DEVOPS PROJECT-1

BY
BHARATH P

You have been hired as a Sr. DevOps Engineer in Abode Software. They want to implement DevOps Lifecycle in their company. You have been asked to implement this lifecycle as fast as possible. Abode Software is a product-based company and their product is available on this GitHub link.

https://github.com/hshar/website.git

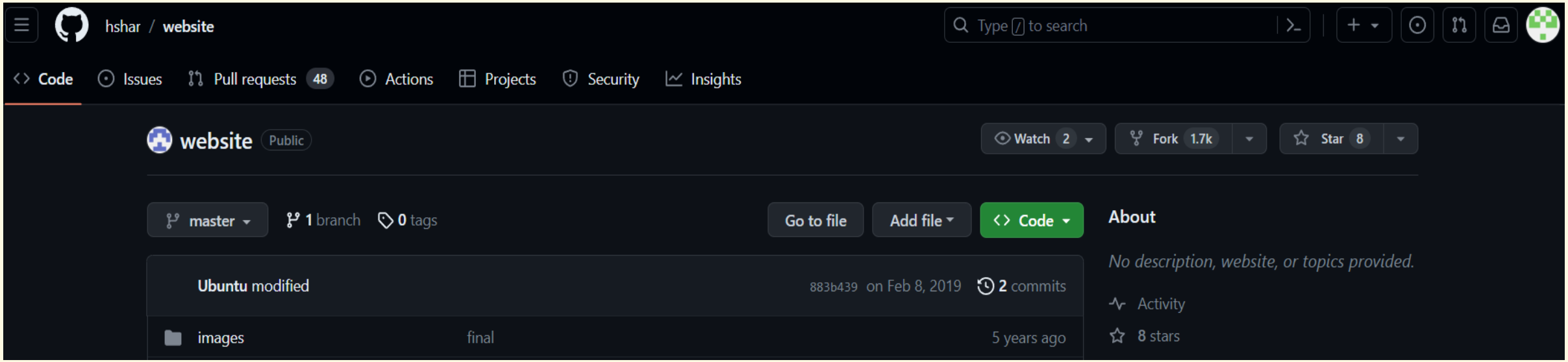
Following are the specifications of the lifecycle:

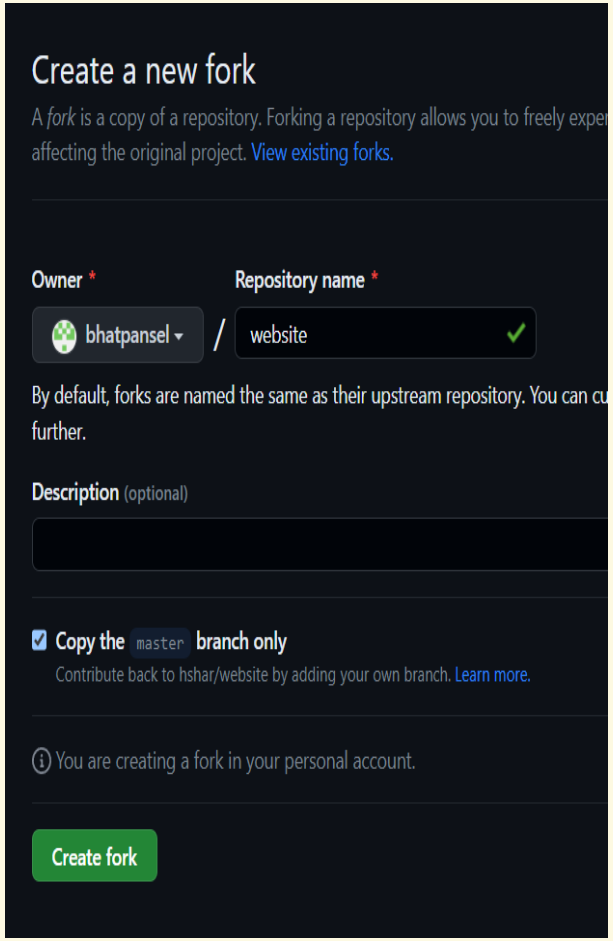
1. Install the necessary software on the machines using a configuration management tool
2. Git workflow has to be implemented
3. CodeBuild should automatically be triggered once a commit is made to master branch or develop branch.
    a. If a commit is made to master branch, test and push to prod
    b. If a commit is made to develop branch, just test the product, do not push to prod
4. The code should be containerized with the help of a Dockerfile. The Dockerfile should be built every time there is a push to GitHub. Use the following pre-built container for your application: hshar/webapp
   The code should reside in '/var/www/html'
5. The above tasks should be defined in a Jenkins Pipeline with the following jobs:
    a. Job1 : build
    b. Job2 : test
    c. Job3 : prod

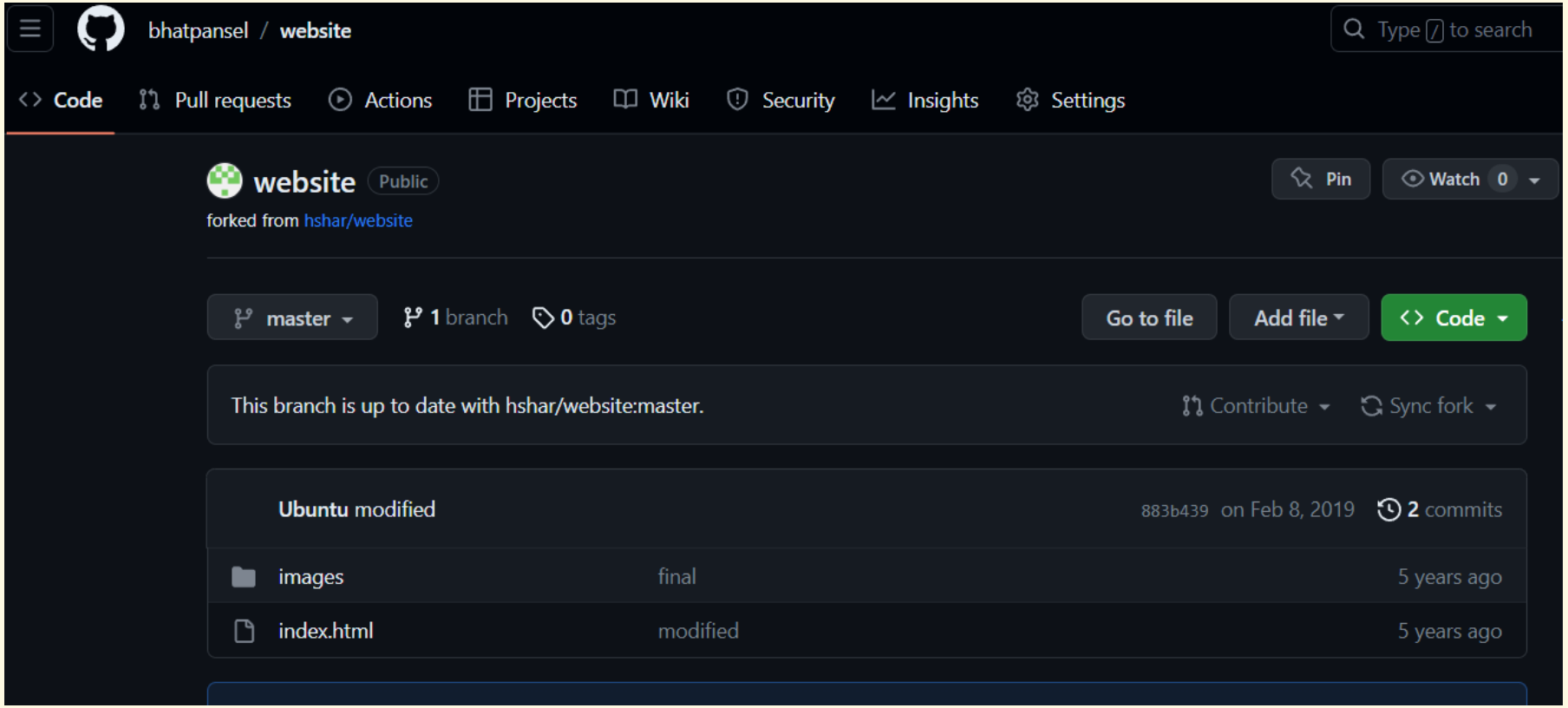
You have been hired as a Sr. DevOps Engineer in Abode Software. They want to implement DevOps Lifecycle in their company. You have been asked to implement this lifecycle as fast as possible. Abode Software is a product-based company and their product is available on this GitHub link.

