

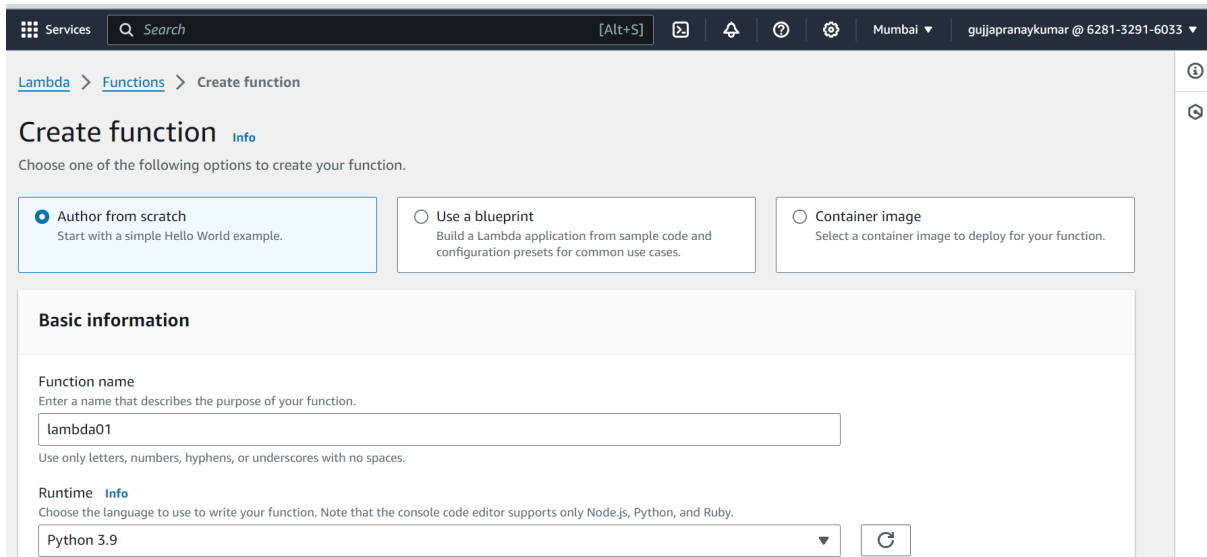
Serverless computing using AWS LAMBDA

Overview:

1. Deploy code in AWS lambda
2. Create and invoke API for lambda function

Code deployment using AWS Lambda

1. Navigate to Lambda page and click on create function
 2. Provide the function name
 3. Select the Runtime as python 3.9
 4. Click on create function and it should be created successfully
- A:

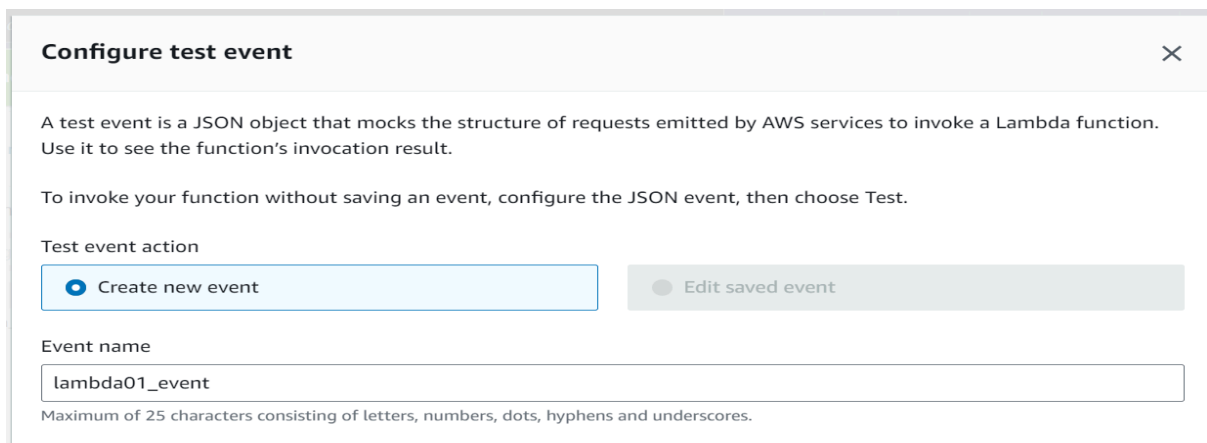


The screenshot shows the AWS Lambda 'Create function' page. At the top, there's a navigation bar with 'Services', a search bar, and user information. Below the navigation bar, the breadcrumb trail is 'Lambda > Functions > Create function'. The main heading is 'Create function' with an 'Info' link. Below the heading, there's a sub-heading 'Choose one of the following options to create your function.' and three radio button options: 'Author from scratch' (selected), 'Use a blueprint', and 'Container image'. The 'Author from scratch' option has a sub-text 'Start with a simple Hello World example.' Below the options, there's a 'Basic information' section. It contains a 'Function name' field with the value 'lambda01' and a sub-text 'Enter a name that describes the purpose of your function. Use only letters, numbers, hyphens, or underscores with no spaces.' Below the name field, there's a 'Runtime' dropdown menu with 'Python 3.9' selected and a sub-text 'Choose the language to use to write your function. Note that the console code editor supports only Node.js, Python, and Ruby.' There's also a 'Refresh' button next to the dropdown.

5. Scroll down and you can see a sample python code that you can use it for the deployment

6. Go to test tab to create a new event, provide the event name and click on save event and the event will get saved

A:

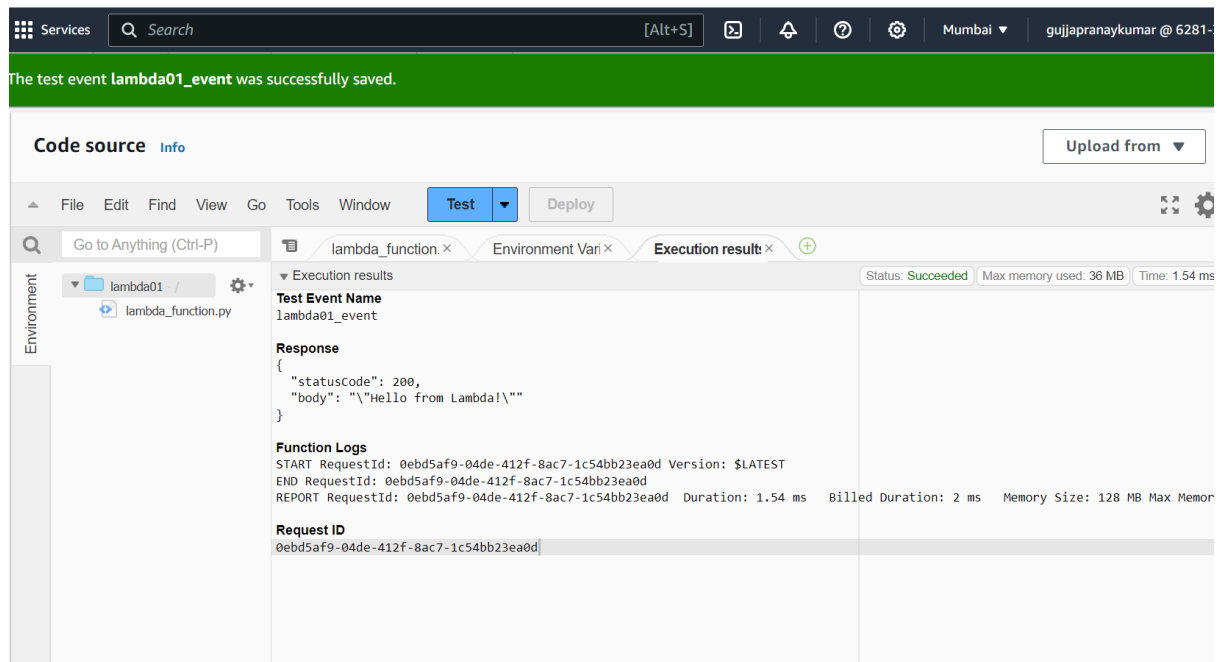


The screenshot shows the 'Configure test event' dialog box. It has a title bar with a close button. The main content area has a sub-heading 'Configure test event' and a description: 'A test event is a JSON object that mocks the structure of requests emitted by AWS services to invoke a Lambda function. Use it to see the function's invocation result.' Below the description, there's a sub-heading 'To invoke your function without saving an event, configure the JSON event, then choose Test.' Below this, there's a 'Test event action' section with two radio button options: 'Create new event' (selected) and 'Edit saved event'. Below the actions, there's an 'Event name' field with the value 'lambda01_event' and a sub-text 'Maximum of 25 characters consisting of letters, numbers, dots, hyphens and underscores.'

