



Placement Empowerment Program
Cloud Computing and DevOps Centre

Secure Access with a Bastion Host
Set up a bastion host in a public subnet to securely access instances in a private subnet.

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Introduction

In cloud environments, securing access to private instances is crucial. A **Bastion Host** (or Jump Box) is a special-purpose instance that acts as a secure gateway to access EC2 instances in a private subnet. Instead of exposing private instances directly to the internet, users connect to the Bastion Host first and then access the private instances from there.

This setup **enhances security** by limiting direct SSH access to private instances and applying strict security controls.

Overview

We will set up a **Bastion Host** in a **public subnet** that provides controlled SSH access to instances inside a **private subnet**.

What We Will Do?

1. **Create a VPC** with a **Public and Private Subnet**.
2. **Set Up a Bastion Host** in the Public Subnet.
3. **Launch a Private EC2 Instance** in the Private Subnet.
4. **Configure Secure SSH Access** via the Bastion Host.

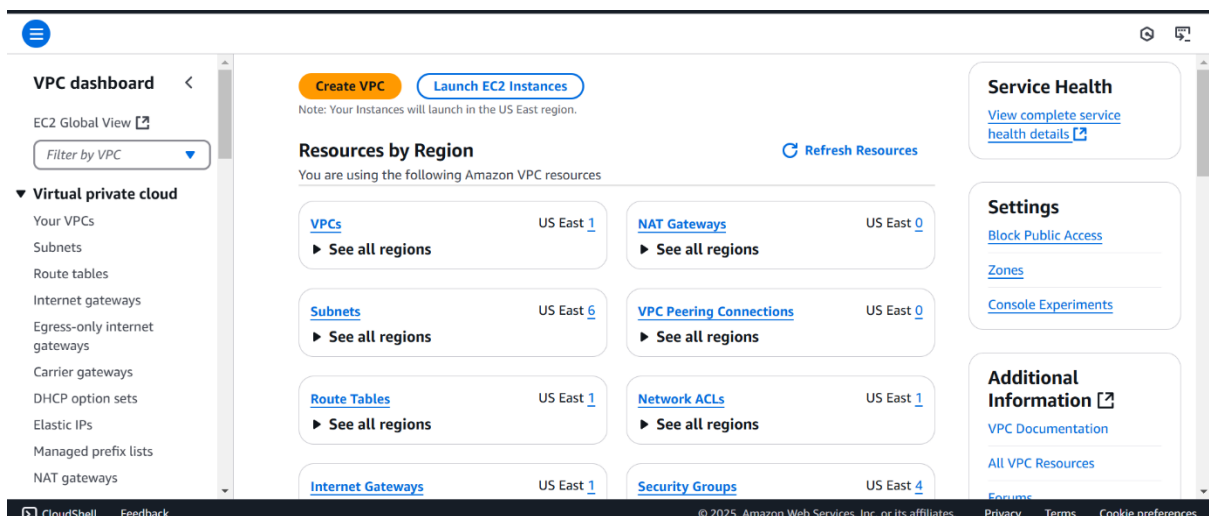
5. Enhance Security by restricting SSH access and considering AWS Systems Manager as an alternative.

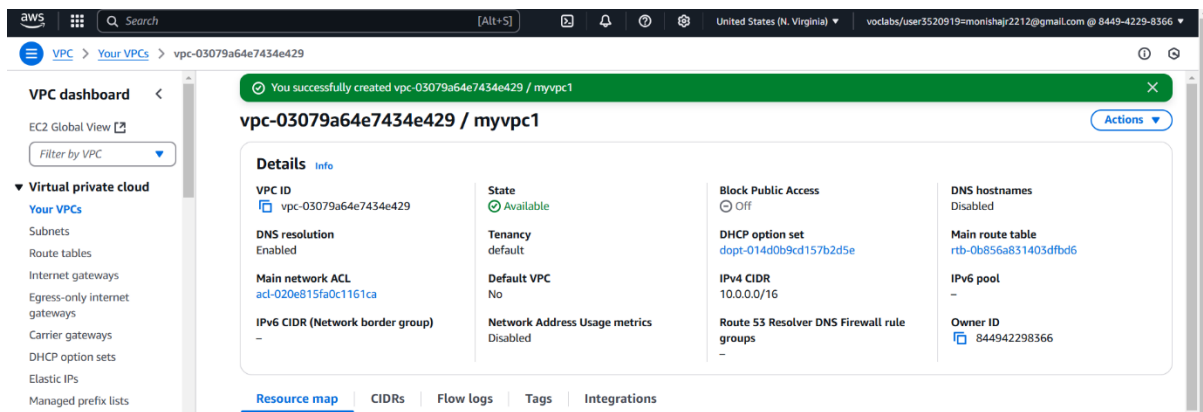
Step 1:

Create a VPC with Public and Private Subnets

1.1 Create a VPC

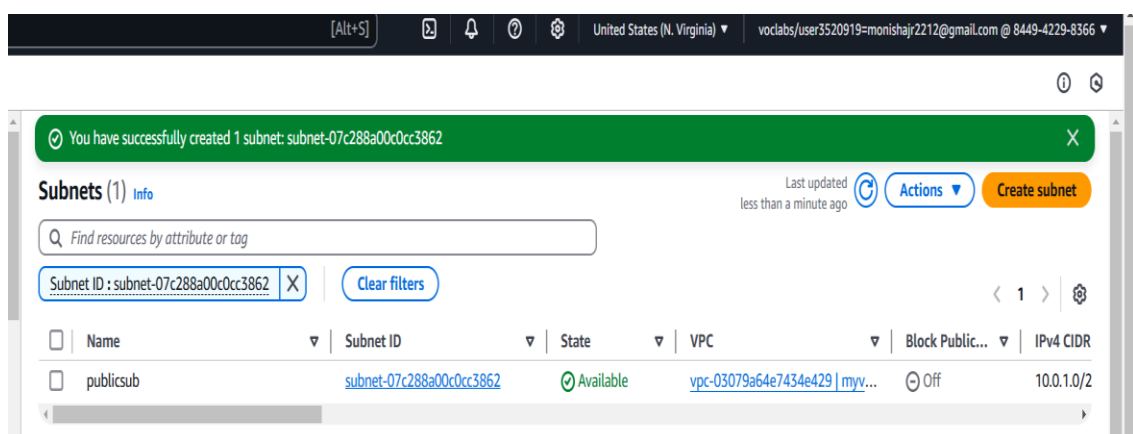
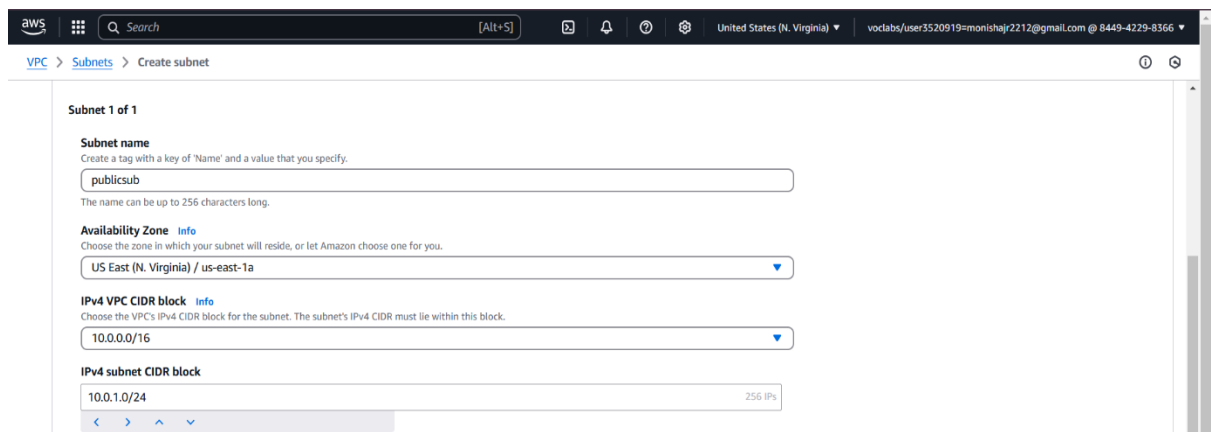
- Go to AWS Console → VPC Dashboard.
- Click Create VPC and name it MyVPC.
- Set IPv4 CIDR Block: 10.0.0.0/16.
- Click Create VPC.





