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.

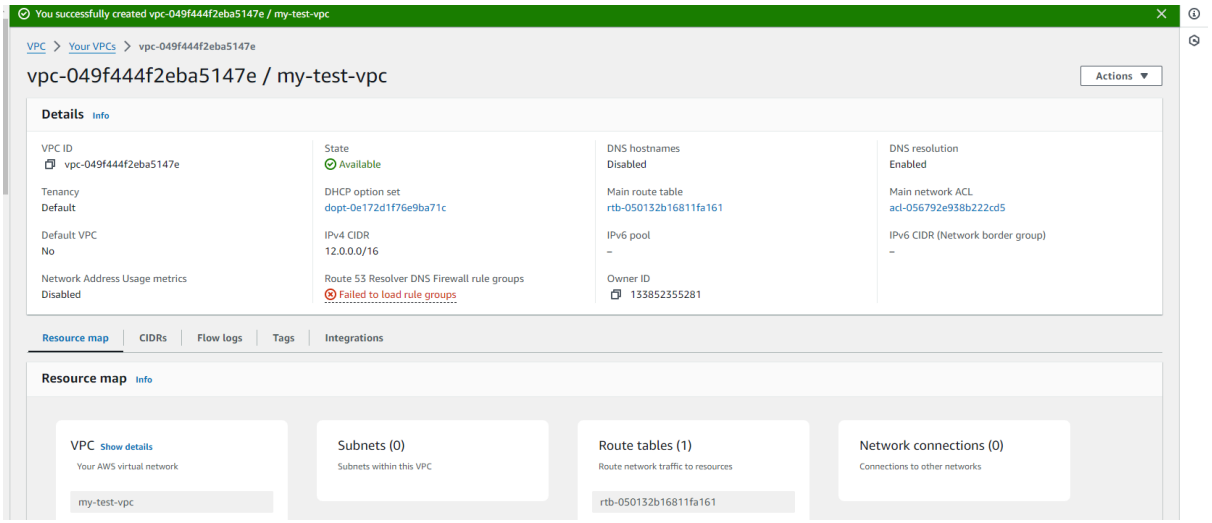
Approach:

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.

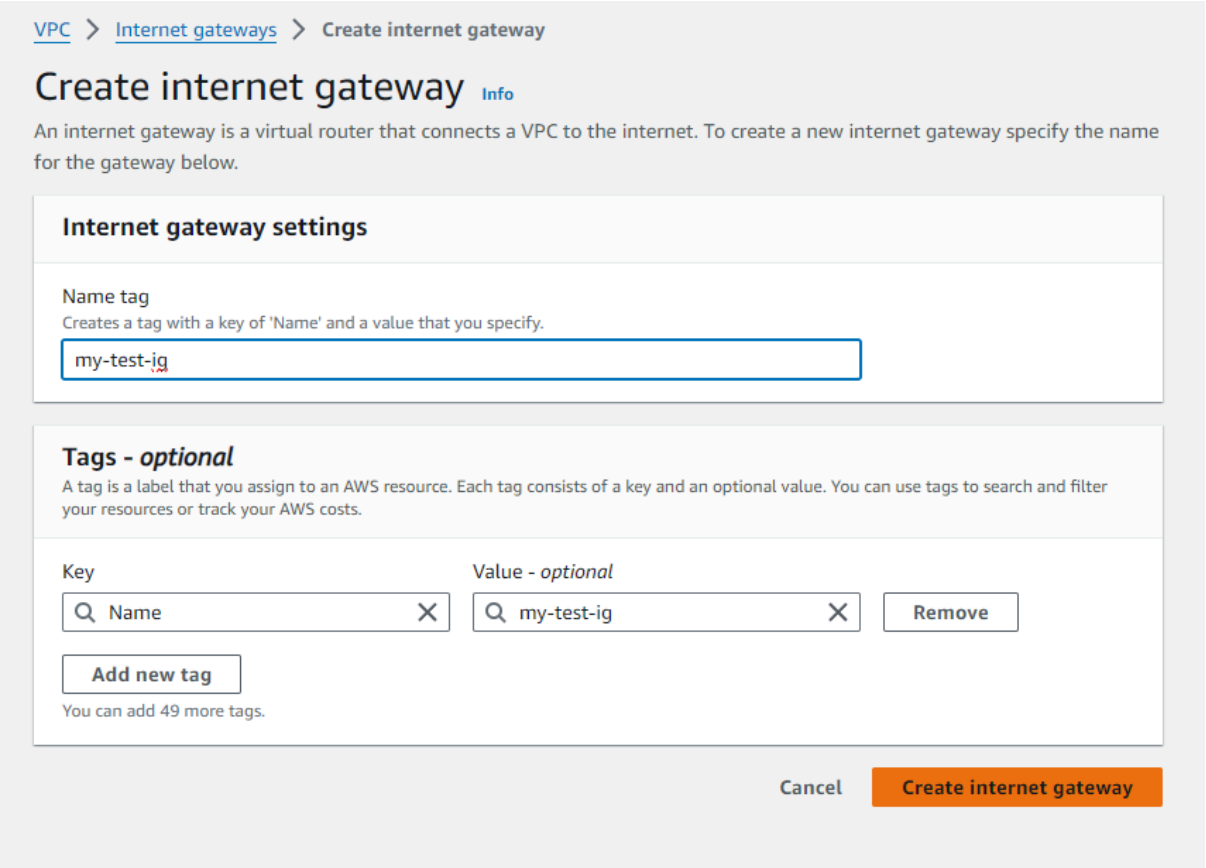
Goal: By the end of this lab, students will have a hands-on understanding of setting up a load-balanced and auto-scaled web application using AWS services.

