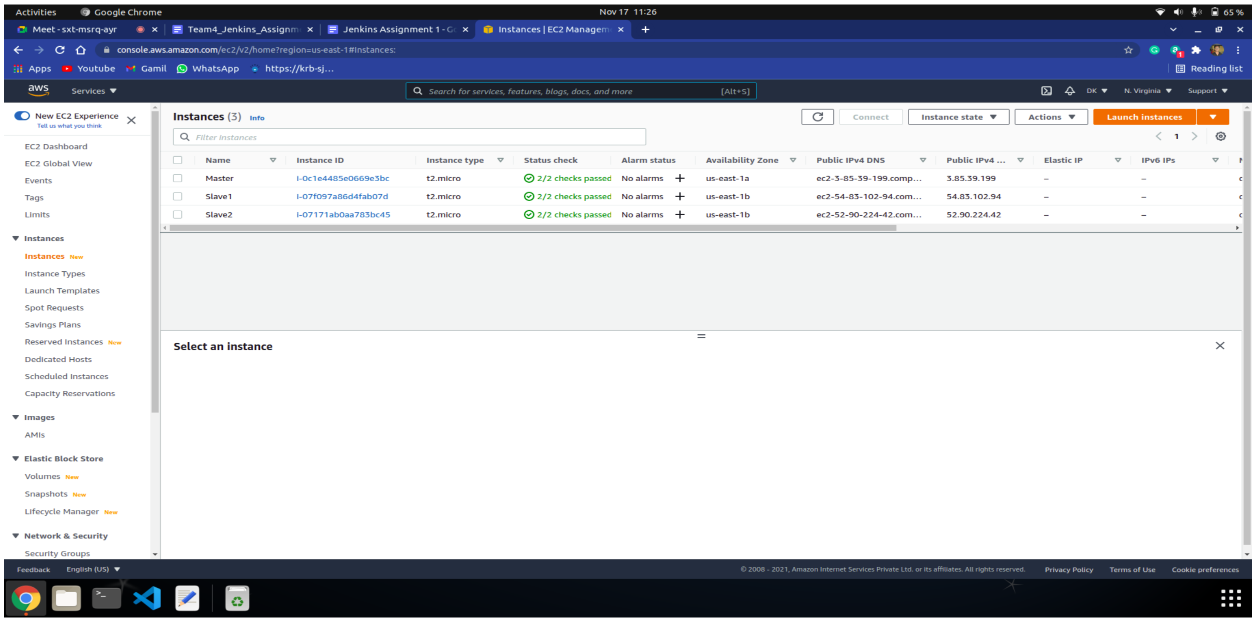
Team 4
DevOps Assignment 2 (Jenkins - 1)
IIIT DHARWAD
17 Nov 2021

<u>Jenkins</u>

Setting up CI/CD Jenkins pipeline for Kubernetes:

Tools and Technologies used :
- Github
- Docker and Docker hub
- Jenkins
- Kubernetes Cluster

Prerequisites:
- NodeJS v8+
- 2 AWS Ec2 Ubuntu instances of size t2.medium and 15 GB of volumes are attached.
- Install Docker and Kubernetes on AWS Instances



Instances (3)

