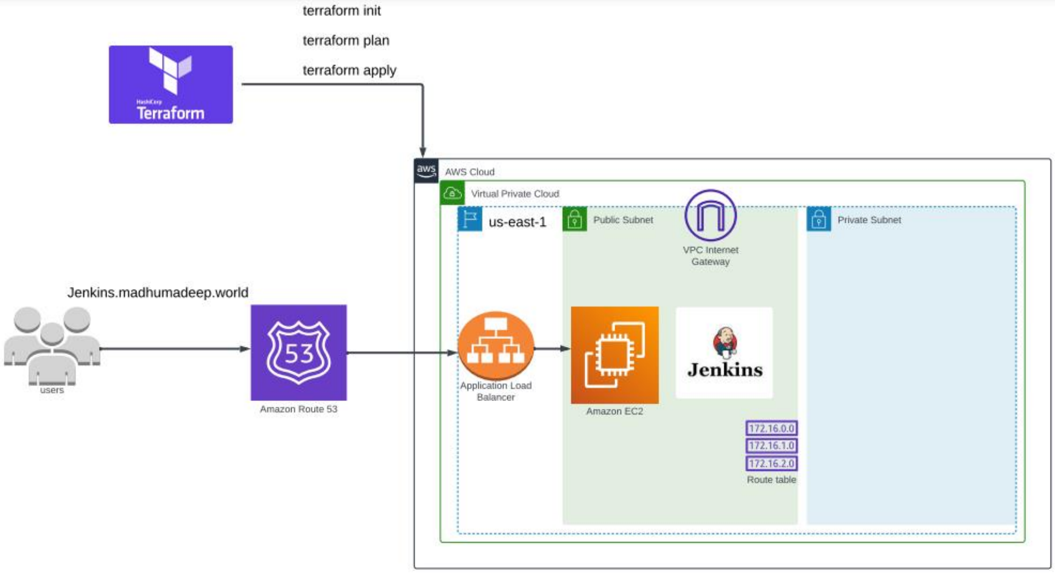
Deploying REST API on AWS with Terraform and Jenkins Magic

Step:1 Infrastructure Setup

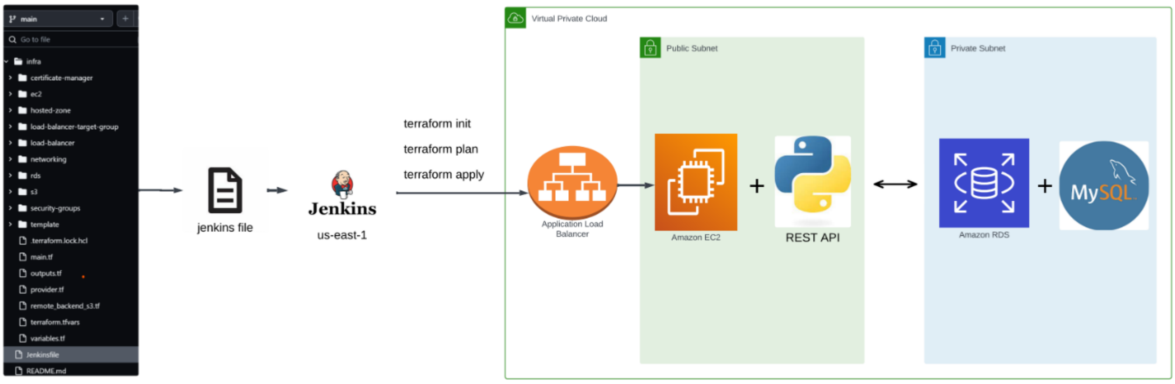


GitHub URl: https://github.com/Madeep9347/terraform-route53.git

1. Create a VPC, Subnets, Route Tables, Internet Gateway, EC2 Instance and Security Groups.
2. Install Jenkins in the EC2 instance using User data.
3. Create Target Group and Application Load Balancer.
4. For Target Group use the Target port as 8080 and use Listener port HTTP (80) for Application Load Balancer.
5. Try to access the Jenkins using DNS name of Application Load Balancer.
6. Create a Hosted Zone in Route53 and Create simple record for Application Load Balancer.
7. Create SSL/TLS Certificate for Domain name and push that Certificate into Route53 as a Record.
8. Create another Listener HTTPS (443) and Redirect the traffic from HTTP to HTTPS.
9. Now Try to access the Jenkins using Domain name.

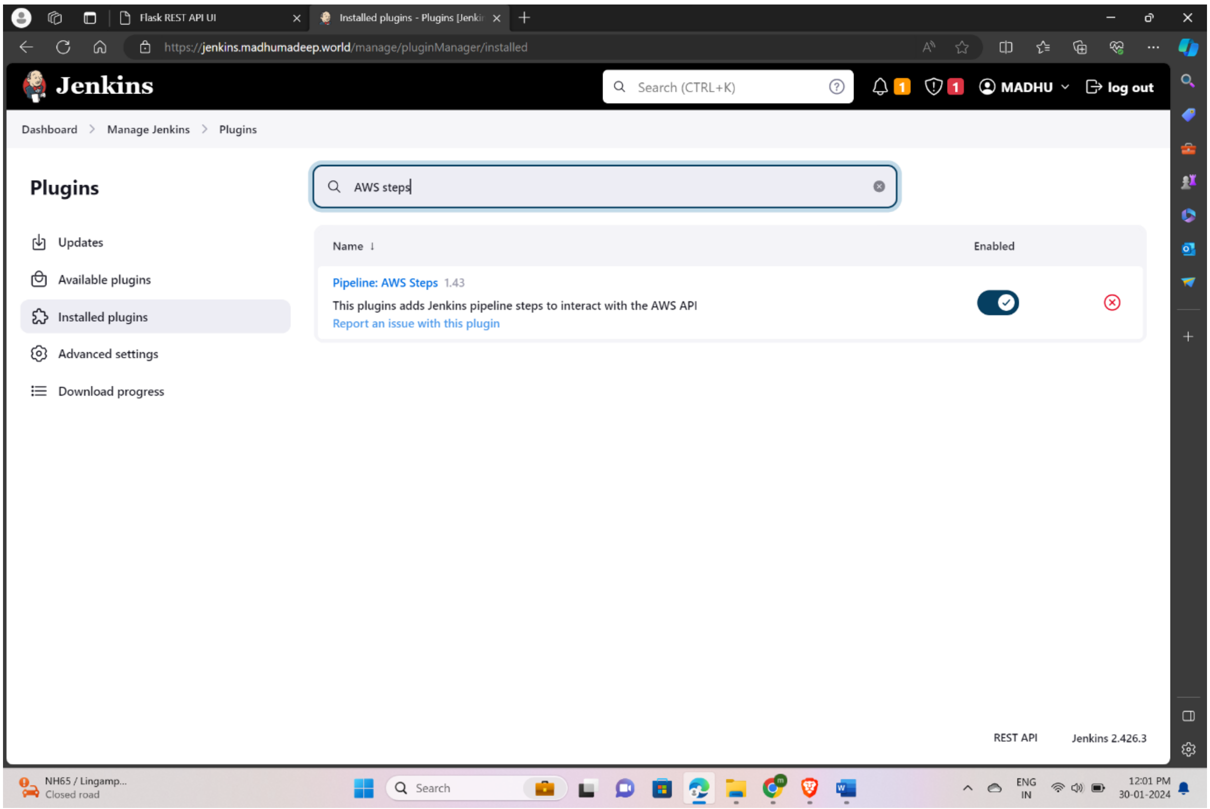
Note: You can clone the GitHub Repository and made some changes when ever it needs like(public key, AMI ID, Domain name).

