Project Title:

"Inter-Region Private Network Connectivity Using AWS VPC Peering Across Global Regions"

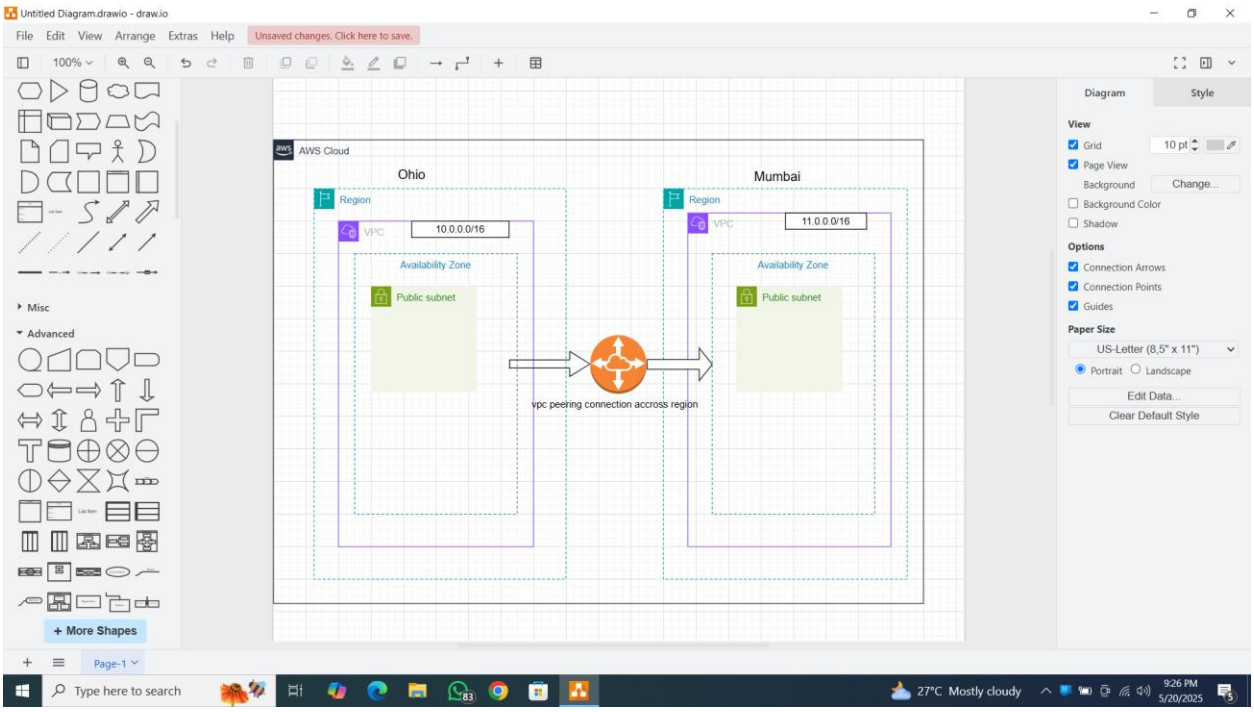
1. Project Overview

This project demonstrates secure and efficient inter-region connectivity between two Amazon Virtual Private Clouds (VPCs) hosted in different AWS regions (Ohio and Mumbai). VPC peering is used to enable private IP communication between EC2 instances across these regions without using public internet or VPNs.

2. Objectives

- Establish a **private, low-latency connection** between two VPCs across different AWS regions.
- Enable **EC2 instances** in both regions to communicate using **private IP addresses**.
- Ensure a **secure, cost-effective architecture** without public IPs or NAT Gateways.

3. Architecture Diagram



Regions:

- **Ohio (us-east-2)** → VPC A → CIDR: `10.0.0.0/16`
- **Mumbai (ap-south-1)** → VPC B → CIDR: `11.0.0.0/16`

Connection: Inter-region VPC Peering
Subnet Type: Public subnets in both regions
EC2 Communication: Private IP-based SSH/Ping

5. Implementation Steps

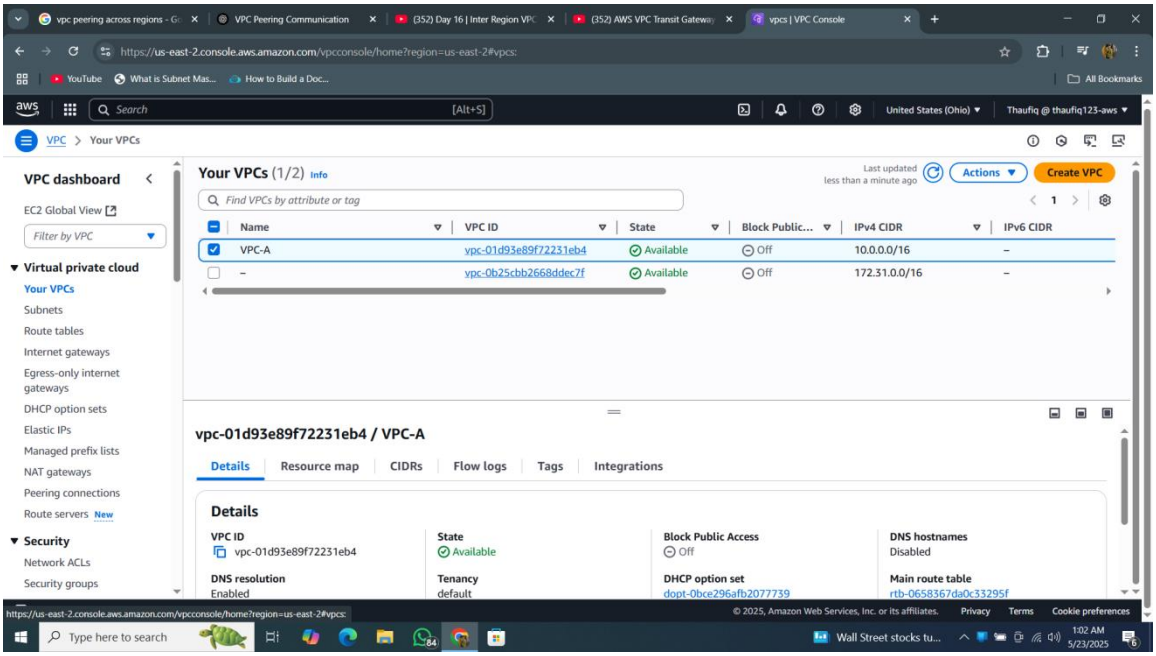
A. Create VPCs

- **Ohio:** `10.0.0.0/16`
- **Mumbai:** `11.0.0.0/16`

B. Create Subnets & Launch EC2 Instances

- Public subnets in both VPCs
- EC2 Instances with key pair & security group allowing:
    - **SSH (port 22)**
    - **ICMP (ping) / HTTP**