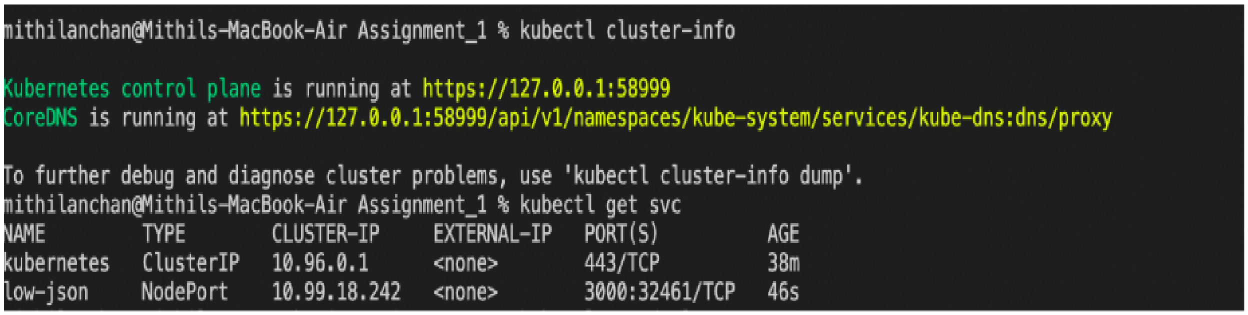
Name	Instance ID	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS	Public IPv4 ...	Elastic IP	IPv6 IPs
Master	i-0c1e4485e0669e3bc	t2.micro	2/2 checks passed	No alarms	us-east-1a	ec2-3-85-39-199.comp...	3.85.39.199	–	–
Slave1	i-07f097a86d4fab07d	t2.micro	2/2 checks passed	No alarms	us-east-1b	ec2-54-83-102-94.com...	54.83.102.94	–	–
Slave2	i-07171ab0aa783bc45	t2.micro	2/2 checks passed	No alarms	us-east-1b	ec2-52-90-224-42.com...	52.90.224.42	–	–

Select an instance

Step - 1 : Setting Up kubernetes Cluster

We have used the kubeadm tool to set up the kubernetes cluster.
Setting up a kubernetes cluster containing 2 nodes master and
worker.

1. Install docker and add docker daemon after that enable and start the docker on both the nodes
2. Install kubernetes(Kubeadm,Kubelet and Kubectl) on both the nodes
3. Initialize the master node using kubeadm. Output of this command would be a key , through which worker nodes can join the kubernetes cluster. Copy the token and save it somewhere



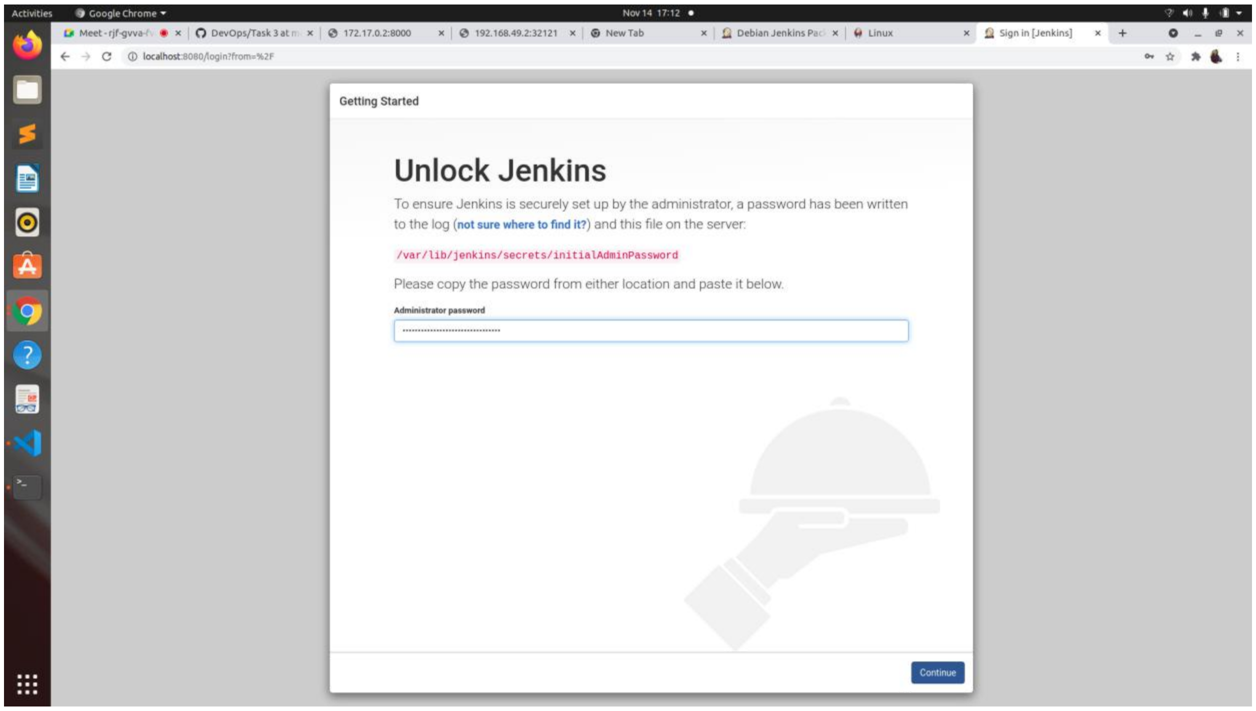
```
mithilanchan@Mithils-MacBook-Air Assignment_1 % kubectl cluster-info

Kubernetes control plane is running at https://127.0.0.1:58999
CoreDNS is running at https://127.0.0.1:58999/api/v1/namespaces/kube-system/services/kube-dns:dns/proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
mithilanchan@Mithils-MacBook-Air Assignment_1 % kubectl get svc
NAME         TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)          AGE
kubernetes   ClusterIP   10.96.0.1      <none>        443/TCP          38m
low-json     NodePort    10.99.18.242   <none>        3000:32461/TCP   46s
```