Step 2: Jenkins Automation for Application Deployment



GitHub Repository : https://github.com/Madeep9347/devops-REST_API-project.git

1. Install the Plugins and create a user in Jenkins and Goto Manage Jenkins→Plugins→Available Plugins and Install Plugin AWS Steps for Storing the AWS Access keys and Secret Keys.

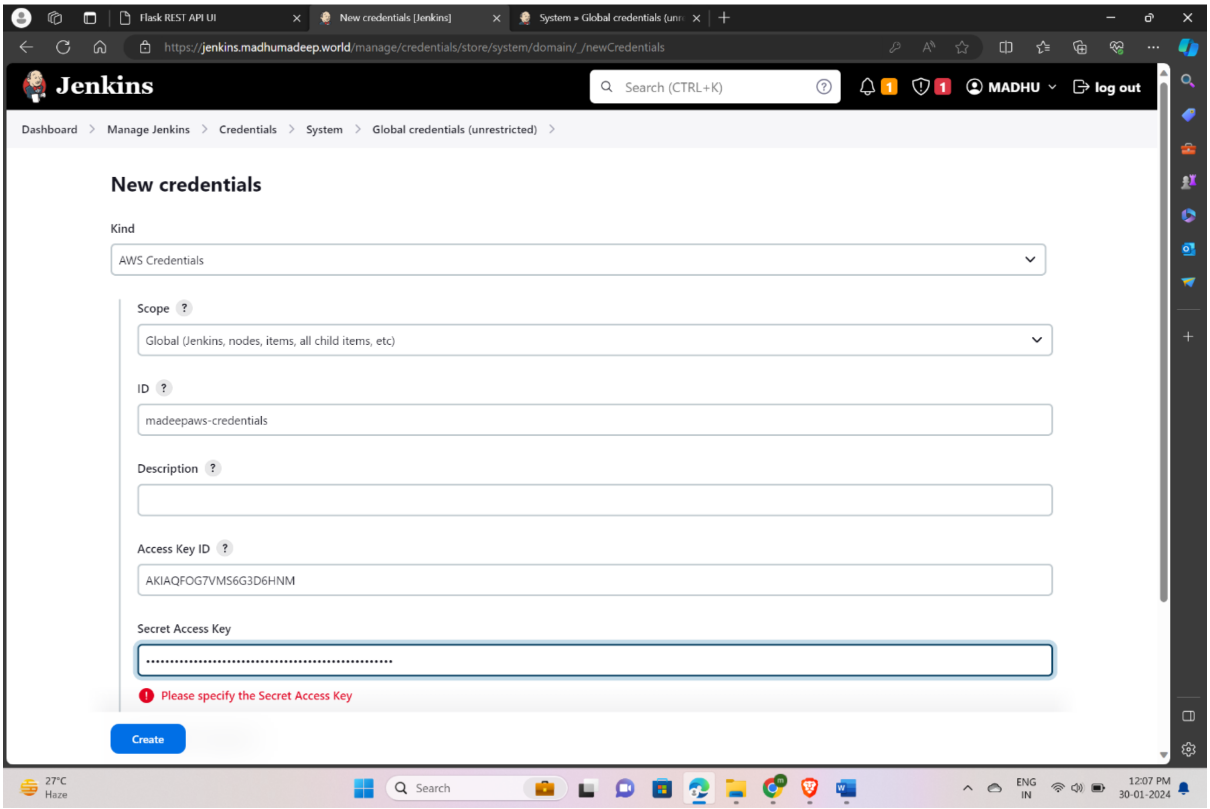


Plugins

AWS steps

Name ↓	Enabled
Pipeline: AWS Steps 1.43 This plugins adds Jenkins pipeline steps to interact with the AWS API Report an issue with this plugin	✓

2. Goto to manage Jenkins→ credentials → global → Add credentials (access key and secret key).



https://jenkins.madhumadeep.world/manage/credentials/store/system/domain/_/newCredentials

Dashboard > Manage Jenkins > Credentials > System > Global credentials (unrestricted)

New credentials

Kind: AWS Credentials

Scope: Global (Jenkins, nodes, items, all child items, etc)

ID: madeepaws-credentials

Description:

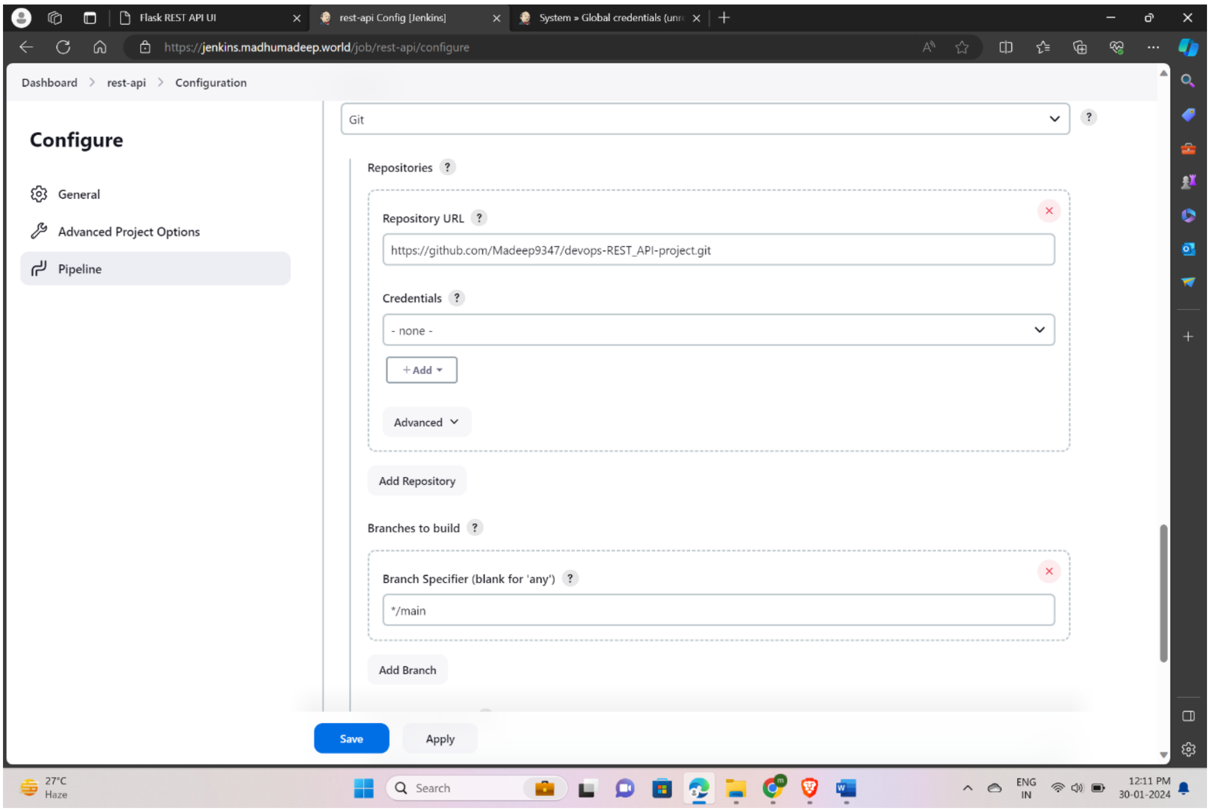
Access Key ID: AKIAQFOG7VMS6G3D6HNM

Secret Access Key: ••

Please specify the Secret Access Key

Create

3. Create pipeline job and configure and select “pipeline script from SCM” and add GitHub repository URL, Branch and Jenkins file name.



https://jenkins.madhumadeep.world/job/rest-api/configure

Dashboard > rest-api > Configuration

Configure

- General
- Advanced Project Options
- Pipeline

Git

Repositories

Repository URL: https://github.com/Madeep9347/devops-REST_API-project.git

Credentials: - none -

+ Add

Advanced

Add Repository

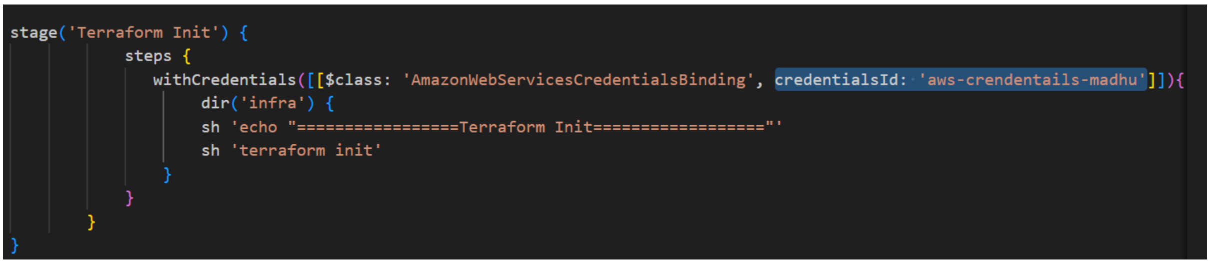
Branches to build

Branch Specifier (blank for 'any'): */main

Add Branch

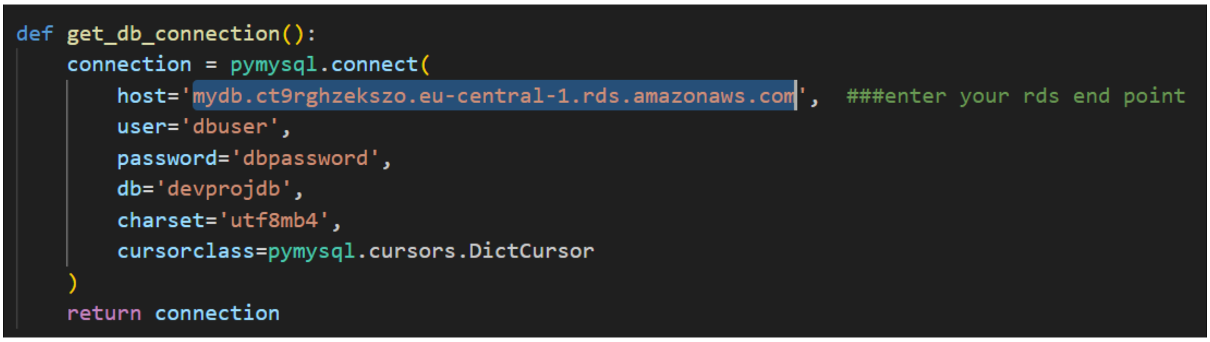
Save Apply

4. Clone the GitHub Repository and make changes the necessary changes in Jenkins file like(credentials id, repository URL).



