TERRAFORM - POC

Installing aws cli and configuring

AWS configure

Providing credentials region and output types

1. Create Two Resources in Different Regions

Here's how you can create two resources, such as EC2 instances, in different regions

Provider.tf

```
provider.tf > ** provider.tf > * provider "aws" > * alias

    # Define the AWS provider for the US East region

provider "aws" {
    alias = "us_east"
    region = "us-east-1"
    }

# Define the AWS provider for the US West region

provider "aws" {
    alias = "us_west"
    region = "us-west-2"
}
```

Main.tf

```
≡ .terraform.lock.hcl
🏴 main.tf
               provider.tf
🦞 main.tf > ધ resource "aws_instance" "instance_west" > 局 tags
  1 # Resource in US East region
2 resource "aws_instance" "instance_east" {
      provider = aws.us_east
ami = "ami-0ba9883b710b05ac6" # Example AMI ID
         instance_type = "t2.micro"
         tags = {
         Name = "Instance-EAST"
       resource "aws_instance" "instance_west" {
       provider = aws.us_west
               = "ami-0440fa9465661a496" # Example AMI ID
         ami
         instance_type = "t2.micro"
         tags = {
           Name = "Instance-WEST"
```

```
PS E:\Terraform> terraform init
Initializing the backend...
Initializing provider plugins...
- Reusing previous version of hashicorp/aws from the dependency lock file
- Using previously-installed hashicorp/aws v5.61.0

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.

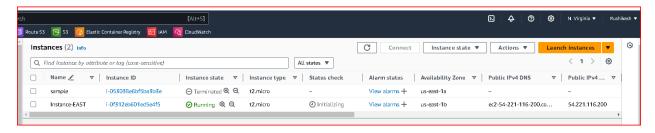
If you ever set or change modules or backend configuration for Terraform, rerun this command to reinitialize your working directory. If you forget, other commands will detect it and remind you to do so if necessary.
```

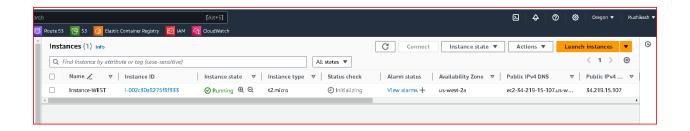
```
PS E:\Terraform> terraform plan
Terraform used the selected providers to generate the following execution plan. Resource actions are
  + create
Terraform will perform the following actions:
  # aws_instance.instance_east will be created
  + resource "aws_instance" "instance_east" {
                                              = "ami-0ba9883b710b05ac6"
     + ami
                                             = (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
+ disable_api_termination
                                             = (known after apply)
                                             = (known after apply)
                                             = (known after apply)
      + ebs_optimized
      + get_password_data
                                             = false
      + host id
                                             = (known after apply)
                                             = (known after apply)
      + host_resource_group_arn
      + iam_instance_profile
                                             = (known after apply)
      + id
                                             = (known after apply)
      + instance_initiated_shutdown_behavior = (known after apply)
                                             = (known after apply)
      + instance_lifecycle
                                             = (known after apply)
      + instance state
                                             = "t2.micro"
      + instance_type
      + ipv6_address_count
                                             = (known after apply)
                                             = (known after apply)
      + ipv6_addresses
      + key_name
                                             = (known after apply)
      + monitoring
                                             = (known after apply)
```

```
PS E:\Terraform> terraform apply
Terraform used the selected providers to generate the following execution plan. Resource actions are indicated wi
Terraform will perform the following actions:
  # aws instance.instance east will be created
  + resource "aws_instance" "instance_east" {
                                                .
= "ami-0ba9883b710b05ac6"
                                              = (known after apply)
      + arn
                                             = (known after apply)
= (known after apply)
     + associate_public_ip_address
      + availability_zone
                                              = (known after apply)
     + cpu_core_count
                                             = (known after apply)
= (known after apply)
= (known after apply)
= (known after apply)
= false
     + cpu_threads_per_core
      + disable_api_stop
     + disable_api_termination
     + ebs_optimized
     + get_password_data
                                             = (known after apply)
= (known after apply)
= (known after apply)
     + host_id
     + iam_instance_profile
      + id
                                               = (known after apply)
      + instance_initiated_shutdown_behavior = (known after apply)
                                 = (known after apply)
      + instance lifecycle
                                               = (known after apply)
= "t2.micro"
      + instance_state
      + instance_type
      + ipv6_address_count
                                               = (known after apply)
      + ipv6_addresses
                                               = (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
aws_instance.instance_east: Creating...
aws_instance.instance_west: Creating...
aws_instance.instance_east: Still creating... [10s elapsed]
aws_instance.instance_west: Still creating... [10s elapsed]
aws instance.instance east: Still creating... [20s elapsed]
aws_instance.instance_west: Still creating... [20s elapsed]
aws_instance.instance_east: Still creating... [30s elapsed]
aws_instance.instance_west: Still creating... [30s elapsed]
aws_instance.instance_east: Creation complete after 36s [id=i-0f312eb601ed5e4f5]
aws_instance.instance_west: Creation complete after 37s [id=i-002c30a8275f8f333]
Apply complete! Resources: 2 added, 0 changed, 0 destroyed.
```