4. Using the token copied earlier run this command on worker node : sudo kubeadm join 172.31.7.219:6443 --token etipst.0p05m5f584805wdk --discovery-token-ca-cert-hashsha256:2a0d9a8414faeda1 3f4693a33d746f68ea0c64d0f5ce8b03345c233810cb4351
5. When we run kubectl get nodes on master node Now there would be 2 nodes one master and one newly joined worker node newly joined node's role name would be <none> to label it as worker Using the token copied earlier.

Step - 2: Setting up Jenkins locally

Install Java and Jenkins. Run the Jenkins file, the first time it asks for an admin password. Run cat

/var/lib/jenkins/secrets/initialAdminPassword and copy the password and paste it.


Getting Started

Unlock Jenkins

To ensure Jenkins is securely set up by the administrator, a password has been written to the log (not sure where to find it?) and this file on the server:

`/var/lib/jenkins/secrets/initialAdminPassword`

Please copy the password from either location and paste it below.

Administrator password

- Next install the suggested plugins After installing the dashboard opens up Go to Manage Jenkins -> Manage Plugins -> Available and install plugins for Nodejs, Docker, Kubernetes, Github, Kubernetes CLI.
- Configure Docker Hub and github credentials. Go to Manage Jenkins -> Manage credentials and add a credential for docker hub with your username and password. Create a credential id (which will be used later) and description. Similarly add github credentials, i.e. username and Personal Access Token.
- Run the following command to create an environment variable named KUBECONFIG and provide the .kube/config path. Jenkins goes to this path to execute kubectl commands.
- export KUBECONFIG=~/.kube/config

Install docker on jenkins server and add current ubuntu usr and jenkins to docker group

Step - 3: Setting up code

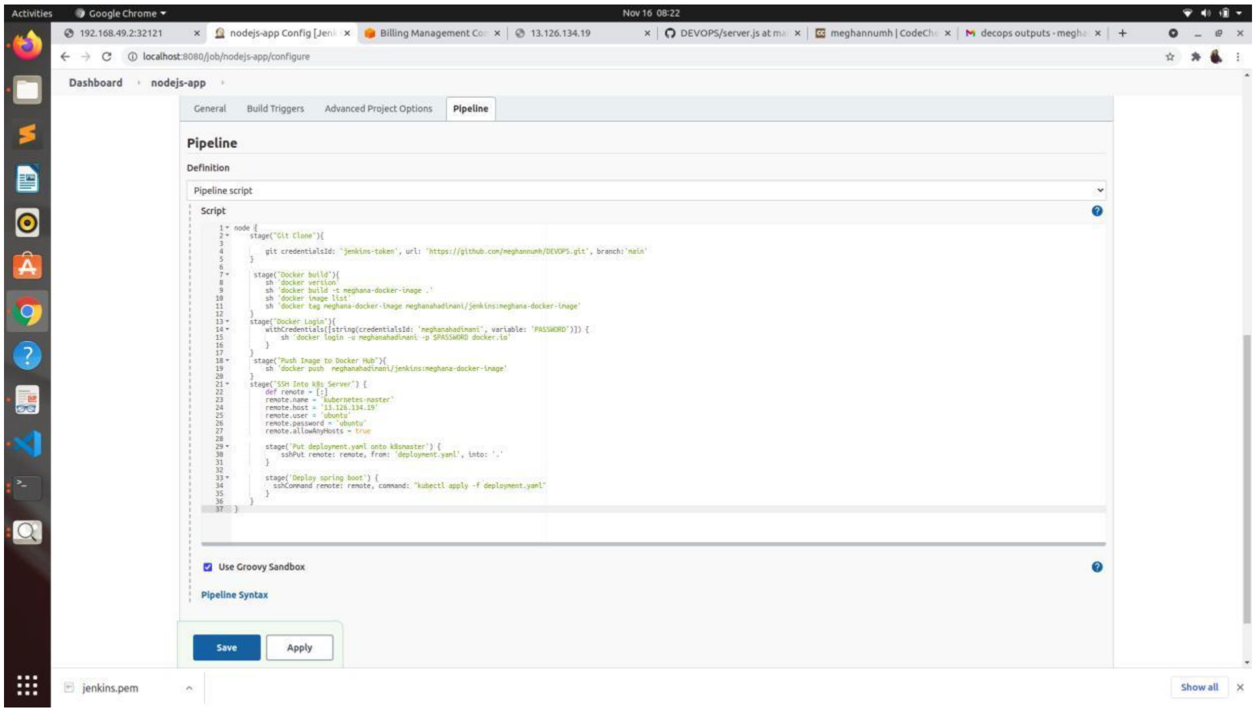
We made a simple node.js application, the code is on github. Code link
Deployment file link

