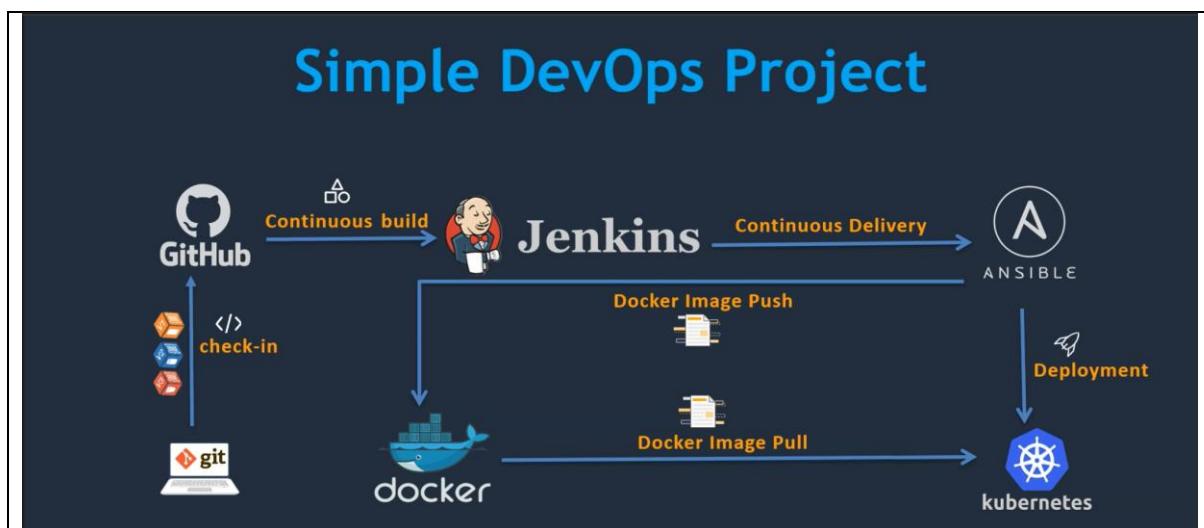


## Simple Devops Projects

### Requirements : CI/CD pipeline System

- Git - local version control system.
- GitHub - As Distributed version control system.
- Jenkins - Continuous Integration tool.
- Maven - As a Build Tool.
- Ansible - Configuration Management & Deployment tool.
- docker - Containerization
- Kubernetes - As Container Management Tool.

### Flow Diagram :-



## What Do we Cover?

### Build and Deploy on Tomcat Server.

Setup CI/CD with GitHub, Jenkins, Maven & Tomcat.

- Setup Jenkins
- Setup & Configure Maven , Git.
- Setup Tomcat Server.
- Integrating GitHub,Maven ,Tomcat Server with Jenkins
- Create a CI and CD Job.
- Test the Deployment.

#### 1. Deploy Artifacts on a Tomcat Server



Fig. Deploy Artifacts on a Tomcat Server

## **Build and Deploy on Container.**

Setup CI/CD with GitHub, Jenkins, Maven & Docker.

- Setting up the docker Environment.
- Write DockerFile.
- Create an Image and Container on Docker Host.
- Integrate Docker Host with Jenkins.
- Create CI/CD Job on Jenkins to build and deploy on container.

### **2. Deploy Artifacts on a Container**

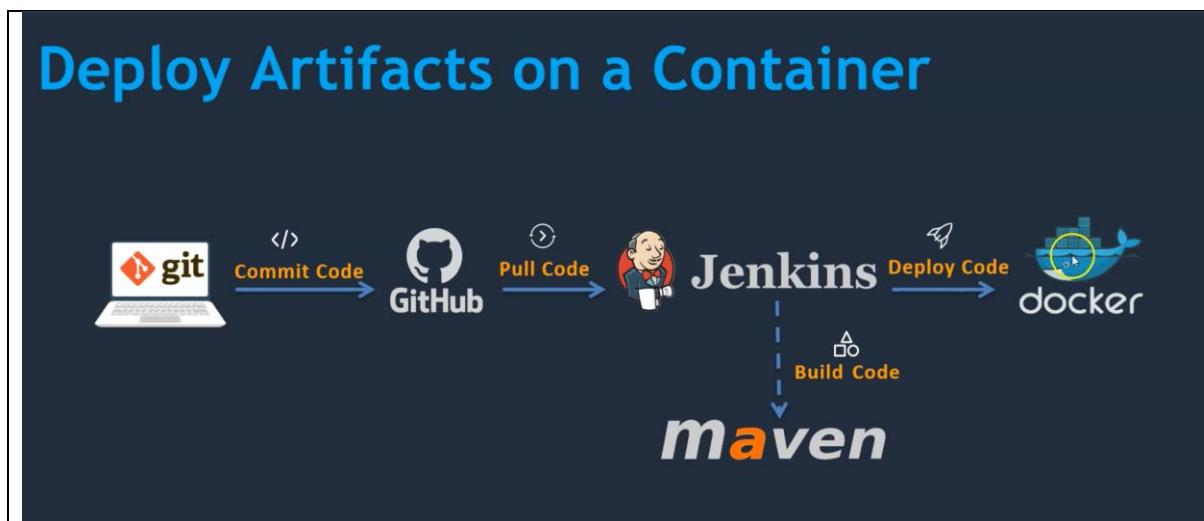


Fig. Deploy Artifacts on a Docker Container

## **Build and Deploy on Container.**

CI/CD with GitHub, Jenkins, Maven, Ansible & Docker.

- Setting up the Ansible Server

- Integrate Docker Host with Ansible.
- Ansible playbook to create Image.
- Ansible playbook to create Container.
- Integrate Ansible with Jenkins.
- CI/CD Job to build code on Ansible & Deploy it on docker container.

### 3. Deploy Artifacts on a Container

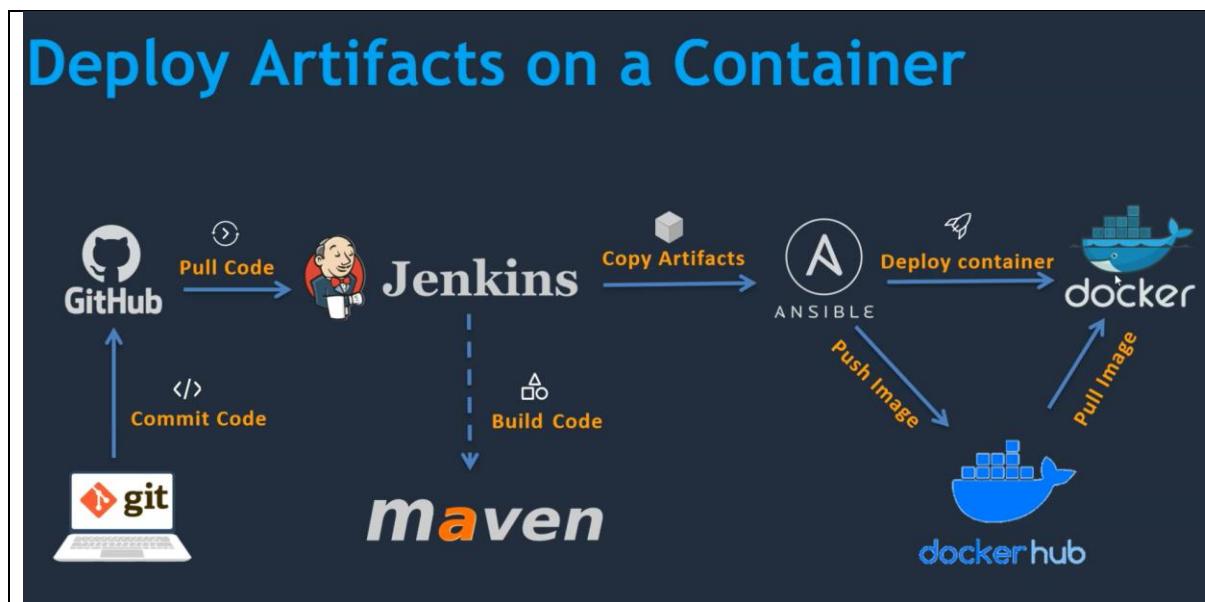


Fig. Deploy Artifacts on a Ansible Container.

### Build and Deploy on Container.

CI/CD with GitHub, Jenkins, Maven, Ansible & Kubernetes.

- Setting up the Kubernetes (EKS).

- Write pod service and deployment manifest file.
- Integrate Kubernetes with Ansible.
- Ansible playbook to create deployment & service.
- CI/CD Job to build code on Ansible & Deploy it on Kubernetes.

#### 4. Deploy Artifacts on a Kubernetes.

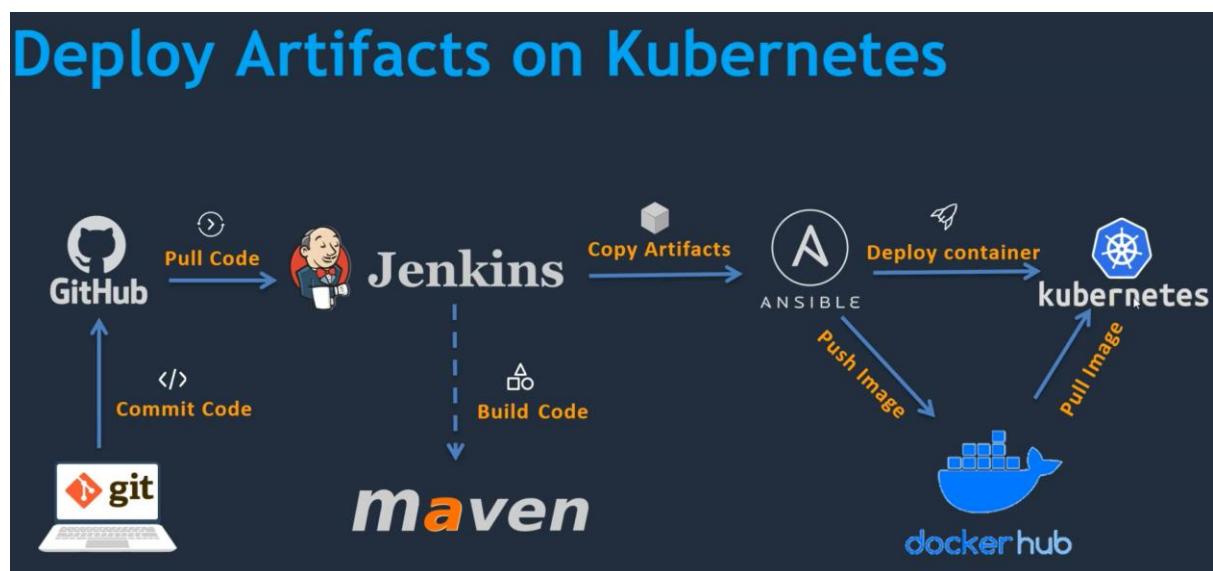


Fig. Deploy Artifacts on Kubernetes.

#### What is CI and CD

- Continuous Integration.
- Continuous Delivery.
- Continuous Deployment.

## How Does CI and CD Works on AWS?



Fig. CI and CD Works on AWS.

## How Does CI and CD Working on Devops?

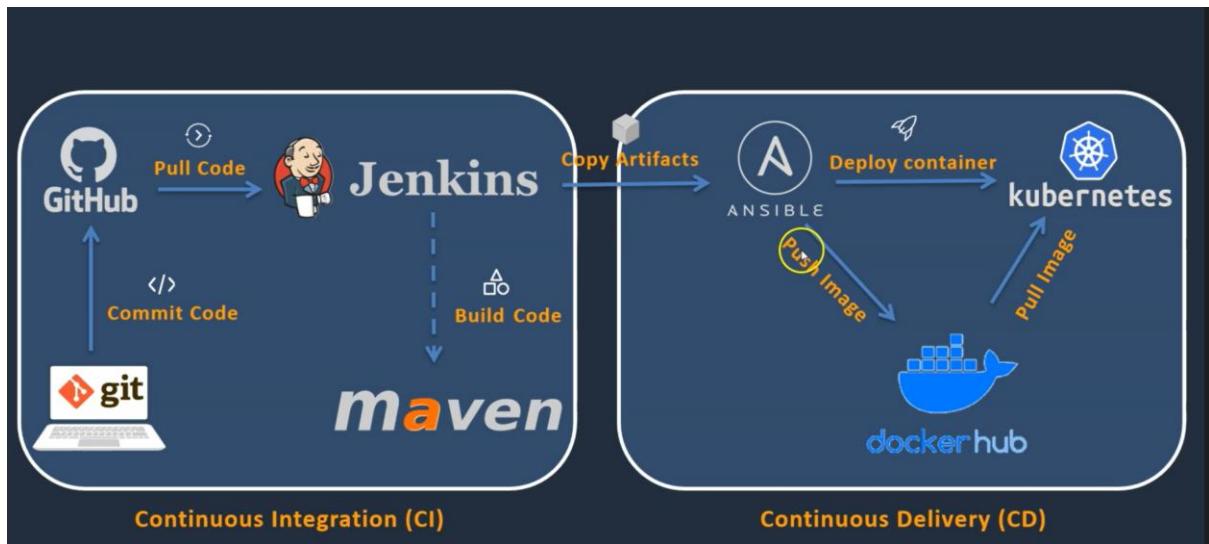


Fig. CI and CD Works on Devops.

**Note:** For Continuous Deployment we need multiple environments (With Manual Interventions).

## 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.

## CI and CD pipeline using Git, Jenkins & Maven.

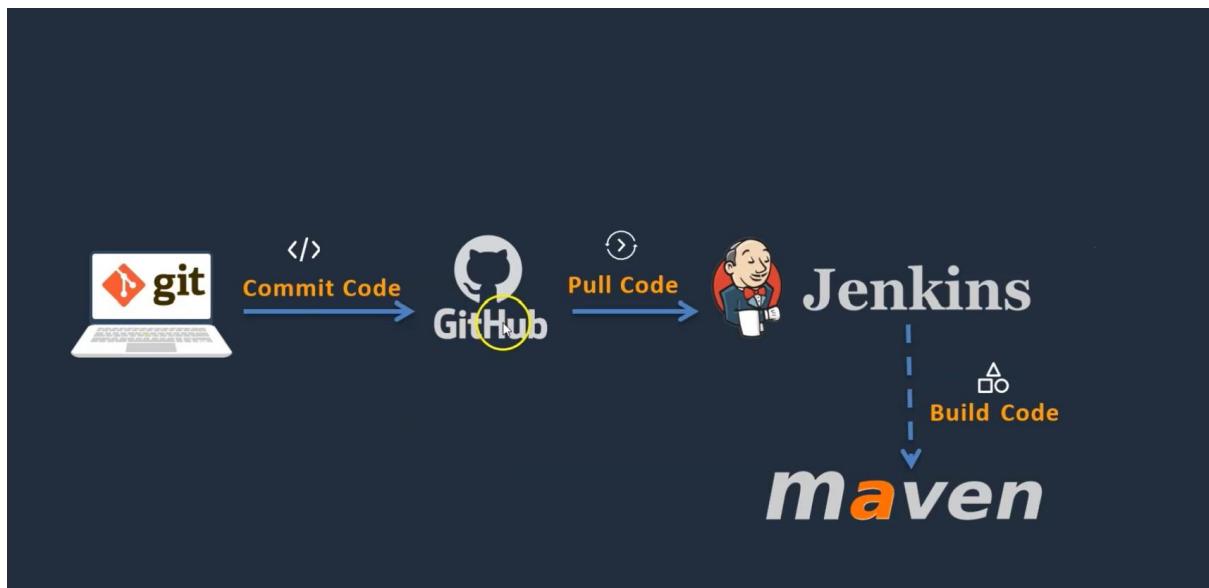


Fig. Build Code Jenkins on Maven

## Setup Jenkins Server

- Setup a Linux EC2 instance
- Install Java
- Install Jenkins

- Start Jenkins
- Access Web UI on port 8080

## Setup a Linux EC2 instance

The screenshot shows the AWS Management Console interface for the EC2 service. On the left, there's a navigation sidebar with links like 'EC2 Dashboard', 'Events', 'Tags', 'Limits', 'Instances', 'Images', and 'Elastic Block Store'. The main content area is titled 'Instances (1/1) Info' and shows a table with one row. The row details are:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Jenkins_Server	i-0956a6b2a7840f540	Running	t2.micro	-	No alarms	us-east-1c	ec2-35-172-185-163.co.

Below the table, there's a detailed view for the selected instance 'i-0956a6b2a7840f540 (Jenkins\_Server)'. The 'Details' tab is active, showing the following information:

- Instance summary**: Instance ID (i-0956a6b2a7840f540), Public IPv4 address (35.172.185.163), Private IPv4 address (172.31.31.201).
- Networking**: Instance state (Running).
- Storage**: Hostname type (IP name: ip-172-31-31-201.ec2.internal), Private IP DNS name (ip-172-31-31-201.ec2.internal).
- Monitoring**: Answer private resource DNS name (IPv4 (A)).

Fig.EC2 Instance for Jenkins Server

## Installation of Jenkins

First Step:

Connecting MobaXterm

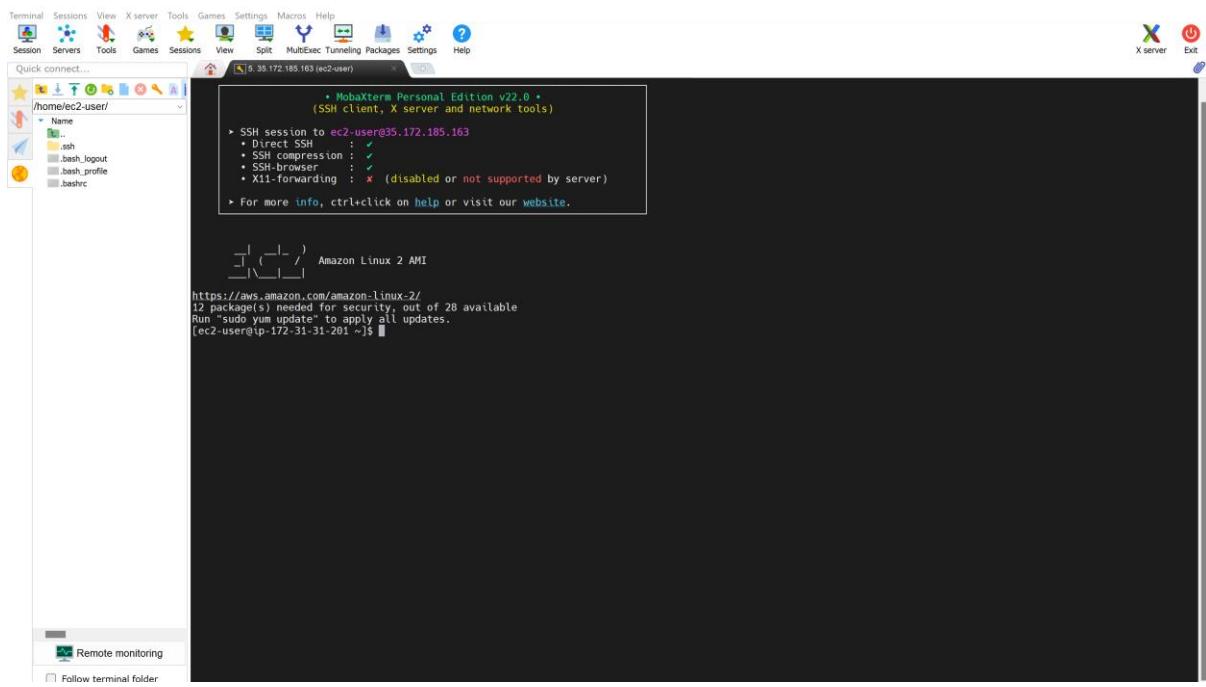


Fig. MobaXterm

## Second Step:

Official website: - <https://pkg.jenkins.io/redhat-stable/>

```
sudo wget -O /etc/yum.repos.d/jenkins.repo https://pkg.jenkins.io/redhat-stable/jenkins.repo
sudo rpm --import https://pkg.jenkins.io/redhat-stable/jenkins.io.key
```

```
yum install epel-release //fails
sudo amazon-linux-extras install epel
sudo amazon-linux-extras install java-openjdk11
yum install jenkins
```

## Installation of Java

```
[root@ip-172-31-31-201 ~]# java --version
```

**openjdk 11.0.13 2021-10-19 LTS**

**OpenJDK Runtime Environment 18.9 (build 11.0.13+8-LTS)**

**OpenJDK 64-Bit Server VM 18.9 (build 11.0.13+8-LTS, mixed mode, sharing)**

## Jenkins Start

```
[root@ip-172-31-31-201 ~]# service jenkins status
```

- **jenkins.service - Jenkins Continuous Integration Server**

**Loaded: loaded (/usr/lib/systemd/system/jenkins.service; disabled; vendor preset: disabled)**

**Active: inactive (dead)**

```
[root@ip-172-31-31-201 ~]# service Jenkins start
```

Starting jenkins (via systemctl): [ OK ]

```
[root@ip-172-31-31-201 ~]# service jenkins status
```

- **jenkins.service - Jenkins Continuous Integration Server**

**Loaded: loaded (/usr/lib/systemd/system/jenkins.service; disabled; vendor preset: disabled)**

**Active: active (running) since Sun 2022-05-01 19:02:31 UTC; 2min 3s ago**

**Main PID: 6549 (java)**

**CGroup: /system.slice/jenkins.service**

```
         └─6549 /usr/bin/java -Djava.awt.headless=true -jar  
/usr/share/java/jenkins.war --webroot=%C/jenkins/war --httpPort=8080
```

**May 01 19:02:02 ip-172-31-31-201.ec2.internal jenkins[6549]: This may also be found at: /var/lib/jenkins/secrets/initialAdminPassword**

**May 01 19:02:02 ip-172-31-31-201.ec2.internal jenkins[6549]:**

```
*****
```

**May 01 19:02:02 ip-172-31-31-201.ec2.internal jenkins[6549]:**

\*\*\*\*\*

**May 01 19:02:02 ip-172-31-31-201.ec2.internal jenkins[6549]:**

\*\*\*\*\*

**May 01 19:02:31 ip-172-31-31-201.ec2.internal jenkins[6549]: 2022-05-01**

**19:02:31.729+0000 [id=30] INFO**

**jenkins.InitReactorRunner\$1#onAttained...lization**

**May 01 19:02:31 ip-172-31-31-201.ec2.internal jenkins[6549]: 2022-05-01**

**19:02:31.755+0000 [id=23] INFO hudson.lifecycle.Lifecycle#onReady:**

**Je... running**

**May 01 19:02:31 ip-172-31-31-201.ec2.internal systemd[1]: Started Jenkins**

**Continuous Integration Server.**

**May 01 19:02:31 ip-172-31-31-201.ec2.internal jenkins[6549]: 2022-05-01**

**19:02:31.868+0000 [id=45] INFO**

**h.m.DownloadService\$Downloadable#load:...nstaller**

**May 01 19:02:31 ip-172-31-31-201.ec2.internal jenkins[6549]: 2022-05-01**

**19:02:31.869+0000 [id=45] INFO hudson.util.Retriger#start: Performed**

**t...tempt #1**

**May 01 19:02:31 ip-172-31-31-201.ec2.internal jenkins[6549]: 2022-05-01**

**19:02:31.878+0000 [id=45] INFO**

**hudson.model.AsyncPeriodicWork#lambda\$...0,935 ms**

**Hint: Some lines were ellipsized, use -l to show in full.**

## Access Web UI on port 8080:

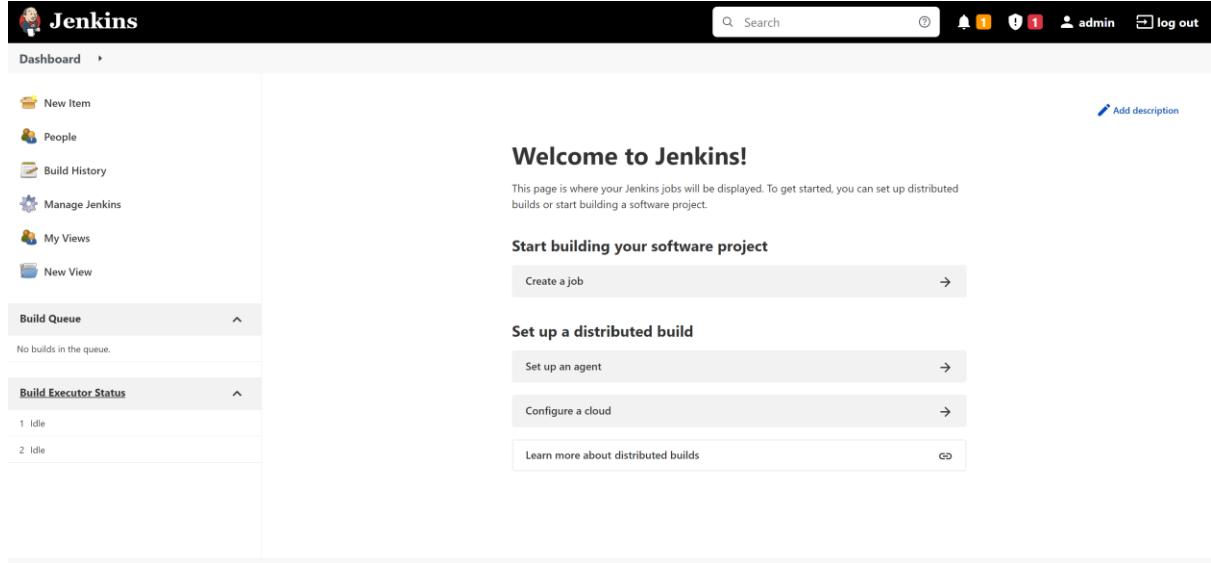


Fig. Access Web UI on port 8080

## Run First Jenkins Job:

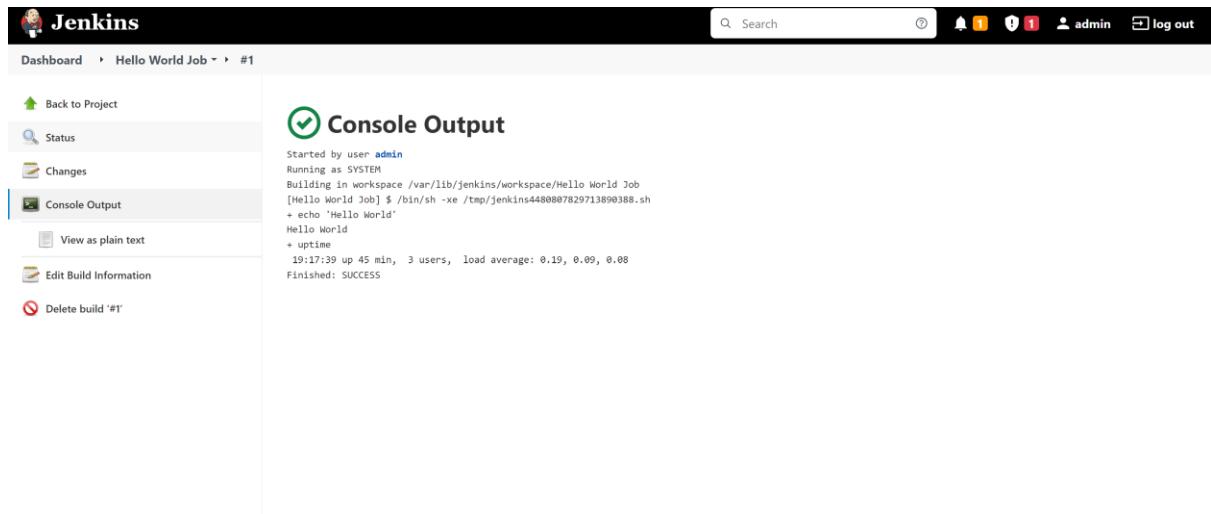


Fig. Run First Jenkins Job

## 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:

```
yum install git
```

```
[root@Jenkins_Server ~]# git --version  
git version 2.32.0
```

### Install GitHub plug in on Jenkins GUI

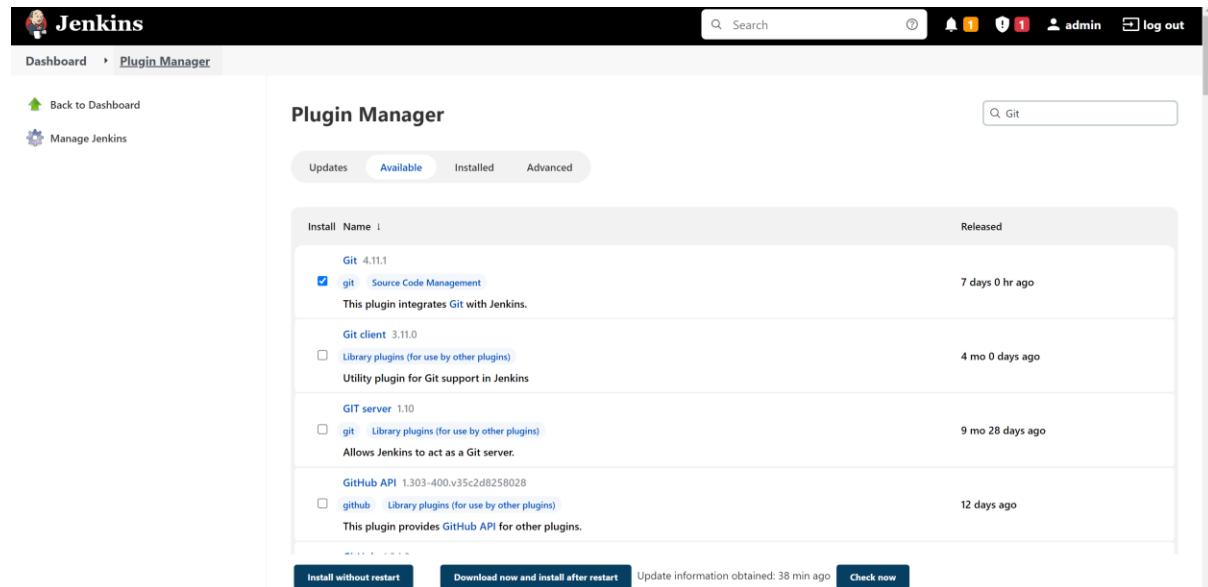


Fig. Plugin Integrates git with Jenkins.

SSH Credentials	Success	(Green checkmark)
Pipeline: Step API	Success	(Green checkmark)
SSH server	Success	(Green checkmark)
Plain Credentials	Success	(Green checkmark)
Credentials Binding	Success	(Green checkmark)
Pipeline: SCM Step	Success	(Green checkmark)
JAXB	Success	(Green checkmark)
Oracle Java SE Development Kit Installer	Success	(Green checkmark)
Caffeine API	Success	(Green checkmark)
Script Security	Success	(Green checkmark)
Command Agent Launcher	Success	(Green checkmark)
Apache HttpComponents Client 4.x API	Success	(Green checkmark)
JSch dependency	Success	(Green checkmark)
Git client	Success	(Green checkmark)
SCM API	Success	(Green checkmark)
Display URL API	Success	(Green checkmark)
Mailer	Success	(Green checkmark)
Git	Success	(Green checkmark)
Loading plugin extensions	Success	(Green checkmark)

Fig. Success Plugin Integrates git with Jenkins.

## Configure Git on Jenkins GUI

The screenshot shows the Jenkins Global Tool Configuration interface. It includes sections for Git and Maven. In the Git section, there is a 'Name' field containing 'Git', a 'Path to Git executable' field containing 'git', and a checkbox for 'Install automatically'. In the Maven section, there is a 'Add Maven' button. At the bottom, there are 'Save' and 'Apply' buttons.

Section	Setting	Value
Git	Name	Git
	Path to Git executable	git
	Install automatically	<input type="checkbox"/>
Maven	Add Maven	
Buttons		Save    Apply

Fig. Configure Git on Jenkins GUI

## Run Jenkins Job to pull code from GitHub

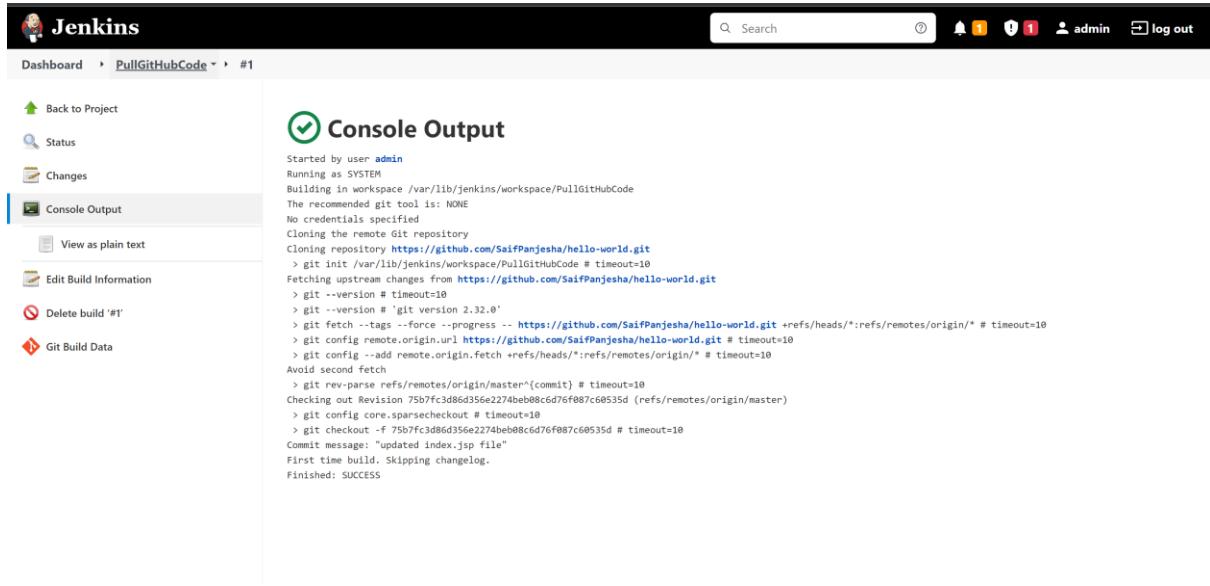


Fig Run Jenkins Job to pull code from GitHub

```
[root@Jenkins_Server ~]# cd /var/lib/jenkins/workspace/PullGitHubCode
```

```
[root@Jenkins_Server PullGitHubCode]# ll
```

```
total 24
```

```
-rw-r--r-- 1 jenkins jenkins 130 May 1 20:20 Dockerfile
```

```
-rw-r--r-- 1 jenkins jenkins 5970 May 1 20:20 pom.xml
```

```
-rw-r--r-- 1 jenkins jenkins 271 May 1 20:20 README.md
```

```
-rw-r--r-- 1 jenkins jenkins 479 May 1 20:20 regapp-deploy.yml
```

```
-rw-r--r-- 1 jenkins jenkins 195 May 1 20:20 regapp-service.yml
```

```
drwxr-xr-x 3 jenkins jenkins 32 May 1 20:20 server
```

```
drwxr-xr-x 3 jenkins jenkins 32 May 1 20:20 webapp
```

```
[root@Jenkins_Server PullGitHubCode]#
```

## Integrate Maven with Jenkins

- Setup Maven on Jenkins Server
- Setup Environment Variables
  - JAVA\_HOME, M2, M2\_HOME
- Install Maven Plugin
- Configure Maven and Java

### Setup Maven on Jenkins Server

```
[root@Jenkins_Server opt]# wget https://dlcdn.apache.org/maven/maven-3/3.8.5/binaries/apache-maven-3.8.5-bin.tar.gz
```

```
[root@Jenkins_Server opt]# ll
```

```
[root@Jenkins_Server opt]# mv apache-maven-3.8.5 maven
```

```
[root@Jenkins_Server opt]# cd maven
```

```
[root@Jenkins_Server ~]# cd /opt
```

```
[root@Jenkins_Server opt]# ll
```

```
[root@Jenkins_Server maven]# cd bin
```

```
[root@Jenkins_Server bin]# ll
```

```
[root@Jenkins_Server bin]# ./mvn -v
```

```
Apache Maven 3.8.5 (3599d3414f046de2324203b78ddcf9b5e4388aa0)
```

```
Maven home: /opt/maven
```

```
Java version: 11.0.13, vendor: Red Hat, Inc., runtime: /usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86_64
```

Default locale: en\_US, platform encoding: UTF-8

OS name: "linux", version: "4.14.275-207.503.amzn2.x86\_64", arch: "amd64", family: "unix"

```
[root@Jenkins_Server bin]# cd ..
```

```
[root@Jenkins_Server maven]# cd bin
```

```
[root@Jenkins_Server bin]# mvn -v
```

```
[root@Jenkins_Server bin]# cd ~
```

```
[root@Jenkins_Server ~]# ll -a
```

### Setup Environment Variables

#### JAVA\_HOME, M2, M2\_HOME

```
[root@Jenkins_Server ~]# vi .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-11.0.13.0.8-1.amzn2.0.3.x86_64
```

```
# User specific environment and startup programs
```

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

```
export PATH
```

```
[root@Jenkins_Server ~]# echo $Path
```

```
[root@Jenkins_Server ~]# source .bash_profile
```

```
[root@Jenkins_Server ~]# echo $Path
```

```
[root@Jenkins_Server ~]# vi .bash_profile
```

```
[root@Jenkins_Server ~]# echo $Path
```

```
[root@Jenkins_Server ~]# logout
```

```
[root@Jenkins_Server /]# cd ~
```

```
[root@Jenkins_Server ~]# echo $path
```

```
[root@Jenkins_Server ~]# echo $PATH
```

```
/sbin:/bin:/usr/sbin:/usr/bin
```

```
[root@Jenkins_Server ~]# vi .bash_profile
```

```
[root@Jenkins_Server ~]# echo $PATH
```

```
/sbin:/bin:/usr/sbin:/usr/bin
```

```
[root@Jenkins_Server ~]# source .bash_profile
```

```
[root@Jenkins_Server ~]# echo $PATH
```

```
/sbin:/bin:/usr/sbin:/usr/bin:/root/bin:/usr/lib/jvm/java-11-openjdk-  
11.0.13.0.8-1.amzn2.0.3.x86_64:/opt/maven:/opt/maven/bin
```

```
[root@Jenkins_Server ~]# mvn -v
```

```
Apache Maven 3.8.5 (3599d3414f046de2324203b78ddcf9b5e4388aa0)
```

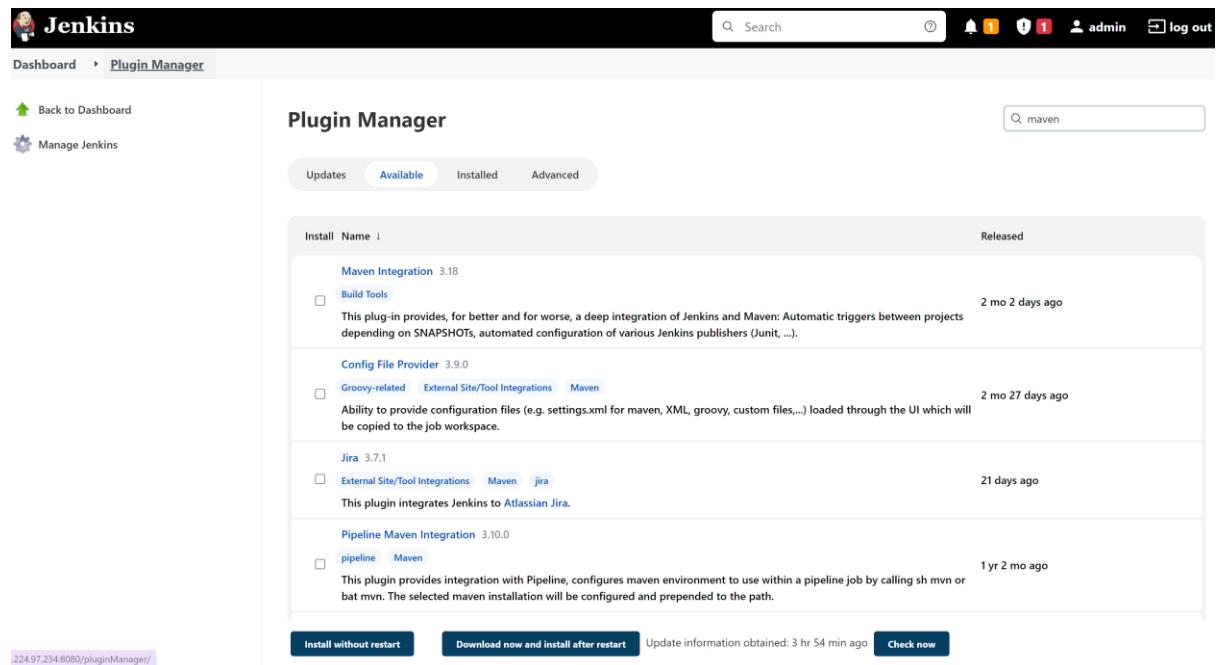
```
Maven home: /opt/maven
```

```
Java version: 11.0.13, vendor: Red Hat, Inc., runtime: /usr/lib/jvm/java-11-  
openjdk-11.0.13.0.8-1.amzn2.0.3.x86_64
```

```
Default locale: en_US, platform encoding: UTF-8
```

**OS name: "linux", version: "4.14.275-207.503.amzn2.x86\_64", arch: "amd64", family: "unix"**

## Install Maven Plugin



The screenshot shows the Jenkins Plugin Manager interface. The top navigation bar includes links for Dashboard, Plugin Manager, and Manage Jenkins, along with user information for 'admin'. A search bar at the top right contains the query 'maven'. Below the search bar, tabs for 'Updates', 'Available' (which is selected), 'Installed', and 'Advanced' are visible. A sidebar on the left provides links for Back to Dashboard and Manage Jenkins. The main content area displays a list of available plugins. The 'Maven Integration' plugin is highlighted, showing its version (3.18), release date ('2 mo 2 days ago'), and a brief description: 'This plug-in provides, for better and for worse, a deep integration of Jenkins and Maven: Automatic triggers between projects depending on SNAPSHOTs, automated configuration of various Jenkins publishers (Junit, ...).'. Other listed plugins include 'Config File Provider', 'Jira', and 'Pipeline Maven Integration'. At the bottom of the page are buttons for 'Install without restart', 'Download now and install after restart', and a status message: 'Update information obtained: 3 hr 54 min ago' followed by a 'Check now' button.

Fig Maven Plugin

## Configure Maven and Java

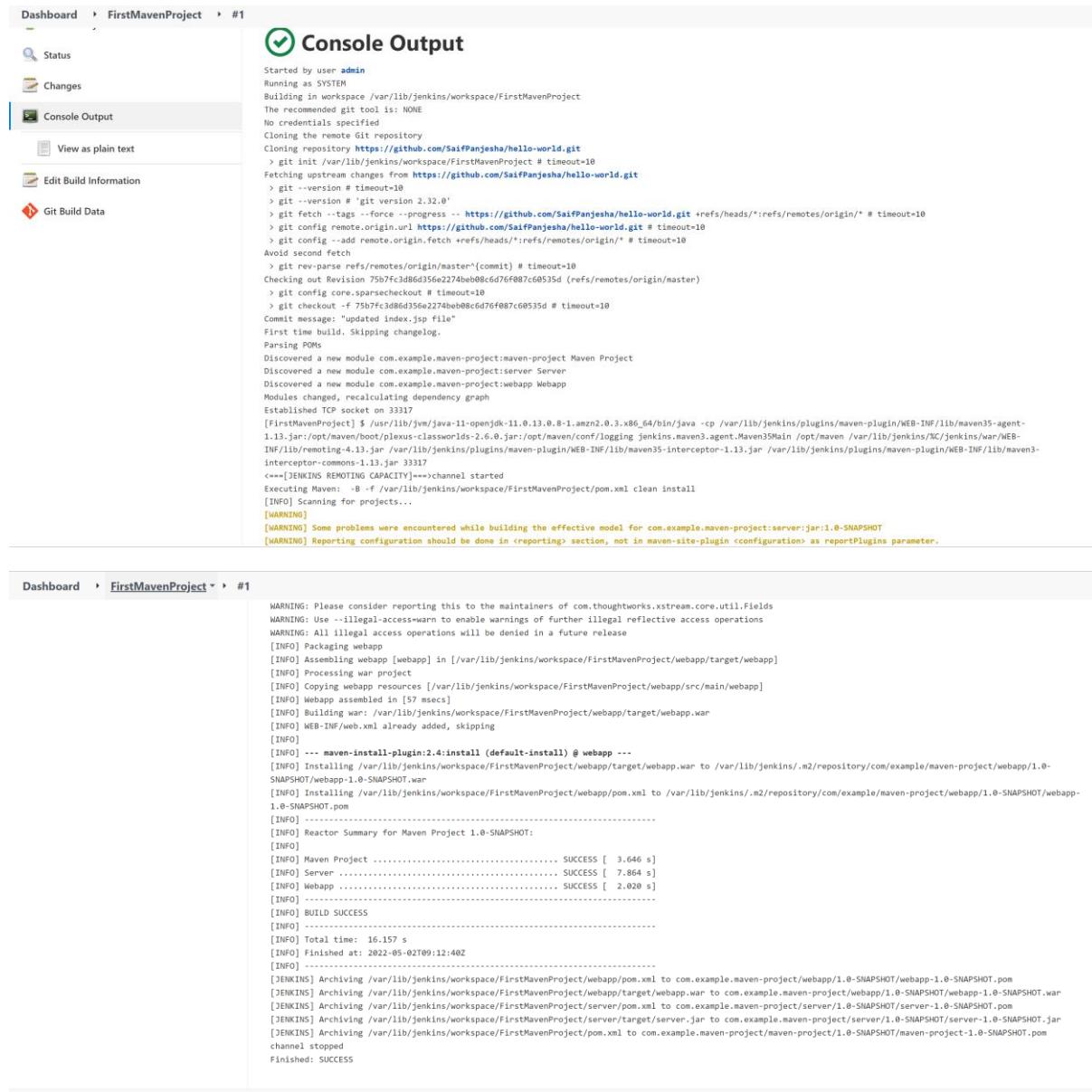
The screenshot shows the Jenkins Global Tool Configuration page for Java. At the top, there's a navigation bar with 'Dashboard' and 'Global Tool Configuration'. Below it, a 'Manage Jenkins' link. The main title is 'Global Tool Configuration' with a wrench icon. Under 'Maven Configuration', there are dropdowns for 'Default settings provider' (set to 'Use default maven settings') and 'Default global settings provider' (set to 'Use default maven global settings'). In the 'JDK' section, there's a 'JDK installations' list with a single entry named 'java-11'. An 'Add JDK' button is available. Under 'JAVA\_HOME', the path '/usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86\_64' is listed, followed by a red error message: '"/usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86\_64 doesn't look like a JDK directory"'. There's also an 'Install automatically' checkbox and a 'Delete JDK' button.

Fig. Java Global Tool Configuration.

The screenshot shows the Jenkins Global Tool Configuration page for Maven. At the top, there's a navigation bar with 'Dashboard' and 'Global Tool Configuration'. Below it, a 'Manage Jenkins' link. The main title is 'Global Tool Configuration' with a wrench icon. Under 'Maven', there's a 'Maven installations' list with a single entry named 'maven-3.8.5'. An 'Add Maven' button is available. Under 'MAVEN\_HOME', the path '/opt/maven' is listed, followed by an 'Install automatically' checkbox and a 'Delete Maven' button. A note at the bottom states 'List of Maven installations on this system'.