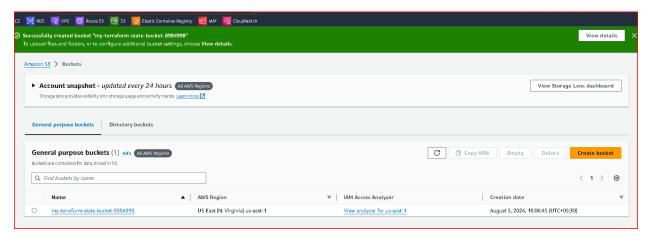
Successfully created resources within two different regions



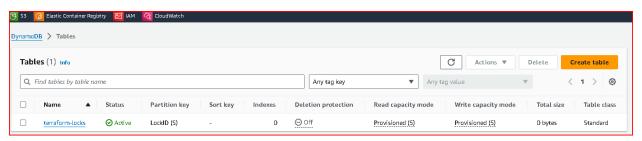


2. Perform state lock

Creating S3 bucket



Creating dynamoDB table



Initializing backend to store state

```
PS E:\Terraform> terraform init
Initializing the backend...
Do you want to copy existing state to the new backend?

Pre-existing state was found while migrating the previous "local" backend to the newly configured "s3" backend. No existing state was found in the newly configured "s3" backend. Do you want to copy this state to the new "s3" backend? Enter "yes" to copy and "no" to start with an empty state.

Enter a value: yes

Releasing state lock. This may take a few moments...

Successfully configured the backend "s3"! Terraform will automatically use this backend unless the backend configuration changes.

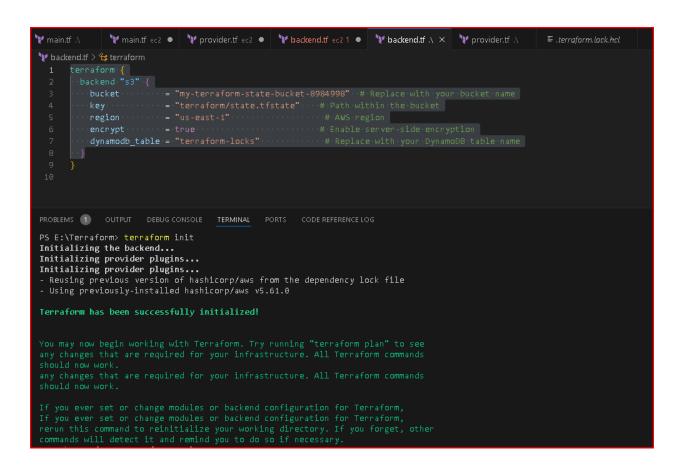
Initializing provider plugins...

Reusing previous version of hashicorp/aws from the dependency lock file

Using previously-installed hashicorp/aws v5.61.0

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.
PS E:\Terraform> terraform apply
Acquiring state lock. This may take a few moments...
aws_instance.instance_east: Refreshing state... [id=i-0f312eb601ed5e4f5]
aws instance.instance west: Refreshing state... [id=i-002c30a8275f8f333]
No changes. Your infrastructure matches the configuration.
Terraform has compared your real infrastructure against your configuration and found no differe
Releasing state lock. This may take a few moments...
Apply complete! Resources: 0 added, 0 changed, 0 destroyed.
PS E:\Terraform> terraform apply
Acquiring state lock. This may take a few moments...
aws_instance.instance_east: Refreshing state... [id=i-0f312eb601ed5e4f5]
aws_instance.instance_west: Refreshing state... [id=i-002c30a8275f8f333]
No changes. Your infrastructure matches the configuration.
Terraform has compared your real infrastructure against your configuration and found no differe
Releasing state lock. This may take a few moments...
Apply complete! Resources: 0 added, 0 changed, 0 destroyed.
```

