Project - 1: Deploying a Multi-Tier Website Using AWS EC2

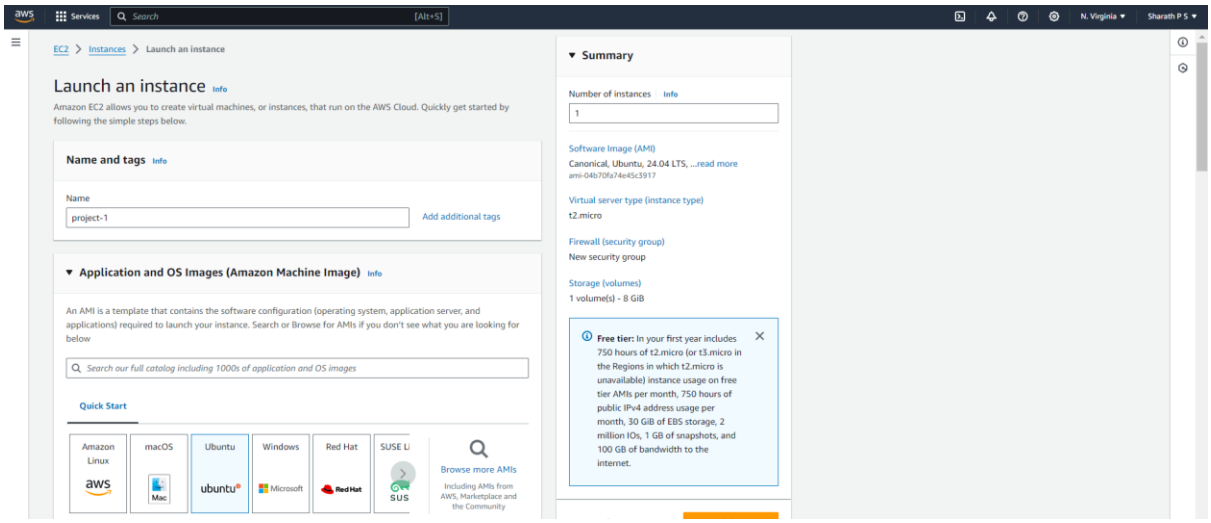
Problem Statement:

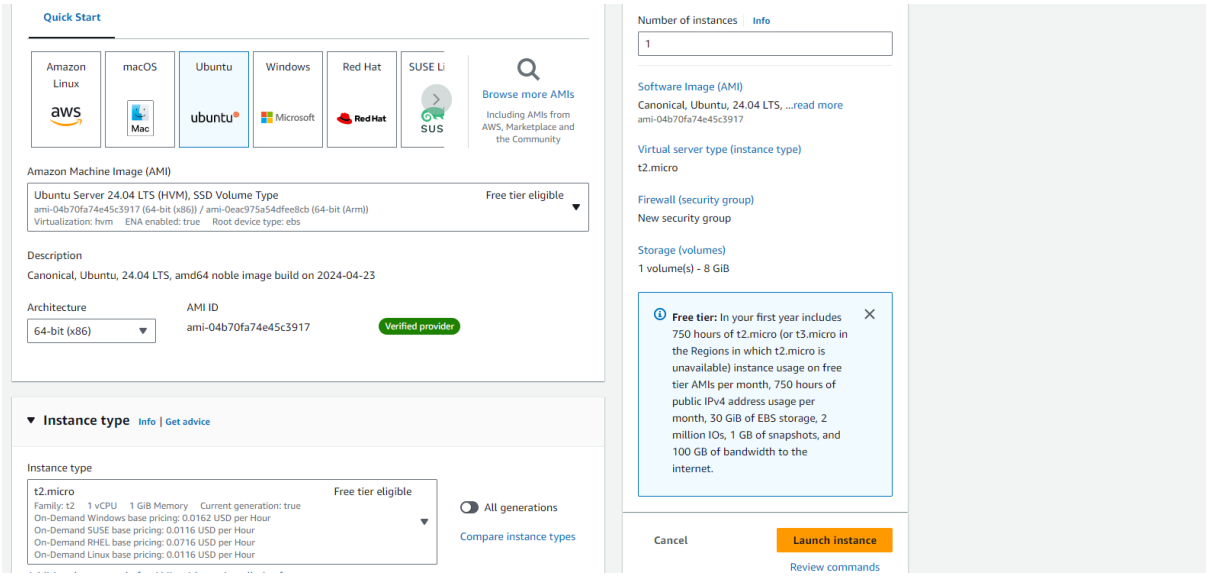
Company ABC wants to move their product to AWS. They have the following things set up right now:
1. MySQL DB
2. Website (PHP)
The company wants high availability on this product, therefore wants Auto Scaling to be enabled on this website.

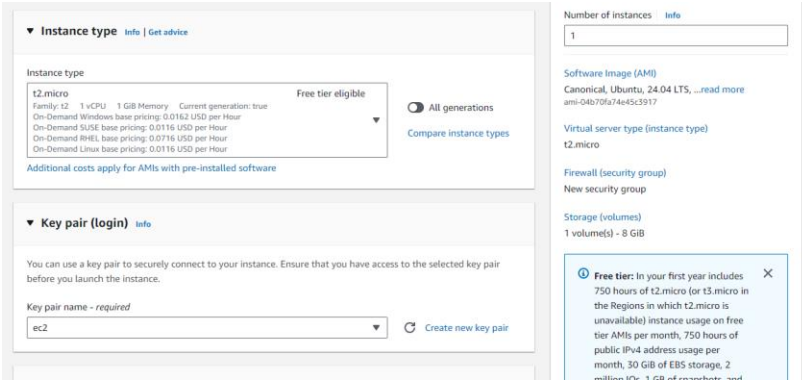
Steps To Solve:

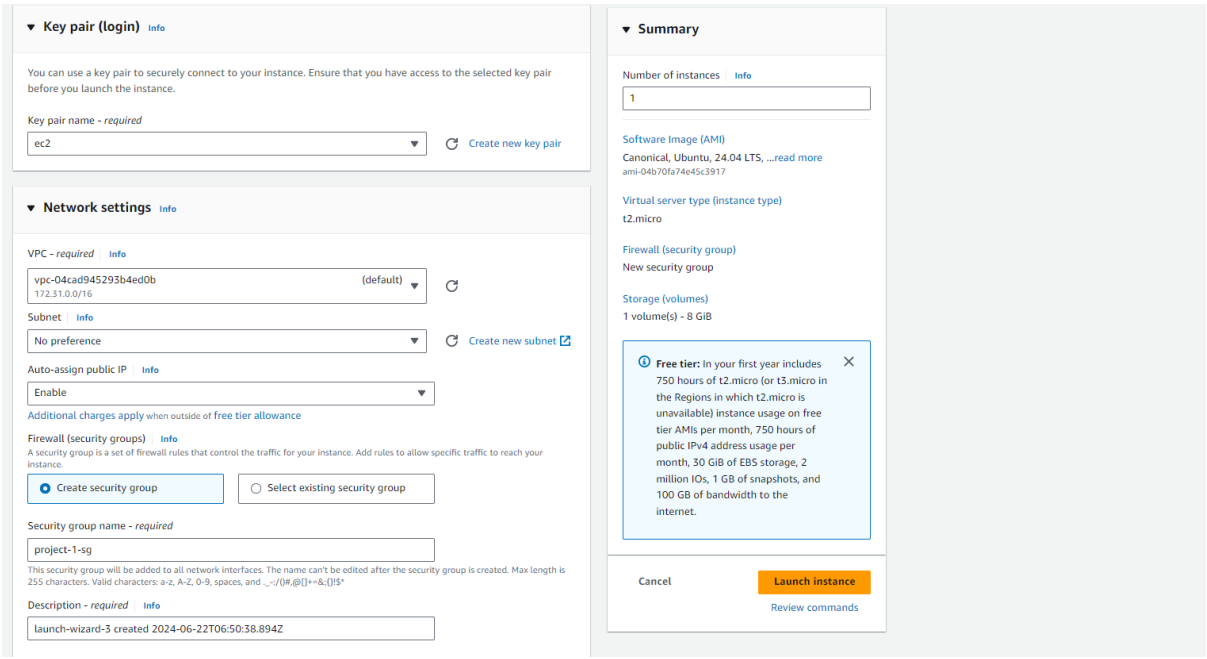
1. Launch an EC2 Instance
2. Enable Auto Scaling on these instances (minimum 2)
3. Create an RDS Instance
4. Create Database & Table in RDS instance:
a. Database name: intel
b. Table name: data
c. Database password: intel123
5. Change hostname in website
6. Allow traffic from EC2 to RDS instance
7. Allow all-traffic to EC2 instance

