Project Report - Manual Exercises (Bac +2)

LAB 02

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LAB 02 – VPC Creation

Introduction:

In today's digital landscape, crafting a secure and robust infrastructure is critical for organizations aiming to thrive in the cloud. This lab exercise dives deep into the intricacies of creating a Virtual Private Cloud (VPC) within AWS, an essential step in architecting scalable and resilient cloud environments.
Throughout this lab, I'll guide you through the process of setting up a VPC with carefully planned subnets, including public and private configurations spread across different Availability Zones. We'll explore the significance of subnetting for organizing resources efficiently and ensuring high availability.
Moreover, we'll establish internet connectivity for our VPC by attaching an Internet Gateway (IGW) and configuring route tables. This step is crucial for enabling communication between our VPC and external networks, facilitating access to internet-based services while maintaining security.
Additionally, we'll delve into the implementation of Network Address Translation (NAT) gateways to facilitate outbound internet access from private subnets. This aspect is vital for securely accessing external resources while safeguarding sensitive data within the confines of our private network.
By mastering these concepts and techniques, we'll gain invaluable insights into designing VPCs that are not only secure and scalable but also optimized for performance and reliability. As organizations increasingly rely on cloud infrastructures to power their operations, understanding how to craft well-architected VPCs becomes a cornerstone of successful cloud adoption and management.

1. **Create a VPC**:
   - Go to the AWS Management Console.
   - Navigate to the VPC service.
   - Click on "Create VPC".
   - Select the "VPC Only" option.
   - Provide a name for your VPC (e.g., MyVPC1).
   - Enter the IPv4 CIDR block as 120.0.0.0/16.
   - Select "Default" tenancy.
   - Click on "Create VPC".

