

# RELATIONAL DATABASE SERVICE

Amazon **RDS (Relational Database Service)** is a **managed database service** in AWS that makes it easy to set up, operate, and scale a **relational database** in the cloud. It automates database administration tasks such as backups, patching, and scaling, allowing you to focus on your application.

## Key Features of RDS

1. **Supports Multiple Database Engines**
  - MySQL
  - PostgreSQL
  - MariaDB
  - Oracle
  - Microsoft SQL Server
  - Amazon Aurora (AWS's high-performance database engine)
2. **Managed Service**
  - Automatic backups, software patching, and maintenance.
  - Multi-AZ (high availability) and read replicas (performance optimization).
3. **Scalability**
  - Supports both **vertical scaling** (resizing instances) and **horizontal scaling** (adding read replicas).
4. **Security**
  - Encryption at rest and in transit.
  - **IAM authentication** and VPC integration.
5. **High Availability & Disaster Recovery**
  - **Multi-AZ Deployment:** Ensures automatic failover to a standby instance in case of failure.
  - **Read Replicas:** Improves read performance by distributing traffic.
6. **Monitoring & Performance**
  - **Amazon CloudWatch** for real-time monitoring.
  - **Performance Insights** for database tuning.

## Use Cases of RDS

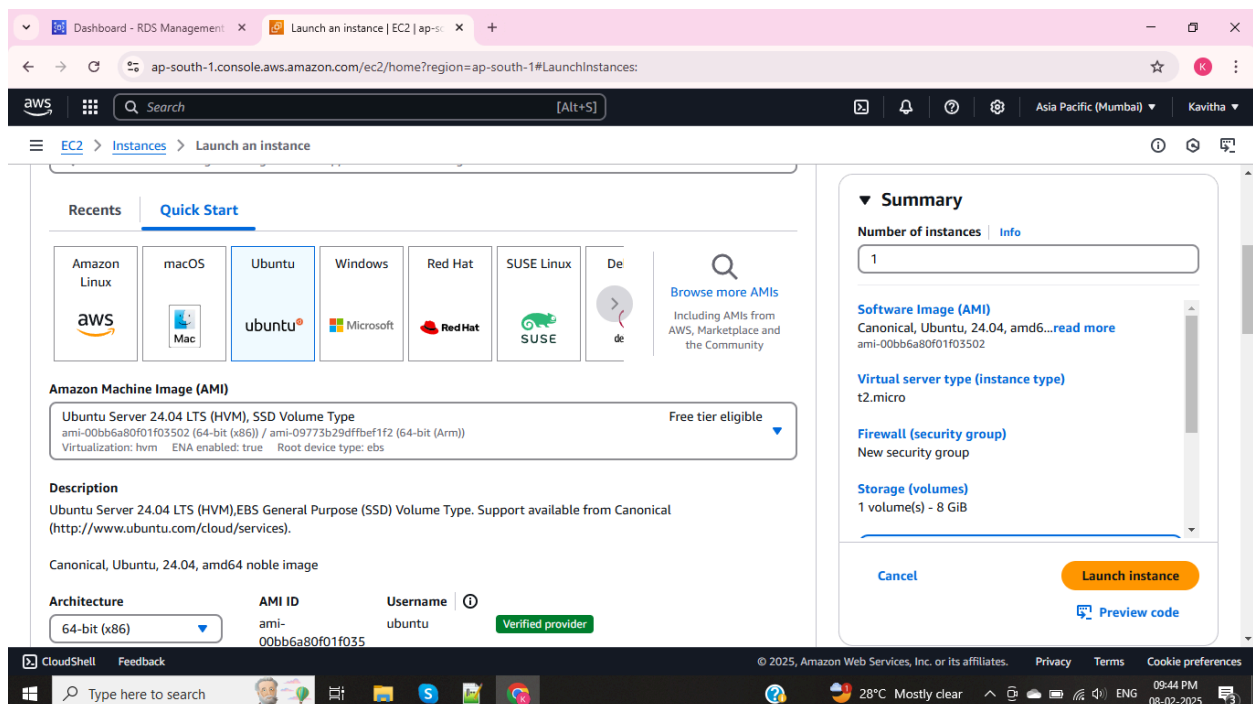
- Web & mobile applications that require structured relational data.
- E-commerce platforms (storing product, user, and order data).
- Enterprise applications like CRM and ERP. Data analytics and reporting.

Application is hosting in EC2 Instance. That application need database to store the data. From Database data want to see and data want to send means its required EC2 Instance. **Steps to Linked EC2 Instance with RDS Database.**

## Step 1: Create an EC2 Instance

### Using AWS Management Console

1. Go to **AWS Console** → **EC2 Service** → Click **Launch Instance**.
2. Choose an **Amazon Ubuntu OS**
3. Select an appropriate **instance type** (**t2.micro**).
4. Configure networking:
  - **VPC**: Ensure EC2 and RDS are in the **same VPC**.
  - **Subnet**: Use the same subnet (or allow communication across subnets).
5. Add **security group rules**.
6. Launch the instance.



SecurityGroups | VPC Console x Launch an instance | EC2 | ap-sou x +

ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#LaunchInstances:

aws [Alt+S] Asia Pacific (Mumbai) Kavitha

EC2 > Instances > Launch an instance

### Network settings

**VPC - required** | Info  
vpc-03c4ef00c4d76e0aa (default) 172.31.0.0/16

**Subnet** | Info  
subnet-006c569ae60da613c  
VPC: vpc-03c4ef00c4d76e0aa Owner: 476114123923  
Availability Zone: ap-south-1c Zone type: Availability Zone  
IP addresses available: 4091 CIDR: 172.31.16.0/20

**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

**Common security groups** | Info  
Select security groups [Compare security group rules](#)  
Security groups that you add or remove here will be added to or removed from all your network interfaces.

