

# USER MANUAL

10/10/2023

# I. Introduction

This project will extend/modify the infrastructure and program developed in project phoot album.

## II. Create a secure Virtual Private Cloud (VPC)

The VPC is named 'AKaggdasVPC' because we need to give it a name using the initial of our first name and Last name. The VPC has two availability zones each with a private and public subnet with suitable CIDR.

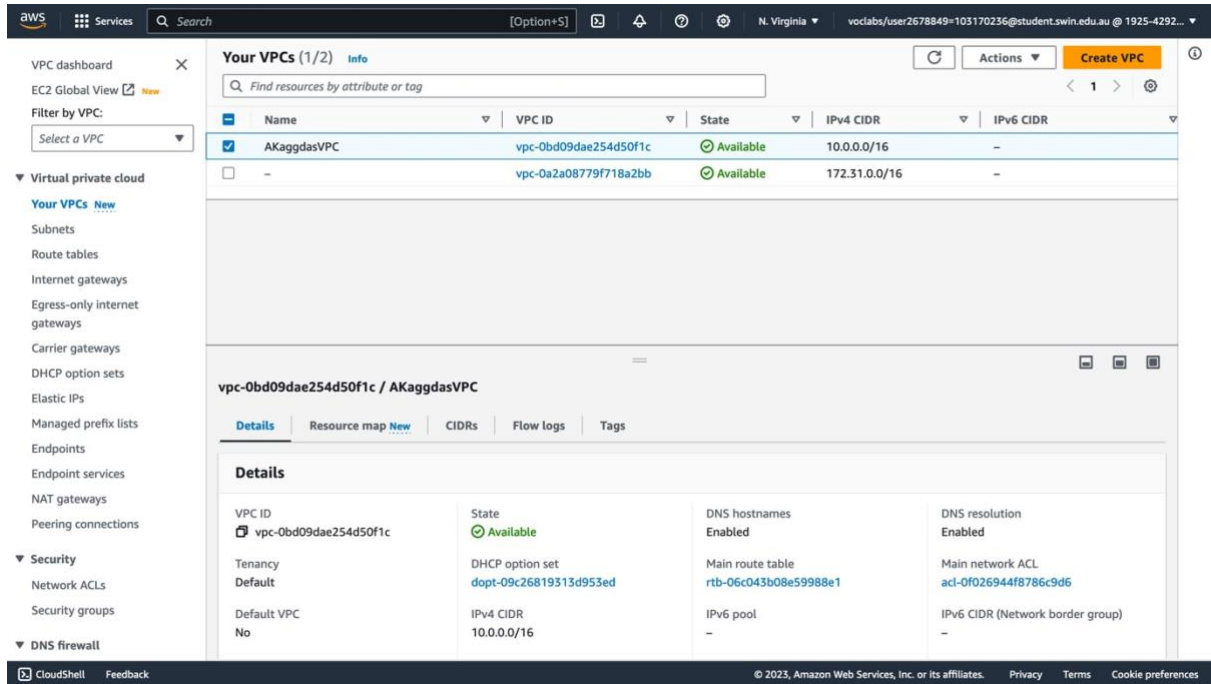


Figure 1 - Virtual Private Cloud

## III. Route Tables

### Public Route Table Configuration :

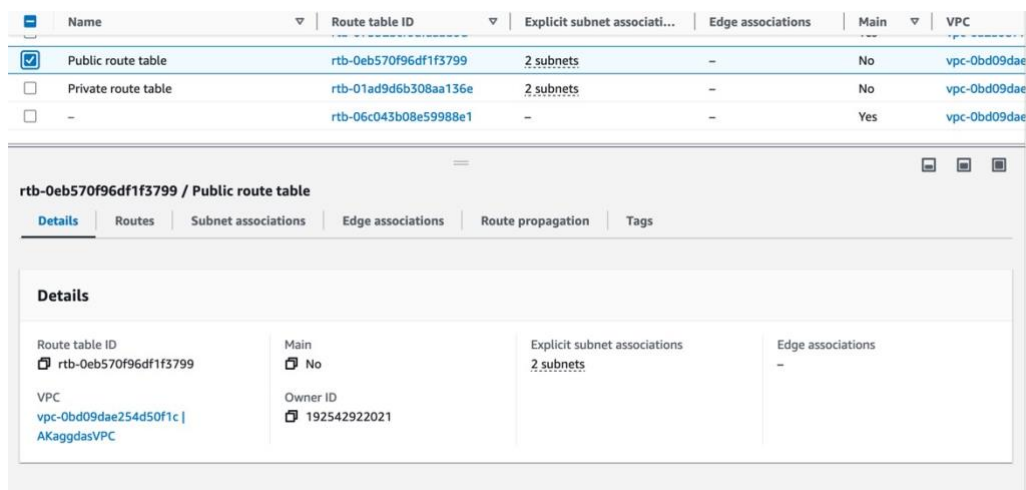


Figure 2 - Public Route table

Name	Route table ID	Explicit subnet associati...	Edge associations	Main	VPC
<input checked="" type="checkbox"/> Public route table	rtb-0eb570f96df1f3799	2 subnets	-	No	vpc-0bd09dae
<input type="checkbox"/> Private route table	rtb-01ad9d6b308aa136e	2 subnets	-	No	vpc-0bd09dae

rtb-0eb570f96df1f3799 / Public route table

Details

Routes

Subnet associations

Edge associations

Route propagation

Tags

Routes (2)

Both

Edit routes

Destination	Target	Status	Propagated
0.0.0.0/0	igw-05e2a9875bd673d22	Active	No
10.0.0.0/16	local	Active	No

Routes

Figure 3 - Public

<input checked="" type="checkbox"/> Public route table	rtb-0eb570f96df1f3799	2 subnets	-	No	vpc-0bd09dae
--	-----------------------	-----------	---	----	--------------

Explicit subnet associations (2)

Edit subnet associations

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
Public subnet 1	subnet-00204b1444c276d63	10.0.1.0/24	-
Public subnet 2	subnet-0cf3b28d6c1ecb2a	10.0.2.0/24	-

Subnets without explicit associations (0)

Edit subnet associations

The following subnets have not been explicitly associated with any route tables and are therefore associated with the main route table:

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
------	-----------	-----------	-----------

Figure 4 - Public Routes subnet associations

Private Route Table Configuration :

Name	Route table ID	Explicit subnet associati...	Edge associations	Main	VPC
<input type="checkbox"/> Public route table	rtb-0eb570f96df1f3799	2 subnets	-	No	vpc-0bd09dae
<input checked="" type="checkbox"/> Private route table	rtb-01ad9d6b308aa136e	2 subnets	-	No	vpc-0bd09dae
<input type="checkbox"/> -	rtb-06c043b08e59988e1	-	-	Yes	vpc-0bd09dae

rtb-01ad9d6b308aa136e / Private route table

Details

Routes

Subnet associations

Edge associations

Route propagation

Tags

Details

Route table ID

rtb-01ad9d6b308aa136e

VPC

vpc-0bd09dae254d50f1c | AKaggdasVPC

Main

No

Owner ID

192542922021

Explicit subnet associations

2 subnets

Edge associations

-

Figure 5 - Private Routes table

<input checked="" type="checkbox"/>	Private route table	rtb-01ad9d6b308aa136e	2 subnets	-	No	vpc-0b...
-------------------------------------	---------------------	-----------------------	-----------	---	----	-----------

rtb-01ad9d6b308aa136e / Private route table

Details

**Routes**

Subnet associations

Edge associations

Route propagation

Tags

Routes (2)

Both

< 1 >

Destination	Target	Status	Propagated
0.0.0.0/0	<a href="#">eni-015ba0c8714c06ca1</a>	Active	No
10.0.0.0/16	local	Active	No

Figure 6 - Private Routes

<input checked="" type="checkbox"/>	Private route table <input type="button" value="Edit"/>	rtb-01ad9d6b308aa136e	2 subnets	-	No	vpc-0b...
-------------------------------------	---	-----------------------	-----------	---	----	-----------

Explicit subnet associations (2)

Edit subnet associations

< 1 >

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
Private subnet 2	<a href="#">subnet-0619a143b04ef8fb3</a>	10.0.4.0/24	-
Private subnet 1	<a href="#">subnet-0ab0375adbc50e7de</a>	10.0.3.0/24	-

Subnets without explicit associations (0)

The following subnets have not been explicitly associated with any route tables and are therefore associated with the main route table:

< 1 >

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
------	-----------	-----------	-----------

Figure 7 - Private Routes subnet associations

## IV. Create Security groups

We create five security groups : 1] DevServerSG 2] DBServerSG. 3] ELBSG 4] NAT Server 5] Web Server . We edit the Inbound rules for all the three and leave the outbound rules to default.

The screenshot displays the AWS Management Console interface for the security group 'sg-0e2af0673a9db7d33 - DevServerSG'. The left sidebar shows the navigation menu with categories like EC2 Dashboard, Instances, Images, Elastic Block Store, and Network & Security. The main content area is titled 'sg-0e2af0673a9db7d33 - DevServerSG' and includes an 'Actions' dropdown. Below the title, the 'Details' section provides key information about the security group, including its name, ID, description, VPC ID, owner, and rule counts. The 'Inbound rules' tab is selected, showing a list of four inbound rules with columns for Name, Security group rule, IP version, Type, Protocol, and Port range.