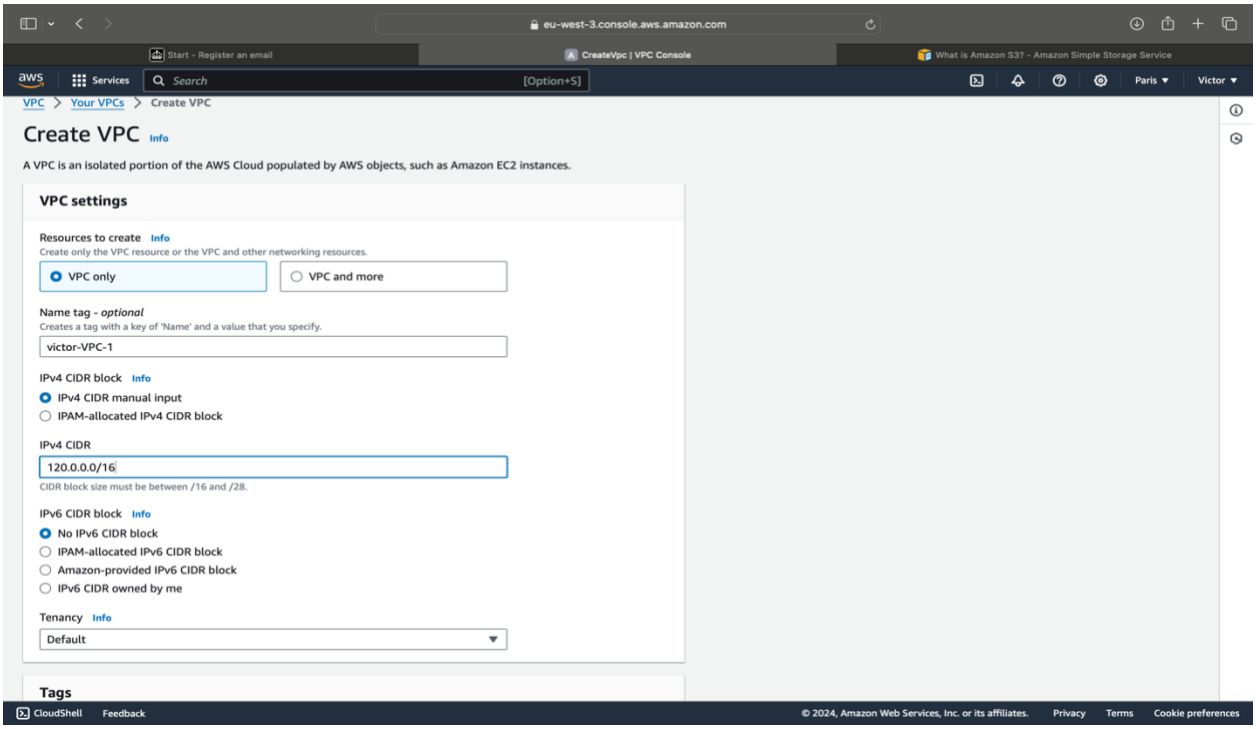

Figure 1 - create VPC

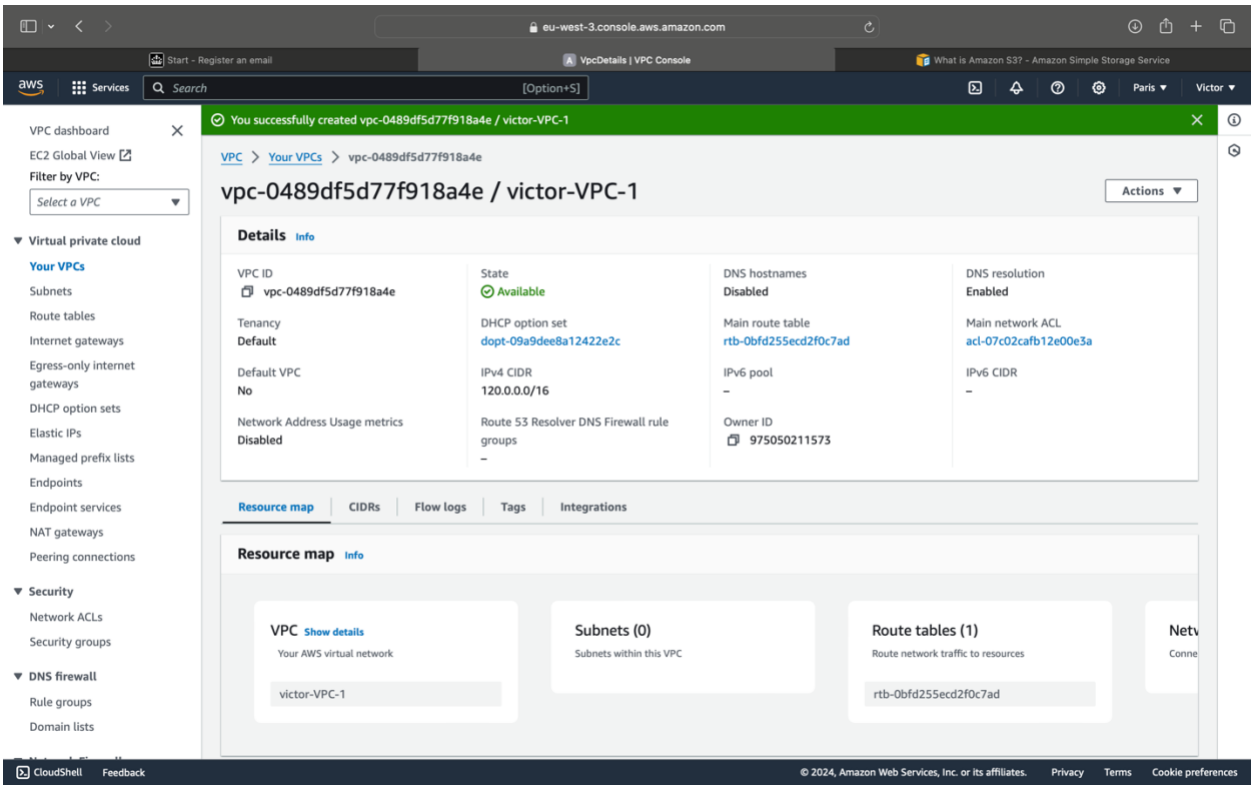

Figure 2 - VPC created

2. **Create Subnets**:
   - After creating the VPC, click on "Subnets" in the VPC service.
   - Click on "Create subnet".
   - For the first subnet (public):
     - Select the VPC you just created.
     - Provide a name for the subnet (e.g., Public).
     - Assign the IPv4 CIDR block for this subnet as 120.0.3.0/24.
     - Click on "Create subnet".
   - For the second subnet (private1):
     - Select the appropriate VPC.
     - Provide a name for the subnet (e.g., Private1).
     - Select an Availability Zone (AZ) different from the one used for the public subnet for redundancy.
     - Assign the IPv4 CIDR block for this subnet as 120.0.1.0/24.
     - Click on "Create subnet".
   - For the third subnet (private2):
     - Repeat the same steps as for private1 subnet, with a different name and CIDR block (e.g., Private2, 120.0.2.0/24).

