



Bulletproof HTML5 Websites with AWS in a Nutshell

V1.48



Course title

BackSpace Academy
Nutshell Series



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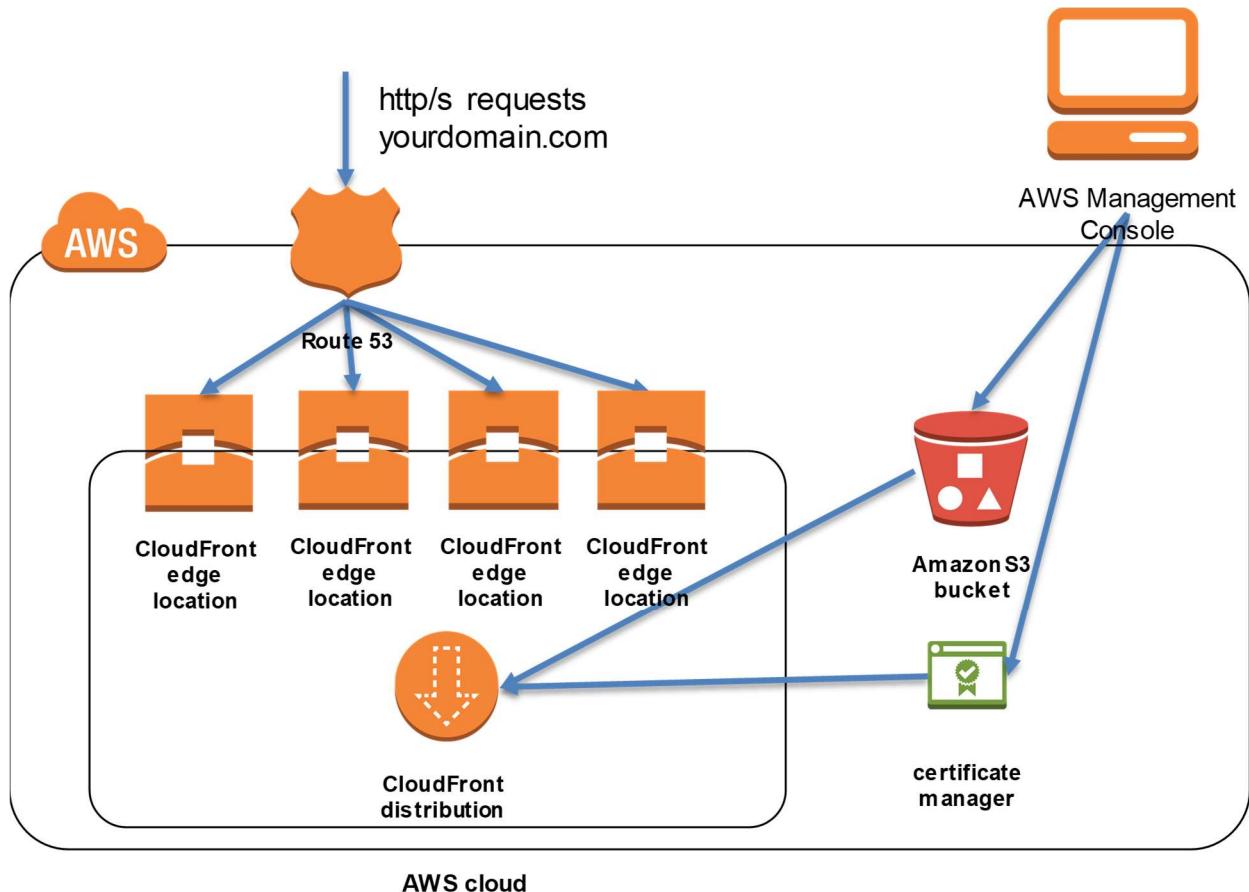
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▶ About the Lab

Please note that not all AWS services are supported in all regions. Please use the US-East-1 (North Virginia) region for this lab.

These lab notes are to support the instructional videos on Bulletproof HTML5 Websites with AWS in a Nutshell Course.

This is a typical use case for S3 and CloudFront to deliver highly available static websites that can handle heavy traffic.



Please note that AWS services change on a weekly basis and it is extremely important you check the version number on this document to ensure you have the lastest version with any updates or corrections.

▶ Purchasing a Custom Domain Name

In this section, we will purchase a domain name through AWS Route 53.

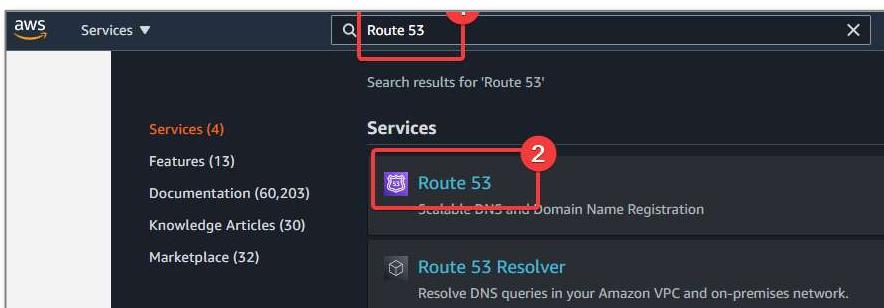
*Please note this process will involve paying for a domain name with AWS.

Although not recommended, if you would like to use another domain registrar instructions are detailed later under *Routing Traffic with a Domain Name from another Registrar*.

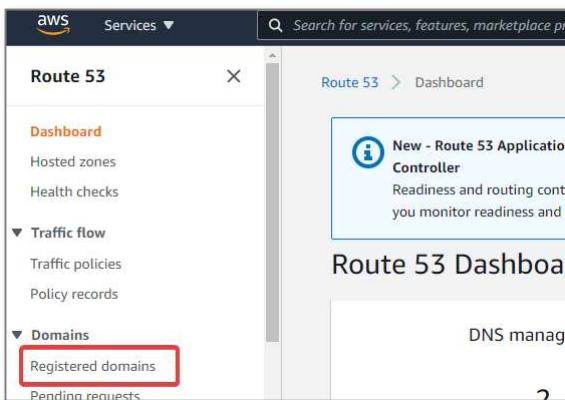
Our first task is to purchase a domain name for our website.

This part involves purchasing a domain through the Route 53 service.

From the management console search *Route 53*.



