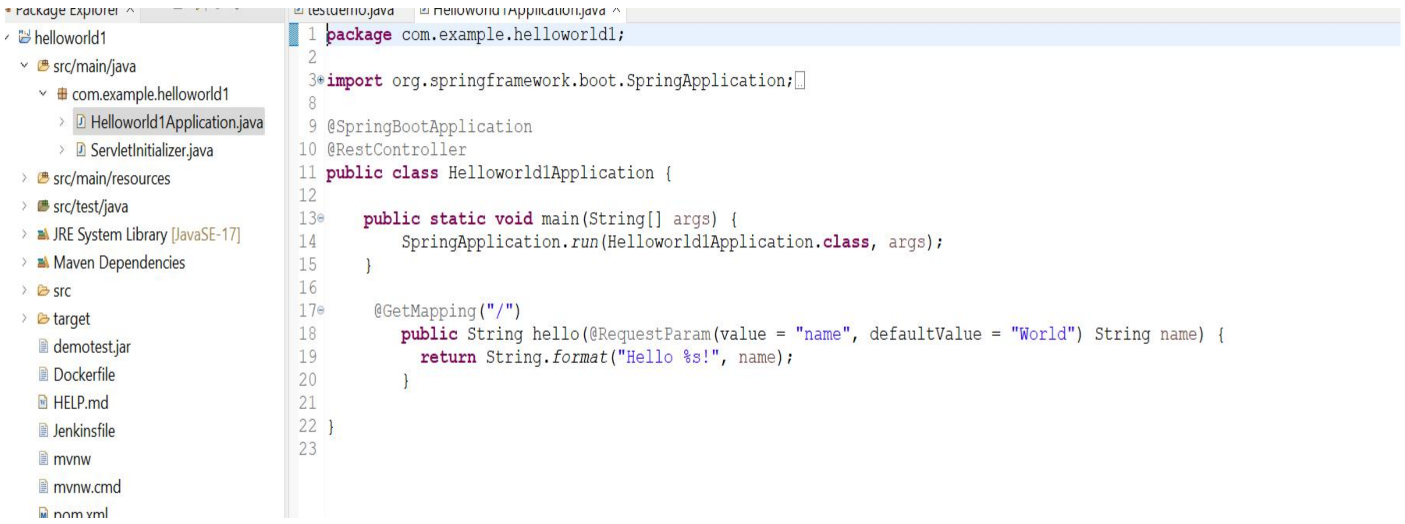
BIPOLAR FACTORY

DevOps - Assignment

Submitted by - J. Sai Revanth kumar

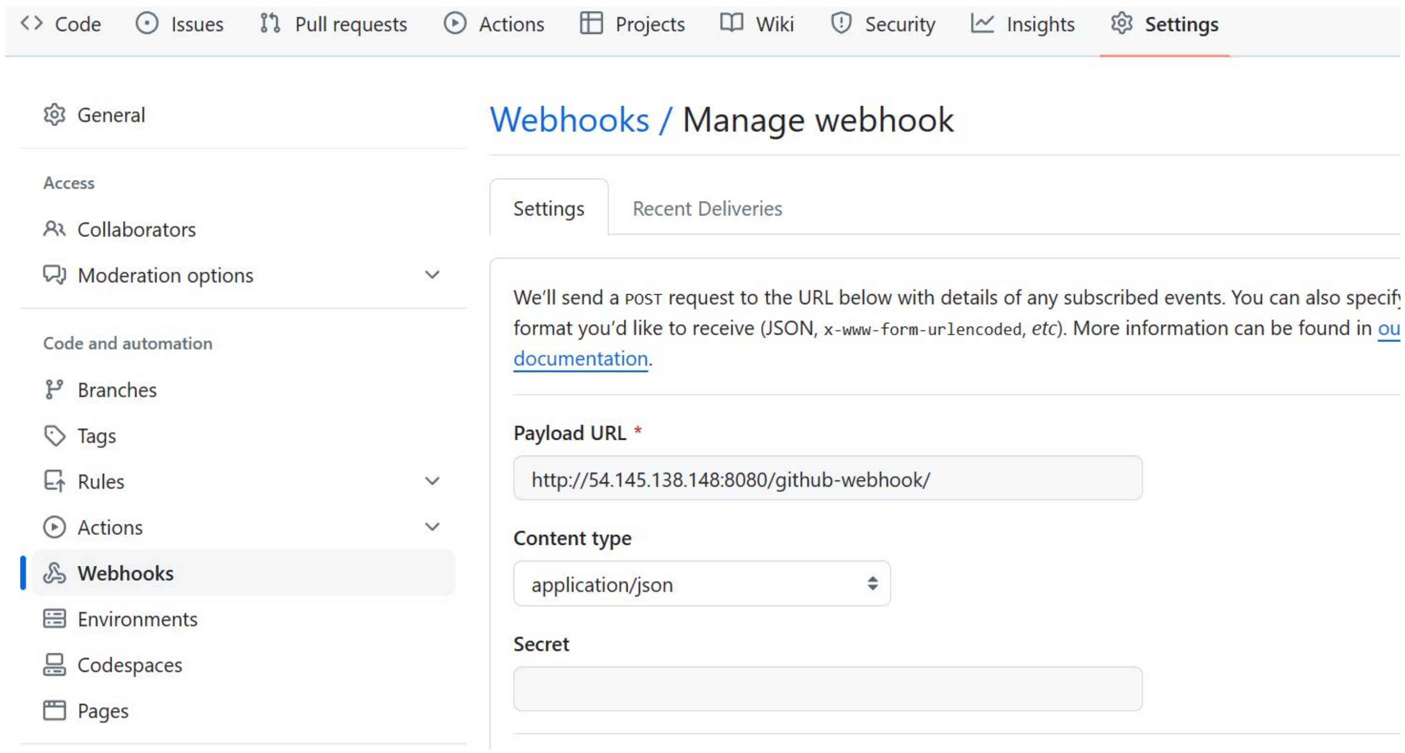
➢ Created Spring boot Application of Helloworld :-



```java
package com.example.helloworld1;

import org.springframework.boot.SpringApplication;

@SpringBootApplication
@RestController
public class Helloworld1Application {

    public static void main(String[] args) {
        SpringApplication.run(Helloworld1Application.class, args);
    }

     @GetMapping("/")
        public String hello(@RequestParam(value = "name", defaultValue = "World") String name) {
          return String.format("Hello %s!", name);
        }

}
```

➢ Created GITHUB REPO :-

- Created Github repo :- **https://github.com/SaiRevanth-J/bipolar-test.git**
- Application files are uploaded in the repo.
- In repo setting added Webhook to automate the jenkins job whenever there is new push to repo.



Webhooks / Manage webhook

We'll send a POST request to the URL below with details of any subscribed events. You can also specify format you'd like to receive (JSON, x-www-form-urlencoded, etc). More information can be found in ou documentation.

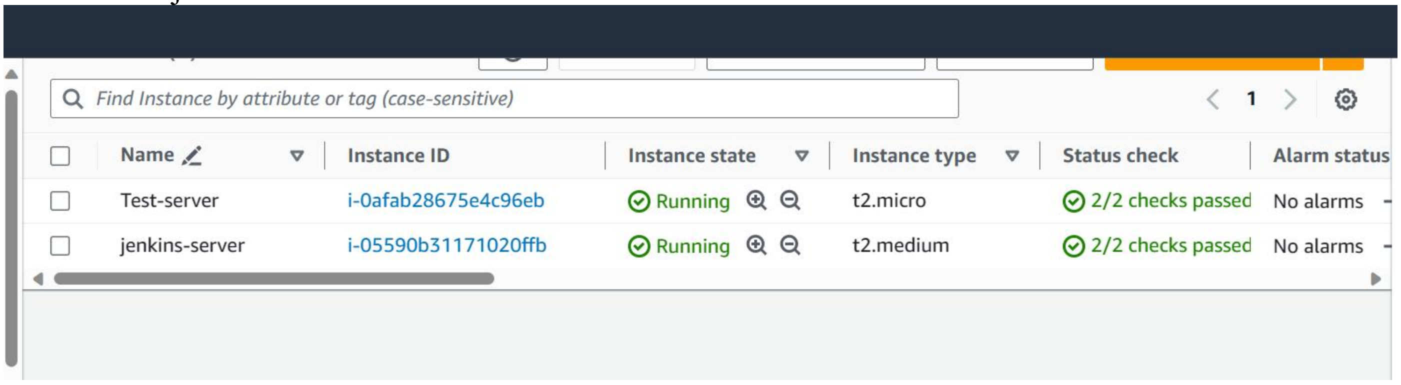
Payload URL *
http://54.145.138.148:8080/github-webhook/

Content type
application/json

Secret

➢ **Launched Jenkins-Server for CI/CD pipeline,Monitoring and Test-server for application deployment :-**

- In AWS jenkins-server and test-server are launched .



