School of Computer Science

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES DEHRADUN, UTTARAKHAND

System Provisioning and Configuration Management

Lab File (2022-2026)
6th Semester

Submitted To:

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EXPERIMENT 4

Lab Exercise: Provisioning an EC2 Instance on AWS

Prerequisites: Terraform Installed: Make sure you have Terraform installed on your machine. Follow the official installation guide if needed.

AWS Credentials: Ensure you have AWS credentials (Access Key ID and Secret Access Key) configured. You can set them up using the AWS CLI or by setting environment variables.

Exercise Steps:

Step 1: Create a New Directory:

Create a new directory for your Terraform configuration:

```
mkdir aws-terraform-demo

cd aws-terraform-demo
```

```
C:\Users\aksha>cd ./Documents

C:\Users\aksha\Documents>mkdir aws-terraform

C:\Users\aksha\Documents>cd aws-terraform

C:\Users\aksha\Documents\aws-terraform>
```

Step 2: Create Terraform Configuration File (main.tf):

Create a file named main.tf with the following content:

```
terraform {
  required_providers {
    aws = {
      source = "hashicorp/aws"
```

```
    version = "5.31.0"
   }
  }
}
provider "aws" {
  region     = "ap-south-1"
  access_key = "your IAM access key"
  secret_key = "your secret access key"
}
```

This script defines an AWS provider and provisions an EC2 instance.

```
main.tf
terraform{
    required_providers{
        aws={
            source="hashicorp/aws"
            version="5.31.0"
        }
    }
}
provider "aws"{
    region ="ap-south-1"
    access_key="AKIA2UC3F5EDGLE4TE7L"
    secret_key="lvc1E+Dqvn3MsdD4bbpRXHF5+gtYaR28MYBlg92M"
}
```

Step 3: Initialize Terraform:

Run the following command to initialize your Terraform working directory:

terraform init

```
C:\Users\aksha\Documents\aws-terraform>terraform init
Initializing the backend...
Initializing provider plugins...
- Finding hashicorp/aws versions matching "5.31.0"...
- Installing hashicorp/aws v5.31.0...
- Installed hashicorp/aws v5.31.0 (signed by HashiCorp)
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.

C:\Users\aksha\Documents\aws-terraform>
```

Step 4: Create Terraform Configuration File for EC2 instance (instance.tf):

Create a file named instnace.tf with the following content:

```
resource "aws_instance" "My-instance" {

  instance_type = "t2.micro"

  ami = "ami-03f4878755434977f"

  count = 1

  tags = {

    Name = "UPES-EC2-Instnace"

  }

}
```

instance.tf

```
resource "aws_instance" "My-instance" {
    instance_type="t2.micro"
    ami="ami-03f4878755434977f"
    count=1
    tags={
        Name="Upes-Ec2-Instance"
    }
}
```

Step 5: Review Plan:

Run the following command to see what Terraform will do:

terraform plan

```
C:\Users\aksha\Documents\aws-terraform>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:

  # aws_instance.My-instance[0] will be created
  + resource "aws_instance" "My-instance" {
      + ami                                  = "ami-03f4878755434977f"
      + arn                                  = (known after apply)
      + associate_public_ip_address          = (known after apply)
      + availability_zone                    = (known after apply)
      + cpu_core_count                       = (known after apply)
      + cpu_threads_per_core                 = (known after apply)
      + disable_api_stop                     = (known after apply)
      + disable_api_termination              = (known after apply)
      + ebs_optimized                        = (known after apply)
      + get_password_data                    = false
      + host_id                              = (known after apply)
      + host_resource_group_arn              = (known after apply)
      + iam_instance_profile                 = (known after apply)
      + id                                   = (known after apply)
      + instance_initiated_shutdown_behavior = (known after apply)
      + instance_lifecycle                   = (known after apply)
      + instance_state                       = (known after apply)
      + instance_type                        = "t2.micro"
      + ipv6_address_count                   = (known after apply)
      + ipv6_addresses                       = (known after apply)
      + key_name                             = (known after apply)
      + monitoring                           = (known after apply)
      + outpost_arn                          = (known after apply)
      + password_data                        = (known after apply)
      + placement_group                      = (known after apply)
      + placement_partition_number           = (known after apply)
      + primary_network_interface_id         = (known after apply)
      + private_dns                          = (known after apply)
      + private_ip                           = (known after apply)
      + public_dns                           = (known after apply)
      + public_ip                            = (known after apply)
      + secondary_private_ips                = (known after apply)
      + security_groups                      = (known after apply)
      + source_dest_check                    = true
      + spot_instance_request_id             = (known after apply)
      + subnet_id                            = (known after apply)
      + tags                                 = {
          + "Name" = "Upes-Ec2-Instance"
        }
      + tags_all                             = {
          + "Name" = "Upes-Ec2-Instance"
        }
      + tenancy                              = (known after apply)
      + user_data                            = (known after apply)
      + user_data_base64                     = (known after apply)
      + user_data_replace_on_change          = false
      + vpc_security_group_ids               = (known after apply)
```

```
      + vpc_security_group_ids               = (known after apply)
      + capacity_reservation_specification (known after apply)
      + cpu_options (known after apply)
      + ebs_block_device (known after apply)
      + enclave_options (known after apply)
      + ephemeral_block_device (known after apply)
      + instance_market_options (known after apply)
      + maintenance_options (known after apply)
      + metadata_options (known after apply)
      + network_interface (known after apply)
      + private_dns_name_options (known after apply)
      + root_block_device (known after apply)
    }

Plan: 1 to add, 0 to change, 0 to destroy.

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Note: You didn't use the -out option to save this plan, so Terraform can't guarantee to take exactly these actions if
you run "terraform apply" now.

C:\Users\aksha\Documents\aws-terraform>
```

