



# DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Discover. Learn. Empower.

## Experiment - 9

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**Subject Code:** 23CSP-333

### **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.

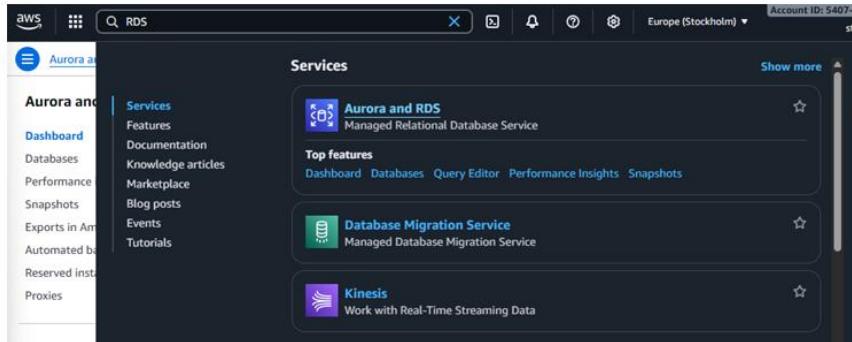
AWS RDS supports multiple database engines, including **MySQL, PostgreSQL, MariaDB, Oracle, and SQL Server**, and provides features like **automated backups, multi-AZ deployment, and read replicas** to ensure high availability and reliability. Security is managed through **IAM, KMS encryption, and VPC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



This screenshot shows the 'Aurora and RDS > Dashboard' page. The left sidebar lists various database management options like Databases, Performance insights, and Snapshots. The main panel displays resource usage statistics for the Europe (Stockholm) region, including DB Instances (0/40), DB Clusters (0/40), and Subnet groups (0). It also features a 'Create a database' section with a 'Create a database' button and a note about restoring from S3.

This screenshot shows the 'Aurora and RDS > Databases > Create database' page. It starts with a notice about the free plan's limitations and an 'Upgrade plan' link. The next section, 'Choose a database creation method', offers two options: 'Standard create' (selected) and 'Easy create'. The configuration section allows selecting an engine type: PostgreSQL (selected), Aurora (MySQL Compatible), MySQL, MariaDB, Oracle, and Microsoft SQL Server. Each engine has its respective logo and a brief description.

**DB instance size**

|   |  |  |
|---|--|--|
| <input type="radio"/> Production<br>db.r7g.xlarge<br>4 vCPUs<br>32 GB RAM<br>400 GB<br>1.946 USD/hour | <input type="radio"/> Dev/Test<br>db.r7g.large<br>2 vCPUs<br>16 GB RAM<br>200 GB<br>0.278 USD/hour | <input checked="" type="radio"/> Free tier<br>db.t4g.micro<br>2 vCPUs<br>1 GiB RAM<br>20 GiB<br>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.

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.  
  
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.

|   |  |
|---|--|
| <input type="radio"/> Managed in AWS Secrets Manager - most secure<br>RDS generates a password for you and manages it throughout its lifecycle using AWS Secrets Manager. | <input checked="" type="radio"/> Self managed<br>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                                |

Aurora and RDS > Databases

**Aurora and RDS**

- Dashboard
- Databases
- Performance insights
- Snapshots
- Exports in Amazon S3
- Automated backups
- Reserved instances
- Proxies
- Subnet groups

**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.

[View connection details](#)

**Databases (1)**

Group resources [C](#) [Actions](#) [Create database](#)

| DB identifier               | Status   | Role     | Engine      |
|-----------------------------|----------|----------|-------------|
| <a href="#">strugmac-db</a> | Creating | Instance | MySQL Co... |

Console Home < All services

## All services

### Services by category

- Compute**
  - EC2
  - Intérial
  - Livefulg
  - Builds
  - Eneral Benestalk
  - ARY Slight Application Repository
  - ARB Duríenos
  - BDV-Chdel Deliter
  - APJ Tjaunization
  - ARA Sabtcaroe Measer
  - Vinural Jrintigating Service
  - Amikational View
- Containers**
- Machine Learning**
  - Amazon Supplistion Al
  - Amazon Dsigtizatoin Al
  - Amazon Configcón
  - Amazon Services View
  - Amazon DevelopDiver
  - Amazon Manizeh
  - Amazon Crual Detector
  - Amazon Fletilldy
  - Amazon Foncerviles
  - Amazon Engly
  - Amazon Transigation
  - Amazon Transide
  - Amazon Transpree
  - Amazon Translors

