FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING

Department of Computer Engineering

Course, Subject & Experiment Details

Practical No:	
Title:	To study and Implement Infrastructure as a Service using AWS/Microsoft Azure
Name of the Student:	Warren Fernandes
Roll No:	8940
Date of Performance:	28/03/2022
Date of Submission:	28/03/2022

Evaluation:

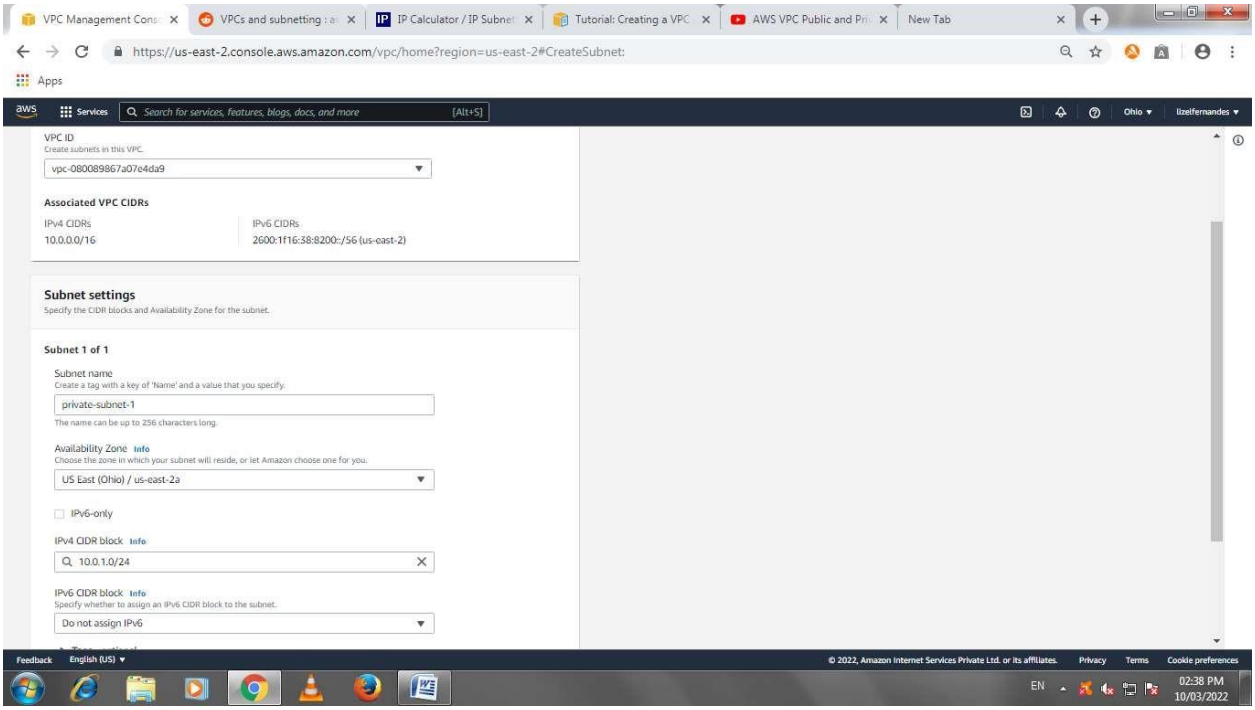
Sr. No.	Rubric	Grade
1	On time submission/completion (2)	
2	Preparedness (2)	
3	Skill (4)	
4	Output (2)	

Signature of the Teacher

AWS VPC Configuration

Steps to create a VPC

- Create VPC and public and private subnets
- Create Internet Gateway and attach to VPC
- Create public and private routing tables
- Set public routing table for IG
- Add subnet association (public subnet) in public routing table
- Create NAT Gateway in public subnet
- Set private routing table for NAT
- Add subnet association (private subnet) in private routing table Create EC2 instances for public and private subnets