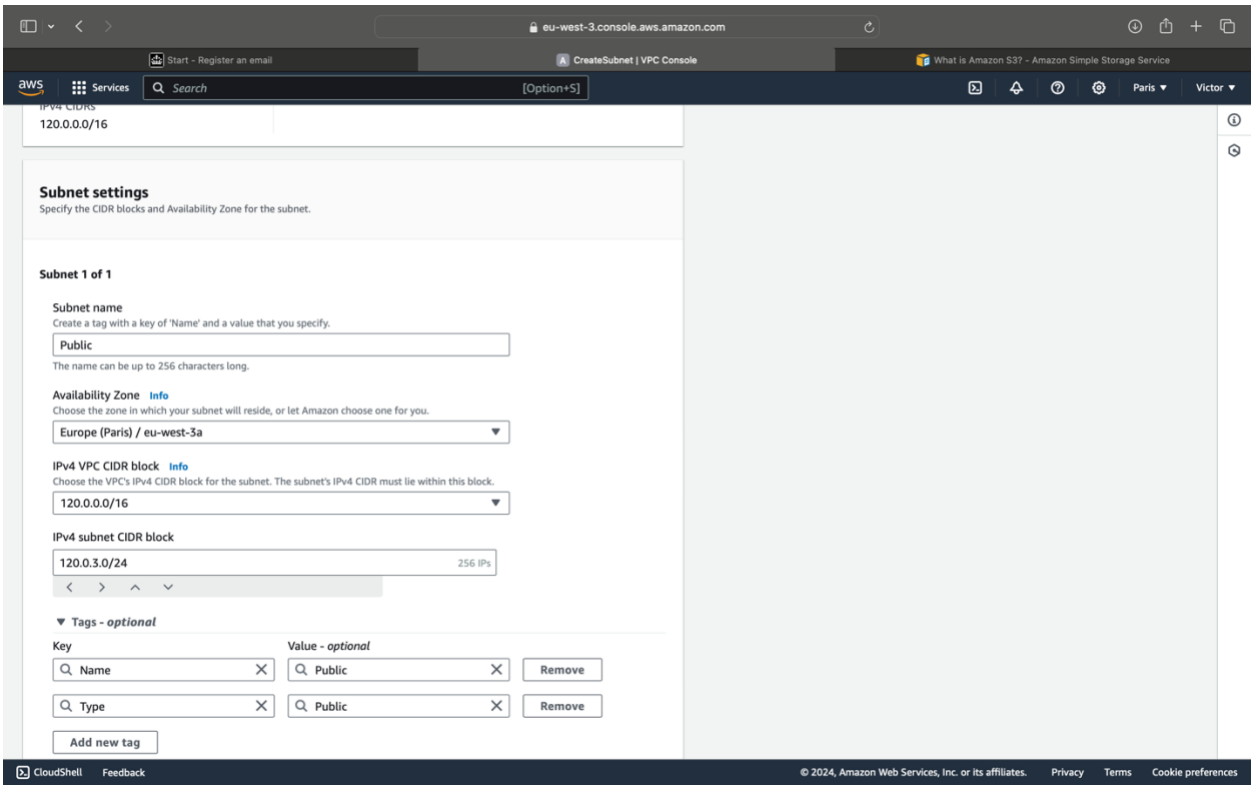

Figure 3 - creating subnet 1

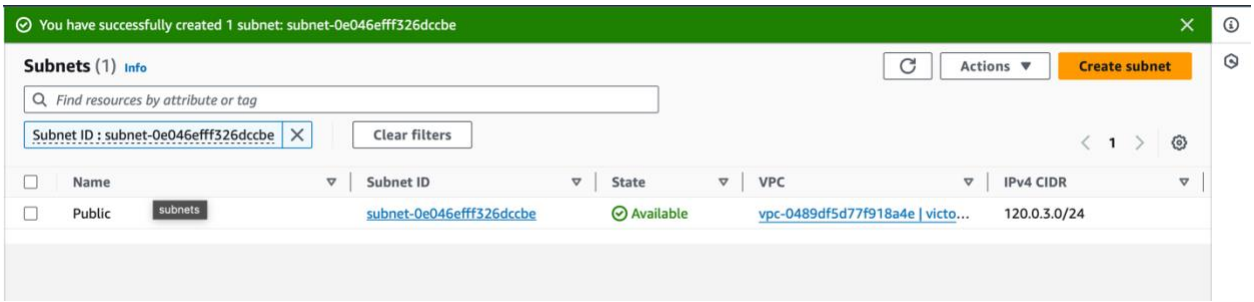

Figure 4 - subnet 1 created

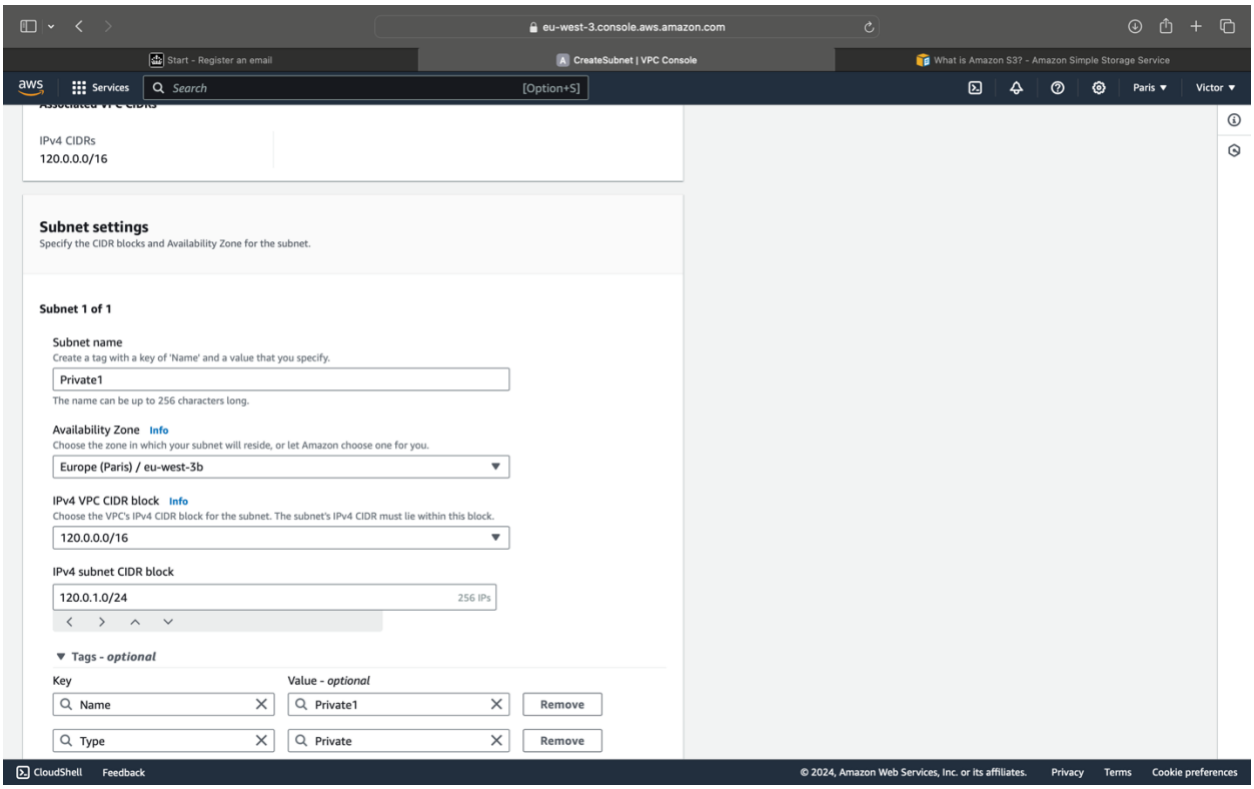

Figure 5 - creating subnet 2

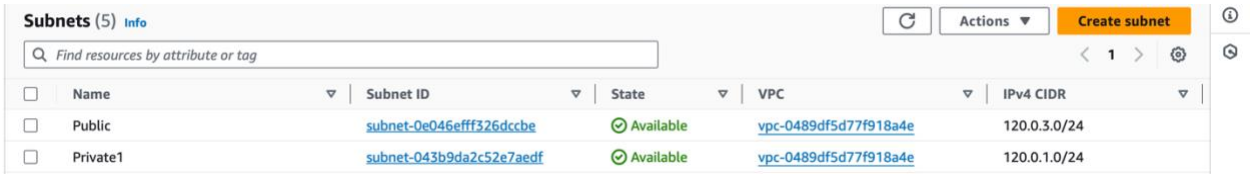

Figure 6 - subnet 2 created

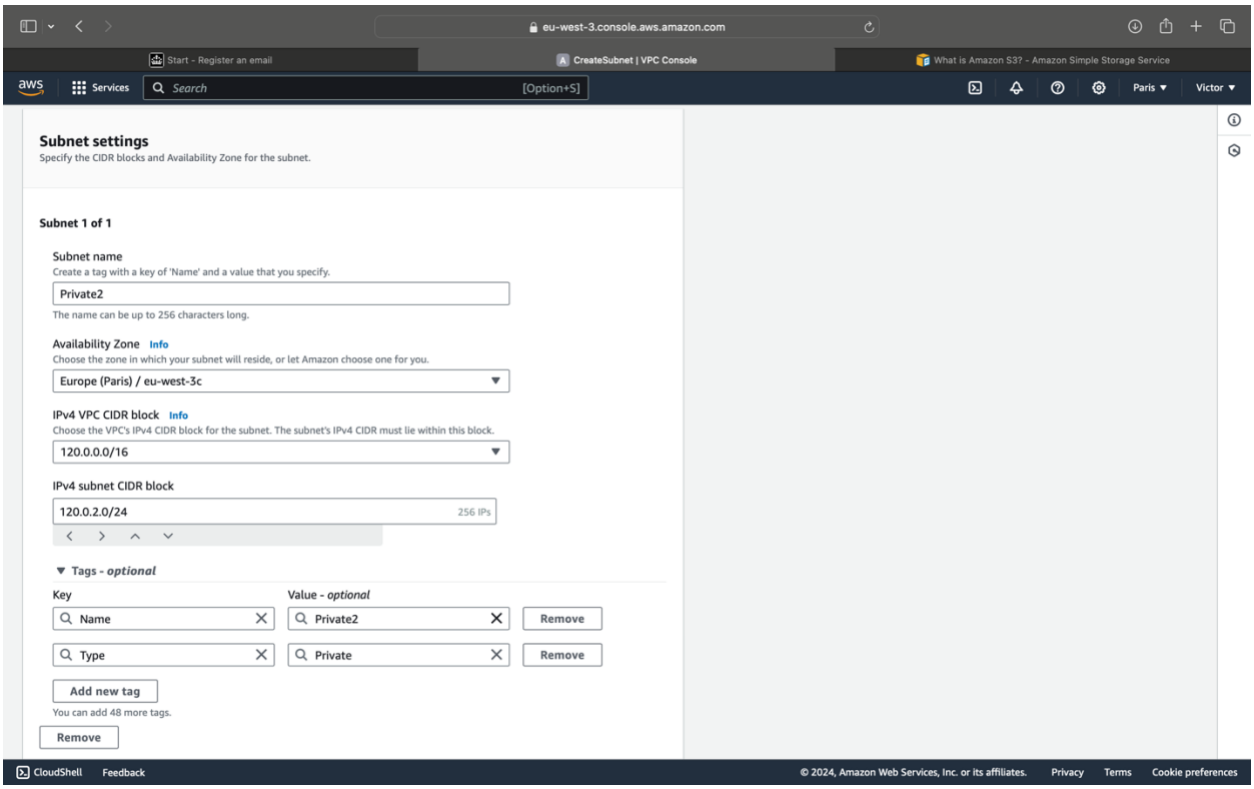

Figure 7 - creating subnet 3

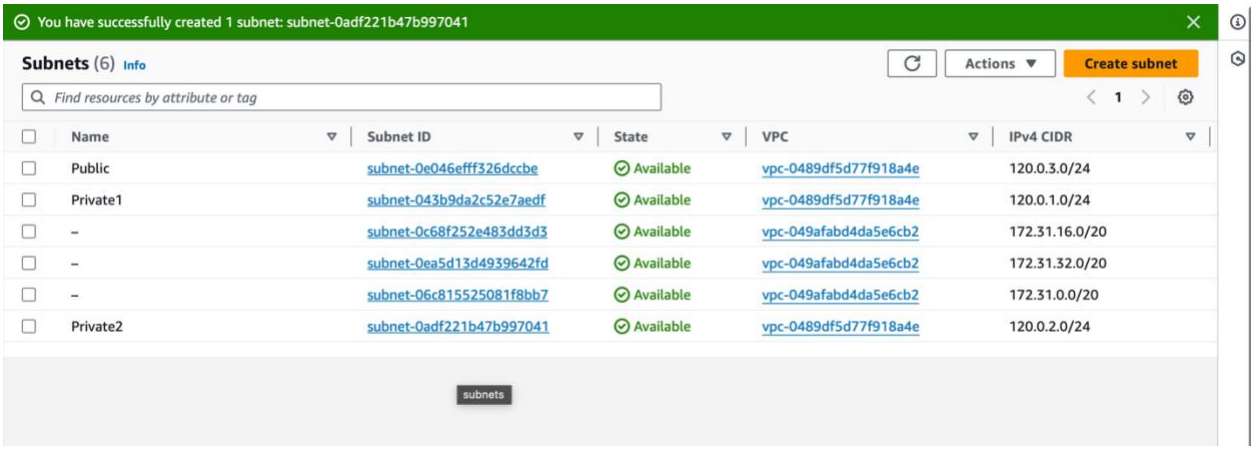

Figure 8 - subnet 3 created

3. **Create Internet Gateway (IGW):**
   - In the VPC service, click on "Internet Gateways".
   - Click on "Create Internet Gateway".
   - Provide a name for the internet gateway (e.g., igw1).
   - Click on "Create internet Gateway".
   - Select the newly created IGW, go to "Actions" and choose "Attach to VPC".
   - Select the VPC you created (MyVPC1) and attach the IGW.