Solution:

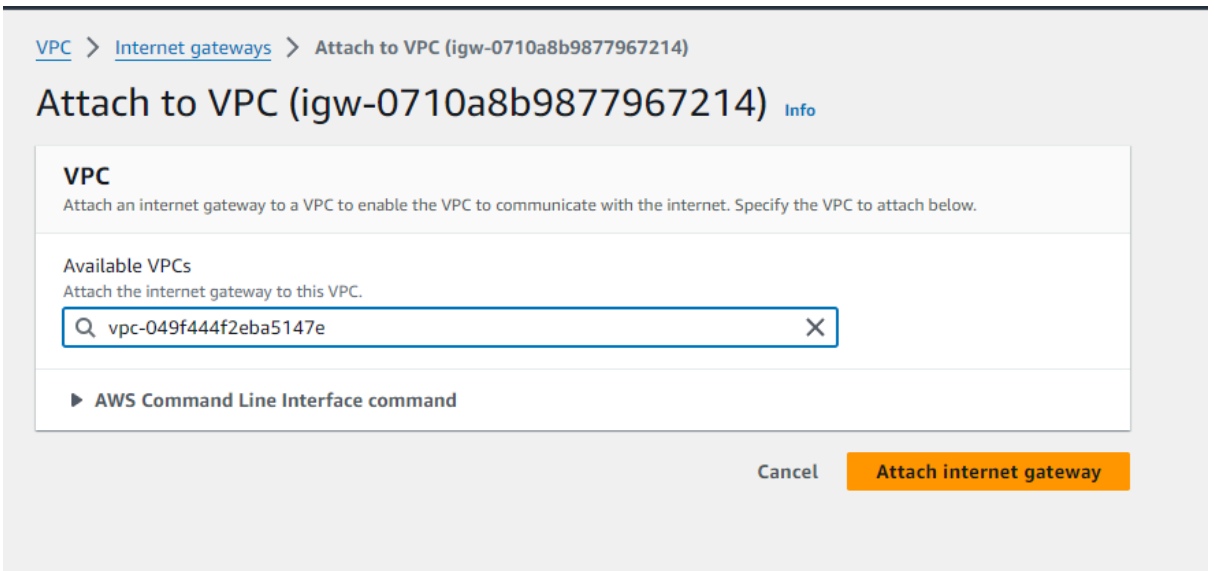
1. Created my-test-vpc



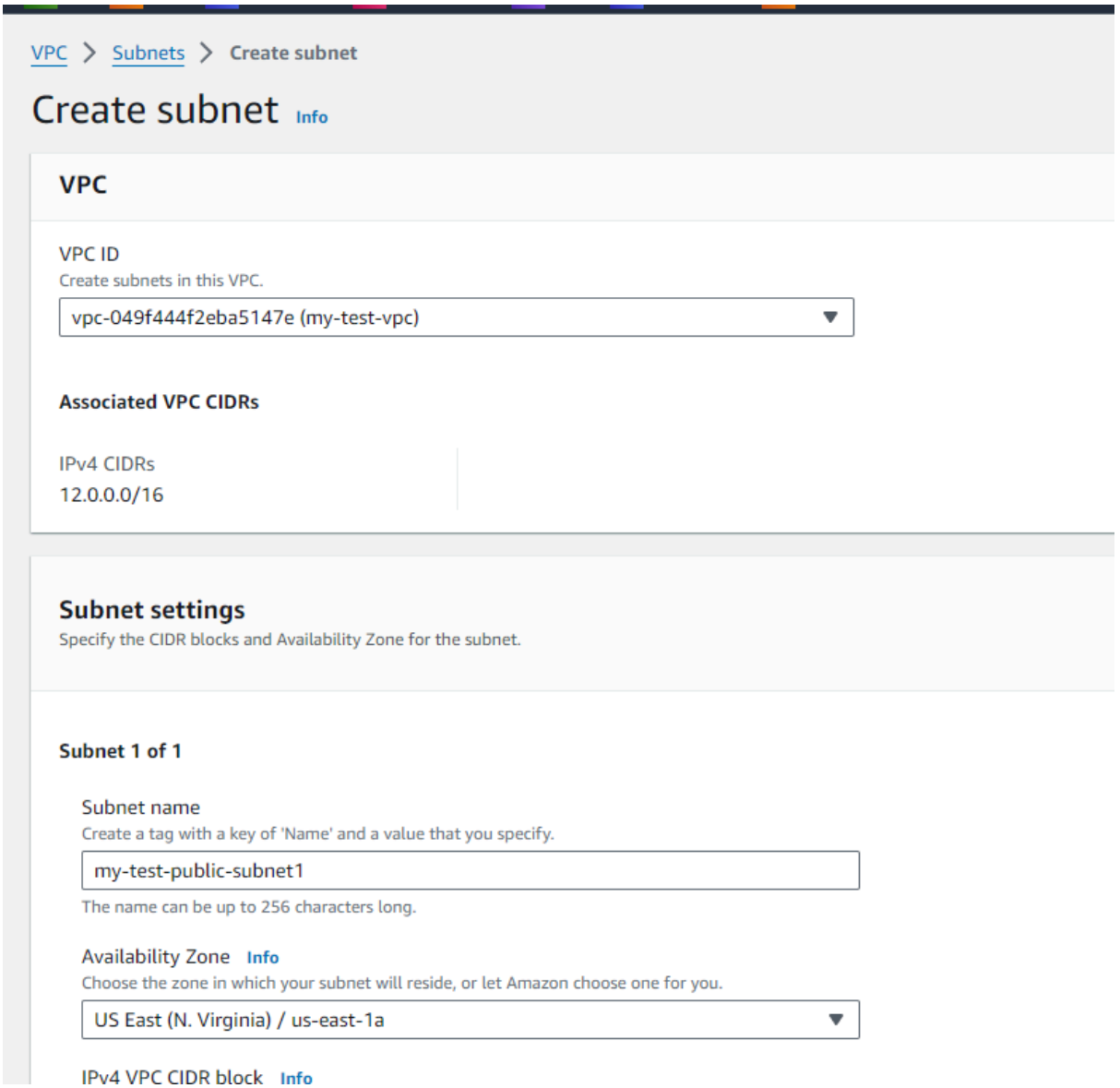
2. Appropriate Internet Gateway was created



3. Attached the internet gateway to the VPC



4. Subnets were created with proper IP address assignment



Subnet 1 of 2

Subnet name

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

my-test-public-subnet1

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

12.0.1.0/24 256 IPs

Tags - *optional*

Key	Value - *optional*	
Name	my-test-public-subnet1	Remove

Add new tag

You can add 49 more tags.

