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Hashu Advani Memorial Complex, Collector Colony, Chembur East, Mumbai - 400074.

Department of Information Technology A.Y. 2024-25

Advance DevOps Lab
Experiment 06

Aim: To Build, change, and destroy AWS / GCP /Microsoft Azure/ DigitalOcean infrastructure Using Terraform.

Roll No.	53
Name	Aryan Deepak Saraf
Class	D15B
Subject	Advance DevOps Lab
LO Mapped	LO1: To understand the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements. LO3: To apply best practices for managing infrastructure as code environments and use terraform to define and deploy cloud infrastructure.
Grade:	

AIM : To Build, change, and destroy AWS / GCP / Microsoft Azure / DigitalOcean infrastructure Using Terraform. (S3 bucket or Docker) fdp

THEORY:

Terraform is a powerful Infrastructure as Code (IaC) tool that allows users to define, build, change, and manage cloud infrastructure across various providers like AWS, Google Cloud, Microsoft Azure, and DigitalOcean. By using Terraform, infrastructure is treated as code, enabling automation, consistency, and version control in managing resources such as S3 buckets, EC2 instances, and other cloud components.

Creating an S3 Bucket with Terraform

When using Terraform to create an S3 bucket on AWS, the process involves defining the desired state of the infrastructure through configuration files written in HashiCorp Configuration Language (HCL). These files specify the cloud provider, resources, and other configurations required to set up the infrastructure.

1. Provider Configuration: Terraform uses providers to interact with different cloud platforms. In this case, the AWS provider is configured with the necessary credentials, such as the Access Key ID and Secret Access Key, to authenticate and authorize Terraform's actions on the AWS cloud.

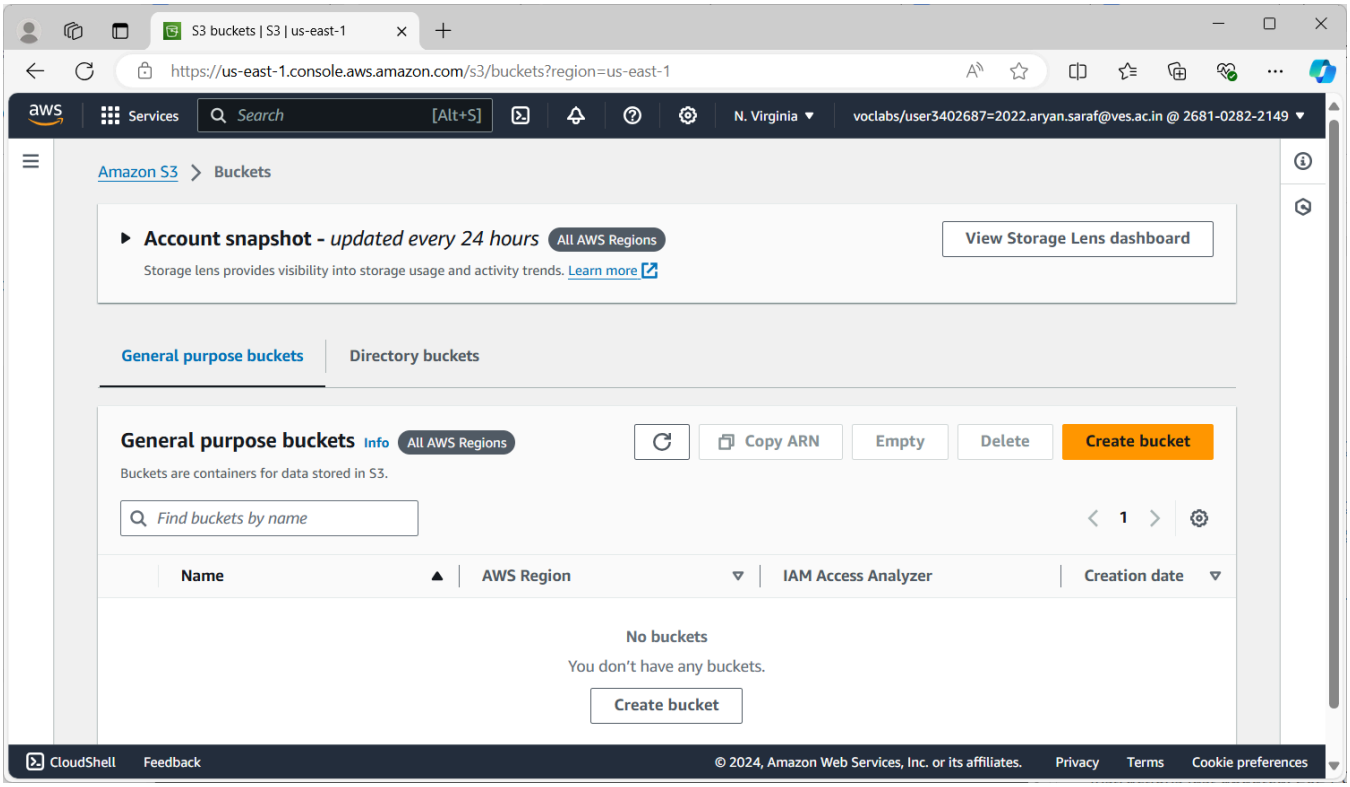
2. Resource Definition: The core of Terraform's functionality lies in its ability to define and manage resources. For creating an S3 bucket, a resource block is used to specify the properties of the bucket, such as its name, region, and access control settings. Terraform then ensures that the specified bucket is created with these properties.

3. Infrastructure as Code (IaC): By writing the configuration in code, Terraform enables the infrastructure to be versioned, shared, and reused across different environments. This approach not only improves collaboration among teams but also ensures that the infrastructure can be easily replicated or modified as needed.

