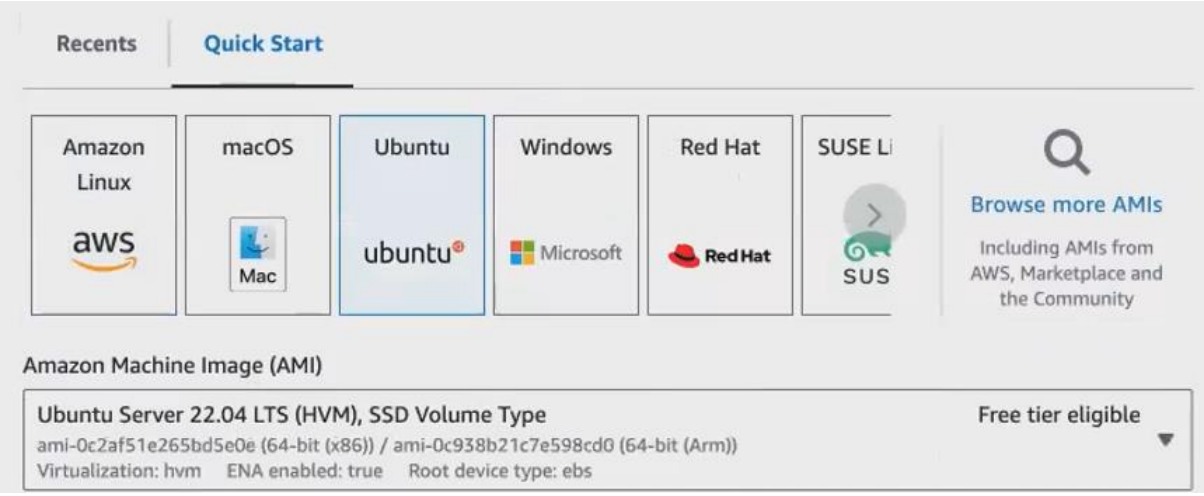
Day 4- Kubernetes - Pods & Services [in this build java application]

https://docs.google.com/document/d/1Is4h94KVFliaNxSuBZX9Spui98CYiFOIawjLfYa3wBU/edit [this is very important.do this must]

https://github.com/zen-class/zen-class-devops-documentation

launch an instance & connect:



Select t2.medium.because install docker, Jenkins , Kubernetes cluster in single machine

3 tools are required to launch your Kubernetes cluster

1. **Kubectl**
2. **Eksctl**

3. **Jenkins**
    1. **Awscli**
    2. **Create Kubernetes cluster**

Kubectl:

```
ubuntu@ip-172-31-44-53:~$ curl -o kubectl https://amazon-eks.s3.us-west-2.amazonaws.com/1.19.6/2021-01-05/bin/linux/amd64/kubectl
```

```
ubuntu@ip-172-31-44-53:~$ chmod +x ./kubectl
sudo mv ./kubectl /usr/local/bin
kubectl version --short --client
Client Version: v1.19.6-eks-49a6c0
```

Eksctl:

```
ubuntu@ip-172-31-44-53:~$ curl --silent --location "https://github.com/weaveworks/eksctl/releases/latest/download/eksctl_$(uname -s)_amd64.tar.gz" | tar
xz -C /tmp

sudo mv /tmp/eksctl /usr/local/bin
eksctl version
```

```
ubuntu@ip-172-31-44-53:~$ sudo apt update
```

Duplicate the machine to install Jenkins ,docker:

1. install Jenkins [inside Jenkins install awscli & create Kubernetes cluster]
2. install docker

install Jenkins:

```
To check for new updates run: sudo apt update
```

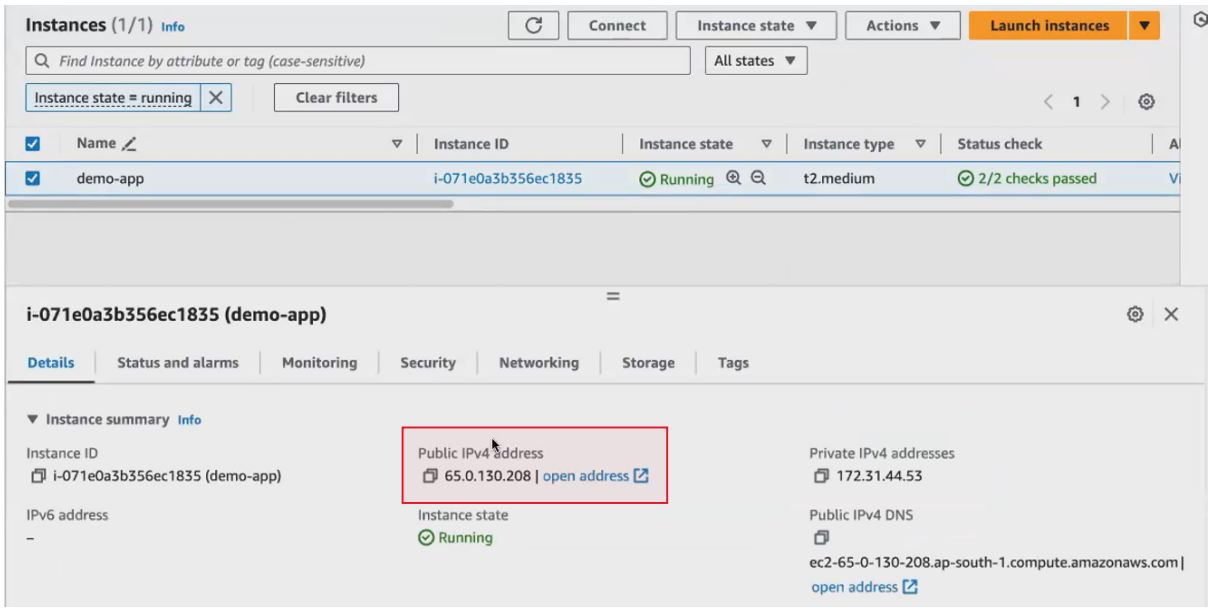
```
ubuntu@ip-172-31-42-111:~$ sudo apt install openjdk-17-jdk -y
```

```
ubuntu@ip-172-31-42-111:~$ sudo wget -O /usr/share/keyrings/jenkins-keyring.asc \
  https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
echo "deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc]" \
  https://pkg.jenkins.io/debian-stable binary/ | sudo tee \
  /etc/apt/sources.list.d/jenkins.list > /dev/null
sudo apt-get update
sudo apt-get install jenkins
```

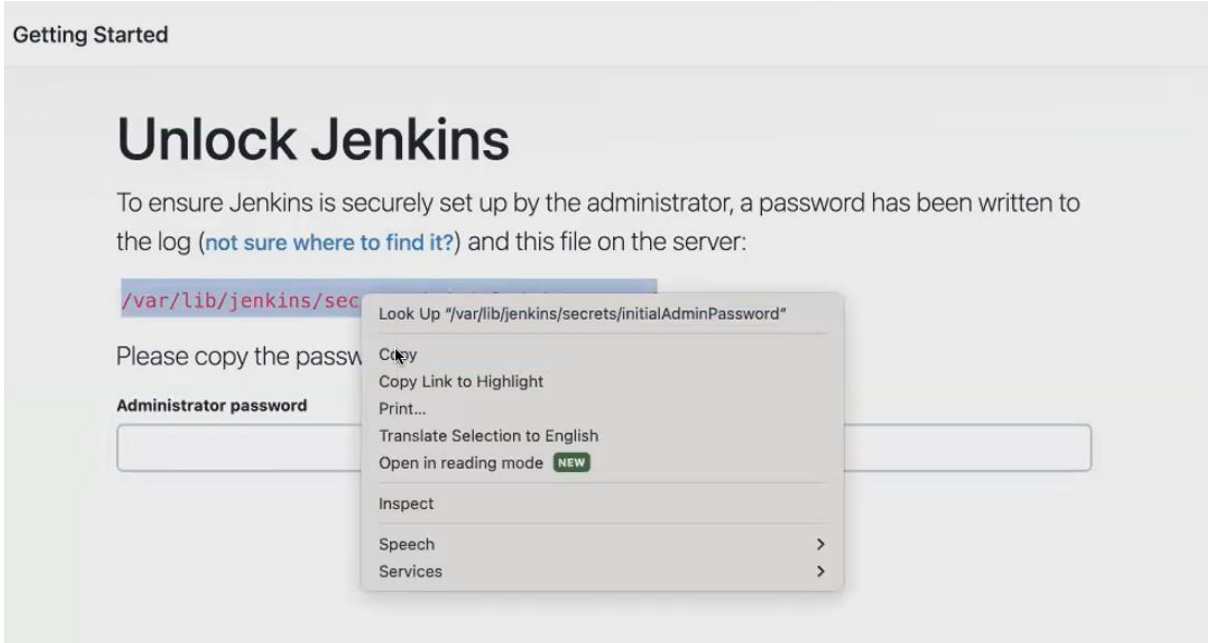
Duplicate the machine: [where we installed Jenkins]

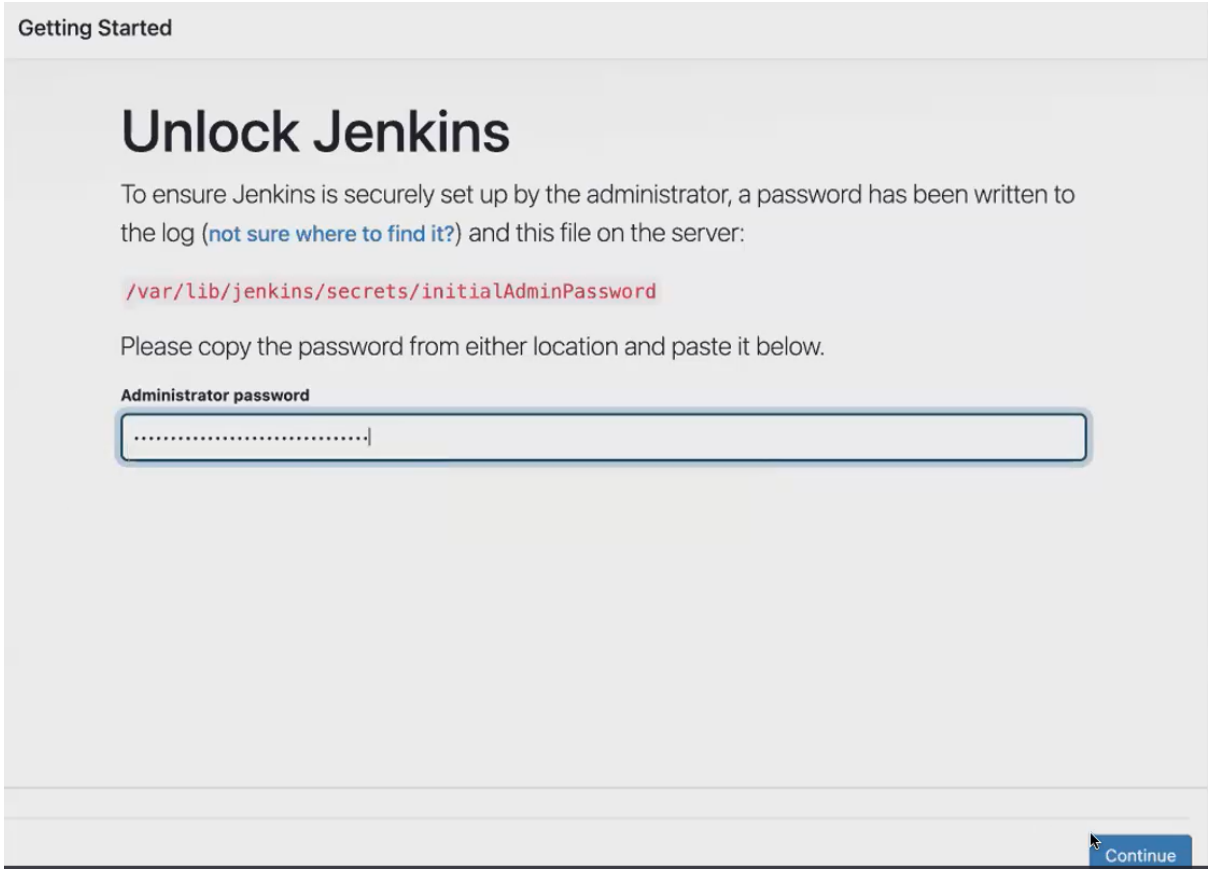
- So now you can see my Jenkins from the Jenkins user and launching my cluster.
- Okay, let it launch. I will take another session.

