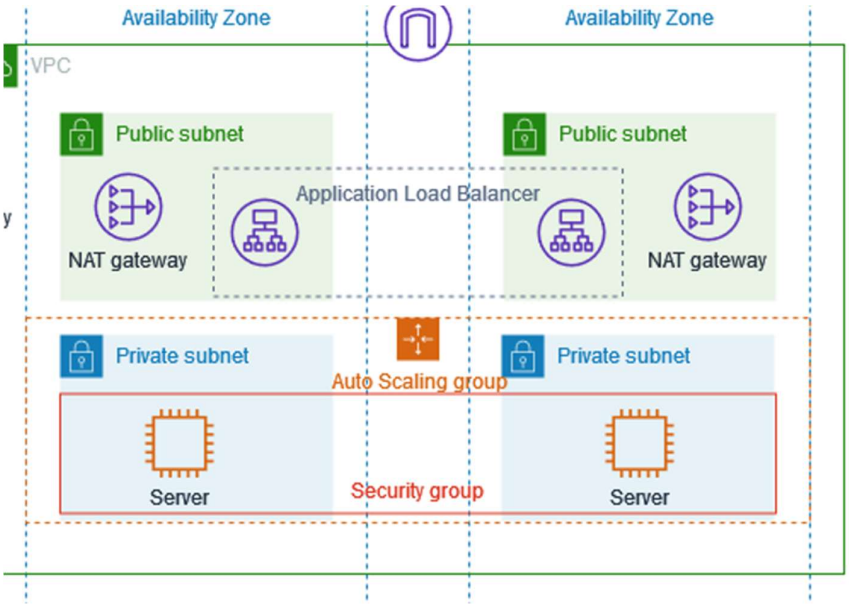
# AWS PROJECT- *VPC with Public-Private Subnet.*




MAIN GOAL –

- **The VPC creates a private network for your instances. Even though the ALB is public (in a public subnet), your instances are in a private subnet. This means no one can directly access your instances from the internet—they can only reach them through the ALB.**
- **Example: Think of the VPC as a gated community. The ALB is the front gate that's open to visitors, but your house (the instances) is inside, and no one can just walk in without going through the gate.**
- **The Application or Website is Stored inside the Private Subnet , Only the Load Balancer can Access the Private Subnet, AS The Load-Balancer present at PUBLIC SUBNET of SAME VPC. So when an Outside user trying to access to the Website with Load-Balancer URL, The Load-Balancer Actually send request to Instance that is in Private Subnet.**
- **So Here The user is Not Accessing the website Directly, first he is Accessing the LoadBalancer and then Instance.**

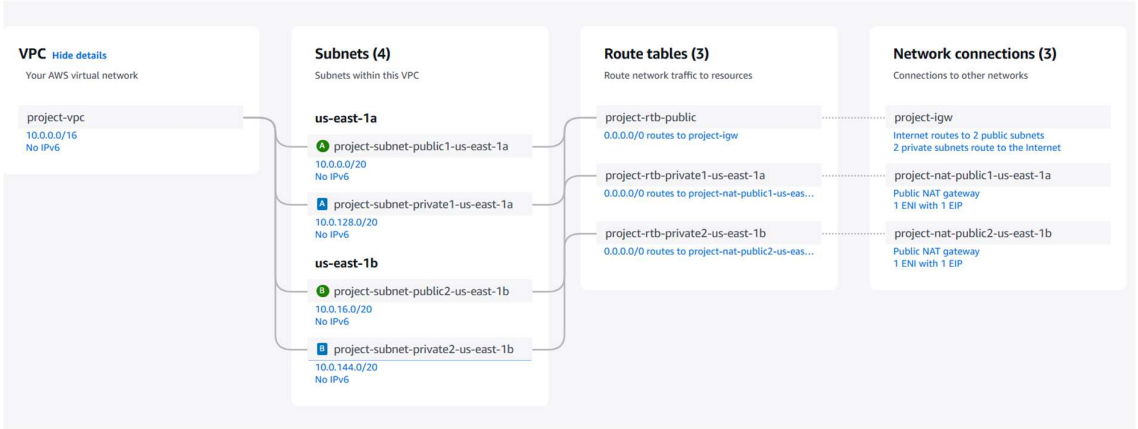
## WORKING STEPS-

STEP1-

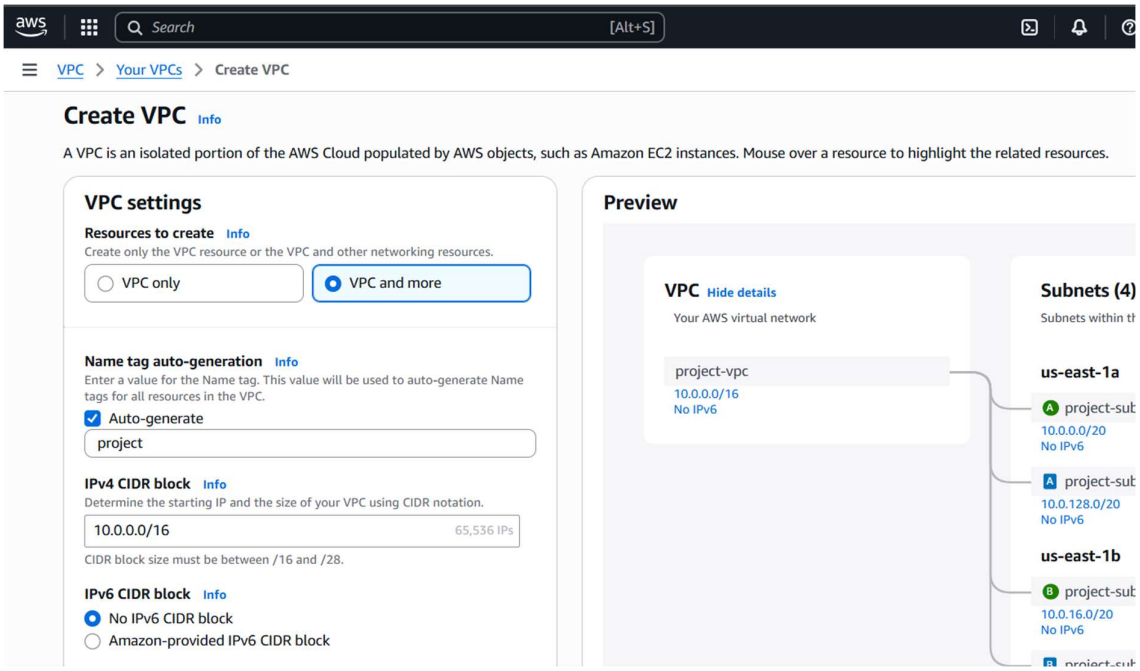
**VPC and Subnet Setup**

- **VPC Name**: project-vpc
- **CIDR Block**: 10.0.0.0/16
- Created **4 subnets** (2 public and 2 private) across **2 Availability Zones** (us-east-1a & us-east-1b).
    - **Public Subnets**:
        - project-subnet-public1-us-east-1a
        - project-subnet-public2-us-east-1b
    - **Private Subnets**:
        - project-subnet-private1-us-east-1a
        - project-subnet-private2-us-east-1b
- **Internet Gateway (IGW)** attached for public access.
- **NAT Gateways** created in each public subnet to allow outbound internet access from private subnets.
- **Route Tables** properly configured:
    - Public route table routes to the IGW.
    - Private route tables route to respective NAT gateways.

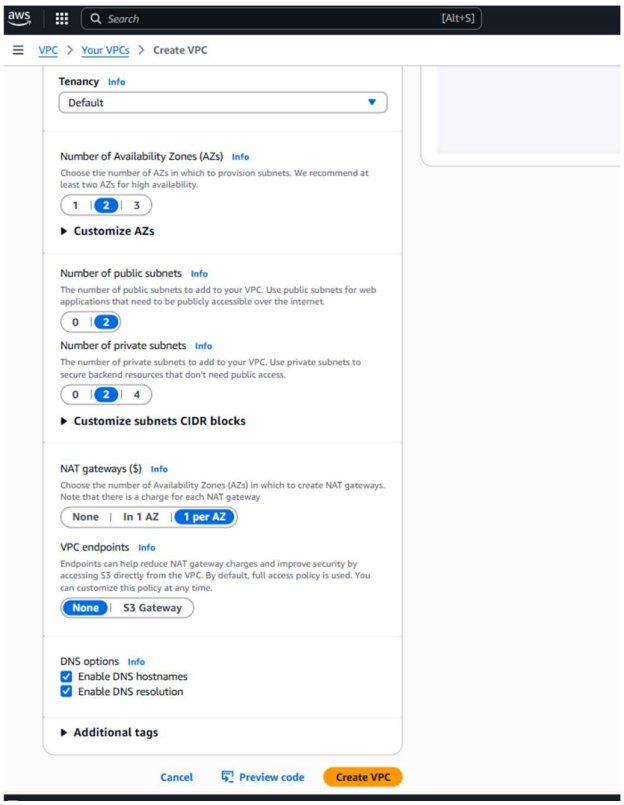
A)



