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2KE20CS032

Assignment 49

Understood. To follow the provided instructions and create the files/directory using the same name and case as provided in the task steps, please provide me with the specific names and case instructions for the files/directory you want to create.

AWS

Assignment: 2 : Creating Lambda Function to access RDS Database

Creating RDS Database

1. Navigate to RDS service and Create a Database

2. Choose Standard create, Engine type MySQL, Leave Engine version as default, choose Templates as Free tier

3. In Settings Give a name for your Database or leave it as default, leave Master username as default, Set Master password for your Database


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


☒ Show versions that support the Multi-AZ DB cluster [Info](#)

Create a A Multi-AZ DB cluster with one primary DB instance and two readable standby DB instances. Multi-AZ DB clusters provide up to 2x faster transaction commit latency and automatic failover in typically under 35 seconds.

☐ Show versions that support the Amazon RDS Optimized Writes [Info](#)

Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

Engine Version

MySQL 8.0.35

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](#)

Availability and durability

Deployment options [Info](#)

The deployment options below are limited to those supported by the engine you selected above.

☒ Single DB instance (not supported for Multi-AZ DB cluster snapshot)

Creates a single DB instance with no standby DB instances.

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 60 alphanumeric characters or hyphens. First character must be a letter. Can't contain two consecutive hyphens. Can't end with a hyphen.

▼ 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.

☐ Manage master credentials in AWS Secrets Manager

Manage master user credentials in Secrets Manager. RDS can generate a password for you and manage it throughout its lifecycle.

[Info](#) If you manage the master user credentials in Secrets Manager, some RDS features aren't supported. [Learn more](#)

☐ Auto generate a password

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

Master password [Info](#)

Constraints: At least 8 printable ASCII characters. Can't contain any of the following: / (slash), ' (single quote), " (double quote) and @ (at sign).

Confirm master password [Info](#)

4. Instance Configuration and Storage you can leave it as default

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](#)

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

[i](#) 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

5. In Connectivity Choose first option(Don't connect to an EC2 Compute Resource) and inVPC select your VPC, Public access No, VPC security groups, you can create a new security group

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.

my-vpc-01 (vpc-0e190ca43b317839f)
5 Subnets, 2 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.

Create new DB Subnet Group

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 incoming traffic.

- ☐ **Choose existing**
Choose existing VPC security groups

- ☒ **Create new**
Create new VPC security group

New VPC security group name

rds-security-group

Availability Zone [Info](#)

ap-south-1a

RDS Proxy

RDS Proxy is a fully managed, highly available database proxy that improves application scalability, resiliency, and security.

- ☐ **Create an RDS Proxy** [Info](#)
RDS automatically creates an IAM role and a Secrets Manager secret for the proxy. RDS Proxy has additional costs. For more information, see [Amazon RDS Proxy pricing](#).

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-2019 (default)
Expiry: Aug 22, 2024

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

► **Additional configuration**

6 In Database Authentication choose first method

7 Disable Monitoring and click on Create database, Your database will be created

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

Databases (1)

Group resources [Modify](#) [Actions](#) [Restore from S3](#) [Create database](#)

Filter by databases

DB identifier ▲	Status ▼	Role ▼	Engine ▼	Region & AZ ▼	Size ▼	Recommendations ▼	CPU ▼	Current activity ▼	Maintenance ▼
database-1	Creating	Instance	MySQL Community	ap-south-1a	db.t3.micro		-		none

8. Go to the database and open your security group, In inbound rules, add a rule in security group, choose the type as MYSQL/Aurora and allow your VPC range, In Outbound rule allow all traffic

Inbound rules [Info](#)

Security group rule ID: sgr-0a8479727d45aace

Type	Protocol	Port range	Source	Description - optional
MySQL/Aurora	TCP	3306	Custom	157.50.67.84/32
MySQL/Aurora	TCP	3306	Custom	10.0.0.0/8

[Add rule](#) [Cancel](#) [Preview changes](#) [Save rules](#)

