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3-Tier Architecture for Web Applications in AWS

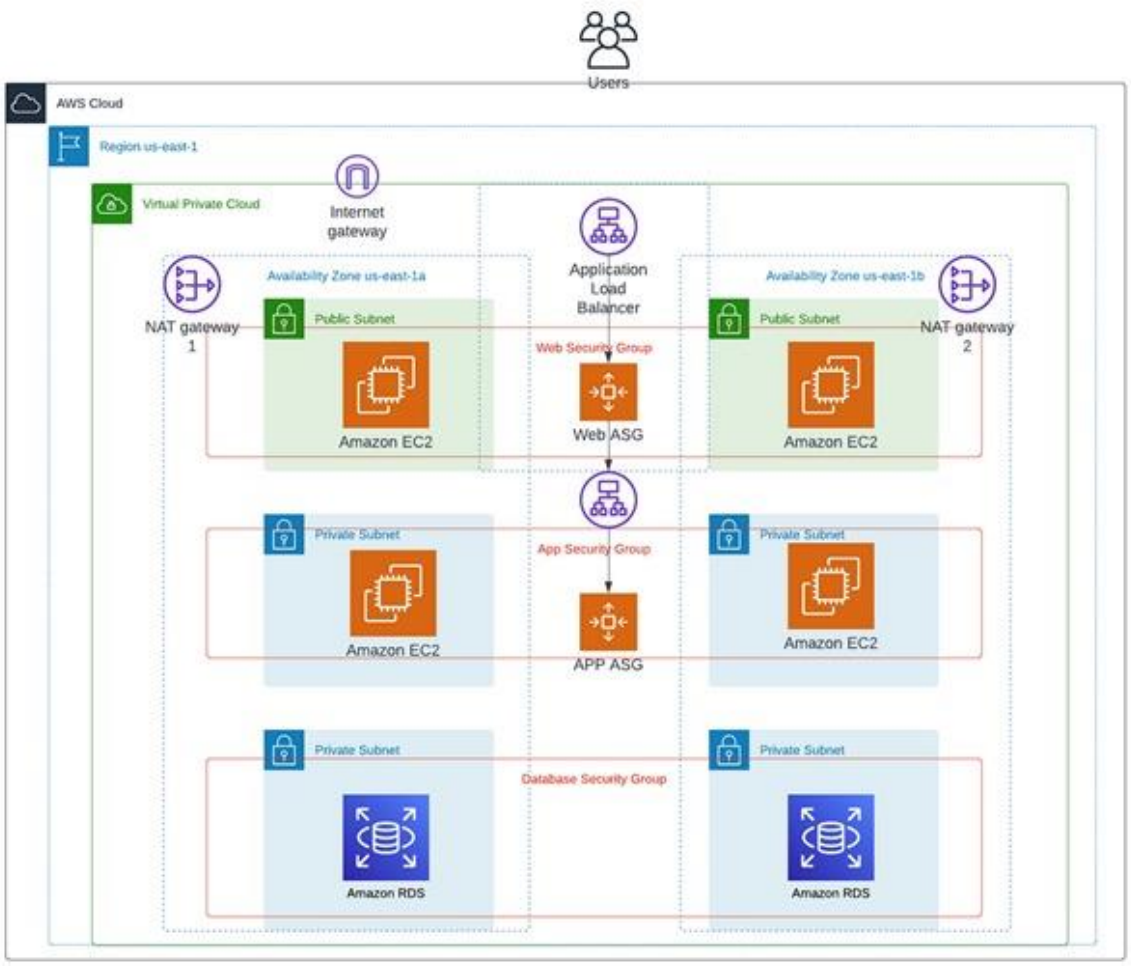


Fig: Creating a Highly Available 3-Tier Architecture for Web Applications in AWS

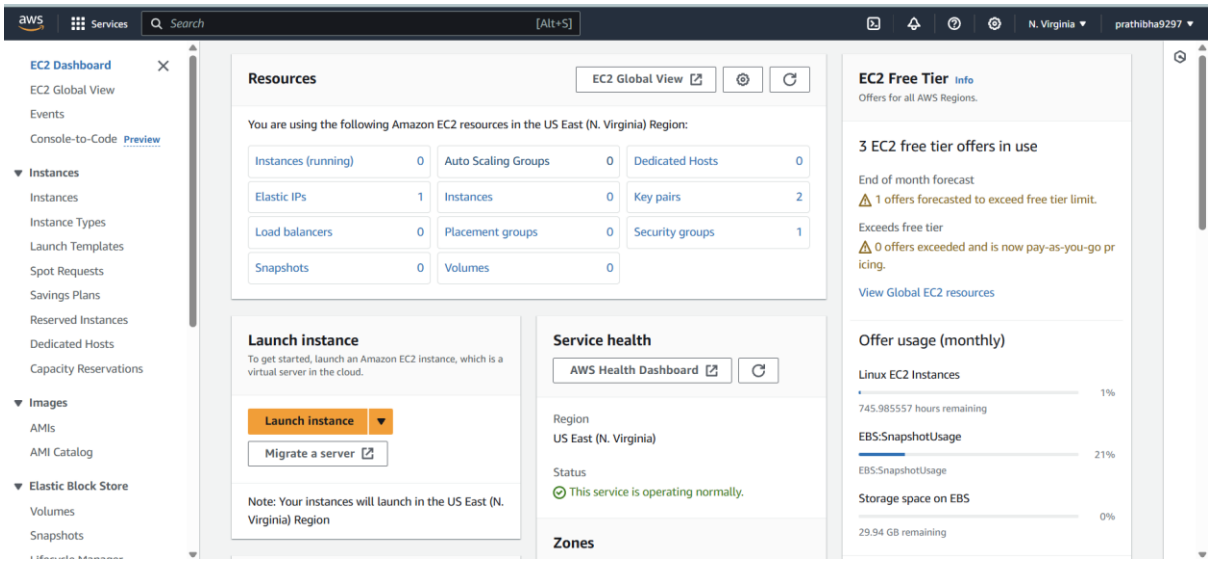
ABOUT:

In a three-tier application architecture, each tier serves a specific role and communicates with the other tiers to deliver a complete application experience. Implementing this architecture on AWS involves using various services to handle the presentation (web), application (logic), and data (database) layers.

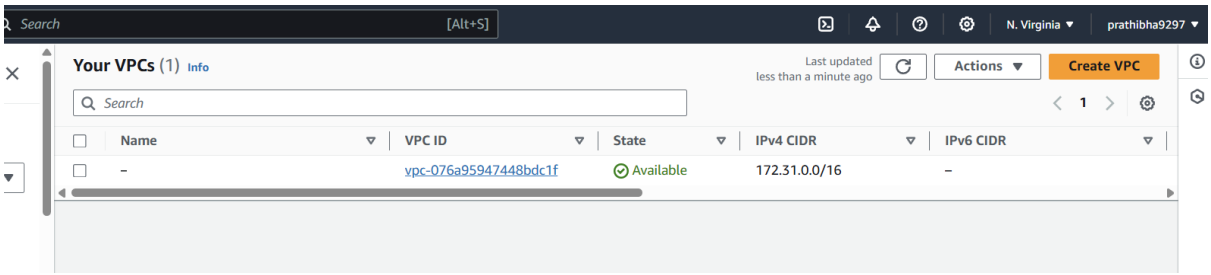
VPC:

A Virtual Private Cloud (VPC) is a fundamental component in Amazon Web Services (AWS) that enables you to create a logically isolated network environment within the AWS cloud. It provides control over a virtualized network that mimics a traditional on-premises network, including IP address ranges, subnets, route tables, and network gateways. With VPC, you can securely deploy and manage your AWS resources, such as EC2 instances, RDS databases, and other services, in a private and controlled network space.

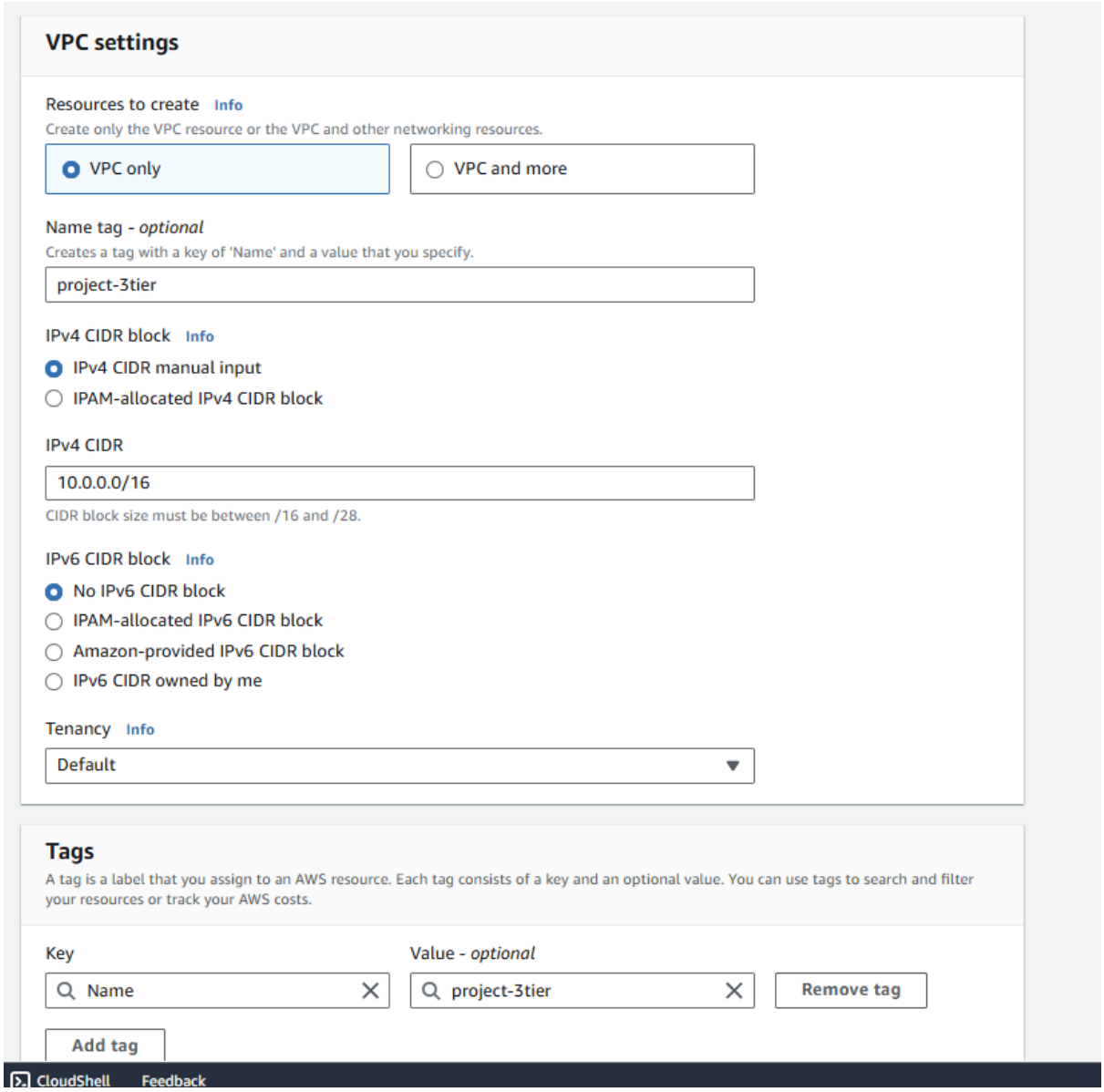
Go to AWS console, in that I was used **us-east-1a** and **us-east-1b** availability zones in **US East N.virginia** region



Click on VPC in AWS console and then click on create VPC.



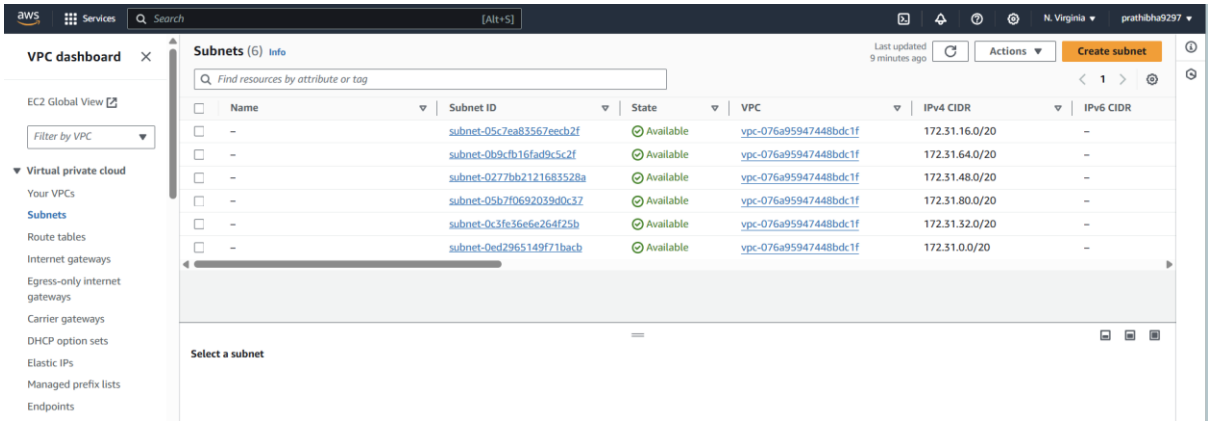
- Go to VPC dashboard click on create VPC.
- Click on VPC only and name tag as project-3tier.
- Give IPV4 CIDR (classless inter domain routing) as 10.0.0.0/16.
- Click on VPC, it is created.



Subnets:

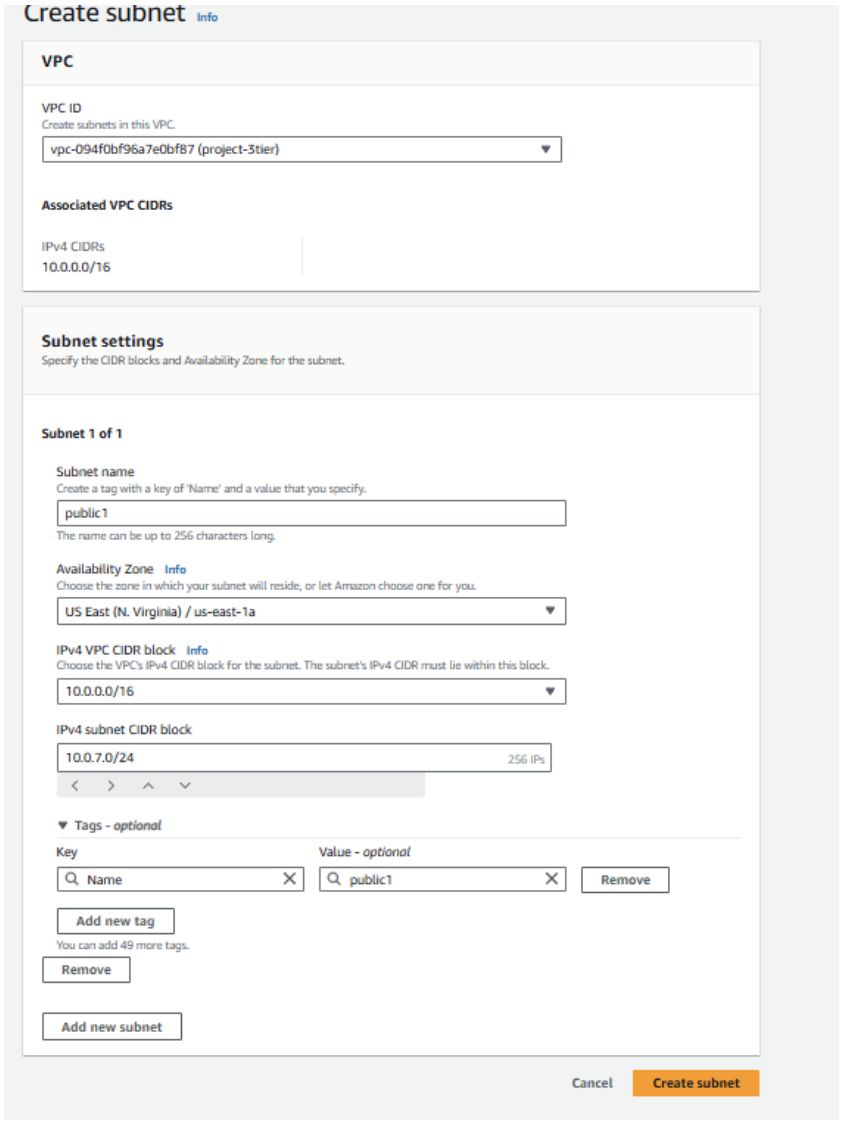
- **Public Subnets:** Subnets that have access to the internet via an Internet Gateway. Typically used for resources that need to be reachable from the outside, such as web servers.
- **Private Subnets:** Subnets that do not have direct internet access. Used for resources that should not be exposed to the internet, such as databases and application servers.

For this 3-tier architecture 6 subnets need to create, In that 2 subnets are public and remaining 4 subnets are private.



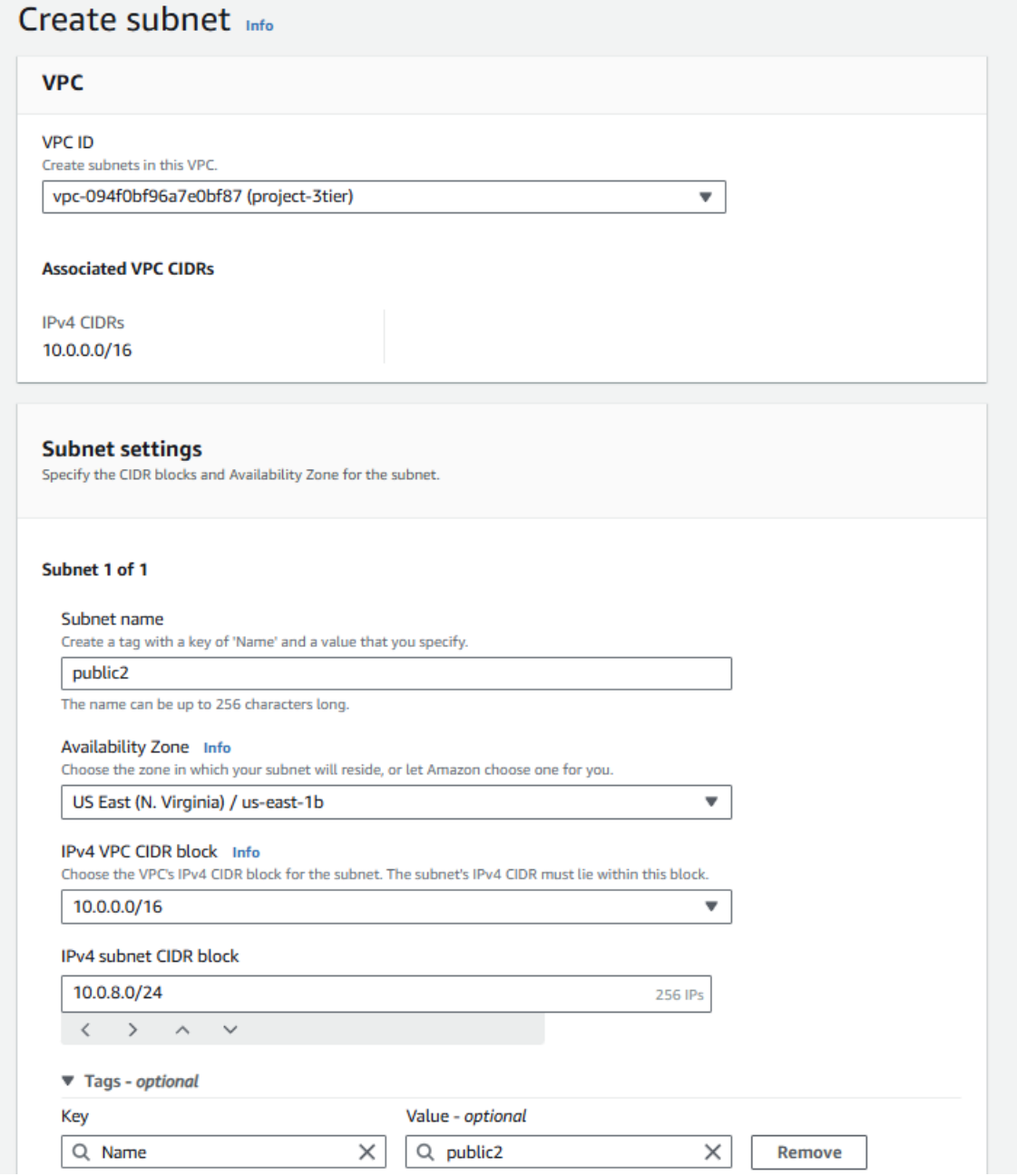
Subnet 1:

- Click on create subnet
- Select the VPC (project-3tier)
- Give the name tag as public1->select availability zone as US East(N.virginia)/us-east-1a
- Give CIDR as 10.0.7.0/24 and then click on create subnet