Step - 4: Building the pipeline

Create a Jenkins pipeline. Add this code to create stages which include:

- Git clone
- Docker Build
- Docker login
- Push image to docker hub
- Adding ssh into k8 server
- Copy Deployment.yaml file to kubernetes master
- Create the deployment and service on kubernetes

Pipeline code:



Pipeline

Definition

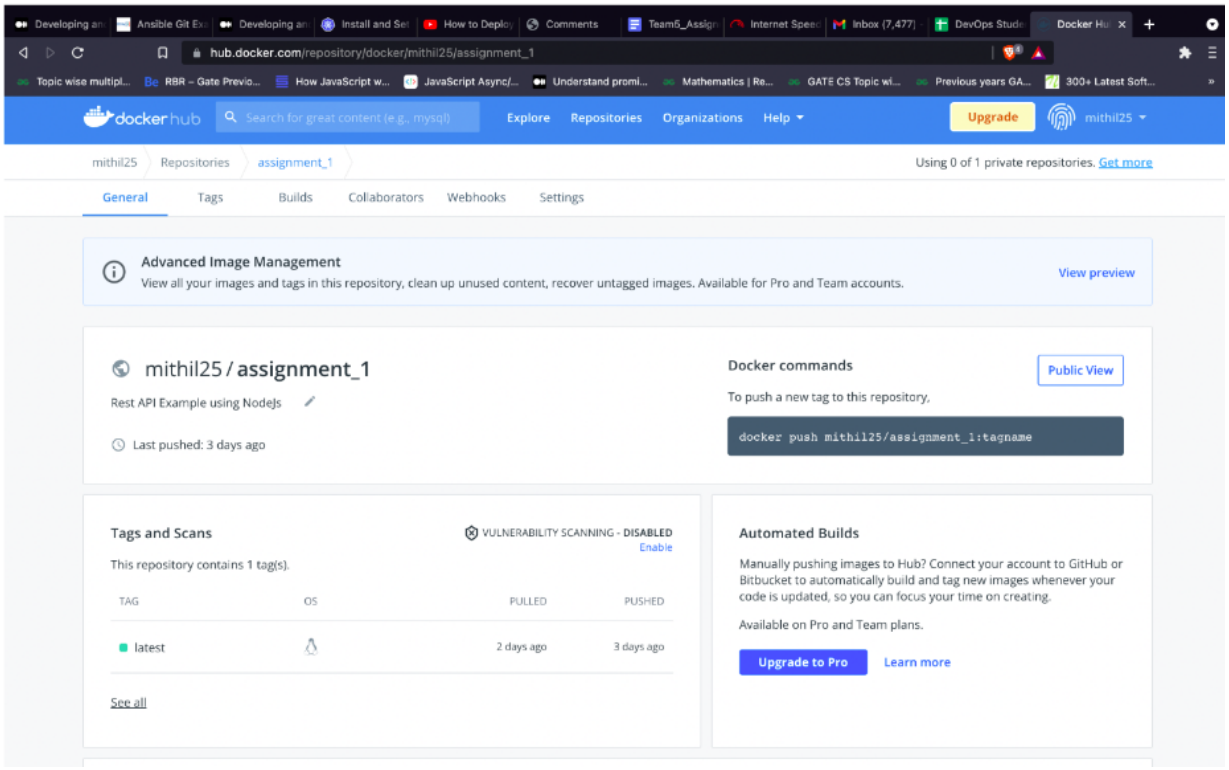
Pipeline script

Script

```
node {
    stage("Git Clone"){

        git credentialsId: 'jenkins-token', url: 'https://github.com/meghannumh/DEVOPS.git', branch:'main'
    }

     stage('Docker build'){
        sh 'docker version'
        sh 'docker build -t meghana-docker-image .'
        sh 'docker image list'
        sh 'docker tag meghana-docker-image meghanahadimani/jenkins:meghana-docker-image'
    }
    stage('Docker Login'){
        withCredentials([string(credentialsId: 'meghanahadimani', variable: 'PASSWORD')]) {
            sh 'docker login -u meghanahadimani -p $PASSWORD docker.io'
        }
    }
     stage('Push Image to Docker Hub'){
        sh 'docker push  meghanahadimani/jenkins:meghana-docker-image'
    }
    stage("SSH Into k8s Server") {
        def remote = [:]
        remote.name = 'kubernetes-master'
        remote.host = '13.126.134.19'
        remote.user = 'ubuntu'
        remote.password = 'ubuntu'
        remote.allowAnyHosts = true

        stage('Put deployment.yaml onto k8smaster') {
            sshPut remote: remote, from: 'deployment.yaml', into: '.'
        }

        stage('Deploy spring boot') {
          sshCommand remote: remote, command: "kubectl apply -f deployment.yaml"
        }
    }
}
```

[✓] Use Groovy Sandbox

Pipeline Syntax


hub.docker.com/repository/docker/mithil25/assignment_1

mithil25 › Repositories › assignment_1

Using 0 of 1 private repositories. Get more

General | Tags | Builds | Collaborators | Webhooks | Settings

Advanced Image Management
View all your images and tags in this repository, clean up unused content, recover untagged images. Available for Pro and Team accounts.
View preview

mithil25 / assignment_1
Rest API Example using NodeJs
Last pushed: 3 days ago

Docker commands
To push a new tag to this repository,

```
docker push mithil25/assignment_1:tagname
```

Tags and Scans
VULNERABILITY SCANNING - DISABLED
Enable
This repository contains 1 tag(s).

