Lesson 10 Demo 02

Authenticating Terraform State Backend

Objective: To authenticate and manage Terraform state using two different backend types, S3 standard backend and remote enhanced backend

Tools required: Visual Studio Code

Prerequisites: Ensure you have created and implemented the AWS access key and secret key before starting this demo. Refer to Lesson 08 Assisted Practice 02 for detailed steps

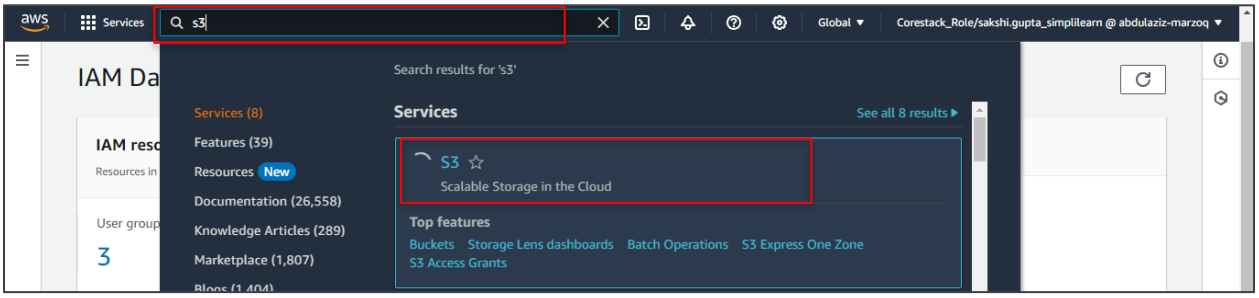
Note: The folder structure created in the previous demos is used here. It is also included in the resources section of LMS. Please refer Lesson_10_demo_01

Steps to be followed:

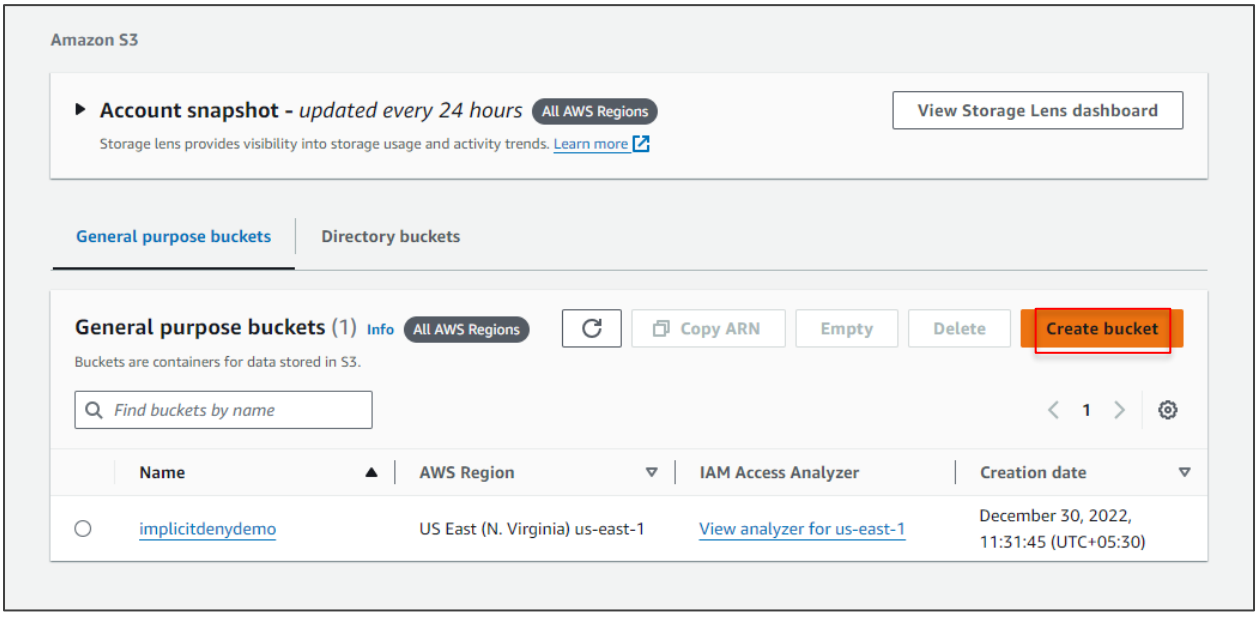
1. Authenticate S3 standard backend
2. Authenticate remote enhanced backend

Step 1: Authenticate S3 standard backend

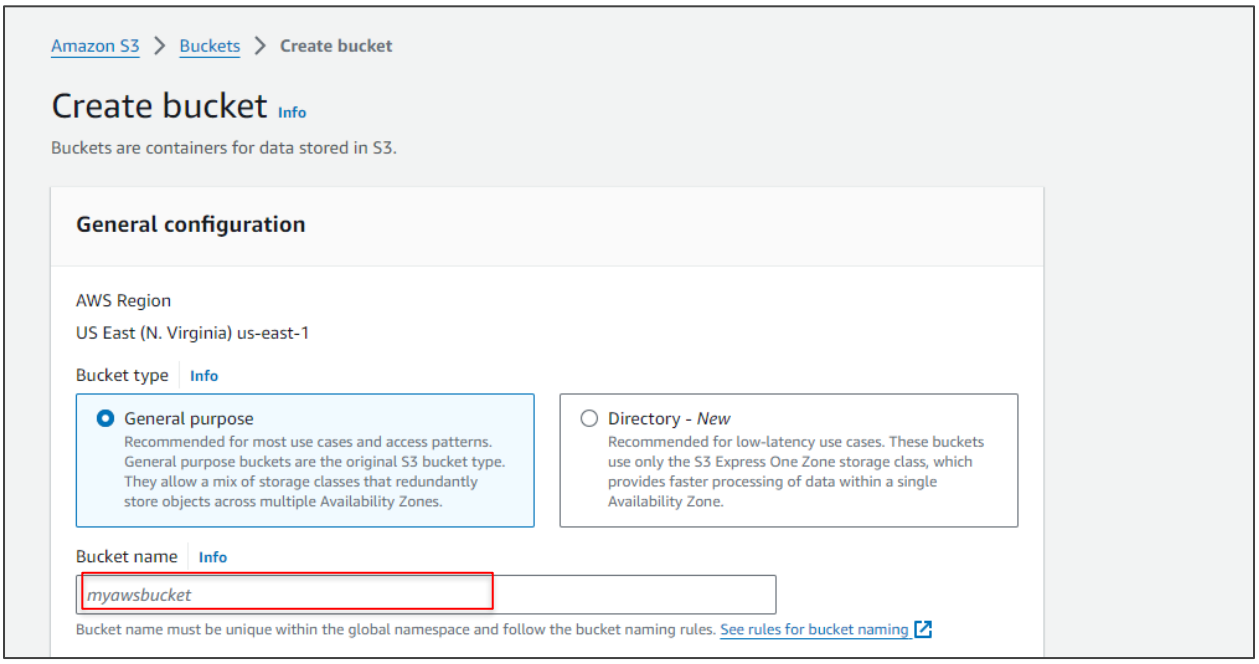
1.1 Log in to the AWS Management Console and navigate to the **S3** service using the search bar

