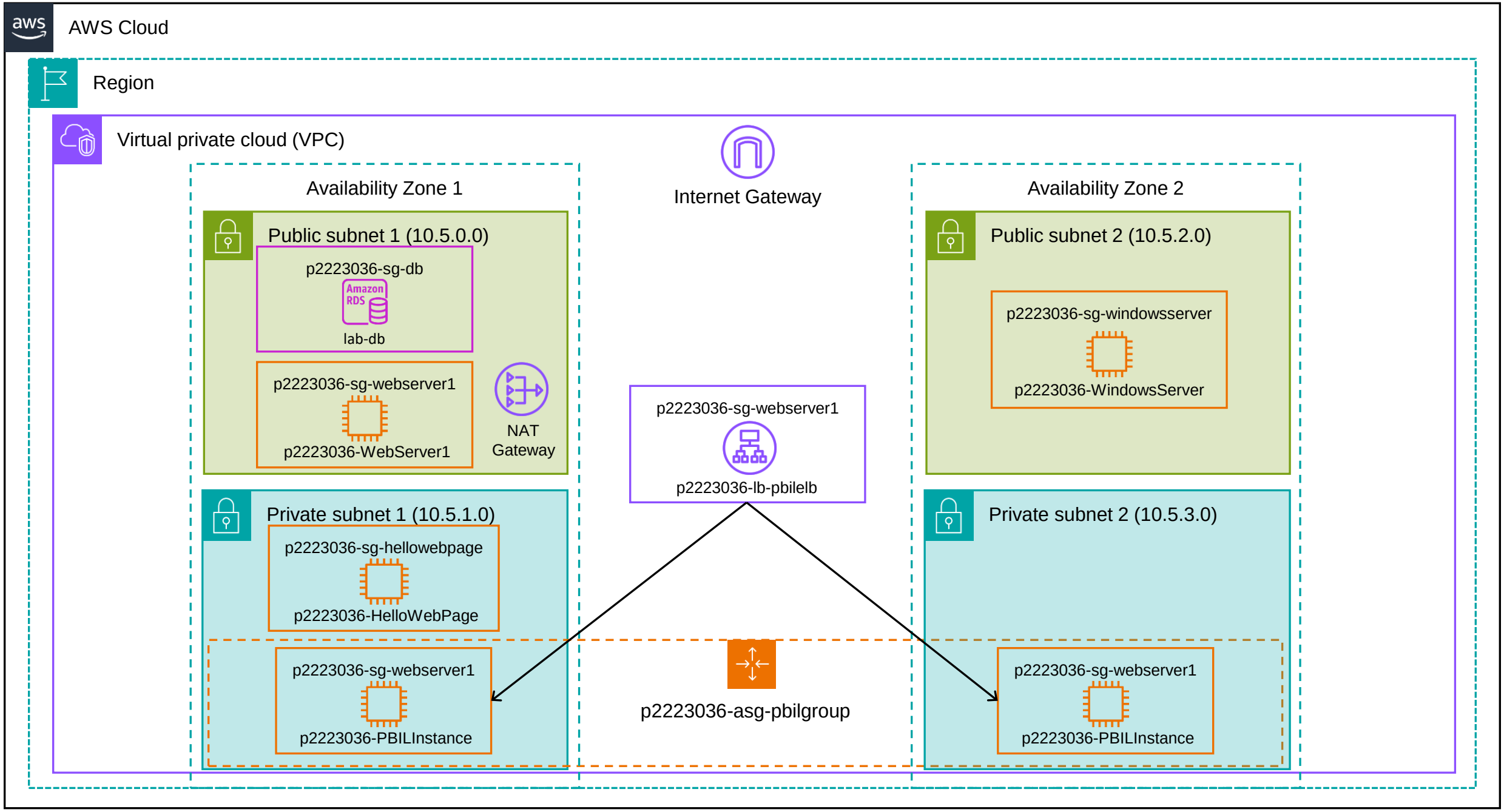
AWS Auto-Scaling and Load-Balancing System

By Yashvanth Kumar

Contents


AWS Cloud
Region
Virtual private cloud (VPC)
Internet Gateway
Availability Zone 1
Public subnet 1 (10.5.0.0)
p2223036-sg-db
Amazon RDS
lab-db
p2223036-sg-webserver1
p2223036-WebServer1
NAT Gateway
Private subnet 1 (10.5.1.0)
p2223036-sg-hellowebpage
p2223036-HelloWebPage
p2223036-sg-webserver1
p2223036-PBILInstance
Availability Zone 2
Public subnet 2 (10.5.2.0)
p2223036-sg-windowsserver
p2223036-WindowsServer
Private subnet 2 (10.5.3.0)
p2223036-sg-webserver1
p2223036-PBILInstance
p2223036-sg-webserver1
p2223036-lb-pbilelb
p2223036-asg-pbilgroup

Services Deployed and Justification

Services	Brief Description	Justification
VPC	AWS networking service to create isolated virtual networks, enabling control over IP addressing, subnets, and security settings.	To isolate resources within a virtual network, enabling customized security groups and subnet configurations for enhanced control and protection
EC2	Scalable virtual server instances in the cloud, offering various compute capacities for running applications and services.	To provision scalable Linux and Windows instances for web servers, such as Web Server 1, Windows Server and Hello Web Page, offering flexibility in computing power and remote management
RDS	Managed database service for SQL databases, automating administrative tasks like backups, patching, and scaling.	To create and manage users' contacts in the database
ELB	Distributes incoming traffic across multiple EC2 instances to enhance availability and fault tolerance of applications.	To distribute incoming traffic across multiple EC2 instances, ensuring high availability and fault tolerance
ASG	Automates the scaling of EC2 instances based on demand, maintaining desired performance and minimizing costs during traffic fluctuations.	To automatically adjust the number of EC2 instances based on demand, maintaining optimal performance and resource utilization by scaling in and out dynamically

