Lesson 06 Lesson-End Project
Deploying MySQL RDS Using AWS

Project agenda: To create and configure an RDS instance for deploying a MySQL database on AWS and ensuring secure access through EC2 and SSH

Description: You must create an RDS database and deploy a Linux instance by creating it in EC2 and connecting an SSH client through EC2.

Tools required: AWS Management Console

Prerequisites: AWS account with CloudShell installed

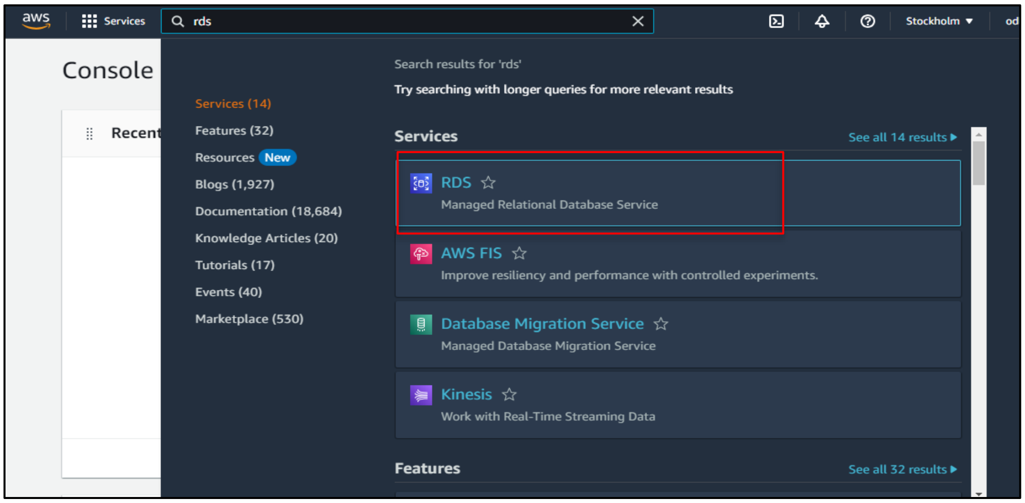
Expected deliverables: RDS database with SSH client

Steps to be followed:

1. Create an RDS database
2. Launch an EC2 instance
3. Create security groups
4. Connect the terminal to SSH

Step 1: Create an RDS instance

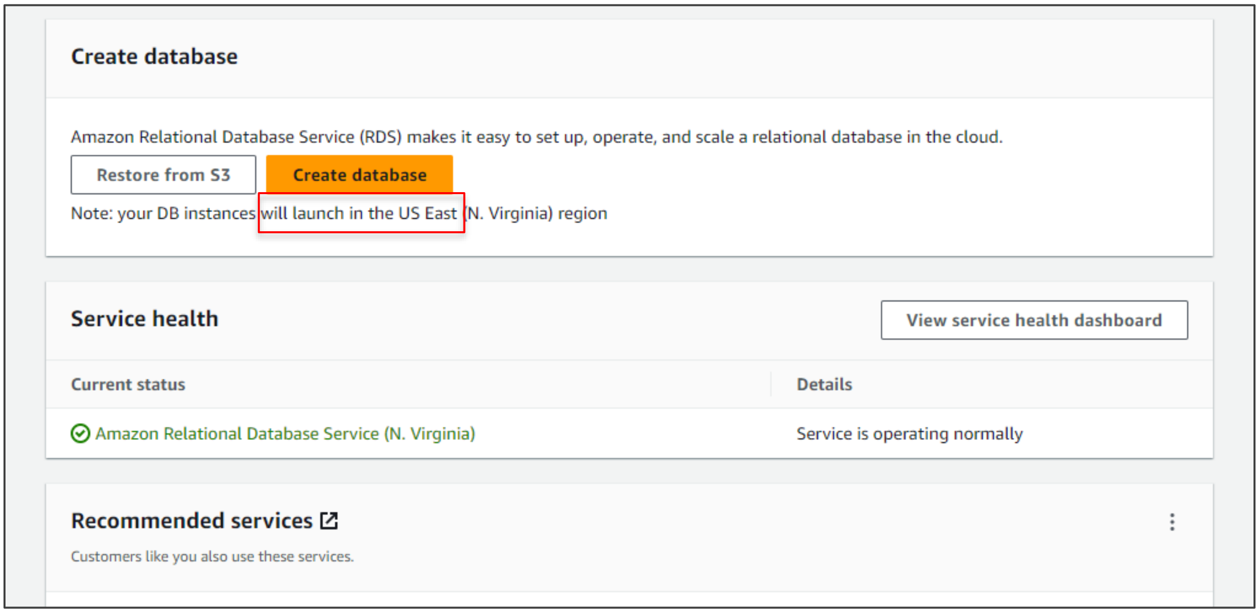
1.1 In the AWS Management Console, search for and select **RDS**



Search results for 'rds'

Try searching with longer queries for more relevant results

1.2 Scroll down and click on **Create database**



Create database

Amazon Relational Database Service (RDS) makes it easy to set up, operate, and scale a relational database in the cloud.

Note: your DB instances will launch in the US East (N. Virginia) region

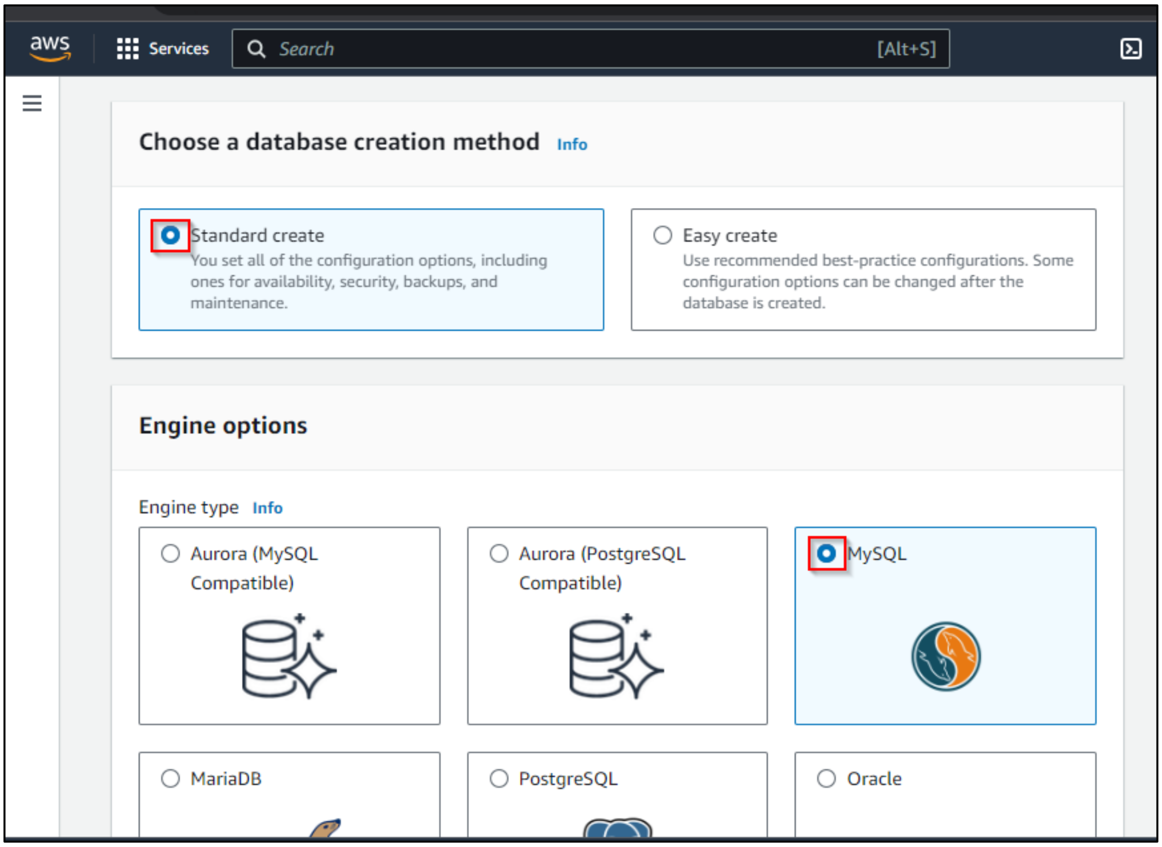
Service health

Current status	Details
✓ Amazon Relational Database Service (N. Virginia)	Service is operating normally

Recommended services

Customers like you also use these services.

1.3 Choose **Standard create** and select **MySQL**



Choose a database creation method Info

● Standard create
You set all of the configuration options, including ones for availability, security, backups, and maintenance.

○ Easy create
Use recommended best-practice configurations. Some configuration options can be changed after the database is created.

Engine options

Engine type Info

○ Aurora (MySQL Compatible)

○ Aurora (PostgreSQL Compatible)

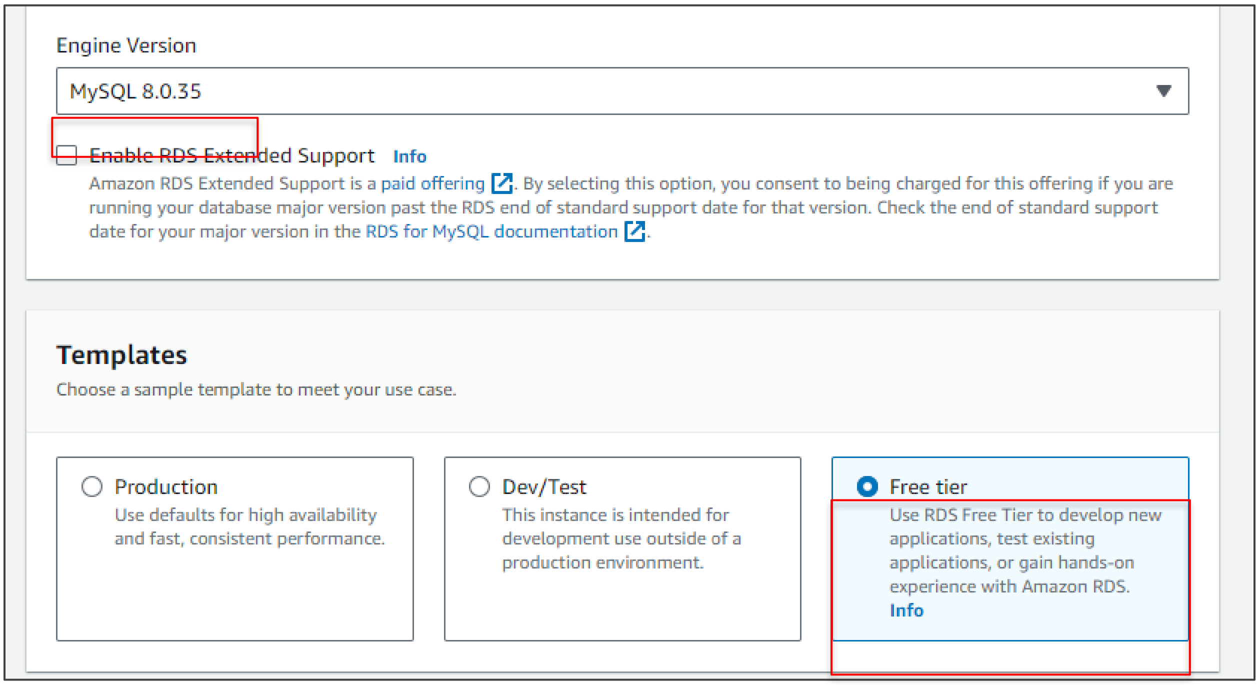
● MySQL

○ MariaDB

○ PostgreSQL

○ Oracle

1.4 Select the **MySQL 8.0.35** option and choose the **Free tier** box



Engine Version

MySQL 8.0.35 ▼

□ Enable RDS Extended Support Info

Amazon RDS Extended Support is a paid offering. By selecting this option, you consent to being charged for this offering if you are running your database major version past the RDS end of standard support date for that version. Check the end of standard support date for your major version in the RDS for MySQL documentation.