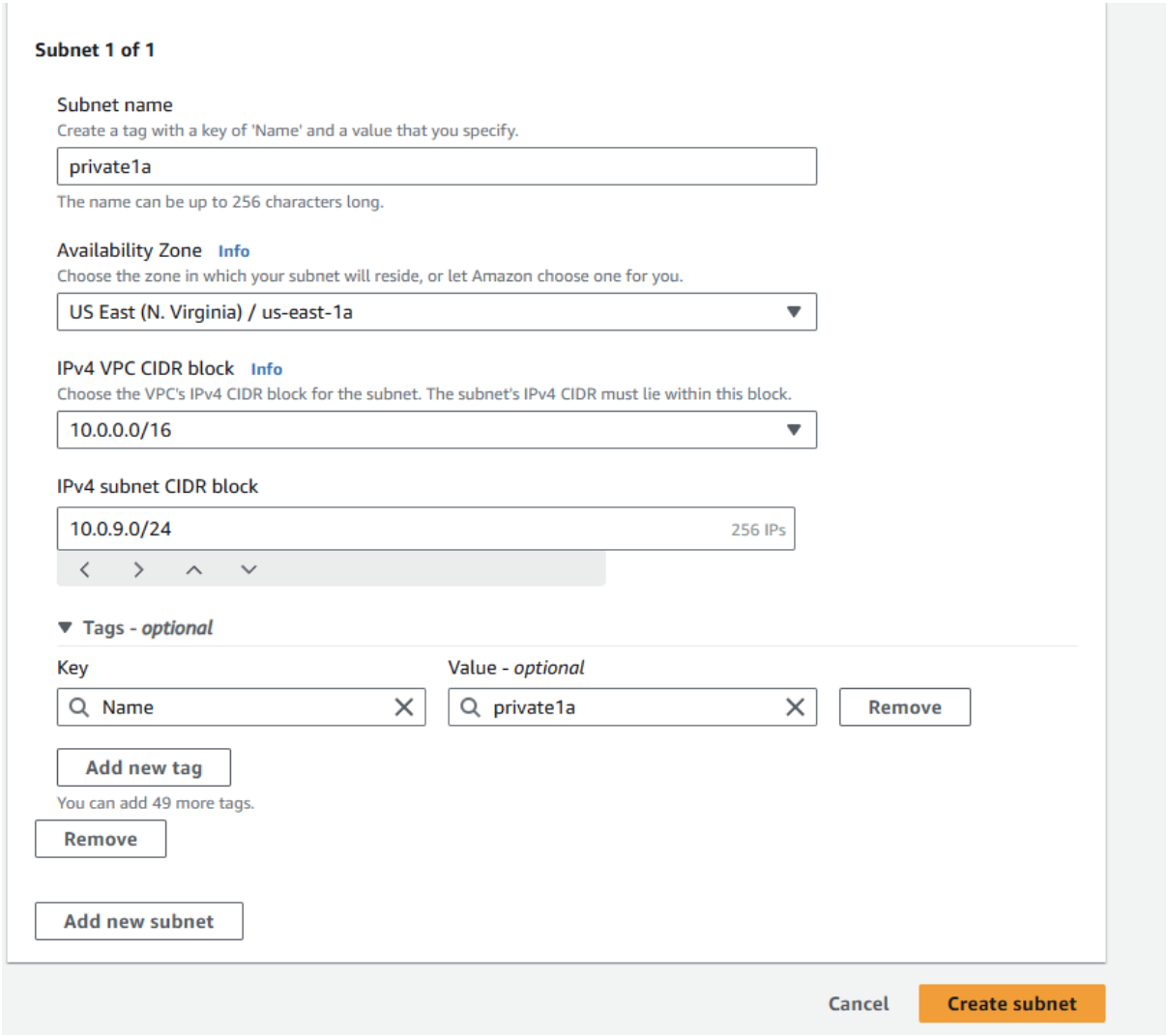
Subnet 2:

- Click on create subnet
- Select the VPC (project-3tier)
- Give the name tag as public2->select availability zone as US East(N.virginia)/us-east-1b
- Give CIDR as 10.0.8.0/24 and then click on create subnet.



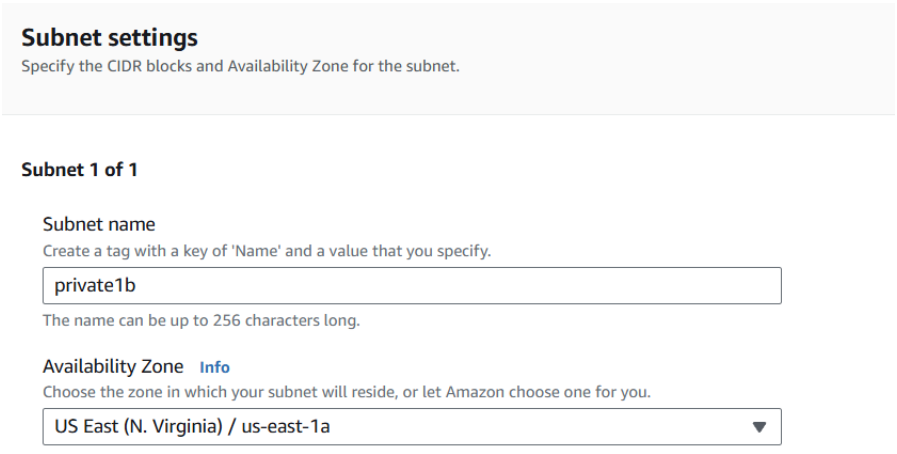
Subnet 3:

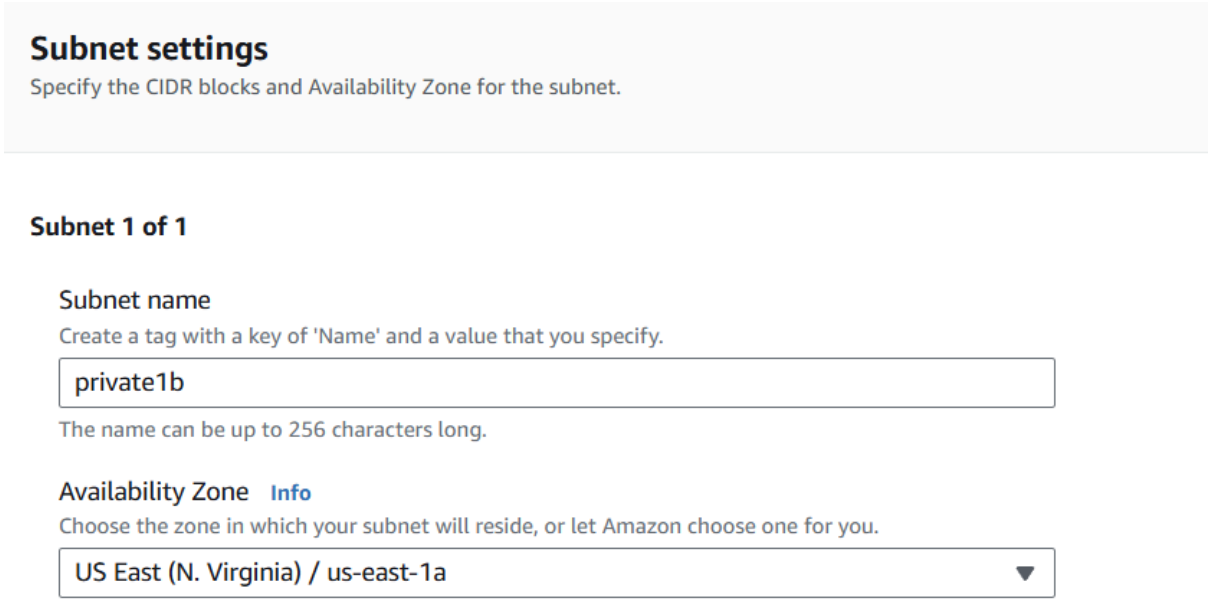
- Click on create subnet
- Select the VPC (project-3tier)
- Give the name tag as private1a->select availability zone as US East(N.virginia)/us-east-1a
- Give CIDR as 10.0.9.0/24 and then click on create subnet.



Subnet 4:

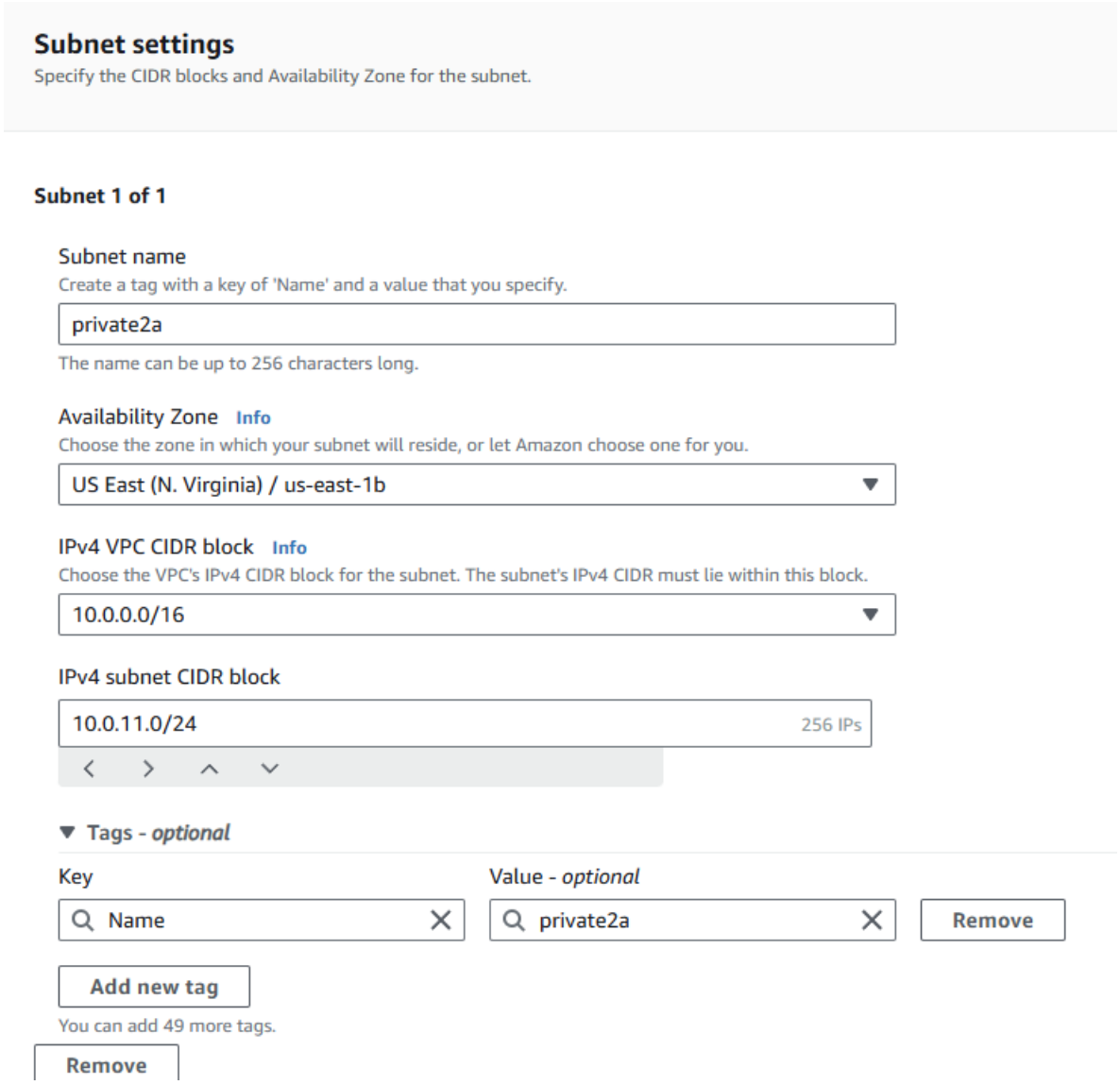
- Click on create subnet
- Select the VPC (project-3tier)
- Give the name tag as private1b->select availability zone as US East(N.virginia)/us-east-1a
- Give CIDR as 10.0.10.0/24 and then click on create subnet.





Subnet 5:

- Click on create subnet
- Select the VPC (project-3tier)
- Give the name tag as private2a->select availability zone as US East(N.virginia)/us-east-1b
- Give CIDR as 10.0.11.0/24 and then click on create subnet.



Subnet 6:

- Click on create subnet
- Select the VPC (project-3tier)
- Give the name tag as private2b->select availability zone as US East(N.virginia)/us-east-1b
- Give CIDR as 10.0.12.0/24 and then click on create subnet.

Subnet 1 of 1

Subnet name
Create a tag with a key of 'Name' and a value that you specify.
private2b
The name can be up to 256 characters long.

Availability Zone Info
Choose the zone in which your subnet will reside, or let Amazon choose one for you.
US East (N. Virginia) / us-east-1b

IPv4 VPC CIDR block Info
Choose the VPC's IPv4 CIDR block for the subnet. The subnet's IPv4 CIDR must lie within this block.
10.0.0.0/16

IPv4 subnet CIDR block
10.0.12.0/24 256 IPs

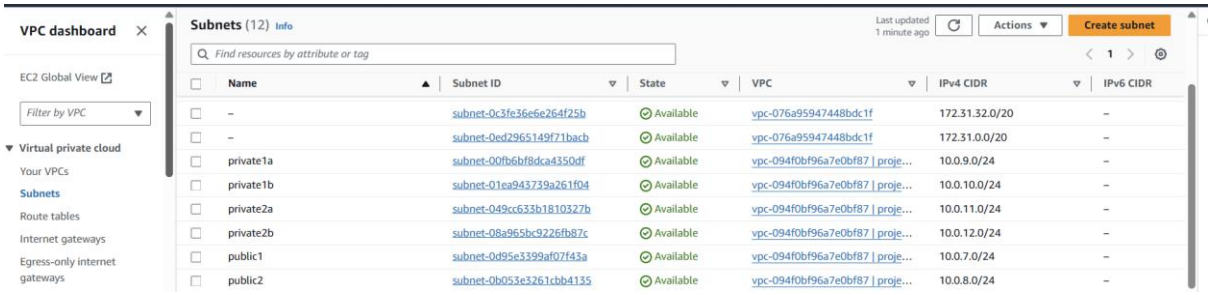
▼ Tags - *optional*

Key: Name
Value - *optional*: private2b
Remove

Add new tag
You can add 49 more tags.

Remove

Total 6 subnets we just created as shown in below.



Internet gateway(IGW):

A gateway that provides internet access to resources in your VPC. It is attached to your VPC to enable communication between instances in your VPC and the internet.

- Click on create internet gateway->Give name tag as project-igw-> click on create.
- Once IGW created click on attach to a VPC
- Select the VPC and then click on attach internet gateway.

VPC > Internet gateways > Create internet gateway

Create internet gateway Info

An internet gateway is a virtual router that connects a VPC to the internet. To create a new internet gateway specify the name for the gateway below.

Internet gateway settings

Name tag

Creates a tag with a key of 'Name' and a value that you specify.

project-igw

Tags - *optional*

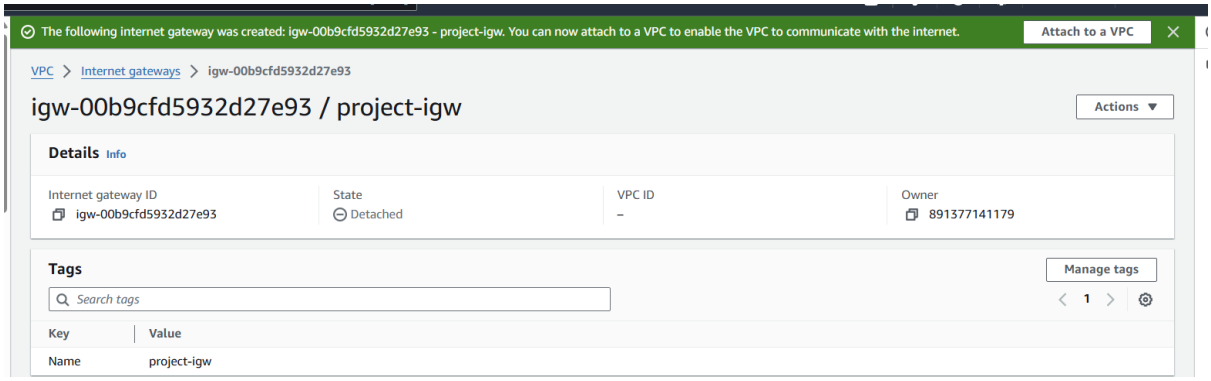
A tag is a label that you assign to an AWS resource. Each tag consists of a key and an optional value. You can use tags to search and filter your resources or track your AWS costs.

Key	Value - *optional*	
Name	project-igw	Remove

Add new tag

You can add 49 more tags.

Cancel | Create internet gateway



The following internet gateway was created: igw-00b9cfd5932d27e93 - project-igw. You can now attach to a VPC to enable the

VPC > Internet gateways > Attach to VPC (igw-00b9cfd5932d27e93)

Attach to VPC (igw-00b9cfd5932d27e93) Info

VPC

Attach an internet gateway to a VPC to enable the VPC to communicate with the internet. Specify the VPC to attach below.

Available VPCs

Attach the internet gateway to this VPC.

vpc-094f0bf96a7e0bf87

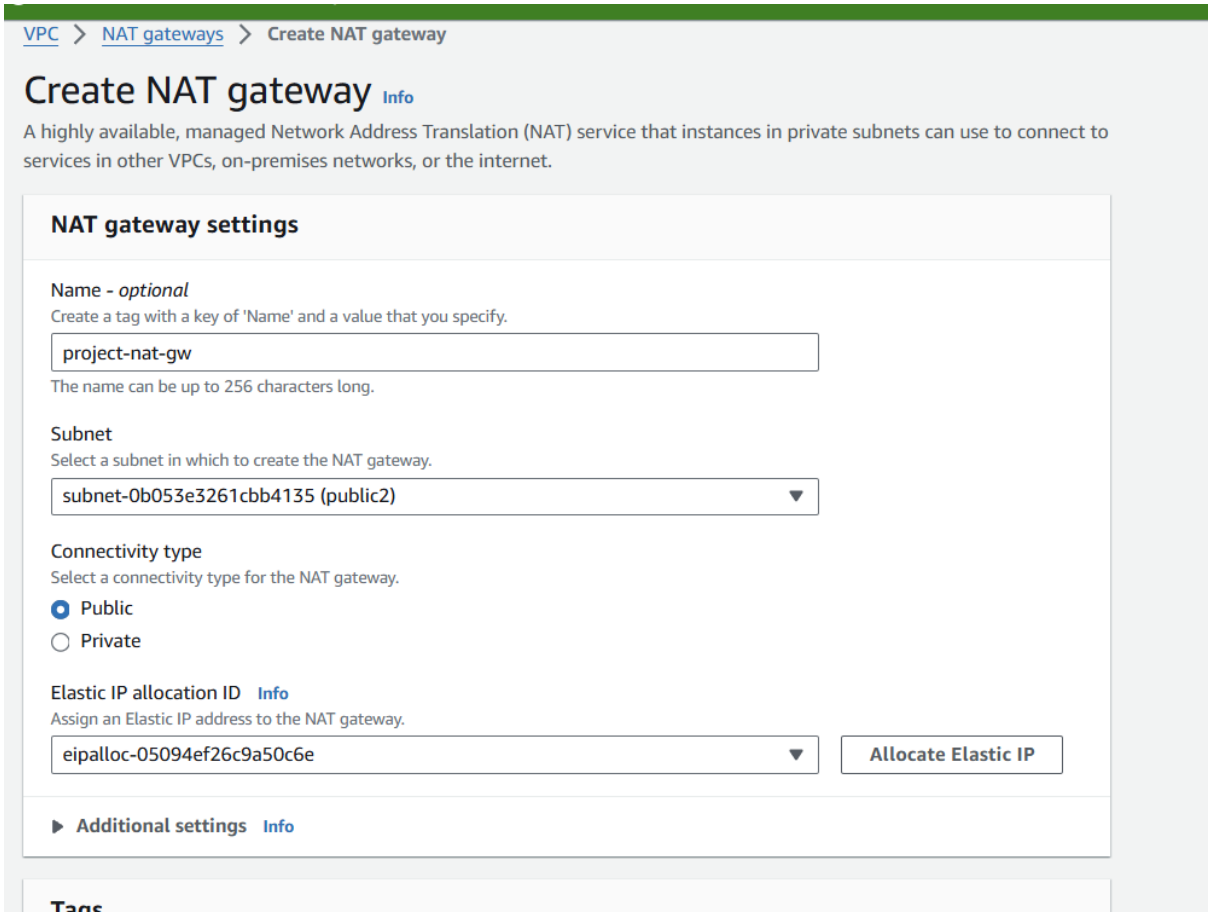
▶ AWS Command Line Interface command

Cancel | Attach internet gateway

NAT gateway:

A managed service that allows instances in a private subnet to initiate outbound traffic to the internet while preventing unsolicited inbound traffic.