Click on Registered Domains from the menu



Click on Register Domain



Type in the domain name you would like and click *Check* to see if it is available.



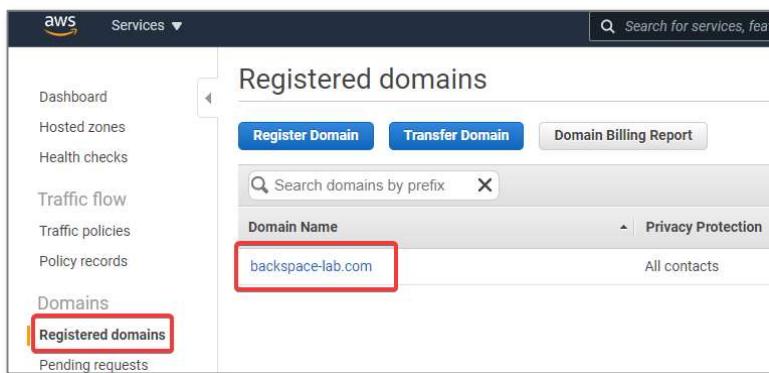
If it is available click 'add to cart'

Scroll down and click on 'Continue'

Complete the process making sure you use a valid email for the domain registration otherwise the process will fail.

You should receive an email with a link to verify your email. About 30 minutes after your email address has been verified you should receive an email stating the domain was successfully registered with Route 53.

After the domain has been successfully registered you will see it in the 'Registered domains'

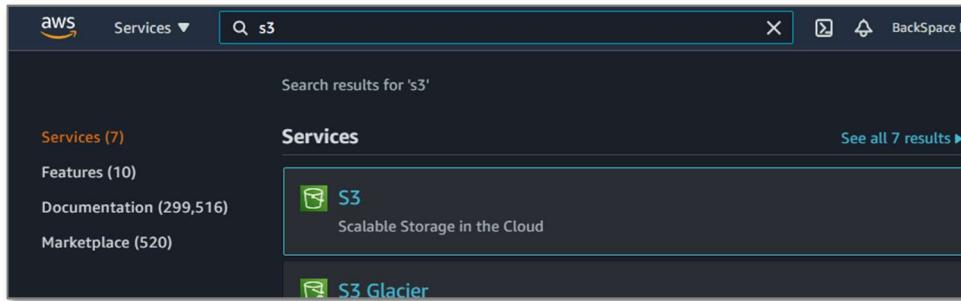


Creating an S3 Bucket and Uploading our Website

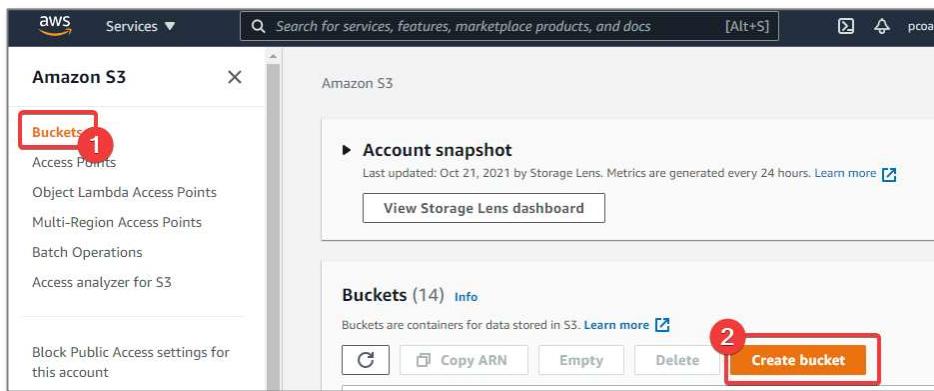
In this section we will create an S3 bucket and upload our HTML5 website.

Create an S3 Bucket

From the management console search *S3*.



Click on *Buckets* -> *Create Bucket*



Enter your custom domain name.

Select US East (N. Virginia).

The screenshot shows the 'Create bucket' page in the AWS S3 console. The 'Bucket name' field contains 'backspace-lab.com', which is highlighted with a red box. Below it, a note says 'Bucket name must be unique and must not contain spaces or uppercase letters. See rules for bucket naming'. The 'AWS Region' dropdown is set to 'US East (N. Virginia) us-east-1'. A section for 'Copy settings from existing bucket - optional' includes a 'Choose bucket' button. At the bottom right of the form area is a 'Create bucket' button.

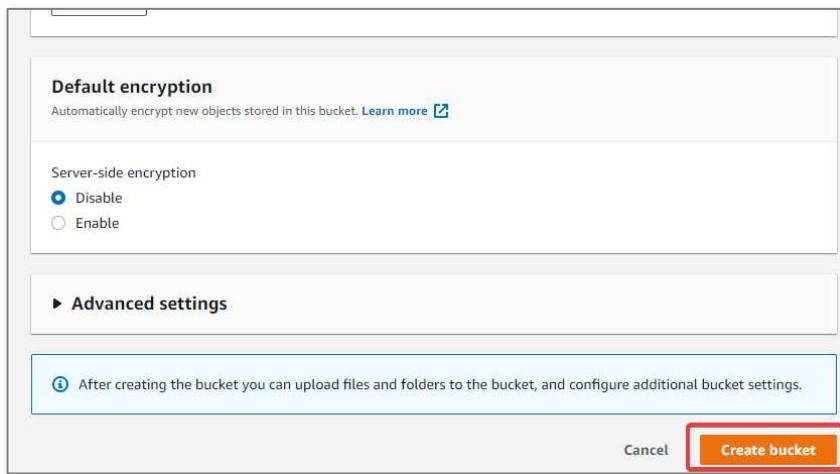
Uncheck *Block all public access*

*Without public access our website cannot be seen by the public. We can still restrict access to any objects as required. By default individual objects uploaded will be private.

The screenshot shows the 'Block Public Access settings for this bucket' page. The 'Block all public access' checkbox is highlighted with a red box. A note below it states: 'Turning this setting on is the same as turning on all four settings below. Each of the following settings are independent of one another.' Below this are four sub-options, each with its own checkbox: 'Block public access to buckets and objects granted through new access control lists (ACLs)', 'Block public access to buckets and objects granted through any access control lists (ACLs)', 'Block public access to buckets and objects granted through new public bucket or access point policies', and 'Block public and cross-account access to buckets and objects through any public bucket or access point policies'. At the bottom left is a warning icon with the text: 'Turning off block all public access might result in this bucket and the objects within becoming public. AWS recommends that you turn on block all public access, unless public access is required for specific and verified use cases such as static website hosting.' A checkbox labeled 'I acknowledge that the current settings might result in this bucket and the objects within becoming public.' is checked and highlighted with a red box.

