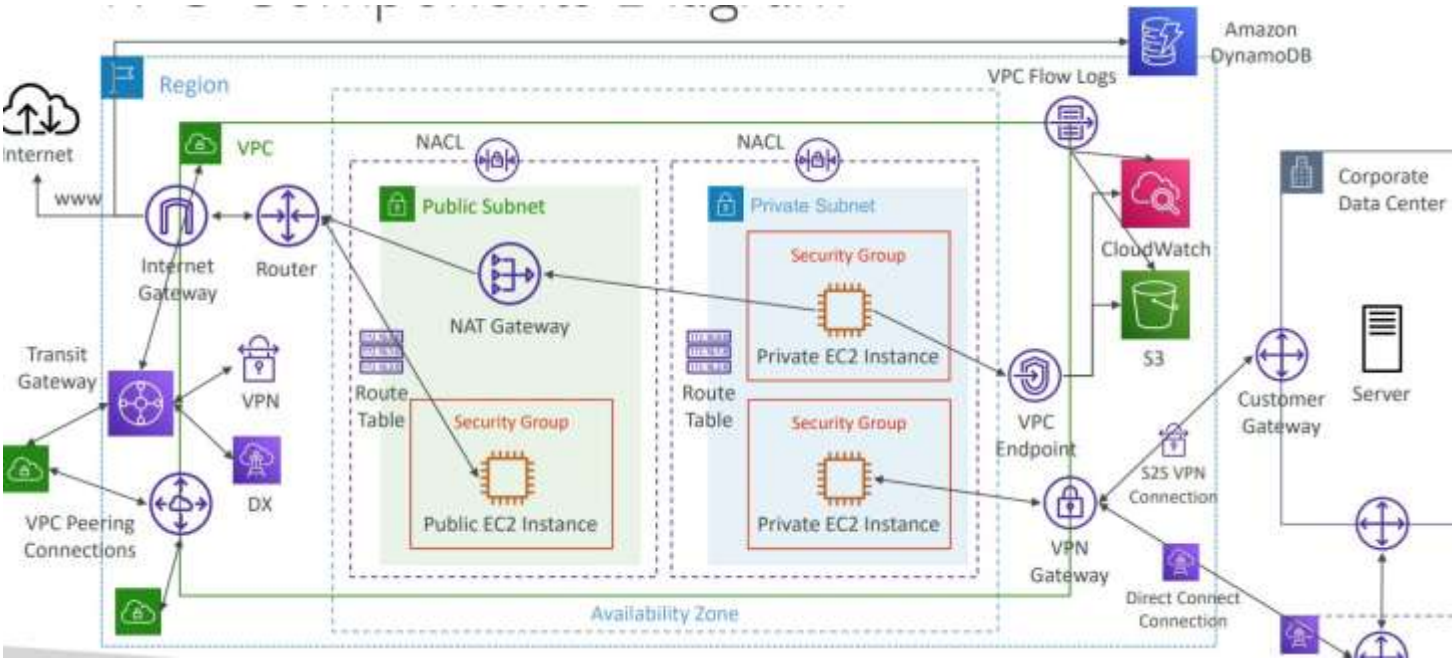
Creating an AWS VPC from Scratch
(ENTER PRISE GRADE)



This is the final VPC which I will construct step by step

VPC

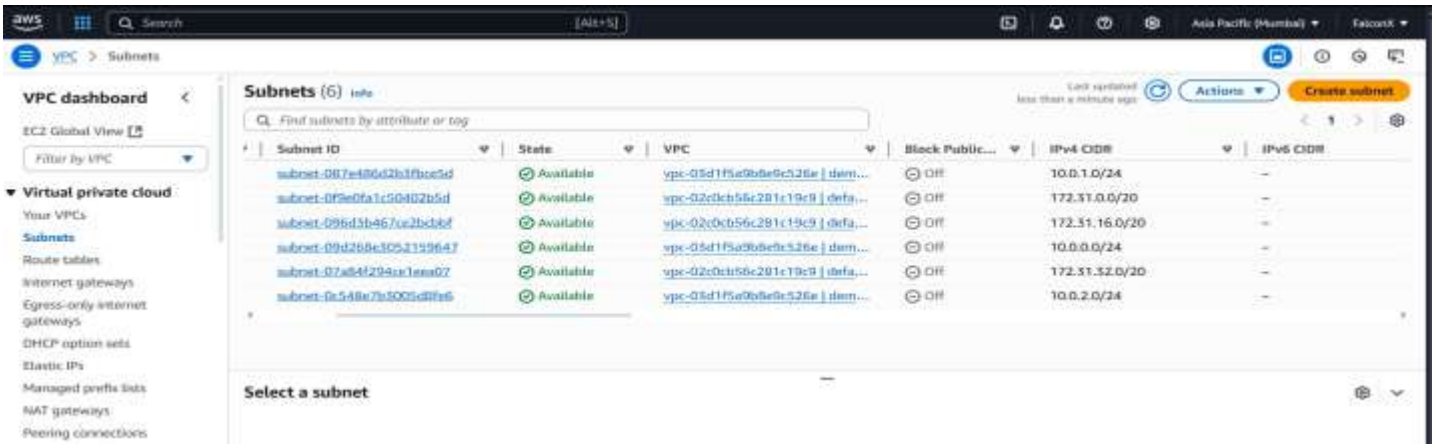
Stands for Virtual Private Cloud
In this guide, I'll create a custom VPC in AWS from scratch, including subnets, route tables, Internet connectivity, and essential components. This provides better control and security than using the default VPC.
This VPC WILL BE an Enterprise grade VPC with options and features which ensure

1. High Availability and scalability
2. Resilience
3. Security
4. High performance and traffic spiking workloads

Let's make it from scratch
Step1.

