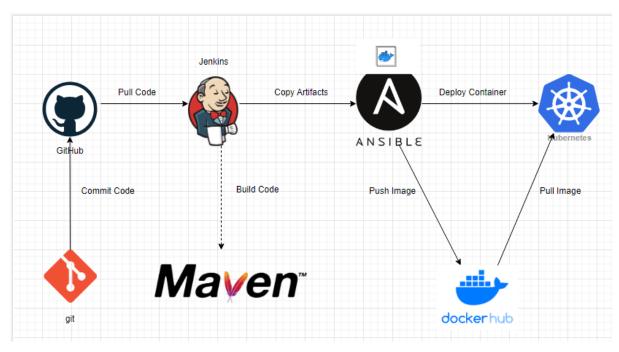# Devops Project

CI/CD pipeline System

Requirements :

- Git - local version control system.

- GitHub - As Distributed version control system.

- Jenkins - Continous Integration tool.

- Maven - As a Build Tool.

- Anisible - Configuration Management & Deployment tool.

- docker -Containerization

- Kubernetes - As Container Management Tool.

Flow Diagram :

Resources to Setup CI and CD pipeline.

- Free Tier AWS account.
- GitHub account (for source code and documentation).
- MobaXterm – enhanced terminal for windows with X11 Server tabbed SSH clients, network tool and much more.
- Git – local version control system.

Setup Jenkins Server

- Setup a Linux EC2 instance
- Install Java
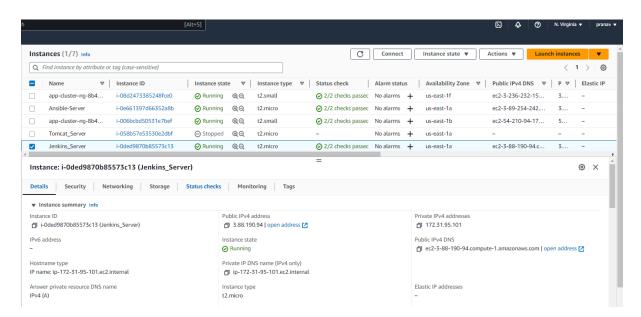- Install Jenkins
- Start Jenkins
- Access Web UI on port 8080

Fig.EC2 Instance for Jenkins Server

```
[root@ip-172-31-95-101 ~]# service jenkins start
Starting jenkins (via systemctl):                    [  OK  ]
```

Integrate Git with Jenkins

- Install Git on Jenkins Instances

- Install GitHub plug in on Jenkins GUI

- Configure Git on Jenkins GUI

Install Git on Jenkins Instances

```
[root@ip-172-31-95-101 ~]# git --version
git version 2.39.2
```

Install GitHub plug in on Jenkins GUI

Fig. Plugin Integrates git with Jenkins.

Configure Git on Jenkins GUI

Fig. Configure Git on Jenkins GUI

Integrate Maven with Jenkins
- Setup Maven on Jenkins Server

- Setup Environment Variables
- JAVA_HOME, M2, M2_HOME

- Install Maven Plugin

- Configure Maven and Java

```
[root@ip-172-31-95-101 ~]# ll -la
total 36
dr-xr-x---  3 root root  140 May 17 06:24 .
dr-xr-xr-x 18 root root  257 Apr 28 18:10 ..
-rw-------  1 root root 1815 May  9 18:59 .bash_history
-rw-r--r--  1 root root   18 Oct 18  2017 .bash_logout
-rw-r--r--  1 root root  307 Apr 28 19:31 .bash_profile
-rw-r--r--  1 root root  176 Oct 18  2017 .bashrc
-rw-r--r--  1 root root  100 Oct 18  2017 .cshrc
drwx------  2 root root   29 Apr 28 18:10 .ssh
-rw-r--r--  1 root root  129 Oct 18  2017 .tcshrc
-rw-------  1 root root 9074 May 17 06:24 .viminfo
```

```
[root@ip-172-31-95-101 ~]# cat .bash_profile
# .bash_profile

# Get the aliases and functions
if [ -f ~/.bashrc ]; then
        . ~/.bashrc
fi
M2_HOME=/opt/maven
M2=/opt/maven/bin
JAVA_HOME=/usr/lib/jvm/java-11-openjdk-11.0.18.0.10-1.amzn2.0.1.x86_64
# User specific environment and startup programs

PATH=$PATH:$HOME/bin:$JAVA_HOME:$M2_HOME:$M2

export PATH
```

Fig:Setup Environment Variables

```
[root@ip-172-31-95-101 ~]# mvn -v
Apache Maven 3.9.1 (2e178502fcdbffc201671fb2537d0cb4b4cc58f8)
Maven home: /opt/maven
Java version: 11.0.18, vendor: Red Hat, Inc., runtime: /usr/lib/jvm/java-11-openjdk-11.0.18.0.10-1.amzn2.0.1.x86_64
Default locale: en_US, platform encoding: UTF-8
OS name: "linux", version: "5.10.177-158.645.amzn2.x86_64", arch: "amd64", family: "unix"
```
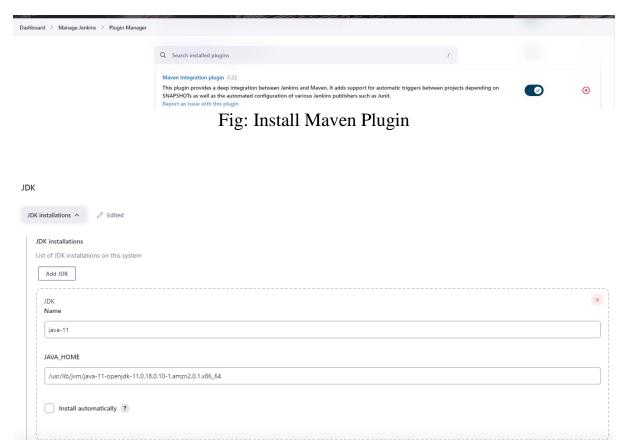
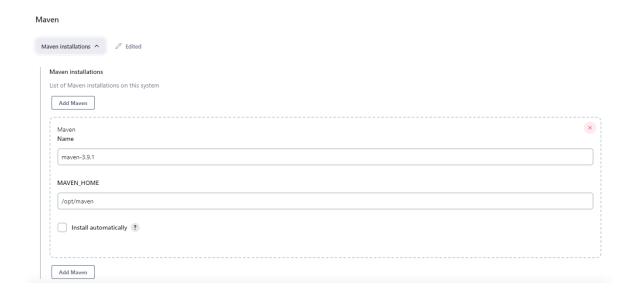Fig: Install Maven Plugin

Fig. Java Global Tool Configuration.

