CLOUD COMPUTING

LAB EXERCISE 1

Submitted by:

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Infrastructure as a Service (IaaS)

IaaS (Infrastructure as a Service) is a form of cloud computing that provides virtualized computing resources over the internet. IaaS is one of the three main categories of cloud services, alongside PaaS (Platform as a Service) and SaaS (Software as a Service). With IaaS, businesses can rent IT infrastructure like servers, storage, and networking on a pay-as-you-go basis.

Key Characteristics of IaaS:

- Scalability: Users can scale resources up or down based on demand.
- Cost-Effectiveness: Pay only for what you use, reducing the need for large capital expenditures on hardware.
- Accessibility: Resources can be accessed over the internet, allowing for remote management.
- Flexibility: Users can run any application or OS on the rented hardware.
- Managed Infrastructure: The provider is responsible for maintaining the hardware, including servers, storage, and networking.

Compute and Storage Services in AWS and GCP

1.Amazon Web Services (AWS):

Compute Services:

- Amazon EC2 (Elastic Compute Cloud): Scalable virtual servers.
- AWS Lambda: Serverless compute service that runs code in response to events.
- Amazon ECS (Elastic Container Service): Container management service.
- Amazon EKS (Elastic Kubernetes Service): Managed Kubernetes service.
- AWS Fargate: Serverless compute engine for containers.
- Amazon Lightsail: Simple cloud servers for smaller applications.
- AWS Outposts: On-premises compute and storage.

2.Storage Services:

- Amazon S3 (Simple Storage Service): Scalable object storage.
- Amazon EBS (Elastic Block Store): Block storage for EC2 instances.
- Amazon EFS (Elastic File System): Scalable file storage.
- Amazon Glacier: Low-cost archive storage.
- AWS Storage Gateway: Hybrid cloud storage service.
- Amazon FSx: File systems for Windows and Lustre.
- Amazon S3 Glacier Deep Archive: Long-term archive storage.

Google Cloud Platform (GCP):

Compute Services:

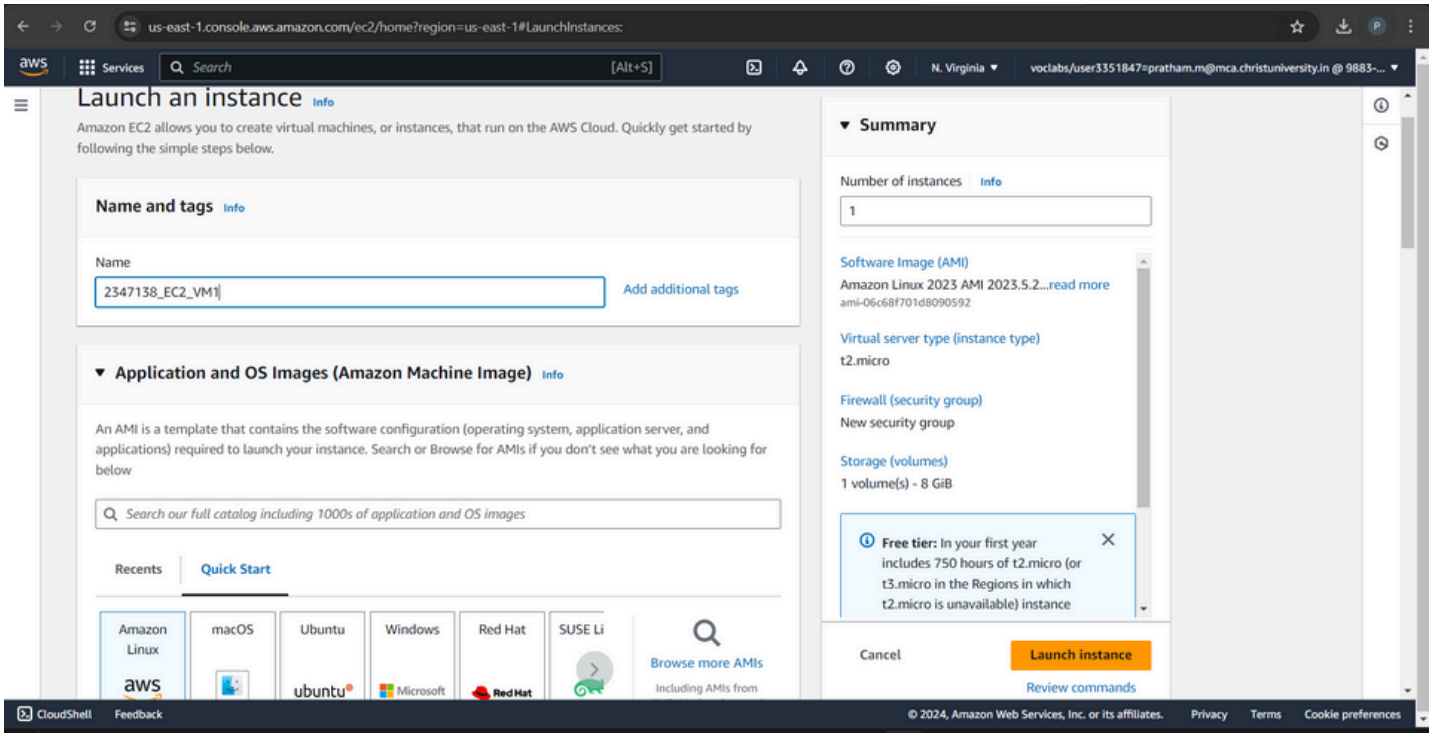
- Google Compute Engine: Scalable virtual machines.
- Google Kubernetes Engine (GKE): Managed Kubernetes service.
- Google App Engine: Platform for building scalable web applications.
- Cloud Functions: Serverless compute service.
- Cloud Run: Managed compute platform for running containers.
- Bare Metal Solution: Dedicated bare metal servers.