Fig. Maven Global Tool Configuration

## Build a Java project using Jenkins and generate artifacts.

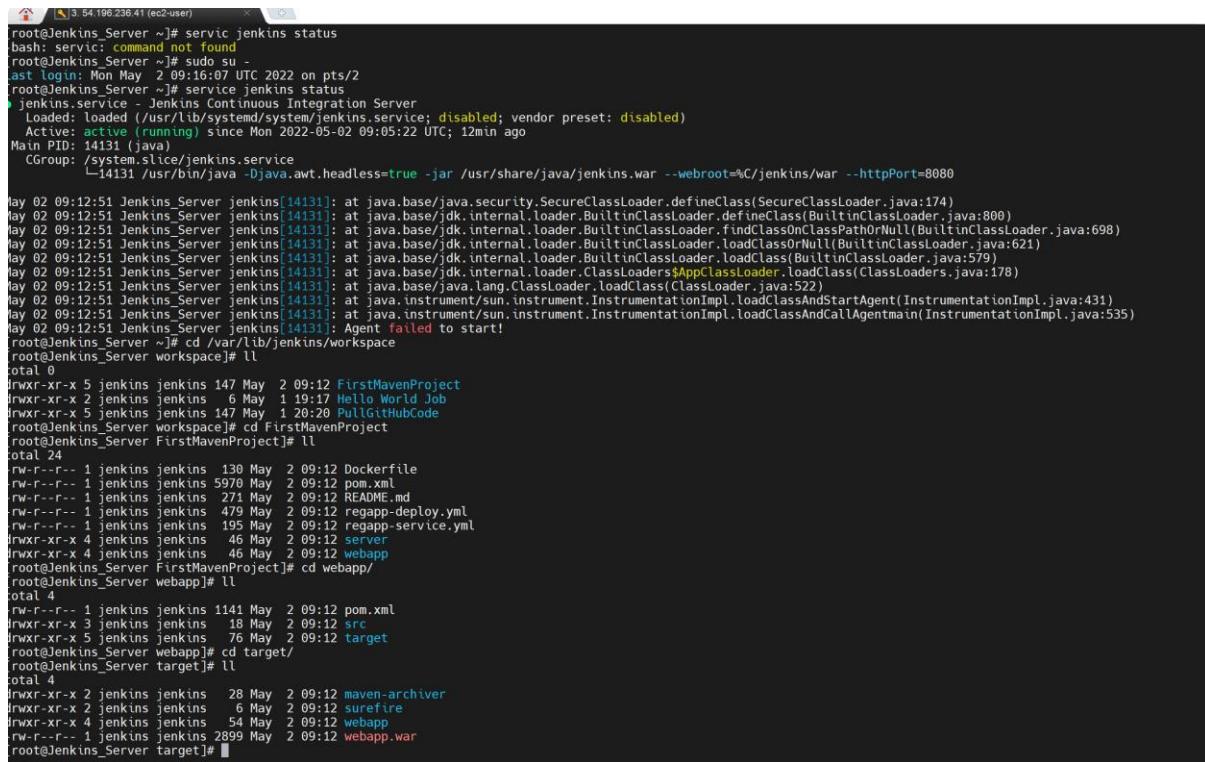


The screenshot shows the Jenkins interface for a project named "FirstMavenProject". The "Console Output" tab is selected, displaying the command-line logs of the build process. The logs show the cloning of a GitHub repository, the execution of Maven commands (like `mvn clean install`), and the final successful build summary. The output ends with Jenkins archiving the build artifacts.

```
Started by user admin
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/FirstMavenProject
The recommended git tool is: NONE
No credentials specified
Cloning the remote Git repository
  Cloning repository https://github.com/SaiFPanjesha/hello-world.git
    > git init /var/lib/jenkins/workspace/FirstMavenProject # timeout=10
Fetching upstream changes from https://github.com/SaiFPanjesha/hello-world.git
  > git --version # timeout=10
  > git --version # git version 2.32.0'
  > git fetch --tags --force --progress .. https://github.com/SaiFPanjesha/hello-world.git +refs/heads/*:refs/remotes/origin/*
  > git config remote.origin.url https://github.com/SaiFPanjesha/hello-world.git # timeout=10
  > git config --add remote.origin.fetch +refs/heads/*:refs/remotes/origin/* # timeout=10
Avoid second fetch
  > git rev-parse refs/remotes/origin/master^{commit} # timeout=10
Checking out Revision 75b7fc3d86d356e2274beb9c6d76f6f087c60535d (refs/remotes/origin/master)
  > git config core.sparsecheckout # timeout=10
  > git checkout -f 75b7fc3d86d356e2274beb9c6d76f6f087c60535d # timeout=10
Commit message: "updated index.jsp file"
First time build. Skipping changelog.
Parsing POM...
Discovered a new module com.example.maven-project:maven-project Maven Project
Discovered a new module com.example.maven-project:server Server
Discovered a new module com.example.maven-project:webapp Webapp
Modules changed, recalculating dependency graph
Established TCP socket [33317]
[FirstMavenProject] $ /usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86_64/bin/java -cp /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-agent-1.13.jar:/opt/maven/boot/plexus-classworlds-2.6.0.jar:/opt/maven/conf/logging jenkins.maven3.agent.Maven3Main /opt/maven /var/lib/jenkins/JC/jenkins/war/WEB-INF/lib/remoting-4.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-1.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-commons-1.13.jar 33317
<--[JENKINS REMOTING CAPACITY]-->channel started
Executing Maven: -B -f /var/lib/jenkins/workspace/FirstMavenProject/pom.xml clean install
[INFO] Scanning for projects...
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:server:jar:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[INFO] ------------------------------------------------------------------------
[INFO] Reactor Summary for Maven Project 1.0-SNAPSHOT:
[INFO]
[INFO] Maven Project ..... SUCCESS [ 3.646 s]
[INFO] Server ..... SUCCESS [ 7.864 s]
[INFO] Webapp ..... SUCCESS [ 2.028 s]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 16.157 s
[INFO] Finished at: 2022-05-02T09:12:40Z
[INFO] ------------------------------------------------------------------------
[JENKINS] Archiving /var/lib/jenkins/workspace/FirstMavenProject/webapp/pom.xml to com.example.maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.pom
[JENKINS] Archiving /var/lib/jenkins/workspace/FirstMavenProject/webapp/target/webapp.war to com.example.maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.war
[JENKINS] Archiving /var/lib/jenkins/workspace/FirstMavenProject/server/pom.xml to com.example.maven-project/server/1.0-SNAPSHOT/server-1.0-SNAPSHOT.pom
[JENKINS] Archiving /var/lib/jenkins/workspace/FirstMavenProject/server/target/server.jar to com.example.maven-project/server/1.0-SNAPSHOT/server-1.0-SNAPSHOT.jar
[JENKINS] Archiving /var/lib/jenkins/workspace/FirstMavenProject/pom.xml to com.example.maven-project/maven-project/1.0-SNAPSHOT/maven-project-1.0-SNAPSHOT.pom
channel stopped
Finished: SUCCESS
```

Fig. Build a Java project using Jenkins

## Generate Artifacts



```
[root@Jenkins_Server ~]# service jenkins status
bash: service: command not found
[root@Jenkins_Server ~]# sudo su -
[User@Jenkins_Server ~]# last login: Mon May 2 09:16:07 UTC 2022 on pts/2
[root@Jenkins_Server ~]# service jenkins status
● jenkins.service - Jenkins Continuous Integration Server
   Loaded: loaded (/usr/lib/systemd/system/jenkins.service; disabled; vendor preset: disabled)
     Active: active (running) since Mon 2022-05-02 09:05:22 UTC; 12min ago
       Main PID: 14131 (java)
      Group: /system.slice/jenkins.service
         └─14131 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=%C/jenkins/war --httpPort=8080

May 02 09:12:51 Jenkins_Server jenkins[14131]: at java.base/java.security.SecureClassLoader.defineClass(SecureClassLoader.java:174)
May 02 09:12:51 Jenkins_Server jenkins[14131]: at java.base/jdk.internal.loader.BuiltinClassLoader.defineClass(BuiltinClassLoader.java:800)
May 02 09:12:51 Jenkins_Server jenkins[14131]: at java.base/jdk.internal.loader.BuiltinClassLoader.findClassOnClassPathOrNull(BuiltinClassLoader.java:698)
May 02 09:12:51 Jenkins_Server jenkins[14131]: at java.base/jdk.internal.loader.BuiltinClassLoader.loadClassOrNull(BuiltinClassLoader.java:621)
May 02 09:12:51 Jenkins_Server jenkins[14131]: at java.base/jdk.internal.loader.BuiltinClassLoader.loadClass(BuiltinClassLoader.java:579)
May 02 09:12:51 Jenkins_Server jenkins[14131]: at java.base/jdk.internal.loader.ClassLoaders$AppClassLoader.loadClass(ClassLoaders.java:178)
May 02 09:12:51 Jenkins_Server jenkins[14131]: at java.base/java.lang.ClassLoader.loadClass(ClassLoader.java:522)
May 02 09:12:51 Jenkins_Server jenkins[14131]: at java.instrument/sun.instrument.InstrumentationImpl.loadClassAndStartAgent(InstrumentationImpl.java:431)
May 02 09:12:51 Jenkins_Server jenkins[14131]: at java.instrument/sun.instrument.InstrumentationImpl.loadClassAndCallAgentmain(InstrumentationImpl.java:535)
May 02 09:12:51 Jenkins_Server jenkins[14131]: Agent failed to start!
[root@Jenkins_Server ~]# cd /var/lib/jenkins/workspace
[root@Jenkins_Server workspace]# ll
total 0
[root@Jenkins_Server workspace]# ll
total 0
drwxr-xr-x 5 jenkins jenkins 147 May 2 09:12 FirstMavenProject
drwxr-xr-x 2 jenkins jenkins 6 May 1 19:17 Hello_World_Job
drwxr-xr-x 5 jenkins jenkins 147 May 1 20:20 PullGitHubCode
[root@Jenkins_Server workspace]# cd FirstMavenProject
[root@Jenkins_Server FirstMavenProject]# ll
total 24
-rw-r--r-- 1 jenkins jenkins 130 May 2 09:12 Dockerfile
-rw-r--r-- 1 jenkins jenkins 5970 May 2 09:12 pom.xml
-rw-r--r-- 1 jenkins jenkins 271 May 2 09:12 README.md
-rw-r--r-- 1 jenkins jenkins 479 May 2 09:12 regapp-deploy.yml
-rw-r--r-- 1 jenkins jenkins 195 May 2 09:12 regapp-service.yml
drwxr-xr-x 4 jenkins jenkins 46 May 2 09:12 server
drwxr-xr-x 4 jenkins jenkins 46 May 2 09:12 webapp
[root@Jenkins_Server FirstMavenProject]# cd webapp/
[root@Jenkins_Server webapp]# ll
total 4
-rw-r--r-- 1 jenkins jenkins 1141 May 2 09:12 pom.xml
drwxr-xr-x 3 jenkins jenkins 18 May 2 09:12 src
drwxr-xr-x 5 jenkins jenkins 76 May 2 09:12 target
[root@Jenkins_Server webapp]# cd target/
[root@Jenkins_Server target]# ll
total 4
drwxr-xr-x 2 jenkins jenkins 28 May 2 09:12 maven-archiver
drwxr-xr-x 2 jenkins jenkins 6 May 2 09:12 surefire
drwxr-xr-x 4 jenkins jenkins 54 May 2 09:12 webapp
-rw-r--r-- 1 jenkins jenkins 2899 May 2 09:12 webapp.war
[root@Jenkins_Server target]#
```

Fig. Artifacts Generated

## Integrate Tomcat in CI/CD pipeline:

- **Setup Tomcat Server**
- **Setup a Linux EC2 Instance**
- **Install Java**
- **Configure Tomcat**
- **Start Tomcat Server**
- **Access Web UI on port 8080**

## Setup a Linux EC2 Instance

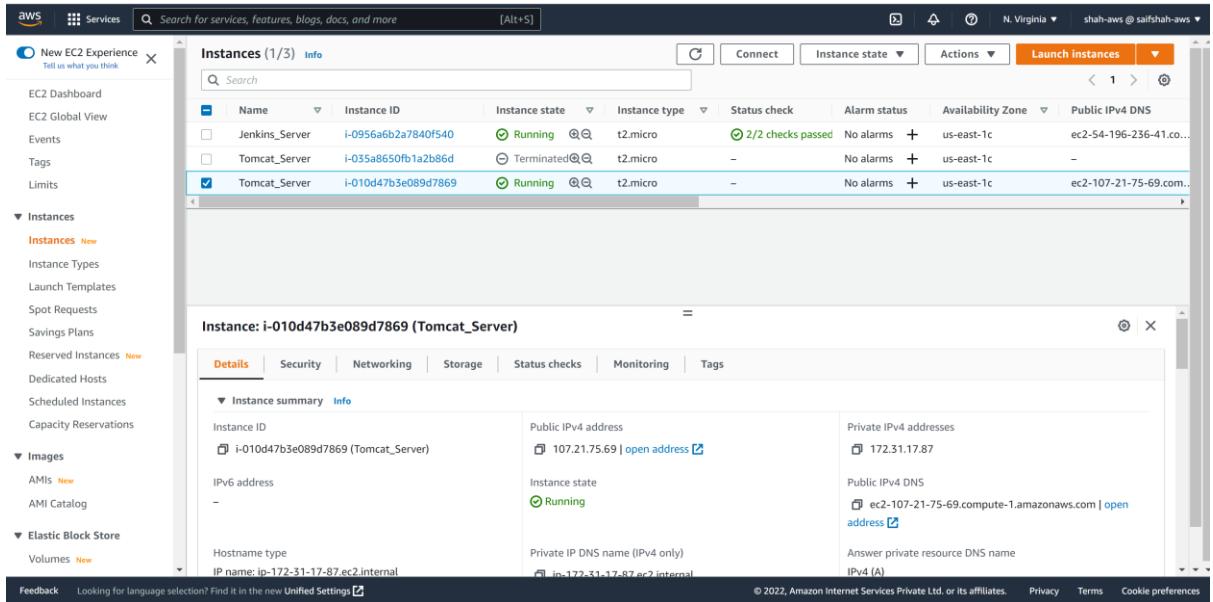


Fig. EC2 Instance for Tomcat Server

## Install Java

```
61 dnsmasq2.85           available [ =stable ]
[root@ip-172-31-17-87 ~]# java --version
openjdk 11.0.13 2021-10-19 LTS
OpenJDK Runtime Environment 18.9 (build 11.0.13+8-LTS)
OpenJDK 64-Bit Server VM 18.9 (build 11.0.13+8-LTS, mixed mode, sharing)
[root@ip-172-31-17-87 ~]#
```

Fig. Installation of Java

## Configure Tomcat

```
-| '-' Amazon Linux 2 AMI
https://aws.amazon.com/amazon-linux-2/
12 package(s) needed for security, out of 28 available
Run "sudo yum update" to apply all updates.
[ec2-user@tomcat_server ~]$ sudo su
[ec2-user@tomcat_server ~]# clear
[ec2-user@tomcat_server ~]# java --version
Unrecognized option: --version
Error: Could not create the Java Virtual Machine.
Error: A fatal exception has occurred. Program will exit.
[ec2-user@tomcat_server ~]# java -version
openjdk 11.0.13 2021-10-19 LTS
OpenJDK Runtime Environment 18.9 (build 11.0.13+8-LTS)
OpenJDK 64-Bit Server VM 18.9 (build 11.0.13+8-LTS, mixed mode, sharing)
[ec2-user@tomcat_server ~]# wget https://dlcdn.apache.org/tomcat/tomcat-9/v9.0.62/bin/apache-tomcat-9.0.62.tar.gz
--2022-05-02 10:42:15-- https://dlcdn.apache.org/tomcat/tomcat-9/v9.0.62/bin/apache-tomcat-9.0.62.tar.gz
Resolving dlcdn.apache.org (dlcdn.apache.org)... 151.101.2.132, 2a04:4e42:644
Connecting to dlcdn.apache.org (dlcdn.apache.org)|151.101.2.132|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 11560971 (11M) [application/x-gzip]
Saving to: 'apache-tomcat-9.0.62.tar.gz'

100%[=====] 11,560,971 --.-K/s in 0.05s
2022-05-02 10:42:15 (226 MB/s) - 'apache-tomcat-9.0.62.tar.gz' saved [11560971/11560971]

[ec2-user@tomcat_server ~]# ll
total 11296
-rw-r--r-- 1 root root      13 May  2 09:58 ;
-rw-r--r-- 1 root root 11560971 Mar 31 14:40 apache-tomcat-9.0.62.tar.gz
[ec2-user@tomcat_server ~]# tar -xvf apache-tomcat-9.0.62.tar.gz
apache-tomcat-9.0.62/conf/
apache-tomcat-9.0.62/conf/catalina.policy
apache-tomcat-9.0.62/conf/catalina.properties
apache-tomcat-9.0.62/conf/context.xml
apache-tomcat-9.0.62/conf/jaspic-providers.xml
apache-tomcat-9.0.62/conf/jaspic-providers.xsd
apache-tomcat-9.0.62/conf/logging.properties
apache-tomcat-9.0.62/conf/server.xml
apache-tomcat-9.0.62/conf/tomcat-users.xml
apache-tomcat-9.0.62/conf/tomcat-users.xsd
apache-tomcat-9.0.62/conf/web.xml
apache-tomcat-9.0.62/bin/
apache-tomcat-9.0.62/lib/
apache-tomcat-9.0.62/logs/
apache-tomcat-9.0.62/temp/
apache-tomcat-9.0.62/webapps/
apache-tomcat-9.0.62/webapps/ROOT/
```

Fig .Tomcat Configuration

## Start Tomcat Server

```
[root@tomcat_server ~]# cd bin
[root@tomcat_server bin]# ll
total 884
-rw-r----- 1 root root 18980 Mar 31 14:34 BUILDING.txt
drwxr-x--- 2 root root   238 Mar 31 14:34 conf
-rw-r----- 1 root root 6210 Mar 31 14:34 CONTRIBUTING.md
drwxr-x--- 2 root root  4096 May  2 10:42 lib
-rw-r----- 1 root root 57092 Mar 31 14:34 LICENSE
drwxr-x--- 2 root root    6 Mar 31 14:34 logs
-rw-r----- 1 root root 2333 Mar 31 14:34 NOTICE
-rw-r----- 1 root root 3378 Mar 31 14:34 README.md
-rw-r----- 1 root root 6898 Mar 31 14:34 RELEASE-NOTES
-rw-r----- 1 root root 16497 Mar 31 14:34 RUNNING.txt
drwxr-x--- 2 root root   30 May  2 10:42 temp
drwxr-x--- 7 root root   81 Mar 31 14:34 webapps
drwxr-x--- 2 root root    6 Mar 31 14:34 work
[root@tomcat_server tomcat]# cd bin
[root@tomcat_server bin]# ll
total 884
-rw-r----- 1 root root 34699 Mar 31 14:34 bootstrap.jar
-rw-r----- 1 root root 16840 Mar 31 14:34 catalina.bat
-rwxr-x--- 1 root root 25294 Mar 31 14:34 catalina.sh
-rw-r----- 1 root root 1664 Mar 31 14:34 catalina-tasks.xml
-rw-r----- 1 root root 2123 Mar 31 14:34 ciphers.bat
-rwxr-x--- 1 root root 1997 Mar 31 14:34 ciphers.sh
-rw-r----- 1 root root 25308 Mar 31 14:34 commons-daemon.jar
-rw-r----- 1 root root 210038 Mar 31 14:34 commons-daemon-native.tar.gz
-rw-r----- 1 root root 2040 Mar 31 14:34 configtest.bat
-rwxr-x--- 1 root root 1922 Mar 31 14:34 configtest.sh
-rwxr-x--- 1 root root 9100 Mar 31 14:34 daemon.sh
-rw-r----- 1 root root 2091 Mar 31 14:34 digest.bat
-rwxr-x--- 1 root root 1965 Mar 31 14:34 digest.sh
-rw-r----- 1 root root 3606 Mar 31 14:34 makebase.bat
-rwxr-x--- 1 root root 3382 Mar 31 14:34 makebase.sh
-rw-r----- 1 root root 3460 Mar 31 14:34 setclasspath.bat
-rwxr-x--- 1 root root 3708 Mar 31 14:34 setclasspath.sh
-rw-r----- 1 root root 2020 Mar 31 14:34 shutdown.bat
-rwxr-x--- 1 root root 1902 Mar 31 14:34 shutdown.sh
-rw-r----- 1 root root 2022 Mar 31 14:34 startup.bat
-rwxr-x--- 1 root root 1904 Mar 31 14:34 startup.sh
-rw-r----- 1 root root 46897 Mar 31 14:34 tomcat-juli.jar
-rw-r----- 1 root root 429747 Mar 31 14:34 tomcat-native.tar.gz
-rw-r----- 1 root root 4574 Mar 31 14:34 tool-wrapper.bat
-rwxr-x--- 1 root root 5540 Mar 31 14:34 tool-wrapper.sh
-rw-r----- 1 root root 2026 Mar 31 14:34 version.bat
-rwxr-x--- 1 root root 1908 Mar 31 14:34 version.sh
[root@tomcat_server bin]# ./startup.sh
Using CATALINA_BASE: /root/tomcat
Using CATALINA_HOME: /root/tomcat
Using CATALINA_TMPDIR: /root/tomcat/temp
Using JRE_HOME: /usr
Using CLASSPATH: /root/tomcat/bin/bootstrap.jar:/root/tomcat/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
```

Fig Tomcat Server Started

## Access Web UI on port 8080

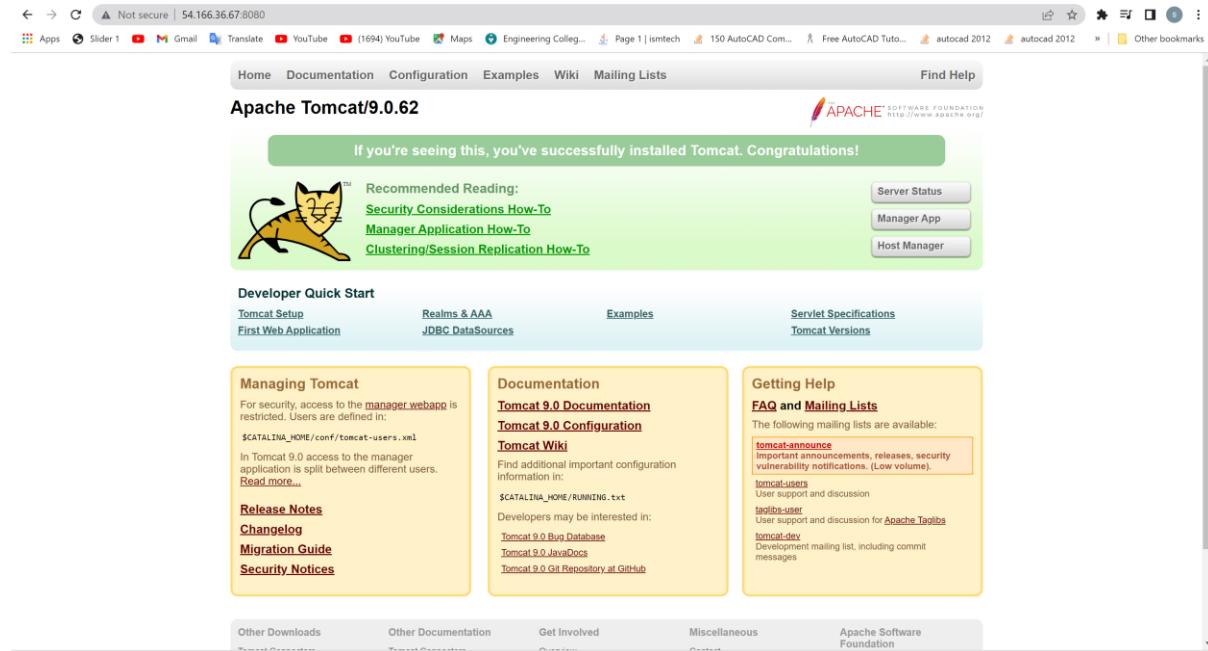


Fig. Access Web UI on port 8080

## Edit Manage App Error

**403 Access Denied**

You are not authorized to view this page.

By default the Manager is only accessible from a browser running on the same machine as Tomcat. If you wish to modify this restriction, you'll need to edit the Manager's `context.xml` file.

If you have already configured the Manager application to allow access and you have used your browser's back button, used a saved bookmark or similar then you may have triggered the cross-site request forgery (CSRF) protection that has been enabled for the HTML interface of the Manager application. You will need to reset this protection by returning to the `mainManager.cgi`. Once you return to this page, you will be able to continue using the Manager application's HTML interface normally. If you continue to see this access denied message, check that you have the necessary permission to access this application.

If you have not changed any configuration files, please examine the file `conf/tomcat-users.xml` in your installation. That file must contain the credentials to let you use this webapp.

For example, to add the `manager-gui` role to a user named `tomcat` with a password of `$secret`, add the following to the config file listed above.

```
<role rolename="manager-gui"/>
<user username="tomcat" password="$secret" roles="manager-gui"/>
```

Note that for Tomcat 7 onwards, the roles required to use the manager application were changed from the single `manager` role to the following four roles. You will need to assign the role(s) required for the functionality you wish to access.

- `manager-gui` - allows access to the HTML GUI and the status pages
- `manager-script` - allows access to the text interface and the status pages
- `manager-jmx` - allows access to the JMX proxy and the status pages
- `manager-status` - allows access to the status pages only

The HTML interface is protected against CSRF but the text and JMX interfaces are not. To maintain the CSRF protection:

- Users with the `manager-gui` role should not be granted either the `manager-script` or `manager-jmx` roles.
- If the text or jmx interfaces are accessed through a browser (e.g. for testing since these interfaces are intended for tools not humans) then the browser must be closed afterwards to terminate the session.

For more information - please see the [Manager App How-To](#).

```
t0ot@tomcat_server tomcat]# find -name context.xml
conf/context.xml
webapps/examples/META-INF/context.xml
webapps/host-manager/META-INF/context.xml
webapps/manager/META-INF/context.xml
t0ot@tomcat_server tomcat]#
```

Fig. Manage App Error

```
# vi ./webapps/host-manager/META-INF/context.xml
```

Fig. allow access host manager in context file

```
# vi ./webapps/manager/META-INF/context.xml
```

Fig. allow access manager in context file

## Create Tomcat Users

### Configure tomcat user's xml file

```
[root@tomcat_server bin]# cd ..
[root@tomcat_server tomcat]# cd conf
[root@tomcat_server conf]# ll
total 232
drwxr-x--- 3 root root    23 May  2 10:44 Catalina
-rw----- 1 root root 12953 Mar 31 14:34 catalina.policy
-rw----- 1 root root   7308 Mar 31 14:34 catalina.properties
-rw----- 1 root root   1400 Mar 31 14:34 context.xml
-rw----- 1 root root  1149 Mar 31 14:34 jaspic-providers.xml
-rw----- 1 root root  2313 Mar 31 14:34 jaspic-providers.xsd
-rw----- 1 root root  4144 Mar 31 14:34 logging.properties
-rw----- 1 root root  7580 Mar 31 14:34 server.xml
-rw----- 1 root root  2756 Mar 31 14:34 tomcat-users.xml
-rw----- 1 root root  2558 Mar 31 14:34 tomcat-users.xsd
-rw----- 1 root root 172359 Mar 31 14:34 web.xml
[root@tomcat_server conf]#
```

Fig. Configure tomcat user's xml file

### #.vi tomcat-users.xml

```
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License.

<!--
tomcat-users xmlns="http://tomcat.apache.org/xml"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://tomcat.apache.org/xml tomcat-users.xsd"
  version="1.0">

!---
By default, no user is included in the "manager-gui" role required
to operate the "/manager/html" web application. If you wish to use this app,
you must define such a user - the username and password are arbitrary.

Built-in Tomcat manager roles:
- manager-gui - allows access to the HTML GUI and the status pages
- manager-script - allows access to the HTTP API and the status pages
- manager-jmx - allows access to the JMX proxy and the status pages
- manager-status - allows access to the status pages only

The users below are wrapped in a comment and are therefore ignored. If you
wish to configure one or more of these users for use with the manager web
application, do not forget to remove the <... ...> that surrounds them. You
will also need to set the passwords to something appropriate.
-->

!---
<user username="admin" password=<must-be-changed> roles="manager-gui"/>
<user username="robot" password=<must-be-changed> roles="manager-script"/>
-->

!---
The sample user and role entries below are intended for use with the
examples web application. They are wrapped in a comment and thus are ignored
when reading this file. If you wish to configure these users for use with the
examples web application, do not forget to remove the <... ...> that surrounds
them. You will also need to set the passwords to something appropriate.
-->

!---
<role rolename="tomcat"/>
<role rolename="role1"/>
<user username="tomcat" password=<must-be-changed> roles="tomcat"/>
<user username="both" password=<must-be-changed> roles="tomcat,role1"/>
<user username="role1" password=<must-be-changed> roles="role1"/>
-->

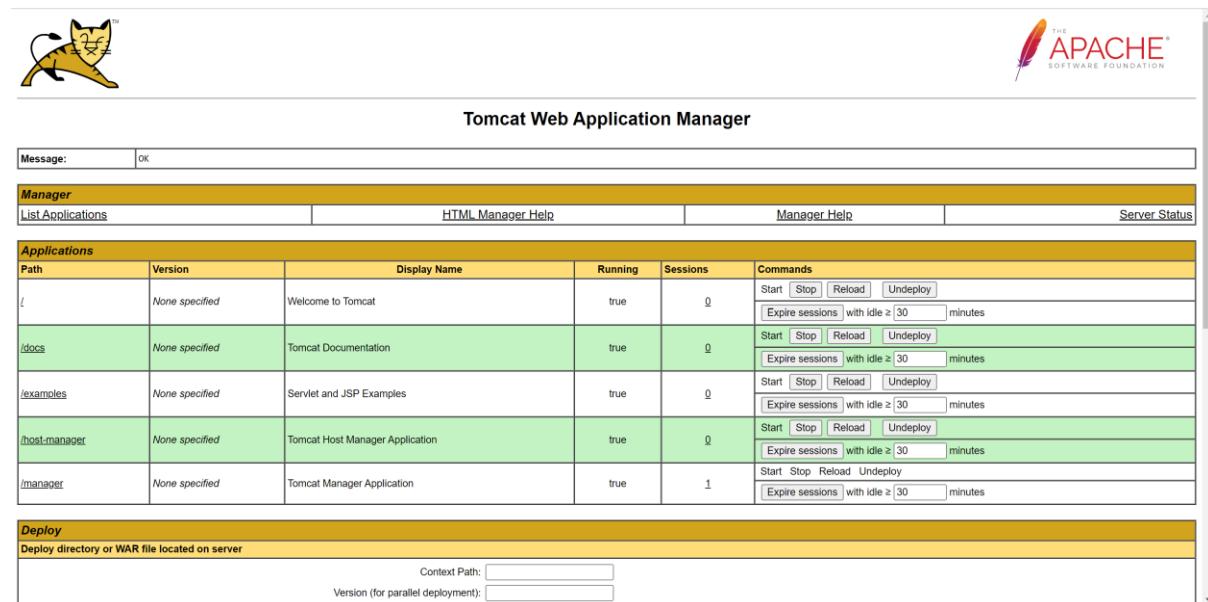
<!--
role rolename="manager-gui"/>
role rolename="manager-script"/>
role rolename="manager-jmx"/>
role rolename="manager-status"/>
user username="admin" password="admin" roles="manager-gui, manager-script, manager-jmx, manager-status"/>
user username="deployer" password="deployer" roles="manager-script"/>
user username="tomcat" password="secret" roles="manager-gui"/>
-->
```

Fig. Adding Tomcat roles

## Tomcat Start and Shutdown

In -s /opt/apache-tomcat/bin/startup.sh /usr/local/bin/tomcatup

In -s /opt/apache-tomcat-<version>/bin/shutdown.sh  
/usr/local/bin/tomcatdown



The screenshot shows the Tomcat Web Application Manager interface. At the top, there's a logo of a yellow cat and the Apache Software Foundation logo. Below that is the title "Tomcat Web Application Manager". A message box says "Message: OK". The main area has tabs for "Manager", "List Applications", "HTML Manager Help", "Manager Help", and "Server Status". Under the "Manager" tab, there's a section titled "Applications" with a table:

Path	Version	Display Name	Running	Sessions	Commands
/	None specified	Welcome to Tomcat	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ [30] minutes
/docs	None specified	Tomcat Documentation	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ [30] minutes
/examples	None specified	Servlet and JSP Examples	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ [30] minutes
/host-manager	None specified	Tomcat Host Manager Application	true	0	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ [30] minutes
/manager	None specified	Tomcat Manager Application	true	1	<a href="#">Start</a> <a href="#">Stop</a> <a href="#">Reload</a> <a href="#">Undeploy</a> <a href="#">Expire sessions</a> with idle ≥ [30] minutes

Below the applications table is a "Deploy" section with fields for "Deploy directory or WAR file located on server", "Context Path:", and "Version (for parallel deployment:)".

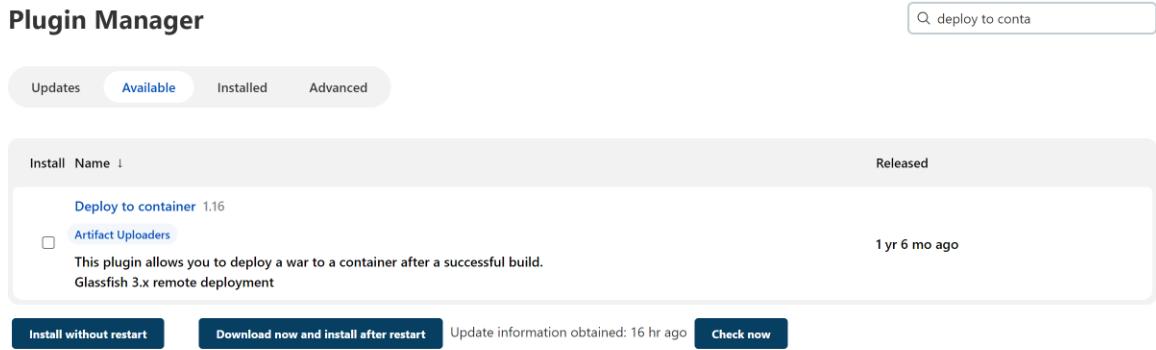
Fig. Tomcat Web Application Manager

## Install Tomcat with Jenkins

Install plug- in “deploy -to -container”

Configure Tomcat Server with Credentials.

Install plug- in “deploy to container”



## Installing Plugins/Upgrades

### Preparation

- Checking internet connectivity
- Checking update center connectivity
- Success

Deploy to container



Success

Loading plugin extensions



Success

➔ [Go back to the top page](#)

(you can start using the installed plugins right away)

➔  Restart Jenkins when installation is complete and no jobs are running

Fig. Plug In deploy to container

## Build Maven and Deploy to Tomcat Server

```

Dashboard > BuildandDeployMavenProject > #2

Back to Project
Status
Changes
Console Output
View as plain text
Edit Build Information
Delete build '#2'
Git Build Data
Redeploy Artifacts
Test Result
See Fingerprints
Previous Build

Started by user admin
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/BuildandDeployMavenProject
The recommended git tool is: NONE
No credentials specified
> git rev-parse --resolve-git-dir /var/lib/jenkins/workspace/BuildandDeployMavenProject/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url https://github.com/SaifPanjesha/hello-world.git # timeout=10
Fetching upstream changes from https://github.com/SaifPanjesha/hello-world.git
> git --version # timeout=10
> git fetch -tags -force --progress -- https://github.com/SaifPanjesha/hello-world.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/master^{commit} # timeout=10
Checking out Revision 75b7fc3d86d356e2274beb08c6d76f087c60535d (refs/remotes/origin/master)
> git config core.sparsecheckout # timeout=10
> git checkout -f 75b7fc3d86d356e2274beb08c6d76f087c60535d # timeout=10
Commit message: "Updated index.jsp file"
> git rev-list --no-walk 75b7fc3d86d356e2274beb08c6d76f087c60535d # timeout=10
Parsing POMs
Established TCP socket on 41823
[BuildandDeployMavenProject] $ /usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86_64/bin/java -cp /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-agent-1.13.jar:/opt/maven/boot/plexus-classworlds-2.6.0.jar:/opt/maven/conf/logging jenkins.maven3.agent.Maven3Main /opt/maven /var/lib/jenkins/%C/jenkins/war/WEB-INF/lib/remoting-4.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-commons-1.13.jar 41823
<===[JENKINSL REMOTING CAPACITY]==>channel started
Executing Maven: -B -f /var/lib/jenkins/workspace/BuildandDeployMavenProject/pom.xml clean install
[INFO] Scanning for projects...
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:server:jar:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.

```

**Fig. Build Maven**

### New user Register for DevOps Learning

Please fill in this form to create an account.

Enter Full Name	<input type="text"/>
Enter mobile	<input type="text"/>
Enter Email Address	<input type="text"/>
Password	<input type="password"/>
Repeat Password	<input type="password"/>

By creating an account you agree to our [Terms and Privacy](#).

[Register](#)

Already have an account? [Sign in](#).

**Thankyou, Happy Learning**

**Build Amazing Carrer With Devops**

**Fig. Deploy to tomcat server**

### Deploy Artifacts on Tomcat Server -Using Git Bash

```
saiiff@LAPTOP-H8UBOVRR MINGW64 ~
$ cd D:/Devops

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops
$ pwd
/d/Devops

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops
$ git clone https://github.com/SaifPanjesha/hello-world.git
Cloning into 'hello-world'...
remote: Enumerating objects: 403, done.
remote: Total 403 (delta 0), reused 0 (delta 0), pack-reused 403
Receiving objects: 100% (403/403), 45.79 KiB | 558.00 KiB/s, done.
Resolving deltas: 100% (90/90), done.

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops
$ ll
total 4
drwxr-xr-x 1 saiff 197609 0 May  2 17:35 hello-world/
drwxr-xr-x 1 saiff 197609 0 May  2 00:39 'saiffaizalpanjesha -aws'/

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops
$ cd hello-world

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world (master)
$ ll
total 12
-rw-r--r-- 1 saiff 197609 134 May  2 17:35 Dockerfile
-rw-r--r-- 1 saiff 197609 274 May  2 17:35 README.md
-rw-r--r-- 1 saiff 197609 6190 May  2 17:35 pom.xml
-rw-r--r-- 1 saiff 197609 507 May  2 17:35 regapp-deploy.yml
-rw-r--r-- 1 saiff 197609 209 May  2 17:35 regapp-service.yml
drwxr-xr-x 1 saiff 197609 0 May  2 17:35 server/
drwxr-xr-x 1 saiff 197609 0 May  2 17:35 webapp/

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world (master)
$ cd webapps/
bash: cd: webapps/: No such file or directory

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world (master)
$ cd webapp

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp (master)
$ ll
total 4
-rw-r--r-- 1 saiff 197609 1185 May  2 17:35 pom.xml
drwxr-xr-x 1 saiff 197609 0 May  2 17:35 src/

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp (master)
$ cd src/main

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main (master)
$ ll
total 0
drwxr-xr-x 1 saiff 197609 0 May  2 17:35 webapp/

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main (master)
$ cd webapp

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ ll
total 4
drwxr-xr-x 1 saiff 197609 0 May  2 17:35 WEB-INF/
-rw-r--r-- 1 saiff 197609 1354 May  2 17:35 index.jsp

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ vi index.jsp

saiiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ git status
On branch master
Your branch is up to date with 'origin/master'.

Changes not staged for commit:
```

```

(use "git add <file>..." to update what will be committed)
(use "git restore <file>..." to discard changes in working directory)
      modified:   index.jsp

no changes added to commit (use "git add" and/or "git commit -a")

saiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ add .
bash: add: command not found

saiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ git add .

saiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ git status
On branch master
Your branch is up to date with 'origin/master'.

Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
      modified:   index.jsp

saiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ commit -m "updated index.jsp"
bash: commit: command not found

saiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ commit -m "updated index.jsp file"
bash: commit: command not found

saiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ git commit -m "updated index.jsp file"
[master 9d96f0d] updated index.jsp file
 1 file changed, 1 insertion(+), 1 deletion(-)

saiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$ git push origin master
Enumerating objects: 13, done.
Counting objects: 100% (13/13), done.
Delta compression using up to 8 threads
Compressing objects: 100% (5/5), done.
Writing objects: 100% (7/7), 560 bytes | 560.00 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/SaifPanjesha/hello-world.git
  75b7fc3..9d96f0d master -> master

saiff@LAPTOP-H8UBOVRR MINGW64 /d/Devops/hello-world/webapp/src/main/webapp (master)
$
```

## Automate Build and Deploy using poll SCM

The screenshot shows the Jenkins 'Build Triggers' configuration for a 'BuildandDeployMavenProject'. The 'Poll SCM' option is selected and configured to run 'every minute'. A note at the bottom of the 'Schedule' section states: '⚠️ Do you really mean "every minute" when you say \* \* \* \* \*? Perhaps you meant "H \* \* \* \*"? to poll once per hour'. The cron syntax is explained as follows: MINUTE HOUR DOM MONTH DOY.

The screenshot shows the Jenkins 'Console Output' page for the same build. The output shows the Maven build process starting with an SCM change, cloning from GitHub, and executing a 'mvn clean install' command. The output ends with several warning messages about reporting configuration.

```

Started by an SCM change
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/BuildandDeployMavenProject
The recommended git tool is: NONE
No credentials specified
> git rev-parse --resolve-git-dir /var/lib/jenkins/workspace/BuildandDeployMavenProject/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url https://github.com/SaifPanjesha/hello-world.git # timeout=10
Fetching upstream changes from https://github.com/SaifPanjesha/hello-world.git
> git --version # timeout=10
> git fetch --tags --force --progress -- https://github.com/SaifPanjesha/hello-world.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/master^{commit} # timeout=10
Checking out Revision 2cba2d0201a4601576547a9053b9df2c98f9b5f39 (refs/remotes/origin/master)
> git config core.sparsecheckout # timeout=10
> git checkout -f 2cba2d0201a4601576547a9053b9df2c98f9b5f39 # timeout=10
Commit message: "updated index.jsp file"
> git rev-list --no-walk 9d9ef0d1902a9a0a1cb35e80d6910f15df1f862 # timeout=10
Parsing POMs
Established TCP socket on 44885
[BuildandDeployMavenProject] $ /usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86_64/bin/java -cp /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-agent-1.3.jar:/opt/maven/boot/plexus-classworlds-2.6.0.jar:/opt/maven/conf/logging jenkins.maven3.agent.Maven3Main /opt/maven /var/lib/jenkins/%C/jenkins/war/WEB-INF/lib/remoting-4.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-1.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-commons-1.13.jar 44885
<==[JENKINS REMOTING CAPACITY]==>channel started
Executing Maven: -B -f /var/lib/jenkins/workspace/BuildandDeployMavenProject/pom.xml clean install
[INFO] Scanning for projects...
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:server:jar:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin<configuration> as reportPlugins parameter.

```

**Thankyou, Happy Learning**

**Build Amazing Carrer With Devops**

**I appreciate**

**Fig. Automate Build and Deploy using poll SCM**

# Integrating Docker in CI/CD pipeline

## Setup a Docker Environment

### Setup Docker Host

- Setup a Linux EC2 Instance
- Install Docker
- Start docker services
- Basic docker commands

### Setup a Linux EC2 Instance

The screenshot shows the AWS Management Console with the EC2 service selected. The left sidebar shows navigation options like EC2 Dashboard, Events, Tags, Limits, Instances, Images, and Elastic Block Store. The main content area displays a table of running instances:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Jenkins_Server	i-0956a6b2a7840f540	Stopped	t2.micro	-	No alarms	+ us-east-1c	-
Tomcat_Server	i-010d47b3e089d7869	Stopped	t2.micro	-	No alarms	+ us-east-1c	-
Docker_Server	i-0875a802a59fdd059	Running	t2.micro	Initializing	No alarms	+ us-east-1c	ec2-54-175-26-67.com..