Templates

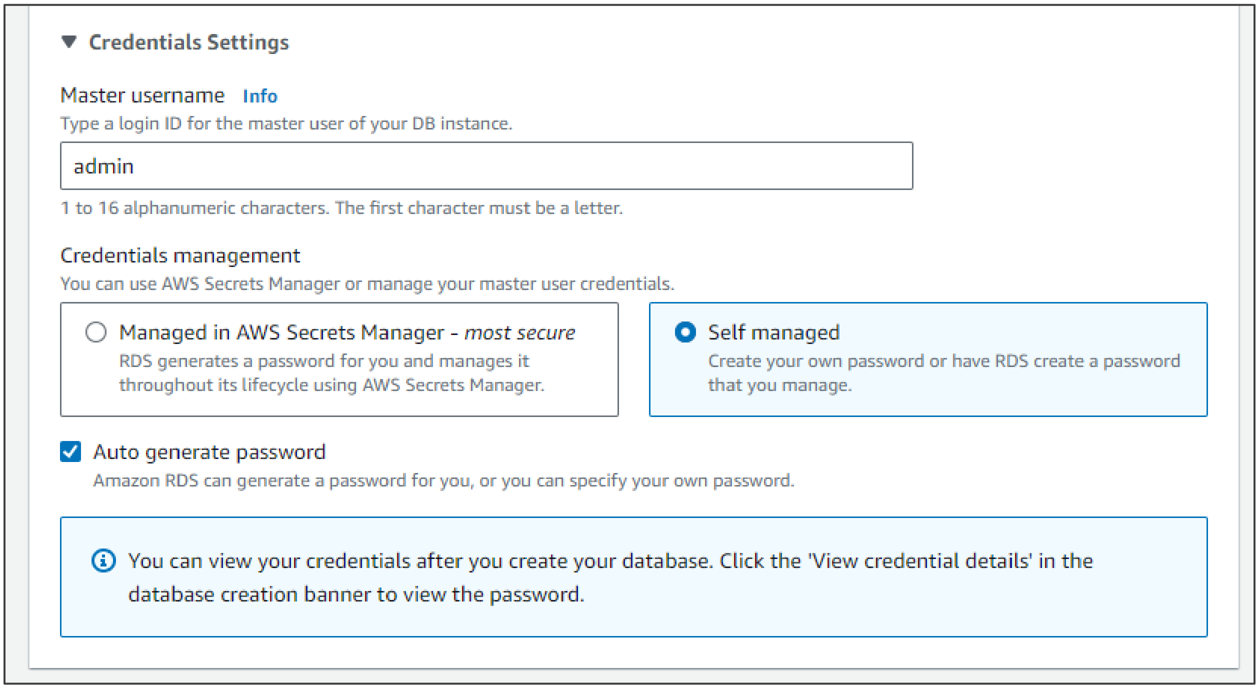
Choose a sample template to meet your use case.

○ Production
Use defaults for high availability and fast, consistent performance.

○ Dev/Test
This instance is intended for development use outside of a production environment.

● Free tier
Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS. Info

1.5 Scroll down to **Credentials management**, click on **Self managed**, and select **Auto generate password**



▼ Credentials Settings

Master username Info

Type a login ID for the master user of your DB instance.

admin

1 to 16 alphanumeric characters. The first character must be a letter.

Credentials management

You can use AWS Secrets Manager or manage your master user credentials.

○ Managed in AWS Secrets Manager - *most secure*
RDS generates a password for you and manages it throughout its lifecycle using AWS Secrets Manager.

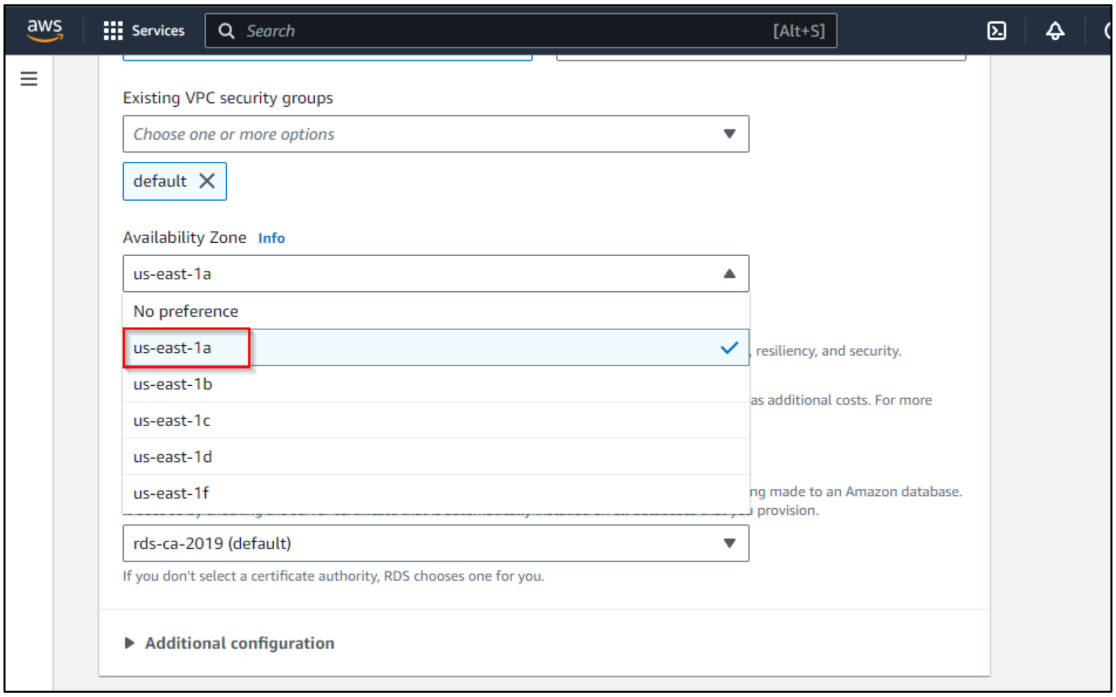
● Self managed
Create your own password or have RDS create a password that you manage.

☑ Auto generate password

Amazon RDS can generate a password for you, or you can specify your own password.

ⓘ You can view your credentials after you create your database. Click the 'View credential details' in the database creation banner to view the password.

1.6 Select **us-east-1a** as the **Availability Zone**



Existing VPC security groups

Choose one or more options

default ✕

Availability Zone

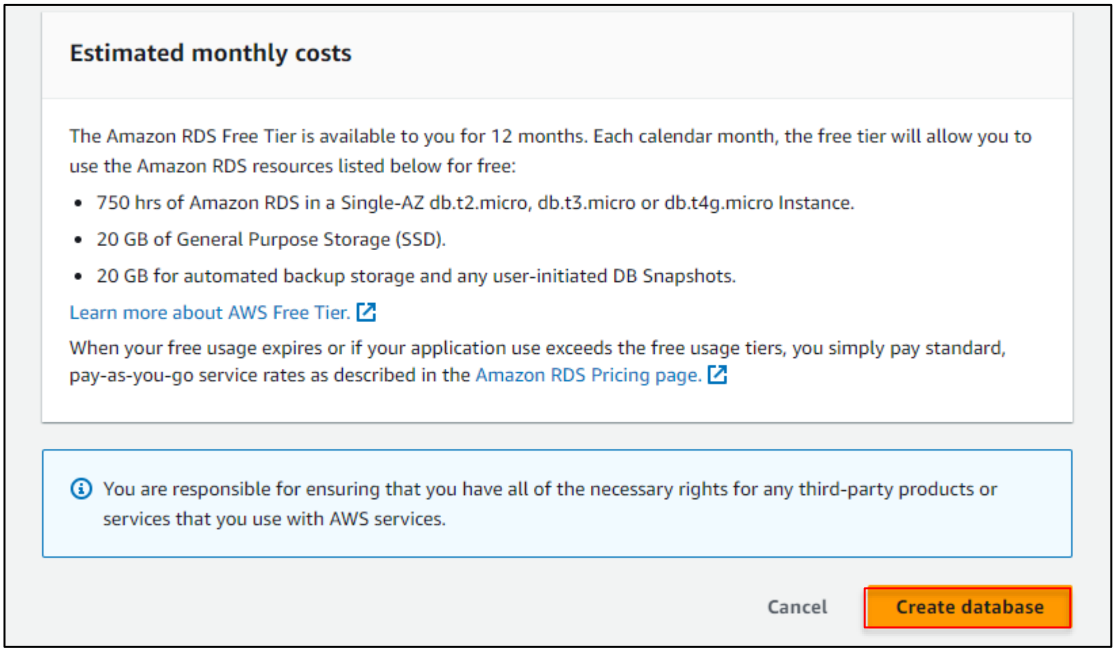
us-east-1a

us-east-1a ✓

rds-ca-2019 (default)

If you don't select a certificate authority, RDS chooses one for you.

1.7 Click on **Create database**



Estimated monthly costs

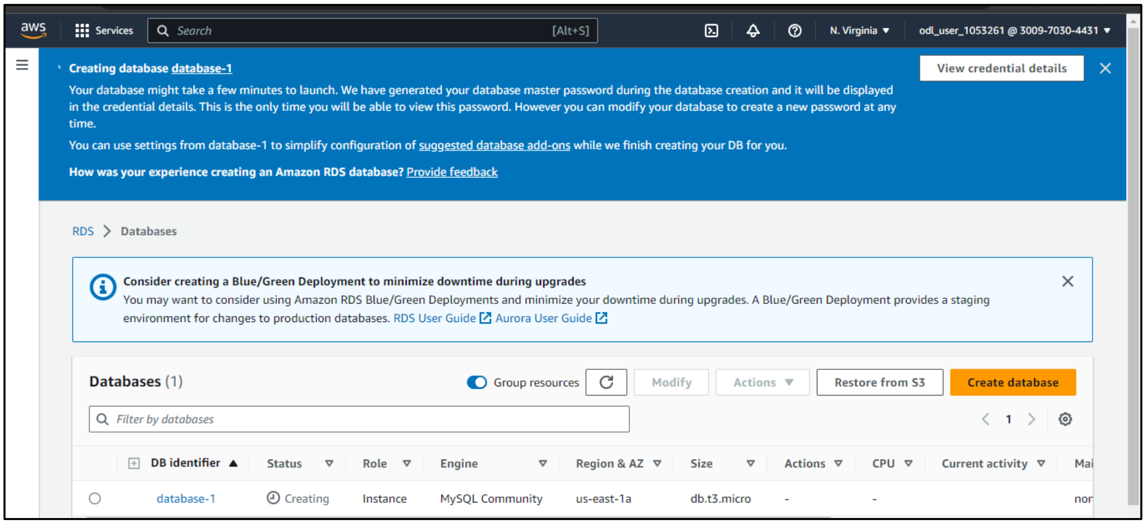
The Amazon RDS Free Tier is available to you for 12 months. Each calendar month, the free tier will allow you to use the Amazon RDS resources listed below for free:

- 750 hrs of Amazon RDS in a Single-AZ db.t2.micro, db.t3.micro or db.t4g.micro Instance.
- 20 GB of General Purpose Storage (SSD).
- 20 GB for automated backup storage and any user-initiated DB Snapshots.

Learn more about AWS Free Tier.

When your free usage expires or if your application use exceeds the free usage tiers, you simply pay standard, pay-as-you-go service rates as described in the Amazon RDS Pricing page.

You are responsible for ensuring that you have all of the necessary rights for any third-party products or services that you use with AWS services.



Creating database database-1

Your database might take a few minutes to launch. We have generated your database master password during the database creation and it will be displayed in the credential details. This is the only time you will be able to view this password. However you can modify your database to create a new password at any time.

You can use settings from database-1 to simplify configuration of suggested database add-ons while we finish creating your DB for you.

How was your experience creating an Amazon RDS database? Provide feedback

RDS > Databases

Consider creating a Blue/Green Deployment to minimize downtime during upgrades

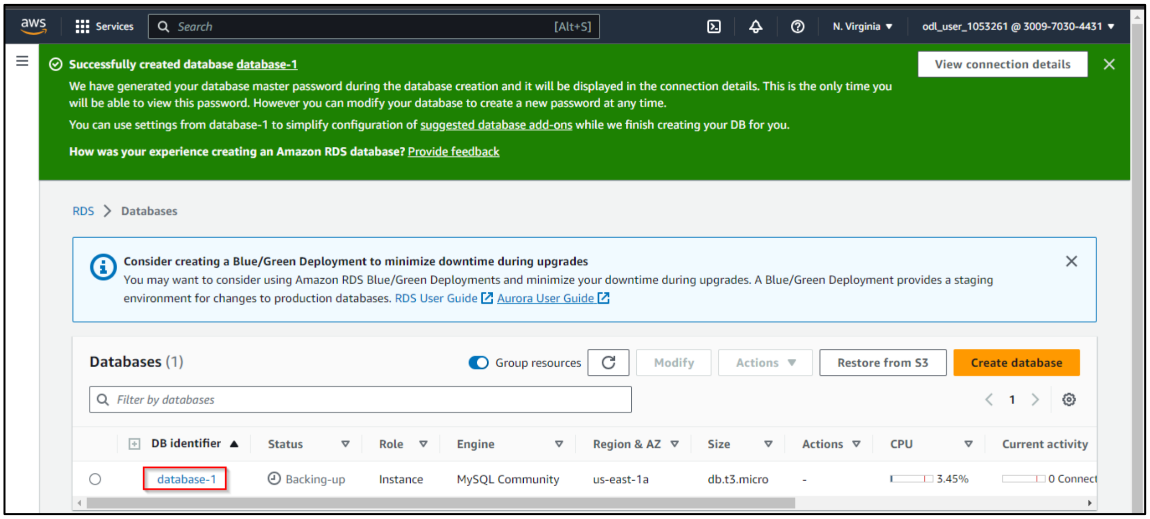
You may want to consider using Amazon RDS Blue/Green Deployments and minimize your downtime during upgrades. A Blue/Green Deployment provides a staging environment for changes to production databases. RDS User Guide Aurora User Guide

Databases (1)

	DB identifier ▲	Status	Role	Engine	Region & AZ	Size	Actions	CPU	Current activity	Mai
○	database-1	Creating	Instance	MySQL Community	us-east-1a	db.t3.micro	-	-		nor

You must wait a few minutes to complete the database.