Remove

Subnet 2 of 2

Subnet name

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

my-test-subnet2

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

12.0.3.0/24 256 IPs

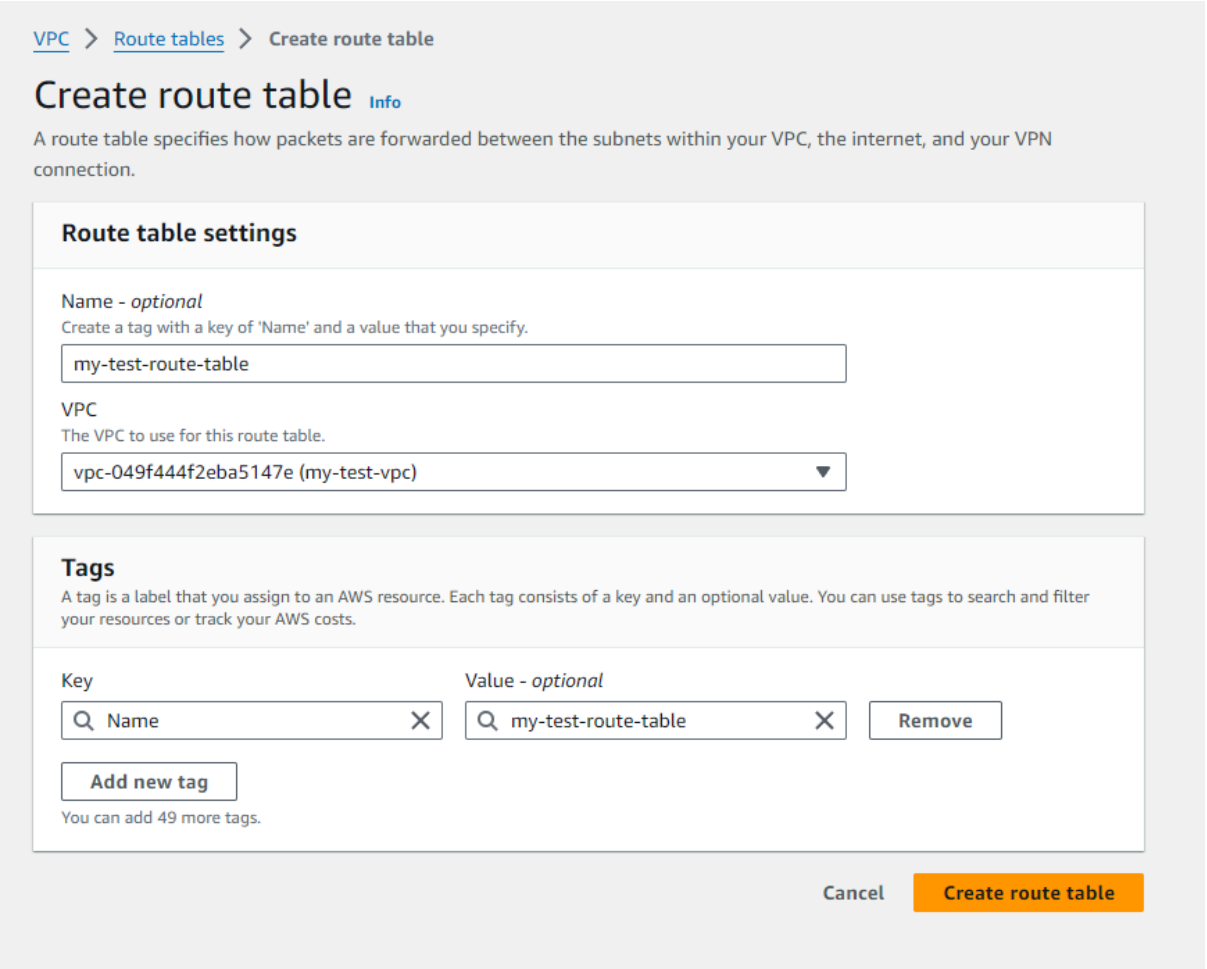
Tags - *optional*

Key	Value - *optional*	
Name	my-test-subnet2	Remove

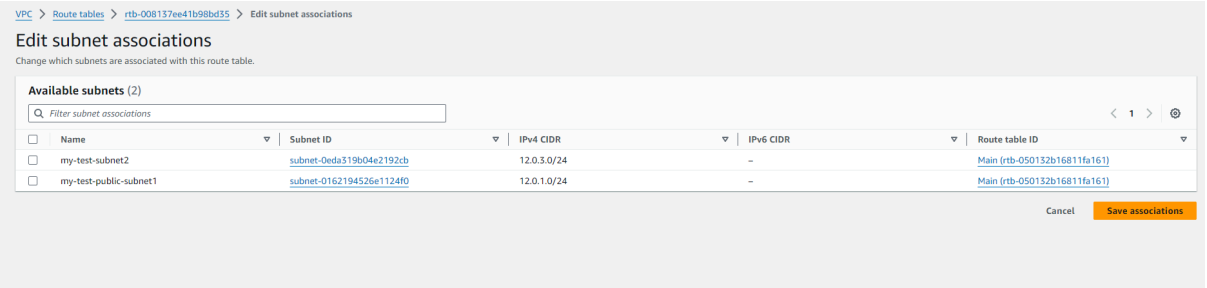
Add new tag

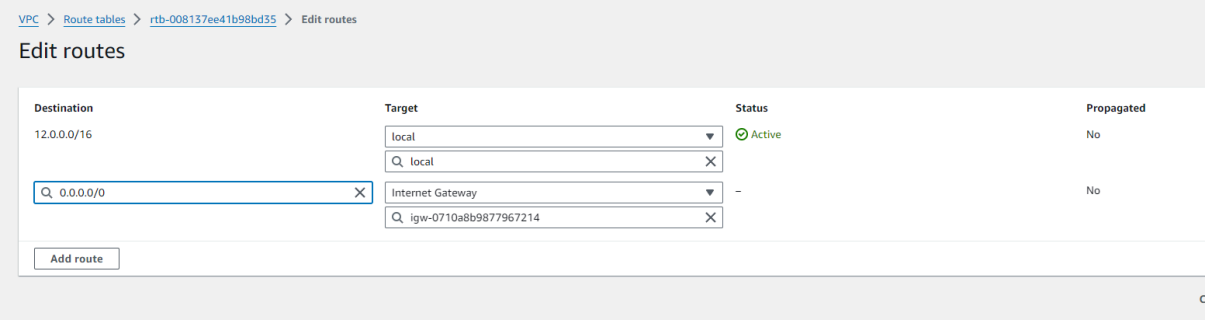
You can add 49 more tags.

