

DevOps Project

(Creating an Jenkins Pipeline in Docker for One-Click

Deployment of a Webpage)

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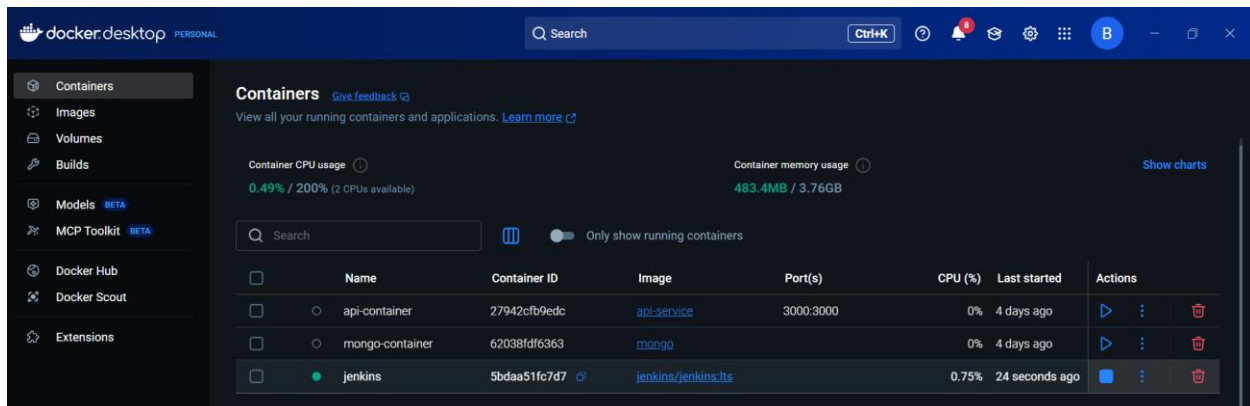
1. Creating the Complete Project Structure

```
saeedqj@SaeedQJ-PC: ~/DevOps-Pipeline-Project$ ls -a
.      .azure      .cache      .local      .sudo_as_admin_successful
..     .bash_history .docker      .motd_shown .wget-hsts
.ansible .bash_logout .jenkins     .profile    ansible-lab
.aws     .bashrc      .landscape   .ssh        kubeAnsible
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ mkdir DevOps-Pipeline-Project
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ ls -a
.      .azure      .cache      .local      .sudo_as_admin_successful  kubeAnsible
..     .bash_history .docker      .motd_shown .wget-hsts
.ansible .bash_logout .jenkins     .profile    DevOps-Pipeline-Project
.aws     .bashrc      .landscape   .ssh        ansible-lab
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ cd DevOps-Pipeline-Project/
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ mkdir terraform, ansible, app
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ ls -a
.      .      ansible, app terraform,
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ rmdir terraform,
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ rmdir ansible,/
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ mkdir terraform ansible
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ ls -a
.      .      ansible app terraform
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ cd terraform/
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/terraform$ touch main.tf
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/terraform$ touch variables.tf
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/terraform$ ls -a
.      .      main.tf variables.tf
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/terraform$ cd ..
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ cd ansible/
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/ansible$ touch install_web.yml
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/ansible$ ls -a
.      .      install_web.yml
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/ansible$ cd ..
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ cd app
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/app$ touch index.html
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/app$ ls -a
.      .      index.html
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/app$ cd ..
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ touch Jenkinsfile
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ touch README.md
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ ls -a
.      .      Jenkinsfile README.md  ansible app terraform
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$
```

Note - We ran nano command and inserted some html template in the index.html file in the app folder. Wasn't really comfortable with nano so used VS code instead.