1.8 Once the database is successfully created, access the database details by clicking on it



Successfully created database database-1

We have generated your database master password during the database creation and it will be displayed in the connection details. This is the only time you will be able to view this password. However you can modify your database to create a new password at any time.

You can use settings from database-1 to simplify configuration of suggested database add-ons while we finish creating your DB for you.

How was your experience creating an Amazon RDS database? Provide feedback

RDS > Databases

Consider creating a Blue/Green Deployment to minimize downtime during upgrades

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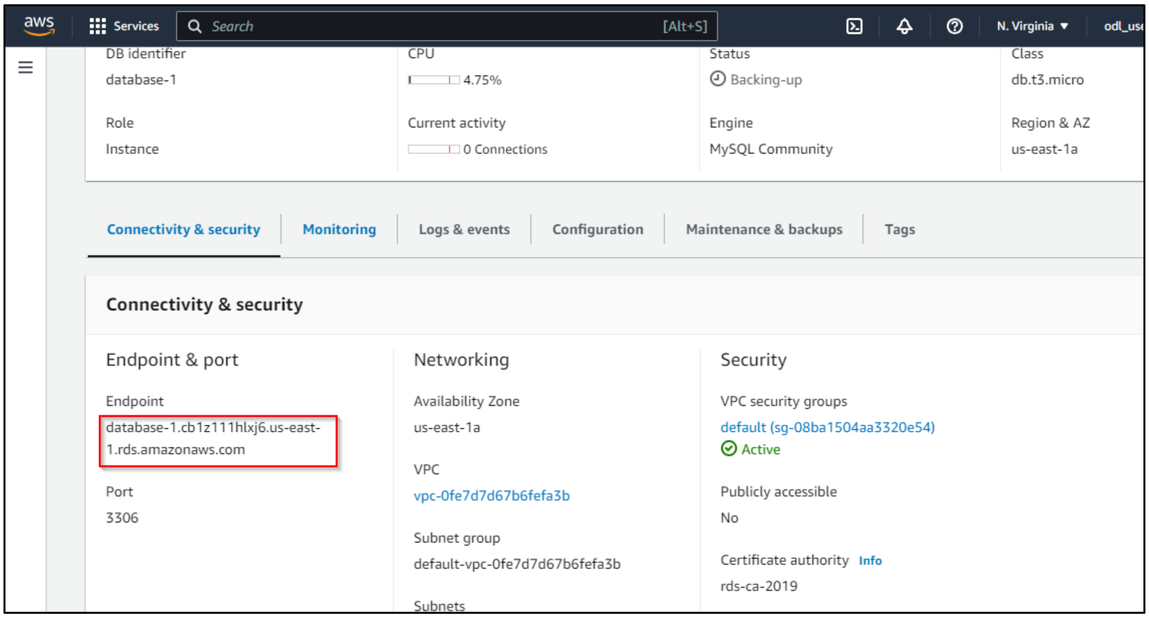
Databases (1)

	DB identifier ▲	Status	Role	Engine	Region & AZ	Size	Actions	CPU	Current activity
○	database-1	Backing-up	Instance	MySQL Community	us-east-1a	db.t3.micro	-	3.45%	0 Connect

1.9 After the creation of the database, take note of the **Endpoint**



DB identifier
database-1

CPU
4.75%

Status
Backing-up

Class
db.t3.micro

Role
Instance

Current activity
0 Connections

Engine
MySQL Community

Region & AZ
us-east-1a

Connectivity & security

Endpoint & port

Endpoint
database-1.cb1z111hlxj6.us-east-1.rds.amazonaws.com

Port
3306

Networking

Availability Zone
us-east-1a

VPC
vpc-0fe7d7d67b6fefa3b

Subnet group
default-vpc-0fe7d7d67b6fefa3b

Subnets

Security

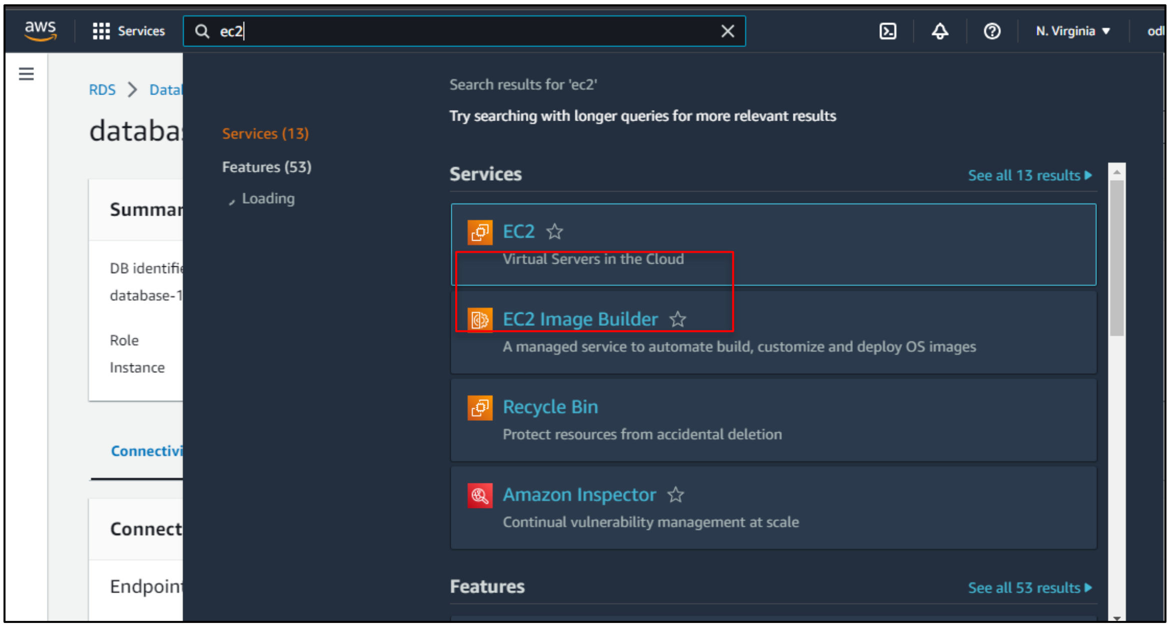
VPC security groups
default (sg-08ba1504aa3320e54)
Active

Publicly accessible
No

Certificate authority Info
rds-ca-2019

Step 2: Launch an EC2 instance

2.1 Navigate to the AWS Management Console, click on **EC2**



Search results for 'ec2'

Try searching with longer queries for more relevant results

Services
See all 13 results ▸

EC2 ☆
Virtual Servers in the Cloud

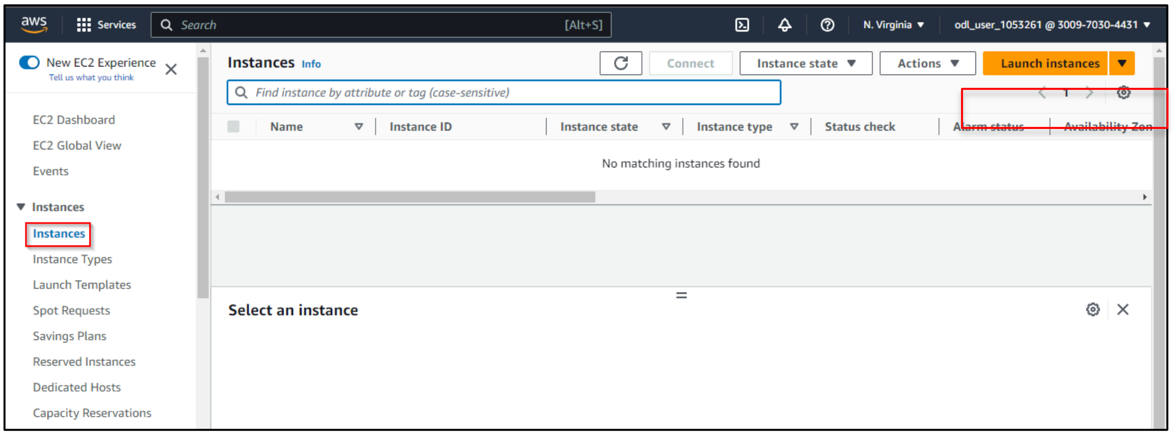
EC2 Image Builder ☆
A managed service to automate build, customize and deploy OS images

Recycle Bin
Protect resources from accidental deletion

Amazon Inspector ☆
Continual vulnerability management at scale

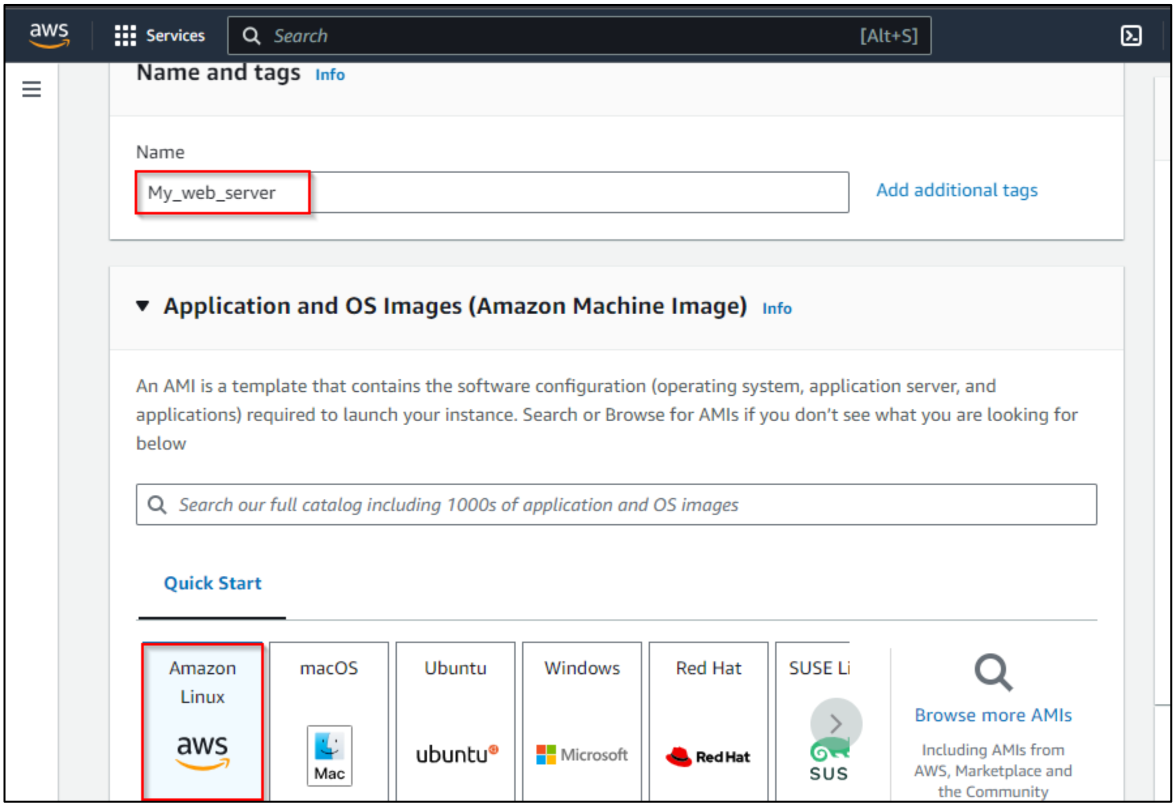
Features
See all 53 results ▸

2.2 Click on **Instances** and select **Launch instances**



No matching instances found

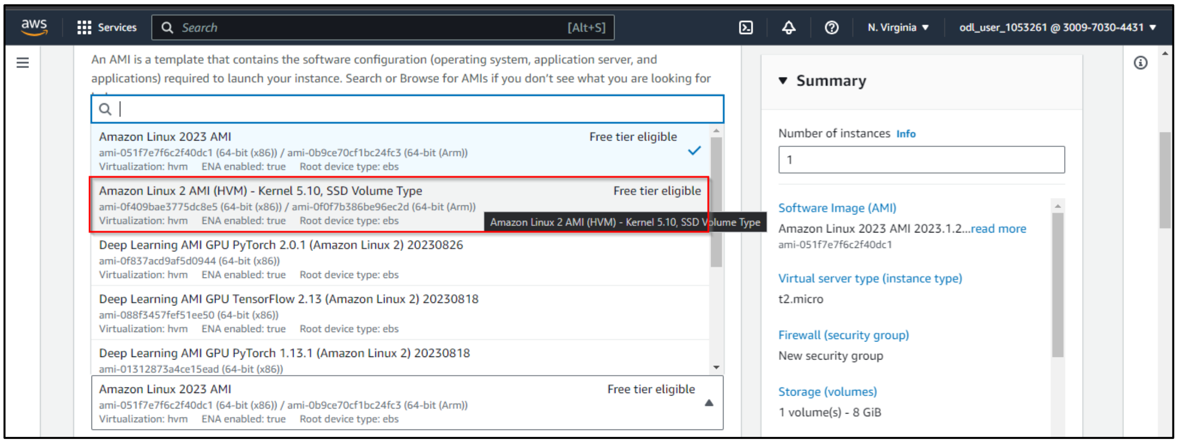
2.3 Provide an instance name and choose the **Amazon Linux** option