Leave the rest as defaults.

Scroll down and click *Create bucket*



Upload Website Objects

Now it is time to upload our website objects. You can find free website templates at <https://html5up.net/>

Make sure that you unzip the file before attempting to upload the files.

Click on the bucket (yourdomain.com)

Name	AWS Region	Access
backspace-lab.com	Asia Pacific (Sydney) ap-southeast-2	Objects can be public
cf-templates-1v2ku1qgvq6gr-us-east-1	US East (N. Virginia) us-east-1	Objects can be public

Click *Upload*

You want to upload entire directories, including contents, do not Click *Add Files*. Open a Windows File Explorer window and drag the entire contents from File Explorer and drop on top of the Upload form.

The screenshot shows the AWS S3 'Upload' interface. At the top, there's a note: 'Add the files and folders you want to upload to S3. To upload a file larger than 160GB, use the AWS CLI, AWS SDK or Amazon S3 REST API. Learn more' with a link icon. Below this is a dashed box containing the text 'Drag and drop files and folders you want to upload here, or choose Add files, or Add folder.' A table titled 'Files and folders (72 Total, 3.5 MB)' follows, showing a list of files and folders with columns for Name, Folder, Type, and Size. There are buttons for 'Remove', 'Add files', and 'Add folder'. A search bar labeled 'Find by name' and a page navigation bar with numbers 1 through 8 are also present.

<input type="checkbox"/>	Name	Folder	Type	Size
<input type="checkbox"/>	01.jpg	images/gallery/fulls/	image/jpeg	62.2 KB
<input type="checkbox"/>	01.jpg	images/gallery/thumbs/	image/jpeg	20.2 KB
<input type="checkbox"/>	02.jpg	images/gallery/fulls/	image/jpeg	25.2 KB
<input type="checkbox"/>	02.jpg	images/gallery/thumbs/	image/jpeg	7.7 KB

Expand Permissions

The screenshot shows the 'Permissions' section of the AWS S3 upload interface. It includes fields for 'Destination' (set to 's3://backspace-lab.com') and 'Destination details' (with a note about bucket settings). The 'Permissions' section is highlighted with a red box. It contains a checkbox for 'Grant public access' and a note: 'Grant public access and access to other AWS accounts.'

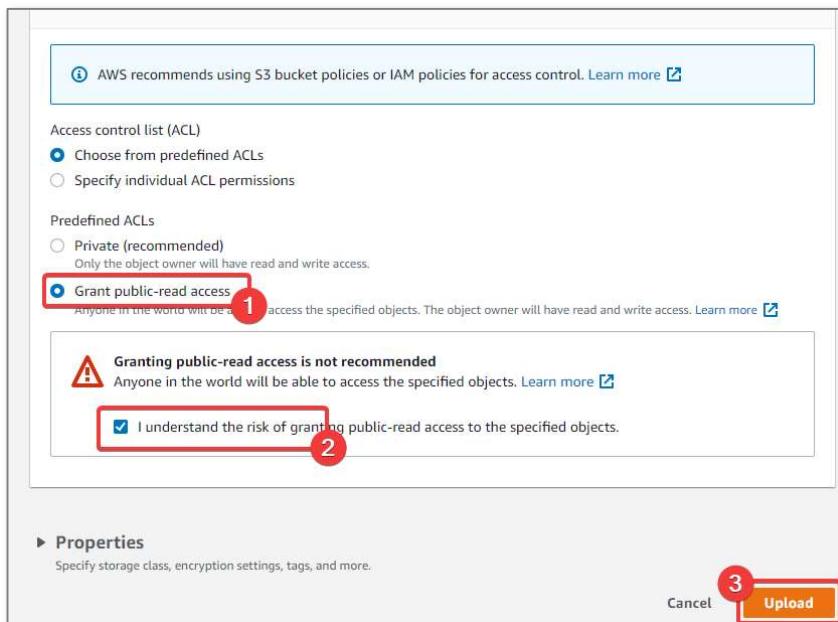
Scroll down to *Access Control List (ACL)*

Select *Grant public – read access*

Click the *understand* checkbox

Leave rest as defaults

Click *Upload*



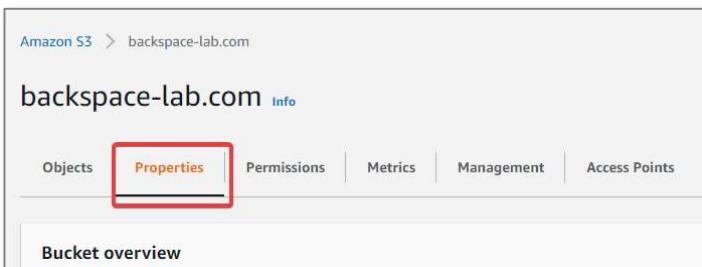
Your files will now be uploading.



▶ Enabling S3 Website Hosting

In this section we will enable website hosting for our root domain (`yourdomain.com`) and also redirect requests to the `www` subdomain (`www.yourdomain.com`) to our root domain.

Select *Properties*



Scroll down to *Static Website Hosting*

Click *Edit*



Now Select Use this bucket to host a website

Enter the Index Document (required)

Enter Error Document if available or else just leave empty

Click *Save changes*

Edit static website hosting Info

Static website hosting
Use this bucket to host a website or redirect requests. [Learn more](#)

Static website hosting
 Disable
 Enable **1**

Hosting type
 Host a static website **2**
 Use the bucket endpoint [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](#)

Index document
 Specify the home or default page of the website.
index.html **3**

Error document - *optional*
 This is returned when an error occurs.
error.html

If you scroll down to Static Webstite Hosting you will see the public endpoint for the S3 website.

Endpoint : <http://yourdomain.com.s3-website-us-east-1.amazonaws.com>

Click on the endpoint to see your website in your browser.

Static website hosting
Use this bucket to host a website or redirect requests. [Learn more](#)

Static website hosting
 Enabled

Hosting type
 Bucket hosting

Bucket website endpoint
 When you configure your bucket as a static website, the website is available at the AWS Region-specific website endpoint of the bucket. [Learn more](#)

<http://backspace-lab.com.s3-website-ap-southeast-2.amazonaws.com>

Troubleshooting

If you get either of the following message your object permissions are not set to public.