VPC Management Cons
VPCs and subnetting : a
IP Calculator / IP Subnet
Tutorial: Creating a VPC
AWS VPC Public and Pri
New Tab
https://us-east-2.console.aws.amazon.com/vpc/home?region=us-east-2#CreateSubnet:
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Ohio
lizelfernandes
VPC ID
Create subnets in this VPC.
vpc-080089867a07e4da9
Associated VPC CIDRs
IPv4 CIDRs
10.0.0.0/16
IPv6 CIDRs
2600:1f16:38:8200::/56 (us-east-2)
Subnet settings
Specify the CIDR blocks and Availability Zone for the subnet.
Subnet 1 of 1
Subnet name
Create a tag with a key of 'Name' and a value that you specify.
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 East (Ohio) / us-east-2a
IPv6-only
IPv4 CIDR block Info
10.0.1.0/24
IPv6 CIDR block Info
Specify whether to assign an IPv6 CIDR block to the subnet.
Do not assign IPv6
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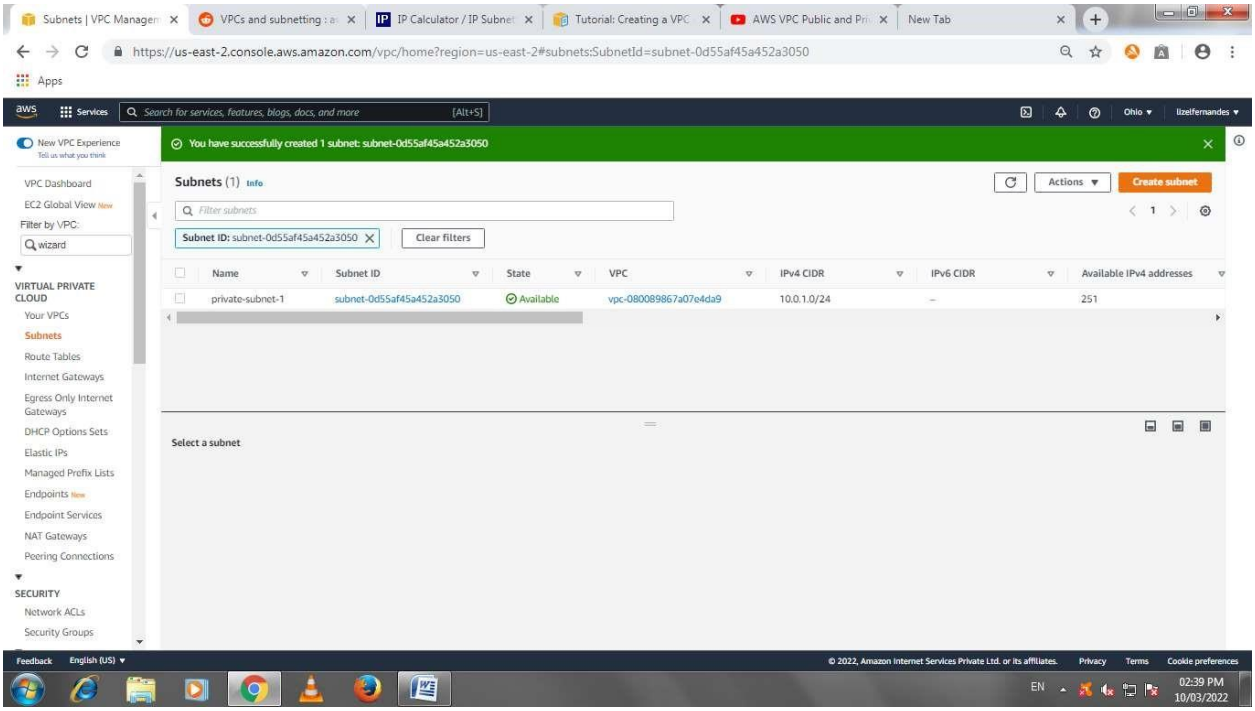
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New Tab
https://us-east-2.console.aws.amazon.com/vpc/home?region=us-east-2#subnets:SubnetId=subnet-0d55af45a452a3050
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New VPC Experience
Tell us what you think
You have successfully created 1 subnet: subnet-0d55af45a452a3050
VPC Dashboard
EC2 Global View New
Filter by VPC:
wizard
VIRTUAL PRIVATE CLOUD
Your VPCs
Subnets
Route Tables
Internet Gateways
Egress Only Internet Gateways
DHCP Options Sets
Elastic IPs
Managed Prefix Lists
Endpoints New
Endpoint Services
NAT Gateways
Peering Connections
SECURITY
Network ACLs
Security Groups
Subnets (1) Info
Actions
Create subnet
Filter subnets
Subnet ID: subnet-0d55af45a452a3050
Clear filters
Name
Subnet ID
State
VPC
IPv4 CIDR
IPv6 CIDR
Available IPv4 addresses
private-subnet-1
subnet-0d55af45a452a3050
Available
vpc-080089867a07e4da9
10.0.1.0/24
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Select a subnet
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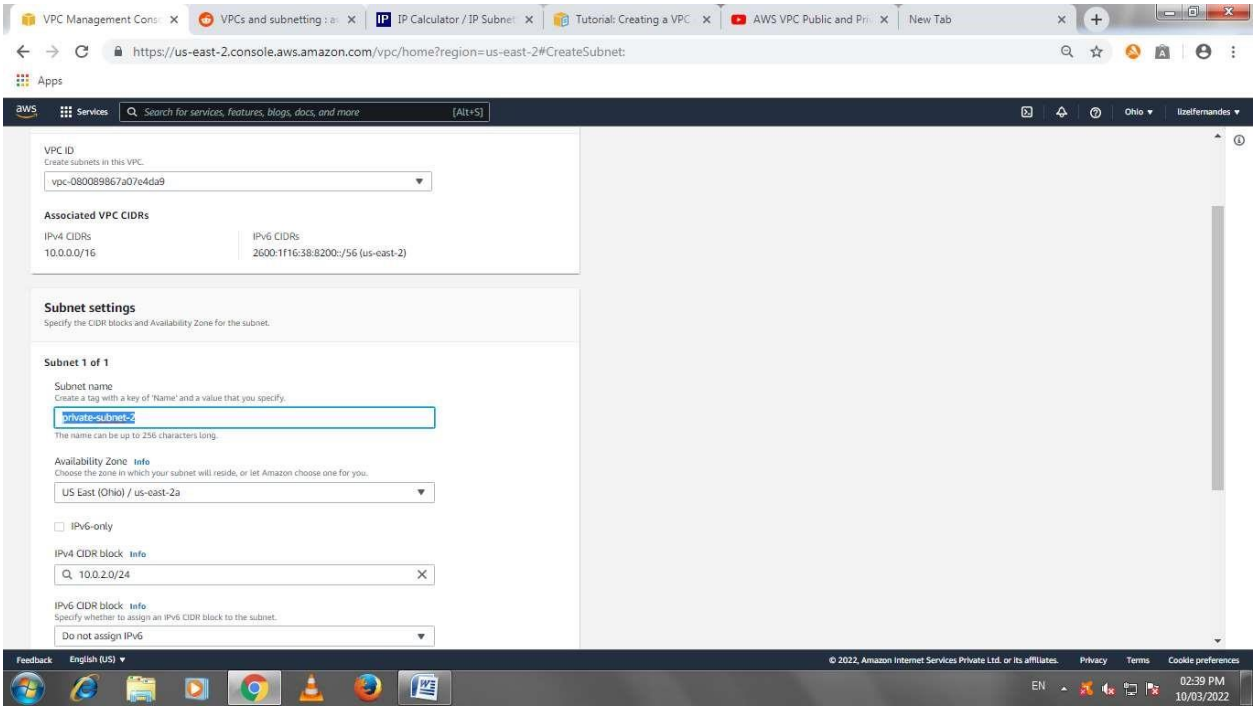
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Subnet settings
Specify the CIDR blocks and Availability Zone for the subnet.
Subnet 1 of 1
Subnet name
Create a tag with a key of 'Name' and a value that you specify.
private-subnet-2
The name can be up to 256 characters long.
Availability Zone Info
Choose the zone in which your subnet will reside, or let Amazon choose one for you.
