😊 Network Address Translation (NAT) Gateway

A Network Address Translation (NAT) gateway is a device or service that allows multiple devices within a local network to share a single public IP address for accessing resources on the internet. It acts as an intermediary between the devices on the internal network and the external network (usually the internet). NAT gateways are commonly used in home and office networks to conserve public IP addresses and enhance security.

Here are some key points about NAT gateways:

1. Address Translation: NAT gateways translate private IP addresses used within a local network into a single public IP address when communicating with external networks. This helps in conserving public IP addresses, as a large number of devices can share the same public IP.
2. Outbound Traffic: When devices within the local network initiate outbound connections to the internet, the NAT gateway assigns a unique source port for each connection. This allows multiple devices to use the same public IP address simultaneously.
3. Inbound Traffic: For incoming traffic from the internet to reach specific devices within the local network, the NAT gateway keeps track of the source port and private IP address of the internal device. It then uses this information to forward the incoming traffic to the correct device.
4. Security: NAT gateways add a layer of security by hiding the internal network structure from external sources. Since devices on the internal network have private IP addresses, they are not directly accessible from the internet. Inbound traffic is only allowed if it corresponds to an established outbound connection.
5. Stateful Operation: NAT gateways operate in a stateful manner, meaning they keep track of the state of active connections and can dynamically adjust their translation tables based on the traffic flow.
6. Port Address Translation (PAT): Often, NAT gateways use a specific form of NAT called Port Address Translation (PAT) or Network Address Port Translation (NAPT). In PAT, multiple private IP addresses are mapped to a single public IP address, with each connection using a unique combination of source IP address and port.

NAT gateways are essential components in many networking environments, providing a way to extend the use of IPv4 addresses and enhance network security. It's important to note that as the networking landscape evolves, and with the increasing adoption of IPv6, some of the traditional roles of NAT may change.

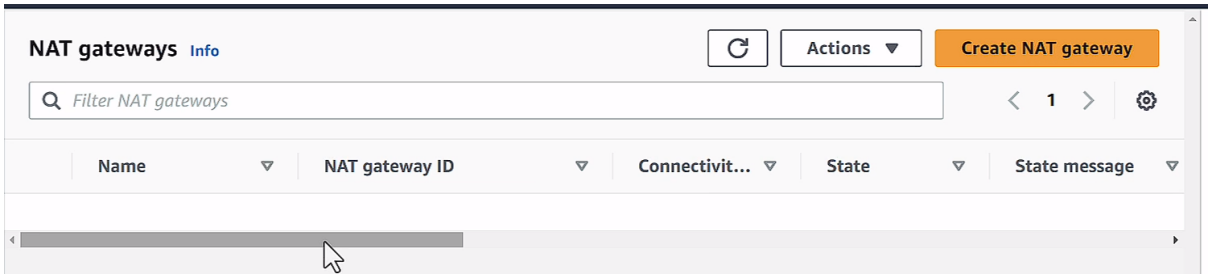
😁 To begin with the Lab

1. In the previous lab, you created two EC2 instances based on Ubuntu. The first instance was based on Web subnet which is your public subnet and second one was based on DB subnet which is your private subnet.

