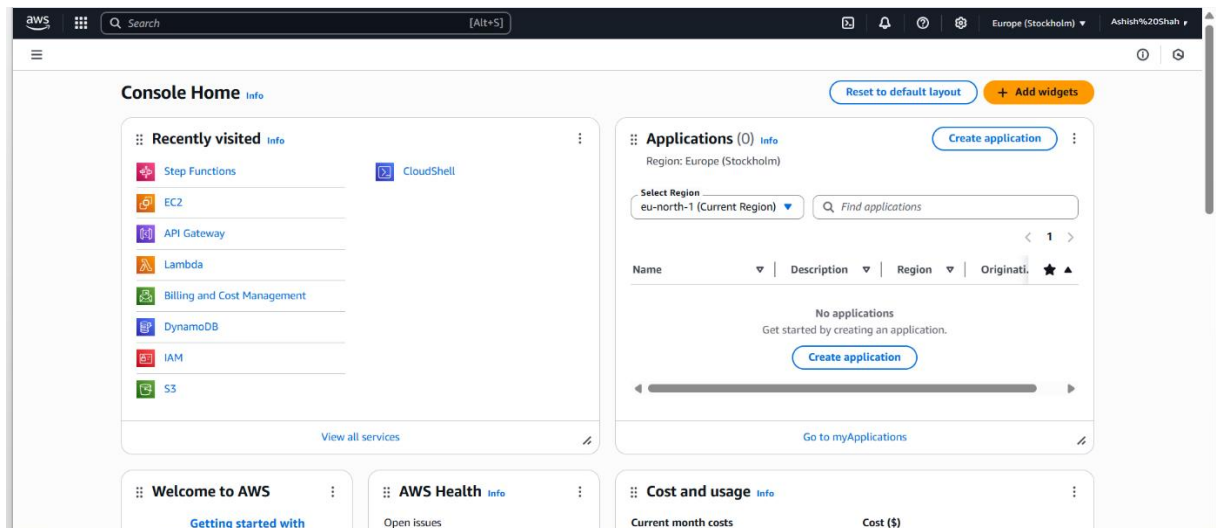


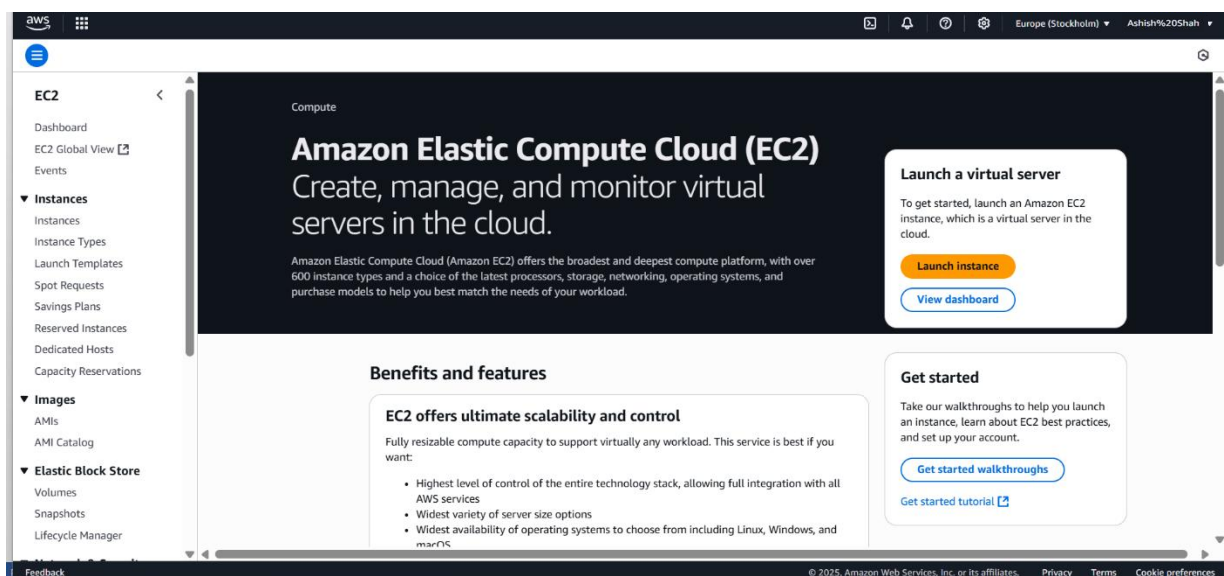
## PROGRAM 6: Migrating a Web Application to Docker Containers

### Steps for creating an EC2 Instance:

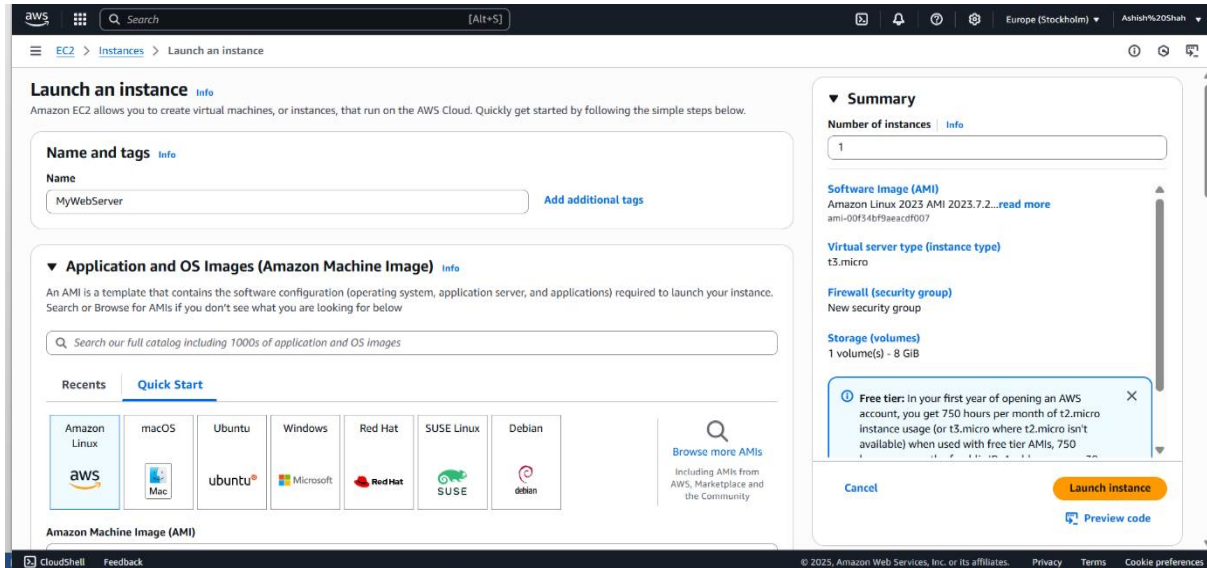
#### Step 1: Login to AWS Account.