TAG	OS	PULLED	PUSHED
latest		2 days ago	3 days ago

See all

Automated Builds
Manually pushing images to Hub? Connect your account to GitHub or Bitbucket to automatically build and tag new images whenever your code is updated, so you can focus your time on creating.
Available on Pro and Team plans.
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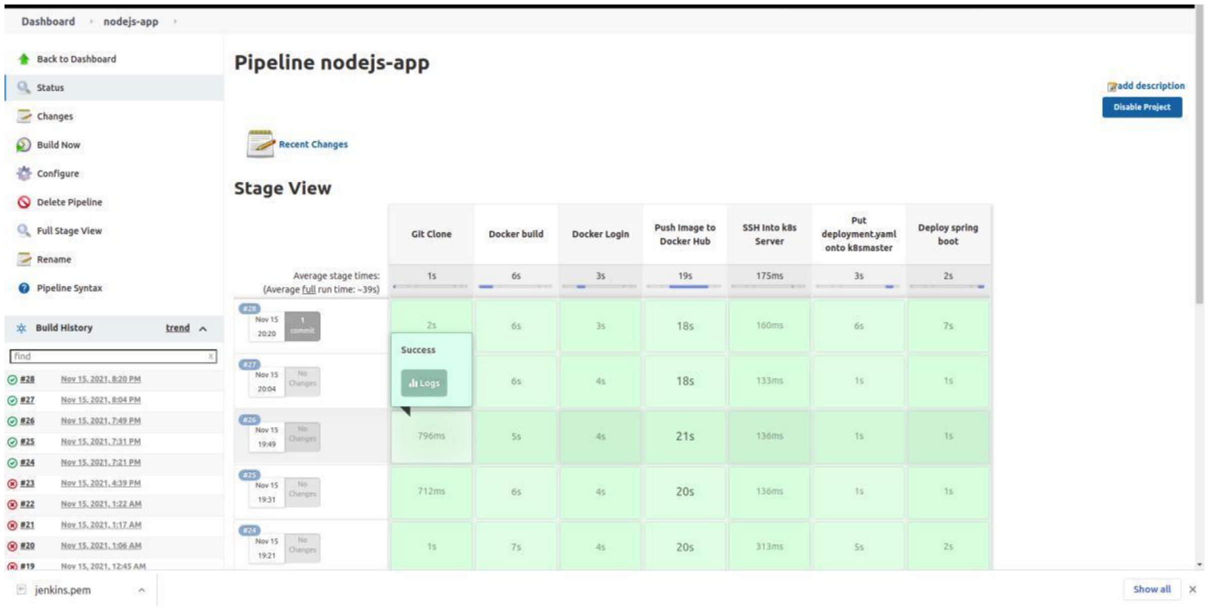
Go to the ~/ .kube directory and type the command cat config to get all the information about the cluster to fill inside the withKubeConfig method in the pipeline.