Review the plan to ensure it aligns with your expectations.

Step 6: Apply Changes:

Apply the changes to create the AWS resources:

```
terraform apply
```

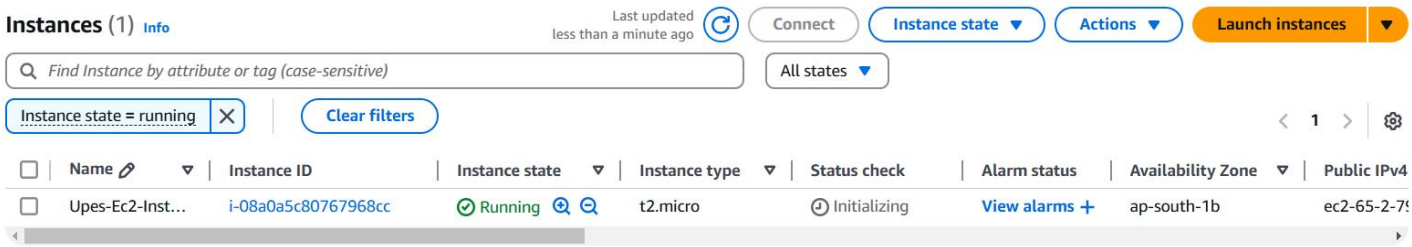
Type yes when prompted.

```
C:\Users\aksha\Documents\aws-terraform>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:

  # aws_instance.My-instance[0] will be created
  + resource "aws_instance" "My-instance" {
      + ami                                  = "ami-03f4878755434977f"
      + arn                                  = (known after apply)
      + associate_public_ip_address          = (known after apply)
      + availability_zone                    = (known after apply)
      + cpu_core_count                       = (known after apply)
      + cpu_threads_per_core                 = (known after apply)
      + disable_api_stop                     = (known after apply)
      + disable_api_termination              = (known after apply)
      + ebs_optimized                        = (known after apply)
      + get_password_data                    = false
      + host_id                              = (known after apply)
      + host_resource_group_arn              = (known after apply)
      + iam_instance_profile                 = (known after apply)
      + id                                   = (known after apply)
      + instance_initiated_shutdown_behavior = (known after apply)
      + instance_lifecycle                   = (known after apply)
      + instance_state                       = (known after apply)
      + instance_type                        = "t2.micro"
      + ipv6_address_count                   = (known after apply)
      + ipv6_addresses                       = (known after apply)
      + key_name                             = (known after apply)
      + monitoring                           = (known after apply)
      + outpost_arn                          = (known after apply)
      + password_data                        = (known after apply)
      + placement_group                      = (known after apply)
      + placement_partition_number           = (known after apply)
      + primary_network_interface_id         = (known after apply)
      + private_dns                          = (known after apply)
      + private_ip                           = (known after apply)
      + public_dns                           = (known after apply)
      + public_ip                            = (known after apply)
      + secondary_private_ips                = (known after apply)
      + security_groups                      = (known after apply)
      + source_dest_check                    = true
```

```
      + subnet_id                            = (known after apply)
      + tags                                 = {
          + "Name" = "Upes-Ec2-Instance"
        }
      + tags_all                             = {
          + "Name" = "Upes-Ec2-Instance"
        }
      + tenancy                              = (known after apply)
      + user_data                            = (known after apply)
      + user_data_base64                     = (known after apply)
      + user_data_replace_on_change          = false
      + vpc_security_group_ids               = (known after apply)

      + capacity_reservation_specification (known after apply)

      + cpu_options (known after apply)

      + ebs_block_device (known after apply)

      + enclave_options (known after apply)

      + ephemeral_block_device (known after apply)

      + instance_market_options (known after apply)

      + maintenance_options (known after apply)

      + metadata_options (known after apply)

      + network_interface (known after apply)

      + private_dns_name_options (known after apply)

      + root_block_device (known after apply)
    }

Plan: 1 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
```

