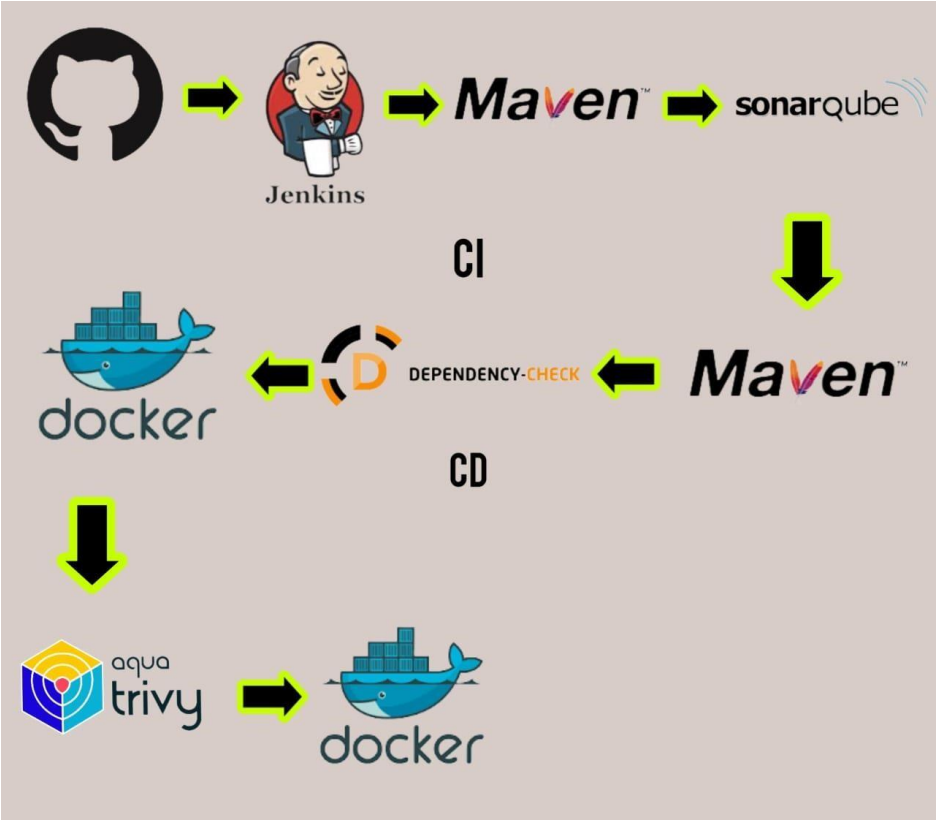
PROJECT – 3

COURSE: DEVOPS

MODULE: Docker Automation

TRAINER: Mr. MADHUKAR



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Project Repo: https://github.com/Venn1991/jpetstore-6.git

Steps:-

Step 1 — Create an Ubuntu(22.04) T2 Large Instance

Step 2 — Install Jenkins, Docker and Trivy. Create a SonarQube Container using Docker.

Step 3 — Install Plugins like JDK, SonarQube Scanner, Maven, and OWASP Dependency Check.

Step 4 — Create a Pipeline Project in Jenkins using a Declarative Pipeline

Step 5 — Install OWASP Dependency Check Plugins

Step 6 — Docker Image Build and Push

Step 7 — Scan image using Trivy

Step 8 — Deploy the image using Docker Step

9 — Access the Real-World Application

Step 10 — Terminate the AWS EC2 Instances.

STEP1: Create an Ubuntu (22.04) T2 Large Instance

Launch an AWS T2 Large Instance. Use the image as Ubuntu. You can create a new key pair or use an existing one. Enable HTTP and HTTPS settings in the Security Group and open all ports (not best case to open all ports but just for learning purposes it's okay).

Create AWS instance and connect to web server:

- First enter into AWS console login page.
- Login into AWS account.
- Select Ec2 service in AWS account.
- Create new instance by click on launch instance.
- Give name, select ubuntu, select T2 large and keypair name click on launch instance.

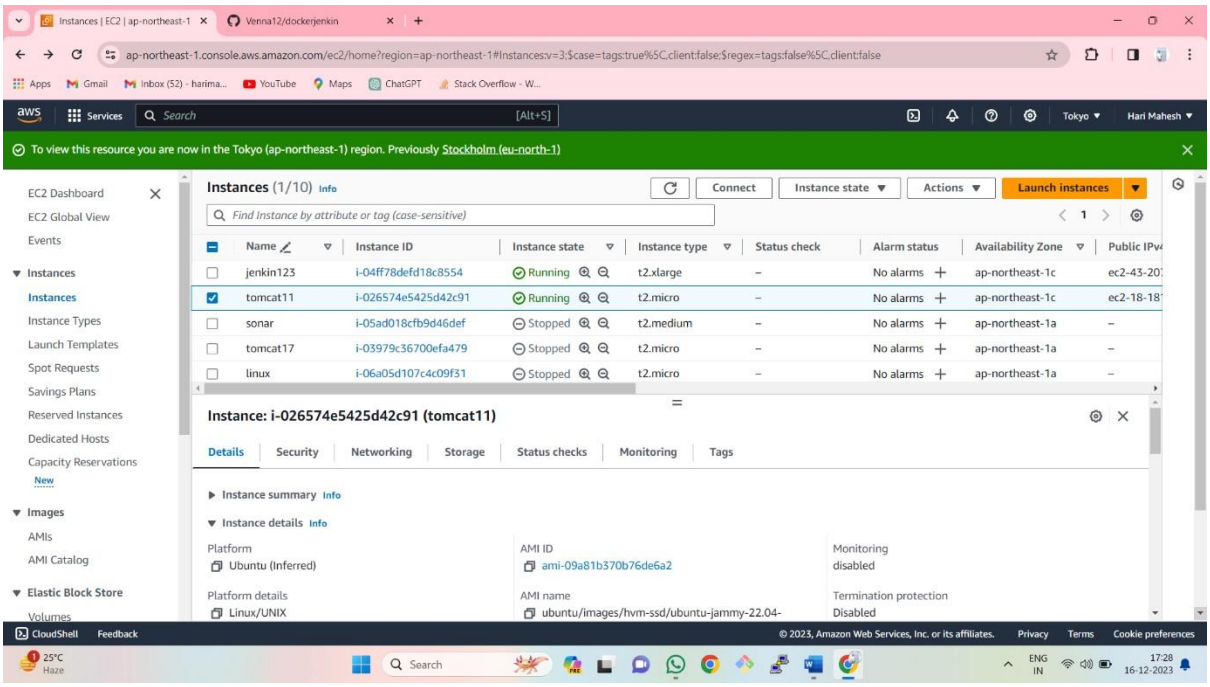
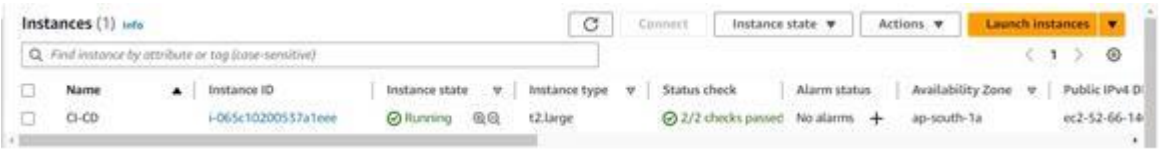


Fig.1 After completing launch instance.



- After launch instance click on connect then it enters into web server.
- After enter into server the window looks like above.
- To convert root user, enter sudo -i.

Step 2 — Install Jenkins, Docker and Trivy

2A — To Install Jenkins

Connect to your console, and enter these commands to Install Jenkins

vi jenkins.sh

#!/bin/bash sudo apt

update -y #sudo apt

upgrade -y

wget -O - https://packages.adoptium.net/artifactory/api/gpg/key/public | tee /etc/apt/keyrings/adoptium.asc

echo "deb [signed-by=/etc/apt/keyrings/adoptium.asc] https://packages.adoptium.net/artifactory/deb $(awk -F= '/^VERSION_CODENAME/{print$2}' /etc/os-release) main" | tee /etc/apt/sources.list.d/adoptium.list

sudo apt update -y

sudo apt install temurin-17-jdk -y

sudo apt install maven -y /usr/bin/java

--version

**curl -fsSL https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key | sudo tee **

/usr/share/keyrings/jenkins-keyring.asc > /dev/null 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 -y

sudo apt-get install jenkins -y

sudo systemctl start jenkins sudo

systemctl status Jenkins sudo

chmod 777 jenkins.sh

./jenkins.sh # this will installl Jenkins

Once Jenkins is installed, you will need to go to your AWS EC2 Security Group and open Inbound Port 8080, since Jenkins works on Port 8080.

