

# DevOps Project: Milestone 2

## Question Statement:

Create an end-to-end CI/CD pipeline in AWS platform using Jenkins as the orchestration tool, Github as the SCM, Maven as the Build tool, deploy in a docker instance and create a Docker image, Store the docker image in ECR, Achieve Kubernetes deployment using the ECR image. Build a sample java web app using maven.

## Requirements:

- CI/CD Pipeline System
- Git: Source Code Management
- Github: Distributed Version Control System
- Jenkins: Automation tool for Continuous Integration and Continuous Deployment
- Maven: Build Automation tool for Java
- Tomcat: Java based Web Server for JavaServer Pages (JSP)
- Docker: Containerisation tool used for creating Docker Image
- Kubernetes: Deployment Automation and Management of Containerized Application

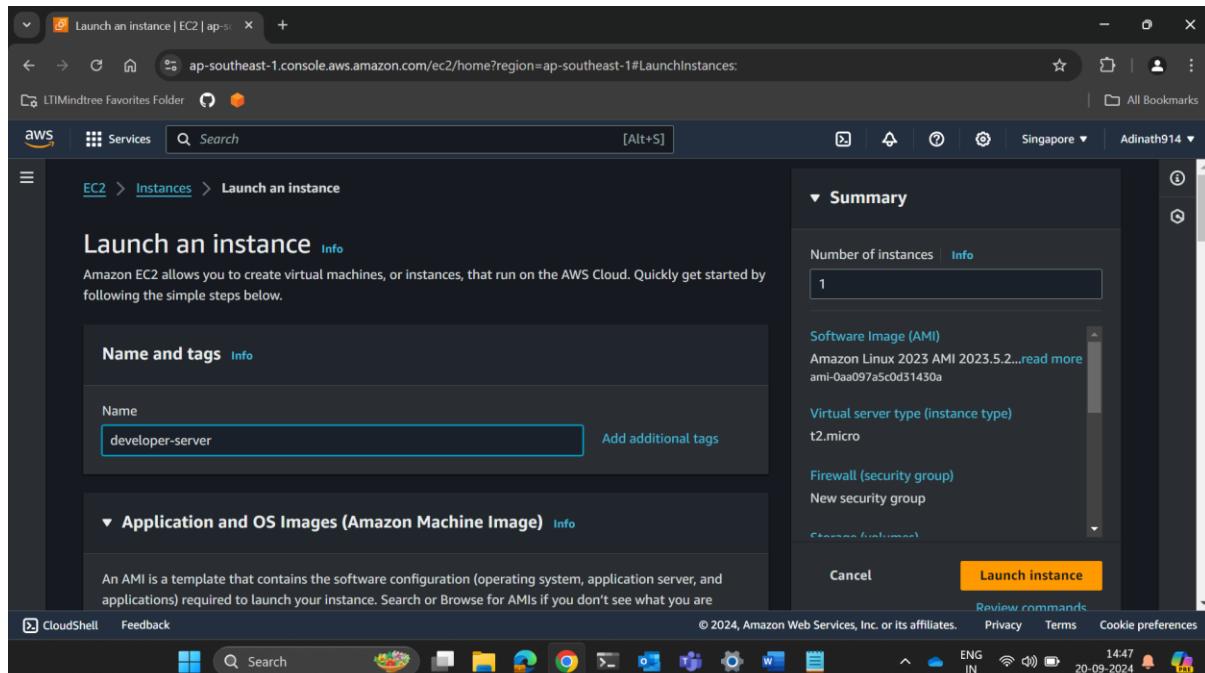
## Servers Created:

- Developer Server
- Jenkins Server
- Tomcat Server
- Docker Server
- Kubernetes Server

## Steps:

### 1. Created Developer Server

- 1.1. Initiated Amazon Linux EC2 instance for Developer Server and connected to local device via ssh.



```
root@ip-172-31-37-145:~# 
Microsoft Windows [Version 10.0.22631.4169]
(c) Microsoft Corporation. All rights reserved.

C:\Users\10747904>cd Downloads

C:\Users\10747904\Downloads>ssh -i "Milestone-2-kp.pem" ec2-user@ec2-47-129-239-247.ap-southeast-1.compute.amazonaws.com
Last login: Fri Sep 20 09:19:57 2024 from 136.226.233.102
[ec2-user@ip-172-31-37-145 ~]$ sudo su -
Last login: Fri Sep 20 09:20:00 UTC 2024 on pts/1
[root@ip-172-31-37-145 ~]# yum update -
Last metadata expiration check: 0:13:24 ago on Fri Sep 20 09:19:04 2024.
Dependencies resolved.
Nothing to do.
Complete!
[root@ip-172-31-37-145 ~]# hostnamectl set-hostname developer-server.example.com
[root@ip-172-31-37-145 ~]# bash
[root@developer-server ~]#
```

## 1.2. Installed git on developer server.

The screenshot shows a terminal window titled 'root@ip-172-31-37-145~'. The command 'yum install git -y' is run, followed by a dependency resolution message. A table lists the packages being installed, including 'git' and its dependencies like 'git-core', 'perl-Error', etc., along with their versions, repositories, and sizes. Transaction details show the total download size and individual package download speeds. The terminal window has a dark theme with light-colored text. The bottom right corner shows system status icons and the date/time '20-09-2024 14:50'.

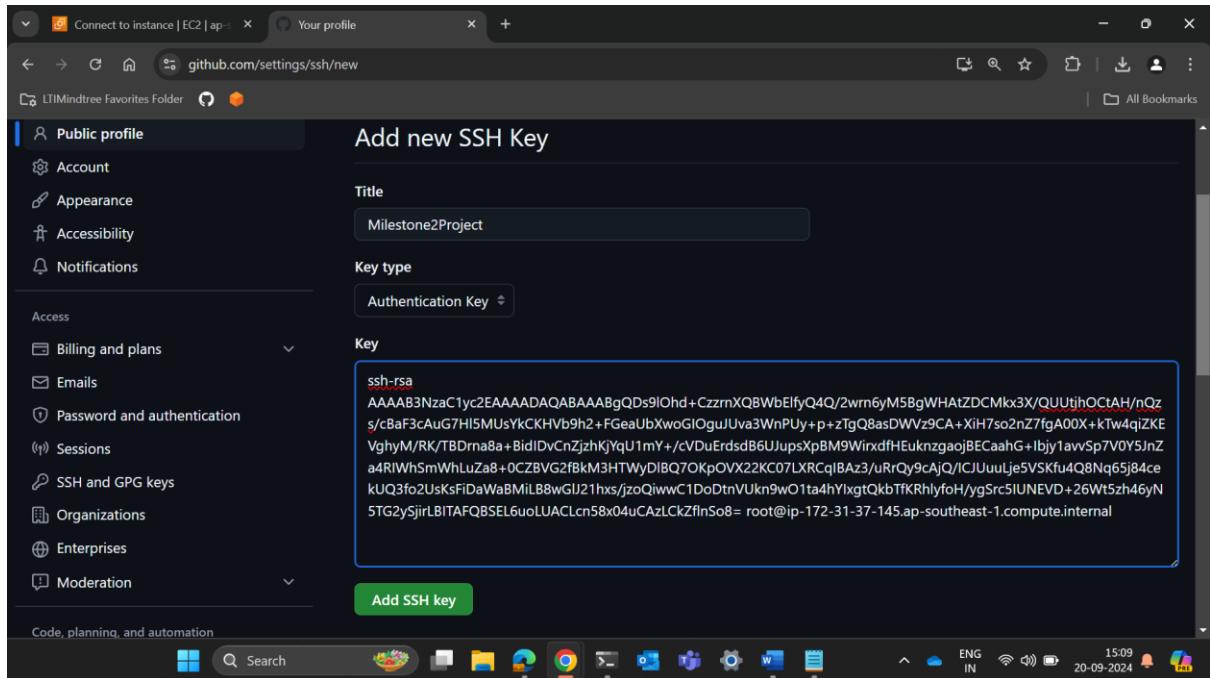
```
[root@ip-172-31-37-145 ~]# yum install git -y
Last metadata expiration check: 0:01:28 ago on Fri Sep 20 09:19:04 2024.
Dependencies resolved.
=====
| Package           | Architecture | Version      | Repository | Size |
| ======           | ======       | ======       | ======     | ===== |
| Installing:      |              |              |            |        |
| git              | x86_64       | 2.40.1-1.amzn2023.0.3 | amazonlinux | 54 k  |
| Installing dependencies: |          |              |            |        |
| git-core          | x86_64       | 2.40.1-1.amzn2023.0.3 | amazonlinux | 4.3 M |
| git-core-doc      | noarch       | 2.40.1-1.amzn2023.0.3 | amazonlinux | 2.6 M |
| perl-Error        | noarch       | 1.0.17029-5.amzn2023.0.2 | amazonlinux | 41 k  |
| perl-File-Find    | noarch       | 1.37-477.amzn2023.0.6 | amazonlinux | 26 k  |
| perl-Git          | noarch       | 2.40.1-1.amzn2023.0.3 | amazonlinux | 42 k  |
| perl-TermReadKey  | x86_64       | 2.38-9.amzn2023.0.2  | amazonlinux | 36 k  |
| perl-lib          | x86_64       | 0.65-477.amzn2023.0.6 | amazonlinux | 15 k  |
|
| Transaction Summary |          |              |            |        |
| ======           | ======       | ======       | ======     | ===== |
| Install 8 Packages |          |              |            |        |
|
Total download size: 7.1 M
Installed size: 34 M
Downloading Packages:
(1/8): git-2.40.1-1.amzn2023.0.3.x86_64.rpm          1.1 MB/s | 54 kB   00:00
(2/8): perl-Error-0.17029-5.amzn2023.0.2.noarch.rpm  2.5 MB/s | 41 kB   00:00
(3/8): perl-File-Find-1.37-477.amzn2023.0.6.noarch.rpm 1.3 MB/s | 26 kB   00:00
(4/8): perl-Git-2.40.1-1.amzn2023.0.3.noarch.rpm     1.4 MB/s | 42 kB   00:00
(5/8): git-core-doc-2.40.1-1.amzn2023.0.3.noarch.rpm  18 MB/s | 2.6 MB  00:00
(6/8): perl-TermReadKey-2.38-9.amzn2023.0.2.x86_64.rpm 1.1 MB/s | 36 kB   00:00
(7/8): perl-lib-0.65-477.amzn2023.0.6.x86_64.rpm     588 kB/s | 15 kB   00:00
(8/8): git-core-2.40.1-1.amzn2023.0.3.x86_64.rpm     19 MB/s | 4.3 MB  00:00
-----
```

## 1.3. Generated ssh-key for connection between EC2 and Github Account.

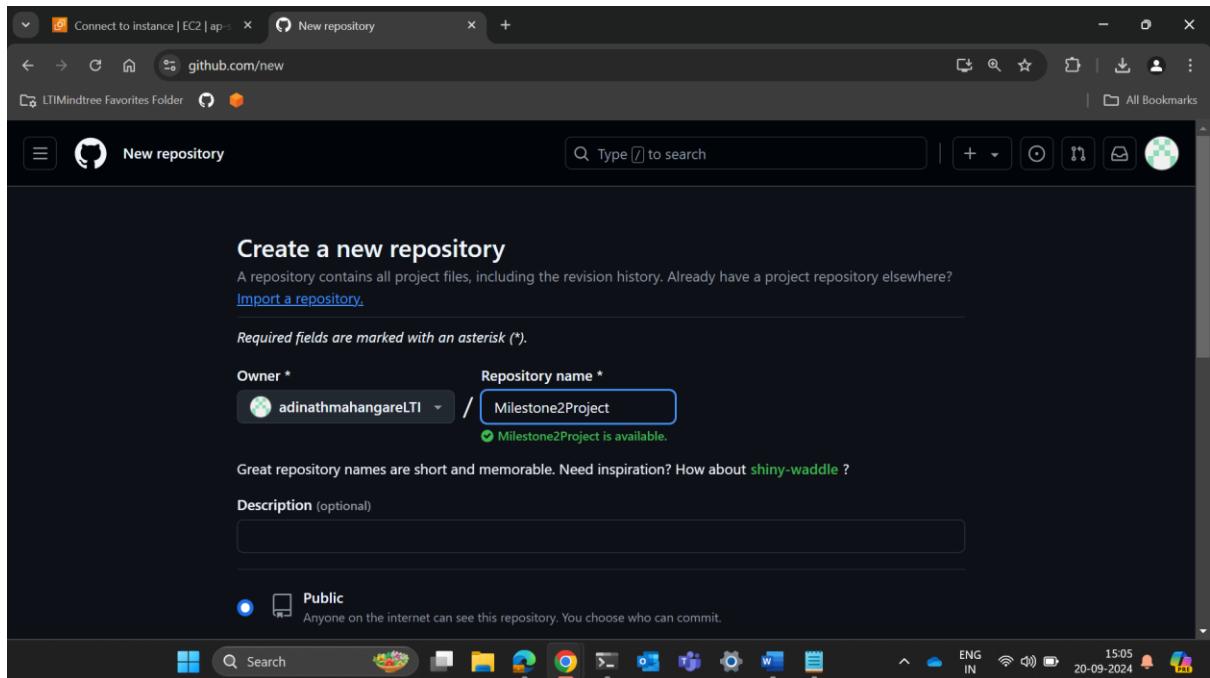
The screenshot shows a terminal window titled 'root@developer-server ~'. The command 'ssh-keygen' is run, generating a public/private RSA key pair. It asks for a file to save the key, noting that '/root/.ssh/id\_rsa' already exists. It then displays the generated public key content. The terminal window has a dark theme with light-colored text. The bottom right corner shows system status icons and the date/time '20-09-2024 15:08'.

```
[root@developer-server ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
/root/.ssh/id_rsa already exists.
Overwrite (y/n)?
[root@developer-server ~]# cat .ssh/id_rsa.pub
ssh-rsa AAAAB3NzaC1yc2EAAAQABAAABgQDs9tOhd+CzrrnXQBwbfElfyQ4Q/2wrn6yM5BgWhAtZDCMkx3X/QUUtjhOctAH/nQzs/cBaF3cAuG7H15MuSYhCKHVb9h2+FG
eaUbXwoGI0guJUva3WnPuy+p+ztgQ8asDWvz9CA+XiH7so2nZ7fgA00X+kTw4qizKEVghY/RK/TBDrna8a+BidIDvCnJzhkjYqU1mY+cVDuErdsd86UJupsXpBM9Wixdf
HEukunzgaojBECaahG+Ibjy1avvSp7V0Y5JnZa4RIWhSmWhLuZa8+0CZBVG2FBkM3HTWdLBQ70kpOVX22KC07LXRcqIBAz3/uRrQy9cAjQ/ICJJuulje5VSKfu4Q8Nq65j84c
ekUQ3fo2UsksFiDwWa8MiLB8wGlJ21hx5/jzoQiwmC1DoDtnVUkn9w01ta4hYIxgtQkbTfKRhlyFoH/ygSrc5IUNEVD+26Wt5zh46yN5TG2ySjirLBITAfQBSel6uoLAACLcn
58x04uCazLckZflnSo8= root@ip-172-31-37-145.ap-southeast-1.compute.internal
[root@developer-server ~]#
```

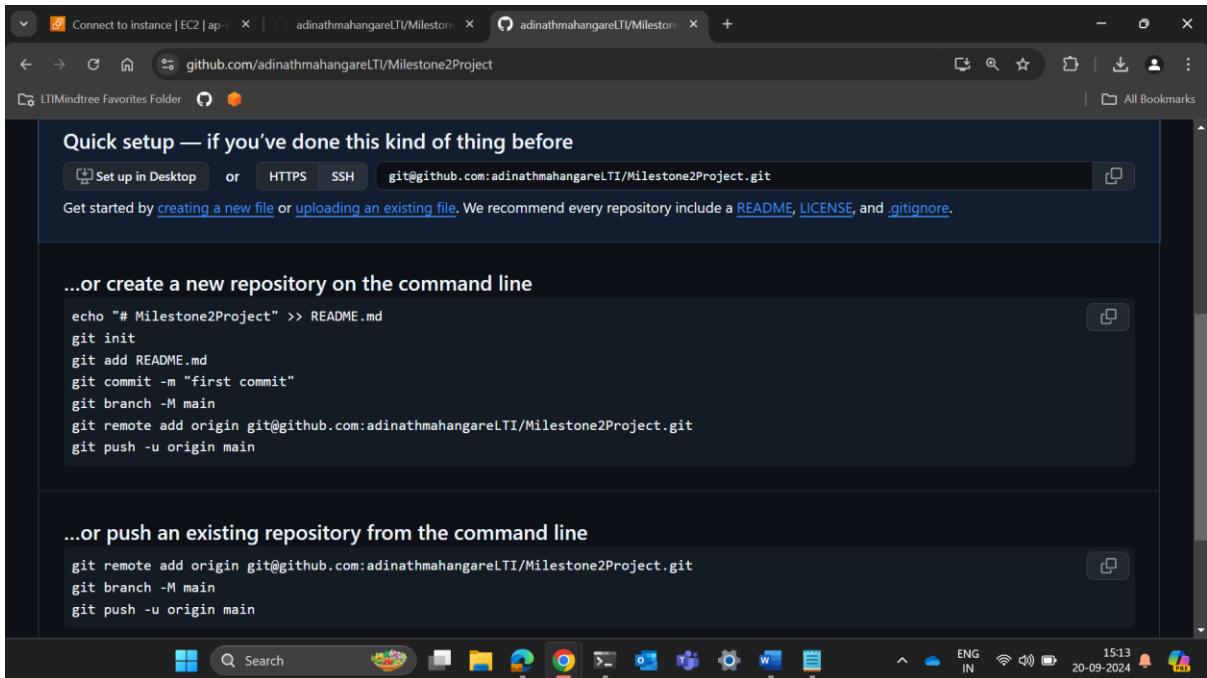
## 1.4. Added ssh-key of Developer Server to Github Account



## 1.5. Created new repository on Github Account with name Milestone2Project.



## 1.6. Copied code for adding remote to local repository.



## 1.7. Initiated git on project repository on Developer Server and added remote to it.

A screenshot of a terminal window on a Linux developer server. The user is root and has navigated to the Milestone2Project directory. They run 'git status' which shows there is no git repository. They then run 'git init'. This initializes an empty Git repository and creates a .git directory. Next, they run 'git remote add origin git@github.com:adinathmahangareLTI/Milestone2Project.git'. The output shows the remote 'origin' has been added. The terminal window is located at the bottom of the screen, with a Windows taskbar visible above it.

## 1.8. Added all files in project repository to staging area of Git.

```
[root@developer-server Milestone2Project]# git status
On branch master

No commits yet

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    Dockerfile
    Jenkinsfile
    README.md
    pom.xml
    server/
    webapp/

nothing added to commit but untracked files present (use "git add" to track)
[root@developer-server Milestone2Project]# git add .
[root@developer-server Milestone2Project]# git status
On branch master

No commits yet

Changes to be committed:
  (use "git rm --cached <file>..." to unstage)
    new file:  Dockerfile
    new file:  Jenkinsfile
    new file:  README.md
    new file:  pom.xml
    new file:  server/pom.xml
    new file:  server/src/main/java/com/example/Greeter.java
    new file:  server/src/site/apt/index.apt
    new file:  server/src/test/java/com/example/TestGreeter.java
    new file:  webapp/pom.xml
    new file:  webapp/src/main/webapp/WEB-INF/web.xml
```

## 1.9. Committed all the changes in the staging area of Git.

```
[root@developer-server Milestone2Project]# git commit -m "Added java-project to repository Milestone2Project"
[master (root-commit) ecb7d9c] Added java-project to repository Milestone2Project
Committer: root <root@developer-server.example.com>
Your name and email address were configured automatically based
on your username and hostname. Please check that they are accurate.
You can suppress this message by setting them explicitly. Run the
following command and follow the instructions in your editor to edit
your configuration file:

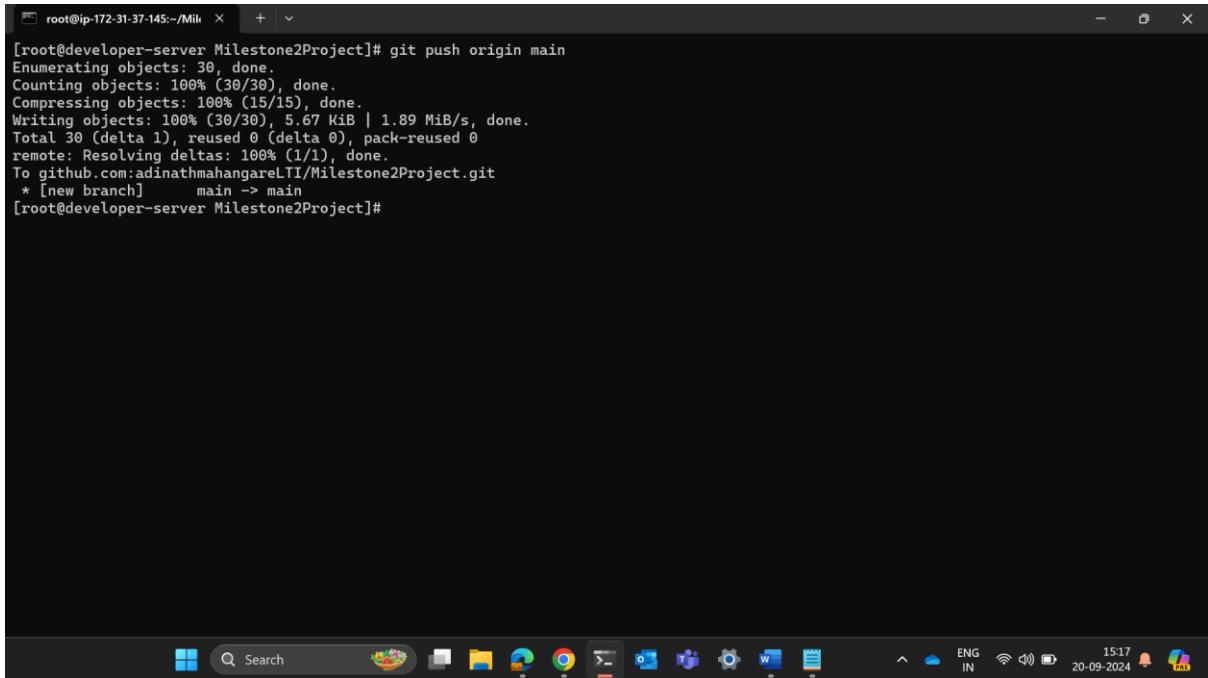
  git config --global --edit

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

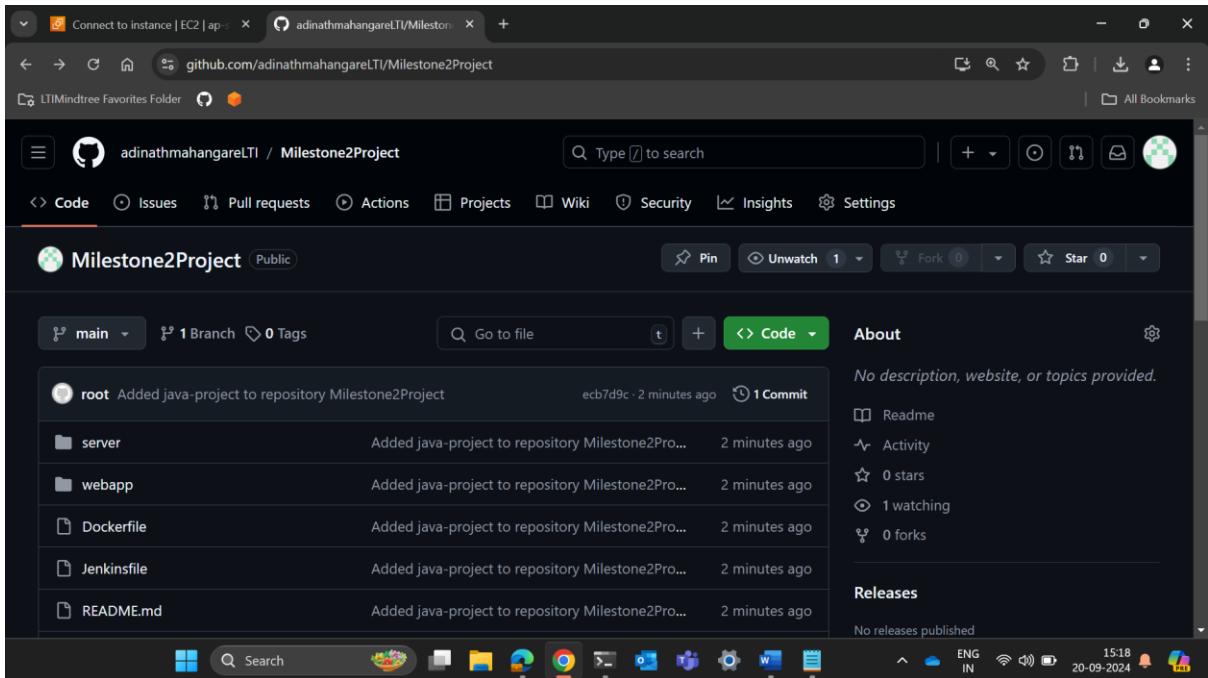
  git commit --amend --reset-author

11 files changed, 552 insertions(+)
create mode 100644 Dockerfile
create mode 100644 Jenkinsfile
create mode 100644 README.md
create mode 100644 pom.xml
create mode 100644 server/pom.xml
create mode 100644 server/src/main/java/com/example/Greeter.java
create mode 100644 server/src/site/apt/index.apt
create mode 100644 server/src/test/java/com/example/TestGreeter.java
create mode 100644 webapp/pom.xml
create mode 100644 webapp/src/main/webapp/WEB-INF/web.xml
create mode 100644 webapp/src/main/webapp/index.jsp
[root@developer-server Milestone2Project]# |
```