Step 7: Verify Resources:

After the terraform apply command completes, log in to your AWS Management Console and navigate to the EC2 dashboard. Verify that the EC2 instance has been created.



Step 8: Cleanup Resources:

When you are done experimenting, run the following command to destroy the created resources:

```
terraform destroy
```

Type yes when prompted.

```
C:\Users\aksha\Documents\aws-terraform>terraform destroy
aws_instance.My-instance[0]: Refreshing state... [id=i-08a0a5c80767968cc]

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:

  # aws_instance.My-instance[0] will be destroyed
  - resource "aws_instance" "My-instance" {
      - ami                                  = "ami-03f4878755434977f" -> null
      - arn                                  = "arn:aws:ec2:ap-south-1:730335668486:instance/i-08a0a5c80767968cc" -> null
      - associate_public_ip_address          = true -> null
      - availability_zone                    = "ap-south-1b" -> null
      - cpu_core_count                       = 1 -> null
      - cpu_threads_per_core                 = 1 -> null
      - disable_api_stop                     = false -> null
      - disable_api_termination              = false -> null
      - ebs_optimized                        = false -> null
      - get_password_data                    = false -> null
      - hibernation                          = false -> null
      - id                                   = "i-08a0a5c80767968cc" -> null
      - instance_initiated_shutdown_behavior = "stop" -> null
      - instance_state                       = "running" -> null
      - instance_type                        = "t2.micro" -> null
      - ipv6_address_count                   = 0 -> null
      - ipv6_addresses                       = [] -> null
      - monitoring                           = false -> null
      - placement_partition_number           = 0 -> null
      - primary_network_interface_id         = "eni-0c5ad9fb044a54408" -> null
      - private_dns                          = "ip-172-31-7-36.ap-south-1.compute.internal" -> null
      - private_ip                           = "172.31.7.36" -> null
      - public_dns                           = "ec2-65-2-79-107.ap-south-1.compute.amazonaws.com" -> null
      - public_ip                            = "65.2.79.107" -> null
      - secondary_private_ips                = [] -> null
      - security_groups                      = [
          - "default",
        ] -> null
      - source_dest_check                    = true -> null
      - subnet_id                            = "subnet-0d8a71344fc721a4e" -> null
      - tags                                 = {
          - "Name" = "Upes-Ec2-Instance"
        } -> null
      - tags_all                             = {
```

```
    } -> null
  - tenancy                              = "default" -> null
  - user_data_replace_on_change          = false -> null
  - vpc_security_group_ids               = [
      - "sg-0cf4f615da3ce0bf2",
    ] -> null
    # (8 unchanged attributes hidden)

  - capacity_reservation_specification {
      - capacity_reservation_preference = "open" -> null
    }

  - cpu_options {
      - core_count       = 1 -> null
      - threads_per_core = 1 -> null
        # (1 unchanged attribute hidden)
    }

  - credit_specification {
      - cpu_credits = "standard" -> null
    }

  - enclave_options {
      - enabled = false -> null
    }

  - maintenance_options {
      - auto_recovery = "default" -> null
    }

  - metadata_options {
      - http_endpoint               = "enabled" -> null
      - http_protocol_ipv6          = "disabled" -> null
      - http_put_response_hop_limit = 1 -> null
      - http_tokens                 = "optional" -> null
      - instance_metadata_tags      = "disabled" -> null
    }

  - private_dns_name_options {
      - enable_resource_name_dns_a_record    = false -> null
      - enable_resource_name_dns_aaaa_record = false -> null
      - hostname_type                        = "ip-name" -> null
    }
```

Notes:

Customize the instance.tf file to provision different AWS resources.

Explore the Terraform AWS provider documentation for additional AWS resources and configuration options.

Always be cautious when running terraform destroy to avoid accidental resource deletion.

This exercise provides a basic introduction to using Terraform with the AWS provider. Feel free to explore more complex Terraform configurations and resources based on your needs.