Project name: Set up a multi-region disaster recovery architecture using AWS

GitHub repo name: https://github.com/Mithra1995/aws-disaster-recovery-terraform.git

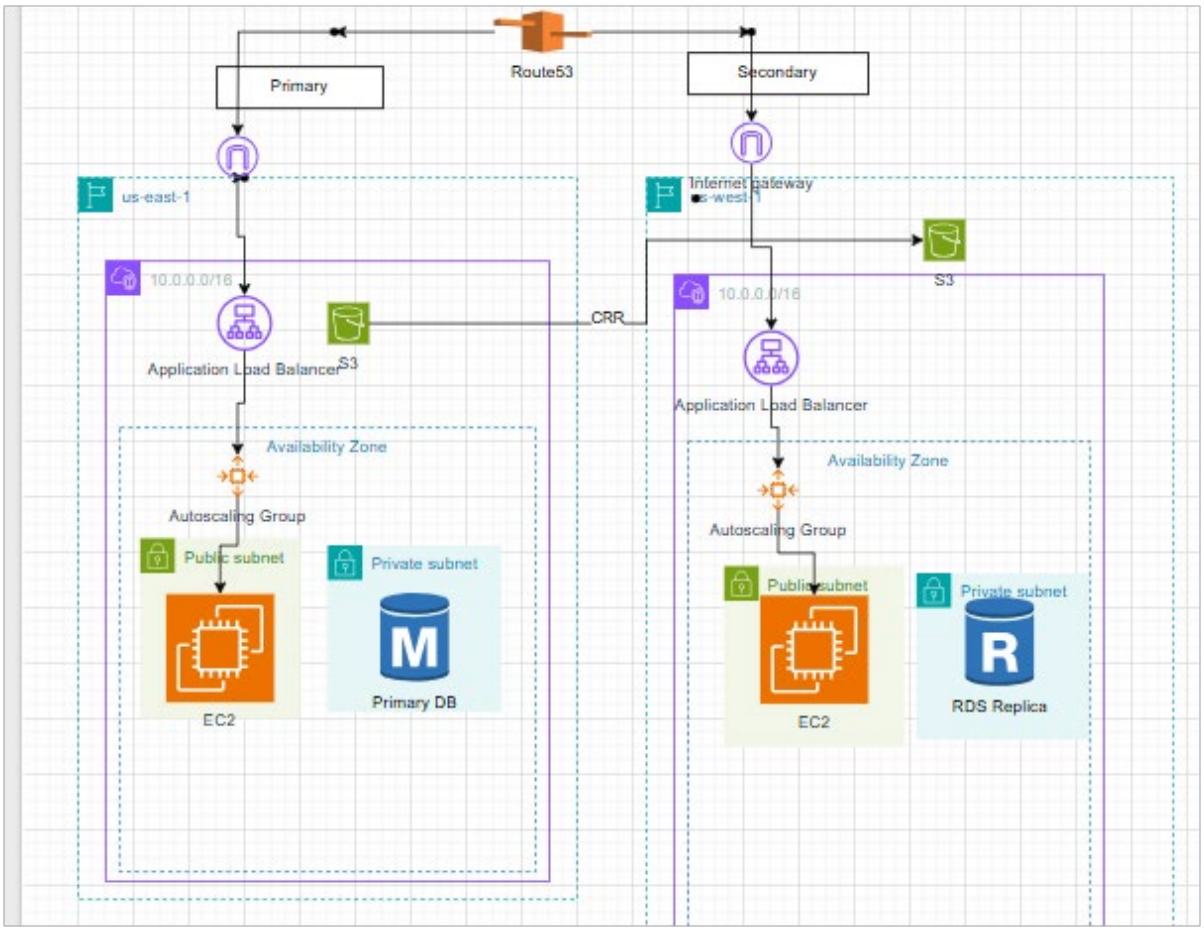
1. Objective

To design and implement a multi-region disaster recovery solution using AWS services, where infrastructure is deployed in two AWS regions. The solution will replicate data across regions, ensure high availability, and implement a failover mechanism for disaster recovery.

2. Architecture Overview

The architecture involves provisioning AWS resources across two regions to create a highly available and resilient infrastructure. Key components include Amazon VPC for networking, Amazon S3 for cross-region data replication, Amazon RDS for multi-region database deployment, and Route 53 for DNS failover routing. The solution ensures that both regions are synchronized and can automatically switch to the backup region if needed.

3. Architecture Diagram

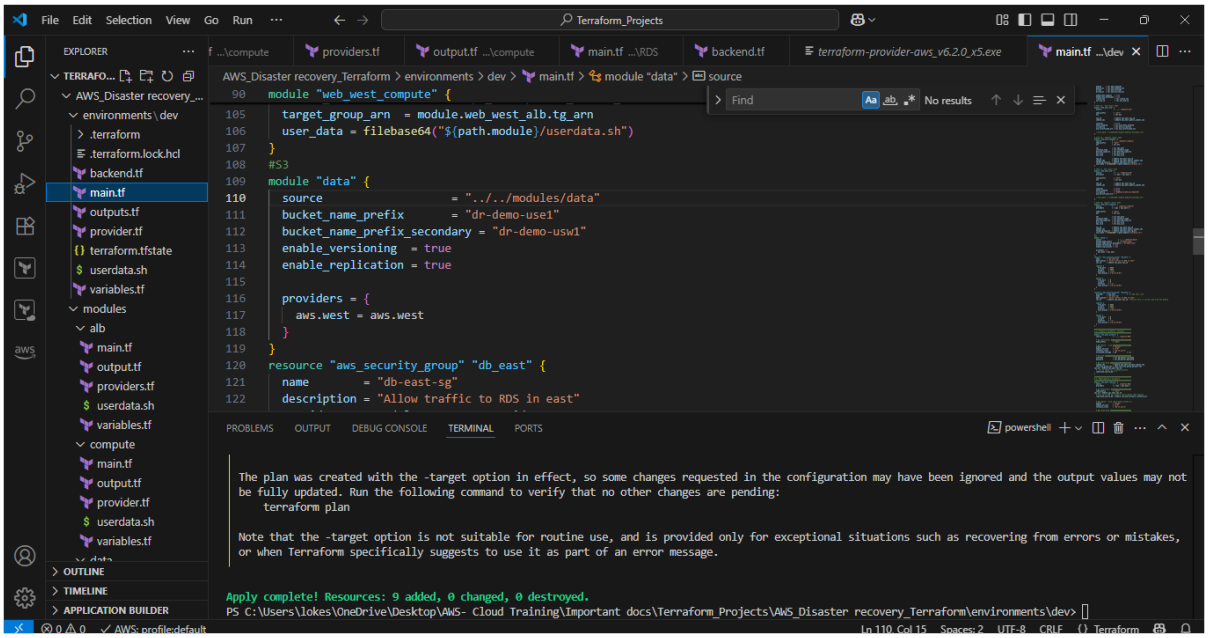


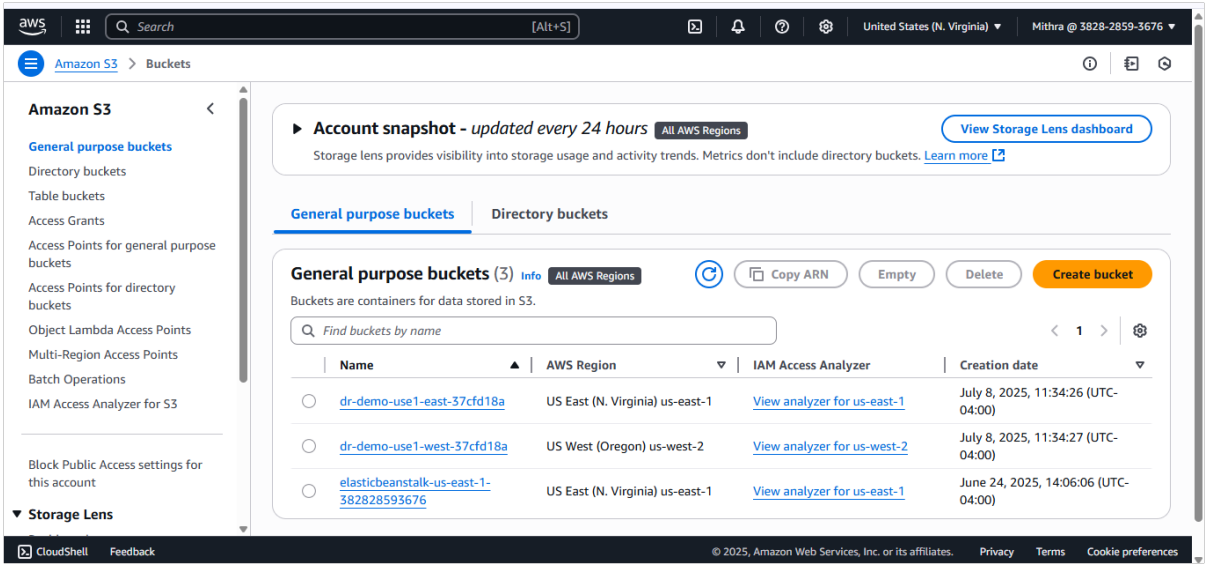
4. Infrastructure setup

- ☑ VPCs in `us-east-1` (Primary) and `us-west-2` (Secondary)
- ☑ Subnets (Public/Private) in multiple Availability Zones
- ☑ Internet Gateways & NAT Gateways
- ☑ Route Tables
- ☑ S3 Buckets with cross-region replication
- ☑ RDS instances with multi-region replication
- ☑ Route 53 with DNS failover
- ☑ Auto Scaling Groups and Load Balancers

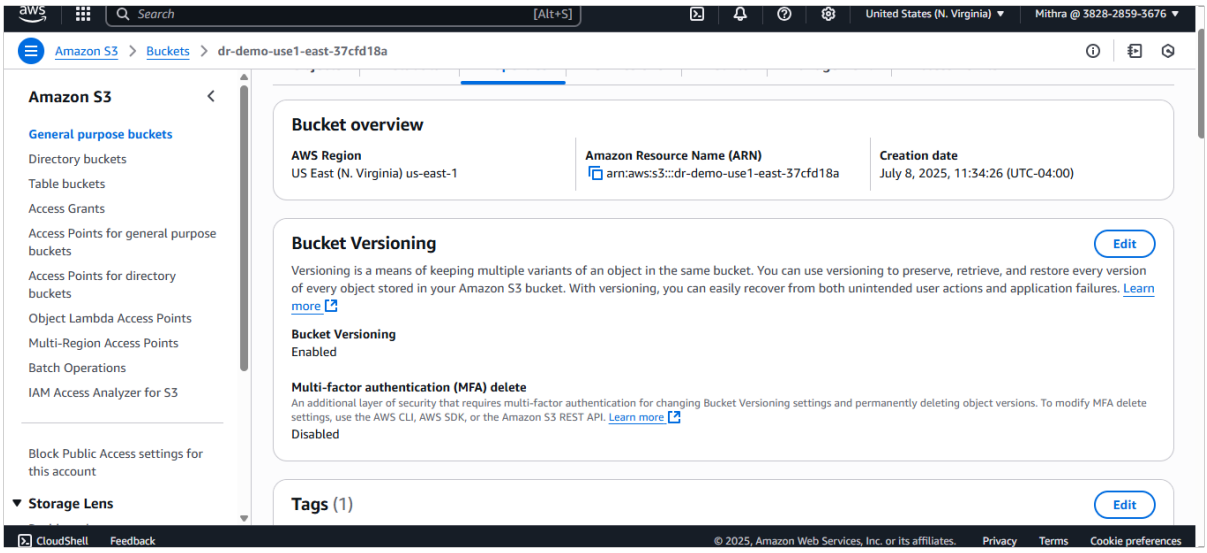
5. Step by step process:

S3 bucket creation in both us-east and us-west region





Now I will upload the image in us-east region and incorporate that content to launch template