403 Forbidden

- Code: AccessDenied
- Message: Access Denied
- RequestId: 3D615DE91F90446F
- HostId: VGBfqelVfAp1LoS/1QsZzYCa3/V11o75WDkmFpJDPLrJyvqZoqYuRddGnZNaF+QUiKNNtA5nGDk=

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
▼<ListBucketResult xmlns="http://s3.amazonaws.com/doc/2006-03-01/">
  <Name>backspaceacademy.com</Name>
  <Prefix/>
  <Marker/>
  <MaxKeys>1000</MaxKeys>
  <IsTruncated>false</IsTruncated>
  ▼<Contents>
    <Key>404.html</Key>
    <LastModified>2017-04-27T09:05:21.000Z</LastModified>
    <ETag>"75f1debdb9d7654a9ad312d2a9516a69"</ETag>
    <Size>2942</Size>
    <StorageClass>STANDARD</StorageClass>
  </Contents>
  ▼<Contents>
```

If you find svg images are not showing on your website it is most probably incorrect header information. Upload the specific files again but add Content-type "image/svg+xml" in the Metadata section (you need to expand *Additional upload options* and scroll down to see it).

Metadata
Metadata is optional information provided as a name-value (key-value) pair. [Learn more](#)

Type	Key	Value
System defined	Content-Type	image/svg+xml X

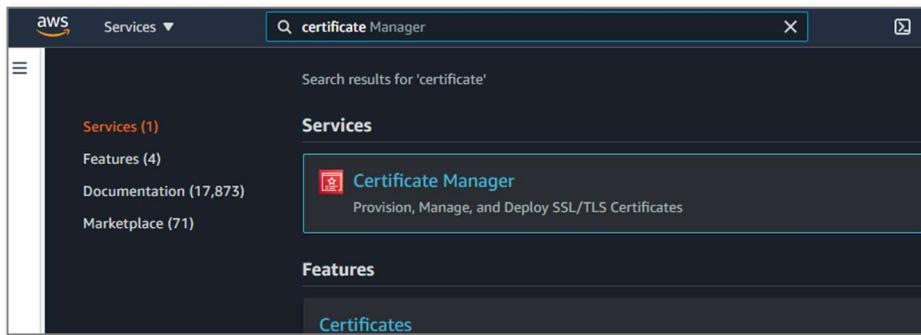
[Add metadata](#)

▶ Creating an SSL Certificate with AWS Certificate Manager

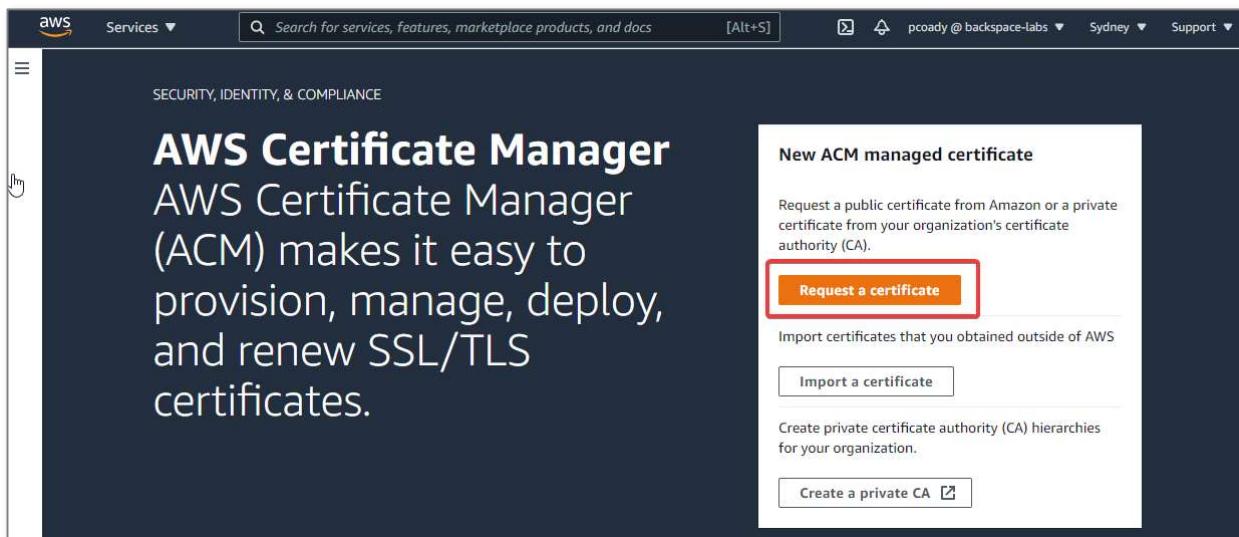
In this section we will use the AWS Certificate Manager to create an SSL certificate we can use to enable HTTPS with CloudFront.

Please note that to require HTTPS between viewers and CloudFront, you must change the AWS region to US East (N. Virginia) before you request or import a certificate.

From the management console search *Certificate Manager*.



Click *Request a Certificate*



Select *Request a public certificate*

Click *Next*

AWS Certificate Manager > Certificates > Request certificate

Request certificate

Certificate type Info

ACM certificates can be used to establish secure communications access across the internet or within an internal network. Choose the type of certificate for acm to provide.

Request a public certificate 1
Request a public SSL/TLS certificate from Amazon. By default, public certificates are trusted by browsers and operating systems.

Request a private certificate 2
No private CAs available for issuance.

Requesting a private certificate requires the creation of a private certificate authority (CA). To create a private CA, visit ACM Private Certificate Authority [\[?\]](#)

Cancel 2 Next

Enter the root domain (yourdomain.com)

Click *Add another name to this certificate*

Enter the root domain prefixed with *. (*.yourdomain.com)

AWS Certificate Manager > Certificates > Request certificate > Request public certificate

Request public certificate

Domain names

Fully qualified domain name Info 1
backspace-lab.com Remove

*.backspace-lab.com 2 Remove

Add another name to this certificate

You can add additional names to this certificate. For example, if you're requesting a certificate for "www.example.com", you might want to add the name "example.com" so that customers can reach your site by either name.

Leave default settings

Click *Request*

Select validation method Info

