffic, cutting bandwidth costs up to 70%.

CDNs also increase availability and improve SEO rankings.

CDN Security Features

DDoS Protection

CDNs mitigate Distributed Denial of Service (DDoS) attacks by distributing traffic across multiple servers, preventing overload and maintaining website availability.

Bot Management

CDNs identify and block malicious bots, preventing them from scraping content, conducting fraud, or overwhelming the server with unwanted traffic.



WAF (Web Application Firewall)

WAFs filter malicious traffic, protecting against common web exploits such as SQL injection and cross-site scripting (XSS) attacks.

SSL/TLS Encryption

CDNs encrypt data in transit using SSL/TLS protocols, ensuring secure communication between users and the origin server, protecting sensitive information.

These features collectively enhance the security posture of web applications and ensure a safer online experience for users.

Popular CDN Providers



Amazon CloudFront

Integrates with AWS. Offers fast content delivery. It has many security options.



Azure CDN

Part of Microsoft's cloud platform. Provides reliable CDN services.



Akamai

One of the oldest CDN providers. Delivers media and software. Very reliable.



Cloudflare

Offers security features and CDN services. Protects against threats. Easy to use.



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S3 Bucket

AWS S3 buckets are essential to CDN functionality. They act as origin servers, providing the original content.

Storage

S3 offers scalable storage for various content types.

Integration

Seamlessly integrates with Amazon CloudFront for efficient delivery.



Working with S3 Bucket

The screenshot shows the AWS Management Console home page. At the top left, it says "Console Home" with an "Info" link. Below that, the "Recently visited" section shows "S3" and "CloudFront". At the top right, there are "Reset to default layout" and "+ Add widgets" buttons. In the center, the "Applications" section shows "(0)" applications, with a "Create application" button. It also displays the region as "Asia Pacific (Mumbai)" and the current region as "ap-south-1 (Current Region)". A search bar with "Find applications" placeholder text is present. Below the search bar, there's a red-bordered error message box containing a red "X" icon, the text "Access denied to servicatalog>ListApplications", and a "Diagnose with Amazon Q" button. At the bottom of the page, there are links for "View all services", "Welcome to AWS", "AWS Health", and "Cost and usage".

The AWS Management Console home page serves as a centralized platform for accessing, managing, and monitoring a wide range of AWS services.

Access Grants
Access Points
Object Lambda Access Points
Multi-Region Access Points
Batch Operations
IAM Access Analyzer for S3

Block Public Access settings for this account

Storage Lens

General purpose buckets		Directory buckets			
General purpose buckets (4) Info All AWS Regions					
Buckets are containers for data stored in S3.					
<input type="text"/> Find buckets by name					
Name	AWS Region	IAM Access Analyzer	Creation date		
babyverse-ct-events	Asia Pacific (Mumbai) ap-south-1	View analyzer for ap-south-1	April 19, 2022, 17:57:31 (UTC+05:30)		
elasticbeanstalk-ap-south-1-924202070044	Asia Pacific (Mumbai) ap-south-1	View analyzer for ap-south-1	April 7, 2022, 19:41:51 (UTC+05:30)		

General configuration

AWS Region
Asia Pacific (Mumbai) ap-south-1

Bucket type [Info](#)

General purpose
Recommended for most use cases and access patterns. General purpose buckets are the original S3 bucket type. They allow a mix of storage classes that redundantly store objects across multiple Availability Zones.

Directory
Recommended for low-latency use cases. These buckets use only the S3 Express One Zone storage class, which provides faster processing of data within a single Availability Zone.