VPC-A


vpc peering across regions - G
VPC Peering Communication
(352) Day 16 | Inter Region VPC
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https://us-east-2.console.aws.amazon.com/vpcconsole/home?region=us-east-2#vpcs:
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Subnets
Route tables
Internet gateways
Egress-only internet gateways
DHCP option sets
Elastic IPs
Managed prefix lists
NAT gateways
Peering connections
Route servers New
Security
Network ACLs
Security groups
Your VPCs (1/2) Info
Last updated less than a minute ago
Actions
Create VPC
Find VPCs by attribute or tag
Name
VPC ID
State
Block Public...
IPv4 CIDR
IPv6 CIDR
VPC-A
vpc-01d93e89f72231eb4
Available
Off
10.0.0.0/16
vpc-0b25cbb2668ddec7f
172.31.0.0/16
vpc-01d93e89f72231eb4 / VPC-A
Details
Resource map
CIDRs
Flow logs
Tags
Integrations
Details
VPC ID
State
Block Public Access
DNS hostnames
Disabled
DNS resolution
Enabled
Tenancy
default
DHCP option set
dopt-0bce296afb2077739
Main route table
rtb-0658367da0c33295f
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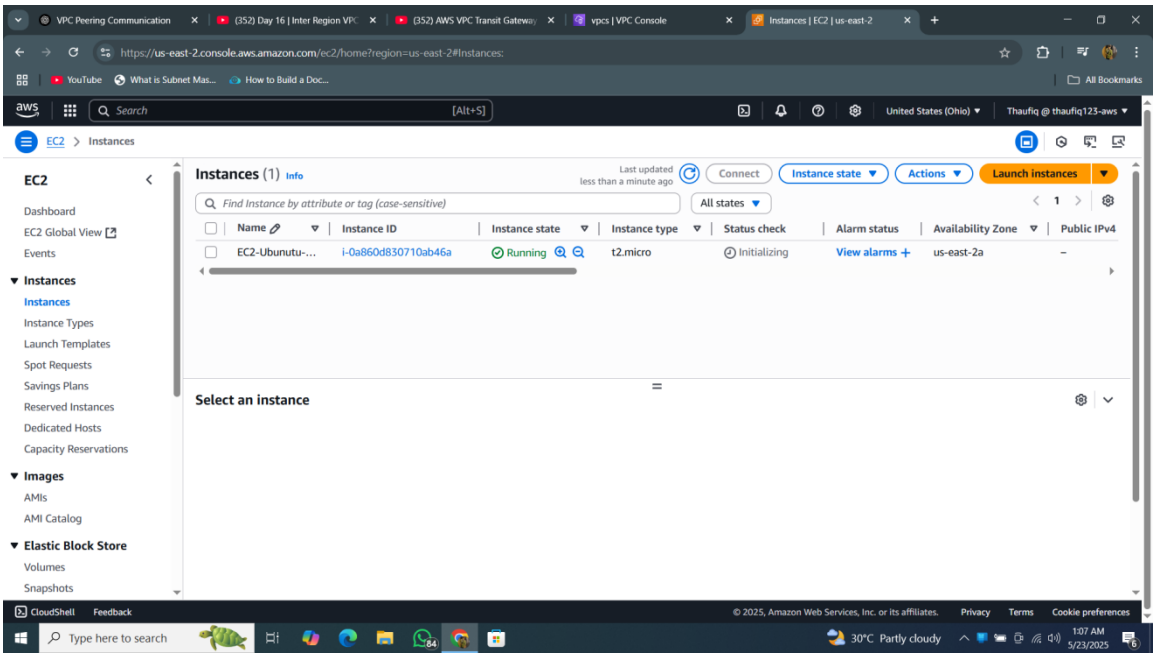
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Instances | EC2 | us-east-2
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Capacity Reservations
Images
AMIs
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Elastic Block Store
Volumes
Snapshots
Instances (1) Info
Last updated less than a minute ago
Connect
Instance state
Actions
Launch instances
Find Instance by attribute or tag (case-sensitive)
All states
Name
Instance ID
Instance state
Instance type
Status check
Alarm status
Availability Zone
Public IPv4
EC2-Ubunutu-...
i-0a860d830710ab46a
Running
t2.micro
Initializing
View alarms
us-east-2a
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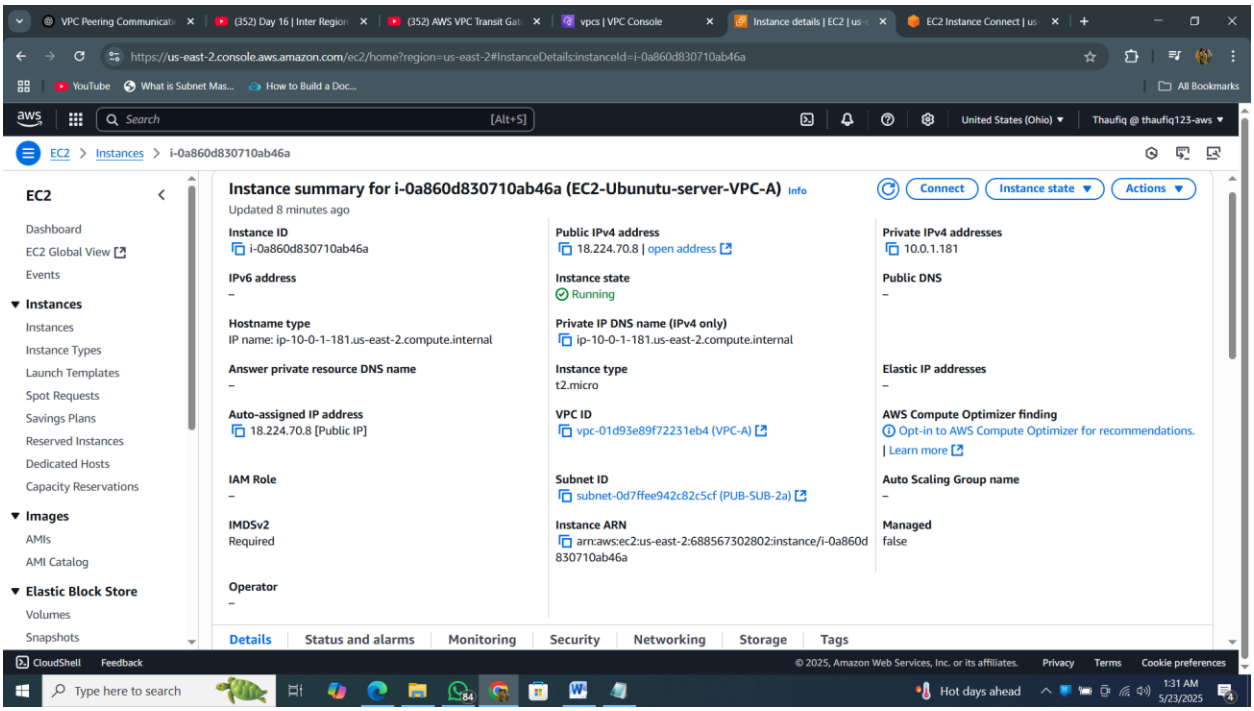
Instance summary for i-0a860d830710ab46a (EC2-Ubunutu-server-VPC-A)
Connect
Instance state
Actions
Instance ID
i-0a860d830710ab46a
Public IPv4 address
18.224.70.8 | open address
Private IPv4 addresses
10.0.1.181
IPv6 address
–
Instance state
Running
Public DNS
–
Hostname type
IP name: ip-10-0-1-181.us-east-2.compute.internal
Private IP DNS name (IPv4 only)
ip-10-0-1-181.us-east-2.compute.internal
Answer private resource DNS name
–
Instance type
t2.micro
Elastic IP addresses
–
Auto-assigned IP address
18.224.70.8 [Public IP]
VPC ID
vpc-01d93e89f72231eb4 (VPC-A)
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Opt-in to AWS Compute Optimizer for recommendations. | Learn more
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–
Subnet ID
subnet-0d7ffee942c82c5cf (PUB-SUB-2a)
Auto Scaling Group name
–
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Required
Instance ARN
arn:aws:ec2:us-east-2:688567302802:instance/i-0a860d830710ab46a
Managed
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Operator
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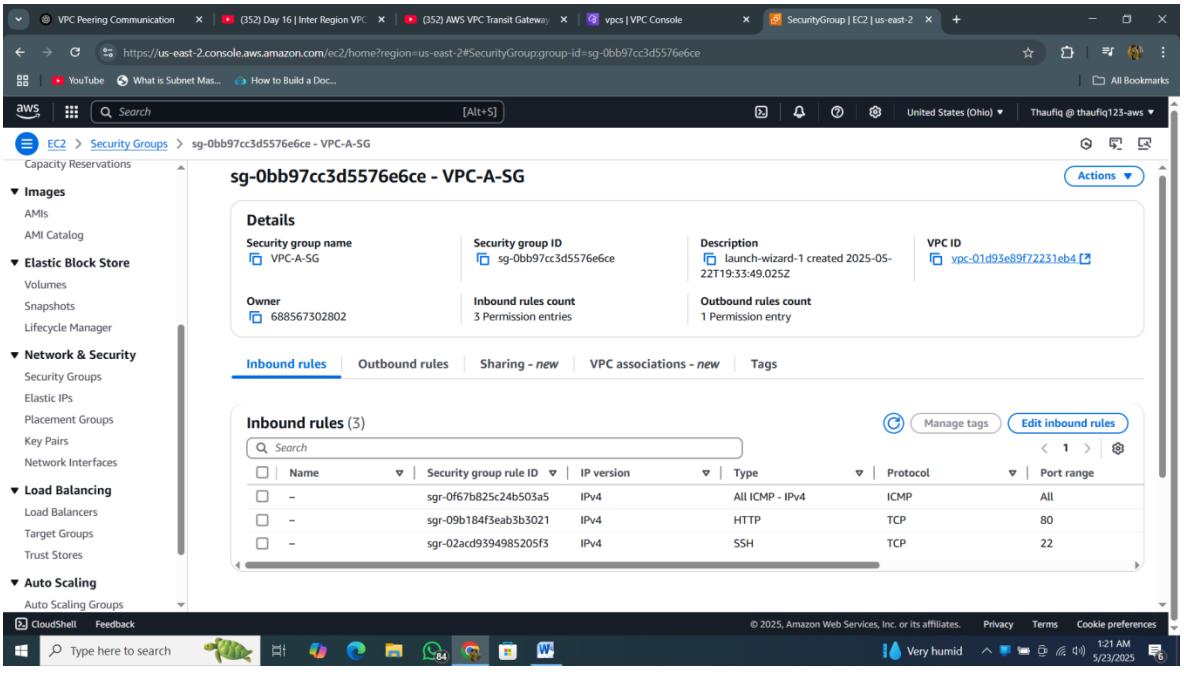
Details
Status and alarms
Monitoring
Security
Networking
Storage
Tags