created new terraform project state lock with similar codes and Backend to store statefile

```
      Image: Properties
      I
```

```
PS E:\Terraform> terraform init
Initializing the backend...
Initializing provider plugins...
Initializing provider plugins...
- Reusing previous version of hashicorp/aws from the dependency lock file
- Using previously-installed hashicorp/aws v5.61.0

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.
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.
```

```
PS E:\Terraform > terraform apply
Acquiring state lock. This may take a few moments...

Enror: Error acquiring the state lock

Error message: operation error DynamoDB: PutItem, https response error StatusCode: 400, RequestID: FKIDFS6LPSLKESMJSMD1N84iIBVV4KQNSOSAEMVJF66Q9ASUAAJG,
ConditionalCheckFailedException: The conditional request failed
Lock Info:

ID: c2dc68f6-b32a-fd87-dbe4-315540be45df
Path: my-terraform=state-bucket-8984998/terraform/state.tfstate
Operation: OperationTypeApply
Who: CYBAGE\rushikeshja@GVC1502
Version: 1.9.3
Created: 2024-08-05 11:05:55.1949527 +0000 UTC
Info:

Terraform acquires a state lock to protect the state from being written
by multiple users at the same time. Please resolve the issue above and try
again. For most commands, you can disable locking with the "-lock=false"
flag, but this is not recommended.

PS.E:\Tercaform. \[ \]
```

3. Create 3 identical resources with different name using loops.

provider.tf: Configures the AWS provider with the desired region i.e "us-east-1"

main.tf:

- a. variable "instance_count": Defines the number of instances to create.
- b. variable "instance_names": Defines the names for each instance.
- c. resource "aws_instance" "example": Uses the count meta-argument to create multiple instances. The count.index is used to index into the instance_names variable to assign unique names.

```
X Welcome
                 🍟 main.tf
                                  y outputs.tf
                                                  🦞 provider.tf 🏻 🗨
🦖 main.tf > ધ resource "aws_instance" "example" > 🖭 ami
       # main.tf
       variable "instance_count" {
   2
         default = 3
   3
   4
   5
       variable "instance_names" {
         default = ["instance-1", "instance-2", "instance-3"]
   7
   8
   9
       resource "aws_instance" "example" {
  10
                        = var.instance count
  11
                         = "ami-0ad21ae1d0696ad58"
          ami
  12
         instance_type = "t2.micro"
 13
          tags = {
  14
  15
            Name = var.instance_names[count.index]
  16
  17
  18
```

outputs.tf:

output "instance_ids": Outputs the IDs of the created instances.

output "instance public ips": Outputs the public IP addresses of the created instances.

```
Y outputs.tf X
                                                     provider.tf
X Welcome
                  main.tf
 💜 outputs.tf > ...
        # outputs.tf
        # Output the IDs of the instances
   3
        output "instance_ids" {
   4
   5
          description = "The IDs of the instances"
   6
                        = [for instance in aws_instance.example : instance.id]
   7
   8
        # Output the public IP addresses of the instances
   9
        output "instance_public_ips" {
  10
          description = "The public IP addresses of the instances"

value = [for instance in aws_instance.example : instance.public_ip]
  11
  12
  13
```

successfully executing following commands

Terraform init-

```
PS C:\Users\karanpa\Documents\Terraform\terraform-loops> terraform init
Initializing the backend...
Initializing provider plugins...
- Finding latest version of hashicorp/aws...
- Installing hashicorp/aws v5.59.0...
- Installed hashicorp/aws v5.59.0 (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
```

