

System Provisioning and Configuration Module Lab

Assignment 1

Under the Guidance of Dr. Hitesh Kumar Sharma

Submitted by – Bhavi Bhagwanani

SAP ID - 500105053

Roll No - R2142220465

Batch - DevOps B1(NH)

1. Create two T2 Micro EC2 Instances. This instance.tf file contains the Iac code to create two instances of type t2.micro and ami of ubuntu.

```
instance.tf
     # Public Subnet for VPN Endpoint (ins1)
     resource "aws_subnet" "public" {
       vpc_id = aws_vpc.main.id
cidr_block = "10.0.1.0/24"
availability_zone = "ap-south-1a"
      vpc_id
       map_public_ip_on_launch = true
       tags = {
         Name = "Sid_Public_Subnet"
     # Security Group for VPN Endpoint
     resource "aws_security_group" "vpn_sg" {
       name = "vpn_endpoint_sg"
       description = "Allow IPSec VPN traffic"
       vpc_id = aws_vpc.main.id
17
       ingress {
          description = "IKE (UDP 500)"
          from_port = 500
         to_port = 500
protocol = "udp"
          cidr_blocks = ["0.0.0.0/0"]
        ingress {
          description = "NAT-T (UDP 4500)"
          from_port = 4500
          to_port = 4500
          protocol = "udp"
          cidr_blocks = ["0.0.0.0/0"]
```

```
instance.tf
       resource "aws_security_group" "vpn_sg" {
         ingress {
          description = "SSH"
           from_port = 22
         to_port = 22
protocol = "tcp"
          cidr_blocks = ["0.0.0.0/0"]
         egress {
          from_port = 0
          to_port = 0
          protocol = "-1"
          cidr_blocks = ["0.0.0.0/0"]
         tags = {
          Name = "Sid_VPN_SecurityGroup"
       # VPN Endpoint Instance
       resource "aws_instance" "ins1" {
       ami
                             = "ami-0e35ddab05955cf57"  # Ubuntu 24.04
                         = "t2.micro"
= aws_subnet.public.id
        instance_type
        subnet_id
        vpc_security_group_ids = [aws_security_group.vpn_sg.id]
        tags = {
         Name = "Sid_VPN_Endpoint"
65 # Regular Instance (Optional)
     resource "aws_instance" "ins2" {
      ami = "ami-0e35ddab05955cf57"
      instance_type = "t2.micro"
      subnet_id
                   = aws_subnet.public.id # Can change to private subnet if needed
      tags = {
       Name = "Sid_Instance2"
     # Elastic IP for VPN Endpoint
     resource "aws_eip" "vpn_eip" {
     instance = aws_instance.ins1.id
      tags = {
         Name = "Sid_VPN_EIP"
```

2. Create a VPN on AWS This resource.tf file contains the complete code to make a VPN. It consists of resources like vpc, customer gateway and vpn connection.

```
resource.tf
    # Main VPC
    resource "aws_vpc" "main" {
      cidr_block = "10.0.0.0/16"
      enable_dns_support = true
      enable_dns_hostnames = true
      tags = {
        Name = "Sid VPC"
    # Internet Gateway
    resource "aws_internet_gateway" "igw" {
      vpc_id = aws_vpc.main.id
      tags = {
        Name = "Sid_IGW"
     # Route Table for Public Subnet
     resource "aws_route_table" "public" {
      vpc_id = aws_vpc.main.id
      route {
        cidr_block = "0.0.0.0/0"
         gateway_id = aws_internet_gateway.igw.id
       tags = {
        Name = "Sid_Public_RT"
```

```
resource.tf
     # Route Table Association
     resource "aws_route_table_association" "public" {
       subnet_id
                   = aws_subnet.public.id
       route_table_id = aws_route_table.public.id
    # VPN Gateway
    resource "aws_vpn_gateway" "vpn_gw" {
      vpc_id = aws_vpc.main.id
      tags = {
         Name = "Sid_VPN_Gateway"
     # Customer Gateway (Using EC2's EIP)
     resource "aws_customer_gateway" "cgw" {
       bgp_asn = 65000
       ip_address = aws_eip.vpn_eip.public_ip
                  = "ipsec.1"
       tags = {
        Name = "Sid_Customer_Gateway"
```

```
# VPN Connection
resource "aws_vpn_connection" "main" {

vpn_gateway_id = aws_vpn_gateway.vpn_gw.id

customer_gateway_id = aws_customer_gateway.cgw.id

type = "ipsec.1"

static_routes_only = true

tags = {

Name = "Sid_VPN_Connection"

}

Keype = "ipsec.1"

Static_routes_only = true

Tags = {

Name = "Sid_VPN_Connection"

Tags = {

Name = "Sid_VPN_Connection"

Tags = {

Name = "Sid_VPN_Connection"
```

