Capstone Projects

You have been Hired Sr. DevOps Engineer in Abode Software. They want to implement DevOpsLifecycle in their company. You have been asked to implement this lifecycle as fast as possible. Abode Software is a product-based company, 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.Code Build should automatically be triggered once commit is made to master branch or develop branch.

If commit is made to master branch, test and push to prod

If 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 Git-Hub. 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:

Job1 : build Job2: test Job3 : prod

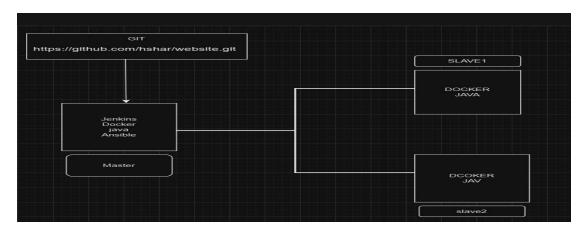
Upon reading we found below things

We will create cluster of three instances, one master and two slaves, according to line 1- we need to ansible to configure tools, according to line 2 we will be using GIT, according to line 3 and 5-we need Jenkins for automation and line 4 tells us to use docker.

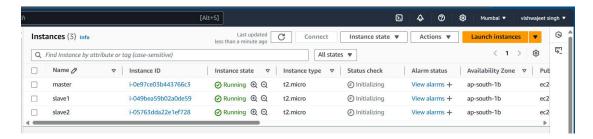
We will be using following tools

- 1. Ansible
- 2. Docker
- 3. GIT
- 4. Jenkins

Master node ----> install Ansible,docker, Jenkins,java Slave node ----> install docker and java



<u>Step1: lets launch ec2 instances. We will be launching 3 instances, one will act as master and other two as slaves</u>



<u>Step2: connect with master instance and install the ansible, we will use ansible to install required tools on all instances</u>

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

Run above command one by one and ansible will be installed.

```
ubuntu@ip-172-31-3-54:-$ ansible --version
ansible [core 2.17.5]
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 = 3.10.12 (main, Sep 11 2024, 15:47:36) [GCC 11.4.0] (/usr/bin/python3)
jinja version = 3.0.3
libyanl = True
ubuntu@ip-172-31-3-54:-$

i-0e97ce03b443766c3 (master)
PublidPs:53:154.89.71 PrivatePs:172.31.554
```

Next we will setup ssh password-less connection between slave and master, also we will add the private ip in the hosts file of ansible directory.

- use command ssh-keygen -t rsa to generate public key, this public key needs to be pasted in the authorized keys file.

```
Ununculip: 72-3-3-54:4; sah-kayyan - tasa

| Inter fils |
```

Check if connection has been established or not

```
ubuntu8ip-172-31-10-132:-$ exit
Logout
Connection to 172.31.10.132 closed.
Connection to 172.31.10.132 closed.
Connection to 172.31.254:5 sent 172.31.3.80
Connection to 172.31.3.10.132 closed.
Connection to 172.31.3.80 (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31.3.80) (172.31
```

Now we will add the private ip in hosts file, run command sudo nano /etc/ansible/hosts



now we will create yaml file to install the tools, which is

On master - Java ,Docker, Jenkins On slave- Java, Docker

We will do this with the help of script, so lets create two script as per above requirement

Master.sh(check official documenttion for below commands)

!/bin/bash
Sudo apt update
sudo apt install fontconfig openjdk-17-jre -y
sudo apt install docker.io -y
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 update
sudo apt install jenkins -y

```
ubuntuBip-172-313-541-$ sudo nano master.sh
ubuntuBip-172-313-541-$ cat master.sh
#!/bin/bash
Sudo apt-qet update
Sudo apt-qet update
Sudo apt-get install docker.io -y
sudo wpet -0 /usr/share/keyrings/jenkins-keyring.asc \
https://pky.jenkins.io/dobian-stable/jenkins.io-2023.key
echo "deb [signed-by-/usr/share/keyrings/jenkins-keyring.asc]" \
https://pky.jenkins.io/dobian-stable/jenkins-keyring.asc]" \
https://pky.jenkins.io/dobian-stable/jenkins-keyring.a
```

Slave.sh

#!/bin/bash sudo apt update sudo apt install fontconfig openjdk-17-jre -y sudo apt-get install docker.io -y

```
ubuntu8ip-172-31-3-54:-$ sudo nano slave.sh
ubuntu8ip-172-31-3-54:-$ cat slave.sh
4!/bin/bash
Sudo apt-get update
Sudo apt install docker.io -y
ubuntu8ip-172-31-3-54:-$

i-0e97ce03b443766c3 (master)
```