Search
[Alt+S]
United States (N. Virginia)
Mithra @ 3828-2859-3676
Amazon S3 > Buckets > dr-demo-use1-east-37cfd18a
Amazon S3
General purpose buckets
Directory buckets
Table buckets
Access Grants
Access Points for general purpose buckets
Access Points for directory buckets
Object Lambda Access Points
Multi-Region Access Points
Batch Operations
IAM Access Analyzer for S3
Block Public Access settings for this account
Storage Lens
Bucket overview
AWS Region
US East (N. Virginia) us-east-1
Amazon Resource Name (ARN)
arn:aws:s3:::dr-demo-use1-east-37cfd18a
Creation date
July 8, 2025, 11:34:26 (UTC-04:00)
Bucket Versioning
Edit
Versioning is a means of keeping multiple variants of an object in the same bucket. You can use versioning to preserve, retrieve, and restore every version of every object stored in your Amazon S3 bucket. With versioning, you can easily recover from both unintended user actions and application failures. Learn more
Bucket Versioning
Enabled
Multi-factor authentication (MFA) delete
An additional layer of security that requires multi-factor authentication for changing Bucket Versioning settings and permanently deleting object versions. To modify MFA delete settings, use the AWS CLI, AWS SDK, or the Amazon S3 REST API. Learn more
Disabled
Tags (1)
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CloudShell
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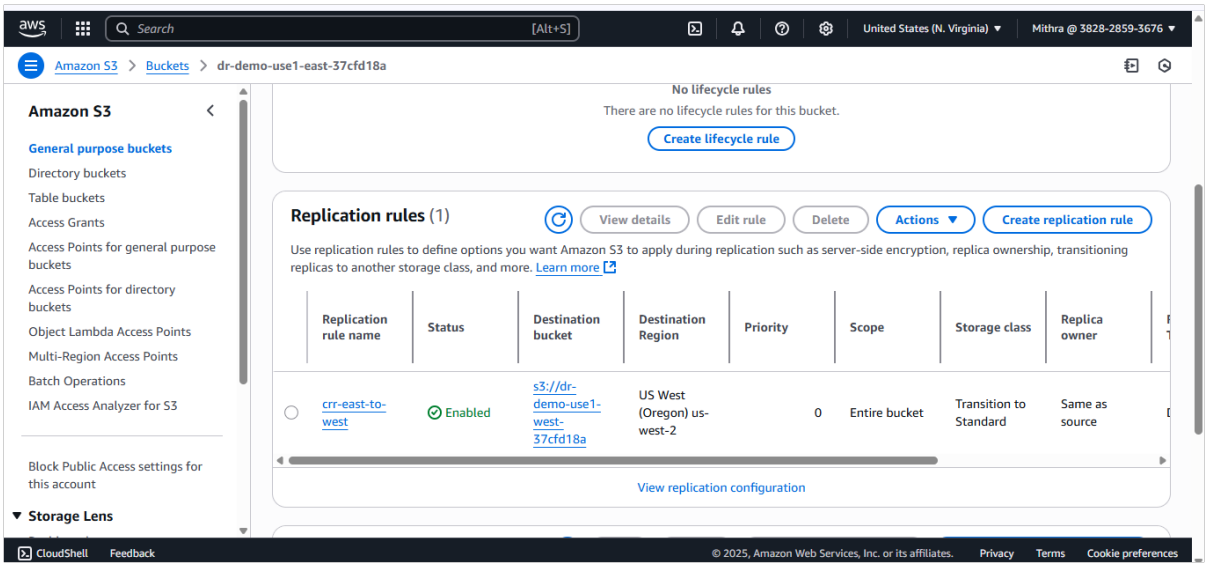
Search
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United States (N. Virginia)
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Amazon S3 > Buckets > dr-demo-use1-east-37cfd18a
Amazon S3
General purpose buckets
Directory buckets
Table buckets
Access Grants
Access Points for general purpose buckets
Access Points for directory buckets
Object Lambda Access Points
Multi-Region Access Points
Batch Operations
IAM Access Analyzer for S3
Block Public Access settings for this account
Storage Lens
No lifecycle rules
There are no lifecycle rules for this bucket.
Create lifecycle rule
Replication rules (1)
View details
Edit rule
Delete
Actions
Create replication rule
Use replication rules to define options you want Amazon S3 to apply during replication such as server-side encryption, replica ownership, transitioning replicas to another storage class, and more. Learn more
Replication rule name
Status
Destination bucket
Destination Region
Priority
Scope
Storage class
Replica owner
crr-east-to-west
Enabled
s3://dr-demo-use1-west-37cfd18a
US West (Oregon) us-west-2
0
Entire bucket
Transition to Standard
Same as source
View replication configuration
CloudShell
Feedback
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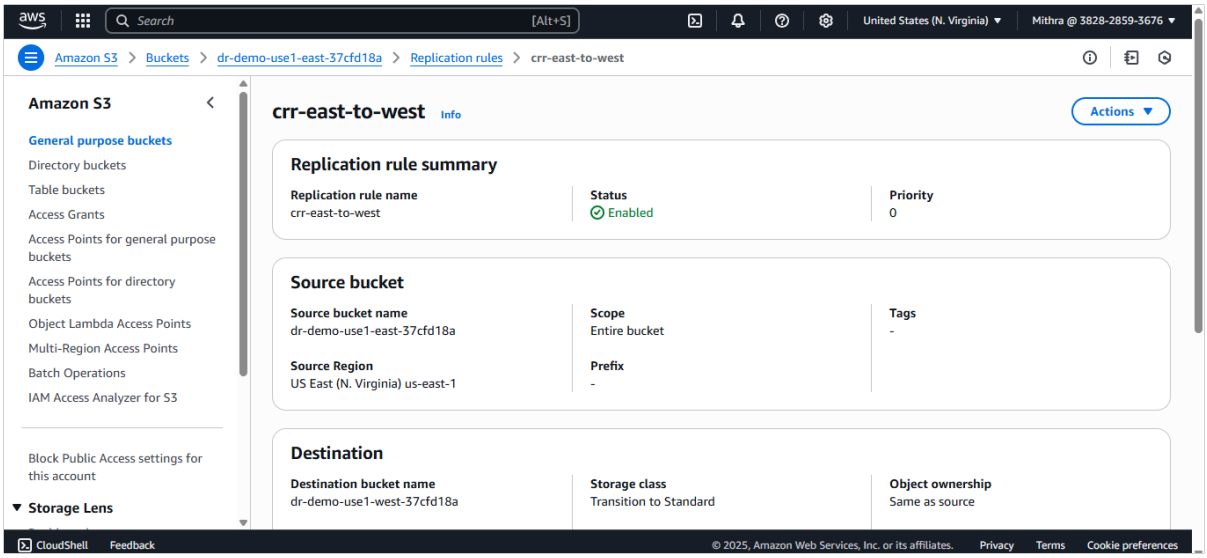
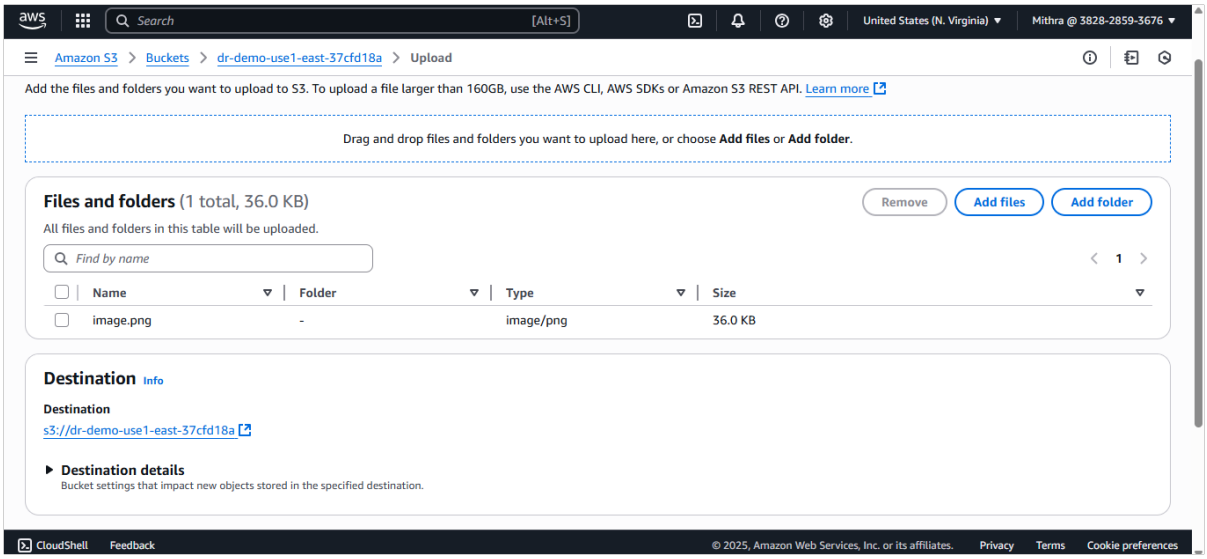
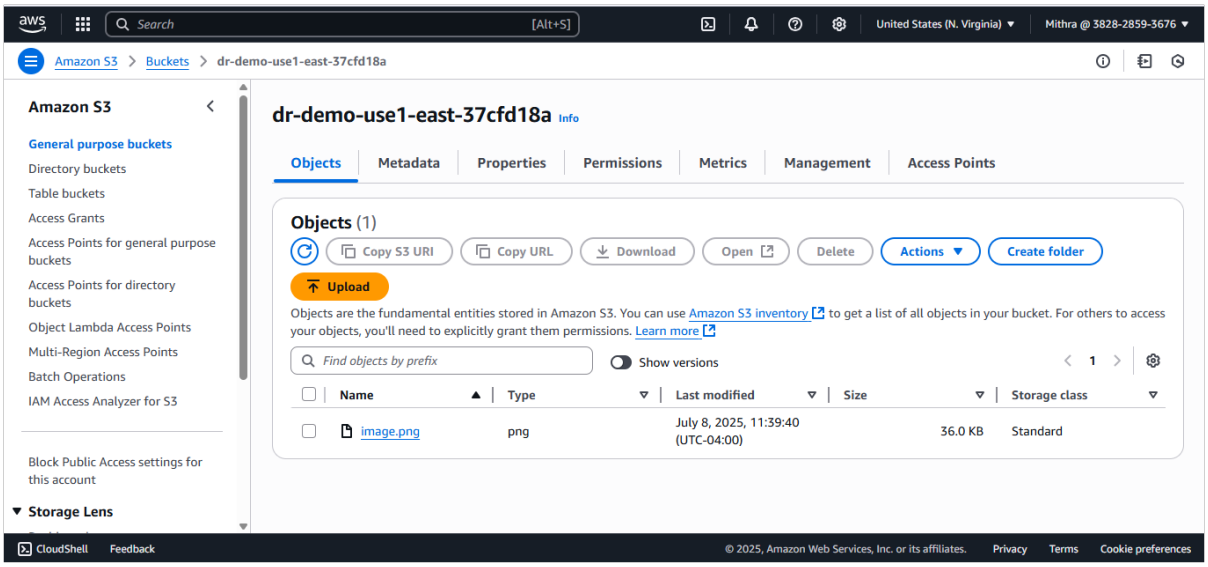
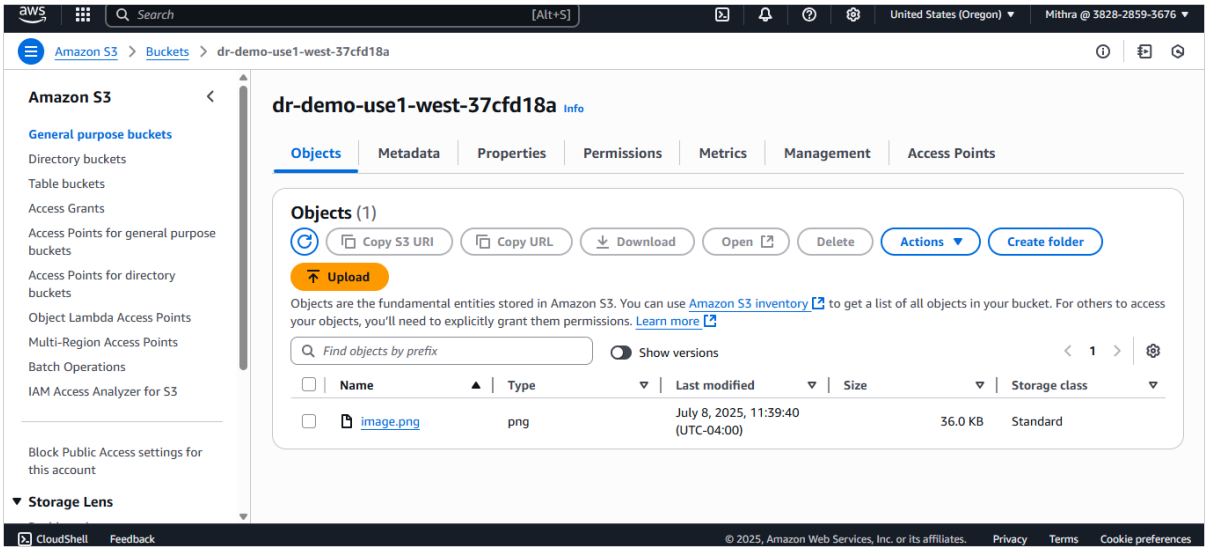


Upload image in east region

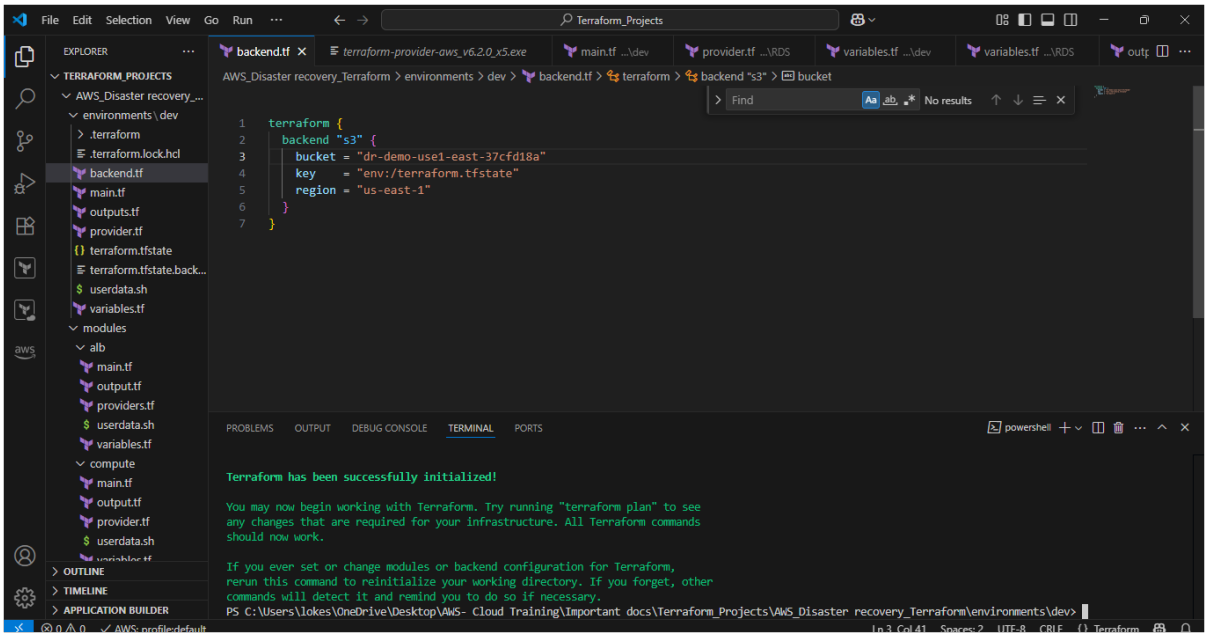




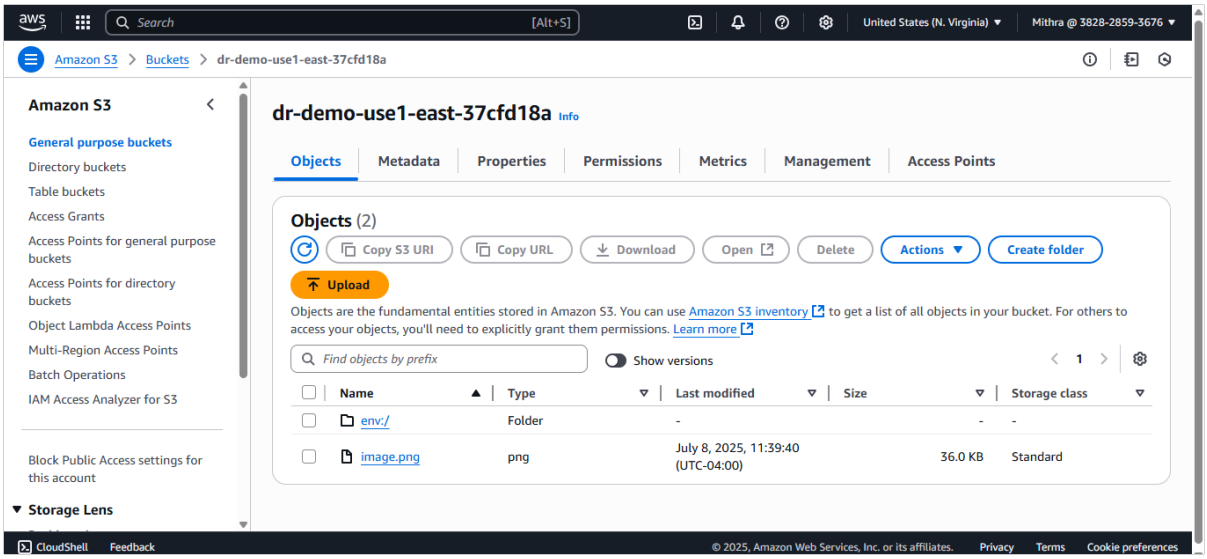
The image got replicated in west region as well