1.10. Pushed all the committed files in Local Project Repository to Remote Github Repository.



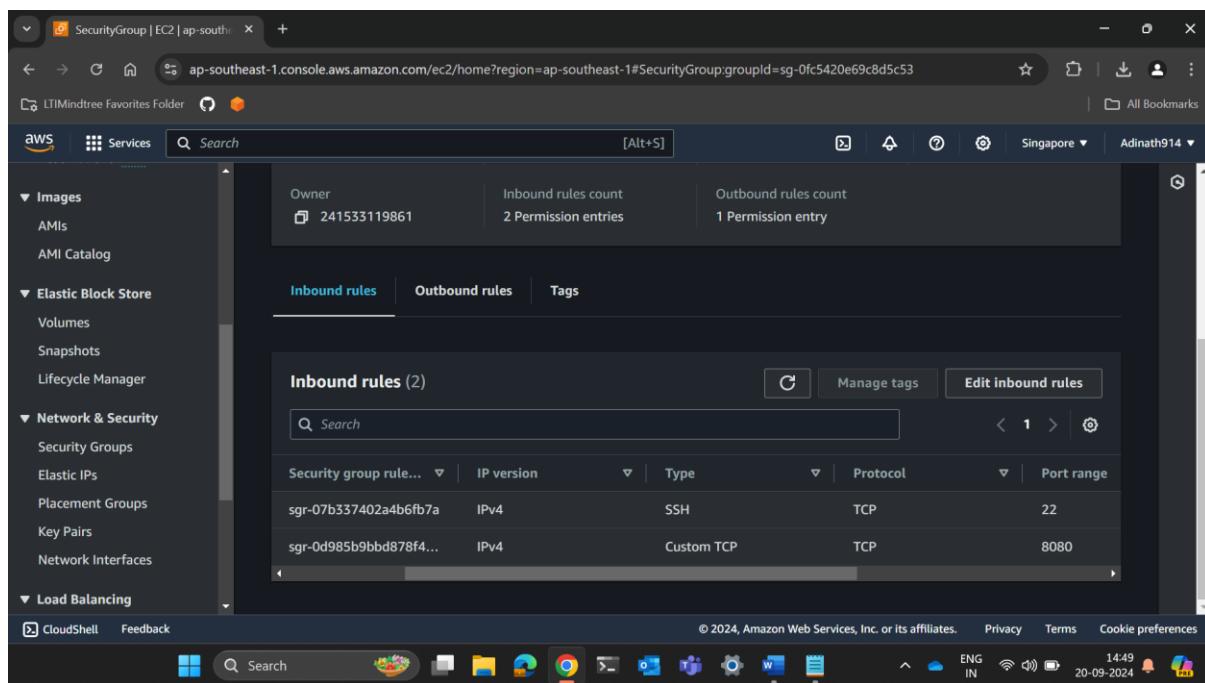
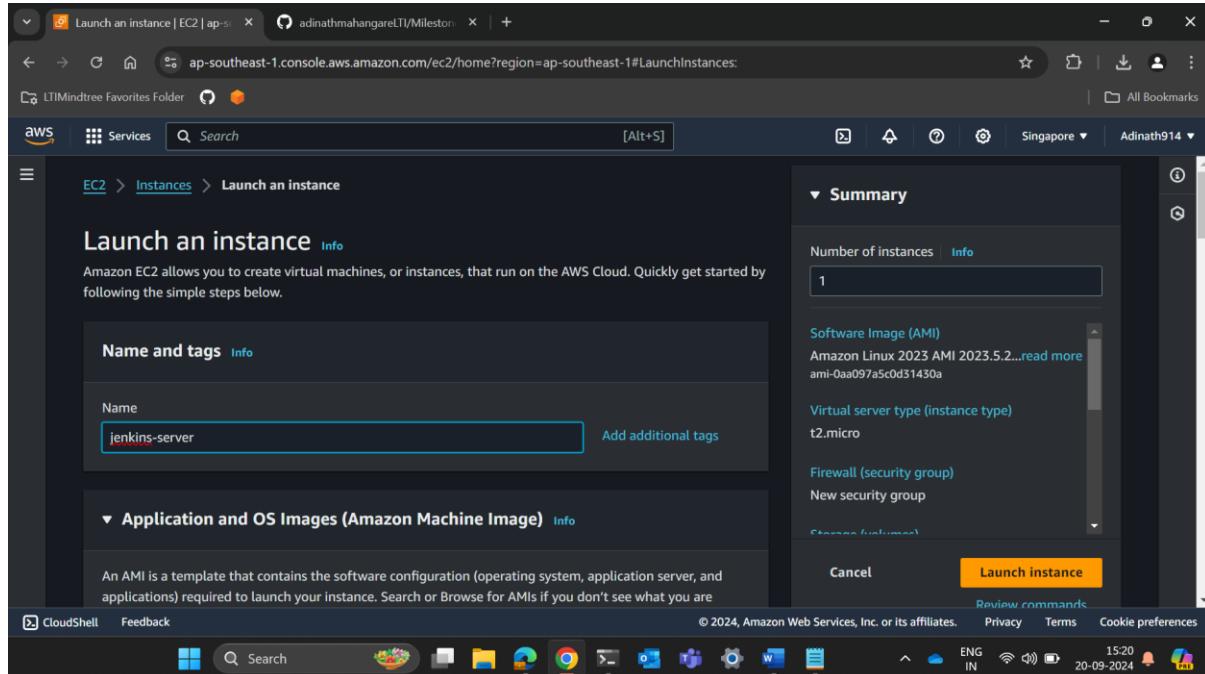
```
[root@developer-server Milestone2Project]# git push origin main
Enumerating objects: 30, done.
Counting objects: 100% (30/30), done.
Compressing objects: 100% (15/15), done.
Writing objects: 100% (30/30), 5.67 KiB | 1.89 MiB/s, done.
Total 30 (delta 1), reused 0 (delta 0), pack-reused 0
remote: Resolving deltas: 100% (1/1), done.
To github.com:adinathmahangareLTI/Milestone2Project.git
 * [new branch]      main -> main
[root@developer-server Milestone2Project]#
```

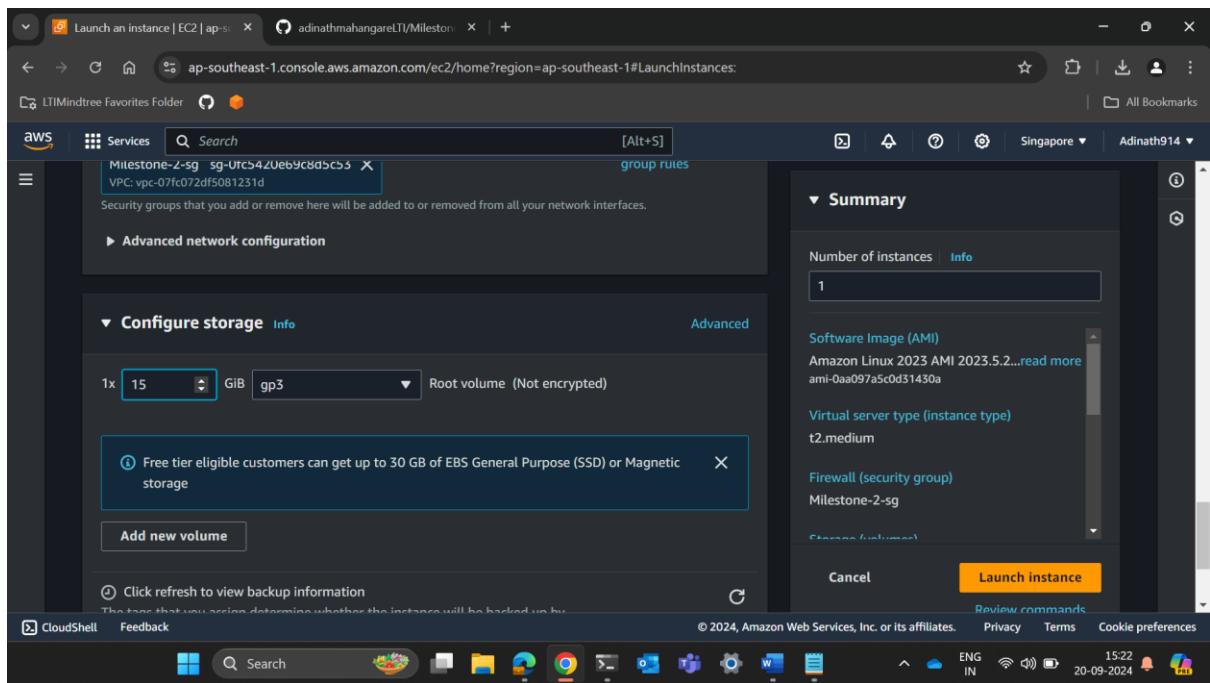
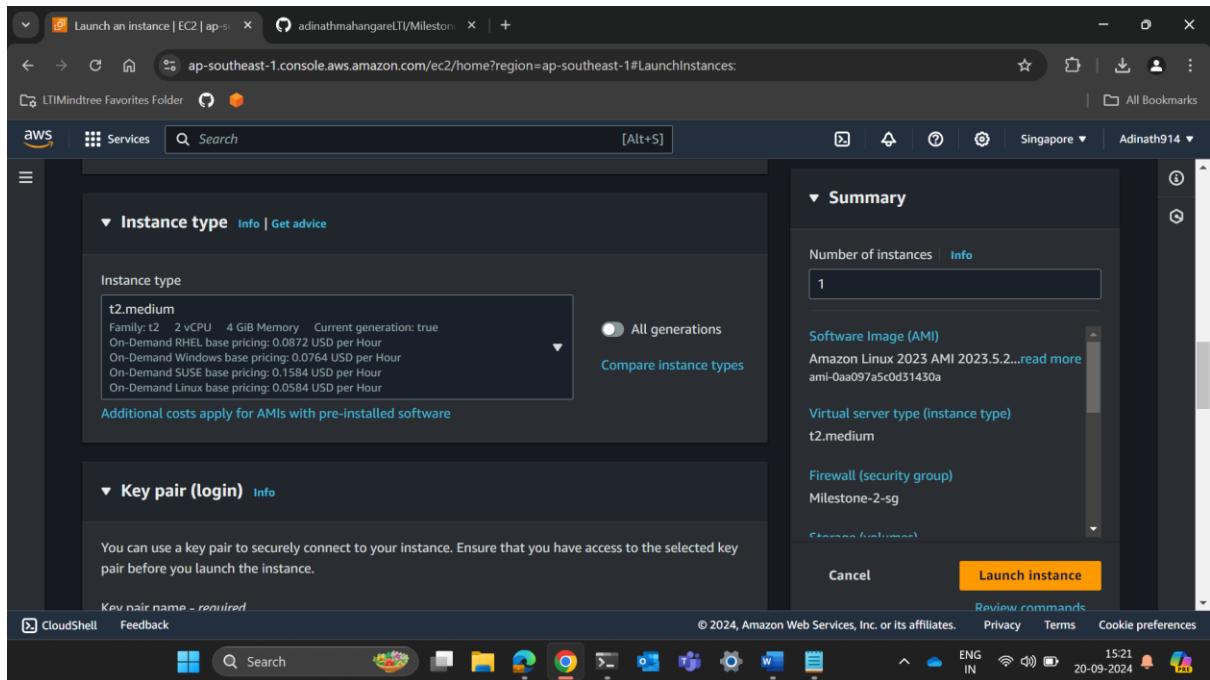


Developer added project to Github Repository Successfully!

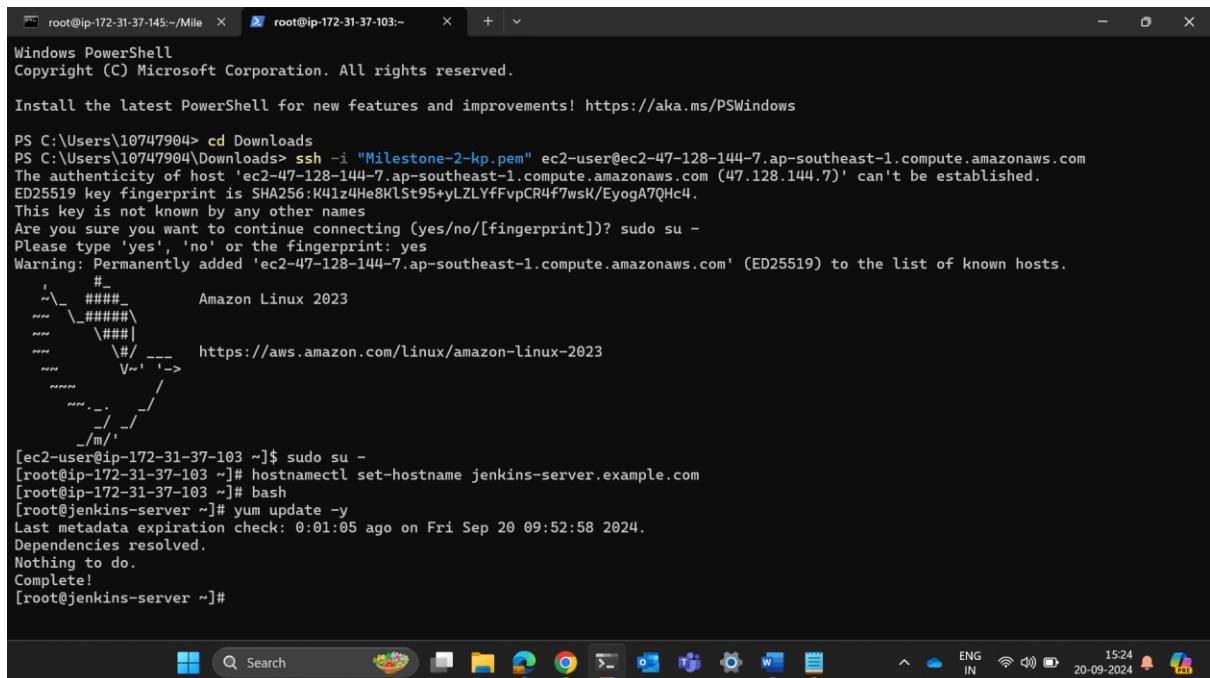
## 2. Created Jenkins Server

2.1. Initiated Amazon Linux EC2 instance for Jenkins-server. Added 8080 TCP port in Security Group. Selected t2.medium as instance type. Added 15 GB as storage.





## 2.2. Connected Jenkins-server EC2 to local machine via ssh.

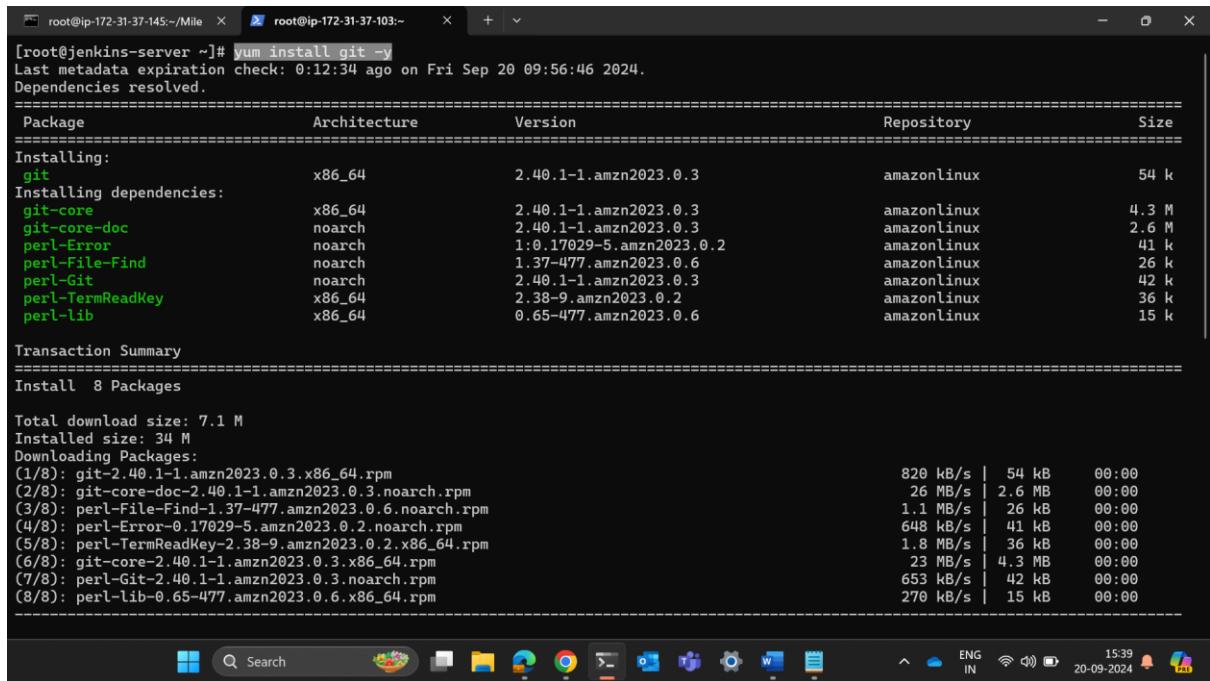


```
PS C:\Users\10747904> cd Downloads
PS C:\Users\10747904\Downloads> ssh -i "Milestone-2-kp.pem" ec2-user@ec2-47-128-144-7.ap-southeast-1.compute.amazonaws.com
The authenticity of host 'ec2-47-128-144-7.ap-southeast-1.compute.amazonaws.com (47.128.144.7)' can't be established.
ED25519 key fingerprint is SHA256:K41z4He8KLst95+yLZYfFvpCR4f7wsK/EyogA7QHc4.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? sudo su -
Please type 'yes', 'no' or the fingerprint: yes
Warning: Permanently added 'ec2-47-128-144-7.ap-southeast-1.compute.amazonaws.com' (ED25519) to the list of known hosts.

      _#
     /_#_          Amazon Linux 2023
    /###\_
   /###\_
  /##|_
 /#/  __ https://aws.amazon.com/linux/amazon-linux-2023
 V~' '-->
   /
   /_/
  /_/
 _/m/_/]

[ec2-user@ip-172-31-37-103 ~]$ sudo su -
[root@ip-172-31-37-103 ~]# hostnamectl set-hostname jenkins-server.example.com
[root@ip-172-31-37-103 ~]# bash
[root@jenkins-server ~]# yum update -y
Last metadata expiration check: 0:01:05 ago on Fri Sep 20 09:52:58 2024.
Dependencies resolved.
Nothing to do.
Complete!
[root@jenkins-server ~]#
```

