EKS Provisioning using Terraform

- We will provision the EKS using Terraform as an Infrastructure as Code.
- We will deploy it in a custom Virtual Private Cloud for isolation.
- We will also deploy RDS MySQL Instance to store the relational data and connect it to EKS.

Prerequisites

1. AWS Account with an IAM User with administrative permissions.
2. Terraform installed.
3. Kubectl installed.

Write Terraform Configuration files

First, we will write Terraform configuration files for AWS resources using predefined modules available on the internet.

Steps

1. Create the **eks-terraform** directory.
2. The folder structure for the above-created directory is as follows:

```
eks-terraform
├──.terraform.lock.hcl
├──locals.tf
├──main.tf
├──outputs.tf
├──providers.tf
├──terraform.tfstate
├──terraform.tfstate.backup
└──.terraform
```

> We need to only create *providers.tf*, *main.tf*, *outputs.tf*, & *locals.tf* file. Other files are generated while initiating terraform.

3. Create a *providers.tf* file inside the above-created directory.
4. Inside it, define the following:
    - terraform
        - required_providers
    - provider
        - aws
5. Click code for reference.
6. The definition of *providers.tf* file is complete.

7. Now, create the *main.tf* file.
8. Inside *main.tf* file, we will use the following predefined modules:
    - vpc
    - rds
    - eks
9. Click code for reference.
10. The definition of *main.tf* file is complete.
11. Now we will create *outputs.tf* file.
12. Inside it, define the following outputs.
    - DB_HOST
    - bastion-host-ip
13. Click code for reference.
14. The definition of *outputs.tf* file is complete.
15. Now we will create *locals.tf* file.
16. Inside it, define the following variables:
    - vpc-properties
    - database-properties
    - bastion-properties
    - eks-properties
17. Click code for reference.
18. The definition of *locals.tf* file is complete.

> Ensure you give the appropriate values to the variables defined in *locals.tf* file.

Provisioning the Infrastructure

Now we will provision the AWS infrastructure by applying the above-created configuration files.

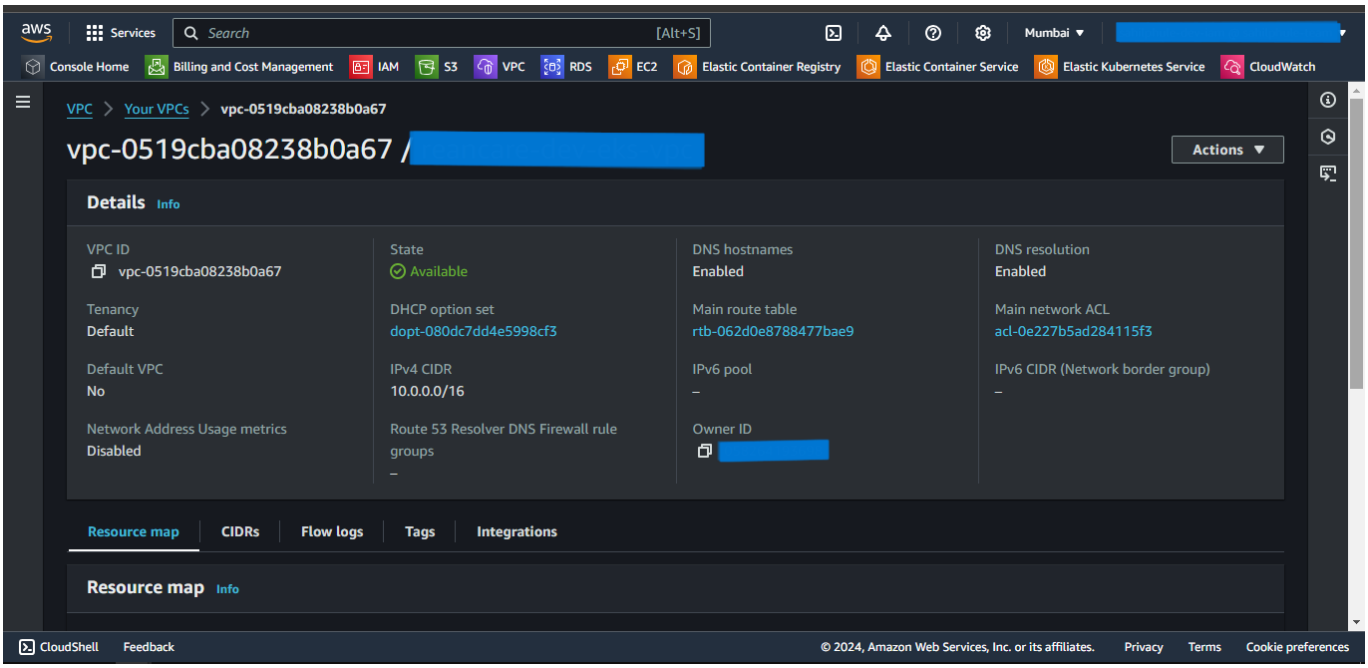
> Ensure AWS CLI is configured with appropriate AWS user credentials and enough permissions.