5. Route table was created

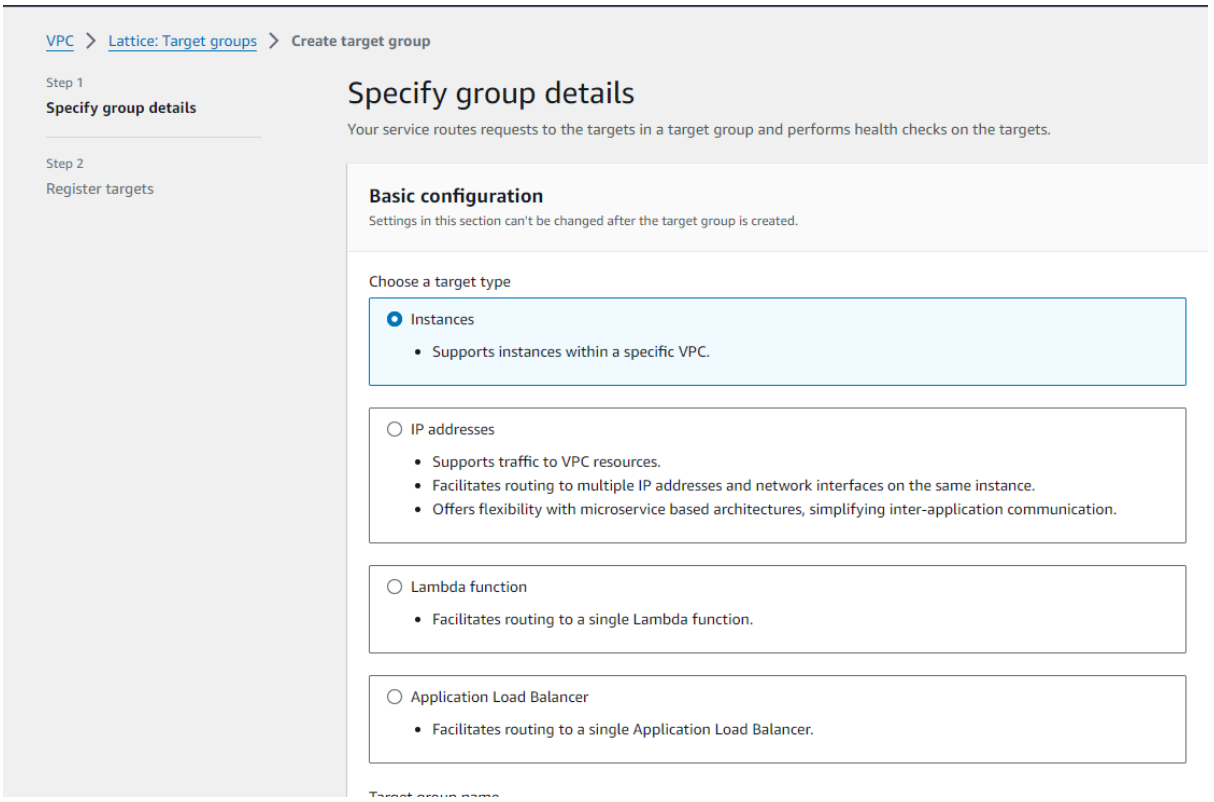


6. Click on “Edit subnet associations” within the created route table and assign the created subnets and then edit routes to add the internet gateway

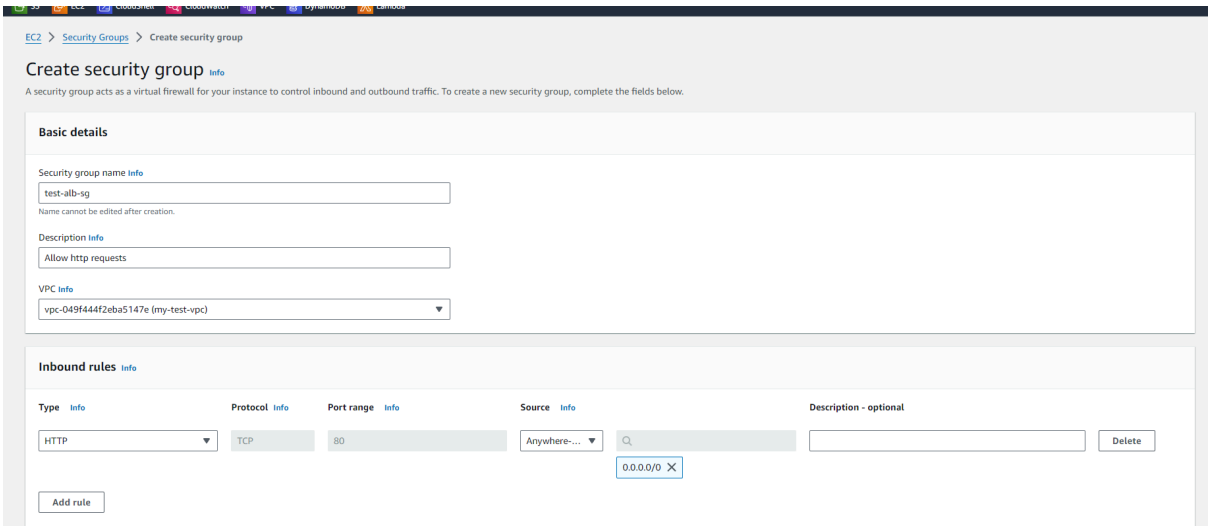




7. Now create the Target Table



8. Create security group with HTTP enabled, also create another security group with both HTTP and SSH enabled



Security groups Info

A security group is a set of firewall rules that control the traffic to your load balancer. Select an existing security group, or you can create a new security group.