Name	Security group rule...	IP version	Type	Protocol	Port range
-	sgr-0c112a3e751f0f5f2	IPv4	All ICMP - IPv4	ICMP	All
-	sgr-0783384a06622b...	IPv4	HTTP	TCP	80
-	sgr-02cce3e89eb48f0d6	IPv4	HTTPS	TCP	443
-	sgr-067b752924ad3d...	IPv4	SSH	TCP	22

Figure 8 –Dev Server Security Group

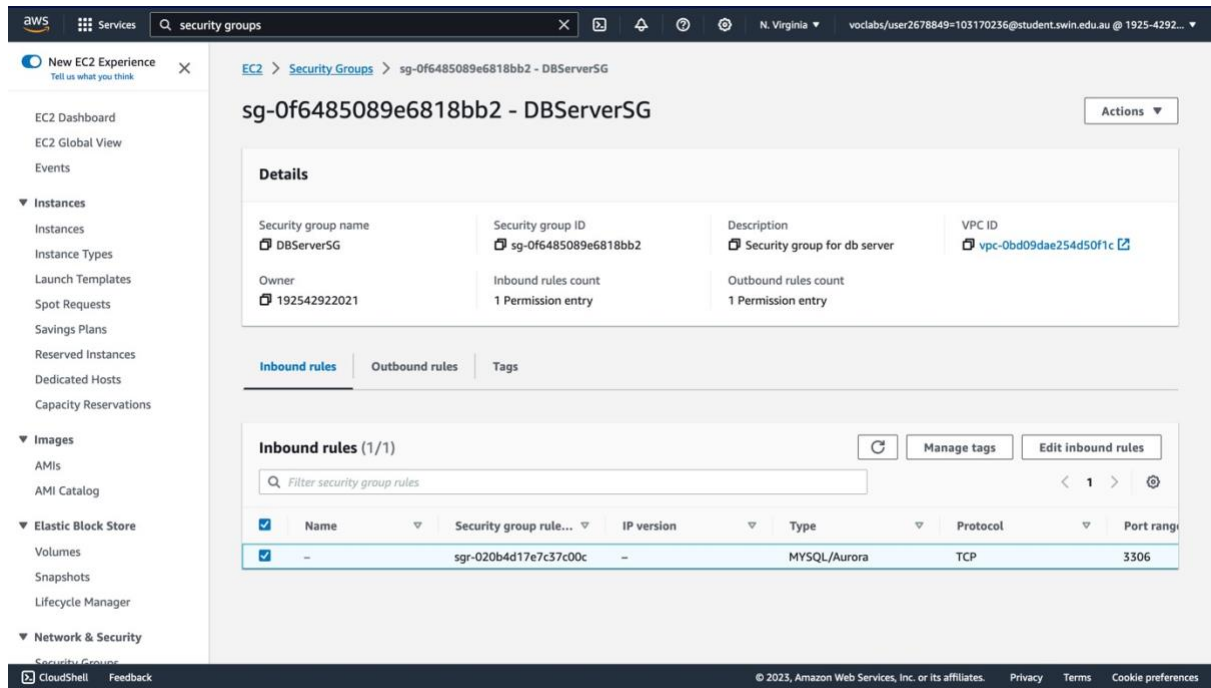


Figure 9 – DBServer Security Group

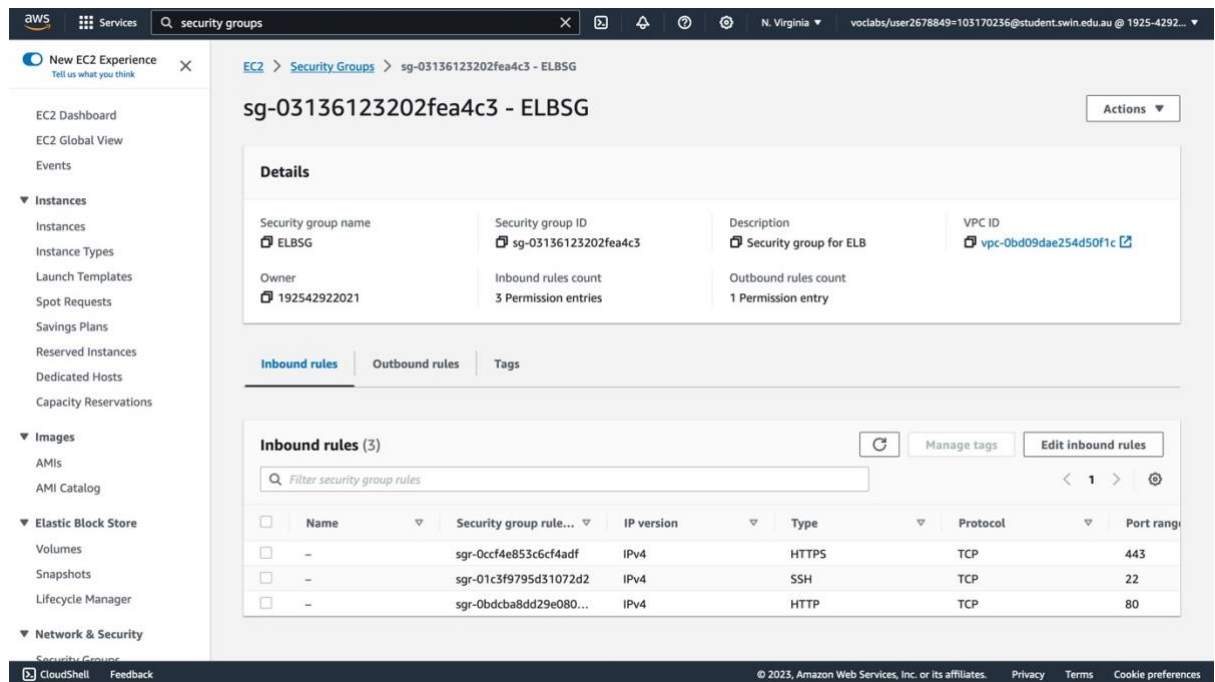


Figure 10 – ELBSG Security Group

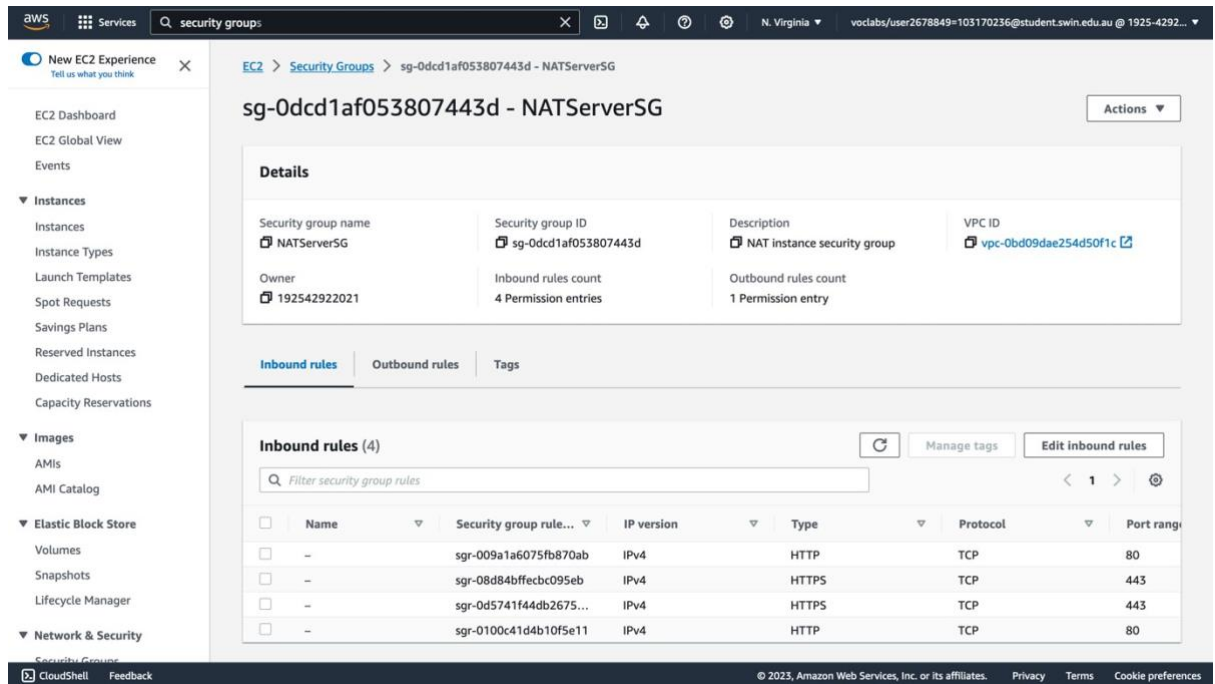


Figure 11: NAT Server Security Group

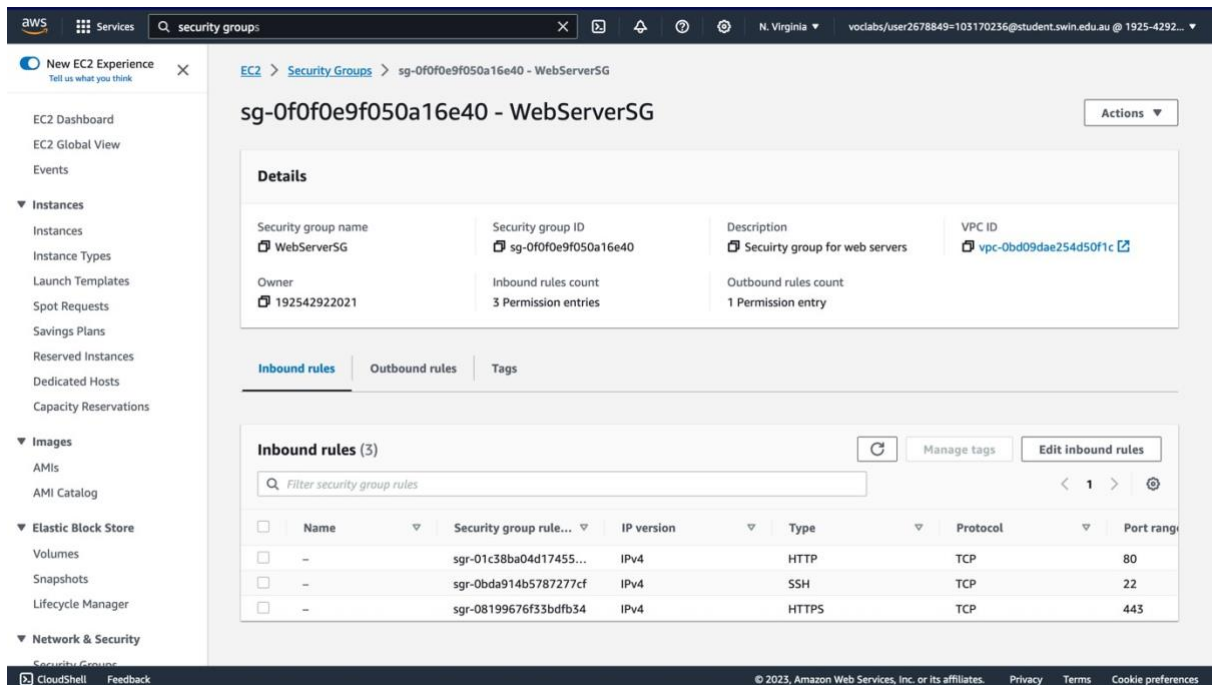


Figure 12 – WebServer Security Group

## V. Create Key Pair

We create a key pair to associate with the EC2 instances .We name the key pair 'assignment2'.