7. Now navigate back to the code tab and click on test

8. You will get the execution results as below

A:



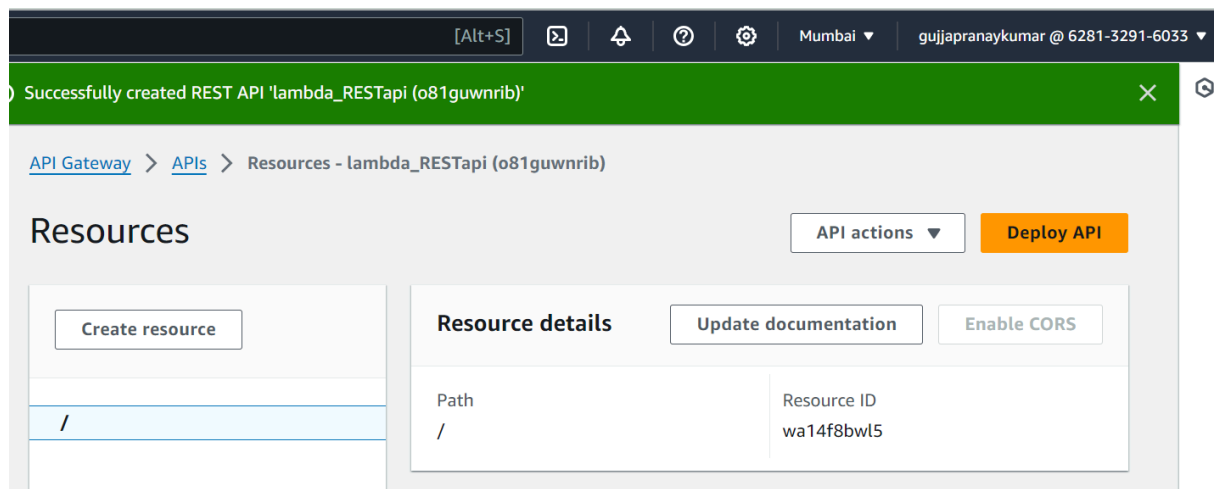
Configure REST API to call the lambda function

1. Navigate to API gateway dashboard

2. Scroll down and select Build option on REST api in the API type

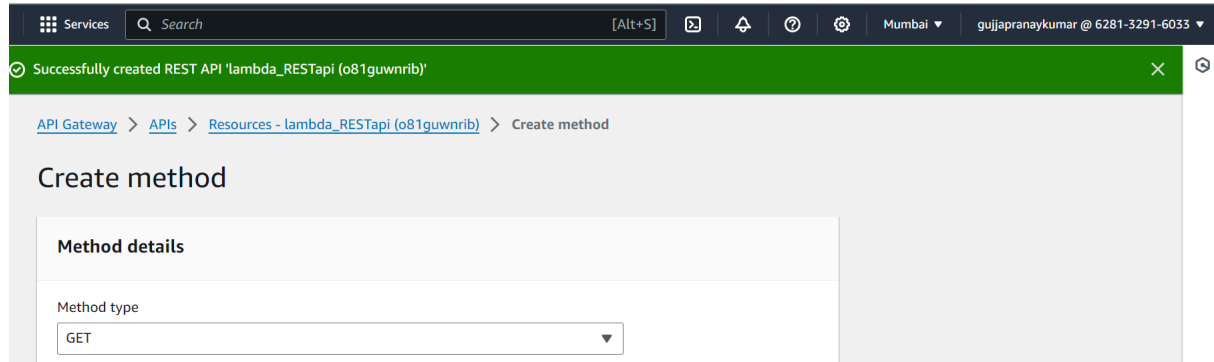
3. Click on New api, provide the api name, description and click on create API you will get a response as below

A:



4. Navigate to Actions and click on 'Create Method' and select GET from the resource dropdown and click on tick mark

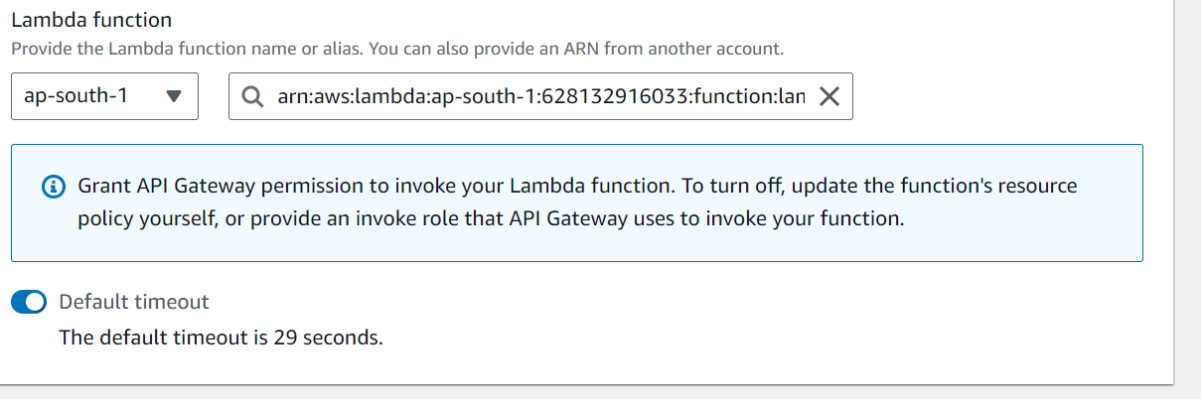
A:



5. In the LAMBDA function text box type the lambda function that you have created before and leave remaining all settings as default

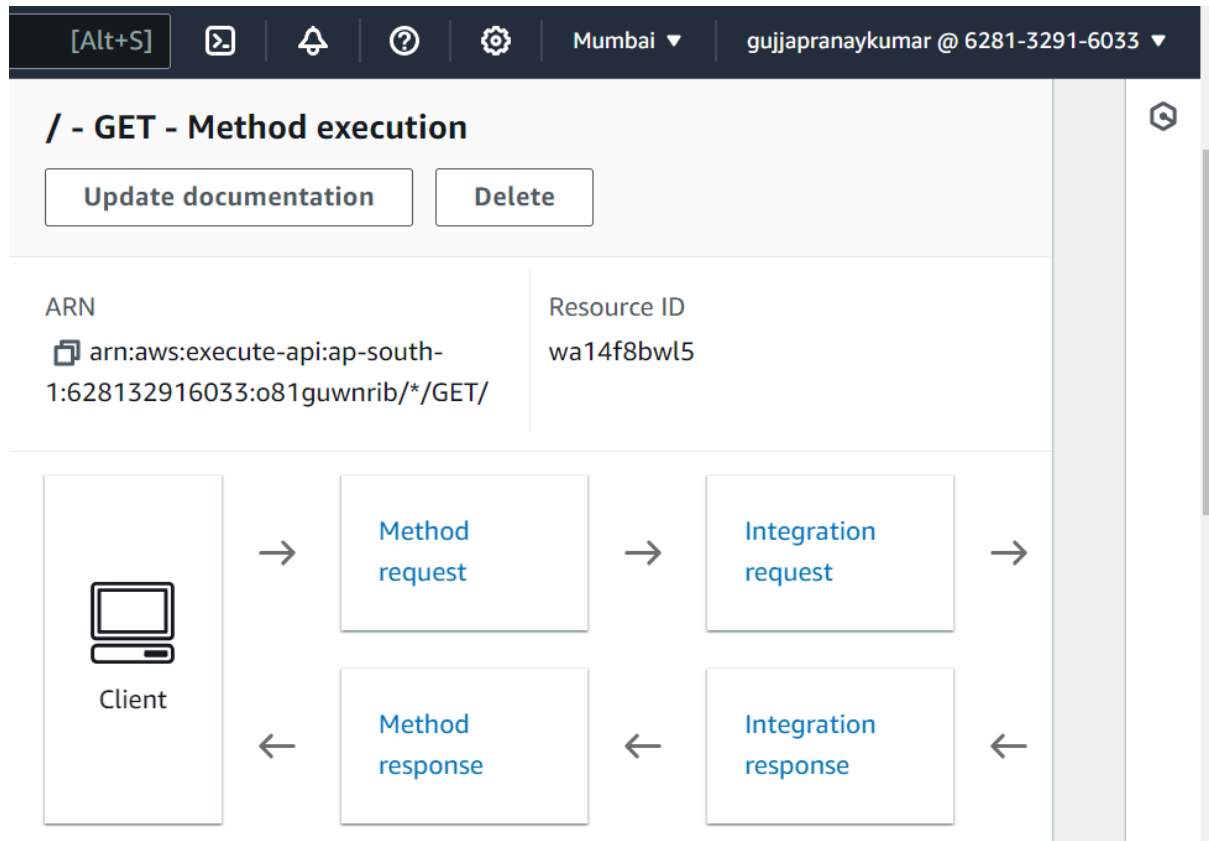
6. Click on Save and then click 'OK' in the prompt

