

# System Provisioning and Configuration Module Lab

# **Assignment 1**

# **Under the Guidance of: Dr. Hitesh Kumar Sharma**

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Batch - DevOps B1(H)

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)
 2 resource "aws_subnet" "public" {
                 = aws_vpc.main.id
 3 vpc_id
     cidr_block = "10.0.1.0/24"
availability_zone = "ap-south-1a"
     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
       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
         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-0e35ddab05955cf57" # Ubuntu 24.04
                        = "t2.micro"
       instance_type
                           = aws_subnet.public.id
       subnet_id
       vpc_security_group_ids = [aws_security_group.vpn_sg.id]
       tags = {
        Name = "Sid_VPN_Endpoint"
```

```
# 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"

Name = "Sid_VPN_EIP"

Name = "Sid_VPN_EIP"
```

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
 1 # 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
12 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
33 # 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
40 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"

}

66
```

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

```
resource "aws_s3_bucket" "assignment_bucket" {
    bucket = "r2142220666"
    tags = {
        Name = "Sid_Assignment_Bucket"
        Environment = "Assignment"
    }
}
```

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
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
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.
```

Terraform plan to see the resources that will be created.

```
PS G:\New Volume E\6th sem\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-0e2e8738c0ed9cau3]
aws_vpn_gateway.vpn_gw: Refreshing state... [id=vgw-04e7657a0495c01b1]
aws_subnet.public: Refreshing state... [id=subnet-0e26a9362063a4d00d]
aws_security_group.vpn_sg: Refreshing state... [id=sg-039725890fd2770ce]
aws_route_table.public: Refreshing state... [id=i-0476f054b84661b4sff]
aws_instance.ins2: Refreshing state... [id=i-0436d3c5elc951f53]
aws_instance.ins1: Refreshing state... [id=i-047fb55b094abc44]
aws_route_table_association.public: Refreshing state... [id=rbtassoc-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=vpn-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:
 tags = {
+ "Name" = "Sid_Customer_Gateway"
       + type
                       = "ipsec.1"
 = (known after apply)
         private_dns
private_ip
         ptr_record
public_dns
         public_ip
          public_ipv4_pool
         tags
+ "Name" = "Sid_VPN_EIP"
       = (known after apply)
 # aws_instance.ins1 will be created
+ resource "aws_instance" "ins1" {
                                                         = "ami-0e35ddab05955cf57"
         arn
                                                         = (known after apply)
= (known after apply)
       + arn
+ associate_public_ip_address
+ availability_zone
                                                         = (known after apply)
= (known after apply)
= (known after apply)
         cpu_core_count
cpu_threads_per_core
         disable_api_stop
disable_api_termination
                                                         = (known after apply)
= (known after apply)
= (known after apply)
          ebs_optimized
                                                        = (known after apply)
= false
= (known after apply)
= (known after apply)
         get_password_data
host_id
         host_resource_group_arn
iam_instance_profile
          id = (known after apply)
instance_lifecycle = (known after apply)
```

```
instance_state
                                                                            (known after apply)
          instance_type
ipv6_address_count
ipv6_addresses
                                                                        = "t2.micro"

= (known after apply)
                                                                         = "t2.micro"
         key_name
monitoring
          outpost_arn
          password_data
          placement_group
          placement_partition_number
          primary_network_interface_id
private_dns
                                                                         = (known after apply)
= (known after apply)
= (known after apply)
          private_ip
          public_ip
          secondary_private_ips
security_groups
source_dest_check
                                                                         = (known after apply)
= (known after apply)
                                                                         = (known after apply)
= (known after apply)
= {
          spot_instance_request_id
subnet_id
          tags
+ "Name" = "Sid_VPN_Endpoint"
       = (known after apply)
= (known after apply)
= (known after apply)
= false
       + tenancy
+ user_data
+ user_data_base64
       + user_data_replace_on_change
+ 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)
# aws_instance.ins2 will be created
+ resource "aws_instance" "ins2" {
                                                                          = "ami-0e35ddab05955cf57"
                                                                        = "ami-0e35ddab05955cf

(known after apply)

= false
          arn
       + associate_public_ip_address
+ availability_zone
          cpu_core_count
cpu_threads_per_core
          disable_api_stop
disable_api_termination
          ebs_optimized
          get_password_data
host_id
                                                                         = false
= (known after apply)
```