VPC and Subnet Details

VPC Name:	P2223036-vpc
Region:	us-east-1 (N. Virginia)
CIDR Range	10.5.0.0/16

Subnet Name	Type (Public/Private)	AZ	CIDR
p2223036-subnet-public1-us-east-1a	Public	us-east-1a	10.5.0.0/24
p2223036-subnet-private1-us-east-1a	Private	us-east-1a	10.5.1.0/24
p2223036-subnet-public2-us-east-1b	Public	us-east-1b	10.5.2.0/24
p2223036-subnet-private2-us-east-1b	Private	us-east-1b	10.5.3.0/24

Route Tables Details

Route Table Name	VPC	Descriptions	Subnets	AZ
p2223036-rtb-public	p2223036-vpc	-	• p2223036-subnet-public1-us-east-1a • p2223036-subnet-public2-us-east-1b	• us-east-1a • us-east-1b
p2223036-rtb-private1-us-east-1a	p2223036-vpc	-	• p2223036-subnet-private1-us-east-1a • p2223036-subnet-private2-us-east-1b	• us-east-1a • us-east-1b
p2223036-rtb-private2-us-east-1b	p2223036-vpc	-	-	-

Name	Route Table	Destination CIDR	Target
VPC	• p2223036-rtb-public • p2223036-rtb-private1-us-east-1a • p2223036-rtb-private2-us-east-1b	10.5.0.0/16	local
NAT Gateway	• p2223036-rtb-private1-us-east-1a • p2223036-rtb-private2-us-east-1b	0.0.0.0/0	NAT

Route Tables Details

Route Table Name: P2223036-rtb-public	
Destination CIDR	Target
0.0.0.0/0	P2223036-igw
10.5.0.0/16	local

Route Table Name: P2223036-rtb-private1-us-east-1a	
Destination CIDR	Target
0.0.0.0/0	P2223036-nat-public1-us-east-1a
10.5.0.0/16	local

Route Table Name: P2223036-rtb-private2-us-east-1b	
Destination CIDR	Target
0.0.0.0/0	P2223036-nat-public1-us-east-1a
10.5.0.0/16	local

Security Groups (SG) Details

SG Name:	p2223036-sg-webserver1
Inbound/ Outbound:	Inbound
Type:	SSH and HTTP
Source:	0.0.0.0/0
Description:	Allow SSH and HTTP access

SG Name:	p2223036-sg-hellowebpage
Inbound/ Outbound:	Inbound
Type:	HTTP
Source:	0.0.0.0/0
Description:	Allow HTTP access

Security Groups (SG) Details

SG Name:	p2223036-sg-windowsserver
Inbound/ Outbound:	Inbound
Type:	RDP
Source:	0.0.0.0/0
Description:	Allow RDP access

SG Name:	p2223036-sg-db
Inbound/ Outbound:	Inbound
Type:	MYSQL/Aurora
Source:	p2223036-sg-webserver1 (0.0.0.0/0)
Description:	Permit access from WebServer1 Security Group

EC2 Instance Details

Tag	OS	Type	Size	Public IPv4 address	Private IPv4 address	Which Subnet	User Data (Y/N)*
p2223036-WebServer1	Linux 2023	t2.micro	8 GiB	34.201.163.214	10.5.0.191	p2223036-subnet-public1-us-east-1a	Y
p2223036-HelloWebPage	Linux 2023	t2.micro	8 GiB	3.88.25.204	10.5.1.199	p2223036-subnet-private1-us-east-1a	Y
p2223036-WindowsServer	Windows Server 2016	t2.micro	30 GiB	44.199.197.147	10.5.2.62	p2223036-subnet-public2-us-east-1b	N