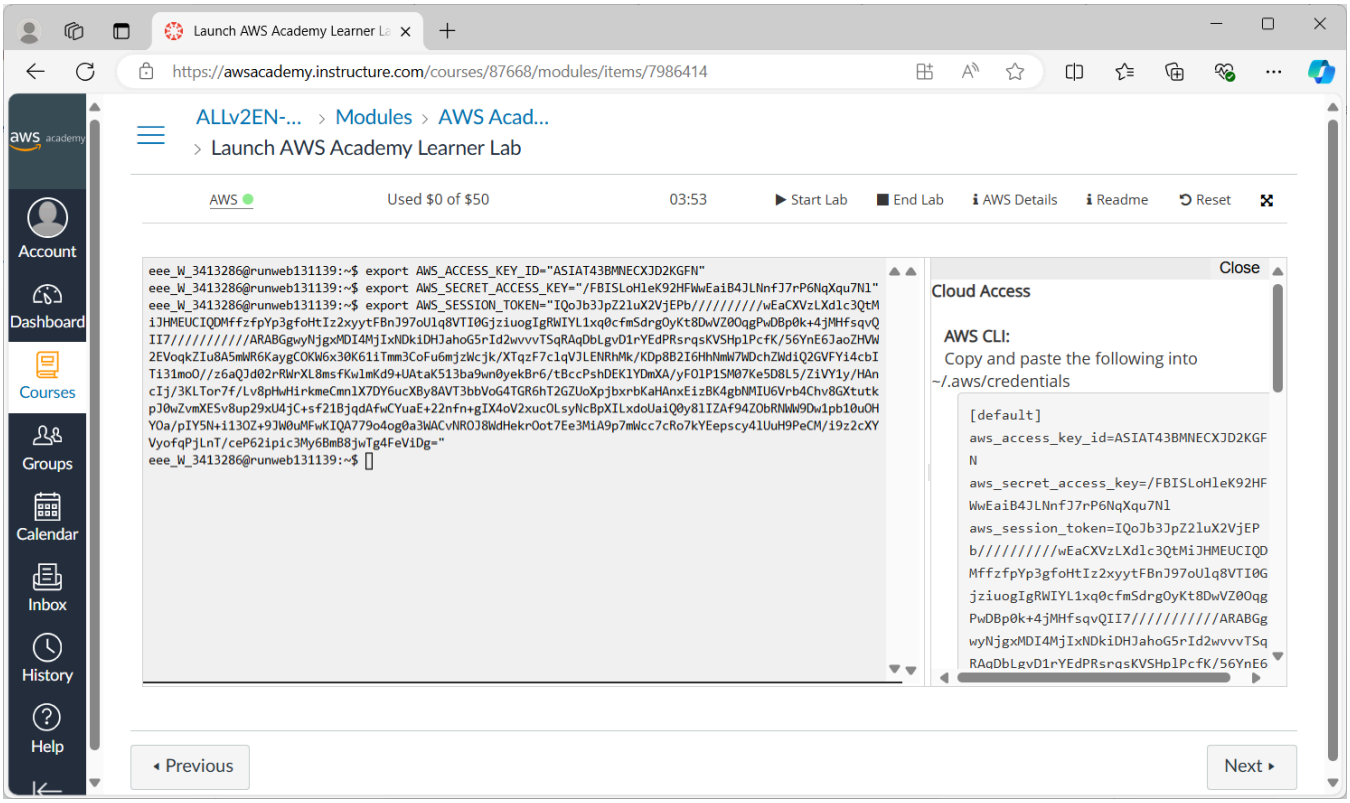
4. Lifecycle Management: Terraform’s lifecycle commands—`init`, `plan`, `apply`, and `destroy`—allow users to manage the entire lifecycle of their infrastructure. These commands initialize the environment, preview changes, apply the configuration, and eventually destroy the infrastructure when it is no longer needed. This level of control ensures that resources are managed efficiently, avoiding unnecessary costs and maintaining an organized cloud environment.

5. State Management: Terraform maintains a state file that tracks the current state of the managed infrastructure. This state file is crucial for determining what changes need to be applied when updating the infrastructure. It ensures that the live infrastructure remains in sync with the configuration files, allowing Terraform to make precise and minimal changes.

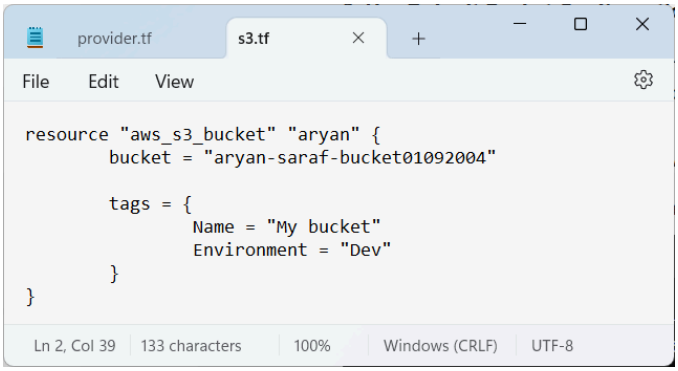
AWS S3 bucket dashboard before performing the experiment.



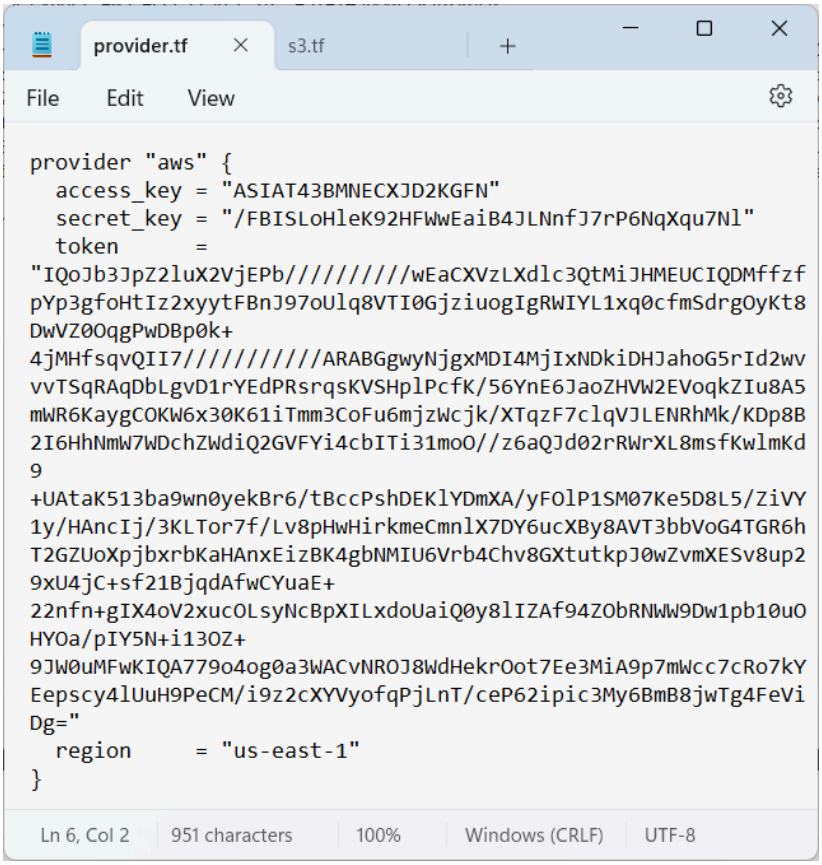
Export all the three credentials from the CLI of the AWS Academy Learner Lab.



