Day 2 Group Activity: AWS Auto Scaling and Load Balancing

GROUP 6

WEEK 5

OBJECTIVES

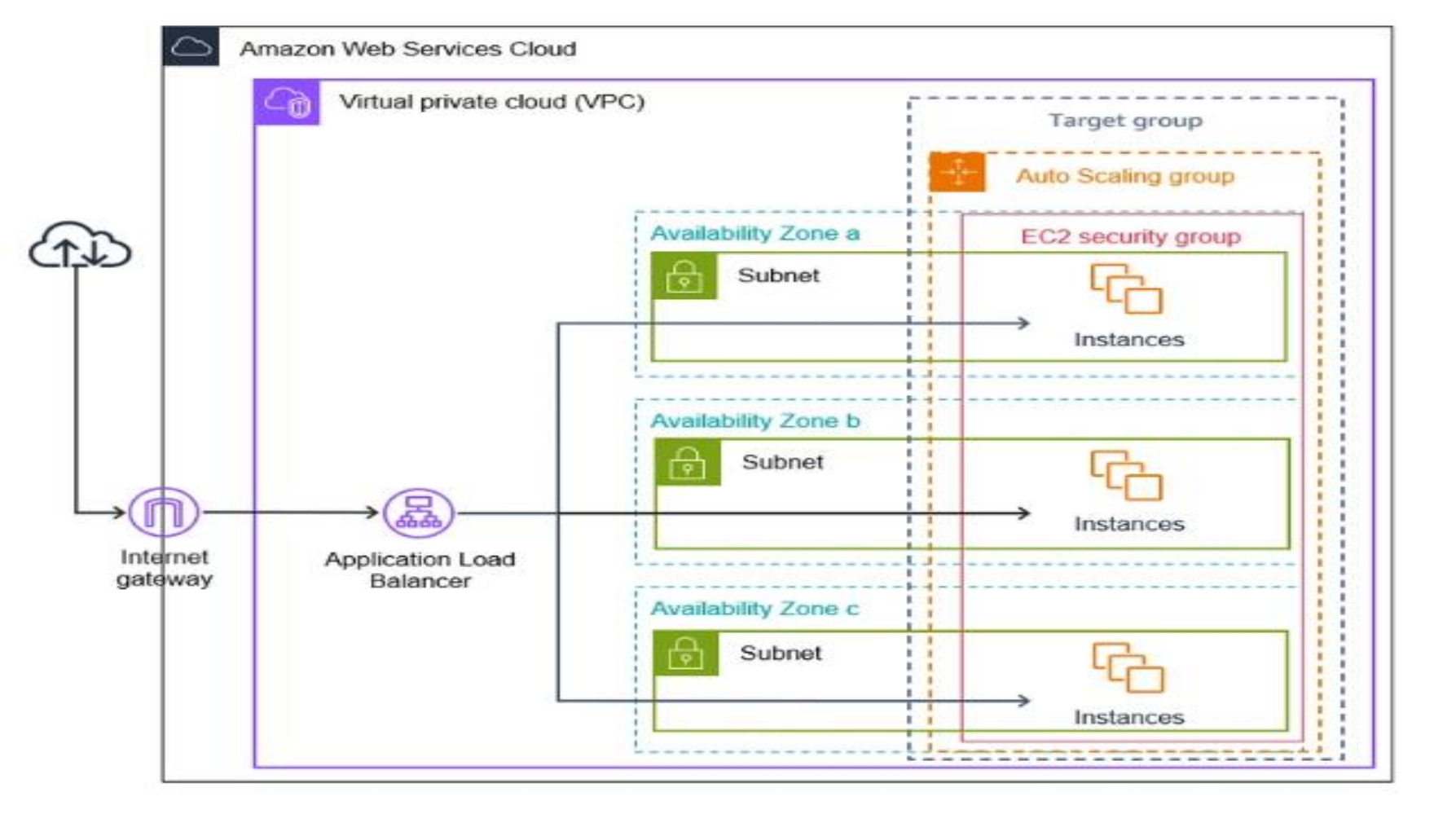
To:

- Understand how auto scaling works and why it is important for dynamic scaling
- Setup and configure an Elastic Load Balancer (ELB) and implement Auto Scaling for fault tolerance.
- Test the system under load to verify automatic scaling behavior.