Creating a VPC and establishing subnets in a **region**

VPC as stated is a virtual private cloud in short like an independent society with residents not dependent on the outside for any resources.
Imagine Subnets like the houses in the Neighborhood Some our public like movie halls and parks
Rest are private like residential Homes



STEP2

Internet GateWay

Now that the neighborhoods created, we require a connection for import exports or in cloud terms Internet Access to the instances containing the app

I created an internet Gateway now the diagram is like this

Note:

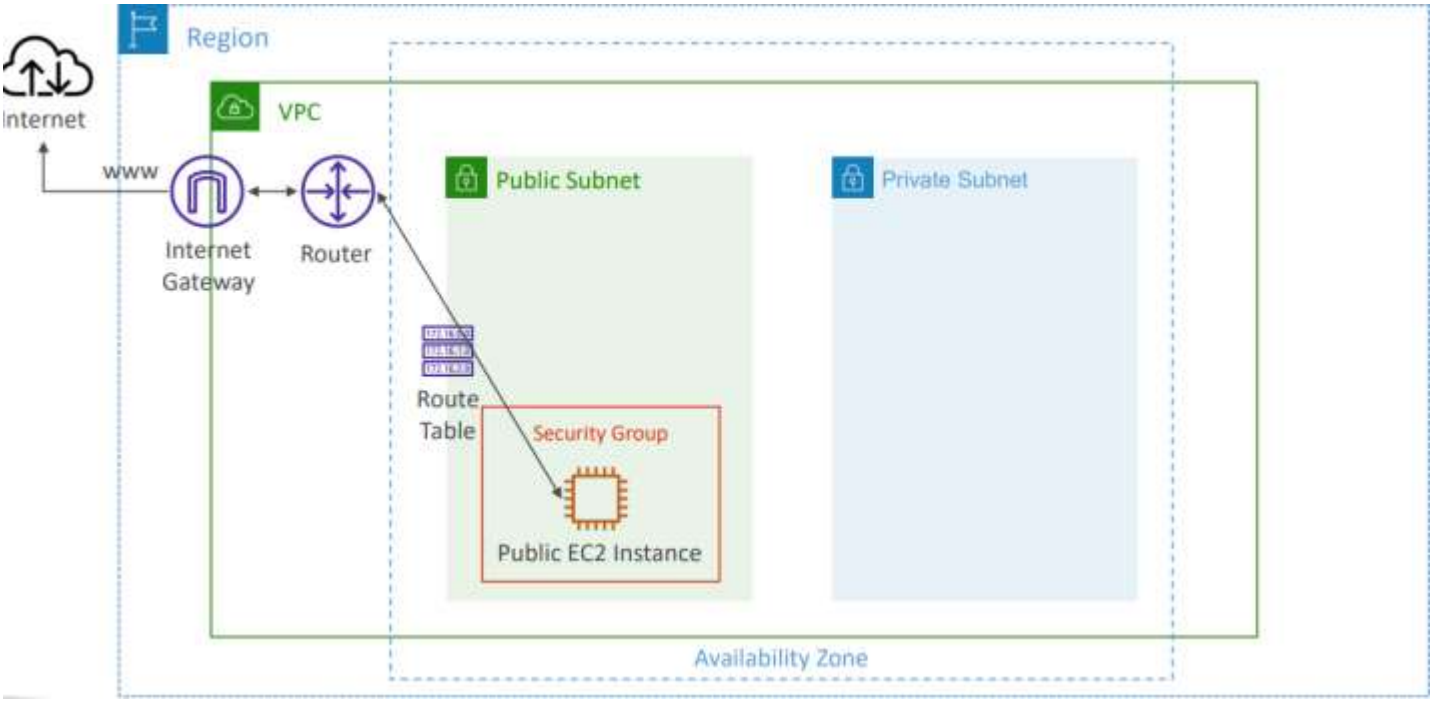
• It scales horizontally and is highly available and redundant

• Must be created separately from a VPC

• One VPC can only be attached to one IGW and vice versa

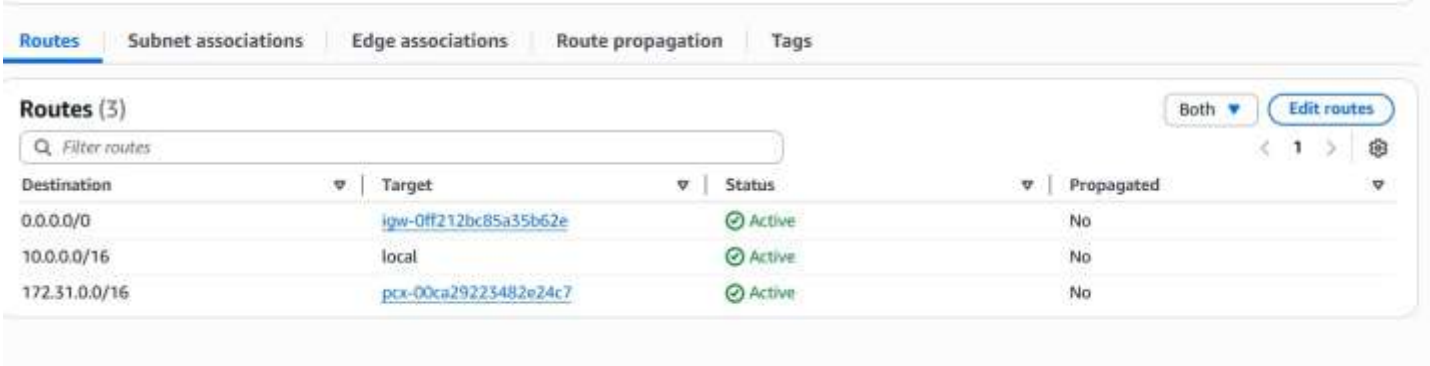
• Internet Gateways on their own do not allow Internet access…

• Route tables must also be edited!



