

## **AWS PROJECT**

### **3-TIER WEB IN AWS USING VPC, ALB, EC2 AND RDS**

In this project, I am going to demonstrate how to set up basic networking and deploy a simple 3-tier application in AWS cloud.

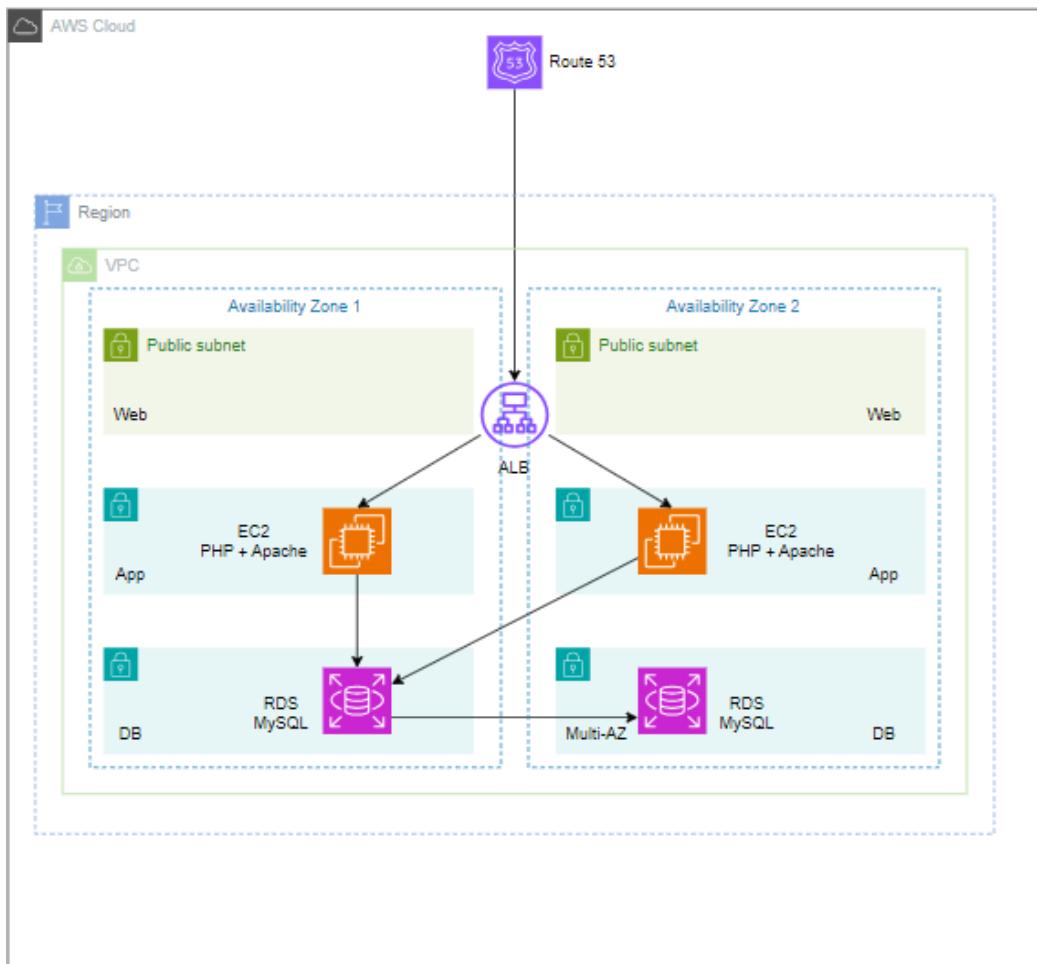
**The services used are** ; VPC, ALB(Application load Balancer), EC2 and RDS

#### **Steps**

- I have to create a networking base for this service.
- AWS networking.
- 3-tier-app Architecture.
- Create a VPC.
- Create Subnets.
- Create Route tables.
- Associate the Route tables.
- Create the Internet gateway(IGW).
- Create a NAT gateway.
- Add Routes for IGW and NAT.
- Create a jump server.
- Create a PHP server.
- Installation of PHP, Apache.
- Installation of PHPMyAdmin(Sample app).
- Create and configure an ALB(Application Load Balancer).
- Create an RDS(Relational Database service) instance.
- Configure PHPMyAdmin with RDS.
- Configure session stickiness.

The Networking Architecture is shown down below;

## Networking Architecture



## The Next steps will be:

- Create a VPC.
- Create 3 Public subnets(1 subnet in each Availability zone) for the Web servers, each subnet will have internet facing load balancers, Web servers and Jump servers.
- I will then create a Private subnet in each Availability zone (AZ) for app deployment and lastly, create a Private subnet for the DB servers/instances.
- I have to create an Internet gateway(IGW) to configure incoming and outgoing traffic.
- IGW needs to be configured with the VPC and a NAT gateway needs to be created in any of the Public subnets. I will create a NAT gateway in each Public subnet for redundancy and failure.
- For the sake of this project, I will stick with just one NAT gateway. NAT gateway resides in the Public subnet even if it brings traffic into the Private subnet.
- After the gateways are created, I have to create the corresponding Route tables for Web App and DB subnets.
- Next, once the line networking infrastructure components are created, I can start with the Application components. For this (Route 53) is optional as I can directly access the app via the ALB(Application Load Balancer).

- I will go on to create (2 EC2 instances) in both (AZ'S) and insert PHP Apache onto them and finally, I will create RDS instances and the multi-AZ configuration is optional.

## I. CREATING A VPC

- Go to the AWS console, and search for VPC.
- Under the (Services) section, click on VPC'S.
- Click on the (VPC id).
- Open the (VPC id) and notice that the (Default VPC) is yes.
- Going back to the (VPC'S), click on (Create VPC).
- Then in the (Create VPC) name the VPC as (my-vpc-1).
- The IPV<sub>4</sub> CIDR as (172.20.0.0/20).
- And leave the tenancy as (Default).
- Next, click on (Your VPC'S) to verify that the (VPC'S).

**Note:** the term CIDR which stands for “Classless Inter-Domain Routing”, is a method of assigning IP addresses that improves the efficiency of address distribution and replaces the previous system of Class A, Class B and Class C networks.

These are shown in the pictures below;

The screenshot shows the AWS VPC console interface. At the top, there's a blue header bar with a message about the new VPC console experience. Below it, there are two buttons: 'Create VPC' (orange) and 'Launch EC2 Instances'. A note below the buttons states: 'Note: Your Instances will launch in the US West region.' The main area is titled 'Resources by Region' and shows the following data:

Resource Type	Count	Action
VPCs	US West 1	<a href="#">See all regions</a>
Subnets	US West 4	<a href="#">See all regions</a>
Route Tables	US West 1	<a href="#">See all regions</a>
NAT Gateways	US West 0	<a href="#">See all regions</a>
VPC Peering Connections	US West 0	<a href="#">See all regions</a>
Network ACLs	US West 1	<a href="#">See all regions</a>

Your VPCs (1) <a href="#">Info</a>							
<input type="text"/> Search		Actions <a href="#">Actions ▾</a> <a href="#">Create VPC</a>					
Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP option set	Main route	
-	vpc-077cb04aac5695bd4	<span>Available</span>	172.31.0.0/16	-	dopt-0d90e4f1326fc62cd	rtb-069dfdf	

vpc-077cb04aac5695bd4			
Details <a href="#">Info</a>			
VPC ID	State	DNS hostnames	DNS resolution
<a href="#">vpc-077cb04aac5695bd4</a>	<span>Available</span>	Enabled	Enabled
Tenancy	DHCP option set	Main route table	Main network ACL
Default	dopt-0d90e4f1326fc62cd	rtb-069dfdf051c789e788	acl-041972783aaeb0124
Default VPC	IPv4 CIDR	IPv6 pool	IPv6 CIDR (Network border group)
<span>Yes</span>	172.31.0.0/16	-	-
Network Address Usage metrics	Route 53 Resolver DNS Firewall rule groups	Owner ID	
Disabled	-	<a href="#">411746592027</a>	

Your VPCs (1/1) <a href="#">Info</a>							
<input type="text"/> Search		Actions <a href="#">Actions ▾</a> <a href="#">Create VPC</a>					
<input checked="" type="checkbox"/>	Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP option set	Main route
<input checked="" type="checkbox"/>	-	vpc-077cb04aac5695bd4	<span>Available</span>	172.31.0.0/16	-	dopt-0d90e4f1326fc62cd	rtb-069dfdf

## Create VPC Info

A VPC is an isolated portion of the AWS Cloud populated by AWS objects, such as Amazon EC2 instances.

### VPC settings

#### Resources to create Info

Create only the VPC resource or the VPC and other networking resources.

VPC only

VPC and more

#### Name tag - optional

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

my-vpc-1

#### IPv4 CIDR block Info

- IPv4 CIDR manual input  
 IPAM-allocated IPv4 CIDR block

#### IPv4 CIDR

172.20.0.0/20

CIDR block size must be between /16 and /28.

#### IPv6 CIDR block Info

- No IPv6 CIDR block  
 IPAM-allocated IPv6 CIDR block  
 Amazon-provided IPv6 CIDR block  
 IPv6 CIDR owned by me

#### Tenancy Info

Default

You successfully created vpc-0e3379c555caaaf61 / my-vpc-1

VPC > Your VPCs > vpc-0e3379c555caaaf61

vpc-0e3379c555caaaf61 / my-vpc-1

Actions ▾

#### Details Info

VPC ID	vpc-0e3379c555caaaf61	State	Available	DNS hostnames	Disabled	DNS resolution	Enabled
Tenancy	Default	DHCP option set	dopt-0d90e4f1326fc62cd	Main route table	rtb-0e7189df0996b51e0	Main network ACL	acl-0f075ee47ec8b724d
Default VPC	No	IPv4 CIDR	172.20.0.0/20	IPv6 pool	=	IPv6 CIDR (Network border group)	=
Network Address Usage metrics	Disabled	Route 53 Resolver DNS Firewall rule groups	-	Owner ID	411746592027		

Resource map | CIDRs | Flow logs | Tags | Integrations

Name	VPC ID	State	IPv4 CIDR	IPv6 CIDR	DHCP option set	Main route
-	vpc-077ch04aac5695bd4	Available	172.31.0.0/16	-	dopt-0d90e4f1326fc62cd	rtb-069dfdf
my-vpc-1	vpc-0e3379c555caaaf61	Available	172.20.0.0/20	-	dopt-0d90e4f1326fc62cd	-

## II. CREATING THE SUBNETS

### SUBNET 1

- Go to the (Subnets) and click on it.
- Click on (Create Subnet).
- Under the (Create Subnet); VPC ID [(vpc-0e3379c555caaaf61(my-vpc-1))].
- Go under (Subnet settings) then go under (Subnet name) and enter (my-public-subnet-1) as the name.
- Choose the Availability zone; (us-west-2a).
- Choose the IPV<sub>4</sub> CIDR block as (172.20.1.0/24).

### SUBNET 2

- Go to (Subnet 2) and put the name as (my-public-subnet-2).
- Availability zone as (us-west-2b).
- CIDR IPV<sub>4</sub> block as (172.20.2.0/24).

### SUBNET 3

- Keep the same name in (Subnet 2) the same as (Subnet 3), changing the number at the end of the subnet from 2 to 3. Making it (my-public-subnet-3).
- Select the Availability zone as (us-west-2c).
- Select the IPV<sub>4</sub> CIDR block as (172.20.3.0/24).

### SUBNET 4

- Go to (Subnet 4).
- Enter the subnet name as (my-private-subnet-1).
- Availability zone as (us-west-2a).
- The IPV<sub>4</sub> subnet CIDR block as (172.20.4.0/24).

## **SUBNET 5**

- Click on (Add new subnet) to create (Subnet 5).
- Enter the name under (Subnet name) as (my-private-subnet-2).
- Availability zone as (us-west-2b).
- CIDR block as (172.20.5.0/24).

## **SUBNET 6**

- Enter the subnet name as (my-private-subnet-3).
- Availability zone as (us-west-2c).
- CIDR block as (172.20.6.0/24).

## **SUBNET 7**

- Click on (Add new Subnet).
- The Subnet name will be (my-private-db-subnet-1).
- Availability zone as (us-west-2a).
- The CIDR block will be (172.20.7.0/24).

## **SUBNET 8**

- Repeat the process to add a new (DB Subnet).
- Name (my-private-db-subnet-2).
- Availability zone as (us-west-2b).
- CIDR block will be (172.20.8.0/24).

## **SUBNET 9**

- Enter the name as (my-private-db-subnet-3).
- Availability zone as (us-west-2c).
- CIDR block will be (172.20.9.0/24).

Now that I have verified that all the Subnets are created, I will show the pictures of these below;

**Subnet 2 of 4**

**Subnet name**  
Create a tag with a key of 'Name' and a value that you specify.

my-public-subnet-2

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 West (Oregon) / us-west-2b

**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.

172.20.0.0/20

**IPv4 subnet CIDR block**

172.20.2.0/20 4,096 IPs

< > ^ v

---

**Subnet name**  
Create a tag with a key of 'Name' and a value that you specify.

my-public-subnet-1

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 West (Oregon) / us-west-2a

**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.

172.20.0.0/20

**IPv4 subnet CIDR block**

172.20.1.0/24 256 IPs

< > ^ v

**Subnet 3 of 4**

**Subnet name**  
Create a tag with a key of 'Name' and a value that you specify.

my-public-subnet-3

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 West (Oregon) / us-west-2c

**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.

172.20.0.0/20

**IPv4 subnet CIDR block**

172.20.3.0/20 4,096 IPs

< > ^ ▼

---

**Subnet 4 of 9**

**Subnet name**

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

my-private-subnet-1

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 West (Oregon) / us-west-2a



**IPv4 VPC CIDR block** [Info](#)

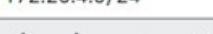
Choose the VPC's IPv4 CIDR block for the subnet. The subnet's IPv4 CIDR must lie within this block.

172.20.0.0/20



**IPv4 subnet CIDR block**

172.20.4.0/24 256 IPs



---

### Subnet 5 of 9

**Subnet name**

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

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.

**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.

**IPv4 subnet CIDR block**

256 IPs



---

### Subnet 6 of 9

**Subnet name**

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

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.

**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.

**IPv4 subnet CIDR block**

256 IPs



---

### Subnet 7 of 9

**Subnet name**

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

The name can be up to 256 characters long.

**Availability Zone [Info](#)**

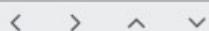
Choose the zone in which your subnet will reside, or let Amazon choose one for you.

**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.

**IPv4 subnet CIDR block**

256 IPs



---

## Subnet 8 of 9

**Subnet name**

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

The name can be up to 256 characters long.

**Availability Zone** [Info](#)

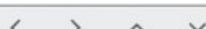
Choose the zone in which your subnet will reside, or let Amazon choose one for you.

**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.

**IPv4 subnet CIDR block**

256 IPs



---

## Subnet 9 of 9

**Subnet name**

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

The name can be up to 256 characters long.

**Availability Zone** [Info](#)

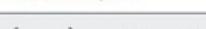
Choose the zone in which your subnet will reside, or let Amazon choose one for you.