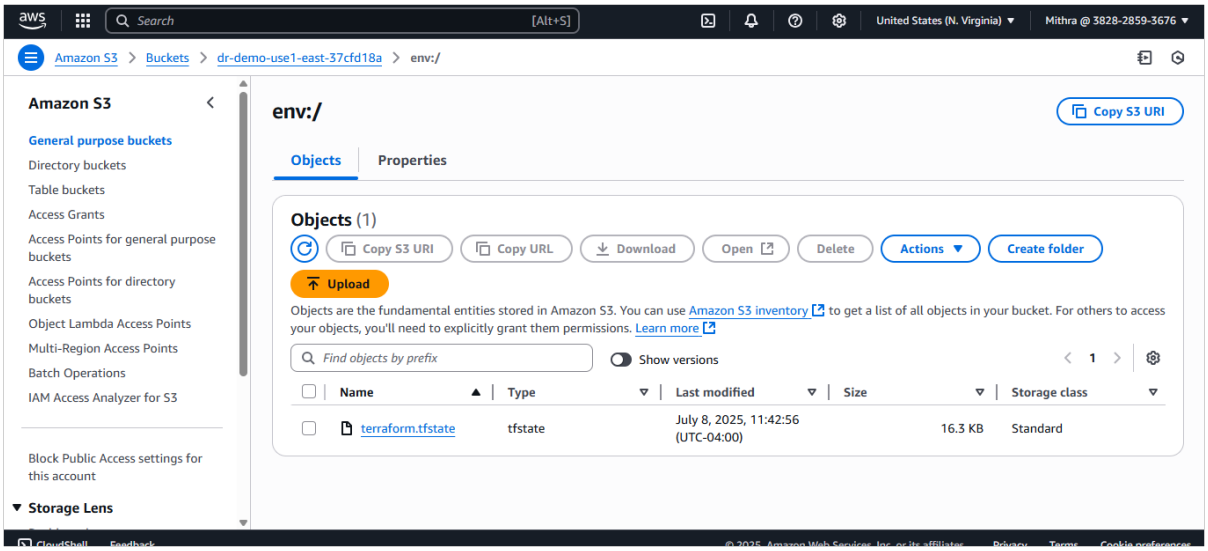


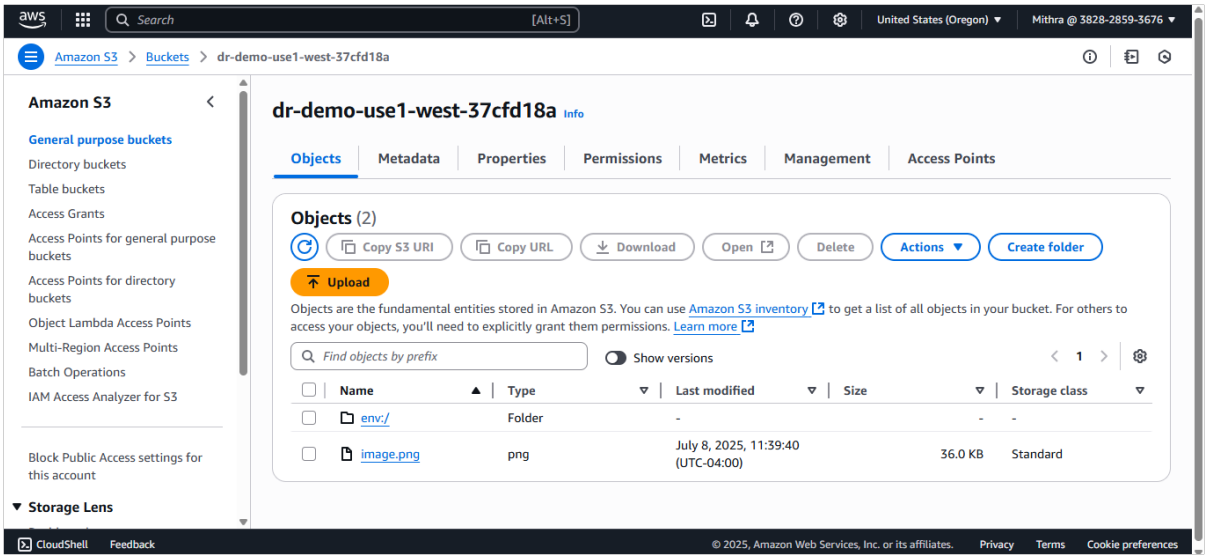
Now I am enabling the s3 backend to store my state file



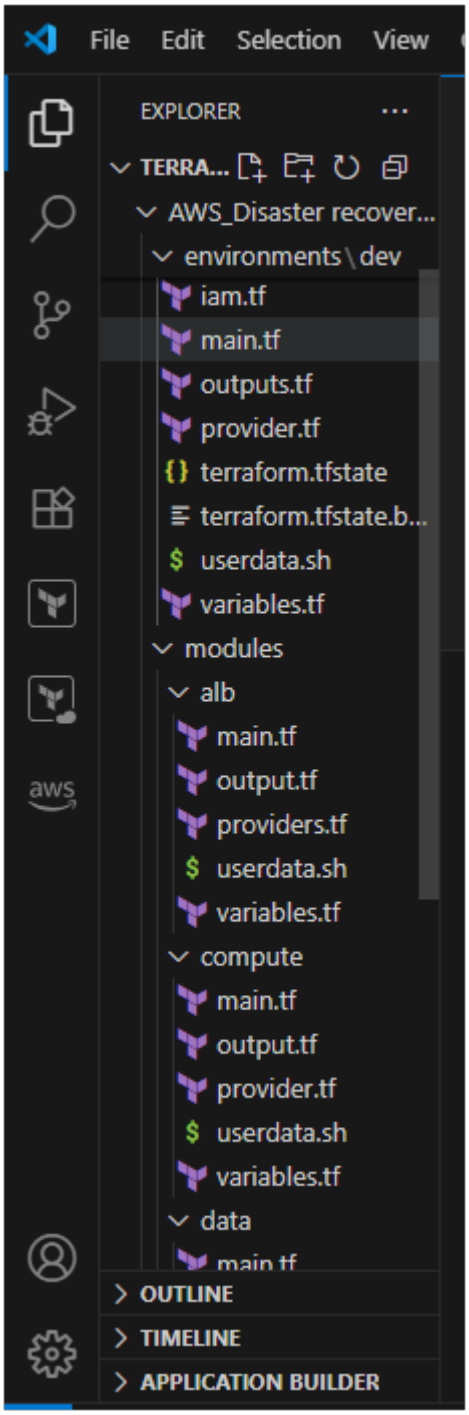
And my terraform state file got stored in both the regions







Provisioned the resources like EC2, VPC, Subnets, route tables, internet gateway, NAT gateway, S3, Launch templates and load balancer,RDS


File
Edit
Selection
View
EXPLORER
TERRA...
AWS_Disaster recover...
environments \ dev
iam.tf
main.tf
outputs.tf
provider.tf
terraform.tfstate
terraform.tfstate.b...
userdata.sh
variables.tf
modules
alb
main.tf
output.tf
providers.tf
userdata.sh
variables.tf
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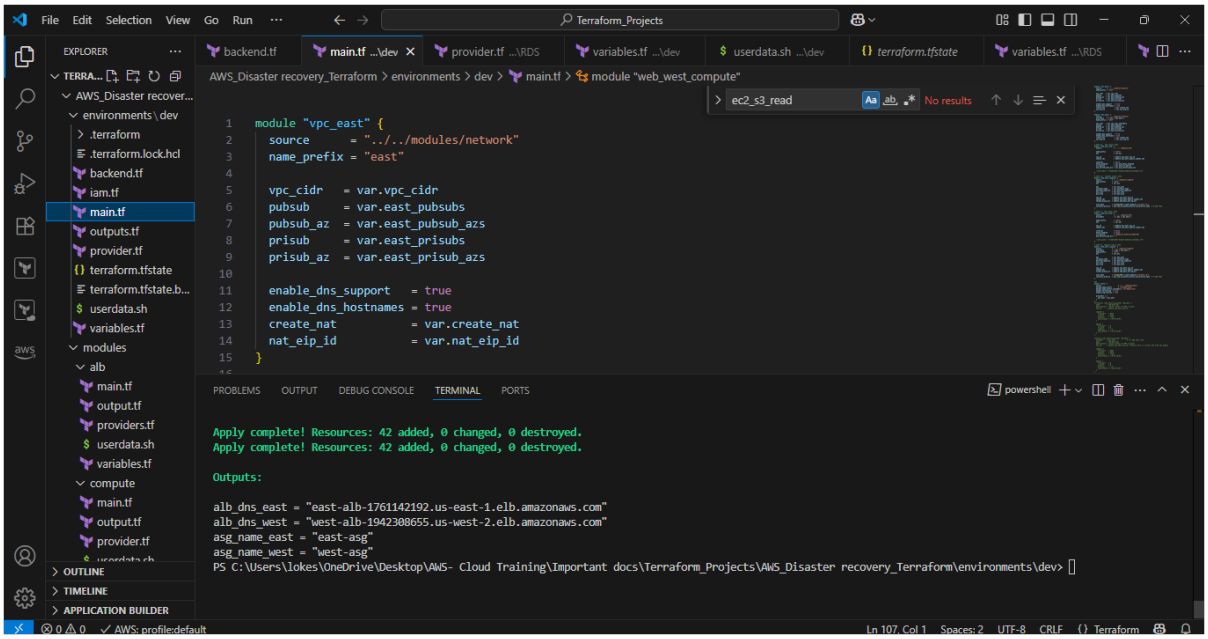
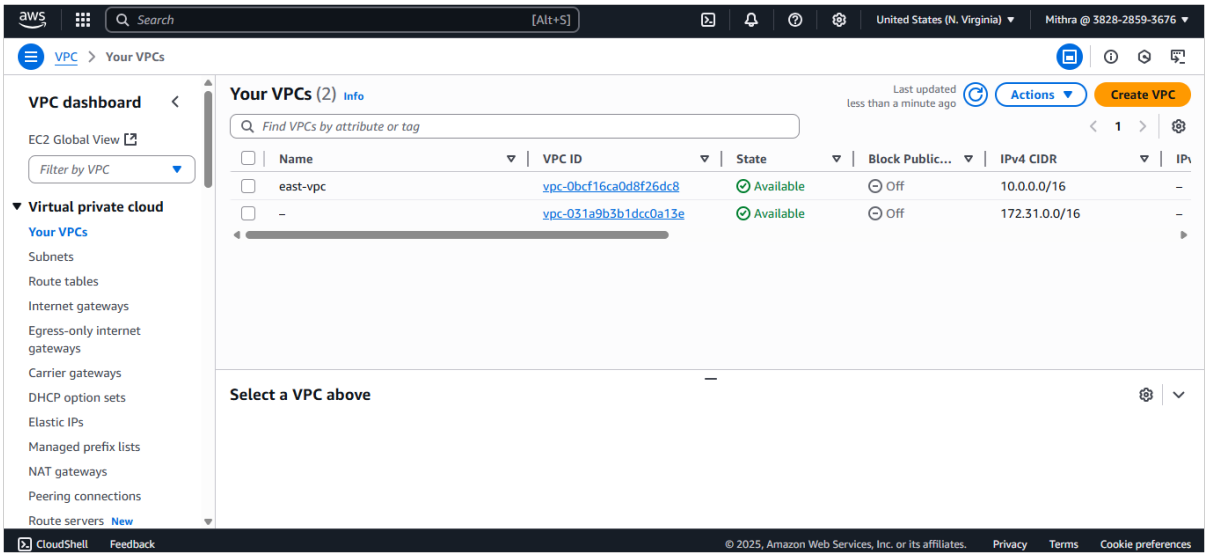
main.tf
output.tf
provider.tf
userdata.sh
variables.tf
data
main.tf
OUTLINE
TIMELINE
APPLICATION BUILDER