Storage Services:

- Google Cloud Storage: Scalable object storage.
- Persistent Disk: Block storage for VMs.
- Filestore: Managed file storage.
- Cloud Storage Archive: Long-term archive storage.
- Cloud Storage Nearline: Low-cost storage for infrequent access.
- Cloud Storage Coldline: Low-cost storage for long-term data.
- Transfer Appliance: Secure transfer appliance for migrating data to Google Cloud.

3. Create 2 Identical AWS EC2 Instances (Instance Name: Regno_EC2_VM1, Regno_EC2_VM2) and install the necessary packages to execute a program of your choice in 'Regno_EC2_VM1'.

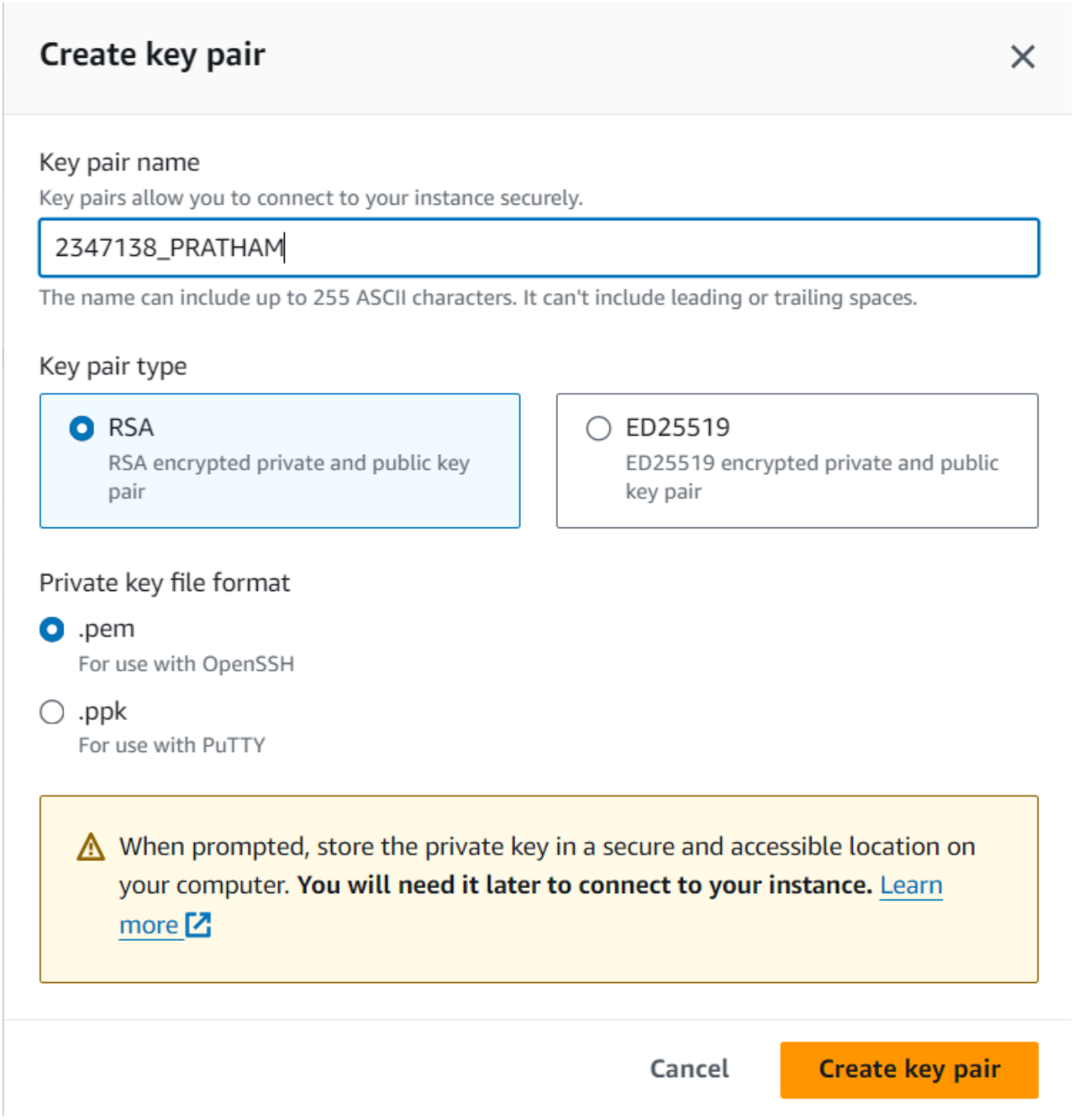
STEP 1:
OPEN AWS MANAGEMENT CONSOLE
SEARCH EC2, CLICK ON INSTANCES
CLICK ON LAUNCH INSTANCE



