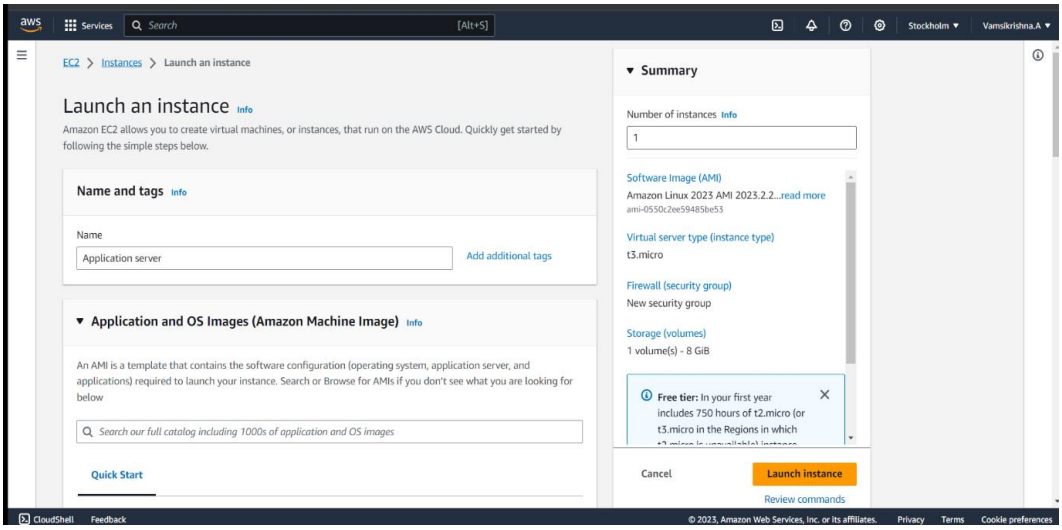
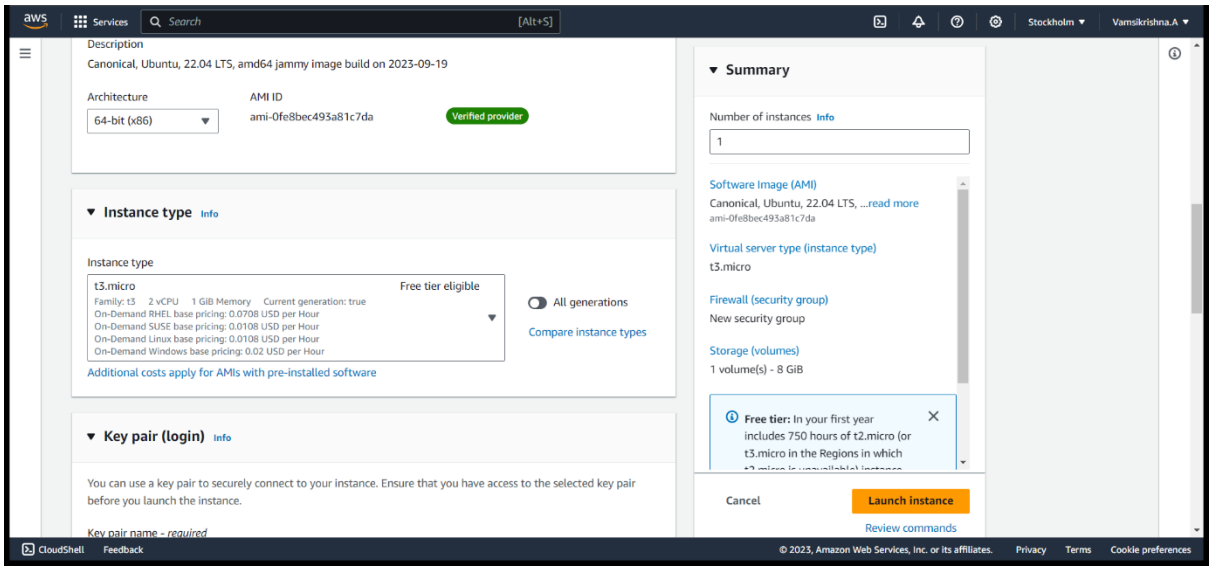
Submitted by
Vamsikrishna Annadanam
Vamsiannadanam918@gmail.com
Ph – 8897672249
Linked in- https://www.linkedin.com/in/vamsikrishna-annadanam-0b315a268/

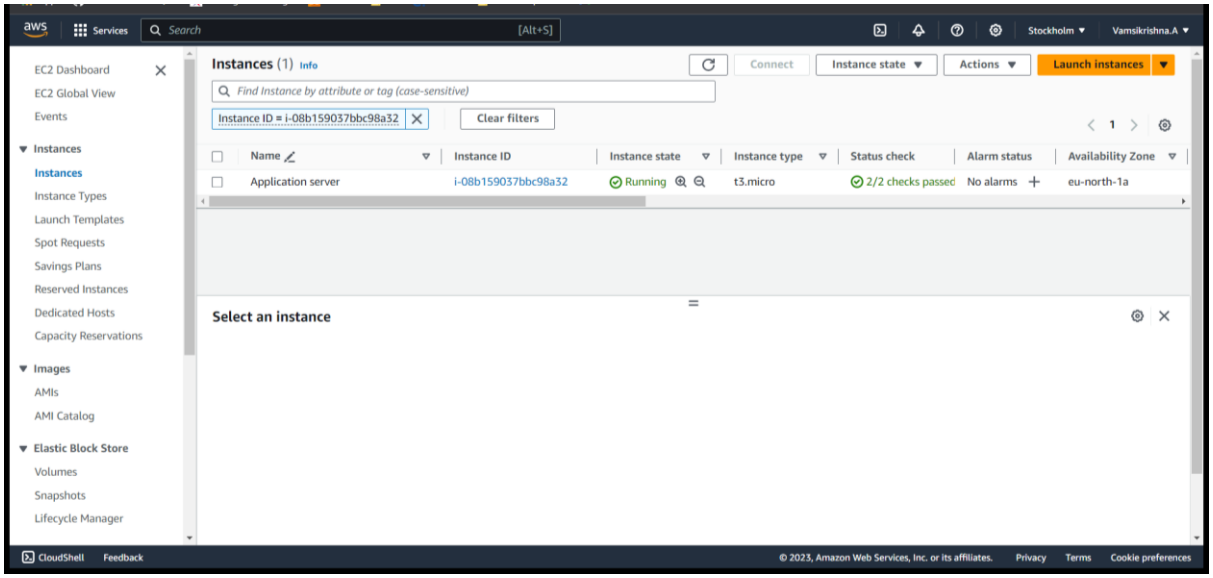
Python application deployment CICD.

