ADVANCE DEVOPS EXP-4

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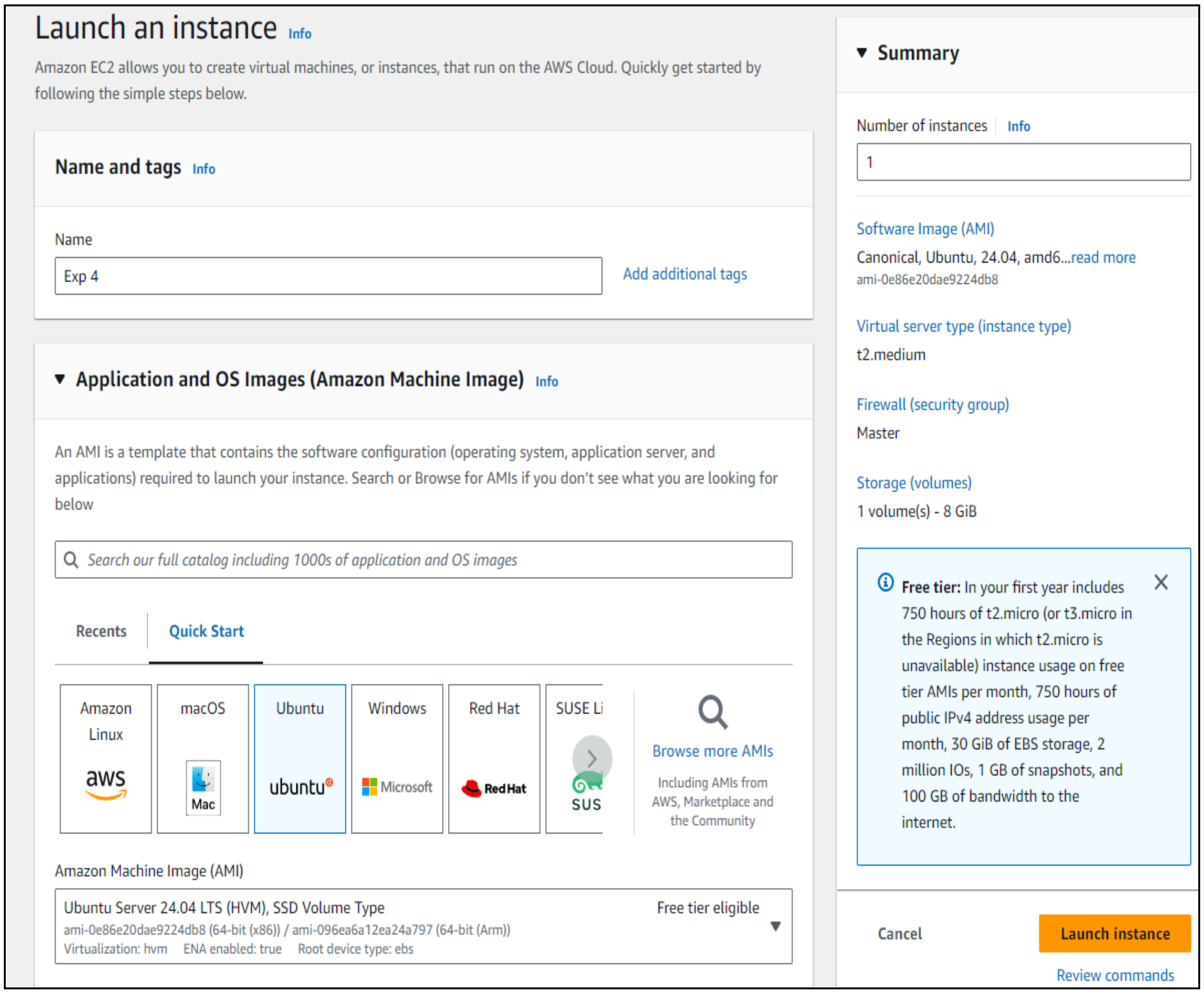
Aim: To install Kubectl and execute Kubectl commands to manage the Kubernetes cluster and deploy Your First Kubernetes Application.

Step 1: Log in to your AWS Academy/personal account and launch a new Ec2 Instance.Select Ubuntu as AMI and t2.medium as Instance Type, create a key of type RSA with .pem extension, and move the downloaded key to the new folder.



Launch an instance

Amazon EC2 allows you to create virtual machines, or instances, that run on the AWS Cloud. Quickly get started by following the simple steps below.

Name and tags

Name: Exp 4

Application and OS Images (Amazon Machine Image)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. Search or Browse for AMIs if you don't see what you are looking for below

Amazon Machine Image (AMI)

Ubuntu Server 24.04 LTS (HVM), SSD Volume Type — Free tier eligible
ami-0e86e20dae9224db8 (64-bit (x86)) / ami-096ea6a12ea24a797 (64-bit (Arm))
Virtualization: hvm ENA enabled: true Root device type: ebs

Summary

Number of instances: 1

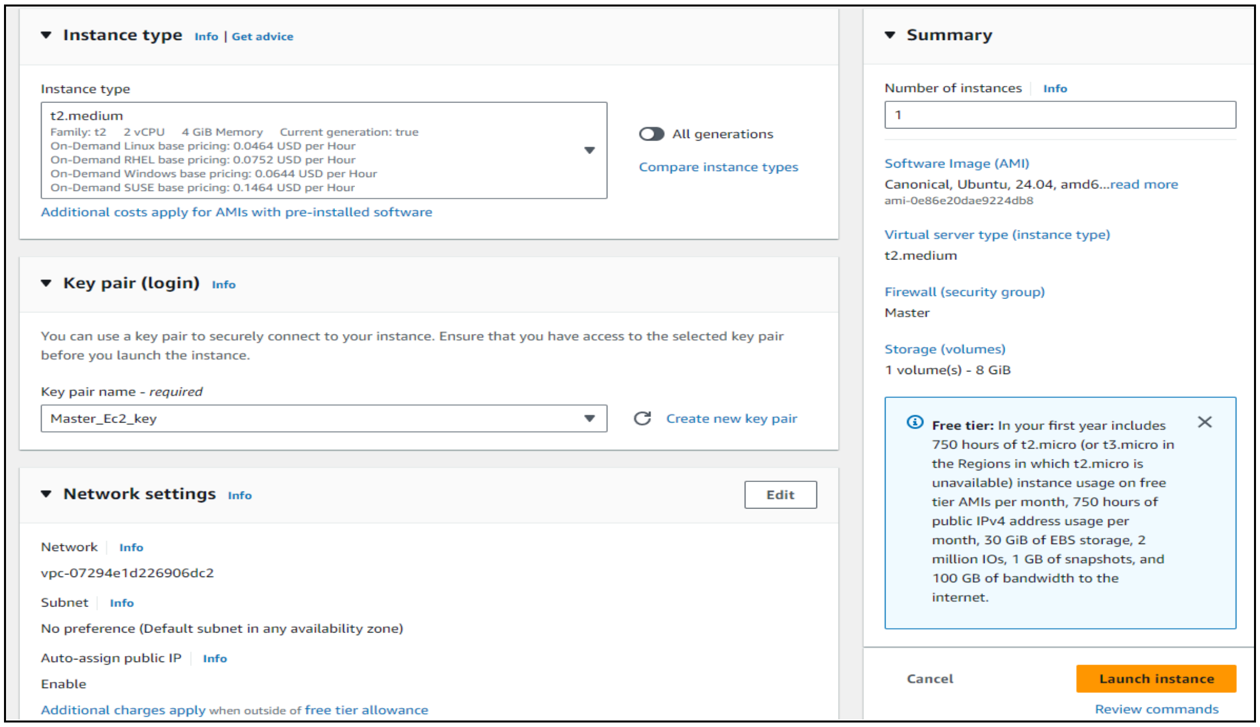
Software Image (AMI): Canonical, Ubuntu, 24.04, amd6...read more
ami-0e86e20dae9224db8

Virtual server type (instance type): t2.medium

Firewall (security group): Master

Storage (volumes): 1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.



Instance type Info | Get advice

Instance type

t2.medium
Family: t2 2 vCPU 4 GiB Memory Current generation: true
On-Demand Linux base pricing: 0.0464 USD per Hour
On-Demand RHEL base pricing: 0.0752 USD per Hour
On-Demand Windows base pricing: 0.0644 USD per Hour
On-Demand SUSE base pricing: 0.1464 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 - *required*

Master_Ec2_key

Create new key pair

Network settings Info Edit

Network Info
vpc-07294e1d226906dc2

Subnet Info
No preference (Default subnet in any availability zone)

Auto-assign public IP Info
Enable

Additional charges apply when outside of free tier allowance

Summary

Number of instances Info
1

Software Image (AMI)
Canonical, Ubuntu, 24.04, amd6...read more
ami-0e86e20dae9224db8

Virtual server type (instance type)
t2.medium

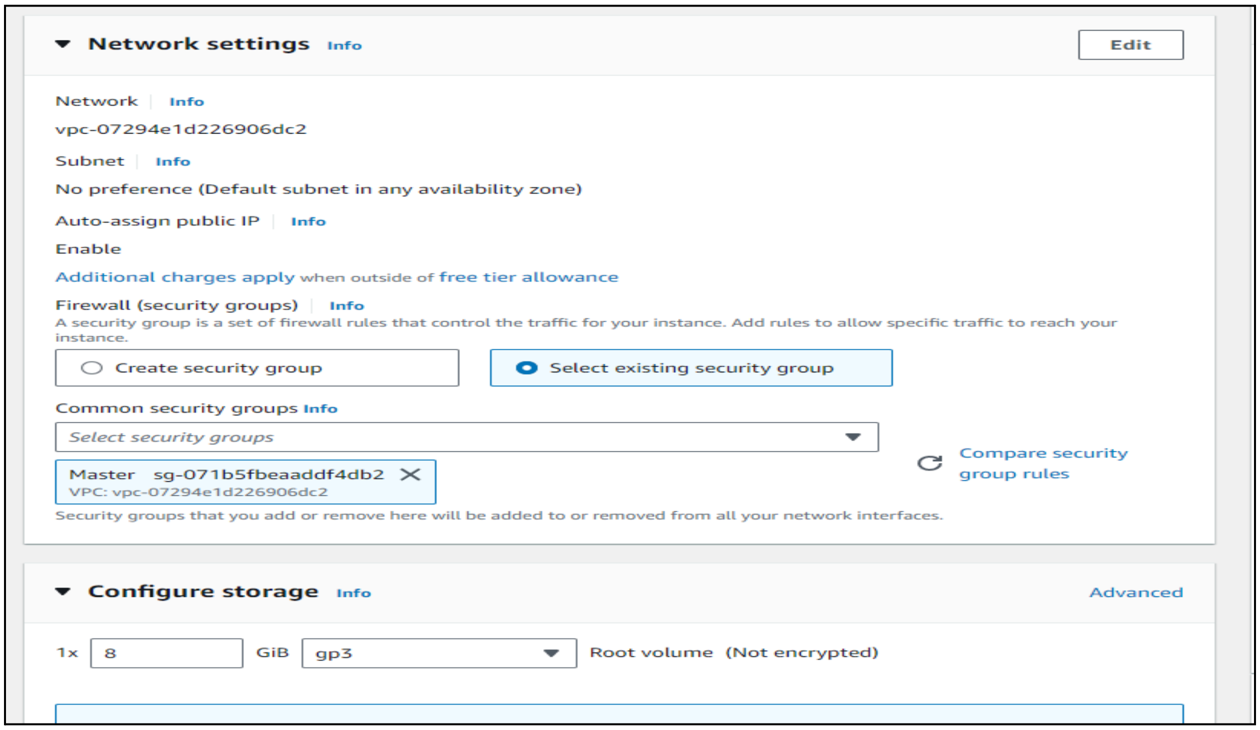
Firewall (security group)
Master

Storage (volumes)
1 volume(s) - 8 GiB

Free tier: In your first year includes 750 hours of t2.micro (or t3.micro in the Regions in which t2.micro is unavailable) instance usage on free tier AMIs per month, 750 hours of public IPv4 address usage per month, 30 GiB of EBS storage, 2 million IOs, 1 GB of snapshots, and 100 GB of bandwidth to the internet.