Find Instance by attribute or tag (case-sensitive)

Name	Instance ID	Instance state	Instance type	Status check	Alarm status
Test-server	i-0afab28675e4c96eb	Running	t2.micro	2/2 checks passed	No alarms
jenkins-server	i-05590b31171020ffb	Running	t2.medium	2/2 checks passed	No alarms

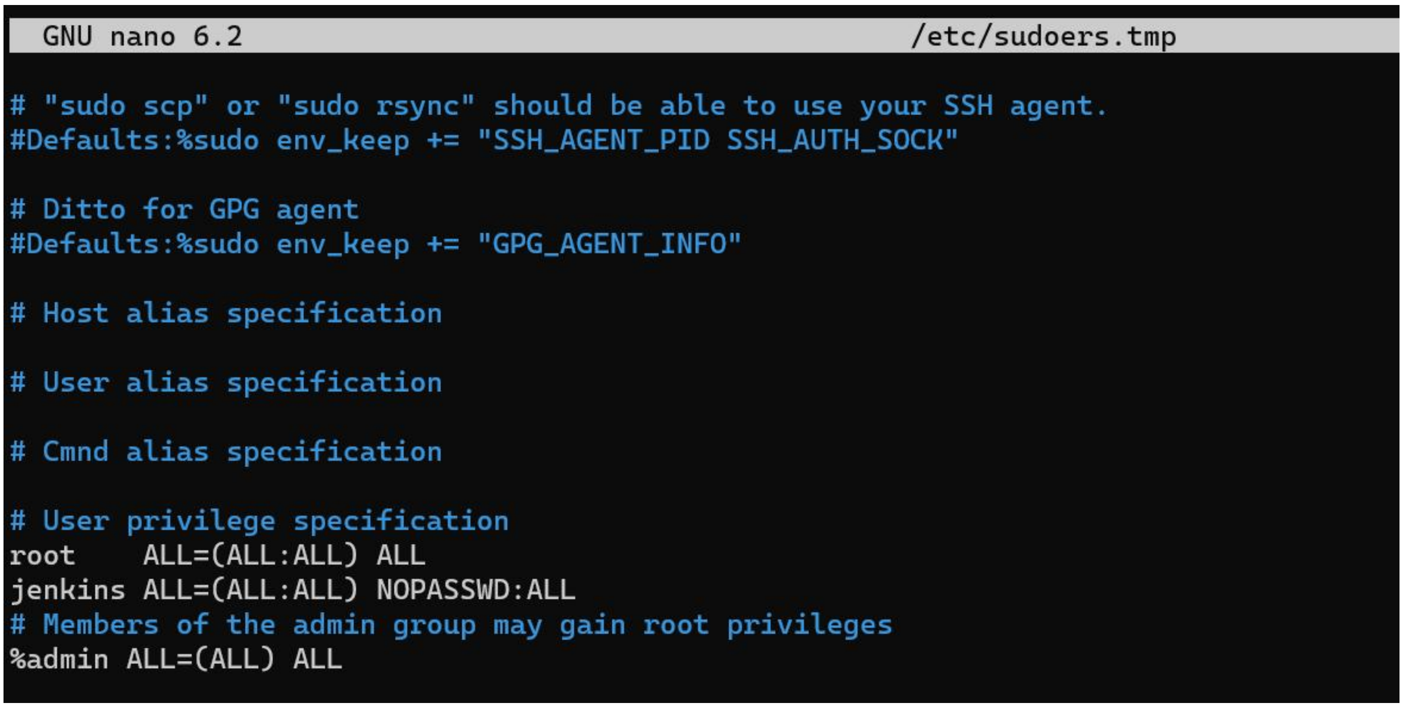
- Test-server is configured with following commands.

1. Sudo apt update -y
2. Sudo apt install docker.io -y

- jenkins-server is configured with following commands to start the setup .

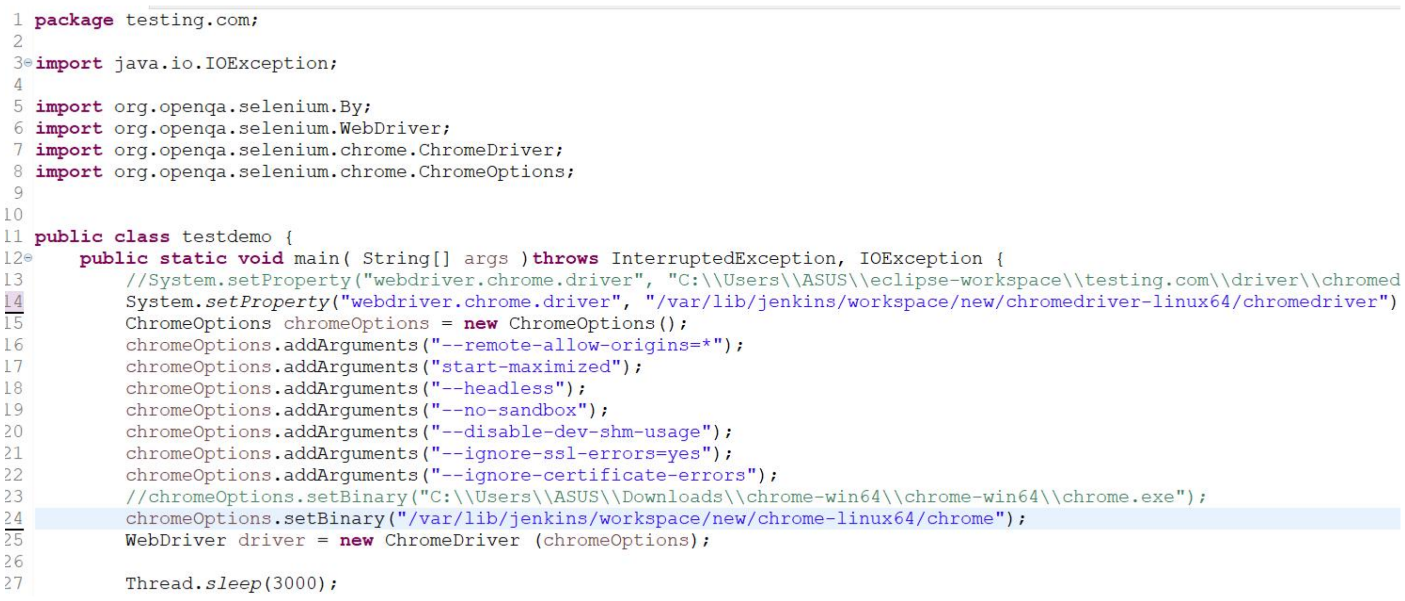
1. Sudo apt update -y
2. Sudo apt install git maven docker.io -y
3. Sudo apt install openjdk-17-jdk -y
4. sudo wget -O /usr/share/keyrings/jenkins-keyring.asc https://pkg.jenkins.io/debian-stable/jenkins.io-2023.key
5. echo deb [signed-by=/usr/share/keyrings/jenkins-keyring.asc] https://pkg.jenkins.io/debian-stable binary/ | sudo tee /etc/apt/sources.list.d/jenkins.list > /dev/null
6. sudo apt-get update -y
7. sudo apt-get install jenkins .

- Added Jenkins user to the sudeors file to give sudo permissions as shown below.

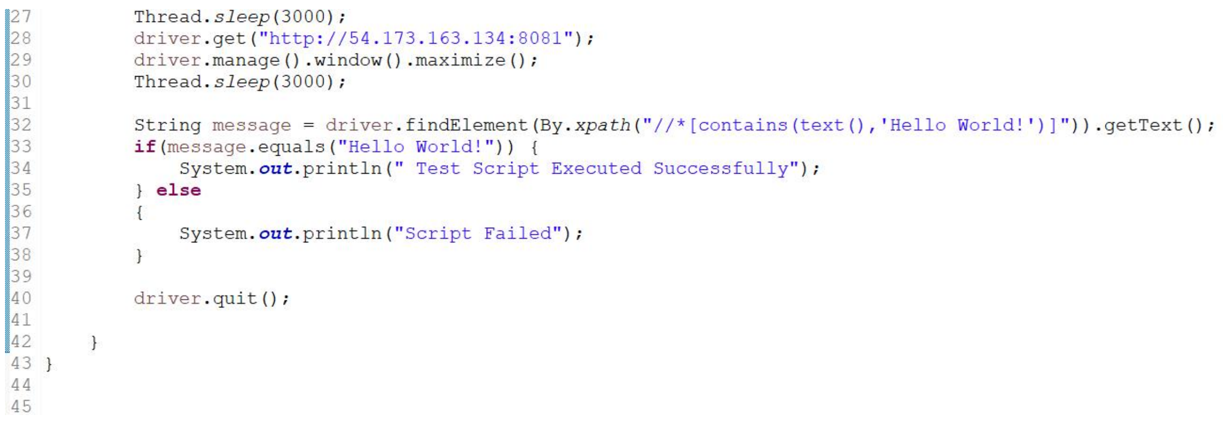


```
  GNU nano 6.2                                          /etc/sudoers.tmp

# "sudo scp" or "sudo rsync" should be able to use your SSH agent.
#Defaults:%sudo env_keep += "SSH_AGENT_PID SSH_AUTH_SOCK"

# Ditto for GPG agent
#Defaults:%sudo env_keep += "GPG_AGENT_INFO"

# Host alias specification

# User alias specification

# Cmnd alias specification

# User privilege specification
root    ALL=(ALL:ALL) ALL
jenkins ALL=(ALL:ALL) NOPASSWD:ALL
# Members of the admin group may gain root privileges
%admin ALL=(ALL) ALL
```

- Maven is used for build application.
- Docker is used to containerize the application .
- Selenium automated test case are written and extracted as runnable jar (demotest.jar) to run automated test when application is deployed given in repo as shown below .