https://github.com/hshar/website.git

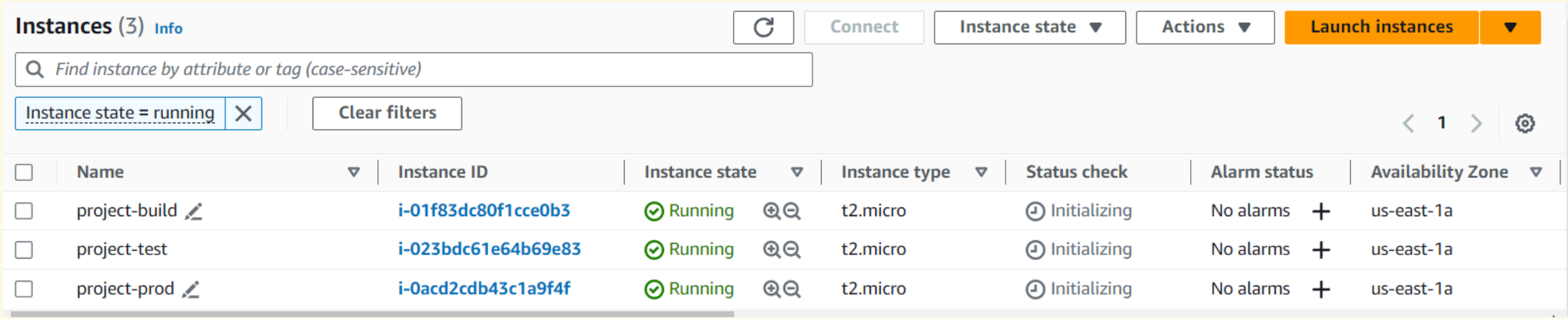
First initially we need to get the software from the given github link to our own GitHub repositories




Create a new fork
A fork is a copy of a repository. Forking a repository allows you to freely exper
affecting the original project. View existing forks.
Owner *
Repository name *
bhatpansel
/
website
By default, forks are named the same as their upstream repository. You can cu
further.
Description (optional)
Copy the master branch only
Contribute back to hshar/website by adding your own branch. Learn more.
You are creating a fork in your personal account.
Create fork


bhatpansel / website
Type / to search
Code
Pull requests
Actions
Projects
Wiki
Security
Insights
Settings
website
Public
forked from hshar/website
Pin
Watch 0
master
1 branch
0 tags
Go to file
Add file
Code
This branch is up to date with hshar/website:master.
Contribute
Sync fork
Ubuntu modified
883b439 on Feb 8, 2019
2 commits
images
final
5 years ago
index.html
modified
5 years ago

Instances created for our project to do



1. Install the necessary software on the machines using a configuration management tool

Installed ansible in master as per instructions in below link
https://docs.ansible.com/ansible/latest/installation_guide/installation_distros.html#installing-ansible-on-ubuntu

```
$ sudo apt update
$ sudo apt install software-properties-common
$ sudo add-apt-repository --yes --update ppa:ansible/ansible
$ sudo apt install ansible
```

```
ubuntu@ip-172-31-86-49:~$ ansible --version
ansible [core 2.12.10]
  config file = /etc/ansible/ansible.cfg
  configured module search path = ['/home/ubuntu/.ansible/plugins/modules', '/usr/share/ansible/plugins/modules']
  ansible python module location = /usr/lib/python3/dist-packages/ansible
  ansible collection location = /home/ubuntu/.ansible/collections:/usr/share/ansible/collections
  executable location = /usr/bin/ansible
  python version = 3.8.10 (default, Mar 13 2023, 10:26:41) [GCC 9.4.0]
  jinja version = 2.10.1
  libyaml = True
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.233.163.9 PrivateIPs: 172.31.86.49

Generated key pair in master

```
ubuntu@ip-172-31-86-49:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ubuntu/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/ubuntu/.ssh/id_rsa
Your public key has been saved in /home/ubuntu/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:3xYI74kWV6rPtoDLEH7y/S2+RMFv76Caz+jM96p1a0U ubuntu@ip-172-31-86-49
The key's randomart image is:
+---[RSA 3072]----+
|                 |
|         .       |
|        . o .    |
|         o *  E  |
|     .  S * +.   |
|    . . . O + o. |
|     + o = * =.. |
|      * * X+=.+  |
|       +.XO%B+ . |
+----[SHA256]-----+
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.233.163.9 PrivateIPs: 172.31.86.49

Copy public key generated in master to authorized_keys file in test and prod

```
ubuntu@ip-172-31-92-228:~/.ssh$ cat authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQCz7oz7tNvuz+tjL59iR21d1+5QMpLtEG40
9JJHesPwD7w1AAfYVtHiWTwU4i9hBvzwnp3z3nCVHubhbQh91KchijLJFVceJ/sHGJAjKJqK
x4xq/5QAOgWl3XhrhriTZAXeRtmOxZGRn0Nf module10key

ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABgQDegDvL4LVJrefvLevqbfYRdB5RcSp85F/u
+iZNDNZre4yqnnFsVu0/spZkBfK1+hecvQrF+30czZkfHVjKqyA6OI5rJ6XimqKmkCxDZPzE
oMPG2KBYayLIhp9W0jwan+jQqnmOOLtyjXzCm5vZv0MY6PETs1R6O1fXO+G9nnCLnyuq72+d
xMeZHZG//z39Fgc56vWdYP0uP++f5dq3efs= ubuntu@ip-172-31-86-49
ubuntu@ip-172-31-92-228:~/.ssh$
```

i-0acd2cdb43c1a9f4f (project-prod)