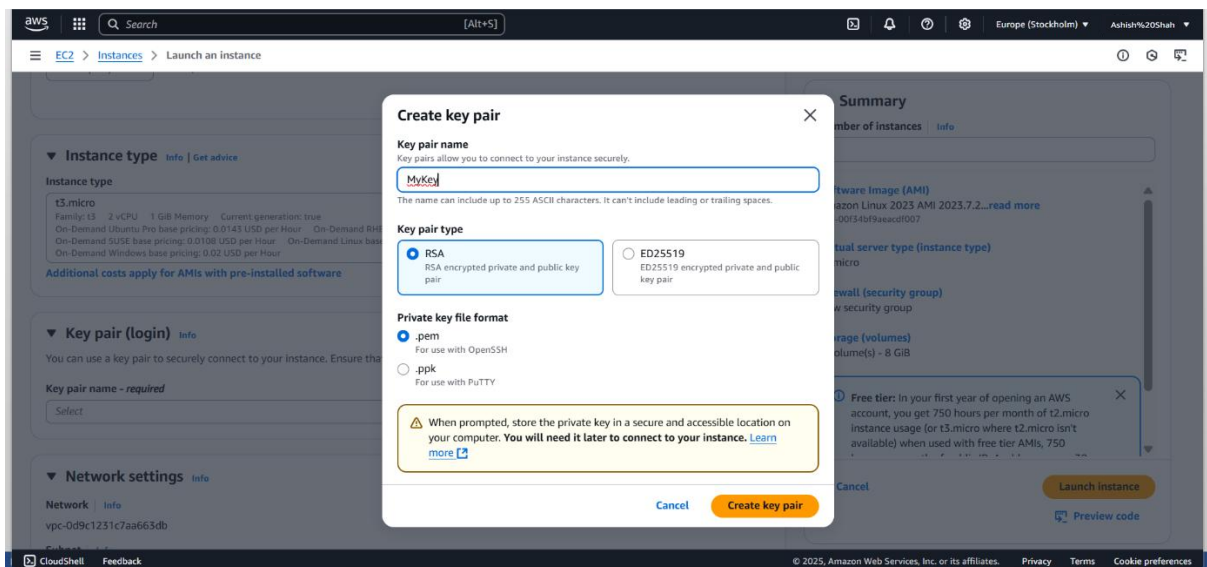
#### Step 2: Open Amazon EC2 dashboard and click on Launch Instance.



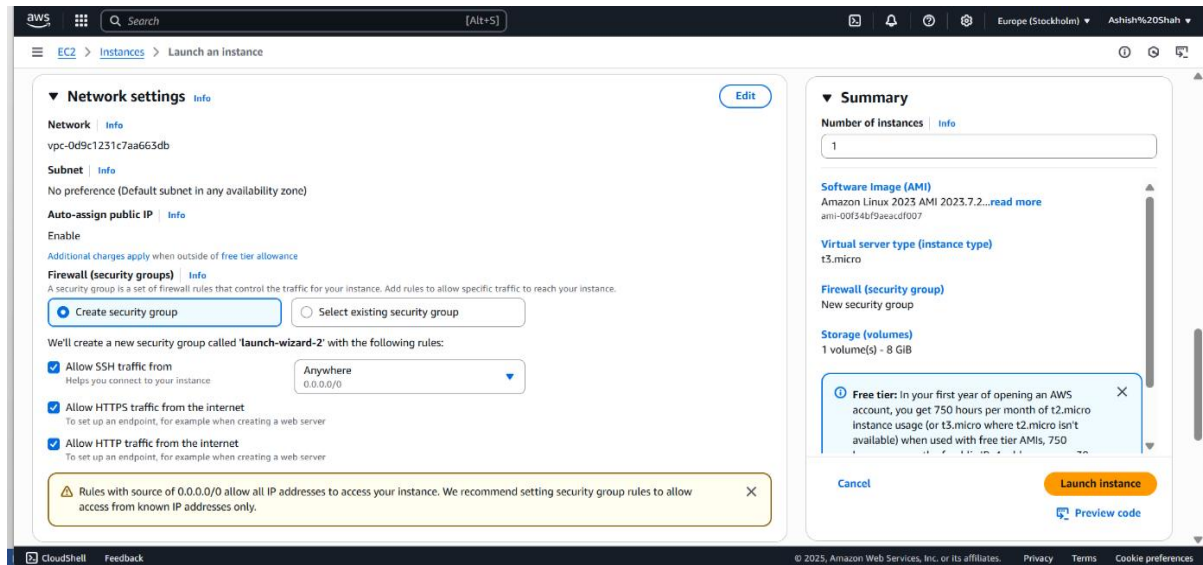
### Step 3: Give instance a Name (e.g. MyWebServer) and Select Amazon Linux as Instance Type.



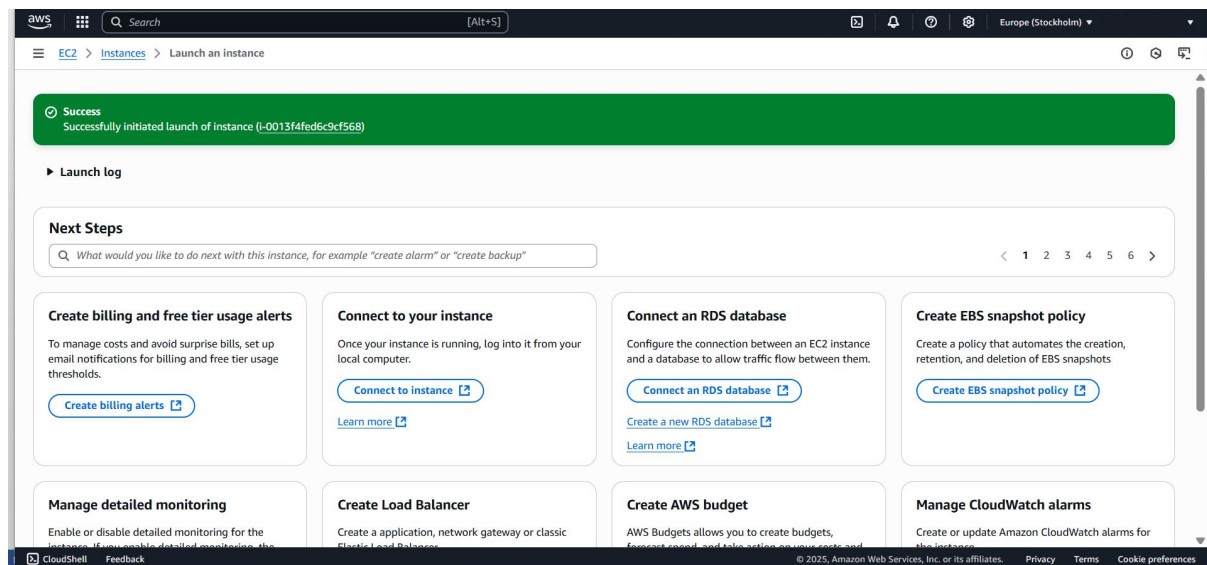
### Step 4: Select Key pair or create new key pair.