But for this Application case, we are running Jenkins on another port. so change the port to 8090 using the below commands.

sudo systemctl stop jenkins

sudo systemctl status jenkins cd

/etc/default

sudo vi jenkins #chnage port HTTP_PORT=8090 and save and exit cd

/lib/systemd/system

sudo vi jenkins.service #change Environments="Jenkins_port=8090" save and exit

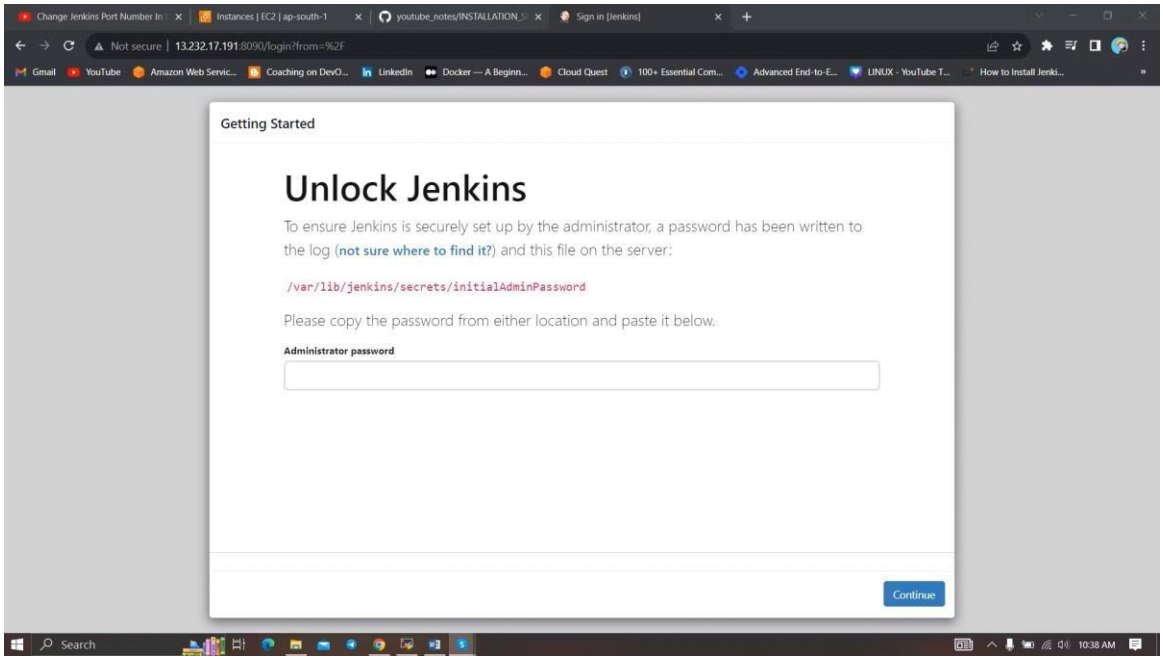
sudo systemctl daemon-reload sudo systemctl restart jenkins sudo systemctl status

Jenkins

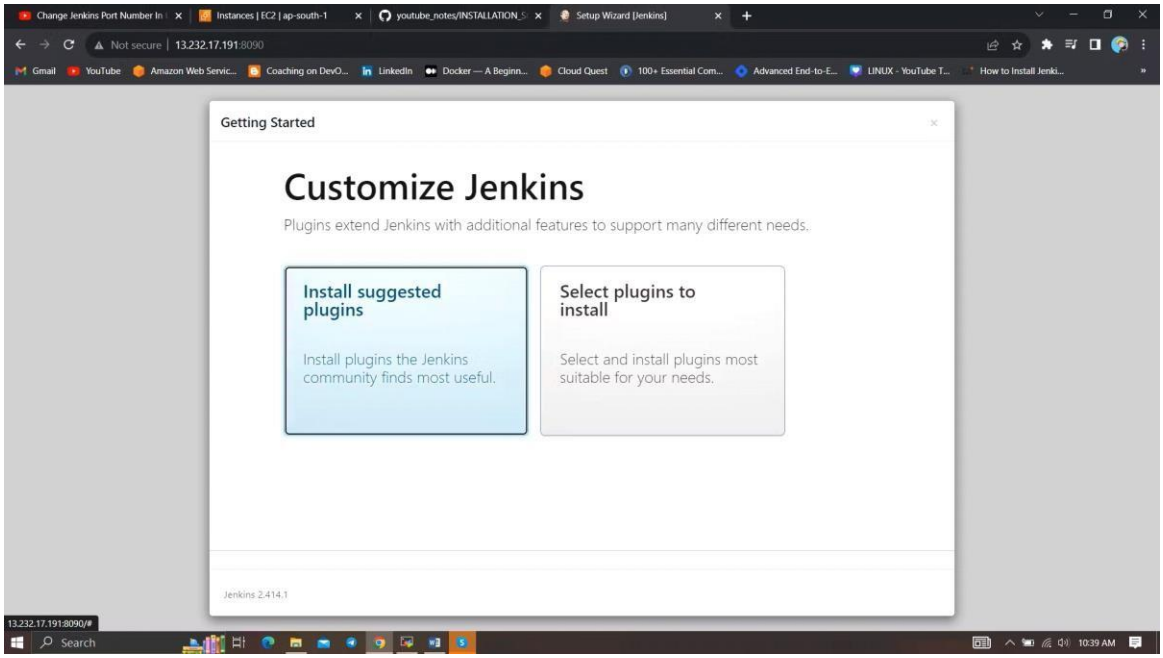
Now, grab your Public IP Address

<EC2 Public IP Address:8090>

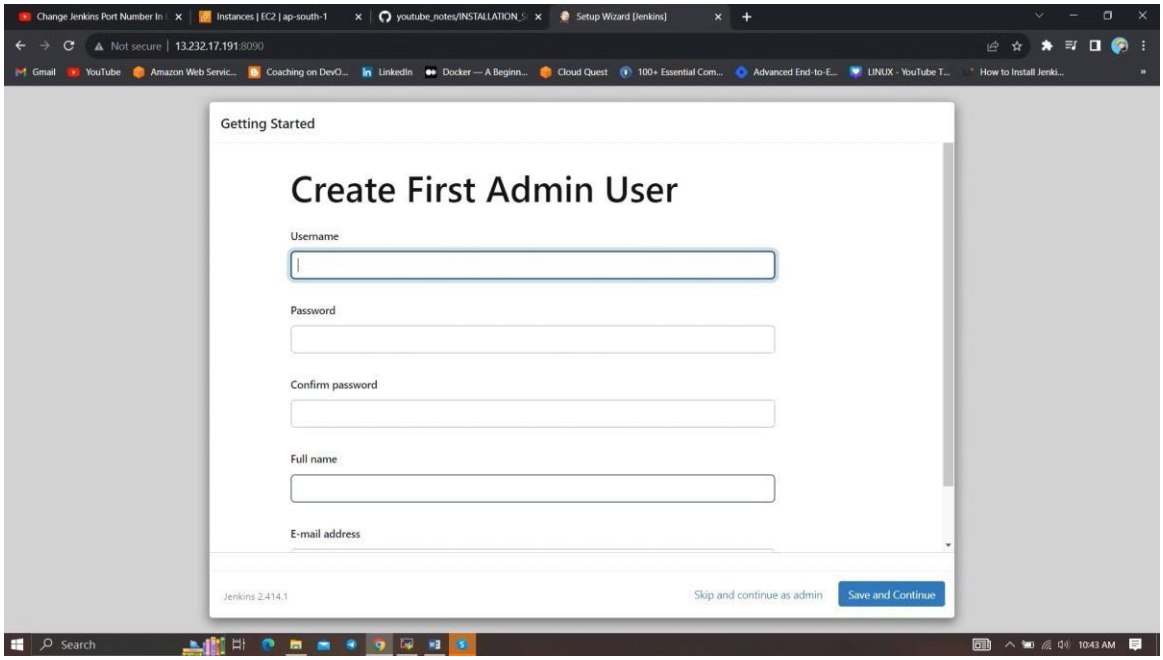
sudo cat /var/lib/jenkins/secrets/initialAdminPassword



Unlock Jenkins using an administrative password and install the suggested plugins.

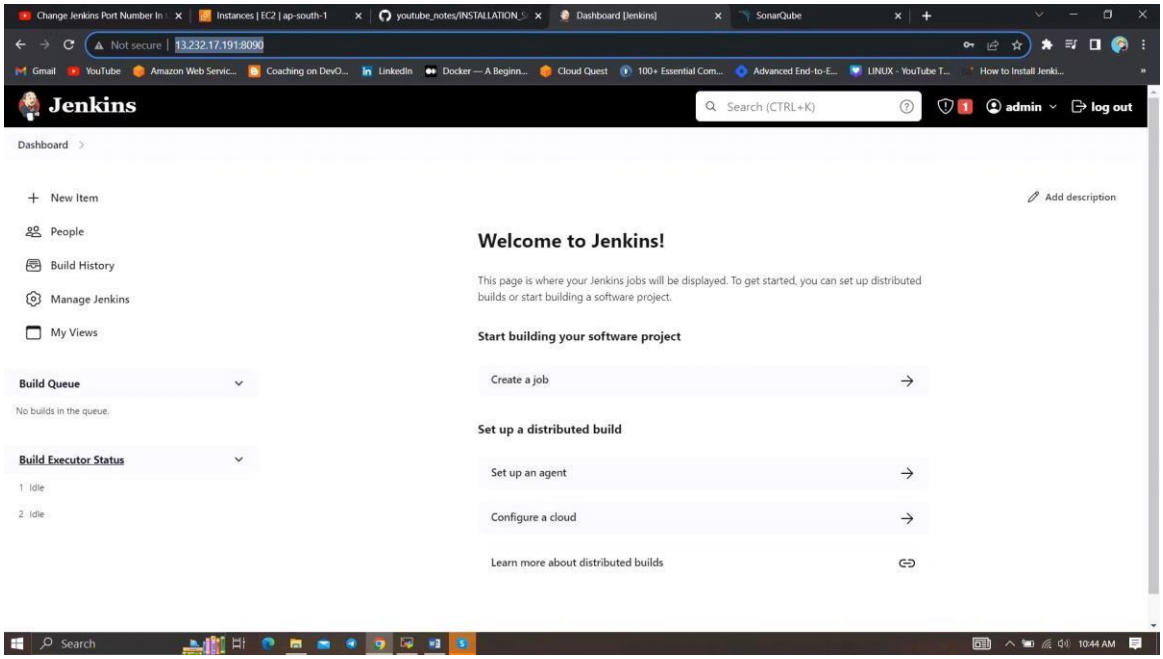


Jenkins will now get installed and install all the libraries.



