

ECS Provisioning using Terraform

- We will provision the ECS using Terraform as an Infrastructure as Code.
 - We will deploy it in a custom Virtual Private Cloud for isolation.
 - We will connect the Container App to ECR for Docker Image.
 - We will also create S3 bucket to store the `.env` file.
 - Also will deploy RDS MySQL Instance to store the relational data and connect it to ECS.
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Prerequisites

1. AWS Account with an IAM User with administrative permissions.
 2. Terraform installed.
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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 **ecs-terraform** directory.
2. The folder structure for the above-created directory is as follows:

```
ecs-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
 - docker
 - 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:
 - `module.vpc`
 - `module.s3-bucket`
 - `module.rds`
 - `module.ecr`
 - `module.load-balancer`
 - `module.ecs`
9. Also define the following s3 resource for uploading local `.env` file:
 - `resource.aws_s3_object`
10. Click [code](#) for reference.
11. The definition of *main.tf* file is complete.
12. Now we will create *outputs.tf* file.
13. Inside it, define the following outputs.
 - `output.DB_HOST`
 - `output.bastion-host-ip`
14. Click [code](#) for reference.
15. The definition of *outputs.tf* file is complete.
16. Now we will create *locals.tf* file.
17. Inside it, define the following variables:
 - `local.vpc-properties`
 - `local.s3-bucket-properties`
 - `local.database-properties`
 - `local.bastion-properties`
 - `local.load-balancer-properties`
 - `local.ecs-properties`
18. Click [code](#) for reference.
19. The definition of *locals.tf* file is complete.

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

Also, update the *s3-object-source-path* variable under *s3-bucket-properties* with local `.env` file relative path.

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.

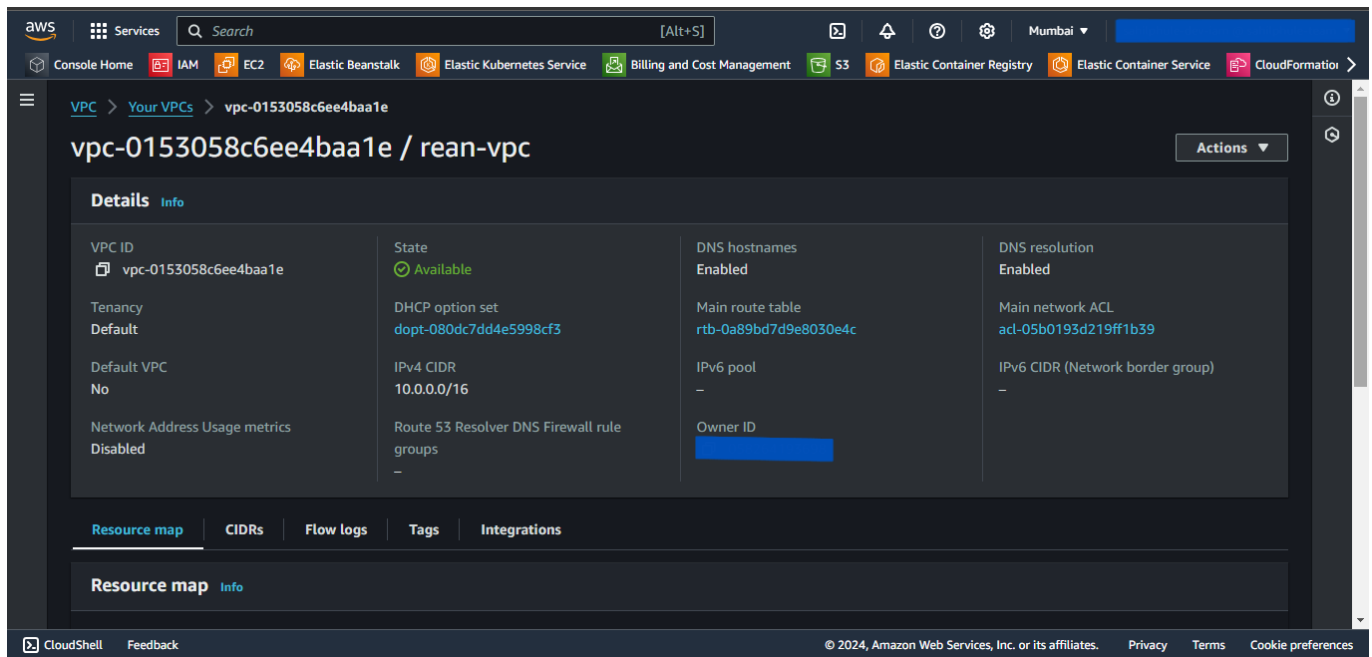
Steps:

1. Open the PowerShell.
2. Change the directory to the above-created **ecs-terraform** directory using `cd` command.
3. Run the `terraform fmt -recursive` command to format the syntax of the files.

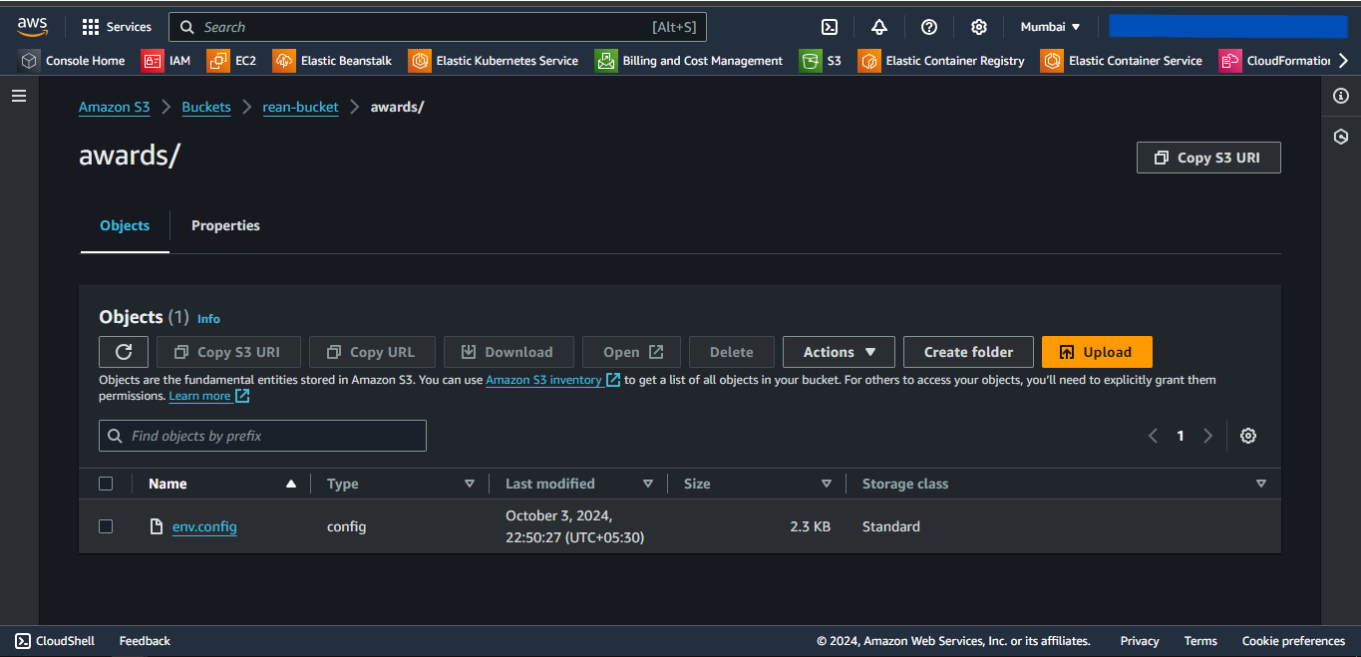
4. Run the **terraform init** command to initialize the *terraform*.
5. Run the **terraform validate** command to validate the configuration files.
6. Run the **terraform plan** command to plan the resources to be created.
7. Run the **terraform apply** command and if prompted, type **yes** to provision 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.
10. Then,
 - Head towards EC2 dashboard.
 - Select *Load Balancers*, and select the created load balancer.
 - Copy the DNS address.
 - Paste the address in the browser to access the application.