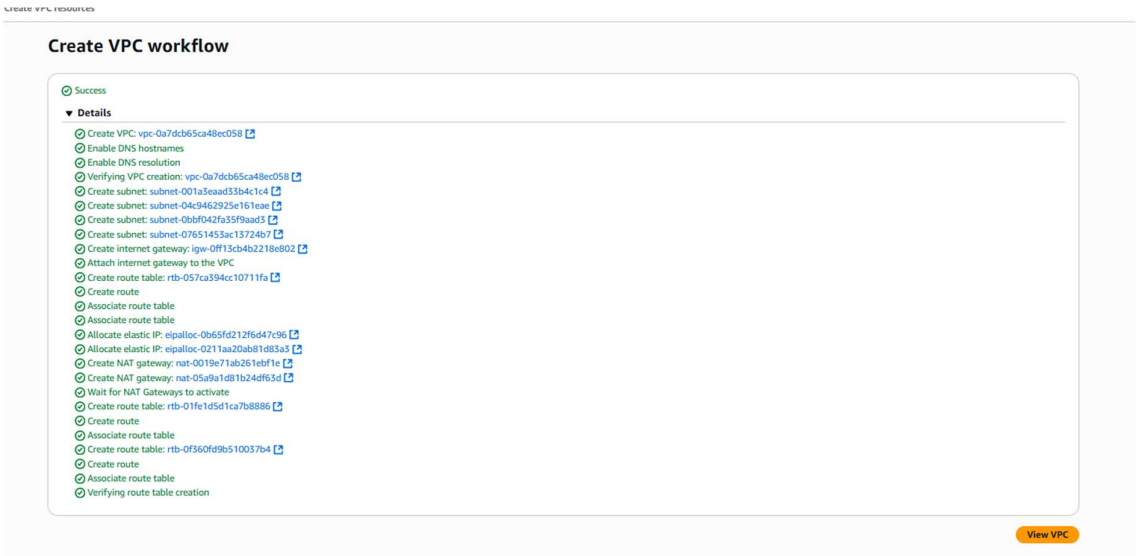
B)


aws
Search
[Alt+S]
VPC > Your VPCs > Create VPC
Create VPC Info
A VPC is an isolated portion of the AWS Cloud populated by AWS objects, such as Amazon EC2 instances. Mouse over a resource to highlight the related resources.
VPC settings
Resources to create Info
Create only the VPC resource or the VPC and other networking resources.
VPC only
VPC and more
Name tag auto-generation Info
Enter a value for the Name tag. This value will be used to auto-generate Name tags for all resources in the VPC.
Auto-generate
project
IPv4 CIDR block Info
Determine the starting IP and the size of your VPC using CIDR notation.
10.0.0.0/16
65,536 IPs
CIDR block size must be between /16 and /28.
IPv6 CIDR block Info
No IPv6 CIDR block
Amazon-provided IPv6 CIDR block
Preview
VPC Hide details
Your AWS virtual network
project-vpc
10.0.0.0/16
No IPv6
Subnets (4)
us-east-1a
project-sub
10.0.0.0/20
No IPv6
project-sub
10.0.128.0/20
No IPv6
us-east-1b
project-sub
10.0.16.0/20
No IPv6

C)




Create VPC

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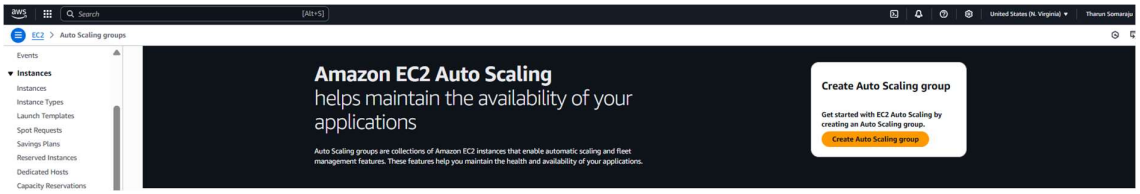
STEP 2-

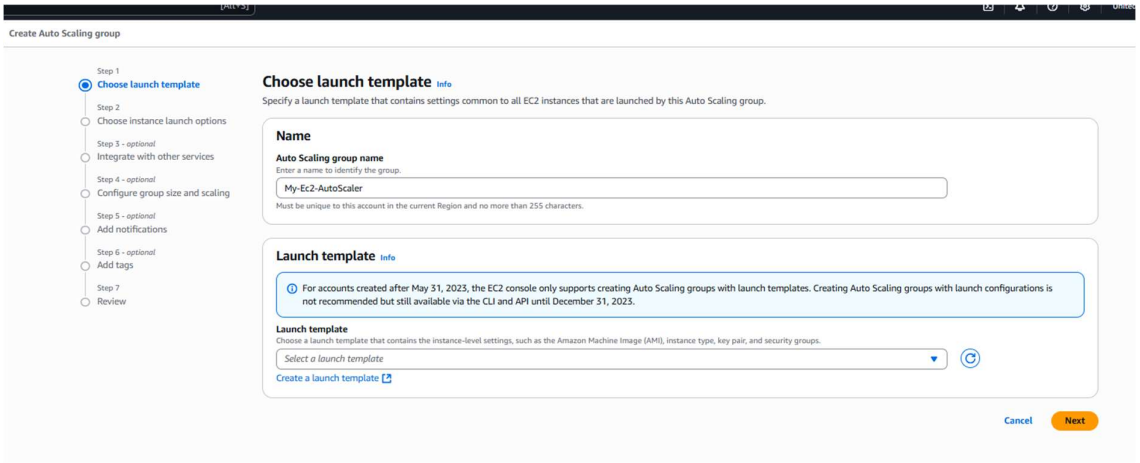
A)

Launch Ec2 Ubuntu Instance in each Private Subnets, by Auto Scaling

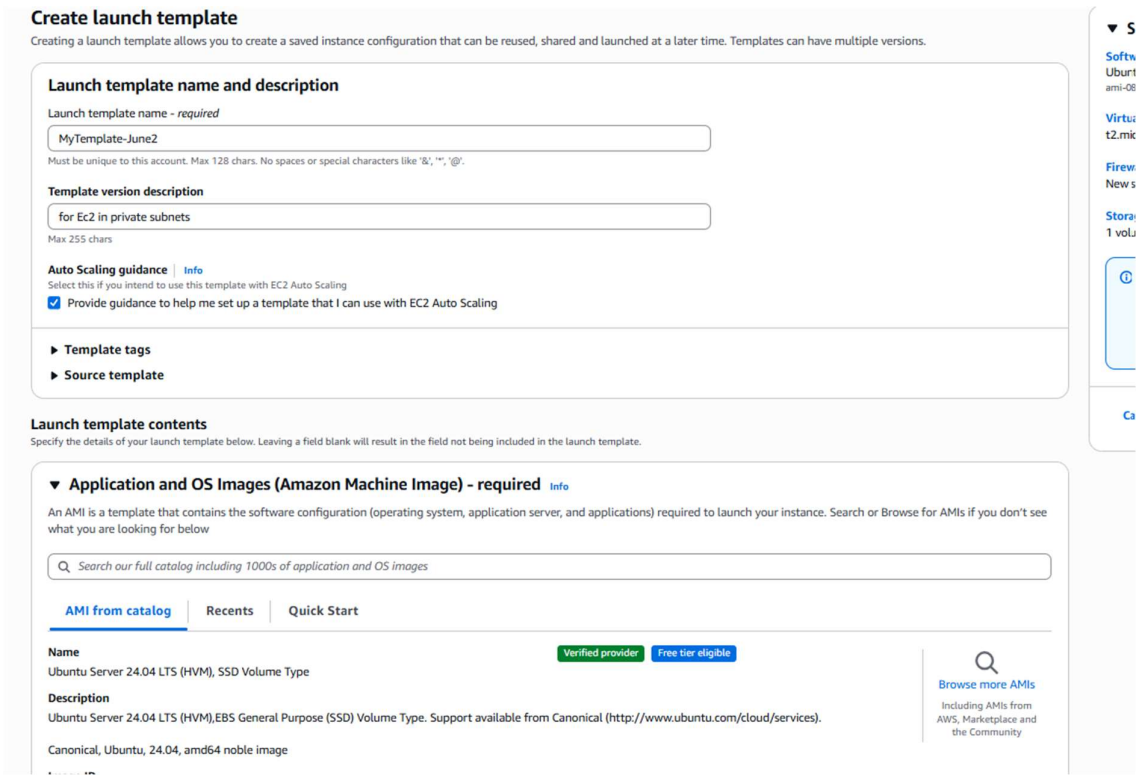



B)

Create Launch Template for Ec2 Specifications (which we use in the Future for any Creations)