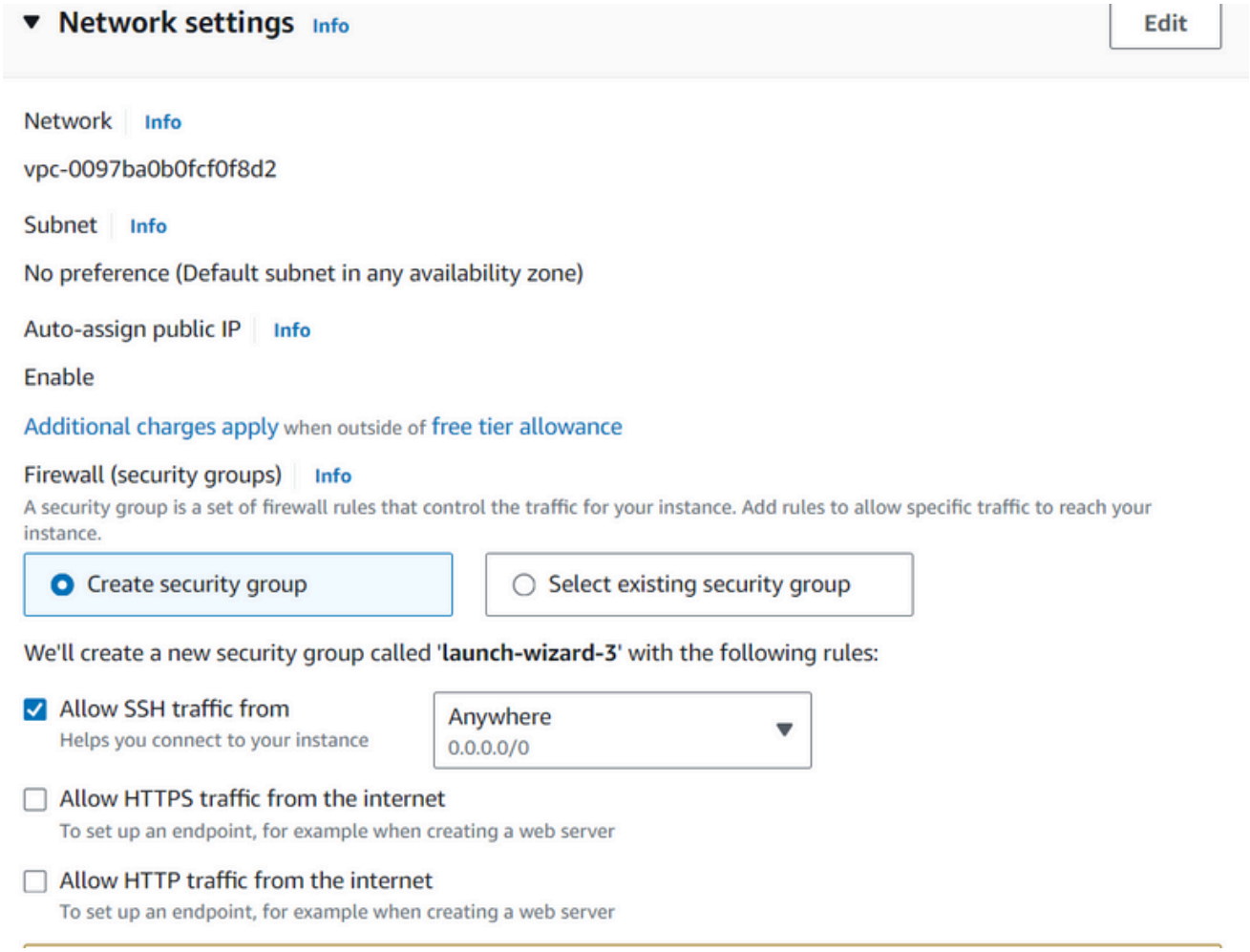
STEP 2:
SELECT AMI: AMAZON LINUX

STEP 3:
SELECT INSTANCE TYPE : t2.micro

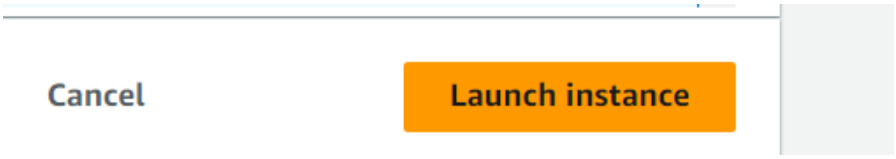
STEP 4:
Create Key pair



STEP 5:
Select Create Security Group and Allow SSH Traffic

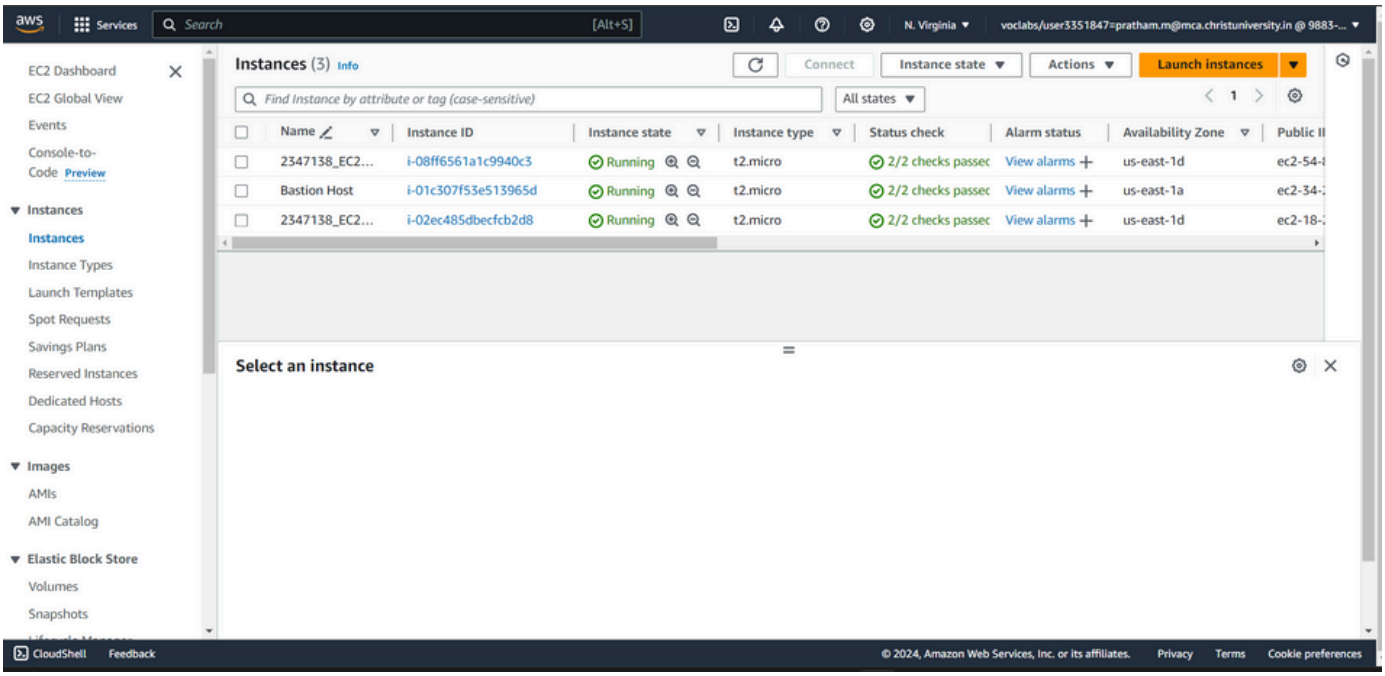


STEP 6:
clcik launch instance



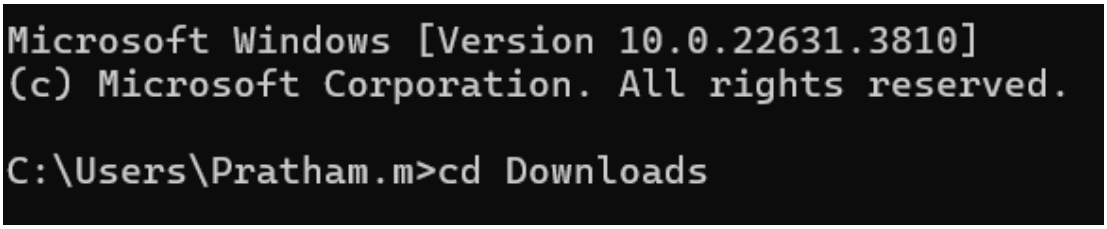
STEP 7:

AFTER LAUNCHING INSTANCE WAIT TILL THE PROCESS IS COMPLETED
THEN IN SIDE NAV BAR CLICK ON INSTANCES TO SEE ALL INSTANCES LIST



STEP 8:

INSTALLING PACKAGES ON WINDOWS USE COMMAND PROMPT



```
C:\Users\Pratham.m\Downloads>icacls "C:\Users\P
ratham.m\Downloads\2347138.pem" /grant:r Pratha
m.m:(R)
processed file: C:\Users\Pratham.m\Downloads\23
47138.pem
Successfully processed 1 files; Failed processi
ng 0 files
```