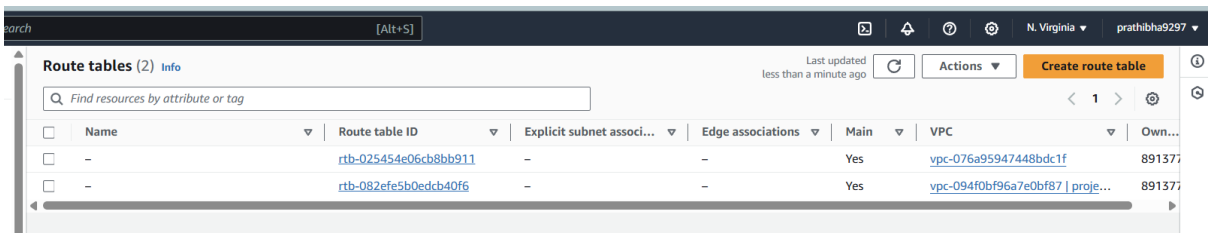
- Click on create NAT gateway
- Give name tag as project-nat-gw->select the public subnet(public2)->connectivity type should be public-
- Click on allocate Elastic IP and then click on create Nat gateway



Route tables:

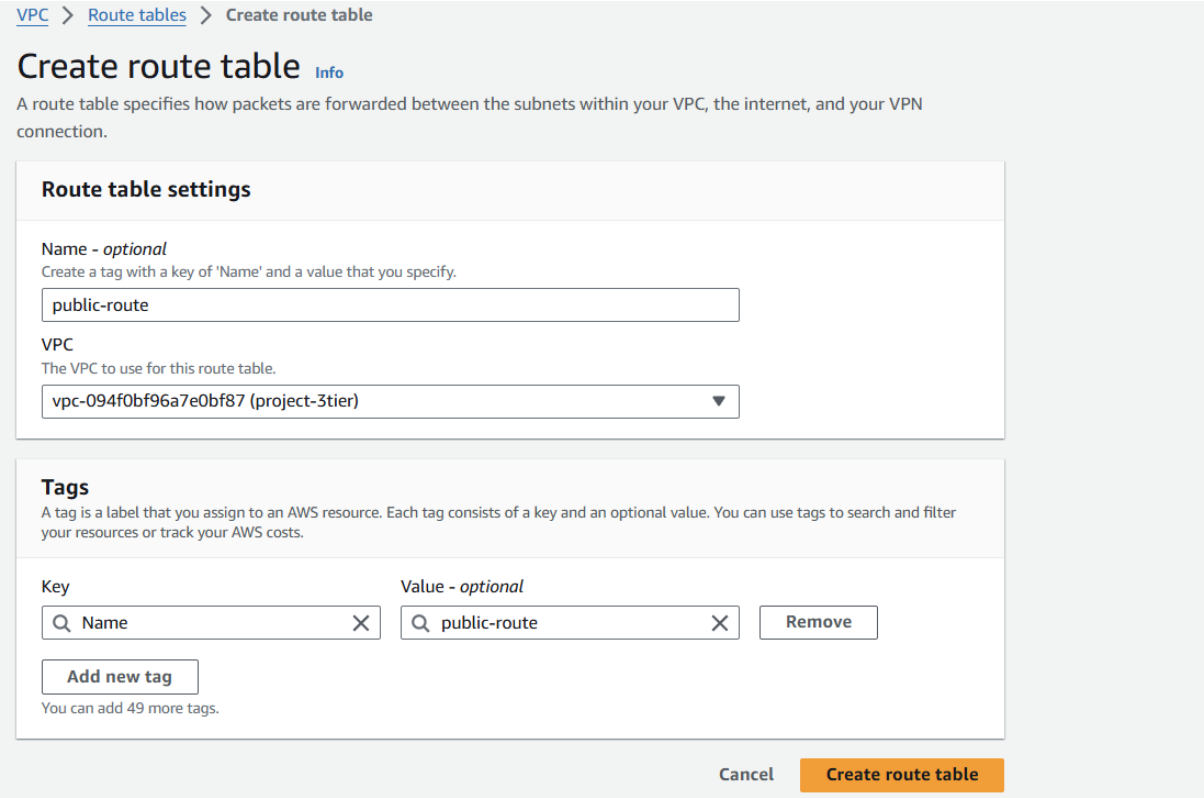
Route tables control the routing of traffic within your VPC. You can define routes for directing traffic between subnets and to/from the internet or other networks.

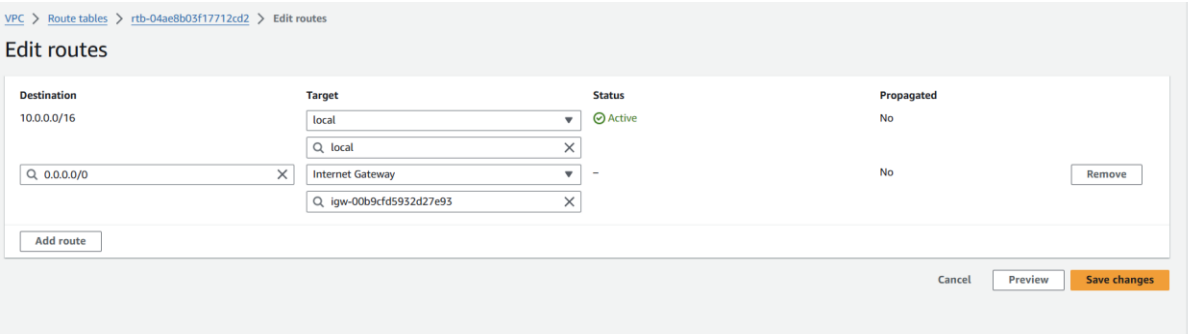
For 3 tier architecture we need to create 2 route tables. One is for public subnets and another is for private subnets.

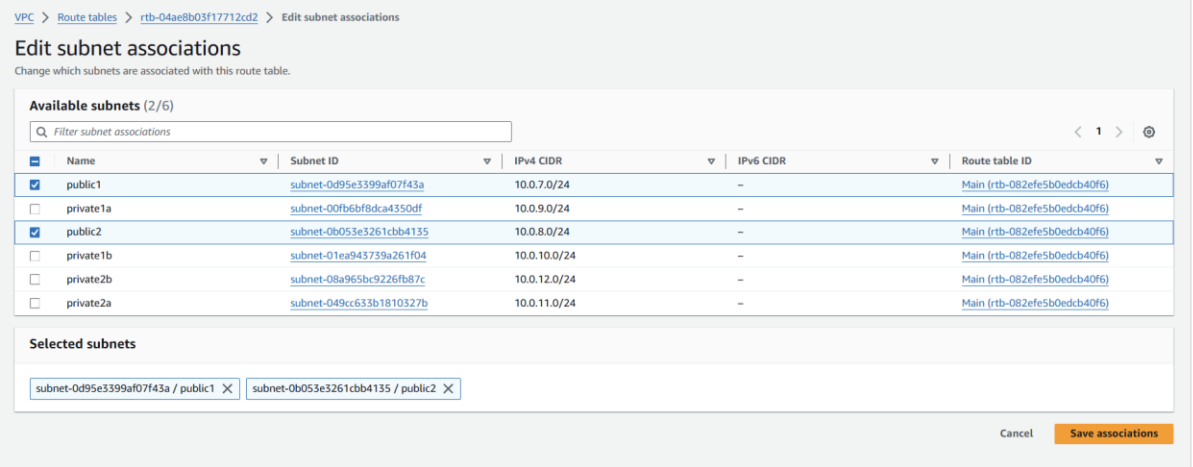


Route table1:

- Go to route tables under VPC field and click on create route table
- Give name tag as public-route->select VPC->click on create
- Once created click on action->Edit route->add IGW in add routes field->save changes.
- Click Edit subnet associations->select 2 public subnets [public1 & public2]->click on save associations.

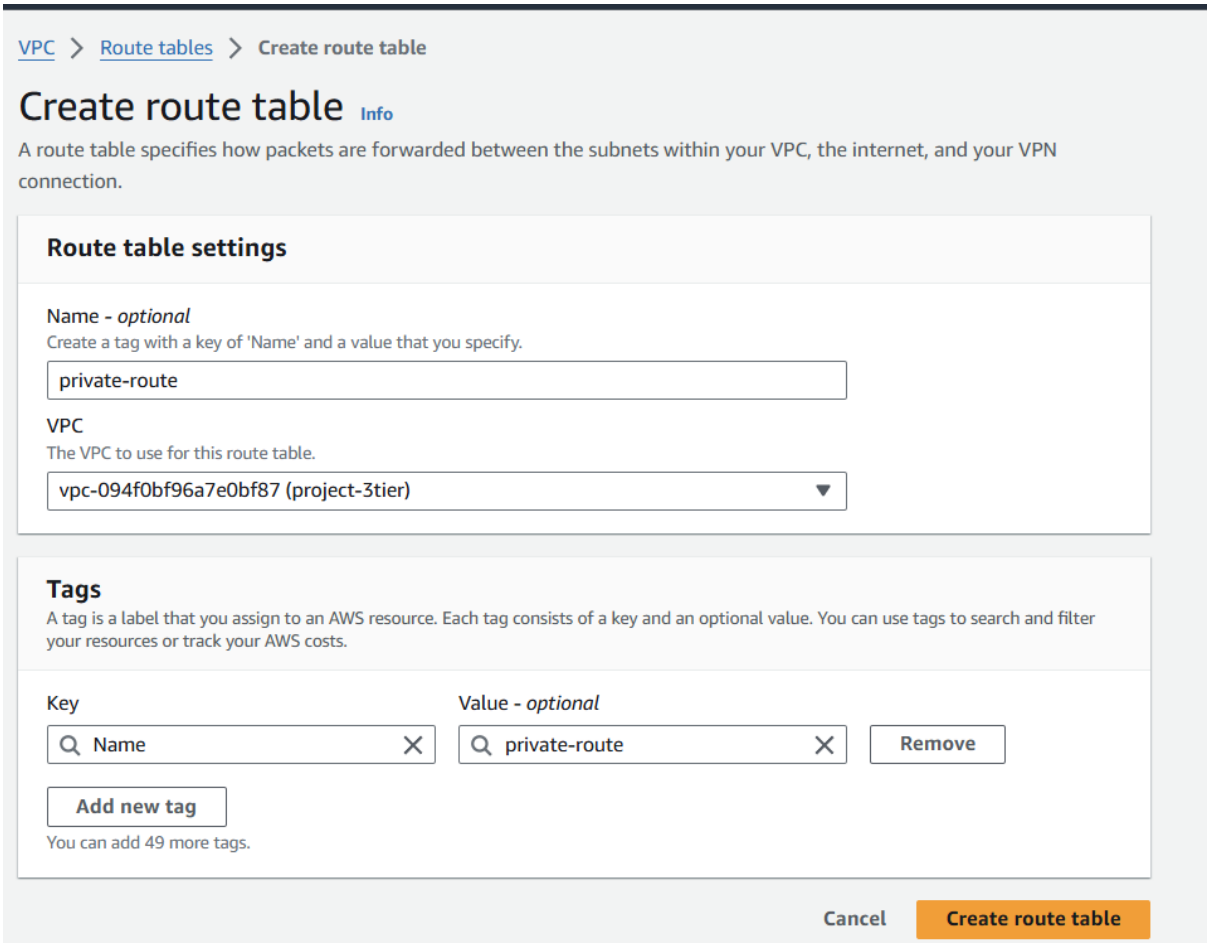


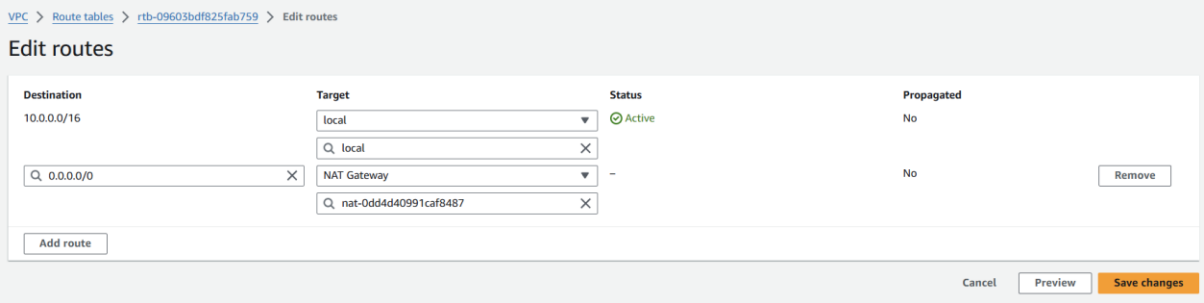


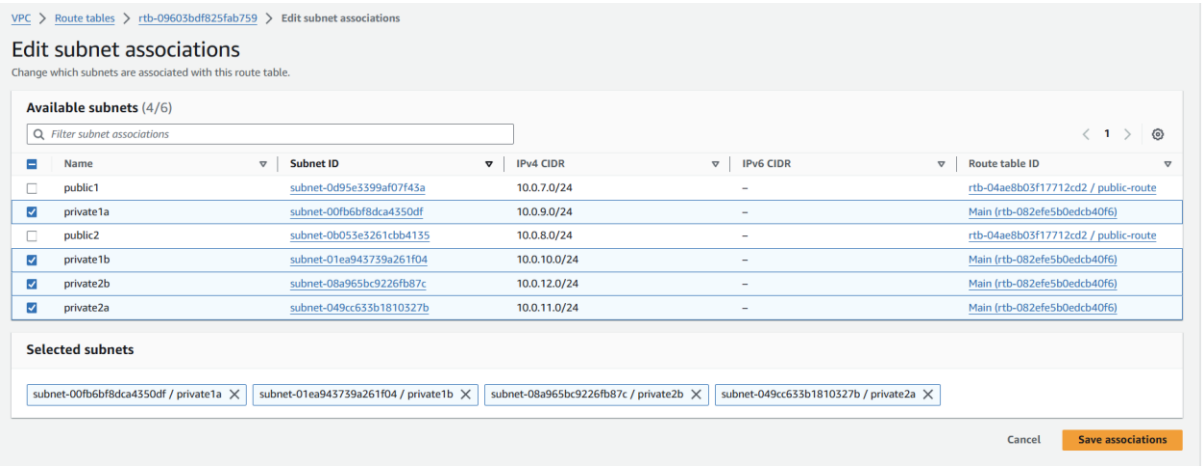


Route table2:

- Click on create route table
- Give name tag as private-route->select VPC->click on create
- Once created click on action->Edit route->add NAT gateway in add routes field->save changes.
- Click Edit subnet associations->select 4 private subnets [private1a,private1b,private2a & private2b]->click on save associations.







EC2 instance:

Amazon EC2 (Elastic Compute Cloud) is a core component of Amazon Web Services (AWS) that provides scalable computing capacity in the cloud. It allows you to launch and manage virtual servers, known as instances, which can run various applications and workloads.

Instance1:

- Go to EC2 dashboard and click on launch instance
- Give name tag as project-3tier-public1->select ubuntu -> create key pair and named as project-3tier
- Click on network settings->select VPC as project-3tier->select subnet public1->Enable the Auto assign public IP->create security group name as sg3tier->add http port number 80 for security group-> click on launch instance.
- The overall configuration as shown following slides.

Name and tags Info

Name

project-3tier-public1

Add additional tags

Application and OS Images (Amazon Machine Image) Info

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Search our full catalog including 1000s of application and OS images

Recents | My AMIs | Quick Start

Amazon Linux | macOS | Ubuntu | Windows | Red Hat | SUSE Li

Browse more AMIs

Including AMIs from AWS, Marketplace and the Community

Key pair name - *required*

project-3tier

Create new key pair

Network settings Info

VPC - *required* Info

vpc-094f0bf96a7e0bf87 (project-3tier)
10.0.0.0/16

Subnet Info

subnet-0d95e3399af07f43a public1
VPC: vpc-094f0bf96a7e0bf87 Owner: 891377141179 Availability Zone: us-east-1a
IP addresses available: 251 CIDR: 10.0.7.0/24)

Create new subnet

Auto-assign public IP Info

Enable

Additional charges apply when outside of free tier allowance

Firewall (security groups) Info

A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.

Create security group | Select existing security group

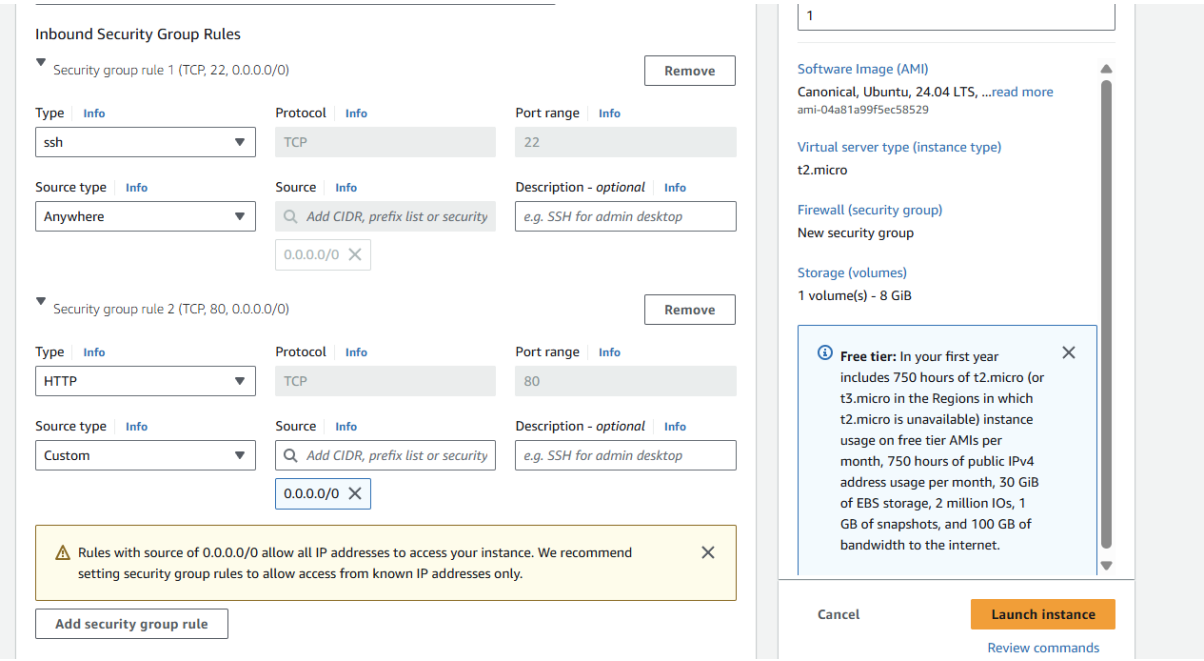
Security group name - *required*

sg3teir

This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and ._-:/()#,@[]+=&;{}!$*

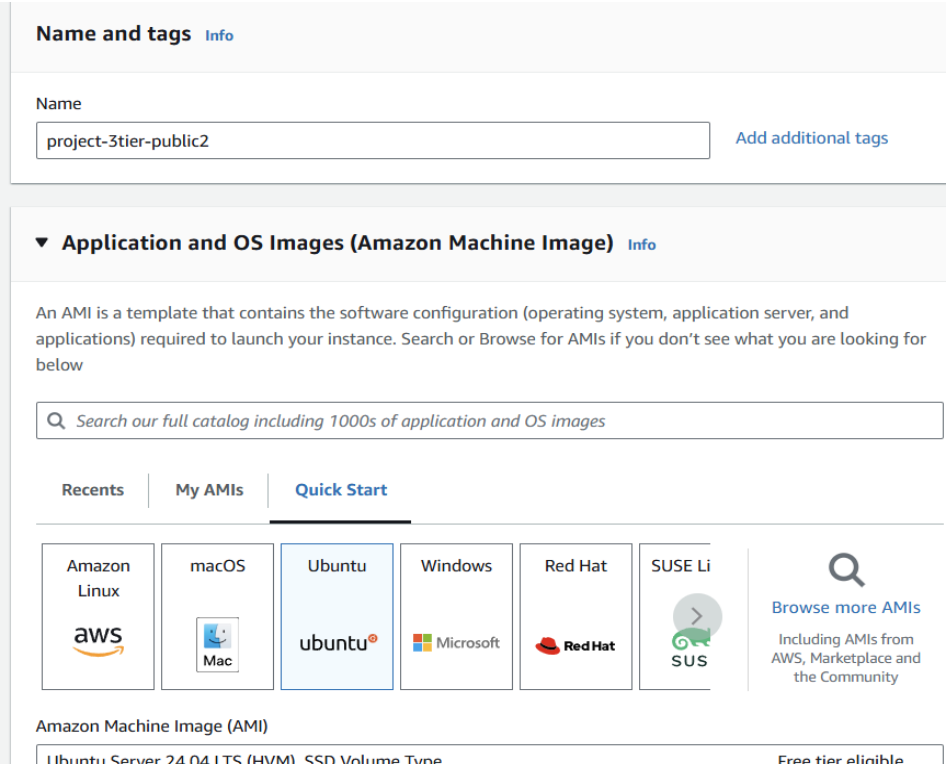
Description - *required* Info

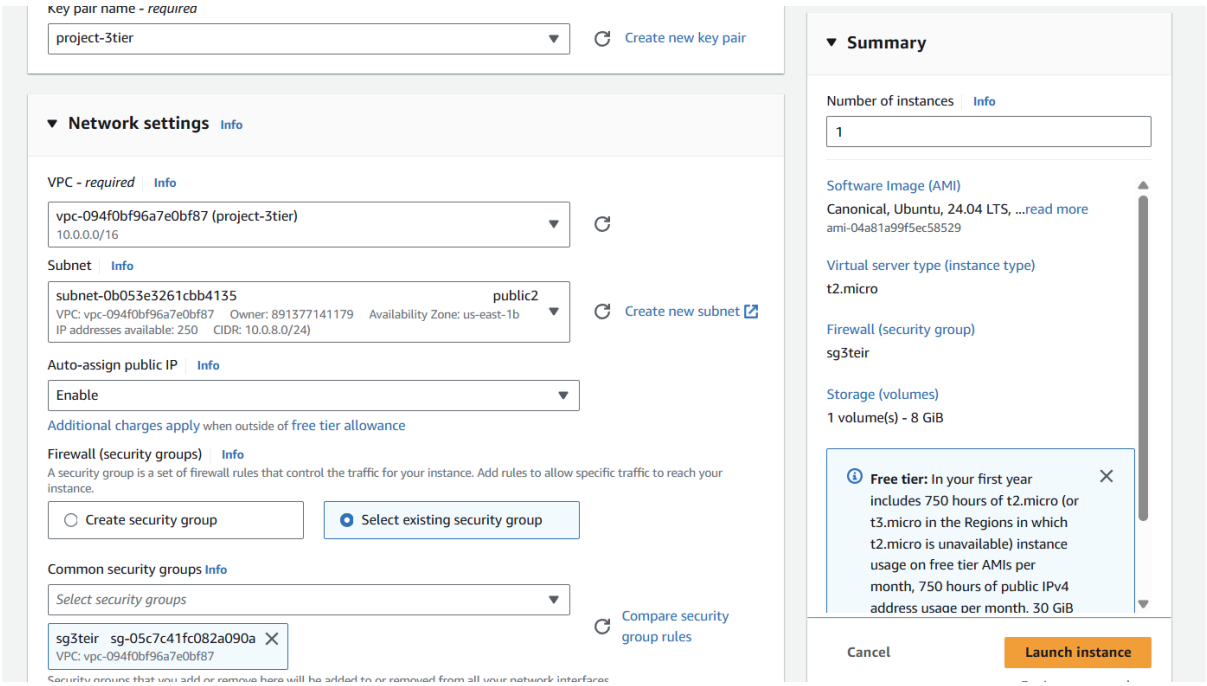
launch-wizard-1 created 2024-08-04T11:51:49.741Z

