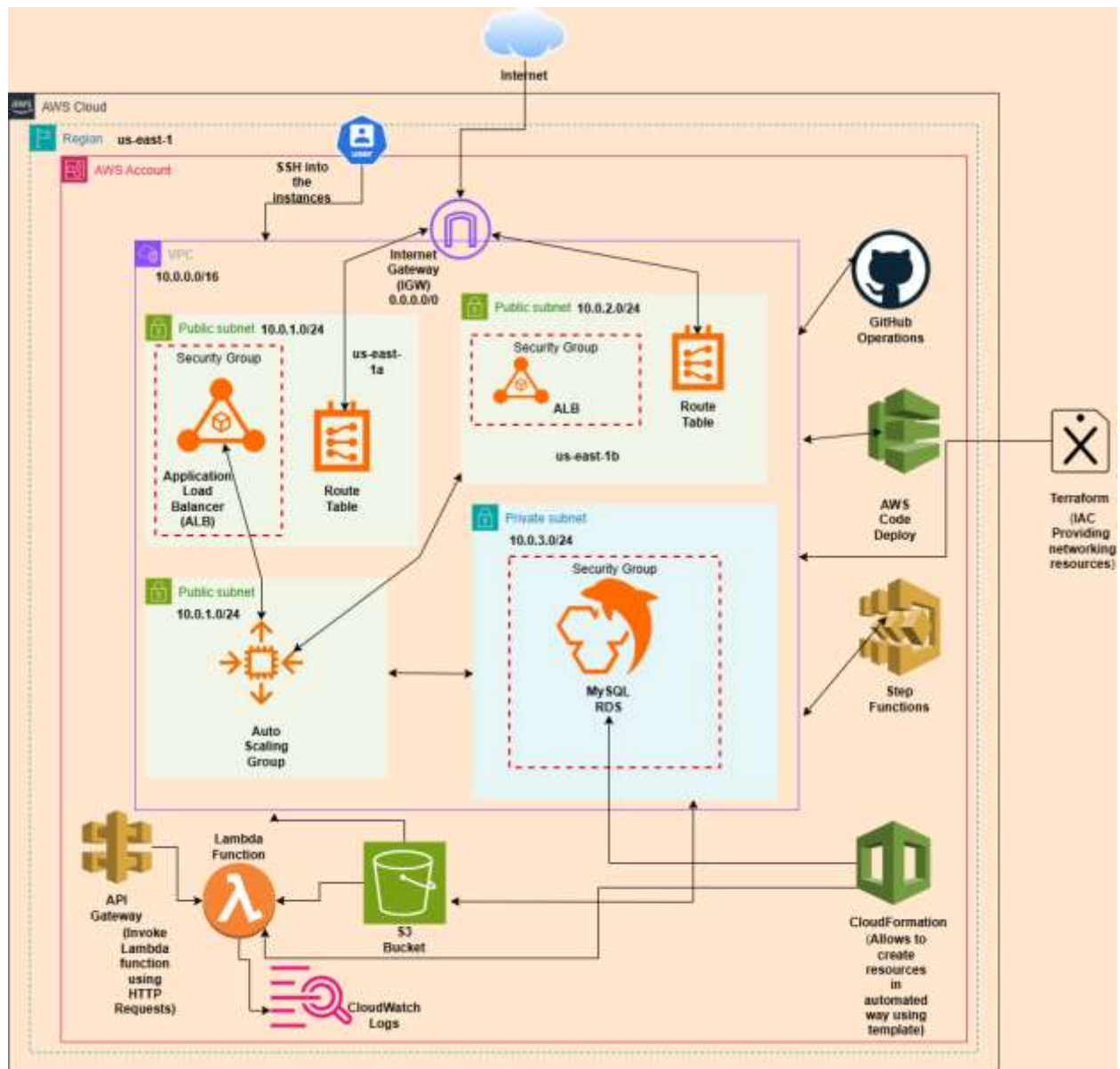


# IS-698 Project Screenshots – UB01976

## 1. Architecture Diagram



2(A). Terraform screenshots related to networking components creation (VPC, Subnets, Route tables, Associations, and Security Groups)

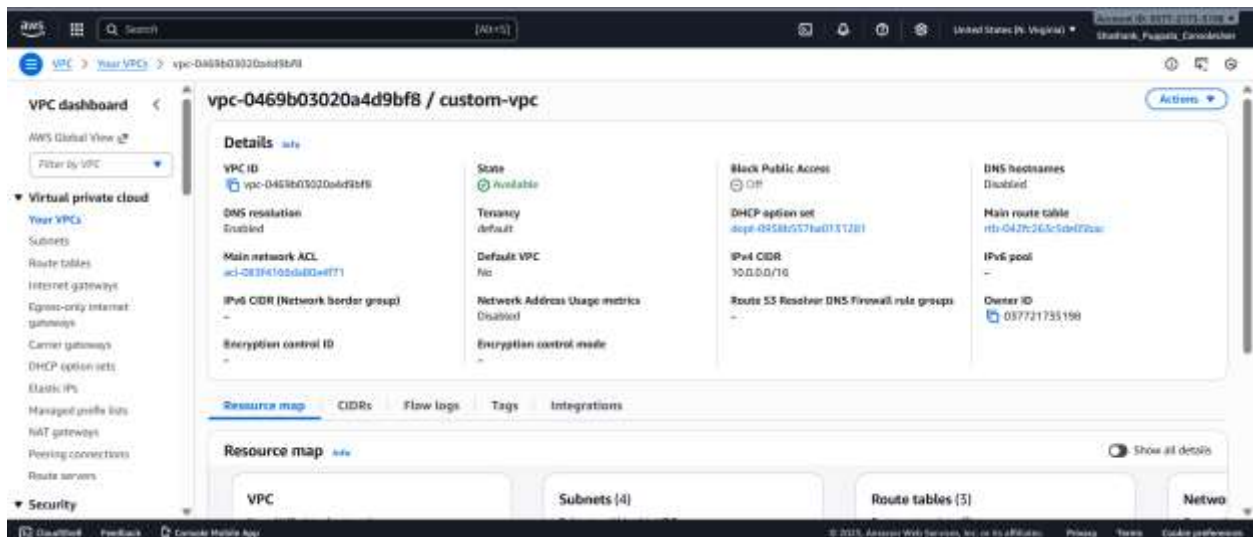
```
Command Prompt
Microsoft Windows [Version 10.0.26200.7171]
(c) Microsoft Corporation. All rights reserved.

C:\Users\puppa>mkdir terraform-project-networking-components
C:\Users\puppa>cd terraform-project-networking-components
C:\Users\puppa\terraform-project-networking-components>echo. > main.tf
C:\Users\puppa\terraform-project-networking-components>
```

Apply complete! Resources: 14 added, 0 changed, 0 destroyed.

Outputs:

```
db_security_group_id = "sg-02d1977bd943e10a7"
private_subnet_ids = [
  "subnet-0ccb3181bc86d224b",
  "subnet-07d8c971fa8357be9",
]
public_subnet_ids = [
  "subnet-0a8736df876f2047c",
  "subnet-0fc9864465b7493cf",
]
vpc_id = "vpc-0469b03020a4d9bf8"
web_security_group_id = "sg-0e042b05953c64171"
```



Public Subnets in different Availability Zones: -

**subnet-0a8736df876f2047c / public-subnet-1**

**Details**

<b>Subnet ID</b> <a href="#">subnet-0a8736df876f2047c</a>	<b>Subnet ARN</b> <a href="#">arn:aws:ec2:us-east-1:057721735198:subnet/subnet-0a8736df876f2047c</a>	<b>State</b> <span>Available</span>	<b>Block Public Access</b> <input type="checkbox"/> Off
<b>IPv4 CIDR</b> <a href="#">10.0.1.0/24</a>	<b>Available IPv4 addresses</b> <a href="#">251</a>	<b>IPv6 CIDR</b> -	<b>IPv6 CIDR association ID</b> -
<b>Availability Zone</b> <a href="#">us-east-1a</a>	<b>Network border group</b> <a href="#">us-east-1</a>	<b>VPC</b> <a href="#">vpc-0468d9921a4c9bfb</a> / custom-vpc	<b>Route table</b> <a href="#">rtb-0468d9921a4c9bfb</a> / public-route-table
<b>Network ACL</b> <a href="#">acl-06364166d80a4f71</a>	<b>Default subnet</b> No	<b>Auto-assign public IPv4 address</b> Yes	<b>Auto-assign IPv6 address</b> No
<b>Auto-assign customer-owned IPv4 address</b> No	<b>Customer-owned IPv4 pool</b> -	<b>Outpost ID</b> -	<b>IPv4 CIDR reservations</b> -
<b>IPv6 CIDR reservations</b> -	<b>IPv6-only</b> No	<b>Hostname type</b> IP name	<b>Resource name DNS A record</b> Disabled
<b>Resource name DNS AAAA record</b> Disabled	<b>DNS64</b> Disabled	<b>Owner</b> <a href="#">057721735198</a>	

**Security** | [Flow logs](#) | [Route table](#) | [Network ACL](#) | [CIDR reservations](#) | [Sharing](#) | [Tags](#)

**subnet-0fc9864465b7493cf / public-subnet-2**

**Details**

<b>Subnet ID</b> <a href="#">subnet-0fc9864465b7493cf</a>	<b>Subnet ARN</b> <a href="#">arn:aws:ec2:us-east-1:057721735198:subnet/subnet-0fc9864465b7493cf</a>	<b>State</b> <span>Available</span>	<b>Block Public Access</b> <input type="checkbox"/> Off
<b>IPv4 CIDR</b> <a href="#">10.0.2.0/24</a>	<b>Available IPv4 addresses</b> <a href="#">251</a>	<b>IPv6 CIDR</b> -	<b>IPv6 CIDR association ID</b> -
<b>Availability Zone</b> <a href="#">us-east-1b</a>	<b>Network border group</b> <a href="#">us-east-1</a>	<b>VPC</b> <a href="#">vpc-0468d9921a4c9bfb</a> / custom-vpc	<b>Route table</b> <a href="#">rtb-0468d9921a4c9bfb</a> / public-route-table
<b>Network ACL</b> <a href="#">acl-06364166d80a4f71</a>	<b>Default subnet</b> No	<b>Auto-assign public IPv4 address</b> Yes	<b>Auto-assign IPv6 address</b> No
<b>Auto-assign customer-owned IPv4 address</b> No	<b>Customer-owned IPv4 pool</b> -	<b>Outpost ID</b> -	<b>IPv4 CIDR reservations</b> -
<b>IPv6 CIDR reservations</b> -	<b>IPv6-only</b> No	<b>Hostname type</b> IP name	<b>Resource name DNS A record</b> Disabled
<b>Resource name DNS AAAA record</b> Disabled	<b>DNS64</b> Disabled	<b>Owner</b> <a href="#">057721735198</a>	

**Security** | [Flow logs](#) | [Route table](#) | [Network ACL](#) | [CIDR reservations](#) | [Sharing](#) | [Tags](#)

Private Subnets in different Availability Zones: -

**subnet-0ccb3181bc86d224b / private-subnet-1**

**Details**

<b>Subnet ID</b> <a href="#">subnet-0ccb3181bc86d224b</a>	<b>Subnet ARN</b> <a href="#">arn:aws:ec2:us-east-1:057721735198:subnet/subnet-0ccb3181bc86d224b</a>	<b>State</b> <span>Available</span>	<b>Block Public Access</b> <input type="checkbox"/> Off
<b>IPv4 CIDR</b> 10.0.3.0/24	<b>Available IPv4 addresses</b> 251	<b>IPv6 CIDR</b> -	<b>IPv6 CIDR association ID</b> -
<b>Availability Zone</b> <a href="#">us-east-1a</a>	<b>Network border group</b> <a href="#">us-east-1</a>	<b>VPC</b> <a href="#">vpc-0489b05020a4d9bfb</a>   custom-vpc	<b>Route table</b> <a href="#">rtb-072aa736c9963567</a>   private-route-table
<b>Network ACL</b> <a href="#">acl-083f6164d8d8a8771</a>	<b>Default subnet</b> No	<b>Auto-assign public IPv4 address</b> No	<b>Auto-assign IPv6 address</b> No
<b>Auto-assign customer-owned IPv4 address</b> No	<b>Customer-owned IPv4 pool</b> -	<b>Outpost ID</b> -	<b>IPv4 CIDR reservations</b> -
<b>IPv6 CIDR reservations</b> -	<b>IPv6-only</b> No	<b>Hostname type</b> IP name	<b>Resource name DNS A record</b> Disabled
<b>Resource name DNS AAAA record</b> Disabled	<b>DNS64</b> Disabled	<b>Owner</b> <a href="#">057721735198</a>	

**Security** | [Flow logs](#) | [Route table](#) | [Network ACL](#) | [CIDR reservations](#) | [Sharing](#) | [Tags](#)

**subnet-07d8c971fa8357be9 / private-subnet-2**

**Details**

<b>Subnet ID</b> <a href="#">subnet-07d8c971fa8357be9</a>	<b>Subnet ARN</b> <a href="#">arn:aws:ec2:us-east-1:057721735198:subnet/subnet-07d8c971fa8357be9</a>	<b>State</b> <span>Available</span>	<b>Block Public Access</b> <input type="checkbox"/> Off
<b>IPv4 CIDR</b> 10.0.4.0/24	<b>Available IPv4 addresses</b> 251	<b>IPv6 CIDR</b> -	<b>IPv6 CIDR association ID</b> -
<b>Availability Zone</b> <a href="#">us-east-1b</a>	<b>Network border group</b> <a href="#">us-east-1</a>	<b>VPC</b> <a href="#">vpc-0489b05020a4d9bfb</a>   custom-vpc	<b>Route table</b> <a href="#">rtb-072aa736c9963567</a>   private-route-table
<b>Network ACL</b> <a href="#">acl-083f6164d8d8a8771</a>	<b>Default subnet</b> No	<b>Auto-assign public IPv4 address</b> No	<b>Auto-assign IPv6 address</b> No
<b>Auto-assign customer-owned IPv4 address</b> No	<b>Customer-owned IPv4 pool</b> -	<b>Outpost ID</b> -	<b>IPv4 CIDR reservations</b> -
<b>IPv6 CIDR reservations</b> -	<b>IPv6-only</b> No	<b>Hostname type</b> IP name	<b>Resource name DNS A record</b> Disabled
<b>Resource name DNS AAAA record</b> Disabled	<b>DNS64</b> Disabled	<b>Owner</b> <a href="#">057721735198</a>	

**Security** | [Flow logs](#) | [Route table](#) | [Network ACL](#) | [CIDR reservations](#) | [Sharing](#) | [Tags](#)

Route Tables: -

rtb-068a0de33478268f8 / public-route-table

**Details**

Route table ID: rtb-068a0de33478268f8

VPC: vpc-0463503020a4d8bf8 | custom-vpc

Main: No

Owner ID: 017721735198

Explicit subnet associations: 2 subnets

Edge associations: -

**Routes (2)**

Destination	Target	Status	Propagated	Route Origin
0.0.0.0/0	igw-071cd8b1269225d15	Active	No	Create Route
10.0.0.0/16	local	Active	No	Create Route Table

rtb-072aa736cf9663567 / private-route-table

**Details**

Route table ID: rtb-072aa736cf9663567

VPC: vpc-0463503020a4d8bf8 | custom-vpc

Main: No

Owner ID: 017721735198

Explicit subnet associations: 2 subnets

Edge associations: -

**Explicit subnet associations (2)**

Name	Subnet ID	IPv4 CIDR	IPv6 CIDR
private-subnet-1	subnet-0c651f81bc86d224b	10.0.3.0/24	-
private-subnet-2	subnet-0708c971fa83579cf	10.0.4.0/24	-

**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:

Internet Gateway: -

**VPC dashboard** < **igw-071e6db1269225d15 / custom-igw** Actions

**Details** [info](#)

Internet gateway ID: [igw-071e6db1269225d15](#) State: Attached VPC ID: [vpc-0462b05953c64171](#) Owner: [037721735198](#)