```
(known after apply)
(known after apply)
(known after apply)
(known after apply)
       host_resource_group_armiam_instance_profile
       instance_initiated_shutdown_behavior =
                                                                   (known after apply)
(known after apply)
       instance_lifecycle
instance_state
instance_type
                                                                   "t2.micro"
                                                                  "t2.micro"

(known after apply)
       ipv6_address_count
ipv6_addresses
      key_name
monitoring
       outpost_arn
password_data
       placement_group
placement_partition_number
primary_network_interface_id
                                                                  (known after apply)
(known after apply)
(known after apply)
(known after apply)
       private_dns
       private_ip
       public_dns
       public_ip
       secondary_private_ips
security_groups
source_dest_check
                                                                  (known after apply)
(known after apply)
                                                                   true
                                                                = (known after apply)
= (known after apply)
       spot_instance_request_id
       subnet_id
    + tags
_+ "Name" = "Sid_Instance2"
                                                                = {
       tags_all + "Name" = "Sid Instance2"
       tenancy
                                                                = (known after apply)
    + user_data
+ user_data_base64
                                                               = (known after apply)
= (known after apply)
                                                                = (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)
route + {
              + cidr_block
                                               = "0.0.0.0/0"
              + gateway_id = (known after apply)
# (11 unchanged attributes hidden)
     + tags
            "Name" = "Sid_Public_RT"
     + tags_all = {
+ "Name" = "Sid_Public_RT"
     + vpc_id
                        = (known after apply)
+ arn
       Ducket_regional_domain_name = (known after apply)
force_destroy = false
hosted_zone_id = (known after apply)
id = (known after apply)
object_lock_enabled = (known after apply)
policy = (known after apply)
region = (known after apply)
request_payer = (known after apply)
= (known after apply)
     + force_destroy
+ hosted_zone_id
     + policy
+ region
       tags = {
+ "Environment" = "Assignment"
+ "Name" = "Sid_Assignment_Bucket"
     + tags_all
```

= (known after apply) = (known after apply)

+ website\_domain + website\_endpoint

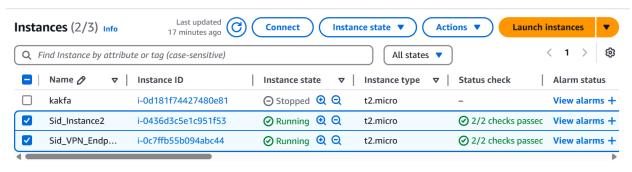
+ cors\_rule (known after apply)
+ grant (known after apply)

+ lifecycle\_rule (known after apply)+ logging (known after apply)

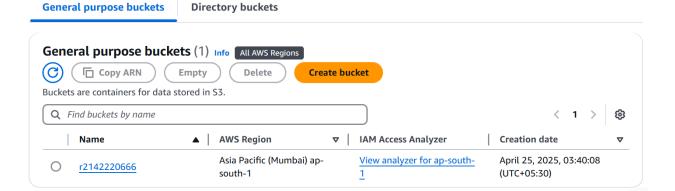
```
# aws_vpn_gateway.vpn_gw will be created
+ resource "aws_vpn_gateway" "vpn_gw" {
+ amazon_side_asn = (known after apply)
+ arn = (known after apply)
+ id = (known after apply)
                                                                   tags
+ "Name" = "Sid_VPN_Gateway"
                                                  }
+ tags_all = {
+ "Name" = "Sid_VPN_Gateway"
                                                                                                                                                                                   = (known after apply)
       Plan: 13 to add, 0 to change, 0 to destroy.
   Changes to Outputs:
+ s3_bucket_name = "R2142228666"
+ 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_s2_bucket.assignment_bucket: Creating...
aws_s2_bucket.assignment_bucket: Creating...
