Experiment - 9

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1. Aim:

To understand and implement the creation and management of a relational database instance using **AWS RDS**, including setting up database connectivity (via pgAdmin or MySQL client), configuring security groups, and comparing RDS with EC2 database setups in terms of scalability, performance, and manageability.

2. Objective:

- To study the concept and features of **Amazon Web Services (AWS) Relational Database Service (RDS)**.
- To understand the **advantages of using RDS** over EC2 and on-premise database setups.
- To learn how to **create a database instance** on AWS RDS.
- To configure and manage **security groups** for secure database access.
- To learn how to **connect AWS RDS to local pgAdmin or MySQL client**.
- To explore various **RDS features** such as automated backups, monitoring, and scaling.
- To understand **Multi-AZ deployment**, **read replicas**, and **cross-region replication** for high availability.
- To gain hands-on experience in **launching and managing cloud-based databases** using AWS.

3. Theory:

Amazon Web Services (AWS) Relational Database Service (RDS) is a **managed cloud database service** that simplifies the setup, operation, and scaling of relational databases. It automates key administrative tasks such as provisioning, patching, backups, and monitoring, allowing developers to focus on application logic rather than infrastructure management.

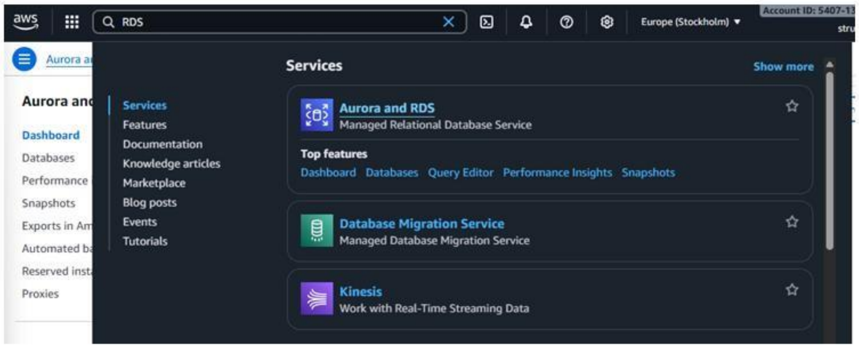
AWS RDS supports multiple database engines, including **MySQL, PostgreSQL, MariaDB, Oracle, and SQL Server**, and provides features like **automated backups**, **multi-AZ deployment**, and **read replicas** to ensure high availability and reliability. Security is managed through **IAM**, **KMS encryption**, and **VPC security groups**, which protect databases from unauthorized access.

Additionally, AWS RDS integrates with **CloudWatch** for performance monitoring and offers **storage auto-scaling** to handle growing data needs efficiently. Compared to running databases on EC2 instances, RDS provides greater scalability, reduced administrative overhead, and enhanced performance, making it a cost-effective and reliable choice for cloud-based database management.

4. Procedure:

- Log in to the AWS Management Console using your credentials.
- Search for and open the **RDS** service from the AWS dashboard.
- Click on **Create Database** to start a new RDS instance setup.
- Choose the **Standard Create** option for manual configuration.
- Select the required **database engine** (MySQL or PostgreSQL).
- Enter the **DB instance name**, **master username**, and **password**.
- Choose the **instance class** and configure **storage settings**.
- Enable **storage auto-scaling** if needed.
- Configure **VPC** and **security groups** for database connectivity.
- Set the database to be **publicly accessible** (if connecting locally).
- Enable **automated backups** and optional **Multi-AZ deployment**.
- Review all settings and click **Create Database**.
- Wait for the instance status to become **Available** in the RDS dashboard.
- Copy the **endpoint** (host name) of the created database.
- Open **pgAdmin** or **MySQL Workbench** on your local machine.
- Create a new connection using the endpoint, username, and password.
- If connection fails, modify **inbound rules** in the security group to allow your local IP.
- Test the connection and perform basic SQL operations to verify setup.