**Step 5:** Under Firewall Allow HTTPS and HTTP traffic from Internet and click on Launch Instance.

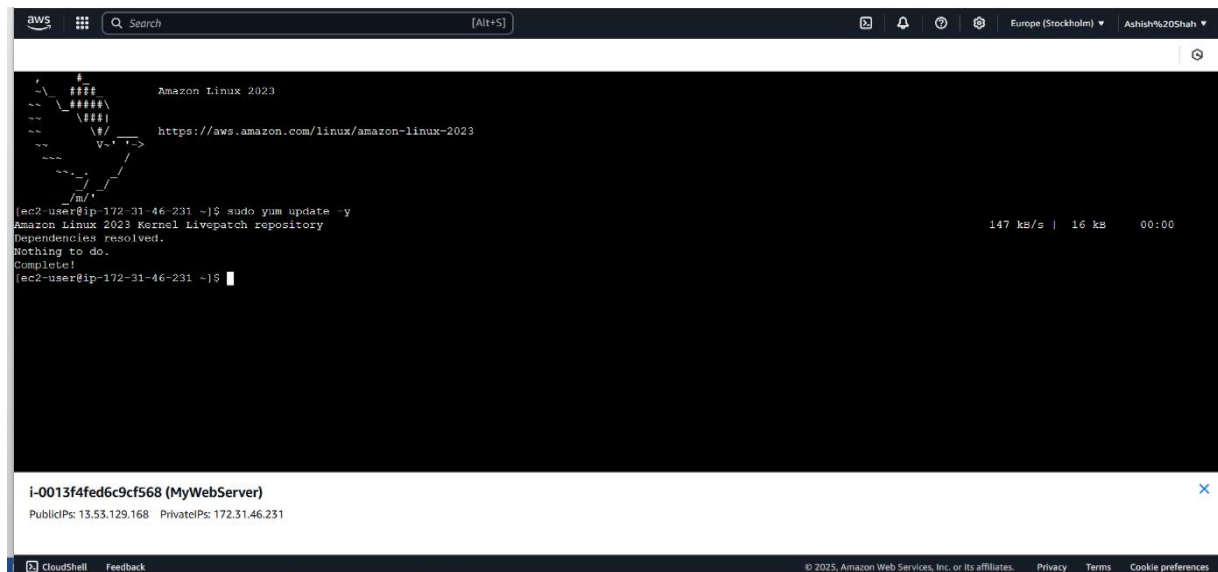


**Step 6:** A successful launch initiation notification is displayed.





**Step 3:** Run 'sudo yum update -y' command to update or get newer features if available.



```
aws
[Alt+S]
Europe (Stockholm) Ashish%20Shah

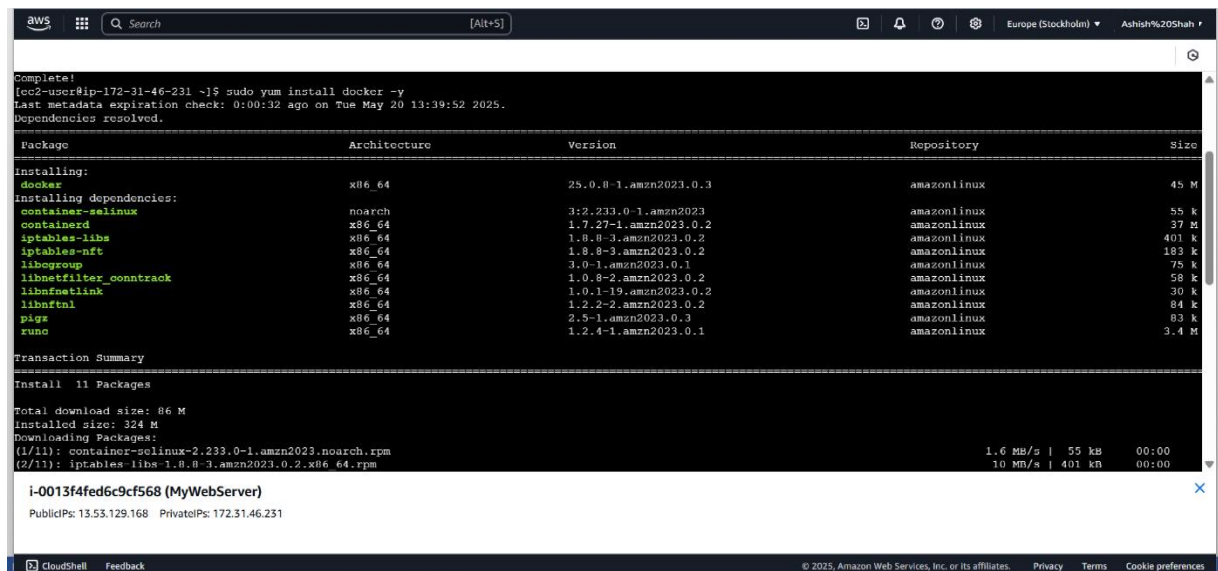
Amazon Linux 2023
https://aws.amazon.com/linux/amazon-linux-2023

[ec2-user@ip-172-31-46-231 ~]$ sudo yum update -y
Amazon Linux 2023 Kernel Livepatch repository
Dependencies resolved.
Nothing to do.
Complete!
[ec2-user@ip-172-31-46-231 ~]$
```

i-0013f4fed6c9cf568 (MyWebServer)  
PublicIPs: 13.53.129.168 PrivateIPs: 172.31.46.231

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**Step 4:** Run 'sudo yum install docker -y' command to install Docker application on our instance.



```
aws
[Alt+S]
Europe (Stockholm) Ashish%20Shah

Complete!
[ec2-user@ip-172-31-46-231 ~]$ sudo yum install docker -y
Last metadata expiration check: 0:00:32 ago on Tue May 20 13:39:52 2025.
Dependencies resolved.

Package Architecture Version Repository Size
-----
Installing:
docker x86_64 25.0.0-1.amzn2023.0.3 amazonlinux 45 M
Installing dependencies:
container-selinux noarch 3:2.233.0-1.amzn2023 amazonlinux 55 k
containerd x86_64 1.7.27-1.amzn2023.0.2 amazonlinux 37 M
iptables-libs x86_64 1.8.8-3.amzn2023.0.2 amazonlinux 401 k
iptables-nft x86_64 1.8.8-3.amzn2023.0.2 amazonlinux 183 k
libnftnl x86_64 3.0-1.amzn2023.0.1 amazonlinux 75 k
libnetfilter_conntrack x86_64 1.0.8-2.amzn2023.0.2 amazonlinux 58 k
libnetfilterlink x86_64 1.0.1-19.amzn2023.0.2 amazonlinux 30 k
libnftnl x86_64 1.2.2-2.amzn2023.0.2 amazonlinux 84 k
pigz x86_64 2.5-1.amzn2023.0.3 amazonlinux 83 k
runo x86_64 1.2.4-1.amzn2023.0.1 amazonlinux 3.4 M

Transaction Summary
-----
Install 11 Packages

Total download size: 86 M
Installed size: 324 M
Downloading Packages:
(1/11): container-selinux-2.233.0-1.amzn2023.noarch.rpm 1.6 MB/s | 55 kB 00:00
(2/11): iptables-libs-1.8.8-3.amzn2023.0.2.x86_64.rpm 10 MB/s | 401 kB 00:00

i-0013f4fed6c9cf568 (MyWebServer)  
PublicIPs: 13.53.129.168 PrivateIPs: 172.31.46.231
```

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```

aws [Alt+S] Europe (Stockholm) Ashish%20Shah

Running scriptlet: container-selinux-3:2.233.0-1.amzn2023.noarch 10/11
Installing      : container-selinux-3:2.233.0-1.amzn2023.noarch 10/11
Running scriptlet: container-selinux-3:2.233.0-1.amzn2023.noarch 10/11
Running scriptlet: docker-25.0.8-1.amzn2023.0.3.x86_64 11/11
Installing      : docker-25.0.8-1.amzn2023.0.3.x86_64 11/11
Running scriptlet: docker-25.0.8-1.amzn2023.0.3.x86_64 11/11
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /usr/lib/systemd/system/docker.socket.