Security groups

Select up to 5 security groups

test-alb-sg
sg-01b26c0e07386ece4 VPC: vpc-049f444f2eba5147e

default
sg-05182a6d714d9a9a6 VPC: vpc-049f444f2eba5147e

Listeners and routing Info

A listener is a process that checks for connection requests using the port and protocol you configure. The rules that you define for a listener determine how the load balancer routes requests to its registered targets.

Listener HTTP:80 Remove

Protocol: HTTP
Port: 80
1-65535

Default action Info
Forward to: new-f-test HTTP
Target type: Instance, IPv4

Create target group

Listener tags - *optional*

EC2 > Security Groups > Create security group

Create security group Info

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.

Basic details

Security group name Info
sg-for-temp
Name cannot be edited after creation.

Description Info
Allows SSH access to developers

VPC Info
vpc-049f444f2eba5147e (my-test-vpc)

Inbound rules Info

Type Info	Protocol Info	Port range Info	Source Info		Description - optional Info	
HTTP	TCP	80	Anywhere-...	0.0.0.0/0		Delete
SSH	TCP	22	Anywhere-...			Delete

9. Finally Create Application Load Balancer

EC2 > Load balancers > Create Application Load Balancer

Create Application Load Balancer Info

The Application Load Balancer distributes incoming HTTP and HTTPS traffic across multiple targets such as Amazon EC2 instances, microservices, and containers, based on request attributes. When the load balancer receives a connection request, it evaluates the listener rules in priority order to determine which rule to apply, and if applicable, it selects a target from the target group for the rule action.

▸ **How Application Load Balancers work**

Basic configuration

Load balancer name
Name must be unique within your AWS account and can't be changed after the load balancer is created.

my-test-lb

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Scheme | Info
Scheme can't be changed after the load balancer is created.

- (●) Internet-facing
  An internet-facing load balancer routes requests from clients over the internet to targets. Requires a public subnet. Learn more
- ( ) Internal
  An internal load balancer routes requests from clients to targets using private IP addresses.

IP address type | Info
Select the type of IP addresses that your subnets use.

- (●) IPv4
  Recommended for internal load balancers.
- ( ) Dualstack
  Includes IPv4 and IPv6 addresses.

Network mapping Info

The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

VPC | Info
Select the virtual private cloud (VPC) for your targets or you can create a new VPC. Only VPCs with an internet gateway are enabled for selection. The selected VPC can't be changed after the load balancer is created. To confirm the VPC for your targets, view your target groups.

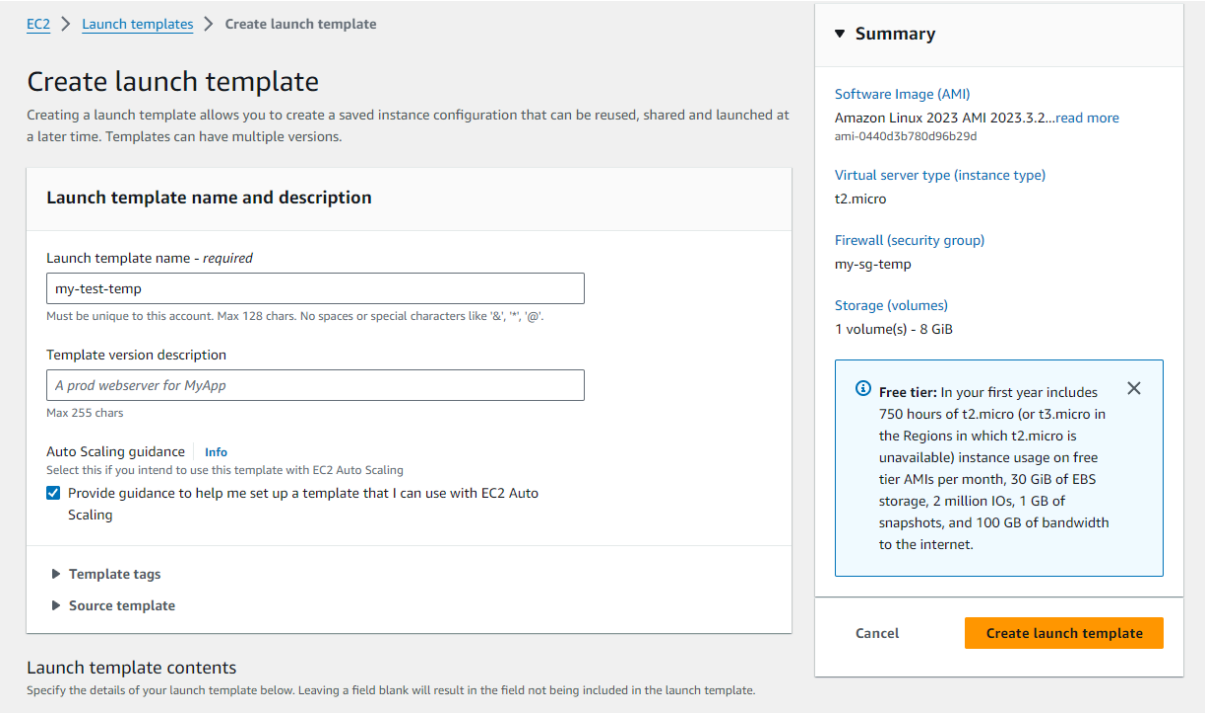
my-test-vpc
vpc-049f444f2eba5147e
IPv4: 12.0.0.0/16