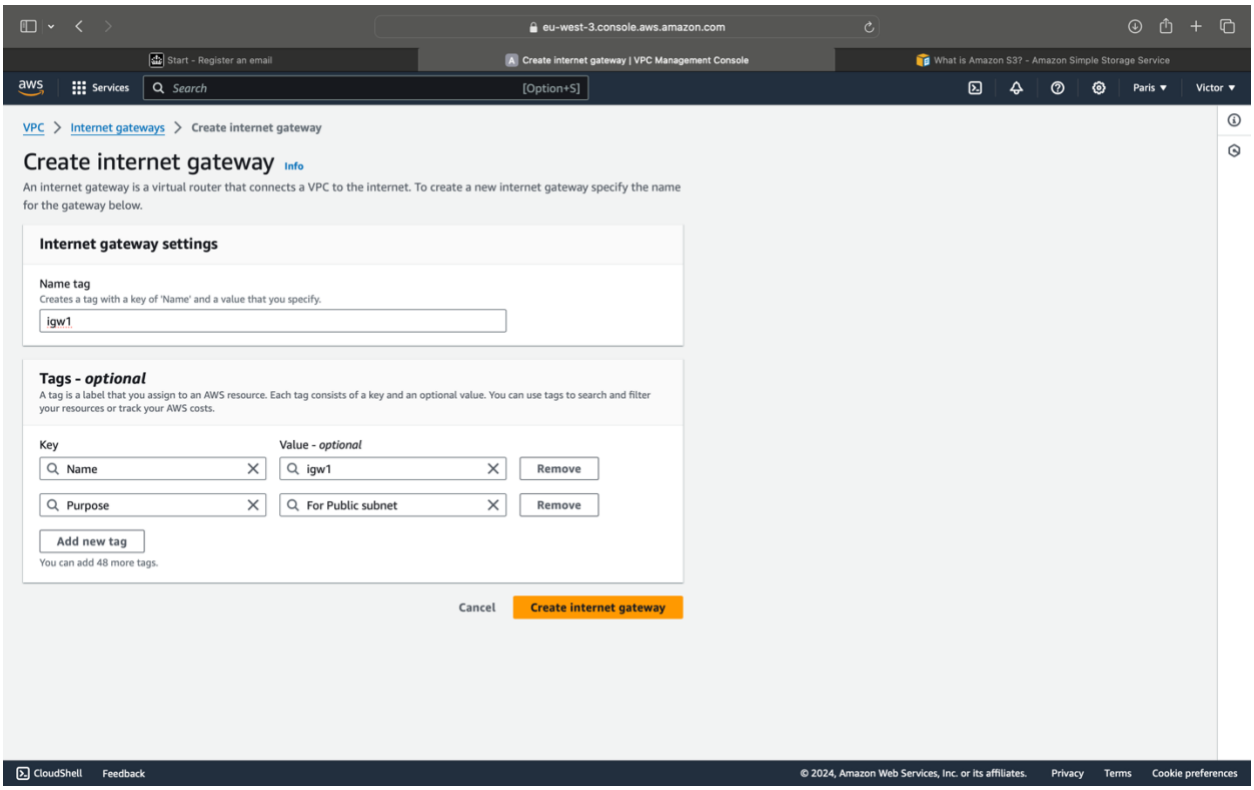

Figure 9 -creating internet gateway

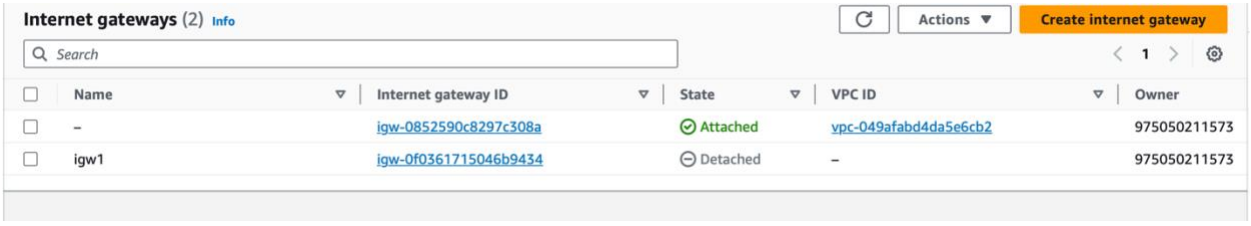

Figure 10 - internet gateway created

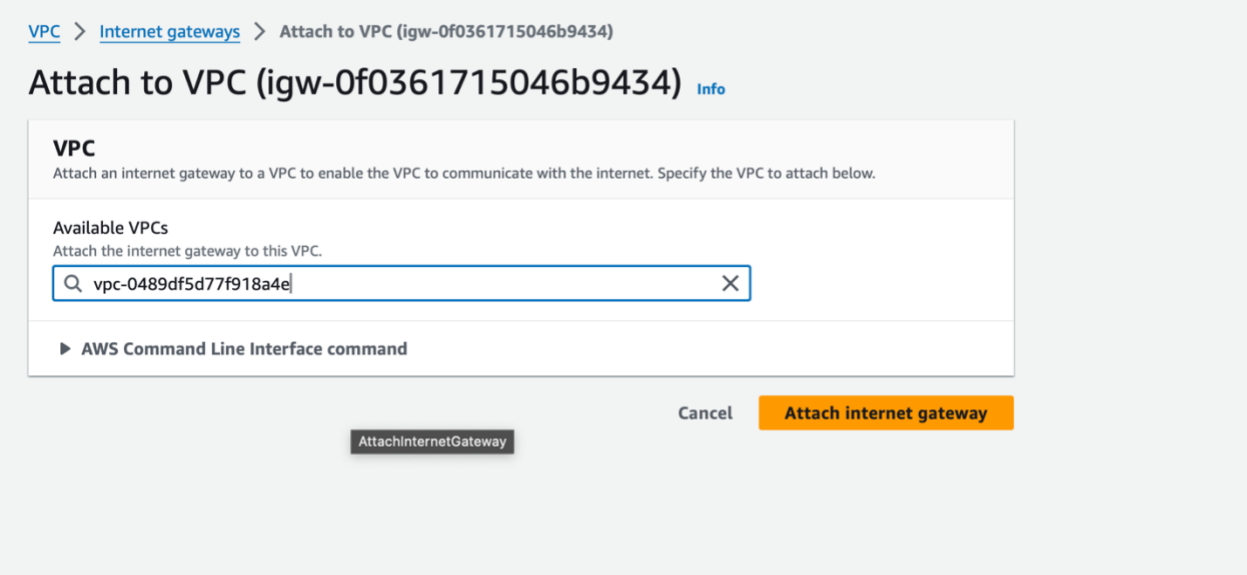

Figure 11 - attaching the internet gateway

4. **Enable Internet Route to Public Subnet**:
   - Go to the route tables in the VPC service.
   - Create a new route table (if needed).
   - Edit the route table associated with the public subnet.
   - Add a route with destination 0.0.0.0/0 and target as the IGW.
   - Save the changes.