Cancel Launch instance

Review commands



Network settings Info Edit

Network Info
vpc-07294e1d226906dc2

Subnet Info
No preference (Default subnet in any availability zone)

Auto-assign public IP Info
Enable

Additional charges apply when outside of free tier allowance

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.

Create security group [✓ Select existing security group]

Common security groups Info

Select security groups

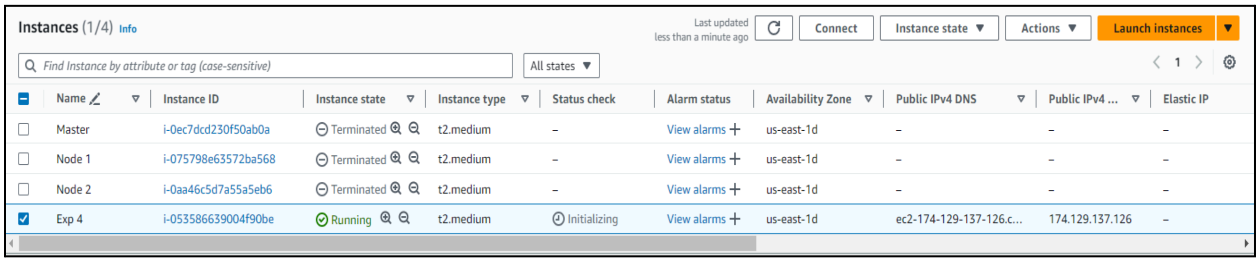
Master sg-071b5fbeaaddf4db2
VPC: vpc-07294e1d226906dc2

Compare security group rules

Security groups that you add or remove here will be added to or removed from all your network interfaces.

Configure storage Info Advanced

1x 8 GiB gp3 Root volume (Not encrypted)



Instances (1/4) Info

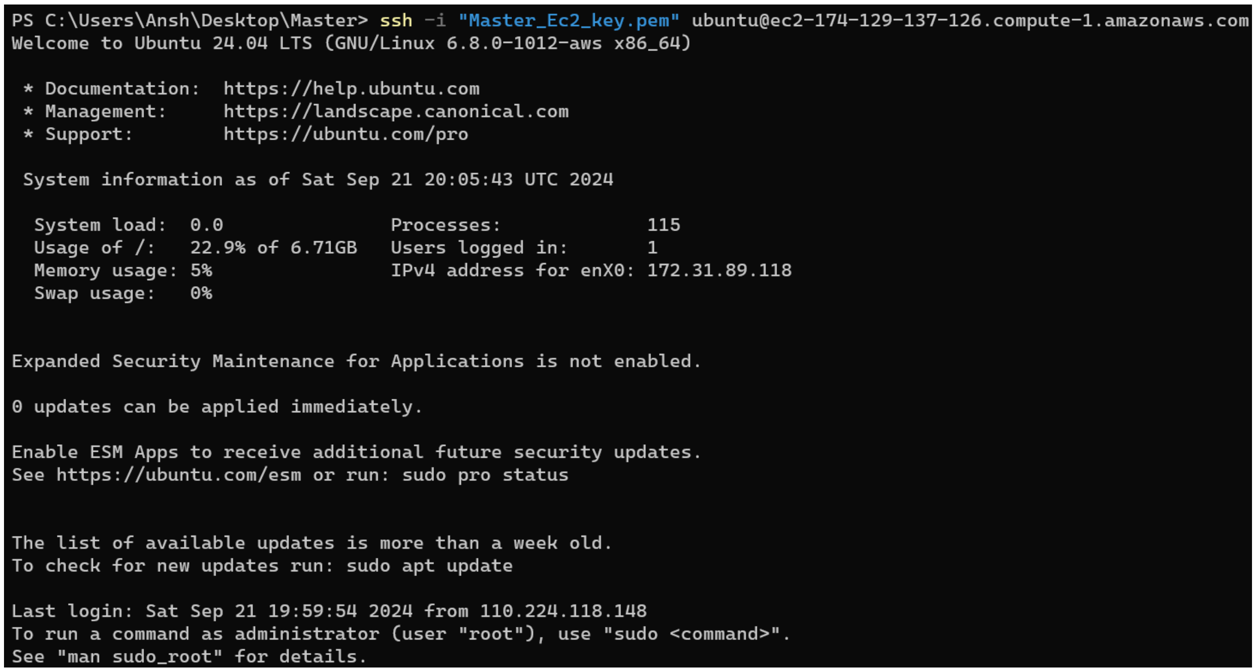
Last updated less than a minute ago

Connect Instance state Actions Launch instances

Find Instance by attribute or tag (case-sensitive) All states

	Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP
☐	Master	i-0ec7dcd230f50ab0a	Terminated	t2.medium	–	View alarms +	us-east-1d	–	–	–
☐	Node 1	i-075798e63572ba568	Terminated	t2.medium	–	View alarms +	us-east-1d	–	–	–
☐	Node 2	i-0aa46c5d7a55a5eb6	Terminated	t2.medium	–	View alarms +	us-east-1d	–	–	–
✓	Exp 4	i-053586639004f90be	Running	t2.medium	Initializing	View alarms +	us-east-1d	ec2-174-129-137-126.c...	174.129.137.126	–

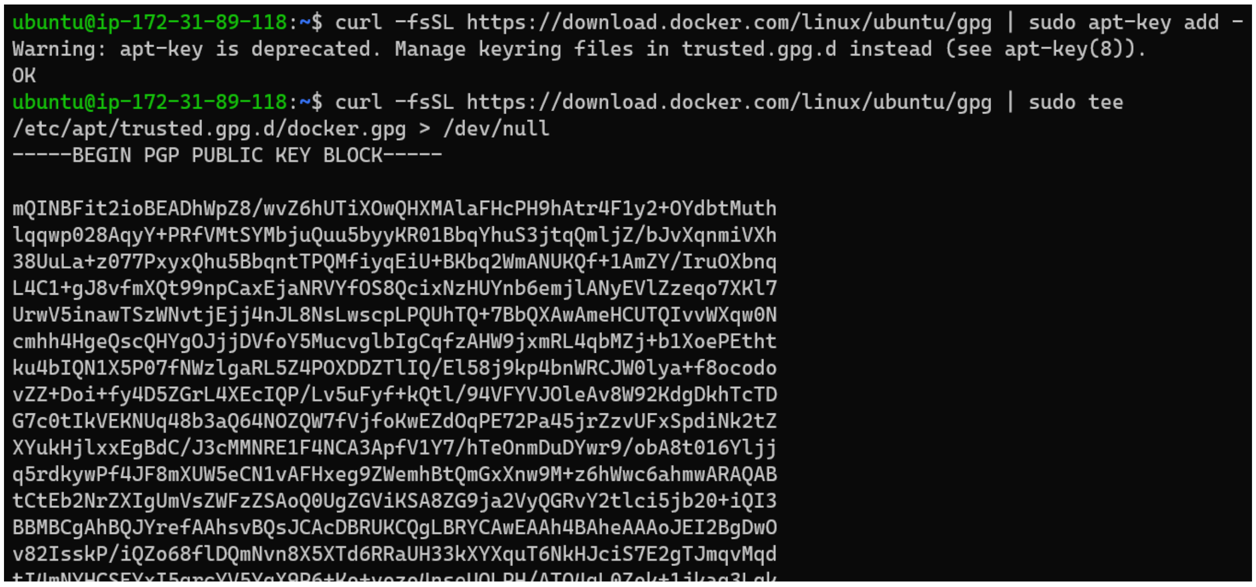
Step 2: After creating the instance click on Connect the instance and navigate to SSH Client. Copy the example command. Open your key Folder in terminal and paste the command there.



```
PS C:\Users\Ansh\Desktop\Master> ssh -i "Master_Ec2_key.pem" ubuntu@ec2-174-129-137-126.compute-1.amazonaws.com
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1012-aws x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

 System information as of Sat Sep 21 20:05:43 UTC 2024

  System load:  0.0               Processes:             115
  Usage of /:   22.9% of 6.71GB   Users logged in:       1
  Memory usage: 5%                IPv4 address for enX0: 172.31.89.118
  Swap usage:   0%


Expanded Security Maintenance for Applications is not enabled.

0 updates can be applied immediately.

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status


The list of available updates is more than a week old.
To check for new updates run: sudo apt update

Last login: Sat Sep 21 19:59:54 2024 from 110.224.118.148
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
```

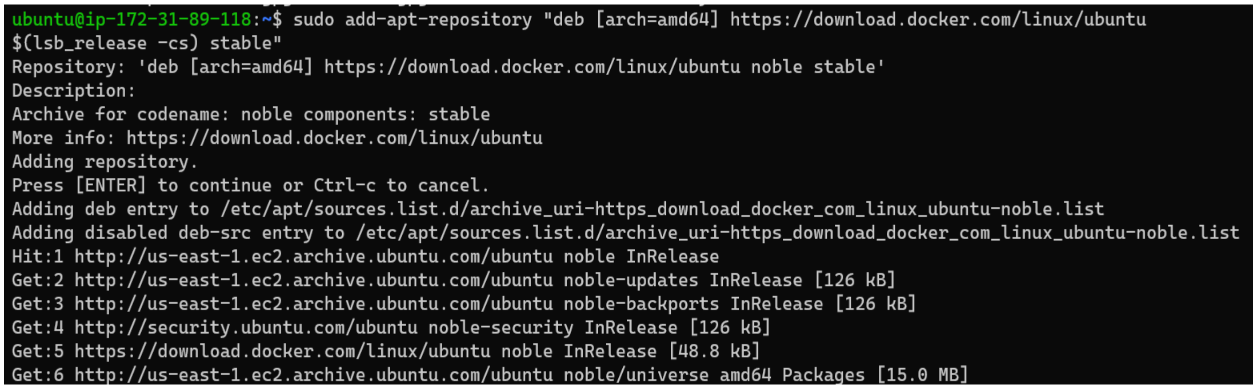
Step 3: Run the below commands to install and setup Docker.

- curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -
- curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo tee /etc/apt/trusted.gpg.d/docker.gpg > /dev/null
- sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu $(lsb_release -cs) stable"

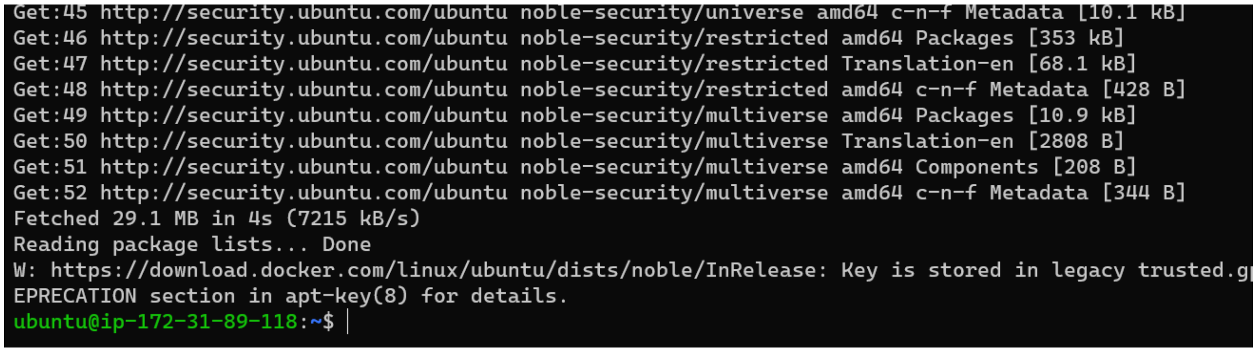


```
ubuntu@ip-172-31-89-118:~$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo apt-key add -
Warning: apt-key is deprecated. Manage keyring files in trusted.gpg.d instead (see apt-key(8)).
OK
ubuntu@ip-172-31-89-118:~$ curl -fsSL https://download.docker.com/linux/ubuntu/gpg | sudo tee
/etc/apt/trusted.gpg.d/docker.gpg > /dev/null
-----BEGIN PGP PUBLIC KEY BLOCK-----
```

```
mQINBFit2ioBEADhWpZ8/wvZ6hUTiXOwQHXMAlaFHcPH9hAtr4F1y2+OYdbtMuth
lqqwp028AqyY+PRfVMtSYMbjuQuu5byyKR01BbqYhuS3jtqQmljZ/bJvXqnmiVXh
38UuLa+z077PxyxQhu5BbqntTPQMfiyqEiU+BKbq2WmANUKQf+1AmZY/IruOXbnq
L4C1+gJ8vfmXQt99npCaxEjaNRVYfOS8QcixNzHUYnb6emjlANyEVlZzeqo7XKl7
UrwV5inawTSzWNvtjEjj4nJL8NsLwscpLPQUhTQ+7BbQXAwAmeHCUTQIvvWXqw0N
cmhh4HgeQscQHYgOJjjDVfoY5MucvglbIgCqfzAHW9jxmRL4qbMZj+b1XoePEtht
ku4bIQN1X5P07fNWzlgaRL5Z4POXDDZTlIQ/El58j9kp4bnWRCJW0lya+f8ocodo
vZZ+Doi+fy4D5ZGrL4XEcIQP/Lv5uFyf+kQtl/94VFYVJOleAv8W92KdgDkhTcTD
G7c0tIkVEKNUq48b3aQ64NOZQW7fVjfoKwEZdOqPE72Pa45jrZzvUFxSpdiNk2tZ
XYukHjlxxEgBdC/J3cMMNRE1F4NCA3ApfV1Y7/hTeOnmDuDYwr9/obA8t016Yljj
q5rdkywPf4JF8mXUW5eCN1vAFHxeg9ZWemhBtQmGxXnw9M+z6hWwc6ahmwARAQAB
tCtEb2NrZXIgUmVsZWFzZSAoQ0UgZGViKSA8ZG9ja2VyQGRvY2tlci5jb20+iQI3
BBMBCgAhBQJYrefAAhsvBQsJCAcDBRUKCQgLBRYCAwEAAh4BAheAAAoJEI2BgDwO
v82IsskP/iQZo68flDQmNvn8X5XTd6RRaUH33kXYXquT6NkHJciS7E2gTJmqvMqd
```

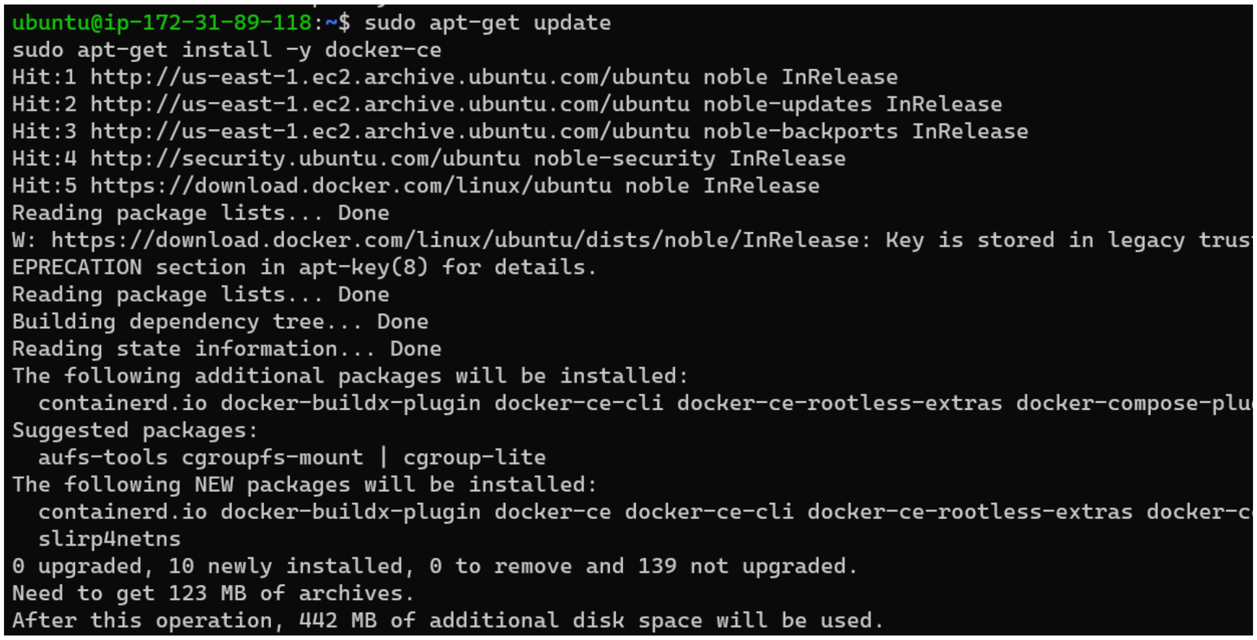


```
ubuntu@ip-172-31-89-118:~$ sudo add-apt-repository "deb [arch=amd64] https://download.docker.com/linux/ubuntu
$(lsb_release -cs) stable"
Repository: 'deb [arch=amd64] https://download.docker.com/linux/ubuntu noble stable'
Description:
Archive for codename: noble components: stable
More info: https://download.docker.com/linux/ubuntu
Adding repository.
Press [ENTER] to continue or Ctrl-c to cancel.
Adding deb entry to /etc/apt/sources.list.d/archive_uri-https_download_docker_com_linux_ubuntu-noble.list
Adding disabled deb-src entry to /etc/apt/sources.list.d/archive_uri-https_download_docker_com_linux_ubuntu-noble.list
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]
Get:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]
Get:4 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]
Get:5 https://download.docker.com/linux/ubuntu noble InRelease [48.8 kB]
Get:6 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 Packages [15.0 MB]
```

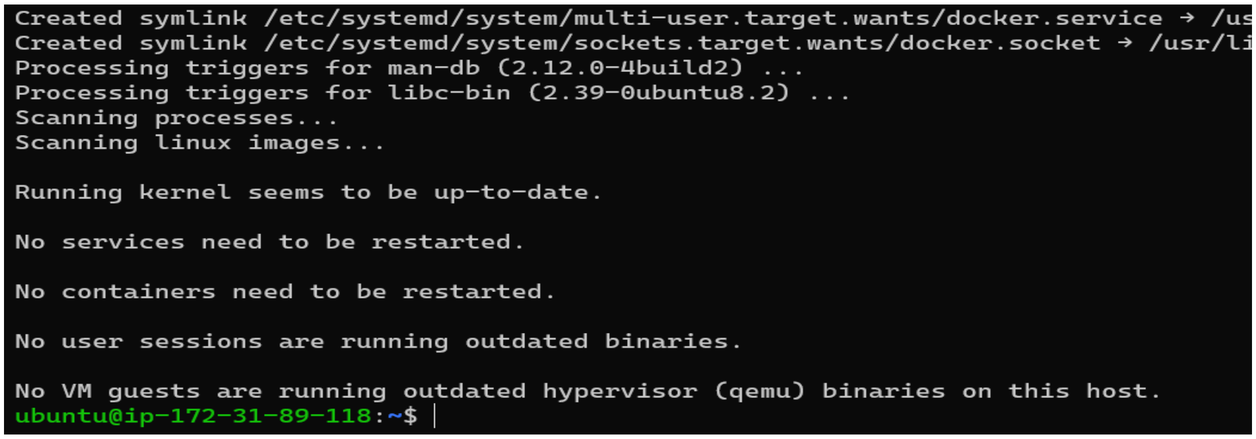


```
Get:45 http://security.ubuntu.com/ubuntu noble-security/universe amd64 c-n-f Metadata [10.1 kB]
Get:46 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Packages [353 kB]
Get:47 http://security.ubuntu.com/ubuntu noble-security/restricted Translation-en [68.1 kB]
Get:48 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 c-n-f Metadata [428 B]
Get:49 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Packages [10.9 kB]
Get:50 http://security.ubuntu.com/ubuntu noble-security/multiverse Translation-en [2808 B]
Get:51 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [208 B]
Get:52 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 c-n-f Metadata [344 B]
Fetched 29.1 MB in 4s (7215 kB/s)
Reading package lists... Done
W: https://download.docker.com/linux/ubuntu/dists/noble/InRelease: Key is stored in legacy trusted.g
EPRECATION section in apt-key(8) for details.
ubuntu@ip-172-31-89-118:~$ 
```

- sudo apt-get update
- sudo apt-get install -y docker-ce

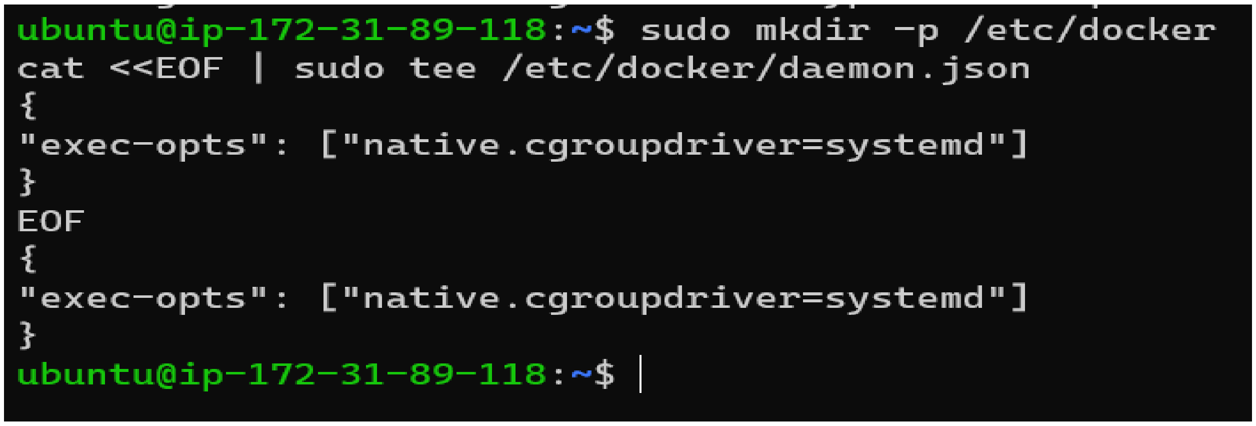


```
ubuntu@ip-172-31-89-118:~$ sudo apt-get update
sudo apt-get install -y docker-ce
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease
Hit:5 https://download.docker.com/linux/ubuntu noble InRelease
Reading package lists... Done
W: https://download.docker.com/linux/ubuntu/dists/noble/InRelease: Key is stored in legacy trus
EPRECATION section in apt-key(8) for details.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  containerd.io docker-buildx-plugin docker-ce-cli docker-ce-rootless-extras docker-compose-plu
Suggested packages:
  aufs-tools cgroupfs-mount | cgroup-lite
The following NEW packages will be installed:
  containerd.io docker-buildx-plugin docker-ce docker-ce-cli docker-ce-rootless-extras docker-c
  slirp4netns
0 upgraded, 10 newly installed, 0 to remove and 139 not upgraded.
Need to get 123 MB of archives.
After this operation, 442 MB of additional disk space will be used.
```



