



**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.***

Name: Raichal Maria P

Department: IT



## 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.

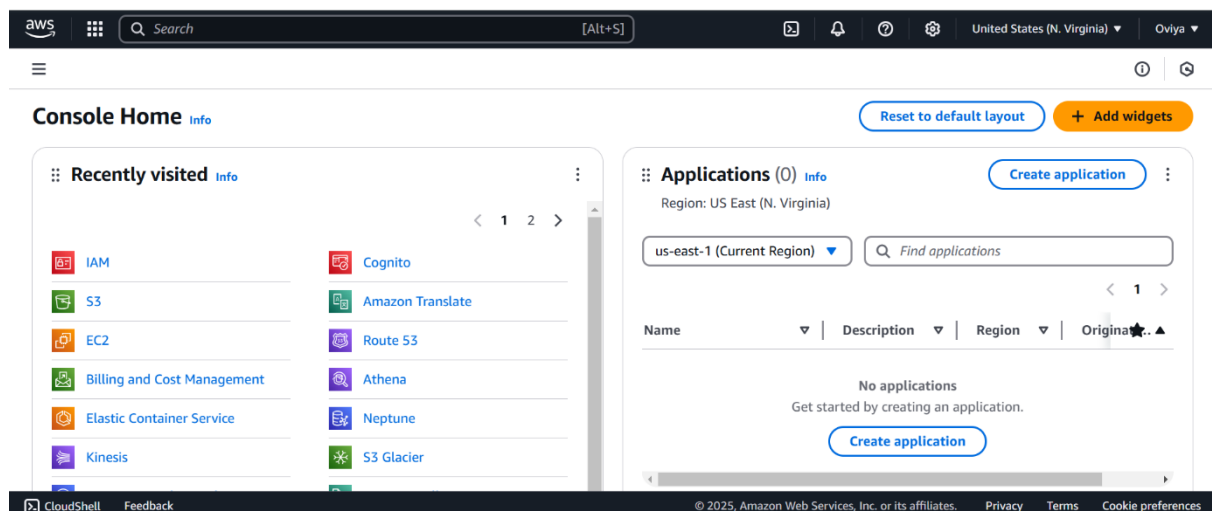
## 5. **Enhance Security** by restricting SSH access and considering AWS Systems Manager as an alternative.