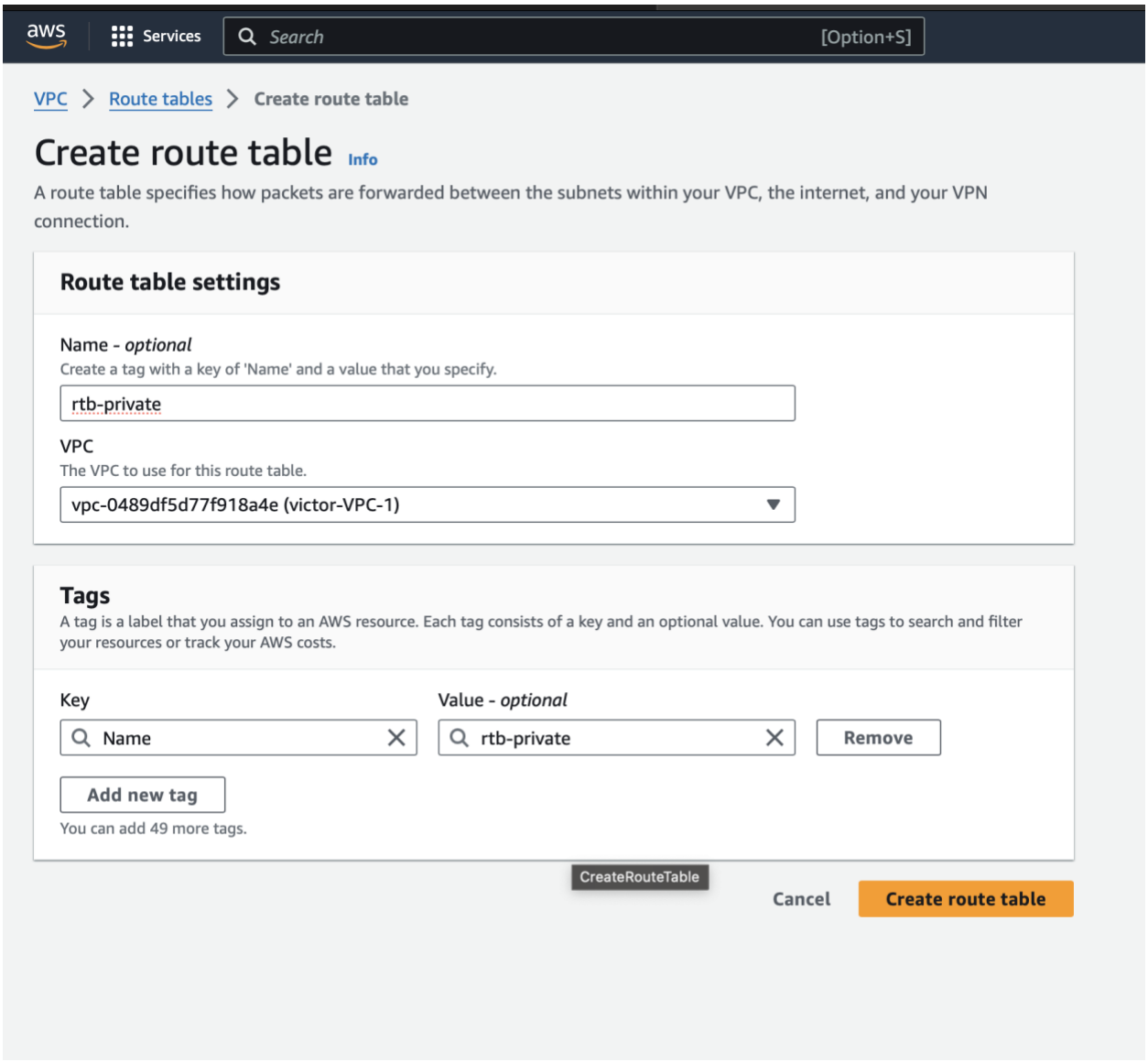

Figure 12 - creating route table

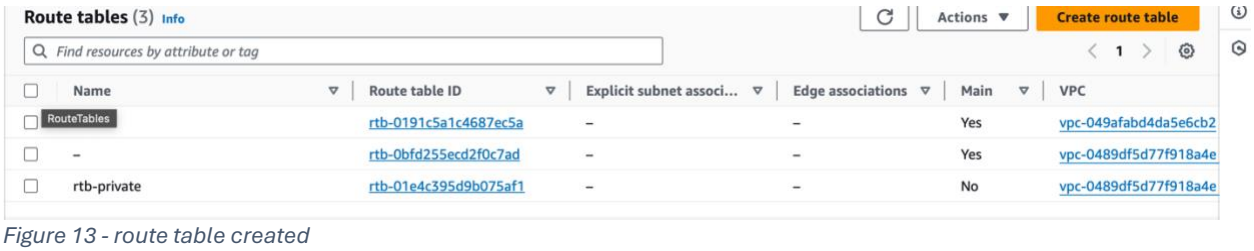

Figure 13 - route table created

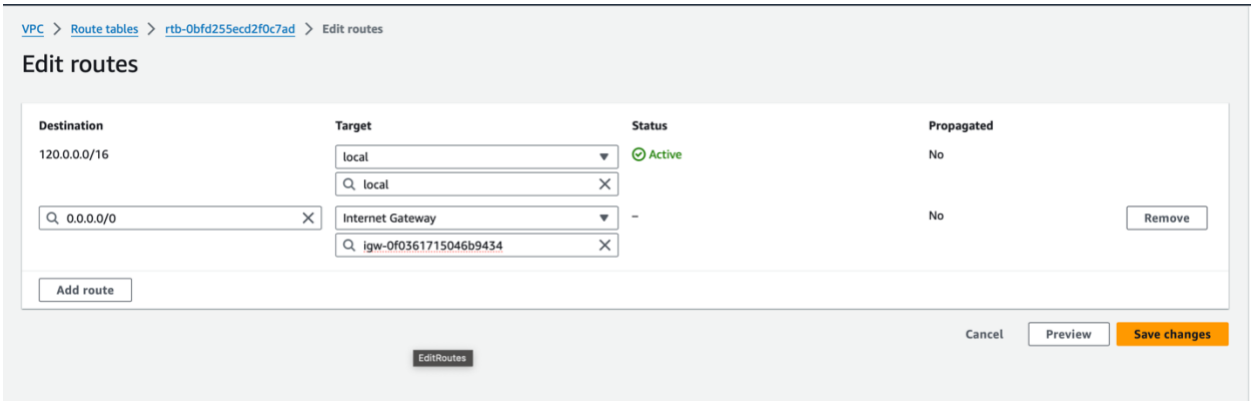

Figure 14 - editing routes

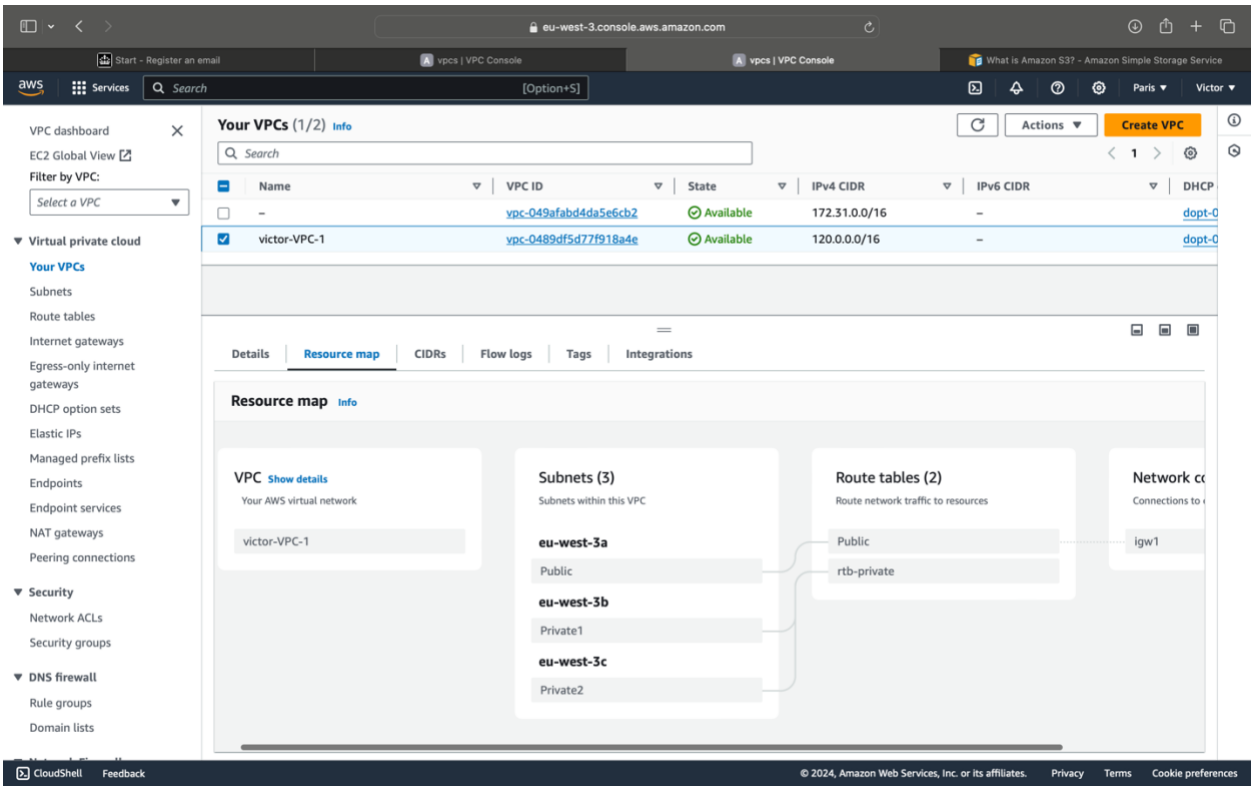

Figure 15 - resource map

5. **Create NAT Gateway**:
   - In the VPC service, go to NAT Gateways.
   - Click on "Create NAT gateways".
   - Provide a name for the NAT gateway (e.g., my-nat-gateway1).

- Select the appropriate subnet(s) (private subnets).
- Choose "Public" for connectivity type.
- Assign an Elastic IP.
- Click on "Create NAT Gateway".