Below the table, a detailed view is open for the Docker\_Server instance (i-0875a802a59fdd059). The details tab is selected, showing the following information:

- Instance ID: i-0875a802a59fdd059 (Docker\_Server)
- Public IPv4 address: 54.175.26.67 (with a copy link)
- Private IP4 address: 172.31.31.176
- IPv6 address: -
- Instance state: Running
- Hostname type: IP name: ip-172-31-31-176.ec2.internal
- Private IP DNS name (IPv4 only): ip-172-31-31-176.ec2.internal
- Public IPv4 DNS: ec2-54-175-26-67.compute-1.amazonaws.com (with a copy link)
- Answer private resource DNS name: IPv4 (A)

Fig. Docker Server EC2 Instance

### Install Docker

```
[root@ip-172-31-31-176 ~]# yum install docker -y
```

### Start docker services

```
[root@ip-172-31-31-176 ~]# service docker start
```

### Basic docker commands

```
[root@ip-172-31-31-176 ~]# docker images
```

```
[root@ip-172-31-31-176 ~]# docker ps //running container
```

```
[root@ip-172-31-31-176 ~]# docker ps -a // all container
```

```
[root@ip-172-31-31-176 ~]# docker --version
```

```
[root@ip-172-31-31-176 ~]# docker --help
```

### Create a Tomcat Container

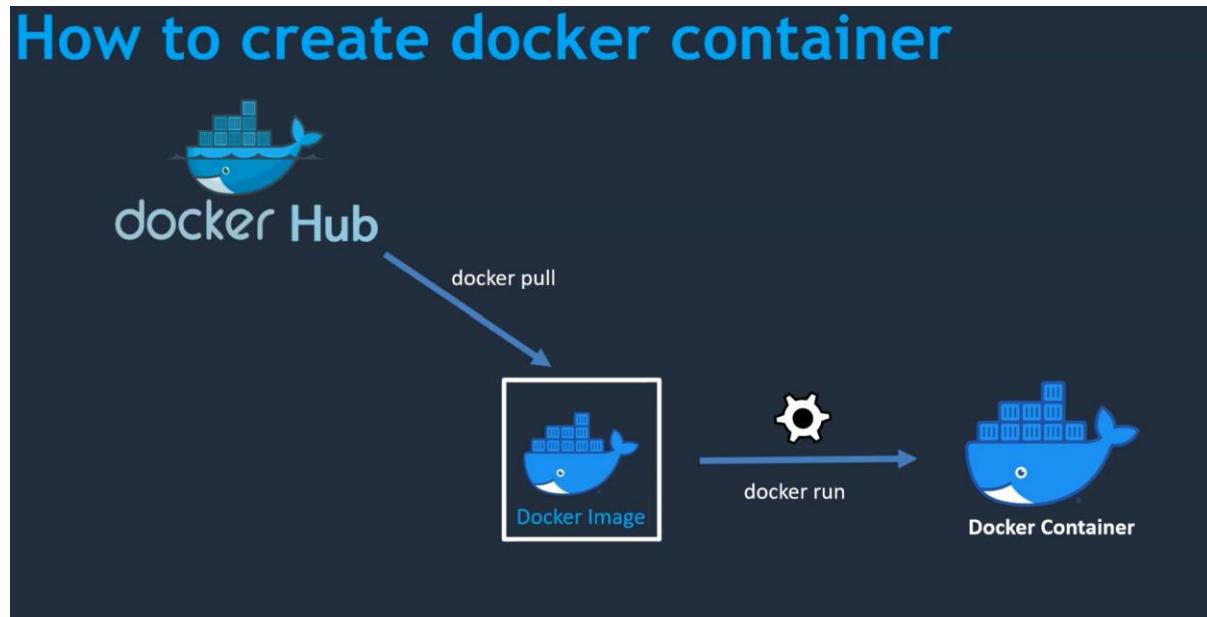


Fig. Creating Docker Container(<https://hub.docker.com/>)

- **Creating Images**

```
[root@dockerhost ~]# docker pull tomcat
```

```
[root@dockerhost ~]# docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
tomcat	latest	0183eb12bb0c	6 days ago	680MB

- Creating Container

```
[root@dockerhost ~]# docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
78e9303c67b9f67ca161776a1321da5cb8bad4b85e64c9753a84bf91359ace21	tomcat	"catalina.sh run"	14 seconds ago	Up 13 seconds	0.0.0.0:8081->8080/tcp, :::8081->8080/tcp	tomcat-container

```
[root@dockerhost ~]# docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
PORTS				NAMES

78e9303c67b9	tomcat	"catalina.sh run"	14 seconds ago	Up 13 seconds
0.0.0.0:8081->8080/tcp, :::8081->8080/tcp				tomcat-container

```
[root@dockerhost ~]#
```

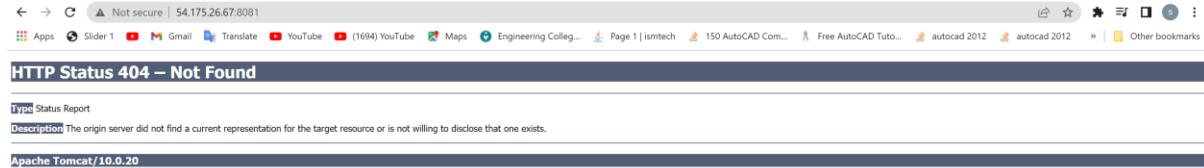


Fig. Tomcat Container

## Fixing Tomcat Container Issue

```
root@dockerhost ~]# docker exec -it tomcat-container /bin/bash
root@78e9303c67b9:/usr/local/tomcat# ls
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs native-jni-lib temp webapps webapps.dist work
root@78e9303c67b9:/usr/local/tomcat# cd webapps
root@78e9303c67b9:/usr/local/tomcat/webapps# ls
root@78e9303c67b9:/usr/local/tomcat/webapps# cd ..
root@78e9303c67b9:/usr/local/tomcat/webapps# cd ..
root@78e9303c67b9:/usr/local/tomcat# cd webapp.dist
bash: cd: webapp.dist: No such file or directory
root@78e9303c67b9:/usr/local/tomcat# cd webapps.dist
root@78e9303c67b9:/usr/local/tomcat/webapps.dist# ls
ROOT docs examples host-manager manager
root@78e9303c67b9:/usr/local/tomcat/webapps.dist# cp -R * ../webapps
root@78e9303c67b9:/usr/local/tomcat/webapps.dist# cd ..
root@78e9303c67b9:/usr/local/tomcat# cd webapps
root@78e9303c67b9:/usr/local/tomcat/webapps# ls
```

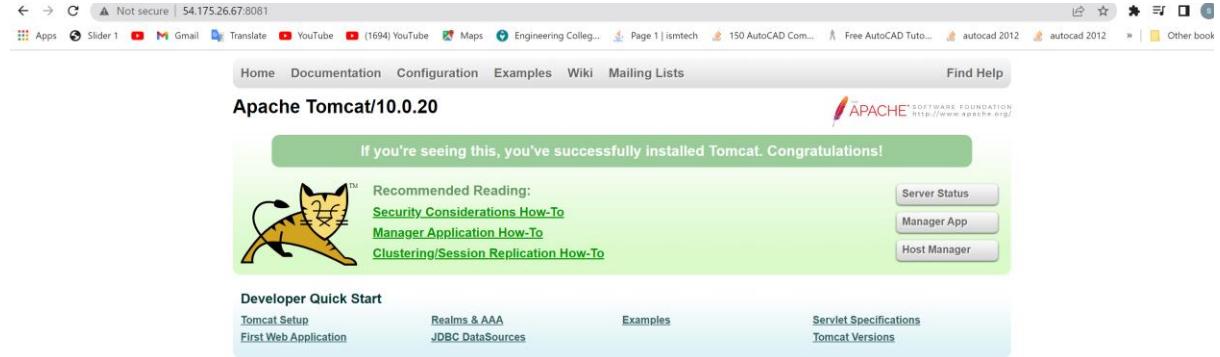


Fig. Fixing Tomcat Container Issue

```
[root@dockerhost ~]# docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS
PORTS NAMES
78e9303c67b9 tomcat "catalina.sh run" 21 minutes ago Up 21 minutes
0.0.0.0:8081->8080/tcp, :::8081->8080/tcp tomcat-container

[root@dockerhost ~]# docker stop tomcat-container
tomcat-container

[root@dockerhost ~]# docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS
PORTS NAMES
78e9303c67b9 tomcat "catalina.sh run" 22 minutes ago Exited (143) 7
seconds ago tomcat-container

[root@dockerhost ~]# docker ps
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES

[root@dockerhost ~]# docker run -d --name tomca2 -p 8082:8080
tomcat:latest
d4c7db9d910fdceef014d3e3fc685e9ef04305627373c5e2df1db43c75c03fb

[root@dockerhost ~]# docker exec -it tomca2 /bin/bash
root@d4c7db9d910f:/usr/local/tomcat#
```



Fig. refuse to connect

## Create a Docker File

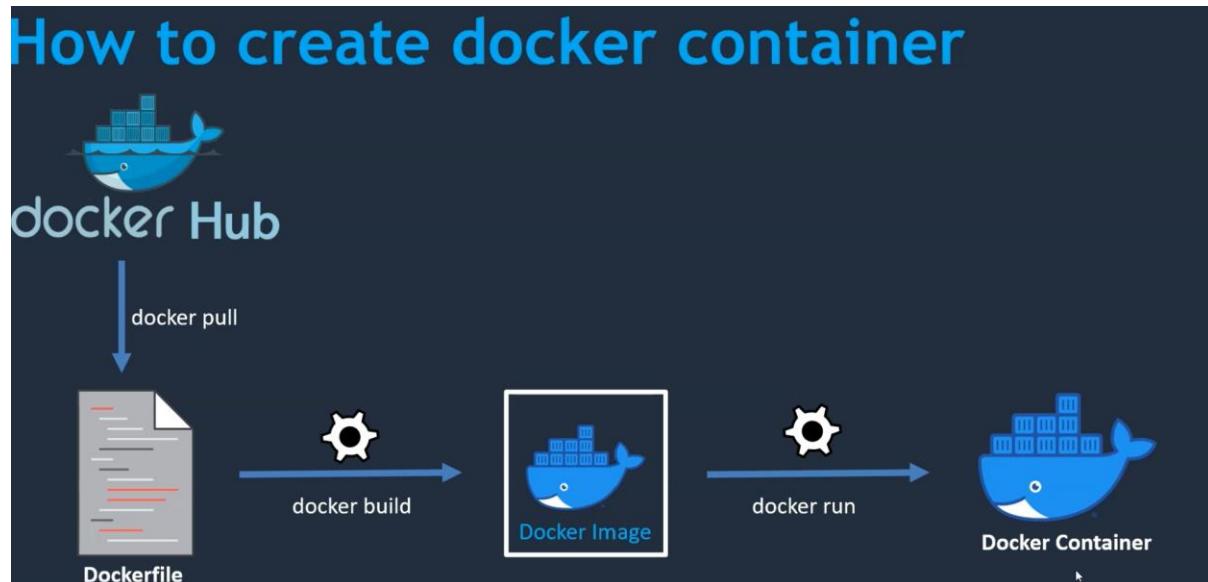


Fig. Create Docker File

Docker File

**vi DockerFile**

```
FROM centos
RUN mkdir /opt/tomcat/
WORKDIR /opt/tomcat
RUN curl -O https://dlcdn.apache.org/tomcat/tomcat-9/v9.0.62/bin/apache-tomcat-9.0.62.tar.gz
RUN tar -xvzf apache-tomcat-9.0.62.tar.gz
RUN mv apache-tomcat-9.0.62/* /opt/tomcat
RUN cd /etc/yum.repos.d/
RUN sed -i 's/mirrorlist/#mirrorlist/g' /etc/yum.repos.d/CentOS-*
RUN sed -i 's/#baseurl=http://mirror.centos.org|baseurl=http://vault.centos.org|g' /etc/yum.repos.d/CentOS-*
RUN yum -y install java
CMD /bin/bash
EXPOSE 8080

CMD ["/opt/tomcat/bin/catalina.sh", "run"]
```

**Run:**

```
docker build -t mytomcat .
```

## Resolving Error for port 8082 Tomcat Container

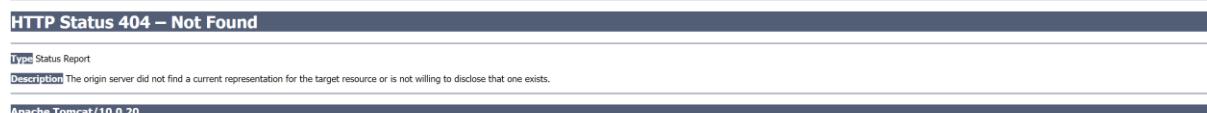


Fig. refuse to connect

```
[root@dockerhost ~]# vi DockerFile
```

```
FROM tomcat:latest
```

```
RUN cp -R /usr/local/tomcat webpp.dist/* /usr/local/tomcatwebapps
```

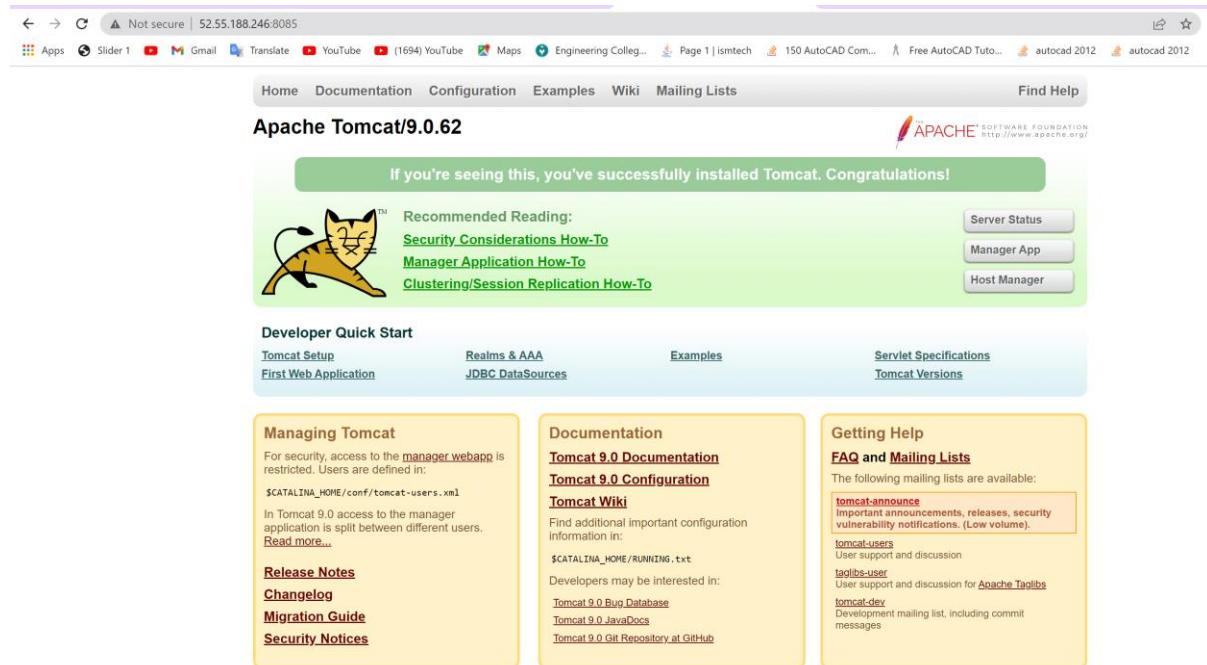


Fig. resolving error for port 8085 Apache Tomcat container

## **Integrate Docker with Jenkins**

Create a docker admin user

Install “Publish Over SSH “plugin

Add Docker Host to Jenkins “configure systems”

```
[root@dockerhost ~]# cat /etc/passwd //User
```

```
[root@dockerhost ~]# cat /etc/group //Groups
```

```
[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:

passwd: all authentication tokens updated successfully.

```
[root@dockerhost ~]#
```

```
[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 ~]#
```

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

```
[root@dockerhost ~]# vi /etc/ssh/sshd_config
```

```
[root@dockerhost ~]# service sshd reload
```

```
Redirecting to /bin/systemctl reload sshd.service
```

```
[root@dockerhost ~]#
```

—|\_\_|

<https://aws.amazon.com/amazon-linux-2/>

```
[dockeradmin@dockerhost ~]$
```

## Install “Publish Over SSH” plugin

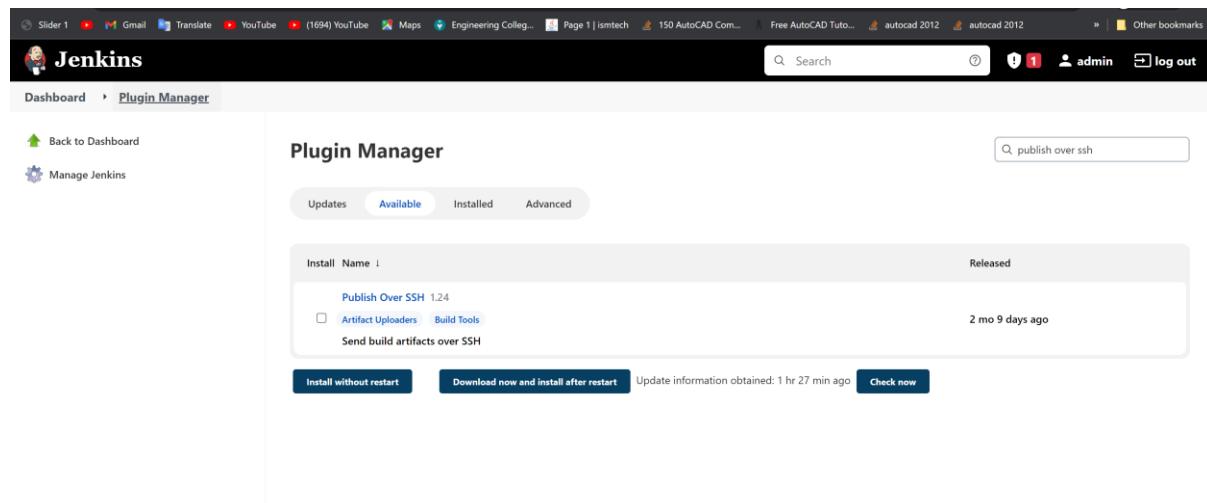


Fig. Publish Over SSH plugin

The screenshot shows the Jenkins Update Center interface. On the left, there's a sidebar with links: 'Back to Dashboard', 'Manage Jenkins', and 'Manage Plugins' (which is currently selected). The main content area has a title 'Installing Plugins/Upgrades'. Under 'Preparation', it lists three items: 'Checking internet connectivity', 'Checking update center connectivity', and 'Success'. Below this, under 'bouncycastle API', 'Infrastructure plugin for Publish Over X', 'Publish Over SSH', and 'Loading plugin extensions', each item has a green checkmark icon followed by the word 'Success'. At the bottom, there are two buttons: 'Go back to the top page' and 'Restart Jenkins when installation is complete and no jobs are running'.

Fig. Publish Over SSH plugin Success

## Add Docker Host to Jenkins “configure systems”

This screenshot shows the 'Configure Systems' section of Jenkins. It includes fields for 'Test configuration by sending test e-mail', 'Publish over SSH' (with fields for 'Jenkins SSH Key', 'Passphrase', 'Path to key', and 'Key'), and 'SSH Servers' (with a 'Name' field containing 'dockerhost'). There are also checkboxes for 'Disable exec' and other options.

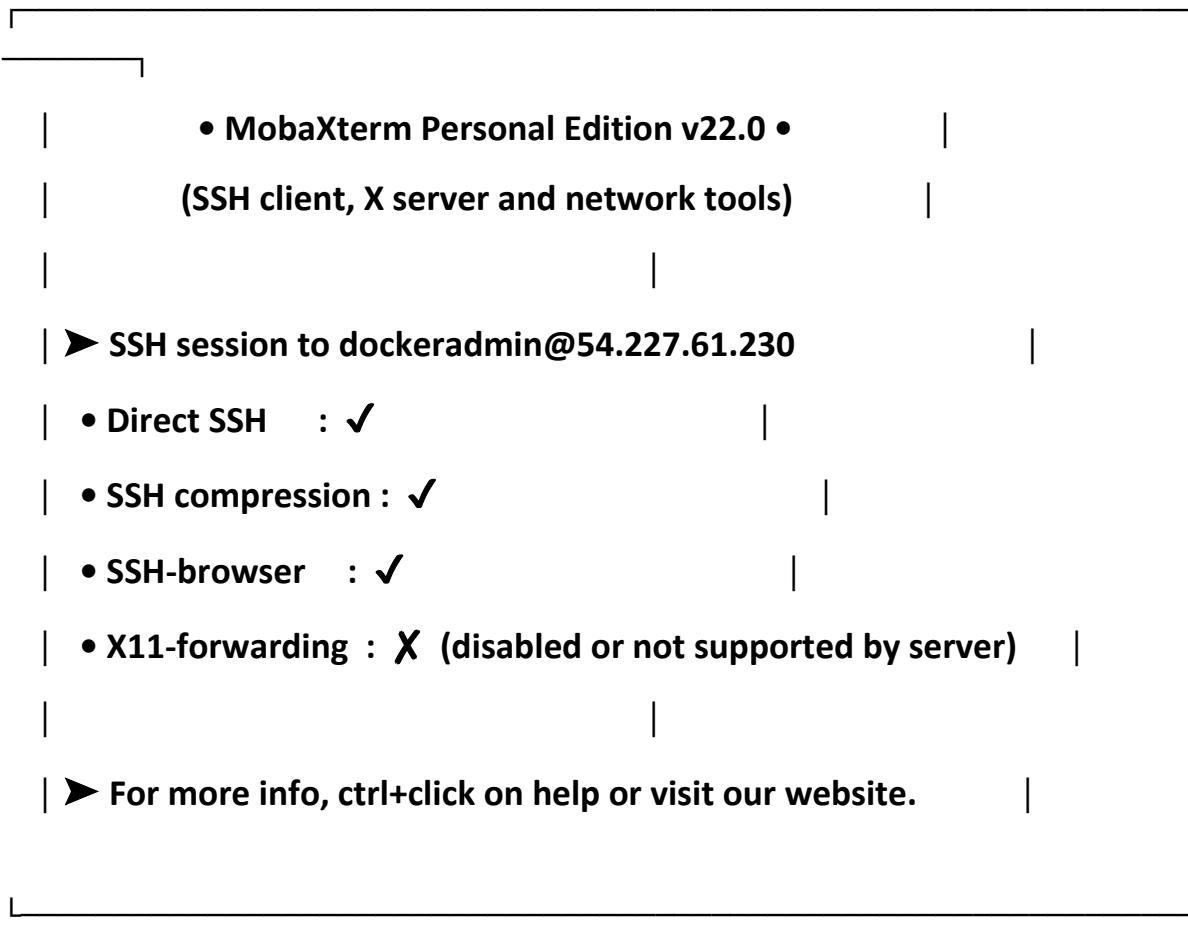
Fig. Configure System Success

**Steps to configure systems:**

**Login as: dockeradmin**

**Server refused our key**

**dockeradmin@54.227.61.230's password:**



**Last login: Wed May 11 11:24:01 2022 from 152.57.203.204**

\_| \_|\_ )  
\_| ( / Amazon Linux 2 AMI  
\_\_| \\_\_|\_\_|

<https://aws.amazon.com/amazon-linux-2/>

4 package(s) needed for security, out of 4 available

Run "sudo yum update" to apply all updates.

[dockeradmin@dockerhost ~]\$ ssh-keygen

Generating public/private rsa key pair.

Enter file in which to save the key (/home/dockeradmin/.ssh/id\_rsa):

/home/dockeradmin/.ssh/id\_rsa already exists.

Overwrite (y/n)? y

Enter passphrase (empty for no passphrase):

Enter same passphrase again:

Your identification has been saved in /home/dockeradmin/.ssh/id\_rsa.

Your public key has been saved in /home/dockeradmin/.ssh/id\_rsa.pub.

The key fingerprint is:

SHA256:3NHEC/uXpcApxGxmukI0Ca3VwRMTOnyww48ZF+eyQZs  
dockeradmin@dockerhost

The key's randomart image is:

+---[RSA 2048]----+

| .o.+B\*... |

| o\*=+BOo. |

| +O.EBo+.o |

| ..@.=o.= .|

| .o S..o . + |

| ... .+ |

```
| . . |  
| | |  
| | |
```

-----[SHA256]-----

```
[dockeradmin@dockerhost ~]$ cd /home/dockeradmin  
[dockeradmin@dockerhost ~]$ ll  
total 0
```

```
[dockeradmin@dockerhost ~]$ cd /.ssh  
-bash: cd: /.ssh: No such file or directory
```

```
[dockeradmin@dockerhost ~]$ cd /home/dockeradmin/.ssh  
[dockeradmin@dockerhost .ssh]$ ll  
total 8
```

```
-rw----- 1 dockeradmin dockeradmin 1679 May 11 11:35 id_rsa  
-rw-r--r-- 1 dockeradmin dockeradmin 404 May 11 11:35 id_rsa.pub
```

```
[dockeradmin@dockerhost .ssh]$
```

## Jenkins Job to build and copy the artifacts on to docker host

### Creating a new Job item:

**Enter an item name**

BuildandDeployonContainerui  
» Required field

 **Freestyle project**  
This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and this can be even used for something other than software build.

 **Maven project**  
Build a maven project. Jenkins takes advantage of your POM files and drastically reduces the configuration.

If you want to create a new item from other existing, you can use this option:

 Copy from  
BuildandDeployMavenProject

**OK**

Fig. BuildandDeployonContainer item Created

The screenshot shows the Jenkins 'Build Settings' configuration page. The 'Build Settings' tab is active. Under 'Post-build Actions', there is a section titled 'Deploy war/ear to a container'. This section includes fields for 'WAR/EAR files' (containing '\*\*/\*.war') and 'Context path' (empty). Below this is a 'Containers' section for 'Tomcat 8.x Remote'. It shows a dropdown menu set to 'deployer/\*\*\*\*\*\*\*\* (tomcat\_deployer)' and an 'Add' button. The 'Tomcat URL' field contains 'http://107.20.115.17:8080'. An 'Advanced...' button is located at the bottom right of this section.

Fig. deleting Deploy war/ear on Container item.

## Build Artifacts over SSH:

The screenshot shows the Jenkins 'Post Steps' configuration page. It includes options for running steps based on build results and a list of available actions. The 'Send build artifacts over SSH' action is highlighted with a callout box.

- Run only if build succeeds
- Run only if build succeeds or is unstable
- Run regardless of build result
- Should the post-build steps run only for successful builds, etc.

Available actions include:
 

- Aggregate downstream test results
- Archive the artifacts
- Build other projects
- Deploy artifacts to Maven repository
- Record fingerprints of files to track usage
- Git Publisher
- Deploy war/ear to a container
- Send build artifacts over SSH**

Fig. send build artifacts over SSH

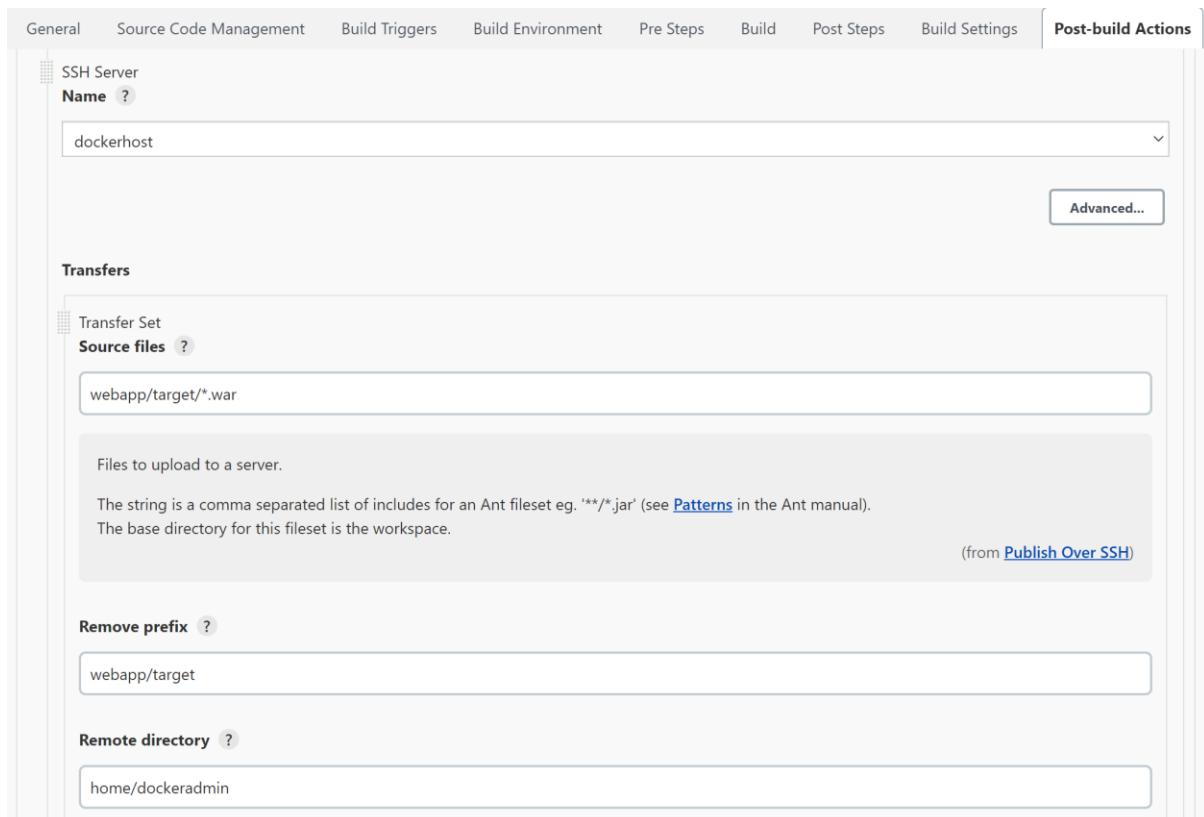


Fig. Configuring SSH Server

## Test Case Success:

```

Dashboard > BuildandDeployonContainer > #1
[INFO] Copying webapp resources [/var/lib/jenkins/workspace/BuildandDeployonContainer/webapp/src/main/webapp]
[INFO] Webapp assembled in [35 msecs]
[INFO] Building war: /var/lib/jenkins/workspace/BuildandDeployonContainer/webapp/target/webapp.war
[INFO] WEB-INF/web.xml already added, skipping
[INFO]
[INFO] --- maven-install-plugin:2.4:install (default-install) @ webapp ---
[INFO] Installing /var/lib/jenkins/workspace/BuildandDeployonContainer/webapp/target/webapp.war to /var/lib/jenkins/.m2/repository/com/example/maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.war
[INFO] Installing /var/lib/jenkins/workspace/BuildandDeployonContainer/webapp/pom.xml to /var/lib/jenkins/.m2/repository/com/example/maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.pom
[INFO] -----
[INFO] Reactor Summary for Maven Project 1.0-SNAPSHOT:
[INFO]
[INFO] Maven Project ..... SUCCESS [ 1.294 s]
[INFO] Server ..... SUCCESS [ 5.750 s]
[INFO] Webapp ..... SUCCESS [ 1.418 s]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 11.878 s
[INFO] Finished at: 2022-05-11T12:05:38Z
[INFO] -----
[JENKINS] Archiving /var/lib/jenkins/workspace/BuildandDeployonContainer/webapp/pom.xml to com.example.maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.pom
[JENKINS] Archiving /var/lib/jenkins/workspace/BuildandDeployonContainer/webapp/target/webapp.war to com.example.maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.war
[JENKINS] Archiving /var/lib/jenkins/workspace/BuildandDeployonContainer/server/pom.xml to com.example.maven-project/server/1.0-SNAPSHOT/server-1.0-SNAPSHOT.pom
[JENKINS] Archiving /var/lib/jenkins/workspace/BuildandDeployonContainer/server/target/server.jar to com.example.maven-project/server/1.0-SNAPSHOT/server-1.0-SNAPSHOT.jar
[JENKINS] Archiving /var/lib/jenkins/workspace/BuildandDeployonContainer/pom.xml to com.example.maven-project/maven-project/1.0-SNAPSHOT/maven-project-1.0-SNAPSHOT.pom
channel stopped
SSH: Connecting from host [Jenkins_Server]
SSH: Connecting with configuration [dockerhost] ...
SSH: Disconnecting configuration [dockerhost] ...
SSH: Transferred 1 file(s)
Finished: SUCCESS

```

Fig. Success

```
[dockeradmin@dockerhost ~]$ ll
total 0

[dockeradmin@dockerhost ~]$ ll
total 0
drwxrwxr-x 3 dockeradmin dockeradmin 25 May 11 12:05 home

[dockeradmin@dockerhost ~]$ ll
total 4
drwxrwxr-x 3 dockeradmin dockeradmin 25 May 11 12:05 home
-rw-rw-r-- 1 dockeradmin dockeradmin 2912 May 11 12:07 webapp.war

[dockeradmin@dockerhost ~]$ rm -rf /home
rm: cannot remove '/home/ec2-user': Permission denied
rm: cannot remove '/home/dockeradmin': Permission denied

[dockeradmin@dockerhost ~]$ rm -rf home/
[dockeradmin@dockerhost ~]$ ll
total 0

[dockeradmin@dockerhost ~]$ ls
[dockeradmin@dockerhost ~]$ ll
total 0

[dockeradmin@dockerhost ~]$ cd ..
[dockeradmin@dockerhost home]$ ll
total 0
drwx----- 2 dockeradmin dockeradmin 6 May 11 12:08 dockeradmin
drwx----- 4 ec2-user ec2-user 125 May 2 21:42 ec2-user

[dockeradmin@dockerhost home]$ cd dockeradmin
[dockeradmin@dockerhost ~]$ ll
```

```
total 0
```

```
[dockeradmin@dockerhost ~]$ ll
```

```
total 4
```

```
-rw-r--r-- 1 dockeradmin dockeradmin 2912 May 11 12:09 webapp.war
```

## Update Tomcat Docker File to automate deployment process

```
[root@dockerhost ~]# cd /opt
```

```
[root@dockerhost opt]# ll
```

```
total 0
```

```
drwxr-xr-x 4 root root 33 Apr 19 16:16 aws
```

```
drwx--x--x 4 root root 28 May 2 19:54 containerd
```

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

```
[root@dockerhost opt]# mkdir docker
```

```
[root@dockerhost opt]# ll
```

```
total 0
```

```
drwxr-xr-x 4 root root 33 Apr 19 16:16 aws
```

```
drwx--x--x 4 root root 28 May 2 19:54 containerd
```

```
drwxr-xr-x 2 root root 6 May 11 14:14 docker
```

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

## Permission Given to docker admin :

```
[root@dockerhost opt]# chmod -R dockeradmin:dockeradmin docker
```

```
chmod: invalid mode: 'dockeradmin:dockeradmin'
```

```
Try 'chmod --help' for more information.
```

```
[root@dockerhost opt]# chown -R dockeradmin:dockeradmin docker
```

```
[root@dockerhost opt]# ll
```

```
total 0
```

```
drwxr-xr-x 4 root      root    33 Apr 19 16:16 aws
```

```
drwx--x--x 4 root      root    28 May  2 19:54 containerd
```

```
drwxr-xr-x 2 dockeradmin dockeradmin 6 May 11 14:14 docker
```

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

```
[root@dockerhost opt]# ls -ld //Given Execution Permission
```

```
drwxr-xr-x 6 root root 59 May 11 14:14 .
```

Searching and moving Dockerfile in docker folder

```
[root@dockerhost opt]# cd root/
```

```
-bash: cd: root/: No such file or directory
```

```
[root@dockerhost opt]# cd /root
```

```
[root@dockerhost ~]# ll
```

```
total 8
```

```
-rw-r--r-- 1 root root 527 May  2 21:59 Dockerfile
```

```
-rw-r--r-- 1 root root  86 May  3 07:34 DockerFile
```

```
[root@dockerhost ~]# vi DockerFile
```

```
[root@dockerhost ~]# mv Dockerfile /opt/docker
```

```
[root@dockerhost ~]# cd /opt/docker
[root@dockerhost docker]# ll
total 4
-rw-r--r-- 1 root root 527 May 2 21:59 Dockerfile
[root@dockerhost docker]# chown -R dockeradmin:dockeradmin Dockerfile
[root@dockerhost docker]# ll
total 4
-rw-r--r-- 1 dockeradmin dockeradmin 527 May 2 21:59 Dockerfile
[root@dockerhost docker]#
```

**Configuring path to copy in cd/opt :**

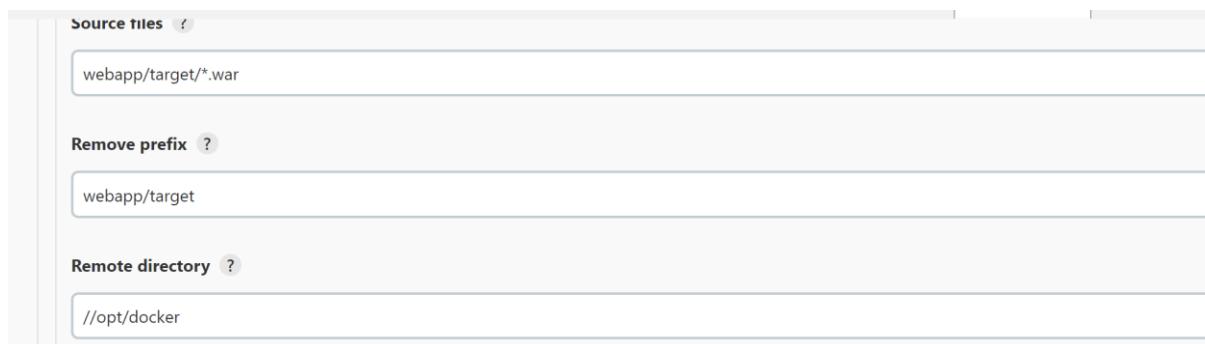


Fig. Remote Directory Path added

```
[root@dockerhost docker]# ll
total 8
-rw-r--r-- 1 dockeradmin dockeradmin 527 May 2 21:59 Dockerfile
-rw-r--r-- 1 dockeradmin dockeradmin 2912 May 11 14:31 webapp.war
[root@dockerhost docker]#
[root@dockerhost docker]# date
Wed May 11 14:34:06 UTC 2022
```

```
FROM tomcat:latest

RUN cp -R /usr/local/tomcat webpp.dist/* /usr/local/tomcatwebapps

COPY ./*.war /usr/local/tomcatwebapps
```

```
[root@dockerhost docker]# ll
total 12
-rw-r--r-- 1 dockeradmin dockeradmin 527 May  2 21:59 Dockerfile
-rw-r--r-- 1 dockeradmin dockeradmin  86 May  3 07:34 DockerFile
-rw-r--r-- 1 dockeradmin dockeradmin 2912 May 11 14:31 webapp.war
```

```
[root@dockerhost docker]# date
```

```
Wed May 11 14:38:20 UTC 2022
```

```
[root@dockerhost docker]# vi DockerFile
```

```
[root@dockerhost docker]# vi DockerFile
```

```
[root@dockerhost docker]# docker build -t tomcat:v1 .
```

```
Cannot connect to the Docker daemon at unix:///var/run/docker.sock. Is the
docker daemon running?
```

```
[root@dockerhost docker]# cat DockerFile
```

```
FROM tomcat:latest
```

```
RUN cp -R /usr/local/tomcat webpp.dist/* /usr/local/tomcatwebapps
```

```
COPY ./*.war /usr/local/tomcatwebapps
```

```
[root@dockerhost docker]# service docker status
```

```
Redirecting to /bin/systemctl status docker.service
```

```
● docker.service - Docker Application Container Engine
```

```
  Loaded: loaded (/usr/lib/systemd/system/docker.service; disabled; vendor
  preset: disabled)
```

**Active: inactive (dead)**

**Docs:** <https://docs.docker.com>

```
[root@dockerhost docker]# service docker start
```

```
Redirecting to /bin/systemctl start docker.service
```

```
[root@dockerhost docker]# docker build -t tomcat:v1 .
```

```
Sending build context to Docker daemon 7.168kB
```

**Step 1/13 : FROM centos**

```
---> 5d0da3dc9764
```

**Step 2/13 : RUN mkdir /opt/tomcat/**

```
---> Using cache
```

```
---> 29c2831a4695
```

**Step 3/13 : WORKDIR /opt/tomcat**

```
---> Using cache
```

```
---> ecea7cd5c77e
```

**Step 4/13 : RUN curl -O https://dlcdn.apache.org/tomcat/tomcat-9/v9.0.62/bin/apache-tomcat-9.0.62.tar.gz**

```
---> Using cache
```

```
---> 5123cdc2263f
```

**Step 5/13 : RUN tar -xvzf apache-tomcat-9.0.62.tar.gz**

```
---> Using cache
```

```
---> 4776da674d01
```

**Step 6/13 : RUN mv apache-tomcat-9.0.62/\* /opt/tomcat**

```
---> Using cache
```

```
---> fce4b9b7e164
```

**Step 7/13 : RUN cd /etc/yum.repos.d/**

```
---> Using cache
```

```
---> f7a2265a5410
```

**Step 8/13 : RUN sed -i 's/mirrorlist/#mirrorlist/g' /etc/yum.repos.d/CentOS-\***

---> Using cache

---> 2e2e2d5d8a29

**Step 9/13 : RUN sed -i**

's | #baseurl=http://mirror.centos.org |baseurl=http://vault.centos.org |g'  
/etc/yum.repos.d/CentOS-\*

---> Using cache

---> abdc8de2b2b

**Step 10/13 : RUN yum -y install java**

---> Using cache

---> 10ce50067582

**Step 11/13 : CMD /bin/bash**

---> Using cache

---> 4561a92d2242

**Step 12/13 : EXPOSE 8080**

---> Using cache

---> 95f4005d94f7

**Step 13/13 : CMD ["/opt/tomcat/bin/catalina.sh", "run"]**

---> Using cache

---> 9c295cdb7c8c

**Successfully built 9c295cdb7c8c**

**Successfully tagged tomcat:v1**

**Checks Images:**

```
[root@dockerhost docker]# docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
------------	-----	----------	---------	------

```
demotomcat latest 9c295cdb7c8c 8 days ago 510MB
mytomcat latest 9c295cdb7c8c 8 days ago 510MB
tomcat v1 9c295cdb7c8c 8 days ago 510MB
tomcat latest 0183eb12bb0c 2 weeks ago 680MB
centos latest 5d0da3dc9764 7 months ago 231MB
```

### Running Container :

```
[root@dockerhost docker]# docker run -d --name tomcatv1 -p 8086:8080
tomcat:v1
edef49a560653ec2a7d2c3cb260abdfaacea025654b5bf91e4124a61c18f0e5
[root@dockerhost docker]# docker ps
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS
PORtS		NAMES		
edef49a56065	tomcat:v1	"/opt/tomcat/bin/cat..."	7 seconds ago	Up 6 seconds 0.0.0.0:8086->8080/tcp, :::8086->8080/tcp tomcatv1

```
[root@dockerhost docker]#
```

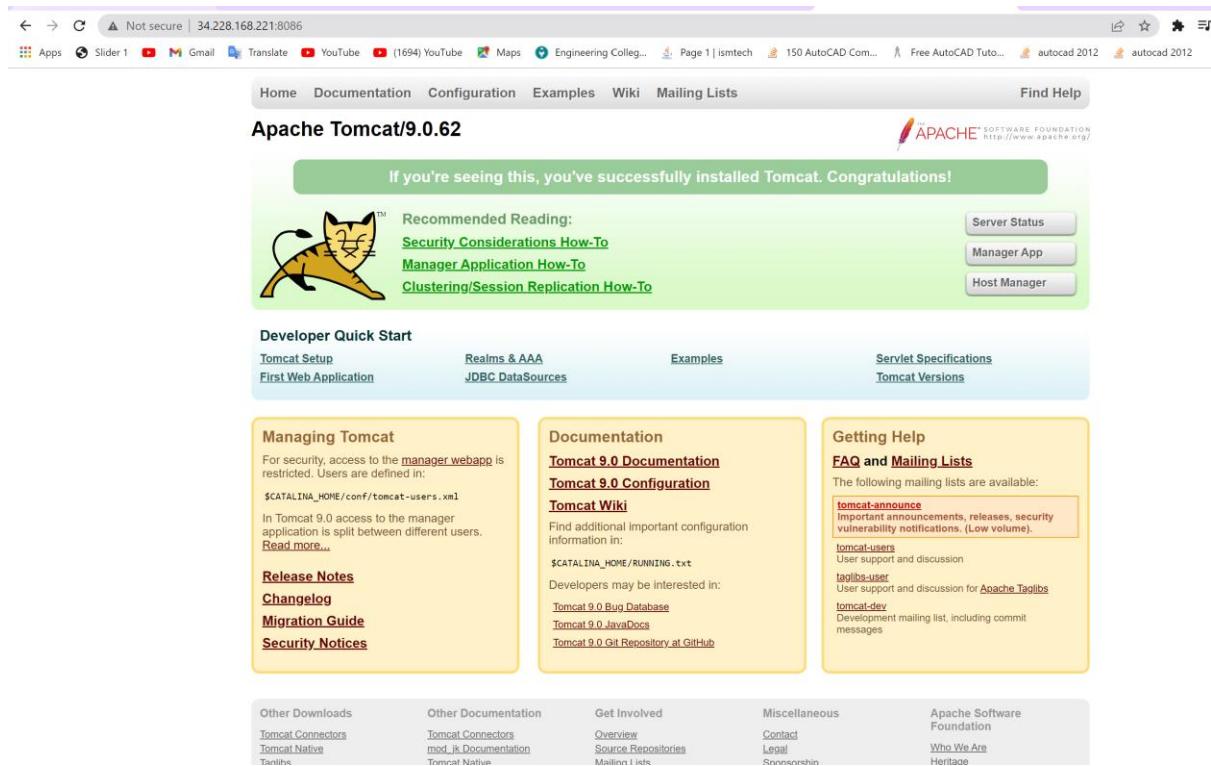


Fig. Tomcat Started

## Automate Build and Deployment on Docker Container :

```
cd /opt/docker;  
docker build -t regapp:v1 .;  
docker run -d --name regapp:v1 -p 8087:8080 regapp:v1
```

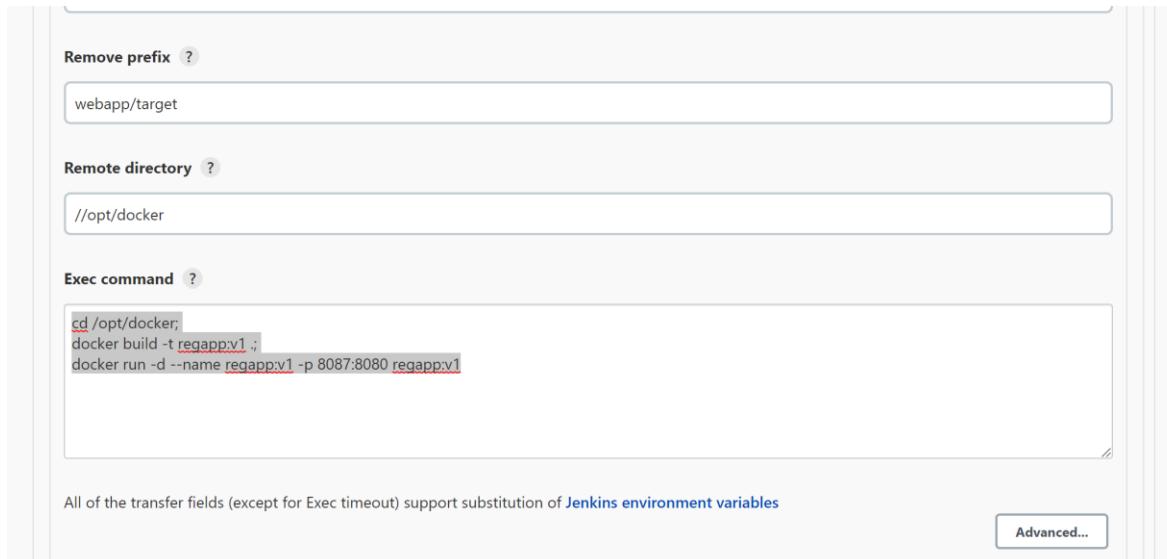


Fig. Configuration on Jenkins Server

```
[root@dockerhost ~]# service docker start
Redirecting to /bin/systemctl start docker.service
[root@dockerhost ~]# docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS               NAMES
edef49a56065        tomcat:v1          "/opt/tomcat/bin/cat..."   24 minutes ago    Up 24 minutes     0.0.0.0:8086->8080/tcp, :::8086->8080/tcp   tomcatv1
5251eac3a9         demotomcat          "/opt/tomcat/bin/cat..."   8 days ago        Exited (143) 8 days ago
183307c95d1b       mytomcat           "/opt/tomcat/bin/cat..."   8 days ago        Exited (143) 8 days ago
13967cbc8a35       5dd0da3dc9764      "/bin/sh -c 'sudo am..."   8 days ago        Exited (143) 8 days ago
36d65ecb9a6e       5dd0da3dc9764      "/bin/sh -c 'amazon..."  8 days ago        Exited (127) 8 days ago
c6093995c672       5dd0da3dc9764      "/bin/sh -c 'yun ins..."  8 days ago        Exited (127) 8 days ago
74fc8d513fff       5dd0da3dc9764      "/bin/sh -c 'yun ins..."  8 days ago        Exited (1) 8 days ago
89d40f0e2c5e       5dd0da3dc9764      "/bin/sh -c 'yun ins..."  8 days ago        Exited (1) 8 days ago
9ac2c0b28c45       5dd0da3dc9764      "/bin/sh -c 'yun ins..."  8 days ago        Exited (1) 8 days ago
d4c7dbd910f       tomcat:latest      "catalina.sh run"       8 days ago        Exited (143) 8 days ago
78e9303c67b9       tomcat           "catalina.sh run"       8 days ago        Exited (143) 8 days ago
[root@dockerhost ~]# docker stop
"docker stop" requires at least 1 argument.
See 'docker stop --help'.
Usage: docker stop [OPTIONS] CONTAINER [CONTAINER...]
Stop one or more running containers
[root@dockerhost ~]# docker stop edef49a56065
[root@dockerhost ~]# docker ps -a
CONTAINER ID        IMAGE               COMMAND             CREATED            STATUS              PORTS               NAMES
edef49a56065        tomcat:v1          "/opt/tomcat/bin/cat..."   25 minutes ago    Exited (143) 5 seconds ago
5251eac3a9         demotomcat          "/opt/tomcat/bin/cat..."   8 days ago        Exited (143) 8 days ago
183307c95d1b       mytomcat           "/opt/tomcat/bin/cat..."   8 days ago        Exited (143) 8 days ago
13967cbc8a35       5dd0da3dc9764      "/bin/sh -c 'sudo am..."   8 days ago        Exited (127) 8 days ago
36d65ecb9a6e       5dd0da3dc9764      "/bin/sh -c 'amazon..."  8 days ago        Exited (127) 8 days ago
c6093995c672       5dd0da3dc9764      "/bin/sh -c 'yun ins..."  8 days ago        Exited (1) 8 days ago
74fc8d513fff       5dd0da3dc9764      "/bin/sh -c 'yun ins..."  8 days ago        Exited (1) 8 days ago
89d40f0e2c5e       5dd0da3dc9764      "/bin/sh -c 'yun ins..."  8 days ago        Exited (1) 8 days ago
9ac2c0b28c45       5dd0da3dc9764      "/bin/sh -c 'yun ins..."  8 days ago        Exited (1) 8 days ago
d4c7dbd910f       tomcat:latest      "catalina.sh run"       8 days ago        Exited (143) 8 days ago
78e9303c67b9       tomcat           "catalina.sh run"       8 days ago        Exited (143) 8 days ago
[root@dockerhost ~]# docker container prune
WARNING! This will remove all stopped containers.
Are you sure you want to continue? [y/N] y
Deleted Containers:
edef49a560653ec2a7d2c3b260abdfaace025654b5bf91e4124a61c18f0e5
5251eac3ad991f75f289e597f245643e124693162ffa58b542685b4ea64129d
183307c95d1b6c91603de52e753f9a0d16f8cee32fe7300b129b4c5c9e34864
13967cbc8a35d2df2c49041dfad83781246f33973dc1ad7c9f315f9e0009612
36d65ecb9a6ead4c6ca2cf7601c2f6994fb04844ec5e8ea380f4b21397a032a
c6093995c672959c720618124a022c7a395e0927951b695109f916265ada3c1
74fc8d513fff43605c9a945ebc235af74f20eb4d1bb524ff00ad5fe699866
89d40f0e2c5eb5ee062f4977ea336eaf614d70eaf30de7aeaa509498b9a0c
9ac2c0b28c452a9b3fa50fd5023f14e7e1c34cea57e0a618d97655617733a250
d4c7dbd910f6ceee014d3e3fc685e9ef04305627373c5e2d1db43c75c03fb
78e9303c67b9f67ca161776a1321da5cb8bad4b85e64c9753a84bf91359ace21
```

Fig. Removing all running container

docker images prune -a // remove images

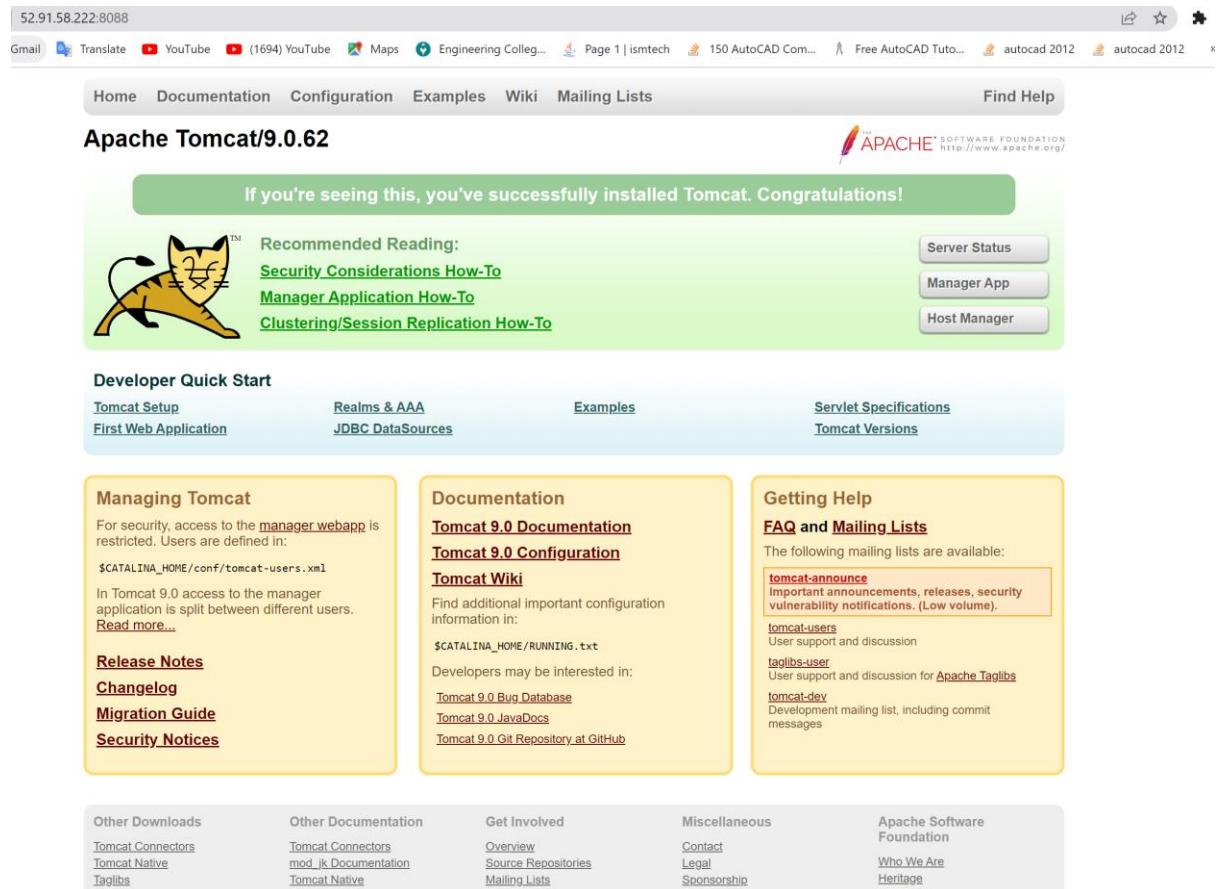


Fig . Tomcat Started on port 8088

## Integrate Ansible in CI/CD Pipeline:



Fig. Using Ansible to create containers

## 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

The screenshot shows the AWS Management Console interface for the EC2 service. The top navigation bar includes links for Apps, Slider 1, YouTube, Google Maps, Engineering College, Page 1 | ismtech, 150 AutoCAD Tutorials, Free AutoCAD Tutorials, autocad 2012, autocad 2012, and Other bookmarks. The user is signed in as shah-aws @ saifshah-aws.