**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.

**IPv4 subnet CIDR block**

256 IPs



⌚ You have successfully created 9 subnets: subnet-0d01e0f6a7ae546ba, subnet-0bc891f751fd359ad, subnet-02a3c48453450b097, subnet-06dc10f9db2068990, subnet-0da69627292c65c0d, subnet-02fd7f2f7170afca4, subnet-0f8999925cb31f8d2, subnet-072b710d7c5bb15f3, subnet-0dc966dec375b8977

**Subnets (9)** [Info](#)Last updated  
1 minute ago[Actions](#) [Create subnet](#)

Subnets (9)								
<input type="text"/> Find resources by attribute or tag								
Subnet ID : subnet-0d01e0f6a7ae546ba		Subnet ID : subnet-0bc891f751fd359ad		Subnet ID : subnet-02a3c48453450b097		<input type="checkbox"/> Show more (+6)		
Name	Subnet ID	State	VPC	IPv4 CIDR	IPv6 CIDR			
my-private-subnet-2	subnet-0da69627292c65c0d	<span>Available</span>	vpc-0e3379c555caaaf61   my-v...	172.20.5.0/24	-			
my-public-subnet-3	subnet-02a3c48453450b097	<span>Available</span>	vpc-0e3379c555caaaf61   my-v...	172.20.3.0/24	-			
my-public-subnet-2	subnet-0bc891f751fd359ad	<span>Available</span>	vpc-0e3379c555caaaf61   my-v...	172.20.2.0/24	-			
my-private-db-subnet-3	subnet-0dc966dec375b8977	<span>Available</span>	vpc-0e3379c555caaaf61   my-v...	172.20.9.0/24	-			
my-private-db-subnet-1	subnet-0f8999925cb31f8d2	<span>Available</span>	vpc-0e3379c555caaaf61   my-v...	172.20.7.0/24	-			
my-public-subnet-1	subnet-0d01e0f6a7ae546ba	<span>Available</span>	vpc-0e3379c555caaaf61   my-v...	172.20.1.0/24	-			

### **III. CREATE ROUTE TABLES**

#### **WEB SERVER**

- Now the Subnets have been created, I have to create the Route tables.
- Click on the (Route tables) in the (VPC dashboard).
- Click on (Create Route table).
- I named my first route table (my-public-w-route-table).
- I selected the VPC that I created.
- Click on the (Create Route table).

#### **APPLICATION**

- Click on (Route Table).
- Click on (Create Route Table).
- Name (my-private-app-route-table).
- Select the VPC (my-vpc-1).
- Click on (Create route table).

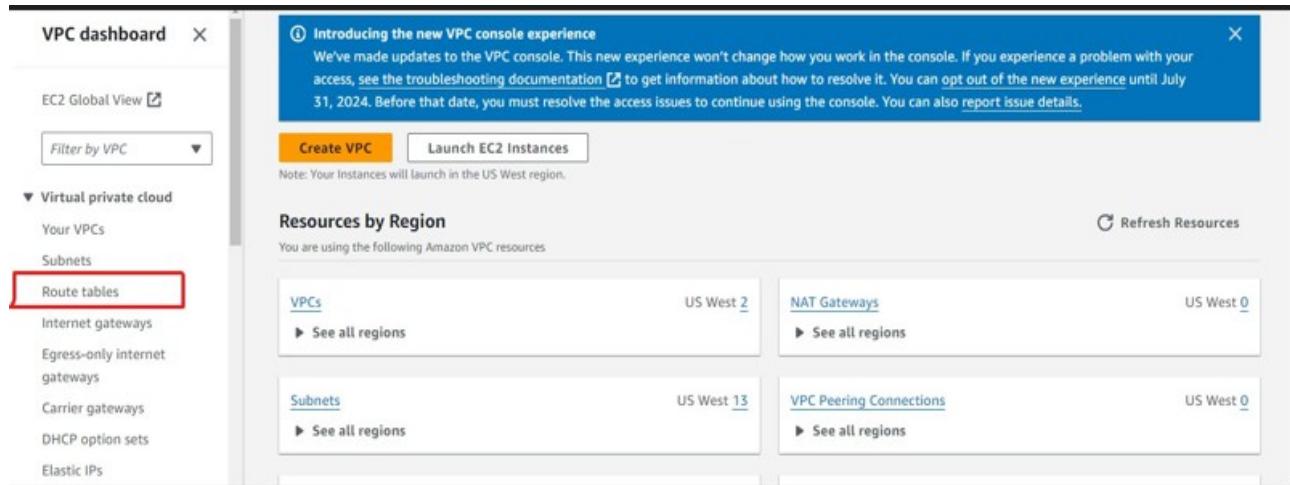
#### **DATABASE**

- Click on Route tables.
- Name it (my-private-db-route-table).
- Select the VPC (my-vpc-1).

Now that the following Route tables are created below;

- Web Route table (my-public-w-route-table).
- App Route table (my-private-app-route-table).
- Database Route table (my-private-db-route-table).

These are shown in the pictures below;



VPC dashboard X

Route tables (2) Info

Last updated 5 minutes ago Actions ▾ Create route table

Find resources by attribute or tag

Name	Route table ID	Explicit subnet associ...	Edge associations	Main	VPC	Owner ID
-	rtb-069df6051c789e788	-	-	Yes	vpc-077cb04aac5695bd4	411746592027
-	rtb-0e7189d10996b51e0	-	-	Yes	vpc-0e3379c555caaaf61   my-v...	411746592027

EC2 Global View Filter by VPC Virtual private cloud Your VPCs Subnets Route tables Internet gateways Egress-only internet gateways Carrier gateways

VPC > Route tables > Create route table

## Create route table Info

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

### Route table settings

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

my-public-w-route-table

**VPC**  
The VPC to use for this route table.

vpc-0e3379c555caaaf61 (my-vpc-1)

### Tags

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
<input type="text"/> Name	<input type="text"/> my-public-w-route-table
<input type="button" value="Add new tag"/>	<input type="button" value="Remove"/>

You can add 49 more tags.

Cancel

Route table rtb-06f3a4ed93f1ecfea | my-public-w-route-table was created successfully.

VPC > Route tables > rtb-06f3a4ed93f1ecfea

### rtb-06f3a4ed93f1ecfea / my-public-w-route-table

Actions ▾

**Details** Info

Route table ID <a href="#">rtb-06f3a4ed93f1ecfea</a>	Main <input checked="" type="checkbox"/> No	Explicit subnet associations -	Edge associations -
VPC <a href="#">vpc-0e3379c555caaaf61</a>   my-vpc-1	Owner ID <a href="#">411746592027</a>		

Routes Subnet associations Edge associations Route propagation Tags

**Routes (1)**

Filter routes Both Edit routes < 1 > @

Destination	Target	Status	Propagated
172.20.0.0/20	local	<span>Active</span>	No

VPC > **Route tables** rtb-06f3a4ed93f1ecfea

### rtb-06f3a4ed93f1ecfea / my-public-w-route-table

Actions ▾

**Details** Info

Route table ID <a href="#">rtb-06f3a4ed93f1ecfea</a>	Main <input checked="" type="checkbox"/> No	Explicit subnet associations -	Edge associations -
VPC <a href="#">vpc-0e3379c555caaaf61</a>   my-vpc-1	Owner ID <a href="#">411746592027</a>		

Routes Subnet associations Edge associations Route propagation Tags

**Routes (1)**

Filter routes Both Edit routes < 1 > @

Destination	Target	Status	Propagated
172.20.0.0/20	local	<span>Active</span>	No

**Route tables (3)** Info

Last updated 6 minutes ago Actions ▾ [Create route table](#) < 1 > @

Find resources by attribute or tag

Name	Route table ID	Explicit subnet associ...	Edge associations	Main	VPC	Owner ID
-	<a href="#">rtb-069dfd051c789e788</a>	-	-	Yes	<a href="#">vpc-077cb04aac5695bd4</a>	411746592027
-	<a href="#">rtb-0e7189df0996b51e0</a>	-	-	Yes	<a href="#">vpc-0e3379c555caaaf61</a>   my-v...	411746592027
my-public-w-route-table	<a href="#">rtb-06f3a4ed93f1ecfea</a>	-	-	No	<a href="#">vpc-0e3379c555caaaf61</a>   my-v...	411746592027

VPC > Route tables > Create route table

## Create route table Info

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

### Route table settings

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

my-private-app-route-table

**VPC**  
The VPC to use for this route table.

vpc-0e3379c555caaaf61 (my-vpc-1)

### Tags

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
<input type="text" value="Name"/> <span>X</span>	<input type="text" value="my-private-app-route-table"/> <span>X</span> <span>Remove</span>
<span>Add new tag</span>	

You can add 49 more tags.

Cancel Create route table

Route table rtb-0073c8fbc10feb014 | my-private-app-route-table was created successfully.

VPC > Route tables > rtb-0073c8fbc10feb014

rtb-0073c8fbc10feb014 / my-private-app-route-table Actions ▾

Details <small>Info</small>			
Route table ID <input type="text" value="rtb-0073c8fbc10feb014"/>	Main <input type="checkbox"/> No	Explicit subnet associations -	Edge associations -
VPC <input type="text" value="vpc-0e3379c555caaaf61   my-vpc-1"/>	Owner ID <input type="text" value="411746592027"/>		
<a href="#">Routes</a> <a href="#">Subnet associations</a> <a href="#">Edge associations</a> <a href="#">Route propagation</a> <a href="#">Tags</a>			
Routes (1)			
<input type="text" value="Filter routes"/> <span>Both ▾</span> <span>Edit routes</span> <span>&lt; 1 &gt; @</span>			
Destination <input type="text" value="172.20.0.0/20"/>	Target <input type="text" value="local"/>	Status <input checked="" type="checkbox"/> Active	Propagated No

VPC > Route tables > Create route table

## Create route table Info

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

### Route table settings

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

VPC  
 The VPC to use for this route table.

### Tags

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 - <i>optional</i>
<input type="text" value="Name"/>	<input type="text" value="my-private-db-route-table"/> <input type="button" value="Remove"/>

You can add 49 more tags.

Route table rtb-008029f726a492f2c | my-private-db-route-table was created successfully.

VPC > Route tables > rtb-008029f726a492f2c

### rtb-008029f726a492f2c / my-private-db-route-table

Details <small>Info</small>			
Route table ID <input type="text" value="rtb-008029f726a492f2c"/>	Main <input type="checkbox"/> No	Explicit subnet associations -	Edge associations -
VPC <input type="text" value="vpc-0e3379c555caaaf61   my-vpc-1"/>	Owner ID <input type="text" value="411746592027"/>		

Routes (1)		<input type="button" value="Both"/> <input type="button" value="Edit routes"/>	
<input type="text" value="Filter routes"/>		<input type="button" value="Filter routes"/>	
Destination	Target	Status	Propagated
172.20.0.0/20	local	<input checked="" type="checkbox"/> Active	No

Route tables (5) [Info](#)

Last updated 2 minutes ago [Actions](#) [Create route table](#)

<input type="checkbox"/>	Name	Route table ID	Explicit subnet associ...	Edge associations	Main	VPC	Owner ID
<input type="checkbox"/>	-	rtb-069df051c789e788	-	-	Yes	vpc-077cb04aac5695bd4	411746592027
<input type="checkbox"/>	-	rtb-0e7189df0996b51e0	-	-	Yes	vpc-0e3379c555caaaf61   my-v...	411746592027
<input checked="" type="checkbox"/>	my-public-w-route-table	rtb-06f3a4ed93f1ecfea	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027
<input type="checkbox"/>	my-private-app-route-table	rtb-0073c8fb010feb014	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027
<input type="checkbox"/>	my-private-db-route-table	rtb-008029f726a492f2c	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027

Route tables (1/5) [Info](#)

Last updated about 1 hour ago [Actions](#) [Create route table](#)

<input type="checkbox"/>	Name	Route table ID	Explicit subnet associ...	Edge associations	Main	VPC	Owner ID
<input type="checkbox"/>	-	rtb-069df051c789e788	-	-	Yes	vpc-077cb04aac5695bd4	411746592027
<input type="checkbox"/>	-	rtb-0e7189df0996b51e0	-	-	Yes	vpc-0e3379c555caaaf61   my-v...	411746592027
<input checked="" type="checkbox"/>	my-public-w-route-table	rtb-06f3a4ed93f1ecfea	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027
<input type="checkbox"/>	my-private-app-route-table	rtb-0073c8fb010feb014	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027
<input type="checkbox"/>	my-private-db-route-table	rtb-008029f726a492f2c	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027

### rtb-06f3a4ed93f1ecfea / my-public-w-route-table

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

#### Details

Route table ID <a href="#">rtb-06f3a4ed93f1ecfea</a>	Main <input type="checkbox"/> No	Explicit subnet associations -	Edge associations -
VPC vpc-0e3379c555caaaf61   my-vpc-1	Owner ID <a href="#">411746592027</a>		

#### Edit subnet associations

Change which subnets are associated with this route table.

##### Available subnets (3/9)

Filter subnet associations

<input type="checkbox"/>	Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID
<input type="checkbox"/>	my-private-subnet-2	subnet-0da6962729c65c0d	172.20.5.0/24	-	Main (rtb-0e7189df0996b51e0)
<input checked="" type="checkbox"/>	my-public-subnet-3	subnet-02a3c48453450b097	172.20.3.0/24	-	Main (rtb-0e7189df0996b51e0)
<input checked="" type="checkbox"/>	my-public-subnet-2	subnet-0bc891f51fd559ad	172.20.2.0/24	-	Main (rtb-0e7189df0996b51e0)
<input type="checkbox"/>	my-private-db-subnet-5	subnet-0dc96d6dec175b977	172.20.9.0/24	-	Main (rtb-0e7189df0996b51e0)
<input type="checkbox"/>	my-private-db-subnet-1	subnet-0f8999925cb31f8d2	172.20.7.0/24	-	Main (rtb-0e7189df0996b51e0)
<input checked="" type="checkbox"/>	my-public-subnet-1	subnet-0d01e0f6a7ae546ba	172.20.1.0/24	-	Main (rtb-0e7189df0996b51e0)
<input type="checkbox"/>	my-private-db-subnet-2	subnet-072b710d7c5bb15f3	172.20.8.0/24	-	Main (rtb-0e7189df0996b51e0)
<input type="checkbox"/>	my-private-subnet-1	subnet-06cd10f9db2068990	172.20.4.0/24	-	Main (rtb-0e7189df0996b51e0)
<input type="checkbox"/>	my-private-subnet-3	subnet-02f7d71f7170afca4	172.20.6.0/24	-	Main (rtb-0e7189df0996b51e0)

##### Selected subnets

[subnet-0d01e0f6a7ae546ba / my-public-subnet-1](#) [X](#) [subnet-0bc891f51fd559ad / my-public-subnet-2](#) [X](#) [subnet-02a3c48453450b097 / my-public-subnet-3](#) [X](#)

[Cancel](#) [Save associations](#)

You have successfully updated subnet associations for rtb-06f3a4ed93f1ecfea / my-public-w-route-table.