Screenshots of Provisioned Infrastructure

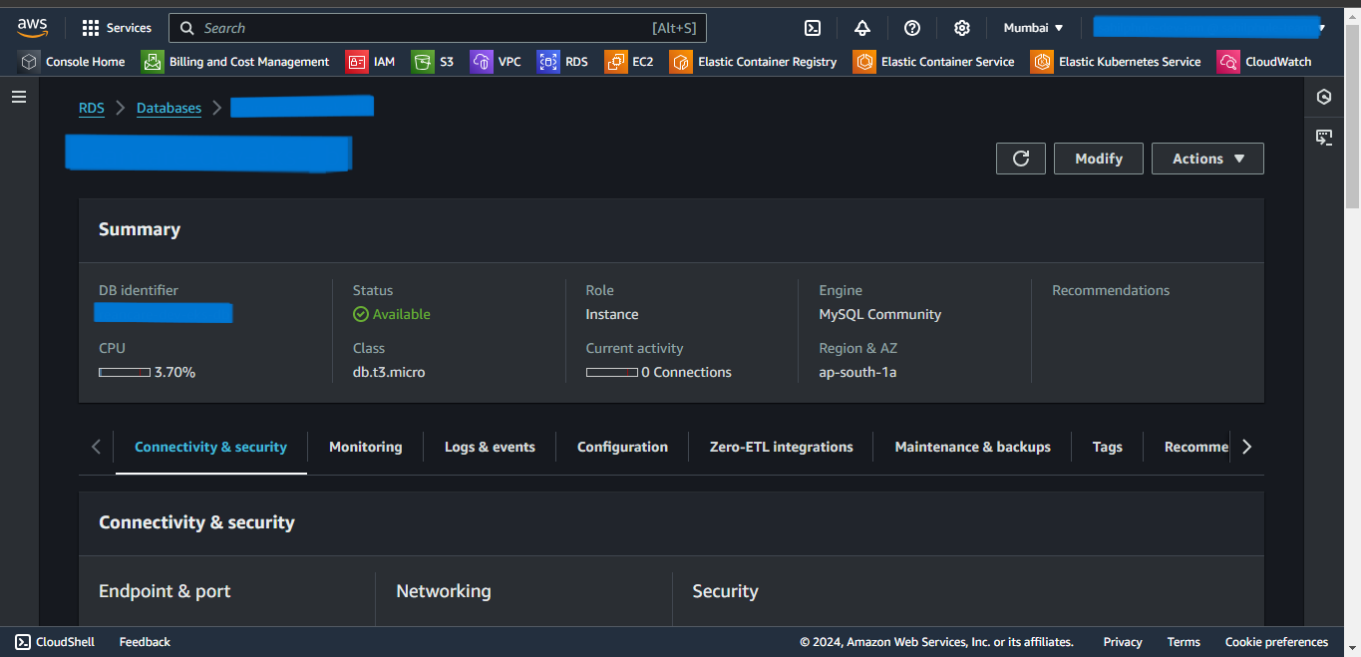
VPC Image



S3 Image



RDS Image



ALB Image

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Load balancers

rean-alb

rean-alb

Actions

Details

Load balancer type

Application

Status

Active

VPC

vpc-0153058c6ee4baa1e

Load balancer IP address type

IPv4

Scheme

Internet-facing

Hosted zone

Availability Zones

subnet-0768c943ef8187aad ap-south-1b (aps1-az3)
subnet-05d6089e1626f3f96 ap-south-1a (aps1-az1)

Date created

October 3, 2024, 23:00 (UTC+05:30)

Load balancer ARN

arn:aws:elasticloadbalancing:ap-south-1:1886577089:loadbalancer/app/rean-alb/593c4b8a5c6bea7b

DNS name

rean-alb-1886577089.ap-south-1.elb.amazonaws.com (A Record)

Listeners and rules

Network mapping

Resource map - new

Security

Monitoring

Integrations

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Tasks

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Info