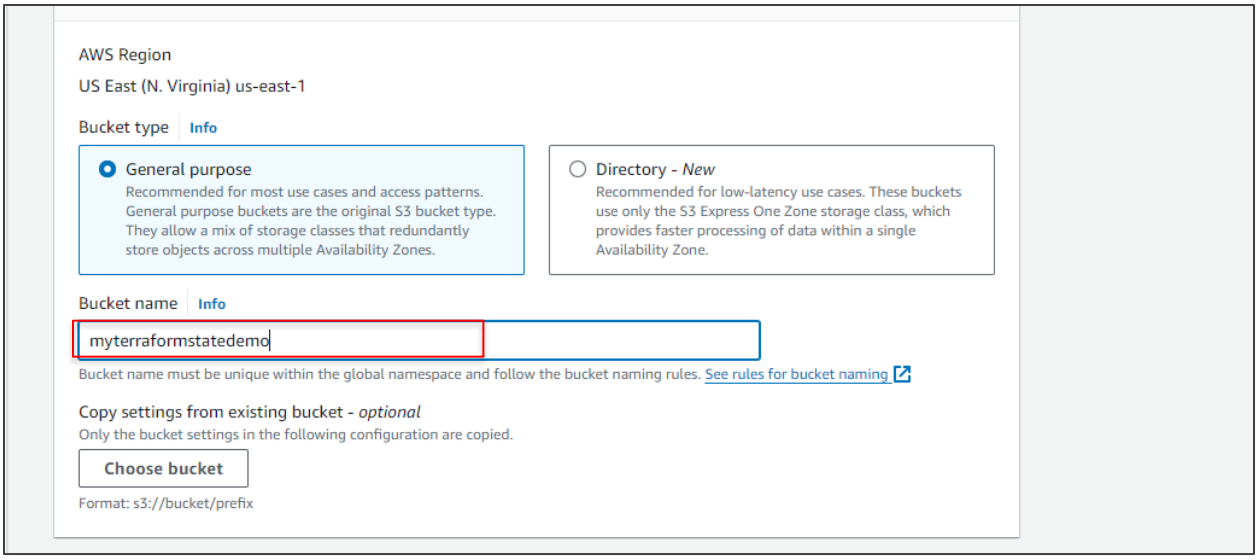


1.2 Click on **Create bucket**

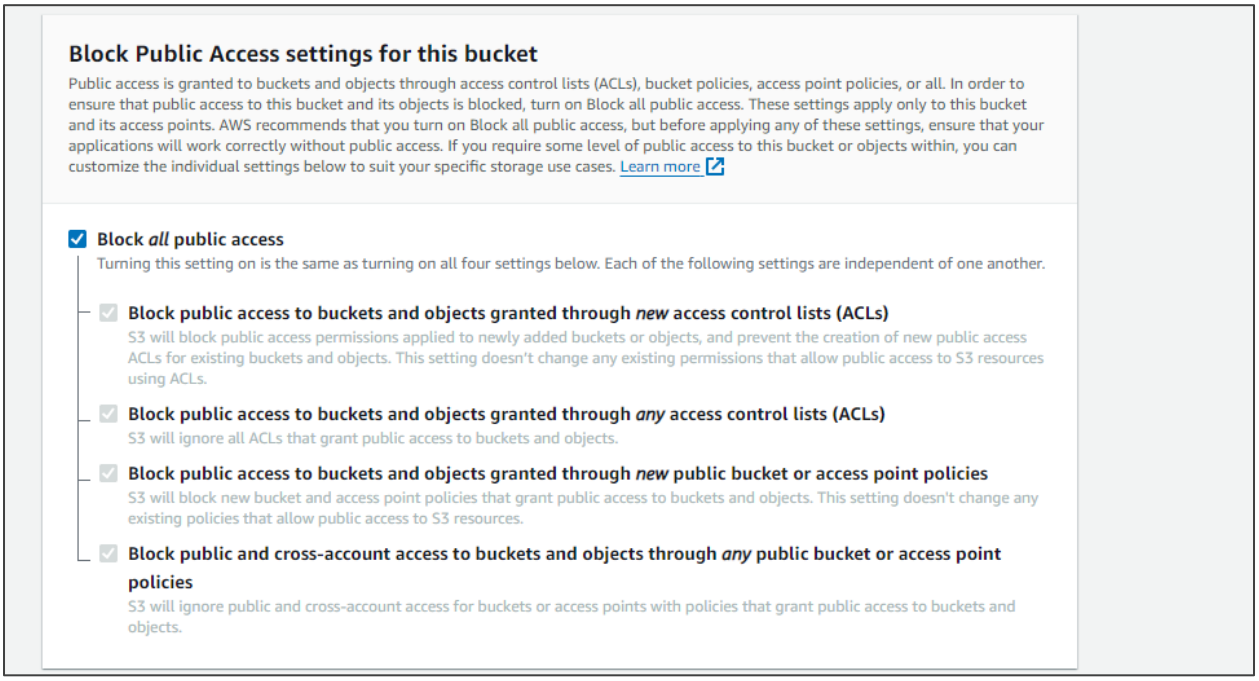


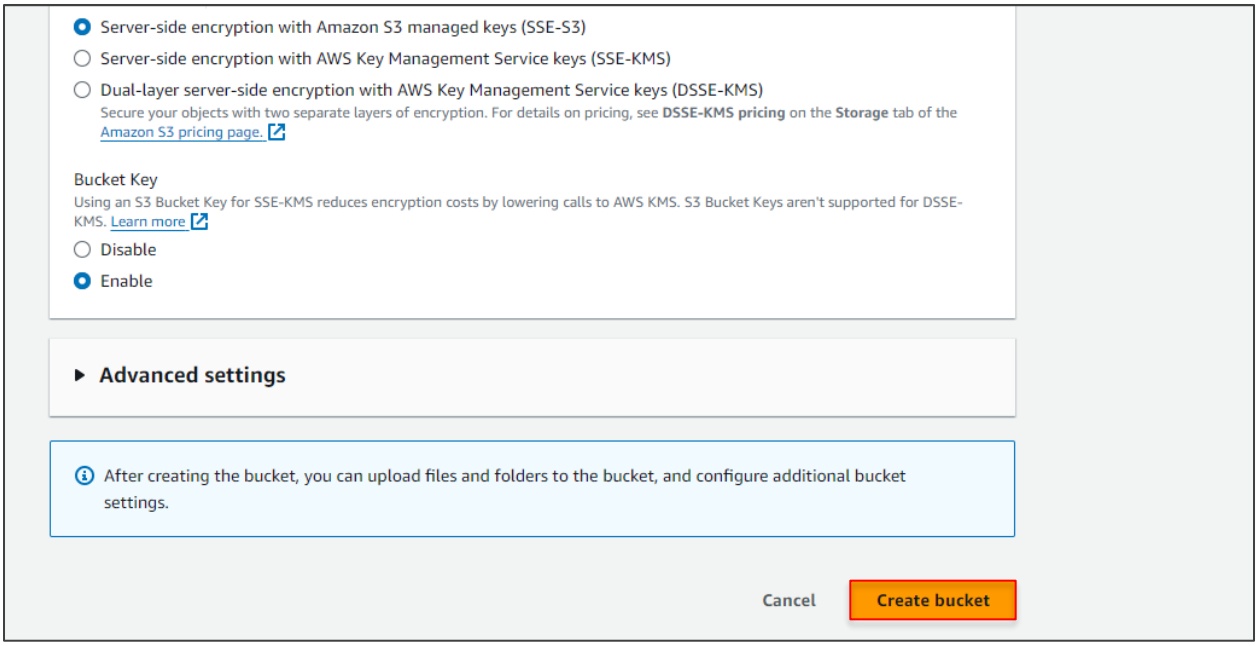
1.3 Name it appropriately for storing Terraform state files





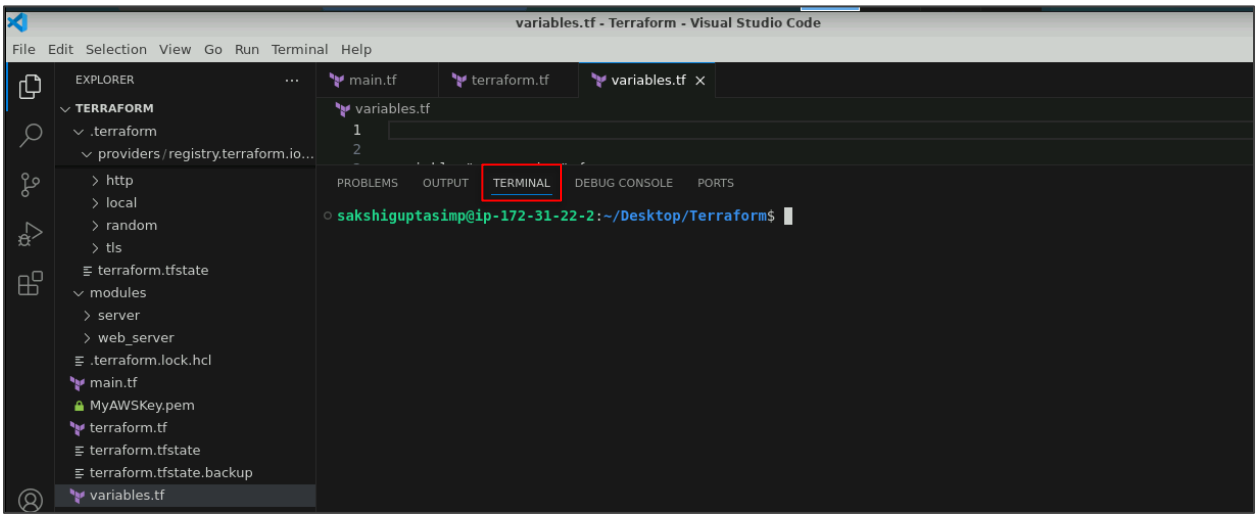
1.4 Retain all the other configurations at their default settings and click on **Create bucket**





The bucket will be created as shown above.