US East (Ohio) / us-east-2a
IPv6-only
IPv4 CIDR block Info
10.0.2.0/24
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Specify whether to assign an IPv6 CIDR block to the subnet.
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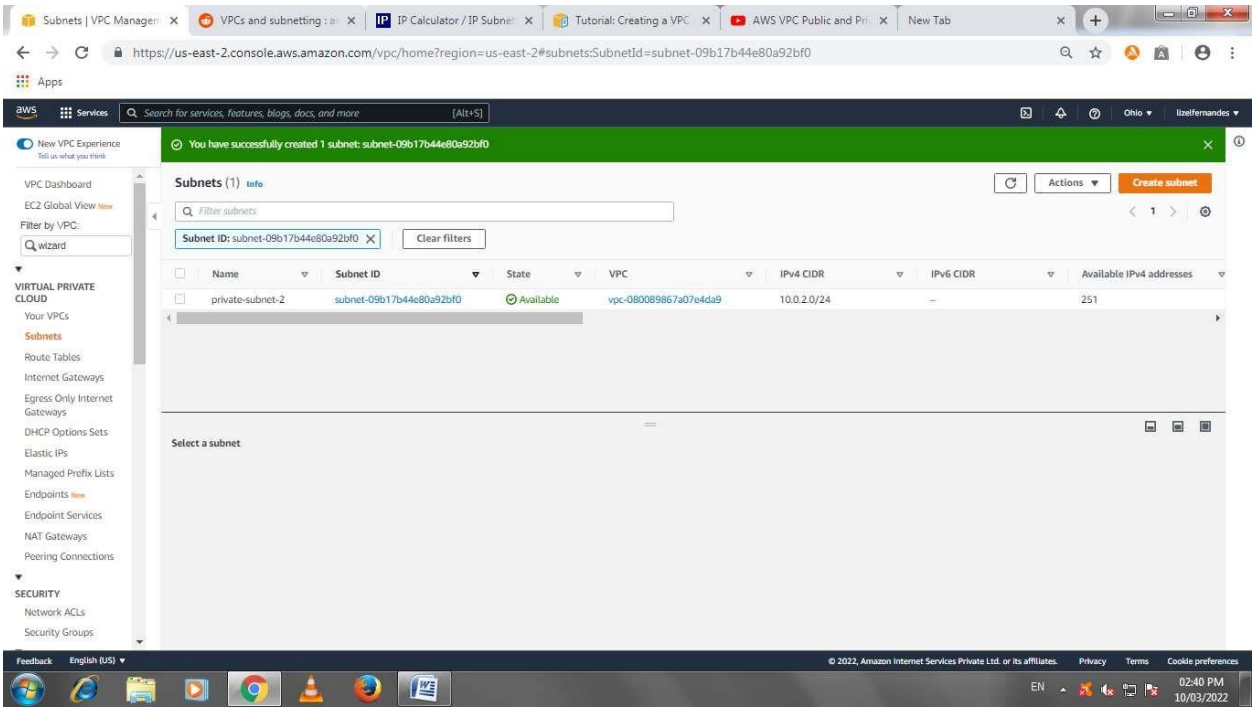
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Subnets (1) Info
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Actions
Create subnet
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Clear filters
Name
Subnet ID
State
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subnet-09b17b44e80a92bf0
Available
vpc-080089867a07e4da9
10.0.2.0/24
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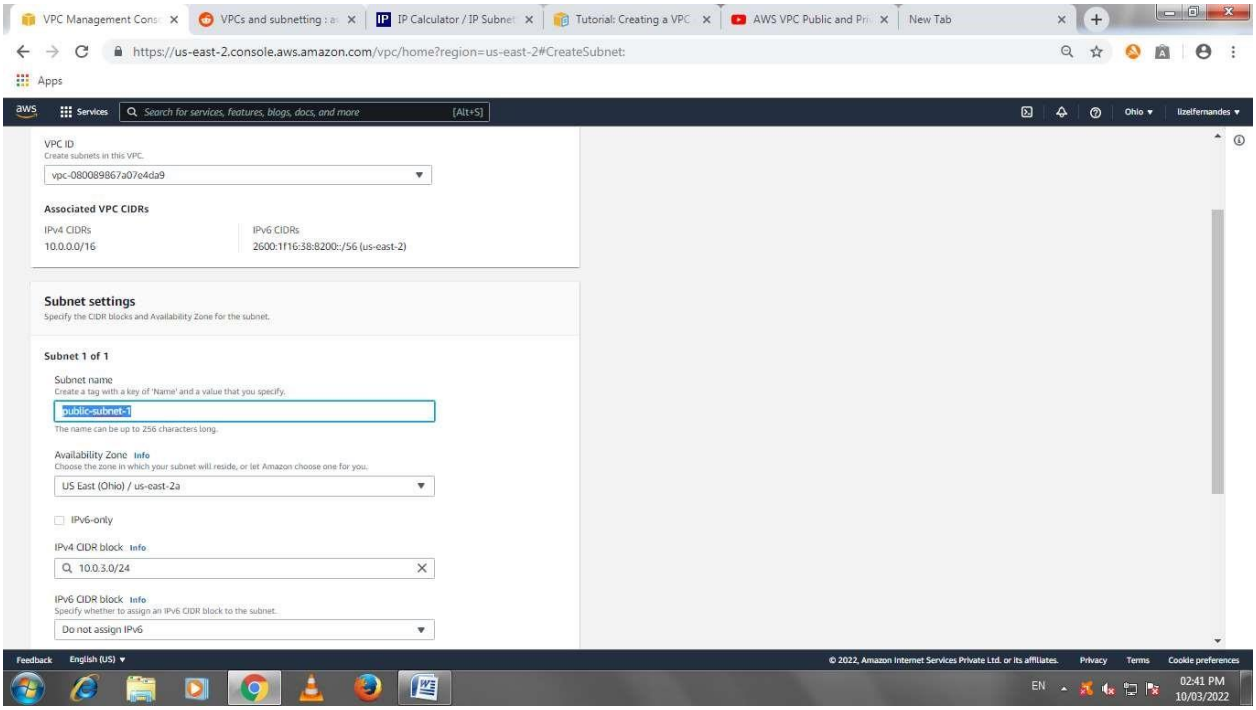
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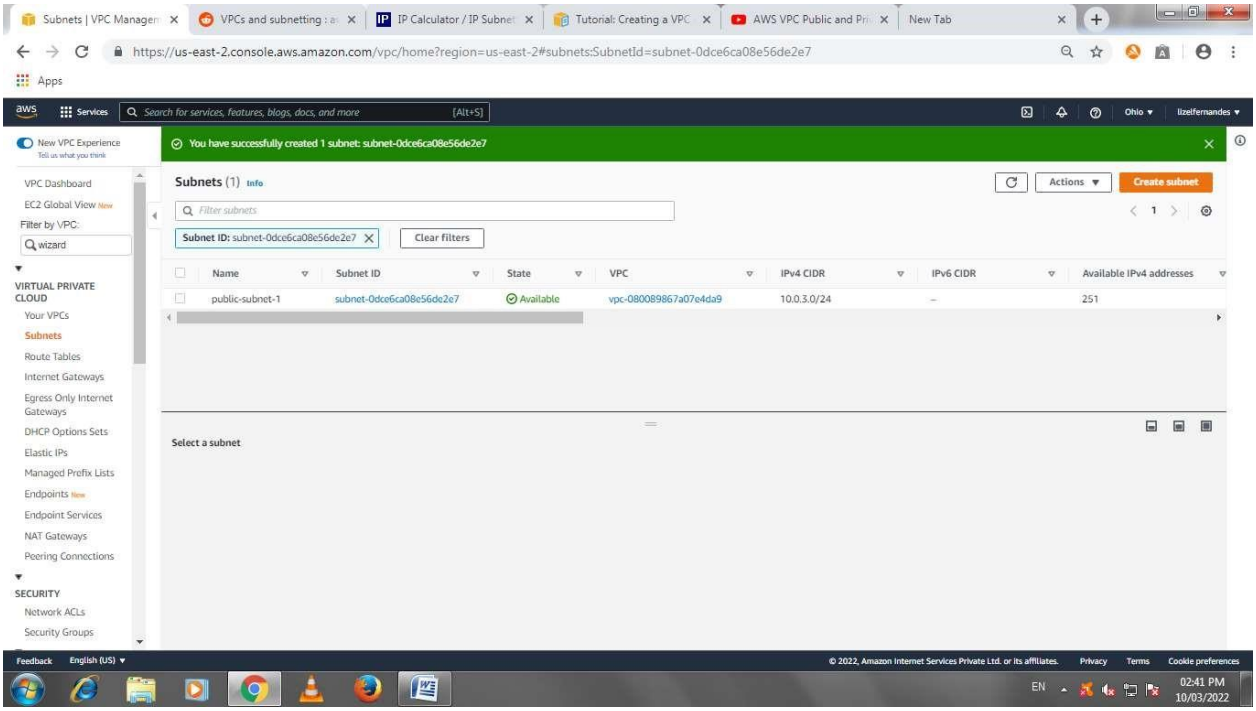
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https://us-east-2.console.aws.amazon.com/vpc/home?region=us-east-2#subnets:SubnetId=subnet-0dce6ca08e56de2e7
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Clear filters
Name
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State
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IPv6 CIDR
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subnet-0dce6ca08e56de2e7
Available
vpc-080089867a07e4da9
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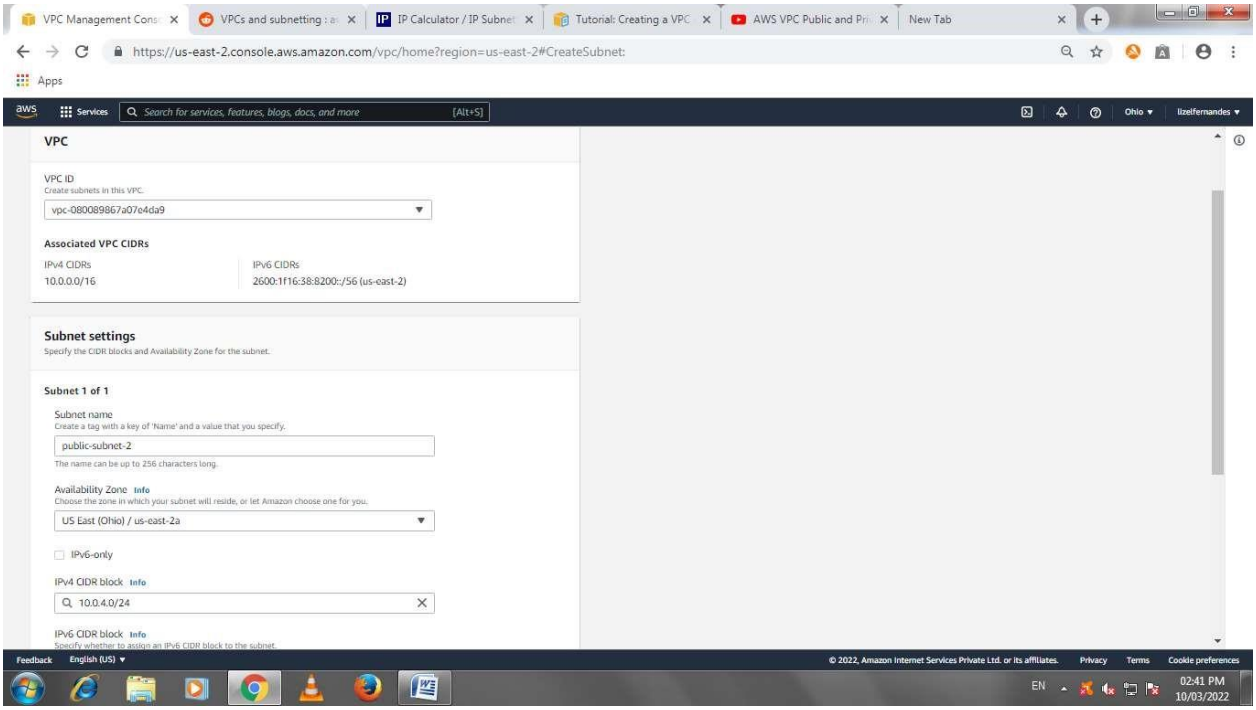
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IPv4 CIDRs
10.0.0.0/16
IPv6 CIDRs
2600:1f16:38:8200::/56 (us-east-2)
Subnet settings
Specify the CIDR blocks and Availability Zone for the subnet.
Subnet 1 of 1
Subnet name
Create a tag with a key of 'Name' and a value that you specify.
public-subnet-2
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 East (Ohio) / us-east-2a
IPv6-only
IPv4 CIDR block Info
10.0.4.0/24
IPv6 CIDR block Info
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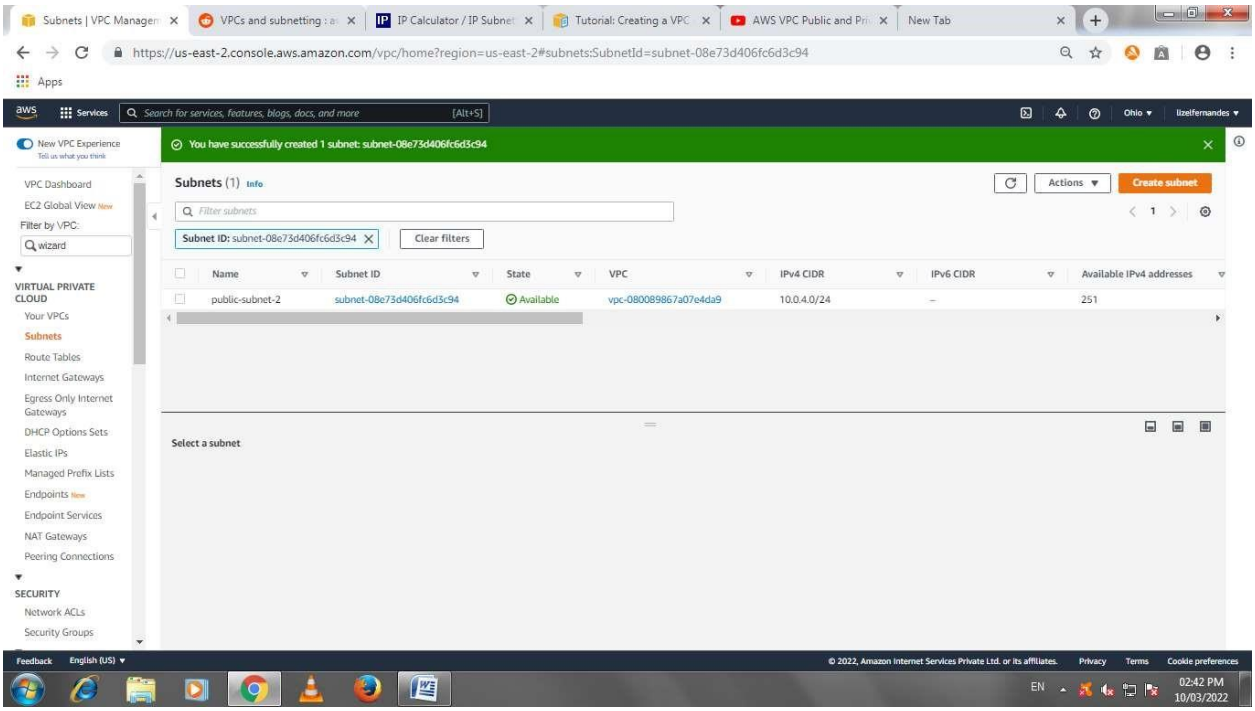
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Clear filters
Name
Subnet ID
State
VPC
IPv4 CIDR
IPv6 CIDR
Available IPv4 addresses
public-subnet-2
subnet-08e73d406fc6d3c94
Available
vpc-080089867a07e4da9
10.0.4.0/24
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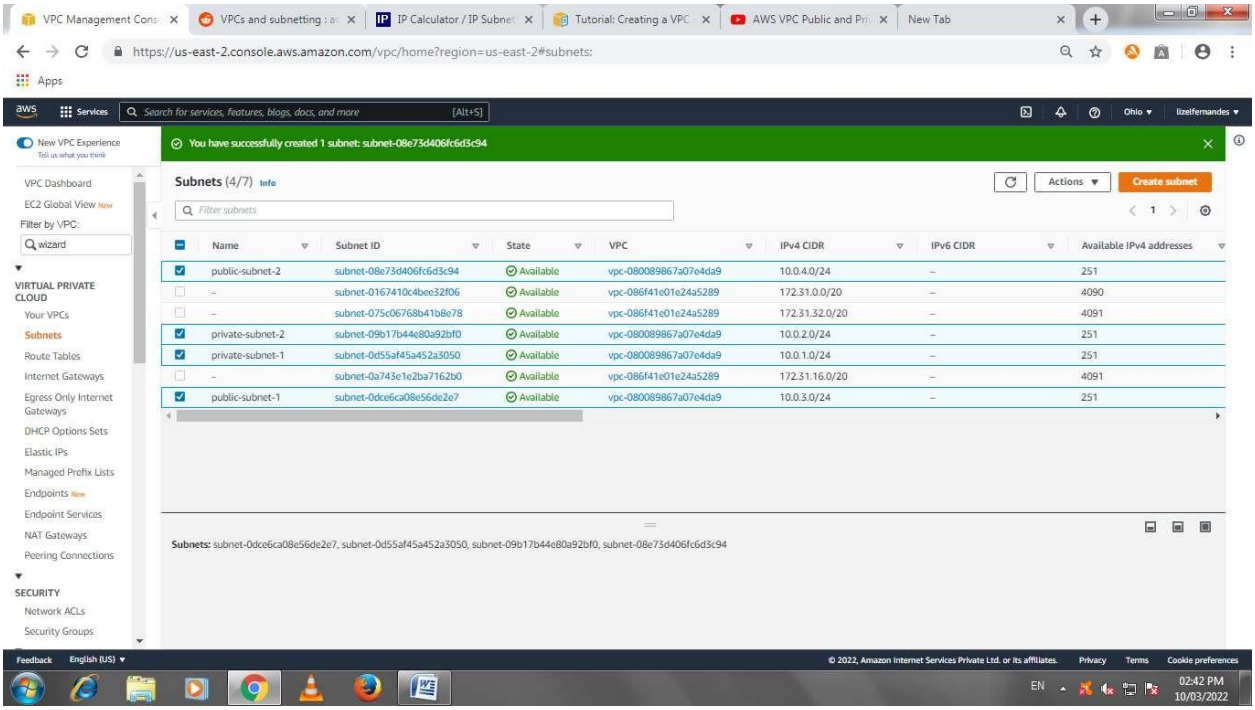
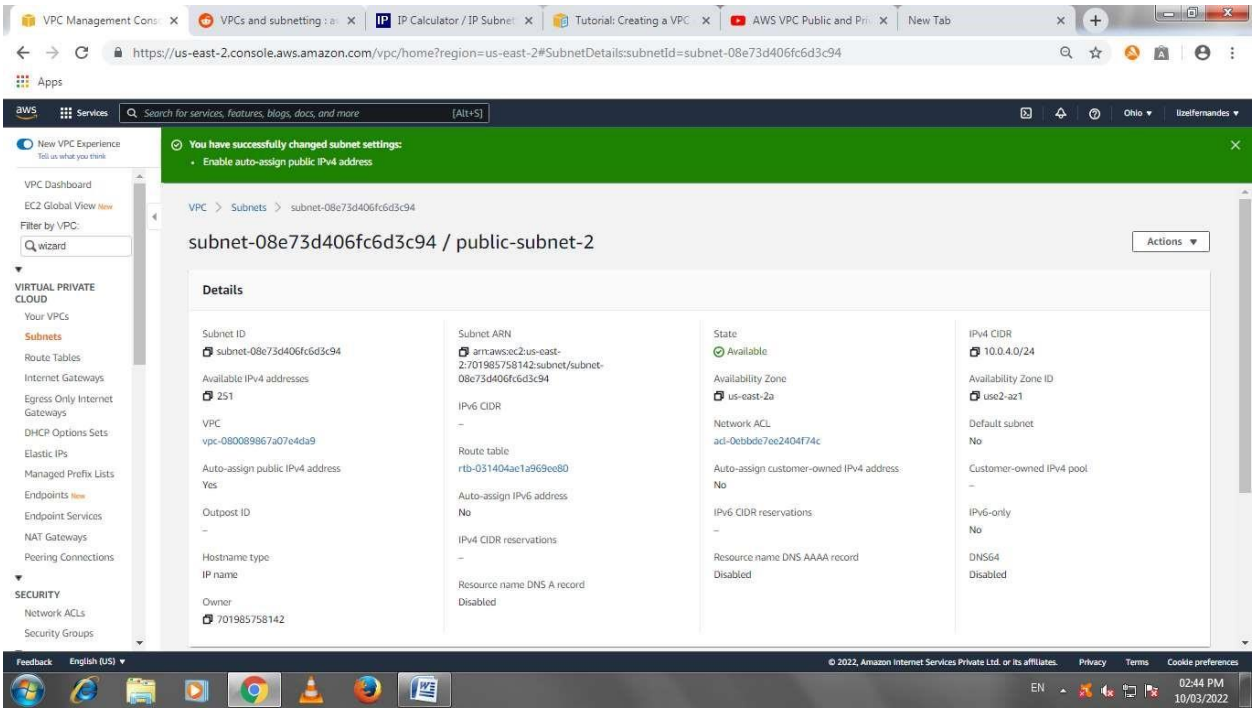
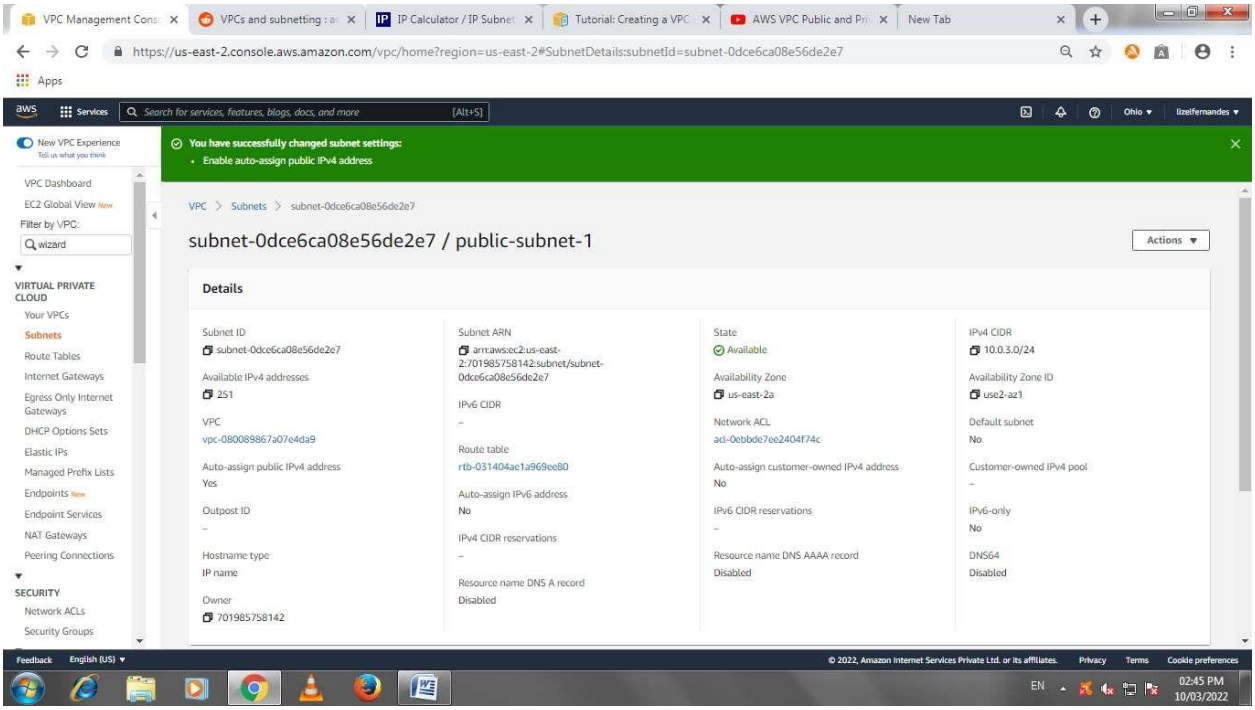