Create a user click on save and continue.

Jenkins Getting Started Screen.



2B — Install Docker

sudo apt-get update sudo apt-

get install docker.io -y

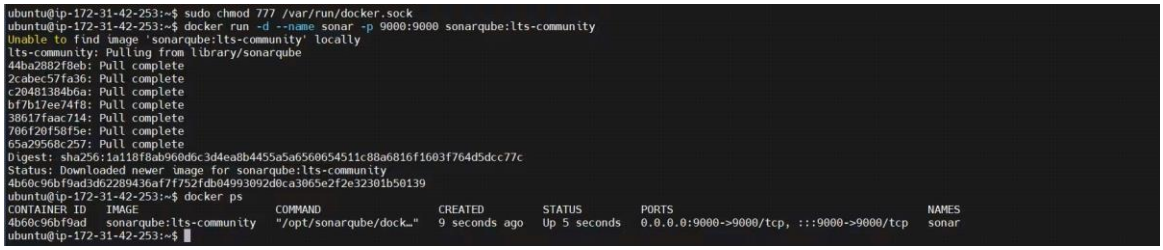
sudo usermod -aG docker $USER #my case is ubuntu newgrp

docker

sudo chmod 777 /var/run/docker.sock

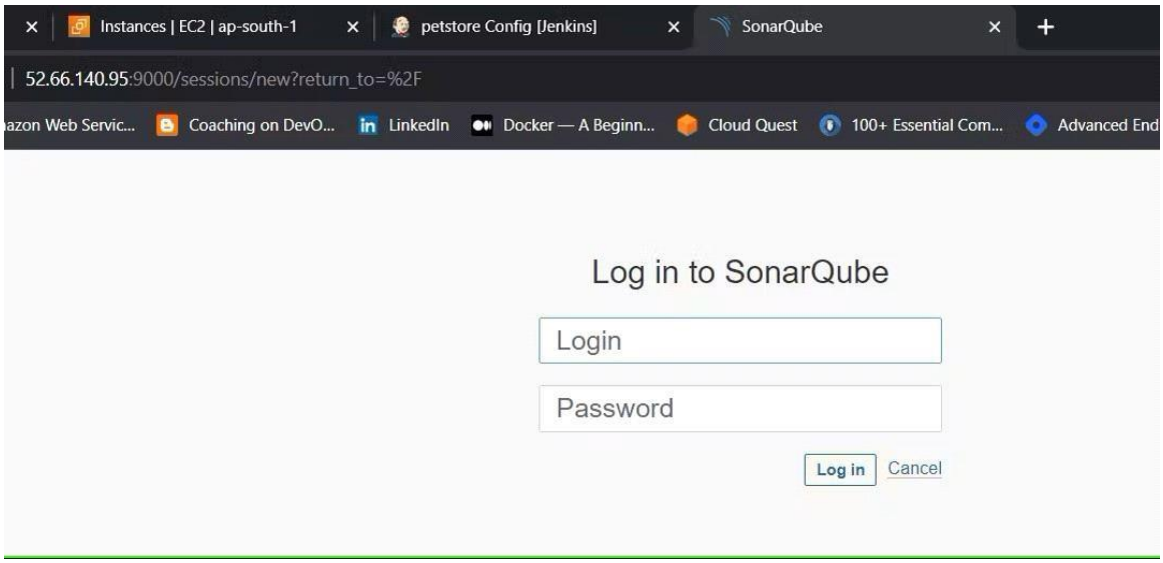
After the docker installation, we create a sonarqube container (Remember added 9000 ports in the security group

docker run -d --name sonar -p 9000:9000 sonarqube:lts-community



```
ubuntu@ip-172-31-42-253:~$ sudo chmod 777 /var/run/docker.sock
ubuntu@ip-172-31-42-253:~$ docker run -d --name sonar -p 9000:9000 sonarqube:lts-community
Unable to find image 'sonarqube:lts-community' locally
lts-community: Pulling from library/sonarqube
44ba2882f8eb: Pull complete
2cabec57fa36: Pull complete
c20481384b6a: Pull complete
bf7b17ee74f8: Pull complete
38617faac714: Pull complete
706f20f58f5e: Pull complete
65a29568c257: Pull complete
Digest: sha256:1a118f8ab960d6c3d4ea8b4455a5a6560654511c88a6816f1603f764d5dcc77c
Status: Downloaded newer image for sonarqube:lts-community
4b60c96bf9ad3d62289436af7f752fdb04993092d0ca3065e2f2e32301b50139
ubuntu@ip-172-31-42-253:~$ docker ps
CONTAINER ID   IMAGE                  COMMAND                  CREATED         STATUS         PORTS                                          NAMES
4b60c96bf9ad   sonarqube:lts-community   "/opt/sonarqube/dock…"   9 seconds ago   Up 5 seconds   0.0.0.0:9000->9000/tcp, :::9000->9000/tcp   sonar
ubuntu@ip-172-31-42-253:~$
```

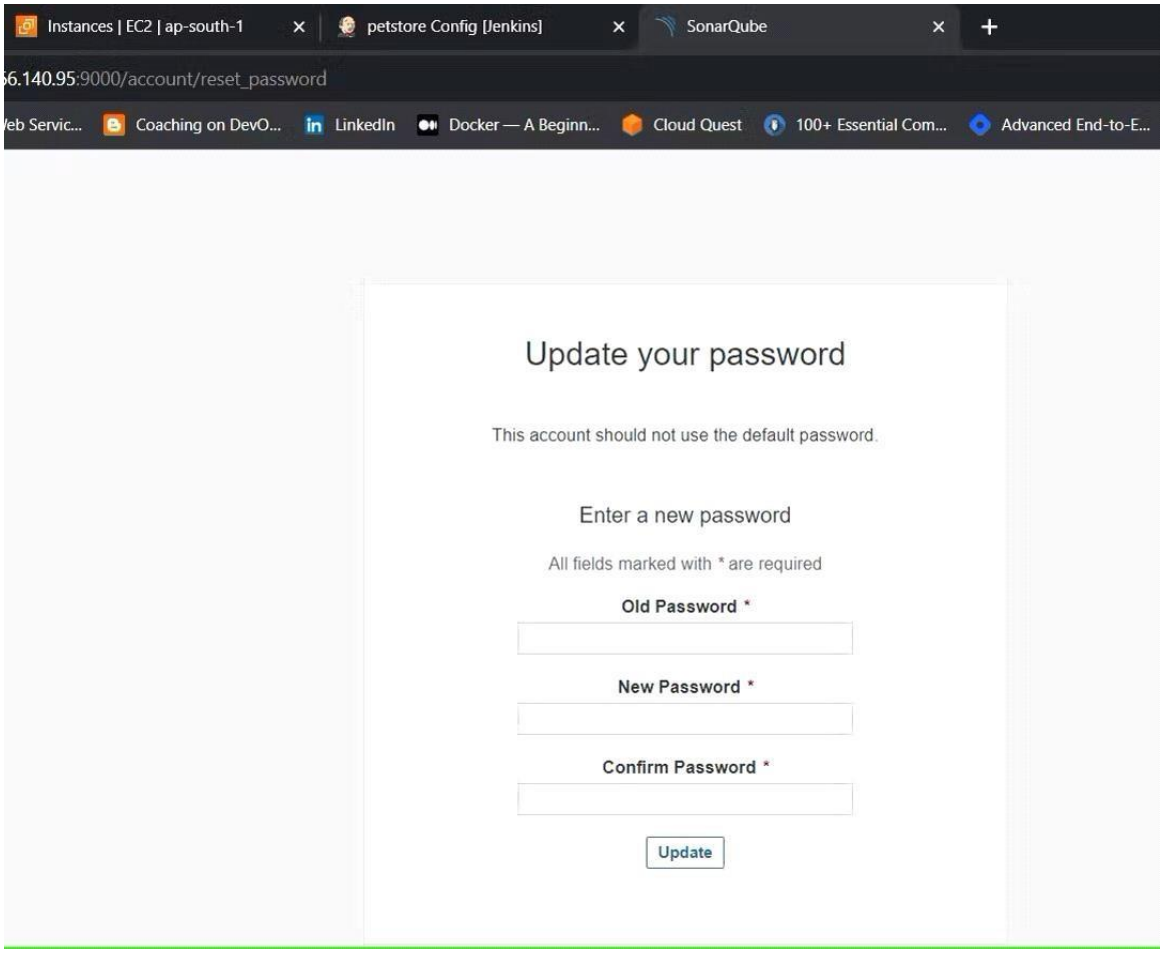
Now our SonarQube is up and running



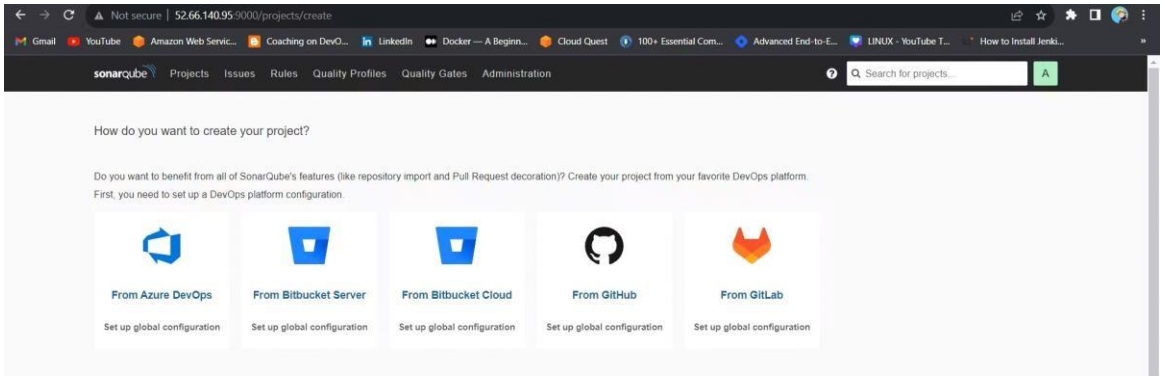
Enter username and password, click on login and change password

username admin password

admin



Update New password, This is Sonar Dashboard.



