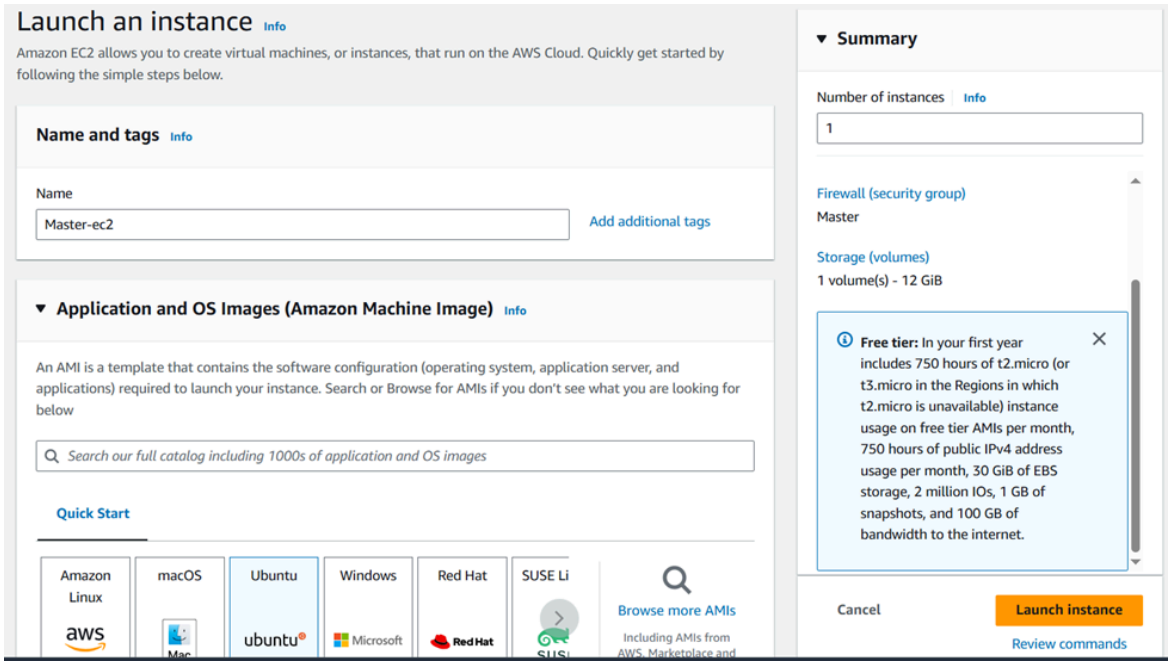
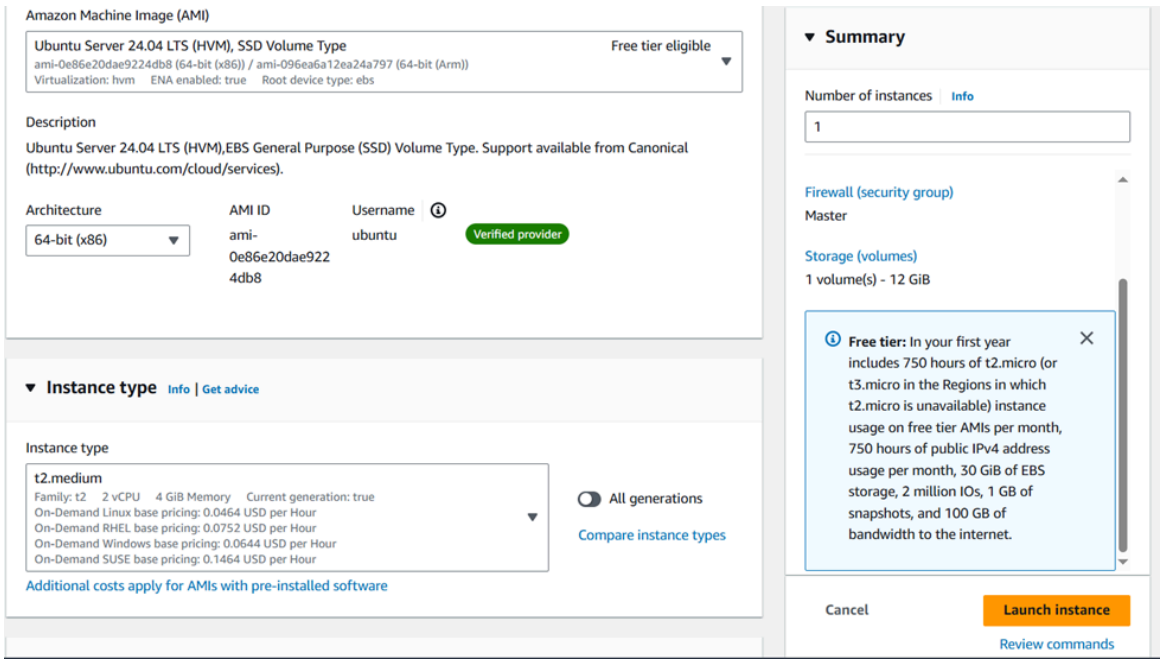
Siddhant Sathe **D15A/51**