Select a method for validating domain ownership

DNS validation - recommended
Choose this option if you are authorized to modify the DNS configuration for the domains in your certificate request.

Email validation
Choose this option if you do not have permission or cannot obtain permission to modify the DNS configuration for the domains in your certificate request.

Tags Info

To help you manage your certificates you can optionally assign your own metadata to each resource in the form of tags.

Tag key	Tag value - optional
<input type="text" value="Enter key"/>	<input type="text" value="Enter value"/>
<input type="button" value="Add tag"/>	
You can add 49 more tag(s).	

After about a minute you will see status *Pending validation*

If certificate is stuck on *Pending Validation* for over 15 minutes then the DNS records have not been automatically created by AWS.

Click on the Certificate

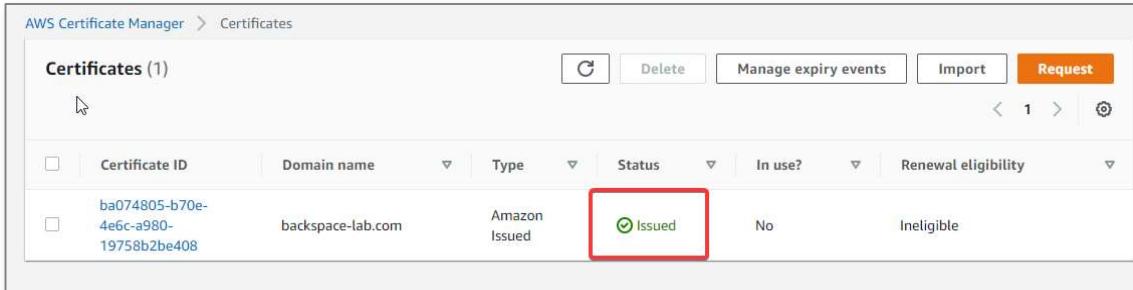
Certificates (1)						
<input type="checkbox"/>	Certificate ID	Domain name	Type	Status	In use?	Renewal eligibility
<input type="checkbox"/>	ba074805-b70e-4e6c-a980-19758b2be408	-	Amazon Issued	<small>Pending validation</small>	No	Ineligible

Scroll down to *Domains*

Click Create DNS records in Amazon Route 53

Domains (2)					
Domain	Status	Renewal status	Type	CNAME name	CNAME value
backspace.academy	<small>Pending validation</small>	-	CNAME	_a4587435cb796850ecec2bca49dab09c.backspace.academy.	<small>caaee0aa29db0ef4245d79e9371d631d1.ltfvzjuylp.acm-validations.aws.</small>
*.backspace.academy	<small>Pending validation</small>	-	CNAME	_a4587435cb796850ecec2bca49dab09c.backspace.academy.	<small>caaee0aa29db0ef4245d79e9371d631d1.ltfvzjuylp.acm-validations.aws.</small>

Wait about 15 minutes then click the refresh icon to check if it has been issued successfully.



The screenshot shows the AWS Certificate Manager interface with the title 'AWS Certificate Manager > Certificates'. A table lists one certificate:

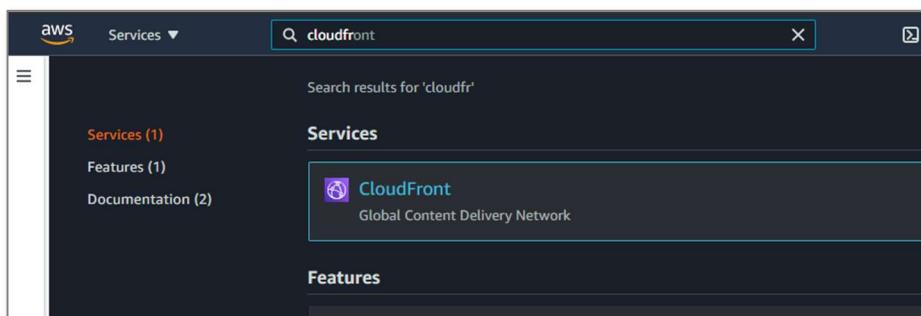
Certificate ID	Domain name	Type	Status	In use?	Renewal eligibility
ba074805-b70e-4e6c-a980-19758b2be408	backspace-lab.com	Amazon Issued	Issued	No	Ineligible

A red box highlights the 'Issued' status column for the first row.

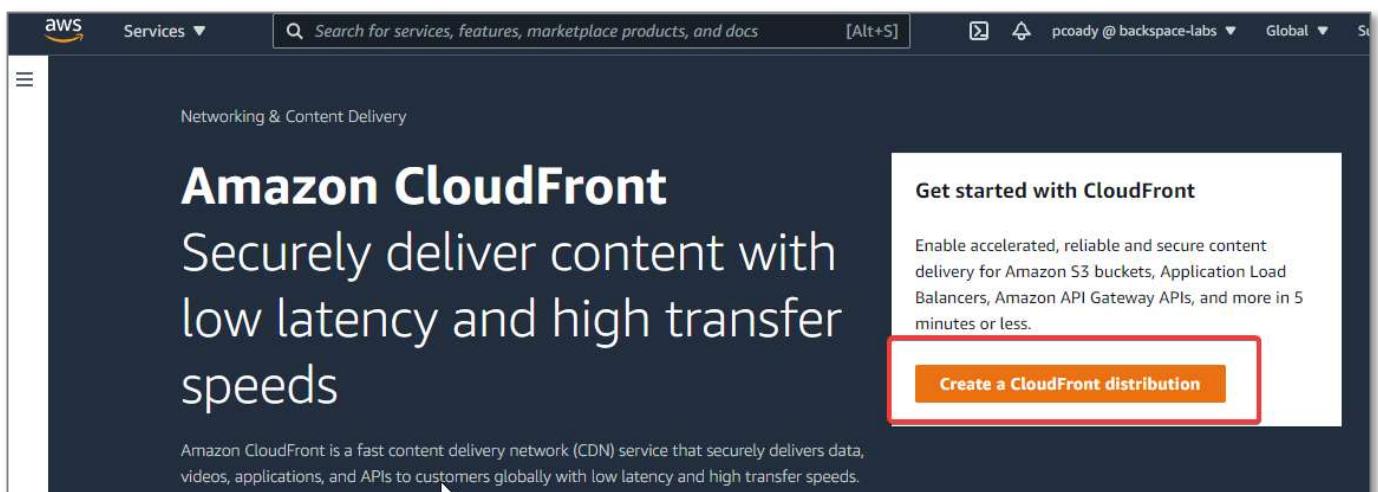
▶ Creating a CloudFront Distribution

In this section we will use the AWS CloudFront Content Delivery Network (CDN) to cache our site to edge locations across the Globe.

From the management console search *CloudFront*



Click on *Create a CloudFront Distribution*



In *Origin Settings* select your s3 bucket as the *Origin Domain Name*

Origin

Origin domain
Choose an AWS origin, or enter your origin's domain name.

X

Origin path - optional Info
Enter a URL path to append to the origin domain name for origin requests.

Name
Enter a name for this origin.

S3 bucket access Info
Use a CloudFront origin access identity (OAI) to access the S3 bucket.

Don't use OAI (bucket must allow public access)
 Yes use OAI (bucket can restrict access to only CloudFront)

Add custom header - optional
CloudFront includes this header in all requests that it sends to your origin.