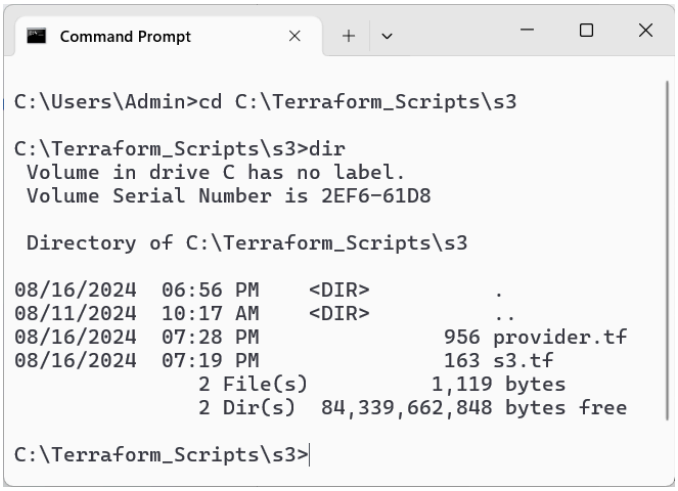
Write a Terraform Script for creating S3 Bucket on Amazon AWS.



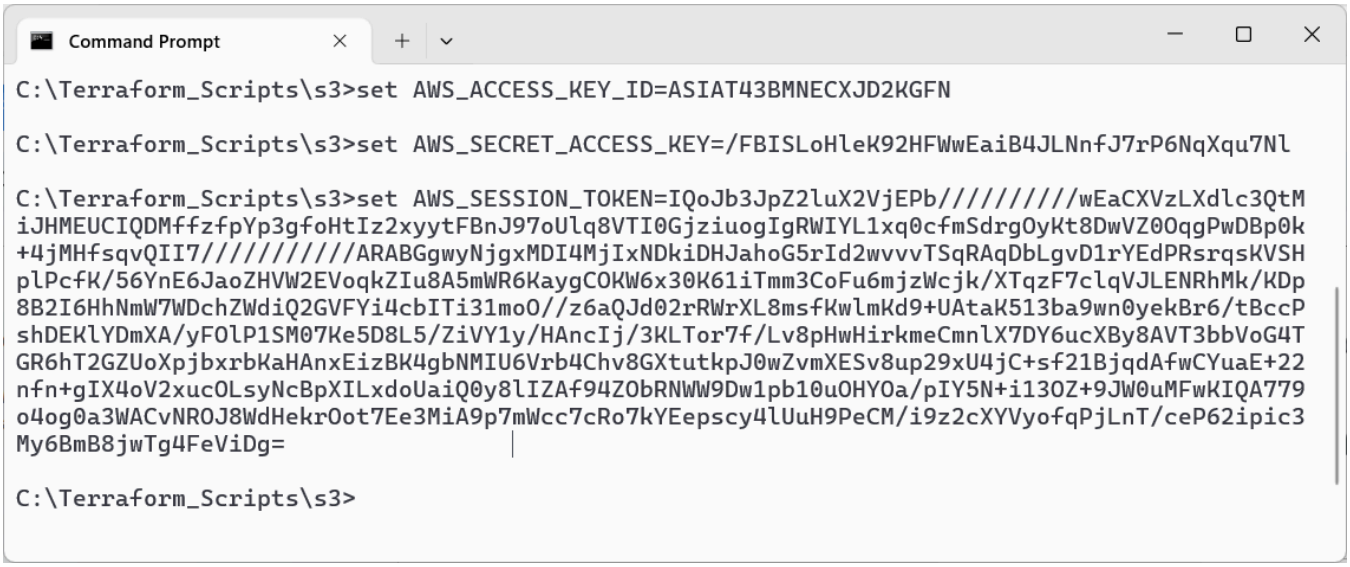
Create a new provider.tf file and write the following contents into it.



