

Little Bit Advance Labs

Part 1: EC2 with ELB and ASG

Objective: Learn how to create a scalable and highly available web application environment using Amazon EC2 instances, ELB, and ASG.

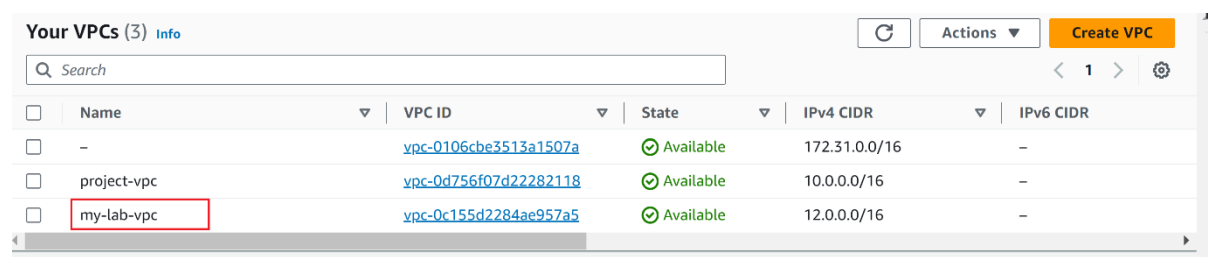
Approach:

1. **Launch EC2 Instances:** Start by launching two or more EC2 instances. These instances will run a simple web application (e.g., a "Hello World" page or any basic web service).
2. **Configure Load Balancer:** Set up an Elastic Load Balancer (ELB) to distribute incoming web traffic across your EC2 instances. This step ensures high availability and fault tolerance.
3. **Set Up Auto Scaling Group (ASG):** Create an ASG that uses the launched EC2 instances. Configure ASG policies to automatically scale the number of instances up or down based on criteria like CPU usage or network traffic.
4. **Test Your Setup:** Simulate traffic to test the scaling policies and the load balancer. Observe how ASG adds or removes instances and how ELB distributes traffic.
5. **Verify Website Functionality:** Ensure that the website hosted on EC2 instances remains accessible and functional during scaling operations.

Goal: By the end of this lab, students will have a hands-on understanding of setting up a load-balanced and auto-scaled web application using AWS services.

Steps:

1. Open AWS Management Console and create a VPC with necessary configurations.



The screenshot shows the AWS Management Console interface for 'Your VPCs (3)'. It includes a search bar, a table of VPCs, and a 'Create VPC' button. The table lists three VPCs: an unnamed VPC, 'project-vpc', and 'my-lab-vpc'. The 'my-lab-vpc' row is highlighted with a red box.

<input type="checkbox"/>	Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR
<input type="checkbox"/>	-	vpc-0106cbe3513a1507a	Available	172.31.0.0/16	-
<input type="checkbox"/>	project-vpc	vpc-0d756f07d22282118	Available	10.0.0.0/16	-
<input type="checkbox"/>	my-lab-vpc	vpc-0c155d2284ae957a5	Available	12.0.0.0/16	-

2. Next, create an internet gateway with the necessary configuration and attach to our newly created VPC.

VPC > Internet gateways > Create internet gateway

Create internet gateway [Info](#)

An internet gateway is a virtual router that connects a VPC to the internet. To create a new internet gateway specify the name for the gateway below.

Internet gateway settings

Name tag

Creates a tag with a key of 'Name' and a value that you specify.

Tags - optional

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key



Value - optional

RemoveAdd new tag

You can add 49 more tags.

CancelCreate internet gateway

VPC > Internet gateways > igw-0a77a0c3f382765c4

igw-0a77a0c3f382765c4 / my-lab-vpc

Actions ▼

Details [Info](#)

Internet gateway ID

igw-0a77a0c3f382765c4

State

Attached

VPC ID

[vpc-0c155d2284ae957a5](#) | my-lab-vpc

Owner

794872146236

Tags

Manage tags

< 1 >

Key	Value
Name	my-lab-vpc

Create subnet [Info](#)

VPC

VPC ID

Create subnets in this VPC.

vpc-0c155d2284ae957a5 (my-lab-vpc) ▼

Associated VPC CIDRs

IPv4 CIDRs

12.0.0.0/16

Subnet settings

Specify the CIDR blocks and Availability Zone for the subnet.

Subnet 1 of 1

Subnet name

Create a tag with a key of 'Name' and a value that you specify.

test-subnet-1

The name can be up to 256 characters long.