Enable Origin Shield Info
Origin Shield is an additional caching layer that can help reduce the load on your origin and help protect its availability.

No
 Yes

► Additional settings

Set *Viewer Protocol Policy* to **Redirect HTTP to HTTPS**

Default cache behavior

Path pattern [Info](#)
Default (*)

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
 Yes

Cache key and origin requests
We recommend using a cache policy and origin request policy to control the cache key and origin requests.

Cache policy and origin request policy (recommended)
 Legacy cache settings

Cache policy
Choose an existing cache policy or create a new one.
CachingOptimized Recommended for S3 origins ▾ [G](#)
[Create policy](#) [View policy](#)

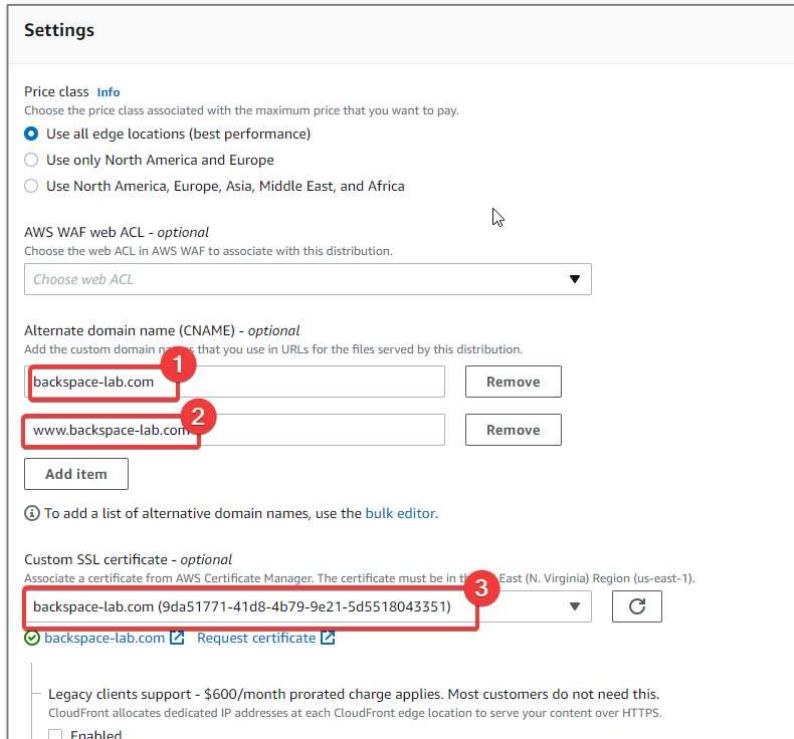
Origin request policy - optional
Choose an existing origin request policy or create a new one.
Select origin policy ▾ [G](#)
[Create policy](#)

► Additional settings

Under *Settings* enter your domain name and subdomains (www.yourdomain.com) into *Alternate Domain Names (CNAMEs)*

Under *Distribution Settings* enter/select your custom SSL certificate

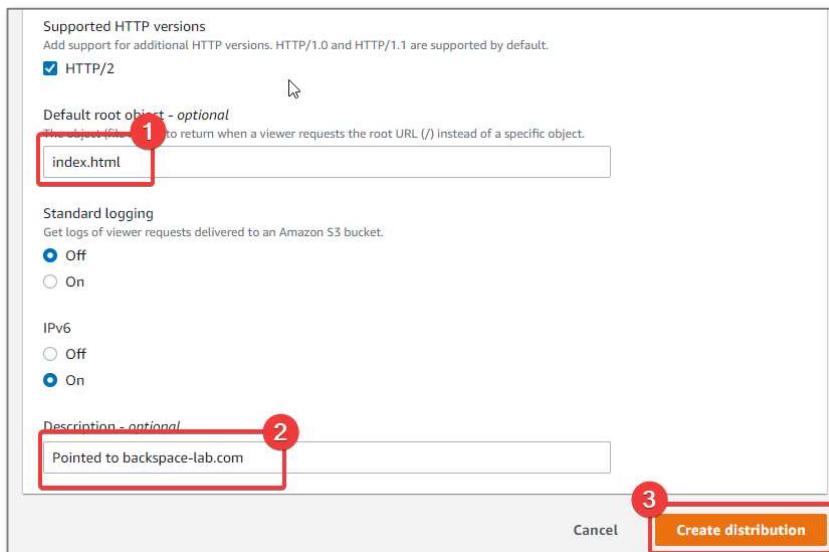
If the Custom SSL option is not available your certificate is either not issued yet or information has not propagated to CloudFront service yet. Cancel the distribution and try again after a few minutes.



Under *Default root object* enter the index.html file for your website

Put in a comment so that you easily identify the distribution.

Click *Create Distribution*



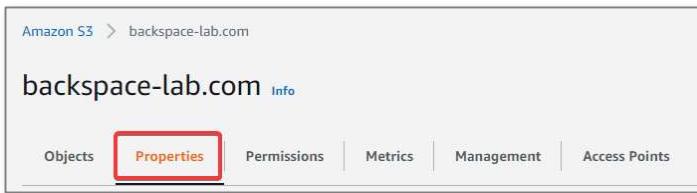
The Status of the distribution will change when it has been distributed to the edge locations.

Requiring HTTPS for Communication Between CloudFront and Your Amazon S3 Origin

If you are creating a secure site you can also require HTTPS for communication between your S3 bucket and CloudFront. This is achieved by disabling website hosting for the S3 bucket. It will then only be possible to view the website through CloudFront.

Go to the S3 management console and select the bucket.

Select the *Properties* tab

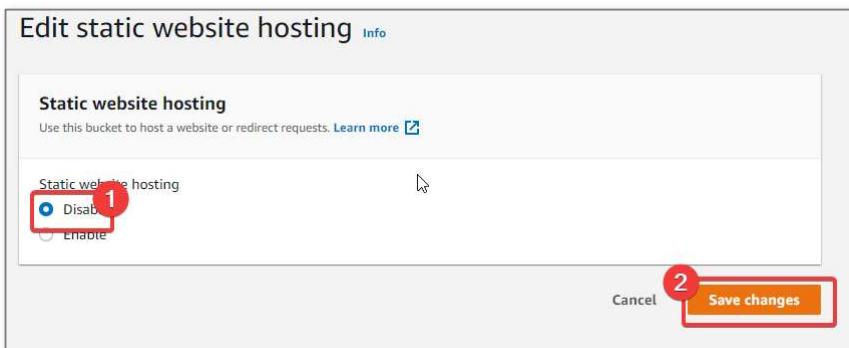


Scroll down to *Static website hosting*

Click *Edit*



Select *Disable website hosting* and then click *Save*



Invalidating a CloudFront Distribution

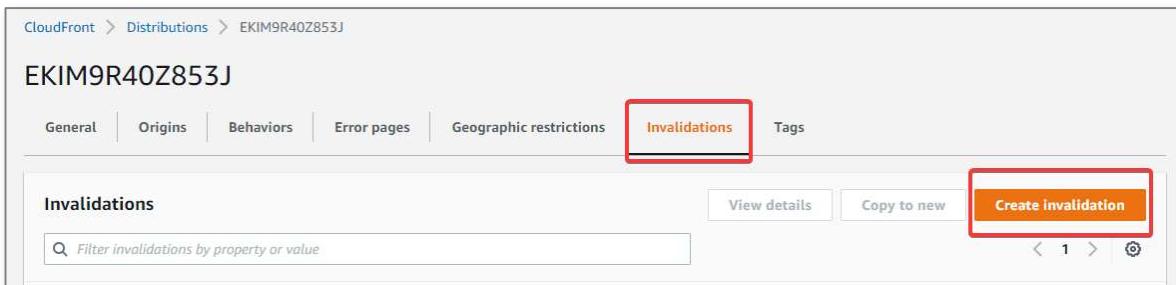
If you need to change your website and update your CloudFront distribution you can force CloudFront to fetch and update the distribution using invalidations.

To invalidate/update a CloudFront distribution:

Click on the distribution from the list of distributions

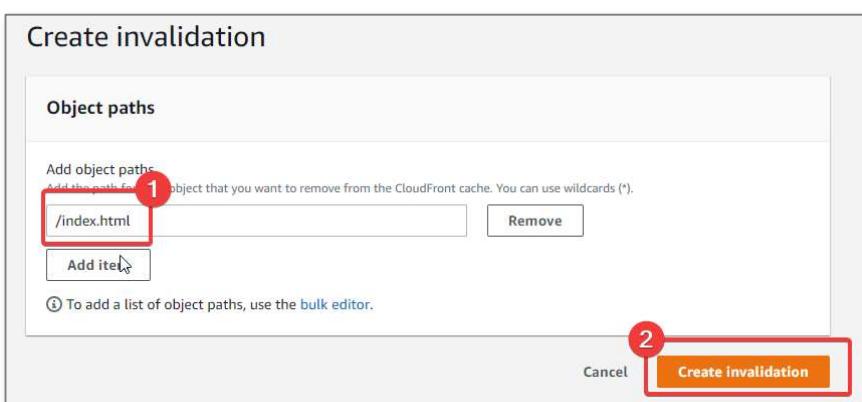
Click on the *Invalidations* tab

Click *Create Invalidations*



Enter the object path to the file you want to invalidate/update (e.g. /index.html) or use a wildcard symbol to invalidate all the files (e.g. /*)

Click *Create Invalidations*



This will take some time to complete.

▶ Routing Traffic with AWS Route 53

In this section we will direct all requests to our domain name and www subdomain to CloudFront using Route 53 Domain Name Service (DNS).