PublicIPs: 3.85.131.37 PrivateIPs: 172.31.92.228

```
ubuntu@ip-172-31-88-192:~/.ssh$  cat authorized_keys
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABAQCz7oz7tNvuz+tjL59i
9JJHesPwD7w1AAfYVtHiWTwU4i9hBvzwnp3z3nCVHubhbQh91KchijLJ
x4xq/5QAOgWl3XhrhriTZAXeRtmOxZGRn0Nf module10key

ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAABgQDegDvL4LVJrefvLevq
+iZNDNZre4yqnnFsVu0/spZkBfK1+hecvQrF+30czZkfHVjKqyA6OI5r
oMPG2KBYayLIhp9W0jwan+jQqnmOOLtyjXzCm5vZv0MY6PETs1R6O1fX
xMeZHZG//z39Fgc56vWdYP0uP++f5dq3efs= ubuntu@ip-172-31-86
ubuntu@ip-172-31-88-192:~/.ssh$
```

i-023bdc61e64b69e83 (project-test)

PublicIPs: 54.165.141.218 PrivateIPs: 172.31.88.192

Added private IP of test and prod in master host file

VPC EC2 S3 RDS CloudFormation Route 53 IAM CloudWatch

```
  GNU nano 4.8                                                    /etc/ans
[test]
172.31.88.192

[prod]
172.31.92.228
```

Pinged all from master

```
ubuntu@ip-172-31-86-49:~$ ansible -m ping all
The authenticity of host '172.31.88.192 (172.31.88.192)' can't be established.
ECDSA key fingerprint is SHA256:16v2l1R91OGr5RAw8lyY3SDOB+chl/hZl1m3+JopiYE.
Are you sure you want to continue connecting (yes/no/[fingerprint])? 172.31.92.228 | S
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
yes
172.31.88.192 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python3"
    },
    "changed": false,
    "ping": "pong"
}
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

Created Play.yaml to install softwares in master and slave by calling shell scripts

```
ubuntu@ip-172-31-86-49:~$ sudo nano play.yaml
ubuntu@ip-172-31-86-49:~$ cat play.yaml
---
- name: installing tools on master
  hosts: localhost
  become: true
  tasks:
  - name: running master.sh script
    script: master.sh
- name: installing tools in slaves
  hosts: all
  become: true
  tasks:
  - name: running slave.sh script
    script: slave.sh

ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

Created Master.sh to Install Java,Docker,Jenkins in master

```
ubuntu@ip-172-31-86-49:~$ sudo nano master.sh
ubuntu@ip-172-31-86-49:~$ cat master.sh
sudo apt install openjdk-11-jdk -y

sudo apt apt install docker.io -y

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

sudo apt-get install jenkins
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

Created slave.sh to install Java and Docker in test and prod

```
ubuntu@ip-172-31-86-49:~$ sudo nano slave.sh
ubuntu@ip-172-31-86-49:~$ cat slave.sh
sudo apt install openjdk-11-jdk -y

sudo apt install docker.io -y
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

Ran play.yaml in master. Test n prod softwares installed

```
ubuntu@ip-172-31-86-49:~$ ansible-playbook play.yaml

PLAY [installing tools on master] ***********************************************

TASK [Gathering Facts] **********************************************************
ok: [localhost]

TASK [running master.sh script] *************************************************
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

```
ubuntu@ip-172-31-86-49:~$ jenkins --version
2.401.2
ubuntu@ip-172-31-86-49:~$ java --version
openjdk 11.0.19 2023-04-18
OpenJDK Runtime Environment (build 11.0.19+7-post-Ubuntu-0ubuntu120.04.1)
OpenJDK 64-Bit Server VM (build 11.0.19+7-post-Ubuntu-0ubuntu120.04.1, mixed mode, sharing)
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

```
ubuntu@ip-172-31-88-192:~$ java --version
openjdk 11.0.19 2023-04-18
OpenJDK Runtime Environment (build 11.0.19+7-post-Ubuntu-0ubuntu120.04.1)
OpenJDK 64-Bit Server VM (build 11.0.19+7-post-Ubuntu-0ubuntu120.04.1, mixed mode, sharing)
ubuntu@ip-172-31-88-192:~$ docker --version
Docker version 20.10.21, build 20.10.21-0ubuntu1~20.04.2
ubuntu@ip-172-31-88-192:~$
```

i-023bdc61e64b69e83 (project-test)

PublicIPs: 44.210.130.226 PrivateIPs: 172.31.88.192

```
ubuntu@ip-172-31-92-228:~$ java --version
openjdk 11.0.19 2023-04-18
OpenJDK Runtime Environment (build 11.0.19+7-post-Ubuntu-0ubuntu120.04.1)
OpenJDK 64-Bit Server VM (build 11.0.19+7-post-Ubuntu-0ubuntu120.04.1, mixed mode, sharing)
ubuntu@ip-172-31-92-228:~$ docker --version
Docker version 20.10.21, build 20.10.21-0ubuntu1~20.04.2
ubuntu@ip-172-31-92-228:~$
```

i-0acd2cdb43c1a9f4f (project-prod)

PublicIPs: 44.202.161.201 PrivateIPs: 172.31.92.228

In Master set up git repository by cloning the forked repo.

```
ubuntu@ip-172-31-86-49:~$ git clone https://github.com/bhatpansel/website.git
Cloning into 'website'...
remote: Enumerating objects: 8, done.
remote: Total 8 (delta 0), reused 0 (delta 0), pack-reused 8
Unpacking objects: 100% (8/8), 82.67 KiB | 11.81 MiB/s, done.
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

In master create a Dockerfile in the website folder to do the following tasks when executed:

- create ubuntu image with apache2 installed .
- The files in website folder will have to be copied to /var/www/html in the image.