Steps:

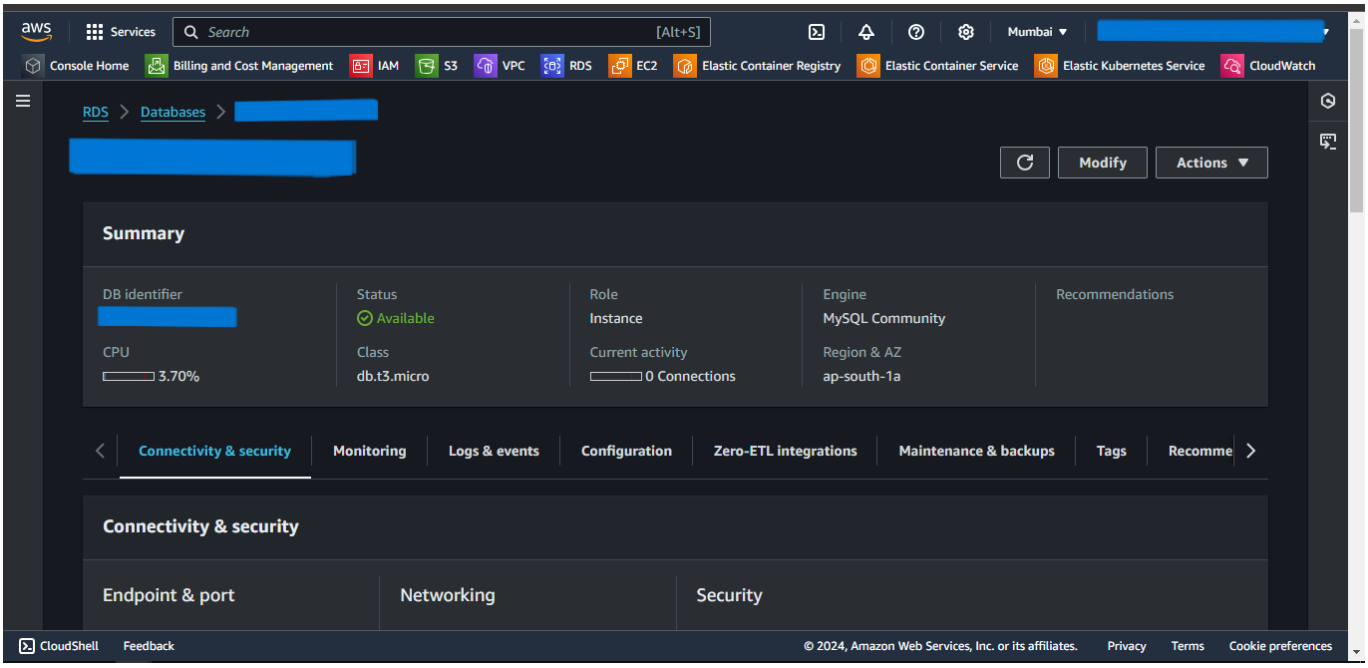
1. Open the PowerShell.
2. Change the directory to the above-created **eks-terraform** directory using `cd` command.
3. Run the `terraform fmt -recursive` command to format the syntax of the files.
4. Run the `terraform init` command to initialize the *terraform*.
5. Run the `terraform validate` command to validate the configuration files.
6. Run the `terraform plan` command to plan the resources to be created.
7. Run the `terraform apply` command and if prompted, type `yes` to provision the infrastructure.
8. Run the `terraform output` command to get the values of defined variables in *outputs.tf* file.
9. Head to the AWS Console, and verify the created resources.