sg-0bb97cc3d5576e6ce - VPC-A-SG
Actions
Details
Security group name
VPC-A-SG
Security group ID
sg-0bb97cc3d5576e6ce
Description
launch-wizard-1 created 2025-05-22T19:33:49.025Z
VPC ID
vpc-01d93e89f72231eb4
Owner
688567302802
Inbound rules count
3 Permission entries
Outbound rules count
1 Permission entry
Inbound rules
Outbound rules
Sharing - new
VPC associations - new
Tags
Inbound rules (3)
Manage tags
Edit inbound rules
Name
Security group rule ID
IP version
Type
Protocol
Port range
–
sgr-0f67b825c24b503a5
IPv4
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sgr-09b184f3eab3b3021
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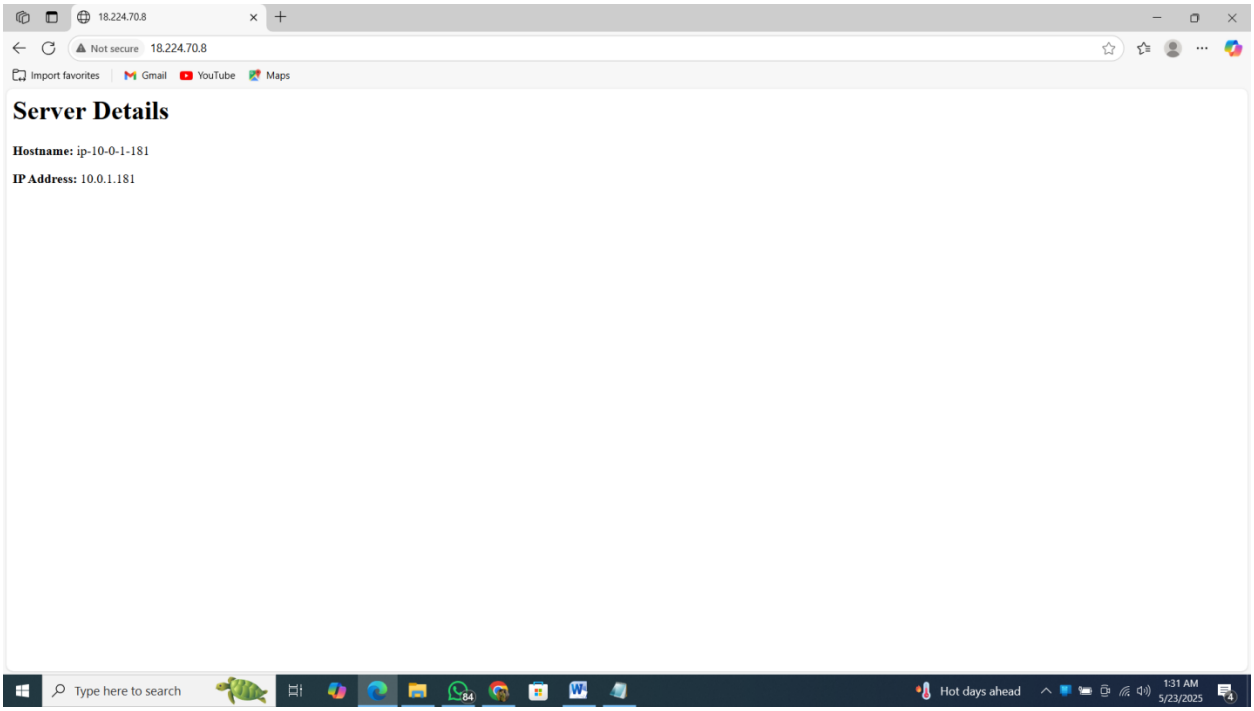
18.224.70.8
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Server Details
Hostname: ip-10-0-1-181
IP Address: 10.0.1.181
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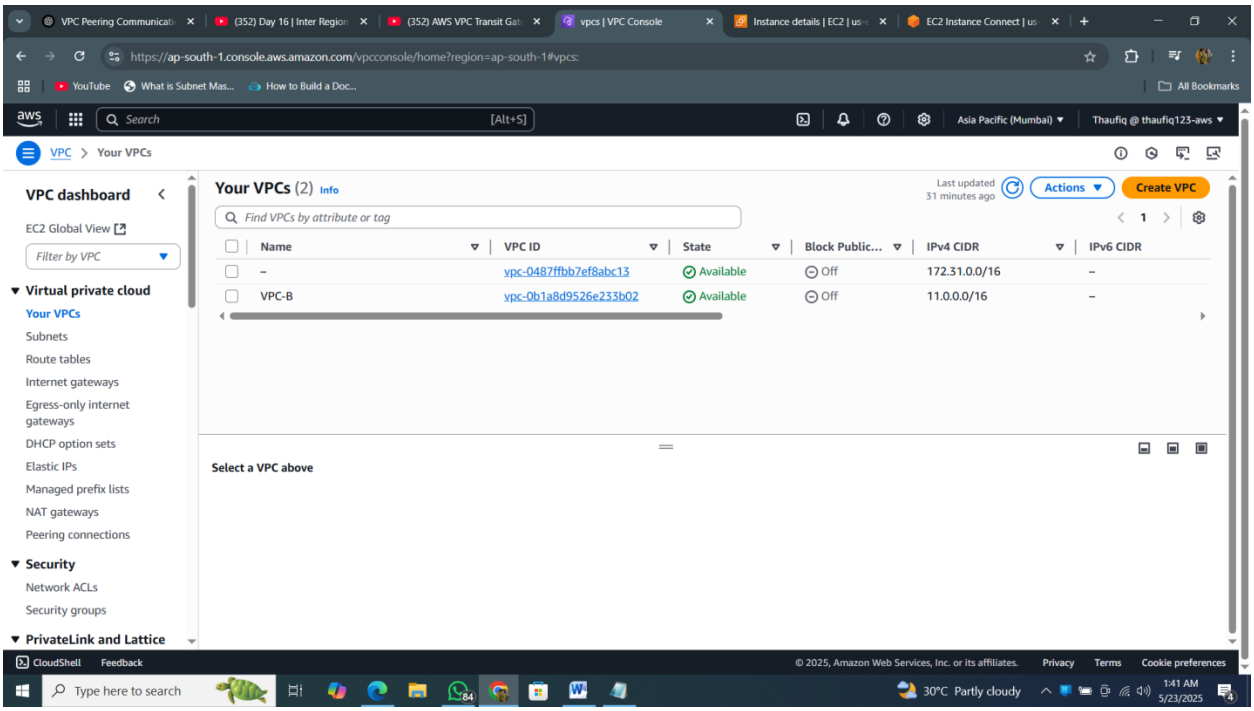
VPC-B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DHCP option sets
Elastic IPs
Managed prefix lists
NAT gateways
Peering connections
Security
Network ACLs
Security groups
PrivateLink and Lattice
Your VPCs (2) Info
Last updated 31 minutes ago
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Create VPC
Find VPCs by attribute or tag
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VPC ID
State
Block Public...
IPv4 CIDR
IPv6 CIDR
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vpc-0487ffbb7ef8abc13
Available
Off
172.31.0.0/16
VPC-B
vpc-0b1a8d9526e233b02
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Off
11.0.0.0/16
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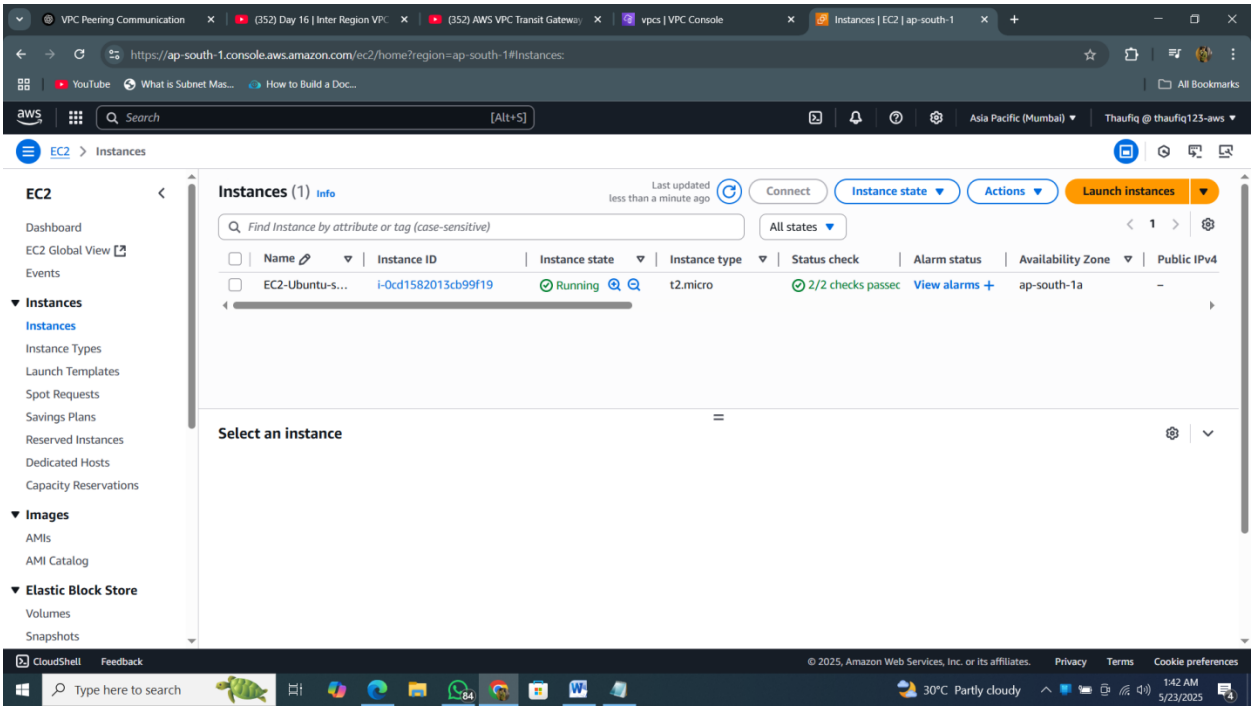
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Name
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Instance state
Instance type
Status check
Alarm status
Availability Zone
Public IPv4
EC2-Ubuntu-s...
i-0cd1582013cb99f19
Running
t2.micro
2/2 checks passed
View alarms
ap-south-1a
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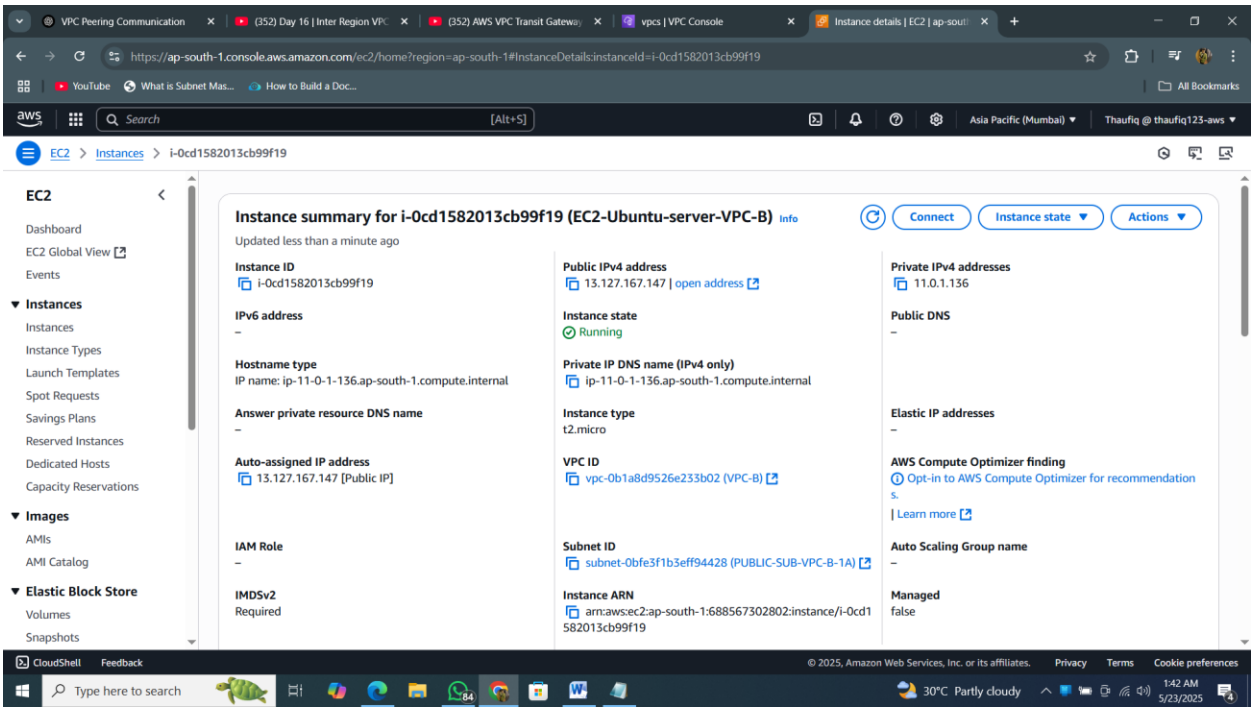
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https://ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#InstanceDetails:instanceId=i-0cd1582013cb99f19
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Dedicated Hosts