File Edit Selection View Go Run
Terraform_Projects
EXPLORER
backend.tf
main.tf ...\dev
provider.tf ...\RDS
variables.tf ...\dev
userdata.sh ...\dev
terraform.tfstate
variables.tf ...\RDS
AWS_Disaster recovery_Terraform > environments > dev > main.tf > module "web_west_compute"
ec2_s3_read
No results
module "vpc_east" {
source = "../../modules/network"
name_prefix = "east"
vpc_cidr = var.vpc_cidr
pubsub = var.east_pubsubs
pubsub_az = var.east_pubsub_azs
prisub = var.east_prisubs
prisub_az = var.east_prisub_azs
enable_dns_support = true
enable_dns_hostnames = true
create_nat = var.create_nat
nat_eip_id = var.nat_eip_id
}
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS
powershell
Apply complete! Resources: 42 added, 0 changed, 0 destroyed.
Apply complete! Resources: 42 added, 0 changed, 0 destroyed.
Outputs:
alb_dns_east = "east-alb-1761142192.us-east-1.elb.amazonaws.com"
alb_dns_west = "west-alb-1942308655.us-west-2.elb.amazonaws.com"
asg_name_east = "east-asg"
asg_name_west = "west-asg"
PS C:\Users\lokes\OneDrive\Desktop\AWS- Cloud Training\Important docs\Terraform_Projects\AWS_Disaster recovery_Terraform\environments\dev>
OUTLINE
TIMELINE
APPLICATION BUILDER
AWS: profile:default
Ln 107, Col 1 Spaces: 2 UTF-8 CRLF Terraform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VPC > Your VPCs
VPC dashboard
EC2 Global View
Filter by VPC
Virtual private cloud
Your VPCs
Subnets
Route tables
Internet gateways
Egress-only internet gateways
Carrier gateways
DHCP option sets
Elastic IPs
Managed prefix lists
NAT gateways
Peering connections
Route servers New
Your VPCs (2) Info
Last updated less than a minute ago
Actions
Create VPC
Find VPCs by attribute or tag
Name
VPC ID
State
Block Public...
IPv4 CIDR
east-vpc
vpc-0bcf16ca0d8f26dc8
Available
Off
10.0.0.0/16
–
vpc-031a9b3b1dcc0a13e
Available
Off
172.31.0.0/16
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Feedback
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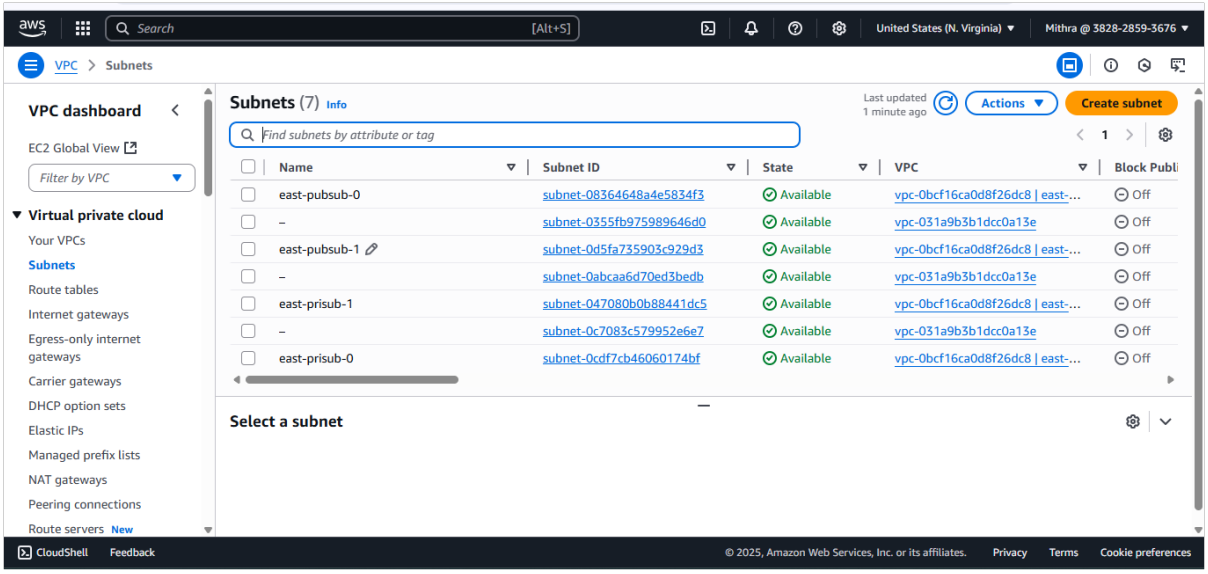
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Elastic IPs
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NAT gateways
Peering connections
Route servers New
Subnets (7) Info
Last updated 1 minute ago
Actions
Create subnet
Find subnets by attribute or tag
Name
Subnet ID
State
VPC
Block Publi
east-pubsub-0 subnet-08364648a4e5834f3 Available vpc-0bcf16ca0d8f26dc8 | east-... Off
– subnet-0355fb975989646d0 Available vpc-031a9b3b1dcc0a13e Off
east-pubsub-1 subnet-0d5fa735903c929d3 Available vpc-0bcf16ca0d8f26dc8 | east-... Off
– subnet-0abcaa6d70ed3bedb Available vpc-031a9b3b1dcc0a13e Off
east-prisub-1 subnet-047080b0b88441dc5 Available vpc-0bcf16ca0d8f26dc8 | east-... Off
– subnet-0c7083c579952e6e7 Available vpc-031a9b3b1dcc0a13e Off
east-prisub-0 subnet-0cdf7cb46060174bf Available vpc-0bcf16ca0d8f26dc8 | east-... Off
Select a subnet
CloudShell
Feedback
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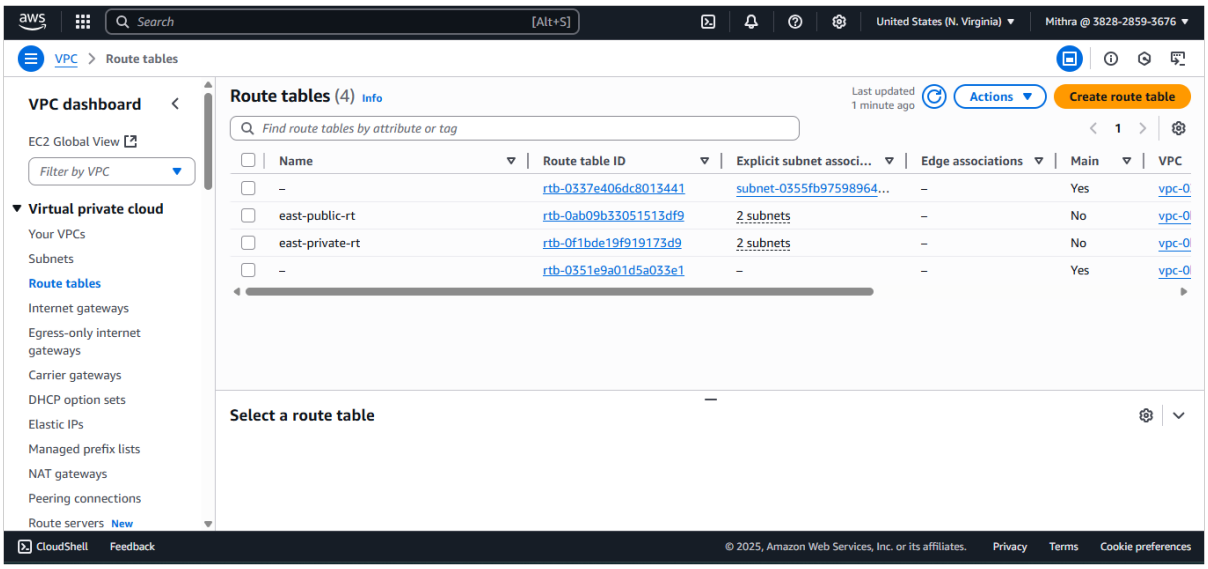
Search [Alt+S]
United States (N. Virginia)
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VPC > Route tables
VPC dashboard
EC2 Global View
Filter by VPC
Virtual private cloud
Your VPCs
Subnets
Route tables
Internet gateways
Egress-only internet gateways
Carrier gateways
DHCP option sets
Elastic IPs
Managed prefix lists
NAT gateways
Peering connections
Route servers New
Route tables (4) Info
Last updated 1 minute ago
Actions
Create route table
Find route tables by attribute or tag
Name
Route table ID
Explicit subnet associ...
Edge associations
Main
VPC
– rtb-0337e406dc8013441 subnet-0355fb97598964... – Yes vpc-0
east-public-rt rtb-0ab09b33051513df9 2 subnets – No vpc-0
east-private-rt rtb-0f1bde19f919173d9 2 subnets – No vpc-0
– rtb-0351e9a01d5a033e1 – – Yes vpc-0
Select a route table
CloudShell
Feedback
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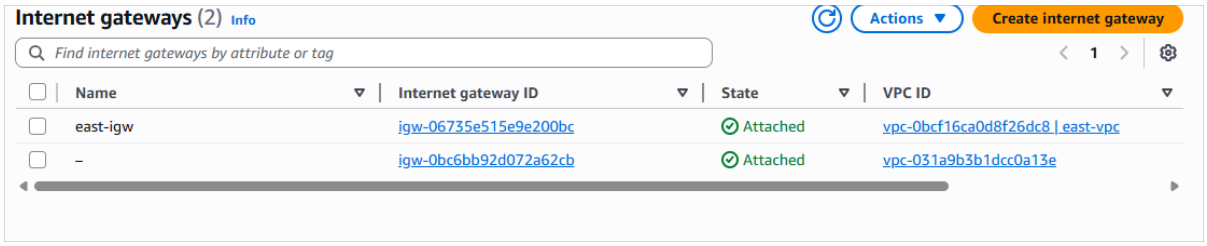
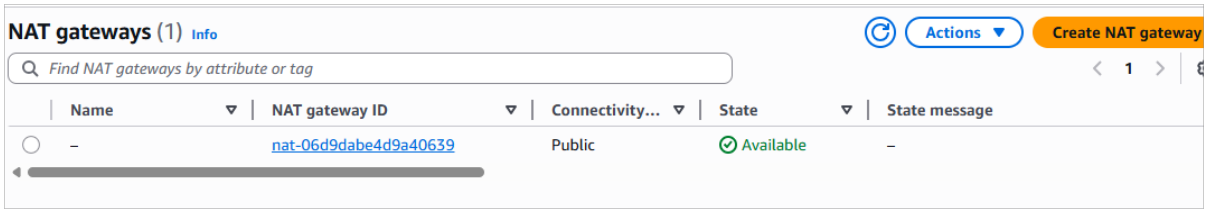
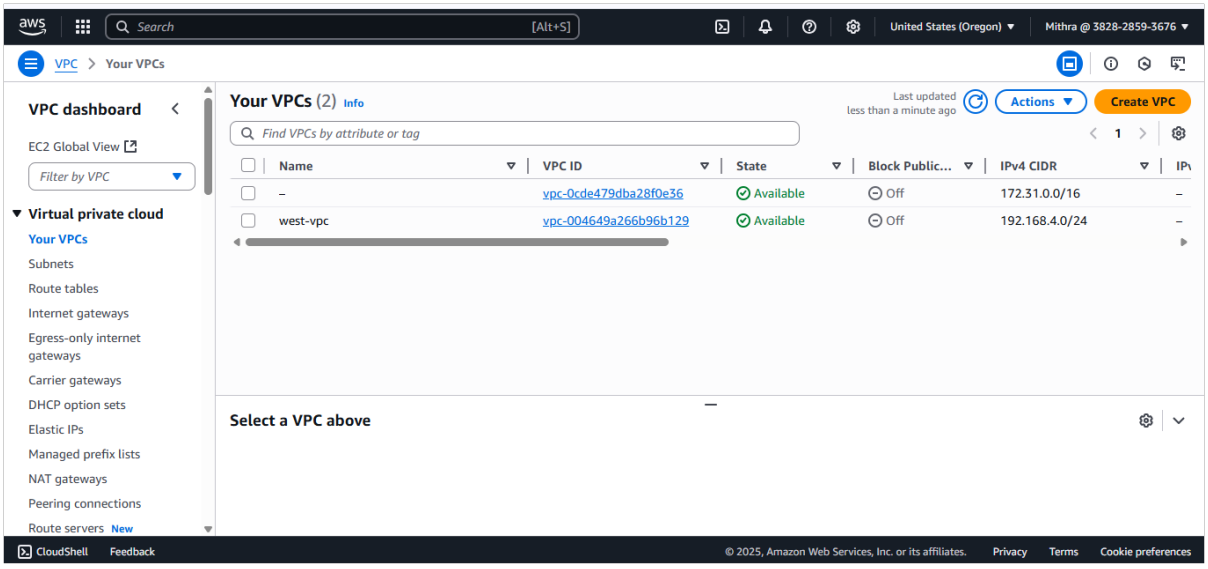
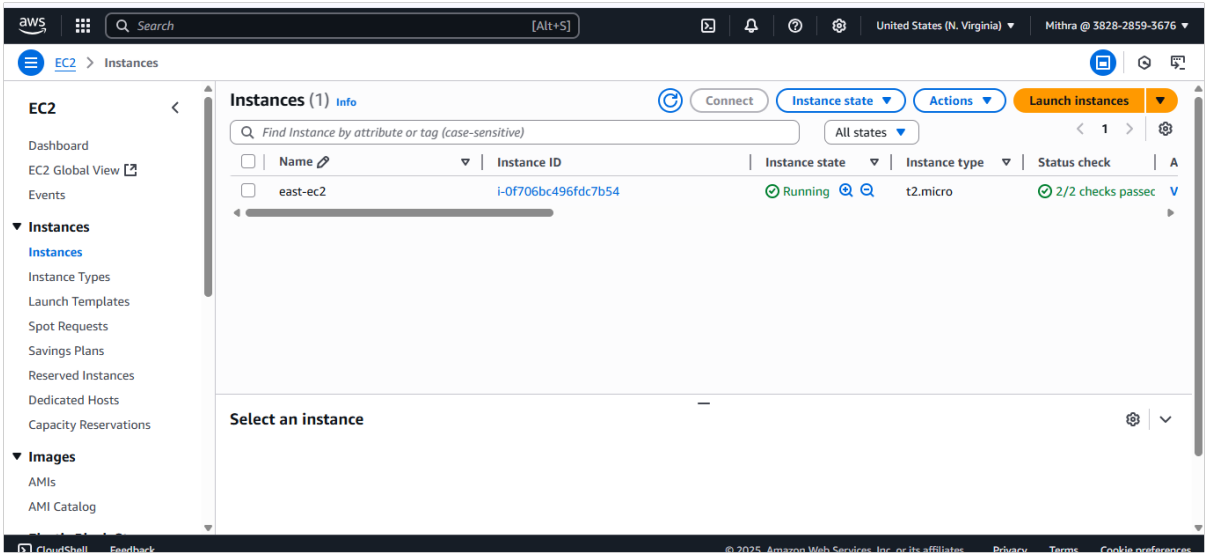
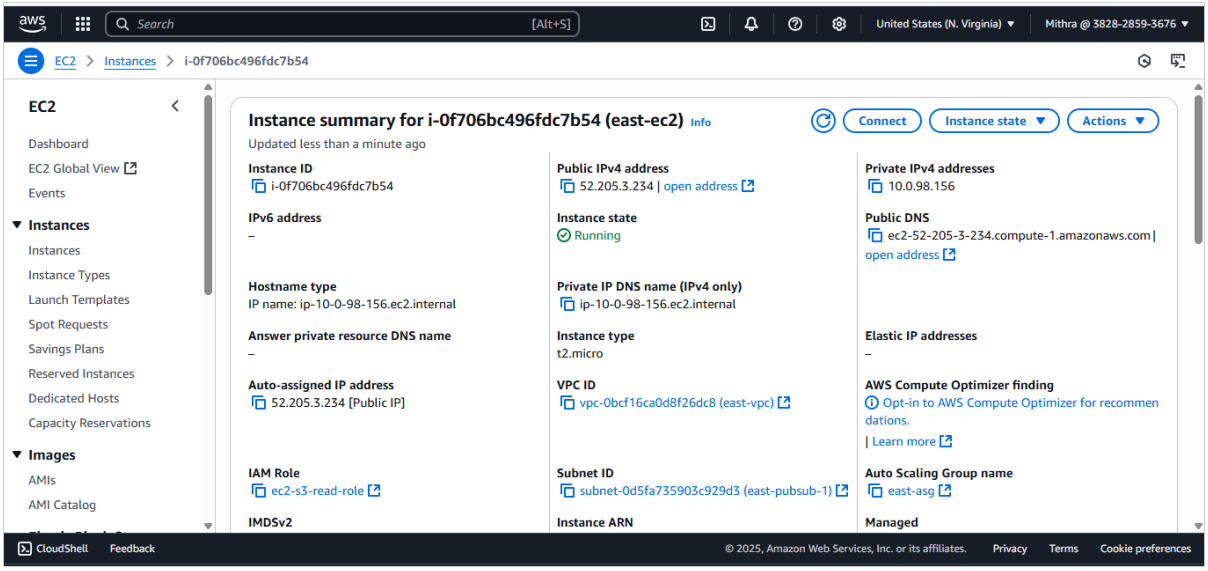