### Summary

**Number of instances** | Info  
1

**Software Image (AMI)**  
Canonical, Ubuntu, 24.04, amd64...[read more](#)  
ami-00bb6a80f01f03502

**Virtual server type (instance type)**  
t3.micro

**Firewall (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

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vpcs | VPC Console x Launch an instance | EC2 | ap-sou x +

ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#LaunchInstances:

aws [Alt+S] Asia Pacific (Mumbai) Kavitha

EC2 > Instances > Launch an instance

### Network settings

**Network** | Info  
vpc-03c4ef00c4d76e0aa

**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

**Common security groups** | Info  
Select security groups  
launch-wizard-1 sg-0799525168472fa31  
VPC: vpc-03c4ef00c4d76e0aa  
[Compare security group rules](#)  
Security groups that you add or remove here will be added to or removed from all your network interfaces.

### Summary

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t2.micro

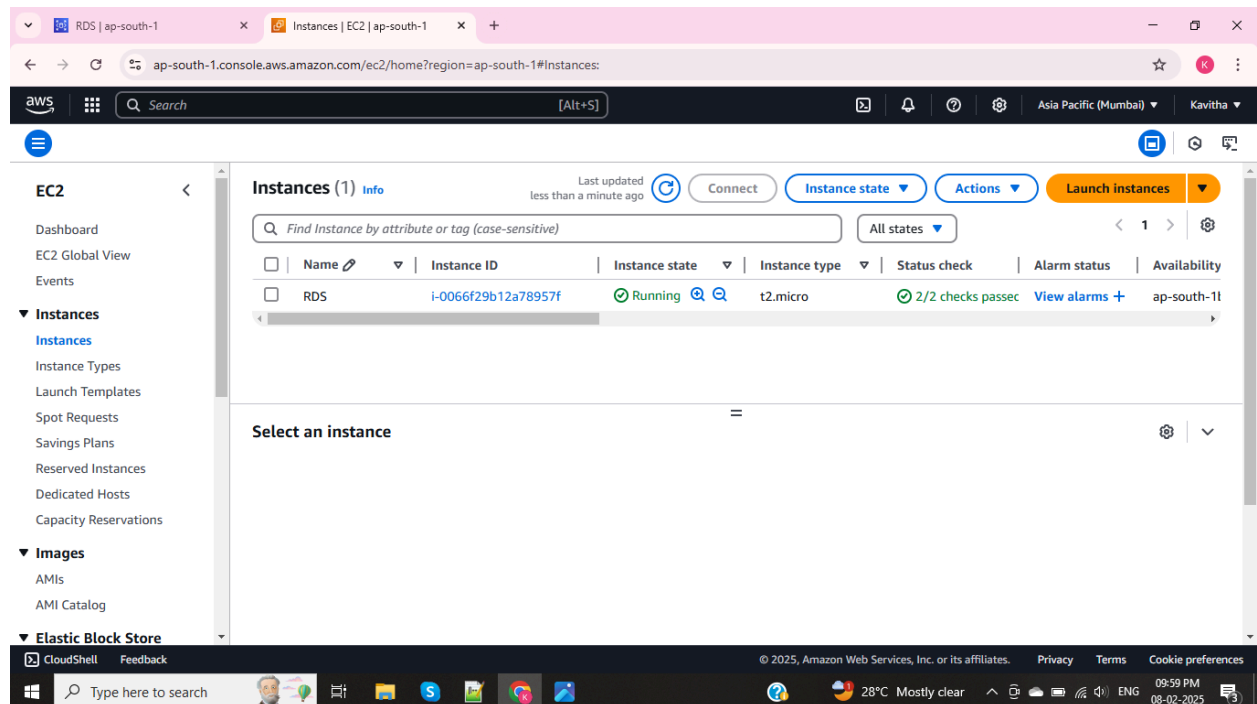
**Firewall (security group)**  
launch-wizard-1

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

Cancel [Launch instance](#) [Preview code](#)

