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ADVANCED DEV-OPS EXPERIMENT-06

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

Implementation:
A. Creating docker image using terraform

Prerequisite:
1) Download and Install Docker Desktop from https://www.docker.com/

Step 1: Check the docker functionality

```
Microsoft Windows [Version 10.0.22631.4037]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Admin>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

Management Commands:
  builder    Manage builds
  buildx*    Docker Buildx (Docker Inc., v0.11.2-desktop.5)
  compose*   Docker Compose (Docker Inc., v2.22.0-desktop.2)
  container  Manage containers
  context    Manage contexts
  dev*       Docker Dev Environments (Docker Inc., v0.1.0)
```

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

Step 2: Firstly create a new folder named 'Docker' in the 'TerraformScripts' folder. Then create a new docker.tf file using Atom editor and write the followingcontents into it to create a Ubuntu Linux container

```
Docker > terraform.tf
1    terraform {
2      required_providers {
3        docker = {
4          source  = "kreuzwerker/docker"
5          version = "2.21.0"
6        }
7      }
8    }
9
10   provider "docker" {
11     host = "npipe:////./pipe/docker_engine"
12   }
13
14   # Pull the image
15   resource "docker_image" "ubuntu" {
16     name = "ubuntu:latest"
17   }
18
19   # Create a container
20   resource "docker_container" "foo" {
21     image = docker_image.ubuntu.image_id
22     name  = "foo"
23     command = ["sleep", "3600"]
24   }
```

Step 3: Execute Terraform Init command to initialize the resource

```
PS C:\Users\Admin\Desktop\Terraform Scripts>
PS C:\Users\Admin\Desktop\Terraform Scripts> cd docker
PS C:\Users\Admin\Desktop\Terraform Scripts\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.
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.
PS C:\Users\Admin\Desktop\Terraform Scripts\docker> []
```

Step 4: Execute Terraform plan to see the available resources

```
PS C:\Users\Admin\Desktop\Terraform Scripts\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
```

```
      + 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

      + 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.
```

Step 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"

```
PS C:\Users\Admin\Desktop\Terraform Scripts\docker> terraform apply

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
```

```
      + 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 12s [id=sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest]
docker_container.foo: Creating...
docker_container.foo: Creation complete after 3s [id=9dcd9e799109022c4cfa1545e449894948a72460b66ca2e468f933bc2b650255]

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

Docker images, Before Executing Apply step:

```
PS C:\Users\Admin\Desktop\Terraform Scripts\docker> docker images
REPOSITORY                                         TAG                            IMAGE ID        CREATED        SIZE
```

Docker images, After Executing Apply step:

```
PS C:\Users\Admin\Desktop\Terraform Scripts\docker> docker images
REPOSITORY                                         TAG                            IMAGE ID        CREATED        SIZE
ubuntu                                             latest                         edbfe74c41f8    3 weeks ago    78.1MB
```

Step 6: Execute Terraform destroy to delete the configuration, which will automatically delete the Ubuntu Container.

```
PS C:\Users\Admin\Desktop\Terraform Scripts\docker> terraform destroy
docker_image.ubuntu: Refreshing state... [id=sha256:edbfe74c41f8a3501ce542e137cf28ea04dd03e6df8c9d66519b6ad761c2598aubuntu:latest]
docker_container.foo: Refreshing state... [id=9dcd9e799109022c4cfa1545e449894948a72460b66ca2e468f933bc2b650255]

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          = "9dcd9e799109" -> null
      - id                = "9dcd9e799109022c4cfa1545e449894948a72460b66ca2e468f933bc2b650255" -> 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
```

```
                - ip_address              = "172.17.0.2"
                - ip_prefix_length        = 16
                - network_name            = "bridge"
                  # (2 unchanged attributes hidden)
            },
        ] -> null
      - network_mode      = "default" -> null
      - privileged        = false -> null
      - publish_all_ports = false -> null
      - read_only         = false -> null
      - remove_volumes    = true -> null
      - restart           = "no" -> null
      - rm                = false -> null
      - runtime           = "runc" -> null
      - security_opts     = [] -> null
      - shm_size          = 64 -> null
      - start             = true -> null
      - stdin_open        = false -> 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=9dcd9e799109022c4cfa1545e449894948a72460b66ca2e468f933bc2b650255]
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.
PS C:\Users\Admin\Desktop\Terraform Scripts\docker> []
```

Docker images After Executing Destroy step

```
PS C:\Users\Admin\Desktop\Terraform Scripts\docker> docker images
REPOSITORY                                    TAG                    IMAGE ID      CREATED      SIZE
```