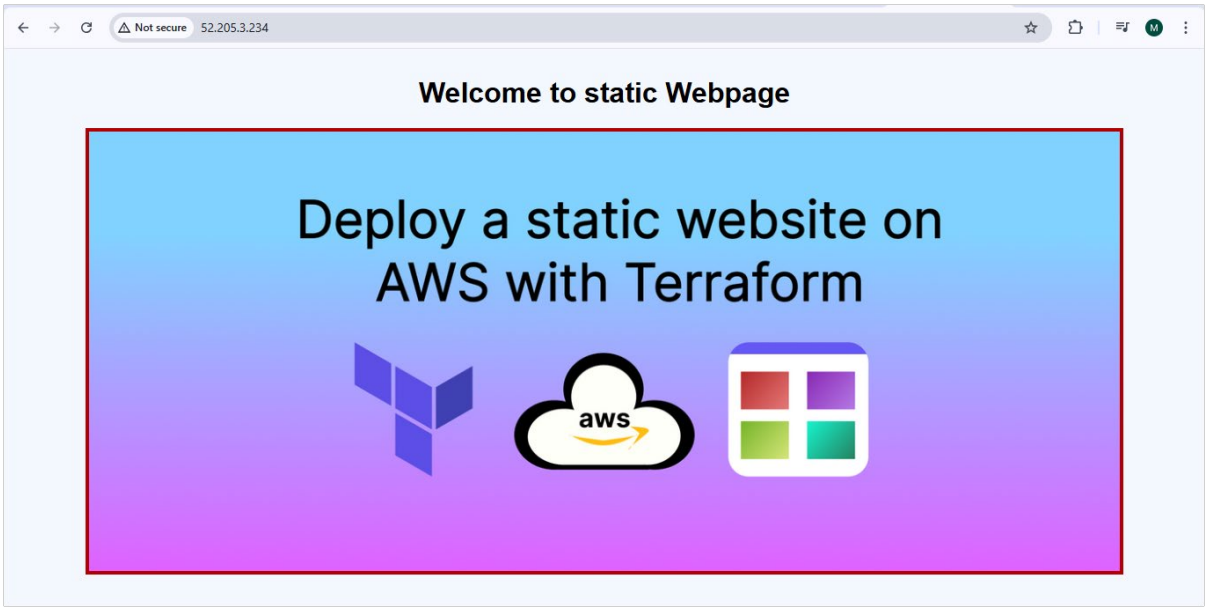
West region – us-west-2

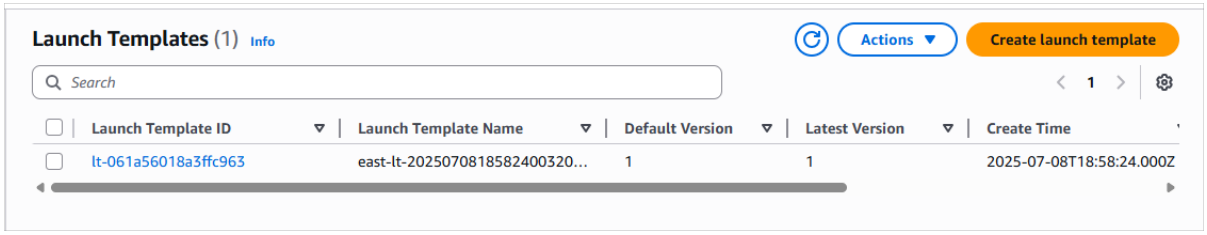




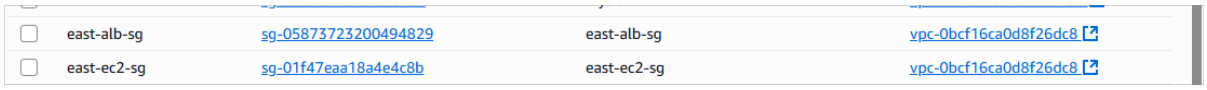


Displaying static webpage from EC2-public ip

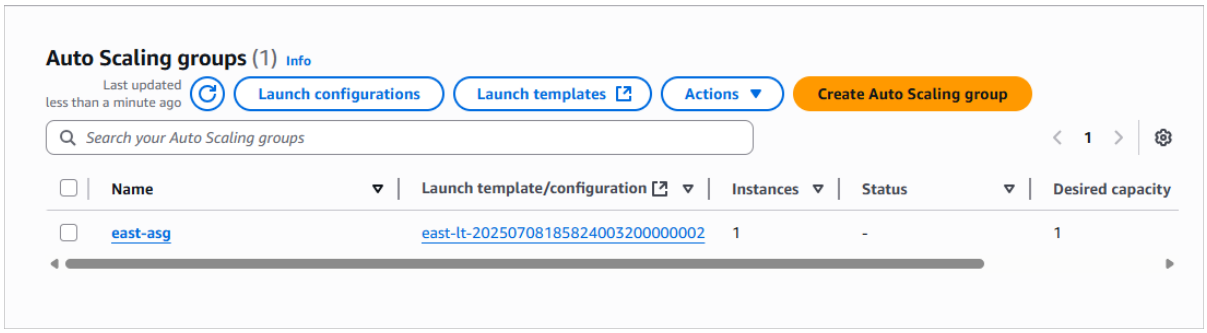




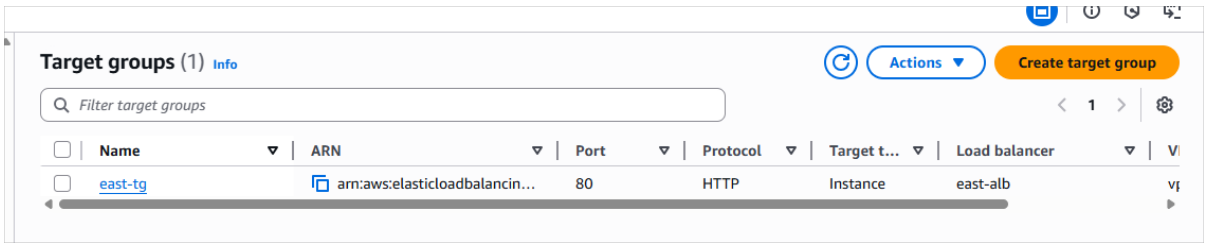
Security group EC2 and ALB



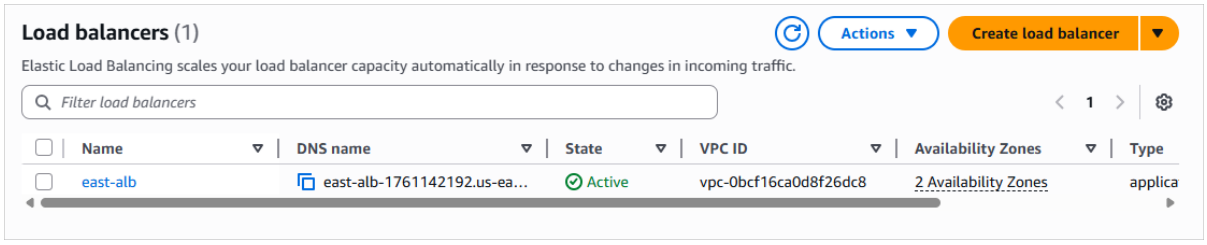
ASG – min,max and desired capacity = 1



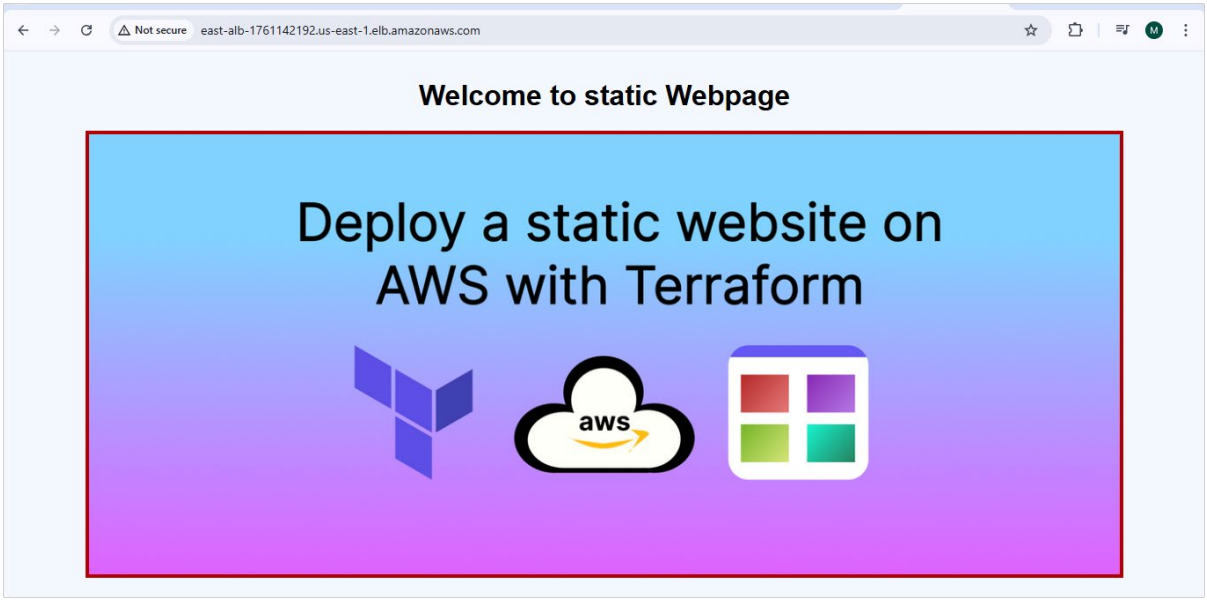
Target group



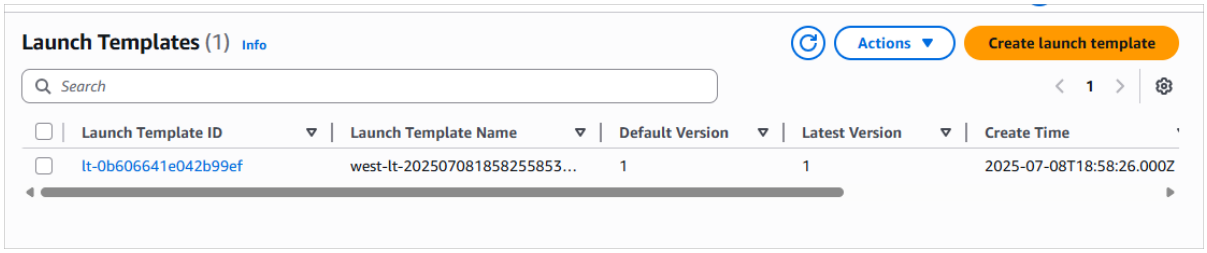
Load Balancer



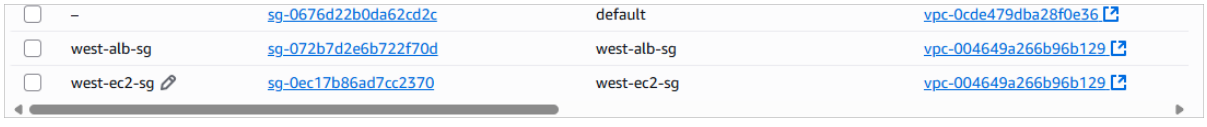
Static webpage from ALB – east region

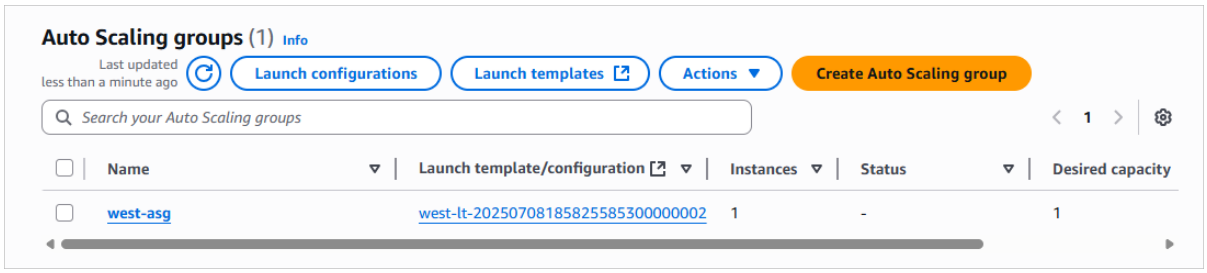


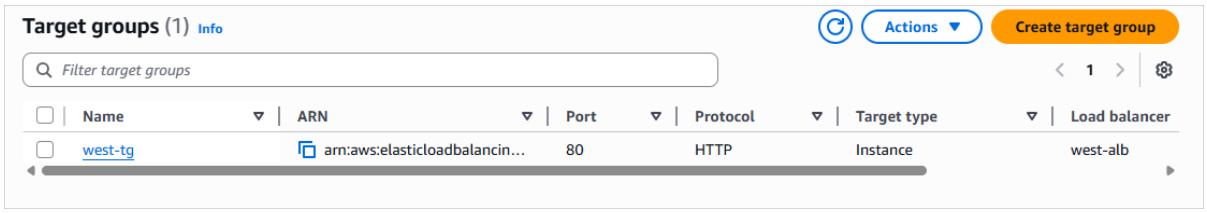
Now check the west region ALB



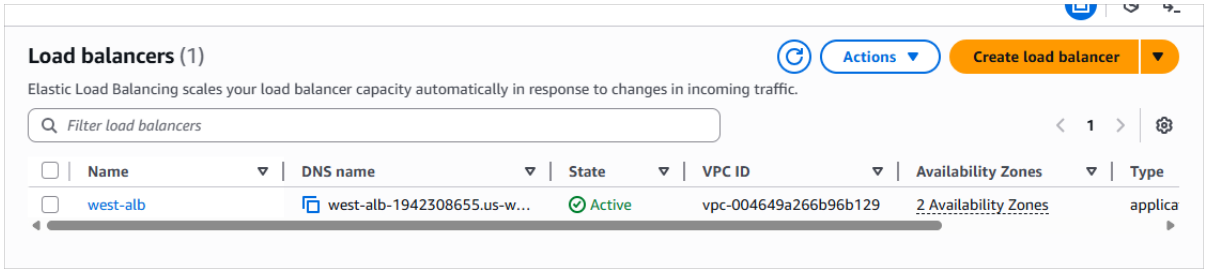