Availability Zone [Info](#)

Choose the zone in which your subnet will reside, or let Amazon choose one for you.

US East (N. Virginia) / us-east-1a ▼

IPv4 VPC CIDR block [Info](#)

Choose the VPC's IPv4 CIDR block for the subnet. The subnet's IPv4 CIDR must lie within this block.

12.0.0.0/16 ▼

IPv4 subnet CIDR block

12.0.3.0/24

256 IPs

< > ^ v

▼ Tags - optional

Key

Q Name

×

Value - optional

Q test-subnet-1

×

Remove

Add new tag

You can add 49 more tags.

Remove

Add new subnet

Cancel

Create subnet

Create subnet [Info](#)

VPC

VPC ID

Create subnets in this VPC.

vpc-0c155d2284ae957a5 (my-lab-vpc) ▼

Associated VPC CIDRs

IPv4 CIDRs

12.0.0.0/16

Subnet settings

Specify the CIDR blocks and Availability Zone for the subnet.

Subnet 1 of 1

Subnet name

Create a tag with a key of 'Name' and a value that you specify.

test-subnet-2

The name can be up to 256 characters long.

Availability Zone [Info](#)

Choose the zone in which your subnet will reside, or let Amazon choose one for you.

US East (N. Virginia) / us-east-1b ▼

IPv4 VPC CIDR block [Info](#)

Choose the VPC's IPv4 CIDR block for the subnet. The subnet's IPv4 CIDR must lie within this block.

12.0.0.0/16 ▼

IPv4 subnet CIDR block

12.0.3.0/23

512 IPs

< > ^ v

▼ Tags - optional

Key

Q Name X

Value - optional

Q test-subnet-2 X

Remove

Add new tag

You can add 49 more tags.

Remove

Add new subnet

Cancel

Create subnet

- Now we will create a route table with our VPC

VPC > Route tables > Create route table

Create route table [Info](#)

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

Route table settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.

VPC
The VPC to use for this route table.

Tags

A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key

Value - optional

You can add 49 more tags.

5. Now we will link the route table to the subnet.

VPC > Route tables > rtb-013a7e88ca4a1d7c7 > Edit subnet associations

Edit subnet associations

Change which subnets are associated with this route table.

Available subnets (2/2)

<input checked="" type="checkbox"/>	Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID
<input checked="" type="checkbox"/>	test-subnet-1	subnet-0e9e7e74e0efad3e2	12.0.3.0/24	-	Main (rtb-077794888daed7658)
<input checked="" type="checkbox"/>	test-subnet-2	subnet-0ca8ccc39ad68def2	12.0.128.0/17	-	Main (rtb-077794888daed7658)

Selected subnets

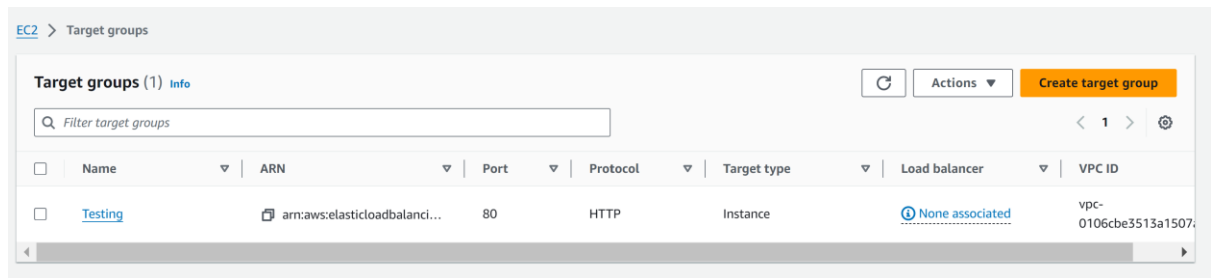
6. We will also add the routes from the Route Table by selecting Internet Gateway.