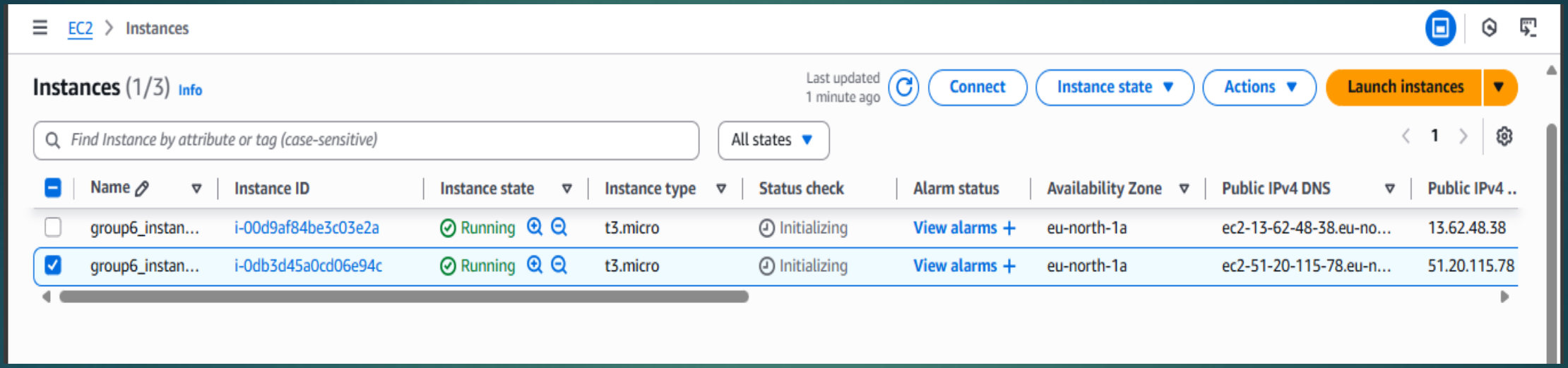
GENERAL OVERVIEW

- Auto Scaling and Load Balancing work together to create a reliable and efficient cloud infrastructure. **Auto Scaling Groups (ASG)** automatically adjust the number of EC2 instances based on demand, optimizing performance and cost while **Load Balancers (ALB or NLB)** distribute incoming traffic evenly across instances, preventing overloads and improving reliability.
- This process includes defining scaling policies, setting up CloudWatch alarms, testing load distribution, simulating real-world traffic conditions, and monitoring system performance. By using these strategies, cloud systems can stay adaptable, cost-effective, and resilient, ensuring smooth application availability even during high traffic periods.