Lets write the playbook which will be in yaml format

- name: Installation of Java, Docker, and Jenkins

hosts: localhost become: yes tasks:

- name: Run the master.sh script

script: master.sh

- name: Installation of Java and Docker

hosts: slave become: yes

tasks:

- name: Run the slave.sh script

script: slave.sh

```
GNU mano 6.2

- name: Installation of Java, Docker, and Jenkins
hosts: localhost
become: yes
tasks: and the master.sh script
script: master.sh script
- name: Run the master.sh script
script: master.sh
- name: Run the slave and Docker
hosts: slave
become: yes
tasks:
- name: Run the slave.sh script
script: slave.sh
```

step3: lets run playbook

Run the command ansible-playbook play1.yml

Check if all tools has been installed or not

Run command on master Java --version Docker --version Jenkins --version

```
ubuntu@ip-172-31-3-54:-$ java -version
openjdk version "17.0.12" 2024-07-16
OpenJUK Rutime Environment (build 17.0.1247-Ubuntu-lubuntu222.04)
OpenJUK 64-Bit Server VM (build 17.0.1247-Ubuntu-lubuntu222.04, mixed mode, sharing)
ubuntu@ip-172-31-33-54:-$ obcker --version
Docker version 24.0.7, build 24.0.7-Oubuntu2-22.04.1
ubuntu@ip-172-31-35-54:-$ jokins --version
2.46c.3
ubuntu@ip-172-31-35-54:-$ 
i-Oe97ceO3b443766c3 (master)

Publiclers $5,154.89,71 PrivatelPst 172.31.3.54
```

```
ubuntu8ip-172-31-10-132:-% java -version
openjdk version *17.0.12** 2024-07-16
OpenJDK Rottine Environment (build 17.0.1247-Ubuntu-lubuntu222.04)
OpenJDK 64-Bit Server VM (build 17.0.1247-Ubuntu-lubuntu222.04, mixed mode, sharing)
ubuntu8ip-172-31-01-132:-$ docker -version
Docker version 24.0.7, build 24.0.7-Oubuntu2-22.04.1
ubuntu8ip-172-31-01-232:-$ 

i-049bea59b02a0de59 (slave1)
PublicPs: 13.127.154.27 PrivatePs: 172.31.10.132

ubuntu8ip-172-31-3-80:-$ java --version
openjdk 17.0.12 2024-07-16
OpenJDK multime Environment (build 17.0.1247-Ubuntu-lubuntu222.04)
OpenJDK Rottine Environment (build 17.0.1247-Ubuntu-lubuntu222.04)
OpenJDK Rottine Environment (build 17.0.1247-Ubuntu-lubuntu222.04)
OpenJDK Rottine Environment (build 17.0.1247-Ubuntu-lubuntu222.04)
Ubuntu8ip-172-31-38-08-5 docker --version
Docker version 24.0.7, build 24.0.7-Oubuntu2-22.04.1
```

Required tools have been installed. Now lets do the assigned task, we will establish Jenkins and clone the repo to execute the task. So lets configure the Jenkins first

Step 4: configure jenkins

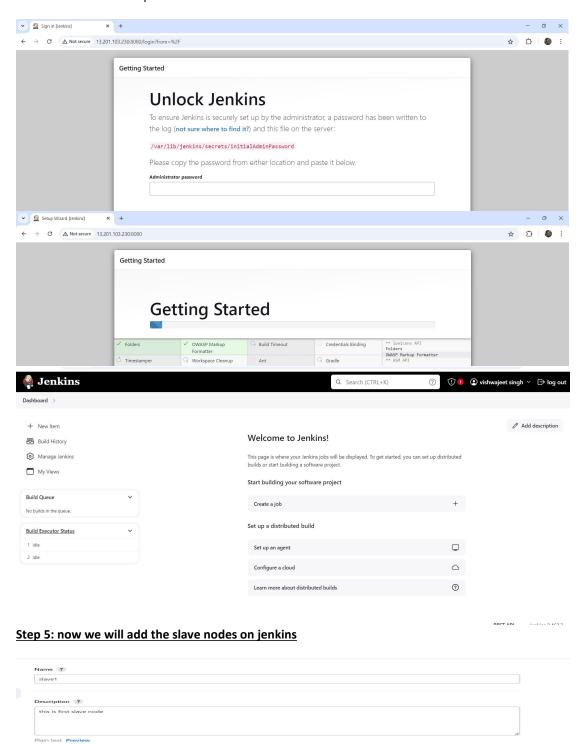
Number of executors ?