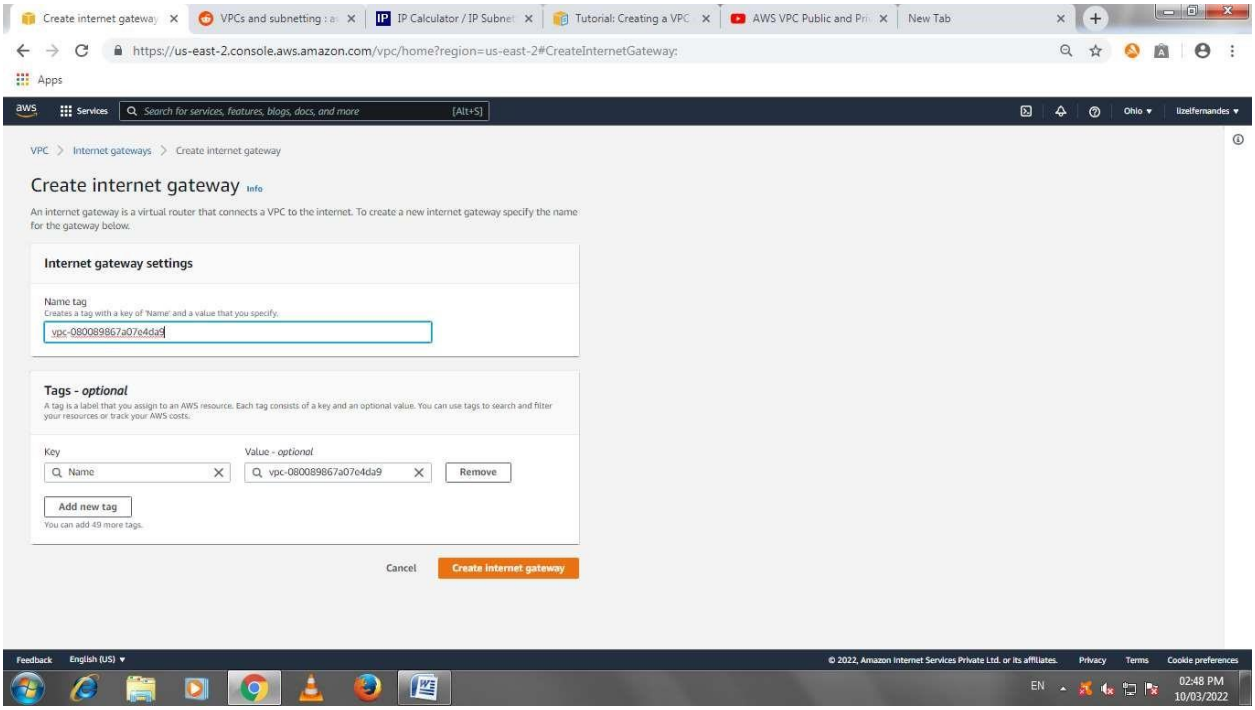
Auto assign enable for public subnet 2

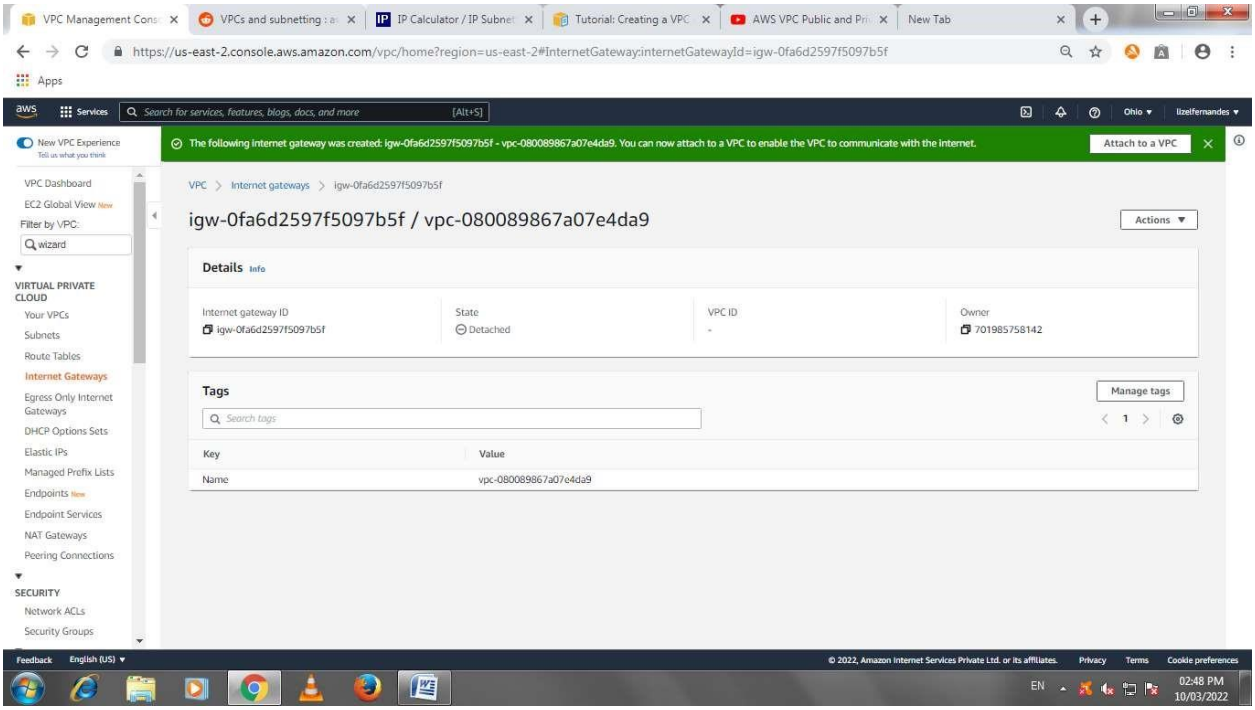


Auto assign enable for public subnet 1

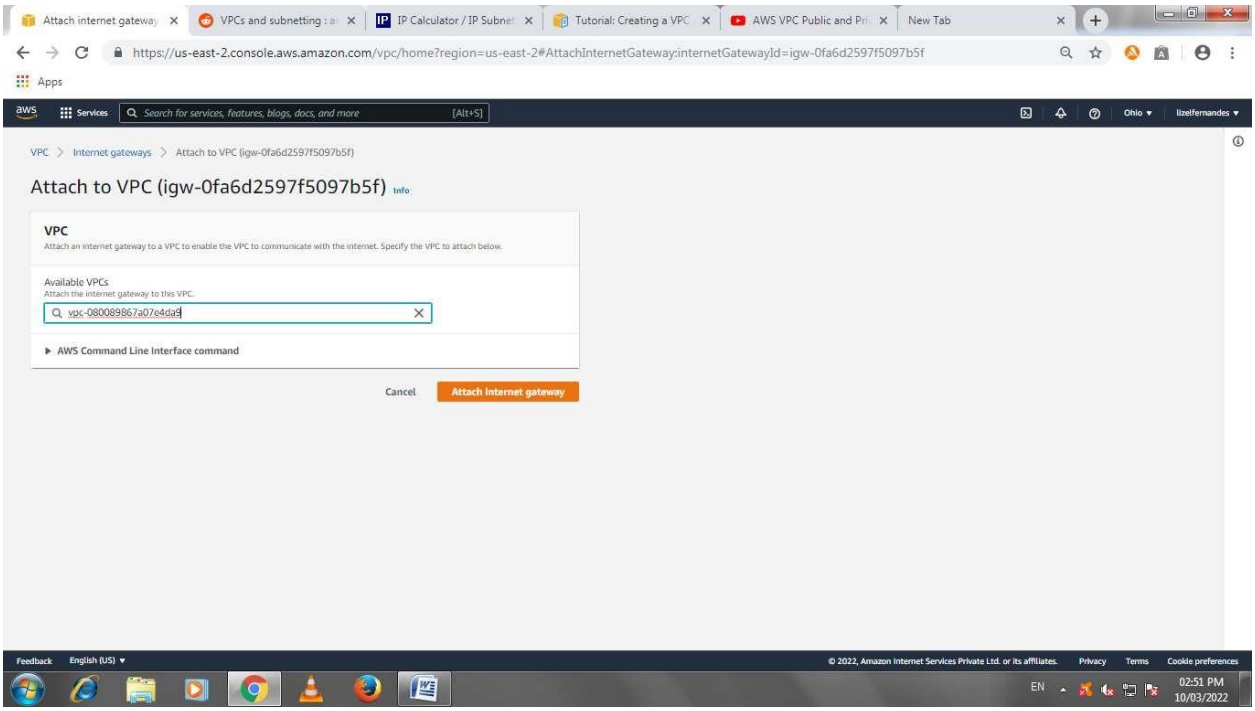


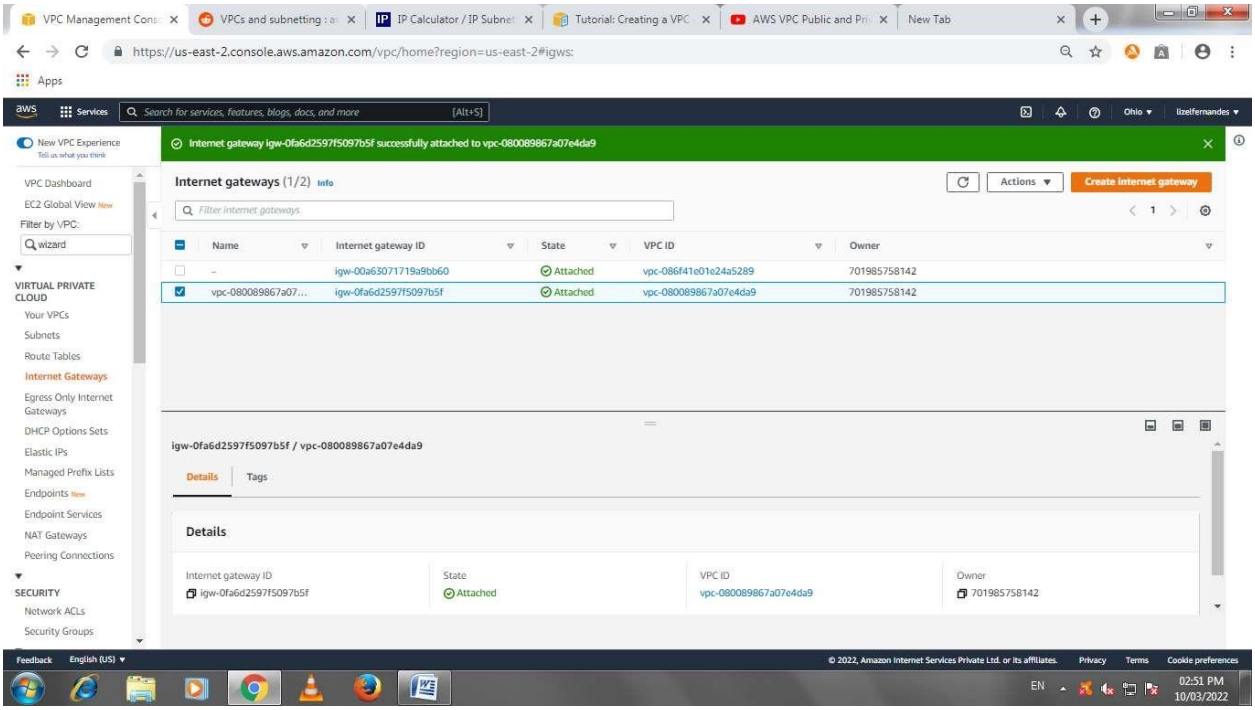
Internet gateway



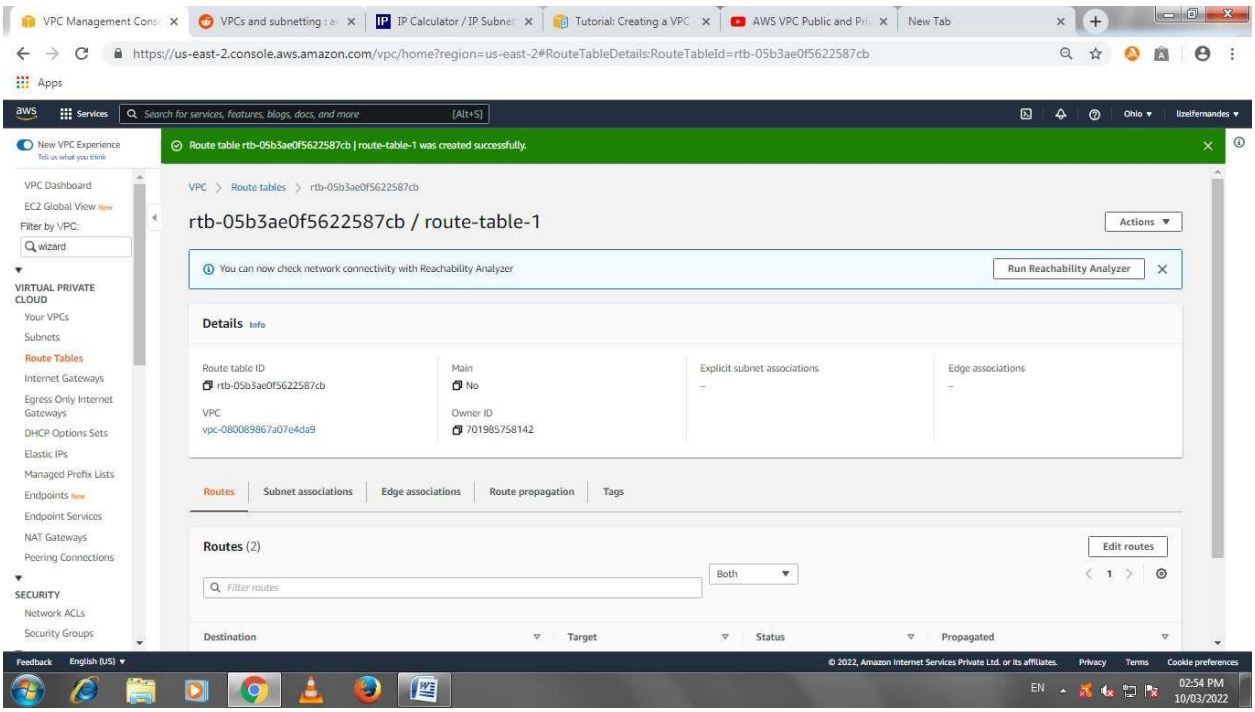


Internet gateway attached to vpc