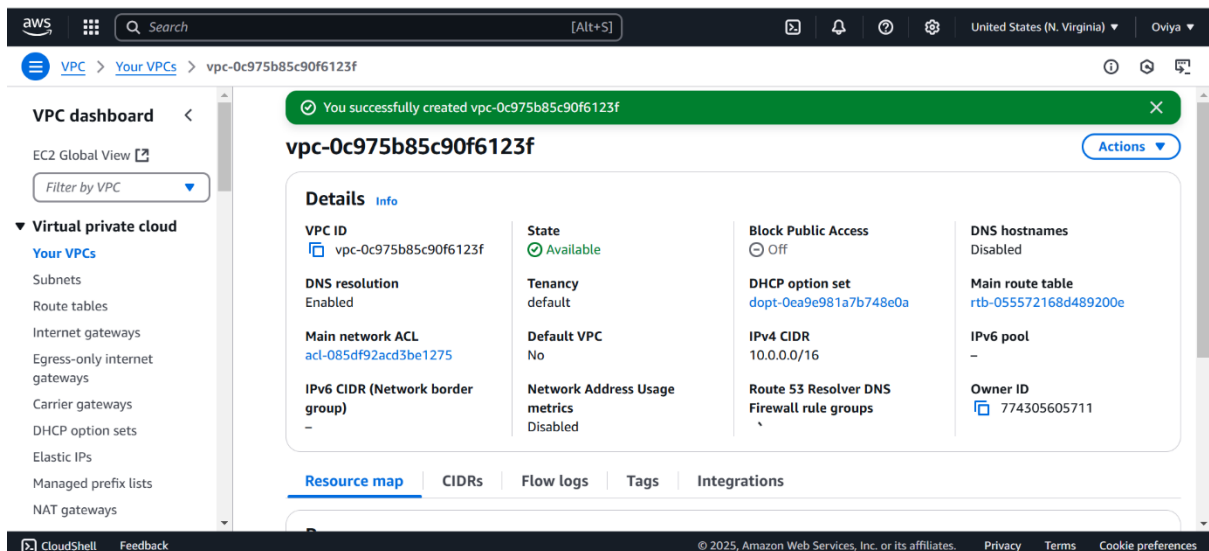
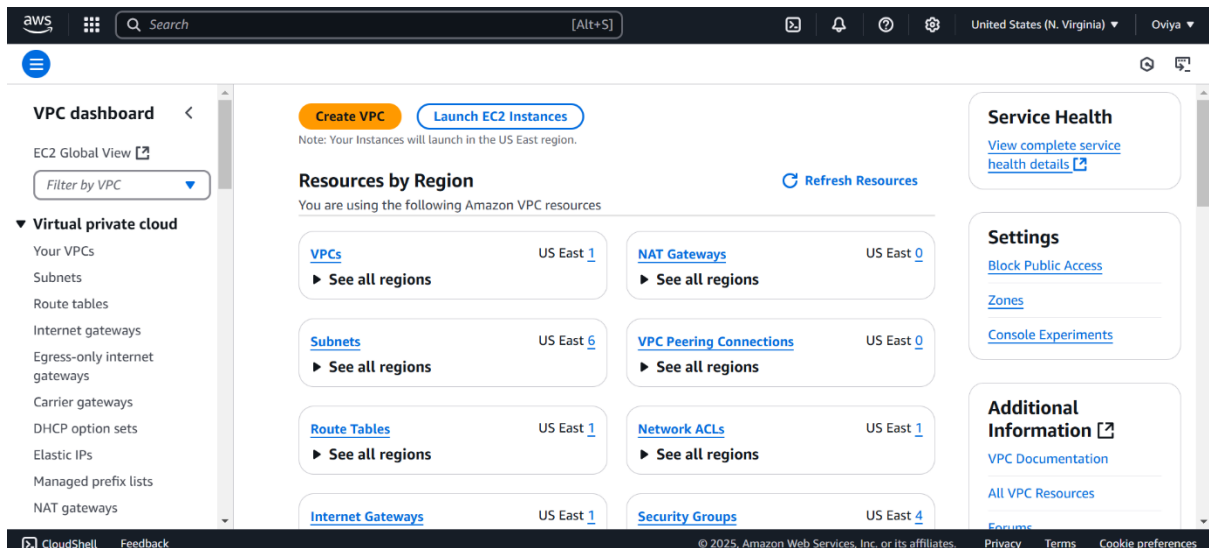
### Step 1:

#### **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

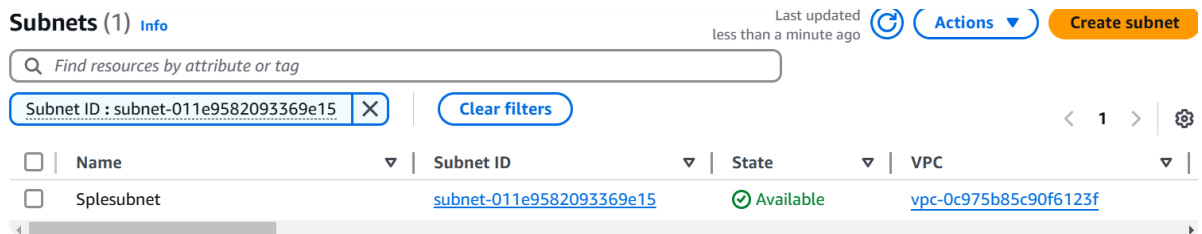
- Go to **Subnets** → **Create Subnet**.
- Select **MyVPC** and set CIDR block 10.0.1.0/24.
- Enable **Auto-Assign Public IP**.