3. Create a S3 Bucket Code to create a s3 bucket.

4. Main.tf file to perform the above-mentioned tasks

5. Terraform init to initialize the terraform folder which will have the aws provider.

```
PS G:\New Volume E\6th sem\System Provisioning Lab\Assignment-1> terraform init
PS G:\New Volume E\6th sem\System Provisioning Lab\Assignment-1> terraform init Initializing the backend...
Initializing provider plugins...
- Finding hashicorp/aws versions matching "5.68.0"...
- Installing hashicorp/aws v5.68.0...
- Installed hashicorp/aws v5.68.0 (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
  rerun this command to reinitialize your working directory. If you forget, other commands will detect it and remind you to do so if necessary.
```

6. Terraform plan to see the resources that will be created.

```
District of the resources that will be created by the sem's system provisioning Lab\Assignment-1> terraform plan aws_vpc.main: Refreshing state... [id=vpc-04ff9b57c16aadb1f] aws_s3_bucket.assignment_bucket: Refreshing state... [id=r2142220666] aws_internet_gateway.igw: Refreshing state... [id=igw-0e2e8738c0ed9ca43] aws_vpn_gateway.vpn_gw: Refreshing state... [id=yw-04e7657a0495cd1b1] aws_subnet.public: Refreshing state... [id=subnet-0e26a936205a4d00d] aws_security_group.vpn_sg: Refreshing state... [id=subnet-0e26a936205add00d] aws_route_table.public: Refreshing state... [id=rtb-0d67b64b84661baff] aws_instance.ins2: Refreshing state... [id=i-0436d3c5e1c951f53] aws_instance.ins1: Refreshing state... [id=i-047ffb55b094abc44] aws_route_table_association.public: Refreshing state... [id=rtbassoc-0d7c070f171a7bf8f] aws_eip.vpn_eip: Refreshing state... [id=eipalloc-0b7533407a3bdfeed] aws_customer_gateway.cgw: Refreshing state... [id=cgw-0c9a8b7812ecf9660] aws_vpn_connection.main: Refreshing state... [id=cypn-08f2ede948ccd26ac]
           No changes. Your infrastructure matches the configuration.
```

P.s. - I performed terraform plan after terraform apply so the resources were actually created. In practice, it is advised to perform terraform plan before terraform apply to see what resources will be created.