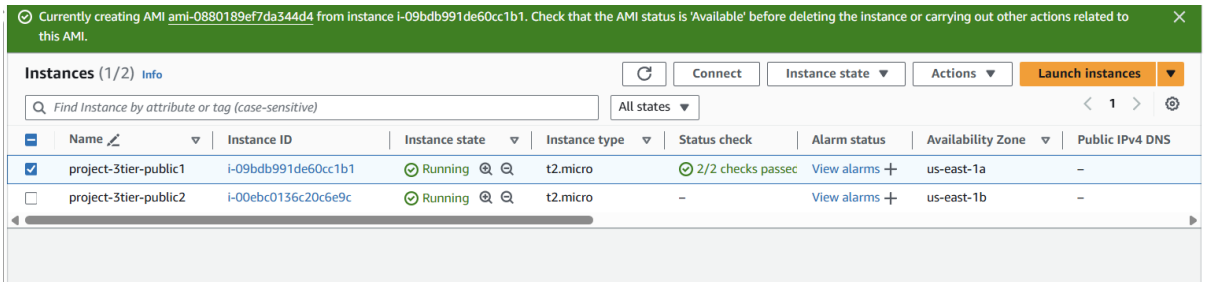


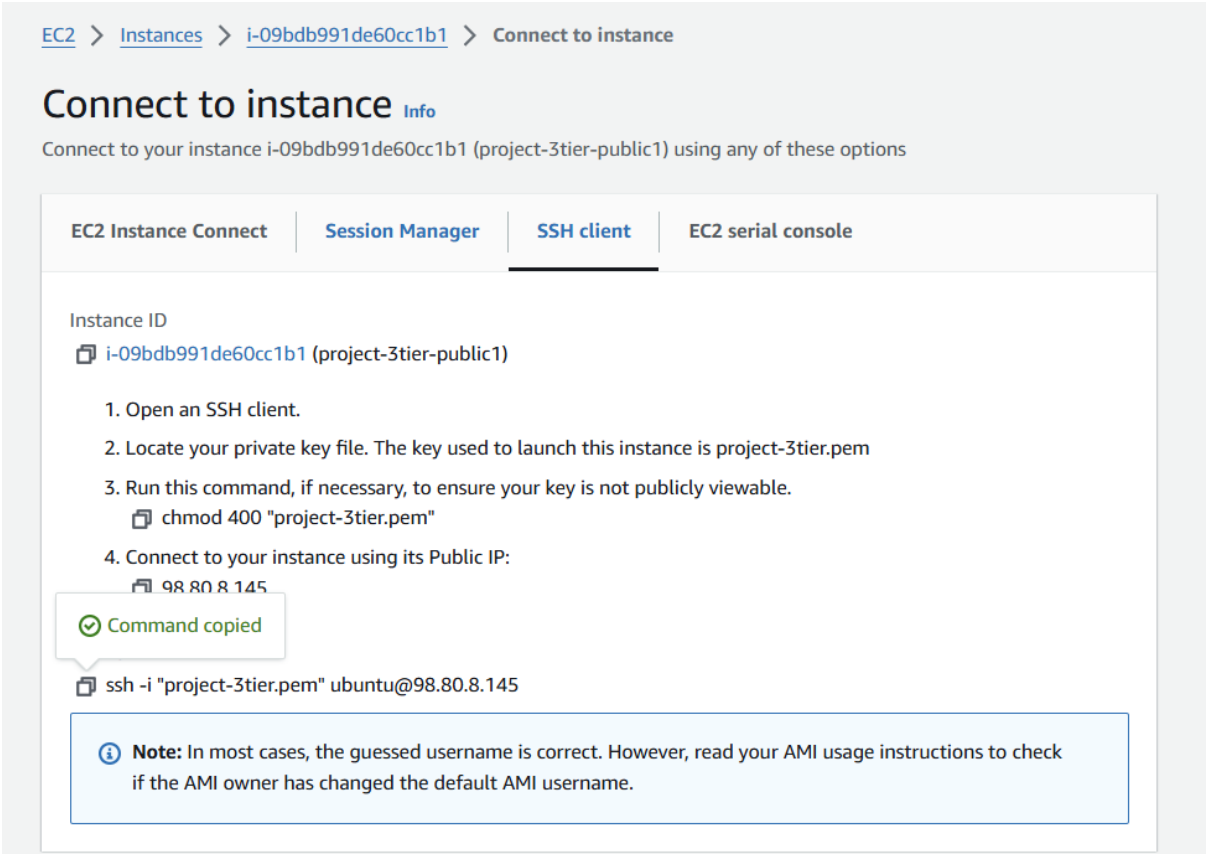
Instance2:

- click on launch instance.
- Give name tag as project-3tier-public2->select ubuntu -> select key pair as project-3tier
- Click on network settings->select VPC as project-3tier->select subnet public2->Enable the Auto assign public IP->select the existing security group-sg3tier-> click on launch instance.
- The overall configuration as shown following slides

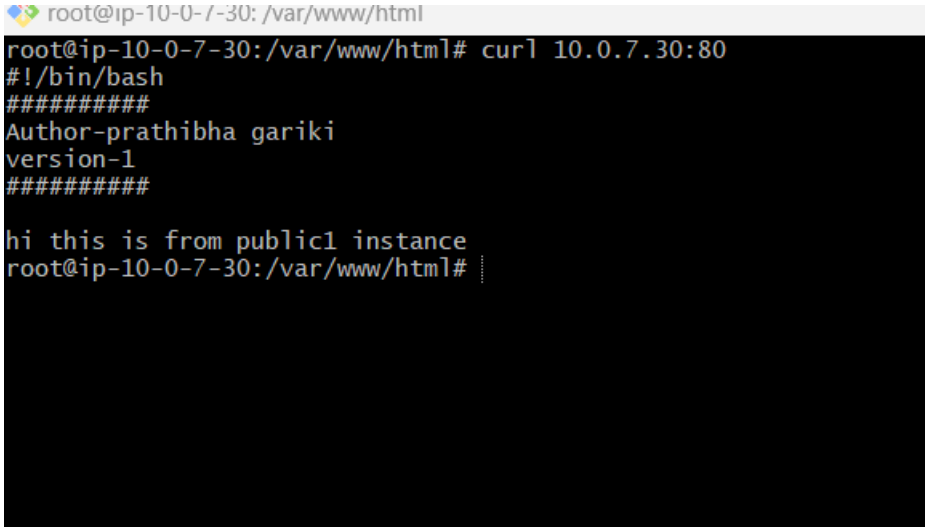



Key pair name - required
project-3tier
Create new key pair
Network settings Info
VPC - required Info
vpc-094f0bf96a7e0bf87 (project-3tier)
10.0.0.0/16
Subnet Info
subnet-0b053e3261cbb4135 public2
VPC: vpc-094f0bf96a7e0bf87 Owner: 891377141179 Availability Zone: us-east-1b
IP addresses available: 250 CIDR: 10.0.8.0/24)
Create new subnet
Auto-assign public IP Info
Enable
Additional charges apply when outside of free tier allowance
Firewall (security groups) Info
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.
Create security group
Select existing security group
Common security groups Info
Select security groups
sg3teir sg-05c7c41fc082a090a
VPC: vpc-094f0bf96a7e0bf87
Compare security group rules
Summary
Number of instances Info
1
Software Image (AMI)
Canonical, Ubuntu, 24.04 LTS, ...read more
ami-04a81a99f5ec58529
Virtual server type (instance type)
t2.micro
Firewall (security group)
sg3teir
Storage (volumes)
1 volume(s) - 8 GiB
Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB
Cancel
Launch instance


Currently creating AMI ami-0880189ef7da344d4 from instance i-09bdb991de60cc1b1. Check that the AMI status is 'Available' before deleting the instance or carrying out other actions related to this AMI.
Instances (1/2) Info
Connect
Instance state
Actions
Launch instances
Find Instance by attribute or tag (case-sensitive)
All states
Name
Instance ID
Instance state
Instance type
Status check
Alarm status
Availability Zone
Public IPv4 DNS
project-3tier-public1 i-09bdb991de60cc1b1 Running t2.micro 2/2 checks passed View alarms us-east-1a –
project-3tier-public2 i-00ebc0136c20c6e9c Running t2.micro – View alarms us-east-1b –


EC2 > Instances > i-09bdb991de60cc1b1 > Connect to instance
Connect to instance Info
Connect to your instance i-09bdb991de60cc1b1 (project-3tier-public1) using any of these options
EC2 Instance Connect
Session Manager
SSH client
EC2 serial console
Instance ID
i-09bdb991de60cc1b1 (project-3tier-public1)
1. Open an SSH client.
2. Locate your private key file. The key used to launch this instance is project-3tier.pem
3. Run this command, if necessary, to ensure your key is not publicly viewable.
chmod 400 "project-3tier.pem"
4. Connect to your instance using its Public IP:
98.80.8.145
Command copied
ssh -i "project-3tier.pem" ubuntu@98.80.8.145
Note: In most cases, the guessed username is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI username.

- Once created the instance click on connect and copy the ssh command in SSH client field and then go to git bash and connect to the server.
- Once connected change to root user->sudo -i
- Then update the server->apt update -y
- Install apache2->apt install apache2 -y
- Change directory path->cd /var/www/html
- Remove the default index.html and create new file.
- Restart->systemctl restart apache2
- Output shown in below slide.



- Once created the instance2 click on connect and copy the ssh command in SSH client field and then go to git bash and connect to the server.
- Once connected change to root user->sudo -i
- Then update the server->apt update -y
- Install apache2->apt install apache2 -y
- Change directory path->cd /var/www/html
- Remove the default index.html and create new file.
- Restart->systemctl restart apache2
- Output shown in below slide.

Load balancer:

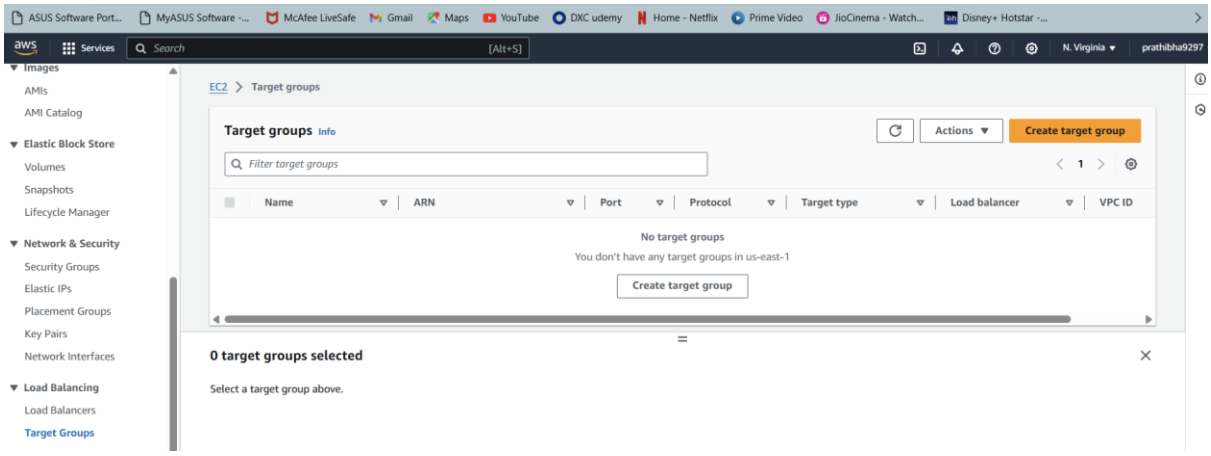
A load balancer distributes incoming network or application traffic across multiple servers to ensure no single server becomes overwhelmed. This improves the availability, reliability, and scalability of applications

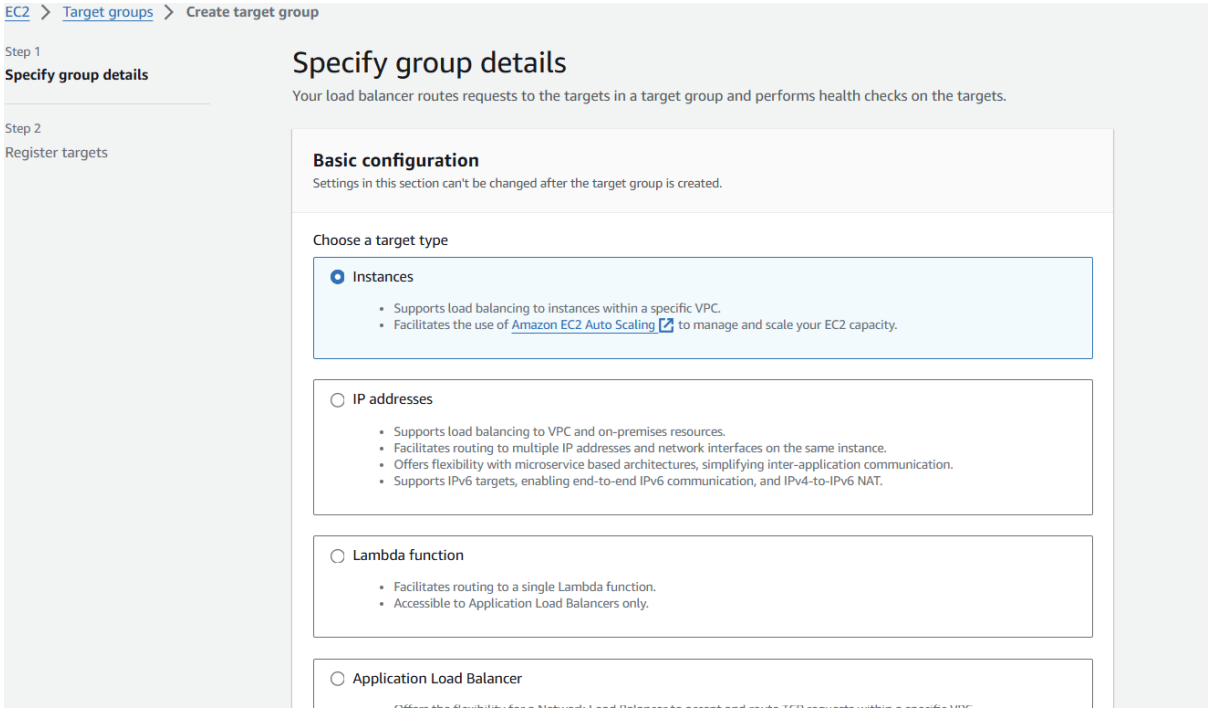
Step1:

Target group:

- For load balancer first we need to create Target group

- Click on create Target group->select instances under choose target type->select VPC project-3tier->select instances under register targets->click on include as pending below->click on create target group
- Once target group created go to load balancer.





IPv4
Each instance has a default network interface (eth0) that is assigned the primary private IPv4 address. The instance's primary private IPv4 address is the one that will be applied to the target.

IPv6
Each instance you register must have an assigned primary IPv6 address. This is configured on the instance's default network interface (eth0). Learn more

VPC
Select the VPC with the instances that you want to include in the target group. Only VPCs that support the IP address type selected above are available in this list.

project-3tier
vpc-094f0bf96a7e0bf87
IPv4 VPC CIDR: 10.0.0.0/16

Protocol version

HTTP1
Send requests to targets using HTTP/1.1. Supported when the request protocol is HTTP/1.1 or HTTP/2.

HTTP2
Send requests to targets using HTTP/2. Supported when the request protocol is HTTP/2 or gRPC, but gRPC-specific features are not available.

gRPC
Send requests to targets using gRPC. Supported when the request protocol is gRPC.

Health checks
The associated load balancer periodically sends requests, per the settings below, to the registered targets to test their status.

Health check protocol

HTTP

EC2 > Target groups > Create target group

Step 1
Specify group details

Step 2
Register targets

Register targets
This is an optional step to create a target group. However, to ensure that your load balancer routes traffic to this target group you must register your targets.

Available instances (2/2)

Filter instances

Instance ID	Name	State	Security groups	Zone
i-00ebc0136c20c6e9c	project-3tier-public2	Running	sg3teir	us-east-1b
i-09bdb991de60cc1b1	project-3tier-public1	Running	sg3teir	us-east-1a

2 selected

Ports for the selected instances
Ports for routing traffic to the selected instances.
80
1-65535 (separate multiple ports with commas)

Include as pending below

aws Services Search [Alt+S] N. Virginia prathibha9297

- Images
  - AMIs
  - AMI Catalog
- Elastic Block Store
  - Volumes
  - Snapshots
  - Lifecycle Manager
- Network & Security
  - Security Groups
  - Elastic IPs
  - Placement Groups
  - Key Pairs
  - Network Interfaces
- Load Balancing
  - Load Balancers
  - Target Groups

EC2 > Load balancers

Load balancers
Elastic Load Balancing scales your load balancer capacity automatically in response to changes in incoming traffic.