1.5 Open Visual Studio Code and navigate to the **Terminal**



1.6 Clean up any existing infrastructure to prepare for backend configuration by using the following command:
terraform destroy

```
PROBLEMS    OUTPUT    TERMINAL    DEBUG CONSOLE    PORTS
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$ terraform destroy
```

1.7 When prompted, confirm the destruction of resources by typing **yes**

```
PROBLEMS    OUTPUT    TERMINAL    DEBUG CONSOLE    PORTS

  - public_ip                  = "18.207.104.133" -> null
  - public_ip_server_subnet_1  = "54.163.63.185" -> null
  - size                       = "t2.micro" -> null

Do you really want to destroy all resources?
  Terraform will destroy all your managed infrastructure, as shown above.
  There is no undo. Only 'yes' will be accepted to confirm.

  Enter a value: yes
```

```
PROBLEMS    OUTPUT    TERMINAL    DEBUG CONSOLE    PORTS
aws_nat_gateway.nat_gateway: Still destroying... [id=nat-05b819ebbdb65964b, 40s elapsed]
aws_nat_gateway.nat_gateway: Destruction complete after 40s
aws_subnet.public_subnets["public_subnet_1"]: Destroying... [id=subnet-0d049c1ebbd0a0872]
aws_subnet.public_subnets["public_subnet_3"]: Destroying... [id=subnet-019ef181be686d113]
aws_eip.nat_gateway_eip: Destroying... [id=eipalloc-077e4d1caf6a7c46d]
aws_subnet.public_subnets["public_subnet_2"]: Destroying... [id=subnet-00149eda4bed0de7b]
aws_subnet.public_subnets["public_subnet_1"]: Destruction complete after 0s
aws_subnet.public_subnets["public_subnet_3"]: Destruction complete after 0s
aws_subnet.public_subnets["public_subnet_2"]: Destruction complete after 0s
aws_eip.nat_gateway_eip: Destruction complete after 1s
aws_internet_gateway.internet_gateway: Destroying... [id=igw-01ffeafe8937357ef]
aws_internet_gateway.internet_gateway: Destruction complete after 0s
aws_vpc.vpc: Destroying... [id=vpc-077c667402e032623]
aws_vpc.vpc: Destruction complete after 1s

Destroy complete! Resources: 30 destroyed.
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$
```

1.8 Go to **terraform.tf** file and set up Terraform to use the created S3 bucket by using the following code:

```
terraform {
 backend "s3" {
  bucket = "myterraformstatedemo"
  key    = "prod/aws_infra"
  region = "us-east-1"
 }
```

```
terraform.tf
terraform {
  backend "s3" {
    bucket = "myterraformstatedemo"
    key = "prod/aws_infra"
    region = "us-east-1"
  }
```

1.9 Format the terraform configuration file by using the following command:
terraform fmt

```
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$ terraform fmt
terraform.tf
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$
```

1.10 Set the environment variables for AWS credentials by using the following command:
export AWS_ACCESS_KEY_ID="your-access-key"
export AWS_SECRET_ACCESS_KEY="your-secret-key"

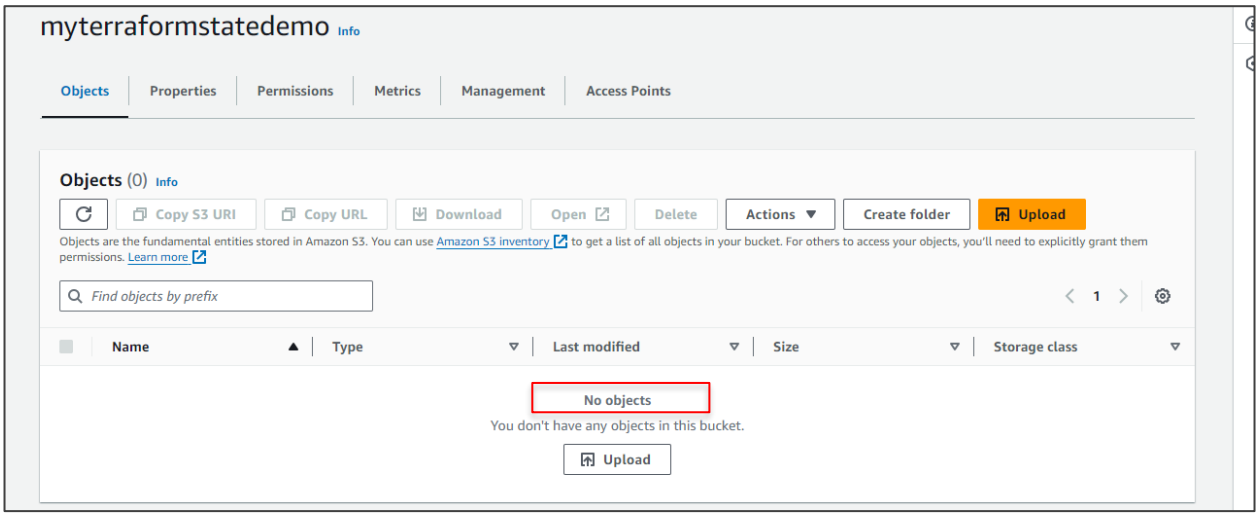
```
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$ export AWS_ACCESS_KEY_ID="AKIA5FR7SGZJKQFM2PUM"
export AWS_SECRET_ACCESS_KEY="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"
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$
```

1.11 Initialize the Terraform working directory by using the following commands:
terraform init

```
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$ terraform init
Initializing modules...

Initializing the backend...

Successfully configured the backend "s3"! Terraform will automatically
use this backend unless the backend configuration changes.

Initializing provider plugins...
- Reusing previous version of hashicorp/local from the dependency lock file
- Reusing previous version of hashicorp/tls from the dependency lock file
- Reusing previous version of hashicorp/aws from the dependency lock file
- Reusing previous version of hashicorp/http from the dependency lock file
- Reusing previous version of hashicorp/random from the dependency lock file
- Using previously-installed hashicorp/tls v3.1.0
- Using previously-installed hashicorp/aws v3.76.1
```

```
PROBLEMS    OUTPUT    TERMINAL    DEBUG CONSOLE    PORTS

- Reusing previous version of hashicorp/tls from the dependency lock file
- Reusing previous version of hashicorp/aws from the dependency lock file
- Reusing previous version of hashicorp/http from the dependency lock file
- Reusing previous version of hashicorp/random from the dependency lock file
- Using previously-installed hashicorp/tls v3.1.0
- Using previously-installed hashicorp/aws v3.76.1
- Using previously-installed hashicorp/http v2.1.0
- Using previously-installed hashicorp/random v3.1.0
- Using previously-installed hashicorp/local v2.1.0

Terraform has been successfully initialized!

You may now begin working with Terraform. Try running "terraform plan" to see
any changes that are required for your infrastructure. All Terraform commands
should now work.

If you ever set or change modules or backend configuration for Terraform,
rerun this command to reinitialize your working directory. If you forget, other
commands will detect it and remind you to do so if necessary.
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$
```