A:



7. Resource will be created and you will get a response as below

A:



8. Click on Actions and click on Deploy API

9. Select the Deployment stage as New stage, provide the stage name, stage description, and deployment description and click on deploy

A:

Deploy API ✕

Choose a stage where your API will be deployed. For example, a test version of your API could be deployed to a stage named beta.

Stage

New stage ▼

Stage name

lambda_Rest01

i A new stage will be created with the default settings. Edit your stage settings on the **Stage** page.

Deployment description

this is the rest_api deployment for lambda01

Cancel Deploy

10. You will get a response page as below

A:

Stage actions ▼ Create stage

Stage details Info

Edit

Stage name	Rate Info
lambda_Rest01	-
Web ACL	API cache
-	⊖ Inactive
Burst Info	Client certificate
-	-
Invoke URL	
🔗 https://o81guwnrib.execute-api.ap-south-1.amazonaws.com/lambda_Rest01	

11. Now click on the Invoke url and you will get the function invoked using REST API A:



END

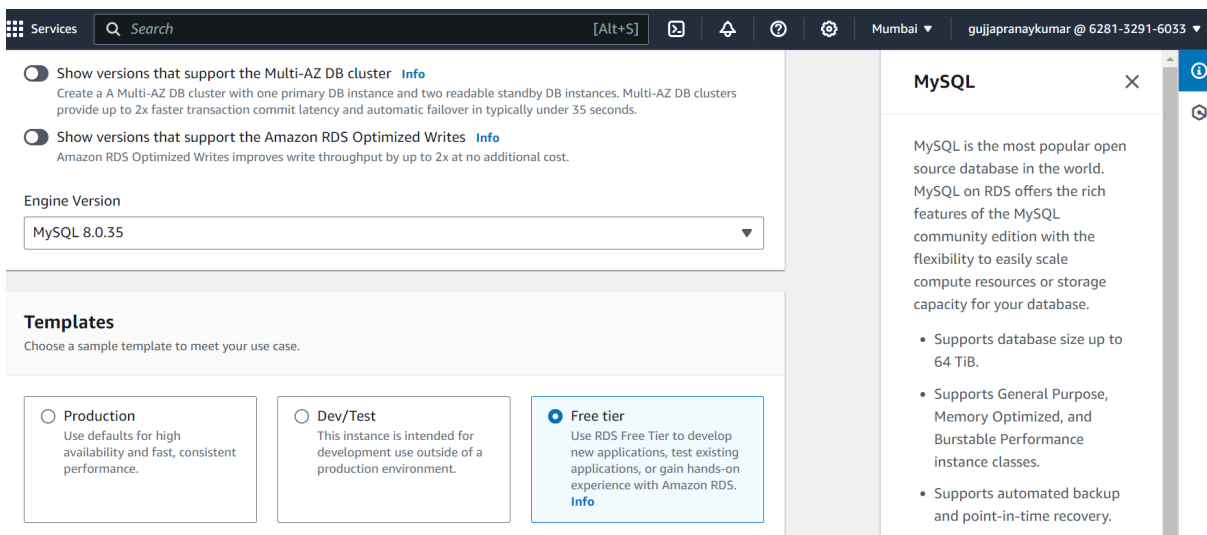
Creating Lambda Function to access RDS Database