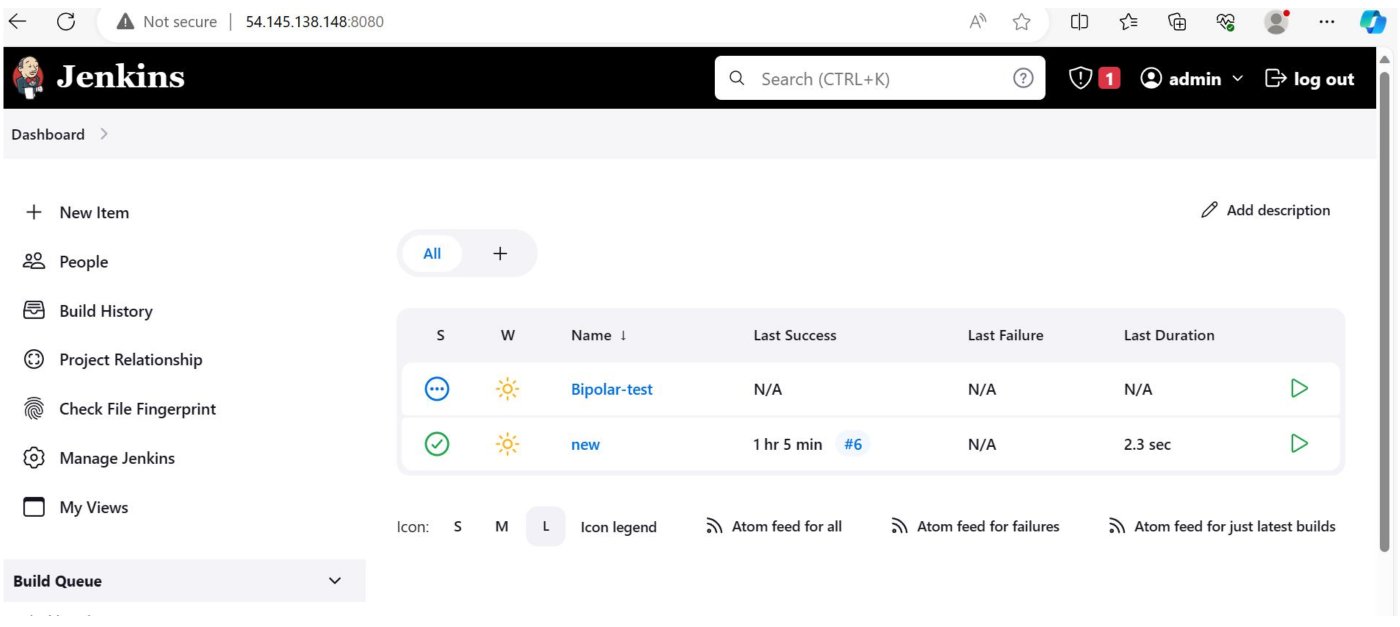


```java
package testing.com;

import java.io.IOException;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;
import org.openqa.selenium.chrome.ChromeOptions;


public class testdemo {
    public static void main( String[] args )throws InterruptedException, IOException {
        //System.setProperty("webdriver.chrome.driver", "C:\\Users\\ASUS\\eclipse-workspace\\testing.com\\driver\\chromed
        System.setProperty("webdriver.chrome.driver", "/var/lib/jenkins/workspace/new/chromedriver-linux64/chromedriver")
        ChromeOptions chromeOptions = new ChromeOptions();
        chromeOptions.addArguments("--remote-allow-origins=*");
        chromeOptions.addArguments("start-maximized");
        chromeOptions.addArguments("--headless");
        chromeOptions.addArguments("--no-sandbox");
        chromeOptions.addArguments("--disable-dev-shm-usage");
        chromeOptions.addArguments("--ignore-ssl-errors=yes");
        chromeOptions.addArguments("--ignore-certificate-errors");
        //chromeOptions.setBinary("C:\\Users\\ASUS\\Downloads\\chrome-win64\\chrome-win64\\chrome.exe");
        chromeOptions.setBinary("/var/lib/jenkins/workspace/new/chrome-linux64/chrome");
        WebDriver driver = new ChromeDriver (chromeOptions);

        Thread.sleep(3000);
```



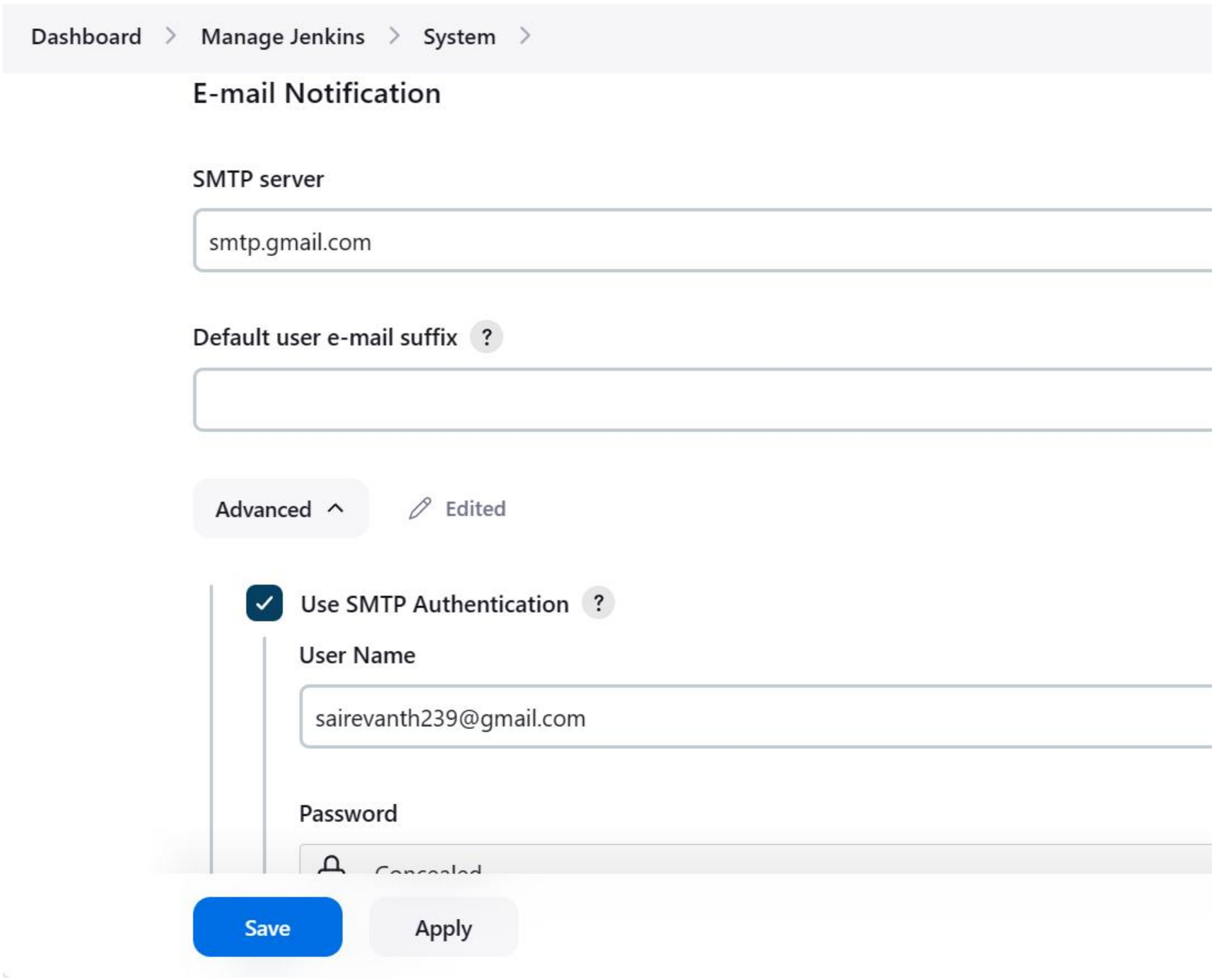
```java
         Thread.sleep(3000);
         driver.get("http://54.173.163.134:8081");
         driver.manage().window().maximize();
         Thread.sleep(3000);

         String message = driver.findElement(By.xpath("//*[contains(text(),'Hello World!')]")).getText();
         if(message.equals("Hello World!")) {
             System.out.println(" Test Script Executed Successfully");
         } else
         {
             System.out.println("Script Failed");
         }

         driver.quit();

     }
 }
```

- Jenkins is Accessed at public ip of jenkins-server http://54.145.138.148:8080 as shown below.



S	W	Name ↓	Last Success	Last Failure	Last Duration
⋯	☀	Bipolar-test	N/A	N/A	N/A
✓	☀	new	1 hr 5 min #6	N/A	2.3 sec

- Smtp Server is Configured in mange jenkins > system to notify the job failure through email



Dashboard > Manage Jenkins > System >

E-mail Notification

SMTP server: smtp.gmail.com

Default user e-mail suffix ?

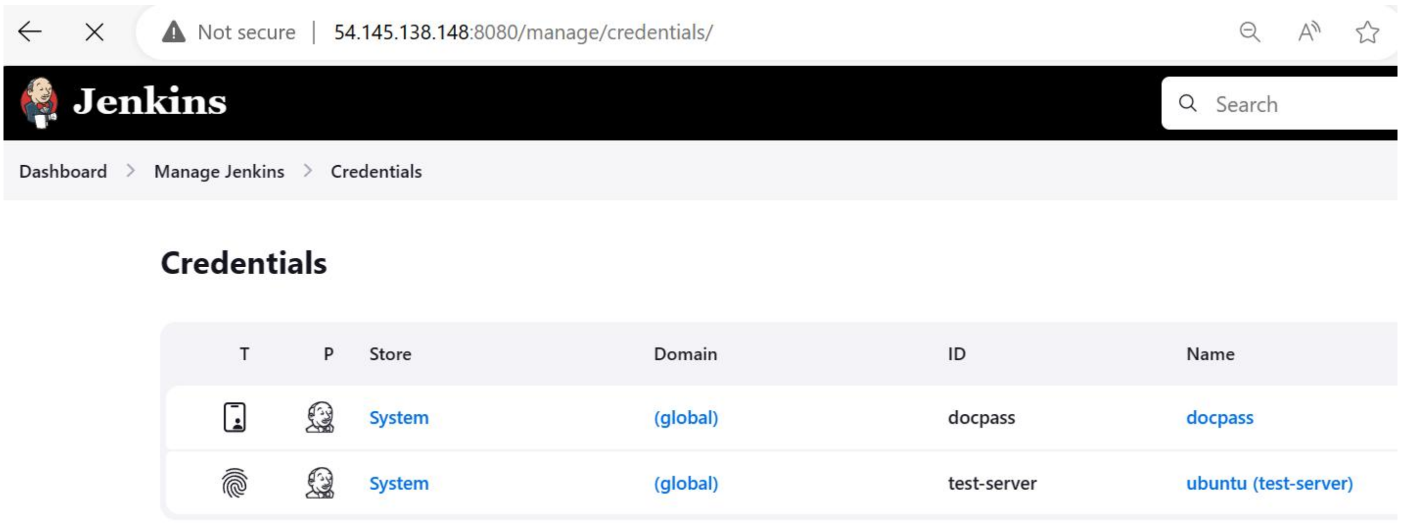
Advanced ^ Edited

[✓] Use SMTP Authentication ?

User Name: sairevanth239@gmail.com

Password: Concealed

- In Manage Jenkins > Credentials , credentials are configured for dockerhub and test-server access as shown below.