Create the Launch Template as it automatically loads the page in other Tab



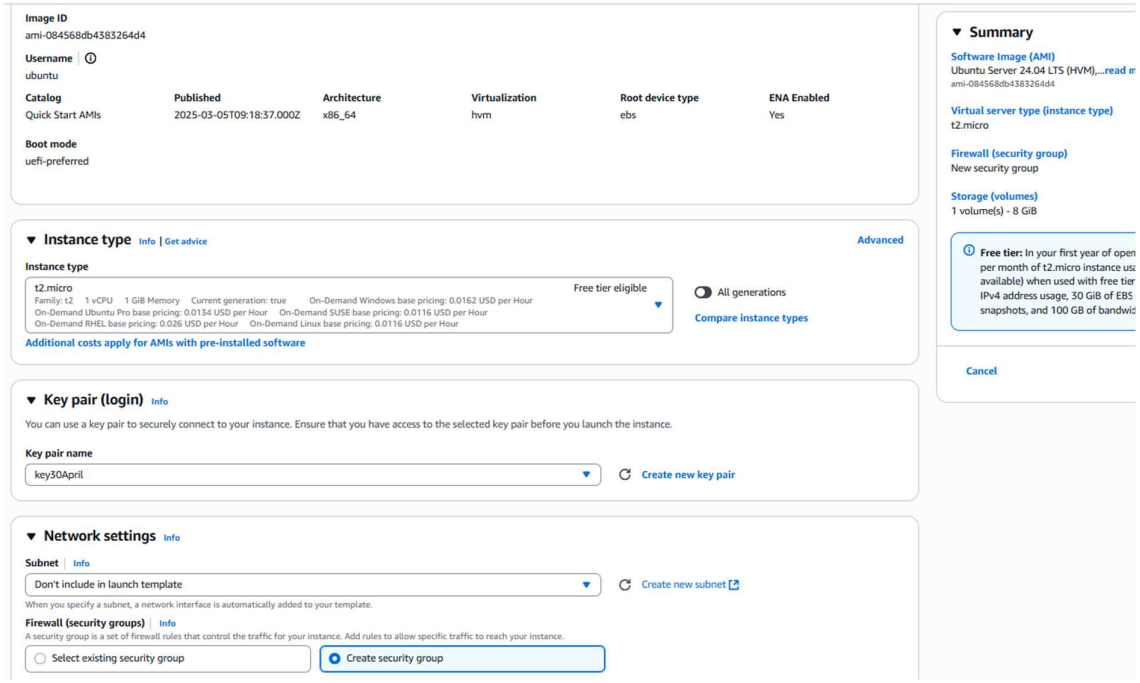
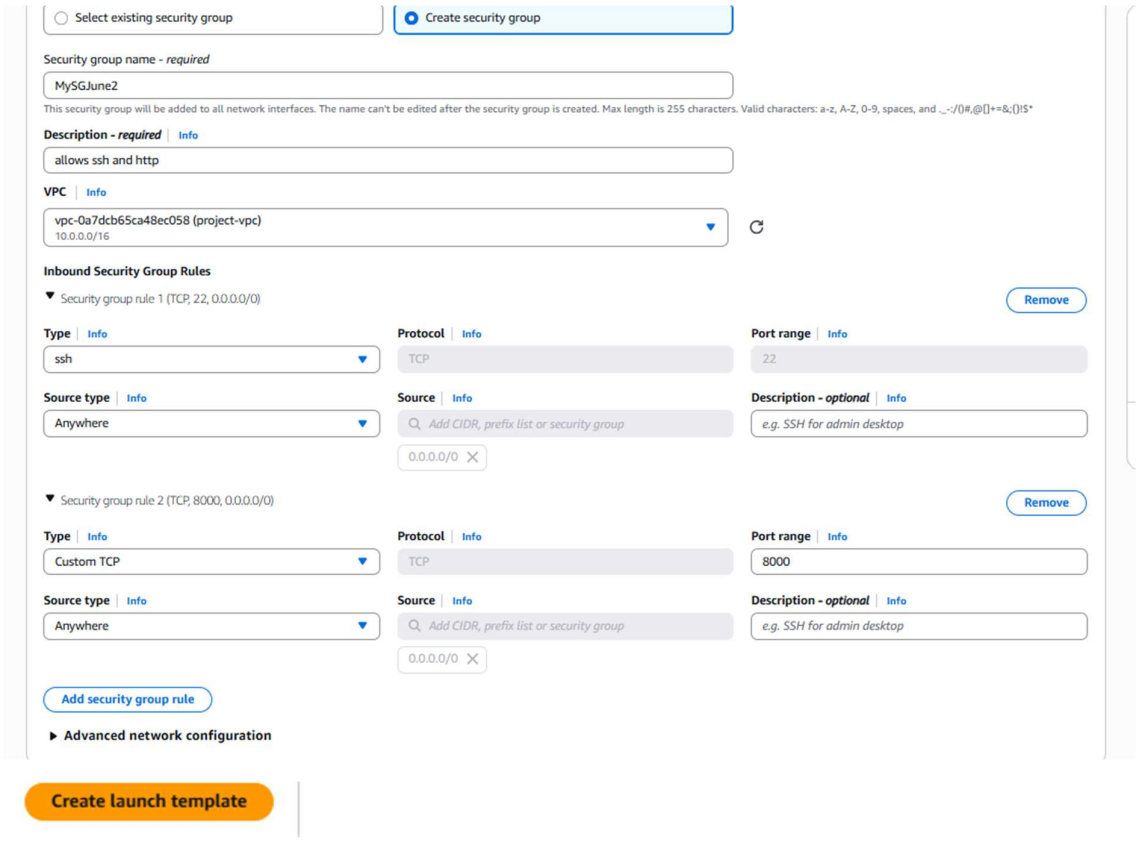
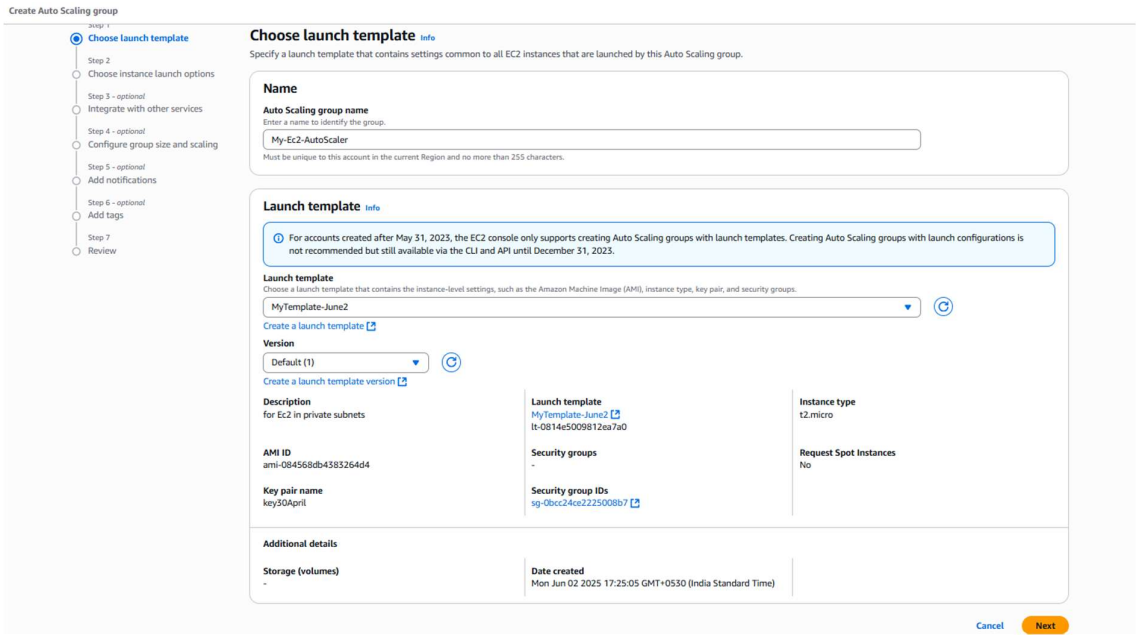


Image ID
ami-084568db4383264d4
Username
ubuntu
Catalog
Quick Start AMIs
Published
2025-03-05T09:18:37.000Z
Architecture
x86_64
Virtualization
hvm
Root device type
ebs
ENA Enabled
Yes
Boot mode
uefi-preferred
Instance type Info | Get advice
Advanced
Instance type
t2.micro
Free tier eligible
Family: t2 1 vCPU 1 GiB Memory Current generation: true On-Demand Windows base pricing: 0.0162 USD per Hour
On-Demand Ubuntu Pro base pricing: 0.0134 USD per Hour On-Demand SUSE base pricing: 0.0116 USD per Hour
On-Demand RHEL base pricing: 0.026 USD per Hour On-Demand Linux base pricing: 0.0116 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
key30April
Create new key pair
Network settings Info
Subnet Info
Don't include in launch template
Create new subnet
When you specify a subnet, a network interface is automatically added to your template.
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.
Select existing security group
Create security group
Summary
Software Image (AMI)
Ubuntu Server 24.04 LTS (HVM),...read m
ami-084568db4383264d4
Virtual server type (instance type)
t2.micro
Firewall (security group)
New security group
Storage (volumes)
1 volume(s) - 8 GiB
Free tier: In your first year of open
per month of t2.micro instance usa
available) when used with free tier
IPv4 address usage, 30 GiB of EBS
snapshots, and 100 GB of bandwi
Cancel


Select existing security group
Create security group
Security group name - required
MySGJune2
This security group will be added to all network interfaces. The name can't be edited after the security group is created. Max length is 255 characters. Valid characters: a-z, A-Z, 0-9, spaces, and ._-:/()#,@[]+=&;{}!$*
Description - required Info
allows ssh and http
VPC Info
vpc-0a7dcb65ca48ec058 (project-vpc)
10.0.0.0/16
Inbound Security Group Rules
Security group rule 1 (TCP, 22, 0.0.0.0/0)
Remove
Type Info
ssh
Protocol Info
TCP
Port range Info
22
Source type Info
Anywhere
Source Info
Add CIDR, prefix list or security group
0.0.0.0/0
Description - optional Info
e.g. SSH for admin desktop
Security group rule 2 (TCP, 8000, 0.0.0.0/0)
Remove
Type Info
Custom TCP
Protocol Info
TCP
Port range Info
8000
Source type Info
Anywhere
Source Info
Add CIDR, prefix list or security group
0.0.0.0/0
Description - optional Info
e.g. SSH for admin desktop
Add security group rule
Advanced network configuration
Create launch template

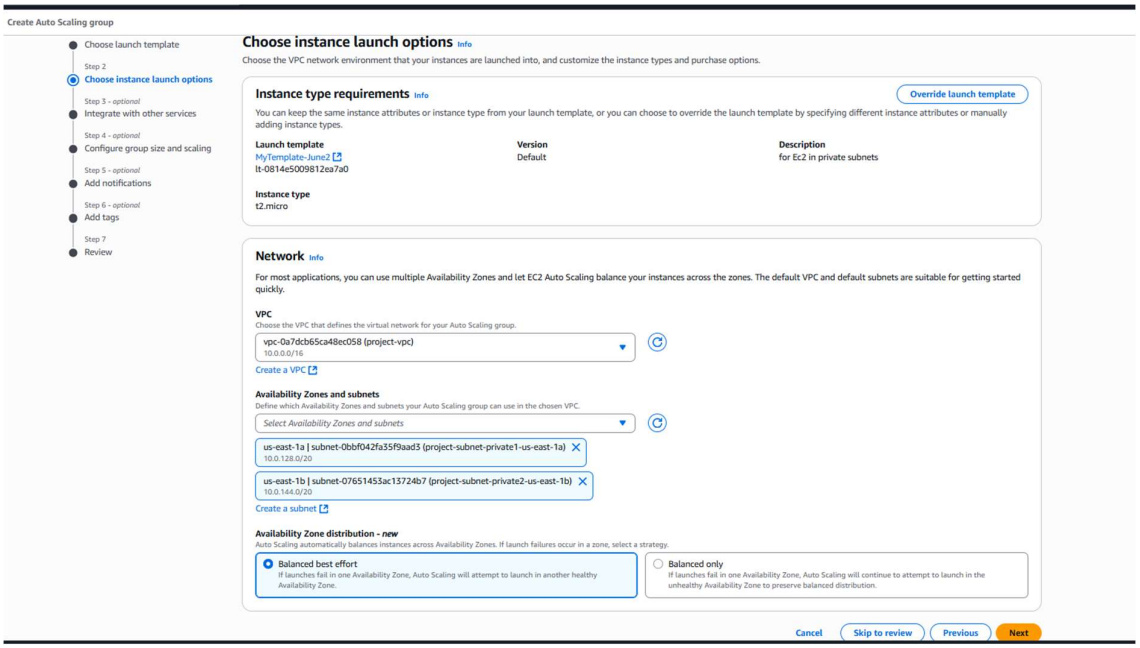
C)