## 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.

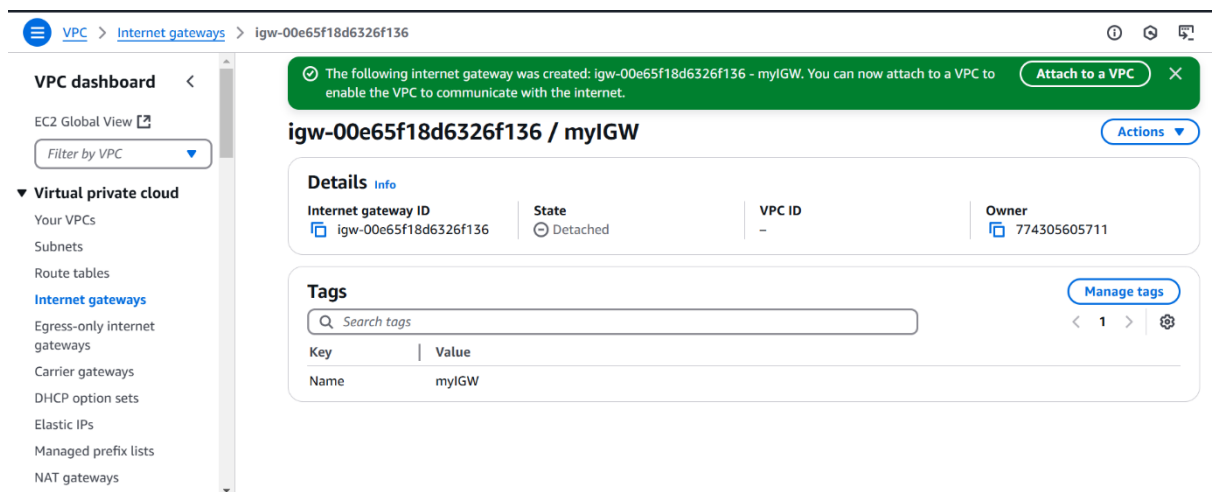


## Step 2:

## Configure Public Subnet for Internet Access

### 2.1 Create an Internet Gateway (IGW)

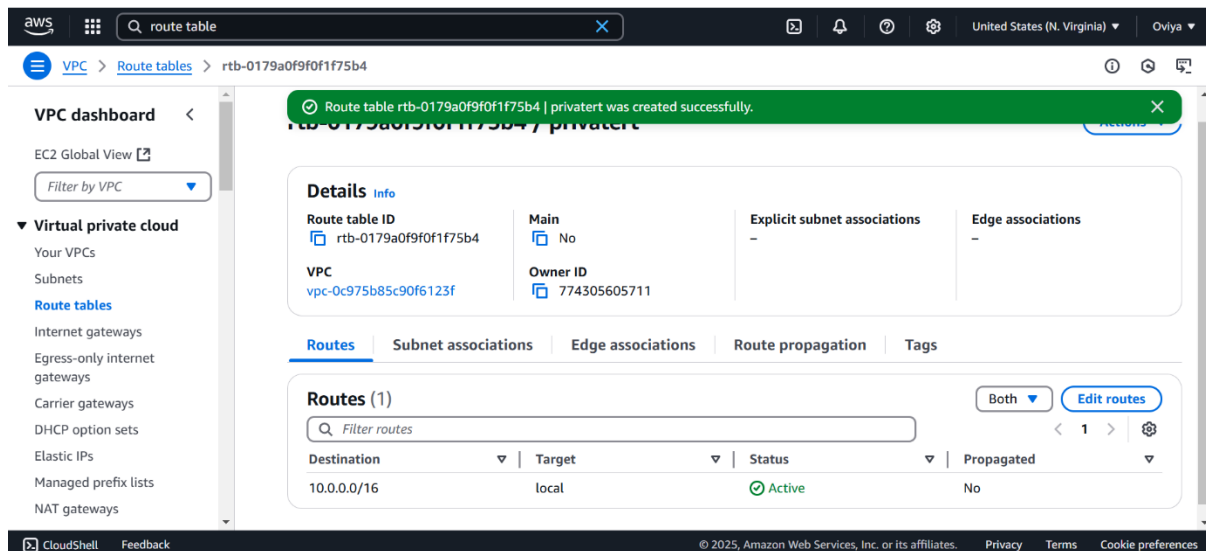
- Go to **Internet Gateways** → Click **Create Internet Gateway**.
- Name it **MyIGW**, attach it to **MyVPC**.