- So, in this machine we have installed Jenkins. Right, we will go and open up the port number [8080].



Jenkins page opened.





Get into the Jenkins user:

1. install awscli
2. create Kubernetes cluster

get into Jenkins user [sudo su -jenkins]

```
ubuntu@ip-172-31-44-53:~$ sudo su - jenkins
jenkins@ip-172-31-44-53:~$
```

Awscli:

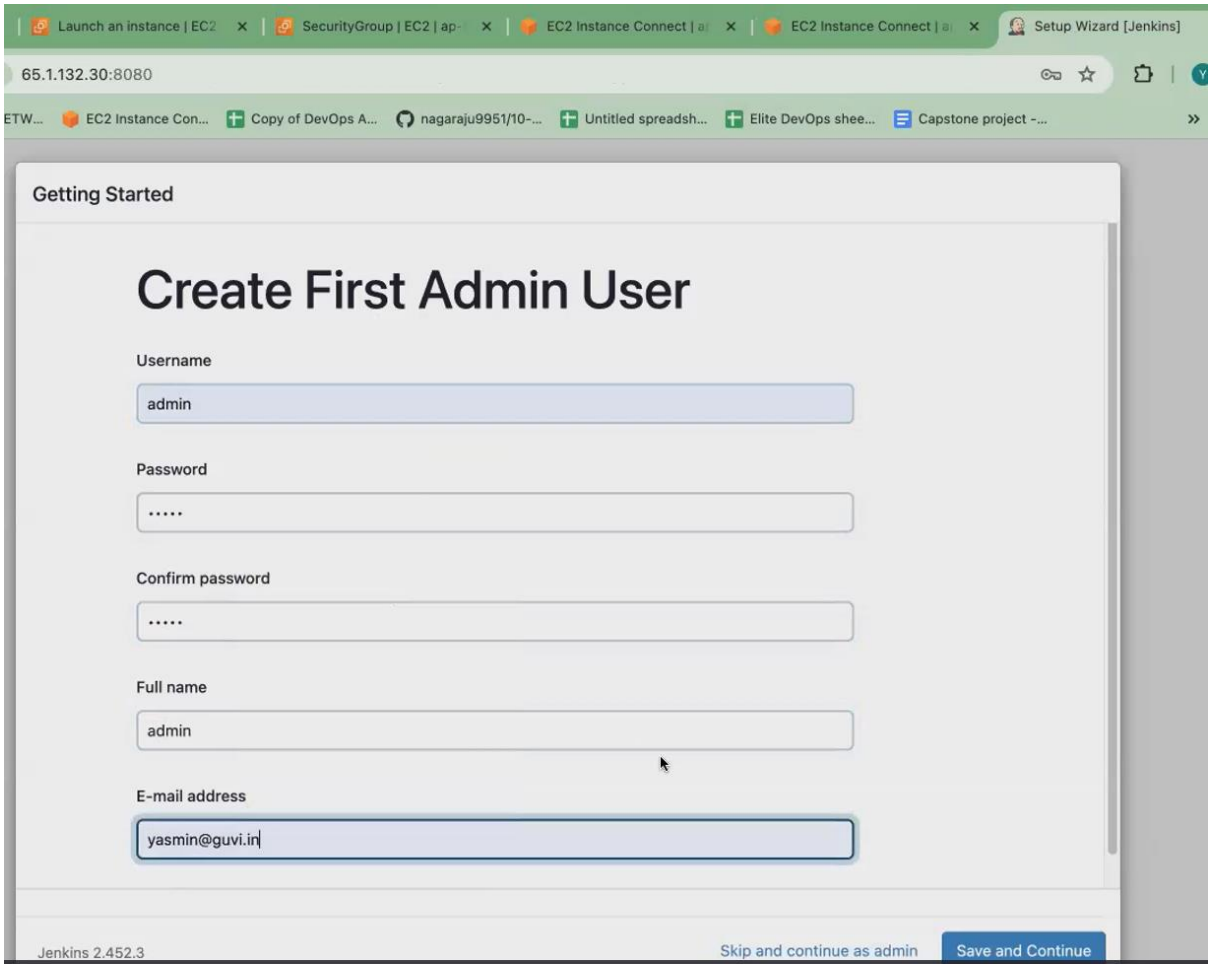
```
jenkins@ip-172-31-44-53:~$ aws configure
AWS Access Key ID [None]: AKIASGIII4IGBNATXP47
AWS Secret Access Key [None]: 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
Default region name [None]: ap-south-1
Default output format [None]: json
jenkins@ip-172-31-44-53:~$
```

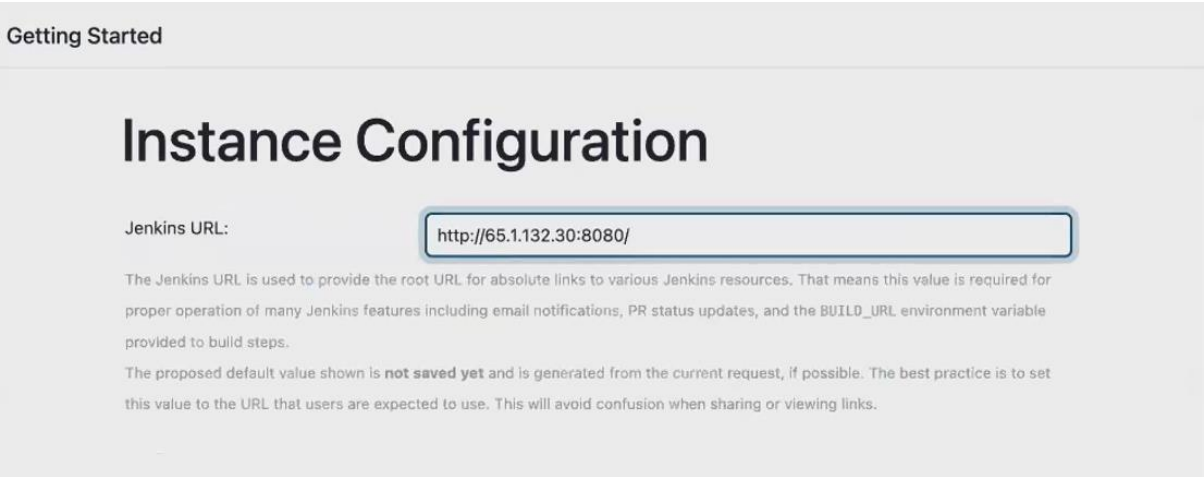
Create Kubernetes cluster inside Jenkins user:

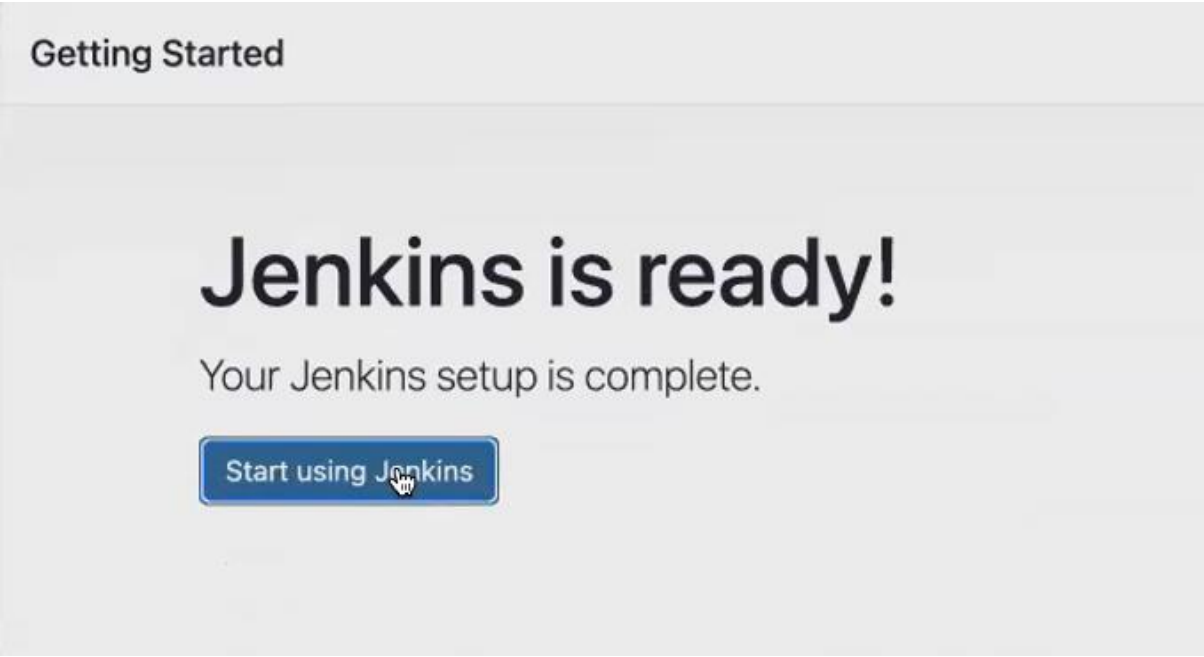
- Now you're inside the Jenkins user. from the Jenkins user Only, we have to launch the cluster.
- Only then your Jenkins can identify this cluster.
- Create cluster name of your cluster
- which region you want to launch a cluster
- type of worker node that you want to launch.
- worker node by default will be created with instance type t2.small. now the cluster, while the cluster is being created.