Creating RDS Database

1. Navigate to RDS service and Create a Database

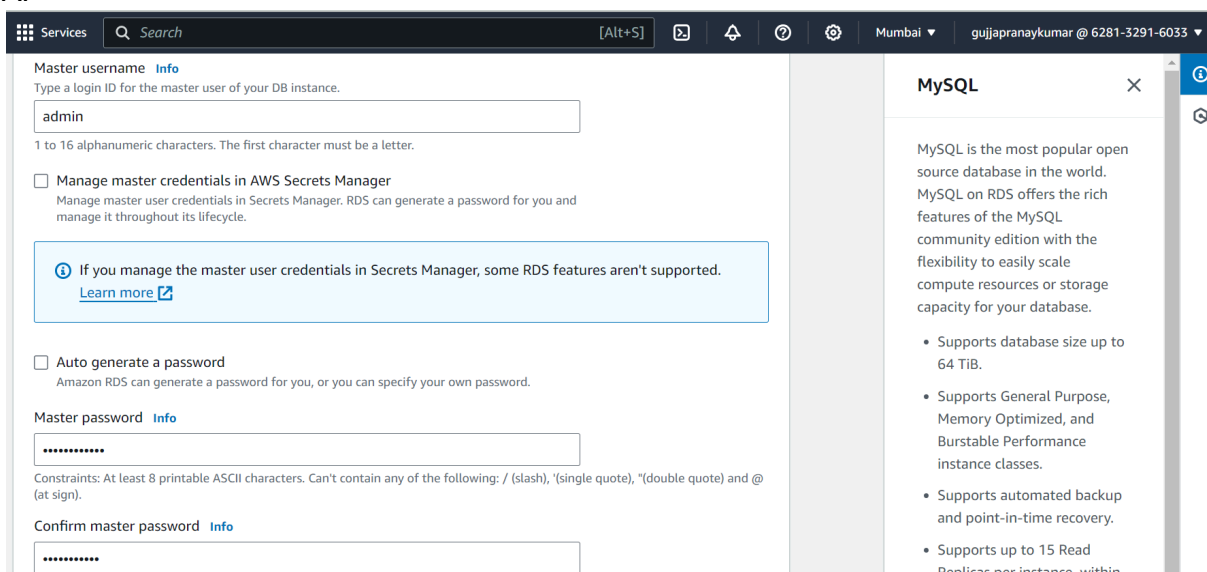
2. Choose Standard create, Engine type MySQL, Leave Engine version as default, choose Templates as Free tier

A:



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

A:



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

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

A:

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.

vpc-0358873cfff60846f
7 Subnets, 2 Availability Zones

Only VPCs with a corresponding DB subnet group are listed.

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_securitygrp

Availability Zone [Info](#)

ap-south-1a

6.In Database Authentication choose first method

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

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

A:

EC2 > Security Groups > sg-0bebd067be20435c7 - rds_securitygrp > 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
sg-07b741204a5c69c23	MYSQL/Aurora	TCP	3306	Cu... 10.0.0.0/16	

Cancel

Preview changes

Save rules

Connect to RDS instance

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

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

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

A:

```
mysql> create database sampleDB;
Query OK, 1 row affected (0.00 sec)

mysql> use sampleDB;
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> show tables;
+-----+
| Tables_in_sampleDB |
+-----+
| customers           |
+-----+
1 row in set (0.00 sec)

mysql> desc customers;
+-----+-----+-----+-----+-----+-----+
| Field | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| id    | int(11)       | NO   | PRI | NULL    |       |
| name  | varchar(20)   | NO   |     | NULL    |       |
| age   | int(11)       | NO   |     | NULL    |       |
| address | char(25)      | YES  |     | NULL    |       |
| salary | decimal(18,2) | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.01 sec)
```

```
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 (0.00 sec)

mysql> flush privileges;
Query OK, 0 rows affected (0.00 sec)
```

Gave privileges to sampleDB to user admin: grant all privileges sampleDB.* to 'admin'@'%';

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.

A: the zip file name is nodejs

```
[pranay@localhost aws01]$ sudo zip awsrds.zip node_modules package.json package-lock.json
[sudo] password for pranay:
  adding: node_modules/ (stored 0%)
  adding: package.json (deflated 16%)
  adding: package-lock.json (deflated 83%)
You have new mail in /var/spool/mail/pranay
[pranay@localhost aws01]$ ls
awsrds.zip  node_modules  package.json  package-lock.json
```

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

A:

Name

aws_rds_layer01

Description - *optional*

this is created for aws lambda rds

☒ Upload a .zip file

☐ Upload a file from Amazon S3

Upload

awsrds.zip 6.07 KB

For files larger than 10 MB, consider uploading using Amazon S3.