SG for EC2 and ALB

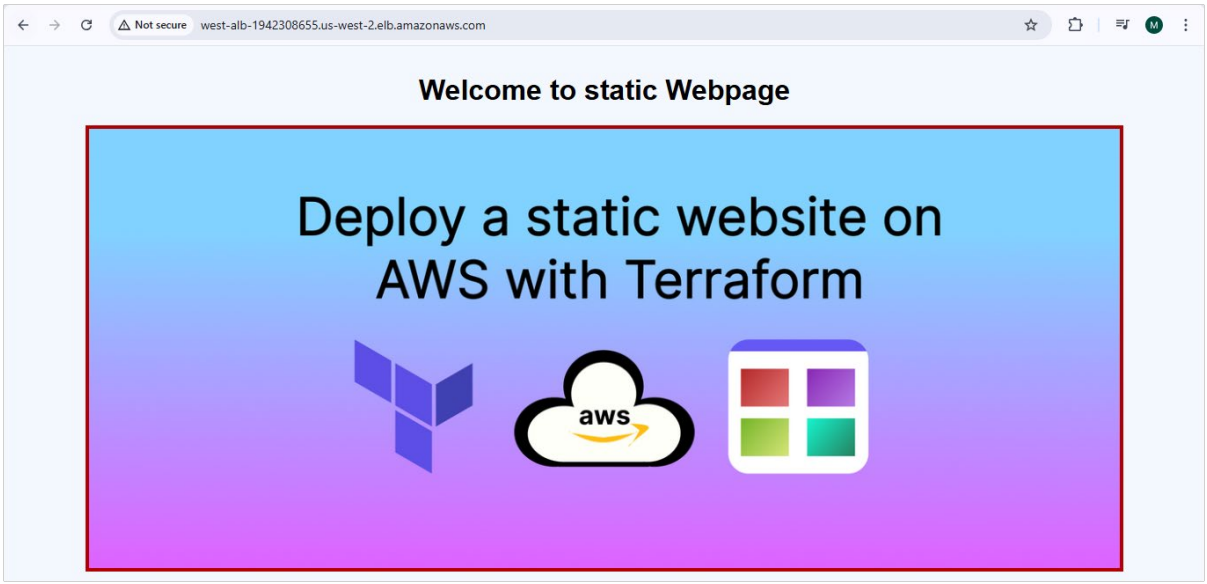






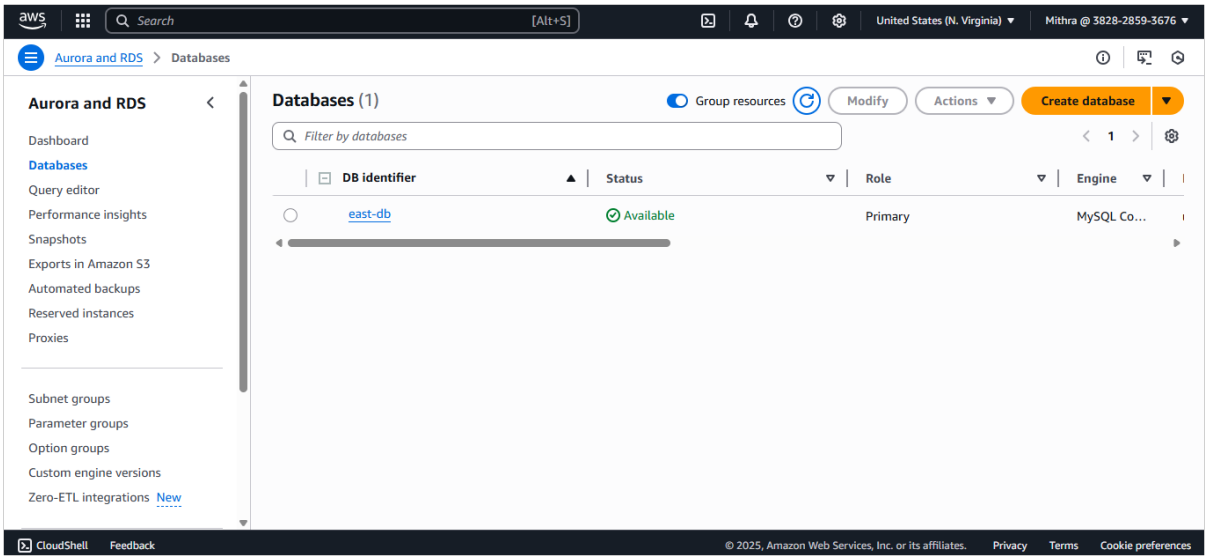
Load Balancer

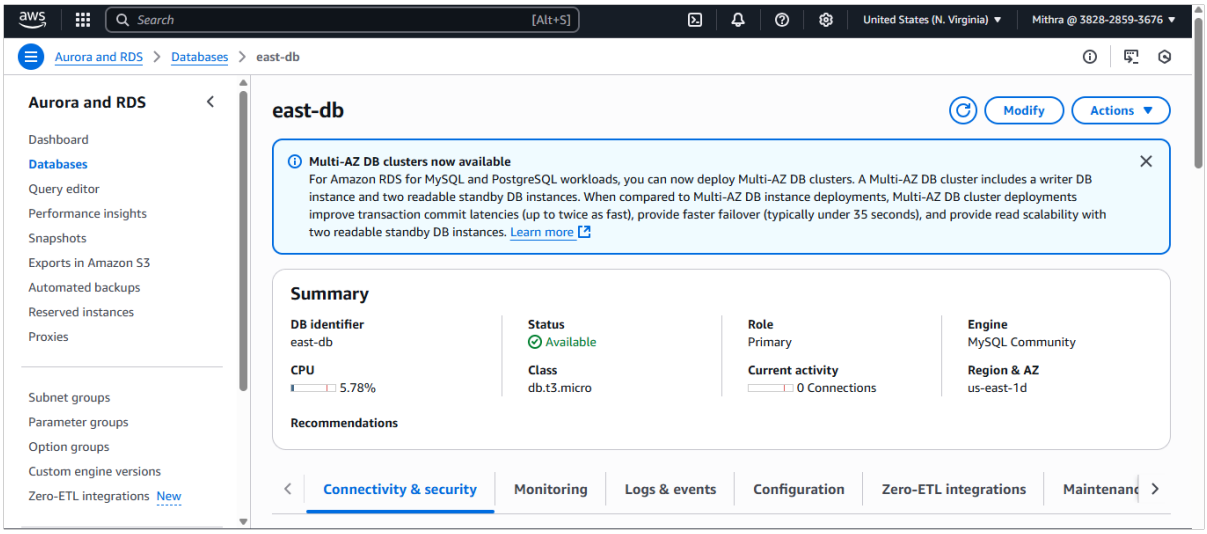




Now check the RDS

Primary RDS





Connectivity & security

Endpoint & port

Endpoint
east-db.c8ls4qsi4evl.us-east-1.rds.amazonaws.com

Port
3306

Networking

Availability Zone
us-east-1d

VPC
east-vpc (vpc-01f47f8dbdd116382)

Subnet group
east-db-sng

Subnets
subnet-061d6ce836b83f8d2
subnet-03f295590f57d3b23

Network type
IPv4

Security

VPC security groups
db-east-sg (sg-0916a5a168551ec89)
Active

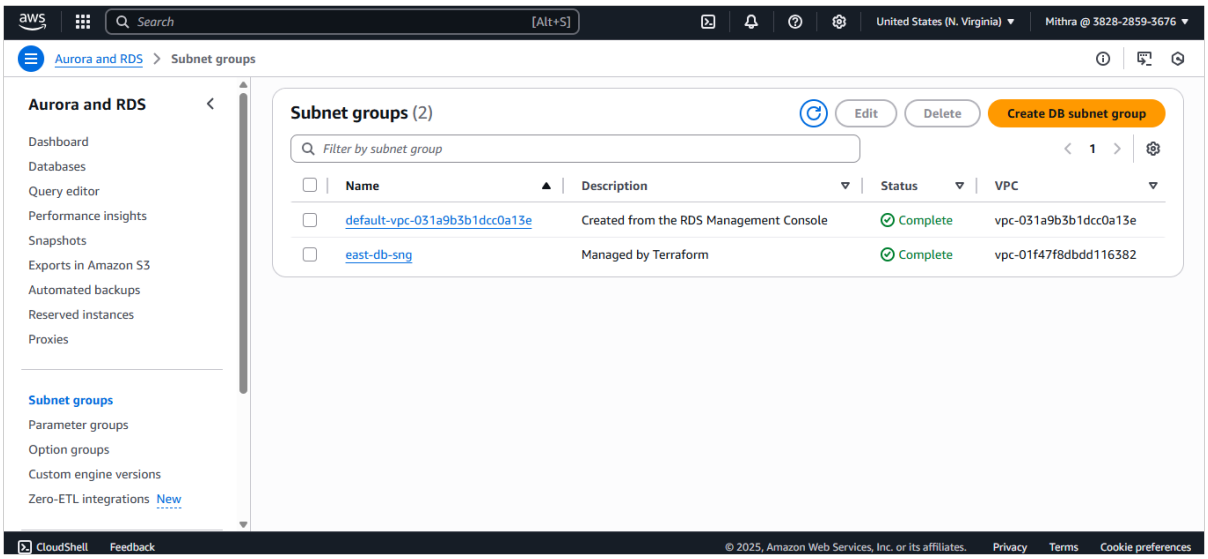
Publicly accessible
No

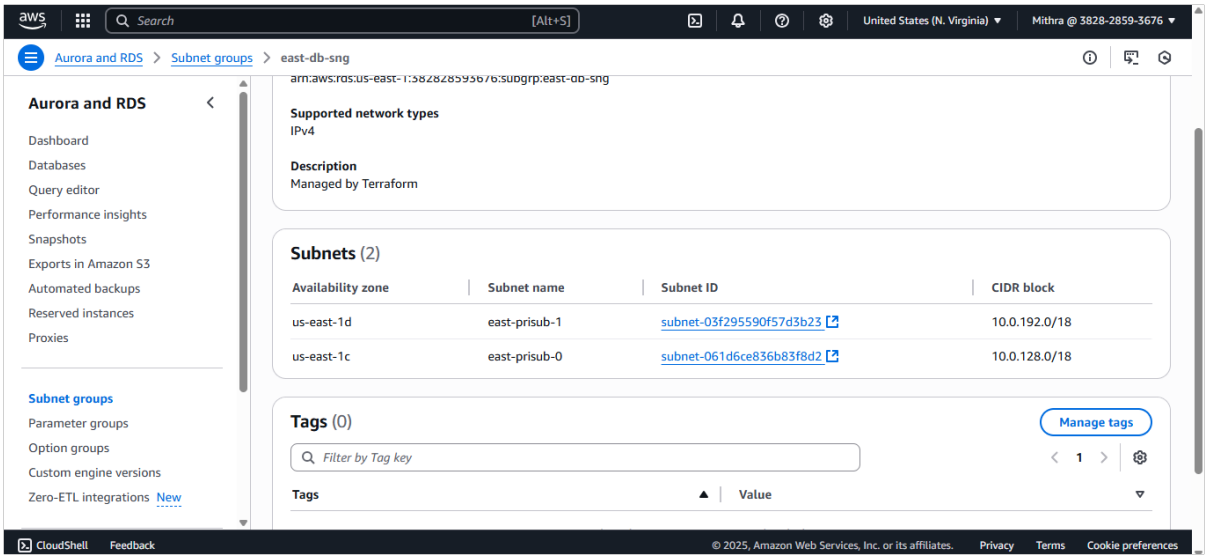
Certificate authority Info
rds-ca-rsa2048-g1