7. Terraform apply to create the mentioned resources.

```
PS G:\New Volume E\6th sem\System Provisioning Lab\Assignment-1> 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_customer_gateway.cgw will be created
     tags_all = {
+ "Name" = "Sid_Customer_Gateway"
                               = "ipsec.1"
          + type
   # aws_eip.vpn_eip will be created
+ resource "aws_eip" "vpn_eip" {
+ allocation_id = (known after apply)
          + atlocation_id = (known after apply)
+ arn = (known after apply)
+ carrier_ip = (known after apply)
+ customer_owned_ip = (known after apply)
+ domain = (known after apply)
+ id = (known after apply)
+ instance = (known after apply)
+ network_border_group = (known after apply)
             network_interface private_dns = (known after apply)
private_ip = (known after apply)
ptr_record = (known after apply)
public_ip = (known after apply)
public_ip = (known after apply)
public_ip = (known after apply)
public_ipv4_pool = (known after apply)
             tags
+ "Name" = "Sid_VPN_EIP"
          = (known after apply)
          + vpc
   # aws_instance.ins1 will be created
+ resource "aws_instance" "ins1" {
                                                                                = "ami-0e35ddab05955cf57'
          + ami
                                                                              = "ami-0e35ddab05955cd

= (known after apply)

= false
          + associate_public_ip_address+ availability_zone
              cpu_core_count
             cpu_threads_per_core
disable_api_stop
disable_api_termination
             ebs_optimized
             get_password_data
                                                                                = false
                                                                               = false
= (known after apply)
= (known after apply)
= (known after apply)
= (known after apply)
              host_id
             host_resource_group_arn
              iam_instance_profile
             id
              instance_initiated_shutdown_behavior = (known after apply)
                                                                                = (known after apply)
             instance_lifecycle
```

```
instance_state
instance_type
ipv6_address_count
                                                               = (known after apply)
= "t2.micro"
= (known after apply)
                                                                = (known after apply)
         ipv6_addresses
      + key_name
+ monitoring
      + outpost arn
        password_data
        placement_group
placement_partition_number
        primary_network_interface_id
                                                                = (known after apply)
= (known after apply)
        private_dns
private_ip
         public_dns
                                                                = (known after apply)
                                                                = (known after apply)
= (known after apply)
= (known after apply)
        public_ip
secondary_private_ips
        security_groups
source_dest_check
                                                               = true
= (known after apply)
= (known after apply)
= {
         spot_instance_request_id
         subnet_id
      + tags
+ "Name" = "Sid_VPN_Endpoint"
      + tags_all
+ "Name" = "Sid_VPN_Endpoint"
     + tenancy
+ user_data
                                                                = (known after apply)
                                                                = (known after apply)
      + user_data_base64
                                                                = (known after apply)
= false
        user_data_replace_on_change
                                                                = (known after apply)
        vpc_security_group_ids
      + 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)
# aws_instance.ins2 will be created
+ resource "aws_instance" "ins2" {
                                                                = "ami-0e35ddab05955cf57"
                                                                = "ami-0e35ddab05955c
= (known after apply)
= (known after apply)
= (known after apply)
= (known after apply)
      + arn
         associate_public_ip_address
         availability_zone
        cpu_core_count
cpu_threads_per_core
                                                                 = (known after apply)
                                                                = (known after apply)
= (known after apply)
= (known after apply)
        disable_api_stop
disable_api_termination
         ebs_optimized
        get_password_data
host_id
                                                                = false
                                                                = (known after apply)
```

```
host_resource_group_arm
                                                             = (known after apply)
= (known after apply)
= (known after apply)
= (known after apply)
     + iam_instance_profile
     + id
       instance_initiated_shutdown_behavior = instance_lifecycle =
                                                             = (known after apply)
= "t2.micro"
       instance_state
       instance_type
ipv6_address_count
                                                             = (known after apply)
= (known after apply)
= (known after apply)
       ipv6_addresses
       key_name
                                                            = (known after apply)
= true
       monitoring
       outpost_arn
       password_data
       placement_group
       placement_partition_number
      primary_network_interface_id
private_dns
       private_ip
      public_ip