aws
Services
Search
[Alt+S]
Name and tags
Info
Name
Add additional tags
Application and OS Images (Amazon Machine Image)
Info
Search our full catalog including 1000s of application and OS images
Quick Start
Amazon Linux
aws
macOS
Mac
Ubuntu
ubuntu
Windows
Microsoft
Red Hat
Red Hat
SUSE Li
SUS
Browse more AMIs
Including AMIs from AWS, Marketplace and the Community

Name: My_web_server

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

2.4 Select the **Amazon Machine Image (AMI)** with kernel version 5.10



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

Amazon Linux 2023 AMI — Free tier eligible ✓
ami-051f7e7f6c2f40dc1 (64-bit (x86)) / ami-0b9ce70cf1bc24fc3 (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type — Free tier eligible
ami-0f409bae3775dc8e5 (64-bit (x86)) / ami-0f0f7b386be96ec2d (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type

Deep Learning AMI GPU PyTorch 2.0.1 (Amazon Linux 2) 20230826
ami-0f837acd9af5d0944 (64-bit (x86))
Virtualization: hvm ENA enabled: true Root device type: ebs

Deep Learning AMI GPU TensorFlow 2.13 (Amazon Linux 2) 20230818
ami-088f3457fef51ee50 (64-bit (x86))
Virtualization: hvm ENA enabled: true Root device type: ebs

Deep Learning AMI GPU PyTorch 1.13.1 (Amazon Linux 2) 20230818
ami-01312873a4ce15ead (64-bit (x86))

Amazon Linux 2023 AMI — Free tier eligible
ami-051f7e7f6c2f40dc1 (64-bit (x86)) / ami-0b9ce70cf1bc24fc3 (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

▼ Summary

Number of instances Info
1

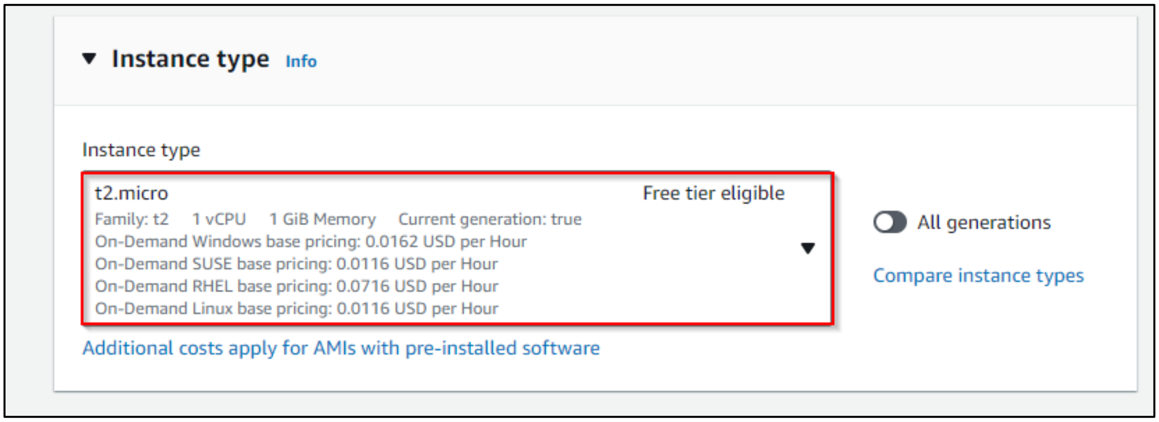
Software Image (AMI)
Amazon Linux 2023 AMI 2023.1.2...read more
ami-051f7e7f6c2f40dc1

Virtual server type (instance type)
t2.micro

Firewall (security group)
New security group

Storage (volumes)
1 volume(s) - 8 GiB

2.5 Choose the **t2.micro** instance type



▼ Instance type Info

Instance type

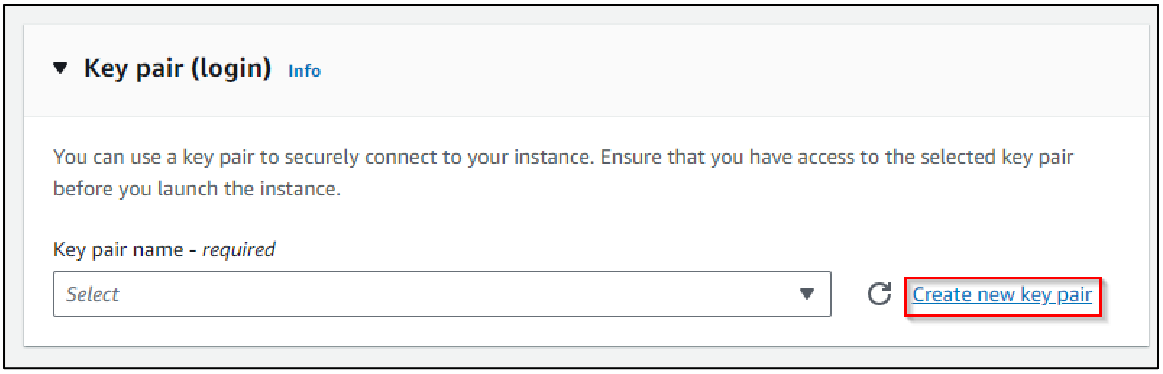
t2.micro — Free tier eligible
Family: t2 1 vCPU 1 GiB Memory Current generation: true
On-Demand Windows base pricing: 0.0162 USD per Hour
On-Demand SUSE base pricing: 0.0116 USD per Hour
On-Demand RHEL base pricing: 0.0716 USD per Hour
On-Demand Linux base pricing: 0.0116 USD per Hour

All generations

Compare instance types

Additional costs apply for AMIs with pre-installed software

2.6 Click on **Create new key pair**



▼ Key pair (login) Info

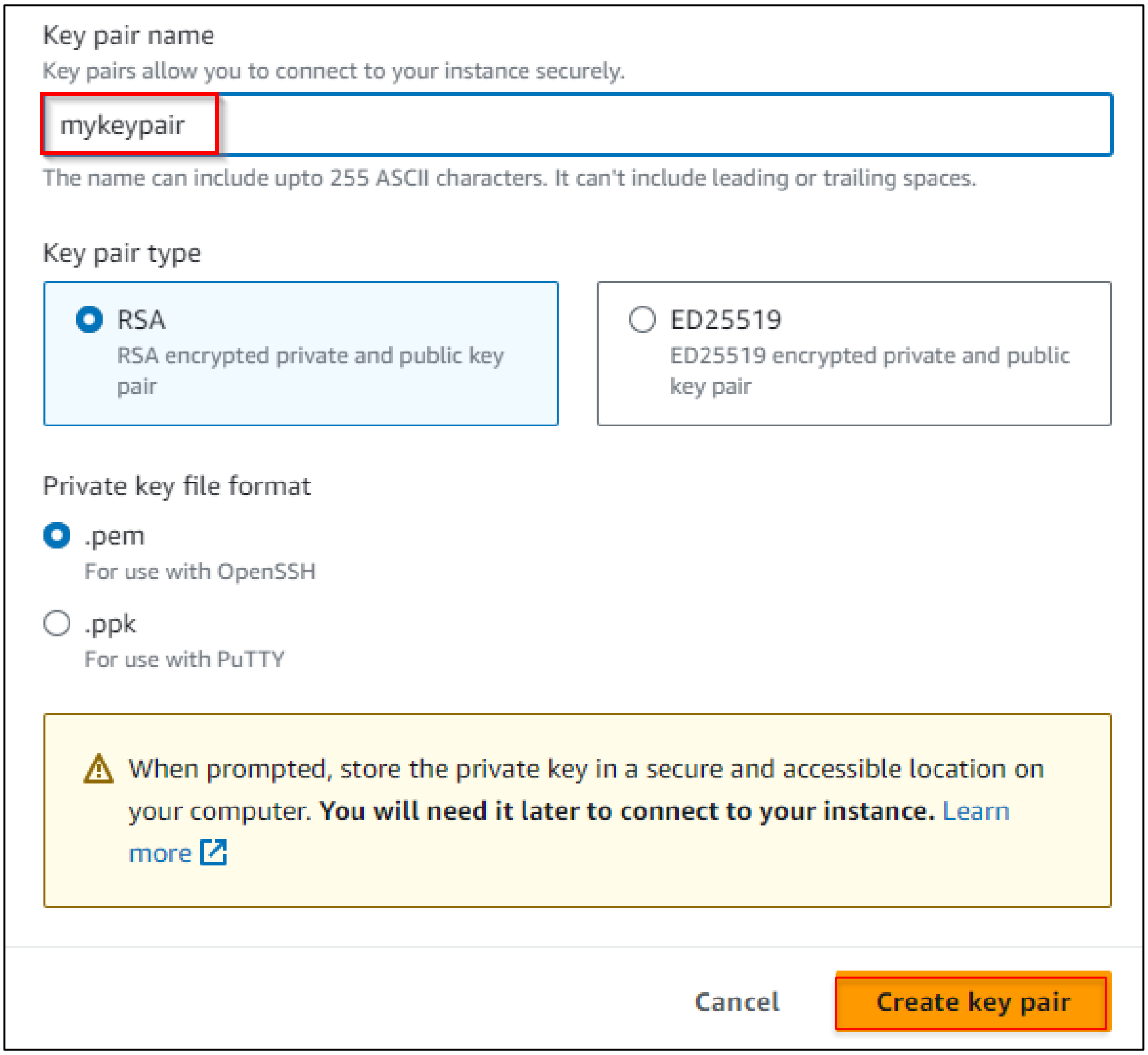
You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

Key pair name - *required*

Select ▼

Create new key pair

2.7 Enter the **Key pair name** as **mykeypair** and click on **Create key pair**



Key pair name

Key pairs allow you to connect to your instance securely.

mykeypair

The name can include upto 255 ASCII characters. It can't include leading or trailing spaces.