### 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)

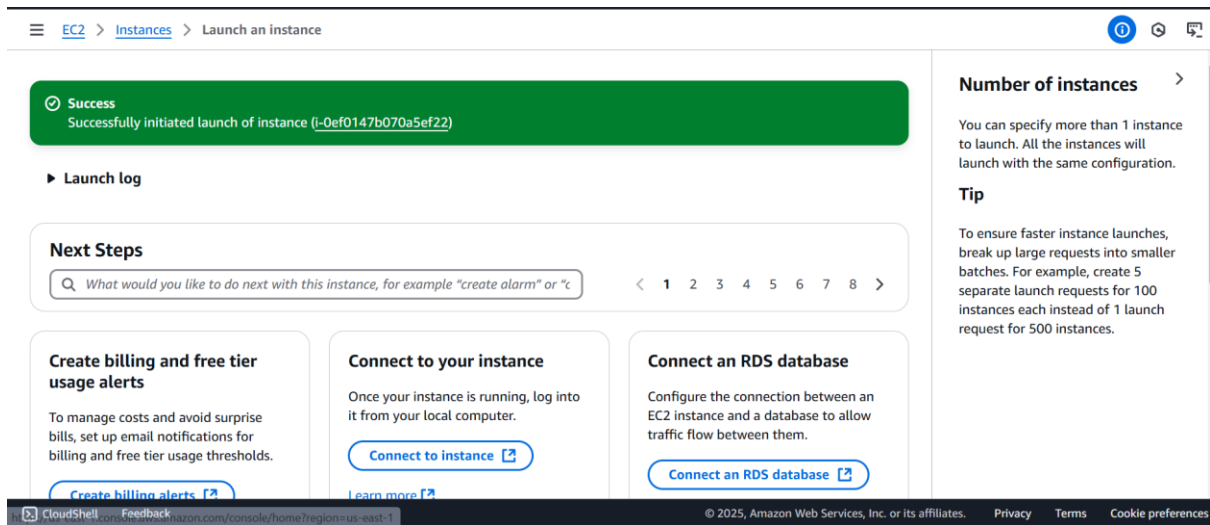


## Step 3:

### 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).

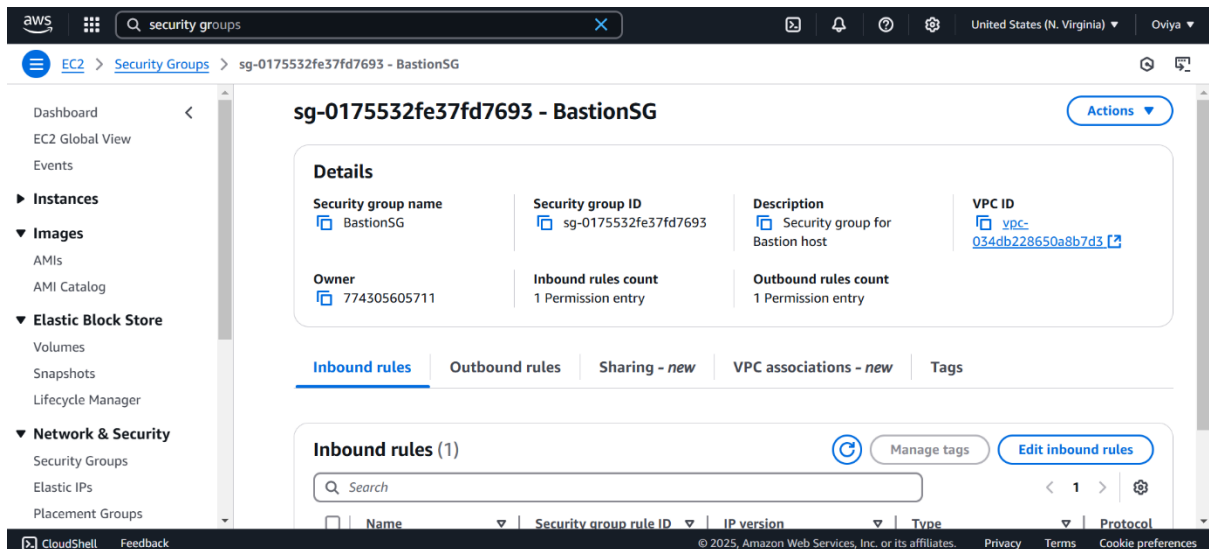
## 7. Click **Launch**.