```
ubuntu@ip-172-31-86-49:~$ sudo nano dockerfile
ubuntu@ip-172-31-86-49:~$ cat dockerfile
FROM ubuntu
RUN apt update
RUN apt install apache2 -y
ADD . /var/www/html
ENTRYPOINT apachectl -D FOREGROUND
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

Commit Dockerfile

```
ubuntu@ip-172-31-86-49:~$ git add dockerfile
ubuntu@ip-172-31-86-49:~$ git commit -m "commiting dockerfile"
[master (root-commit) 1e54641] commiting dockerfile
 Committer: Ubuntu <ubuntu@ip-172-31-86-49.ec2.internal>
Your name and email address were configured automatically based
on your username and hostname. Please check that they are accurate.
You can suppress this message by setting them explicitly. Run the
following command and follow the instructions in your editor to edit
your configuration file:

    git config --global --edit

After doing this, you may fix the identity used for this commit with:

    git commit --amend --reset-author

 1 file changed, 5 insertions(+)
 create mode 100644 dockerfile
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

Create develop branch

```
ubuntu@ip-172-31-86-49:~$ git branch
  develop
* master
ubuntu@ip-172-31-86-49:~$
```

i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

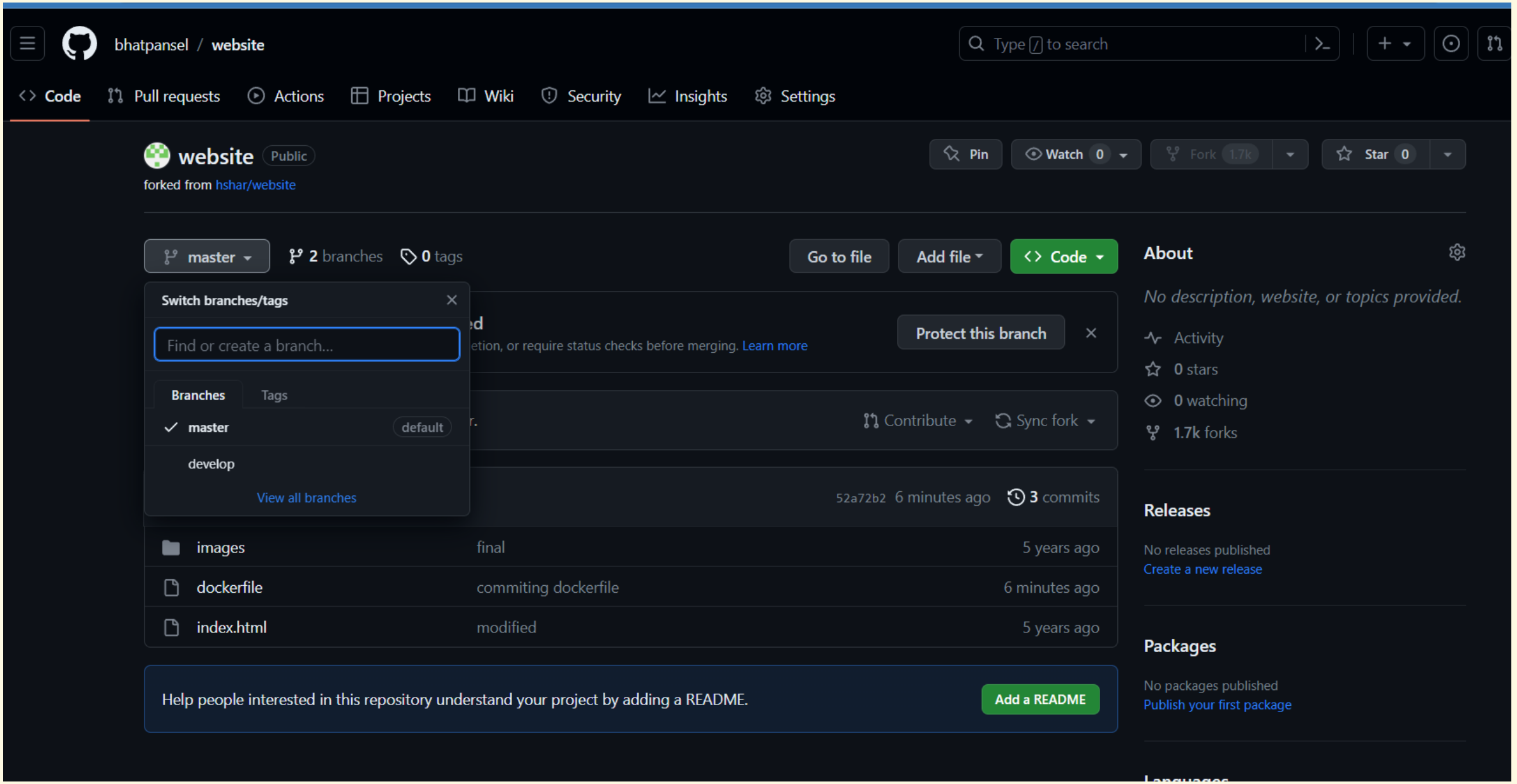
Push all changes to GITHub