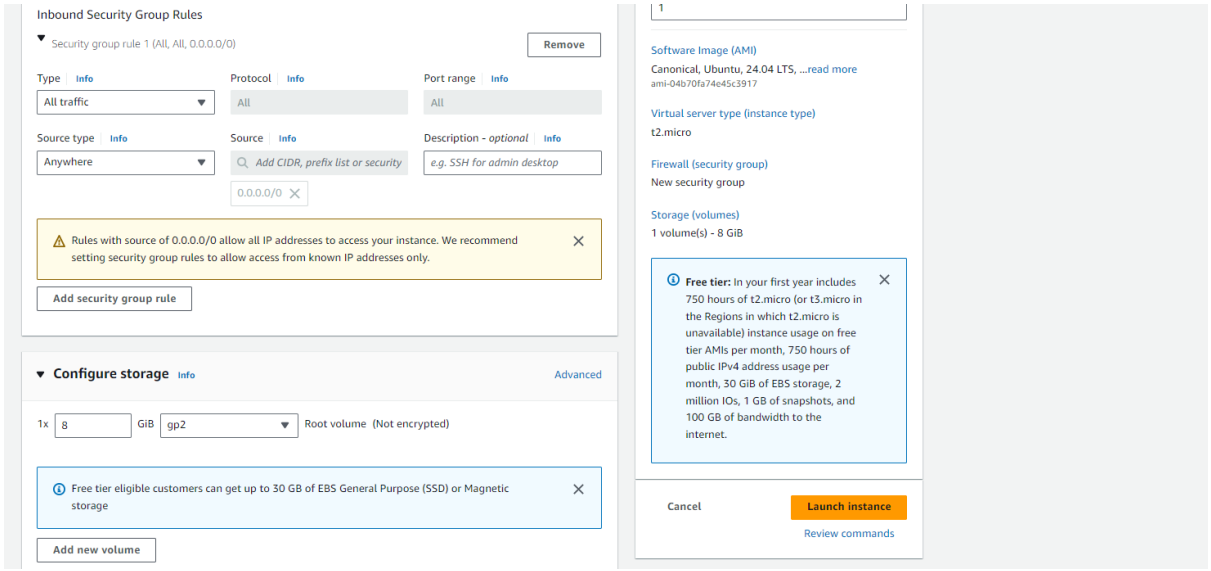
1. EC2 instance and configuration

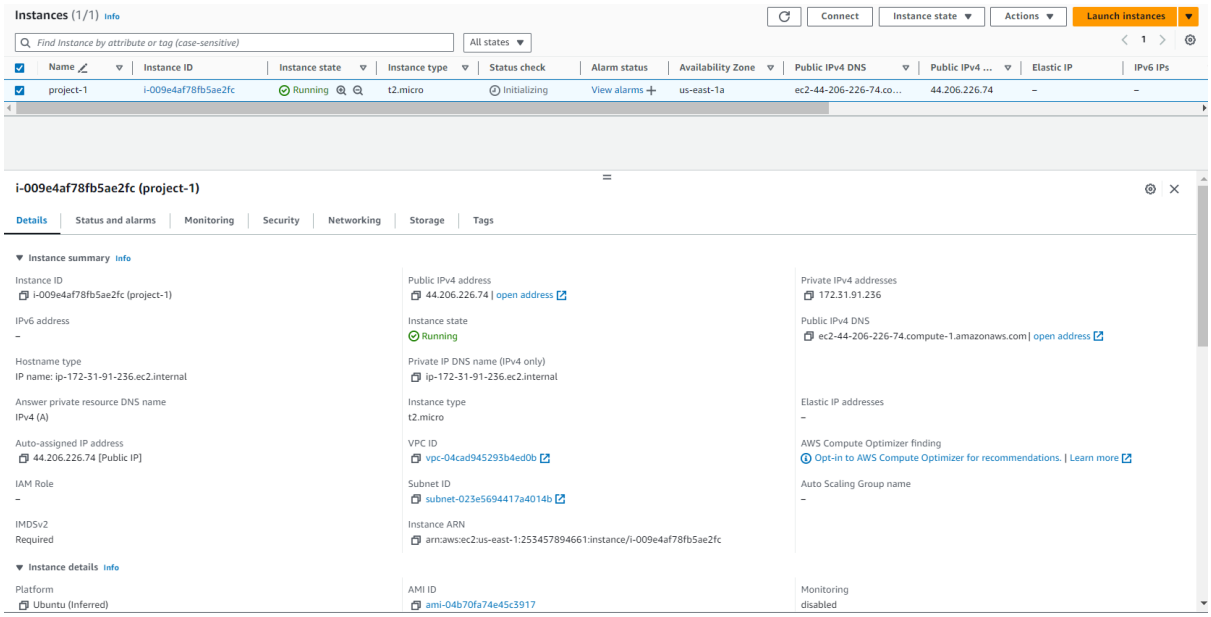



Quick Start
Amazon Linux
macOS
Ubuntu
Windows
Red Hat
Browse more AMIs
Including AMIs from AWS, Marketplace and the Community
Amazon Machine Image (AMI)
Ubuntu Server 24.04 LTS (HVM), SSD Volume Type
Free tier eligible
Description
Canonical, Ubuntu, 24.04 LTS, amd64 noble image build on 2024-04-23
Architecture
64-bit (x86)
AMI ID
ami-04b70fa74e45c3917
Verified provider
Number of instances Info
1
Software Image (AMI)
Canonical, Ubuntu, 24.04 LTS, ...read more
Virtual server type (instance type)
t2.micro
Firewall (security group)
New security group
Storage (volumes)
1 volume(s) - 8 GiB
Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.
Instance type Info | Get advice
Instance type
t2.micro
Free tier eligible
All generations
Compare instance types
Cancel
Launch instance
Review commands


Instance type Info | Get advice
Instance type
t2.micro
Free tier eligible
All generations
Compare instance types
Additional costs apply for AMIs with pre-installed software
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 - required
ec2
Create new key pair
Number of instances Info
1
Software Image (AMI)
Canonical, Ubuntu, 24.04 LTS, ...read more
Virtual server type (instance type)
t2.micro
Firewall (security group)
New security group
Storage (volumes)
1 volume(s) - 8 GiB
Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2


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 - required
ec2
Create new key pair
Network settings Info
VPC - required Info
vpc-04cad945293b4ed0b
(default)
172.31.0.0/16
Subnet Info
No preference
Create new subnet
Auto-assign public IP Info
Enable
Additional charges apply when outside of free tier allowance
Firewall (security groups) Info
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.
Create security group
Select existing security group
Security group name - required
project-1-sg
This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and ._-:/()#,@[]+=&;{}!$*
Description - required Info
launch-wizard-3 created 2024-06-22T06:50:38.894Z
Summary
Number of instances Info
1
Software Image (AMI)
Canonical, Ubuntu, 24.04 LTS, ...read more
ami-04b70fa74e45c3917
Virtual server type (instance type)
t2.micro
Firewall (security group)
New security group
Storage (volumes)
1 volume(s) - 8 GiB
Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.
Cancel
Launch instance
Review commands

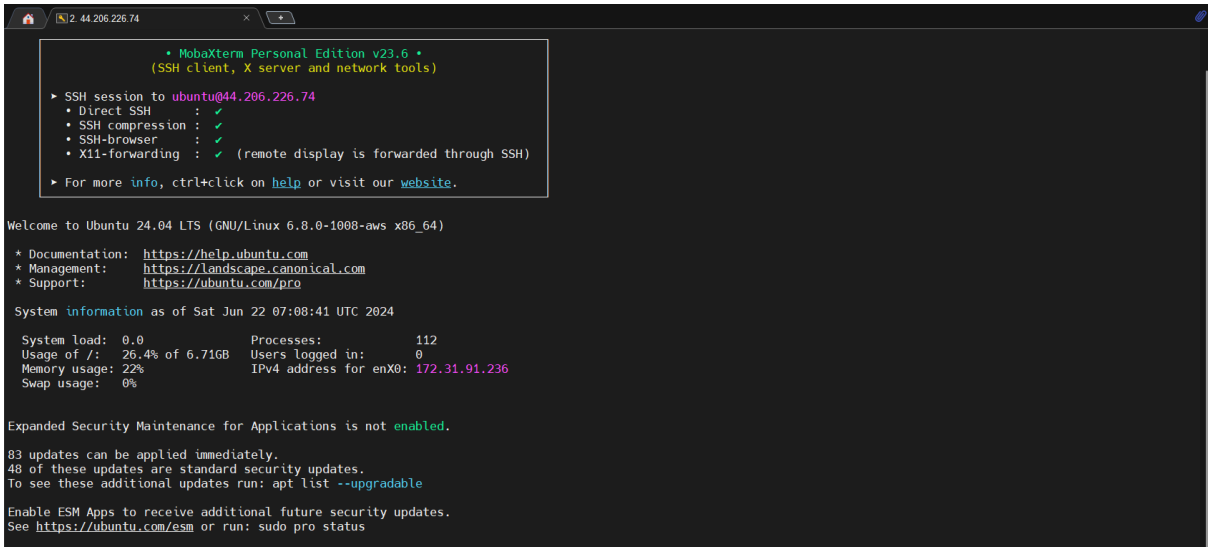




2. Connect EC2 instance and install required services

   Connecting to EC2 using the public IP. Then processing the below linux commands to install the services.

   - sudo apt-get update
   - sudo apt-get install apache2
   - systemctl start apache2
   - systemctl enable apache2



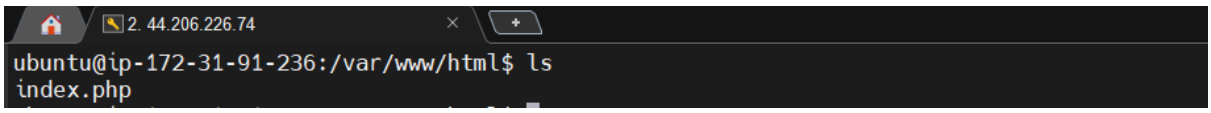
After installed the apache service - goto the location of the index.html

- cd /var/www/html

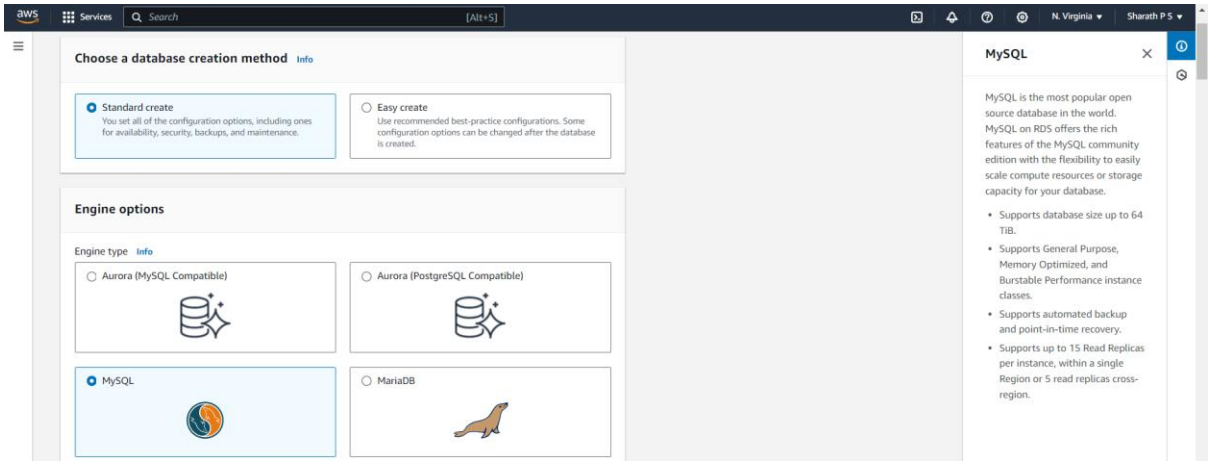
Remove the index.html file and add index.php file instead of it