Fig. Maven Global Tool Configuration

Integrating Docker in CI/CD pipeline

Setup a Docker Environment
Setup Docker Host
- Setup a Linux EC2 Instance
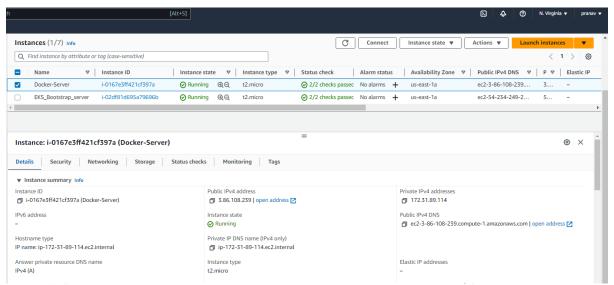- Install Docker
- Start docker services

Fig. Docker Server EC2 Instance

Fig.Starting Docker Server

Integrate Docker with Jenkins
- Create a docker admin user
- Install "Publish Over SSH "plugin
- Add Docker Host to Jenkins "configure systems"

[root@dockerhost ~]# useradd dockeradmin // Creating Users
[root@dockerhost ~]# passwd dockeradmin // Creating Password
Changing password for user dockeradmin.
New password:
BAD PASSWORD: The password contains the user name in some form
Retype new password:

[root@dockerhost ~]# usermod -aG docker dockeradmin
// Modifying Docker Group

[root@dockerhost ~]# id dockeradmin
uid=1001(dockeradmin) gid=1001(dockeradmin)
groups=1001(dockeradmin),992(docker)

[root@dockerhost ~]# vi /etc/ssh/sshd_config // Configure path password

[root@dockerhost ~]# service sshd reload

Install "Publish Over SSH "plugin

Publish over SSH

Jenkins SSH Key ?

Passphrase ?

🔒 Concealed   Change Password

Path to key ?

Key ?

☐ Disable exec ?

Fig. Publish Over SSH plugin

SSH Server
Name ?

dockerhost

Hostname ?

172.31.89.114

Username ?

dockeradmin

Remote Directory ?

Advanced ⌄   ✎ Edited

Test Configuration

Fig. Adding Docker Host to Jenkins "configure systems"

Integrate Ansible in CI/CD Pipeline:

Prepare Ansible Server:

- Setup EC2 Instance

- Setup hostname

- Create ansadmin users

- Add Users to sudoers file

- Generate ssh keys

- Enable Password Based Login

- Install Ansible

Setup EC2 Instance

Fig.EC2 Instance Setup For Ansible

Generated SSH Keys:

[ansadmin@nsible-server ~]$ ssh-keygen

Generating public/private rsa key pair.

Enter file in which to save the key (/home/ansadmin/.ssh/id_rsa):

Created directory '/home/ansadmin/.ssh'.

Enter passphrase (empty for no passphrase):

Enter same passphrase again:

Your identification has been saved in /home/ansadmin/.ssh/id_rsa.

Your public key has been saved in /home/ansadmin/.ssh/id_rsa.pub.

The key fingerprint is:

SHA256:1eWQGH9lwcDotDMlxHjHjpVn6nQOtefY+iL1KBSxF+Q
ansadmin@nsible-server

The key's randomart image is:

```
+---[RSA 2048]----+
|       =+=+*.+|
|      ..Oo%.B |
|      = @oE..|
|      . *o*.o.|
|     S  =o++.|
|         ..o.o|
|         . . + |
|         o + .|
|          o o.|
+----[SHA256]-----+
```

Install Ansible:

[root@nsible-server ~]# python --version

Python 2.7.18

[root@nsible-server ~]# ansible --version

ansible 2.9.23

  config file = /etc/ansible/ansible.cfg

  configured module search path = [u'/root/.ansible/plugins/modules', u'/usr/share/ansible/plugins/modules']

  ansible python module location = /usr/lib/python2.7/site-packages/ansible

  executable location = /usr/bin/ansible

  python version = 2.7.18 (default, Feb 28 2023, 02:51:06) [GCC 7.3.1 20180712 (Red Hat 7.3.1-15)]

Integrate Docker with Ansible:

Create ansadmin

 [root@dockerhost ~]# useradd ansadmin

[root@dockerhost ~]# passwd ansadmin

Changing password for user ansadmin.

New password:

BAD PASSWORD: The password is shorter than 8 characters

Retype new password:

passwd: all authentication tokens updated successfully.

Add ansadmin to sudoers file

```
#
# Adding HOME to env_keep may enable a user to run unrestricted
# commands via sudo.
#
# Defaults   env_keep += "HOME"

Defaults    secure_path = /sbin:/bin:/usr/sbin:/usr/bin

## Next comes the main part: which users can run what software on
## which machines (the sudoers file can be shared between multiple
## systems).
## Syntax:
##
##      user    MACHINE=COMMANDS
##
## The COMMANDS section may have other options added to it.
##
## Allow root to run any commands anywhere
root    ALL=(ALL)       ALL

## Allows members of the 'sys' group to run networking, software,
## service management apps and more.
# %sys ALL = NETWORKING, SOFTWARE, SERVICES, STORAGE, DELEGATING, PROCESSES, LOCATE, DRIVERS

## Allows people in group wheel to run all commands
%wheel  ALL=(ALL)       ALL

## Same thing without a password
# %wheel        ALL=(ALL)       NOPASSWD: ALL
ansadmin ALL=(ALL)      NOPASSWD: ALL
## Allows members of the users group to mount and unmount the
## cdrom as root
# %users  ALL=/sbin/mount /mnt/cdrom, /sbin/umount /mnt/cdrom

## Allows members of the users group to shutdown this system
# %users  localhost=/sbin/shutdown -h now

## Read drop-in files from /etc/sudoers.d (the # here does not mean a comment)
```

Enable Password Based Login

[root@dockerhost ~]# grep Password /etc/ssh/sshd_config

PasswordAuthentication yes

#PermitEmptyPasswords no

#PasswordAuthentication no

PasswordAuthentication. Depending on your PAM configuration,

PAM authentication, then enable this but set PasswordAuthentication

Copy public key to target system

Copy ssh keys

[ansadmin@nsible-server .ssh]$ ssh-copy-id 172.31.89.114

/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/ansadmin/.ssh/id_rsa.pub"

The authenticity of host '172.31.89.114 (172.31.89.114)' can't be established.

