VPC Peering - Connecting Two VPCs

Project Overview

This project represents Part 6 in my AWS VPC series - **connecting two separate VPCs using VPC Peering**! After mastering single VPC connectivity in Part 5, I expanded my skills by creating two isolated VPCs and establishing a peering connection between them. I learned how to configure route tables for cross-VPC communication, troubleshoot Elastic IP assignments, and validate the peering connection using ping tests between EC2 instances in different VPCs.

AWS Region Used: eu-west-3 (Paris)
Project Series: Part 6 of NextWork VPC Challenge

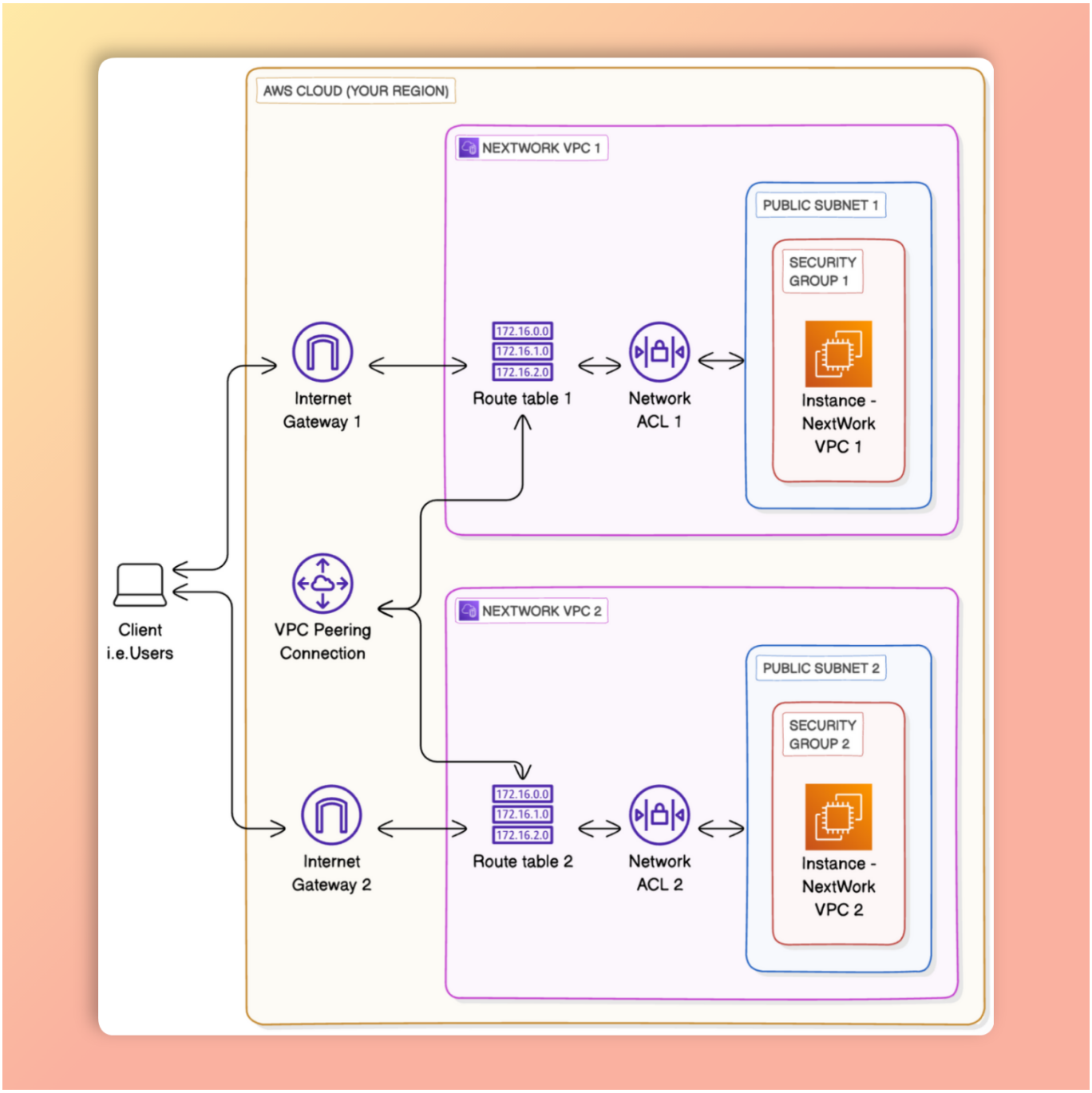
Table of Contents

What I Built

A complete VPC peering architecture connecting two isolated VPCs:

VPC Infrastructure:

Key Achievement: Successfully established private communication between two separate VPCs without using the public internet!



Technologies & Concepts

AWS Services Used

- **Amazon VPC** - Virtual Private Cloud for isolated networks
- **VPC Peering** - Direct connection between two VPCs
- **VPC Wizard** - Automated VPC creation tool
- **Amazon EC2** - Virtual servers for testing connectivity
- **Elastic IP** - Static IPv4 addresses for instances
- **Route Tables** - Direct traffic between VPCs via peering connection
- **Security Groups** - Instance-level firewall rules
- **EC2 Instance Connect** - Browser-based SSH access

Step-by-Step Implementation

Step 1: Set Up Two VPCs Using VPC Wizard

What I did:

I used the AWS VPC Wizard to rapidly create two complete VPCs with all necessary components.

Planning CIDR Blocks for Peering

Critical Rule: VPCs being peered **cannot have overlapping CIDR blocks**.

If both VPCs used `10.0.0.0/16`, the router couldn't determine whether traffic to `10.0.1.50` should go to VPC 1 or VPC 2 - causing routing conflicts.

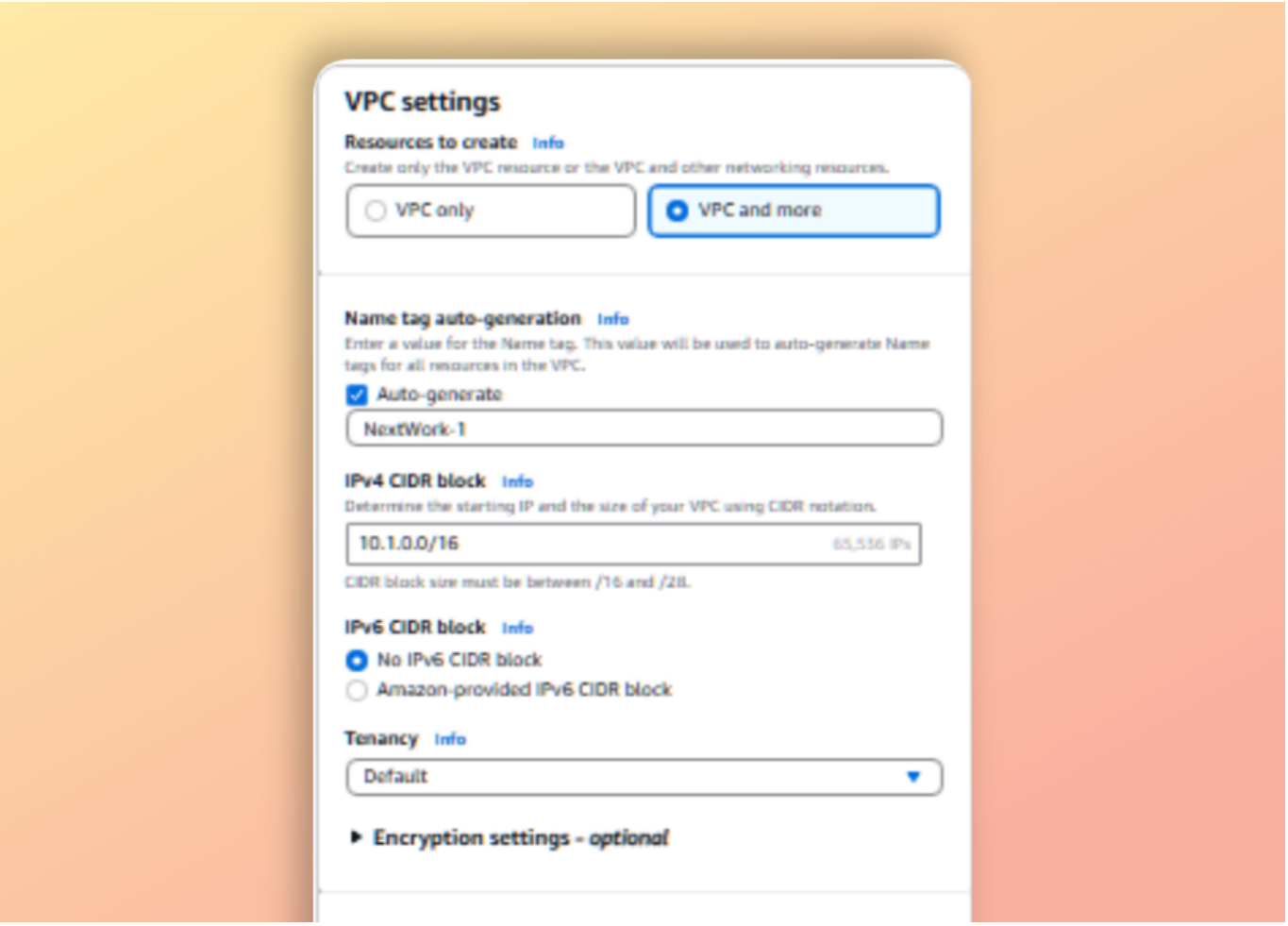
My Solution:

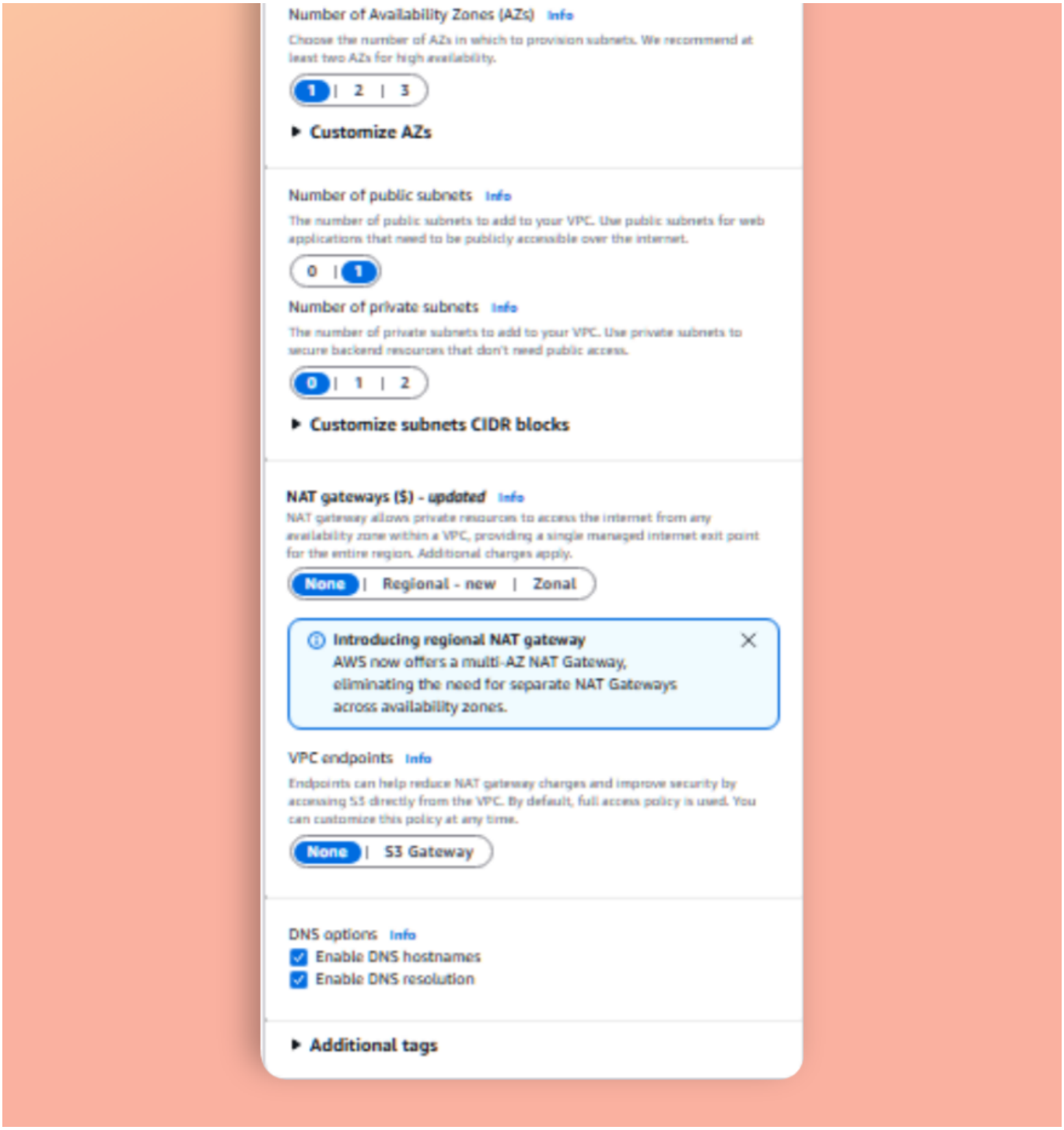
```
VPC 1: 10.1.0.0/16
VPC 2: 10.2.0.0/16
```

