Peering multiple VPCs using Transit Gateway

By Chisom Uketui

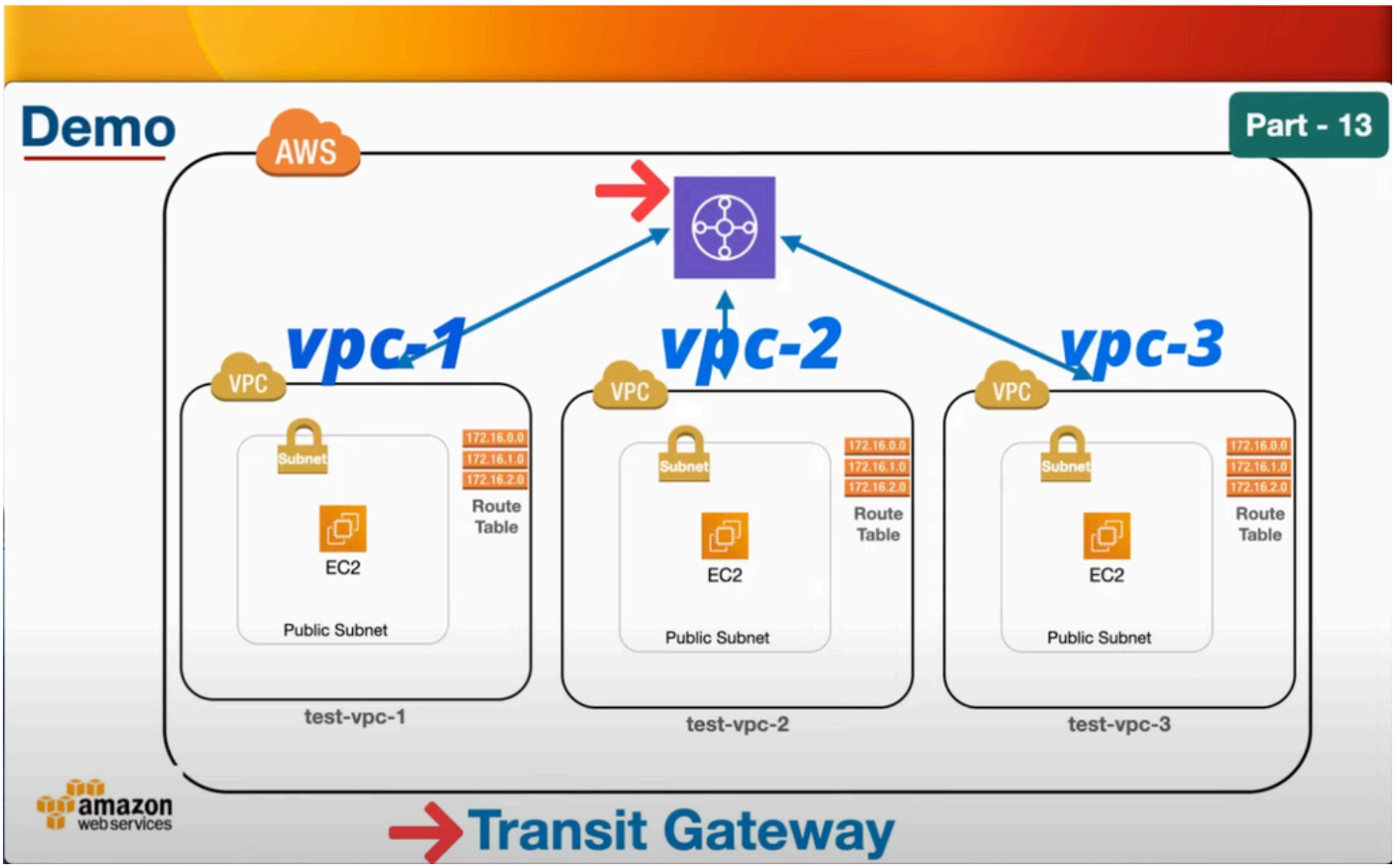
Introducing Today's Project!

Today I am going to showcase how to utilise a Transit gateway to network multiple VPCs present inside an AWS account to be able to communicate with one another. First we will create 3 different VPCs, each would have a public subnet and inside each subnet we will spin up an EC2 instance. We will then set up a Transit gateway that will be attached to all three VPCs and thereafter perform a test where we access one of the Ec2 instance in one VPC and try to access the another Ec2 instance running into another VPC so that we know our Transit Gateway is working.

What is a Transit Gateway?

- **Definition**: AWS Transit Gateway is a networking service that connects multiple Virtual Private Clouds (VPCs) and on-premises networks(VPNs) via a central hub.
- **Importance**:
  - Simplifies network management by eliminating complex peering relationships.
  - Acts as a scalable and efficient solution for connecting multiple VPCs across regions.

Below is an overview of what I will be doing in this project.



In the first part of my project…

Step 1 – Set up my VPCs
In this step, I am going to create 3 VPCs, test- VPC-1, test-VPC-2 and test-VPC-3.

Will start by creating the first VPC, subnet and internet gateway.

aws Services Search [Option+S]

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

test-vpc-1

IPv4 CIDR block Info

- IPv4 CIDR manual input
- IPAM-allocated IPv4 CIDR block

IPv4 CIDR

12.0.0.0/16

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

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*	
Name	test-vpc-1	Remove tag

The following internet gateway was created: igw-099a983e14d178c10 - igw-test-vpc-1. You can now attach to a VPC to enable the VPC to communicate with the internet.

Attach to a VPC

VPC > Internet gateways > igw-099a983e14d178c10

igw-099a983e14d178c10 / igw-test-vpc-1

Actions

Details Info

Internet gateway ID	State	VPC ID	Owner
igw-099a983e14d178c10	Detached	–	242396018804