The main content area displays the 'Instances' section with the following details:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Tomcat_Server	i-010d47b3e089d7869	Stopped	t2.micro	-	No alarms	+ us-east-1c	-
Docker_Server	i-0875a802a59fdd059	Stopped	t2.micro	-	No alarms	+ us-east-1c	-
Jenkins_Server1	i-00f1e4c8cb15c9042	Stopped	t2.micro	-	No alarms	+ us-east-1c	-
Ansible_Server	i-0dc753250431fbac9	Running	t2.micro	-	No alarms	+ us-east-1c	ec2-3-90-12-179.comp...

A modal window titled 'Select an instance' is open at the bottom, listing the same four instances: Tomcat\_Server, Docker\_Server, Jenkins\_Server1, and Ansible\_Server.

Fig.EC2 Instance Setup For Ansible

## Setup hostname

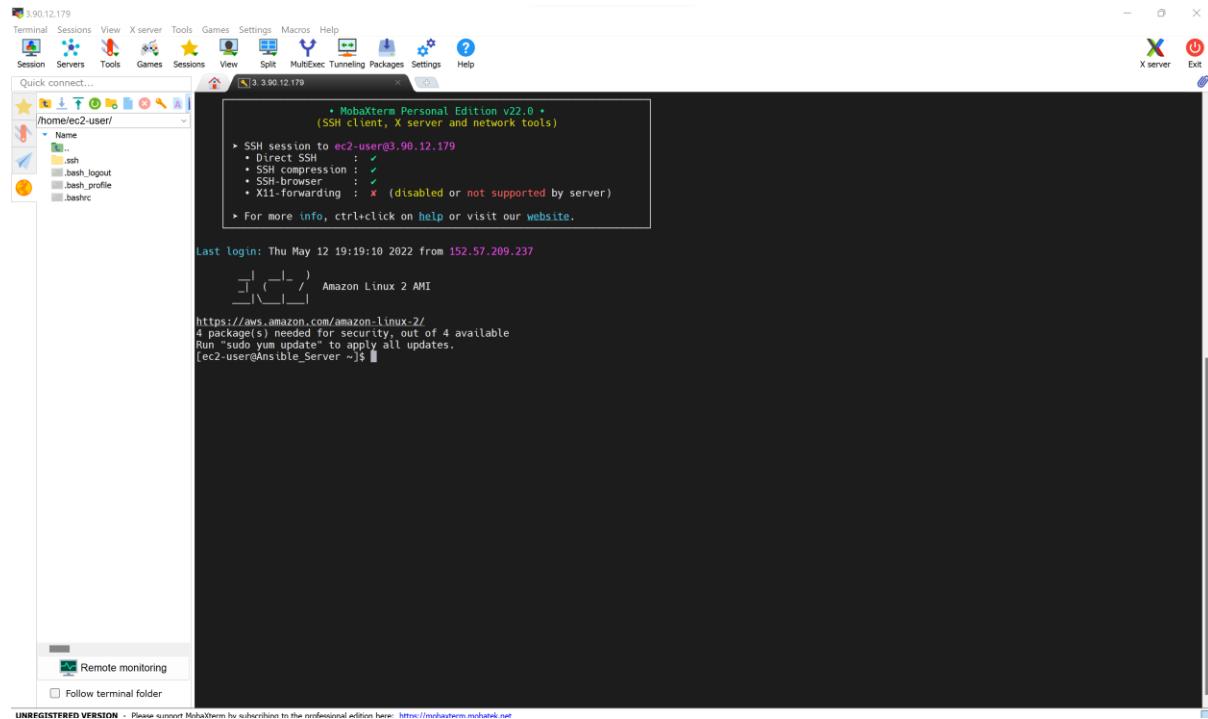


Fig.EC2 Setup hostname For Ansible

## Create ansadmin users

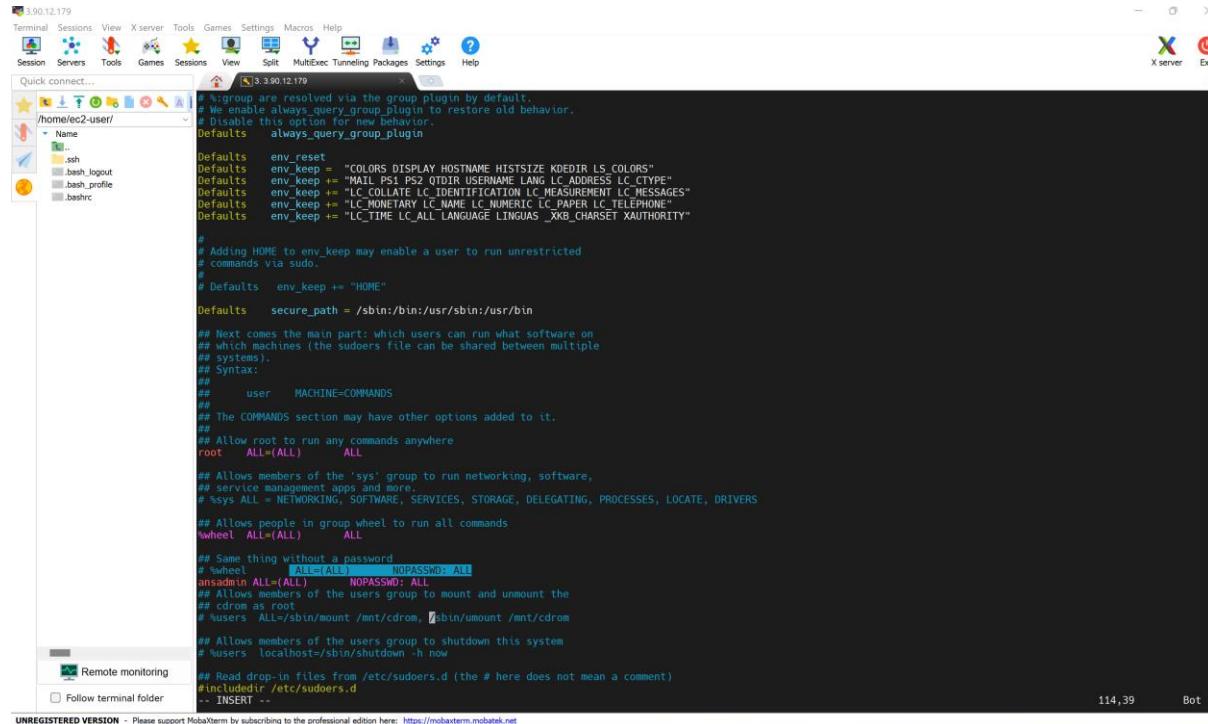
```
[root@Ansible_Server ~]# useradd ansadmin
[root@Ansible_Server ~]# passwd ansadmin
Changing password for user ansadmin.
New password:
BAD PASSWORD: The password contains the user name in some form
Retype new password:
passwd: all authentication tokens updated successfully.
[root@Ansible_Server ~]#
```

Fig. ansadmin users is created

## Add Users to sudoers file

The **sudoers** file is a file Linux and Unix administrators use to allocate system rights to system users.

Command to enter **visudo**



The screenshot shows a terminal window titled "3.39.0.12.179" running on MobaXterm. The window displays the contents of the /etc/sudoers file. The file contains various configuration options and command definitions for user permissions. At the bottom of the file, there is a section starting with "# Read drop\_in files from /etc/sudoers.d (the # here does not mean a comment)". This indicates where additional sudoers rules can be defined. The terminal interface includes a sidebar with session management tools like Session, Servers, Tools, Games, Sessions, View, Split, Multitab, Tunneling, Packages, Settings, and Help. The status bar at the bottom right shows "114,39 Bot".

```
# %group are resolved via the group plugin by default.
# We enable always_query_group_plugin to restore old behavior.
# Disable this option for new behavior.
Defaults    always_query_group_plugin

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

## 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 umount 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 --
```

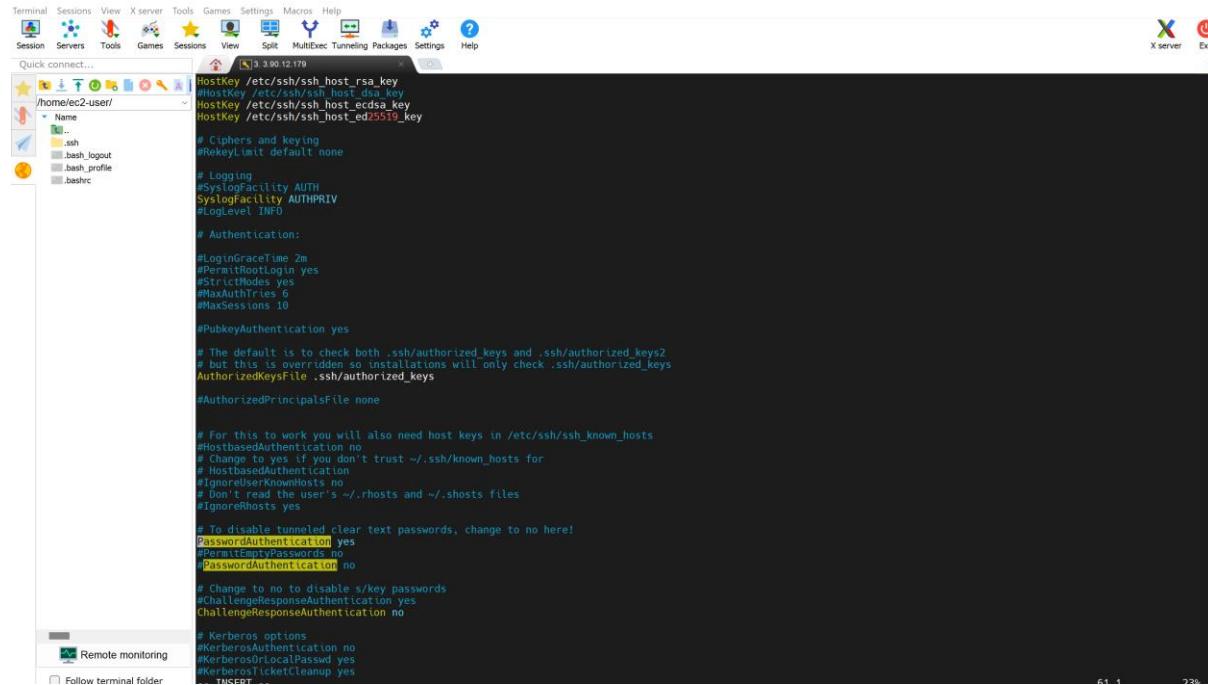
Fig. Add Users to sudoers file

- Note: Shift +g to end of line

## Configuring SSH

```
[root@Ansible_Server ~]# vi /etc/ssh/sshd_config
```

```
[root@Ansible_Server ~]# service sshd reload
```



The screenshot shows a terminal window titled "3.3.90.12.179" displaying the contents of the /etc/ssh/sshd\_config file. The configuration includes host key settings, logging options, and various authentication methods like RSA, DSA, ECDSA, and ECDSA. It also specifies cipher and key exchange preferences, as well as password and publickey authentication parameters. The terminal interface includes a menu bar at the top and a sidebar on the left containing session management icons and a "Remote monitoring" section.

```
HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_dsa_key
HostKey /etc/ssh/ssh_host_ecdsa_key
HostKey /etc/ssh/ssh_host_ed25519_key

# Ciphers and keying
#RekeyLimit default none

# Logging
#SyslogFacility AUTH
#SyslogFacility AUTHPRIV
#LogLevel INFO

# Authentication:

#LoginGraceTime 2m
#PermitRootLogin yes
#StrictModes yes
#MaxAuthTries 6
#MaxSessions 10

#PubkeyAuthentication yes

# The default is to check both .ssh/authorized_keys and .ssh/authorized_keys2
# but this is overridden so installations will only check .ssh/authorized_keys
AuthorizedKeysFile .ssh/authorized_keys

#AuthorizedPrincipalsFile none

# For this to work you will also need host keys in /etc/ssh/ssh_known_hosts
#HostbasedAuthentication no
# Change to yes if you don't trust ~/.ssh/known_hosts for
# HostbasedAuthentication
#IgnoreUnknownHosts no
# Don't read the user's ~/.rhosts and ~/.shosts files
#IgnoreRhosts yes

# To disable tunneled clear text passwords, change to no here!
PasswordAuthentication yes
#PermitEmptyPasswords no
#PasswordAuthentication no

# Change to no to disable s/key passwords
#ChallengeResponseAuthentication yes
ChallengeResponseAuthentication no

# Kerberos options
#KerberosAuthentication no
#KerberosOrLocalPasswd yes
#KerberosTicketCleanup yes
```

Fig. Configuring Passwd

## Enable Password Based Login

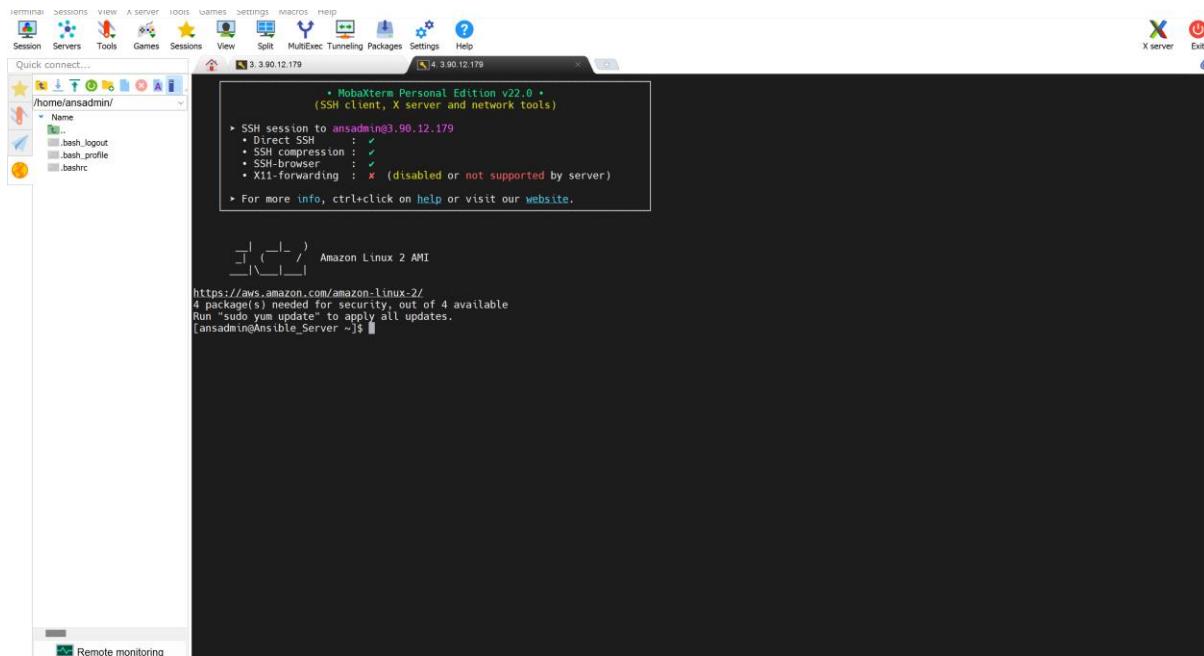


Fig. Login as ansadmin

## Generated SSH Keys:

```
[ansadmin@Ansible_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:+4bEKmcZCo4uVhQ8BYqwqn/bZwLbV+CI30I0dUDJMIE

ansadmin@Ansible\_Server

The key's randomart image is:

----[RSA 2048]----

|...o. .=Eo |

|o..+ o o o|

|o. o o ..|

|.. . .... |

|.. oS+ .. |

|.... .=... |

|.o.. =.=+ o . |

|oo. =.B =.o o |

|+....=.= .. |

----[SHA256]----

[ansadmin@Ansible\_Server ~]\$

## Install Ansible

The screenshot shows a terminal window on an Amazon Linux 2 AMI server. The terminal session is for user 'ansadmin'. The window title is '3.3.90.12.179'. The terminal content shows the following steps:

- SSH key generation: The user runs 'ssh-keygen' to generate RSA 2048 keys. It asks for a passphrase, which is left empty.
- Key distribution: The public key is saved to '/home/ansadmin/.ssh/id\_rsa.pub'. The key's randomart image is displayed.
- Ansible installation: The user runs 'sudo su' and then 'yum install ansible'. The output shows that the package 'ansible' is not available.
- Ansible availability: A note states that Ansible is available in the 'amazon-linux-extras' topic.
- Final command: The user runs 'amazon-linux-extras install ansible' as root.

The terminal window has a dark background with light-colored text. It includes standard Linux navigation commands like 'Session', 'Servers', 'Tools', 'Games', 'Sessions', 'View', 'Split', 'MultiExec', 'Tunneling', 'Packages', 'Settings', 'Help', and 'X server' and 'Exit' buttons at the top right.

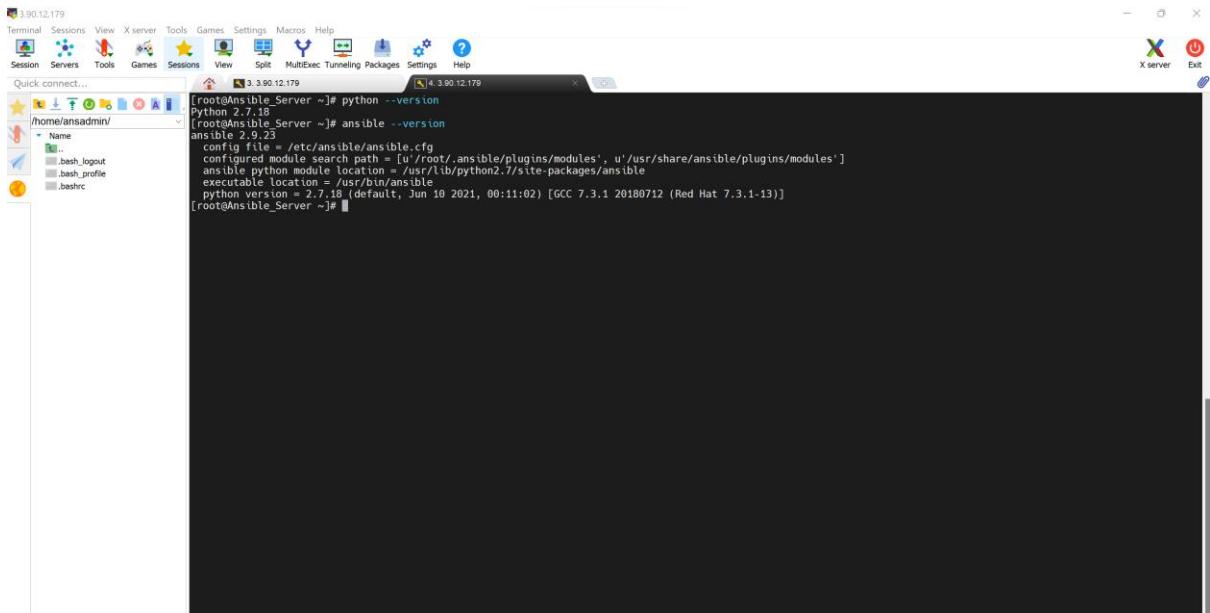


Fig. Installing Ansible

Note: For Installing Ansible required python which inbuilt comes amazon ec2 service.

### Integrate Docker with Ansible:

- **On Docker Host**
  - Create ansadmin
  - Add ansadmin to sudoers file
  - Enable Password Based Login

- **On Ansible Node**
  - Add to host file
  - Copy ssh keys
  - Test the Connection

## Create ansadmin

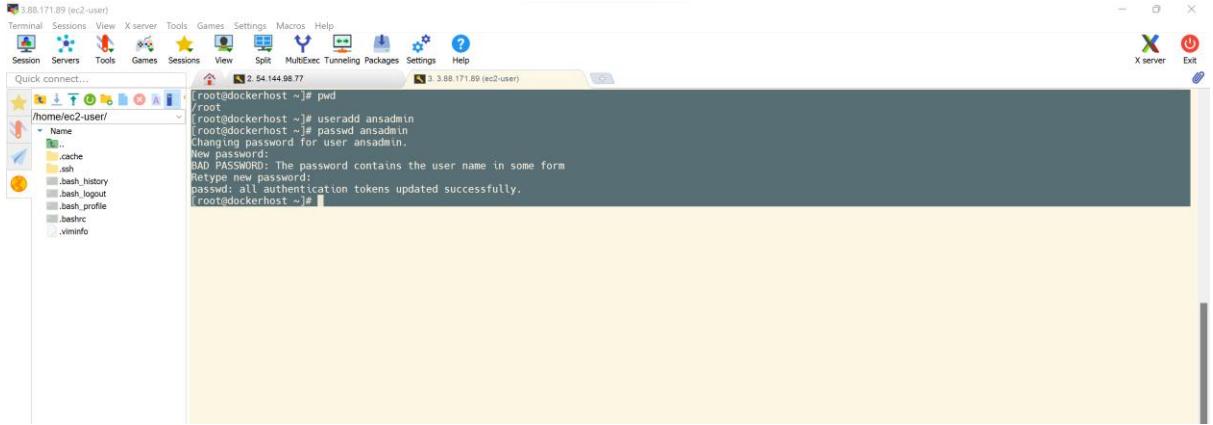


Fig. Created ansadmin for docker

## Add ansadmin to sudoers file

The **sudoers** file is a file Linux and Unix administrators use to allocate system rights to system users.

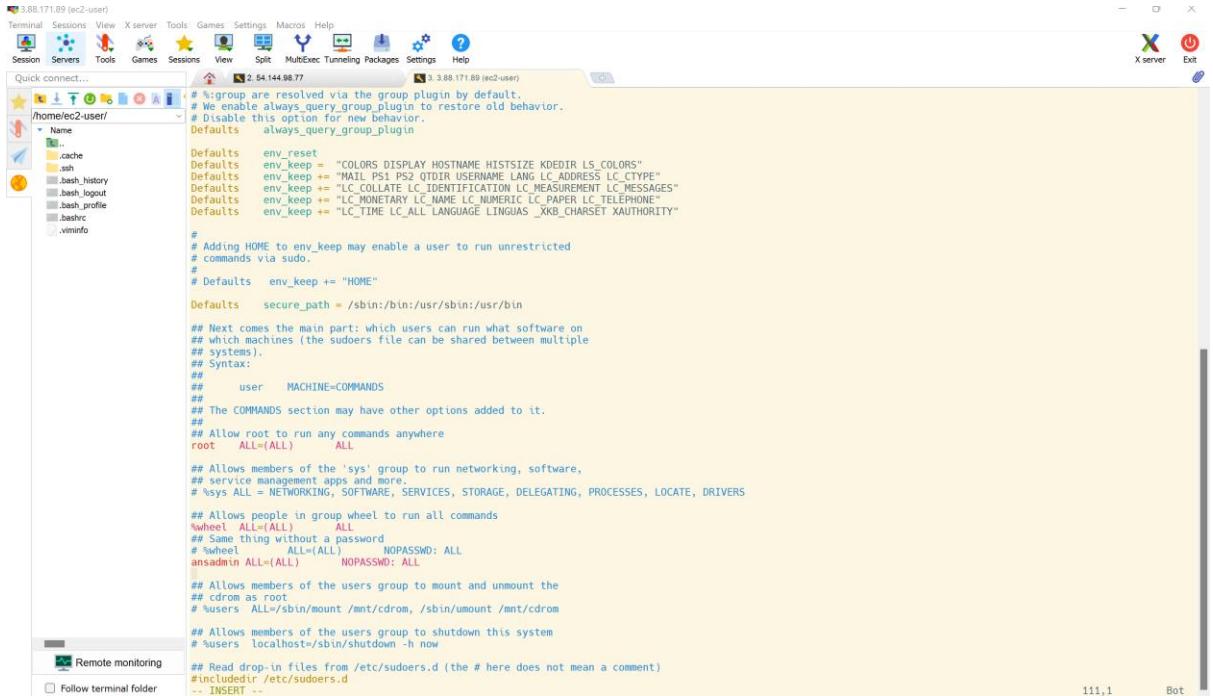


Fig. Created ansadmin added to sudoers file

## Enable Password Based Login

```
[root@dockherost ~]# vi /etc/ssh/sshd_config
[root@dockherost ~]# 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
[root@dockherost ~]#
```

Fig. Enable Password Based Login

## -----On Ansible Node-----

## Add to host file

```
[root@Ansible_Server ~]# vi /etc/ansible/hosts
```

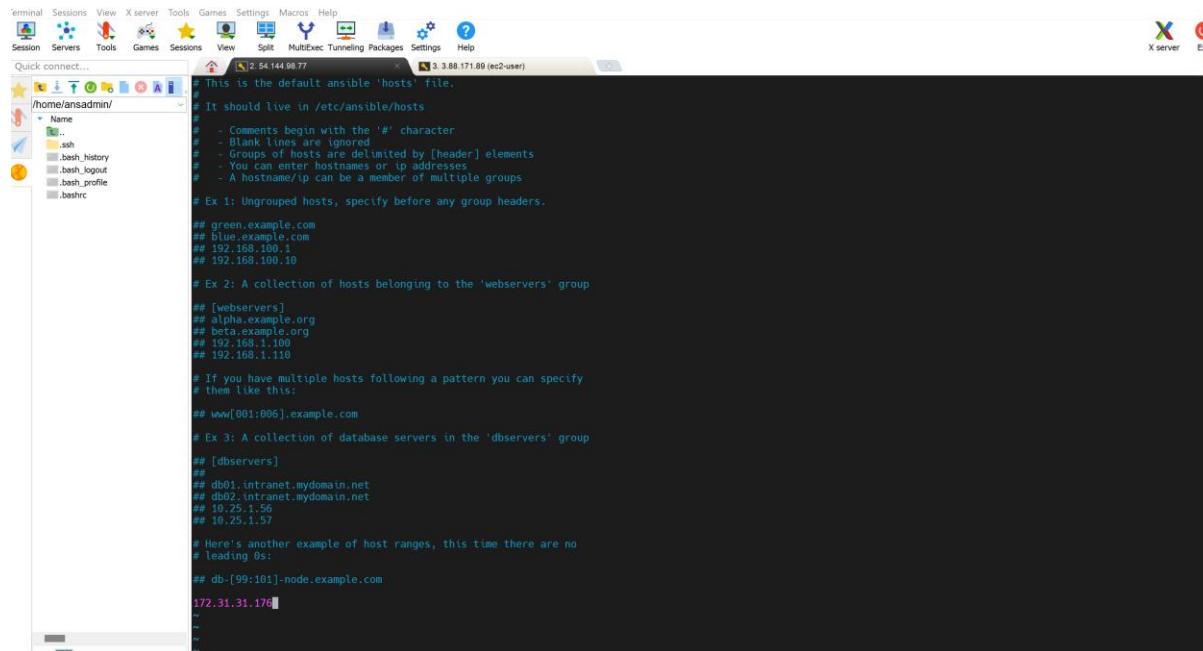


Fig. Added host ipconfig address from docker host

## Copy ssh keys

```
[root@Ansible_Server ~]# vi /etc/ansible/hosts
[root@Ansible_Server ~]# ^C
[root@Ansible_Server ~]# ll -la
total 32
dr-xr-x--- 4 root root 156 May 12 23:16 .
dr-xr-xr-x 18 root root 257 May 12 19:16 ..
drwx----- 3 root root 17 May 12 19:59 .ansible
-rw----- 1 root root 110 May 12 20:44 .bash_history
-rw-r--r-- 1 root root 18 Oct 18 2017 .bash_logout
-rw-r--r-- 1 root root 176 Oct 18 2017 .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 May 12 19:16 .ssh
-rw-r--r-- 1 root root 129 Oct 18 2017 .tcshrc
-rw----- 1 root root 6707 May 12 23:16 .viminfo
[root@Ansible_Server ~]# cd .ssh
[root@Ansible_Server .ssh]# ssh-copy-id 172.31.31.176
/usr/bin/ssh-copy-id: ERROR: failed to open ID file '/root/.pub': No such file or directory
  (to install the contents of '/root/.pub' anyway, look at the -f option)
[root@Ansible_Server .ssh]# cd ..
[root@Ansible_Server ~]# ssh-copy-id 172.31.31.176
/usr/bin/ssh-copy-id: ERROR: failed to open ID file '/root/.pub': No such file or directory
  (to install the contents of '/root/.pub' anyway, look at the -f option)
[root@Ansible_Server ~]# sudo su -ansadmin
su: invalid option -- 'a'
Try 'su -help' for more information.
[root@Ansible_Server ~]# sudo su - ansadmin
Last login: Thu May 12 23:14:30 UTC 2022 from 152.57.194.21 on pts/1
[ansadmin@Ansible_Server ~]$ ssh-copy-id 172.31.31.176
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/home/ansadmin/.ssh/id_rsa.pub"
The authenticity of host '172.31.31.176 (172.31.31.176)' can't be established.
ECDSA key fingerprint is SHA256:flrc1phat6JiqGx8dpGk0plgs9Xk24wJvpF3lghX3s.
ECDSA key fingerprint is MD5:cc:2b:7d:e0:d1:b2:db:35:07:38:03:1f:47:68:8f:b4.
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@172.31.31.176's password:
Number of key(s) added: 1

Now try logging into the machine, with: "ssh '172.31.31.176'"
and check to make sure that only the key(s) you wanted were added.

[ansadmin@Ansible_Server ~]$
```

```
• MobaXterm Personal Edition v22.0 •
(SSH client, X server and network tools)

> SSH session to ec2-user@3.88.171.89
  • Direct SSH : ✓
  • SSH compression : ✓
  • SSH-browser : ✓
  • X11-forwarding : ✘ (disabled or not supported by server)

> For more info, ctrl+click on help or visit our website.

Last login: Thu May 12 22:57:57 2022 from 152.57.194.21
[ec2-user@dockerhost ~]$ ls
[ec2-user@dockerhost ~]$ ls
[ec2-user@dockerhost ~]$ ls
[ec2-user@dockerhost ~]$ ls
[ec2-user@dockerhost ~]$ ll -la
total 0
[ec2-user@dockerhost ~]$ ll -la
total 12
drwx----- 3 ansadmin ansadmin 74 May 12 23:21 .
drwxr-xr-x 5 root root 57 May 12 22:58 ..
-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 12 23:21 .ssh
[ansadmin@dockerhost ~]$ cd .ssh
[ansadmin@dockerhost .ssh]$ ll
total 4
-rw----- 1 ansadmin ansadmin 405 May 12 23:21 authorized_keys
[ansadmin@dockerhost .ssh]$ date
Thu May 12 23:27:09 UTC 2022
[ansadmin@dockerhost .ssh]$
```

Fig. Copying sshkey to docker host.

```
[ansadmin@Ansible_Server ~]$ cat .ssh/id_rsa.pub
```

ssh-rsa

```
AAAAB3NzaC1yc2EAAAQABAAQCbHRU93Nngsu3VtGfMvQktI1pktg  
GWyd9z8iyiak0Dizs8AiIPGEEwoP4ihhsx8l9loSU5i1D9/rGG2KtpQh95SXUzgfvu  
tnA/UEuEiPV1oTYpeteltG868/qsCLUME8b9nJU57g782QvnNBS4OBmNUHTQ6  
egxxpwtOzl/O1Oq8eNe84QODGyuOk7EJjqjLxOh17B/BeRG07sKLvA/n183pep6  
dM+5OwdTe+c1wuoJ2V9mdD/fbIfKkC789LofxNuZPuvOF5sn9KeuJ65pOuUn6t  
/L6Ev2vUw2YXe8FCQrBgY6Ab02Rlc2VufjfJ+nUXwaGoV67p/2VGcyQwXdvdcb  
ansadmin@Ansible_Server
```

```
[ansadmin@Ansible_Server ~]$
```

```
[ansadmin@dockerhost .ssh]$ cat authorized_keys
```

ssh-rsa

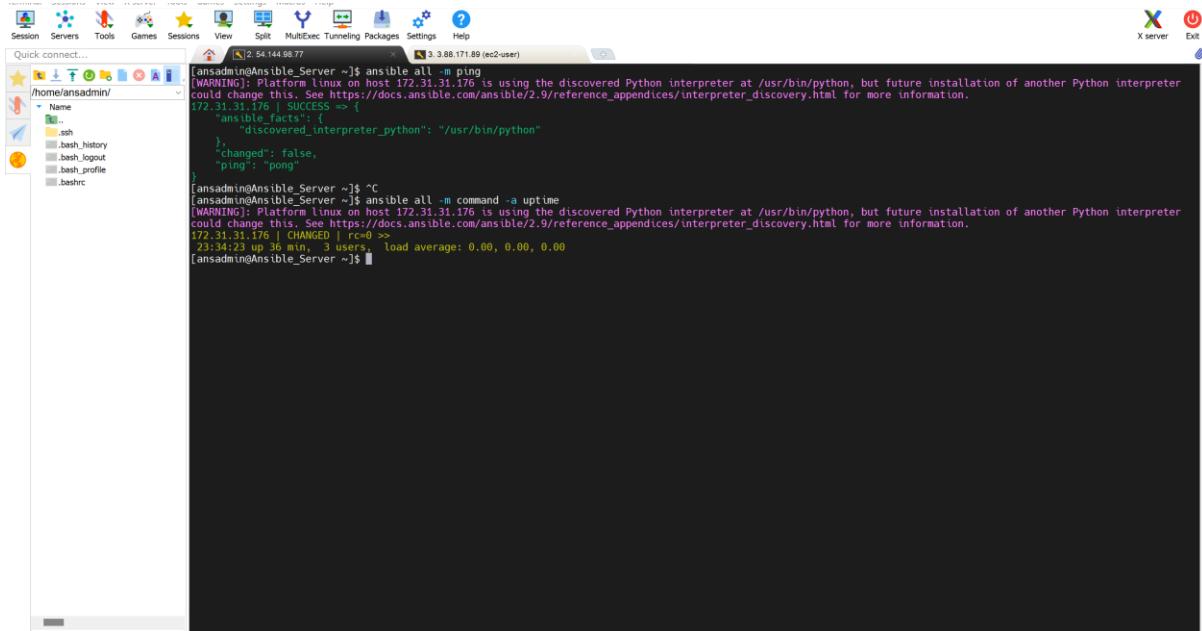
```
AAAAB3NzaC1yc2EAAAQABAAQCbHRU93Nngsu3VtGfMvQktI1pktg  
GWyd9z8iyiak0Dizs8AiIPGEEwoP4ihhsx8l9loSU5i1D9/rGG2KtpQh95SXUzgfvu  
tnA/UEuEiPV1oTYpeteltG868/qsCLUME8b9nJU57g782QvnNBS4OBmNUHTQ6  
egxxpwtOzl/O1Oq8eNe84QODGyuOk7EJjqjLxOh17B/BeRG07sKLvA/n183pep6  
dM+5OwdTe+c1wuoJ2V9mdD/fbIfKkC789LofxNuZPuvOF5sn9KeuJ65pOuUn6t  
/L6Ev2vUw2YXe8FCQrBgY6Ab02Rlc2VufjfJ+nUXwaGoV67p/2VGcyQwXdvdcb  
ansadmin@Ansible_Server
```

```
[ansadmin@dockerhost .ssh]$
```

## Test the Connection

```
[ansadmin@Ansible_Server ~]$ ansible all -m ping
```

```
[ansadmin@Ansible_Server ~]$ ansible all -m command -a uptime
```



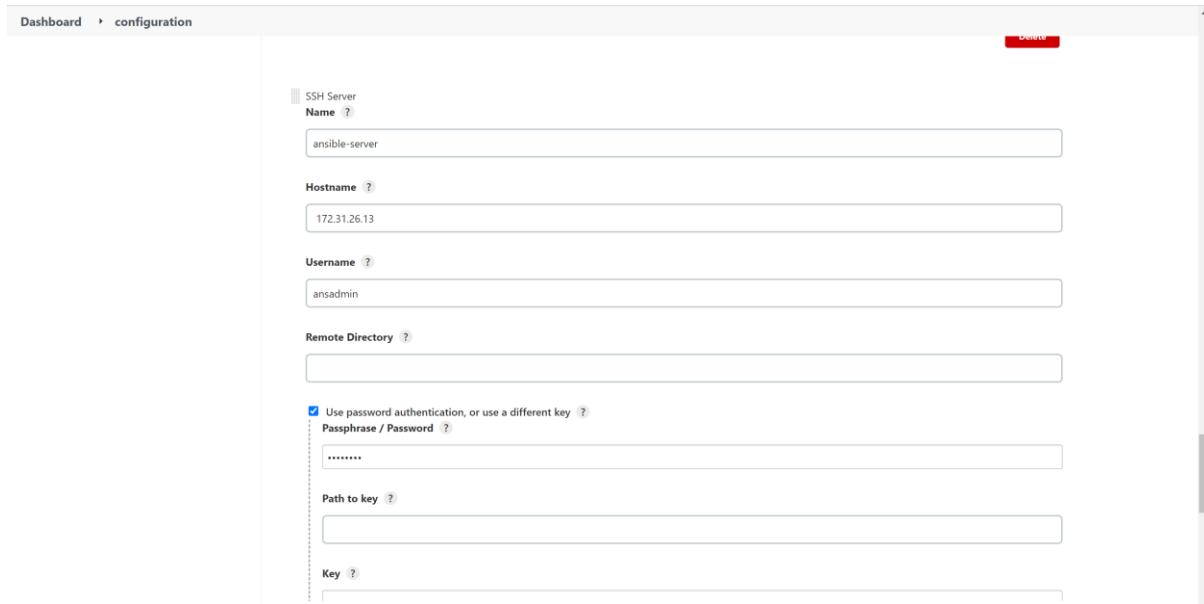
```
[ansadmin@Ansible_Server ~]$ ansible all -m ping
[WARNING]: Platform linux on host 172.31.31.176 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interpreter could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
172.31.31.176 | SUCCESS => {
    "ansible_facts": {
        "discovered_interpreter_python": "/usr/bin/python"
    },
    "changed": false,
    "ping": "pong"
}

[ansadmin@Ansible_Server ~]$ ansible all -m command -a uptime
[WARNING]: Platform linux on host 172.31.31.176 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.
172.31.31.176 | CHANGED | rc=0 >
23:34:23 up 36 min, 3 users, load average: 0.00, 0.00, 0.00
[ansadmin@Ansible_Server ~]$
```