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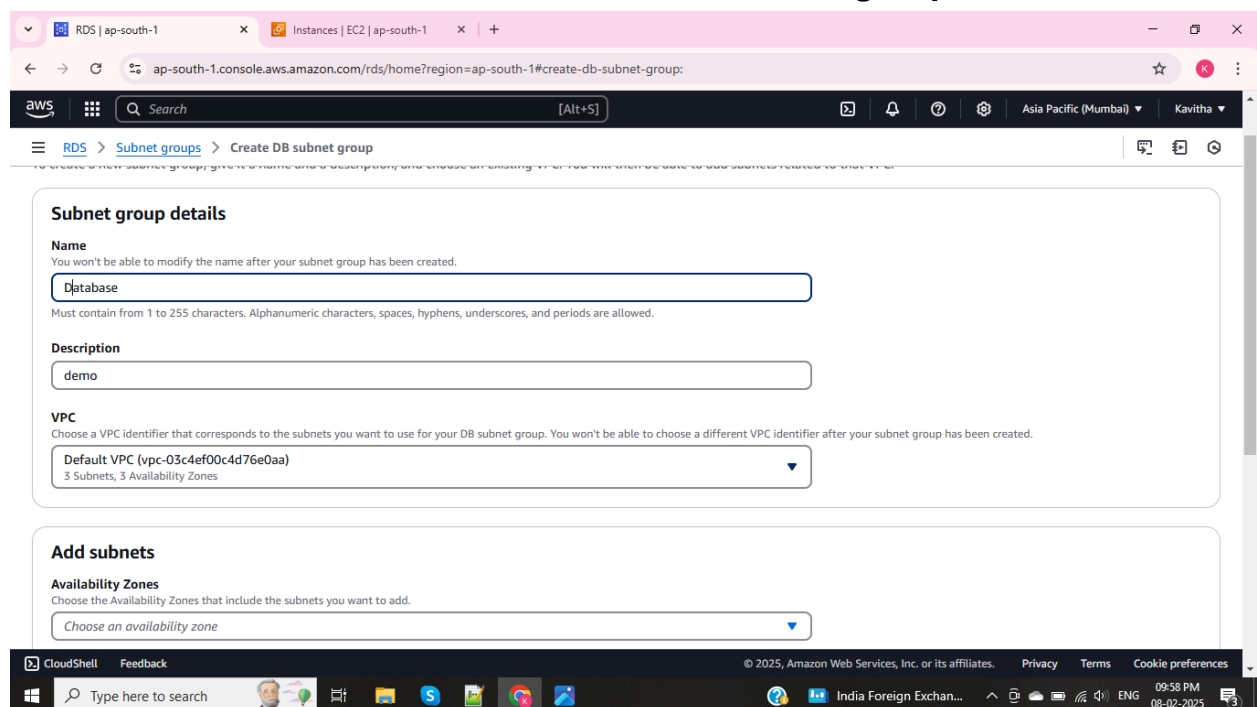
## EC2 Instance created successfully



Before creating RDS Database need to create **SUBNET GROUP** without subnet group unable to create Database.

## Step 2 : Create an Subnet group

Go to **AWS Console** → **RDS Service** → Click **subnet groups** → **Create**.



## Adding same Subnets and availability zones which given in EC2 Instance

**Add subnets**

**Availability Zones**  
Choose the Availability Zones that include the subnets you want to add.

Choose an availability zone

ap-south-1a X ap-south-1b X ap-south-1c X

**Subnets**  
Choose the subnets that you want to add. The list includes the subnets in the selected Availability Zones.

Select subnets

- Subnet ID: subnet-006c569ae60da613c CIDR: 172.31.16.0/20 X

- Subnet ID: subnet-069adf10dc45d03f2 CIDR: 172.31.32.0/20 X

- Subnet ID: subnet-013b752352710a797 CIDR: 172.31.0.0/20 X

For Multi-AZ DB clusters, you must select 3 subnets in 3 different Availability Zones.

**Subnets selected (3)**

Availability zone	Subnet name	Subnet ID	CIDR block
ap-south-1a		subnet-006c569ae60da613c	172.31.16.0/20
ap-south-1b		subnet-069adf10dc45d03f2	172.31.32.0/20
ap-south-1c		subnet-013b752352710a797	172.31.0.0/20