Tags

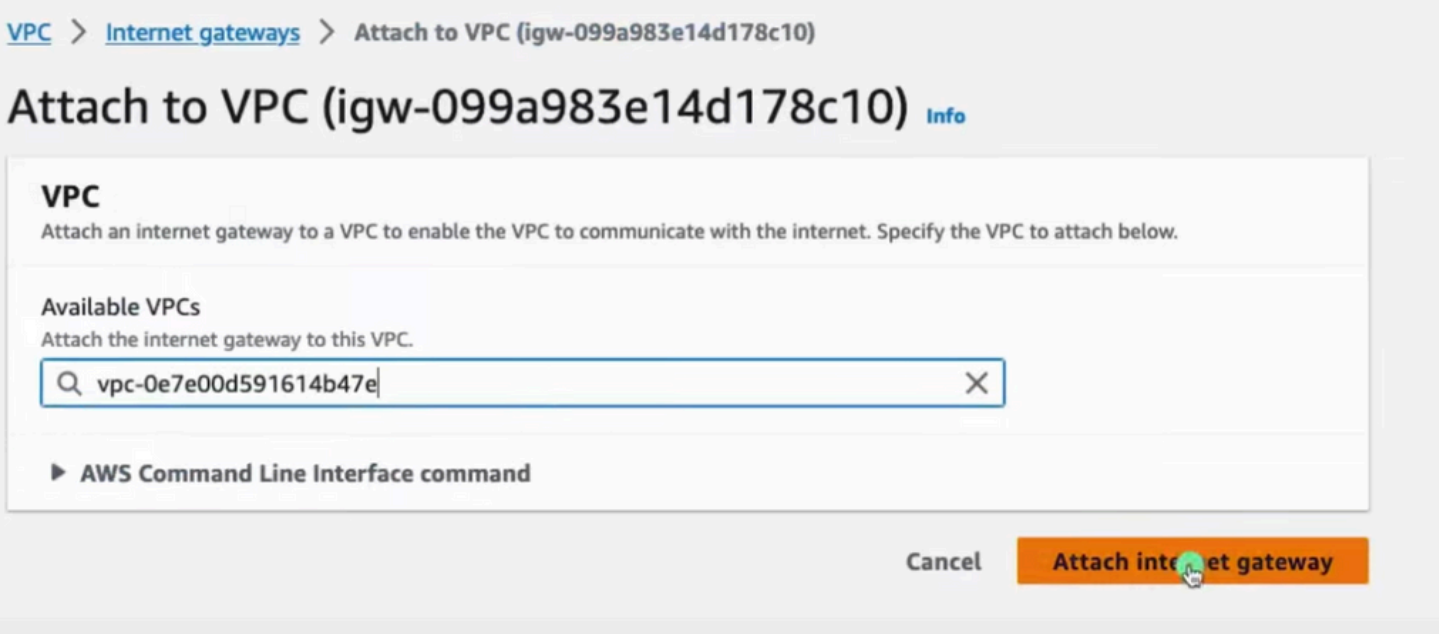
Manage tags

Search tags

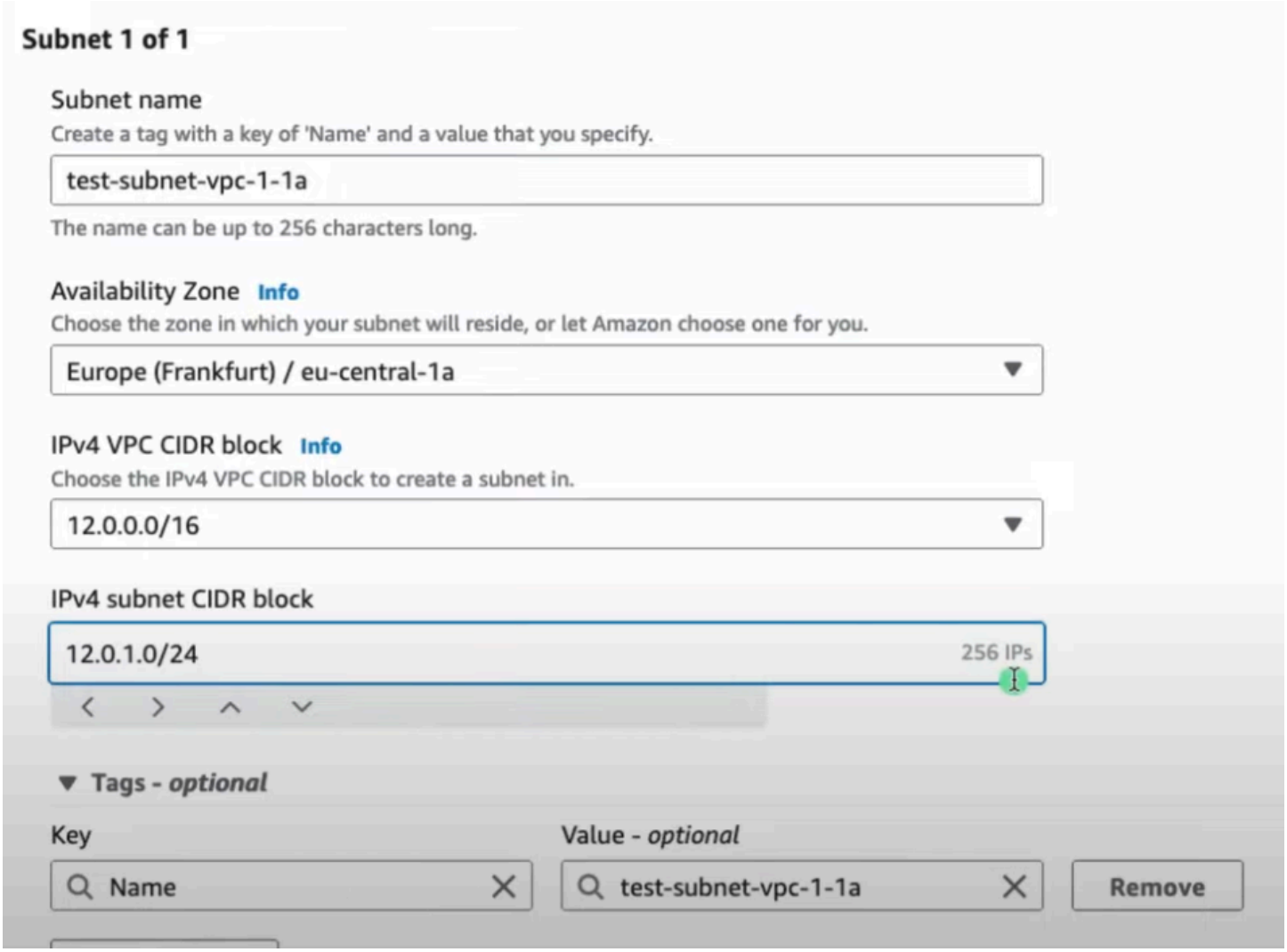
1

Key	Value
Name	igw-test-vpc-1

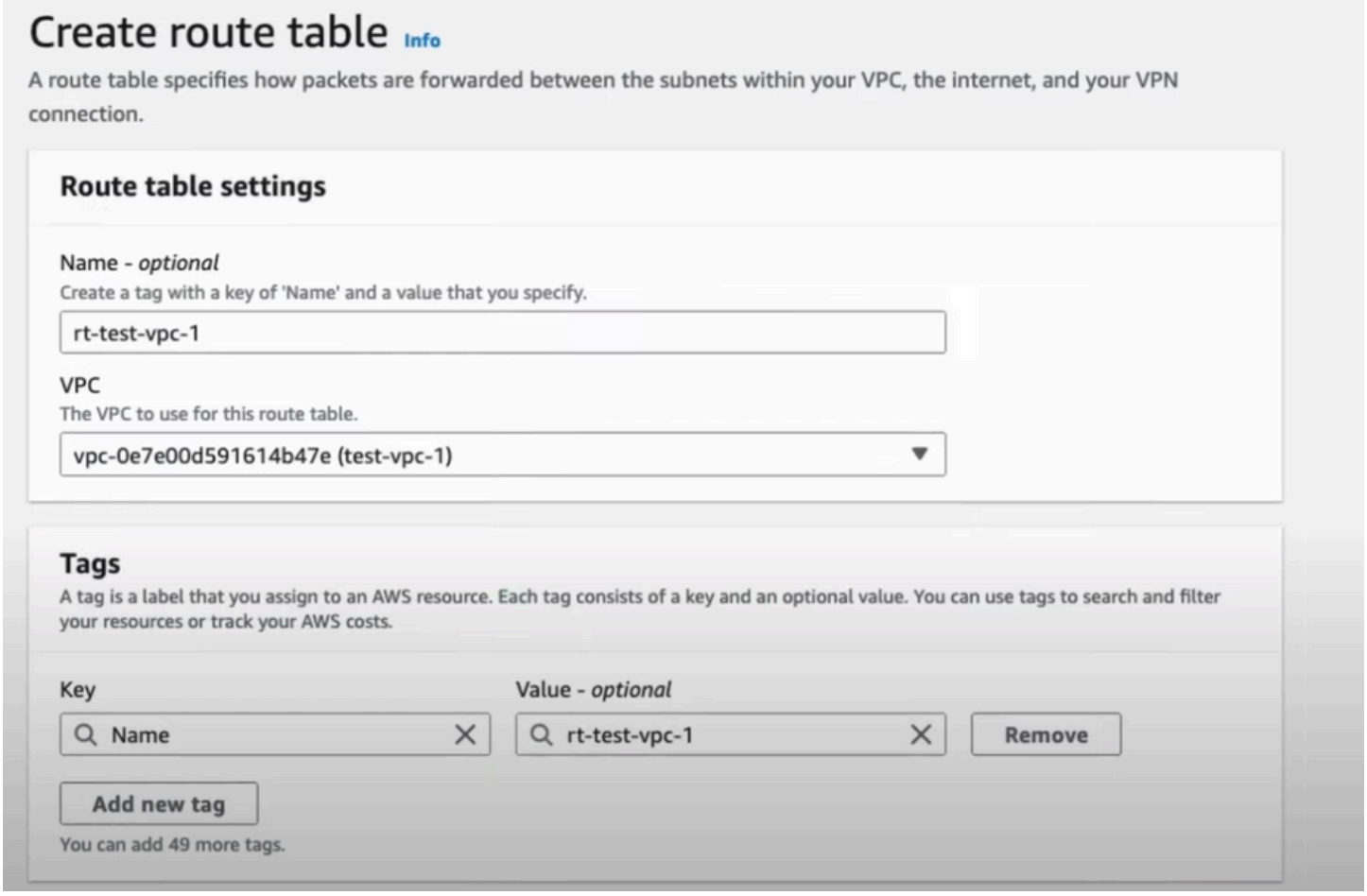
Attach the internet gateway to our VPC.