**Tags** [1] Manage tags

Key	Value
Name	custom-igw

**Virtual private cloud**

- Your VPCs
- Subnets
- Route tables
- Internet gateways**
- Egress-only Internet gateways
- Carrier gateways
- DHCP option sets
- Elastic IPs
- Managed prefix lists
- NAT gateways
- Peering connections
- Route servers

**Security**

CloudTrail Feedback Console Mobile App

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Security groups: -

**VPC > Security Groups** [ig-0e042b05953c64171 - web-ig](#) Actions

**sg-0e042b05953c64171 - web-sg**

**Details**

Security group name: [web-sg](#) Security group ID: [sg-0e042b05953c64171](#) Description: [Managed by Terraform](#) VPC ID: [vpc-0462b05953c64171](#)

Owner: [037721735198](#) Inbound rules count: 1 Permission entry Outbound rules count: 1 Permission entry

[Inbound rules](#) [Outbound rules](#) [Sharing - new](#) [VPC associations - new](#) [Tags](#)

**Inbound rules (1)** Manage tags Edit inbound rules

	Name	Security group rule ID	IP version	Type	Protocol	Port range	Source
<input type="checkbox"/>	-	sg-07011775418e78077	IPv4	HTTP	TCP	80	0.0.0.0/0

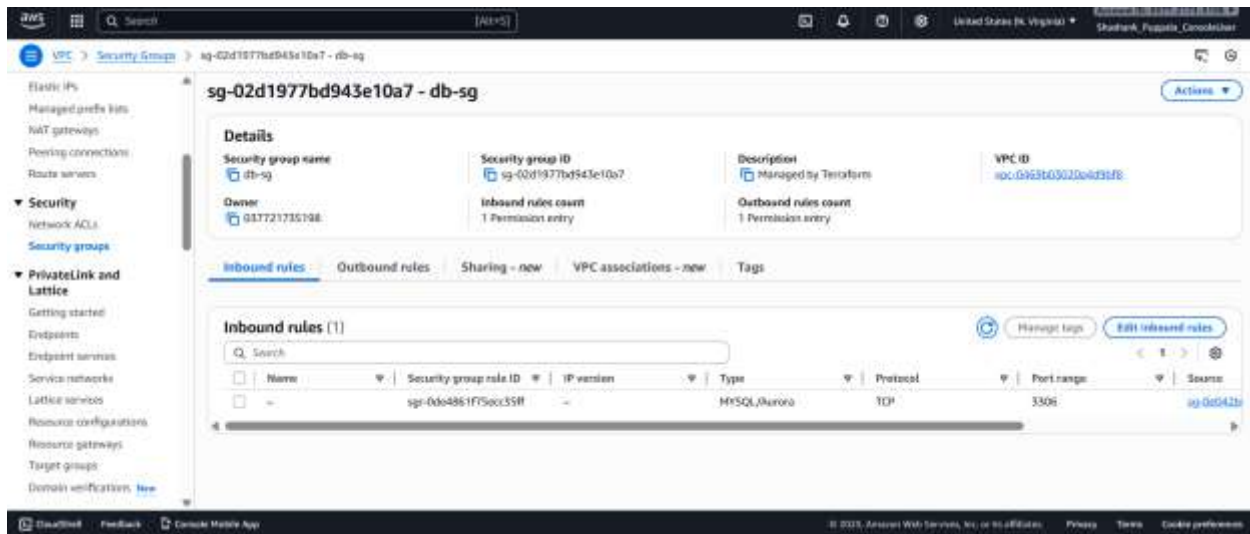
**PrivateLink and Lattice**

- Getting started
- Endpoints
- Endpoint services
- Service networks
- Lattice service
- Resource configurations
- Resource gateways
- Target groups
- Domain verifications [New](#)

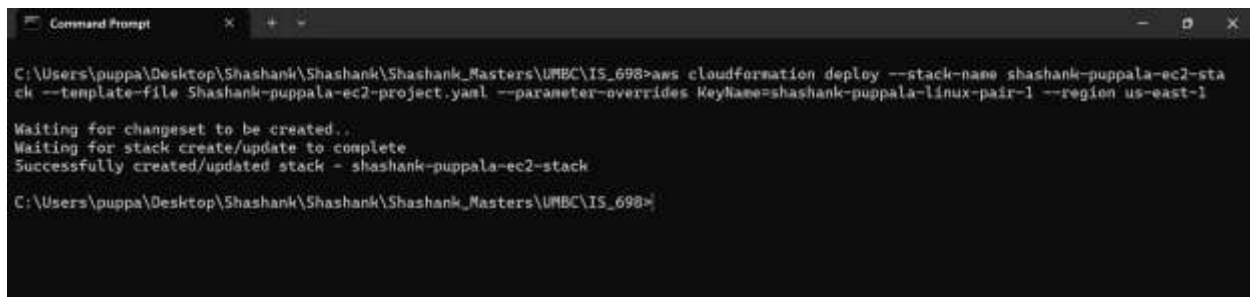
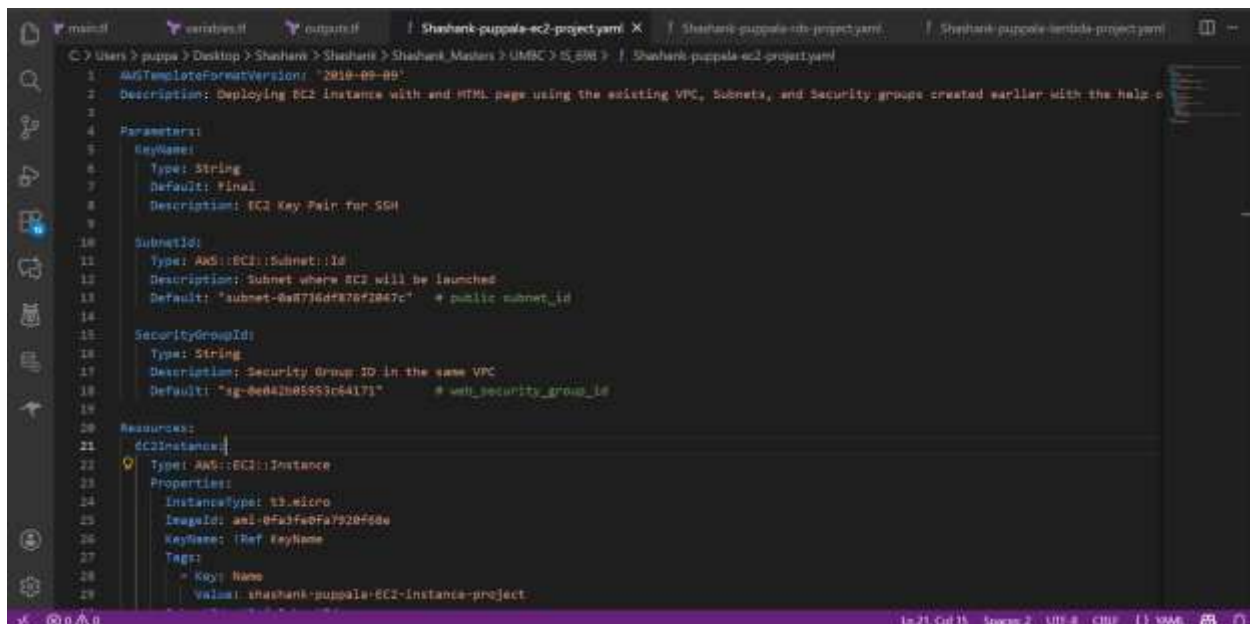
CloudTrail Feedback Console Mobile App

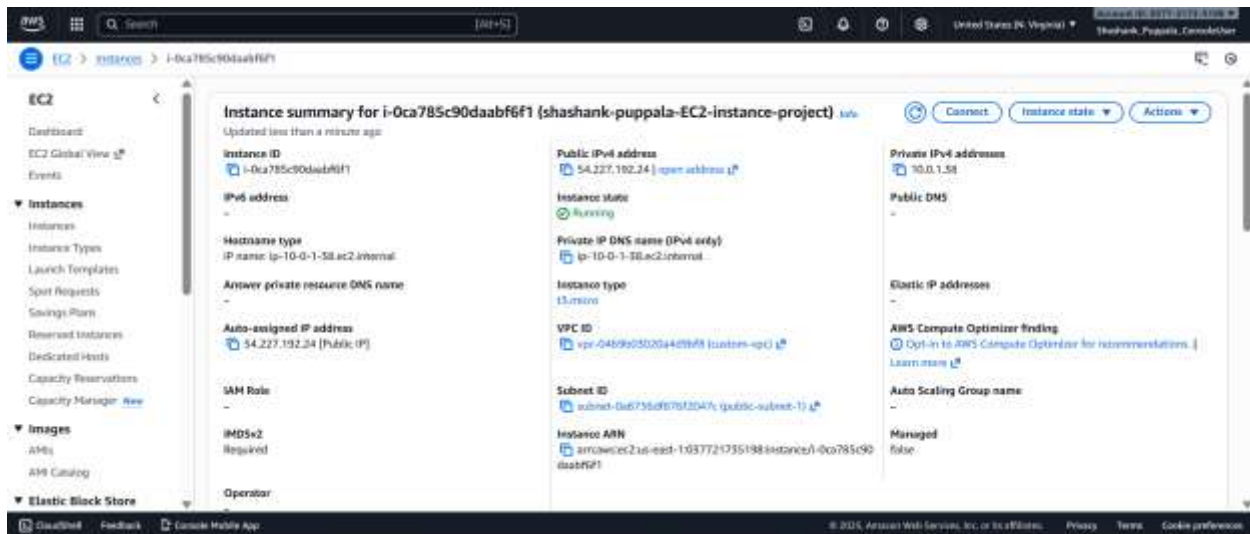
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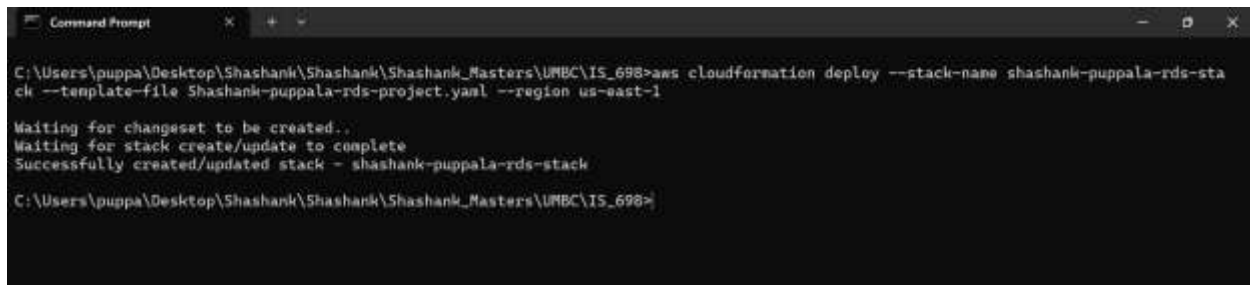
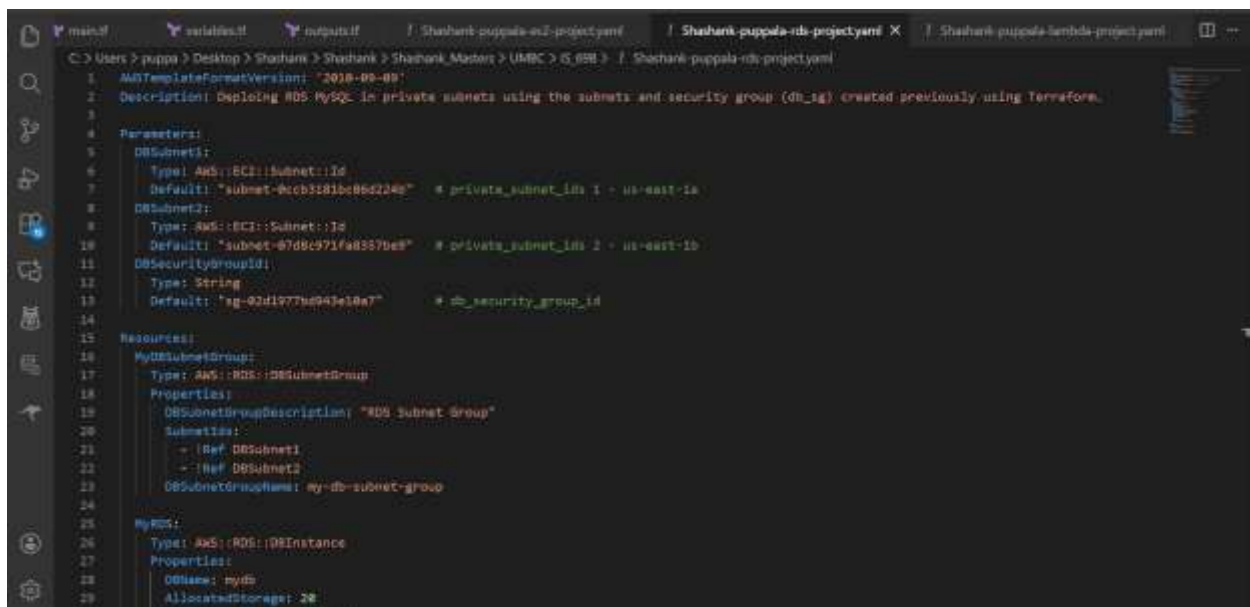