Certificate authority date
May 25, 2061, 19:34 (UTC-04:00)

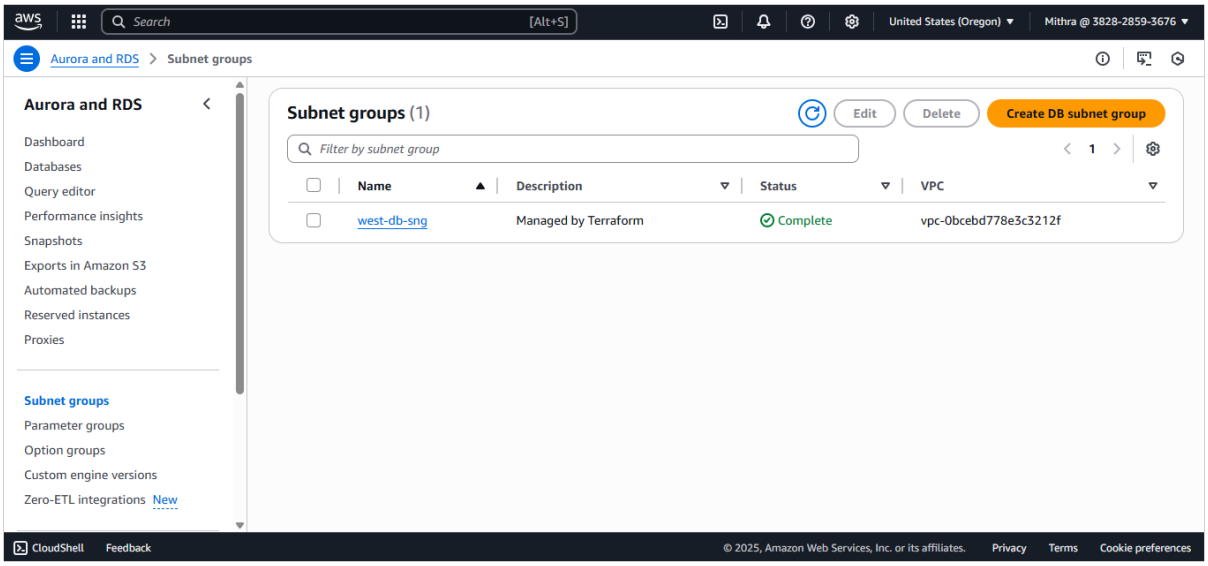
DB instance certificate expiration date
July 08, 2026, 11:56 (UTC-04:00)

Subnet group





West region – RDS Replica


Search
[Alt+S]
United States (Oregon)
Mithra @ 3828-2859-3676
Aurora and RDS
Subnet groups
Aurora and RDS
Dashboard
Databases
Query editor
Performance insights
Snapshots
Exports in Amazon S3
Automated backups
Reserved instances
Proxies
Subnet groups
Parameter groups
Option groups
Custom engine versions
Zero-ETL integrations New
Subnet groups (1)
Edit
Delete
Create DB subnet group
Filter by subnet group
1
Name
Description
Status
VPC
west-db-sng
Managed by Terraform
Complete
vpc-0bcebd778e3c3212f
CloudShell
Feedback
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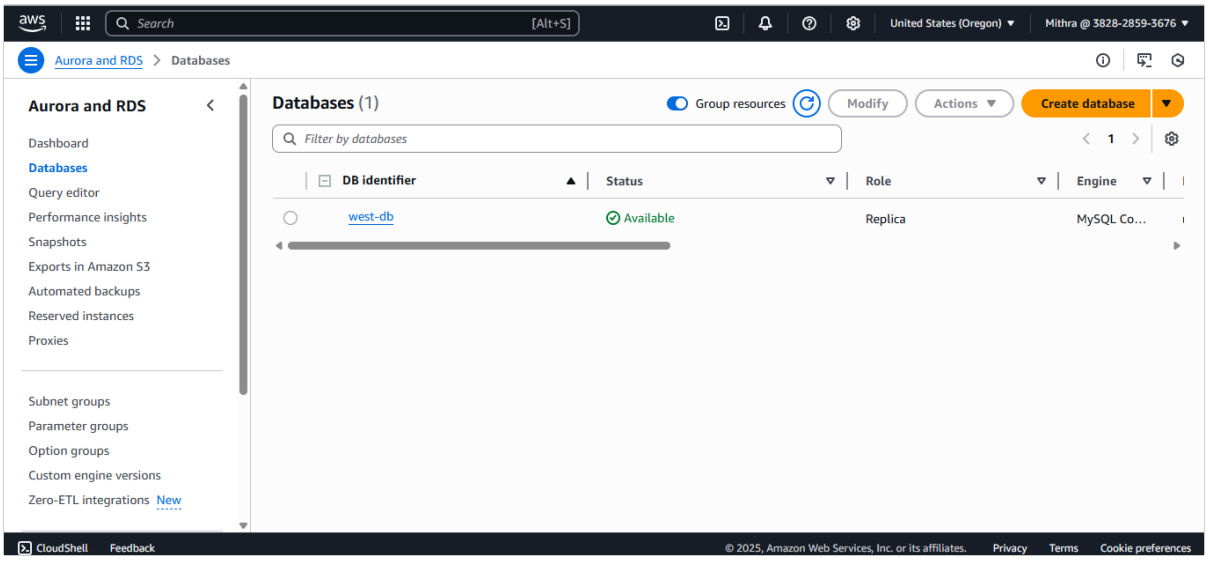
Search
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Aurora and RDS
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Reserved instances
Proxies
Subnet groups
Parameter groups
Option groups
Custom engine versions
Zero-ETL integrations New
Databases (1)
Group resources
Modify
Actions
Create database
Filter by databases
1
DB identifier
Status
Role
Engine
west-db
Available
Replica
MySQL Co...
CloudShell
Feedback
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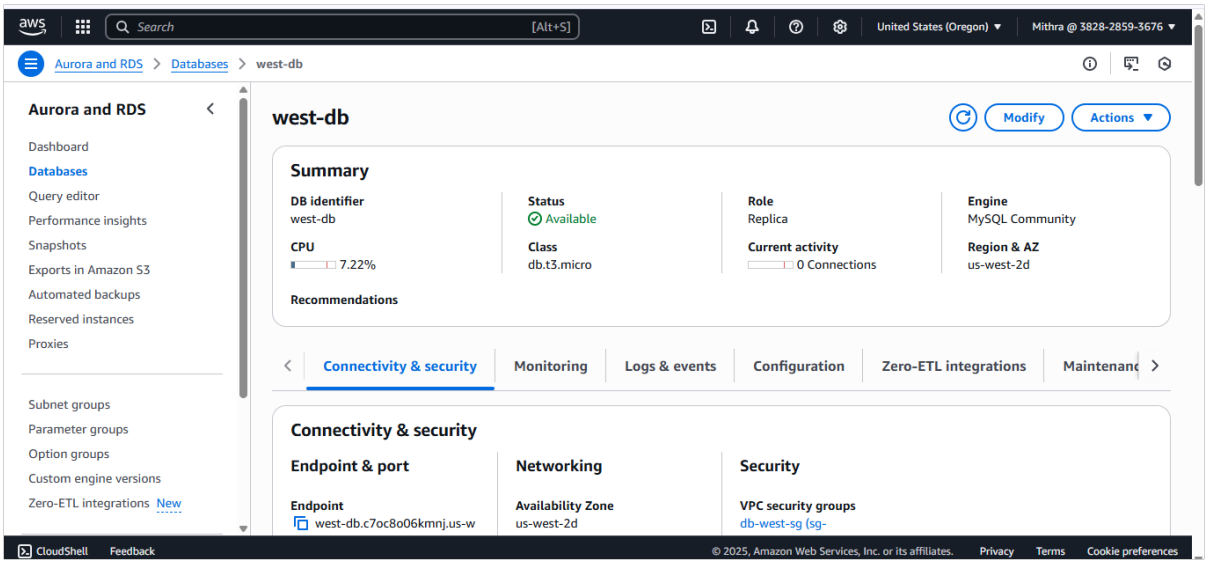
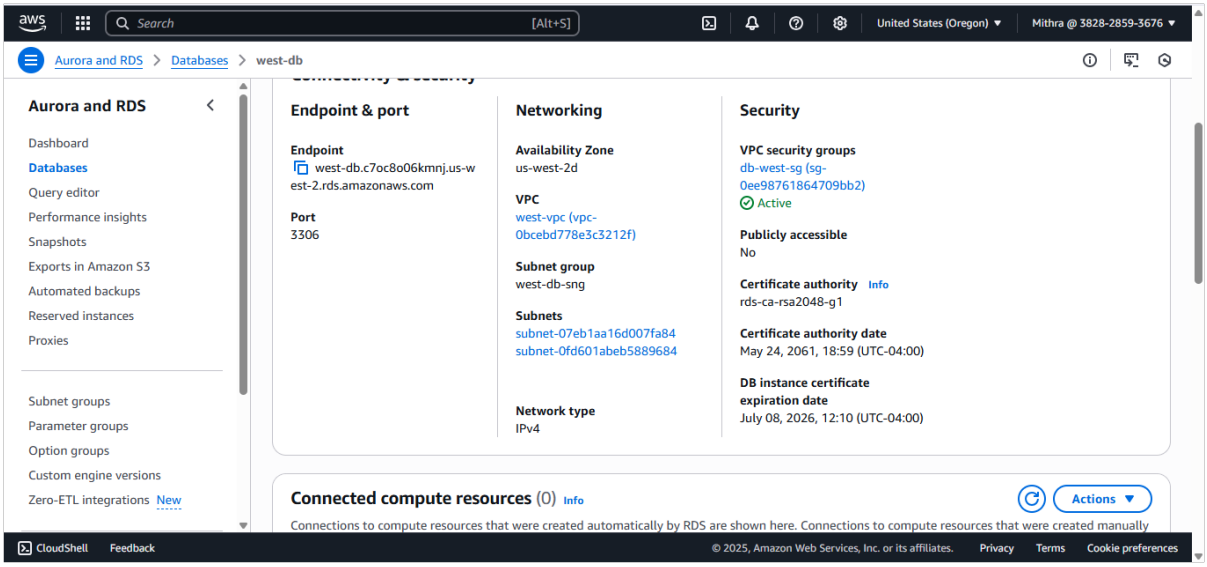
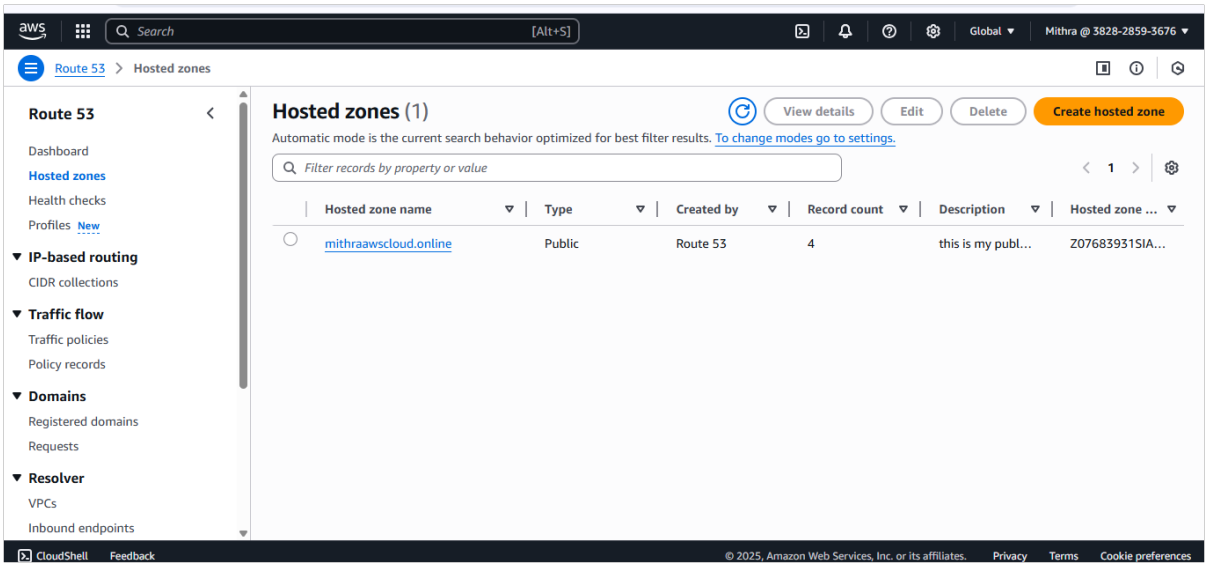
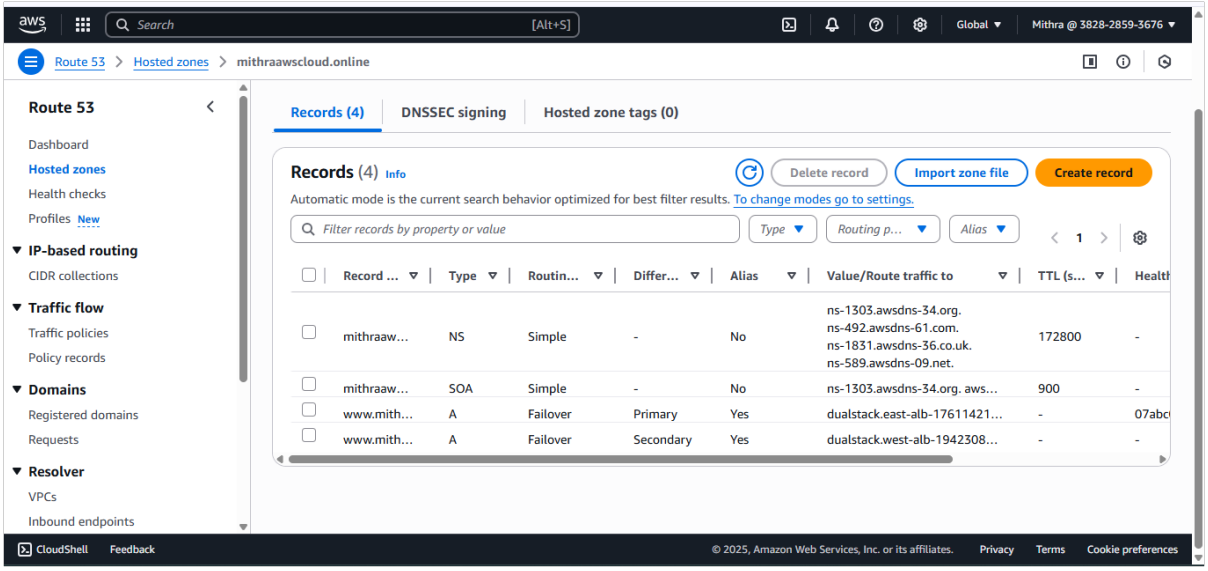