Dashboard › nodejs-app

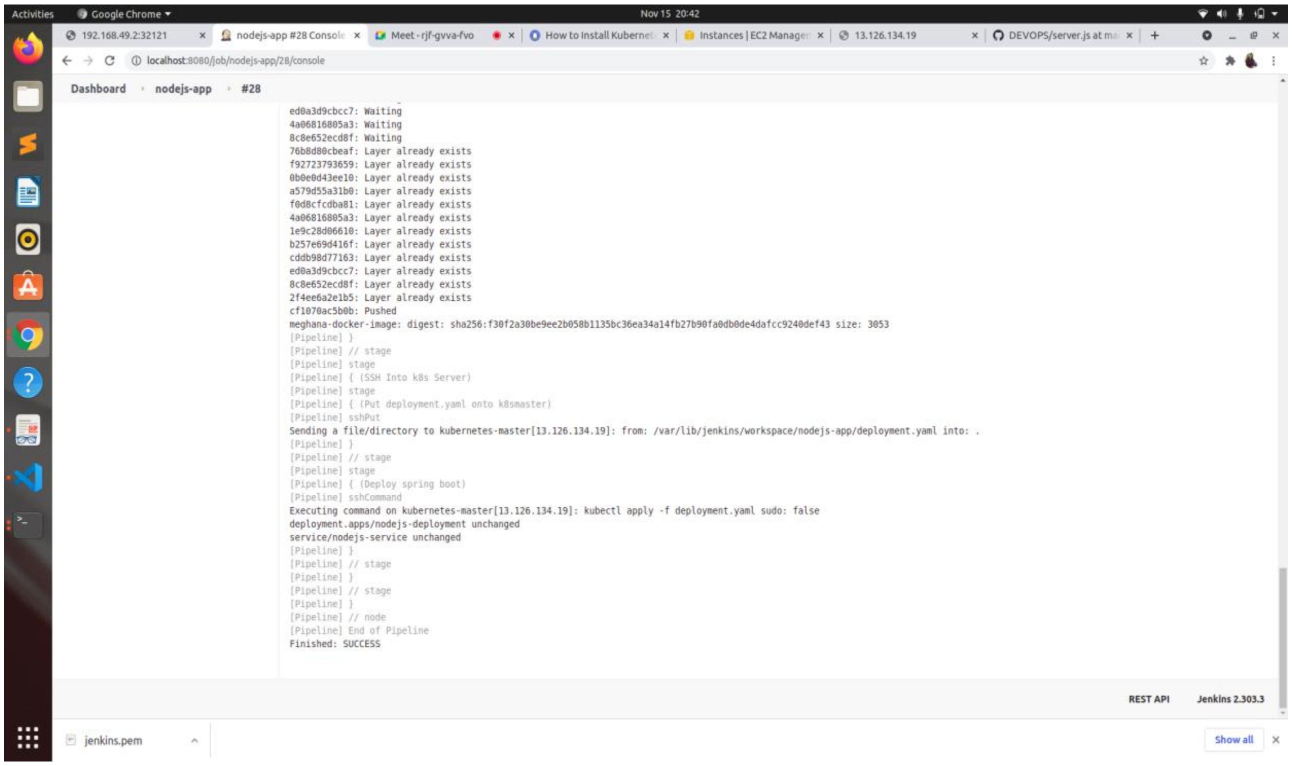
Pipeline nodejs-app

Stage View

	Git Clone	Docker build	Docker Login	Push Image to Docker Hub	SSH Into k8s Server	Put deployment.yaml onto k8smaster	Deploy spring boot
Average stage times: (Average full run time: ~39s)	1s	6s	3s	19s	175ms	3s	2s
#28 Nov 15 20:20 1 commit	2s	6s	3s	18s	160ms	6s	7s
#27 Nov 15 20:04 No Changes	Success Logs	6s	4s	18s	133ms	1s	1s
#26 Nov 15 19:49 No Changes	796ms	5s	4s	21s	136ms	1s	1s
#25 Nov 15 19:31 No Changes	712ms	6s	4s	20s	136ms	1s	1s
#24 Nov 15 19:21 No Changes	1s	7s	4s	20s	313ms	5s	2s

Build History

#28	Nov 15, 2021, 8:20 PM
#27	Nov 15, 2021, 8:04 PM
#26	Nov 15, 2021, 7:49 PM
#25	Nov 15, 2021, 7:31 PM
#24	Nov 15, 2021, 7:21 PM
#23	Nov 15, 2021, 4:39 PM
#22	Nov 15, 2021, 1:22 AM
#21	Nov 15, 2021, 1:17 AM
#20	Nov 15, 2021, 1:06 AM
#19	Nov 15, 2021, 12:45 AM