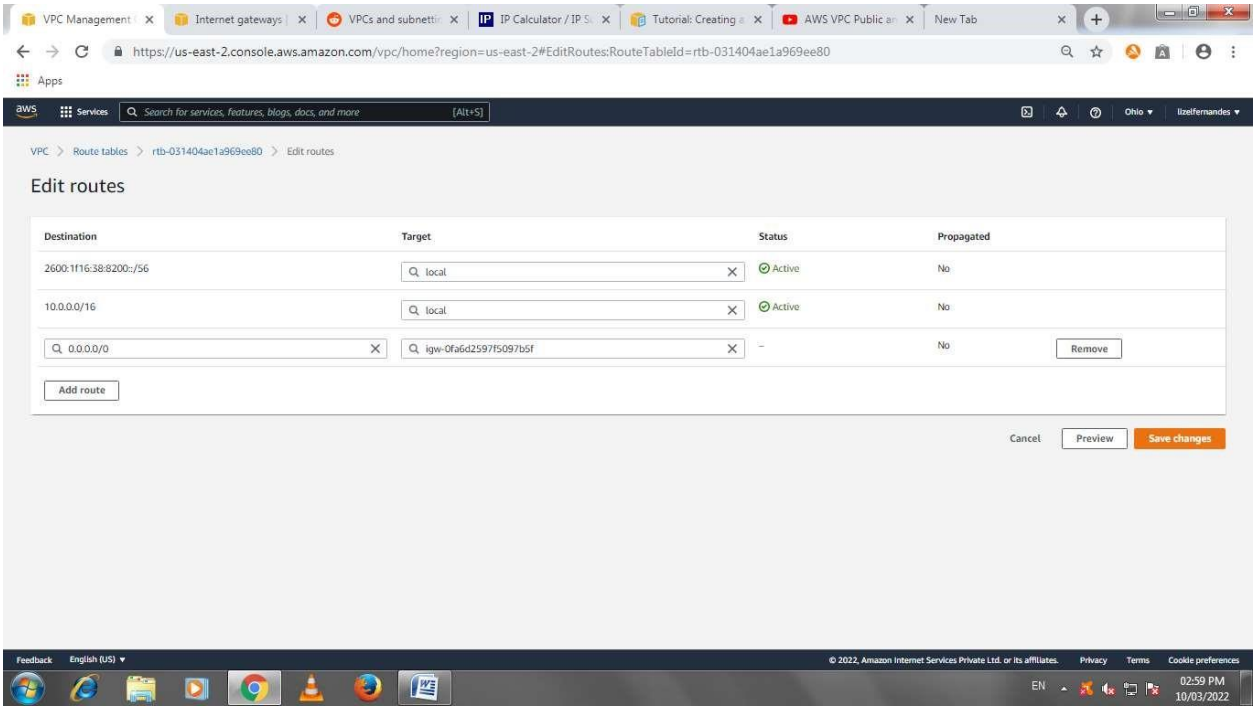


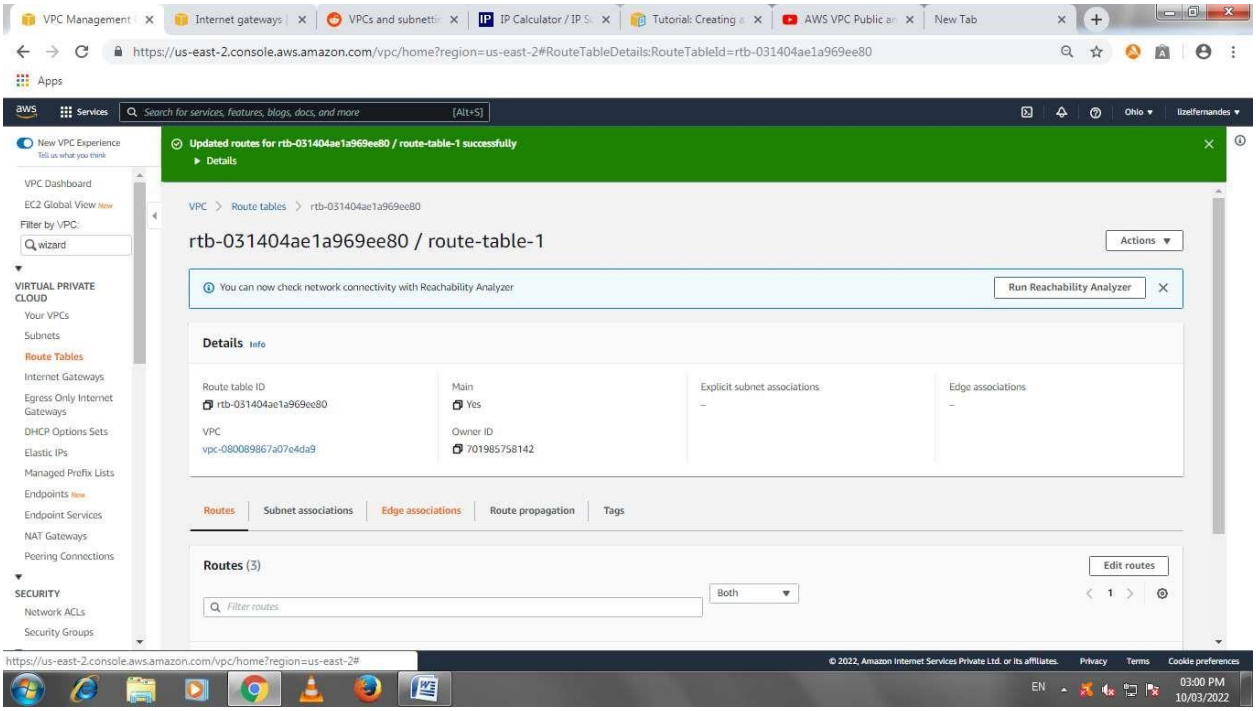


Route table creation

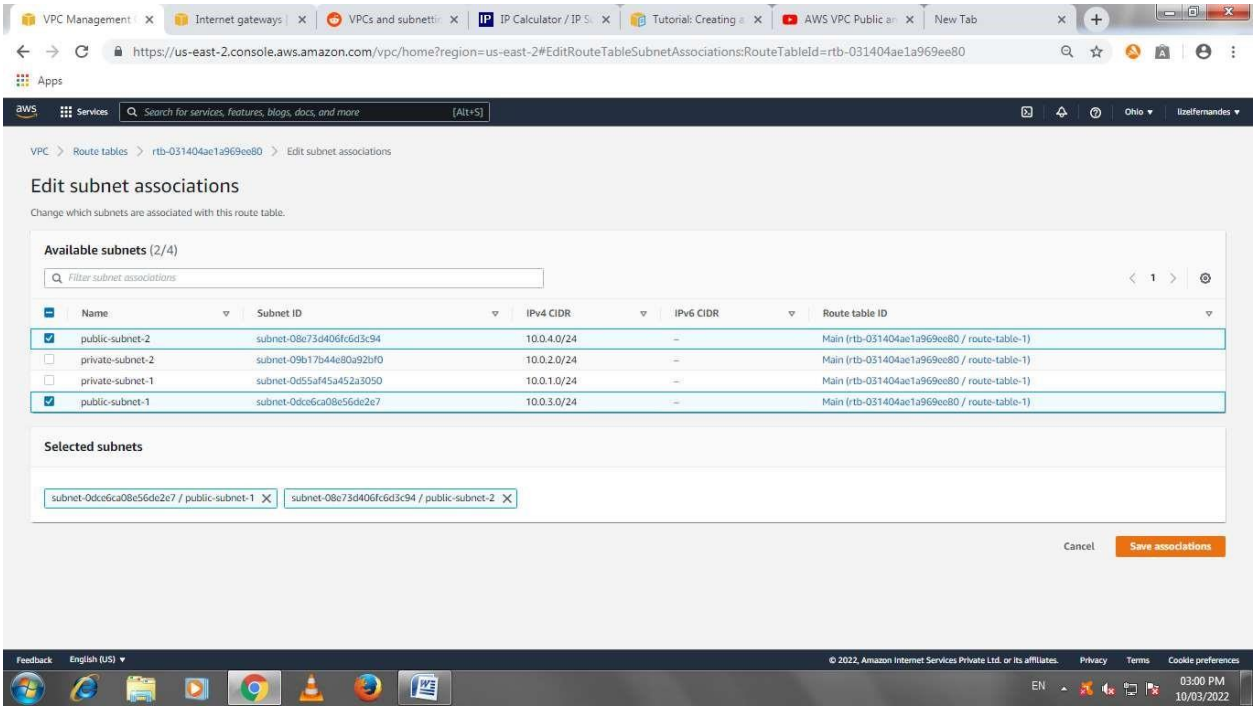


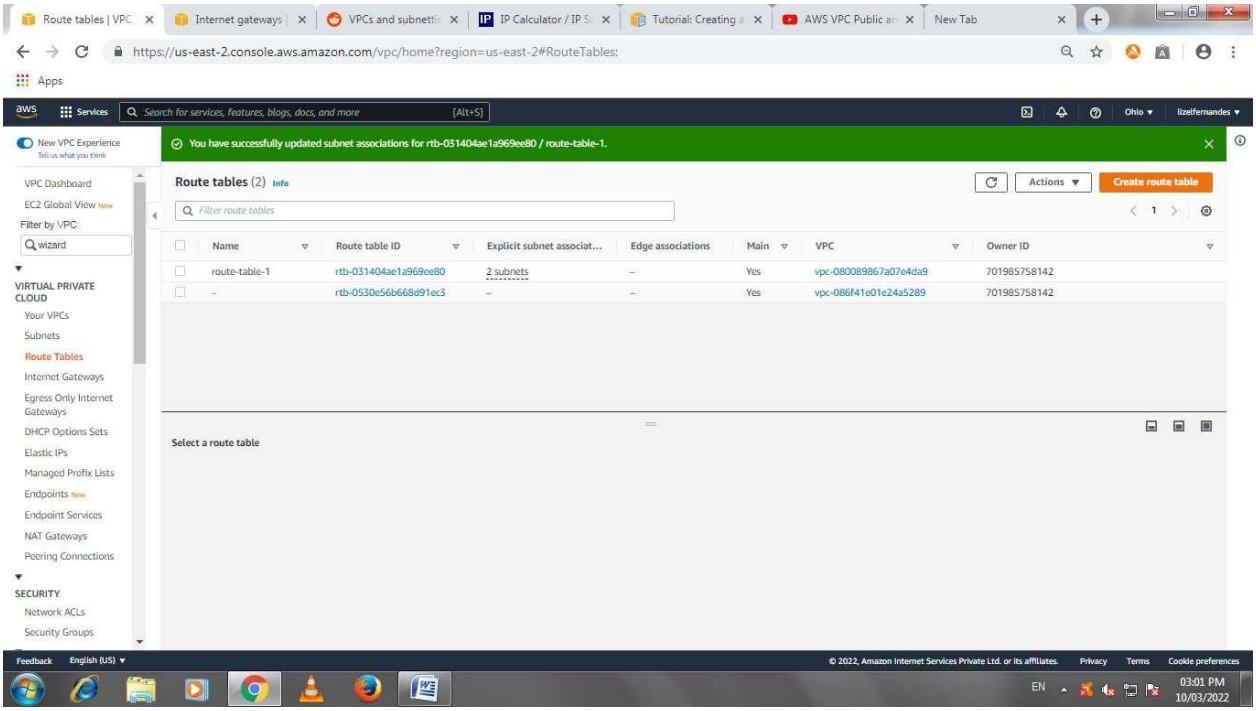
Adding internet gateway



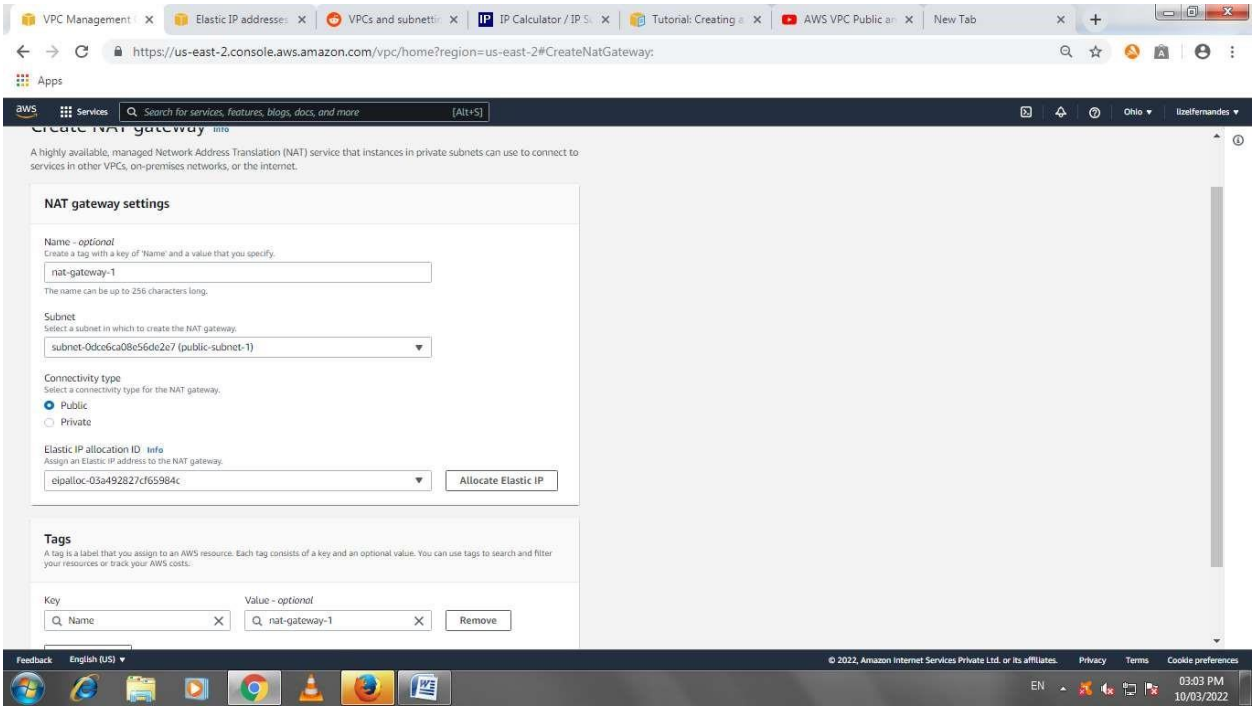


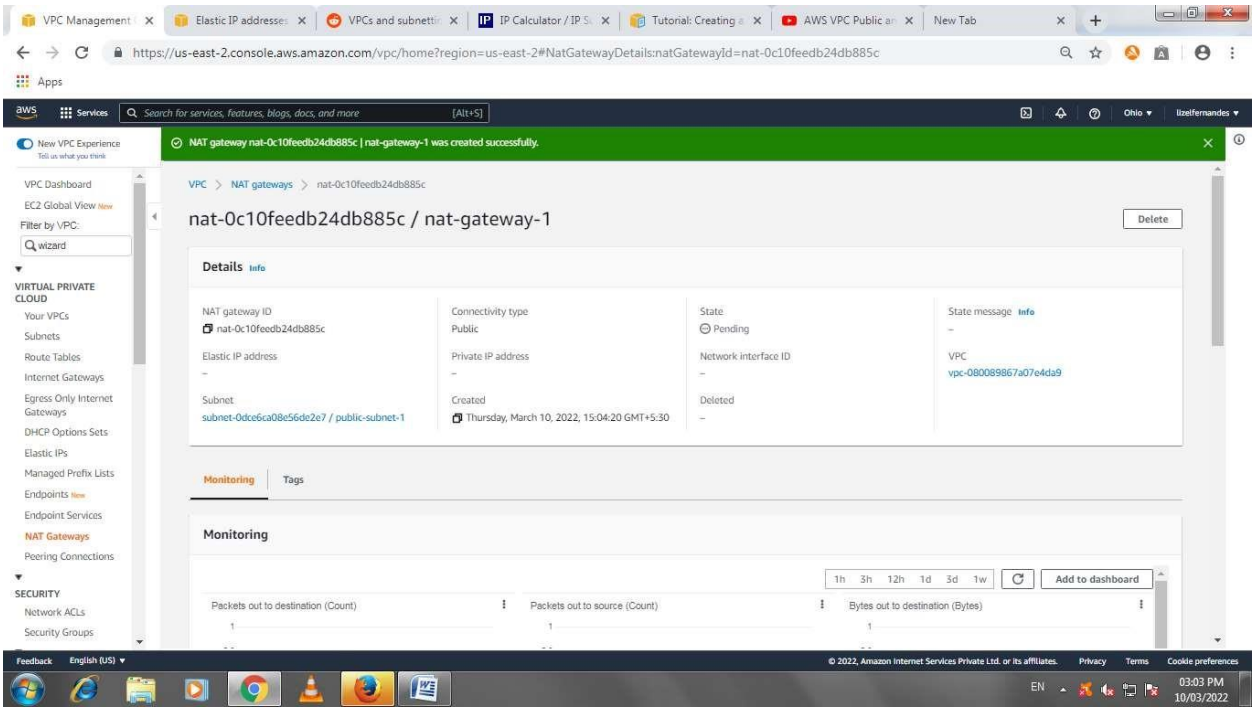
Adding public subnets to the route table