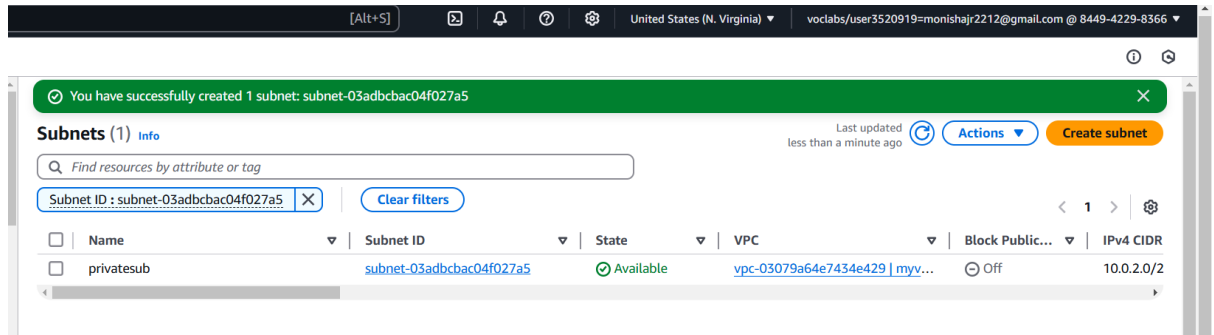
1.2 Create a Public Subnet

- Go to **Subnets** → **Create Subnet**.
- Select **MyVPC** and set CIDR block 10.0.1.0/24.
- Enable **Auto-Assign Public IP**.



1.3 Create a Private Subnet

- Repeat the same process, but use CIDR block 10.0.2.0/24.
- **Do not enable** Auto-Assign Public IP.