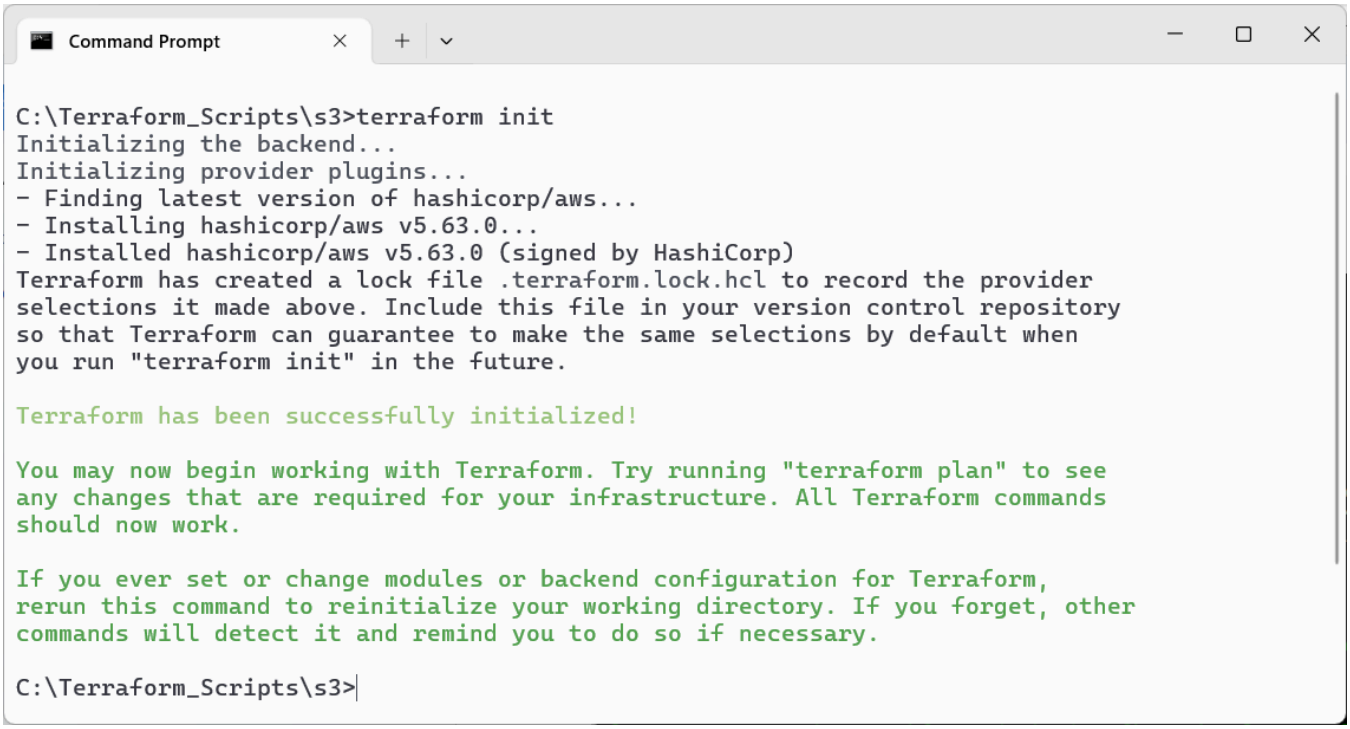
Save both the files in the same directory Terraform_Scripts/S3. Open Command Prompt and go to Terraform_Script\S3 directory where our .tf files are stored.



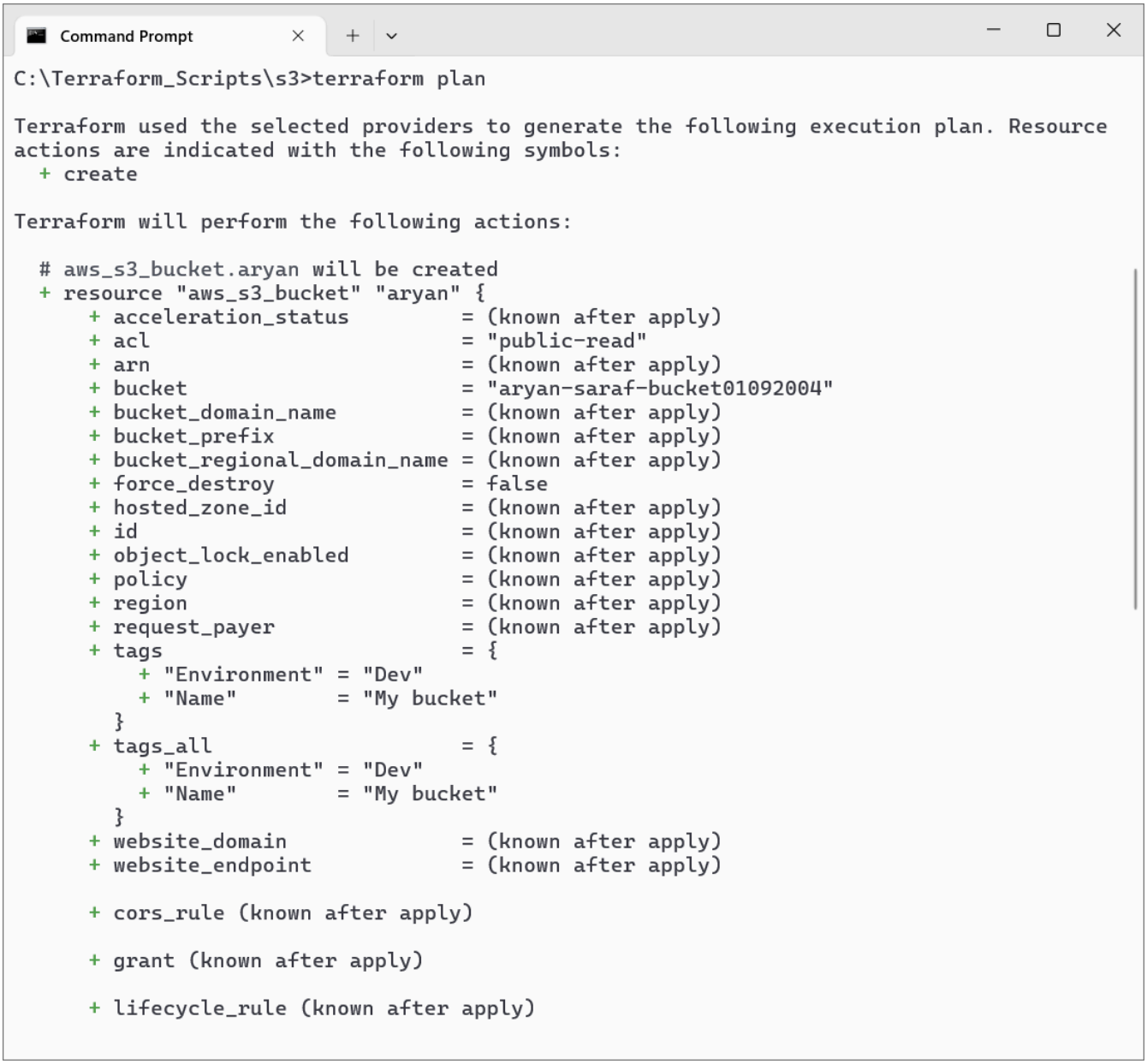
Set all the three credentials in the command prompt as well.