Architectural Overview

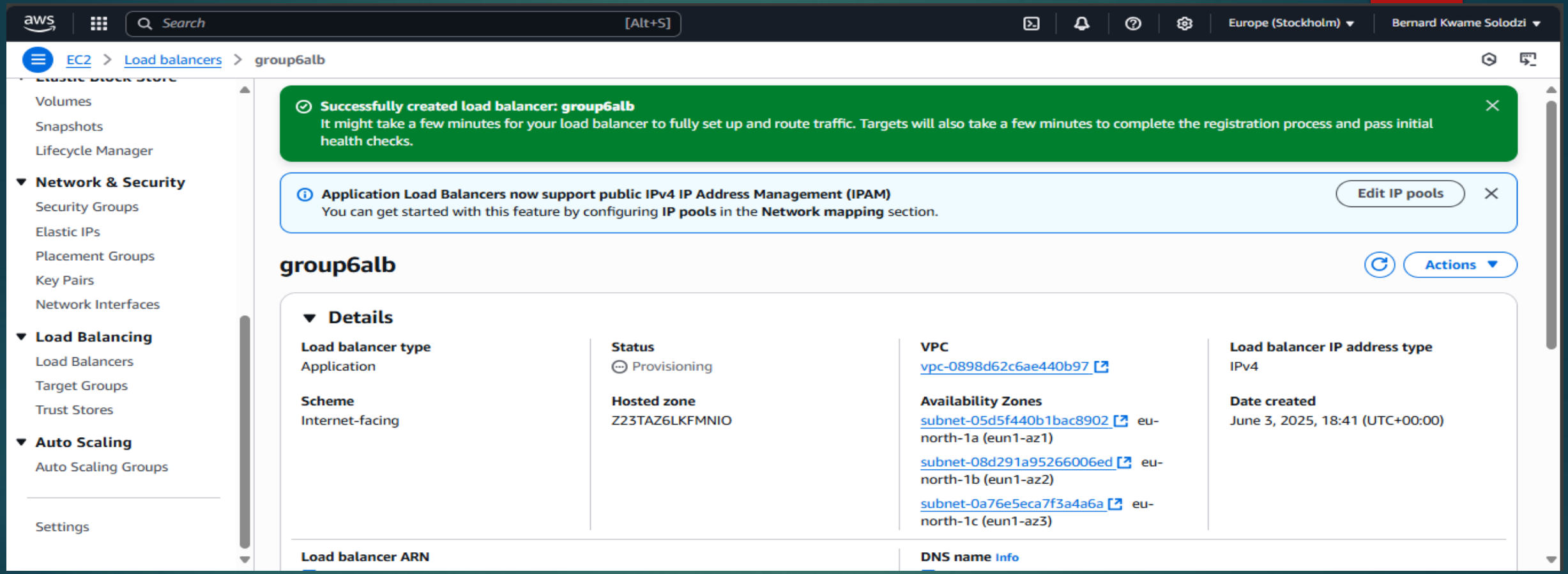


1.LAUNCHING EC2 INSTANCES



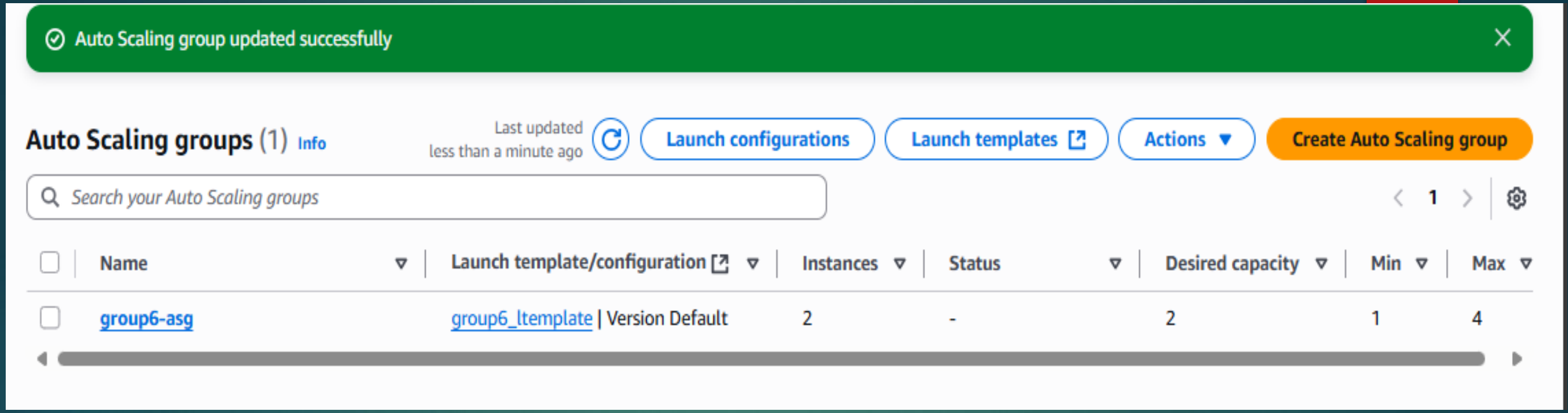
- We launched 2 EC2 instances using the same AMI and ensured they were both in the same availability zone i.e. ***eu-north-1a***

2.CREATING AN ELASTIC LOAD BALANCER



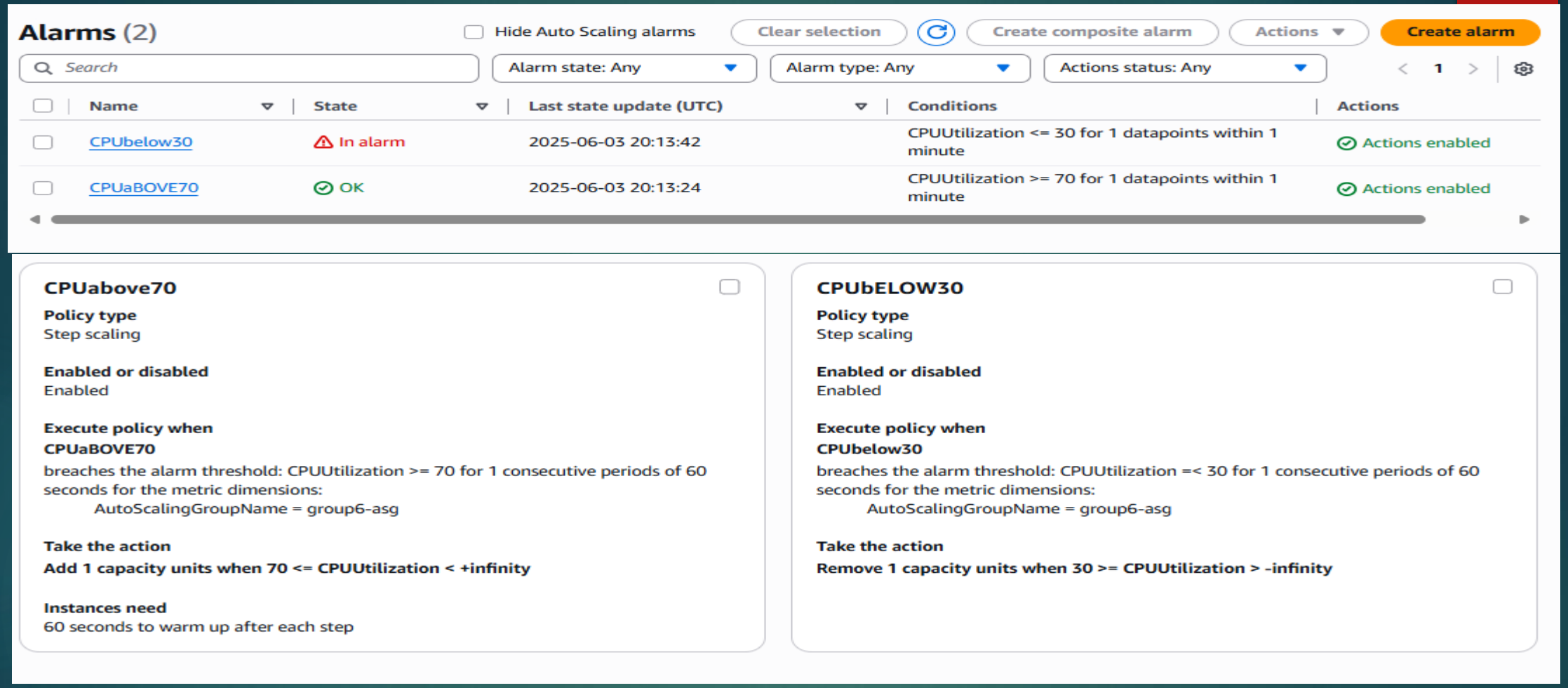
- We created an application load balancer and attached it to the VPC with three Availability zones.
- Configured it to accept HTTP requests using port 80.
- Selected the launched instances to register with the ELB.
- This was done to improve fault tolerance, high availability and latency.