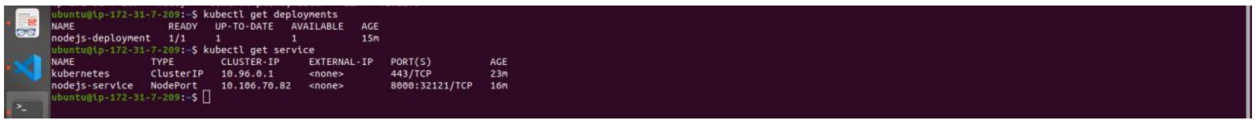


```
ed0a3d9cbcc7: Waiting
4a06816805a3: Waiting
8c8e652ecd8f: Waiting
76b8d80cbeaf: Layer already exists
f92723793659: Layer already exists
0b0e0d43ee10: Layer already exists
a579d55a31b0: Layer already exists
f0d8cfcdba81: Layer already exists
4a06816805a3: Layer already exists
1e9c28d06610: Layer already exists
b257e69d416f: Layer already exists
cddb98d77163: Layer already exists
ed0a3d9cbcc7: Layer already exists
8c8e652ecd8f: Layer already exists
2f4ee6a2e1b5: Layer already exists
cf1070ac5b0b: Pushed
meghana-docker-image: digest: sha256:f30f2a30be9ee2b058b1135bc36ea34a14fb27b90fa0db0de4dafcc9240def43 size: 3053
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (SSH Into k8s Server)
[Pipeline] stage
[Pipeline] { (Put deployment.yaml onto k8smaster)
[Pipeline] sshPut
Sending a file/directory to kubernetes-master[13.126.134.19]: from: /var/lib/jenkins/workspace/nodejs-app/deployment.yaml into: .
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Deploy spring boot)
[Pipeline] sshCommand
Executing command on kubernetes-master[13.126.134.19]: kubectl apply -f deployment.yaml sudo: false
deployment.apps/nodejs-deployment unchanged
service/nodejs-service unchanged
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