Route tables (1/5) <a href="#">Info</a>							Last updated	<a href="#">Actions</a>	<a href="#">Create route table</a>
							less than a minute ago		
<input type="text"/> Find resources by attribute or tag									
Name	Route table ID	Explicit subnet associ...	Edge associations	Main	VPC	Owner ID			
-	rtb-069df051c789e788	-	-	Yes	vpc-077cb04aac5695bd4	411746592027			
-	rtb-0e7189df0996b51e0	-	-	Yes	vpc-0e3379c555caaaf61   my-v...	411746592027			
<input checked="" type="checkbox"/> my-public-w-route-table	rtb-06f3a4ed93f1ecfea	3 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027			
my-private-app-route-table	rtb-0073c8fb10feb014	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027			
my-private-db-route-table	rtb-008029f726a492f2c	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027			

Last updated 6 minutes ago

Route tables (1/5) <a href="#">Info</a>							Last updated	<a href="#">Actions</a>	<a href="#">Create route table</a>
<input type="text"/> Find resources by attribute or tag									
Name	Route table ID	Explicit subnet associ...	Edge associations	Main	VPC	Owner ID			
-	rtb-069df051c789e788	-	-	Yes	vpc-077cb04aac5695bd4	411746592027			
-	rtb-0e7189df0996b51e0	-	-	Yes	vpc-0e3379c555caaaf61   my-v...	411746592027			
my-public-w-route-table	rtb-06f3a4ed93f1ecfea	3 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027			
<input checked="" type="checkbox"/> my-private-app-route-table	rtb-0073c8fb10feb014	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027			
my-private-db-route-table	rtb-008029f726a492f2c	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027			

rtb-0073c8fb10feb014 / my-private-app-route-table

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

### Edit subnet associations

Change which subnets are associated with this route table.

Available subnets (3/9)						
<input type="text"/> Filter subnet associations						
Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID		
<input checked="" type="checkbox"/> my-private-subnet-2	subnet-0da69627292c65c0d	172.20.5.0/24	-	Main (rtb-0e7189df0996b51e0)		
<input type="checkbox"/> my-public-subnet-3	subnet-02a3c484544506097	172.20.3.0/24	-	rtb-06f3a4ed93f1ecfea / my-public-w-rou...		
<input type="checkbox"/> my-public-subnet-2	subnet-0bc891f751fd559ad	172.20.2.0/24	-	rtb-06f3a4ed93f1ecfea / my-public-w-rou...		
<input type="checkbox"/> my-private-db-subnet-3	subnet-0dc966dec5750b0977	172.20.9.0/24	-	Main (rtb-0e7189df0996b51e0)		
<input type="checkbox"/> my-private-db-subnet-1	subnet-0f8999925cb31f8d2	172.20.7.0/24	-	Main (rtb-0e7189df0996b51e0)		
<input type="checkbox"/> my-public-subnet-1	subnet-0d01e0f6a7ae546ba	172.20.1.0/24	-	rtb-06f3a4ed93f1ecfea / my-public-w-rou...		
<input type="checkbox"/> my-private-db-subnet-2	subnet-072b710d75bb15f3	172.20.8.0/24	-	Main (rtb-0e7189df0996b51e0)		
<input checked="" type="checkbox"/> my-private-subnet-1	subnet-06dc10f9db2068990	172.20.4.0/24	-	Main (rtb-0e7189df0996b51e0)		
<input checked="" type="checkbox"/> my-private-subnet-3	subnet-02fd7f2f7170afca4	172.20.6.0/24	-	Main (rtb-0e7189df0996b51e0)		

**Selected subnets**

[subnet-06dc10f9db2068990 / my-private-subnet-1](#) [subnet-02fd7f2f7170afca4 / my-private-subnet-3](#) [subnet-0da69627292c65c0d / my-private-subnet-2](#)

[Cancel](#) **Save associations**

You have successfully updated subnet associations for rtb-0073c8fb10feb014 / my-private-app-route-table.

Route tables (1/5) <a href="#">Info</a>								
<a href="#">Actions</a> <a href="#">Create route table</a>								
<input type="text"/> Find resources by attribute or tag								
Name	Route table ID	Explicit subnet assoc...	Edge associations	Main	VPC	Owner ID	Last updated	Actions
-	rtb-069dfd051c789e788	-	-	Yes	vpc-077cb04aac5695bd4	411746592027	less than a minute ago	<a href="#">Edit</a> <a href="#">Delete</a>
-	rtb-0e7189df0996b51e0	-	-	Yes	vpc-0e3379c555caaaf61   my-v...	411746592027		<a href="#">Edit</a> <a href="#">Delete</a>
my-public-w-route-table	rtb-06f3a4ed93f1ecfea	3 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027		<a href="#">Edit</a> <a href="#">Delete</a>
<input checked="" type="checkbox"/> my-private-app-route-table	rtb-0073c8fb10feb014	3 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027		<a href="#">Edit</a> <a href="#">Delete</a>
my-private-db-route-table	rtb-008029f726a492f2c	-	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027		<a href="#">Edit</a> <a href="#">Delete</a>

### Edit subnet associations

Change which subnets are associated with this route table.

Available subnets (3/9)						
<input type="text"/> Filter subnet associations						
Name	Subnet ID	IPv4 CIDR	IPv6 CIDR	Route table ID		
my-private-subnet-2	subnet-0da6927292c65c0d	172.20.5.0/24	-	rtb-0073c8fb10feb014 / my-private-app...		
my-public-subnet-3	subnet-02a5c48453450b097	172.20.3.0/24	-	rtb-06f3a4ed93f1ecfea / my-public-w-rou...		
my-public-subnet-2	subnet-0bc891f751hd359ad	172.20.2.0/24	-	rtb-06f3a4ed93f1ecfea / my-public-w-rou...		
<input checked="" type="checkbox"/> my-private-db-subnet-3	subnet-0dc966dec375b8977	172.20.9.0/24	-	Main (rtb-0e7189df0996b51e0)		
<input checked="" type="checkbox"/> my-private-db-subnet-1	subnet-0f899925c51f8b2	172.20.7.0/24	-	Main (rtb-0e7189df0996b51e0)		
my-public-subnet-1	subnet-0d01e0f6a7ae546ba	172.20.1.0/24	-	rtb-06f3a4ed93f1ecfea / my-public-w-rou...		
<input checked="" type="checkbox"/> my-private-db-subnet-2	subnet-072b710d7c5bb15f3	172.20.8.0/24	-	Main (rtb-0e7189df0996b51e0)		
my-private-subnet-1	subnet-06dc10f9b2068990	172.20.4.0/24	-	rtb-0073c8fb10feb014 / my-private-app...		
my-private-subnet-3	subnet-02fd7f217170afc4	172.20.6.0/24	-	rtb-0073c8fb10feb014 / my-private-app...		

Selected subnets

subnet-072b710d7c5bb15f3 / my-private-db-subnet-2 [X](#) subnet-0f899925c51f8b2 / my-private-db-subnet-1 [X](#) subnet-0dc966dec375b8977 / my-private-db-subnet-3 [X](#)

[Cancel](#) [Save associations](#)

You have successfully updated subnet associations for rtb-008029f726a492f2c / my-private-db-route-table.

Route tables (1/5) <a href="#">Info</a>								
<a href="#">Actions</a> <a href="#">Create route table</a>								
<input type="text"/> Find resources by attribute or tag								
Name	Route table ID	Explicit subnet assoc...	Edge associations	Main	VPC	Owner ID	Last updated	Actions
-	rtb-069dfd051c789e788	-	-	Yes	vpc-077cb04aac5695bd4	411746592027	4 minutes ago	<a href="#">Edit</a> <a href="#">Delete</a>
-	rtb-0e7189df0996b51e0	-	-	Yes	vpc-0e3379c555caaaf61   my-v...	411746592027		<a href="#">Edit</a> <a href="#">Delete</a>
my-public-w-route-table	rtb-06f3a4ed93f1ecfea	3 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027		<a href="#">Edit</a> <a href="#">Delete</a>
my-private-app-route-table	rtb-0073c8fb10feb014	3 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027		<a href="#">Edit</a> <a href="#">Delete</a>
<input checked="" type="checkbox"/> my-private-db-route-table	rtb-008029f726a492f2c	3 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027		<a href="#">Edit</a> <a href="#">Delete</a>

## IV. SUBNET/ROUTE TABLE ASSOCIATION

- Highlight the first subnet (the-public-w-route-table) and click on (Subnet associations).
- Click on (Edit subnet associations).
- Also, search for the web route tables which fall under the (my-public-subnet-1, my-public-subnet-2, my-public-subnet-3).
- Select each of the public subnets and click on (Save associations).

- Follow the same procedure for the web route table above.
- So tick the (my-private-app-route-table).
- Click on (Subnet associations).
- Click on (Edit Subnet associations).
- Then tick (my-private-subnet, my-private-subnet-2, my-private-subnet-3).
- Then (Save associations).

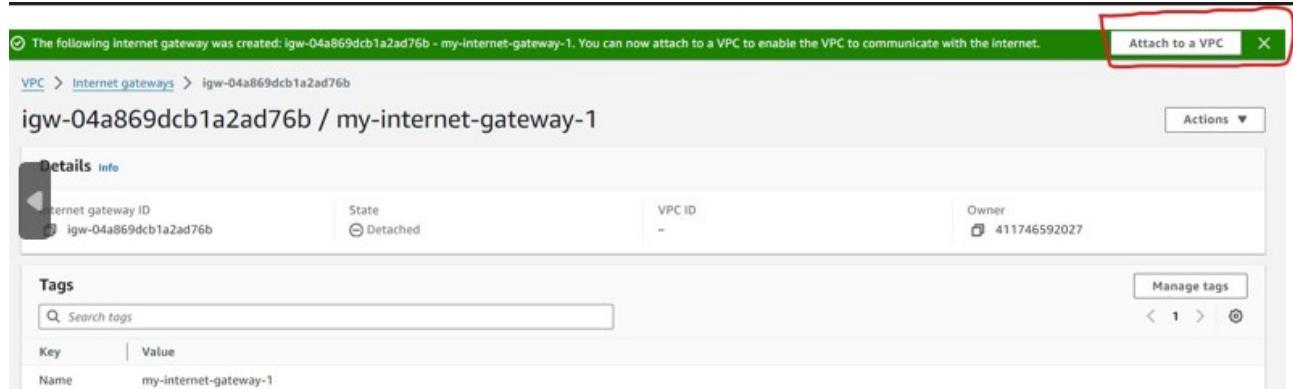
Finally, repeat the process but this time ticking the DB Subnet(my-private-db-subnet-1, my-private-db-subnet-2, my-private-db-subnet-3), then follow the same procedure like the one above to associate the (Subnets and Route tables).

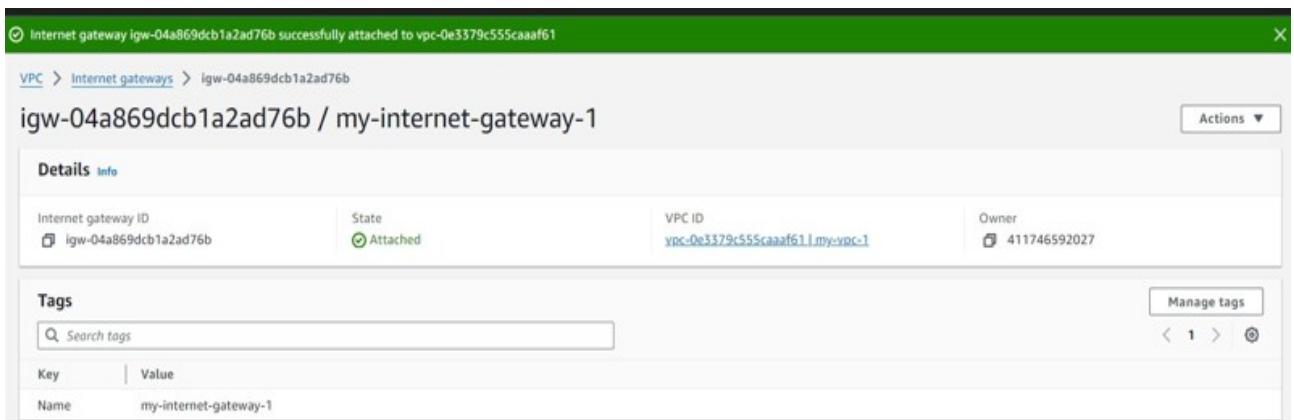
These are shown in the pictures above in the previous section.

## V. INTERNET GATEWAY

- Go to (Internet Gateway).
- Click on (Internet Gateway).
- Name the Internet Gateway as (my-internet gateway-1).
- Click on (Create internet gateway).
- After that, Click on (Attach to a VPC).
- Search for (Available VPC'S) and choose (my-vpc-1).
- Then click on (Attach internet Gateway).
- Internet Gateway is attached.

These are shown in the pictures below;





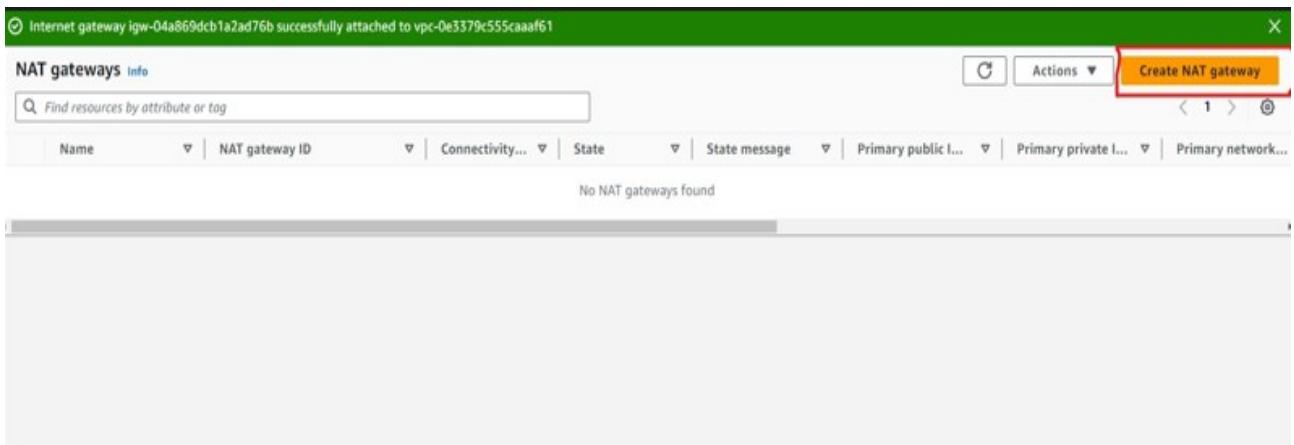
## VI. NAT GATEWAY

- Click on (NAT Gateway).
- Click on (Create NAT Gateway).
- I will create 1 NAT Gateway for this project but in reality and for best practice, I should create up to 3 NAT Gateways for failures and redundancies.
- Name of NAT Gateway (my-nat-gateway-1).
- Select the Subnet as (the pub-subnet-1).
- Click on (Allocate Elastic IP).
- 

“An Elastic IP address is a (Reserved public IP) address that you can assign to any EC2 instance in a particular region, until you choose to release it”.

- Then Click on (Create NAT Gateway).
- Go to (NAT Gateway) to check if it is created.

These are shown in the pictures below;



## Create NAT gateway [Info](#)

A 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.

The name can be up to 256 characters long.

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

A 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.