## Successfully created Subnets group

**Successfully created Database. View subnet group**

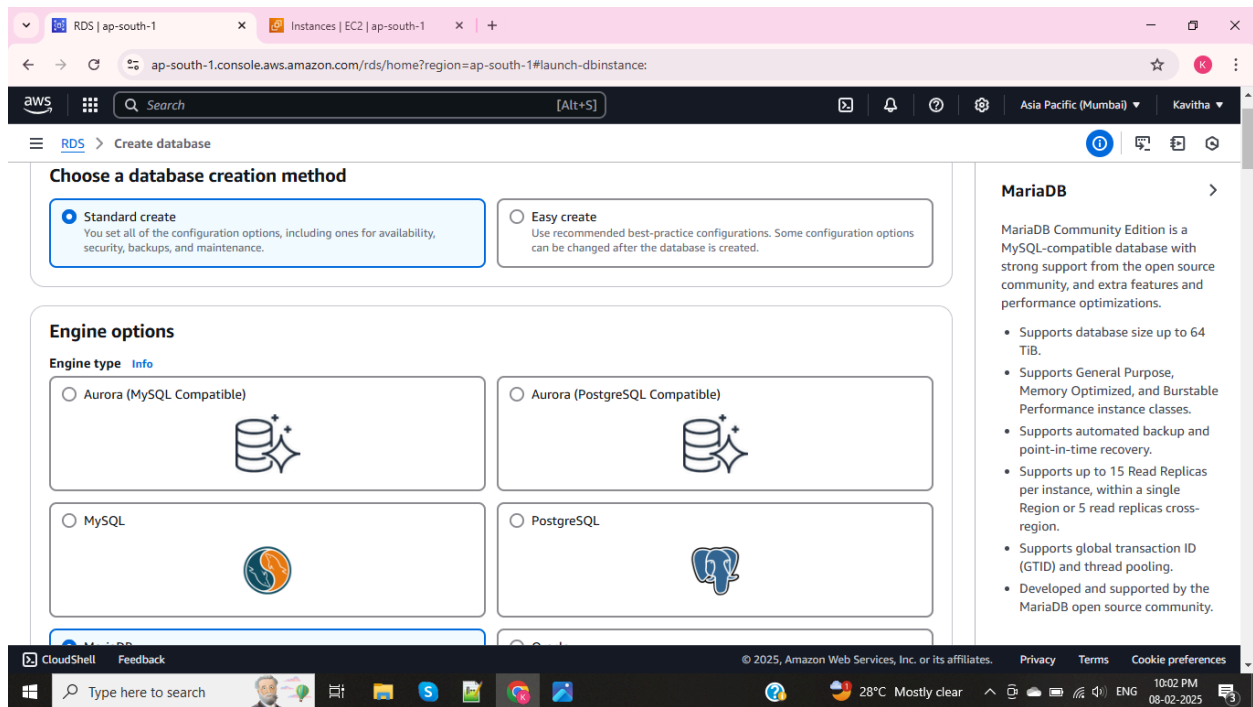
**Subnet groups (1)**

Filter by subnet group

Name	Description	Status	VPC
database	demo	Complete	vpc-03c4ef00c4d76e0aa

## Step 3: Create an RDS Database

1. Go to the **AWS Management Console** and search for **RDS**.
2. Click **Create database**.
3. Select the **database engine** (Mariadb).
4. Choose **Free Tier**
5. Configure **DB instance details**:
  - **DB Instance Identifier**: Choose a unique name.
  - **Username & Password**: Set up credentials.
  - **Instance Class**: Select compute resources
6. Configure **Availability & Security**:
  - Enable **Multi-AZ Deployment** (if needed for high availability).
  - Set **VPC, Subnet, and Security Groups**.
7. Click **Create Database**.



RDS | ap-south-1

Instances | EC2 | ap-south-1

+

ap-south-1.console.aws.amazon.com/rds/home?region=ap-south-1#launch-dbinstance:

aws

Search

[Alt+S]

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RDS

Create database

Engine version

MariaDB 10.6.18

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](#)

Settings

DB instance identifier

[Info](#)

Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.

database-1

The DB instance identifier is case-insensitive, but is stored as all lowercase (as in "mydbinstance"). Constraints: 1 to 63 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

Credentials Settings

CloudShell

Feedback

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## MariaDB

MariaDB Community Edition is a MySQL-compatible database with strong support from the open source community, and extra features and performance optimizations.

- Supports database size up to 64 TiB.
- Supports General Purpose, Memory Optimized, and Burstable Performance instance classes.
- Supports automated backup and point-in-time recovery.
- Supports up to 15 Read Replicas per instance, within a single Region or 5 read replicas cross-region.
- Supports global transaction ID (GTID) and thread pooling.
- Developed and supported by the MariaDB open source community.

RDS | ap-south-1

Instances | EC2 | ap-south-1

+

ap-south-1.console.aws.amazon.com/rds/home?region=ap-south-1#launch-dbinstance:

aws

Search

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RDS

Create database

Credentials Settings

Master username

[Info](#)

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

kavi

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.

Master password

[Info](#)

\*\*\*\*\*

Password strength

Neutral

Minimum constraints: At least 8 printable ASCII characters. Can't contain any of the following symbols: / ' \* @

Confirm master password

[Info](#)

\*\*\*\*\*

MariaDB

>

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ap-south-1 RDS | ap-south-1 x Instances | EC2 | ap-south-1 x +

ap-south-1.console.aws.amazon.com/rds/home?region=ap-south-1#launch-dbinstance:

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RDS > Create 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 incoming traffic.

☒ **Choose existing**  
Choose existing VPC security groups

☐ **Create new**  
Create new VPC security group

**Additional VPC security group**  
Choose one or more options

launch-wizard-1 X

Amazon RDS will add a new VPC security group `rds-ec2-1` to allow connectivity with your compute resource.

**Availability Zone** [Info](#)  
ap-south-1b

**Certificate authority - optional** [Info](#)  
Using a server certificate provides an extra layer of security by validating that the connection is being made to an Amazon database. It does so by checking the server certificate that is automatically installed on all databases that you provision.

rds-ca-rsa2048-g1 (default)  
Expiry: May 20, 2061

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

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ap-south-1 RDS | ap-south-1 x Instances | EC2 | ap-south-1 x +

ap-south-1.console.aws.amazon.com/rds/home?region=ap-south-1#launch-dbinstance:

aws Search [Alt+S] Asia Pacific (Mumbai) Kavitha

RDS > Create database

**Additional configuration**

**Database port** [Info](#)  
TCP/IP port that the database will use for application connections.

3306

**Tags - optional**  
A tag consists of a case-sensitive key-value pair.  
No tags associated with the resource.

Add new tag  
You can add up to 50 more tags.

**Database authentication**

**Database authentication options** [Info](#)

☒ **Password authentication**  
Authenticates using database passwords.

☐ **Password and IAM database authentication**  
Authenticates using the database password and user credentials through AWS IAM users and roles.