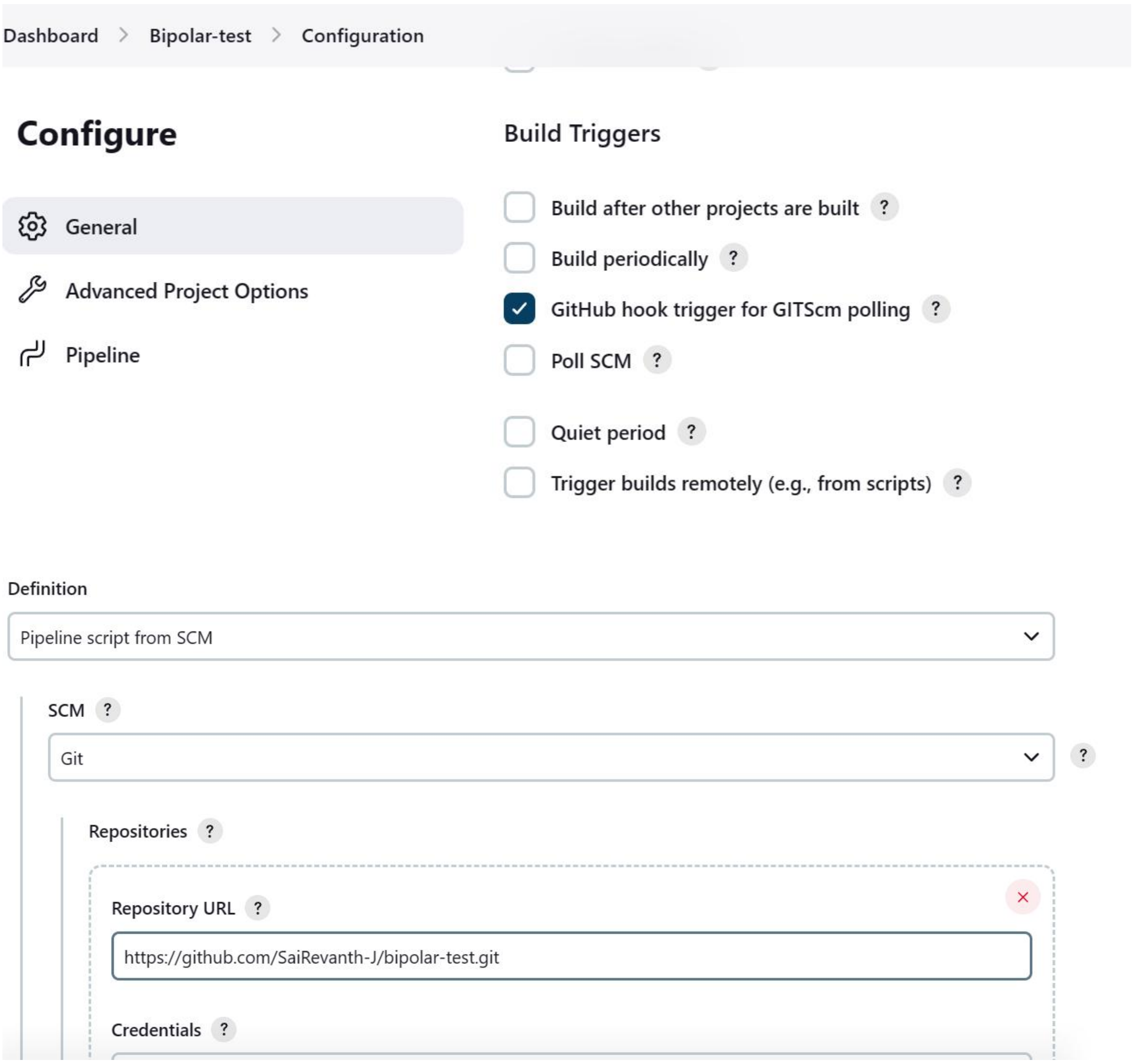
Not secure | 54.145.138.148:8080/manage/credentials/

Dashboard > Manage Jenkins > Credentials

Credentials

T	P	Store	Domain	ID	Name
		System	(global)	docpass	docpass
		System	(global)	test-server	ubuntu (test-server)

- Created Jenkins pipeline Job with webhook trigger and declarative pipeline is taken from JenkinsFile.


Dashboard > Bipolar-test > Configuration

Configure

Build Triggers

- [ ] Build after other projects are built
- [ ] Build periodically
- [x] GitHub hook trigger for GITScm polling
- [ ] Poll SCM
- [ ] Quiet period
- [ ] Trigger builds remotely (e.g., from scripts)

Definition: Pipeline script from SCM

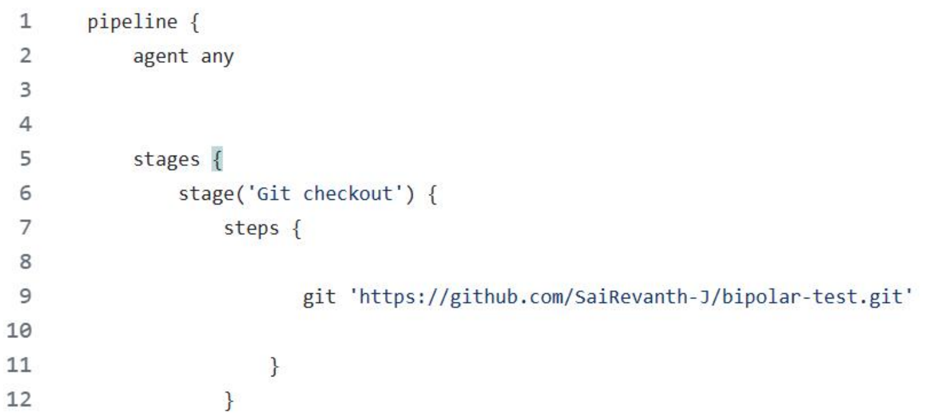
SCM: Git

Repositories

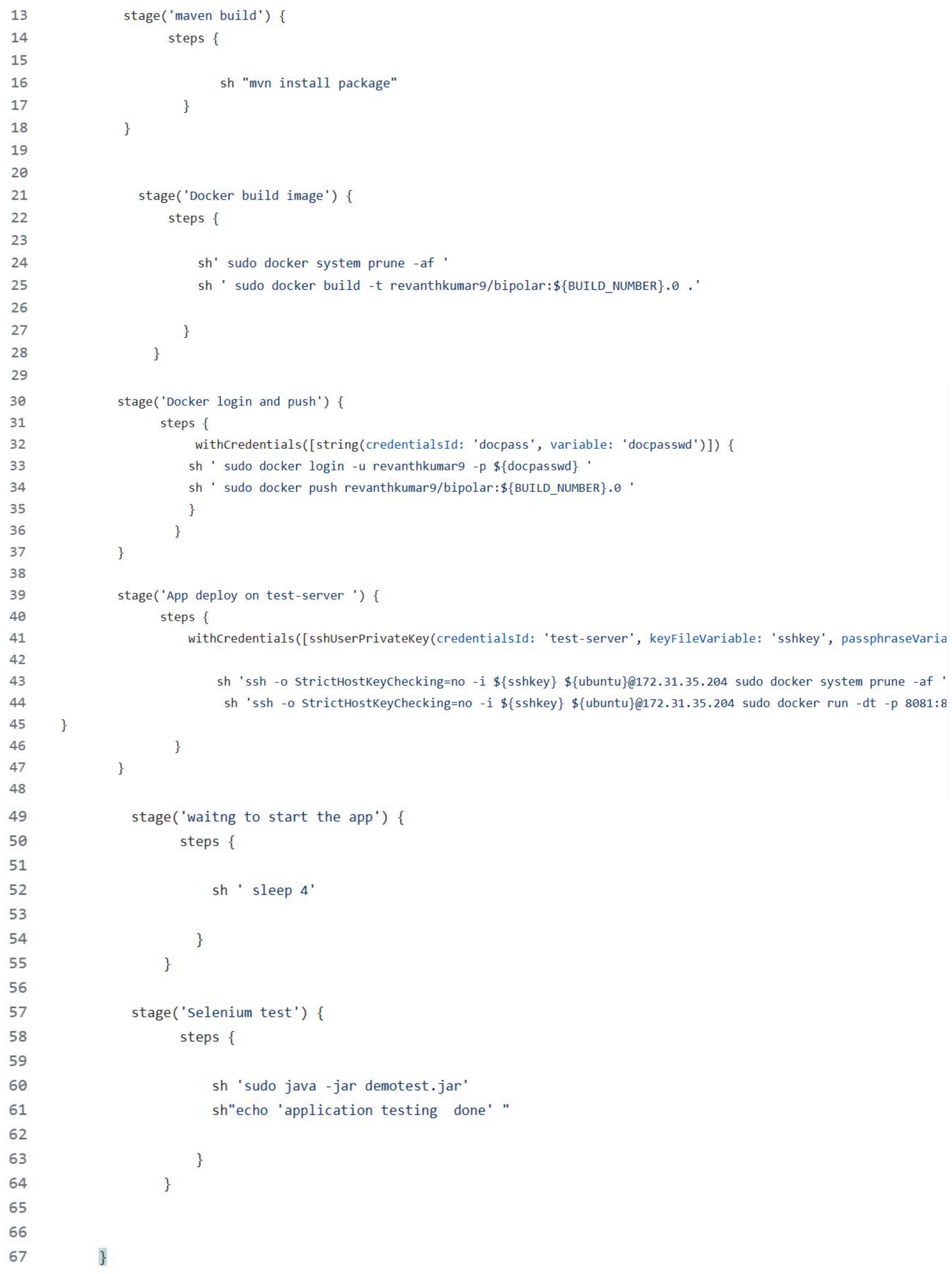
Repository URL: https://github.com/SaiRevanth-J/bipolar-test.git

Credentials

- Jenkinsfile pipeline is as shown below.