```
[ansadmin@dockerhost .ssh]$ ^C
[ansadmin@dockerhost .ssh]$ uptime
23:36:35 up 39 min, 2 users, load average: 0.00, 0.00, 0.00
[ansadmin@dockerhost .ssh]$
```

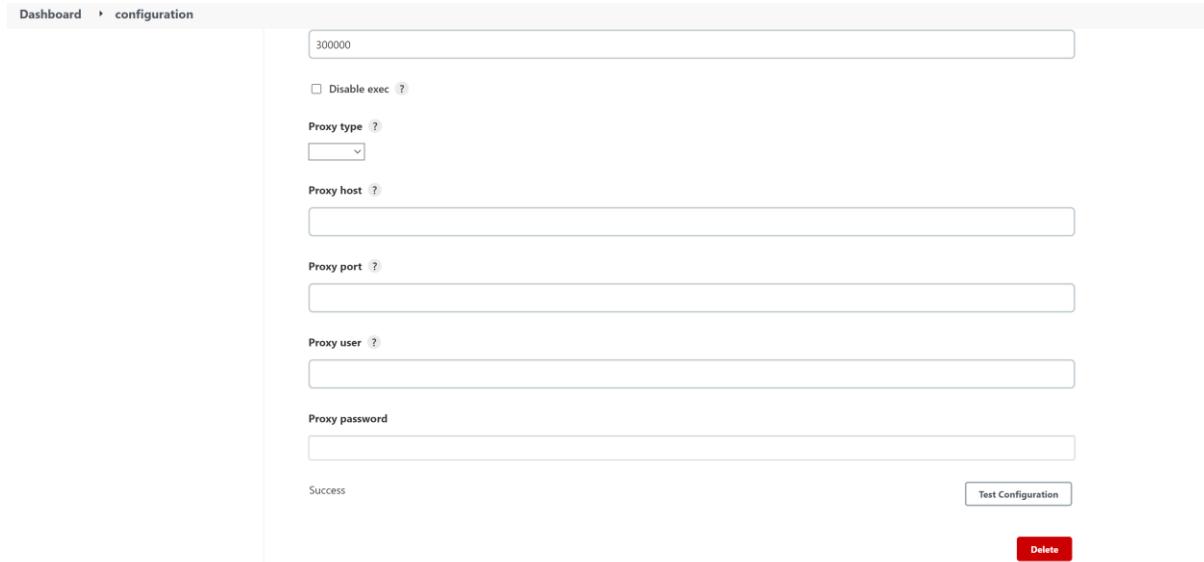
Fig. Connection Success

## Integrate Ansible with Jenkins:



The screenshot shows the Jenkins configuration interface for an SSH server. The 'Name' field is set to 'ansible-server'. The 'Hostname' field contains '172.31.26.13'. The 'Username' field is 'ansadmin'. The 'Remote Directory' field is empty. A checkbox for 'Use password authentication, or use a different key' is checked, and the 'Passphrase / Password' field contains '\*\*\*\*\*'. The 'Path to key' and 'Key' fields are also empty.

Fig. Configuring Ansible with Jenkins



The screenshot shows the Jenkins configuration interface for proxy settings. The 'Proxy port' field is set to '30000'. The 'Proxy type' dropdown is set to 'None'. The 'Proxy host' and 'Proxy user' fields are empty. The 'Proxy password' field is empty. At the bottom right, there is a 'Test Configuration' button and a 'Delete' button.

Fig. Testing Success and save it.

## Creating Item:

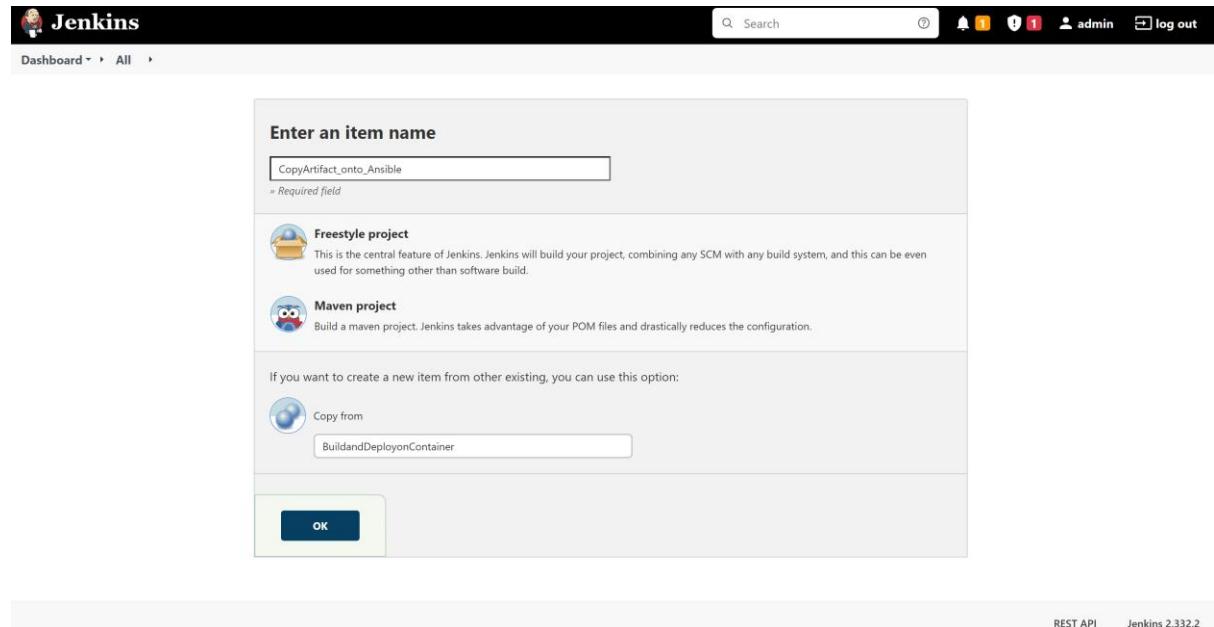


Fig. CopyArtifact\_onto\_Ansible

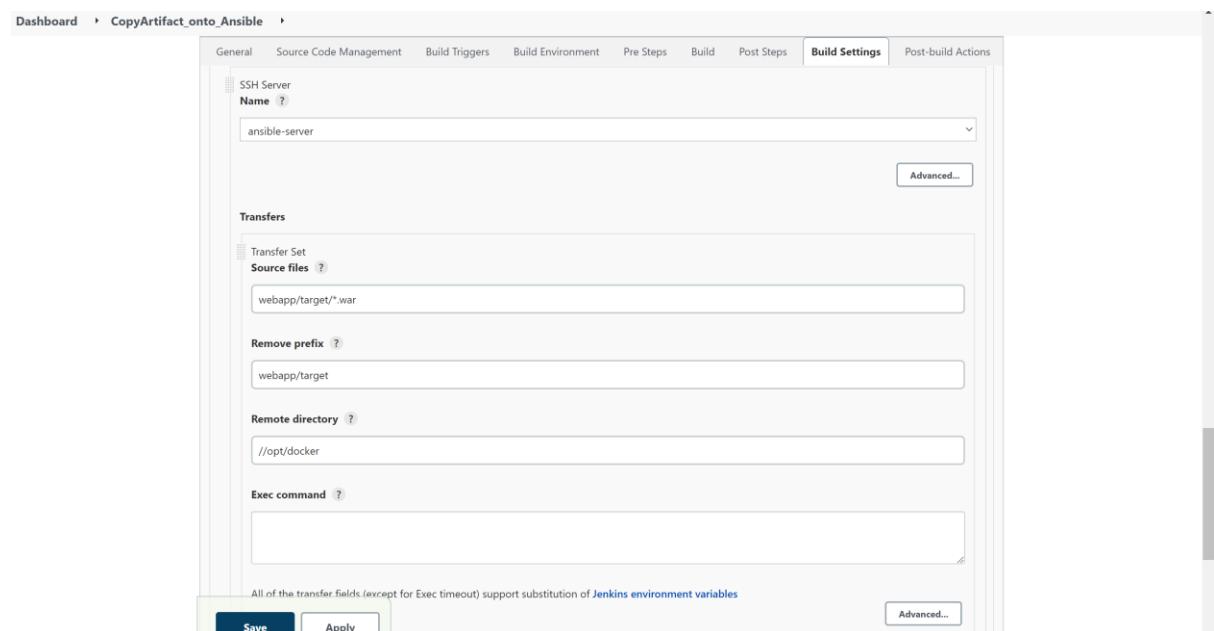
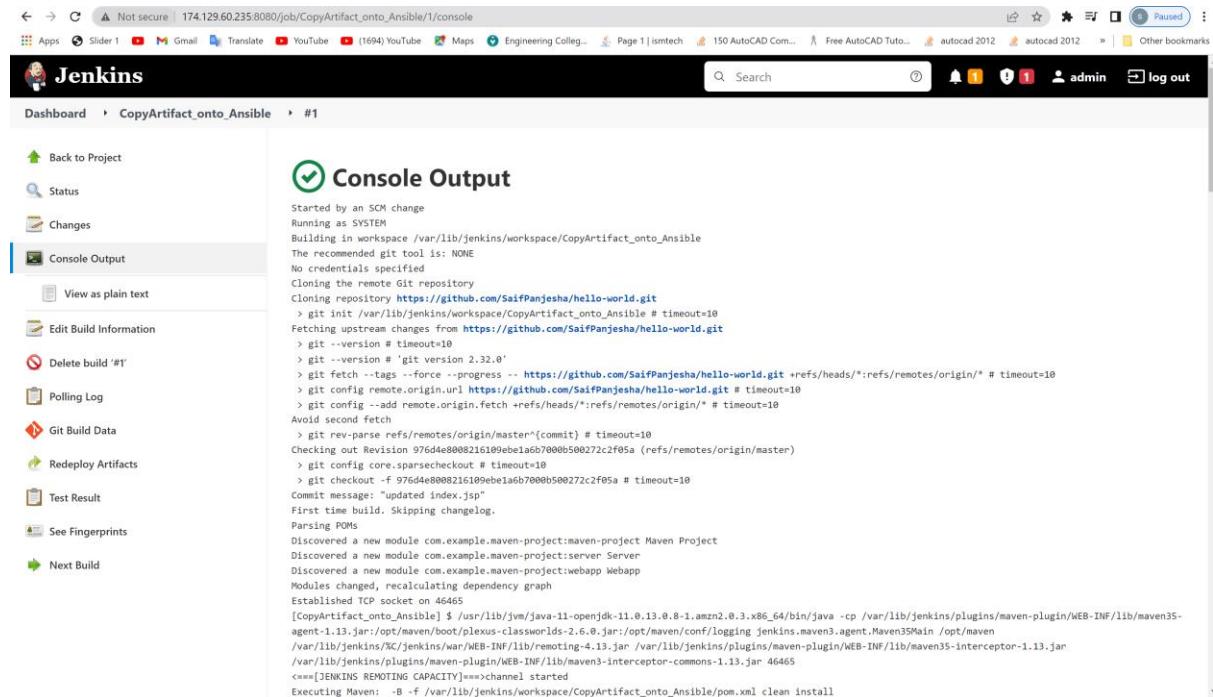


Fig. Configuring SSH Server with ansible-server

## Creating docker directory on Ansible Server:

```
[root@Ansible_Server ~]# cd /opt
[root@Ansible_Server opt]# ll
total 0
drwxr-xr-x 4 root root 33 Apr 28 19:54 aws
drwxr-xr-x 2 root root 6 Aug 16 2018 rh
[root@Ansible_Server opt]# mkdir docker
[root@Ansible_Server opt]# ll
total 0
drwxr-xr-x 4 root root 33 Apr 28 19:54 aws
drwxr-xr-x 2 root root 6 May 13 09:36 docker
drwxr-xr-x 2 root root 6 Aug 16 2018 rh
[root@Ansible_Server opt]# chown ansadmin:ansadmin docker
[root@Ansible_Server opt]# ll
total 0
drwxr-xr-x 4 root root 33 Apr 28 19:54 aws
drwxr-xr-x 2 ansadmin ansadmin 6 May 13 09:36 docker
drwxr-xr-x 2 root root 6 Aug 16 2018 rh
[root@Ansible_Server opt]#
```

## Console Output:



The screenshot shows a Jenkins job named "CopyArtifact\_onto\_Ansible" with a single build step. The build status is "Success". The console output window displays the log of the build process, which includes cloning a GitHub repository, fetching upstream changes, and executing Maven commands to clean and install the project. The log ends with the command "Executing Maven: -B -f /var/lib/jenkins/workspace/CopyArtifact\_onto\_Ansible/pom.xml clean install".

```
Started by an SCM change
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/CopyArtifact_onto_Ansible
The recommended git tool is: NONE
No credentials specified
Cloning the remote Git repository https://github.com/SaifPanjesha/hello-world.git
> git init /var/lib/jenkins/workspace/CopyArtifact_onto_Ansible # timeout=10
Fetching upstream changes from https://github.com/SaifPanjesha/hello-world.git
> git -version # timeout=10
> git -version # 'git version 2.32.0'
> git fetch --tags --progress -- https://github.com/SaifPanjesha/hello-world.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git config remote.origin.url https://github.com/SaifPanjesha/hello-world.git # timeout=10
> git config -add remote.origin.fetch +refs/heads/*:refs/remotes/origin/* # timeout=10
Avoid second fetch
> git rev-parse refs/remotes/origin/master^{commit} # timeout=10
Checking out Revision 976d4e8008216109ebc1a6b7000b500272c2f05a (refs/remotes/origin/master)
> git config core.sparsecheckout # timeout=10
> git checkout -f 976d4e8008216109ebc1a6b7000b500272c2f05a # timeout=10
Commit message: "updated index.jsp"
First time build. Skipping changelog.
Parsing POMs
Discovered a new module com.example.maven-project:maven-project Maven Project
Discovered a new module com.example.maven-project:server Server
Discovered a new module com.example.maven-project:webapp Webapp
Modules changed, recalculating dependency graph
Established TCP socket on 46465
[CopyArtifact_onto_Ansible] $ /usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86_64/bin/java -cp /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-agent-1.13.jar:/opt/maven/boot/plexus-classworlds-2.6.0.jar:/opt/maven/conf/logging jenkins.maven3.agent.Javen3MavenMain /opt/maven /var/lib/jenkins/WEB-INF/lib/remoting-4.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-commons-1.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-commons-1.13.jar 46465
<===[JENKINS REMOTING CAPACITY]==>channel started
Executing Maven: -B -f /var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/pom.xml clean install
```

Fig. Success Build on Jenkins

[root@Ansible\_Server opt]# cd docker

[root@Ansible\_Server docker]# ll

total 4

-rw-rw-r-- 1 ansadmin ansadmin 2907 May 13 09:41 webapp.war

[root@Ansible\_Server docker]# date

Fri May 13 09:42:51 UTC 2022

[root@Ansible\_Server docker]#

## Build an Image and create Container on Ansible

Step 1: Installing docker

```
[root@Ansible_Server docker]# yum install docker
```

```
[root@Ansible_Server docker]# cat /etc/group
```

The screenshot shows a terminal window with a dark background and light-colored text. On the left, there are two small gray boxes: one labeled 'remote monitoring' and another labeled 'w terminal folder'. The main terminal area displays the command 'cat /etc/group' followed by its output, which includes the entry 'docker:x:992:[root@Ansible\_Server docker]#'. The text is in a monospaced font.

```
chrony:x:994:  
stapusr:x:156:  
stapsys:x:157:  
stapdev:x:158:  
screen:x:84:  
tcpdump:x:72:  
ec2-user:x:1000:  
ansadmin:x:1001:  
cgred:x:993:  
docker:x:992:  
[root@Ansible_Server docker]#
```

Fig. Docker Successful Installed on Ansible

```
[root@Ansible_Server docker]# usermod -aG docker ansadmin
```

```
[root@Ansible_Server docker]# id ansadmin
```

```
uid=1001(ansadmin) gid=1001(ansadmin)  
groups=1001(ansadmin),992(docker)
```

```
[root@Ansible_Server docker]# service docker start
```

```
Redirecting to /bin/systemctl start docker.service
```

```
[root@Ansible_Server docker]# service docker status
```

```
Redirecting to /bin/systemctl status docker.service
```

- docker.service - Docker Application Container Engine

```
Loaded: loaded (/usr/lib/systemd/system/docker.service; disabled; vendor  
preset: disabled)
```

```
Active: active (running) since Fri 2022-05-13 11:51:21 UTC; 25s ago
```

Docs: <https://docs.docker.com>

Process: 3450 ExecStartPre=/usr/libexec/docker/docker-setup-runtimes.sh  
(code=exited, status=0/SUCCESS)

Process: 3440 ExecStartPre=/bin/mkdir -p /run/docker (code=exited,  
status=0/SUCCESS)

Main PID: 3458 (dockerd)

Tasks: 7

Memory: 27.4M

CGroup: /system.slice/docker.service

```
└─3458 /usr/bin/dockerd -H fd:// --  
containerd=/run/containerd/containerd.sock --default-ulimit  
nofile=32768:65536
```

May 13 11:51:21 Ansible\_Server dockerd[3458]: time="2022-05-  
13T11:51:21.544859745Z" level=info msg="scheme \"unix\" not registered,  
fallback to default sc...dule=grpc

May 13 11:51:21 Ansible\_Server dockerd[3458]: time="2022-05-  
13T11:51:21.545114355Z" level=info msg="ccResolverWrapper: sending  
update to cc: {{unix:///ru...dule=grpc

May 13 11:51:21 Ansible\_Server dockerd[3458]: time="2022-05-  
13T11:51:21.545391892Z" level=info msg="ClientConn switching balancer to  
\"pick\_first\"" module=grpc

May 13 11:51:21 Ansible\_Server dockerd[3458]: time="2022-05-  
13T11:51:21.584329972Z" level=info msg="Loading containers: start."

May 13 11:51:21 Ansible\_Server dockerd[3458]: time="2022-05-  
13T11:51:21.798738326Z" level=info msg="Default bridge (docker0) is  
assigned with an IP address... address"

May 13 11:51:21 Ansible\_Server dockerd[3458]: time="2022-05-  
13T11:51:21.858803093Z" level=info msg="Loading containers: done."

```
May 13 11:51:21 Ansible_Server dockerd[3458]: time="2022-05-13T11:51:21.872257256Z" level=info msg="Docker daemon" commit=906f57f graphdriver(s)=overlay2 ...=20.10.13
```

```
May 13 11:51:21 Ansible_Server dockerd[3458]: time="2022-05-13T11:51:21.872693304Z" level=info msg="Daemon has completed initialization"
```

```
May 13 11:51:21 Ansible_Server systemd[1]: Started Docker Application Container Engine.
```

```
May 13 11:51:21 Ansible_Server dockerd[3458]: time="2022-05-13T11:51:21.898522550Z" level=info msg="API listen on /run/docker.sock"
```

Hint: Some lines were ellipsized, use -l to show in full.

```
[root@Ansible_Server docker]# ^C
```

### Creating Docker File:

```
[ansadmin@Ansible_Server docker]$ vi Dockerfile
```

```
FROM tomcat:latest
RUN cp -R /usr/local/tomcat webpp.dist/* /usr/local/tomcatwebapps
COPY ./*.war /usr/local/tomcatwebapps
```

### Build The File:

```
docker build -t regapp:v1 .
```

### Docker Images

```
[ansadmin@Ansible_Server docker]$ docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
regapp	v1	15574dfecf93	About a minute ago	510MB
tomcat	latest	6a1271dfce51	36 hours ago	680MB
centos	latest	5d0da3dc9764	7 months ago	231MB

Create a Container out of it :

```
[ansadmin@Ansible_Server docker]$ docker build -t regapp:v1 .
```

Output Console:

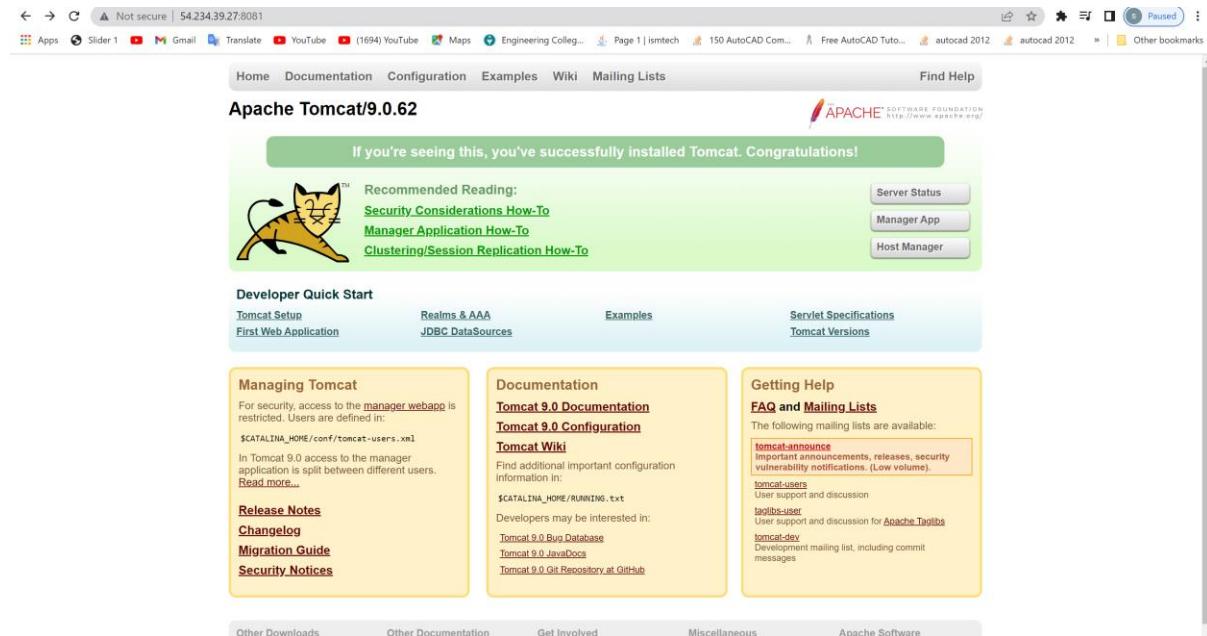
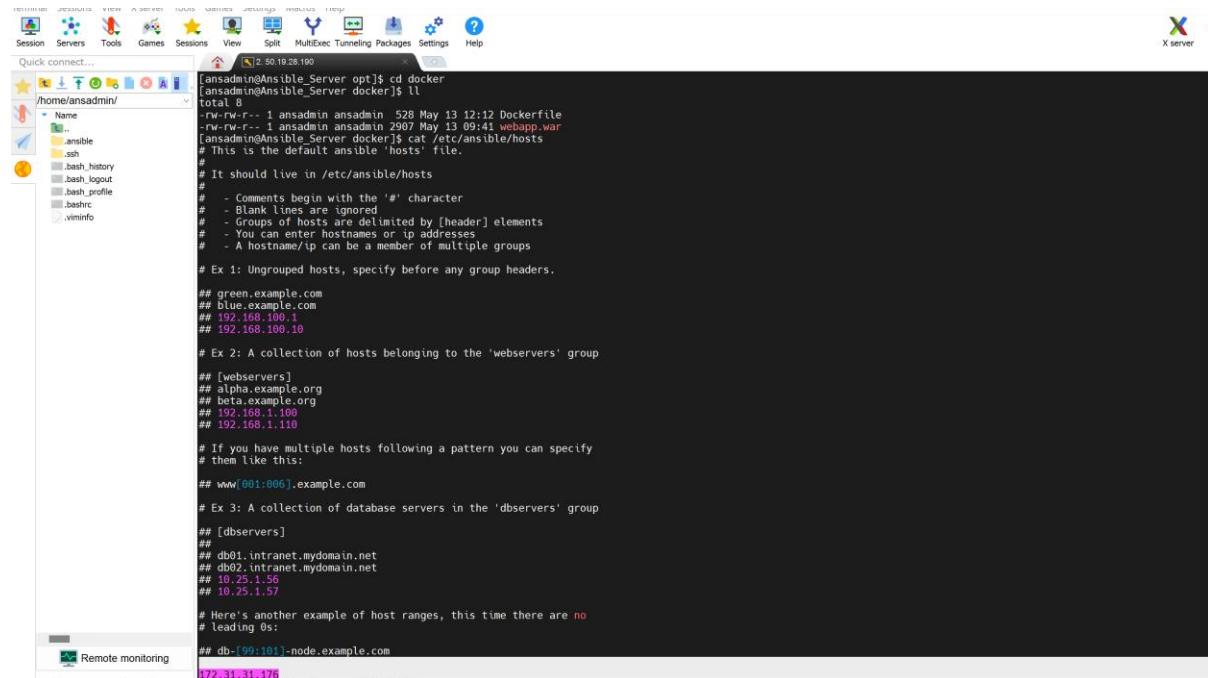


Fig.Tomcat Started

## Ansible Playbook to create image and container



The screenshot shows a terminal window titled '[ansadmin@Ansible\_Server docker]\$'. The command entered is 'cd docker' followed by 'ls'. The output shows a directory structure with files like Dockerfile, webapp.war, and a hosts file. The hosts file contains comments explaining its structure and examples of host definitions.

```
[ansadmin@Ansible_Server opt]$ cd docker
[ansadmin@Ansible_Server docker]$ ls
total 8
-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile
-rw-rw-r-- 1 ansadmin ansadmin 2907 May 13 09:41 webapp.war
[ansadmin@Ansible_Server docker]$ cat /etc/ansible/hosts
#
# This is the default ansible 'hosts' file.
#
# It should live in /etc/ansible/hosts
#
# - Comments begin with the '#' character
# - Blank lines are ignored
# - Groups of hosts are delimited by [header] elements
# - You can enter hostnames or ip addresses
# - A hostname/ip can be a member of multiple groups
#
# Ex 1: Ungrouped hosts, specify before any group headers.

## green.example.com
## blue.example.com
## 192.168.100.1
## 192.168.100.10

# Ex 2: A collection of hosts belonging to the 'webservers' group

## [webservers]
## alpha.example.org
## beta.example.org
## 192.168.1.100
## 192.168.1.110

# If you have multiple hosts following a pattern you can specify
# them like this:

## www[001:006].example.com

# Ex 3: A collection of database servers in the 'dbservers' group

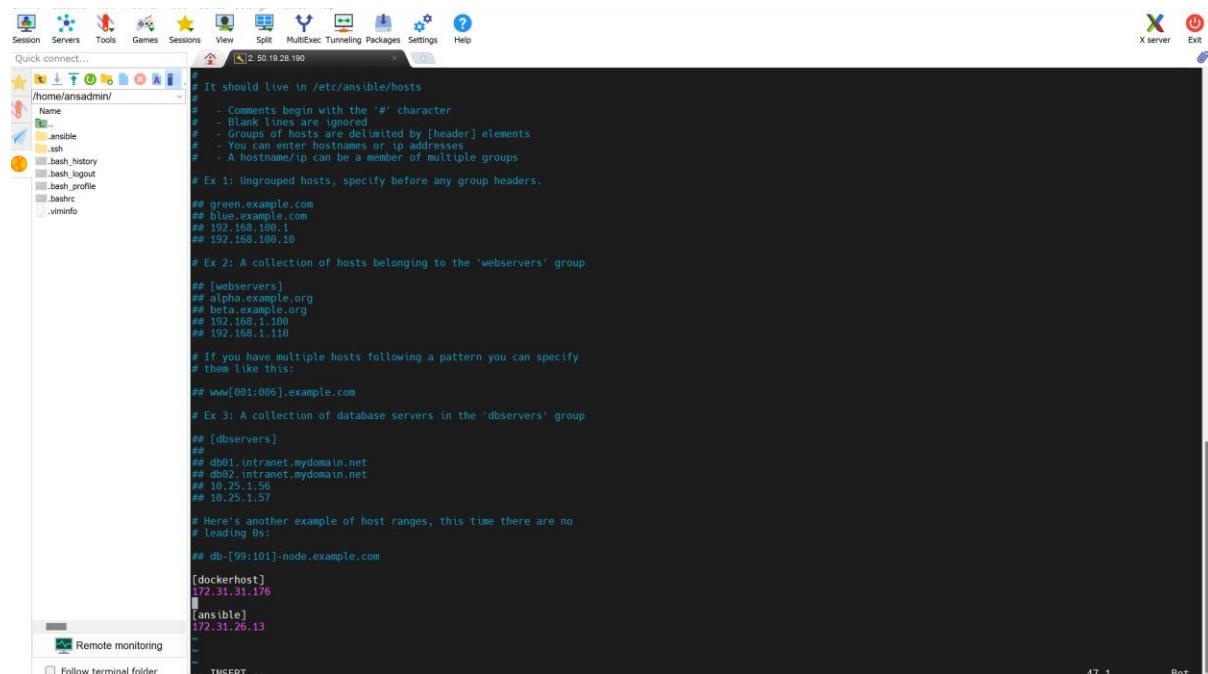
## [dbservers]
##
## db01.intranet.mydomain.net
## db02.intranet.mydomain.net
## 10.25.1.56
## 10.25.1.57

# Here's another example of host ranges, this time there are no
# leading 0s:

## db-[99:101]-node.example.com
[2.31.31.36]
```

Fig.Default ansible-playbook hosts

[ansadmin@Ansible\_Server docker]\$ sudo vi /etc/ansible/hosts



The screenshot shows a terminal window titled '[ansadmin@Ansible\_Server docker]\$'. The command entered is 'sudo vi /etc/ansible/hosts'. The screen displays the same hosts file content as the previous screenshot, but with additional entries at the bottom: '[dockerhost] 172.31.31.176' and '[ansible] 172.31.26.13'. The bottom right corner shows the status '47,1 Bot'.

```
[ansadmin@Ansible_Server opt]$ sudo vi /etc/ansible/hosts
[ansadmin@Ansible_Server docker]$ ls
total 8
-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile
-rw-rw-r-- 1 ansadmin ansadmin 2907 May 13 09:41 webapp.war
[ansadmin@Ansible_Server docker]$ cat /etc/ansible/hosts
#
# This is the default ansible 'hosts' file.
#
# It should live in /etc/ansible/hosts
#
# - Comments begin with the '#' character
# - Blank lines are ignored
# - Groups of hosts are delimited by [header] elements
# - You can enter hostnames or ip addresses
# - A hostname/ip can be a member of multiple groups
#
# Ex 1: Ungrouped hosts, specify before any group headers.

## green.example.com
## blue.example.com
## 192.168.100.1
## 192.168.100.10

# Ex 2: A collection of hosts belonging to the 'webservers' group

## [webservers]
## alpha.example.org
## beta.example.org
## 192.168.1.100
## 192.168.1.110

# If you have multiple hosts following a pattern you can specify
# them like this:

## www[001:006].example.com

# Ex 3: A collection of database servers in the 'dbservers' group

## [dbservers]
##
## db01.intranet.mydomain.net
## db02.intranet.mydomain.net
## 10.25.1.56
## 10.25.1.57

# Here's another example of host ranges, this time there are no
# leading 0s:

## db-[99:101]-node.example.com
[dockerhost]
172.31.31.176
[ansible]
172.31.26.13
[2.31.31.36]
```

Fig. Adding address for host

```
[ansadmin@Ansible_Server docker]$ sudo vi /etc/ansible/hosts  
[ansadmin@Ansible_Server docker]$ ansible all -a uptime  
[WARNING]: Platform linux on host 172.31.31.176 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.  
  
172.31.31.176 | CHANGED | rc=0 >>  
16:35:26 up 3 min, 2 users, load average: 0.01, 0.01, 0.00  
  
[WARNING]: Platform linux on host 172.31.26.13 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.  
  
172.31.26.13 | CHANGED | rc=0 >>  
16:35:26 up 32 min, 2 users, load average: 0.08, 0.02, 0.01  
  
[ansadmin@Ansible_Server docker]$
```

## Creating playbook:



The screenshot shows a terminal session within the MultiTerm application. The terminal window title is "2. 50.19.28.190". The command entered is:

```
hosts:  
Name:  
  - ssh  
  - ansible  
  - bash_history  
  - bash_logout  
  - bash_profile  
  - bashrc  
  - viminfo  
  
tasks:  
  - name : create docker image  
    command : docker build -t regapp:latest .  
    args :  
      chdir : /opt/docker
```

Fig. regapp.yml is created for ansible playbook

```
10.19.28.190
Terminal Sessions View X server Tools Games Settings Macros Help
Session Server Tools Games Sessions View Split MultiExec Tunneling Packages Setting Help
Quick connect...
http://10.19.28.190:54.221.143.252
ansadmin@Ansible_Server docker]$ vt regapp.yml
[ansadmin@Ansible_Server docker]$ ansible-playbook regapp.yml --check
PLAY [ansible] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 172.31.26.13 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.
ok: [172.31.26.13]
TASK [create docker image] ****
skipping: [172.31.26.13]

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

[ansadmin@Ansible_Server docker]$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
regapp v1 15554dfcef93 5 months ago 510MB
regapp latest 6a1271dfce51 41 hours ago 680MB
tomcat latest 5d0da3dc9764 7 months ago 231MB
centos latest 5d0da3dc9764 7 months ago 231MB
[ansadmin@Ansible_Server docker]$ ansible-playbook regapp.yml

PLAY [ansible] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 172.31.26.13 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.
ok: [172.31.26.13]
TASK [create docker image] ****
changed: [172.31.26.13]

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

[ansadmin@Ansible_Server docker]$ docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
regapp latest 15554dfcef93 5 months ago 510MB
regapp v1 15554dfcef93 5 months ago 510MB
tomcat latest 6a1271dfce51 41 hours ago 680MB
centos latest 5d0da3dc9764 7 months ago 231MB
[ansadmin@Ansible_Server docker]$
```

Fig. Successful docker Image is Created

## Copying Images on dockerhub:

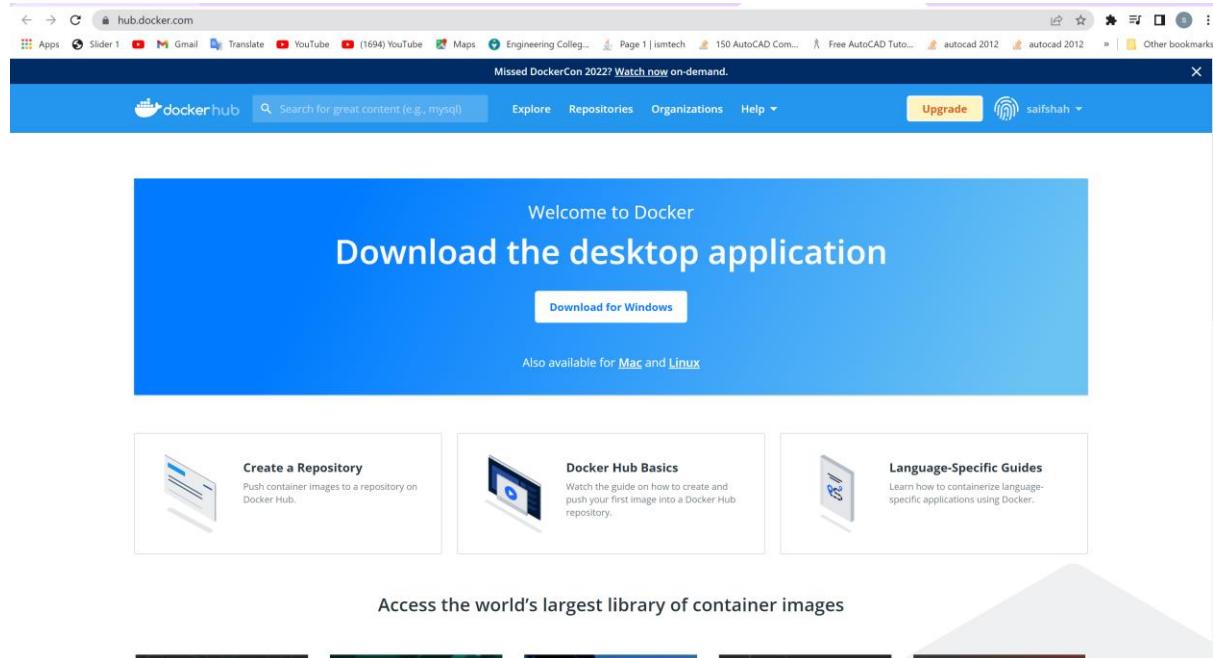


Fig .Dockerhub account

```
34.202.229.203
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
/home/ansadmin/
  + Name
    - .. 
    - ansible
    - ssh
    - vim
    - bash_history
    - bash_logout
    - bash_profile
    - bashrc
    - .viminfo
[ansadmin@Ansible_Server docker]$ sudo service docker start
Redirecting to /bin/systemctl start docker.service
[ansadmin@Ansible_Server docker]$ docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
regapp          latest   15574dfecf93   6 hours ago   510MB
regapp          v1      15574dfecf93   6 hours ago   510MB
tomcat          latest   6a1271dfce51   42 hours ago  680MB
centos          latest   5d0da3dc9764   8 months ago  231MB
[ansadmin@Ansible_Server docker]$ docker login
Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to https://hub.docker.com to create one.
Username: saifshah
Password:
WARNING! Your password will be stored unencrypted in /home/ansadmin/.docker/config.json.
Configure a credential helper to remove this warning. See
https://docs.docker.com/engine/reference/commandline/login/#credentials-store
Login Succeeded
[ansadmin@Ansible_Server docker]$ docker tag 15574dfecf93 saifshah/regapp:latest
[ansadmin@Ansible_Server docker]$ docker images
REPOSITORY      TAG      IMAGE ID      CREATED      SIZE
regapp          latest   15574dfecf93   6 hours ago   510MB
regapp          v1      15574dfecf93   6 hours ago   510MB
saifshah/regapp latest   15574dfecf93   6 hours ago   510MB
tomcat          latest   6a1271dfce51   42 hours ago  680MB
centos          latest   5d0da3dc9764   8 months ago  231MB
[ansadmin@Ansible_Server docker]$ docker push saifshah/regapp
Using default tag: latest
The push refers to repository [docker.io/saifshah/regapp]
ce5cfdb80a722: Pushed
edb4f71f2d30: Pushed
f33ada86a683: Pushed
ee37335edb77: Pushed
3196622490: Pushed
a11a056e0851: Pushed
ab20706f091: Pushed
74dddeec08fa: Mounted from library/centos
latest: digest: sha256:4c9bf05e487fee2c74107743cb246f6945c278bf5f4b2d7cea0246518cd19881 size: 2000
[ansadmin@Ansible_Server docker]$
```

Fig. Added Images to Docker Hub

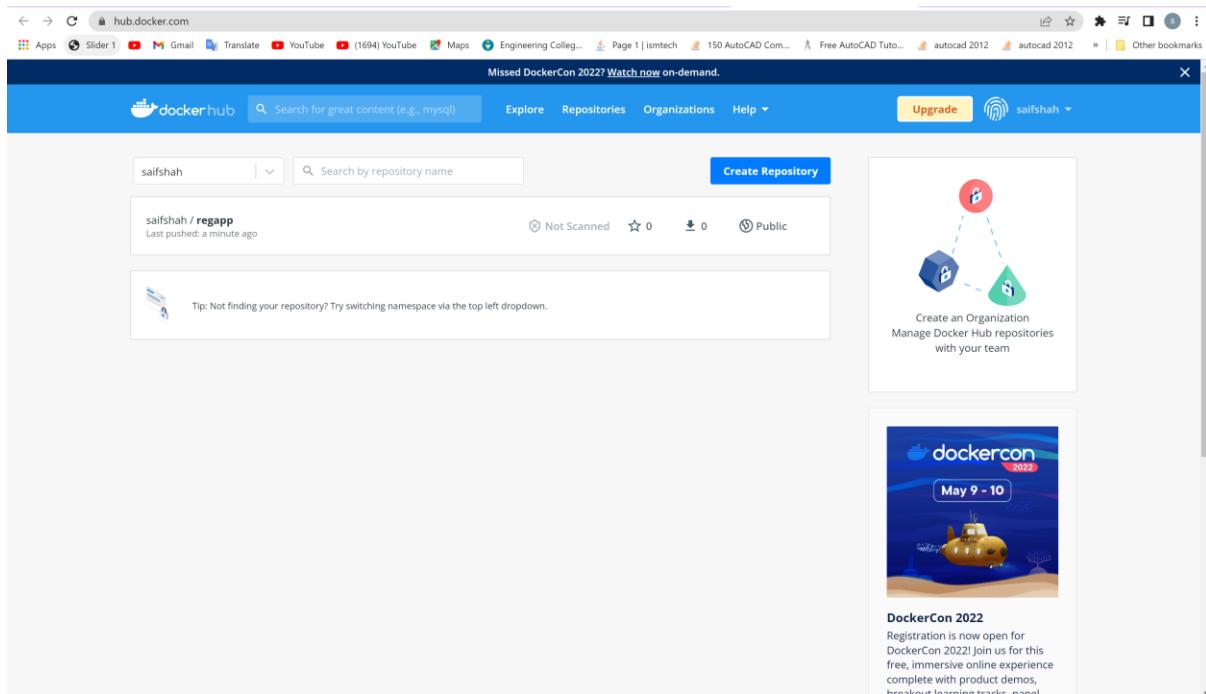


Fig. Successful Copying Images on Docker Hub

### Jenkins Job to build an image on ansible:

[ansadmin@Ansible\_Server docker]\$ vi regapp.yml

```

34.202.229.203
Session Servers Tools Games Sessions View Split MultExec Tunneling Packages Settings Help
Session 2.34.202.229.203 X server Ex
Quick connect...
/home/ansadmin/
└── Name
    └── ...
        ├── .ansible
        ├── .ssh
        ├── .vim
        ├── .bash_history
        ├── .bash_logout
        ├── .bash_profile
        ├── .zshrc
        └── .viminfo

--- hosts: ansible
  tasks:
    - name : create docker image
      command : docker build -t regapp:latest .
      args :
        chdir : /opt/docker
    - name : create tag to push image on docker hub
      command : docker tag regapp:latest saifshah/regapp:latest
    - name : push docker image on docker hub
      command : docker push saifshah/regapp:latest

```

Fig. Created Ansible playbook

```
[ansadmin@Ansible_Server docker]$ vi regapp.yml  
[ansadmin@Ansible_Server docker]$ ^C  
[ansadmin@Ansible_Server docker]$ ansible-playbook regapp.yml --check
```

## PLAY [ansible]

```
*****  
*****  
*****
```

## TASK [Gathering Facts]

```
*****  
*****  
*****
```

[WARNING]: Platform linux on host 172.31.26.13 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](https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html) for more information.

ok: [172.31.26.13]

## TASK [create docker image]

```
*****  
*****  
*****
```

skipping: [172.31.26.13]

## TASK [create tag to push image on docker hub]

```
*****  
*****
```

skipping: [172.31.26.13]

## TASK [push docker image on docker hub]

```
*****  
*****
```

skipping: [172.31.26.13]

## PLAY RECAP

```
*****  
*****  
*****
```

172.31.26.13 : ok=1 changed=0 unreachable=0 failed=0  
skipped=3 rescued=0 ignored=0

[ansadmin@Ansible\_Server docker]\$

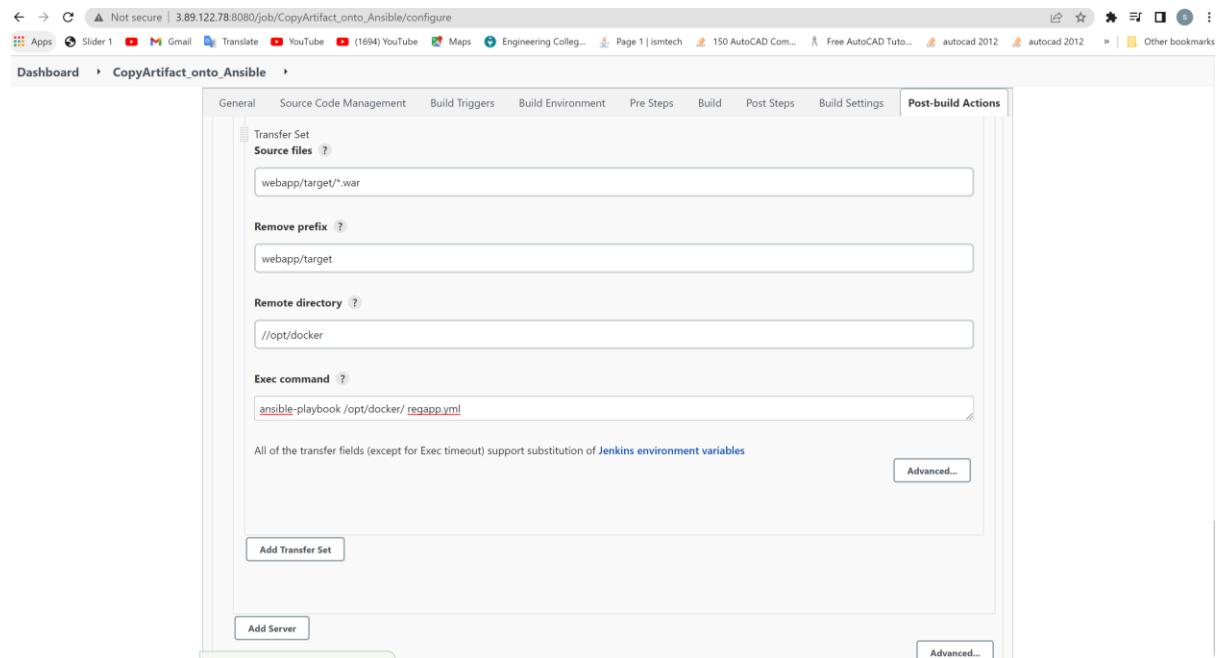


Fig. Configuring Artifact onto Ansible

ansible-playbook /opt/docker/regapp.yml

```

MINGW64:/c/Users/saiff/hello-world/webapp/src/main/webapp
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>
  <br>

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

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

  <label for="email"><b>Enter Email Address</b></label>
  <input type="text" placeholder="Enter Email Address" 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>
  <br>
  <br>
  <p>By creating an account you agree to our <a href="#">Terms and 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>

<h1> Thankyou, Happy Learning </h1>
<h1>Build Amazing Carrer With Devops <h1>
<b> I appreciate</b>
</form>

```

Fig. Editing index.jsp file

[ansadmin@Ansible\_Server docker]\$ ll

**total 12**

```

-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile
-rw-rw-r-- 1 ansadmin ansadmin 357 May 13 18:21 regapp.yml
-rw-rw-r-- 1 ansadmin ansadmin 2913 May 13 18:59 webapp.war

```

[ansadmin@Ansible\_Server docker]\$ date

Fri May 13 19:00:02 UTC 2022

[ansadmin@Ansible\_Server docker]\$ docker images

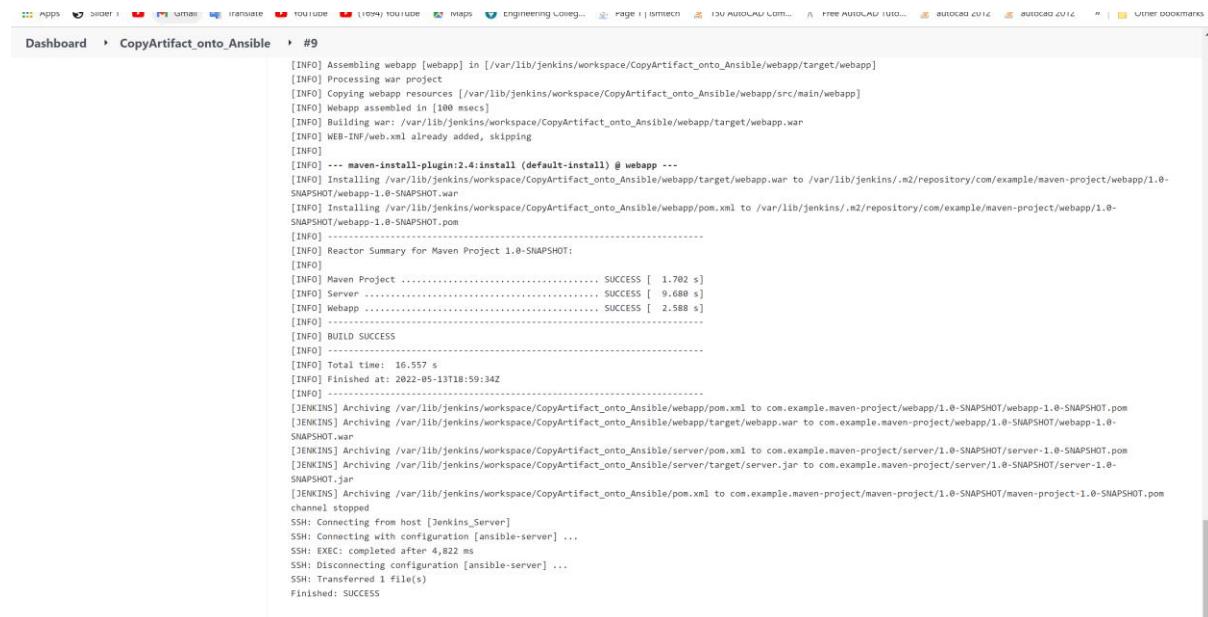
REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
regapp	latest	15574dfecf93	7 hours ago	510MB

```

regapp      v1      15574dfecf93  7 hours ago  510MB
saifshah/regapp latest  15574dfecf93  7 hours ago  510MB
tomcat      latest   6a1271dfce51  43 hours ago  680MB
centos      latest   5d0da3dc9764  8 months ago  231MB

```

[ansadmin@Ansible\_Server docker]\$



```

Dashboard > CopyArtifact_onto_Ansible > #9
[INFO] Assembling webapp [webapp] in [/var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/webapp/target/webapp]
[INFO] Processing war project
[INFO] Copying webapp resources [/var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/webapp/src/main/webapp]
[INFO] Webapp assembled in [100 msecs]
[INFO] Building war: [/var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/webapp/target/webapp.war
[INFO] WEB-INF/web.xml already added, skipping
[INFO]
[INFO] --- maven-install-plugin:2.4:install (default-install) @ webapp ---
[INFO] Installing [/var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/webapp/target/webapp.war to /var/lib/jenkins/.m2/repository/com/example/maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.war
[INFO] Installing [/var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/webapp/pom.xml to /var/lib/jenkins/.m2/repository/com/example/maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.pom
[INFO] -----
[INFO] Reactor Summary for Maven Project 1.0-SNAPSHOT:
[INFO]
[INFO] Maven Project ..... SUCCESS [ 1.792 s]
[INFO] Server ..... SUCCESS [ 9.680 s]
[INFO] Webapp ..... SUCCESS [ 2.588 s]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time:  16.557 s
[INFO] Finished at: 2022-05-13T18:59:34Z
[INFO] -----
[JENKINS] Archiving /var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/webapp/pom.xml to com.example.maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.pom
[JENKINS] Archiving /var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/webapp/target/webapp.war to com.example.maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.war
[JENKINS] Archiving /var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/server/pom.xml to com.example.maven-project/server/1.0-SNAPSHOT/server-1.0-SNAPSHOT.pom
[JENKINS] Archiving /var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/server/target/server.jar to com.example.maven-project/server/1.0-SNAPSHOT/server-1.0-SNAPSHOT.jar
[JENKINS] Archiving /var/lib/jenkins/workspace/CopyArtifact_onto_Ansible/pom.xml to com.example.maven-project/maven-project/1.0-SNAPSHOT/maven-project-1.0-SNAPSHOT.pom
channel stopped
SSH: Connecting from host [Jenkins_Server]
SSH: Connecting with configuration [ansible-server] ...
SSH: EXEC: completed after 4,622 ms
SSH: Disconnecting configuration [ansible-server] ...
SSH: Transferred 1 file(s)
Finished: SUCCESS

```

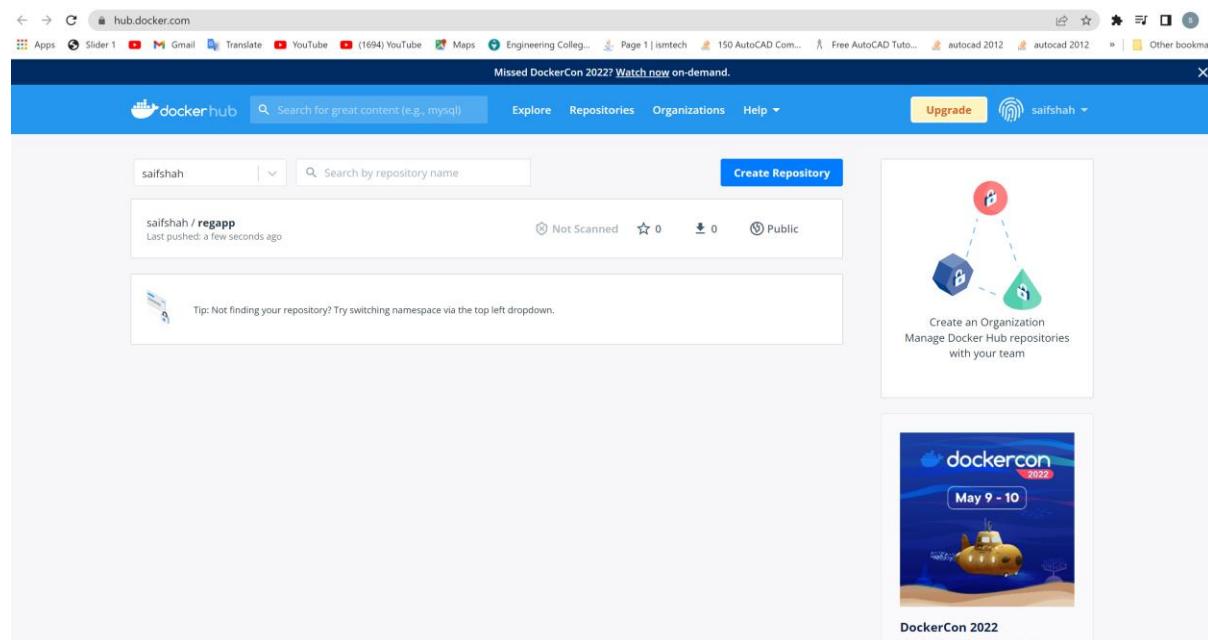


Fig. Success Build an image on ansible

## **How to create container on dockerhost using ansible playbook -Devops Project:**

The screenshot shows a terminal window from the Mobatek application. The title bar includes 'terminal', 'Sessions', 'View', 'X server', 'Tools', 'Games', 'Settings', 'Macros', 'Help' on the left, and 'X server' and 'Exit' on the right. A toolbar below the title bar contains icons for Session, Server, Tools, Games, Sessions, View, Split, MultiExec, Tunneling, Packages, Settings, and Help. The main area shows a file tree under '/home/asadmin/' with a selected 'hosts' entry. The terminal pane displays the command:

```
hosts : dockerhost
tasks:
- name : create docker container
  command : docker run -d --name regapp-server -p 8082:8080 saifshah/regapp:latest
```

At the bottom, there's a 'Remote monitoring' section with a graph icon, a checkbox for 'Follow terminal folder', and an 'INSERT' button. The status bar at the bottom right shows '6,5 All'.