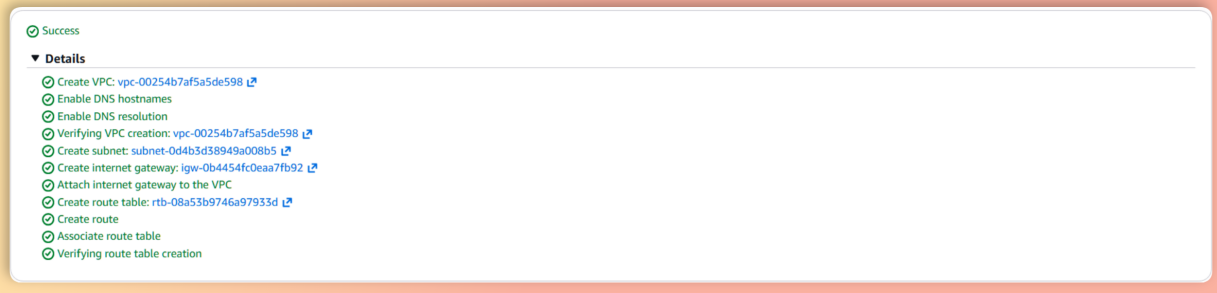
Memory Trick: Match the second octet to the VPC number (VPC **1** → 10.**1**.0.0/16)

Creating NextWork VPC 1

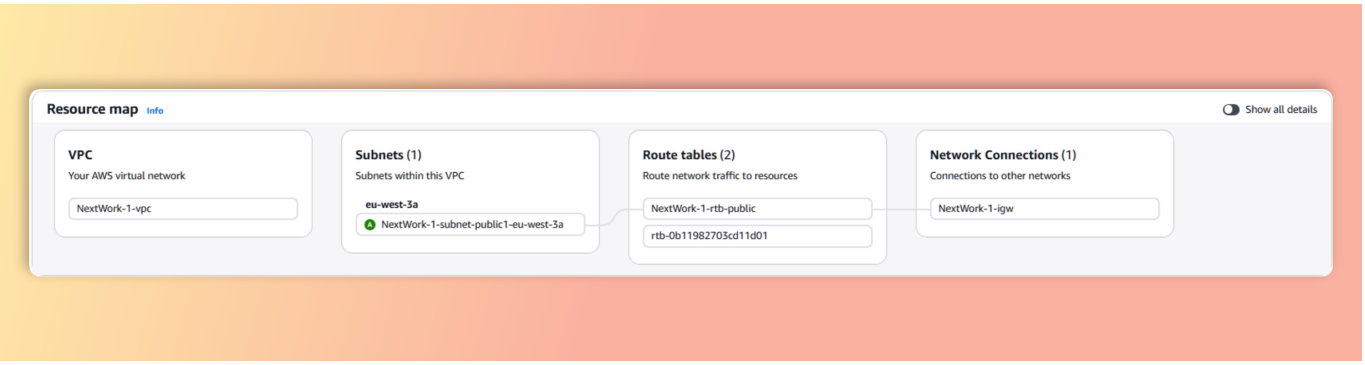
VPC Wizard Configuration:





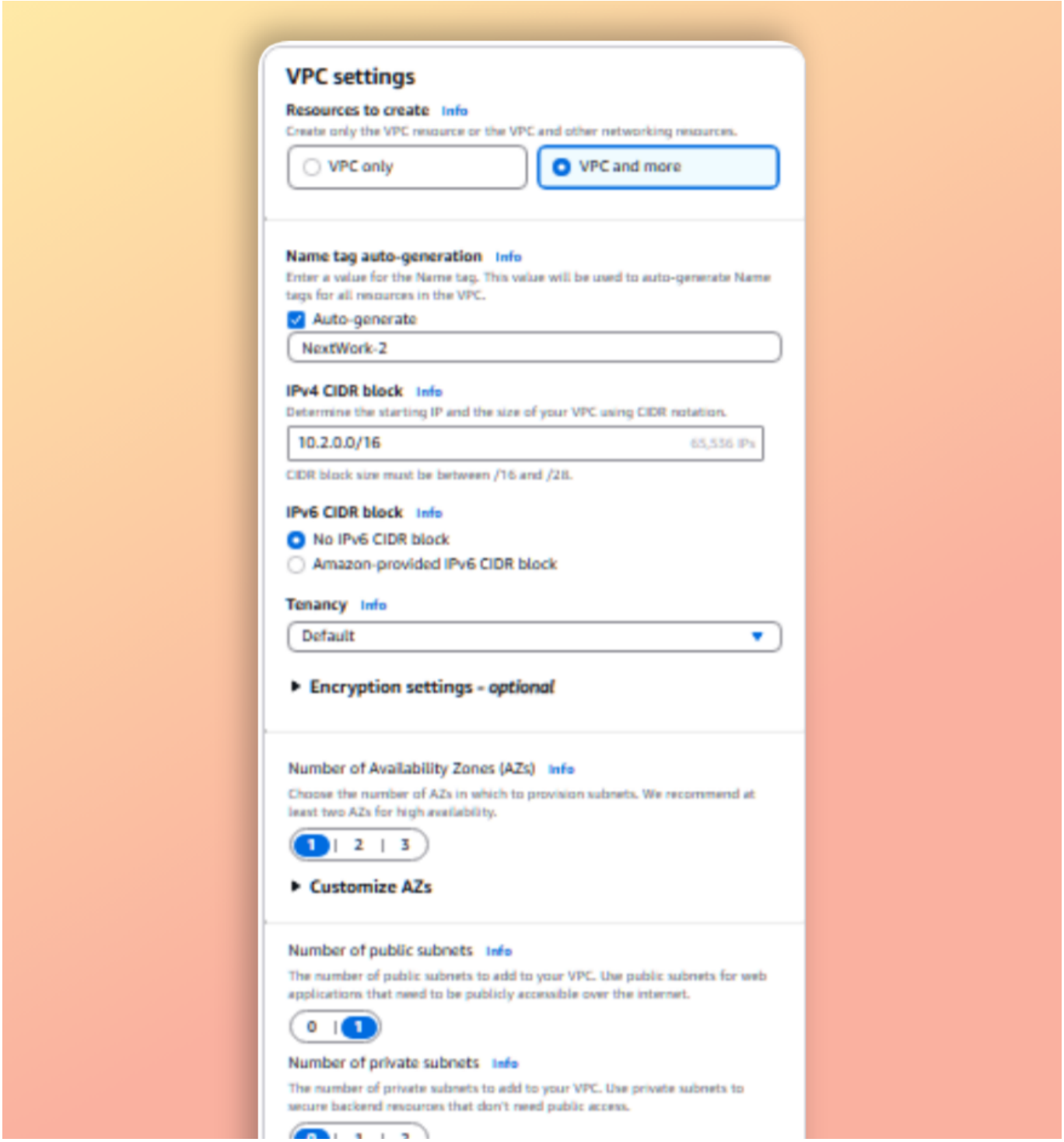


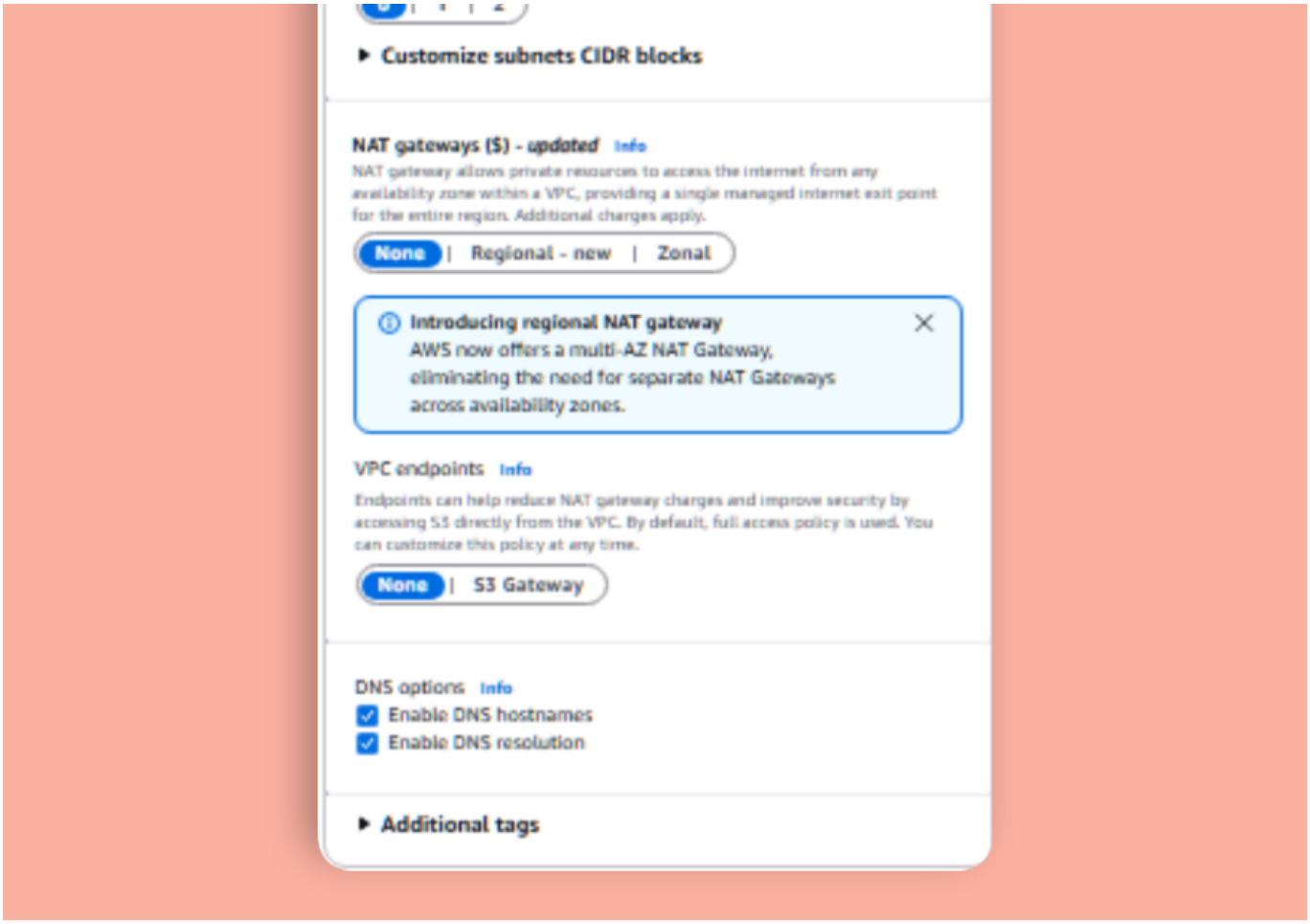
VPC 1 Resource Map

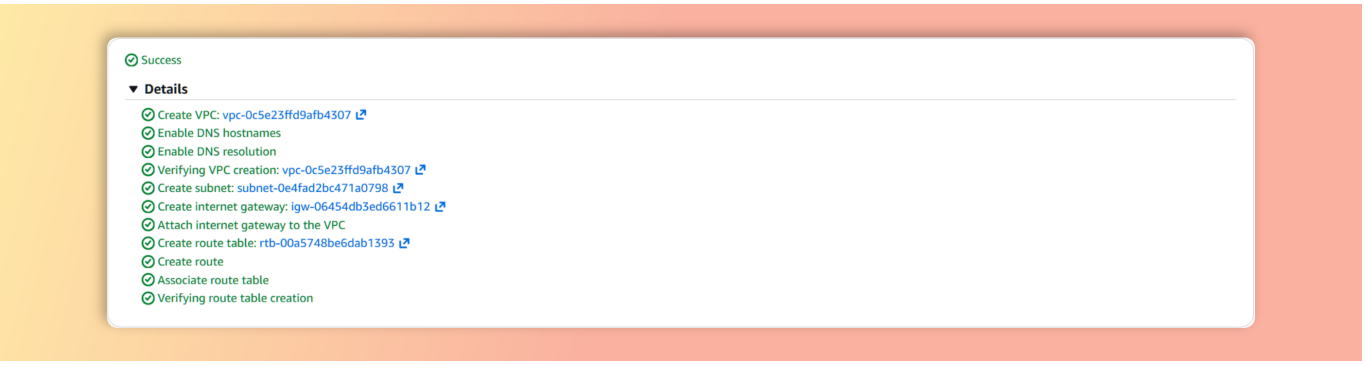


Creating NextWork VPC 2

VPC Wizard Configuration:







VPC 2 Resource Map

Step 2: Create VPC Peering Connection

What I did:

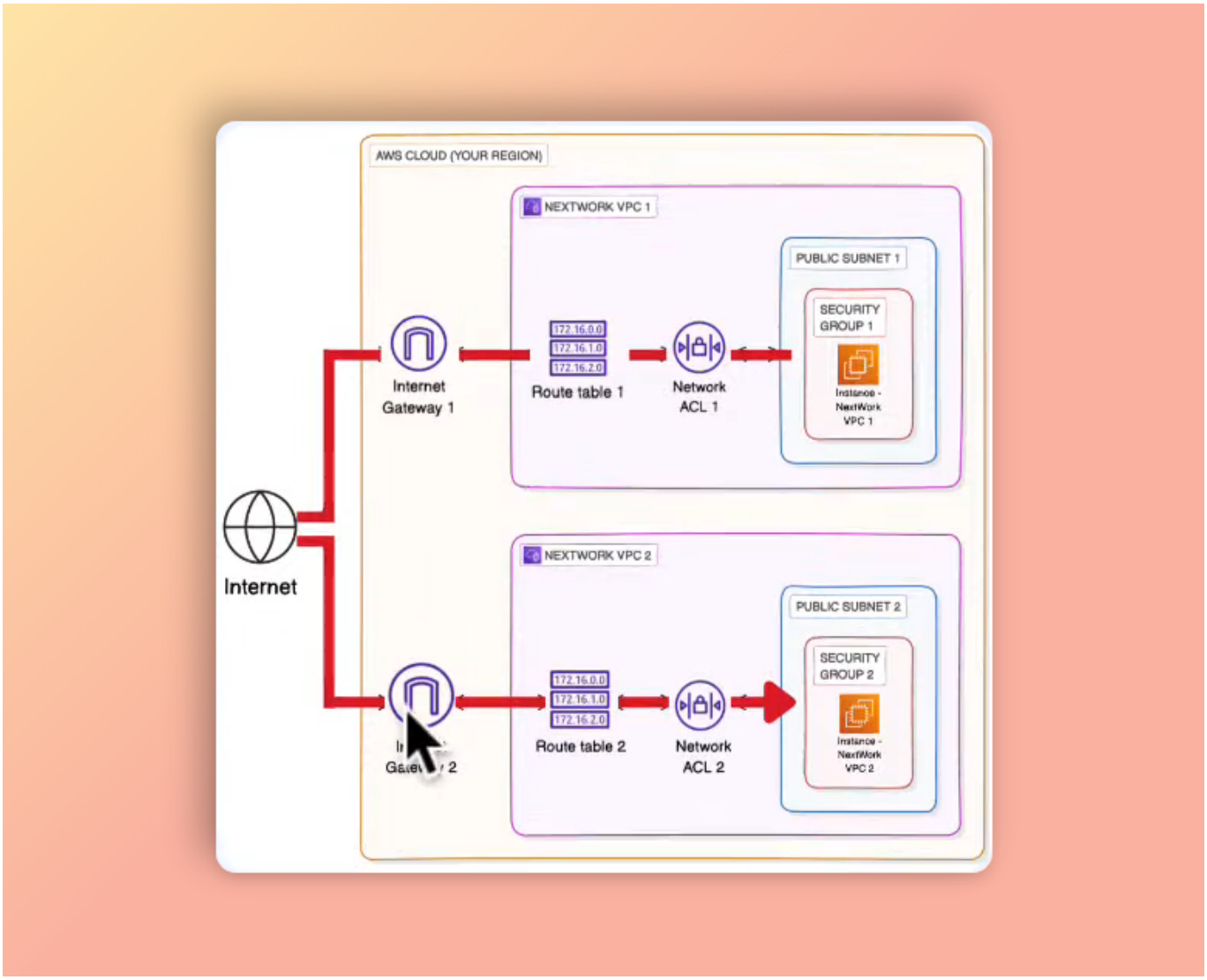
I created a VPC peering connection to establish a private network link between the two VPCs.

Understanding VPC Peering

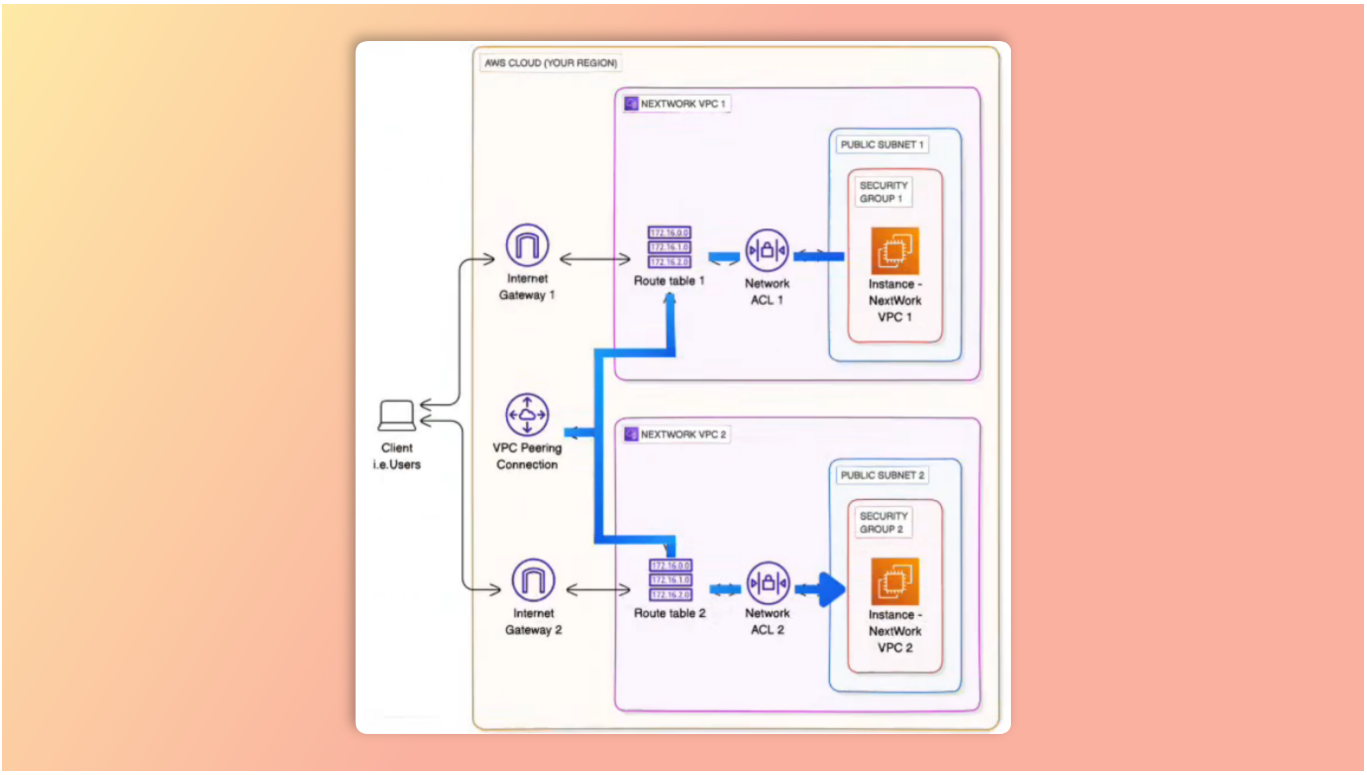
What is VPC Peering?

VPC Peering is a networking connection between two VPCs that enables traffic routing using **private IP addresses**, as if they were part of the same network.

Without VPC Peering:



With VPC Peering:



Benefits:

- **Security**: Traffic never traverses the public internet
- **Performance**: Lower latency, faster data transfer
- **Cost**: No data transfer charges between peered VPCs in same region
- **Simplicity**: No VPN or gateway infrastructure needed

Understanding Peering Terminology: Requester vs Accepter

Requester (VPC 1):

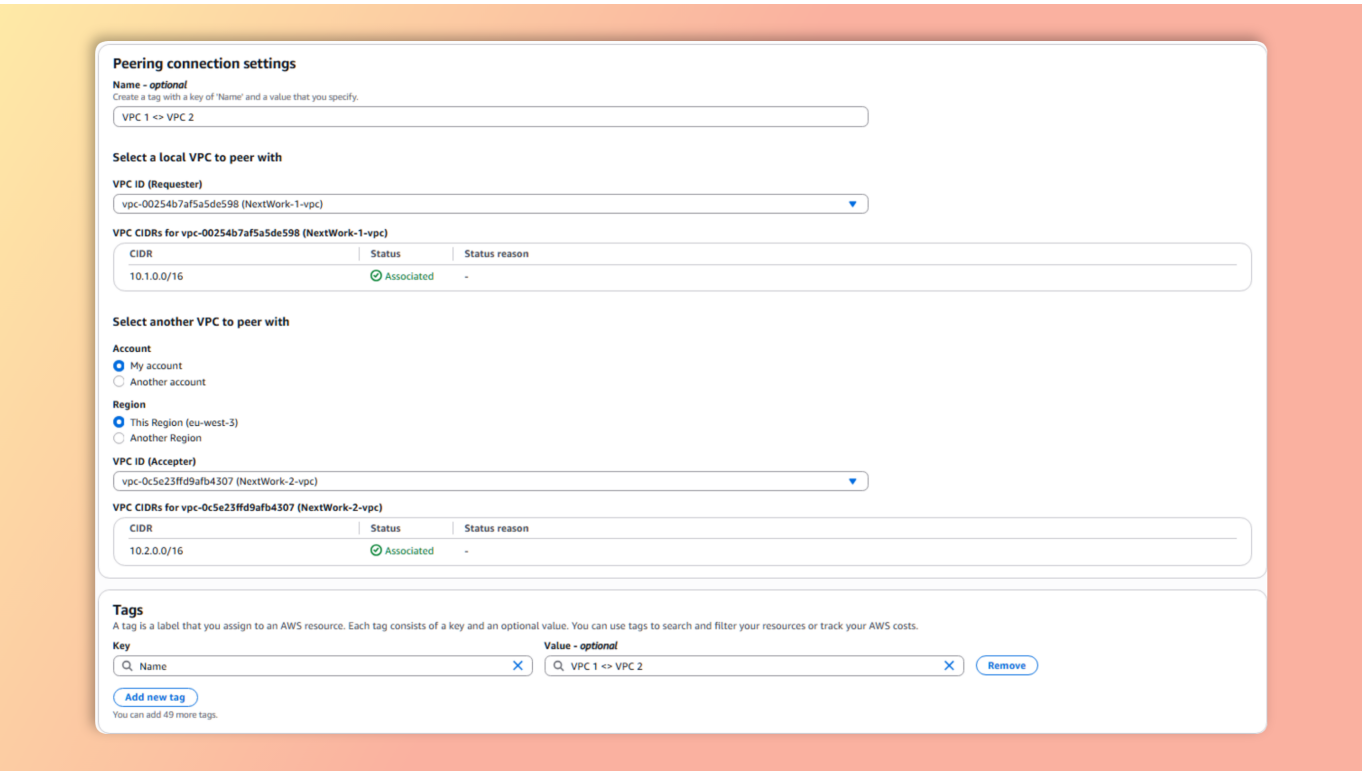
- The VPC that initiates the peering connection request
- Sends invitation to the accepter VPC