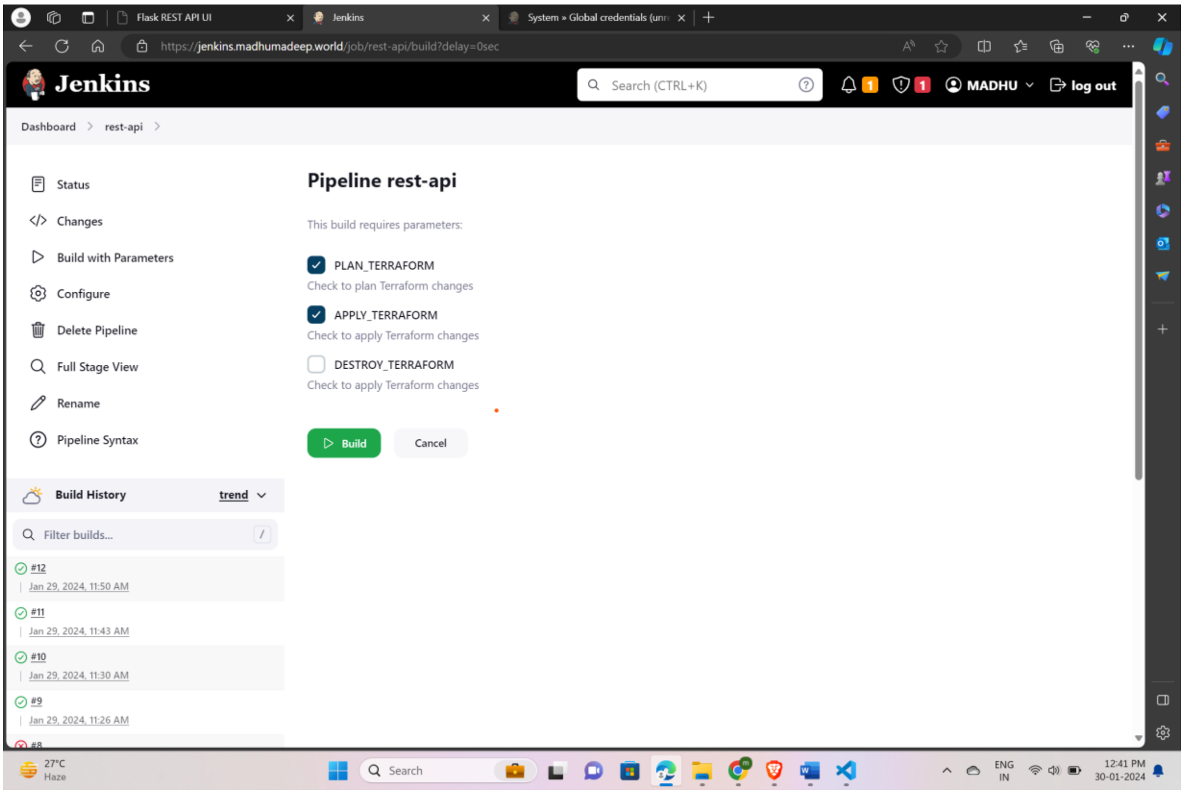
```
stage('Terraform Init') {
            steps {
               withCredentials([[$class: 'AmazonWebServicesCredentialsBinding', credentialsId: 'aws-crendentails-madhu']]){
                    dir('infra') {
                    sh 'echo "================Terraform Init================="'
                    sh 'terraform init'
                }
            }
        }
}
```

5. Automated the creation of a new VPC, Subnets, Internet gateway, Route tables, EC2 instance (public subnet), security groups, target group, Application Load Balancer, S3 bucket for state file storage, and RDS MySQL database (private subnet) using Terraform.
6. Deployed the REST API application into the EC2 instance created in the public subnet.
7. **For REST API application use this git Repository** **https://github.com/Madeep9347/python-mysql-devops-REST-API-PROJECT.git**
8. Change the RDS endpoint in app.py



```
def get_db_connection():
    connection = pymysql.connect(
        host='mydb.ct9rghzekszo.eu-central-1.rds.amazonaws.com',  ###enter your rds end point
        user='dbuser',
        password='dbpassword',
        db='devprojdb',
        charset='utf8mb4',
        cursorclass=pymysql.cursors.DictCursor
    )
    return connection
```

9. Run the job with needed parameters.



Pipeline rest-api

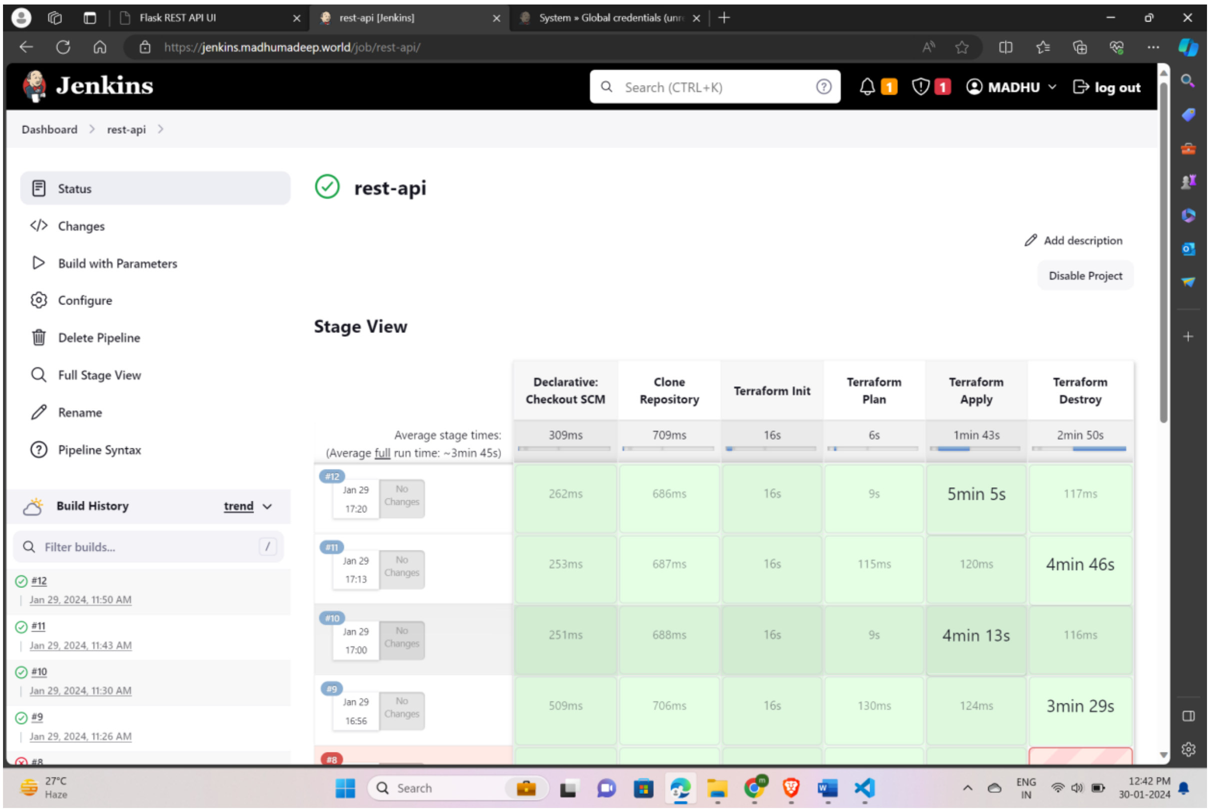
This build requires parameters:

☑ PLAN_TERRAFORM
Check to plan Terraform changes

☑ APPLY_TERRAFORM
Check to apply Terraform changes

□ DESTROY_TERRAFORM
Check to apply Terraform changes

#12 Jan 29, 2024, 11:50 AM
#11 Jan 29, 2024, 11:43 AM
#10 Jan 29, 2024, 11:30 AM
#9 Jan 29, 2024, 11:26 AM
#8