Screenshots of Provisioned Infrastructure

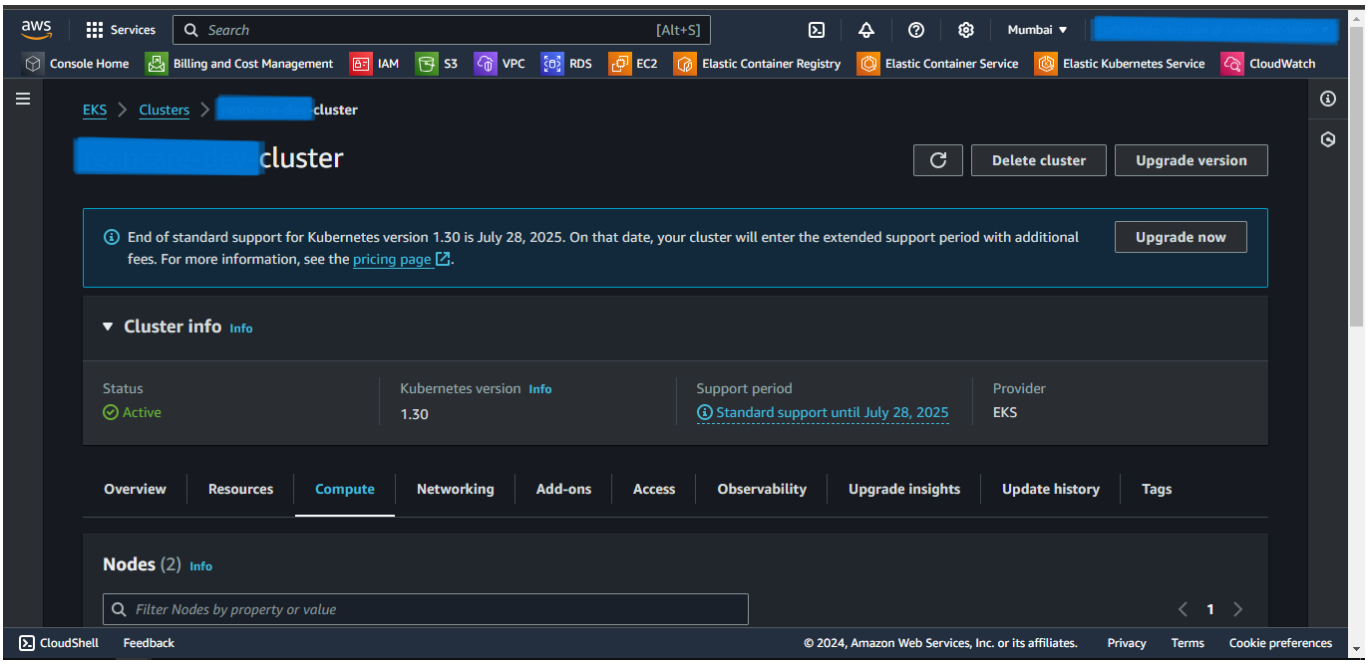
VPC Image



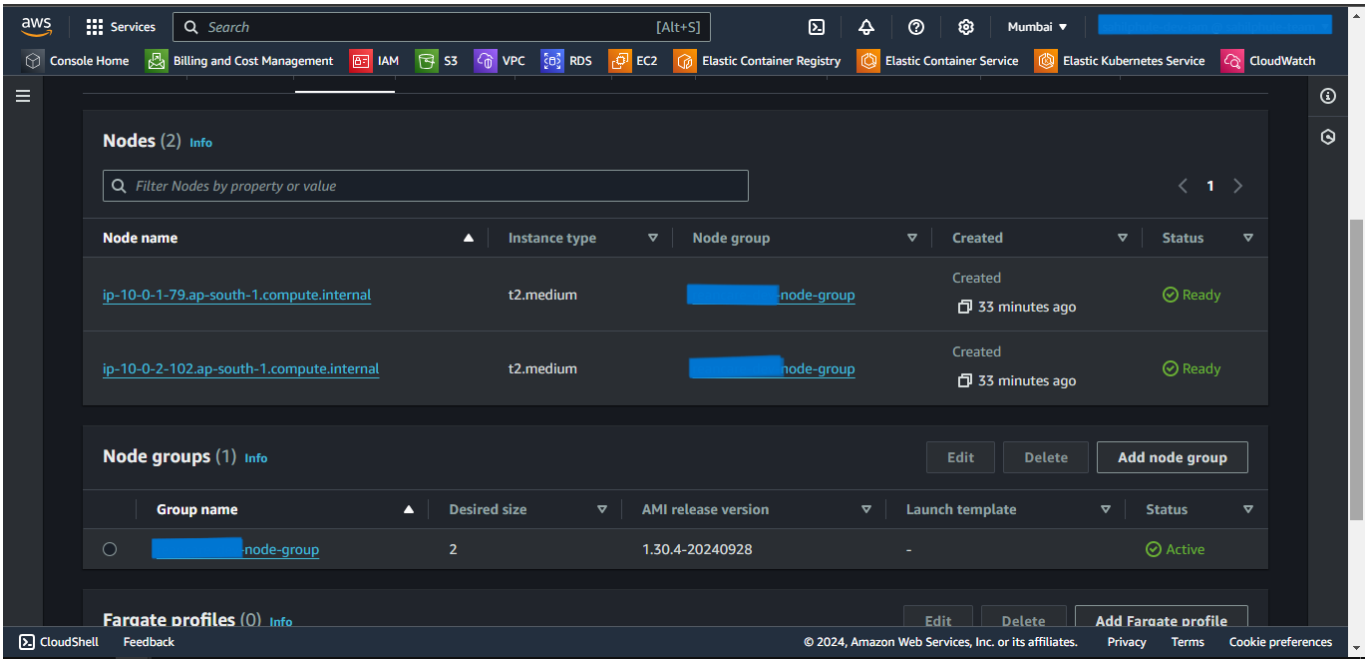
RDS Image



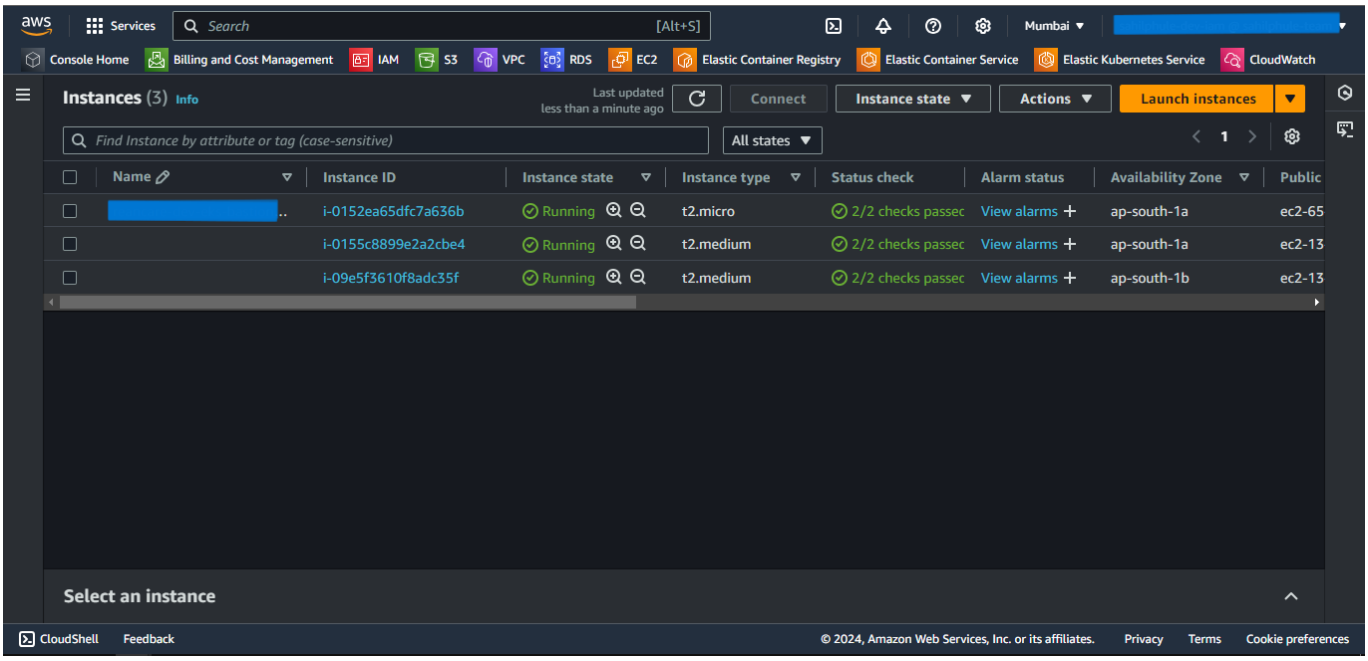
EKS Cluster Image



EKS Node Group Image



EKS Nodes Image



Connect to the EKS Cluster from Powershell

Steps

1. Open a new Powershell window.
2. Run the following command to configure local kubectl with eks cluster:
   - `aws eks --region "region-name" update-kubeconfig --name "cluster-name"`
     Substitute *region-name* and *cluster-name* with the values defined in the above-created locals.tf file.
3. Now apply the Kubernetes manifest files of the application using the following command:
   - `kubectl apply -f "file-path"`
     Substitute *file-path* with the Kubernetes manifest file path.
4. To list them all, run `kubectl get all`.
5. If a Load Balancer type Service is present then try accessing the External IP of that service in the browser.