Actions | Create load balancer

Filter load balancers

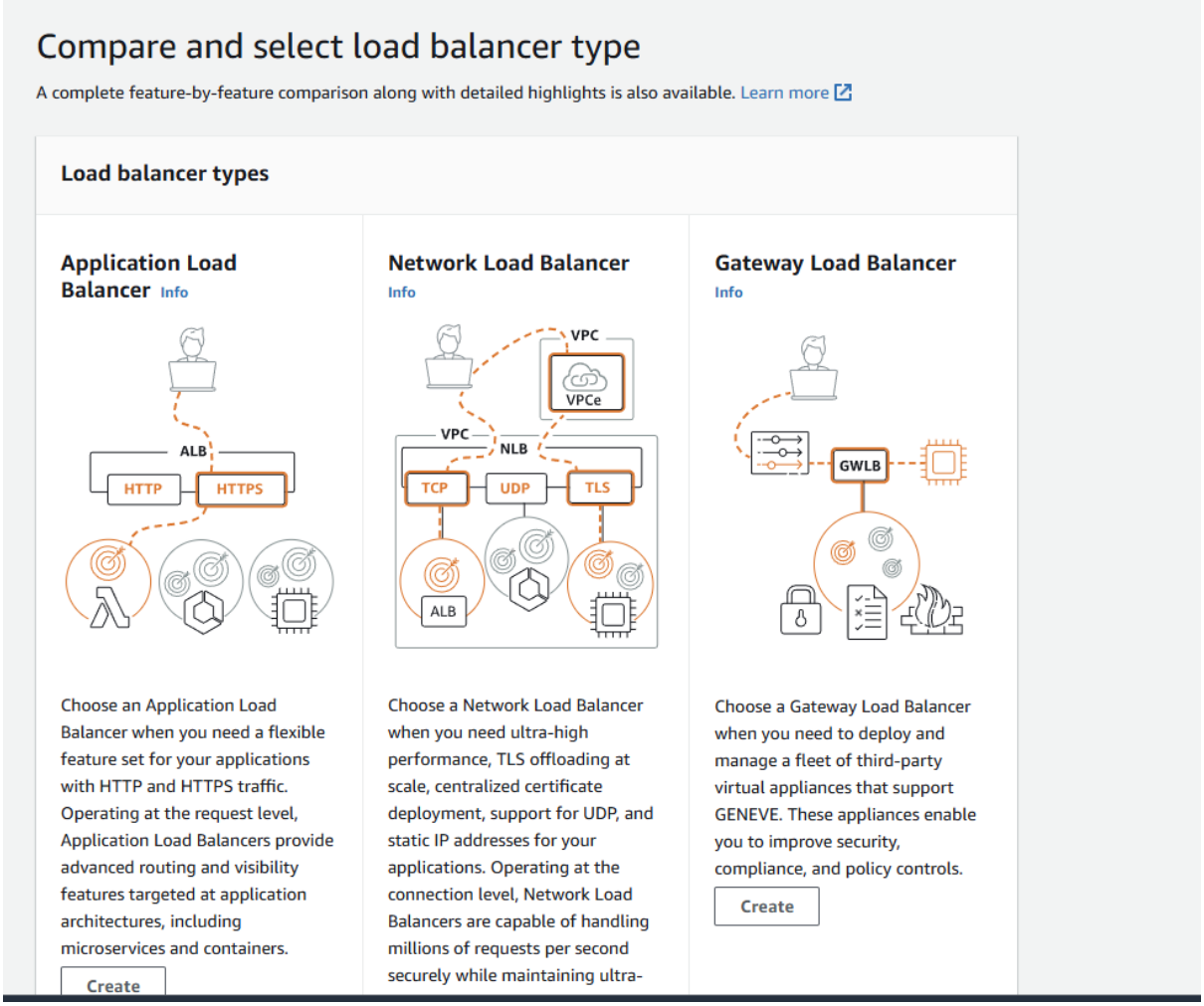
Name	DNS name	State	VPC ID	Availability Zones	Type	Date created

No load balancers
You don't have any load balancers in us-east-1
Create load balancer

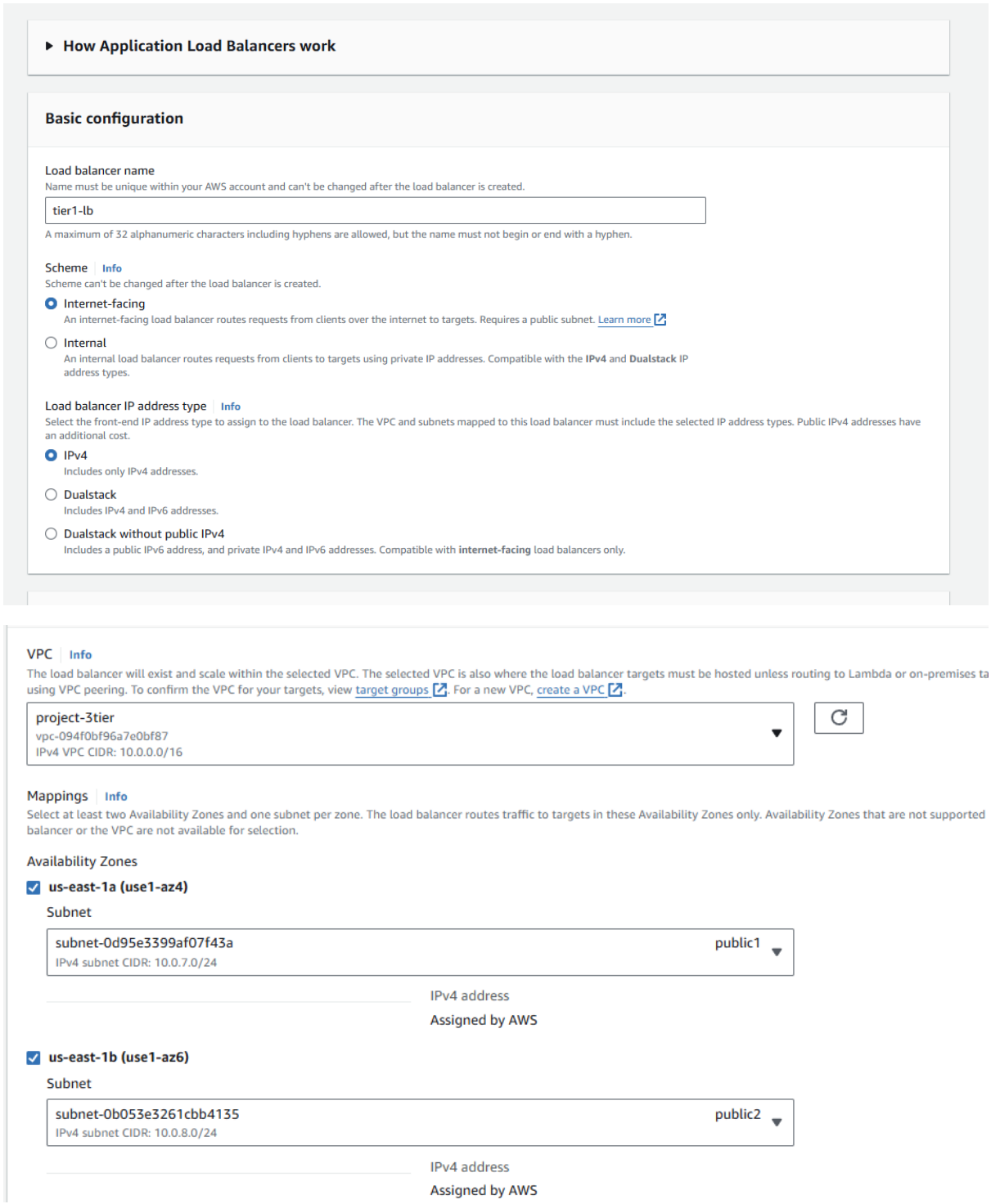
0 load balancers selected

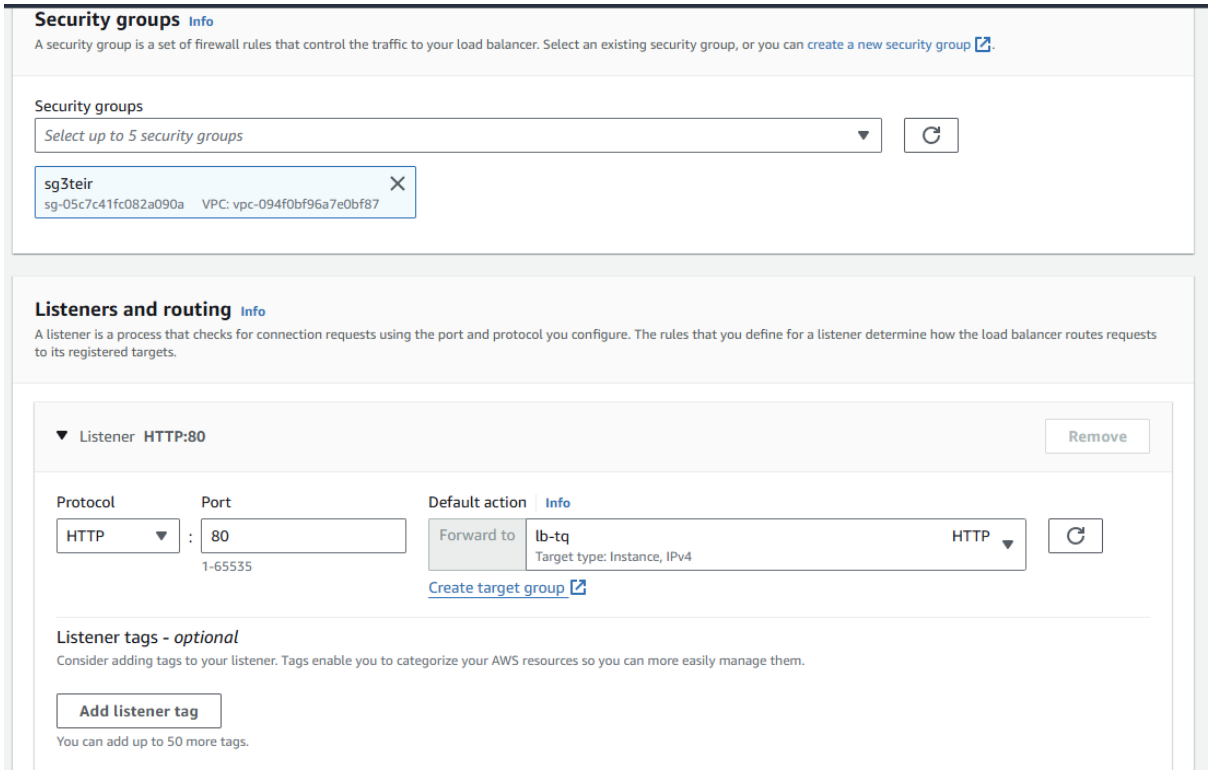
Select a load balancer above.

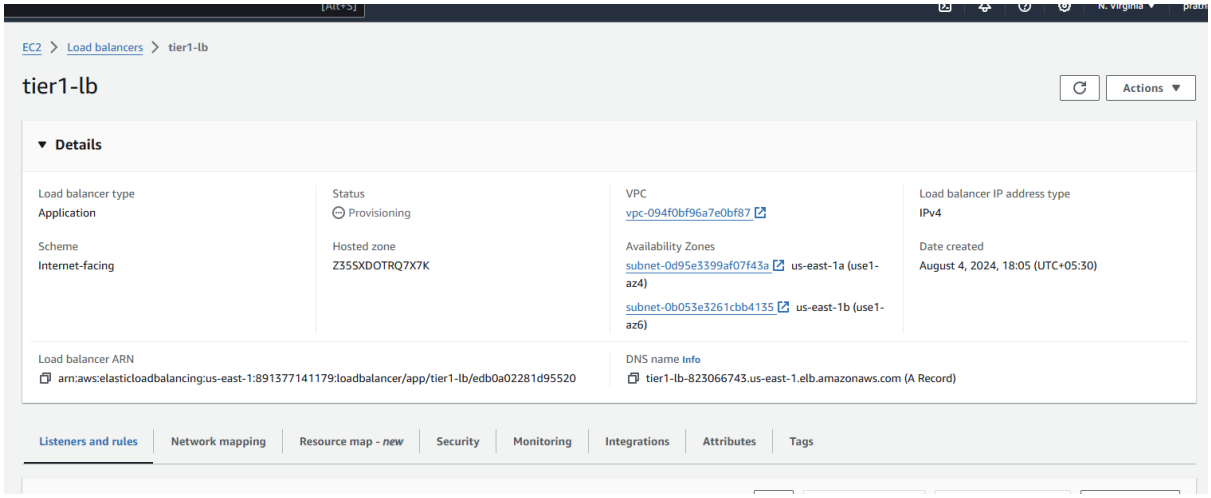
- Go to load balancer and click on create load balancer.
- Select application load balancer



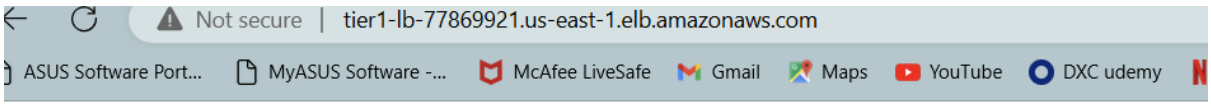
- Give name tag as tier1-lb->click on internet facing under scheme field->select VPC project-3tier->select availability zone us-east-1a & us-east-1b->select subnets public1 & public2->select security group->select target group (lb-tg)->remaining fields leave as default and click on next->click on create load balancer.


How Application Load Balancers work
Basic configuration
Load balancer name
Name must be unique within your AWS account and can't be changed after the load balancer is created.
tier1-lb
A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.
Scheme Info
Scheme can't be changed after the load balancer is created.
Internet-facing
An internet-facing load balancer routes requests from clients over the internet to targets. Requires a public subnet. Learn more
Internal
An internal load balancer routes requests from clients to targets using private IP addresses. Compatible with the IPv4 and Dualstack IP address types.
Load balancer IP address type Info
Select the front-end IP address type to assign to the load balancer. The VPC and subnets mapped to this load balancer must include the selected IP address types. Public IPv4 addresses have an additional cost.
IPv4
Includes only IPv4 addresses.
Dualstack
Includes IPv4 and IPv6 addresses.
Dualstack without public IPv4
Includes a public IPv6 address, and private IPv4 and IPv6 addresses. Compatible with internet-facing load balancers only.
VPC Info
The load balancer will exist and scale within the selected VPC. The selected VPC is also where the load balancer targets must be hosted unless routing to Lambda or on-premises ta
using VPC peering. To confirm the VPC for your targets, view target groups. For a new VPC, create a VPC.
project-3tier
vpc-094f0bf96a7e0bf87
IPv4 VPC CIDR: 10.0.0.0/16
Mappings Info
Select at least two Availability Zones and one subnet per zone. The load balancer routes traffic to targets in these Availability Zones only. Availability Zones that are not supported
balancer or the VPC are not available for selection.
Availability Zones
us-east-1a (use1-az4)
Subnet
subnet-0d95e3399af07f43a
public1
IPv4 subnet CIDR: 10.0.7.0/24
IPv4 address
Assigned by AWS
us-east-1b (use1-az6)
Subnet
subnet-0b053e3261cbb4135
public2
IPv4 subnet CIDR: 10.0.8.0/24
IPv4 address
Assigned by AWS

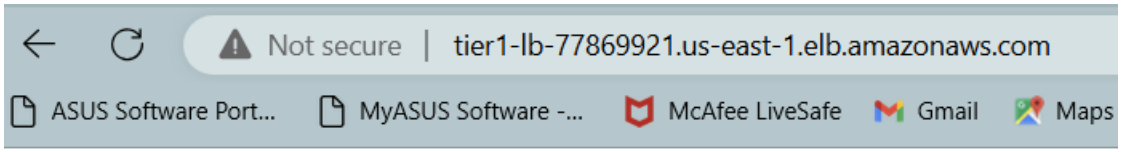




- Once load balancer created copy the DNS name and paste it in chrome.
- Out put shown in below slides.



/bin/bash ########## Author-prathibha gariki version-1 ########## hi this is from public1 instance

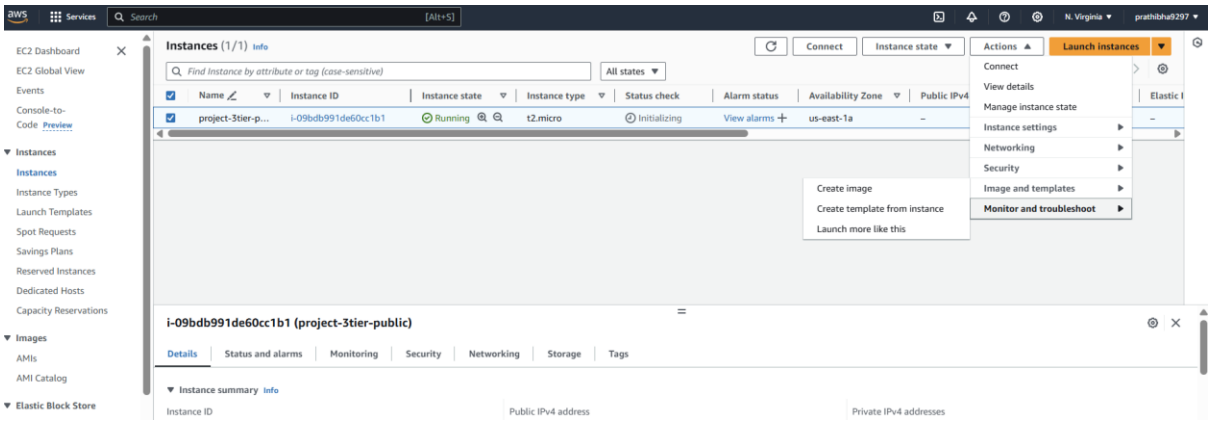


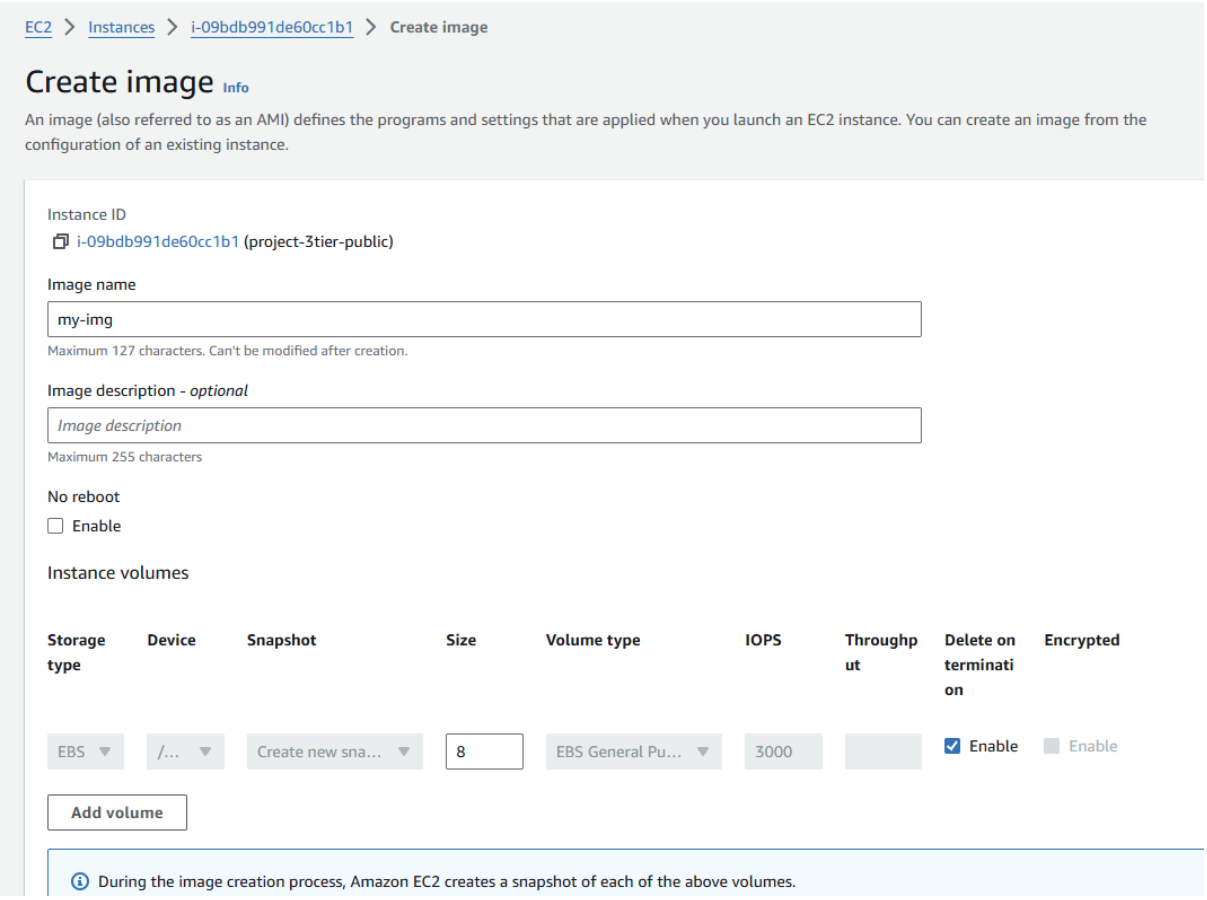
###################### hi this is from public2 instance

Auto scaling:

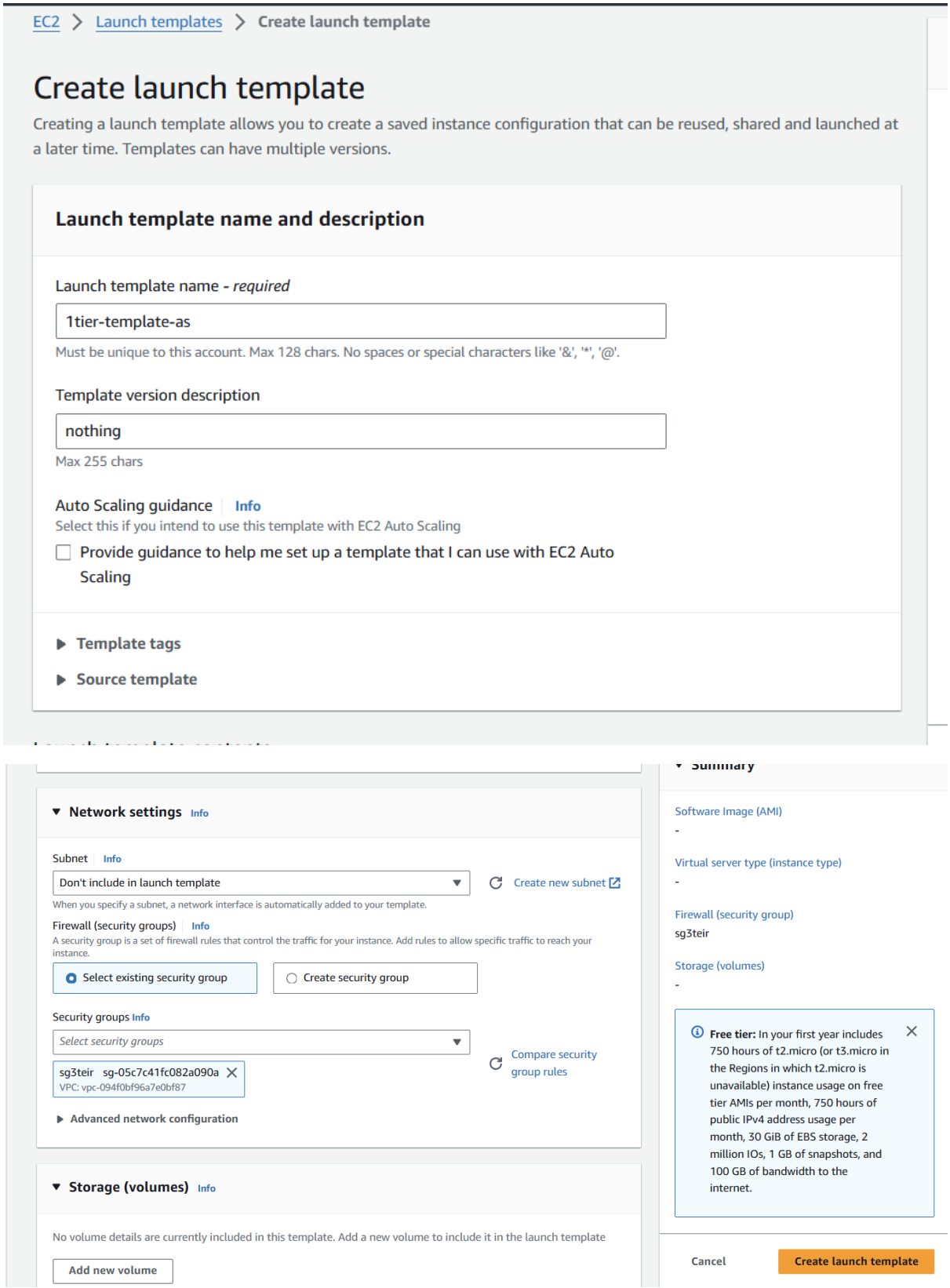
AWS Auto Scaling is a service that automatically adjusts the number of compute resources (such as EC2 instances) based on current demand. This helps maintain performance and optimize costs by scaling your resources up or down according to defined policies

- Create image using instance->select instance and click actions->image and templates->create image.
- Give name tag as my-img under create image field as shown in below slides.