Below shows the attached Internet Gateway
and the route table records being attached to the Internet Gateway

PUBLIC SUBNET	PRIVATE SUBNET
Its personal Route table is created pointing the Internet Gateway	Its personal Route table is created either pointing to a Bastion Host or private networks only



So now you might be having a doubt?

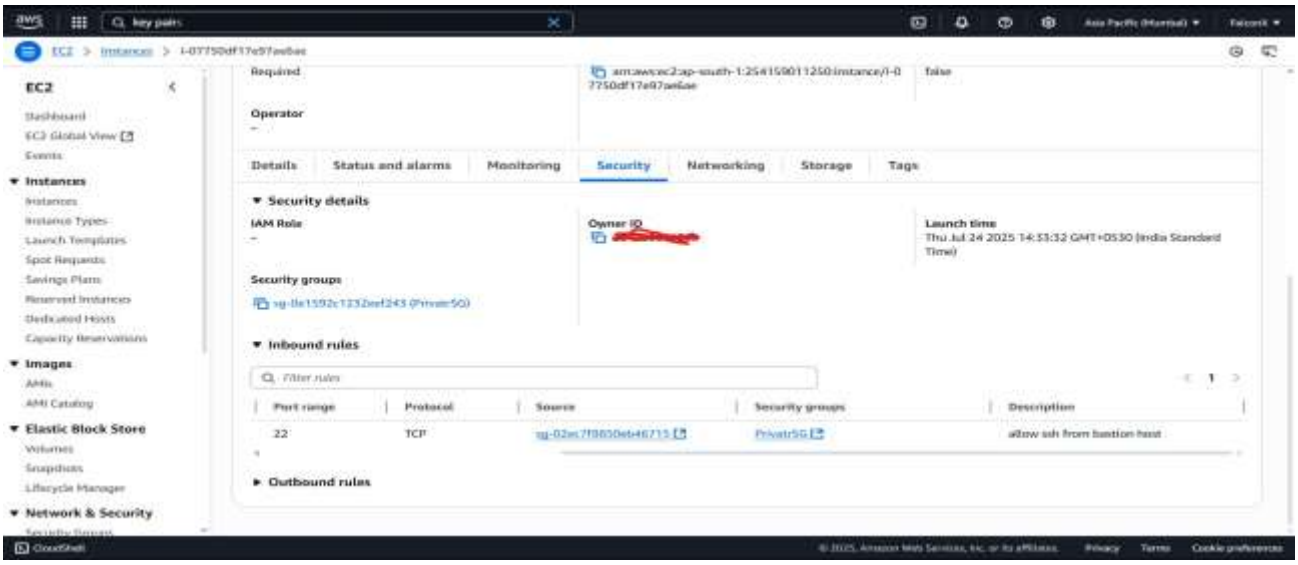
I want to keep my applications private so that they are visible only to me. For those, I will not give a connection to the Internet Gateway. So, from where will they get the network?"

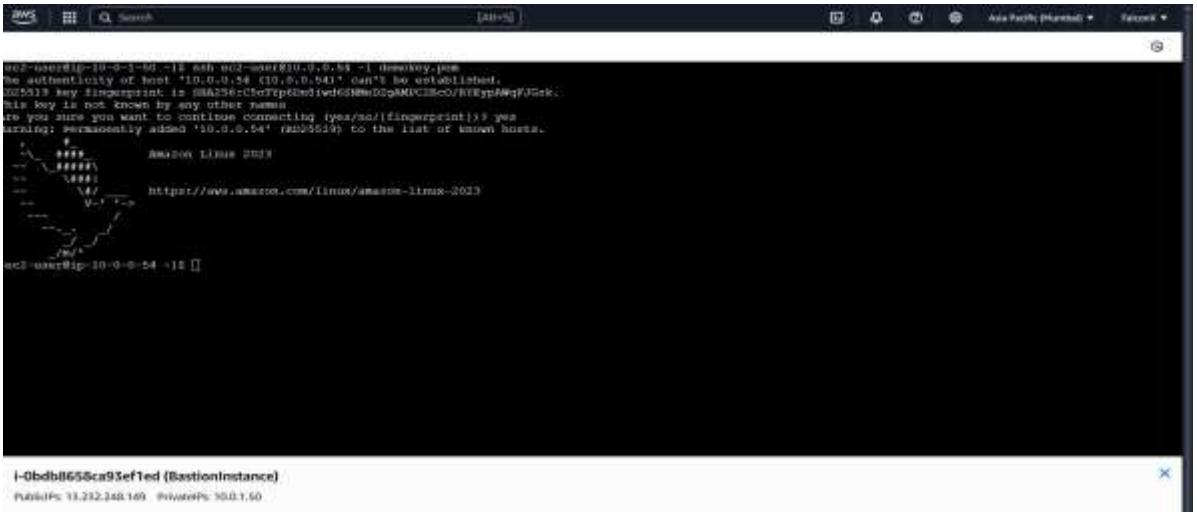
Bastion Hosts (Step-2.5)

These are the types of instances which are hosted on public subnets have access and are visible to the public and can operate resources to the private subnet instances simply but doing SSH into those instances

