Placement Empowerment Program

Cloud Computing and DevOps Centre

Secure Access with a Bastion HostSet 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.

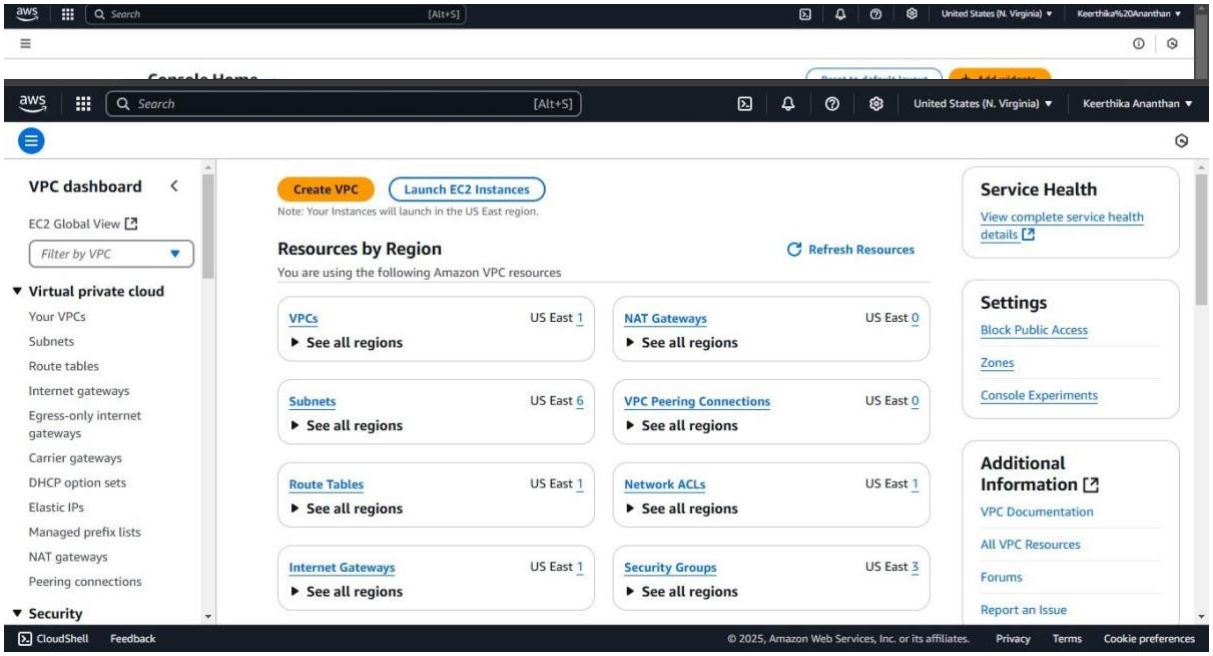
5. **Enhance Security** by restricting SSH access and considering AWS Systems Manager as an alternative.

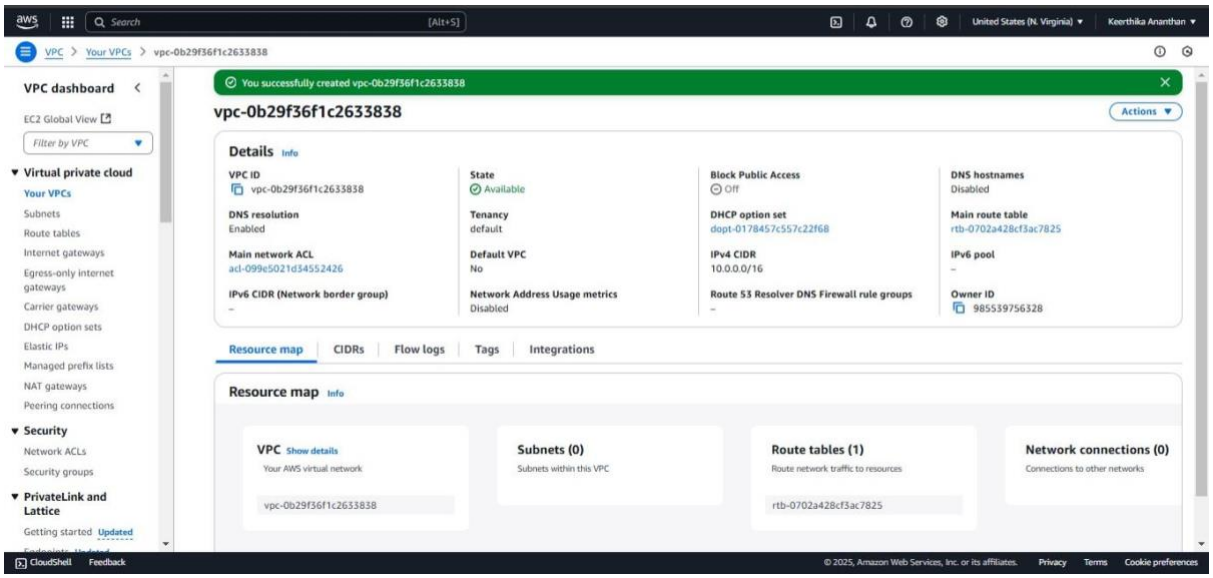
Step 1:

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.



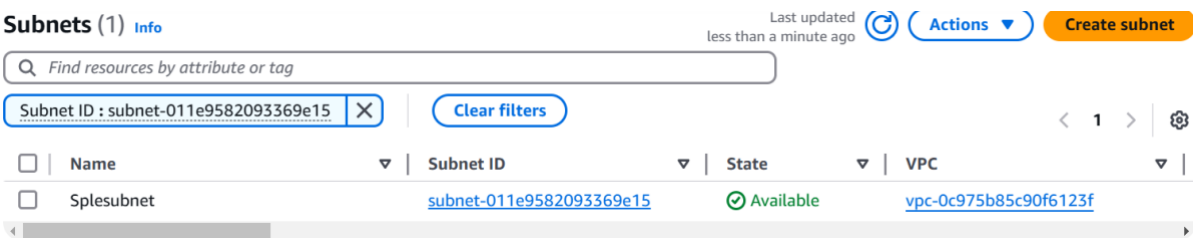


1.2 Create a Public Subnet

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

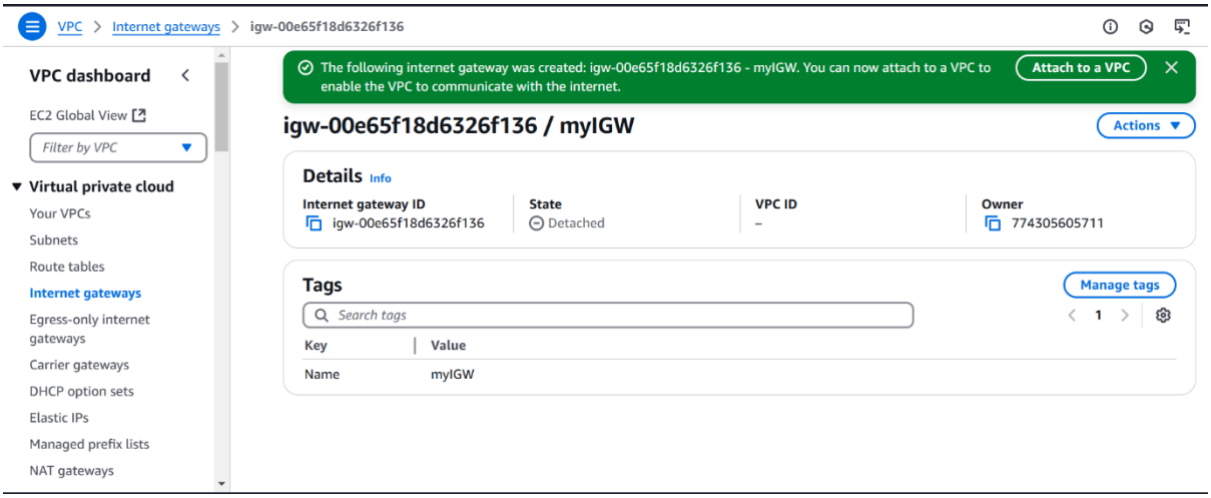
1.3 Create a Private Subnet

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



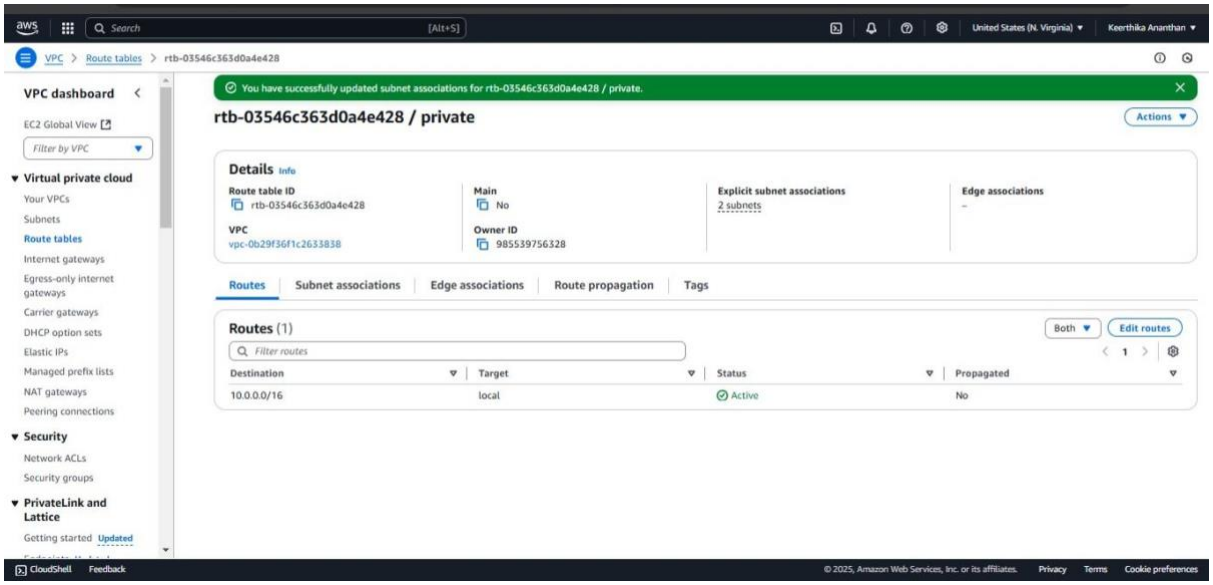