3.CONFIGURING AN AUTO SCALING GROUP



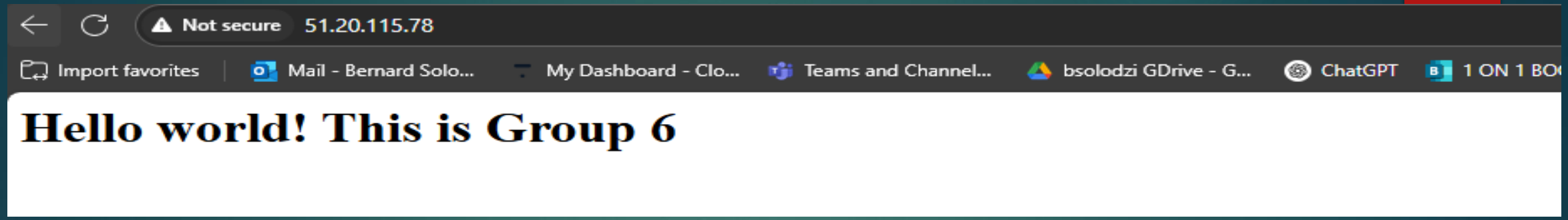
- Created an auto-scaling group named ***group6-asg***
- This was achieved by first creating a launch template named ***group6_ltemplate*** to serve as a template for creating instances.
- Desired capacity was set to 2, minimum=1 & maximum=4.
- The load balancer was then attached to the auto scaling group.

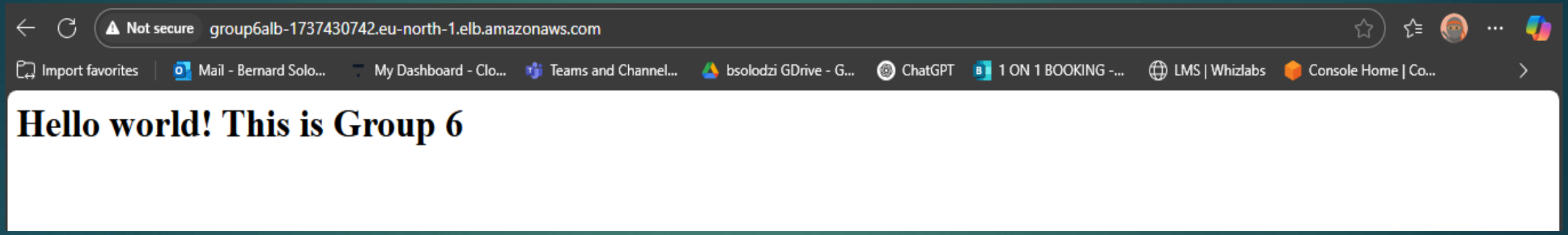
4.SETTING UP SCALING POLICIES



- We used CloudWatch to create alarms based on CPU usage and attached to scaling policies that will trigger instance creation or termination based on CPU utilization.
- CPUabove70 handled CPU usage above 70% which would trigger an addition of 1 instance to our resources.
- CPUbelow30 handled CPU usage below 30% which would trigger a termination of 1 instance from our resources.
- These policies were then linked to the auto-scaling group.

5.TESTING THE LOAD BALANCER





- We accessed the application load balancer's URL by copying its DNS Name: ***group6alb-1737430742.eu-north-1.elb.amazonaws.com*** and pasted in web tab.
- This displayed the content of the html file we saw earlier but this time with a different address and not the public IP address of the EC2 instance indicating an active load balancer.