ECDSA key fingerprint is SHA256:VyyK5S3p9Ejp2w2vBnHiHfoWMiuCz+0orNnNuwRU10c.

ECDSA key fingerprint is MD5:95:25:97:7b:f4:10:7f:ab:fb:8d:37:f4:88:c7:50:5b.

Are you sure you want to continue connecting (yes/no)? yes

/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed

/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys

ansadmin@172.31.89.114's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh '172.31.89.114'"

and check to make sure that only the key(s) you wanted were added.

Copying sshkey to docker host.

[root@dockerhost ~]# sudo su - ansadmin

[ansadmin@dockerhost ~]$ ll -la

total 12

drwx------ 3 ansadmin ansadmin 74 May 6 18:17 .

drwxr-xr-x 5 root   root   57 May 6 18:07 ..

-rw-r--r-- 1 ansadmin ansadmin 18 Jul 15 2020 .bash_logout

-rw-r--r-- 1 ansadmin ansadmin 193 Jul 15 2020 .bash_profile

-rw-r--r-- 1 ansadmin ansadmin 231 Jul 15 2020 .bashrc

drwx------ 2 ansadmin ansadmin 29 May 6 18:17 .ssh

[ansadmin@dockerhost ~]$ cd .ssh

[ansadmin@dockerhost .ssh]$ ll

total 4

-rw------- 1 ansadmin ansadmin 404 May 6 18:17 authorized_keys

[ansadmin@dockerhost .ssh]$ date

Sat May 6 18:18:46 UTC 2023

Test the Connection

[ansadmin@nsible-server .ssh]$ ansible all -m ping

[WARNING]: Platform linux on host 172.31.89.114 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python

interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery .html for more information.

172.31.89.114 | SUCCESS => {

  "ansible_facts": {

    "discovered_interpreter_python": "/usr/bin/python"

  },

  "changed": false,

  "ping": "pong"

}

Connection Success

[ansadmin@dockerhost ~]$ uptime

 18:25:05 up 19 min, 1 user, load average: 0.00, 0.00, 0.00

Integrate Ansible with Jenkins:

Fig. Configuring Ansible with Jenkins

Creating docker directory on Ansible Server:

[ansadmin@nsible-server ~]# cd /opt

[ansadmin@nsible-server opt]# mkdir docker

[ansadmin@nsible-server opt]# chown ansadmin:ansadmin docker

[ansadmin@nsible-server opt]$ ll

total 0

drwxr-xr-x 4 root   root   33 Apr 20 18:29 aws

drwx--x--x 4 root   root   28 May 7 17:18 containerd

drwxr-xr-x 2 ansadmin ansadmin 60 May 7 19:44 docker

drwxr-xr-x 2 root   root   6 Aug 16 2018 rh

Install docker

Creating Docker File:

[ansadmin@ansible-server docker]$ vi Dockerfile

[ansadmin@ansible-server docker]$ cat Dockerfile

FROM tomcat

RUN cp -R /usr/local/tomcat/webapps.dist/* /usr/local/tomcat/webapps

COPY ./*.war /usr/local/tomcat/webapps

Adding address for host

[ansadmin@ansible-server docker]$ cat hosts

[ansible]

172.31.84.114

[dockeradmin]

172.31.89.114

[ansadmin@ansible-server docker]$ ansible all -a uptime

[WARNING]: Platform linux on host 172.31.89.114 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python

interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery .html for more information.

172.31.89.114 | CHANGED | rc=0 >>

 18:13:20 up 54 min, 2 users, load average: 0.00, 0.00, 0.00

[WARNING]: Platform linux on host 172.31.84.114 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python

interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery .html for more information.

172.31.84.114 | CHANGED | rc=0 >>

 18:13:20 up 1:25, 2 users, load average: 0.09, 0.04, 0.01

Creating playbook:

[ansadmin@ansible-server docker]$ cat create_image_regapp.yml

---

- hosts: ansible

  tasks:

  - name: create docker image

    command: docker build -t regapp:latest .

    args:

     chdir: /opt/docker

  - name: create tag to push image onto dockerhub

    command: docker tag regapp:latest pranav27/regapp:latest

  - name: push docker image

    command: docker push pranav27/regapp:latest

[ansadmin@ansible-server docker]$ cat docker_deployment.yml

- hosts: dockerhost

  tasks:
  - name: Stop exisitng container
    command: docker stop regapp-server
    ignore_errors: yes

  - name: remove the container
    command: docker rm regapp-server
    ignore_errors: yes
  - name: remove image
    command: docker rmi pranav27/regapp
    ignore_errors: yes

  - name: create container
    command: docker run -d --name regapp-server -p 8082:8080 pranav27/regapp:latest

Complete CI and CD job to build and deploy code on Kubernetes:
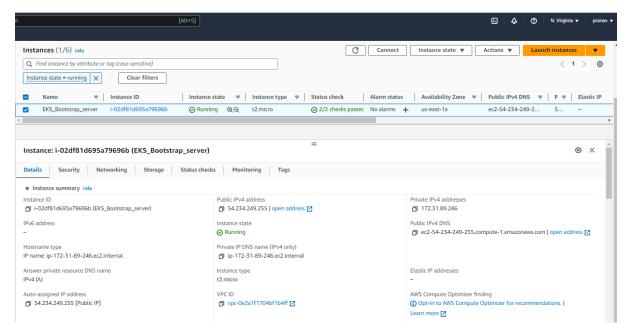
Fig. Bootstrap Server Running