Terraform plan

Terraform apply with outputs

```
PROBLEMS
          OUTPUT
                    DEBUG CONSOLE
                                   TERMINAL
                                              PORTS
aws_instance.example[2]: Still creating... [30s elapsed]
aws instance.example[0]: Creation complete after 32s [id=i-0b196e763d8cfe84f]
aws_instance.example[1]: Creation complete after 32s [id=i-037dd7591b7d42934]
aws instance.example[2]: Creation complete after 32s [id=i-0a86fc61029ef6e6a]
Apply complete! Resources: 3 added, 0 changed, 0 destroyed.
Outputs:
instance ids = [
  "i-0b196e763d8cfe84f",
  "i-037dd7591b7d42934",
  "i-0a86fc61029ef6e6a",
instance public ips = [
  "13.201.21.101",
  "43.204.229.130",
  "43.204.143.85",
```

4. Deploy 3-tier application using terraform

- a. Set up environment: Install Terraform and AWS CLI.
- b. Create directory structure: Organize Terraform files.

```
✓ 3-TER-APP-TERRAFORM
                                       🦞 main.tf > 😭 resource "aws_subnet" "public" > 🙉 cidr_block
                                              provider <u>"aws"</u> {
    region = "us-east-1"
 > .terraform
🍟 main.tf
w output.tf
{} terraform.tfstate

    terraform.tfstate.backup

                                              cidr_block = "10.0.0.0/16"
$ user_data.sh
variable.tf
                                              tags = {
                                                Name = "main-vpc"
                                                 vpc_id
                                                                             = aws_vpc.main.id
```

c. Write configuration: Define provider, variables, resources, and outputs.

```
output.tf > 1 output "load_balancer_dns_name" {
1 output "load_balancer_dns_name" {
2 | value = aws_lb.main.dns_name
3 }
```

```
🗽 main.tf > 😭 resource "aws_subnet" "public" > 🙉 cidr_block
     provider "aws" {
  region = "us-east-1"
     resource "aws_vpc" "main" {
cidr_block = "10.0.0.0/16"
       tags = {
| Name = "main-vpc"
       cidr_block
       map_public_ip_on_launch = true
       Name = "public-subnet-${count.index + 1}"
       Name = "private-subnet-${count.index + 1}"
       tags = {
| Name = "main-gateway"
```

d. Initialize and apply: Use Terraform commands to deploy and verify resources.

```
PS E:\3-Tier-App-Terraform> terraform init
Initializing the backend...
Initializing provider plugins...
- Reusing previous version of hashicorp/aws from the dependency lock file
- Using previously-installed hashicorp/aws v5.61.0

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.

DS E:\3-Tier-App-Terraform> \Pi
```

```
PS E:\all-Tier-App-Terraform terraform plan
ddta.aws_availability_zones.available: Reading...
aws_wpc.main: Refreshing state... [id-vpc-00b326375a6de2d]
ddta.aws_availability_zones.available: Read complete_after ls [id-us-cast-1]
aws_submet_private[1]: Refreshing state... [id-submet-067247869577adib]
aws_submet_private[1]: Refreshing state... [id-submet-067247869577adib]
aws_submet_private[1]: Refreshing state... [id-submet-067247869577adib]
aws_submet_private[9]: Refreshing state... [id-submet-00672405de07441]
aws_submet_private[9]: Refreshing state... [id-submet-0072666632de07441]
aws_security_group.wb_sg: Refreshing state... [id-sp_g-046ac57406479667]
aws_submet_public[0]: Refreshing state... [id-sp_g-046ac5740647967]
aws_submet_public[0]: Refreshing state... [id-ib-068a1469638068007]
aws_security_group.wb_sg: Refreshing state... [id-ib-068a1469638068007]
aws_security_group.wb_sg: Refreshing state... [id-ib-068a1466808a]
aws_instance.wb[1]: Refreshing state... [id-ib-068a14680781f8b]
aws_instance.wb[1]: Refreshing state... [id-ib-068a14680781f8b]
aws_b_submet_group.default: Refreshing state... [id-ib-068a14680781f8b]
aws_b_submet_group.default: Refreshing state... [id-ib-068a1680781f8b]
aws_b_submet_group.default: Refreshing state... [id-ib-068a16808810c]
aws_b_submet_group.default: Refreshing state... [id-ib-068a168088080]
aws_b_submet_group.default: Refreshing state... [id-ib-068a16808080]
aws_b_submet_group.default: Refreshing state... [id-ib-068a168080]
aws_b_security_group.db_sg: Refreshing state... [id-ib-068a168080]
aws_b_security_group.db_sg: Refreshing state... [id-ib-068a168080]
aws_b_security_group.db_s
```