2. Running Jenkins in Docker

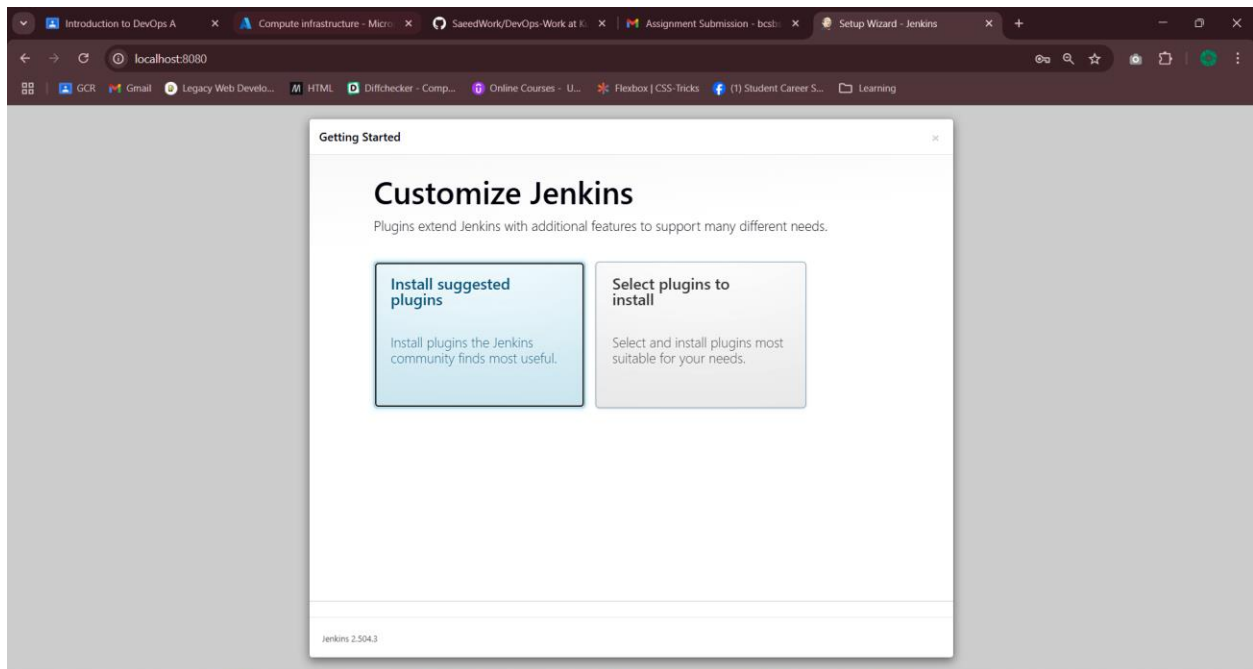
```
saeedqj@SaeedQJ-PC: ~$ docker run -d \
  --name jenkins \
  -p 8080:8080 -p 50000:50000 \
  -v jenkins_home:/var/jenkins_home \
  -v /var/run/docker.sock:/var/run/docker.sock \
  -v $(which terraform):/usr/local/bin/terraform \
  -v $(which ansible-playbook):/usr/local/bin/ansible-playbook \
  -v $(pwd):/workspace \
  jenkins/jenkins:lts
Unable to find image 'jenkins/jenkins:lts' locally
lts: Pulling from jenkins/jenkins
0c01110621e0: Pull complete
2315362e4443: Pull complete
4185f63a4bf1: Pull complete
51c9d25ed578: Pull complete
10709260192c: Pull complete
474c0ab7c65d: Pull complete
62d5bb186774: Pull complete
f1c4b8ee4b6f: Pull complete
719a01689f92: Pull complete
1c8d8eef6986: Pull complete
e05a8359c72d: Pull complete
981fa0afce25: Pull complete
Digest: sha256:f4607803bd1ee4dc91b1695b07d3a04c77b4f575a507ff65375af888e1497662
Status: Downloaded newer image for jenkins/jenkins:lts
5bdaa51fc7d7f1813754a82c1bd0927c1256aa7cb49e7e6333bd307a7d4a80f3
saeedqj@SaeedQJ-PC: ~$
```