**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.

Allocate Elastic IP

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

### Tags

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
<input type="text" value="Name"/>	<input type="text" value="my-nat-gateway-1"/> Remove

Add new tag

You can add 49 more tags.

Cancel Create NAT gateway

NAT gateway nat-Of2a20b0d1c6eb8e1 | my-nat-gateway-1 was created successfully.

VPC > NAT gateways > nat-Of2a20b0d1c6eb8e1

**nat-Of2a20b0d1c6eb8e1 / my-nat-gateway-1**

**Details**

NAT gateway ID nat-Of2a20b0d1c6eb8e1	Connectivity type Public	State Pending	State message -
NAT gateway ARN arn:aws:ec2:us-west-2:411746592027:natgateway/nat-Of2a20b0d1c6eb8e1	Primary public IPv4 address -	Primary private IPv4 address 172.20.1.146	Primary network interface ID eni-02630c41db4503409
VPC vpc-0e3379c555caaaf61 / my-vpc-1	Subnet subnet-0d07ef6a7ae546ba / my-public-subnet-1	Created Monday, July 29, 2024 at 15:08:44 GMT+1	Deleted -

**Secondary IPv4 addresses**

Secondary IPv4 addresses

Search:

Private IPv4 address	Network interface ID	Status	Failure message
----------------------	----------------------	--------	-----------------

Secondary IPv4 addresses are not available for this nat gateway.

NAT gateways [1] [Info](#)

Find resources by attribute or tag

Name	NAT gateway ID	Connectivity...	State	State message	Primary public I...	Primary private I...	Primary network...	VPC	Subnet
my-nat-gateway-1	nat-Of2a20b0d1c6eb8e1	Public	Available	-	35.95.233.160	172.20.1.146	eni-02630c41db450...	vpc-0e3379c555caaaf61 / my-v...	subnet-0d01e...

## VII. ADD ROUTES FOR THE INTERNET GATEWAY AND NAT GATEWAY

- Click on (Route table).
- Making changes in the (Route tables) so that the connectivity to the internet can be established.
- Tick the (my-public-w-route-table).
- Click on (Routes) to establish routes and connection for my public subnet's (IGW) and private subnet's (NAT Gateway).
- Click on (Edit Routes).
- Then (Add Route) in the public route table for (0.0.0.0/0) and point it to the (IGW).
- Then Route successfully pointed to the (IGW).

Next, making changes to the Route.

### STEPS

- Click on (Route Tables).

- Tick the (Private-app-subnet).
- Click on (Edit Routes).
- Add create a route for (0.0.0.0/0) and point it to the NAT Gateway.

Repeat this process again but this time create a NAT Gateway using the (private-subnet-route) and then this is successfully routed. This is the networking part of the project completed and the VPC has been created, IGW, NAT and the Route tables have been connected to each other.

These are shown in the pictures below;

VPC > Route tables > rtb-06f3a4ed93f1ecfea > Edit routes

Edit routes

Destination	Target	Status	Propagated
172.20.0.0/20	local	Active	No
<input type="text" value="Q. 0.0.0/0"/> X	Internet Gateway	Active	No
	Q. igw-	In Progress	No

Add route

Cancel Preview Save changes

Updated routes for rtb-06f3a4ed93f1ecfea / my-public-w-route-table successfully

Details

VPC > Route tables > rtb-06f3a4ed93f1ecfea

rtb-06f3a4ed93f1ecfea / my-public-w-route-table

Details		Actions																													
Route table ID	rtb-06f3a4ed93f1ecfea	Main	No																												
VPC	vpc-0e3379c555caaaf61   my-vpc-1	Owner ID	411746592027																												
Explicit subnet associations 3 subnets																															
Edge associations =																															
<a href="#">Routes</a> <a href="#">Subnet associations</a> <a href="#">Edge associations</a> <a href="#">Route propagation</a> <a href="#">Tags</a>																															
<b>Routes (2)</b> <table border="1"> <thead> <tr> <th colspan="2">Filter routes</th> <th colspan="3">Both</th> <th colspan="2">Edit routes</th> </tr> <tr> <th>Destination</th> <th>Target</th> <th>Status</th> <th>Propagated</th> <th colspan="3"></th> </tr> </thead> <tbody> <tr> <td>0.0.0.0/0</td> <td>igw-04a869dcb1a2ad76b</td> <td>Active</td> <td>No</td> <td colspan="3"></td> </tr> <tr> <td>172.20.0.0/20</td> <td>local</td> <td>Active</td> <td>No</td> <td colspan="3"></td> </tr> </tbody> </table>				Filter routes		Both			Edit routes		Destination	Target	Status	Propagated				0.0.0.0/0	igw-04a869dcb1a2ad76b	Active	No				172.20.0.0/20	local	Active	No			
Filter routes		Both			Edit routes																										
Destination	Target	Status	Propagated																												
0.0.0.0/0	igw-04a869dcb1a2ad76b	Active	No																												
172.20.0.0/20	local	Active	No																												

Route tables (1/5) <a href="#">Info</a>							
<a href="#">Find resources by attribute or tag</a>		Route table ID	Explicit subnet associ...	Edge associations	Main	VPC	Owner ID
<input type="checkbox"/>	Name	rtb-00f3a4e093f1ecfea	3 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027
<input type="checkbox"/>	-	rtb-060d9d4051c789e7bb	-	-	Yes	vpc-077cb04aae5695bd4	411746592027
<input type="checkbox"/>	-	rtb-0e189d09996a51e0	-	-	Yes	vpc-0e3379c555caaaf61   my-v...	411746592027
<input checked="" type="checkbox"/>	my-private-app-route-table	rtb-0073cf8fb10feb014	5 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027
<input type="checkbox"/>	my-private-db-route-table	rtb-006023f726492f2a	3 subnets	-	No	vpc-0e3379c555caaaf61   my-v...	411746592027

rtb-0073cf8fb10feb014 / my-private-app-route-table							
<a href="#">Details</a>		<a href="#">Routes</a>	<a href="#">Subnet associations</a>	<a href="#">Edge associations</a>	<a href="#">Route propagation</a>	<a href="#">Tags</a>	<a href="#">Actions</a>
<b>Routes (1)</b>							
<a href="#">Edit routes</a>	<a href="#">Both</a>	<a href="#">Edit routes</a>	<a href="#">&lt; 1 &gt;</a>	<a href="#">@</a>			

Edit routes							
Destination	Target	Status	Propagated				
172.20.0.0/20	local	<span>Active</span>	No				
<input type="text" value="0.0.0.0"/> X	NAT Gateway	<span>Active</span>	No				
	nat-0f2a2080d1c6eb8e1	<span>Active</span>	No				
<a href="#">Add route</a>				<a href="#">Cancel</a>	<a href="#">Preview</a>	<a href="#">Save changes</a>	

<input checked="" type="checkbox"/>	Updated routes for rtb-0073cf8fb10feb014 / my-private-app-route-table successfully						
<a href="#">Details</a>							
VPC > Route tables > rtb-0073cf8fb10feb014							
rtb-0073cf8fb10feb014 / my-private-app-route-table							
<a href="#">Actions</a>							
Details <a href="#">Info</a>							
Route table ID	<a href="#">rtb-0073cf8fb10feb014</a>						
Main	<input checked="" type="radio"/> No						
Owner ID	vpc-0e3379c555caaaf61						
Edge associations	-						
Explicit subnet associations							
3 subnets							
Routes (2)							
<a href="#">Edit routes</a>	<a href="#">Both</a>	<a href="#">Edit routes</a>	<a href="#">&lt; 1 &gt;</a>	<a href="#">@</a>			
<a href="#">Filter routes</a>							
Destination	Target	Status	Propagated				
0.0.0.0/0	nat-0f2a2080d1c6eb8e1	<span>Active</span>	No				
172.20.0.0/20	local	<span>Active</span>	No				

VPC > Route tables > rtb-008029f726a492f2c > Edit routes

Edit routes

Destination	Target	Status	Propagated
172.20.0.0/20	local	Active	No
0.0.0.0/0	NAT Gateway		No
	nat-0f2a20b0d1c6eb8e1		

Add route

Cancel Preview Save changes

Updated routes for rtb-008029f726a492f2c / my-private-db-route-table successfully

Details

VPC > Route tables > rtb-008029f726a492f2c

rtb-008029f726a492f2c / my-private-db-route-table

Actions

Details		Info	
Route table ID	rtb-008029f726a492f2c	Main	No
VPC	vpc-0e3379c555caaaf61   my-vpc-1	Owner ID	411746592027
Explicit subnet associations	3 subnets	Edge associations	=

Routes | Subnet associations | Edge associations | Route propagation | Tags

Routes (2)

Destination	Target	Status	Propagated
0.0.0.0/0	nat-0f2a20b0d1c6eb8e1	Active	No
172.20.0.0/20	local	Active	No

## VIII. DEPLOYING THE APPLICATION COMPONENTS

- Go to EC2 instance.
- Click on the (instances).
- Click on the (Launch instances).
- In the (Launch an instance) page, select (Amazon Linux 2 AMI) as my AMI(Amazon machine image).
- Under my (Instance type), select (t2 micro).
- Under (Network settings), select the VPC that I created which is (my-vpc-1).
- Select the Public Subnet as this will be my (Jump server).

“A Jump server is a server that is used to access other servers. It is also known as a bastion host. It is a server that is accessible from the internet and it’s used to access other servers that are not accessible from the internet”.

- Select the (my-public-subnet-1) as my jump server.
- Next, (Enable) Auto-assign public IP.
- Go to (Security Groups), tick (Create new Security group).
- Security group name enter; (my-jumper-server-sg).
- Description enter; (my-jumper-server-sg).
- Go back to (Key pair name) and enter (Create new key pair).
- Click on (Create key pair) and under key pair name, name it (my key pair).
- Download the (.pem key).
- Then click on (Launch instance).
- Before then, I went back to the Name and tags; Name(my-jump-server).

These are shown in some of the pictures below;

The screenshot shows the EC2 Dashboard with the 'Resources' section selected. A red box highlights the 'Instances (running)' row, which shows 0 instances. Below this, there are other resource counts: Auto Scaling Groups (0), Dedicated Hosts (0), Elastic IPs (1), Instances (0), Key pairs (0), Load balancers (0), Placement groups (0), Savings Plans (2), Snapshots (0), and Volumes (0).

The screenshot shows the 'Instances' page. A red box highlights the search bar at the top, which contains the placeholder 'Find Instance by attribute or tag (case-sensitive)'. To the right of the search bar is a 'Launch instances' button, also highlighted with a red box. The main table area shows no matching instances found.

**Create key pair**

**Key pair name**  
Key pairs allow you to connect to your instance securely.

The name can include up to 255 ASCII characters. It can't include leading or trailing spaces.

**Key pair type**

RSA RSA encrypted private and public key pair

ED25519 ED25519 encrypted private and public key pair

**Private key file format**

.pem For use with OpenSSH

.ppk For use with PuTTY

**⚠️** When prompted, store the private key in a secure and accessible location on your computer. You will need it later to connect to your instance. [Learn more](#)

**Create key pair**

EC2 > Instances > Launch an instance

### Launch an instance Info

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

**Name and tags Info**

Name  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.

**Quick Start**

Amazon Linux	macOS	Ubuntu	Windows	Red Hat	SUSE Li

**Summary**

Number of instances

Software Image (AMI)  
Amazon Linux 2 Kernel 5.10 AMI...read more  
ami-0648742c7600c103f

Virtual server type (instance type)  
t2.micro

Firewall (security group)  
New security group

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 of EBS storage, 2 million IOPS, 1 GiB of memory, and 1000 AWS Lambda requests per month.

**Launch instance**

Amazon Linux 2 AMI (HVM) - Kernel 5.10, SSD Volume Type  
 ami-0648742c7600c103f (64-bit (x86)) / ami-0d8e3ee533ea62941 (64-bit (Arm))  
 Virtualization: hvm ENA enabled: true Root device type: ebs

**Description**  
 Amazon Linux 2 comes with five years support. It provides Linux kernel 5.10 tuned for optimal performance on Amazon EC2, systemd 219, GCC 7.3, Glibc 2.26, Binutils 2.29.1, and the latest software packages through extras. This AMI is the successor of the Amazon Linux AMI that is now under maintenance only mode and has been removed from this wizard.

**Architecture** 64-bit (x86) **AMI ID** ami-0648742c7600c103f **Verified provider**

**Instance type** [Info](#) | [Get advice](#)

**Instance type**  
**t2.micro** Family: t2 1 vCPU 1 GiB Memory Current generation: true Free tier eligible  
 On-Demand Linux base pricing: 0.0116 USD per Hour  
 On-Demand SUSE base pricing: 0.0116 USD per Hour  
 On-Demand Windows base pricing: 0.0162 USD per Hour  
 On-Demand RHEL base pricing: 0.026 USD per Hour

All generations Compare instance types

Additional costs apply for AMIs with pre-installed software

**Key pair (login)** [Info](#)

You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.

**Key pair name - required** mykeypair [Create new key pair](#)

**Summary**

Number of instances: 1 [Info](#)

Software image (AMI)  
 Amazon Linux 2 Kernel 5.10 AMI... [read more](#)  
 ami-0648742c7600c103f

Virtual server type (instance type)  
 t2.micro

Firewall (security group)  
 New security group

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 of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

**Launch instance**

EC2 > Instances > Launch an instance

**Success**  
 Successfully initiated launch of instance i-0a8cc02b596e3b0d

[Launch log](#)

**Next Steps**

What would you like to do next with this instance, for example "create alarm" or "create backup"

Instances (1) <a href="#">Info</a>										
<a href="#">Find instance by attribute or tag (case-sensitive)</a> <a href="#">All states</a>										
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 IP	Elastic IP	IPv6 IPs
my-jump-server	i-0a8cc02b596e3b0d	<span>Running</span>	t2.micro	<span>Initializing</span>	<a href="#">View alarms</a>	us-west-2a	34.217.108.21	-	-	disabled

The screenshot shows the AWS EC2 Instances page with a green success banner at the top stating "Successfully initiated launch of instance i-05e40a44e1bf75094". Below the banner, there's a "Launch log" link and a "Next Steps" section. The "Next Steps" section contains several links: "Create billing and free tier usage alerts", "Connect to your instance", "Connect an RDS database", "Create EBS snapshot policy", "Manage detailed monitoring", and "Create Load Balancer". A search bar and a navigation menu are also visible.

Next, Go back to the instances and I can see that the jump server (my-jump-server) has been created/launched.

## **IX. CREATE THE PHP INSTANCE**

- Click on (Launch instances).
- Select (Amazon Linux 2) as my AMI.
- Select (Instance type) as (t2 micro).
- Go to (Network settings), click (Edit) and select my VPC that I created which is my (my-vpc-1).
- Under (Subnet); Select the (App subnet) which is (my-private-subnet-1).
- Go to key pair name, name it as (my-php-app-server-1).
- Go to (Security Groups) and select (Create Security group).
- Enter Security group name as (my-php-app-server-sg).
- Enter the same name under (Description) as (my-php-app-server-sg).
- Allow the SSH connection for the (App server) from the (Jump server).
- Change the (Source) to (Custom) and enter the source (my jump server sg).
- Then click on (Launch instance).
- PHP instance is successfully launched.
- Go back to instances to check if the PHP instance has been created.
- PHP is created.