5. Output:



aws | RDS | Europe (Stockholm) ▾ | Account ID: 5407-13

Aurora a

Aurora an

Dashboard

Databases

Performance

Snapshots

Exports in Am

Automated b

Reserved inst

Proxies

Services

Features

Documentation

Knowledge articles

Marketplace

Blog posts

Events

Tutorials

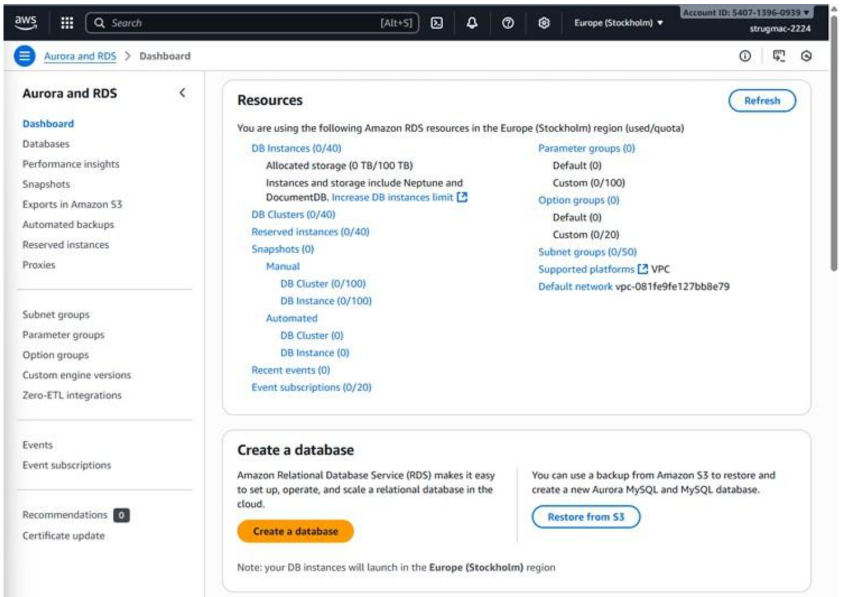
Services | Show more

Aurora and RDS
Managed Relational Database Service

Top features
Dashboard Databases Query Editor Performance Insights Snapshots

Database Migration Service
Managed Database Migration Service

Kinesis
Work with Real-Time Streaming Data



aws | Search [Alt+S] | Europe (Stockholm) ▾ | Account ID: 5407-1396-0939 ▾ strugmac-2224

Aurora and RDS > Dashboard

Aurora and RDS

Dashboard

Databases

Performance insights

Snapshots

Exports in Amazon S3

Automated backups

Reserved instances

Proxies

Subnet groups

Parameter groups

Option groups

Custom engine versions

Zero-ETL integrations

Events

Event subscriptions

Recommendations 0

Certificate update

Resources | Refresh

You are using the following Amazon RDS resources in the Europe (Stockholm) region (used/quota)

DB Instances (0/40)
Allocated storage (0 TB/100 TB)
Instances and storage include Neptune and DocumentDB. Increase DB instances limit
DB Clusters (0/40)
Reserved instances (0/40)
Snapshots (0)
Manual
DB Cluster (0/100)
DB Instance (0/100)
Automated
DB Cluster (0)
DB Instance (0)
Recent events (0)
Event subscriptions (0/20)

Parameter groups (0)
Default (0)
Custom (0/100)
Option groups (0)
Default (0)
Custom (0/20)
Subnet groups (0/50)
Supported platforms VPC
Default network vpc-081fe9fe127bb8e79

Create a database

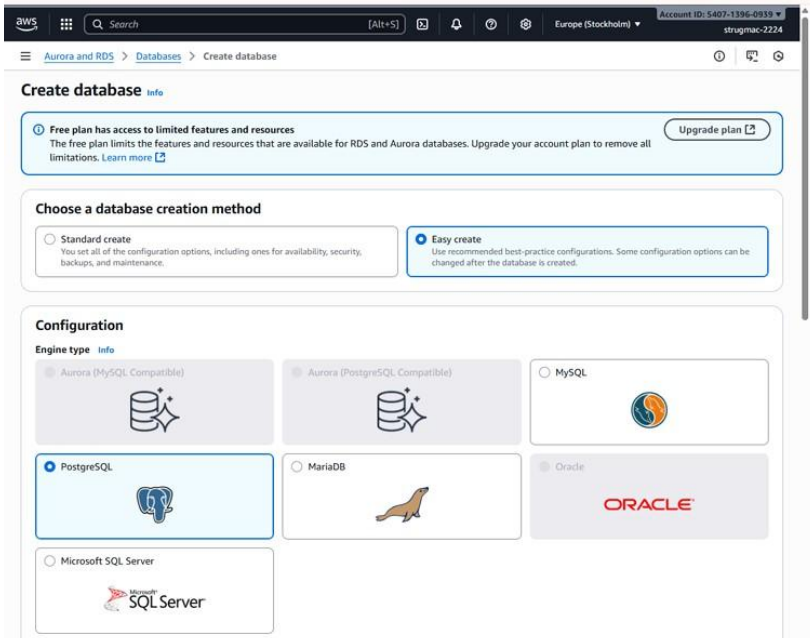
Amazon Relational Database Service (RDS) makes it easy to set up, operate, and scale a relational database in the cloud.

Create a database

You can use a backup from Amazon S3 to restore and create a new Aurora MySQL and MySQL database.

Restore from S3

Note: your DB instances will launch in the Europe (Stockholm) region



aws | Search [Alt+S] | Europe (Stockholm) ▾ | Account ID: 5407-1396-0939 ▾ strugmac-2224

Aurora and RDS > Databases > Create database

Create database Info

Free plan has access to limited features and resources
The free plan limits the features and resources that are available for RDS and Aurora databases. Upgrade your account plan to remove all limitations. Learn more

Upgrade plan

Choose a database creation method

○ 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.