### 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**.

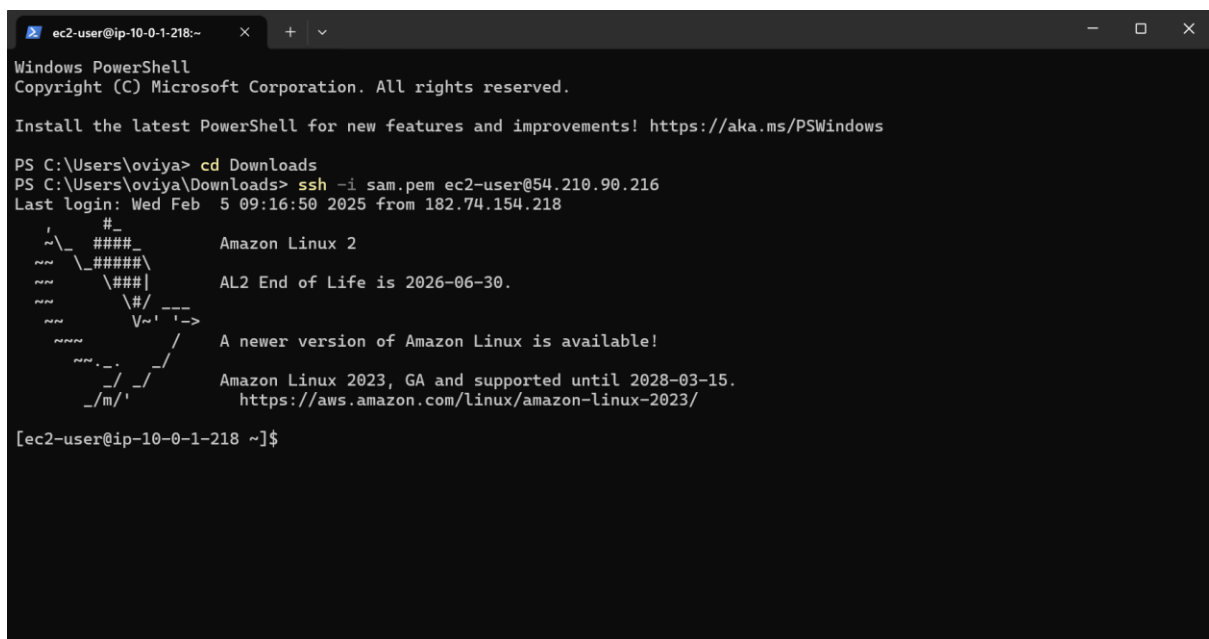


## Step 5: Connect to the Private Instance Using the Bastion Host

### 5.1 Connect to the Bastion Host

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

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





## 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
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
```

```
#_
~\   ####_
    \#####\
     \####|
      \#|
       V__'--->
           |
           | A new 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:Y6FPLIZSIaktMnwnbl3YqISXQPKRyeyIHTZPbylOrLY.
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
```

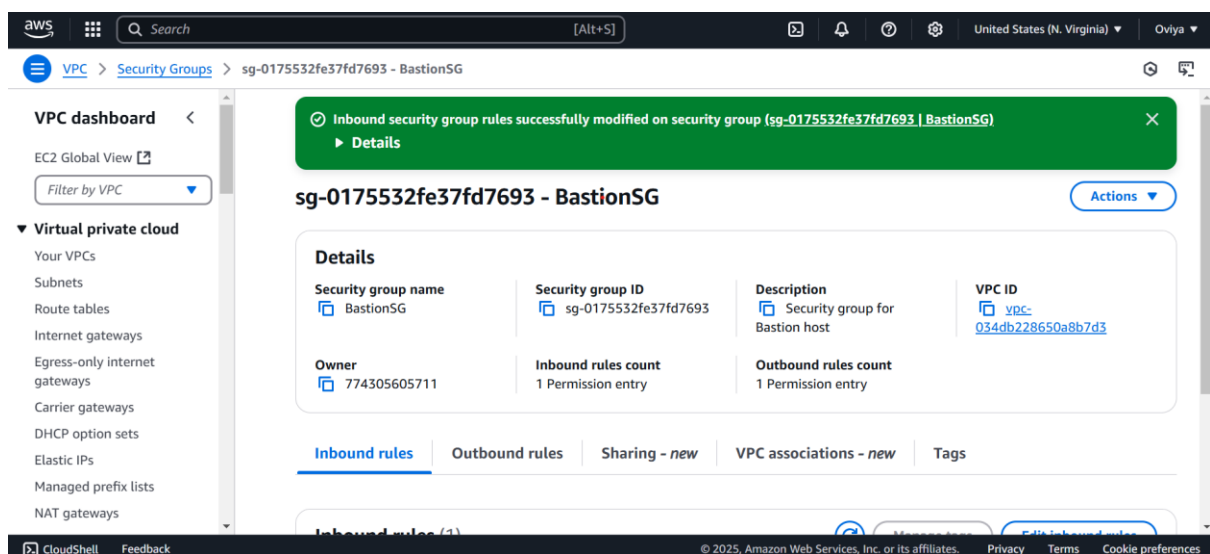
```
#_
~\   ####_
    \#####\
     \####|
      \#|
       V__'--->
           |
           | A new version of Amazon Linux is available!
           |
           | Amazon Linux 2023, GA and supported until 2028-03-15.
           | https://aws.amazon.com/linux/amazon-linux-2023/
           |
```