CloudFormation to Deploy EC2, RDS, and LAMBDA resources: -

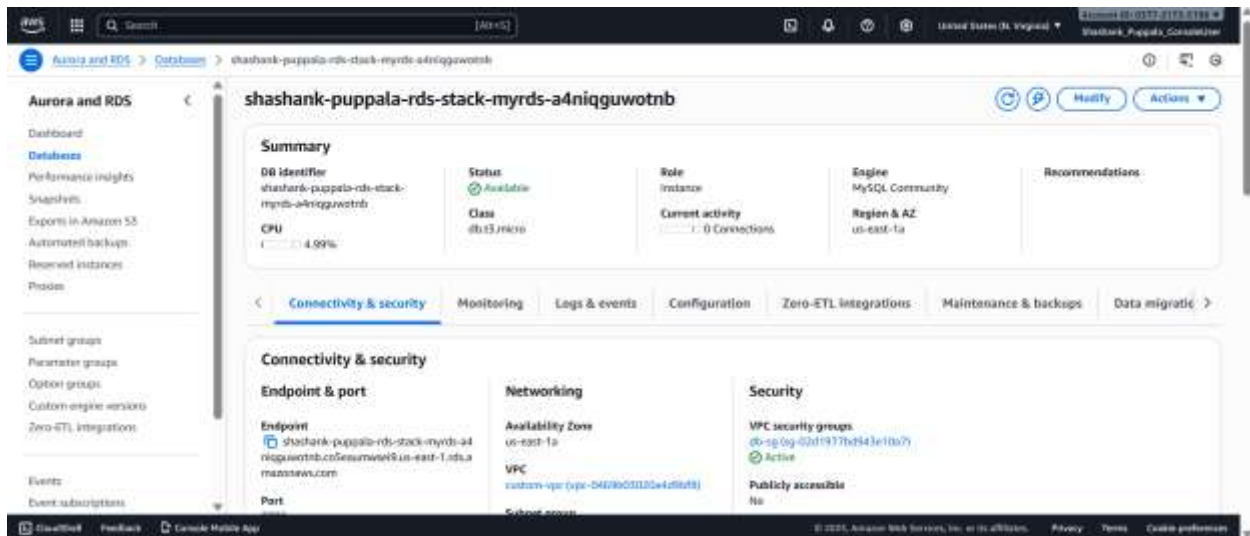




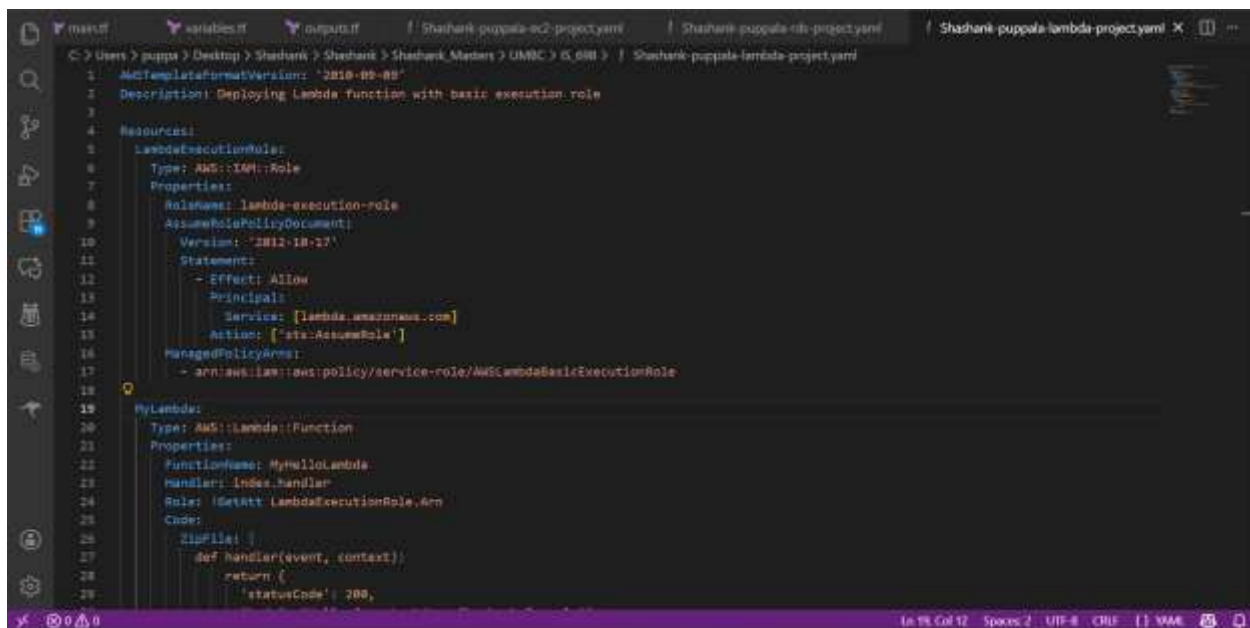
RDS Creation: -

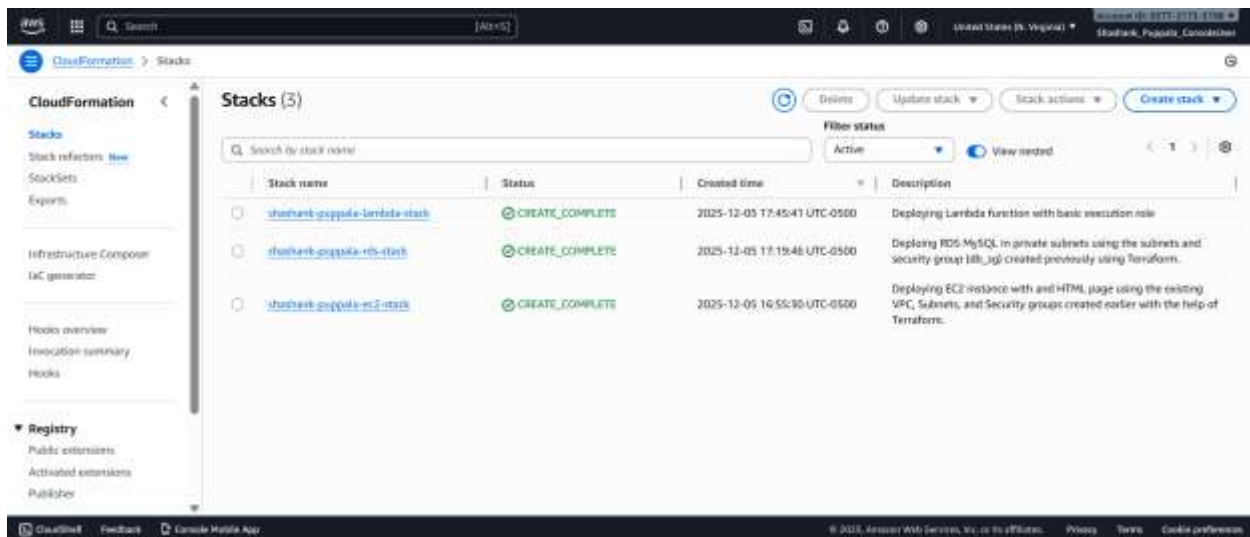
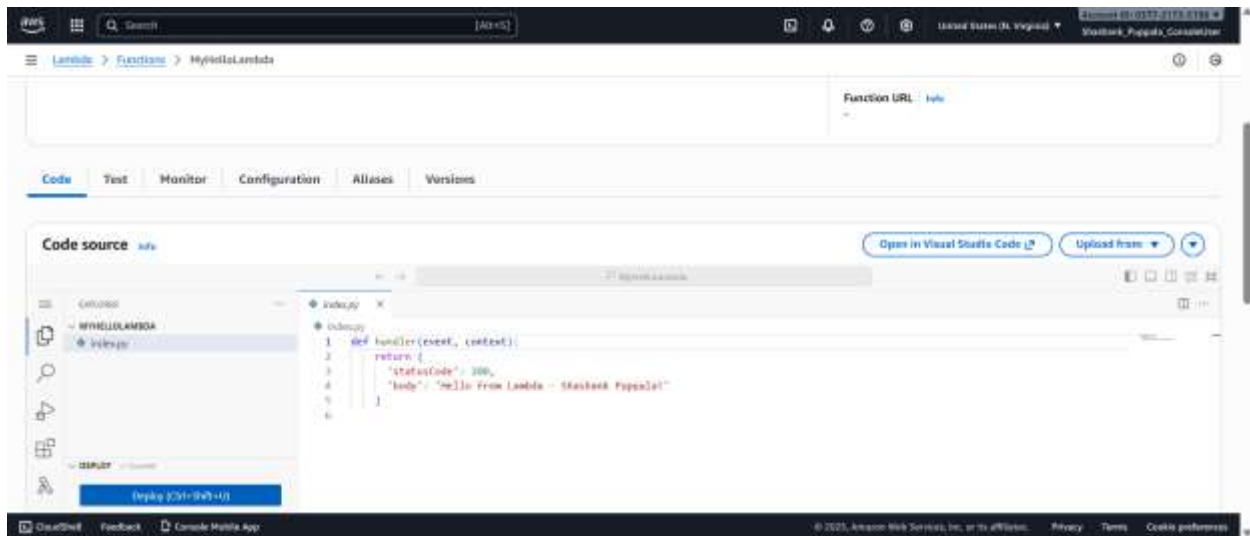






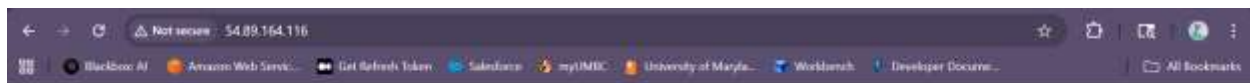
Lambda Function: -





Deploying a simple web application on EC2 (a HTML Static Web Page): -

```
oed.py Shashank-puppala-python-metadata-ec2-project.py Shashank-puppala-python-invoke-manually-project.py Shashank-puppala-ec2-static-webpage-project.yml X ...
C:\Users\puppa\Desktop> Shashank\Shashank\Shashank_Masters\UMBC> C:\B88> | Shashank-puppala-ec2-static-webpage-project.yml
1 AWSTemplateFormatVersion: '2010-09-09'
2 Description: Deploy a simple static HTML web application on EC2 using Apache
3
4 Parameters:
5   KeyName:
6     Description: Name of an existing EC2 KeyPair for SSH access
7     Type: AWS::EC2::KeyPair::KeyName
8
9   InstanceType:
10    Description: EC2 Instance type
11    Type: String
12    Default: t3.micro
13
14   SubnetId:
15    Description: Subnet ID for the EC2 instance
16    Type: AWS::EC2::Subnet::Id
17
18   SecurityGroupId:
19    Description: Security Group ID for the EC2 instance
20    Type: AWS::EC2::SecurityGroup::Id
21
22 Resources:
23   WebAppInstances:
24     Type: AWS::EC2::Instance
25     Properties:
26       InstanceType: !Ref InstanceType
27       KeyName: !Ref KeyName
28       ImageId: ami-0fa3fe0fa7920f90e # Amazon Linux 2023 (us-west-1)
29       NetworkInterfaces:
```



## Hello from EC2! - This is Shashank Puppala's Static Web Page

This static web page is deployed via CloudFormation.

Configuring Database backend for application: -

```
ec2-user@ip-10-0-1-81:~$ sudo yum install mariadb105 -y
Last metadata expiration check: 1:00:47 ago on Sat Dec  6 00:10:50 2023.
Dependencies resolved.
Package                               Architecture      Version           Repository      Size
Installing:
mariadb105                           x86_64            3:10.5.29-1.amzn2023.0.1  amazonlinux    1.5 M
Installing dependencies:
mariadb-connector-c                   x86_64            3.3.10-1.amzn2023.0.1  amazonlinux    211 k
mariadb-connector-c-config            noarch            3.3.10-1.amzn2023.0.1  amazonlinux    9.9 k
mariadb105-common                     x86_64            3:10.5.29-1.amzn2023.0.1  amazonlinux    24 k
perl-Sys-Hostname                     x86_64            1.23-477.amzn2023.0.7    amazonlinux    16 k

Transaction Summary
Install 5 Packages
Total download size: 1.8 M
Installed size: 19 M
Downloading Packages:
(1/5): mariadb-connector-c-config-3.3.10-1.amzn2023.0.1.noarch.rpm 303 kB/s | 9.9 kB  00:00
(2/5): mariadb-connector-c-3.3.10-1.amzn2023.0.1.x86_64.rpm       5.5 MB/s | 211 kB  00:00
(3/5): mariadb105-3:10.5.29-1.amzn2023.0.1.x86_64.rpm           28 MB/s | 1.5 MB  00:00
(4/5): mariadb105-common-3:10.5.29-1.amzn2023.0.1.x86_64.rpm     1.2 MB/s | 20 kB  00:00
(5/5): perl-Sys-Hostname-1.23-477.amzn2023.0.7.x86_64.rpm        783 kB/s | 16 kB  00:00

Total
30 MB/s | 1.8 MB  00:00

Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction:
Preparing : : 2/1
Installing : mariadb-connector-c-config-3.3.10-1.amzn2023.0.1.noarch 2/5
Installing : mariadb-connector-c-3.3.10-1.amzn2023.0.1.x86_64 2/5
Installing : mariadb105-3:10.5.29-1.amzn2023.0.1.x86_64 3/5
Installing : perl-Sys-Hostname-1.23-477.amzn2023.0.7.x86_64 4/5
Installing : mariadb105-3:10.5.29-1.amzn2023.0.1.x86_64 5/5
Running scriptlet: mariadb105-3:10.5.29-1.amzn2023.0.1.x86_64 5/5
Verifying : mariadb-connector-c-3.3.10-1.amzn2023.0.1.x86_64 3/5
Verifying : mariadb-connector-c-config-3.3.10-1.amzn2023.0.1.noarch 2/5
Verifying : mariadb105-3:10.5.29-1.amzn2023.0.1.x86_64 5/5
```

```
ec2-user@ip-10-0-1-81:~$ sudo yum install httpd php php-mysqlnd
Running scriptlet: mariadb105-3:10.5.29-1.amzn2023.0.1.x86_64 5/5
Verifying : mariadb-connector-c-3.3.10-1.amzn2023.0.1.x86_64 3/5
Verifying : mariadb-connector-c-config-3.3.10-1.amzn2023.0.1.noarch 2/5
Verifying : mariadb105-3:10.5.29-1.amzn2023.0.1.x86_64 5/5
Verifying : mariadb105-common-3:10.5.29-1.amzn2023.0.1.x86_64 4/5
Verifying : perl-Sys-Hostname-1.23-477.amzn2023.0.7.x86_64 5/5

Installed:
mariadb-connector-c-3.3.10-1.amzn2023.0.1.x86_64 mariadb-connector-c-config-3.3.10-1.amzn2023.0.1.noarch mariadb105-3:10.5.29-1.amzn2023.0.1.x86_64
mariadb105-common-3:10.5.29-1.amzn2023.0.1.x86_64 perl-Sys-Hostname-1.23-477.amzn2023.0.7.x86_64

Complete!
ec2-user@ip-10-0-1-81:~$ sudo yum --version
yum Ver 3.11.1 Distrib 10.5.29-MariaDB, for Linux (x86_64) using Editline wrapper
ec2-user@ip-10-0-1-81:~$ sudo yum install httpd php php-mysqlnd
Last metadata expiration check: 1:04:26 ago on Sat Dec  6 00:10:50 2023.
Package httpd-2.4.65-1.amzn2023.0.2.x86_64 is already installed.
Dependencies resolved.
Package                               Architecture      Version           Repository      Size
Installing:
php8.4                                x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    36 k
php8.4-mysqlnd                        x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    155 k
Installing dependencies:
libexif                               x86_64            1.0.19-4.amzn2023.0.1  amazonlinux    176 k
libxslt                               x86_64            1.1.43-1.amzn2023.0.1  amazonlinux    183 k
openssl-filesystem                    noarch            3:1.20.0-1.amzn2023.0.2  amazonlinux    9.6 k
php8.4-cgi                            x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    3.8 M
php8.4-common                         x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    802 k
php8.4-fpm                           x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    99 k
php8.4-process                        x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    51 k
php8.4-xml                            x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    675 k
Installing weak dependencies:
php8.4-fpm                            x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    2.0 M
php8.4-odbc                           x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    540 k
php8.4-opcache                        x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    489 k
php8.4-sodium                         x86_64            8.4.14-1.amzn2023.0.1  amazonlinux    47 k

Transaction Summary
Install 14 Packages
```

```
ec2-user@ip-10-0-1-81:~$
Running scriptlet: php8.4-fpm-8.4.14-1.amzn2023.0.1.x86_64 8/14
Installing : libxslt-1.1.43-1.amzn2023.0.3.x86_64 9/14
Installing : php8.4-smi-8.4.14-1.amzn2023.0.1.x86_64 10/14
Installing : libiodbc-1.0.19-4.amzn2023.x86_64 11/14
Installing : php8.4-odbc-8.4.14-1.amzn2023.0.1.x86_64 12/14
Installing : php8.4-8.4.14-1.amzn2023.0.1.x86_64 13/14
Installing : php8.4-mysqli-8.4.14-1.amzn2023.0.1.x86_64 14/14
Running scriptlet: php8.4-mysqli-8.4.14-1.amzn2023.0.1.x86_64 14/14
Verifying : libxslt-1.1.43-1.amzn2023.x86_64 1/14
Verifying : libxslt-1.1.43-1.amzn2023.0.3.x86_64 2/14
Verifying : ogins-filesystem-1.1.28-0-1.amzn2023.0.2.noarch 3/14
Verifying : php8.4-8.4.14-1.amzn2023.0.1.x86_64 4/14
Verifying : php8.4-cli-8.4.14-1.amzn2023.0.1.x86_64 5/14
Verifying : php8.4-common-8.4.14-1.amzn2023.0.1.x86_64 6/14
Verifying : php8.4-fpm-8.4.14-1.amzn2023.0.1.x86_64 7/14
Verifying : php8.4-mysqli-8.4.14-1.amzn2023.0.1.x86_64 8/14
Verifying : php8.4-odbc-8.4.14-1.amzn2023.0.1.x86_64 9/14
Verifying : php8.4-opcache-8.4.14-1.amzn2023.0.1.x86_64 10/14
Verifying : php8.4-pdo-8.4.14-1.amzn2023.0.1.x86_64 11/14
Verifying : php8.4-process-8.4.14-1.amzn2023.0.1.x86_64 12/14
Verifying : php8.4-sodium-8.4.14-1.amzn2023.0.1.x86_64 13/14
Verifying : php8.4-smi-8.4.14-1.amzn2023.0.1.x86_64 14/14

Installed:
libiodbc-1.0.19-4.amzn2023.x86_64 libxslt-1.1.43-1.amzn2023.0.3.x86_64 ogins-filesystem-1.1.28-0-1.amzn2023.0.2.noarch
php8.4-8.4.14-1.amzn2023.0.1.x86_64 php8.4-cli-8.4.14-1.amzn2023.0.1.x86_64 php8.4-common-8.4.14-1.amzn2023.0.1.x86_64
php8.4-fpm-8.4.14-1.amzn2023.0.1.x86_64 php8.4-mysqli-8.4.14-1.amzn2023.0.1.x86_64 php8.4-odbc-8.4.14-1.amzn2023.0.1.x86_64
php8.4-opcache-8.4.14-1.amzn2023.0.1.x86_64 php8.4-pdo-8.4.14-1.amzn2023.0.1.x86_64 php8.4-process-8.4.14-1.amzn2023.0.1.x86_64
php8.4-sodium-8.4.14-1.amzn2023.0.1.x86_64 php8.4-smi-8.4.14-1.amzn2023.0.1.x86_64

Complete!
[ec2-user@ip-10-0-1-81 ~]$ sudo systemctl enable httpd
[ec2-user@ip-10-0-1-81 ~]$ sudo systemctl start httpd
[ec2-user@ip-10-0-1-81 ~]$ mysql -h shashank-puppala-rds-stack-synchr-a4niggwotnb.co5eawmew19.us-east-1.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MySQL connection id is 81
Server version: 8.0.43 Source distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation AB and others.

Type 'help;' or '\h' for help. Type '\q' to clear the current input statement.

MySQL [(none)]>
```