Install AWSCLI latest version

[ec2-user@ip-172-31-89-246 ~]$ sudo su –

[root@ip-172-31-89-246 ~]# curl "https://awscli.amazonaws.com/awscli-exe-linux-x86_64.zip" -o "awscliv2.zip"

```
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 54.9M  100 54.9M    0     0   281M      0 --:--:-- --:--:-- --:--:--  281M
```


[root@ip-172-31-89-246 ~]# unzip awscliv2.zip

Archive: awscliv2.zip

[root@ip-172-31-89-246 ~]# sudo ./aws/install

You can now run: /usr/local/bin/aws --version

[root@ip-172-31-89-246 ~]# aws --version

aws-cli/2.11.18 Python/3.11.3 Linux/5.10.177-158.645.amzn2.x86_64 exe/x86_64.amzn.2 prompt/off

Setup kubectl
Download kubectl version 1.26

[root@ip-172-31-89-246 ~]# curl -O https://s3.us-west-2.amazonaws.com/amazon-eks/1.26.2/2023-03-17/bin/linux/amd64/kubectl

```
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current

                                 Dload  Upload   Total   Spent    Left  Speed
100 45.8M  100 45.8M    0     0  5044k      0  0:00:09  0:00:09 --:--:-- 5158k
```

Grant execution permissions to kubectl executable

[root@ip-172-31-89-246 ~]# chmod +x ./kubectl

Move kubectl onto /usr/local/bin

[root@ip-172-31-89-246 ~]# mv ./kubectl /usr/local/bin

Test that your kubectl installation was successful

[root@ip-172-31-89-246 ~]# kubectl version

WARNING: This version information is deprecated and will be replaced with the output from kubectl version --short. Use --output=yaml|json to get the full version.

Client Version: version.Info{Major:"1", Minor:"26+", GitVersion:"v1.26.2-eks-a59e1f0", GitCommit:"8b68f4b95d7121d039ceebd30870e48acc7772e4", GitTreeState:"clean", BuildDate:"2023-03-09T20:03:04Z", GoVersion:"go1.19.6", Compiler:"gc", Platform:"linux/amd64"}

Kustomize Version: v4.5.7

The connection to the server localhost:8080 was refused - did you specify the right host or port?

Setup eksctl

[root@ip-172-31-89-246 ~]# curl -sL "https://github.com/weaveworks/eksctl/releases/latest/download/eksctl_checksums.txt" | grep $PLATFORM | sha256sum --check

eksctl_Linux_amd64.tar.gz: OK

Move the extracted binary to /usr/local/bin

[root@ip-172-31-89-246 tmp]# mv eksctl /usr/local/bin

Test that your eksctl installation was successful

[root@ip-172-31-89-246 tmp]# eksctl version

0.140.0

Create an IAM Role and attach it to EC2 instance
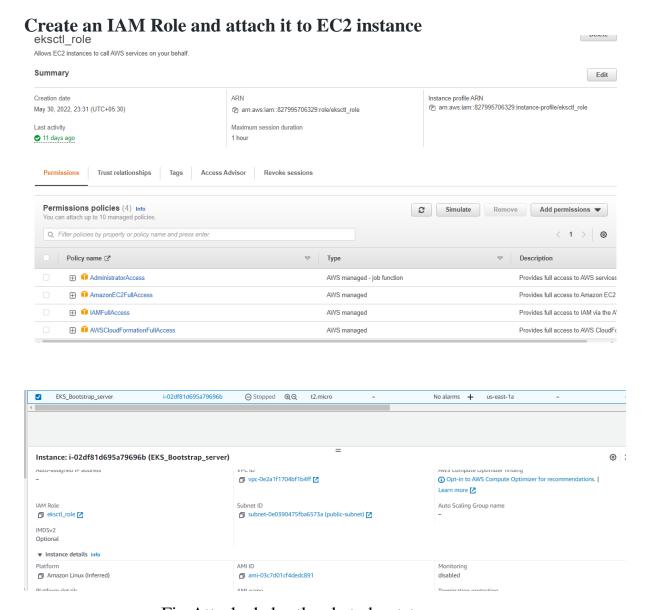
Fig.Attached eksctl_role to bootstrap server

Create your cluster and nodes

[root@ip-172-31-89-246 ~]# cd /tmp

[root@ip-172-31-89-246 tmp]# eksctl create cluster --name app-cluster \

> --region us-east-1 \

> --node-type t2.small
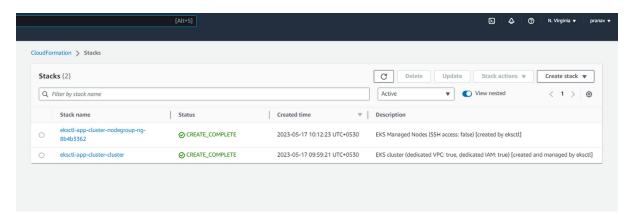
Fig. Stacks in CloudFormation

Creating a deployment file:

[root@ip-172-31-89-246 ~]# vi regapp-deployment.yml

[root@ip-172-31-89-246 ~]# cat regapp-deployment.yml

apiVersion: apps/v1

kind: Deployment

metadata:

  name: app-regapp

  labels:

    app: regapp

spec:

```yaml
replicas: 3
selector:
  matchLabels:
    app: regapp

template:
  metadata:
    labels:
      apps: regapp
  spec:
    containers:
    - name: regapp
      image: pranav27/regapp
      imagePullPolicy: Always
      ports:
      - containerPort: 8080
strategy:
  type: RollingUpdate
  rollingUpdate:
    maxSurge: 1
    maxUnavailable: 1
```

Creating a service file:

[root@ip-172-31-89-246 ~]# cat regapp-service.yml

apiVersion: v1

kind: Service

metadata:

  name: regapp-service

  labels:

    app: regapp

spec:

  selector:

    app: regapp

  ports:

    - port: 8080

      targetPort: 8080

  type: LoadBalancer

Integrate Kubernetes Bootstrap Server with Ansible:

On Bootstrap Server:

Create ansadmin
[root@ip-172-31-89-246 ~]# useradd ansadmin
[root@ip-172-31-89-246 ~]# passwd ansadmin
Changing password for user ansadmin.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.