Here I have

1. Created instance amid bastion host in public subnet and one in private subnet
2. Modified the security group inbound rules of private instance to allow traffic on port 22(SSH Port) to point FROM THE SECURITY GROUP OF BASTION HOST
3. Now I ssh into the Bastion host
4. From here I ssh into the private instance – make a .pem file ,import it in the terminal itself and echo a “Hello” in Private instance
5. As soon as I curl cmd(For calling) it in the public instance it returns the desired output

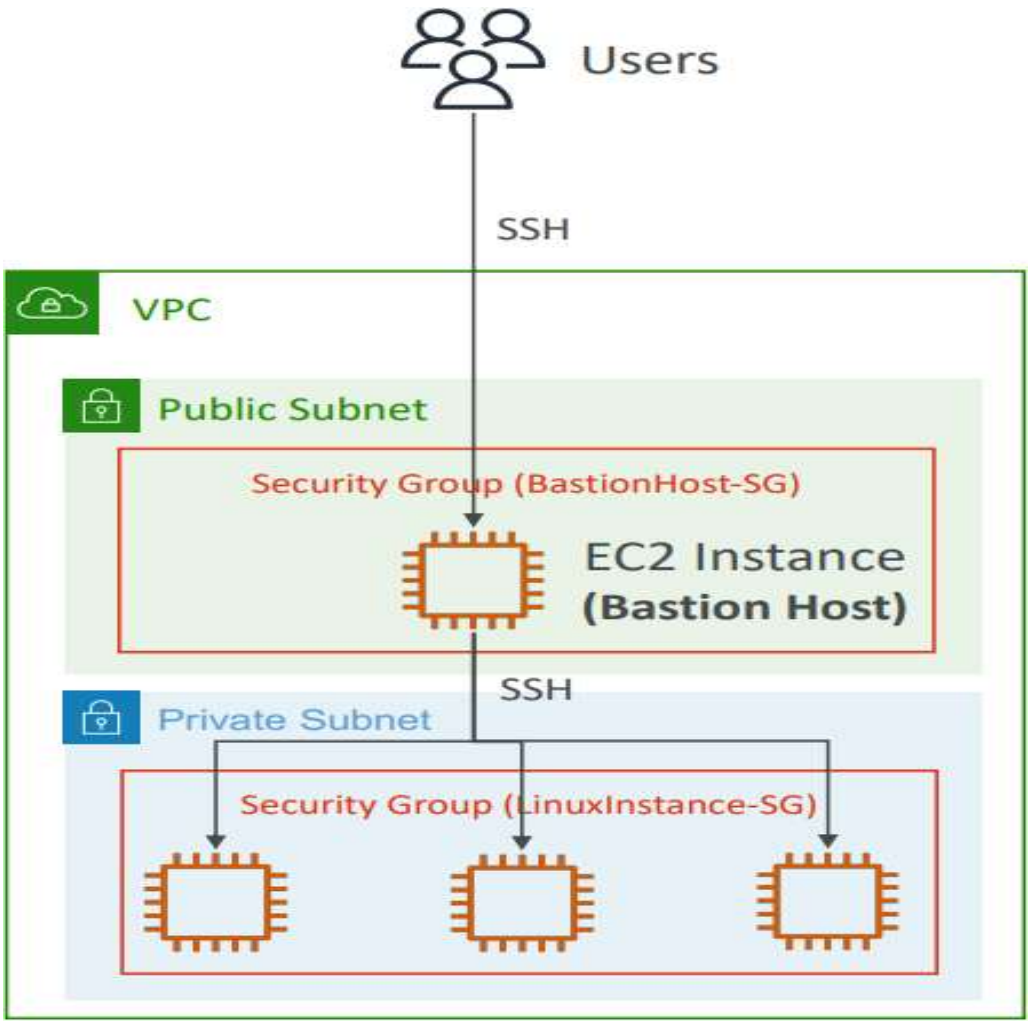




Expected Output:

```
[ec2-user@ip-172-31-3-7 ~]$ curl 10.0.1.50
hello
[ec2-user@ip-172-31-3-7 ~]$
```

NOW THE Structure LOOK LIKE THIS



Step 3

Increasing level

This method is great but not reliable for bigger workloads so

NAT GATEWAY

This thing ensures a stable internet connection both in and out be given to private subnets with a window for security checks of!