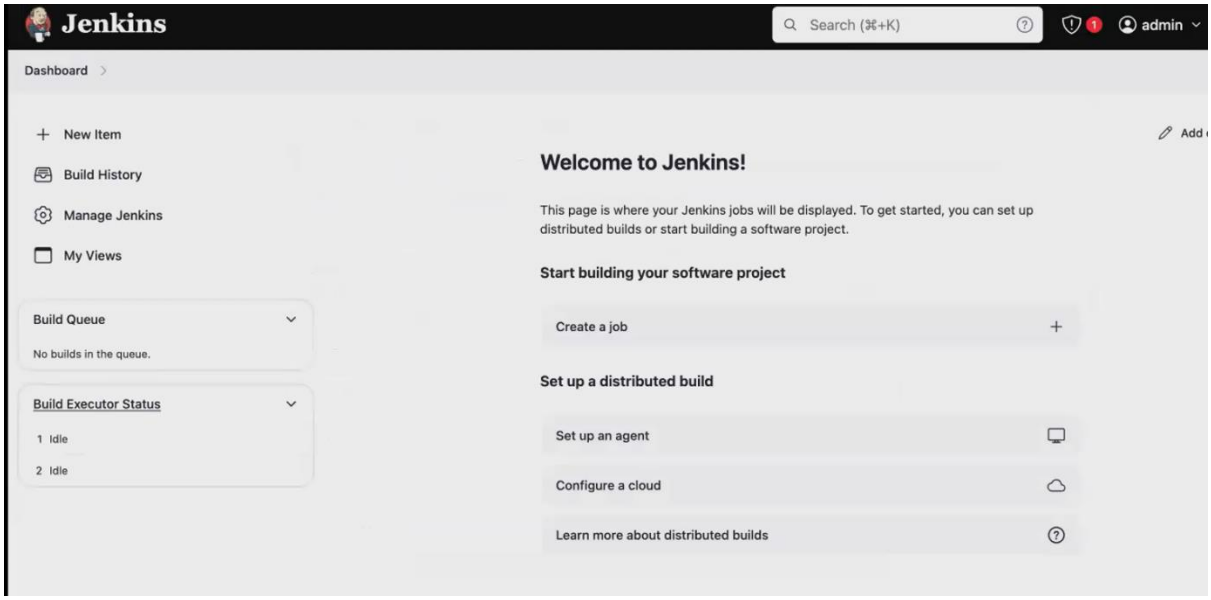
```
jenkins@ip-172-31-42-111:~$ eksctl create cluster --name test-cluster --region ap-south-1
2024-07-24 11:41:59 [i]  eksctl version 0.187.0
2024-07-24 11:41:59 [i]  using region ap-south-1
```

open Jenkins page:









All are doing in the same machine.

- so once you have launched the cluster, what you have to do.
- our application, will go and look into the application. Our application is a Java application.
- so, you have to build your application. That is, you have to artifact. You have to package your application, using Maven so for that what you need. You have to install, Maven.

Install maven:

- why, I'm installing in this machine.
- My Jenkins have to build the application. My Jenkins should build the Java application via Maven, so I have to give my Jenkins. I have to install maven and my Jenkins machine.
- So, I have installed Maven.
- so, I'm installed Maven, Java, Jenkins. Everything is running.
- We will also install Docker. So do we have to install

```
ubuntu@ip-172-31-42-111:~$ sudo apt install maven -y
```

```
ubuntu@ip-172-31-42-111:~$ mvn --version
Apache Maven 3.6.3
Maven home: /usr/share/maven
```

Install docker:

```
ubuntu@ip-172-31-42-111:~$ sudo apt install docker.io
```

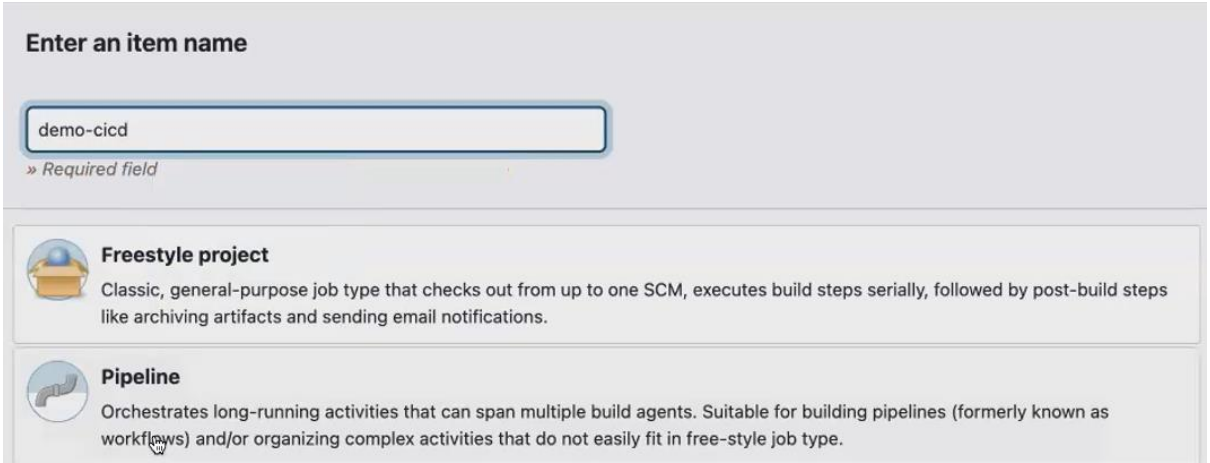
```
ubuntu@ip-172-31-42-111:~$ sudo usermod -aG docker jenkins
ubuntu@ip-172-31-42-111:~$ sudo usermod -aG docker ubuntu
```

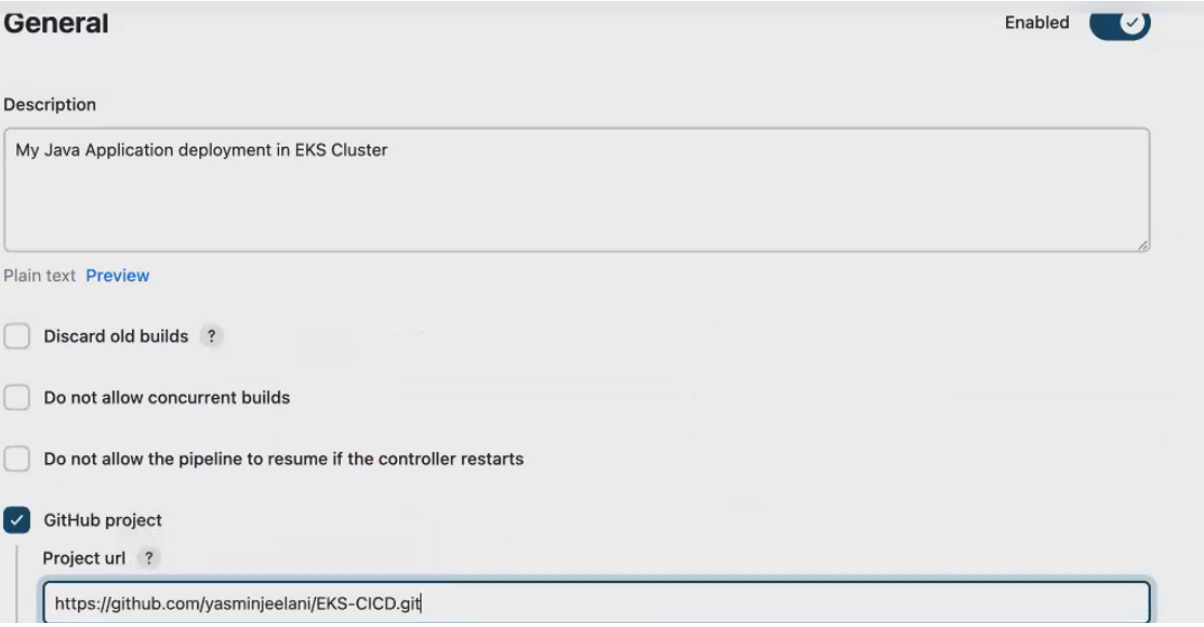
- after installing Docker, make sure you give permission for Jenkins and Ubuntu to the docker user.
- So you don't have to use the pseudo command to run your docker commands.

```
ubuntu@ip-172-31-42-111:~$ sudo systemctl restart jenkins
```

Create a pipeline in Jenkins:

Click build project





Later on do automation. don’t select poll scm

Pipeline

Definition

Pipeline script

Script ?

Hello World

```
pipeline {
    tools {
        maven Maven3
    }
    agent any
    environment {
        registry = "150878085644.dkr.ecr.ap-south-1.amazonaws.com/test"
    }

    stages {
        stage('Hello') {
            steps {
                echo 'Hello World'
            }
        }
```

1. tools

2. environment

3. stages

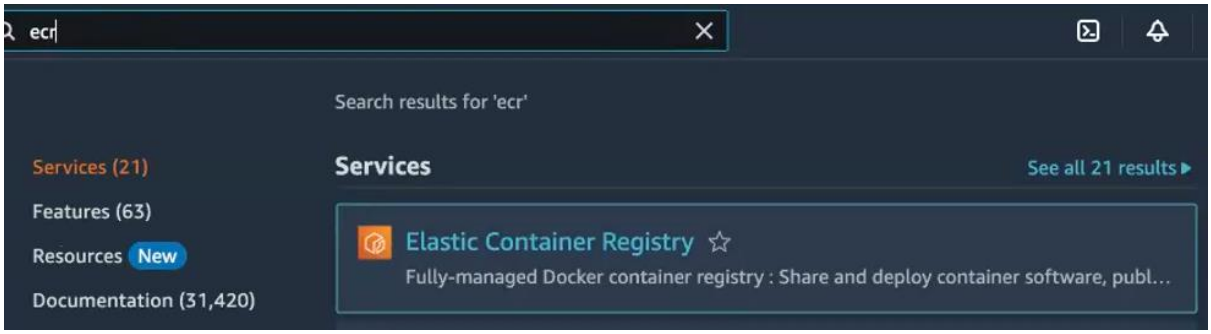
1st stage [checkout]

2nd stage [built the application using maven]

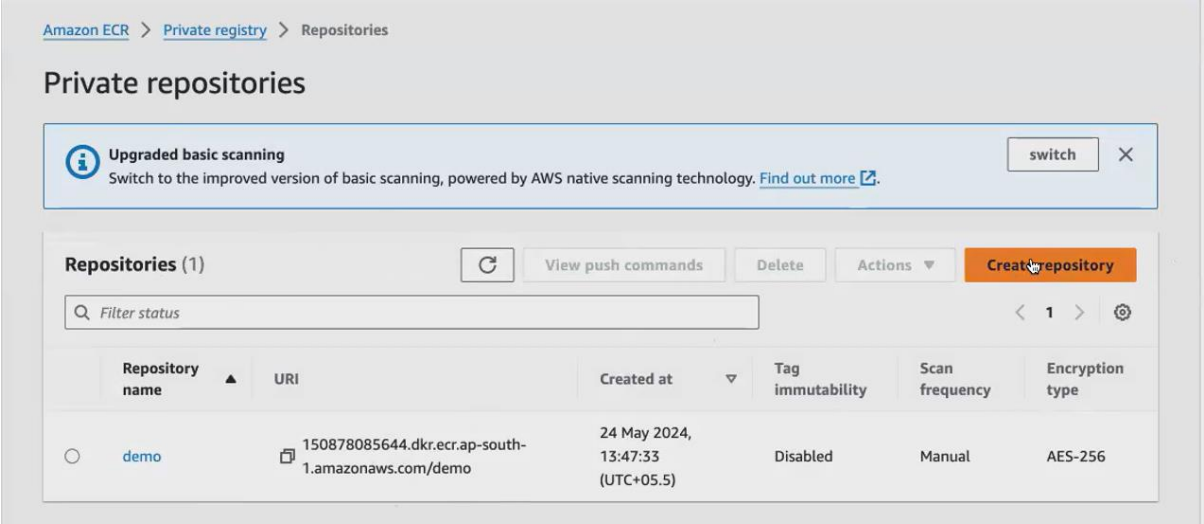
3rd stage [build docker]