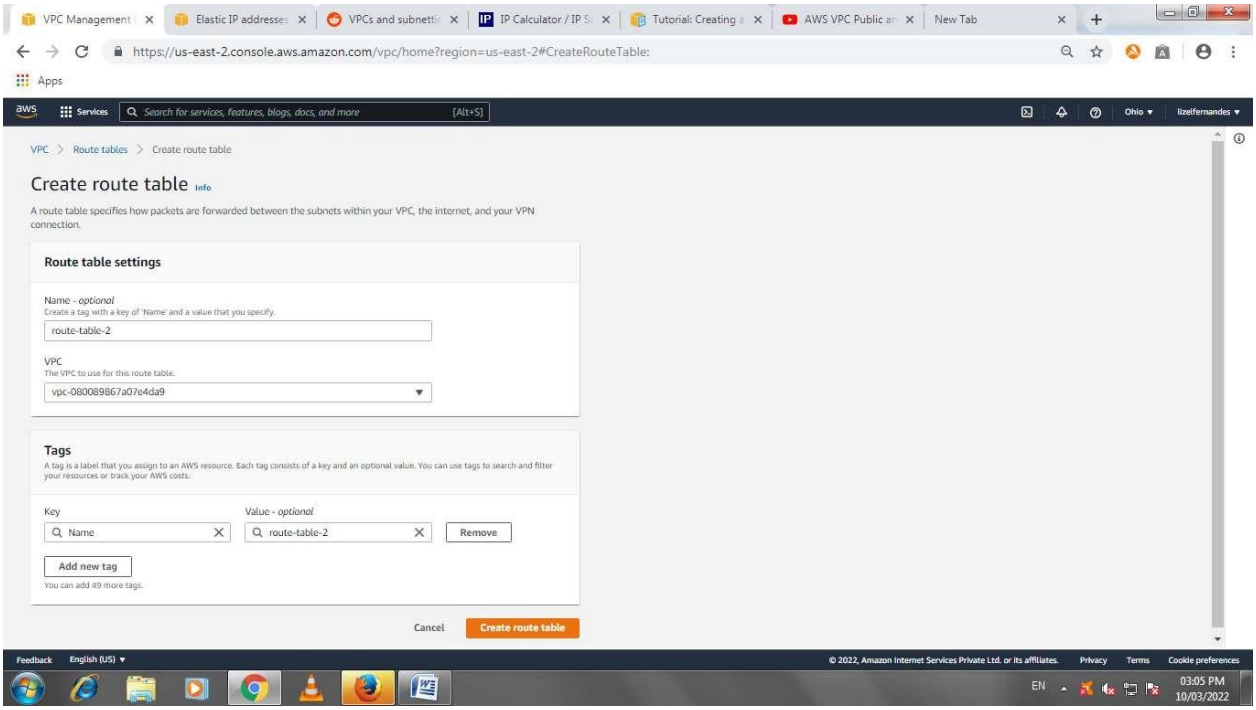


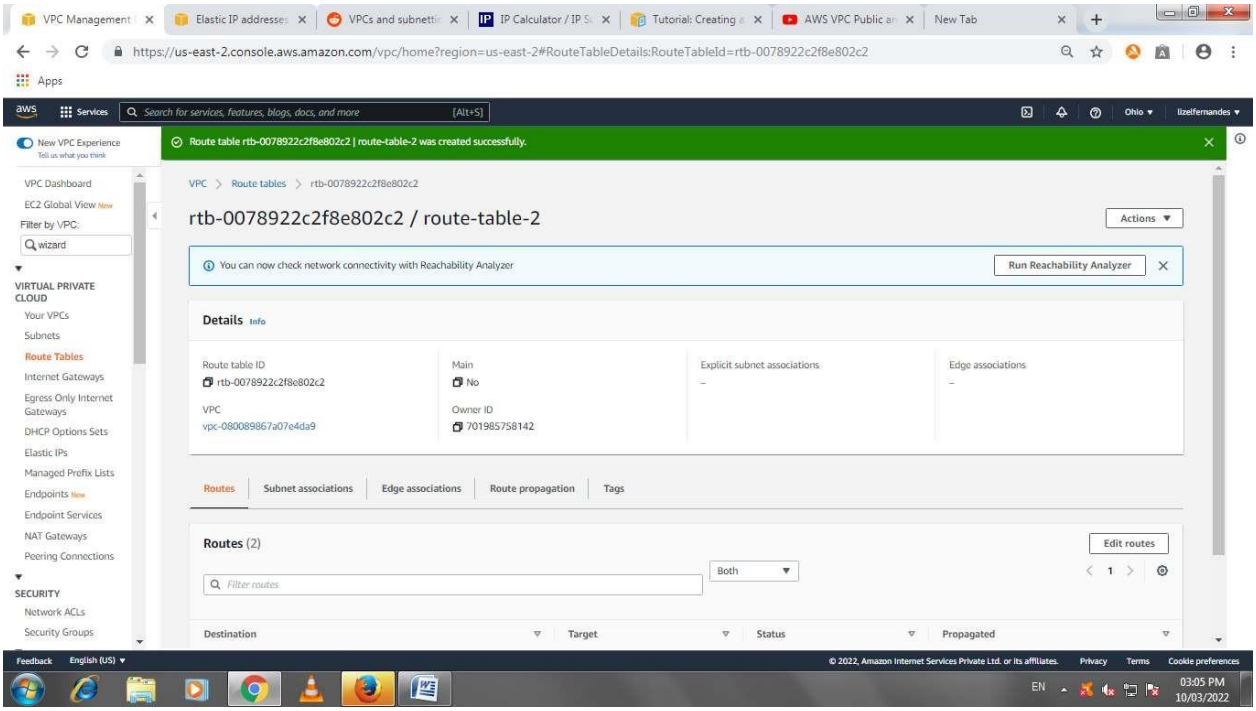
Nat gateway creation



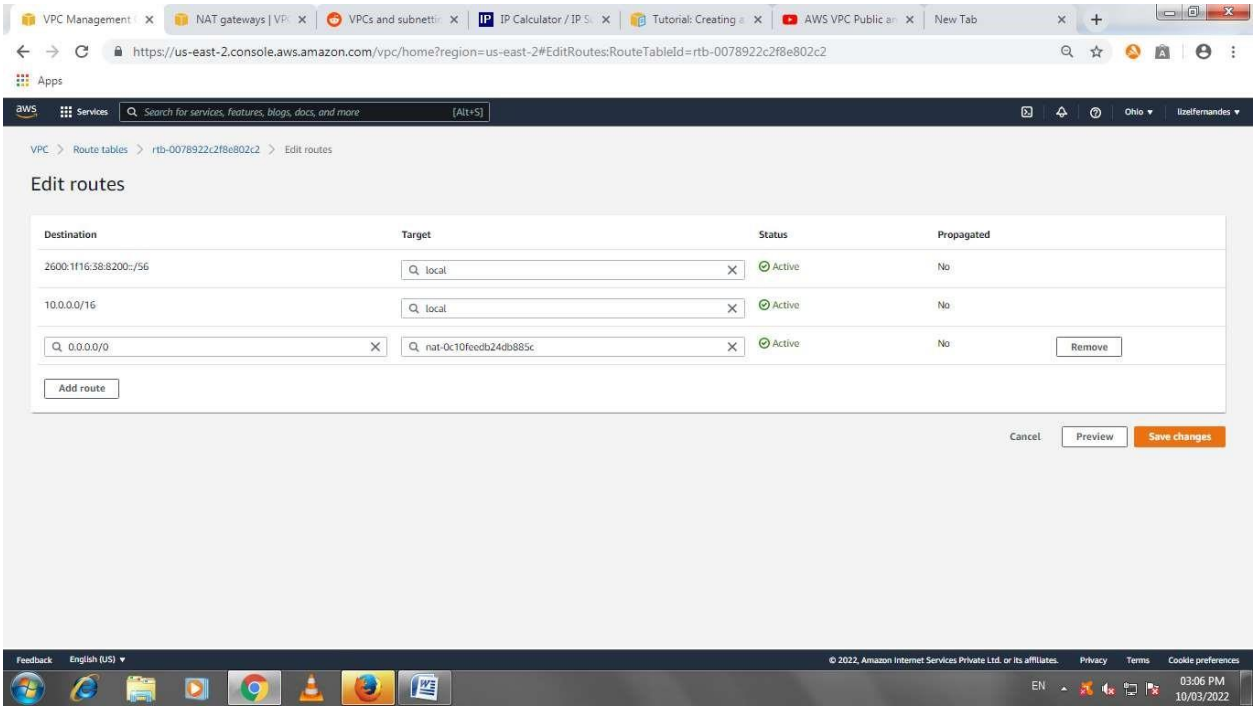


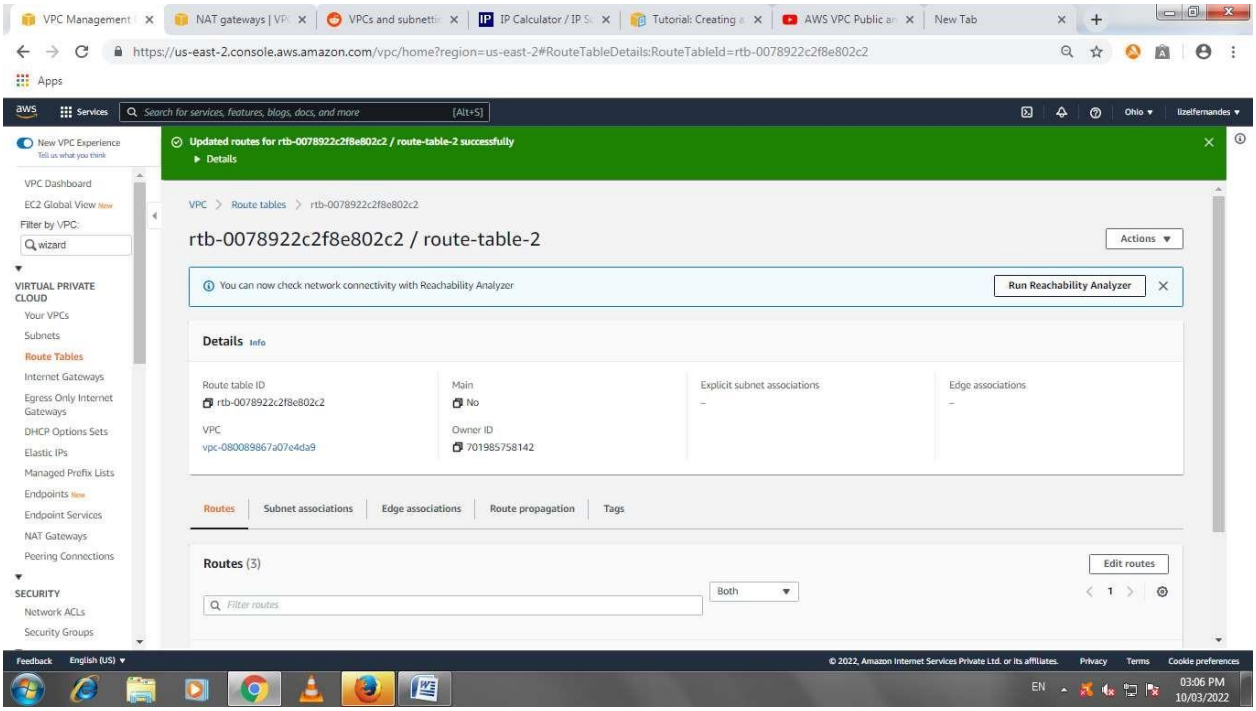
Route table 2 creation



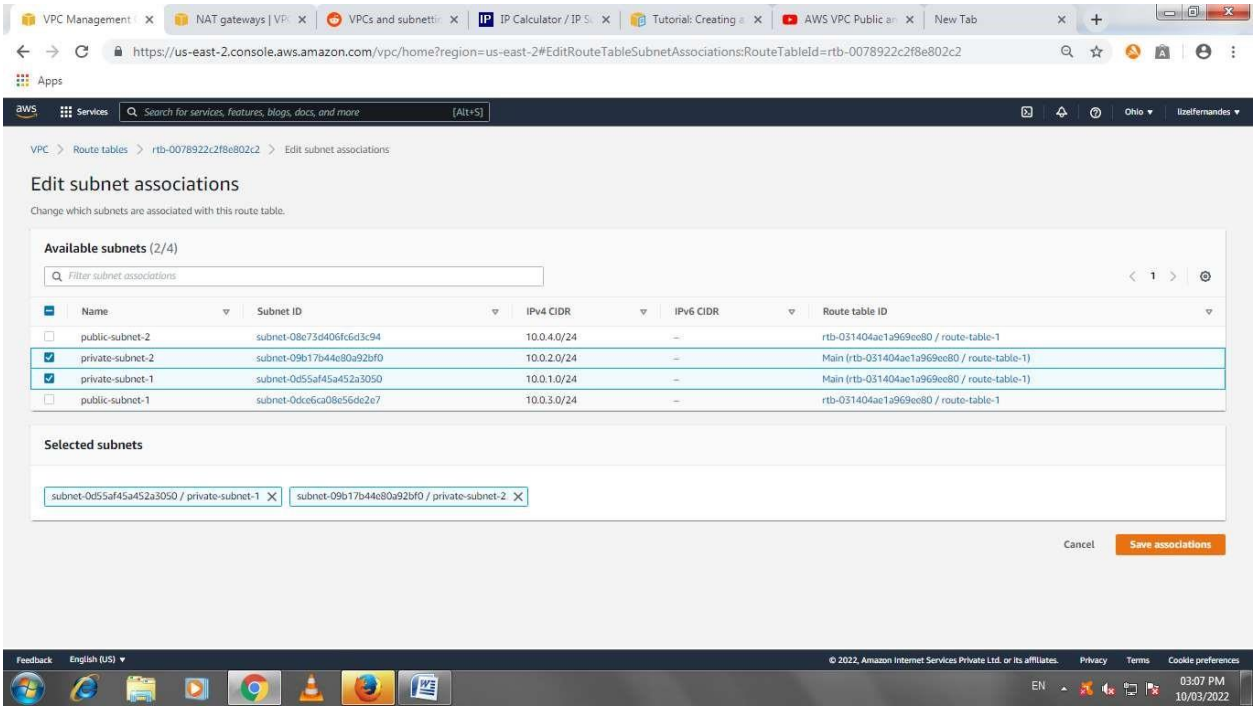


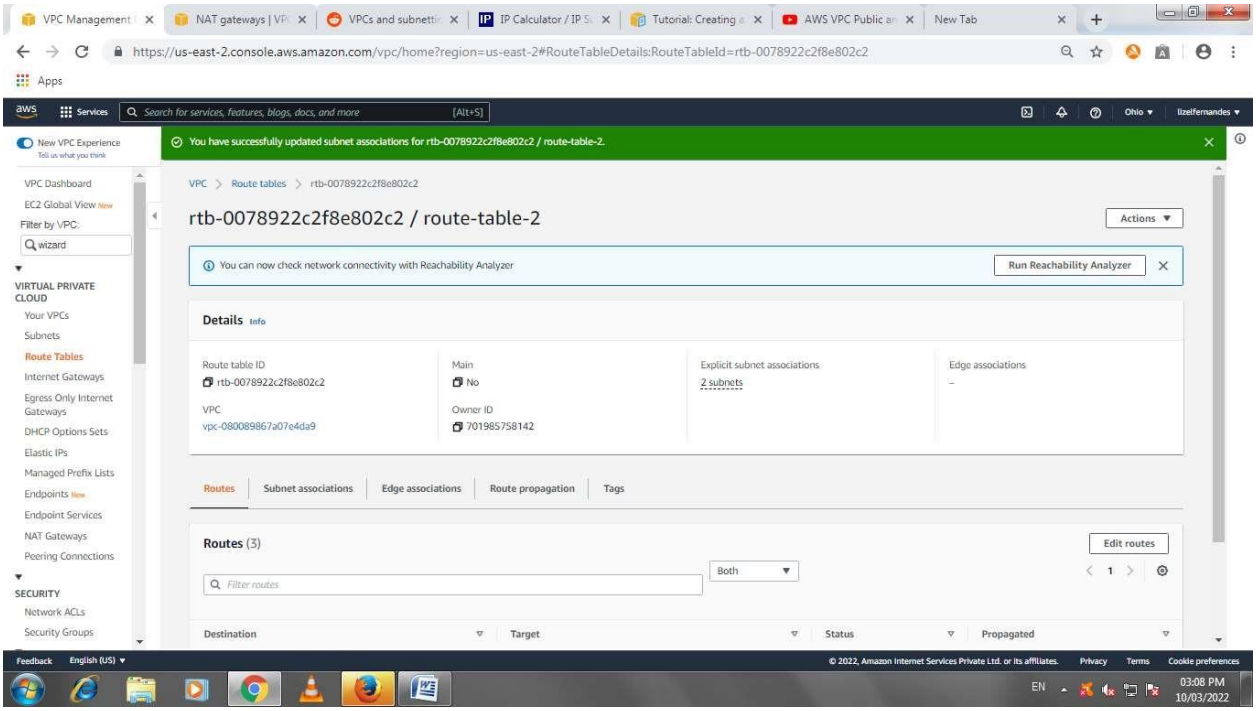
Adding nat gateway for the private subenests