```
ubuntu@ip-172-31-86-49:~/website$ git push origin --all
Username for 'https://github.com': bhatpansel
Password for 'https://bhatpansel@github.com':
Enumerating objects: 4, done.
Counting objects: 100% (4/4), done.
Compressing objects: 100% (3/3), done.
Writing objects: 100% (3/3), 420 bytes | 420.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0)
To https://github.com/bhatpansel/website.git
   883b439..52a72b2  master -> master
 * [new branch]      develop -> develop
ubuntu@ip-172-31-86-49:~/website$
```

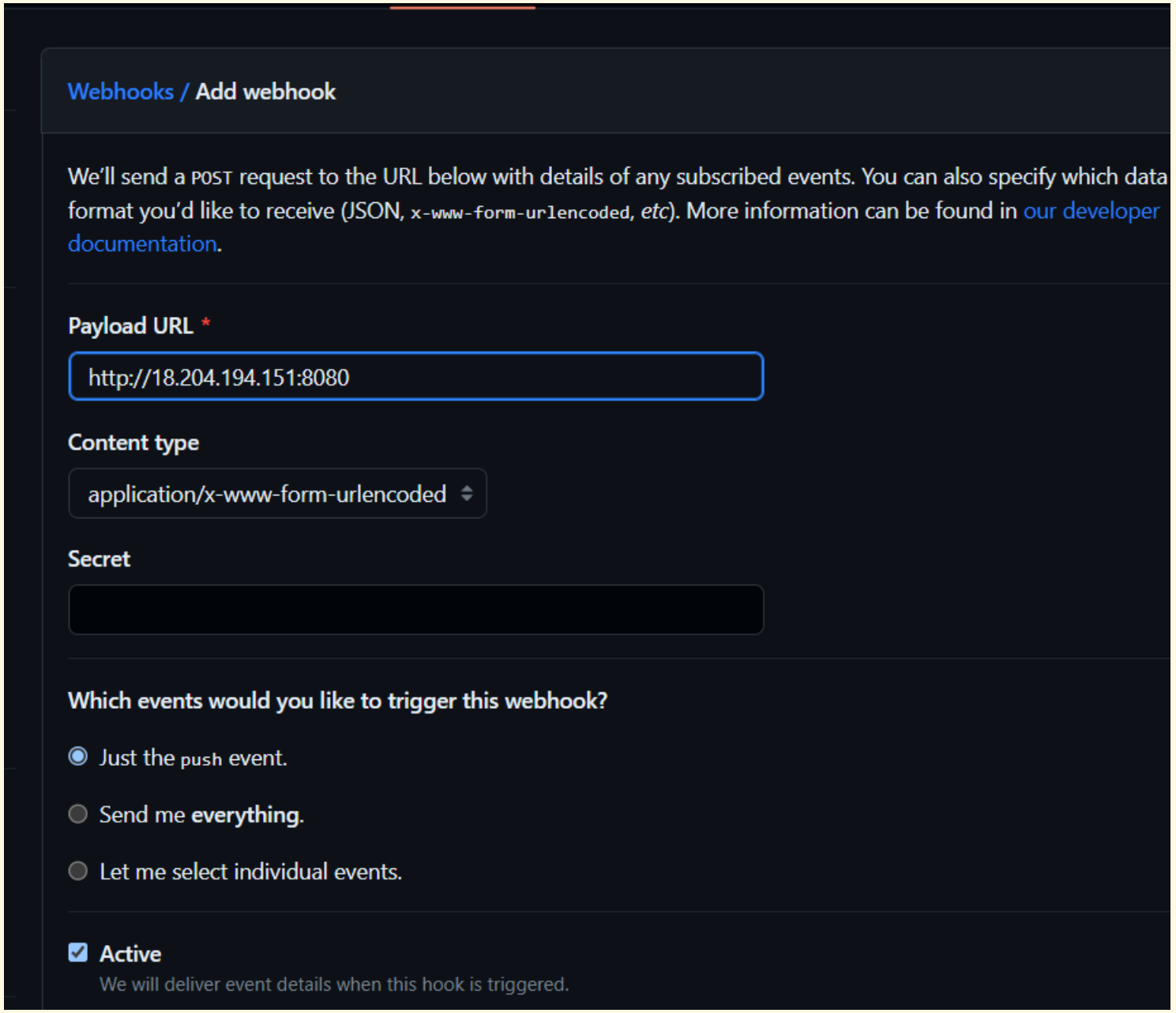
i-01f83dc80f1cce0b3 (project-build)

PublicIPs: 18.204.194.151 PrivateIPs: 172.31.86.49

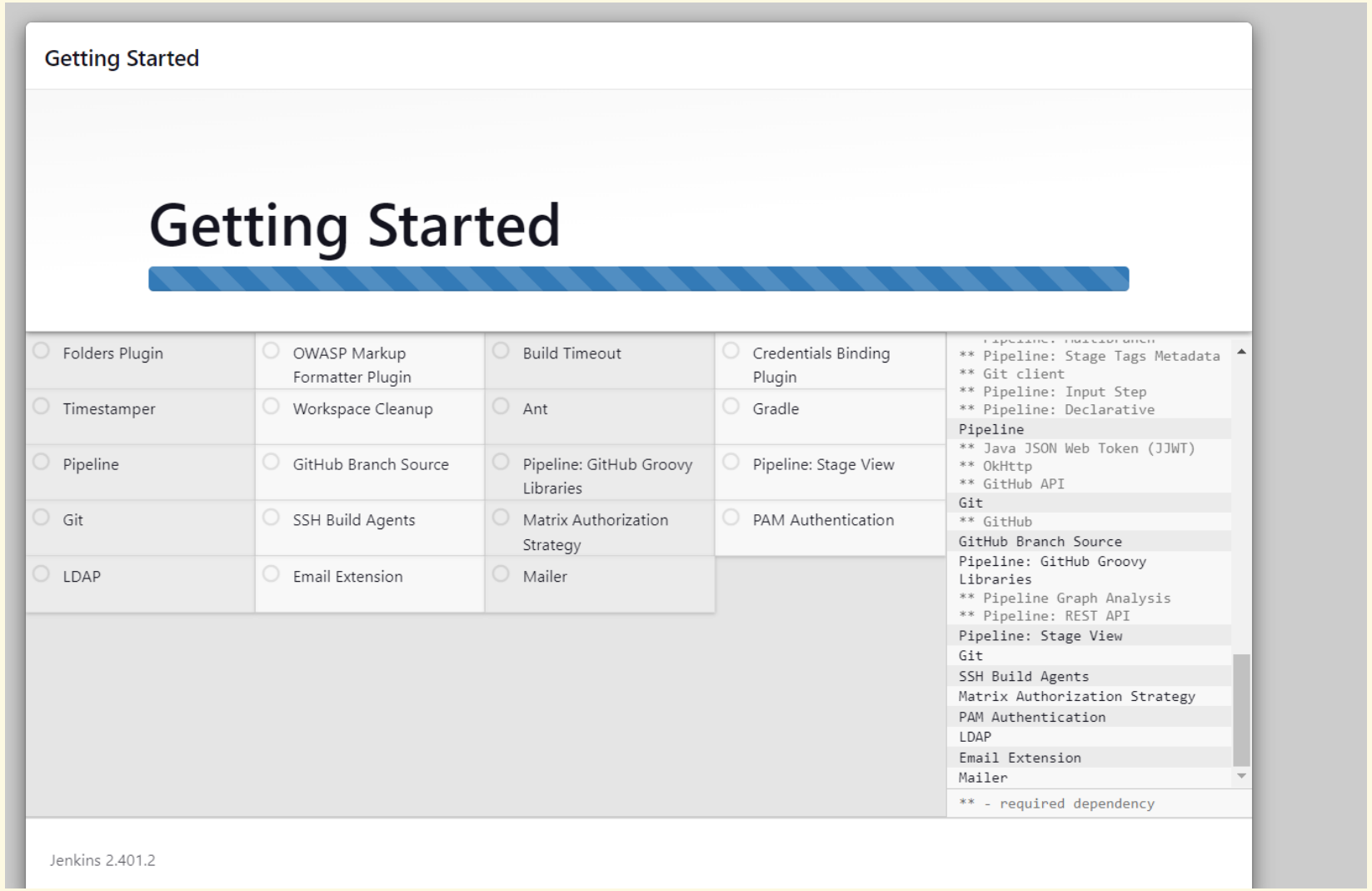
Dockerfile and develop branch visible in github



Create webhook in github repository (source)



Browse to jenkin url - public ip of master:8080 and install suggested plugins and configure



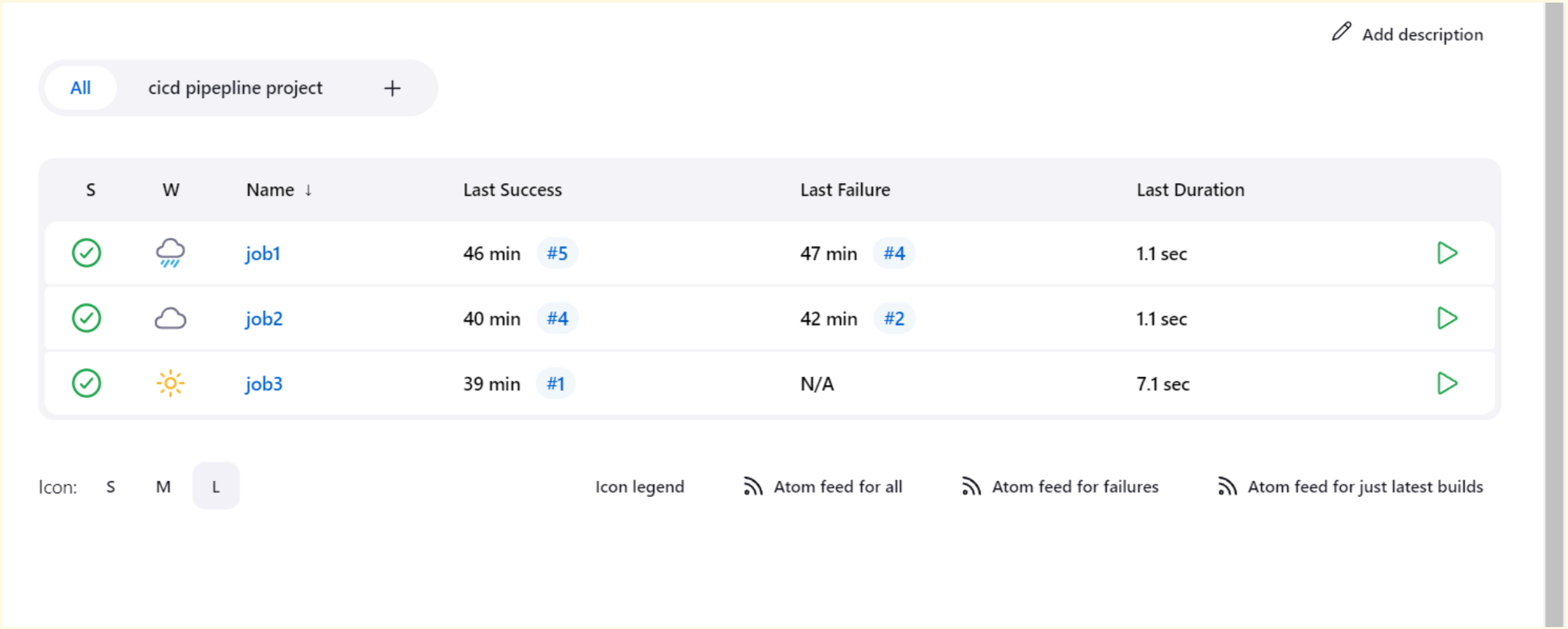
Created Nodes in jenkins for test and prod

Nodes

+ New Node

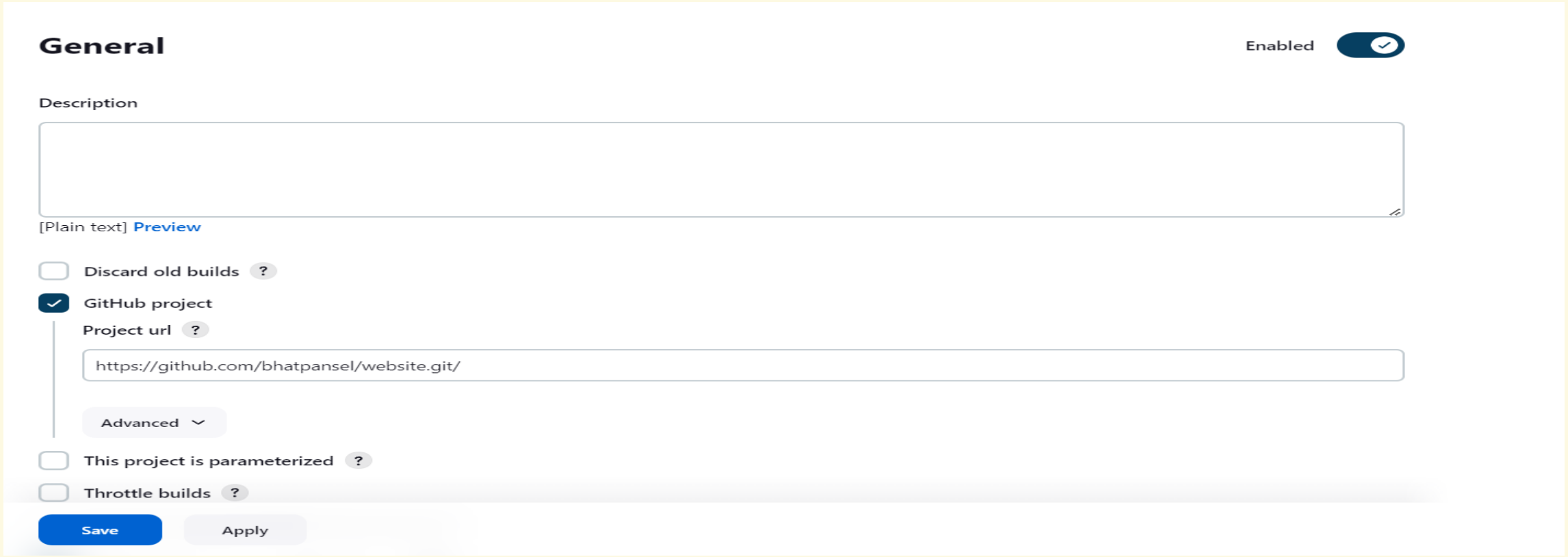