VPC > Route tables > rtb-013a7e88ca4a1d7c7 > Edit routes

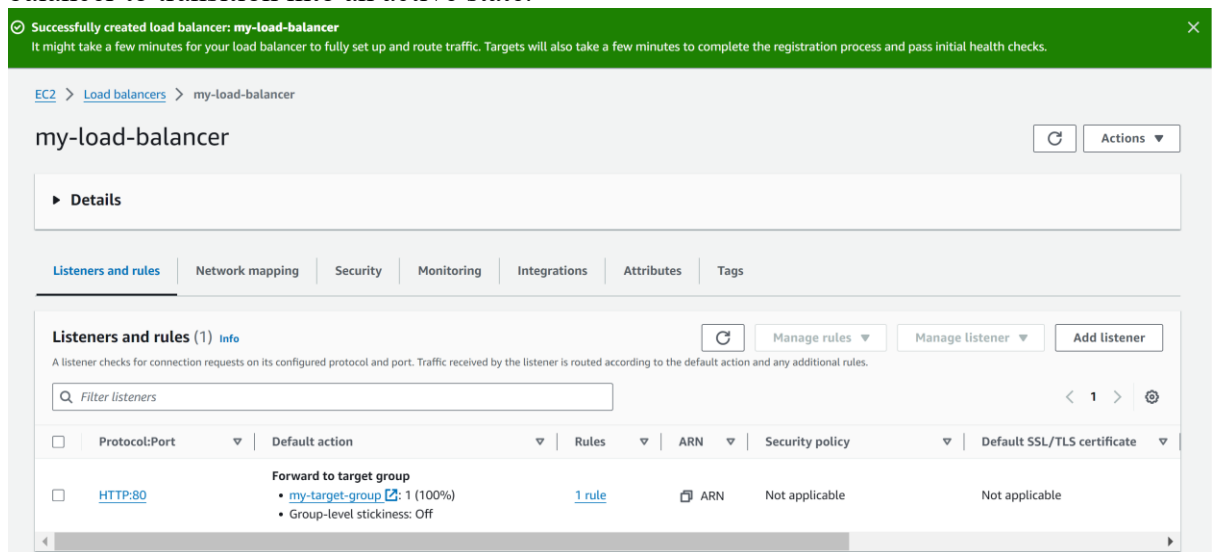
Edit routes

Destination	Target	Status	Propagated
12.0.0.0/16	local	Active	No
0.0.0.0/0	Internet Gateway	-	No

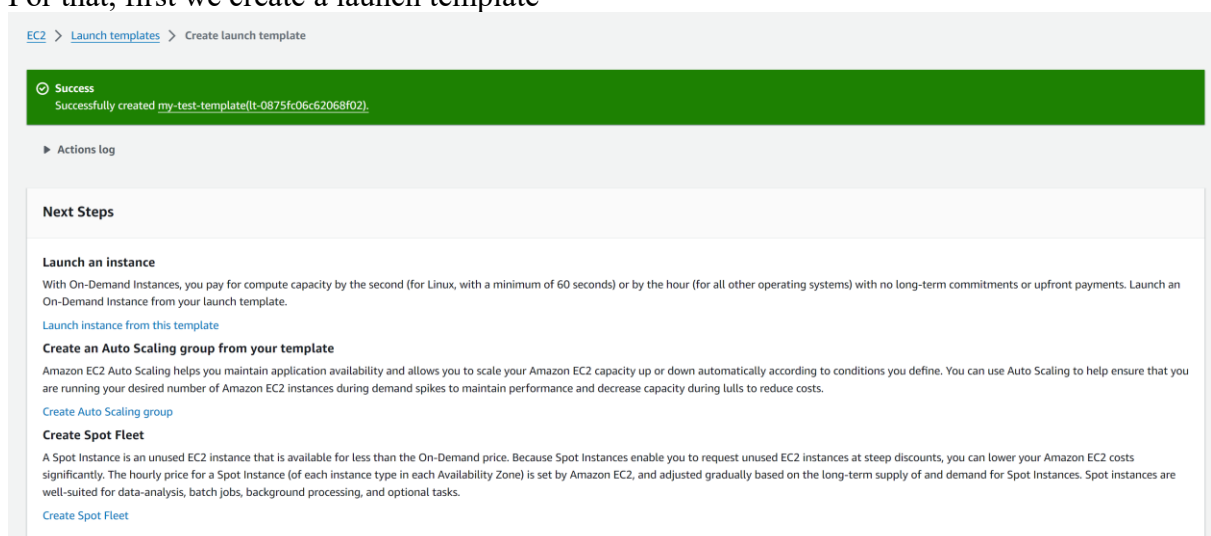
7. Now we will create a target group that will point to our EC2 Instance so we will choose a target type to instance and our created VPC while creating target group.