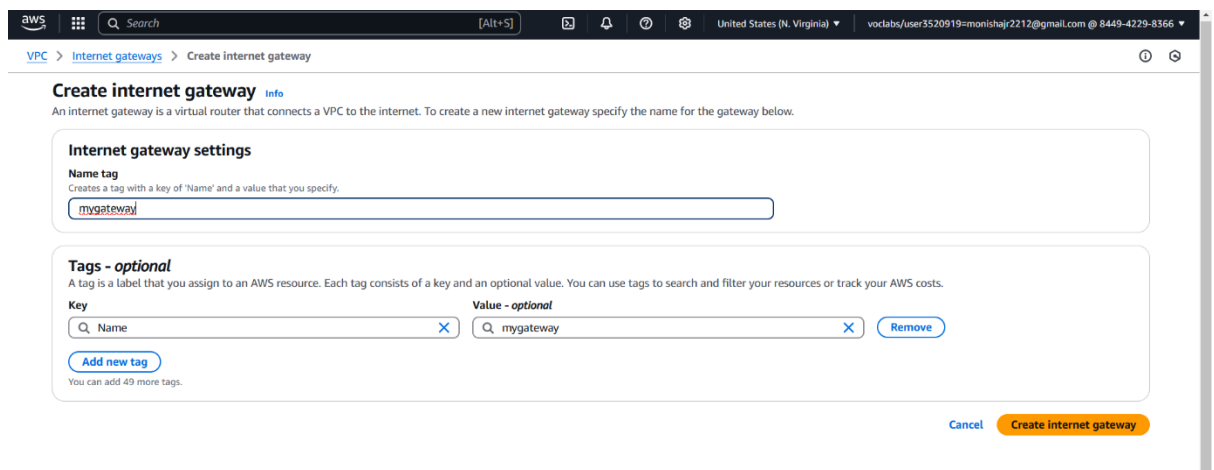


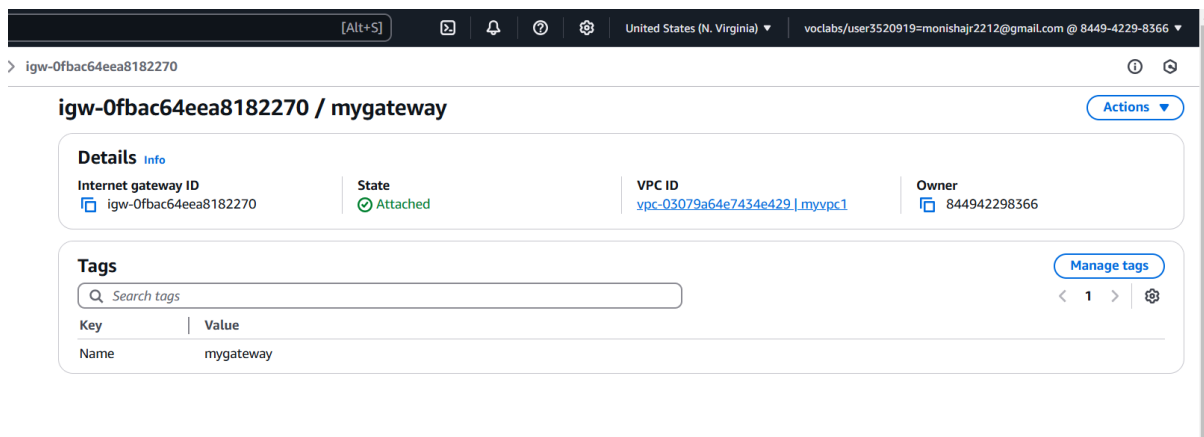
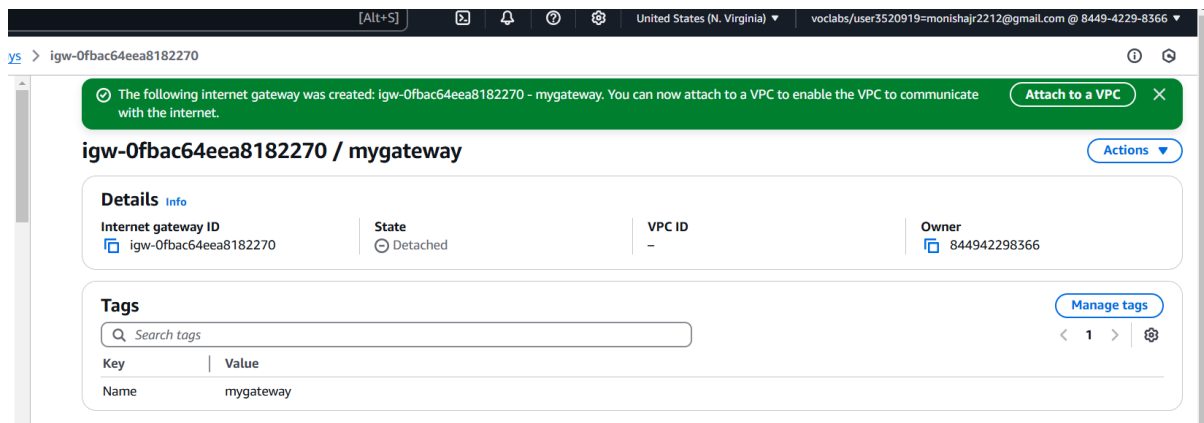
Step 2:

Configure Public Subnet for Internet Access

2.1 Create an Internet Gateway (IGW)

- Go to **Internet Gateways** → Click **Create Internet Gateway**.
- Name it **MyIGW**, attach it to **MyVPC**.





2.2 Update Public Route Table

- Go to **Route Tables** → **Create Route Table** → Name it **PublicRouteTable**.
- Associate it with **PublicSubnet**.
- Add a route:
 - **Destination:** 0.0.0.0/0
 - **Target:** Internet Gateway (MyIGW)

Create route table [info](#)

A route table specifies how packets are forwarded between the subnets within your VPC, the internet, and your VPN connection.

Route table settings

Name - optional
Create a tag with a key of 'Name' and a value that you specify.

myroute1

VPC
The VPC to use for this route table.

vpc-03079a64e7434e429 (myvpc1)

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**

Q Name X Q myroute1 X Remove

Add new tag

You can add 49 more tags.