* If User Data needed, include in separate slide

User Data for EC2 instances

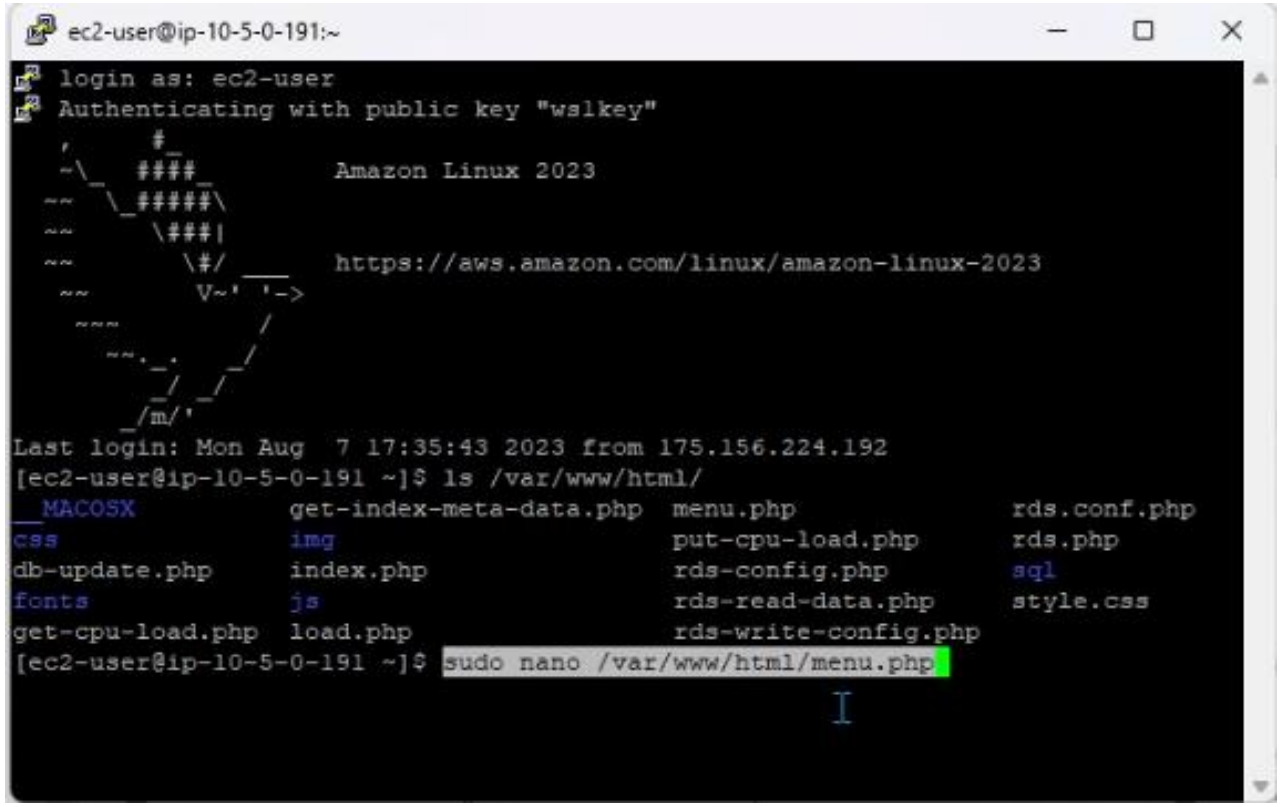
Web Server 1

- *#!/bin/bash# Install Apache Web Server and PHPdnf install -y httpd wget php mariadb105-server# Download Lab fileswget https://aws-tc-largeobjects.s3.us-west-2.amazonaws.com/CUR-TF-100-ACCLFO-2/2-lab2-vpc/s3/lab-app.zipunzip lab-app.zip -d /var/www/html/# Turn on web serverchkconfig httpd onservice httpd start*

Hello Web Page

- *#!/bin/bashdnf install -y httpdsystemctl enable httpdsystemctl start httpdecho '<html><h1>Hello From Your Web Server!</h1></html>' > /var/www/html/index.html*