Running scriptlet: container-selinux-3:2.233.0-1.amzn2023.noarch 11/11
Running scriptlet: docker-25.0.8-1.amzn2023.0.3.x86_64 11/11
Verifying      : container-selinux-3:2.233.0-1.amzn2023.noarch 1/11
Verifying      : containerd-1.7.27-1.amzn2023.0.2.x86_64 2/11
Verifying      : docker-25.0.8-1.amzn2023.0.3.x86_64 3/11
Verifying      : iptables-libse-1.8.8-3.amzn2023.0.2.x86_64 4/11
Verifying      : iptables-nft-1.8.8-3.amzn2023.0.2.x86_64 5/11
Verifying      : libcgrou-3.0-1.amzn2023.0.1.x86_64 6/11
Verifying      : libnetfilter_conntrack-1.0.8-2.amzn2023.0.2.x86_64 7/11
Verifying      : libnftnl-1.0.1-19.amzn2023.0.2.x86_64 8/11
Verifying      : libnftnl-1.2.2-2.amzn2023.0.2.x86_64 9/11
Verifying      : pigz-2.5-1.amzn2023.0.3.x86_64 10/11
Verifying      : runc-1.2.4-1.amzn2023.0.1.x86_64 11/11

Installed:
container-selinux-3:2.233.0-1.amzn2023.noarch      containerd-1.7.27-1.amzn2023.0.2.x86_64      docker-25.0.8-1.amzn2023.0.3.x86_64
iptables-libse-1.8.8-3.amzn2023.0.2.x86_64      iptables-nft-1.8.8-3.amzn2023.0.2.x86_64      libcgrou-3.0-1.amzn2023.0.1.x86_64
libnetfilter_conntrack-1.0.8-2.amzn2023.0.2.x86_64  libnftnl-1.0.1-19.amzn2023.0.2.x86_64      libnftnl-1.2.2-2.amzn2023.0.2.x86_64
pigz-2.5-1.amzn2023.0.3.x86_64                  runc-1.2.4-1.amzn2023.0.1.x86_64

Complete!
[ec2-user@ip-172-31-46-231 ~]$

i-0013f4fed6c9cf568 (MyWebServer)
PublicIPs: 13.53.129.168 PrivateIPs: 172.31.46.231

```

**Step 5:** Run ‘sudo service docker start’ command to start docker service on our instance.

```

aws [Alt+S] Europe (Stockholm) Ashish%20Shah

Running scriptlet: container-selinux-3:2.233.0-1.amzn2023.noarch 10/11
Running scriptlet: docker-25.0.8-1.amzn2023.0.3.x86_64 11/11
Installing      : docker-25.0.8-1.amzn2023.0.3.x86_64 11/11
Running scriptlet: docker-25.0.8-1.amzn2023.0.3.x86_64 11/11
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /usr/lib/systemd/system/docker.socket.

Running scriptlet: container-selinux-3:2.233.0-1.amzn2023.noarch 11/11
Running scriptlet: docker-25.0.8-1.amzn2023.0.3.x86_64 11/11
Verifying      : container-selinux-3:2.233.0-1.amzn2023.noarch 1/11
Verifying      : containerd-1.7.27-1.amzn2023.0.2.x86_64 2/11
Verifying      : docker-25.0.8-1.amzn2023.0.3.x86_64 3/11
Verifying      : iptables-libse-1.8.8-3.amzn2023.0.2.x86_64 4/11
Verifying      : iptables-nft-1.8.8-3.amzn2023.0.2.x86_64 5/11
Verifying      : libcgrou-3.0-1.amzn2023.0.1.x86_64 6/11
Verifying      : libnetfilter_conntrack-1.0.8-2.amzn2023.0.2.x86_64 7/11
Verifying      : libnftnl-1.0.1-19.amzn2023.0.2.x86_64 8/11
Verifying      : libnftnl-1.2.2-2.amzn2023.0.2.x86_64 9/11
Verifying      : pigz-2.5-1.amzn2023.0.3.x86_64 10/11
Verifying      : runc-1.2.4-1.amzn2023.0.1.x86_64 11/11

Installed:
container-selinux-3:2.233.0-1.amzn2023.noarch      containerd-1.7.27-1.amzn2023.0.2.x86_64      docker-25.0.8-1.amzn2023.0.3.x86_64
iptables-libse-1.8.8-3.amzn2023.0.2.x86_64      iptables-nft-1.8.8-3.amzn2023.0.2.x86_64      libcgrou-3.0-1.amzn2023.0.1.x86_64
libnetfilter_conntrack-1.0.8-2.amzn2023.0.2.x86_64  libnftnl-1.0.1-19.amzn2023.0.2.x86_64      libnftnl-1.2.2-2.amzn2023.0.2.x86_64
pigz-2.5-1.amzn2023.0.3.x86_64                  runc-1.2.4-1.amzn2023.0.1.x86_64

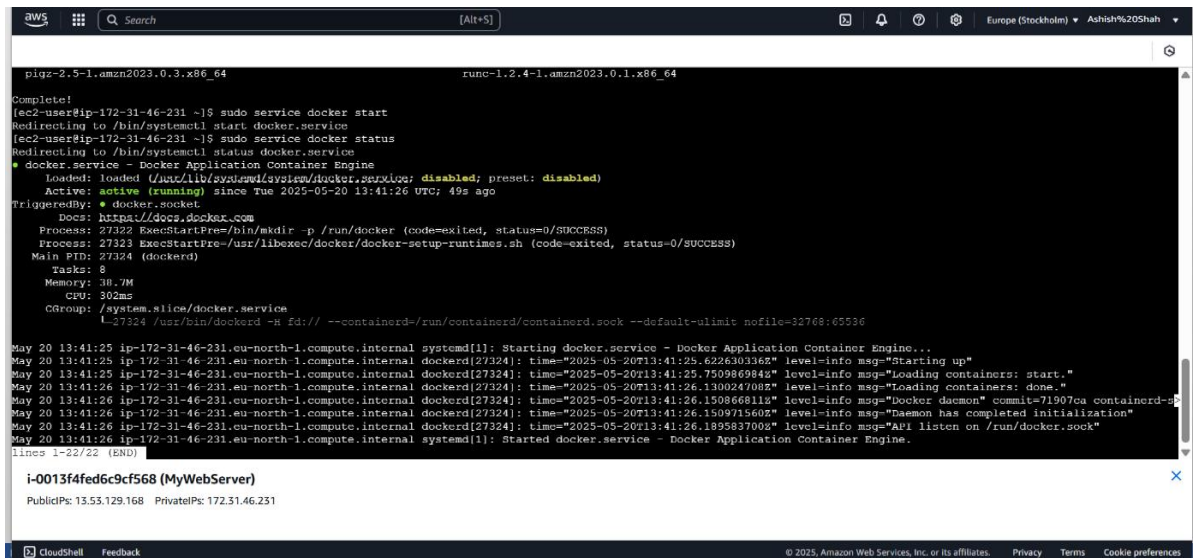
Complete!
[ec2-user@ip-172-31-46-231 ~]$ sudo service docker start
Redirecting to /bin/systemctl start docker.service
[ec2-user@ip-172-31-46-231 ~]$

