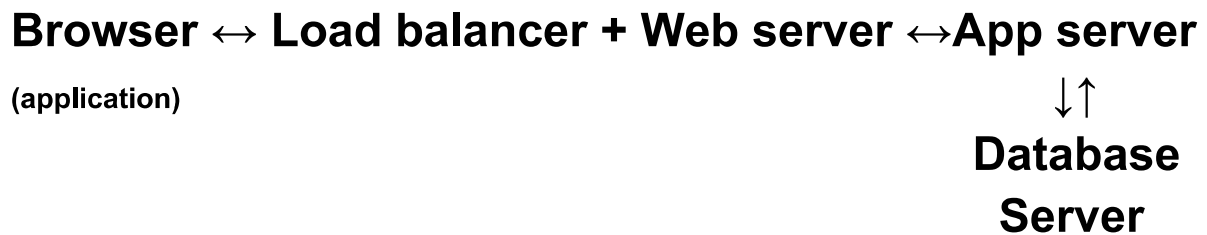


CREATING A HIGHLY AVAILABLE 3-TIER ARCHITECTURE IN AWS

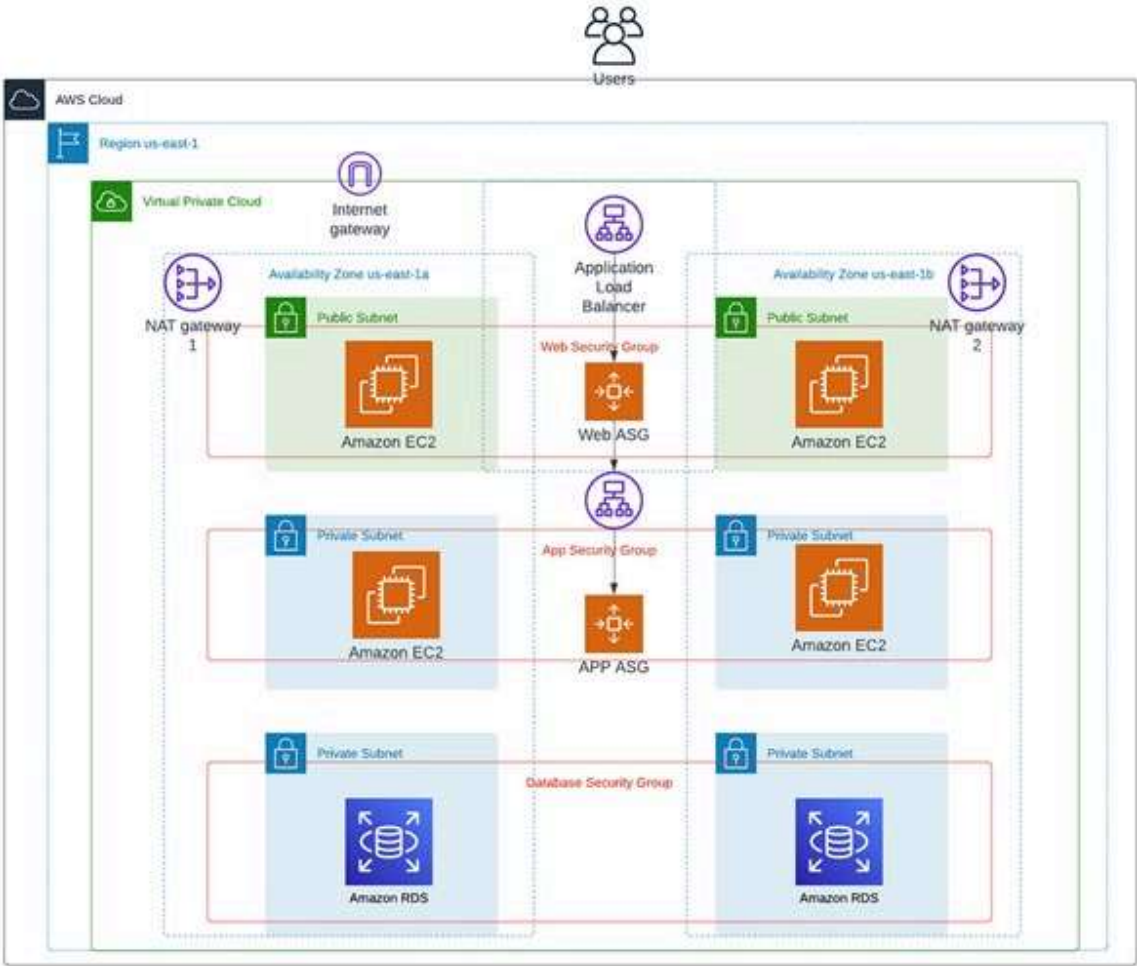


- 1.Load balancer+web server = web tier**
- 2.App server = app tier**
- 3.Data base server = database tier**