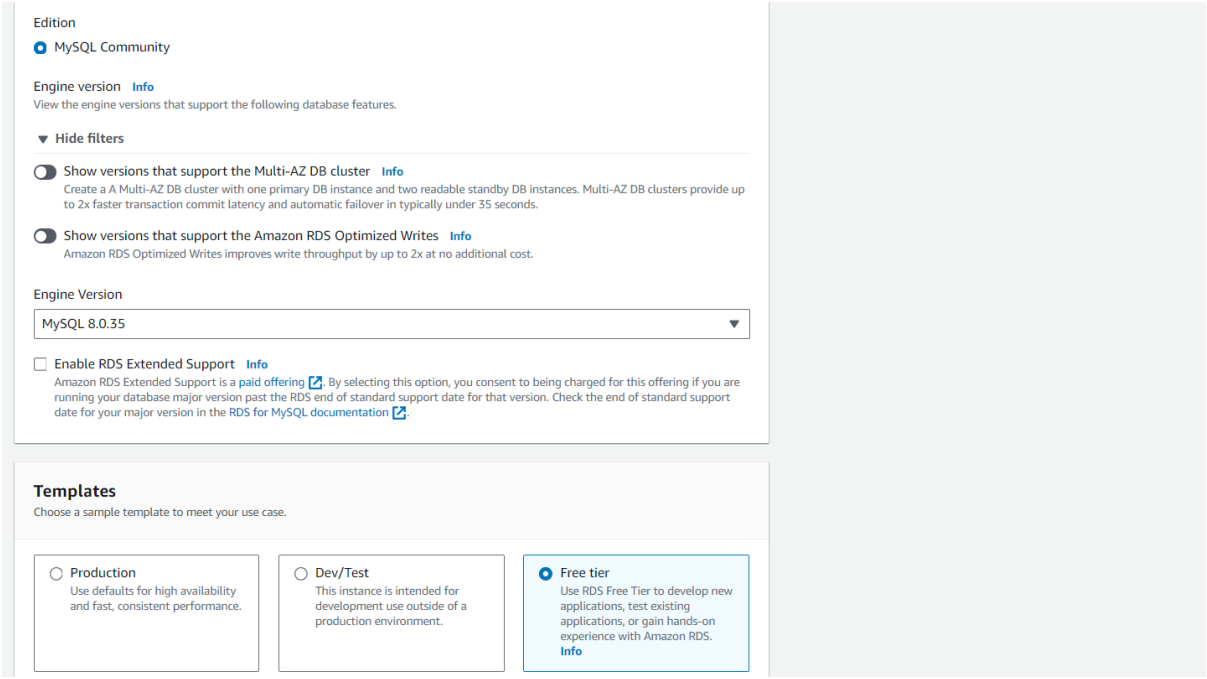
- rm index.html
- nano index.php

1243\index.php



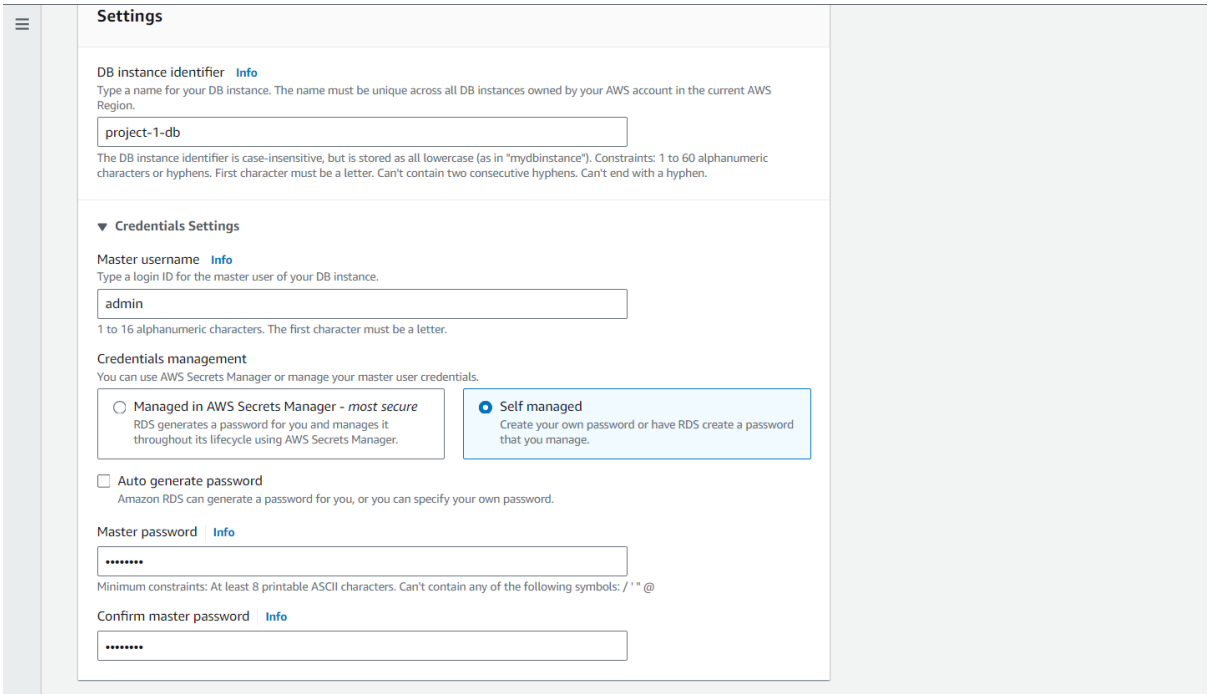
3. Create MySQL Database and configure it.