Capacity Reservations
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AMI Catalog
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Volumes
Snapshots
Instance summary for i-0cd1582013cb99f19 (EC2-Ubuntu-server-VPC-B) Info
Updated less than a minute ago
Connect
Instance state
Actions
Instance ID
i-0cd1582013cb99f19
IPv6 address
–
Hostname type
IP name: ip-11-0-1-136.ap-south-1.compute.internal
Answer private resource DNS name
–
Auto-assigned IP address
13.127.167.147 [Public IP]
Public IPv4 address
13.127.167.147 | open address
Instance state
Running
Private IP DNS name (IPv4 only)
ip-11-0-1-136.ap-south-1.compute.internal
Instance type
t2.micro
VPC ID
vpc-0b1a8d9526e233b02 (VPC-B)
Subnet ID
subnet-0bfe3f1b3eff94428 (PUBLIC-SUB-VPC-B-1A)
Instance ARN
arn:aws:ec2:ap-south-1:688567302802:instance/i-0cd1582013cb99f19
Private IPv4 addresses
11.0.1.136
Public DNS
–
Elastic IP addresses
–
AWS Compute Optimizer finding
Opt-in to AWS Compute Optimizer for recommendations.
Learn more
Auto Scaling Group name
–
Managed
false
IAM Role
–
IMDSv2
Required
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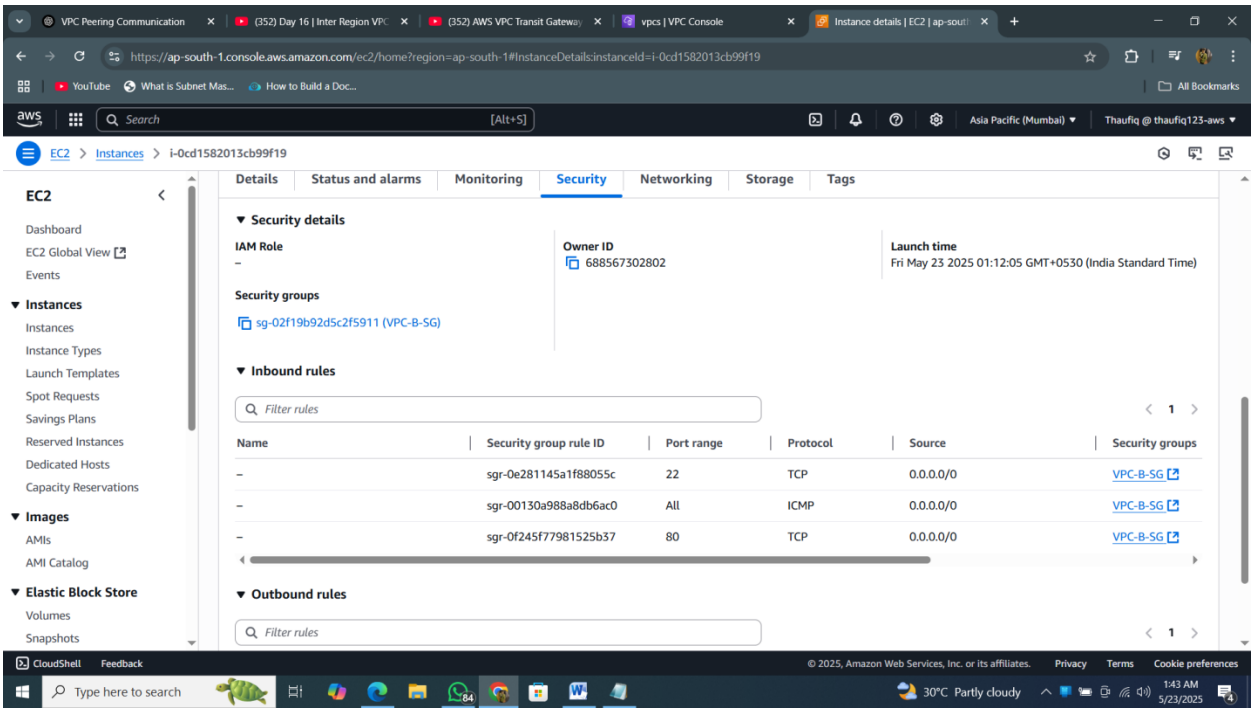
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vpcs | VPC Console
Instance details | EC2 | ap-south
https://ap-south-1.console.aws.amazon.com/ec2/home?region=ap-south-1#InstanceDetails:instanceId=i-0cd1582013cb99f19
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Instance Types
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Images
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Volumes
Snapshots
Details
Status and alarms
Monitoring
Security
Networking
Storage
Tags
Security details
IAM Role
–
Security groups
sg-02f19b92d5c2f5911 (VPC-B-SG)
Owner ID
688567302802
Launch time
Fri May 23 2025 01:12:05 GMT+0530 (India Standard Time)
Inbound rules
Filter rules
1
Name
Security group rule ID
Port range
Protocol
Source
Security groups
– sgr-0e281145a1f88055c 22 TCP 0.0.0.0/0 VPC-B-SG
– sgr-00130a988a8db6ac0 All ICMP 0.0.0.0/0 VPC-B-SG
– sgr-0f245f77981525b37 80 TCP 0.0.0.0/0 VPC-B-SG
Outbound rules
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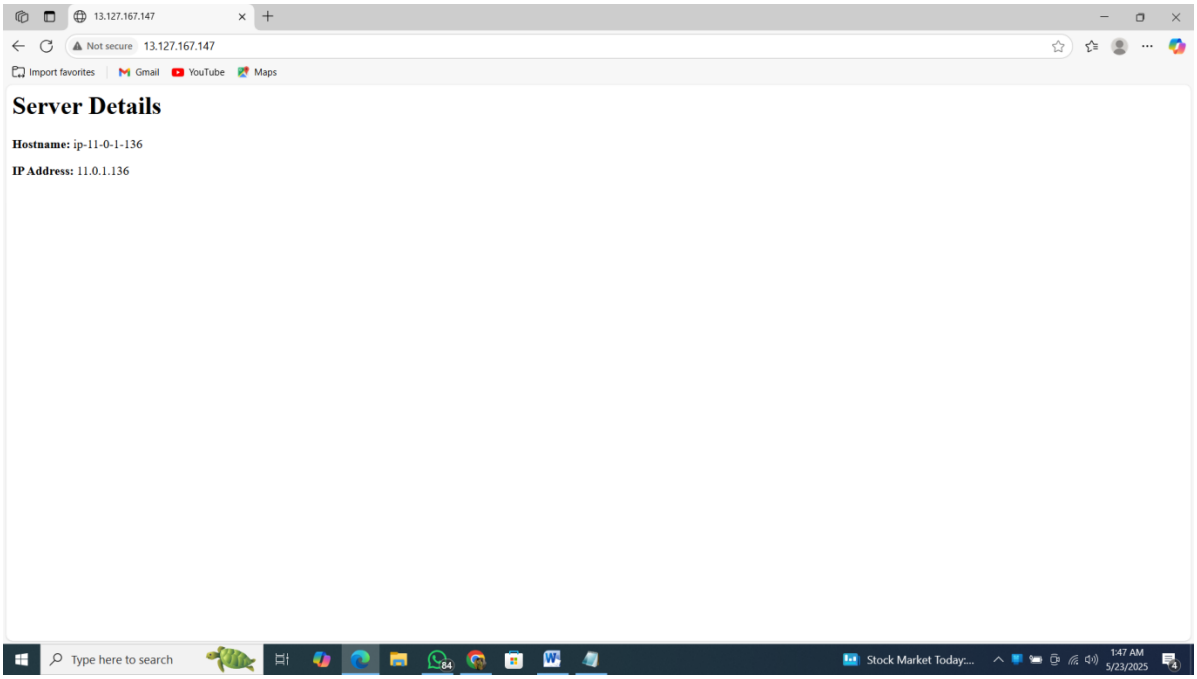
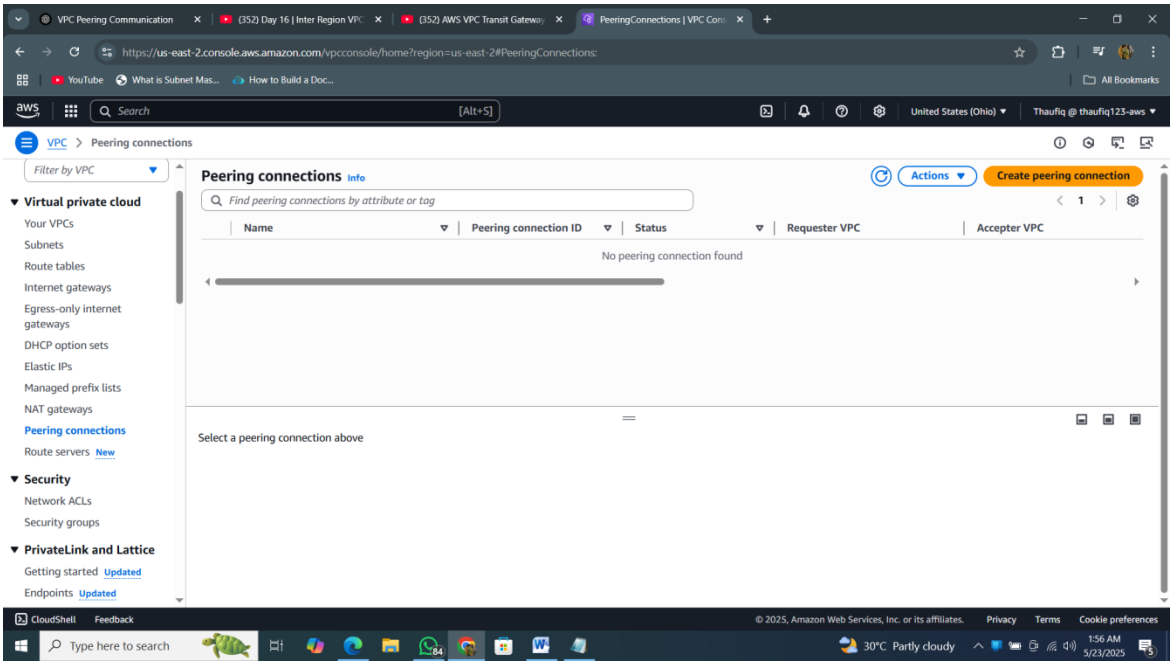