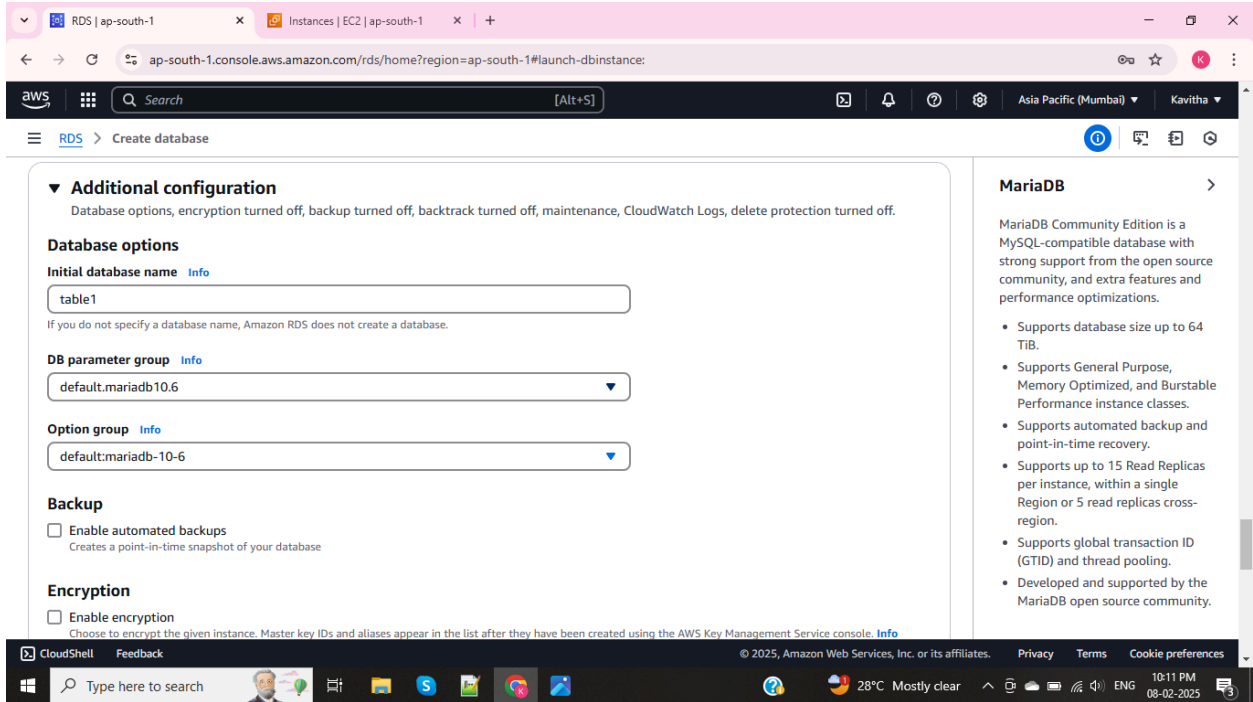
**MariaDB** >

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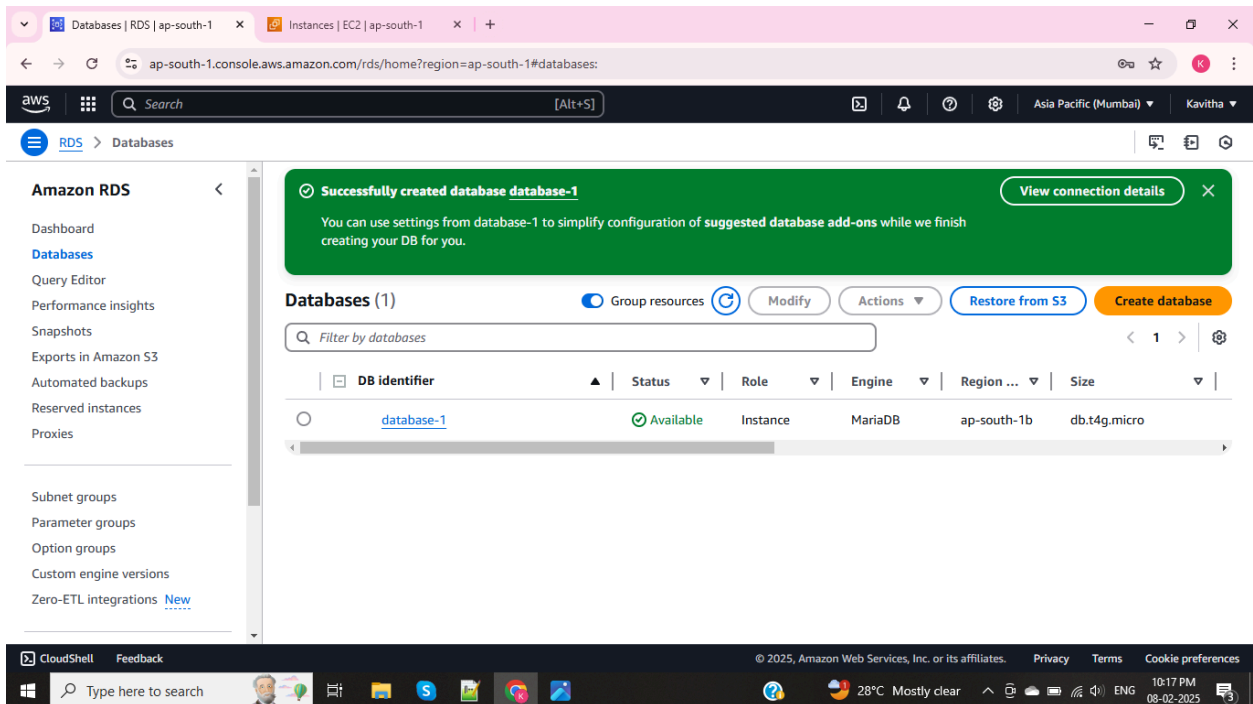
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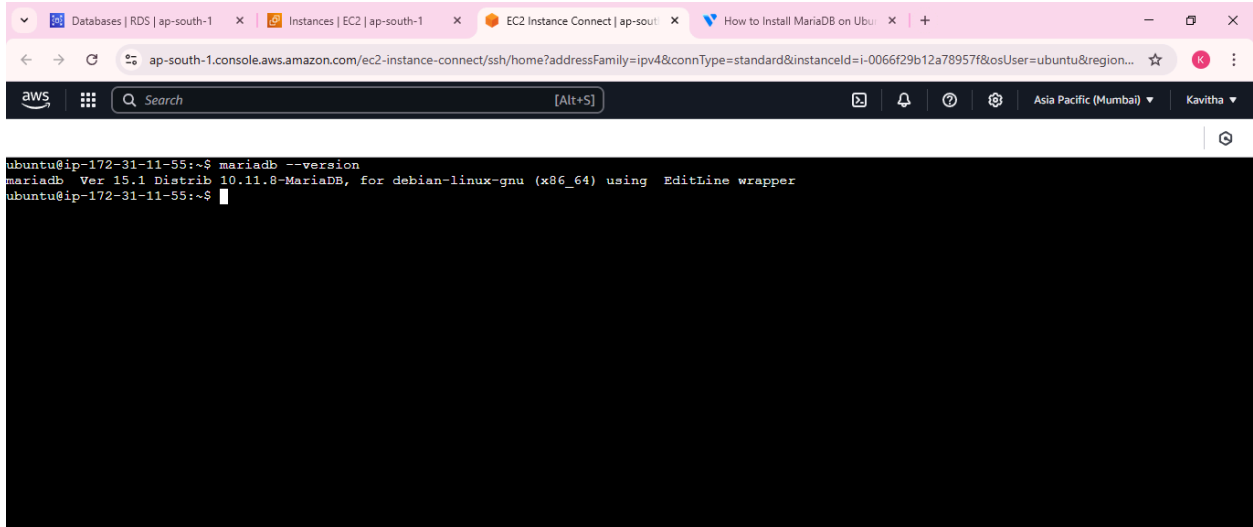