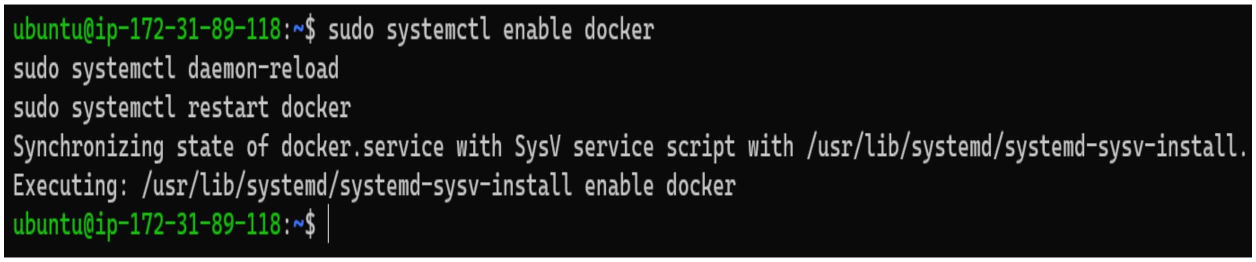
```
Created symlink /etc/systemd/system/multi-user.target.wants/docker.service → /us
Created symlink /etc/systemd/system/sockets.target.wants/docker.socket → /usr/li
Processing triggers for man-db (2.12.0-4build2) ...
Processing triggers for libc-bin (2.39-0ubuntu8.2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-89-118:~$
```

- sudo mkdir -p /etc/docker
  cat <<EOF | sudo tee /etc/docker/daemon.json
  {
  "exec-opts": ["native.cgroupdriver=systemd"]
  }
  EOF



```
ubuntu@ip-172-31-89-118:~$ sudo mkdir -p /etc/docker
cat <<EOF | sudo tee /etc/docker/daemon.json
{
"exec-opts": ["native.cgroupdriver=systemd"]
}
EOF
{
"exec-opts": ["native.cgroupdriver=systemd"]
}
ubuntu@ip-172-31-89-118:~$
```

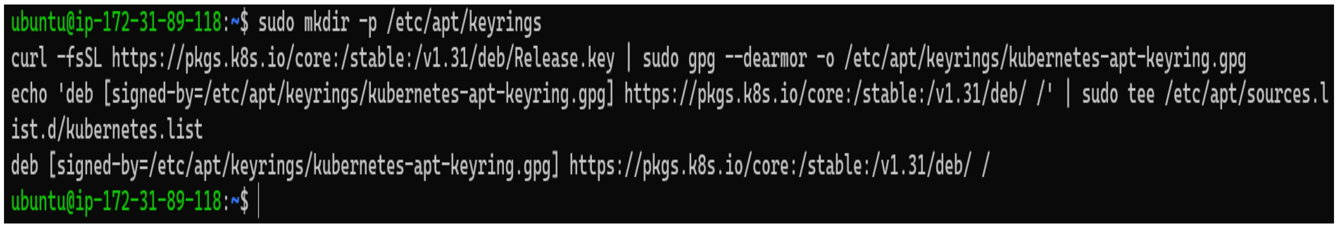
- sudo systemctl enable docker
- sudo systemctl daemon-reload
- sudo systemctl restart docker



```
ubuntu@ip-172-31-89-118:~$ sudo systemctl enable docker
sudo systemctl daemon-reload
sudo systemctl restart docker
Synchronizing state of docker.service with SysV service script with /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable docker
ubuntu@ip-172-31-89-118:~$
```

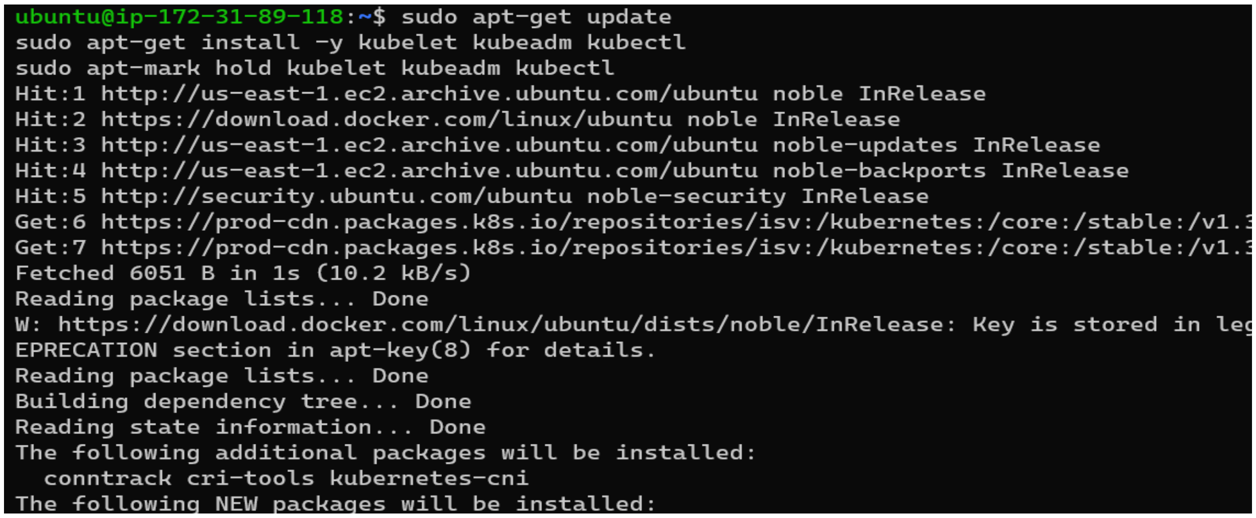
Step 4: Run the below command to install Kubernetes.

- sudo mkdir -p /etc/apt/keyrings
- curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.31/deb/Release.key | sudo gpg --dearmor -o /etc/apt/keyrings/kubernetes-apt-keyring.gpg
- echo 'deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg] https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /' | sudo tee /etc/apt/sources.list.d/kubernetes.list

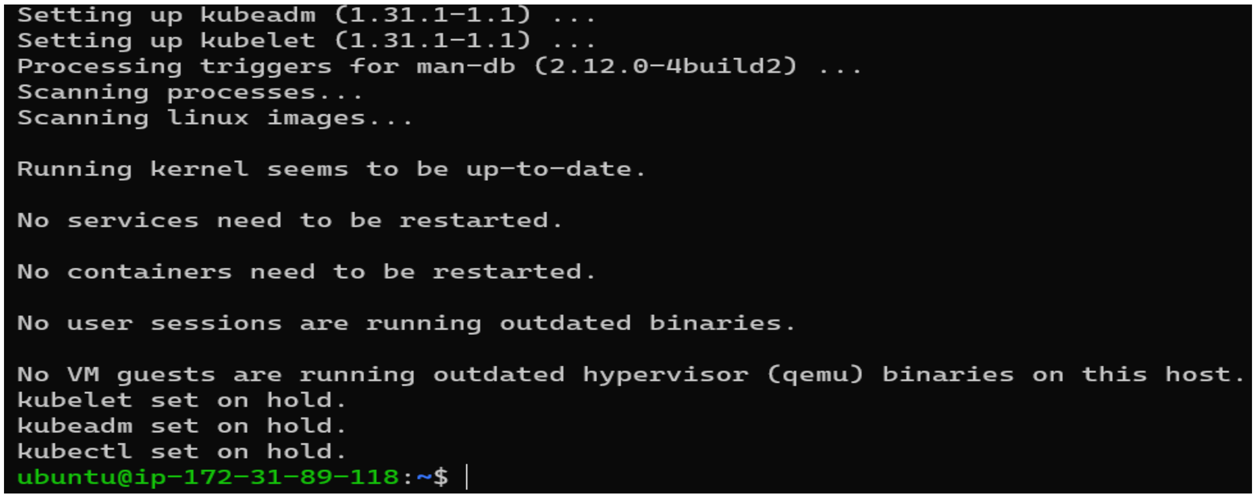


```
ubuntu@ip-172-31-89-118:~$ sudo mkdir -p /etc/apt/keyrings
curl -fsSL https://pkgs.k8s.io/core:/stable:/v1.31/deb/Release.key | sudo gpg --dearmor -o /etc/apt/keyrings/kubernetes-apt-keyring.gpg
echo 'deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg] https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /' | sudo tee /etc/apt/sources.l
ist.d/kubernetes.list
deb [signed-by=/etc/apt/keyrings/kubernetes-apt-keyring.gpg] https://pkgs.k8s.io/core:/stable:/v1.31/deb/ /
ubuntu@ip-172-31-89-118:~$
```

- sudo apt-get update
- sudo apt-get install -y kubelet kubeadm kubectl
- sudo apt-mark hold kubelet kubeadm kubectl

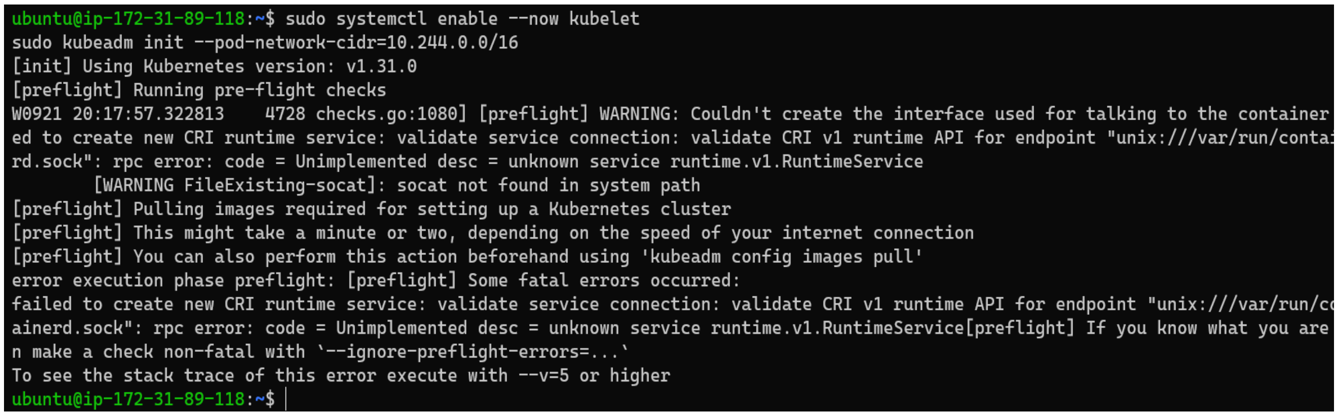


```
ubuntu@ip-172-31-89-118:~$ sudo apt-get update
sudo apt-get install -y kubelet kubeadm kubectl
sudo apt-mark hold kubelet kubeadm kubectl
Hit:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble InRelease
Hit:2 https://download.docker.com/linux/ubuntu noble InRelease
Hit:3 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates InRelease
Hit:4 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-backports InRelease
Hit:5 http://security.ubuntu.com/ubuntu noble-security InRelease
Get:6 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.3
Get:7 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/core:/stable:/v1.3
Fetched 6051 B in 1s (10.2 kB/s)
Reading package lists... Done
W: https://download.docker.com/linux/ubuntu/dists/noble/InRelease: Key is stored in leg
EPRECATION section in apt-key(8) for details.
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following additional packages will be installed:
  conntrack cri-tools kubernetes-cni
The following NEW packages will be installed:
```



```
Setting up kubeadm (1.31.1-1.1) ...
Setting up kubelet (1.31.1-1.1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
kubelet set on hold.
kubeadm set on hold.
kubectl set on hold.
ubuntu@ip-172-31-89-118:~$
```