Load the Created Launch Template in the Auto Scaling Section

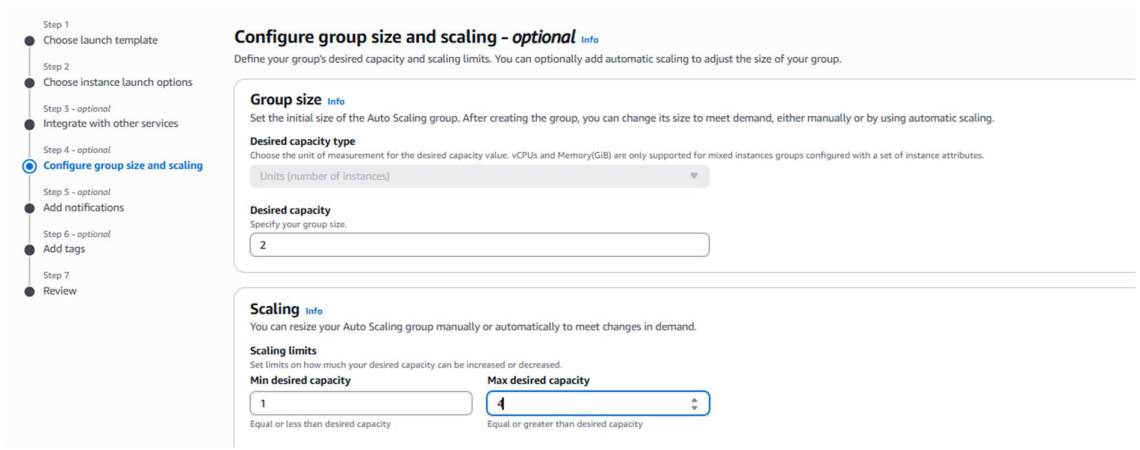


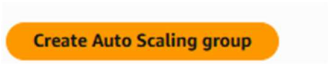

D)

Create AutoScaling in the Private Subnet of Created VPC- private1A and private 1B

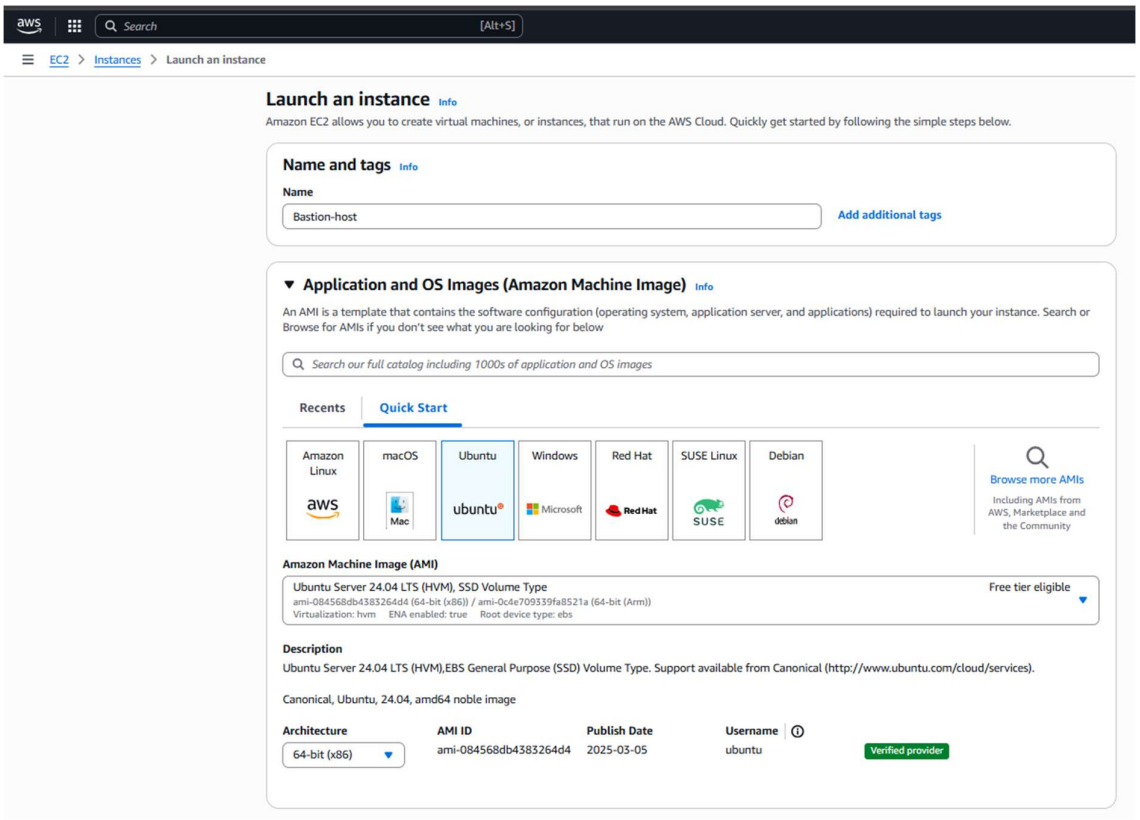


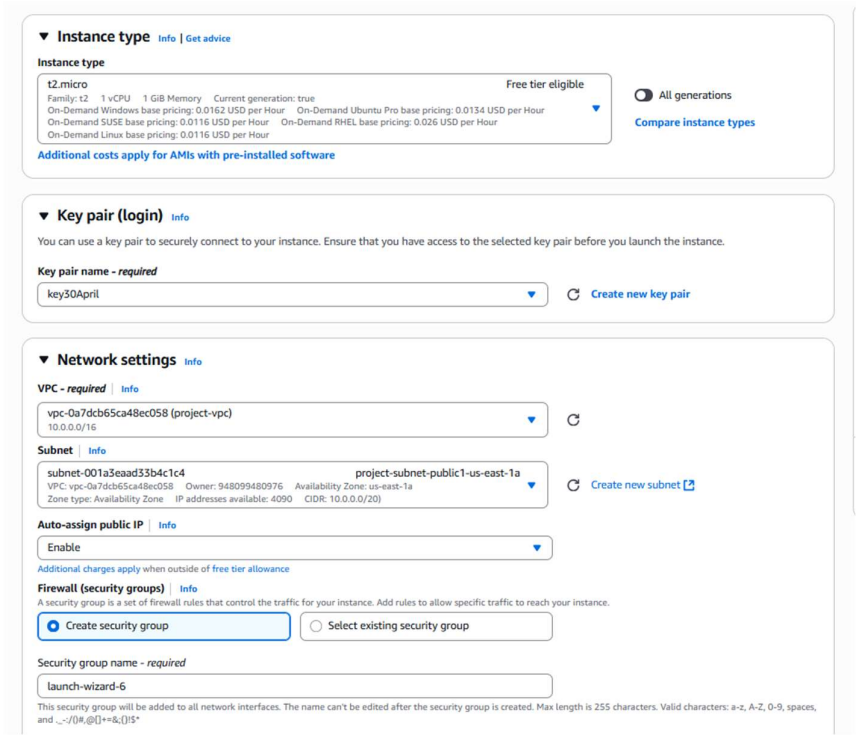

E)Configure group size and Auto Scaling of the Ec2 Instances

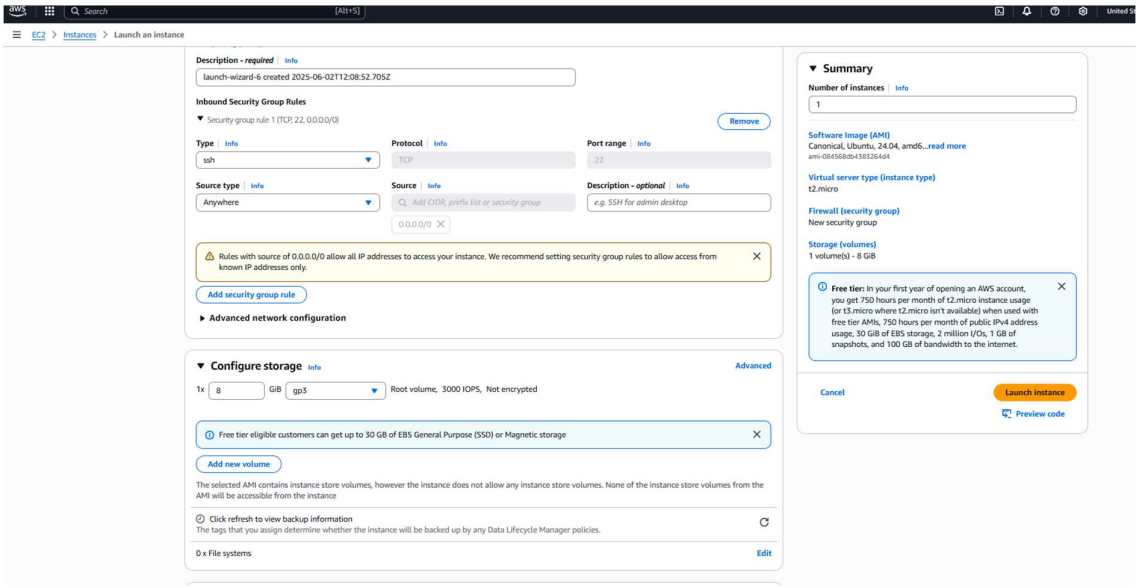



F) 


G)Create another Ec2 Instance - Bastion-Host(Jump Server) in the Public Subnet of Our VPC, as from our own PC Cmd-line we need to SSH to Bastion





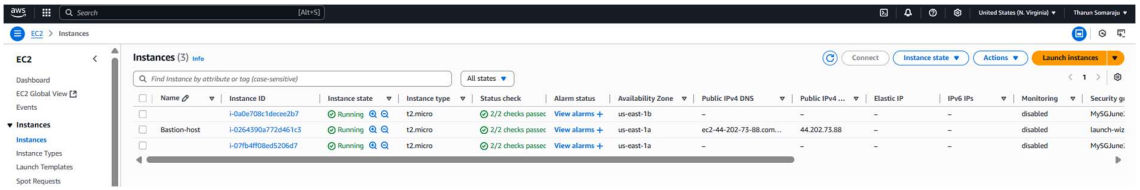




LAUNCH THE Instance.