[root@ip-172-31-89-246 ~]# visudo

Add ansadmin to sudoers file

```
Defaults    env_reset
Defaults    env_keep =  "COLORS DISPLAY HOSTNAME HISTSIZE KDEDIR LS_COLORS"
Defaults    env_keep += "MAIL PS1 PS2 QTDIR USERNAME LANG LC_ADDRESS LC_CTYPE"
Defaults    env_keep += "LC_COLLATE LC_IDENTIFICATION LC_MEASUREMENT LC_MESSAGES"
Defaults    env_keep += "LC_MONETARY LC_NAME LC_NUMERIC LC_PAPER LC_TELEPHONE"
Defaults    env_keep += "LC_TIME LC_ALL LANGUAGE LINGUAS _XKB_CHARSET XAUTHORITY"

#
# Adding HOME to env_keep may enable a user to run unrestricted
# commands via sudo.
#
# Defaults   env_keep += "HOME"

Defaults    secure_path = /sbin:/bin:/usr/sbin:/usr/bin

## Next comes the main part: which users can run what software on
## which machines (the sudoers file can be shared between multiple
## systems).
## Syntax:
##
##      user    MACHINE=COMMANDS
##
## The COMMANDS section may have other options added to it.
##
## Allow root to run any commands anywhere
root    ALL=(ALL)       ALL
ansadmin ALL=(ALL)      NOPASSWD: ALL
## Allows members of the 'sys' group to run networking, software,
## service management apps and more.
# %sys ALL = NETWORKING, SOFTWARE, SERVICES, STORAGE, DELEGATING, PROCESSES, LOCATE, DRIVERS

## Allows people in group wheel to run all commands
%wheel  ALL=(ALL)       ALL

## Same thing without a password
# %wheel        ALL=(ALL)       NOPASSWD: ALL

## Allows members of the users group to mount and unmount the
## cdrom as root
# %users  ALL=/sbin/mount /mnt/cdrom, /sbin/umount /mnt/cdrom

## Allows members of the users group to shutdown this system
# %users  localhost=/sbin/shutdown -h now

## Read drop-in files from /etc/sudoers.d (the # here does not mean a comment)
#includedir /etc/sudoers.d
-- INSERT --
```

Fig. Add ansadmin to sudoers file

Enable Password based login
[root@ip-172-31-89-246 ~]# vi /etc/ssh/sshd_config
[root@ip-172-31-89-246 ~]# service sshd reload
Redirecting to /bin/systemctl reload sshd.service

Create Ansible Playbooks for deployment and Service File:

```
[ansadmin@ansible-server docker]$ cat kube_deploy.yml
---
- hosts: kubernetes
  #  become: true
  user: root

  tasks:
  - name: deploy regapp on kubernetes
    command: kubectl apply -f regapp-deployment.yml

  - name: create service for regapp
    command: kubectl apply -f regapp-service.yml

  - name: update deployment with new pods if image updated in docker hub
    command: kubectl rollout restart deployment.apps/app-regapp
```
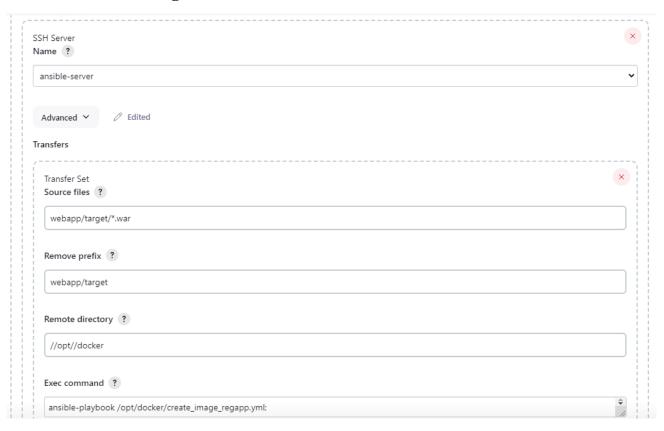
Fig. Kubernetes deploy file created

```
[ansadmin@ansible-server docker]$ cat  kube_service.yml
---
- hosts: kubernetes
  #  become: true
  user: root
  tasks:
  - name: deploy regapp on kubernetes
    command: kubectl apply -f regapp-service.yml
[ansadmin@ansible-server docker]$ cat Dockerfile
FROM tomcat
RUN cp -R /usr/local/tomcat/webapps.dist/* /usr/local/tomcat/webapps
COPY ./*.war /usr/local/tomcat/webapps
```
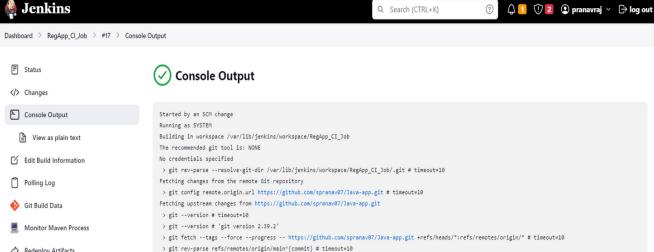
Fig. Kubernetes service file created

CI Job to create Image for Kubernetes:

SSH Server
Name ?

```
ansible-server
```

Advanced ⌄   ✎ Edited

Transfers

Transfer Set
Source files ?

```
webapp/target/*.war
```

Remove prefix ?

```
webapp/target
```

Remote directory ?

```
//opt//docker
```

Exec command ?

```
ansible-playbook /opt/docker/create_image_regapp.yml;
```

Post-build Actions

≡ **Build other projects** ?   ×

Projects to build

```
RegApp_CD_ Job
```

🔘 Trigger only if build is stable

⚪ Trigger even if the build is unstable

⚪ Trigger even if the build fails

✓ Console Output

```
Started by an SCM change
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/RegApp_CI_Job
The recommended git tool is: NONE
No credentials specified
 > git rev-parse --resolve-git-dir /var/lib/jenkins/workspace/RegApp_CI_Job/.git # timeout=10
Fetching changes from the remote Git repository
 > git config remote.origin.url https://github.com/spranav07/Java-app.git # timeout=10
Fetching upstream changes from https://github.com/spranav07/Java-app.git
 > git --version # timeout=10
 > git --version # 'git version 2.39.2'
 > git fetch --tags --force --progress -- https://github.com/spranav07/Java-app.git +refs/heads/*:refs/remotes/origin/* # timeout=10
 > git rev-parse refs/remotes/origin/main^{commit} # timeout=10
Checking out Revision 1f7f0b4e71fbb9f328f92919693e522f01613fe0 (refs/remotes/origin/main)
 > git config core.sparsecheckout # timeout=10
 > git checkout -f 1f7f0b4e71fbb9f328f92919693e522f01613fe0 # timeout=10
Commit message: "updated index"
 > git rev-list --no-walk 81807660be2ddbd1e198a8ab86948aef53bc1068 # timeout=10
Parsing POMs
Established TCP socket on 39375
[RegApp_CI_Job] $ /usr/lib/jvm/java-11-openjdk-11.0.18.0.10-1.amzn2.0.1.x86_64/bin/java -cp /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven35-agent-
1.14.jar:/opt/maven/boot/plexus-classworlds-2.6.0.jar:/opt/maven/conf/logging jenkins.maven3.agent.Maven35Main /opt/maven
```
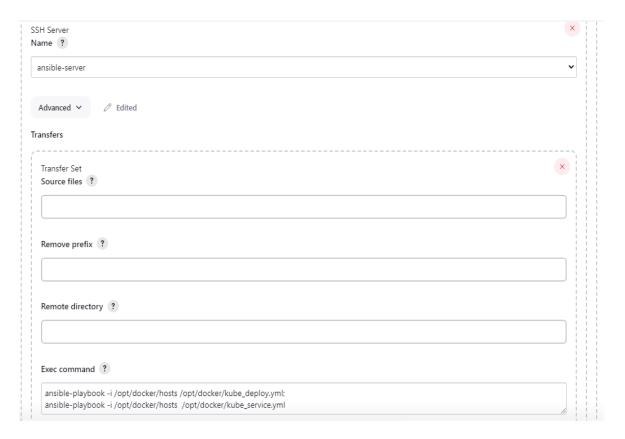
```
PLAY [ansible] *********************************************************

TASK [Gathering Facts] ************************************************
[WARNING]: Platform linux on host 172.31.84.114 is using the discovered Python
interpreter at /usr/bin/python, but future installation of another Python
interpreter could change this. See https://docs.ansible.com/ansible/2.9/referen
ce_appendices/interpreter_discovery.html for more information.
ok: [172.31.84.114]

TASK [create docker image] ********************************************
changed: [172.31.84.114]

TASK [create tag to push image onto dockerhub] ***********************
changed: [172.31.84.114]

TASK [push docker image] *********************************************
changed: [172.31.84.114]

PLAY RECAP **********************************************************
172.31.84.114              : ok=4    changed=3    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0

SSH: EXEC: completed after 23,221 ms
SSH: Disconnecting configuration [ansible-server] ...
SSH: Transferred 1 file(s)
Triggering a new build of RegApp_CD_ Job
Finished: SUCCESS
```

RegApp_CD_ Job

Complete CI and CD job to build and deploy code on Kubernetes:

Jenkins

Q Search (CTRL+K)   ?   🔔 1 🛡 2 👤 pranavraj ∨ ⤷ log out

- 📄 Status
- </> Changes
- ▶ Console Output
  - 📄 View as plain text
- ☑ Edit Build Information
- 🗑 Delete build '#14'
- ← Previous Build

✓ Console Output

```
Started by upstream project "RegApp_CI_Job" build number 17
originally caused by:
 Started by an SCM change
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/RegApp_CD_ Job
SSH: Connecting from host [ip-172-31-95-101.ec2.internal]
SSH: Connecting with configuration [ansible-server] ...
SSH: Creating session: username [ansadmin], hostname [172.31.84.114], port [22]
SSH: Connecting session ...
SSH: Connected
SSH: Opening exec channel ...
SSH: EXEC: channel open
SSH: EXEC: STDOUT/STDERR from command [ansible-playbook -i /opt/docker/hosts /opt/docker/kube_deploy.yml;
ansible-playbook -i /opt/docker/hosts  /opt/docker/kube_service.yml] ...
SSH: EXEC: connected

PLAY [kubernetes] ************************************************************

TASK [Gathering Facts] ******************************************************
[WARNING]: Platform linux on host 172.31.89.246 is using the discovered Python
interpreter at /usr/bin/python, but future installation of another Python
interpreter could change this. See https://docs.ansible.com/ansible/2.9/referen
ce appendices/interpreter discovery html for more information.
```

```
TASK [update deployment with new pods if image updated in docker hub] **********
changed: [172.31.89.246]

PLAY RECAP ******************************************************************
172.31.89.246              : ok=4   changed=3   unreachable=0   failed=0   skipped=0   rescued=0   ignored=0


PLAY [kubernetes] ************************************************************

TASK [Gathering Facts] ******************************************************
[WARNING]: Platform linux on host 172.31.89.246 is using the discovered Python
interpreter at /usr/bin/python, but future installation of another Python
interpreter could change this. See https://docs.ansible.com/ansible/2.9/referen
ce_appendices/interpreter_discovery.html for more information.
ok: [172.31.89.246]

TASK [deploy regapp on kubernetes] ******************************************
changed: [172.31.89.246]

PLAY RECAP ******************************************************************
172.31.89.246              : ok=2   changed=1   unreachable=0   failed=0   skipped=0   rescued=0   ignored=0

SSH: EXEC: completed after 12,008 ms
SSH: Disconnecting configuration [ansible-server] ...
SSH: Transferred 0 file(s)
Finished: SUCCESS
```

Output :