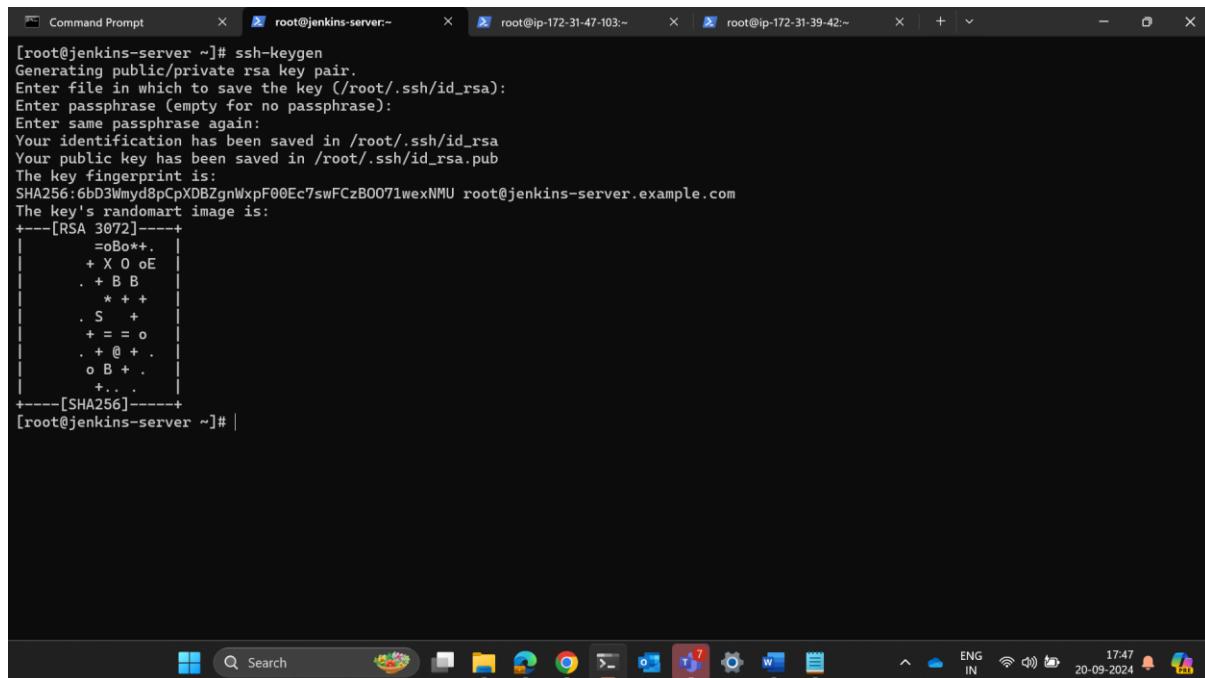
## 2.3. Installed git on Jenkins Server.



```
[root@jenkins-server ~]# yum install git -y
Last metadata expiration check: 0:12:34 ago on Fri Sep 20 09:56:46 2024.
Dependencies resolved.
=====
== Package           Architecture Version       Repository      Size ==
=====
Installing:
git                  x86_64      2.40.1-1.amzn2023.0.3      amazonlinux   54 k
Installing dependencies:
git-core              x86_64      2.40.1-1.amzn2023.0.3      amazonlinux   4.3 M
git-core-doc          noarch     2.40.1-1.amzn2023.0.3      amazonlinux   2.6 M
perl-Error            noarch     1:0.17029-5.amzn2023.0.2      amazonlinux   41 k
perl-File-Find        noarch     1.37-477.amzn2023.0.6      amazonlinux   26 k
perl-Git              noarch     2.40.1-1.amzn2023.0.3      amazonlinux   42 k
perl-TermReadKey     x86_64      2.38-9.amzn2023.0.2      amazonlinux   36 k
perl-lib              x86_64      0.65-477.amzn2023.0.6      amazonlinux   15 k
=====
Transaction Summary
=====
Install 8 Packages

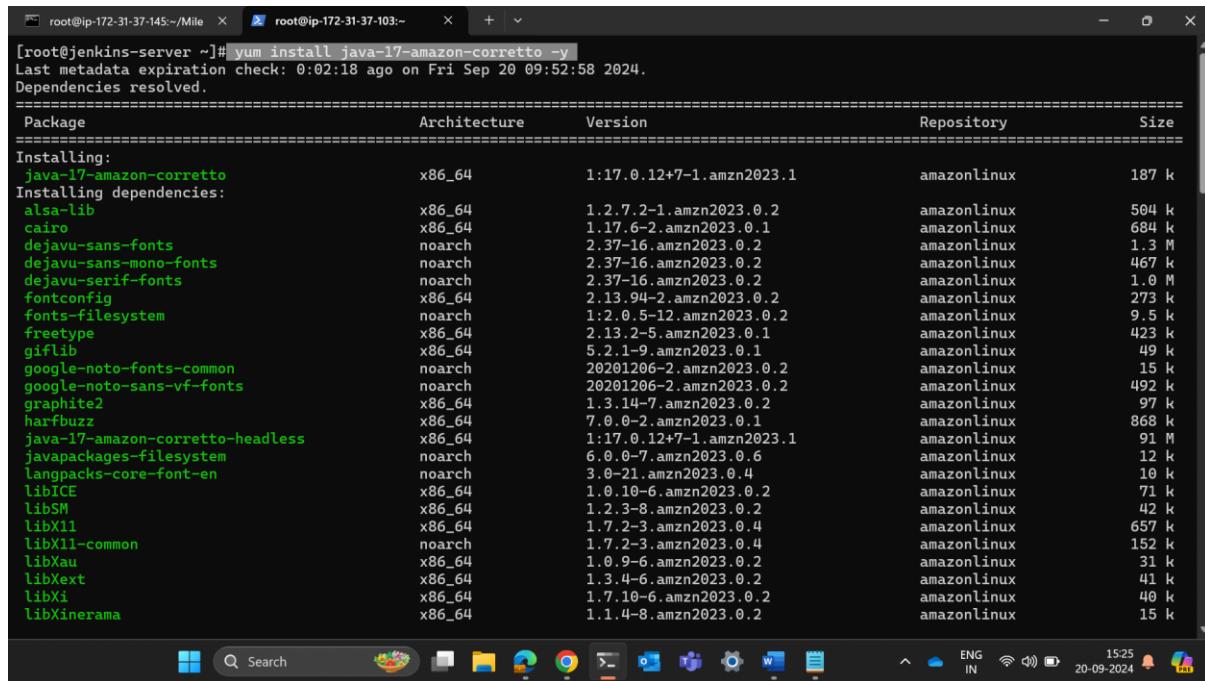
Total download size: 7.1 M
Installed size: 34 M
Downloading Packages:
(1/8): git-2.40.1-1.amzn2023.0.3.x86_64.rpm          820 kB/s | 54 kB  00:00
(2/8): git-core-doc-2.40.1-1.amzn2023.0.3.noarch.rpm  26 MB/s | 2.6 MB  00:00
(3/8): perl-File-Find-1.37-477.amzn2023.0.6.noarch.rpm 1.1 MB/s | 26 kB  00:00
(4/8): perl-Error-0.17029-5.amzn2023.0.2.noarch.rpm  648 kB/s | 41 kB  00:00
(5/8): perl-TermReadKey-2.38-9.amzn2023.0.2.x86_64.rpm 1.8 MB/s | 36 kB  00:00
(6/8): git-core-2.40.1-1.amzn2023.0.3.x86_64.rpm      23 MB/s | 4.3 MB  00:00
(7/8): perl-Git-2.40.1-1.amzn2023.0.3.noarch.rpm    653 kB/s | 42 kB  00:00
(8/8): perl-lib-0.65-477.amzn2023.0.6.x86_64.rpm    270 kB/s | 15 kB  00:00
=====
```

## 2.4. Generated ssh-key on Jenkins Server.



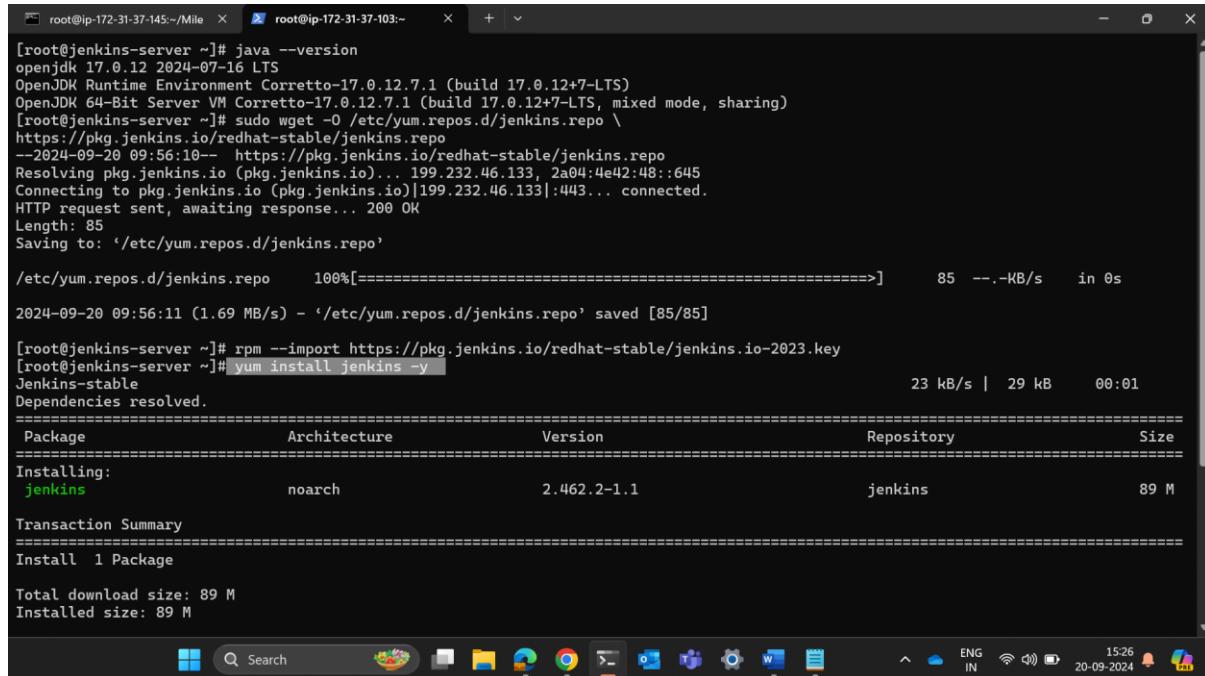
```
[root@jenkins-server ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa
Your public key has been saved in /root/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:6bD3Wmyd8pCpXDBZgnWxpF00Ec7swFCzB007lwexNMU root@jenkins-server.example.com
The key's randomart image is:
+---[RSA 3072]---+
=Bo*+.
+ X O oE
. + B B
* +
. S +
+ = = o
. + @ +
o B + .
+...
+---[SHA256]---+
[root@jenkins-server ~]# |
```

## 2.5. Installed java-17-amazon-corretto on Jenkins Server.



```
[root@jenkins-server ~]# yum install java-17-amazon-corretto -y
Last metadata expiration check: 0:02:18 ago on Fri Sep 20 09:52:58 2024.
Dependencies resolved.
=====
Package           Architecture Version       Repository      Size
=====
Installing:
java-17-amazon-corretto x86_64     1:17.0.12+7-1.amzn2023.1 amazonlinux   187 k
Installing dependencies:
alsa-lib           x86_64     1.2.7.2-1.amzn2023.0.2 amazonlinux   504 k
cairo              x86_64     1.17.6-2.amzn2023.0.1 amazonlinux   684 k
dejavu-sans-fonts noarch    2.37-16.amzn2023.0.2 amazonlinux   1.3 M
dejavu-sans-mono-fonts noarch    2.37-16.amzn2023.0.2 amazonlinux   467 k
dejavu-serif-fonts noarch    2.37-16.amzn2023.0.2 amazonlinux   1.0 M
fontconfig         x86_64     2.13.94-2.amzn2023.0.2 amazonlinux   273 k
fonts-filesystem  noarch    1:2.0.5-12.amzn2023.0.2 amazonlinux   9.5 k
freetype            x86_64     2.13.94-2.amzn2023.0.1 amazonlinux   423 k
giflib              x86_64     5.2.1-9.amzn2023.0.1 amazonlinux   49 k
google-noto-fonts-common noarch    20201206-2.amzn2023.0.2 amazonlinux   15 k
google-noto-sans-vf-fonts noarch    20201206-2.amzn2023.0.2 amazonlinux   492 k
graphite2          x86_64     1.3.14-7.amzn2023.0.2 amazonlinux   97 k
harfbuzz            x86_64     7.0.0-2.amzn2023.0.1 amazonlinux   868 k
java-17-amazon-corretto-headless x86_64     1:17.0.12+7-1.amzn2023.1 amazonlinux   91 M
javapackages-filesystem noarch    6.0.0-7.amzn2023.0.6 amazonlinux   12 k
langpacks-core-font-en noarch    3.0-21.amzn2023.0.4 amazonlinux   10 k
libICE              x86_64     1.0.10-6.amzn2023.0.2 amazonlinux   71 k
libSM              x86_64     1.2.3-8.amzn2023.0.2 amazonlinux   42 k
libX11              x86_64     1.7.2-3.amzn2023.0.4 amazonlinux   657 k
libX11-common       noarch    1.7.2-3.amzn2023.0.4 amazonlinux   152 k
libXau              x86_64     1.0.9-6.amzn2023.0.2 amazonlinux   31 k
libXext             x86_64     1.3.4-6.amzn2023.0.2 amazonlinux   41 k
libXi               x86_64     1.7.10-6.amzn2023.0.2 amazonlinux   40 k
libXinerama         x86_64     1.1.4-8.amzn2023.0.2 amazonlinux   15 k
```

## 2.6. Added required repos for installation and imported key. Installed Jenkins on Jenkins Server.



```
[root@jenkins-server ~]# java --version
openjdk 17.0.12 2024-07-16 LTS
OpenJDK Runtime Environment Corretto-17.0.12.7.1 (build 17.0.12+7-LTS)
OpenJDK 64-Bit Server VM Corretto-17.0.12.7.1 (build 17.0.12+7-LTS, mixed mode, sharing)
[root@jenkins-server ~]# sudo wget -O /etc/yum.repos.d/jenkins.repo \
https://pkg.jenkins.io/redhat-stable/jenkins.repo
--2024-09-20 09:56:10-- https://pkg.jenkins.io/redhat-stable/jenkins.repo
Resolving pkg.jenkins.io (pkg.jenkins.io)... 199.232.46.133, 2a04:4e42:48::645
Connecting to pkg.jenkins.io (pkg.jenkins.io)|199.232.46.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 85
Saving to: '/etc/yum.repos.d/jenkins.repo'

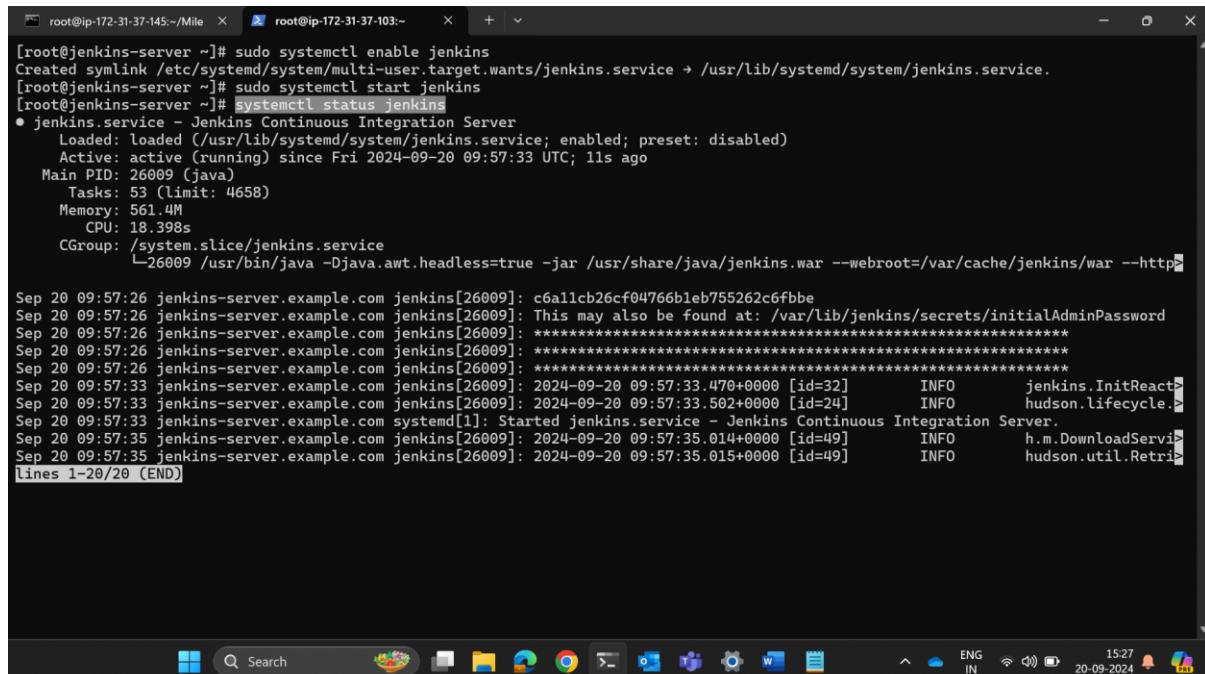
/etc/yum.repos.d/jenkins.repo      100%[=====]     85  --.-KB/s   in 0s

2024-09-20 09:56:11 (1.69 MB/s) - '/etc/yum.repos.d/jenkins.repo' saved [85/85]

[root@jenkins-server ~]# rpm --import https://pkg.jenkins.io/redhat-stable/jenkins.io-2023.key
[root@jenkins-server ~]# yum install jenkins -y
Jenkins-stable
Dependencies resolved.
=====
Package           Architecture      Version       Repository      Size
=====
Installing:
  jenkins          noarch          2.462.2-1.1    jenkins        89 M
Transaction Summary
=====
Install 1 Package

Total download size: 89 M
Installed size: 89 M
```

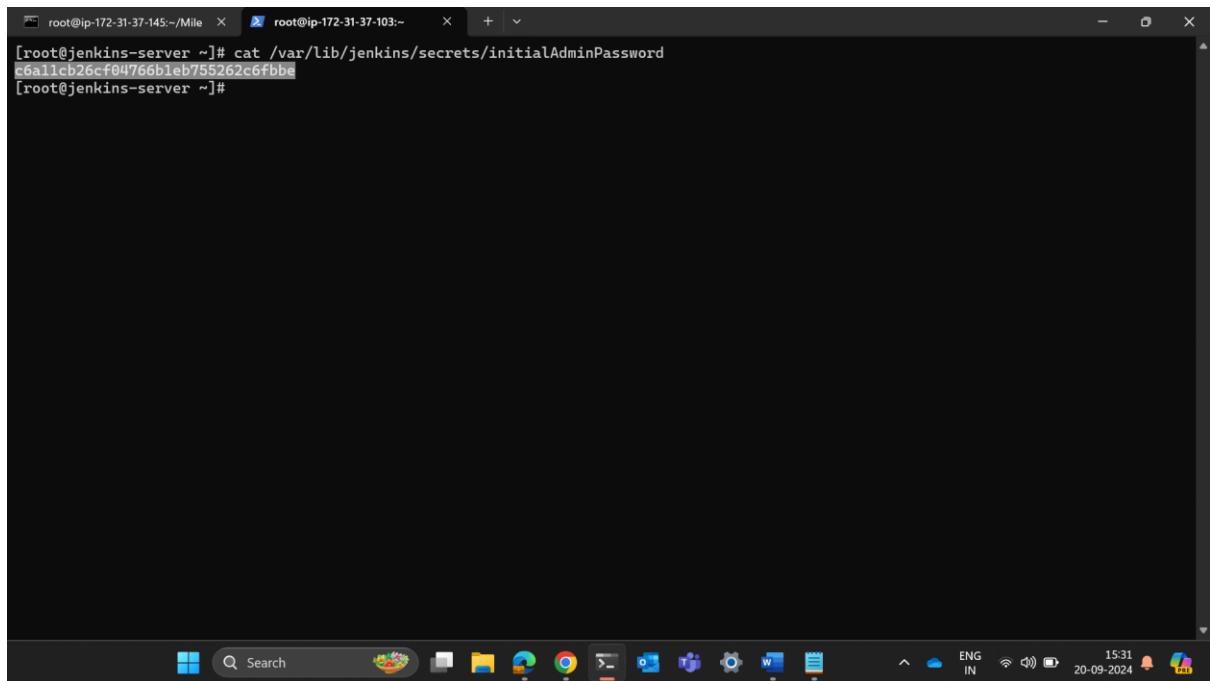
## 2.7. Enabled Jenkins and Started Jenkins and checked status whether it is running correctly.



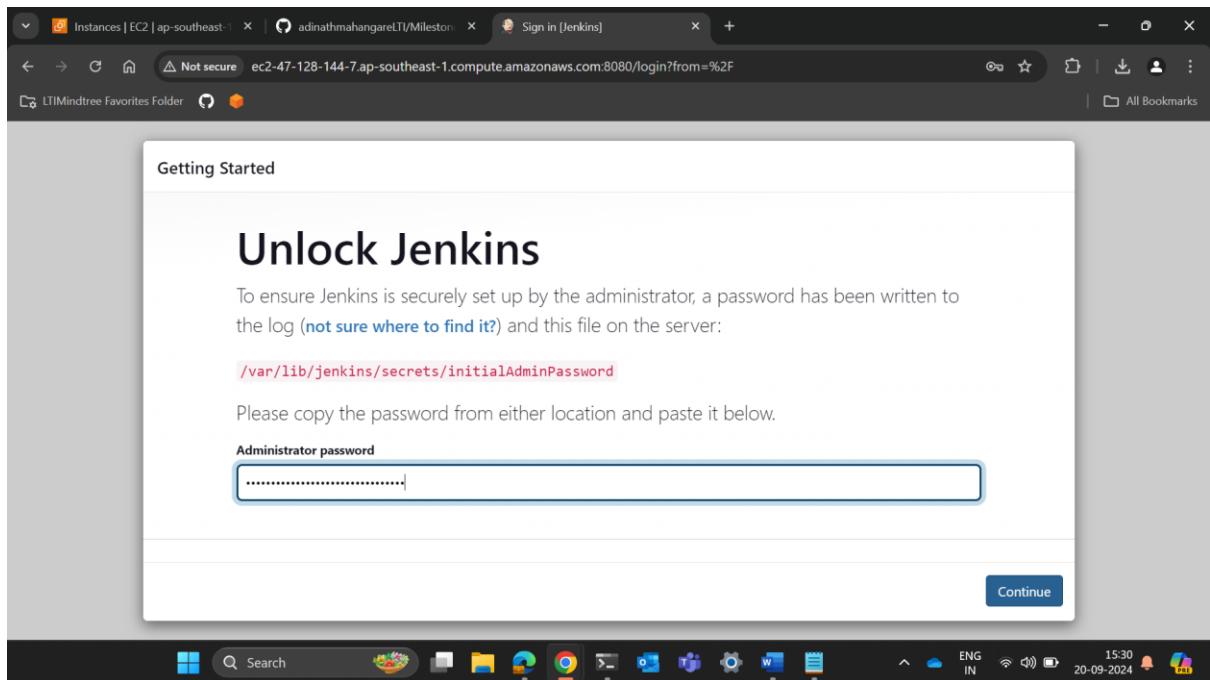
```
[root@jenkins-server ~]# sudo systemctl enable jenkins
Created symlink /etc/systemd/system/multi-user.target.wants/jenkins.service → /usr/lib/systemd/system/jenkins.service.
[root@jenkins-server ~]# sudo systemctl start jenkins
[root@jenkins-server ~]# systemctl status jenkins
● jenkins.service - Jenkins Continuous Integration Server
   Loaded: loaded (/usr/lib/systemd/system/jenkins.service; enabled; preset: disabled)
   Active: active (running) since Fri 2024-09-20 09:57:33 UTC; 11s ago
     Main PID: 26009 (java)
        Tasks: 53 (limit: 4658)
       Memory: 561.4M
          CPU: 18.398s
         CGroup: /system.slice/jenkins.service
                   └─26009 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=/var/cache/jenkins/war --http

Sep 20 09:57:26 jenkins-server.example.com jenkins[26009]: c6a1cb26cf04766b1eb755262c6fbbe
Sep 20 09:57:26 jenkins-server.example.com jenkins[26009]: This may also be found at: /var/lib/jenkins/secrets/initialAdminPassword
Sep 20 09:57:26 jenkins-server.example.com jenkins[26009]: ****
Sep 20 09:57:26 jenkins-server.example.com jenkins[26009]: ****
Sep 20 09:57:26 jenkins-server.example.com jenkins[26009]: ****
Sep 20 09:57:33 jenkins-server.example.com jenkins[26009]: 2024-09-20 09:57:33.470+0000 [id=32]      INFO      jenkins.InitReact
Sep 20 09:57:33 jenkins-server.example.com jenkins[26009]: 2024-09-20 09:57:33.502+0000 [id=24]      INFO      hudson.lifecycle
Sep 20 09:57:33 jenkins-server.example.com systemd[1]: Started jenkins.service - Jenkins Continuous Integration Server.
Sep 20 09:57:35 jenkins-server.example.com jenkins[26009]: 2024-09-20 09:57:35.014+0000 [id=49]      INFO      h.m.DownloadServic
Sep 20 09:57:35 jenkins-server.example.com jenkins[26009]: 2024-09-20 09:57:35.015+0000 [id=49]      INFO      hudson.util.Retrie
lines 1-20/20 (END)
```

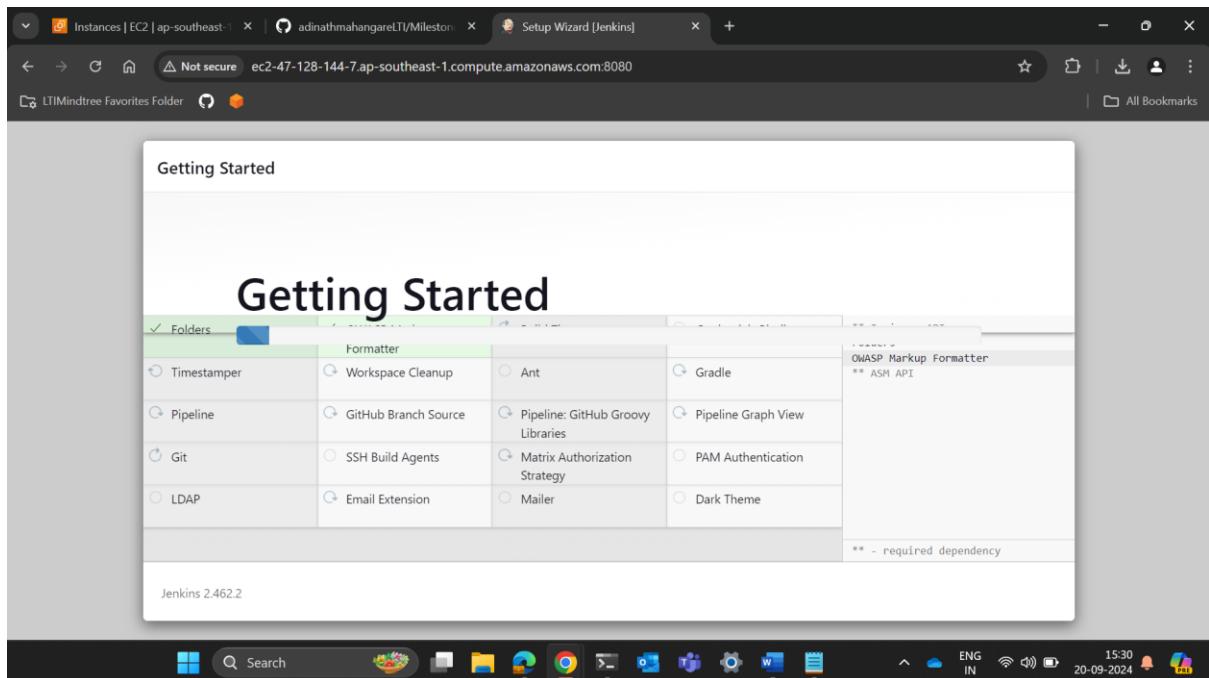
## 2.8. Copied secret password for initiating admin access in Jenkins Dashboard and Unlocked Jenkins on port 8080 as admin.