Checking the deployments on kubernetes server

1. To get list of deployments on server run kubectl get deployments

2. To get list of services on kubernetes server run kubectl get services

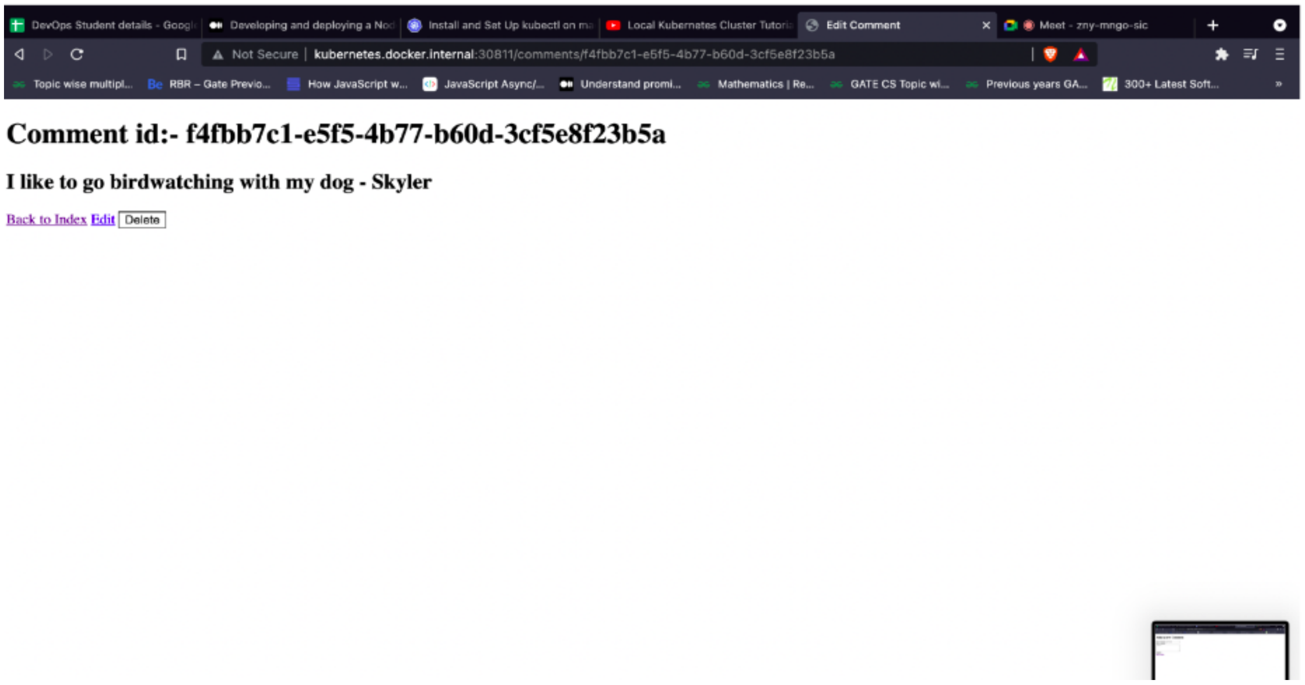


```
ubuntu@ip-172-31-7-209:~$ kubectl get deployments
NAME                READY   UP-TO-DATE   AVAILABLE   AGE
nodejs-deployment   1/1     1            1           15m
ubuntu@ip-172-31-7-209:~$ kubectl get service
NAME             TYPE        CLUSTER-IP     EXTERNAL-IP   PORT(S)          AGE
kubernetes       ClusterIP   10.96.0.1      <none>        443/TCP          23m
nodejs-service   NodePort    10.106.70.82   <none>        8000:32121/TCP   16m
ubuntu@ip-172-31-7-209:~$ 
```

node-js service in running on Nodeport, so Deployment is Successful

From the terminal output, node-js-service is running on port number 32121, so open tcp custom 32121 on kubernetes service instance

Application is successfully deployed in kubernetes through Jenkins CICD pipeline.


Not Secure | kubernetes.docker.internal:30811/comments/f4fbb7c1-e5f5-4b77-b60d-3cf5e8f23b5a
Edit Comment

Comment id:- f4fbb7c1-e5f5-4b77-b60d-3cf5e8f23b5a

I like to go birdwatching with my dog - Skyler

Back to Index Edit Delete