6.SIMULATING AUTO-SCALING

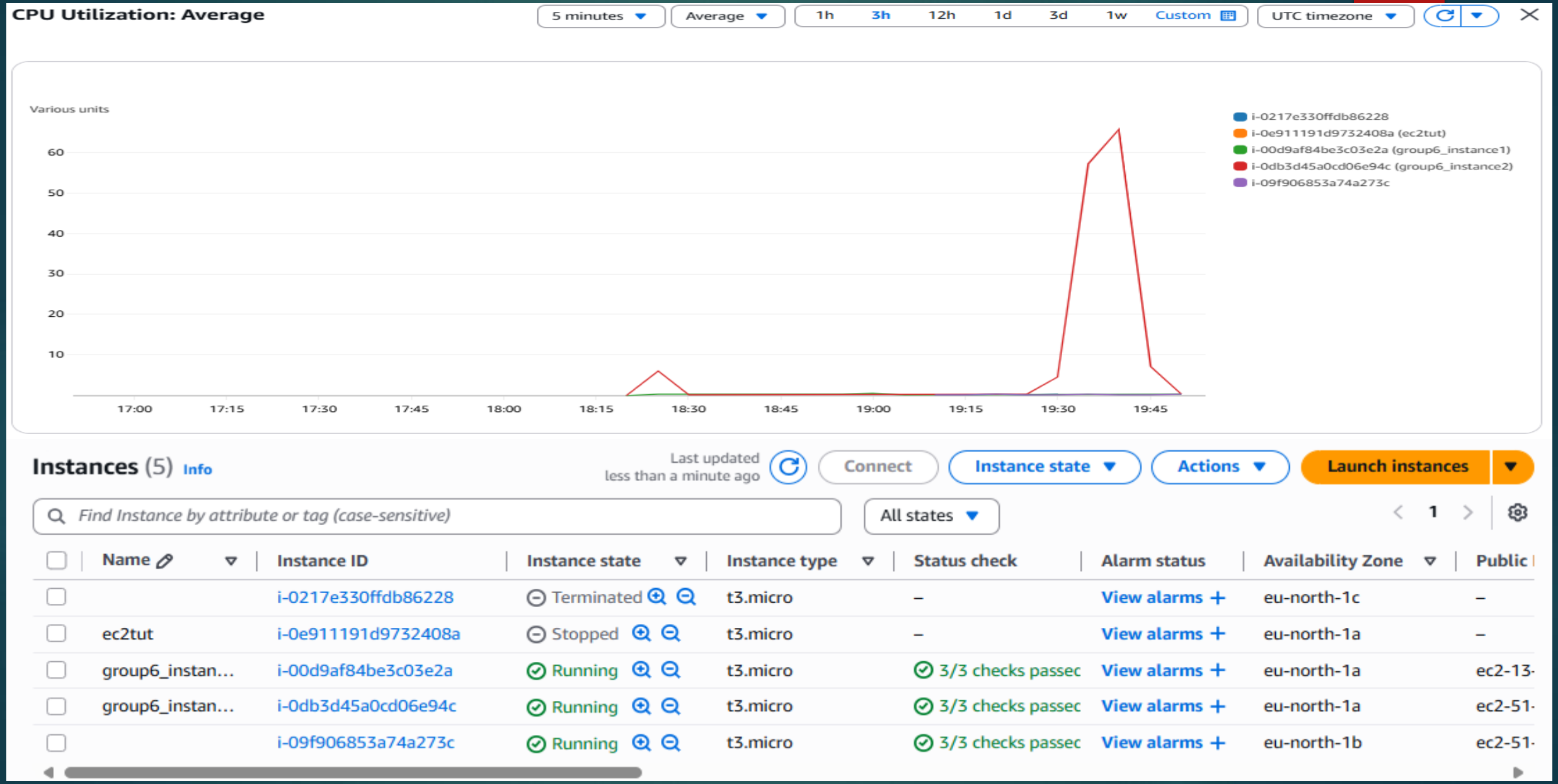
```
Total download size: 34 k
Installed size: 68 k
Downloading Packages:
stress-1.0.7-2.amzn2023.0.1.x86_64.rpm           584 kB/s |  34 kB     00:00
--------------------------------------------------------------------------------
Total                                            408 kB/s |  34 kB     00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :                                                        1/1
  Installing       : stress-1.0.7-2.amzn2023.0.1.x86_64                     1/1
  Running scriptlet: stress-1.0.7-2.amzn2023.0.1.x86_64                     1/1
  Verifying        : stress-1.0.7-2.amzn2023.0.1.x86_64                     1/1

Installed:
  stress-1.0.7-2.amzn2023.0.1.x86_64

Complete!
[ec2-user@ip-10-0-0-188 ~]$ stress -c 1 -i 1 -m 1 --vm-bytes 128M -t 100s
stress: info: [29821] dispatching hogs: 1 cpu, 1 io, 1 vm, 0 hdd
stress: info: [29821] successful run completed in 100s
[ec2-user@ip-10-0-0-188 ~]$
```

i-0db3d45a0cd06e94c (group6_instance2)