2C — Install Trivy

vi trivy.sh

sudo apt-get install wget apt-transport-https gnupg lsb-release -y

wget -qO - https://aquasecurity.github.io/trivy-repo/deb/public.key | gpg --dearmor | sudo tee /usr/share/keyrings/trivy.gpg > /dev/null

echo "deb [signed-by=/usr/share/keyrings/trivy.gpg] https://aquasecurity.github.io/trivy-repo/deb $(lsb_release -sc) main" | sudo tee -a /etc/apt/sources.list.d/trivy.list

sudo apt-get update

sudo apt-get install trivy -y

Next, we will log in to Jenkins and start to configure our Pipeline in Jenkins

Step 3 — Install Plugins like JDK, Sonarqube Scanner, Maven, OWASP Dependency Check

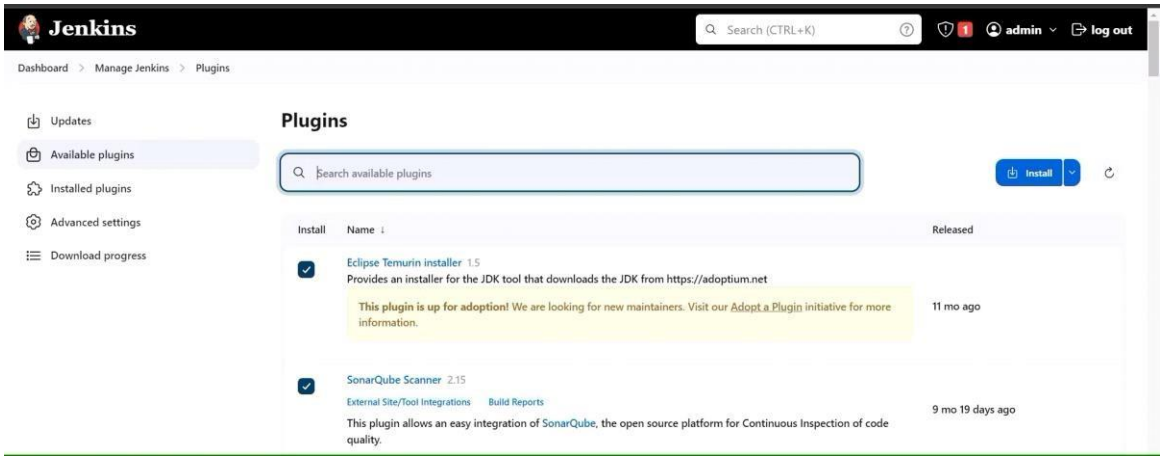
3A — Install Plugin

Goto Manage Jenkins →Plugins → Available Plugins →

Install below plugins

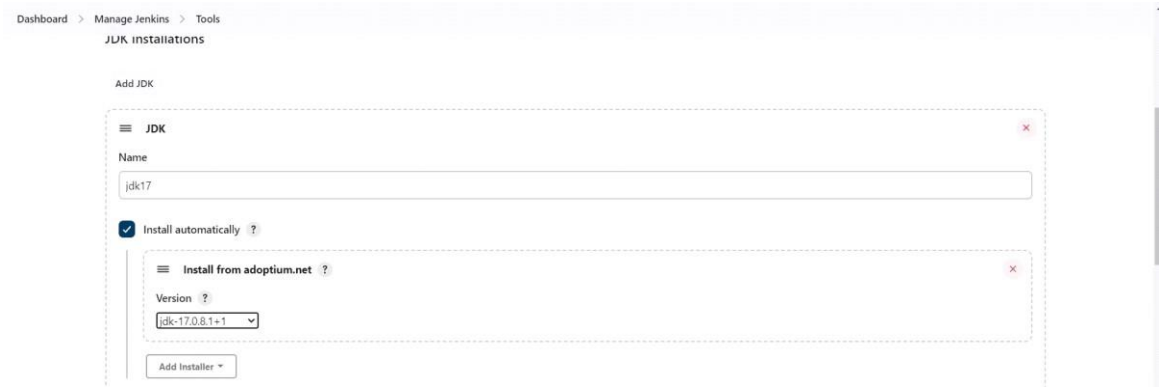
1 → Eclipse Temurin Installer (Install without restart)

2 → SonarQube Scanner (Install without restart)

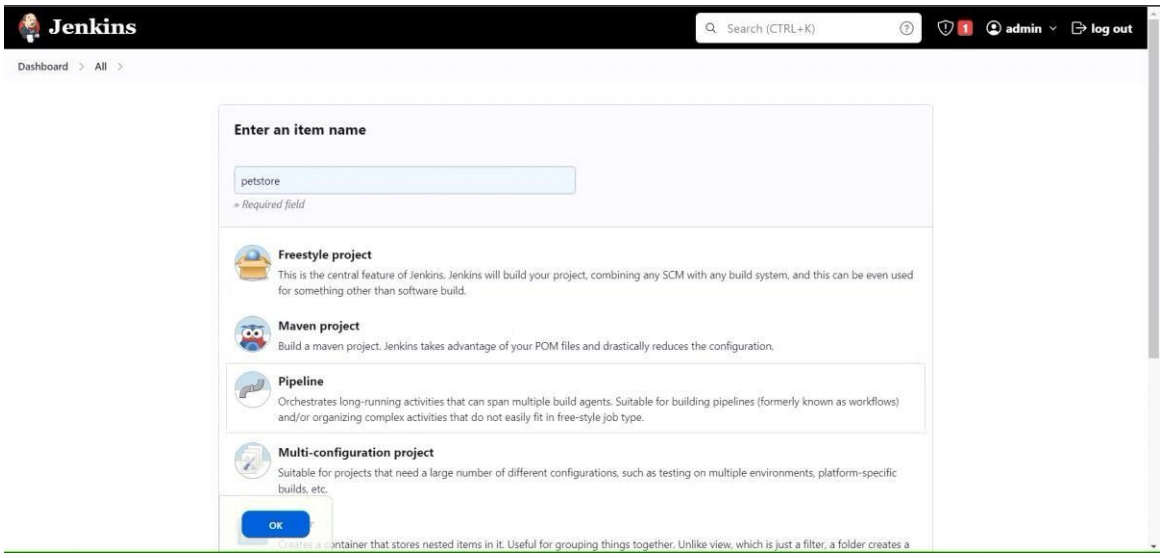


3B — Configure Java and Maven in Global Tool Configuration

Goto Manage Jenkins → Tools → Install JDK(17) and Maven3(3.6.0) → Click on Apply and Save



