

NWEN243 Project 3 Lab Report Part A

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This lab report documents how I followed the steps laid out in part A of the instructions of the project. NOTE: answers to the questions in the PDF highlighted in red start at page 20.

Preliminary

```
import java.io.IOException;
import java.net.ServerSocket;
import java.net.Socket;

/**
 * Health Check for the server. Accepts a connection and immediately drops it.
 * Only works on port 5001, which has been selected in the AWS instance
 * security group.
 */
public class MusicGuruHealthCheck {

    //takes 1 argument, port
    public static void main(String[] args) {
        int port = Integer.parseInt(args[0]);
        try (ServerSocket serverSocket = new ServerSocket(port)) {
            while (true) {
                Socket clientSocket = serverSocket.accept();
                clientSocket.close();
            }
        } catch (IOException e) {
            e.printStackTrace();
        }
    }
}
```

This shows the code I used for the health check server. It constantly loops around accepting and closing socket connections.

```
GNU nano 6.2
#!/bin/sh
cd /home/ec2-user/
java MusicGuruServer 5000 &
java MusicGuruHealthCheck 5001 &
```

This code shows the run.sh file, edited to start up the health check server when the instance is started. The health check server is situated on port 5001 on my instance.

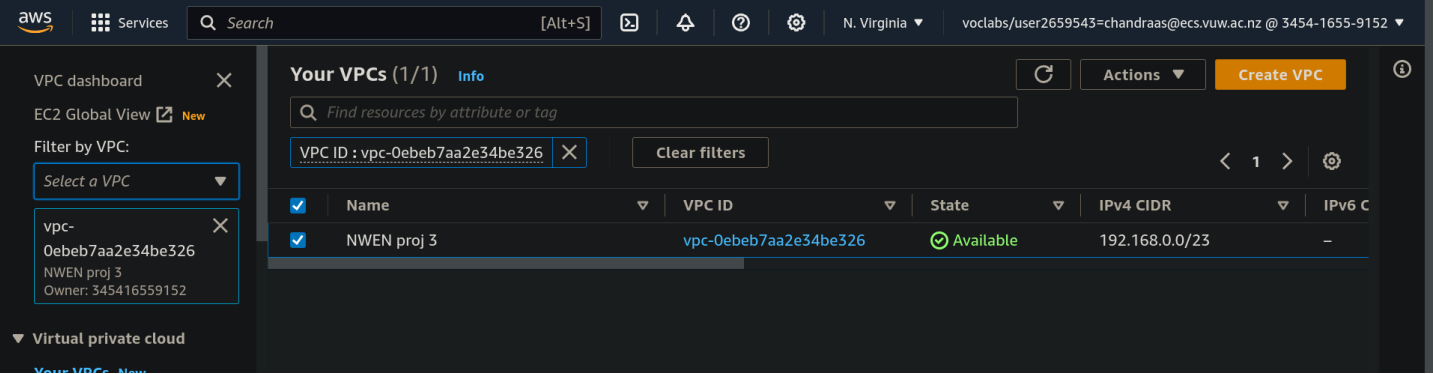
```
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 3$ telnet 54.89.229.208 5001
Trying 54.89.229.208...
Connected to 54.89.229.208.
Escape character is '^]'.
Connection closed by foreign host.
```

Here it is showing that the server is healthy. I use telnet to connect to the server and the server automatically closes the connection.

Amazon Machine Images (AMIs) (2) Info				
	Recycle Bin	EC2 Image Builder	Actions ▾	Launch instance from AMI
Owned by me ▾	<input type="text" value="Find AMI by attribute or tag"/>			< 1 > ⚙
<input type="checkbox"/>	Name	AMI ID	AMI name	Source
<input type="checkbox"/>		ami-0a1a56942cd15bf1c	NWEN project 3A image	345416559152/NWEN project 3A image
<input type="checkbox"/>		ami-0b2c87e2a146810cc	Music Image	345416559152/Music Image

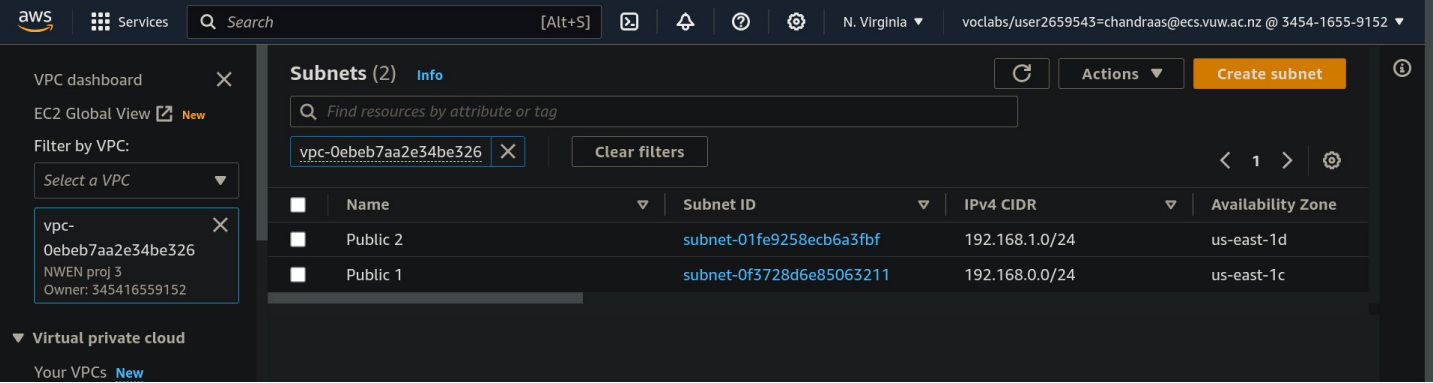
Here is showing the image I've created from the updated instance.

Q1-4



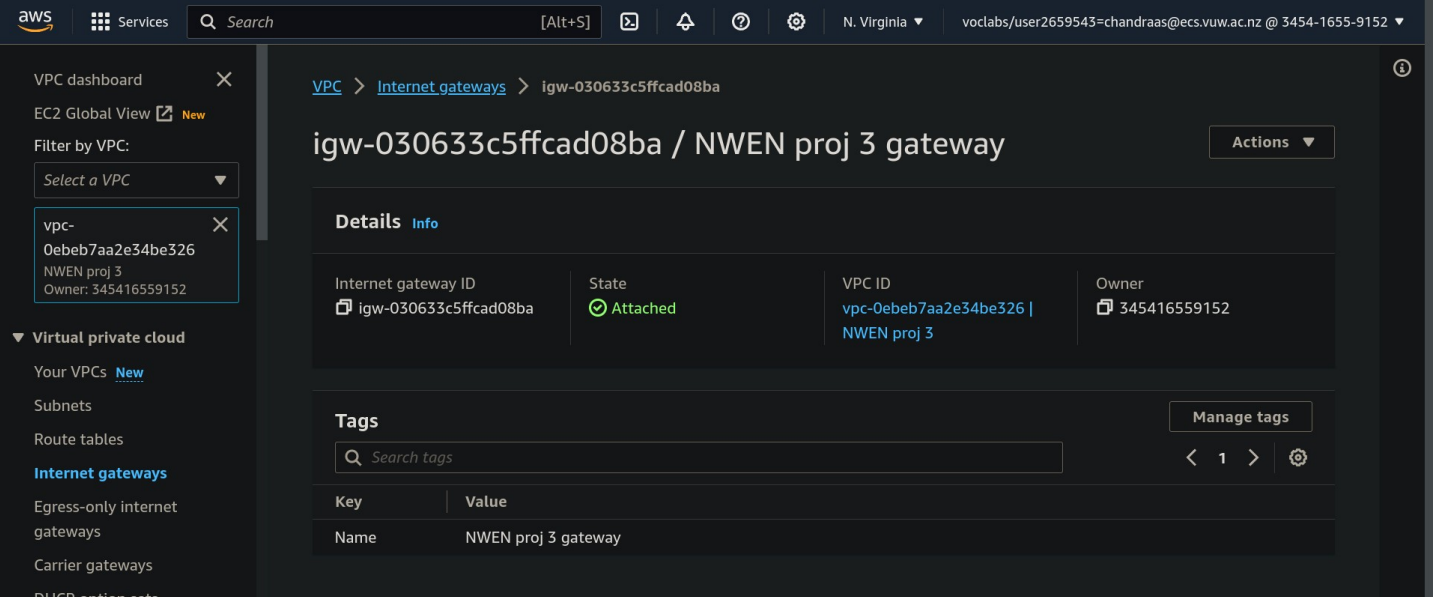
This shows the creation of the VPS alongside the IPv4 CIDR.