8. Once more, set up a load balancer, opting for an application load balancer, and designate our VPC along with the two subnets we've established. Additionally, generate a new security group in this step. Post-creation, allow some time for the load balancer to transition into an active state.



9. Now we will create Auto Scaling Groups
For that, first we create a launch template



Info

Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto Scaling group.

Name

Auto Scaling group name

Enter a name to identify the group

my-autoscaling-group

Must be unique to this account in the current Region and no more than 255 characters.

Info

③ For accounts created after May 31, 2023, the EC2 console only supports creating Auto Scaling groups with launch templates. Creating Auto Scaling groups with launch configurations is not recommended but still available via the CLI and API until December 31, 2023.

Launch template

Choose a launch template that contains the instance-level settings, such as the Amazon Machine Image (AMI), instance type, key pair, and security groups.

my-test-template

[Create a launch template](#)

Version

Default (1)

[Create a launch template version](#) 

Description

first temp

AMI ID

ami-0e731c8a588258d0d

Key pair name

Launch template

[my-test-template](#)

lt-0875fc06c62068f02

Security groups

Security group IDs

 Springer

Instance type

t2.micro

Request Spot Instances

No

Additional details

Storage (volumes)

Date created

Mon Feb 19 2024 18:18:08

GMT+0545 (Nepal Time)

Cancel

Next

Choose instance launch options [Info](#)

Choose the VPC network environment that your instances are launched into, and customize the instance types and purchase options.

Instance type requirements [Info](#)

[Override launch template](#)

You can keep the same instance attributes or instance type from your launch template, or you can choose to override the launch template by specifying different instance attributes or manually adding instance types.

Launch template
[my-test-template](#) [↗](#)
lt-0875fc06c62068f02

Version
Default

Description
first temp

Instance type
t2.micro

Network [Info](#)

For most applications, you can use multiple Availability Zones and let EC2 Auto Scaling balance your instances across the zones. The default VPC and default subnets are suitable for getting started quickly.

VPC

Choose the VPC that defines the virtual network for your Auto Scaling group.

vpc-0c155d2284ae957a5 (my-lab-vpc)
12.0.0.0/16



[Create a VPC](#) [↗](#)

Availability Zones and subnets

Define which Availability Zones and subnets your Auto Scaling group can use in the chosen VPC.

Select Availability Zones and subnets



us-east-1a | subnet-0e9e7e74e0efad3e2 (test-subnet-1)
12.0.3.0/24



us-east-1b | subnet-0ca8ccc39ad68def2 (test-subnet-2)
12.0.128.0/17



[Create a subnet](#) [↗](#)

Cancel

Skip to review

Previous

Next

[EC2](#) > Auto Scaling groups

Auto Scaling groups (1) [Info](#)



[Launch configurations](#)

[Launch templates](#) [↗](#)

[Actions](#) ▼

[Create Auto Scaling group](#)

Search your Auto Scaling groups

< 1 > ⚙

<input type="checkbox"/>	Name	Launch template/configuration ↗	Instances	Status	Desired capacity	Min	Max	Availability Zones
<input type="checkbox"/>	my-autoscaling-group	my-test-template Version Default	0	Updating capacity...	1	1	1	us-east-1a, us-east-1b

The following are the two instances that we have created

Instances (1/5) Info									
<input type="text" value="Find Instance by attribute or tag (case-sensitive)"/> <input type="button" value="Connect"/> <input type="button" value="Instance state"/> <input type="button" value="Actions"/> <input type="button" value="Launch instances"/>									
<input type="text" value="Any state"/>									
<input type="button" value="Instance state = running"/> <input type="button" value="Clear filters"/>									
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS		
MyWeb	i-084ad51df8026f149	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1b	ec2-3-87-93-108.comp...	3.	
MyWeb	i-0e795a8f7009a6c3a	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1b	ec2-3-87-74-72.comput...	3.	
	i-0394cf0b322cac41a	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1b	-	-	
	i-0dfa1fa50d99c33c0	Running	t2.micro	Initializing	View alarms +	us-east-1b	-	5.	
	i-0a99d79ffa89cb7fa	Running	t2.micro	Initializing	View alarms +	us-east-1a	-	5.	