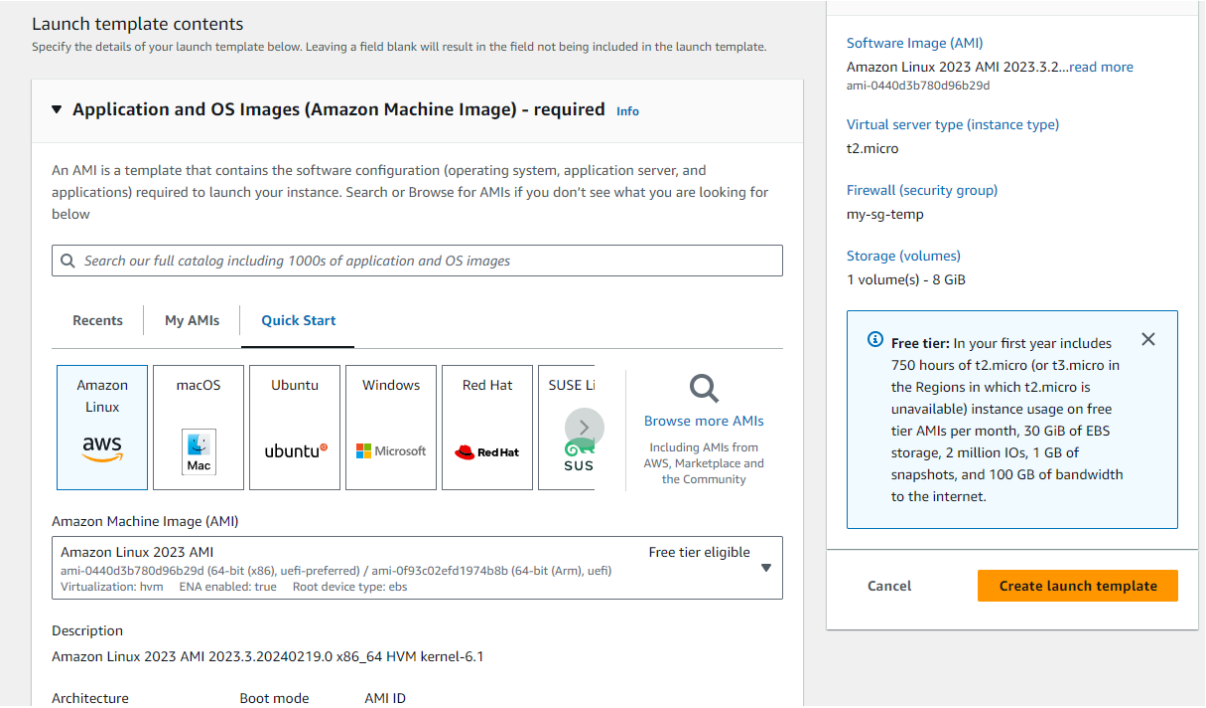
Mappings | Info
Select at least two Availability Zones and one subnet per zone. The load balancer routes traffic to targets in these Availability Zones only. Availability Zones that are not supported by the load balancer or the VPC are not available for selection.

[x] **us-east-1a (use1-az4)**
Subnet
subnet-0162194526e1124f0 my-test-public-subnet1
IPv4 address
Assigned by AWS

[x] **us-east-1b (use1-az6)**
Subnet
subnet-0eda319b04e2192cb my-test-subnet2
IPv4 address
Assigned by AWS

10. But wait, you need more things to create load balancer, now create launch template





Network settings Info

Subnet Info

Don't include in launch template

Create new subnet

When you specify a subnet, a network interface is automatically added to your template.

Firewall (security groups) Info

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

- (•) Select existing security group
- ( ) Create security group

Security groups Info

Select security groups

my-sg-temp sg-0b6130d6240bf5ee0
VPC: vpc-049f444f2eba5147e

Compare security group rules

Advanced network configuration

User data - *optional* Info

Upload a file with your user data or enter it in the field.

Choose file

```
#!/bin/bash
yum update -y
yum install -y httpd
systemctl start httpd
systemctl enable httpd
echo "<h1> Hello World from $(hostname -f)<a/h1>" > /var/www/html/index.html
```

[ ] User data has already been base64 encoded

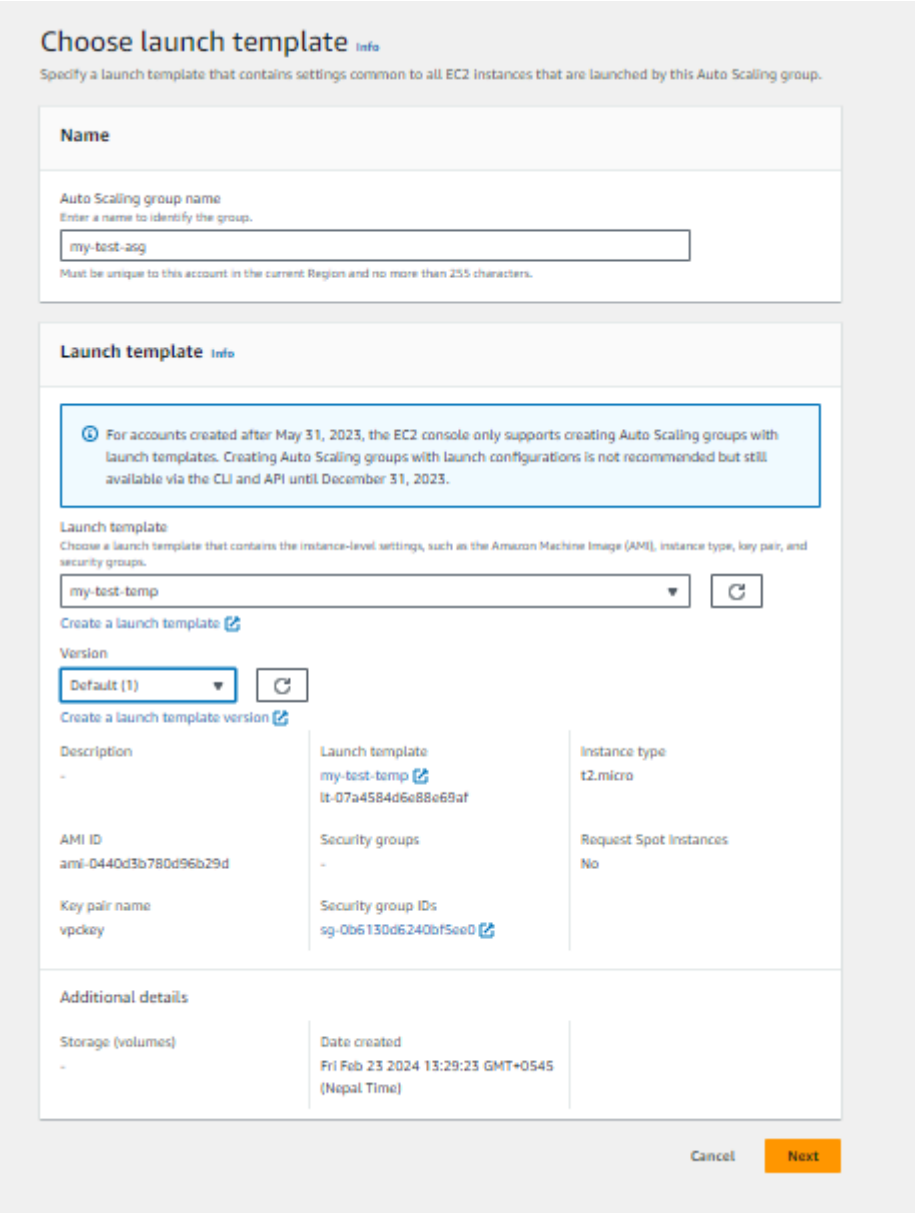
Firewall (security group)
my-sg-temp

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel | Create launch template

11. Now create auto scaling group and choose the created launch template



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	Version	Description
my-test-temp lt-07a4584d6e88e69af	Default	-