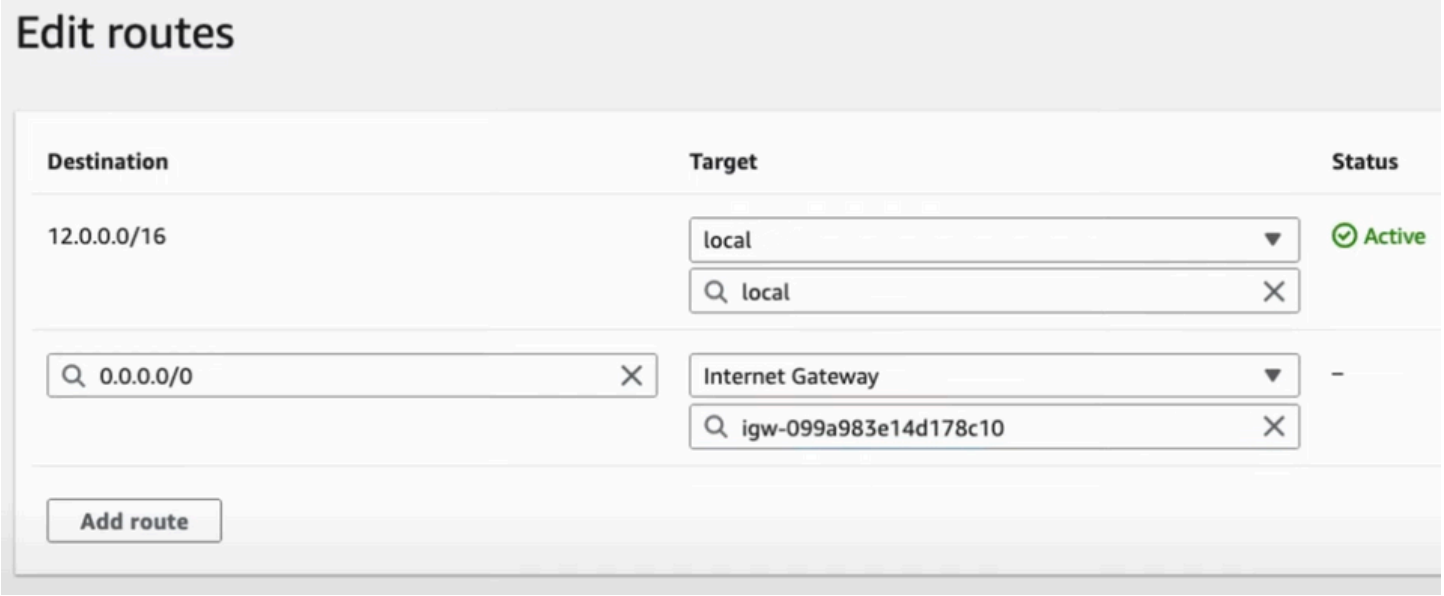
Create a subnet and attach our internet gateway to it to make it a public subnet



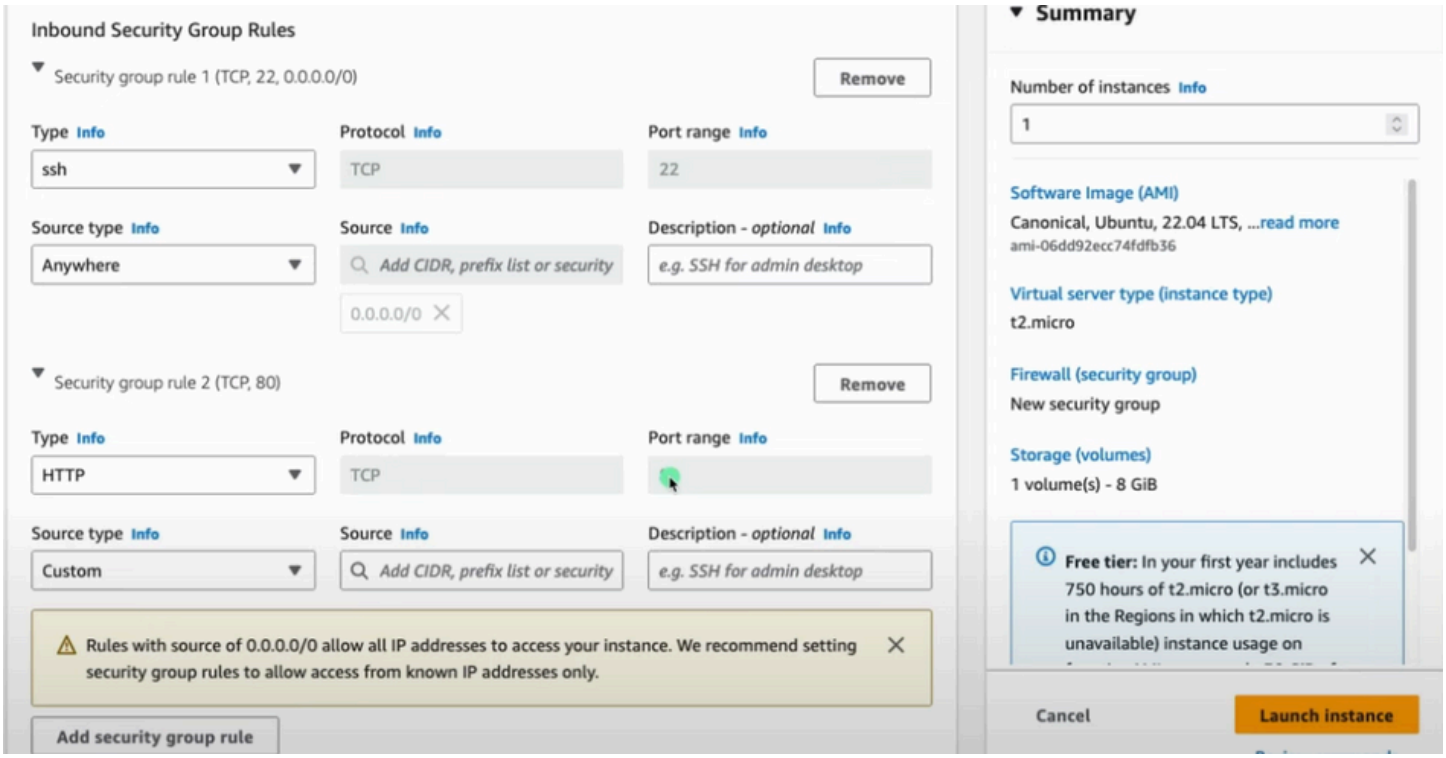
Create a route table that will direct traffic to our subnet and then associate this route table with our subnet.



