

ASSIGNMENT NO. 02

01. Create One VPC.
02. Create two private subnet and two public subnet under that VPC.
03. Create one Internet Gateway as well as NAT gateway and attach it to public and private route table.
04. Create two EC2 instances under public and private subnet.
05. (Here ec2 instance in Public subnet will be web server and another which is in private subnet will be an application server)
06. Create two separate security groups named web-sg and app-sg and get it attached to respective ec2 instances.
07. Create one Application Load balancer and attach one security group to load balancer named alb-sg.
Also, allow all inbound traffic on port 80 and 443 to alb-sg.
08. For web-sg allow traffic on port 80 and 443 from Application load balancer & for app-sg allow traffic only from web-server ec2 instance on port 8080.
09. Create one RDS instance (MySQL) and attach one security group named rds-sg. Allow traffic on MySQL port from application ec2 instance.
10. Also create one S3 bucket and make sure public access is denied.

SOLUTION:-

```
root@DESKTOP-VIDGD8F:Assignment2# terraform init

Initializing the backend...
Initializing modules...

Initializing provider plugins...
- Reusing previous version of hashicorp/aws from the dependency lock file
- Reusing previous version of hashicorp/random from the dependency lock file
- Using previously-installed hashicorp/aws v5.31.0
- Using previously-installed hashicorp/random v3.6.0

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.
```

```
root@DESKTOP-VIDGD8F:Assignment2# terraform plan -var-file=./TFVARS/dev.tfvars
```

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:

module.S3_bucket.aws_iam_instance_profile.aws_iam_profile will be created

```
+ resource "aws_iam_instance_profile" "aws_iam_profile" {
  + arn           = (known after apply)
  + create_date  = (known after apply)
  + id           = (known after apply)
  + name         = "iam_profile"
  + name_prefix  = (known after apply)
  + path         = "/"
  + role         = "s3_role"
  + tags_all     = (known after apply)
  + unique_id    = (known after apply)
}
```

module.S3_bucket.aws_iam_role.s3_role will be created

```
+ resource "aws_iam_role" "s3_role" {
  + arn           = (known after apply)
  + assume_role_policy = jsonencode(
    {
      + Statement = [
        + {
          + Action = [
            + "sts:AssumeRole",
          ]
          + Effect = "Allow"
          + Principal = {
            + Service = [
              + "ec2.amazonaws.com",
            ]
          }
        }
      ]
    }
  )
}
```

Activate Windows
Go to Settings to activate Windows

```
root@DESKTOP-VIDGD8F:Assignment2# terraform apply -var-file=./TFVARS/dev.tfvars -auto-approve
```

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:

module.S3_bucket.aws_iam_instance_profile.aws_iam_profile will be created

```
+ resource "aws_iam_instance_profile" "aws_iam_profile" {
  + arn           = (known after apply)
  + create_date  = (known after apply)
  + id           = (known after apply)
  + name         = "iam_profile"
  + name_prefix  = (known after apply)
  + path         = "/"
  + role         = "s3_role"
  + tags_all     = (known after apply)
  + unique_id    = (known after apply)
}
```

module.S3_bucket.aws_iam_role.s3_role will be created

```
+ resource "aws_iam_role" "s3_role" {
  + arn           = (known after apply)
  + assume_role_policy = jsonencode(
    {
      + Statement = [
        + {
          + Action = [
            + "sts:AssumeRole",
          ]
          + Effect = "Allow"
          + Principal = {
            + Service = [
              + "ec2.amazonaws.com",
            ]
          }
        }
      ]
    }
  )
}
```