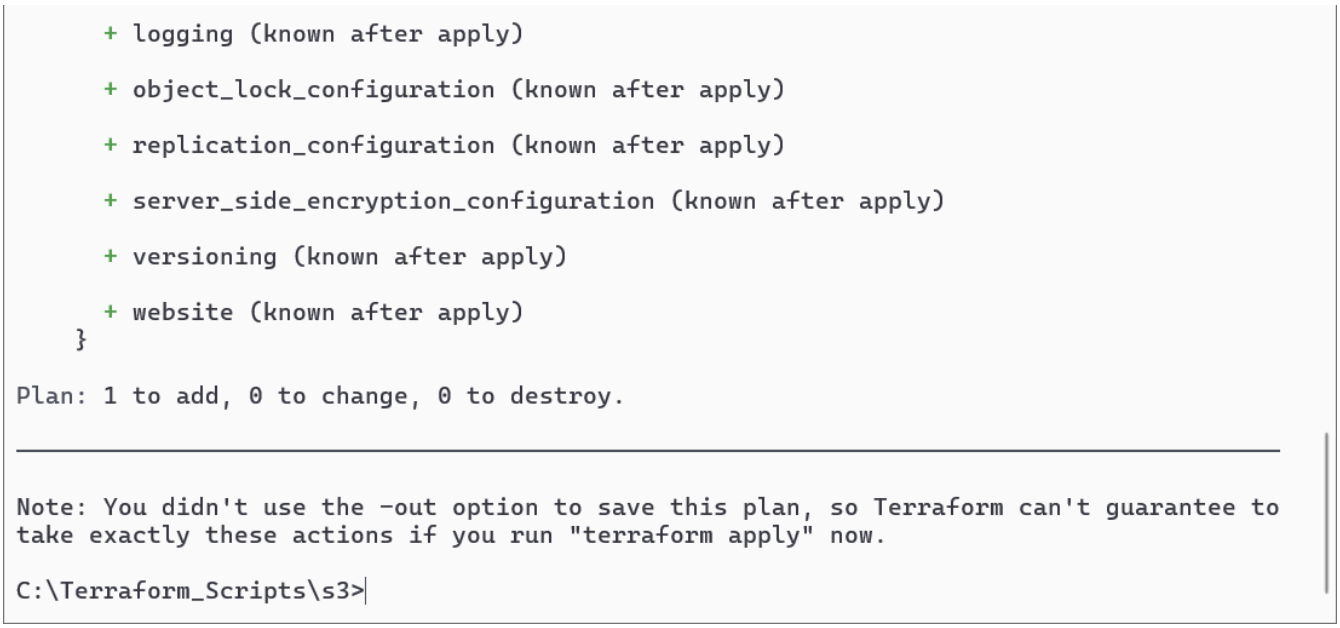


Execute Terraform Init command to initialize the resources

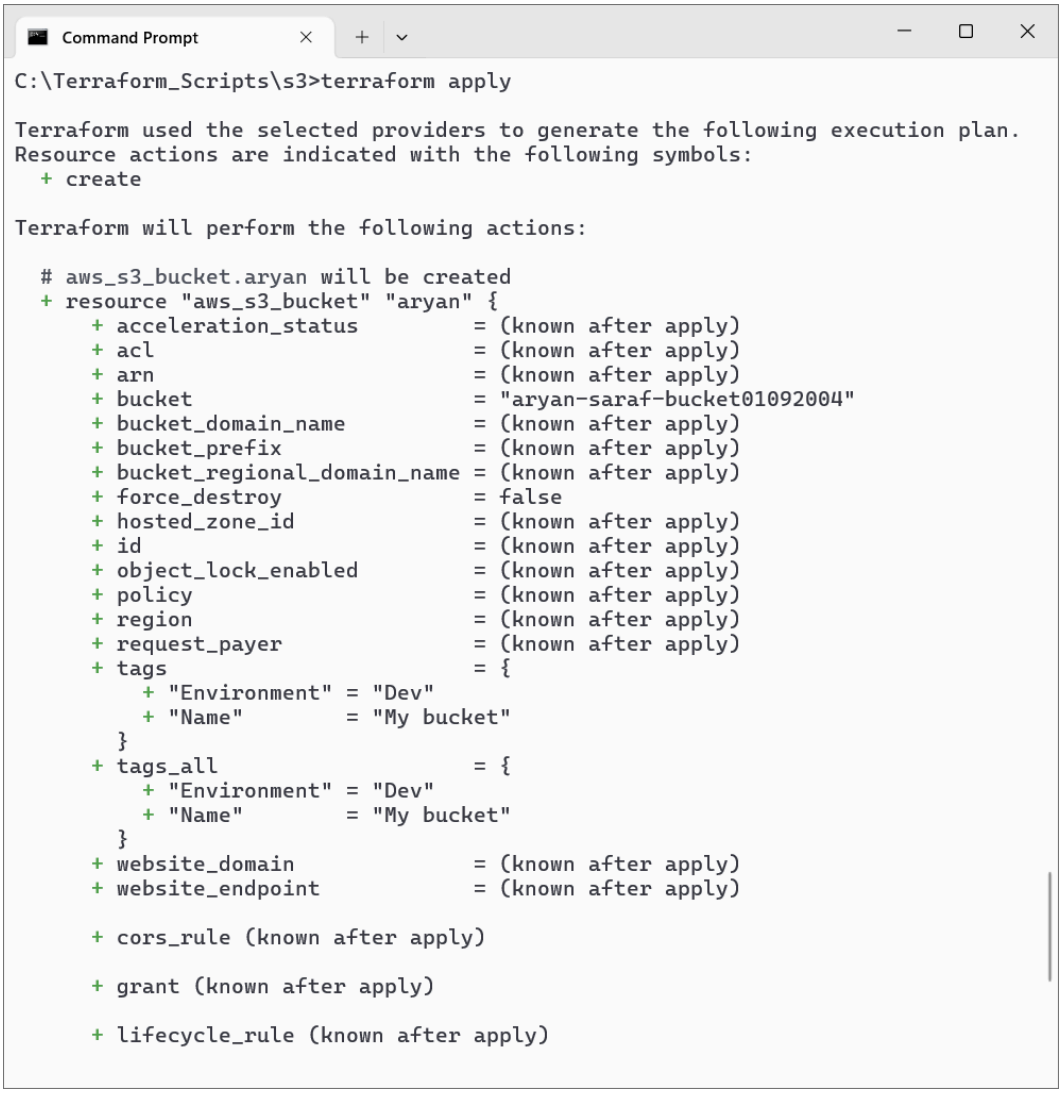


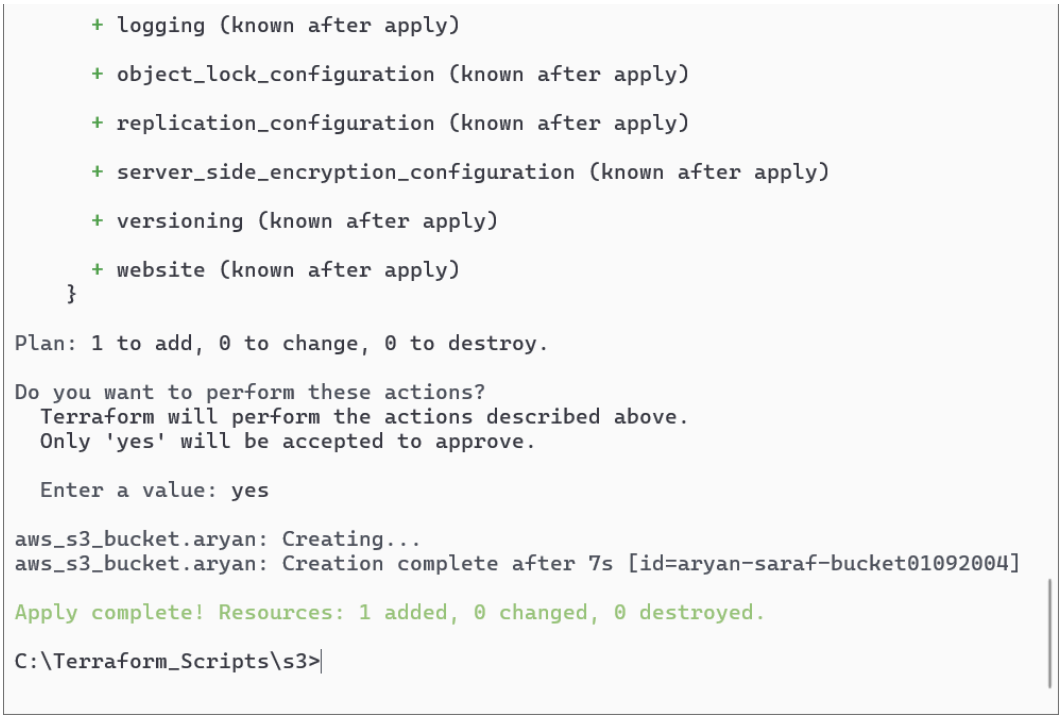