Next, I will create the other php.server following the same instructions above but changing the name.

## **STEPS**

- Click on (Launch instances).
- Select the AMI as (Amazon Linux 2).
- Select the instance type as (t2 micro).
- Select the VPC; (my-vpc-1).
- Select the other App subnet which is (my-private-subnet-2).
- Go to (Name & tags) and enter the Name as (my-php-app-server-2).
- The Security group is already created so I will select it (my-php-app-server-sg).
- Go to Key pair (Login).

- Under key pair name, select (Create new Key pair).
- Select; (my key pair).
- Launch instance.
- Check (instances) to check the (Created Instance).
- “my-php-app-server-2” is launched.

These are shown in the pictures below;

Instances (2) <a href="#">Info</a>											
<a href="#">Find instance by attribute or tag (case-sensitive)</a> <span style="float: right;">All states ▾</span>											
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	IPv6 IPs	Monitoring
my-jump-server	i-0a8cca92b596e3b0d	Running	t2.micro	2/2 checks passed	<a href="#">View alarms +</a>	us-west-2a	-	34.217.108.21	-	-	disabled
my-php-app-s...	i-05e40a44e1bf75094	Running	t2.micro	2/2 checks passed	<a href="#">View alarms +</a>	us-west-2a	-	-	-	-	disabled

EC2 > Instances > Launch an instance

Success  
Successfully initiated launch of instance i-0a010651d6919b68d

[Launch log](#)

**Next Steps**

Q What would you like to do next with this instance, for example "create alarm" or "create backup"

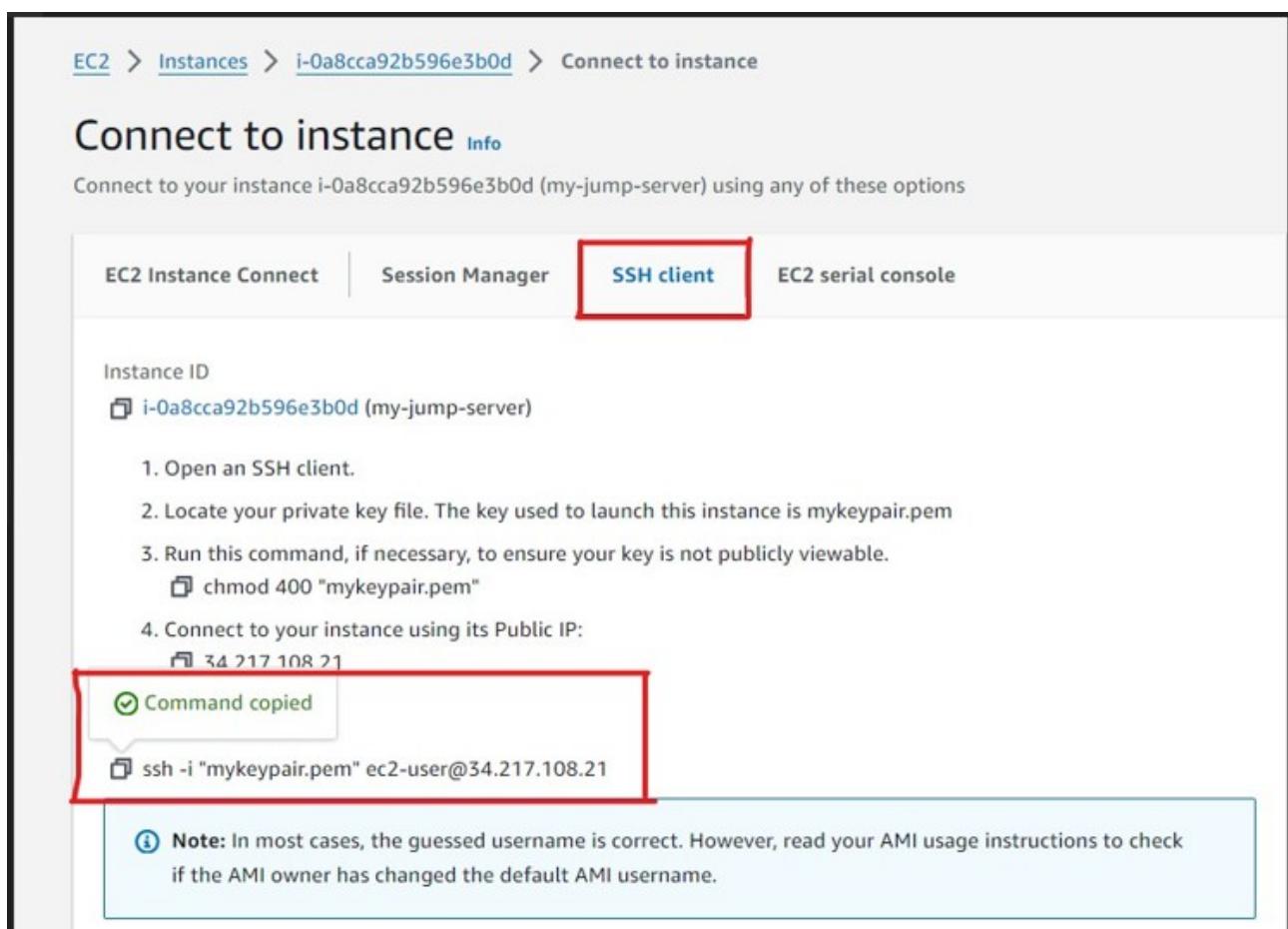
Instances (3) <a href="#">Info</a>											
<a href="#">Find instance by attribute or tag (case-sensitive)</a> <span style="float: right;">All states ▾</span>											
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	IPv6 IPs	Monitoring
my-jump-server	i-0a8cca92b596e3b0d	Running	t2.micro	2/2 checks passed	<a href="#">View alarms +</a>	us-west-2a	-	34.217.108.21	-	-	disabled
my-php-app-server-1	i-05e40a44e1bf75094	Running	t2.micro	2/2 checks passed	<a href="#">View alarms +</a>	us-west-2a	-	-	-	-	disabled
my-php-app-server-2	i-0a010651d6919b68d	Running	t2.micro	Initializing	<a href="#">View alarms +</a>	us-west-2b	-	-	-	-	disabled

Instances (1/3) <a href="#">Info</a>											
<a href="#">Find instance by attribute or tag (case-sensitive)</a> <span style="float: right;">All states ▾</span>											
Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	IPv6 IPs	Monitoring
my-jump-server	i-0a8cca92b596e3b0d	Running	t2.micro	2/2 checks passed	<a href="#">View alarms +</a>	us-west-2a	-	-	-	-	disabled
my-php-app-server-1	i-05e40a44e1bf75094	Running	t2.micro	2/2 checks passed	<a href="#">View alarms +</a>	us-west-2a	-	-	-	-	disabled
my-php-app-server-2	i-0a010651d6919b68d	Running	t2.micro	2/2 checks passed	<a href="#">View alarms +</a>	us-west-2b	-	-	-	-	disabled

## X. INSTALLATION OF PHP APACHE

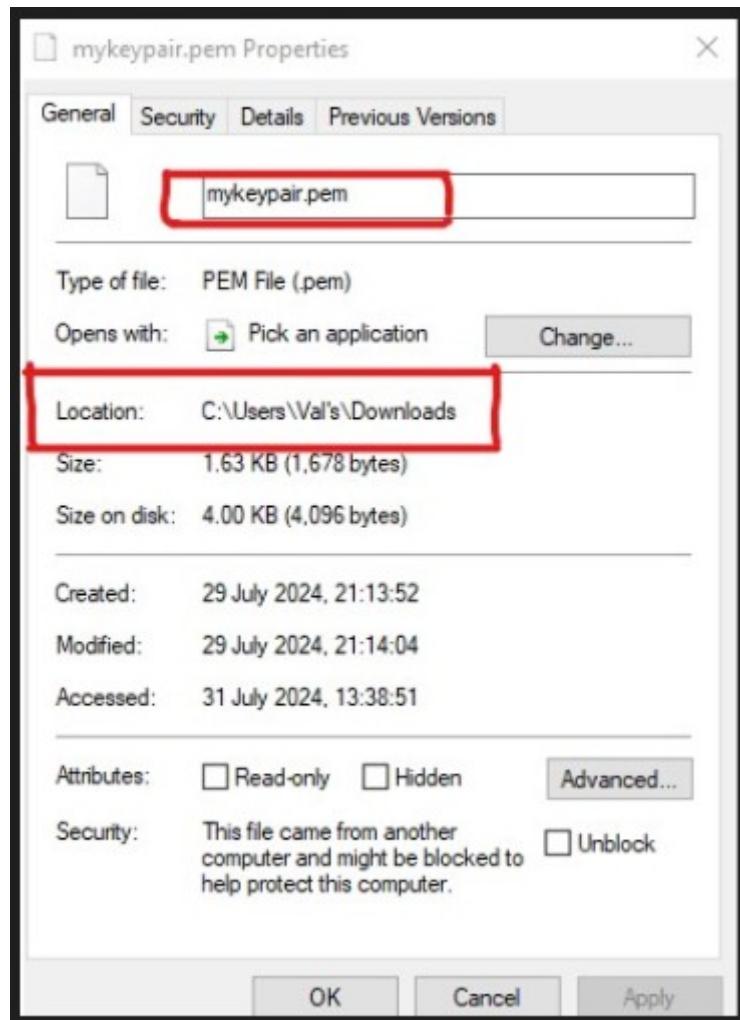
- Allow the Servers are in a running state.
- Click on the (Jump server) which is the (my-jump-server).
- Click (Connect to instance).
- Click on the (SSH) client link and connect to (ssh-i"mykeypair.pem"@user34.217.108.21).
- Copy the SSH link.
- Go the (Command Prompt), open the Command prompt in (Admin mode).
- Type in (SSH) to make sure I have (SSH) installed in my Computer.
- Log into (my instance) type in (ssh-i) and (-i) stands for (identity file).
- Copy the entire (Location) of the file and paste it in the Command line prompt.
- After the (ssh-i\users\val's\downloads), then add "mykeypair.pem" to it.
- Go back to the (jump server instance ID), copy the (Public IPV<sub>4</sub>) address then paste it onto the (Command Prompt).
- Open the Command prompt in Admin mode.
- Next, connect the PHP servers to my machine.
- Click on the connect.
- Then going to the (.pem key) of the (php-app-server).
- Go to properties and get the link for the (location).
- Copy the link of the file name (my-php-app-server-1.pem) and the link of the location (c:\users\val's\Downloads).
- Repeat the same process of pasting them in the Command prompt with the (Private IPV<sub>4</sub> address) instead of the (Public IPV<sub>4</sub> address) that I used in the previous instance (jump server instance).

These are shown in the pictures below;



```
C:\Users\Val's>ssh
usage: ssh [-46AaCfGgKkMNnqsTtVvXxYy] [-B bind_interface]
           [-b bind_address] [-c cipher_spec] [-D [bind_address:]port]
           [-E log_file] [-e escape_char] [-F configfile] [-I pkcs11]
           [-i identity_file] [-J [user@]host[:port]] [-L address]
           [-l login_name] [-m mac_spec] [-O ctl_cmd] [-o option] [-p port]
           [-Q query_option] [-R address] [-S ctl_path] [-W host:port]
           [-w local_tun[:remote_tun]] destination [command]
```

C:\Users\Val's>



i-0a8cca92b596e3b0d (my-jump-server)		
Instance ID	i-0a8cca92b596e3b0d (my-jump-server)	
IPv6 address	-	
Hostname type		
IP name:	ip-172-20-1-51.us-west-2.compute.internal	
Answer private resource DNS name	-	
Auto-assigned IP address	34.217.108.21 [Public IP]	
Public IPv4 address	34.217.108.21   open address	
Instance state	Running	
Private IP DNS name (IPv4 only)	ip-172-20-1-51.us-west-2.compute.internal	
Instance type	t2.micro	
VPC ID	vpc-0e3379c555caaaf61 (my-vpc-1)	
Private IPv4 addresses	172.20.1.51	
Public IPv4 DNS	-	
Elastic IP addresses	-	
AWS Compute Optimizer finding	Opt-in to AWS Compute Optimizer for recommendations.	
Learn more		

```

ec2-user@ip-172-20-1-51:~ Microsoft Windows [Version 10.0.19045.4651]
(c) Microsoft Corporation. All rights reserved.

C:\WINDOWS\system32>ssh -i C:/Users/Val's/Downloads/mykeypair.pem ec2-user@34.217.108.21
The authenticity of host '34.217.108.21 (34.217.108.21)' can't be established.
ECDSA key fingerprint is SHA256:gMm0kziWtpTVQw7fyFeVsh2qvRhhHFX8cQQ6EImpA00.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added '34.217.108.21' (ECDSA) to the list of known hosts.

,#
~\_#####
~~\_\#####
~~ \#####
~~ \#/   AL2 End of Life is 2025-06-30.
~~ \#/.-->
~~ /     A newer version of Amazon Linux is available!
~~ .-. /   Amazon Linux 2023, GA and supported until 2028-03-15.
~/m/ /   https://aws.amazon.com/linux/amazon-linux-2023/

[ec2-user@ip-172-20-1-51 ~]$
```

```
~~~ \####\ AL2 End of Life is 2025-06-30.  
~~~ \|/ A newer version of Amazon Linux is available!  
~~~ / Amazon Linux 2023, GA and supported until 2028-03-15.  
~/m/ https://aws.amazon.com/linux/amazon-linux-2023/  
  
[ec2-user@ip-172-20-1-51 ~]$ [ec2-user ~]$ sudo yum update -y  
-bash: [ec2-user: command not found  
[ec2-user@ip-172-20-1-51 ~]$ clear  
[ec2-user@ip-172-20-1-51 ~]$ [ec2-user ~]$ sudo yum update -y  
-bash: [ec2-user: command not found  
[ec2-user@ip-172-20-1-51 ~]$ sudo amazon-linux-extras install mariadb10.5  
Topic mariadb10.5 has end-of-support date of 2025-06-24  
Installing mariadb  
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd  
Cleaning repos: amzn2-core amzn2extra-docker amzn2extra-kernel-5.10 amzn2extra-mariadb10.5  
17 metadata files removed  
6 sqlite files removed  
0 metadata files removed  
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd  
amzn2-core  
amzn2extra-docker  
amzn2extra-kernel-5.10  
amzn2extra-mariadb10.5  
(1/9): amzn2-core/2/x86_64/group_gz 3.6 kB 00:00:00  
(2/9): amzn2-core/2/x86_64/updateinfo 2.9 kB 00:00:00  
(3/9): amzn2extra-docker/2/x86_64/updateinfo 3.0 kB 00:00:00  
(4/9): amzn2extra-mariadb10.5/2/x86_64/updateinfo 3.0 kB 00:00:00  
(5/9): amzn2extra-kernel-5.10/2/x86_64/updateinfo 2.7 kB 00:00:00  
(6/9): amzn2extra-docker/2/x86_64/primary_db 951 kB 00:00:00  
| 16 kB 00:00:00  
| 7.8 kB 00:00:00  
| 74 kB 00:00:00  
| 105 kB 00:00:00
```