Q5-6



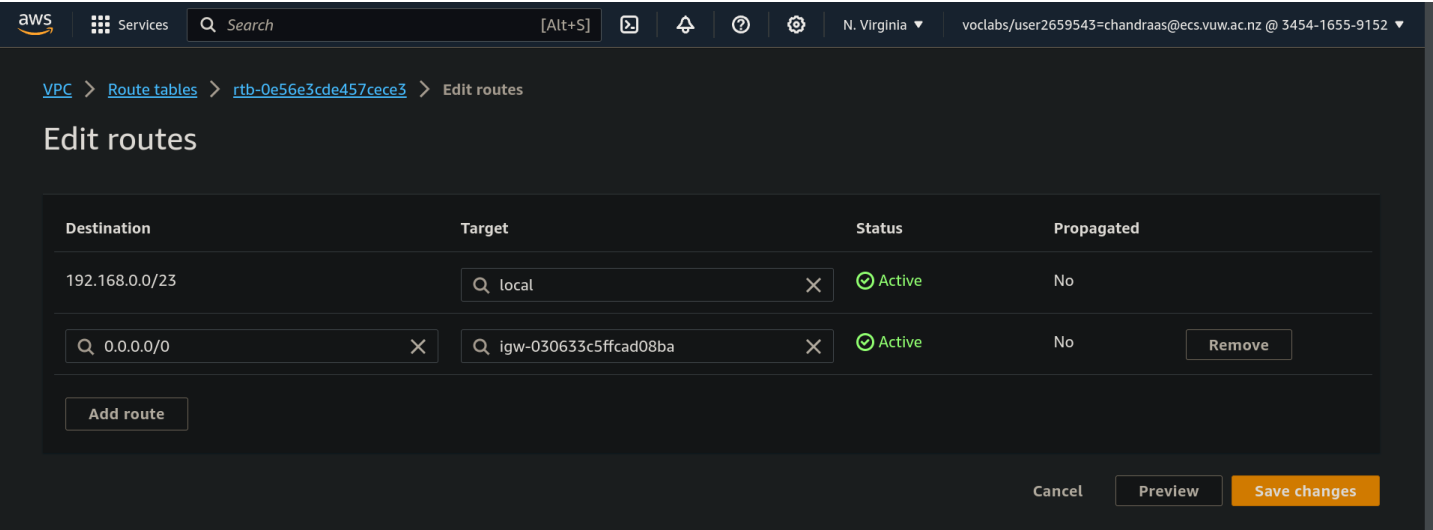
This shows the subnets I created from the VPC, and the different availability zones.

Q7-10



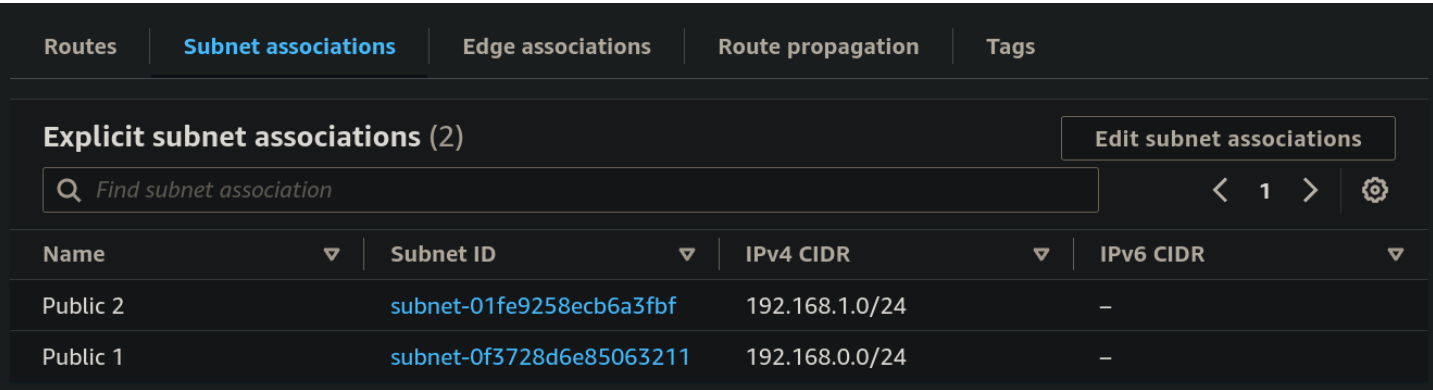
The creation of the Internet Gateway.

Q11-15



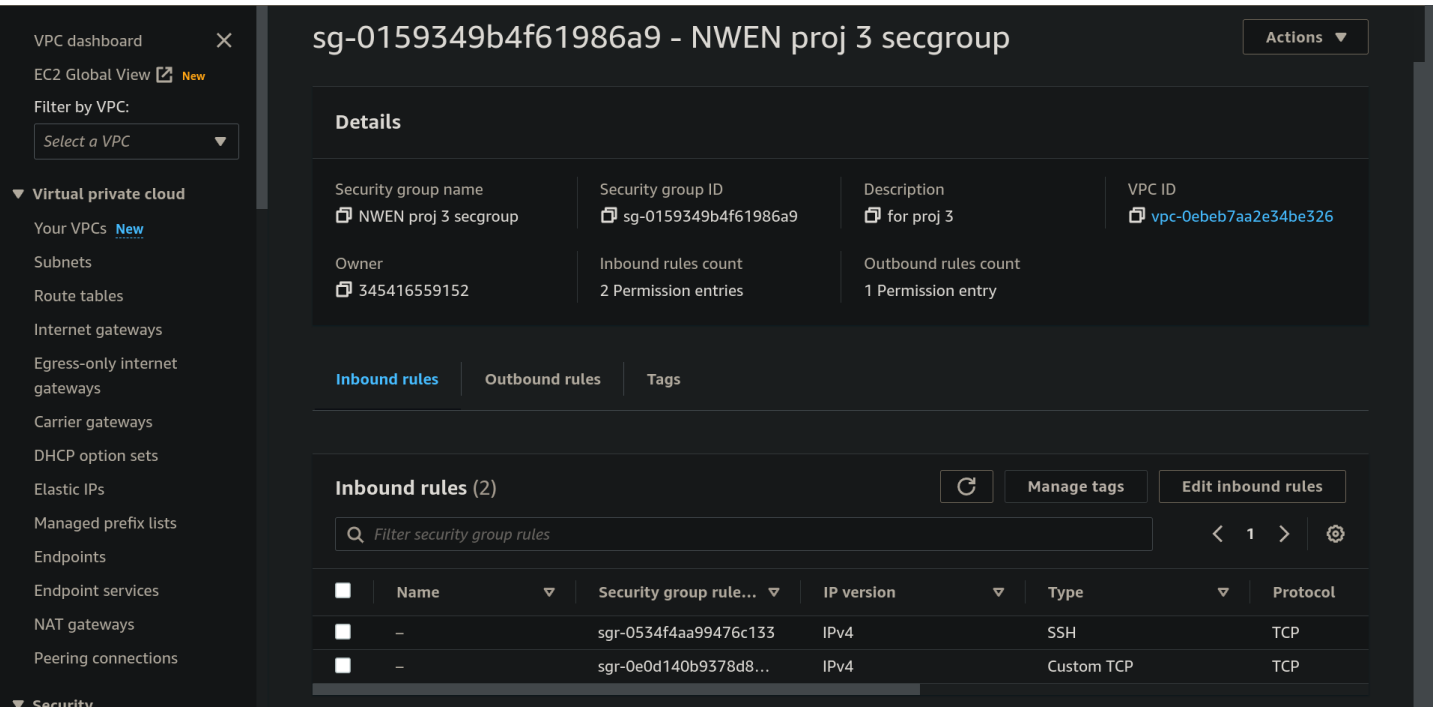
Adding the internet gateway to the routing table of the VPC. The destination is set to 0.0.0.0/23 to allow traffic from everywhere.