Step 2:
Configure Public Subnet for Internet Access
2.1 Create an Internet Gateway (IGW)

- 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)**



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).

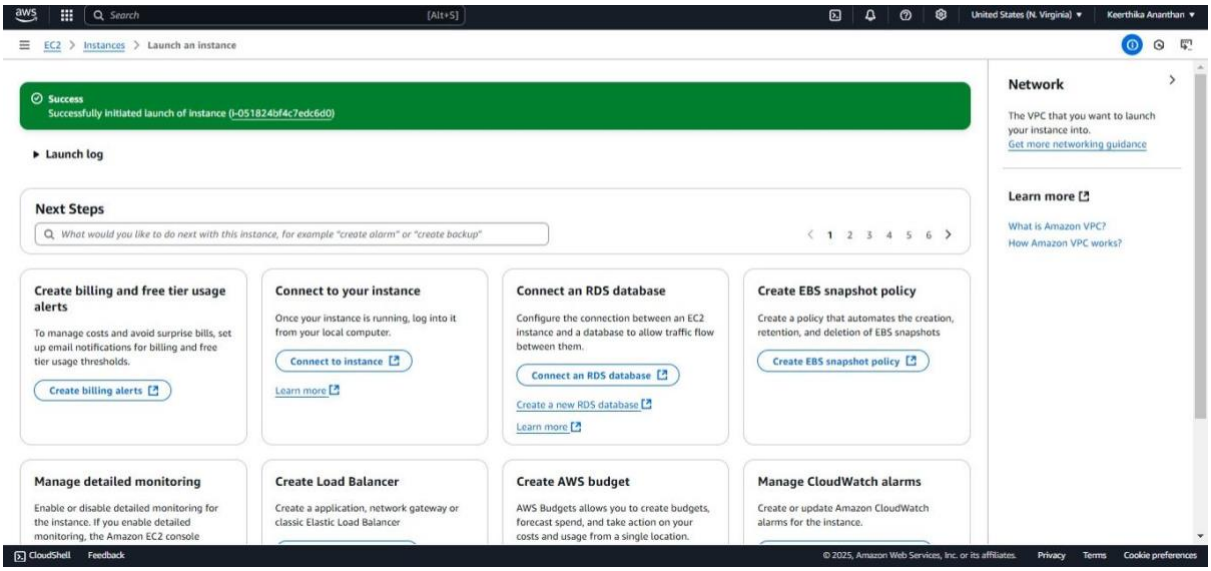
4.Place it in PublicSubnet with Auto-Assign Public IP enabled.