i-0013f4fed6c9cf568 (MyWebServer)
PublicIPs: 13.53.129.168 PrivateIPs: 172.31.46.231

```



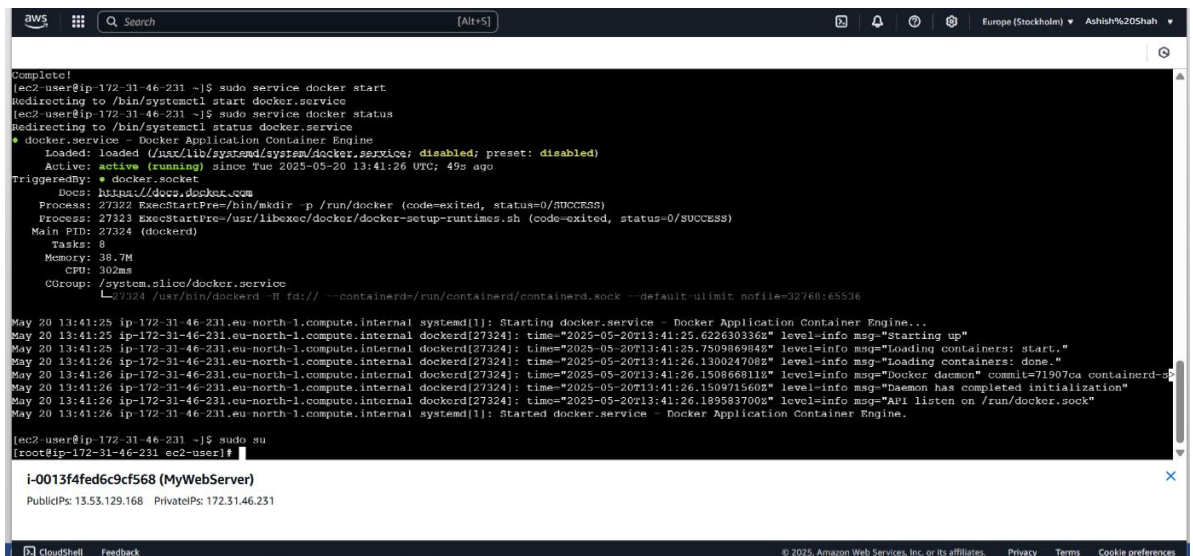
**Step 6:** Run ‘sudo service docker status’ command to check if Docker is running.



```
Complete!  
[ec2-user@ip-172-31-46-231 ~]$ sudo service docker start  
Redirecting to /bin/systemctl start docker.service  
[ec2-user@ip-172-31-46-231 ~]$ sudo service docker status  
Redirecting to /bin/systemctl status docker.service  
● docker.service - Docker Application Container Engine  
   Loaded: loaded (/usr/lib/systemd/system/docker.service; disabled; preset: disabled)  
   Active: active (running) since Tue 2025-05-20 13:41:26 UTC; 49s ago  
TriggeredBy: ● docker.socket  
   Docs: https://docs.docker.com  
   Process: 27322 ExecStartPre=/bin/mkdir -p /run/docker (code=exited, status=0/SUCCESS)  
   Process: 27323 ExecStartPre=/usr/libexec/docker/docker-setup-runtimes.sh (code=exited, status=0/SUCCESS)  
   Main PID: 27324 (dockerd)  
     Tasks: 8  
    Memory: 38.7M  
       CPU: 302ms  
   CGroup: /system.slice/docker.service  
           └─27324 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock --default-ulimit nofile=32768:65536  
  
May 20 13:41:25 ip-172-31-46-231.eu-north-1.compute.internal systemd[1]: Starting docker.service - Docker Application Container Engine...  
May 20 13:41:25 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:25.622630336Z" level=info msg="Starting up"  
May 20 13:41:25 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:25.750986984Z" level=info msg="Loading containers: start."  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:26.130024708Z" level=info msg="Loading containers: done."  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:26.150866811Z" level=info msg="Docker daemon" commit=71907ca containerd-s  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:26.150971560Z" level=info msg="Daemon has completed initialization"  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:26.189583700Z" level=info msg="API listen on /run/docker.sock"  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal systemd[1]: Started docker.service - Docker Application Container Engine.  
  
lines 1-22/22 (END)
```

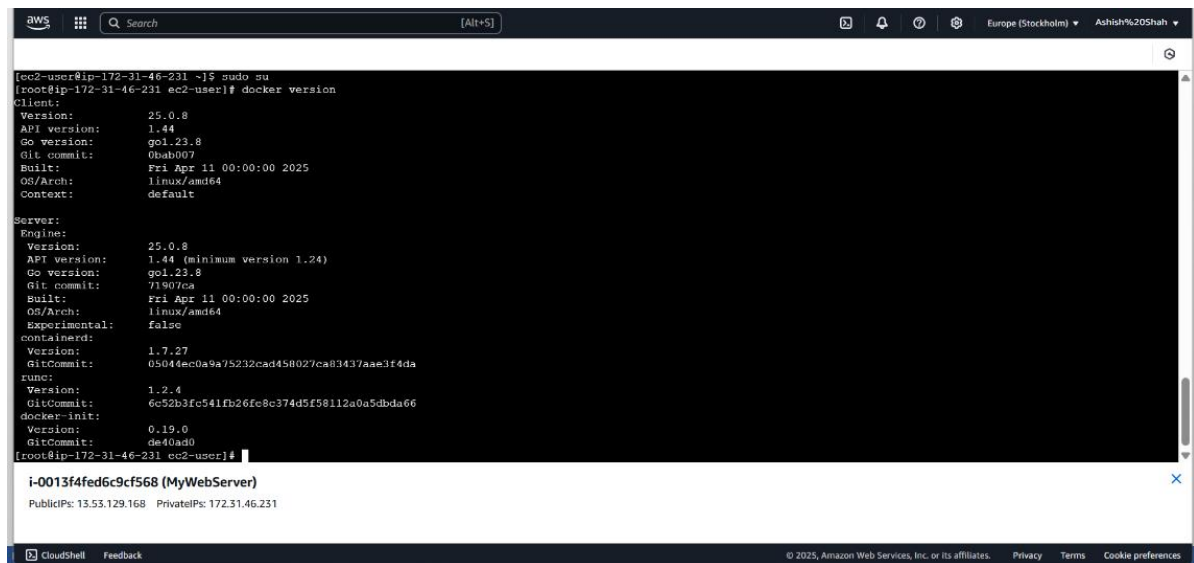
i-0013f4fed6c9cf568 (MyWebServer)  
PublicIPs: 13.53.129.168 PrivateIPs: 172.31.46.231

**Step 7:** Run ‘sudo su’ command to go to root directory on our instance.



```
Complete!  
[ec2-user@ip-172-31-46-231 ~]$ sudo service docker start  
Redirecting to /bin/systemctl start docker.service  
[ec2-user@ip-172-31-46-231 ~]$ sudo service docker status  
Redirecting to /bin/systemctl status docker.service  
● docker.service - Docker Application Container Engine  
   Loaded: loaded (/usr/lib/systemd/system/docker.service; disabled; preset: disabled)  
   Active: active (running) since Tue 2025-05-20 13:41:26 UTC; 49s ago  
TriggeredBy: ● docker.socket  
   Docs: https://docs.docker.com  
   Process: 27322 ExecStartPre=/bin/mkdir -p /run/docker (code=exited, status=0/SUCCESS)  
   Process: 27323 ExecStartPre=/usr/libexec/docker/docker-setup-runtimes.sh (code=exited, status=0/SUCCESS)  
   Main PID: 27324 (dockerd)  
     Tasks: 8  
    Memory: 38.7M  
       CPU: 302ms  
   CGroup: /system.slice/docker.service  
           └─27324 /usr/bin/dockerd -H fd:// --containerd=/run/containerd/containerd.sock --default-ulimit nofile=32768:65536  
  
May 20 13:41:25 ip-172-31-46-231.eu-north-1.compute.internal systemd[1]: Starting docker.service - Docker Application Container Engine...  
May 20 13:41:25 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:25.622630336Z" level=info msg="Starting up"  
May 20 13:41:25 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:25.750986984Z" level=info msg="Loading containers: start."  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:26.130024708Z" level=info msg="Loading containers: done."  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:26.150866811Z" level=info msg="Docker daemon" commit=71907ca containerd-s  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:26.150971560Z" level=info msg="Daemon has completed initialization"  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal dockerd[27324]: time="2025-05-20T13:41:26.189583700Z" level=info msg="API listen on /run/docker.sock"  
May 20 13:41:26 ip-172-31-46-231.eu-north-1.compute.internal systemd[1]: Started docker.service - Docker Application Container Engine.  
  