Q16-18



Associating the routing table with the two subnets created earlier.

Q19-24



Creation of the custom SSH and TCP groups for the VPC.

Inbound rules [Info](#)

Security group rule ID	Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info	
sgr-0534f4aa99476c133	SSH ▼	TCP	22	C... ▼	<div><div>Q</div><div>0.0.0.0/0 ✕</div></div>	<div></div> <div>Delete</div>
sgr-0e0d140b9378d8e29	Custom TCP ▼	TCP	5000 - 5	C... ▼	<div><div>Q</div><div>0.0.0.0/0 ✕</div></div>	<div></div> <div>Delete</div>

Add rule

The security groups closer. Both set to accept inbound traffic from all addresses. The custom TCP rule accepts inbound traffic arriving at ports 5000-5001 for the actual MusicGuru server and the health check server.

Q25-28

Launch template name and description

Launch template name - *required*

NWEN-proj-3a

Must be unique to this account. Max 128 chars. No spaces or special characters like '&', '*', '@'.

Template version description

MusicGuru Load balanced web server

Max 255 chars

Auto Scaling guidance [Info](#)

Select this if you intend to use this template with EC2 Auto Scaling

☒ Provide guidance to help me set up a template that I can use with EC2 Auto Scaling

▶ Template tags

▶ Source template

Creating a template, naming it and clicking the box.

Q29-31

▼ Application and OS Images (Amazon Machine Image) - required [Info](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Q Search our full catalog including 1000s of application and OS images

Recents

My AMIs

Quick Start

☒ Owned by me

☐ Shared with me

Q

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Amazon Machine Image (AMI)

NWEN project 3A image

ami-0a1a56942cd15bf1c

2023-09-27T08:35:36.000Z Virtualization: hvm ENA enabled: true Root device type: ebs

Selecting the image I created.

Q31

▼ Instance type Info

Advanced

Instance type

t2.micro

Family: t2 1 vCPU 1 GiB Memory Current generation: true

On-Demand Windows base pricing: 0.0162 USD per Hour

On-Demand SUSE base pricing: 0.0116 USD per Hour

On-Demand RHEL base pricing: 0.0716 USD per Hour

On-Demand Linux base pricing: 0.0116 USD per Hour

Free tier eligible

☐ All generations

Compare instance types

Additional costs apply for AMIs with pre-installed software

Selecting t2.micro.

Q32

▼ Key pair (login) Info

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name

musicguruloadbalance

Create new key pair

Creating a new key pair.

Q34

VPC - required [Info](#)

vpc-0ebeb7aa2e34be326 (NWEN proj 3)
192.168.0.0/23

▼

↻

Inbound Security Group Rules

▼ Security group rule 1 (TCP, 22, 0.0.0.0/0)

Remove

Type [Info](#)

Protocol [Info](#)

Port range [Info](#)

ssh ▼

TCP

22

Source type [Info](#)

Source [Info](#)

Description - optional [Info](#)

Custom ▼

🔍 Add CIDR, prefix list or security group

0.0.0.0/0 ✕

e.g. SSH for admin desktop

▼ Security group rule 2 (TCP, 5000, 0.0.0.0/0)

Remove

Type [Info](#)

Protocol [Info](#)

Port range [Info](#)

Custom TCP ▼

TCP

5000

Source type [Info](#)

Source [Info](#)

Description - optional [Info](#)

Custom ▼

🔍 Add CIDR, prefix list or security group

0.0.0.0/0 ✕

e.g. SSH for admin desktop

Creating the security groups; one for ssh and the port that my MusicGuru server is using. My VPC is also selected at the top.

Q35-36

▼ Advanced network configuration

Network interface 1

Remove

Device index Info

0

Network interface Info

New interface ▼

Existing network interfaces are not recommended when creating a template for auto-scaling.

Description Info

Subnet Info

Don't include in launch template

Not applicable for EC2 Auto Scaling

Security groups Info

New security group

Auto-assign public IP Info

Enable ▼

Primary IP Info

Not applicable for EC2 Auto Scaling

Secondary IP Info

Don't include in launch temp... ▼

Not applicable for EC2 Auto Scaling

IPv6 IPs Info

Don't include in launch temp... ▼

Not applicable for EC2 Auto Scaling

IPv4 Prefixes Info

Don't include in launch temp... ▼

The selected instance type does not support IPv4 prefixes.

IPv6 Prefixes Info

Don't include in launch temp... ▼

The selected instance type does not support IPv6 prefixes.

Assign Primary IPv6 IP Info

Don't include in launch temp... ▼

Delete on termination Info

Yes ▼

Elastic Fabric Adapter Info

☒ Enable

EFA is only compatible with certain instance types.

Network card index Info

Don't include in launch temp... ▼

The selected instance type does not support multiple network cards.

Enabling “Auto-assign IP” and “Delete on termination”.

Q38

Launch Templates (1/1) Info

Search

Launch Template ID	Launch Template Name	Default Version	Latest Ver
lt-08faf9007fb6adab1	NWEN-proj-3a	1	1

NWEN-proj-3a (lt-08faf9007fb6adab1)

Actions

Create launch template

Launch instance from template

Modify template (Create new version)

Delete template

Delete template version

Set default version

Manage tags

Create Spot Fleet

Create Auto Scaling group

View details

Launching an instance from the template I created.

Q39

<input type="checkbox"/>	NWEN proj 3a subnet 2	i-096f472f0b3a6df43
<input type="checkbox"/>	NWEN proj 3a subnet 1	i-09a792181ada3b0ff

The two instances launched using both subnets.

Q40

us-east-1d	–	44.202.103.135
us-east-1c	–	44.213.101.175

The public IP addresses of the instances.

```

raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 3$ ssh -i m
usicguruloadbalance.pem ec2-user@44.213.101.175
Last login: Wed Sep 27 06:58:08 2023 from 151.210.160.8

#
~\_#####_ Amazon Linux 2
~~\_#####\
~~\_###| AL2 End of Life is 2025-06-30.
~~\_#/
~~_V~'-'->
~~~_/_/ A newer version of Amazon Linux is available!
~~~_./_/_/_/
~~~_/_/_/_/_/ Amazon Linux 2023, GA and supported until 2028-03-15.
_/_/_/_/_/_/ https://aws.amazon.com/linux/amazon-linux-2023/

[ec2-user@ip-192-168-0-47 ~]$
```

SSH-ing into one of the instances.