Edit routes to allow public access to our subnet, adding the internet gateway as target.



`Create our resource - EC2 instance.



Here, we are adding a script in the user data for installing the Apache web server. The user data section is used to install certain packages onto your Ec2 instance when setting it up for the first time.

User data - *optional* Info

Upload a file with your user data or enter it in the field.

Choose file

```
#!/bin/bash
yes | sudo apt update
yes | sudo apt install apache2
echo "<h1>Server Details</h1><p><strong>Hostname:</strong> $(hostname)
</p><p><strong>IP Address:</strong> $(hostname -I | cut -d" " -f1)</p>" >
/var/www/html/index.html
sudo systemctl restart apache2
```

Ec2 instance is running!

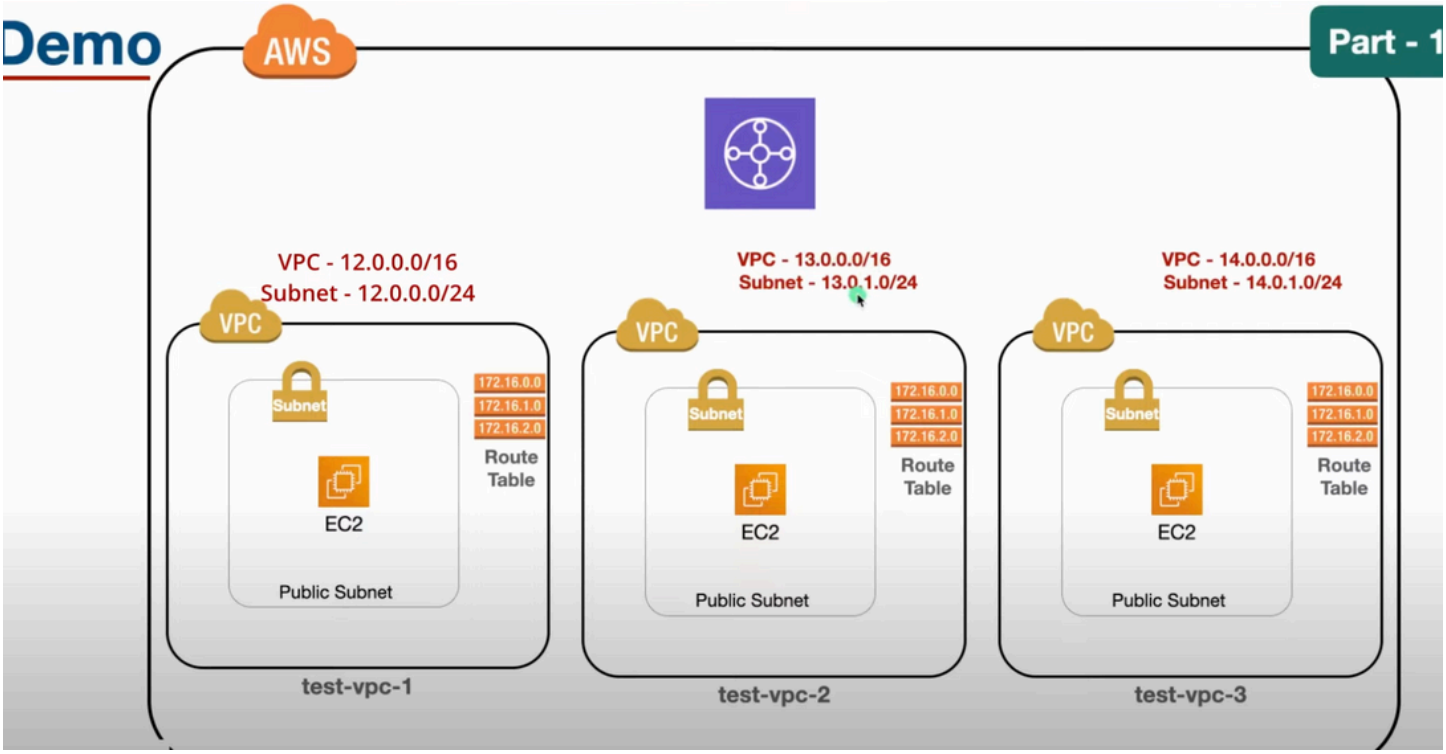
Instances (1/1) Info | Connect | Instance state | Actions | Launch instances

Find Instance by attribute or tag (case-sensitive)

Instance state = running | Clear filters

Name	Instance ID	Instance state	Instance type	Status check	Alarm stat
ec2-test-vcp-1	i-0622831ea865ed0e2	Running	t2.micro	Initializing	No alarms

We will then set up the remaining 2 VPCs and subnets using the CIDR range and blocks shown in the diagram below.



Transit gateway

In this step we will go ahead to set up our transit gateway

VPC > Transit gateways > Create transit gateway

Create transit gateway Info

A transit gateway (TGW) is a network transit hub that interconnects attachments (VPCs and VPNs) within the same AWS account or across AWS accounts.

Details - *optional*

Name tag

Creates a tag with the key set to Name and the value set to the specified string.

tg-vpc-1-vpc-2-vpc-3

Description Info

Set the description of your transit gateway to help you identify it in the future.