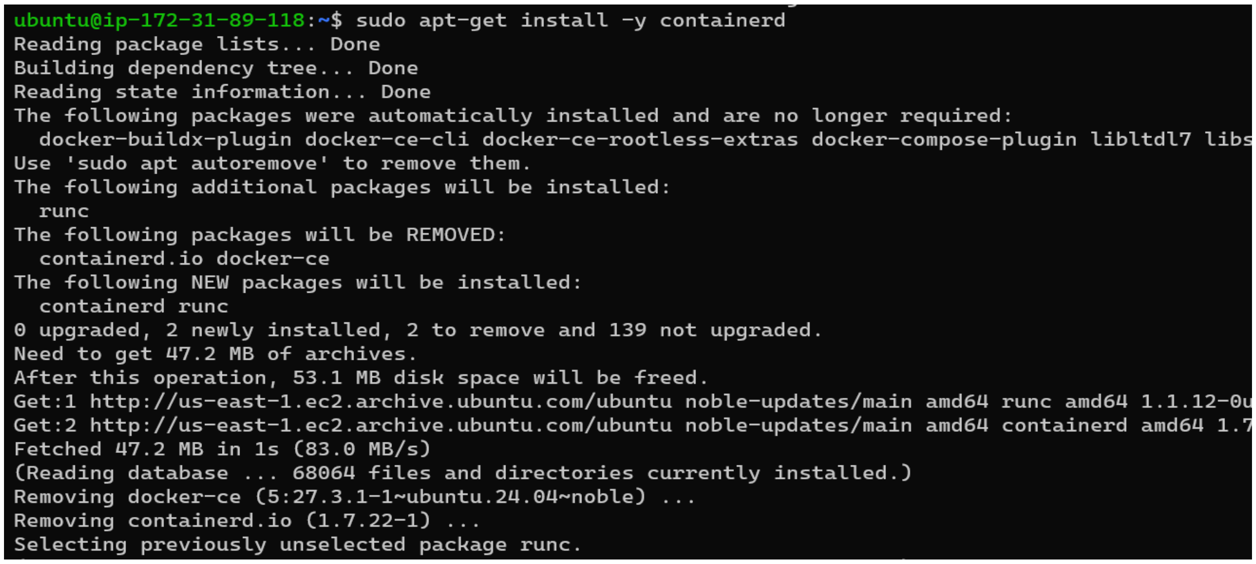
- sudo systemctl enable --now kubelet
- sudo kubeadm init --pod-network-cidr=10.244.0.0/16



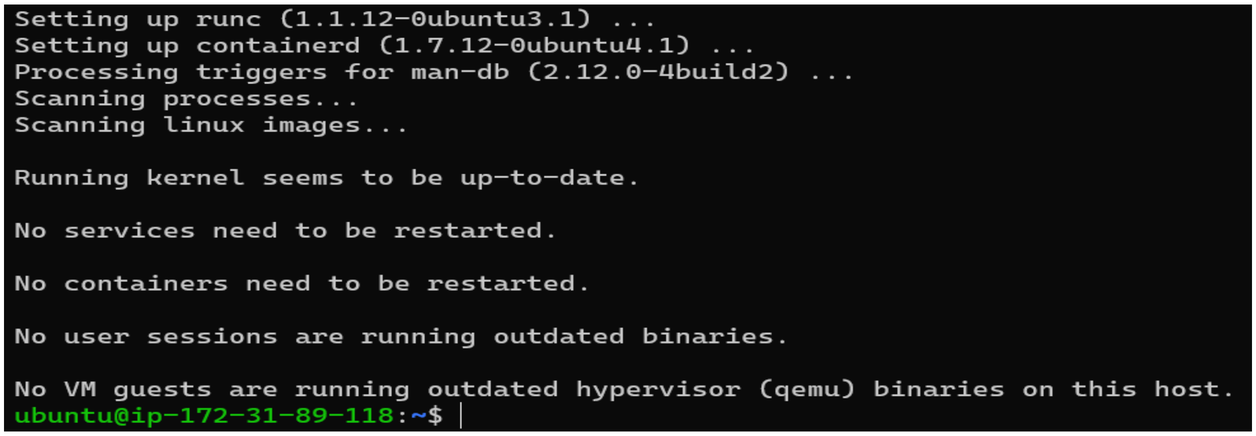
```
ubuntu@ip-172-31-89-118:~$ sudo systemctl enable --now kubelet
sudo kubeadm init --pod-network-cidr=10.244.0.0/16
[init] Using Kubernetes version: v1.31.0
[preflight] Running pre-flight checks
W0921 20:17:57.322813    4728 checks.go:1080] [preflight] WARNING: Couldn't create the interface used for talking to the container
ed to create new CRI runtime service: validate service connection: validate CRI v1 runtime API for endpoint "unix:///var/run/conta
rd.sock": rpc error: code = Unimplemented desc = unknown service runtime.v1.RuntimeService
        [WARNING FileExisting-socat]: socat not found in system path
[preflight] Pulling images required for setting up a Kubernetes cluster
[preflight] This might take a minute or two, depending on the speed of your internet connection
[preflight] You can also perform this action beforehand using 'kubeadm config images pull'
error execution phase preflight: [preflight] Some fatal errors occurred:
failed to create new CRI runtime service: validate service connection: validate CRI v1 runtime API for endpoint "unix:///var/run/c
ainerd.sock": rpc error: code = Unimplemented desc = unknown service runtime.v1.RuntimeService[preflight] If you know what you are
n make a check non-fatal with `--ignore-preflight-errors=...`
To see the stack trace of this error execute with --v=5 or higher
ubuntu@ip-172-31-89-118:~$
```

Now We have got an error.
So we have to perform some additional commands as follows.

- sudo apt-get install -y containerd

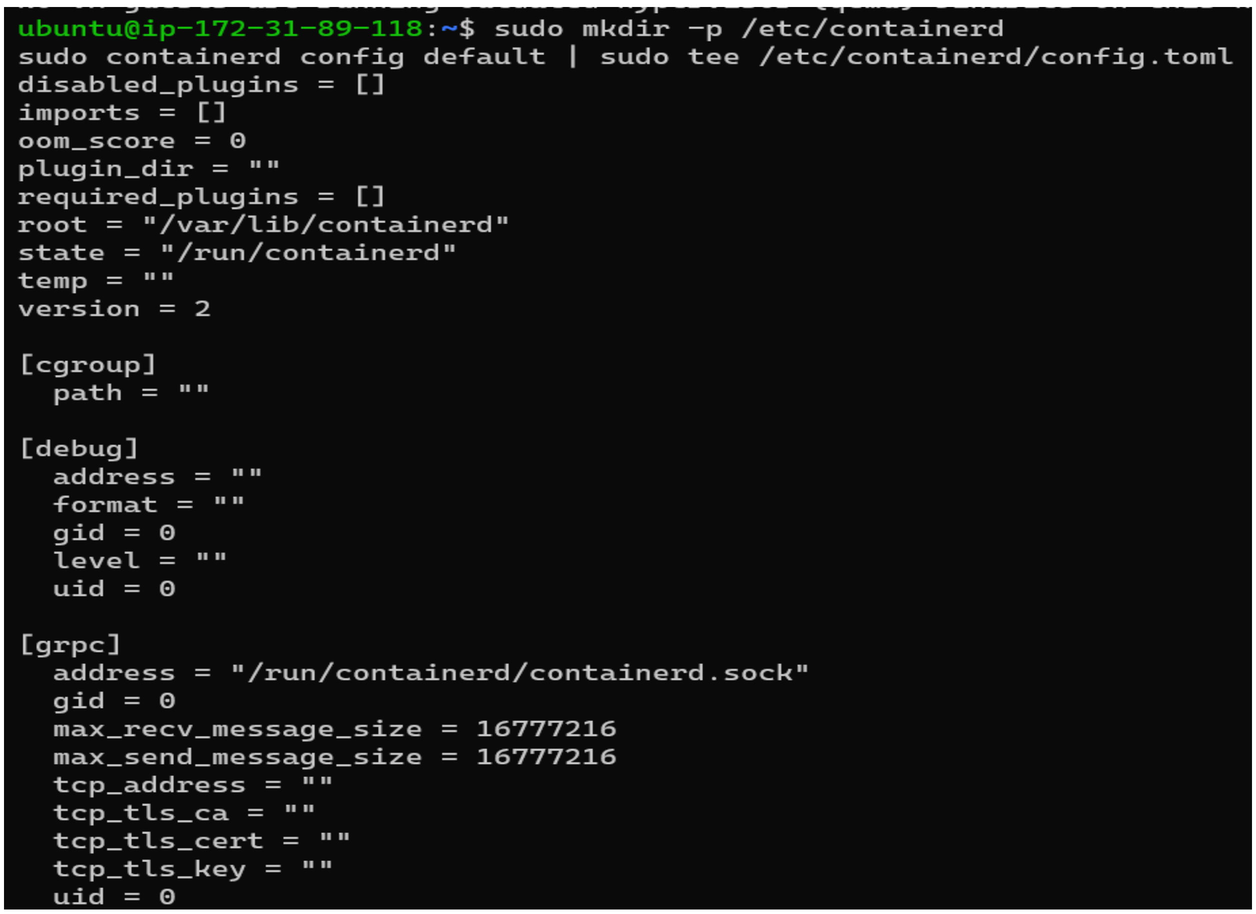


```
ubuntu@ip-172-31-89-118:~$ sudo apt-get install -y containerd
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  docker-buildx-plugin docker-ce-cli docker-ce-rootless-extras docker-compose-plugin libltdl7 libs
Use 'sudo apt autoremove' to remove them.
The following additional packages will be installed:
  runc
The following packages will be REMOVED:
  containerd.io docker-ce
The following NEW packages will be installed:
  containerd runc
0 upgraded, 2 newly installed, 2 to remove and 139 not upgraded.
Need to get 47.2 MB of archives.
After this operation, 53.1 MB disk space will be freed.
Get:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 runc amd64 1.1.12-0u
Get:2 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 containerd amd64 1.7
Fetched 47.2 MB in 1s (83.0 MB/s)
(Reading database ... 68064 files and directories currently installed.)
Removing docker-ce (5:27.3.1-1~ubuntu.24.04~noble) ...
Removing containerd.io (1.7.22-1) ...
Selecting previously unselected package runc.
```