Git repository- https://github.com/vamsikrishna918/PythonWebApplication

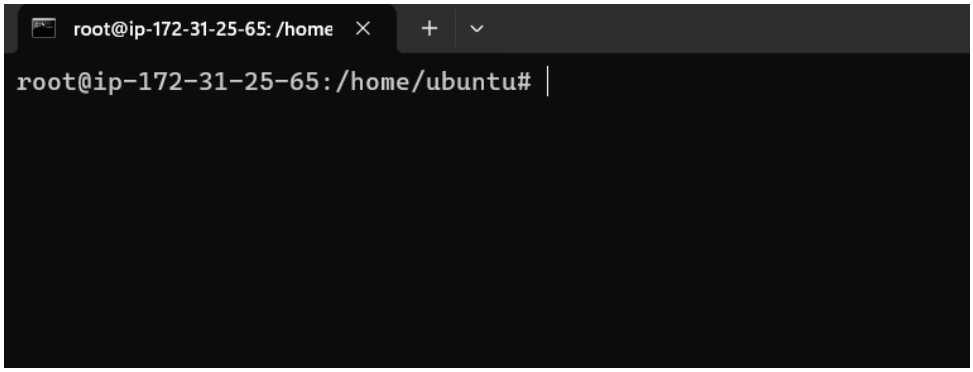


Have gone with free-tier T3.micro



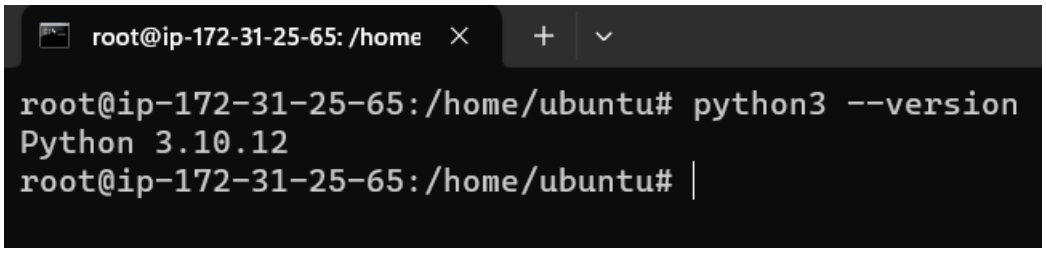


Connected to the instance with SSH via .pem file



Command –

- apt update
- Apt install python3



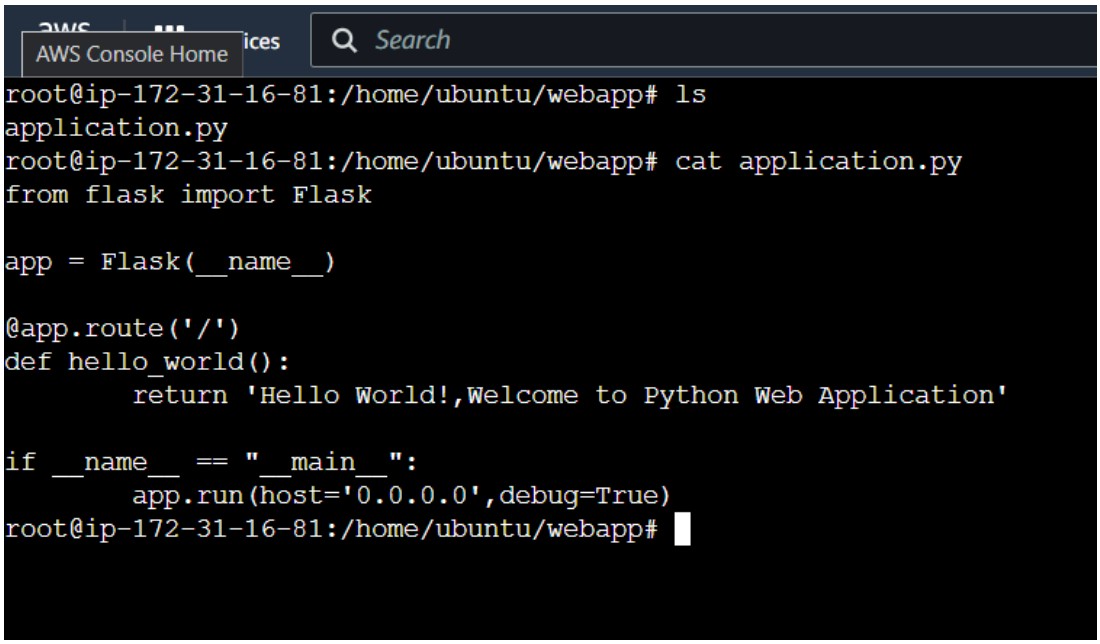
- Creating and updating the python file as below

////

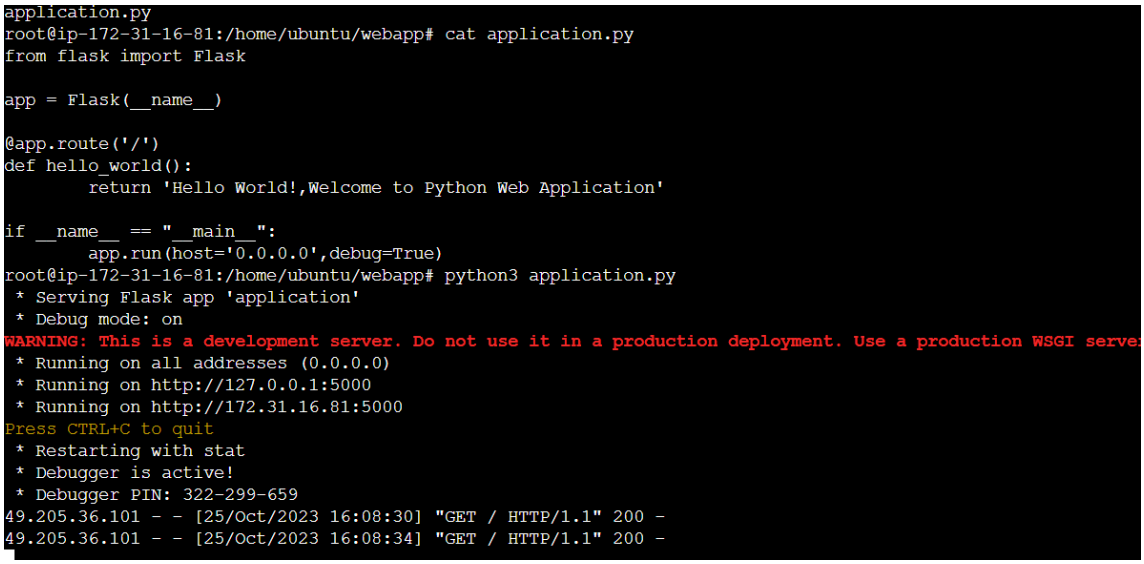
```
from flask import Flask

app = Flask(__name__)
```

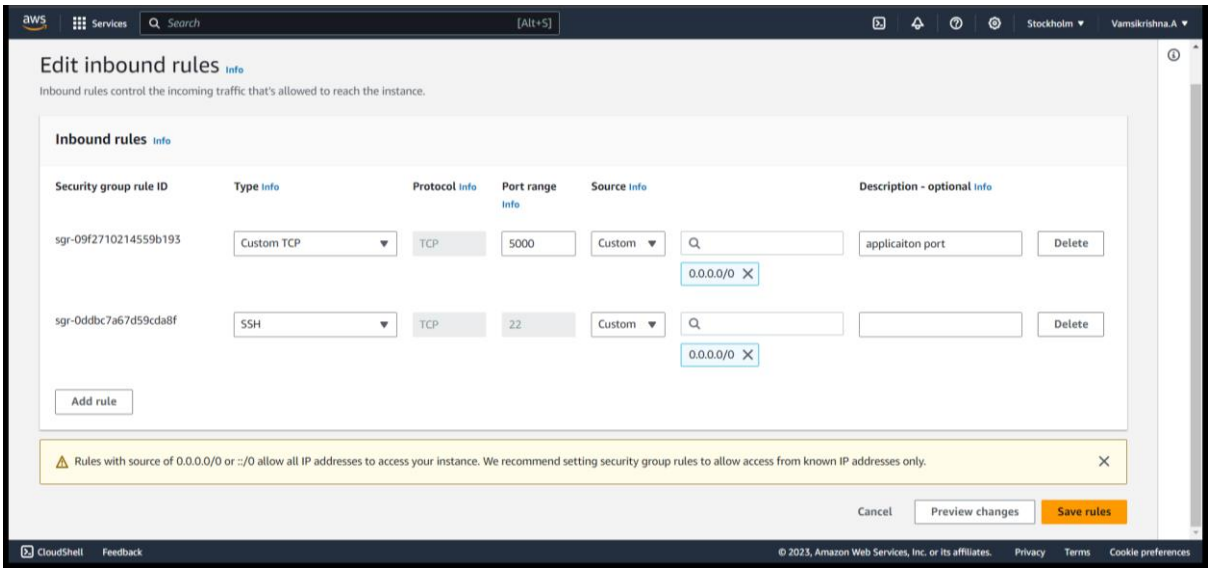
```
@app.route('/')
def hello_world():
        return 'Hello World!,Welcome to Python Web Application'
if __name__ == "__main__":
        app.run(host='0.0.0.0',debug=True)
```



- Running the application locally on the instance:



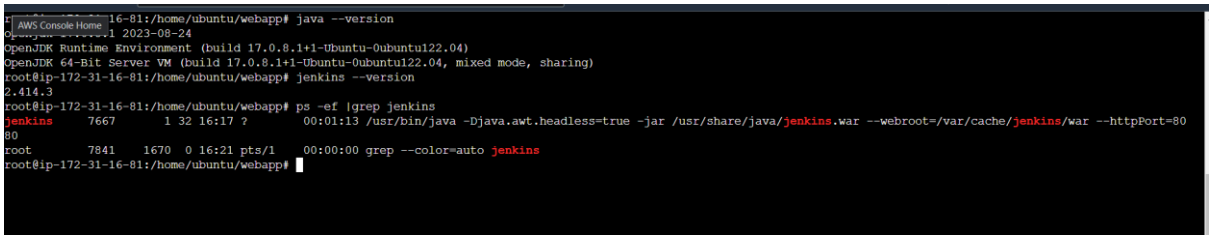
- Open port of security group port **5000** in Inbound rules



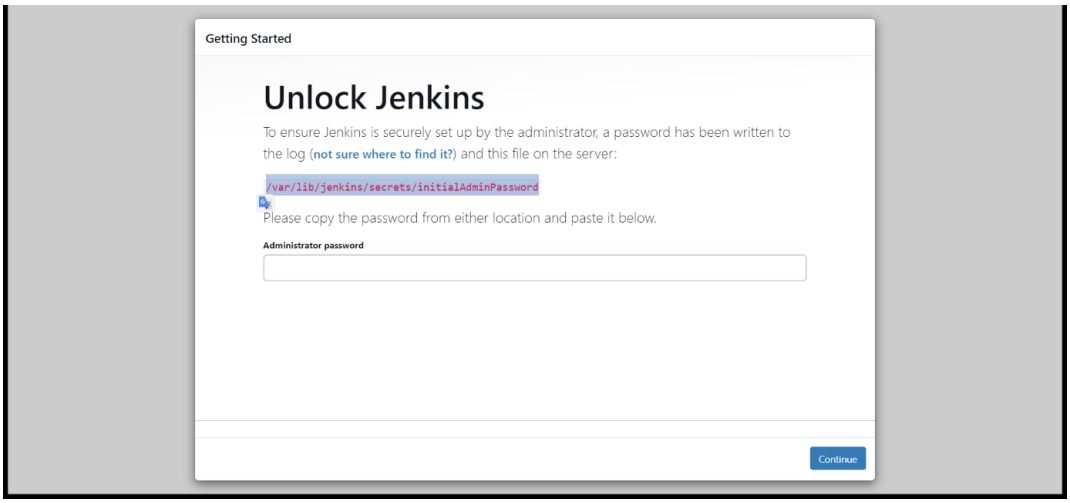
- **Jenkins**

  - Follow the steps In the below url of official Jenkins doc

    https://www.jenkins.io/doc/book/installing/linux/#debianubuntu

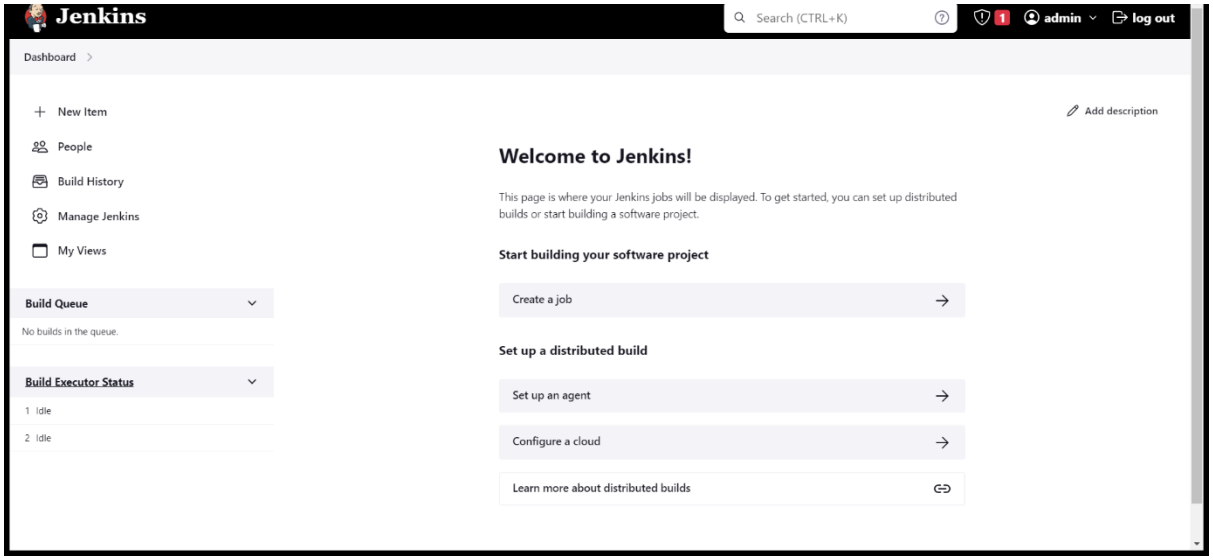


- Open port of security group port **8080** in Inbound rules

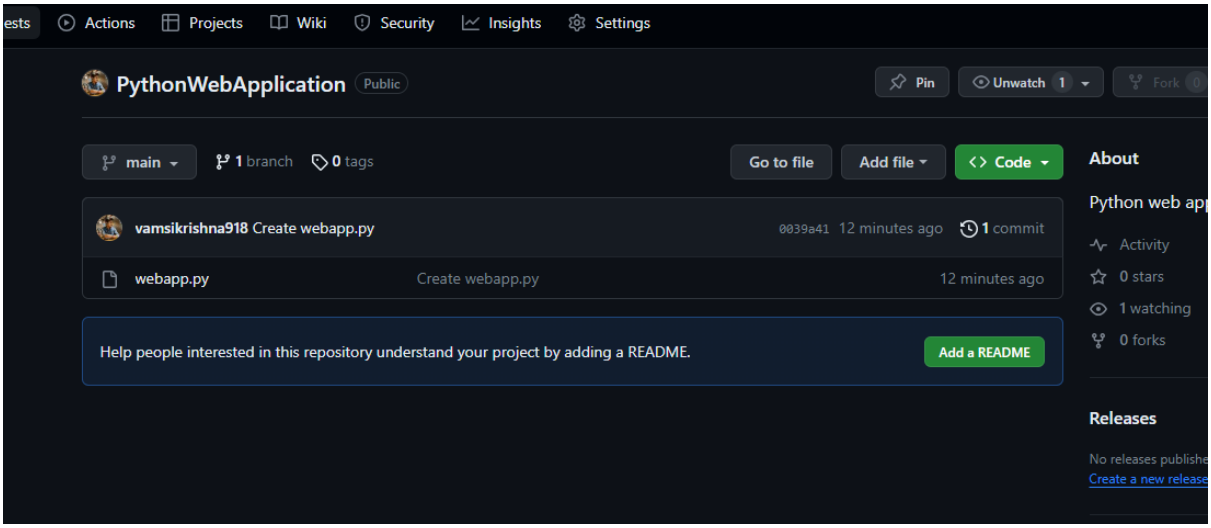


To get initial password:

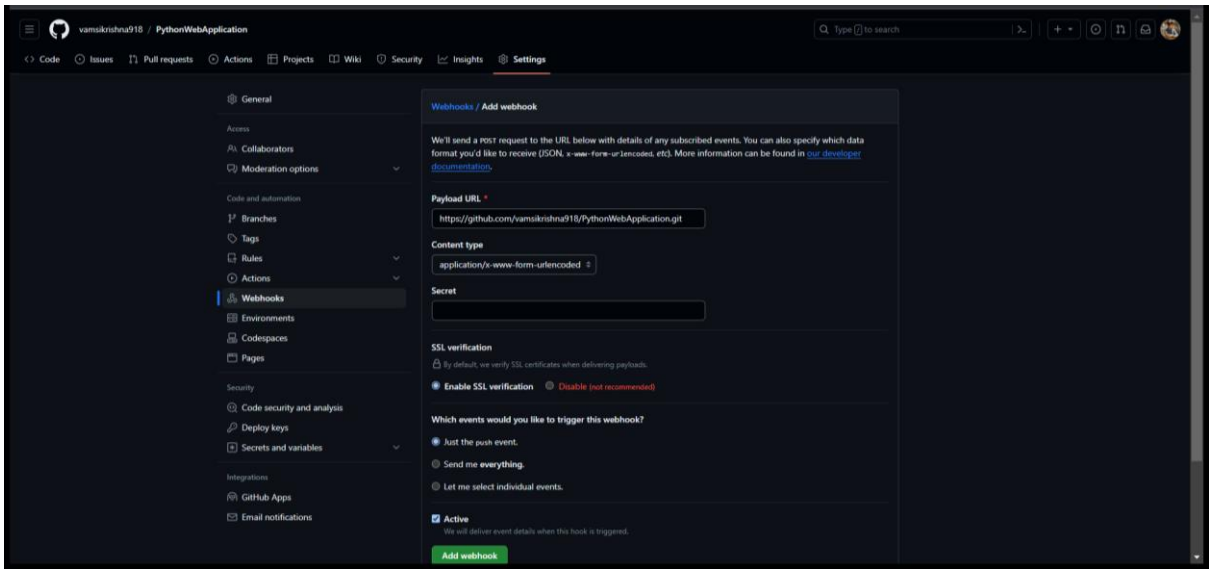
cat /var/lib/jenkins/secrets/initialAdminPassword

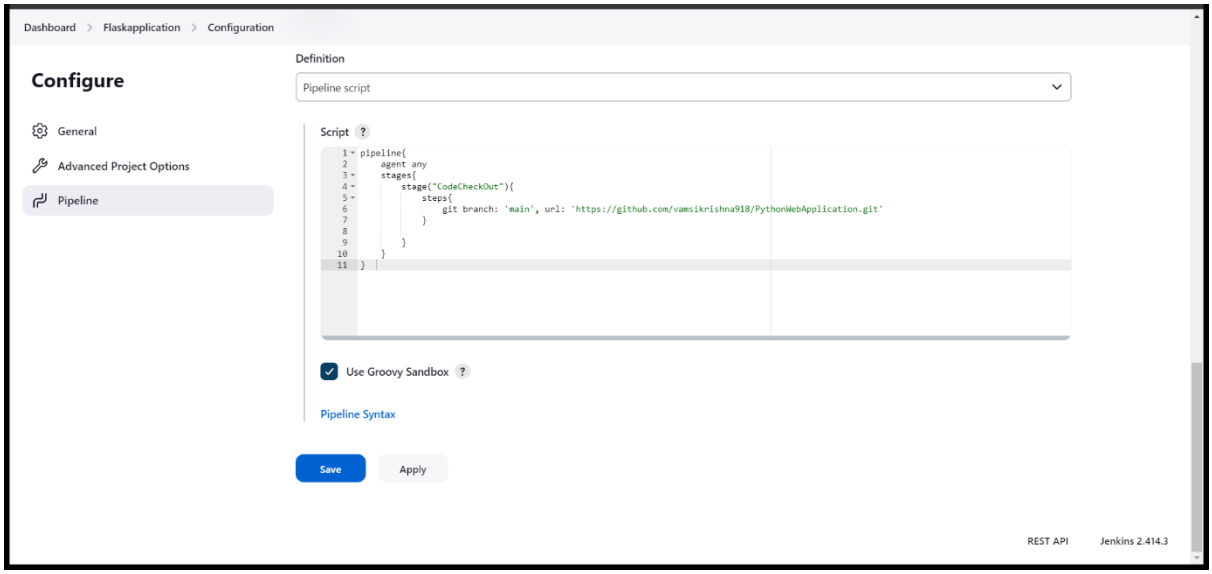


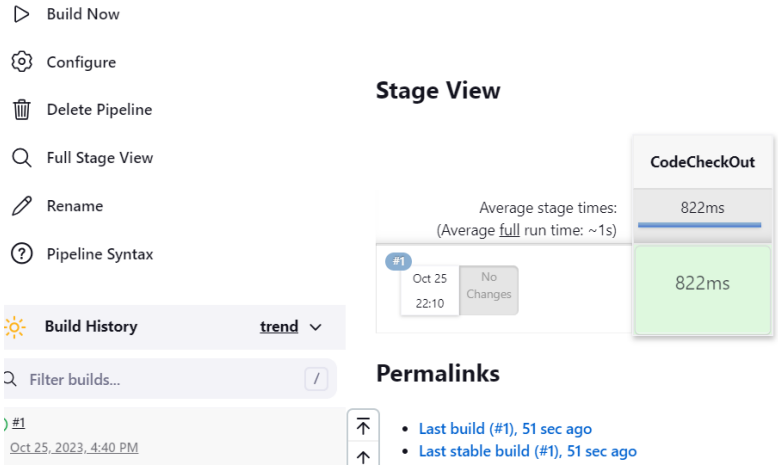
- Commit the application to GitHub



Webhook:


vamsikrishna918 / PythonWebApplication
Code
Issues
Pull requests
Actions
Projects
Wiki
Security
Insights
Settings
General
Access
Collaborators
Moderation options
Code and automation
Branches
Tags
Rules
Actions
Webhooks
Environments
Codespaces
Pages
Security
Code security and analysis
Deploy keys
Secrets and variables
Integrations
GitHub Apps
Email notifications
Webhooks / Add webhook
We'll send a POST request to the URL below with details of any subscribed events. You can also specify which data format you'd like to receive (JSON, x-www-form-urlencoded, etc). More information can be found in our developer documentation.
Payload URL *
https://github.com/vamsikrishna918/PythonWebApplication.git
Content type
application/x-www-form-urlencoded
Secret
SSL verification
By default, we verify SSL certificates when delivering payloads.
Enable SSL verification
Disable (not recommended)
Which events would you like to trigger this webhook?
Just the push event.
Send me everything.
Let me select individual events.
Active
We will deliver event details when this hook is triggered.
Add webhook

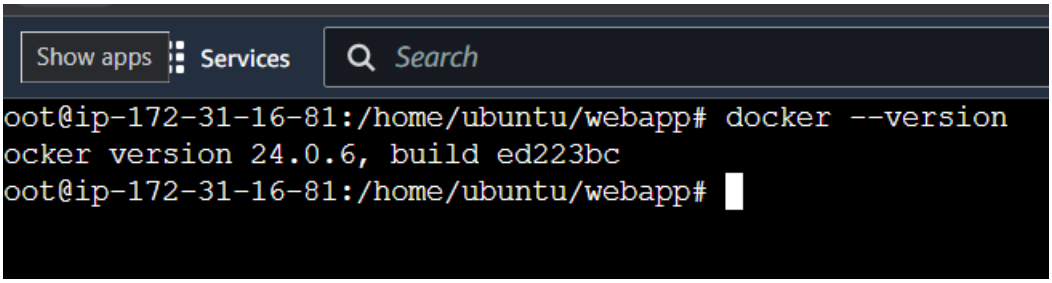

Dashboard
Flaskapplication
Configuration
Configure
General
Advanced Project Options
Pipeline
Definition
Pipeline script
Script
pipeline{
agent any
stages{
stage("CodeCheckOut"){
steps{
git branch: 'main', url: 'https://github.com/vamsikrishna918/PythonWebApplication.git'
}
}
}
}
Use Groovy Sandbox
Pipeline Syntax
Save
Apply
REST API
Jenkins 2.414.3


Build Now
Configure
Delete Pipeline
Full Stage View
Rename
Pipeline Syntax
Build History
trend
Filter builds...
#1
Oct 25, 2023, 4:40 PM
Stage View
CodeCheckOut
Average stage times:
(Average full run time: ~1s)
822ms
#1
Oct 25
22:10
No Changes
822ms
Permalinks
Last build (#1), 51 sec ago
Last stable build (#1), 51 sec ago