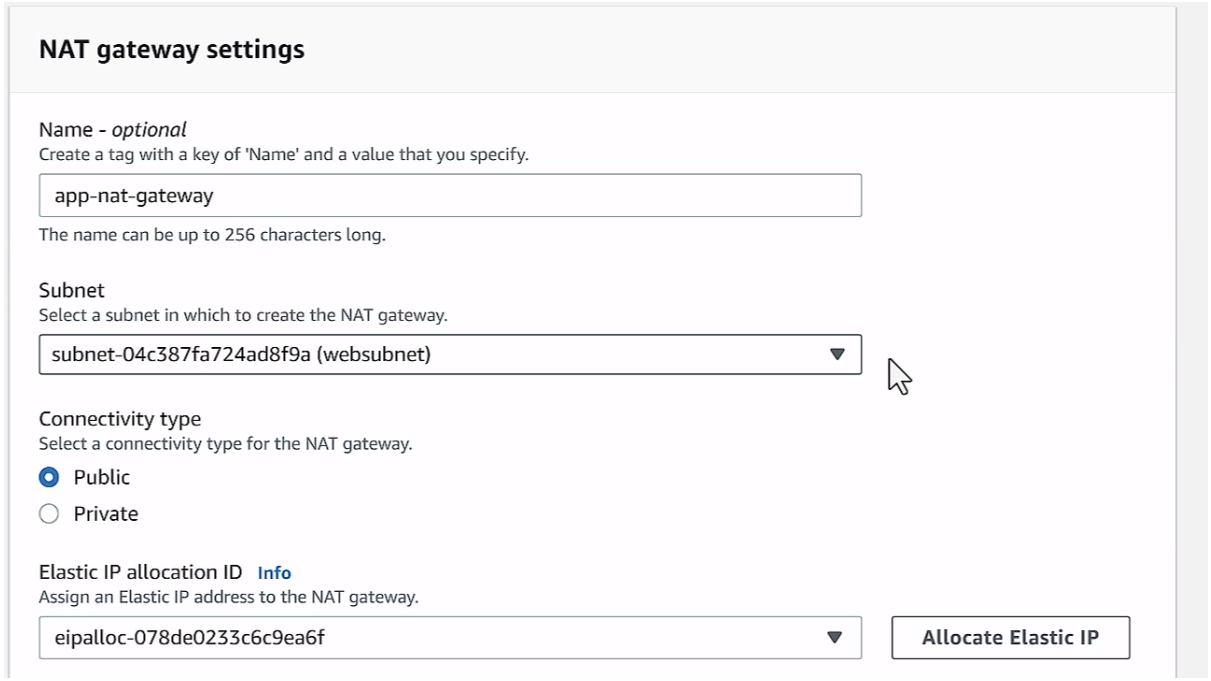
2. So, after establishing connection between them. Now you need to install MySQL on your DB subnet. But the thing is your DB subnet cannot connect to the internet because the private does not allow it to establish connection.

```
ubuntu@ip-10-0-1-25:~$ sudo apt-get update
0% [Connecting to ap-south-1.ec2.archive.ubuntu.com (3.110.200.74)] [Connecting to security.ubuntu.com (2
```

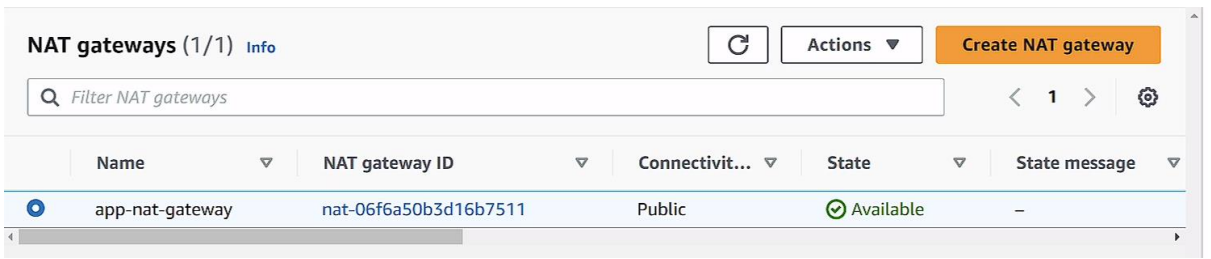
3. For that you are going to use NAT gateway and then you will establish connection between your instance and the internet.
4. So, now you need to go back to the console and create a NAT gateway.