       secondary_private_ips
      security_groups
source_dest_check
                                                             = true
= (known after apply)
= (known after apply)
     + spot_instance_request_id
     + subnet id
    + tags
+ "Name" = "Sid_Instance2"
     + tags_all
+ "Name" = "Sid_Instance2"
                                                             = {
                                                             = (known after apply)
= (known after apply)
= (known after apply)
     + tenancy
     + user_data
    + user_data_base64
        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)
```

```
tags_all = {
+ "Name" = "Sid_IGW"
   + vpc_id = (known after apply)
+ cidr_block
+ gateway_id
                      = "0.0.0.0/0"
= (known after apply)
           # (11 unchanged attributes hidden)
   s_all = {
"Name" = "Sid_Public_RT"
   + tags_all
                 = (known after apply)
   + vpc_id
# aws_route_table_association.public will be created
 + u
+ object_lock_enabled
+ policy
+ region
+ request_payer
+ tags
   + tags = {
+ "Environment" = "Assignment"
+ "Name" = "Sid_Assignment_Bucket"
   = (known after apply)
= (known after apply)
   + website_domain
   + website_endpoint
   + cors_rule (known after apply)
   + grant (known after apply)
   + lifecycle_rule (known after apply)
   + logging (known after apply)
```

```
aws_subnet.public will be created
resource "aws_subnet" "public" {
                                                                                               = (known after apply)
= false
= "ap-south-la"
= (known after apply)
= "10.0.1.0/24"
           arn
          arn
assign_ipv6_address_on_creation
availability_zone
availability_zone_id
cidr_block
enable_dns64
enable_resource_name_dns_a_record_on_launch
enable_resource_name_dns_aaaa_record_on_launch
id
         emoun after apply)

"10.0.1.0/24"

"false

enable_resource_name_dns_a_record_on_launch
enable_resource_name_dns_aaaa_record_on_launch
ipv6.cidr_block_association_id
ipv6.cidr_block_association_id
ipv6.native
map_public_ip_on_launch
owner_id
private_dns_hostname_type_on_launch
tags

+ "Name" = "Sid_Public_Subnet"
}

tags_all
        + tags_all
+ "Name" = "Sid_Public_Subnet"
        + vpc_id
                                                                                               = (known after apply)
# aws_vpc.main will be created
+ resource "aws_vpc" "main" {
          # aws_vpn_connection.main will be created
+ resource "aws_vpn_connection" "main" {
         tags_all = {
+ "Name" = "Sid_VPN_Connection"
```

```
ama.
arn = (known
id = {
tags = {
+ "Name" = "Sid_VPN_Gateway"
- {
                                     = (known after apply)
     Plan: 13 to add, 0 to change, 0 to destroy.
  Changes to Outputs:
+ s3_bucket_name = "R2142220666"
+ vpn_connection_id = (known after apply)
+ vpn_endpoint_ip = (known after apply)
+ vpn_tunnel_details = (known after apply)
     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
aws_vpc.main: Creating...
aws_s3_bucket.assignment_bucket: Creating...
aws_s3_bucket.assignment_bucket: Creating...
aws_vpc.main: Still creating... [10s_elapsed]
aws_vpc.main: Creation complete after 12s [id=vpc-04ff9b57c16aadb1f]
aws_upc.main: Creation complete after 12s [id=vpc-04ff9b57c16aadb1f]
aws_internet_gateway.jgw: Creating...
aws_scupt.public: Creating...
aws_security_group.vpn_sg: Creation complete after 0s [id=igw-0e2e8738c0ed9ca43]
aws_route_table.public: Creating...
aws_noute_table.public: Creating...
aws_noute_table.public: Creating...
aws_noute_table.public: Creating...
aws_route_table.public: Creating...
aws_noute_table.public: Creating...
[10s_elapsed]
aws_scupr_gateway.vpn_gw: Still creating... [10s_elapsed]
aws_subnet.public: Still creating... [10s_elapsed]
aws_subnet.public: Still creating... [10s elapsed]

aws_route_table.public: Creation complete after 1s [id=rtb-0d67b64b84661baff]

aws_security_group.vpn_gs: Creation complete after 2s [id=sg-039725890fd2770ce]

aws_vpn_gateway.vpn_gw: Still creating... [10s elapsed]

aws_subnet.public: Still creating... [10s elapsed]

aws_subnet.public: Creation complete after 11s [id=subnet-0e26a936205a4d00d]

aws_route_table_association.public: Creating...

aws_instance.ins1: Creating...

aws_instance.ins1: Creating...

aws_route_table_association.public: Creation complete after 0s [id=rtbassoc-0d7c070f171a7bf8f]

aws_vpn_gateway.vpn_gw: Still creating... [20s elapsed]

aws_instance.ins2: Still creating... [10s elapsed]

aws_instance.ins1: Still creating... [10s elapsed]

aws_instance.ins1: Still creating... [10s elapsed]

aws_eip.vpn_eip: Creation complete after 13s [id=i-047ffb55b094abc44]

aws_eip.vpn_eip: Creation complete after 13s [id=i-0436d3c5elc951f53]

aws_eip.vpn_eip: Creation complete after 1s [id=eipalloc-0b7533407a3bdfeed]

aws_customer_gateway.cgw: Creating...

aws_ustomer_gateway.cgw: Still creating... [10s elapsed]

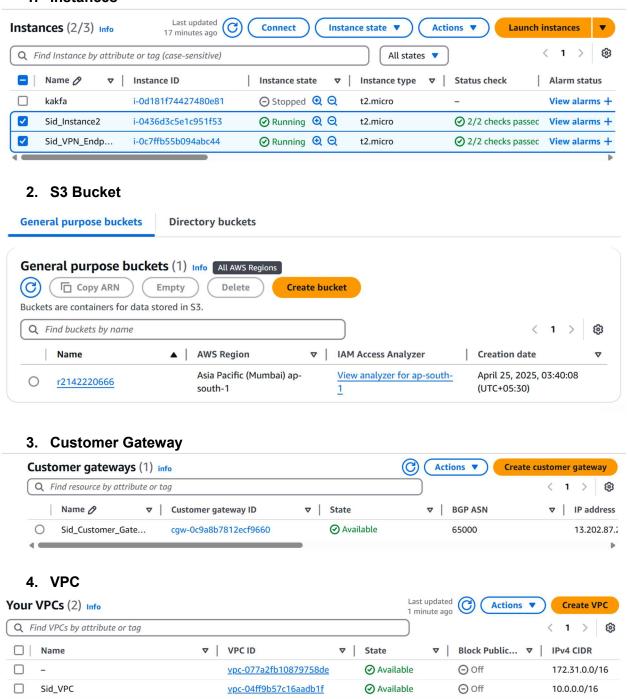
aws_customer_gateway.cgw: Creation complete after 11s [id=cgw-0c9a8b7812ecf9660]

aws_vpn_gateway.vpn_gw: Still creating... [10s elapsed]

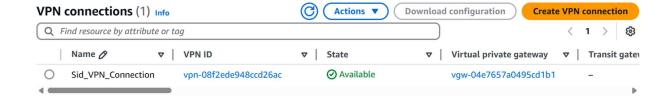
aws_vpn_gateway.vpn_gw: Still creating... [40s elapsed]

aws_vpn_connection.main: Still creating... [20s elapsed]
  aws_vpn_connection.main: Still creating... [2m40s elapsed]
aws_vpn_connection.main: Still creating... [2m50s elapsed]
aws_vpn_connection.main: Still creating... [3m0s elapsed]
aws_vpn_connection.main: Still creating... [3m10s elapsed]
aws_vpn_connection.main: Still creating... [3m10s elapsed]
aws_vpn_connection.main: Creation complete after 3m16s [id=vpn-08f2ede948ccd26ac]
        aws_s3_bucket.assignment_bucket: Creating...
aws_s3_bucket.assignment_bucket: Creation complete after 2s [id=r2142220666]
```