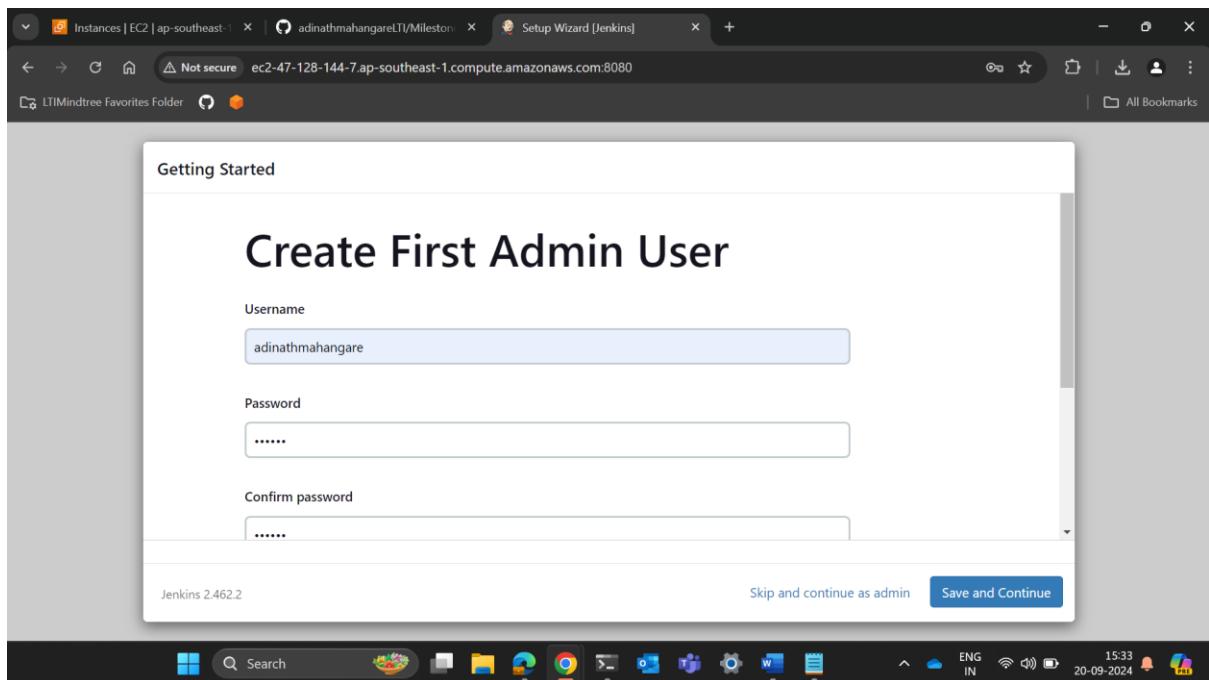
```
[root@jenkins-server ~]# cat /var/lib/jenkins/secrets/initialAdminPassword
c6a11cb26cf04766b1eb755262c6fbbe
[root@jenkins-server ~]#
```

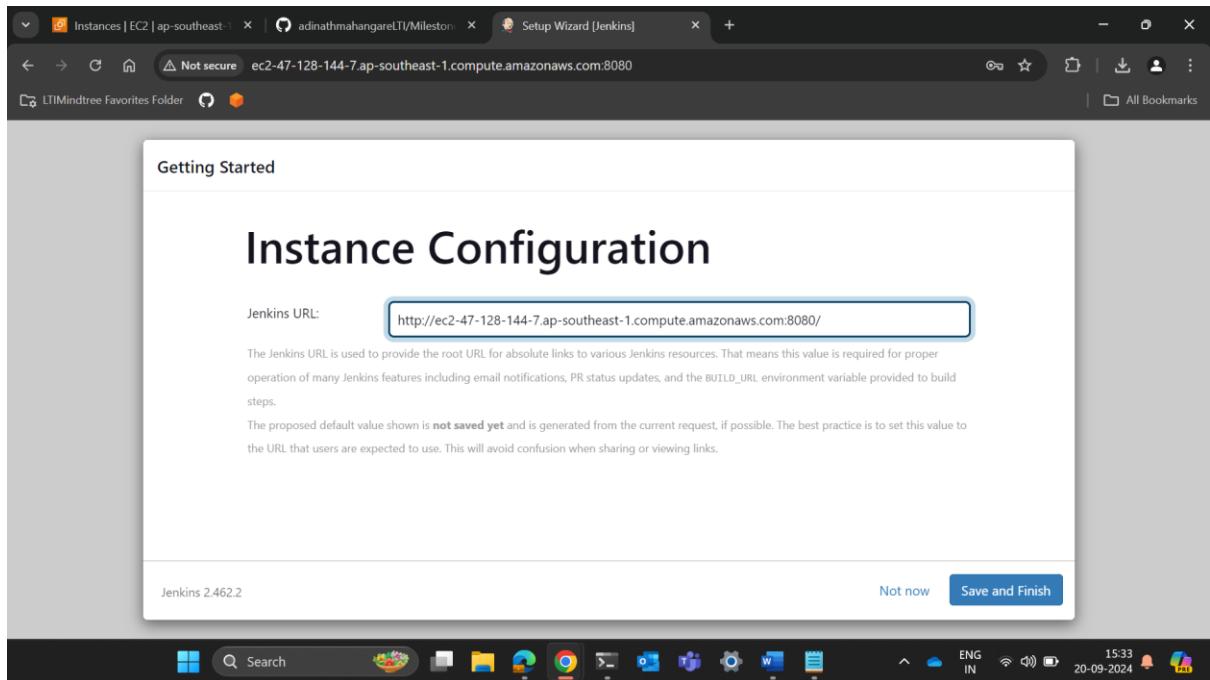


## 2.9. Installed all the necessary plugins for Jenkins.



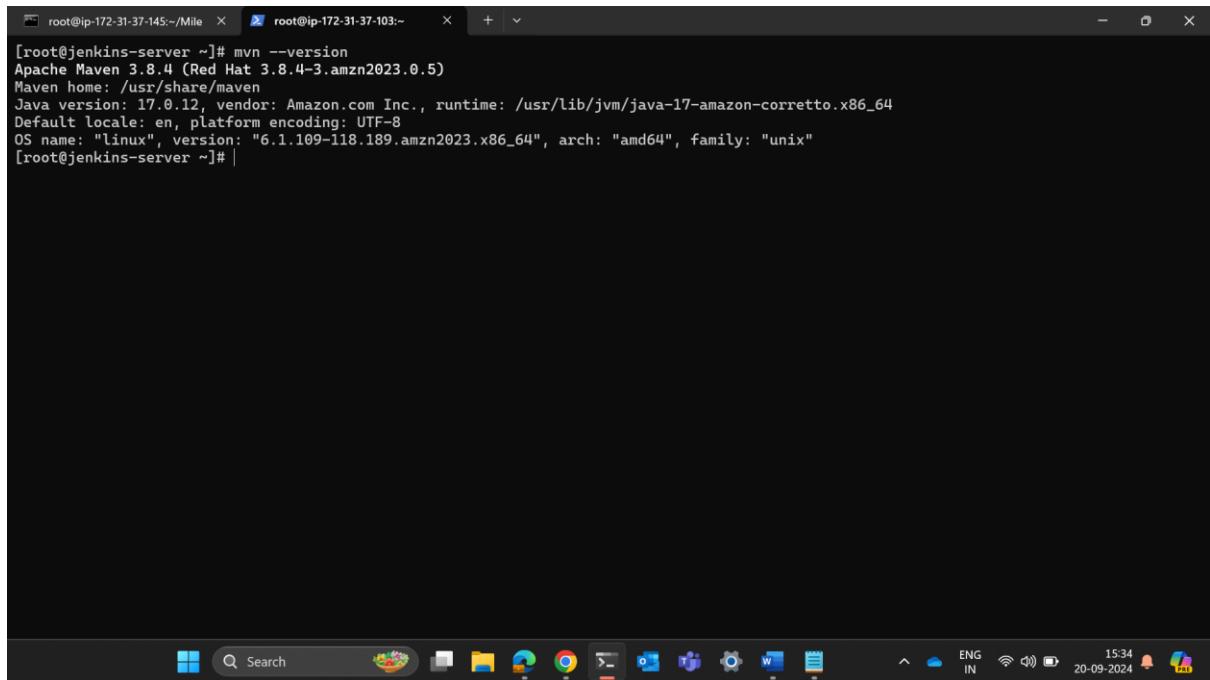
## 2.10. Added Login information for creating first Admin user and started Jenkins dashboard.





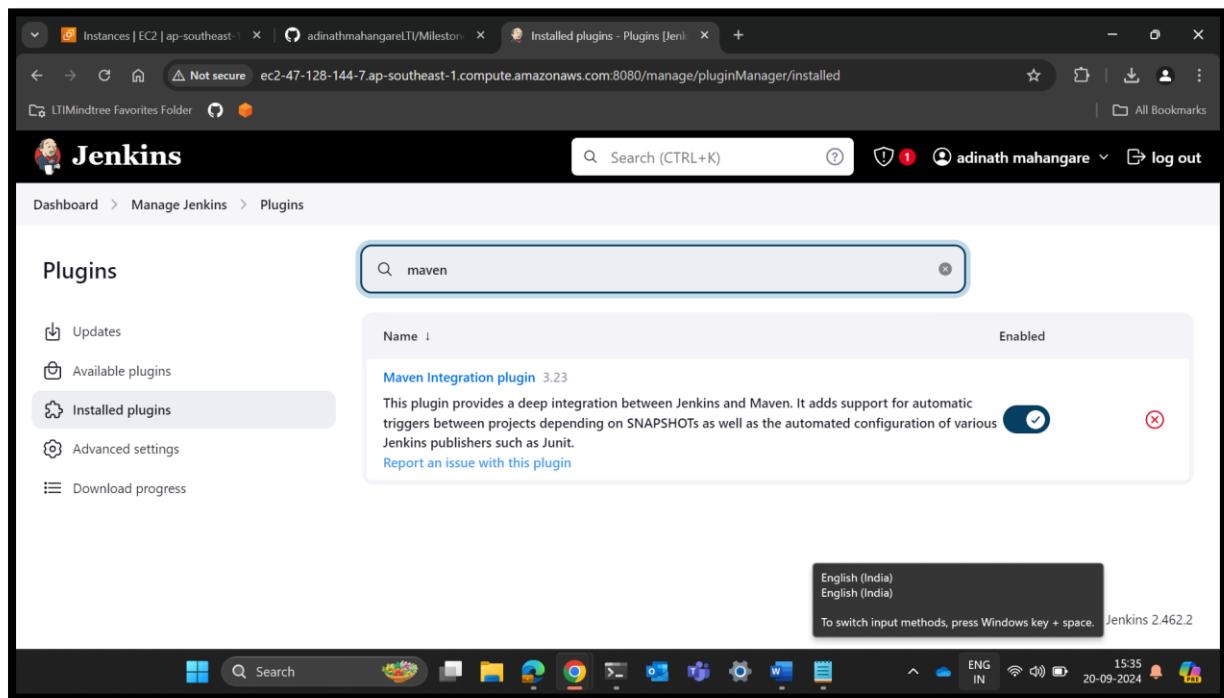
## 2.11. Installed Maven on Jenkins Server as build tool for Java Application.

```
[root@jenkins-server ~]# yum install maven -y
Last metadata expiration check: 0:07:31 ago on Fri Sep 20 09:56:46 2024.
Dependencies resolved.
=====
Package           Architecture   Version        Repository      Size
=====
Installing:
maven             noarch        1:3.8.4-3.amzn2023.0.5    amazonlinux   18 k
Installing dependencies:
apache-commons-cli noarch        1.5.0-3.amzn2023.0.3    amazonlinux   76 k
apache-commons-codec noarch       1.15-6.amzn2023.0.3    amazonlinux   303 k
apache-commons-io  noarch       1:2.8.0-7.amzn2023.0.4   amazonlinux   284 k
apache-commons-lang3 noarch      3.12.0-7.amzn2023.0.3   amazonlinux   559 k
atinject          noarch       1.0.5-3.amzn2023.0.3   amazonlinux   23 k
cdi-api           noarch       2.0.2-6.amzn2023.0.3   amazonlinux   54 k
google-guice      noarch       4.2.3-8.amzn2023.0.6   amazonlinux   473 k
guava             noarch       31.0.1-3.amzn2023.0.6   amazonlinux   2.4 M
httpcomponents-client noarch     4.5.13-4.amzn2023.0.4   amazonlinux   657 k
httpcomponents-core noarch      4.4.13-6.amzn2023.0.3   amazonlinux   632 k
jakarta-annotations noarch     1.3.5-13.amzn2023.0.3   amazonlinux   46 k
jansi              x86_64       2.4.0-3.amzn2023.0.3   amazonlinux   113 k
java-17-amazon-corretto-devel x86_64      1:17.0.12+7-1.amzn2023.1   amazonlinux   142 k
jcl-over-slf4j      noarch       1.7.32-3.amzn2023.0.4   amazonlinux   25 k
jsoup              noarch       1.13.1-9.amzn2023.0.5   amazonlinux   377 k
jsr-305            noarch       3.0.2-5.amzn2023.0.4   amazonlinux   32 k
maven-amazon-corretto17 noarch     1:3.8.4-3.amzn2023.0.5   amazonlinux   9.4 k
maven-lib           noarch       1:3.8.4-3.amzn2023.0.5   amazonlinux   1.5 M
maven-resolver     noarch       1:1.7.3-3.amzn2023.0.4   amazonlinux   557 k
maven-shared-utils noarch       3.3.4-4.amzn2023.0.3   amazonlinux   152 k
maven-wagon         noarch       3.4.2-6.amzn2023.0.4   amazonlinux   113 k
plexus-cipher      noarch       1.8-3.amzn2023.0.3   amazonlinux   27 k
plexus-classworlds noarch       2.6.0-10.amzn2023.0.4   amazonlinux   61 k
plexus-containers-component-annotations noarch   2.1.0-9.amzn2023.0.4   amazonlinux   19 k
```



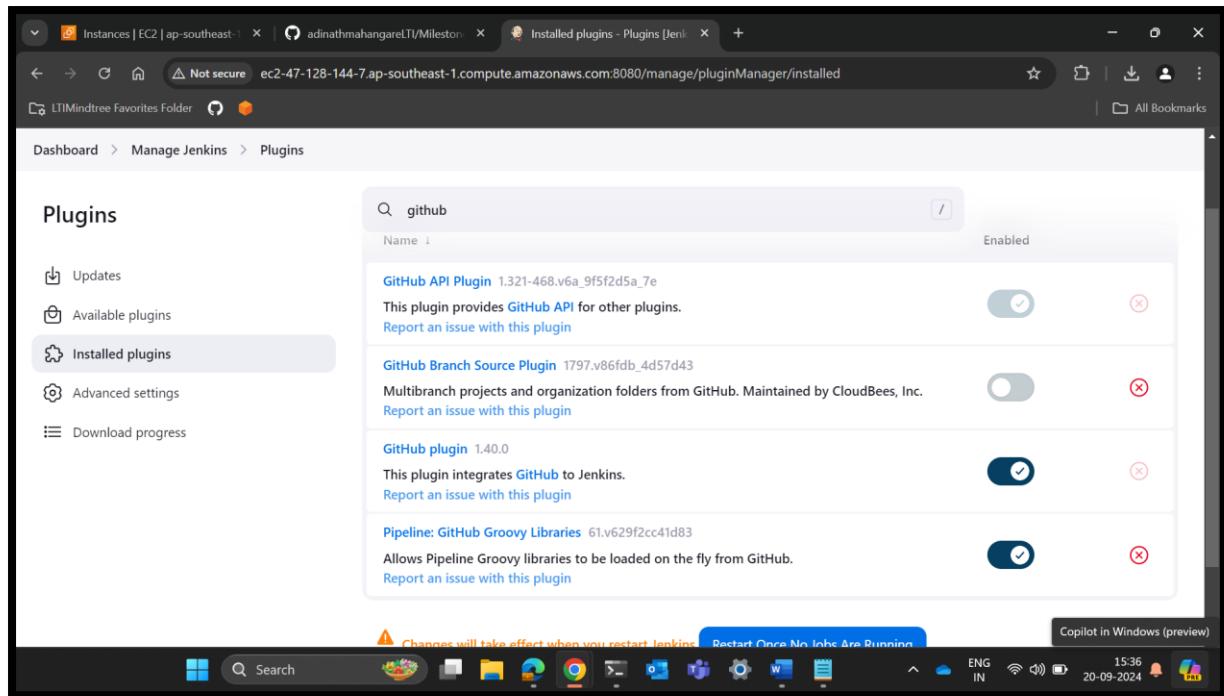
```
[root@jenkins-server ~]# mvn --version
Apache Maven 3.8.4 (Red Hat 3.8.4-3.amzn2023.0.5)
Maven home: /usr/share/maven
Java version: 17.0.12, vendor: Amazon.com Inc., runtime: /usr/lib/jvm/java-17-amazon-corretto.x86_64
Default locale: en, platform encoding: UTF-8
OS name: "linux", version: "6.1.109-118.189.amzn2023.x86_64", arch: "amd64", family: "unix"
[root@jenkins-server ~]#
```

## 2.12. Installed plugin **Maven Integration Plugin** on Jenkins Dashboard.

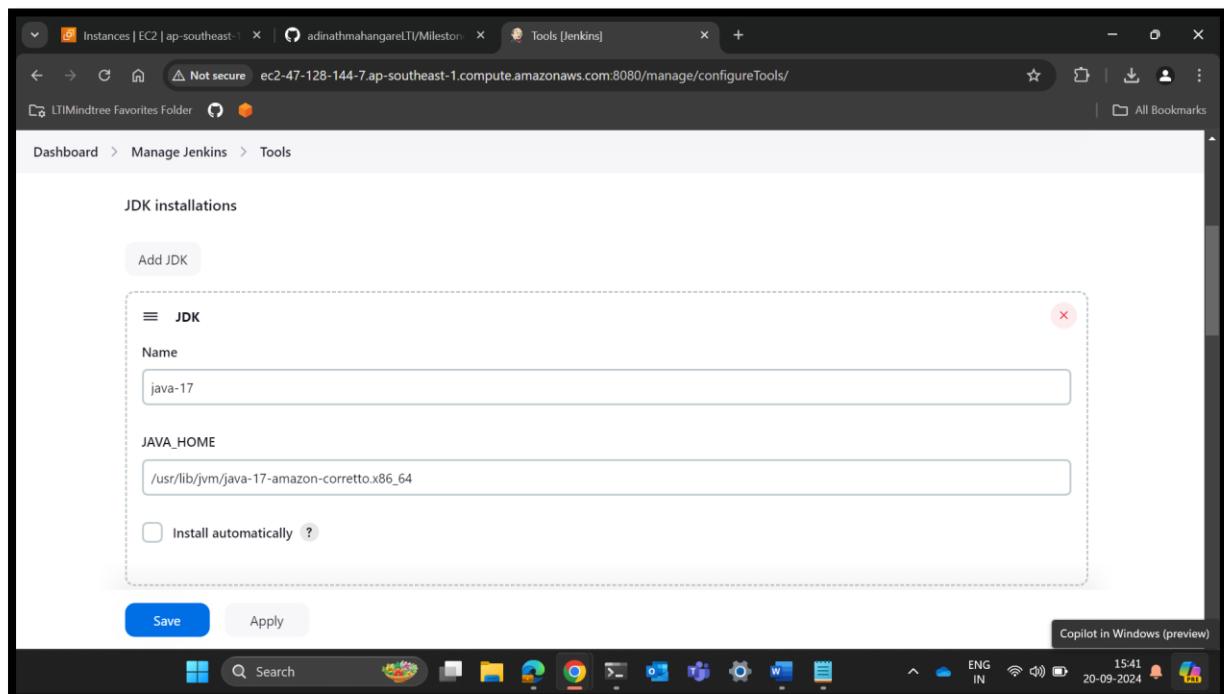


The screenshot shows the Jenkins dashboard under the 'Manage Jenkins' section, specifically the 'Plugins' page. A search bar at the top right contains the text 'maven'. On the left, a sidebar menu has 'Installed plugins' selected. In the main content area, a table lists the 'Maven Integration plugin' version 3.23. The plugin is described as providing deep integration between Jenkins and Maven, supporting automatic triggers and Jenkins publishers like JUnit. A status indicator shows it is 'Enabled' with a green checkmark. A red 'x' icon is visible to the right of the plugin entry. A tooltip at the bottom right of the table area provides input method switching instructions: 'English (India) English (India)' and 'To switch input methods, press Windows key + space.' The Jenkins version 'Jenkins 2.462.2' is also mentioned. The system tray at the bottom shows standard icons for battery, signal, and date/time.