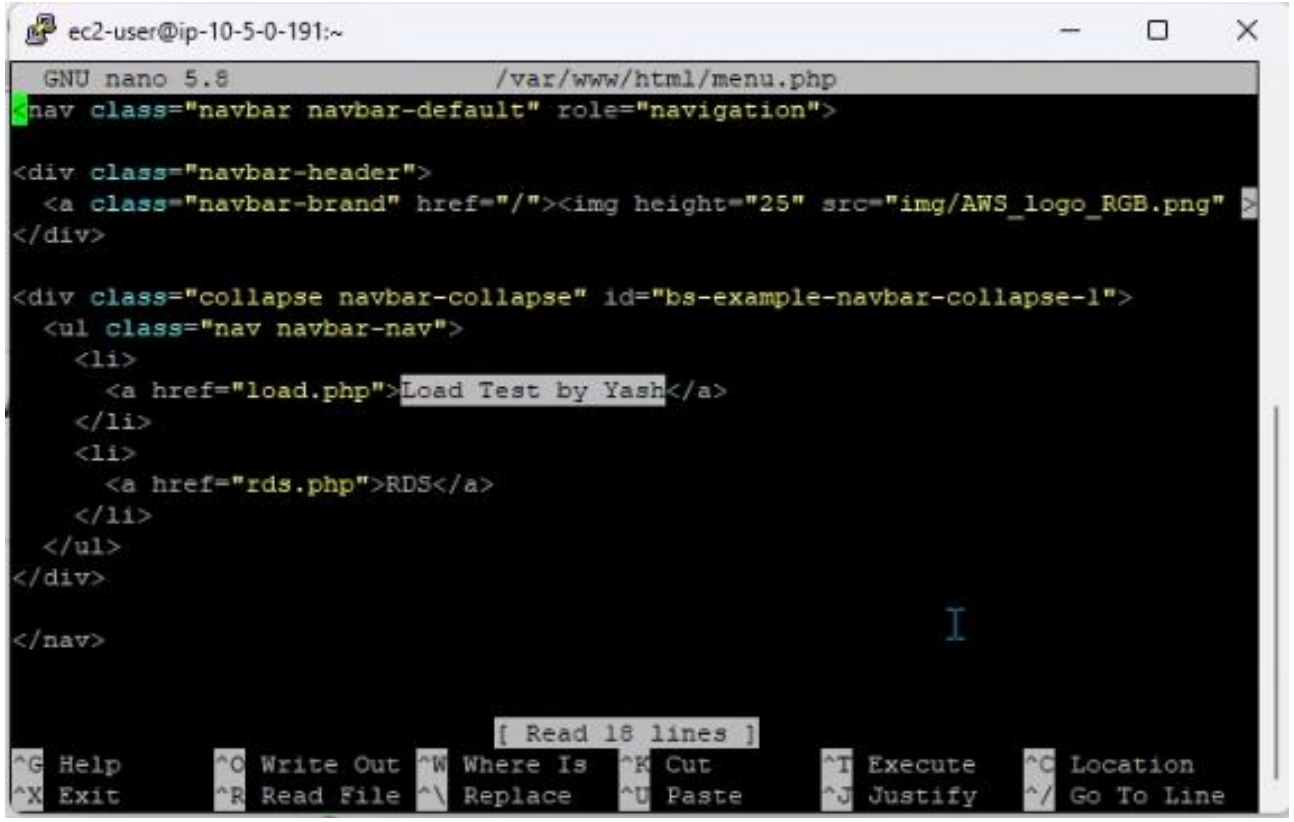
SSH Connection details



Commands

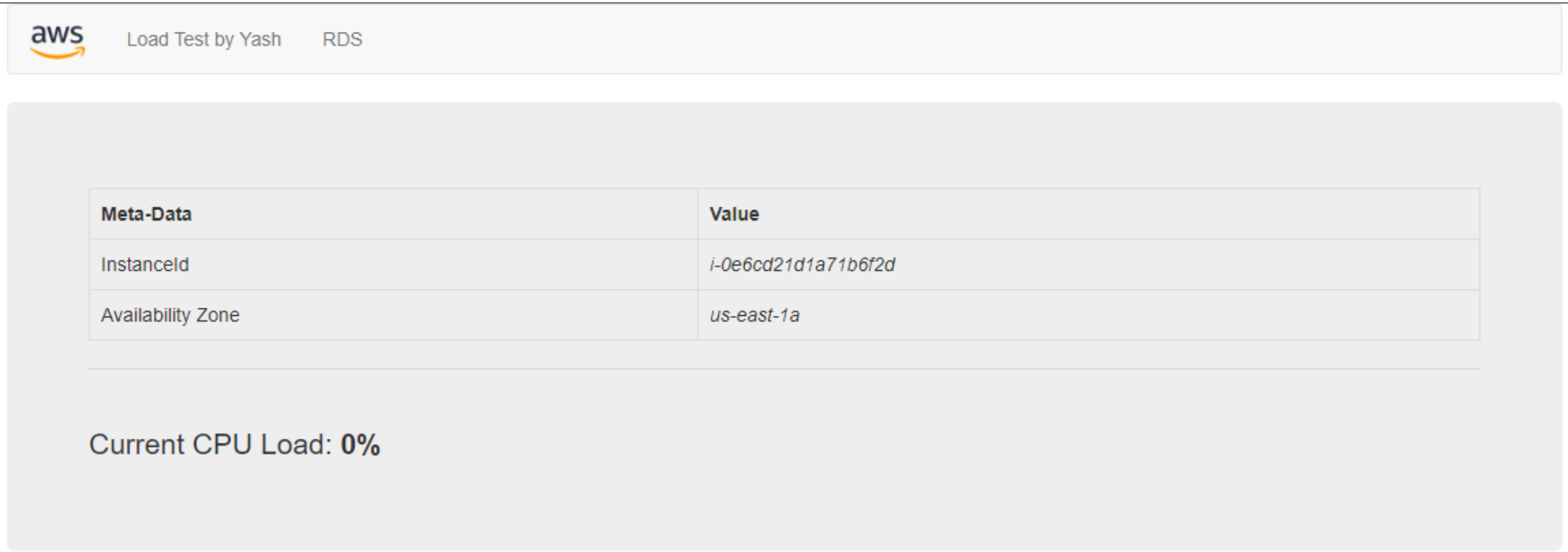
- *ls /var/www/html/* (To locate the Web Server)
- *sudo nano /var/www/html/menu.php* (To authorise the edit to add initials)