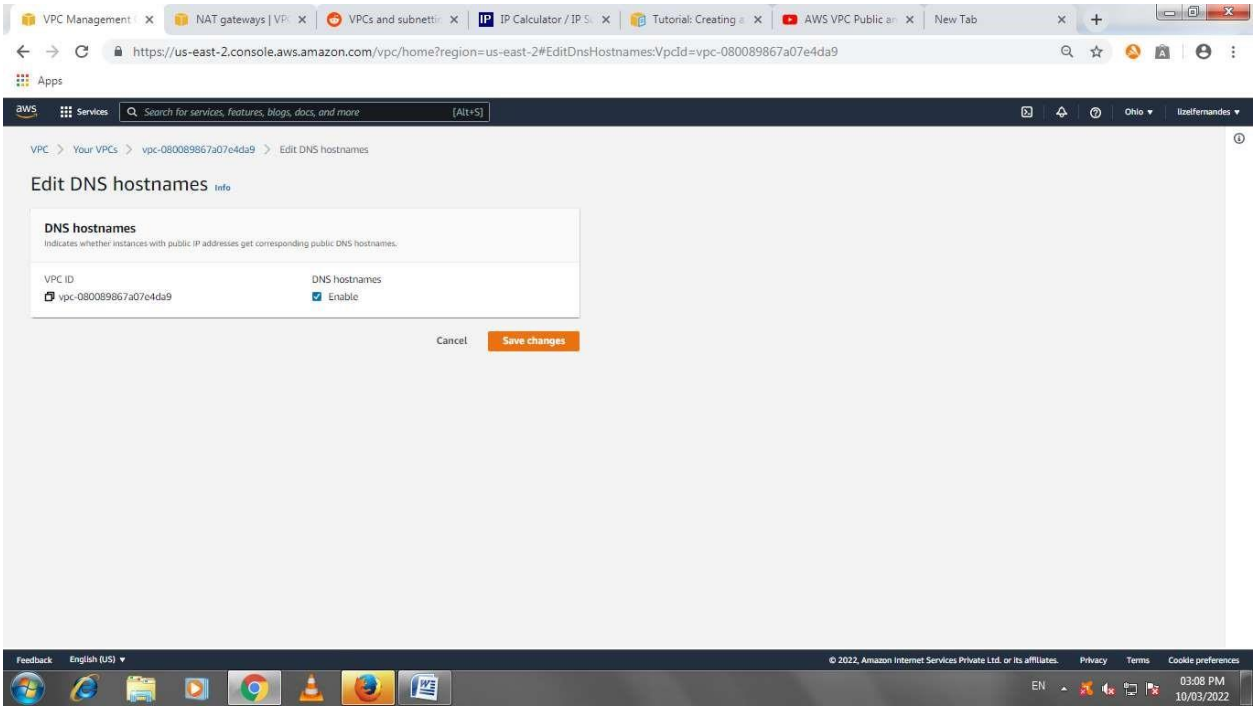


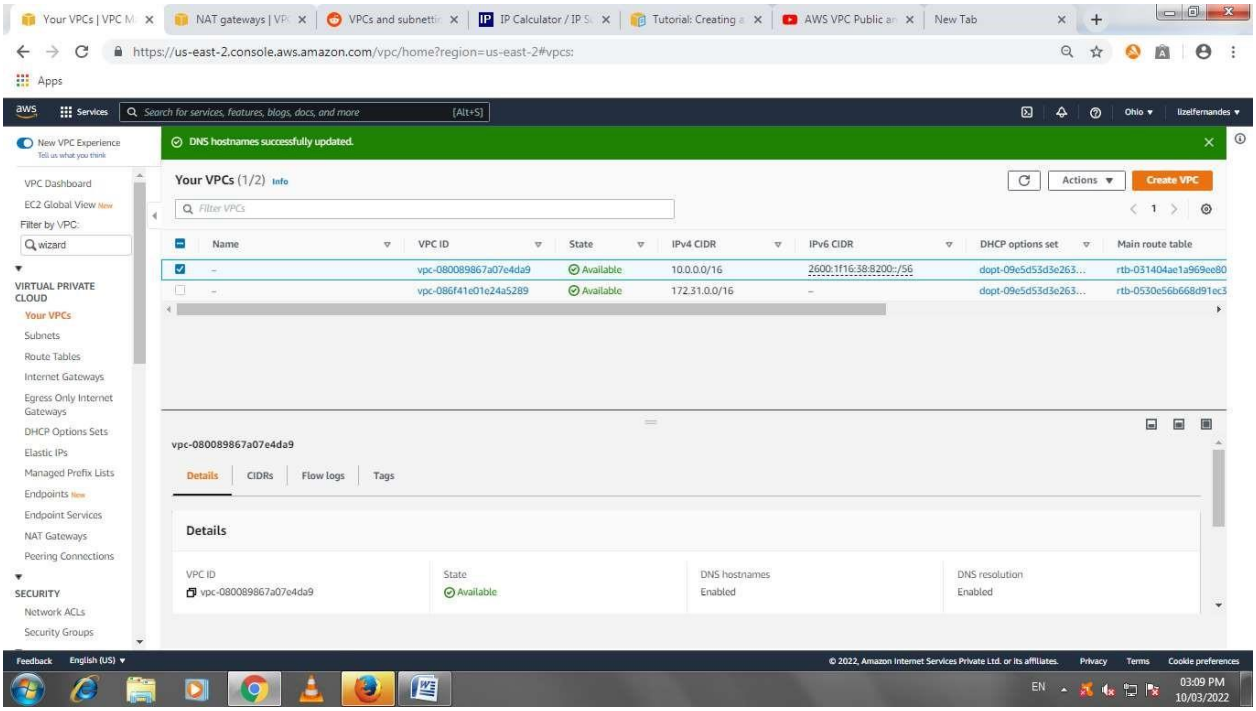
Adding association for the private subnets (route table for private subnets)



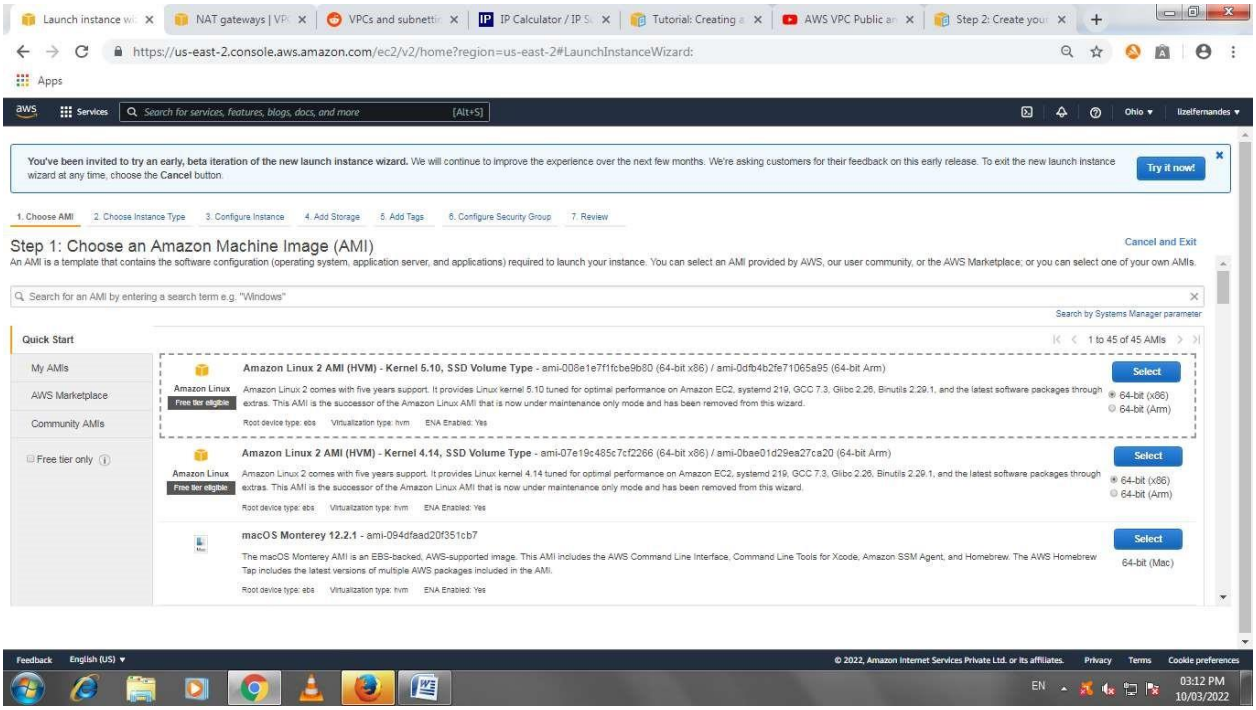


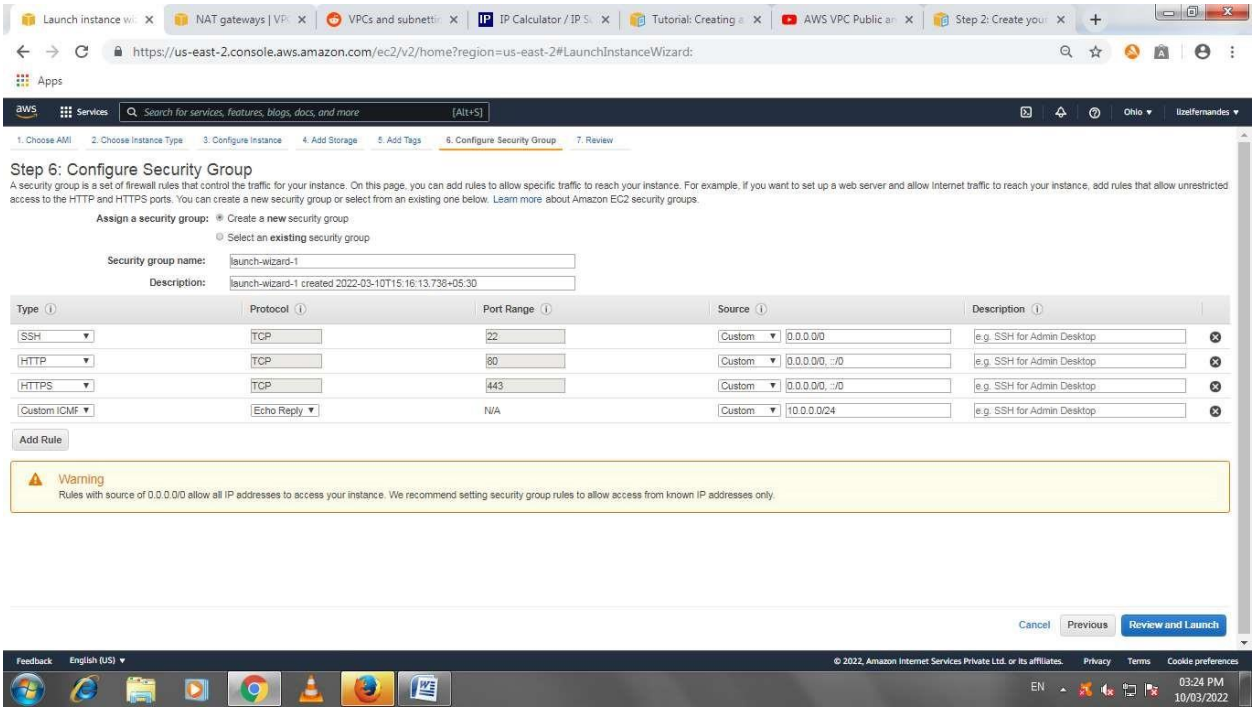
Enable dns for the vpc





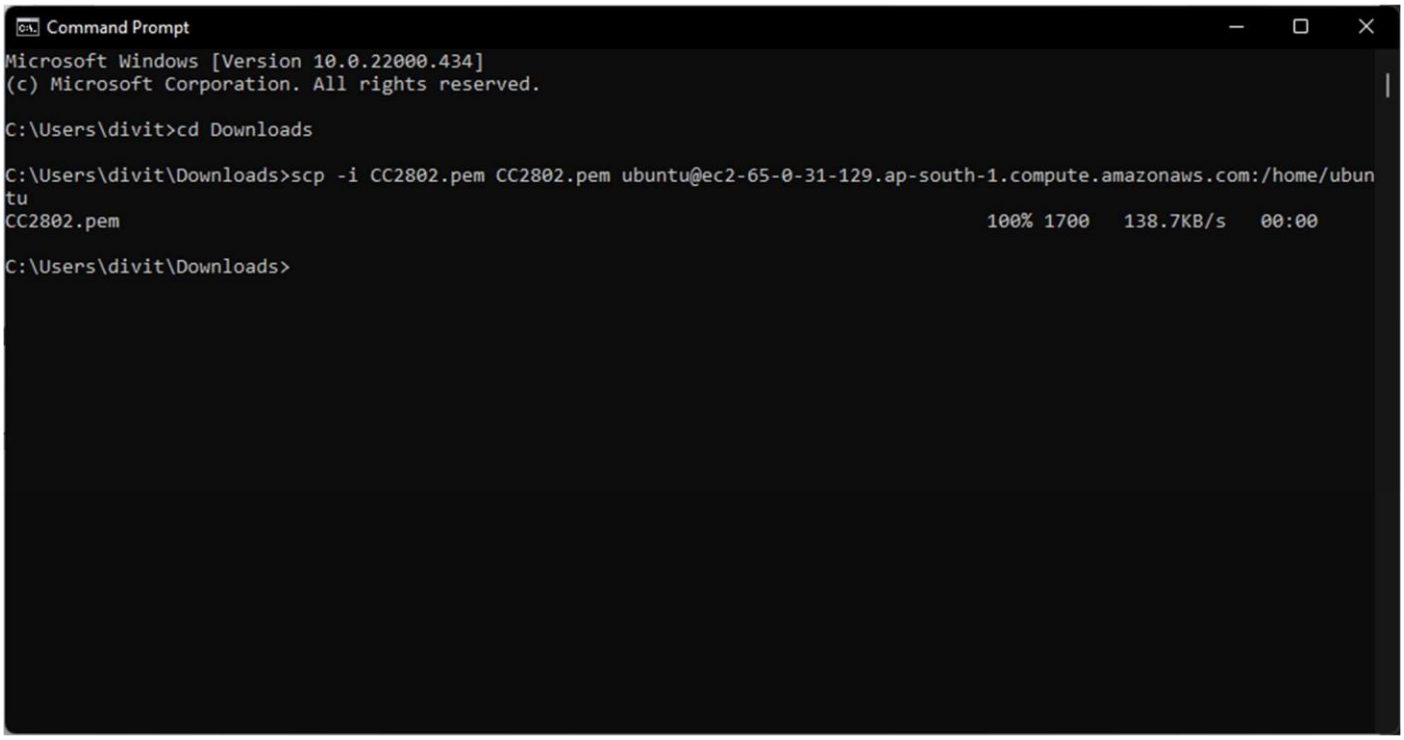
Create ec2 instance and connections for new instances