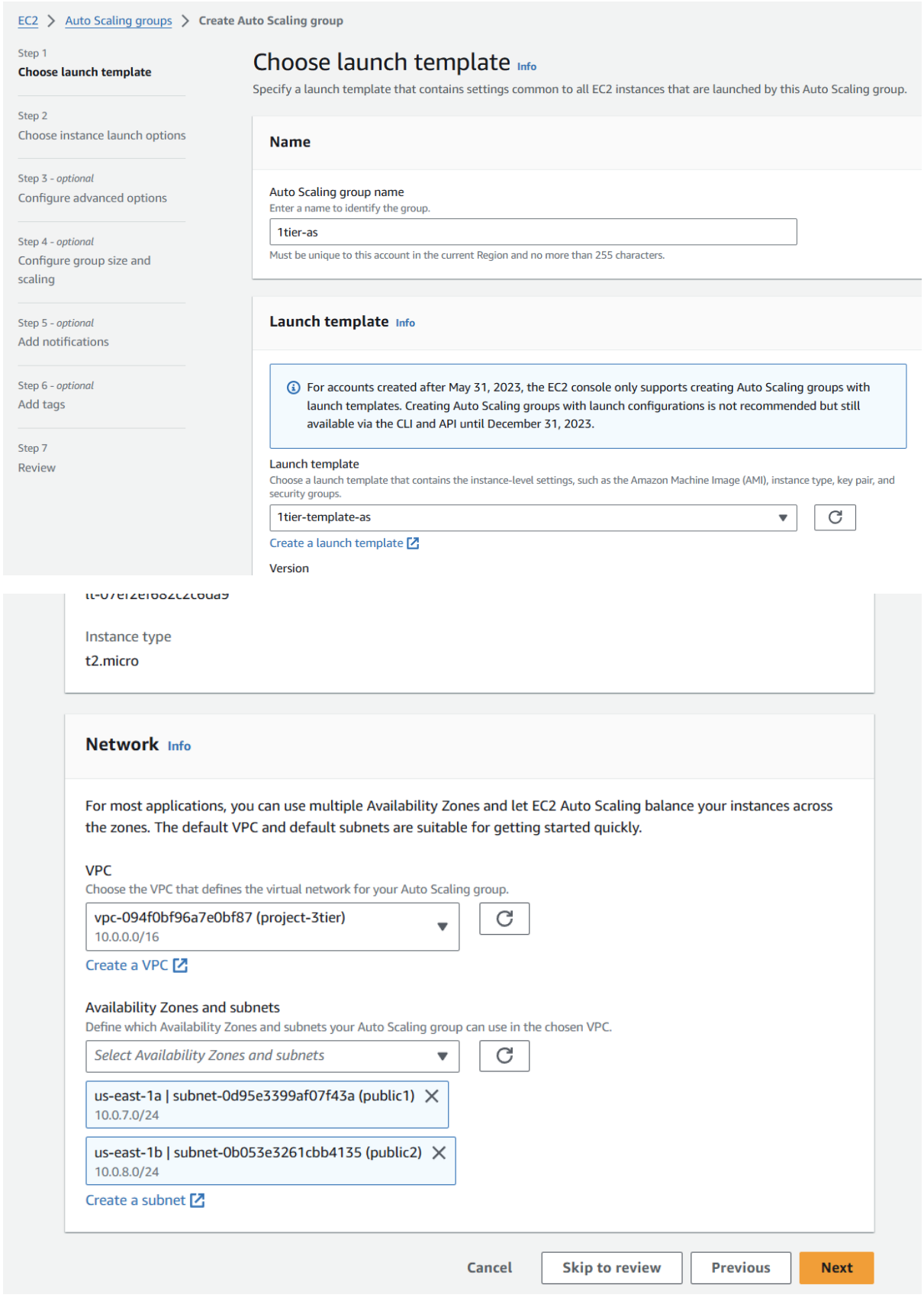


- Once image created go to EC2 dashboard and click on templates
- Give name tag as 1tier-template-as->template version as nothing
- Click the network settings and select existing security group as shown in below.



- Go to auto scaling and click on create auto scaling groups
- Give name tag as 1tier-as
- Select created target group-1tier-template-as
- Select the VPC -> select availability zone us-east-1a (public1 subnet) & us-east-1b (public2 subnet)->click attached to an existing load balancer->select existing target group.

- Give desired capacity as 2, min capacity as 2 and max capacity as 3
- Select target tracking scaling policy under auto scaling options.
- Click on create auto scaling.



control over health check replacements and monitoring.

Load balancing Info

Use the options below to attach your Auto Scaling group to an existing load balancer, or to a new load balancer that you define.

- ○ No load balancer
  Traffic to your Auto Scaling group will not be fronted by a load balancer.
- ◉ Attach to an existing load balancer
  Choose from your existing load balancers.
- ○ Attach to a new load balancer
  Quickly create a basic load balancer to attach to your Auto Scaling group.

Attach to an existing load balancer

Select the load balancers that you want to attach to your Auto Scaling group.

- ◉ Choose from your load balancer target groups
  This option allows you to attach Application, Network, or Gateway Load Balancers.
- ○ Choose from Classic Load Balancers

Existing load balancer target groups

Only instance target groups that belong to the same VPC as your Auto Scaling group are available for selection.

Select target groups ▼ ↻

lb-tg | HTTP ✕
Application Load Balancer: tier1-lb

Choose the unit of measurement for the desired capacity value. vCPUs and Memory(GiB) are only supported for mixed instances groups configured with a set of instance attributes.

Units (number of instances)

Desired capacity

Specify your group size.

2

Scaling Info

You can resize your Auto Scaling group manually or automatically to meet changes in demand.

Scaling limits

Set limits on how much your desired capacity can be increased or decreased.

Min desired capacity	Max desired capacity
2	3
Equal or less than desired capacity	Equal or greater than desired capacity

Automatic scaling - *optional*

Choose whether to use a target tracking policy | Info

You can set up other metric-based scaling policies and scheduled scaling after creating your Auto Scaling group.

- ○ No scaling policies
  Your Auto Scaling group will remain at its initial size and will not dynamically resize to meet demand.
- ◉ Target tracking scaling policy
  Choose a CloudWatch metric and target value and let the scaling policy adjust the desired capacity in proportion to the metric's value.

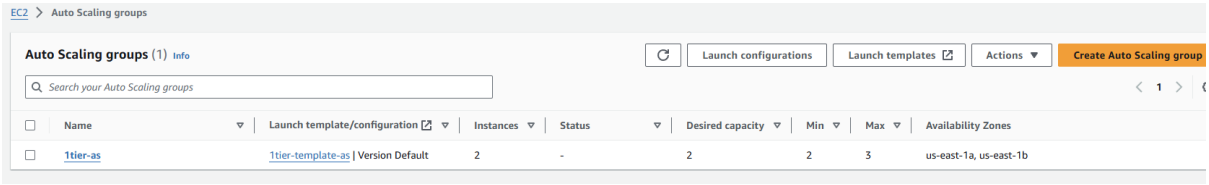
Scaling policy name

Target Tracking Policy

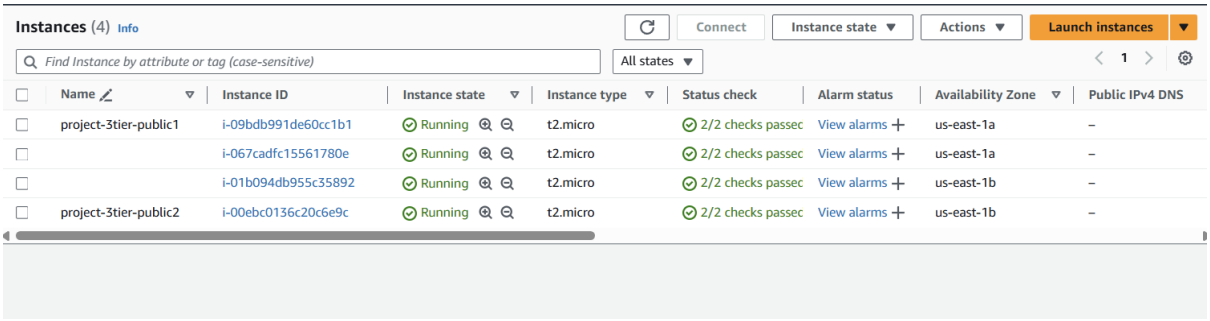
Metric type Info

Monitored metric that determines if resource utilization is too low or high. If using EC2 metrics, consider enabling detailed monitoring for better scaling performance.

Average CPU utilization

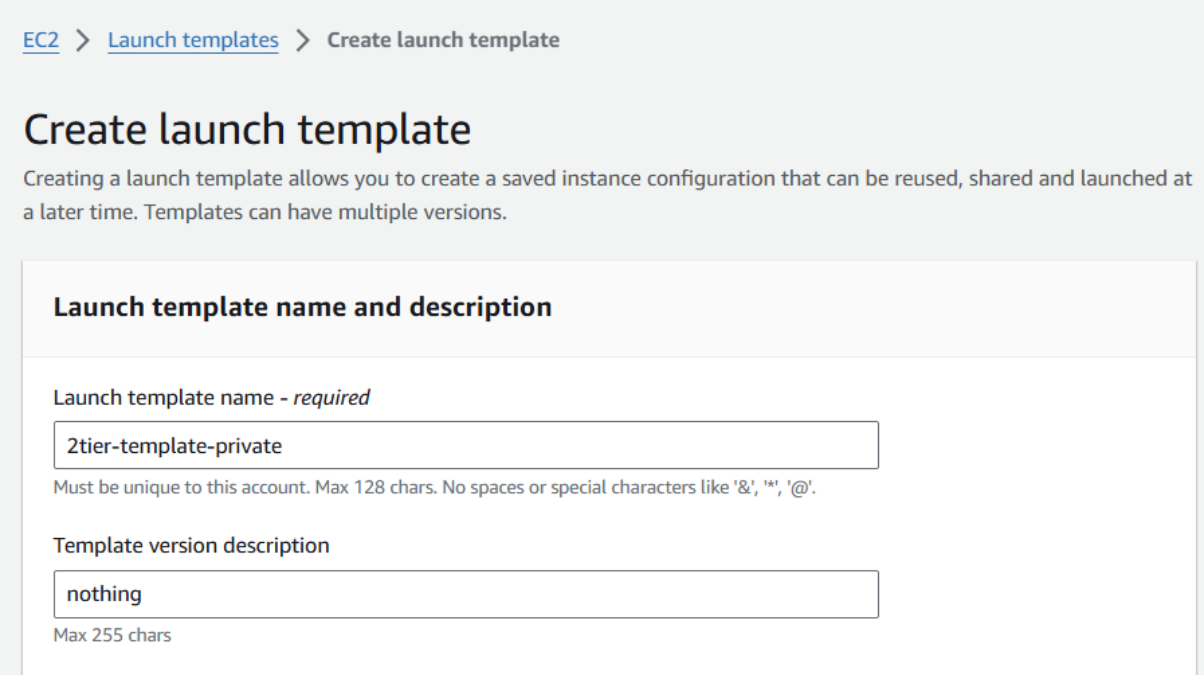


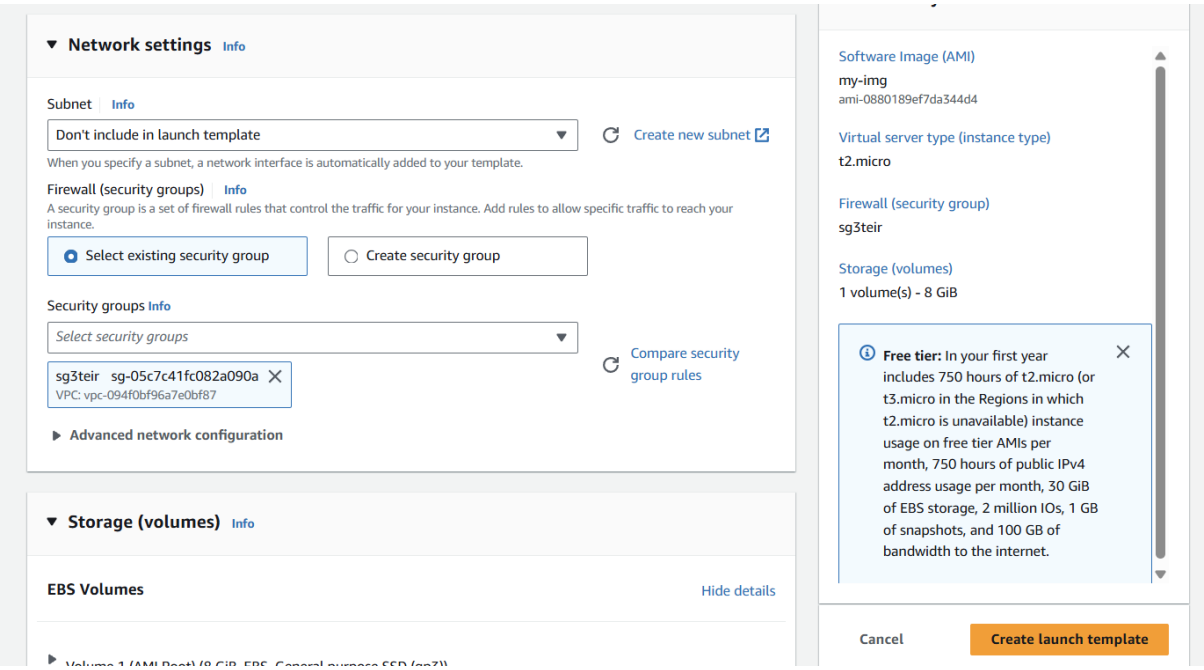
Once auto scaling created another 2 extra instances added. Previously 2 instances created and after auto scaling another 2 instances added to total 4 instances.



Auto scaling for private subnets:

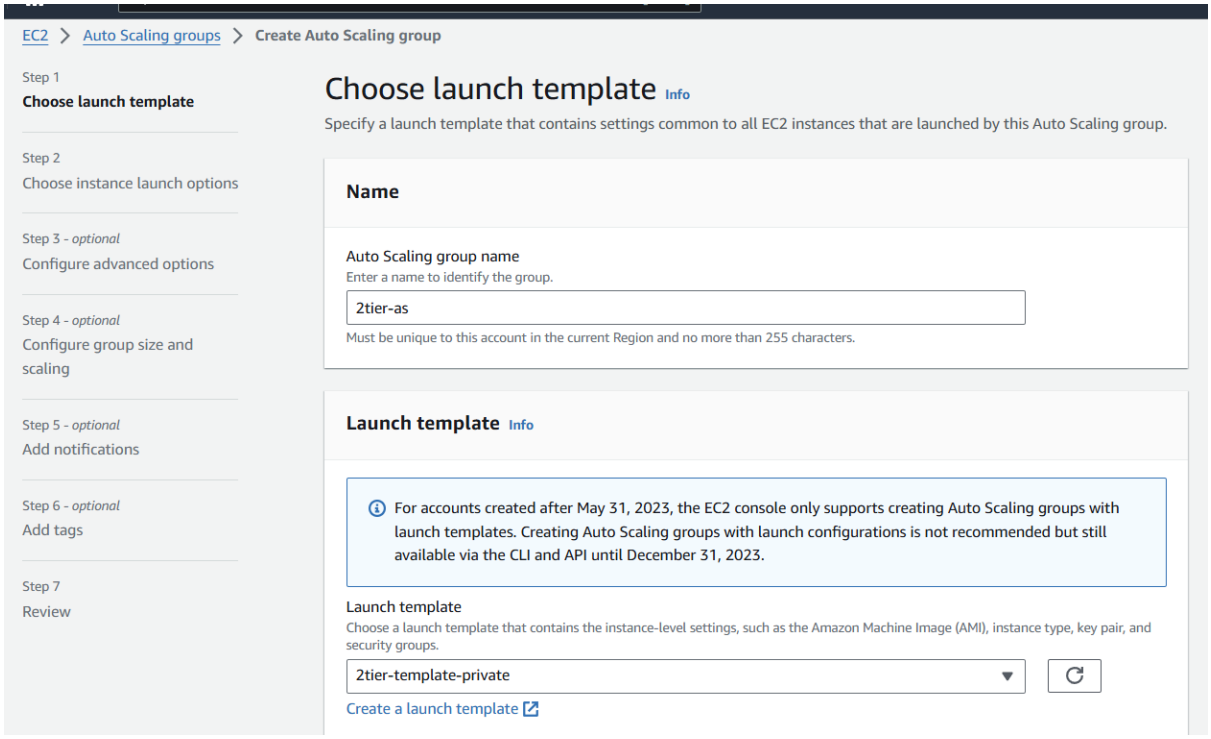
- Give name tag as 2tier-template-private->template version as nothing
- Click the network settings and select existing security group and click on create launch template as shown in below.

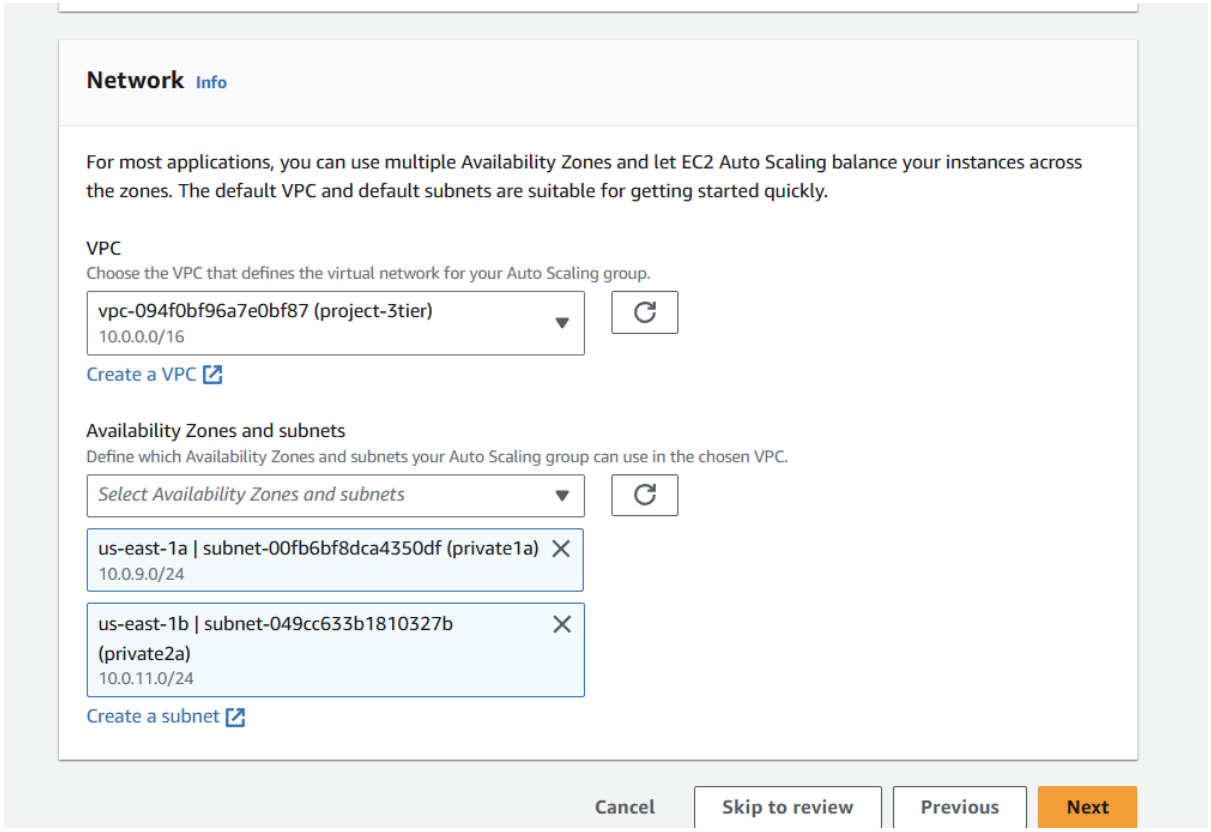




- Go to auto scaling and click on create auto scaling groups
- Give name tag as 2tier-as
- Select created target group-2tier-template-private
- Select the VPC -> select availability zone us-east-1a (private1a subnet) & us-east-1b (private2a subnet)->click attached to new load balancer->for load balancer give name tag as lb-private -> click on internet facing->select private1a & private2a subnets under availability zone->click on create target group->give name as lb-tg-private.
- Give desired capacity as 2, min capacity as 2 and max capacity as 3

- Select target tracking scaling policy under auto scaling options.
- Click on create auto scaling.