PASTE UR SSH

```
C:\Users\Pratham.m\Downloads>icacls "C:\Users\P
ratham.m\Downloads\2347138.pem" /grant:r Pratha
m.m:(R)
processed file: C:\Users\Pratham.m\Downloads\23
47138.pem
Successfully processed 1 files; Failed processi
ng 0 files

C:\Users\Pratham.m\Downloads>ssh -i "2347138.pe
m" ec2-user@ec2-18-212-254-22.compute-1.amazona
ws.com
The authenticity of host 'ec2-18-212-254-22.com
pute-1.amazonaws.com (18.212.254.22)' can't be
established.
ED25519 key fingerprint is SHA256:1sLjqG5mqOH97
pDHmWnCTV7Mua5Y969G5OqDy20FRes.
This key is not known by any other names
Are you sure you want to continue connecting (y
es/no/[fingerprint])? yes
Warning: Permanently added 'ec2-18-212-254-22.c
ompute-1.amazonaws.com' (ED25519) to the list o
```

```
Complete!
[ec2-user@ip-172-31-21-5 ~]$ sudo yum install p
ython3-pip -y
Last metadata expiration check: 0:11:06 ago on
Mon Jul  8 14:09:00 2024.
Dependencies resolved.
================================================
 Package           Arch   Version
                                Repository   Size
================================================
Installing:
 python3-pip       noarch 21.3.1-2.amzn2023.0.7
                                amazonlinux 1.8 M
Installing weak dependencies:
 libxcrypt-compat x86_64 4.4.33-7.amzn2023
                                amazonlinux  92 k

Transaction Summary
================================================
Install  2 Packages

Total download size: 1.9 M
Installed size: 11 M
Downloading Packages:
(1/2): libxcry 1.4 MB/s |  92 kB     00:00
(2/2): python3  16 MB/s | 1.8 MB     00:00
------------------------------------------------
------------------------------------------------
Total            11 MB/s | 1.9 MB     00:00
Running transaction check
Transaction check succeeded.
Running transaction test
Transaction test succeeded.
Running transaction
  Preparing        :                          1/1
  Installing       : libxcrypt-compat-4.      1/2
  Installing       : python3-pip-21.3.1-      2/2
  Running scriptlet: python3-pip-21.3.1-      2/2
  Verifying        : libxcrypt-compat-4.      1/2
  Verifying        : python3-pip-21.3.1-      2/2

Installed:
  libxcrypt-compat-4.4.33-7.amzn2023.x86_64
  python3-pip-21.3.1-2.amzn2023.0.7.noarch

Complete!
```

Configure a Webserver on 'Regno_EC2_VM2' Instance and host you organization website (Static Website) and provide access only to your machine.

1. Connect to your EC2 instance:

```
ssh -i "2347138_EC2.pem" ec2-user@ec2-34-229-193-25.compute-1.amazonaws.com
```

2. Update the system:

```
sudo yum update -y
```

3. Install Apache web server:

```
sudo yum install httpd -y
```

4. Start the Apache service and enable it to start on boot:

```
sudo systemctl start httpd
sudo systemctl enable httpd
```

5. Install necessary tools:

```
sudo yum install unzip wget -y
```

6. Navigate to the Apache web root directory:

```
cd /var/www/html

sudo wget
https://github.com/PrathamM16/AI_BLOG_GENERATOR_FRONTEND/archive/refs/heads/main.z
ip
sudo unzip main.zip
sudo mv AI_BLOG_GENERATOR_FRONTEND-main/* .
sudo rm -rf AI_BLOG_GENERATOR_FRONTEND-main main.zip

sudo chown -R apache:apache /var/www/html
sudo chmod -R 755 /var/www/html
```

7. Configure Apache to allow access only from your IP:

```
sudo nano /etc/httpd/conf/httpd.conf
```

Add these lines at the end of the file (replace YOUR_IP with your actual IP address):

```
<Directory "/var/www/html">
    Require ip YOUR_IP
</Directory>
```

8. Save the file and exit the editor (in nano, press Ctrl+X, then Y, then Enter).

9. Restart Apache to apply changes:

```
sudo systemctl restart httpd
```

10. Configure the security group for your EC2 instance:

- Open the EC2 dashboard in AWS Console
- Select your instance (i-0589242f291d20307)
- Go to the "Security" tab
- Click on the security group
- Edit inbound rules
- Add a rule: Type: HTTP, Source: Your IP address/32

Remember to replace 'YOUR_IP' in step 9 with your actual IP address. You can find your public IP by searching "what is my IP" in a search engine.