Bucket name [Info](#)
ss-2732025

Bucket names must be 3 to 63 characters and unique within the global namespace. Bucket names must also begin and end with a letter or number. Valid characters are a-z, 0-9, periods (.), and hyphens (-). [Learn More](#)

Objects Properties Permissions Metrics Management Access Points

Objects (0)

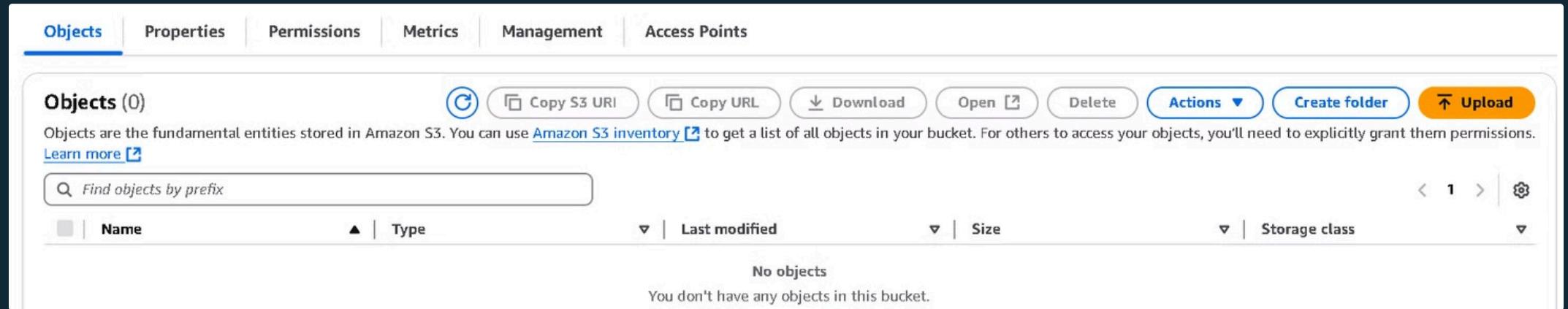
Objects are the fundamental entities stored in Amazon S3. You can use [Amazon S3 inventory](#) to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. [Learn more](#)

Find objects by prefix

Name ▲ Type ▾ Last modified ▾ Size ▾ Storage class ▾

No objects
You don't have any objects in this bucket.

Actions ▾ Create folder Upload



Open

Desktop > staticweb

Search staticweb

Organize New folder

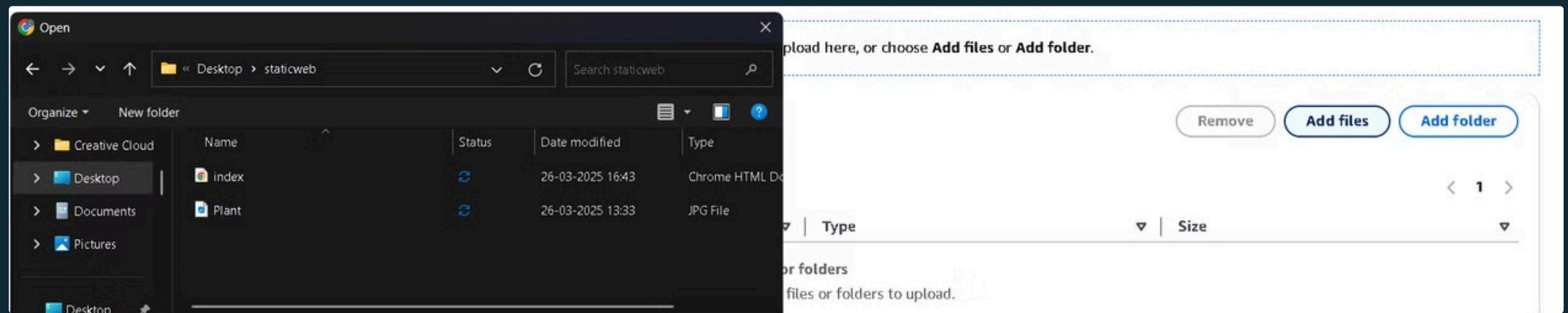
Name	Status	Date modified	Type
index	○	26-03-2025 16:43	Chrome HTML Document
Plant	○	26-03-2025 13:33	JPG File

Upload here, or choose Add files or Add folder.

Add files Add folder

Type Size

or folders
files or folders to upload.