```
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 3$ ssh -i m
usicguruloadbalance.pem ec2-user@44.202.103.135
The authenticity of host '44.202.103.135 (44.202.103.135)' can't be established.
ED25519 key fingerprint is SHA256:eKmmkiQq7kI5JWDA+I9nfbbi7TWG2o3KwoBPjTbxmi0.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '44.202.103.135' (ED25519) to the list of known hosts
.
Last login: Wed Sep 27 06:58:08 2023 from 151.210.160.8
      #_
    ~\_####_          Amazon Linux 2
   ~~\_#####\_
   ~~\_#####\_
   ~~\_###|         AL2 End of Life is 2025-06-30.
   ~~\_#/
   ~~\_V~'-'->
       ~~~
           /        A newer version of Amazon Linux is available!
       ~~-./
           /_/_/
       _/m/'_/_/_/   Amazon Linux 2023, GA and supported until 2028-03-15.
                       https://aws.amazon.com/linux/amazon-linux-2023/

[ec2-user@ip-192-168-1-95 ~]$
```

SSH-ing into the other.

```
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$ java MusicGuruClient 44.213.101.175 5000 1963
Range: 1950-2009
Sending year 1963
In 1963 the number 9 song was Blowin' In The Wind by Bob Dylan / Peter Paul & Mary
(192.168.0.47)
```

Connecting to the instance via the MusicGuru client for the first instance.