Configuration

Engine type Info

○ Aurora (MySQL Compatible)

○ Aurora (PostgreSQL Compatible)

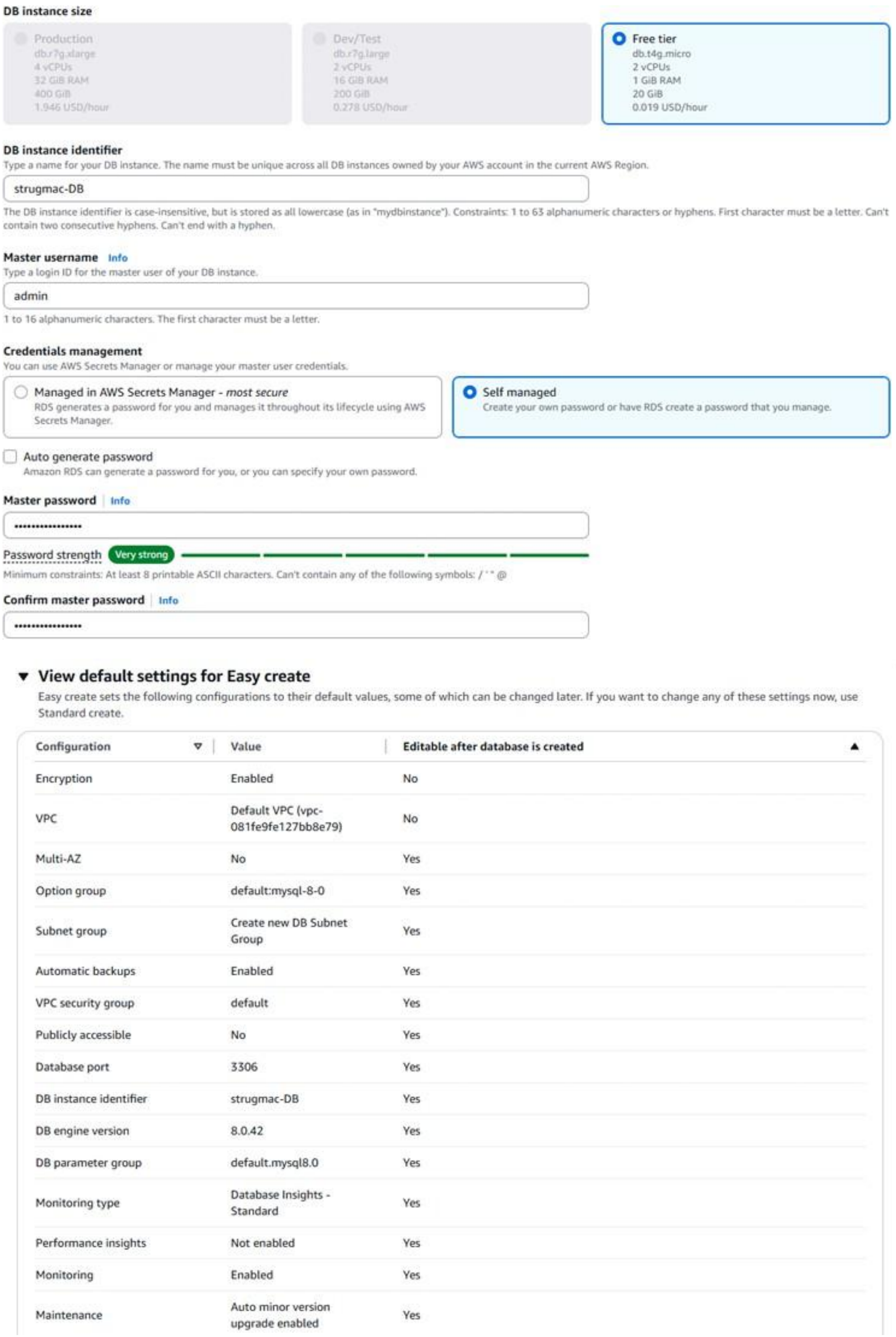
○ MySQL

● PostgreSQL

○ MariaDB

○ Oracle

○ Microsoft SQL Server



DB instance size

○ Production db.r7g.xlarge 4 vCPUs 32 GiB RAM 400 GiB 1.946 USD/hour	○ Dev/Test db.r7g.large 2 vCPUs 16 GiB RAM 200 GiB 0.278 USD/hour	● Free tier db.t4g.micro 2 vCPUs 1 GiB RAM 20 GiB 0.019 USD/hour

DB instance identifier

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.

strugmac-DB

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.

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.