## Successfully created DATABASE



## Step 4 : Connect EC2 Instance to RDS

Connect Instance > Install MariaDB which is running in RDS Database



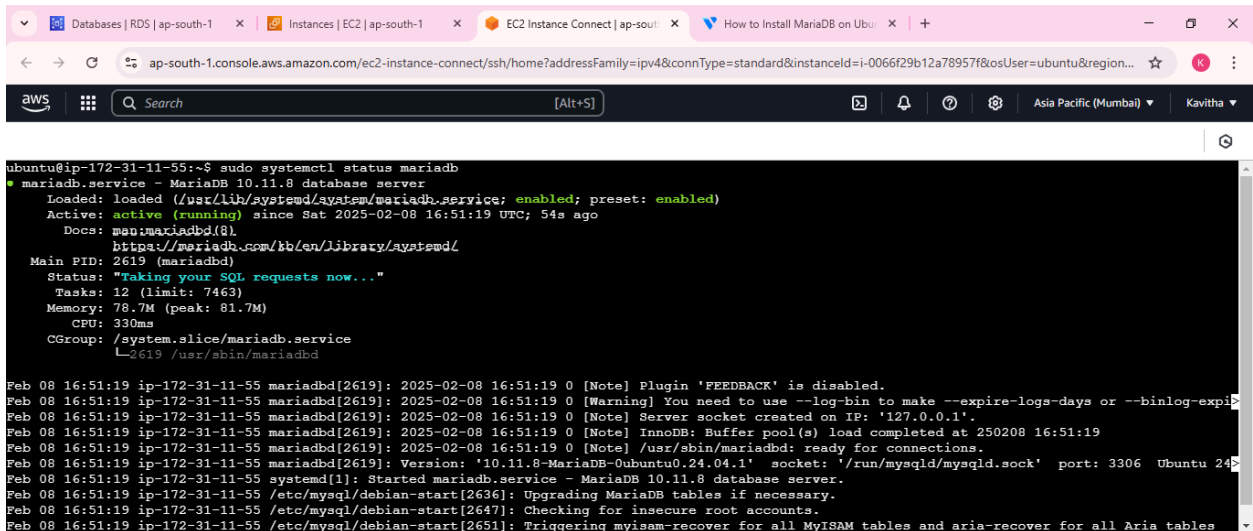
```
ubuntu@ip-172-31-11-55:~$ mariadb --version
mariadb Ver 15.1 Distrib 10.11.8-MariaDB, for debian-linux-gnu (x86_64) using EditLine wrapper
ubuntu@ip-172-31-11-55:~$
```

i-0066f29b12a78957f (RDS)