Whenever we open an application in browser it will go to load balancer there are multiple web servers and load balancer hits the empty web server it will send that request to application server and application server connects with the database server ,it will retrieve the data and convert to proper understanding format and send to app server . App server sends to web server ,it will send to load balancer and load balancer will send to the browser.

Advantages of 3-tier architecture :

- Security
- Queue management
- Speed
- Quality of data
- Scalability and flexibility



Step 1 : Create a VPC (my-web-app-db-vpc) .

VPC dashboard X

EC2 Global View

Filter by VPC:

Select a VPC

Virtual private cloud

Your VPCs

Subnets

Route tables

Internet gateways

Egress-only internet gateways

DHCP option sets

Elastic IPs

Managed prefix lists

Endpoints

Endpoint services

NAT gateways

Your VPCs (2) Info

Search

<input type="checkbox"/>	Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR
<input type="checkbox"/>	--	vpc-07aebdae1b1ba559b	Available	172.31.0.0/16	--
<input type="checkbox"/>	my-web-app-db-vpc	vpc-0b325dba0d1384ee2	Available	172.20.0.0/20	--

Select a VPC above

Step 2 : Create an internet gateway (my-igw) and attach to VPC (my-web-app-db-vpc)

VPC dashboard X

EC2 Global View

Filter by VPC:

Select a VPC

Virtual private cloud

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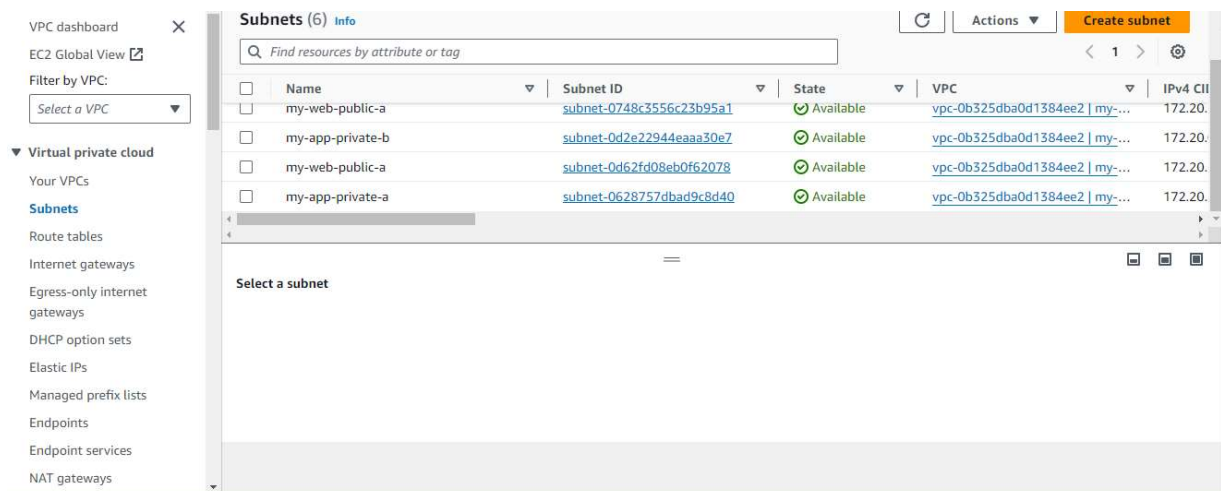
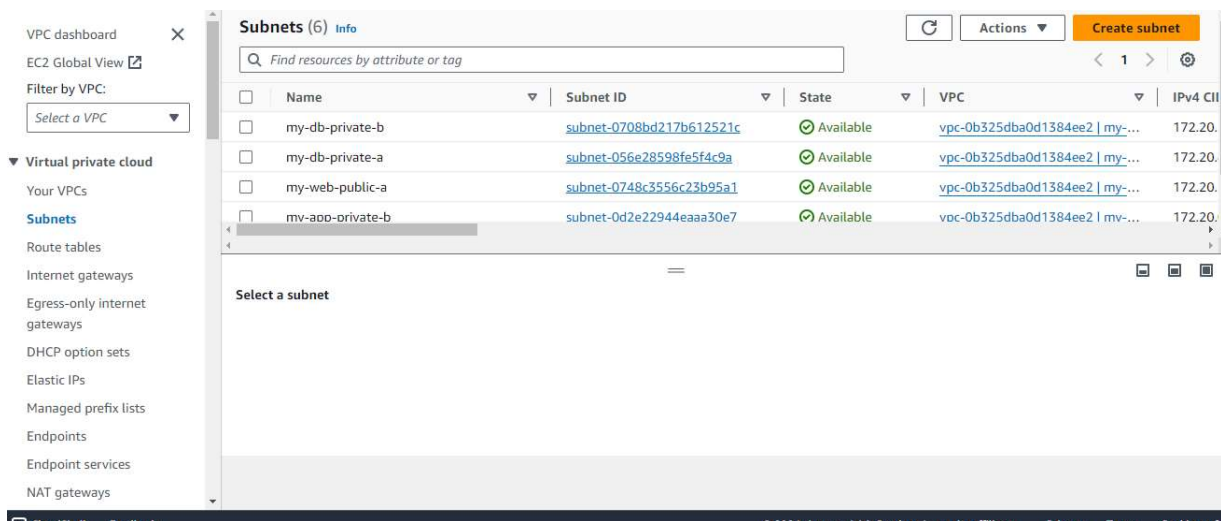
Internet gateways (1+) Info