[ec2-user@ip-172-31-46-231 ~]$ sudo su  
[root@ip-172-31-46-231 ec2-user]#
```

i-0013f4fed6c9cf568 (MyWebServer)  
PublicIPs: 13.53.129.168 PrivateIPs: 172.31.46.231

**Step 8:** Run ‘docker version’ command to check version of Docker installed.

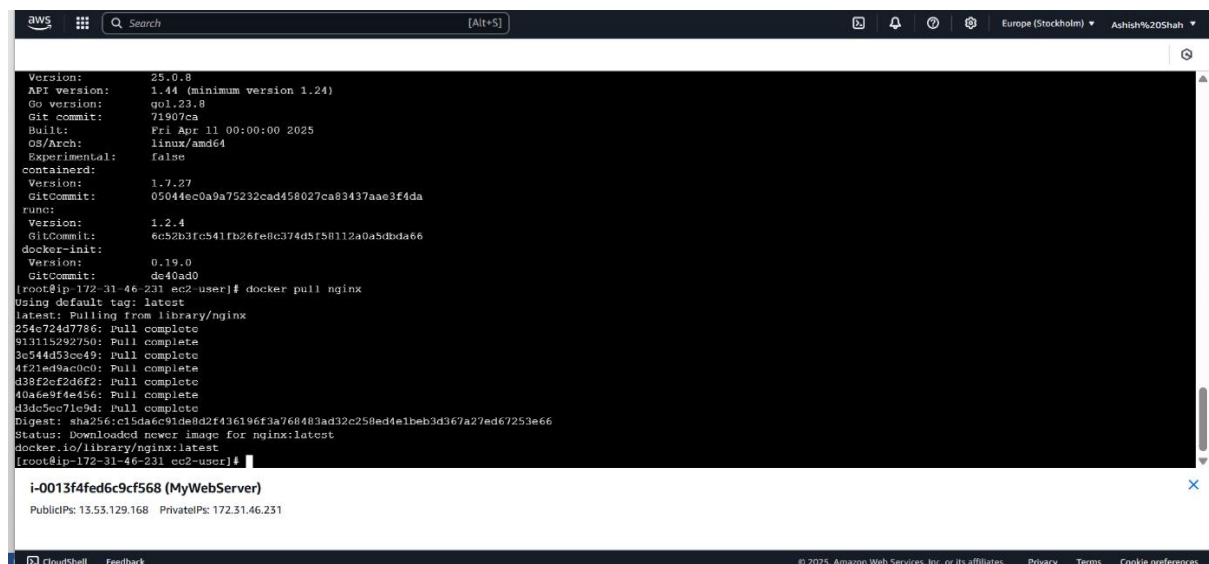
```
aws
[Search] [Alt+S] Europe (Stockholm) Ashish%20Shah

[ec2-user@ip-172-31-46-231 ~]$ sudo su
[root@ip-172-31-46-231 ec2-user]# docker version
Client:
 Version:      25.0.8
 API version:  1.44
 Go version:   go1.23.8
 Git commit:   0bab007
 Built:        Fri Apr 11 00:00:00 2025
 OS/Arch:     linux/amd64
 Context:      default

Server:
 Engine:
  Version:      25.0.8
  API version:  1.44 (minimum version 1.24)
  Go version:   go1.23.8
  Git commit:   71907ca
  Built:        Fri Apr 11 00:00:00 2025
  OS/Arch:     linux/amd64
  Experimental: false
 containerd:
  Version:      1.7.27
  GitCommit:    05044ec0a9a75232cad458027ca83437aae3f4da
 runc:
  Version:      1.2.4
  GitCommit:    6c52b3fc541fb26fe8c374d5f58112a0a5dbda66
 docker-init:
  Version:      0.19.0
  GitCommit:    de40ad0
[root@ip-172-31-46-231 ec2-user]#
```

i-0013f4fed6c9cf568 (MyWebServer)  
PublicIP: 13.53.129.168 PrivateIP: 172.31.46.231

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**Step 9:** Run ‘docker pull nginx’ command to download the nginx web application from Docker’s repository.

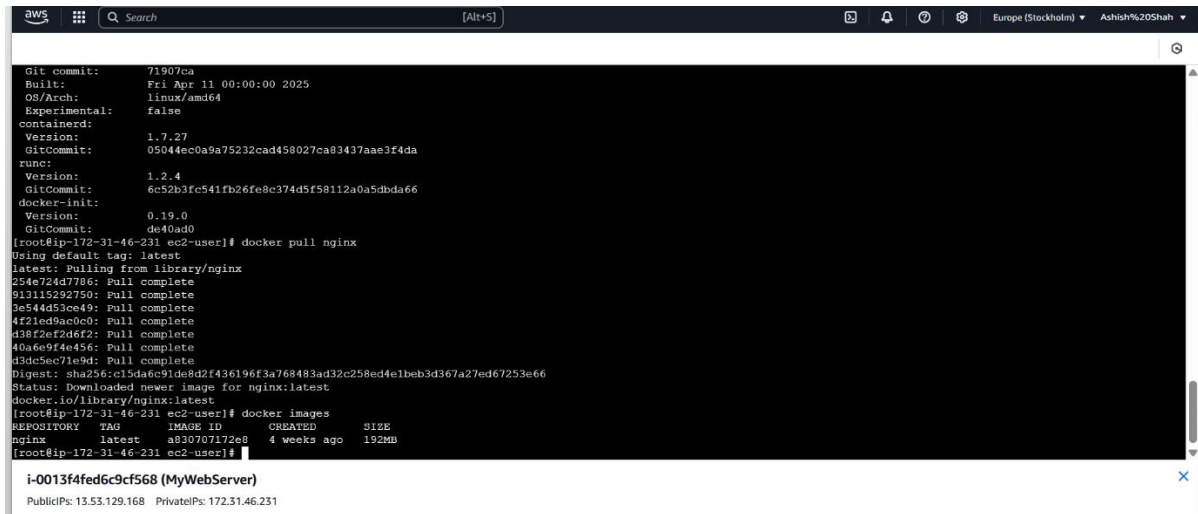
```
aws
[Search] [Alt+S] Europe (Stockholm) Ashish%20Shah