description

Configure the transit gateway

Amazon side Autonomous System Number (ASN) Info

ASN

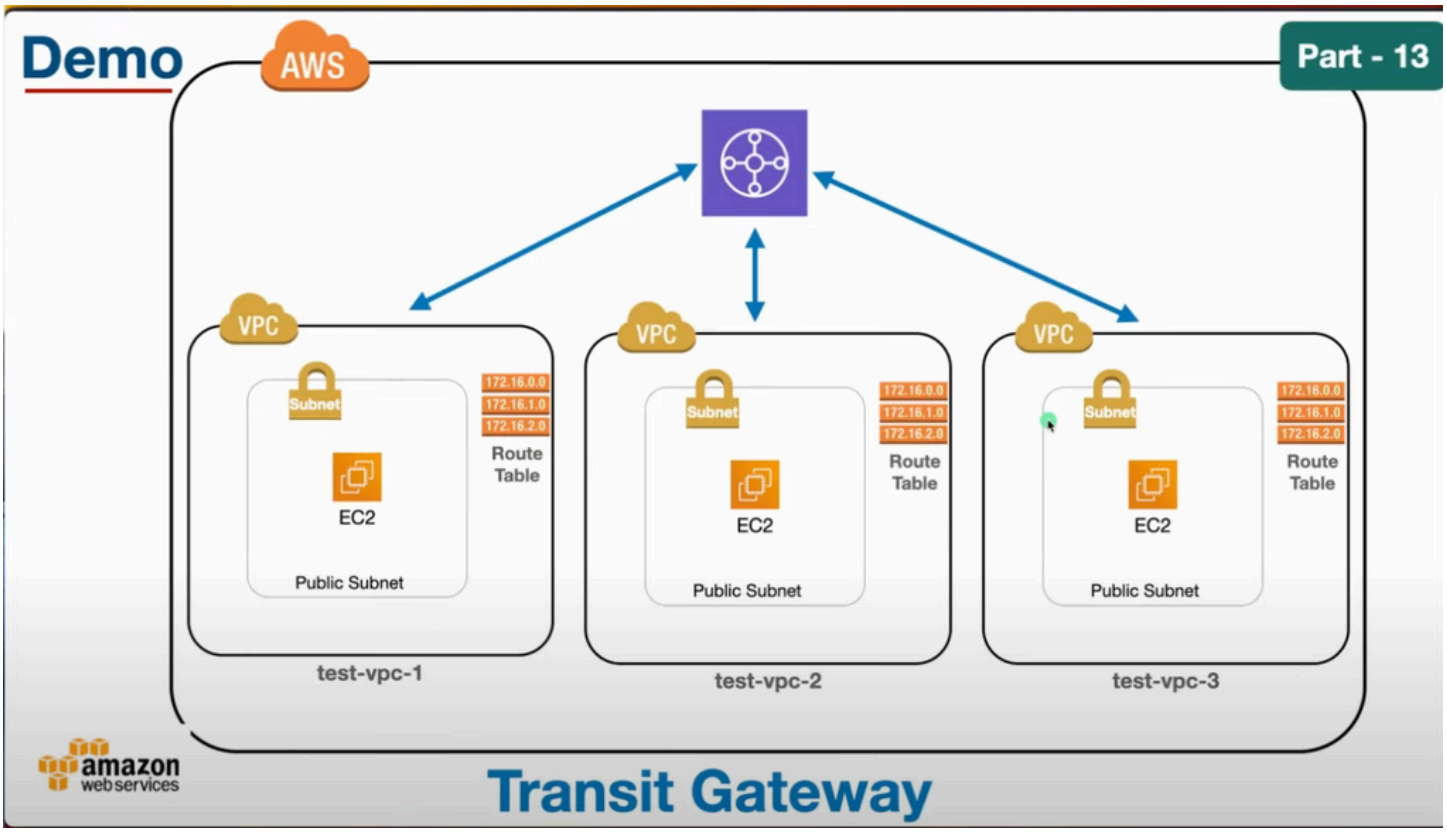
Transit gateways (1) Info

Filter transit gateways

Transit gateway ID: tgw-00f76b6b5d186a784 ✕ Clear filters

Name	Transit gateway ID	Owner ID	State
tg-vpc-1-vpc-2-vpc-3	tgw-00f76b6b5d186a784	242396018804	Available

Transit gateway attachment



In this step we are going to attach the transit gateway to our VPCs. Click on the transit gateway attachment button and create attachment based on each VPC (VPC1, VPC2 and VPC3). We will also define the VPC so first attachment we are going to create is towards the VPC1.

VPC > Transit gateway attachments > Create transit gateway attachment

Create transit gateway attachment Info

A transit gateway (TGW) is a network transit hub that interconnects attachments (VPCs and VPNs) within the same AWS account or across AWS accounts.

Details

Name tag - *optional*

Creates a tag with the key set to Name and the value set to the specified string.

tg-attachment-vpc-1

Transit gateway ID Info

tgw-00f76b6b5d186a784 (tg-vpc-1-vpc-2-vpc-3)

Attachment type Info

VPC

VPC attachment

Select and configure your VPC attachment.

You successfully created VPC attachment tgw-attach-0943f41c7e0291503 / tg-attachment-vpc-1.

You can visualize and monitor your Transit Gateway(s) from the AWS Network Manager. Register your Transit Gateway by creating a global network to get started.