Execute Terraform plan to see the available resources.



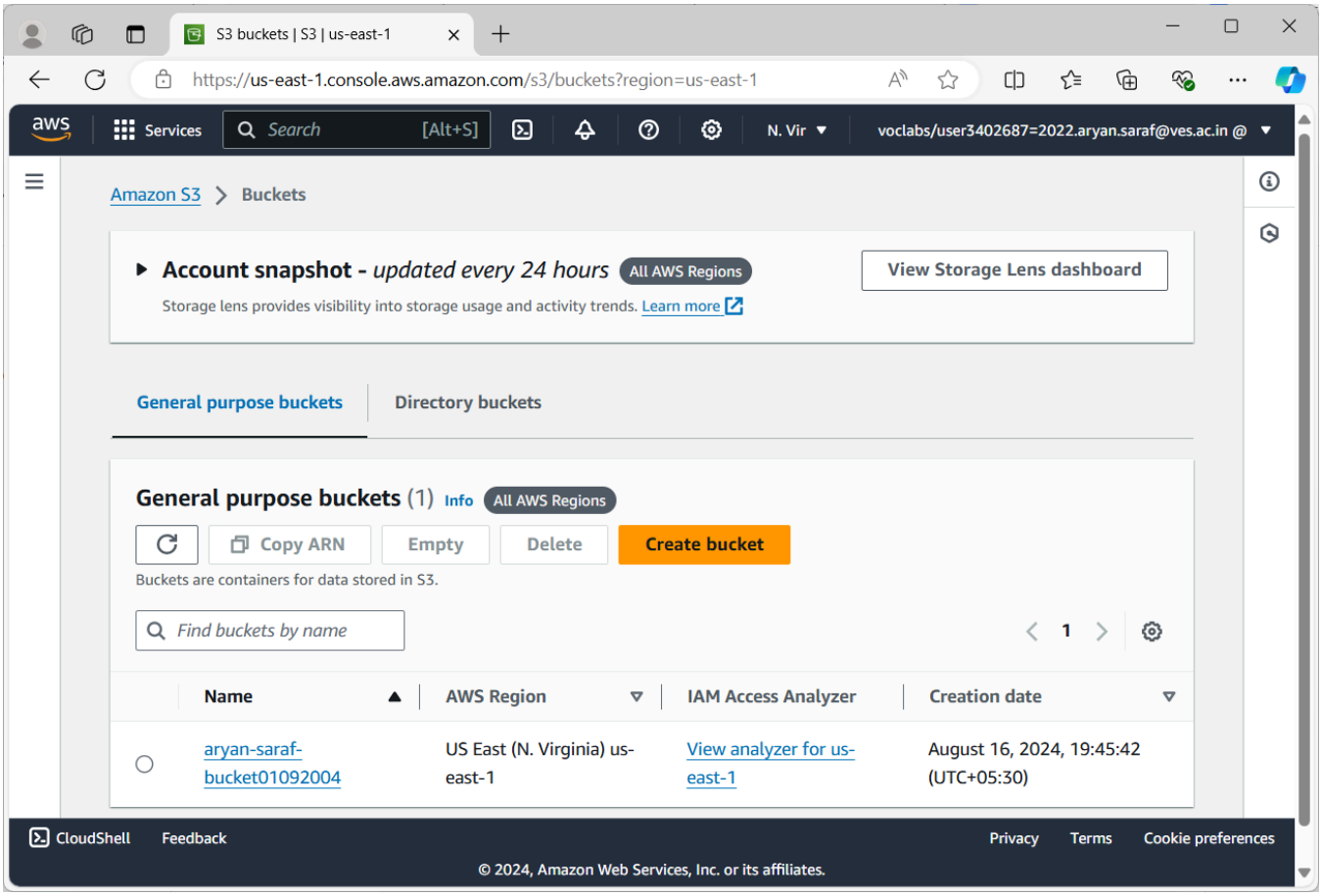


Execute Terraform apply to apply the configuration, which will automatically create an S3 bucket based on our configuration.