Version:      25.0.8
API version:  1.44 (minimum version 1.24)
Go version:   go1.23.8
Git commit:   71907ca
Built:        Fri Apr 11 00:00:00 2025
OS/Arch:     linux/amd64
Experimental: false
containerd:
 Version:      1.7.27
 GitCommit:    05044ec0a9a75232cad458027ca83437aae3f4da
runc:
 Version:      1.2.4
 GitCommit:    6c52b3fc541fb26fe8c374d5f58112a0a5dbda66
docker-init:
 Version:      0.19.0
 GitCommit:    de40ad0
[root@ip-172-31-46-231 ec2-user]# docker pull nginx
Using default tag: latest
latest: Pulling from library/nginx
254c724d7786: Pull complete
913115292750: Pull complete
3c544d33cc49: Pull complete
4f21ed9a0800: Pull complete
438f2cf2d6f2: Pull complete
40a6e9f4e456: Pull complete
d3dc5ec71c9d: Pull complete
Digest: sha256:c15da6c91de8d2f436196f3a768483ad32c258ed4e1beb3d367a27ed67253e66
Status: Downloaded newer image for nginx:latest
docker.io/library/nginx:latest
[root@ip-172-31-46-231 ec2-user]#
```

i-0013f4fed6c9cf568 (MyWebServer)  
PublicIP: 13.53.129.168 PrivateIP: 172.31.46.231

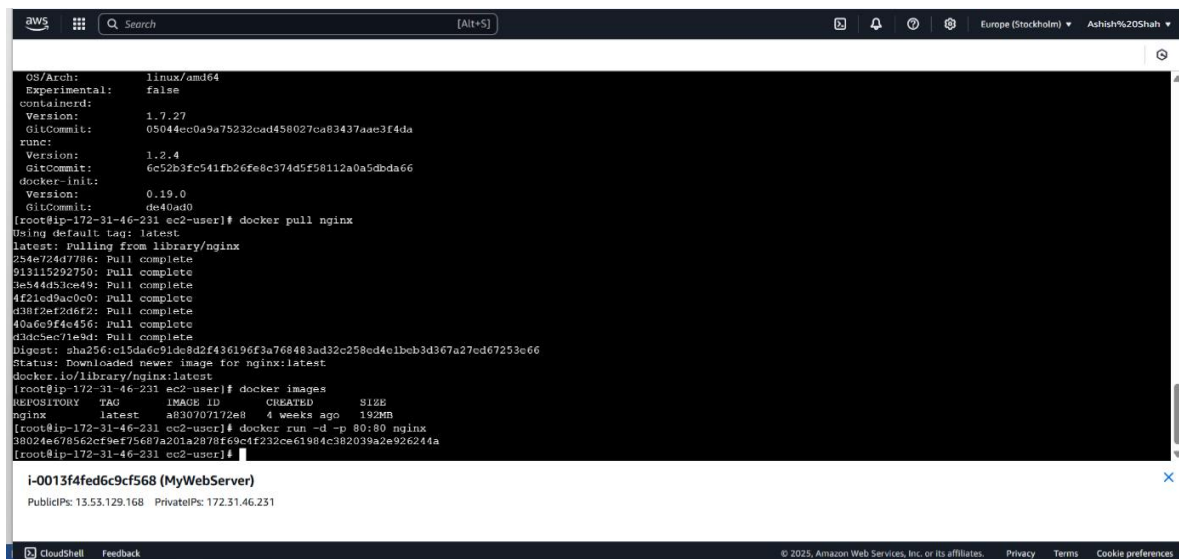
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**Step 10:** Run ‘docker images’ command to see downloaded application images.