Master password | Info

••••••••••••••••

Password strength Very strong

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

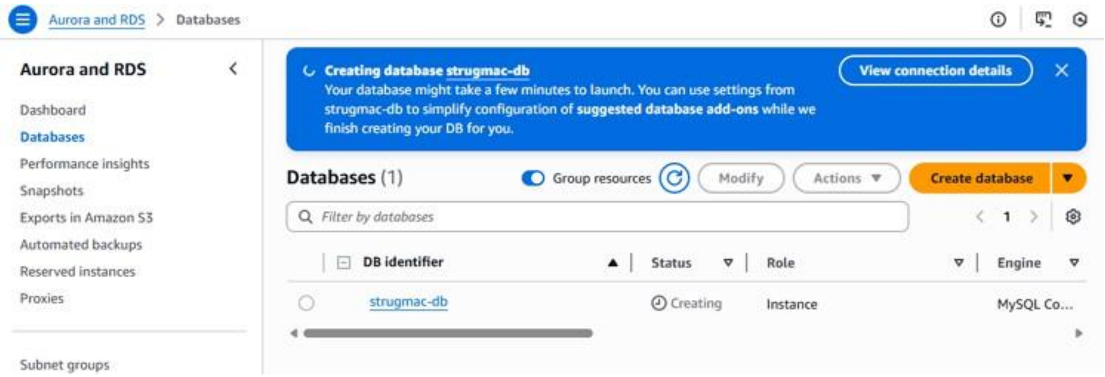
Confirm master password | Info

••••••••••••••••

▼ View default settings for Easy create

Easy create sets the following configurations to their default values, some of which can be changed later. If you want to change any of these settings now, use Standard create.

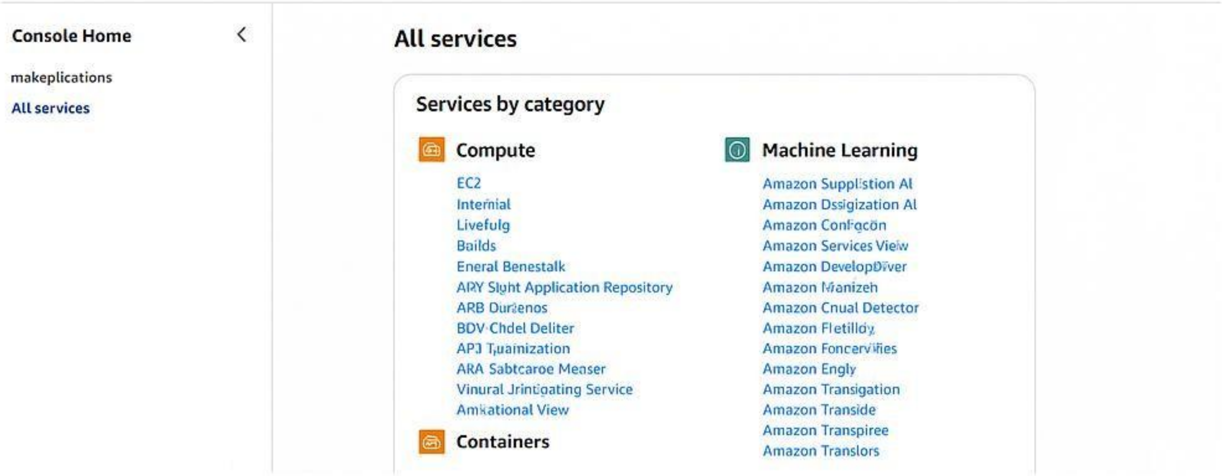
Configuration	Value	Editable after database is created
Encryption	Enabled	No
VPC	Default VPC (vpc-081fe9fe127bb8e79)	No
Multi-AZ	No	Yes
Option group	default:mysql-8-0	Yes
Subnet group	Create new DB Subnet Group	Yes
Automatic backups	Enabled	Yes
VPC security group	default	Yes
Publicly accessible	No	Yes
Database port	3306	Yes
DB instance identifier	strugmac-DB	Yes
DB engine version	8.0.42	Yes
DB parameter group	default.mysql8.0	Yes
Monitoring type	Database Insights - Standard	Yes
Performance insights	Not enabled	Yes
Monitoring	Enabled	Yes
Maintenance	Auto minor version upgrade enabled	Yes



Creating database strugmac-db
Your database might take a few minutes to launch. You can use settings from strugmac-db to simplify configuration of **suggested database add-ons** while we finish creating your DB for you.

Databases (1)

DB identifier	Status	Role	Engine
strugmac-db	Creating	Instance	MySQL Co...