Key pair type

● RSA
RSA encrypted private and public key pair

○ ED25519
ED25519 encrypted private and public key pair

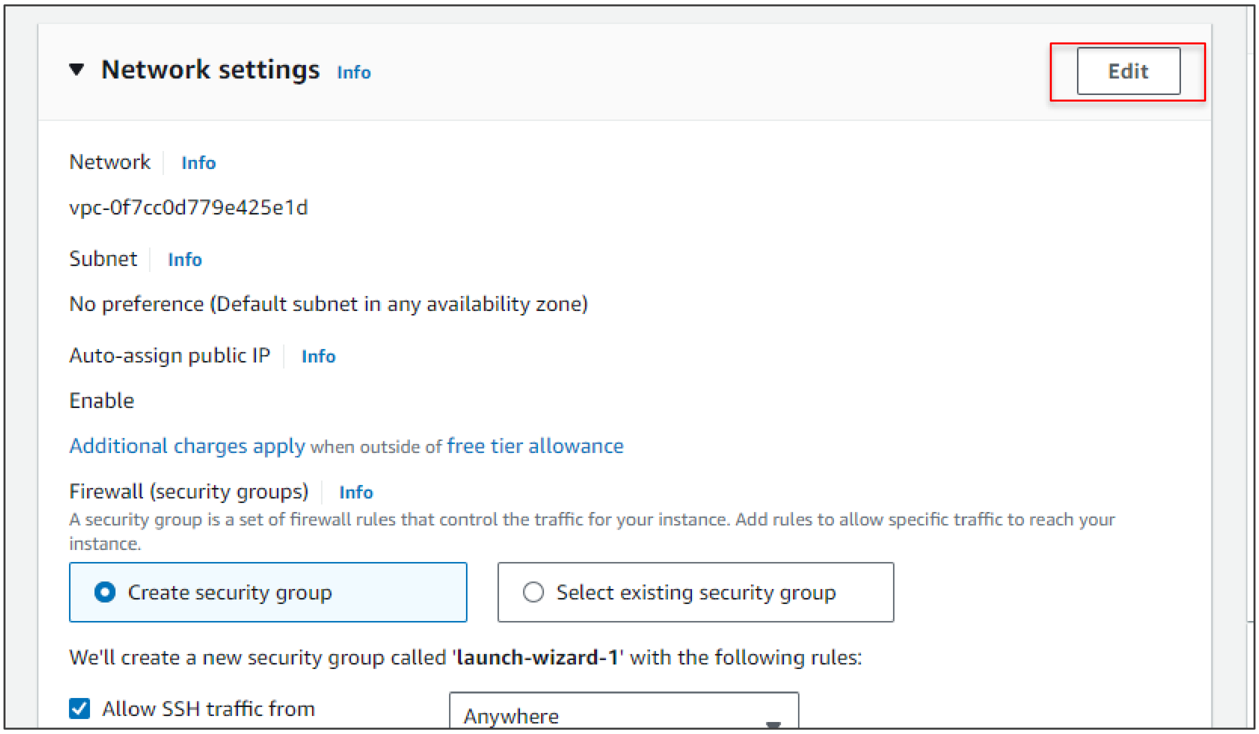
Private key file format

● .pem
For use with OpenSSH

○ .ppk
For use with PuTTY

When prompted, store the private key in a secure and accessible location on your computer. **You will need it later to connect to your instance.** Learn more

2.8 Scroll down to **Network settings**, click on **Edit**, and then select **us-east-1a** as the Subnet



▼ Network settings Info

Edit

Network Info

vpc-0f7cc0d779e425e1d

Subnet Info

No preference (Default subnet in any availability zone)

Auto-assign public IP Info

Enable

Additional charges apply when outside of free tier allowance

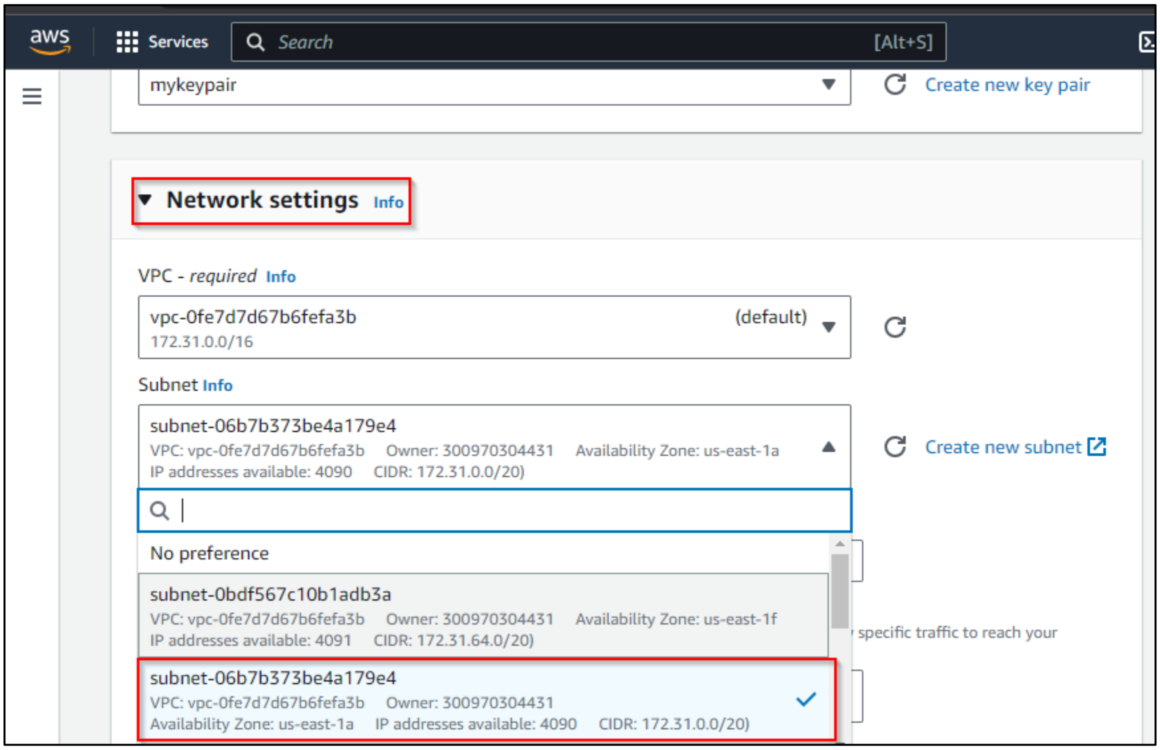
Firewall (security groups) Info

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

We'll create a new security group called '**launch-wizard-1**' with the following rules:

☑ Allow SSH traffic from Anywhere



mykeypair

Create new key pair

▼ Network settings Info

VPC - *required* Info

vpc-0fe7d7d67b6fefa3b (default)
172.31.0.0/16

Subnet Info

subnet-06b7b373be4a179e4
VPC: vpc-0fe7d7d67b6fefa3b Owner: 300970304431 Availability Zone: us-east-1a
IP addresses available: 4090 CIDR: 172.31.0.0/20)

Create new subnet

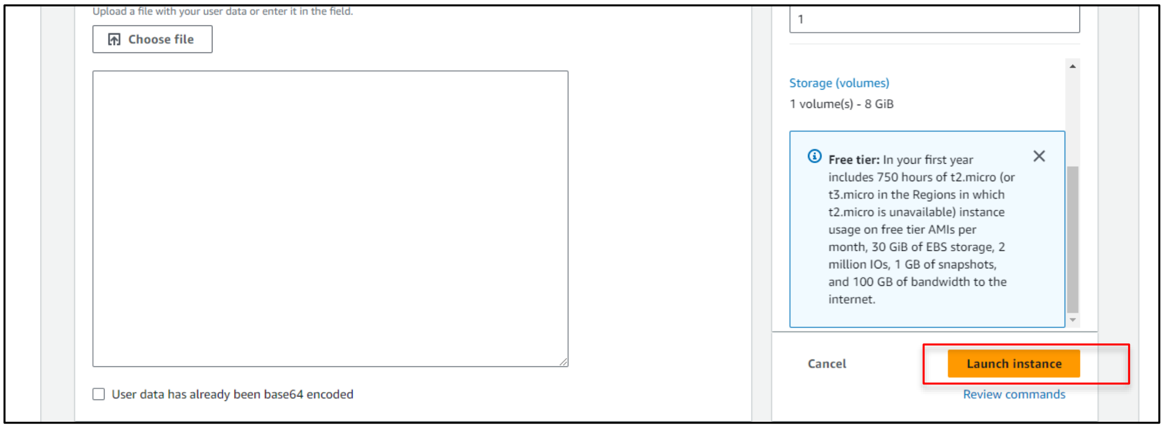
No preference

subnet-0bdf567c10b1adb3a
VPC: vpc-0fe7d7d67b6fefa3b Owner: 300970304431 Availability Zone: us-east-1f
IP addresses available: 4091 CIDR: 172.31.64.0/20)

subnet-06b7b373be4a179e4 ✓
VPC: vpc-0fe7d7d67b6fefa3b Owner: 300970304431
Availability Zone: us-east-1a IP addresses available: 4090 CIDR: 172.31.0.0/20)

specific traffic to reach your

2.9 Click on **Launch instance**

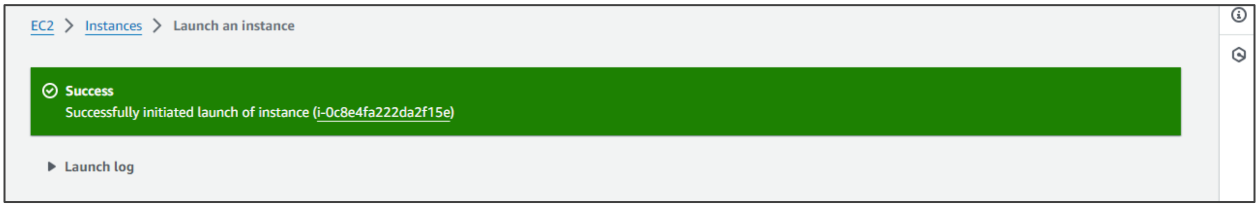


Upload a file with your user data or enter it in the field.

□ User data has already been base64 encoded

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, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.



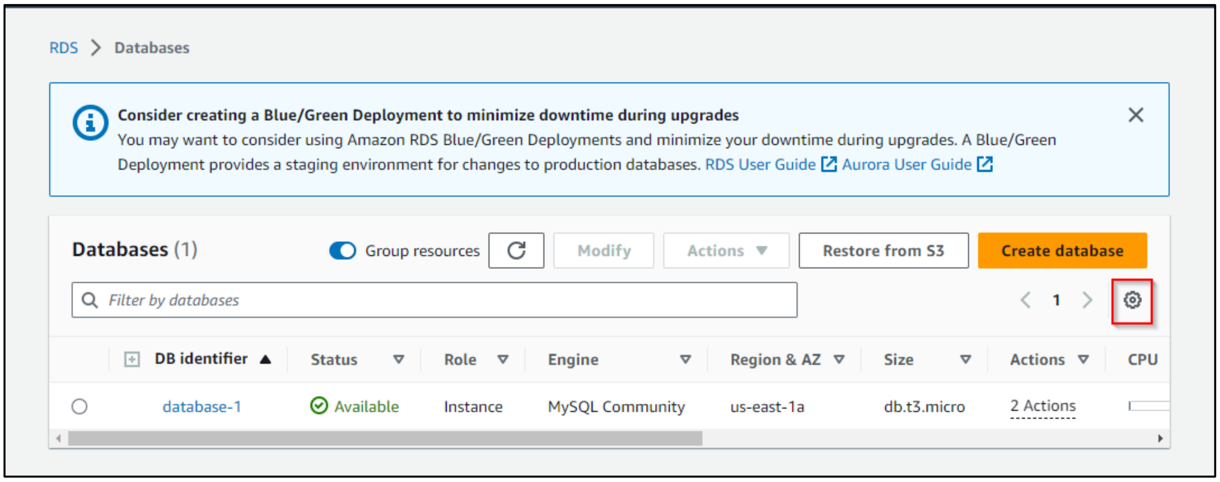
EC2 > Instances > Launch an instance

Success
Successfully initiated launch of instance (i-0c8e4fa222da2f15e)

The instance is successfully launched.