Fig. Create new dockerhosts playbook for ansible

The screenshot shows the Ansible Control Center interface. At the top, there's a navigation bar with icons for Session, Servers, Tools, Games, Sessions, View, Split, MultiExec, Tunneling, Packages, Settings, and Help. The main area has a title bar "Ansible Control Center" with a progress bar showing "2.52/23.231.87". On the left, there's a "Quick connect..." dropdown menu and a file tree under "/home/ansadmin/". The file tree includes ".ansible", ".docker", ".ssh", ".vim", ".viminfo", ".bash\_history", ".bash\_logout", ".bash\_profile", and ".bashrc". The right side of the screen displays a terminal session output:

```
[ansadmin@Ansible_Server docker]$ ll
total 12
-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile
-rw-rw-r-- 1 ansadmin ansadmin 357 May 13 18:21 regapp.yml
-rw-rw-r-- 1 ansadmin ansadmin 2913 May 13 18:59 webapp.war
[ansadmin@Ansible_Server docker]$ vi deploy_regapp.yml
[ansadmin@Ansible_Server docker]$ ansible-playbook deploy_regapp.yml --check

PLAY [dockerhost] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 172.31.31.176 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.
ok: [172.31.31.176]

TASK [create docker container] ****
skipping: [172.31.31.176]

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

[ansadmin@Ansible_Server docker]$
```

At the bottom, there are two checkboxes: "Remote monitoring" and "Follow terminal folder".

Fig. Successful Check

```

[ansadmin@Ansible_Server docker]$ ansible-playbook deploy_regapp.yml --check
PLAY [dockerhost] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 172.31.31.176 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interp could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [172.31.31.176]

TASK [create docker container] ****
skipping: [172.31.31.176]

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

[ansadmin@Ansible_Server docker]$ ansible-playbook deploy_regapp.yml
PLAY [dockerhost] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 172.31.31.176 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interp could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [172.31.31.176]

TASK [create docker container] ****
fatal: [172.31.31.176]: FAILED! => {"changed": true, "cmd": ["docker", "run", "-d", "-name", "regapp-server", "-p", "8002:8000", "saifshah/regapp:latest"], "delta": "0:00:00.073060", "end": "2022-05-13 20:11:11.290303", "msg": "non-zero return code", "rc": 126, "start": "2022-05-13 20:11:11.217243", "stderr": "docker: Got permission denied while trying to connect to the Docker daemon socket at unix:///var/run/docker.sock: Post \"http://\%2Fvar%\2Frun%\2Fdocker.sock/v1.24/containers/create egapp-server\": dial unix /var/run/docker.sock: connect: permission denied.\nSee 'docker run --help'.", "stdout": "", "stdout_lines": []}

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

[ansadmin@Ansible_Server docker]$ ansible-playbook deploy_regapp.yml --check
PLAY [dockerhost] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 172.31.31.176 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interp could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [172.31.31.176]

TASK [create docker container] ****
skipping: [172.31.31.176]

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

[ansadmin@Ansible_Server docker]$ 

```

Fig. Error to fix permission

```

[root@dockerhost ~]# chmod /// /var/run/docker.sock:
chmod: cannot access '/var/run/docker.sock': No such file or directory
[root@dockerhost ~]# chmod 777 /var/run/docker.sock
[root@dockerhost ~]# 

```

Fig. Fixed Permission Error



The screenshot shows a desktop environment with a terminal window open. The terminal window title is '[ansadmin@Ansible\_Server docker]\$'. The command 'ansible-playbook deploy\_regapp.yml' is being run. The output shows:

```

PLAY [dockerhost] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 172.31.31.176 is using the discovered Python interpreter at /usr/bin/python, but future installation of another Python interp could change this. See https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html for more information.
ok: [172.31.31.176]

TASK [create docker container] ****
changed: [172.31.31.176]

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

[ansadmin@Ansible_Server docker]$ 

```

Fig. ansible-playbook deploy-regapp.yml success

```

[root@dockherhost ~]# chmod 777 /var/run/docker.sock
chmod: cannot access '/var/run/docker.sock': No such file or directory
[root@dockherhost ~]# chmod 777 /var/run/docker.sock
[root@dockherhost ~]# docker images
REPOSITORY          TAG      IMAGE ID      CREATED        SIZE
satishah/regapp   latest   15574dfecf93   8 hours ago   510MB
[root@dockherhost ~]# docker ps -a
CONTAINER ID   IMAGE      COMMAND       CREATED        STATUS        PORTS     NAMES
aae53bdfc599   satishah/regapp:latest   "/opt/tomcat/bin/cat..."   49 seconds ago   Up 48 seconds   0.0.0.0:8082->8080/tcp, :::8082->8080/tcp   regapp-server
[root@dockherhost ~]#

```

Fig. Images and Container are running

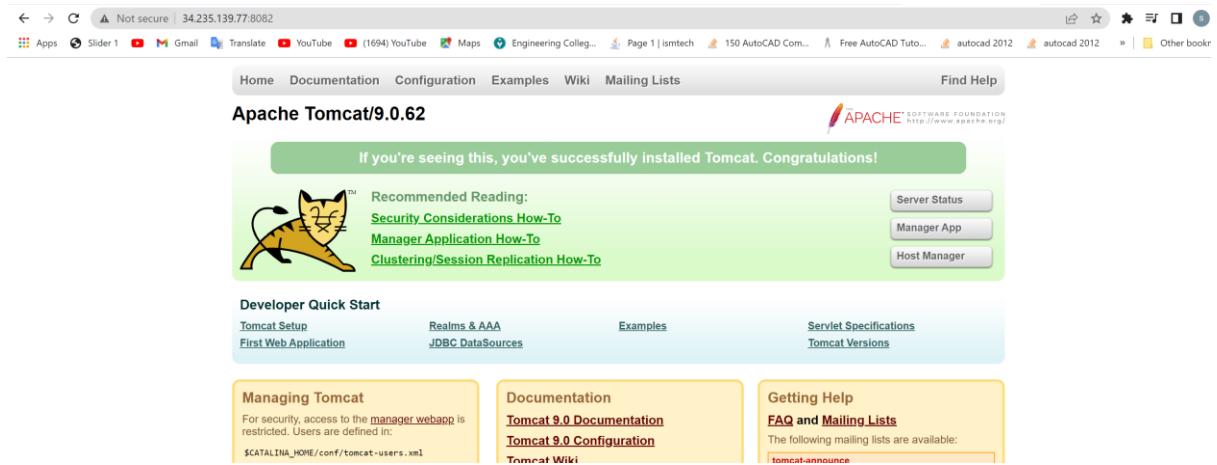
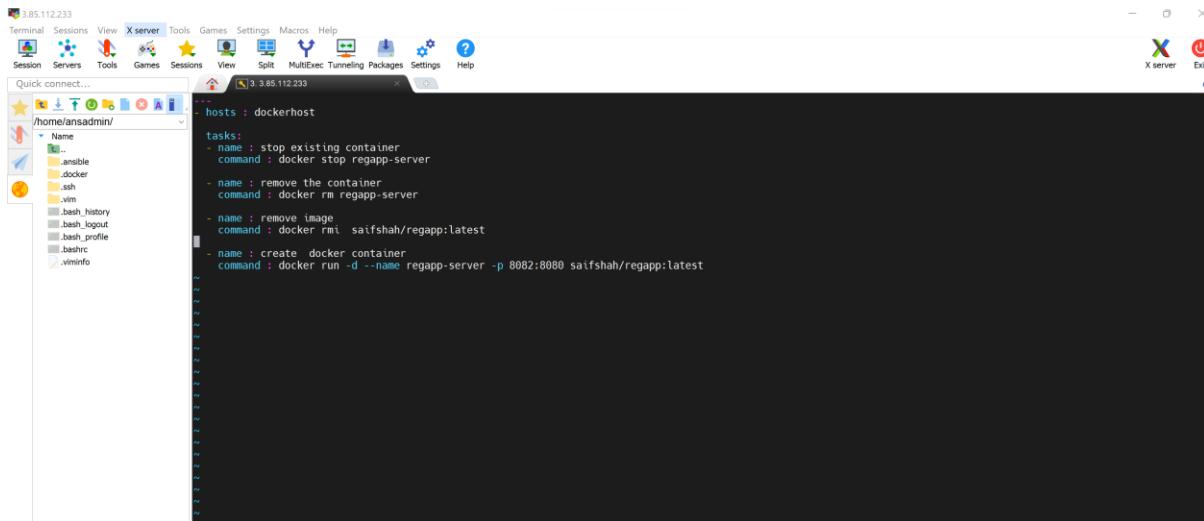


Fig. Access to the port 8082 on server

## Continous deployment of docker container using ansible playbook

### Deploy ansible playbook

- Remove existing container
- Remove existing image
- Create new container



## Fig. Creating ansible playbook

**Note : ignore\_errors : yes // ignoring the tasks**

```
[ansadmin@Ansible_Server docker]$ ansible-playbook deploy_regapp.yml --check
PLAY [dockerhost] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 172.31.31.176 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.
ok: [172.31.31.176]

TASK [stop existing container] ****
skipping: [172.31.31.176]

TASK [remove the container] ****
skipping: [172.31.31.176]

TASK [remove image] ****
skipping: [172.31.31.176]

TASK [create docker container] ****
skipping: [172.31.31.176]

PLAY RECAP ****
172.31.31.176 : ok=1    changed=0    unreachable=0    failed=0    skipped=4    rescued=0    ignored=0

[ansadmin@Ansible_Server docker]$
```

Fig . Check Success

```
Last login: Fri May 13 20:02:14 2022 from 152.57.216.141
 _\|_ /_ ) Amazon Linux 2 AMI
 _\ \_\_|_|
https://aws.amazon.com/amazon-linux-2/
4 package(s) needed for security, out of 4 available
Run "sudo yum update" to apply all updates.
[ec2-user@dockherhost ~]$ sudo su -
Last login: Fri May 13 20:02:21 UTC 2022 on pts/0
[root@dockherhost ~]# cd /opt/docker
[root@dockherhost docker]# service docker start
Redirecting to /bin/systemctl start docker.service
[root@dockherhost docker]# docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
aae5d8dfe509 saifshah/regapp:latest "/opt/tomcat/bin/cat..." 12 hours ago Exited (143) 11 hours ago regapp-server
[root@dockherhost docker]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
saifshah/regapp latest 15574dfecf93 20 hours ago 510MB
[root@dockherhost docker]#
```

## Fig . Docker Images and Container

```
[ansadmin@Ansible_Server docker]$ ansible-playbook deploy_regapp.yml
PLAY [dockerhost] ****
TASK [Gathering Facts] ****
[WARNING]: Platform linux on host 172.31.31.176 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.
ok: [172.31.31.176]

TASK [stop existing container] ****
changed: [172.31.31.176]

TASK [remove the container] ****
changed: [172.31.31.176]

TASK [remove image] ****
changed: [172.31.31.176]

TASK [create docker container] ****
changed: [172.31.31.176]

PLAY RECAP ****
172.31.31.176 : ok=5    changed=4    unreachable=0    failed=0    skipped=0    rescued=0    ignored=0
```

Fig. Succesful ansible playbook created

```
root@dockerhost docker]# docker images
REPOSITORY TAG IMAGE ID CREATED SIZE
aifshah/regapp latest 15574dfeccf93 20 hours ago 510MB
root@dockerhost docker]# docker ps -a
CONTAINER ID IMAGE COMMAND CREATED STATUS PORTS NAMES
47675a7cd2a aifshah/regapp:latest "/opt/tomcat/bin/cat..." About a minute ago Up About a minute 0.0.0.0:8082->8080/tcp, :::8082->8080/tcp regapp-server
root@dockerhost docker]#
```

Fig . Docker images and container output after ansible playbook

Hint: [https://docs.ansible.com/ansible/2.4/docker\\_image\\_module.html](https://docs.ansible.com/ansible/2.4/docker_image_module.html)

## Jenkins CI/CD to deploy on container using Ansible

The screenshot shows the Jenkins 'CopyArtifact onto Ansible' configuration screen. The 'Build Settings' tab is active. In the 'Source files' section, the path 'webapp/target/\*.war' is specified. In the 'Remove prefix' section, the path 'webapp/target' is listed. In the 'Remote directory' section, the path '//opt/docker' is specified. In the 'Exec command' section, the Jenkinsfile snippet 'ansible-playbook /opt/docker/regapp.yml; sleep 10; ansible-playbook /opt/docker/deploy\_regapp.yml;' is pasted into the text area. A note at the bottom states: 'All of the transfer fields (except for Exec timeout) support substitution of Jenkins environment variables'.

Fig. Configuring deploy\_regapp.yml

The screenshot shows the Jenkins interface with the following details:

- Project Path:** Dashboard > CopyArtifact\_onto\_Ansible > #10
- Job Name:** CopyArtifact\_onto\_Ansible
- Status:** Success (indicated by a green checkmark icon)
- Console Output:**
  - Started by an SCM change
  - Running as SYSTEM
  - Building in workspace /var/lib/jenkins/workspace/CopyArtifact\_onto\_Ansible
  - The recommended git tool is: NONE
  - Fetching changes from the remote Git repository
  - git config remote.origin.url https://github.com/SaifPanjesha/hello-world.git # timeout=10
  - Fetching upstream changes from https://github.com/SaifPanjesha/hello-world.git
  - git --version # timeout=10
  - git --version # 'git version 2.32.0'
  - git fetch --tags --force --progress -- https://github.com/SaifPanjesha/hello-world.git +refs/heads/\*:refs/remotes/origin/\* # timeout=10
  - git rev-parse refs/remotes/origin/master^(commit) # timeout=10
  - Checking out Revision 9415bc7b5ecd4d582ce4bc6801ed3dc9826395ea (refs/remotes/origin/master)
  - git config core.sparsecheckout # timeout=10
  - git checkout -f 9415bc7b5ecd4d582ce4bc6801ed3dc9826395ea # timeout=10
  - Commit message: "Update registry in index.jsp"
  - git rev-list --no-walk 990ae174811d78a550c8221ea6e4938f162a6f14 # timeout=10
  - Parsing POM
  - Established TCP socket on 35713
  - [CopyArtifact\_onto\_Ansible] \$ /usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86\_64/bin/java -cp /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-agent-1.13.jar:/opt/maven/boot/plexus-classworlds-2.6.0.jar:/opt/maven/conf/logging jenkins.maven3.agent.Maven3Main /opt/maven /var/lib/jenkins/.M3/jenkins/war/WEB-INF/lib/remoting-4.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-1.13.jar
  - ==>[JENKINSL REMOTING CAPACITY]==>channel started
  - Executing Maven: -B -f /var/lib/jenkins/workspace/CopyArtifact\_onto\_Ansible/pom.xml clean install
  - [INFO] Scanning for projects...
  - [WARNING]
  - [WARNING] Some problems were encountered while building the effective model for com.example.maven-project:server:jar:1.0-SNAPSHOT
  - [WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
  - [WARNING]
  - [WARNING] Some problems were encountered while building the effective model for com.example.maven-project:webapp:war:1.0-SNAPSHOT
  - [WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.

Fig. Build Success

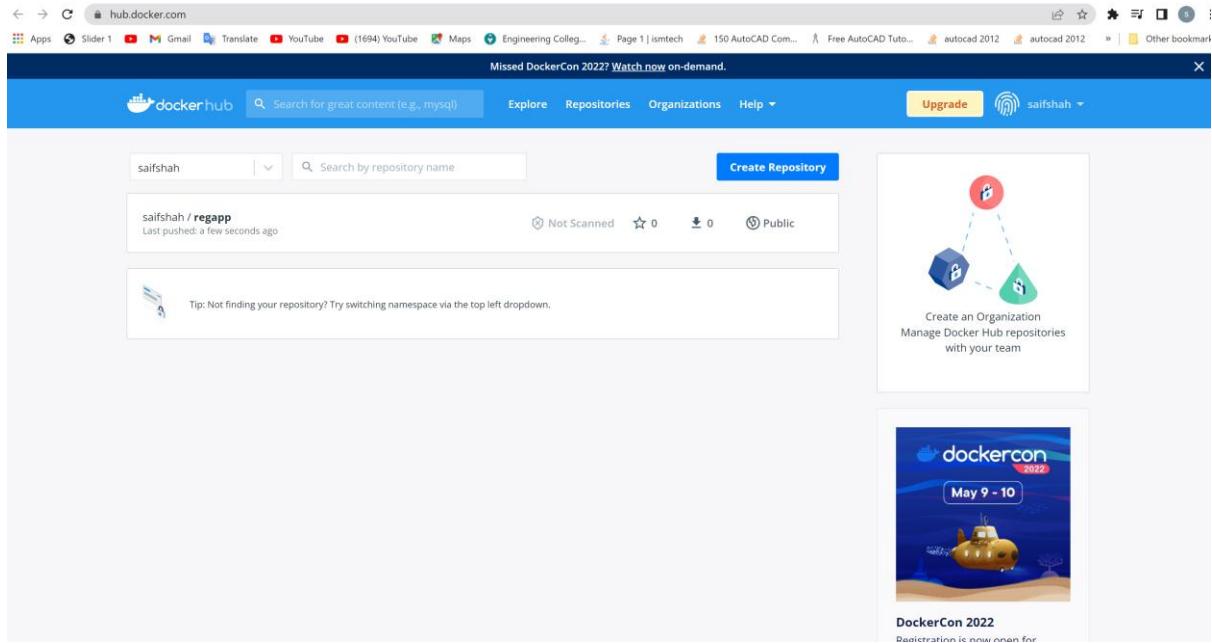


Fig. Success Build an image on ansible

**Kubernetes:**

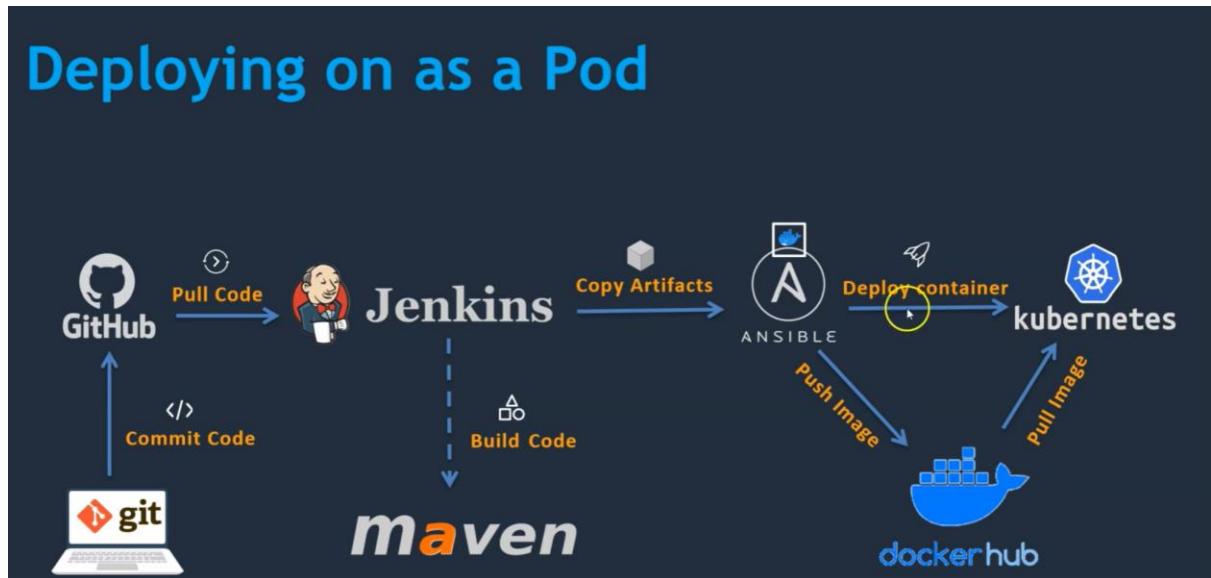


Fig. Kubernetes

**Kubernetes installation methods:**

### Installing Kubernetes with deployment tools

- Bootstrapping clusters with kubeadm
- Installing Kubernetes with kops
- Installing Kubernetes with Kubespray

### Turnkey Cloud Solutions

### Windows in Kubernetes

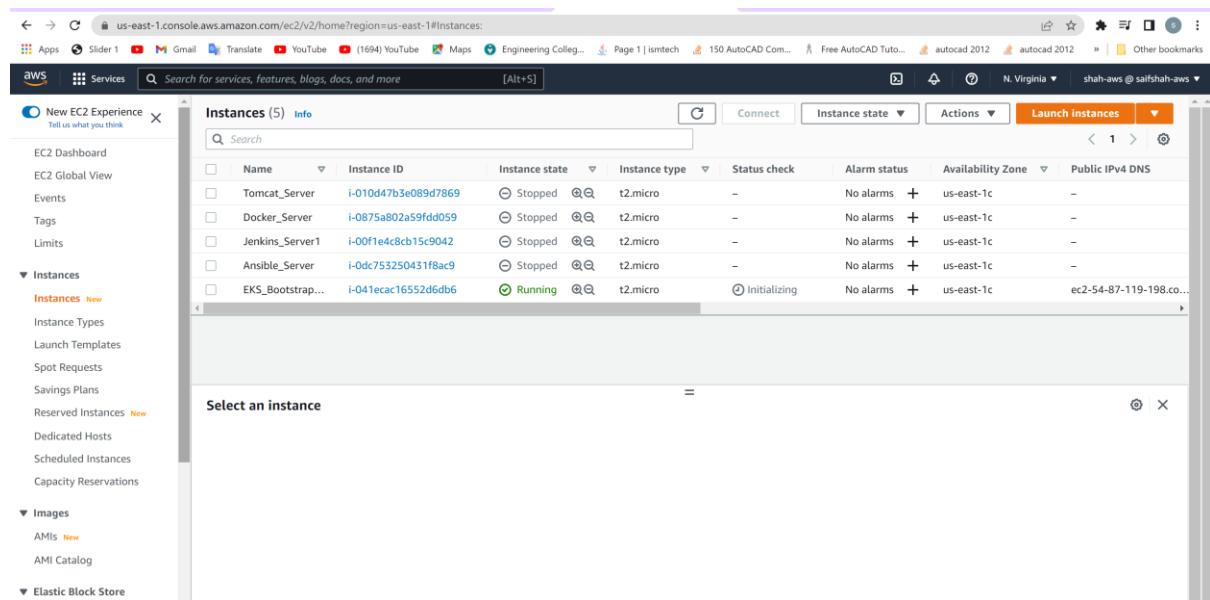
Windows containers in Kubernetes

## EKS installation procedure

### Kubernetes Setup using eksctl

Pre-requisites:

- an EC2 Instance



The screenshot shows the AWS EC2 Instances page. On the left, there's a sidebar with navigation links like EC2 Dashboard, Instances, Images, and Elastic Block Store. The main area displays a table of instances. One instance, named 'EKS\_Bootstrap...', is highlighted with a green checkmark icon and labeled 'Running'. The table includes columns for Name, Instance ID, Instance state, Instance type, Status check, Alarm status, Availability Zone, and Public IPv4 DNS. A modal window titled 'Select an instance' is open at the bottom, indicating the user is about to select the running instance.

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
Tomcat_Server	i-010d47b3e089d7869	Stopped	t2.micro	-	No alarms	us-east-1c	-
Docker_Server	i-0875a802a59fdd059	Stopped	t2.micro	-	No alarms	us-east-1c	-
Jenkins_Server1	i-00f1e4c8cb15c9042	Stopped	t2.micro	-	No alarms	us-east-1c	-
Ansible_Server	i-0dc753250431f8ac9	Stopped	t2.micro	-	No alarms	us-east-1c	-
EKS_Bootstrap...	i-041ecac16552d6db6	Running	t2.micro	Initializing	No alarms	us-east-1c	ec2-54-87-119-198.co...

Fig. EKS Bootstrap Server

- Install AWSCLI latest version

```
curl "https://awscli.amazonaws.com/awscli-exe-linux-x86_64.zip" -o "awscliv2.zip"
```

```
unzip awscliv2.zip
```

```
sudo ./aws/install
```

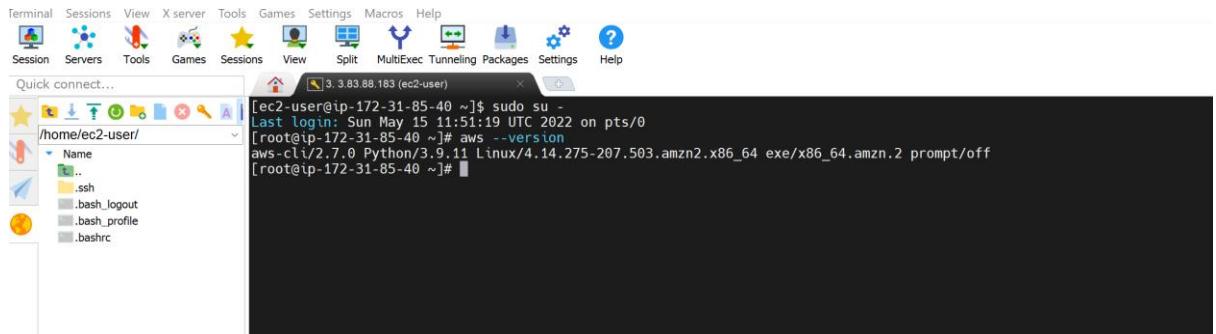


Fig. Successful AWS cli updated

## 1. Setup kubectl

### a. Download kubectl version 1.22

```
curl -o kubectl https://s3.us-west-2.amazonaws.com/amazon-eks/1.22.6/2022-03-09/bin/linux/amd64/kubectl
```

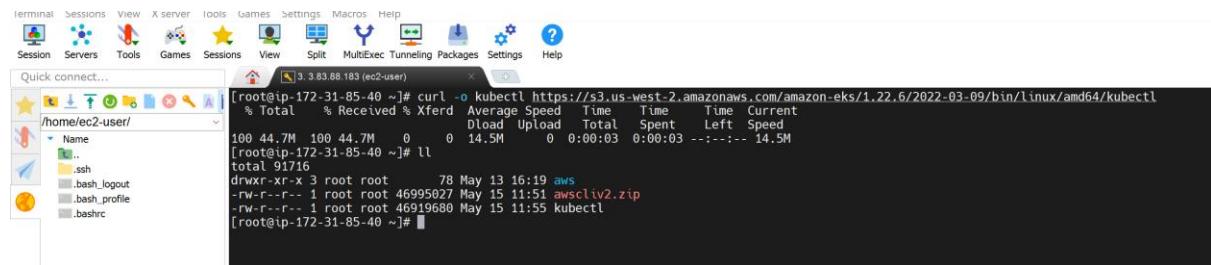


Fig. Kubectl version 1.22

### b. Grant execution permissions to kubectl executable

```
[root@ip-172-31-85-40 ~]# chmod +x kubectl
```

### c. Move kubectl onto /usr/local/bin

```
[root@ip-172-31-85-40 ~]# mv kubectl /usr/local/bin
```

#### d. Test that your kubectl installation was successful

```
[root@ip-172-31-85-40 ~]# kubectl version
```

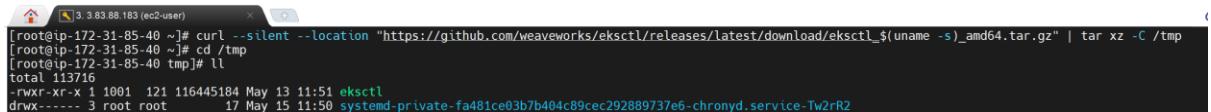
```
Client Version: version.Info{Major:"1", Minor:"22+", GitVersion:"v1.22.6-eks-7d68063",
GitCommit:"f24e667e49fb137336f7b064dba897beed639bad",
GitTreeState:"clean", BuildDate:"2022-02-23T19:32:14Z",
GoVersion:"go1.16.12", Compiler:"gc", Platform:"linux/amd64"}
```

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

## 2. Setup eksctl

### a. Download and extract the latest release

```
curl --silent --location
"https://github.com/weaveworks/eksctl/releases/latest/download/eksctl_$(uname -s)_amd64.tar.gz" | tar xz -C /tmp
```



A screenshot of a terminal window titled '3.383.88.163 (ec2-user)'. The window shows the command being run: 'curl --silent --location "https://github.com/weaveworks/eksctl/releases/latest/download/eksctl\_\$(uname -s)\_amd64.tar.gz" | tar xz -C /tmp'. Below the command, the terminal displays the output of the tar command, showing a file named 'eksctl' with permissions '-rwxr-xr-x' and size '113716'. The file was modified on 'May 13 11:51'.

Fig. eksctl download and release

### b. Move the extracted binary to /usr/local/bin

```
[root@ip-172-31-85-40 tmp]# mv eksctl /usr/local/bin
```

### c. Test that your eksctl installation was successful

```
[root@ip-172-31-85-40 tmp]# eksctl version
```

0.97.0

### 3. Create an IAM Role and attach it to EC2 instance

**Note: create IAM user with programmatic access if your bootstrap system is outside of AWS**

**IAM user should have access to**

**IAM**

**EC2**

**CloudFormation**

**Note: Check eksctl documentaiton for Minimum IAM policies**

The screenshot shows the AWS IAM Roles page. On the left, the navigation menu includes 'Identity and Access Management (IAM)', 'Access management', 'Access reports', and 'Service control policies (SCPs)'. The main content area displays the 'eksctl\_role' details. It was created on May 15, 2022, at 17:50 (UTC+05:30). The 'Permissions' tab is selected, showing four managed policies attached:

Policy name	Type	Description
AmazonEC2FullAccess	AWS managed	Provides full access to Amazon EC2 vi...
IAMFullAccess	AWS managed	Provides full access to IAM via the AW...
AdministratorAccess	AWS managed - job function	Provides full access to AWS services a...
AWSCloudFormationFullAccess	AWS managed	Provides full access to AWS CloudFor...

Below the table, there is a section for 'Permissions boundary - (not set)' with a note: 'Set a permissions boundary to control the maximum permissions this role can have. This is not a common'.

Fig. Created IAM role

The screenshot shows the 'Modify IAM role' dialog box within the EC2 Instances interface. The path is EC2 > Instances > i-0a1972f80a26866df > Modify IAM role. The 'eksctl\_role' is selected from the dropdown menu under 'IAM role'. At the bottom, there are 'Cancel' and 'Save' buttons.

Fig. Role Save to EC2 Instance

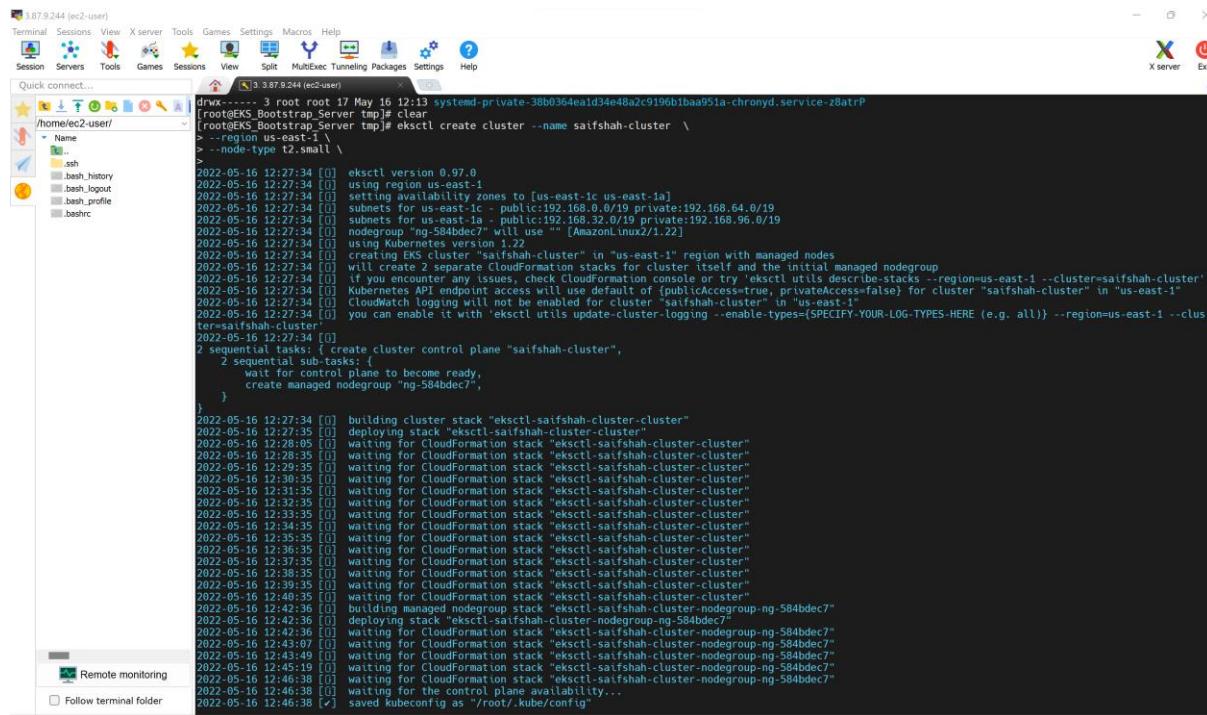
## 4. Create your cluster and nodes

```
eksctl create cluster --name cluster-name \
--region region-name \
--node-type instance-type \
--nodes-min 2 \
--nodes-max 2 \
--zones <AZ-1>,<AZ-2>
```

Example :

```
eksctl create cluster --name saifshah-cluster \
--region us-east-1 \
--node-type t2.small \
```

Output:



```
3.87.9.244 (ec2-user)
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
/home/ec2-user/
  - Name
    ssh
  bash_history
  bash_logout
  bash_profile
  .bashrc
3.87.9.244 (ec2-user) [root@EKS_Bootstrap_Server ~]# clear
[root@EKS_Bootstrap_Server ~]# eksctl create cluster --name saifshah-cluster \
--region us-east-1 \
--node-type t2.small \
drwx----- 3 root root 17 May 16 12:13 systemd-private-38b0364eald34e48a2c9196b1baa951a-chronyd.service-z8atrP
[root@EKS_Bootstrap_Server ~]# clear
[root@EKS_Bootstrap_Server ~]# eksctl create cluster --name saifshah-cluster \
--region us-east-1 \
--node-type t2.small \
> --node-type t2.small \
2022-05-16 12:27:34 [0] eksctl version 0.97.0
2022-05-16 12:27:34 [0] using region us-east-1
2022-05-16 12:27:34 [0] setting availability zones to [us-east-1c us-east-1a]
2022-05-16 12:27:34 [0] subnets for us-east-1c - public:192.168.0.0/19 private:192.168.64.0/19
2022-05-16 12:27:34 [0] subnets for us-east-1a - public:192.168.32.0/19 private:192.168.96.0/19
2022-05-16 12:27:34 [0] nodegroup "ng-584bdec7" will use "" [AmazonLinux2/1.22]
2022-05-16 12:27:34 [0] using Kubernetes version 1.22
2022-05-16 12:27:34 [0] creating EKS cluster "saifshah-cluster" in "us-east-1" region with managed nodes
2022-05-16 12:27:34 [0] will create 2 sequential CloudFormation stacks for cluster itself and the initial managed nodegroup
2022-05-16 12:27:34 [0] if you want any timestamp CloudFormation console output, add --describe-stacks --region=us-east-1 --cluster=saifshah-cluster
2022-05-16 12:27:34 [0] Kubernetes API endpoint access will use default of {publicAccess=true , privateAccess=false} for cluster "saifshah-cluster" in "us-east-1"
2022-05-16 12:27:34 [0] CloudWatch logging will not be enabled for cluster "saifshah-cluster" in "us-east-1"
2022-05-16 12:27:34 [0] you can enable it with `eksctl utils update-cluster-logging --enable-types={SPECIFY-YOUR-LOG-TYPES-HERE (e.g. all)} --region=us-east-1 --cluster=saifshah-cluster`
2022-05-16 12:27:34 [0] 
2 sequential tasks: [
  2 sequential sub-tasks: {
    wait for control plane to become ready,
    create managed nodegroup "ng-584bdec7",
  }
]
2022-05-16 12:27:34 [0] building cluster stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:27:35 [0] deploying stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:28:05 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:28:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:29:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:30:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:31:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:32:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:33:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:34:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:35:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:36:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:37:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:38:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:39:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:40:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:42:30 [0] building managed nodegroup stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:42:36 [0] deploying stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:42:36 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:43:07 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:43:49 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:44:19 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:46:38 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:46:38 [0] waiting for the control plane availability...
2022-05-16 12:46:38 [✓] saved kubeconfig as '/root/.kube/config'
```

```

2022-05-16 12:27:34 [0] using Kubernetes version 1.22
2022-05-16 12:27:34 [0] creating EKS cluster "saifshah-cluster" in "us-east-1" region with managed nodes
2022-05-16 12:27:34 [0] will create 2 separate CloudFormation stacks for cluster itself and the initial managed nodegroup
2022-05-16 12:27:34 [0] if you encounter any issues, check CloudFormation console or try `eksctl utils describe-stacks --region=us-east-1 --cluster=saifshah-cluster`
2022-05-16 12:27:34 [0] Kubernetes API endpoint access will use default of {publicAccess=true, privateAccess=false} for cluster "saifshah-cluster" in "us-east-1"
2022-05-16 12:27:34 [0] CloudWatch logging will not be enabled for cluster "saifshah-cluster" by default
2022-05-16 12:27:34 [0] you can enable it by `eksctl utils update-cluster-logging --enable-types={SPECIFY-YOUR-LOG-TYPES-HERE (e.g. all)} --region=us-east-1 --cluster=saifshah-cluster`
2022-05-16 12:27:34 [0] 2 sequential tasks: 1. create cluster control plane "saifshah-cluster",
2022-05-16 12:27:34 [0]     2 sequential sub-tasks: 1. wait for control plane to become ready,
2022-05-16 12:27:34 [0]         2. create managed nodegroup "ng-584bdec7",
2022-05-16 12:27:34 [0] 
2022-05-16 12:27:35 [0] building cluster stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:27:35 [0] deploying stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:28:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:29:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:30:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:31:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:32:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:33:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:34:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:35:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:36:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:37:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:38:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:39:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:40:35 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-cluster"
2022-05-16 12:42:36 [0] building managed nodegroup stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:42:36 [0] deploying stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:42:36 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:42:36 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:43:49 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:45:19 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:46:38 [0] waiting for CloudFormation stack "eksctl-saifshah-cluster-nodegroup-ng-584bdec7"
2022-05-16 12:46:38 [0] waiting for the control plane availability...
2022-05-16 12:46:38 [x] saved kubeconfig as "/root/.kube/config"
2022-05-16 12:46:38 [x] no tasks
2022-05-16 12:46:38 [x] all the Cluster resources for "saifshah-cluster" have been created
2022-05-16 12:46:38 [x] nodegroup "ng-584bdec7" has 2 node(s)
2022-05-16 12:46:38 [0] node "ip-192-168-60-68.ec2.internal" is ready
2022-05-16 12:46:38 [0] nodegroup "ng-584bdec7" has 2 node(s)
2022-05-16 12:46:38 [0] node "ip-192-168-7-5.ec2.internal" is ready
2022-05-16 12:46:38 [0] node "ip-192-168-7-5.ec2.internal" is ready
2022-05-16 12:46:41 [0] kubectl command should work with "/root/.kube/config", try "kubectl get nodes"
2022-05-16 12:46:41 [x] EKS cluster "saifshah-cluster" in "us-east-1" region is ready
[root@EKS_Bootstrap_Server tmp]#

```

Fig. Cluster Created

Stack name	Status	Created time	Description
eksctl-saifshah-cluster-nodegroup-ng-584bdec7	CREATE_COMPLETE	2022-05-16 18:12:56 UTC+0530	EKS Managed Nodes (SSH access: false) [created by eksctl]
eksctl-saifshah-cluster-cluster	CREATE_COMPLETE	2022-05-16 17:57:34 UTC+0530	EKS cluster (dedicated VPC: true, dedicated IAM: true) [created and managed by eksctl]

Fig. Stacks in CloudFormation

## 5. To delete the EKS cluster

**eksctl delete cluster saifshah --region us-east-1**

**6. Validate your cluster using by creating by checking nodes and by creating a pod**

Fig. cat /root/.kube/config

```
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
4.387.9.244 (ec2-user)
/home/ec2-user/
[root@EKS_Bootstrap_Server tmp]# kubectl get nodes
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME           STATUS   ROLES      AGE    VERSION
ip-192-168-60-68.ec2.internal   Ready    <none>   16m   v1.22.6-eks-7d68063
ip-192-168-7-5.ec2.internal   Ready    <none>   16m   v1.22.6-eks-7d68063
[root@EKS_Bootstrap_Server tmp]# kubectl get all
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP   10.100.0.1   <none>       443/TCP   26m
[root@EKS_Bootstrap_Server tmp]#
```

Fig. Created nodes and check all service/Kubernetes

## Creating a pod:

```
[root@EKS_Bootstrap_Server tmp]# kubectl run webapp --image=httdp;
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
pod/webapp created
[root@EKS_Bootstrap_Server tmp]# kubectl get all
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          READY   STATUS    RESTARTS   AGE
pod/webapp   0/1     ImagePullBackOff   0          51s

NAME          TYPE      CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
service/kubernetes  ClusterIP  10.100.0.1   <none>        443/TCP   36s
```

Fig . Pod Successful created

**Command for only showing pod:**

```
[root@EKS_Bootstrap_Server tmp]# kubectl get po
```

Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.

NAME	READY	STATUS	RESTARTS	AGE
webapp	0/1	ImagePullBackOff	0	2m44s

```
[root@EKS_Bootstrap_Server tmp]#
```

---

**Run Kubernetes Basic Commands:**

## 7. Deploying Nginx Container

```
kubectl create deployment demo-nginx --image=nginx --replicas=2 --port=80
```

```
# kubectl deployment regapp --image=saifshah/regapp --replicas=2 --  
port=8080
```

```
kubectl get all
```

```
kubectl get pod
```

```

[54.211.230.181 (ec2-user)]
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
/home/ec2-user/
  • Name
    .ssh
    bash_history
    bash_logout
    bash_profile
    bashrc
[54.211.230.181 (ec2-user)]# kubectl create deployment demo-nginx --image=nginx --port=80 --replicas=2
error: exactly one NAME is required; got none
Try 'kubectl create deployment --help' for help and examples
[54.211.230.181 (ec2-user)]# kubectl create deployment demo-nginx --image=nginx --replicas=2 --port=80
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
deployment.apps/demo-nginx created
[54.211.230.181 (ec2-user)]# kubectl get all
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          READY   STATUS    RESTARTS   AGE
pod/demo-nginx-848d469579-pc7mc   1/1     Running   0          40s
pod/demo-nginx-848d469579-wlljj   1/1     Running   0          40s

NAME            TYPE        CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
service/kubernetes   ClusterIP   10.100.0.1   <none>           443/TCP    72m

NAME          READY   STATUS    RESTARTS   AGE
deployment.apps/demo-nginx  2/2     2          0          40s

NAME          DESIRED  CURRENT  READY   AGE
replicaset.apps/demo-nginx-848d469579  2         2         2         40s
[54.211.230.181 (ec2-user)]# kubectl get po
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          READY   STATUS    RESTARTS   AGE
demo-nginx-848d469579-pc7mc   1/1     Running   0          62s
demo-nginx-848d469579-wlljj   1/1     Running   0          70s
[54.211.230.181 (ec2-user)]# kubectl get pod
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          READY   STATUS    RESTARTS   AGE
demo-nginx-848d469579-pc7mc   1/1     Running   0          107s
[54.211.230.181 (ec2-user)]# kubectl get replicaset
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          DESIRED  CURRENT  READY   AGE
demo-nginx-848d469579            2         2         2         2m53s
[54.211.230.181 (ec2-user)]# 

```

Fig. Deploying Ngnix Container

## 8. Expose the deployment as service. This will create an ELB in front of those 2 containers and allow us to publicly access them.

```

kubectl expose deployment demo-nginx --port=80 --type=LoadBalancer
# kubectl expose deployment regapp --port=8080 --type=LoadBalancer
kubectl get services -o wide

```

```

[54.211.230.181 (ec2-user)]
Terminal Sessions View X server Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help
Quick connect...
/home/ec2-user/
  • Name
    .ssh
    bash_history
    bash_logout
    bash_profile
    bashrc
[54.211.230.181 (ec2-user)]# kubectl expose deployment demo-nginx --port=8000 --type=LoadBalancer
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
Error from server: (NotFound): deployments.apps "demo-nginx" not found
[54.211.230.181 (ec2-user)]# kubectl expose deployment demo-nginx --port=80 --type=LoadBalancer
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
service/demo-nginx exposed
[54.211.230.181 (ec2-user)]# kubectl get all
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          READY   STATUS    RESTARTS   AGE
pod/demo-nginx-848d469579-pc7mc   1/1     Running   0          11m
pod/demo-nginx-848d469579-wlljj   1/1     Running   0          11m

NAME            TYPE        CLUSTER-IP      EXTERNAL-IP      PORT(S)      AGE
service/demo-nginx   LoadBalancer   10.100.41.107  a5e7c80d74c5f46029e7050de1ead81d-921720739.us-east-1.elb.amazonaws.com  80:32674/TCP  36s
service/kubernetes   ClusterIP   10.100.0.1   <none>           443/TCP    83m

NAME          READY   STATUS    RESTARTS   AGE
deployment.apps/demo-nginx  2/2     2          0          11m

NAME          DESIRED  CURRENT  READY   AGE
replicaset.apps/demo-nginx-848d469579  2         2         2         11m
[54.211.230.181 (ec2-user)]# ^C
[54.211.230.181 (ec2-user)]# 

```

Fig. Deployment as a service

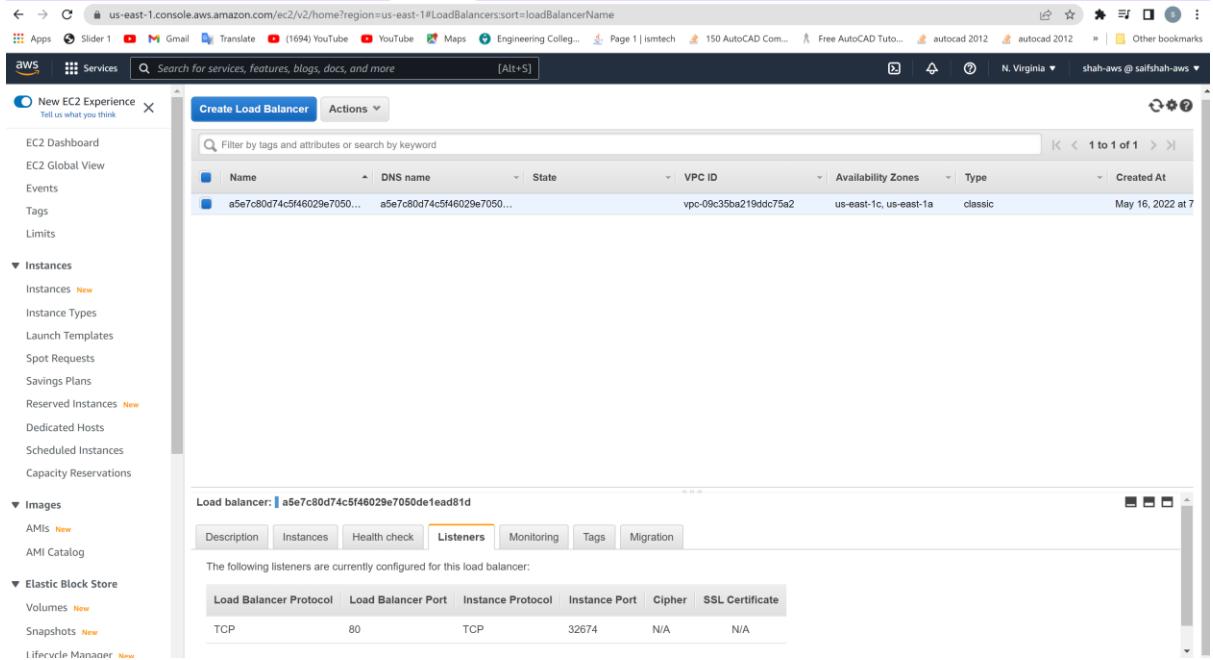


Fig. CloudWatch Metrics.