Transit gateway attachments (1) Info

Actions | Create transit gateway attachment

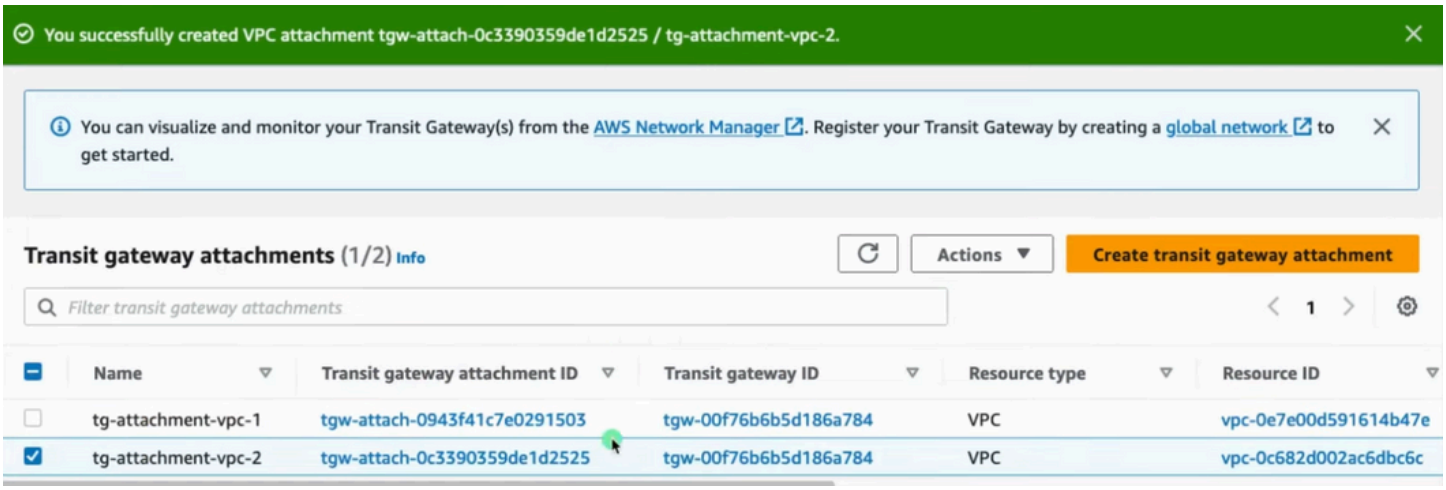
Filter transit gateway attachments

1

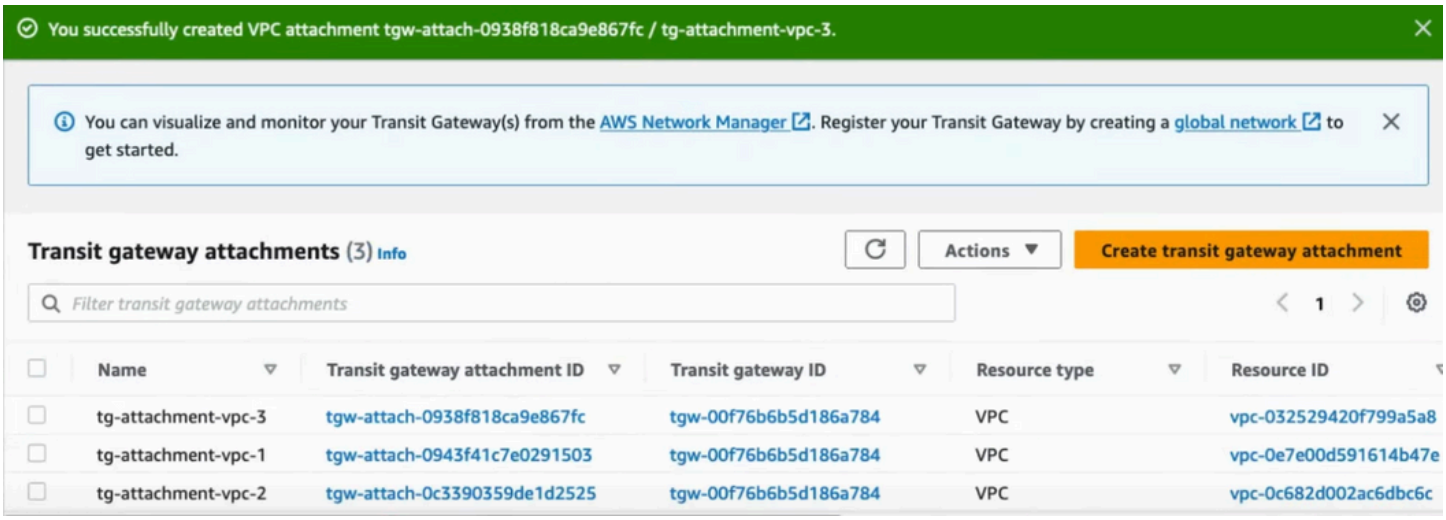
Transit gateway attachment ID: tgw-attach-0943f41c7e0291503 | Clear filters

Name	Transit gateway attachment ID	Transit gateway ID	Resource type	Resource ID
tg-attachment-vpc-1	tgw-attach-0943f41c7e0291503	tgw-00f76b6b5d186a784	VPC	vpc-0e7e00d591614b47e

Create the second attachment for VPC 2:



And finally for the third VPC:



Transit Gateway vs VPC Peering

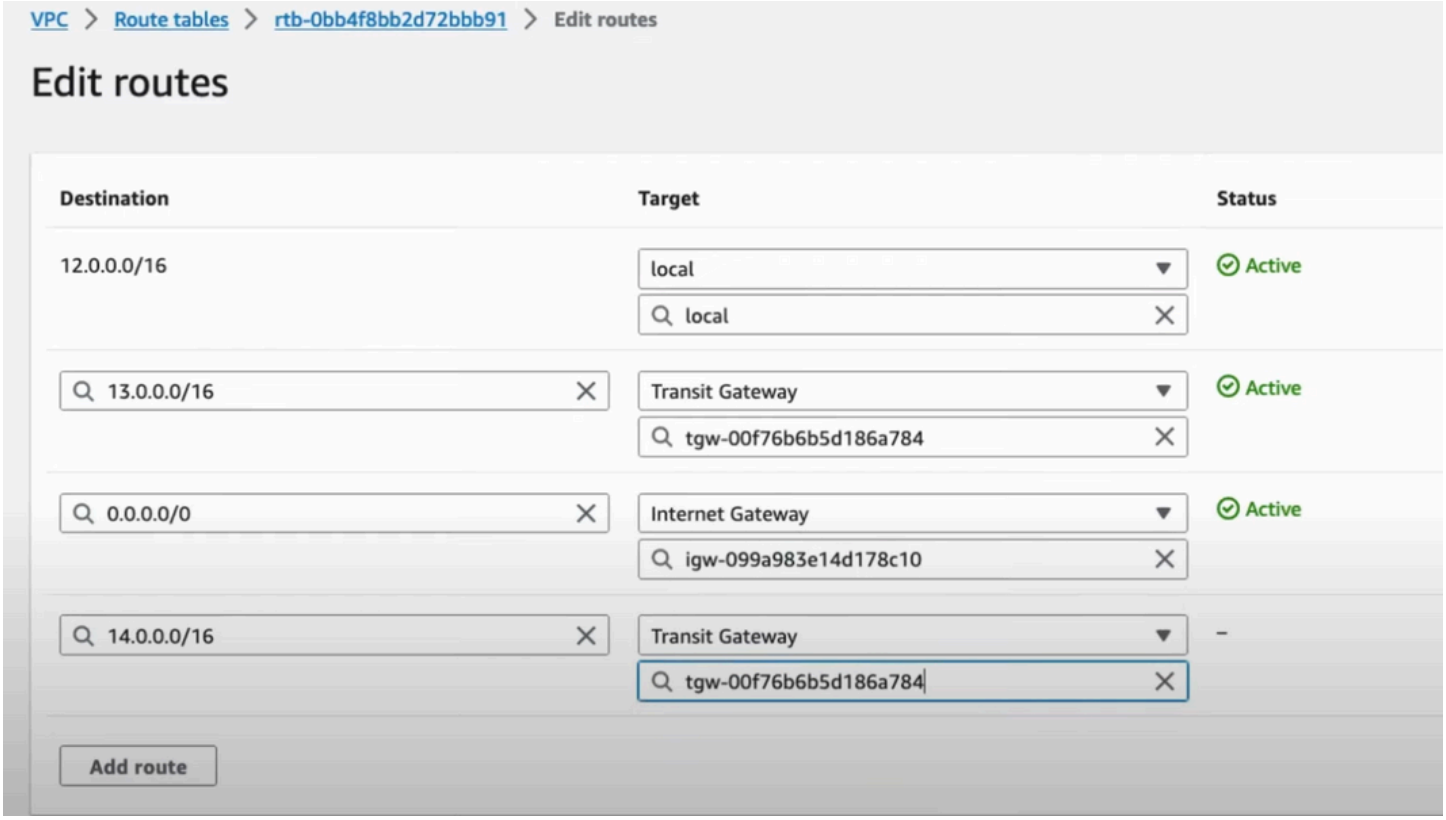
Transit Gateway (TGW) and **VPC Peering** are both AWS networking solutions but serve different purposes:

- **VPC Peering** connects two VPCs directly, allowing traffic to flow between them as if they were part of the same network. It's a one-to-one connection and doesn't scale well if you need to connect multiple VPCs.
- **Transit Gateway** is a centralized hub that connects multiple VPCs, on-premises networks, and other resources. It simplifies large-scale networking by acting as an intermediary, reducing the complexity of managing many individual peering connections.