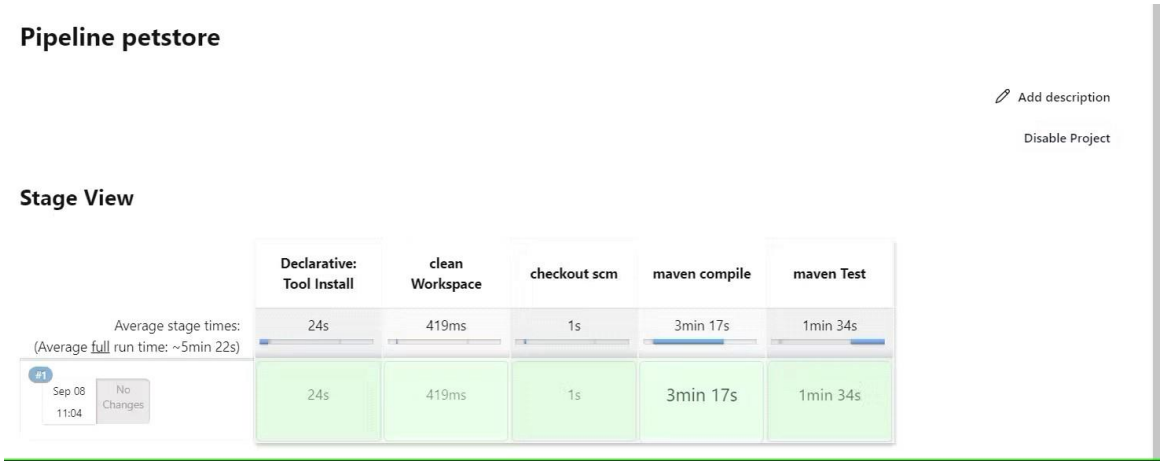
3C — Create a Job



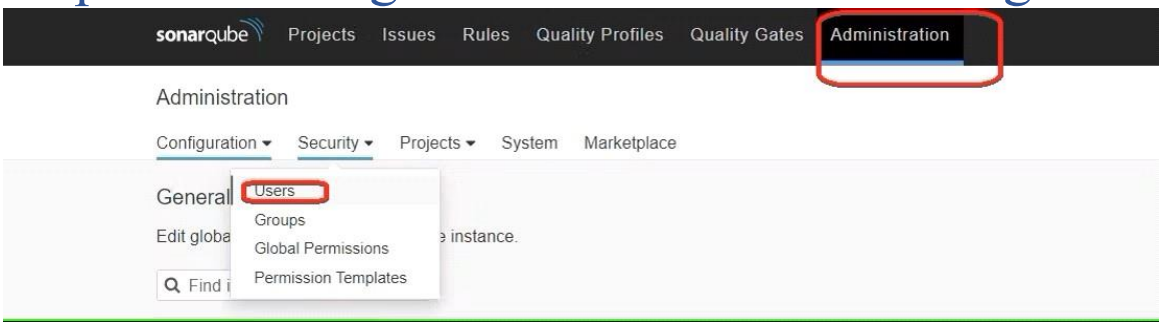
Enter this in Pipeline Script,

```
pipeline{     agent
any     tools
{         jdk 'jdk17'
maven 'maven3'
    }
stages{
        stage ('clean
Workspace'){             steps{
 cleanWs()
            }
        }
       stage ('checkout ') {            steps {                checkout scmGit(branches: [[name: '*/master']],
extensions: [], userRemoteConfigs: [[url: 'https://github.com/harimahesh2344/jpetstore-6.git']])
            }
        }
        stage ('mvn compile')
{             steps {
                sh 'mvn compile'
            }
        }
        stage ('mvn test')
{             steps
{                 sh 'mvn
test'
            }
        }
   }
}
```

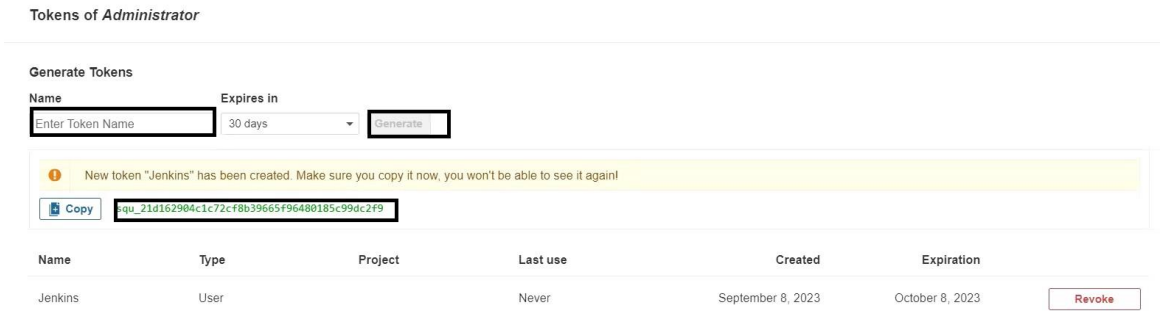
The stage view would look like this,



Step 4 — Configure Sonar Server in Manage Jenkins

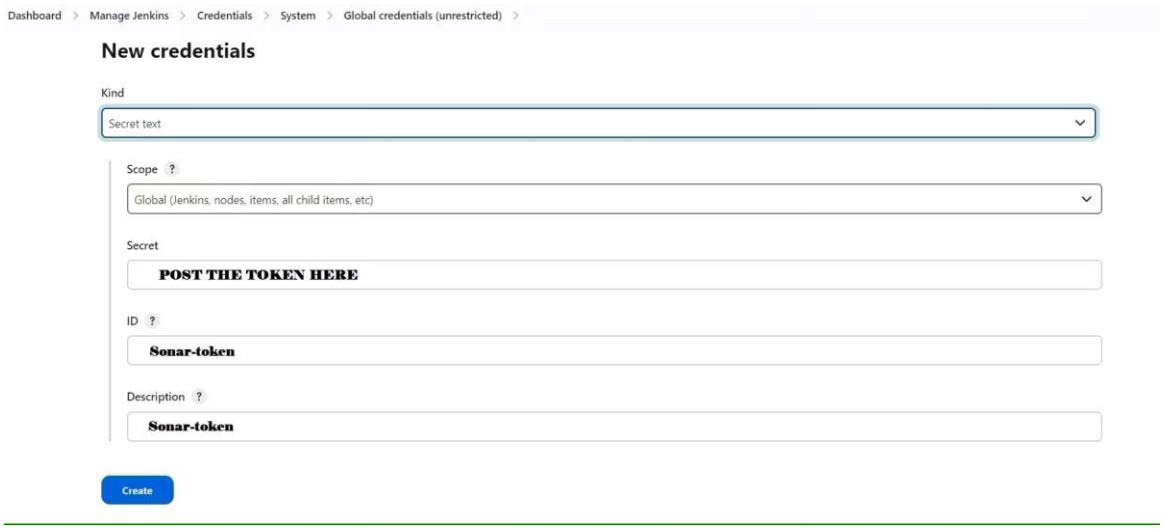


Create a token with a name and generate



copy Token

Goto Jenkins Dashboard → Manage Jenkins → Credentials → Add Secret Text. It should look like this



You will this page once you click on create

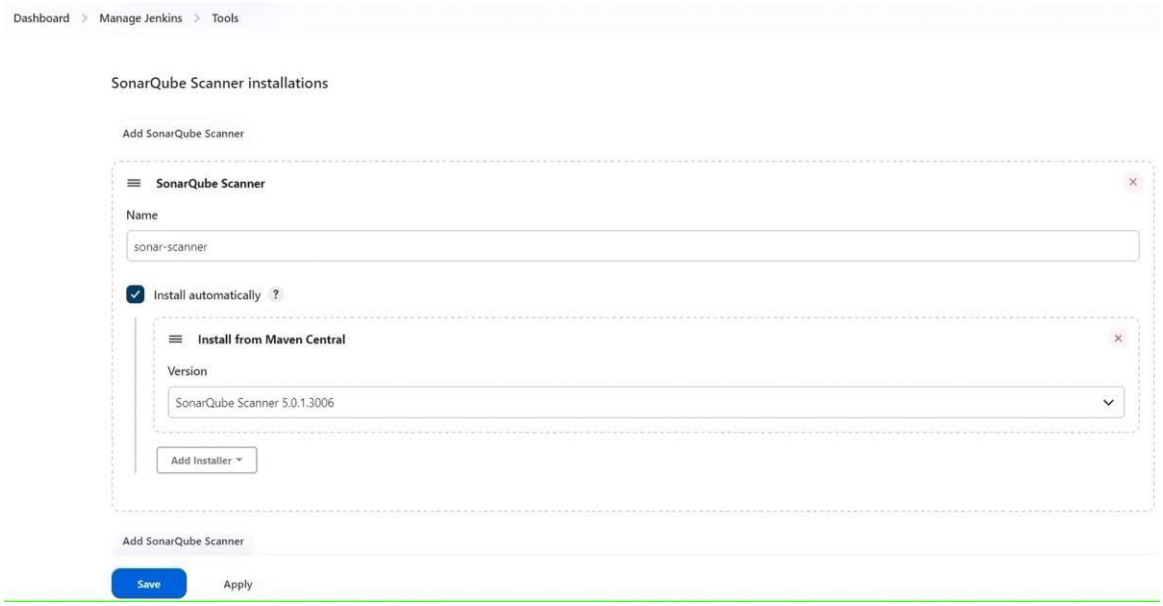
Now, go to Dashboard → Manage Jenkins → System and Add like the below image.

Click on Apply and Save

The Configure System option is used in Jenkins to configure different server

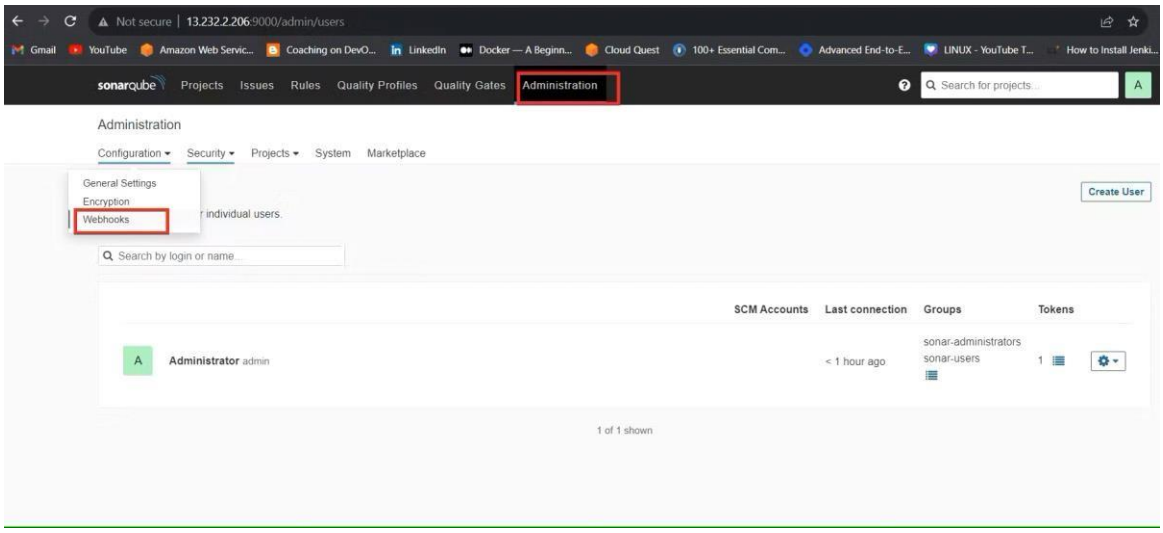
Global Tool Configuration is used to configure different tools that we install using Plugins

We will install a sonar scanner in the tools.