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS CODE REFERENCE LOG

aws lb listener.web listener: Creating...
aws lb listener.web listener: Creation complete after 1s [id=arn:aws:elasticloadbalancing:us-east-1:533267249366:listener/app/main-lb/77a3dfe22098d2a5/ac28
aws lb main: Still creating... [3m1is elapsed]
ng... [3m20s elapsed]
aws_db_instance.default: Creation complete after 3m37s [id=db-0570GwHHI7AGPYM3UWRKJSJKRY]
ng... [3m20s elapsed]
aws_db_instance.default: Creation complete after 3m37s [id=db-0570GwHHI7AGPYM3UWRKJSJKRY]
ng... [3m20s elapsed]
aws_db_instance.default: Creation complete after 3m37s [id=db-0570GwHHI7AGPYM3UWRKJSJKRY]
ng... [3m20s elapsed]
aws_db_instance.default: Still creating... [3m30s elapsed]
aws_db_instance.default: Still creating... [3m30s elapsed]
aws_db_instance.default: Still creating... [3m30s elapsed]
aws_db_instance.default: Creation complete after 3m37s [id=db-0570GwHHI7AGPYM3UWRKJSJKRY]
aws_db_instance.default: Still creating... [3m30s elapsed]
aws_db_instance.default: Creation complete after 3m37s [id=db-0570GwHHI7AGPYM3UWRKJSJKRY]

Apply complete! Resources: 22 added, 0 changed, 0 destroyed.

Outputs:
Outputs:
Outputs:
Outputs:
```

e. Copy LB dns and hit

http://main-lb-1928893195.us-east-1.elb.amazonaws.com/



f. Clean up: Destroy resources when no longer needed.

```
aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 1m40s elapsed]
aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 1m50s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 2m0s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 2m10s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 2m20s elapsed]
aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 2m30s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 2m40s elapsed]
aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 2m50s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 3m0s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 3m10s elapsed]
aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UwRKJSJKRY, 3m20s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UwRKJSJKRY, 3m30s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UwRKJSJKRY, 3m40s elapsed]
aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UMRKJSJKRY, 3m50s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UMRKJSJKRY, 4m0s elapsed] aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 4m10s elapsed]
aws_db_instance.default: Still destroying... [id=db-05706WHHT7AGPYM3UWRKJSJKRY, 4m20s elapsed]
aws_db_instance.default: Destruction complete after 4m29s
aws_security_group.db_sg: Destroying... [id=sg-0caf14ec30618310c]
aws_db_subnet_group.default: Destroying... [id=main-subnet-group]
aws_db_subnet_group.default: Destruction complete after 1s
aws_subnet.private[0]: Destroying... [id=subnet-026d56a52d6d73441] aws_subnet.private[1]: Destroying... [id=subnet-0c0bcd8eb74108b5e]
aws_security_group.db_sg: Destruction complete after 2s
aws_security_group.app_sg: Destroying... [id=sg-020a87c3da7ec2e4c]
aws_subnet.private[1]: Destruction complete after 1s
aws_subnet.private[0]: Destruction complete after 1s
aws_security_group.app_sg: Destruction complete after 1s
aws_security_group.web_sg: Destroying... [id=sg-0da6ec3f9d9af9667]
aws_security_group.web_sg: Destruction complete after 2s
aws_vpc.main: Destroying... [id=vpc-00bb32d5375a6de2d]
aws_vpc.main: Destruction complete after 0s
Destroy complete! Resources: 21 destroyed.
```