```

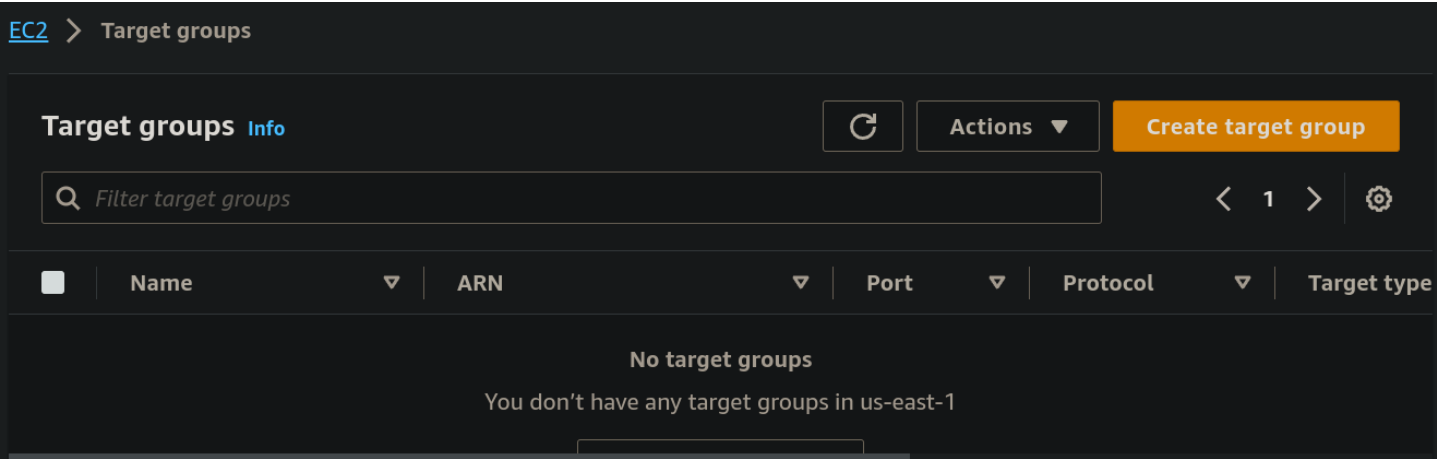
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$ java Mus
icGuruClient 44.202.103.135 5000 1963
Range: 1950-2009
Sending year 1963
In 1963 the number 3 song was I Want To Hold Your Hand by Beatles
(192.168.1.95)

```

Connecting to the instance via the MusicGuru client for the second instance.

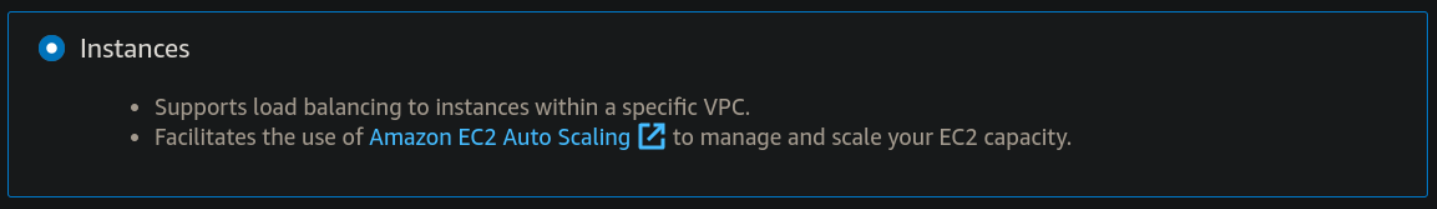
Creating the Load Balancer

Q43



On the “Target Groups” menu.

Q44-45



Selecting the default “instances” option.

Target group name

MusicGuruGroup

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

Protocol

TCP

Port

5000

1-65535

IP address type

Only targets with the indicated IP address type can be included in this target group.

☒ IPv4
 ☐ IPv6

Each target you register must have an assigned primary IPv6 address. This is configured on the instances default network interface (eth0). [Learn more](#)

VPC

Select the VPC with the instances that you want to include in the target group. Only VPCs that support the IP address type selected above are available in this list.

NWEN proj 3

vpc-0ebeb7aa2e34be326

IPv4: 192.168.0.0/23

Naming the target group, changing the protocol to TCP and changing the port to 5000 for the server, and selecting the VPC I created.

Q46

Health checks

The associated load balancer periodically sends requests, per the settings below, to the registered targets to test their status.

Health check protocol

TCP

▼ Advanced health check settings

Restore defaults

Health check port

The port the load balancer uses when performing health checks on targets. By default, the health check port is the same as the target group's traffic port. However, you can specify a different port as an override.

☐ Traffic port

☒ Override

5001

1-65535

Changing the health check server to TCP protocol and port 5001.

Q48

Target groups (1) Info

↻

Actions ▼

Create target group

🔍 Filter target groups

< 1 > ⚙️

<input type="checkbox"/>	Name ▼	ARN ▼	Port ▼	Protocol ▼	Target type
<input type="checkbox"/>	MusicGuruGroup	arn:aws:elasticloadbalanci...	5000	TCP	Instance

Target group created.

Q50

Load balancers

Elastic Load Balancing scales your load balancer capacity automatically in response to changes in incoming traffic.

↻

Actions ▼

Create load balancer

▼

🔍 Filter by property or value

< 1 > ⚙️

<input type="checkbox"/>	Name ▼	DNS name ▼	State ▼	VPC ID ▼	Availabili
No load balancers					
You don't have any load balancers in us-east-1					
<div>Create load balancer</div>					

Creating the load balancer.

Q51-52

Create Network Load Balancer Info

The Network Load Balancer distributes incoming TCP and UDP traffic across multiple targets such as Amazon EC2 instances, microservices, and containers. When the load balancer receives a connection request, it selects a target based on the protocol and port that are specified in the listener configuration, and the routing rule specified as the default action.

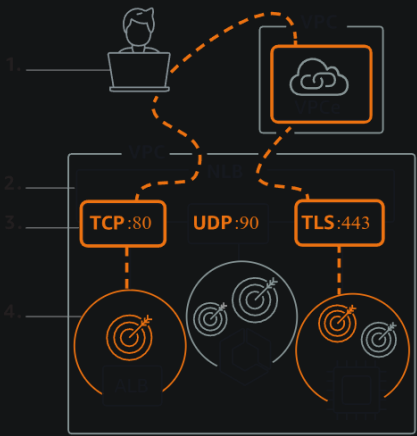
▼ How Elastic Load Balancing works

1. Clients make requests to your application.

2. The load balancer receives the request either directly or through an endpoint for private connectivity (via AWS PrivateLink).

3. The listeners in your load balancer receive requests of matching protocol and port, and route these requests based on the default action that you specify. You can use a TLS listener to offload the work of encryption and decryption to your load balancer.

4. Healthy targets in one or more target groups receive traffic according to the flow hash algorithm.



Creating a Network Load Balancer and reading the dropdown.

Q53

Basic configuration

Load balancer name

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

MusicGuruLoadBalancer

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

Scheme

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.

Naming the load balancer and leaving defaults.

Q54

VPC

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](#).

NWEN proj 3
vpc-0ebeb7aa2e34be326
IPv4: 192.168.0.0/23

↻

Mappings

Select at least one Availability Zone and one subnet for each zone. We recommend selecting at least two Availability Zones. The load balancer will route traffic only to targets in the selected Availability Zones. Zones that are not supported by the load balancer or VPC can't be selected. Subnets can be added, but not removed, once a load balancer is created.

☒ us-east-1c (use1-az1)

Subnet

subnet-0f3728d6e85063211Public 1 ▼

IPv4 address

Assigned by AWS ▼

☒ us-east-1d (use1-az2)

Subnet

subnet-01fe9258ecb6a3fbfPublic 2 ▼

IPv4 address

Assigned by AWS ▼

Selecting the Music Guru VPC made and selecting both subnets to map to.

Q55

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 - recommended

Security groups support on Network Load Balancers can only be enabled at creation by including at least one security group. You can change security groups after creation. The security groups for your load balancer must allow it to communicate with registered targets on both the listener port and the health check port. For PrivateLink Network Load Balancers, security group rules are enforced on PrivateLink traffic; however, you can turn off inbound rule evaluation after creation within the load balancer's Security tab or using the API.

Select up to 5 security groups

default

sg-0445b1338eb8e2ce1 VPC: vpc-0eb7aa2e34be326

Musgurusecgroup

sg-05b7eebd54226c0f7 VPC: vpc-0eb7aa2e34be326

Adding the security group made previously alongside the default one.

Q56

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 TCP:5000

Remove

Protocol

TCP ▼

:

Port

5000

1-65535

Default action

Forward to

MusicGuruGroup

Target type: Instance, IPv4

Info

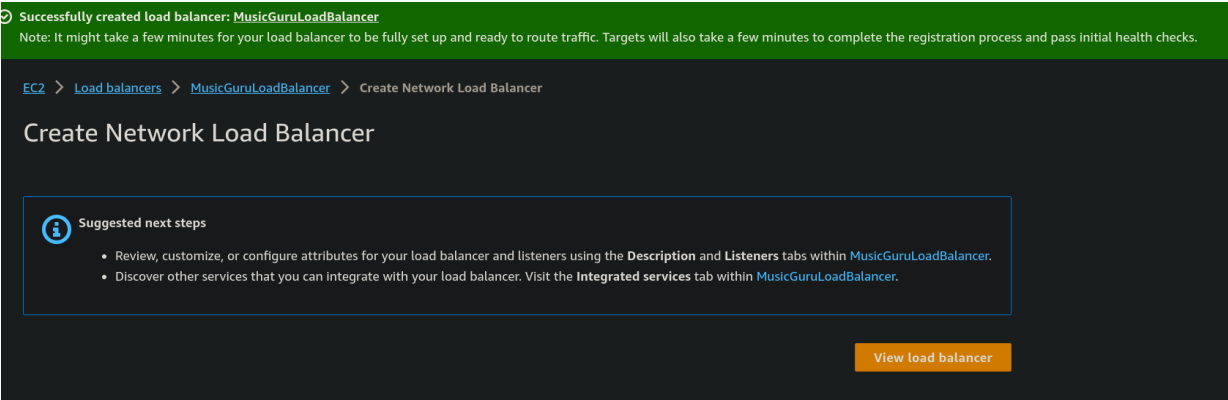
TCP ▼

↺

Create target group [↗](#)

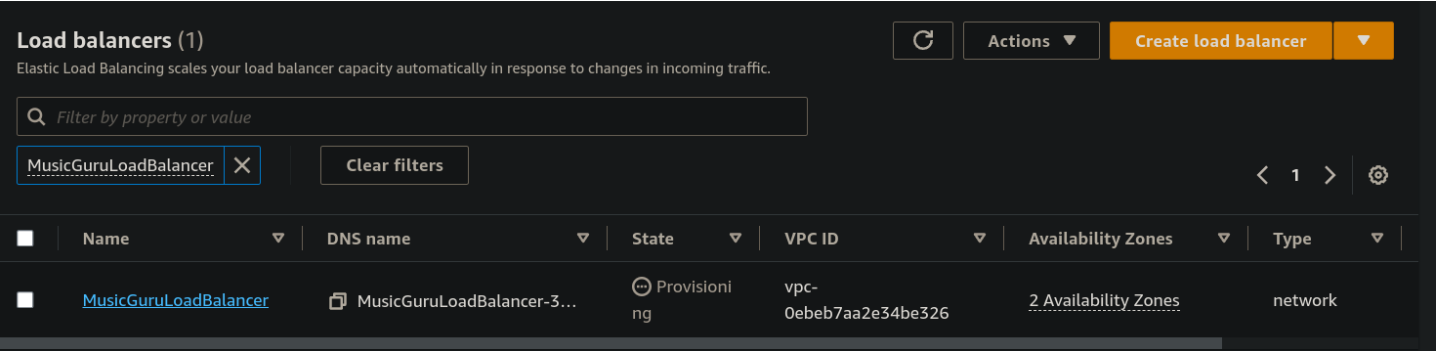
Choosing the target group I created and correcting the port.

Q57



Load balancer created.

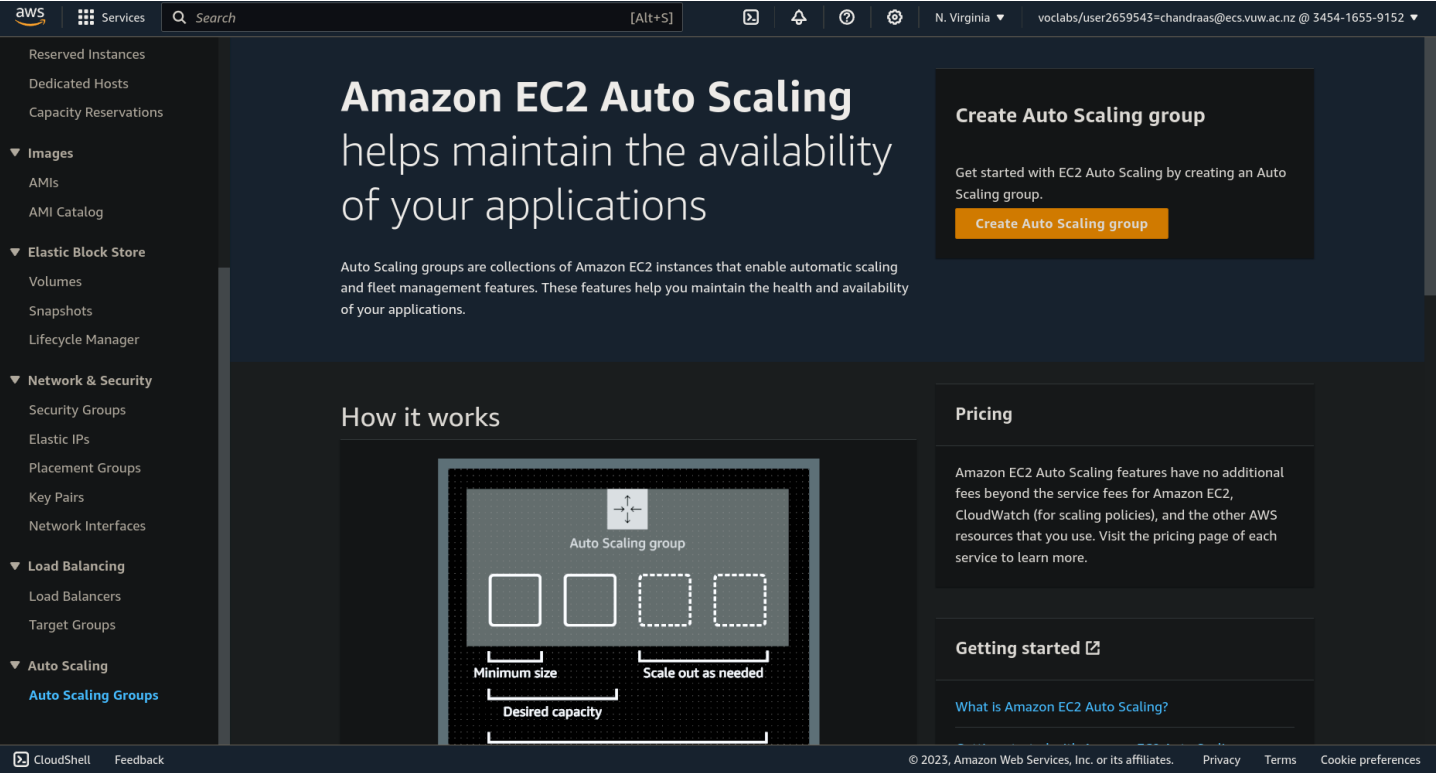
Q58



Viewing load balancer.

Creating an Autoscaling Group

Q59-61



Viewing the autoscaling group page and reading the information.

Q62

Name

Auto Scaling group name

Enter a name to identify the group.

MusicGuruScaleGroup