Activate Windows
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```
module.rds.random_password.password: Creating...
module.rds.random_password.password: Creation complete after 0s [id=none]
module.aws_key_pair.aws_key_pair.this_ssh_key: Creating...
module.rds.aws_ssm_parameter.this_ssm_parameter: Creating...
module.S3_bucket.aws_iam_role.s3_role: Creating...
module.vpc.aws_vpc.this_vpc: Creating...
module.vpc.aws_eip.this_eip: Creating...
module.S3_bucket.aws_s3_bucket.aws_buc: Creating...
module.aws_key_pair.aws_key_pair.this_ssh_key: Creation complete after 1s [id=ssh-key]
module.S3_bucket.aws_iam_role.s3_role: Creation complete after 1s [id=s3_role]
module.S3_bucket.aws_iam_role_policy.s3_policy: Creating...
module.S3_bucket.aws_iam_instance_profile.aws_iam_profile: Creating...
module.vpc.aws_eip.this_eip: Creation complete after 2s [id=eipalloc-0d1bf05c34ec47cce]
module.rds.aws_ssm_parameter.this_ssm_parameter: Creation complete after 2s [id=rds-pass]
module.S3_bucket.aws_iam_role_policy.s3_policy: Creation complete after 1s [id=s3_role:test_policy]
module.S3_bucket.aws_iam_instance_profile.aws_iam_profile: Creation complete after 2s [id=iam_profile]
module.S3_bucket.aws_s3_bucket.aws_buc: Creation complete after 6s [id=sanu-s3-bucket]
module.vpc.aws_vpc.this_vpc: Still creating... [10s elapsed]
module.vpc.aws_vpc.this_vpc: Creation complete after 15s [id=vpc-0d39e7481e7c43192]
module.vpc.aws_subnet.this_public_subnet[1]: Creating...
module.vpc.aws_internet_gateway.this_igw: Creating...
```

1] VPC

Your VPCs (2) Info							Refresh Actions		Create VPC
<input type="text" value="Search"/>							< 1 > Settings		
<input type="checkbox"/>	Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP o			
<input type="checkbox"/>	aws-vpc	vpc-0d39e7481e7c43192	Available	10.0.0.0/16	-	dopt-07			
<input type="checkbox"/>	-	vpc-07a622e9f21111a56	Available	172.31.0.0/16	-	dopt-07			

2] SUBNETS

Subnets (4) Info							Refresh Actions		Create subnet
<input type="text" value="Find resources by attribute or tag"/>							< 1 > Settings		
<input type="checkbox"/>	Name	Subnet ID	State	VPC	IPv4 CIDR				
<input type="checkbox"/>	private02_2	subnet-0daf81baeadd1375	Available	vpc-0d39e7481e7c43192 aws...	10.0.192.0/18				
<input type="checkbox"/>	private01_1	subnet-0f84f81fa715fd32e	Available	vpc-0d39e7481e7c43192 aws...	10.0.128.0/18				
<input type="checkbox"/>	public02_2	subnet-0b27aa895c875d058	Available	vpc-0d39e7481e7c43192 aws...	10.0.64.0/18				