Update service

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Health and metrics

Tasks

Logs

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Events

Configuration and networking

Tags

Tasks (1/2)

Filter tasks by property or value

Filter desired status

Running

Filter launch type

Any launch type

1

Stop

Task	Last status	Desired st...	T...	Health sta...	Started at	Container instan...	Launch type	Plat
3fcf60...	Activating	Running	awa...	Unknown	-	-	FARGATE	1.4.0

Containers for task 8d4de1306a43416183540895a1ffeabad

Container name	Container runtime ID	Image URI	Image Digest	Status	Health status	CPU	M
awards-task	8d4de1306a4341...	sahilphule...	sha256:83...	Running	Unknown	.5 vCPU	1

Connection to the RDS database through Bastion Host using MySQL Workbench

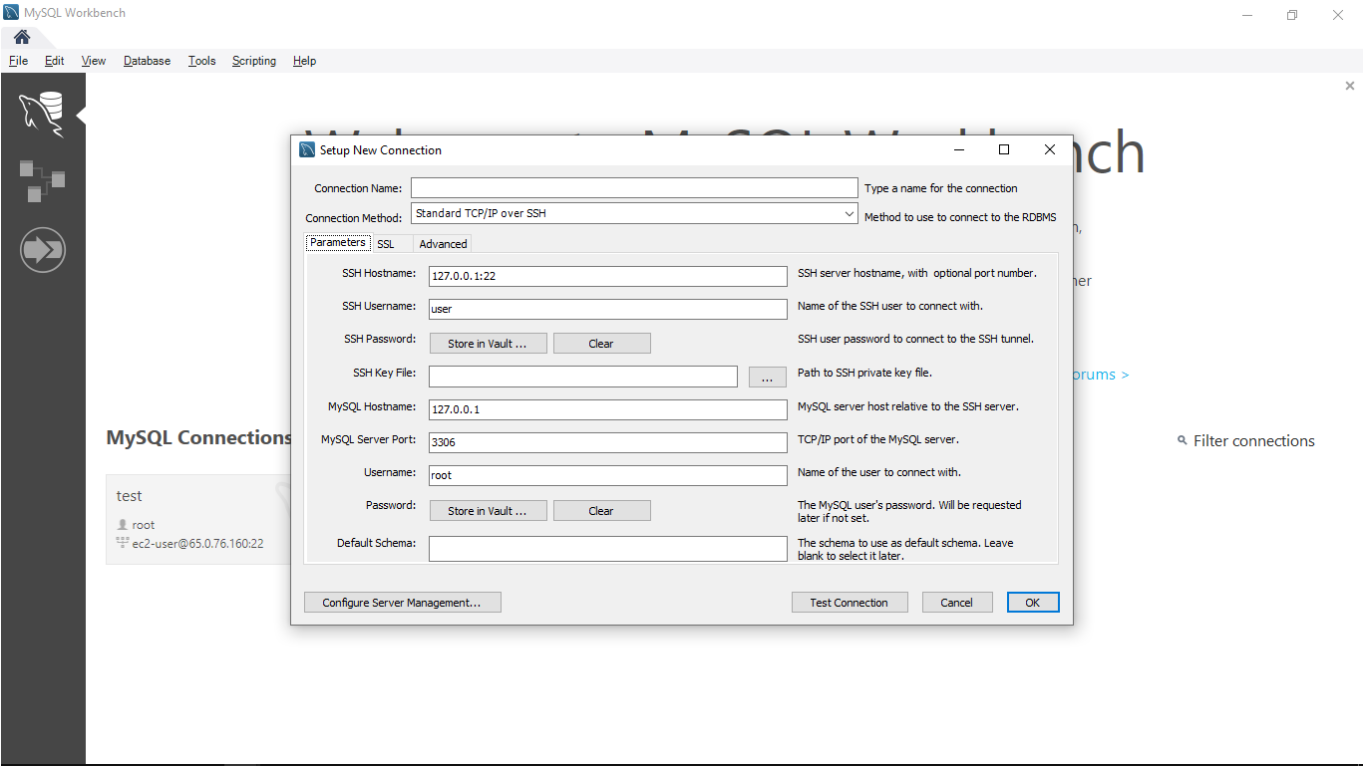
Now, we will use MySQL Workbench to connect and access the MySQL RDS Database through above created Bastion Host.