1.12 Navigate to the newly created bucket in the AWS Console and observe that there are no **objects** yet



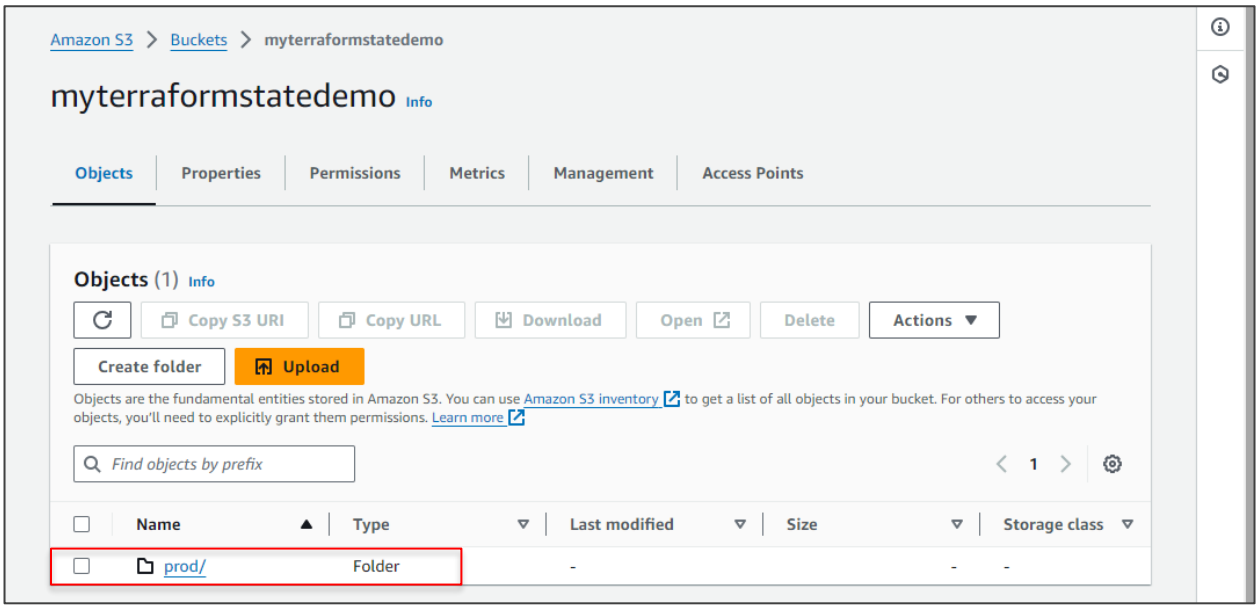
1.13 Navigate to the terminal in Visual Studio Code and update infrastructure resources by using the following command:
terraform apply

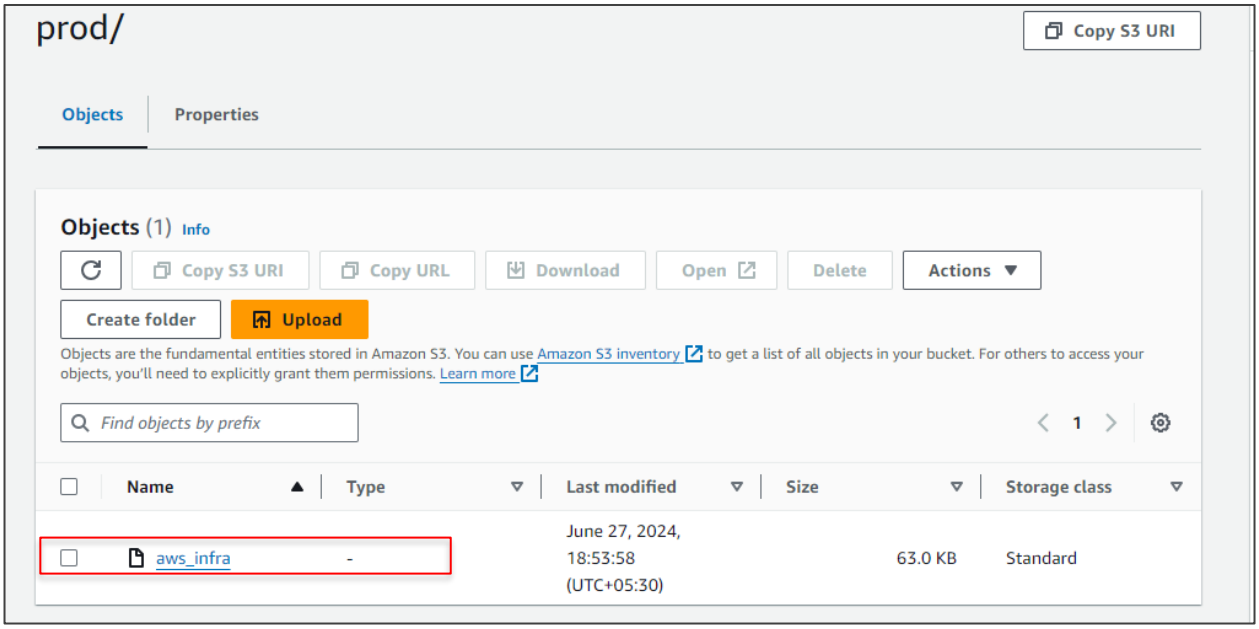
```
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$ terraform apply
```

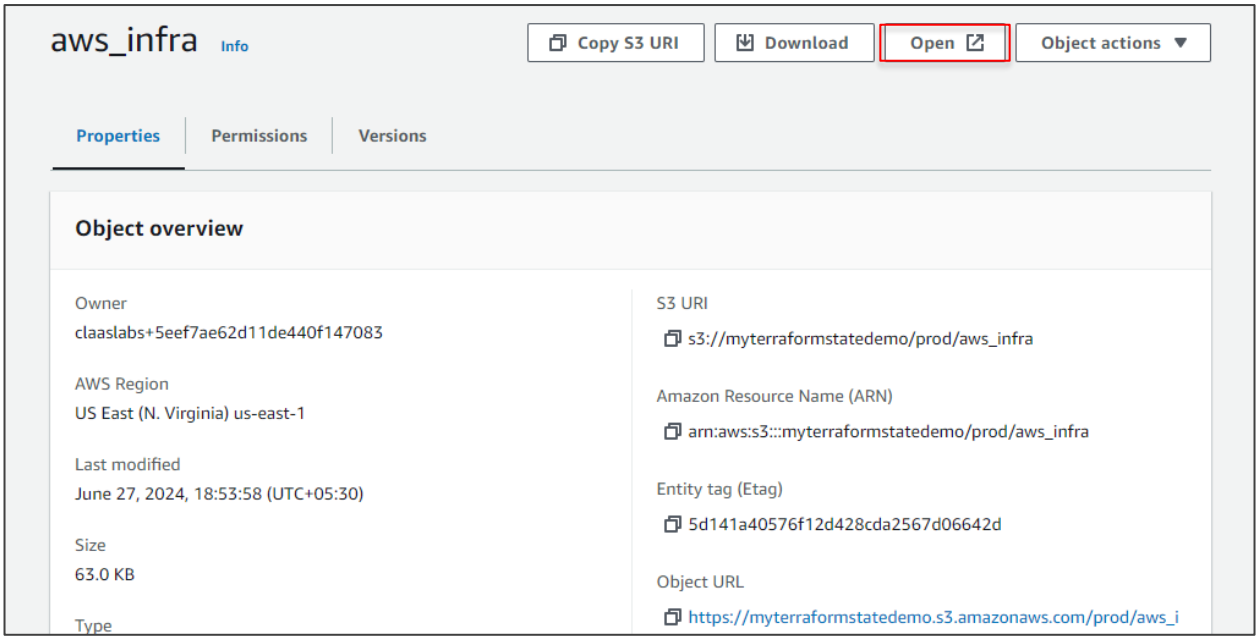
```
PROBLEMS    OUTPUT    TERMINAL    DEBUG CONSOLE    PORTS

          + volume_id             = (known after apply)
          + volume_size           = (known after apply)
          + volume_type           = (known after apply)
        }
    }

Plan: 30 to add, 0 to change, 0 to destroy.

Changes to Outputs:
  + public_dns                = (known after apply)
  + public_dns_server_subnet_1 = (known after apply)
  + public_ip                 = (known after apply)
  + public_ip_server_subnet_1  = (known after apply)
  + size                      = "t2.micro"

Do you want to perform these actions?
  Terraform will perform the actions described above.
  Only 'yes' will be accepted to approve.

  Enter a value: yes
```

```
PROBLEMS    OUTPUT    TERMINAL    DEBUG CONSOLE    PORTS

aws_route_table_association.private["private_subnet_3"]: Creating...
aws_route_table_association.private["private_subnet_1"]: Creating...
aws_route_table_association.private["private_subnet_2"]: Creating...
aws_route_table_association.private["private_subnet_3"]: Creation complete after 1s [id=rtbassoc-0dfa9f925
45019a79]
aws_route_table_association.private["private_subnet_2"]: Creation complete after 1s [id=rtbassoc-0b1f4308f
a4c8eaee]
aws_route_table_association.private["private_subnet_1"]: Creation complete after 1s [id=rtbassoc-0012cbbd8
402d4717]

Apply complete! Resources: 30 added, 0 changed, 0 destroyed.

Outputs:

public_dns = "ec2-34-201-56-208.compute-1.amazonaws.com"
public_dns_server_subnet_1 = "ec2-54-236-6-73.compute-1.amazonaws.com"
public_ip = "34.201.56.208"
public_ip_server_subnet_1 = "54.236.6.73"
size = "t2.micro"
sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$
```

1.14 Go to the created bucket in the AWS Console and observe that object has been added. Click on it to view it in detail.