Before

```
[ansadmin@ansible-server docker]$ ll
total 28
-rw-rw-r-- 1 ansadmin ansadmin  335 May  7 19:44 create_image_regapp.yml
-rw-rw-r-- 1 ansadmin ansadmin  425 May  8 15:19 docker_deployment.yml
-rw-rw-r-- 1 ansadmin ansadmin  121 May  7 17:21 Dockerfile
-rw-rw-r-- 1 ansadmin ansadmin  117 May  9 11:06 hosts
-rw-rw-r-- 1 ansadmin ansadmin  384 May  9 18:24 kube_deploy.yml
-rw-rw-r-- 1 ansadmin ansadmin  151 May  9 07:16 kube_service.yml
-rw-rw-r-- 1 ansadmin ansadmin 2364 May 17 06:50 webapp.war
[ansadmin@ansible-server docker]$ date
Wed May 17 09:35:55 UTC 2023
```

```
[ansadmin@ansible-server docker]$ docker images
REPOSITORY    TAG          IMAGE ID      CREATED     SIZE
[ansadmin@ansible-server docker]$ docker ps -a
CONTAINER ID   IMAGE        COMMAND      CREATED     STATUS      PORTS       NAMES
```

After

Changing the source code

```
Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master (main)
$ ll
total 11
-rw-r--r-- 1 Pranav 197121  130 Mar 10  2022 Dockerfile
-rw-r--r-- 1 Pranav 197121 5970 Mar 10  2022 pom.xml
-rw-r--r-- 1 Pranav 197121  479 Mar 10  2022 regapp-deploy.yml
-rw-r--r-- 1 Pranav 197121  195 Mar 10  2022 regapp-service.yml
drwxr-xr-x 1 Pranav 197121    0 Mar 10  2022 server/
drwxr-xr-x 1 Pranav 197121    0 Mar 10  2022 webapp/

Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master (main)
$ cd  webapp

Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp (mai
n)
$ ll
total 4
-rw-r--r-- 1 Pranav 197121 1141 Mar 10  2022 pom.xml
drwxr-xr-x 1 Pranav 197121    0 Mar 10  2022 src/

Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp (mai
n)
$ cd src

Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src
(main)
$ ll
total 0
drwxr-xr-x 1 Pranav 197121 0 Mar 10  2022 main/

Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src
(main)
$ cd main

Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/
main (main)
$ ll
total 0
drwxr-xr-x 1 Pranav 197121 0 May 10 00:10 webapp/

Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/
main (main)
$ cd webapp

Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/
main/webapp (main)
$ ll
total 4
drwxr-xr-x 1 Pranav 197121    0 Mar 10  2022 WEB-INF/
-rw-r--r-- 1 Pranav 197121 1274 May 10 00:10 index.jsp

Pranav@DESKTOP-OORBH2O MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/
main/webapp (main)
$ vi index.jsp
```

```
Pranav@DESKTOP-OORBH20 MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/main/webapp (main)
$ vi index.jsp


Pranav@DESKTOP-OORBH20 MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/main/webapp (main)
$

Pranav@DESKTOP-OORBH20 MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/main/webapp (main)
$ vi index.jsp

Pranav@DESKTOP-OORBH20 MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/main/webapp (main)
$ git add .
warning: LF will be replaced by CRLF in webapp/src/main/webapp/index.jsp.
The file will have its original line endings in your working directory

Pranav@DESKTOP-OORBH20 MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/main/webapp (main)
$ git commit -m "updated index"
[main 1f7f0b4] updated index
 1 file changed, 2 insertions(+), 1 deletion(-)

Pranav@DESKTOP-OORBH20 MINGW64 /d/DEVOPS/Java App/hello-world-master/webapp/src/main/webapp (main)
$ git push -u origin main
Enumerating objects: 13, done.
Counting objects: 100% (13/13), done.
Delta compression using up to 4 threads
Compressing objects: 100% (5/5), done.
Writing objects: 100% (7/7), 531 bytes | 265.00 KiB/s, done.
Total 7 (delta 2), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (2/2), completed with 2 local objects.
To https://github.com/spranav07/Java-app.git
   8180766..1f7f0b4  main -> main
Branch 'main' set up to track remote branch 'main' from 'origin'.
```

```html
<form action="action_page.php">
  <div class="container">
    <h1>New user Register for DevOps Learning</h1>
    <p>Please fill in this form to create an account.</p>
    <hr>

    <label for="Name"><b>Enter Name</b></label>
    <input type="text" placeholder="Enter Name" name="Name" id="Name" required>
    <br>

    <label for="mobile"><b>Enter mobile number</b></label>
    <input type="text" placeholder="Enter moible number" name="mobile" id="mobile" required>
    <br>

    <label for="email"><b>Enter Email</b></label>
    <input type="text" placeholder="Enter Email" name="email" id="email" required>
    <br>

    <label for="psw"><b>Password</b></label>
    <input type="password" placeholder="Enter Password" name="psw" id="psw" required>
    <br>

    <label for="psw-repeat"><b>Repeat Password</b></label>
    <input type="password" placeholder="Repeat Password" name="psw-repeat" id="psw-repeat" required>
    <hr>
    <br>
    <p>By creating an account you agree to our <a href="#">Terms & Privacy</a>.</p>
    <button type="submit" class="registerbtn">Register</button>
  </div>
  <div class="container signin">
    <p>Already have an account? <a href="#">Sign in</a>.</p>
  </div>


    <h2>Successfully pulled from Repository</h2>


</form>
~
~
~
~
~
```

Fig.index.isp edited

Fig. Ansible Server Webapp.war time change after success

Fig. Bootstrap Server Running
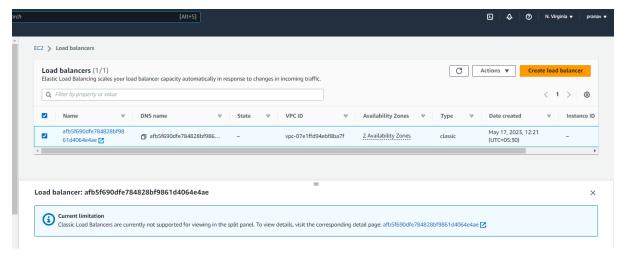
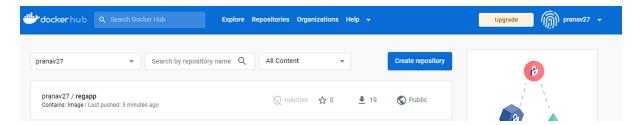
Fig.Load balancer created