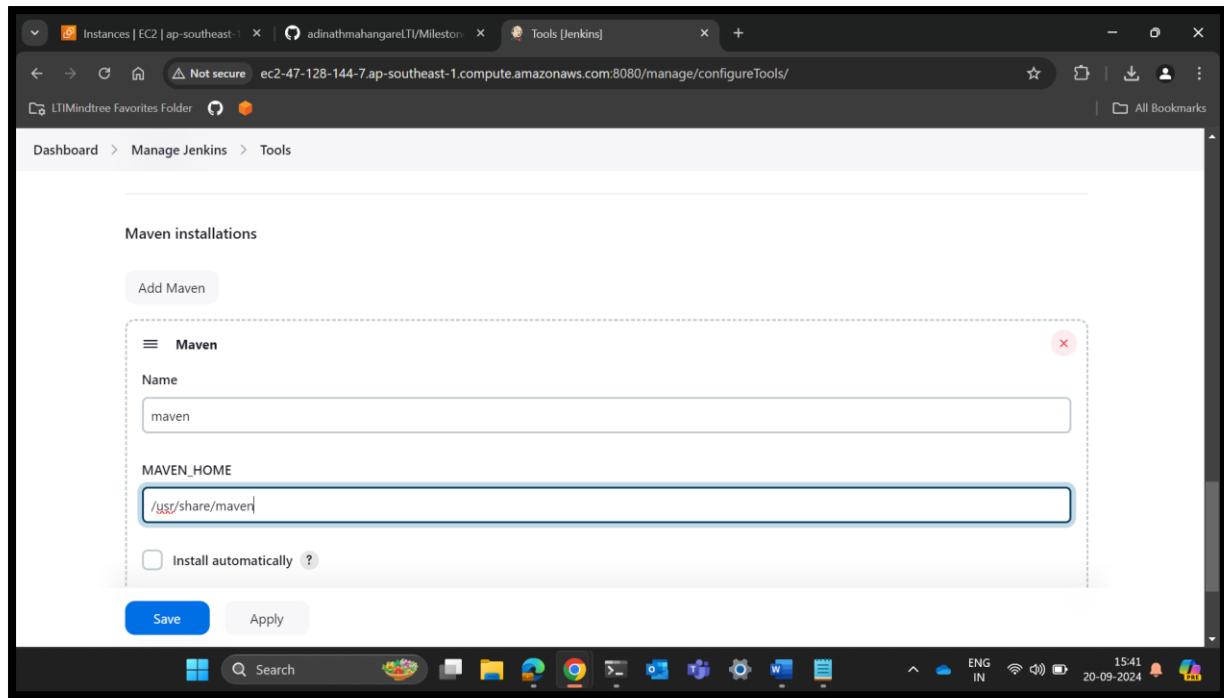
## 2.13. Changed configuration for already installed Github plugins.



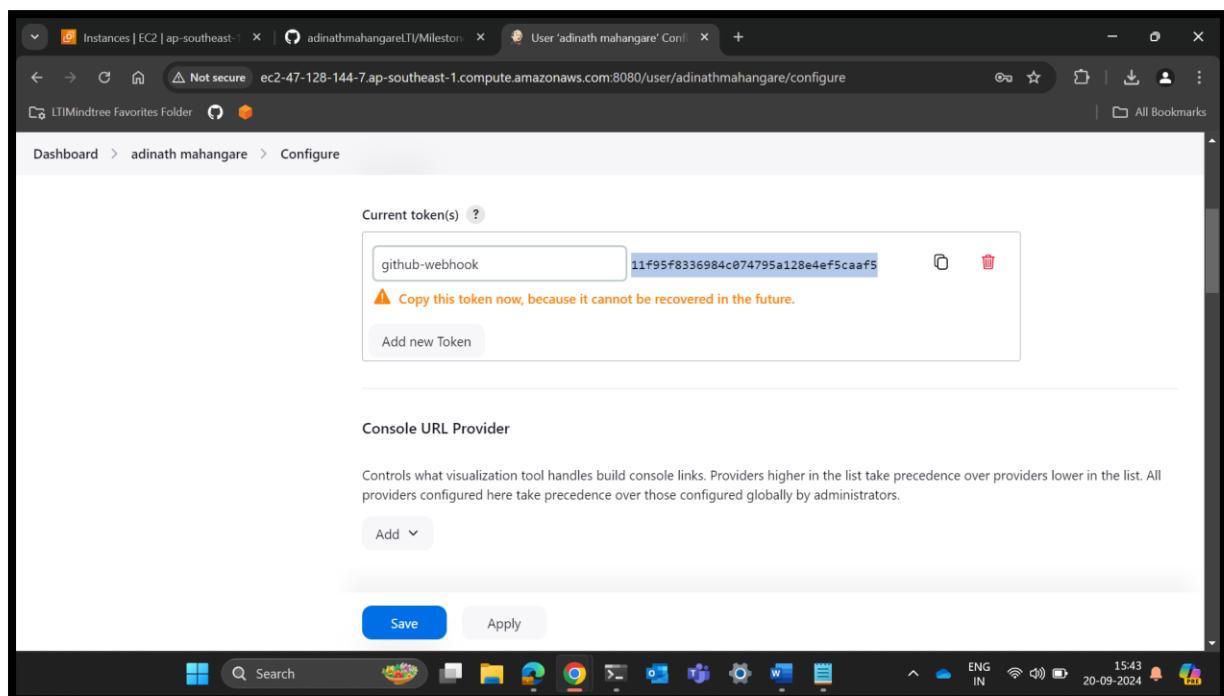
## 2.14. Added java installation path in Tools section of Jenkins Dashboard.



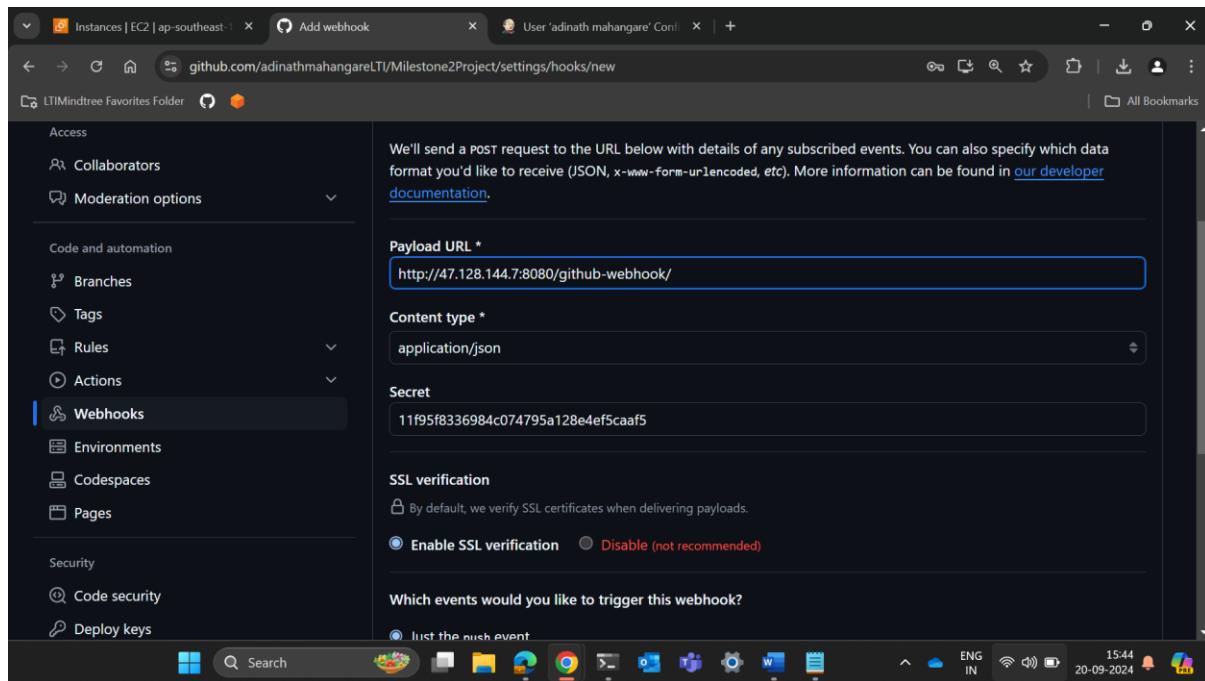
2.15. Added Maven installation path in Tools section of Jenkins Dashboard.



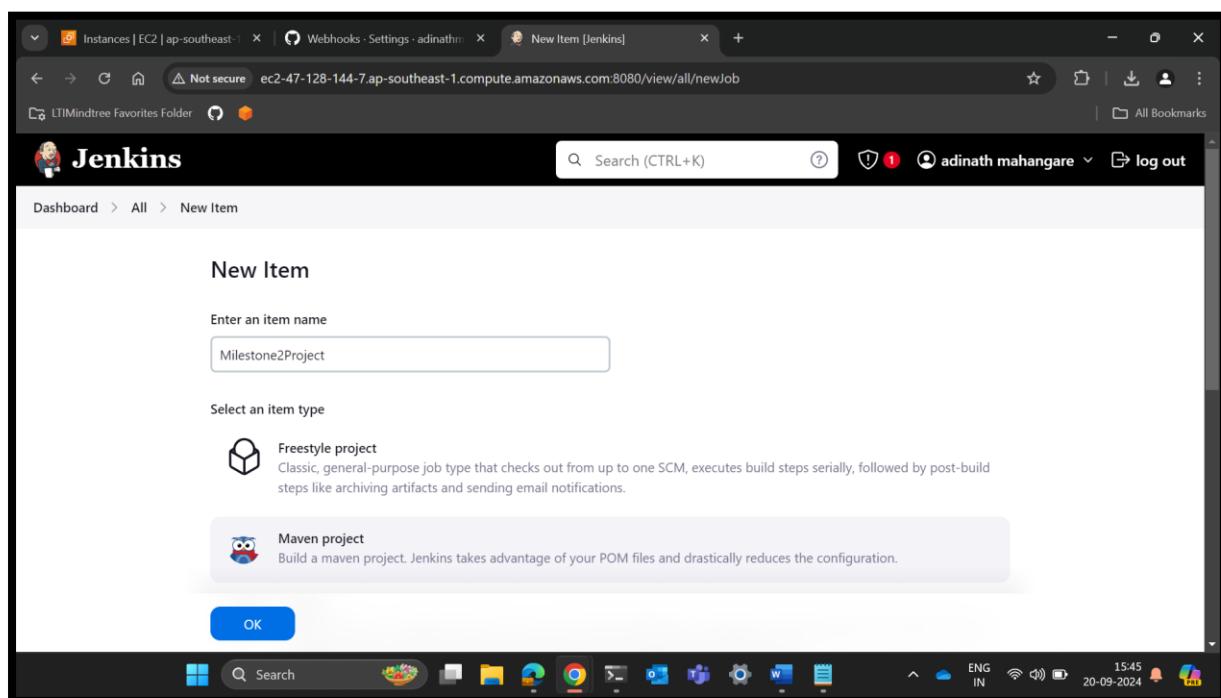
2.16. Generated token from Jenkins Account Configure Section and Copied it for creating connection between Github Repository and Jenkins Server.



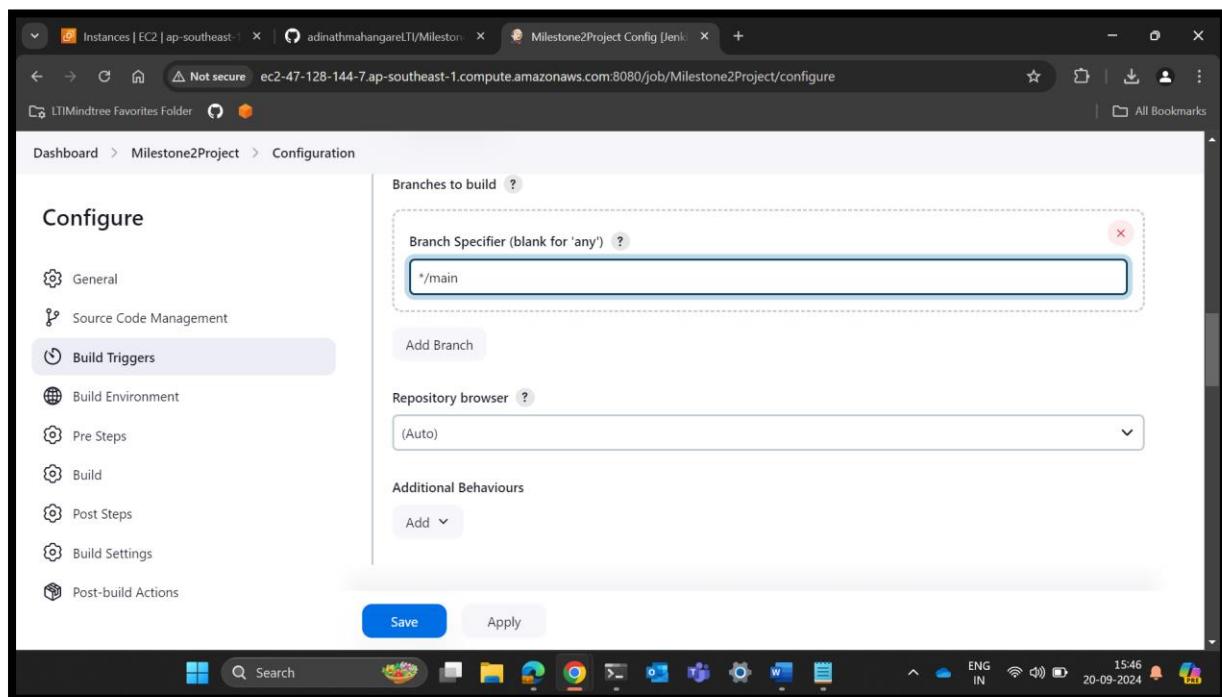
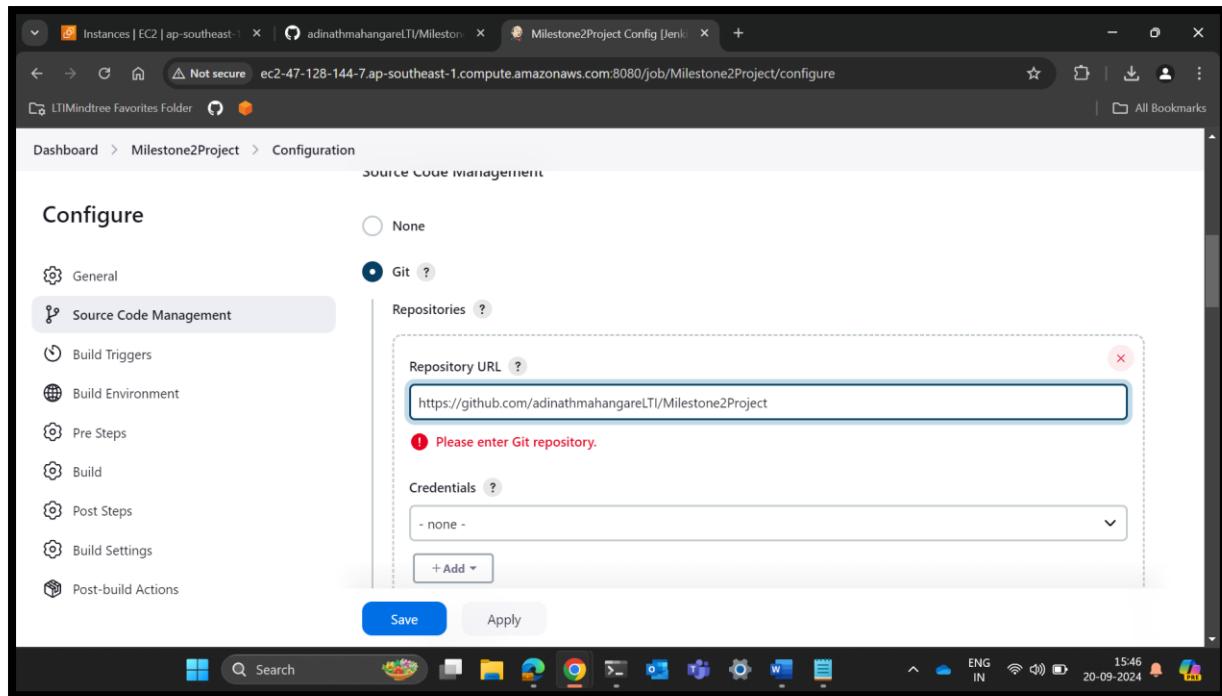
2.17. Created one Github Webhook from settings of Milestone2Project repository. Added http path for Jenkins Server in payload URL. Added generated token copied from Jenkins as Secret.



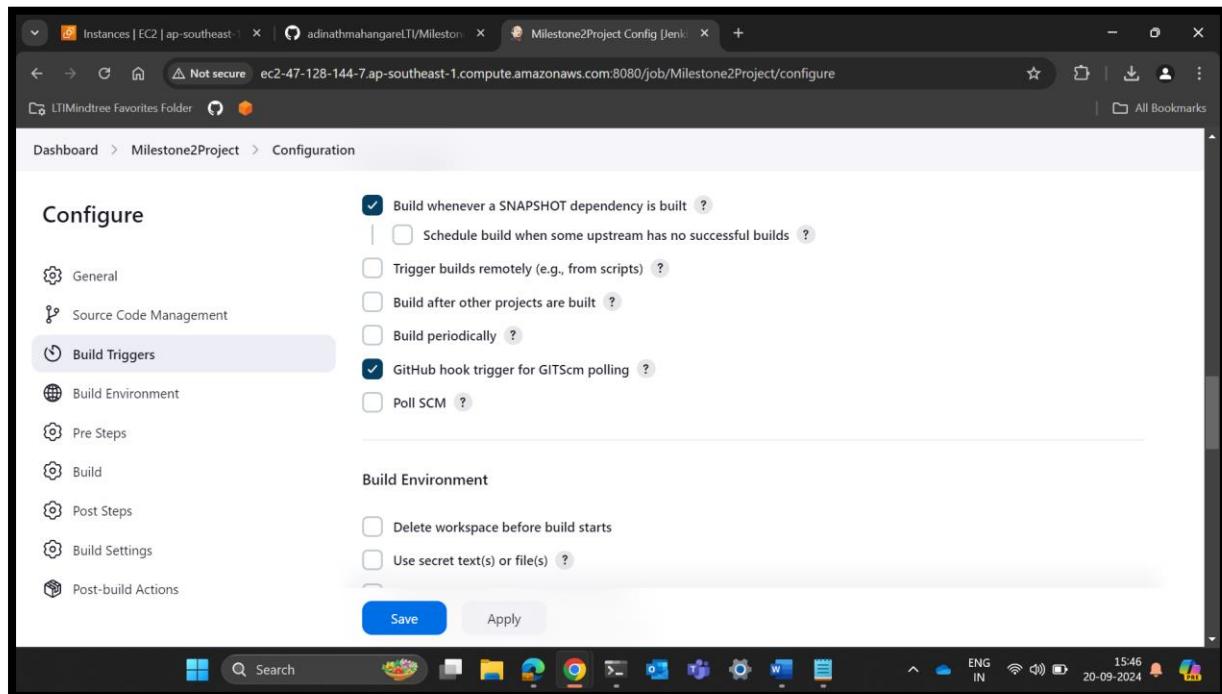
2.18. Created maven project Milestone2Project.



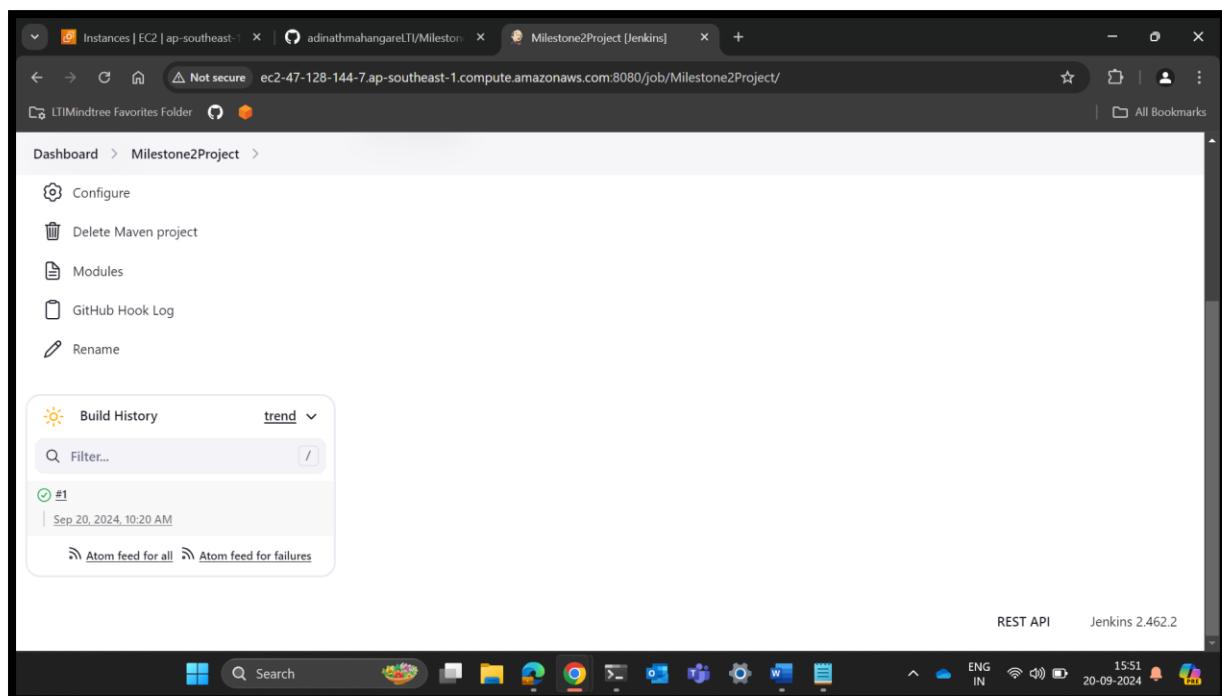
2.19. Added Github repo link as Source Code Management and select branch main.