```
ec2-user@ip-172-20-1-51 ~$  
zlib-devel x86_64 1.2.7-19.amzn2.0.3 amzn2-core 51 k  
Upgrading for dependencies:  
mariadb-libs x86_64 3:10.5.25-1.amzn2 amzn2extra-mariadb10.5 158 k  
  
Transaction Summary  
=====  
Install 1 Package (+38 Dependent packages)  
Upgrade 1 Dependent package  
  
Total download size: 50 M  
Is this ok [y/d/N]:
```

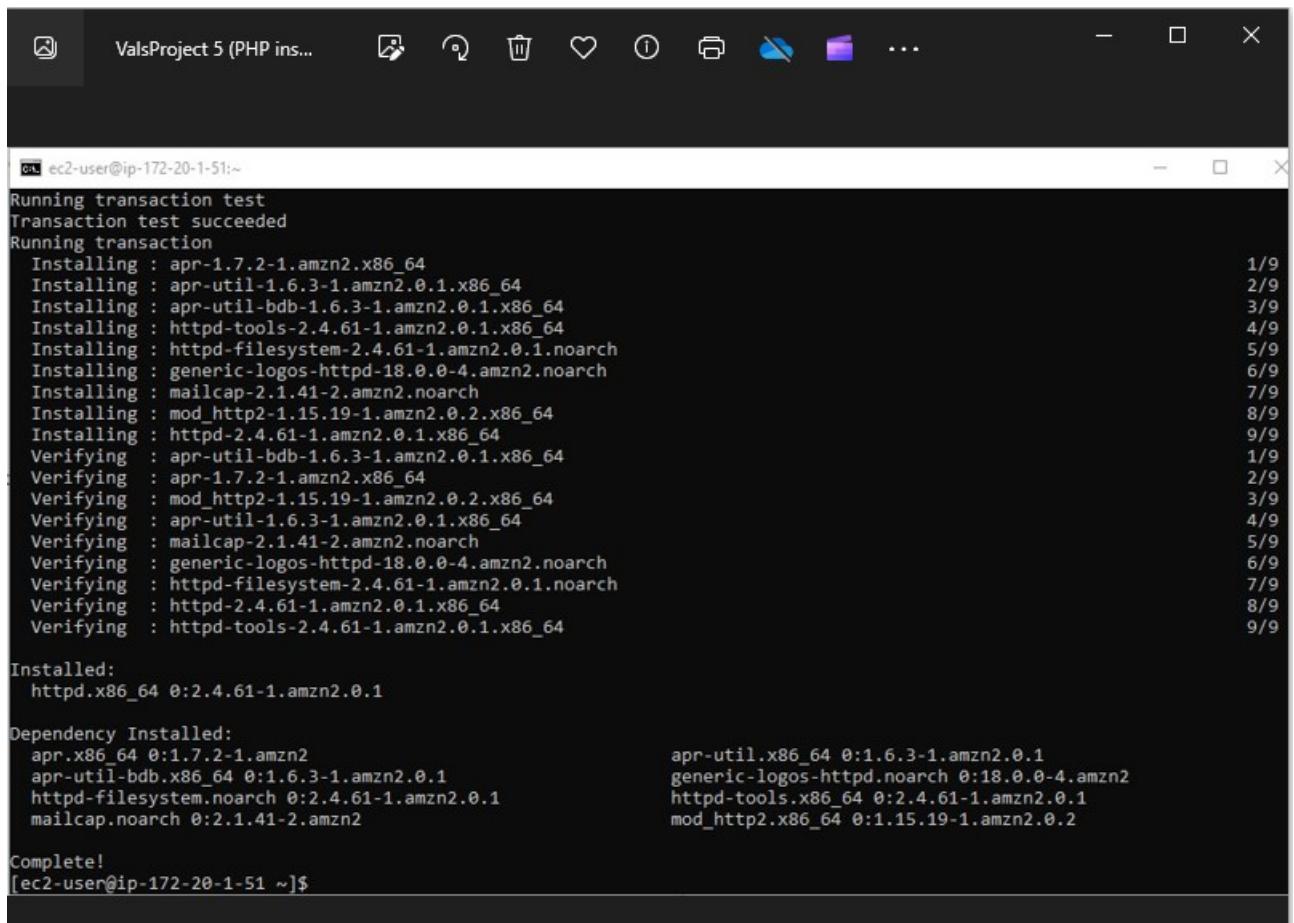
```
ec2-user@ip-172-20-1-51:~
```

36	BCC	available	[ =0.x =stable ]
37	mono	available	[ =5.x =stable ]
38	nginx1	available	[ =stable ]
40	mock	available	[ =stable ]
43	livepatch	available	[ =stable ]
44	+python3.8	available	[ =stable ]
45	haproxy2	available	[ =stable ]
46	collectd	available	[ =stable ]
47	aws-nitro-enclaves-cli	available	[ =stable ]
48	R4	available	[ =stable ]
—	kernel-5.4	available	[ =stable ]
50	selinux-ng	available	[ =stable ]
52	tomcat9	available	[ =stable ]
53	unbound1.13	available	[ =stable ]
54	+mariadb10.5=latest	enabled	[ =stable ]
55	kernel-5.10=latest	enabled	[ =stable ]
56	redis6	available	[ =stable ]
58	+postgresql12	available	[ =stable ]
59	+postgresql13	available	[ =stable ]
60	mock2	available	[ =stable ]
61	dnsmasq2.85	available	[ =stable ]
62	kernel-5.15	available	[ =stable ]
63	+postgresql14	available	[ =stable ]
64	firefox	available	[ =stable ]
65	lustre	available	[ =stable ]
—	+php8.1	available	[ =stable ]
67	awscli1	available	[ =stable ]
68	+php8.2=latest	enabled	[ =stable ]
69	dnsmasq	available	[ =stable ]
70	unbound1.17	available	[ =stable ]
72	collectd-python3	available	[ =stable ]

```
+ Note on end-of-support. Use 'info' subcommand.
```

```
[ec2-user@ip-172-20-1-51 ~]$
```

```
ValsProject 5 (PHP ins... -
```



```
ec2-user@ip-172-20-1-51:~
```

```
Running transaction test
Transaction test succeeded
Running transaction
  Installing : apr-1.7.2-1.amzn2.x86_64 1/9
  Installing : apr-util-1.6.3-1.amzn2.0.1.x86_64 2/9
  Installing : apr-util-bdb-1.6.3-1.amzn2.0.1.x86_64 3/9
  Installing : httpd-tools-2.4.61-1.amzn2.0.1.x86_64 4/9
  Installing : httpd-filesystem-2.4.61-1.amzn2.0.1.noarch 5/9
  Installing : generic-logos-httpd-18.0.0-4.amzn2.noarch 6/9
  Installing : mailcap-2.1.41-2.amzn2.noarch 7/9
  Installing : mod_http2-1.15.19-1.amzn2.0.2.x86_64 8/9
  Installing : httpd-2.4.61-1.amzn2.0.1.x86_64 9/9
  Verifying : apr-util-bdb-1.6.3-1.amzn2.0.1.x86_64 1/9
  Verifying : apr-1.7.2-1.amzn2.x86_64 2/9
  Verifying : mod_http2-1.15.19-1.amzn2.0.2.x86_64 3/9
  Verifying : apr-util-1.6.3-1.amzn2.0.1.x86_64 4/9
  Verifying : mailcap-2.1.41-2.amzn2.noarch 5/9
  Verifying : generic-logos-httpd-18.0.0-4.amzn2.noarch 6/9
  Verifying : httpd-filesystem-2.4.61-1.amzn2.0.1.noarch 7/9
  Verifying : httpd-2.4.61-1.amzn2.0.1.x86_64 8/9
  Verifying : httpd-tools-2.4.61-1.amzn2.0.1.x86_64 9/9

Installed:
  httpd.x86_64 0:2.4.61-1.amzn2.0.1

Dependency Installed:
  apr.x86_64 0:1.7.2-1.amzn2
  apr-util-bdb.x86_64 0:1.6.3-1.amzn2.0.1
  httpd-filesystem.noarch 0:2.4.61-1.amzn2.0.1
  mailcap.noarch 0:2.1.41-2.amzn2

  apr-util.x86_64 0:1.6.3-1.amzn2.0.1
  generic-logos-httpd.noarch 0:18.0.0-4.amzn2
  httpd-tools.x86_64 0:2.4.61-1.amzn2.0.1
  mod_http2.x86_64 0:1.15.19-1.amzn2.0.2

Complete!
[ec2-user@ip-172-20-1-51 ~]$
```

```
ec2-user@ip-172-20-1-51:~
```

36	BCC	available	[ =0.x =stable ]
37	mono	available	[ =5.x =stable ]
38	nginx1	available	[ =stable ]
40	mock	available	[ =stable ]
43	livepatch	available	[ =stable ]
44	python3.8	available	[ =stable ]
45	haproxy2	available	[ =stable ]
46	collectd	available	[ =stable ]
47	aws-nitro-enclaves-cli	available	[ =stable ]
48	R4	available	[ =stable ]
	kernel-5.4	available	[ =stable ]
50	selinux-ng	available	[ =stable ]
52	tomcat9	available	[ =stable ]
53	unbound1.13	available	[ =stable ]
54	†mariadb10.5=latest	enabled	[ =stable ]
55	kernel-5.10=latest	enabled	[ =stable ]
56	redis6	available	[ =stable ]
58	postgresql12	available	[ =stable ]
59	postgresql13	available	[ =stable ]
60	mock2	available	[ =stable ]
61	dnsmasq2.85	available	[ =stable ]
62	kernel-5.15	available	[ =stable ]
63	postgresql14	available	[ =stable ]
64	firefox	available	[ =stable ]
65	lustre	available	[ =stable ]
†php8.1	available	[ =stable ]	
67	awscli1	available	[ =stable ]
68	†php8.2=latest	enabled	[ =stable ]
69	dnsmasq	available	[ =stable ]
70	unbound1.17	available	[ =stable ]
72	collectd-python3	available	[ =stable ]

† Note on end-of-support. Use 'info' subcommand.

```
[ec2-user@ip-172-20-1-51 ~]$
```

```
ec2-user@ip-172-20-1-51:~
```

Installing :	apr-util-1.6.3-1.amzn2.0.1.x86_64	2/9
Installing :	apr-util-bdb-1.6.3-1.amzn2.0.1.x86_64	3/9
Installing :	httpd-tools-2.4.61-1.amzn2.0.1.x86_64	4/9
Installing :	httpd-filesystem-2.4.61-1.amzn2.0.1.noarch	5/9
Installing :	generic-logos-httpd-18.0.0-4.amzn2.noarch	6/9
Installing :	mailcap-2.1.41-2.amzn2.noarch	7/9
Installing :	mod_http2-1.15.19-1.amzn2.0.2.x86_64	8/9
Installing :	httpd-2.4.61-1.amzn2.0.1.x86_64	9/9
Verifying :	apr-util-bdb-1.6.3-1.amzn2.0.1.x86_64	1/9
Verifying :	apr-1.7.2-1.amzn2.x86_64	2/9
Verifying :	mod_http2-1.15.19-1.amzn2.0.2.x86_64	3/9
Verifying :	apr-util-1.6.3-1.amzn2.0.1.x86_64	4/9
Verifying :	mailcap-2.1.41-2.amzn2.noarch	5/9
Verifying :	generic-logos-httpd-18.0.0-4.amzn2.noarch	6/9
Verifying :	httpd-filesystem-2.4.61-1.amzn2.0.1.noarch	7/9
Verifying :	httpd-2.4.61-1.amzn2.0.1.x86_64	8/9
Verifying :	httpd-tools-2.4.61-1.amzn2.0.1.x86_64	9/9

Installed:

```
httpd.x86_64 0:2.4.61-1.amzn2.0.1
```

Dependency Installed:

```
apr.x86_64 0:1.7.2-1.amzn2
apr-util-bdb.x86_64 0:1.6.3-1.amzn2.0.1
httpd-filesystem.noarch 0:2.4.61-1.amzn2.0.1
mailcap.noarch 0:2.1.41-2.amzn2
```

Complete!

```
[ec2-user@ip-172-20-1-51 ~]$ sudo systemctl enable httpd
Created symlink from /etc/systemd/system/multi-user.target.wants/httpd.service to /usr/lib/systemd/system/httpd.service.
[ec2-user@ip-172-20-1-51 ~]$ sudo systemctl is-enabled httpd
enabled
[ec2-user@ip-172-20-1-51 ~]$
```

⌚ Inbound security group rules successfully modified on security group (sg-04f6bf056188c1897 | my-php-app-server-sg)

▶ Details

[EC2](#) > [Security Groups](#) > sg-04f6bf056188c1897 - my-php-app-server-sg

### sg-04f6bf056188c1897 - my-php-app-server-sg

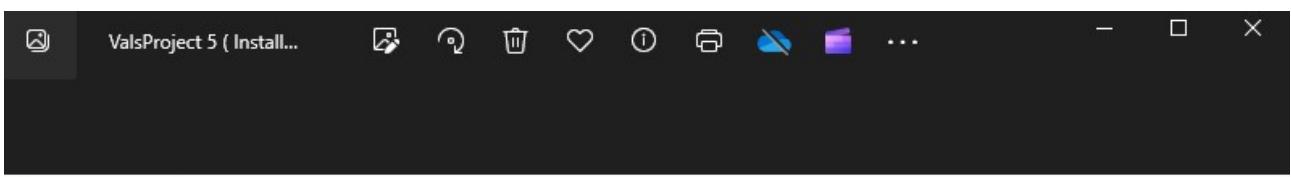
[Actions ▾](#)

Details			
Security group name my-php-app-server-sg	Security group ID sg-04f6bf056188c1897	Description my-php-app-server-sg	VPC ID <a href="#">vpc-0e3379c555caaaf61</a>
Owner 411746592027	Inbound rules count 1 Permission entry	Outbound rules count 1 Permission entry	

[Inbound rules](#) | [Outbound rules](#) | [Tags](#)

**Inbound rules (1)**

<input type="checkbox"/>	Name	Security group rule...	IP version	Type	Protocol	Port range	Source
<input type="checkbox"/>	-	sgr-00c6a4e6c9ccb45a	-	HTTP	TCP	80	sg-0ba7fc72a555



ValsProject 5 ( Install... )

ec2-user@ip-172-20-1-51:~

```

~~~ \###|      AL2 End of Life is 2025-06-30.
~~~ \|/|
~~~ V~'-'>
~~~ / A newer version of Amazon Linux is available!
~~~_.-' / Amazon Linux 2023, GA and supported until 2028-03-15.
~~~_/.-' / https://aws.amazon.com/linux/amazon-linux-2023/
~~~/_m/.'-/

ec2-user@ip-172-20-1-51 ~]$ sudo dnf update -y
udo: dnf: command not found
ec2-user@ip-172-20-1-51 ~]$ sudo dnf install -y httpd php php-mysqli mariadb105
udo: dnf: command not found
ec2-user@ip-172-20-1-51 ~]$ cat /etc/system-release
amazon Linux release 2 (Karoo)
ec2-user@ip-172-20-1-51 ~]$ screen
screen is terminating]
ec2-user@ip-172-20-1-51 ~]$ [ec2-user@ip-172-20-1-51 ~]$ sudo yum update
loaded plugins: extras_suggestions, langpacks, priorities, update-motd
imzn2-core
imzn2extra-docker
imzn2extra-kernel-5.10
imzn2extra-mariadb10.5
imzn2extra-php8.2
lo packages marked for update
ec2-user@ip-172-20-1-51 ~]$ y
bash: y: command not found
ec2-user@ip-172-20-1-51 ~]$ sudo yum update openssl
loaded plugins: extras_suggestions, langpacks, priorities, update-motd
lo packages marked for update
ec2-user@ip-172-20-1-51 ~]$ 
```

3.6 kB 00:00:00
2.9 kB 00:00:00
3.0 kB 00:00:00
3.0 kB 00:00:00
2.9 kB 00:00:00

## XI. INSTALL A LAMP SERVER ON AL2(Amazon Linux 2)

PHP requests the PHP file & Web server executes the PHP code and generates the HTML file and send it to the Web Browser.