Step 3: Create security groups

3.1 Navigate to **RDS Databases** and access the settings **icon**



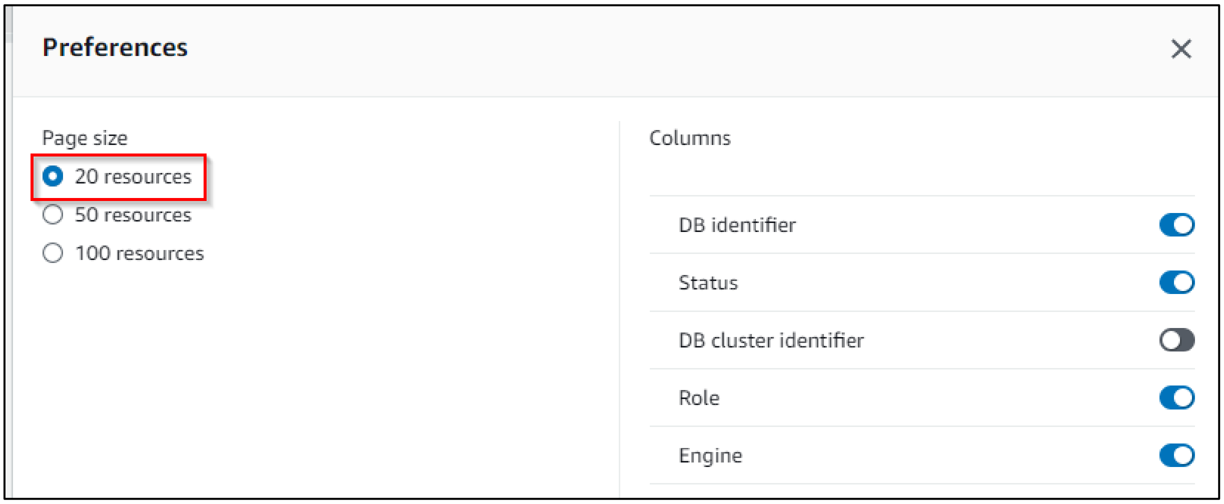
RDS > Databases

Consider creating a Blue/Green Deployment to minimize downtime during upgrades
You may want to consider using Amazon RDS Blue/Green Deployments and minimize your downtime during upgrades. A Blue/Green Deployment provides a staging environment for changes to production databases. RDS User Guide Aurora User Guide

Databases (1)

	DB identifier ▲	Status	Role	Engine	Region & AZ	Size	Actions	CPU
○	database-1	✓ Available	Instance	MySQL Community	us-east-1a	db.t3.micro	2 Actions	

3.2 Change the resources per page to **20**



Preferences

Page size

● 20 resources

○ 50 resources

○ 100 resources

Columns

DB identifier ●

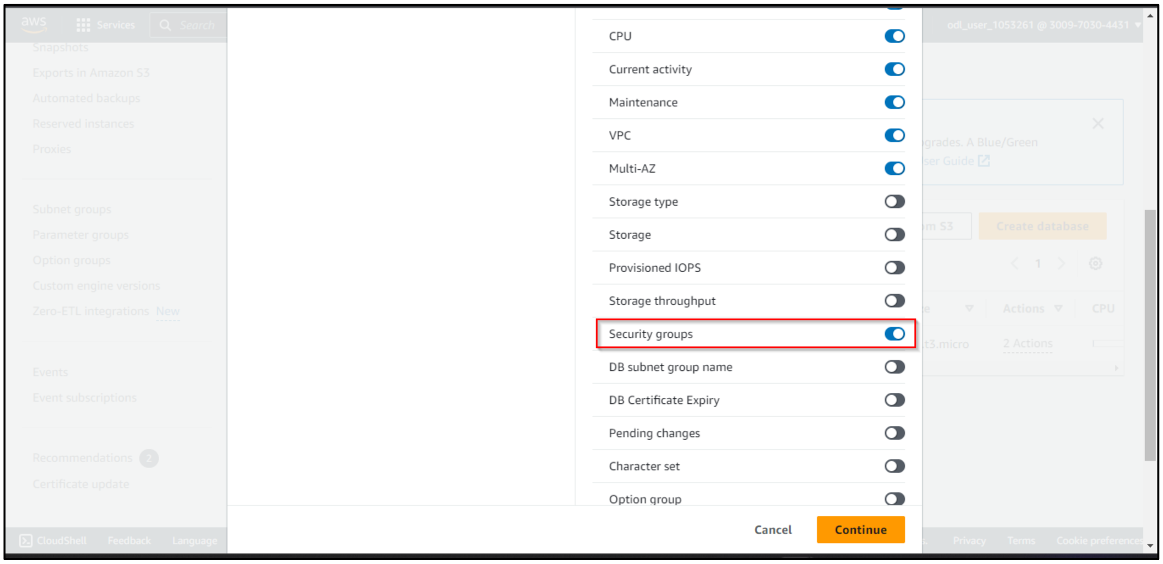
Status ●

DB cluster identifier ○

Role ●

Engine ●

3.3 Enable **Security groups** and click on **Continue**



CPU ●

Current activity ●

Maintenance ●

VPC ●

Multi-AZ ●

Storage type ○

Storage ○

Provisioned IOPS ○

Storage throughput ○

Security groups ●

DB subnet group name ○

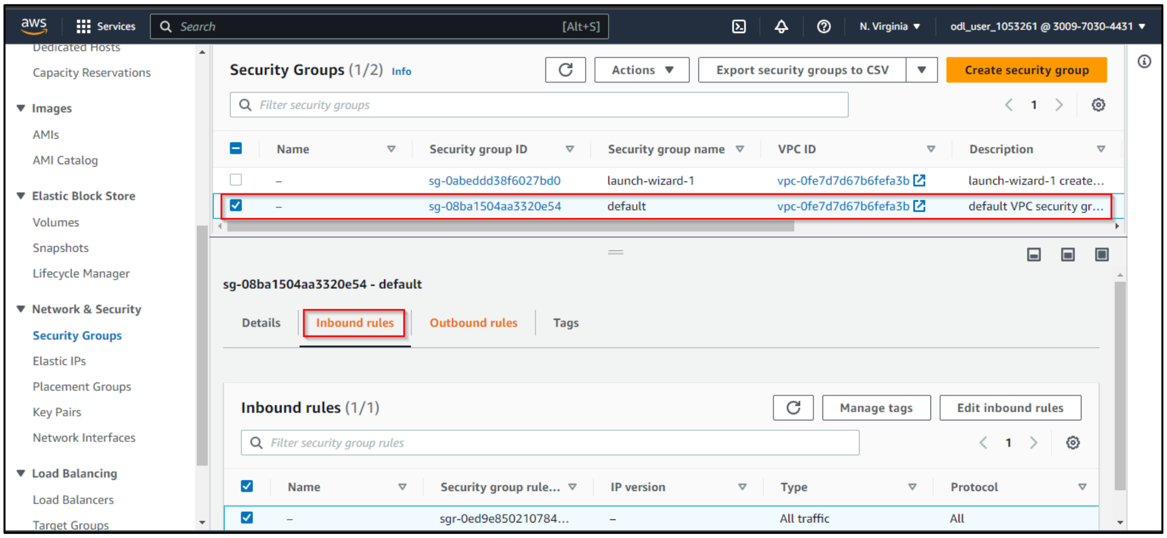
DB Certificate Expiry ○

Pending changes ○

Character set ○

Option group ○

3.4 Navigate to EC2 dashboard, Click on the default security group and navigate to **Inbound rules**



Security Groups (1/2) Info

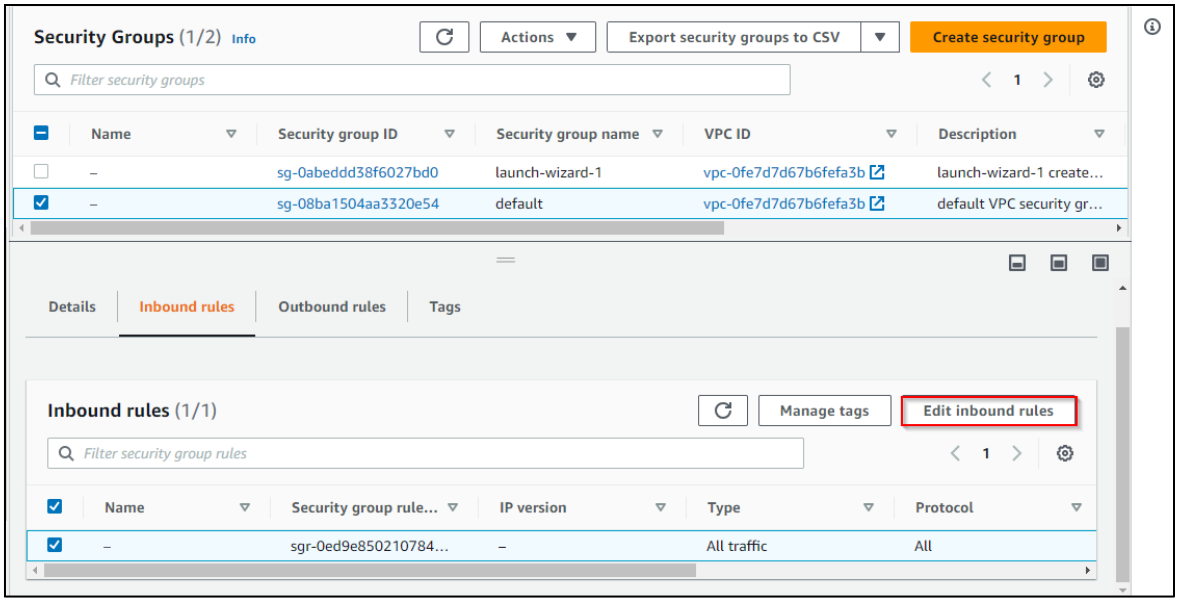
	Name	Security group ID	Security group name	VPC ID	Description
□	–	sg-0abeddd38f6027bd0	launch-wizard-1	vpc-0fe7d7d67b6fefa3b	launch-wizard-1 create…
☑	–	sg-08ba1504aa3320e54	default	vpc-0fe7d7d67b6fefa3b	default VPC security gr…

sg-08ba1504aa3320e54 - default

Inbound rules (1/1)

	Name	Security group rule…	IP version	Type	Protocol
☑	–	sgr-0ed9e850210784…	–	All traffic	All

3.5 Click on **Edit inbound rules**



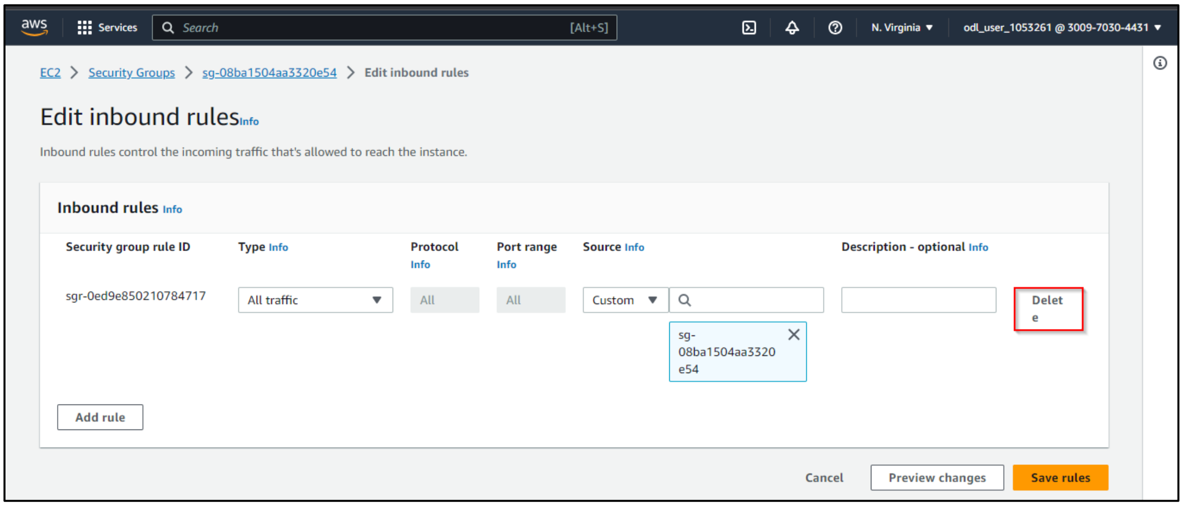
Security Groups (1/2) Info

	Name	Security group ID	Security group name	VPC ID	Description
□	–	sg-0abeddd38f6027bd0	launch-wizard-1	vpc-0fe7d7d67b6fefa3b	launch-wizard-1 create…
☑	–	sg-08ba1504aa3320e54	default	vpc-0fe7d7d67b6fefa3b	default VPC security gr…

Inbound rules (1/1)

	Name	Security group rule…	IP version	Type	Protocol
☑	–	sgr-0ed9e850210784…	–	All traffic	All

3.6 **Delete** the default inbound rules and save the changes



EC2 > Security Groups > sg-08ba1504aa3320e54 > Edit inbound rules

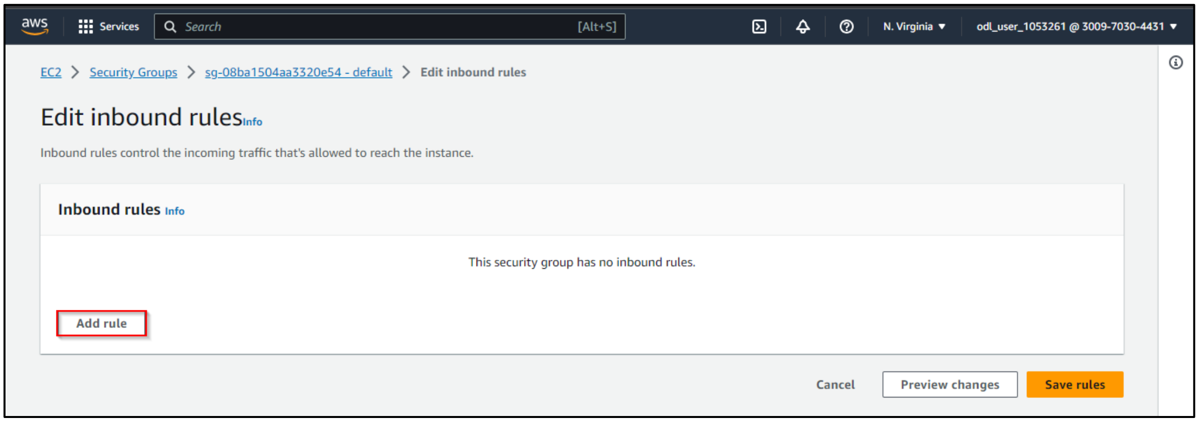
Edit inbound rules Info

Inbound rules control the incoming traffic that's allowed to reach the instance.