STEP 3-

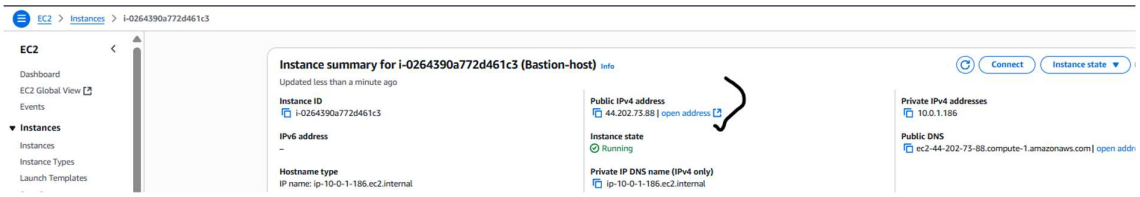
A)

We Can see 3 instance – One is Bastion and two are Private Subnet Instances.




B)

Go to Bastion-host instance and note the Public IP of it.




C)

FOR copying  key **key30April.pem** from the Local Pc to Bastion (as we want to login to private subnet from bastion) in the Command Prompt of the PC

**scp -i "C:\Users\Somaraju Tharun\Downloads\key30April.pem" "C:\Users\Somaraju Tharun\Downloads\key30April.pem" ubuntu@44.202.73.88:/home/ubuntu/**

```
C:\Users\Somaraju Tharun>scp -i "C:\Users\Somaraju Tharun\Downloads\key30April.pem" "C:\Users\Somaraju Tharun\Downloads\
key30April.pem" ubuntu@44.202.73.88:/home/ubuntu/
The authenticity of host '44.202.73.88 (44.202.73.88)' can't be established.
ED25519 key fingerprint is SHA256:u0wpy+nyWoDzTBFeJ4rFQ2sbm+z3n1H4XAfFMx+P0Q8.
This key is not known by any other names.
Are you sure you want to continue connecting (yes/no/[fingerprint])?
Warning: Permanently added '44.202.73.88' (ED25519) to the list of known hosts.
key30April.pem                                                100% 1678     5.3KB/s   00:00

C:\Users\Somaraju Tharun>
```

**SUCCESSFULLY COPIED THE Key-Pair to Bastion from the Local PC**

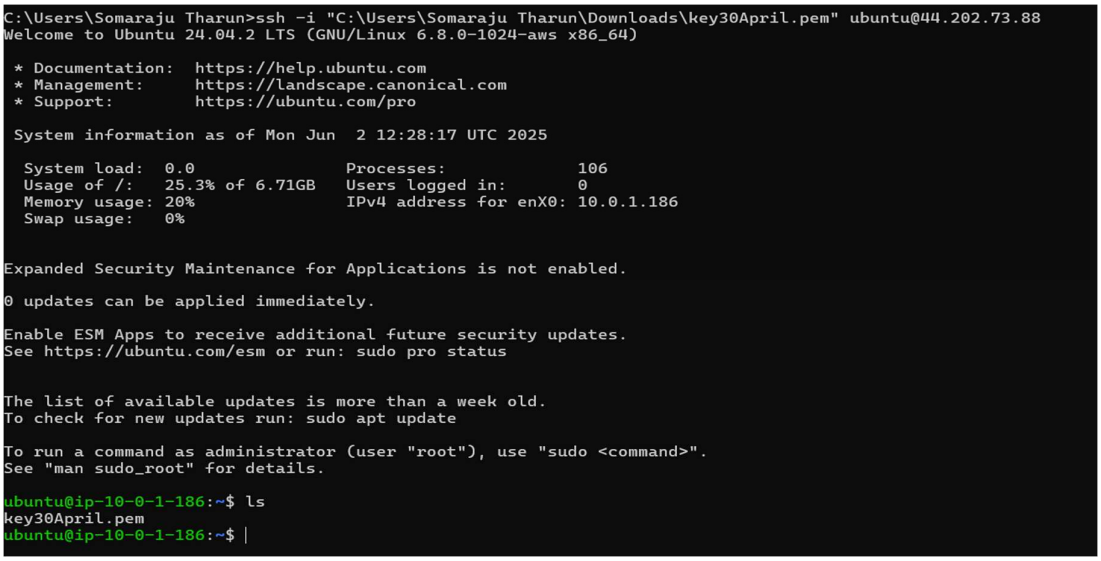
D)

To verify if the key got copied or not

**-ssh -i "C:\Users\Somaraju Tharun\Downloads\key30April.pem" ubuntu@44.202.73.88**

**-$ ls**

**You will see the key**




E)

**chmod 400** is used to secure the .pem file by allowing only the owner to read it, which SSH requires for safe access.

**$chmod 400 key30April.pem**

F)

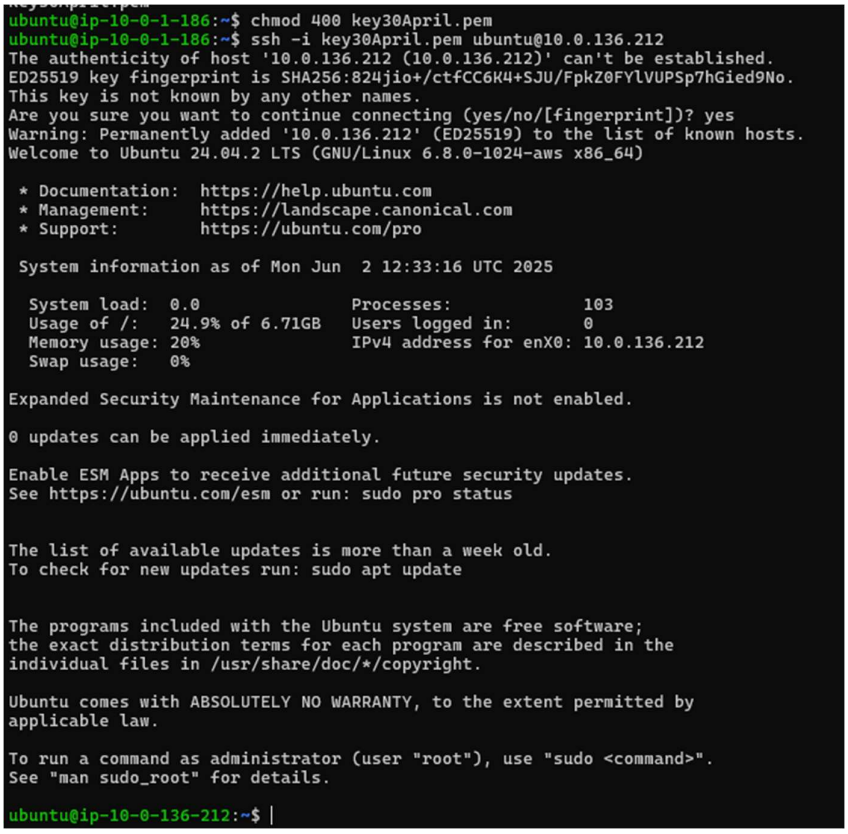
To SSH from the **Bastion Host** into the **private EC2 instance (10.0.151.236)**, use the following command **on the Bastion terminal**:

**$ssh -i key30April.pem ubuntu@10.0.136.212**

G)

**You are Finally in Ec2 instace Terminal –**

## ubuntu@ip-10-0-136-212:~$




H)

CREATE A HTML PAGE IN THE EC2 TERMINAL

**1. Create the file**

Run this on your EC2 instance:

bash

CopyEdit

## $nano index.html

**Paste the following code:**

html

CopyEdit

```
<!DOCTYPE html>
<html>
<head>
   <title>My AWS Project</title>
</head>
<body>
```

**<h1>Welcome to My AWS  Created on June 2nd -2025</h1>**
** This page is hosted on a private EC2 instance via a Bastion Host. **
**</body>**
**</html>**

**3. Save and exit:**

- Press **Ctrl + O** → **Enter** to save
- Then **Ctrl + X** to exit Nano

✅ Your HTML page is ready as index.html.

**Create a Python server**

**$ python3 -m http.server 8000**

🌐 **What happens when user visits Load Balancer?**

1. The request goes to the Load Balancer.
2. Load Balancer sends the request to your private EC2.
3. The Python server running on that EC2 responds with your HTML page.
4. User sees your website!