Compatible architectures - *optional* [Info](#)

Choose the compatible instruction set architectures for your layer.

☐ x86_64

☐ arm64

Compatible runtimes - *optional* [Info](#)

Choose up to 15 runtimes.

Runtimes

Node.js 16.x

6. In the lambda Configuration choose your VPC, Subnet, Security groups Which will make your lambda available at your VPC level,

A:

VPC [Info](#) Edit

VPC vpc-0358873cfff60846f (10.0.0.0/16)	Subnets <ul style="list-style-type: none">• Allow IPv6 traffic = false• subnet-0df08dbebdd368656 (10.0.1.0/24) ap-south-1b, public subnet 2• subnet-000034a8c50f4335a (10.0.4.0/24) ap-south-1a, public instance 2	Security groups <ul style="list-style-type: none">• sg-0e87280b200c20730 (launch-wizard-3)
--	---	---

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

A: gave full access to ec2 and vpc

Testing Lambda Function

1. Test your lambda function by creating a event and save it and click on test.

A:

[Code](#) [Test](#) [Monitor](#) [Configuration](#) [Aliases](#) [Versions](#)

Test event [Info](#) Delete Save Test

To invoke your function without saving an event, modify the event, then choose Test. Lambda uses the modified event to invoke your function, but does not overwrite the original event until you choose Save changes.