## kubectl get services -o wide

```

root@EKS_Bootstrap_Server tmp]# kubectl get services -o wide
Warning: kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME      TYPE      CLUSTER-IP   EXTERNAL-IP   PORT(S)        AGE   SELECTOR
lemo-nginx   LoadBalancer   10.100.41.107   a5e7c80d74c5f46029e7050de1ead81d-921720739.us-east-1.elb.amazonaws.com   80:32674/TCP   7m6s   app=demo-nginx
kubernetes   ClusterIP    10.100.0.1     <none>
root@EKS_Bootstrap_Server tmp]#

```

Fig. Kubectl services.

## Create a Manifest File:

```
[root@EKS_Bootstrap_Server ~]# cd /tmp
[root@EKS_Bootstrap_Server tmp]# kubectl get all
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME                                         READY   STATUS    RESTARTS   AGE
pod/demo-nginx-848d469579-pc7mc           1/1     Running   0          32m
pod/demo-nginx-848d469579-wljj            1/1     Running   0          32m

NAME                TYPE      CLUSTER-IP   EXTERNAL-IP   PORT(S)        AGE
service/demo-nginx LoadBalancer   10.100.41.107   a5e7c80d74c5f46029e7050de1ead81d-921720739.us-east-1.elb.amazonaws.com   80:32674/TCP   21m
service/kubernetes ClusterIP   10.100.0.1    <none>        443/TCP       104m

NAME              READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/demo-nginx   2/2     2           2           32m

NAME          DESIRED   CURRENT   READY   AGE
replicaset.apps/demo-nginx-848d469579   2         2         2         32m
[root@EKS_Bootstrap_Server tmp]# delete deployment demo-nginx
-bash: delete: command not found
[root@EKS_Bootstrap_Server tmp]# kubectl delete deployment demo-nginx
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
deployment.apps "demo-nginx" deleted
[root@EKS_Bootstrap_Server tmp]# kubectl get all
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME                                         READY   STATUS    RESTARTS   AGE
service/demo-nginx LoadBalancer   10.100.41.107   a5e7c80d74c5f46029e7050de1ead81d-921720739.us-east-1.elb.amazonaws.com   80:32674/TCP   22m
service/kubernetes ClusterIP   10.100.0.1    <none>        443/TCP       105m
[root@EKS_Bootstrap_Server tmp]# kubectl delete service/demo-nginx
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
service "demo-nginx" deleted
```

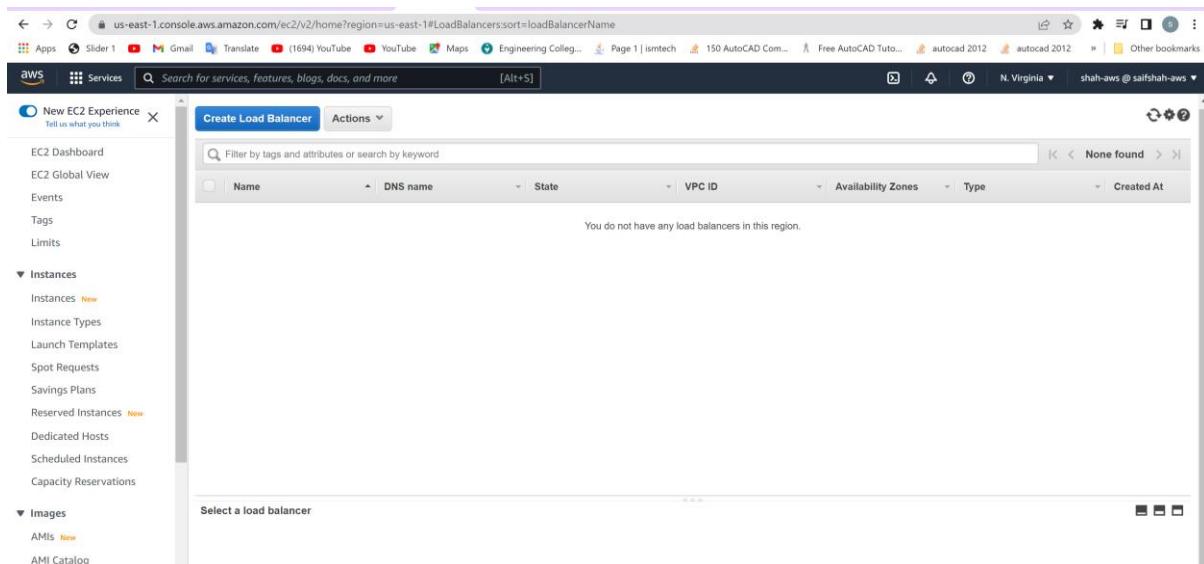


Fig. Deleted earlier configuration

Creating a manifest file:

```
[root@EKS_Bootstrap_Server tmp]# vi pod.yml
```

```
apiVersion: v1
kind: pod
metadata:
  name: data-pod
  labels:
    users: my-user
spec:
  containers:
    - name: demo-nginx
      image: nginx
    ports:
      - name: demo-nginx
        containerPort: 80
```

Creating a service manifest file:

```
[root@EKS_Bootstrap_Server tmp]# vi service.yml
```

```
[root@EKS_Bootstrap_Server tmp]# cat service.yml
```

```
apiVersion: v1
kind: Service
metadata:
  name: demo-Service
```

```
spec:  
  ports:  
    - name: nginx-port  
      port: 80  
      targetPort: 80  
  
  type: LoadBalancer
```

---

Output: pod.yml

```
[root@EKS_Bootstrap_Server tmp]# cat pod.yml  
apiVersion: v1  
kind: Pod  
metadata:  
  name: nginx-pod  
labels:  
  app: demo-app
```

```
spec:  
  containers:  
    - name: nginx-container  
      image: nginx  
  ports:  
    - name: nginx
```

containerPort: 80

[root@EKS\_Bootstrap\_Server tmp]# kubectl apply -f pod.yml //applying

Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.

pod/nginx-pod created

[root@EKS\_Bootstrap\_Server tmp]# kubectl get all

Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.

NAME READY STATUS RESTARTS AGE

pod/nginx-pod 1/1 Running 0 25s

NAME TYPE CLUSTER-IP EXTERNAL-IP PORT(S) AGE

service/kubernetes ClusterIP 10.100.0.1 <none> 443/TCP 7h37m

[root@EKS\_Bootstrap\_Server tmp]#

---

Output : service.yml

[root@EKS\_Bootstrap\_Server tmp]# clear

[root@EKS\_Bootstrap\_Server tmp]# ll

total 8

-rw-r--r-- 1 root root 199 May 16 20:11 pod.yml

-rw-r--r-- 1 root root 160 May 16 20:16 service.yml

drwx----- 3 root root 17 May 16 19:39 systemd-private-  
2a2e6e9d1ac347feaab952b1c678ed15-chronyd.service-2einFz

[root@EKS\_Bootstrap\_Server tmp]# cat service.yml

```
apiVersion: v1  
kind: Service  
metadata:  
  name: demo-service
```

```
spec:  
  ports:  
    - name: nginx-port  
      port: 80  
      targetPort: 80
```

```
  type: LoadBalancer
```

```
[root@EKS_Bootstrap_Server tmp]# kubectl apply -f service.yml
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
service/demo-service created
```

```
[root@EKS_Bootstrap_Server tmp]# kubectl get all
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

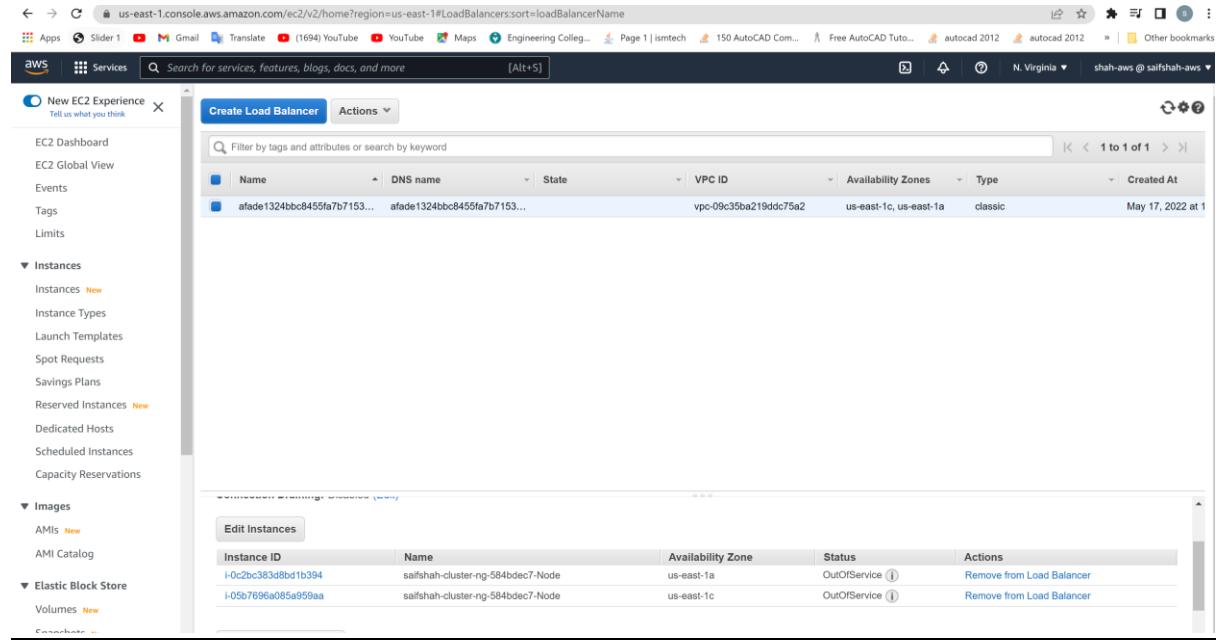
NAME	READY	STATUS	RESTARTS	AGE
pod/nginx-pod	1/1	Running	0	5m32s

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP
PORT(S)	AGE		

service/demo-service LoadBalancer 10.100.56.237  
afade1324bbc8455fa7b71537a4bcf6e-1513829373.us-east-  
1.elb.amazonaws.com 80:31295/TCP 22s

service/kubernetes ClusterIP 10.100.0.1 <none>  
443/TCP 7h42m

[root@EKS Bootstrap Server tmp]#



The screenshot shows the AWS EC2 Load Balancer console. The left sidebar navigation includes 'EC2 Dashboard', 'EC2 Global View', 'Events', 'Tags', 'Limits', 'Instances' (with sub-options like 'Instances', 'Instance Types', 'Launch Templates', 'Spot Requests', 'Savings Plans', 'Reserved Instances', 'Dedicated Hosts', 'Scheduled Instances', 'Capacity Reservations'), 'Images' (with sub-options like 'AMIs', 'AMI Catalog'), and 'Elastic Block Store' (with sub-options like 'Volumes'). The main content area has a header 'Create Load Balancer Actions'. Below it is a table titled 'Load Balancers' with columns: Name, DNS name, State, VPC ID, Availability Zones, Type, and Created At. One row is visible: 'afade1324bbc8455fa7b7153...' with 'afade1324bbc8455fa7b7153...' as the DNS name, 'vpc-09c35ba219ddc75a2' as the VPC ID, 'us-east-1c, us-east-1a' as the Availability Zones, 'classic' as the Type, and 'May 17, 2022 at 1' as the Created At date. At the bottom, there is a table titled 'Edit Instances' with columns: Instance ID, Name, Availability Zone, Status, and Actions. Two instances are listed: 'i-0c2bc383d8bd1b394' (Name: 'saifshah-cluster-nginx-584bdec7-Node', Availability Zone: 'us-east-1a', Status: 'OutOfService', Actions: 'Remove from Load Balancer') and 'i-05b7696a085a959aa' (Name: 'saifshah-cluster-nginx-584bdec7-Node', Availability Zone: 'us-east-1c', Status: 'OutOfService', Actions: 'Remove from Load Balancer').

Fig. LoadBalancer is created.

## Setup Pod and Service:



The screenshot shows a terminal window within the X server interface. The terminal displays the following content:

```
[root@EKS_Bootstrap_Server tmp]# ll
total 8
-rw-r--r-- 1 root root 199 May 16 20:11 pod.yml
-rw-r--r-- 1 root root 193 May 16 20:32 service.yml
drwx----- 3 root root 17 May 16 19:39 systemd-private-2a2e6e9d1ac347feab952b1c678ed15-chrony.service-e2einf
[root@EKS_Bootstrap_Server tmp]# cat pod.yml
apiVersion: v1
kind: Pod
metadata:
  name: nginx-pod
  labels:
    app: demo-app
spec:
  containers:
    - name: nginx-container
      image: nginx
      ports:
        - name: nginx
          containerPort: 80
[root@EKS_Bootstrap_Server tmp]# cat service.yml
apiVersion: v1
kind: Service
metadata:
  name: demo-service
spec:
  ports:
    - name: nginx-port
      port: 80
      targetPort: 80
  selector :
    app: demo-app
  type: LoadBalancer

[root@EKS_Bootstrap_Server tmp]#
```

Fig. Adding Label as a selector app

```
terminal SESSIONS View A server Tools Games Settings Macros Help
Session Servers Tools Games Session View Split MultiExe Tuning Packages Settings Help Find
Quick connect...
/home/ec2-user/
└── Name
    ├── .._
    ├── .ssh
    └── .bash_history
        └── .bash_logout
            └── .bash_profile
                └── .bashrc
[root@EKS Bootstrap_Server tmp]# kubectl apply -f pod.yaml
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
pod/nginx-pod unchanged
[root@EKS Bootstrap_Server tmp]# kubectl apply -f service.yaml
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
service/demo-service configured
[root@EKS Bootstrap_Server tmp]# vi pod.yaml
[root@EKS Bootstrap_Server tmp]# kubectl get all
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          READY   STATUS    RESTARTS   AGE
pod/nginx-pod  1/1     Running   0          24m
NAME           TYPE     CLUSTER-IP      EXTERNAL-IP   PORT(S)          AGE
service/demo-service  LoadBalancer   afafe1324bbc8455fa7b71537a4bcf6e-1513829373.us-east-1.elb.amazonaws.com  80:31295/TCP   19m
service/kubernetes  ClusterIP      10.96.0.1       <none>        443/TCP         8h
[root@EKS Bootstrap_Server tmp]# kubectl describe service/demo-service
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
Name:           demo-service
Namespace:      default
Labels:         <none>
Annotations:   <none>
Selector:       app=demo app
Type:          LoadBalancer
IP Family Policy:  SingleStack
IP Families:   IPv4
IP:             10.96.0.1
IPs:            10.96.0.1
LoadBalancer Ingress: afafe1324bbc8455fa7b71537a4bcf6e-1513829373.us-east-1.elb.amazonaws.com
Port:          <unset>        80/TCP
TargetPort:    80/TCP
NodePort:      <unset>        31295/TCP
Endpoints:    192.168.20.75:80
Session Affinity: None
External Traffic Policy: Cluster
Events:
  Type  Reason  Age   From            Message
  ----  -----  --   --              --
  Normal  EnsuringLoadBalancer  2m13s (x2 over 20m)  service-controller  Ensuring load balancer
  Normal  EnsuredLoadBalancer  2m12s (x2 over 19m)  service-controller  Ensured load balancer
[root@EKS Bootstrap_Server tmp]# kubectl pod -w
error: unknown command "pod" for "kubectl"
Did you mean this?
    top

Run 'kubectl --help' for usage.
[root@EKS Bootstrap_Server tmp]# kubectl get pod -w
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          READY   STATUS    RESTARTS   AGE   IP           NOMINATED NODE   READINESS GATES
nginx-pod     1/1     Running   0          26m   192.168.20.75   <none>        <none>
[root@EKS Bootstrap_Server tmp]# ^C
[root@EKS Bootstrap_Server tmp]#
```

## Fig. Using Labels & Selector

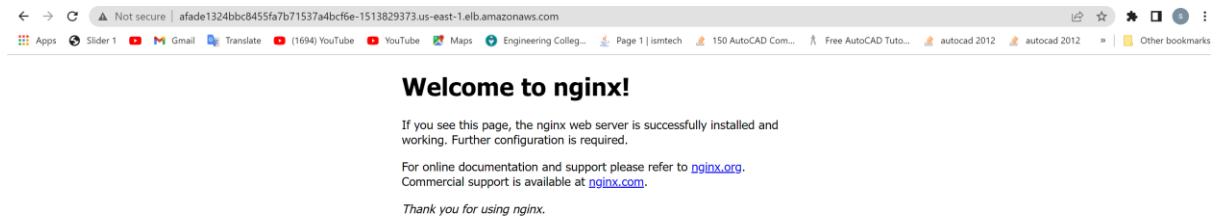


Fig. Output Successful out of Service Load Balancer Working.

---

## Integrating Kubernetes in CI/CD pipeline:

### Deleting previous configuration:

```
[root@EKS_Bootstrap_Server tmp]# kubectl get all
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

NAME	READY	STATUS	RESTARTS	AGE
pod/nginx-pod	1/1	Running	0	35m

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP
PORT(S)	AGE		

service/demo-service	LoadBalancer	10.100.56.237
afade1324bbc8455fa7b71537a4bcf6e-1513829373.us-east-1.elb.amazonaws.com	80:31295/TCP	30m

service/kubernetes	ClusterIP	10.100.0.1	<none>
443/TCP	8h		

```
[root@EKS_Bootstrap_Server tmp]# kubectl delete pod/nginx-pod
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
pod "nginx-pod" deleted
```

```
[root@EKS_Bootstrap_Server tmp]# kubectl get po
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
No resources found in default namespace.
```

```
[root@EKS_Bootstrap_Server tmp]# kubectl delete service/demo-service
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
service "demo-service" deleted
```

```
[root@EKS_Bootstrap_Server tmp]#
```

Write a deployment file:

```
[root@EKS_Bootstrap_Server ~]# cat regapp-deploy.yml
```

```
apiVersion: apps/v1
```

```
kind: Deployment
```

```
metadata:
```

```
  name: saifshah-regapp
```

```
  labels:
```

```
    app: regapp
```

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

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

```
[root@EKS_Bootstrap_Server ~]# cat regapp-service.yml
```

```
apiVersion: v1  
kind: Service
```

```
metadata:  
  name: saifshah-service  
  
  labels:  
    app: regapp  
  
spec:  
  selector:  
    app: regapp
```

```
  ports:  
    - port: 8080  
      targetPort: 8080  
  
  type: LoadBalancer
```

```
[root@EKS_Bootstrap_Server ~]#
```

```
[root@EKS_Bootstrap_Server ~]# ls
```

```
aws awscliv2.zip regapp-deploy.yml regapp-service.yml
```

```
[root@EKS_Bootstrap_Server ~]# kubectl apply -f regapp-deploy.yml
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
error: error when retrieving current configuration of:
```

```
Resource: "apps/v1, Resource=deployments", GroupVersionKind: "apps/v1,  
Kind=Deployment"
```

```
Name: "saifshah/regapp", Namespace: "default"
```

```
from server for: "regapp-deploy.yml": invalid resource name  
"saifshah/regapp": [may not contain '/']
```

```
[root@EKS_Bootstrap_Server ~]# vi regapp-deploy.yml
```

```
[root@EKS_Bootstrap_Server ~]# clear
```

```
[root@EKS_Bootstrap_Server ~]# ls
```

```
aws awscli2.zip regapp-deploy.yml regapp-service.yml
```

```
[root@EKS_Bootstrap_Server ~]# kubectl apply -f regapp-deploy.yml
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
deployment.apps/saifshah-regapp created
```

```
[root@EKS_Bootstrap_Server ~]# vi regapp-service.yml
```

```
[root@EKS_Bootstrap_Server ~]# kubectl apply -f regapp-service.yml
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
service/saifshah-service created
```

```
[root@EKS_Bootstrap_Server ~]# kubectl get all
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

NAME	READY	STATUS	RESTARTS	AGE
pod/saifshah-regapp-67dc7d6554-5gdbh	1/1	Running	0	3m53s
pod/saifshah-regapp-67dc7d6554-n8vfm	1/1	Running	0	3m53s
pod/saifshah-regapp-67dc7d6554-q4bnf	1/1	Running	0	3m53s

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP
PORT(S)	AGE		

```
service/kubernetes     ClusterIP   10.100.0.1    <none>
443/TCP      24h
```

```
service/saifshah-service  LoadBalancer  10.100.223.173
a1968e704ce994e9e8a9832790201698-1437160444.us-east-
1.elb.amazonaws.com  8080:32727/TCP  3m4s
```

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
deployment.apps/saifshah-regapp	3/3	3	3	3m53s

NAME	DESIRED	CURRENT	READY	AGE
replicaset.apps/saifshah-regapp-67dc7d6554	3	3	3	3m53s

```
[root@EKS_Bootstrap_Server ~]# kubectl describe
```

```
error: You must specify the type of resource to describe. Use "kubectl api-
resources" for a complete list of supported resources.
```

```
[root@EKS_Bootstrap_Server ~]# kubectl describe service/saifshah-service
```

```
Kubeconfig user entry is using deprecated API version
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to
update.
```

```
Name:          saifshah-service
```

```
Namespace:      default
```

```
Labels:         app=regapp
```

```
Annotations:    <none>
```

```
Selector:       app=regapp
```

```
Type:          LoadBalancer
```

```
IP Family Policy: SingleStack
```

```
IP Families:    IPv4
```

```
IP:            10.100.223.173
```

```
IPs:           10.100.223.173
```

LoadBalancer Ingress: a1968e704ce994e9e8a9832790201698-1437160444.us-east-1.elb.amazonaws.com

Port: <unset> 8080/TCP

TargetPort: 8080/TCP

NodePort: <unset> 32727/TCP

Endpoints:

192.168.0.41:8080,192.168.27.33:8080,192.168.33.84:8080

Session Affinity: None

External Traffic Policy: Cluster

Events:

Type	Reason	Age	From	Message
----	-----	----	-----	

Normal EnsuringLoadBalancer 3m42s service-controller Ensuring load balancer

Normal EnsuredLoadBalancer 3m37s service-controller Ensured load balancer

[root@EKS\_Bootstrap\_Server ~]# kubectl get pod -o wide

Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.

NAME	READY	STATUS	RESTARTS	AGE	IP	NODE
NOMINATED NODE	READINESS	GATES				
saifshah-regapp-67dc7d6554-5gdbh	1/1	Running	0	5m38s		
192.168.0.41	ip-192-168-0-77.ec2.internal	<none>			<none>	
saifshah-regapp-67dc7d6554-n8vfm	1/1	Running	0	5m38s		
192.168.33.84	ip-192-168-48-13.ec2.internal	<none>			<none>	
saifshah-regapp-67dc7d6554-q4bnf	1/1	Running	0	5m38s		
192.168.27.33	ip-192-168-0-77.ec2.internal	<none>			<none>	

[root@EKS\_Bootstrap\_Server ~]#

After deletion 3 pods in replica set :

```
[root@EKS_Bootstrap_Server ~]# kubectl delete pod saifshah-regapp-67dc7d6554-5gdbh
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
pod "saifshah-regapp-67dc7d6554-5gdbh" deleted
```

```
[root@EKS_Bootstrap_Server ~]# kubectl get pod -o wide
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

NAME	READY	STATUS	RESTARTS	AGE	IP	NODE
NOMINATED NODE	READINESS	GATES				
saifshah-regapp-67dc7d6554-n8vfm	1/1	Running	0	12m		
192.168.33.84	ip-192-168-48-13.ec2.internal	<none>			<none>	
saifshah-regapp-67dc7d6554-q4bnf	1/1	Running	0	12m		
192.168.27.33	ip-192-168-0-77.ec2.internal	<none>			<none>	
saifshah-regapp-67dc7d6554-r6mkj	1/1	Running	0	6s		
192.168.18.246	ip-192-168-0-77.ec2.internal	<none>			<none>	//new pod created

```
[root@EKS_Bootstrap_Server ~]#
```

## **Integrate Kubernetes Bootstrap Server with Ansible:**

## On Bootstrap Server:

- Create ansadmin

```
[root@EKS_Bootstrap_Server ~]
```

```
[root@EKS_Bootstrap_Server ~]
```

  - Add ansadmin to sudoers file

```
[root@EKS_Bootstrap_Server ~]# useradd ansadmin  
[root@EKS_Bootstrap_Server ~]# visudo
```

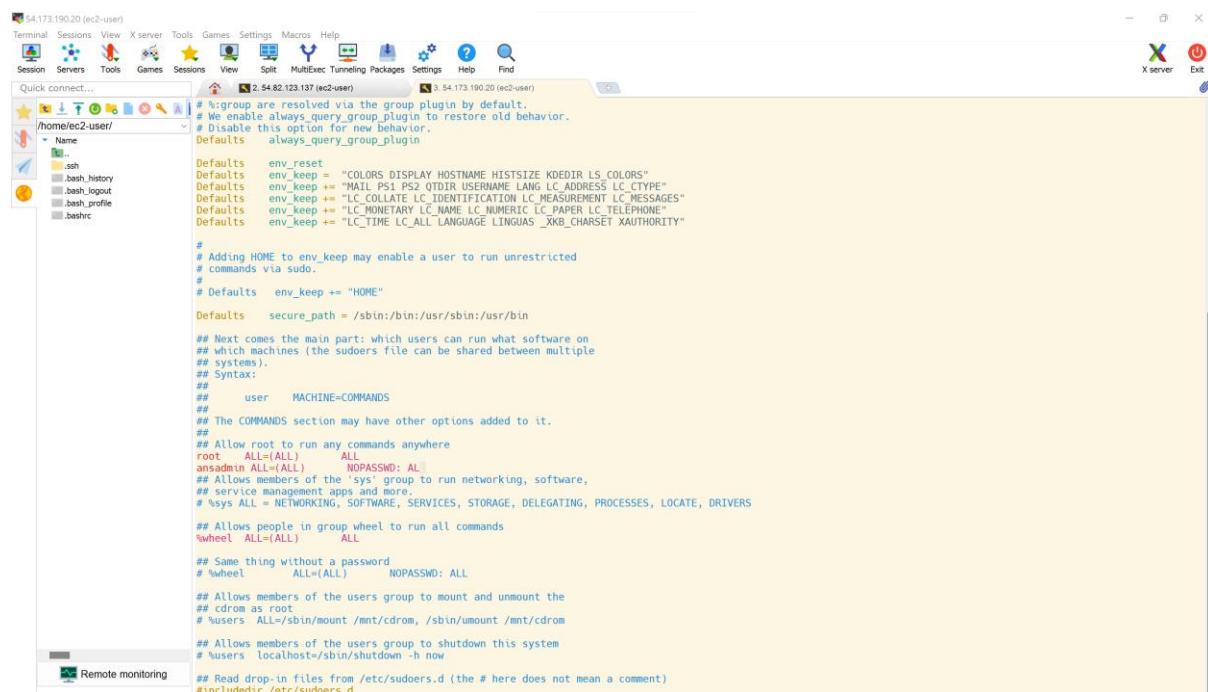


Fig. Add ansadmin to sudoers file

- Enable Password based login

```
[root@EKS_Bootstrap_Server ~]# service sshd reload
Redirecting to /bin/systemctl reload sshd.service
```

```
# Change to yes if you don't trust ~/.ssh/known_hosts for
# HostbasedAuthentication
#IgnoreUserKnownHosts no
# Don't read the user's ~/.rhosts and ~/.shosts files
#IgnoreRhosts yes

# To disable tunneled clear text passwords, change to no here!
#PasswordAuthentication yes
#PermitEmptyPasswords no
# PasswordAuthentication no

# Change to no to disable s/key passwords
#ChallengeResponseAuthentication yes
ChallengeResponseAuthentication no

# Kerberos options
#KerberosAuthentication no
#KerberosOrLocalPasswd yes
#KerberosTicketCleanup yes
#KerberosGetAFSToken no
#KerberosUseKuserok yes

# GSSAPI options
#GSSAPIAuthentication yes
#GSSAPICleanupCredentials no
#GSSAPIStrictAcceptorCheck yes
#GSSAPIKeyExchange no
#GSSAPIEnableUsers no

# Set this to 'yes' to enable PAM authentication, account processing,
# and session processing. If this is enabled, PAM authentication will
# be allowed through the ChallengeResponseAuthentication and
# PasswordAuthentication. Depending on your PAM configuration,
# PAM authentication via ChallengeResponseAuthentication may bypass
# the setting of "PermitRootLogin without-password".
# If you just want the PAM account and session checks to run without
# PAM authentication, then enable this but set PasswordAuthentication
# and ChallengeResponseAuthentication to "no".
# WARNING: 'UsePAM no' is not supported in Red Hat Enterprise Linux and may cause several
# problems.
UsePAM yes

#AllowTcpForwarding yes
#GatewayPorts no
X11Forwarding yes
#X11DisplayOffset 10
#X11UseLocalhost yes
#PermitTTY yes
#PrintMotd yes
#PrintLastLog yes
-- INSERT --
```

Fig. [root@EKS\_Bootstrap\_Server ~]# vi /etc/ssh/sshd\_config

### On Ansible Node:

[root@Ansible Server ~]# sudo su - ansadmin

Last login: Sat May 14 08:19:14 UTC 2022 from 152.57.213.2 on pts/1

[ansadmin@Ansible Server ~]\$ cd /opt/docker

[ansadmin@Ansible Server docker]\$ ll

total 16

-rw-rw-r-- 1 ansadmin ansadmin 381 May 14 07:49 deploy regapp.yml

-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile

-rw-rw-r-- 1 ansadmin ansadmin 357 May 13 18:21 regapp.yml

-rw-rw-r-- 1 ansadmin ansadmin 2913 May 14 08:28 webapp.war

[ansadmin@Ansible Server docker]\$ mv regapp.yml  
create image regapp.yml

[ansadmin@Ansible Server docker]\$ ll

total 16

-rw-rw-r-- 1 ansadmin ansadmin 357 May 13 18:21  
create image regapp.yml

-rw-rw-r-- 1 ansadmin ansadmin 381 May 14 07:49 deploy regapp.yml

-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile

-rw-rw-r-- 1 ansadmin ansadmin 2913 May 14 08:28 webapp.war

[ansadmin@Ansible Server docker]\$ cat deploy regapp.yml

--

- hosts : dockerhost

tasks:

- name : stop existing container  
command : docker stop regapp-server

- name : remove the container  
command : docker rm regapp-server

- name : remove image  
command : docker rmi saifshah/regapp:latest

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

```
[ansadmin@Ansible_Server docker]$ mv deploy_regapp.yml  
docker_deployment regapp.yml
```

```
[ansadmin@Ansible_Server docker]$ ll
```

total 16

-rw-rw-r-- 1 ansadmin ansadmin 357 May 13 18:21  
create\_image\_regapp.yml

-rw-rw-r-- 1 ansadmin ansadmin 381 May 14 07:49  
docker\_deployment regapp.yml

-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile

-rw-rw-r-- 1 ansadmin ansadmin 2913 May 14 08:28 webapp.war

```
[ansadmin@Ansible_Server docker]$
```

```
[root@EKS_Bootstrap_Server ~]# passwd ansadmin
```

Changing password for user ansadmin.

New password:

BAD PASSWORD: The password contains the user name in some form

Retype new password:

passwd: all authentication tokens updated successfully.

```
[root@EKS_Bootstrap_Server ~]#
```

- Add to hosts file

```
[ansadmin@Ansible_Server docker]$ vi hosts
```

```
[ansadmin@Ansible_Server docker]$ cat hosts
```

**localhost**

**[kubernetes]**

**172.31.85.40**

[ansible]

**172.31.26.13**

[ansadmin@Ansible\_Server docker]\$

- **Copy ssh keys**

```
[ansadmin@Ansible_Server docker]$ ssh-copy-id 172.31.85.40
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed:
"/home/ansadmin/.ssh/id_rsa.pub"
The authenticity of host '172.31.85.40 (172.31.85.40)' can't be
established.
ECDSA key fingerprint is
SHA256:eBN1hfJascvuNM/WaTVamjZqJOqCVahsgPQKljMW+0E.
ECDSA key fingerprint is
MD5:5f:dd:07:95:8a:01:be:8a:85:a8:52:7e:4e:e7:46:a2.
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@172.31.85.40's password:
```

**Number of key(s) added: 1**

**Now try logging into the machine, with: "ssh '172.31.85.40'"  
and check to make sure that only the key(s) you wanted were added.**

- Test the Connection

```
[ansadmin@Ansible_Server docker]$ ansible -i hosts all -a uptime
[WARNING]: Platform linux on host 172.31.85.40 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.

172.31.85.40 | CHANGED | rc=0 >>
18:47:04 up 25 min, 3 users, load average: 0.00, 0.00, 0.00
[WARNING]: Platform linux on host localhost 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.

localhost | CHANGED | rc=0 >>
18:47:04 up 26 min, 4 users, load average: 0.00, 0.00, 0.00
[WARNING]: Platform linux on host 172.31.26.13 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.

172.31.26.13 | CHANGED | rc=0 >>
18:47:04 up 26 min, 4 users, load average: 0.00, 0.00, 0.00
```

### Create Ansible Playbooks for deployment and Service File:

```
[ansadmin@Ansible_Server docker]$ vi kube_deploy.yml
```

The screenshot shows a terminal window with two tabs open. The left tab is titled '2: 54.82.123.137 (ec2-user)' and the right tab is titled '3. 54.173.190.20 (ec2-user)'. The terminal content displays an Ansible playbook:

```
hosts: kubernetes
become: true

tasks:
  - name: deploy regapp on kubernetes
    command: kubectl apply -f /root/regapp-deploy.yml
```

Fig. Kubernetes deploy file created

**[ansadmin@Ansible\_Server docker]\$ vi kube\_service.yml**

The screenshot shows a terminal window with two tabs open. The left tab is titled '2: 54.82.123.137 (ec2-user)' and the right tab is titled '3. 54.173.190.20 (ec2-user)'. The terminal content displays an Ansible playbook:

```
hosts: kubernetes
become: true

tasks:
  - name: deploy regapp on kubernetes
    command: kubectl apply -f /root/regapp-service.yml
```

Fig. Kubernetes service file created

```
[ansadmin@Ansible_Server docker]$ ls
```

```
create image regapp.yml docker deployment regapp.yml Dockerfile hosts  
webapp.war
```

```
[ansadmin@Ansible_Server docker]$ vi kube_deploy.yml
```

```
[ansadmin@Ansible_Server docker]$ vi kube_deploy.yml
```

```
[ansadmin@Ansible_Server docker]$ ^C
```

```
[ansadmin@Ansible_Server docker]$ vi kube_service.yml
```

```
[ansadmin@Ansible_Server docker]$ ^C
```

```
[ansadmin@Ansible_Server docker]$ ansible-playbook -i /root/docker/hosts  
kube_deploy.yml
```

```
[WARNING]: Unable to parse /root/docker/hosts as an inventory source
```

```
[WARNING]: No inventory was parsed, only implicit localhost is available
```

```
[WARNING]: provided hosts list is empty, only localhost is available. Note  
that the implicit localhost does not match 'all'
```

```
[WARNING]: Could not match supplied host pattern, ignoring: kubernetes
```

```
PLAY [kubernetes]
```

```
*****  
*****  
*****
```

```
skipping: no hosts matched
```

```
PLAY RECAP
```

```
*****  
*****  
*****
```

```
[ansadmin@Ansible_Server docker]$ ansible-playbook -i /opt/docker/hosts  
kube_deploy.yml
```

## **PLAY [kubernetes]**

```
*****  
*****  
*****
```

## **TASK [Gathering Facts]**

```
*****  
*****  
*****
```

**[WARNING]: Platform linux on host 172.31.85.40 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](https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html) for more information.

**ok: [172.31.85.40]**

## **TASK [deploy regapp on kubernetes]**

```
*****  
*****  
***
```

**fatal: [172.31.85.40]: FAILED! => {"changed": false, "cmd": "kubectl apply -f /root/regapp-deploy.yml", "msg": "[Errno 2] No such file or directory", "rc": 2}**

## **PLAY RECAP**

```
*****  
*****  
*****
```

**172.31.85.40 : ok=1 changed=0 unreachable=0 failed=1  
skipped=0 rescued=0 ignored=0**

```
[ansadmin@Ansible_Server docker]$ vi kube_deploy.yml
```

```
[ansadmin@Ansible_Server docker]$ ansible-playbook -i /opt/docker/hosts  
kube_deploy.yml
```

### PLAY [kubernetes]

```
*****  
*****  
*****
```

### TASK [Gathering Facts]

```
*****  
*****  
*****
```

```
fatal: [172.31.85.40]: UNREACHABLE! => {"changed": false, "msg": "Failed to  
connect to the host via ssh: Permission denied (publickey,gssapi-  
keyex,gssapi-with-mic,password).", "unreachable": true}
```

### PLAY RECAP

```
*****  
*****  
*****
```

```
172.31.85.40 : ok=0 changed=0 unreachable=1 failed=0  
skipped=0 rescued=0 ignored=0
```

```
[ansadmin@Ansible_Server docker]$ vi kube_deploy.yml
```

```
[ansadmin@Ansible_Server docker]$ ls
```

```
create image regapp.yml docker deployment regapp.yml Dockerfile hosts  
kube deploy.yml kube service.yml webapp.war
```

```
[ansadmin@Ansible_Server docker]$ vi kube_service.yml
```

```
[ansadmin@Ansible_Server docker]$
```

```
[ansadmin@Ansible_Server docker]$ ansible-playbook -i /opt/docker/hosts  
kube_deploy.yml
```

### PLAY [kubernetes]

```
*****  
*****  
*****
```

### TASK [Gathering Facts]

```
*****  
*****  
*****
```

```
fatal: [172.31.85.40]: UNREACHABLE! => {"changed": false, "msg": "Failed to  
connect to the host via ssh: Permission denied (publickey,gssapi-  
keyex,gssapi-with-mic,password).", "unreachable": true}
```

### PLAY RECAP

```
*****  
*****  
*****
```

```
172.31.85.40 : ok=0  changed=0  unreachable=1  failed=0  
skipped=0  rescued=0  ignored=0
```

```
[ansadmin@Ansible_Server docker]$ vi kube_deploy.yml
```

```
[ansadmin@Ansible_Server docker]$ ls
```

```
create  image  regapp.yml  docker  deployment  regapp.yml  Dockerfile  hosts  
kube  deploy.yml  kube  service.yml  webapp.war
```

```
[ansadmin@Ansible_Server docker]$ vi kube_service.yml
```

```
[ansadmin@Ansible_Server docker]$ ^C
```

```
[ansadmin@Ansible_Server docker]$ ansible-playbook -i /opt/docker/hosts  
kube_deploy.yml
```

### PLAY [kubernetes]

```
*****  
*****  
*****
```

### TASK [Gathering Facts]

```
*****  
*****  
*****
```

```
fatal: [172.31.85.40]: UNREACHABLE! => {"changed": false, "msg": "Failed to  
connect to the host via ssh: Permission denied (publickey,gssapi-  
keyex,gssapi-with-mic,password).", "unreachable": true}
```

### PLAY RECAP

```
*****  
*****  
*****
```

```
172.31.85.40 : ok=0  changed=0  unreachable=1  failed=0  
skipped=0  rescued=0  ignored=0
```

```
[ansadmin@Ansible_Server docker]$
```

```
[ansadmin@Ansible_Server docker]$ ssh_copy_id 172.31.85.40
```

```
-bash: ssh_copy_id: command not found
```

```
[ansadmin@Ansible_Server docker]$ ssh-copy-id 172.31.85.40
```

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

```
/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: WARNING: All keys were skipped because they already  
exist on the remote system.
```

(if you think this is a mistake, you may want to use -f option)

```
[ansadmin@Ansible_Server docker]$ ansible-playbook -i /opt/docker/hosts  
kube_deploy.yml
```

#### PLAY [kubernetes]

```
*****  
*****  
*****
```

#### TASK [Gathering Facts]

```
*****  
*****  
*****
```

```
fatal: [172.31.85.40]: UNREACHABLE! => {"changed": false, "msg": "Failed to  
connect to the host via ssh: Permission denied (publickey,gssapi-  
keyex,gssapi-with-mic,psword).", "unreachable": true}
```

#### PLAY RECAP

```
*****  
*****  
*****
```

```
172.31.85.40      : ok=0  changed=0  unreachable=1  failed=0  
skipped=0  rescued=0  ignored=0
```

[ansadmin@Ansible Server docker]\$ ssh-copy-id 172.31.85.40

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

/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: WARNING: All keys were skipped because they already  
exist on the remote system.