Connect to RDS instance

1 Launch an ec2 instance and install mysql alone there follow mattermost software Installation Document

```
Verifying      : mysql-community-common-8.0.35-1.el9.x86_64      3/6
Verifying      : mysql-community-icu-data-files-8.0.35-1.el9.x86_64 4/6
Verifying      : mysql-community-libs-8.0.35-1.el9.x86_64      5/6
Verifying      : mysql-community-server-8.0.35-1.el9.x86_64      6/6

Installed:
mysql-community-client-8.0.35-1.el9.x86_64  mysql-community-client-plugins-8.0.35-1.el9.x86_64
mysql-community-common-8.0.35-1.el9.x86_64  mysql-community-icu-data-files-8.0.35-1.el9.x86_64
mysql-community-libs-8.0.35-1.el9.x86_64    mysql-community-server-8.0.35-1.el9.x86_64

Complete!
```

```
ec2-user@ip-10-0-1-197.ap-south-1.compute.internal ~ (0.969s)
sudo systemctl status mysqld
● mysqld.service - MySQL Server
   Loaded: loaded (/usr/lib/systemd/system/mysqld.service; enabled; preset: disabled)
   Active: active (running) since Sun 2023-12-31 07:16:14 UTC; 4s ago
     Docs: man:mysqld(8)
           http://dev.mysql.com/doc/refman/en/using-systemd.html
  Main PID: 4915 (mysqld)
    Status: "Server is operational"
     Tasks: 38 (limit: 1114)
    Memory: 426.9M
       CPU: 5.869s
  CGroup: /systemd/system/mysqld.service
```

2. Connect to mysql using the command as follows,
mysql -h your-rds-dnsname -u admin -p

```
mysql -h database-1.c5usk8ag8mpj.ap-south-1.rds.amazonaws.com -p 3306 -u admin -p
```

```
Enter password:
ERROR 1049 (42000): Unknown database '3306'
```

```
ec2-user@ip-10-0-1-197.ap-south-1.compute.internal ~
mysql -h database-1.c5usk8ag8mpj.ap-south-1.rds.amazonaws.com -u admin -p
```

```
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 47
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>
```

3. For Creating Database, tables, Inserting Content into the tables, follow the attached images

```
mysql> create database simpleDB ;
Query OK, 1 row affected (0.01 sec)

mysql> use simpleDB;
Database changed
mysql> CREATE TABLE CUSTOMERS (
    ->     ID INT NOT NULL,
    ->     NAME VARCHAR(20) NOT NULL,
    ->     AGE INT NOT NULL,
    ->     ADDRESS CHAR(25),
    ->     SALARY DECIMAL(18, 2),
    ->     PRIMARY KEY (ID)
    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> 
```

```
    ->     ADDRESS CHAR(25),
    ->     SALARY DECIMAL(18, 2),
    ->     PRIMARY KEY (ID)
    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> show tables;
+-----+
| Tables_in_simpleDB |
+-----+
| CUSTOMERS           |
+-----+
1 row in set (0.01 sec)

mysql> 
```

```

Tables_in_simptedb
+-----+
| CUSTOMERS |
+-----+
1 row in set (0.01 sec)

```

```
mysql> INSERT INTO CUSTOMERS (ID, NAME, AGE, ADDRESS, SALARY) VALUES (1, 'Ramesh', 32, 'Ahmedabad', 2000.00);
Query OK, 1 row affected (0.01 sec)
```

```
mysql> INSERT INTO CUSTOMERS (ID, NAME, AGE, ADDRESS, SALARY) VALUES (2, 'Khilan', 25, 'Delhi', 1500.00);
Query OK, 1 row affected (0.00 sec)
```

```
mysql> INSERT INTO CUSTOMERS (ID, NAME, AGE, ADDRESS, SALARY) VALUES (3, 'Kaushik', 23, 'Kota', 2000.00);
Query OK, 1 row affected (0.00 sec)
```

```
mysql> INSERT INTO CUSTOMERS (ID, NAME, AGE, ADDRESS, SALARY) VALUES (4, 'Chaitali', 25, 'Mumbai', 6500.00);
Query OK, 1 row affected (0.00 sec)
```

```
mysql> INSERT INTO CUSTOMERS (ID, NAME, AGE, ADDRESS, SALARY) VALUES (5, 'Hardik', 27, 'Bhopal', 8500.00);
Query OK, 1 row affected (0.00 sec)
```

```
mysql> 
```

```
mysql> commit;
```

Query OK, 0 rows affected (0.01 sec)

```
mysql> select * from tables;
```

```
ERROR 1064 (42000): You have an error in your SQL syntax; check the
e 1
```

```
mysql> select * from customers;
```

```
ERROR 1064 (42000): You have an error in your SQL syntax; check the
line 1
```

```
mysql> select * form CUSTOMERS;
```

```
ERROR 1064 (42000): You have an error in your SQL syntax; check the
line 1
```

```
mysql> select * from CUSTOMERS;
```

ID	NAME	AGE	ADDRESS	SALARY
1	Ramesh	32	Ahmedabad	2000.00
2	Khilan	25	Delhi	1500.00
3	Kaushik	23	Kota	2000.00
4	Chaitali	25	Mumbai	6500.00
5	Hardik	27	Bhopal	8500.00