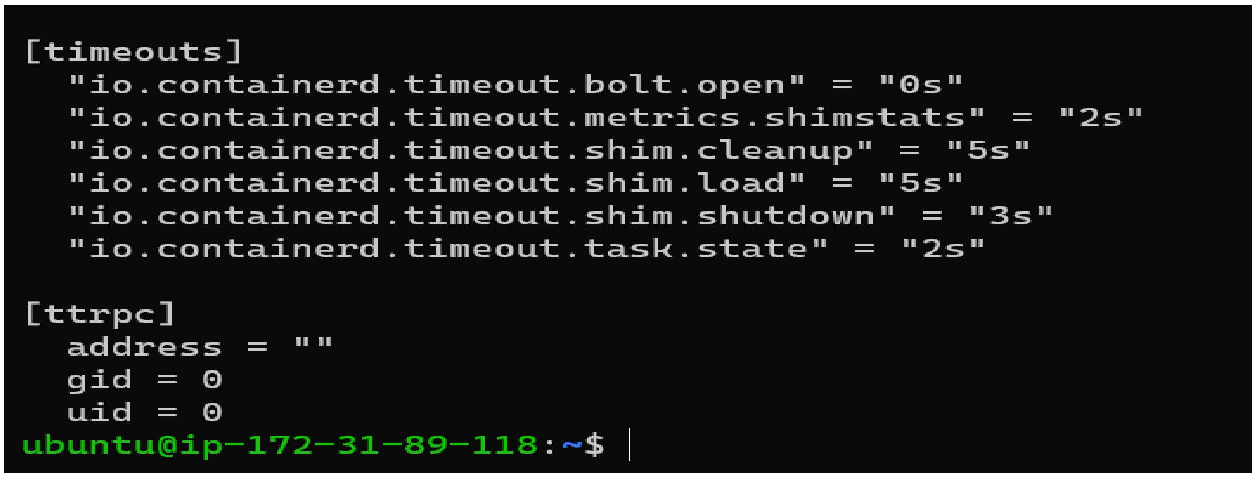


```
Setting up runc (1.1.12-0ubuntu3.1) ...
Setting up containerd (1.7.12-0ubuntu4.1) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-89-118:~$
```

- sudo mkdir -p /etc/containerd
- sudo containerd config default | sudo tee /etc/containerd/config.toml

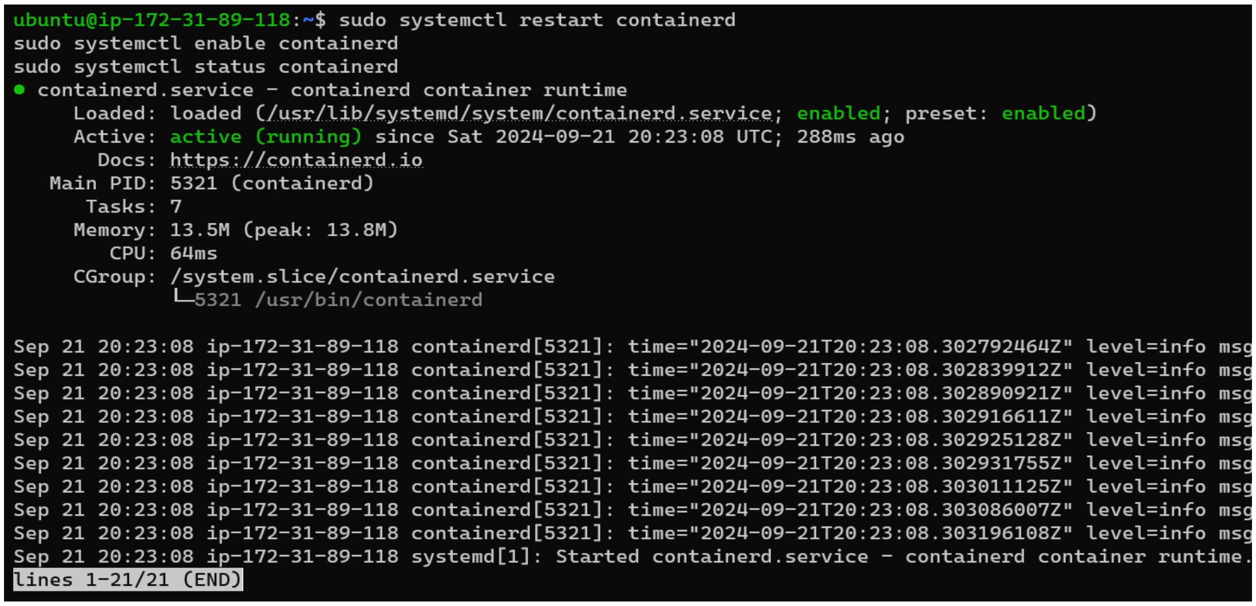


```
ubuntu@ip-172-31-89-118:~$ sudo mkdir -p /etc/containerd
sudo containerd config default | sudo tee /etc/containerd/config.toml
disabled_plugins = []
imports = []
oom_score = 0
plugin_dir = ""
required_plugins = []
root = "/var/lib/containerd"
state = "/run/containerd"
temp = ""
version = 2

[cgroup]
  path = ""

[debug]
  address = ""
  format = ""
  gid = 0
  level = ""
  uid = 0

[grpc]
  address = "/run/containerd/containerd.sock"
  gid = 0
  max_recv_message_size = 16777216
  max_send_message_size = 16777216
  tcp_address = ""
  tcp_tls_ca = ""
  tcp_tls_cert = ""
  tcp_tls_key = ""
  uid = 0
```



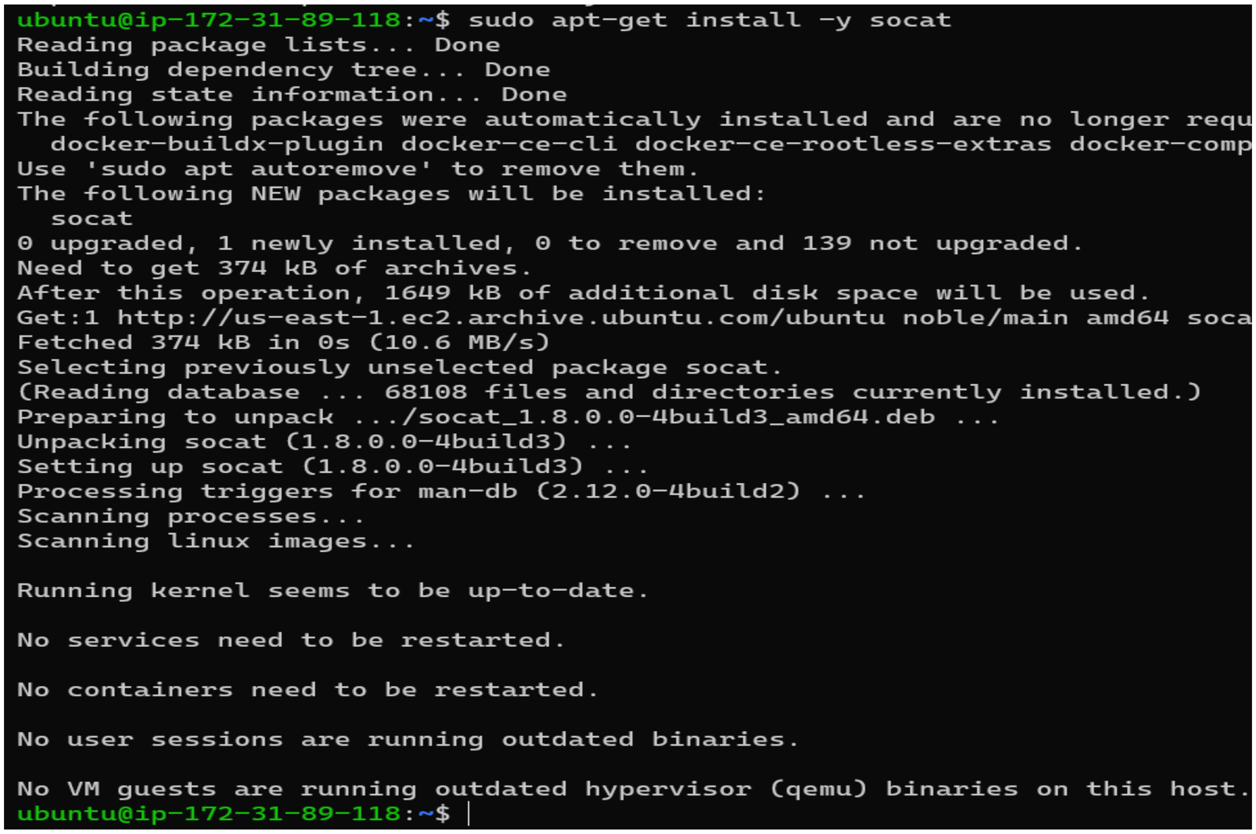
```
[timeouts]
  "io.containerd.timeout.bolt.open" = "0s"
  "io.containerd.timeout.metrics.shimstats" = "2s"
  "io.containerd.timeout.shim.cleanup" = "5s"
  "io.containerd.timeout.shim.load" = "5s"
  "io.containerd.timeout.shim.shutdown" = "3s"
  "io.containerd.timeout.task.state" = "2s"

[ttrpc]
  address = ""
  gid = 0
  uid = 0
ubuntu@ip-172-31-89-118:~$
```

- sudo systemctl restart containerd
- sudo systemctl enable containerd
- sudo systemctl status containerd



```
ubuntu@ip-172-31-89-118:~$ sudo systemctl restart containerd
sudo systemctl enable containerd
sudo systemctl status containerd
● containerd.service - containerd container runtime
     Loaded: loaded (/usr/lib/systemd/system/containerd.service; enabled; preset: enabled)
     Active: active (running) since Sat 2024-09-21 20:23:08 UTC; 288ms ago
       Docs: https://containerd.io
   Main PID: 5321 (containerd)
      Tasks: 7
     Memory: 13.5M (peak: 13.8M)
        CPU: 64ms
     CGroup: /system.slice/containerd.service
             └─5321 /usr/bin/containerd

Sep 21 20:23:08 ip-172-31-89-118 containerd[5321]: time="2024-09-21T20:23:08.302792464Z" level=info msg
Sep 21 20:23:08 ip-172-31-89-118 containerd[5321]: time="2024-09-21T20:23:08.302839912Z" level=info msg
Sep 21 20:23:08 ip-172-31-89-118 containerd[5321]: time="2024-09-21T20:23:08.302890921Z" level=info msg
Sep 21 20:23:08 ip-172-31-89-118 containerd[5321]: time="2024-09-21T20:23:08.302916611Z" level=info msg
Sep 21 20:23:08 ip-172-31-89-118 containerd[5321]: time="2024-09-21T20:23:08.302925128Z" level=info msg
Sep 21 20:23:08 ip-172-31-89-118 containerd[5321]: time="2024-09-21T20:23:08.302931755Z" level=info msg
Sep 21 20:23:08 ip-172-31-89-118 containerd[5321]: time="2024-09-21T20:23:08.303011125Z" level=info msg
Sep 21 20:23:08 ip-172-31-89-118 containerd[5321]: time="2024-09-21T20:23:08.303086007Z" level=info msg
Sep 21 20:23:08 ip-172-31-89-118 containerd[5321]: time="2024-09-21T20:23:08.303196108Z" level=info msg
Sep 21 20:23:08 ip-172-31-89-118 systemd[1]: Started containerd.service - containerd container runtime.
lines 1-21/21 (END)
```