Here, is the description of our auto scaling group

[EC2](#) > [Auto Scaling groups](#) > my-new-scal-group

my-new-scal-group

Details			
Activity	Automatic scaling	Instance management	Monitoring
Instance refresh			
Group details			
Auto Scaling group name my-new-scal-group	Desired capacity 2	Desired capacity type Units (number of instances)	Amazon Resource Name (ARN) arn:aws:autoscaling:us-east-1:794872146236:autoScalingGroup:f254a2af-7353-47a9-a282-896f93c77cb6:autoScalingGroupName/my-new-scal-group
Date created Tue Feb 20 2024 11:51:48 GMT+0545 (Nepal Time)	Minimum capacity 1	Status -	
	Maximum capacity 3		

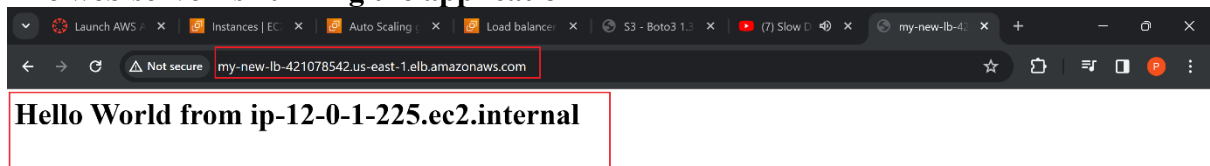
[EC2](#) > [Load balancers](#) > my-new-lb

my-new-lb

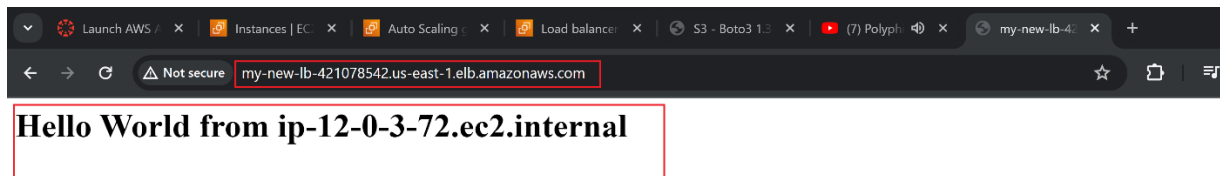
Details			
Load balancer type Application	Status Active	VPC vpc-056ea6bc053c7bbaf	IP address type IPv4
Scheme Internet-facing	Hosted zone Z35SXDOTRQ7X7K	Availability Zones subnet-079b5cf3c05f4c899 us-east-1b (use1-az4) subnet-0fd2f67061c36424e us-east-1a (use1-az1)	Date created February 20, 2024, 11:42 (UTC+05:45)
Load balancer ARN arn:aws:elasticloadbalancing:us-east-1:794872146236:loadbalancer/app/my-new-lb/41e1660e14eef6dd	<div>my-new-lb-421078542.us-east-1.elb.amazonaws.com (A Record)</div>		

Now we copy the above outlined DNS name and paste the copied DNS name in the browser url:

The web server is running the application



We can also see that when we refresh the url link, our another instance ip address is displayed which means the load balancer is balancing the requests according to the load to the instances.



Now, we will go to the load balancer target group instance. We can see the two instances are running in healthy condition.

Instance ID	Name	Port	Zone	Health status	Health status details	Launch...	Anomaly detection...
i-024fe37981bfe7ea8		80	us-east-1a	Healthy	-	February ...	Normal
i-0ce7ed8bad9221b86		80	us-east-1b	Healthy	-	February ...	Normal

Now, if we terminate one or two of the EC2 instance, then the auto scaling group will automatically re-create the instance.

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
	i-024fe37981bfe7ea8	Shutting-down	t2.micro	2/2 checks passed	View alarms +	us-east-1a	-
	i-0ce7ed8bad9221b86	Running	t2.micro	2/2 checks passed	View alarms +	us-east-1b	-
Lab2	i-032f592c6f64ee2a7	Terminated	t2.micro	-	View alarms +	us-east-1d	-
Lab1	i-006cae8a67eb2fd1b	Terminated	t2.micro	-	View alarms +	us-east-1d	-

Instance ID	Lifecycle	Instance type	Weighted capac...	Launch templat...	Availability Zone	Health status	Protected from
i-00d5398c1ab29e09e	Pending	t2.micro	-	asg-test-template	us-east-1a	Healthy	
i-024fe37981bfe7ea8	Terminating	t2.micro	-	asg-test-template	us-east-1a	Unhealthy	
i-0ce7ed8bad9221b86	InService	t2.micro	-	asg-test-template	us-east-1b	Healthy	

Part 2: Hosting a Static Portfolio Website on S3

Objective: Learn to host a static website (such as a personal portfolio) on Amazon S3.