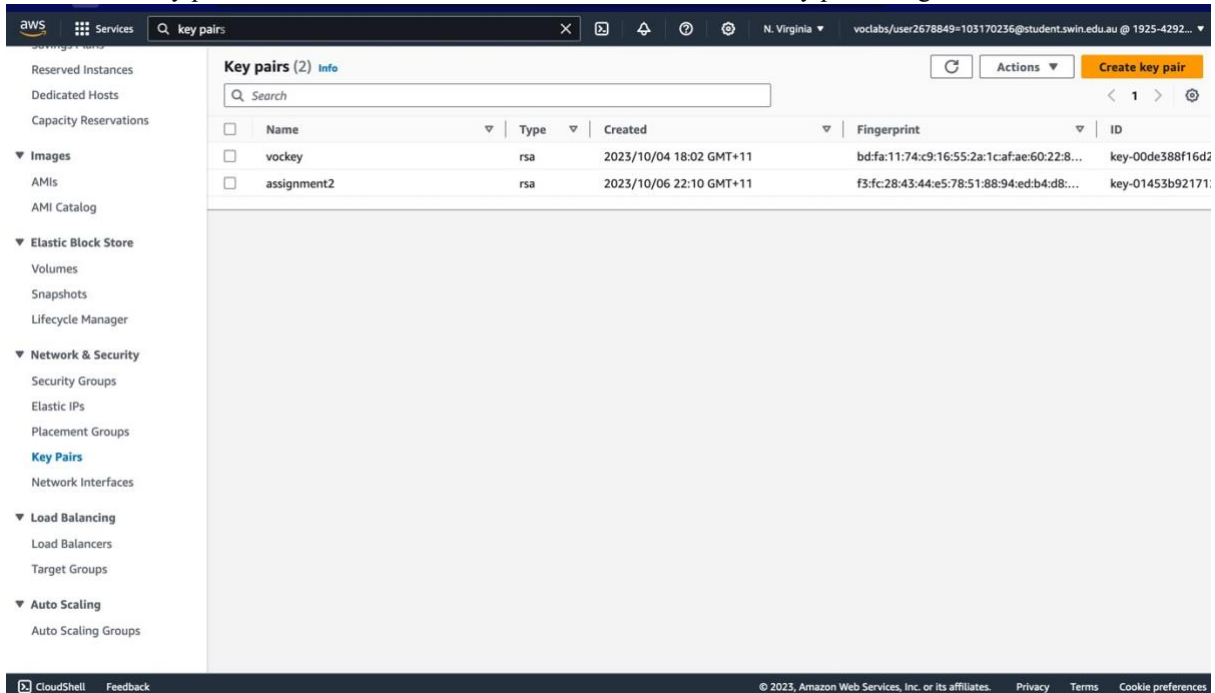


Figure 13 - Key Pair

## VI. Create EC2 Instances

We create two EC2 instances, a 'Dev server' instance and a 'Nat' instance. The Nat instance is created in order for the instances launched by the auto scaling group to communicate to resources outside the VPC(the internet). The 'Dev server' instance is created with all necessary configurations and an AMI of this instance created to launch the auto scaling group.



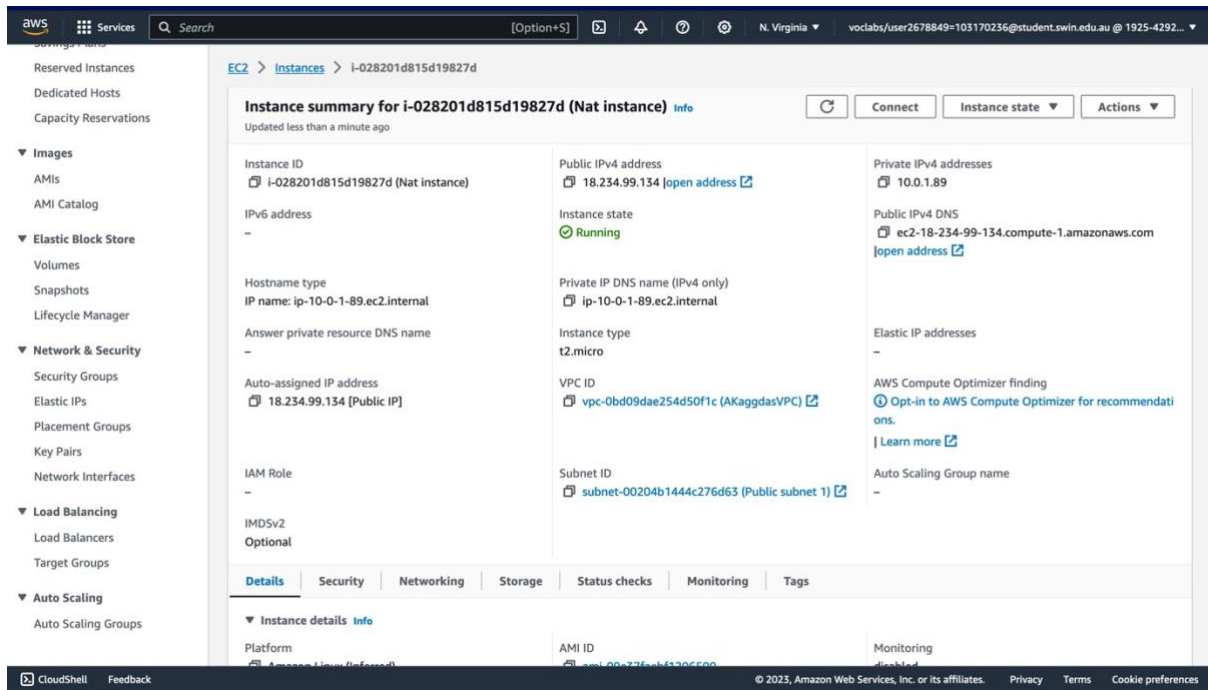


Figure 14 : Summary of Nat Instance

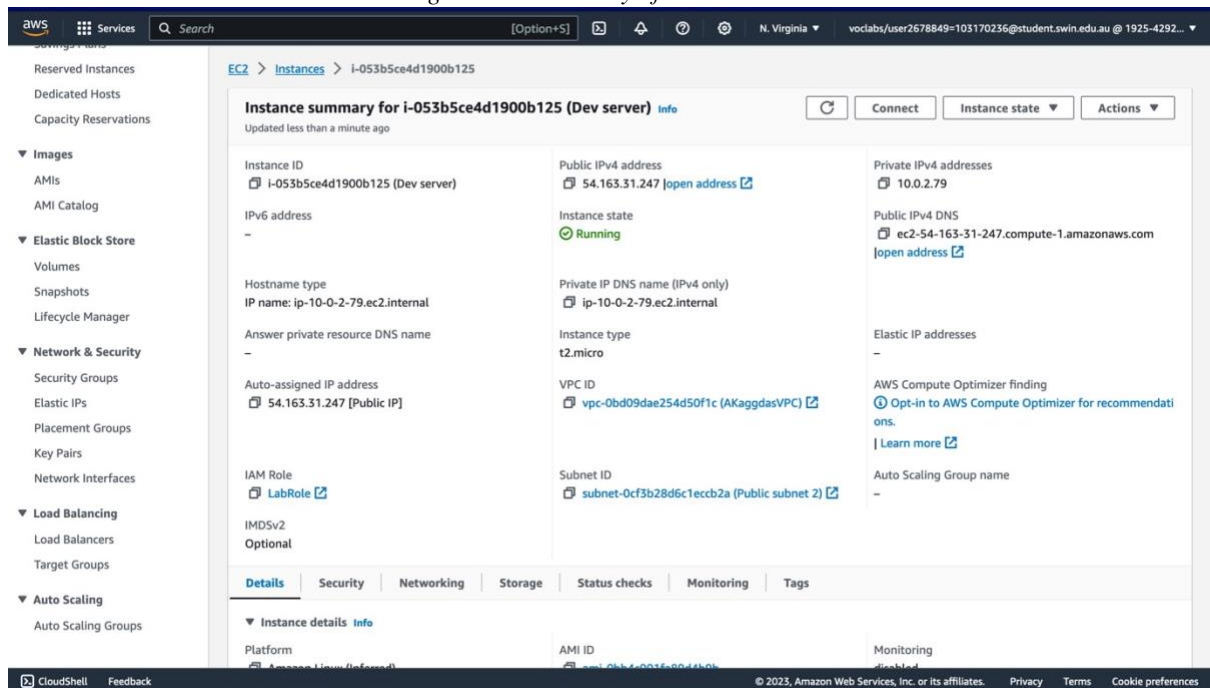


Figure 15: Summary of Dev server Instance

## VII. Create an Amazon RDS DB Instance

We name the RDS 'photoalbum'.