## IMPORTANT POINT TO REMEMBER ABOUT-

### *How does an EC2 instance recognize the key-pair?*

**When we**
**SSH FROM Local PC -→ Bastion-Host(Public Subnet)**

**Bastion-Host(Public Subnet) --→ Ec2 (Private Subnet)**

**Here we are copying KeyPair.pem from local pc to bastion , as we want this KeyPair.pem to be verified with private ec2 when we are doing  SSH from bastion to Private ec2.**

***BELOW IS THE MAIN AND IMPORTANT DESCRIPTION about the ABOVE:-***

When you **launch an EC2 instance**, you **attach a key-pair** (like key30April.pem) to it. Here's what happens:

---

✅ **Behind the Scenes:**

1. When the EC2 is created with a key-pair:
    - AWS puts the **public part** of the key into a file called:

**/home/ubuntu/.ssh/authorized_keys**

2. When you try to connect using:

**ssh -i key30April.pem ubuntu@<ec2-ip>**

    - Your **private key** (key30April.pem) is used by your SSH client.
    - The EC2 instance checks:
        - "Does this private key match the public key I have in authorized_keys?"
3. ✅ If it matches:
    - You are allowed to login.
4. ❌ If it doesn't match:
    - Access is denied.

---

🔑 **Simple Analogy:**

Think of it like a **lock and key**:

- EC2 has the **lock** (public key).
- You have the **key** (private key .pem).
- Only the **right key** can unlock it.

---

📌 **So to answer your question:**

**How does EC2 recognize the key-pair?**

Because **when the instance is launched**, AWS **automatically saves the public part of the key-pair** into the EC2's login system. When you try to connect using the private key, it matches it with the stored public key.

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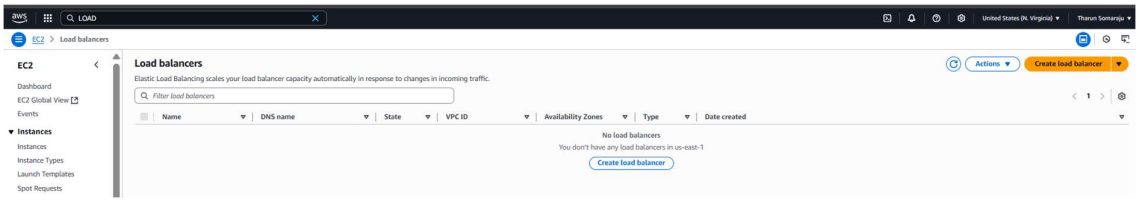
STEP 4-

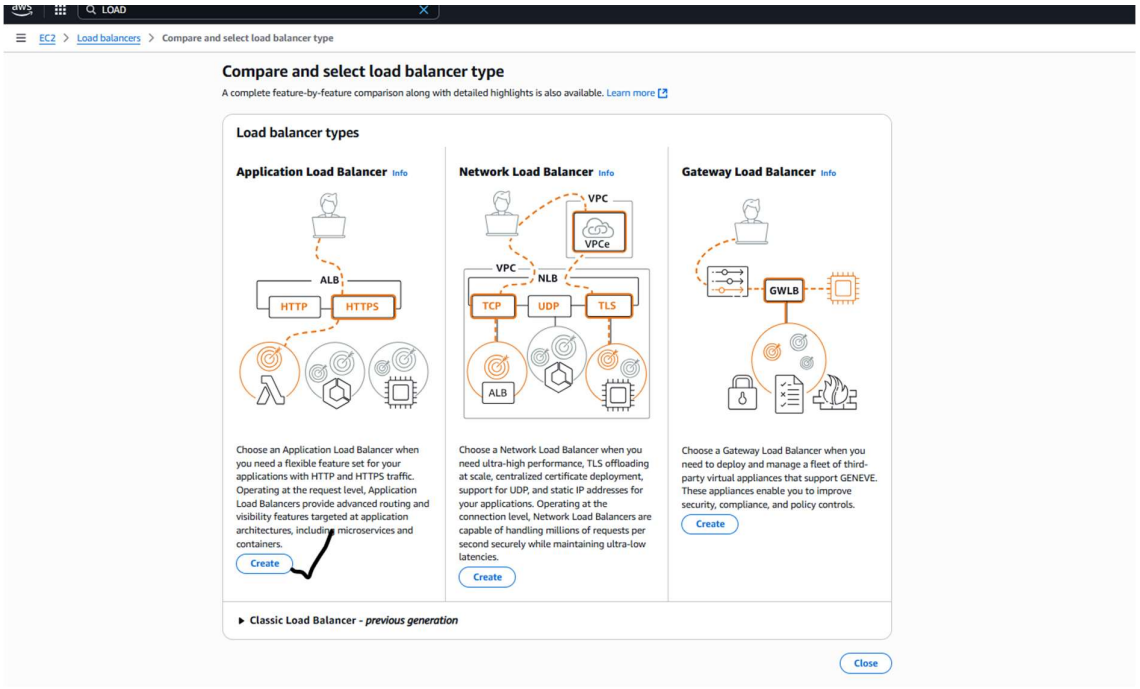
A)

Create LOAD BALANCER

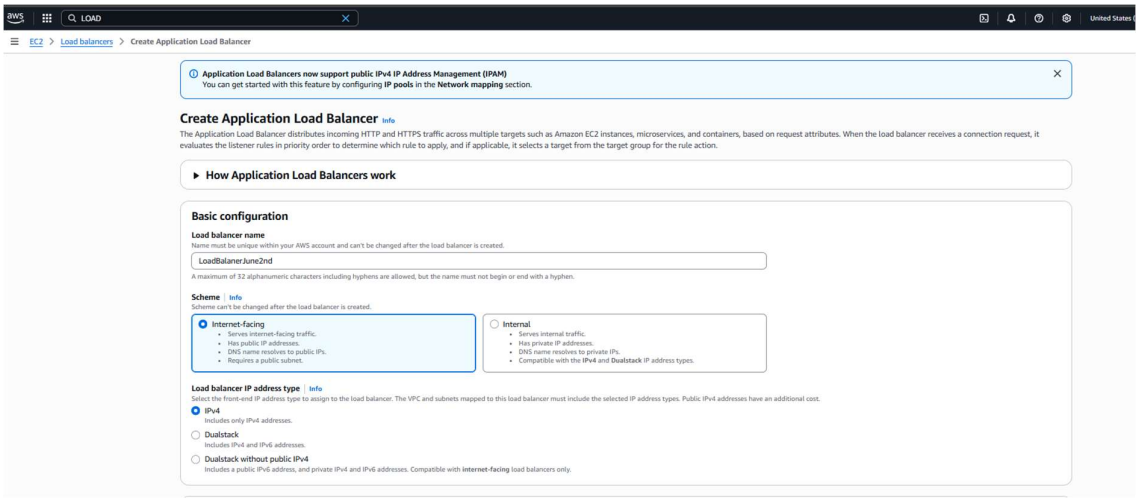



B)

Create APPLICATION LOAD BALANCER

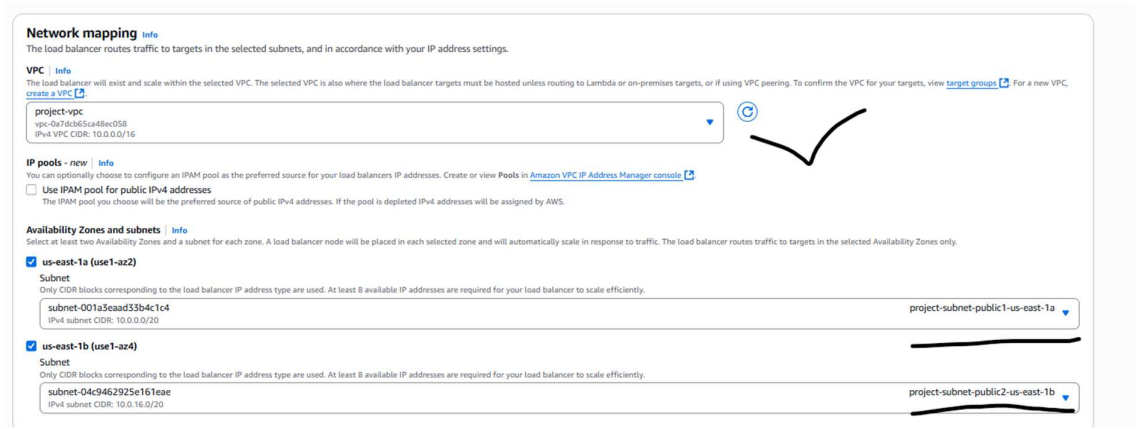



C)



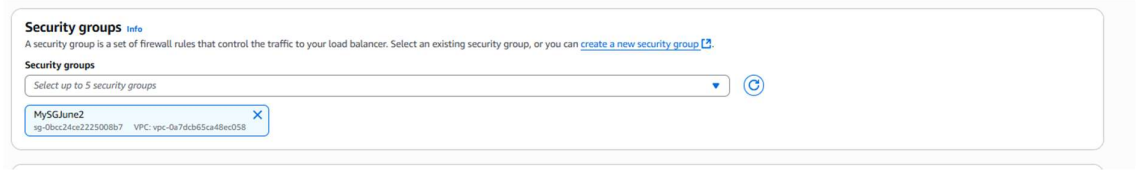

D)

Make sure that Load Balancer in the Public Subnets of OUR VPC



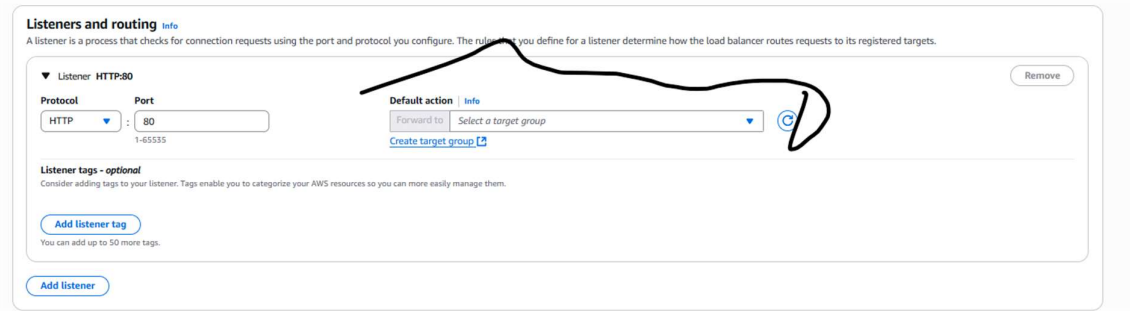

E)