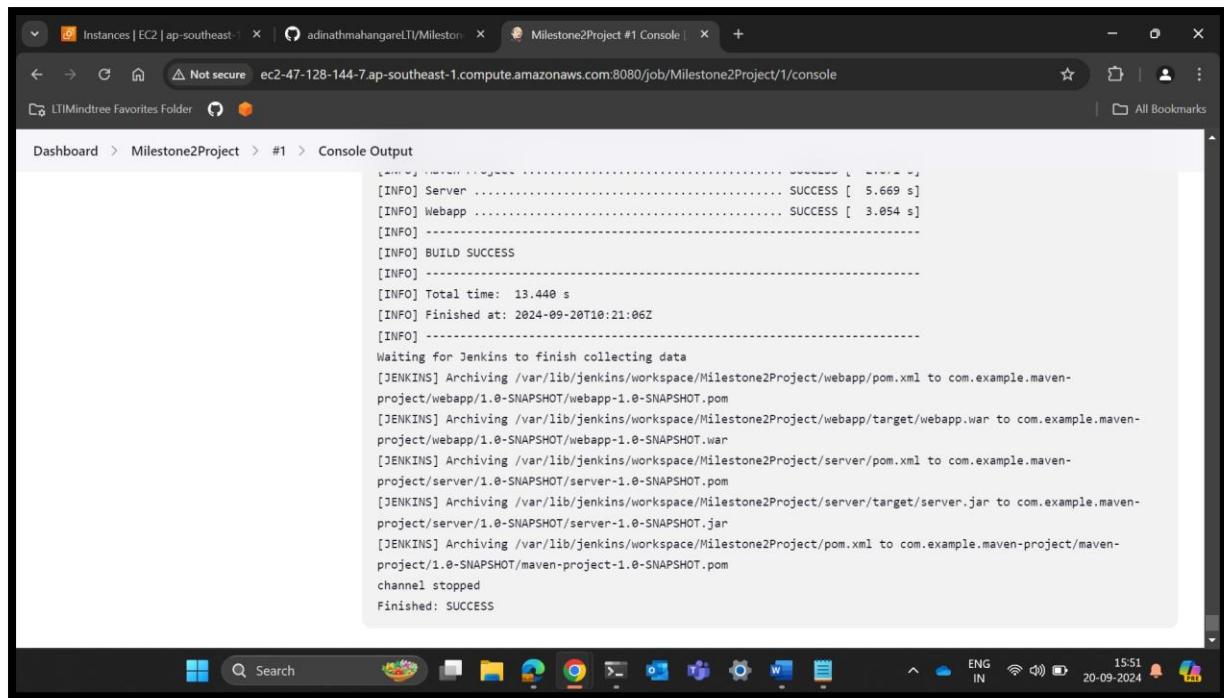


2.20. Checked **Github hook trigger for GITScm polling** for Automatic Building whenever there is change Source Code.



2.21. Build Java Application using Maven.





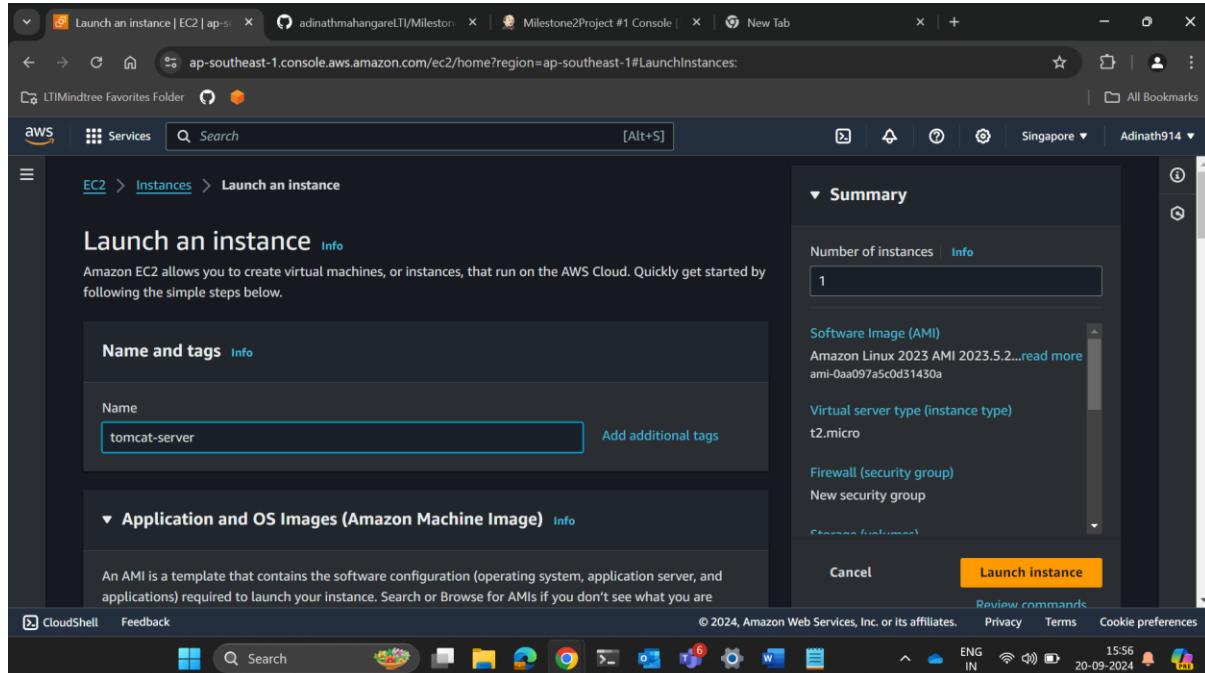
The screenshot shows a Microsoft Edge browser window displaying the Jenkins console output for a Java application build. The URL is `ec2-47-128-144-7.ap-southeast-1.compute.amazonaws.com:8080/job/Milestone2Project/1/console`. The console output is as follows:

```
[INFO] Server ..... SUCCESS [ 5.669 s]
[INFO] Webapp ..... SUCCESS [ 3.054 s]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 13.440 s
[INFO] Finished at: 2024-09-20T10:21:06Z
[INFO] -----
Waiting for Jenkins to finish collecting data
[JENKINS] Archiving /var/lib/jenkins/workspace/Milestone2Project/webapp/pom.xml to com.example.maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.pom
[JENKINS] Archiving /var/lib/jenkins/workspace/Milestone2Project/webapp/target/webapp.war to com.example.maven-project/webapp/1.0-SNAPSHOT/webapp-1.0-SNAPSHOT.war
[JENKINS] Archiving /var/lib/jenkins/workspace/Milestone2Project/server/pom.xml to com.example.maven-project/server/1.0-SNAPSHOT/server-1.0-SNAPSHOT.pom
[JENKINS] Archiving /var/lib/jenkins/workspace/Milestone2Project/server/target/server.jar to com.example.maven-project/server/1.0-SNAPSHOT/server-1.0-SNAPSHOT.jar
[JENKINS] Archiving /var/lib/jenkins/workspace/Milestone2Project/pom.xml to com.example.maven-project/maven-project/1.0-SNAPSHOT/maven-project-1.0-SNAPSHOT.pom
channel stopped
Finished: SUCCESS
```

Java Application Build Successful!

### 3. Created Tomcat Server

3.1. Initiated amazon Linux EC2 instance tomcat-server and connected it with local machine via ssh.



```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

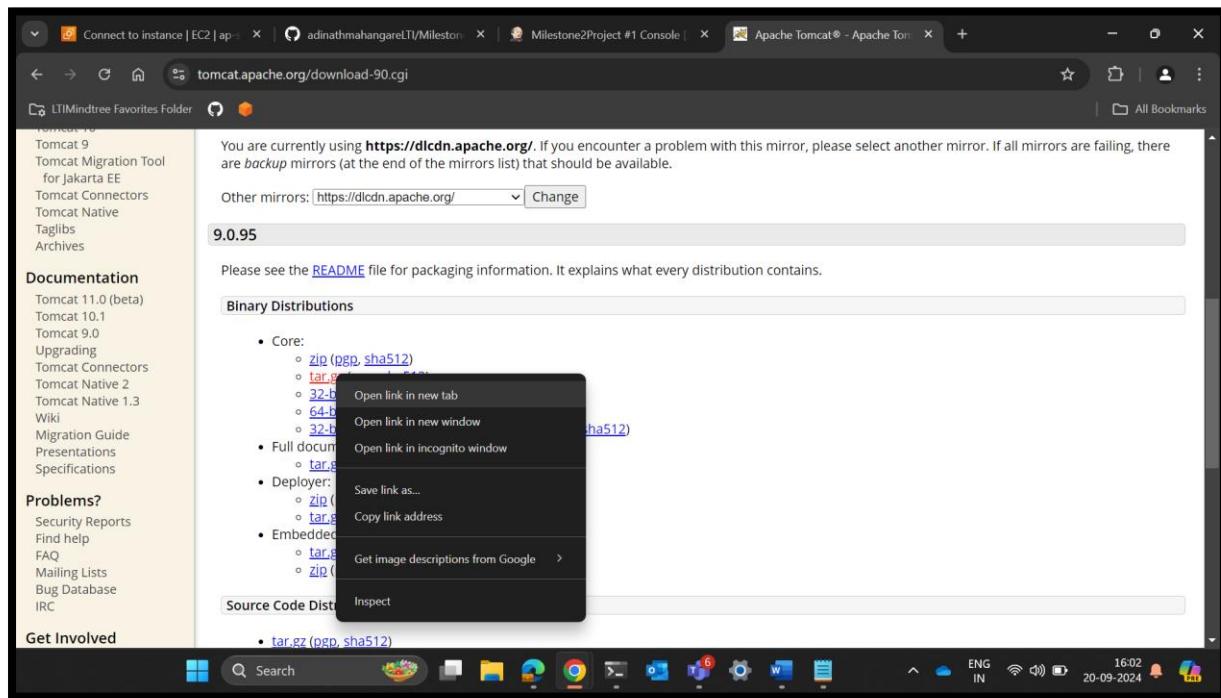
PS C:\Users\10747904> cd Downloads
PS C:\Users\10747904\Downloads> ssh -i "Milestone2-2-kp.pem" ec2-user@ec2-52-77-247-252.ap-southeast-1.compute.amazonaws.com
The authenticity of host 'ec2-52-77-247-252.ap-southeast-1.compute.amazonaws.com (52.77.247.252)' can't be established.
ED25519 key fingerprint is SHA256:7YISftBRI+YXPcYmiejYqFb2nLMXkg+U2EUGKmoZeo8.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'ec2-52-77-247-252.ap-southeast-1.compute.amazonaws.com' (ED25519) to the list of known hosts.

          _#
         /_###_
        /####\
       /##|
      /#/
     V~`-'>
      /
     /`-
    /`/
   /`/
  /`/
 /`/
[ec2-user@ip-172-31-47-103 ~]$ sudo su -
[root@ip-172-31-47-103 ~]# hostnamectl set-hostname tomcat-server.example.com
[root@ip-172-31-47-103 ~]# bash
[root@tomcat-server ~]# yum update -y
Last metadata expiration check: 0:02:12 ago on Fri Sep 20 10:27:46 2024.
Dependencies resolved.
Nothing to do.
Complete!
[root@tomcat-server ~]# |
```

### 3.2. Install Java on Tomcat Server.

Package	Architecture	Version	Repository	Size
java-1.8.0-amazon-corretto	x86_64	1:1.8.0_422.b05-1.amzn2023	amazonlinux	38 M
java-1.8.0-amazon-corretto-devel	x86_64	1:1.8.0_422.b05-1.amzn2023	amazonlinux	63 M
java-11-amazon-corretto	x86_64	1:11.0_24+8-1.amzn2023	amazonlinux	197 k
java-11-amazon-corretto-devel	x86_64	1:11.0_24+8-1.amzn2023	amazonlinux	211 k
java-11-amazon-corretto-javadoc	x86_64	1:11.0_24+8-1.amzn2023	amazonlinux	13 M
java-11-amazon-corretto-jmods	x86_64	1:11.0_24+8-1.amzn2023	amazonlinux	71 M
java-17-amazon-corretto	x86_64	1:17.0_12+7-1.amzn2023.1	amazonlinux	187 k
java-17-amazon-corretto-javadoc	x86_64	1:17.0_12+7-1.amzn2023.1	amazonlinux	12 M
java-17-amazon-corretto-jmods	x86_64	1:17.0_12+7-1.amzn2023.1	amazonlinux	69 M
java-21-amazon-corretto	x86_64	1:21.0_4+7-1.amzn2023.1	amazonlinux	213 k
java-21-amazon-corretto-devel	x86_64	1:21.0_4+7-1.amzn2023.1	amazonlinux	150 k
java-21-amazon-corretto-javadoc	x86_64	1:21.0_4+7-1.amzn2023.1	amazonlinux	13 M
java-21-amazon-corretto-jmods	x86_64	1:21.0_4+7-1.amzn2023.1	amazonlinux	75 M
java-22-amazon-corretto	x86_64	1:22.0_2+9-1.amzn2023.1	amazonlinux	213 k
java-22-amazon-corretto-devel	x86_64	1:22.0_2+9-1.amzn2023.1	amazonlinux	150 k
java-22-amazon-corretto-javadoc	x86_64	1:22.0_2+9-1.amzn2023.1	amazonlinux	13 M
java-22-amazon-corretto-jmods	x86_64	1:22.0_2+9-1.amzn2023.1	amazonlinux	74 M
java_cup	noarch	1:0.11b-21.amzn2023.0.3	amazonlinux	129 k
java_cup-javadoc	noarch	1:0.11b-21.amzn2023.0.3	amazonlinux	163 k
java_cup-manual	noarch	1:0.11b-21.amzn2023.0.3	amazonlinux	32 k
javacc	noarch	7.0_4-11.amzn2023.0.1	amazonlinux	606 k
javacc-demo	noarch	7.0_4-11.amzn2023.0.1	amazonlinux	95 k
javacc-javadoc	noarch	7.0_4-11.amzn2023.0.1	amazonlinux	229 k
javacc-manual	noarch	7.0_4-11.amzn2023.0.1	amazonlinux	84 k
javacc-maven-plugin	noarch	2.6-35.amzn2023.0.1	amazonlinux	77 k
javacc-maven-plugin-javadoc	noarch	2.6-35.amzn2023.0.1	amazonlinux	126 k

### 3.3. Copied link for downloading tar.gz file from tomcat 9.



### 3.4. Downloaded file in Tomcat Server using wget command and unzipped it using tar.

```
[root@tomcat-server ~]# wget https://dlcdn.apache.org/tomcat/tomcat-9/v9.0.95/bin/apache-tomcat-9.0.95.tar.gz
--2024-09-20 10:32:29-- https://dlcdn.apache.org/tomcat/tomcat-9/v9.0.95/bin/apache-tomcat-9.0.95.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: 12715996 (12M) [application/x-gzip]
Saving to: 'apache-tomcat-9.0.95.tar.gz'

apache-tomcat-9.0.95.tar.gz      100%[=====] 12.13M --.-KB/s   in 0.1s

2024-09-20 10:32:29 (87.0 MB/s) - 'apache-tomcat-9.0.95.tar.gz' saved [12715996/12715996]

[root@tomcat-server ~]# ls
apache-tomcat-9.0.95.tar.gz
[root@tomcat-server ~]# tar -xvzf apache-tomcat-9.0.95.tar.gz
apache-tomcat-9.0.95/conf/
apache-tomcat-9.0.95/conf/catalina.policy
apache-tomcat-9.0.95/conf/catalina.properties
apache-tomcat-9.0.95/conf/context.xml
apache-tomcat-9.0.95/conf/jaspic-providers.xml
apache-tomcat-9.0.95/conf/jaspic-providers.xsd
apache-tomcat-9.0.95/conf/logging.properties
apache-tomcat-9.0.95/conf/server.xml
apache-tomcat-9.0.95/conf/tomcat-users.xml
apache-tomcat-9.0.95/conf/tomcat-users.xsd
apache-tomcat-9.0.95/conf/web.xml
apache-tomcat-9.0.95/bin/
apache-tomcat-9.0.95/lib/
apache-tomcat-9.0.95/logs/
apache-tomcat-9.0.95/temp/
apache-tomcat-9.0.95/webapps/
apache-tomcat-9.0.95/webapps/ROOT/
apache-tomcat-9.0.95/webapps/ROOT/WEB-INF/
```

### 3.5. Started Tomcat Server and configured some pre-requisite settings.

```
[root@tomcat-server ~]# cd apache-tomcat-9.0.95/
[root@tomcat-server apache-tomcat-9.0.95]# ls
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs temp webapps work
[root@tomcat-server apache-tomcat-9.0.95]# cd bin
[root@tomcat-server bin]# ./startup.sh
Using CATALINA_BASE: /root/apache-tomcat-9.0.95
Using CATALINA_HOME: /root/apache-tomcat-9.0.95
Using CATALINA_TMPDIR: /root/apache-tomcat-9.0.95/temp
Using JRE_HOME: /usr
Using CLASSPATH: /root/apache-tomcat-9.0.95/bin/bootstrap.jar:/root/apache-tomcat-9.0.95/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
[root@tomcat-server bin]# |
```

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
Licensed to the Apache Software Foundation (ASF) under one or more
contributor license agreements. See the NOTICE file distributed with
this work for additional information regarding copyright ownership.
The ASF licenses this file to You under the Apache License, Version 2.0
(the "License"); you may not use this file except in compliance with
the License. You may obtain a copy of the License at

http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software
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.
-->
<Context antiResourceLocking="false" privileged="true" >
    <CookieProcessor className="org.apache.tomcat.util.http.Rfc6265CookieProcessor"
        sameSiteCookies="strict" />
    <!-- <Valve className="org.apache.catalina.valves.RemoteAddrValve"
        allow="127\\.\\d+\\.\\d+\\.\\d+(:\\d{2,5})?" /> -->
    <Manager sessionAttributeValueClassNameFilter="java\\.lang\\.\\?:(Boolean|Integer|Long|Number|String)|org\\.apache\\.catalina\\.filters\\.C
srfPreventionFilter\\$LruCache\\?\\$1|java\\.util\\.\\?:(Linked)?HashMap"/>
</Context>
~
~
~
~
~
~
~
-- INSERT --
22,57          All
```

```
[root@tomcat-server bin]# cd ..
[root@tomcat-server apache-tomcat-9.0.95]# find / -name context.xml
/root/apache-tomcat-9.0.95/conf/context.xml
/root/apache-tomcat-9.0.95/webapps/docs/META-INF/context.xml
/root/apache-tomcat-9.0.95/webapps/examples/META-INF/context.xml
/root/apache-tomcat-9.0.95/webapps/host-manager/META-INF/context.xml
/root/apache-tomcat-9.0.95/webapps/manager/META-INF/context.xml
[root@tomcat-server apache-tomcat-9.0.95]# |
```

```
<?xml version="1.0" encoding="UTF-8"?>
<!--
Licensed to the Apache Software Foundation (ASF) under one or more
contributor license agreements. See the NOTICE file distributed with
this work for additional information regarding copyright ownership.
The ASF licenses this file to You under the Apache License, Version 2.0
(the "License"); you may not use this file except in compliance with
the License. You may obtain a copy of the License at

    http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software
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.
-->
<Context antiResourceLocking="false" privileged="true" >
    <CookieProcessor className="org.apache.tomcat.util.http.Rfc6265CookieProcessor"
        sameSiteCookies="strict" />
    <!-- <Valve className="org.apache.catalina.valves.RemoteAddrValve"
        allow="127\\.\\d+\\.\\d{1,3}\\.\\d{1,3}\\.\\d{1,3}\\.\\d{1,3}" /> -->
    <Manager sessionAttributeValueClassNameFilter="java\\.lang\\.\\?:(Boolean|Integer|Long|Number|String)|org\\.apache\\.catalina\\.filters\\.C
srfPreventionFilter\\$LruCache\\?\\$1|java\\.util\\.\\?:(Linked)?HashMap"/>
</Context>
~
~
~
~
~
~
~
-- INSERT --
22,56     All
```

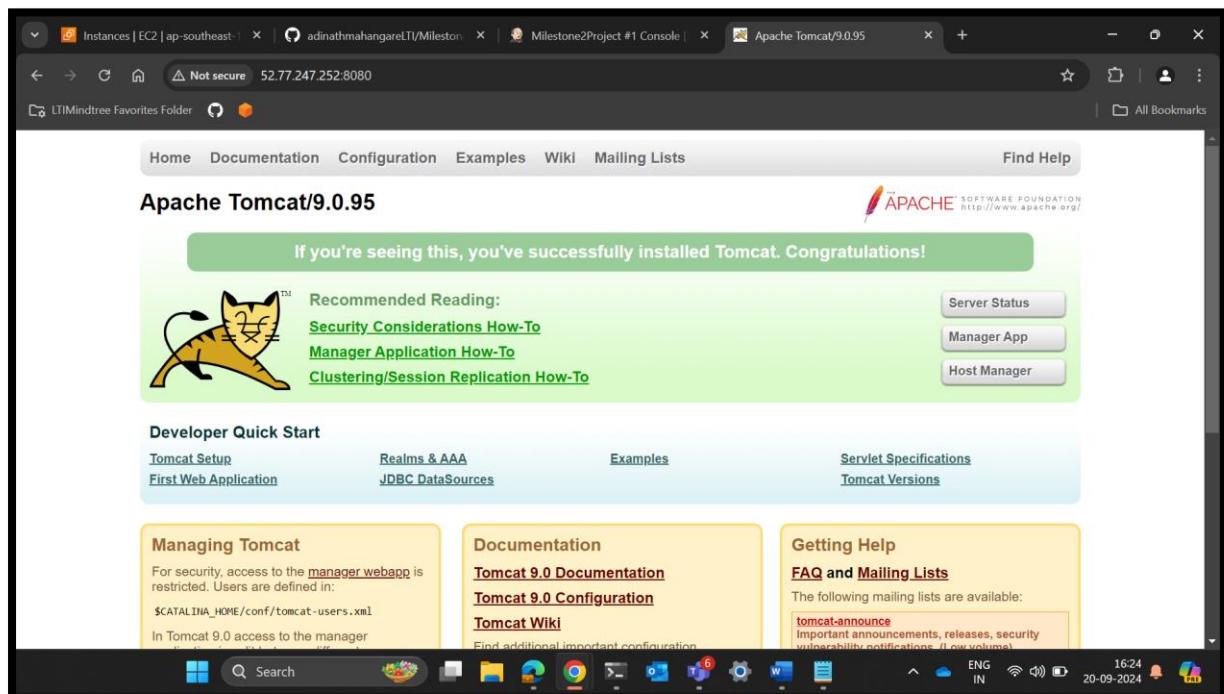
### 3.6. Added roles and users in tomcat-users.xml.