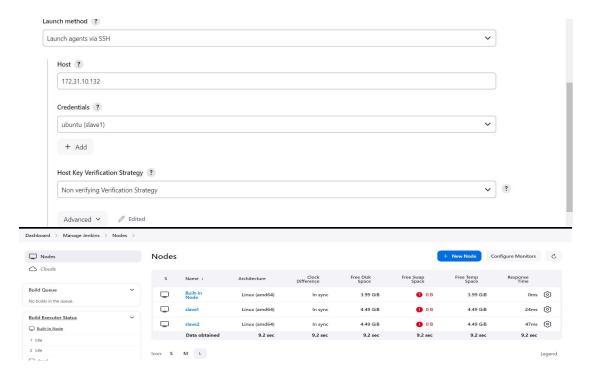
1

Remote root directory ?

/home/ubuntu/jenkins

Copy public ip of master and add :8080 after it to get below page on browser Now lets do all the setup



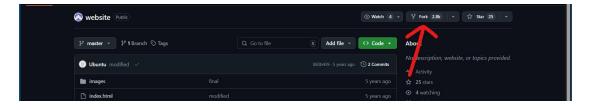


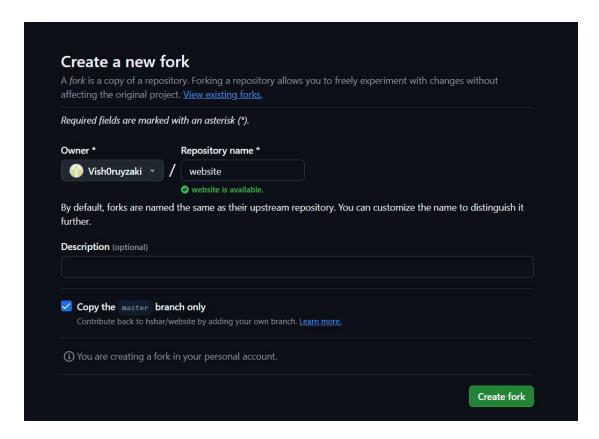
We have added the both nodes. Now we clone the repo which is given in this assigment

Step6: clone the repo

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

Now fork the repo in your repo





Now we will run command git clone "link" to clone the repo

```
ubuntu@[p-172-31-3-54:-$ git clone https://github.com/VishOruyzaki/website.git
Cloning into 'website'...
remote: Enumerating objects: 8, done.
remote: Total 8 (delta 0), remsed 0 (delta 0), pack-reused 8 (from 1)
Receiving objects: 100% (8/8), 82.69 kim | 7.52 kim/s, done.
Resolving dotitas: 100% (8/8), 82.69 kim | 7.52 kim/s, done.
Resolving dotitas: 100% (8/8), 82.69 kim | 7.52 kim/s, done.
Resolving dotitas: 100% (8/8), 82.69 kim | 7.52 kim/s, done.
Resolving dotitas: 100% (8/8), 82.69 kim | 7.52 kim/s, done.
Resolving dotitas: 100% (17), done.
Resolving dotita
```

Step7: lets create develop branch and then push it to github

```
ubuntu8jp-172-31-3-54:-/website$ git branch develop
ubuntu8jp-172-31-3-54:-/website$ git branch
develop

* master
ubuntu8jp-172-31-3-54:-/website$ git checkout develop
Switched to branch 'develop'
ubuntu8jp-172-31-3-54:-/website$ git pessen and ubuntu8jp-172-31-3-54:-/website$ ls
images index.html

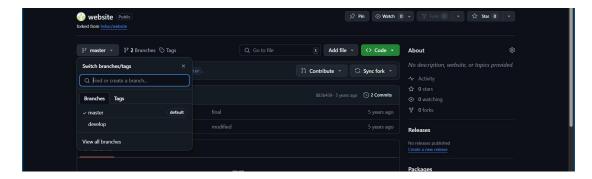
**ubuntu8jp-172-31-3-54:-/website$ git push -all
error: did you mean --all' (with two dashes)?
ubuntu8jp-172-31-3-54:-/website$ git push -all
Username for 'https://github.com': 'lishOruyzaki
Password for 'https://github.com': 'lishOruyzaki
Password for 'https://github.com': 'lishOruyzaki
Password for 'https://github.com': 'lishOruyzaki
Password for 'https://github.com': 'lishOruyzaki
Poster of 'https://github.com/vishOruyzaki/website/pull/new/develop
remote: 'https://github.com/vishOruyzaki/website/pull/new/develop
remote: https://github.com/vishOruyzaki/website.git

* 'now branch] develop - develop
ubuntu8jp-172-31-3-54:-/website$

i-Oe97ceO3b443766c3 (master)

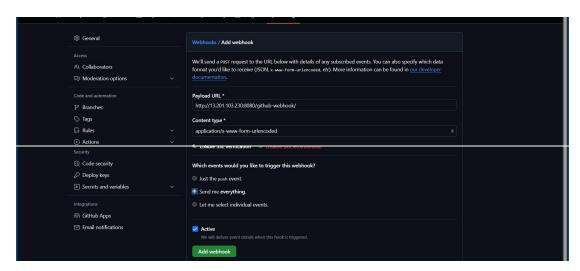
PubliciPs: 13.201.103.230 PrivateiPs: 172.31.554
```