Inbound rules Info

Security group rule ID	Type Info	Protocol Info	Port range Info	Source Info	Description - optional Info	
sgr-0ed9e850210784717	All traffic	All	All	Custom sg-08ba1504aa3320e54		Delete

3.7 Now, click on **Add rule**



EC2 > Security Groups > sg-08ba1504aa3320e54 - default > Edit inbound rules

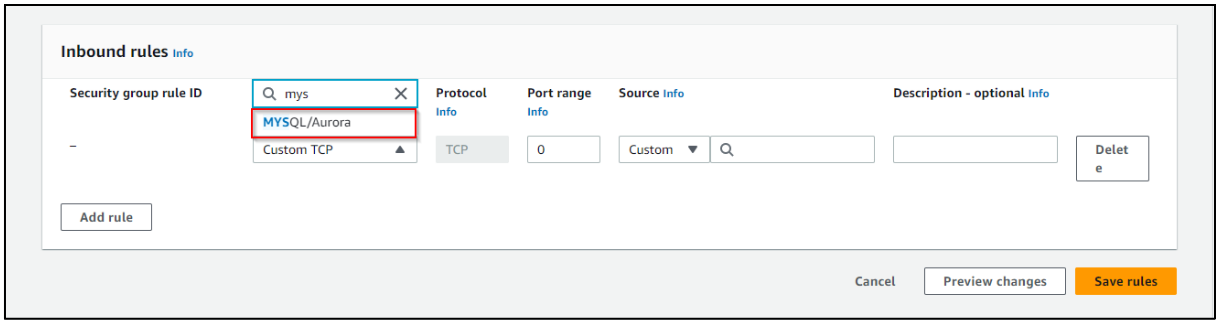
Edit inbound rules Info

Inbound rules control the incoming traffic that's allowed to reach the instance.

Inbound rules Info

This security group has no inbound rules.

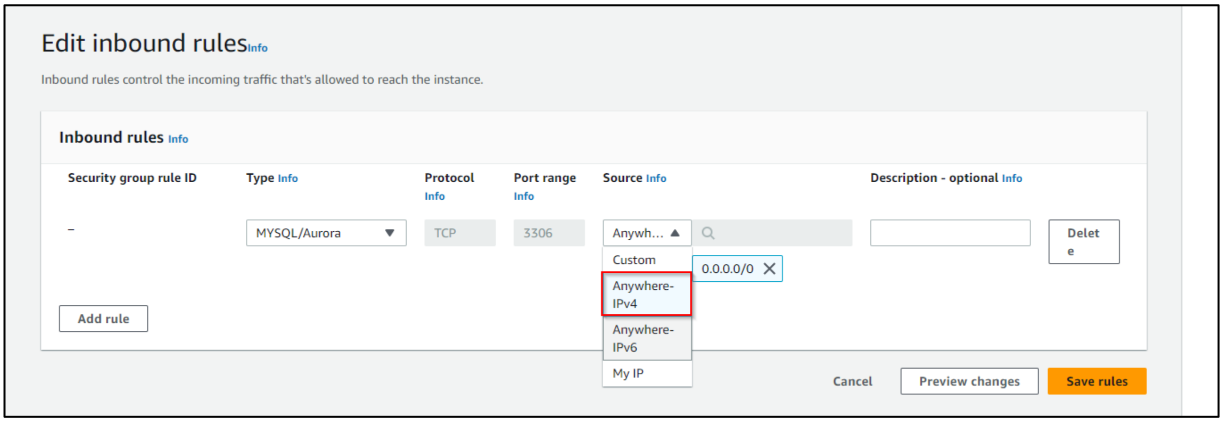
3.8 Search and select **MYSQL/Aurora** and click on **Save rules**



Inbound rules Info

Security group rule ID	Type	Protocol Info	Port range Info	Source Info	Description - optional Info	
–	mys MYSQL/Aurora Custom TCP	TCP	0	Custom		Delete

3.9 Select Source as **Anywhere IPv4** and click on **Save rules**

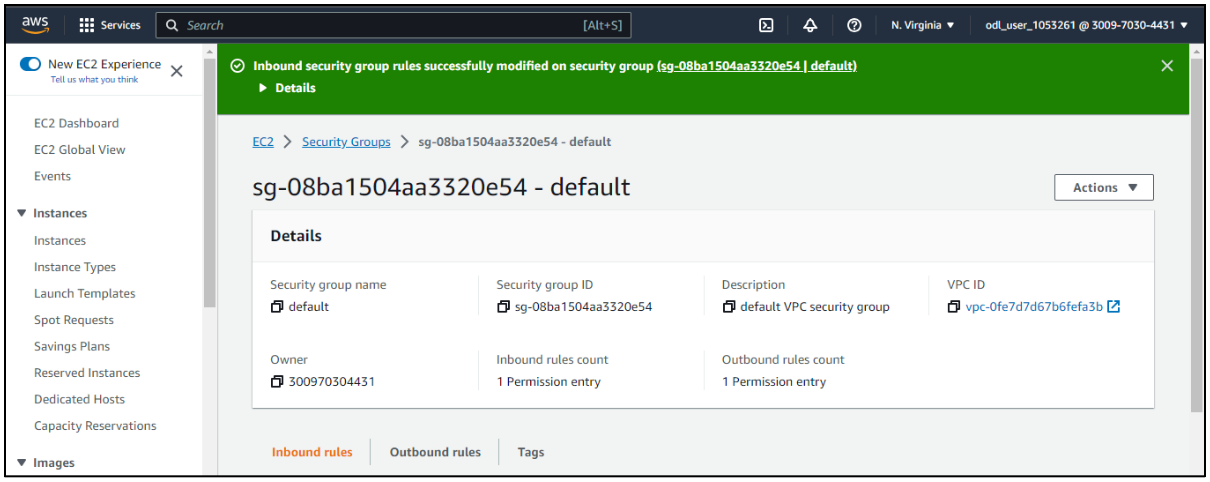


Edit inbound rules Info

Inbound rules control the incoming traffic that's allowed to reach the instance.

Inbound rules Info

Security group rule ID	Type Info	Protocol Info	Port range Info	Source Info		Description - optional Info
–	MYSQL/Aurora	TCP	3306	Anywh...	0.0.0.0/0	



Inbound security group rules successfully modified on security group (sg-08ba1504aa3320e54 | default)

EC2 > Security Groups > sg-08ba1504aa3320e54 - default

sg-08ba1504aa3320e54 - default

Details

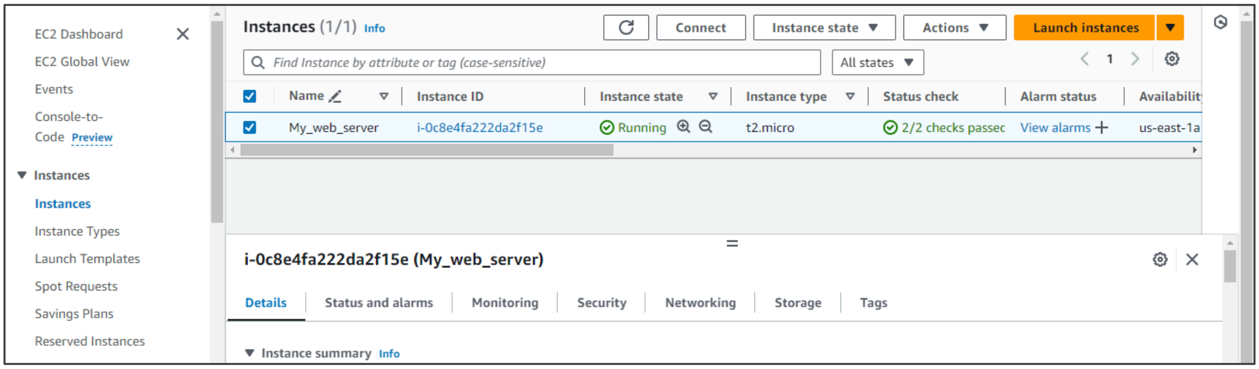
Security group name	Security group ID	Description	VPC ID
default	sg-08ba1504aa3320e54	default VPC security group	vpc-0fe7d7d67b6fefa3b

Owner	Inbound rules count	Outbound rules count
300970304431	1 Permission entry	1 Permission entry

Inbound Security groups are created successfully.

Step 4: Connect the terminal to SSH

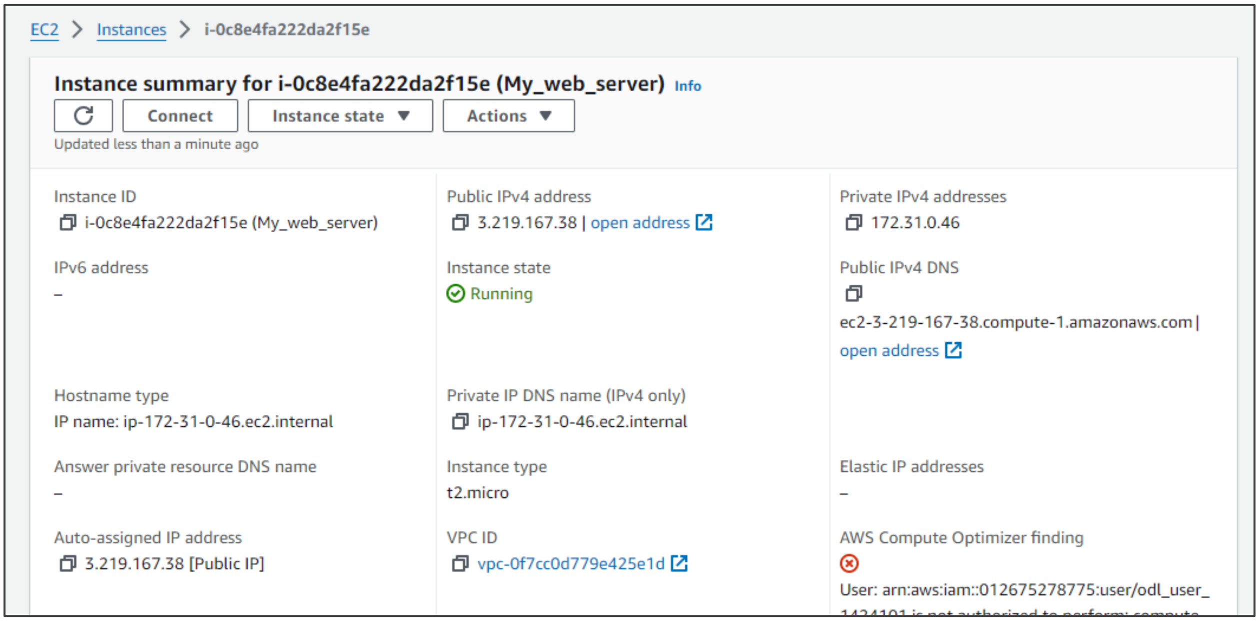
4.1 Navigate to **EC2** in the console, select **Instance,** and click **Connect**



Instances (1/1) Info

☑	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availabilit
☑	My_web_server	i-0c8e4fa222da2f15e	Running	t2.micro	2/2 checks passec	View alarms +	us-east-1a

i-0c8e4fa222da2f15e (My_web_server)



Instance summary for i-0c8e4fa222da2f15e (My_web_server)

Updated less than a minute ago

Instance ID
i-0c8e4fa222da2f15e (My_web_server)