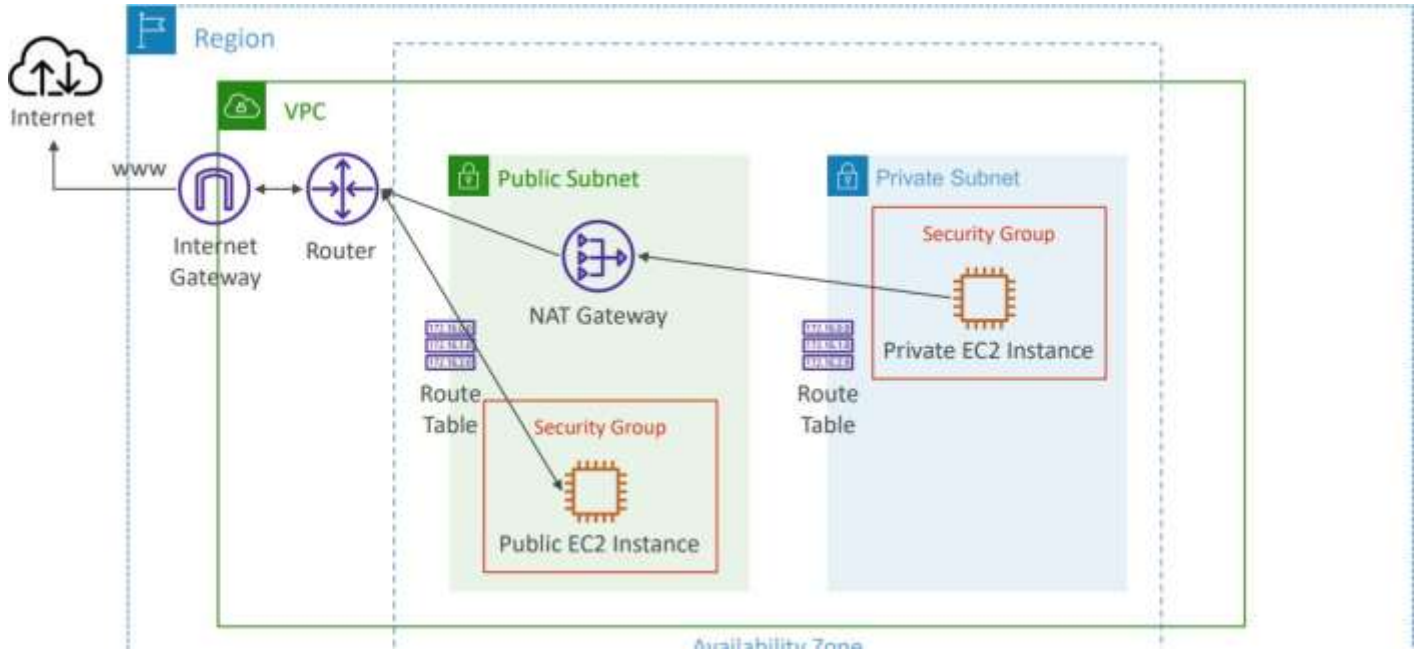
AWS-managed NAT, higher bandwidth, high availability, no administration

• NATGW is created in a specific Availability Zone, uses an Elastic IP

• Can’t be used by EC2 instance in the same subnet (only from other subnets)

• Requires an IGW (Private Subnet => NATGW => IGW)

• 5 Gbps of bandwidth with automatic scaling up to 100 Gbps



Now Comes the Security Part to secure the infrastructure for

1.Malicious Traffic

2. Misguided Traffic

Step-4

NACL(s) /Security Groups

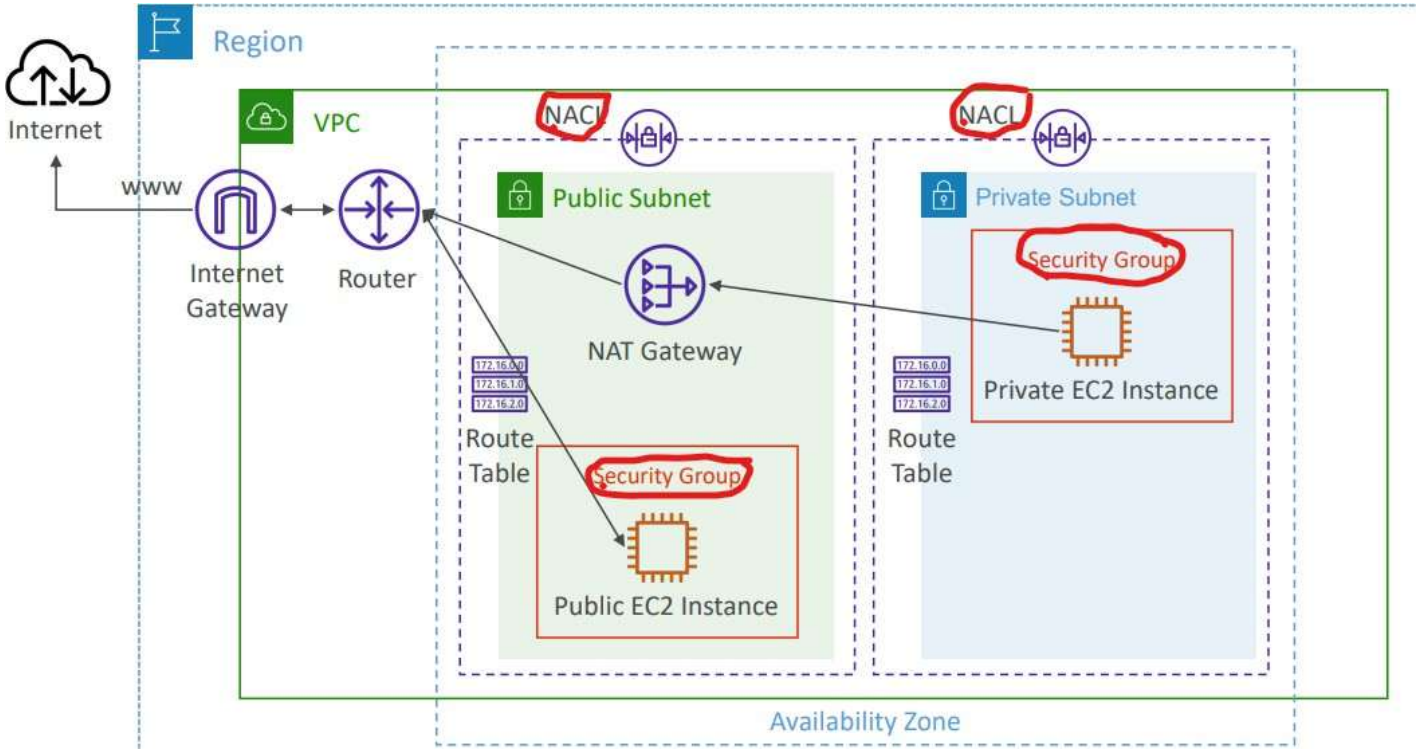
NACL(s) are Subnet Level completely stateless (Check both in and out traffic) and are based on Rules priority no's.