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

Launch template

Info

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.

NWEN-proj-3a

Create a launch template

Naming autoscaling group and selecting launch template.

Q63

Choosing the latest version.

Version

Latest (1)

Create a launch template version

Q64-65

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-0ebeb7aa2e34be326 (NWEN proj 3)
192.168.0.0/23



[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-1c | subnet-0f3728d6e85063211 (Public 1) X
192.168.0.0/24

us-east-1d | subnet-01fe9258ecb6a3fbf (Public 2) X
192.168.1.0/24

[Create a subnet](#)

Choosing my VPC and subnets.

66-68

Configure advanced options - *optional* [Info](#)

Integrate your Auto Scaling group with other services to distribute network traffic across multiple servers using a load balancer or to establish service-to-service communications using VPC Lattice. You can also set options that give you more control over health check replacements and monitoring.

Load balancing [Info](#)

Use the options below to attach your Auto Scaling group to an existing load balancer, or to a new load balancer that you define.

☐ No load balancer

Traffic to your Auto Scaling group will not be fronted by a load balancer.

☒ Attach to an existing load balancer

Choose from your existing load balancers.

☐ Attach to a new load balancer

Quickly create a basic load balancer to attach to your Auto Scaling group.

Attach to an existing load balancer

Select the load balancers that you want to attach to your Auto Scaling group.

☒ Choose from your load balancer target groups

This option allows you to attach Application, Network, or Gateway Load Balancers.

☐ Choose from Classic Load Balancers

Existing load balancer target groups

Only instance target groups that belong to the same VPC as your Auto Scaling group are available for selection.

Select target groups



MusicGuruGroup | TCP X
Network Load Balancer: MusicGuruLoadBalancer

Configure advanced options. Selected “Attach to an existing load balancer” and selected my load balancer target group.

Q69-70

Health checks

Health checks increase availability by replacing unhealthy instances. When you use multiple health checks, all are evaluated, and if at least one fails, instance replacement occurs.

EC2 health checks

Always enabled

Additional health check types - optional

Info

Turn on Elastic Load Balancing health checks

Recommended

Elastic Load Balancing monitors whether instances are available to handle requests. When it reports an unhealthy instance, EC2 Auto Scaling can replace it on its next periodic check.

Turn on VPC Lattice health checks

VPC Lattice can monitor whether instances are available to handle requests. If it considers a target as failed a health check, EC2 Auto Scaling replaces it after its next periodic check.

Health check grace period

Info

This time period delays the first health check until your instances finish initializing. It doesn't prevent an instance from terminating when placed into a non-running state.

300

seconds

Additional health checks not enabled.

Q71

Additional settings

Monitoring

Info

Enable group metrics collection within CloudWatch

Enabled group metrics collection within CloudWatch.

Q72-73

Group size - optional

Info

Specify the size of the Auto Scaling group by changing the desired capacity. You can also specify minimum and maximum capacity limits. Your desired capacity must be within the limit range.

Desired capacity

2

Minimum capacity

2

Maximum capacity

3

Modified group size to 2 desired, 2 minimum, 3 maximum.

Q74

Scaling policies - optional

Choose whether to use a scaling policy to dynamically resize your Auto Scaling group to meet changes in demand. [Info](#)

Target tracking scaling policy

Choose a desired outcome and leave it to the scaling policy to add and remove capacity as needed to achieve that outcome.

None

Scaling policy name

Target Tracking Policy

Metric type [Info](#)

Monitored metric that determines if resource utilization is too low or high. If using EC2 metrics, consider enabling detailed monitoring for better scaling performance.

Average CPU utilization

Target value

50

Instance warmup [Info](#)

300 seconds

☐ Disable scale in to create only a scale-out policy

Choosing default scaling policy.

Q75-78

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 ▾	A... ▾
<input type="checkbox"/>	MusicGuruScaleGroup	NWEN-proj-3a Version Latest	0	⌚ Updating capacity...	2	2	3	us-...

Auto Scaling group created, all other sections skipped through and settings reviewed.

Q79

<input type="checkbox"/>	-	i-0f4533099ace71437	⌚ Terminated 🔍	t2.micro	-	No alarms	+	us-east-1c
<input type="checkbox"/>	-	i-01f7c204349a16906	🟢 Running 🔍	t2.micro	🟢 2/2 checks passed	No alarms	+	us-east-1c
<input type="checkbox"/>	-	i-0419ee00e0acb056d	⌚ Terminated 🔍	t2.micro	-	No alarms	+	us-east-1c
<input type="checkbox"/>	-	i-0a18736e332863dbc	⌚ Terminated 🔍	t2.micro	-	No alarms	+	us-east-1d

I have one instance running but a few were instantly terminated.

Q80

EC2 > Load balancers

Load balancers (1/1)

Elastic Load Balancing scales your load balancer capacity automatically in response to changes in incoming traffic.

↻

Actions ▾

Create load balancer ▾

🔍 Filter by property or value

< 1 > ⚙

<input checked="" type="checkbox"/>	Name ▾	DNS name ▾	State ▾	VPC ID ▾	Availability Zones ▾	Type ▾
<input checked="" type="checkbox"/>	MusicGuruLoadBalancer	MusicGuruLoadBalancer-3...	🟢 Active	vpc-0eeb7aa2e34be326	2 Availability Zones	network

Viewing the load balancers pane again.

Q81

MusicGuruLoadBalancer

Details

Load balancer type Network	Status Active	VPC vpc-0ebeb7aa2e34be326	IP address type IPv4
Scheme Internet-facing	Hosted zone Z26RNL4JYFTOTI	Availability Zones subnet-01fe9258ecb6a3fbf us-east-1d (use1-az2) subnet-0f3728d6e85063211 us-east-1e (use1-az1)	Date created September 29, 2023, 11:57 (UTC+13:00)
Load balancer ARN arn:aws:elasticloadbalancing:us-east-1:345416559152:loadbalancer/net/MusicGuruLoadBalancer/32773571219058a8		DNS name copied MusicGuruLoadBalancer-32773571219058a8.elb.us-east-1.amazonaws.com (A Record)	

Copying the load balancer DNS name.

Q82