Inserted Sample Data into database which can be used for verification purpose;

```
ec2-user@ip-10-0-1-81:~$
Complete!
[ec2-user@ip-10-0-1-81 ~]$ sudo systemctl enable httpd
[ec2-user@ip-10-0-1-81 ~]$ sudo systemctl start httpd
[ec2-user@ip-10-0-1-81 ~]$ mysql -h shashank-puppala-rds-stack-synchr-a4niggwotnb.co5eawmew19.us-east-1.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your MySQL connection id is 81
Server version: 8.0.43 Source distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation AB and others.

Type 'help;' or '\h' for help. Type '\q' to clear the current input statement.

MySQL [(none)]> Show Databases;
+-----+
| Database |
+-----+
| information_schema |
| mysql |
| sys |
| performance_schema |
| sys |
+-----+
5 rows in set (0.011 sec)

MySQL [(none)]> USE mysql;
Database changed
MySQL [mysql]> Create table if not exists employees (id INT PRIMARY KEY, Name
VARCHAR(50), Email VARCHAR(50), Department VARCHAR(50));
Query OK, 0 rows affected (0.013 sec)

MySQL [mysql]> INSERT INTO employees (id, Name, Email, Department) Values (3,
'Shashank', 'shank123@gmail.com', 'IT');
Query OK, 1 row affected (0.008 sec)

MySQL [mysql]> SELECT * FROM employees;
+----+-----+-----+-----+
| id | Name | Email | Department |
+----+-----+-----+-----+
| 3 | Shashank | shank123@gmail.com | IT |
+----+-----+-----+-----+
1 row in set (0.001 sec)

MySQL [mysql]>
```



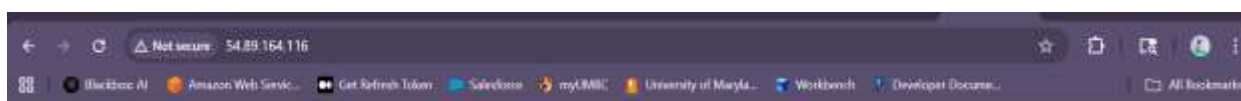
```
#!/usr/bin/perl
use strict;
use warnings;

my $servername = "shashank-puppala-rds-stack-myrdi-s4nqgwetab-cu5wamwsl9-us-east-1.rds.amazonaws.com";
my $username = "admin";
my $password = "shashank123";
my $dbname = "mydb";

my $conn = new MySQLi($servername, $username, $password, $dbname);
if (!$conn->connect_error) {
    die("Connection Failed: " . $conn->connect_error);
}

my $sql = "SELECT * FROM employees";
my $result = $conn->query($sql);
if (!$result) {
    die("Query failed: " . $conn->error);
}

<?php
<html>
<head>
<title>My Dynamic Web Page</title>
</head>
<body>
<h1>Employee Data from RDS</h1>
<table border="1">
<tr>
<th>Id</th>
<th>Name</th>
<th>Email</th>
<th>Department</th>
</tr>
<tr>
<td>1</td>
<td>Shashank</td>
<td>shank123@gmail.com</td>
<td>IS</td>
</tr>
</table>
</body>
</html>
```

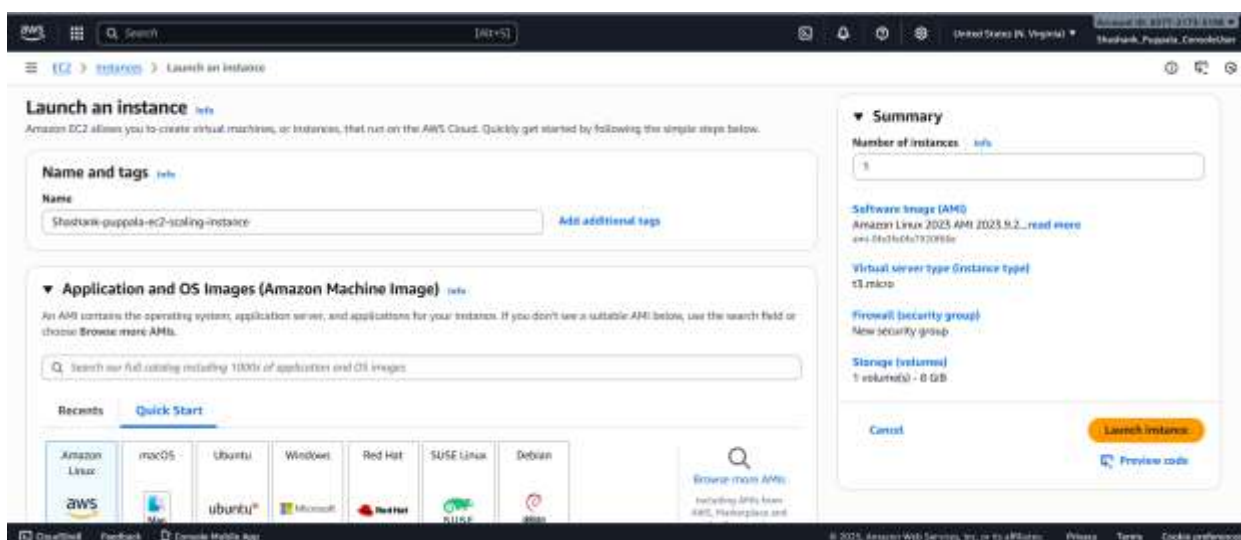


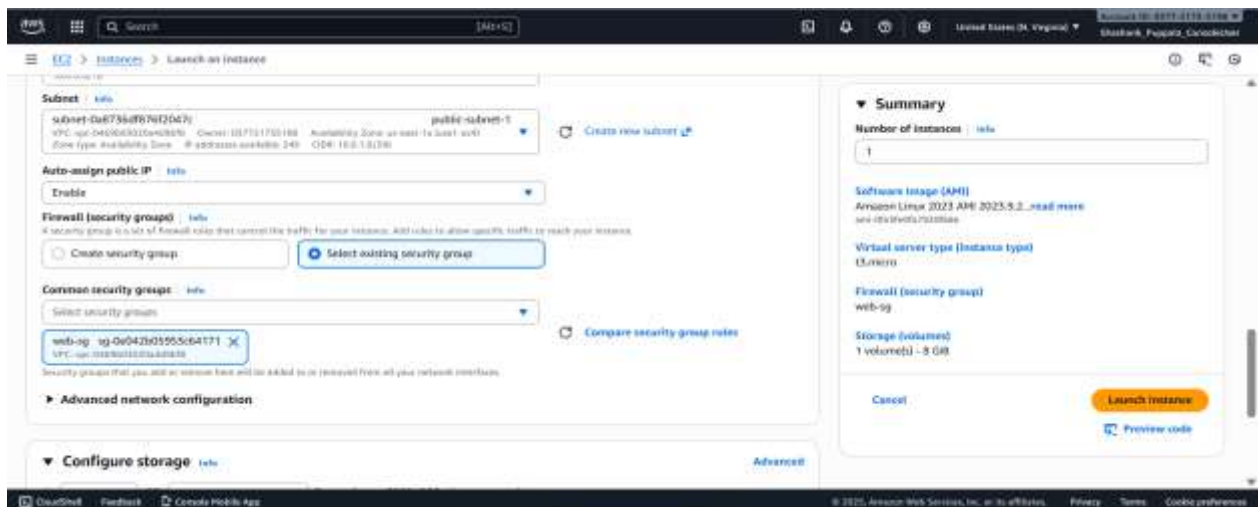
## Employee Data from RDS

Id	Name	Email	Department
1	Shashank	shank123@gmail.com	IS

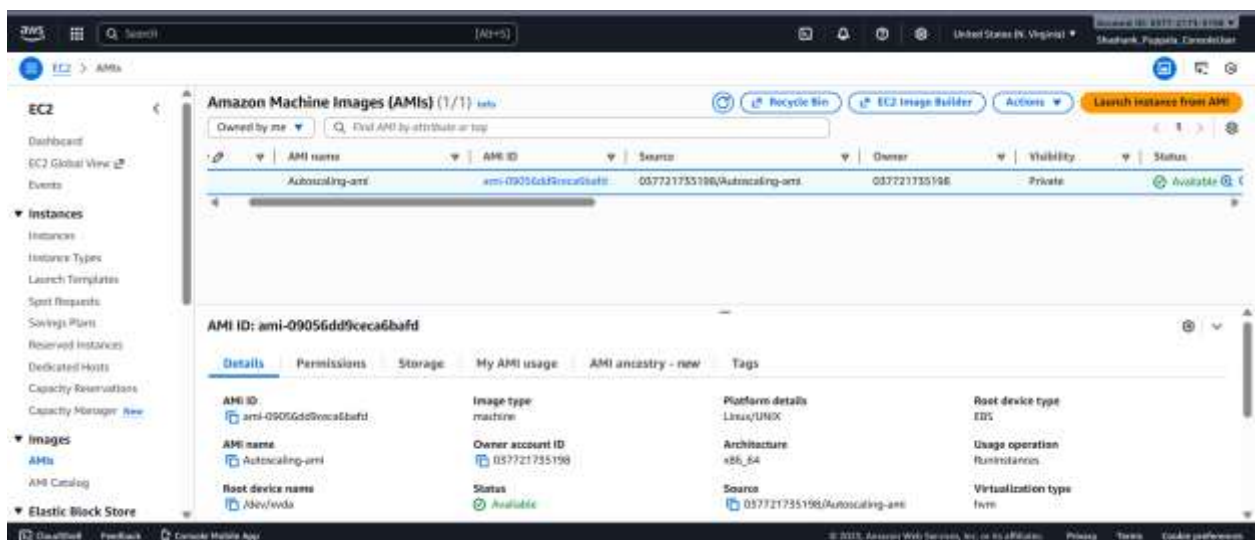
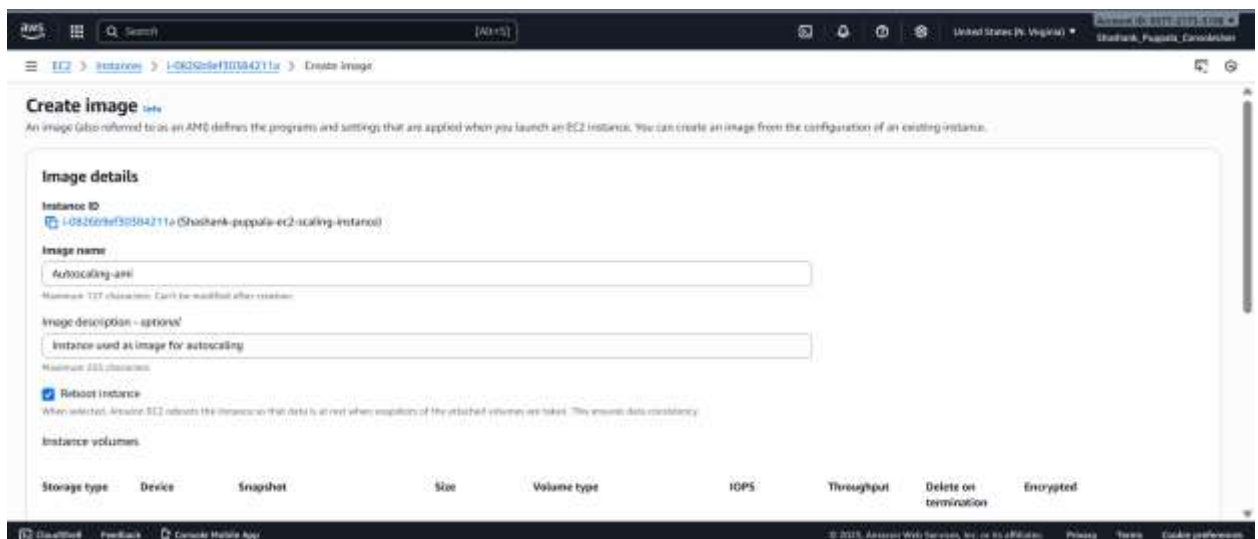
Implementation of Auto Scaling for EC2 Instances: -

First Create the Instance which can be used as an AMI Image for the instance scaling





## AMI Image Creation: -



## Creating a Launch Template: -

This screenshot shows the AWS IAM console page for the 'Autoscaling-ami' (ami-09056dd8cac6ba9d1). The page provides details about the AMI, including its name, description, image ID, username, catalog, published date, architecture, virtualization type, root device type, and EBS status. A 'Create launch template' button is visible on the right side of the page.

**Summary**

- Software image (AMI):** Autoscaling-ami (ami-09056dd8cac6ba9d1)
- Virtual server type (instance type):** -
- Firewall (security group):** -
- Storage (volumes):** 1 volume(s) - 8 GB

**Details:**

- Name:** Autoscaling-ami
- Description:** Instance used as image for autoscaling
- Image ID:** ami-09056dd8cac6ba9d1
- Username:** root (Check with the AMI provider)
- Catalog:** My AMIs
- Published:** 2025-12-06T02:54:31.000Z
- Architecture:** x86\_64
- Virtualization:** hvm
- Root device type:** ebs
- EBS Enabled:** Yes
- Boot mode:** uefi-preferred

This screenshot shows the AWS IAM console page for the 'shashank-puppala-autoscaling-launch-template' (lt-086d61fe7280ee361). The page displays the launch template details, including the launch template ID, name, default version, and owner. It also shows the launch template version details, including the version number, description, date created, and creator. The 'Instance details' tab is selected, showing the AMI ID, instance type, availability zone, and security group IDs.