C. Create VPC Peering Connection

- Initiate peering from VPC A (Ohio) to VPC B (Mumbai)
- Accept the request in the same account

- **Navigate to the VPC Dashboard:**
  - Go to the AWS Console → **VPC** → In the left-hand menu, click on **"Peering Connections"**.

- **Initiate Peering from Ohio (VPC A):**
  - Click **"Create Peering Connection"**.
  - Under **Name tag**, give it a recognizable name (e.g.,`VPC-A - TO - VPC-B Peering Connection`).
  - Under **VPC Requester**, select the VPC in **Ohio** (VPC A with CIDR `10.0.0.0/16`).
  - For **VPC Accepter**, select **Another region**.
    - Choose **ap-south-1 (Mumbai)**.
    - Choose the VPC in Mumbai (VPC B with CIDR `11.0.0.0/16`).
  - Select **My account** (since both VPCs are in the same AWS account).
  - Click **"Create Peering Connection"**.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Elastic IPs
Managed prefix lists
NAT gateways
Peering connections
Route servers New
Security
Network ACLs
Security groups
PrivateLink and Lattice
Getting started Updated
Endpoints Updated
Peering connections Info
Actions
Create peering connection
Find peering connections by attribute or tag
Name
Peering connection ID
Status
Requester VPC
Accepter VPC
No peering connection found
Select a peering connection above
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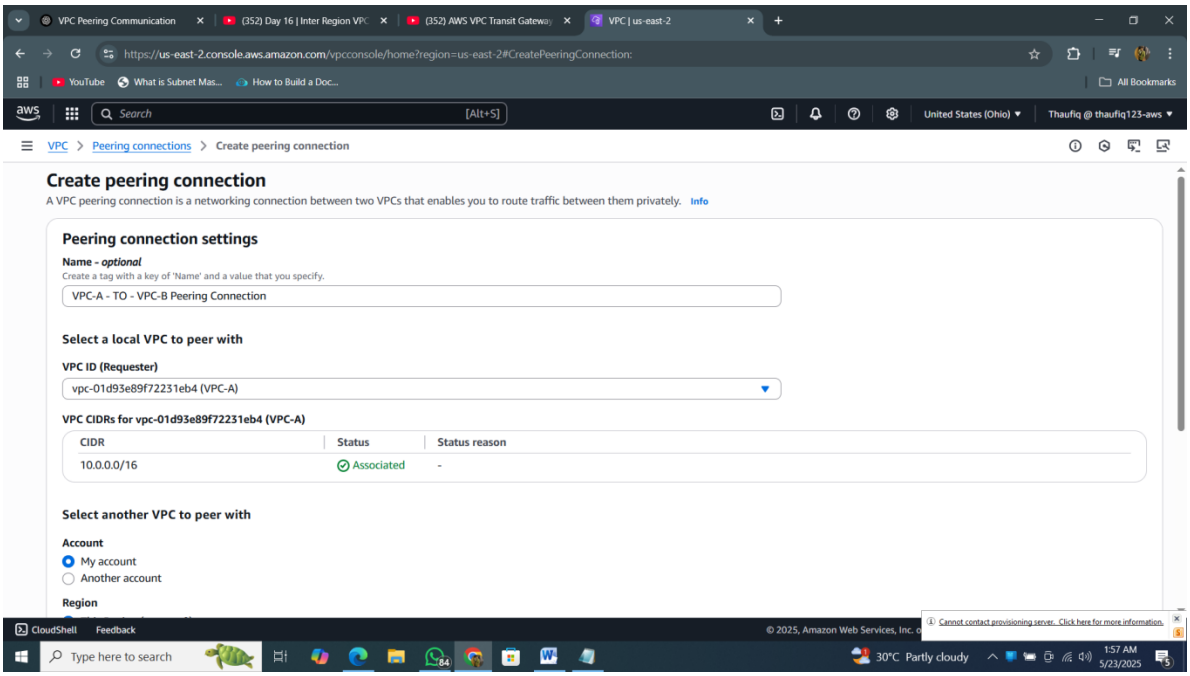
VPC Peering Communication
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VPC > Peering connections > Create peering connection
Create peering connection
A VPC peering connection is a networking connection between two VPCs that enables you to route traffic between them privately. Info
Peering connection settings
Name - optional
Create a tag with a key of 'Name' and a value that you specify.
VPC-A - TO - VPC-B Peering Connection
Select a local VPC to peer with
VPC ID (Requester)
vpc-01d93e89f72231eb4 (VPC-A)
VPC CIDRs for vpc-01d93e89f72231eb4 (VPC-A)
CIDR
Status
Status reason
10.0.0.0/16
Associated
-
Select another VPC to peer with
Account
My account
Another account
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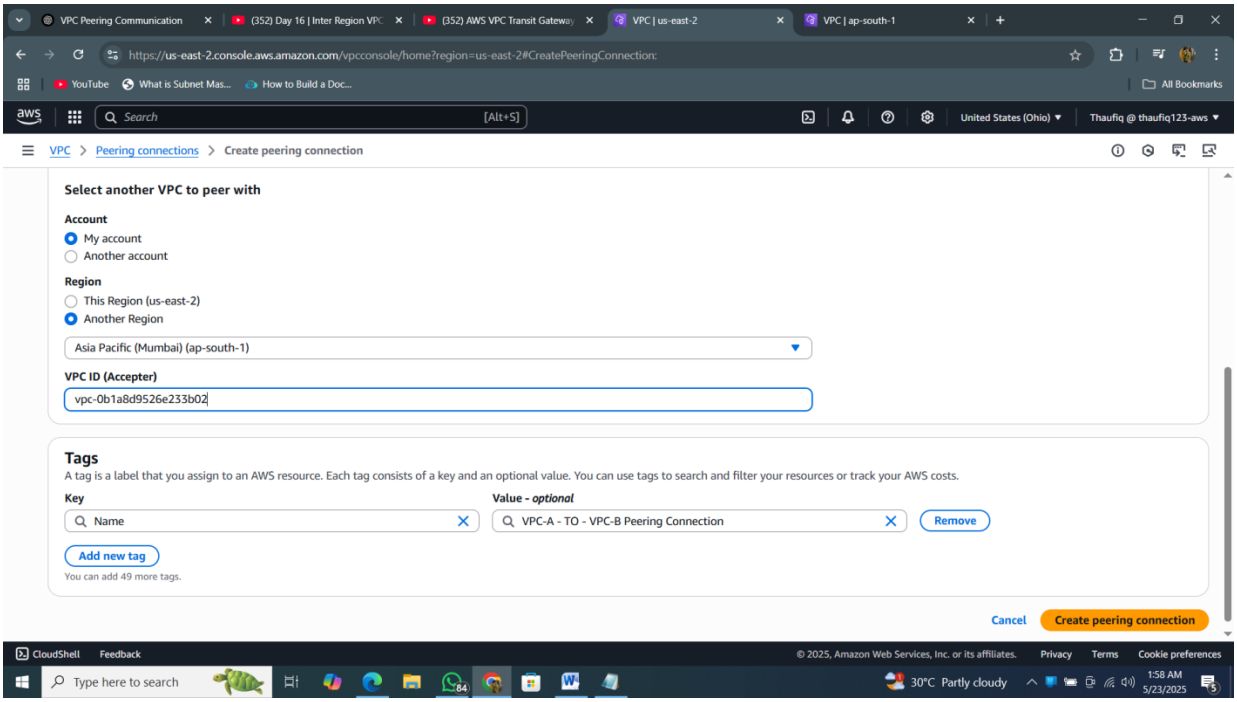
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VPC > Peering connections > Create peering connection
Select another VPC to peer with
Account
My account
Another account
Region
This Region (us-east-2)
Another Region
Asia Pacific (Mumbai) (ap-south-1)
VPC ID (Accepter)
vpc-0b1a8d9526e233b02
Tags
A 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
VPC-A - TO - VPC-B Peering Connection
Remove
Add new tag
You can add 49 more tags.
Cancel
Create peering connection
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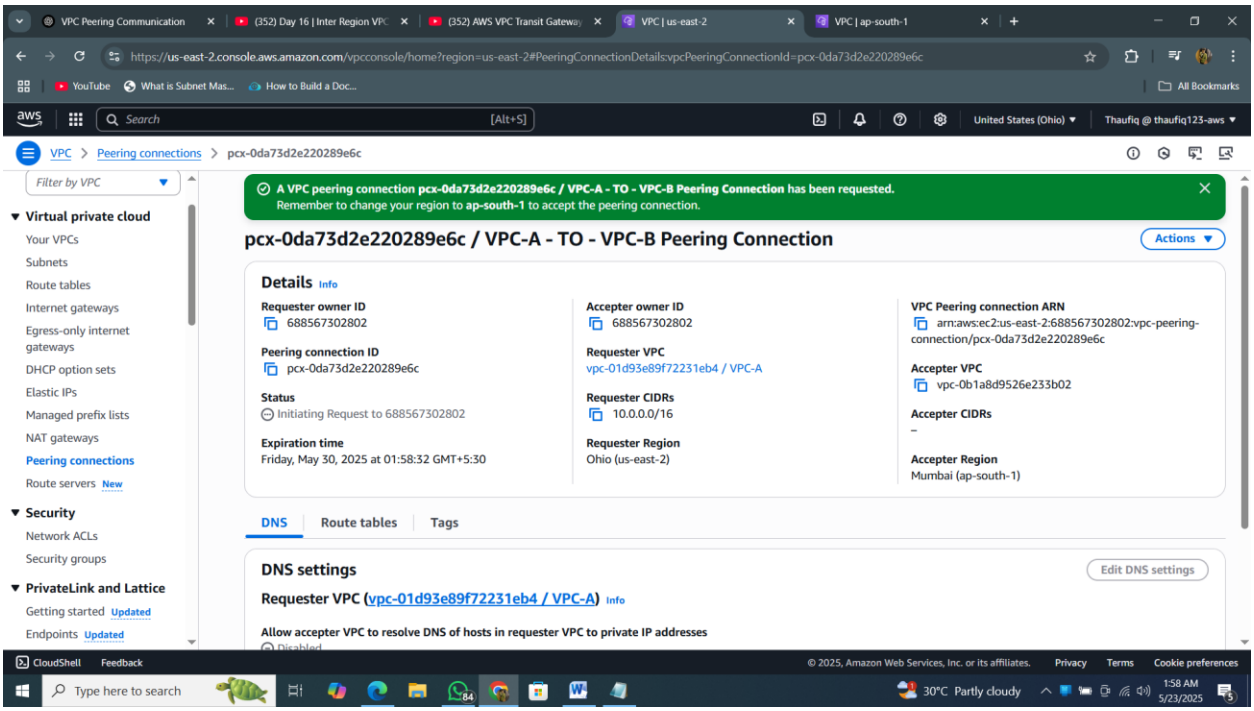
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VPC | us-east-2
VPC | ap-south-1
https://us-east-2.console.aws.amazon.com/vpcconsole/home?region=us-east-2#PeeringConnectionDetails:vpcPeeringConnectionId=pcx-0da73d2e220289e6c
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Peering connections
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Security
Network ACLs
Security groups
PrivateLink and Lattice
Getting started Updated
Endpoints Updated
A VPC peering connection pcx-0da73d2e220289e6c / VPC-A - TO - VPC-B Peering Connection has been requested.
Remember to change your region to ap-south-1 to accept the peering connection.
pcx-0da73d2e220289e6c / VPC-A - TO - VPC-B Peering Connection
Actions
Details Info
Requester owner ID
688567302802
Peering connection ID
pcx-0da73d2e220289e6c
Status
Initiating Request to 688567302802
Expiration time
Friday, May 30, 2025 at 01:58:32 GMT+5:30
Accepter owner ID
688567302802
Requester VPC
vpc-01d93e89f72231eb4 / VPC-A
Requester CIDRs
10.0.0.0/16
Requester Region
Ohio (us-east-2)
VPC Peering connection ARN
arn:aws:ec2:us-east-2:688567302802:vpc-peering-connection/pcx-0da73d2e220289e6c
Accepter VPC
vpc-0b1a8d9526e233b02
Accepter CIDRs
-
Accepter Region
Mumbai (ap-south-1)
DNS
Route tables
Tags
DNS settings
Edit DNS settings
Requester VPC (vpc-01d93e89f72231eb4 / VPC-A) Info
Allow accepter VPC to resolve DNS of hosts in requester VPC to private IP addresses
CloudShell
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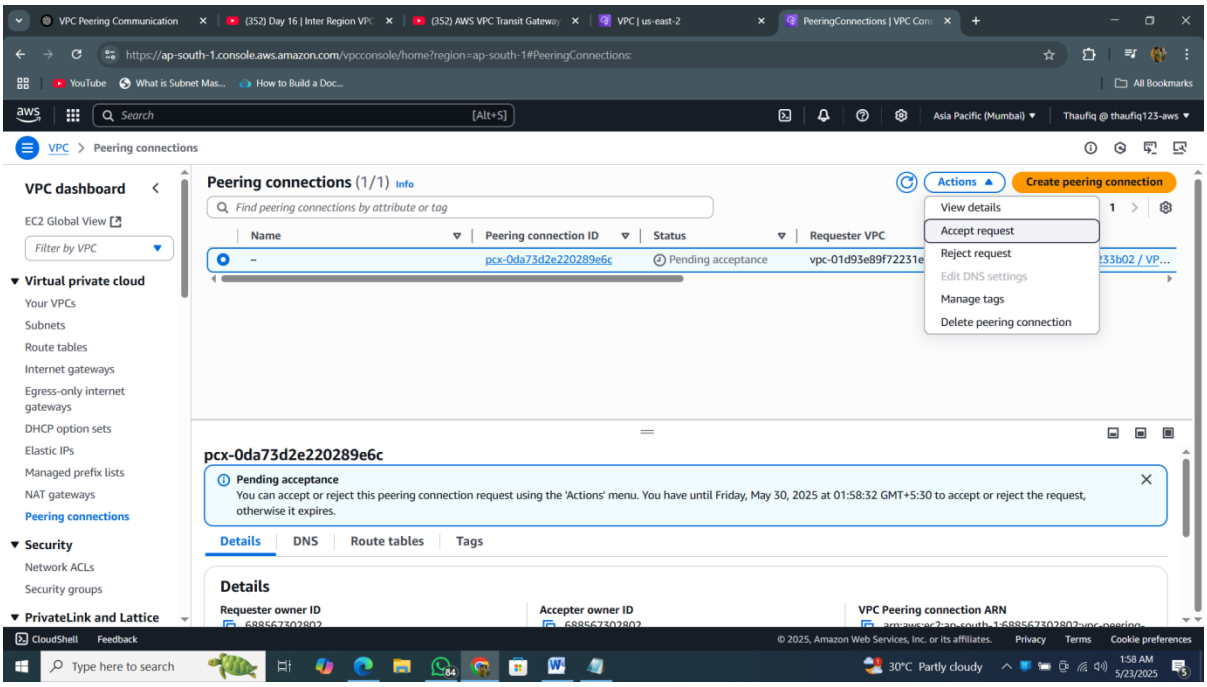
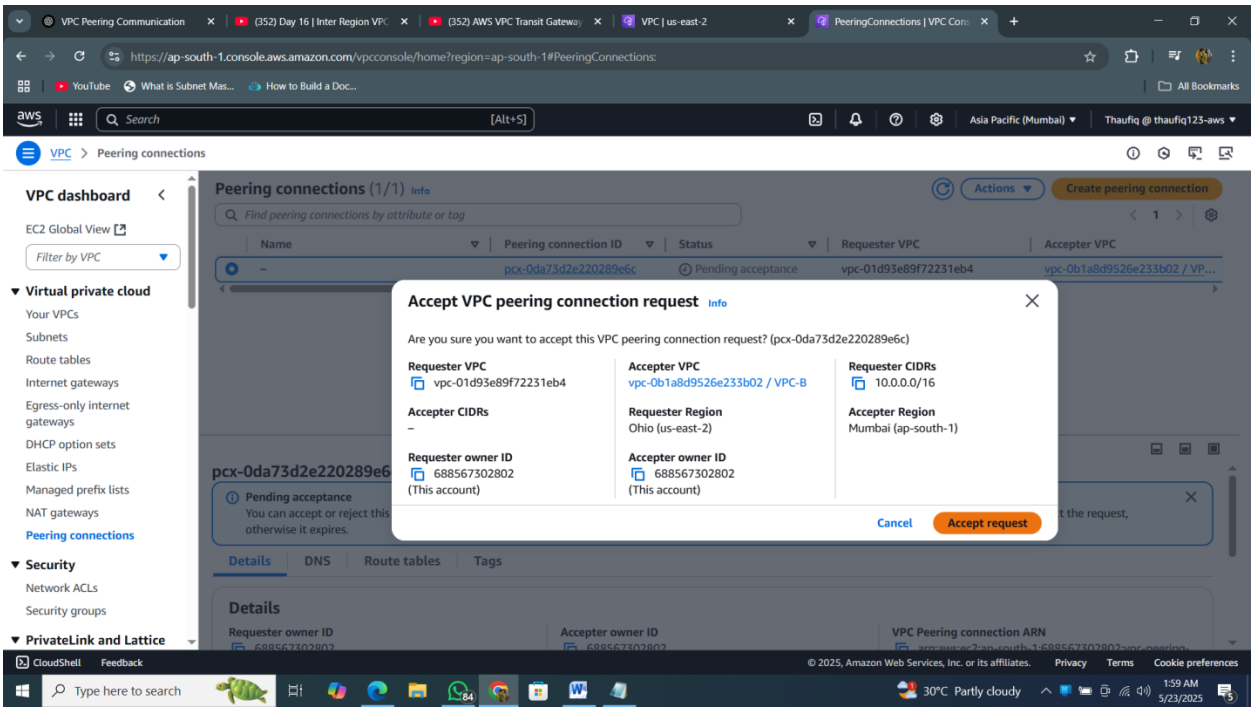
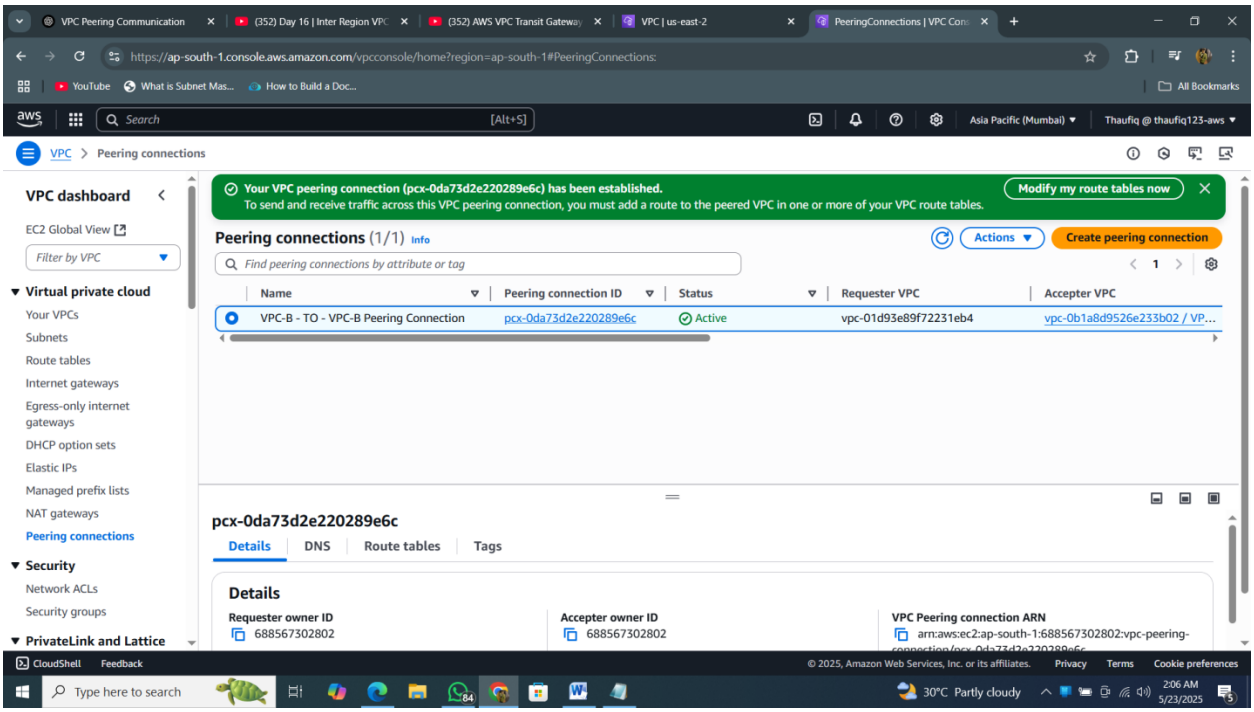
Accept the Peering Request (Mumbai Region):