Steps

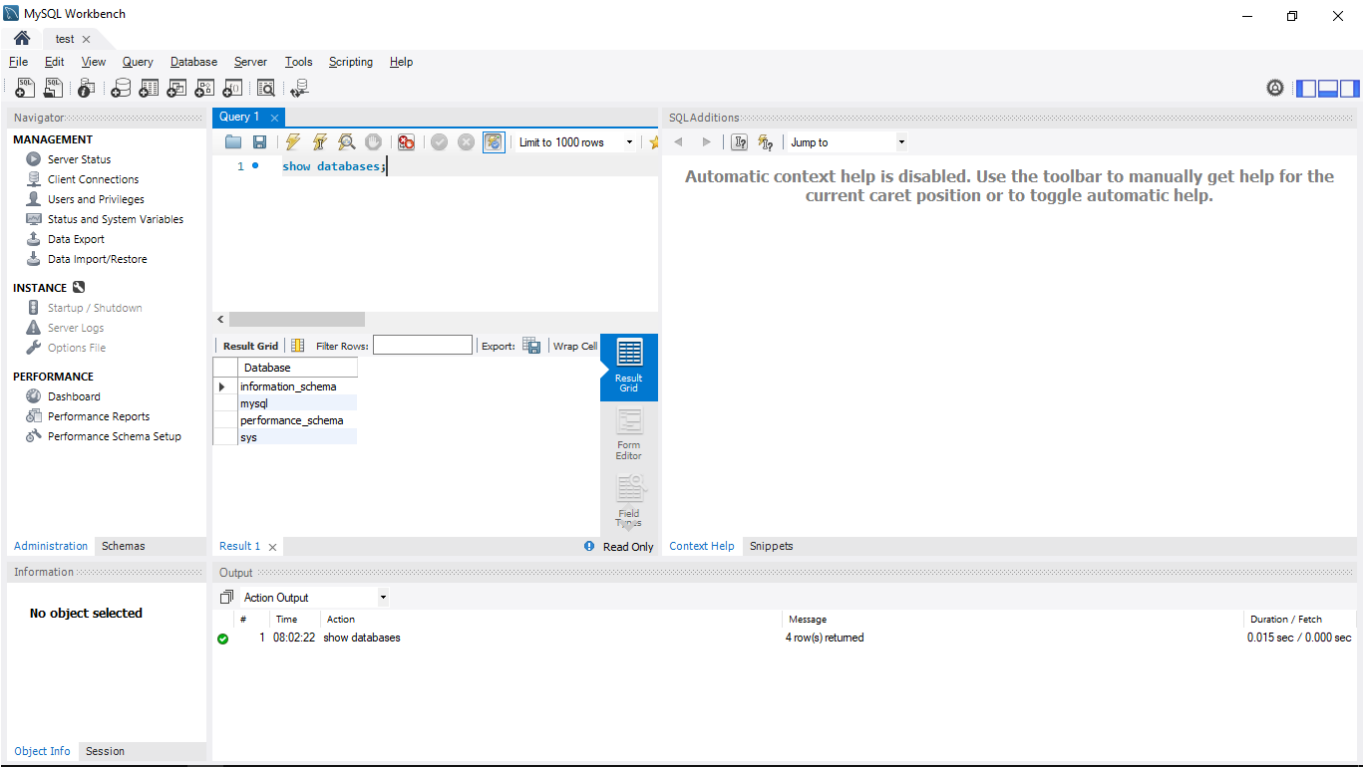
1. Open MySQL Workbench.
 2. Click Add Connection.
 3. Select connection method as **Standard TCP/IP over SSH**.
 4. In SSH Hostname, enter *bastion-host-ip:22* where bastion-host-ip is received from the **terraform output** command.
 5. In SSH Username, enter *ec2-user*.
 6. In SSH Key File, select *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 *ecs-container*.
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Screenshots of MySQL Workbench

Connection Page



Commands Page



Destroy the provisioned infrastructure

Lastly, we will destroy the above-created resources.

Steps

1. To destroy infrastructure, open the Powershell Window and change the directory to the above-created **ecs-terraform** directory using the **cd** command.
 2. Run **terraform destroy** & if prompted, type **yes**.
 3. Infrastructure will be destroyed.
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