S	Name ↓	Architecture	Clock Difference	Free Disk Space	Free Swap Space	Free Temp Space	Response Time
	Built-In Node	Linux (amd64)	In sync	4.07 GB	0 B	4.07 GB	0ms
	prod	Linux (amd64)	In sync	4.87 GB	0 B	4.87 GB	26ms
	test	Linux (amd64)	In sync	4.92 GB	0 B	4.92 GB	59ms
	Data obtained	**0.26 sec**	**0.26 sec**	**0.26 sec**	**0.26 sec**	**0.26 sec**	**0.26 sec**

Created 3 jobs in jenkins



Job1 - it executes Dockerfile and installs the website (from develop branch) to the container. This is triggered when there is change in develop branch in Github repo.

If a commit is made to develop branch, just test the product, do not push to prod



Restrict where this project can be run ?

Label Expression ?

test

Label test matches 1 node. Permissions or other restrictions provided by plugins may further reduce that list.

Advanced

Source Code Management

None

Git ?

Repositories ?

Repository URL ?

https://github.com/bhatpansel/website.git

Credentials ?

- none -

Save Apply

Build Triggers

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

When Jenkins receives a GitHub push hook, GitHub Plugin checks to see whether the hook came from a GitHub repository which matches the Git repository defined in SCM/Git section of this job. If they match and this option is enabled, GitHub Plugin triggers a one-time polling on GITScm. When GITScm polls GitHub, it finds that there is a change and initiates a build. The last sentence describes the behavior of Git plugin, thus the polling and initiating the build is not a part of GitHub plugin.

(from GitHub plugin)

- [ ] Poll SCM ?

Build Environment

- [ ] Delete workspace before build starts
- [ ] Use secret text(s) or file(s) ?
- [ ] Add timestamps to the Console Output
- [ ] Inspect build log for published build scans

Save Apply

Delete workspace before build starts

Use secret text(s) or file(s) ?

Add timestamps to the Console Output

Inspect build log for published build scans

Terminate a build if it's stuck

With Ant ?

Build Steps

Execute shell ?

Command

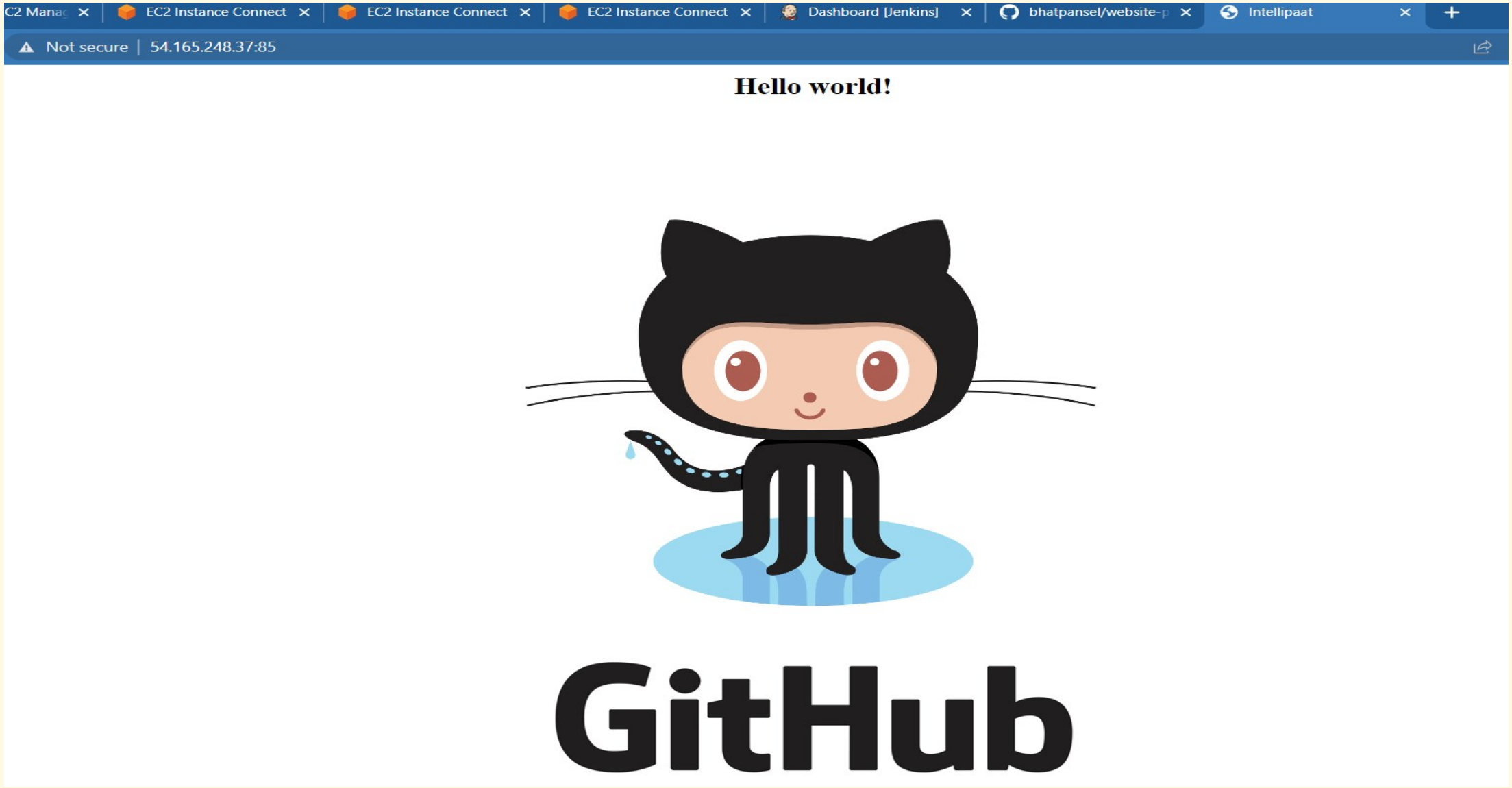
See the list of available environment variables