Load balancing Info

Use the options below to attach your Auto Scaling group to an existing load balancer, or to a new load balancer that you define.

- ○ No load balancer
  Traffic to your Auto Scaling group will not be fronted by a load balancer.
- ○ Attach to an existing load balancer
  Choose from your existing load balancers.
- ◉ Attach to a new load balancer
  Quickly create a basic load balancer to attach to your Auto Scaling group.

Attach to a new load balancer

Define a new load balancer to create for attachment to this Auto Scaling group.

Load balancer type

Choose from the load balancer types offered below. Type selection cannot be changed after the load balancer is created. If you need a different type of load balancer than those offered here, visit the Load Balancing console.

- ◉ Application Load Balancer
  HTTP, HTTPS
- ○ Network Load Balancer
  TCP, UDP, TLS

Load balancer name

Name cannot be changed after the load balancer is created.

lb-private

Load balancer scheme

Scheme cannot be changed after the load balancer is created.

- ○ Internal
- ◉ Internet-facing

Network mapping

Your new load balancer will be created using the same VPC and Availability Zone selections as your Auto Scaling group. You can select different subnets and add subnets from additional Availability Zones.

VPC

vpc-094f0bf96a7e0bf87 project-3tier

Availability Zones and subnets

You must select a single subnet for each Availability Zone enabled. Only public subnets are available for selection to support DNS resolution.

☑ us-east-1a	subnet-00fb6bf8dca4350df
☑ us-east-1b	subnet-049cc633b1810327b

Listeners and routing

If you require secure listeners, or multiple listeners, you can configure them from the Load Balancing console after your load balancer is created.

Protocol	Port	Default routing (forward to)
HTTP	80	Create a target group

New target group name

An instance target group with default settings will be created.

lb-tq-private

EC2 health checks

Always enabled

Additional health check types - *optional* | Info

Turn on Elastic Load Balancing health checks Recommended

Elastic Load Balancing monitors whether instances are available to handle requests. When it reports an unhealthy instance, EC2 Auto Scaling can replace it on its next periodic check.

EC2 Auto Scaling will start to detect and act on health checks performed by Elastic Load Balancing. To avoid unexpected terminations, first verify the settings of these health checks in the Load Balancer console

Turn on VPC Lattice health checks

VPC Lattice can monitor whether instances are available to handle requests. If it considers a target as failed a health check, EC2 Auto Scaling replaces it after its next periodic check.

Health check grace period | Info

This time period delays the first health check until your instances finish initializing. It doesn't prevent an instance from terminating when placed into a non-running state.

300 seconds

Additional settings

Monitoring | Info

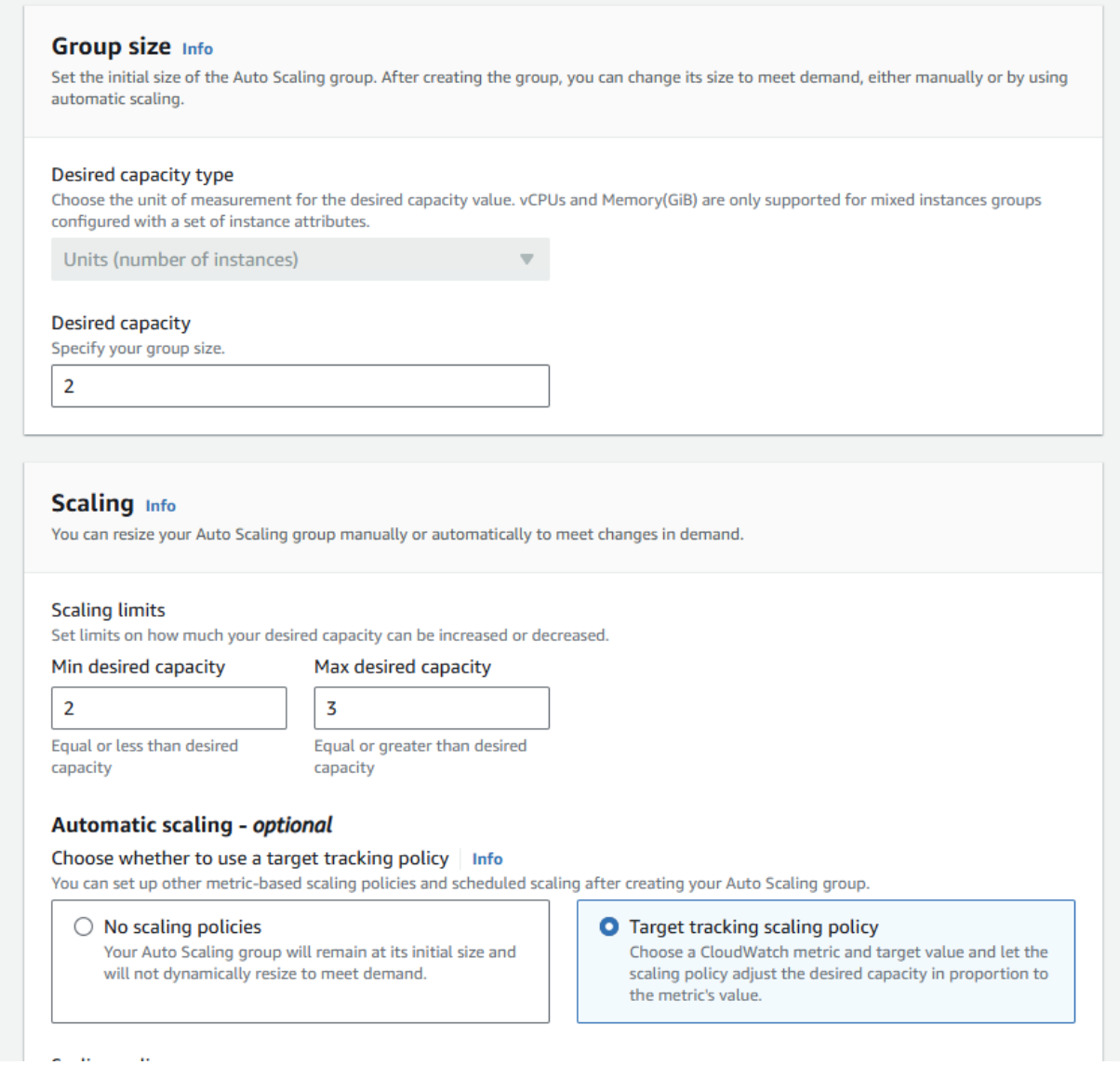
Enable group metrics collection within CloudWatch

Default instance warmup | Info

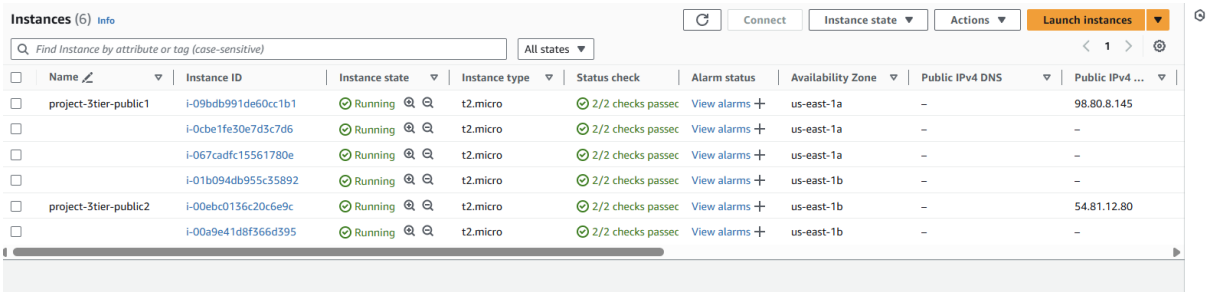
The amount of time that CloudWatch metrics for new instances do not contribute to the group's aggregated instance metrics, as their usage data is not reliable yet.

Enable default instance warmup

Cancel Skip to review Previous Next



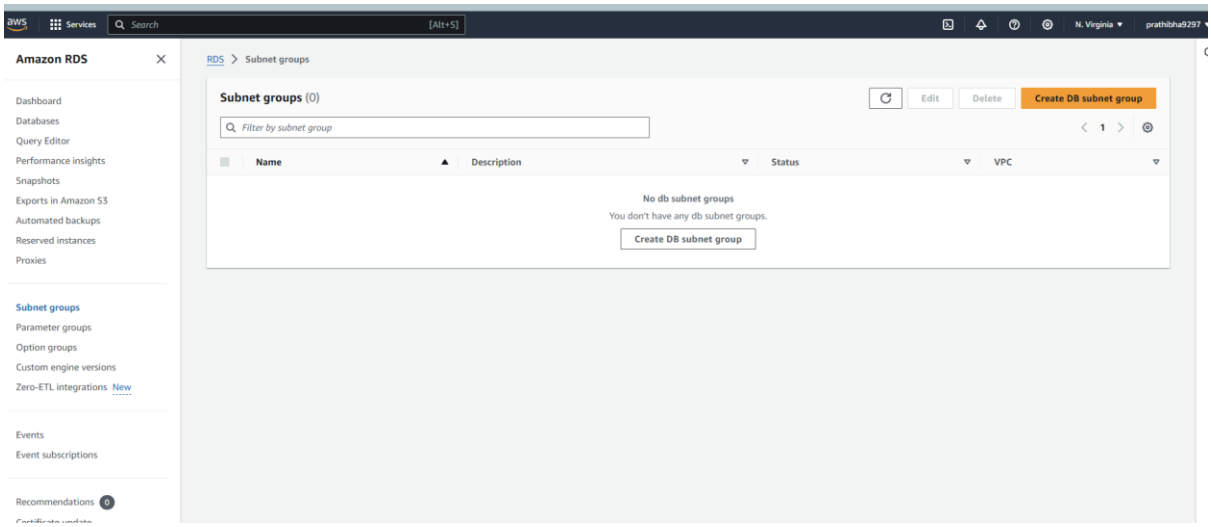
After autoscaling for private subnets (private1a & private 2a) another 2 instances added. Previously 4 instances are available after autoscaling another 2 instances added total 6 instances.

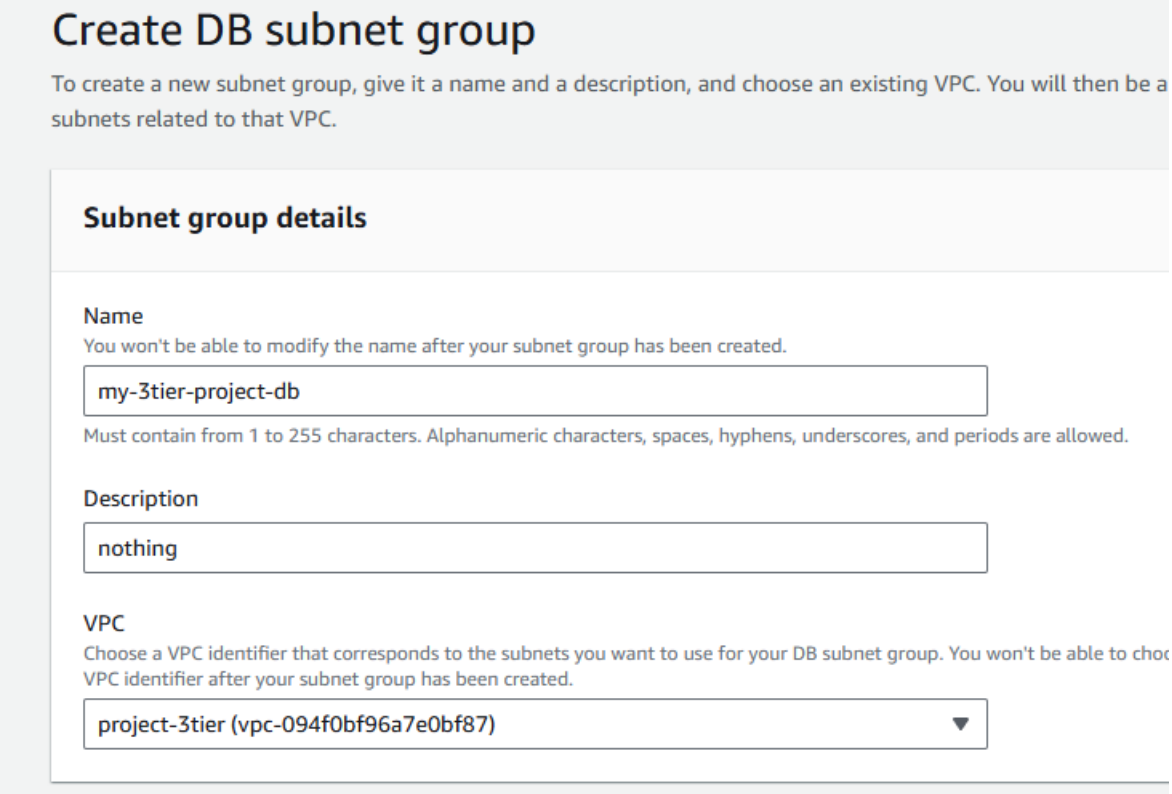


RDS:

1.DB subnet:

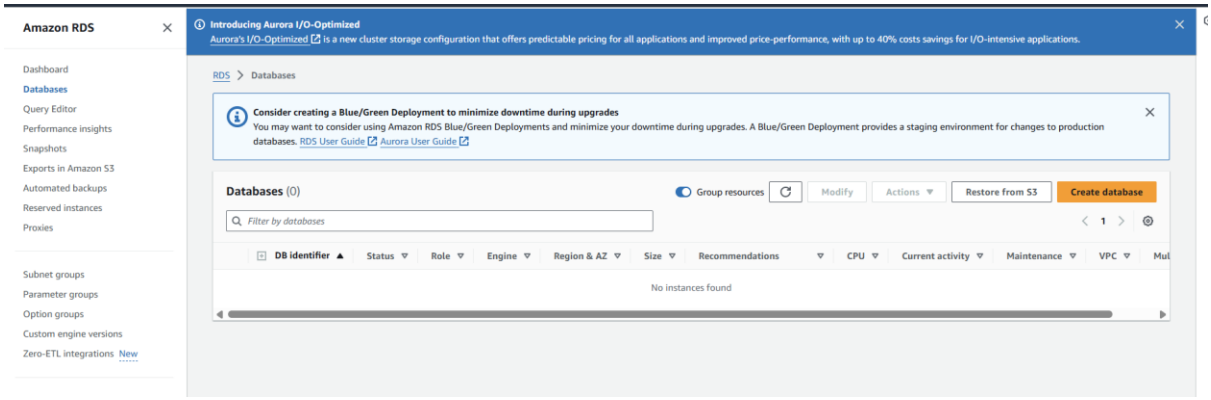
- Go to subnet group and click on create DB subnet group.
- Give name tag as my-3tier-project-db
- Select VPC project-3tier and then click on create DB subnet.

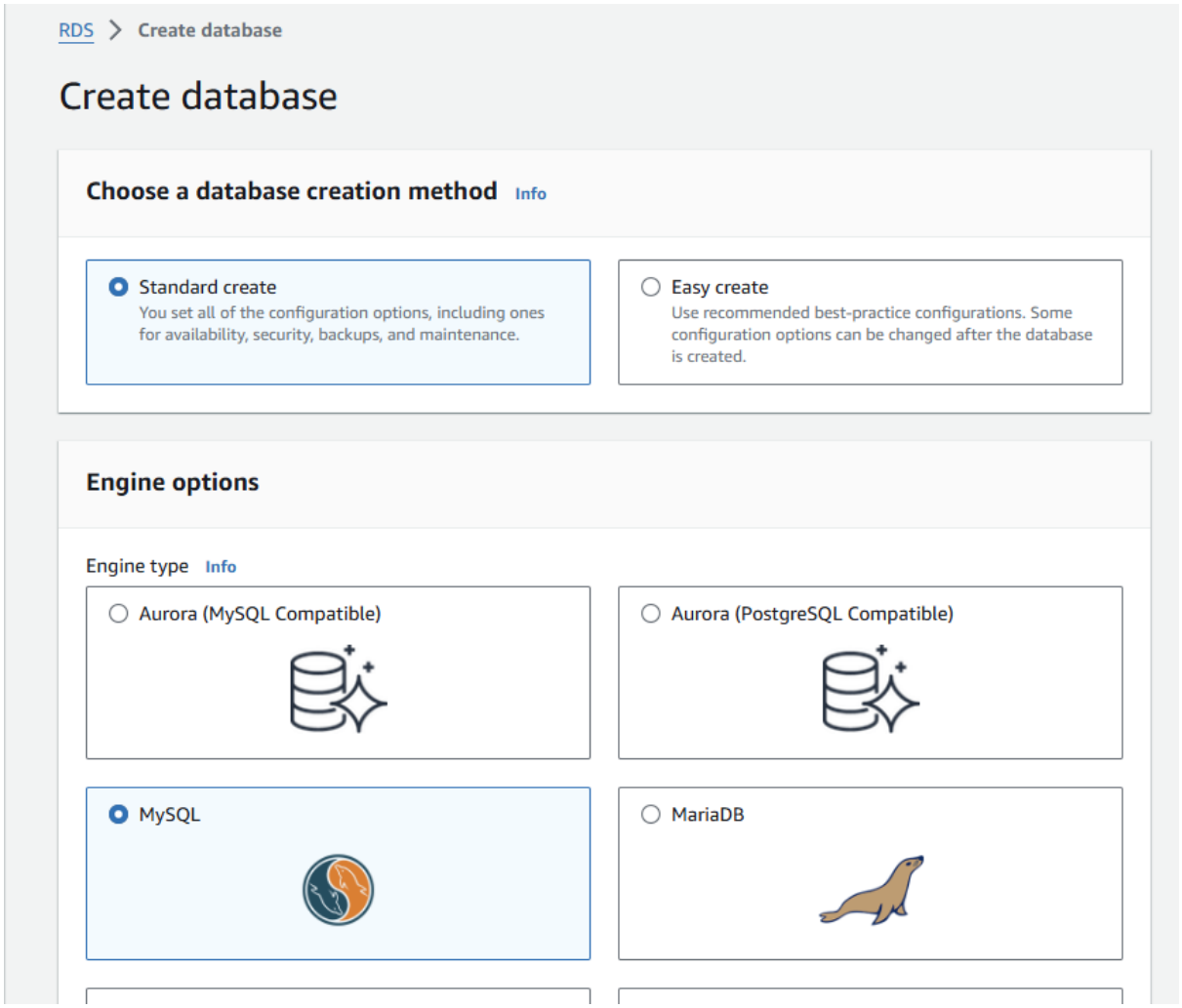




2.Create database:

- Go to RDS and click on create database
- Click on standard create->click on my SQL engine option->click on multi AZ DB cluster->click production in templates->click on self-managed->create password->click on do not include an ec2 instance-> select VPC->select DB subnet group.
- Public access click yes->select existing security group
- Remaining fields leave as default and click on create database as shown below slides.


Amazon RDS
Introducing Aurora I/O-Optimized
Aurora's I/O-Optimized is a new cluster storage configuration that offers predictable pricing for all applications and improved price-performance, with up to 40% costs savings for I/O-intensive applications.
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
RDS > Databases
Consider creating a Blue/Green Deployment to minimize downtime during upgrades
You may want to consider using Amazon RDS Blue/Green Deployments and minimize your downtime during upgrades. A Blue/Green Deployment provides a staging environment for changes to production databases. RDS User Guide Aurora User Guide
Databases (0)
Group resources
Modify
Actions
Restore from S3
Create database
Filter by databases
DB identifier
Status
Role
Engine
Region & AZ
Size
Recommendations
CPU
Current activity
Maintenance
VPC
No instances found


RDS > Create database
Create database
Choose a database creation method Info
Standard create
You set all of the configuration options, including ones for availability, security, backups, and maintenance.
Easy create
Use recommended best-practice configurations. Some configuration options can be changed after the database is created.
Engine options
Engine type Info
Aurora (MySQL Compatible)
Aurora (PostgreSQL Compatible)
MySQL
MariaDB

Engine version Info
View the engine versions that support the following database features.

▼ Hide filters

Show versions that support the Multi-AZ DB cluster Info
Create a A Multi-AZ DB cluster with one primary DB instance and two readable standby DB instances. Multi-AZ DB clusters provide up to 2x faster transaction commit latency and automatic failover in typically under 35 seconds.

Show versions that support the Amazon RDS Optimized Writes Info
Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

Engine Version

MySQL 8.0.35

Enable RDS Extended Support Info
Amazon RDS Extended Support is a paid offering. By selecting this option, you consent to being charged for this offering if you are running your database major version past the RDS end of standard support date for that version. Check the end of standard support date for your major version in the RDS for MySQL documentation.

Templates

Choose a sample template to meet your use case.

- Production
  Use defaults for high availability and fast, consistent performance.
- Dev/Test
  This instance is intended for development use outside of a production environment.
- Free tier
  Use RDS Free Tier to develop new applications, test existing applications, or gain hands-on experience with Amazon RDS.
  Info

Availability and durability

▼ Credentials Settings

Master username Info
Type a login ID for the master user of your DB cluster.

admin

1 to 16 alphanumeric characters. The first character must be a letter.