Console Home

makeplications

All services

All services

Services by category

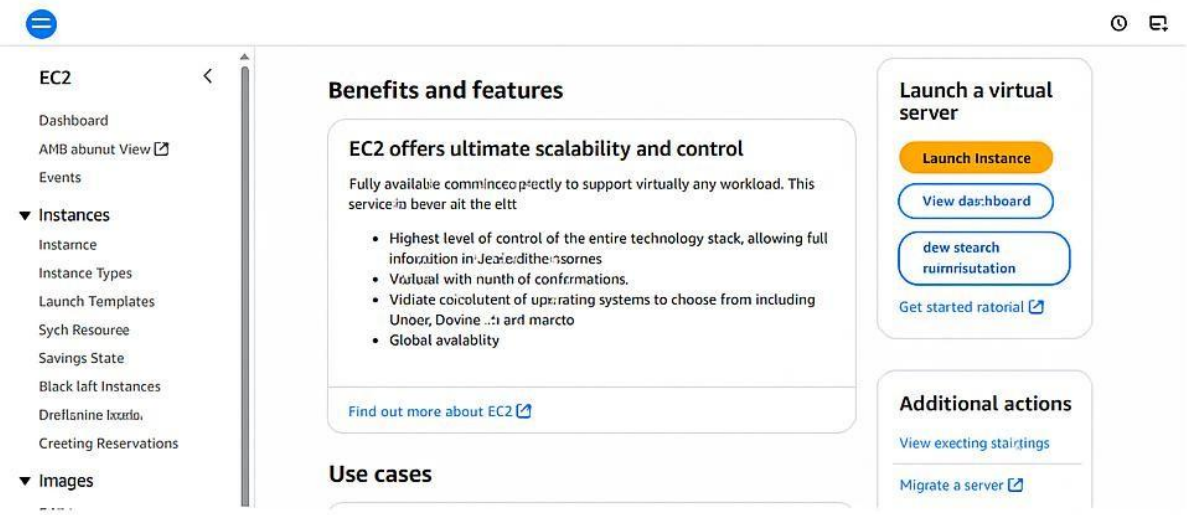
Compute

- EC2
- Internial
- Livefulg
- Builds
- Eneral Benestalk
- ARY Slght Application Repository
- ARB Durienos
- BDV Chdel Deliter
- API Tjuaimization
- ARA Sabtcaroe Menser
- Vinural Jrintigating Service
- Amkational View

Containers

Machine Learning

- Amazon Supplistion Al
- Amazon Dssigization Al
- Amazon ConFgcön
- Amazon Services Vielw
- Amazon DevelopDiver
- Amazon Manizeh
- Amazon Cnual Detector
- Amazon Fletilldy
- Amazon Foncervifies
- Amazon Engly
- Amazon Transigation
- Amazon Transide
- Amazon Transpiree
- Amazon Translors



EC2

Dashboard

AMB abunut View

Events

▼ Instances

Instarnce

Instance Types

Launch Templates

Sych Resouree

Savings State

Black laft Instances

Dreflsnine lxurlo.

Creeting Reservations

▼ Images

Benefits and features

EC2 offers ultimate scalability and control

Fully availabie comminceo pectly to support virtually any workload. This service in bever ait the eltt

- Highest level of control of the entire technology stack, allowing full information in Jeaierdithensornes
- Vaduaal with nunth of confcrmations.
- Vidiate coicolutent of uperating systems to choose from including Unoer, Dovine ..ti ard marcto
- Global avalablity