Info

Properties Permissions Metrics Management Access Points

View

mbai) ap-south-1	Amazon Resource Name (ARN) arn:aws:s3:::s3-2732025	Creation date March 27, 2025, 13:01:53 (UTC+05:30)
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Static website hosting

host a website or redirect requests. [Learn more](#)

Send using AWS Amplify Hosting for static website hosting

Create Amplify app

Secure, fast, and reliable website quickly with AWS Amplify Hosting. Learn more about [Amplify Hosting](#) or [View your existing Amplify apps](#)

Hosting

Static website hosting

Disable
 Enable

Hosting type

Host a static website
Use the bucket endpoint as the web address. [Learn more](#)

Redirect requests for an object
Redirect requests to another bucket or domain. [Learn more](#)

ⓘ For your customers to access content at the website endpoint, you must make all your content publicly readable. To do so, you can edit the S3 Block Public Access settings for the bucket. For more information, see [Using Amazon S3 Block Public Access](#)

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Info

Properties

Permissions

Metrics

Management

Access Points

Access overview

9

Findings provided by IAM external access analyzers. Learn more about [How IAM analyzer findings work](#)

for ap-south-1

Block public access (bucket settings)

S3 buckets and objects through access control lists (ACLs), bucket policies, access point policies, or all. In order to ensure that public access to all your S3 buckets and objects is blocked, turn on Block all public access and its access points. AWS recommends that you turn on Block all public access, but before applying any of these settings, ensure that your applications will work correctly without public access. If you require some level of public access to your buckets or objects within, you can customize the individual settings below to suit your specific storage use cases. [Learn more](#)

Public Access settings for this bucket

Block public access (bucket settings)

Public access is granted to buckets and objects through access control lists (ACLs), bucket policies, access point policies, or all. In order to ensure that public access to all your S3 buckets and objects is blocked, turn on Block all public access. These settings apply only to this bucket and its access points. AWS recommends that you turn on Block all public access, but before applying any of these settings, ensure that your applications will work correctly without public access. If you require some level of public access to your buckets or objects within, you can customize the individual settings below to suit your specific storage use cases. [Learn more](#)

Block all public access

Turning this setting on is the same as turning on all four settings below. Each of the following settings are independent of one another.

Block public access to buckets and objects granted through new access control lists (ACLs)

S3 will block public access permissions applied to newly added buckets or objects, and prevent the creation of new public access ACLs for existing buckets and objects. This setting doesn't change any existing permissions that allow public access to S3 resources using ACLs.

Block public access to buckets and objects granted through any access control lists (ACLs)

S3 will ignore all ACLs that grant public access to buckets and objects.

Block public access to buckets and objects granted through new public bucket or access point policies

S3 will block new bucket and access point policies that grant public access to buckets and objects. This setting doesn't change any existing policies that allow public access to S3 resources.



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cts stored in the bucket. Bucket policies don't apply to objects owned by other accounts. [Learn more](#)

it bucket policy [Info](#)

Bucket policy

[Policy examples](#)[Policy generator](#)

The bucket policy, written in JSON, provides access to the objects stored in the bucket. Bucket policies don't apply to objects owned by other accounts. [Learn more](#)

Bucket ARN

arn:aws:s3:::s3-2732025

Policy

AWS Policy Generator
The AWS Policy Generator is a tool that enables you to create policies that control access to Amazon Web Services (AWS) products and resources. For more information about creating policies, see key concepts in Using AWS Identity and Access Management. Here are sample policies.

Step 1: Select Policy Type
A Policy is a container for permissions. The different types of policies you can create are an IAM Policy, an S3 Bucket Policy, an SNS Topic Policy, a VPC Endpoint Policy, and an SQS Queue Policy.

Select Type of Policy

Step 2: Add Statement(s)
A statement is the formal description of a single permission. See a description of elements that you can use in statements.