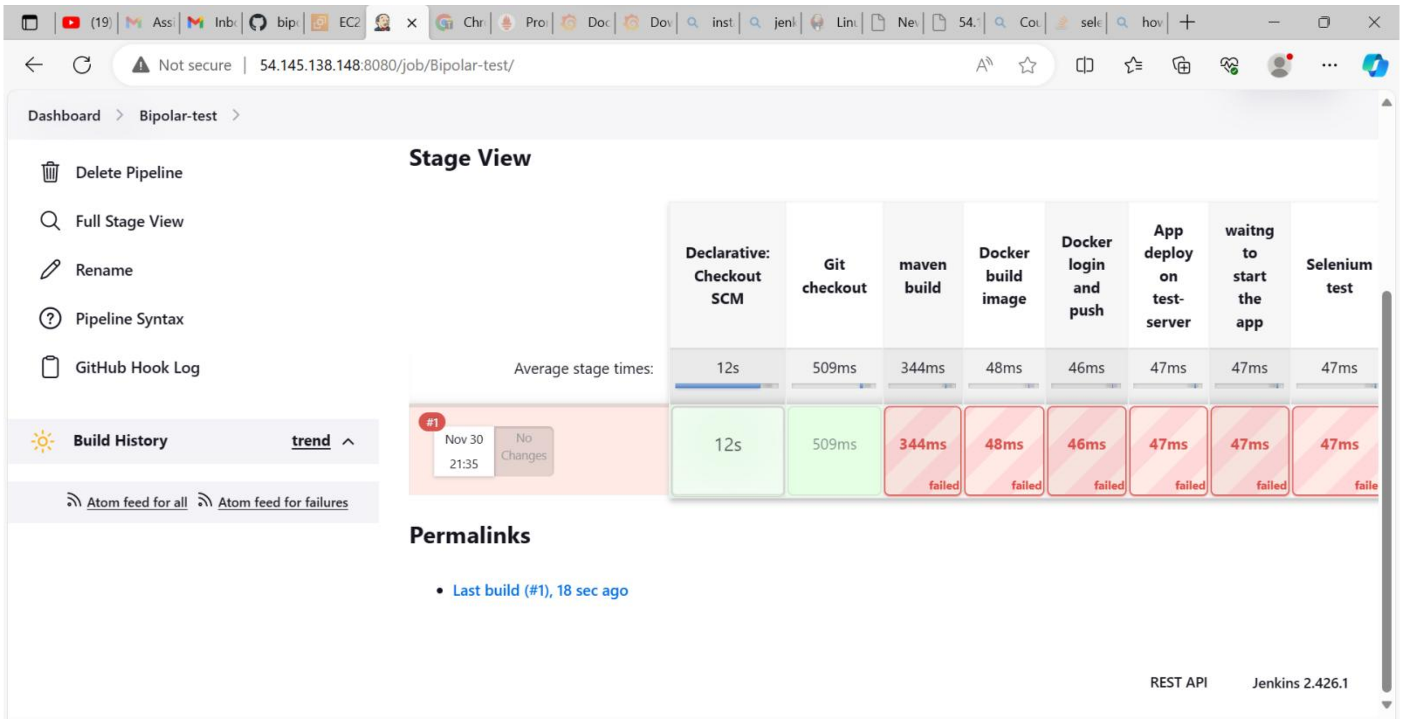
```
pipeline {
    agent any


    stages {
        stage('Git checkout') {
            steps {

                    git 'https://github.com/SaiRevanth-J/bipolar-test.git'

                }
            }
```



```
          stage('maven build') {
                steps {

                      sh "mvn install package"
                  }
          }


            stage('Docker build image') {
                steps {

                    sh' sudo docker system prune -af '
                    sh ' sudo docker build -t revanthkumar9/bipolar:${BUILD_NUMBER}.0 .'

                  }
              }

         stage('Docker login and push') {
               steps {
                    withCredentials([string(credentialsId: 'docpass', variable: 'docpasswd')]) {
                   sh ' sudo docker login -u revanthkumar9 -p ${docpasswd} '
                   sh ' sudo docker push revanthkumar9/bipolar:${BUILD_NUMBER}.0 '
                   }
                 }
         }

         stage('App deploy on test-server ') {
               steps {
                   withCredentials([sshUserPrivateKey(credentialsId: 'test-server', keyFileVariable: 'sshkey', passphraseVaria

                       sh 'ssh -o StrictHostKeyChecking=no -i ${sshkey} ${ubuntu}@172.31.35.204 sudo docker system prune -af '
                        sh 'ssh -o StrictHostKeyChecking=no -i ${sshkey} ${ubuntu}@172.31.35.204 sudo docker run -dt -p 8081:8
 }
                 }
         }

           stage('waitng to start the app') {
                 steps {

                      sh ' sleep 4'

                   }
               }

           stage('Selenium test') {
                 steps {

                      sh 'sudo java -jar demotest.jar'
                      sh"echo 'application testing  done' "

                   }
               }


        }
```

```
            failure {
                echo 'sending email notification from jenkins'

                step([$class: 'Mailer',
          notifyEveryUnstableBuild: true,
          recipients: emailextrecipients([[$class: 'CulpritsRecipientProvider'],
                                          [$class: 'RequesterRecipientProvider']])])


           }
        }
    }
```

- Bipolar-test Pipeline Job-1 is failed intentionally to test the Email Notifications is working or not on job failure.


Not secure | 54.145.138.148:8080/job/Bipolar-test/

Dashboard > Bipolar-test >

Delete Pipeline
Full Stage View
Rename
Pipeline Syntax
GitHub Hook Log

Build History — trend

Atom feed for all — Atom feed for failures

Stage View

	Declarative: Checkout SCM	Git checkout	maven build	Docker build image	Docker login and push	App deploy on test-server	waitng to start the app	Selenium test
Average stage times:	12s	509ms	344ms	48ms	46ms	47ms	47ms	47ms
#1 Nov 30 21:35 — No Changes	12s	509ms	344ms failed	48ms failed	46ms failed	47ms failed	47ms failed	47ms faile

Permalinks

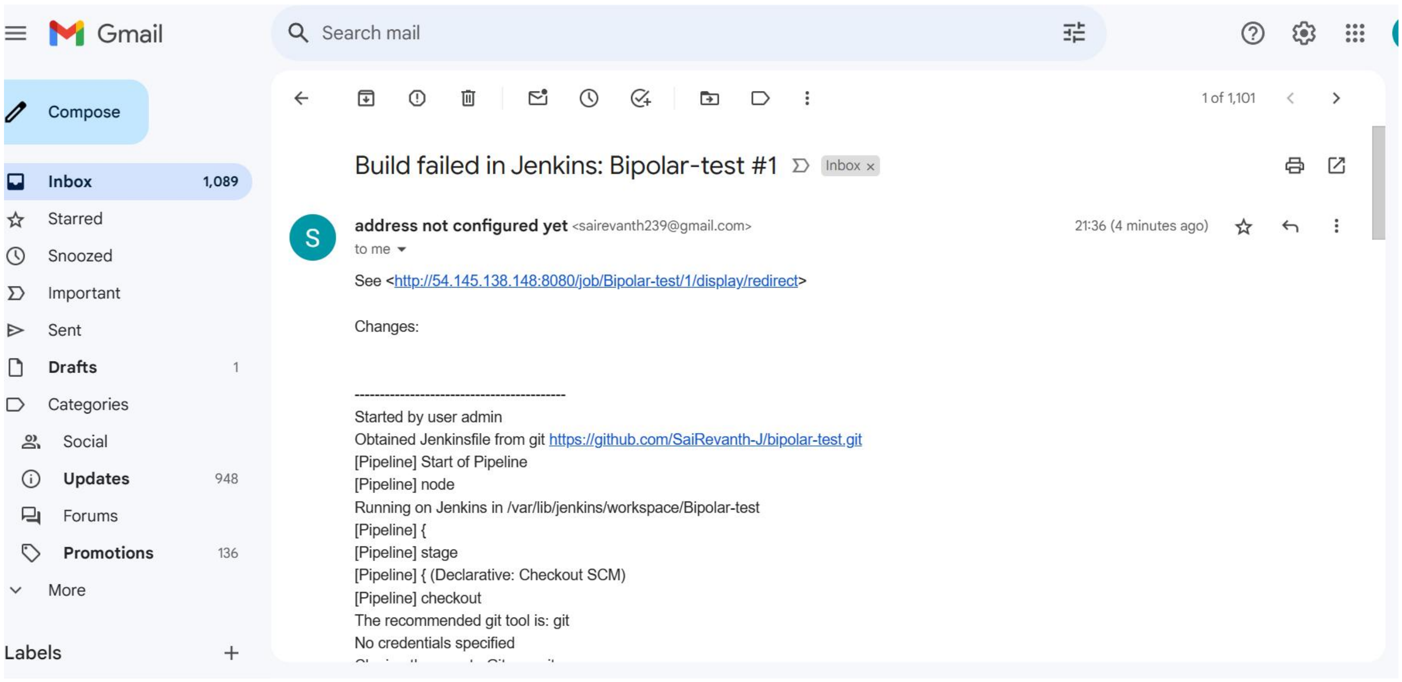
- Last build (#1), 18 sec ago

REST API — Jenkins 2.426.1

.

```
sending email notification from jenkins
[Pipeline] emailextrecipients
[Pipeline] step
Sending e-mails to: sairevanth239@gmail.com
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // withEnv
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
ERROR: script returned exit code 127
Finished: FAILURE
```

- Email notification Received successfully on job failure.as shown below



Build failed in Jenkins: Bipolar-test #1

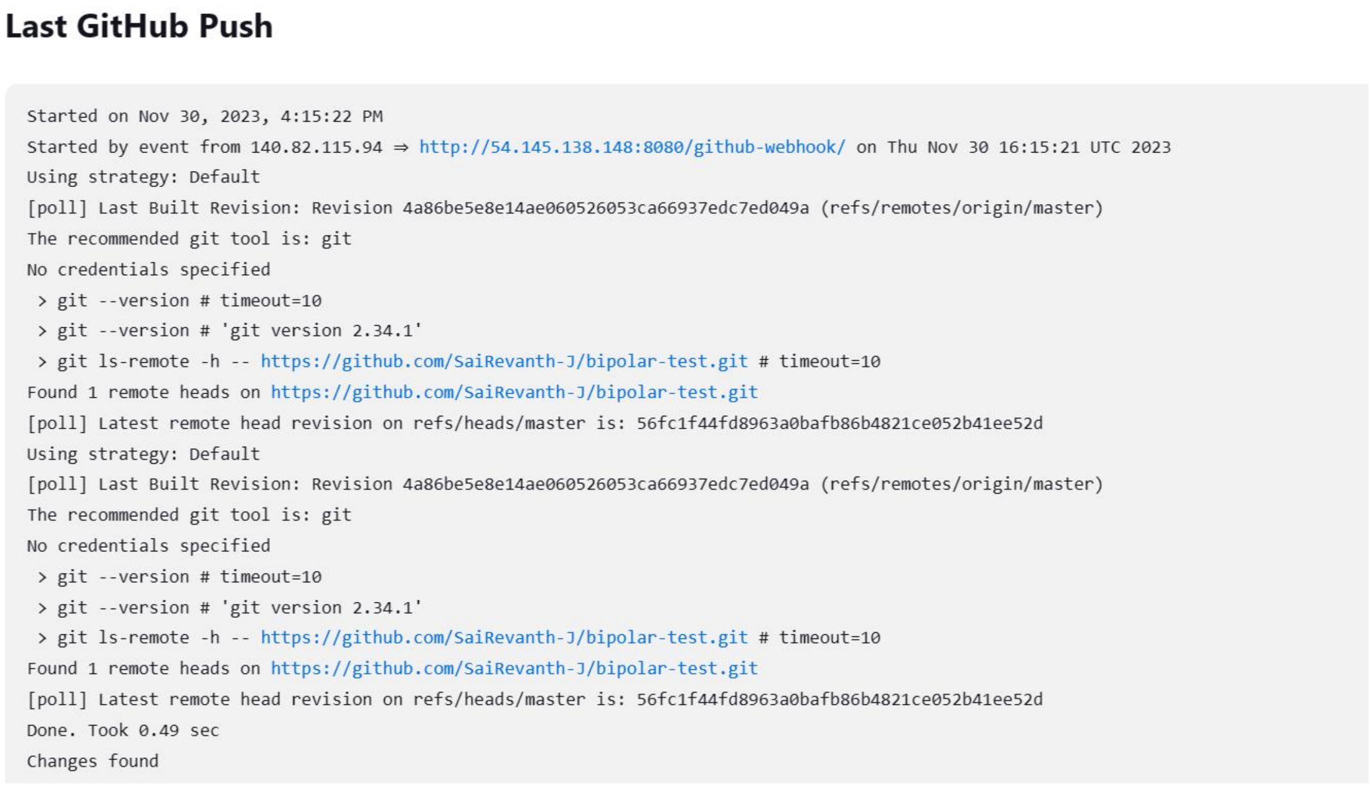
address not configured yet <sairevanth239@gmail.com>
to me