SSH Connection details

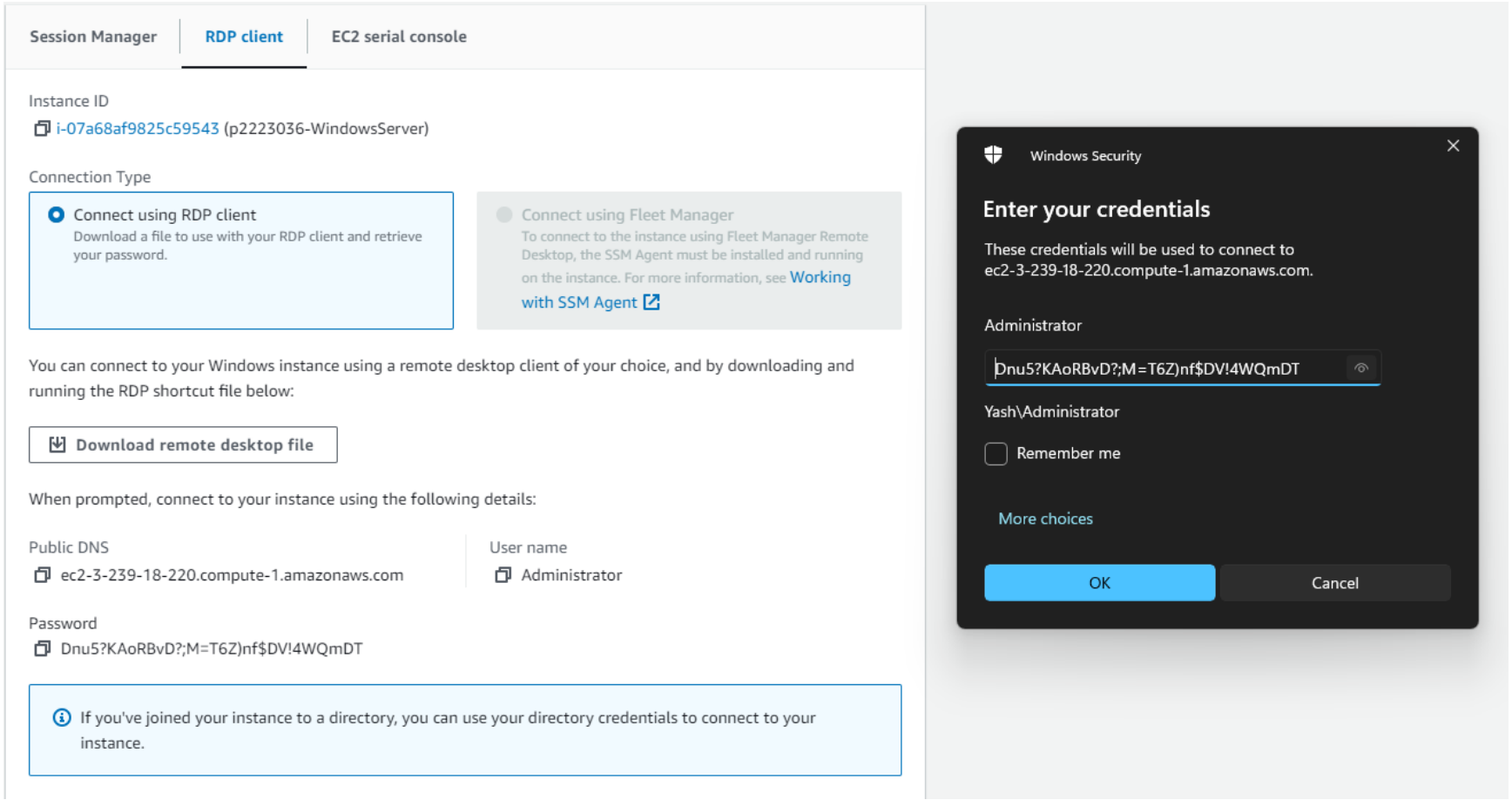


Changed “Load Test” to “Load Test by Yash”

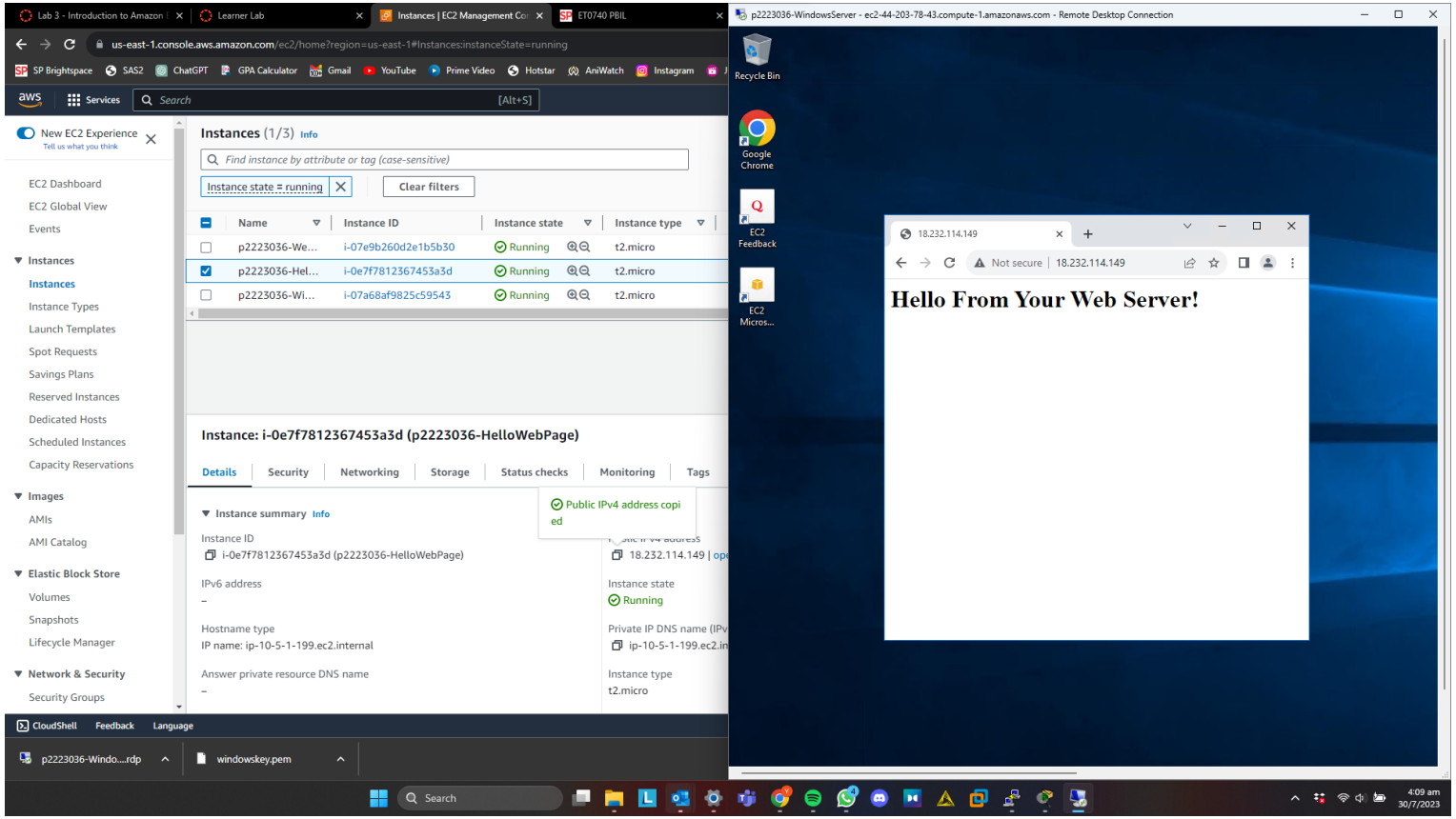
Web Server 1 Page



RDP Connection details



RDP Connection details



Viewing the p2223036-HelloWebPage webpage through the p2223036-WindowsServer instance