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



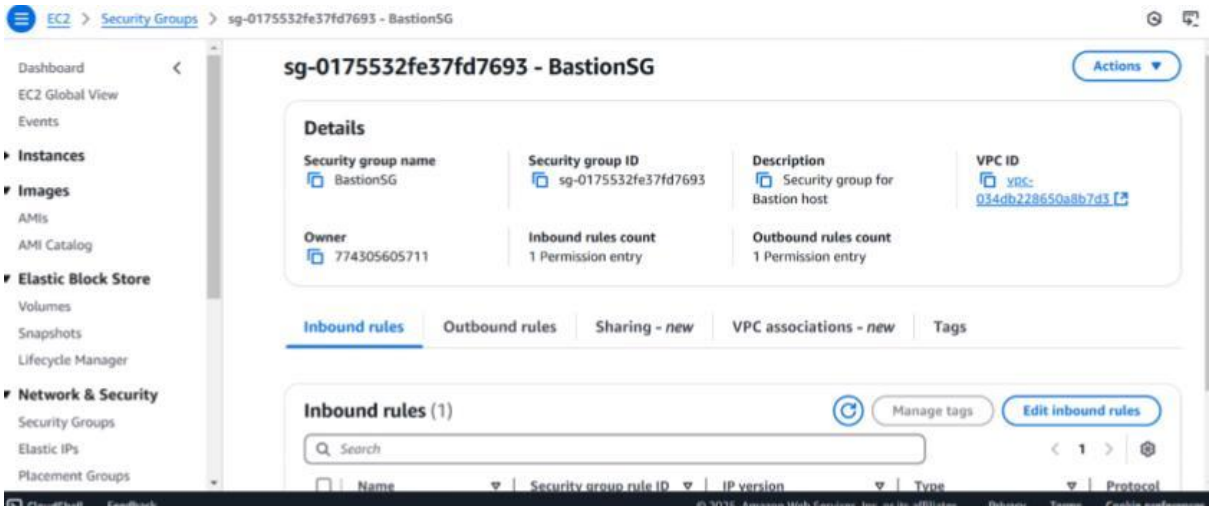
Step 4:

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**.