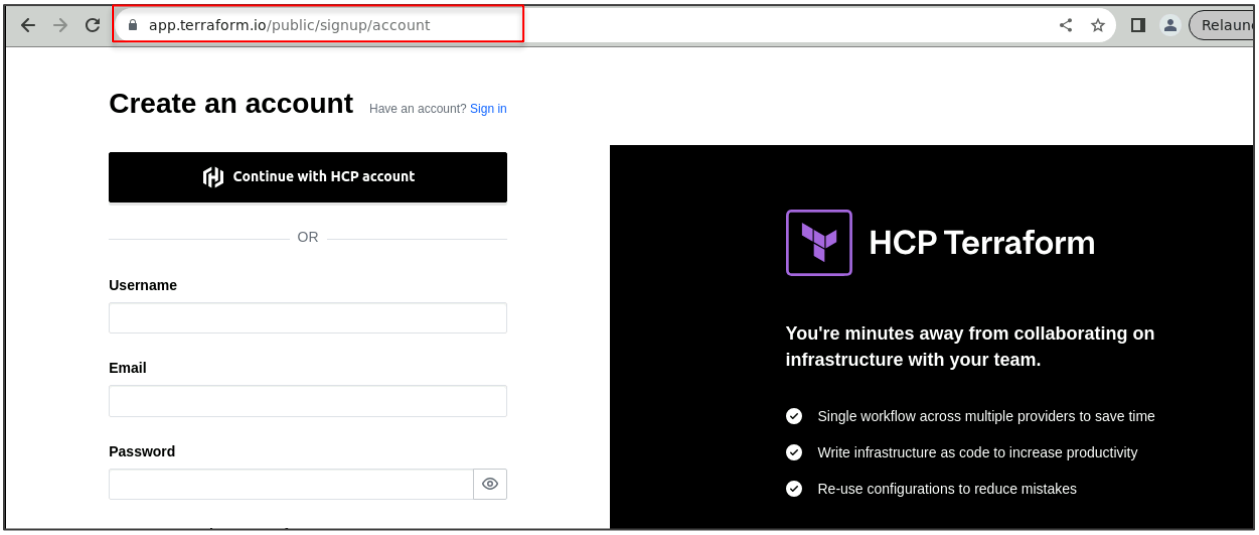

prod/
Copy S3 URI
Objects
Properties
Objects (1) Info
Copy S3 URI
Copy URL
Download
Open
Delete
Actions
Create folder
Upload
Objects are the fundamental entities stored in Amazon S3. You can use Amazon S3 inventory to get a list of all objects in your bucket. For others to access your objects, you'll need to explicitly grant them permissions. Learn more
Find objects by prefix
1
Name
Type
Last modified
Size
Storage class
aws_infra
-
June 27, 2024, 18:53:58 (UTC+05:30)
63.0 KB
Standard


aws_infra Info
Copy S3 URI
Download
Open
Object actions
Properties
Permissions
Versions
Object overview
Owner
claaslabs+5eef7ae62d11de440f147083
AWS Region
US East (N. Virginia) us-east-1
Last modified
June 27, 2024, 18:53:58 (UTC+05:30)
Size
63.0 KB
Type
S3 URI
s3://myterraformstatedemo/prod/aws_infra
Amazon Resource Name (ARN)
arn:aws:s3:::myterraformstatedemo/prod/aws_infra
Entity tag (Etag)
5d141a40576f12d428cda2567d06642d
Object URL
https://myterraformstatedemo.s3.amazonaws.com/prod/aws_i

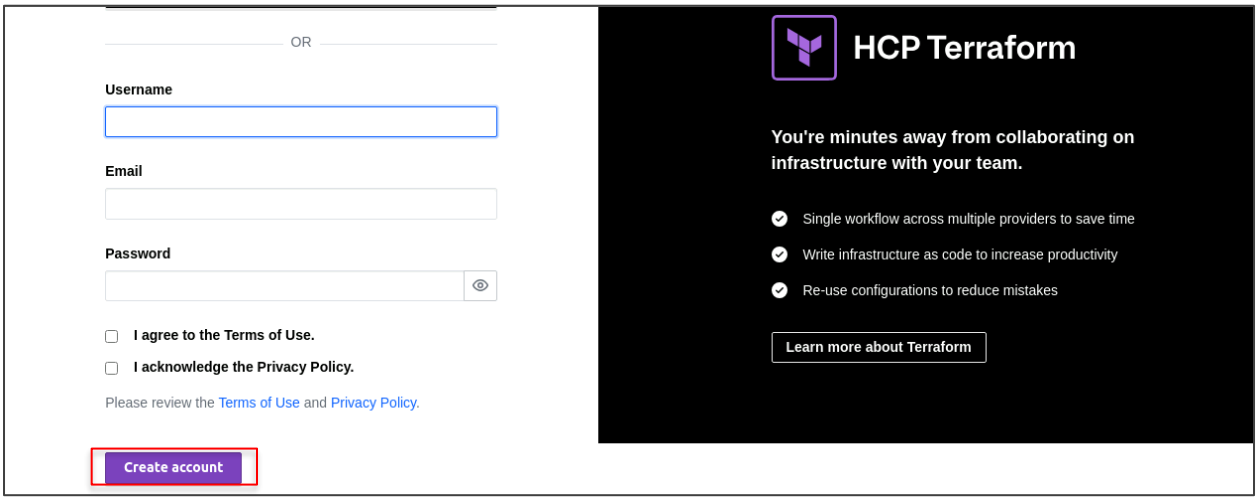
```
{
  "version": 4,
  "terraform_version": "1.1.6",
  "serial": 0,
  "lineage": "a592cde6-75be-4072-a088-766d409b08c7",
  "outputs": {
    "public_dns": {
      "value": "ec2-34-201-56-208.compute-1.amazonaws.com",
      "type": "string"
    },
    "public_dns_server_subnet_1": {
      "value": "ec2-54-236-6-73.compute-1.amazonaws.com",
      "type": "string"
    },
    "public_ip": {
      "value": "34.201.56.208",
      "type": "string"
    },
    "public_ip_server_subnet_1": {
      "value": "54.236.6.73",
      "type": "string"
    },
    "size": {
      "value": "t2.micro",
      "type": "string"
    }
  },
  "resources": [
    {
      "mode": "data",
      "type": "aws_ami",
      "name": "ubuntu",
      "provider": "provider[\"registry.terraform.io/hashicorp/aws\"]",
      "instances": [
        {
          "schema_version": 0,
          "attributes": {
            "architecture": "x86_64",
```

Step 2: Authenticate remote enhanced backend authentication

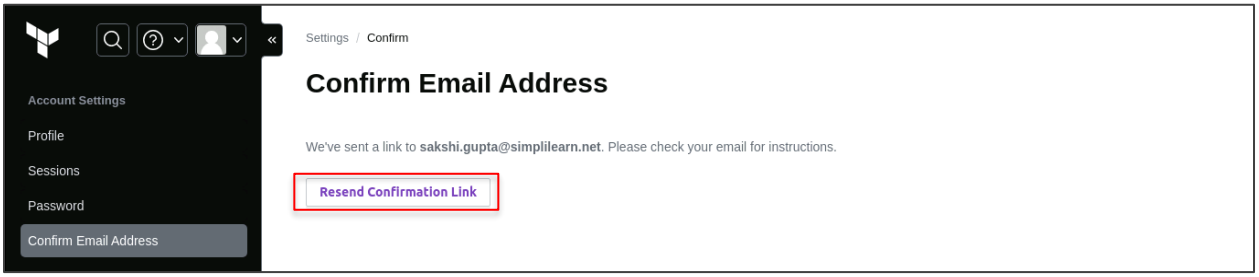
2.1 Create a Terraform Cloud account by visiting the following URL:
https://app.terraform.io/public/signup/account