Effect Allow Deny
Principal
AWS Service Amazon S3 All Services (*)
Actions 1 Action(s) Selected All Actions (*)
Amazon Resource Name (ARN) arn:aws:s3:::s3-2732025
arns should follow the following format: arn:aws:s3:::\${bucketName}/\${keyName}. Use a comma to separate multiple values.
Add Conditions (Optional)

Bucket policy
The bucket policy, written in JSON, provides access to the objects stored in the bucket. Bucket policies don't apply to objects owned by other accounts. [Learn more](#)

Bucket ARN

arn:aws:s3:::s3-2732025

Policy

```
1▼ [ {  
2    "Id": "Policy1743061589338",  
3    "Version": "2012-10-17",  
4    "Statement": [  
5      {  
6        "Sid": "Stmt1743061584067",  
7        "Action": [  
8          "s3:GetObject"  
9        ],  
10       "Effect": "Allow",  
11       "Resource": "arn:aws:s3:::s3-2732025/*",  
12       "Principal": "*"  
13     }  
14   ]  
15 }
```

Edit statement
Select a statement
Select an existing statement in the policy or add a new statement.

Object overview

Owner

5f8e712179d5a17e5490f85055b039a0186d60764b1da660d5f7d8188aa6d408

AWS Region

Asia Pacific (Mumbai) ap-south-1

Last modified

March 27, 2025, 13:05:22 (UTC+05:30)

Size

8.7 KB

S3 URI[s3://s3-2732025/index.html](https://s3-2732025.s3.ap-south-1.amazonaws.com/index.html)**Amazon Resource Name (ARN)**[arn:aws:s3:::s3-2732025/index.html](#)**Entity tag (Etag)**[34dd60173cee1699565ea2810468dc9a](#)**Object URL**<https://s3-2732025.s3.ap-south-1.amazonaws.com/index.html>

<https://s3-2732025.s3.ap-south-1.amazonaws.com/index.html>

Welcome to Cafe Delight

AWS Cloud Front

AWS **CloudFront** is a highly secure and scalable **Content Delivery Network (CDN)** that helps deliver content—such as websites, videos, APIs, and applications—**faster and more securely** to users worldwide. It reduces latency by caching content at globally distributed AWS **Edge Locations**, ensuring quick delivery to end users.

Working



Working With Cloud Front

The screenshot shows the AWS CloudFront console interface. At the top, there's a navigation bar with links for Functions, Static IPs, VPC origins, What's new, Telemetry (Monitoring, Alarms, Logs), and Reports & analytics (Cache statistics). Below the navigation bar, the main content area displays a list of CloudFront distributions. One distribution is selected, showing its status as Production, its origin as swanand03.s3.ap-southern-1.amazonaws.com, and its last updated date as March 26, 2023.

This screenshot shows a dropdown menu titled "Choose origin". It lists several Amazon S3 buckets and one Elastic Load Balancer:

- Amazon S3
 - babyverse-ct-events.s3.amazonaws.com
 - bucket2732025.s3.amazonaws.com
 - elasticbeanstalk-ap-south-1-924202070044.s3.amazonaws.com
 - elasticbeanstalk-us-east-1-924202070044.s3.amazonaws.com
 - swanand03.s3.amazonaws.com
- Elastic Load Balancer
 - awseb-AWSEB-14R3J0THR3HR

This screenshot shows the "Create new OAI" configuration page. It includes the following sections:

- 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.
A dropdown menu shows "bucket2732025.s3.ap-southern-1.amazonaws.com" and a "Create new OAI" button.
- Bucket policy**
Update the S3 bucket policy to allow read access to the OAI.
 No, I will update the bucket policy

Viewer protocol policy

HTTP and HTTPS

Web threats and security vulnerabilities using AWS WAF. Blocked requests.



Do not enable security protections

Select this option if your application does not need security protections.

[Cancel](#)

[Create distribution](#)

Details

Distribution domain name

d2v5kt8fdnbc9.cloudfront.net

ARN



arn:aws:cloudfront::924202070044:distribution/E1B03C16UXY
VYX

Last modified

March 27, 2025 at 10:14:21 AM UTC

Settings

Edit

Description

-

Price class

Use all edge locations (best performance)

Alternate domain names



Standard logging

Off

Cookie logging

Off

Distribution domain name
d2v5kt8fdnbc9.cloudfront.net

1bc9.cloudfront.net/index.html|



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Thank You