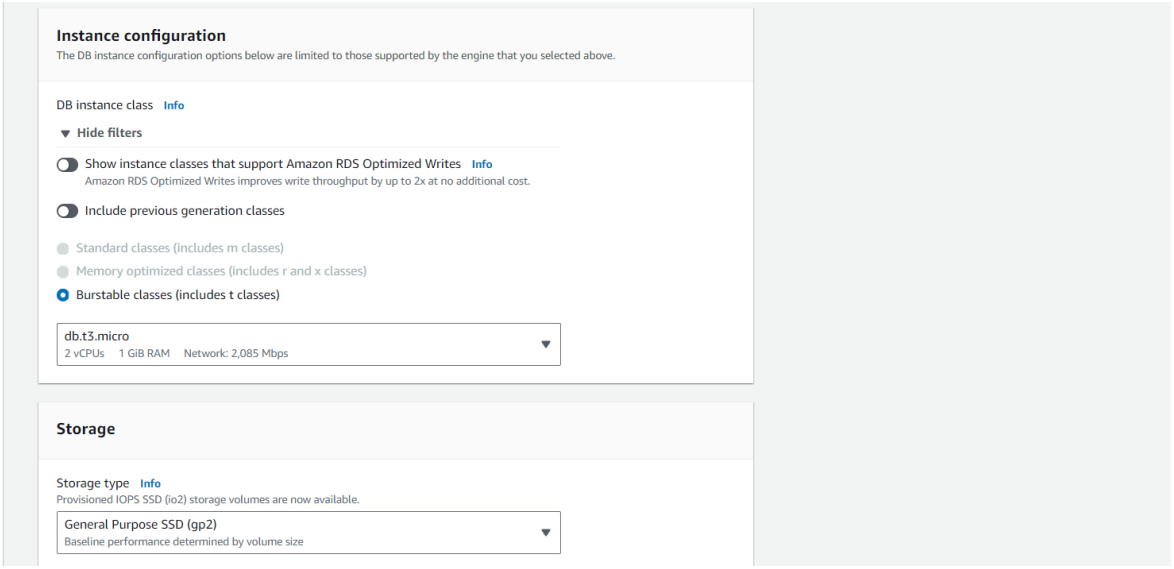


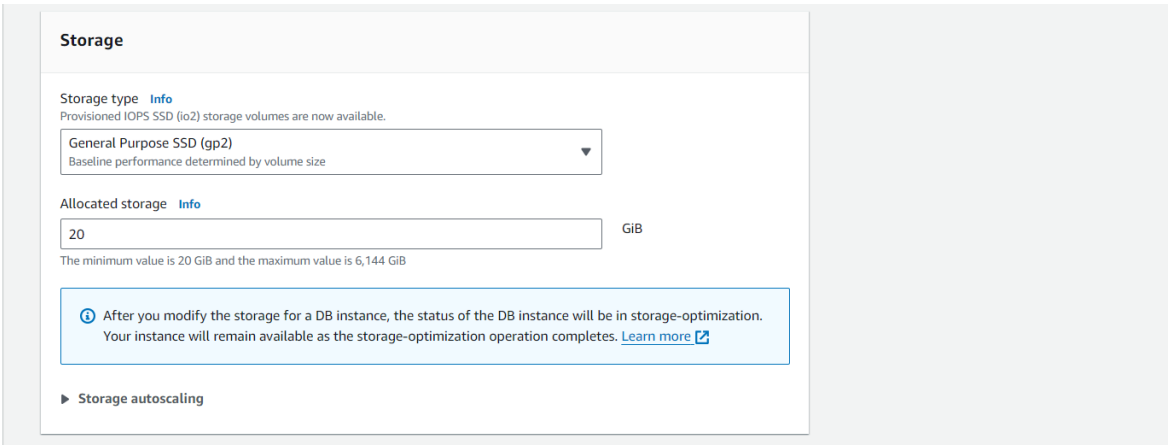


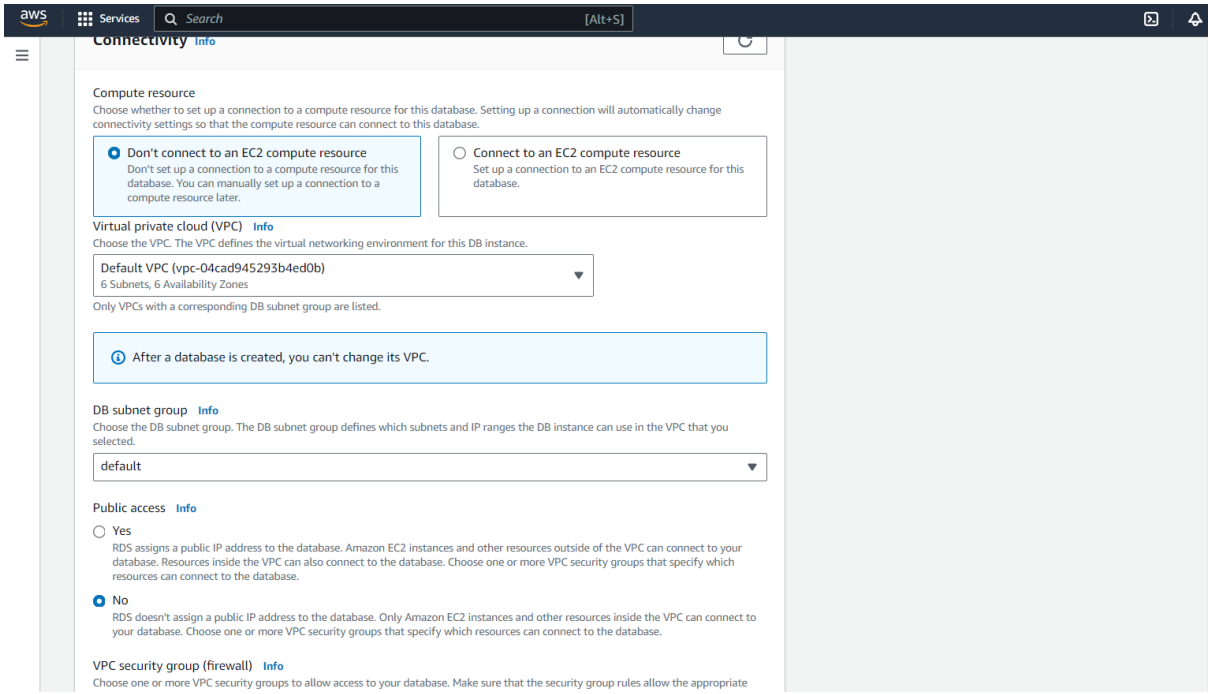
- Credentials

username: admin
password: Admin123

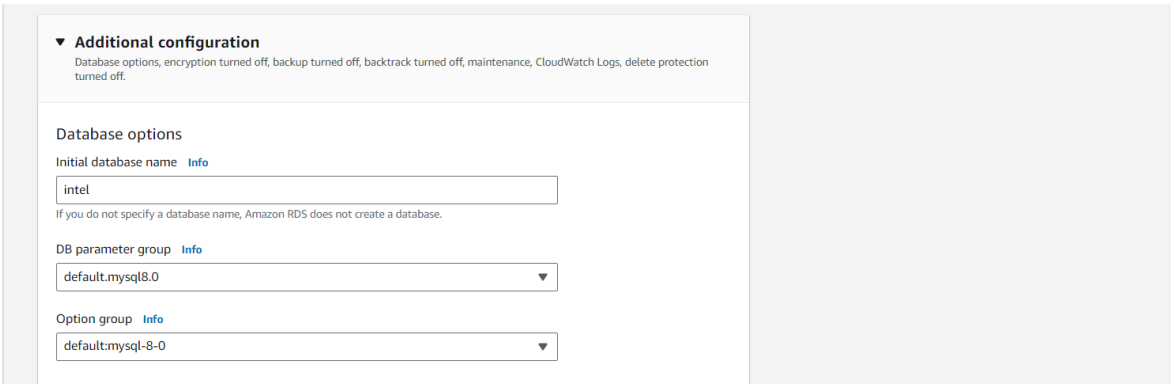



Instance configuration
The DB instance configuration options below are limited to those supported by the engine that you selected above.
DB instance class Info
Hide filters
Show instance classes that support Amazon RDS Optimized Writes Info
Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.
Include previous generation classes
Standard classes (includes m classes)
Memory optimized classes (includes r and x classes)
Burstable classes (includes t classes)
db.t3.micro
2 vCPUs 1 GiB RAM Network: 2,085 Mbps
Storage
Storage type Info
Provisioned IOPS SSD (io2) storage volumes are now available.
General Purpose SSD (gp2)
Baseline performance determined by volume size

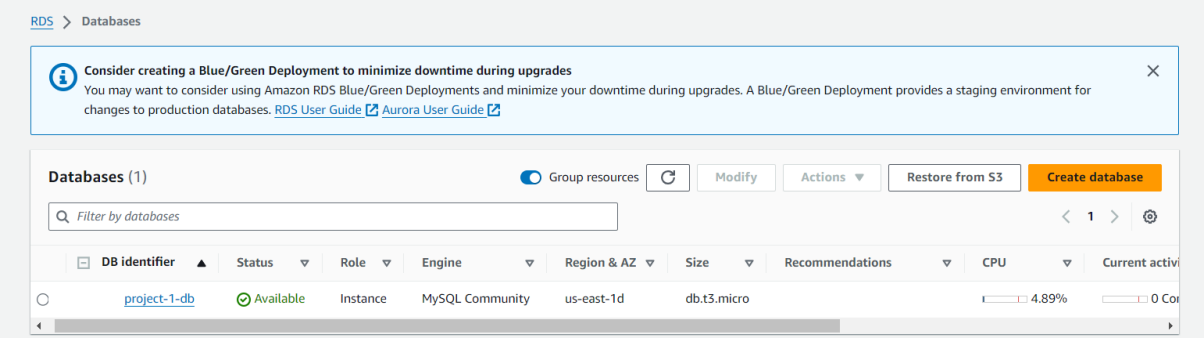

Storage
Storage type Info
Provisioned IOPS SSD (io2) storage volumes are now available.
General Purpose SSD (gp2)
Baseline performance determined by volume size
Allocated storage Info
20
GiB
The minimum value is 20 GiB and the maximum value is 6,144 GiB
After you modify the storage for a DB instance, the status of the DB instance will be in storage-optimization.
Your instance will remain available as the storage-optimization operation completes. Learn more
Storage autoscaling

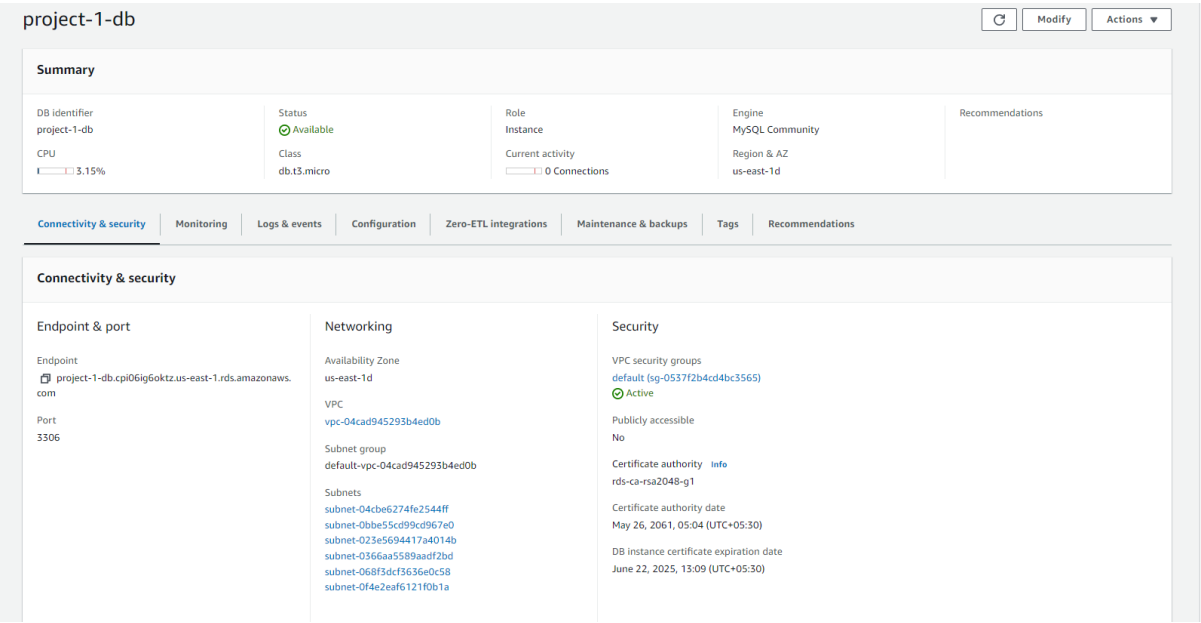

aws
Services
Search
[Alt+S]
Connectivity Info
Compute resource
Choose whether to set up a connection to a compute resource for this database. Setting up a connection will automatically change connectivity settings so that the compute resource can connect to this database.
Don't connect to an EC2 compute resource
Don't set up a connection to a compute resource for this database. You can manually set up a connection to a compute resource later.
Connect to an EC2 compute resource
Set up a connection to an EC2 compute resource for this database.
Virtual private cloud (VPC) Info
Choose the VPC. The VPC defines the virtual networking environment for this DB instance.
Default VPC (vpc-04cad945293b4ed0b)
6 Subnets, 6 Availability Zones
Only VPCs with a corresponding DB subnet group are listed.
After a database is created, you can't change its VPC.
DB subnet group Info
Choose the DB subnet group. The DB subnet group defines which subnets and IP ranges the DB instance can use in the VPC that you selected.
default
Public access Info
Yes
RDS assigns a public IP address to the database. Amazon EC2 instances and other resources outside of the VPC can connect to your database. Resources inside the VPC can also connect to the database. Choose one or more VPC security groups that specify which resources can connect to the database.
No
RDS doesn't assign a public IP address to the database. Only Amazon EC2 instances and other resources inside the VPC can connect to your database. Choose one or more VPC security groups that specify which resources can connect to the database.
VPC security group (firewall) Info
Choose one or more VPC security groups to allow access to your database. Make sure that the security group rules allow the appropriate