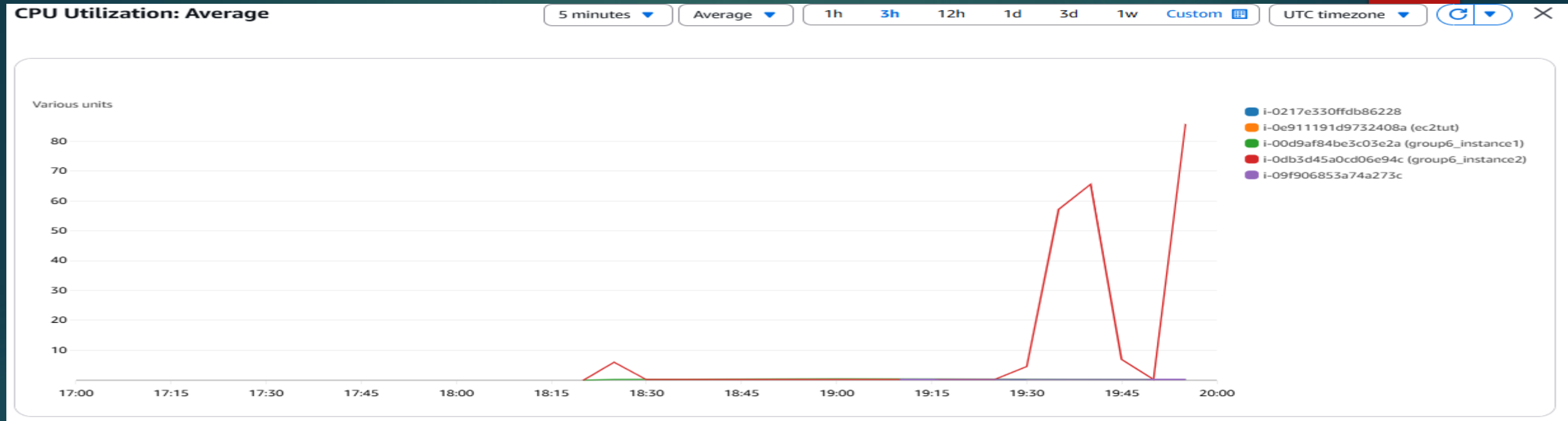
PublicIPs: 51.20.115.78 PrivateIPs: 10.0.0.188

- Firstly, we connected to our running instances via the AWS CLI.
- To simulate traffic, we installed a tool called stress using the *'**sudo yum install –y stress**'* command
- Then, we run a command - *stress -c 1 -i 1 -m 1 --vm-bytes 128M -t 100s* to simulate high load.
- **stress-** Runs the stress tool to load system resources
- **-c 1:** Uses 1 CPU core for stress testing
- **-i 1:** Starts 1 I/O stressor (light disk I/O load)
- **-m 1:** Starts 1 memory stressor (uses RAM)
- **--vm-bytes 128** : Allocates 128 MB of memory per memory worker
- **-t 100s**: Runs the stress test for 100 seconds

SIMULATING AUTO-SCALING cont'd



SIMULATING AUTO-SCALING cont'd



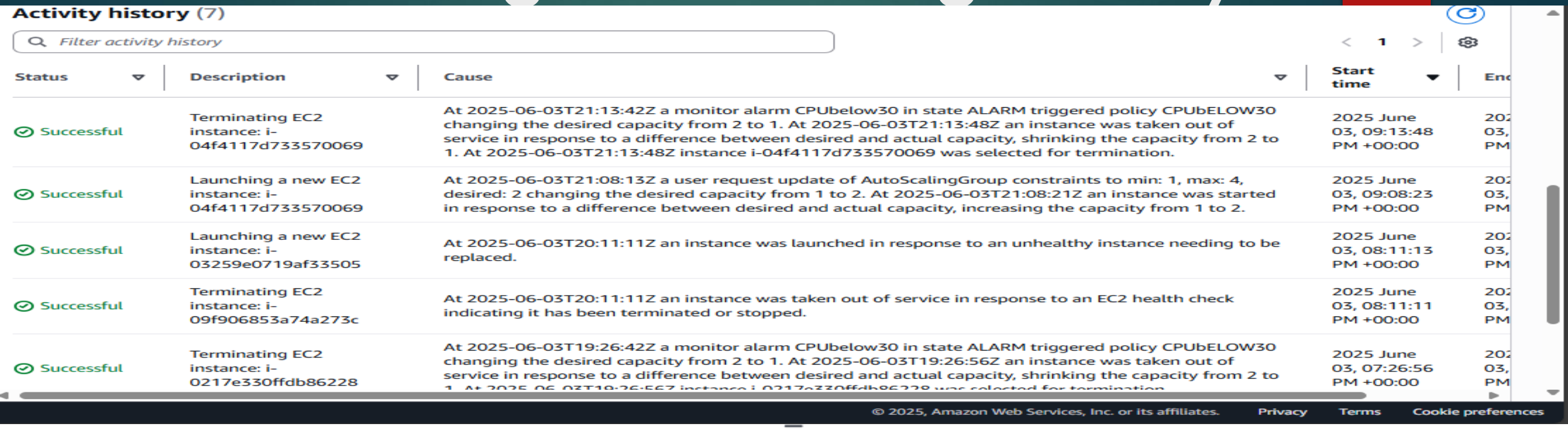
Instances (1/6) Info

Last updated 2 minutes ago | Connect | Instance state | Actions | Launch instances