Search

<input type="checkbox"/>	Name	Internet gateway ID	State	VPC ID
<input type="checkbox"/>	my-igw	igw-0df1bc53075bb38a0	Attached	vpc-0b325dba0d1384ee2 my-web-ap

Select an internet gateway above

Step 3 : Create two public subnets and four private Subnets
 (my-web-public-a,my-web-public-b,My-app-private-a,my-app-private-b
 (my-web-public-a,my-web-public-b,My-app-private-a,my-app-private-b
 my-db-private-a,my-db-private-b) in two different availability zones .



Step 4 : Create two nat gateways (my-ngw-a,my-ngw-b) and connect to public subnets (my-web-public-a,my-web-public-b) so that ec2 instance in public subnets can connect to internet and no one can connect to it because nat gateway is one way traffic either incoming (or) outgoing .

...ing, creating, managing, deleting, and monitoring VPCs and subnets in private and public subnets can be used to connect to services in other VPCs, on-premises networks, or the internet.

NAT gateway settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.

The name can be up to 256 characters long.

Subnet
Select a subnet in which to create the NAT gateway.

Connectivity type
Select a connectivity type for the NAT gateway.

☒ Public
☐ Private

Elastic IP allocation ID [Info](#)
Assign an Elastic IP address to the NAT gateway.

► **Additional settings** [Info](#)

highly available, managed network address translation (NAT) service that instances in private subnets can use to connect to services in other VPCs, on-premises networks, or the internet.

NAT gateway settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.

my-ngw-b

The name can be up to 256 characters long.

Subnet
Select a subnet in which to create the NAT gateway.

subnet-0d62fd08eb0f62078 (my-web-public-a)

Connectivity type
Select a connectivity type for the NAT gateway.

☒ Public
☐ Private

Elastic IP allocation ID [Info](#)
Assign an Elastic IP address to the NAT gateway.

eipalloc-03c58a008d63e1e52

Allocate Elastic IP

[Additional settings](#) [Info](#)

Egress-only internet gateways
DHCP option sets
Elastic IPs
Managed prefix lists
Endpoints
Endpoint services
NAT gateways
Peering connections

NAT gateways (3) [Info](#)

Find resources by attribute or tag

Actions

Create NAT gateway

	Name	NAT gateway ID	Connectivity...	State	State message	Primary public
<input type="radio"/>	my-ngw-b	nat-0699d94119f713c73	Public	Available	-	3.111.5.34
<input type="radio"/>	my-ngw-a	nat-0934c2ddd20e0cac0	Public	Available	-	15.207.232.175
<input type="radio"/>	-	nat-0bf107232c18da8a6	Public	Deleted	-	13.127.122.223

Select a NAT gateway

Step 5 : Now create six route tables

(my-app-public-route-a,my-app-public-route-b,my-web-private-a,my-web-private-b,my-db-private-a,my-db-private-b) and click on save association ,so that route tables can configure routing to subnets in VPC .