- Switch to the **Mumbai region** in the AWS Console.
- Go to **VPC → Peering Connections**.
- You'll see the pending request.
- Select the request → Click **"Actions" → "Accept Request"**.





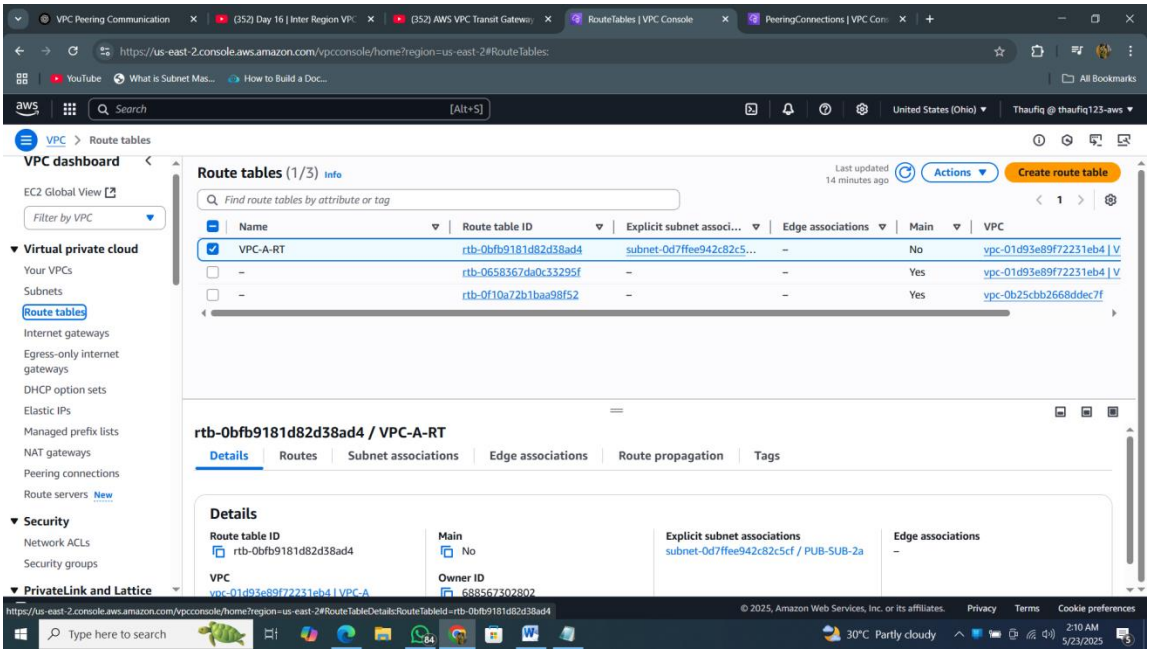


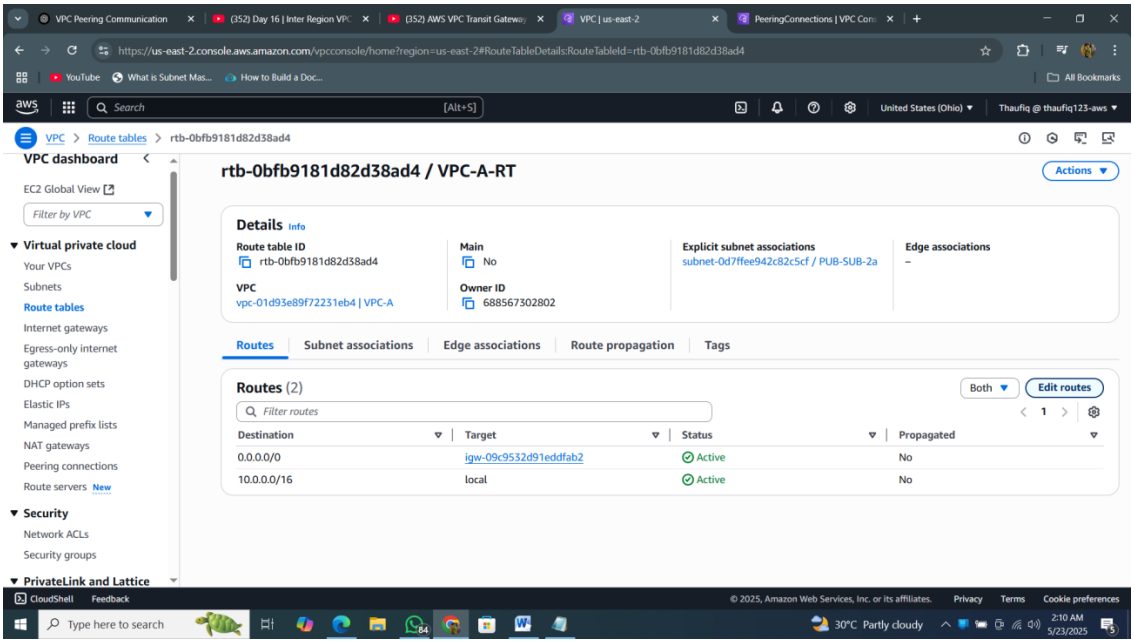
Peering Connection Status:

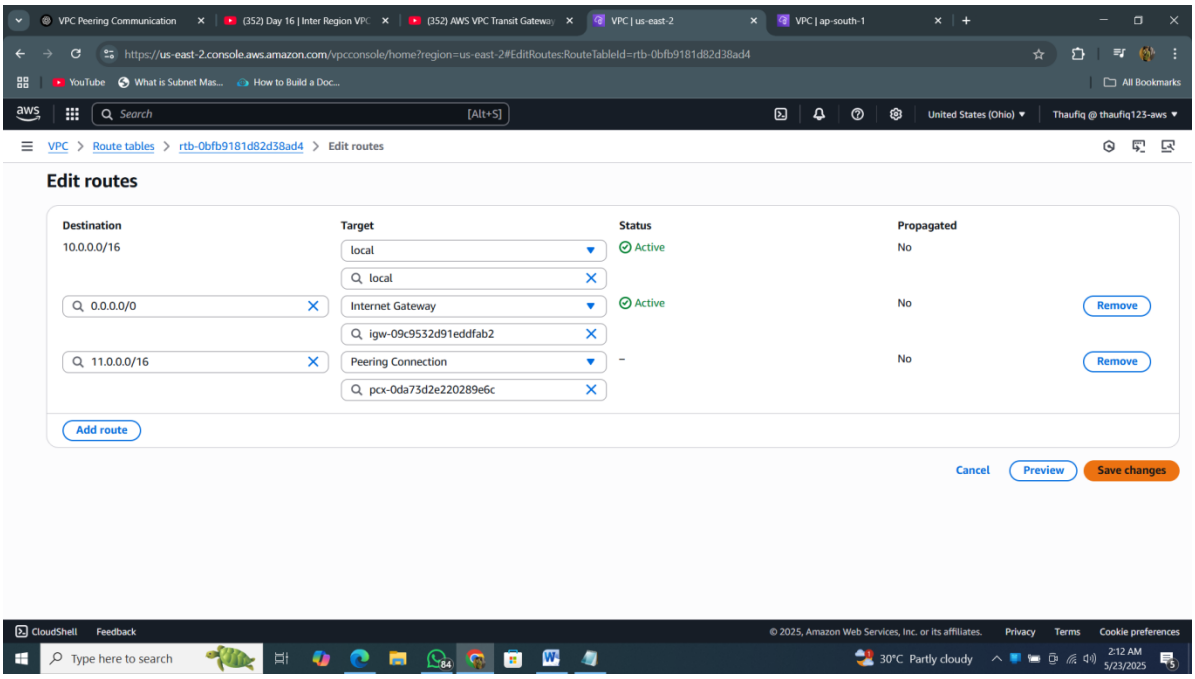
- Once accepted, the peering connection status should change to "**Active**"

D. Update Route Tables

- Add route to `11.0.0.0/16` in Ohio VPC's route table via peering
- Add route to `10.0.0.0/16` in Mumbai VPC's route table via peering






VPC Peering Communication
(352) Day 16 | Inter Region VPC
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VPC | ap-south-1
https://us-east-2.console.aws.amazon.com/vpcconsole/home?region=us-east-2#EditRoutes:RouteTableId=rtb-0bfb9181d82d38ad4
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VPC > Route tables > rtb-0bfb9181d82d38ad4 > Edit routes
Edit routes
Destination
Target
Status
Propagated
10.0.0.0/16
local
Active
No
local
0.0.0.0/0
Internet Gateway
Active
No
Remove
igw-09c9532d91eddfab2
11.0.0.0/16
Peering Connection
–
No
Remove
pcx-0da73d2e220289e6c
Add route
Cancel
Preview
Save changes
CloudShell
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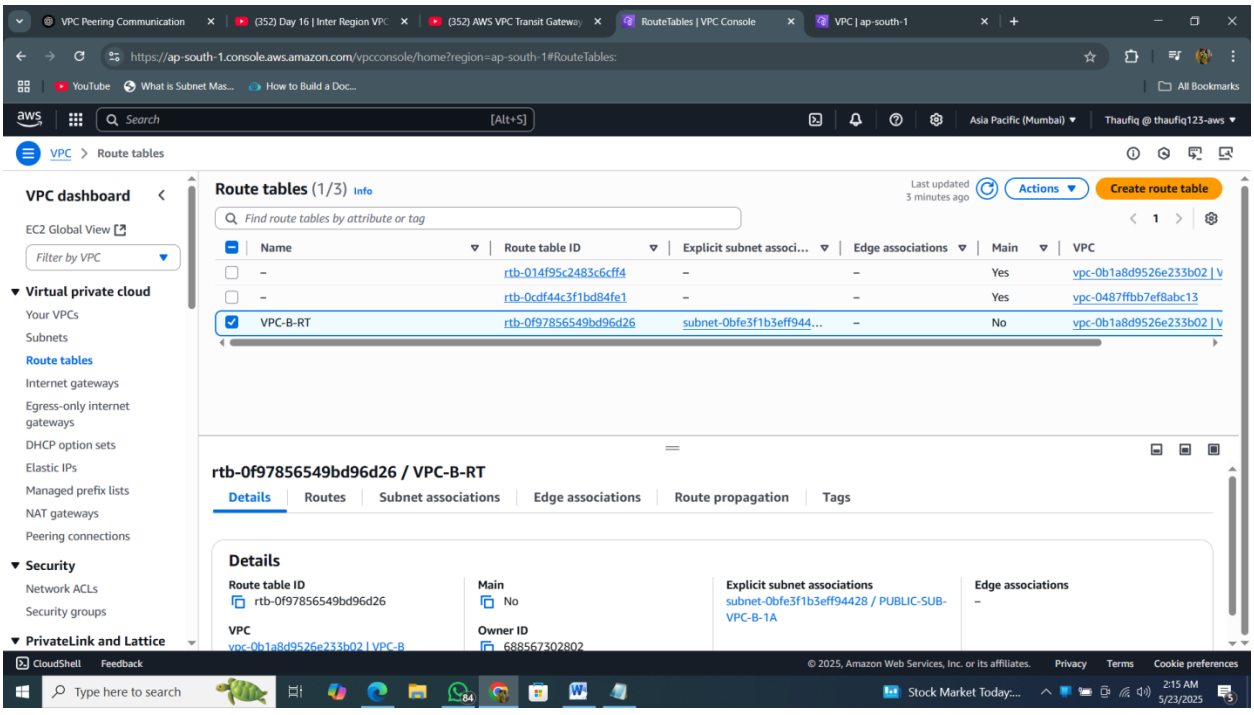
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(352) AWS VPC Transit Gateway
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VPC | ap-south-1
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Security groups
PrivateLink and Lattice
Route tables (1/3) Info
Last updated 3 minutes ago
Actions
Create route table
Find route tables by attribute or tag
Name
Route table ID
Explicit subnet associ...
Edge associations
Main
VPC
rtb-014f95c2483c6cff4
Yes
vpc-0b1a8d9526e233b02 | V
rtb-0cdf44c3f1bd84fe1
Yes
vpc-0487ffbb7ef8abc13
VPC-B-RT
rtb-0f97856549bd96d26
subnet-0bfe3f1b3eff944...
No
vpc-0b1a8d9526e233b02 | V
rtb-0f97856549bd96d26 / VPC-B-RT
Details
Routes
Subnet associations
Edge associations
Route propagation
Tags
Details
Route table ID
rtb-0f97856549bd96d26
Main
No
Explicit subnet associations
subnet-0bfe3f1b3eff94428 / PUBLIC-SUB-VPC-B-1A
Edge associations
–
VPC
Owner ID
688567302802
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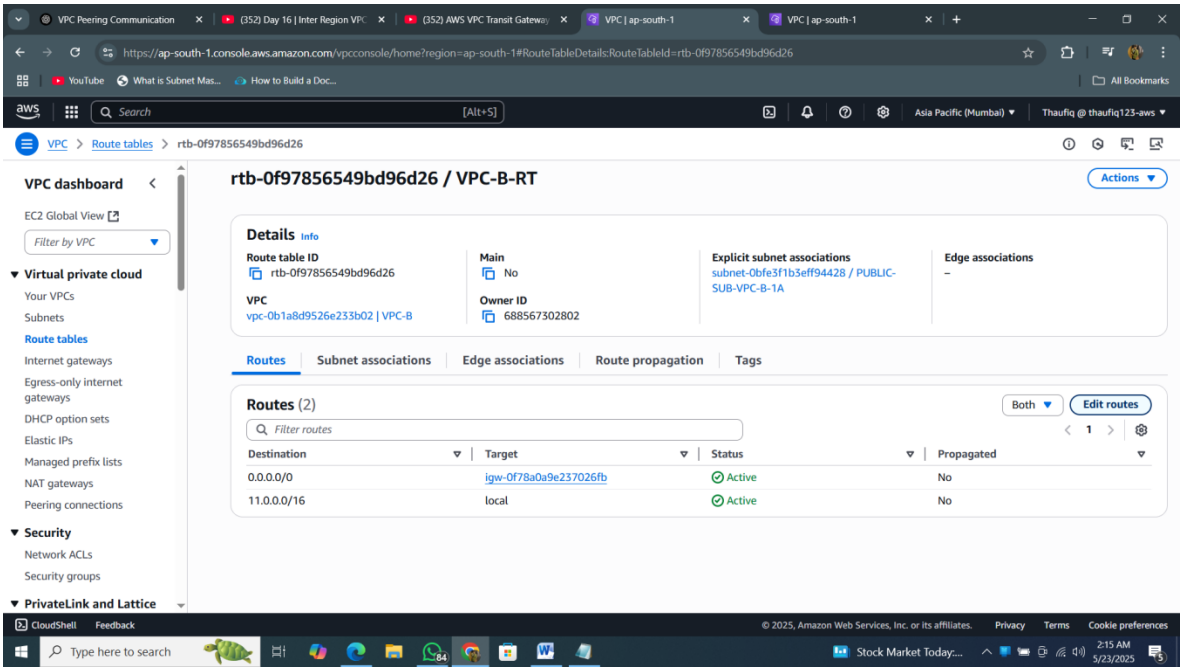
VPC Peering Communication
(352) Day 16 | Inter Region VPC
(352) AWS VPC Transit Gateway
VPC | ap-south-1
VPC | ap-south-1
https://ap-south-1.console.aws.amazon.com/vpcconsole/home?region=ap-south-1#RouteTableDetails:RouteTableId=rtb-0f97856549bd96d26
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DHCP option sets
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Managed prefix lists
NAT gateways
Peering connections
Security
Network ACLs
Security groups
PrivateLink and Lattice
rtb-0f97856549bd96d26 / VPC-B-RT
Actions
Details Info
Route table ID
rtb-0f97856549bd96d26
Main
No
Explicit subnet associations
subnet-0bfe3f1b3eff94428 / PUBLIC-SUB-VPC-B-1A
Edge associations
-
VPC
vpc-0b1a8d9526e233b02 | VPC-B
Owner ID
688567302802
Routes
Subnet associations
Edge associations
Route propagation
Tags
Routes (2)
Both
Edit routes
Filter routes
Destination
Target
Status
Propagated
0.0.0.0/0
igw-0f78a0a9e237026fb
Active
No
11.0.0.0/16
local
Active
No
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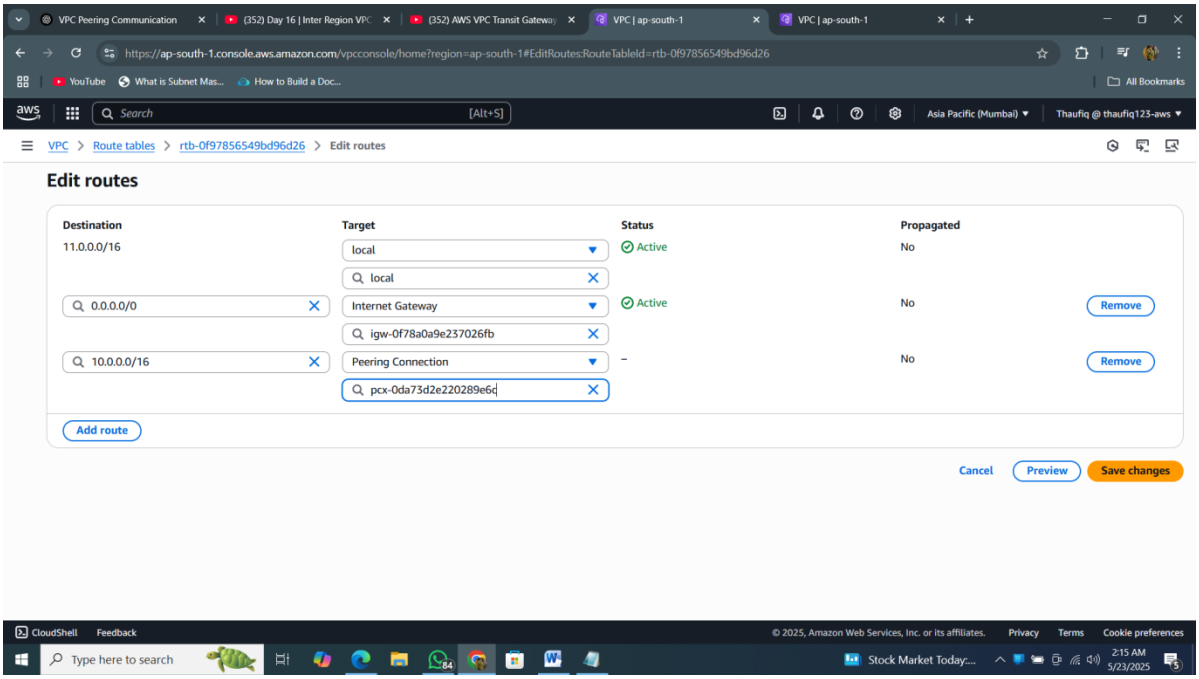
VPC Peering Communication
(352) Day 16 | Inter Region VPC
(352) AWS VPC Transit Gateway
VPC | ap-south-1
VPC | ap-south-1
https://ap-south-1.console.aws.amazon.com/vpcconsole/home?region=ap-south-1#EditRoutes:RouteTableId=rtb-0f97856549bd96d26
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Thaufiq @ thaufiq123-aws
VPC > Route tables > rtb-0f97856549bd96d26 > Edit routes
Edit routes
Destination
Target
Status
Propagated
11.0.0.0/16
local
Active
No
local
0.0.0.0/0
Internet Gateway
Active
No
Remove
igw-0f78a0a9e237026fb
10.0.0.0/16
Peering Connection
-
No
Remove
pcx-0da73d2e220289e6d
Add route
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Test the Setup