Find Instance by attribute or tag (case-sensitive) | All states | 1

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public
	i-0217e330ffdb86228	Terminated	t3.micro	–	View alarms +	eu-north-1c	–
ec2tut	i-0e911191d9732408a	Stopped	t3.micro	–	View alarms +	eu-north-1a	–
group6_instan...	i-00d9af84be3c03e2a	Running	t3.micro	3/3 checks passec	View alarms +	eu-north-1a	ec2-13-
group6_instan...	i-0db3d45a0cd06e94c	Running	t3.micro	3/3 checks passec	View alarms +	eu-north-1a	ec2-51-
	i-09f906853a74a273c	Terminated	t3.micro	–	View alarms +	eu-north-1b	–
	i-03259e0719af33505	Running	t3.micro	3/3 checks passec	View alarms +	eu-north-1b	ec2-16-

7.Monitoring Auto scaling activity



Activity history (7)

Filter activity history

1

Status	Description	Cause	Start time	End
Successful	Terminating EC2 instance: i-04f4117d733570069	At 2025-06-03T21:13:42Z a monitor alarm CPUbelow30 in state ALARM triggered policy CPUbELOW30 changing the desired capacity from 2 to 1. At 2025-06-03T21:13:48Z an instance was taken out of service in response to a difference between desired and actual capacity, shrinking the capacity from 2 to 1. At 2025-06-03T21:13:48Z instance i-04f4117d733570069 was selected for termination.	2025 June 03, 09:13:48 PM +00:00	202 03, PM
Successful	Launching a new EC2 instance: i-04f4117d733570069	At 2025-06-03T21:08:13Z a user request update of AutoScalingGroup constraints to min: 1, max: 4, desired: 2 changing the desired capacity from 1 to 2. At 2025-06-03T21:08:21Z an instance was started in response to a difference between desired and actual capacity, increasing the capacity from 1 to 2.	2025 June 03, 09:08:23 PM +00:00	202 03, PM
Successful	Launching a new EC2 instance: i-03259e0719af33505	At 2025-06-03T20:11:11Z an instance was launched in response to an unhealthy instance needing to be replaced.	2025 June 03, 08:11:13 PM +00:00	202 03, PM
Successful	Terminating EC2 instance: i-09f906853a74a273c	At 2025-06-03T20:11:11Z an instance was taken out of service in response to an EC2 health check indicating it has been terminated or stopped.	2025 June 03, 08:11:11 PM +00:00	202 03, PM
Successful	Terminating EC2 instance: i-0217e330ffdb86228	At 2025-06-03T19:26:42Z a monitor alarm CPUbelow30 in state ALARM triggered policy CPUbELOW30 changing the desired capacity from 2 to 1. At 2025-06-03T19:26:56Z an instance was taken out of service in response to a difference between desired and actual capacity, shrinking the capacity from 2 to 1. At 2025-06-03T19:26:56Z instance i-0217e330ffdb86228 was selected for termination.	2025 June 03, 07:26:56 PM +00:00	202 03, PM