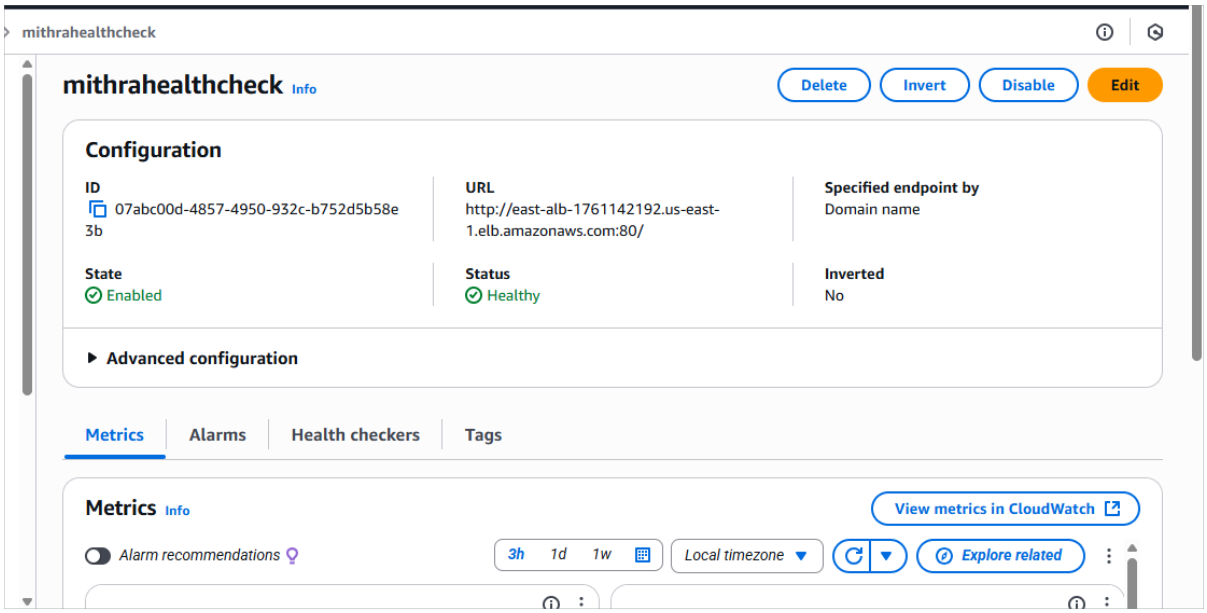
Create Route53

Domain name - www.mithraawscloud.online

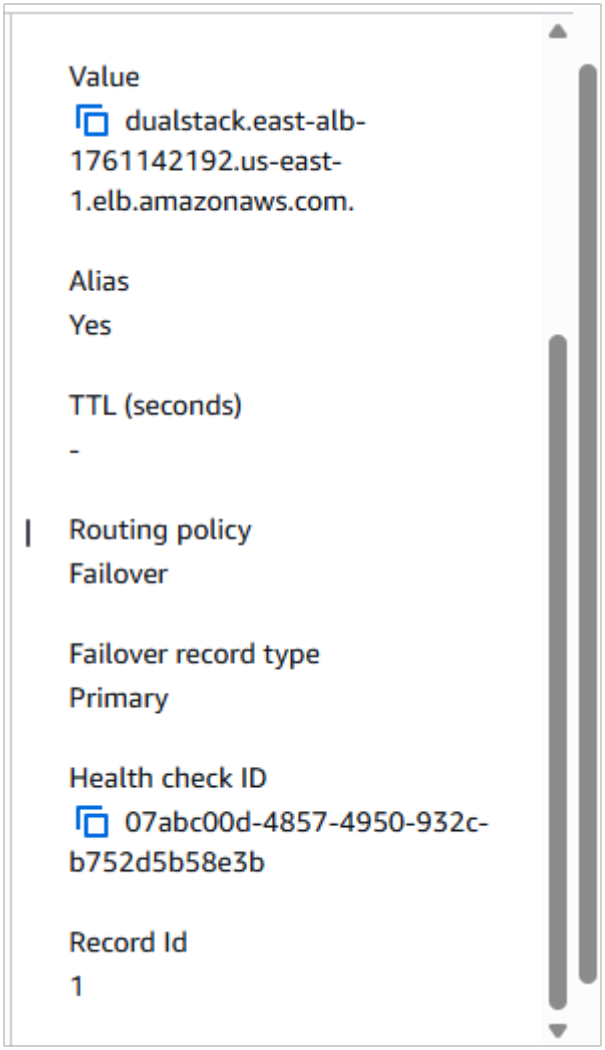




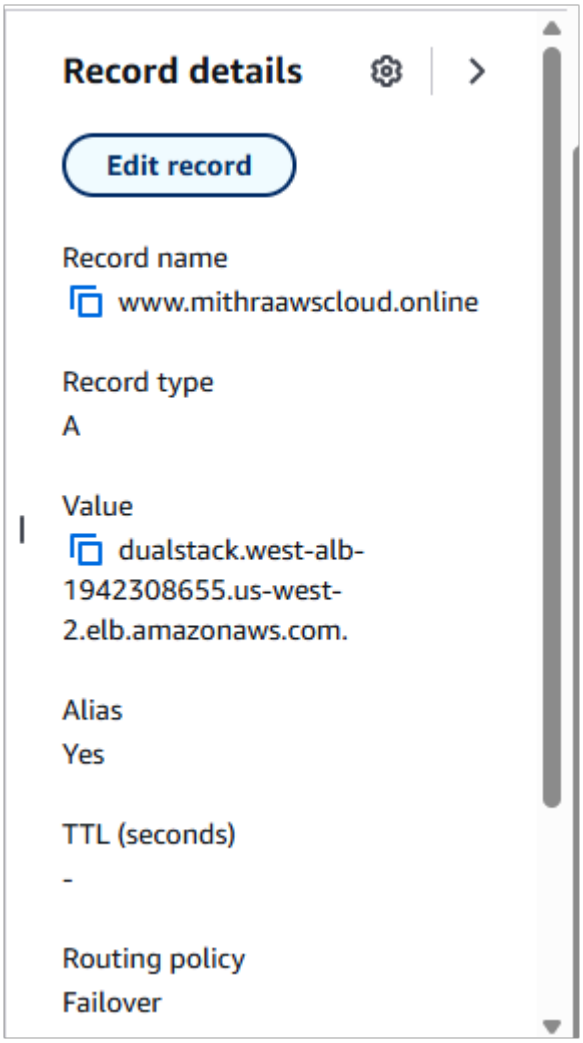
Create health check for primary



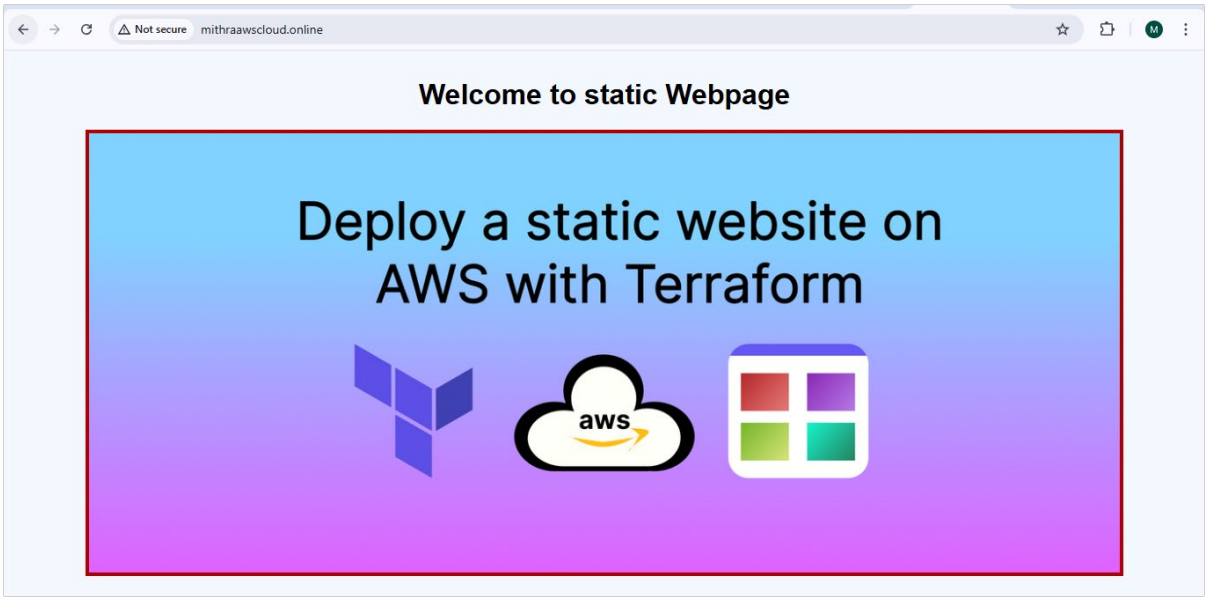
Primary routing policy linked with east region load balancer



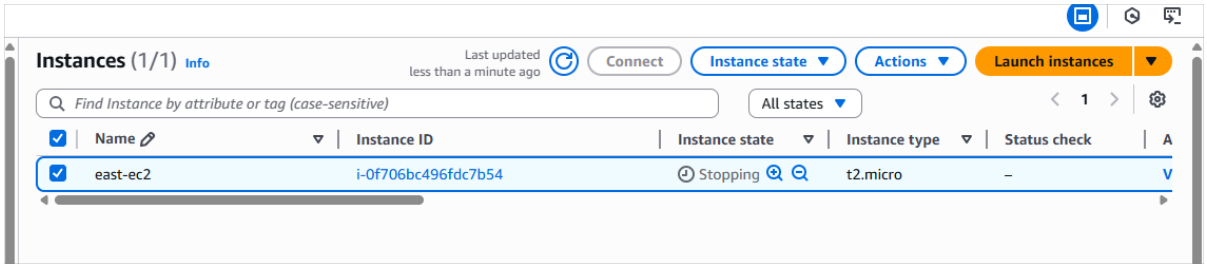
Secondary routing policy linked with west region load balancer



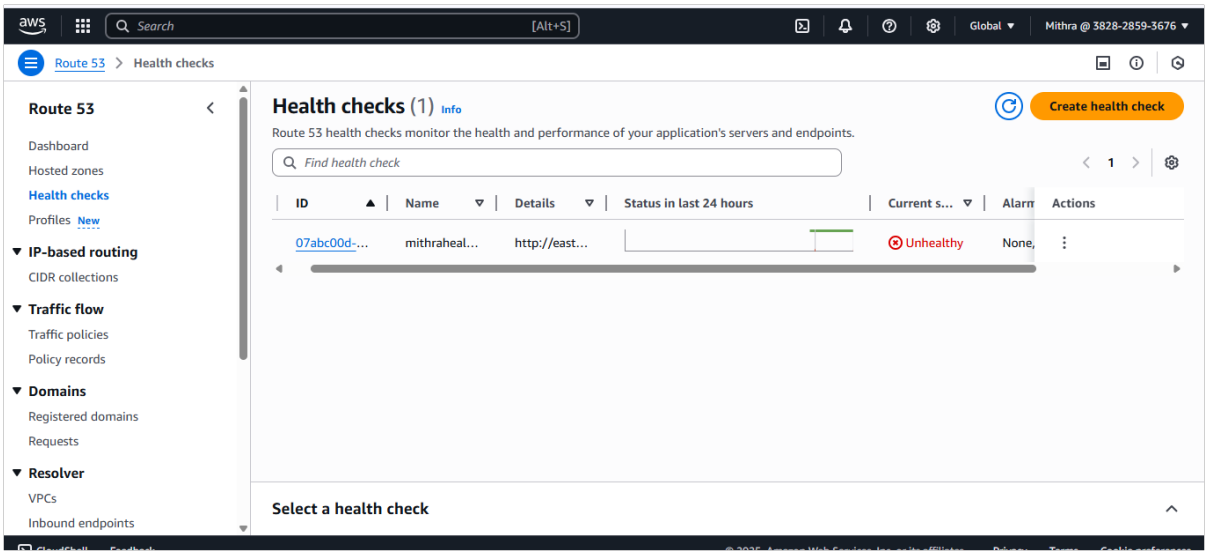
Now check the domain name is working fine



Now manually test that by stopping instance in east region ec2 then the west region should able to work



Now the health check should be unhealthy and it should automatically redirect to secondary



6. Final Verifications:

Test it with: www.mithraawscloud.online

It Displays static webpage with secondary region after manually stopped the primary region instance