```
sudo docker rm -f $(sudo docker ps -a -q)
sudo docker build /home/ubuntu/jenkins/workspace/job-1/ -t test1
sudo docker run -itd -p 85:80 test1
```

Save Apply

Job 2 - it executes Dockerfile and installs the website (from master branch) to the container created in test. This is triggered when there is change in master branch in Github repo.
Job 3 - it executes Dockerfile and installs the website (from master branch) to the container created in test pushed to prod. This is triggered when there is change in master branch inGithub repo.

Execute Job1 manually. This shows original html page in container before making change in develop branch.



We are editing the index.html in develop branch in build server it directly triggers the test server of the job1 in Jenkins.

```
ubuntu@ip-172-31-80-188:~/website-project$ sudo nano index.html
ubuntu@ip-172-31-80-188:~/website-project$ cat index.html
<html>
<head>
<title> Intellipaat </title>
</head>
<body style = "background-image:url('images/github3.jpg'); background-size: 100%">
<h2 ALIGN=CENTER>Hello world!this gonna trigger the test slave! </h2>
</body>
</html>
ubuntu@ip-172-31-80-188:~/website-project$
```

i-09d41749a3acd6589 (project-build)

PublicIPs: 44.201.219.116 PrivateIPs: 172.31.80.188

Project job1

Permalinks

- Last build (#6), 4 min 44 sec ago
- Last stable build (#6), 4 min 44 sec ago
- Last successful build (#6), 4 min 44 sec ago
- Last failed build (#4), 2 hr 4 min ago
- Last unsuccessful build (#4), 2 hr 4 min ago
- Last completed build (#6), 4 min 44 sec ago

Project job1

Permalinks

- Last build (#7), 11 sec ago
- Last stable build (#7), 11 sec ago
- Last successful build (#7), 11 sec ago
- Last failed build (#4), 2 hr 8 min ago
- Last unsuccessful build (#4), 2 hr 8 min ago
- Last completed build (#7), 11 sec ago

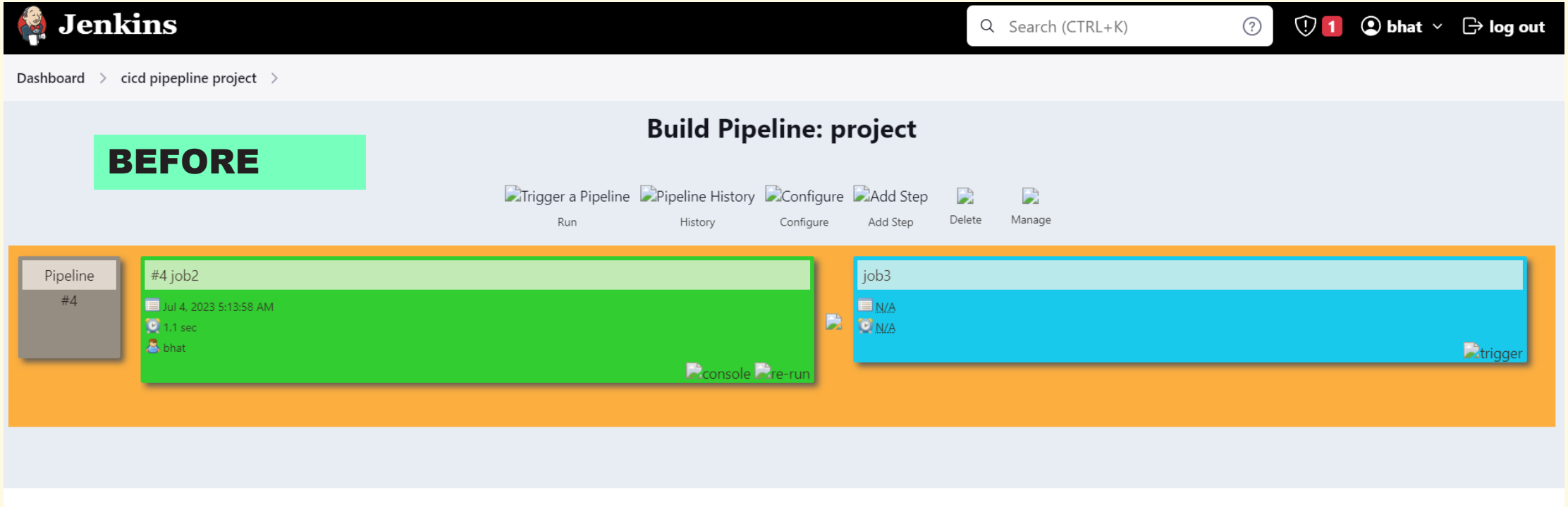
ect to instance | EC2 Instance Connect | EC2 Instance Connect | EC2 Instance Connect | job3 Config [Jenkins] | Webhooks | Intellipaat

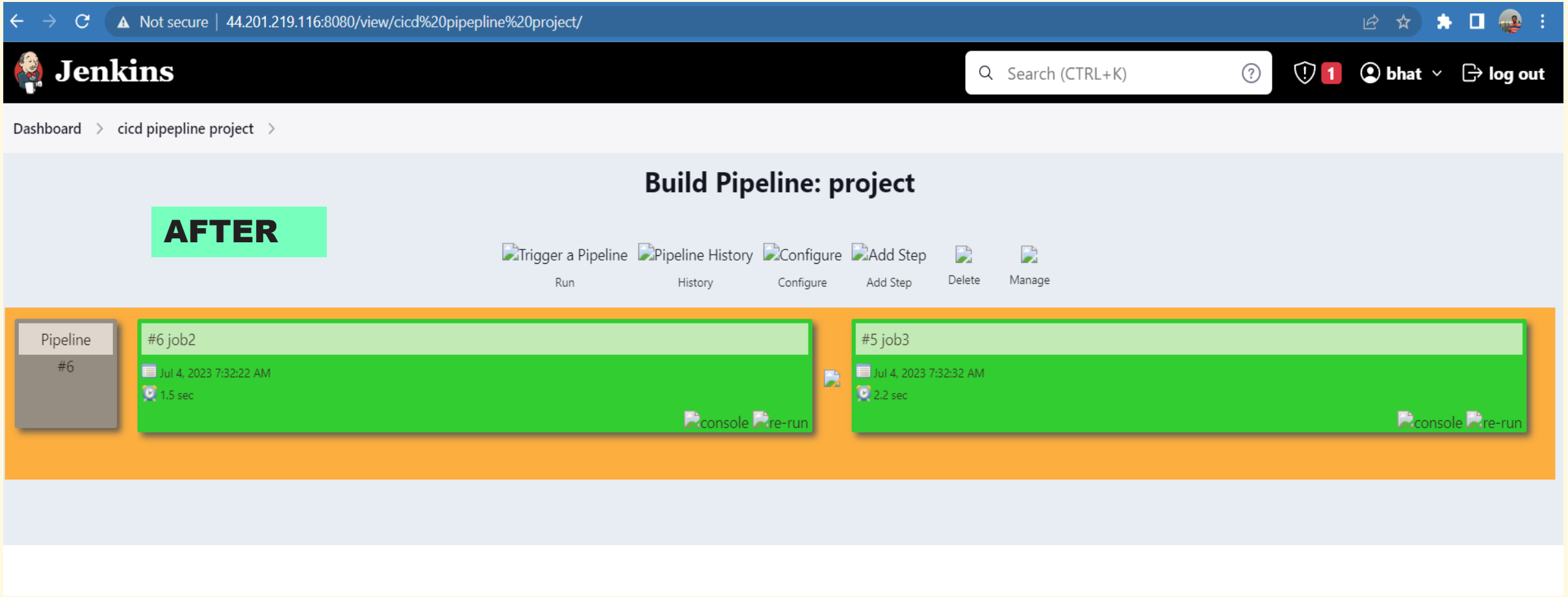
Not secure | 54.165.248.37:85

Hello hello world!this gonna trigger the test slave!

GitHub

We are editing the index.html in master branch in build server it directly triggers the test server of the job2 in Jenkins and push in to prod server we can see in cicd pipeline.




Not secure | 44.201.219.116:8080/view/cicd%20pipepline%20project/
Jenkins
Search (CTRL+K)
1
bhat
log out
Dashboard
cicd pipepline project
Build Pipeline: project
AFTER
Trigger a Pipeline
Run
Pipeline History
History
Configure
Configure
Add Step
Add Step
Delete
Manage
Pipeline
#6
#6 job2
Jul 4, 2023 7:32:22 AM
1.5 sec
console
re-run
#5 job3
Jul 4, 2023 7:32:32 AM
2.2 sec
console
re-run

Thank you