Security groups are instance level to further prevent the misguided traffic to reach its correct path and may not activate a wrong instance these are stateful (logical people if in then out and vice versa types) and have no priority no. System just declarations

There are many places where I used NACLs to block certain CIDRs

And off those Which enter inside to guide through security groups

So here is our progress



NOTE:

EPHIMERAL PORTS- these are on spot usable ports used instead of defined ports for communication for added security.

Now If the app is Enterprise grade and the infrastructure is also Enterprise grade
It cannot rely on only 1 VPC

We have to have multiple VPC but that is not the point that is simple the point is

WE NEED SYNC and updated Information between all the VPCs for the companies

Also an Advantage of this will be to share info across VPC „„next Feature, so that's

why we are using VPC peering.

Step 4

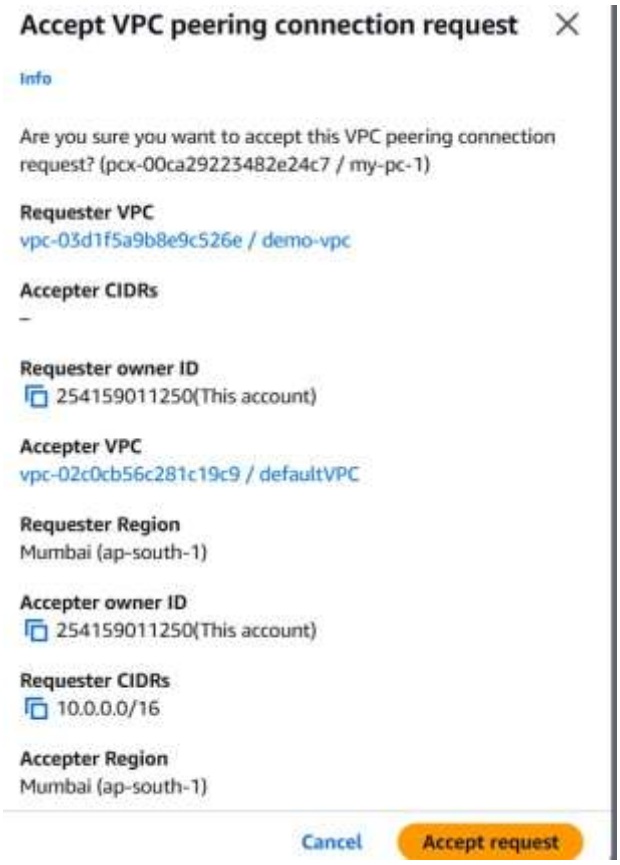
VPC Peering

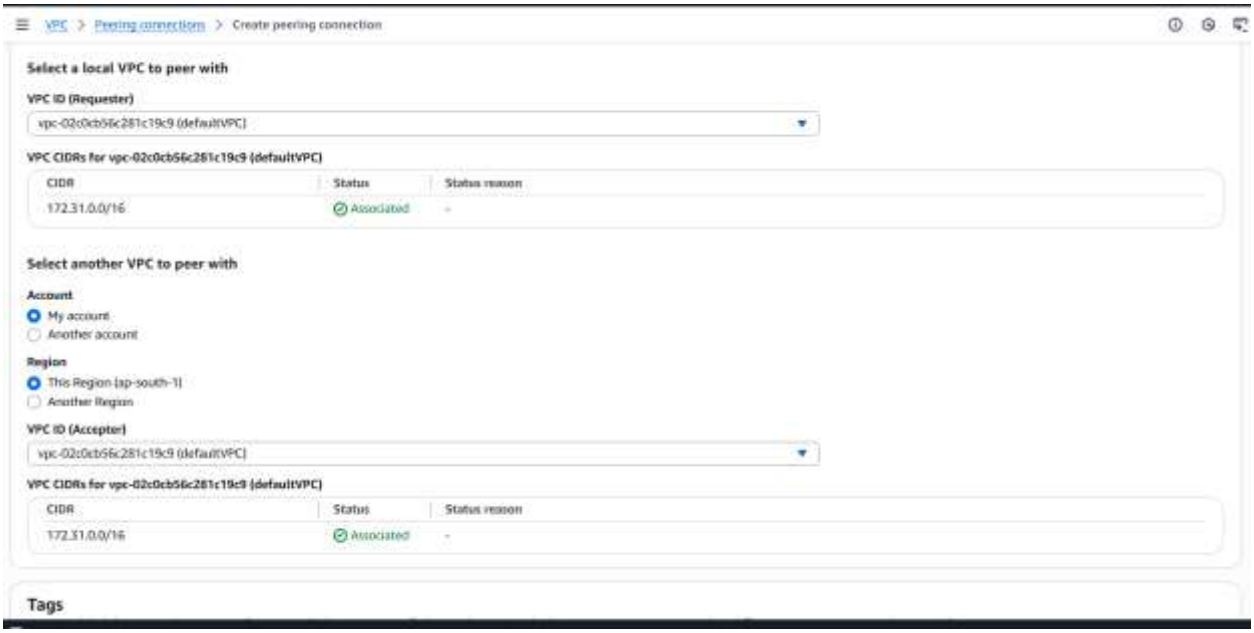
It simply means establishing a peering connection or simply a connection between VPCs