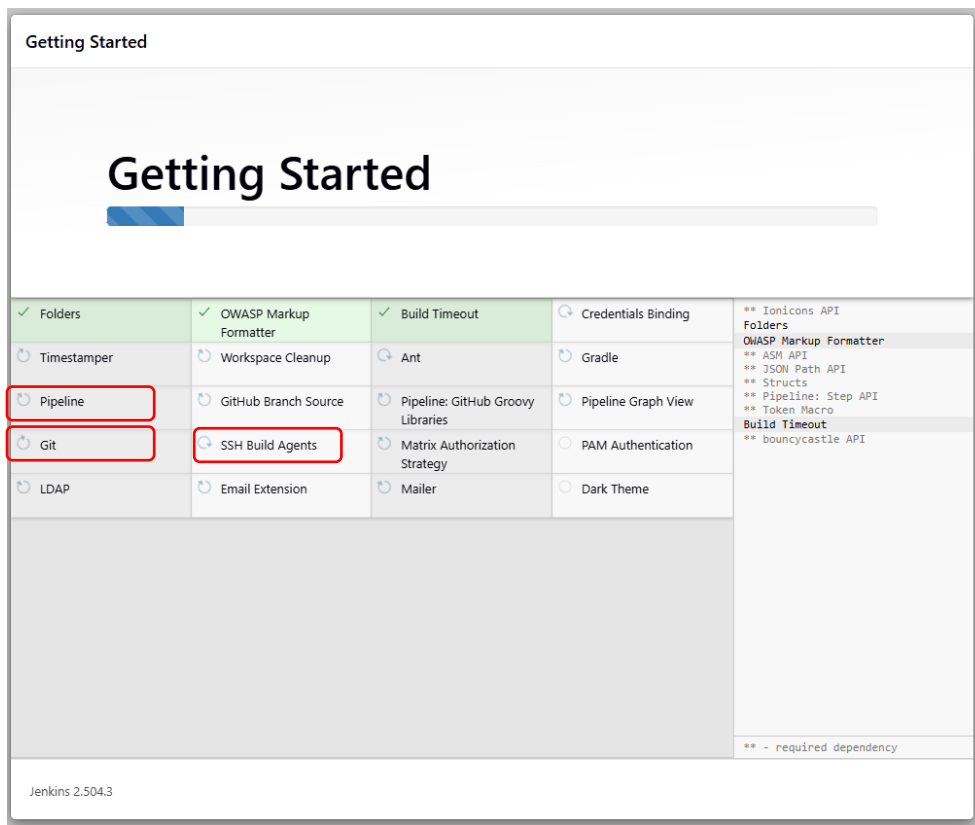
The screenshot shows the Docker Desktop interface. On the left is a sidebar with navigation options: Containers, Images, Volumes, Builds, Models (BETA), MCP Toolkit (BETA), Docker Hub, Docker Scout, and Extensions. The main panel is titled 'Containers' and shows system metrics: 'Container CPU usage' at 0.49% / 200% (2 CPUs available) and 'Container memory usage' at 483.4MB / 3.76GB. A toggle switch is set to 'Only show running containers'. Below this is a table of running containers.

	Name	Container ID	Image	Port(s)	CPU (%)	Last started	Actions
<input type="checkbox"/>	api-container	27942cfb9edc	api-service	3000:3000	0%	4 days ago	
<input type="checkbox"/>	mongo-container	62038fd6363	mongo		0%	4 days ago	
<input checked="" type="checkbox"/>	jenkins	5bdaa51fc7d7	jenkins/jenkins:lts		0.75%	24 seconds ago	

Jenkins is live on port 8080



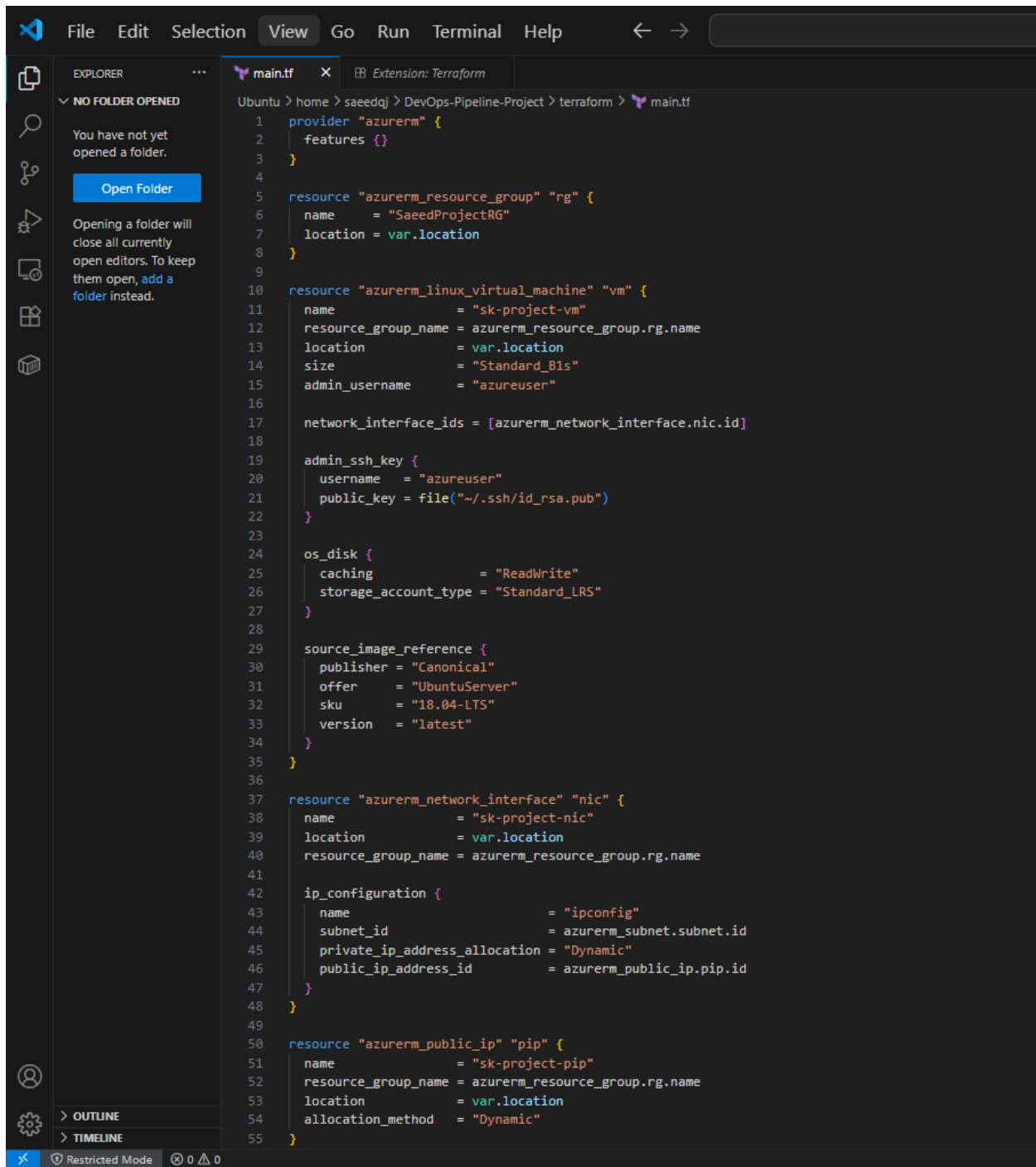
Installing the plugins – Git, Pipeline , SSH Agent



