**Aim** : Exp 6 To Build, change, and destroy AWS / GCP /Microsoft Azure/ DigitalOcean infrastructure Using Terraform.(S3 bucket or Docker)

**Creating the docker image using terraform**

1: Check the docker version and functionality if its not downloaded you can download it from https://www.docker.com/

```
C:\Users\Avan\Desktop>docker --version
Docker version 27.0.3, build 7d4bcd8
```

```
C:\Users\Avan\Desktop>docker

Usage:  docker [OPTIONS] COMMAND

A self-sufficient runtime for containers

Common Commands:
  run         Create and run a new container from an image
  exec        Execute a command in a running container
  ps          List containers
  build       Build an image from a Dockerfile
  pull        Download an image from a registry
  push        Upload an image to a registry
  images      List images
  login       Log in to a registry
  logout      Log out from a registry
  search      Search Docker Hub for images
  version     Show the Docker version information
  info        Display system-wide information
```

(*Now, create a folder named 'Terraform Scripts' in which we save our different types of scripts which will be further used in this experiment*)

2: Firstly create a new folder named **'Docker'** in the **'TerraformScripts'** folder. Then create a new docker.tf file using Atom editor (or you can use vscode) and write the following contents into it to create a Ubuntu Linux container.

```
terraform {
  required_providers {
    docker = {
```

```
    source  = "kreuzwerker/docker"
    version = "2.21.0"
   }
  }
}

provider "docker" {
  host = "npipe:////./pipe/docker_engine"
}

# Pull the image
resource "docker_image" "ubuntu" {
  name = "ubuntu:latest"
}

# Create a container
resource "docker_container" "foo" {
  image = docker_image.ubuntu.image_id
  name  = "foo"
  command = ["sleep", "3600"]
}
```

3: Execute **Terraform Init** command to initialize the resources ( *Make sure you are in the Docker directory before executing the command* )

```
C:\Users\Avan\Desktop\TerraformScripts\Docker>terraform init
Initializing the backend...
Initializing provider plugins...
- Finding kreuzwerker/docker versions matching "2.21.0"...
- Installing kreuzwerker/docker v2.21.0...
- Installed kreuzwerker/docker v2.21.0 (self-signed, key ID BD080C4571C6104C)
Partner and community providers are signed by their developers.
If you'd like to know more about provider signing, you can read about it here:
https://www.terraform.io/docs/cli/plugins/signing.html
Terraform has created a lock file .terraform.lock.hcl to record the provider
selections it made above. Include this file in your version control repository
so that Terraform can guarantee to make the same selections by default when
you run "terraform init" in the future.

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.
```

4. Execute **Terraform plan** to see the available resources

```
C:\Users\Avan\Desktop\TerraformScripts\Docker>terraform plan

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
  + create

Terraform will perform the following actions:

  # docker_container.foo will be created
  + resource "docker_container" "foo" {
      + attach           = false
      + bridge           = (known after apply)
      + command          = [
          + "sleep",
          + "3600",
        ]
      + container_logs   = (known after apply)
      + entrypoint       = (known after apply)
      + env              = (known after apply)
      + exit_code        = (known after apply)
      + gateway          = (known after apply)
      + hostname         = (known after apply)
      + id               = (known after apply)
      + image            = (known after apply)
      + init             = (known after apply)
      + ip_address       = (known after apply)
      + ip_prefix_length = (known after apply)
      + ipc_mode         = (known after apply)
      + log_driver       = (known after apply)
      + logs             = false
      + must_run         = true
      + name             = "foo"
      + network_data     = (known after apply)
      + read_only        = false
      + remove_volumes   = true
      + restart          = "no"
      + rm               = false
      + runtime          = (known after apply)
      + security_opts    = (known after apply)
      + shm_size         = (known after apply)
      + start            = true
      + stdin_open       = false
      + stop_signal      = (known after apply)
      + stop_timeout     = (known after apply)
      + tty              = false
```

```
  # docker_image.ubuntu will be created
  + resource "docker_image" "ubuntu" {
      + id          = (known after apply)
      + image_id    = (known after apply)
      + latest      = (known after apply)
      + name        = "ubuntu:latest"
      + output      = (known after apply)
      + repo_digest = (known after apply)
    }

Plan: 2 to add, 0 to change, 0 to destroy.
```