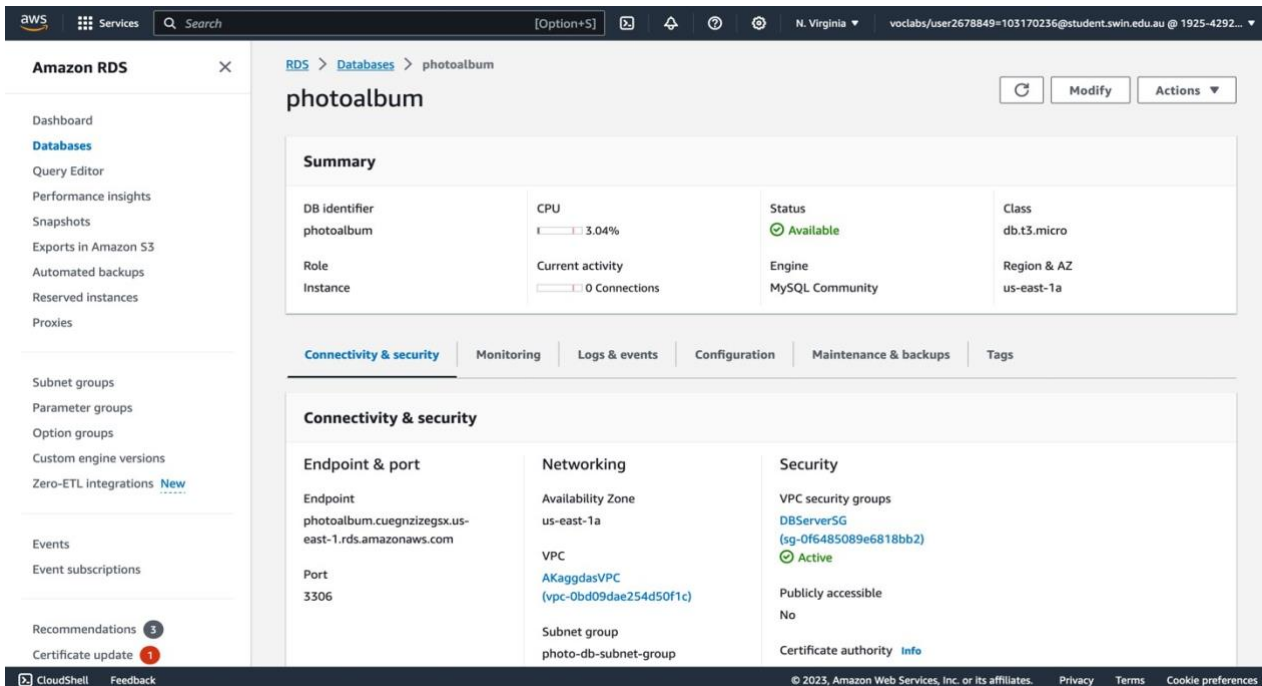


Figure 16- Summary of photoalbum RDS

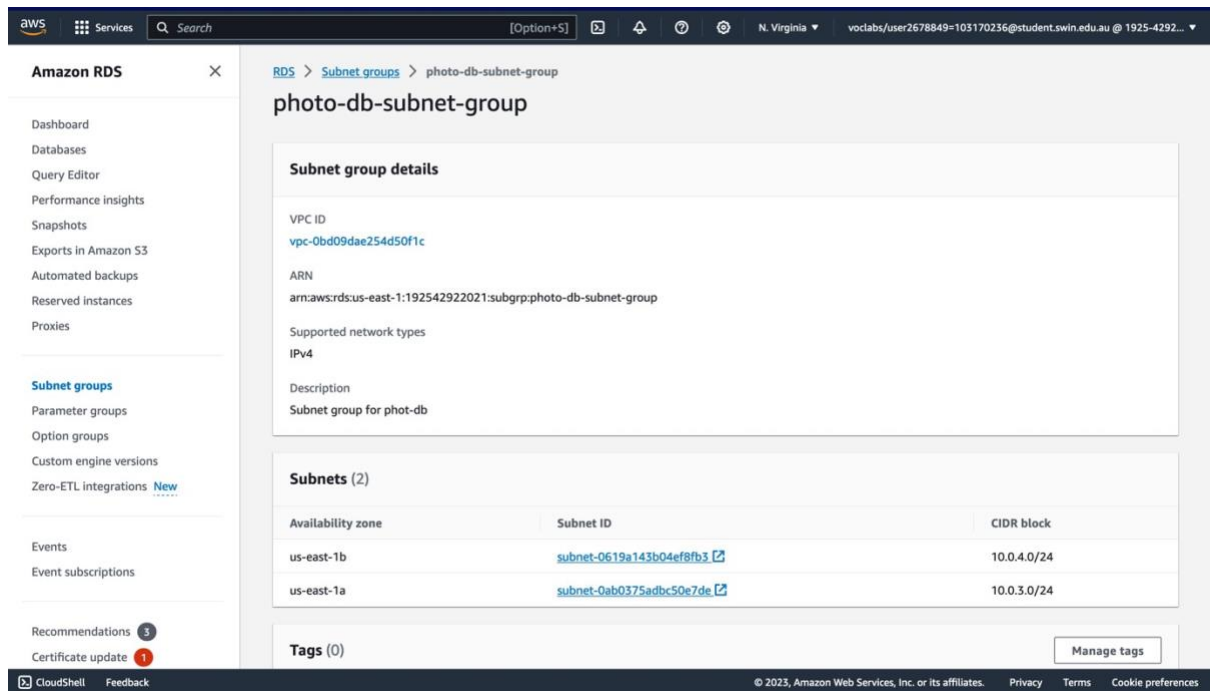


Figure 17- photo-db-subnet-group

## VIII. S3 photo storage

We create an S3 bucket and name it 'aish-photos-bucket' to store our photos.

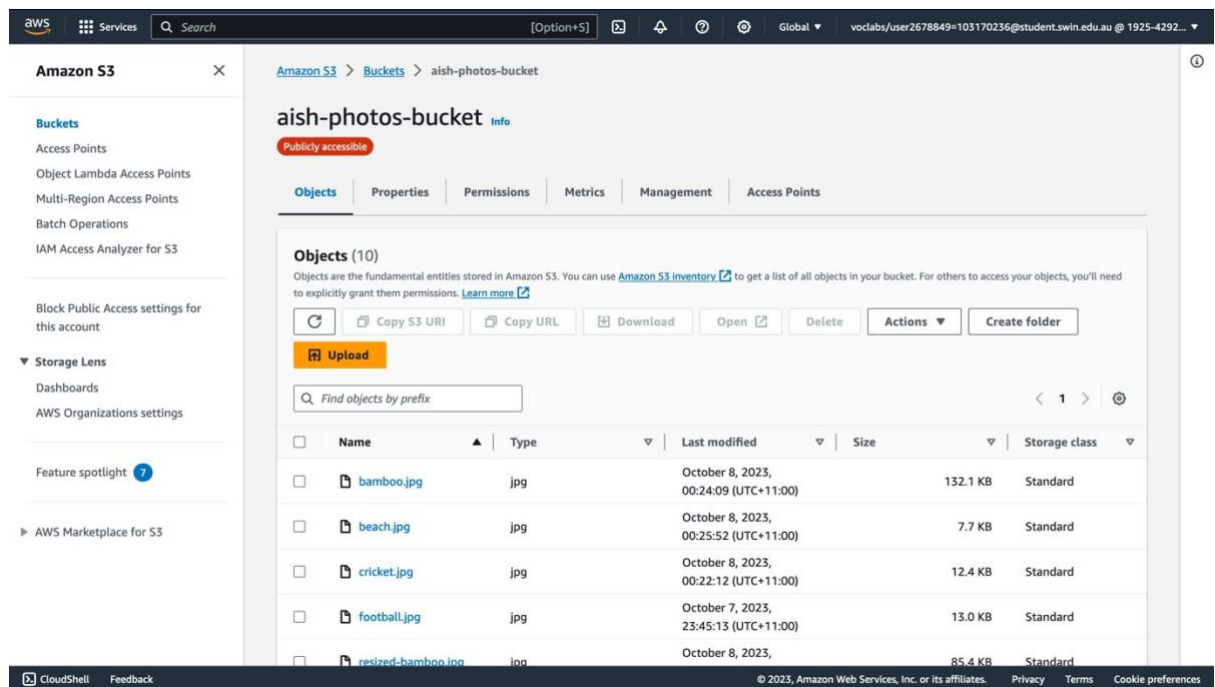


Figure 18 – aish-photos bucket Objects

Below is the screenshot of the bucket policy attached to our bucket, essentially this bucket only allows our website with the load balancer dns to retrieve the images from the bucket and display them to the user.