Accepter (VPC 2):

- The VPC that receives the peering connection request
- Can accept or reject the invitation
- Peering connection becomes active only after acceptance

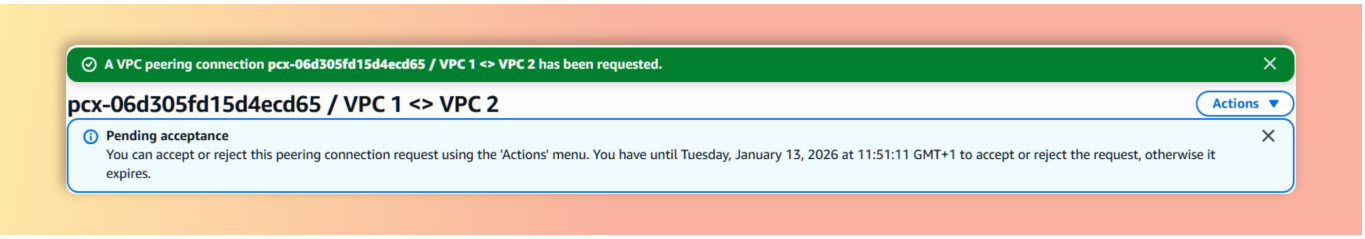
Important: Both VPCs must agree to the peering connection. It's a mutual relationship!

Creating the Peering Connection



Note: You can also peer VPCs across different AWS accounts and regions!

Peering Connection Requested



Status: Pending acceptance

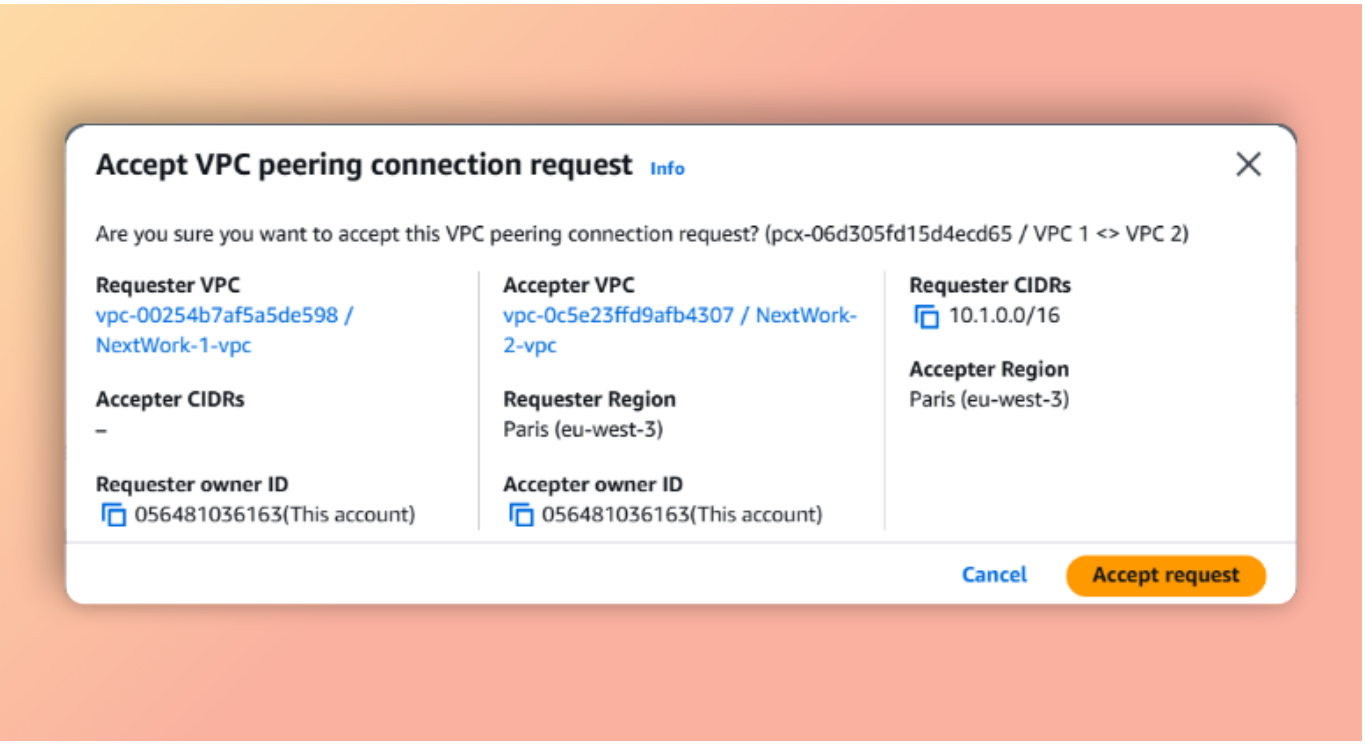
What this means:

The peering connection is created but **not yet active**.

Why is acceptance needed?

This ensures both VPC owners agree to the connection. In cross-account scenarios, the accepter VPC owner must explicitly approve the peering request.

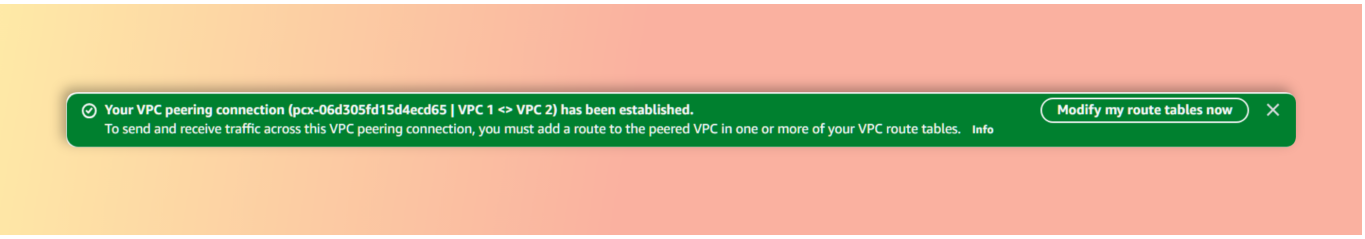
Accepting the Peering Request



Actions: Actions → Accept request

Since I own both VPCs, I'm accepting on behalf of VPC 2 (the accepter).

Peering Connection Active



Success! The peering connection is now established. However, traffic still won't flow until we update the route tables!

Step 3: Update Route Tables

What I did:

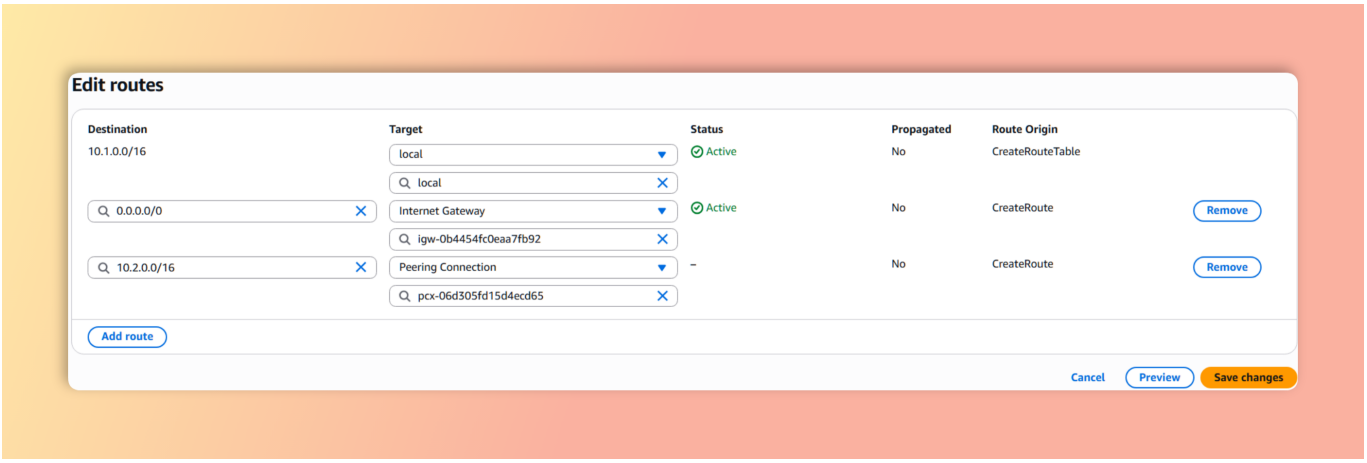
I updated both VPCs' route tables to direct traffic destined for the other VPC through the peering connection.

Understanding Route Tables for VPC Peering

The Challenge:

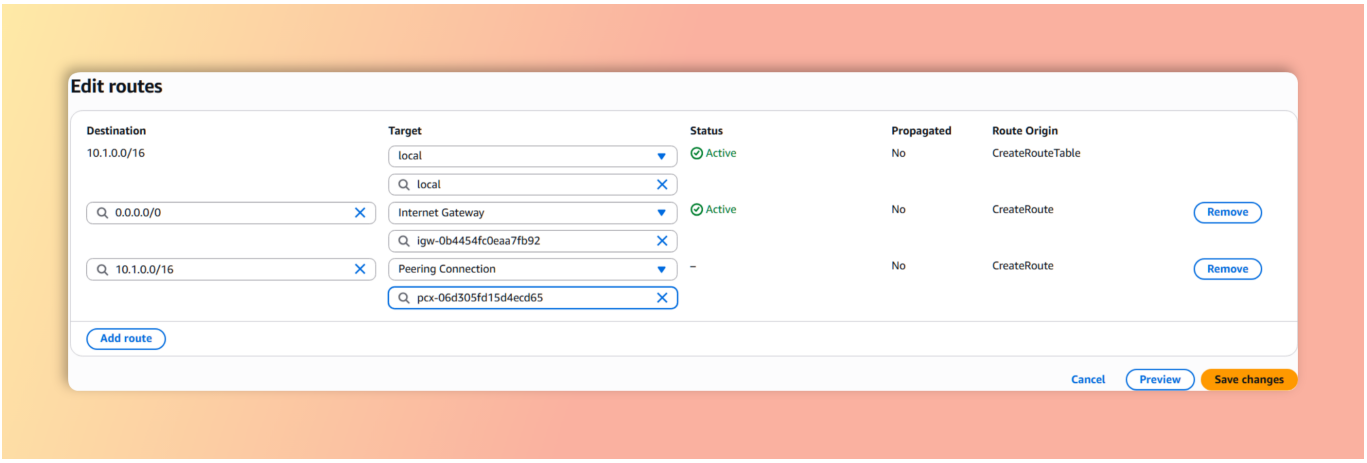
Even after creating a peering connection, traffic doesn't automatically know how to use it. Route tables must be updated to direct traffic through the peering connection.