```
[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`

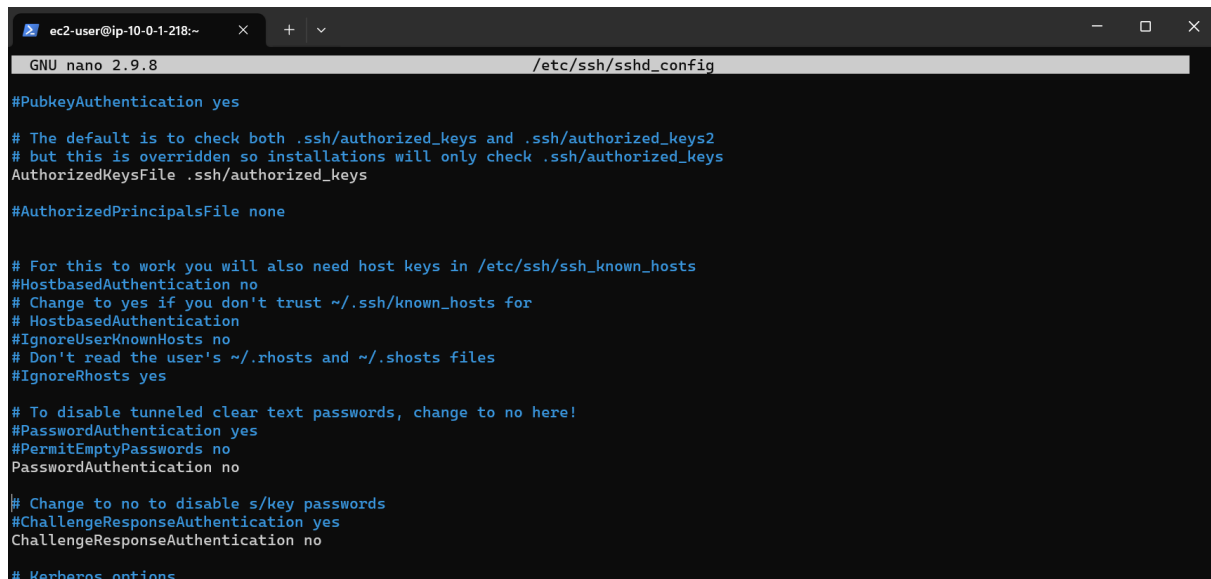
2. Find and update these lines:

`PasswordAuthentication no`

`PermitRootLogin no`

1. Restart SSH service:

`sudo systemctl restart sshd`

A screenshot of a terminal window with a dark background. The window title is 'ec2-user@ip-10-0-1-218:~'. The terminal shows the contents of the '/etc/ssh/sshd\_config' file being edited with 'GNU nano 2.9.8'. The configuration includes settings for PubkeyAuthentication (yes), AuthorizedKeysFile (.ssh/authorized\_keys), AuthorizedPrincipalsFile (none), HostbasedAuthentication (no), IgnoreUserKnownHosts (no), IgnoreRhosts (yes), PasswordAuthentication (no), PermitEmptyPasswords (no), ChallengeResponseAuthentication (yes), and Kerberos options. The file is partially commented out with blue hash symbols.

```
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.