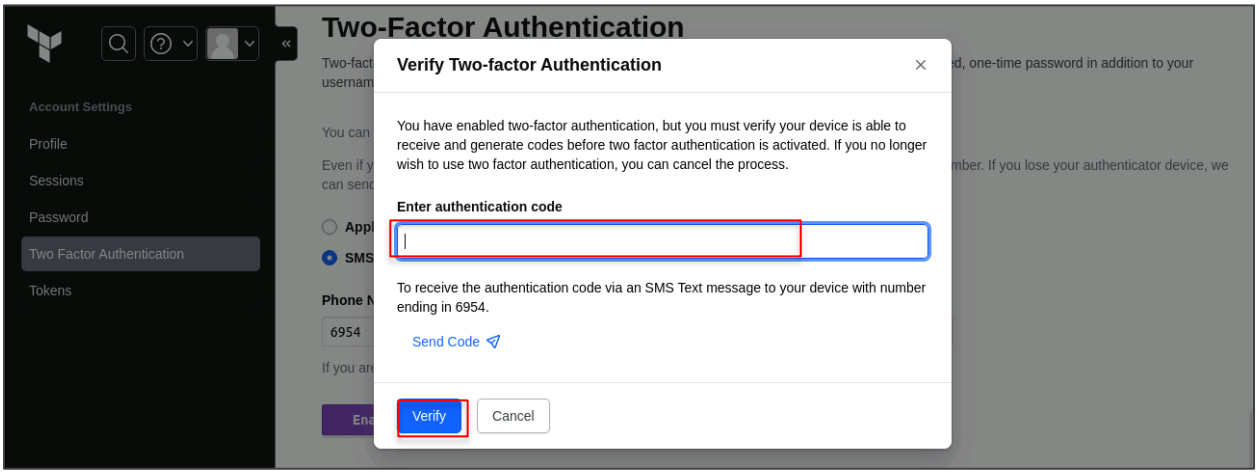
2.2 Enter the details and click on **Create account**



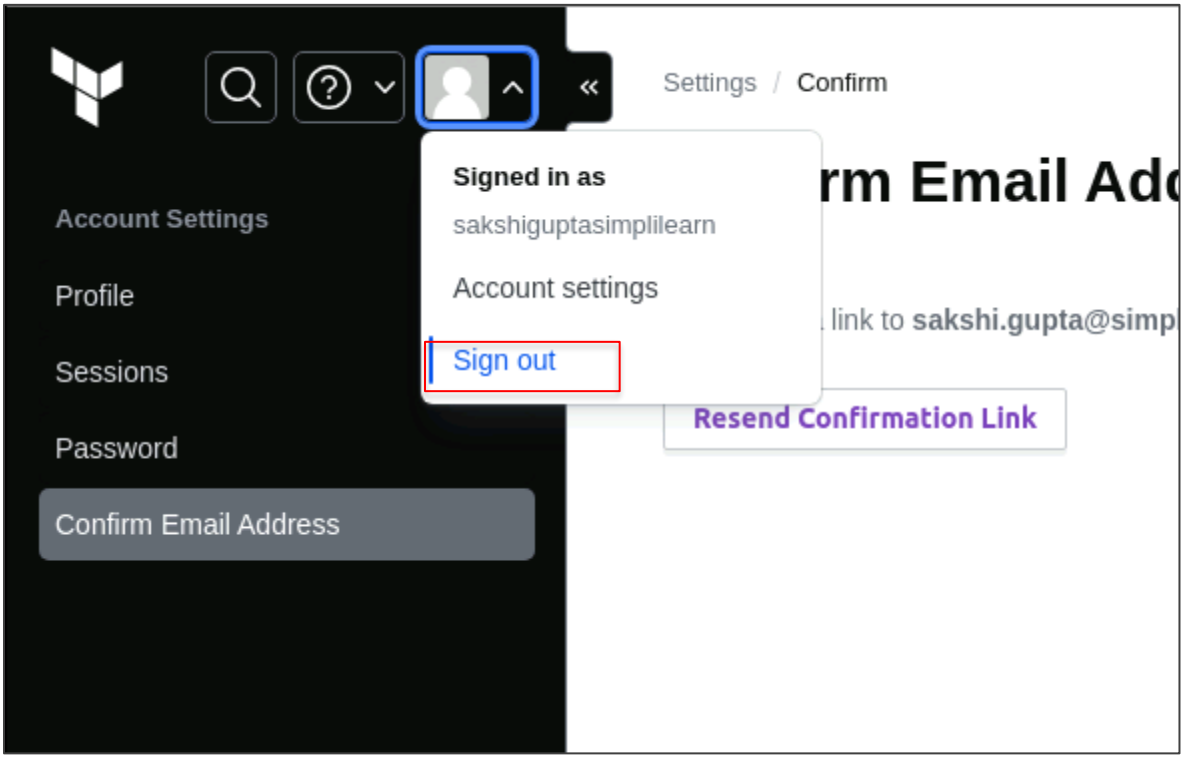
2.3 Click on **Resend Confirmation Link** and follow the procedures through your registered email



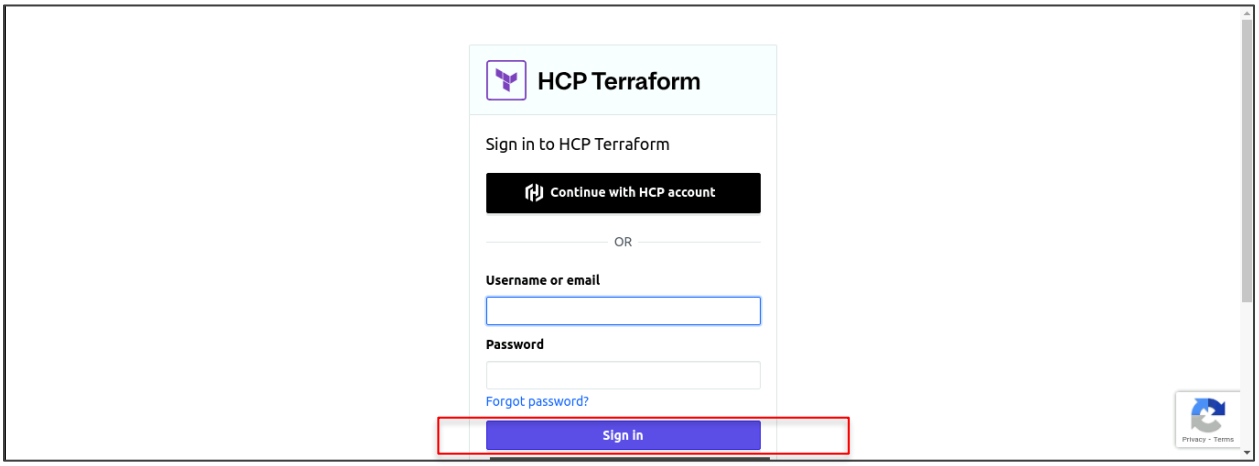
2.4 When promoted, enter the authentication code and click **Verify**.



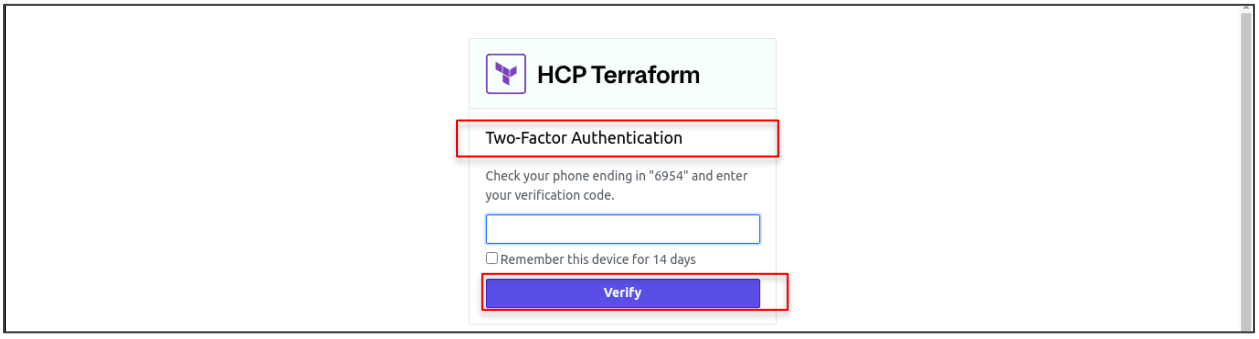
2.5 **Sign out** and re-login to the Terraform Cloud