Creating & adding private key into Jenkins

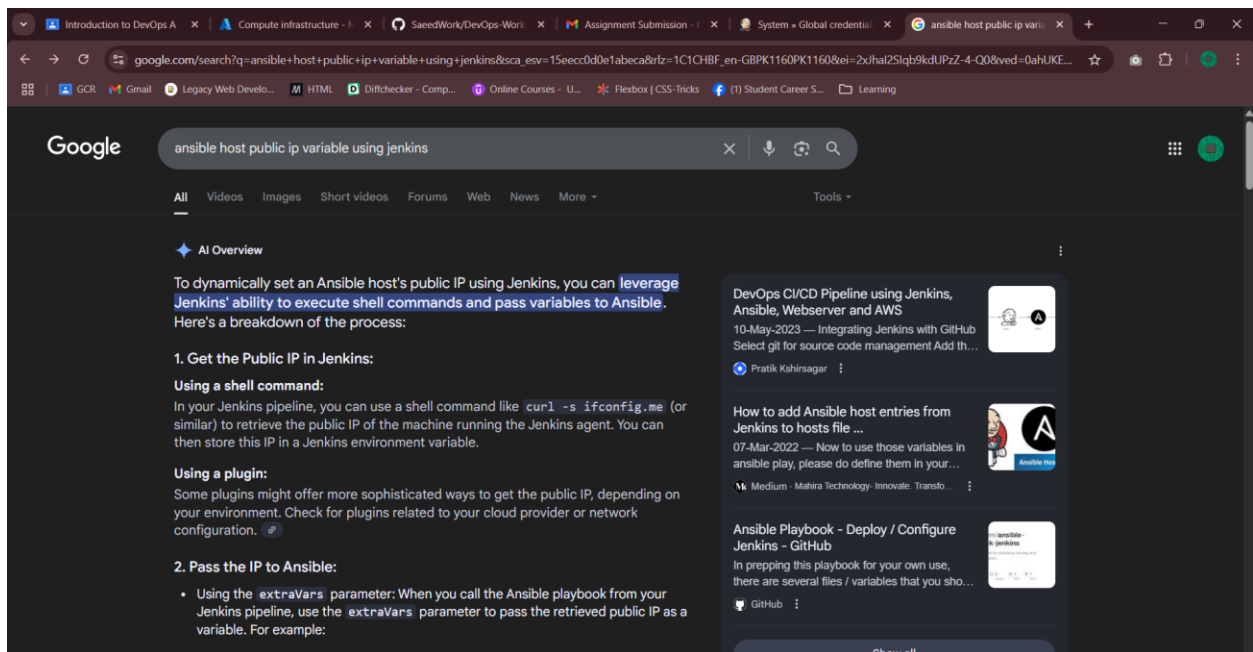
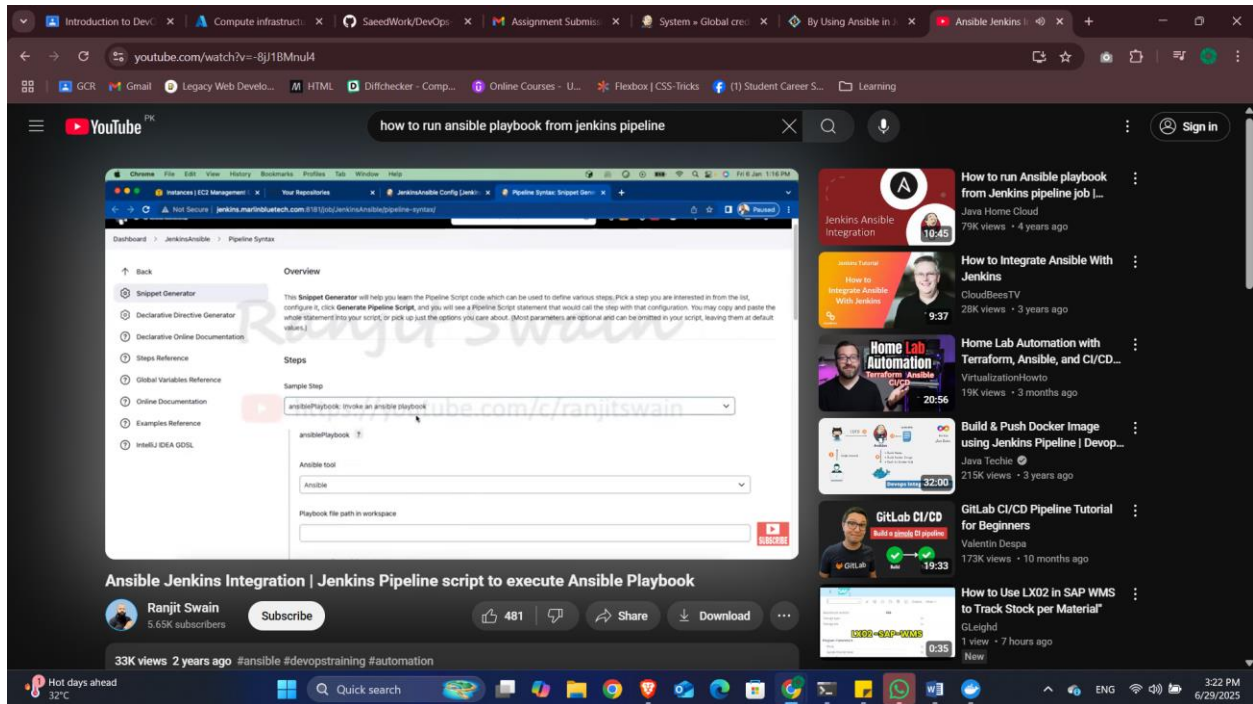
The screenshot shows a Google search result for the query "how to generate ssh private key ubuntu command with proper flags". The search results page is displayed in a dark theme. The main result is an AI Overview that explains how to generate an SSH private key on Ubuntu using the `ssh-keygen` command. It lists common flags: `-t` for key type (e.g., `rsa`, `ed25519`) and `-b` for key length (e.g., `4096` for RSA). The command `ssh-keygen -t rsa -b 4096` is shown, along with a note that it prompts for a file name and passphrase. A breakdown of the command parts is provided: `ssh-keygen` is the command itself; `-t rsa` specifies the key type; `-b 4096` sets the key length; and `-f <filename>` specifies the file name. To the right, there are several related search suggestions, including "How to ssh to remote server using a private key?", "How to Set Up SSH Keys on Ubuntu 20.04 | Guide - CloudPanel", and "What is ssh-keygen & How to Use It to Generate a New SSH Key?".