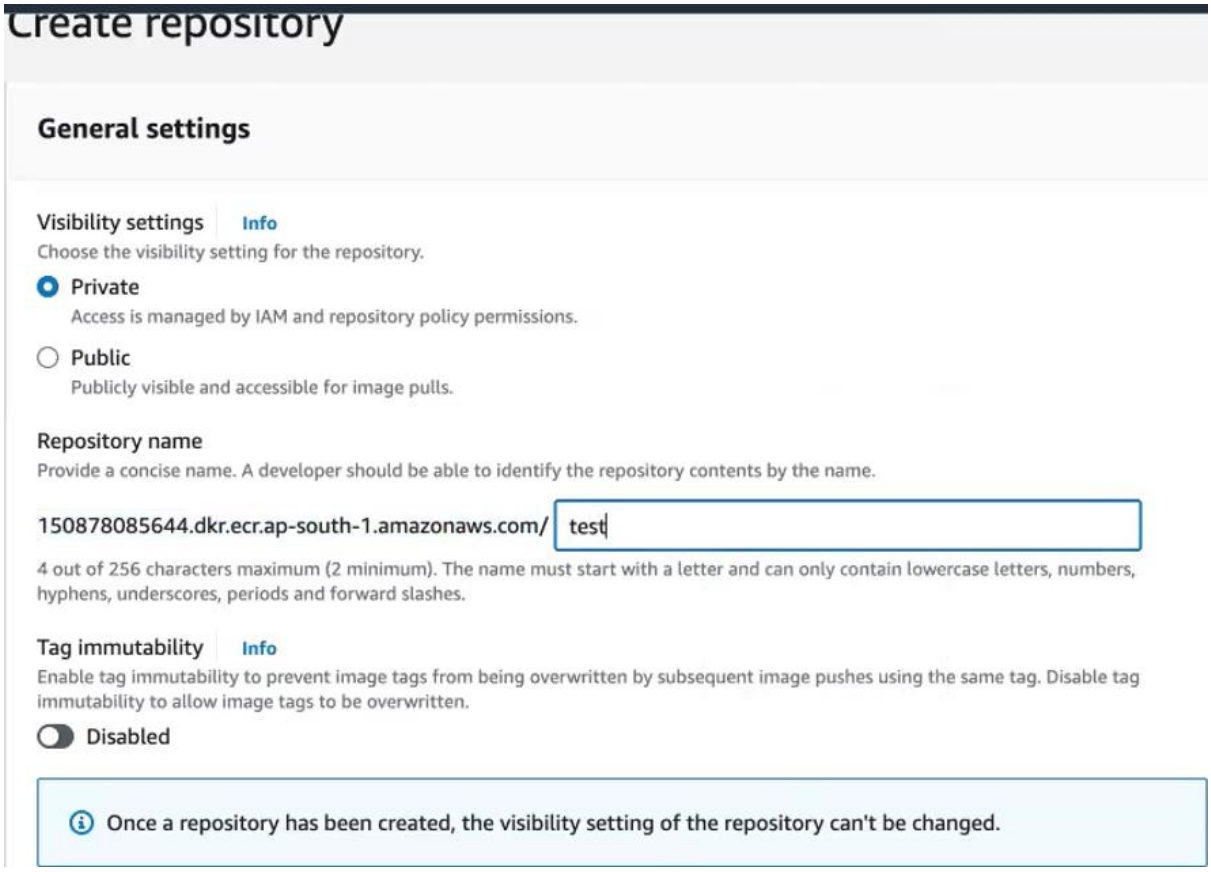
4th stage [push the docker image to ecr registry]

1. Your Jenkins file always starts with pipeline. And after the pipeline, what you need.
2. you have to before agent. Before you specify any agent here,
3. we will be specifying the tools. So here I'm using a tool called Maven. So here I'm using a tool called Maven, and I'm naming that tool as Maven 3.
4. I will tell you where to configure this, Maven 3. you have installed Maven in your Jenkins machine, and you should also bring that Plugin. You have to install that Plugin Maven Plugin to your Jenkins
5. next is the environment. So here I will be using my Ecr registry. Once the docker build is ready, once the docker is ready. Once your docker image is ready, we will be pushing the docker image to the Ecr registry.
6. So where you get the Ecr registry, you know, aws, you have something. You can also push it to your Docker Hub registry. But since we have already done it, we have already seen configuring the Doctor Hub registry without Jenkins.

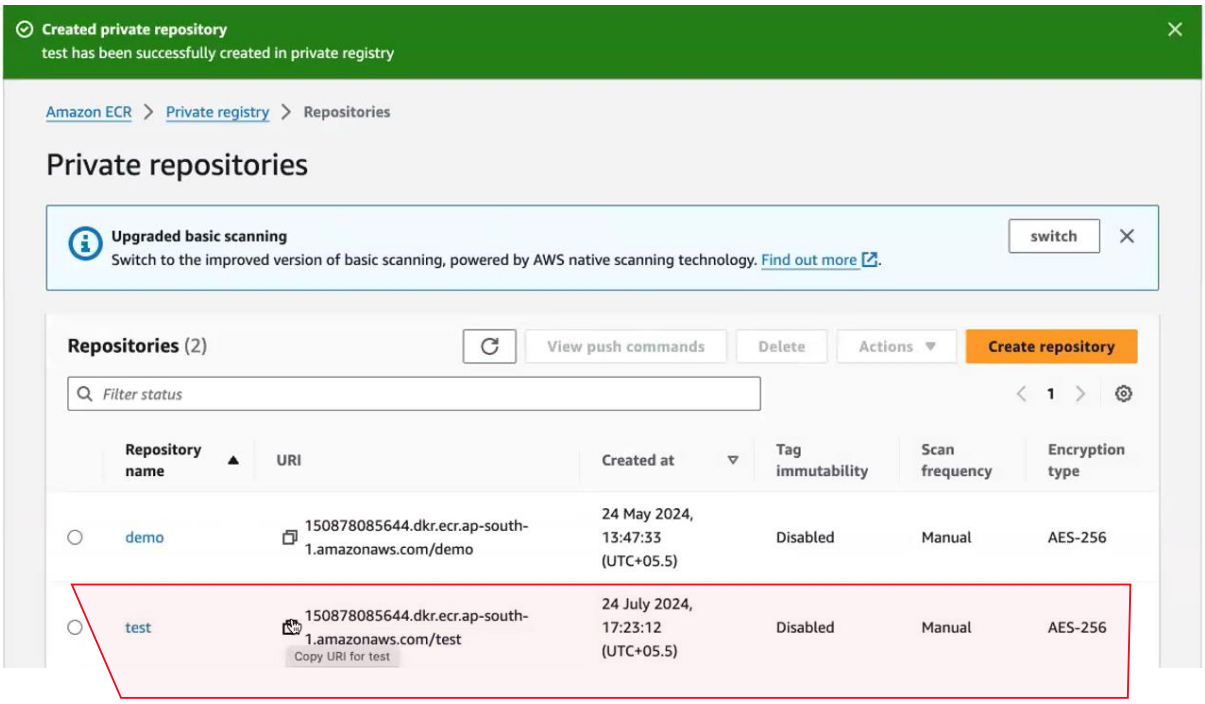


This is same as docker repository. We have push the docker image in this repo.

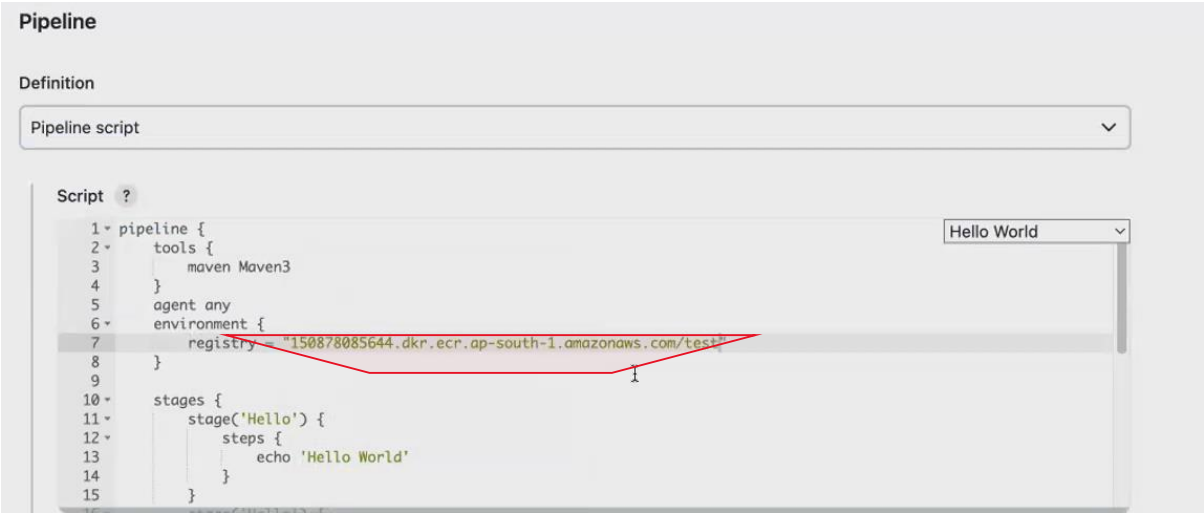


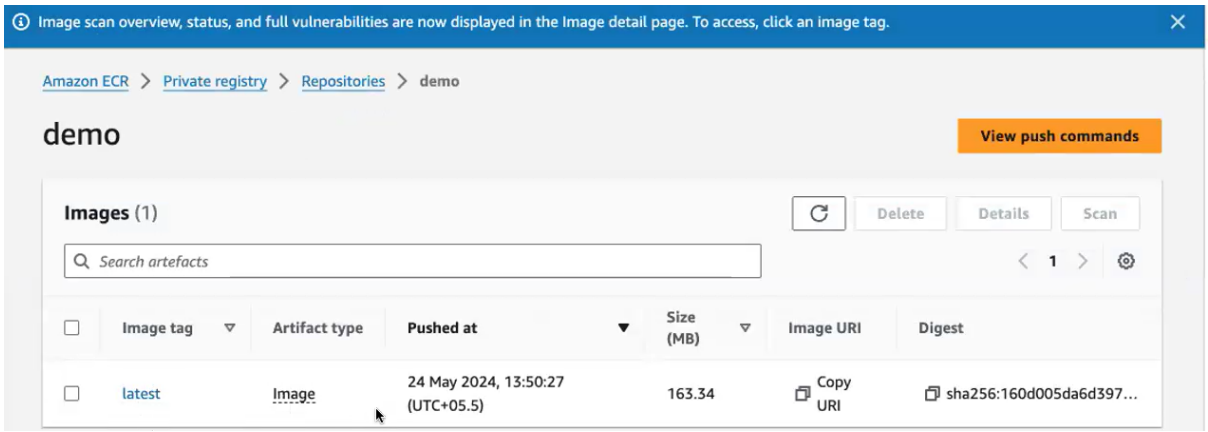


Click create repository



Copy the link and give it in Jenkins file.





7. So, you create a registry and you pass the URL or Ecr registry URL. Here. Okay, so to this registry we will be pushing our docker image.

1st stage [checkout]:

8. So what is the 1st stage? 1st is your checkout stage. 1st you have where to check out.
9. Your Jenkins has to fetch the code from the Github Repository. Okay, so here you have to give the checkout link.

How-to get this path .steps given below:

Script ?

Hello World

```
11      stage('Checkout Github') {
12          steps {
13              checkout scmGit(branches: [[name: '*/main']], extensions: [], userRemoteConfigs: [[url: 'https://git
14          }
15      }
16      stage('Hello') {
17          steps {
18              echo 'Hello World'
19          }
20      }
21      stage('Maven Build') {
22          steps {
23              echo 'Hello World'
24          }
25      }
```

Pipeline script

Script ?

Hello World

```
2       tools {
3           maven Maven3
4       }
5       agent any
6       environment {
7           registry = "150878085644.dkr.ecr.ap-south-1.amazonaws.com/test"
8       }
9
10      stages {
11          stage('Checkout Github') {
12              steps {
13                  echo 'Hello World'
14              }
15          }
16          stage('Hello') {
```

Use Groovy Sandbox ?