Find out more about EC2

Use cases

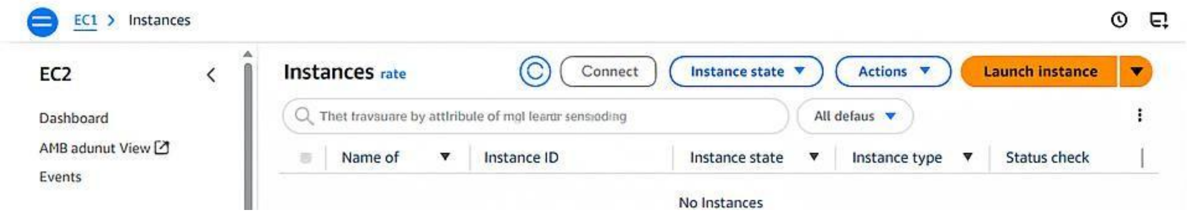
Launch a virtual server

Get started ratorial

Additional actions

View execting stairtings

Migrate a server



EC1 > Instances

EC2

Dashboard

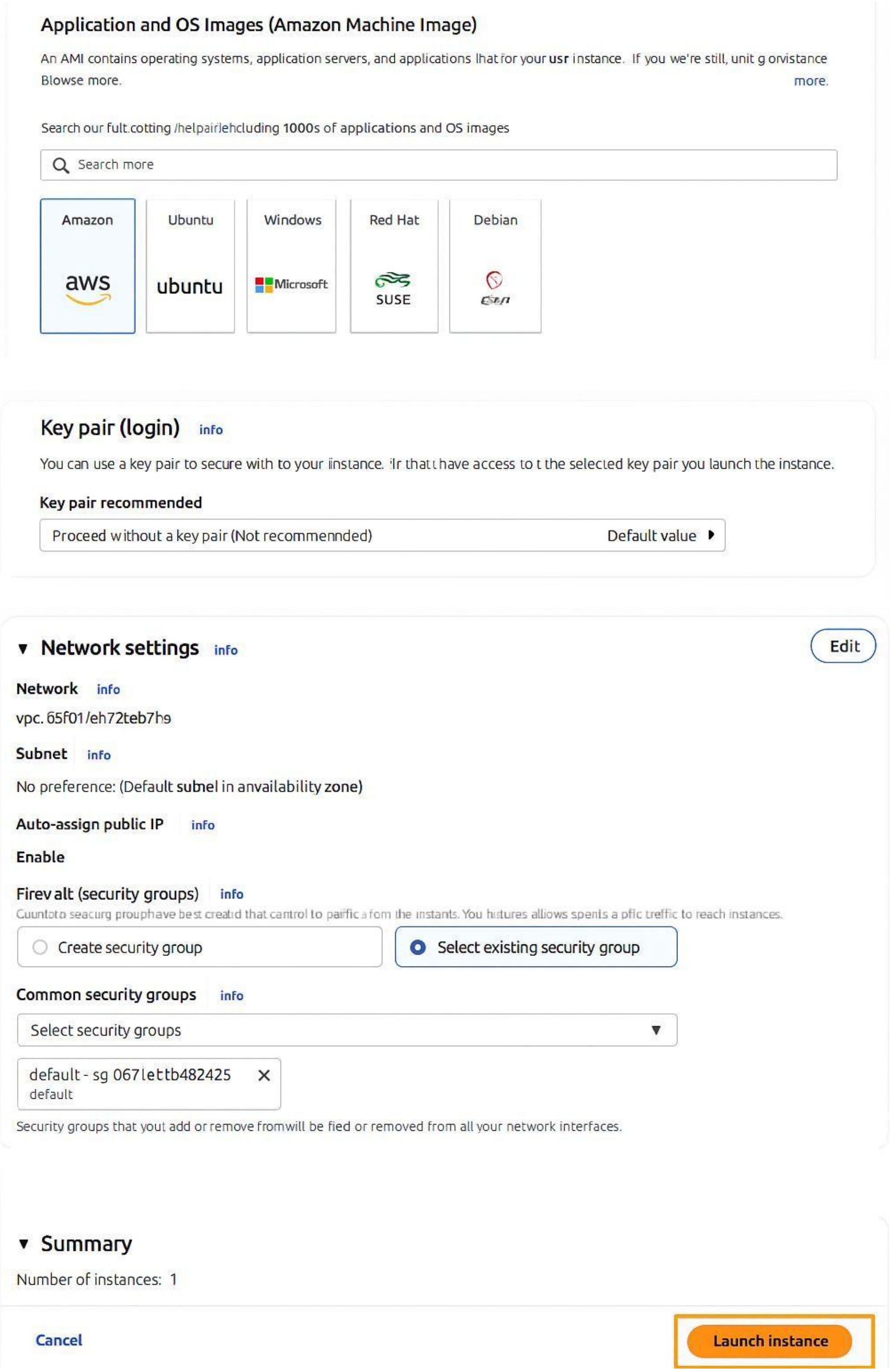
AMB adunut View

Events

Instances rate

Name of	Instance ID	Instance state	Instance type	Status check

No Instances



Application and OS Images (Amazon Machine Image)

An AMI contains operating systems, application servers, and applications lhat for your **usr** instance. If you we're still, unit g orvistance Blowse more. more.

Search our fult.cotting /helpairlehcluding **1000s** of applications and OS images

Search more

Key pair (login) info

You can use a key pair to secure with to your instance. 'Ir thatt have access to t the selected key pair you launch the instance.

Key pair recommended

Proceed without a key pair (Not recommennded) Default value

▼ Network settings info

Network info

vpc. 65f01/eh72teb7h9

Subnet info

No preference: (Default subnel in availability zone)

Auto-assign public IP info

Enable

Firev alt (security groups) info

Cuuntoto seacurg prouphave best creatd that cantrol to parfic a fom the instants. You histures allows spenls a pflc treffic to reach instances.