After successfully establishing the VPC peering connection and updating the route tables and security groups, it's essential to test connectivity between the two EC2 instances located in Ohio and Mumbai.

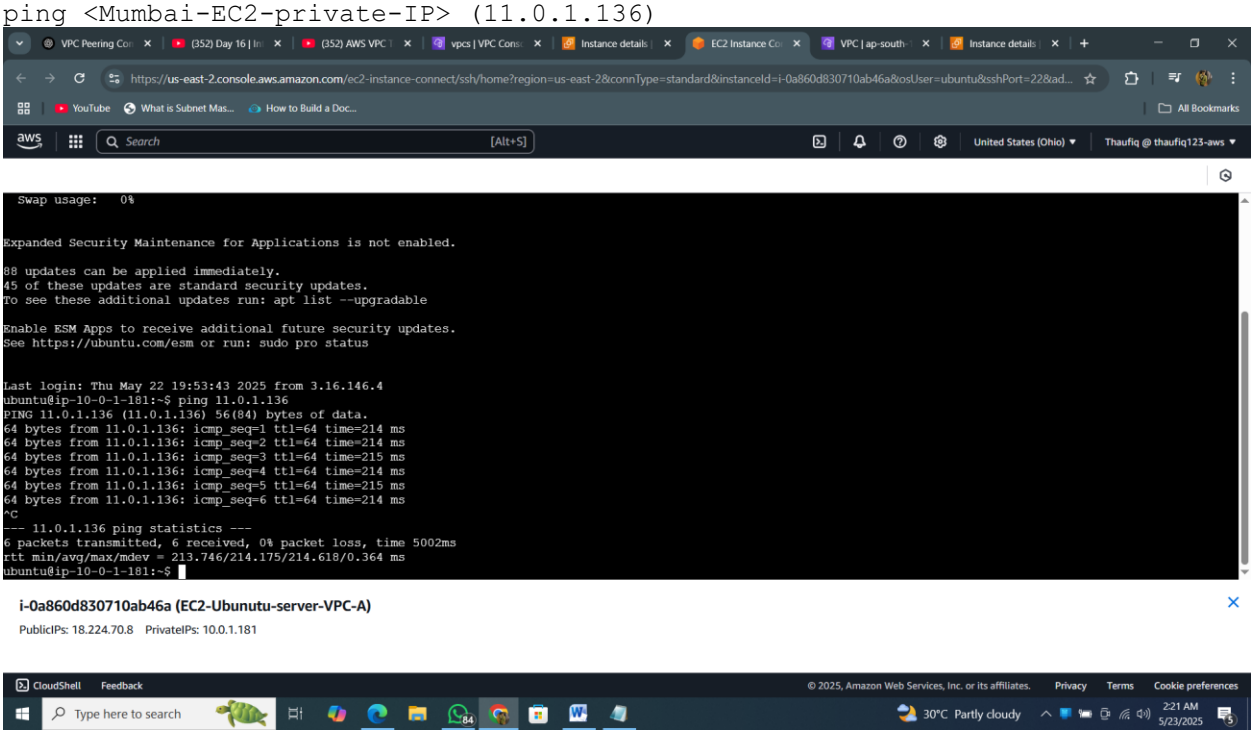
Step-by-Step Testing Instructions:

1. **Obtain the Private IP Addresses:**
    - Go to the **EC2 Dashboard** in the AWS Console for each region.
    - Note down the **private IP address** of the EC2 instance in **Ohio** and **Mumbai**.
2. **SSH into the Ohio EC2 Instance:**
    - From your local terminal or using EC2 Instance Connect (if allowed), SSH into the EC2 instance in the Ohio region:

Ping the EC2 Instance in Mumbai:

- From the Ohio EC2 instance, run the following command using the private IP of the Mumbai EC2:

```
ping <Mumbai-EC2-private-IP> (11.0.1.136)
```

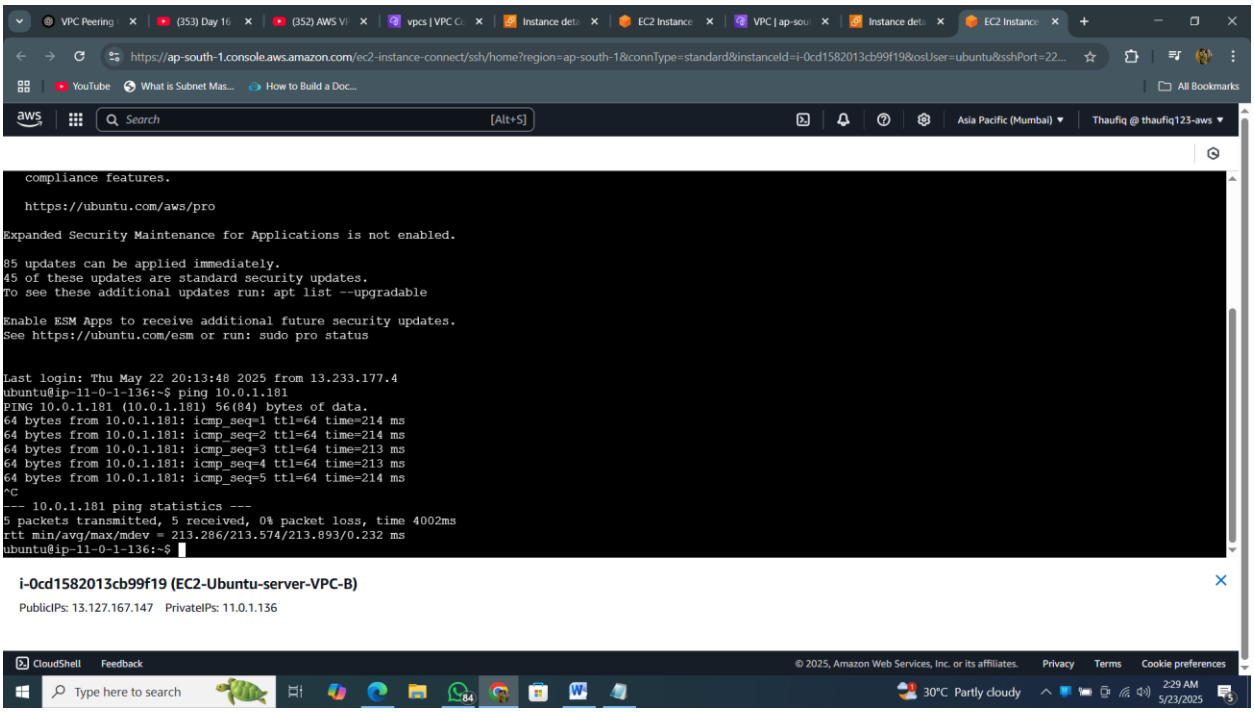


SSH from Ohio to Mumbai (optional):

- If port 22 is allowed in the Mumbai EC2 security group from Ohio's CIDR range, you can also SSH into the Mumbai instance using its private IP

Confirm Bidirectional Communication:

- Repeat the steps in reverse by SSH'ing into the Mumbai EC2 instance and pinging the Ohio EC2's private IP.
- If both instances can ping each other via private IPs, then the VPC peering setup is working correctly.



Expected Result:

- Successful ping replies from both directions.
- Optional SSH session initiated using private IP (if allowed in security group rules).
- No need for public IPs or internet access — all traffic flows through AWS's internal network.

Benefits

- **Cost-efficient:** No NAT or VPN required
- **Low latency:** AWS backbone routing
- **Secure:** Private IP-based communication

Conclusion

This project validates the feasibility and simplicity of using AWS VPC Peering for secure, private connectivity across global regions within the same AWS account, making it an ideal solution for distributed architectures and hybrid workloads.