Updating VPC 1 Route Table

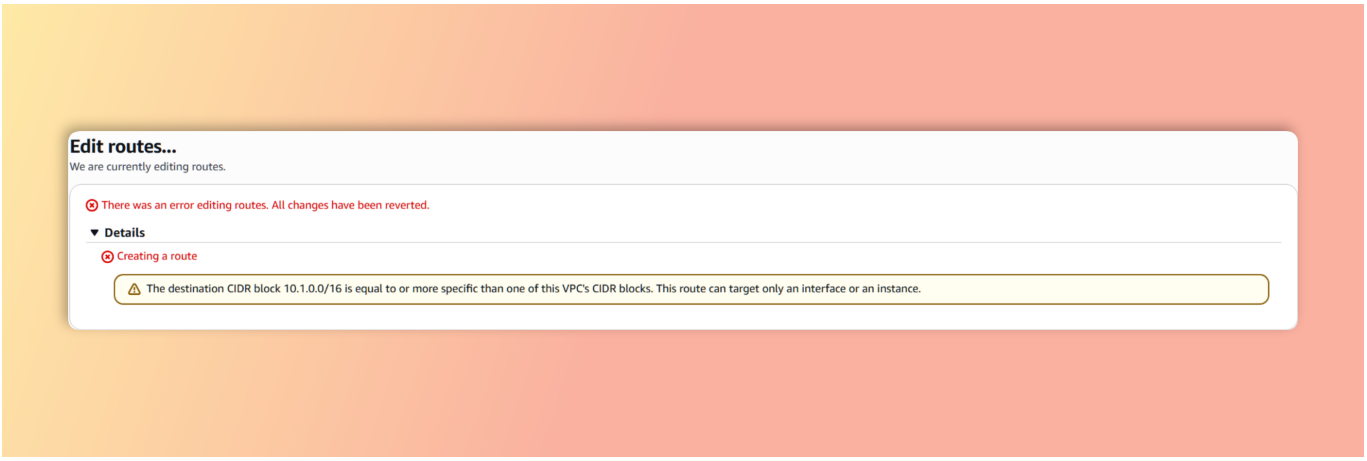


Common Mistake - Wrong CIDR Block

What I did wrong: I accidentally entered 10.1.0.0/16 (VPC 1's own CIDR) instead of 10.2.0.0/16!



Error: "The destination CIDR block overlaps with existing subnet CIDR"

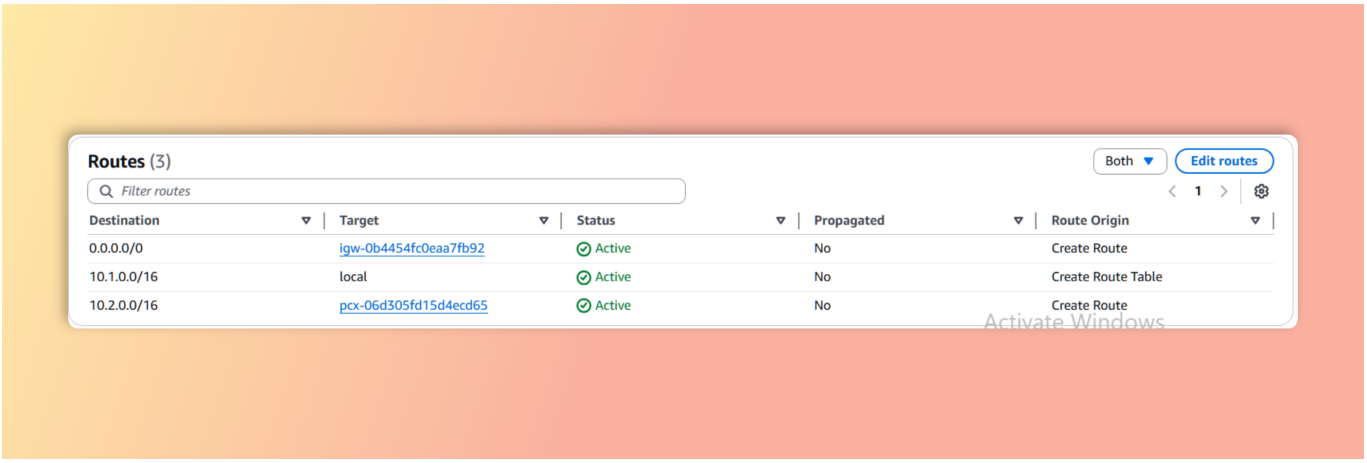


Why this causes an error:

The route table can't differentiate between local traffic and peered traffic if they have the same CIDR block. AWS prevents this misconfiguration.

Fix: Changed destination to 10.2.0.0/16 ☑

VPC 1 Routes Complete

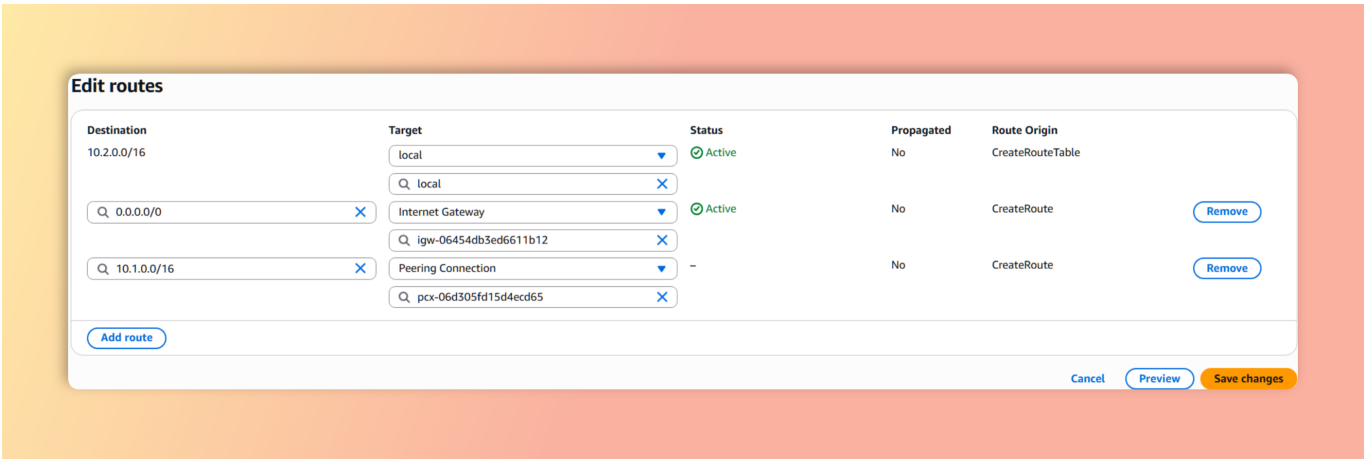


Success! VPC 1 now knows how to reach VPC 2.

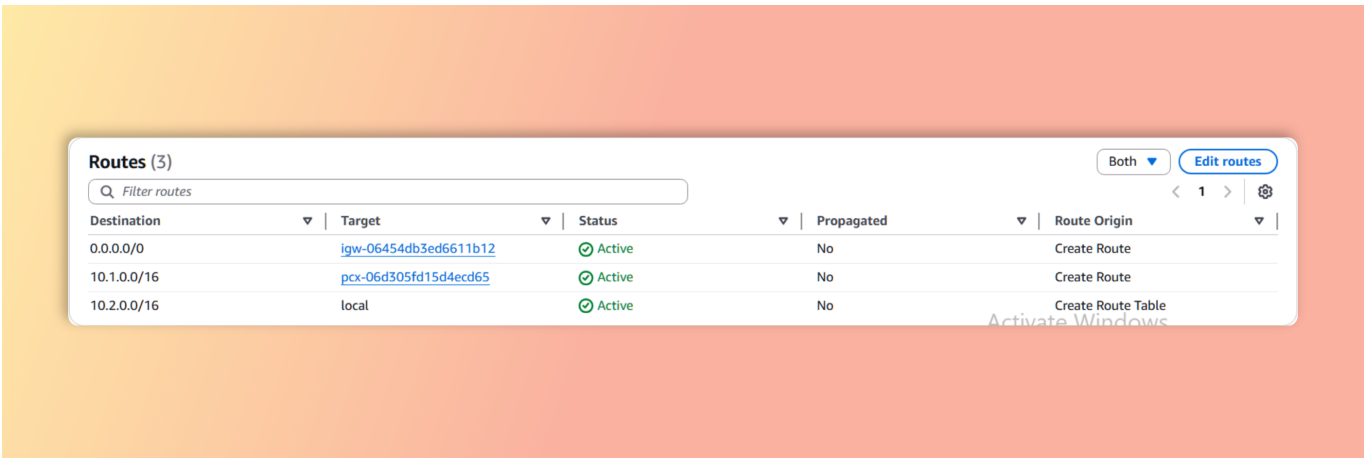
Updating VPC 2 Route Table

Challenge Yourself:

I followed the same process for VPC 2's route table.



VPC 2 Routes Complete



Success! VPC 2 now knows how to reach VPC 1.

Peering is bidirectional! Both route tables must have routes to each other.

Step 4: Launch EC2 Instances

What I did:

I launched one EC2 instance in each VPC to test the peering connection.

Understanding Default Security Groups

Important Discovery:

When you create a VPC, AWS automatically creates a **default security group** with specific rules.

Default Security Group Inbound Rules:

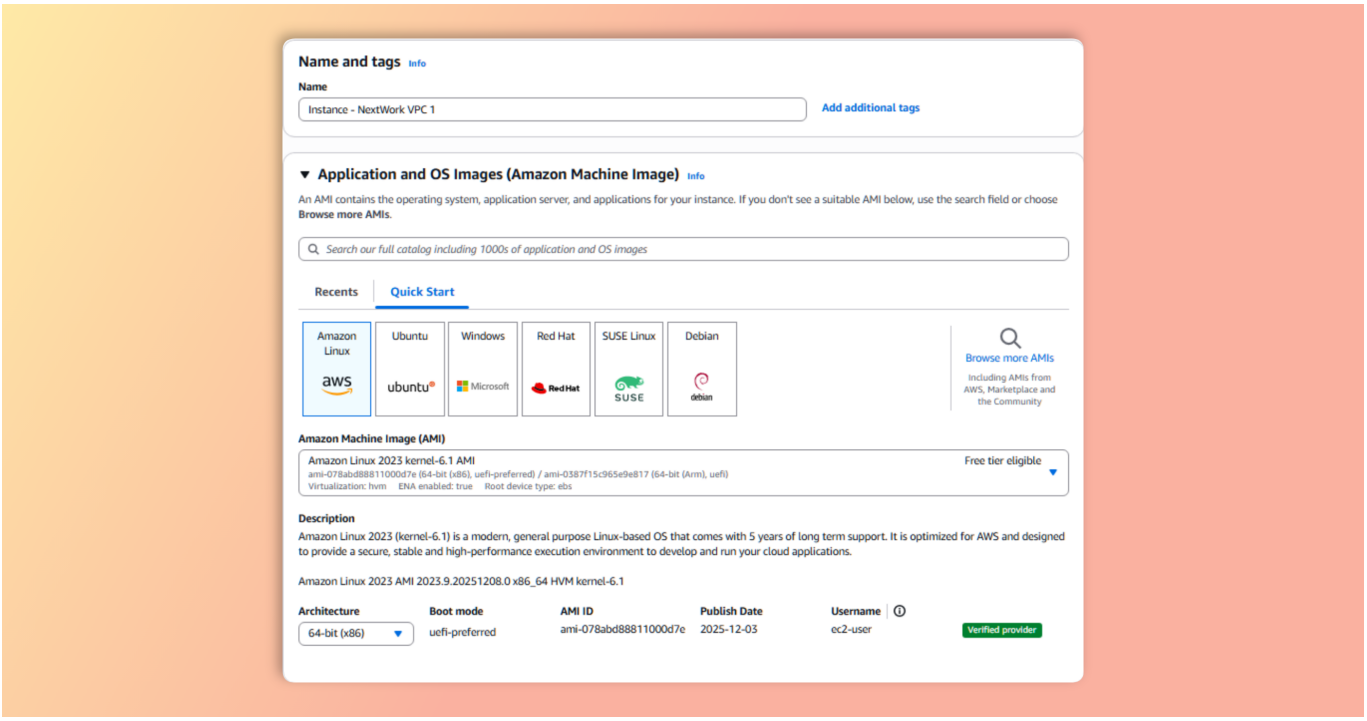
```
Type        Protocol    Port    Source
All traffic    All       All     sg-xxxxx (itself)
```