(if you think this is a mistake, you may want to use -f option)

[ansadmin@Ansible Server docker]\$ ssh-copy-id root@172.31.85.40

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

/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

root@172.31.85.40's password:

Number of key(s) added: 1

Now try logging into the machine, with: "ssh 'root@172.31.85.40'"

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

---

[ansadmin@Ansible Server docker]\$ vi kube\_service.yml

```
[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-deploy.yml
```

```
[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]$ ansible-playbook -i /opt/docker/hosts
```

```
kube_service.yml
```

```
PLAY [kubernetes]
```

```
*****
```

```
*****
```

```
*****
```

```
TASK [Gathering Facts]
```

```
*****
```

\*\*\*\*\*  
\*\*\*\*\*

[WARNING]: Platform linux on host 172.31.85.40 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](https://docs.ansible.com/ansible/2.9/reference_appendices/interpreter_discovery.html) for more information.

ok: [172.31.85.40]

## **TASK [deploy regapp on kubernetes]**

\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*

changed: [172.31.85.40]

PLAY RECAP

\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*

```
172.31.85.40 : ok=2  changed=1  unreachable=0  failed=0  
skipped=0  rescued=0  ignored=0
```

[ansadmin@Ansible Server docker]\$

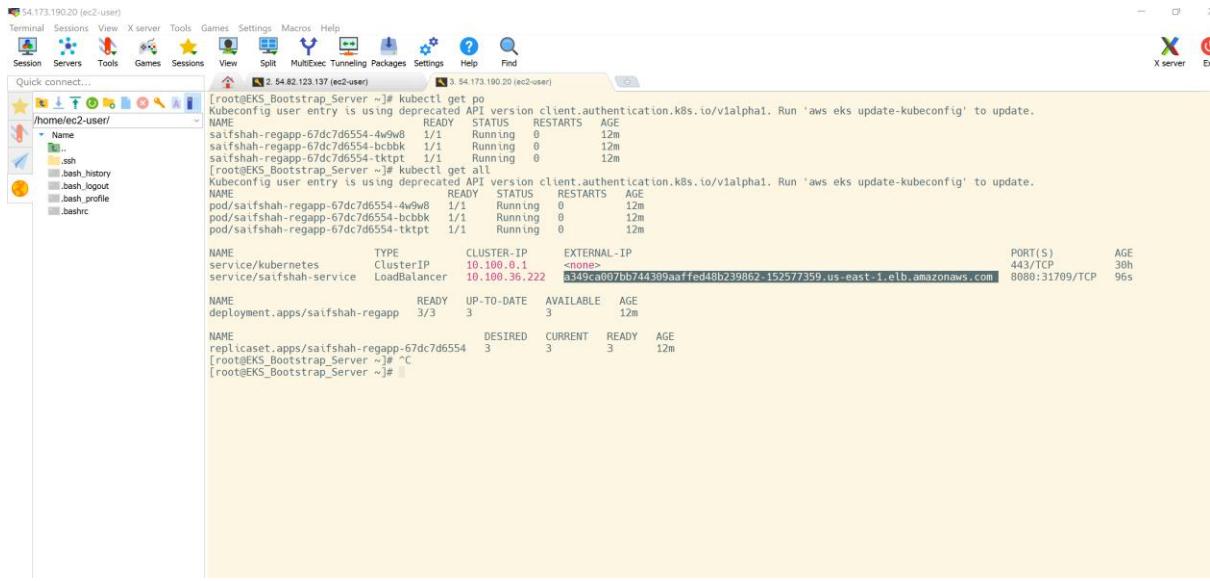


Fig. Ansible Deploy and Service playbook

## Create Jenkins Deployment Job for Kubernetes:

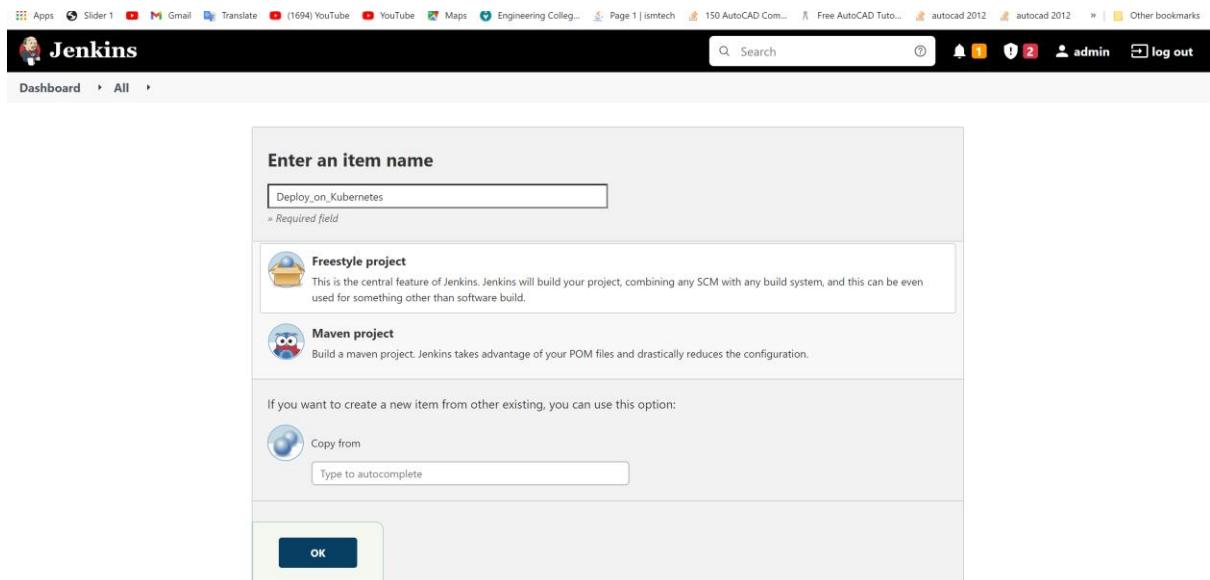


Fig. Deploy\_on\_Kubernetes

[ansadmin@Ansible\_Server docker]\$ ll

```
total 28
```

```
-rw-rw-r-- 1 ansadmin ansadmin 357 May 13 18:21
```

```
create_image_regapp.yml
```

```
-rw-rw-r-- 1 ansadmin ansadmin 381 May 14 07:49
```

```
docker_deployment_regapp.yml
```

```
-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile
```

```
-rw-rw-r-- 1 ansadmin ansadmin 62 May 17 18:42 hosts
```

```
-rw-rw-r-- 1 ansadmin ansadmin 154 May 17 19:13 kube_deploy.yml
```

```
-rw-rw-r-- 1 ansadmin ansadmin 154 May 17 19:31 kube_service.yml
```

```
-rw-rw-r-- 1 ansadmin ansadmin 2913 May 14 08:28 webapp.war
```

```
[ansadmin@Ansible_Server docker]$ ansible-playbook -i /opt/docker/hosts  
kube_service.yml^C
```

```
[ansadmin@Ansible_Server docker]$
```

```
[root@EKS_Bootstrap_Server ~]# kubectl get all
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

NAME	READY	STATUS	RESTARTS	AGE
pod/saifshah-regapp-67dc7d6554-9pt6r	1/1	Running	0	13h
pod/saifshah-regapp-67dc7d6554-dhnqk	1/1	Running	0	13h
pod/saifshah-regapp-67dc7d6554-nb9rw	1/1	Running	0	13h

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP
PORT(S)	AGE		
service/kubernetes	ClusterIP	10.100.0.1	<none>
443/TCP	45h		

```
service/saifshah-service LoadBalancer 10.100.36.222  
a349ca007bb744309aaffed48b239862-152577359.us-east-  
1.elb.amazonaws.com 8080:31709/TCP 14h
```

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
deployment.apps/saifshah-regapp	3/3	3	3	14h

NAME	DESIRED	CURRENT	READY	AGE
replicaset.apps/saifshah-regapp-67dc7d6554	3	3	3	14h

```
[root@EKS_Bootstrap_Server ~]# kubectl delete deployment.apps/saifshah-regapp
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
deployment.apps "saifshah-regapp" deleted
```

```
[root@EKS_Bootstrap_Server ~]# kubectl delete service/saifshah-service
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

```
service "saifshah-service" deleted
```

```
[root@EKS_Bootstrap_Server ~]#
```

```
[root@EKS_Bootstrap_Server ~]# clear
```

```
[root@EKS_Bootstrap_Server ~]# kubectl get all
```

```
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP	PORT(S)	AGE
service/kubernetes	ClusterIP	10.100.0.1	<none>	443/TCP	45h

```
[root@EKS_Bootstrap_Server ~]# kubectl get all  
Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.
```

NAME	READY	STATUS	RESTARTS	AGE
pod/saifshah-regapp-67dc7d6554-m4ck9	1/1	Running	0	27s
pod/saifshah-regapp-67dc7d6554-rr58w	1/1	Running	0	27s
pod/saifshah-regapp-67dc7d6554-x24cx	1/1	Running	0	27s

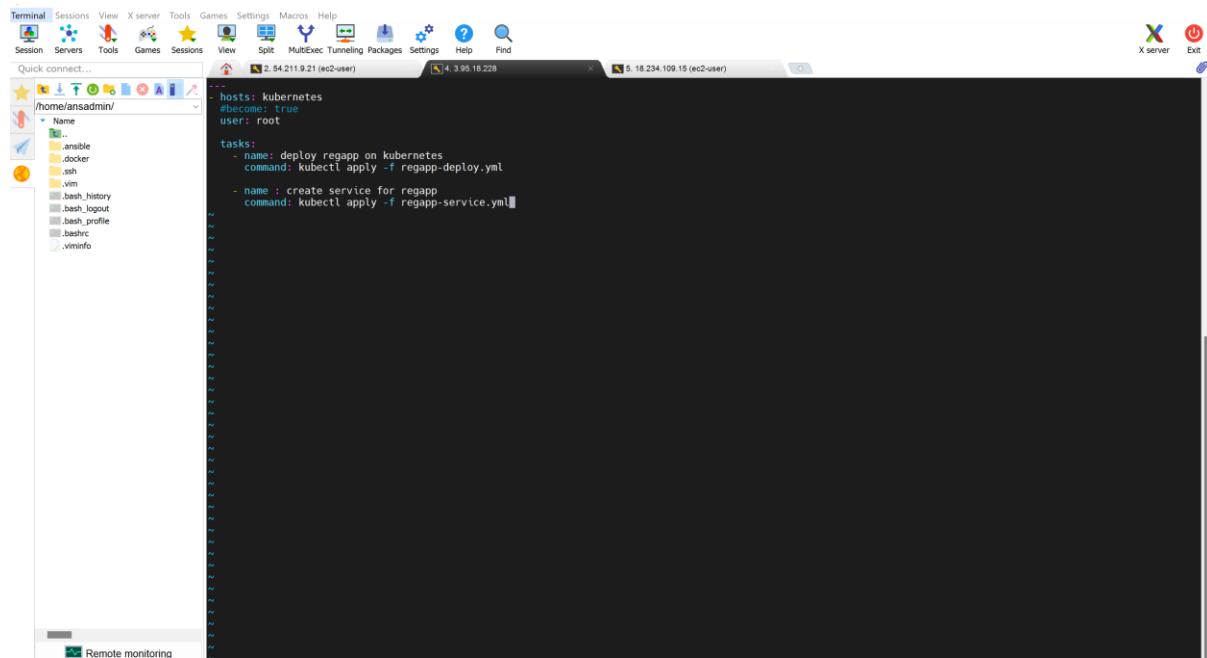
NAME	TYPE	CLUSTER-IP	EXTERNAL-IP
PORT(S)	AGE		
service/kubernetes	ClusterIP	10.100.0.1	<none>
443/TCP	45h		
service/saifshah-service	LoadBalancer	10.100.156.66	
a5cc75730006140938846b05fc830300-559804141.us-east-1.elb.amazonaws.com	8080:30620/TCP	23s	

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
deployment.apps/saifshah-regapp	3/3	3	3	27s

NAME	DESIRED	CURRENT	READY	AGE
replicaset.apps/saifshah-regapp-67dc7d6554	3	3	3	27s

```
[root@EKS_Bootstrap_Server ~]#
```

```
[ansadmin@Ansible_Server docker]$ vi kube_deploy.yml
```



The screenshot shows a terminal window with two tabs open. The left tab displays the file structure of the user's home directory, including files like .bashrc, .viminfo, and .bash\_history. The right tab shows the content of the `kube_deploy.yml` file:

```
hosts: kubernetes
#become: true
user: root

tasks:
- name: deploy regapp on kubernetes
  command: kubectl apply -f regapp-deploy.yml
- name: create service for regapp
  command: kubectl apply -f regapp-service.yml
```

Fig. Merging Service File & Deployment File

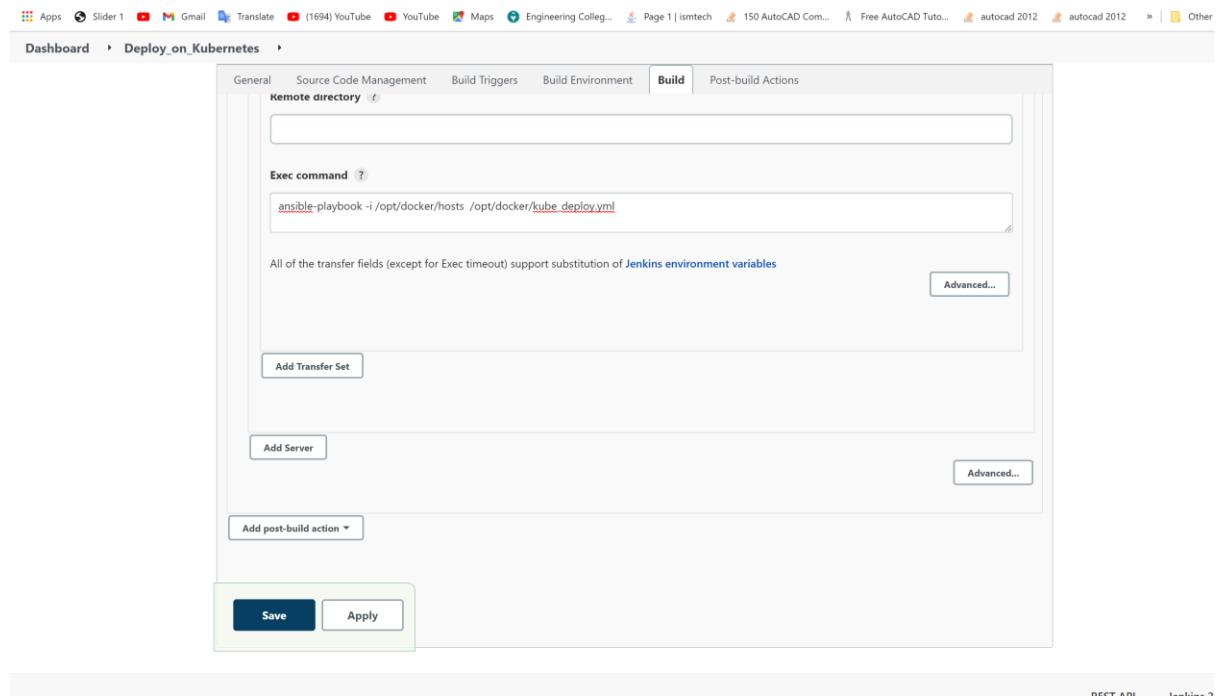


Fig. Exec Command Merge Service File & Deployment File

The screenshot shows the Jenkins interface. On the left, there's a sidebar with links like 'Dashboard', 'Deploy\_on\_Kubernetes #2', 'Back to Project', 'Status', 'Changes', 'Console Output' (which is selected), 'View as plain text', 'Edit Build Information', 'Delete build #2', and 'Previous Build'. The main area has a green checkmark icon and the title 'Console Output'. Below it, the log output is displayed:

```

Started by user admin
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/Deploy_on_Kubernetes
SSH: Connecting from host [Jenkins_Server] ...
SSH: Connecting with configuration [ansible-server] ...
SSH: EXEC: completed after 5,668 ms
SSH: Disconnecting configuration [ansible-server] ...
SSH: Transferred 0 file(s)
Finished: SUCCESS

```

Fig. Build Success

The screenshot shows a terminal window with two tabs. The left tab shows a file tree for 'home/ec2-user'. The right tab shows the output of the 'kubectl get all' command:

```

[root@EKS_Bootstrap_Server ~]# ls
aws awsv2.zip regapp-deploy.yaml regapp-service.yaml
[root@EKS_Bootstrap_Server ~]# kubectl get all
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME           READY   STATUS    RESTARTS   AGE
pod/saifshah-regapp-67dc7d6554-mck9   1/1     Running   0          9m49s
pod/saifshah-regapp-67dc7d6554-rr58w   1/1     Running   0          9m49s
pod/saifshah-regapp-67dc7d6554-x24cx  1/1     Running   0          9m49s
NAME           TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)      AGE
service/kubernetes   ClusterIP   10.100.0.1   <none>        443/TCP     45h
service/saifshah-service   LoadBalancer   10.100.156.66  a5cc75730006140938846b05fc830300-559804141.us-east-1.elb.amazonaws.com  8080:30620/TCP  9m45s
NAME           READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/saifshah-regapp   3/3     3           3           9m49s
NAME           DESIRED  CURRENT   READY   AGE
replicaset.apps/saifshah-regapp-67dc7d6554  3       3       3       9m49s
[root@EKS_Bootstrap_Server ~]#

```

Fig. kubectl get all services & deployment .

## CI Job to create Image for Kubernetes:

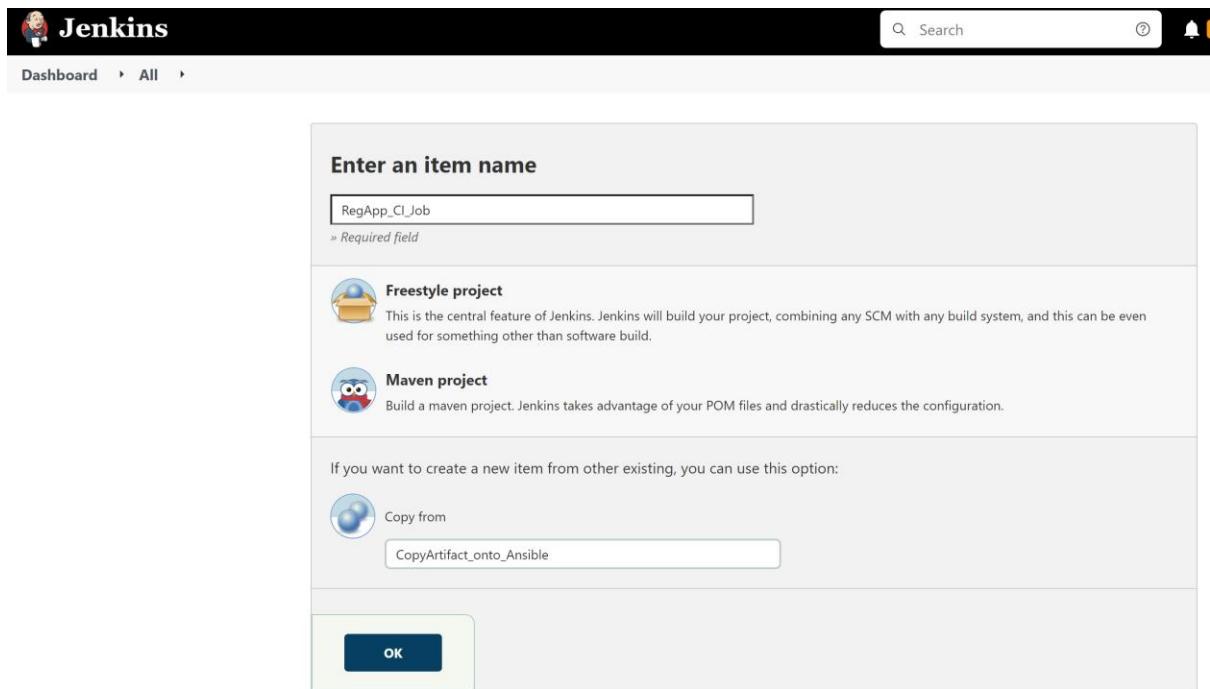


Fig. Creating CI Job

This screenshot shows the 'Post-build Actions' configuration for the 'RegApp\_CI\_Job'. The 'Post-build Actions' tab is selected. Under the 'Remote directory' section, the value '/opt/docker' is entered. In the 'Exec command' section, the command 'ansible-playbook /opt/docker/create\_image\_regapp.yml' is specified. There are 'Advanced...' buttons for both sections. At the bottom, there are 'Save' and 'Apply' buttons.

Fig. Adding Image File

[ansadmin@Ansible\_Server docker]\$ ll

total 28

```
-rw-rw-r-- 1 ansadmin ansadmin 357 May 13 18:21 create_image_regapp.yml  
-rw-rw-r-- 1 ansadmin ansadmin 381 May 14 07:49  
docker_deployment_regapp.yml  
-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile  
-rw-rw-r-- 1 ansadmin ansadmin 62 May 17 18:42 hosts  
-rw-rw-r-- 1 ansadmin ansadmin 245 May 18 09:48 kube_deploy.yml  
-rw-rw-r-- 1 ansadmin ansadmin 154 May 17 19:31 kube_service.yml  
-rw-rw-r-- 1 ansadmin ansadmin 2913 May 14 08:28 webapp.war  
[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 on docker hub  
  command : docker tag regapp:latest saifshah/regapp:latest  
  
- name : push docker image on docker hub  
  command : docker push saifshah/regapp:latest
```

```
[ansadmin@Ansible_Server docker]$ ^C  
[ansadmin@Ansible_Server docker]$ docker login
```

Authenticating with existing credentials...

Login did not succeed, error: Cannot connect to the Docker daemon at unix:///var/run/docker.sock. Is the docker daemon running?

Login with your Docker ID to push and pull images from Docker Hub. If you don't have a Docker ID, head over to <https://hub.docker.com> to create one.

Username (saifshah): saifshah

Password:

WARNING! Your password will be stored unencrypted in /home/ansadmin/.docker/config.json.

Configure a credential helper to remove this warning. See

<https://docs.docker.com/engine/reference/commandline/login/#credentials-store>

Login Succeeded

[ansadmin@Ansible\_Server docker]\$ docker images

Cannot connect to the Docker daemon at unix:///var/run/docker.sock. Is the docker daemon running?

[ansadmin@Ansible\_Server docker]\$ service docker start

Redirecting to /bin/systemctl start docker.service

Failed to start docker.service: The name org.freedesktop.PolicyKit1 was not provided by any .service files

See system logs and 'systemctl status docker.service' for details.

[ansadmin@Ansible\_Server docker]\$ docker images

Cannot connect to the Docker daemon at unix:///var/run/docker.sock. Is the docker daemon running?

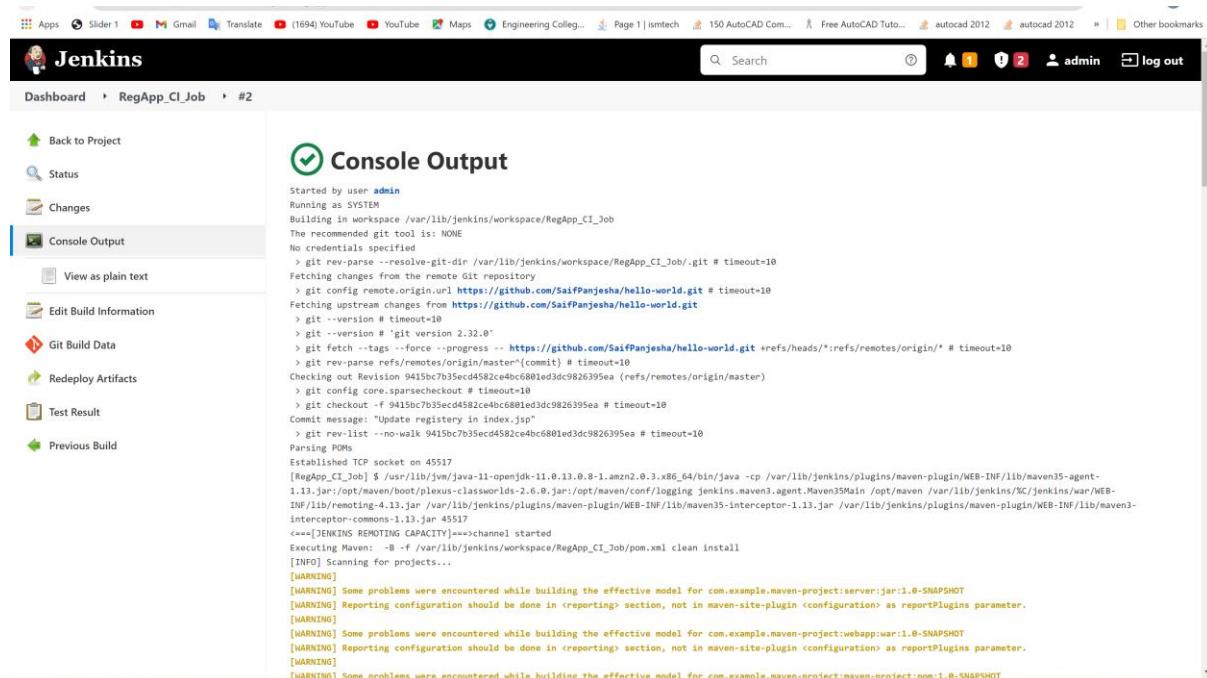
[ansadmin@Ansible\_Server docker]\$ sudo service docker start

Redirecting to /bin/systemctl start docker.service

[ansadmin@Ansible\_Server docker]\$ docker images

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
saifshah/regapp	latest	15574dfecf93	4 days ago	510MB
regapp	latest	15574dfecf93	4 days ago	510MB
regapp	v1	15574dfecf93	4 days ago	510MB
tomcat	latest	6a1271dfce51	6 days ago	680MB
centos	latest	5d0da3dc9764	8 months ago	231MB

[ansadmin@Ansible\_Server docker]\$



The screenshot shows the Jenkins interface with the following details:

- Project Path:** Dashboard > RegApp\_CI\_Job > #2
- Status:** Success (indicated by a green checkmark icon)
- Console Output:**

```

Started by user admin
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/SaifPanjehsa/hello-world.git # timeout=10
Fetching upstream changes from https://github.com/SaifPanjehsa/hello-world.git
> git --version # timeout=10
> git -v
> git fetch --tags --force --progress -- https://github.com/SaifPanjehsa/hello-world.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/master^{commit} # timeout=10
Checking out Revision 9415bc7b35ecd4582c4bc6801ed3dc9826395ea (refs/remotes/origin/master)
> git config core.sparsecheckout # timeout=10
> git checkout -f 9415bc7b35ecd4582c4bc6801ed3dc9826395ea # timeout=10
Commit message: "Update registry in index.json"
> git rev-list --no-walk 9415bc7b35ecd4582c4bc6801ed3dc9826395ea # timeout=10
Parsing POMs
Established TCP socket on 45517
[RegApp_CI_Job] $ /usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86_64/bin/java -cp /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-agent-1.13.jar:/opt/maven/boot/plexus-classworlds-2.6.0.jar:/opt/maven/conf/logging jenkins.maven3.agent.Maven3Main /opt/maven /var/lib/jenkins/%C/jenkins/war/WEB-INF/lib/remoting-4.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-1.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-commons-1.13.jar 45517
<===[JENKINS REMOTING CAPACITY]==>channel started
Executing Maven: -B -f /var/lib/jenkins/workspace/RegApp_CI_Job/pom.xml clean install
[INFO] Scanning for projects...
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:server:jar:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:webapp:war:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:com:1.0-SNAPSHOT

```

Fig. Build Success

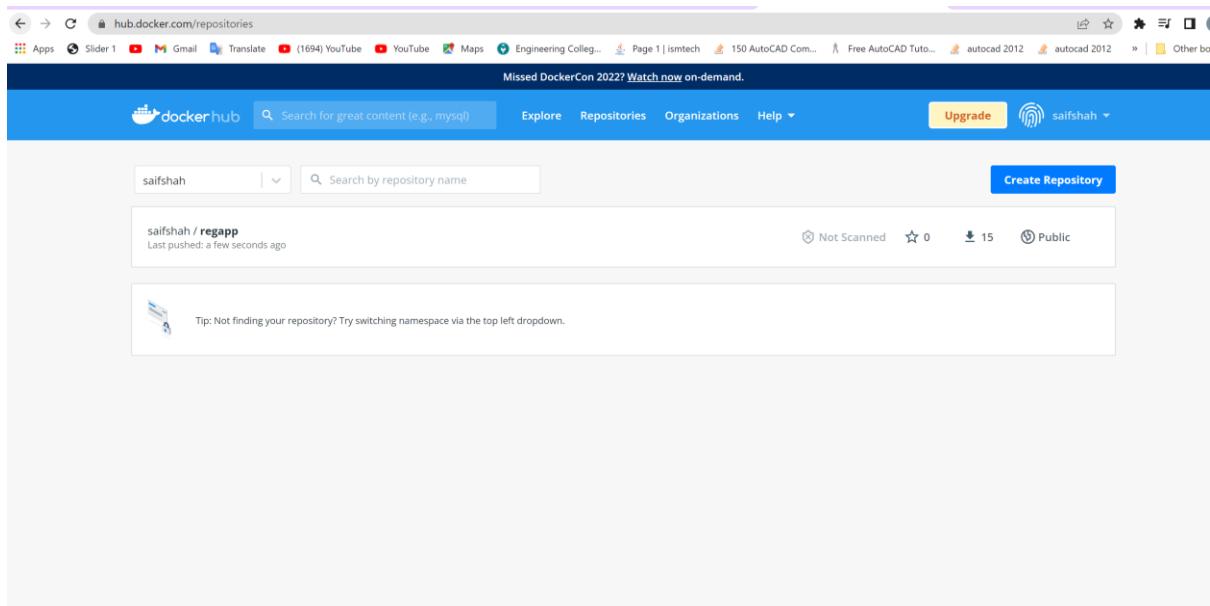


Fig. Image Created on Docker hub

**Enable rolling update to create pod from latest docker image:**

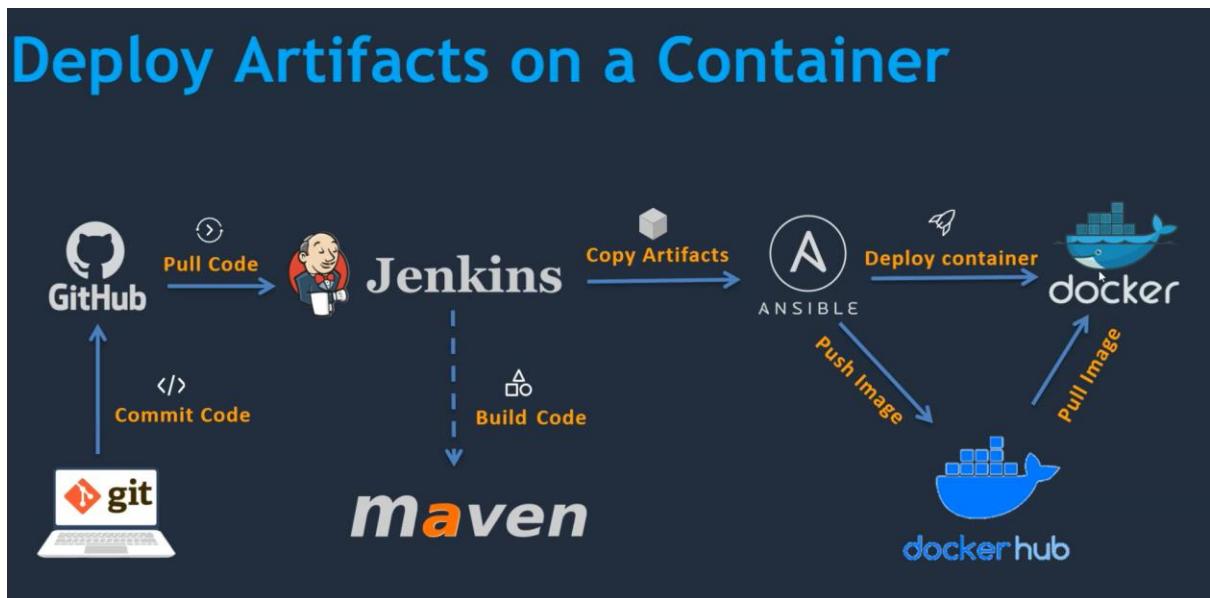


Fig. Deploying on Kubernetes

The screenshot shows the Jenkins 'Build Settings' page for the 'RegApp\_CI\_Job'. The 'Post-build Actions' section is expanded, displaying two configurations:

- Build other projects**: A list titled 'Projects to build' contains 'Regapp\_CD\_Job'. Below it are three trigger options:
  - Trigger only if build is stable
  - Trigger even if the build is unstable
  - Trigger even if the build fails
- Send build artifacts over SSH**: A list titled 'SSH Publishers' contains 'ansible-server'.

Fig. Rolling update for configuration

The screenshot shows the Jenkins 'Console Output' page for build #4 of the 'RegApp\_CI\_Job'. The page title is 'Console Output' with a checkmark icon. The log output is as follows:

```

Started by user admin
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/SaifPanjesta/hello-world.git # timeout=10
Fetching upstream changes from https://github.com/SaifPanjesta/hello-world.git
> git --version # timeout=10
> git --version # git version 2.32.0'
> git fetch --tags --force --progress -- https://github.com/SaifPanjesta/hello-world.git +refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/master^{commit} # timeout=10
Checking out Revision 9415bc7b35ecd4582ce4bc6801ed3dc9826395ea (refs/remotes/origin/master)
> git config core.sparsecheckout # timeout=10
> git checkout -f 9415bc7b35ecd4582ce4bc6801ed3dc9826395ea # timeout=10
Commit message: "Update registry in index.jsp"
> git rev-list --no-walk 9415bc7b35ecd4582ce4bc6801ed3dc9826395ea # timeout=10
Parsing POMs
Established TCP socket on 45117
[RegApp_CI_Job] $ /usr/lib/jvm/java-11-openjdk-11.0.13.0.8-1.amzn2.0.3.x86_64/bin/java -cp /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-agent-1.13.jar:/opt/maven/boot/plexus-classworlds-2.6.0.jar:/opt/maven/conf/logging jenkins.maven3.agent.Maven3Main /opt/maven /var/lib/jenkins/WEB-INF/lib/remoting-4.13.jar /var/lib/jenkins/plugins/maven-plugin/WEB-INF/lib/maven3-interceptor-commons-1.13.jar:45117
====[JENKINS REMOTING CAPACITY]==>channel started
Executing Maven: -B -f /var/lib/jenkins/workspace/RegApp_CI_Job/pom.xml clean install
[INFO] Scanning for projects...
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:server:jar:1.0-SNAPSHOT
[WARNING] Reporting configuration should be done in <reporting> section, not in maven-site-plugin <configuration> as reportPlugins parameter.
[WARNING]
[WARNING] Some problems were encountered while building the effective model for com.example.maven-project:webapp:war:1.0-SNAPSHOT

```

The screenshot shows the Jenkins interface for a job named 'Regapp\_CD\_Job' (Build #4). The 'Console Output' tab is selected. The output log shows a successful execution of an Ansible script, starting with 'Started by upstream project "RegApp\_CI\_Job" build number 4' and ending with 'Finished: SUCCESS'.

```

Started by upstream project "RegApp_CI_Job" build number 4
originally caused by:
    Started by user admin
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/Regapp_CD_Job
SSH: Connecting from host [Jenkins_Server]
SSH: Connecting with configuration [ansible-server] ...
SSH: EXEC: completed after 5,404 ms
SSH: Disconnecting configuration [ansible-server] ...
SSH: Transferred 0 file(s)
Finished: SUCCESS

```

Fig. Build Success

### Error : Unable to upload Latest Image

```

[root@EKS_Bootstrap_Server ~]# cd /opt/docker
-bash: cd: /opt/docker: No such file or directory

[root@EKS_Bootstrap_Server ~]# kubectl get all
Kubeconfig user entry is using deprecated API version
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to
update.

NAME          READY   STATUS    RESTARTS   AGE
pod/saifshah-regapp-67dc7d6554-m4ck9  1/1     Running   0          93m
pod/saifshah-regapp-67dc7d6554-rr58w  1/1     Running   0          93m
pod/saifshah-regapp-67dc7d6554-x24cx  1/1     Running   0          93m

```

NAME	TYPE	CLUSTER-IP	EXTERNAL-IP
PORT(S)	AGE		
service/kubernetes	ClusterIP	10.100.0.1	<none>
443/TCP	46h		

```
service/saifshah-service LoadBalancer 10.100.156.66  
a5cc75730006140938846b05fc830300-559804141.us-east-  
1.elb.amazonaws.com 8080:30620/TCP 93m
```

NAME	READY	UP-TO-DATE	AVAILABLE	AGE
deployment.apps/saifshah-regapp	3/3	3	3	93m

NAME	DESIRED	CURRENT	READY	AGE
replicaset.apps/saifshah-regapp-67dc7d6554	3	3	3	93m

```
[root@EKS_Bootstrap_Server ~]# ^C  
[root@EKS_Bootstrap_Server ~]#
```

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

```
[ansadmin@Ansible_Server docker]$ ll  
total 28  
-rw-rw-r-- 1 ansadmin ansadmin 357 May 13 18:21  
create_image_regapp.yml  
-rw-rw-r-- 1 ansadmin ansadmin 381 May 14 07:49  
docker_deployment_regapp.yml  
-rw-rw-r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile  
-rw-rw-r-- 1 ansadmin ansadmin 62 May 17 18:42 hosts  
-rw-rw-r-- 1 ansadmin ansadmin 245 May 18 09:48 kube_deploy.yml  
-rw-rw-r-- 1 ansadmin ansadmin 154 May 17 19:31 kube_service.yml  
-rw-rw-r-- 1 ansadmin ansadmin 2913 May 18 11:17 webapp.war  
[ansadmin@Ansible_Server docker]$ vi kube_deploy.yml
```

```
[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-deploy.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/saifshah-regapp
```

```
[ansadmin@Ansible_Server docker]$
```

---

**Output :**

```

Last login: Wed May 18 11:22:52 2022 from 152.57.222.50
[ec2-user@K5 Bootstrap_Server ~]$ ls
[ec2-user@K5 Bootstrap_Server ~]$ sudo su -
Last login: Wed May 18 11:17:51 UTC 2022 from ip-172-31-26-13.ec2.internal on pts/4
[ec2-user@K5 Bootstrap_Server ~]$ who
[ec2-user@K5 Bootstrap_Server ~]$ history
0 failed login attempt since the last successful login.
[root@K5 Bootstrap_Server ~]# kubectl get all
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)       AGE
service/kubernetes   ClusterIP   10.100.0.1    <none>        443/TCP     47h
service/saifshah-service   LoadBalancer  10.100.156.66  a5cc7573b006140938846b05fc830300-559804141.us-east-1.elb.amazonaws.com  8080:30628/TCP  119m
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/saifshah-regapp  3/3     3           3           119m
NAME          DESIRED  CURRENT  READY   AGE
replicaset.apps/saifshah-regapp-67dc7d6554  3       3       3       119m
[root@K5 Bootstrap_Server ~]# kubectl get svc
Kubeconfig user entry is using deprecated API version client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to update.
NAME          TYPE        CLUSTER-IP      EXTERNAL-IP   PORT(S)       AGE
service/kubernetes   ClusterIP   10.100.0.1    <none>        443/TCP     47h
service/saifshah-service   LoadBalancer  10.100.156.66  a5cc7573b006140938846b05fc830300-559804141.us-east-1.elb.amazonaws.com  8080:30628/TCP  120m
NAME          READY   UP-TO-DATE   AVAILABLE   AGE
deployment.apps/saifshah-regapp  2/3     3           2           120m
NAME          DESIRED  CURRENT  READY   AGE
replicaset.apps/saifshah-regapp-67dc7d6554  0       0       0       120m
[root@K5 Bootstrap_Server ~]# ^C
[root@K5 Bootstrap_Server ~]#

```

Fig. Bootstrap Server Running

```

terminal sessions view A server tools Games Sessions View Split Multitext Tunneling Packages Settings Help Find
Session Servers Tools Games Sessions Quick connect... /home/ansadmin/
Name
.. ansible docker ssh vim bash_history bash_logout bash_profile bashrc vmlinu
[ansadmin@Ansible_Server docker]$ MobaTerm Personal Edition v22.0
(SSH client, X server and network tools)
> SSH session to ansadmin@95.18.228
  • Direct SSH : ✓
  • SSH compression : ✓
  • SSH-browser : ✓
  • X11-forwarding : ✘ (disabled or not supported by server)
> For more info, ctrl+click on help or visit our website.

Last login: Wed May 18 11:20:17 2022 from 152.57.222.50
[ansadmin@Ansible_Server docker ~]$ cd /opt/docker
[ansadmin@Ansible_Server docker]$ sudo service docker start
Redirecting to /bin/systemctl start docker.service
[ansadmin@Ansible_Server docker]$ ls
create_image_regapp.yml docker_deployment_regapp.yml Dockerfile hosts kube_deploy.yml kube_service.yml webapp.war
[ansadmin@Ansible_Server docker]$ ll
total 28
-rw-r--r-- 1 ansadmin ansadmin 357 May 13 18:21 create_image_regapp.yml
-rw-r--r-- 1 ansadmin ansadmin 381 May 14 07:49 docker_deployment_regapp.yml
-rw-r--r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile
-rw-r--r-- 1 ansadmin ansadmin 62 May 17 18:42 hosts
-rw-r--r-- 1 ansadmin ansadmin 392 May 18 11:24 kube_deploy.yml
-rw-r--r-- 1 ansadmin ansadmin 158 May 17 19:31 kube_service.yml
-rw-r--r-- 1 ansadmin ansadmin 203 May 18 11:17 webapp.war
[ansadmin@Ansible_Server docker]$ ll
total 28
-rw-r--r-- 1 ansadmin ansadmin 357 May 13 18:21 create_image_regapp.yml
-rw-r--r-- 1 ansadmin ansadmin 381 May 14 07:49 docker_deployment_regapp.yml
-rw-r--r-- 1 ansadmin ansadmin 528 May 13 12:12 Dockerfile
-rw-r--r-- 1 ansadmin ansadmin 62 May 17 18:42 hosts
-rw-r--r-- 1 ansadmin ansadmin 392 May 18 11:24 kube_deploy.yml
-rw-r--r-- 1 ansadmin ansadmin 154 May 17 19:31 kube_service.yml
-rw-r--r-- 1 ansadmin ansadmin 2913 May 18 11:41 webapp.war
[ansadmin@Ansible_Server docker]$ 

```

Fig. Ansible Server Webapp.war time change after success

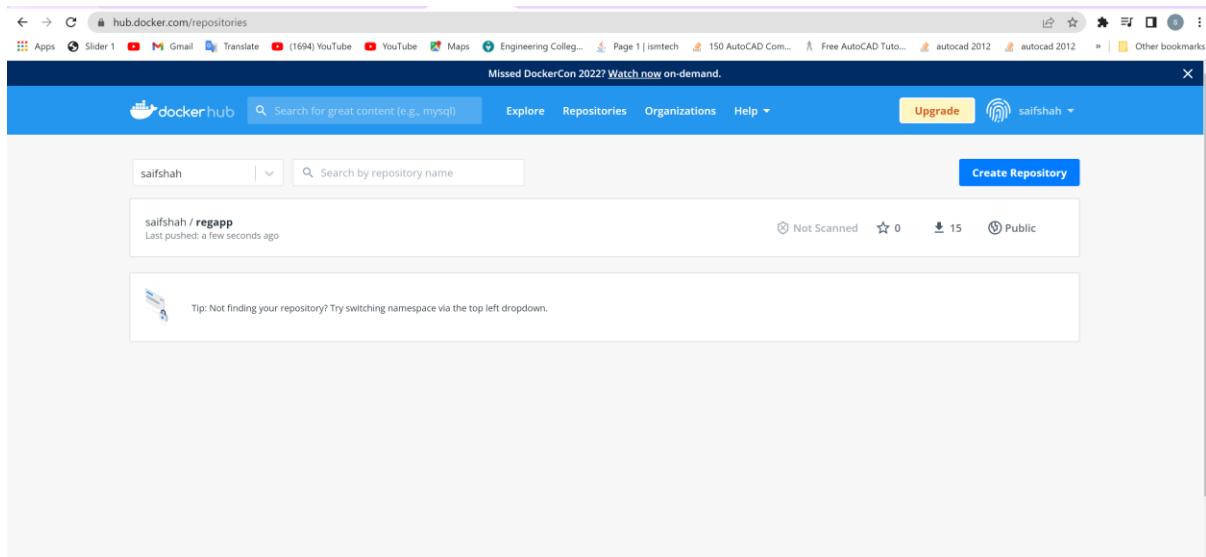


Fig. Docker latest Image

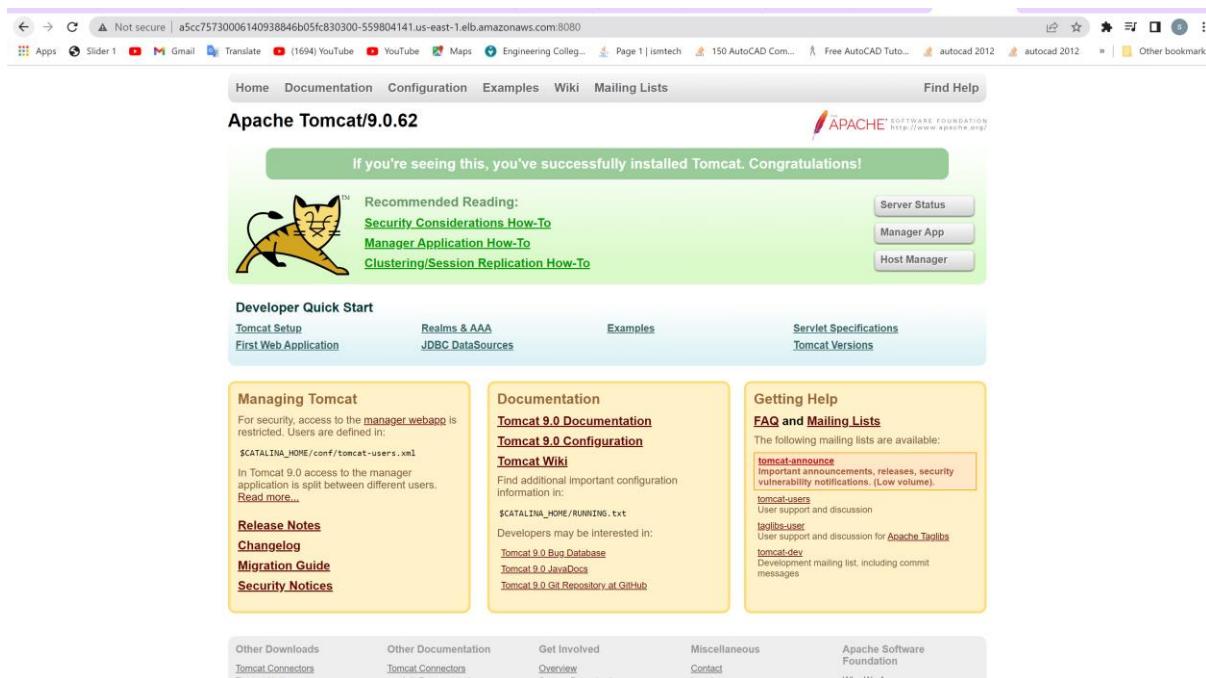


Fig. Access to load balancer on port 8080

Cleaning Setup:

```
[root@EKS_Bootstrap_Server ~]# kubectl delete deployment.apps/saifshah-regapp
```

Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.

**deployment.apps "saifshah-regapp" deleted**

```
[root@EKS_Bootstrap_Server ~]# kubectl delete service/saifshah-service
```

Kubeconfig user entry is using deprecated API version  
client.authentication.k8s.io/v1alpha1. Run 'aws eks update-kubeconfig' to  
update.

**service "saifshah-service" deleted**

```
[root@EKS_Bootstrap_Server ~]#
```

**Deleting Cluster:**

```
eksctl delete cluster saifshah --region us-east-1
```

The screenshot shows the AWS CloudFormation console. On the left, the navigation pane includes 'CloudFormation' (selected), 'Stacks', 'Drifts', 'StackSets', 'Exports', 'Designer', 'Registry' (with 'Public extensions', 'Activated extensions', and 'Publisher' listed), and 'Feedback'. The main content area shows a list of stacks under 'Stacks (2)'. One stack, 'eksctl-saifshah-cluster-cluster', is selected and shown in detail. The 'Stack info' tab displays the following information:

- Stack ID:** arn:aws:cloudformation:us-east-1:365055183576:stack/eksctl-saifshah-cluster-cluster/9093e830-d513-11ec-be4f-0ead2c327235
- Description:** EKS cluster (dedicated VPC: true, dedicated IAM: true) [created and managed by eksctl]
- Status:** DELETE\_IN\_PROGRESS
- Root stack:** -
- Created time:** 2022-05-16 17:57:34 UTC+0530
- Deleted time:** 2022-05-18 17:36:40 UTC+0530
- Updated time:** -
- Drift status:** NOT\_CHECKED
- Last drift check time:** -
- Termination protection:** Disabled
- IAM role:** -

Fig . Cluster Deleted

The screenshot shows the AWS EC2 Instances page. The left sidebar includes 'New EC2 Experience' (selected), 'EC2 Dashboard', 'EC2 Global View', 'Events', 'Tags', 'Limits', 'Instances' (selected), 'Instances' (with 'New'), 'Instance Types', 'Launch Templates', 'Spot Requests', 'Savings Plans', 'Reserved Instances' (New), 'Dedicated Hosts', 'Scheduled Instances', 'Capacity Reservations', 'Images' (with 'AMIs' New), 'AMI Catalog', 'Elastic Block Store' (with 'Volumes' New, 'Snapshots' New, 'Lifecycle Manager' New), and 'Feedback'. The main content area shows a table of instances:

Name	Instance ID	Instance state	Instance type	Status check	Alarm status	Availability Zone	Public IPv4 DNS
saifshah-clust...	i-087bf5b6791d22452	Terminated	t2.small	2/2 checks passed	No alarms	+ us-east-1a	-
Tomcat_Server	i-010d47b3e089d7869	Terminated	t2.micro	-	No alarms	+ us-east-1c	-
Docker_Server	i-0875a802a59fd059	Shutting-down	t2.micro	2/2 checks passed	No alarms	+ us-east-1c	-
Jenkins_Server1	i-00f1e4c8cb15c9042	Shutting-down	t2.micro	2/2 checks passed	No alarms	+ us-east-1c	-
Ansible_Server	i-0dc753250431f8ac9	Shutting-down	t2.micro	2/2 checks passed	No alarms	+ us-east-1c	-
saifshah-clust...	i-067a3ff40a85d554f	Terminated	t2.small	2/2 checks passed	No alarms	+ us-east-1c	-
EKS_Bootstrap...	i-0a1972f80a26866df	Shutting-down	t2.micro	2/2 checks passed	No alarms	+ us-east-1b	ec2-54-211-9-21.comp...

Below the table, a message states: 'Instances: i-087bf5b6791d22452 (saifshah-cluster-**ng-584bdec7-Node**), i-010d47b3e089d7869 (Tomcat\_Server), i-0875a802a59fd059 (Docker\_Server), i-00f1e4c8cb15c9042 (Jenkins\_Server1), i-0dc753250431f8ac9 (Ansible\_Server), i-067a3ff40a85d554f (saifshah-cluster-**ng-584bdec7-Node**), i-0a1972f80a26866df (EKS\_Bootstrap\_Server)'.

The 'Monitoring' section displays four charts: 'CPU utilization (%)', 'Status check failed (any) (cou...)', 'Status check failed (instance)...', and 'Status check failed (system) (...)'.

Fig. Terminates all Instances