<input type="checkbox"/>	public01_1	subnet-089de028f1b190798	Available	vpc-0d39e7481e7c43192 aws...	10.0.0.0/18				

3] INTERNET GATEWAY AND NAT GATEWAY

Internet gateways (1) Info						Refresh Actions		Create internet gateway
<input type="text" value="Search"/>						< 1 > Settings		
<input type="checkbox"/>	Name	Internet gateway ID	State	VPC ID	Owner			
<input type="checkbox"/>	aws-internet-gateway	igw-0707803067ca332e2	Attached	vpc-0d39e7481e7c43192 aws-vpc	255851499496			

NAT gateways (1/1) Info								Refresh Actions		Create NAT gateway
<input type="text" value="Filter NAT gateways"/>								< 1 > Settings		
<input checked="" type="radio"/>	Name	NAT gateway ID	Connectivit...	State	State message	Primary public I...	Primary priv			
<input checked="" type="radio"/>	aws-nat-gateway	nat-095d0ed820590089f	Public	Available	-	3.14.211.252	10.0.44.224			

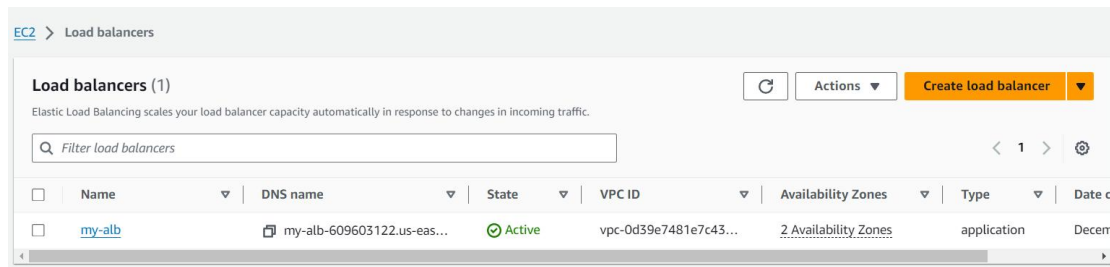
4] EC2 INSTANCE WEB-SERVER AND APP-SERVER

Instances (2) Info									Refresh Connect Instance state Actions		Launch instances
<input type="text" value="Find Instance by attribute or tag (case-sensitive)"/>									< 1 > Settings		
Instance state = running Clear filters											
<input type="checkbox"/>	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv			
<input type="checkbox"/>	web-instance	i-0d789f61d3a82ca0e	Running	t2.micro	2/2 checks passed	No alarms	us-east-2a	ec2-18-11			
<input type="checkbox"/>	app-instance	i-0eda06f81c0323a77	Running	t2.micro	2/2 checks passed	No alarms	us-east-2b	-			

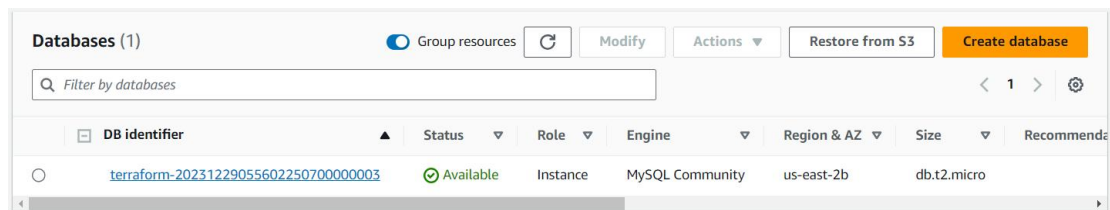
5] SECURITY GROUPS OF ALB,WEB,APP,RDS

Security Groups (6) Info						Refresh Actions		Export security groups to CSV	Create security group
<input type="text" value="Find resources by attribute or tag"/>						< 1 > Settings			
<input type="checkbox"/>	Name	Security group ID	Security group name	VPC ID	Description				
<input type="checkbox"/>	-	sg-0daa5b7af9882e84a	alb-sg	vpc-0d39e7481e7c43192	Managed by T				
<input type="checkbox"/>	-	sg-0755831c56f8db477	app-sg	vpc-0d39e7481e7c43192	Managed by T				
<input type="checkbox"/>	-	sg-0ad1ac60d1e8362af	rds-sg	vpc-0d39e7481e7c43192	Managed by T				
<input type="checkbox"/>	-	sg-068f73a04ee450d1a	web-gs	vpc-0d39e7481e7c43192	Managed by T				

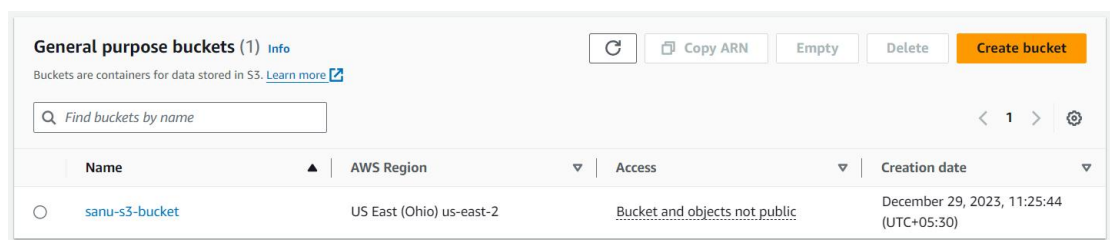
6] APPLICATION LOAD BALANCER



7] RDS

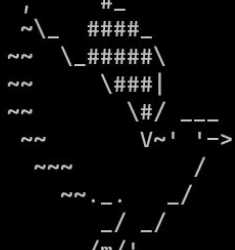


8] S3



LOGIN TO WEB-SERVER FROM TERMINAL