- database name - intel



Database and details

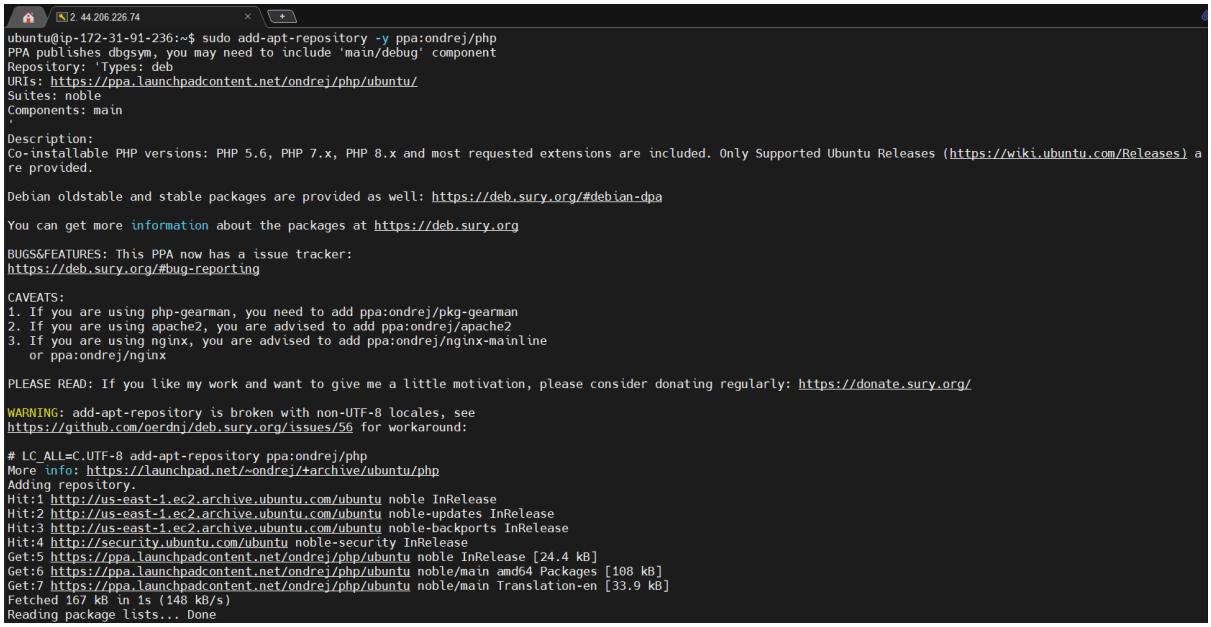


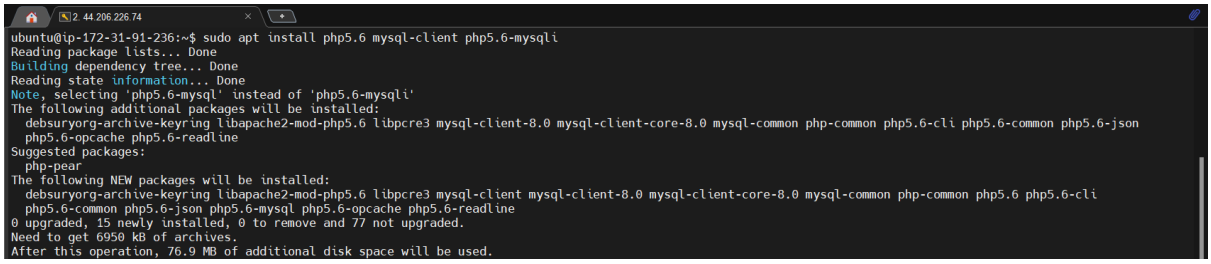


4. Connect back to EC2 instance and install php-mysql using the following commands

- sudo add-apt-repository -y ppa:ondrej/php

- sudo apt install php5.6 mysql-client php5.6-mysqli





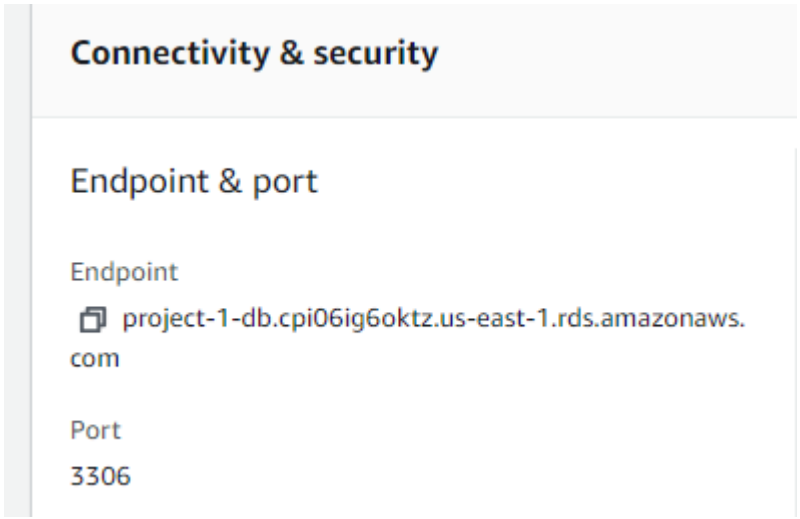
5. Now connect mysql and with the RDS

Before that we need to change the some of the code in the index.php file, so we need to go the location of index.php file and edit it

- cd /var/www/html
- sudo nano index.php

Edit server name, username, password, db

- Server name is the ‘endpoint of the mysql database’



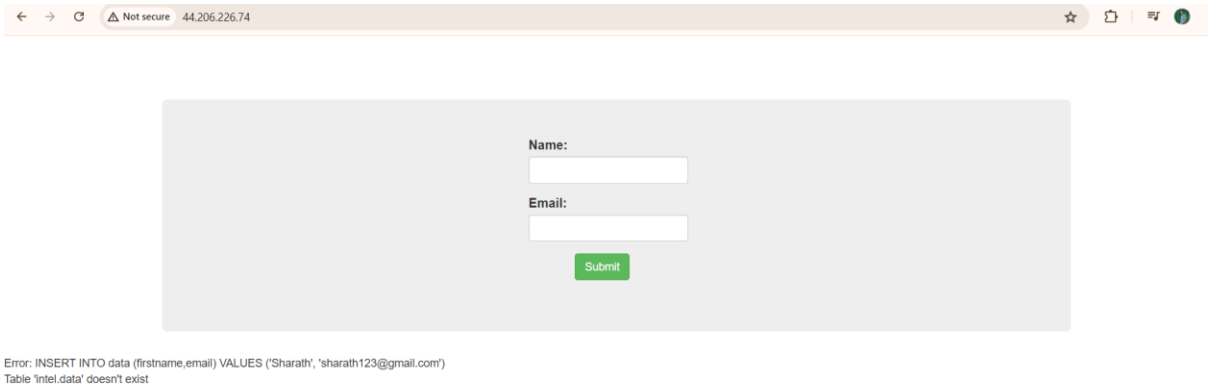

```
 GNU nano 7.2                                                  index.php *
    <input type="text" class="form-control" name="firstname">
  </div>
  <div class="form-group">
    <label for="email">Email:</label>
    <input type="text" class="form-control" name="email">
  </div>
               <button type="submit" class="btn btn-success">Submit</button>
</form></td>
  <td colspan="4"></td>
</tr>
</table>
</div>
</div>
<?php
$firstname=$_POST['firstname'];
$email=$_POST['email'];
$servername = "project-1-db.cpi06ig6oktz.us-east-1.rds.amazonaws.com";
$username = "admin";
$password = "Admin123";
$db = "intel";
// Create connection
$conn = new mysqli($servername, $username, $password, $db);

// Check connection
if ($conn->connect_error) {
    die("Connection failed: " . $conn->connect_error);
}
if(isset($_POST['firstname']) && isset($_POST['email'])){
$sql = "INSERT INTO data (firstname,email)
VALUES ('".$firstname."', '".$email."')";

if ($conn->query($sql) === TRUE) {
    echo "New record created successfully";
} else {
    echo "Error: " . $sql . "<br>" . $conn->error;
}

$conn->close();
```

- Now try to login with the public IP of the instance and the login page will appear



while we add data there will be show the error. so need to connect database and create table for sort out the error.

6. Connect the mysql database through instance and create table in order to save the data

- mysql -h hostname -u username -p password

```
ubuntu@ip-172-31-91-236:/var/www/html$ mysql -h project-1-db.cpi06ig6oktz.us-east-1.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 30
Server version: 8.0.35 Source distribution

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affiliates. Other names may be trademarks of their respective
owners.

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

mysql>
```

Commands for mysql:

- show databases;

```
mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| intel              |
| mysql              |
| performance_schema |
| sys                |
+--------------------+
5 rows in set (0.00 sec)
```

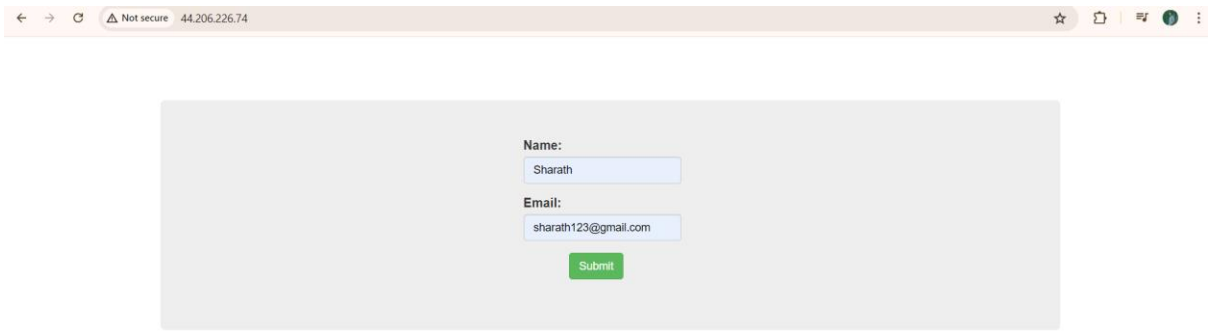
- use intel;

```
mysql> use intel
Database changed
```

- create table data(firstname varchar(15), email varchar(25));

```
mysql> create table data(firstname varchar(15), email varchar(25));
Query OK, 0 rows affected (0.04 sec)
```

Now go to web page and add the data that is name and email, it will record the data successfully.