Add the Security Group of the Ec2 instances in Load-Balancer Aswell



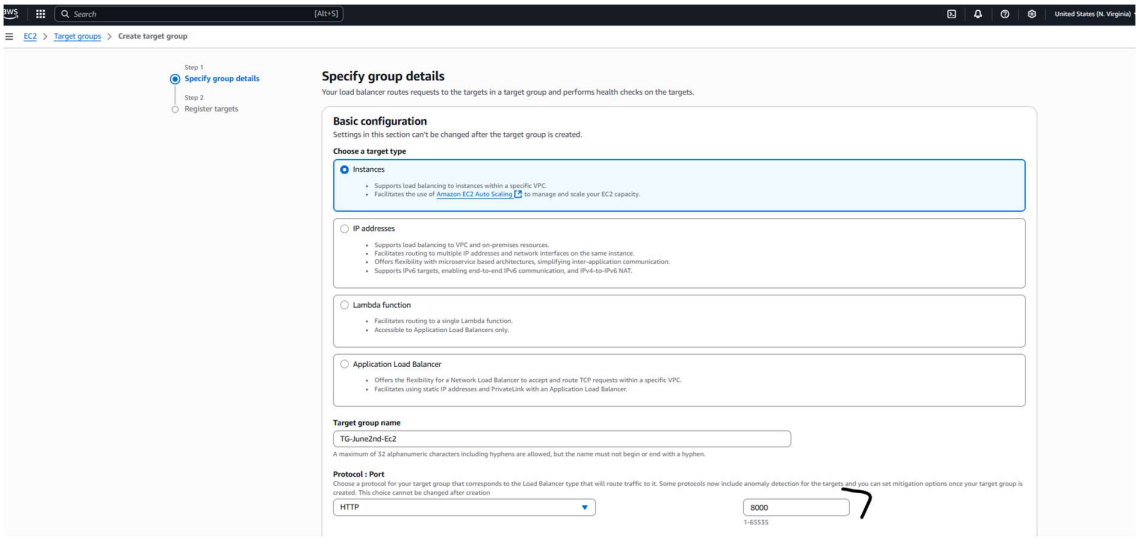

F)

Create a Target-group I.e (Our Private Ec2 Instances which are in the Private Subnet)



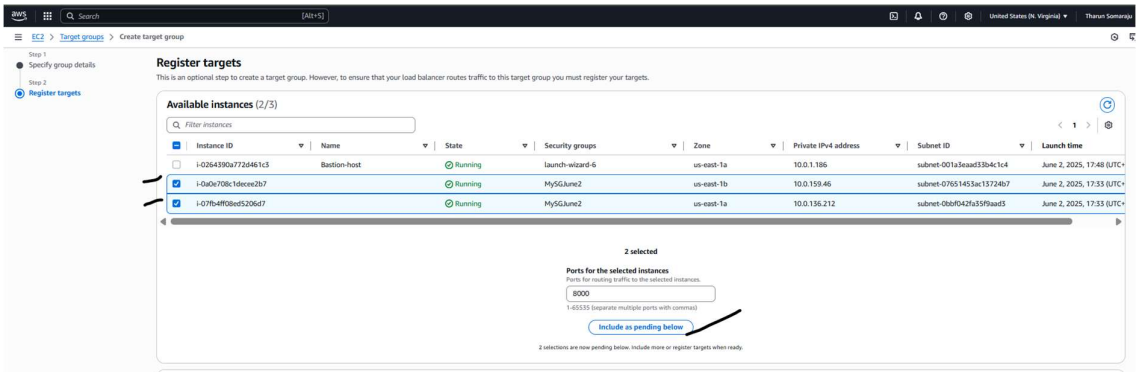

G)

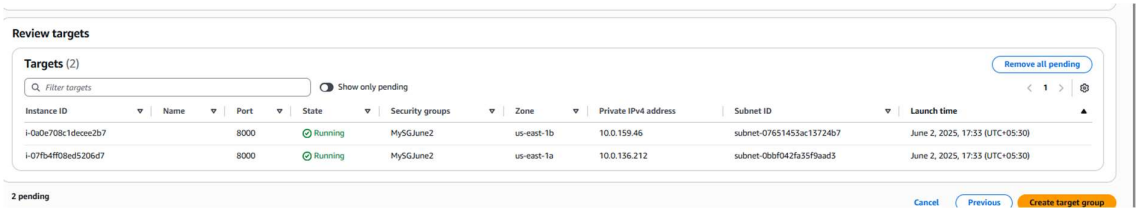
Here the Port as 8000 as we set the Instances Security Group Inbound as Port 8000




H)

Put the Targets as our Private Instances and Press include as Pending Below button

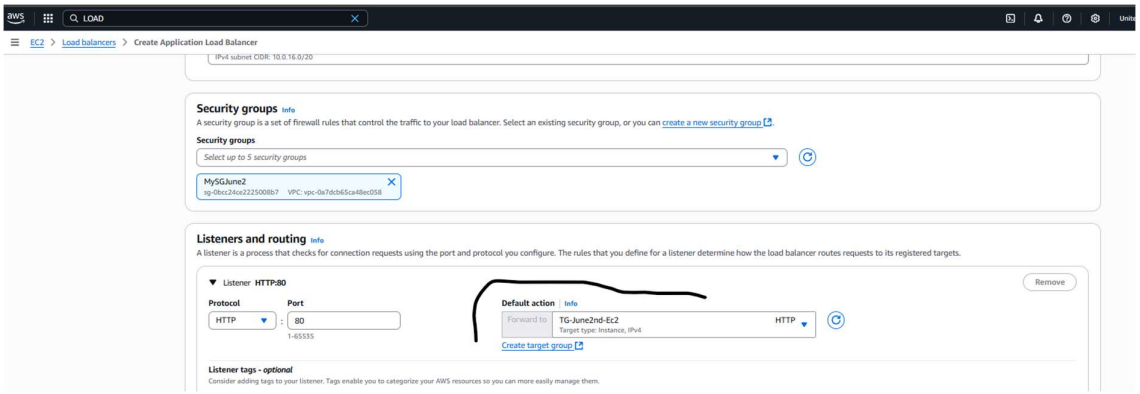





CREATE TARGET GROUP

I)

Now add the Created Target Group to the Load-Balancer

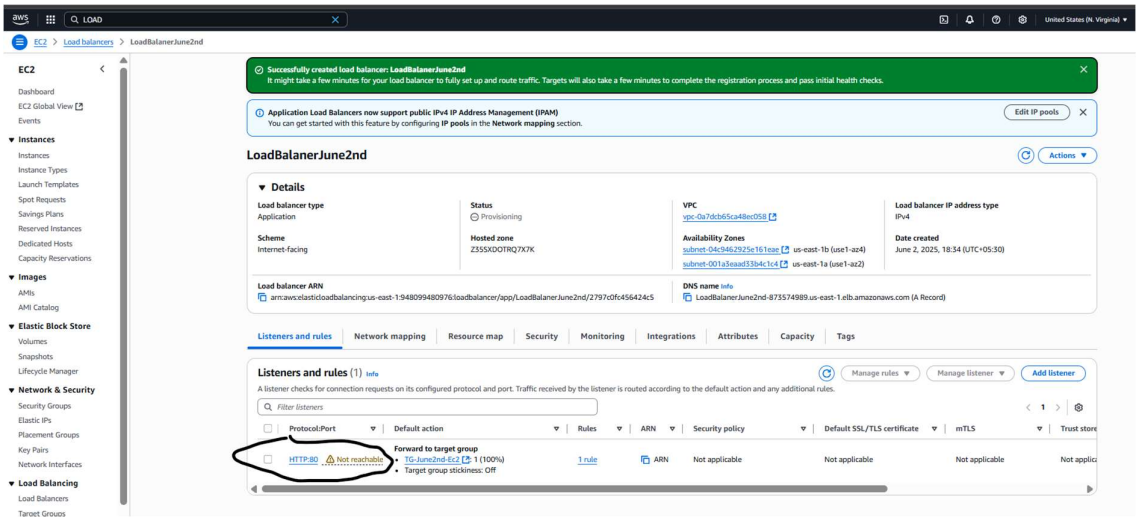



CREATE THE LOAD-BALANCER

J)

After Successful creation of LoadBalancer

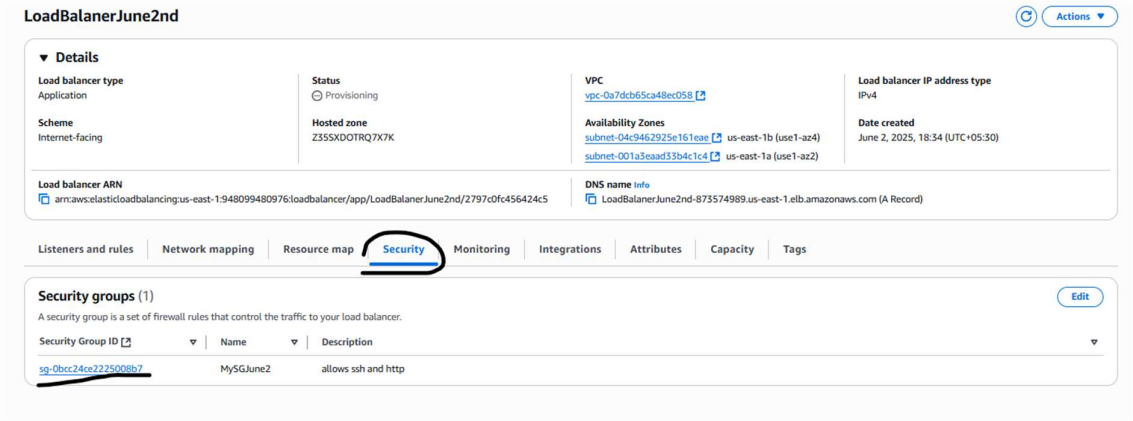
We See this Error in the **LISTERNERS AND RULES** Section