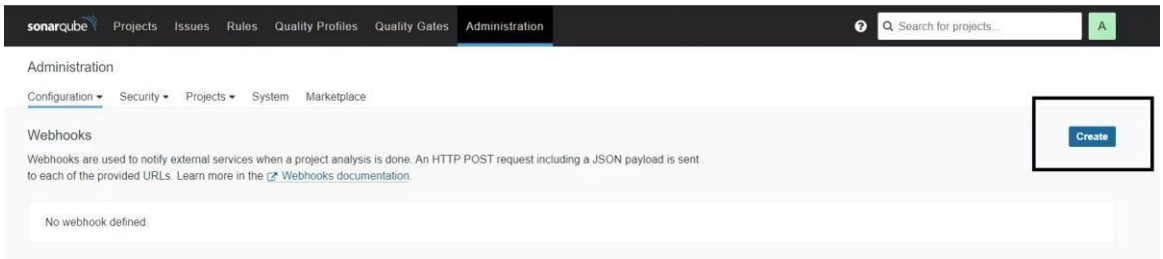


In the Sonarqube Dashboard add a quality gate also

Administration--> Configuration-->Webhooks



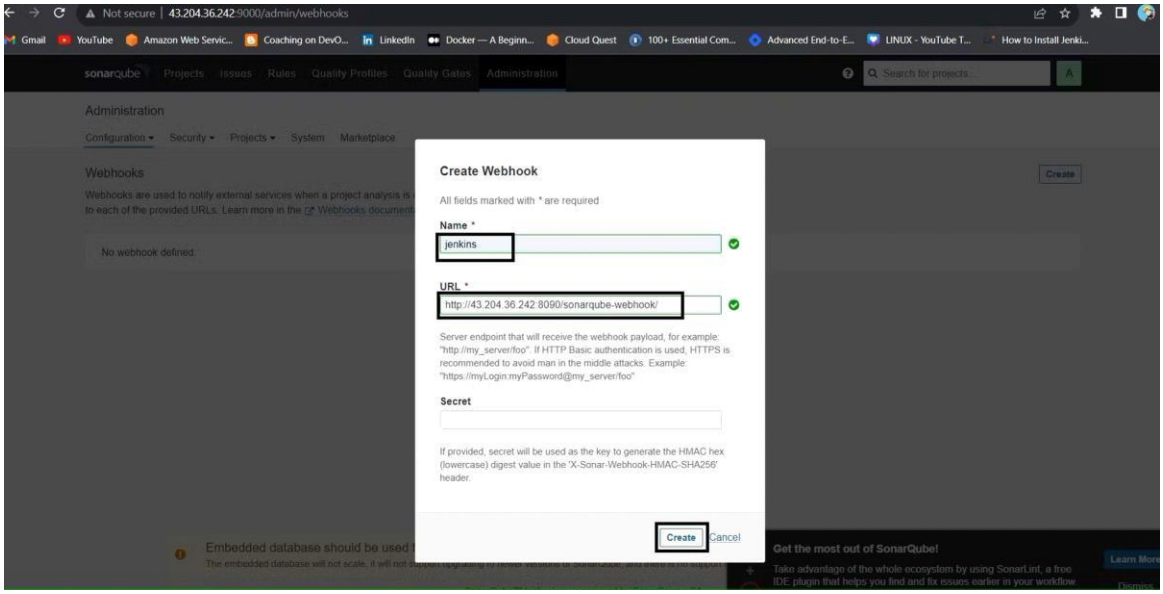
Click on Create



Add details

#in url section of quality gate

<http://jenkins-public-ip:8090>/sonarqube-webhook/



Let's go to our Pipeline and add Sonarqube Stage in our Pipeline Script.

#under tools section add this environment environment

```
{
      SCANNER_HOME=tool 'sonar-scanner'
   }
```

in stages add this stage("Sonar

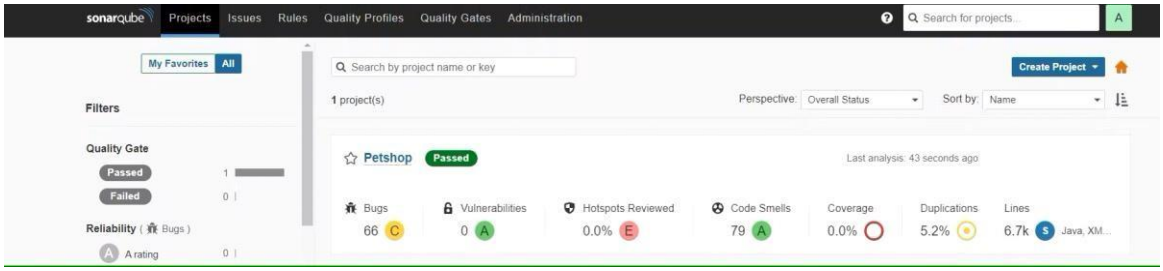
Analysis "){

```
          steps{
              withSonarQubeEnv('sonar-server') {
                sh ''' $SCANNER_HOME/bin/sonar-scanner -Dsonar.projectName=Petshop \                    -
Dsonar.java.binaries=. \
                -Dsonar.projectKey=Petshop '''
```

```
            }
        }
    }
    stage("quality
gate"){            steps
{                 script {
                waitForQualityGate abortPipeline: false, credentialsId: 'Sonar-token'
            }
        }
    }
```

Click on Build now, you will see the stage view like this

To see the report, you can go to Sonarqube Server and go to Projects.



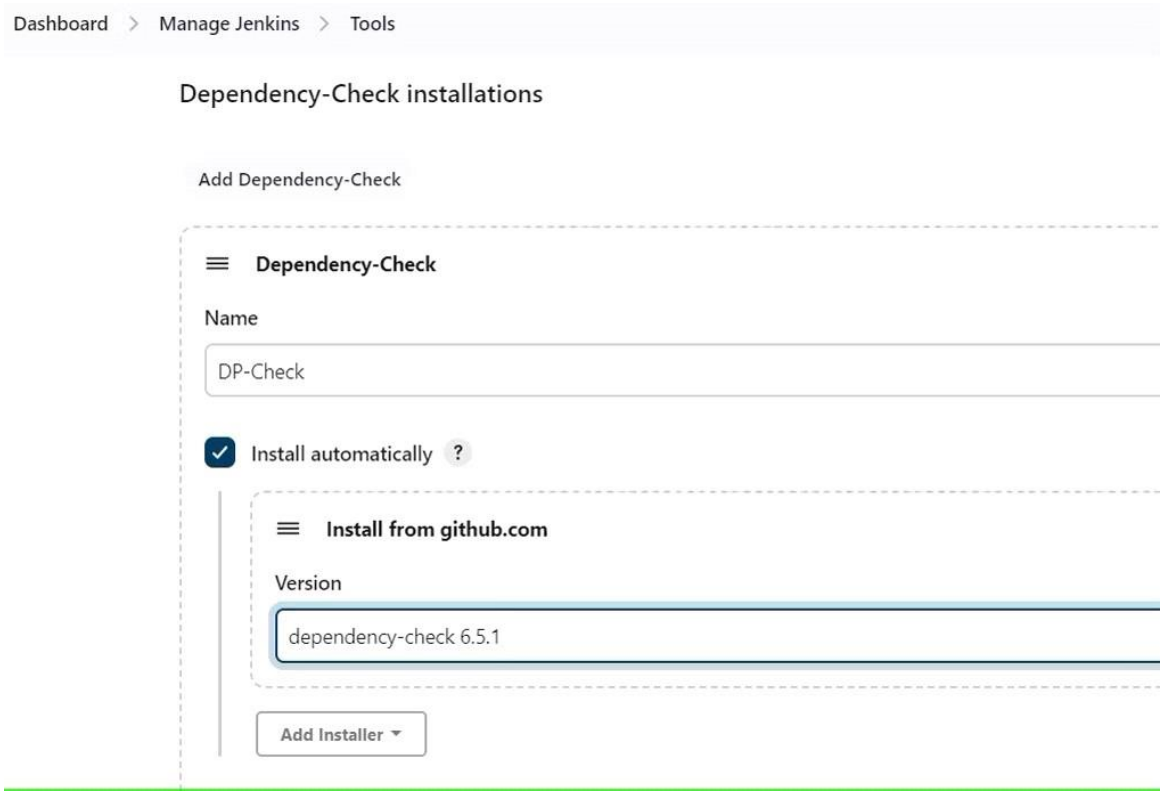
You can see the report has been generated and the status shows as passed. You can see that there are 6.7k lines. To see a detailed report, you can go to issues.

Step 5 — Install OWASP Dependency Check Plugins

GotoDashboard → Manage Jenkins → Plugins → OWASP Dependency-Check. Click on it and install it without restart.

First, we configured the Plugin and next, we had to configure the Tool

Goto Dashboard → Manage Jenkins → Tools →



Click on Apply and Save here.