Cancel Create route table

Route table rtb-09c4641ad93902f8c | myroute1 was created successfully.

rtb-09c4641ad93902f8c / myroute1 [Actions](#)

Details [info](#)

Route table ID
rtb-09c4641ad93902f8c

VPC
vpc-03079a64e7434e429 | myvpc1

Main
No

Owner ID
844942298366

Explicit subnet associations
-

Edge associations
-

Routes Subnet associations Edge associations Route propagation Tags

Routes (1) [Both](#) [Edit routes](#)

Filter routes

Destination	Target	Status	Propagated
10.0.0.0/16	local	Active	No

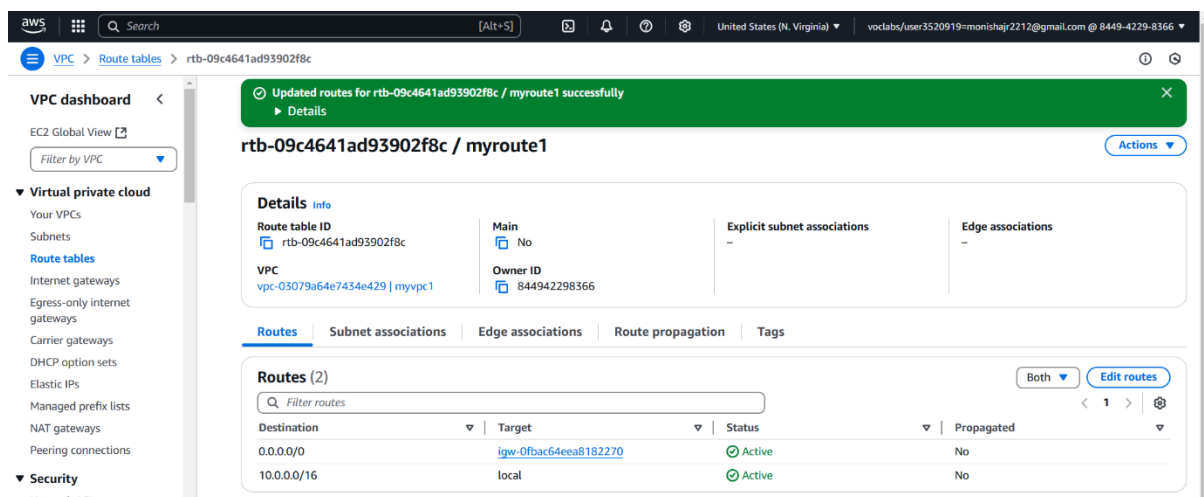
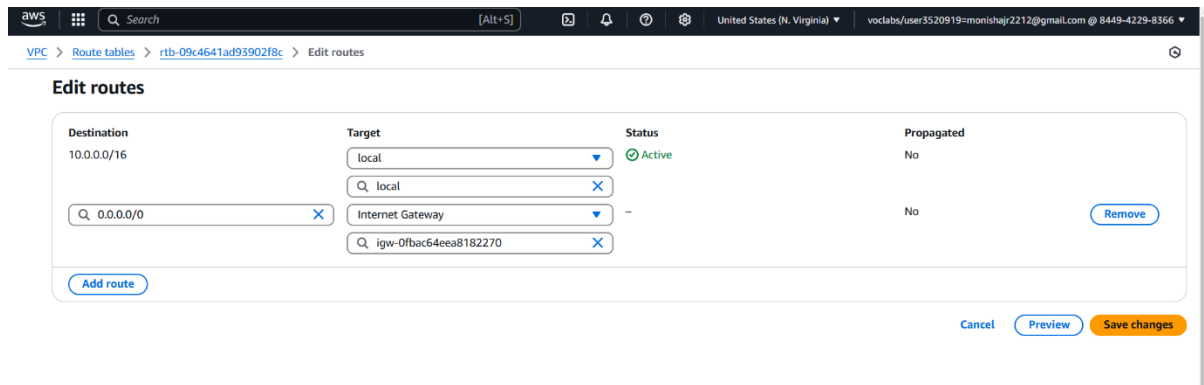
Step 3:

Launch a Bastion Host (Public Subnet)

1. Go to **EC2 Dashboard** → **Launch Instance**.
2. Select **Amazon Linux 2** (or **Ubuntu**).
3. Choose **t2.micro** (**Free Tier Eligible**).
4. Place it in **PublicSubnet** with **Auto-Assign Public IP** enabled.
5. Create a **Security Group (BastionSG)**:
 - Allow **SSH (Port 22)** from **Your IP** (xx.xx.xx.xx/32).

6. Create or use an **existing key pair** (e.g., bastion-key.pem).

7. Click **Launch**.



Step 4:

Launch a Private EC2 Instance

1. Go to **EC2 Dashboard** → **Launch Instance**.
2. Choose **Amazon Linux 2** (or **Ubuntu**).
3. Choose **t2.micro** and place it in **PrivateSubnet**.
4. **Disable Auto-Assign Public IP**.
5. Create a **Security Group (PrivateSG)**:

- Allow **SSH (Port 22)** only from **Bastion Host's Security Group**.
6. Use the same **key pair** (bastion-key.pem).
7. Click **Launch**.