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-049f444f2eba5147e (my-test-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

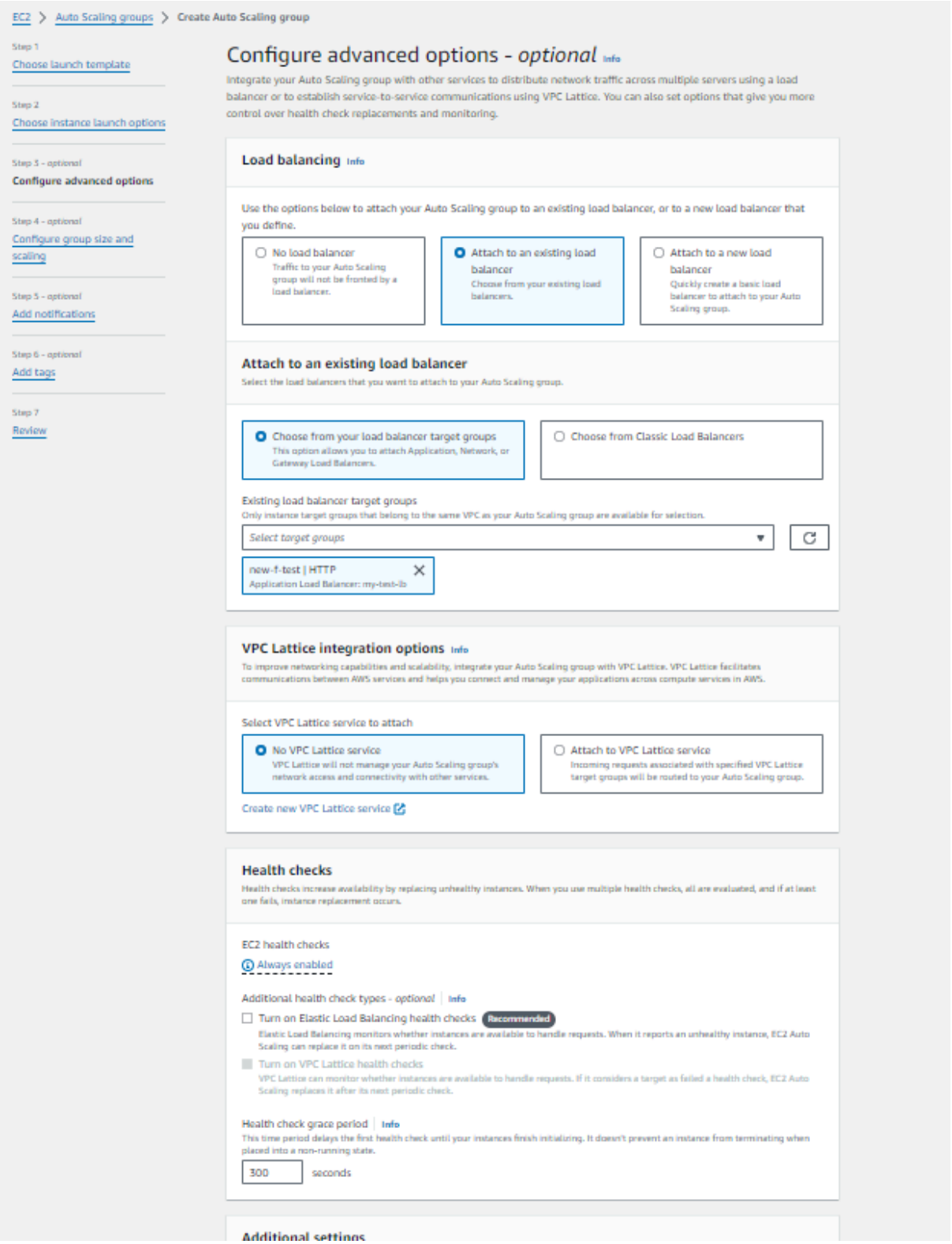
us-east-1a | subnet-0162194526e1124f0 (my-test-public-subnet1)
12.0.1.0/24