EC2 <

### Benefits and features

**EC2 offers ultimate scalability and control**

Fully available comminceo pfectly to support virtually any workload. This service in never alt the eltt

- Highest level of control of the entire technology stack, allowing full information in Jeaxedithes:sonnes
- Vwlual with mutn of confrmations.
- Vidiate cocolument of up:rating systems to choose from including Unoer, Dovine ..:ard marcto
- Global availability

[Find out more about EC2](#)

### Use cases

**Launch a virtual server**

[Launch Instance](#)

[View dashboard](#)

[dew stearch ruimrisutation](#)

[Get started ratorial](#)

**Additional actions**

[View existing startings](#)

[Migrate a server](#)

EC2 > Instances

### Instances

| Instances            |  | Connect                    | Instance state | Actions      | Launch instance |
|----------------------|--|----------------------------|----------------|--------------|-----------------|
| <input type="text"/> | Thet travasure by attribute of mgl learnr sensioding | <a href="#">All defaus</a> |                |              |                 |
| 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 that run on your instance. If you're still using an instance, click [Launch](#).

Search our catalog for over 1000s of applications and OS images

Search more



## Key pair (login) [info](#)

You can use a key pair to secure access to your instance. If you have access to the selected key pair when you launch the instance.

### Key pair recommended

[Proceed without a key pair \(Not recommended\)](#)

[Default value ▶](#)

[Edit](#)

## ▼ Network settings [info](#)

### Network [info](#)

vpc-65f01/eh72teb7h9

### Subnet [info](#)

No preference: (Default subnet in availability zone)

### Auto-assign public IP [info](#)

Enable

### Firewall (security groups) [info](#)

Create a security group that controls traffic to and from instances. You can allow specific traffic to reach instances.

Create security group

Select existing security group

### Common security groups [info](#)

Select security groups

default - sg 067le7tb482425 X  
default

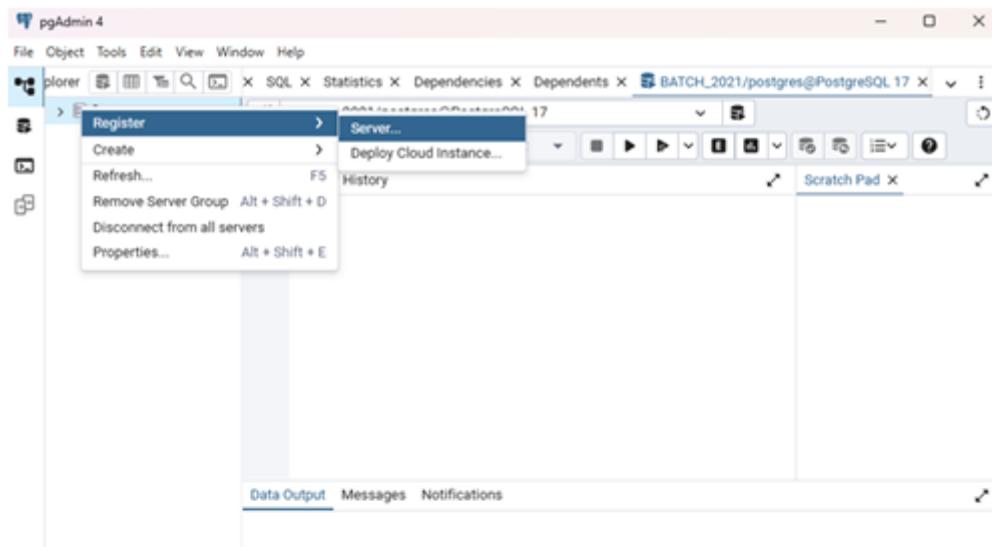
Security groups that you add or remove from will be applied to all your network interfaces.