5. Execute **Terraform apply** to apply the configuration, which will automatically create and run the Ubuntu Linux container based on our configuration. Using command : “terraform apply”

```
C:\Users\Avan\Desktop\TerraformScripts\Docker>terraform apply
docker_image.ubuntu: Refreshing state... [id=sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest]
docker_container.foo: Refreshing state... [id=23364bd2196c264de0ff6af7150449ffea25e1a9f7553ac6955b95679547526e]

Note: Objects have changed outside of Terraform

Terraform detected the following changes made outside of Terraform since the last "terraform apply" which may have affected this plan:

  # docker_image.ubuntu has been deleted
  - resource "docker_image" "ubuntu" {
      id          = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest"
    - image_id    = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598a" -> null
      name        = "ubuntu:latest"
      # (2 unchanged attributes hidden)
    }


Unless you have made equivalent changes to your configuration, or ignored the relevant attributes using ignore_changes, the following plan may include actions
to undo or respond to these changes.

---

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
  + create

Terraform will perform the following actions:

  # docker_container.foo will be created
  + resource "docker_container" "foo" {
      + attach           = false
      + bridge           = (known after apply)
      + command          = [
          + "sleep",
          + "3600",
        ]
      + container_logs   = (known after apply)
      + entrypoint       = (known after apply)
      + env              = (known after apply)
      + exit_code        = (known after apply)
      + gateway          = (known after apply)
```

```
      + shm_size         = (known after apply)
      + start            = true
      + stdin_open       = false
      + stop_signal      = (known after apply)
      + stop_timeout     = (known after apply)
      + tty              = false

      + healthcheck (known after apply)

      + labels (known after apply)
    }

  # docker_image.ubuntu will be created
  + resource "docker_image" "ubuntu" {
      + id          = (known after apply)
      + image_id    = (known after apply)
      + latest      = (known after apply)
      + name        = "ubuntu:latest"
      + output      = (known after apply)
      + repo_digest = (known after apply)
    }

Plan: 2 to add, 0 to change, 0 to destroy.

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

docker_image.ubuntu: Creating...
docker_image.ubuntu: Still creating... [10s elapsed]
docker_image.ubuntu: Creation complete after 14s [id=sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest]
docker_container.foo: Creating...
docker_container.foo: Creation complete after 1s [id=7e9ee45651ce4057af54ab9bb95ef29084eb679a0f4114e88a5e0887c6480b8c]

Apply complete! Resources: 2 added, 0 changed, 0 destroyed.
```

6. Docker images before executing this command

```
C:\Users\Avan\Desktop\TerraformScripts\Docker>docker images
REPOSITORY   TAG       IMAGE ID   CREATED   SIZE
```

Docker images after the execution of command

```
C:\Users\Avan\Desktop\TerraformScripts\Docker>docker images
REPOSITORY   TAG       IMAGE ID       CREATED       SIZE
ubuntu       latest    edbfe74c41f8   3 weeks ago   78.1MB
```

7. Executing the command **terraform providers** a provider is a plugin that allows terraform to interact with APIs of external services, enabling to manage the resources offered by those services.

```
C:\Users\Student\Desktop\TerraformsScripts\Docker>terraform providers

Providers required by configuration:
.
└── provider[registry.terraform.io/kreuzwerker/docker] 2.21.0

Providers required by state:

    provider[registry.terraform.io/kreuzwerker/docker]
```

8. Running the command **terraform validate** to check if the configuration is valid

```
C:\Users\Student\Desktop\TerraformsScripts\Docker>terraform validate
Success! The configuration is valid.
```

9. The **terraform state list** is used to display a list of resources managed by Terraform within the current state file

```
C:\Users\Student\Desktop\TerraformsScripts\Docker>terraform state list
docker_container.foo
docker_image.ubuntu
```

10. Execute **Terraform destroy** to delete the configuration, which will automatically delete the Ubuntu Container.

```
C:\Users\Avan\Desktop\TerraformScripts\Docker>terraform destroy
docker_image.ubuntu: Refreshing state... [id=sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest]
docker_container.foo: Refreshing state... [id=7e9ee45651ce4057af54ab9bb95ef29084eb679a0f4114e88a5e0887c6480b8c]

Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following symbols:
  - destroy

Terraform will perform the following actions:

  # docker_container.foo will be destroyed
  - resource "docker_container" "foo" {
      - attach            = false -> null
      - command           = [
          - "sleep",
          - "3600",
        ] -> null
      - cpu_shares        = 0 -> null
      - dns               = [] -> null
      - dns_opts          = [] -> null
      - dns_search        = [] -> null
      - entrypoint        = [] -> null
      - env               = [] -> null
      - gateway           = "172.17.0.1" -> null
      - group_add         = [] -> null
      - hostname          = "7e9ee45651ce" -> null
      - id                = "7e9ee45651ce4057af54ab9bb95ef29084eb679a0f4114e88a5e0887c6480b8c" -> null
      - image             = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598a" -> null
      - init              = false -> null
      - ip_address        = "172.17.0.2" -> null
      - ip_prefix_length  = 16 -> null
      - ipc_mode          = "private" -> null
      - links             = [] -> null
      - log_driver        = "json-file" -> null
      - log_opts          = {} -> null
      - logs              = false -> null
      - max_retry_count   = 0 -> null
      - memory            = 0 -> null
      - memory_swap       = 0 -> null
      - must_run          = true -> null
      - name              = "foo" -> null
```

```
      - stop_timeout      = 0 -> null
      - storage_opts      = {} -> null
      - sysctls           = {} -> null
      - tmpfs             = {} -> null
      - tty               = false -> null
        # (8 unchanged attributes hidden)
    }

  # docker_image.ubuntu will be destroyed
  - resource "docker_image" "ubuntu" {
      - id          = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest" -> null
      - image_id    = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598a" -> null
      - latest      = "sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598a" -> null
      - name        = "ubuntu:latest" -> null
      - repo_digest = "ubuntu@sha256:8a37d68f4f73ebf3d4efafbcf66379bf3728902a8038616808f04e34a9ab63ee" -> null
    }

Plan: 0 to add, 0 to change, 2 to destroy.

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

docker_container.foo: Destroying... [id=7e9ee45651ce4057af54ab9bb95ef29084eb679a0f4114e88a5e0887c6480b8c]
docker_container.foo: Destruction complete after 0s
docker_image.ubuntu: Destroying... [id=sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest]
docker_image.ubuntu: Destruction complete after 1s

Destroy complete! Resources: 2 destroyed.
```

11. Docker images after the destroy command execution

```
C:\Users\Avan\Desktop\TerraformScripts\Docker>docker images
REPOSITORY   TAG       IMAGE ID   CREATED   SIZE
```