Advanced DevOps Lab
Experiment 5

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Aim:

To create an AWS Lambda function that logs the message "An Image has been added" when an object is uploaded to a specific S3 bucket.

Theory:

Terraform Overview:

Terraform is an open-source infrastructure as code (IaC) tool developed by HashiCorp. It allows you to define, provision, and manage infrastructure across multiple cloud providers (like AWS, Azure, GCP) using declarative configuration files. This approach enables automated and reproducible deployments, scaling, and management of infrastructure.

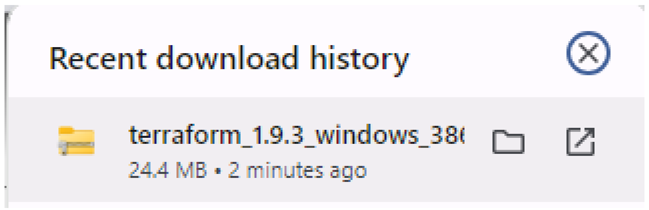
Core Concepts and Terminologies:

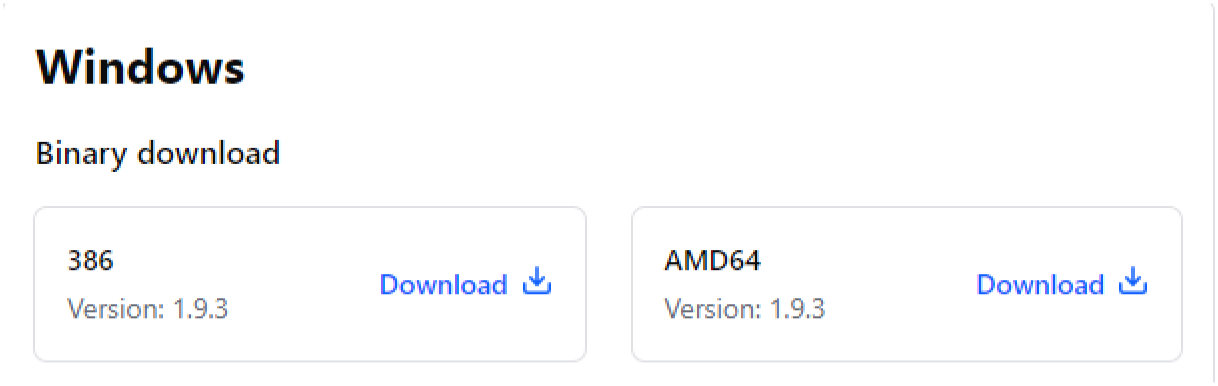
1. **Providers**:
   - Providers are responsible for managing the lifecycle of infrastructure resources. Each provider (like AWS, Azure, GCP) exposes its resources that can be managed using Terraform.
   - Example: `provider "aws" { ... }` defines the AWS provider.
2. **Resources**:
   - Resources represent the infrastructure components (such as servers, databases, or networking components) you want to create or manage.
   - Example: `resource "aws_instance" { ... }` defines an AWS EC2 instance.
3. **State**:
   - Terraform maintains a state file (`terraform.tfstate`) that tracks the current state of infrastructure. This state is used to determine changes between the existing infrastructure and the desired state defined in the configuration.
4. **Modules**:

   - Modules are self-contained packages of Terraform configurations that can be reused and shared. A module can consist of multiple resources.
5. **Variables**:
   - Variables allow you to parameterize the Terraform configurations, making them flexible and reusable. They can be provided through the command line, files, or environment variables.
6. **Outputs**:
   - Outputs allow you to extract and display information about your infrastructure after applying configurations. They can also be passed between modules.
7. **Terraform CLI Commands**:
   - terraform init: Initializes the working directory by downloading providers and configuring the backend.
   - terraform plan: Shows the execution plan, listing the changes that will be made.
   - terraform apply: Applies the desired state and provisions the infrastructure.
   - terraform destroy: Deletes all resources defined in the configuration.
8. **Lifecycle of Terraform**:
   - **Write**: Define infrastructure as code in configuration files.
   - **Initialize**: Initialize Terraform by downloading providers and setting up the workspace.
   - **Plan**: Preview the changes Terraform will make to the infrastructure.
   - **Apply**: Apply the changes to provision or modify the infrastructure.
   - **Destroy**: Clean up resources created by Terraform.