Pipeline Syntax

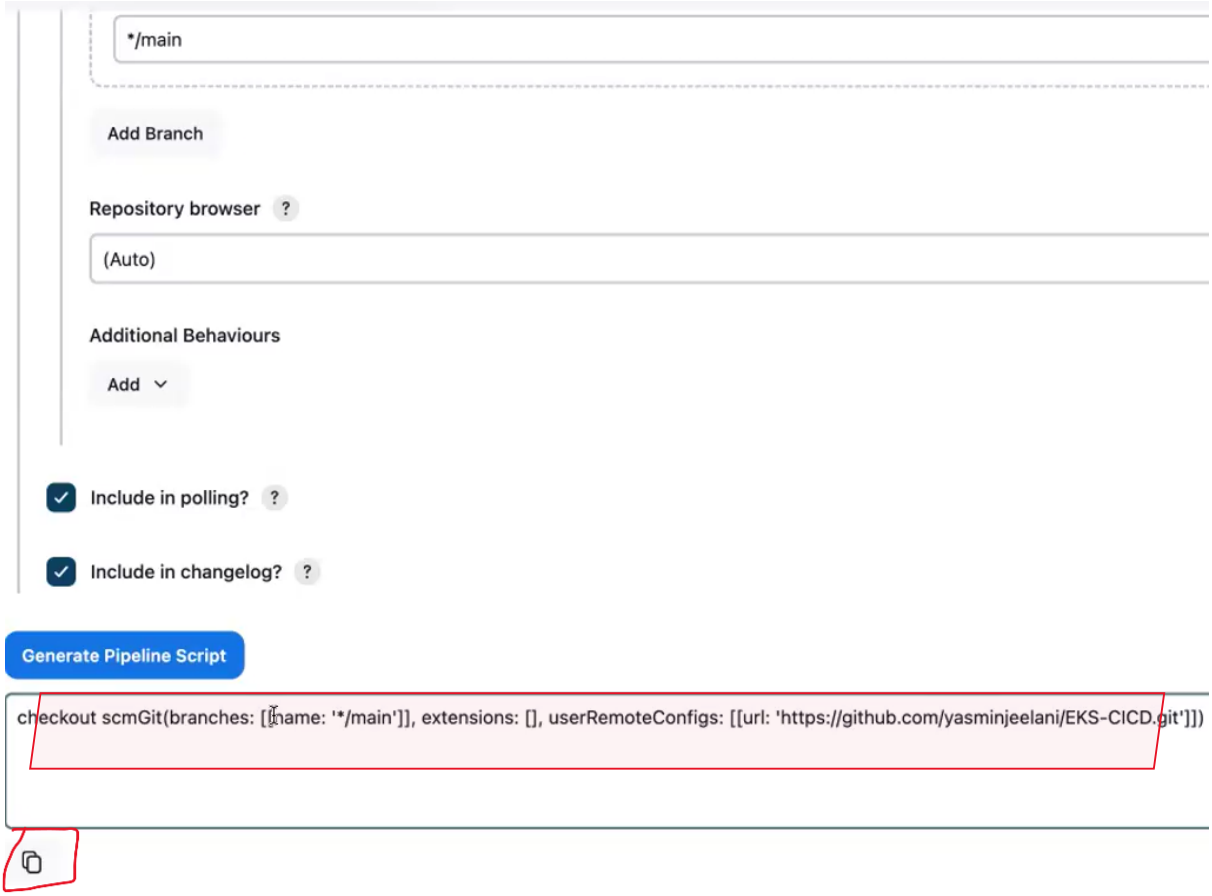
✓ archiveArtifacts: Archive the artifacts

bat: Windows Batch Script

build: Build a job

catchError: Catch error and set build result to failure

checkout: Check out from version control



Copy the path in 1st stage

2nd stage [build stage]:

- So, we will be building it using maven. So you have to perform a maven build.
- To perform Maven, build what you need. You have to integrate your Jenkins with Maven. Since you're already installed it. Okay, you have already installed Maven. I will just enable the main plugin and this Gui.

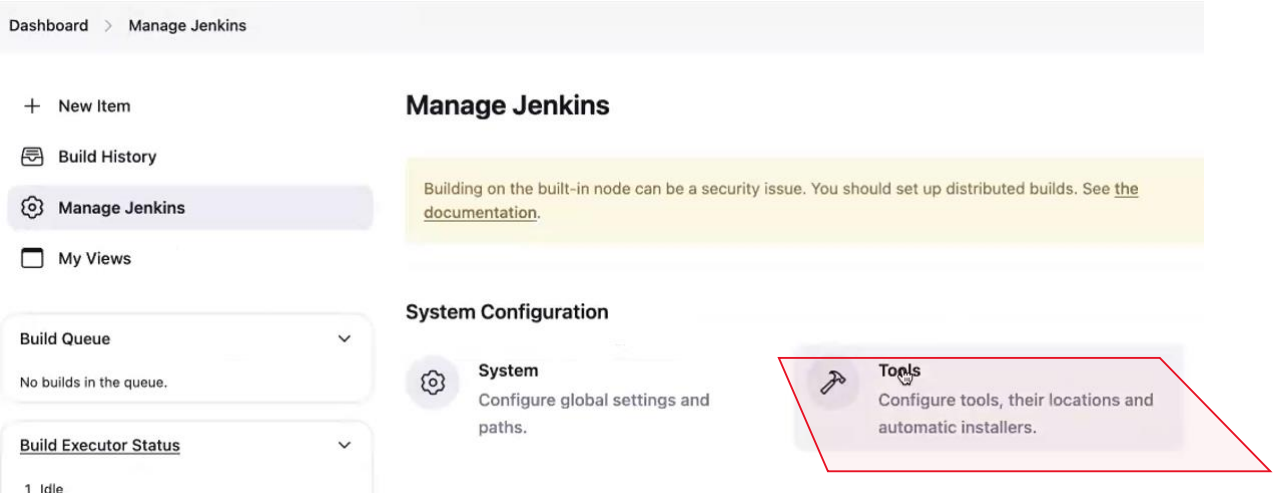
Script ?

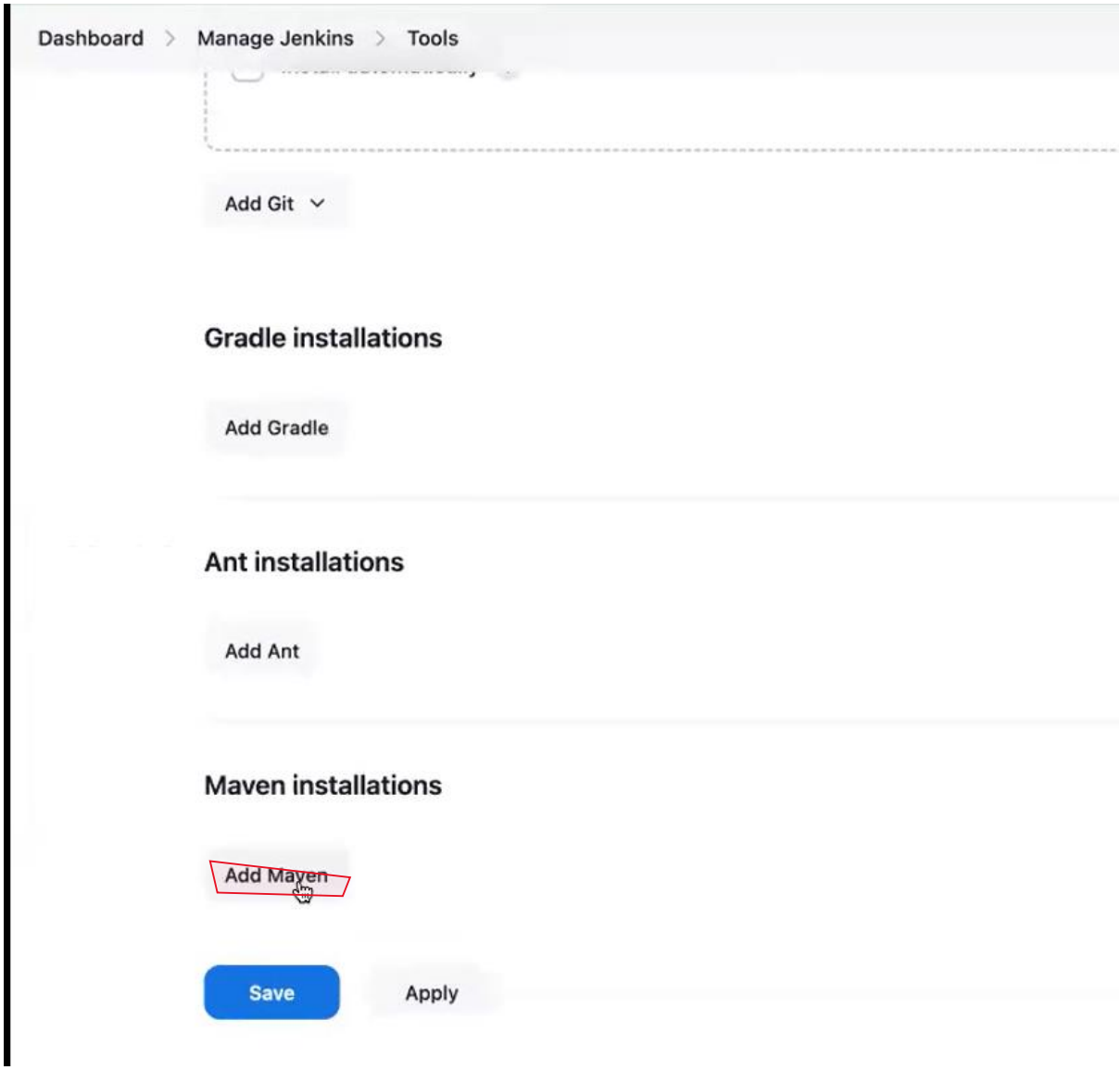
```
11      stage('Checkout Github') {
12          steps {
13              checkout scmGit(branches: [[name: '*/main']], extensions: [
14          }
15      }
16
17      stage('Maven Build') {
18          steps {
19              sh 'mvn clean package'
20          }
21      }
```