Route tables (1/9) [Info](#)

[Create route table](#)

<input type="checkbox"/>	Name	Route table ID	Explicit subnet associ...	Edge associations	Main
<input type="checkbox"/>	my-app-route-public-a	rtb-04166bbb74c7fd5ee	subnet-0628757dbad9c8...	-	No
<input type="checkbox"/>	my-app-route-public-b	rtb-0df1813461f26ce20	subnet-0d2e22944eaaa3...	-	No
<input type="checkbox"/>	my-web-private-a	rtb-03b96635057f76dc3	subnet-0748c3556c23b9...	-	No
<input type="checkbox"/>	my-web-private-b	rtb-087f92ae29c9af047	subnet-0d62fd08eb0f62...	-	No

rtb-02a27911b37b7843e / my-db-private-b

[Details](#) | [Routes](#) | [Subnet associations](#) | [Edge associations](#) | [Route propagation](#) | [Tags](#)

Details

Route table ID	Main	Explicit subnet associations	Edge associations
----------------	------	------------------------------	-------------------

VPC dashboard

EC2 Global View [🔗](#)

Filter by VPC:

▼ Virtual private cloud

- Your VPCs
- Subnets
- Route tables**
- Internet gateways
- Egress-only internet gateways
- DHCP option sets
- Elastic IPs
- Managed prefix lists
- Endpoints
- Endpoint services
- NAT gateways

Route tables (9) [Info](#)

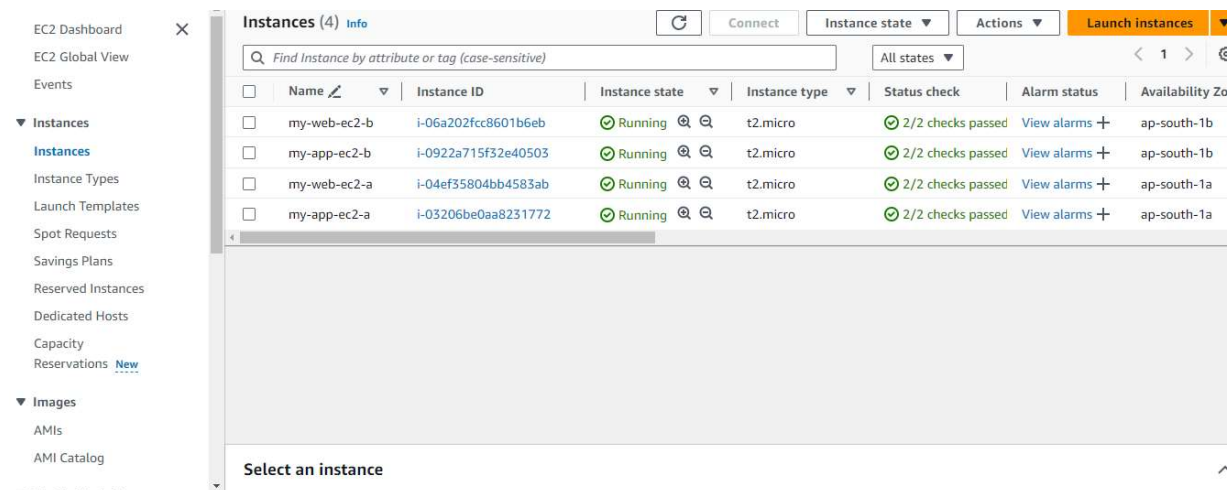
[Create route table](#)

<input type="checkbox"/>	Name	Route table ID	Explicit subnet associ...	Edge associations	Main
<input type="checkbox"/>	my-web-private-a	rtb-03b96635057f76dc3	subnet-0748c3556c23b9...	-	No
<input type="checkbox"/>	my-web-private-b	rtb-087f92ae29c9af047	subnet-0d62fd08eb0f62...	-	No
<input type="checkbox"/>	my-db-private-a	rtb-01f485a5d1427f13f	subnet-056e28598fe5f4c...	-	No
<input type="checkbox"/>	my-db-private-b	rtb-02a27911b37b7843e	subnet-0708bd217b6125...	-	No