Before I work with PHP servers, I will have to do a couple of things namely;

- Create PHP servers.
- Installation of PHP Apache.
- Installation of PHPMyAdmin (Sample App).
- Also, I have to test the Lamp Server.
- Apache (httpd) server files that are kept in a directory called the (Apache document root).
- The Amazon document root is (/var/www/html), which by default is owned by root.
- To add (EC2-User) to the Apache group to give the Apache group ownership of the /var/www directory and assign write permissions to the group.
- To set the file permissions; Add your User (in this case, ec2-user) to the Apache group.

These are shown in the pictures below;

### To set file permissions

1. Add your user (in this case, `ec2-user`) to the `apache` group.

```
[ec2-user ~]$ sudo usermod -a -G apache ec2-user
```

2. Log out and then log back in again to pick up the new group, and then verify your membership.

- a. Log out (use the `exit` command or close the terminal window):

```
[ec2-user ~]$ exit
```

- b. To verify your membership in the `apache` group, reconnect to your instance, and then run the following command:

```
[ec2-user ~]$ groups  
ec2-user adm wheel apache systemd-journal
```

3. Change the group ownership of /var/www and its contents to the apache group.

```
[ec2-user ~]$ sudo chown -R ec2-user:apache /var/www
```

4. To add group write permissions and to set the group ID on future subdirectories, change the directory permissions of /var/www and its subdirectories.

```
[ec2-user ~]$ sudo chmod 2775 /var/www && find /var/www -ty
```

5. To add group write permissions, recursively change the file permissions of /var/www and its subdirectories:

```
[ec2-user ~]$ find /var/www -type f -exec sudo chmod 0664 {} \;
```

## Step 2: Test your LAMP server

If your server is installed and running, and your file permissions are set correctly, your `ec2-user` account should be able to create a PHP file in the `/var/www/html` directory that is available from the internet.

### To test your LAMP server

1. Create a PHP file in the Apache document root.

```
[ec2-user ~]$ echo "<?php phpinfo(); ?>" > /var/www/html/phpinfo.php
```

If you get a "Permission denied" error when trying to run this command, try logging out and logging back in again to pick up the proper group permissions that you configured in [To set file permissions](#).

2. In a web browser, type the URL of the file that you just created. This URL is the public DNS address of your instance followed by a forward slash and the file name. For example:

```
http://my.public.dns.amazonaws.com/phpinfo.php
```

If you do not see this page, verify that the `/var/www/html/phpinfo.php` file was created properly in the previous step. You can also verify that all of the required packages were installed with the following command.

```
[ec2-user ~]$ sudo yum list installed httpd mariadb-server php-mysqld
```

If any of the required packages are not listed in your output, install them with the `sudo yum install package` command. Also verify that the `php7.2` and `lamp-mariadb10.2-php7.2` extras are enabled in the output of the `amazon-linux-extras` command.

3. Delete the `phpinfo.php` file. Although this can be useful information, it should not be broadcast to the internet for security reasons.

```
[ec2-user ~]$ rm /var/www/html/phpinfo.php
```

You should now have a fully functional LAMP web server. If you add content to the Apache document root at `/var/www/html`, you should be able to view that content at the public DNS address for your instance.

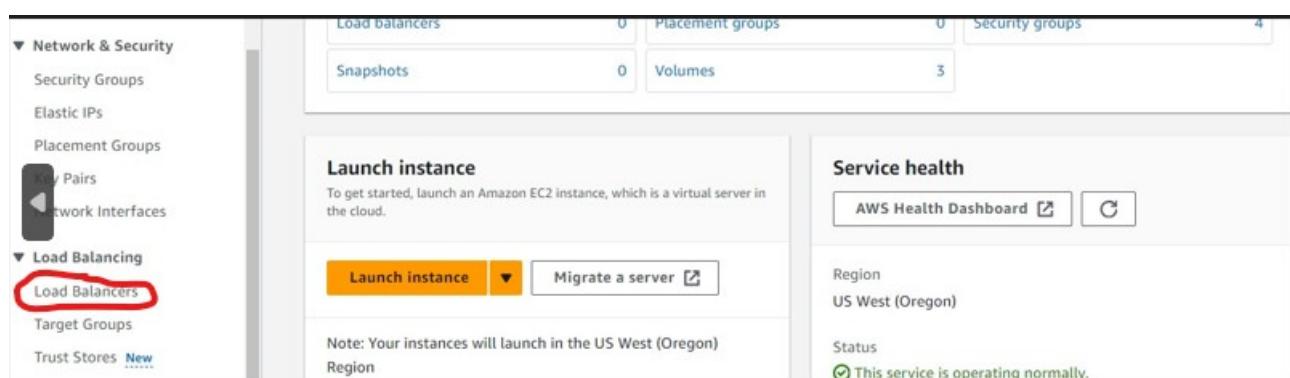
## Next Steps are:

- Configure and create an ALB (Application Load Balancer).
- Create an RDS instance.

## XII. CREATE THE LOAD BALANCER

- Go to the (Load Balancer) under the EC2 dashboard.
- Go to (Create Load Balancer).
- Load Balancer name as (my-alb-1).
- Go down and select the VPC (my-vpc-1).
- Select the AZ'S as Public Subnet (my-public subnet 1, 2 and 3).
- Now go to the Security Groups, click on (Create Security group).
- Enter the security group name as (my-alb-sg).
- Enter the Description as (my-alb-sg).

These are shown in the pictures below;



## Load balancer types

Application Load Balancer <a href="#">Info</a>	Network Load Balancer <a href="#">Info</a>	Gateway Load Balancer <a href="#">Info</a>
<p>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 advanced routing and visibility features targeted at application architectures, including microservices and containers.</p> <p><a href="#">Create</a></p>	<p>Choose a Network Load Balancer when you need ultra-high performance, TLS offloading at scale, centralized certificate deployment, support for UDP, and static IP addresses for your applications. Operating at the connection level, Network Load Balancers are capable of handling millions of requests per second securely while maintaining ultra-low latencies.</p>	<p>Choose a Gateway Load Balancer when you need to deploy and manage a fleet of third-party virtual appliances that support GENEVE. These appliances enable you to improve security, compliance, and policy controls.</p> <p><a href="#">Create</a></p>

## Create Application Load Balancer [Info](#)

The Application Load Balancer distributes incoming HTTP and HTTPS traffic across multiple targets such as Amazon EC2 instances, microservices, and containers, based on request attributes. When the load balancer receives a connection request, it evaluates the listener rules in priority order to determine which rule to apply, and if applicable, it selects a target from the target group for the rule action.

▶ **How Application Load Balancers work**

### Basic configuration

Load balancer name [Info](#)  
 Name must be unique within your AWS account and can't be changed after the load balancer is created.  
 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.

### Network mapping Info

The load balancer routes traffic to targets in the selected subnets, and in accordance with your IP address settings.

**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 targets, or if using VPC peering. To confirm the VPC for your targets, view [target groups](#). For a new VPC, [create a VPC](#).

my-vpc-1 vpc-0e3379c555caaf61 IPv4 VPC CIDR: 172.20.0.0/20	<input type="button" value="G"/>
--	----------------------------------

**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 by the load balancer or the VPC are not available for selection.

**Availability Zones**

- us-west-2a (usw2-az1)**

**Subnet**

subnet-0d01e0f6a7ae546ba IPv4 subnet CIDR: 172.20.1.0/24	my-public-subnet-1
---	--------------------

IPv4 address  
Assigned by AWS

- us-west-2b (usw2-az2)**

**Subnet**

subnet-0bc891f751fd359ad IPv4 subnet CIDR: 172.20.2.0/24	my-public-subnet-2
---	--------------------

IPv4 address  
Assigned by AWS

- us-west-2c (usw2-az3)**

**Subnet**

subnet-02a3c48453450b097	my-public-subnet-3
--------------------------	--------------------

### Create security group Info

A security group acts as a virtual firewall for your instance to control inbound and outbound traffic. To create a new security group, complete the fields below.

**Basic details**

Security group name Info  
  
Name cannot be edited after creation.

Description Info

VPC Info

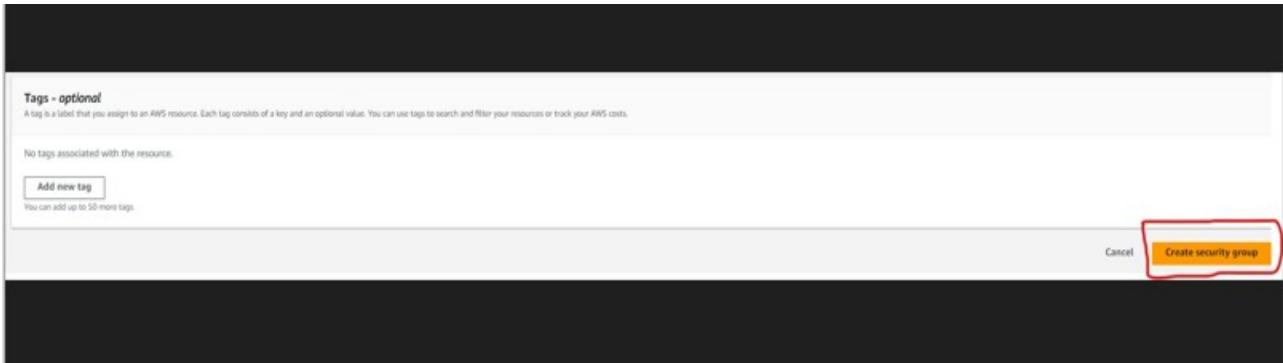
**Inbound rules Info**

Type <small>Info</small>	Protocol <small>Info</small>	Port range <small>Info</small>	Source <small>Info</small>	Description - optional
Custom TCP	TCP	0	Custom	<input type="text"/> <input type="button" value="Delete"/>

**Add rule**

**Outbound rules Info**

Type <small>Info</small>	Protocol <small>Info</small>	Port range <small>Info</small>	Destination <small>Info</small>	Description - optional
All traffic	All	All	Custom	<input type="text"/> <input type="button" value="Delete"/>



The screenshot shows the AWS EC2 Security Groups page. A success message at the top says 'Security group sg-05afc2fadcd77b623 | my-alb-sg was created successfully'. Below it, the 'Details' tab is selected. The security group information includes:

Security group name	Security group ID	Description	VPC ID
my-alb-sg	sg-05afc2fadcd77b623	my-alb-sg	vpc-0e3379c555caaa861
Owner	Inbound rules count	Outbound rules count	
411746592027	0 Permission entries	1 Permission entry	

At the bottom, there are tabs for 'Inbound rules', 'Outbound rules', and 'Tags'. The 'Actions' dropdown menu is also visible at the top right.

Now that the Security group has been created;

- Go back to the (Load Balancers) and under (Listeners and Routing).
- And then the click on (Create target group).
- Enter target group name as (my-alb-tg).
- Go to (Register Targets).
- Successfully created the Load Balancers.
- The Load Balancer (my-alb-1) is created.

Now that the Security group has been created;

- Go back to the (Load Balancers) and under (Listeners and Routing).
- Click on (Create target group).
- Enter target group name as (my-alb-tg).
- Go to (Register Targets).
- Successfully created the Load Balancers.
- The Load Balancer (my-alb-1) is created.

This is shown below;

---

Target group name

A maximum of 72 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

HTTP

80

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](#)

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.

vpc-0e3379c555caaaf61  
IPv4 VPC CIDR: 172.20.0.0/20

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

### Health check path

Use the default path of "/" to perform health checks on the root, or specify a custom path if preferred.

/

Up to 1024 characters allowed.

### ► Advanced health check settings

## Attributes

i Certain default attributes will be applied to your target group. You can view and edit them after creating the target group.

### ► Tags - optional

Consider adding tags to your target group. Tags enable you to categorize your AWS resources so you can more easily manage them.

Cancel

Next

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

EC2 > Target groups > my-alb-php-tg

my-alb-php-tg

Actions ▾

#### Details

i arn:aws:elasticloadbalancing:us-west-2:411746592027:targetgroup/my-alb-php-tg/9f54509c45b74936

Target type  
Instance

Protocol : Port  
HTTP: 80

Protocol version  
HTTP1

VPC  
[vpc-0e3379c555caaaf61](#)

IP address type  
IPv4

Load balancer  
i None associated

0  
Total targets

0  
Healthy

0  
Unhealthy

0  
Unused

0  
Initial

0  
Draining

0 Anomalous

Successfully created load balancer: my-alb-1

It might take a few minutes for your load balancer to fully set up and route traffic. Targets will also take a few minutes to complete the registration process and pass initial health checks.

[EC2](#) > [Load balancers](#) > my-alb-1

### my-alb-1

[Actions](#)

Details	
Load balancer type Application	Status Provisioning
Scheme Internet-facing	Hosted zone Z1H1FL5HAB5F5
VPC <a href="#">vpc-0e3379c555caaaf61</a>	Load balancer IP address type IPv4
Availability Zones	Date created August 2, 2024, 17:26 (UTC+01:00)
<a href="#">subnet-0d01e06a7ee546ba</a> us-west-2a (usw2-az1)	
<a href="#">subnet-072b710d7c5bb15f3</a> us-west-2b (usw2-az2)	
<a href="#">subnet-02a3c48453450b097</a> us-west-2c (usw2-az3)	
Load balancer ARN <a href="#">arn:aws:elasticloadbalancing:us-west-2:411746592027:loadbalancer/app/my-alb-1/6cad8a57b54eb9ee</a>	DNS name info <a href="#">my-alb-1-1744692333.us-west-2.elb.amazonaws.com (A Record)</a>

Targets | Monitoring | Health checks | Attributes | Tags

**Registered targets (3) [Info](#)**

Anomaly mitigation: Not applicable

Target groups route requests to individual registered targets using the protocol and port number specified. Health checks are performed on all registered targets according to the target group's health check settings. Anomaly detection is automatically applied to HTTP/HTTPS target groups with at least 3 healthy targets.