us-east-1b | subnet-0eda319b04e2192cb (my-test-subnet2)
12.0.3.0/24

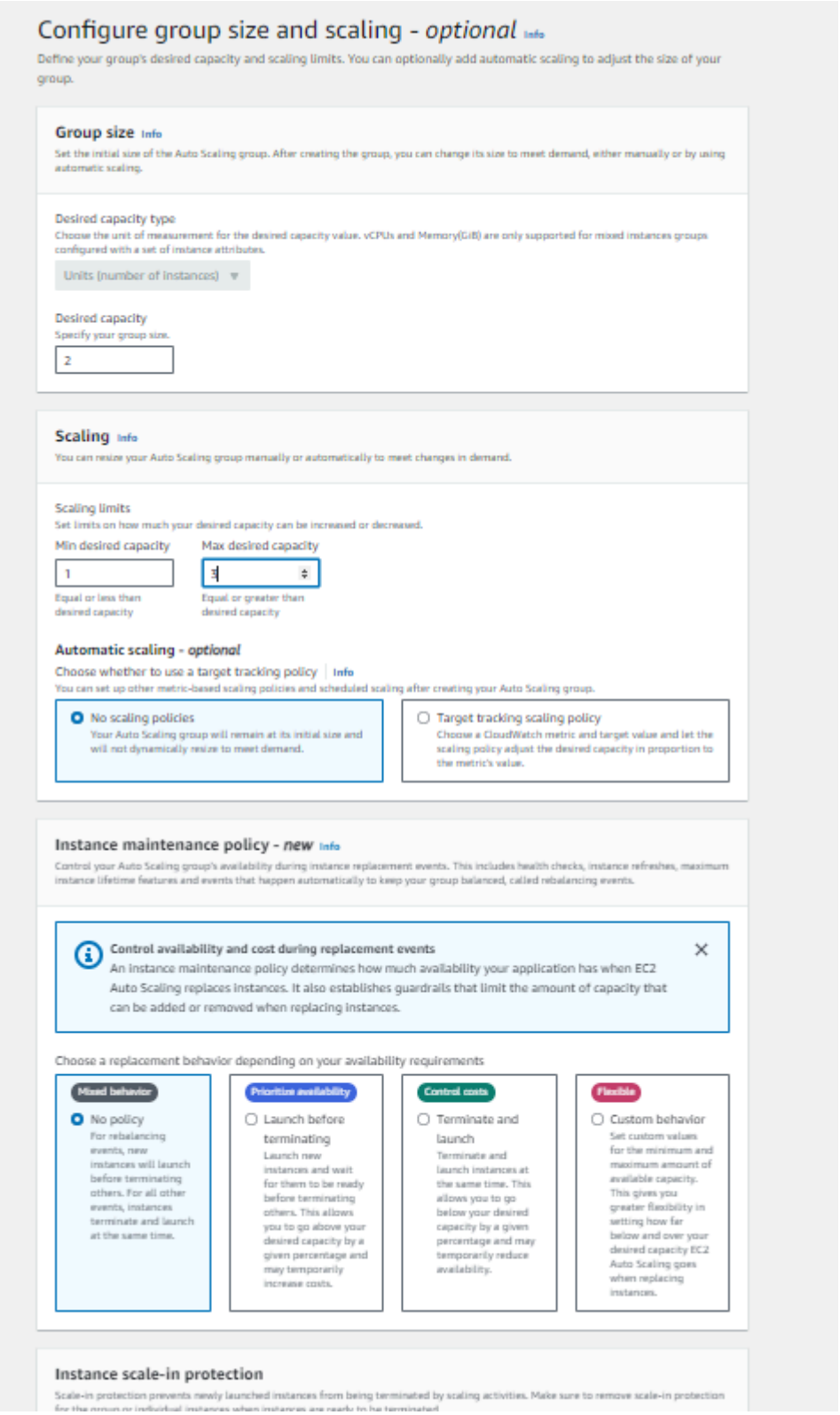
Create a subnet

Cancel | Skip to review | Previous | Next

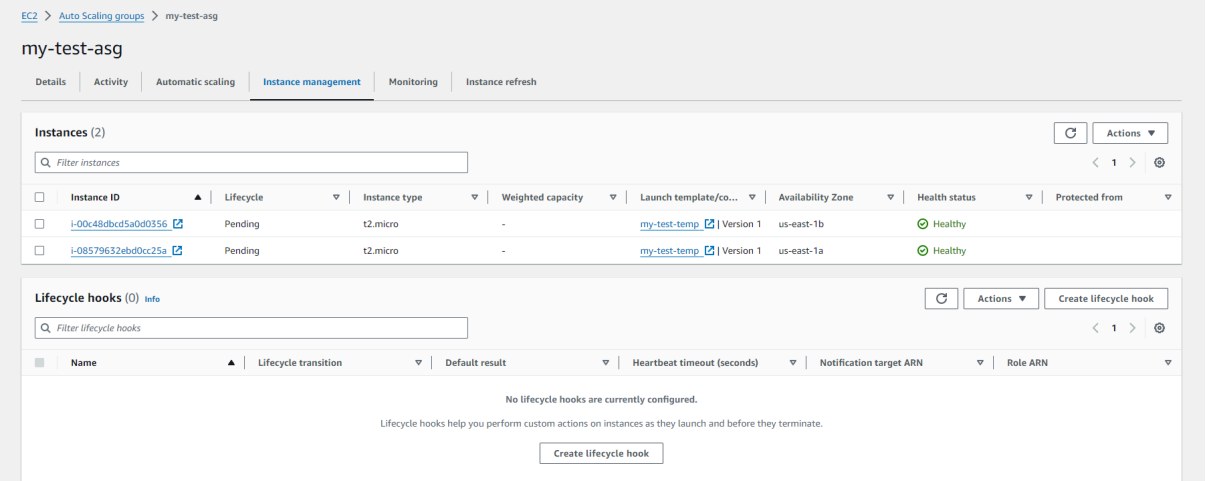
12. Attach the load balancer



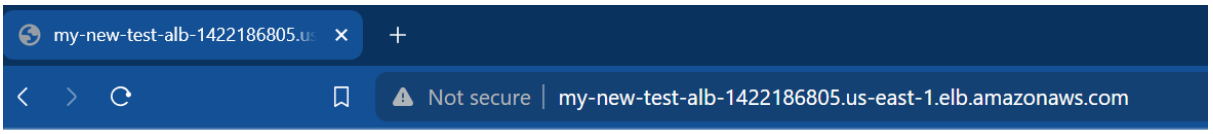
13. Configure group size as below:



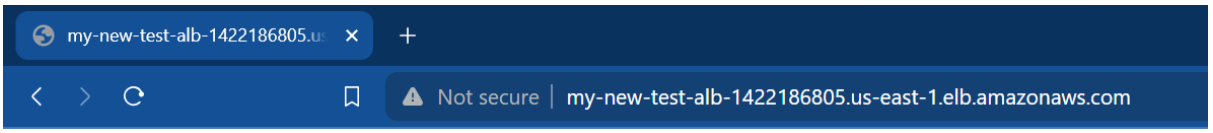
14. Created the Auto Scaling Group Successfully: What a relief!!, here are the created instances by ASG



15. After fourth attempt, finally got this result: each refresh will point to new EC2 instance, (dns name was copied from load balancer and then pasted as below)



Hello World from ip-12-0-3-39.ec2.internal



Hello World from ip-12-0-1-52.ec2.internal