Select a route table

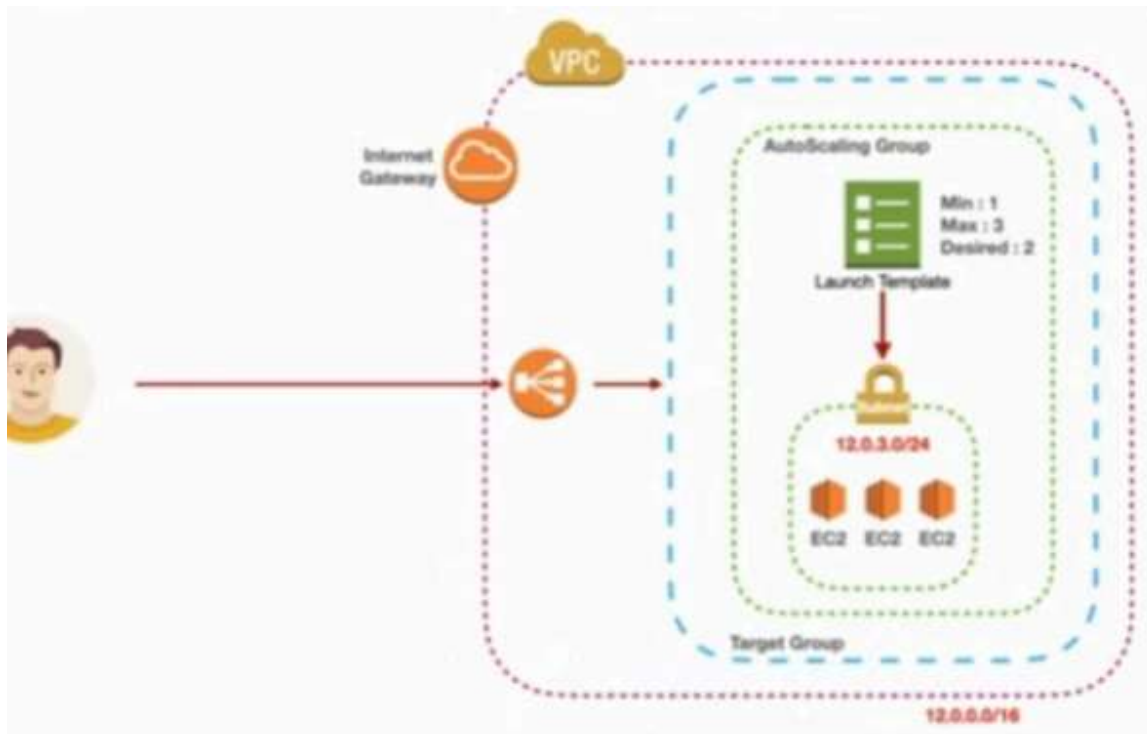
Step 6 : create four ec2 instances

(my-web-ec2-a,my-web-ec2-b,my-app-ec2-a,my-app-ec2-b) in two different availability zones and connect to VPC and also for subnets my-web-public-a,my-web-public-b,my-app-private-a,my-app-private-b.



> Created vpc,subnets,route tables,internet gateway,nat gateways and attached four ec2 instances successfully .


CREATE APPLICATION LOAD BALANCER AND INSTALLING WEBSERVER, APPSERVER



- Load balancer is a service provided by amazon in which the incoming traffic is automatically distributed across a group of servers or targets .
- Load balancer increases the speed and performance .
- Application load balancer is a type of load balancer it works on application layer and also works on http and https protocol .

Step 1 : Create target group and we are creating target group inside the subnets

☒ Instances

- Supports load balancing to instances within a specific VPC.
- Facilitates the use of [Amazon EC2 Auto Scaling](#)  to manage and scale your EC2 capacity.

☐ IP addresses

- Supports load balancing to VPC and on-premises resources.
- Facilitates routing to multiple IP addresses and network interfaces on the same instance.
- Offers flexibility with microservice based architectures, simplifying inter-application communication.
- Supports IPv6 targets, enabling end-to-end IPv6 communication, and IPv4-to-IPv6 NAT.

☐ Lambda function

- Facilitates routing to a single Lambda function.
- Accessible to Application Load Balancers only.

☐ Application Load Balancer

- Offers the flexibility for a Network Load Balancer to accept and route TCP requests within a specific VPC.
- Facilitates using static IP addresses and PrivateLink with an Application Load Balancer.

Target group name

Target group name

tg-a

A maximum of 32 alphanumeric characters including hyphens are allowed, but the name must not begin or end with a hyphen.