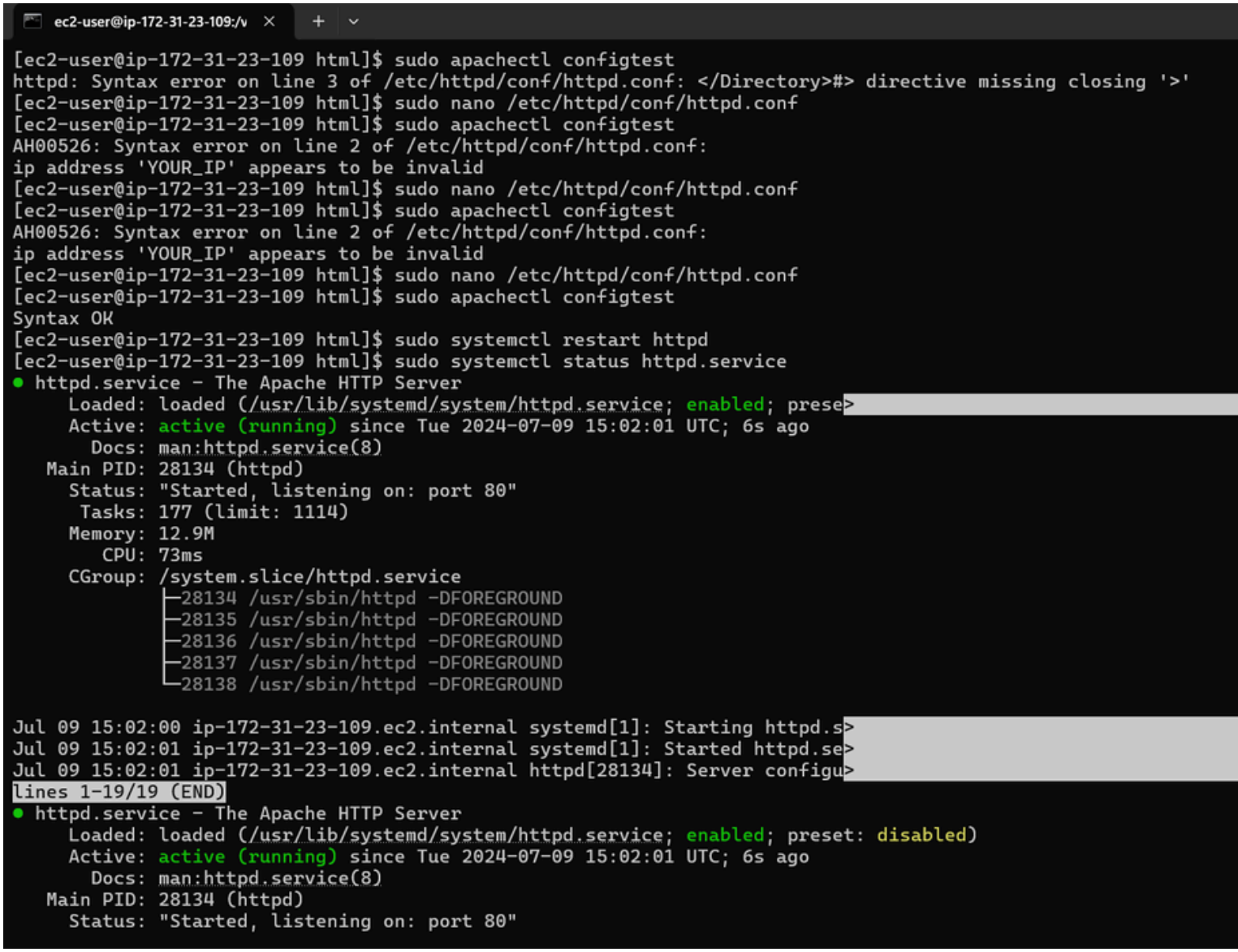
After completing these steps, your website should be hosted on your EC2 instance and accessible only from your IP address. You can test it by opening a web browser and navigating to:

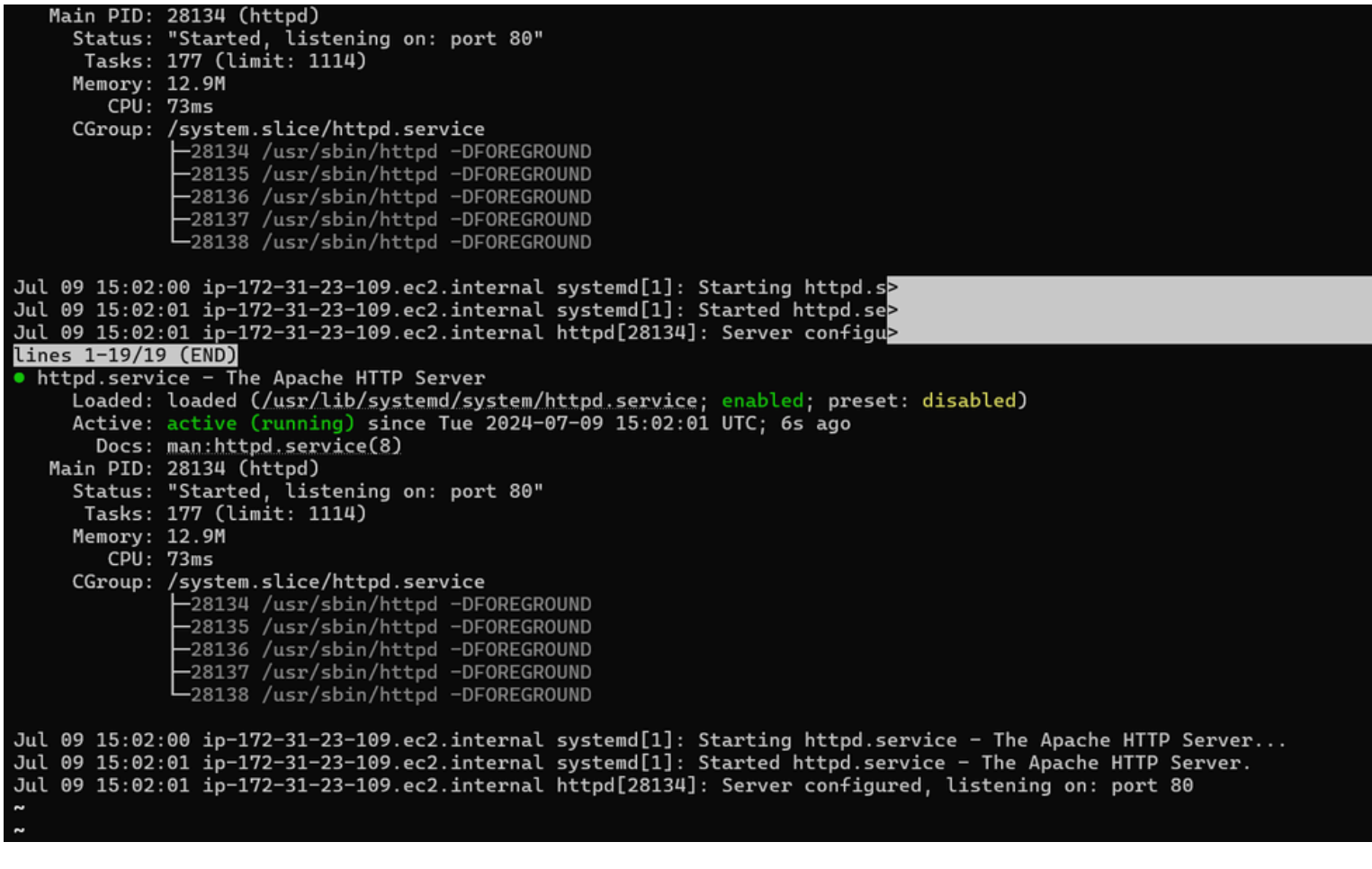
http://ec2-34-229-193-25.compute-1.amazonaws.com