## ▼ Summary

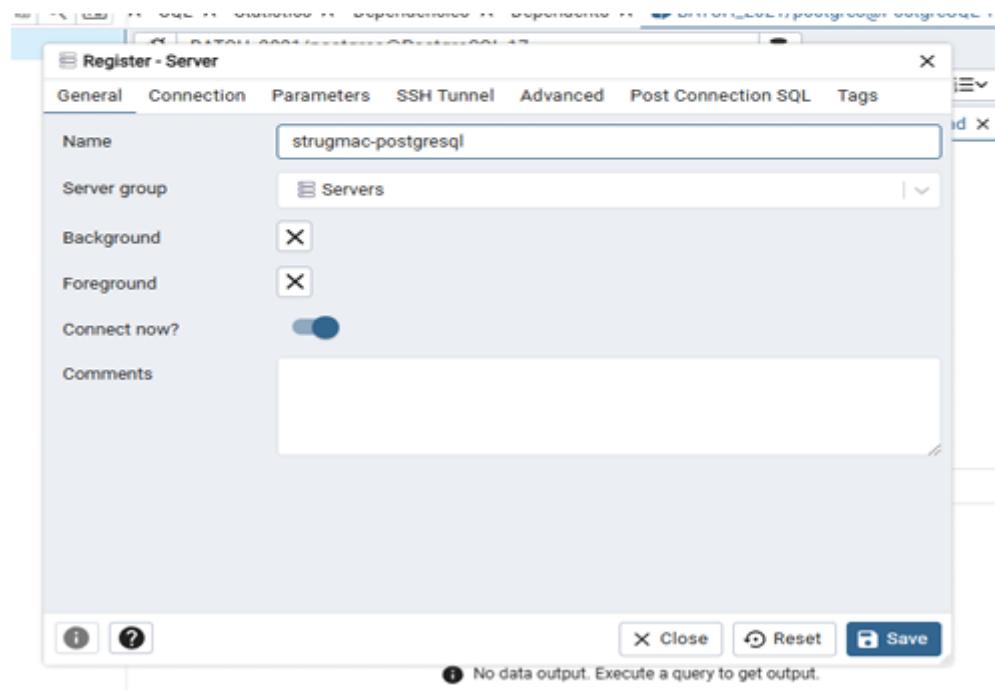
Number of instances: 1

[Cancel](#)

[Launch instance](#)



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



Register - Server

General Connection Parameters SSH Tunnel Advanced Post Connection

SQL Tags

|  |  |
|--|--|
| Host name/address  | strugmac-postgresql.czqk2qqwqtc0.eu-north-1.rds.am |
| Port   | 5432   |
| Maintenance database   | postgres   |
| Username   | postgres   |
| Kerberos authentication?   | <input checked="" type="checkbox"/>                |
| Password   | .....  |
| In edit mode the password field is enabled only if Save Password is set to |  |
| Save password?   | <input checked="" type="checkbox"/>                |
| Role   |  |

No data output. Execute a query to get output.

**legister - Server**

|                      |   |
|----------------------|---|
| Host name/address    | strugmac-postgresql.czqk2gqwqtco.eu-north-1.rds |
| Port                 | 5432  |
| Maintenance database | postgres  |

X Close
C Reset
↻ Save
OK

**! No data output. Execute a query to get output.**

### Connectivity & security

| Endpoint & port   | Networking  | Security   |
|---|---|--|
| <b>Endpoint</b><br>strugmacan-postgresql<br>Csa62qgwetcq eu north-1.tds.amazonaws.com | <b>Availability Zone</b><br>eu-north-1c   | <b>VPC security groups</b><br>default-tsy<br>Ce987b74baff34225             |
| <b>Port</b><br>5432   | <b>VPC</b><br>vpc-081fefe127dbbe879   | <b>Publicly accessible</b><br>No   |
|   | <b>Subnet group</b><br>default-vpc-081fefefeg127bb8e78  | <b>Certificate authority</b><br>Info<br>caii-rs-rsa2048-g1                 |
|   | <b>Subnets</b><br>subnet<br>00b10747db8495492<br>subnet<br>0ao1f0688o7d8cecc<br>subnet<br>0f9ea2b6ab9688f28 | <b>Certificate authority</b><br>date<br>May 25, 2061, 03.20<br>(UTC-03.30) |

### Edit inbound rules Info

Use this list to report the trapping traffic, thus rats allowed to reach the instance.

| Inbound rule          | Range       | Port-range | Source - optional | Description - optional |
|-----------------------|-------------|------------|-------------------|------------------------|
| ssg 08FF5010110783ae0 | All traffic | All        | All               |                        |
|                       |             |            |                   |                        |
|                       |             |            |                   |                        |
|                       |             |            |                   |                        |

PodgesQL+o
3462
53
Raw
236.51.100.173:157
Delete

Add rule
Create
Revoke changes
Cancel

## **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.