Protocol : Port

Choose a protocol for your target group that corresponds to the Load Balancer type that will route traffic to it. Some protocols now include anomaly detection for the targets and you can set mitigation options once your target group is created. This choice cannot be changed after creation

HTTP80

1-65535

IP address type

Only targets with the indicated IP address type can be registered to this target group.

- ☒ 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](#)

Successfully created the target group: tg-a. Anomaly detection is automatically applied to all registered targets. Results can be viewed in the Targets tab.

EC2 > Target groups > tg-a

tg-a

Actions

Details

arn:aws:elasticloadbalancing:ap-south-1:211125473120:targetgroup/tg-a/9d6e1b917602e9ae

Target type	Protocol : Port	Protocol version	VPC
Instance	HTTP: 80	HTTP1	vpc-002e55f71459a5440
IP address type	Load balancer		
IPv4	None associated		

Targets

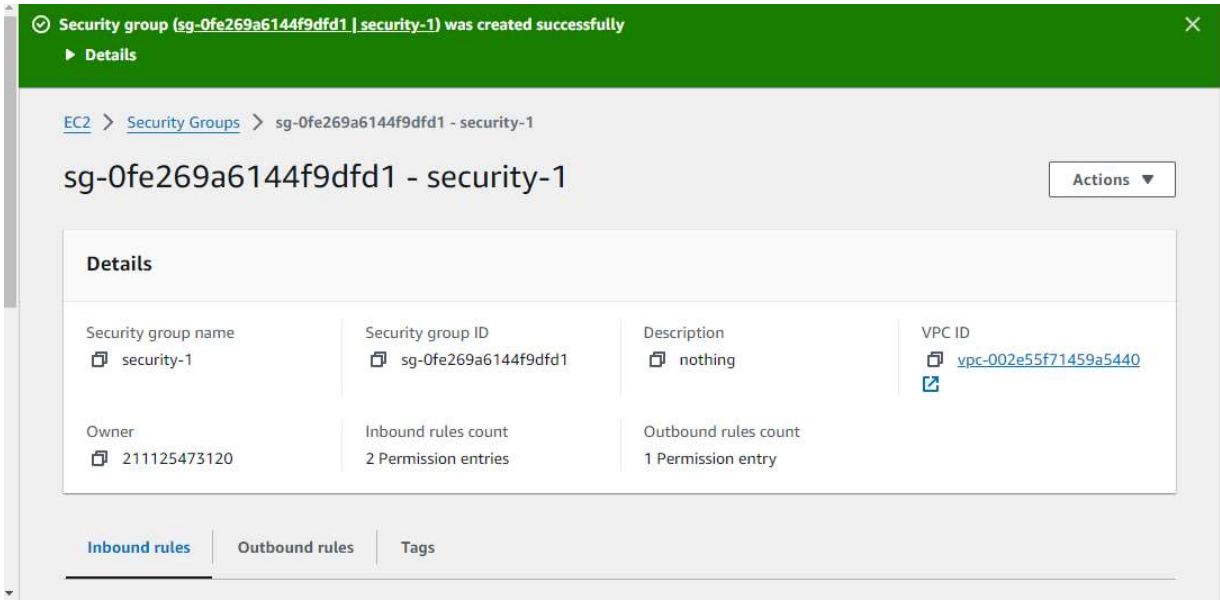
Monitoring

Health checks

Attributes

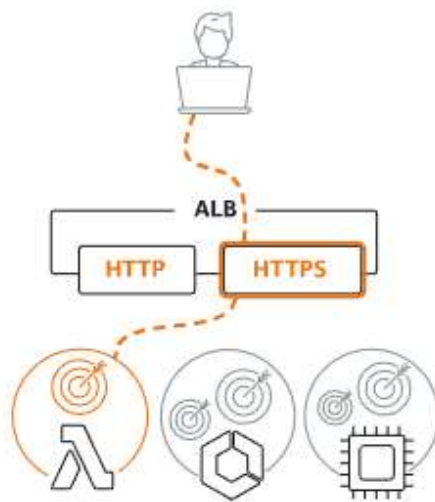
Tags

Step 2: create a security group

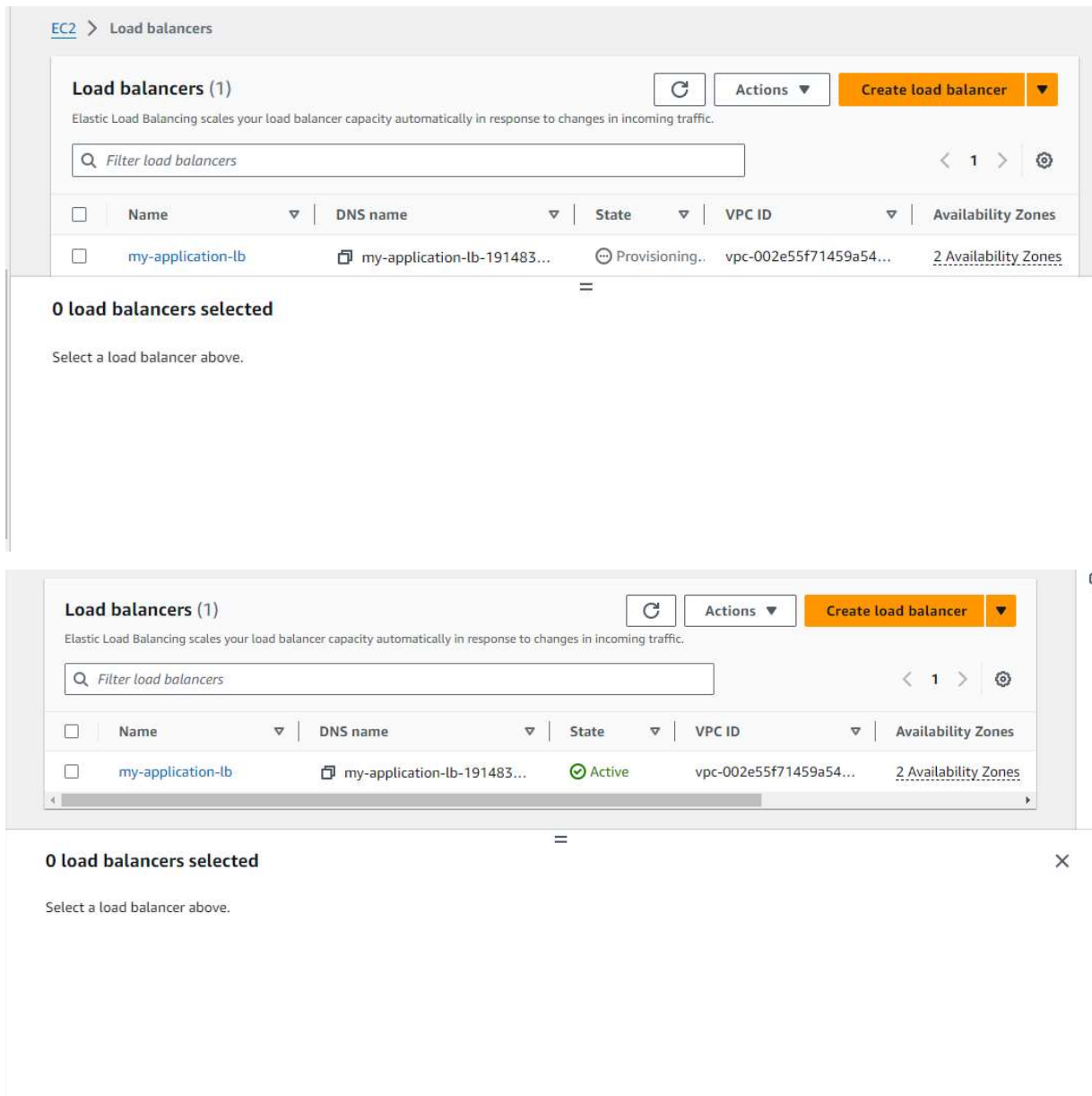


Step 3: create a application load balancer

Application Load Balancer [Info](#)



Choose an Application Load Balancer when you need a flexible feature set for your applications with HTTP and HTTPS traffic. Operating at the request level, Application Load Balancers provide



The image displays two screenshots of the AWS Management Console, specifically the 'Load balancers' page under the 'EC2' section. The top screenshot shows a load balancer named 'my-application-lb' in a 'Provisioning...' state. The bottom screenshot shows the same load balancer in an 'Active' state, indicated by a green checkmark in the 'State' column.