RDS details

Connectivity & security

Endpoint & port

Endpoint
lab-db.cy8qswkuahfh.us-east-1.rds.amazonaws.com

Port
3306

Networking

Availability Zone
us-east-1a

VPC
p2223036-vpc (vpc-09778eb74e149b72b)

Subnet group
db-subnet-group

Subnets
subnet-068dc49c2510b8265
subnet-0ab6d3e63418417db

Network type
IPv4

Security

VPC security groups
p2223036-sg-db (sg-096c88b803ad13fd8)
Active

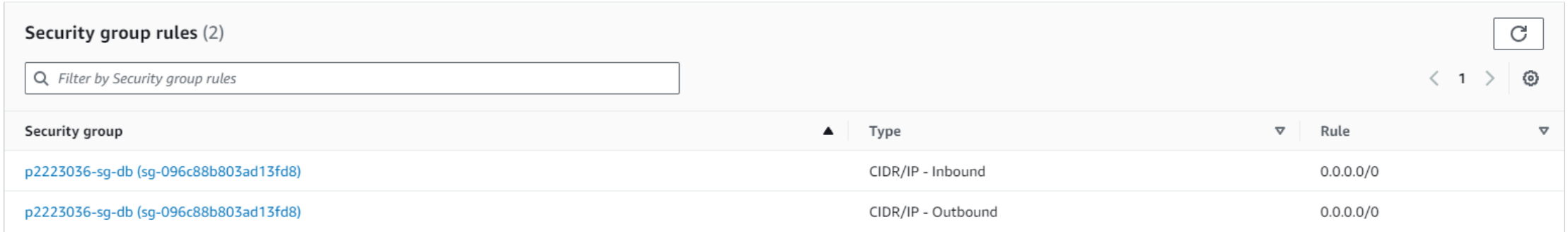
Publicly accessible
Yes

Certificate authority Info
rds-ca-2019

Certificate authority date
August 23, 2024, 01:08 (UTC+08:00)

DB instance certificate expiration date
August 23, 2024, 01:08 (UTC+08:00)

RDS details



Security group rules (2)

Filter by Security group rules

1

Security group	Type	Rule
p2223036-sg-db (sg-096c88b803ad13fd8)	CIDR/IP - Inbound	0.0.0.0/0
p2223036-sg-db (sg-096c88b803ad13fd8)	CIDR/IP - Outbound	0.0.0.0/0

RDS details

Instance

Configuration

DB instance ID
lab-db

Engine version
8.0.33

DB name
lab

License model
General Public License

Option groups
default:mysql-8-0 In sync

Amazon Resource Name (ARN)
arn:aws:rds:us-east-1:121117591756:db:lab-db

Resource ID
db-Y2GJUV7UQWUFWITHNWUSMIPBQU

Created time
August 02, 2023, 00:18 (UTC+08:00)

DB instance parameter group
default.mysql8.0 In sync

Deletion protection
Disabled

Instance class

Instance class
db.t2.micro

vCPU
1

RAM
1 GB

Availability

Master username
main

Master password
****

IAM DB authentication
Not enabled

Multi-AZ
No

Secondary Zone
-

Storage

Encryption
Not enabled

Storage type
General Purpose SSD (gp2)