```
root@DESKTOP-VIDGD8F:Assignment2# ssh -i /root/.ssh/id_rsa ec2-user@18.117.148.203
The authenticity of host '18.117.148.203 (18.117.148.203)' can't be established.
ED25519 key fingerprint is SHA256:kflpw63RZXbdAe5+UFvYBxoWj4VF3aDQK/+kWNPN0vg.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '18.117.148.203' (ED25519) to the list of known hosts.
```



```
Amazon Linux 2023

https://aws.amazon.com/linux/amazon-linux-2023

[ec2-user@ip-10-0-21-166 ~]$
```

LOGIN TO APP-SERVER FROM WEB-SERVER

```
[root@ip-10-0-21-166 ec2-user]# ssh -i key.pem ec2-user@10.0.182.143
The authenticity of host '10.0.182.143 (10.0.182.143)' can't be established.
ED25519 key fingerprint is SHA256:X3LL02sy/dkcFgKxV0h7BVjV2zkbkMnLrnebtvWIdSc.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '10.0.182.143' (ED25519) to the list of known hosts.

#_
~\_ #####_ Amazon Linux 2023
~~ \_#####\
~~ \###|
~~ \#/ --- https://aws.amazon.com/linux/amazon-linux-2023
~~ V~' '--->
~~~
~~ .-
~~ /-
~~ /m/'

[ec2-user@ip-10-0-182-143 ~]$
```