Branch is created and its pushed to github, lets check



The branches has been pushed succesfully

Step8: lets set webhook with our repo



Step 9: we will create dockerfile and create image out of it. This image will be pushed to repo

```
ubuntuBip-172-31-3-54:-/website$ sudo nano Dockerfile
ubuntuBip-172-31-3-54:-/website$ cat Dockerfile
FROM ubuntuBip-172-31-3-54:-/website$
FROM ubuntuBip-172-31-3-54:-/website$
FROM pt-get update
FRUM apt-get install apache2 -y
ADD . /var/ww/html
ENTRYPOINT apachec1 -D FORECROUND
ubuntuBip-172-31-3-54:-/website$

i-0e97ce03b443766c3 (master)

PublicPs: 13.201.103.230 PrivatePs: 172.31.3.54
```

Lets commit this change

```
nbuntuBip-172-31-3-54:-/websiteS git add .
ubuntuBip-172-31-3-54:-/websiteS git commit -m Dockerfile
[master ddn309] Dockerfile
[committer: Ubuntu subuntuBip-172-31-3-54.ap-aouth-1.compute.internal>
Your name and enail address were configured automatically based
on your username and hostname. Please check that they are accurate.
You can suppress this meassage 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:

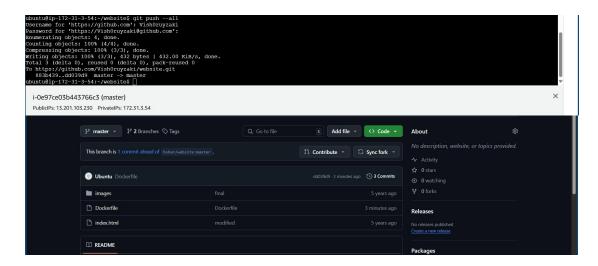
git commit --amend --reset-author

1 file changed, 5 insertions(*)
create mode 100644 Dockerfile
ubuntuBip-172-31-3-54:-/websiteS

i-0e97ce03b443766c3 (master)

PublicPs-13.20.1103.230 PrivatePs:172.31.554
```