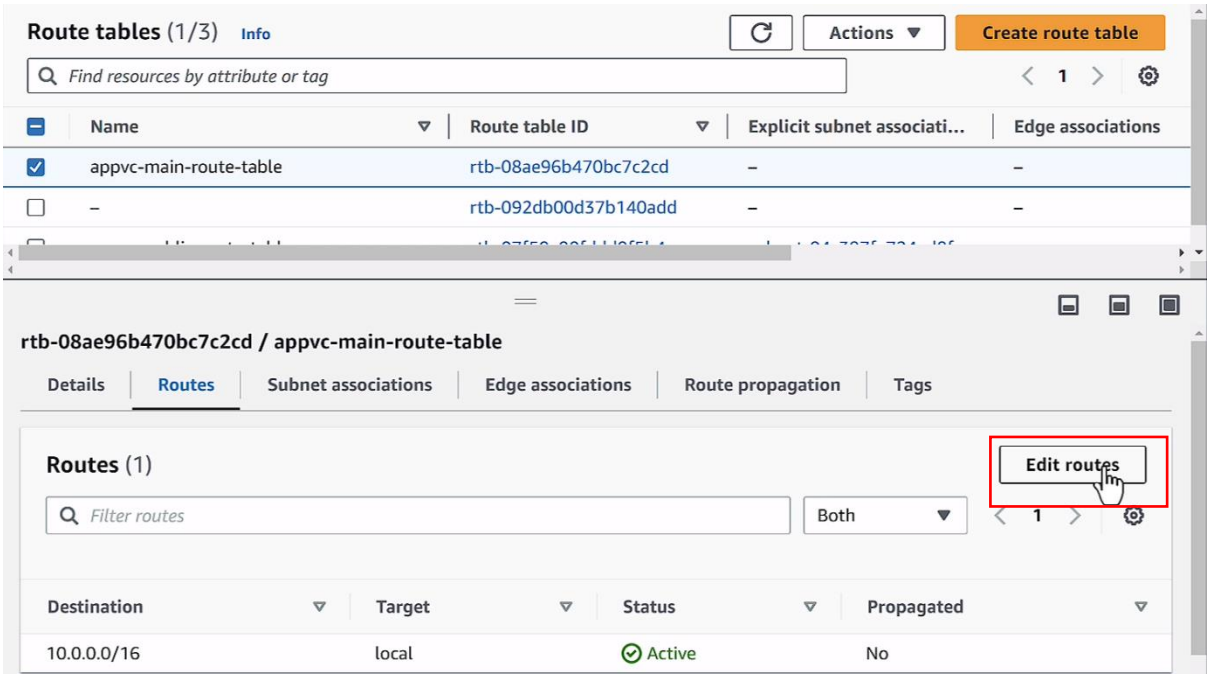
5. Now give it a name and select your web subnet.
6. Then you need to allocate an Elastic IP to it. For that just click on Allocate Elastic IP. It will do the trick for you.
7. Then just click on Create NAT gateway.



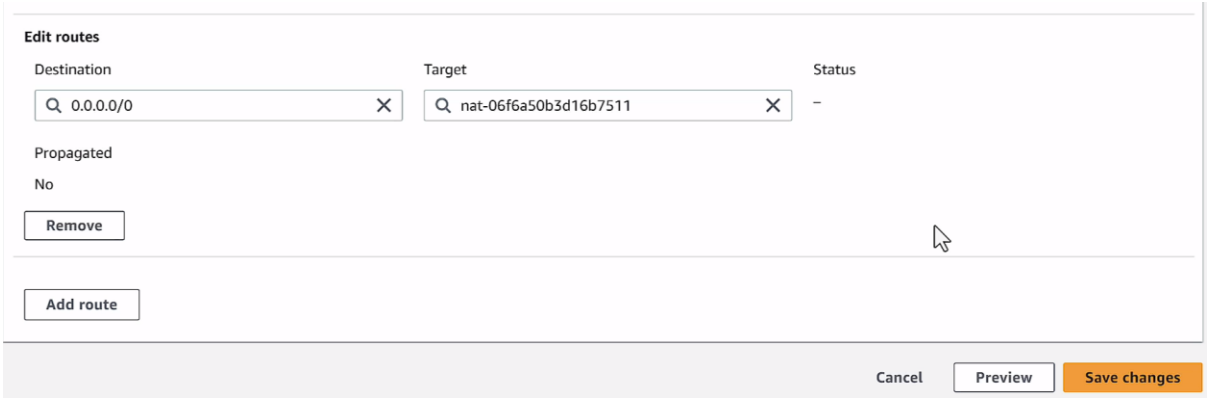
8. Now you need to wait for some time until it gets available.



9. Now you need to navigate to Route tables. Select your main route table to which your DB subnet is connected to.
10. Then click on edit routes and add a NAT gateway route to it.



11. Then you need to click on add route and select your destination to everywhere. Now select your NAT gate way that you created and click on Save changes.



12. Once it is complete now if you will back to your Putty session and try to update your instance using update command it will now connect to the internet.