```
saeedqj@SaeedQJ-PC:~$ ssh-keygen -t rsa -b 4096 -f ~/.ssh/azure_vm_key
Generating public/private rsa key pair.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/saeedqj/.ssh/azure_vm_key
Your public key has been saved in /home/saeedqj/.ssh/azure_vm_key.pub
The key fingerprint is:
SHA256:D8xEtaCABIr0NTXYIzovYVCh4PuQqb2bzKBS+FrzJq8 saeedqj@SaeedQJ-PC
The key's randomart image is:
+---[RSA 4096]---+
|...00=*0...|
|++0..0.=. .|
|00+.. . + . .|
| o+= + . o|
|. *= + S .|
|++o+ . o|
|+ o.+ .|
| o *|
|.Eo.|
+---[SHA256]---+
saeedqj@SaeedQJ-PC:~$ cat ~/.ssh/azure_vm_key
-----BEGIN OPENSSH PRIVATE KEY-----
b3B1bnNzaC1rZXktZjEAAAAABG5vbmuAAAAEbm9uZQAAAAAAAAABAAACFwAAAAAdzc2gtcn
NhAAAAAwEAAQAAAgEA1PzinP818X7nRAqRq2oorpC4ESPcDZ/7xRI2F3z1C2Ib4n2VrezT
48yyHuz+a9UCH1RHFb12ZUC4FvDsbUyMy1KLGGuMjsS8NX20GiFIPR1u0c0y74GIcpYF4T
```

Now we set Ansible, but before that we need to create hosts.yml file and set all hosts in it.