```
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$ java MusicGuruClient MusicGuruLoadBalancer-fefc11a5a3cc10c2.elb.us-east-1.amazonaws.com 5000 1976
Range: 1950-2009
Sending year 1976
In 1976 the number 2 song was Go Your Own Way by Fleetwood Mac
(192.168.0.186)
```

Works!

Q83

```
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 3$ ssh -i musicguruloadbalance.pem ec2-user@44.199.200.89
Last login: Wed Sep 27 06:58:08 2023 from 151.210.160.8

#
##### Amazon Linux 2
#####\
\###| AL2 End of Life is 2025-06-30.
\#/
V~' '->
~~~
~~././
_/m/'

A newer version of Amazon Linux is available!
Amazon Linux 2023, GA and supported until 2028-03-15.
https://aws.amazon.com/linux/amazon-linux-2023/

[ec2-user@ip-192-168-0-98 ~]$ ls
helloworld.class      MusicGuruHealthCheck.class  SongEntry.class
musicdata.txt         MusicGuruServer.class
MusicGuruClient.class  run.sh
[ec2-user@ip-192-168-0-98 ~]$
```

I ssh-ed into one of the instances using the public IP address. Everything seems good.

Q84

MusicGuruGroup

Actions

Details

arn:aws:elasticloadbalancing:us-east-1:345416559152:targetgroup/MusicGuruGroup/0d373599b59e3bd2

Target type Instance	Protocol : Port TCP: 5000	VPC vpc-0ebeb7aa2e34be326	IP address type IPv4
Load balancer MusicGuruLoadBalancer			

Total targets	Healthy	Unhealthy	Unused	Initial	Draining
2	2	0	0	0	0

Distribution of targets by Availability Zone (AZ)

Select values in this table to see corresponding filters applied to the Registered targets table below.

The instances I have are all healthy.

Q85

```
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$ java MusicGuruClient MusicGuruLoadBalancer-fefc11a5a3cc10c2.elb.us-eas
t-1.amazonaws.com 5000 1976
Range: 1950-2009
Sending year 1976
In 1976 the number 4 song was Anarchy in the UK by The Sex Pistols
(192.168.1.154)
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$ java MusicGuruClient MusicGuruLoadBalancer-fefc11a5a3cc10c2.elb.us-eas
t-1.amazonaws.com 5000 1976
Range: 1950-2009
Sending year 1976
In 1976 the number 9 song was The Boys Are Back in Town by Thin Lizzy
(192.168.1.154)
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$ java MusicGuruClient MusicGuruLoadBalancer-fefc11a5a3cc10c2.elb.us-eas
t-1.amazonaws.com 5000 1976
Range: 1950-2009
Sending year 1976
In 1976 the number 3 song was More Than a Feeling by Boston
(192.168.1.154)
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$ java MusicGuruClient MusicGuruLoadBalancer-fefc11a5a3cc10c2.elb.us-eas
t-1.amazonaws.com 5000 1976
Range: 1950-2009
Sending year 1976
In 1976 the number 3 song was More Than a Feeling by Boston
(192.168.0.186)
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$ java MusicGuruClient MusicGuruLoadBalancer-fefc11a5a3cc10c2.elb.us-eas
t-1.amazonaws.com 5000 1976
Range: 1950-2009
Sending year 1976
In 1976 the number 6 song was (Don't Fear) The Reaper by Blue Oyster Cult
(192.168.1.154)
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$ java MusicGuruClient MusicGuruLoadBalancer-fefc11a5a3cc10c2.elb.us-eas
t-1.amazonaws.com 5000 1976
Range: 1950-2009
Sending year 1976
In 1976 the number 9 song was The Boys Are Back in Town by Thin Lizzy
(192.168.1.154)
raashna@raashna-IdeaPad-Flex-5-14ARE05:~/Desktop/uni/NWEN243/project 2$
```

Q1: There doesn’t appear to be any pattern, but the IP address does alternate every 1-3 requests sent.

Q86

☒

-

i-04c547b598ea1da5e

Shutting-down

t2.micro

2/2 checks passed

No alarms

+

us-east-1c

Q2: I terminated this us-east-1c instance here.

Details

arn:aws:elasticloadbalancing:us-east-1:345416559152:targetgroup/MusicGuruGroup/0d373599b59e3bd2

Target type Instance	Protocol : Port TCP: 5000	VPC vpc-0ebeb7aa2e34be326	IP address type IPv4
Load balancer MusicGuruLoadBalancer			

Total targets	Healthy	Unhealthy	Unused	Initial	Draining
1	1	0	0	0	0

Distribution of targets by Availability Zone (AZ)

Select values in this table to see corresponding filters applied to the Registered targets table below.

The amount of healthy instances went down to one.

-

i-0f7b1db0bb12baf67

Running

t2.micro

Initializing

No alarms

+

us-east-1c

After 5 minutes, this instance was made.

MusicGuruGroup

Actions

Details

arn:aws:elasticloadbalancing:us-east-1:345416559152:targetgroup/MusicGuruGroup/0d373599b59e3bd2

Target type Instance	Protocol : Port TCP: 5000	VPC vpc-0ebeb7aa2e34be326	IP address type IPv4
Load balancer MusicGuruLoadBalancer			

Total targets	Healthy	Unhealthy	Unused	Initial	Draining
2	2	0	0	0	0

Distribution of targets by Availability Zone (AZ)

Select values in this table to see corresponding filters applied to the Registered targets table below.

It has now gone back up to 2 healthy instances.

Q87

Group size [Info](#)

Specify the size of the Auto Scaling group by changing the desired capacity. You can also specify minimum and maximum capacity limits. Your desired capacity must be within the limit range.