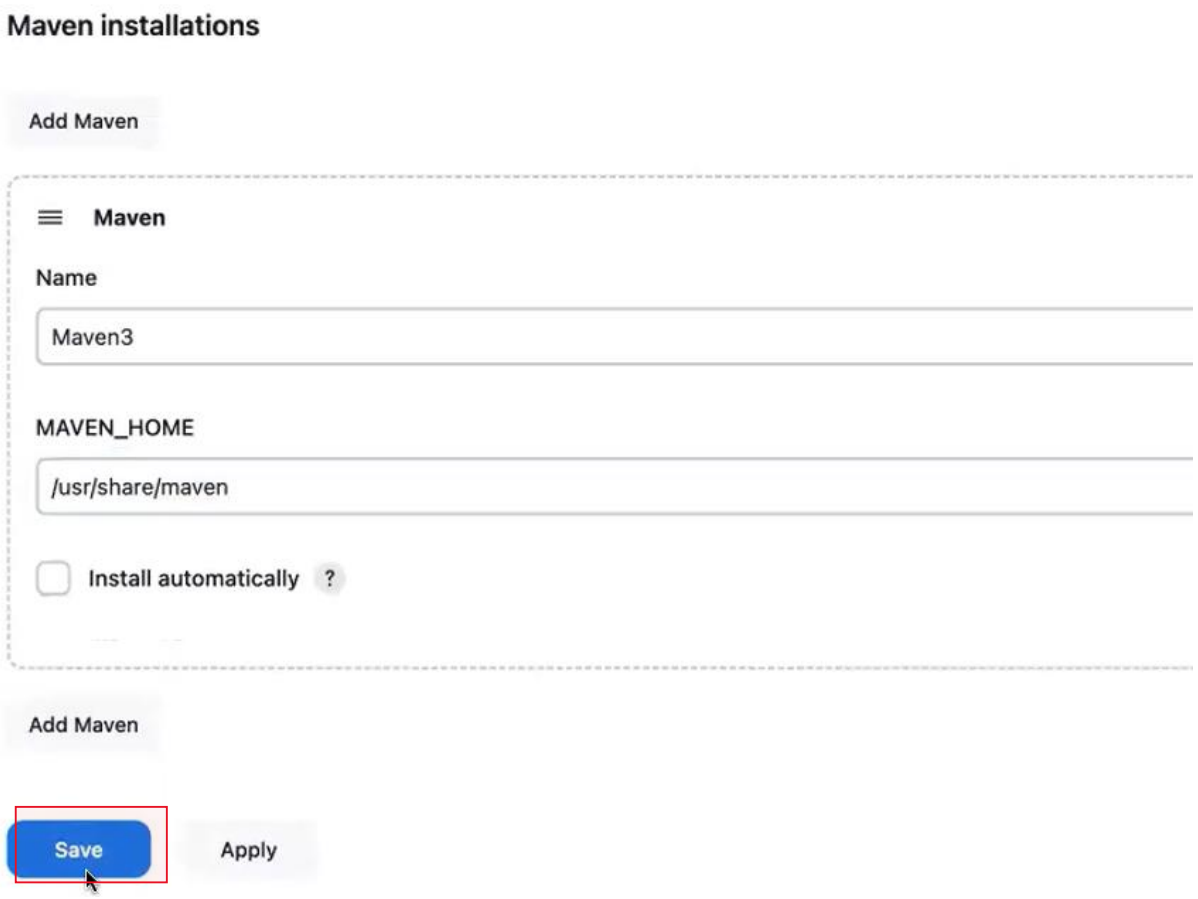
I've already installed. If you haven't installed Maven, you can give installed automatically, it will install it in your Jenkins instance.

Give maven plugin in Jenkins:

Open in new tab. set up the Maven tool in our Jenkins




Dashboard
Manage Jenkins
Tools
Add Git
Gradle installations
Add Gradle
Ant installations
Add Ant
Maven installations
Add Maven
Save
Apply



3rd stage [build docker]:

then we will be building the application using docker.

Instead to give docker image name give ecr registry

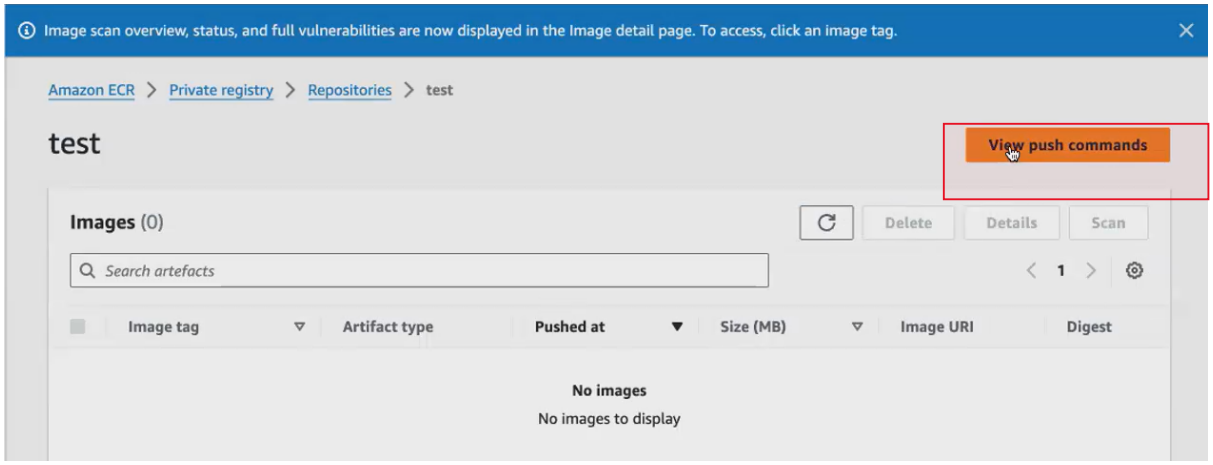
```
stage('Maven Build') {
    steps {
        sh 'mvn clean package'
    }
}
stage('Docker Build') {
    steps {
        sh 'docker build -t registry'
    }
}
```

4th stage [push the docker image to ecr registry]:

```
26        }
27        stage('Push Docker Image to ECR') {
28            steps {
29                sh 'docker build -t registry'
30            }
31        }
32    }
```

- so we will be pushing the docker image to the Ecr registry.
- So to before pushing your docker image to the docker hub registry. What do you do?
- You have to do a docker login
- after doing the docker login only we will be able to push the docker image to the docker Hub register.
- This Ecr belongs to Aws. It is. It doesn't belong to your docker hub. I
- it belongs to aws. So, using the Aws cli command, you will be logging into the Ecr registry after successful logging to ecr registry.
- you will be pushing your application; you will be pushing your docker image to the Ecr registry.

Docker login:



Make sure that you have the latest version of the AWS CLI and Docker installed. For more information, see Getting started with Amazon ECR.

Use the following steps to authenticate and push an image to your repository. For additional registry authentication methods, including the Amazon ECR credential helper, see Registry authentication.

1. Retrieve an authentication token and authenticate your Docker client to your registry. Use the AWS CLI:

```
aws ecr get-login-password --region ap-south-1 | docker login --username AWS --password-stdin
150878085644.dkr.ecr.ap-south-1.amazonaws.com
```

Copy and paste the login in Jenkins file

Docker build already given.

Docker push command copy and paste it in Jenkins file

4. Run the following command to push this image to your newly created AWS repository:

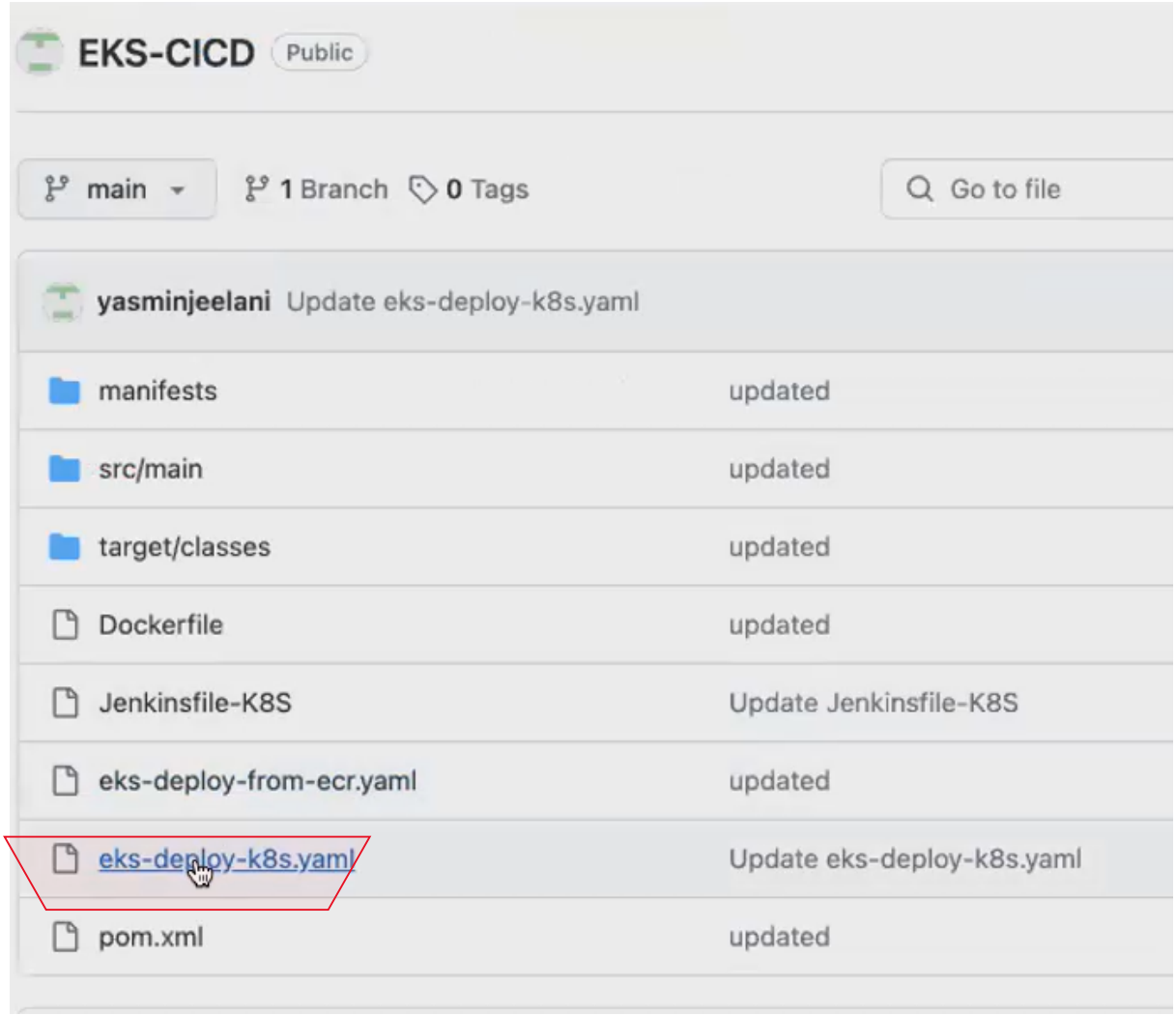
```
docker push 150878085644.dkr.ecr.ap-south-1.amazonaws.com/test:latest
```

Hello World

```
stage('Docker Build') {
    steps {
        sh 'docker build -t registry'
    }
}
stage('Push Docker Image to ECR') {
    steps {
        sh 'aws ecr get-login-password --region ap-south-1 | docker login --username AWS --password-stdin 150878
        sh 'docker push 150878085644.dkr.ecr.ap-south-1.amazonaws.com/test:latest'
    }
}
```

5th stage [deploying the application to the Kubernetes cluster]:

For deployment we have deployment file.in github Yasmin have deployment file and service file in single file. **Service file used to access the application via browser.**


EKS-CICD
Public
main
1 Branch
0 Tags
Go to file
yasminjeelani Update eks-deploy-k8s.yaml
manifests
updated
src/main
updated
target/classes
updated
Dockerfile
updated
Jenkinsfile-K8S
Update Jenkinsfile-K8S
eks-deploy-from-ecr.yaml
updated
eks-deploy-k8s.yaml
Update eks-deploy-k8s.yaml
pom.xml
updated