Go back to the CloudFront Distribution page and copy the distribution domain name

EKIM9R40Z853J

General Origins Behaviors Error pages Geographic restrictions Invalidations Tags

Details

Distribution domain name: **d16kl5d5ipytns.cloudfront.net**

ARN: arn:aws:cloudfront::36191943581:distribution/EKIM9R40Z853J

Last modified: October 22, 2021 at 7:32:12 AM UTC

Now go back to the Route 53 Management Console:

Click on the services menu and select Route 53.

aws Services ▾ Q route 53 1

Search results for 'route 53'

Services (4)

Features (13)

Documentation (63,206)

Knowledge Articles (30)

Marketplace (41)

Route 53 2 Scalable DNS and Domain Name Registration

Route 53 Resolver

Click on Hosted Zones

Click on the hosted zone created by the Route 53 Registrar

Route 53

Route 53 > Hosted zones

Hosted zones (1)

Automatic mode is the current search behavior optimized for best filter results. To change modes go to settings.

Create hosted zone

Filter hosted zones by property or value

Domain name	Type	Created by	Record count	Health
backspace-lab.com	Public	Route 53	3	Healthy

Click on *Create Record*

backspace-lab.com [Info](#)

Delete zone Test record Configure query logging

Hosted zone details [Edit hosted zone](#)

Records (3) [Info](#)

Automatic mode is the current search behavior optimized for best filter results. To change modes go to settings.

Create record

Filter records by property or value

Type	Record name	Type	Routing policy	Alias	Differentiator	Value/Route traffic to
<input type="checkbox"/>	backspace-la...	NS	Simple	-		ns-1126.awsdns-12.org. ns-351.awsdns-43.com. ns-1639.awsdns-12.co.uk. ns-717.awsdns-25.net.

Leave *Record Name* empty

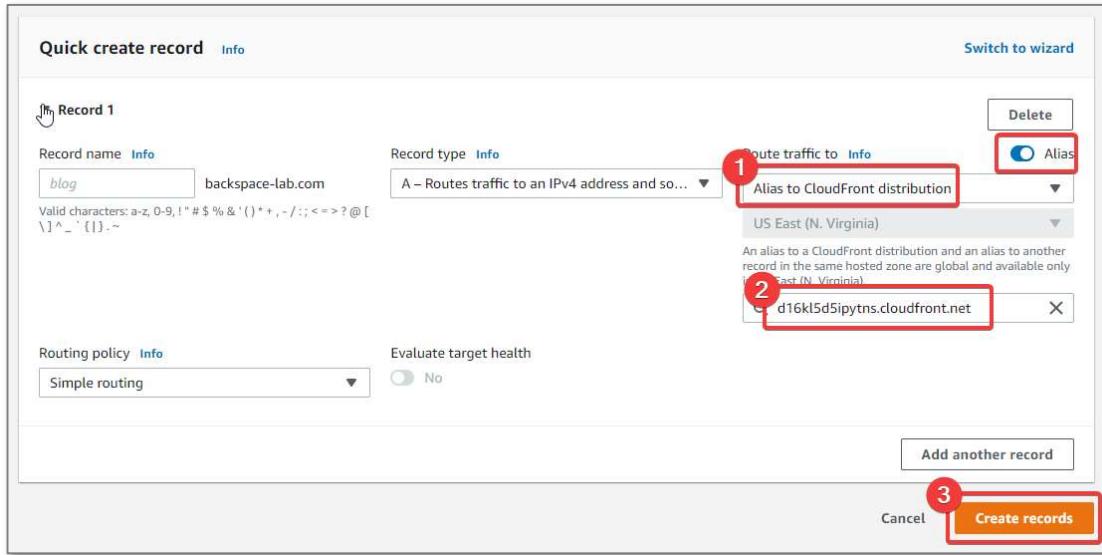
Select *A-/IPv4 address* as Type

Check Alias: *Yes*

Select *Alias to CloudFront distribution*

Select your CloudFront distribution domain name

Click *Create records*



Routing Traffic with a Domain Name from another Registrar

If you have a domain name from another registrar (e.g. GoDaddy) you can still direct traffic for this domain to AWS by replacing the NS records. That way all DNS requests will be directed to AWS name servers. The process is as follows:

1. Create a Route53 hosted zone for the domain
2. Copy the NS records for the hosted zone

Records (3) Info				
Automatic mode is the current search behavior optimized for best filter results. To change modes go to settings.				
<input type="checkbox"/> Record name ▾ <input type="checkbox"/> Type ▾ <input type="checkbox"/> Routine... ▾ <input type="checkbox"/> Differ... ▾ <input type="checkbox"/> Value/Route traffic to				
<input type="checkbox"/>	Record name ▾	Type ▾	Routine... ▾	Differ... ▾
<input type="checkbox"/>	backspace-la...	NS	Simple	-
				<input type="checkbox"/> ns-1126.awsdns-12.org. <input type="checkbox"/> ns-351.awsdns-43.com. <input type="checkbox"/> ns-1639.awsdns-12.co.uk. <input type="checkbox"/> ns-717.awsdns-25.net.

3. Replace the NS records in your registrars DNS service with the NS records from your Route53 hosted zone
4. Add the A record to your Route53 hosted zone as detailed previously above.