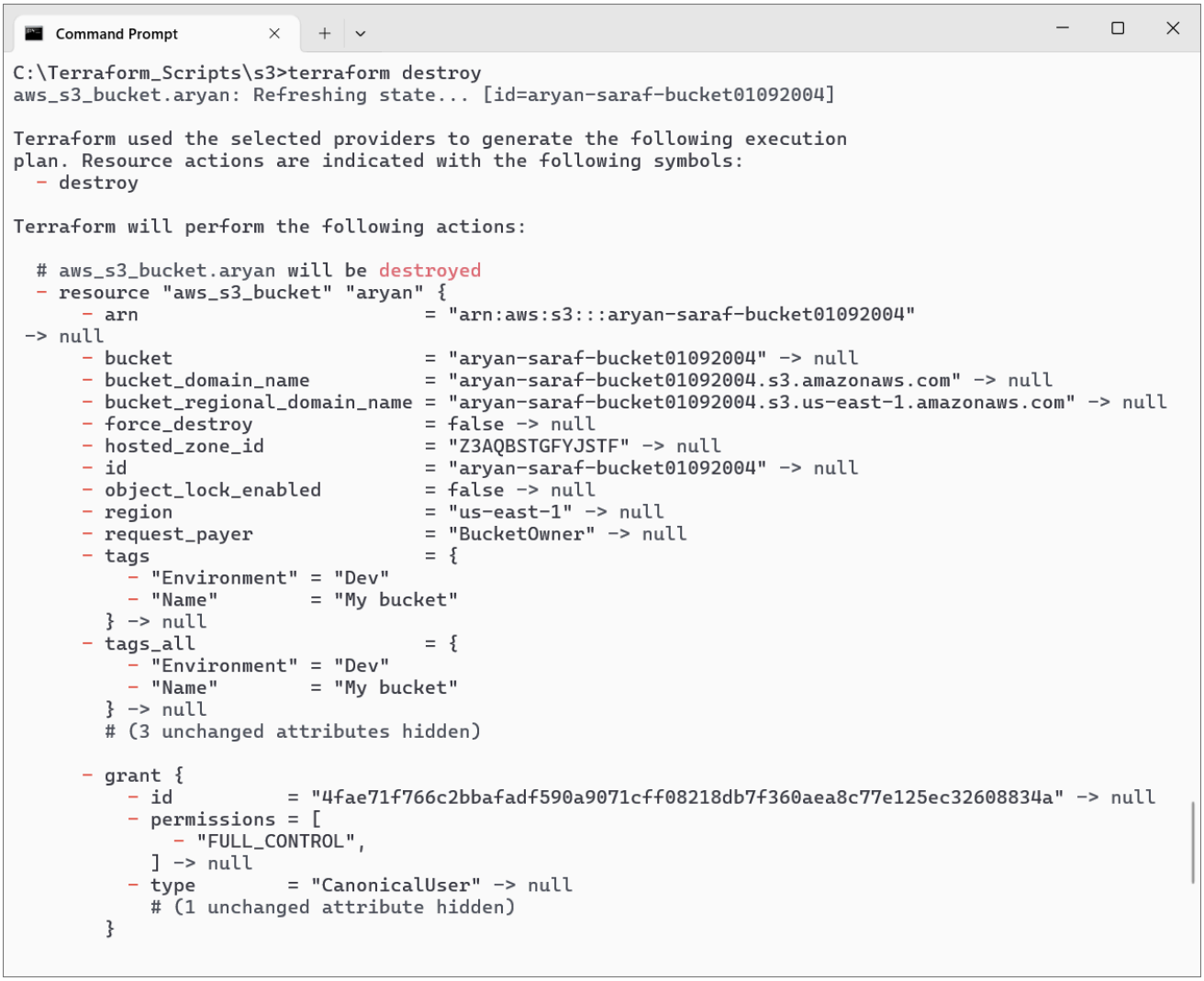


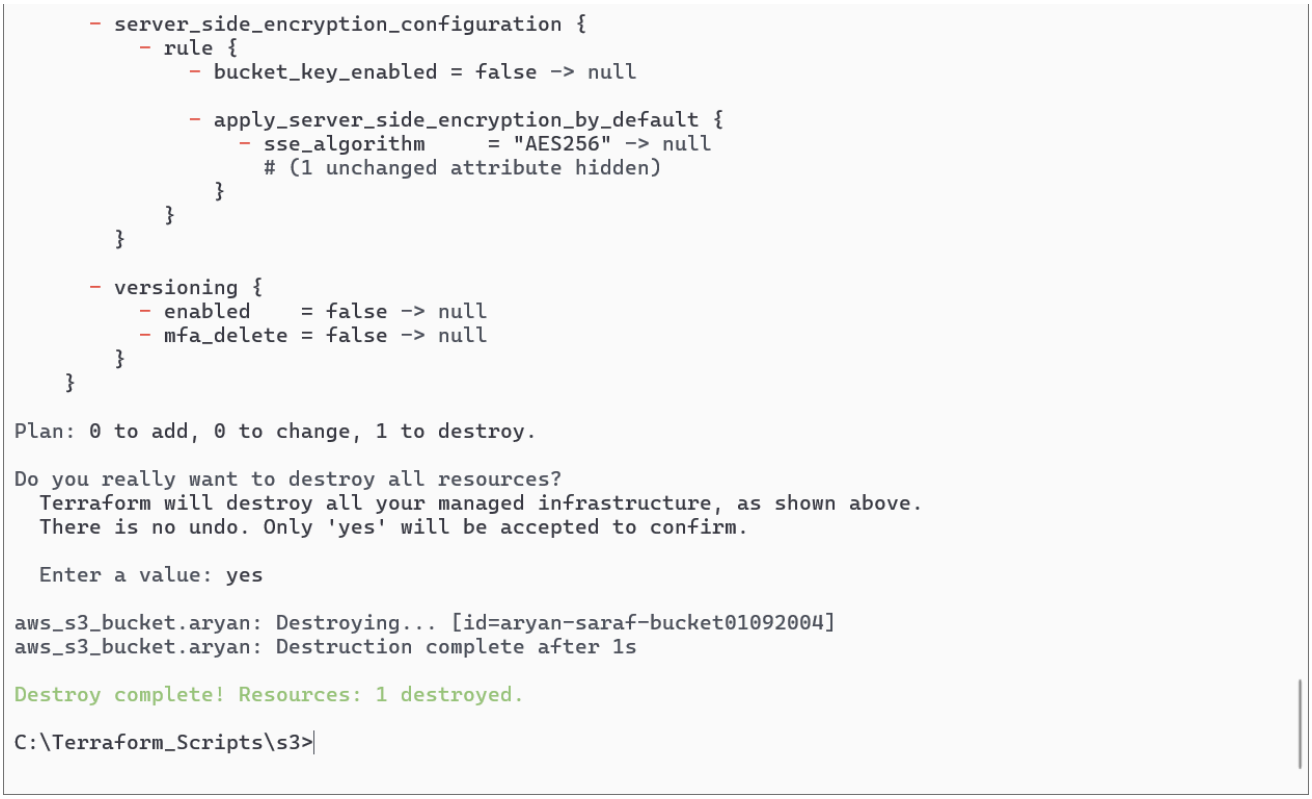


AWS S3 Bucket dashboard after executing apply step.

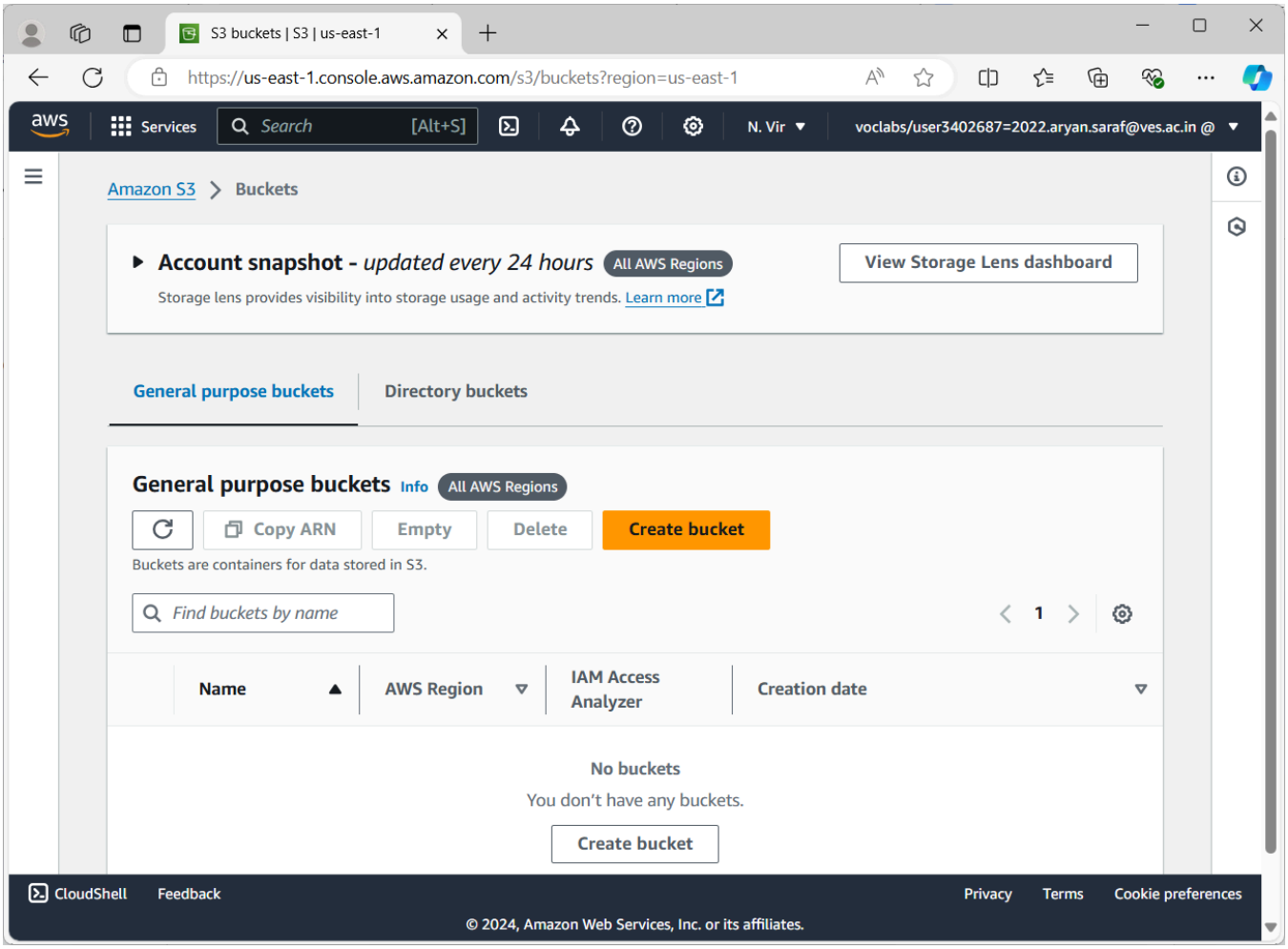


Execute Terraform destroy to delete the configuration, which will automatically delete an EC2 instance.





AWS EC2 dashboard after Executing Destroy step.



CONCLUSION :

Terraform streamlines the process of managing cloud infrastructure by treating it as code, enabling automation and consistency across different cloud platforms. By using Terraform, you can efficiently create, modify, and destroy resources such as S3 buckets, ensuring a more organized and controlled approach to cloud management. Understanding these concepts is key to leveraging Terraform for advanced DevOps practices.