```
[root@tomcat-server apache-tomcat-9.0.95]# ls
BUILDING.txt CONTRIBUTING.md LICENSE NOTICE README.md RELEASE-NOTES RUNNING.txt bin conf lib logs temp webapps work
[root@tomcat-server apache-tomcat-9.0.95]# cd conf
[root@tomcat-server conf]# ls
Catalina      catalina.properties  jaspic-providers.xml  logging.properties  tomcat-users.xml  web.xml
catalina.policy  context.xml       jaspic-providers.xsd  server.xml          tomcat-users.xsd
[root@tomcat-server conf]# vim tomcat-users.xml
[root@tomcat-server conf]# cd ..
[root@tomcat-server apache-tomcat-9.0.95]# cd bin
[root@tomcat-server bin]# ./shutdown.sh
Using CATALINA_BASE:  /root/apache-tomcat-9.0.95
Using CATALINA_HOME:  /root/apache-tomcat-9.0.95
Using CATALINA_TMPDIR: /root/apache-tomcat-9.0.95/temp
Using JRE_HOME:      /usr
Using CLASSPATH:     /root/apache-tomcat-9.0.95/bin/bootstrap.jar:/root/apache-tomcat-9.0.95/bin/tomcat-juli.jar
Using CATALINA_OPTS:
NOTE: Picked up JDK_JAVA_OPTIONS: --add-opens=java.base/java.lang=ALL-UNNAMED --add-opens=java.base/java.io=ALL-UNNAMED --add-opens=
java.base/java.util=ALL-UNNAMED --add-opens=java.base/java.util.concurrent=ALL-UNNAMED --add-opens=java.rmi/sun.rmi.transport=ALL-UNN
AMED
[root@tomcat-server bin]# ./startup.sh
Using CATALINA_BASE:  /root/apache-tomcat-9.0.95
Using CATALINA_HOME:  /root/apache-tomcat-9.0.95
Using CATALINA_TMPDIR: /root/apache-tomcat-9.0.95/temp
Using JRE_HOME:      /usr
Using CLASSPATH:     /root/apache-tomcat-9.0.95/bin/bootstrap.jar:/root/apache-tomcat-9.0.95/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
[root@tomcat-server bin]# |
```

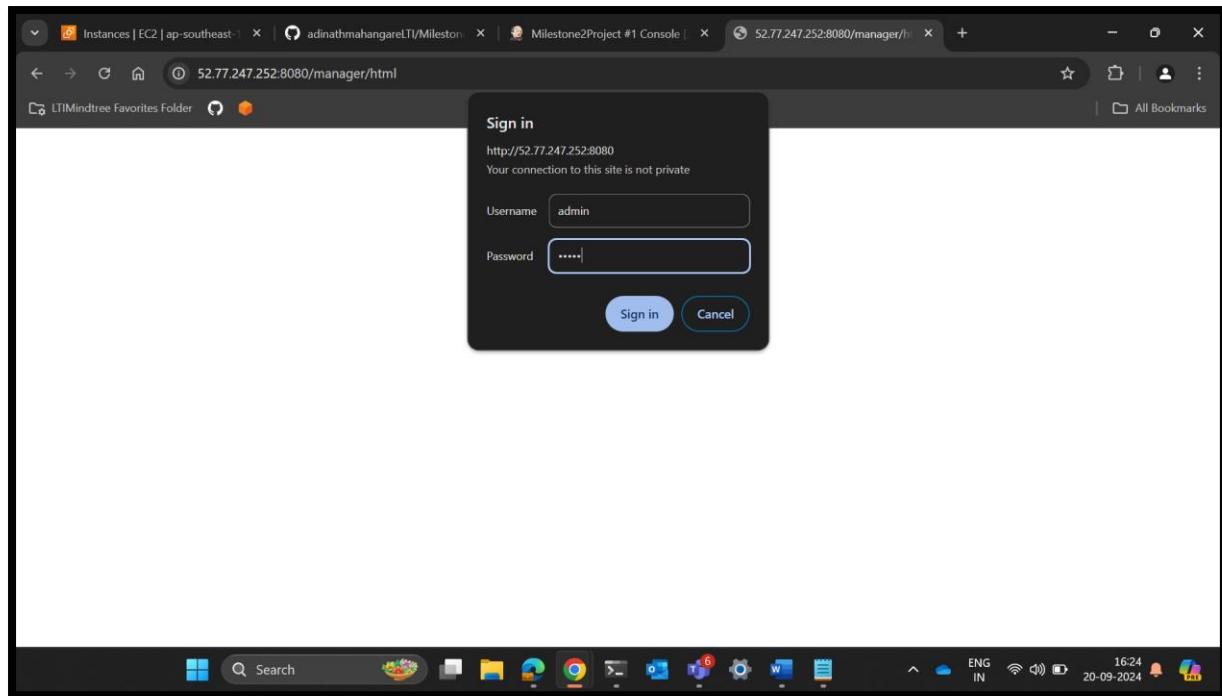
```
root@ip-172-31-37-145:~/Mile| root@ip-172-31-37-103:~| root@ip-172-31-47-103:~/apa| + | - | X |
```

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="" roles="manager-gui"/>  
<user username="robot" password="" 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="" roles="tomcat"/>  
<user username="both" password="" roles="tomcat,role1"/>  
<user username="role1" password="" 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="s3cret" roles="manager-gui"/>  
</tomcat-users>  
:wg|

### 3.7. Hosted tomcat dashboard on 8080 port.



### 3.8. Logged in as Admin using created user in tomcat-users.xml



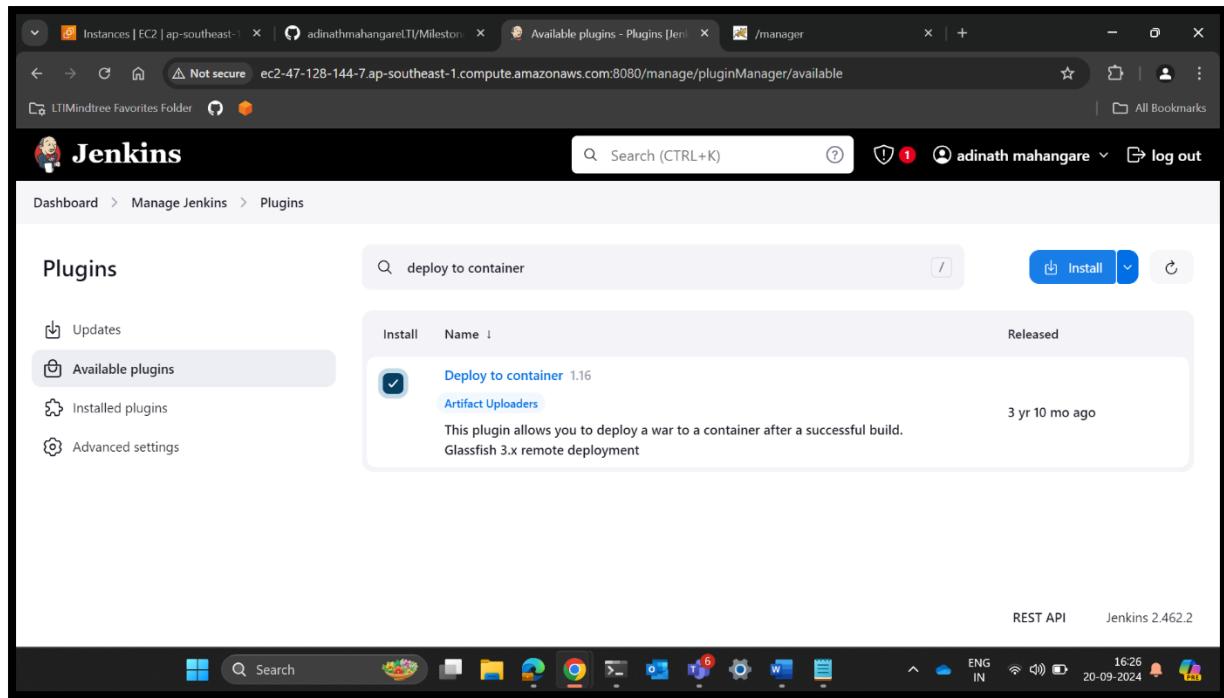
### 3.9. Added deployer credentials in Jenkins Dashboard.

The screenshot shows the Jenkins Manage Jenkins dashboard. In the top right corner, there is a 'Credentials' button. Below it, under the 'Security' section, there is another 'Credentials' button. Both buttons are highlighted with a light gray background, indicating they are selected or active.

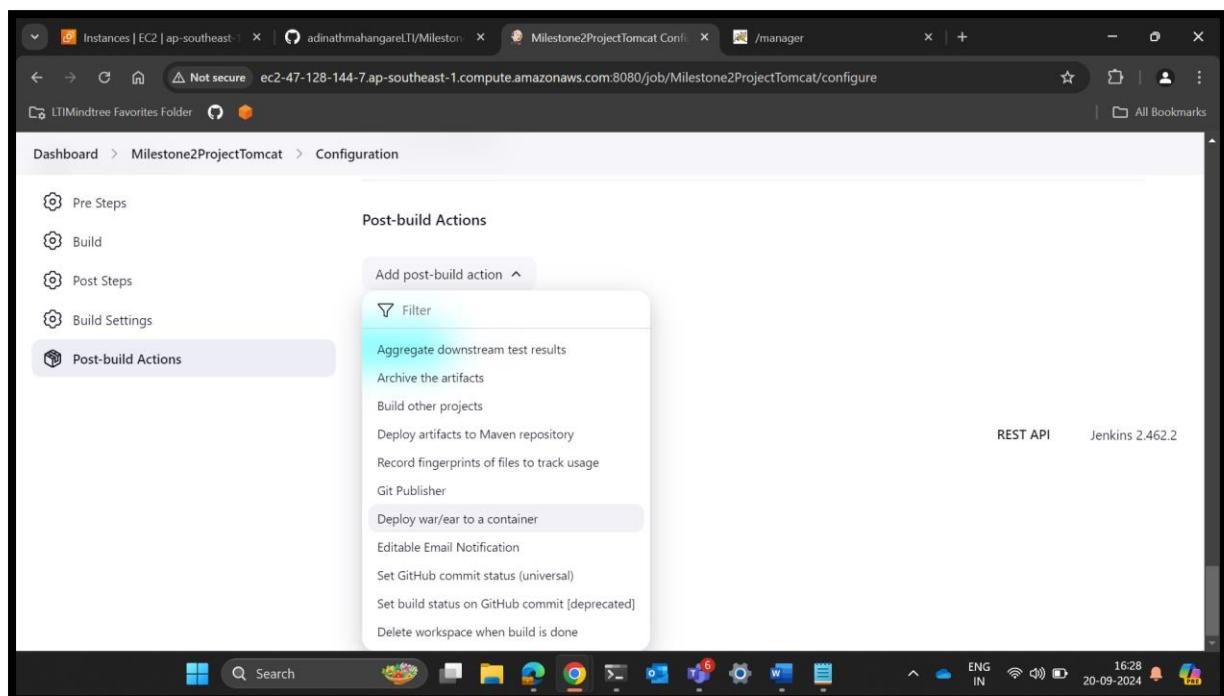
The screenshot shows the 'New credentials' creation form. The 'Username' field contains 'deployer'. The 'Password' field contains a masked password. The 'Create' button at the bottom left is visible.

Field	Value
Username	deployer
Password	.....

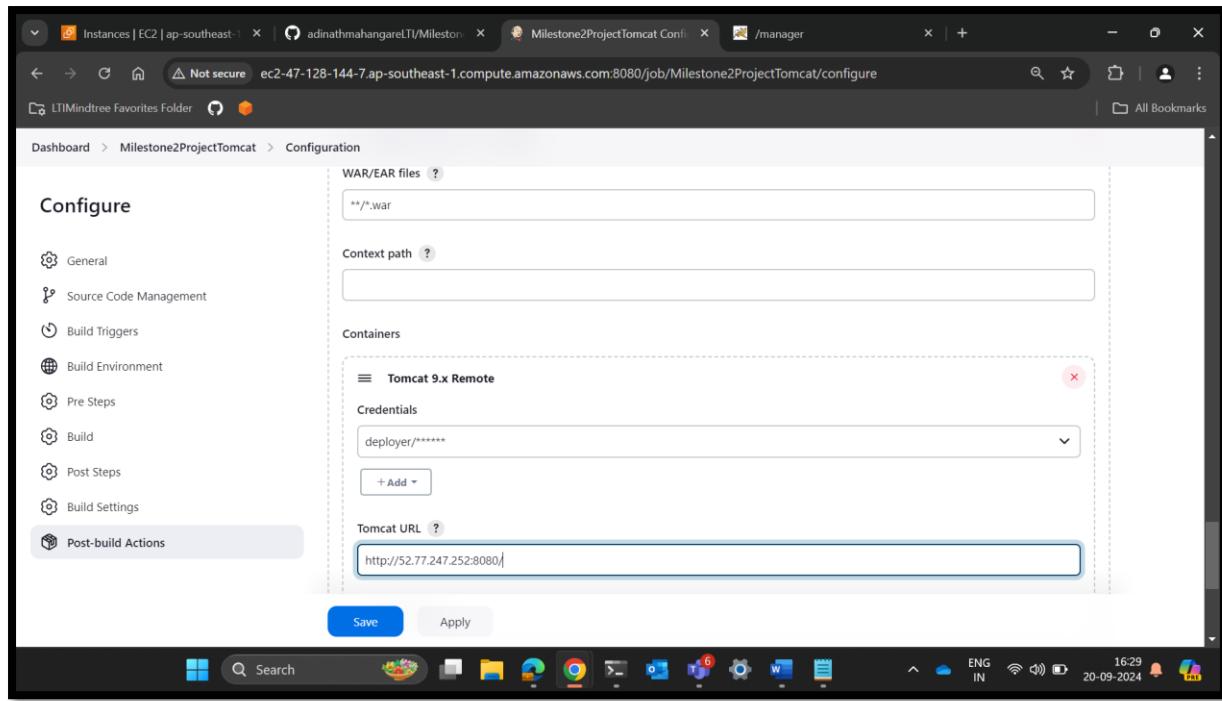
### 3.10. Installed plugin **Deploy to Container** in Jenkins Dashboard.



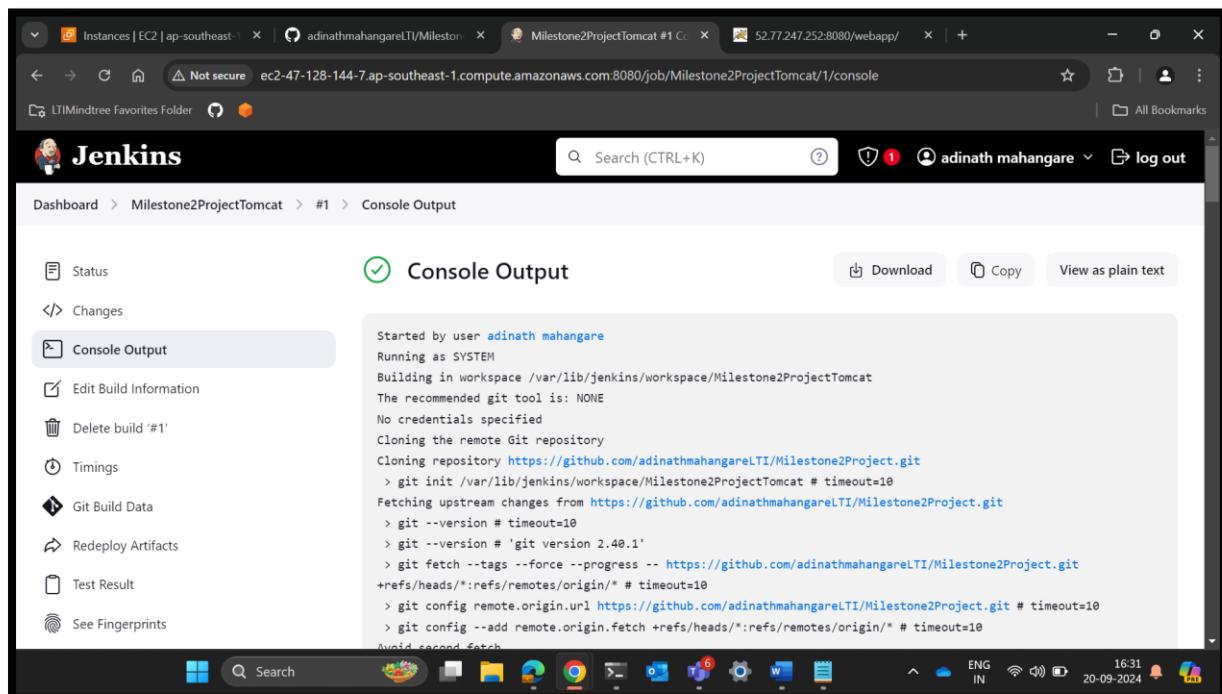
### 3.11. In Jenkins item configured post-build Actions. Selected Deploy war/ear to a container.



### 3.12. Added deployer credentials and Tomcat URL



### 3.13. Build the Java application using tomcat deployment.



3.14. Java based web Application is visible on Tomcat webapp URL.

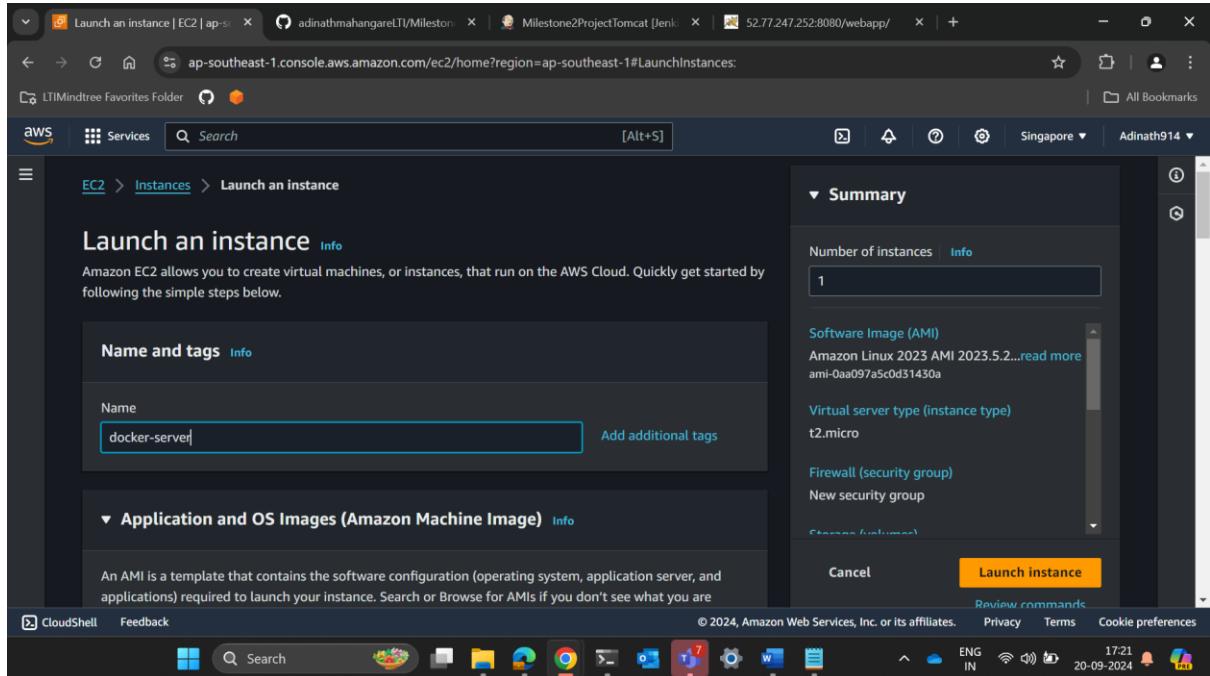
The screenshot shows a web browser window with the following details:

- Address Bar:** 52.77.247.252:8080/webapp/
- Content Area:**
  - Header:** Hi This is Sanjaya Kumar Verma. We are working on Ci/Cd projecti hello.
  - Text:** Please fill in this form to create an account. Adinath Mahangare
  - Form Fields:** Enter Name (Enter Full Name), Enter mobile (Enter moible number), Enter Email (Enter Email), Password (Enter Password), Repeat Password (Repeat Password).
  - Links:** By creating an account you agree to our [Terms & Privacy](#). Already have an account? [Sign in](#).
  - Message:** Thank You
  - Text:** Happy Learning. See You Again.
- Taskbar:** Shows various application icons and system status (16:30, ENG IN, 20-09-2024).

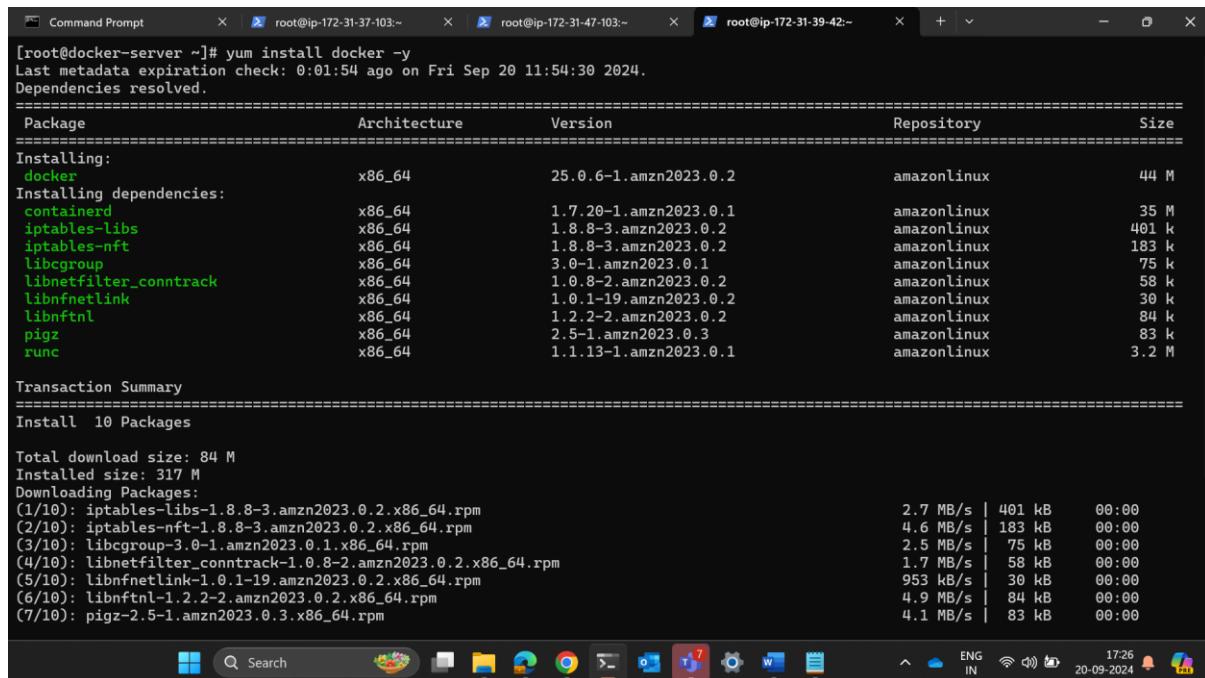
Successfully Deployed application using Tomcat!

#### **4. Created Docker Server**

4.1. Initiated amazon Linux EC2 instance for docker-server and connected to local device via ssh.



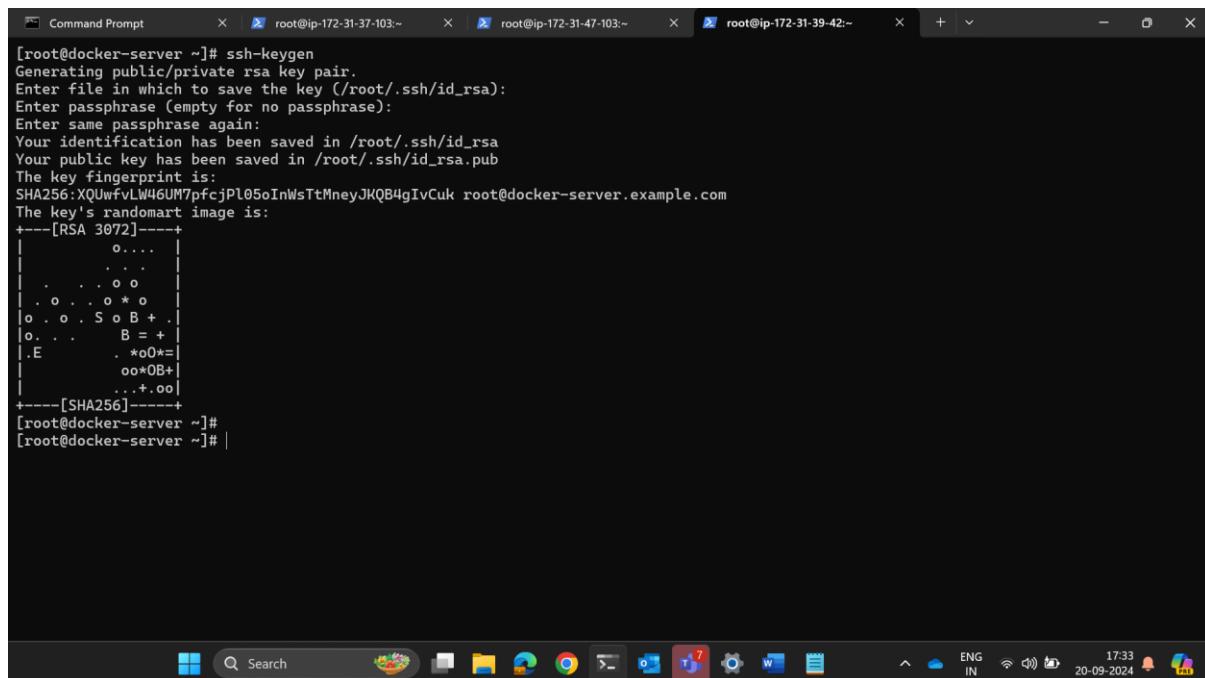
## 4.2. Install docker on Docker Server.