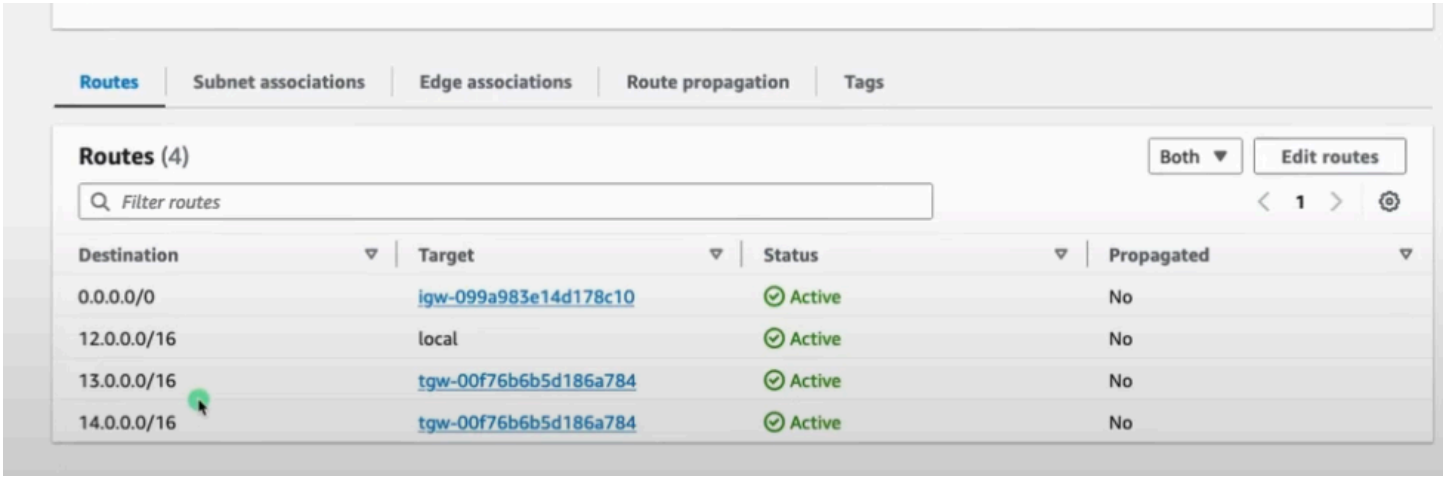
In summary, **VPC Peering** is best for simpler, smaller setups, while **Transit Gateway** is ideal for larger, more complex network architectures where multiple VPCs or hybrid cloud environments are involved.

Now lets Update our routes:

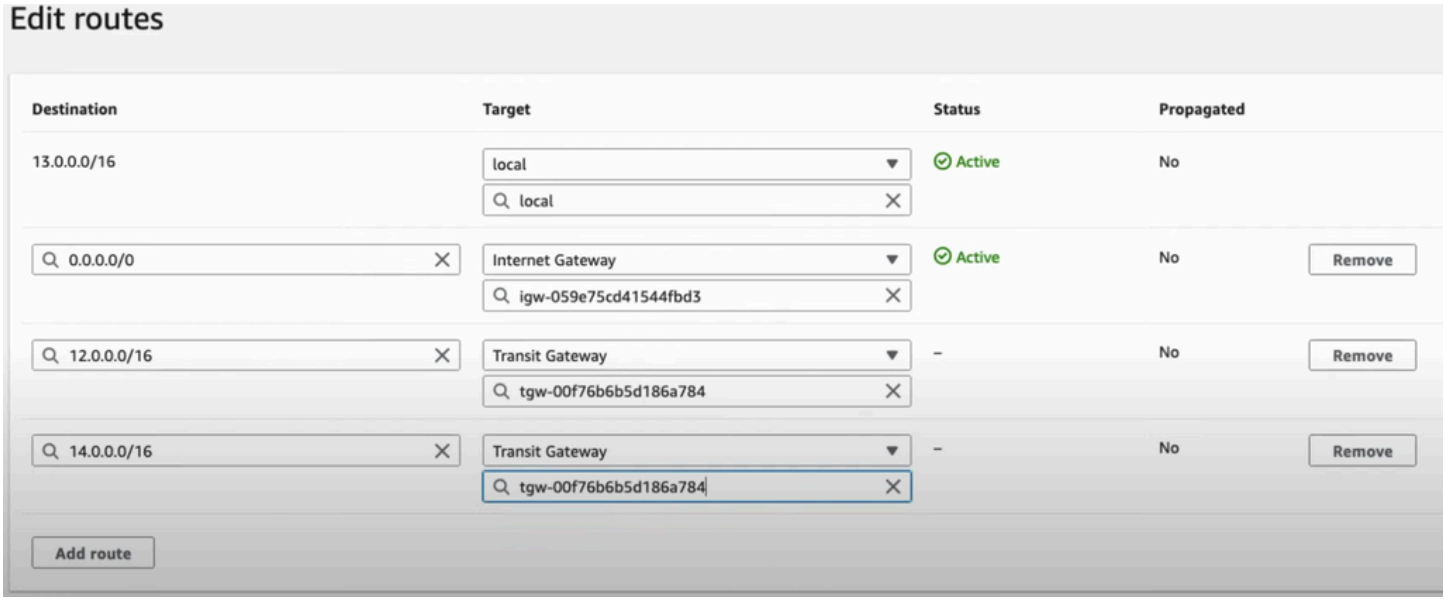
In this step we are going to update our route table so our subnet knows how to route the request to the transit gateway to enable communication with the other VPCs.

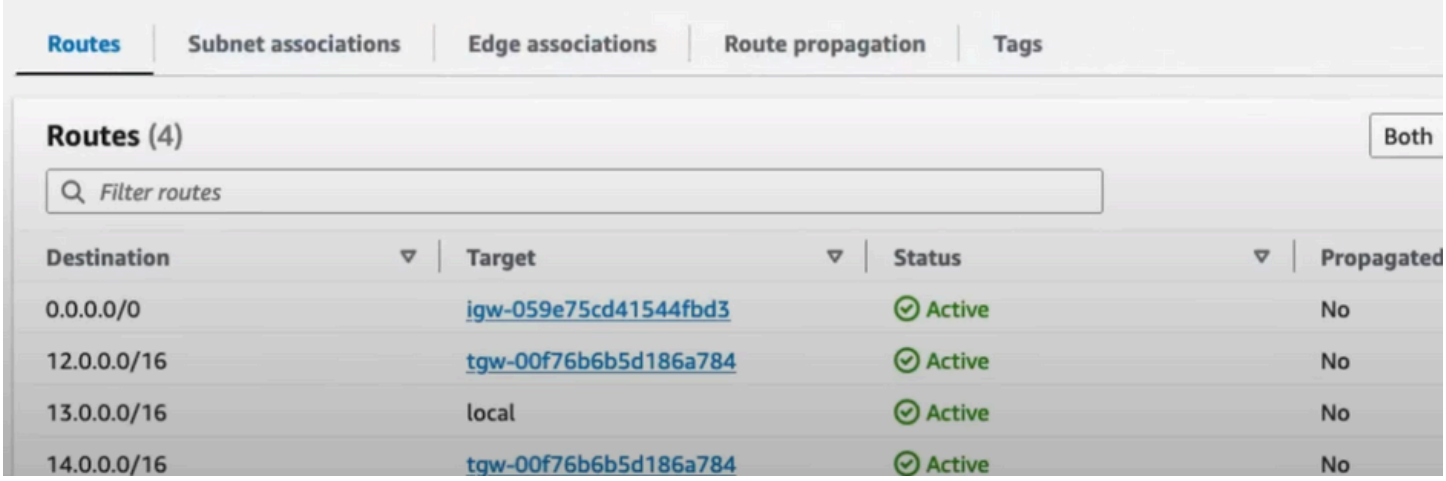


Now we have our connectivity between VPC 2 and VPC 3 with our VPC 1.