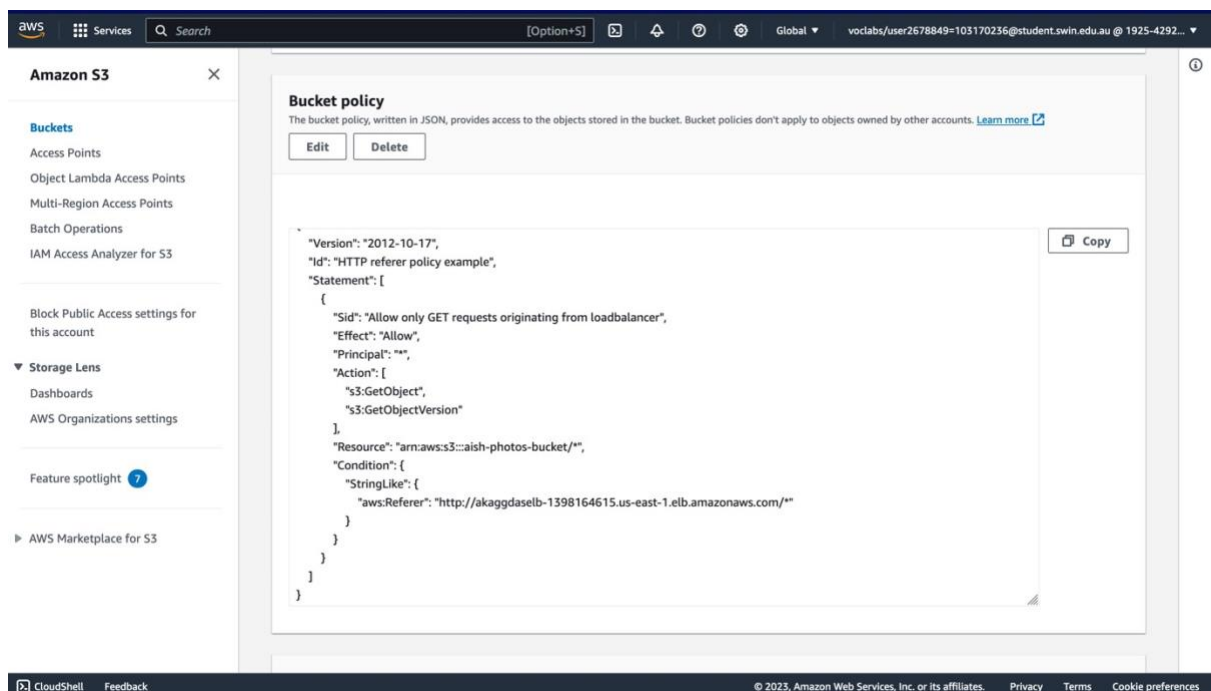


Figure 19 – aish-photos bucket policy

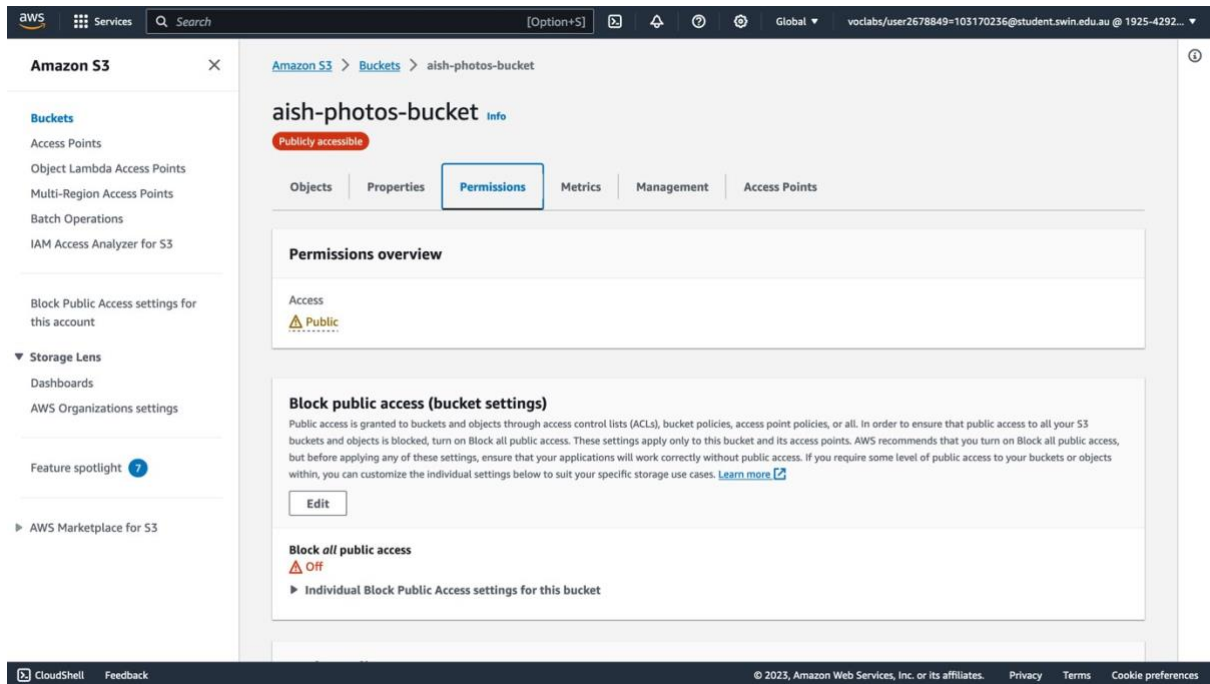


Figure 20 – aish-photos permissions

## IX. Auto Scaling Group and Load Balancer

We create an AMI for Auto Scaling and name it DevServer AMI.

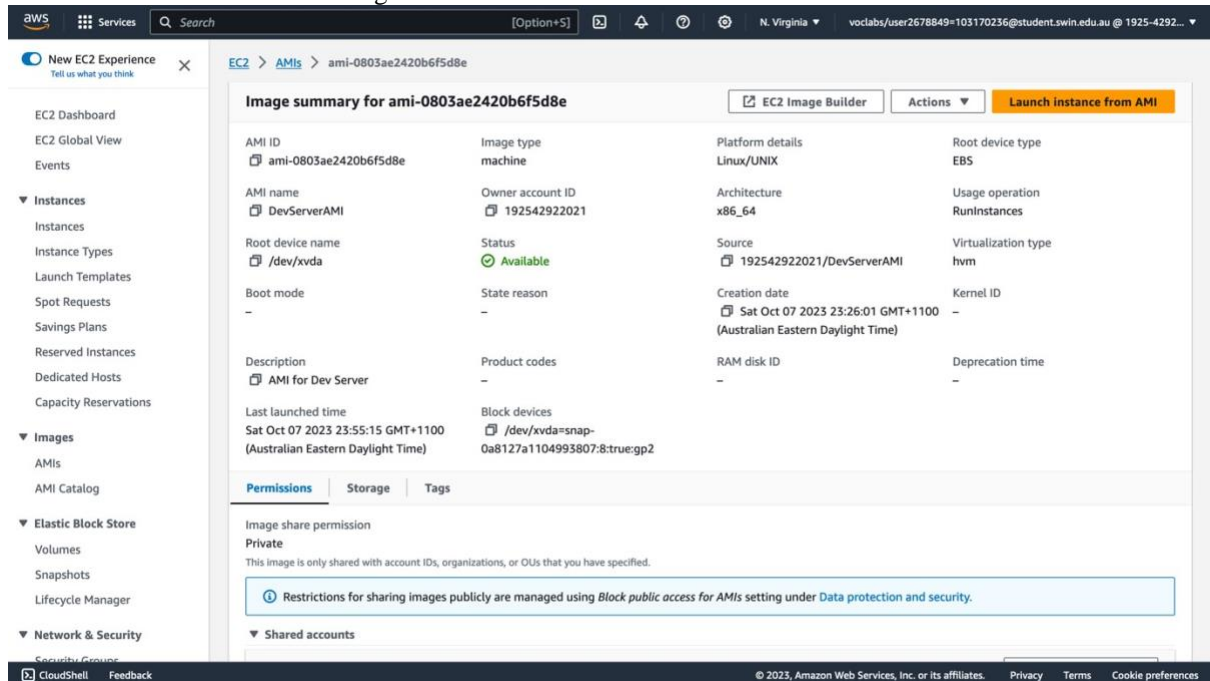


Figure 21 – DevServer AMI

We create target group. *Targets* are the individual instances that will respond to requests from the Load Balancer.

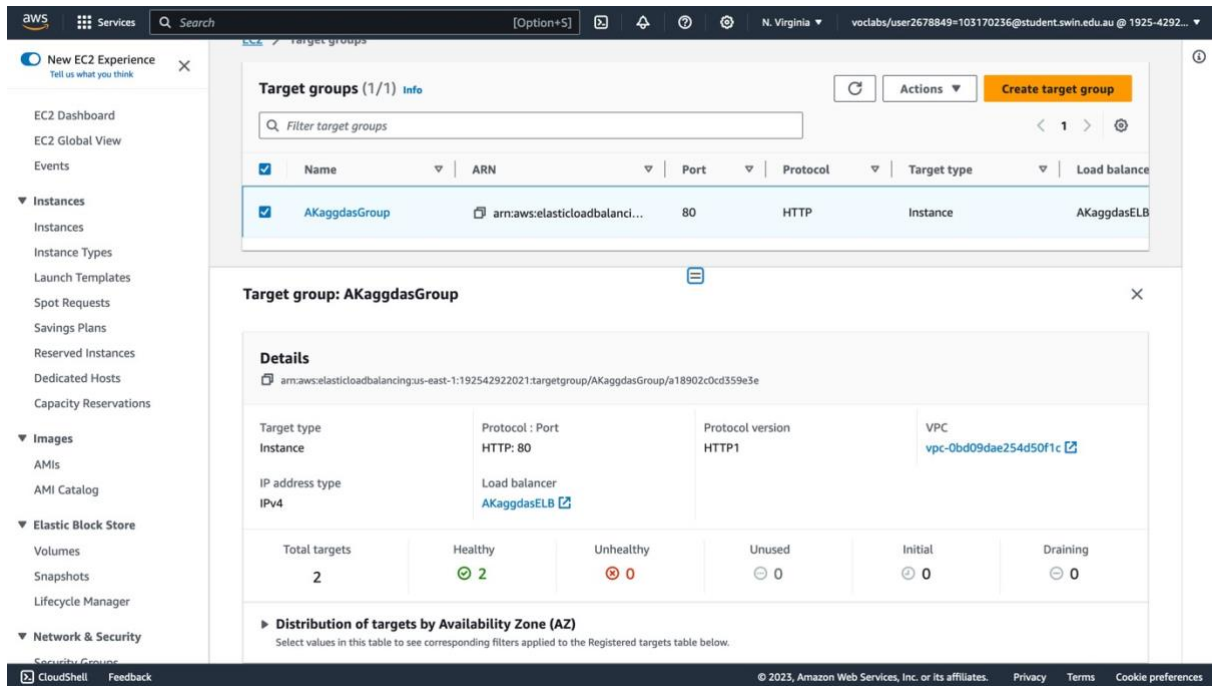


Figure 22: AKaggdasGroup Target Group

We name the load balancer 'AKaggdasELB'.