PublicIPs: 65.1.108.94 PrivateIPs: 172.31.11.55



MariDB status is active



```
ubuntu@ip-172-31-11-55:~$ sudo systemctl status mariadb
● mariadb.service - MariaDB 10.11.8 database server
   Loaded: loaded (/usr/lib/systemd/system/mariadb.service; enabled; preset: enabled)
   Active: active (running) since Sat 2025-02-08 16:51:19 UTC; 54s ago
     Docs: man:mariadb(8)
           https://mariadb.com/kb/en/library/systemd/
   Main PID: 2619 (mariadbd)
   Status: "Taking your SQL requests now..."
     Tasks: 12 (limit: 7463)
    Memory: 78.7M (peak: 81.7M)
       CPU: 330ms
   CGroup: /system.slice/mariadb.service
           └─2619 /usr/sbin/mariadbd

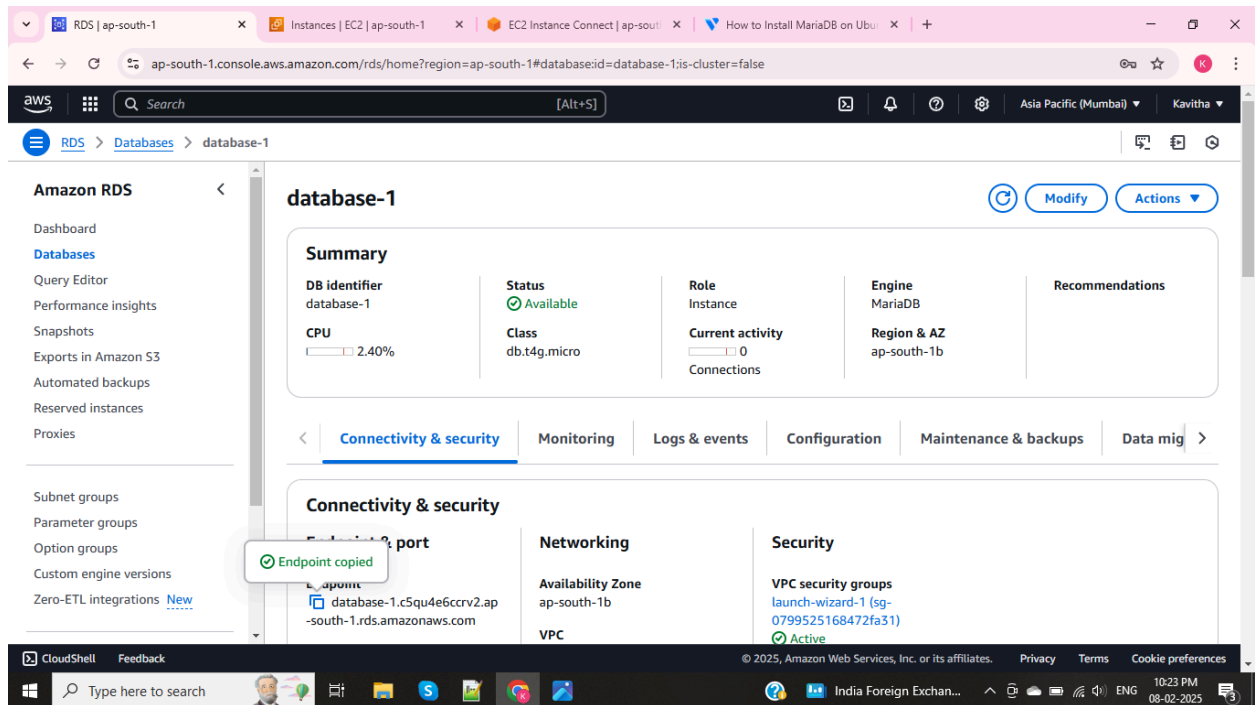
Feb 08 16:51:19 ip-172-31-11-55 mariadbd[2619]: 2025-02-08 16:51:19 0 [Note] Plugin 'FEEDBACK' is disabled.
Feb 08 16:51:19 ip-172-31-11-55 mariadbd[2619]: 2025-02-08 16:51:19 0 [Warning] You need to use --log-bin to make --expire-logs-days or --binlog-expir
Feb 08 16:51:19 ip-172-31-11-55 mariadbd[2619]: 2025-02-08 16:51:19 0 [Note] Server socket created on IP: '127.0.0.1'.
Feb 08 16:51:19 ip-172-31-11-55 mariadbd[2619]: 2025-02-08 16:51:19 0 [Note] InnoDB: Buffer pool(s) load completed at 250208 16:51:19
Feb 08 16:51:19 ip-172-31-11-55 mariadbd[2619]: 2025-02-08 16:51:19 0 [Note] /usr/sbin/mariadbd: ready for connections.
Feb 08 16:51:19 ip-172-31-11-55 mariadbd[2619]: Version: '10.11.8-MariaDB-0ubuntu0.24.04.1' socket: '/run/mysqld/mysqld.sock' port: 3306 Ubuntu 24
Feb 08 16:51:19 ip-172-31-11-55 systemd[1]: Started mariadb.service - MariaDB 10.11.8 database server.
Feb 08 16:51:19 ip-172-31-11-55 /etc/mysql/debian-start[2636]: Upgrading MariaDB tables if necessary.
Feb 08 16:51:19 ip-172-31-11-55 /etc/mysql/debian-start[2647]: Checking for insecure root accounts.
Feb 08 16:51:19 ip-172-31-11-55 /etc/mysql/debian-start[2651]: Triggering myisam-recover for all MyISAM tables and aria-recover for all Aria tables
```

i-0066f29b12a78957f (RDS)