CROSS ACCOUNT & CROSS REGION

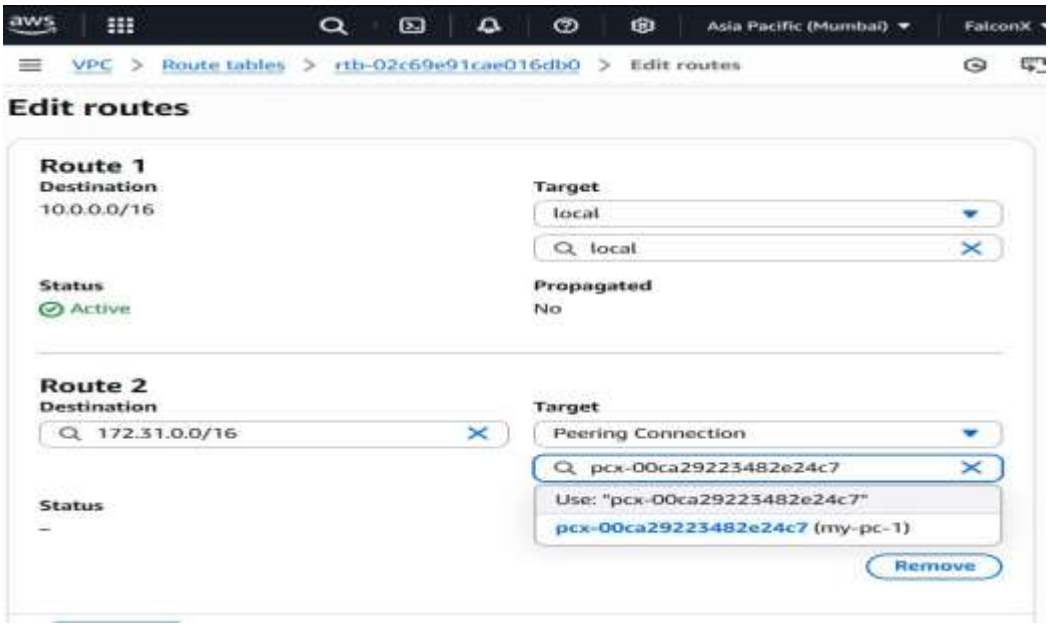
Here I set up

1. **TWO VPCs in different region**
2. **Accept the request of peering**
3. **MOST IMP. ALWAYS update it in the route tables which I will see in common once both VPCs are connected as shown**





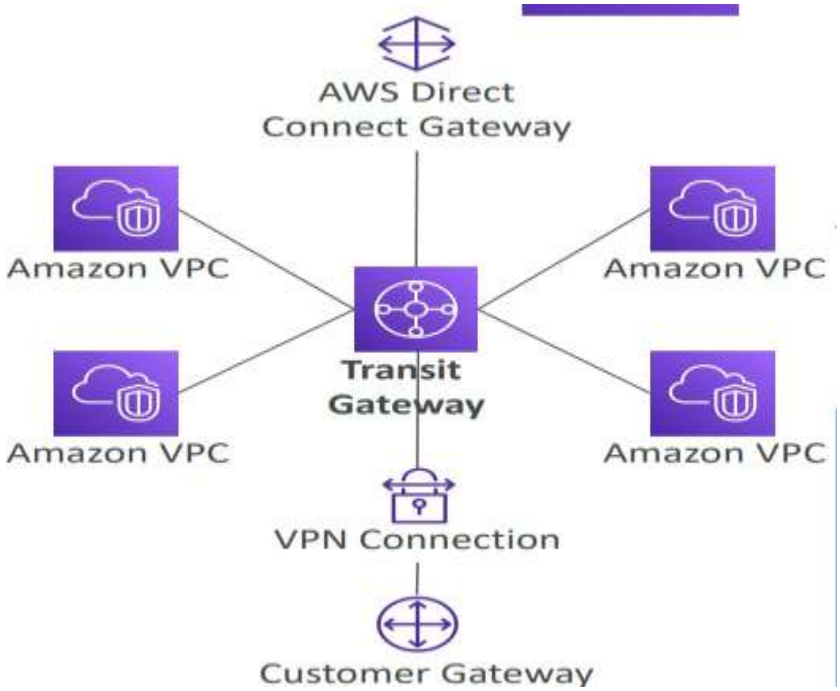
Changing the route Table



ADDITIONAL STEP FOR ENTERPRISE GRADE

Setup a Transit Gateway for incase of connecting multiple VPCs together using peering

Reason: Network Topology becomes **complicated** and difficult to maintain



Some Cost Optimizing approaches....

Okay So Now the thing is I want my Private Instance to access AWS services or my private DATA Center

Why should i incur such costs of setting up a NAT gateway then accessing those services through public