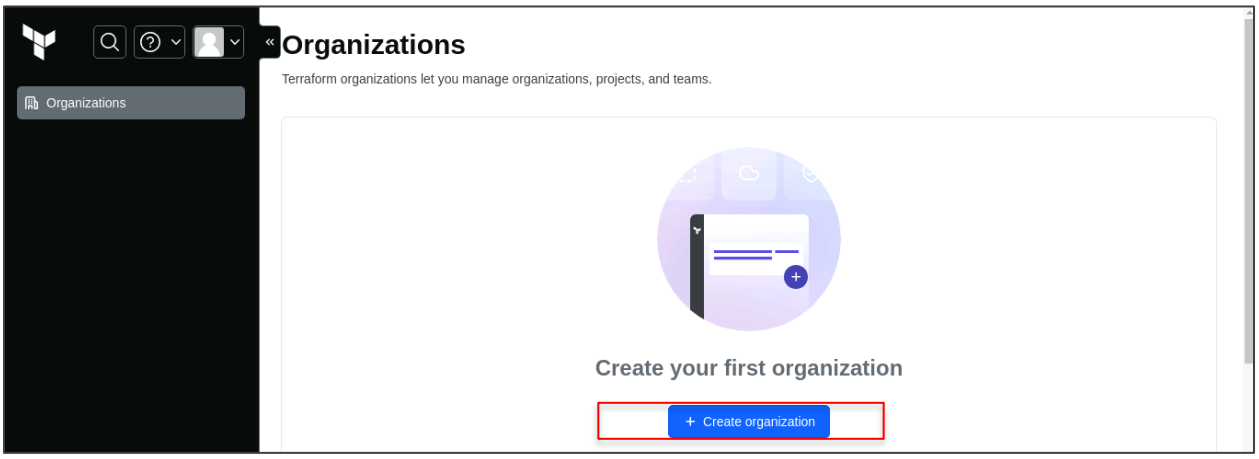
2.6 Enter the required details and click on **Sign In**



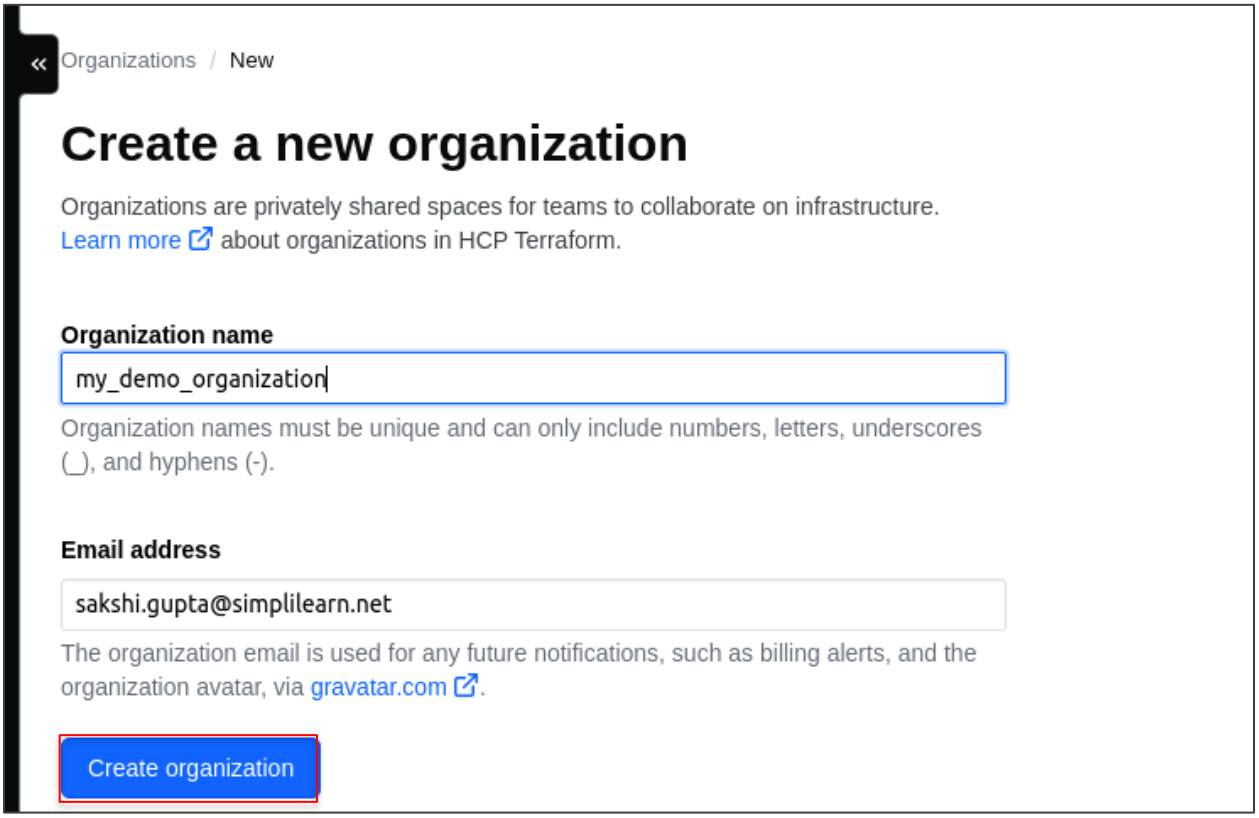
2.7 Click **Verify** after entering the verification code