Experiment 4

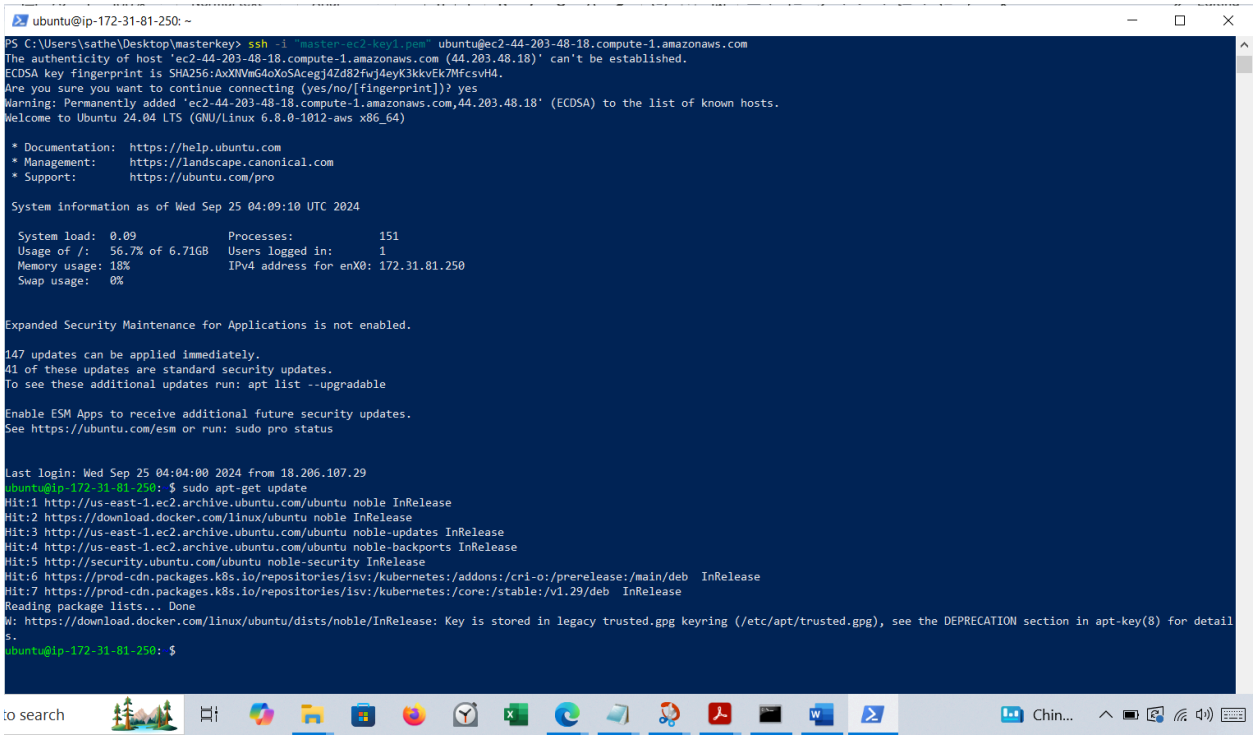
AIm: To install Kubectl and execute Kubectl commands to manage the Kubernetes cluster and deploy Your First Kubernetes Application.

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.





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.



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-172-31-90-179:~$ 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 https://download.docker.com/linux/ubuntu noble InRelease [48.8 kB]
Get:5 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 Packages [15.0 MB]
Get:6 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe Translation-en [5982 kB]
Get:7 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 Components [3871 kB]
Get:8 https://download.docker.com/linux/ubuntu noble/stable amd64 Packages [15.3 kB]
Get:9 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/universe amd64 c-n-f Metadata [301 kB]
Get:10 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/multiverse amd64 Packages [269 kB]
Get:11 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/multiverse Translation-en [118 kB]
Get:12 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/multiverse amd64 Components [35.0 kB]
Get:13 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble/multiverse amd64 c-n-f Metadata [8328 B]
Get:14 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [530 kB]
Get:15 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main Translation-en [128 kB]
Get:16 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/main amd64 c-n-f Metadata [8548 B]
Get:17 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages [374 kB]
Get:18 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/universe Translation-en [154 kB]
Get:19 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Components [45.0 kB]
Get:20 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/universe amd64 c-n-f Metadata [14.6 kB]
Get:21 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Packages [353 kB]
Get:22 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/restricted Translation-en [68.1 kB]
Get:23 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/restricted amd64 c-n-f Metadata [424 B]
Get:24 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Packages [14.4 kB]
Get:25 http://us-east-1.ec2.archive.ubuntu.com/ubuntu noble-updates/multiverse Translation-en [3608 B]
```

- sudo apt-get install -y apt-transport-https ca-certificates curl