**Launch template details**

- Launch template ID:** lt-086d61fe7280ee361
- Launch template name:** shashank-puppala-autoscaling-launch-template
- Default version:** 1
- Owner:** aws-iam-037721733198user/Shashank\_Puppala\_ConsoleUser

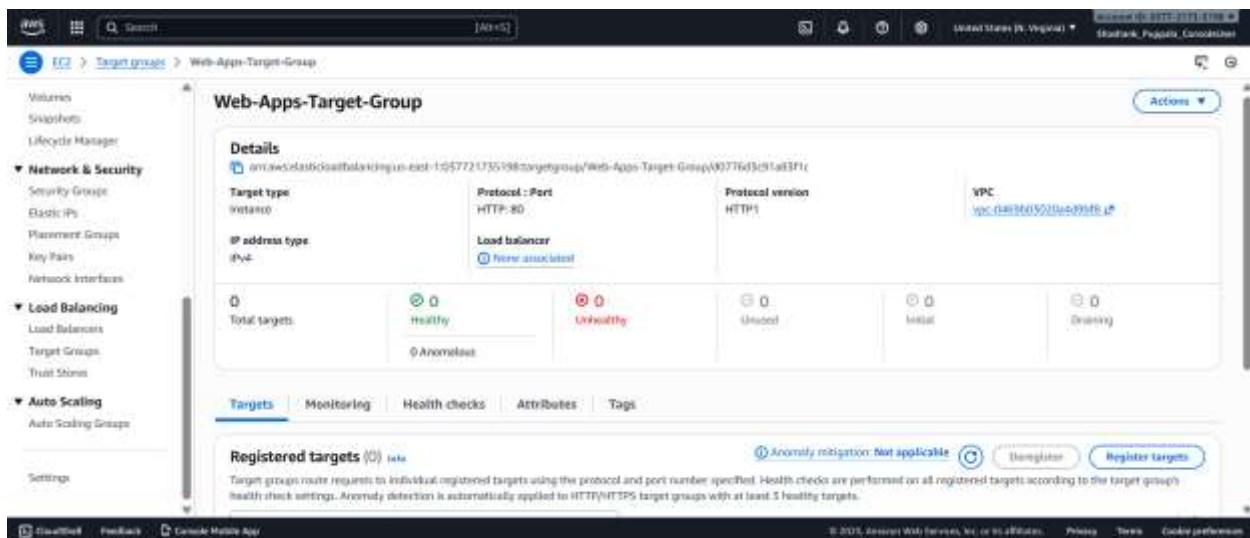
**Launch template version details**

- Version:** 1 (Default)
- Description:** -
- Date created:** 2025-12-06T03:10:10.000Z
- Created by:** aws-iam-037721733198user/Shashank\_Puppala\_ConsoleUser

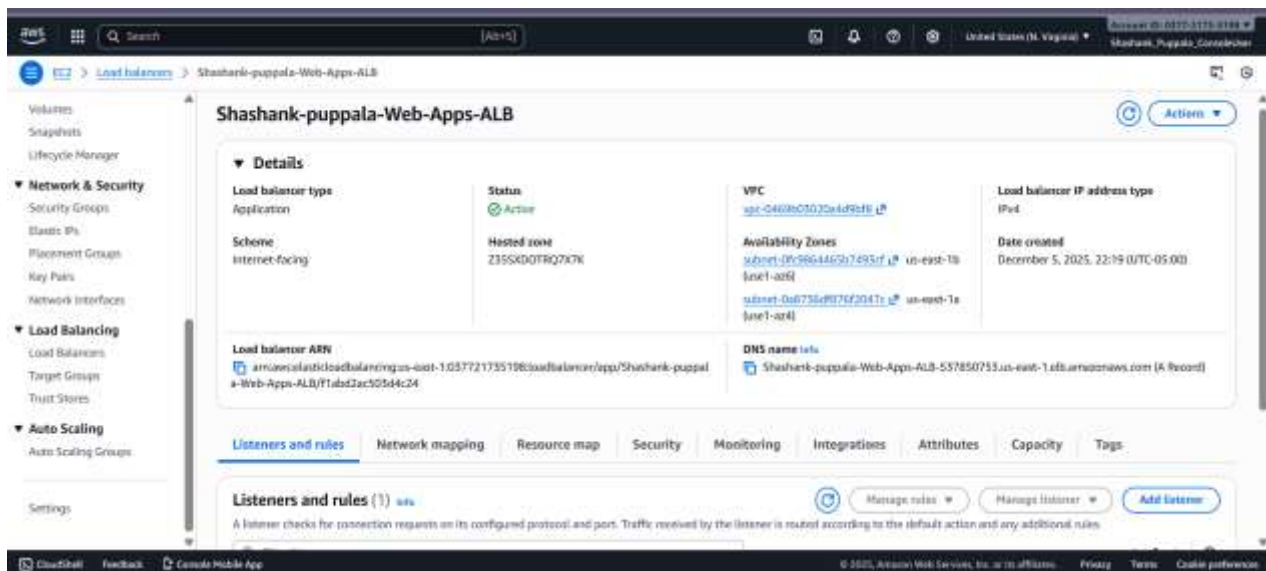
**Instance details**

- AMI ID:** ami-09056dd8cac6ba9d1
- Instance type:** t3.micro
- Availability Zone:** -
- Availability Zone ID:** -
- Key pair name:** shashank-puppala-linux-pair-1
- Security groups:** -
- Security group IDs:** sg-0e042b05955c64171

Target Group: -



Application Load Balancer (ALB): -



Auto Scaling Group (ASG) Creation: -

Step 1 - optional  
Integrate with other services

Step 4 - optional  
Configure group size and scaling

Step 5 - optional  
Add notifications

Step 6 - optional  
Add tags

Step 7  
Review

### Name

**Auto Scaling group name**  
Enter a name to identify the group.

shashank-puppala-web-apps-autoscaling-gp

Must be unique for 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, 2025.

**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.

shashank-puppala-autoscaling-launch-template

[Create a launch template](#)

**Version**  
Default (1)

[Create a launch template version](#)

**Description**  
-

**Launch template**  
shashank-puppala-autoscaling-launch-template  
lt-086d51fe7280ee361

**Instance type**  
t3.micro

CloudShell Feedback Console Mobile App

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Min desired capacity

1

Equal to less than desired capacity

Max desired capacity

1

Equal or greater than desired capacity

### Automatic scaling - optional

**Choose whether to use a target tracking policy** [Info](#)

You can set up other metrics-based scaling policies and scheduled scaling after creating your Auto Scaling group.

☐ No scaling policies  
Your Auto Scaling group will remain at its initial size and will not dynamically resize to meet demand.

☒ Target tracking scaling policy  
Choose a CloudWatch metric and target value and let the scaling policy adjust the desired capacity in proportion to the metric's value.

**Scaling policy name**  
Target Tracking Policy

**Metric type** [Info](#)  
Monitored metric that determines if instance utilization is too low or high. If using EC2 metrics, consider enabling detailed monitoring for better scaling performance.

Average CPU utilization

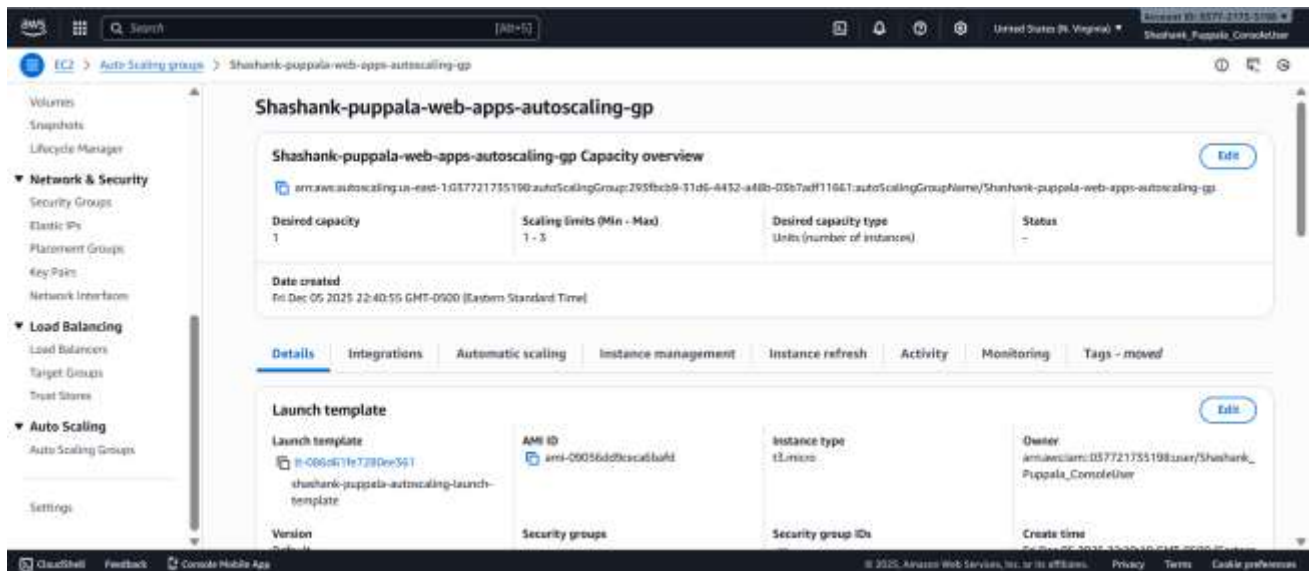
**Target value**  
50

**Instance warmup** [Info](#)  
300 seconds

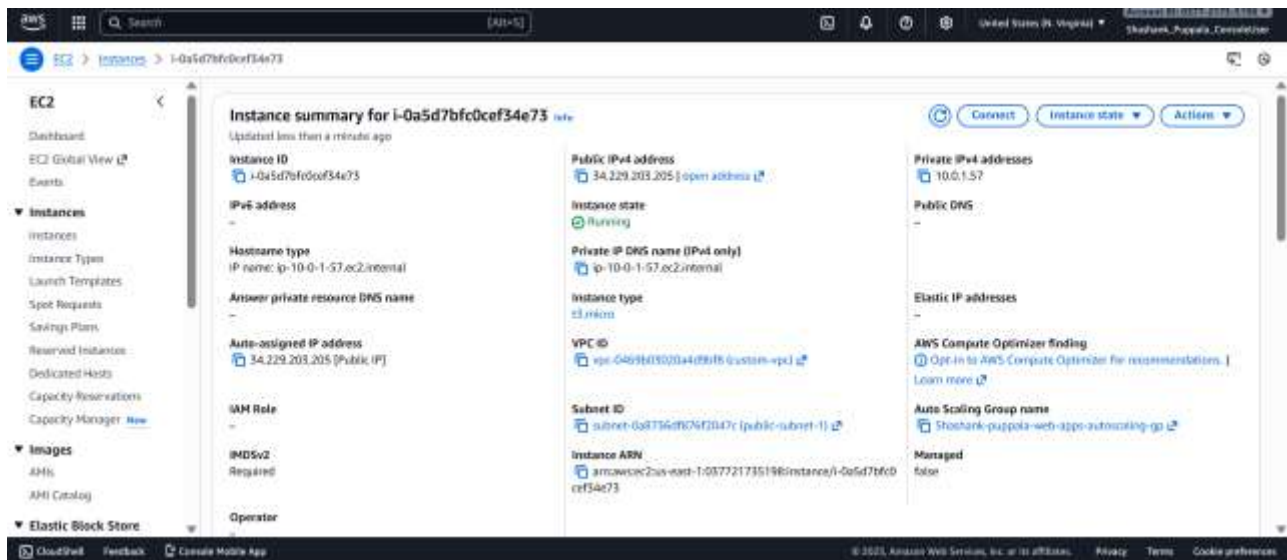
CloudShell Feedback Console Mobile App

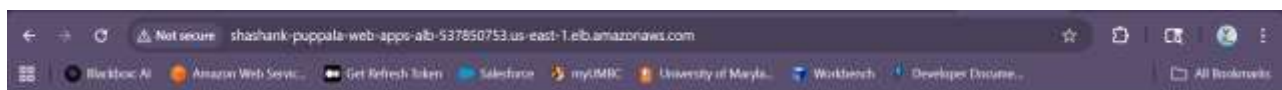
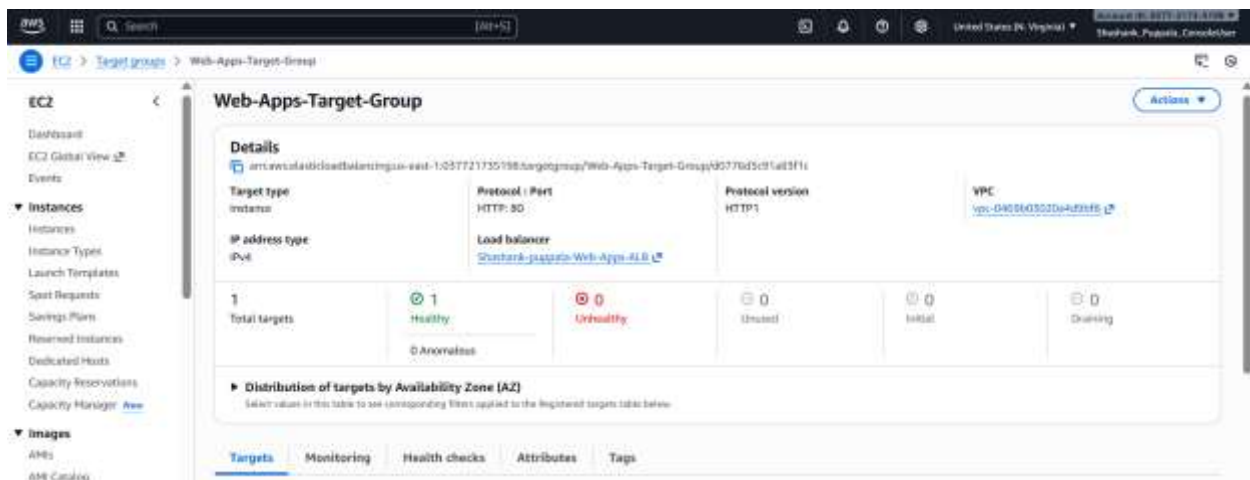
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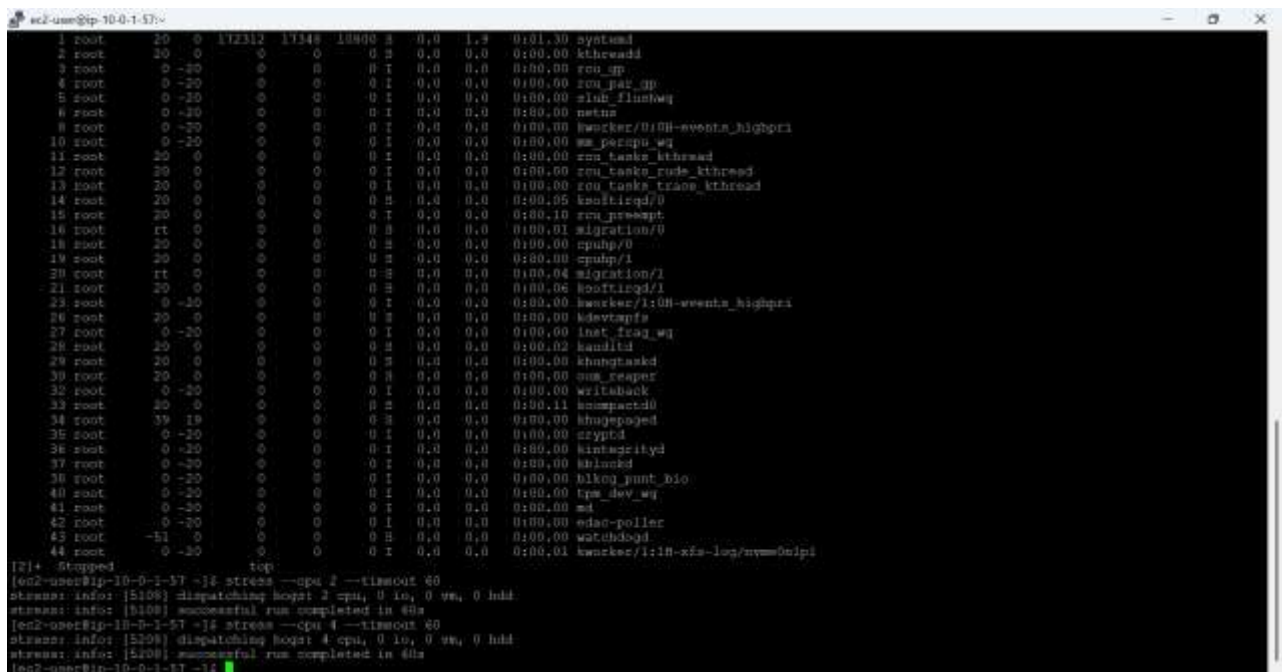
ASG automatically launches an instance after creation: -