Approach:

1. **Create an S3 Bucket:** Start by creating a new S3 bucket. Configure the bucket for website hosting, which includes setting permissions to make the content publicly accessible.
2. **Upload Website Files:** Upload the static files of your portfolio website (HTML, CSS, JavaScript, images) to the S3 bucket.
3. **Configure DNS:** Use Amazon Route 53 or another DNS service to point a domain name to the S3 bucket. This makes the website accessible via a user-friendly URL.
4. **Enable Additional Features (Optional):** Implement features like HTTPS for secure access and CloudFront for content delivery optimization.

Goal: Students will understand how to use S3 for hosting static websites, manage bucket permissions, and integrate with other AWS services for a complete web hosting solution.

We will map an S3 bucket with a static website

We have already created two buckets and will be using one of them.

The screenshot shows the Amazon S3 Buckets console. At the top, there's an 'Account snapshot' section with a 'View Storage Lens dashboard' button. Below it, a table shows account metrics: Total storage (56.7 KB), Object count (1), and Average object size (56.7 KB). The main section is titled 'General purpose buckets (2)' and includes a search bar and a table of buckets.

Name	AWS Region	Access	Creation date
awsplasticbucket	US East (N. Virginia) us-east-1	Public	February 15, 2024, 22:06:27 (UTC+05:45)
mystatbucket	US East (N. Virginia) us-east-1	Public	January 22, 2024, 20:34:34 (UTC+05:45)

We also have created an HTML file named index.html, we will be uploading it to our bucket.

The screenshot shows the 'Upload: status' page in the Amazon S3 console. It features a green 'Upload succeeded' banner at the top. Below, a summary section shows the destination as 's3://mystatbucket' and the upload status as 'Succeeded' with '1 file, 863.0 B (100.00%)'. The 'Files and folders' section shows a table with the uploaded file 'index.html'.

Name	Folder	Type	Size	Status	Error
index.html	-	text/html	863.0 B	Succeeded	-

We will now create a new bucket with the same as our previous bucket but will be adding 'www.' In the beginning and '.com' in the end.

Successfully created bucket "www.mystatbucket.com"

To upload files and folders, or to configure additional bucket settings, choose [View details](#).

Amazon S3 > Buckets

▼ Account snapshot

Last updated: Feb 18, 2024 by Storage Lens. Metrics are generated every 24 hours. Metrics don't include directory buckets. [Learn more](#)

Total storage

56.7 KB

Object count

1

Average object size

56.7 KB

You can enable advanced metrics in the "default-account-dashboard" configuration.

General purpose buckets

Directory buckets

General purpose buckets (3) Info

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

Refresh

Copy ARN

Empty

Delete

Create bucket

Name	▲	AWS Region	▼	Access	▼	Creation date	▼
<input type="radio"/> awspasticbucket		US East (N. Virginia) us-east-1		Public		February 15, 2024, 22:06:27 (UTC+05:45)	
<input type="radio"/> mystatbucket		US East (N. Virginia) us-east-1		Public		January 22, 2024, 20:34:34 (UTC+05:45)	
<input type="radio"/> www.mystatbucket.com		US East (N. Virginia) us-east-1		Bucket and objects not public		February 20, 2024, 14:59:10 (UTC+05:45)	

Next we will go to our bucket i.e. www.mystaticbucket.com and edit static we hosting. Here we will enable the static web hosting and other changes such as hosting type to redirect request host name to your root bucket name and protocol to http.

Amazon S3 > Buckets > www.mystatbucket.com > Edit static website hosting

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

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](#)

Host name

Target bucket website address or personal domain

Protocol - Optional

☐ none

☒ http

☐ https

Cancel

Save changes

Next, we will go to Route 53 and create a new hosted zone. We have to make sure that the name we give should be same as our root S3 bucket name (in our case it is mystaticbucket)

Create hosted zone [Info](#)

Hosted zone configuration

A hosted zone is a container that holds information about how you want to route traffic for a domain, such as example.com, and its subdomains.

Domain name [Info](#)

This is the name of the domain that you want to route traffic for.

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

Description - optional [Info](#)

This value lets you distinguish hosted zones that have the same name.

The description can have up to 256 characters. 43/256

Type [Info](#)

The type indicates whether you want to route traffic on the internet or in an Amazon VPC.