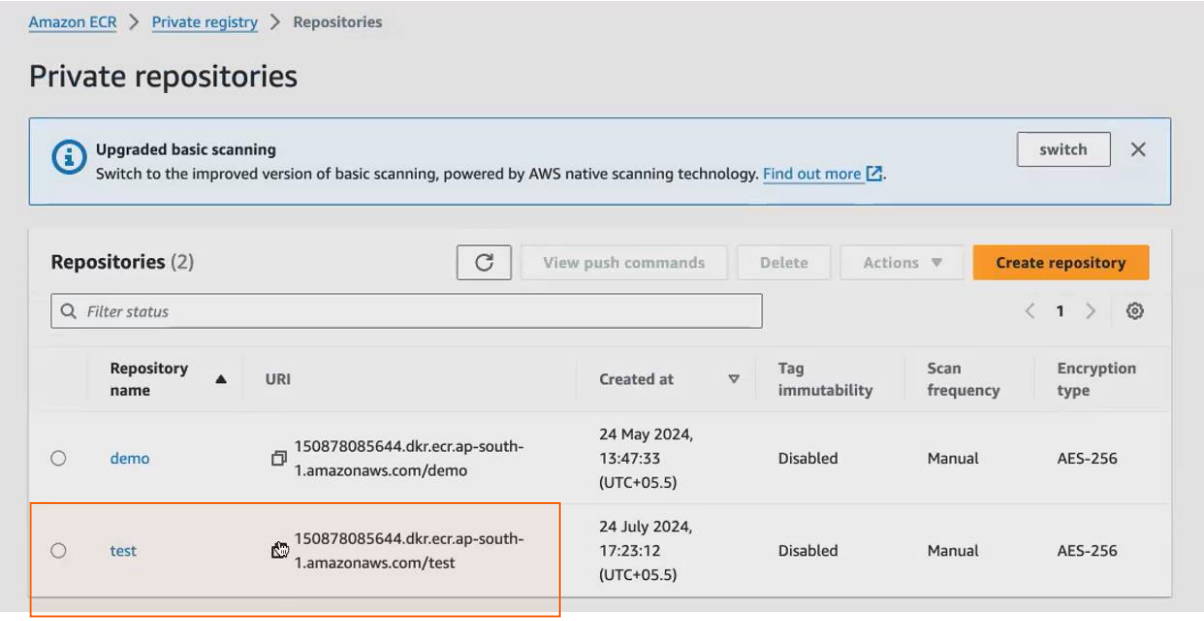
Both files separated by ---

main EKS-CICD / eks-deploy-k8s.yaml

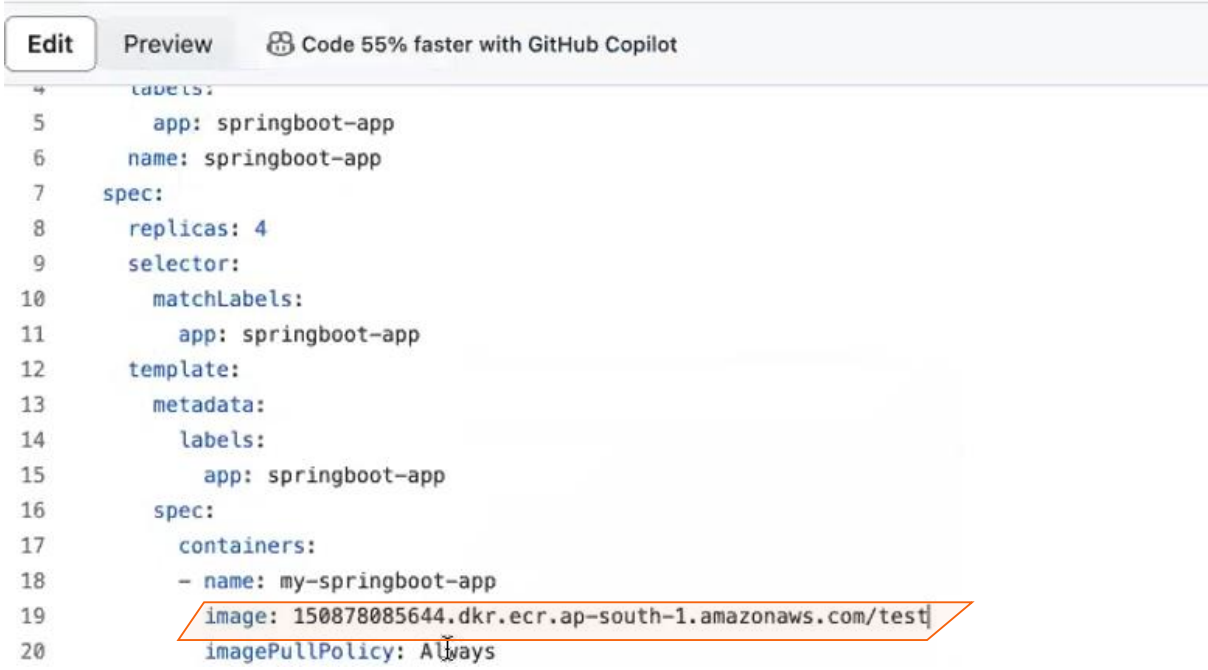
Code Blame 42 lines (42 loc) · 775 Bytes Code 55% faster with GitHub Copilot

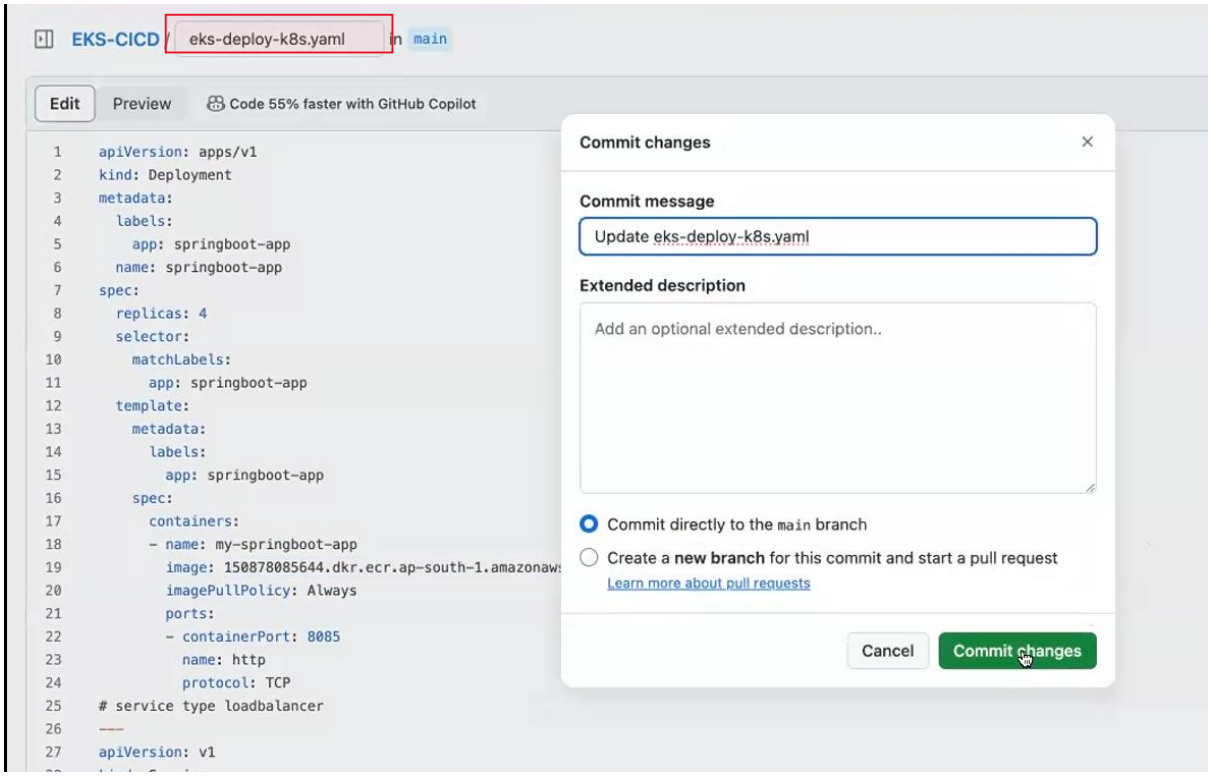
```yaml
      app: springboot-app
  template:
    metadata:
      labels:
        app: springboot-app
    spec:
      containers:
      - name: my-springboot-app
        image: public.ecr.aws/r1g5u8w6/demo
        imagePullPolicy: Always
        ports:
        - containerPort: 8085
          name: http
          protocol: TCP
# service type loadbalancer
---
apiVersion: v1
kind: Service
metadata:
  labels:
    app: springboot-app
    k8s-app: springboot-app
  name: springboot-app
spec:
  ports:
  - name: http
    port: 80
    protocol: TCP
    targetPort: 8085
  type: LoadBalancer
  selector:
    app: springboot-app
```

- **Docker image and you have pushed it to the Ecr registry. Assume that inside this registry you have your docker image.**

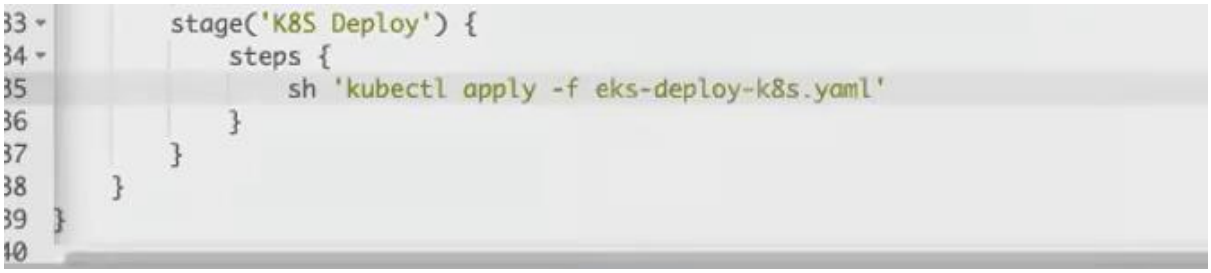


- **copy this registry name. Go to your deployment file and paste it here.**





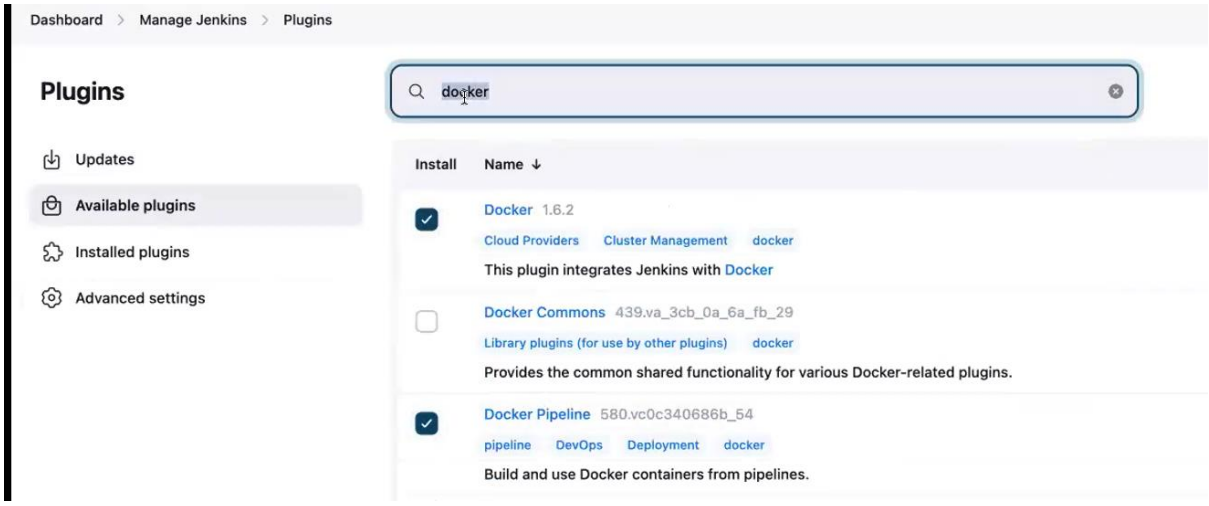
Then give the deployment command with deployment file name [eks-deploy-k8s.yaml]