PublicIPs: 65.1.108.94 PrivateIPs: 172.31.11.55

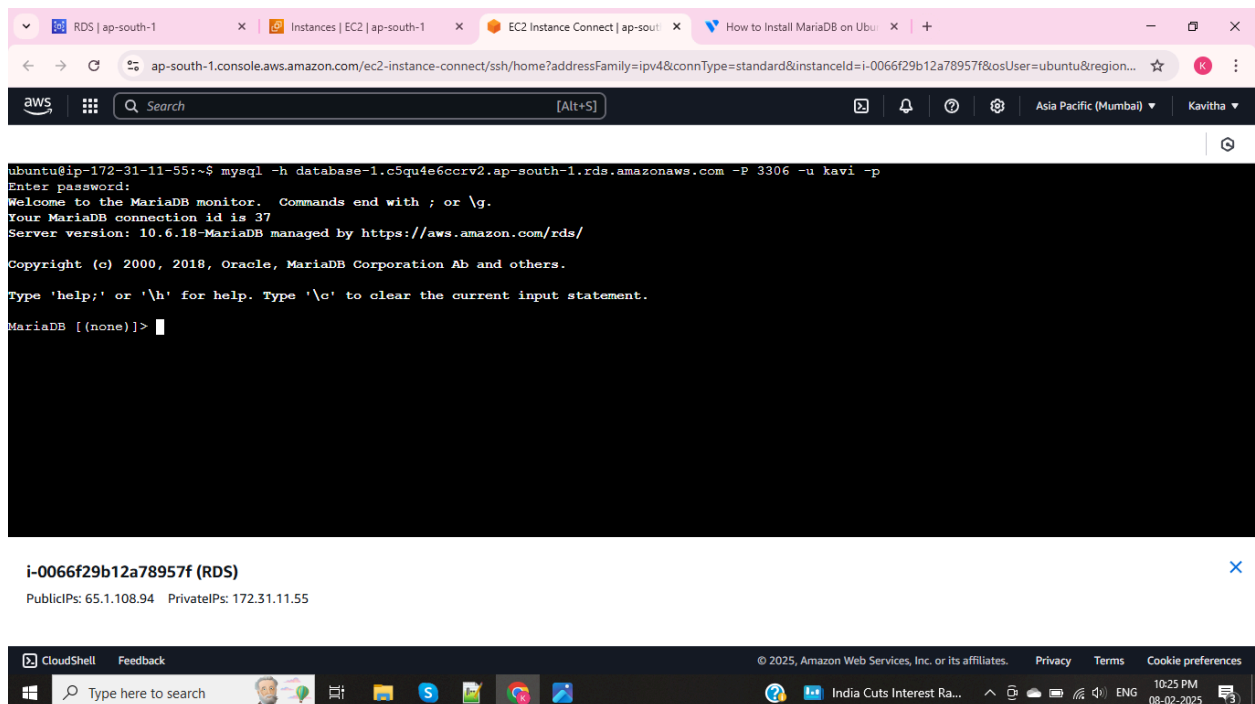


To connect Database: Copy the Database endpoint URL



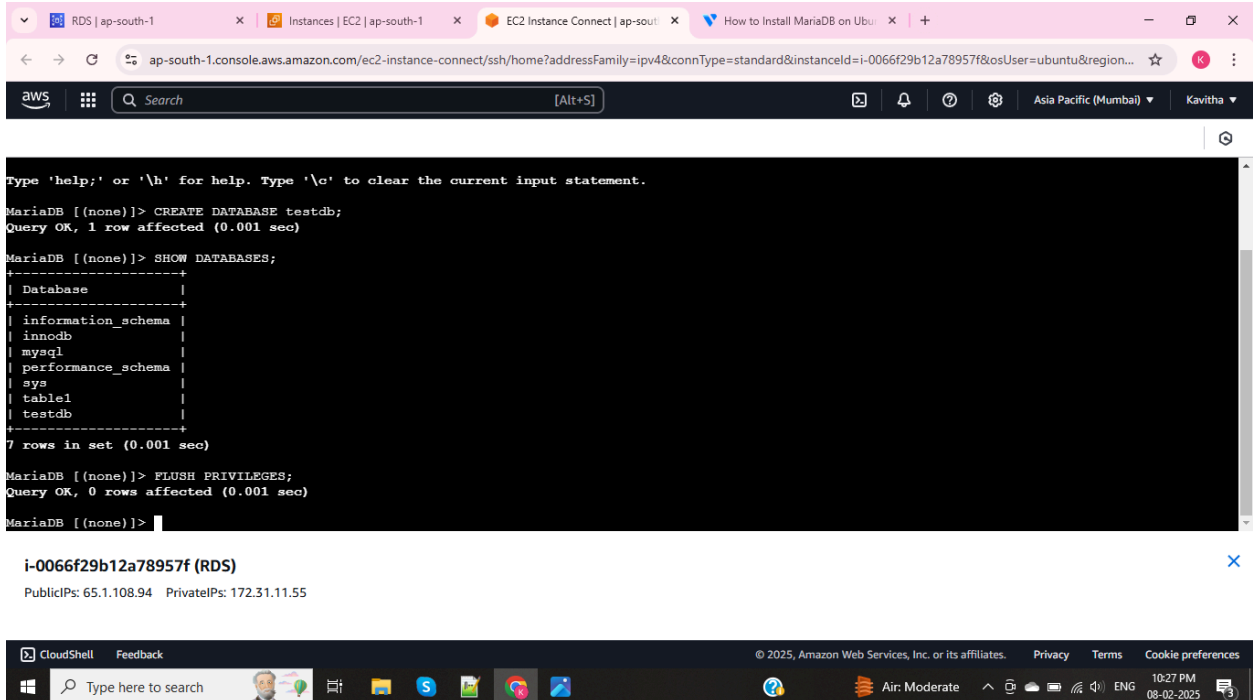
And Once inside the EC2 instance, use the database client to connect.

Mysql -h (RDS Endpoint URL) -P 3306 -u kavi -p  
Enter the **password** when prompted.



## Step 5 : Verify Connection

Use commands > SHOW DATABASES; > CREATE DATABASE testdb;



The screenshot shows the AWS Management Console with the EC2 Instance Connect terminal open. The terminal displays the following commands and output:

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
MariaDB [(none)]> CREATE DATABASE testdb;
Query OK, 1 row affected (0.001 sec)

MariaDB [(none)]> SHOW DATABASES;
+-----+
| Database |
+-----+
| information_schema |
| innodb |
| mysql |
| performance_schema |
| sys |
| table1 |
| testdb |
+-----+
7 rows in set (0.001 sec)

MariaDB [(none)]> FLUSH PRIVILEGES;
Query OK, 0 rows affected (0.001 sec)

MariaDB [(none)]>
```

Below the terminal, the RDS instance details are shown:

**i-0066f29b12a78957f (RDS)**  
PublicIPs: 65.1.108.94 PrivateIPs: 172.31.11.55

The bottom of the screenshot shows the CloudShell interface with a search bar and system status information.

## Summary

Step	Action
1	Launch an <b>EC2 instance</b> in the same <b>VPC</b>
2	Create an RDS instance & note the <b>DB endpoint</b>
3	Configure <b>Security Groups</b> for both RDS & EC2
4	Install <b>database client</b> on EC2
5	Connect using <b>MARIADB client</b>