RUN IN CMD PROMPT

```
Microsoft Windows [Version 10.0.22631.3810]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Pratham.m>cd downloads

C:\Users\Pratham.m\Downloads>ssh -i "2347138_EC2.pem" ec2-user@ec2-34-229-193-25.compute-1.amazonaws.com
   ,     #_
   ~\_  ####_        Amazon Linux 2023
  ~~  \_#####\
  ~~     \###|
  ~~       \#/ ___   https://aws.amazon.com/linux/amazon-linux-2023
   ~~       V~' '->
    ~~~         /
      ~~._.   _/
         _/ _/
       _/m/'
Last login: Tue Jul  9 14:31:03 2024 from 223.185.131.190
[ec2-user@ip-172-31-23-109 ~]$ sudo yum update -y
Last metadata expiration check: 0:24:00 ago on Tue Jul  9 14:18:14 2024.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-172-31-23-109 ~]$ sudo yum install httpd -y
Last metadata expiration check: 0:24:08 ago on Tue Jul  9 14:18:14 2024.
Package httpd-2.4.59-2.amzn2023.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-172-31-23-109 ~]$ sudo systemctl start httpd
[ec2-user@ip-172-31-23-109 ~]$ sudo systemctl enable httpd
[ec2-user@ip-172-31-23-109 ~]$ sudo yum install unzip wget -y
Last metadata expiration check: 0:24:51 ago on Tue Jul  9 14:18:14 2024.
Package unzip-6.0-57.amzn2023.0.2.x86_64 is already installed.
Package wget-1.21.3-1.amzn2023.0.3.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-172-31-23-109 ~]$ cd /var/www/html
[ec2-user@ip-172-31-23-109 html]$ sudo wget https://github.com/PrathamM16/AI_BLOG_GENERATOR_FRONTEND/archive/refs/heads/main.zip
--2024-07-09 14:43:37--  https://github.com/PrathamM16/AI_BLOG_GENERATOR_FRONTEND/archive/refs/heads/main.zip
Resolving github.com (github.com)... 140.82.114.3
```

```
ec2-user@ip-172-31-23-109:/v
Resolving github.com (github.com)... 140.82.114.3
Connecting to github.com (github.com)|140.82.114.3|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://codeload.github.com/PrathamM16/AI_BLOG_GENERATOR_FRONTEND/zip/refs/heads/main [following]
--2024-07-09 14:43:37--  https://codeload.github.com/PrathamM16/AI_BLOG_GENERATOR_FRONTEND/zip/refs/heads/main
Resolving codeload.github.com (codeload.github.com)... 140.82.114.9
Connecting to codeload.github.com (codeload.github.com)|140.82.114.9|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: unspecified [application/zip]
Saving to: ‘main.zip’

main.zip                [ <=>             ]   5.23K  --.-KB/s    in 0.001s

2024-07-09 14:43:37 (8.05 MB/s) - ‘main.zip’ saved [5357]

[ec2-user@ip-172-31-23-109 html]$ sudo unzip main.zip
Archive:  main.zip
95a0f3c71bbc5f463a0201b61bbc5f84f3904eb2
   creating: AI_BLOG_GENERATOR_FRONTEND-main/
  inflating: AI_BLOG_GENERATOR_FRONTEND-main/BLOG-DEATILS.HTML
  inflating: AI_BLOG_GENERATOR_FRONTEND-main/all-blogs.html
  inflating: AI_BLOG_GENERATOR_FRONTEND-main/index.html
  inflating: AI_BLOG_GENERATOR_FRONTEND-main/login.html
  inflating: AI_BLOG_GENERATOR_FRONTEND-main/singnup.html
[ec2-user@ip-172-31-23-109 html]$ sudo mv AI_BLOG_GENERATOR_FRONTEND-main/* .
[ec2-user@ip-172-31-23-109 html]$ sudo mv AI_BLOG_GENERATOR_FRONTEND-main/* .
mv: cannot stat 'AI_BLOG_GENERATOR_FRONTEND-main/*': No such file or directory
[ec2-user@ip-172-31-23-109 html]$ sudo rm -rf AI_BLOG_GENERATOR_FRONTEND-main main.zip
[ec2-user@ip-172-31-23-109 html]$ sudo chown -R apache:apache /var/www/html
[ec2-user@ip-172-31-23-109 html]$ sudo chmod -R 755 /var/www/html
[ec2-user@ip-172-31-23-109 html]$ sudo nano /etc/httpd/conf/httpd.conf
```