aws_vpc.main: Still creating... [10s elapsed]
aws_vpc.main: Still creating...
aws_vpn_gateway.igw: Creating...
aws_upn_gateway.vpn_gw: Creating...
aws_subnet.public: Creating...
aws_security.group.vpn_sg: Creating...
aws_security.group.vpn_sg: Creating...
aws_internet_gateway.igw: Creation complete after 0s [id=igw-0e2e8738c0ed9ca43]
aws_route_table.public: Creating...
aws_route_table.public: Creating...
aws_route_table.public: Creating...
[id=igw-0e2e8738c0ed9ca43]
aws_route_table.public: Creating...
[id=igw-0e2e8738c0ed9ca43]
aws_route_table.public: Creating...
[id=igw-0e2e8738c0ed9ca43]
aws_route_table.public: Creating...
[id=igw-0e2e8738c0ed9ca43]
aws_subnet_table.public: Creating...
[id=igw-0e2e8738c
aws_route_table.public: Still 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.insl: Creating...
aws_instance.insl: Creating...
aws_route_table_association.public: Creation complete after 0s [id=rtbassoc-0d7c070f171a7bf8f]
aws_vpn_gateway.vpn_gw: Still creating... [20s elapsed]
aws_instance.insl: Still creating... [10s elapsed]
aws_instance.insl: Still creating... [10s elapsed]
aws_instance.insl: Creation complete after 13s [id=i-0c7ffb55b094abc44]
aws_eip.vpn_eip: Creation...
aws_instance.insl: Creation complete after 13s [id=i-0436d3c5elc951f53]
aws_eip.vpn_eip: Creation complete after 13s [id=i-0476b7533407a3bdfeed]
aws_customer_gateway.cgw: Creating...
aws_customer_gateway.cgw: Creating... [10s elapsed]
aws_customer_gateway.cgw: Still creating... [10s elapsed]
aws_vpn_gateway.vpn_gw: Still creating... [10s elapsed]
aws_vpn_connection.main: Still creating... [10s elapsed]
aws_vpn_connection.main: Still creating... [20s 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]
```

#### **Resources Created -**

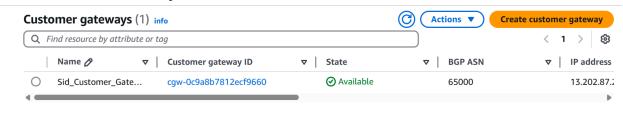
#### 1. Instances



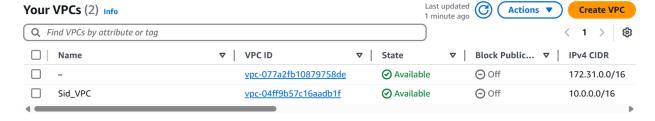
#### 2. S3 Bucket



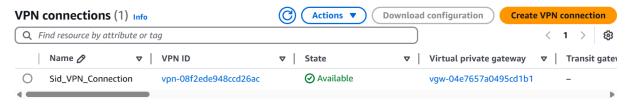
# 3. Customer Gateway



### 4. VPC



#### 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-04e7857a0495cd1b1] aws_internet_gateway.iow: Refreshing state... [id=igw-02e8738c0ed9ca43] aws_subnet.public: Refreshing state... [id=subnet-0e26a936205a4d00d] aws_security_group.vpn_sg: Refreshing state... [id=subnet-0e36a936205a4d00d] aws_route_table_public: Refreshing state... [id=rb-0467b64b484661baff] aws_route_table_association.public: Refreshing state... [id=rtbassoc-0d7c070f17la7bf8f] aws_instance.ins2: Refreshing state... [id=i-047ffb5b094bact44] aws_eip.vpn_eip: Refreshing state... [id=ipalloc-0b7533407a3bdfeed] aws_customer_gateway.cgw: Refreshing state... [id=cgw-0c9a8b7812ecf9660] aws_vpn_connection.main: Refreshing state... [id=vpn-08f2ede948ccd26ac]
    Terraform used the selected providers to generate the following execution plan. Resource actions are indicated with the following
              destroy
    Terraform will perform the following actions:
         # aws_customer_gateway.cgw will be destroyed
               = "cgw-0c9a8b7812ecf9660" -> null
= "13.202.87.220" -> null
                             ip_address
                             tags = {
- "Name" = "Sid_Customer_Gateway"
                             tags_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=ypn-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-0e2e8738c0ed9ca43]
aws_vpn_connection.main: Still destroying... [id=ypn-08f2ede948ccd26ac, 10s elapsed]
aws_instance.ins2: Still destroying... [id=i-0436d3c5elc951f53, 10s elapsed]
aws_vpn_connection.main: Destruction complete after 11s
 aws_subnet.public: Destroying... [id=subnet-0e26a936205a4d00d]
aws_security_group.vpn_sg: Destroying... [id=sg-039725890fd2770ce]
aws_subnet.public: 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> |
```