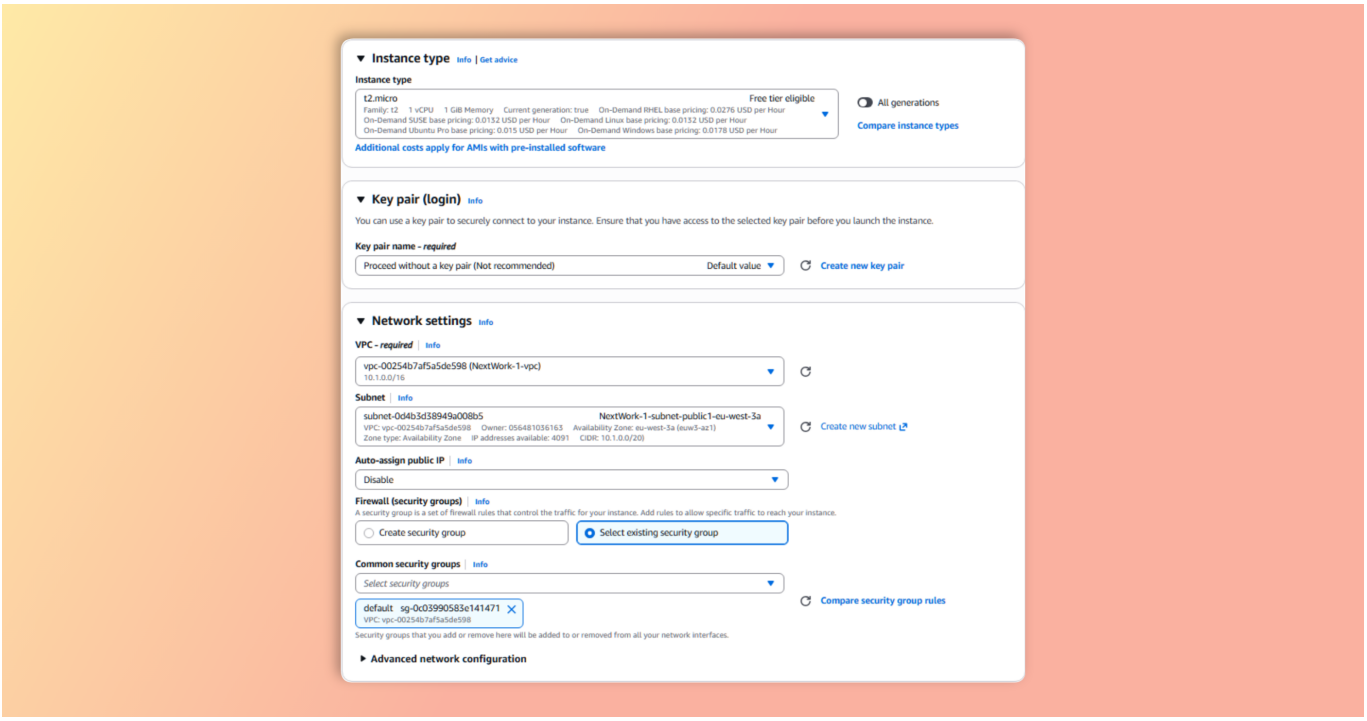
What this means:

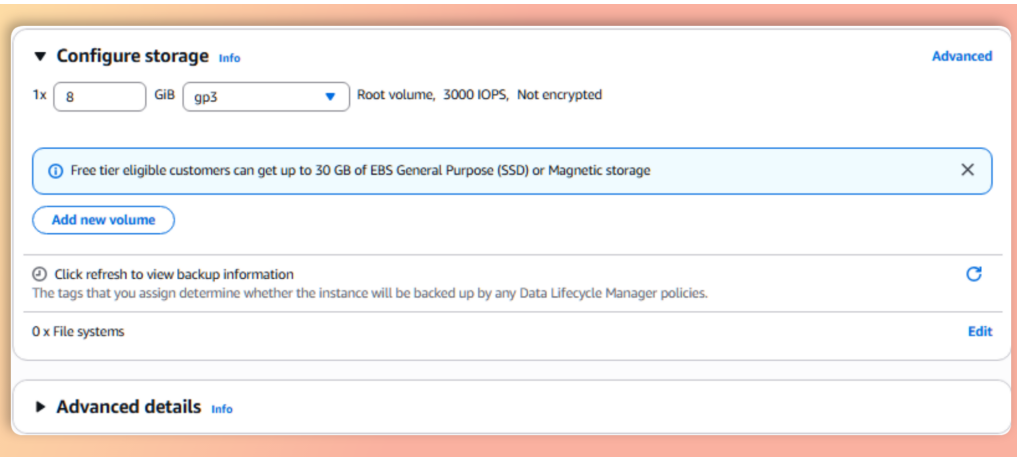
- Allows **all** traffic from resources using the **same security group**
- **Blocks** all traffic from outside the VPC
- **Blocks** SSH from EC2 Instance Connect (comes from internet)

This will become important when we try to connect to our instances!

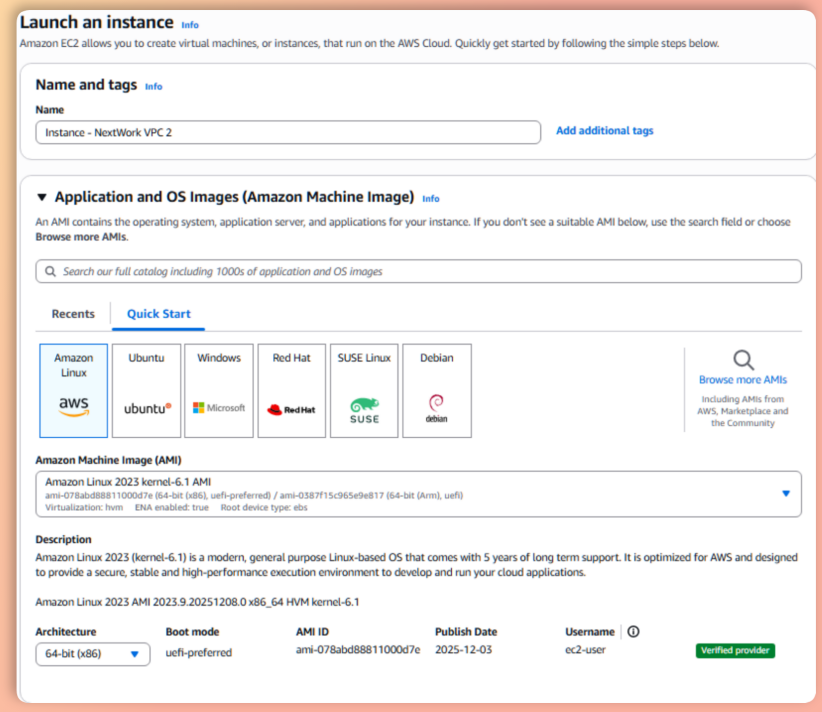
Launching Instance in VPC 1

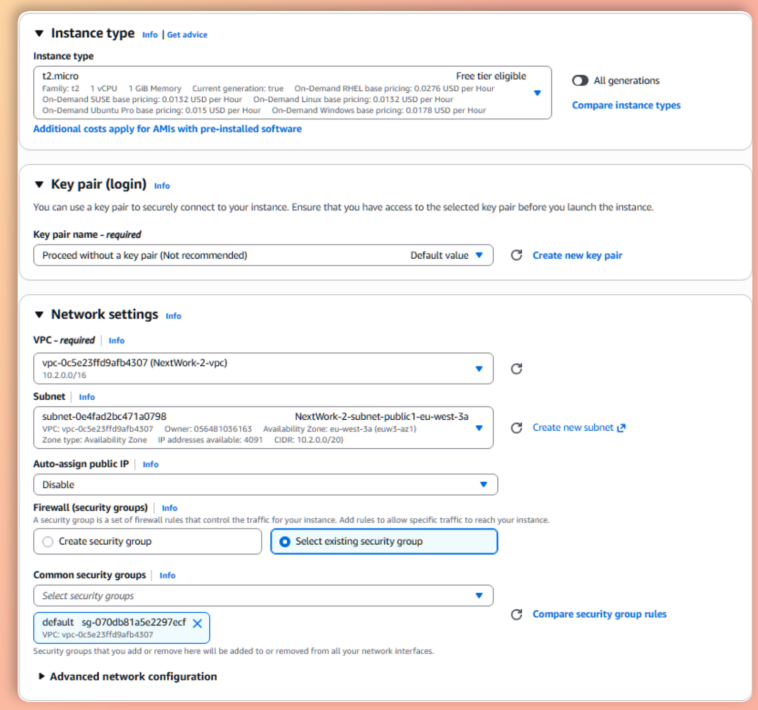


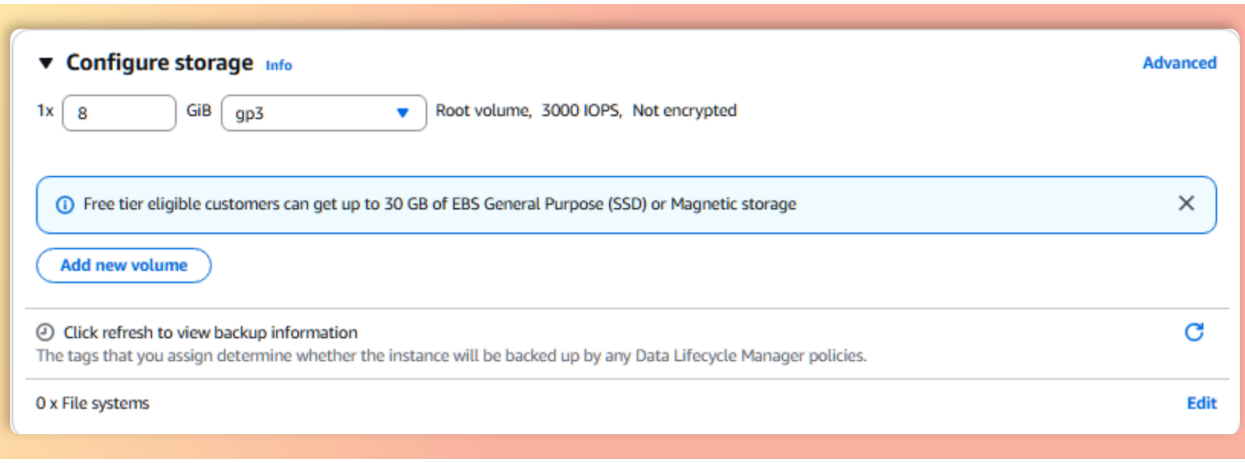




Launching Instance in VPC 2


Launch an instance Info
Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.
Name and tags Info
Name
Instance - NextWork VPC 2
Add additional tags
Application and OS Images (Amazon Machine Image) Info
An AMI contains the operating system, application server, and applications for your instance. If you don't see a suitable AMI below, use the search field or choose Browse more AMIs.
Search our full catalog including 1000s of application and OS images
Recents
Quick Start
Amazon Linux
Ubuntu
Windows
Red Hat
SUSE Linux
Debian
Browse more AMIs
Including AMIs from AWS, Marketplace and the Community
Amazon Machine Image (AMI)
Amazon Linux 2023 kernel-6.1 AMI
ami-078abd88811000d7e (64-bit (x86), uefi-preferred) / ami-0387f15c965e9e817 (64-bit (Arm), uefi)
Virtualization: hvm ENA enabled: true Root device type: ebs
Description
Amazon Linux 2023 (kernel-6.1) is a modern, general purpose Linux-based OS that comes with 5 years of long term support. It is optimized for AWS and designed to provide a secure, stable and high-performance execution environment to develop and run your cloud applications.
Amazon Linux 2023 AMI 2023.9.20251208.0 x86_64 HVM kernel-6.1
Architecture
Boot mode
AMI ID
Publish Date
Username
64-bit (x86)
uefi-preferred
ami-078abd88811000d7e
2025-12-03
ec2-user
Verified provider


Instance type Info | Get advice
Instance type
t2.micro
Free tier eligible
Family: t2 1 vCPU 1 GiB Memory Current generation: true On-Demand RHEL base pricing: 0.0276 USD per Hour
On-Demand SUSE base pricing: 0.0132 USD per Hour On-Demand Linux base pricing: 0.0132 USD per Hour
On-Demand Ubuntu Pro base pricing: 0.015 USD per Hour On-Demand Windows base pricing: 0.0178 USD per Hour
All generations
Compare instance types
Additional costs apply for AMIs with pre-installed software
Key pair (login) Info
You can use a key pair to securely connect to your instance. Ensure that you have access to the selected key pair before you launch the instance.
Key pair name - required
Proceed without a key pair (Not recommended)
Default value
Create new key pair
Network settings Info
VPC - required Info
vpc-0c5e23ffd9afb4307 (NextWork-2-vpc)
10.2.0.0/16
Subnet Info
subnet-0e4fad2bc471a0798
NextWork-2-subnet-public1-eu-west-3a
VPC: vpc-0c5e23ffd9afb4307 Owner: 056481036163 Availability Zone: eu-west-3a (euw3-az1)
Zone type: Availability Zone IP addresses available: 4091 CIDR: 10.2.0.0/20)
Create new subnet
Auto-assign public IP Info
Disable
Firewall (security groups) Info
A security group is a set of firewall rules that control the traffic for your instance. Add rules to allow specific traffic to reach your instance.
Create security group
Select existing security group
Common security groups Info
Select security groups
default sg-070db81a5e2297ecf
VPC: vpc-0c5e23ffd9afb4307
Compare security group rules
Security groups that you add or remove here will be added to or removed from all your network interfaces.
Advanced network configuration


Configure storage Info
Advanced
1x
8
GiB
gp3
Root volume, 3000 IOPS, Not encrypted
Free tier eligible customers can get up to 30 GB of EBS General Purpose (SSD) or Magnetic storage
Add new volume
Click refresh to view backup information
The tags that you assign determine whether the instance will be backed up by any Data Lifecycle Manager policies.
0 x File systems
Edit

Step 5: Assign Elastic IP and Connect to Instance

What I did:

I allocated an Elastic IP address and associated it with Instance 1 to enable EC2 Instance Connect access.