```
ubuntu@ip-172-31-81-250:~$ sudo apt-get install -y apt-transport-https ca-certificates curl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
ca-certificates is already the newest version (20240203).
ca-certificates set to manually installed.
The following additional packages will be installed:
  libcurl3t64-gnutls libcurl4t64
The following NEW packages will be installed:
  apt-transport-https
The following packages will be upgraded:
  curl libcurl3t64-gnutls libcurl4t64
3 upgraded, 1 newly installed, 0 to remove and 140 not upgraded.
Need to get 904 kB of archives.
After this operation, 38.9 kB of additional disk space will be used.
```

```
Running kernel seems to be up-to-date.

Restarting services...
 systemctl restart packagekit.service

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.
```

Step 4:Download and add the GPG key:

sudo curl -fsSLo /usr/share/keyrings/kubernetes-archive-keyring.gpg
echo "deb [signed-by=/usr/share/keyrings/kubernetes-archive-keyring.gpg]
https://apt.kubernetes.io/ kubernetes-focal main" | sudo tee
/etc/apt/sources.list.d/kubernetes.list

```
ubuntu@ip-172-31-81-250: $ sudo curl -fsSLo /usr/share/keyrings/kubernetes-archive-keyring.gpg https://packages.cloud.google.com/apt/doc/apt-key.gpg
ubuntu@ip-172-31-81-250: $ echo "deb [signed-by=/usr/share/keyrings/kubernetes-archive-keyring.gpg] https://apt.kubernetes.io/ kubernetes-focal main" | sudo tee /etc/apt/sources.list.d/ku
bernetes.list
deb [signed-by=/usr/share/keyrings/kubernetes-archive-keyring.gpg] https://apt.kubernetes.io/ kubernetes-focal main
```

Step 5:Update package list:

sudo apt-get update

```
ubuntu@ip-172-31-81-250: $ sudo apt-get update
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 https://download.docker.com/linux/ubuntu noble InRelease
Hit:5 http://security.ubuntu.com/ubuntu noble-security InRelease
Ign:6 https://packages.cloud.google.com/apt kubernetes-focal InRelease
Hit:7 https://prod-cdn.packages.k8s.io/repositories/isv:/kubernetes:/addons:/cri-o:/prerelease:/main/deb  InRelease
Err:8 https://packages.cloud.google.com/apt kubernetes-focal Release
  404  Not Found [IP: 172.253.63.100 443]
Reading package lists... Done
E: The repository 'https://apt.kubernetes.io kubernetes-focal Release' does not have a Release file.
N: Updating from such a repository can't be done securely, and is therefore disabled by default.
N: See apt-secure(8) manpage for repository creation and user configuration details.
W: https://download.docker.com/linux/ubuntu/dists/noble/InRelease: Key is stored in legacy trusted.gpg keyring (/etc/apt/trusted.gpg), see the DEPRECATION section in apt-key(8) for detail
s.
```

sudo apt-get install -y kubectl

```
ubuntu@ip-172-31-81-250:~$ sudo apt-get install -y kubectl
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
kubectl is already the newest version (1.29.0-1.1).
0 upgraded, 0 newly installed, 0 to remove and 137 not upgraded.
ubuntu@ip-172-31-81-250:~$ kubectl version --client
Client Version: v1.29.0
Kustomize Version: v5.0.4-0.20230601165947-6ce0bf390ce3
```

Step 6: Verify the nodes

kubectl get nodes

```
ubuntu@ip-172-31-81-250:~$ kubectl get nodes
NAME               STATUS   ROLES           AGE   VERSION
ip-172-31-81-250   Ready    control-plane   9h    v1.29.0
ip-172-31-81-86    Ready    Node1           9h    v1.29.0
ip-172-31-83-216   Ready    Node2           9h    v1.29.0
ubuntu@ip-172-31-81-250:~$ nano nginx-deployment.yaml
ubuntu@ip-172-31-81-250:~$ ubuntu@ip-172-31-81-250:~$ nano nginx-service.yaml
```

Step 7: Create the Deployment YAML File

1. Create a file named nginx-service.yaml:*

yaml

apiVersion: v1

kind: Service

metadata:

```
  name: nginx-service
spec:
  selector:
    app: nginx
  ports:
    - protocol: TCP
      port: 80
      targetPort: 80
```

And deploy it

```
ubuntu@ip-172-31-81-250:~$ nano nginx-service.yaml
ubuntu@ip-172-31-81-250:~$ ubuntu@ip-172-31-81-250:~$ kubectl apply -f nginx-service.yaml
service/nginx-service created
```

Step 8: Verify the deployment:

kubectl get deployments

kubectl get pods

kubectl get services

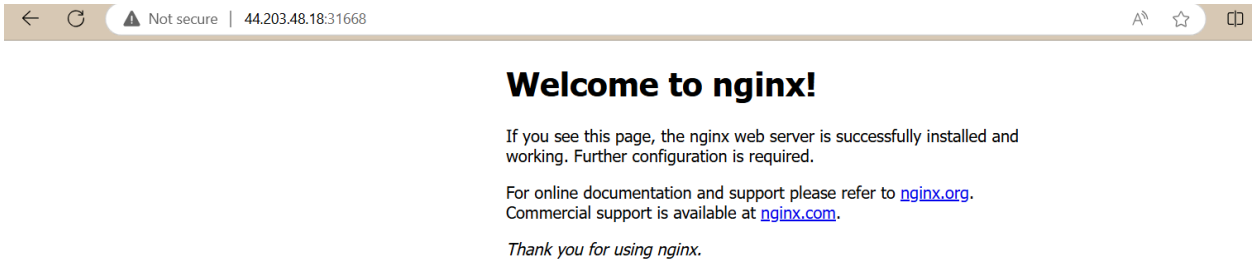
```
ubuntu@ip-172-31-81-250:~$ kubectl get deployments
   kubectl get pods
   kubectl get servicesNAME               READY   UP-TO-DATE   AVAILABLE   AGE
nginx-deployment   3/3     3            3           4m55s
ubuntu@ip-172-31-81-250:~$    kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
nginx-deployment-86dcfdf4c6-2l9tr   1/1     Running   0          4m55s
nginx-deployment-86dcfdf4c6-ksdx9   1/1     Running   0          4m55s
nginx-deployment-86dcfdf4c6-qdqgx   1/1     Running   0          4m55s
ubuntu@ip-172-31-81-250:~$    kubectl get services
NAME            TYPE           CLUSTER-IP     EXTERNAL-IP   PORT(S)        AGE
kubernetes      ClusterIP      10.96.0.1      <none>        443/TCP        9h
nginx-service   LoadBalancer   10.106.1.134   <pending>     80:31668/TCP   60s
```

Step 9: Forward the service port:

kubectl port-forward service/nginx-service 8080:80

```
ubuntu@ip-172-31-81-250:~$ kubectl port-forward service/nginx-service 8080:80
Forwarding from 127.0.0.1:8080 -> 80
Forwarding from [::1]:8080 -> 80
```

Step 10: Open your web browser and go to http://44.203.48.18:31668/



Error : the connection string changes if the ip address is changed

```
PS C:\Users\sathe\Desktop\masterkey> ssh -i "master-ec2-key1.pem" ubuntu@ec2-3-89-117-235.compute-1.amazonaws.com
ssh: connect to host ec2-3-89-117-235.compute-1.amazonaws.com port 22: Connection timed out
PS C:\Users\sathe\Desktop\masterkey> ssh -i "master-ec2-key1.pem" ubuntu@ec2-44-203-48-18.compute-1.amazonaws.com
The authenticity of host 'ec2-44-203-48-18.compute-1.amazonaws.com (44.203.48.18)' can't be established.
ECDSA key fingerprint is SHA256:AxXNVmG4oXoSAcegj4Zd82fwj4eyK3kkvEk7MfcsvH4.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-44-203-48-18.compute-1.amazonaws.com,44.203.48.18' (ECDSA) to the list of known hosts.
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-1012-aws x86_64)
```

To correct it copy the connection string again

Error due to incorrect indentation

```
ubuntu@ip-172-31-81-250: $ kubectl apply -f nginx-deployment.yaml
error: error parsing nginx-deployment.yaml: error converting YAML to JSON: yaml: line 2: mapping values are not allowed in this context
```