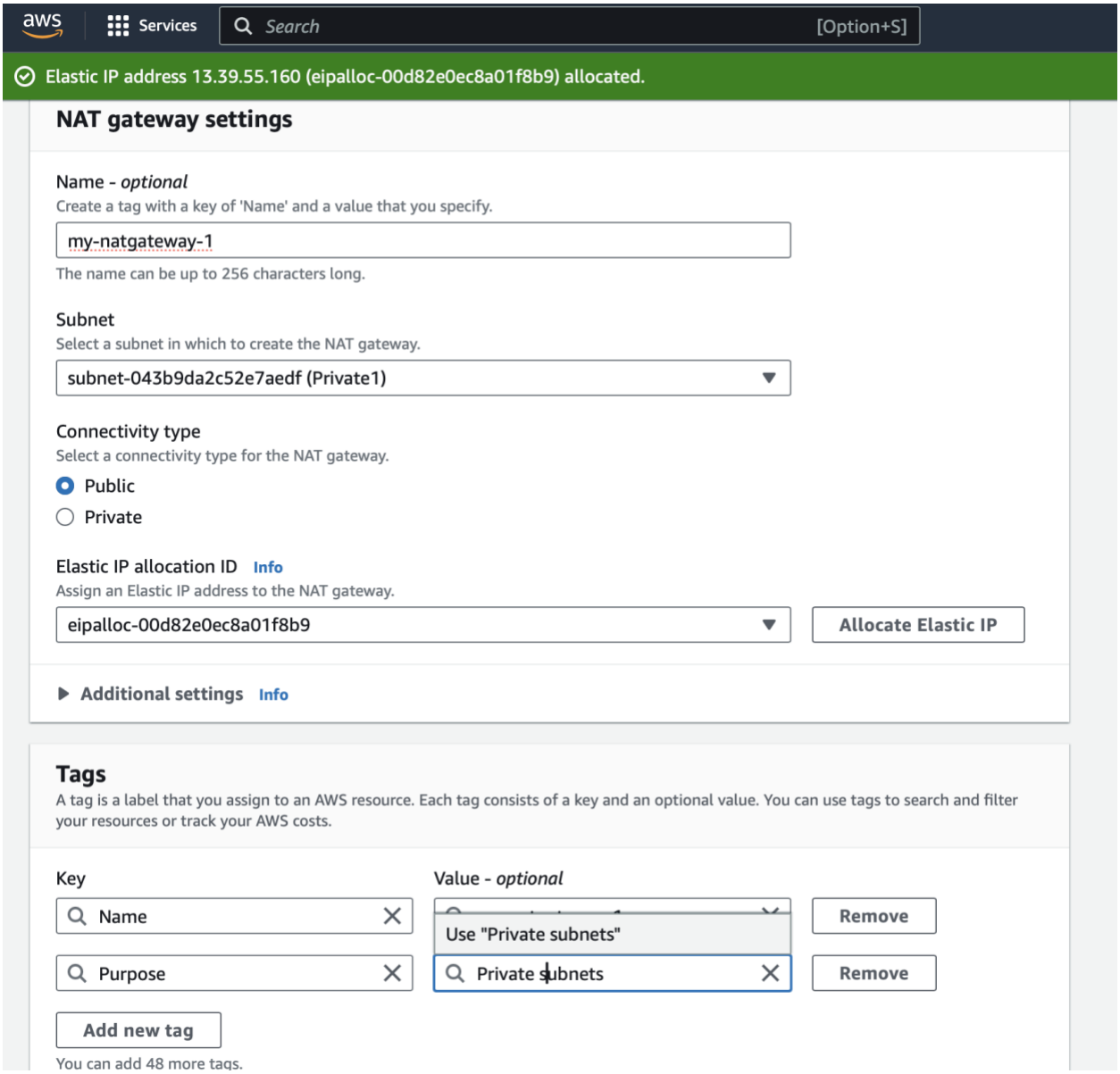

Figure 16 - creating NAT gateway

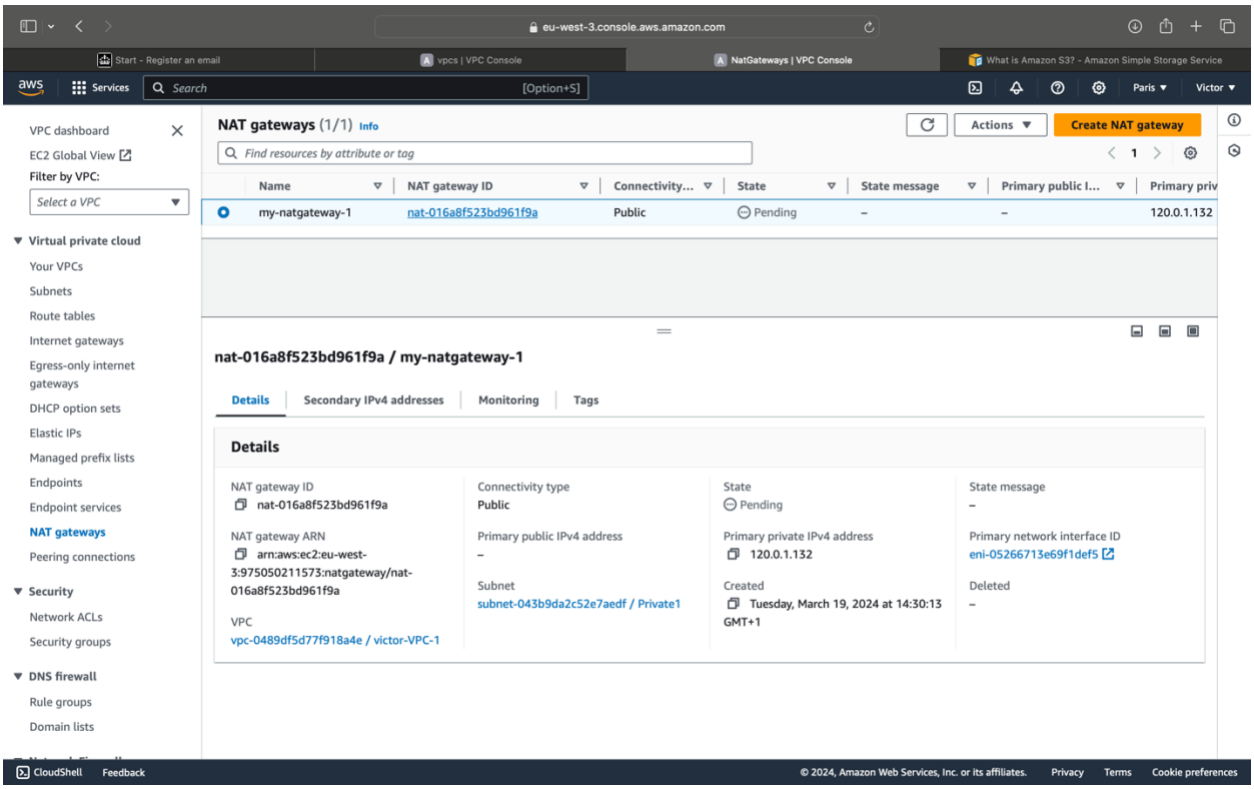

Figure 17 - NAT gateway created

6. **Update Private Route Table**:
   - Go to the route tables in the VPC service.
   - Select the route table associated with the private subnet(s).
   - Edit the route table.
   - Add a route with destination 0.0.0.0/0 and target as the NAT Gateway you created.
   - Save the changes.