Load balancers (1)

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

Filter load balancers

<input type="checkbox"/>	Name	DNS name	State	VPC ID	Availability Zones
<input type="checkbox"/>	my-application-lb	my-application-lb-191483...	Provisioning..	vpc-002e55f71459a54...	2 Availability Zones

0 load balancers selected

Select a load balancer above.

Load balancers (1)

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

Filter load balancers

<input type="checkbox"/>	Name	DNS name	State	VPC ID	Availability Zones
<input type="checkbox"/>	my-application-lb	my-application-lb-191483...	Active	vpc-002e55f71459a54...	2 Availability Zones

0 load balancers selected

Select a load balancer above.

Created application load balancer now have to create a web server .

Now click on the public instance (my-web-ec2-a) and click on connect .

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

Last login: Fri Apr 12 04:24:25 2024 from 13.233.177.4
ec2-user@ip-20-0-2-137 ~]\$ sudo -i
root@ip-20-0-2-137 ~)# clear

Now click on the instance (my-web-ec2-b) and click on connect .

```

      #
    ~\  ###
  ~ ~\  #####\
  ~ ~\  ###|
  ~ ~\  #/
    ~ ~  V~' '->
      ~~~
        ~~-
          -/m/' -/
Last login: Fri Apr 12 04:46:27 2024 from 13.233.177.4
[ec2-user@ip-20-0-1-183 ~]$ sudo -i
[root@ip-20-0-1-183 ~]# clear

```

Now click on private ec2 instances and create app servers and click on connect .

Connect private with the public instances .

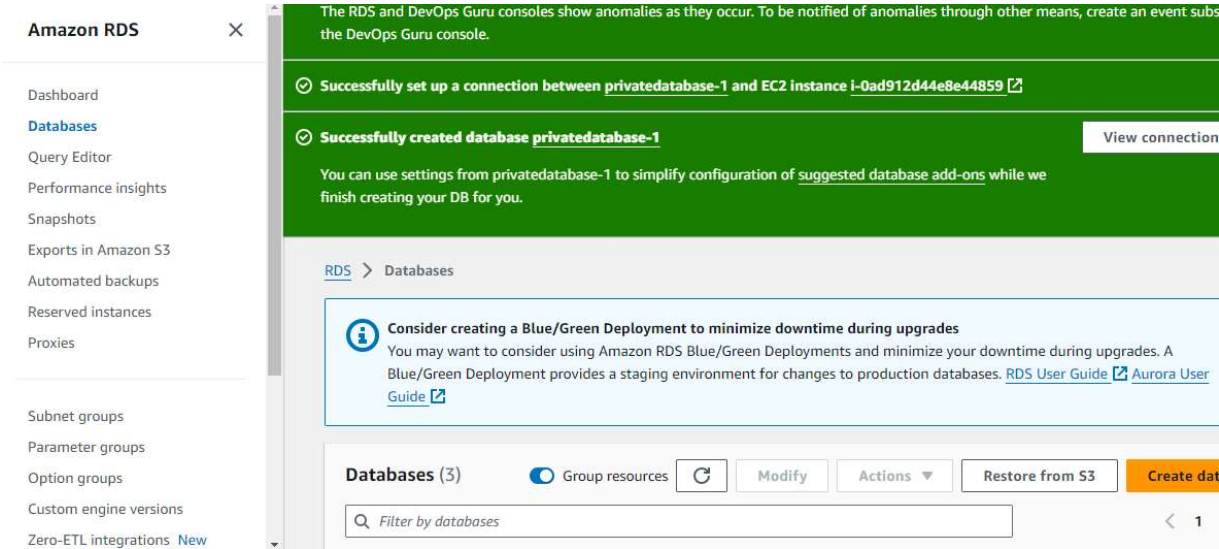
```
#  
~\_#### Amazon Linux 2023  
~~\_#####\  
~~\_###|  
~~\_#/ https://aws.amazon.com/linux/amazon-linux-2023  
~~V~' '->  
~~~ /  
~~.-. /  
~/m/' - /
```

Last login: Fri Apr 12 04:24:25 2024 from 13.233.177.4
ec2-user@ip-20-0-2-137 ~]\$ sudo -i
root@ip-20-0-2-137 ~]# clear

Now create a database and connect to private subnets (my-db-private-a,my-db-private-b).

- **Database is used to store the data in the form of tables that are in rows and columns .**

First create an instance with a private subnet and attach to the database, password is mandatory while creating the database .



Creating another ec2 instance with private subnet and connecting to the database .