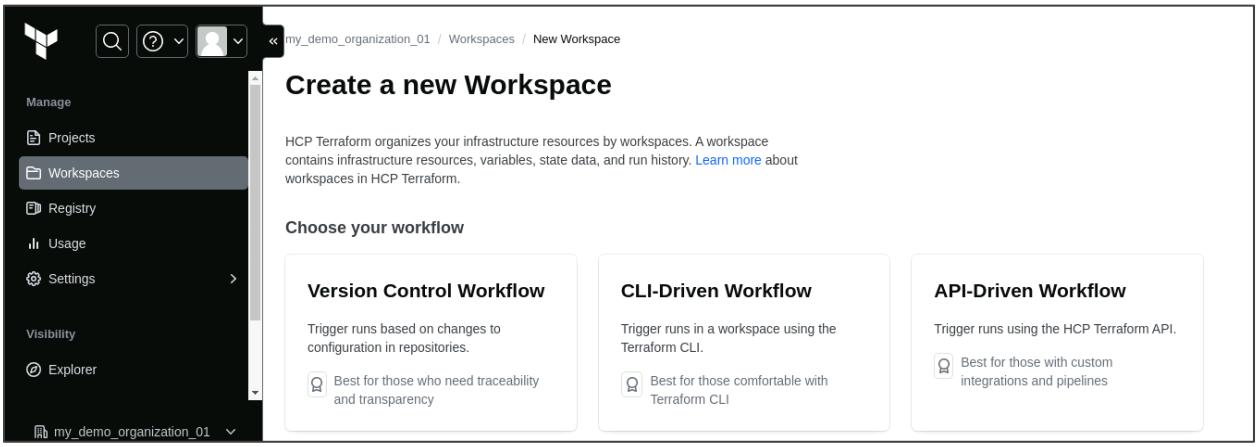


2.8 Click on **Create organization**

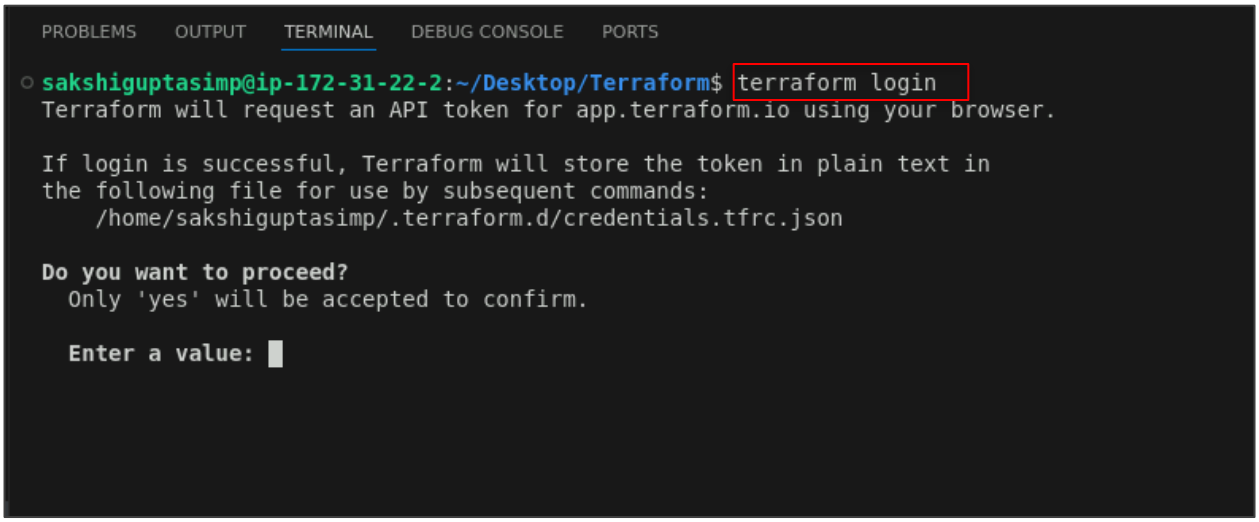


2.9 Enter a unique organization name and email address, then click on **Create organization**

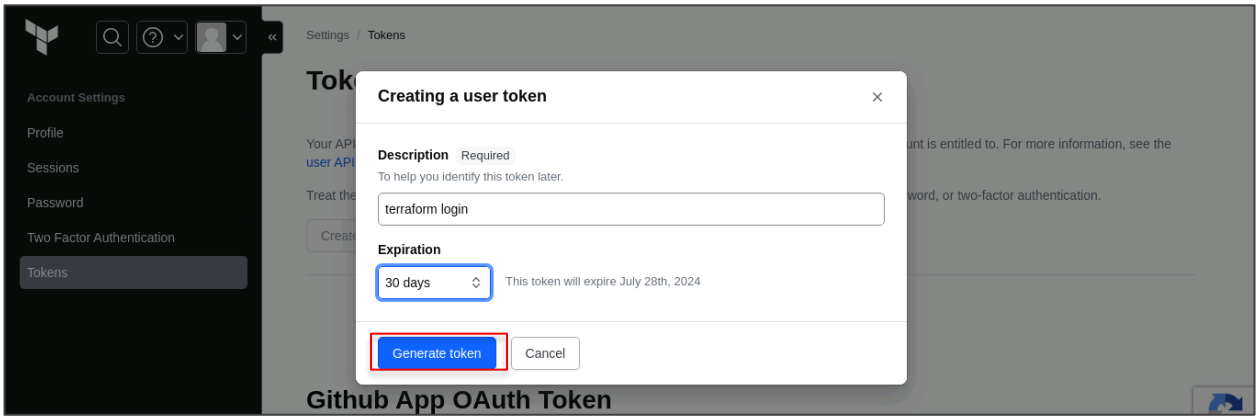




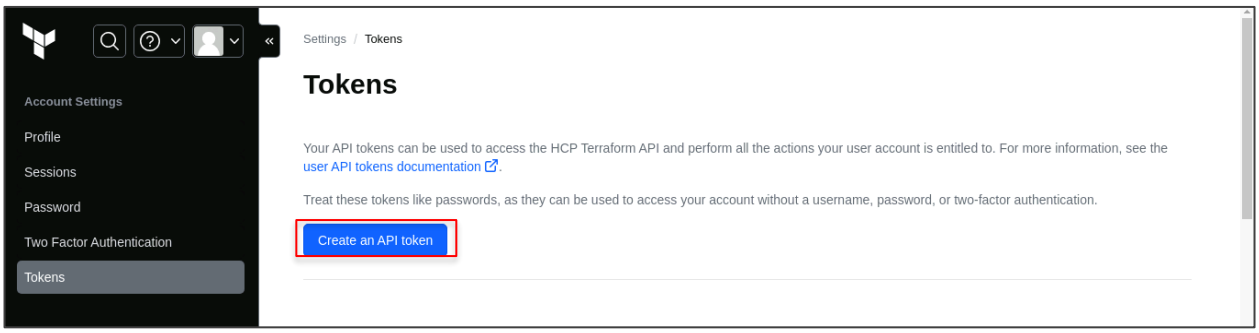
2.10 Authenticate the Terraform CLI to interact with the Terraform Cloud by using the following command:
terraform login

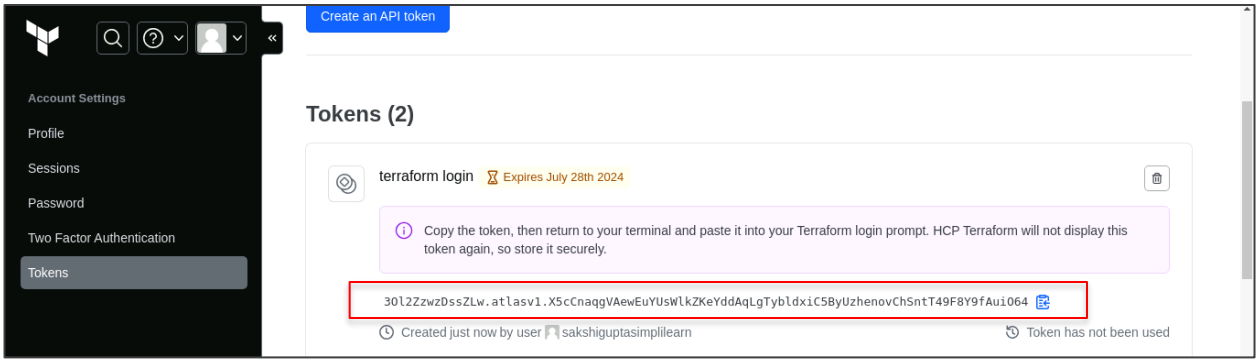


2.11 The Terraform Cloud will automatically open in the browser. Click on **Generate token**.

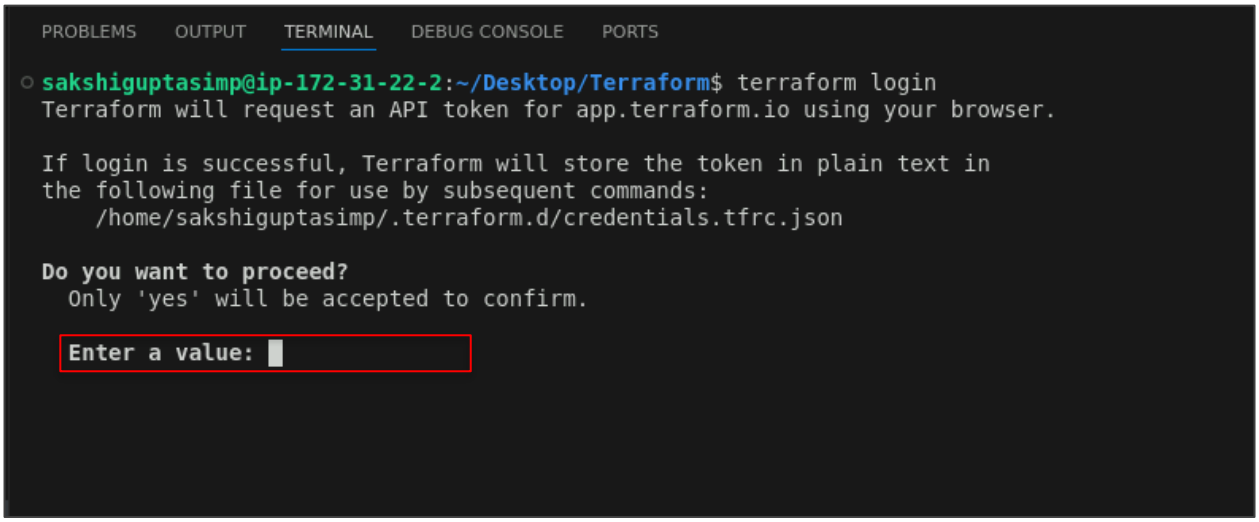


2.12 Click on **Create an API token** and copy the token when generated





2.13 Paste the generated token in the Visual Studio Code terminal:



2.14 A welcome message from Terraform will be displayed.

```
Welcome to HCP Terraform!

Documentation: terraform.io/docs/cloud


New to HCP Terraform? Follow these steps to instantly apply an example configuration:

$ git clone https://github.com/hashicorp/tfc-getting-started.git
$ cd tfc-getting-started
$ scripts/setup.sh

sakshiguptasimp@ip-172-31-22-2:~/Desktop/Terraform$
```

By following the above steps, you have successfully authenticated and managed Terraform state using two different backend types, S3 standard backend and remote enhanced backend.