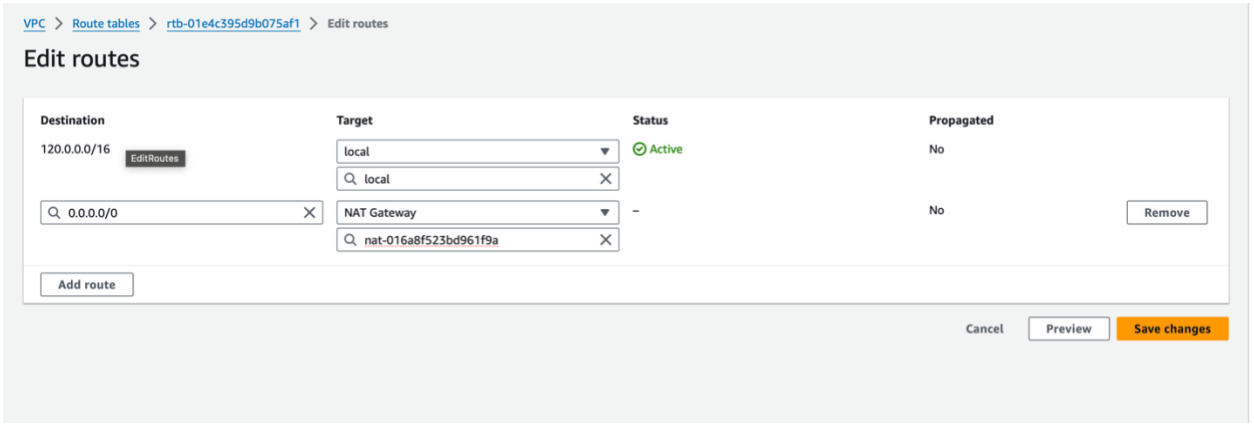

Figure 18 - edit routes to add NAT gateway

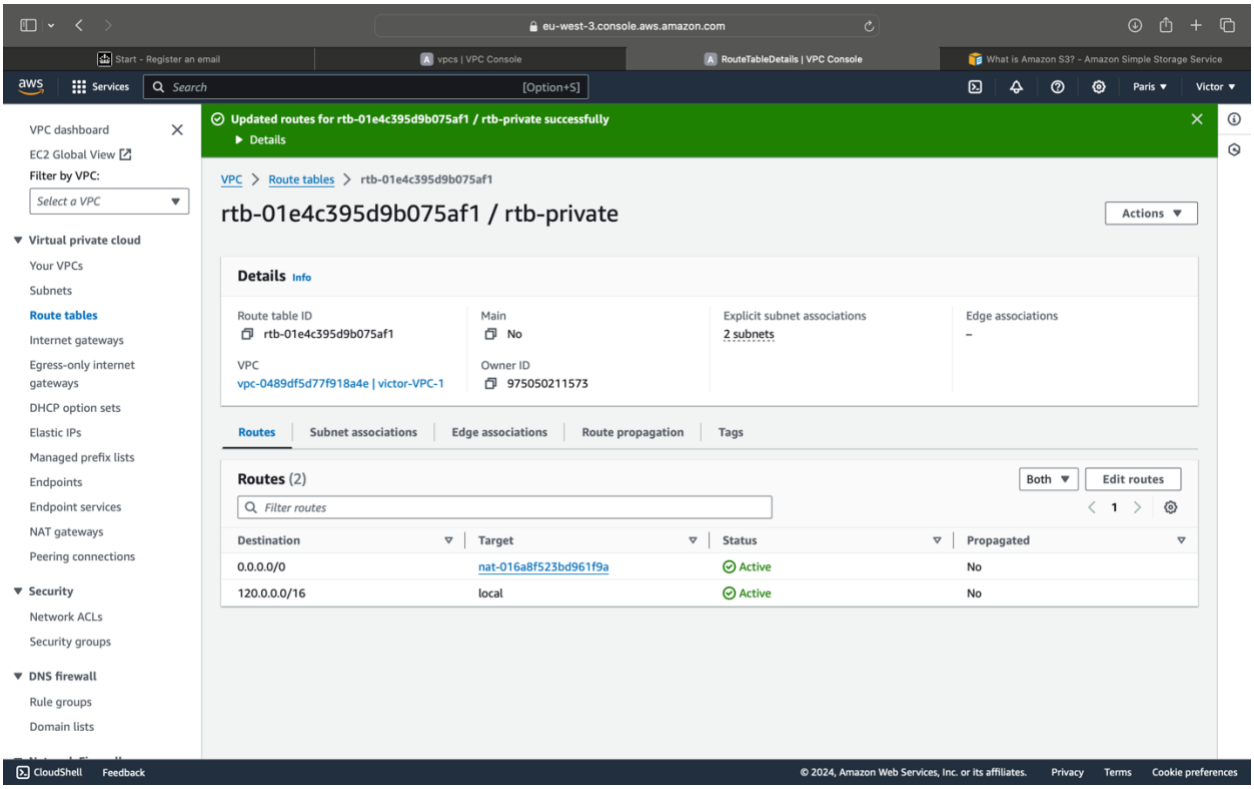

Figure 19 - successfully edited

Summary:

In this lab, we embarked on a comprehensive journey to construct a robust and secure Virtual Private Cloud (VPC) within the AWS ecosystem. By meticulously following a series of guided tasks, we gained practical insights into the intricacies of VPC configuration, subnetting, and connectivity establishment.

We began by creating a custom VPC with a well-defined CIDR block, laying the foundation for our cloud infrastructure. Subsequently, we strategically designed public and private subnets distributed across multiple Availability Zones to ensure fault tolerance and high availability.

The establishment of internet connectivity through the attachment of an Internet Gateway (IGW) to our VPC enabled seamless communication with external networks, facilitating access to internet-based services for resources residing in the public subnet.

Moreover, by implementing Network Address Translation (NAT) gateways, we facilitated secure outbound internet access from private subnets while preserving data confidentiality. This aspect is crucial for organizations seeking to balance connectivity and security in their cloud environments.

Throughout this lab, we honed our skills in VPC management, subnet configuration, and routing within AWS, equipping us with the expertise needed to architect resilient and scalable cloud infrastructures tailored to organizational requirements.

As organizations increasingly embrace cloud technologies, the ability to design well-architected VPCs becomes paramount for driving innovation, scalability, and efficiency in the digital era. By mastering the concepts and techniques covered in this lab, we are better positioned to navigate the complexities of cloud architecture and elevate our organization's cloud strategy to new heights