See <http://54.145.138.148:8080/job/Bipolar-test/1/display/redirect>

Changes:

```
------------------------------------------
Started by user admin
Obtained Jenkinsfile from git https://github.com/SaiRevanth-J/bipolar-test.git
[Pipeline] Start of Pipeline
[Pipeline] node
Running on Jenkins in /var/lib/jenkins/workspace/Bipolar-test
[Pipeline] {
[Pipeline] stage
[Pipeline] { (Declarative: Checkout SCM)
[Pipeline] checkout
The recommended git tool is: git
No credentials specified
```

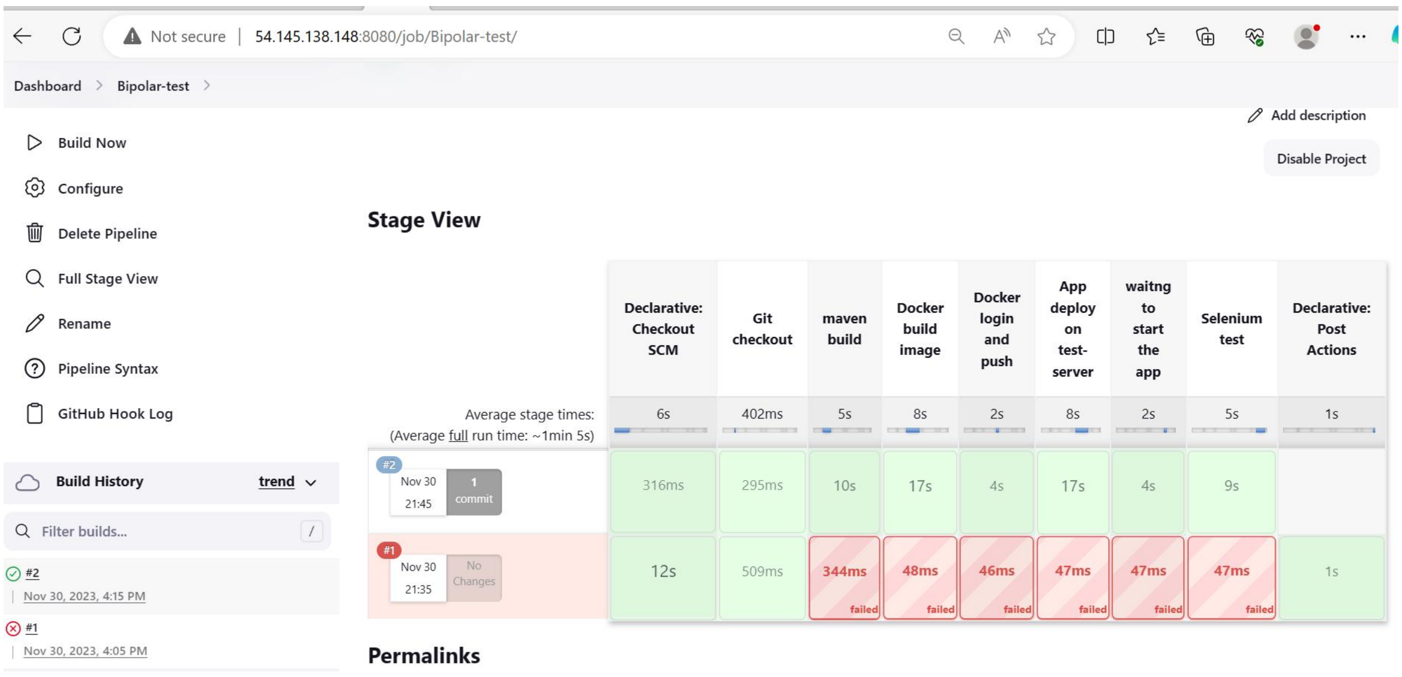
- After Rectification of Error in pipeline and after a new push, webhook triggered the job and run the pipeline successfully as below.



Last GitHub Push

```
Started on Nov 30, 2023, 4:15:22 PM
Started by event from 140.82.115.94 ⇒ http://54.145.138.148:8080/github-webhook/ on Thu Nov 30 16:15:21 UTC 2023
Using strategy: Default
[poll] Last Built Revision: Revision 4a86be5e8e14ae060526053ca66937edc7ed049a (refs/remotes/origin/master)
The recommended git tool is: git
No credentials specified
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
 > git ls-remote -h -- https://github.com/SaiRevanth-J/bipolar-test.git # timeout=10
Found 1 remote heads on https://github.com/SaiRevanth-J/bipolar-test.git
[poll] Latest remote head revision on refs/heads/master is: 56fc1f44fd8963a0bafb86b4821ce052b41ee52d
Using strategy: Default
[poll] Last Built Revision: Revision 4a86be5e8e14ae060526053ca66937edc7ed049a (refs/remotes/origin/master)
The recommended git tool is: git
No credentials specified
 > git --version # timeout=10
 > git --version # 'git version 2.34.1'
 > git ls-remote -h -- https://github.com/SaiRevanth-J/bipolar-test.git # timeout=10
Found 1 remote heads on https://github.com/SaiRevanth-J/bipolar-test.git
[poll] Latest remote head revision on refs/heads/master is: 56fc1f44fd8963a0bafb86b4821ce052b41ee52d
Done. Took 0.49 sec
Changes found
```

- Pipeline is executed successfully.



Not secure | 54.145.138.148:8080/job/Bipolar-test/

Dashboard > Bipolar-test >

Build Now
Configure
Delete Pipeline
Full Stage View
Rename
Pipeline Syntax
GitHub Hook Log

Build History trend

#2 Nov 30, 2023, 4:15 PM
#1 Nov 30, 2023, 4:05 PM

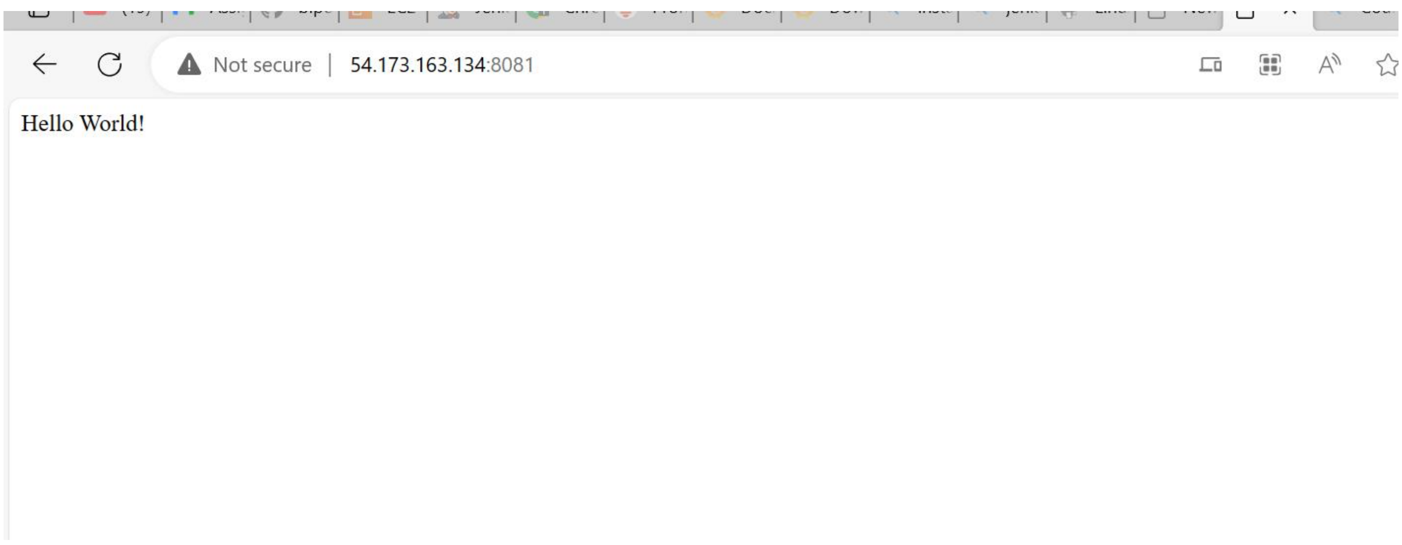
Add description
Disable Project

Stage View

	Declarative: Checkout SCM	Git checkout	maven build	Docker build image	Docker login and push	App deploy on test-server	waitng to start the app	Selenium test	Declarative: Post Actions
Average stage times: (Average full run time: ~1min 5s)	6s	402ms	5s	8s	2s	8s	2s	5s	1s
#2 Nov 30 21:45 1 commit	316ms	295ms	10s	17s	4s	17s	4s	9s	
#1 Nov 30 21:35 No Changes	12s	509ms	344ms failed	48ms failed	46ms failed	47ms failed	47ms failed	47ms failed	1s

Permalinks

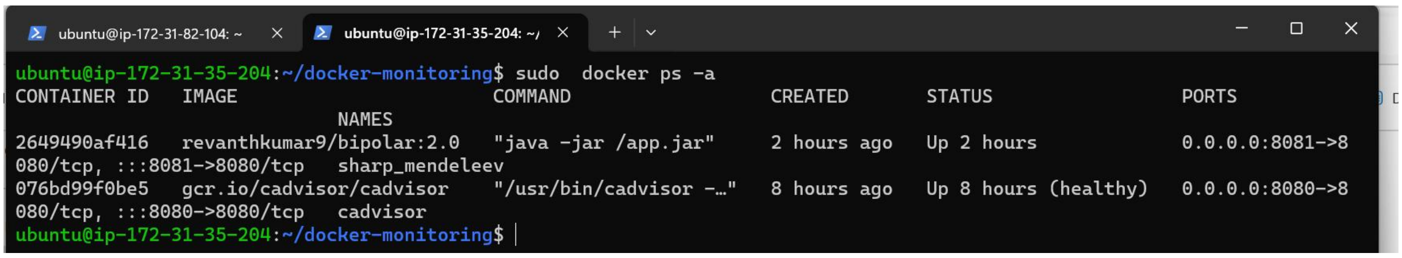
- Application is deployed on test-server and accessed on 54. 173. 163. 134:8081



Not secure | 54.173.163.134:8081

Hello World!