☒ **Public hosted zone**

A public hosted zone determines how traffic is routed on the internet.

☐ **Private hosted zone**

A private hosted zone determines how traffic is routed within an Amazon VPC.

✓ **mystaticbucket.com was successfully created.**

Now you can create records in the hosted zone to specify how you want Route 53 to route traffic for your domain.

Public mystaticbucket.com [Info](#)

[Delete zone](#)[Test record](#)[Configure query logging](#)

► Hosted zone details

[Edit hosted zone](#)[Records \(2\)](#)[DNSSEC signing](#)[Hosted zone tags \(0\)](#)

Records (2) [Info](#)

[Delete record](#)[Import zone file](#)[Create record](#)

Automatic mode is the current search behavior optimized for best filter results. [To change modes go to settings.](#)

[Type ▼](#)[Routing policy ▼](#)[Alias ▼](#)[< 1 > ⚙](#)

<input type="checkbox"/>	Record name ▼	Type ▼	Routin... ▼	Differ... ▼	Alias ▼	Value/Route traffic to ▼
<input type="checkbox"/>	mystaticbucket.com	NS	Simple	-	No	ns-831.awsdns-39.net. ns-1843.awsdns-38.co.uk. ns-1266.awsdns-30.org. ns-299.awsdns-37.com.
<input type="checkbox"/>	mystaticbucket.com	SOA	Simple	-	No	ns-831.awsdns-39.net. awsd...

Next, generate a record for your primary S3 bucket. Here, activate the alias feature and deactivate the evaluate target health option. Choose the region as your current region and direct traffic to the S3 website endpoint via the alias, following the steps illustrated in the provided figure.

Route 53 > Hosted zones > mystaticbucket.com > Create record

Create record [Info](#)

Quick create record [Switch to wizard](#)

▼ Record 1 Delete

Record name [Info](#) mystaticbucket.com Record type [Info](#) A – Routes traffic to an IPv4 address and some AWS resources

Keep blank to create a record for the root domain.

☒ Alias

Route traffic to [Info](#)

Alias to S3 website endpoint

US East (N. Virginia)

Routing policy [Info](#) Evaluate target health ☐ No

Simple routing

Add another record

Cancel Create records

Now, establish a record for your primary S3 bucket. Here, activate the alias option while deactivating the evaluate target health feature. Choose the current region as your selection and direct traffic to the S3 website endpoint using the alias, adhering to the instructions depicted in the figure.

[Route 53](#) > [Hosted zones](#) > [mystaticbucket.com](#) > Create record

Create record [Info](#)

Quick create record

[Switch to wizard](#)

▼ Record 1

Delete

Record name [Info](#)

www .mystaticbucket.com

Keep blank to create a record for the root domain.

Record type [Info](#)

A – Routes traffic to an IPv4 address and some AWS resources

☒ Alias

Route traffic to [Info](#)

Alias to S3 website endpoint

US East (N. Virginia)

Q s3-website-us-east-1.amazonaws.com X

Routing policy [Info](#)

Simple routing

Evaluate target health

☒ Yes

Add another record

Cancel

Create records

These are the list of our records

[Public](#) mystaticbucket.com [Info](#)

Delete zone

Test record

Configure query logging

► Hosted zone details

Edit hosted zone

Records (4)

DNSSEC signing

Hosted zone tags (0)

Records (4) [Info](#)



Delete record

Import zone file

Create record

Automatic mode is the current search behavior optimized for best filter results. [To change modes go to settings.](#)

Q Filter records by property or value

Type ▼

Routing pol... ▼

Alias ▼

< 1 >



<input type="checkbox"/>	Record name	Type	Routin...	Differ...	Alias	Value/Route traffic to	TT
<input type="checkbox"/>	mystaticbucket.com	A	Simple	-	Yes	s3-website-us-east-1.amazo...	-
<input type="checkbox"/>	mystaticbucket.com	NS	Simple	-	No	ns-831.awsdns-39.net. ns-1843.awsdns-38.co.uk. ns-1266.awsdns-30.org. ns-299.awsdns-37.com.	17
<input type="checkbox"/>	mystaticbucket.com	SOA	Simple	-	No	ns-831.awsdns-39.net. awsd...	90
<input type="checkbox"/>	www.mystaticbucket.com	A	Simple	-	Yes	s3-website-us-east-1.amazo...	-