ec2-user@ip-172-31-23-109:/v
[ec2-user@ip-172-31-23-109 html]$ sudo apachectl configtest
httpd: Syntax error on line 3 of /etc/httpd/conf/httpd.conf: </Directory>#> directive missing closing '>'
[ec2-user@ip-172-31-23-109 html]$ sudo nano /etc/httpd/conf/httpd.conf
[ec2-user@ip-172-31-23-109 html]$ sudo apachectl configtest
AH00526: Syntax error on line 2 of /etc/httpd/conf/httpd.conf:
ip address 'YOUR_IP' appears to be invalid
[ec2-user@ip-172-31-23-109 html]$ sudo nano /etc/httpd/conf/httpd.conf
[ec2-user@ip-172-31-23-109 html]$ sudo apachectl configtest
AH00526: Syntax error on line 2 of /etc/httpd/conf/httpd.conf:
ip address 'YOUR_IP' appears to be invalid
[ec2-user@ip-172-31-23-109 html]$ sudo nano /etc/httpd/conf/httpd.conf
[ec2-user@ip-172-31-23-109 html]$ sudo apachectl configtest
Syntax OK
[ec2-user@ip-172-31-23-109 html]$ sudo systemctl restart httpd
[ec2-user@ip-172-31-23-109 html]$ sudo systemctl status httpd.service
● httpd.service - The Apache HTTP Server
Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; prese>
Active: active (running) since Tue 2024-07-09 15:02:01 UTC; 6s ago
Docs: man:httpd.service(8)
Main PID: 28134 (httpd)
Status: "Started, listening on: port 80"
Tasks: 177 (limit: 1114)
Memory: 12.9M
CPU: 73ms
CGroup: /system.slice/httpd.service
├─28134 /usr/sbin/httpd -DFOREGROUND
├─28135 /usr/sbin/httpd -DFOREGROUND
├─28136 /usr/sbin/httpd -DFOREGROUND
├─28137 /usr/sbin/httpd -DFOREGROUND
└─28138 /usr/sbin/httpd -DFOREGROUND
Jul 09 15:02:00 ip-172-31-23-109.ec2.internal systemd[1]: Starting httpd.s>
Jul 09 15:02:01 ip-172-31-23-109.ec2.internal systemd[1]: Started httpd.se>
Jul 09 15:02:01 ip-172-31-23-109.ec2.internal httpd[28134]: Server configu>
lines 1-19/19 (END)
● httpd.service - The Apache HTTP Server
Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
Active: active (running) since Tue 2024-07-09 15:02:01 UTC; 6s ago
Docs: man:httpd.service(8)
Main PID: 28134 (httpd)
Status: "Started, listening on: port 80"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├─28136 /usr/sbin/httpd -DFOREGROUND
├─28137 /usr/sbin/httpd -DFOREGROUND
└─28138 /usr/sbin/httpd -DFOREGROUND
Jul 09 15:02:00 ip-172-31-23-109.ec2.internal systemd[1]: Starting httpd.s>
Jul 09 15:02:01 ip-172-31-23-109.ec2.internal systemd[1]: Started httpd.se>
Jul 09 15:02:01 ip-172-31-23-109.ec2.internal httpd[28134]: Server configu>
lines 1-19/19 (END)
● httpd.service - The Apache HTTP Server
Loaded: loaded (/usr/lib/systemd/system/httpd.service; enabled; preset: disabled)
Active: active (running) since Tue 2024-07-09 15:02:01 UTC; 6s ago
Docs: man:httpd.service(8)
Main PID: 28134 (httpd)
Status: "Started, listening on: port 80"
Tasks: 177 (limit: 1114)
Memory: 12.9M
CPU: 73ms
CGroup: /system.slice/httpd.service
├─28134 /usr/sbin/httpd -DFOREGROUND
├─28135 /usr/sbin/httpd -DFOREGROUND
├─28136 /usr/sbin/httpd -DFOREGROUND
├─28137 /usr/sbin/httpd -DFOREGROUND
└─28138 /usr/sbin/httpd -DFOREGROUND
Jul 09 15:02:00 ip-172-31-23-109.ec2.internal systemd[1]: Starting httpd.service - The Apache HTTP Server...
Jul 09 15:02:01 ip-172-31-23-109.ec2.internal systemd[1]: Started httpd.service - The Apache HTTP Server.
Jul 09 15:02:01 ip-172-31-23-109.ec2.internal httpd[28134]: Server configured, listening on: port 80
~
~

PASTE THIS LINK IN WEB BROWSER AFTER PERFORMING ALL THE ABOVE STEPS

http://ec2-34-229-193-25.compute-1.amazonaws.com