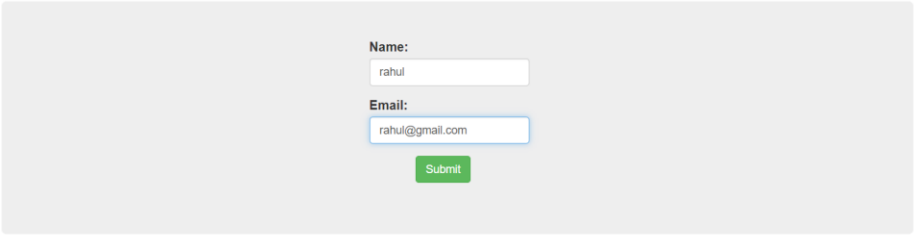
New record created successfully

View the records in database that we stored in the table data.

- select * from table;

```
mysql> select * from data;
+-----------+---------------------+
| firstname | email               |
+-----------+---------------------+
| Sharath   | sharath123@gmail.com |
| Sharath   | sharath123@gmail.com |
| kiran     | kiran22@gmail.com    |
+-----------+---------------------+
3 rows in set (0.00 sec)
```

example:

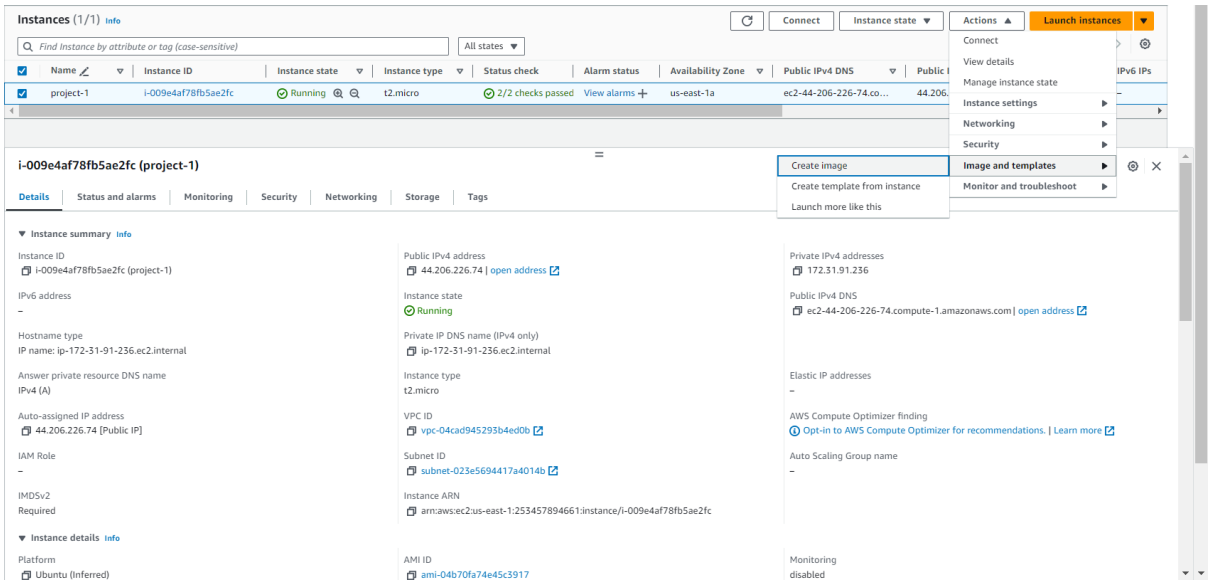


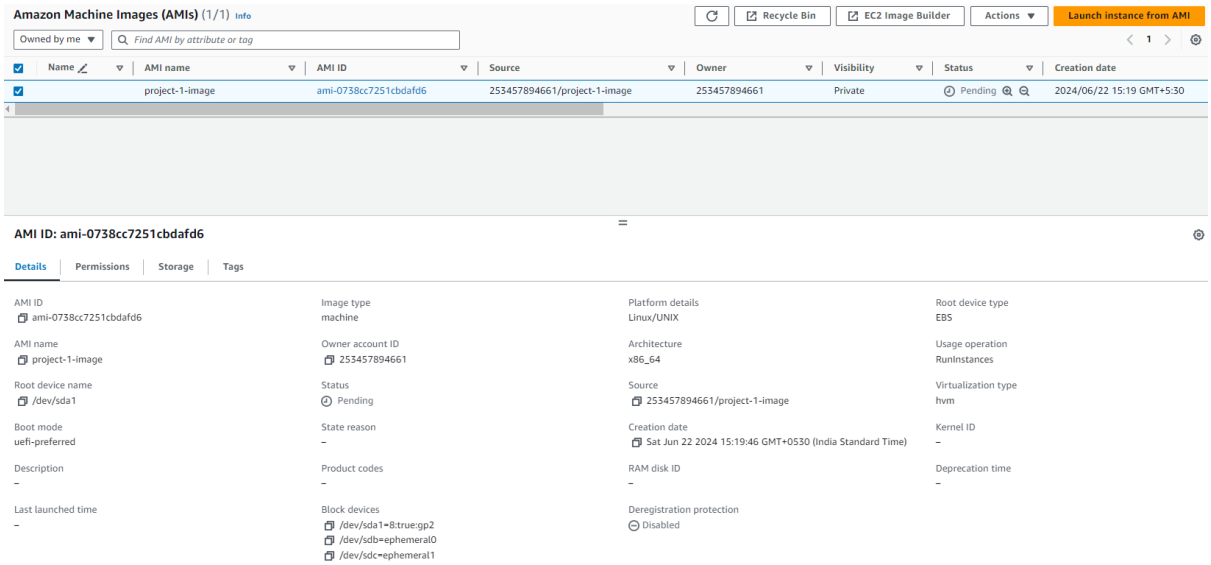
New record created successfully

```
mysql> select * from data;
+-----------+---------------------+
| firstname | email               |
+-----------+---------------------+
| Sharath   | sharath123@gmail.com |
| Sharath   | sharath123@gmail.com |
| kiran     | kiran22@gmail.com    |
| rahul     | rahul@gmail.com      |
+-----------+---------------------+
4 rows in set (0.00 sec)
```