(Was a bit confused that how will I put the host ip if the VM is not created.)



```
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/terraform$ cd ..
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project$ cd ansible/
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/ansible$ ls -a
.  ..  install_web.yml
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/ansible$ touch hosts.yml
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/ansible$ nano hosts.yml
saeedqj@SaeedQJ-PC:~/DevOps-Pipeline-Project/ansible$
```

GNU nano 7.2

```
all:
  hosts:
    web:
      ansible_host: __PUBLIC_IP__
      ansible_user: azureuser
      ansible_ssh_private_key_file: ~/.ssh/azure_vm_key
```

Restricted Mode is intended for safe code browsing. Trust this window to enable all features. [Manage](#)

Jenkinsfile • ! install_web.yml X

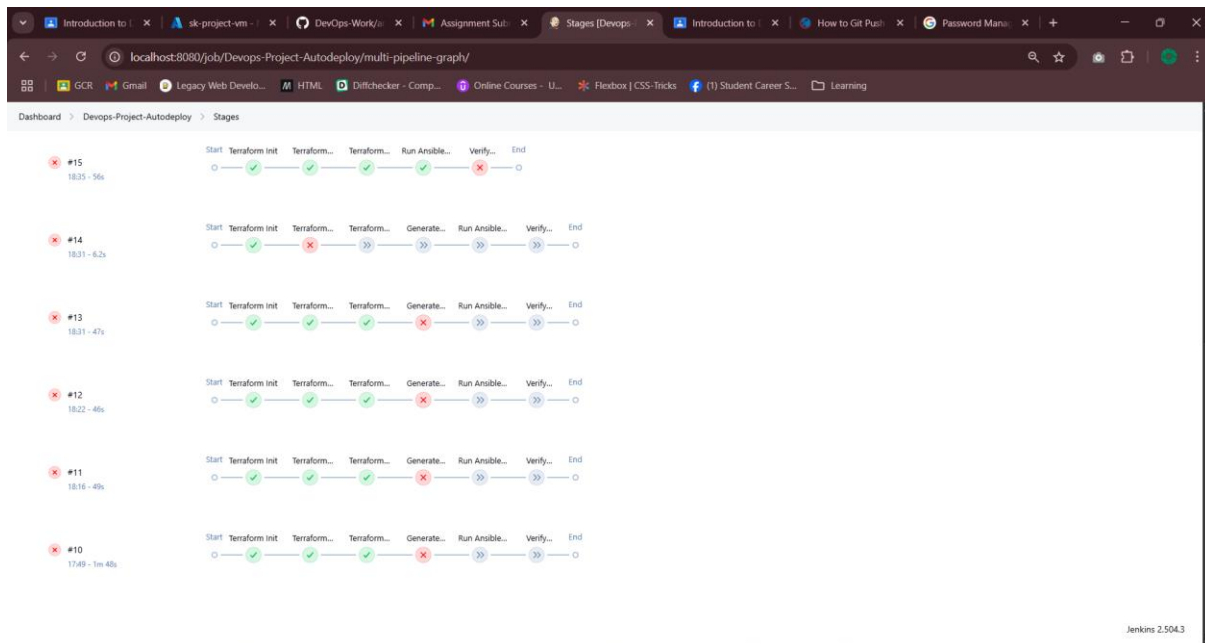
Ubuntu > home > saeedqj > DevOps-Pipeline-Project > ansible > ! install_web.yml

```
1 ---
2 - name: Install Apache and Deploy Web App
3   hosts: all
4   become: yes
5
6   tasks:
7     - name: Update apt cache
8       apt:
9         update_cache: yes
10        cache_valid_time: 3600
11
12    - name: Install Apache
13      apt:
14        name: apache2
15        state: present
16
17    - name: Create a directory in home
18      file:
19        path: /home/azureuser/devops_project
20        state: directory
21        owner: azureuser
22        group: azureuser
23        mode: '0755'
24
25    - name: Deploy index.html
26      copy:
27        src: /workspace/app/index.html
28        dest: /var/www/html/index.html
29        owner: www-data
30        group: www-data
31        mode: '0644'
32
```