Filter targets

Instance ID	Name	Port	Zone	Health status	Health status details	Launch time	Anomaly detection
i-05e40a4de1bf75094	my-php-app-1...	80	us-west-2a	Unhealthy	Request timed out	July 29, 2024, 21:56 (UTC+01:00)	Normal
i-0a8cca92b596e5b0d	my-jump-server	80	us-west-2a	Unhealthy	Request timed out	July 29, 2024, 21:28 (UTC+01:00)	Normal
i-0a010651d6919b68d	my-php-app-1...	80	us-west-2b	Unhealthy	Request timed out	July 29, 2024, 22:23 (UTC+01:00)	Normal

I need to allow the Load balancer security group in our (App server) security group with the following procedures;

- Go to the (app-server-1) instance (my-php-app-server-1).
- Click on the Security groups (my-php-app-server-sg).
- Make the changes, click on (Edit inbound rules).
- Click on (Add rule).
- Choose the security group of the ALB (my-alb-sg).
- Then (Save rules).
- This establishes a connection between the load balancer and instance.
- Go to the (Load Balancers) section and copy the (DNS name).
- Copy the DNS name (my-alb-1).
- Paste the DNS name in a browser to check if the load balancer is working.
- The Load balancer is working.

These are shown in the pictures below;

**Screenshot 1: Security Group Details**

The screenshot shows the AWS CloudFormation console with a security group named "sg-05e40a44e1bf75094 (my-php-app-server-1)". A red box highlights the "Inbound rules" section, which contains one rule: "sg-00c6a4e6c9ccb45a" (HTTP port 80) from "sg-0ba7fc72a55586e10" (my-php-app-server-1).

Name	Security group rule ID	Port range	Protocol	Source	Security groups	Description
-	sgr-00c6a4e6c9ccb45a	80	TCP	sg-0ba7fc72a55586e10	my-php-app-server-sg	-

**Screenshot 2: Security Group Overview**

The screenshot shows the AWS CloudFormation console with a security group named "sg-04f6bf056188c1897 - my-php-app-server-sg". A red box highlights the "Edit inbound rules" button in the top right corner of the "Inbound rules (1)" section.

Name	Type	Protocol	Port range	Source	Description
sgr-00c6a4e6c9ccb45a	HTTP	TCP	80	sg-0ba7fc72a55586e1...	-

**Screenshot 3: Edit Inbound Rules**

The screenshot shows the "Edit inbound rules" page for the security group. It lists two rules: one for HTTP port 80 from "sg-0ba7fc72a55586e10" and another for Custom TCP port 0 from "sg-05afc2fadcd77b623". A red box highlights the "Save rules" button at the bottom right.

Security group rule ID	Type	Protocol	Port range	Source	Description - optional
sgr-00c6a4e6c9ccb45a	HTTP	TCP	80	Custom	sg-0ba7fc72a55586e10
-	Custom TCP	TCP	0	Custom	sg-05afc2fadcd77b623

Load balancers (1/1)

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

Name	DNS name	Status	VPC ID	Availability Zones	Type	Date created
my-alb-1	my-alb-1-1744692333.us-west-2.elb.amazonaws.com	Active	vpc-0e3379c555caaaf61	3 Availability Zones	application	August 2, 2024, 17:26 (UTC+01:00)

**Load balancer: my-alb-1**

Load balancer type Application	Status Active	VPC vpc-0e3379c555caaaf61	Load balancer IP address type IPv4
Scheme Internet-facing	Hosted zone Z1H1FLSHABSFS	Availability Zones subnet-0d01e0f6a7ae546ba, subnet-072b710d7c5bb15f3, subnet-02a3c48453450b097	Date created August 2, 2024, 17:26 (UTC+01:00)
Load balancer ARN arn:aws:elasticloadbalancing:us-west-2:411746592027:loadbalancer/app/my-alb-1/6cad8a57b54eb9ee	DNS name info my-alb-1-1744692333.us-west-2.elb.amazonaws.com (A Record)		

Going to the last part of the Architecture, (The Database) portion of the Architecture;

- Go to the console and search for RDS.
- Go to the (Subnet groups) and click on it.
- Click on (Create Subnet group).
- Go to the name under Subnet group details as (my-db-subnet-gp).
- Description as (my-db-subnet-gp).
- Choose the VPC (my-vpc-1).
- Choose AZ (us-west-2a) & (us-west-2b).
- Choose the 2 subnets for the DB (172.20.8.0/24) and (172.20.7.0/24).
- Then click on (Create).

Now that the (DB Subnet group) is created, I have to create the (DB instance). These are shown in the pictures below;

**Amazon RDS**

**Resources**

You are using the following Amazon RDS resources in the US West (Oregon) region (used/quota)

DB Instances (0/40)	Parameter groups (0)
Allocated storage (0 TB/100 TB)	Default (0)
Increase DB instances limit	Custom (0/100)
DB Clusters (0/40)	Option groups (0)
Reserved Instances (0/40)	Default (0)
Snapshots (0)	Custom (0/20)
Manual	Subnet groups (0/50)
DB Cluster (0/50)	Supported platforms VPC
DB Instance (0/50)	Default network vpc-077cb04aac5695bd4
Automated	
DB Cluster (0)	
DB Instance (0)	
Recent events (0)	
Event subscriptions (0/20)	

**Subnet groups**

Databases  
Query Editor  
Performance insights  
Snapshots  
Exports in Amazon S3  
Automated backups  
Reserved instances  
Proxies

Amazon RDS

RDS > Subnet groups

Subnet groups (0)

No db subnet groups

You don't have any db subnet groups.

Create DB subnet group

Subnets

Choose the subnets that you want to add. The list includes the subnets in the selected Availability Zones.

Select subnets

subnet-072b710d7c5bb15f3 (172.20.8.0/24) X

subnet-0f8999925cb31f8d2 (172.20.7.0/24) X

For Multi-AZ DB clusters, you must select 3 subnets in 3 different Availability Zones.

Subnets selected (2)

Availability zone	Subnet ID	CIDR block
us-west-2b	subnet-072b710d7c5bb15f3	172.20.8.0/24
us-west-2a	subnet-0f8999925cb31f8d2	172.20.7.0/24

Cancel Create

Successfully created my-db-subnet-gp. View subnet group

RDS > Subnet groups

Subnet groups (1)

my-db-subnet-gp

my-db-subnet-gp

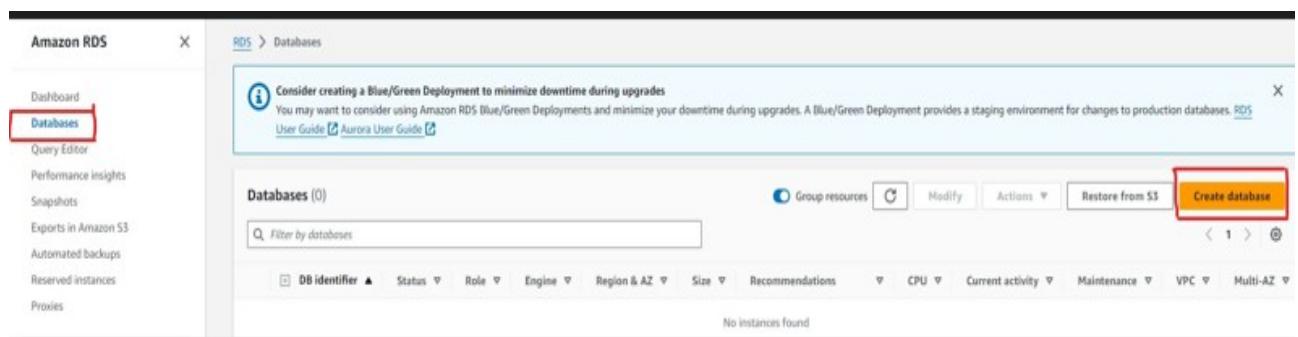
Complete

vpc-0e3379c555caaaf61

### XIII. CREATE DB INSTANCES

- Go back to the RDS Dashboard.
- Click on Databases.
- Click on (Create Database).
- Select (Standard Create).
- Select (MySQL).
- Click (Free tier).
- Set the instance name as (my-db).
- Keep the Master Username as (admin).
- Create the Master (password).
- Keep the (Instance Class) as (t3 micro).
- Disable the (Storage autoscaling).
- In (connectivity), select the VPC I created (my-vpc-1).
- Create a new Security group (my-db-sg).
- Click (Create Database).
- Database created.

These are shown in some of the pictures below;



## 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



**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**

**Deployment options** [Info](#)  
The deployment options below are limited to those supported by the engine you selected above.

**Multi-AZ DB Cluster**  
Creates a DB cluster with a primary DB instance and two readable standby DB instances, with each DB instance in a different Availability Zone (AZ). Provides high availability, data redundancy and increases capacity to serve read workloads.

**Multi-AZ DB instance (not supported for Multi-AZ DB cluster snapshot)**  
Creates a primary DB instance and a standby DB instance in a different AZ. Provides high availability and data redundancy, but the standby DB instance doesn't support connections for read workloads.

**Single DB instance (not supported for Multi-AZ DB cluster snapshot)**  
Creates a single DB instance with no standby DB instances.

**Settings**

**DB instance identifier** [Info](#)  
Type a name for your DB instance. The name must be unique across all DB instances owned by your AWS account in the current AWS Region.

my-db

▼ **Credentials Settings**

**Master username** [Info](#)

Type a login ID for the master user of your DB instance.

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](#)

\*\*\*\*\*

## Instance configuration

The DB instance configuration options below are limited to those supported by the engine that you selected above.

DB instance class [Info](#)

▼ Hide filters

Show instance classes that support Amazon RDS Optimized Writes [Info](#)

Amazon RDS Optimized Writes improves write throughput by up to 2x at no additional cost.

Include previous generation classes

Standard classes (includes m classes)

Memory optimized classes (includes r and x classes)

Burstable classes (includes t classes)

db.t3.micro

2 vCPUs 1 GiB RAM Network: 2,085 Mbps

## 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 instance.

my-vpc-1 (vpc-0e3379c555caaaf61)

9 Subnets, 3 Availability Zones

Only VPCs with a corresponding DB subnet group are listed.

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 instance can use in the VPC that you selected.

my-db-subnet-gp

2 Subnets, 2 Availability Zones

### 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

New VPC security group name

my-db-sg

### Availability Zone [Info](#)

us-west-2a

## Estimated monthly costs

The Amazon RDS Free Tier is available to you for 12 months. Each calendar month, the free tier will allow you to use the Amazon RDS resources listed below for free:

- 750 hrs of Amazon RDS in a Single-AZ db.t2.micro, db.t3.micro or db.t4g.micro Instance.
- 20 GB of General Purpose Storage (SSD).
- 20 GB for automated backup storage and any user-initiated DB Snapshots.

[Learn more about AWS Free Tier.](#)

When your free usage expires or if your application use exceeds the free usage tiers, you simply pay standard, pay-as-you-go service rates as described in the [Amazon RDS Pricing page](#).

**i** You are responsible for ensuring that you have all of the necessary rights for any third-party products or services that you use with AWS services.

Cancel

**Create database**

RDS > Databases

**i** 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 (1)

Filter by databases

Group resources [C](#) [Modify](#) [Actions](#) [Restore from S3](#) [Create database](#)

< 1 > [@](#)

DB identifier	Status	Role	Engine	Region & AZ	Size	Recommendations	CPU	Current activity	Maintenance	VPC
<a href="#">my-db</a>	<a href="#">Creating</a>	Instance	MySQL Community	us-west-2a	db.t3.micro	-	-	none	vpc-0e33	

Next, I will enable the connectivity between (my-app-server) and (db-server).

## Steps

- Go to the (Security group) of the DB by clicking on (Connectivity & Security).
- Click on the (Security group).
- Click on the (Security group).
- Click on the (Edit inbound rules).
- Add 1 & 3 for the (php-app servers).
- For the (Inbound rules), click (Add rule).
- Under the Port range put (3306) and enter the (app-server-sg) in the (source).
- Then delete the (difficult rule) that was created and save the rules by clicking on (Save rules).
- Inbound Security group rules successfully modified.
- Now copy the endpoint of the DB (my-db) by clicking on it.
- Go to the (php-server) and paste it onto it and navigate to the (PhpMyAdmin folder).
- I will rename the file as (my config.sample.inc config.inc.php).
- Open the file.
- Navigate to PhpAdmin to check whether the application is working or not.
- Check the Load Balancers and log into the application.

These are shown in some of the pictures below;

The screenshot shows the 'Connectivity & security' section of the AWS RDS console. It is divided into three main sections: Endpoint & port, Networking, and Security.

- Endpoint & port:** Shows the endpoint as `my-db.c5wc664cadnd.us-west-2.rds.amazonaws.com` and the port as `3306`.
- Networking:** Shows the Availability Zone as `us-west-2a`, the VPC as `my-vpc-1`, the Subnet group as `my-db-subnet-gp`, and the Subnets as `subnet-072b710d7c5bb15f3` and `subnet-0f8999925cb31f8d2`. The Network type is set to `IPv4`.
- Security:** Shows the VPC security groups assigned to the instance. One group, `my-db-sg (sg-0c3d6176c76cb0907)`, is highlighted with a red box. The status is listed as `Active`. Other security settings include being `Publicly accessible: No`, using a certificate authority (`rds-ca-rsa2048-g1`), and a certificate authority date of `May 24, 2061, 23:59 (UTC+01:00)`. The DB instance certificate expiration date is listed as `August 03, 2025, 21:13 (UTC+01:00)`.

The screenshot shows the 'Edit inbound rules' dialog box. It lists a single rule under 'Inbound rules':

Security group rule ID	Type	Protocol	Port range	Source	Description - optional
-	Custom TCP	TCP	3306	Custom	Q, sg-05afc2fadcd77b623 X

At the bottom of the dialog, there are buttons for `Add rule`, `Cancel`, `Preview changes`, and a highlighted `Save rules` button.

sg-0c3d6176c76cb0907 - my-db-sg

**Details**

Security group name my-db-sg	Security group ID sg-0c3d6176c76cb0907	Description Created by RDS management console	VPC ID vpc-0e3379c555caaaaf61
Owner 411746592027	Inbound rules count 1 Permission entry	Outbound rules count 1 Permission entry	

Inbound rules | Outbound rules | Tags

**Inbound rules (1)**

Name	Security group rule...	IP version	Type	Protocol	Port range	Source	Description
-	sgr-06e812a785b9136ef	-	MySQL/Aurora	TCP	3306	sg-05acf2faddcd77b62...	-

**Connectivity & security**

<b>Endpoint &amp; port</b> Endpoint copied my-db.c5wc664cadnd.us-west-2.rds.amazonaws.com	<b>Networking</b> Availability Zone us-west-2a VPC my-vpc-1 (vpc-0e3379c555caaaaf61) Subnet group my-db-subnet-gp Subnets subnet-072b710d7c5bb15f3 subnet-0f899925cb31f8d2	<b>Security</b> VPC security groups my-db-sg (sg-0c3d6176c76cb0907) Active Publicly accessible No Certificate authority Info rds-ca-rsa2048-g1 Certificate authority date May 24, 2061, 23:59 (UTC+01:00)
---	---	--

I had some issues with (PhpAdmin server) as my AMI needed updating. But after doing my research and following the procedures, my overall understanding of this project and the resources used have improved immensely. I also had to overcome a few issues with the PhpAdmin login and the Command prompt of the PHP server. Everything else went smoothly as I explained all through this project stage by stage from; Creating the VPC, IGW, NAT Gateway, Route Tables, Instances, Load balancers, Subnet groups and connecting them all together.