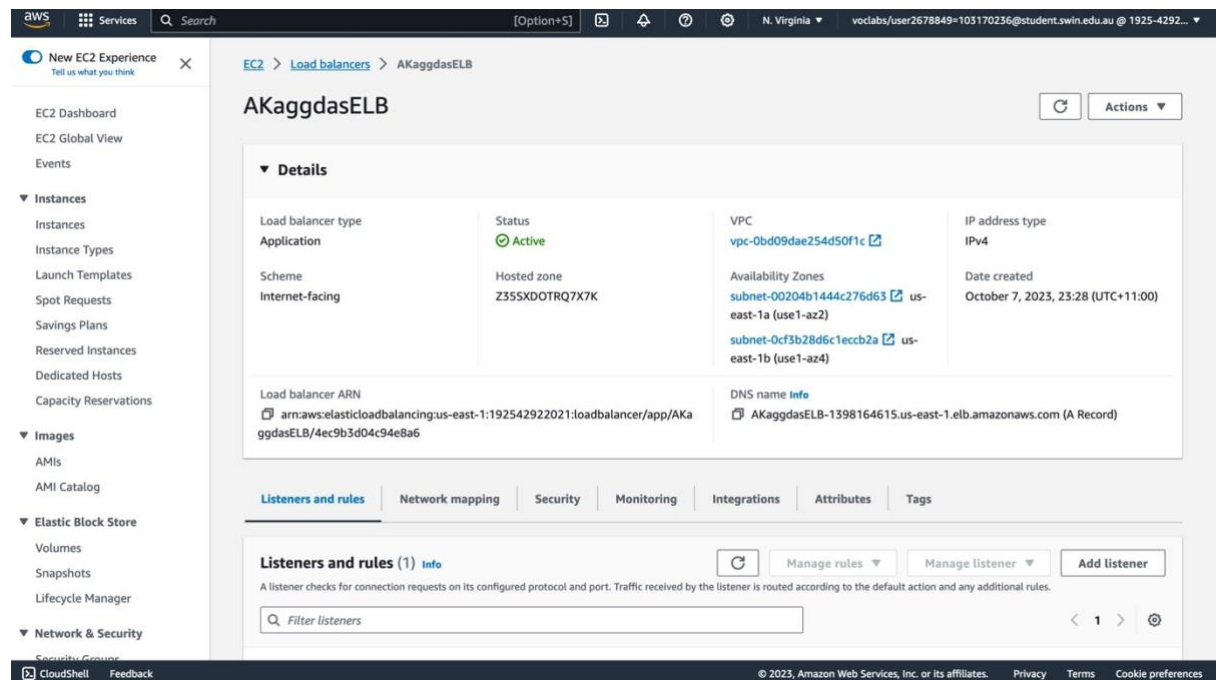


Figure 23 – AKaggdasELB load balancer

We will create a *launch template* for the Auto Scaling group and name it 'AKaggdasConfig'.



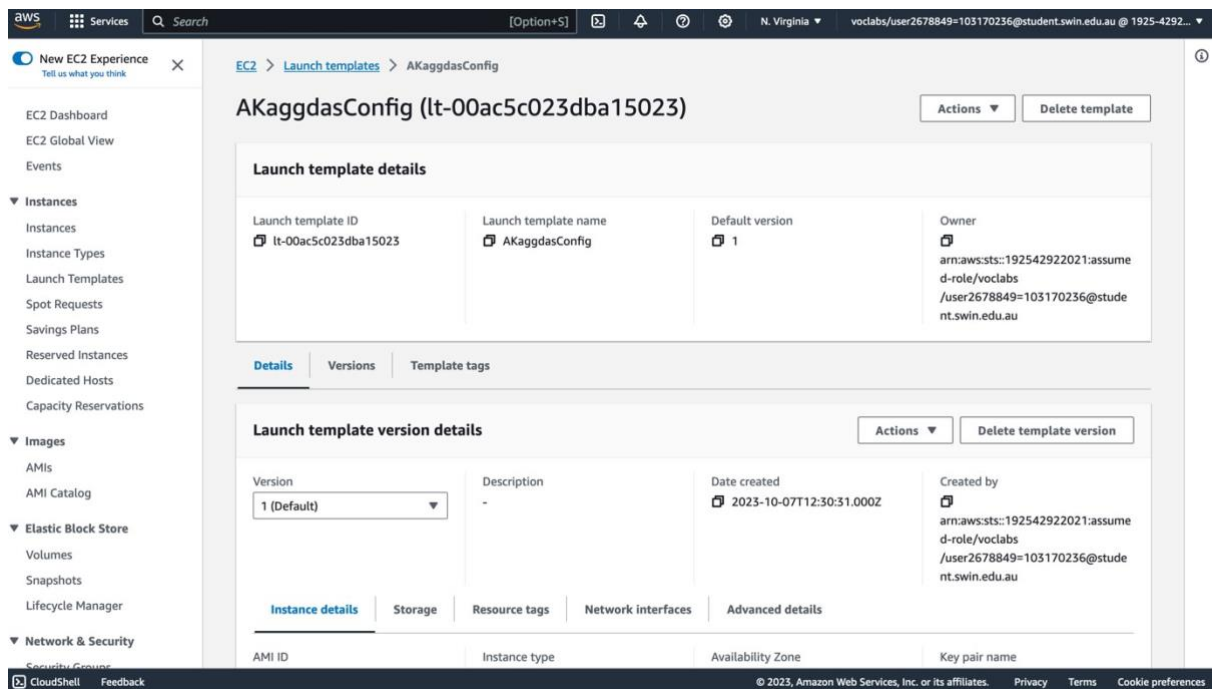


Figure 24 – AKaggdasConfig Launch Template

We name the auto scaling group 'AKaggdas'.

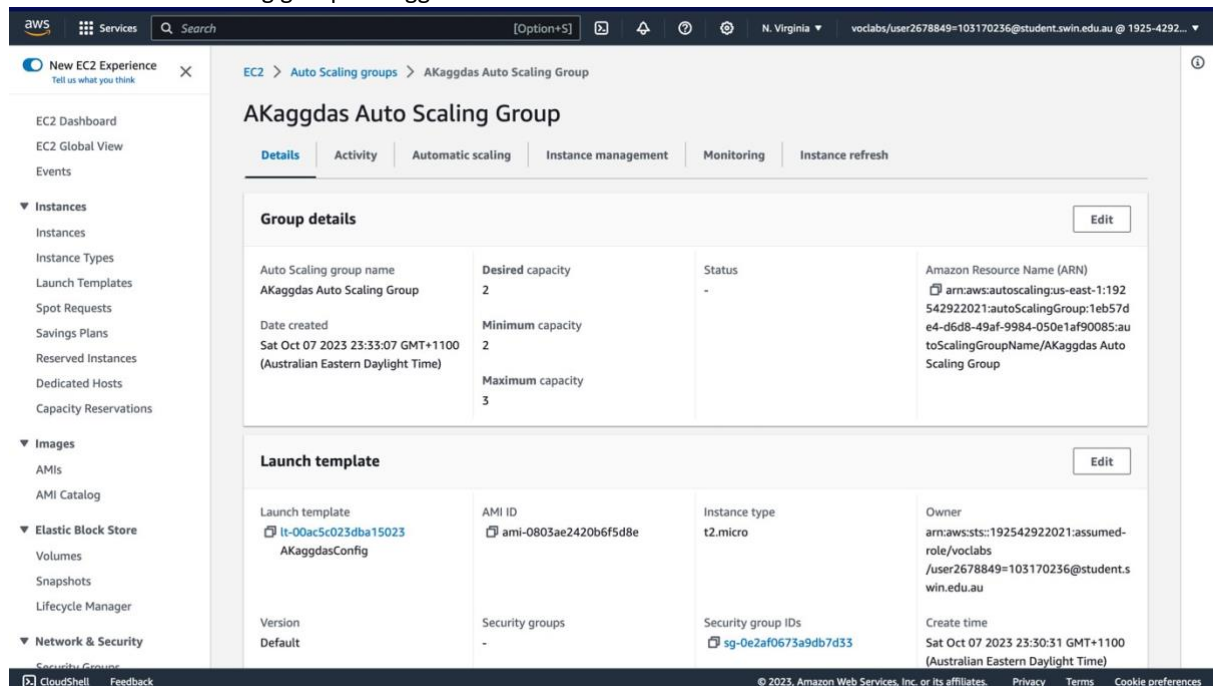


Figure 25 – AKaggdas Auto Scaling group

The auto scaling group launches web server instances, with a default of two and a maximum of three. Even if the web server instance is terminated, they will automatically be launched by autoscaling group.

<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone
<input type="checkbox"/>	Web servers	i-08a45c4a6cdabc440	Running	t2.micro	2/2 checks passed	No alarms +	us-east-1a
<input type="checkbox"/>	Dev server	i-053b5ce4d1900b125	Running	t2.micro	2/2 checks passed	No alarms +	us-east-1b
<input type="checkbox"/>	Web servers	i-01b66fb344563dd5b	Running	t2.micro	2/2 checks passed	No alarms +	us-east-1b
<input type="checkbox"/>	Nat instance	i-028201d815d19827d	Running	t2.micro	2/2 checks passed	No alarms +	us-east-1a

Figure 26: Web server instances

The screenshot shows the AWS Management Console interface for an EC2 instance. The left sidebar contains navigation links for EC2 Dashboard, EC2 Global View, Events, Instances, Instance Types, Launch Templates, Spot Requests, Savings Plans, Reserved Instances, Dedicated Hosts, Capacity Reservations, Images, AMIs, AMI Catalog, Elastic Block Store, Volumes, Snapshots, Lifecycle Manager, Network & Security, and Security Groups. The main content area displays the 'Instance summary for i-08a45c4a6cdabc440 (Web servers)'. The instance is in a 'Running' state. Key details include: Instance ID i-08a45c4a6cdabc440, Public IPv4 address 10.0.3.35, Private IPv4 addresses 10.0.3.35, Instance state Running, Private IP DNS name ip-10-0-3-35.ec2.internal, Instance type t2.micro, VPC ID vpc-0bd09dae254d50f1c, Subnet ID subnet-0ab0375adbc50e7de, IAM Role LabRole, and Auto Scaling Group name AKaggdas Auto Scaling Group. The console also shows an AWS Compute Optimizer finding recommending to opt-in to AWS Compute Optimizer for recommendations.

Figure 27: Summary of Web server instance

## XI. IAM

The IAM role 'LabRole' is attached to the lambda function and automatically to the web servers when launched.