Route Requests for www Subdomain

Click on *Create Record*

Enter www for *Record Name*

Select *CNAME* as *Type*

Select 'No' for Alias.

Enter your domain name (or the CloudFront domain, either will work) for the www subdomain as Value (without the http:// at the start)

Click on *Create Records*

Quick create record [Info](#) [Switch to wizard](#)

Record 1

Record name [Info](#) **Value** [Info](#) **Record type** [Info](#) **TTL (seconds)** [Info](#) **Routing policy** [Info](#) **Alias**

www .backspace-lab.com CNAME – Routes traffic to another domain name 300 Simple routing

Valid characters: a-z, 0-9, !*#%&.'{}*+, - / ; < = > ? @ [\] ^ _ { } , ~

backspace-lab.com [Edit](#) [Delete](#)

Enter multiple values on separate lines.

1m 1h 1d

Recommended values: 60 to 172800 (two days)

[Add another record](#) [Cancel](#) **Create records**

After some time the changes will be propagated to the Internet and you will be able to navigate to your domain name in your browser and see your website.

Checking DNS Propagation Status

The Route 53 entries detailed above will take a while to propagate across the Internet. This could be anywhere from a couple of minutes to an hour. You can check the status of DNS propagation using the following site:

[Global DNS Propagation Checker](#)

After the records have successfully propagated you will be able to navigate to your domain name and see your website.

▶ Deleting the Website

In this section we will show you how to delete all the resources if you no longer need the website.

Delete Bucket

Go to the S3 console

Select the bucket

Click *Empty*

Buckets (15) [Info](#)
Buckets are containers for data stored in S3. [Learn more](#)

Name	AWS Region	Access
backspace-lab.com	Asia Pacific (Sydney) ap-southeast-2	Objects can be public

Actions: [C](#) [Copy ARN](#) [Empty](#) [Delete](#) [Create bucket](#)

[Find buckets by name](#)

Click *Exit*

Select the bucket

Click *Delete*

Buckets (15) [Info](#)
Buckets are containers for data stored in S3. [Learn more](#)

Name	AWS Region	Access
backspace-lab.com	Asia Pacific (Sydney) ap-southeast-2	Objects can be public

Actions: [C](#) [Copy ARN](#) [Empty](#) [Delete](#) [Create bucket](#)

[Find buckets by name](#)

Delete CloudFront Distribution

Go to the CloudFront console

Select CloudFront Distribution

Click *Disable*

The screenshot shows the AWS CloudFront Distributions page. On the left, there's a sidebar with links like 'Distributions', 'Policies', 'Functions', 'What's new', 'Telemetry', 'Monitoring', and 'Alarms'. The main area has a heading 'Distributions (1) Info' with a search bar below it. There are buttons for 'Enable' (disabled), 'Disable' (highlighted with a red box), 'Delete', and 'Create distribution'. A table lists one distribution: ID EKIM9R40Z853J, Description 'Pointed to backspace-la...', Domain name d16kl5d5ipytns.cloudfr..., Alternate domain names backspace-lab.com, www.backspace-lab.com, and Origin bac. A checkbox next to the row is also highlighted with a red box.

Wait for status to change to *disabled*

Click *Delete*