Connection to the RDS database through Bastion Host using MySQL Workbench

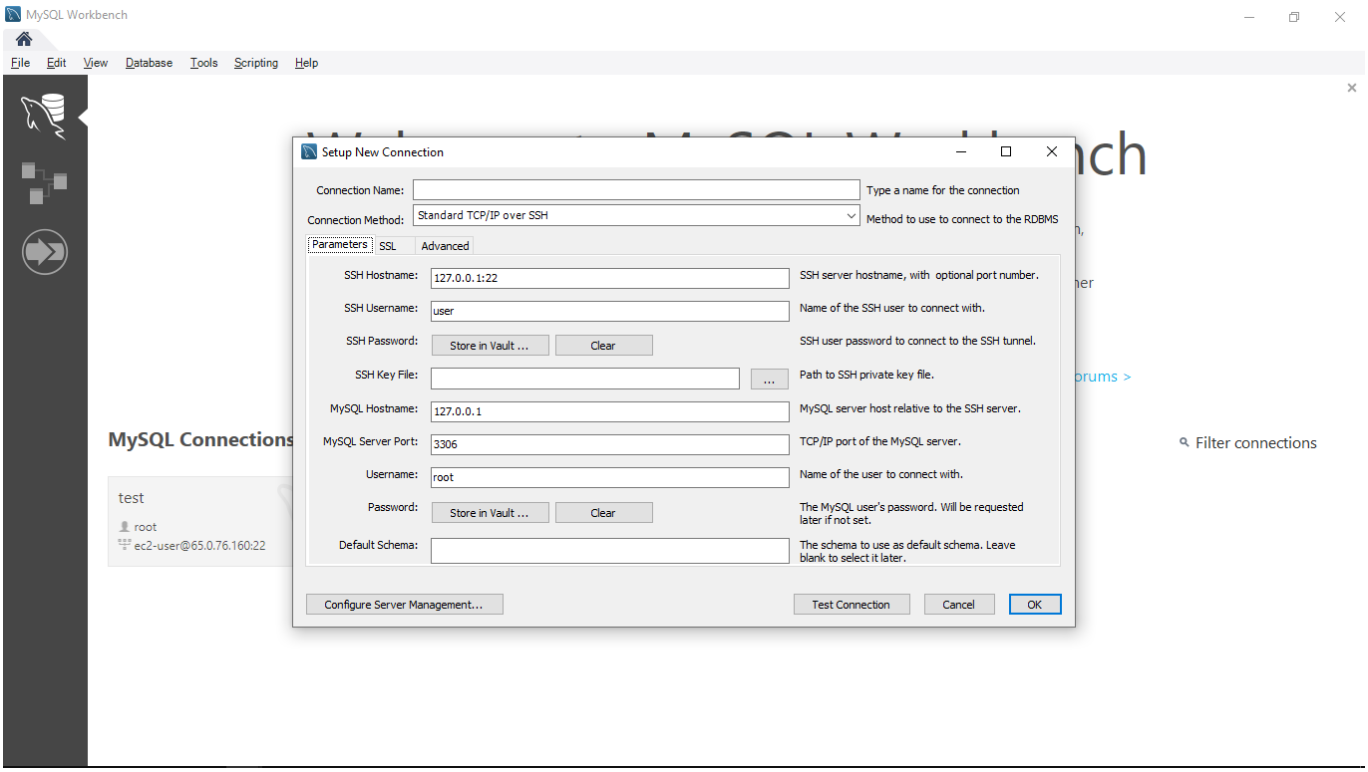
Now, we will use MySQL Workbench to connect and access the MySQL RDS Database through above created Bastion Host.