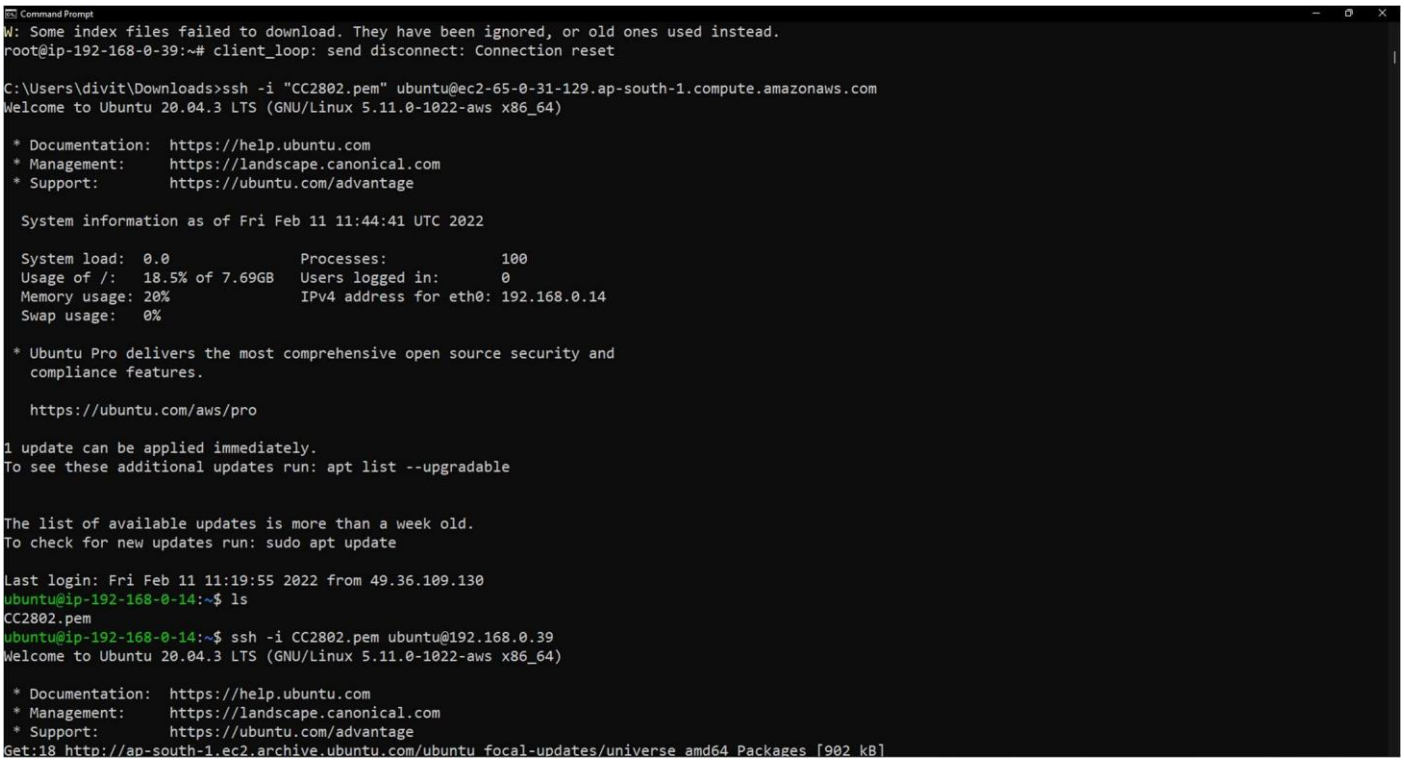


To enable internet on private instance we must do the following:

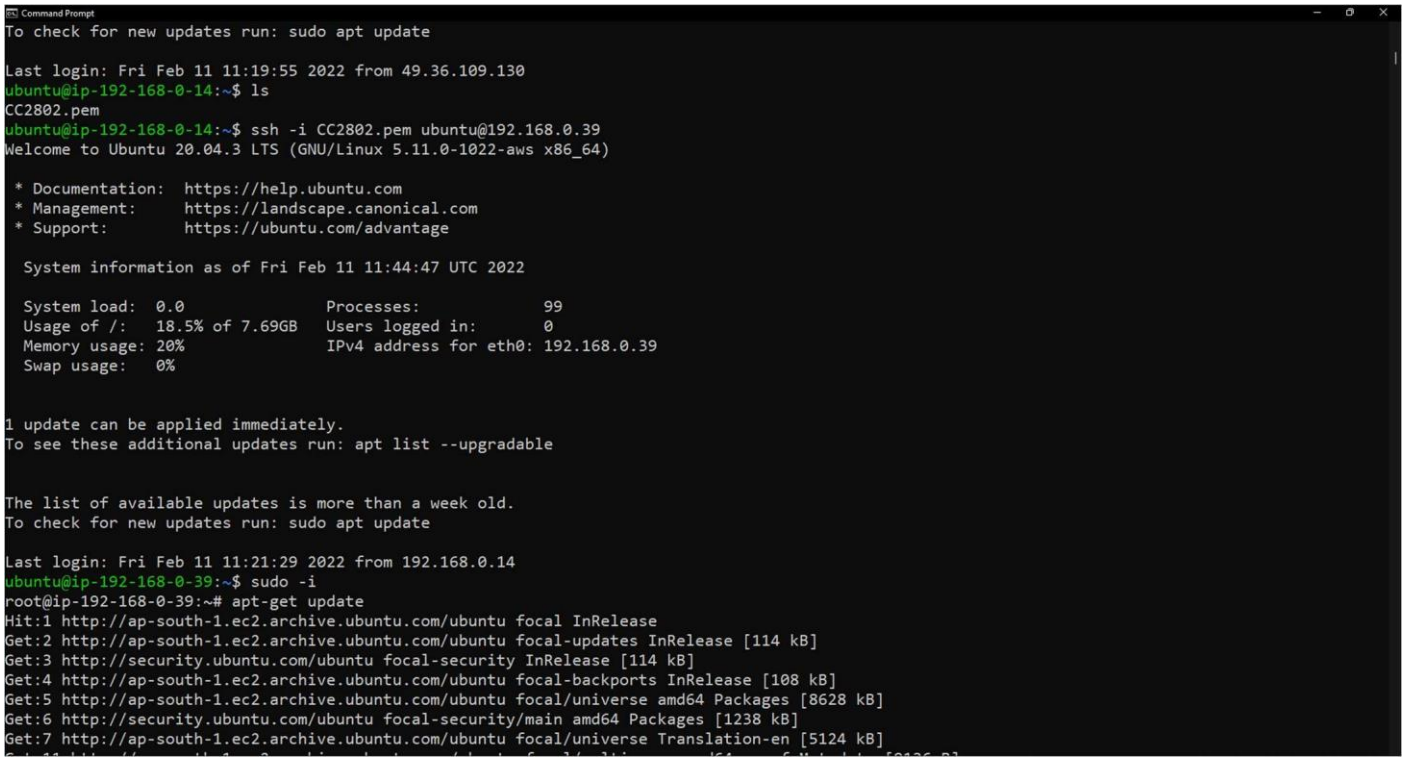
- Go to the folder where the keypair is stored for the instance
- Copy the file from your machine to the public instance scp -i keyname.pem keyname.pem ubuntu@public ipv4 dns:/home/ubuntu
  (e.g., scp -i CC2802.pem CC2802.pem ubuntu@ec2-65-0-31-129.ap-south1.compute.amazonaws.com:/home/ubuntu)
  (Note: if you created instance using linux put ec2-user instead of ubuntu everywhere)



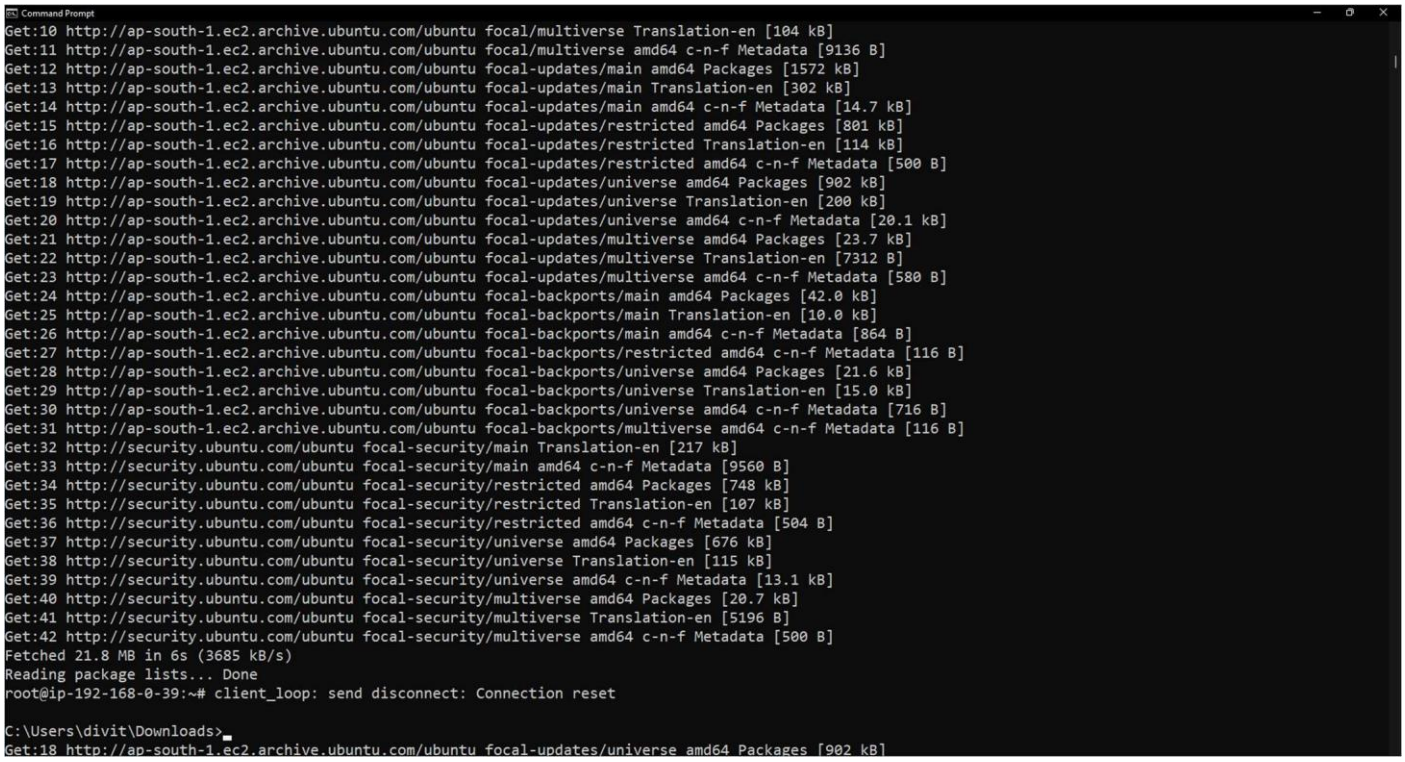
- Now connect your public EC2 instance through SSH or putty



- You can check if the .pem file is copied by ‘ls’ command Set the permissions for the file: chmod 400 keyname.pem
- To connect private instance, enter the command:
  ssh -i keyname.pem ubuntu@private ip address (private instance)
  (Note: you can see that the ip address is changed from public to private after this)
- To check if connection is correct: sudo -i -> apt-get update



- This will show that the connections are correct and now you can install any dependencies you want from the private instance



Experiment 7: Amazon Web Services VPC Post Lab Questions

Q1. What are the components of Amazon VPC?
In AWS the VPC cosists of the following components:-
Subnet: A segment of a VPC's where you can place groups to isolated resources.
Internet Gateway: VPC side of a connection to utilize public Internet.
NAT Gateway: A highly available, managed Network Address Translation (NAT) service for your resources in a private subnet to access the Internet.
Virtual private gateway: The Amazon VPC side of a VPN connection for secure transactions.
Peering Connection: To route traffic via private IP addresses between two peered VPCs.
VPC Endpoints: Enables private connectivity for your service in AWS without using an Internet Gateway, VPN, Network Address Translation (NAT) devices, or firewall proxies.
Egress-only Internet Gateway: A stateful gateway that provides egress only access for IPv6 traffic from the VPC to the Internet.

Q2. How do I get started with Amazon VPC?
To get started using Amazon VPC, you can launch an EC2 instance into your default VPC and default public subnets. Your default VPC is suitable for getting started quickly with Amazon VPC. To learn more about default VPCs and the default public subnets that come with the, see Default VPCs.
Step 1: View information about your default VPC
Step 2: Launch an instance into your VPC
Step 3: Connect to an E2 instance in your public subnet
Step 4: Clean up

Q3. What are the different types of VPC endpoints available on Amazon VPC?
VPC endpoints are virtual devices. They are horizontally scaled, redundant, and highly available VPC components.

- Interface endpoints

An interface endpoint is an elastic network interface with a private IP address from the IP address range of your subnet. It serves as an entry point for traffic destined to a service that is owned by AWS or owned by an AWS customer or partner. For a list of AWS services that integrate with AWS PrivateLink, see AWS services that integrate with AWS PrivateLink.

- Gateway Load Balancer endpoints

A Gateway Load Balancer endpoint is an elastic network interface with a private IP address from the IP address range of your subnet. It serves as an entry point to intercept traffic and route it to a network or security service that you've configured using a Gateway Load Balancer. You specify a Gateway Load Balancer endpoint as a target for a route in a route table. Gateway Load Balancer endpoints are supported only for endpoint services that are configured using a Gateway Load Balancer.

 Gateway endpoints

A gateway endpoint is a gateway that is a target for a route in your route table used for traffic destined to either Amazon S3 or DynamoDB.
There is no charge for using gateway endpoints.

Q4. What are the connectivity options for Amazon VPC?

Option	Use Case	Advantages	Limitations
AWS Managed VPN	AWS managed IPsec VPN connection over the internet to individual VPC	Reuse existing VPN equipment and processes Reuse existing internet connections AWS managed high availability VPN service Supports static routes or dynamic Border Gateway Protocol (BGP) peering and routing policies	Network latency, variability, and availability are dependent on internet conditions Customer managed endpoint is responsible for implementing redundancy and failover (if required) Customer device must support single-hop BGP (when leveraging BGP for dynamic routing)
AWS Transit Gateway + VPN	AWS managed IPsec VPN connection over the internet to regional router for multiple VPCs	Same as the previous option AWS managed high availability and scalability regional network hub for up to 5,000 attachments	Same as the previous option
AWS Direct Connect	Dedicated network connection over private lines	More predictable network performance Reduced bandwidth costs Supports BGP peering and routing policies	May require additional telecom and hosting provider relationships or new network circuits to be provisioned
AWS Direct Connect + AWS Transit Gateway	Dedicated network connection over private lines to regional router for multiple VPCs	Same as the previous option AWS managed high availability and scalability regional network hub for up to 5,000 attachments	Same as previous option

| Option | Use Case | Advantages | Limitations |

AWS Direct Connect + VPN	IPsec VPN connection over private lines	More predictable network performance Reduced bandwidth costs Supports BGP peering and routing policies on AWS Direct Connect Reuse existing VPN equipment and processes AWS managed high availability VPN service Supports static routes or dynamic Border Gateway Protocol (BGP) peering and routing policies on VPN connection	May require additional telecom and hosting provider relationships or new network circuits to be provisioned Customer managed endpoint is responsible for implementing redundancy and failover (if required) Customer device must support single-hop BGP (when leveraging BGP for dynamic routing)
AWS Direct Connect + AWS Transit Gateway + VPN	IPSec VPN connection over private lines to regional router for multiple VPCs	Same as previous option AWS managed high availability and scalability regional network hub for up to 5,000 attachments	Same as previous option
AWS VPN CloudHub	Connect remote branch offices in a hub-and-spoke model for primary or backup connectivity	Reuse existing internet connections and AWS VPN connections AWS managed high availability VPN service Supports BGP for exchanging routes and routing priorities	Network latency, variability, and availability are dependent on the internet User managed branch office endpoints are responsible for implementing redundancy and failover (if required)
Software Siteto-Site VPN	Software appliancebased VPN connection over the internet	Supports a wider array of VPN vendors, products, and protocols Fully customermanaged solution	Customer is responsible for implementing HA (high availability) solutions for all VPN endpoints (if required)