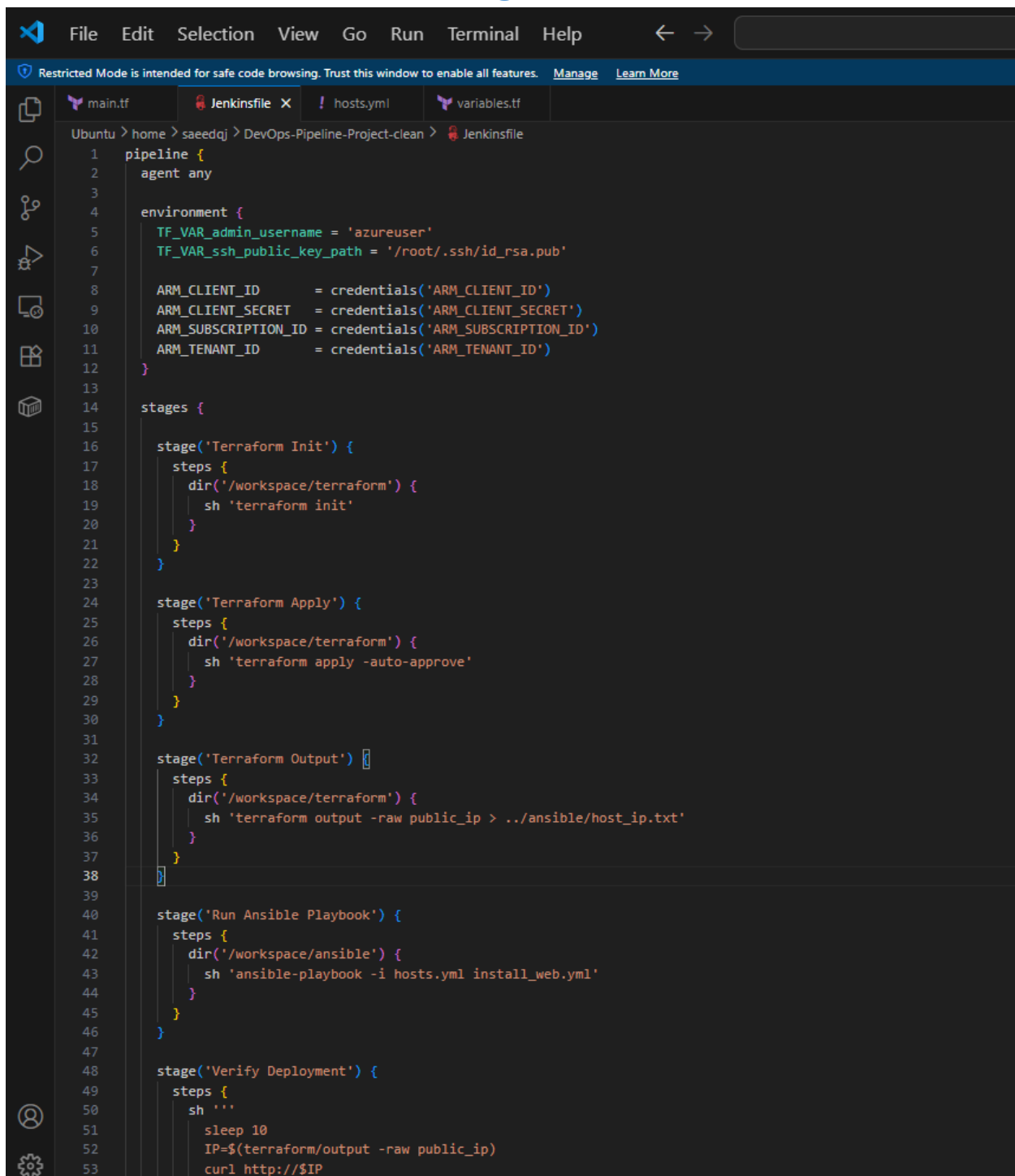

Now we push everything to github and create a pipeline in Jenkins for testing.

```
saeedqj@saeedqj-PC: ~  
saeedqj@saeedqj-PC:~$ ls -la  
..  .ansible  .azure  .bash_logout  .cache  .jenkins  .local  .profile  .sudo_as_admin_successful  DevOps-Pipeline-Project  kubeAn  
..  .aws  .bash_history  .bashrc  .docker  .landscape  .motd_shown  .ssh  .wget-hsts  ansible-lab  
saeedqj@saeedqj-PC:~$ cd DevOps-Pipeline-Project/  
saeedqj@saeedqj-PC:~/DevOps-Pipeline-Project$ git init  
hint: Using 'master' as the name for the initial branch. This default branch name  
hint: is subject to change. To configure the initial branch name to use in all  
hint: of your new repositories, which will suppress this warning, call:  
hint:  
hint:   git config --global init.defaultBranch <name>  
hint:  
hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and  
hint: 'development'. The just-created branch can be renamed via this command:  
hint:  
hint:   git branch -m <name>  
Initialized empty Git repository in /home/saeedqj/DevOps-Pipeline-Project/.git/  
saeedqj@saeedqj-PC:~/DevOps-Pipeline-Project$ git add .  
saeedqj@saeedqj-PC:~/DevOps-Pipeline-Project$ git commit -m "This is the initial commit for the project"  
Author identity unknown  
  
*** Please tell me who you are.  
  
Run  
  
   git config --global user.email "you@example.com"  
   git config --global user.name "Your Name"  
  
to set your account's default identity.  
Omit --global to set the identity only in this repository.  
  
fatal: empty ident name (for <saeedqj@saeedqj-PC.localdomain>) not allowed  
saeedqj@saeedqj-PC:~/DevOps-Pipeline-Project$ git config --global user.email saeed.work53@gmail.com  
saeedqj@saeedqj-PC:~/DevOps-Pipeline-Project$ git config --global user.name SaeedWork  
saeedqj@saeedqj-PC:~/DevOps-Pipeline-Project$ git commit -m "This is the initial commit for the project"  
[master (root-commit) e054598] This is the initial commit for the project  
 7 files changed, 274 insertions(+)  
create mode 100644 Jenkinsfile  
create mode 100644 README.md  
create mode 100644 ansible/hosts.yml  
create mode 100644 ansible/install_web.yml  
create mode 100644 app/index.html  