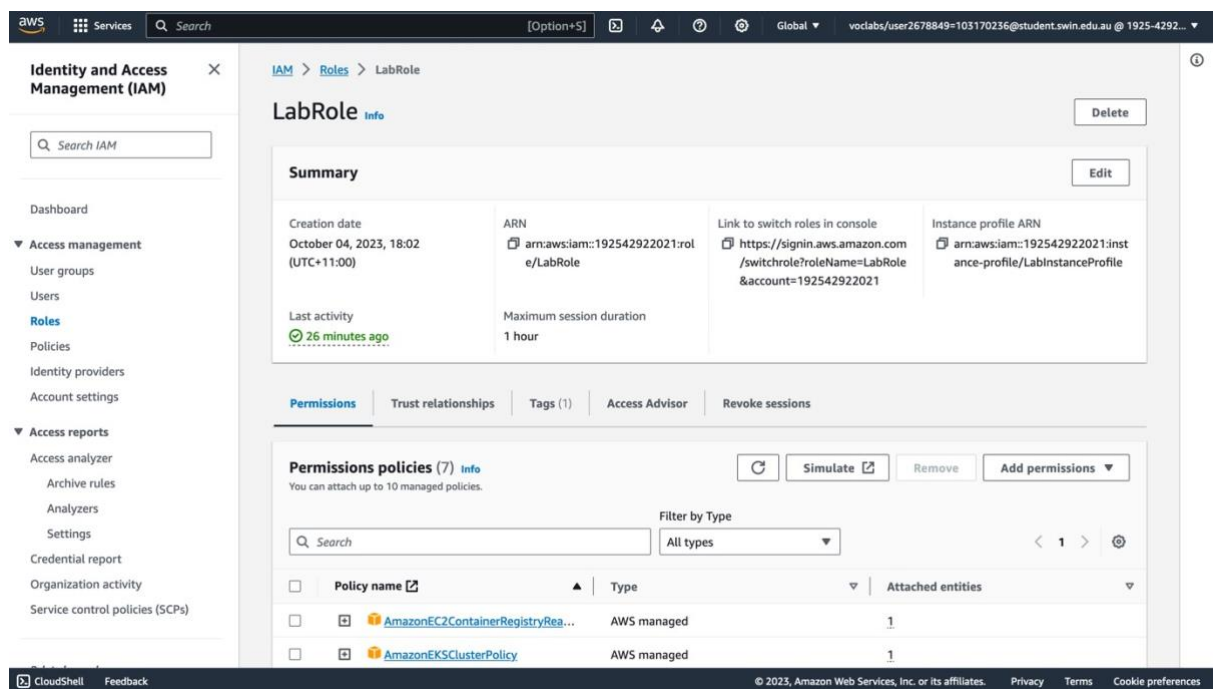


Figure 28: 'Lab Role ' IAM

## XII. Lambda

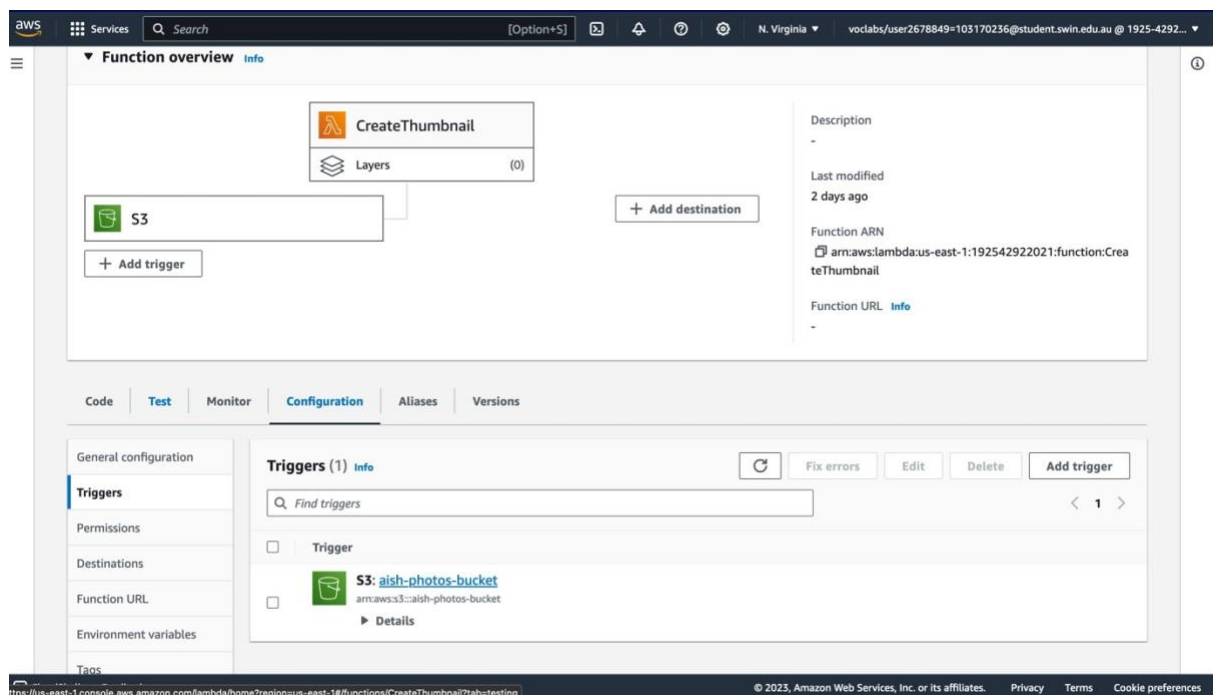


Figure 29: Function overview of Lambda 'CreateThumbnail'



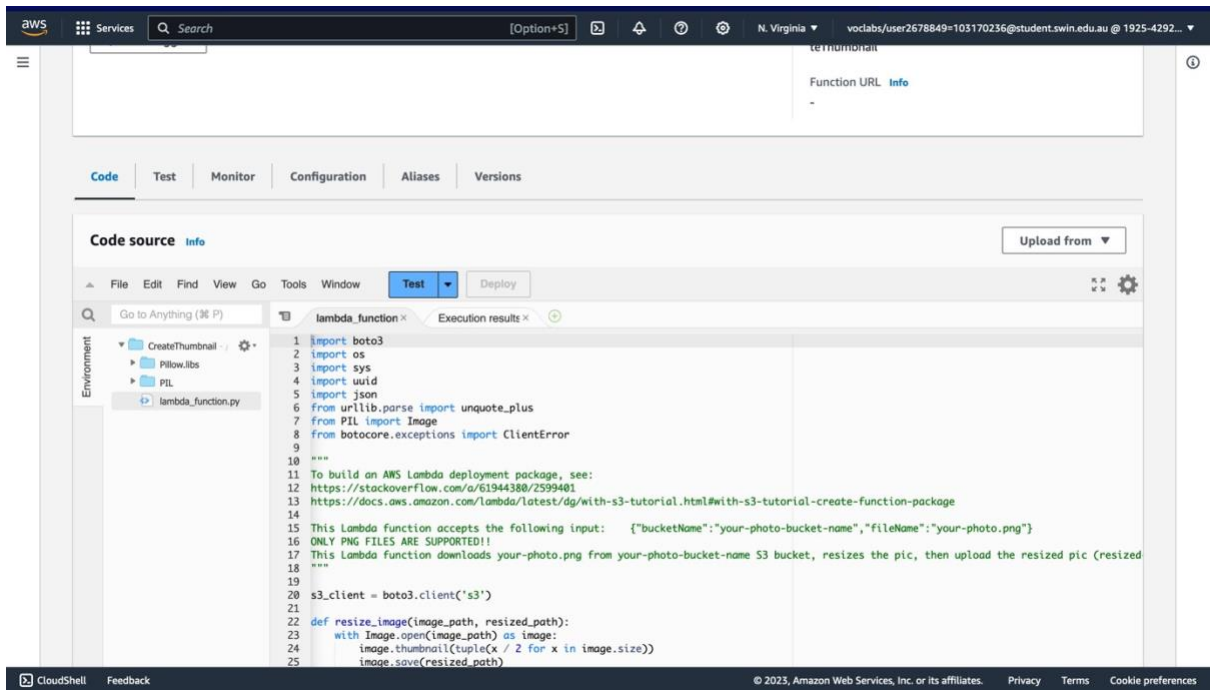


Figure 30: Lambda Function code

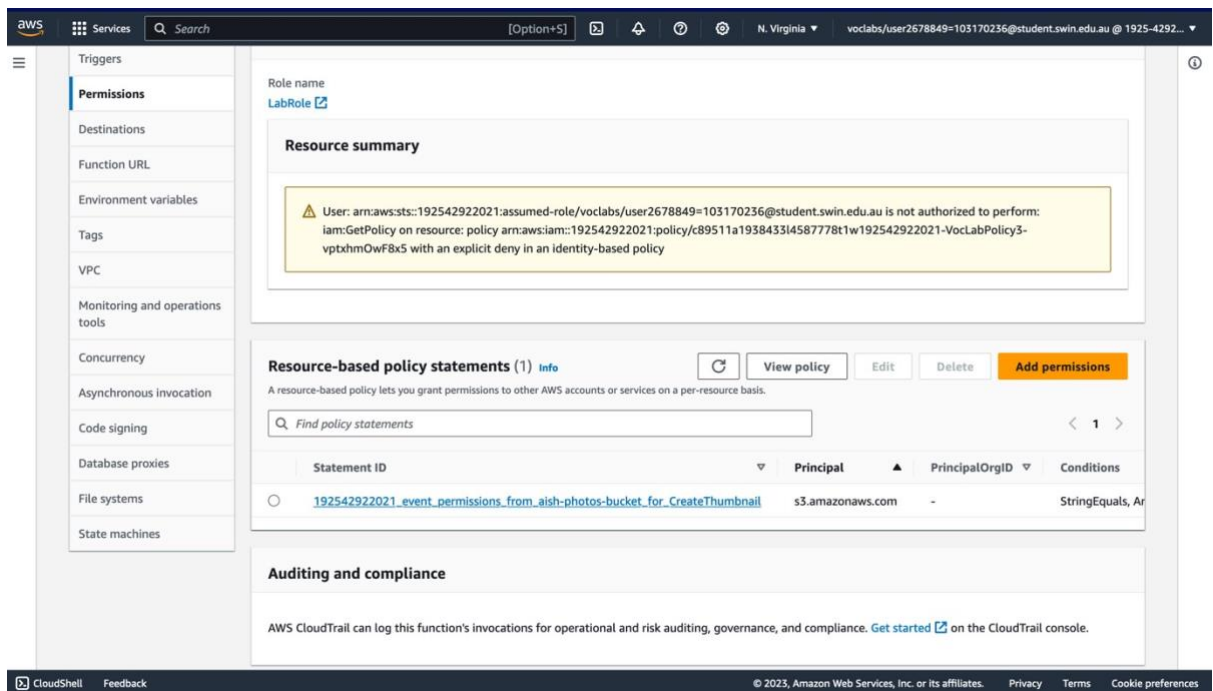


Figure 31: Lambda Permissions

## XIV. Testing

- Check the S3 bucket to see if photos are actually uploaded and if their resized versions are created