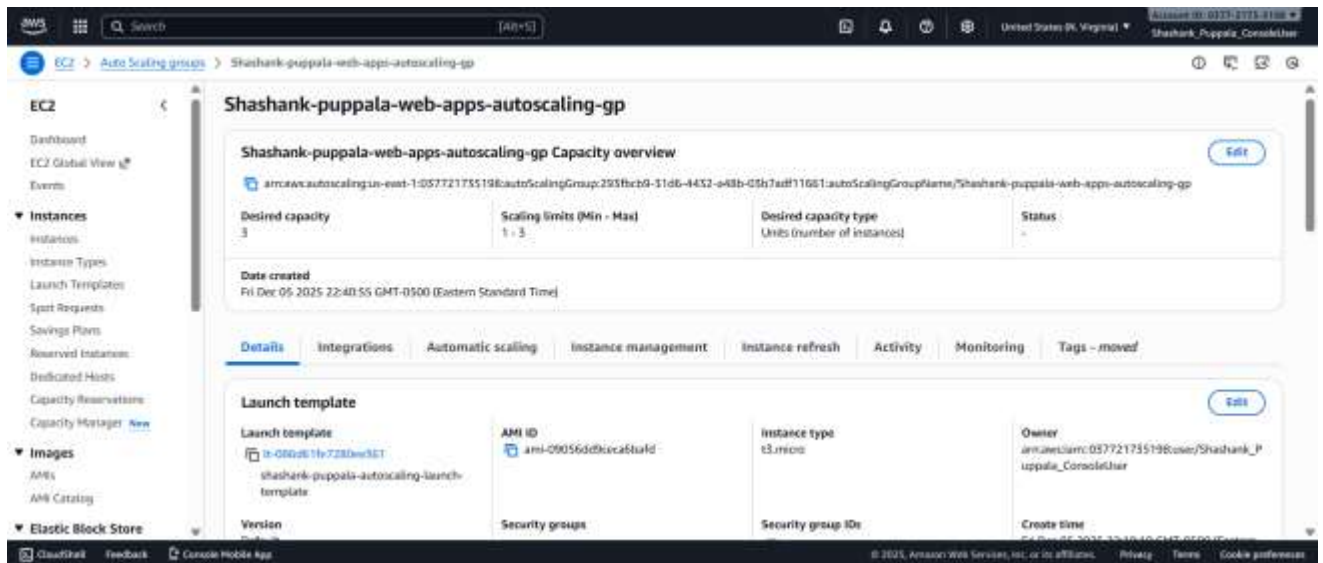


## This instance is part of EC2 Auto Scaling! - Shashank puppala

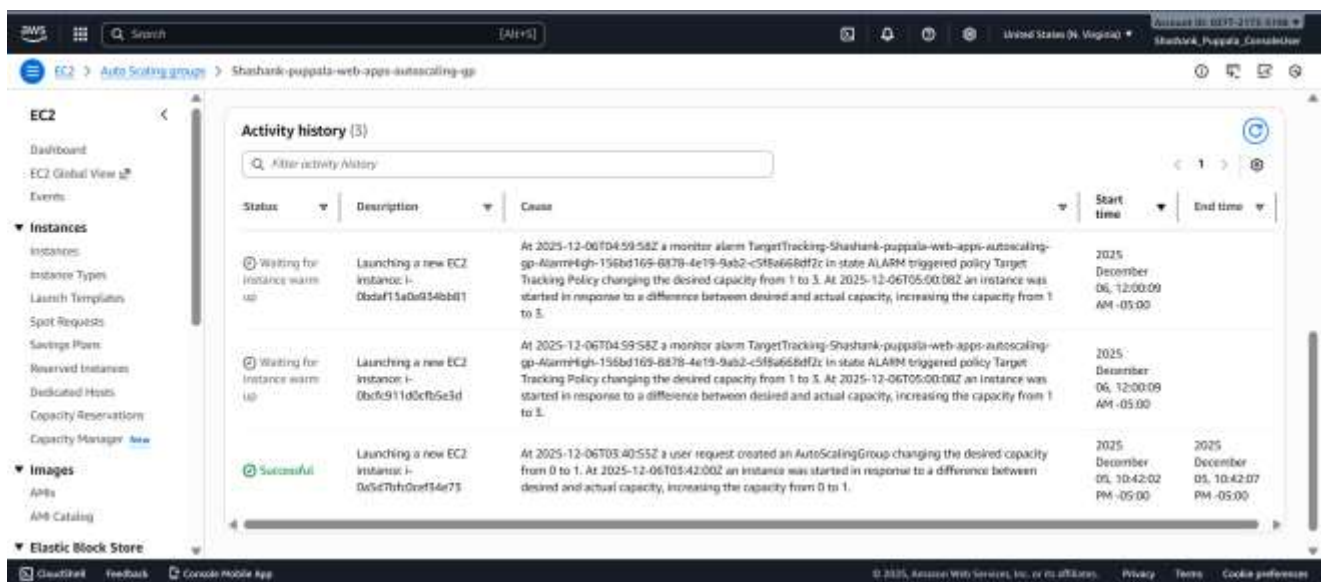
Increase the Stress on the Instance, so that ASG group creates new instances to handle the stress on CPU;

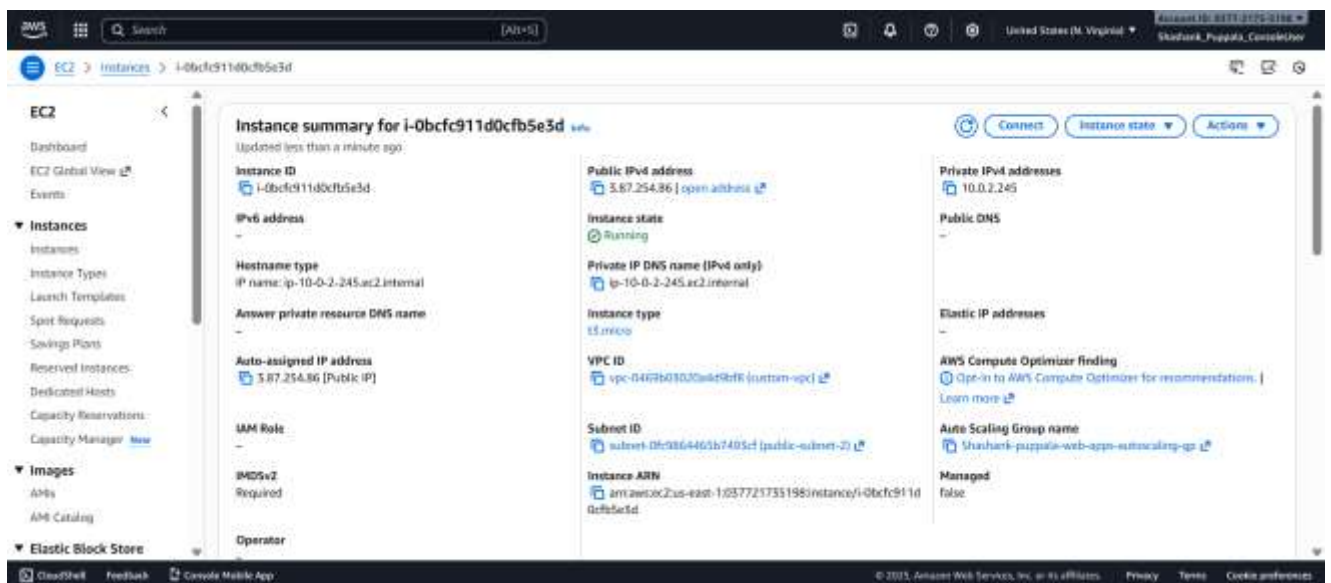
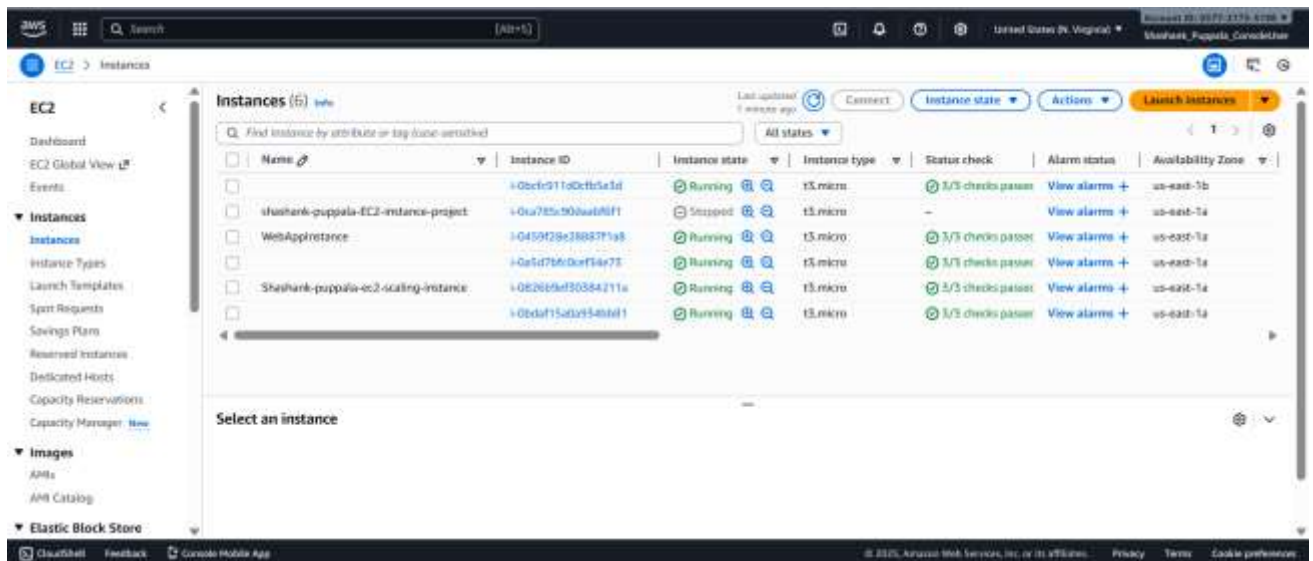


Can check in the ASG activity and verify if the new instances are deployed to handle the stress;

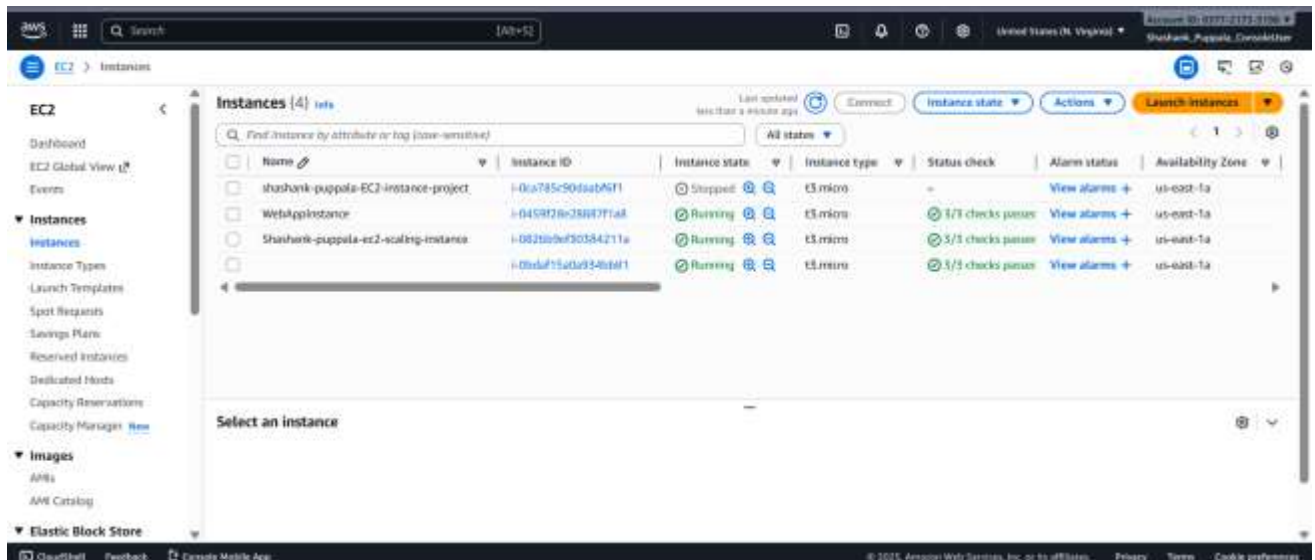
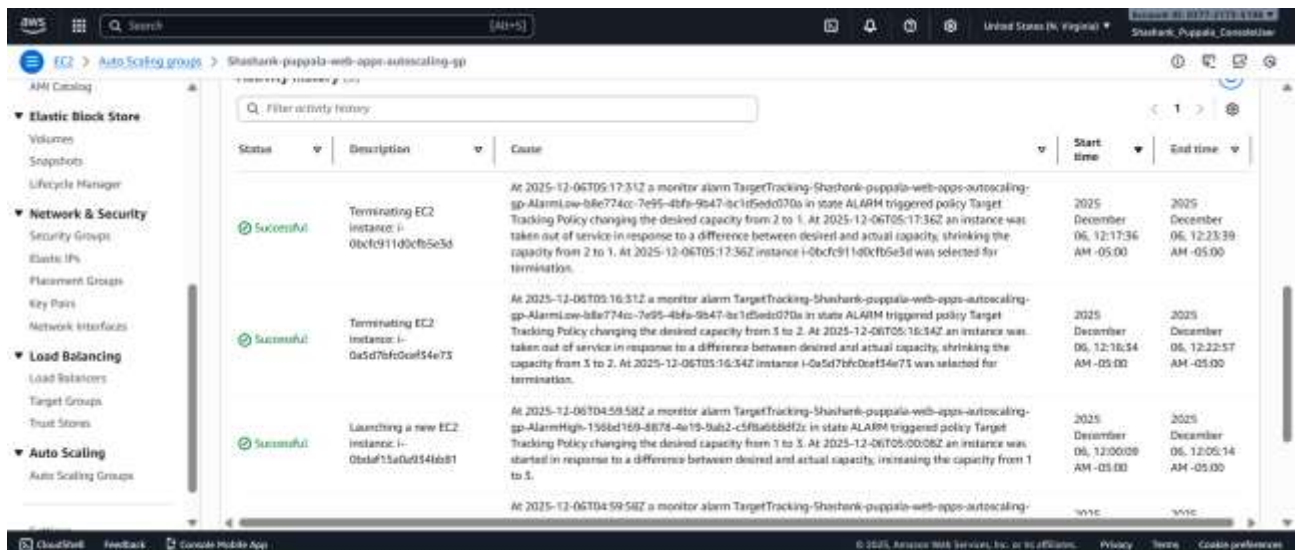


Initially, there was only one instance, but now we can see that ASG has launched 2 more instances to handle the load;





Once, the stress on the CPU comes down, the ASG automatically scales down the instances and terminates the instances that are not required;