```
Git commit: 71907ca
Built: Fri Apr 11 00:00:00 2025
OS/Arch: linux/amd64
Experimental: false
containerd:
  Version: 1.7.27
  GitCommit: 05044ec0a9a75232cad458027ca83437aac3f4da
runc:
  Version: 1.2.4
  GitCommit: 6c52b3fc541fb26fe8e374d5f58112a0a5dbda66
docker-init:
  Version: 0.19.0
  GitCommit: de40ad0
[root@ip-172-31-46-231 ec2-user]# docker pull nginx
Using default tag: latest
latest: Pulling from library/nginx
254e724d7786: Pull complete
913115292750: Pull complete
3e544d53ce49: Pull complete
4f21ed9ac0c0: Pull complete
d38f2ef2d6f2: Pull complete
40a6e9f4c456: Pull complete
d3dc5ec71e9d: Pull complete
Digest: sha256:c15da6c91de8d2f436196f3a768483ad32c258ed4e1beb3d367a27ed67253e66
Status: Downloaded newer image for nginx:latest
docker.io/library/nginx:latest
[root@ip-172-31-46-231 ec2-user]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
nginx latest a830707172e8 4 weeks ago 192MB
[root@ip-172-31-46-231 ec2-user]#
```

i-0013f4fed6c9cf568 (MyWebServer)  
PublicIPs: 13.53.129.168 PrivateIPs: 172.31.46.231

**Step 11:** Run ‘docker run -d -p 80:80 nginx’ command to start the nginx application.

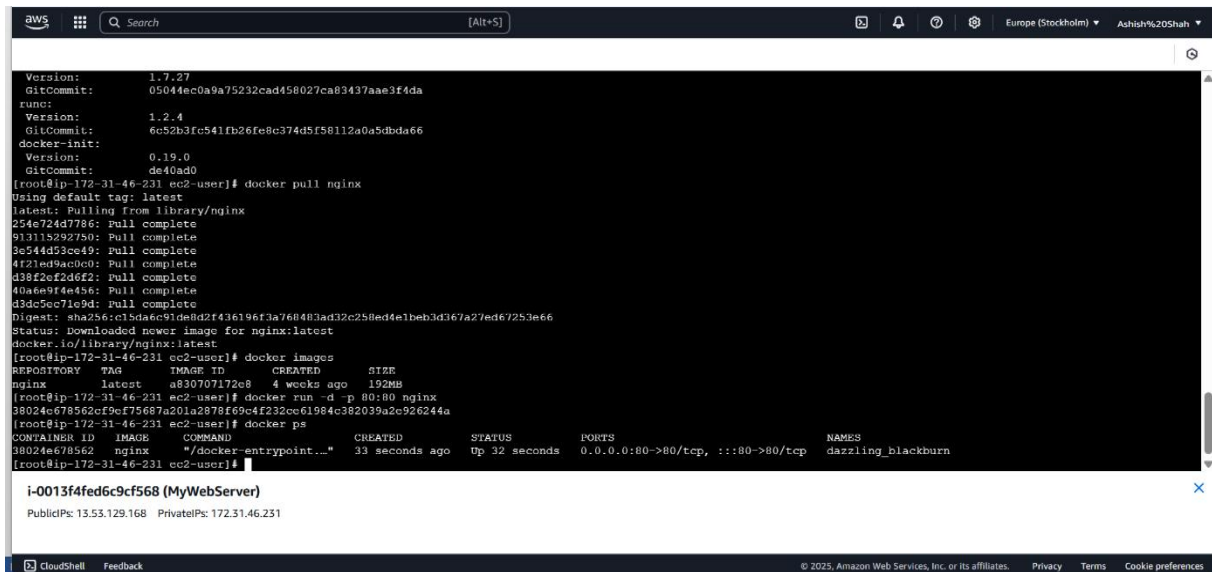
```
OS/Arch: linux/amd64
Experimental: false
containerd:
  Version: 1.7.27
  GitCommit: 05044ec0a9a75232cad458027ca83437aac3f4da
runc:
  Version: 1.2.4
  GitCommit: 6c52b3fc541fb26fe8e374d5f58112a0a5dbda66
docker-init:
  Version: 0.19.0
  GitCommit: de40ad0
[root@ip-172-31-46-231 ec2-user]# docker pull nginx
Using default tag: latest
latest: Pulling from library/nginx
254e724d7786: Pull complete
913115292750: Pull complete
3e544d53ce49: Pull complete
4f21ed9ac0c0: Pull complete
d38f2ef2d6f2: Pull complete
40a6e9f4c456: Pull complete
d3dc5ec71e9d: Pull complete
Digest: sha256:c15da6c91de8d2f436196f3a768483ad32c258ed4e1beb3d367a27ed67253e66
Status: Downloaded newer image for nginx:latest
docker.io/library/nginx:latest
[root@ip-172-31-46-231 ec2-user]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
nginx latest a830707172e8 4 weeks ago 192MB
[root@ip-172-31-46-231 ec2-user]# docker run -d -p 80:80 nginx
38024e678562cf9ef75687a201a2878f69c4f232ce61984c382039a2e926244a
[root@ip-172-31-46-231 ec2-user]#
```

i-0013f4fed6c9cf568 (MyWebServer)  
PublicIPs: 13.53.129.168 PrivateIPs: 172.31.46.231

CloudShell Feedback

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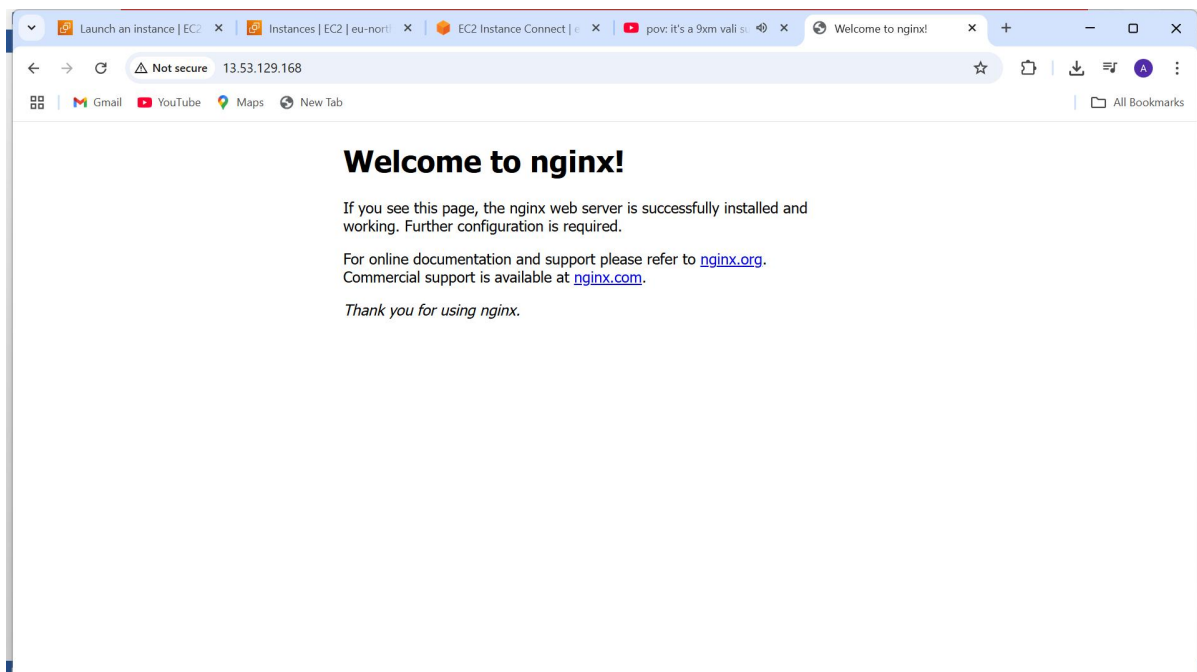
**Step 12:** Run ‘docker ps’ command to check the status of running processes under docker.



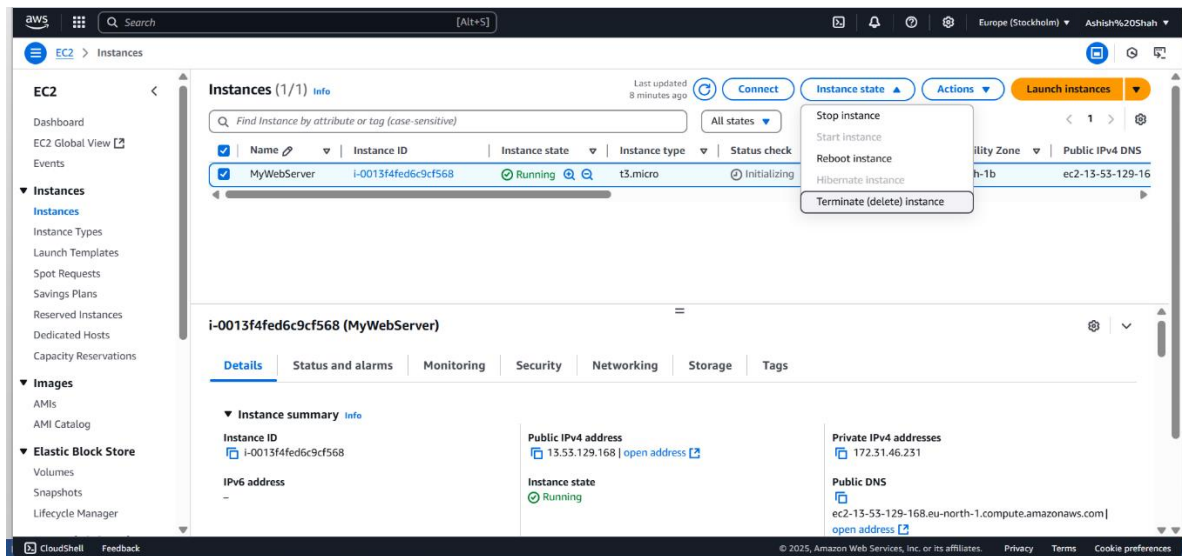
```
Version: 1.7.27
GitCommit: 05044ec0a9a75232cad458027ca83437aae3f4da
runcc:
Version: 1.2.4
GitCommit: 6c52b3fc541fb26fe8c374d5f58112a0a5dbda66
docker-init:
Version: 0.19.0
GitCommit: de40ad0
[root@ip-172-31-46-231 ec2-user]# docker pull nginx
Using default tag: latest
latest: Pulling from library/nginx
254e724d7786: Pull complete
913115292750: Pull complete
3e544d53ce49: Pull complete
4f21ed9ac0c0: Pull complete
d38f2ef2d6f2: Pull complete
40a6e9f4e456: Pull complete
d3dc5ec71c9d: Pull complete
Digest: sha256:c1bda6c91de8d2f436196f3a768483ad32c258ed4e1beb3d367a27ed67253e66
Status: Downloaded newer image for nginx:latest
[root@ip-172-31-46-231 ec2-user]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
nginx latest a830707172e8 4 weeks ago 192MB
[root@ip-172-31-46-231 ec2-user]# docker run -d -p 80:80 nginx
38024c678562cf9cf75687a201a2878f69c4f232cc61984c382039a2c926244a
[root@ip-172-31-46-231 ec2-user]# docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
38024c678562 nginx "/docker-entrypoint..." 33 seconds ago Up 32 seconds 0.0.0.0:80->80/tcp, :::80->80/tcp dazzling_blackburn
[root@ip-172-31-46-231 ec2-user]#
```

i-0013f4fed6c9cf568 (MyWebServer)  
PublicIPs: 13.53.129.168 PrivateIPs: 172.31.46.231

**Step 13:** Copy the public IP Address (e.g. 13.53.129.168) to a new tab to view the running nginx application.



**Step 14:** Delete the EC2 instance after execution by clicking on Terminate(delete) instance.



**Step 15:** Indicates the successful termination of the instance. Also delete the corresponding key pair and Security groups associated with this instance.

User can sign-out of the AWS account after these steps.