Public IPv4 address
3.219.167.38 | open address

Private IPv4 addresses
172.31.0.46

IPv6 address
–

Instance state
Running

Public IPv4 DNS
ec2-3-219-167-38.compute-1.amazonaws.com | open address

Hostname type
IP name: ip-172-31-0-46.ec2.internal

Private IP DNS name (IPv4 only)
ip-172-31-0-46.ec2.internal

Answer private resource DNS name
–

Instance type
t2.micro

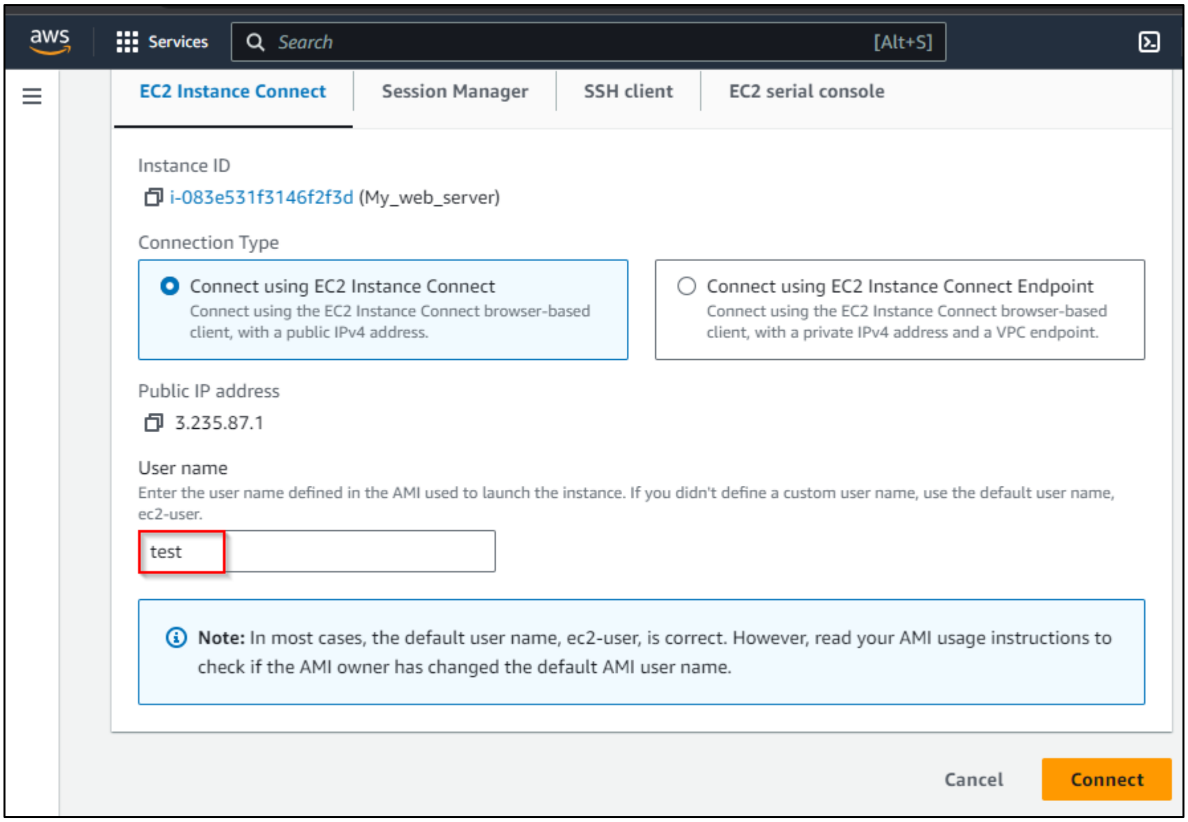
Elastic IP addresses
–

Auto-assigned IP address
3.219.167.38 [Public IP]

VPC ID
vpc-0f7cc0d779e425e1d

AWS Compute Optimizer finding
User: arn:aws:iam::012675278775:user/odl_user_
1424101 is not authorized to perform: compute-

4.2 Enter the username as **test** and click **Connect**



Instance ID
i-083e531f3146f2f3d (My_web_server)

Connection Type

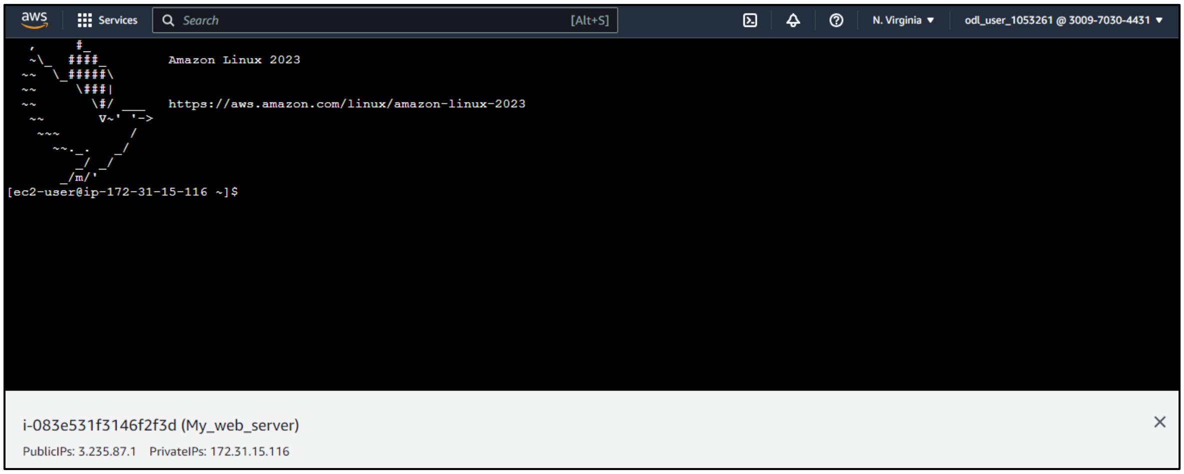
● Connect using EC2 Instance Connect
Connect using the EC2 Instance Connect browser-based client, with a public IPv4 address.

○ Connect using EC2 Instance Connect Endpoint
Connect using the EC2 Instance Connect browser-based client, with a private IPv4 address and a VPC endpoint.

Public IP address
3.235.87.1

User name
Enter the user name defined in the AMI used to launch the instance. If you didn't define a custom user name, use the default user name, ec2-user.
test

Note: In most cases, the default user name, ec2-user, is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.



```
   ,     #_
   ~\_  ####_        Amazon Linux 2023
  ~~  \_#####\
  ~~     \###|
  ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2023
   ~~       V~' '->
    ~~~         /
      ~~._.   _/
         _/ _/
       _/m/'
[ec2-user@ip-172-31-15-116 ~]$
```

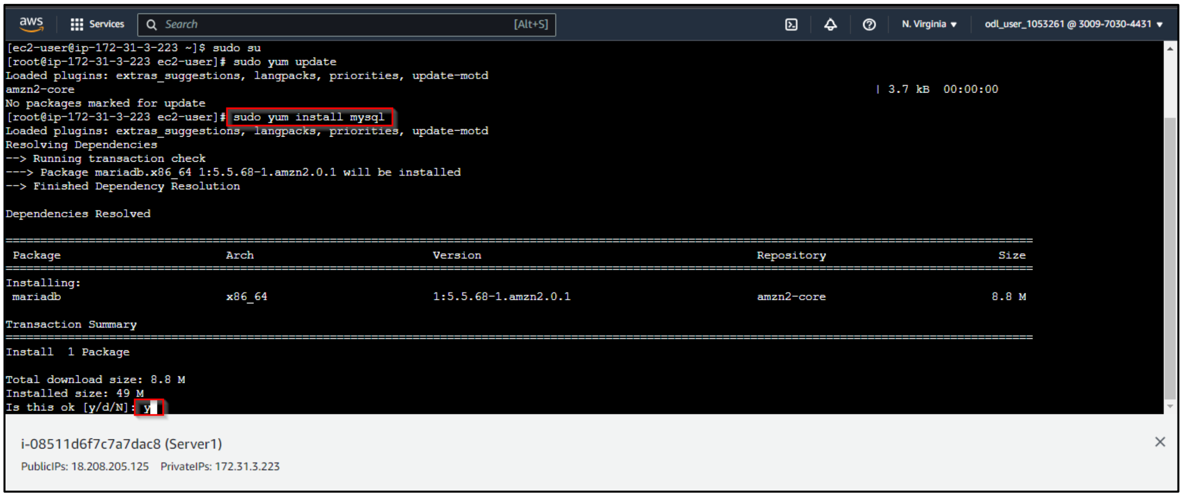
i-083e531f3146f2f3d (My_web_server)

PublicIPs: 3.235.87.1   PrivateIPs: 172.31.15.116

4.3 Enter the command below to install MySQL and type **y** to install:

sudo su

sudo yum install mysql



```
[ec2-user@ip-172-31-3-223 ~]$ sudo su
[root@ip-172-31-3-223 ec2-user]# sudo yum update
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
amzn2-core                                                                                   | 3.7 kB  00:00:00
No packages marked for update
[root@ip-172-31-3-223 ec2-user]# sudo yum install mysql
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
---> Package mariadb.x86_64 1:5.5.68-1.amzn2.0.1 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

======================================================================================================================
 Package                       Arch                          Version                                       Repository                     Size
======================================================================================================================
Installing:
 mariadb                       x86_64                        1:5.5.68-1.amzn2.0.1                          amzn2-core                    8.8 M

Transaction Summary
======================================================================================================================
Install  1 Package

Total download size: 8.8 M
Installed size: 49 M
Is this ok [y/d/N]: y
```

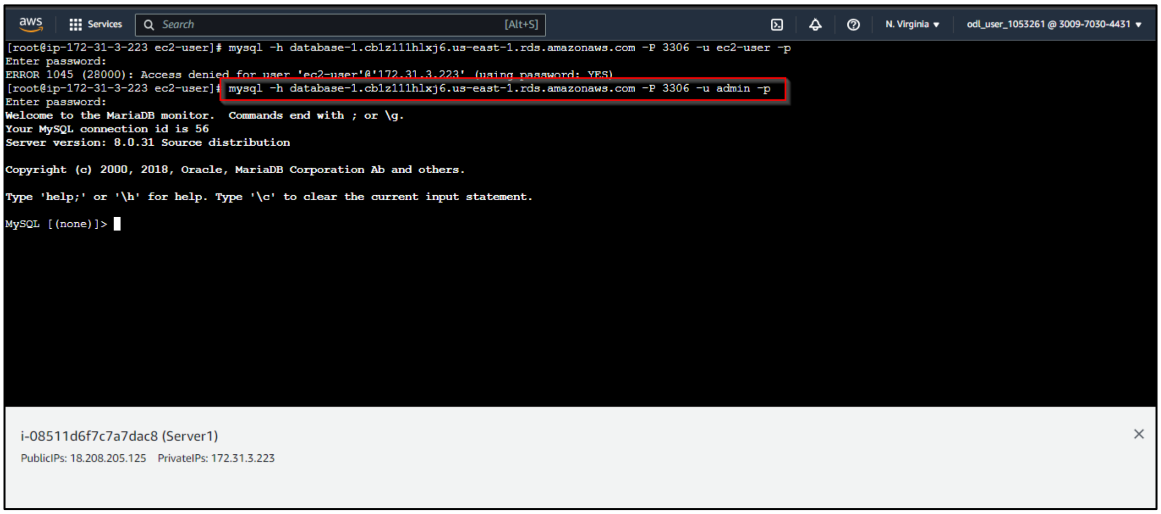
i-08511d6f7c7a7dac8 (Server1)

PublicIPs: 18.208.205.125   PrivateIPs: 172.31.3.223

4.4 Use the command below to connect to the MySQL server (replace placeholders with actual values):

mysql -h <YOUR RDS instance endpoint> -P 3306 -u <USERNAME of your RDS Instance> -p

ex: mysql -h database-1.cb1z111hlxj6.us-east-1.rds.amazonaws.com -P 3306 -u admin -p



```
[root@ip-172-31-3-223 ec2-user]# mysql -h database-1.cb1z111hlxj6.us-east-1.rds.amazonaws.com -P 3306 -u ec2-user -p
Enter password:
ERROR 1045 (28000): Access denied for user 'ec2-user'@'172.31.3.223' (using password: YES)
[root@ip-172-31-3-223 ec2-user]# mysql -h database-1.cb1z111hlxj6.us-east-1.rds.amazonaws.com -P 3306 -u admin -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MySQL connection id is 56
Server version: 8.0.31 Source distribution

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

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

MySQL [(none)]>
```

i-08511d6f7c7a7dac8 (Server1)

PublicIPs: 18.208.205.125 PrivateIPs: 172.31.3.223

The MySQL database has been accessed successfully.

By following these steps, you have successfully created and configured an RDS instance for deploying a MySQL database on AWS and ensuring secure access through EC2 and SSH.