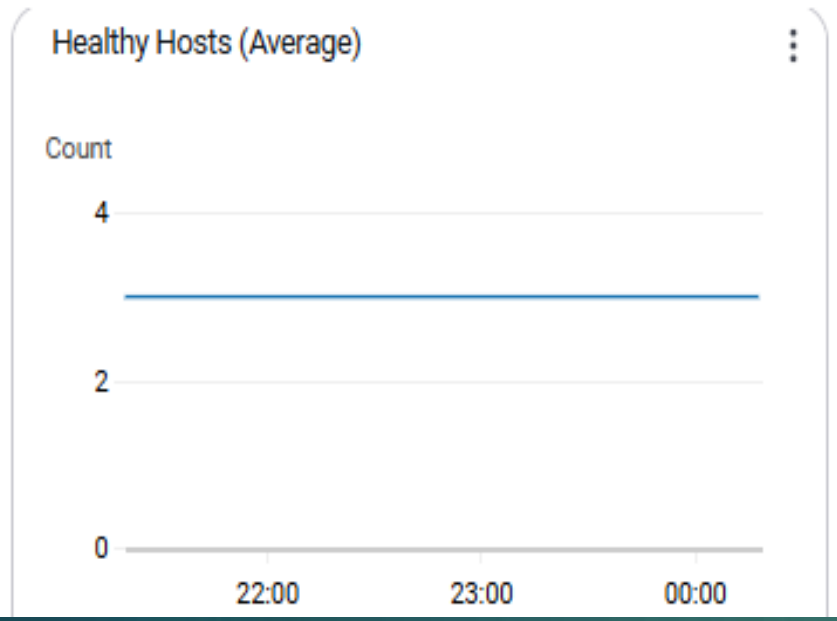
Target group: group6target

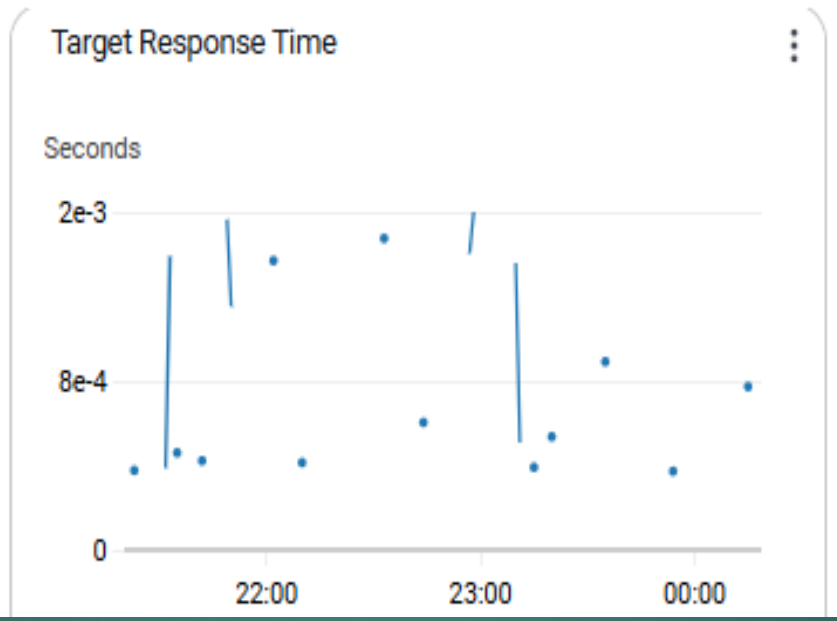
Target type	Protocol : Port	Protocol version	VPC
Instance	HTTP: 80	HTTP1	vpc-0898d62c6ae440b97

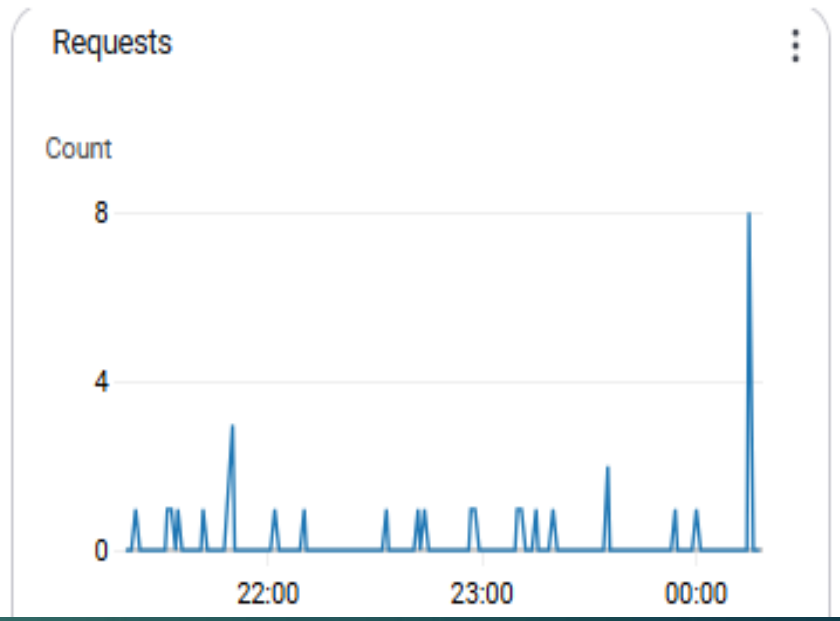
IP address type	Load balancer
IPv4	group6alb

Total targets	Healthy	Unhealthy	Unused	Initial	Draining
3	3	0	0	0	0
	0 Anomalous				

Monitoring Auto scaling activity cont.







- Using CloudWatch, we checked the number of healthy instances running, auto scaling activity (scale up and down actions) and then the health status of ALB and EC2. Inspecting the activity history, we also noted that the ASG adjusts the number of instances based on traffic.

CONCLUSION

- Load balancing and autoscaling help keep systems running smoothly by distributing traffic and adjusting resources as needed.
- Load balancers ensure no single server gets overwhelmed, while autoscaling automatically adds or removes computing power based on demand.
- Testing the system under heavy load showed how these technologies work in real time. Watching resources scale up when traffic increased and scale down when it dropped helped the group understand how autoscaling keeps things efficient while load balancing keeps everything stable.
- This hands-on experience made it clear why these strategies are essential for maintaining reliable, fault tolerant and responsive cloud systems.

Group Members

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Thank you