Fig. Docker latest Image

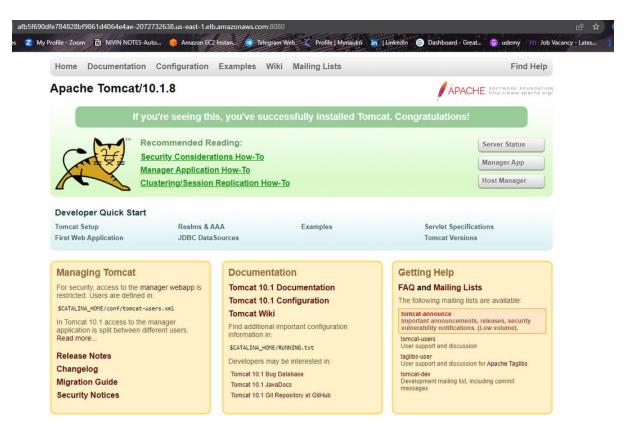Fig. Access to load balancer on port 8080

New user Register for DevOps Learning

Please fill in this form to create an account.

Enter Name [Enter Name]
Enter mobile number [Enter moible number]
Enter Email [Enter Email]
Password [Enter Password]
Repeat Password [Repeat Password]

By creating an account you agree to our Terms & Privacy.

[Register]

Already have an account? Sign in.

Successfully pulled from Repository

Fig.Latest application

Cleaning Setup:

```
[root@ip-172-31-89-246 ~]# kubectl delete deployment.apps/app-regapp
deployment.apps "app-regapp" deleted
[root@ip-172-31-89-246 ~]# kubectl delete service/regapp-service
service "regapp-service" deleted
[root@ip-172-31-89-246 ~]# kubectl get all
NAME                 TYPE        CLUSTER-IP    EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP   10.100.0.1    <none>        443/TCP   5h29m
[root@ip-172-31-89-246 ~]# kubectl get po
No resources found in default namespace.
```

Deleting Cluster:

```
[root@ip-172-31-89-246 ~]# eksctl delete cluster app-cluster --region us-east-1
2023-05-17 10:06:41 [ℹ]  deleting EKS cluster "app-cluster"
2023-05-17 10:06:42 [ℹ]  will drain 0 unmanaged nodegroup(s) in cluster "app-cluster"
2023-05-17 10:06:42 [ℹ]  starting parallel draining, max in-flight of 1
2023-05-17 10:06:42 [ℹ]  deleted 0 Fargate profile(s)
2023-05-17 10:06:42 [✔]  kubeconfig has been updated
2023-05-17 10:06:42 [ℹ]  cleaning up AWS load balancers created by Kubernetes objects of Kind Service or Ingress
2023-05-17 10:06:43 [ℹ]
2 sequential tasks: { delete nodegroup "ng-8b4b3362", delete cluster control plane "app-cluster" [async]
}
2023-05-17 10:06:43 [ℹ]  will delete stack "eksctl-app-cluster-nodegroup-ng-8b4b3362"
2023-05-17 10:06:43 [ℹ]  waiting for stack "eksctl-app-cluster-nodegroup-ng-8b4b3362" to get deleted
2023-05-17 10:06:43 [ℹ]  waiting for CloudFormation stack "eksctl-app-cluster-nodegroup-ng-8b4b3362"
2023-05-17 10:07:13 [ℹ]  waiting for CloudFormation stack "eksctl-app-cluster-nodegroup-ng-8b4b3362"
2023-05-17 10:07:50 [ℹ]  waiting for CloudFormation stack "eksctl-app-cluster-nodegroup-ng-8b4b3362"
2023-05-17 10:08:41 [ℹ]  waiting for CloudFormation stack "eksctl-app-cluster-nodegroup-ng-8b4b3362"
2023-05-17 10:09:44 [ℹ]  waiting for CloudFormation stack "eksctl-app-cluster-nodegroup-ng-8b4b3362"
2023-05-17 10:11:40 [ℹ]  waiting for CloudFormation stack "eksctl-app-cluster-nodegroup-ng-8b4b3362"
2023-05-17 10:12:46 [ℹ]  waiting for CloudFormation stack "eksctl-app-cluster-nodegroup-ng-8b4b3362"
2023-05-17 10:13:36 [ℹ]  waiting for CloudFormation stack "eksctl-app-cluster-nodegroup-ng-8b4b3362"
2023-05-17 10:13:37 [ℹ]  will delete stack "eksctl-app-cluster-cluster"
2023-05-17 10:13:37 [✔]  all cluster resources were deleted
```
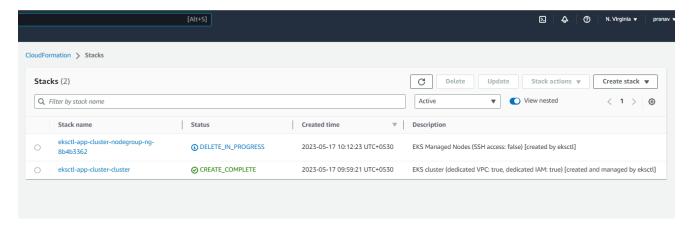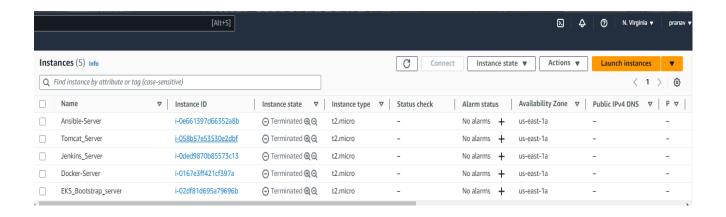
Fig . Cluster Deleted

Fig. Terminates all Instances