Understanding Elastic IP Addresses

What are Elastic IPs?

Elastic IPs are **static, public IPv4 addresses** that you can allocate to your AWS account and assign to EC2 instances.

Regular Public IP vs Elastic IP:

Feature	Regular Public IP	Elastic IP
Assignment	Automatic when instance launches	Manual allocation
Behavior	Changes when instance stops/starts	Remains constant
Cost	Free	Free when attached, $0.005/hour when not attached
Use Case	Temporary instances	Production servers, DNS records

Why Elastic IPs Matter:

Scenario 1: E-commerce Website

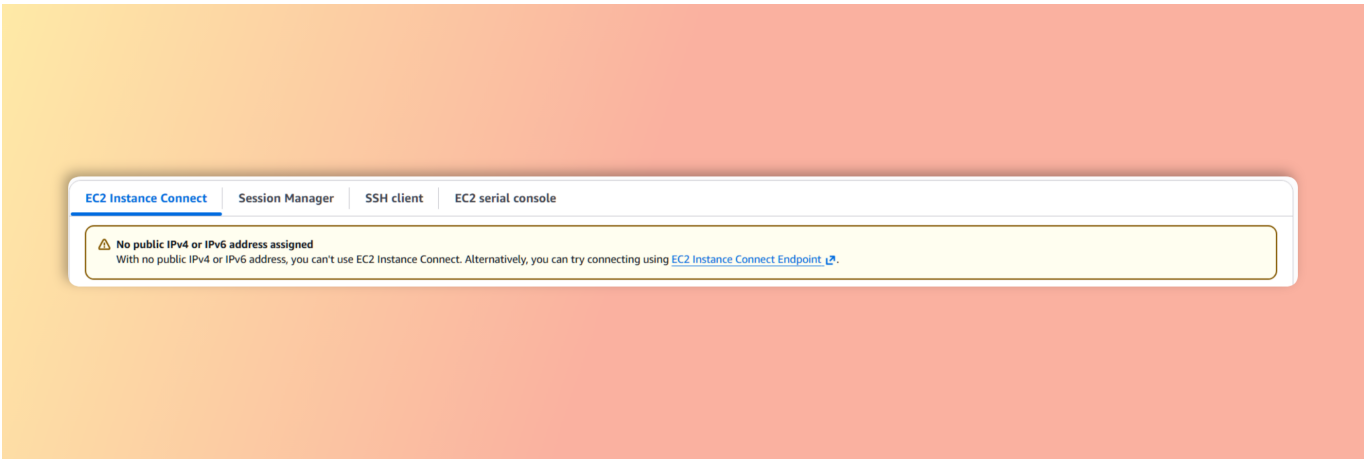
```
Without Elastic IP:
- Instance restarts → New public IP (54.123.45.67 → 18.234.56.78)
- DNS record (shop.example.com) still points to old IP
- Website is DOWN until DNS updates (can take hours!)

With Elastic IP:
- Instance restarts → Same Elastic IP (54.123.45.67)
- DNS record still correct
- Website stays UP! ☑
```

My Use Case:

I launched instances **without auto-assigned public IPs**, so they couldn't use EC2 Instance Connect. Elastic IPs provided a way to assign public IPs **after launch**.

Problem: EC2 Instance Connect Requires Public IP

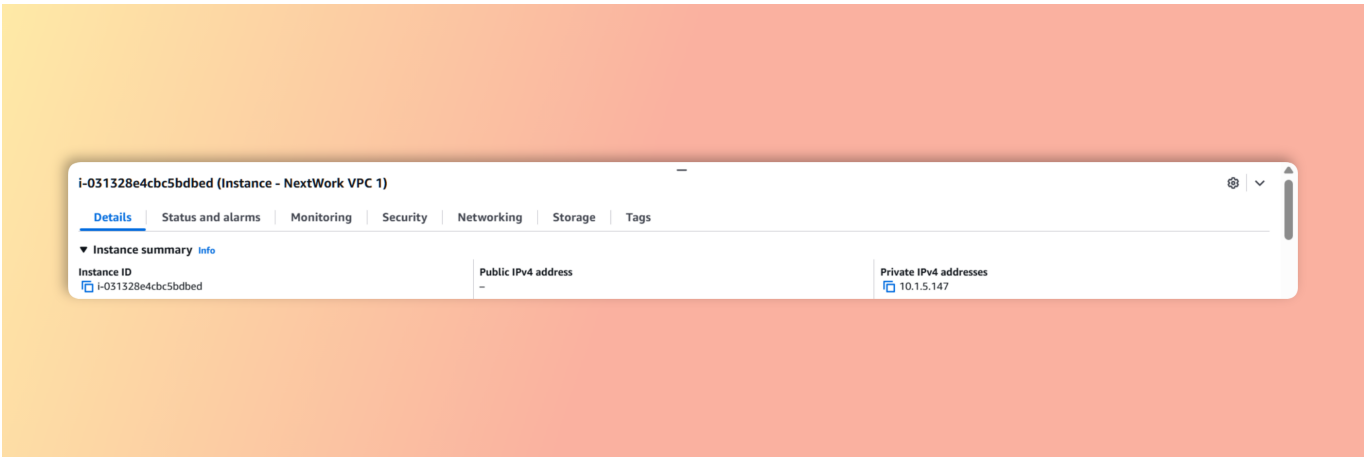
Initial Connection Attempt:



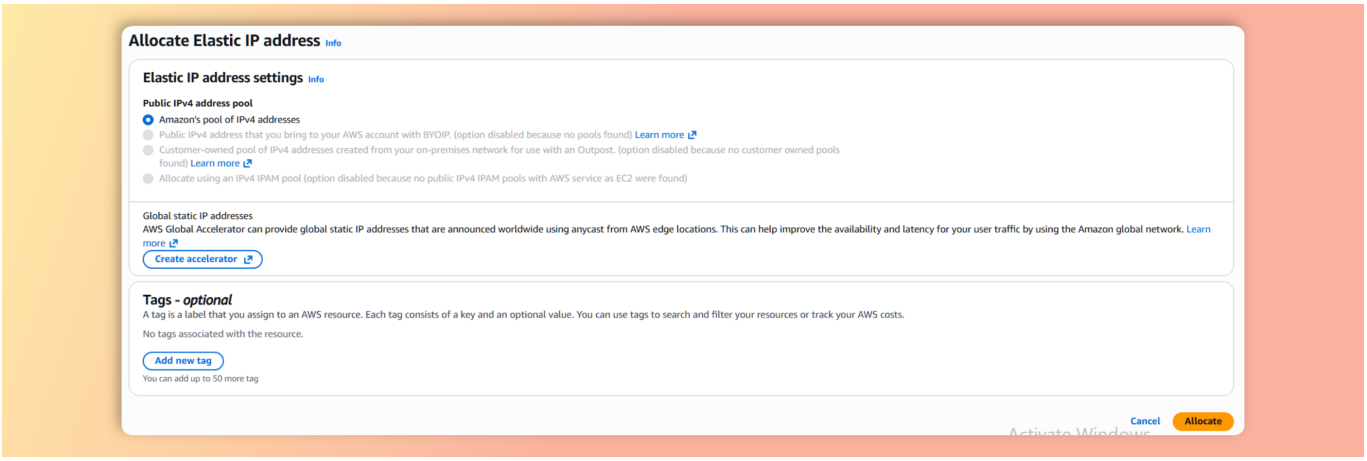
Why this happened:

I disabled auto-assign public IP when launching the instance. EC2 Instance Connect requires a public IP because it connects **over the internet** by default.

Verification:



Allocating an Elastic IP

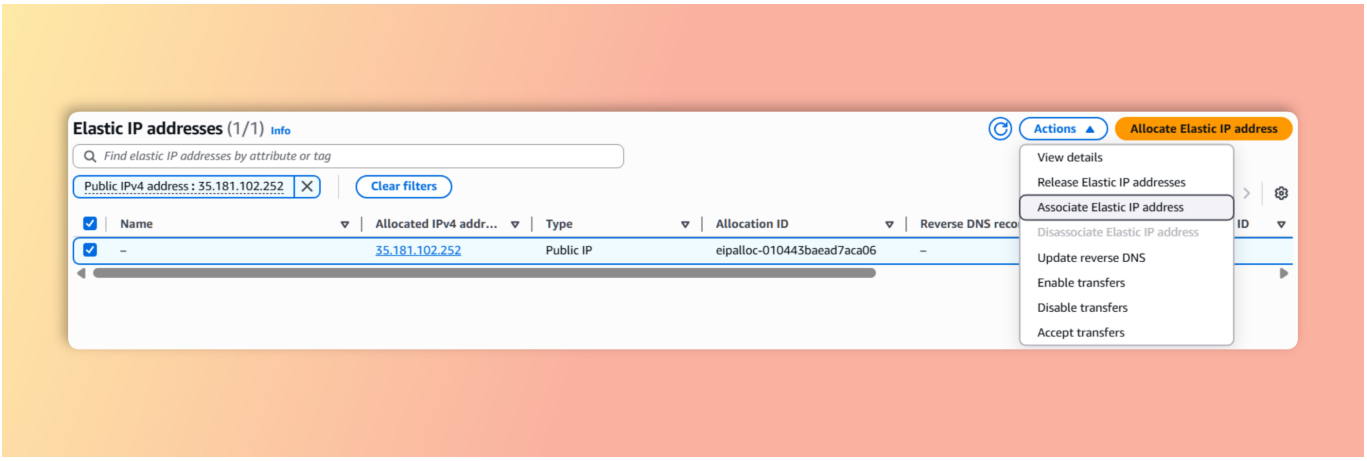


What happens:

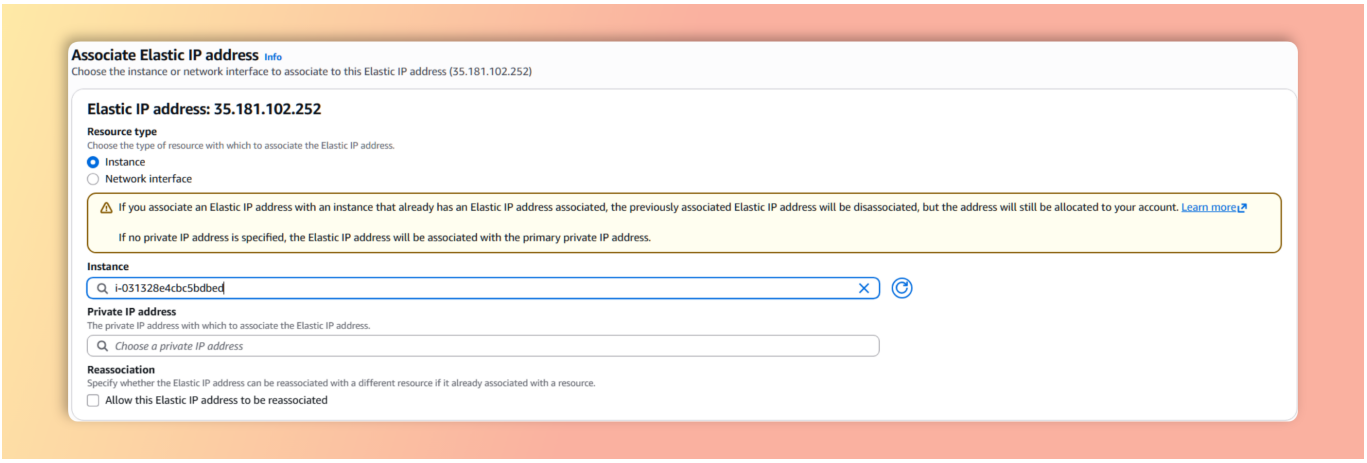
AWS allocates a static IPv4 address from Amazon's pool and assigns it to my account.