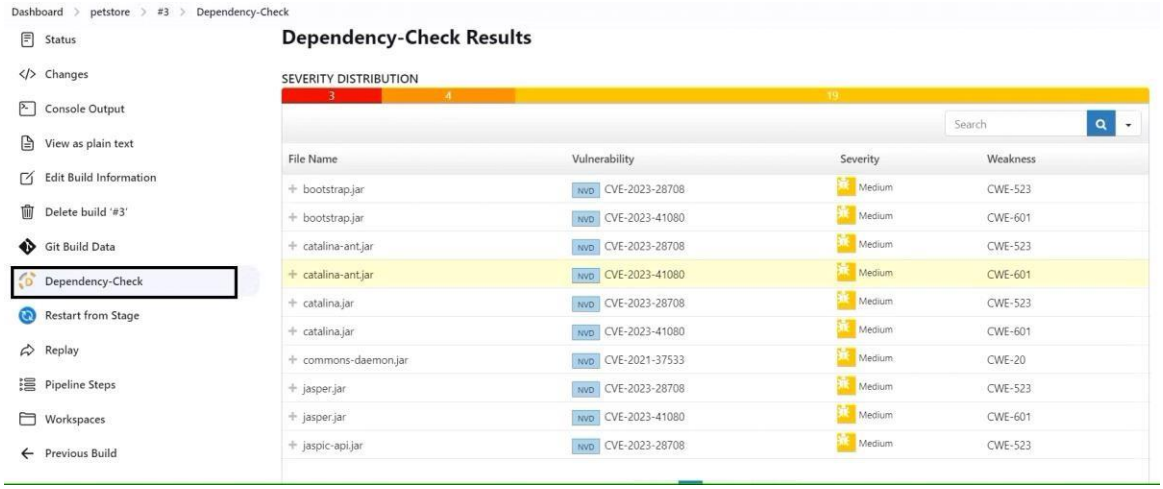
Now go configure → Pipeline and add this stage to your pipeline and build.

```
stage ('Build war file'){
        steps{
            sh 'mvn clean package'
        }
```

```
    }
    stage("Dp Check"){
        steps{
            dependencyCheck additionalArguments: '--scan ./ --format XML ', odcInstallation: 'DP-Check'
dependencyCheckPublisher pattern: '**/dependency-check-report.xml'
        }
    }
```

The stage view would look like this,

You will see that in status, a graph will also be generated and Vulnerabilities.



Step 6 — Docker Image Build and Push

We need to install the Docker tool in our system, Goto Dashboard → Manage Plugins → Available plugins → Search for Docker and install these plugins

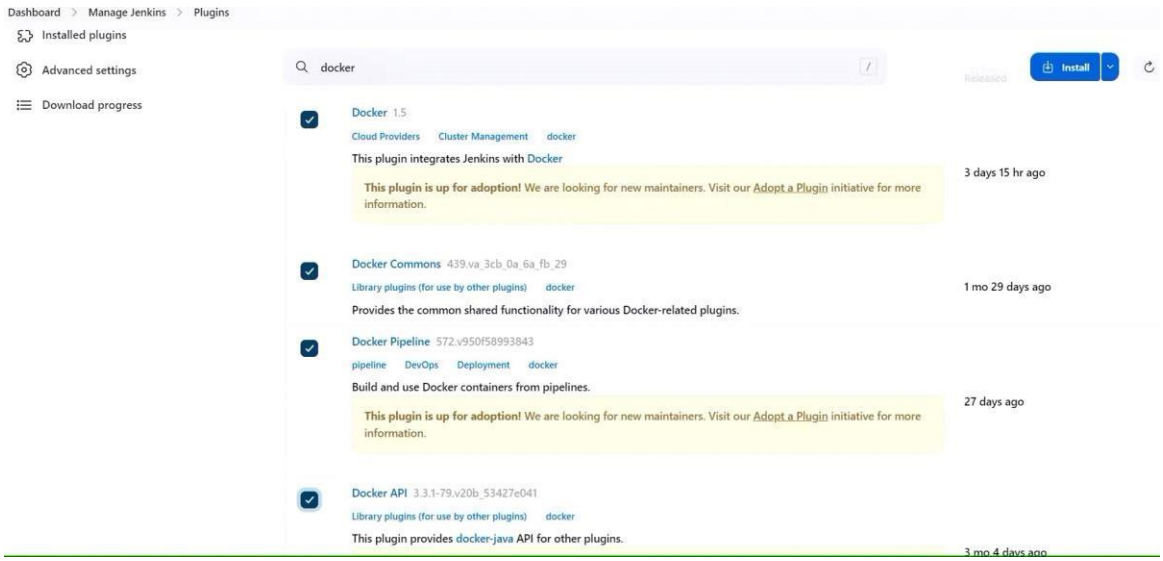
Docker

Docker Commons

Docker Pipeline Docker

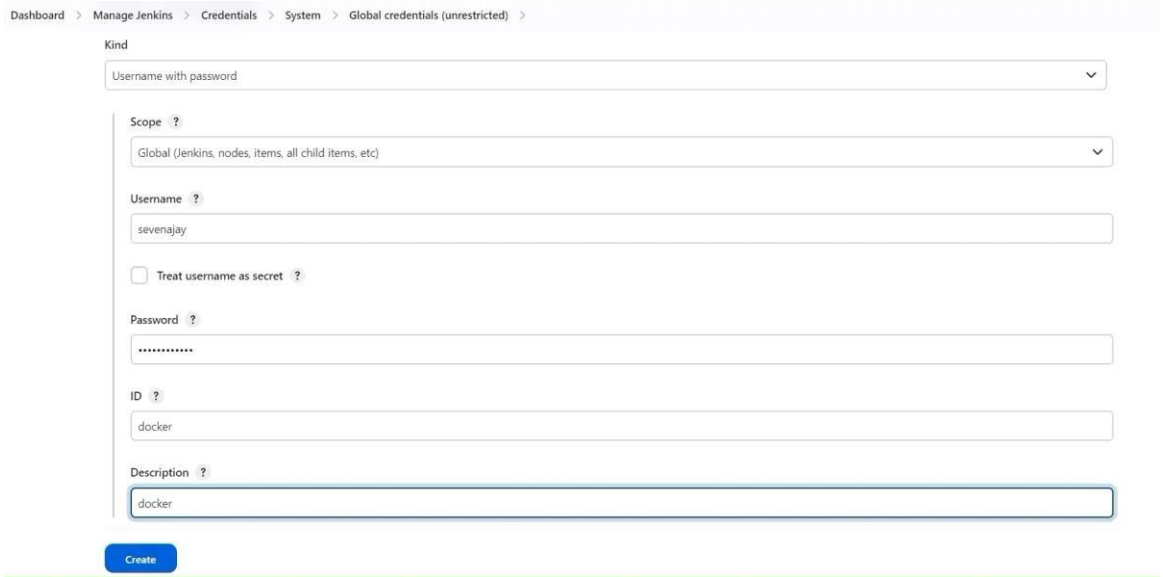
API docker-build-step

and click on install without restart



Now, goto Dashboard → Manage Jenkins → Tools →

Add DockerHub Username and Password under Global Credentials



Add this stage to Pipeline Script

For automation add under environment variables

Environment {

APP_NAME="hari"

VERSION="v1.0.0"

COUNTAINER_NAME="nani12"

DOCKER_USER="harimahesh2344"

DOCKER_PASS="Mahesh@2344"

IMAGE_NAME="${DOCKER_USER}"+"/"+"${APP_NAME}"
IMAGE_TAG="${VERSION}-${BUILD_NUMBER}"

}

Add below stages under the stage: stage

('Build and push to docker hub'){

steps{ scri

pt{

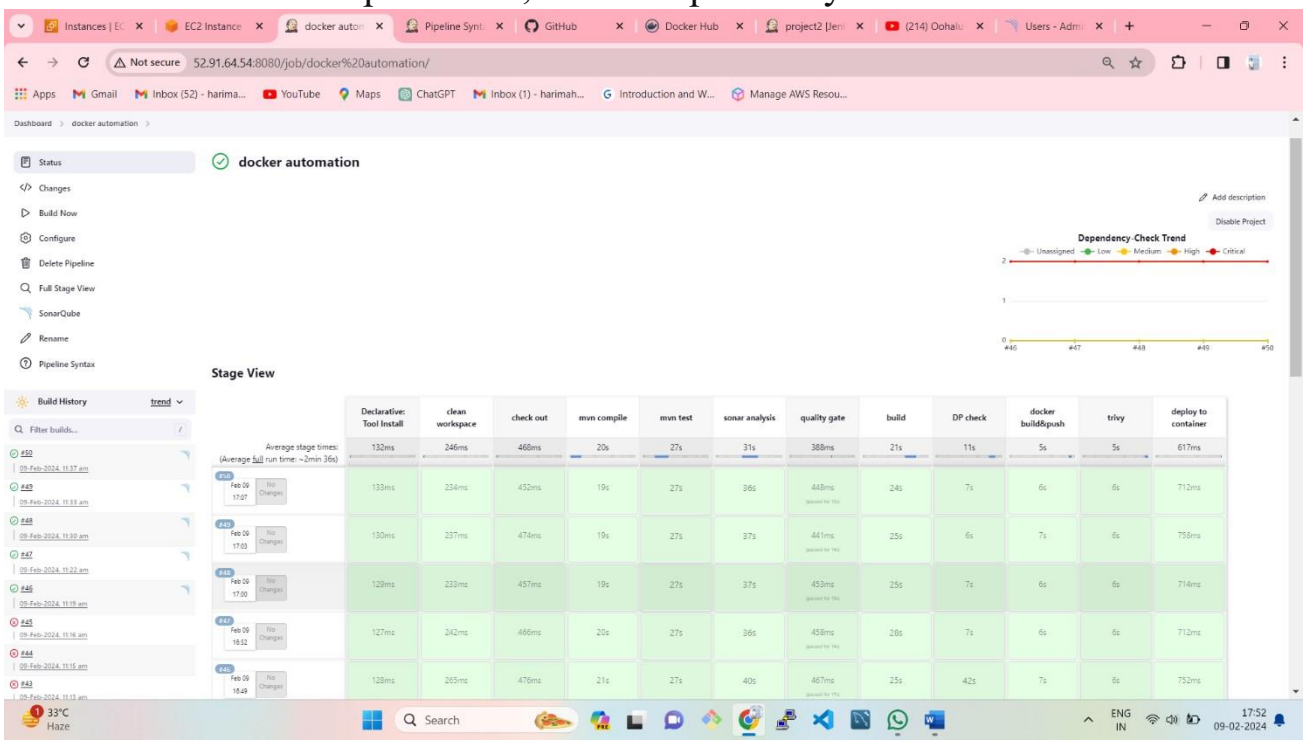
withDockerRegistry(credentialsId: 'docker')

{ sh 'docker rm nani12 -f'

docker_image=docker.build "${IMAGE_NAME}"

```
                docker_image.push("${IMAGE_TAG}")
            }
        }
    }
}
stage("TRIVY"){
    steps{
        sh "trivy image ${DOCKER_USER}"+"/"+"${APP_NAME}:latest > trivy.txt"
    }
}
stage ('Deploy to
container'){            steps{
            sh "docker run --name ${COUNTAINER_NAME} -d -p 8085:8080
${IMAGE_NAME}:${IMAGE_TAG}"
    }
}
```

You will see the output below, with a dependency trend.