**Objects (10)**

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

<input type="checkbox"/>	Name	Type	Last modified	Size	Storage class
<input type="checkbox"/>	<a href="#">bamboo.jpg</a>	jpg	October 8, 2023, 00:24:09 (UTC+11:00)	132.1 KB	Standard
<input type="checkbox"/>	<a href="#">beach.jpg</a>	jpg	October 8, 2023, 00:25:52 (UTC+11:00)	7.7 KB	Standard
<input type="checkbox"/>	<a href="#">cricket.jpg</a>	jpg	October 8, 2023, 00:22:12 (UTC+11:00)	12.4 KB	Standard
<input type="checkbox"/>	<a href="#">football.jpg</a>	jpg	October 7, 2023, 23:45:13 (UTC+11:00)	13.0 KB	Standard
<input type="checkbox"/>	<a href="#">resized-bamboo.jpg</a>	jpg	October 8, 2023, 00:24:10 (UTC+11:00)	85.4 KB	Standard
<input type="checkbox"/>	<a href="#">resized-beach.jpg</a>	jpg	October 8, 2023, 00:25:53 (UTC+11:00)	3.6 KB	Standard
<input type="checkbox"/>	<a href="#">resized-cricket.jpg</a>	jpg	October 8, 2023, 00:22:13 (UTC+11:00)	4.0 KB	Standard
<input type="checkbox"/>	<a href="#">resized-football.jpg</a>	jpg	October 7, 2023, 23:45:14 (UTC+11:00)	4.7 KB	Standard

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Figure 32 : S3 objects

- Check the database to see if their meta-data is recorded.

phpMyAdmin

Server: photoalbum.cueghzdegox.us-east-1.rds.amazonaws.com Database: photoalbum Table: photo\_metadata

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

Showing rows 0 - 4 (5 total, Query took 0.0006 seconds.)

SELECT \* FROM `photo\_metadata`

Profiling [ Edit inline ] [ Edit ] [ Explain SQL ] [ Create PHP code ] [ Refresh ]

Show all | Number of rows: 25 | Filter rows: Search this table

Extra options

title	description	creationdate	keywords	reference
Swinburne Logo	Logo of Swinburne uni	2021-09-08	logo, university	https://aish-photos-bucket.s3.amazonaws.com/swinbu...
Football	Football image	2023-09-27	logo, sport	https://aish-photos-bucket.s3.amazonaws.com/footba...
Cricket	Sport	2023-09-19	logo, sport	https://aish-photos-bucket.s3.amazonaws.com/cricke...
Bamboo Tree	Logo of bamboo tree	2020-02-01	logo, tree	https://aish-photos-bucket.s3.amazonaws.com/bambo...
Beach	Picture of beach	2022-07-20	image, beach	https://aish-photos-bucket.s3.amazonaws.com/beach....

Show all | Number of rows: 25 | Filter rows: Search this table

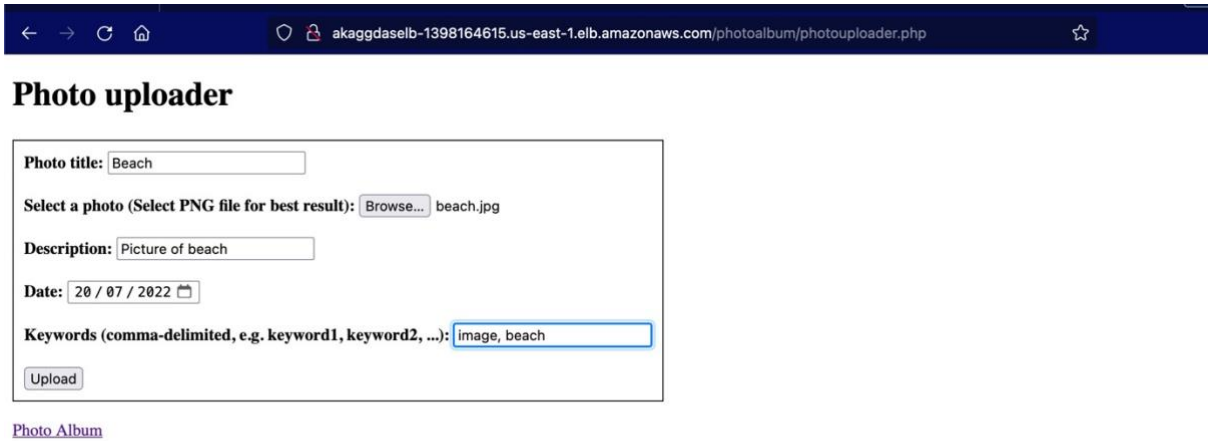
Query results operations

Print Copy to clipboard Export Display chart Create view

Console

Figure 33: photo\_metadata

The PhotoAlbum website is accessible through the load balancer only.



**Photo uploader**

Photo title:

Select a photo (Select PNG file for best result):  beach.jpg

Description:

Date:

Keywords (comma-delimited, e.g. keyword1, keyword2, ...):

[Photo Album](#)

Figure 34: photouploader.php

URL of photouploader.php : <http://akaggdaseib-1398164615.us-east-1.elb.amazonaws.com/photoalbum/photouploader.php>

URL of album.php : <http://akaggdaseib-1398164615.us-east-1.elb.amazonaws.com/photoalbum/album.php>



Student name: Aishwarya Kaggdas

Student ID: 103170236

Tutorial session: Friday 06:30PM

**Uploaded photos:**

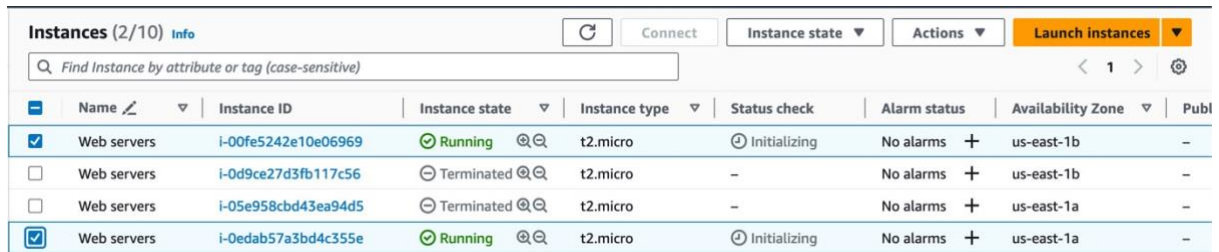
[Upload more photos](#)

Photo	Name	Description	Creation date	Keywords
	Swinburne Logo	Logo of Swinburne uni	2021-09-08	logo, university
	Football	Football image	2023-09-27	logo, sport
	Cricket	Sport	2023-09-19	logo, sport
	Bamboo Tree	Logo of bamboo tree	2020-02-01	logo, tree

■

Figure 35:album.php

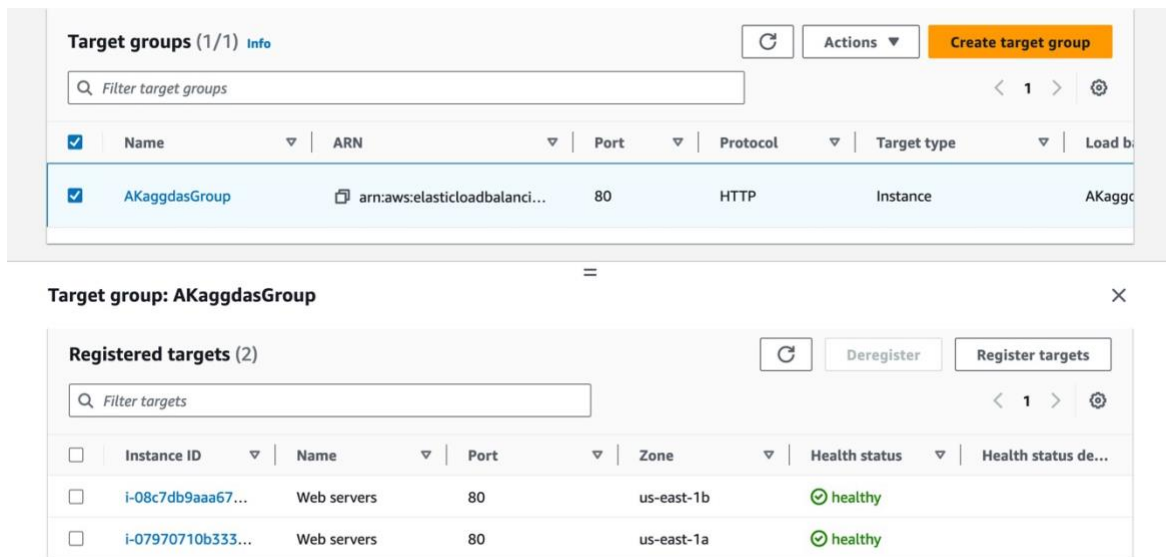
Terminate servers then check to see if replacement EC2 instances are automatically deployed by the ASG. Thoroughly test the functionality of the website again once new instances have been launched .



	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Publ
<input checked="" type="checkbox"/>	Web servers	i-00fe5242e10e06969	Running	t2.micro	Initializing	No alarms +	us-east-1b	-
<input type="checkbox"/>	Web servers	i-0d9ce27d3fb117c56	Terminated	t2.micro	-	No alarms +	us-east-1b	-
<input type="checkbox"/>	Web servers	i-05e958cbd43ea94d5	Terminated	t2.micro	-	No alarms +	us-east-1a	-
<input checked="" type="checkbox"/>	Web servers	i-0edab57a3bd4c355e	Running	t2.micro	Initializing	No alarms +	us-east-1a	-

Figure 36:Web server instances terminated and launched again

- All EC2 targets are healthy.



	Name	ARN	Port	Protocol	Target type	Load b...
<input checked="" type="checkbox"/>	AKaggdasGroup	arn:aws:elasticloadbalanci...	80	HTTP	Instance	AKagge

	Instance ID	Name	Port	Zone	Health status	Health status de...
<input type="checkbox"/>	i-08c7db9aaa67...	Web servers	80	us-east-1b	healthy	
<input type="checkbox"/>	i-07970710b333...	Web servers	80	us-east-1a	healthy	

Figure 37 : 'AKaggdasGroup' target

■

Test direct access to your S3 photos, which should not be publicly accessible.



*Figure 38 :Direct access to S3 photos denied*