create mode 100644 terraform/main.tf  
create mode 100644 terraform/variables.tf  
saeedqj@saeedqj-PC:~/DevOps-Pipeline-Project$ git remote add origin https://github.com/SaeedWork/DevOps-Work.git  
saeedqj@saeedqj-PC:~/DevOps-Pipeline-Project$ git push -u origin main  
error: src refspec main does not match any
```

After a tiring and tedious process of troubleshooting for hours, we were able to run till ansible in Jenkins the last stage was not running













The Jenkins file looks something like this



```
1 pipeline {
2   agent any
3
4   environment {
5     TF_VAR_admin_username = 'azureuser'
6     TF_VAR_ssh_public_key_path = '/root/.ssh/id_rsa.pub'
7
8     ARM_CLIENT_ID      = credentials('ARM_CLIENT_ID')
9     ARM_CLIENT_SECRET  = credentials('ARM_CLIENT_SECRET')
10    ARM_SUBSCRIPTION_ID = credentials('ARM_SUBSCRIPTION_ID')
11    ARM_TENANT_ID       = credentials('ARM_TENANT_ID')
12  }
13
14  stages {
15
16    stage('Terraform Init') {
17      steps {
18        dir('/workspace/terraform') {
19          sh 'terraform init'
20        }
21      }
22    }
23
24    stage('Terraform Apply') {
25      steps {
26        dir('/workspace/terraform') {
27          sh 'terraform apply -auto-approve'
28        }
29      }
30    }
31
32    stage('Terraform Output') {
33      steps {
34        dir('/workspace/terraform') {
35          sh 'terraform output -raw public_ip > ../ansible/host_ip.txt'
36        }
37      }
38    }
39
40    stage('Run Ansible Playbook') {
41      steps {
42        dir('/workspace/ansible') {
43          sh 'ansible-playbook -i hosts.yml install_web.yml'
44        }
45      }
46    }
47
48    stage('Verify Deployment') {
49      steps {
50        sh '''
51          sleep 10
52          IP=$(terraform/output -raw public_ip)
53          curl http://$IP
```

And we added credentials that look like this

Credentials

T	P	Store ↓	Domain	ID	Name
		User: Saeedulkhair	(global)	azure-key	azureuser/*****
		User: Saeedulkhair	(global)	ARM_CLIENT_ID	ARM_CLIENT_ID
		User: Saeedulkhair	(global)	ARM_CLIENT_SECRET	ARM_CLIENT_SECRET
		User: Saeedulkhair	(global)	ARM_SUBSCRIPTION_ID	ARM_SUBSCRIPTION_ID
		User: Saeedulkhair	(global)	ARM_TENANT_ID	ARM_TENANT_ID

The output looks like