Now, when you do **Entire**

pipeline:

```
pipeline{    agent

any

tools{       jdk

'jdk17'       maven

'maven3'

   }

   environment {

      SCANNER_HOME=tool  'sonar-scanner'

      APP_NAME="hari"

      VERSION="v1.0.0"

      COUNTAINER_NAME="nani12"

      DOCKER_USER="harimahesh2344"

      DOCKER_PASS="Mahesh@2344"

      IMAGE_NAME="${DOCKER_USER}"+"/"+"${APP_NAME}"

      IMAGE_TAG="${VERSION}-${BUILD_NUMBER}"

   }

stages{       stage('clean

workspace'){
```

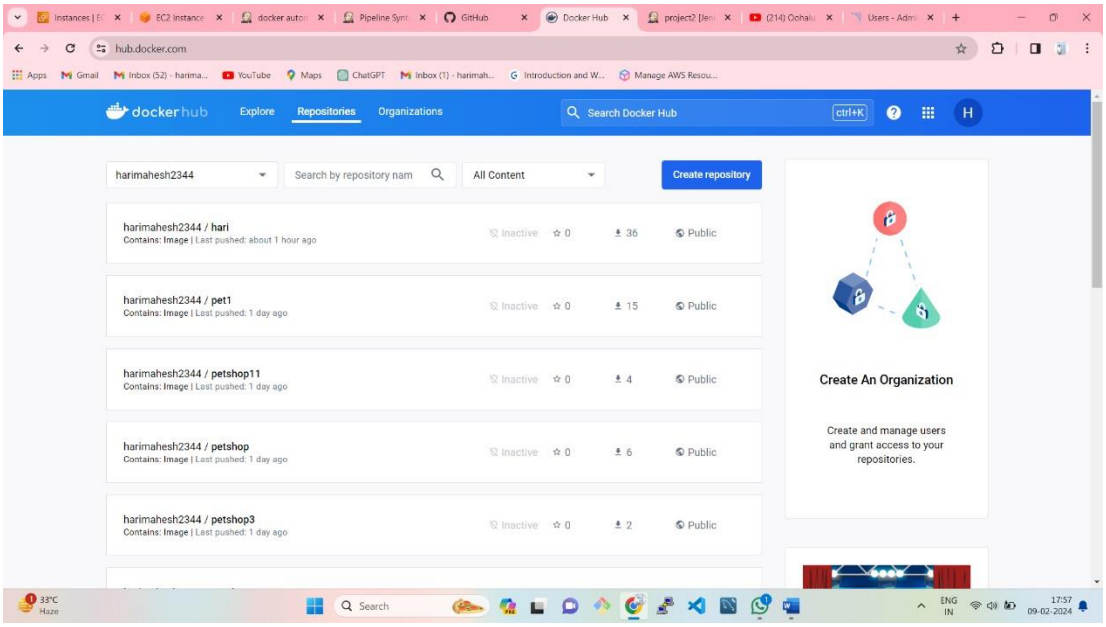
```
steps{                cleanW

s()

            }

        }

        stage('check

out'){            steps{

                    checkout scmGit(branches: [[name: '*/master']], extensions: [],
 userRemoteConfigs: [[url: 'https://github.com/harimahesh2344/jpetstore-6.git']])

            }

        }

        stage('mvn compile'){

            steps{                sh

'mvn compile'

            }

        }

stage('mvn

test'){            steps{

     sh 'mvn test'

            }

        }
```

```
        stage('sonar analysis'){            steps{                withSonarQubeEnv('sonar-token')
{                sh '"$SCANNER_HOME/bin/sonar-scanner -
Dsonar.projectName=Petshop1 \
              -Dsonar.java.binaries=. \
              -Dsonar.projectKey=Petshop1"'
              }
          }
        }         stage('quality
gate'){            steps{
script {
                waitForQualityGate abortPipeline: false, credentialsId: 'Sonar-token'
              }
          }
        }
        stage('build'){
          steps{                sh
'mvn package'
          }
        }
        stage('DP
check'){            steps{
```

```
            dependencyCheck additionalArguments: '--scan ./ --format XML ',
odcInstallation: 'DP-Check'              dependencyCheckPublisher pattern:
'**/dependency-check-report.xml'

        }

    }

    stage("docker build&push"){


steps{              script{                  withDockerRegistry(

credentialsId: 'docker') {                    sh 'docker rm

nani12 -f'

                docker_image=docker.build "${IMAGE_NAME}"

docker_image.push("${IMAGE_TAG}")

              }

            }

        }

    }

    stage('trivy'){

steps{

            sh "trivy image ${DOCKER_USER}"+"/"+"${APP_NAME}:latest >
trivy.txt"

        }

    }
```

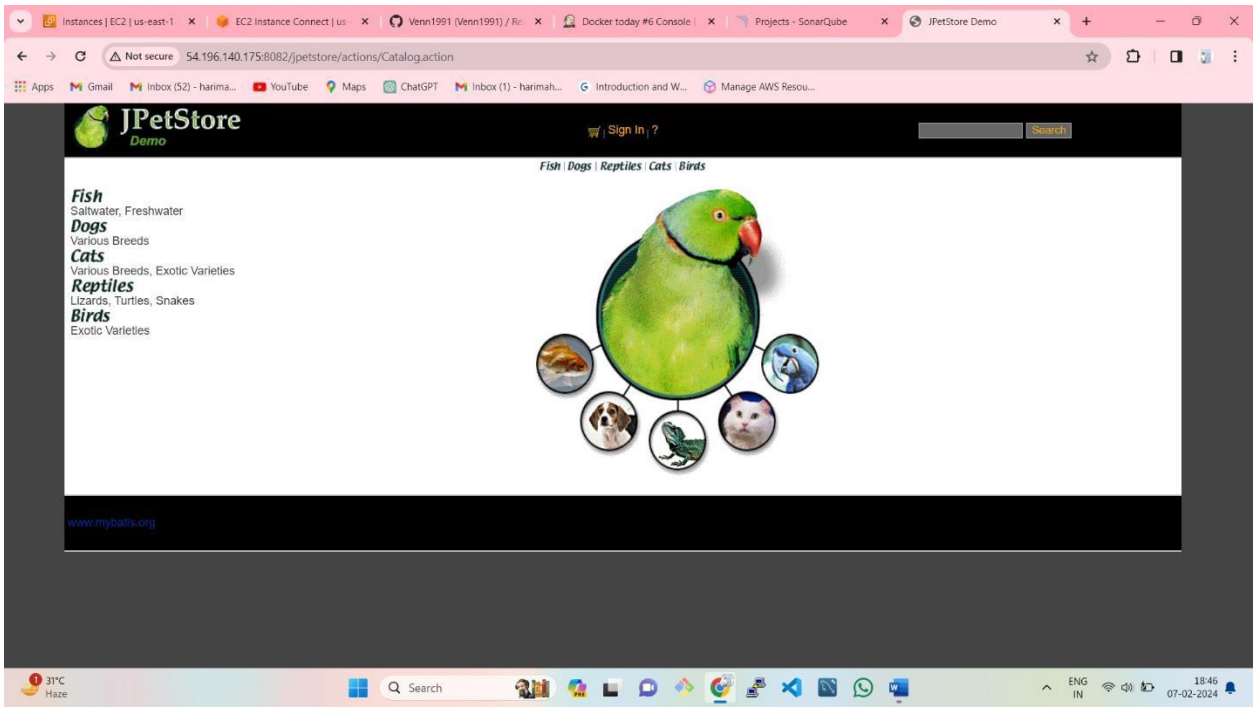
```
        stage('deploy to

container'){            steps{

                sh "docker run --name ${COUNTAINER_NAME}  -d -p 8085:8080
${IMAGE_NAME}:${IMAGE_TAG}"

            }

        }

    }

}
```

When you log in to Dockerhub, you will see a new image is created



<Ec2-public-ip:8080/jpetstore>

You will get this output


Instances | EC2 | us-east-1
EC2 Instance Connect | us
Venn1991 (Venn1991) / Re
Docker today #6 Console
Projects - SonarQube
JPetStore Demo
Not secure
54.196.140.175:8082/jpetstore/actions/Catalog.action
Apps
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YouTube
Maps
ChatGPT
Inbox (1) - harimah...
Introduction and W...
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Demo
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