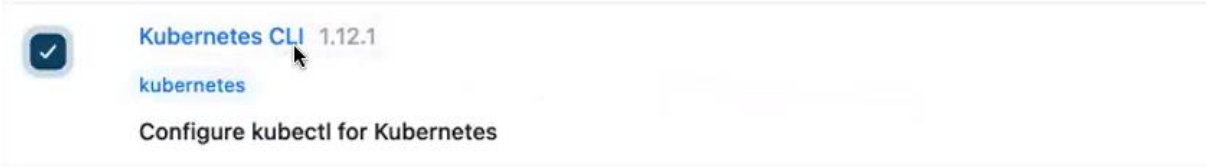


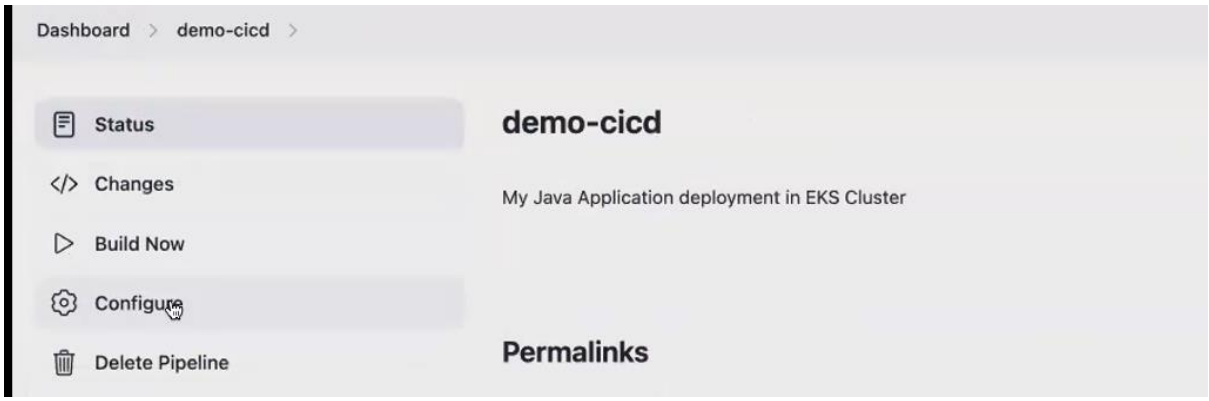
Let save this file

Install plugins

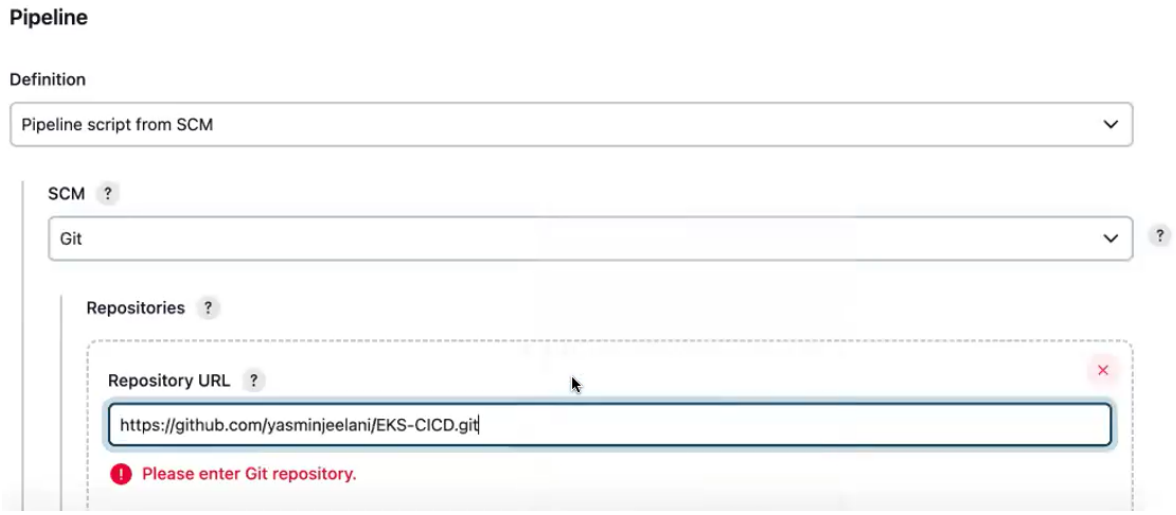
Goto dashboard → manage Jenkins→plugins→ available Jenkins→search docker and Kubernetes cli →select this 2 →click install







We write the Jenkins file in github only.in Jenkins page it's not recommended .so select pipeline script from scm[source code management]



Branch Specifier (blank for 'any') ?

*/main

Add Branch

Repository browser ?

(Auto)

Additional Behaviours

Add

Script Path ?

Jenkinsfile-K8S

Lightweight checkout ?

Pipeline Syntax

Save Apply

Status

Changes

Build scheduled

Build Now

Configure

demo-cicd

My Java Application deployment in EKS Cluster

```
+ kubectl apply -f eks-deploy-k8s.yaml
deployment.apps/springboot-app created
service/springboot-app created
[Pipeline] }
[Pipeline] // script
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

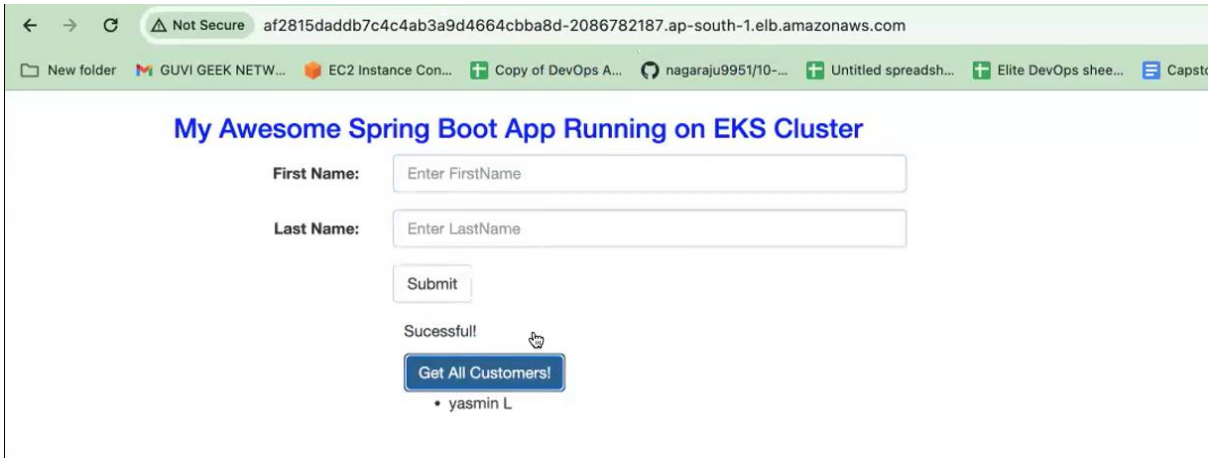
```
ubuntu@ip-172-31-42-111:~$ sudo su - jenkins
jenkins@ip-172-31-42-111:~$ kubectl get all
NAME                                  READY   STATUS    RESTARTS   AGE
pod/springboot-app-789989b54-6vc44    1/1     Running   0          4m1s
pod/springboot-app-789989b54-8pzh7    1/1     Running   0          4m1s
pod/springboot-app-789989b54-nq9hs    1/1     Running   0          4m1s
pod/springboot-app-789989b54-r7xk8    1/1     Running   0          4m1s

NAME                     TYPE           CLUSTER-IP     EXTERNAL-IP
service/kubernetes       ClusterIP      10.100.0.1     <none>
service/springboot-app   LoadBalancer   10.100.63.90   af2815daddb7c4c4ab3a9d4664cbba8d-

NAME                              READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/springboot-app    4/4     4            4           4m1s

NAME                                         DESIRED   CURRENT   READY   AGE
replicaset.apps/springboot-app-789989b54     4         4         4       4m1s
jenkins@ip-172-31-42-111:~$
```

Copy the load balancer ip and paste it in browser


Not Secure
af2815daddb7c4ab3a9d4664cbba8d-2086782187.ap-south-1.elb.amazonaws.com
New folder
GUVI GEEK NETW...
EC2 Instance Con...
Copy of DevOps A...
nagaraju9951/10-...
Untitled spreadsh...
Elite DevOps shee...
My Awesome Spring Boot App Running on EKS Cluster
First Name:
Enter FirstName
Last Name:
Enter LastName
Submit
Sucessful!
Get All Customers!
yasmin L

In Jenkins file:

Instead of giving docker build -t my docker image name I have given as docker.dot build.

So docker.build is nothing but a docker plugin.

Okay, you install docker pipeline. if you have installed docker pipeline, you can simply give docker plugins will be enabled in your Jenkins. You can simply use this function. Docker.build what will happen? It will by default it will execute your docker build command.

main EKS-CICD / Jenkinsfile-K8S

Blame 53 lines (45 loc) · 1.32 KB Code 55% faster with GitHub Copilot

```
}
agent any
environment {
    registry = "150878085644.dkr.ecr.ap-south-1.amazonaws.com/test"
}

stages {
    stage('Cloning Git') {
        steps {
            checkout([$class: 'GitSCM', branches: [[name: '*/main']], doGenerateSubmoduleConfigurations: false, e
        }
    }
  stage ('Build') {
      steps {
        sh 'mvn clean install'
        }
  }
// Building Docker images
stage('Building image') {
  steps{
    script {
      dockerImage = docker.build registry
    }
  }
}
```

- **Mvn claen - mvn clean package command. Okay, what the mvn clean will do. It will remove the target folder. It will remove all the jar file. That is that it got created previously, and it will freshly create the artifact.**
- **So now, this artifact will be inside of Ec2.**

```
Started by user admin
Obtained Jenkinsfile-K8S from git https://github.com/yasminjeelani/EKS-CICD.git
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in /var/lib/jenkins/workspace/demo-cicd
```

Everything done in this work folder.

```
buntu@ip-172-31-42-111:~$ cd /var/lib/jenkins/workspace/demo-cicd
buntu@ip-172-31-42-111:/var/lib/jenkins/workspace/demo-cicd$ ls
ockerfile  Jenkinsfile-K8S  eks-deploy-from-ecr.yaml  eks-deploy-k8s.yaml  manifests  pom.xml  src  target
buntu@ip-172-31-42-111:/var/lib/jenkins/workspace/demo-cicd$ cd target/
buntu@ip-172-31-42-111:/var/lib/jenkins/workspace/demo-cicd/target$ ls
lasses  generated-sources  maven-archiver  maven-status  springbootApp.jar  springbootApp.jar.original
buntu@ip-172-31-42-111:/var/lib/jenkins/workspace/demo-cicd/target$
```

main EKS-CICD / Jenkinsfile-K8S

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```
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    environment {
        registry = "150878085644.dkr.ecr.ap-south-1.amazonaws.com/test"
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          steps {
            sh 'mvn clean install'
            }
      }
    // Building Docker images
    stage('Building image') {
      steps{
        script {
          dockerImage = docker.build registry
        }
      }
    }
```

Repo Link -

https://github.com/yasminjeelani/EKS-CICD.git

repo link for full devops course—

https://github.com/zen-class/zen-class-devops-documentation

documentation for this application by Yasmin--

https://docs.google.com/document/d/1Is4h94KVFliaNxSuBZX9Spui98CYiFOIawjLfYa3wBU/edit