1. Instances



5. VPN Connections



Then use terraform destroy to clean up all the resources.

```
PS G:\New Volume E\6th sem\System Provisioning Lab\Assignment-1> terraform destroy aws_vpc.main: Refreshing state... [id=vpc-04ff9b57c16aadb1f] aws_s3_bucket.assignment_bucket: Refreshing state... [id=r2142220666] aws_vpn_gateway.vpn_gw: Refreshing state... [id=vgw-04e7657a0495cd1b1] aws_internet_gateway.igw: Refreshing state... [id=vgw-04e7657a0495cd1b1] aws_security_group.vpn_sg: Refreshing state... [id=subnet-0e26a936205a4d00d] aws_security_group.vpn_sg: Refreshing state... [id=subnet-0e36a936205a4d00d] aws_route_table.public: Refreshing state... [id=subnet-0e36a936205a4d00d] aws_route_table_association.public: Refreshing state... [id=rbod67b64b44661baff] aws_instance.ins2: Refreshing state... [id=i-047ffb55b094abc44] aws_instance.ins1: Refreshing state... [id=i-047ffb55b094abc44] aws_eip.vpn_eip: Refreshing state... [id=eipalloc-0b7533407a3bdfeed] aws_customer_gateway.cgw: Refreshing state... [id=cgw-0c9a8b7812ecf9660] aws_vpn_connection.main: Refreshing state... [id=cgw-0c9a8b7812ecf9660]
    Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following
              destrov
    Terraform will perform the following actions:
            # aws_customer_gateway.cgw will be destr
                  resource "aws_customer_gateway" "cgw" {
- arn = "arn:aws:ec2:ap-south-1:976193261889:customer-gateway/cgw-0c9a8b7812ecf9660" -> null
                                                                                                = "65000"
                                 bgp_asn
                                                                                                = "cgw-0c9a8b7812ecf9660" -> null
                                  id
                                                                                                = "13.202.87.220"
                                                "Name" = "Sid_Customer_Gateway"
                                  tags_all
                                                =_all = {
"Name" = "Sid_Customer_Gateway"
   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
aws_route_table_association.public: Destroying... [id=rtbassoc-0d7c070f171a7bf8f]
aws_s3_bucket.assignment_bucket: Destroying... [id=r2142220666]
aws_instance.ins2: Destroying... [id=i-0436d3c5elc951f53]
aws_vpn_connection.main: Destroying... [id=vpn-08f2ede948ccd26ac]
aws_route_table_association.public: Destruction complete after 1s
aws_route_table.public: Destroying... [id=rtb-0d67b64b84661baff]
aws_route_table.public: Destruction complete after 0s
aws_s3_bucket.assignment_bucket: Destruction complete after 1s
aws_internet_gateway.igw: Destroying... [id=igw-0e28738c0ed9ca43]
aws_vpn_connection.main: Still destroying... [id=igw-0e8f2ede948ccd26ac, 10s elapsed]
aws_instance.ins2: Still destroying... [id=i-0436d3c5elc951f53, 10s elapsed]
aws_vpn_connection.main: Destruction complete after 1s
aws_subnet.public: Destroying... [id=subnet-0e26a936205a4d00d]
aws_security_group.vpn_sg: Destroying... [id=sg-0a9725890fd2770ce]
aws_subnet.public: Destruction complete after 1s
aws_security_group.vpn_sg: Destruction complete after 1s
aws_security_group.vpn_sg: Destruction complete after 1s
aws_vpc.main: Destroying... [id=vpc-04ff9b57c16aadb1f]
aws_vpc.main: Destruction complete after 0s
  Destroy complete! Resources: 13 destroyed.
PS G:\New Volume E\6th sem\System Provisioning Lab\Assignment-1>|
```