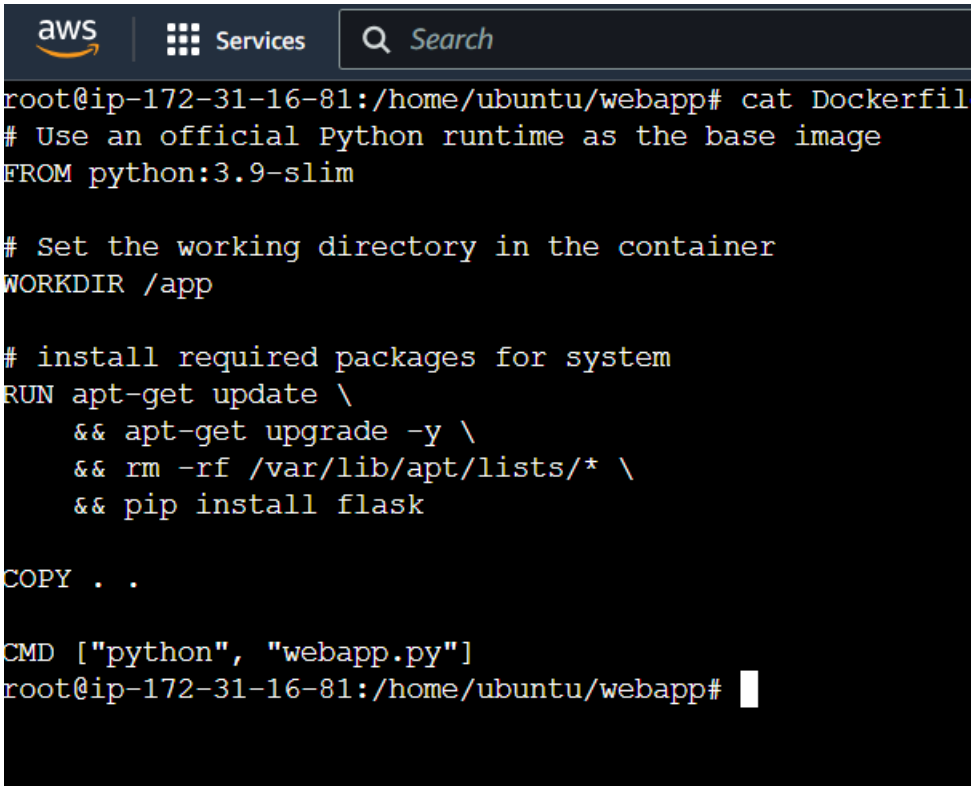
Install docker on ec2 instance:

Follow below url

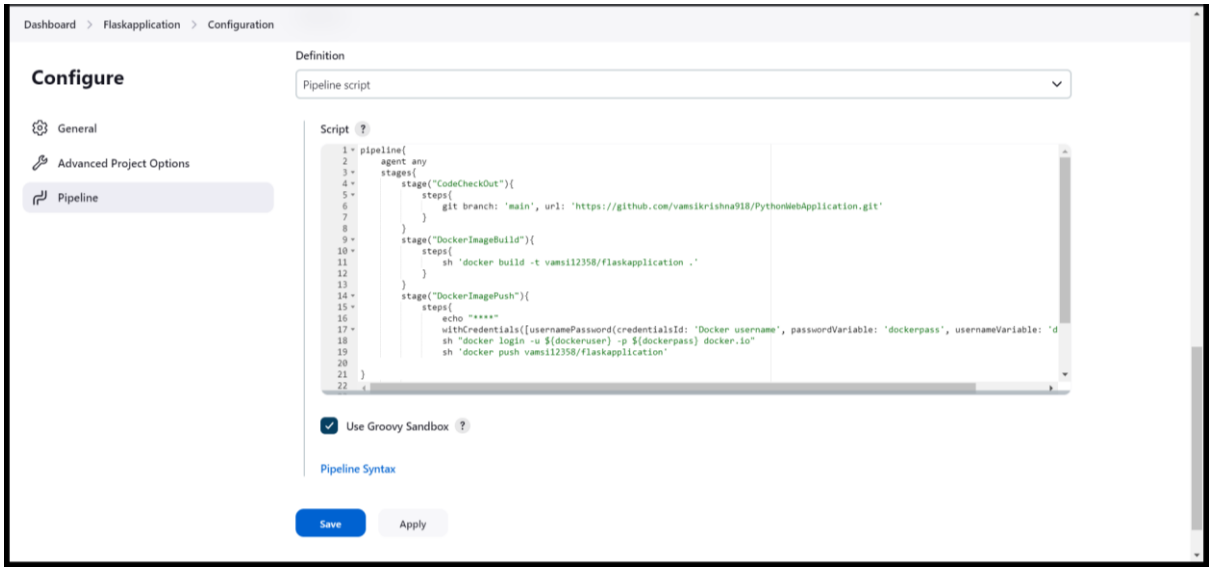
Docker - https://docs.docker.com/engine/install/ubuntu/

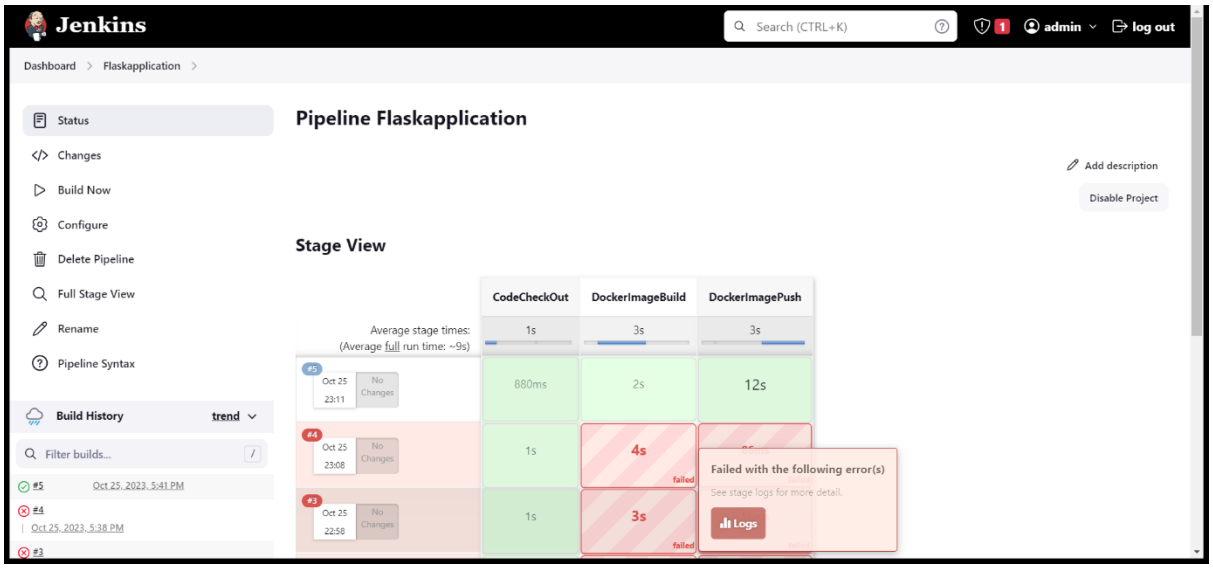


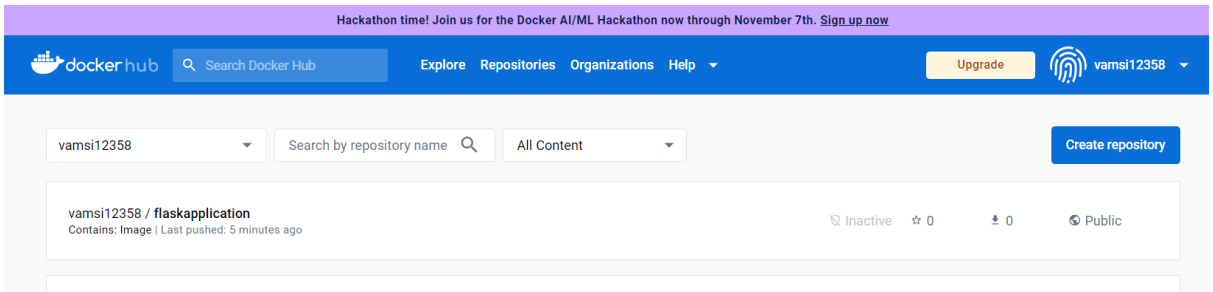
Create a **Docker file**



Building the pipeline and push the image to **Docker Hub**:







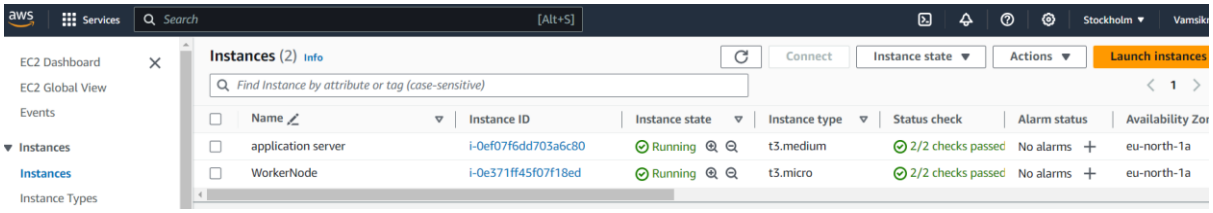
Kubernetes:

Installation:

kubeadm

https://github.com/LondheShubham153/kubestarter/blob/main/kubeadm_installation.md

Create a ec2 instance aces as worker node:



Setup the master and worker nodes

```
[kubelet-start] Writing kubelet environment file with flags to file "/var/lib/kubele
[kubelet-start] Starting the kubelet
[kubelet-start] Waiting for the kubelet to perform the TLS Bootstrap...
I1025 18:21:16.252164    4903 cert_rotation.go:137] Starting client certificate rota
I1025 18:21:16.255089    4903 kubelet.go:188] [kubelet-start] preserving the crisocl
I1025 18:21:16.255111    4903 patchnode.go:30] [patchnode] Uploading the CRI Socket
 annotation

This node has joined the cluster:
* Certificate signing request was sent to apiserver and a response was received.
* The Kubelet was informed of the new secure connection details.

Run 'kubectl get nodes' on the control-plane to see this node join the cluster.

root@ip-172-31-23-127:/home/ubuntu#
```

i-0e371ff45f07f18ed (WorkerNode)

PublicIPs: 13.48.84.250 PrivateIPs: 172.31.23.127

```
root@ip-172-31-16-81:/home/ubuntu# kubectl get nodes
NAME                STATUS   ROLES                  AGE    VERSION
ip-172-31-16-81     Ready    control-plane,master   13m    v1.20.0
ip-172-31-23-127    Ready    <none>                 3m3s   v1.20.0
root@ip-172-31-16-81:/home/ubuntu#
```

i-0ef07f6dd703a6c80 (application server)

PublicIPs: 13.49.76.94 PrivateIPs: 172.31.16.81

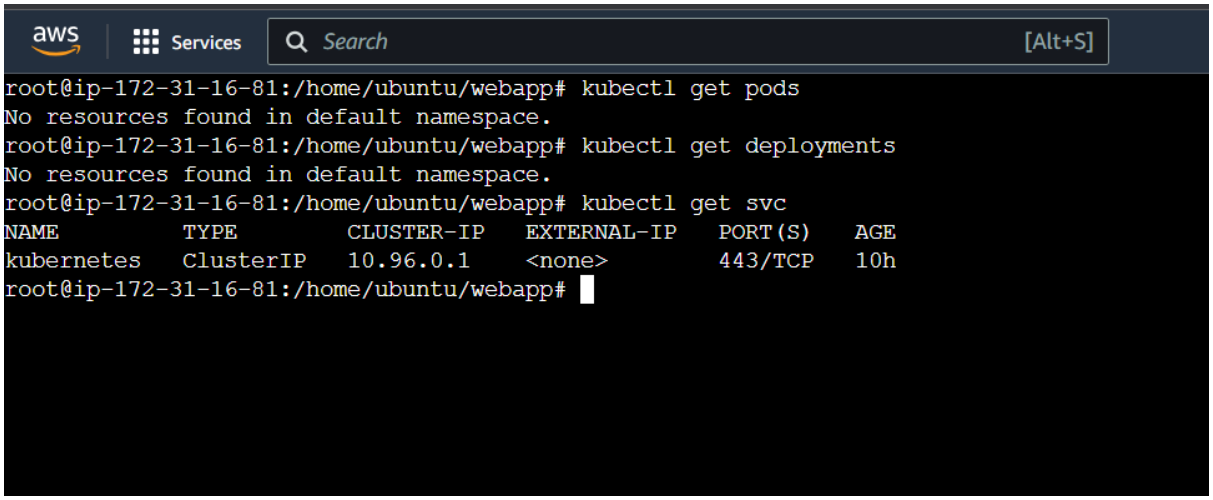
Created a deployment and service manifests.

With commands on master – kubectl apply -f deployment.yml

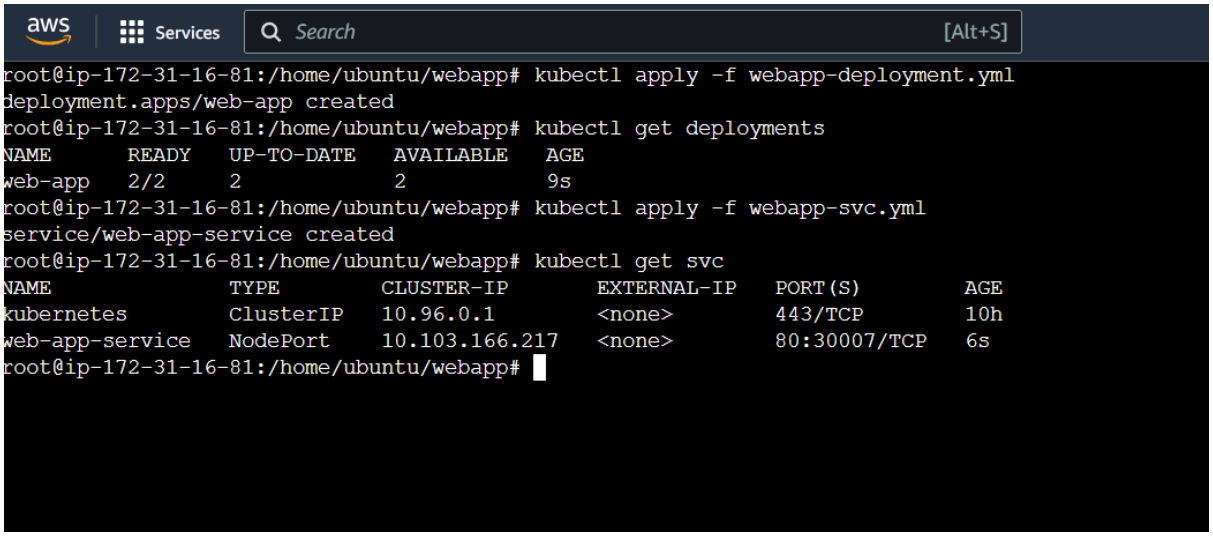
And post that

Kubectl apply -f service.yml To up our cluster

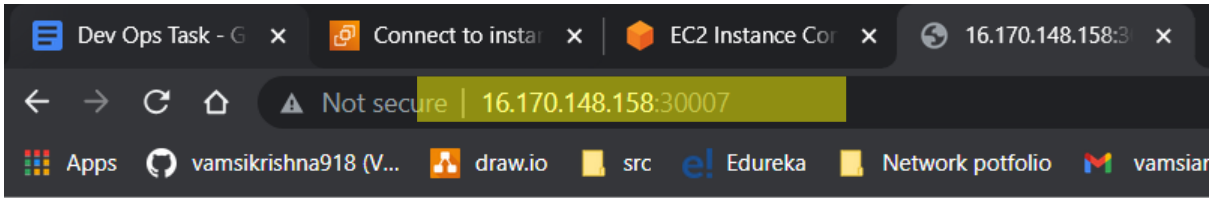
Before applying-



After:

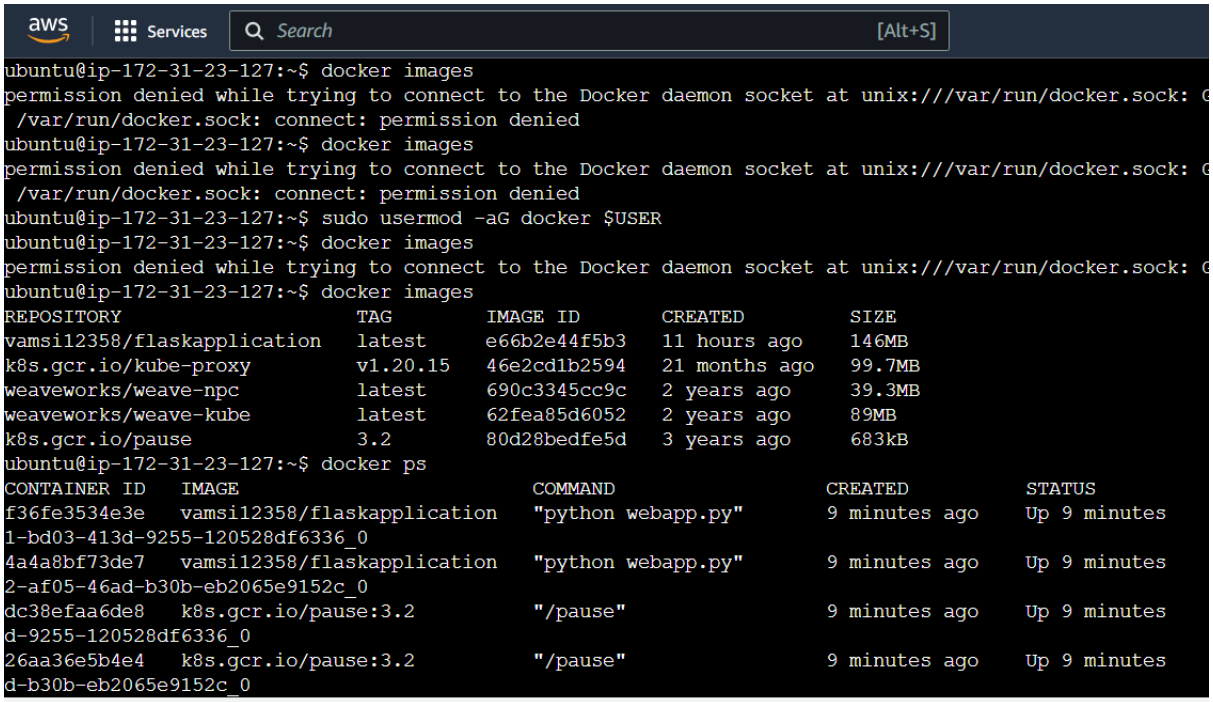


Open port 30007 on worker node in security Inbound rules to access our application.



Hello World!,Welcome to Python Web Application

Running on worker node



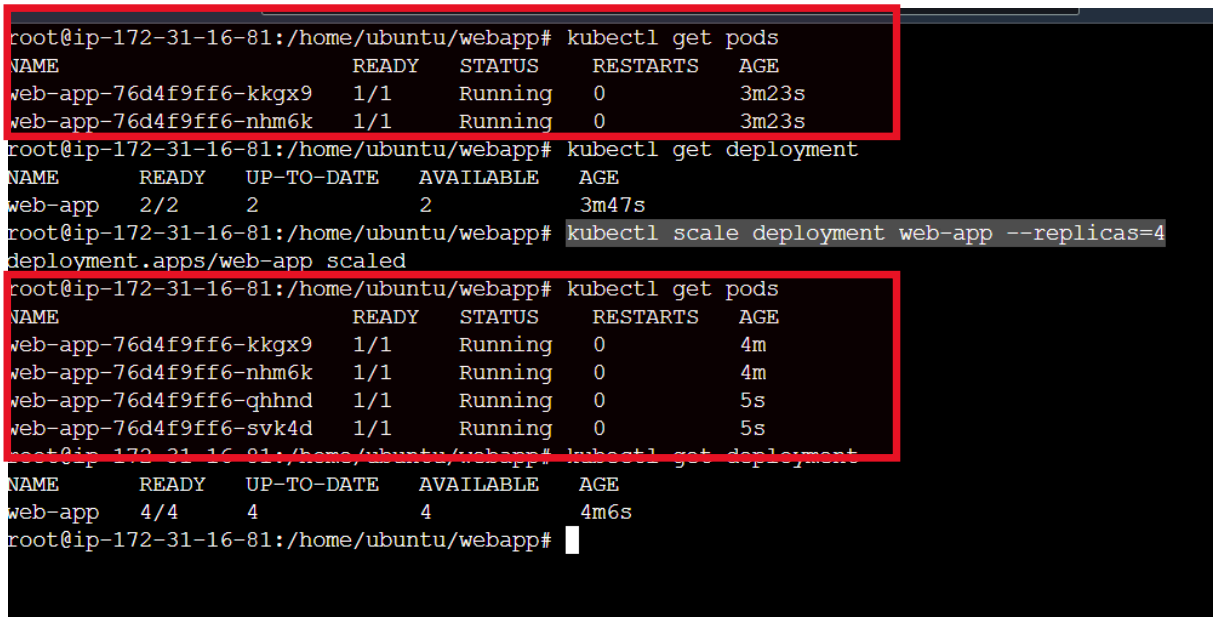
Scalling manually.

Before scalling: running 2 pods

```
service/web-app-service unchanged
root@ip-172-31-16-81:/home/ubuntu/webapp# kubectl get pods
NAME                       READY   STATUS    RESTARTS   AGE
web-app-76d4f9ff6-kkgx9    1/1     Running   0          8s
web-app-76d4f9ff6-nhm6k    1/1     Running   0          8s
root@ip-172-31-16-81:/home/ubuntu/webapp#
```

Increasing replicas to 4:

kubectl scale deployment web-app --replicas=4



Creating HPA:

If cpu utilization is more that 50 % then the pods will be scale up automatically.

apiVersion: autoscaling/v1

kind: HorizontalPodAutoscaler

metadata:

name: hpa-demo-deployment

spec:

scaleTargetRef:

apiVersion: apps/v1

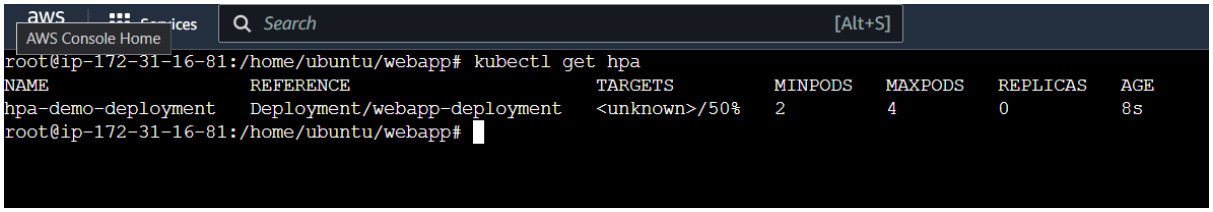
kind: Deployment

name: webapp-deployment

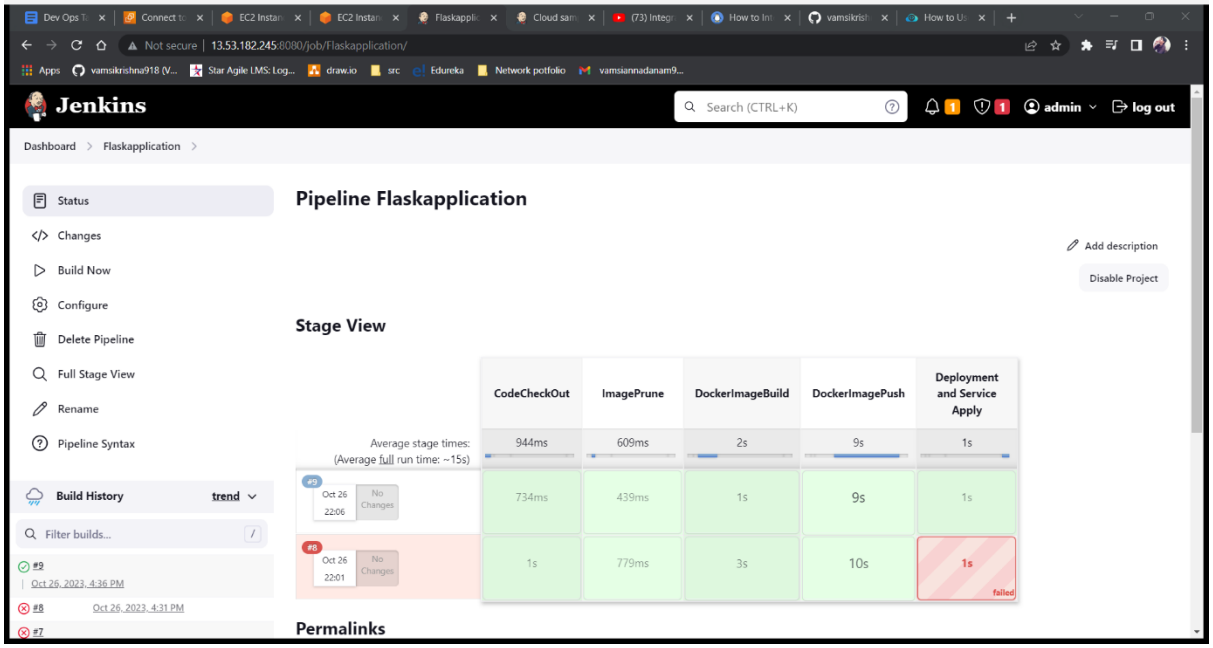
minReplicas: 2

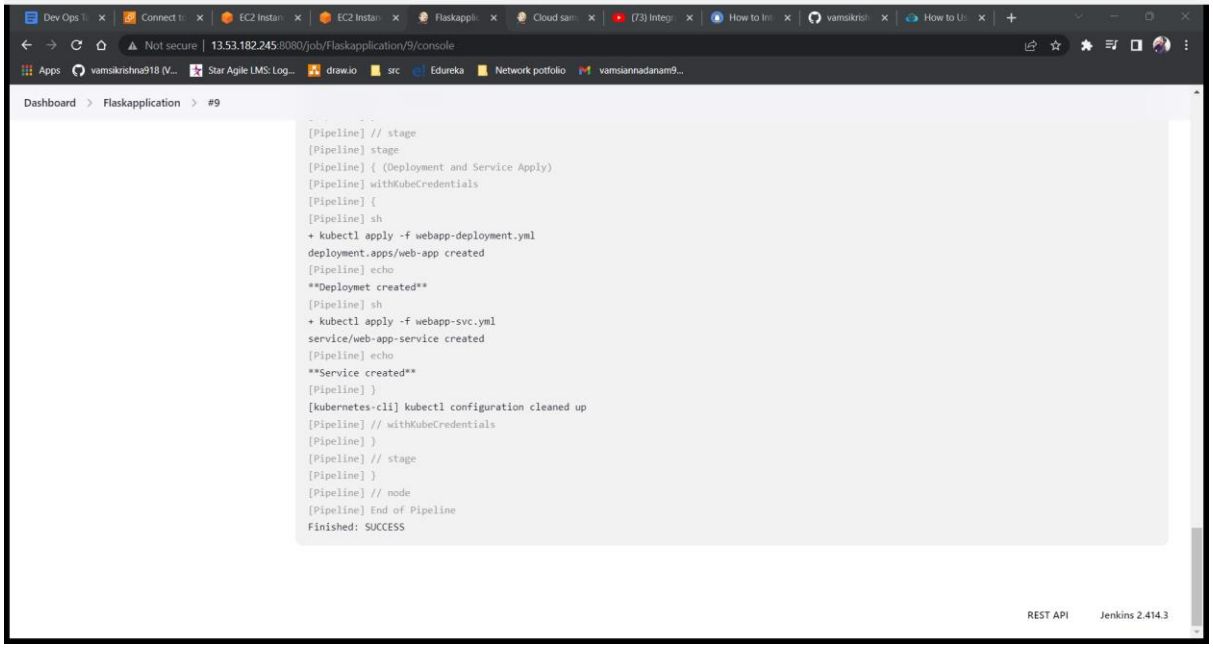
maxReplicas: 4

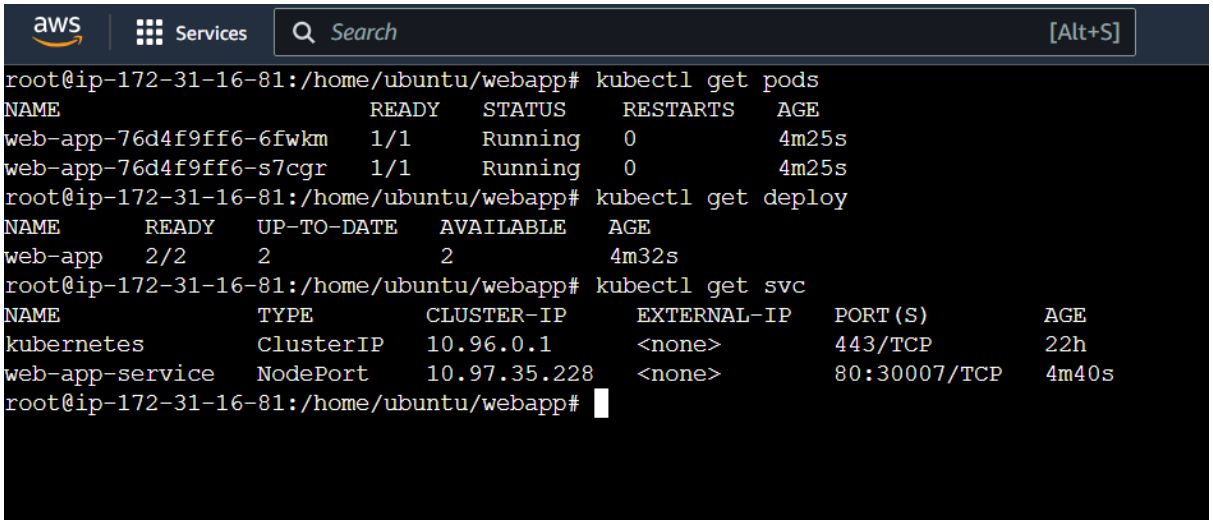
targetCPUUtilizationPercentage: 50



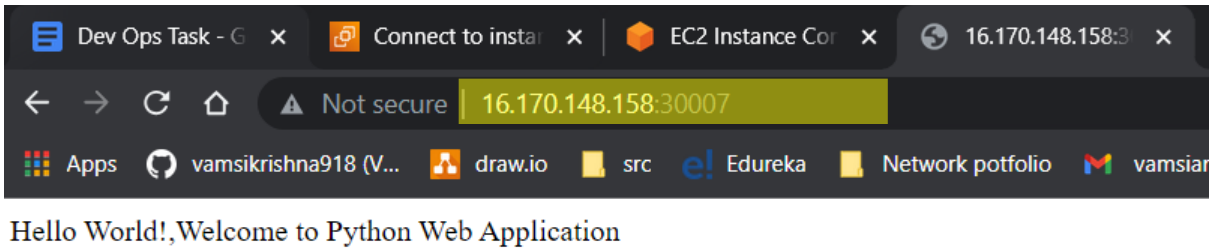
CD with Jenkins.







Technical Checkout-



Hello World!,Welcome to Python Web Application