Associating Elastic IP with Instance

Actions:



Configuration:

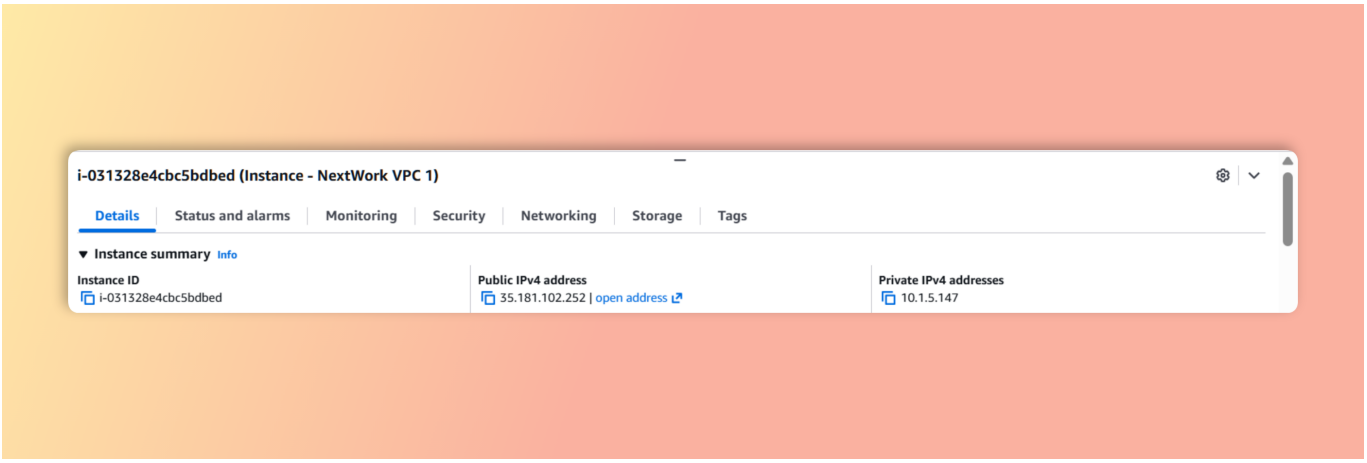


What this does:

Attaches the Elastic IP to the instance's network interface, giving it a public IP address.

Elastic IP Associated

Verification:



Problem: SSH Connection Still Fails

Second Connection Attempt:

Troubleshooting Security Group

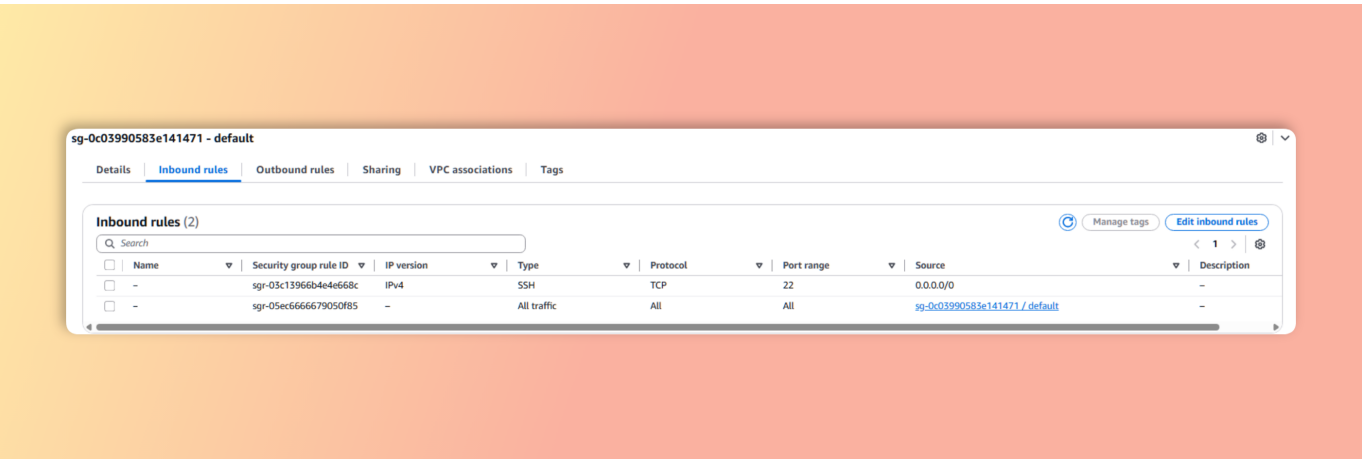
Investigation Steps:

1. ☑ Check Route Table → Has route to Internet Gateway
2. ☑ Check Network ACL → Allows all traffic
3. ⚠ Check Security Group → **Found the issue!**

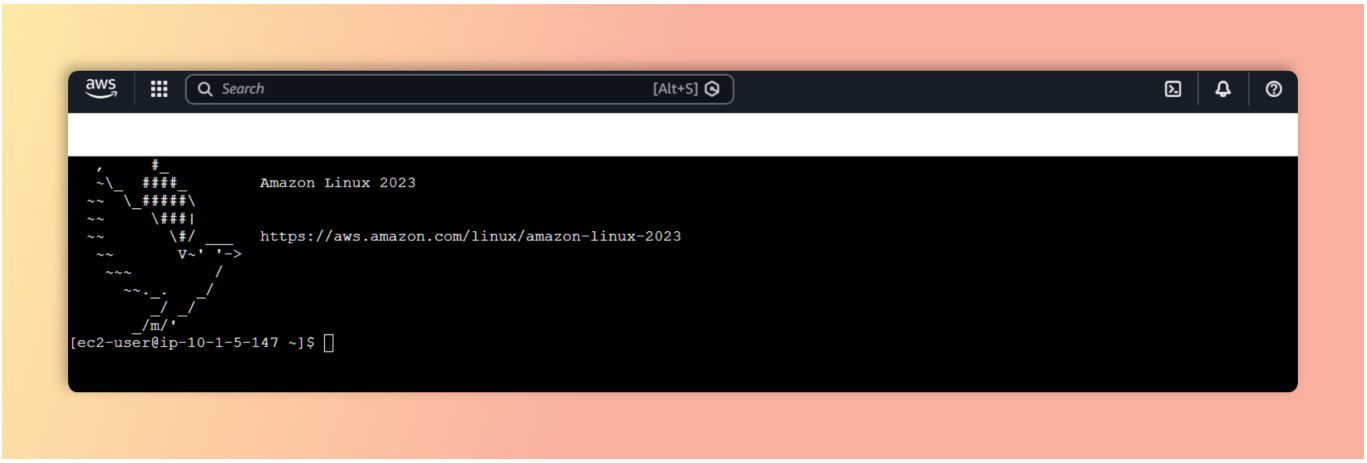
Root Cause:

The default security group **only allows traffic from resources using the same security group**. EC2 Instance Connect connects from the **internet**, which is blocked!

Fixing the Security Group



Successful Connection



Step 6: Test VPC Peering with Ping

What I did:

I tested the VPC peering connection by pinging Instance 2 (VPC 2) from Instance 1 (VPC 1).

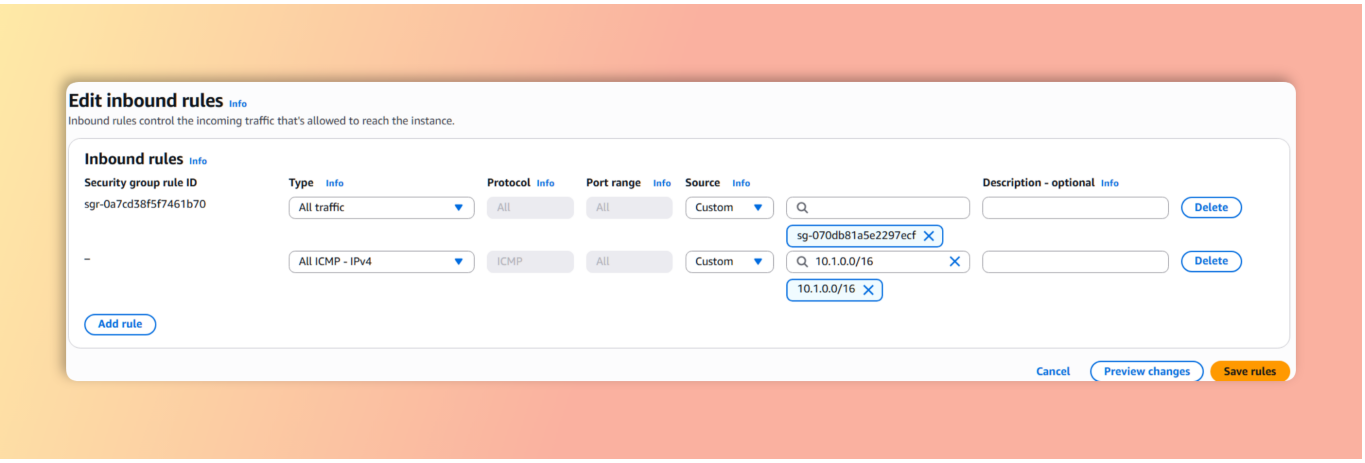
Initial Ping Test

Troubleshooting Security Group

Root Cause Found!

The default security group only allows traffic from resources with the **same security group**. Instance 1 has a **different security group** (from VPC 1), so its ping is blocked!

Adding ICMP Rule to VPC 2 Security Group



Successful Ping Test

Terminal output:

Cleanup

Important: Delete resources in the correct order to avoid dependency errors!

1. **Release Elastic IP addresses** (or they'll keep charging you!)
2. **Terminate EC2 instances**
3. **Delete VPC peering connection**
4. **Delete VPC 1** (cascade deletes subnets, route tables, IGW, NACLs, security groups)
5. **Delete VPC 2** (cascade deletes all associated resources)

Conclusion

This project was a major leap forward - I went from managing a single VPC to **connecting two separate VPCs** and enabling private communication between them!

Key Takeaways:

1. ☑ **Mastered VPC Peering** - Connected two isolated VPCs using a peering connection for private communication

2. ☑ **Understood CIDR planning** - Ensured non-overlapping CIDR blocks (10.1.0.0/16 vs 10.2.0.0/16) to avoid routing conflicts
3. ☑ **Configured bidirectional routes** - Added routes in both VPCs pointing to each other via peering connection
4. ☑ **Learned Elastic IPs** - Allocated and associated static public IP addresses for EC2 Instance Connect
5. ☑ **Troubleshot default security groups** - Discovered they only allow traffic from same SG, had to add SSH and ICMP rules
6. ☑ **Tested cross-VPC connectivity** - Used ping to validate instances in different VPCs can communicate via private IPs
7. ☑ **Used VPC Wizard efficiently** - Created two complete VPCs in minutes with auto-generated resources

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What's Next?

This project is **Part 6** of the NextWork VPC series. In the next projects, I'll explore:

Part 7: VPC Monitoring with Flow Logs

- Capture detailed network traffic logs
- Analyze communication patterns between VPCs
- Debug connectivity issues with packet-level data
- Monitor security threats and unusual traffic
- Use CloudWatch Logs for centralized log analysis

Project Completed: January 2026
Author: YOUHAD AYOUB
Region: eu-west-3 (Paris)
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