○ Create security group ● Select existing security group

Common security groups info

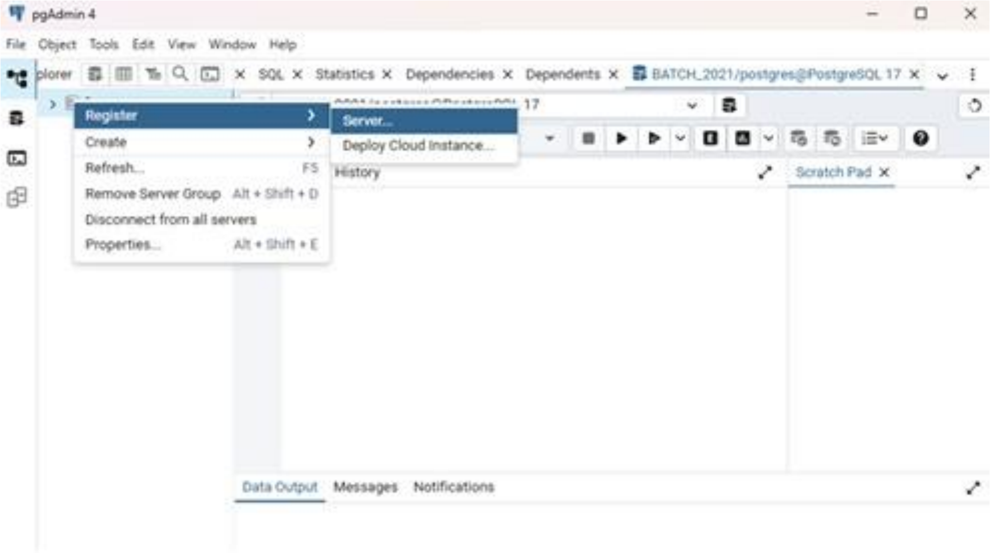
Select security groups ▼

default - sg 067lettb482425 ✕
default

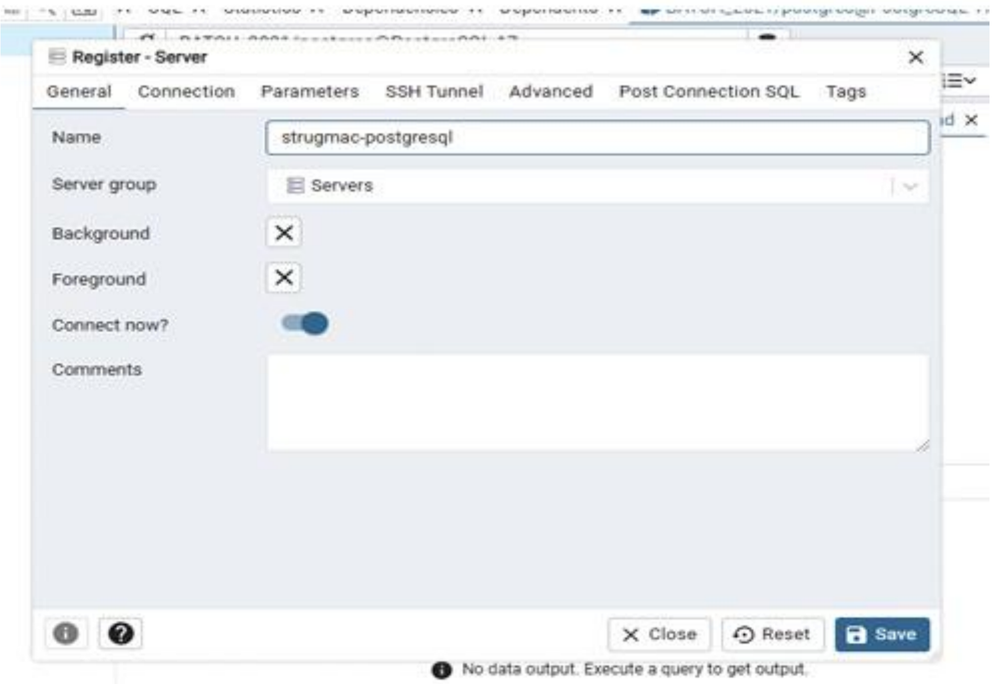
Security groups that yout add or remove fromwill be fied or removed from all your network interfaces.

▼ Summary

Number of instances: 1

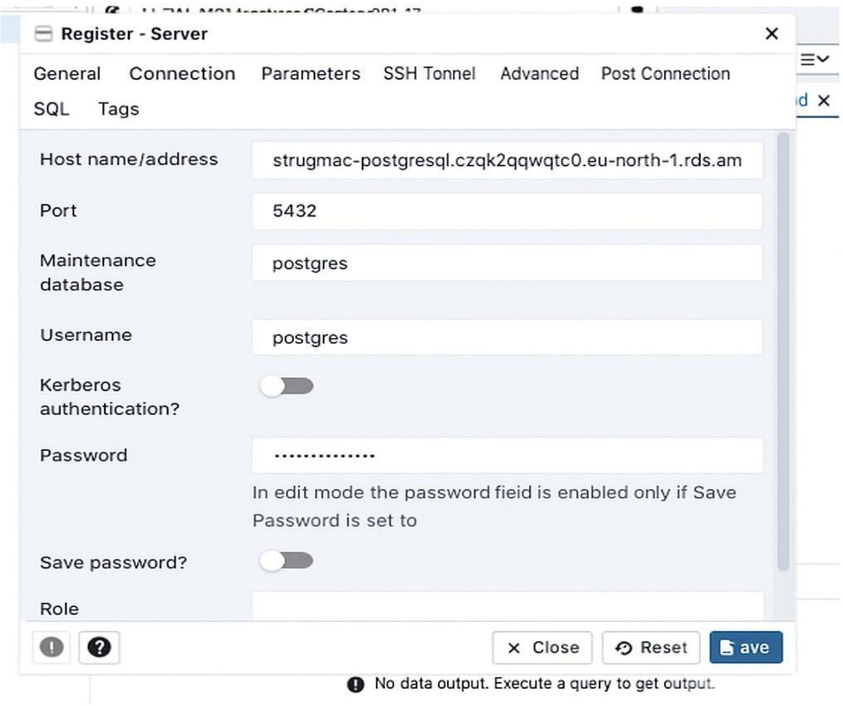

pgAdmin 4
File Object Tools Edit View Window Help
plorer
SQL
Statistics
Dependencies
Dependents
BATCH_2021/postgres@PostgreSQL 17
Register
Server...
Deploy Cloud Instance...
Create
Refresh... F5
Remove Server Group Alt + Shift + D
Disconnect from all servers
Properties... Alt + Shift + E
History
Scratch Pad
Data Output
Messages
Notifications

Copy the API Endpoints from the dashboard of AWS RDS Database instance.



Name	strugmac-postgresql
Server group	Servers
Background	☒
Foreground	☒
Connect now?	●
Comments	

No data output. Execute a query to get output.