Step 5: Connect to the Private Instance Using the Bastion Host

5.1 Connect to the Bastion Host

`ssh -i bastion-key.pem ec2-user@<bastion-public-`

(Replace <bastion-public-ip> with the actual Bastion Host public IP.)

```
ec2-user@ip-10-0-1-218:~  
Windows PowerShell  
Copyright (C) Microsoft Corporation. All rights reserved.  
  
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows  
  
PS C:\Users\oviya> cd Downloads  
PS C:\Users\oviya\Downloads> ssh -i sam.pem ec2-user@54.210.90.216  
Last login: Wed Feb  5 09:16:50 2025 from 182.74.154.218  
#_  
_#_ #####  
_#_ \#####  
_#_ \###|  
_#_ \#/--->  
_#_ V_#'_-->  
_#_ .-'  
_#_ _/m/'  
Amazon Linux 2  
AL2 End of Life is 2026-06-30.  
  
A newer version of Amazon Linux is available!  
  
Amazon Linux 2023, GA and supported until 2028-03-15.  
https://aws.amazon.com/linux/amazon-linux-2023/  
  
[ec2-user@ip-10-0-1-218 ~]$
```

5.2 SSH from Bastion to Private Instance

1.Copy the bastion-key.pem file to the Bastion Host:

```
scp -i bastion-key.pem bastion-key.pem ec2-  
user@<bastion-public-ip>:~/
```

2. Connect to the Bastion Host:

```
ssh -i bastion-key.pem ec2-user@<bastion-public-  
ip>
```

3. Change permissions for the key file:

```
chmod 400 bastion-key.pem
```

4.SSH into the Private Instance from the Bastion Host:

```
ssh -i bastion-key.pem ec2-user@<private-
```

instance-ip>

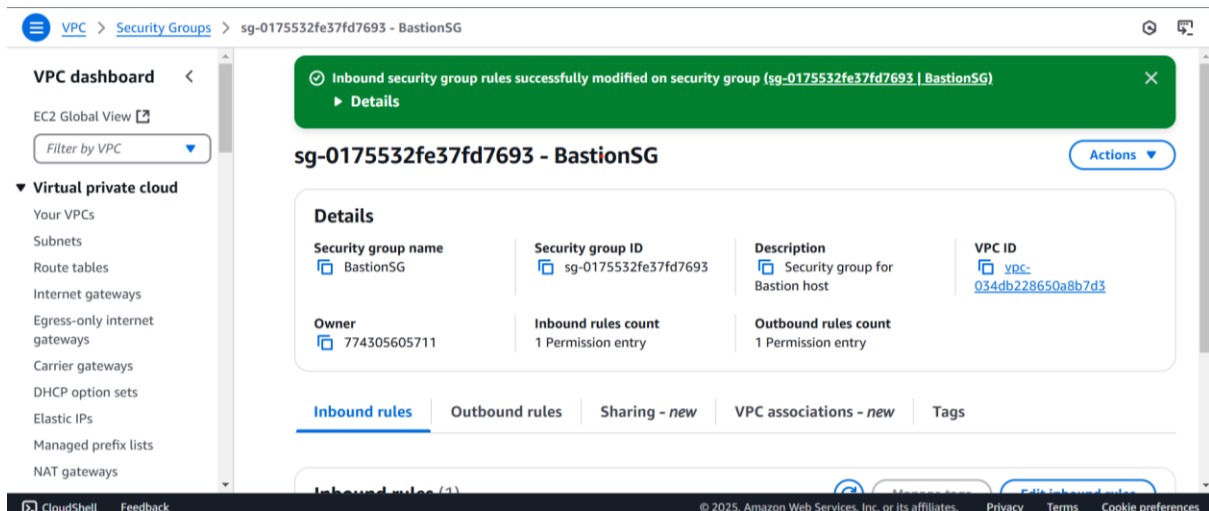
(Replace <private-instance-ip> with the private IP of your instance.)

```
ec2-user@ip-10-0-1-218:~  
PS C:\Users\oviya\Downloads> scp -i sam.pem sam.pem ec2-user@54.210.90.216:~/  
sam.pem 100% 1678 6.6KB/s 00:00  
PS C:\Users\oviya\Downloads> ^C  
PS C:\Users\oviya\Downloads> ssh -i sam.pem ec2-user@54.210.90.216  
Last login: Wed Feb 5 09:20:14 2025 from 182.74.154.218  
  
#  
#####  
Amazon Linux 2  
#####  
AL2 End of Life is 2026-06-30.  
#####  
A newer version of Amazon Linux is available!  
#####  
Amazon Linux 2023, GA and supported until 2028-03-15.  
https://aws.amazon.com/linux/amazon-linux-2023/  
#####  
[ec2-user@ip-10-0-1-218 ~]$ chmod 400 sam.pem  
[ec2-user@ip-10-0-1-218 ~]$ ssh -i sam.pem ec2-user@10.0.1.218  
The authenticity of host '10.0.1.218 (10.0.1.218)' can't be established.  
ECDSA key fingerprint is SHA256:Y6FPLIZ5IAKtMwbnL3Yq1SXQPKRyey1HTZPbYl0rLY.  
ECDSA key fingerprint is MD5:d4:a6:0d:fa:99:92:df:21:ca:36:0f:39:5f:ed:ba:cd.  
Are you sure you want to continue connecting (yes/no)? yes  
Warning: Permanently added '10.0.1.218' (ECDSA) to the list of known hosts.  
Last login: Wed Feb 5 14:18:12 2025 from 223.178.84.112  
  
#  
#####  
Amazon Linux 2  
#####  
AL2 End of Life is 2026-06-30.  
#####  
A newer version of Amazon Linux is available!  
#####  
Amazon Linux 2023, GA and supported until 2028-03-15.  
https://aws.amazon.com/linux/amazon-linux-2023/  
#####  
[ec2-user@ip-10-0-1-218 ~]$ |
```