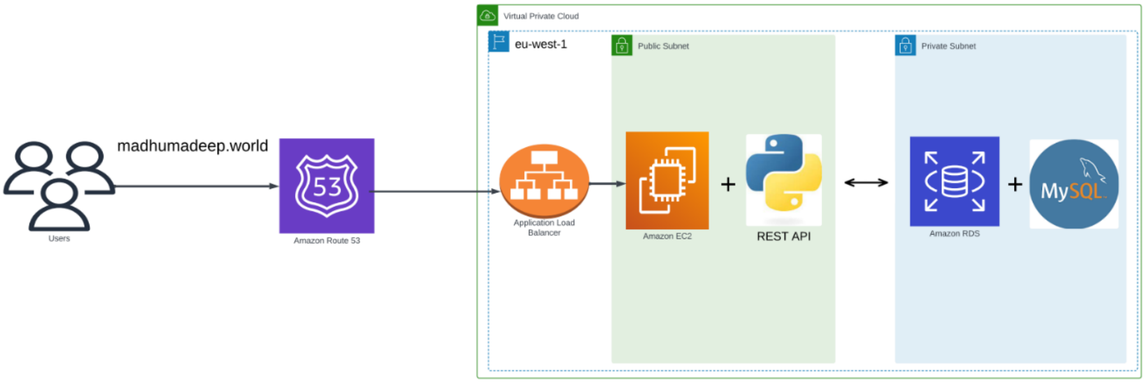
rest-api

Stage View

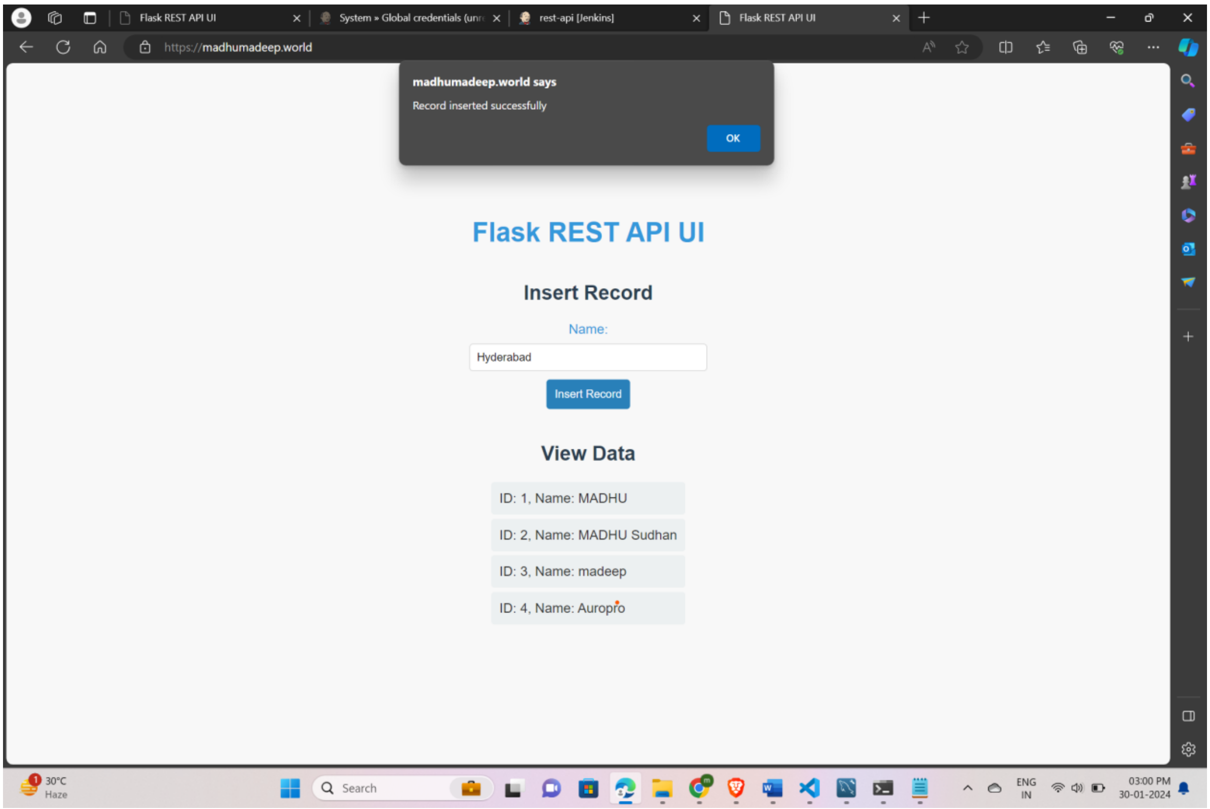
	Declarative: Checkout SCM	Clone Repository	Terraform Init	Terraform Plan	Terraform Apply	Terraform Destroy
Average stage times: (Average full run time: ~3min 45s)	309ms	709ms	16s	6s	1min 43s	2min 50s
#12 Jan 29 17:20 No Changes	262ms	686ms	16s	9s	5min 5s	117ms
#11 Jan 29 17:13 No Changes	253ms	687ms	16s	115ms	120ms	4min 46s
#10 Jan 29 17:00 No Changes	251ms	688ms	16s	9s	4min 13s	116ms
#9 Jan 29 16:56 No Changes	509ms	706ms	16s	130ms	124ms	3min 29s
#8						

#12 Jan 29, 2024, 11:50 AM
#11 Jan 29, 2024, 11:43 AM
#10 Jan 29, 2024, 11:30 AM
#9 Jan 29, 2024, 11:26 AM
#8

Step 3: Application Deployment and Database Management



1. Now enter your dns name in browser you can access your REST API application then you can enter the records into the database.



madhumadeep.world says

Record inserted successfully

OK

Flask REST API UI

Insert Record

Name:

Hyderabad

Insert Record

View Data

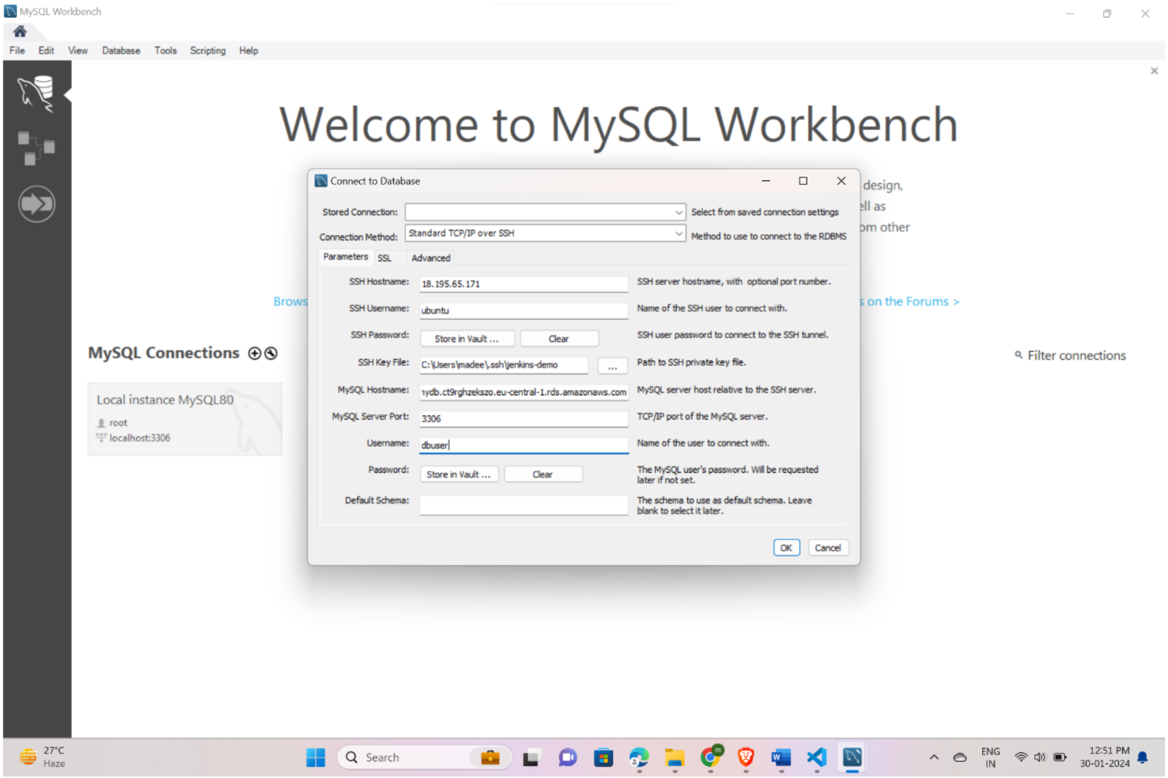
ID: 1, Name: MADHU

ID: 2, Name: MADHU Sudhan

ID: 3, Name: madeep

ID: 4, Name: Auropro

2. Now Try to connect using Local MySQL installed in your system using ssh.



Connect to Database

Stored Connection: Select from saved connection settings

Connection Method: Standard TCP/IP over SSH — Method to use to connect to the RDBMS

Parameters | SSL | Advanced

SSH Hostname: 18.195.65.171 — SSH server hostname, with optional port number.

SSH Username: ubuntu — Name of the SSH user to connect with.

SSH Password: Store in Vault ... | Clear — SSH user password to connect to the SSH tunnel.

SSH Key File: C:\Users\madee\.ssh\jenkins-demo ... — Path to SSH private key file.

MySQL Hostname: ıydb.ct9rghzekszo.eu-central-1.rds.amazonaws.com — MySQL server host relative to the SSH server.

MySQL Server Port: 3306 — TCP/IP port of the MySQL server.

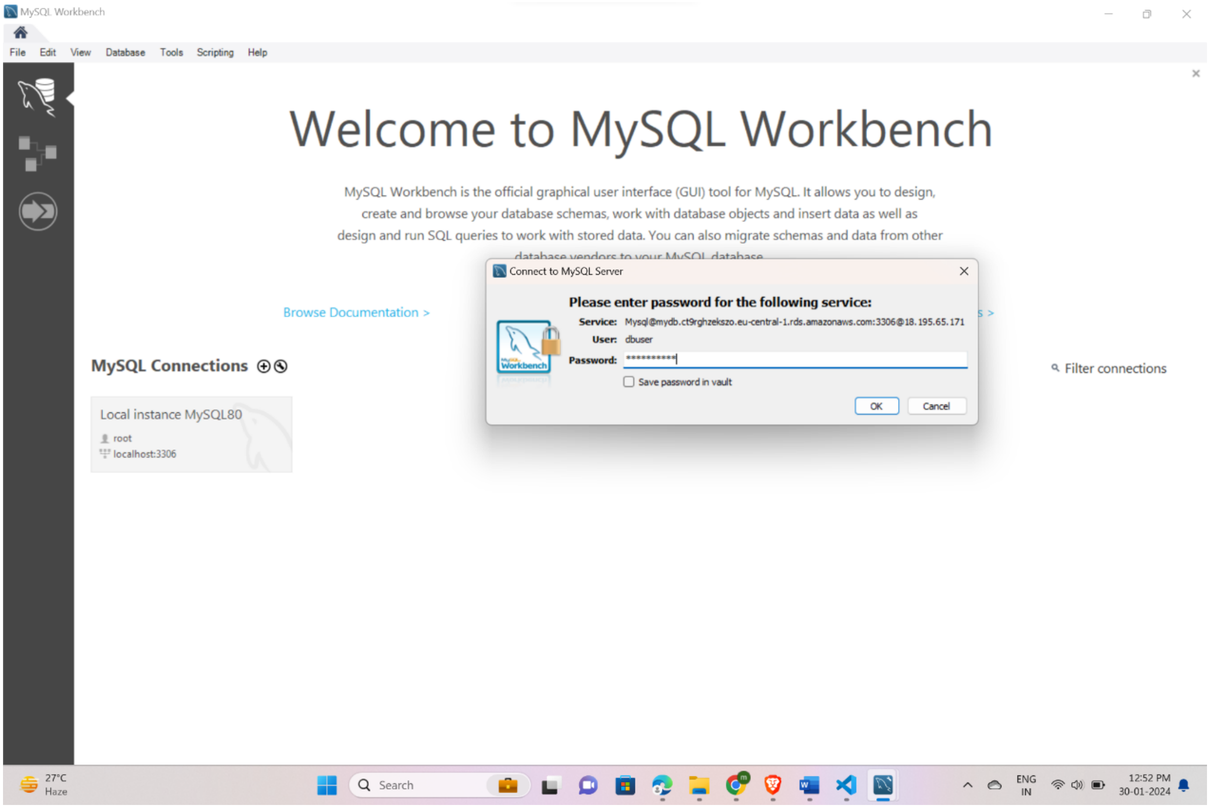
Username: dbuser — Name of the user to connect with.

Password: Store in Vault ... | Clear — The MySQL user's password. Will be requested later if not set.

Default Schema: — The schema to use as default schema. Leave blank to select it later.