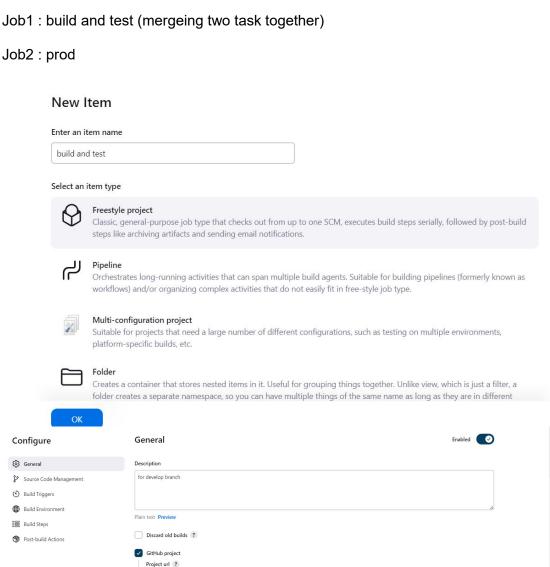
Push the changes back to github

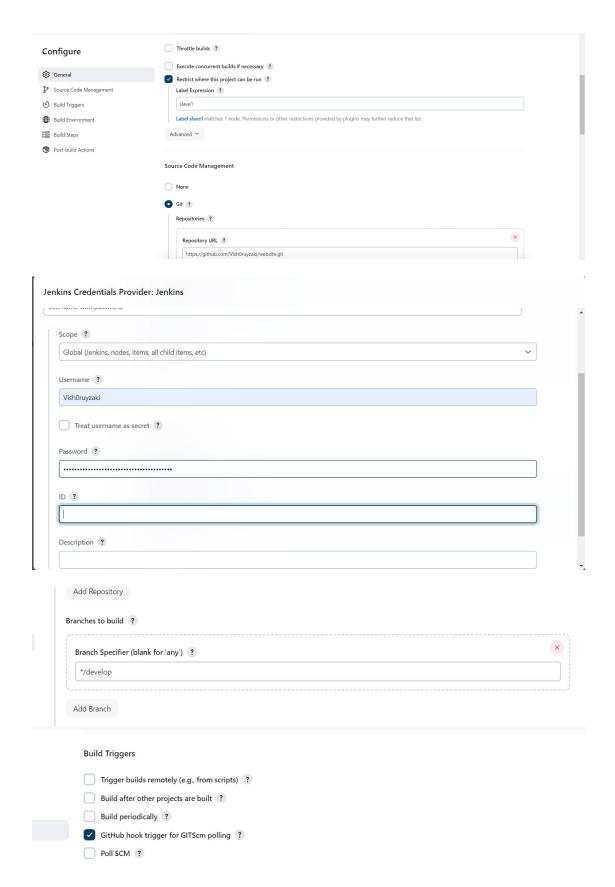


Step 10: lets create the below pipeline on jenkins to run the task

https://github.com/Vish0ruyzaki/website.git

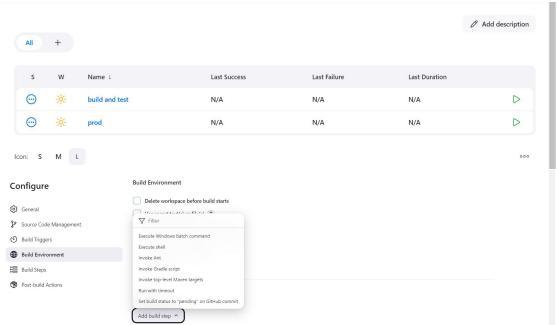
Job2 : prod





Similarty create job which will run on slave2 and will be restricted on master branch

One prod job is created we will add additional step which build after and add script command to run



sudo docker build . -t hello sudo docker run -itd -p 80:80 hello

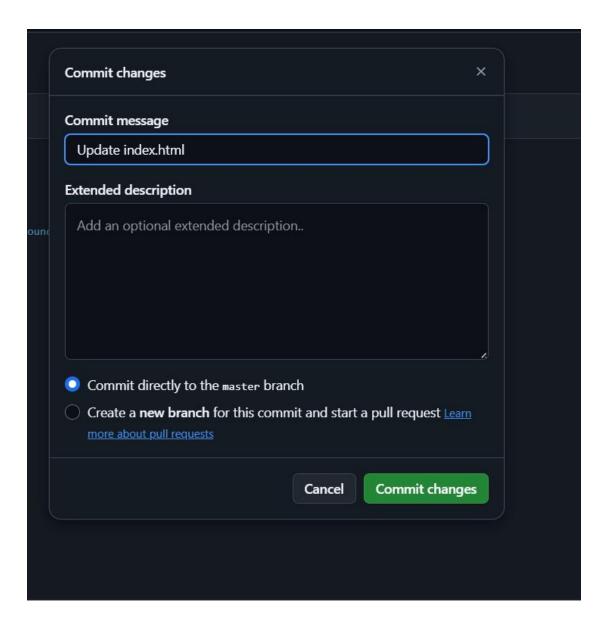


Step11: if commit is done on master, then test and prod job should run automatically

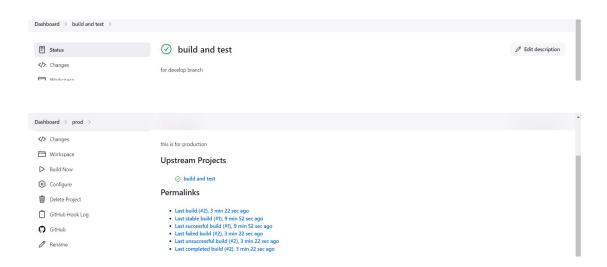
Made change in the html file now lets commit it

```
Edit Preview & Code 55% faster with GitHub Copilot

1 chtal>
2 dead>
3 cftitle hi Intellipant, this is vishwaject </ftitle>
4 
4 
4 
5 dody style = "background-isage:w=1('isages/github3.jpg'); background-size: 180%*>
6 dody style = "background-isage:w=1('isages/github3.jpg'); background-size: 180%*>
8 
6 dody style = "background-isage:w=1('isages/github3.jpg'); background-size: 180%*>
8 
6 dody style = "background-isage:w=1('isages/github3.jpg'); background-size: 180%*>
9
```



We can see the job run automatically once we made change,



We can see the webpage on browser