- Application is deployed on test-server as below (container name : **sharp_mendeleev**).



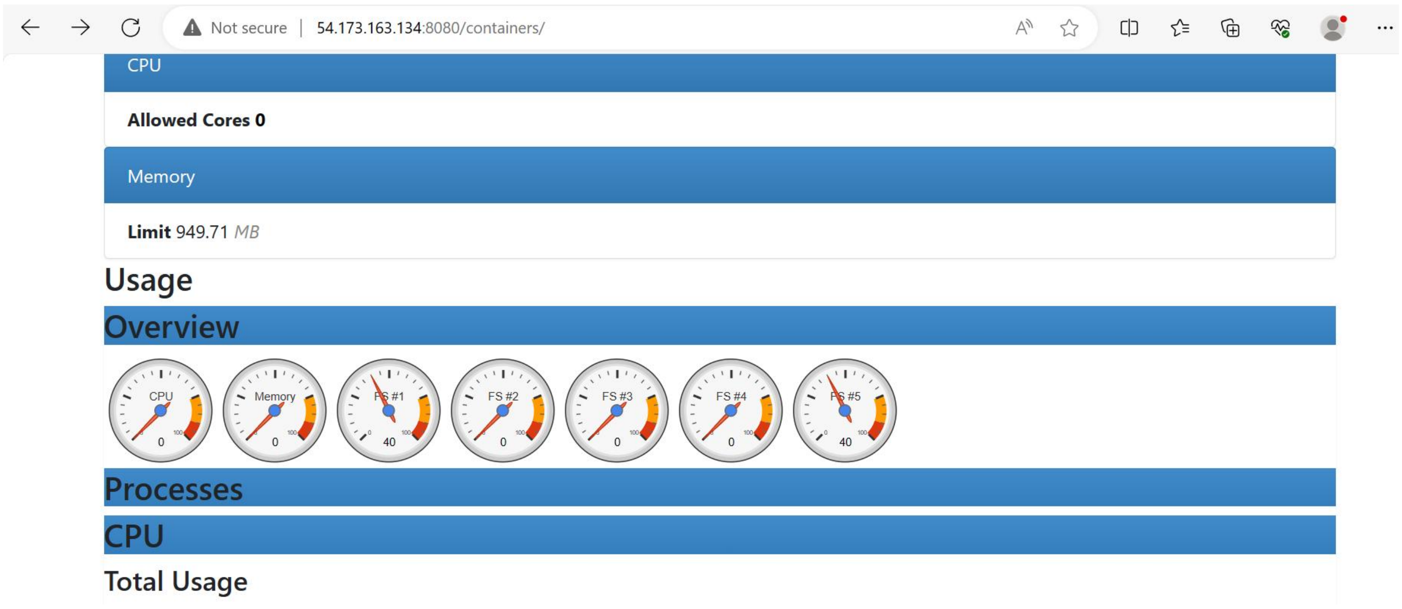
```
ubuntu@ip-172-31-35-204:~/docker-monitoring$ sudo  docker ps -a
CONTAINER ID   IMAGE                         COMMAND                  CREATED       STATUS                  PORTS
                         NAMES
2649490af416   revanthkumar9/bipolar:2.0    "java -jar /app.jar"     2 hours ago   Up 2 hours              0.0.0.0:8081->8
080/tcp, :::8081->8080/tcp   sharp_mendeleev
076bd99f0be5   gcr.io/cadvisor/cadvisor     "/usr/bin/cadvisor -…"   8 hours ago   Up 8 hours (healthy)    0.0.0.0:8080->8
080/tcp, :::8080->8080/tcp   cadvisor
ubuntu@ip-172-31-35-204:~/docker-monitoring$
```

➢ Configured Monitoring and logging :-

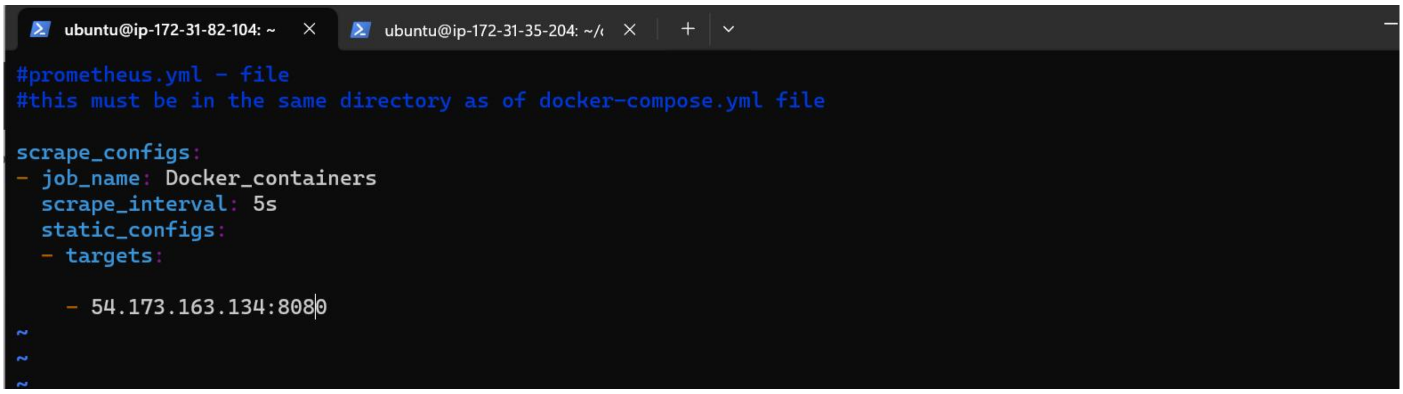
- Deployed application container is monitored by using prometheus , grafana and cAdviser.
- First cAadviser was started on test-server instance to monitor and scrap metrics of the containers with following command.

sudo docker run -d --name=cadvisor -p 8080:8080 -v /:/rootfs:ro -v /var/run:/var/run:ro -v /sys:/sys:ro -v /var/lib/docker/:/var/lib/docker:ro -v /dev/disk/:/dev/disk:ro --privileged --device=/dev/kmsg --restart=unless-stopped gcr.io/cadvisor/cadvisor

- cAdvisor capture the metrics of docker containers.
- Cadvisor container is up and running on test-server 54.173.163.134:8080 as shown below.



- Created prometheus.yml file in jenkins-server and configured to scrap the metrics of test-server docker containers as below from CAdvisor.



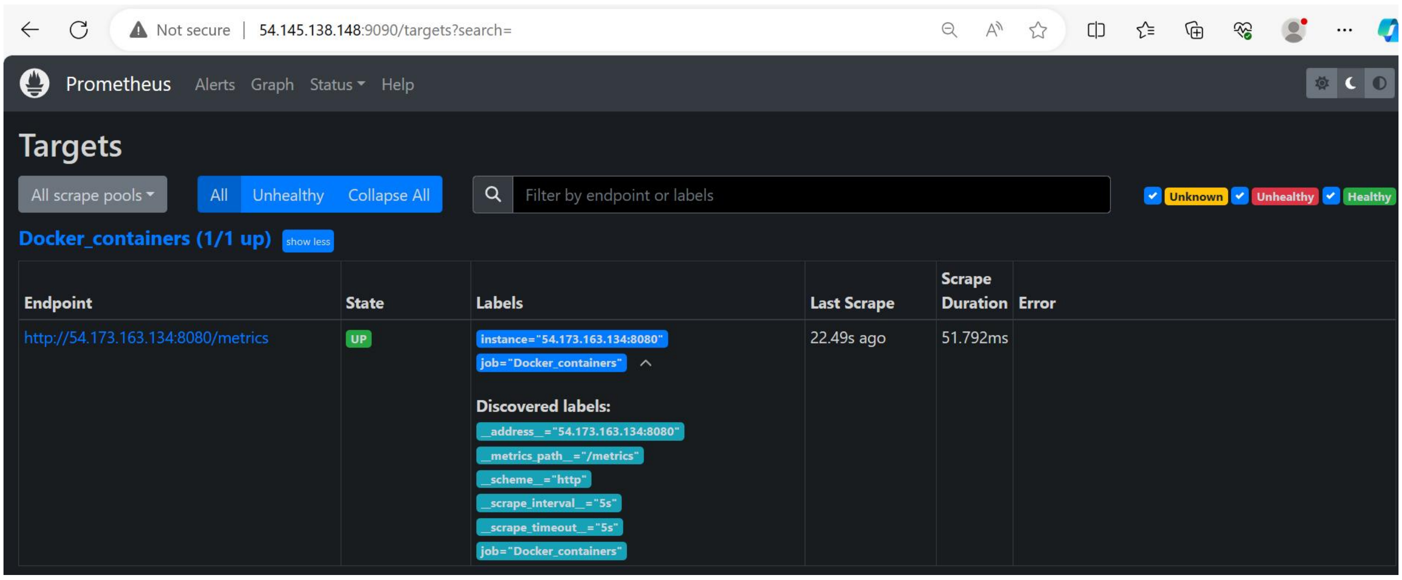
```
#prometheus.yml - file
#this must be in the same directory as of docker-compose.yml file

scrape_configs:
- job_name: Docker_containers
  scrape_interval: 5s
  static_configs:
  - targets:

    - 54.173.163.134:8080
~
~
~
```

- In Jenkins-server Prometheus and grafana are launched as a docker container to stup monitor and logging with following commands

1. Sudo docker volume create prometheus-data
2. Sudo docker run -d \
   -p 9090:9090 \
   -v /path/to/prometheus.yml:/etc/prometheus/prometheus.yml \
   -v prometheus-data:/prometheus \
   prom/prometheus

3. Sudo docker run -d --name=grafana -p 3000:3000 grafana/grafana

- Prometheus is accessed on jenkins-server 54.145.138.148:9090 as shown below.