Step 6: Secure Your Bastion Host

6.1 Restrict SSH Access

- **Go to Security Group (BastionSG) → Edit Inbound Rules.**
- **Allow SSH only from your IP address (xx.xx.xx.xx/32) instead of allowing all (0.0.0.0/0)**



6.2 Disable Password Authentication

1. Edit SSH config:

```
sudo nano /etc/ssh/sshd_config
```

2. Find and update these lines:

PasswordAuthentication no

PermitRootLogin no

1. Restart SSH service:

```
sudo systemctl restart sshd
```

```
ec2-user@ip-10-0-1-218:~  
GNU nano 2.9.8 /etc/ssh/sshd_config  
#PubkeyAuthentication yes  
  
# The default is to check both .ssh/authorized_keys and .ssh/authorized_keys2  
# but this is overridden so installations will only check .ssh/authorized_keys  
AuthorizedKeysFile .ssh/authorized_keys  
  
#AuthorizedPrincipalsFile none  
  
# For this to work you will also need host keys in /etc/ssh/ssh_known_hosts  
#HostbasedAuthentication no  
# Change to yes if you don't trust ~/.ssh/known_hosts for  
# HostbasedAuthentication  
#IgnoreUserKnownHosts no  
# Don't read the user's ~/.rhosts and ~/.shosts files  
#IgnoreRhosts yes  
  
# To disable tunneled clear text passwords, change to no here!  
#PasswordAuthentication yes  
#PermitEmptyPasswords no  
PasswordAuthentication no  
  
# Change to no to disable s/key passwords  
#ChallengeResponseAuthentication yes  
ChallengeResponseAuthentication no  
  
# Kerberos options
```

Step 7:

Alternative - Use AWS Systems Manager (SSM) Instead of SSH

- 1. Attach SSM Managed Policy to EC2 IAM Role** (AmazonSSMManagedInstanceCore).
- 2. Enable SSM Agent** (Pre-installed on Amazon Linux & Ubuntu).
- 3. Use AWS Systems Manager > Session Manager** to connect to instances without SSH.

Conclusion :

Using a Bastion Host significantly enhances security by acting as a controlled access point to private instances. This setup prevents direct internet exposure, enforces security group rules, and allows monitoring/logging of access. For even better security, consider eliminating SSH and using AWS Systems Manager (SSM) Session Manager instead.