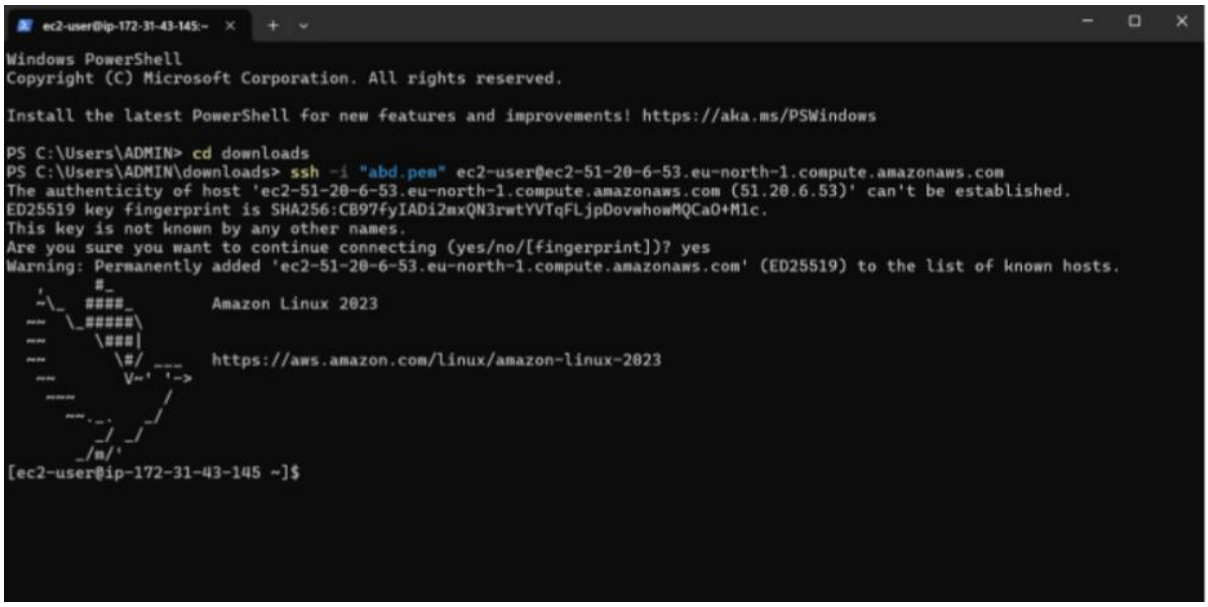


Step 5: Connect to the Private Instance Using the Bastion Host

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>

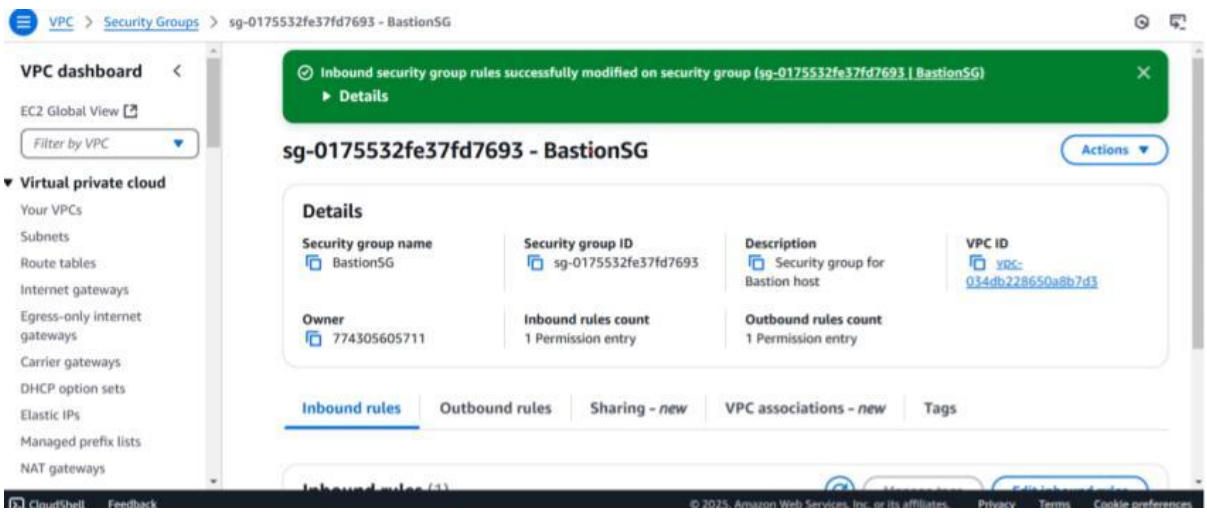
(Replace <private-instance-ip> with the private IP

of your instance.)

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

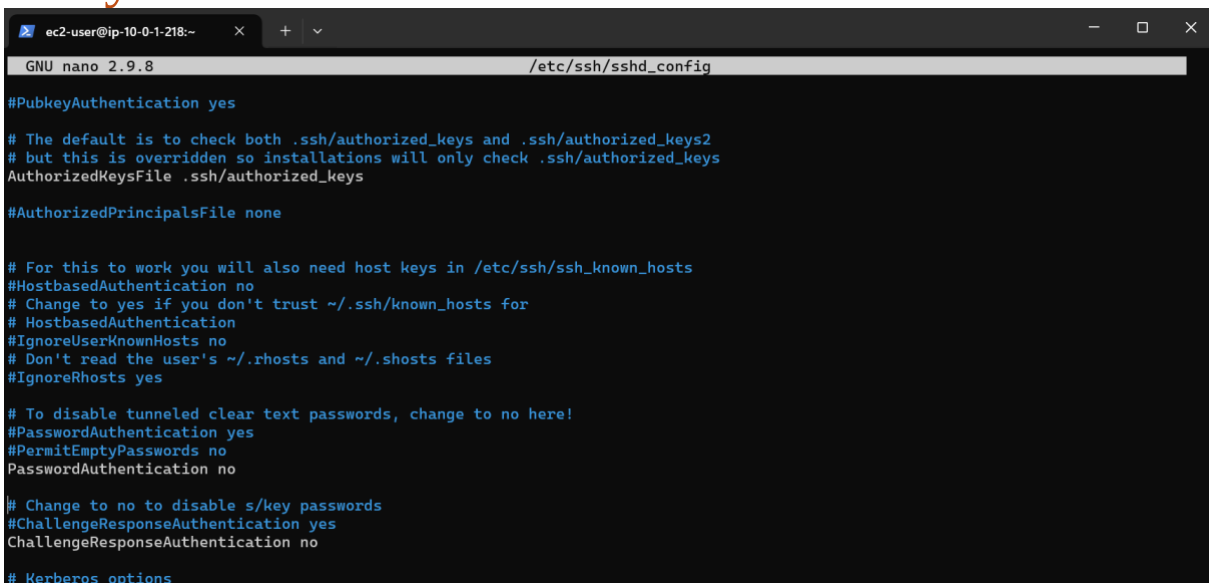
2. Find and update these lines:

PasswordAuthentication no

PermitRootLogin no

1. Restart SSH service:

sudo systemctl restart sshd



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.