Installing Terraform on a Windows Machine:

1. Downloading Terraform from the Hashicorp website.


Recent download history
terraform_1.9.3_windows_38(
24.4 MB • 2 minutes ago

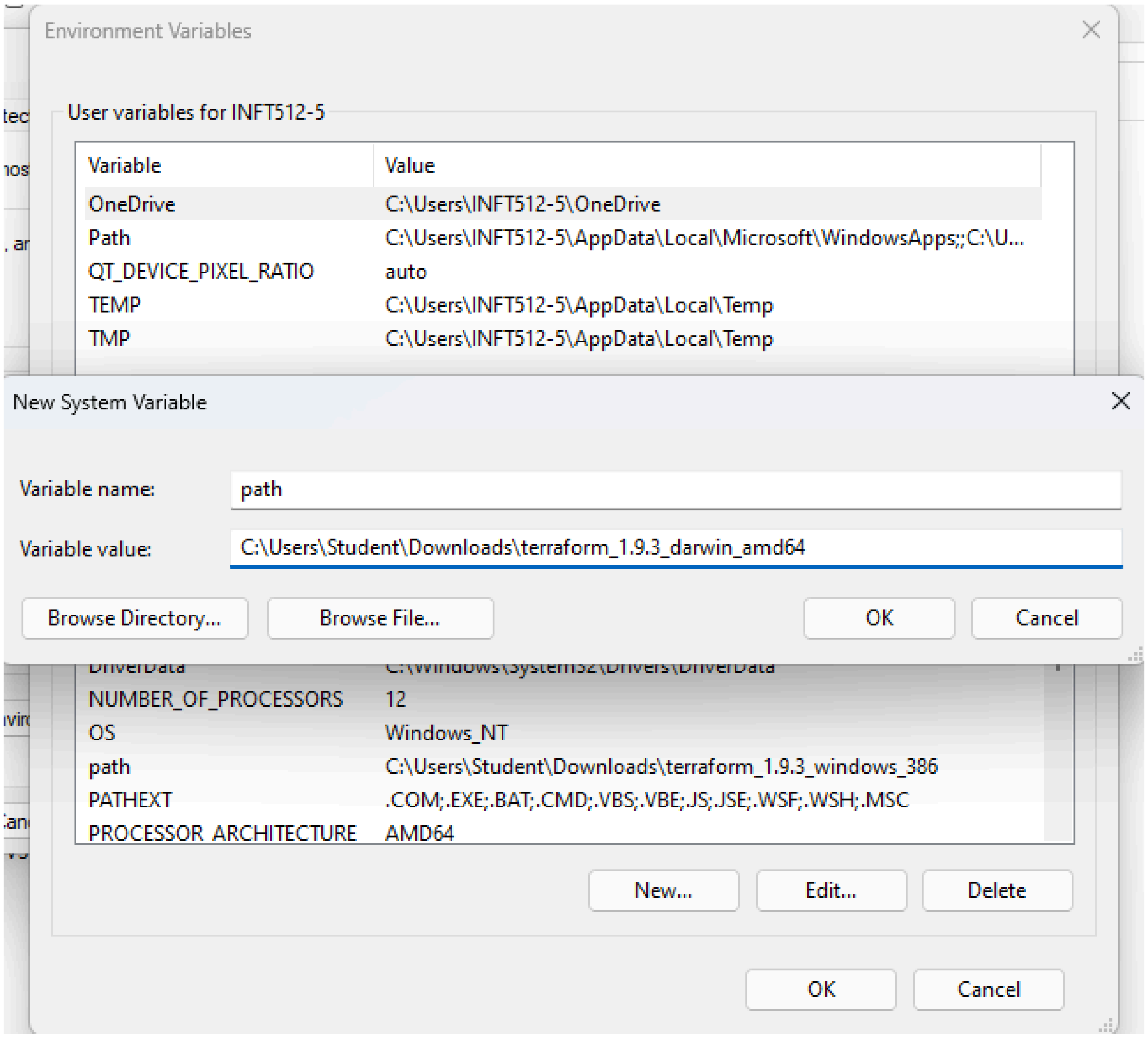

Windows

Binary download

386
Version: 1.9.3
Download

AMD64
Version: 1.9.3
Download

2. Setting path of the terraform in the Environment variables from settings.


Environment Variables

User variables for INFT512-5

Variable	Value
OneDrive	C:\Users\INFT512-5\OneDrive
Path	C:\Users\INFT512-5\AppData\Local\Microsoft\WindowsApps;;C:\U...
QT_DEVICE_PIXEL_RATIO	auto
TEMP	C:\Users\INFT512-5\AppData\Local\Temp
TMP	C:\Users\INFT512-5\AppData\Local\Temp