Steps

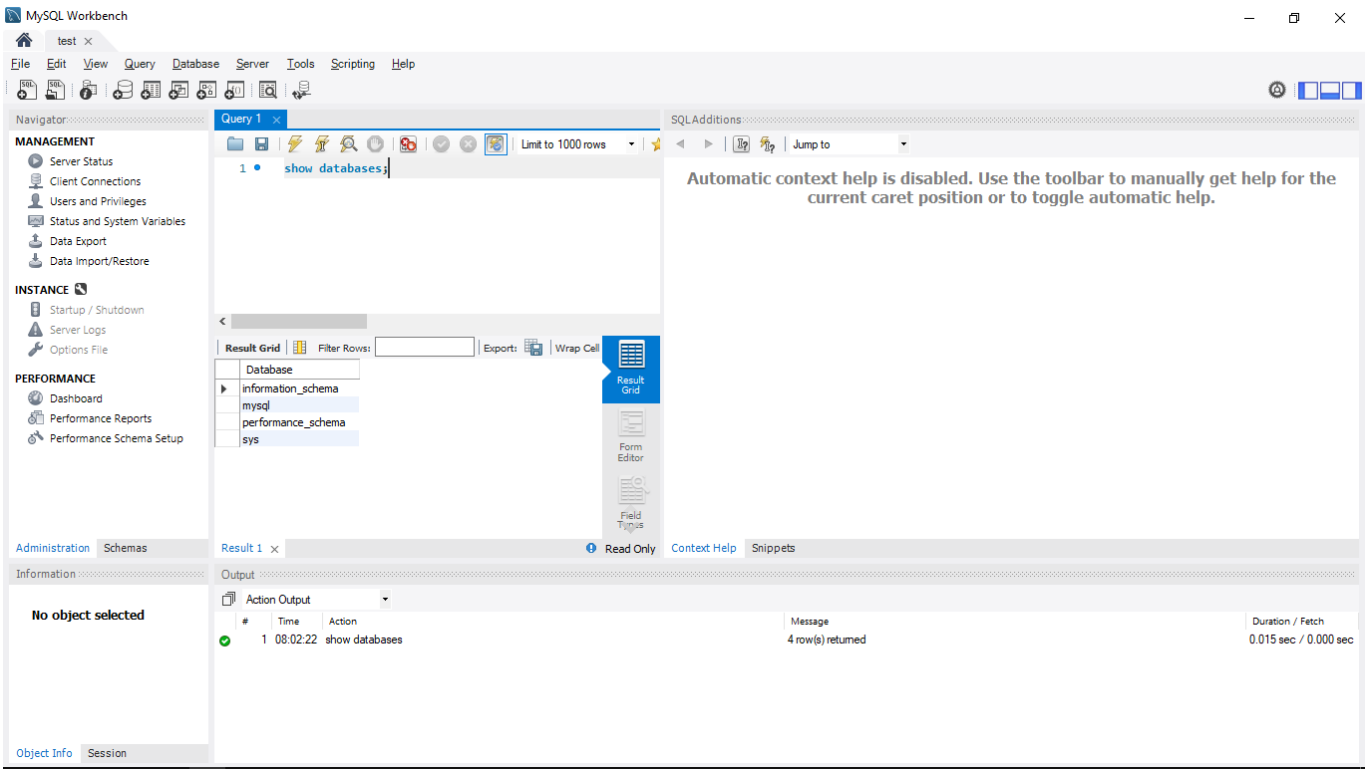
1. Open MySQL Workbench.
2. Click Add Connection.
3. Select connection method as **Standard TCP/IP over SSH**.
4. In SSH Hostname, enter *bastion-host-ip:22* where bastion-host-ip is received from the `terraform output` command.
5. In SSH Username, enter *ec2-user*.
6. In SSH Key File, select *bastion-key.pem* file passed in above *locals.tf* file from your local computer.
7. In MySQL Hostname, enter *DB_HOST* where DB_HOST is received from the `terraform output` command.
8. In the Password section, select *Store in Vault*, and enter the password passed in above-created *locals.tf* file.
9. Click *OK* and open the connection.
10. Now you can run MySQL commands to access databases and verify the successful connection of *eks-nodes*.

Screenshots of MySQL Workbench

Connection Page



Commands Page



Destroy the provisioned infrastructure

Lastly, we will destroy the resources created above by Terraform configuration files for AWS.

Steps

1. Firstly, delete all the Kubernetes Deployments using:
    - `kubectl delete -f "file-path"`
      Substitute *file-path* with the Kubernetes manifest file path.
2. To destroy infrastructure, change the directory to the above-created **eks-terraform** directory using the `cd` command.
3. Run `terraform destroy` & if prompted, type `yes`.
4. Infrastructure will be destroyed.