5 rows in set (0.01 sec)

```
mysql>
```

```
mysql> FLUSH PRIVILEGES;
```

Query OK, 0 rows affected (0.01 sec)

```
mysql> commit;
```

Query OK, 0 rows affected (0.01 sec)

```
mysql>
```


Creating a Lambda Function

1. Navigate to Lambda Function and create a function and copy the function in the attached document and make all the necessary changes - **Lambda Function for RDS DB.pdf**
2. You need to have aws-sdk libraries, if you want to execute lambda functions, we can install the aws-sdk using npm, For that go to your centos machine in which you have nodejs and npm, create one folder in your CentOS and navigate into the folder and execute npm install aws-sdk and npm install mysql , You will get node modules and few files, Create a Zip file for that folders and files. Using filezilla, send that zip file to your windows.
3. Add layers to your lambda functions. Navigate to layers and click on create layer
4. Give a layer name and upload that zip file which you have created before
5. Choose the run time as Nodejs16
6. In the lambda Configuration choose your VPC, Subnet, Security groups Which will make your lambda available at your VPC level,
7. In the lambda Configuration, In Permissions, make sure lambda has correct roles to access your Database, If not create a role and attach it to the lambda

Reference video:

references

AWS - Lambda - Layer Using Node.js

https://www.youtube.com/watch?v=flJ_cfQ53vQ&t=121s

Connect to MySQL on AWS RDS using NodeJS

<https://www.youtube.com/watch?v=6Nt-Jl3CzxE&t=184s>

Lambda with AWS RDS Tutorial: Connecting to MySQL on Lambda using mysql-connector-python

<https://www.youtube.com/watch?v=D2OrhX4XkXQ>

Private RDS Instance & AWS Lambda

<https://www.youtube.com/watch?v=UgWjbSixRg4&t=474s>

Installing npm modules in aws

<https://www.youtube.com/watch?v=RnFowJ130pc&t=247s>

For both the method I have installed requested modules in host machine and transferred those files using FileZilla

Using python 3.10

Lambda > Functions > nodejs--python

nodejs--python

▼ Function overview [Info](#)

Diagram Template

nodejs--python

Layers (0)

API Gateway

+ Add trigger

+ Add destination

Code Test Monitor Configuration Aliases Versions

nodejs--python

Layers (0)

API Gateway

+ Add trigger

+ Add destination

Code Test Monitor Configuration Aliases Versions

✓ Executing function: succeeded ([logs](#))

▼ Details

The area below shows the last 4 KB of the execution log.

```
{
  "statusCode": 200,
  "body": "[{"id": 1, "name": "Ramesh", "age": 32, "address": "Ahmedabad", "salary": 2000.0}, {"id": 2, "name": "Khilan", "age": 3, "name": "Kaushik", "age": 23, "address": "Kota", "salary": 2000.0}, {"id": 4, "name": "Chaitali", "age": 25, "address": "Hardik", "age": 27, "address": "Bhopal", "salary": 8500.0}]"
```

Summary

Code SHA-256 X91LDatjzPUTQAxWoAaPA2oq0eo7K1wP1e3EbJlmhZc=	Execution time 11 seconds ago (January 1, 2024 at 09:18 AM C
--	---

Using nodejs 16x and nodejs 18x

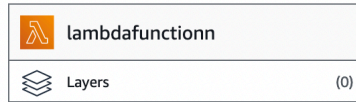
lambdafunctionn

▼ Function overview [Info](#)

Exp

Diagram

Template



API Gateway

+ Add destination

+ Add trigger

even for node js is same but here i took s3 bucket to store the node_modules

Description

-

Last modified
11 hours ago

Function ARN
 arn:aws:la

Function URL

-

Code

Test

Monitor

Configuration

Aliases

Versions



Executing function: succeeded ([logs](#) [↗](#))

▼ Details

The area below shows the last 4 KB of the execution log.

```
{
  "statusCode": 200,
  "body": "[{\\"ID\\": 1, \\"NAME\\": \\"Ramesh\\", \\"AGE\\": 32, \\"ADDRESS\\": \\"Ahmedabad\\", \\"SALARY\\": 2000.0}, {\\"ID\\": 2, \\"NAME\\": \\"Khilan\\", \\"AGE\\": 25,
3, \\"NAME\\": \\"Kaushik\\", \\"AGE\\": 23, \\"ADDRESS\\": \\"Kota\\", \\"SALARY\\": 2000.0}, {\\"ID\\": 4, \\"NAME\\": \\"Chaitali\\", \\"AGE\\": 25, \\"ADDRESS\\": \\"Mumbai\\
\\\"Hardik\\", \\"AGE\\": 27, \\"ADDRESS\\": \\"Bhopal\\", \\"SALARY\\": 8500.0}]"
```

Summary

Code SHA-256

Execution time