Test event action

☐ Create new event

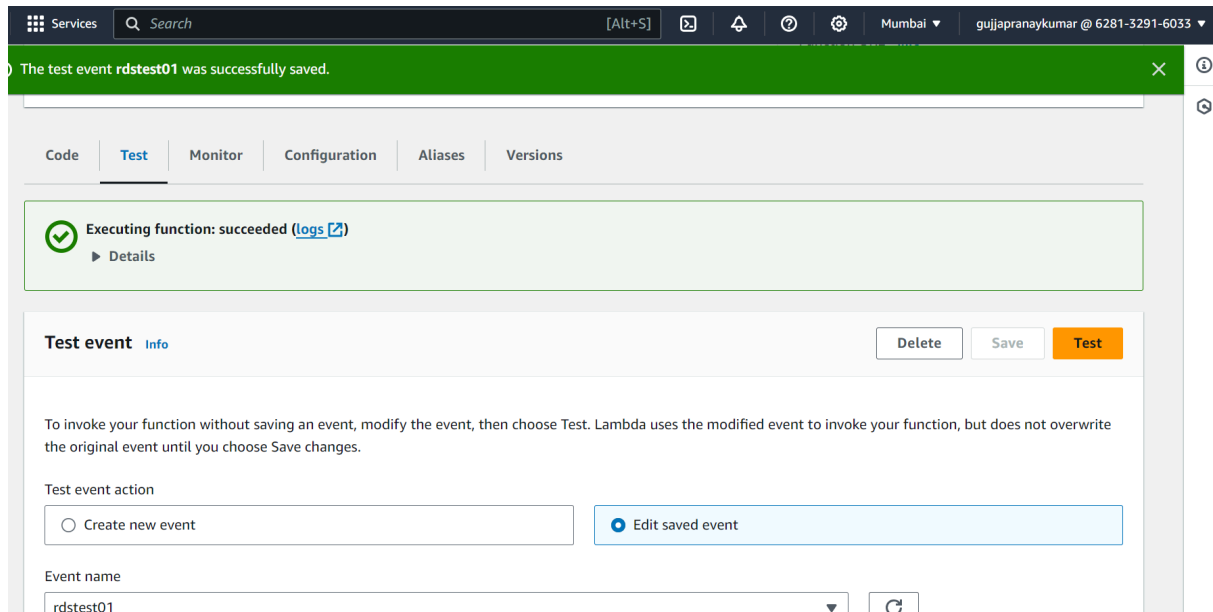
☒ Edit saved event

Event name

▼ ↺

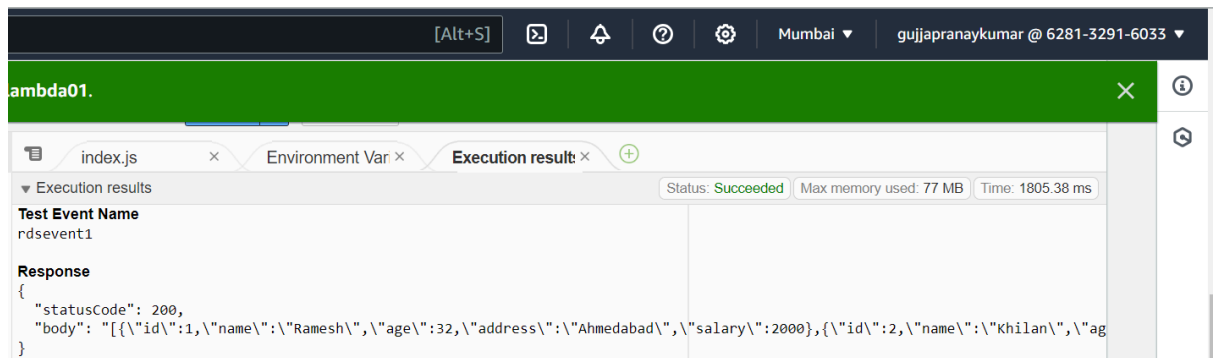
2. Make sure you got no error

A:



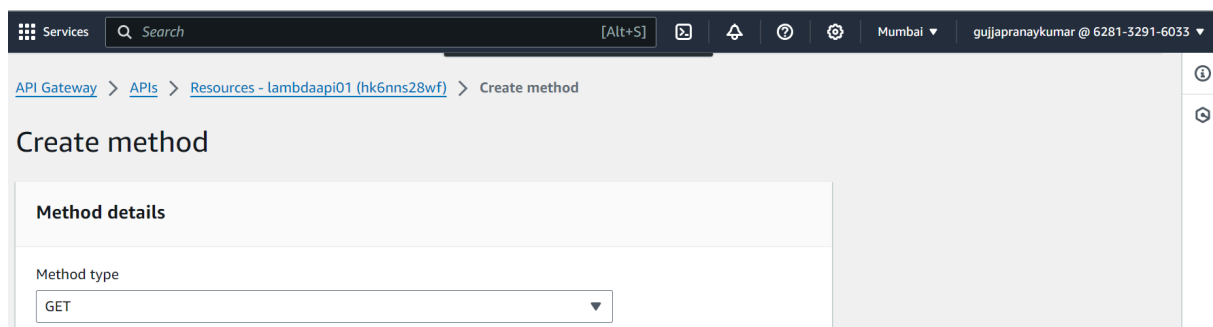
3. Now click on code and deploy it and test it

A:



4. You can configure api gateway also to get the response in the browser

A:



Services

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Mumbai

gujjapranaykumar @ 6281-3291-6033

☐

AWS service


Integrate with an AWS Service.



☐

VPC link

Integrate with a resource that isn't accessible over the public internet.




☒ Lambda proxy integration

Send the request to your Lambda function as a structured event.

Lambda function

Provide the Lambda function name or alias. You can also provide an ARN from another account.

ap-south-1



Grant API Gateway permission to invoke your Lambda function. To turn off, update the function's resource policy yourself, or provide an invoke role that API Gateway uses to invoke your function.

hk6nns28wf.execute-api.ap-south-1.amazonaws.com/lambdaapi_trigger

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```
{
  "statusCode": 200,
  "body": [
    {
      "id": 1,
      "name": "Ramesh",
      "age": 32,
      "address": "Ahmedabad",
      "salary": 2000
    },
    {
      "id": 2,
      "name": "Khilan",
      "age": 25,
      "address": "Delhi",
      "salary": 1500
    },
    {
      "id": 3,
      "name": "Kaushik",
      "age": 23,
      "address": "Kota",
      "salary": 2000
    },
    {
      "id": 4,
      "name": "Chaitali",
      "age": 25,
      "address": "Mumbai",
      "salary": 6500
    },
    {
      "id": 5,
      "name": "Hardik",
      "age": 27,
      "address": "Bhopal",
      "salary": 8500
    }
  ]
}
```