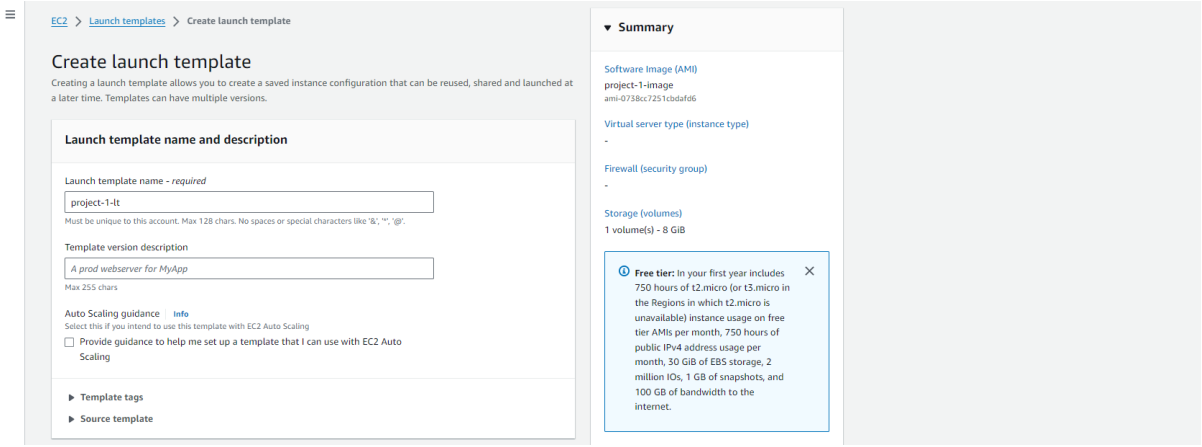
7. Enable Auto Scaling on the instance

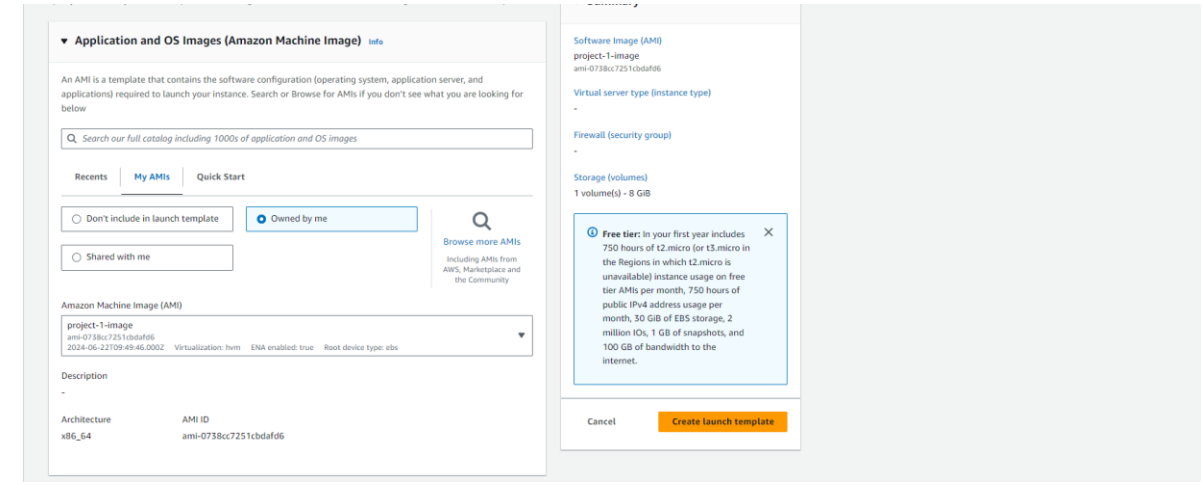
   - Create an image of the EC2

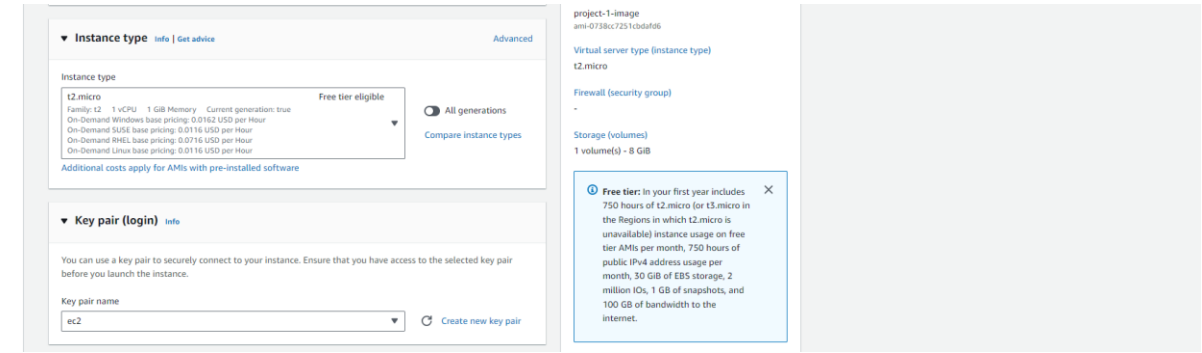


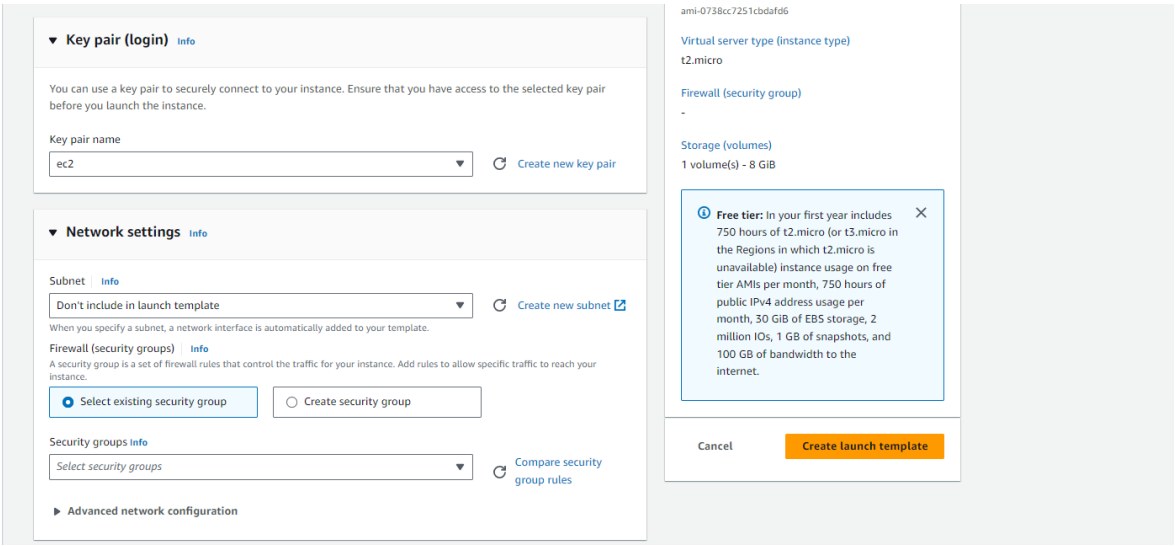


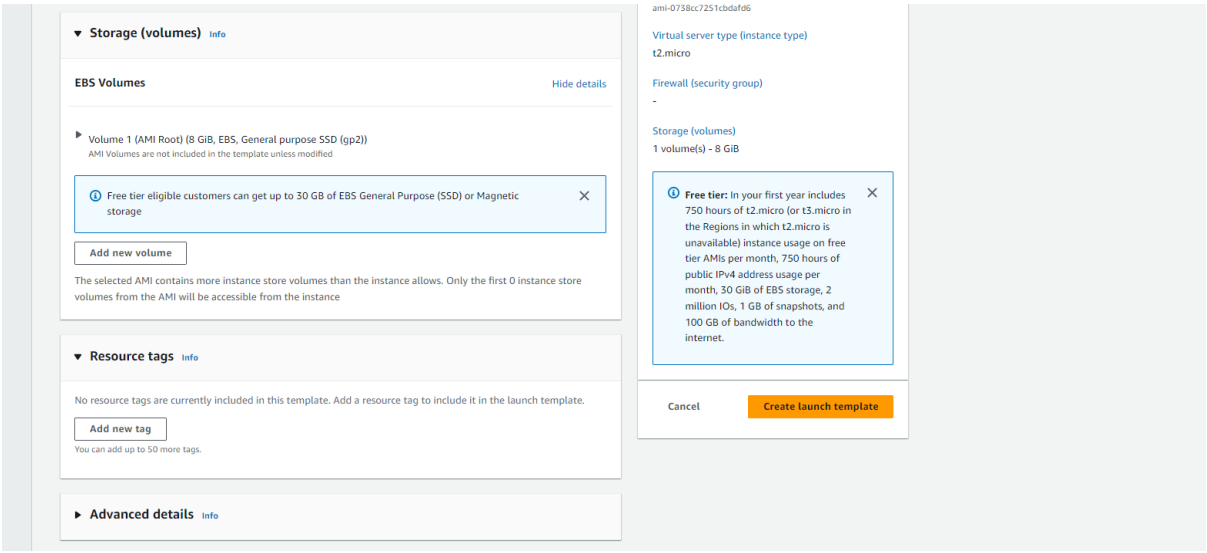
- Creating launch template for the auto scaling