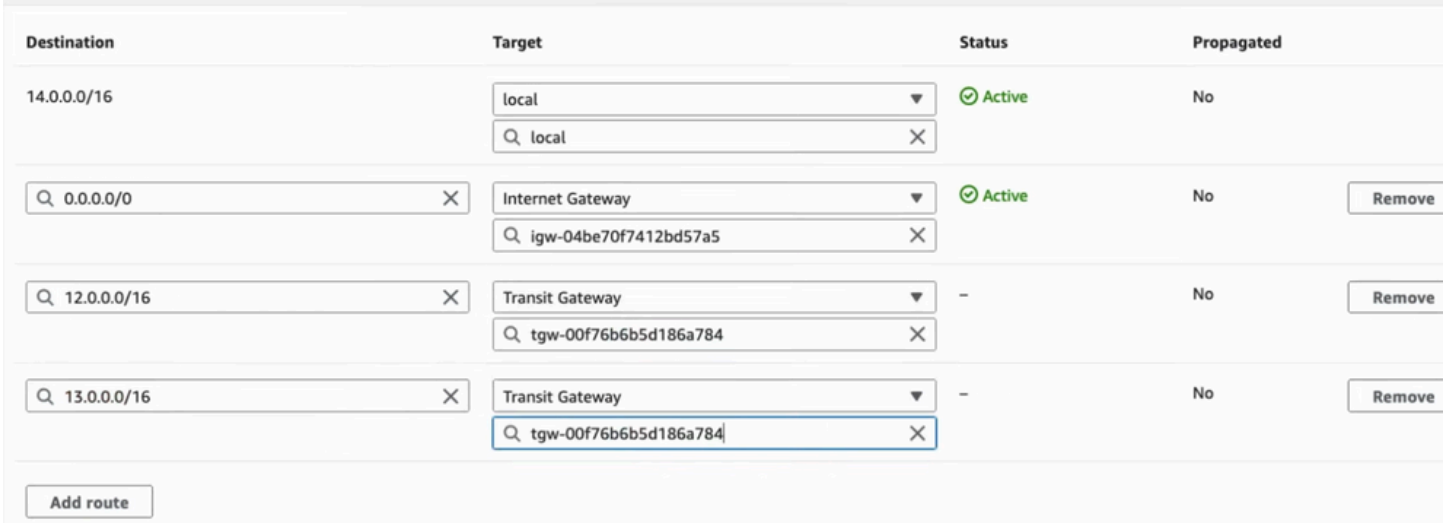


Now let’s work on VPC 2 route table to create a connectivity with VPC 1 and VPC 3.





Now let’s work on VPC 3 route table to create a connectivity with VPC 1 and VPC 2.



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

Routes (4)

Both

Filter routes

Destination	Target	Status	Propagated
0.0.0.0/0	igw-04be70f7412bd57a5	Active	No
12.0.0.0/16	tgw-00f76b6b5d186a784	Active	No
13.0.0.0/16	tgw-00f76b6b5d186a784	Active	No
14.0.0.0/16	local	Active	No

Test VPC peering

In this step, we will SSH into our Ec2 instances and try to curl the pages of our Apache homepages in our Ec2.

Connect to instance Info

Connect to your instance i-0622831ea865ed0e2 (ec2-test-vcp-1) using any of these options

EC2 Instance Connect | Session Manager | SSH client | EC2 serial console

Instance ID

i-0622831ea865ed0e2 (ec2-test-vcp-1)

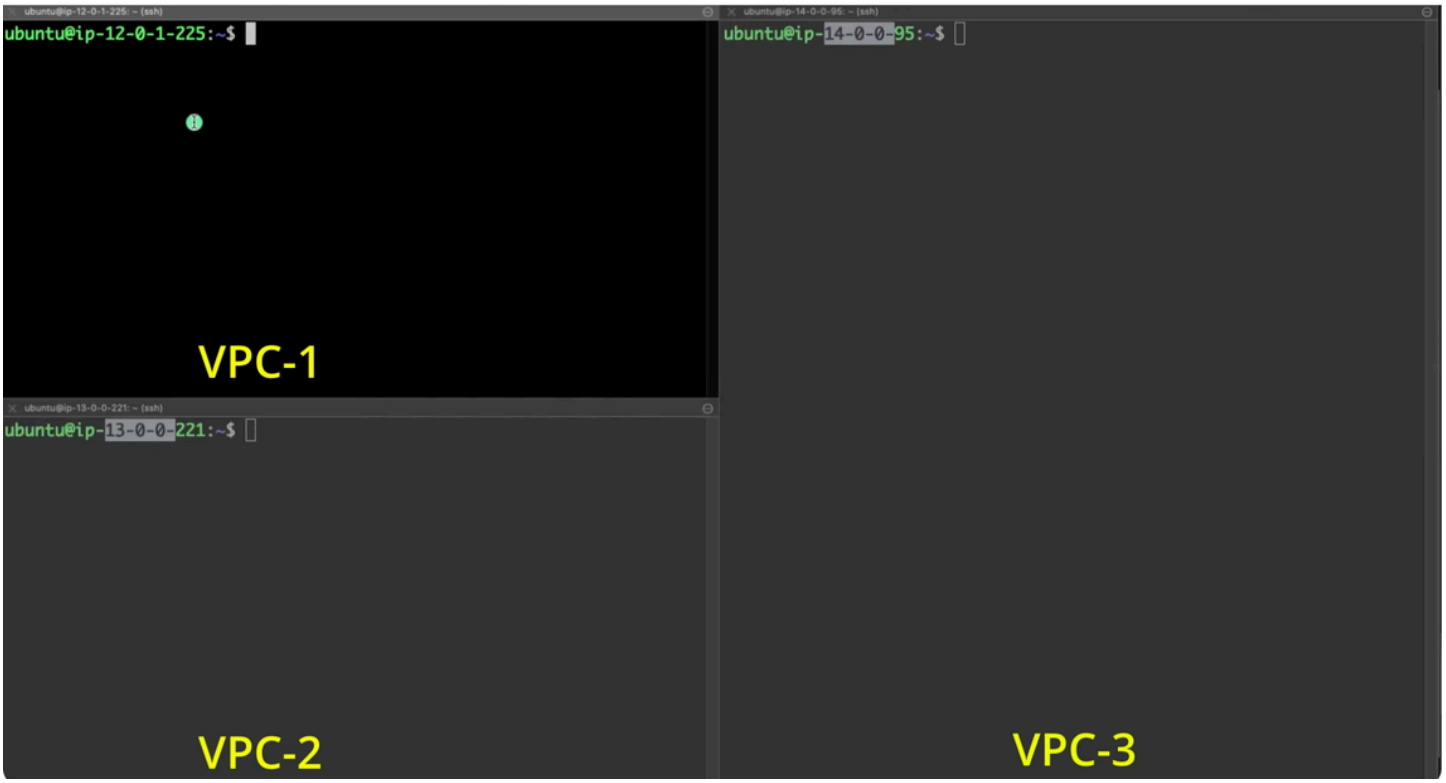
1. Open an SSH client.
2. Locate your private key file. The key used to launch this instance is ec2-test-vpc-1-key.pem
3. Run this command, if necessary, to ensure your key is not publicly viewable.
   chmod 400 ec2-test-vpc-1-key.pem
4. Connect to your instance using its Public IP:
   18.153.95.203

Example:

ssh -i "ec2-test-vpc-1-key.pem" ubuntu@18.153.95.203

Note: In most cases, the guessed user name is correct. However, read your AMI usage instructions to check if the AMI owner has changed the default AMI user name.

Note the IP addresses shown below. These are IPs of VPC 1, VPC 2 and VPC 3.



Below shows we are able to access the Apache page in the different instances deployed on separate VPCs using a curl command. From VPC 1, we were able to access Apaches page in VPC 2 and VPC 3 and vice versa. This shows all three VPCs have been successfully peered together using a transit gateway/transit gateway attachment and they are able to communicate with one another!!! 🙂