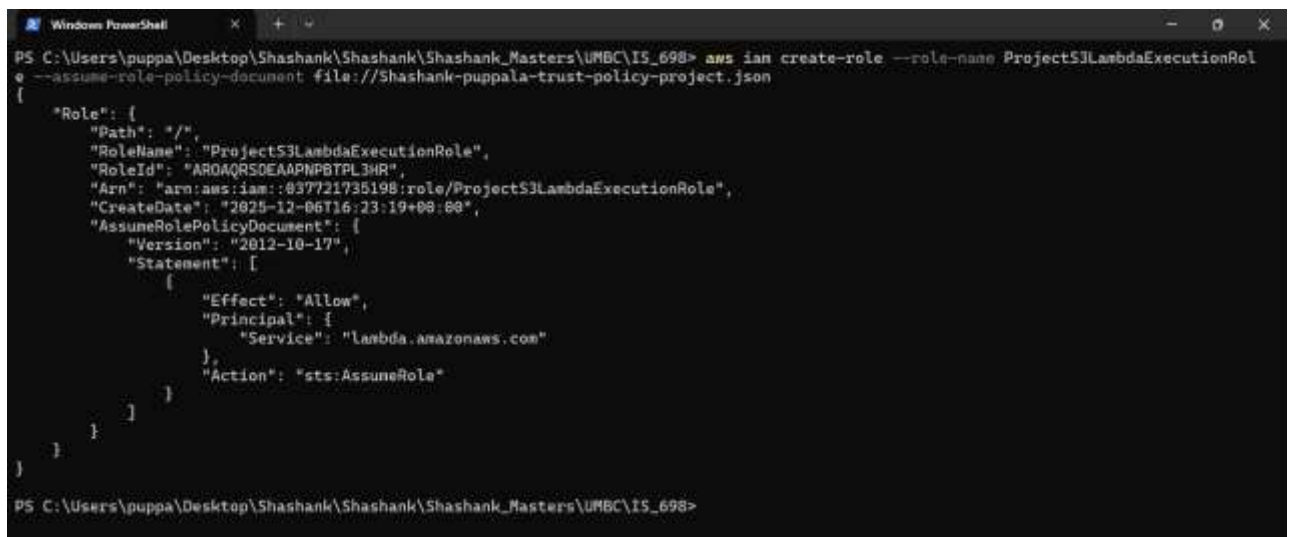
## 2 (B). AWS Lambda for Logging S3 Uploads

Lambda Execution Role Creation: -





```
Shashank-puppala-trust-policy-project.json X
C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> .\Shashank-puppala-trust-policy-project.json
1 {
2   "Version": "2012-10-17",
3   "Statement": [
4     {
5       "Effect": "Allow",
6       "Principal": { "Service": "lambda.amazonaws.com" },
7       "Action": "sts:AssumeRole"
8     }
9   ]
10 }
```



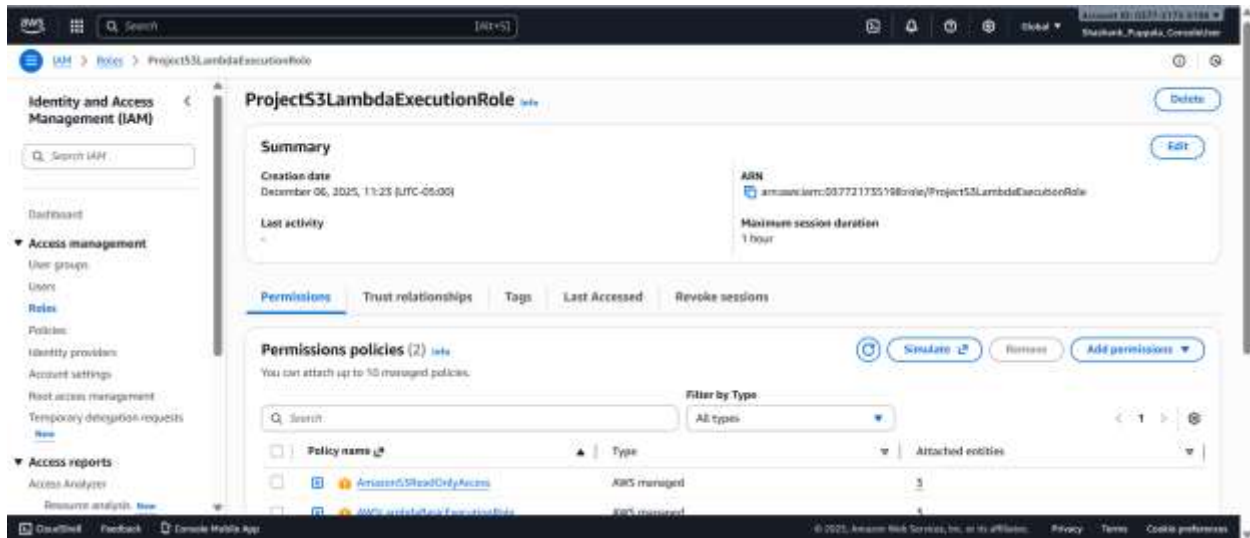
```
Windows PowerShell
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> aws iam create-role --role-name ProjectS3LambdaExecutionRole --assume-role-policy-document file://Shashank-puppala-trust-policy-project.json
{
  "Role": {
    "Path": "/",
    "RoleName": "ProjectS3LambdaExecutionRole",
    "RoleId": "AROARQSD0EAPNPBTPPL3HR",
    "Arn": "arn:aws:iam::837721735198:role/ProjectS3LambdaExecutionRole",
    "CreateDate": "2025-12-06T16:23:19+00:00",
    "AssumeRolePolicyDocument": {
      "Version": "2012-10-17",
      "Statement": [
        {
          "Effect": "Allow",
          "Principal": {
            "Service": "Lambda.amazonaws.com"
          },
          "Action": "sts:AssumeRole"
        }
      ]
    }
  }
}
```

Attach security Policies to Execution role related to Basic Lambda Execution: -

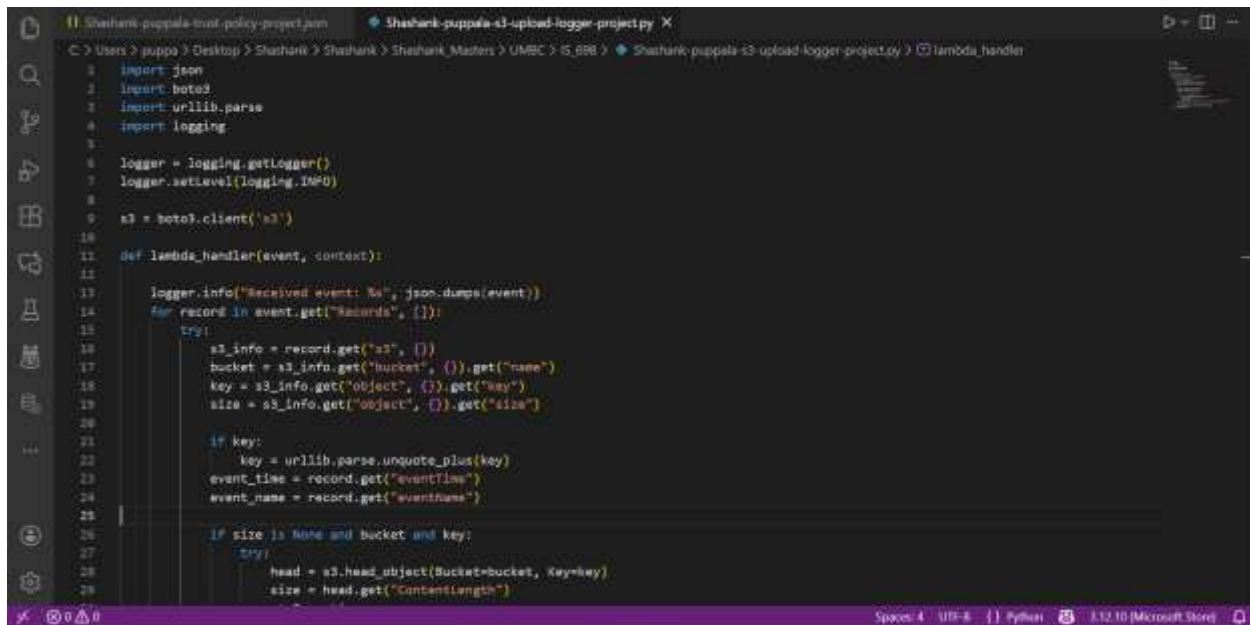


```
Windows PowerShell
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> aws iam attach-role-policy --role-name ProjectS3LambdaExecutionRole --policy-arn arn:aws:iam::aws:policy/service-role/AWSLambdaBasicExecutionRole
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> aws iam attach-role-policy --role-name ProjectS3LambdaExecutionRole --policy-arn arn:aws:iam::aws:policy/AmazonS3ReadOnlyAccess
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> |
```

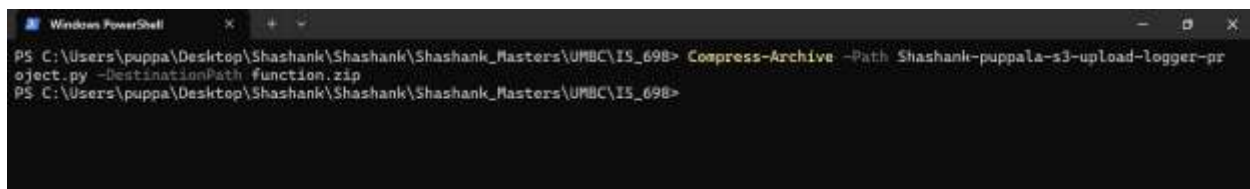
Verify in the AWS Console;



Python Script to show details of file uploaded to S3 bucket



Zip the file and place it in a folder which can be deployed to the AWS;



Deploy the function: -

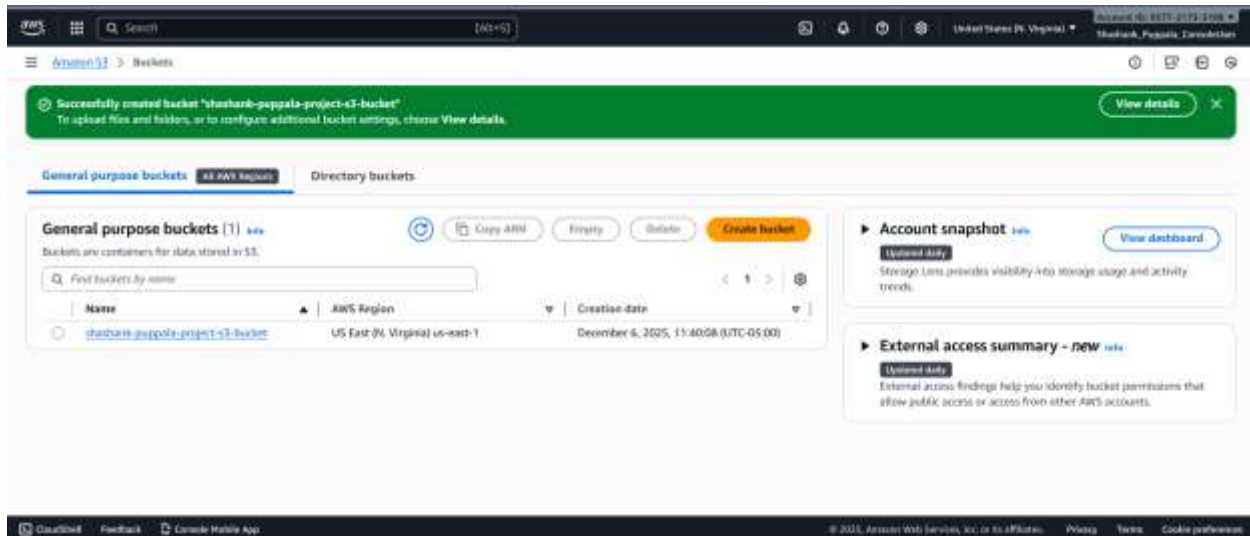
```
Windows PowerShell
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> Compress-Archive -Path Shashank-puppala-s3-upload-logger-project.py -DestinationPath function.zip
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> aws lambda create-function --function-name ProjectS3UploadTrigger --zip-file fileb://C:/Users/puppa/Desktop/Shashank/Shashank\Shashank_Masters\UMBC\IS_698/function.zip --handler Shashank-puppala-s3-upload-logger-project.lambda_handler --runtime python3.12 --role arn:aws:iam::037721735198:role/ProjectS3LambdaExecutionRole
{
  "FunctionName": "ProjectS3UploadTrigger",
  "FunctionArn": "arn:aws:lambda:us-east-1:037721735198:function:ProjectS3UploadTrigger",
  "Runtime": "python3.12",
  "Role": "arn:aws:iam::037721735198:role/ProjectS3LambdaExecutionRole",
  "Handler": "Shashank-puppala-s3-upload-logger-project.lambda_handler",
  "CodeSize": 789,
  "Description": "",
  "Timeout": 3,
  "MemorySize": 128,
  "LastModified": "2025-12-06T16:36:33.543+0000",
  "CodeSha256": "9spJ/MH1HYJ5PQFbi/0S8SYkhB9ZRYD0ZZX9XhmcnP4=",
  "Version": "$LATEST",
  "TracingConfig": {
    "Mode": "PassThrough"
  },
  "RevisionId": "c00b0bfb-1a71-46fd-8456-4f9298ad657b",
  "State": "Pending",
  "StateReason": "The function is being created.",
  "StateReasonCode": "Creating",
  "PackageType": "Zip",
  "Architectures": [
    "x86_64"
  ],
  "EphemeralStorage": {
    "Size": 512
  },
  "SnapStart": {

```

Verify in the Console if the function is added or not;



Create a Sample S3 Bucket;



Provide necessary permissions to invoke the function

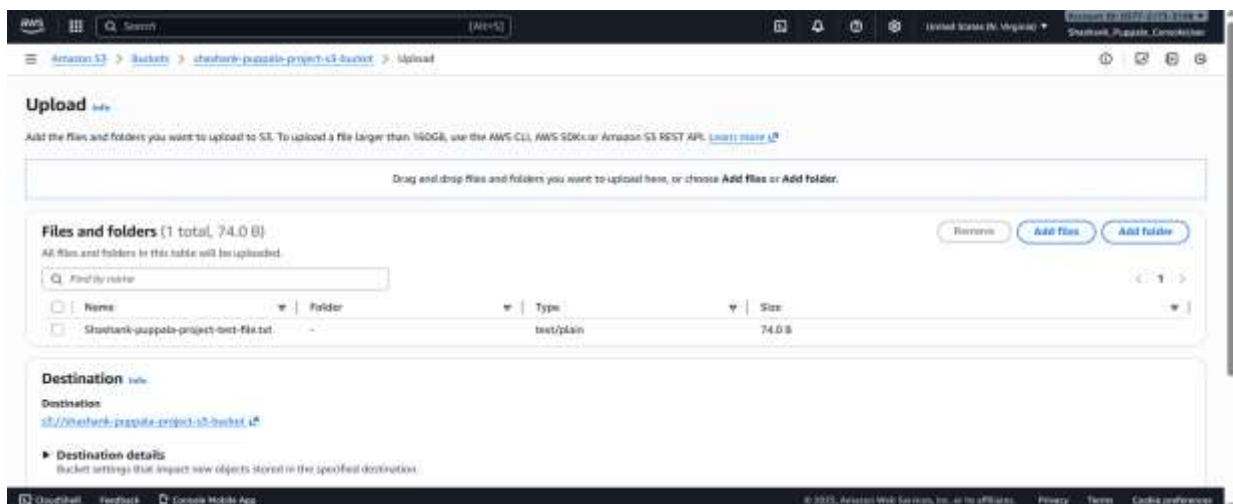
```

PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\I5_698> aws lambda add-permission --function-name ProjectS3UploadTrigger --statement-id s3invoke --action lambda:InvokeFunction --principal s3.amazonaws.com --source-arn arn:aws:s3:::shashank-puppala-project-s3-bucket
{
  "Statement": [ { "Sid": "\s3invoke", "Effect": "Allow", "Principal": { "Service": "s3.amazonaws.com" }, "Action": "lambda:InvokeFunction", "Resource": "arn:aws:lambda:us-east-1:837721735198:function:ProjectS3UploadTrigger", "Condition": { "ArnLike": { "AWS:SourceArn": "arn:aws:s3:::shashank-puppala-project-s3-bucket" } } } ]
}

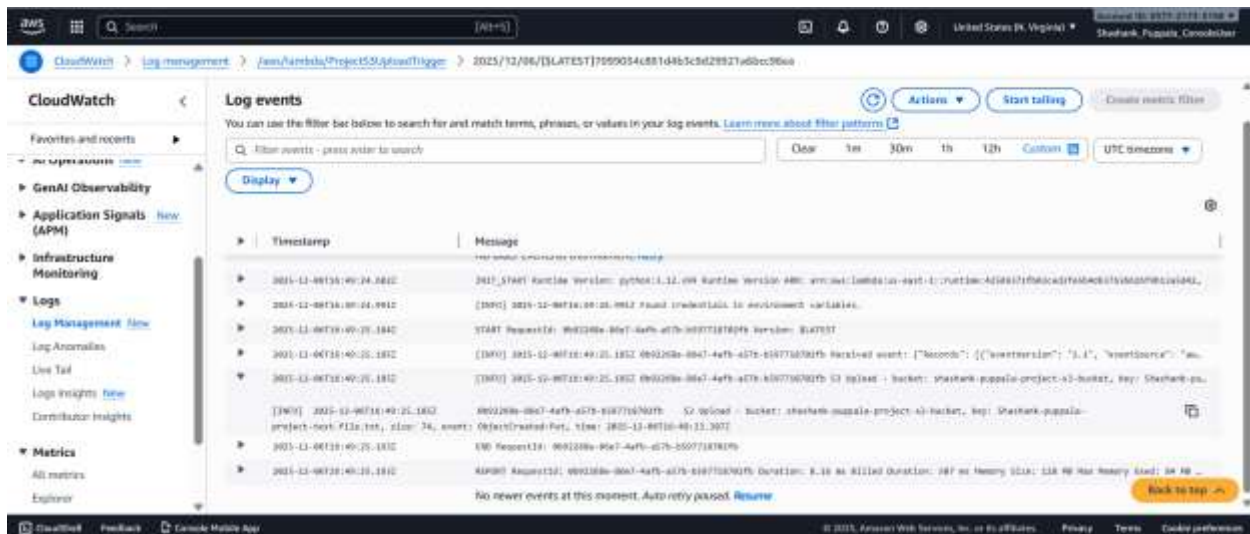
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\I5_698> aws s3api put-bucket-notification-configuration --bucket shashank-puppala-project-s3-bucket --notification-configuration file://Shashank-puppala-notification-project.json
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\I5_698>