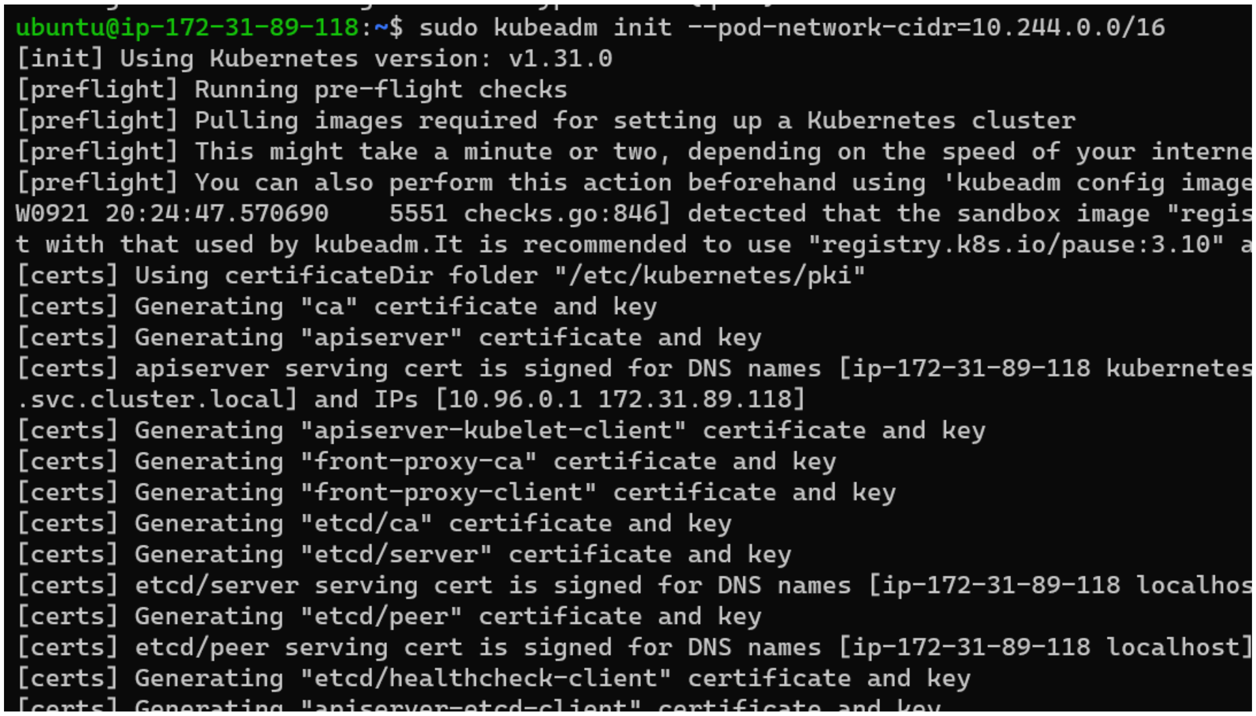
- sudo apt-get install -y socat



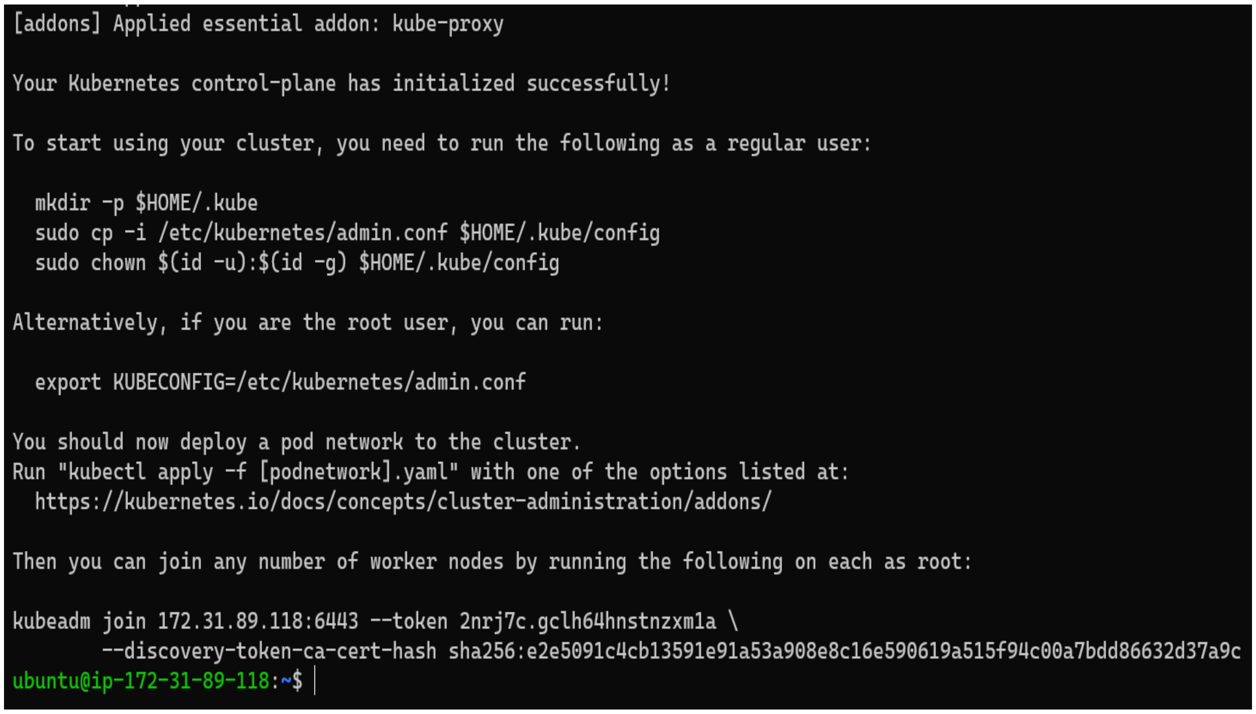
```
ubuntu@ip-172-31-89-118:~$ sudo apt-get install -y socat
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer requ
  docker-buildx-plugin docker-ce-cli docker-ce-rootless-extras docker-comp
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  socat
0 upgraded, 1 newly installed, 0 to remove and 139 not upgraded.
Need to get 374 kB of archives.
After this operation, 1649 kB of additional disk space will be used.
Get:1 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/main amd64 soca
Fetched 374 kB in 0s (10.6 MB/s)
Selecting previously unselected package socat.
(Reading database ... 68108 files and directories currently installed.)
Preparing to unpack .../socat_1.8.0.0-4build3_amd64.deb ...
Unpacking socat (1.8.0.0-4build3) ...
Setting up socat (1.8.0.0-4build3) ...
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
ubuntu@ip-172-31-89-118:~$
```

Step 5: Initialize the Kubecluster .

- sudo kubeadm init --pod-network-cidr=10.244.0.0/16



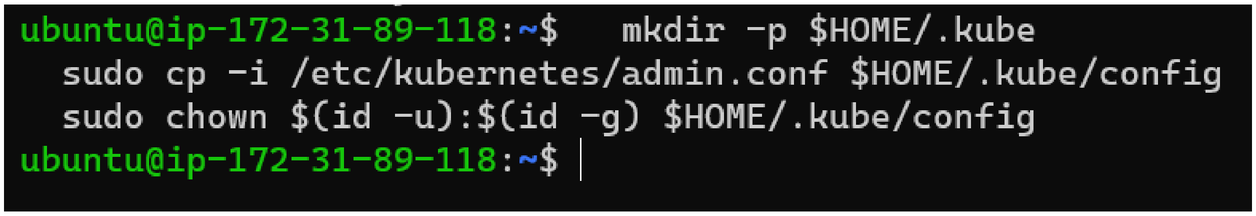
```
ubuntu@ip-172-31-89-118:~$ sudo kubeadm init --pod-network-cidr=10.244.0.0/16
[init] Using Kubernetes version: v1.31.0
[preflight] Running pre-flight checks
[preflight] Pulling images required for setting up a Kubernetes cluster
[preflight] This might take a minute or two, depending on the speed of your interne
[preflight] You can also perform this action beforehand using 'kubeadm config image
W0921 20:24:47.570690    5551 checks.go:846] detected that the sandbox image "regis
t with that used by kubeadm.It is recommended to use "registry.k8s.io/pause:3.10" a
[certs] Using certificateDir folder "/etc/kubernetes/pki"
[certs] Generating "ca" certificate and key
[certs] Generating "apiserver" certificate and key
[certs] apiserver serving cert is signed for DNS names [ip-172-31-89-118 kubernetes
.svc.cluster.local] and IPs [10.96.0.1 172.31.89.118]
[certs] Generating "apiserver-kubelet-client" certificate and key
[certs] Generating "front-proxy-ca" certificate and key
[certs] Generating "front-proxy-client" certificate and key
[certs] Generating "etcd/ca" certificate and key
[certs] Generating "etcd/server" certificate and key
[certs] etcd/server serving cert is signed for DNS names [ip-172-31-89-118 localhos
[certs] Generating "etcd/peer" certificate and key
[certs] etcd/peer serving cert is signed for DNS names [ip-172-31-89-118 localhost]
[certs] Generating "etcd/healthcheck-client" certificate and key
[certs] Generating "apiserver-etcd-client" certificate and key
```



```
[addons] Applied essential addon: kube-proxy

Your Kubernetes control-plane has initialized successfully!

To start using your cluster, you need to run the following as a regular user:

  mkdir -p $HOME/.kube
  sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
  sudo chown $(id -u):$(id -g) $HOME/.kube/config

Alternatively, if you are the root user, you can run:

  export KUBECONFIG=/etc/kubernetes/admin.conf

You should now deploy a pod network to the cluster.
Run "kubectl apply -f [podnetwork].yaml" with one of the options listed at:
  https://kubernetes.io/docs/concepts/cluster-administration/addons/

Then you can join any number of worker nodes by running the following on each as root:

kubeadm join 172.31.89.118:6443 --token 2nrj7c.gclh64hnstnzxm1a \
        --discovery-token-ca-cert-hash sha256:e2e5091c4cb13591e91a53a908e8c16e590619a515f94c00a7bdd86632d37a9c
ubuntu@ip-172-31-89-118:~$
```

Copy the mkdir and chown commands from the top and execute them.

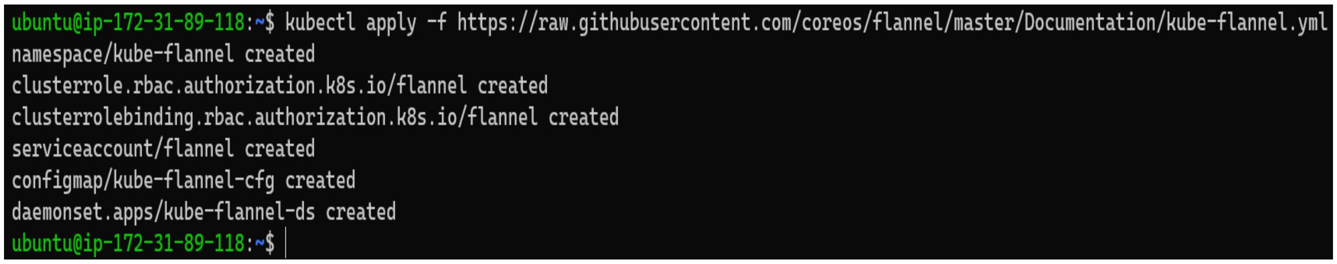
- mkdir -p $HOME/.kube
- sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
- sudo chown $(id -u):$(id -g) $HOME/.kube/config



```
ubuntu@ip-172-31-89-118:~$   mkdir -p $HOME/.kube
  sudo cp -i /etc/kubernetes/admin.conf $HOME/.kube/config
  sudo chown $(id -u):$(id -g) $HOME/.kube/config
ubuntu@ip-172-31-89-118:~$
```

Add a common networking plugin called flannel as mentioned in the code.