Storage
20 GiB

Provisioned IOPS
-

Storage throughput
-

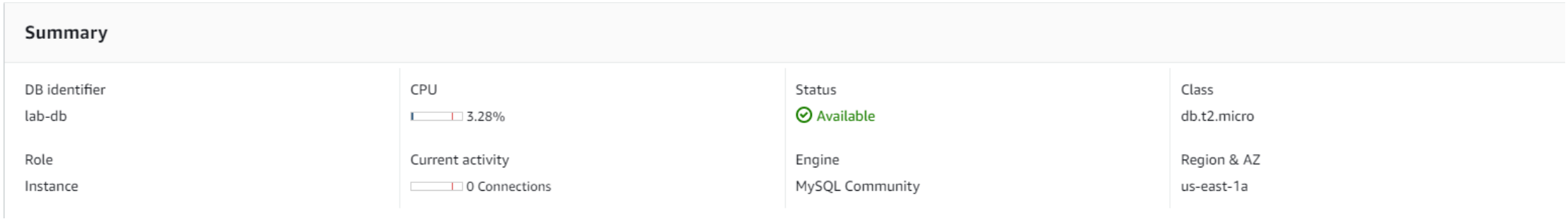
Storage autoscaling
Enabled

Maximum storage threshold
1000 GiB

Performance Insights

Performance Insights enabled
Turned off

RDS details

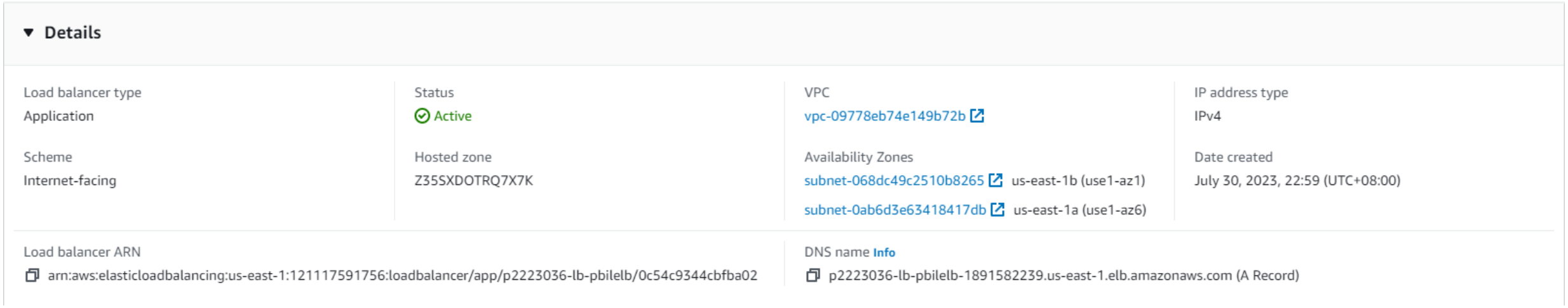

Summary
DB identifier
lab-db
CPU
3.28%
Status
Available
Class
db.t2.micro
Role
Instance
Current activity
0 Connections
Engine
MySQL Community
Region & AZ
us-east-1a

RDS details

- Added 2 new contacts: Michael Smith and Emma Thompson
- Accessible from Lab 5 as the RDS is in a public subnet and thus, publicly accessible

Load Balancer Details

Name	Tag	Type (External/ Internal)	SG Name
p2223036-lb-pbilelb	-	Internal	p2223036-sg-webserver1



Auto Scaling Launch Configuration Details

Name	OS	Type	Size	Role	SG Name
p2223036-lt-pbilconfig	WebServerAMI	t2.micro	8GiB	AWSServiceRoleForAutoScaling (IAM)	p2223036-sg-webserver1

Auto Scaling Group Details

Name	Launch Configuration	Group Size	VPC	Subnets	ELB
p2223036-asg-pbilgroup	p2223036-lt-pbilconfig	Minimum: 2 Maximum: 4	p2223036-vpc	• p2223036-subnet-private1-us-east-1a • p2223036-subnet-private2-us-east-1b	p2223036-lb-pbilelb

Auto Scaling Configuration

Group details Edit

Auto Scaling group name	**Desired** capacity	Status	Amazon Resource Name (ARN)
p2223036-asg-pbilgroup	2	-	arn:aws:autoscaling:us-east-1:121117591756:autoScalingGroup:4c1d2777-8f4a-44ba-99db-525f83b2137e:autoScalingGroupName/p2223036-asg-pbilgroup
Date created Mon Jul 31 2023 16:27:16 GMT+0800 (Singapore Standard Time)	**Minimum** capacity 2		
	Maximum capacity 4		

p2223036-sp-pbilgroup

Target tracking scaling

Enabled

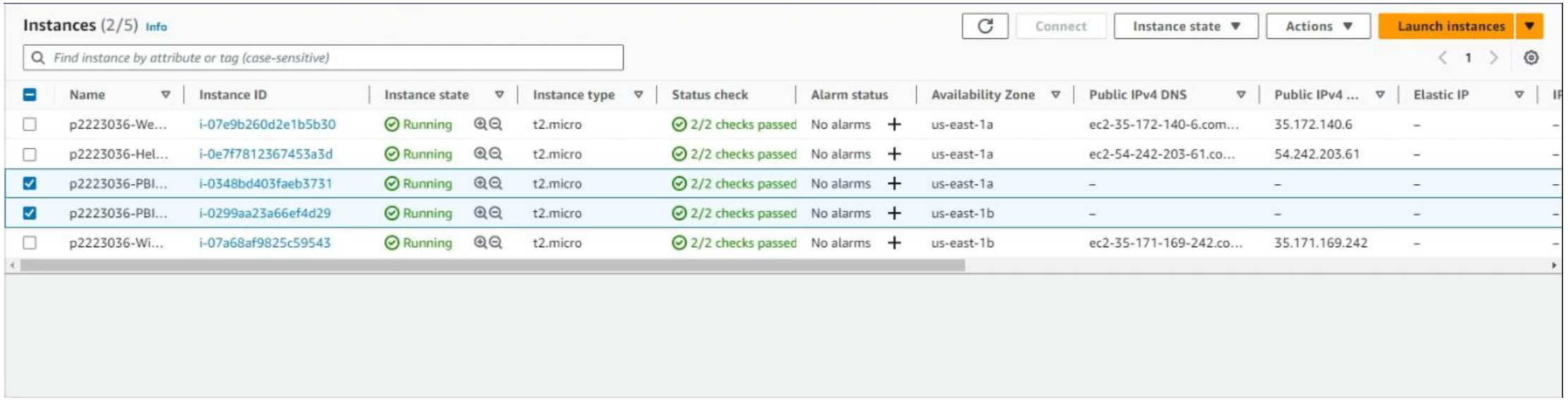
As required to maintain Average CPU utilization at 70