OK | Cancel

Note: SSH Hostname= public Ip of ec2, SSH username=ubuntu, SSH password= your private key, MYSQL Hostname= endpoint of RDS database.



MySQL Workbench is the official graphical user interface (GUI) tool for MySQL. It allows you to design, create and browse your database schemas, work with database objects and insert data as well as design and run SQL queries to work with stored data. You can also migrate schemas and data from other database vendors to your MySQL database.

Connect to MySQL Server

Please enter password for the following service:

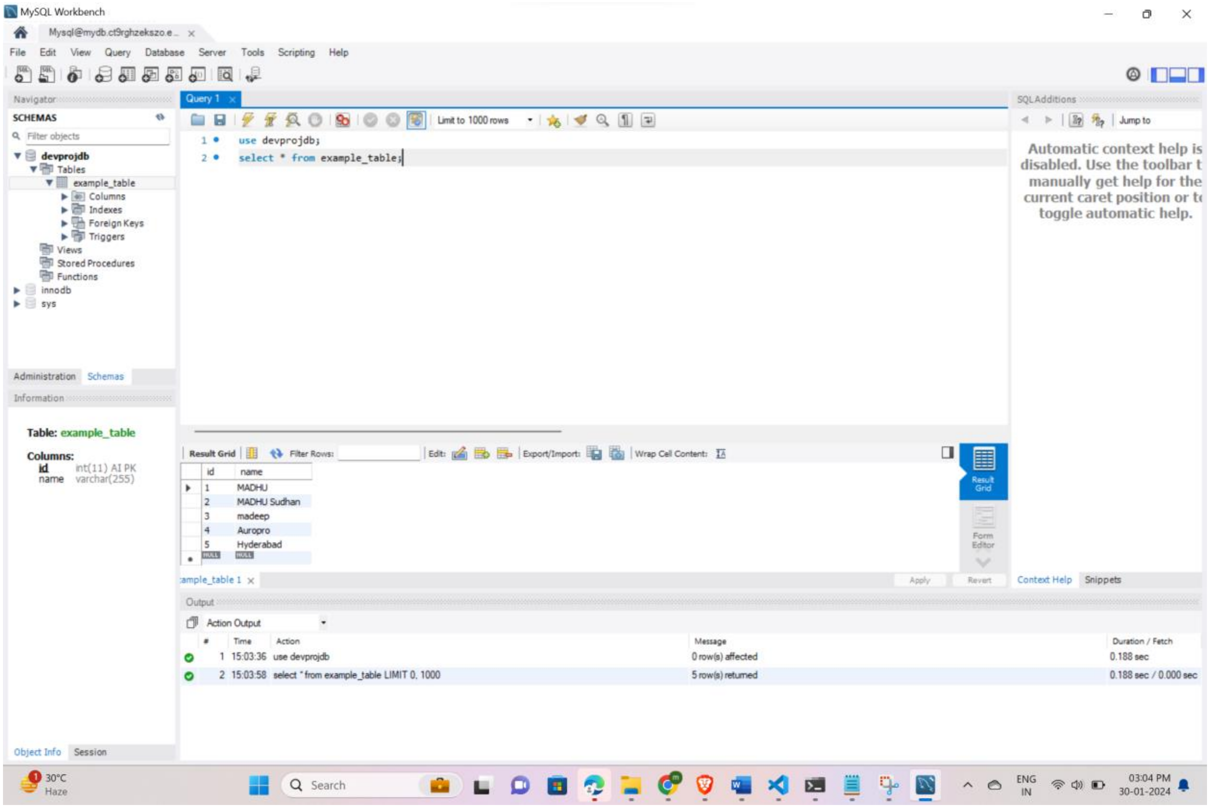
Service: Mysql@mydb.ct9rghzekszo.eu-central-1.rds.amazonaws.com:3306@18.195.65.171

User: dbuser

Password: **********

□ Save password in vault

OK | Cancel



```
use devprojdb;
select * from example_table;
```

Automatic context help is disabled. Use the toolbar t manually get help for the current caret position or t toggle automatic help.

Table: example_table

Columns:
id int(11) AI PK
name varchar(255)