Credentials management
You can use AWS Secrets Manager or manage your master user credentials.

- Managed in AWS Secrets Manager - *most secure*
  RDS generates a password for you and manages it throughout its lifecycle using AWS Secrets Manager.
- Self managed
  Create your own password or have RDS create a password that you manage.

Auto generate password
Amazon RDS can generate a password for you, or you can specify your own password.

Master password Info

••••••••••

Password strength Neutral

Minimum constraints: At least 8 printable ASCII characters. Can't contain any of the following symbols: / ' " @

Confirm master password Info

••••••••••

Connectivity Info

Compute resource

Choose whether to set up a connection to a compute resource for this database. Setting up a connection will automatically change connectivity settings so that the compute resource can connect to this database.

- (•) Don't connect to an EC2 compute resource
  Don't set up a connection to a compute resource for this database. You can manually set up a connection to a compute resource later.
- ( ) Connect to an EC2 compute resource
  Set up a connection to an EC2 compute resource for this database.

Virtual private cloud (VPC) Info

Choose the VPC. The VPC defines the virtual networking environment for this DB cluster.

project-3tier (vpc-094f0bf96a7e0bf87)
6 Subnets, 2 Availability Zones

Only VPCs with a corresponding DB subnet group are listed.

⚠ The VPC subnets must be in 3 Availability Zones (AZs) for the Multi-AZ DB cluster. The current subnets are in **2 AZs (us-east-1a, us-east-1b)**. Add a subnet in a different AZ than the current subnets.

Add new subnet

ⓘ After a database is created, you can't change its VPC.

DB subnet group Info

Choose the DB subnet group. The DB subnet group defines which subnets and IP ranges the DB cluster can use in the VPC that you selected.

my-3tier-project-db
2 Subnets, 2 Availability Zones

Public access Info

Yes

RDS assigns a public IP address to the cluster. Amazon EC2 instances and other resources outside of the VPC can connect to your cluster. Resources inside the VPC can also connect to the cluster. Choose one or more VPC security groups that specify which resources can connect to the cluster.

No

RDS doesn't assign a public IP address to the cluster. Only Amazon EC2 instances and other resources inside the VPC can connect to your cluster. Choose one or more VPC security groups that specify which resources can connect to the cluster.

VPC security group (firewall) Info

Choose one or more VPC security groups to allow access to your database. Make sure that the security group rules allow the appropriate incoming traffic.

Choose existing
Choose existing VPC security groups

Create new
Create new VPC security group

Existing VPC security groups

Choose one or more options

sg3teir

RDS Proxy

RDS Proxy is a fully managed, highly available database proxy that improves application scalability, resiliency, and security.

Create an RDS Proxy Info

RDS automatically creates an IAM role and a Secrets Manager secret for the proxy. RDS Proxy has additional costs. For more information, see Amazon RDS Proxy pricing.

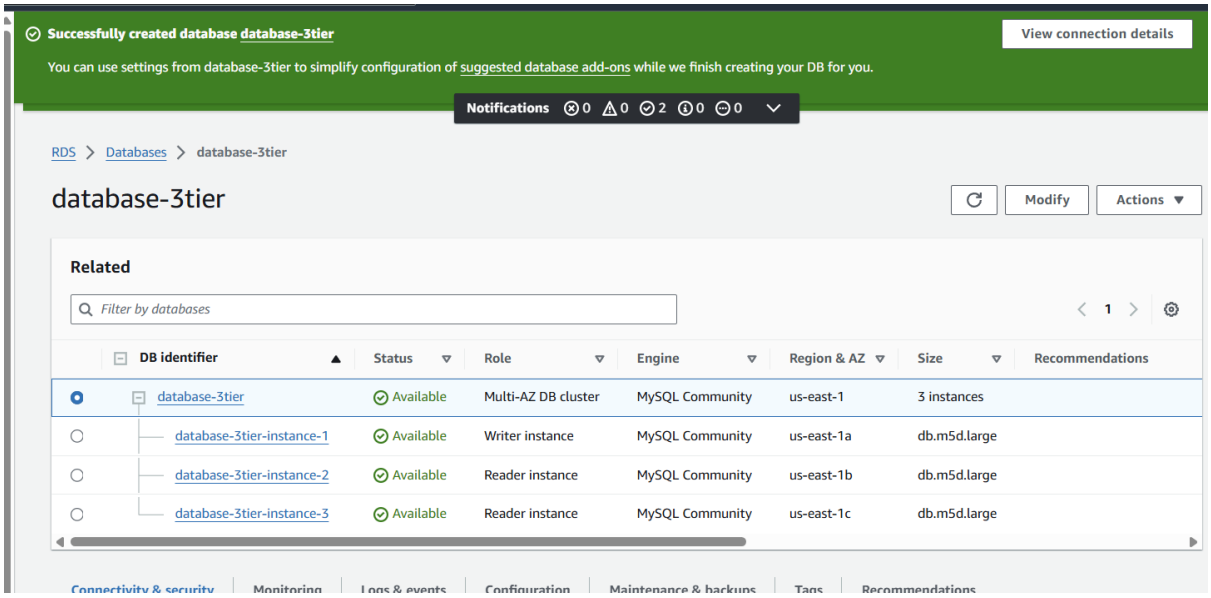
Certificate authority - *optional* Info

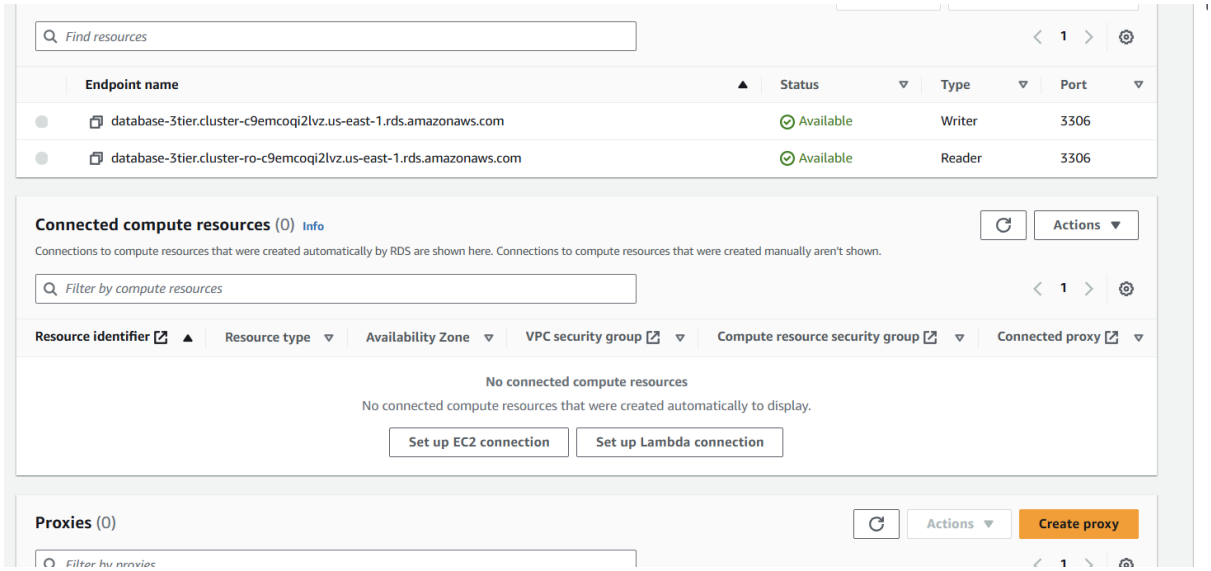
Using a server certificate provides an extra layer of security by validating that the connection is being made to an Amazon database. It does so by checking the server certificate that is automatically installed on all databases that you provision.

rds-ca-rsa2048-g1 (default)
Expiry: May 26, 2061

If you don't select a certificate authority, RDS chooses one for you.

▶ Additional configuration





nection

Set up EC2 connection Info

Select EC2 instance

Database

database-3tier

EC2 instance

Choose the EC2 instance to connect to this database. Only EC2 instances in the same VPC as the database are shown. If no EC2 instances in the same VPC are available, you can create a new EC2 instance.

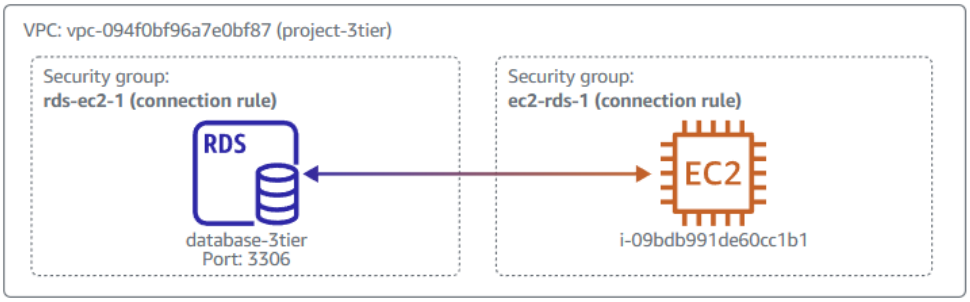
i-09bdb991de60cc1b1
project-3tier-public1 us-east-1a

Create EC2 instance

Cancel Continue

You are setting up a connection between RDS database database-3tier and EC2 instance i-09bdb991de60cc1b1.

To set up a connection between the database and the EC2 instance, VPC security group *rds-ec2-1* is added to the database, and VPC security group *ec2-rds-1* is added to the EC2 instance.



Bold indicates an addition being made to set up a connection.

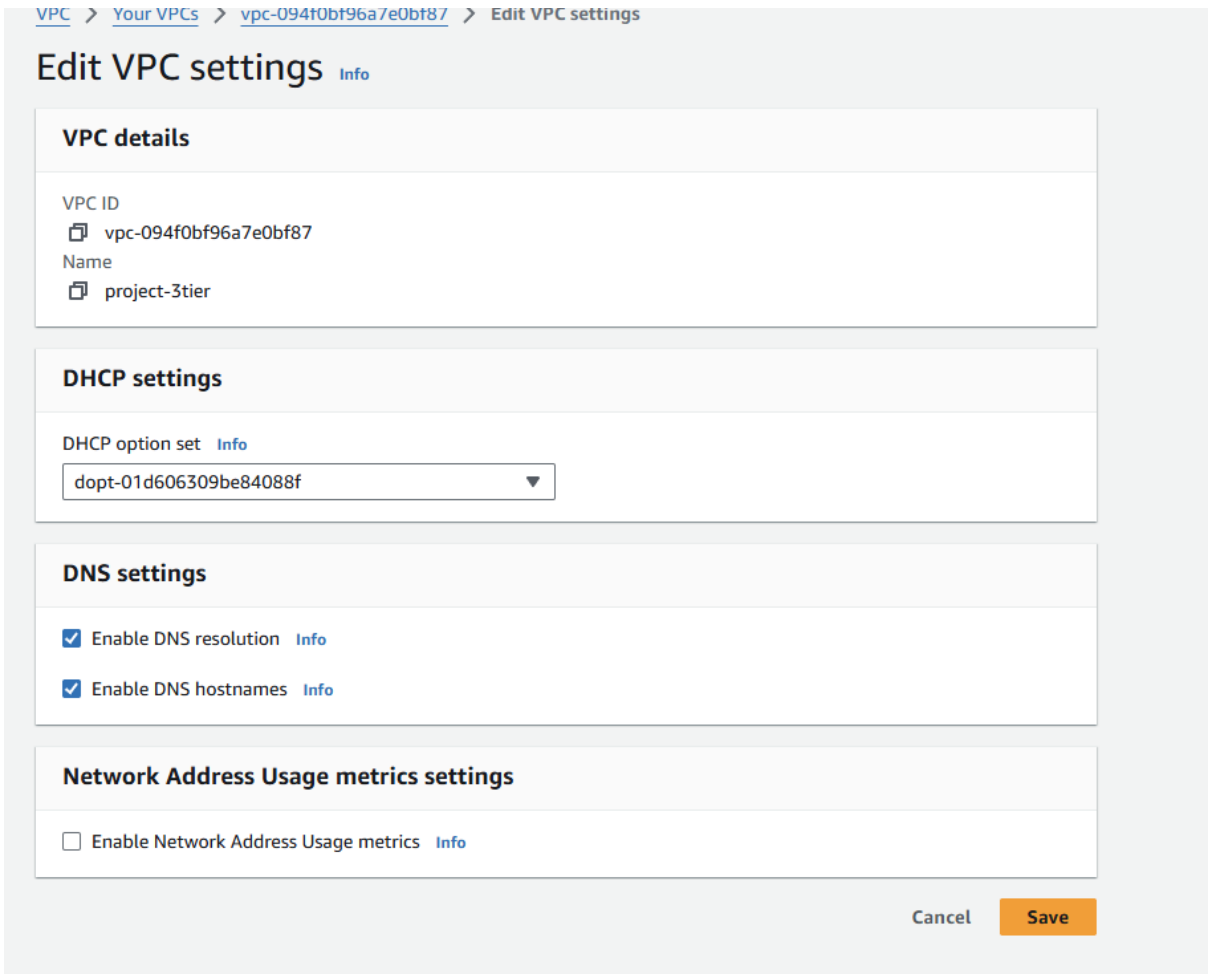
Changes to RDS database: database-3tier

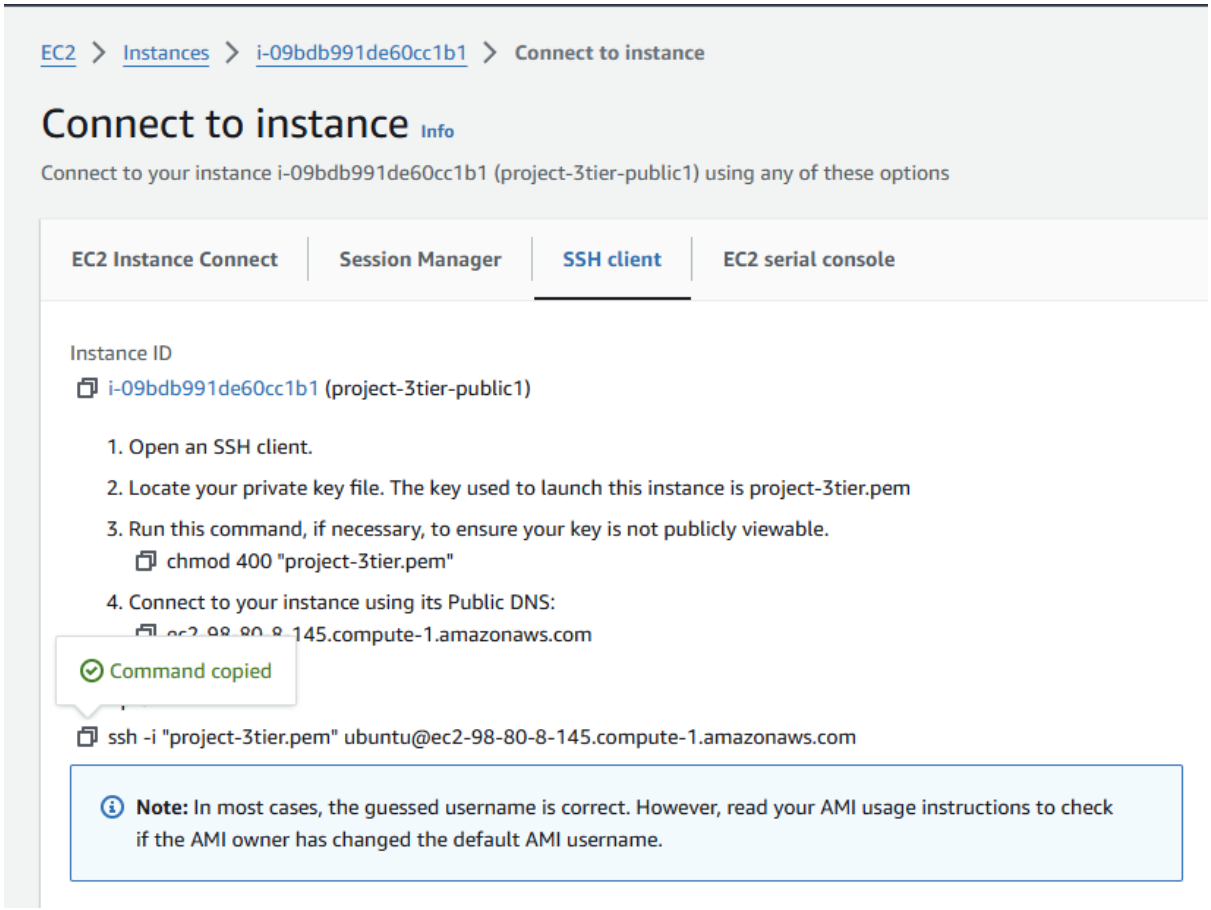
Attribute	Current value	New value
Security group	sg3teir	sg3teir, **rds-ec2-1**

Changes to EC2 instance: i-09bdb991de60cc1b1

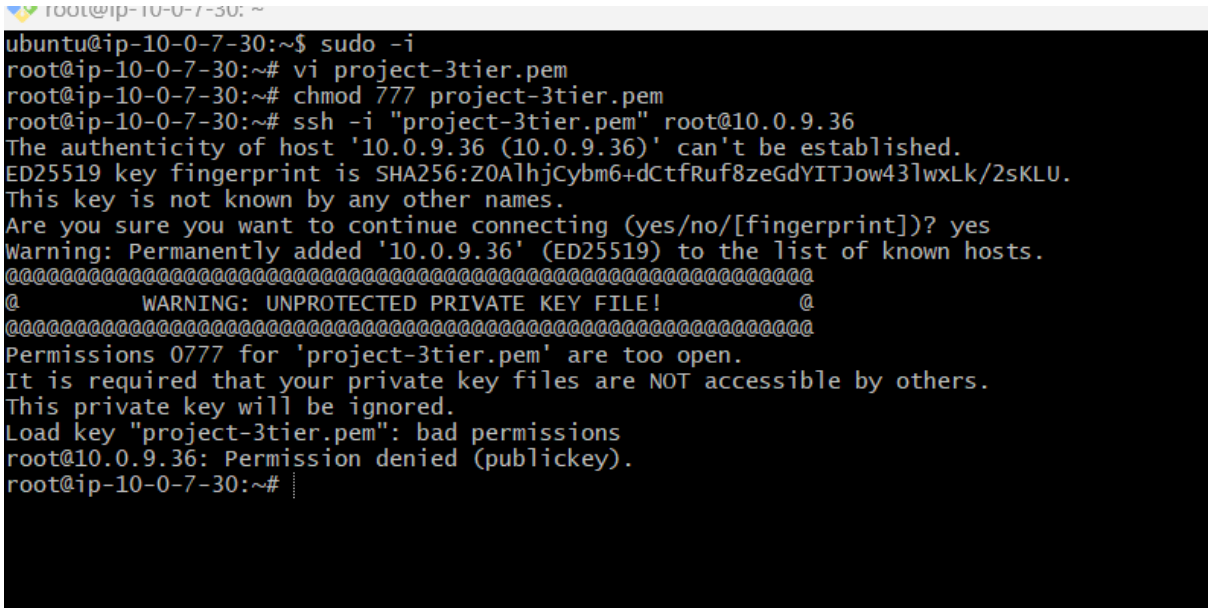
Attribute	Current value	New value
Security group	sg3teir	sg3teir, **ec2-rds-1**

Cancel | Previous | Set up


VPC > Your VPCs > vpc-094f0bf96a7e0bf87 > Edit VPC settings
Edit VPC settings Info
VPC details
VPC ID
vpc-094f0bf96a7e0bf87
Name
project-3tier
DHCP settings
DHCP option set Info
dopt-01d606309be84088f
DNS settings
Enable DNS resolution Info
Enable DNS hostnames Info
Network Address Usage metrics settings
Enable Network Address Usage metrics Info
Cancel
Save



- Once created the RDS connect to the private instance through public instance.



- Install MY SQL->sudo apt install mysql-server
- Restart ->sudo systemctl start mysql service
- Mysql -h database-3tier.cluster-c9emcoqi2lvz.us-east-1.rds.amazonaws.com(rds end point) -u admin -p->Enter password-> u can connect to my SQL as shown in below

```
root@ip-10-0-7-30:~# mysql -h database-3tier.cluster-c9emcoqi2lvz.us-east-1.rds.amazonaws.com -u admin -p
Enter password:
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 62
Server version: 8.0.35 Source distribution

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owners.

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

mysql>
```

- For creating table->
  CREATE TABLE Persons (
  ID int,
  LastName varchar(255),
  FirstName varchar(255),
  Age varchar(255)
  );
- Create the table in in my sql
- The output of creating table as shown in below.

```
mysql> INSERT INTO Persons (ID, LastName, FirstName, Age) VALUES ('7', 'aws', 'devops', '10');
Query OK, 1 row affected (0.01 sec)

mysql> INSERT INTO Persons (ID, LastName, FirstName, Age) VALUES ('8', 'aws', 'k8s', '8');
Query OK, 1 row affected (0.00 sec)

mysql> select * from Persons;
+----+----------+-----------+------+
| ID | LastName | FirstName | Age  |
+----+----------+-----------+------+
|  7 | aws      | devops    |   10 |
|  8 | aws      | k8s       |    8 |
+----+----------+-----------+------+
2 rows in set (0.00 sec)
```