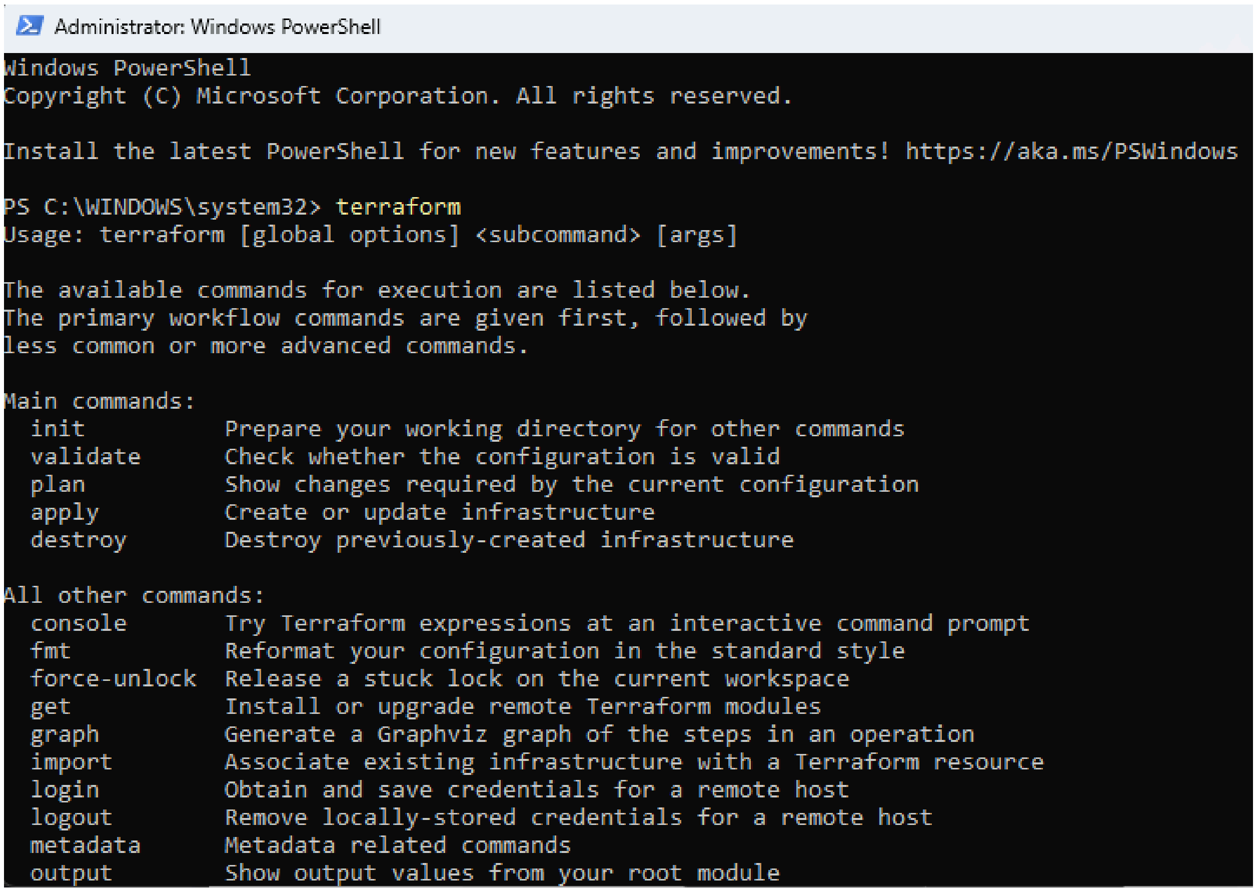
New System Variable

Variable name: path

Variable value: C:\Users\Student\Downloads\terraform_1.9.3_darwin_amd64

DriverData	C:\Windows\System32\Drivers\DriverData
NUMBER_OF_PROCESSORS	12
OS	Windows_NT
path	C:\Users\Student\Downloads\terraform_1.9.3_windows_386
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC
PROCESSOR_ARCHITECTURE	AMD64

3. Working of terraform on Windows Powershell



```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\WINDOWS\system32> terraform
Usage: terraform [global options] <subcommand> [args]

The available commands for execution are listed below.
The primary workflow commands are given first, followed by
less common or more advanced commands.

Main commands:
  init          Prepare your working directory for other commands
  validate      Check whether the configuration is valid
  plan          Show changes required by the current configuration
  apply         Create or update infrastructure
  destroy       Destroy previously-created infrastructure

All other commands:
  console       Try Terraform expressions at an interactive command prompt
  fmt           Reformat your configuration in the standard style
  force-unlock  Release a stuck lock on the current workspace
  get           Install or upgrade remote Terraform modules
  graph         Generate a Graphviz graph of the steps in an operation
  import        Associate existing infrastructure with a Terraform resource
  login         Obtain and save credentials for a remote host
  logout        Remove locally-stored credentials for a remote host
  metadata      Metadata related commands
  output        Show output values from your root module
```

Conclusion:

Terraform simplifies the process of infrastructure management by providing a declarative, human-readable configuration language. By understanding core concepts like providers, resources, and state, users can define and manage complex infrastructures across multiple platforms. Installing Terraform on a Windows machine is straightforward and involves downloading the tool and setting the appropriate system path. Once installed, you can efficiently manage cloud infrastructure in a consistent and automated way, which is ideal for scaling applications and environments.