Host name/address: strugmac-postgresql.czqk2qqwqtc0.eu-north-1.rds.am

Port: 5432

Maintenance database: postgres

Username: postgres

Kerberos authentication? ○

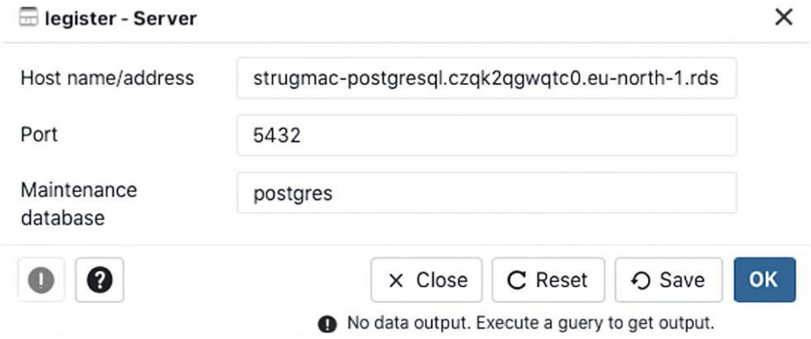
Password: ••••••••••••••

In edit mode the password fieid is enabled only if Save Password is set to

Save password? ○

Role:

No data output. Execute a query to get output.

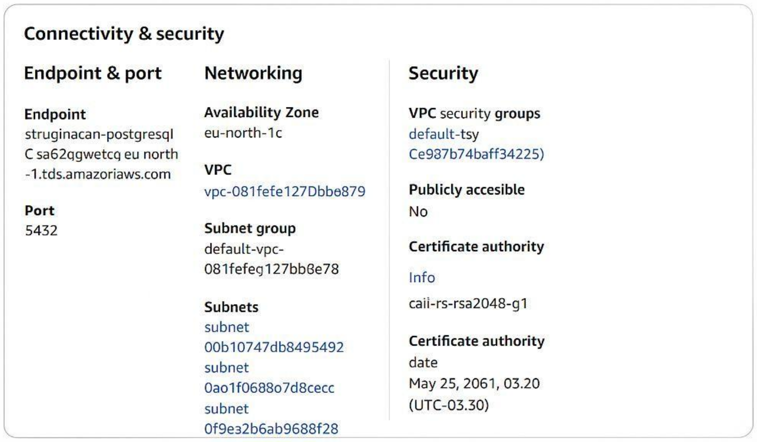


Host name/address: strugmac-postgresql.czqk2qgwqtc0.eu-north-1.rds

Port: 5432

Maintenance database: postgres

No data output. Execute a guery to get output.



Connectivity & security

Endpoint & port

Endpoint
struginacan-postgresql C sa62qgwetcq eu north -1.tds.amazoriaws.com

Port
5432

Networking

Availability Zone
eu-north-1c

VPC
vpc-081fefe127Dbbe879

Subnet group
default-vpc-081fefeg127bb8e78

Subnets
subnet 00b10747db8495492
subnet 0ao1f0688o7d8cecc
subnet 0f9e32b6ab9688f28

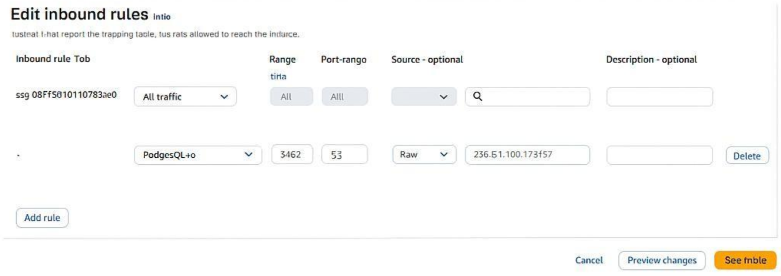
Security

VPC security groups
default-tsy Ce987b74baff34225)

Publicly accesible
No

Certificate authority
Info
caii-rs-rsa2048-g1

Certificate authority date
May 25, 2061, 03.20 (UTC-03.30)



Edit inbound rules Intio

tusteat t-hat report the trapping taole, tus rats allowed to reach the indurce.

Inbound rule Tob		Range tiиa	Port-rango	Source - optional		Description - optional	
ssg 08FfS810110783ae0	All traffic	All	Alll				
·	PodgesQL+o	3462	53	Raw	236.61.100.173f57		Delete

6. Learning Outcomes:

- Understood the concept and functionality of **Amazon RDS (Relational Database Service)**.
- Learned how to **create and configure a database instance** on AWS RDS.
- Gained practical knowledge of **connecting AWS RDS with local pgAdmin/MySQL Workbench**.
- Understood how to **set up and modify VPC security groups** to manage inbound and outbound traffic.
- Learned to **edit inbound rules** to allow database access from specific IP addresses securely.
- Understood the importance of **network configuration and security** in cloud database management.
- Learned to **troubleshoot common connectivity errors** like “connection timeout expired.”
- Gained experience in **launching and configuring EC2 instances** for database connectivity.
- Understood **differences between databases on EC2 and AWS RDS** in terms of scalability and maintenance.
- Developed the ability to **deploy, manage, and secure cloud-based relational databases** effectively.