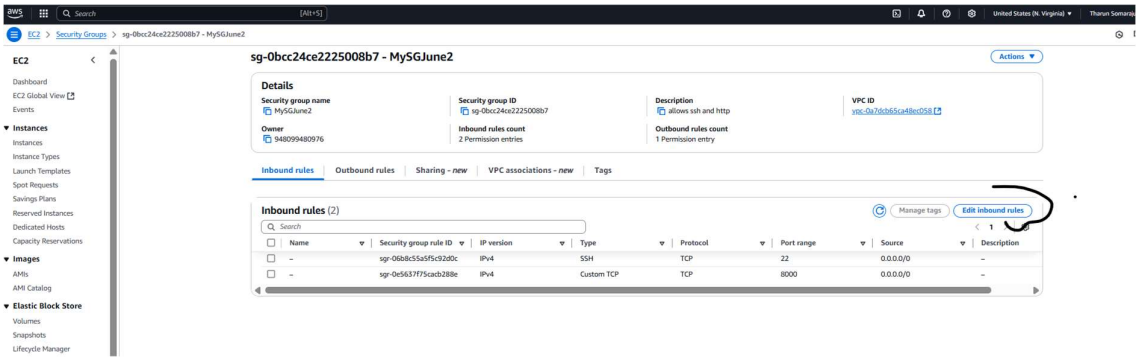
Here This is Showing the Error Because

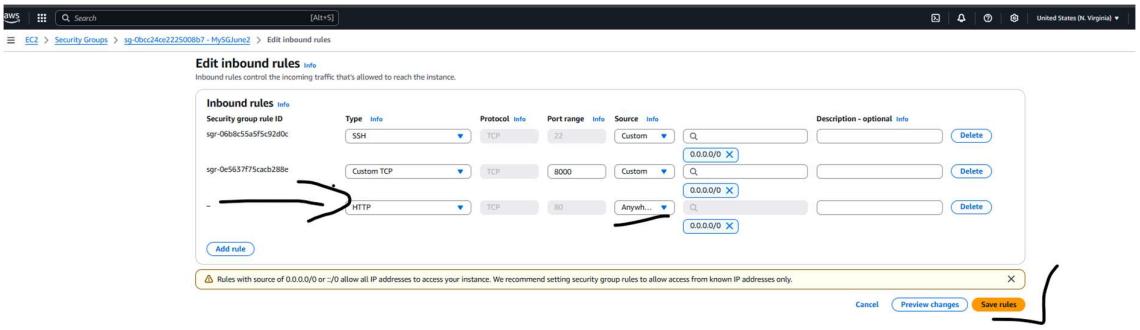
The Load Balancer is Listening on Port 80, But its Own Security Group(same as Ec2 instance's SG) does not allowing the Inbound traffic on Port , So that is why we NOW ENABLE THE PORT 80 IN Security Group

## Go to Security Section and Select the Security Group



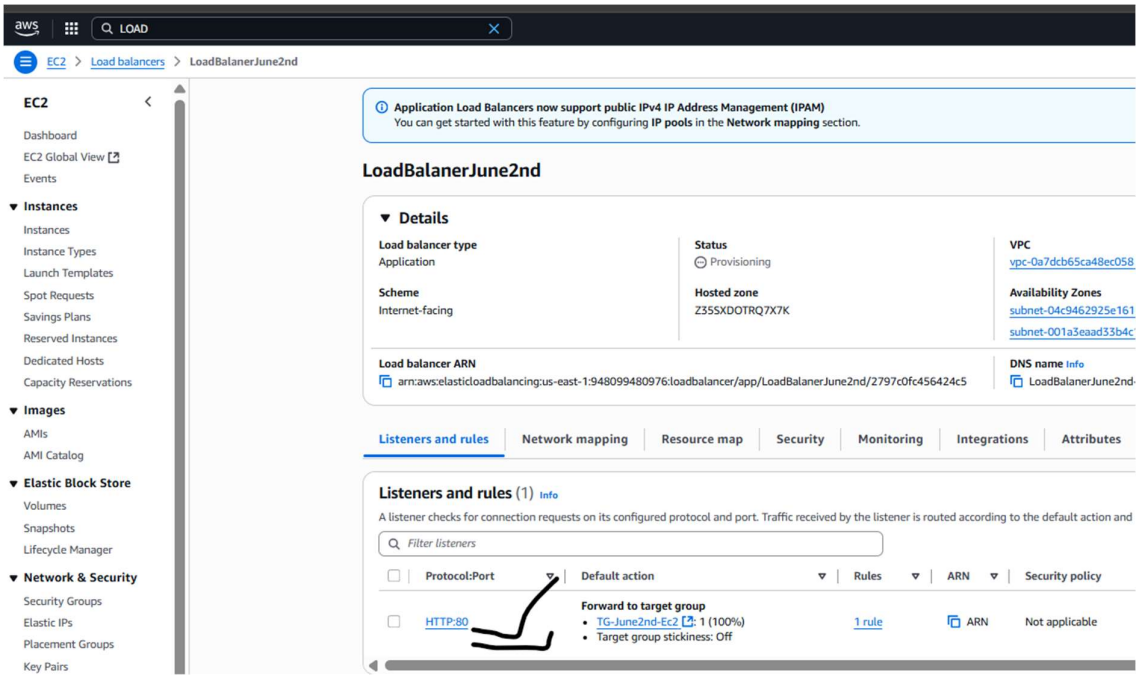

## Now Edit Inbound Rules




## SAVE RULES…

## NOW Go to the Load Balancer and check The Error is Removed




**Points to Remember –**

**The Load Balancer Listener Listens on a Specific Port Like (PORT 80 For HTTP)**

**But if the LB's SG does not allowing that port in its Inbound rules , USER'S Can't reach the LB. So the Listener Port and SG Inbound Port must be same(Both set to 80) to allow traffic from users to reach your website.**

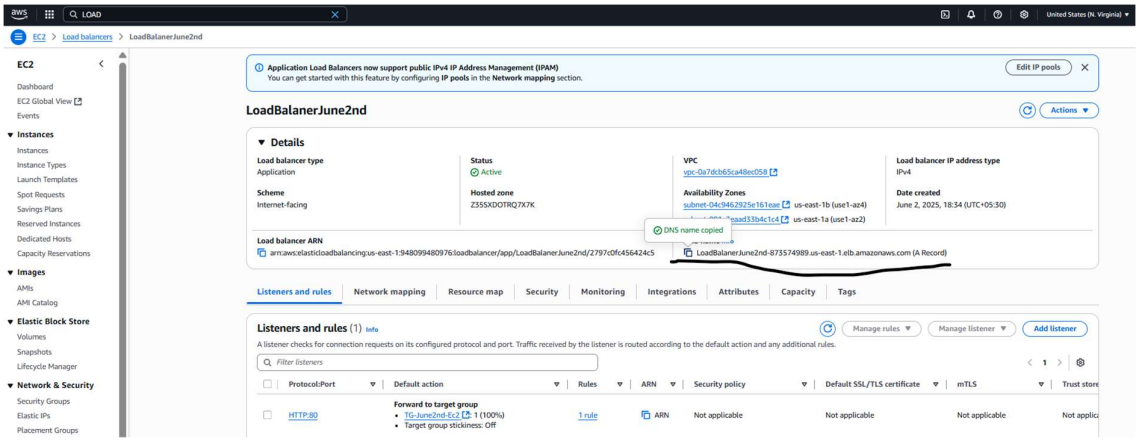
**Therefore , The Listener Port and Load Balancer Security Group Inbound Port must match (Port 80) to allow traffic from users to reach your website.**

---

**STEP 5**

**In the Load-Balancer , Copy the DNS URL and Test it in the Chrome browser ,**

**Now the Traffic only goes to Only one Private Instance, as we Uploaded the HTML in Only one instance.**





# Welcome to My AWS Created on June 2nd -2025

This page is hosted on a private EC2 instance via a Bastion Host.

**Finally we can see the Website ,**

**Here The user is Not Directly accessing the Private Ec2 Instances , instead Via Load Balancer User can Access the Website that is created in the Private Ec2 ..**

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## STEPS TO DISMANTLE THE RESOURCES

Here's a simple checklist to **safely dismantle each AWS tool** from your project and avoid charges:

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✅ **1. Terminate EC2 Instances**

- Go to **EC2 > Instances**
- Select all running instances (including Bastion and private ones)
- Click **"Instance State" > Terminate**

---

✅ **2. Delete Auto Scaling Groups**

- Go to **EC2 > Auto Scaling Groups**
- Delete your Auto Scaling Group (ASG)

---

✅ **3. Delete Load Balancer**

- Go to **EC2 > Load Balancers**
- Select and **delete** your Application Load Balancer (ALB)

---

✅ **4. Delete Target Groups**

- Go to **EC2 > Target Groups**
- Select and **delete** them (if not auto-removed)

---

✅ **5. Delete NAT Gateway**

- Go to **VPC > NAT Gateways**
- Select and **delete**

⚠️ NAT Gateway can **incur charges even when idle** — make sure to remove it!

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✅ **6. Release Elastic IP (if any)**

- Go to **VPC > Elastic IPs**
- Disassociate and then **release** unused IPs

---

✅ **7. Delete Subnets and Route Tables**

- Go to **VPC > Subnets** and **Route Tables**
- Delete custom ones **after** EC2s and NAT are gone

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✅ **8. Delete VPC**

- Go to **VPC > Your VPCs**
- Select and **delete your custom VPC**

**……THE END……**