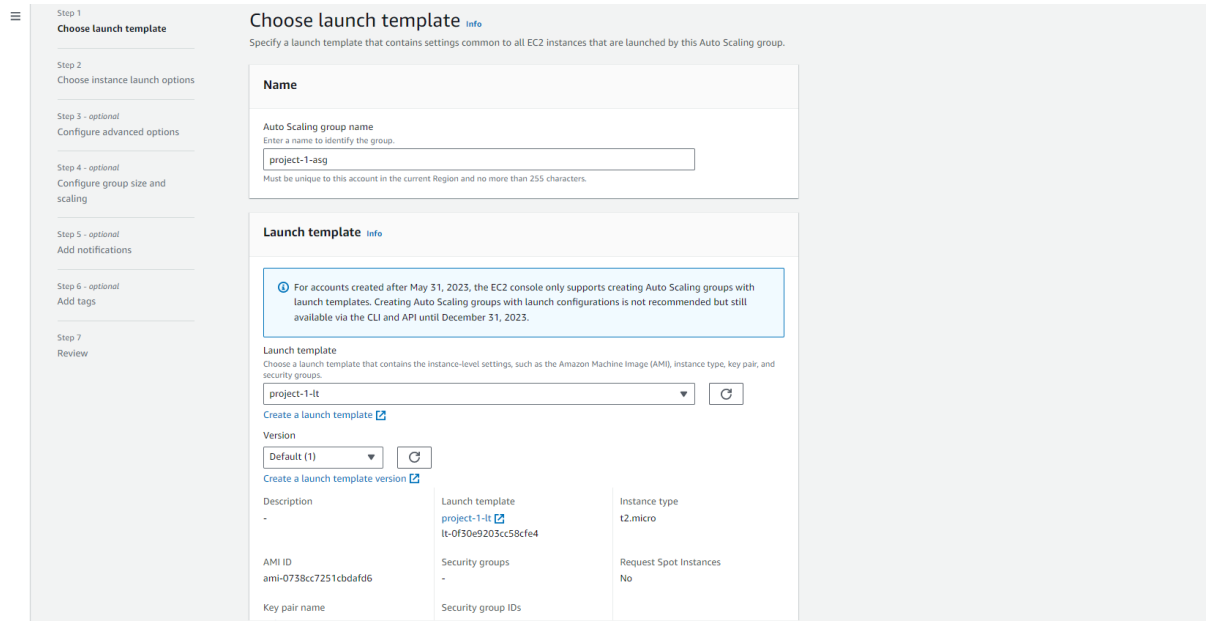


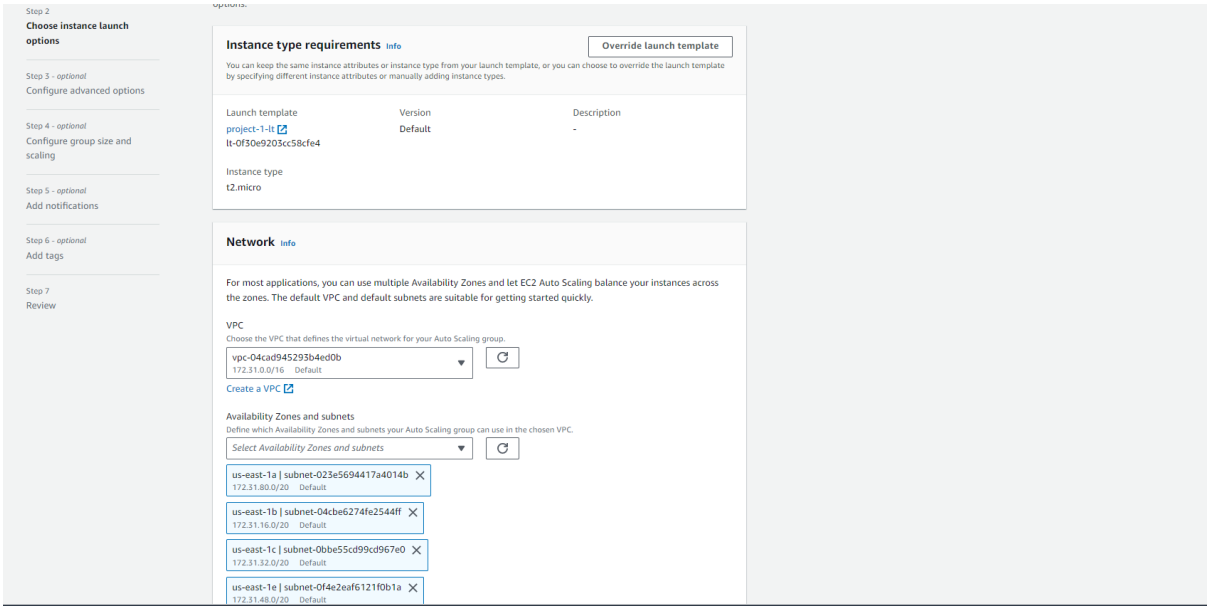


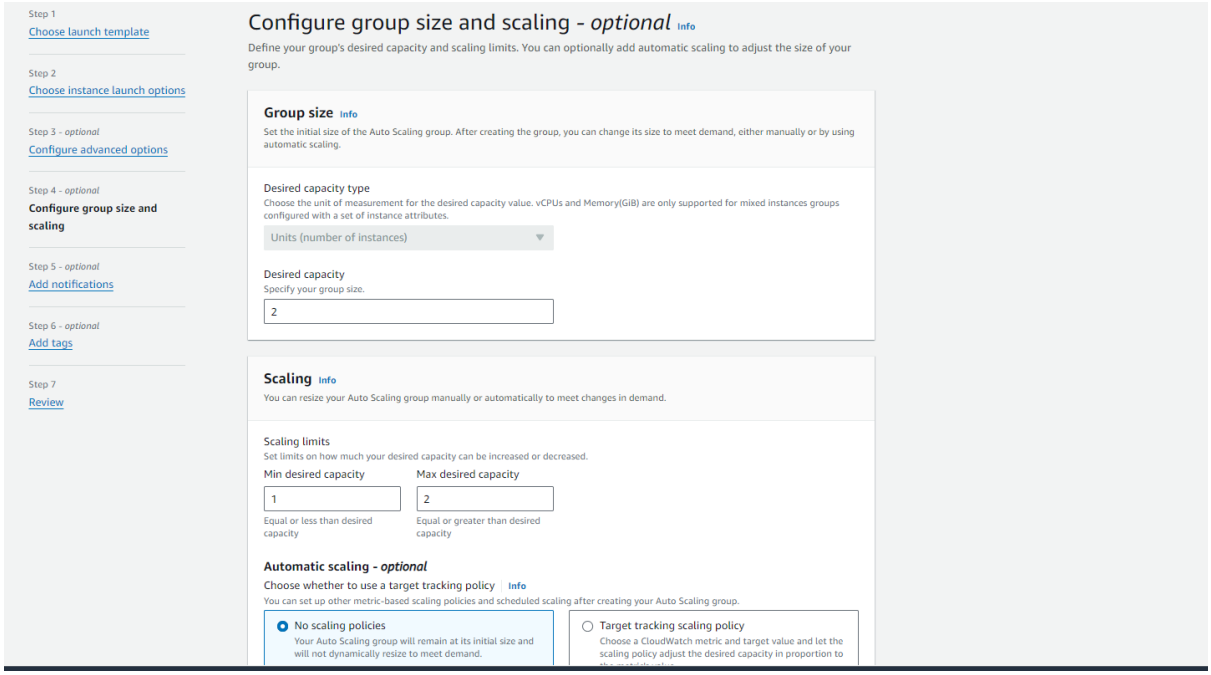


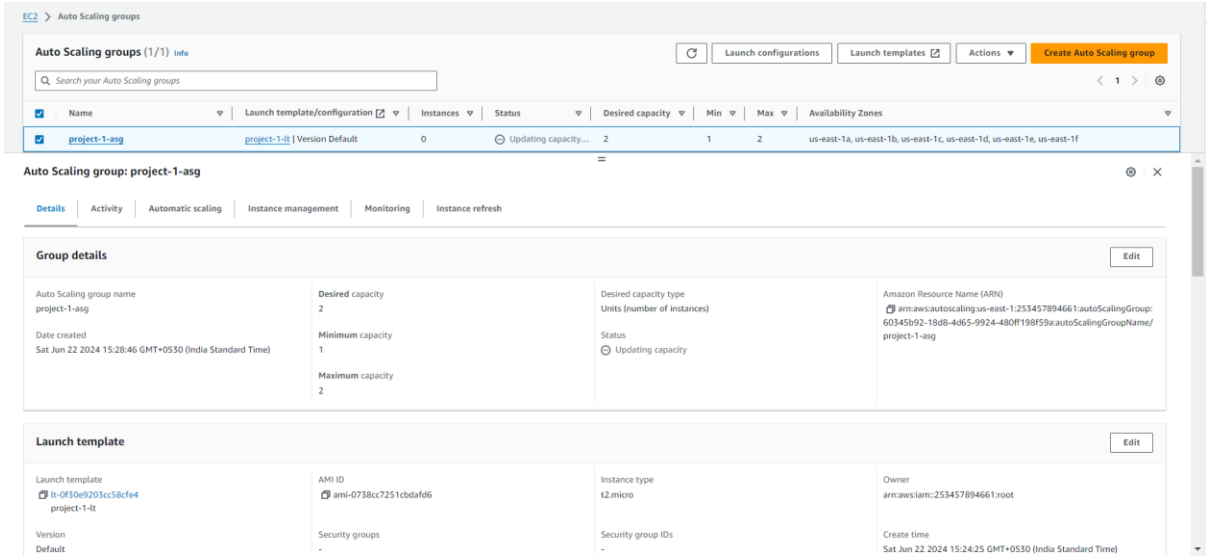


- Autoscaling configuration in ‘autoscaling group’


Step 1
Choose launch template
Step 2
Choose instance launch options
Step 3 - optional
Configure advanced options
Step 4 - optional
Configure group size and scaling
Step 5 - optional
Add notifications
Step 6 - optional
Add tags
Step 7
Review
Choose launch template Info
Specify a launch template that contains settings common to all EC2 instances that are launched by this Auto Scaling group.
Name
Auto Scaling group name
Enter a name to identify the group.
project-1-asg
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.
project-1-lt
Create a launch template
Version
Default (1)
Create a launch template version
Description
-
Launch template
project-1-lt
lt-0f30e9203cc58cfe4
Instance type
t2.micro
AMI ID
ami-0738cc7251cbdafd6
Security groups
-
Request Spot Instances
No
Key pair name
Security group IDs


Step 2
Choose instance launch options
Step 3 - optional
Configure advanced options
Step 4 - optional
Configure group size and scaling
Step 5 - optional
Add notifications
Step 6 - optional
Add tags
Step 7
Review
Instance type requirements Info
Override launch template
You can keep the same instance attributes or instance type from your launch template, or you can choose to override the launch template by specifying different instance attributes or manually adding instance types.
Launch template
project-1-lt
lt-0f30e9203cc58cfe4
Version
Default
Description
-
Instance type
t2.micro
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-04cad945293b4ed0b
172.31.0.0/16 Default
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-1a | subnet-023e5694417a4014b
172.31.80.0/20 Default
us-east-1b | subnet-04cbe6274fe2544ff
172.31.16.0/20 Default
us-east-1c | subnet-0bbe55cd99cd967e0
172.31.32.0/20 Default
us-east-1e | subnet-0f4e2eaf6121f0b1a
172.31.48.0/20 Default


Step 1
Choose launch template
Step 2
Choose instance launch options
Step 3 - optional
Configure advanced options
Step 4 - optional
Configure group size and scaling
Step 5 - optional
Add notifications
Step 6 - optional
Add tags
Step 7
Review
Configure group size and scaling - optional Info
Define your group's desired capacity and scaling limits. You can optionally add automatic scaling to adjust the size of your group.
Group size Info
Set the initial size of the Auto Scaling group. After creating the group, you can change its size to meet demand, either manually or by using automatic scaling.
Desired capacity type
Choose the unit of measurement for the desired capacity value. vCPUs and Memory(GiB) are only supported for mixed instances groups configured with a set of instance attributes.
Units (number of instances)
Desired capacity
Specify your group size.
2
Scaling Info
You can resize your Auto Scaling group manually or automatically to meet changes in demand.
Scaling limits
Set limits on how much your desired capacity can be increased or decreased.
Min desired capacity
1
Equal or less than desired capacity
Max desired capacity
2
Equal or greater than desired capacity
Automatic scaling - optional
Choose whether to use a target tracking policy Info
You can set up other metric-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


EC2 > Auto Scaling groups
Auto Scaling groups (1/1) Info
Launch configurations
Launch templates
Actions
Create Auto Scaling group
Search your Auto Scaling groups
Name
Launch template/configuration
Instances
Status
Desired capacity
Min
Max
Availability Zones
project-1-asg
project-1-lt | Version Default
0
Updating capacity...
2
1
2
us-east-1a, us-east-1b, us-east-1c, us-east-1d, us-east-1e, us-east-1f
Auto Scaling group: project-1-asg
Details
Activity
Automatic scaling
Instance management
Monitoring
Instance refresh
Group details
Edit
Auto Scaling group name
project-1-asg
Date created
Sat Jun 22 2024 15:28:46 GMT+0530 (India Standard Time)
Desired capacity
2
Minimum capacity
1
Maximum capacity
2
Desired capacity type
Units (number of instances)
Status
Updating capacity
Amazon Resource Name (ARN)
arn:aws:autoscaling:us-east-1:253457894661:autoScalingGroup:60345b92-18d8-4d65-9924-480ff198f59a:autoScalingGroupName/project-1-asg
Launch template
Edit
Launch template
lt-0f30e9203cc58cfe4
project-1-lt
AMI ID
ami-0738cc7251cbdafd6
Instance type
t2.micro
Owner
arn:aws:iam::253457894661:root
Version
Default
Security groups
-
Security group IDs
-
Create time
Sat Jun 22 2024 15:24:25 GMT+0530 (India Standard Time)