Not secure | 54.145.138.148:9090/targets?search=

Prometheus Alerts Graph Status Help

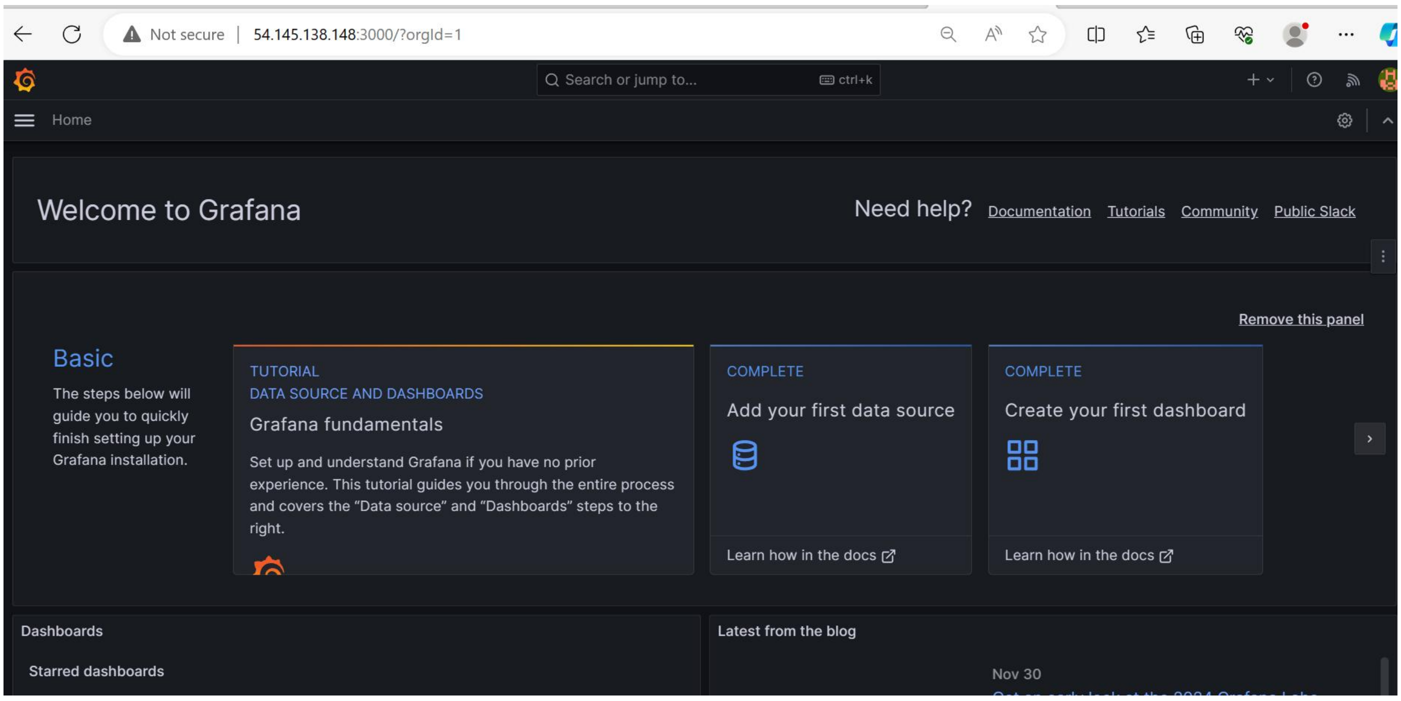
Targets

All scrape pools All Unhealthy Collapse All Filter by endpoint or labels Unknown Unhealthy Healthy

Docker_containers (1/1 up) show less

Endpoint	State	Labels	Last Scrape	Scrape Duration	Error
http://54.173.163.134:8080/metrics	UP	instance="54.173.163.134:8080" job="Docker_containers" Discovered labels: __address__="54.173.163.134:8080" __metrics_path__="/metrics" __scheme__="http" __scrape_interval__="5s" __scrape_timeout__="5s" job="Docker_containers"	22.49s ago	51.792ms	

- Grafana is accessed on jenkins-server 54.145.138.148:3000 as shown below.


Not secure | 54.145.138.148:3000/?orgId=1

Search or jump to... ctrl+k

Home

Welcome to Grafana

Need help? Documentation Tutorials Community Public Slack

Remove this panel

Basic
The steps below will guide you to quickly finish setting up your Grafana installation.

TUTORIAL
DATA SOURCE AND DASHBOARDS
Grafana fundamentals
Set up and understand Grafana if you have no prior experience. This tutorial guides you through the entire process and covers the "Data source" and "Dashboards" steps to the right.

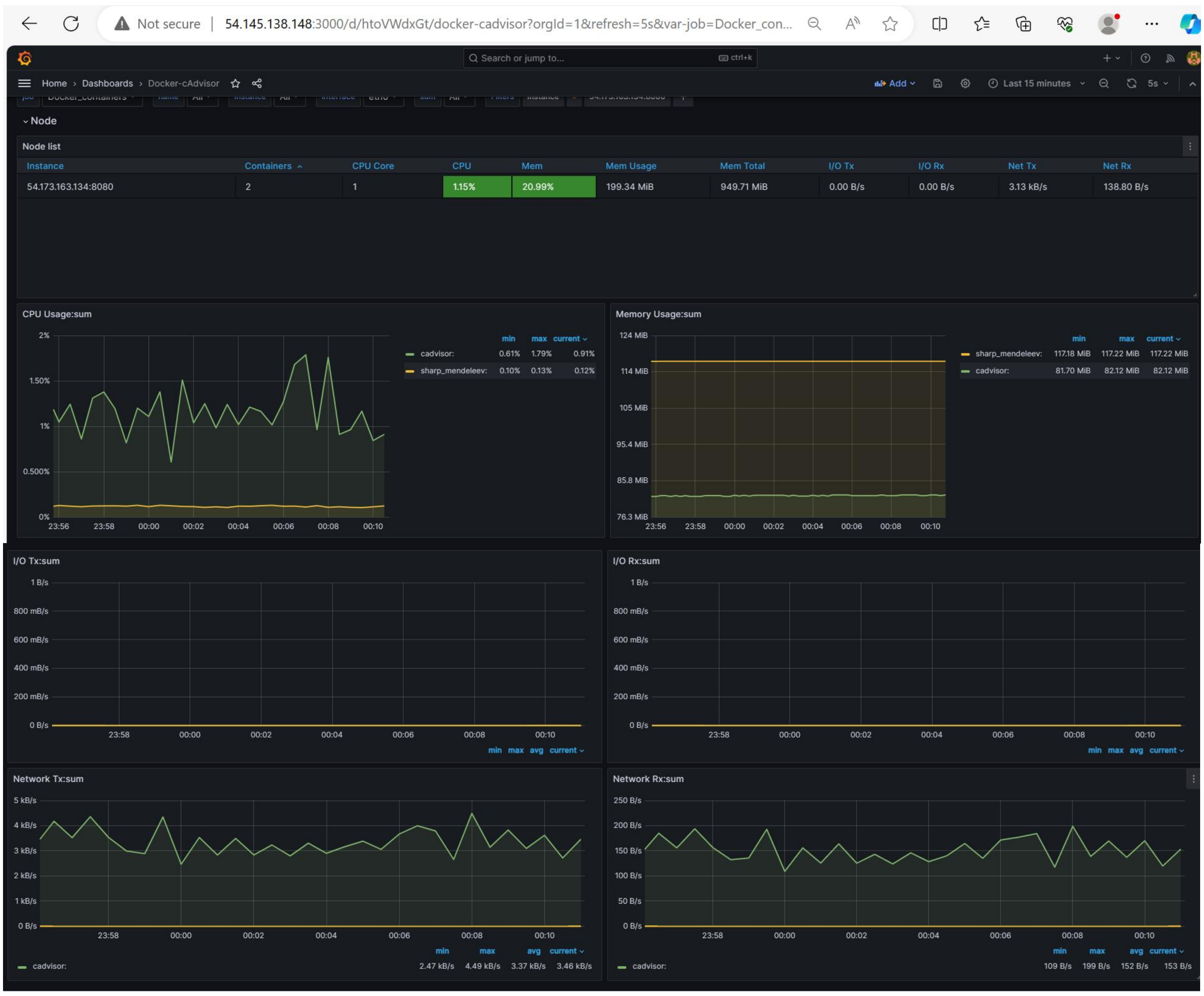
COMPLETE
Add your first data source
Learn how in the docs

COMPLETE
Create your first dashboard
Learn how in the docs

Dashboards
Starred dashboards

Latest from the blog
Nov 30

- Monitoring and logging Dashboard for deployed container is setup as below.



Node list

Instance	Containers	CPU Core	CPU	Mem	Mem Usage	Mem Total	I/O Tx	I/O Rx	Net Tx	Net Rx
54.173.163.134:8080	2	1	1.15%	20.99%	199.34 MiB	949.71 MiB	0.00 B/s	0.00 B/s	3.13 kB/s	138.80 B/s

CPU Usage:sum

	min	max	current
cadvisor:	0.61%	1.79%	0.91%
sharp_mendeleev:	0.10%	0.13%	0.12%

Memory Usage:sum

	min	max	current
sharp_mendeleev:	117.18 MiB	117.22 MiB	117.22 MiB
cadvisor:	81.70 MiB	82.12 MiB	82.12 MiB

Network Tx:sum

	min	max	avg	current
cadvisor:	2.47 kB/s	4.49 kB/s	3.37 kB/s	3.46 kB/s

Network Rx:sum

	min	max	avg	current
cadvisor:	109 B/s	199 B/s	152 B/s	153 B/s