Add or remove capacity units as required

300 seconds to warm up before including in metric

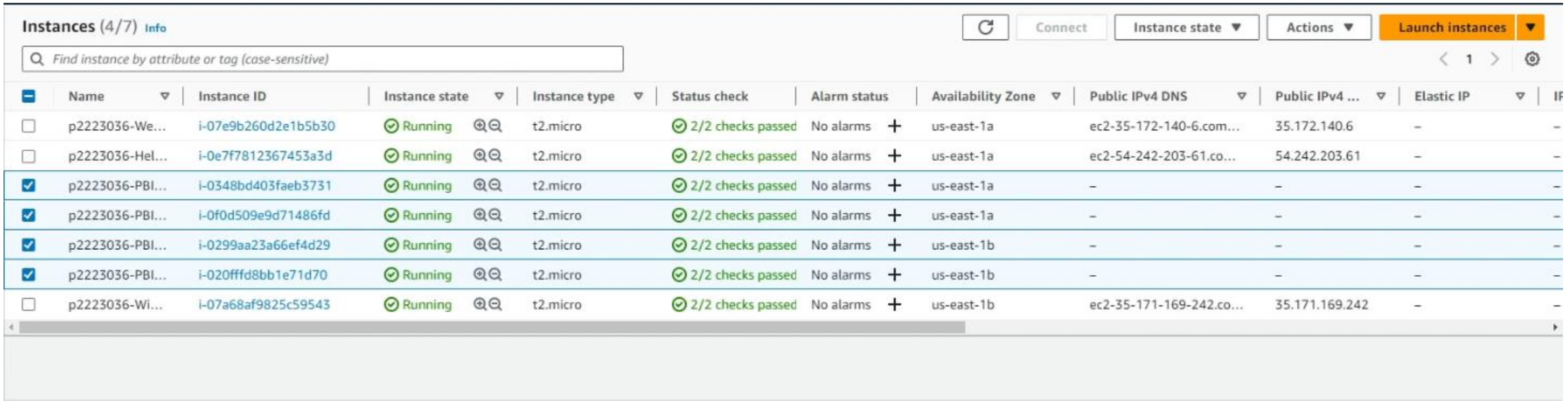
Enabled

Auto Scaled Instances (Base Configuration)



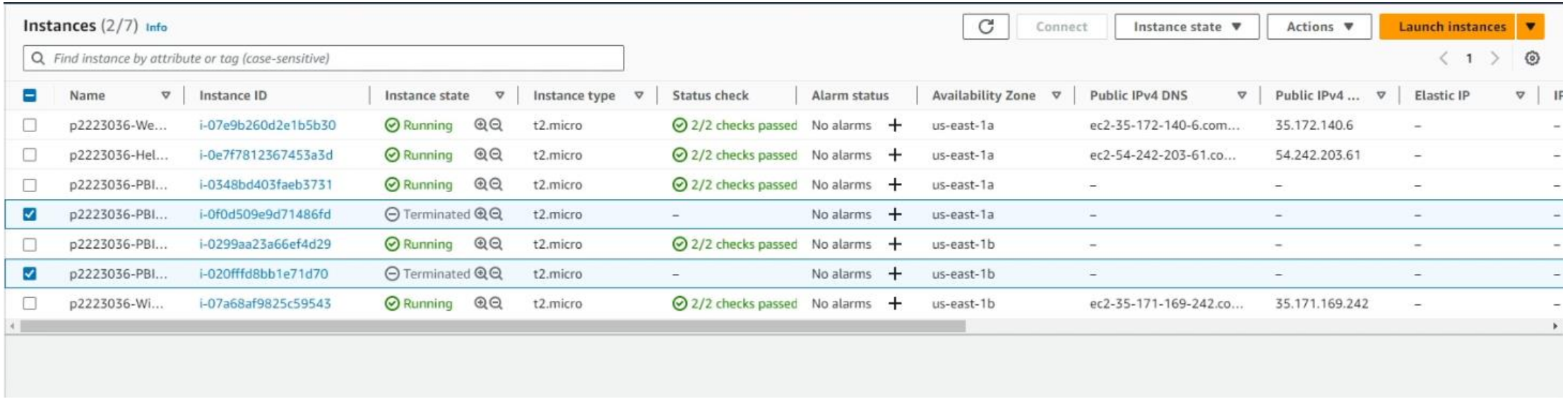
2 Auto Scaled Instances are always running, even when the load is low

Auto Scaled Instances (Scaled Out)



4 Auto Scaled Instances are running when the the load becomes high

Auto Scaled Instances (Scaled In)



Instances (2/7) Info

Connect | Instance state | Actions | Launch instances

Find instance by attribute or tag (case-sensitive)

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP
p2223036-We...	i-07e9b260d2e1b5b30	Running	t2.micro	2/2 checks passed	No alarms	us-east-1a	ec2-35-172-140-6.com...	35.172.140.6	–
p2223036-Hel...	i-0e7f7812367453a3d	Running	t2.micro	2/2 checks passed	No alarms	us-east-1a	ec2-54-242-203-61.co...	54.242.203.61	–
p2223036-PBI...	i-0348bd403faeb3731	Running	t2.micro	2/2 checks passed	No alarms	us-east-1a	–	–	–
p2223036-PBI...	i-0f0d509e9d71486fd	Terminated	t2.micro	–	No alarms	us-east-1a	–	–	–
p2223036-PBI...	i-0299aa23a66ef4d29	Running	t2.micro	2/2 checks passed	No alarms	us-east-1b	–	–	–
p2223036-PBI...	i-020fffd8bb1e71d70	Terminated	t2.micro	–	No alarms	us-east-1b	–	–	–
p2223036-Wi...	i-07a68af9825c59543	Running	t2.micro	2/2 checks passed	No alarms	us-east-1b	ec2-35-171-169-242.co...	35.171.169.242	–

2 Auto Scaled Instances are terminated after the load becomes low again

Alarm in CloudWatch

CPU utilization decreases and remains below 70 percent as load is distributed across Auto Scaled Instances