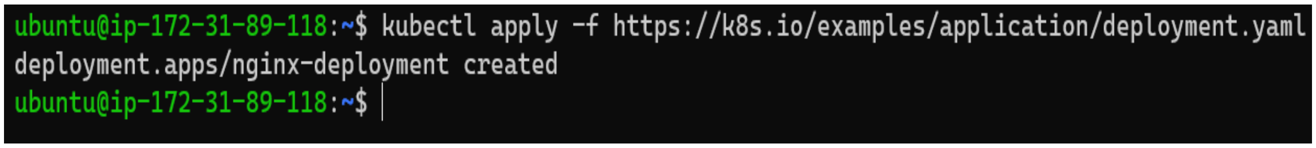
- kubectl apply -f https://raw.githubusercontent.com/coreos/flannel/master/Documentation/kube-flannel.yml



```
ubuntu@ip-172-31-89-118:~$ kubectl apply -f https://raw.githubusercontent.com/coreos/flannel/master/Documentation/kube-flannel.yml
namespace/kube-flannel created
clusterrole.rbac.authorization.k8s.io/flannel created
clusterrolebinding.rbac.authorization.k8s.io/flannel created
serviceaccount/flannel created
configmap/kube-flannel-cfg created
daemonset.apps/kube-flannel-ds created
ubuntu@ip-172-31-89-118:~$
```

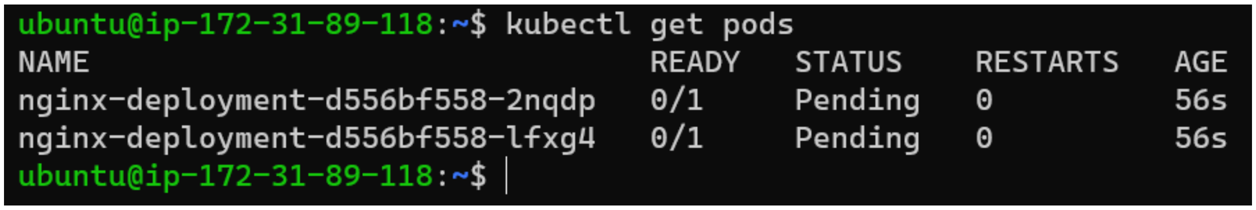
Step 6: Now that the cluster is up and running, we can deploy our nginx server on this cluster.Apply this deployment file using this command to create a deployment

- kubectl apply -f https://k8s.io/examples/application/deployment.yaml



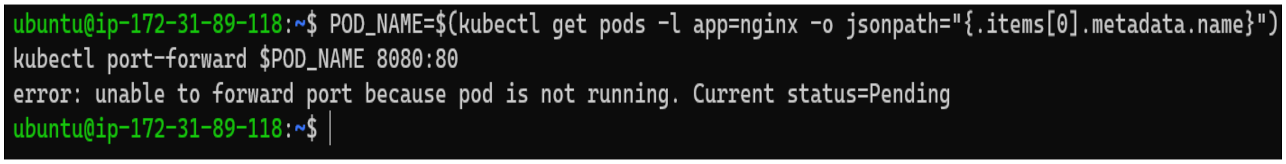
```
ubuntu@ip-172-31-89-118:~$ kubectl apply -f https://k8s.io/examples/application/deployment.yaml
deployment.apps/nginx-deployment created
ubuntu@ip-172-31-89-118:~$
```

- kubectl get pods



```
ubuntu@ip-172-31-89-118:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-d556bf558-2nqdp    0/1     Pending   0          56s
nginx-deployment-d556bf558-lfxg4    0/1     Pending   0          56s
ubuntu@ip-172-31-89-118:~$
```

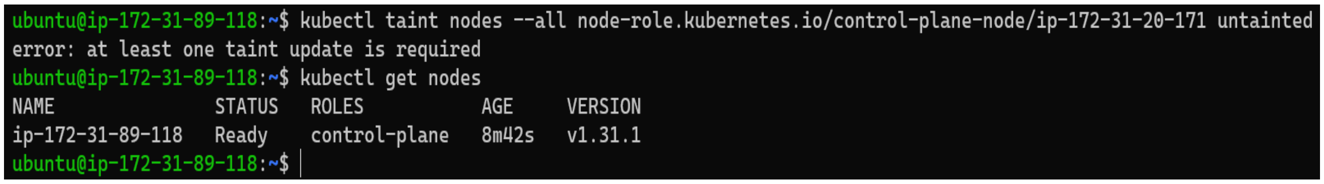
- POD_NAME=$(kubectl get pods -l app=nginx -o jsonpath="{.items[0].metadata.name}")
- kubectl port-forward $POD_NAME 8080:80



```
ubuntu@ip-172-31-89-118:~$ POD_NAME=$(kubectl get pods -l app=nginx -o jsonpath="{.items[0].metadata.name}")
kubectl port-forward $POD_NAME 8080:80
error: unable to forward port because pod is not running. Current status=Pending
ubuntu@ip-172-31-89-118:~$
```

Note : We have faced an error as pod status is pending so make it running, run the below commands then again run above 2 commands.

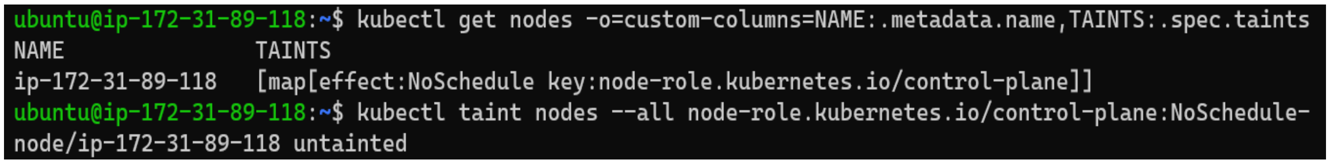
Error:



```
ubuntu@ip-172-31-89-118:~$ kubectl taint nodes --all node-role.kubernetes.io/control-plane-node/ip-172-31-20-171 untainted
error: at least one taint update is required
ubuntu@ip-172-31-89-118:~$ kubectl get nodes
NAME               STATUS   ROLES           AGE     VERSION
ip-172-31-89-118   Ready    control-plane   8m42s   v1.31.1
ubuntu@ip-172-31-89-118:~$
```

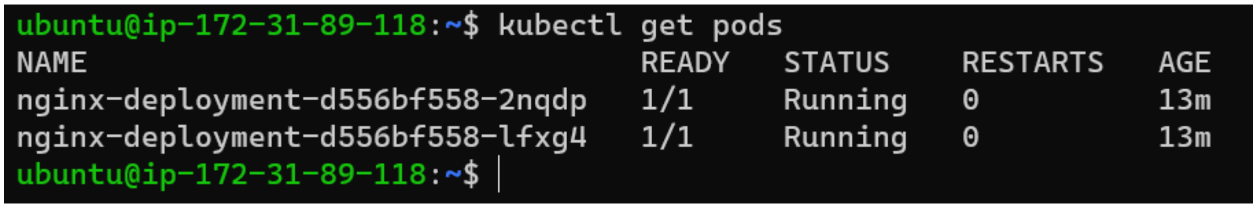
Solving error:

- kubectl get nodes -o=custom-columns=NAME:.metadata.name,TAINTS:.spec.taints
- kubectl taint nodes --all node-role.kubernetes.io/control-plane:NoSchedule-



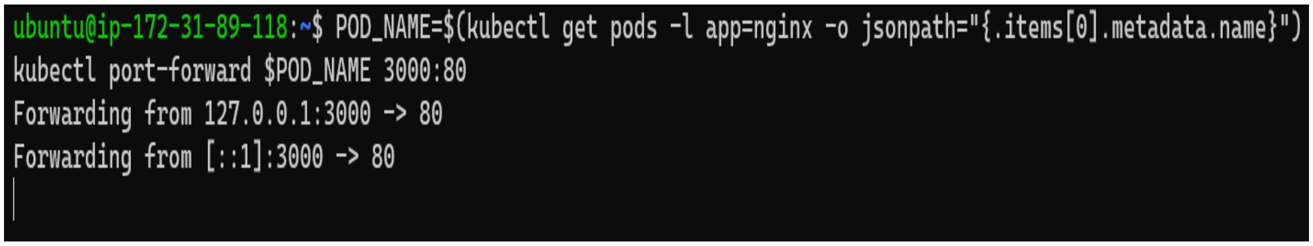
```
ubuntu@ip-172-31-89-118:~$ kubectl get nodes -o=custom-columns=NAME:.metadata.name,TAINTS:.spec.taints
NAME               TAINTS
ip-172-31-89-118   [map[effect:NoSchedule key:node-role.kubernetes.io/control-plane]]
ubuntu@ip-172-31-89-118:~$ kubectl taint nodes --all node-role.kubernetes.io/control-plane:NoSchedule-
node/ip-172-31-89-118 untainted
```

- kubectl get pods



```
ubuntu@ip-172-31-89-118:~$ kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-d556bf558-2nqdp    1/1     Running   0          13m
nginx-deployment-d556bf558-lfxg4    1/1     Running   0          13m
ubuntu@ip-172-31-89-118:~$
```

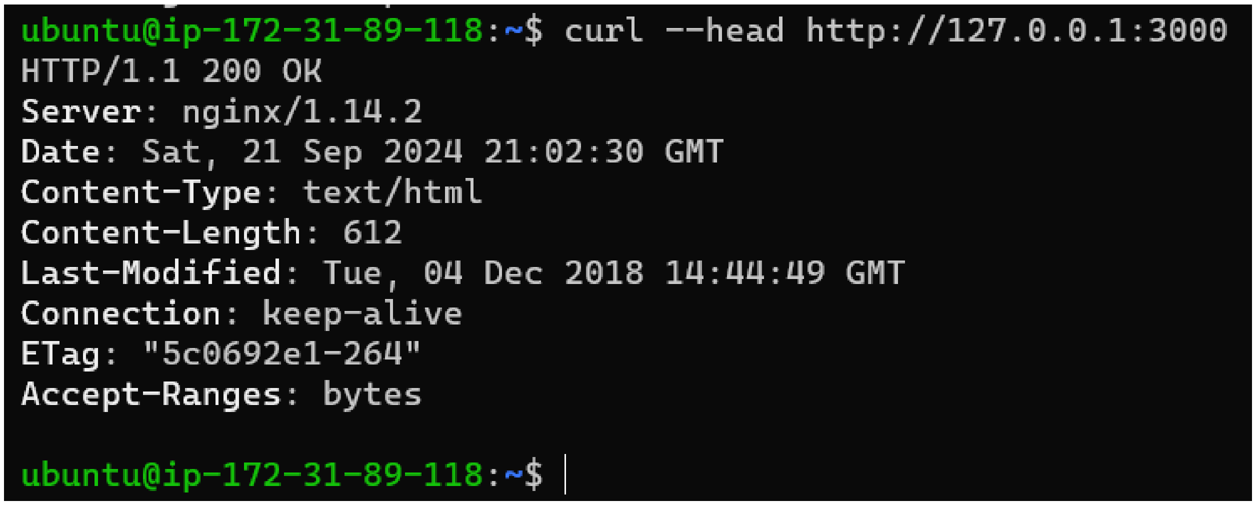
- POD_NAME=$(kubectl get pods -l app=nginx -o jsonpath="{.items[0].metadata.name}")
- kubectl port-forward $POD_NAME 3000:80



```
ubuntu@ip-172-31-89-118:~$ POD_NAME=$(kubectl get pods -l app=nginx -o jsonpath="{.items[0].metadata.name}")
kubectl port-forward $POD_NAME 3000:80
Forwarding from 127.0.0.1:3000 -> 80
Forwarding from [::1]:3000 -> 80
```

Step 7: Verify your deployment
Open up a new terminal and ssh to your EC2 instance.
Then, use this curl command to check if the Nginx server is running.

- curl --head http://127.0.0.1:8080



```
ubuntu@ip-172-31-89-118:~$ curl --head http://127.0.0.1:3000
HTTP/1.1 200 OK
Server: nginx/1.14.2
Date: Sat, 21 Sep 2024 21:02:30 GMT
Content-Type: text/html
Content-Length: 612
Last-Modified: Tue, 04 Dec 2018 14:44:49 GMT
Connection: keep-alive
ETag: "5c0692e1-264"
Accept-Ranges: bytes

ubuntu@ip-172-31-89-118:~$
```