id	name
1	MADHU
2	MADHU Sudhan
3	madeep
4	Auropro
5	Hyderabad
NULL	NULL

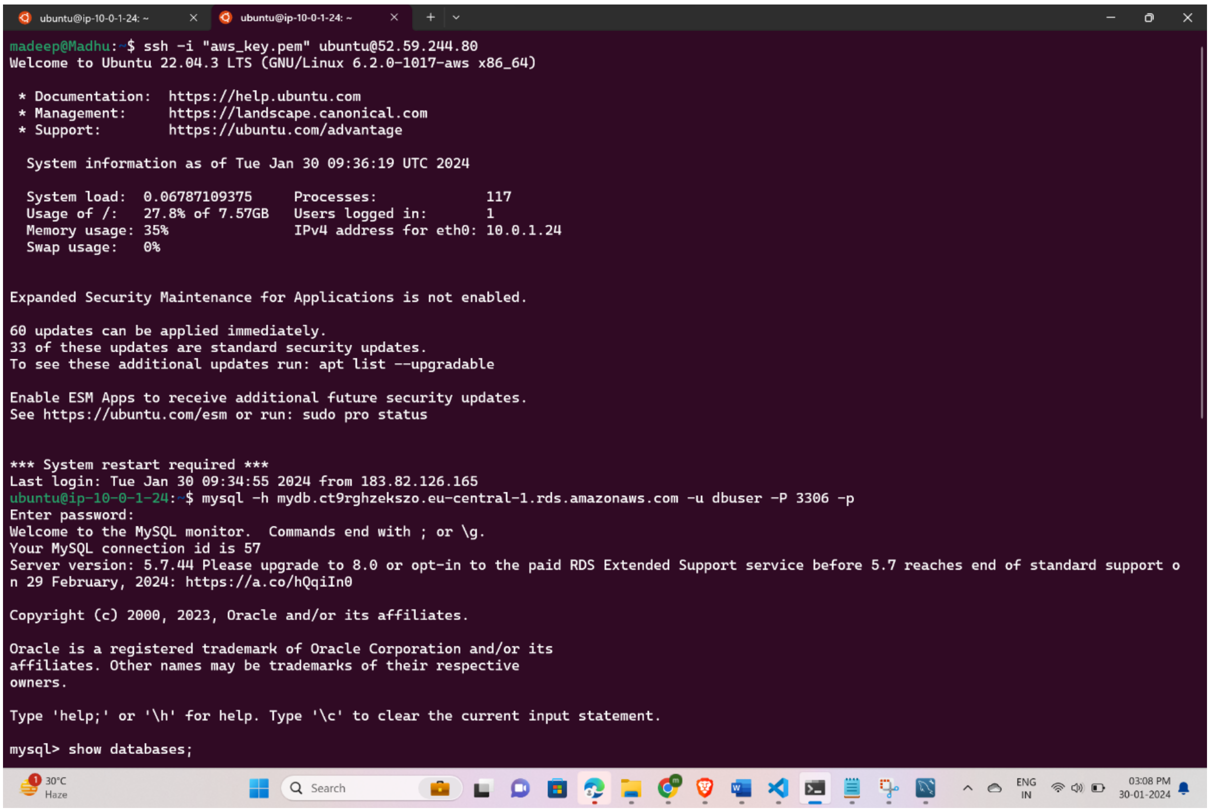
ample_table 1

Output

Action Output

#	Time	Action	Message	Duration / Fetch
1	15:03:36	use devprojdb	0 row(s) affected	0.188 sec
2	15:03:58	select * from example_table LIMIT 0, 1000	5 row(s) returned	0.188 sec / 0.000 sec

3. Connect RDS database through EC2 instance .



```
madeep@Madhu:~$ ssh -i "aws_key.pem" ubuntu@52.59.244.80
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-1017-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

  System information as of Tue Jan 30 09:36:19 UTC 2024

  System load:  0.06787109375     Processes:             117
  Usage of /:   27.8% of 7.57GB   Users logged in:       1
  Memory usage: 35%               IPv4 address for eth0: 10.0.1.24
  Swap usage:   0%


Expanded Security Maintenance for Applications is not enabled.

60 updates can be applied immediately.
33 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


*** System restart required ***
Last login: Tue Jan 30 09:34:55 2024 from 183.82.126.165
ubuntu@ip-10-0-1-24:~$ mysql -h mydb.ct9rghzekszo.eu-central-1.rds.amazonaws.com -u dbuser -P 3306 -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 57
Server version: 5.7.44 Please upgrade to 8.0 or opt-in to the paid RDS Extended Support service before 5.7 reaches end of standard support o
n 29 February, 2024: https://a.co/hQqiIn0

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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> show databases;
```

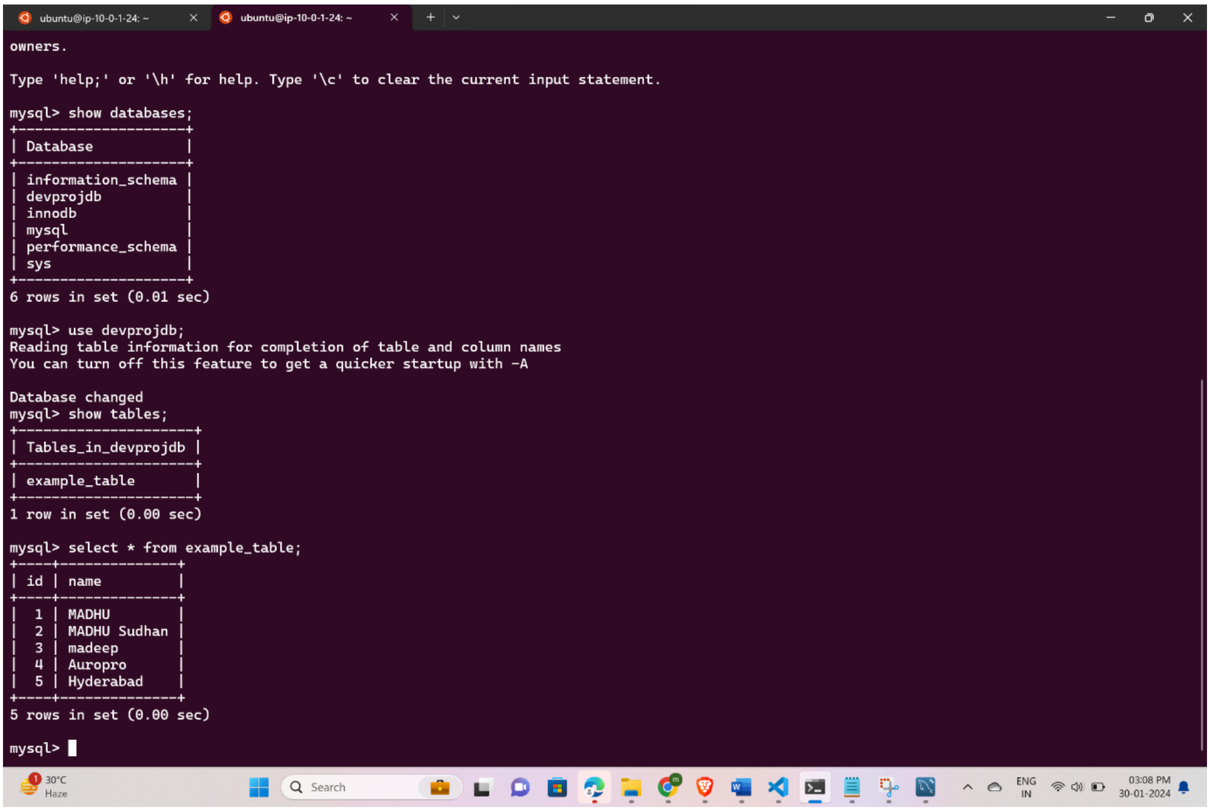

```
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> show databases;
+--------------------+
| Database           |
+--------------------+
| information_schema |
| devprojdb          |
| innodb             |
| mysql              |
| performance_schema |
| sys                |
+--------------------+
6 rows in set (0.01 sec)

mysql> use devprojdb;
Reading table information for completion of table and column names
You can turn off this feature to get a quicker startup with -A

Database changed
mysql> show tables;
+---------------------+
| Tables_in_devprojdb |
+---------------------+
| example_table       |
+---------------------+
1 row in set (0.00 sec)

mysql> select * from example_table;
+----+--------------+
| id | name         |
+----+--------------+
|  1 | MADHU        |
|  2 | MADHU Sudhan |
|  3 | madeep       |
|  4 | Auropro      |
|  5 | Hyderabad    |
+----+--------------+
5 rows in set (0.00 sec)

mysql> █
```

GitHub Repositories:

https://github.com/Madeep9347/terraform-route53.git

https://github.com/Madeep9347/devops-REST_API-project.git

https://github.com/Madeep9347/python-mysql-devops-REST-API-PROJECT.git

Domain names:

https://jenkins.madhumadeep.world/

https://madhumadeep.world