Desired capacity

Minimum capacity

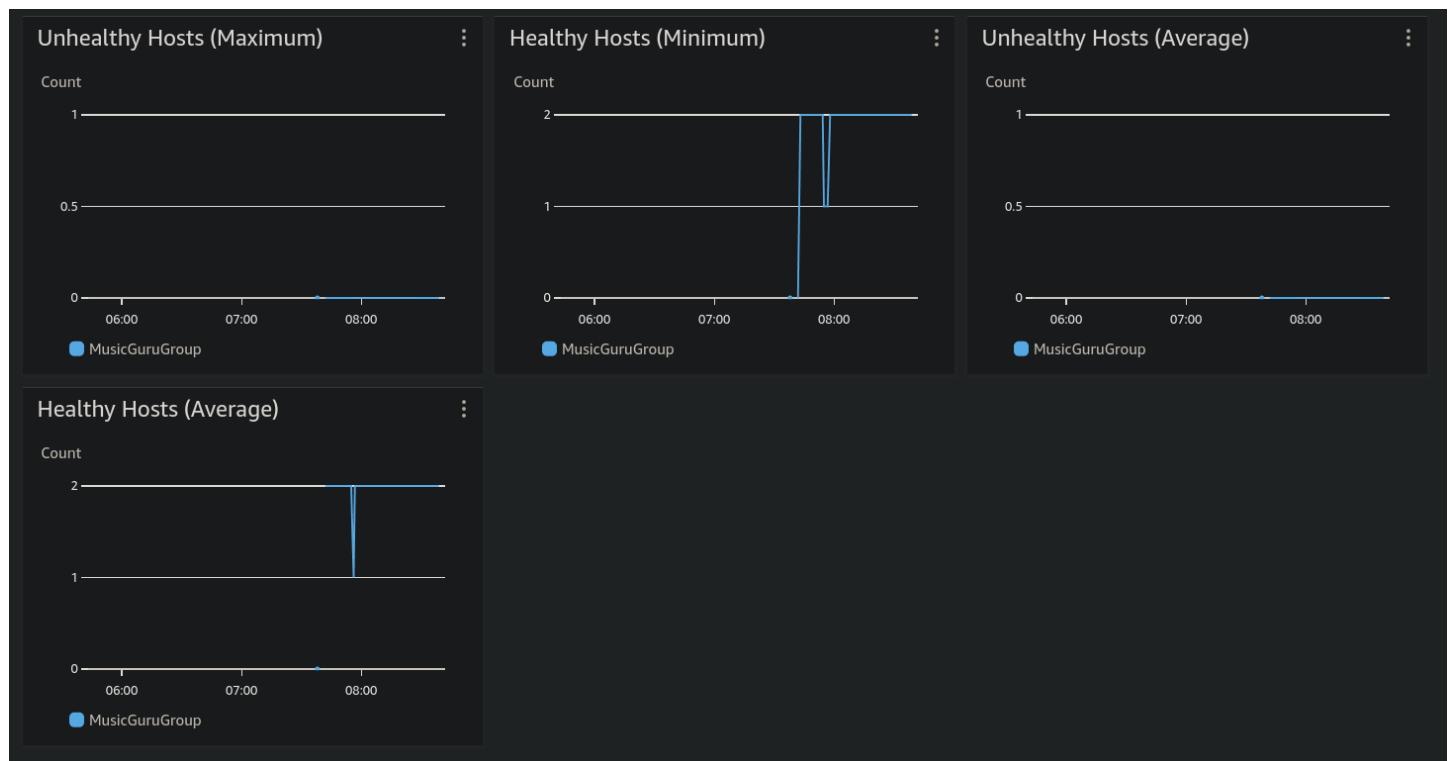
Maximum capacity

I scaled them up to have a desired capacity of 3, minimum capacity of 3, and maximum capacity of 4.

The autoscaler keeps creating instances and terminating them.

Q3: The auto scaler needs to create an instance that match the requirements of the load balancer, the target group, and the security group, in addition to checking if the requirements for the number of instances are met. This takes time, and the change is not immediate. Moreover, the instances themselves have unique requirements, such as port numbers and cron jobs, and the files we have placed in our template need to be copied over to each instance.

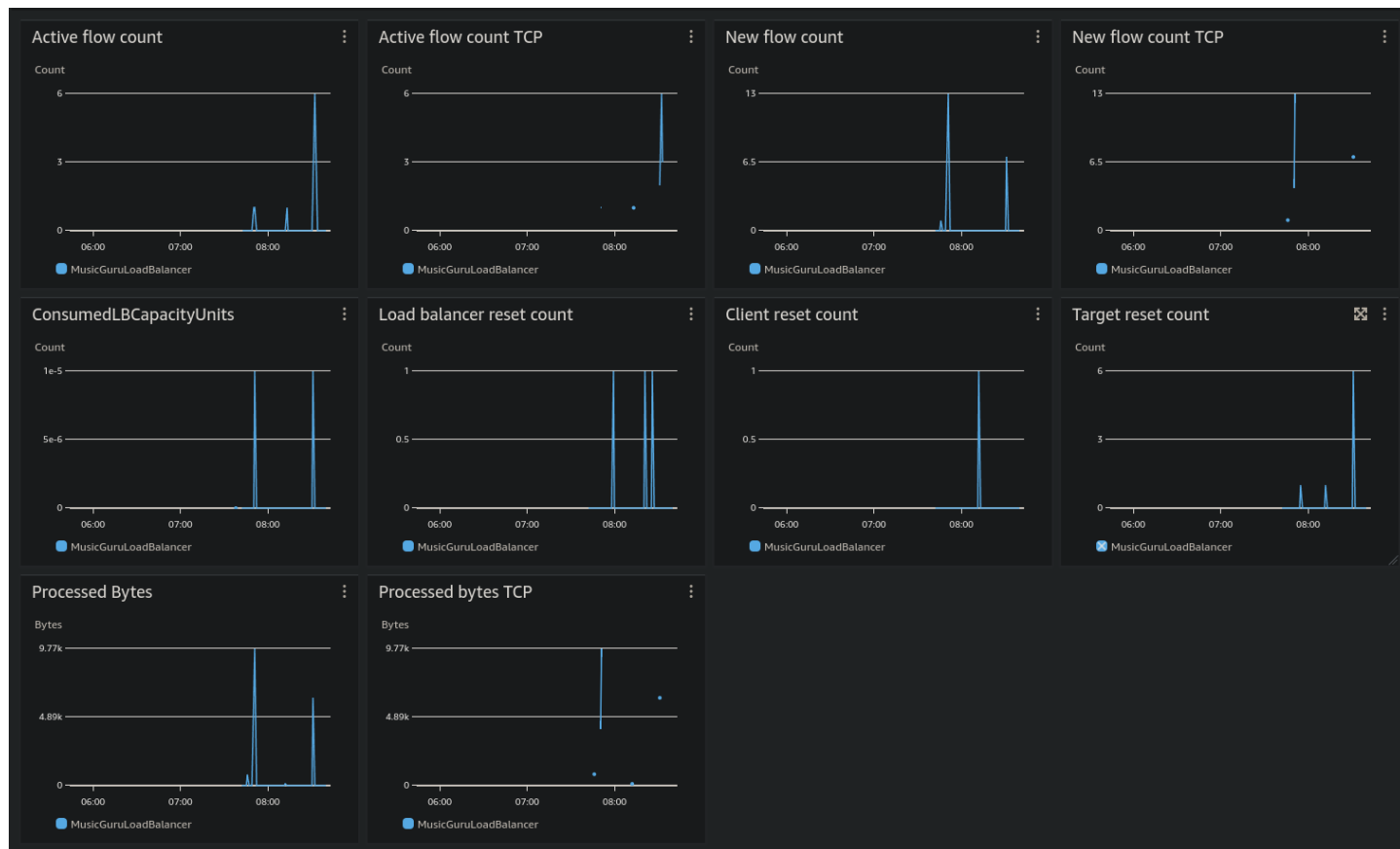
Q88



The “Unhealthy Hosts (Maximum)” and “Unhealthy Hosts (Average)” are both at 0 showing that we’ve never had an unhealthy instance. On “Healthy Hosts (Minimum)” we see the number of instances being created and deleted. Where the line goes from 0 to 2 is the initial creation of our instances via the auto scaling group. The dip seen in the chart and in the “Healthy Hosts (Average)” section is when we terminated one of our instances,

and the autoscaling group immediately created another one to reach the minimum capacity of 2.

Q89



The “Active Flow Count” chart shows the number of concurrent connections to the instances in the load balancer. We can see my attempts at connecting to the load balancer’s instances in this chart, both via SSH-ing into the instances via my computer, and through using my MusicGuruClient. The “Active Flow Count (TCP)” chart displays the amount of concurrent connections to the instances in the load balancer, but only the connections via my MusicGuruClient.