That’s expensive and not even secure

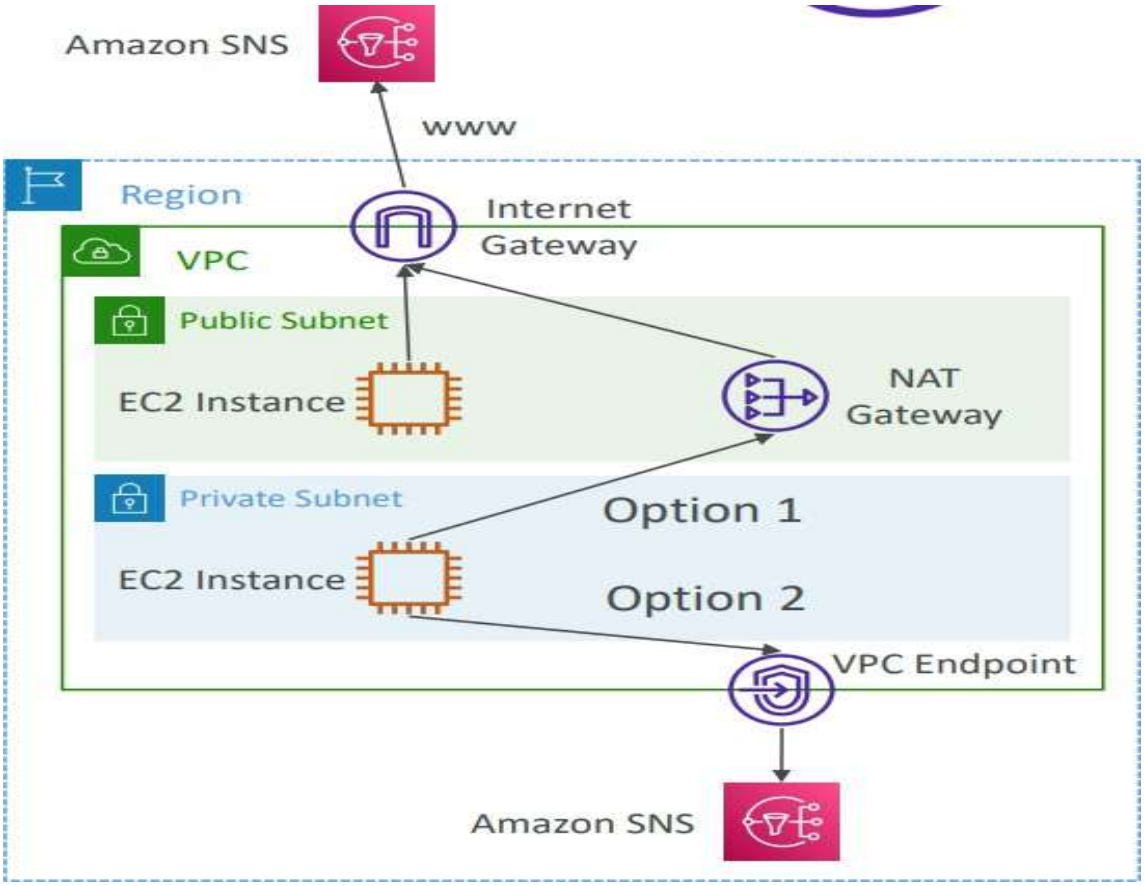
Hence

Step 5

VPC Endpoints

These are like metro connecting dots

VPC Endpoints (powered by AWS Private Link) allows you to connect to AWS services using a private network instead of using the public Internet



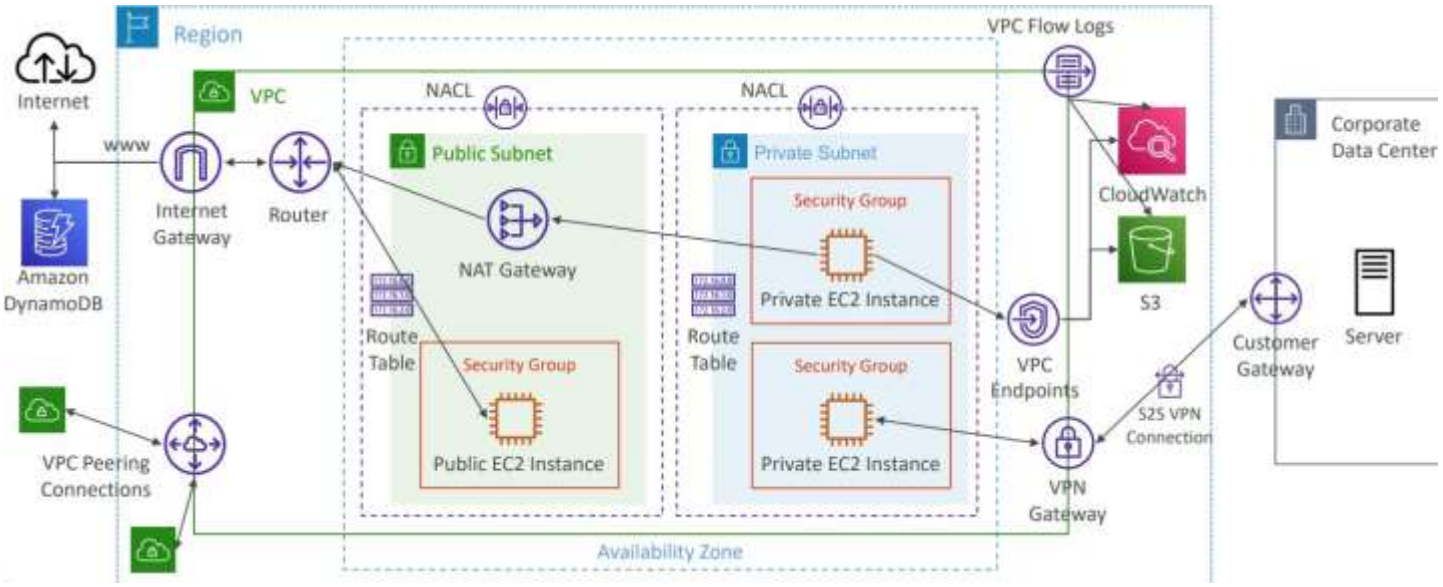
Now this is what I meant

These are also of two types one is a gateway endpoint supporting less services (FOR Small companies)

2. Is Interface endpoints (Basically Endpoint premium subscription for Enterprises)

Finally.... my VPC is all set !!!!

A final step remains.....


Region
VPC Flow Logs
Internet
VPC
NACL
NACL
Public Subnet
Private Subnet
www
Internet Gateway
Router
Amazon DynamoDB
NAT Gateway
Security Group
Private EC2 Instance
CloudWatch
S3
Route Table
Route Table
Security Group
Public EC2 Instance
Security Group
Private EC2 Instance
VPC Endpoints
Customer Gateway
Server
S25 VPN Connection
VPC Peering Connections
VPN Gateway
Availability Zone
Corporate Data Center

THANK YOU