```

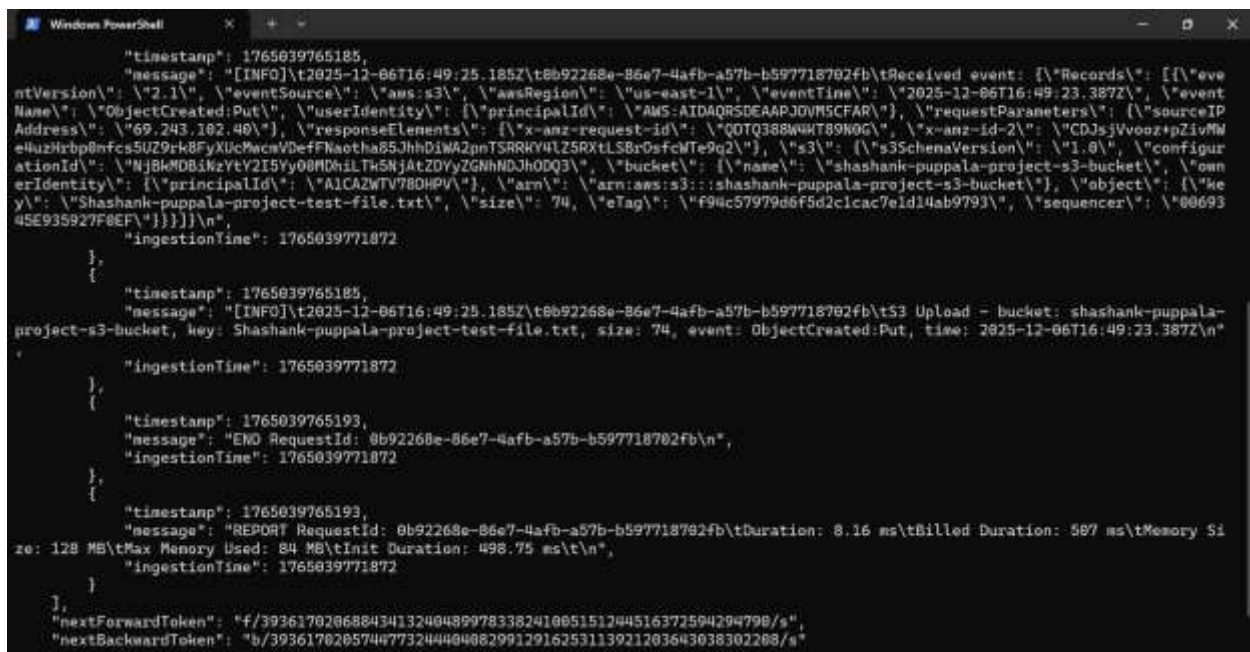
Upload a test file to S3 bucket: -



Check the CloudWatch logs;



Can even check at in the CLI as well for uploaded file details

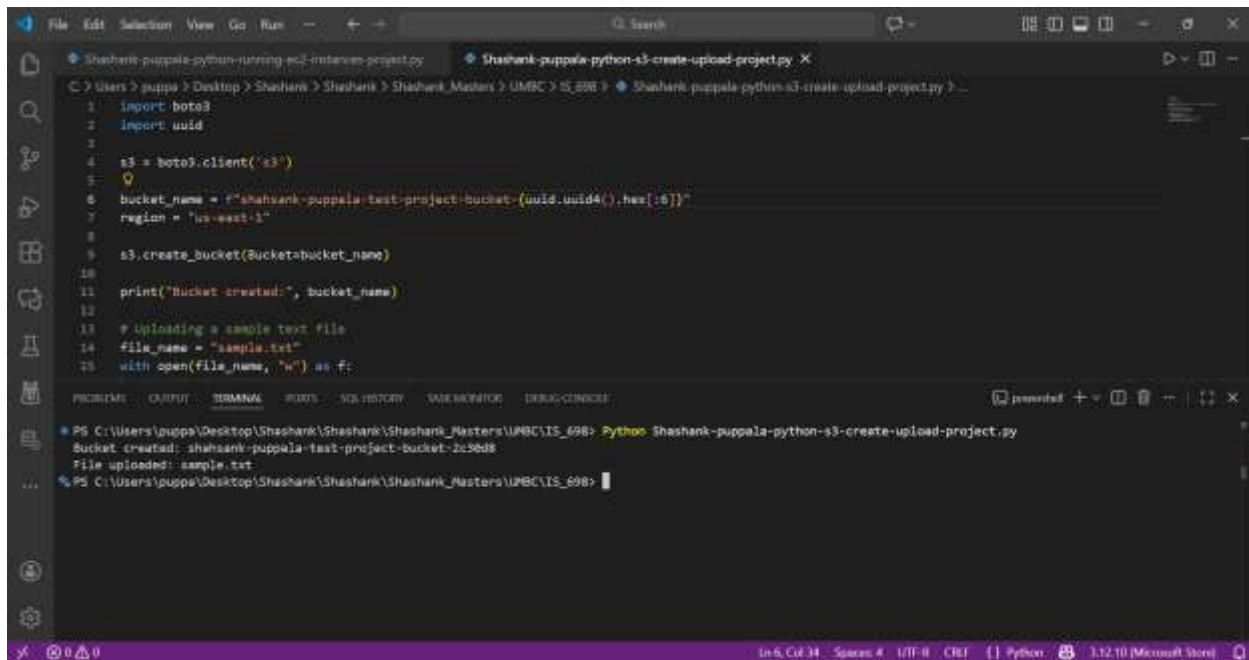


2 (C). AWS Interactions

List of Running EC2 Instances (using Python Boto 3 and AWS CLI)




```
Shashank-puppala-python-running-ec2-instances-project.py X
C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698 > Shashank-puppala-python-running-ec2-instances-project.py
1 import boto3
2
3 ec2 = boto3.client('ec2')
4
5 response = ec2.describe_instances(
6     Filters=[
7         {'Name': 'instance-state-name', 'Values': ['running', 'stopped', 'pending', 'stopping']}
8     ]
9 )
10
11 if not response['Reservations']:
12     print("No EC2 instances found.")
13 else:
14     print("EC2 Instances:")
15     for reservation in response['Reservations']:
16         for instance in reservation['Instances']:
17             # Get Name tag if exists
18             name = "N/A"
19             if 'Tags' in instance:
20                 for tag in instance['Tags']:
21                     if tag['Key'] == 'Name':
22                         name = tag['Value']
23             print("Name:", name)
24             print("Instance ID:", instance['InstanceId'])
25             print("State:", instance['State']['Name'])
26
27
28
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32
33
34
35
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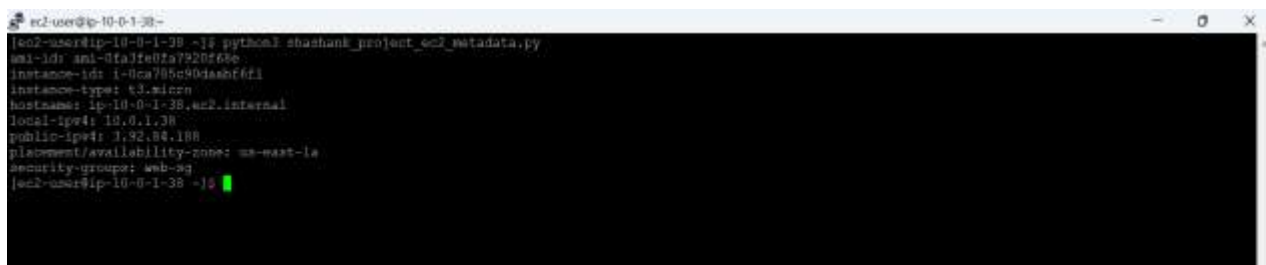
```
Shashank-puppala-python-creating-ec2-instance-project.py Shashank-puppala-python-s3-create-upload-project.py X
C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> python Shashank-puppala-python-s3-create-upload-project.py
1 import boto3
2 import uuid
3
4 s3 = boto3.client('s3')
5
6 bucket_name = f'shashank-puppala-test-project-bucket-{uuid.uuid4().hex[:6]}'
7 region = 'us-east-1'
8
9 s3.create_bucket(Bucket=bucket_name)
10
11 print("Bucket created:", bucket_name)
12
13 # Uploading a sample text file
14 file_name = "sample.txt"
15 with open(file_name, "w") as f:
```

```
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> python Shashank-puppala-python-s3-create-upload-project.py
Bucket created: shashank-puppala-test-project-bucket-2c5bd8
File uploaded: sample.txt
...
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698>
```



```
Windows PowerShell
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> aws s3 mb s3://shashank-puppala-project-s3-bucket-2 --region us-east-1
make_bucket: shashank-puppala-project-s3-bucket-2
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698> aws s3 cp shashank-puppala-testing-file-3.txt s3://shashank-puppala-project-s3-bucket-2/
upload: ./shashank-puppala-testing-file-3.txt to s3://shashank-puppala-project-s3-bucket-2/shashank-puppala-testing-file-3.txt
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC\IS_698>
```

Retrieve EC2 metadata: -



```
ec2-user@ip-10-0-1-38-:~$ python3 shashank_project_ec2_metadata.py
ami-id: ami-0fa1fe0fa7920f66e
instance-id: i-0ca786c90dashff1
instance-type: t3.micro
hostname: ip-10-0-1-38.ec2.internal
local-ip4s: 10.0.1.38
public-ip4s: 3.92.84.188
placement/availability-zone: us-east-1a
security-groups: sg-
ec2-user@ip-10-0-1-38-:~$
```

(Note: - SSH into the instance to get the metadata using python script)

```
Shashank-puppala-python-running-ec2-instances-project.py  Shashank-puppala-python-s3-create-upload-project.py  Shashank-puppala-python-metadata-ec2-project.py X
C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC> S_698> Shashank-puppala-python-metadata-ec2-project.py > ...
1: import boto3
2:
3: ec2 = boto3.client('ec2', region_name='us-east-1')
4:
5: response = ec2.describe_instances(
6:     InstanceIds=['i-8ca785c9daabf6f1']
7: )
8:
9: for reservation in response['Reservations']:
10:     for instance in reservation['Instances']:
11:         print("Instance ID:", instance['InstanceId'])
12:         print("Type:", instance['InstanceType'])

PROBLEMS OUTPUT TERMINAL PORTS SQL HISTORY TASK MONITOR DEBUG CONSOLE
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC> S_698> Python Shashank-puppala-python-metadata-ec2-project.py
Instance ID: i-8ca785c9daabf6f1
Type: t3.micro
State: running
AZ: us-east-1a
Private IP: 10.0.1.38
Public IP: 3.92.84.188
Name: shashank-puppala-ec2-instance-project
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC> S_698>
```

Invoke Lambda Function manually: -

```
Shashank-puppala-python-s3-create-upload-project.py  Shashank-puppala-python-metadata-ec2-project.py  Shashank-puppala-python-invoke-manually-project.py X
C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC> S_698> Shashank-puppala-python-invoke-manually-project.py > ...
1: import boto3
2: import json
3:
4: # Initialize Lambda client
5: lambda_client = boto3.client('lambda', region_name='us-east-1')
6:
7: # Name of your Lambda function
8: function_name = "MyHelloLambda"
9:
10: # Optional: Payload to send to Lambda
11: payload = {}

PROBLEMS OUTPUT TERMINAL PORTS SQL HISTORY TASK MONITOR DEBUG CONSOLE
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC> S_698> Python Shashank-puppala-python-invoke-manually-project.py
Lambda Response: {'statusCode': 200, 'body': 'Hello from Lambda - Shashank Puppala!'}
PS C:\Users\puppa\Desktop\Shashank\Shashank\Shashank_Masters\UMBC> S_698>
```

```
Command Prompt
C:\Users\puppa>aws lambda invoke --function-name MyHelloLambda response.json
{
  "statusCode": 200,
  "ExecutedVersion": "$LATEST"
}

C:\Users\puppa>type response.json
{"statusCode": 200, "body": "Hello from Lambda - Shashank Puppala!"}
C:\Users\puppa>
```

Deploy API Gateway to Invoke Lambda via HTTP requests: -

AWS

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United States (N. Virginia)

Shashank Puppala, Consultant

API Gateway

APIs

Create API

Create REST API

### Create REST API

**API details**

☒ New API  
Create a new REST API

☐ Clone existing API  
Create a copy of an API in this AWS account

☐ Import API  
Import an API from an OpenAPI definition

☐ Example API  
Learn about API Gateway with an example API

**API name**  
shashank-puppala-rest-api-project

**Description - optional**  
REST API to invoke the lambda function

**API endpoint type**  
Regional APIs are deployed to the current AWS Region. Edge-optimized APIs route requests to the nearest CloudFront Point of Presence. Private APIs are only accessible from VPCs.  
Regional

CloudShell

Feedback

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API Gateway

APIs

shashank-puppala-rest-api-project (mal2tfgbcl)

Stages

**API Gateway**

APIs

Custom domain names

Domain name access associations

VPC links

API Core targets [New](#)

▼ API: shashank-puppala-rest-api-project

Resources

**Stages**

Authorizers

Gateway responses

Models

Resource policy

Documentation

Dashboard

API settings

**Stages**

prod

/

/hello

GET

**Method overrides**

Create override

This method inherits its settings from the 'prod' stage.

**Invoke URL**

<https://mal2tfgbcl.execute-api.us-east-1.amazonaws.com/prod/hello>

CloudShell

Feedback

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mal2tfgbcl.execute-api.us-east-1.amazonaws.com/prod/hello

Blackbox AI

Amazon Web Services

Get Refresh Token

Salesforce

myIMBC

University of Mary...

Wolfram

Developer Docume...

All bookmarks

Pretty-print

```
{
  "statusCode": 200,
  "body": "Hello from Lambda - Shashank Puppala!"
}
```