CONNECTING TO RDS FROM APP-SERVER

```
[root@ip-10-0-182-143 ec2-user]# sudo wget https://dev.mysql.com/get/mysql80-community-release-el9-1.noarch.rpm
--2023-12-29 06:10:11-- https://dev.mysql.com/get/mysql80-community-release-el9-1.noarch.rpm
Resolving dev.mysql.com (dev.mysql.com)... 23.34.70.239, 2600:1407:3c00:f80::2e31, 2600:1407:3c00:f93::2e31
Connecting to dev.mysql.com (dev.mysql.com)|23.34.70.239|:443... connected.
HTTP request sent, awaiting response... 302 Moved Temporarily
Location: https://repo.mysql.com//mysql80-community-release-el9-1.noarch.rpm [following]
--2023-12-29 06:10:11-- https://repo.mysql.com//mysql80-community-release-el9-1.noarch.rpm
Resolving repo.mysql.com (repo.mysql.com)... 104.96.247.58, 2600:1407:7400:495::1d68, 2600:1407:7400:486::1d68
Connecting to repo.mysql.com (repo.mysql.com)|104.96.247.58|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 10534 (10K) [application/x-redhat-package-manager]
Saving to: 'mysql80-community-release-el9-1.noarch.rpm'

mysql80-community-release-el9-1.noa 100%[=====] 10.29K --.-KB/s in 0s

2023-12-29 06:10:11 (200 MB/s) - 'mysql80-community-release-el9-1.noarch.rpm' saved [10534/10534]

[root@ip-10-0-182-143 ec2-user]# dnf install mysql80-community-release-el9-1.noarch.rpm -y
Amazon Linux 2023 repository 49 MB/s | 22 MB 00:00
Amazon Linux 2023 Kernel Livepatch repository 921 kB/s | 165 kB 00:00
Dependencies resolved.
=====
Package Architecture Version Repository Size
=====
Installing:
mysql80-community-release noarch el9-1 @commandline 10 k
=====
Transaction Summary
=====
Install 1 Package

Total size: 10 k
Installed size: 5.7 k
Downloading Packages:
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Installing : mysql80-community-release-el9-1.noarch 1/1
Verifying : mysql80-community-release-el9-1.noarch 1/1
Installed:
mysql80-community-release-el9-1.noarch
Complete!
```

```
[root@ip-10-0-182-143 ec2-user]# dnf install mysql80-community-release-el9-1.noarch.rpm -y
Amazon Linux 2023 repository 49 MB/s | 22 MB 00:00
Amazon Linux 2023 Kernel Livepatch repository 921 kB/s | 165 kB 00:00
Dependencies resolved.
=====
Package Architecture Version Repository Size
=====
Installing:
mysql80-community-release noarch el9-1 @commandline 10 k
=====
Transaction Summary
=====
Install 1 Package

Total size: 10 k
Installed size: 5.7 k
Downloading Packages:
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
Preparing : 1/1
Installing : mysql80-community-release-el9-1.noarch 1/1
Verifying : mysql80-community-release-el9-1.noarch 1/1
Installed:
mysql80-community-release-el9-1.noarch
Complete!
```

```
[root@ip-10-0-182-143 ec2-user]# dnf install mysql-community-server -y
MySQL 8.0 Community Server 3.3 MB/s | 1.2 MB 00:00
MySQL Connectors Community 231 kB/s | 36 kB 00:00
MySQL Tools Community 1.5 MB/s | 444 kB 00:00
Dependencies resolved.
=====
Package Architecture Version Repository Size
=====
Installing:
mysql-community-server x86_64 8.0.35-1.el9 mysql80-community 49 M
Installing dependencies:
mysql-community-client x86_64 8.0.35-1.el9 mysql80-community 3.5 M
mysql-community-client-plugins x86_64 8.0.35-1.el9 mysql80-community 1.4 M
mysql-community-common x86_64 8.0.35-1.el9 mysql80-community 557 k
mysql-community-icu-data-files x86_64 8.0.35-1.el9 mysql80-community 2.3 M
mysql-community-libs x86_64 8.0.35-1.el9 mysql80-community 1.4 M
=====
Transaction Summary
=====
Install 6 Packages

Total download size: 58 M
Installed size: 334 M
Downloading Packages:
(1/6): mysql-community-common-8.0.35-1.el9.x86_64.rpm 2.2 MB/s | 557 kB 00:00
(2/6): mysql-community-client-plugins-8.0.35-1.el9.x86_64.rpm 4.6 MB/s | 1.4 MB 00:00
(3/6): mysql-community-client-8.0.35-1.el9.x86_64.rpm 10 MB/s | 3.5 MB 00:00
(4/6): mysql-community-libs-8.0.35-1.el9.x86_64.rpm 20 MB/s | 1.4 MB 00:00
(5/6): mysql-community-icu-data-files-8.0.35-1.el9.x86_64.rpm 16 MB/s | 2.3 MB 00:00
(6/6): mysql-community-server-8.0.35-1.el9.x86_64.rpm 38 MB/s | 49 MB 00:01
=====
Total 35 MB/s | 58 MB 00:01
MySQL 8.0 Community Server 3.0 MB/s | 3.1 kB 00:00
Importing GPG key 0x3A79BD29:
Userid : "MySQL Release Engineering <mysql-build@oss.oracle.com>"
Go to Settings to activate Windows.
```

```
[root@ip-10-0-138-122 ec2-user]# mysql -h terraform-20240102053911693100000003.cxsbwvputkx0.us-east-2.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MySQL monitor. Commands end with ; or \g.
Your MySQL connection id is 21
Server version: 8.0.35 Source distribution

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affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> ^C
mysql> exit
Bye
```

CONNETING S3 BUCKET TO WEB-SERVER

```
[root@ip-10-0-21-166 ec2-user]# aws s3 ls
2023-12-29 05:55:44 sanu-s3-bucket
[root@ip-10-0-21-166 ec2-user]#
```

CONNETING S3 BUCKET TO APP-SERVER

```
[root@ip-10-0-182-143 ec2-user]# aws s3 ls
2023-12-29 05:55:44 sanu-s3-bucket
[root@ip-10-0-182-143 ec2-user]#
```