```
[root@docker-server ~]# yum install docker -y
Last metadata expiration check: 0:01:54 ago on Fri Sep 20 11:54:30 2024.
Dependencies resolved.
=====
Package           Architecture   Version      Repository  Size
=====
Installing:
  docker          x86_64        25.0.6-1.amzn2023.0.2    amazonlinux 44 M
Installing dependencies:
  containerd      x86_64        1.7.20-1.amzn2023.0.1    amazonlinux 35 M
  iptables         x86_64        1.8.8-3.amzn2023.0.2    amazonlinux 401 k
  iptables-nft    x86_64        1.8.8-3.amzn2023.0.2    amazonlinux 183 k
  libcgroup       x86_64        3.0-1.amzn2023.0.1     amazonlinux 75 k
  libnetfilter_conntrack x86_64  1.0.8-2.amzn2023.0.2    amazonlinux 58 k
  libnfnetworklink x86_64        1.0.1-19.amzn2023.0.2   amazonlinux 30 k
  libnftnl        x86_64        1.2.2-2.amzn2023.0.2   amazonlinux 84 k
  pigz            x86_64        2.5-1.amzn2023.0.3     amazonlinux 83 k
  runc            x86_64        1.1.13-1.amzn2023.0.1   amazonlinux 3.2 M
Transaction Summary
=====
Install 10 Packages

Total download size: 84 M
Installed size: 317 M
Downloading Packages:
(1/10): iptables-libc-1.8.8-3.amzn2023.0.2.x86_64.rpm           2.7 MB/s | 401 kB  00:00
(2/10): iptables-nft-1.8.8-3.amzn2023.0.2.x86_64.rpm             4.6 MB/s | 183 kB  00:00
(3/10): libcgroup-3.0-1.amzn2023.0.1.x86_64.rpm                 2.5 MB/s | 75 kB   00:00
(4/10): libnetfilter_conntrack-1.0.8-2.amzn2023.0.2.x86_64.rpm    1.7 MB/s | 58 kB   00:00
(5/10): libnfnetworklink-1.0.1-19.amzn2023.0.2.x86_64.rpm        953 kB/s | 30 kB   00:00
(6/10): libnftnl-1.2.2-2.amzn2023.0.2.x86_64.rpm                4.9 MB/s | 84 kB   00:00
(7/10): pigz-2.5-1.amzn2023.0.3.x86_64.rpm                      4.1 MB/s | 83 kB   00:00
```

## 4.3. Generated ssh keys on Docker Server and changed configurations in sshd\_config for creating ssh-connection between Docker Server and Jenkins Server.



```
[root@docker-server ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa
Your public key has been saved in /root/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:XQUwfVlW46UM7pfCjPl05oInWsTtMneyJKQB4gIvCuk root@docker-server.example.com
The key's randomart image is:
+---[RSA 3072]---+
|          o....|
|          . . . |
|          . o o |
|          . o . o * o |
|          o . o . S o B + .|
|          o . . B = +|
|          .E     . *o0*=|
|          oo*DB+|
|          . .+ oo|
```

```
[root@docker-server ~]# vim /etc/ssh/sshd_config
[root@docker-server ~]# passwd
Changing password for user root.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@docker-server ~]# |
```

```
#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

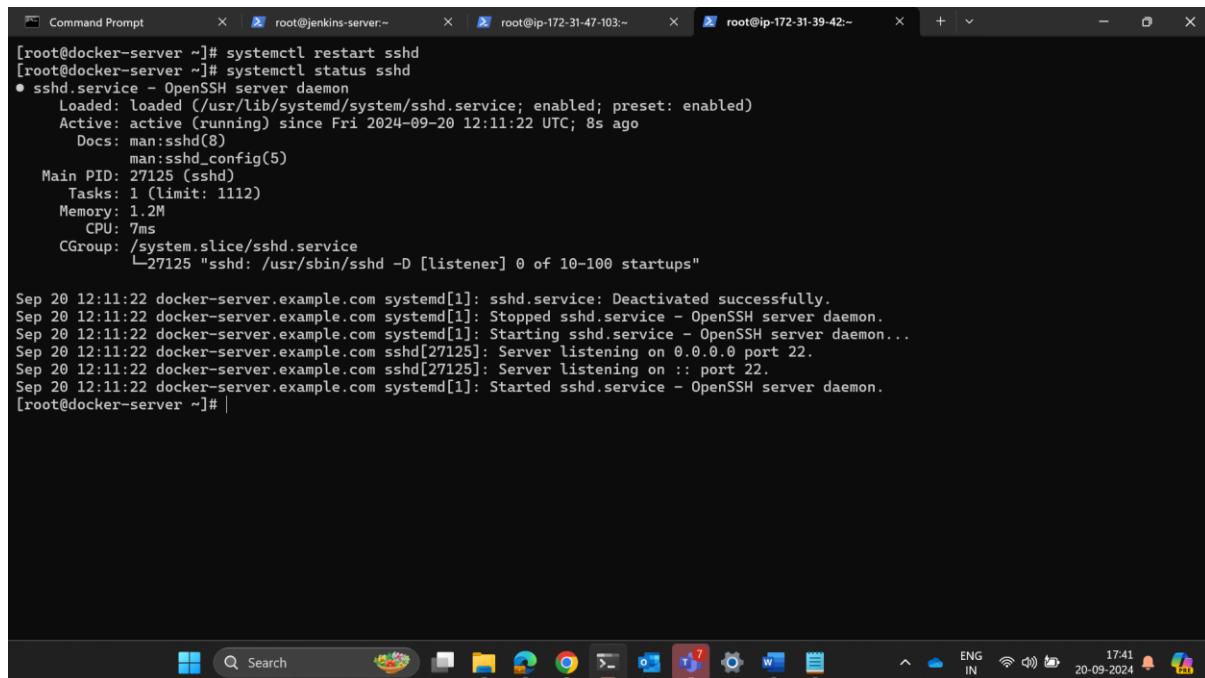
#AuthorizedPrincipalsFile none

# 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
#IgnoreUserKnownHosts no
# Don't read the user's ~/.rhosts and ~/.shosts files
#IgnoreRhosts yes

# Explicitly disable PasswordAuthentication. By presetting it, we
# avoid the cloud-init set_passwords module modifying sshd_config and
# restarting sshd in the default instance launch configuration.
PasswordAuthentication yes
PermitEmptyPasswords yes

# Change to no to disable s/key passwords
#KbdInteractiveAuthentication yes
-- INSERT --
```

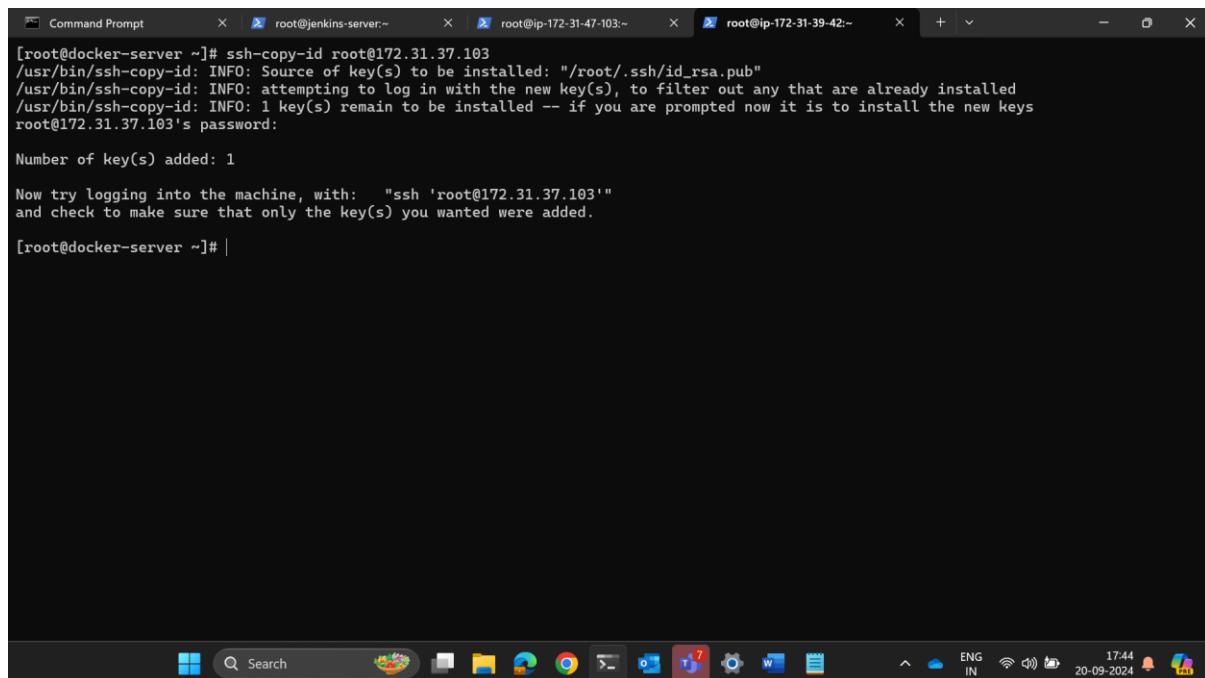
#### 4.4. Restarted daemon sshd.



```
[root@docker-server ~]# systemctl restart sshd
[root@docker-server ~]# systemctl status sshd
● sshd.service - OpenSSH server daemon
  Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; preset: enabled)
  Active: active (running) since Fri 2024-09-20 12:11:22 UTC; 8s ago
    Docs: man:sshd(8)
           man:sshd_config(5)
  Main PID: 27125 (sshd)
    Tasks: 1 (limit: 1112)
   Memory: 1.2M
      CPU: 7ms
     CGroup: /system.slice/sshd.service
             └─27125 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Sep 20 12:11:22 docker-server.example.com systemd[1]: sshd.service: Deactivated successfully.
Sep 20 12:11:22 docker-server.example.com systemd[1]: Stopped sshd.service - OpenSSH server daemon.
Sep 20 12:11:22 docker-server.example.com systemd[1]: Starting sshd.service - OpenSSH server daemon...
Sep 20 12:11:22 docker-server.example.com sshd[27125]: Server listening on 0.0.0.0 port 22.
Sep 20 12:11:22 docker-server.example.com sshd[27125]: Server listening on :: port 22.
Sep 20 12:11:22 docker-server.example.com systemd[1]: Started sshd.service - OpenSSH server daemon.
[root@docker-server ~] #
```

#### 4.5. Copied ssh-key of Docker Server to Jenkins Server.



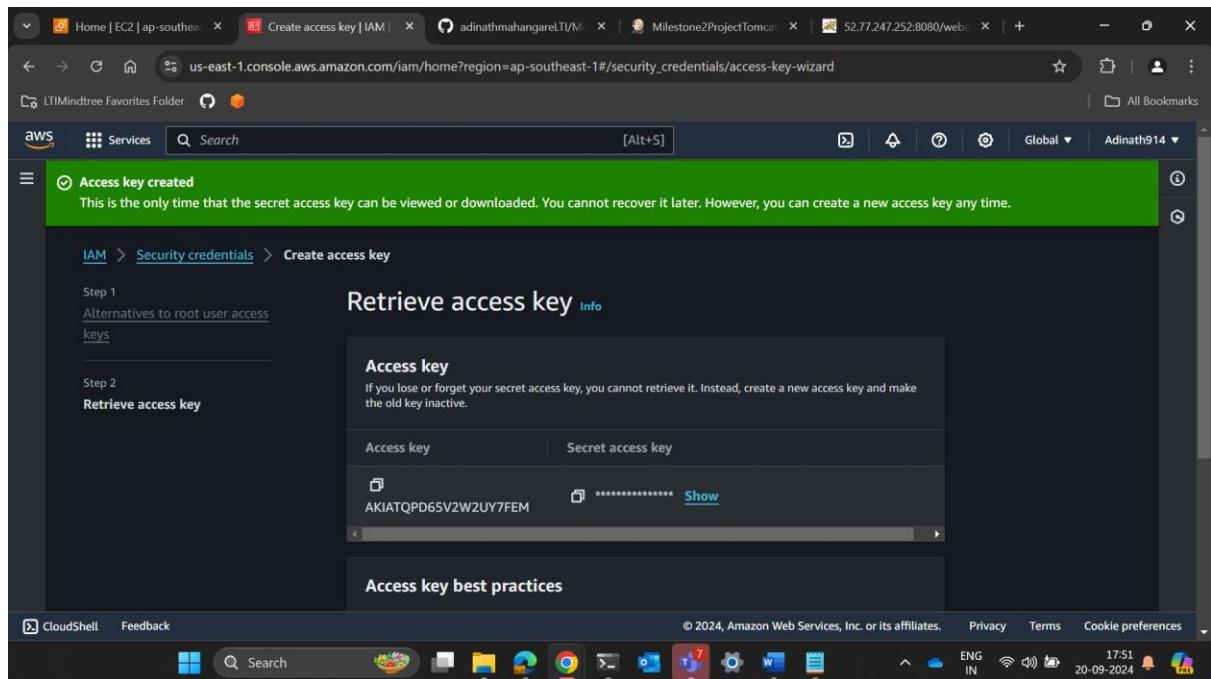
```
[root@docker-server ~]# ssh-copy-id root@172.31.37.103
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
/usr/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out any that are already installed
/usr/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted now it is to install the new keys
root@172.31.37.103's password:

Number of key(s) added: 1

Now try logging into the machine, with:  "ssh 'root@172.31.37.103'"
and check to make sure that only the key(s) you wanted were added.

[root@docker-server ~] #
```

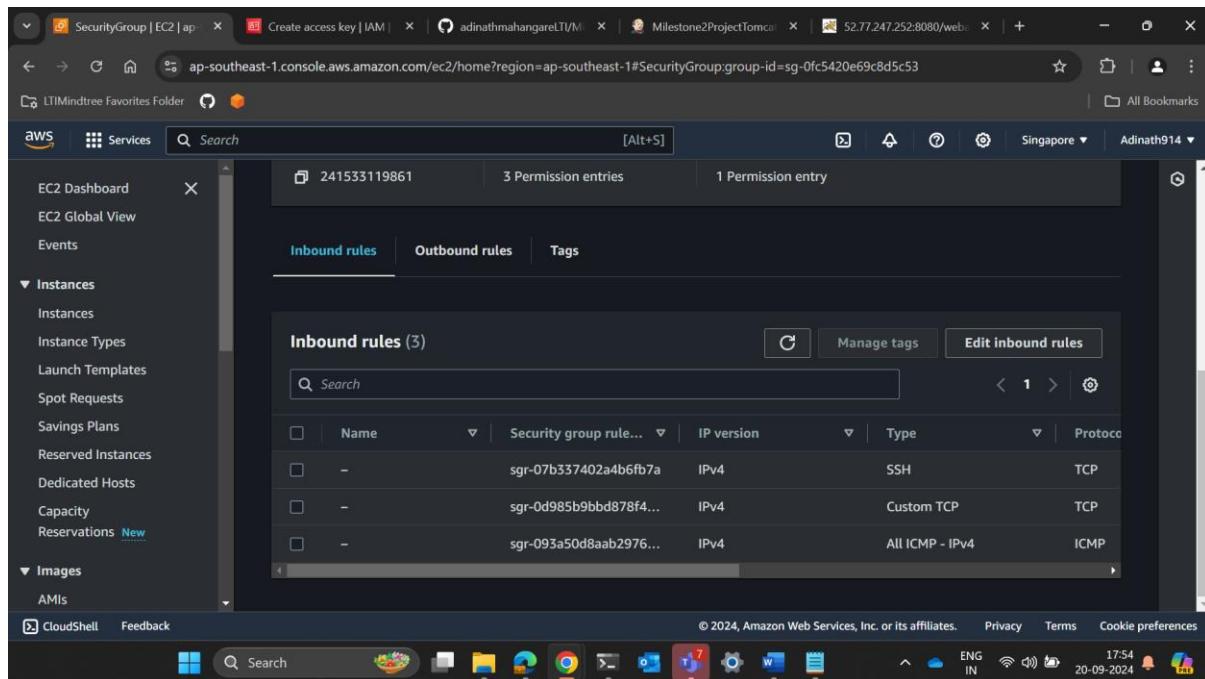
#### 4.6. Created AWS User with **AmazonElasticContainerRegistryPublicPowerUser** and **AmazonEC2FullAccess** policies and generated access key for the user.



#### 4.7. Configured AWS with previously created user access key and secret key.

A screenshot of a Windows Command Prompt window titled "Command Prompt". The command entered is "[root@docker-server ~]# aws configure". The output shows the configuration details: "AWS Access Key ID [None]: AKIATQPD65V2W2UY7FEM", "AWS Secret Access Key [None]: h26ejZ3IMW34eOs70+Gmf01D16A9N1hjnCps0bg", "Default region name [None]:", and "Default output format [None]". The prompt "[root@docker-server ~]#" is visible at the end of the output. The status bar at the bottom shows "ENG IN", "17:51", "20-09-2024", and other system icons.

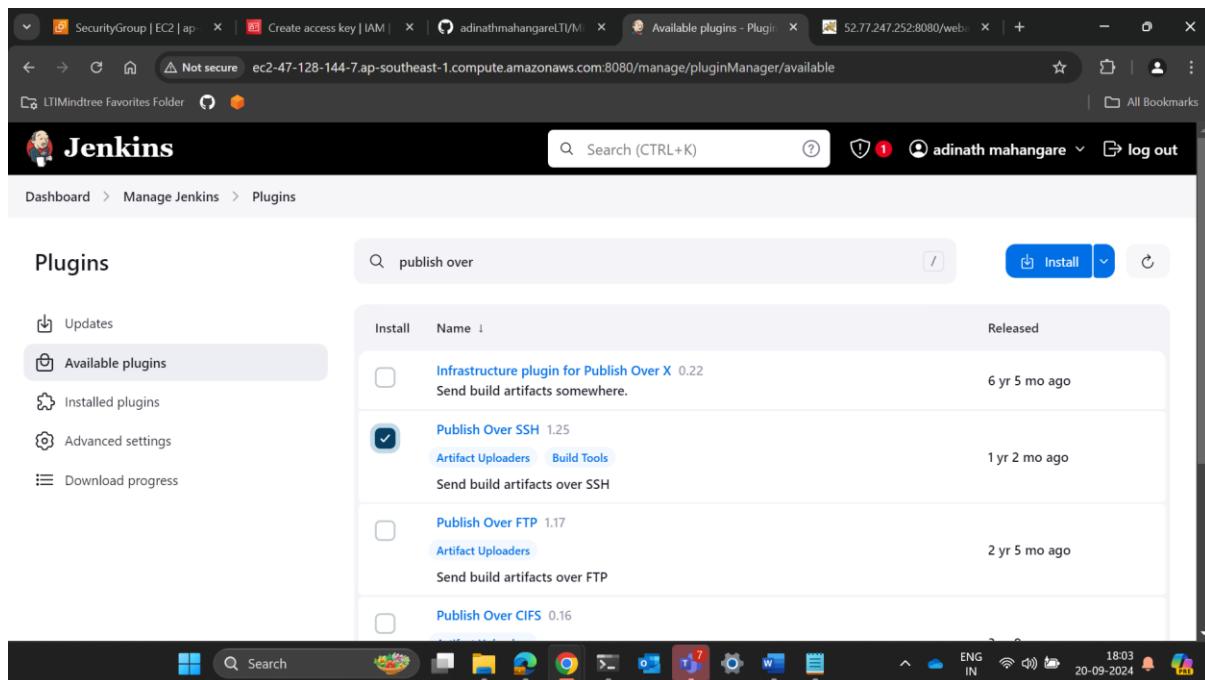
4.8. Added ICMP protocol in security group to check if machines are correctly connected to each other.



The screenshot shows the AWS Management Console interface for managing security groups. The left sidebar is collapsed, showing options like EC2 Dashboard, EC2 Global View, Events, Instances, Images, and CloudShell. The main area displays the details for a security group named 'SecurityGroup' (group ID: sg-0fc5420e69c8d5c53). It shows 3 Permission entries and 1 Permission entry. The 'Inbound rules' tab is selected, showing a table with three entries:

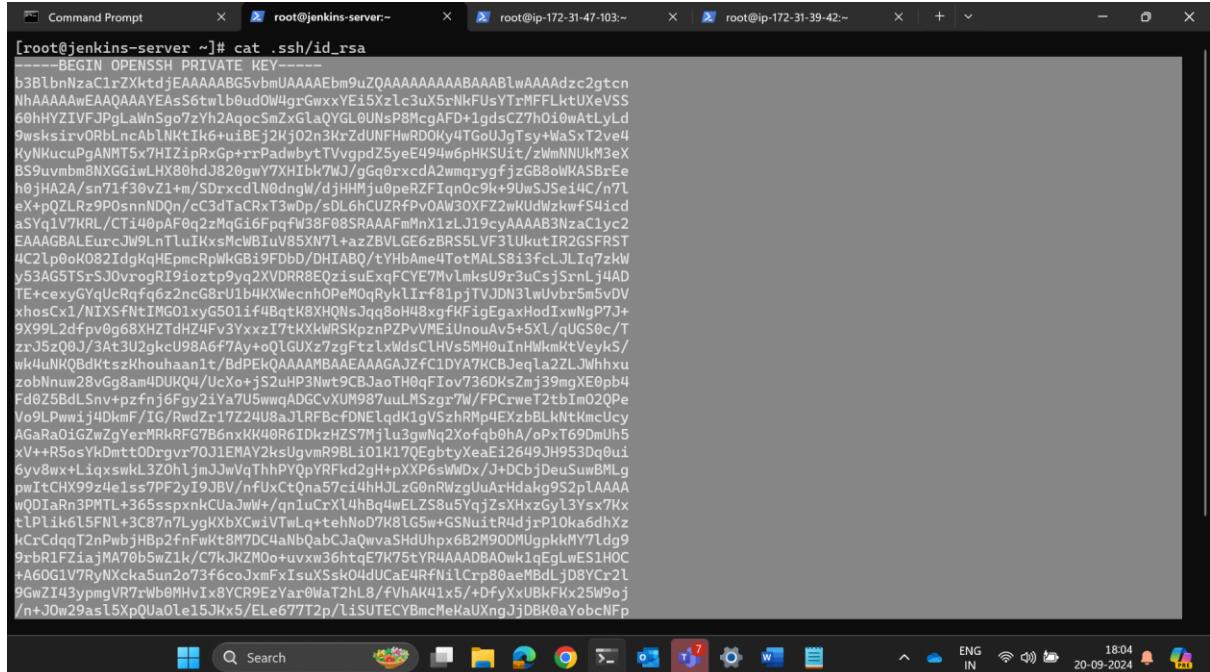
Name	Security group rule...	IP version	Type	Protocol
-	sgr-07b337402a4b6fb7a	IPv4	SSH	TCP
-	sgr-0d985b9bbd878f4...	IPv4	Custom TCP	TCP
-	sgr-093a50d8aab2976...	IPv4	All ICMP - IPv4	ICMP

4.9. Added plugin Publish over SSH in Jenkins Dashboard.

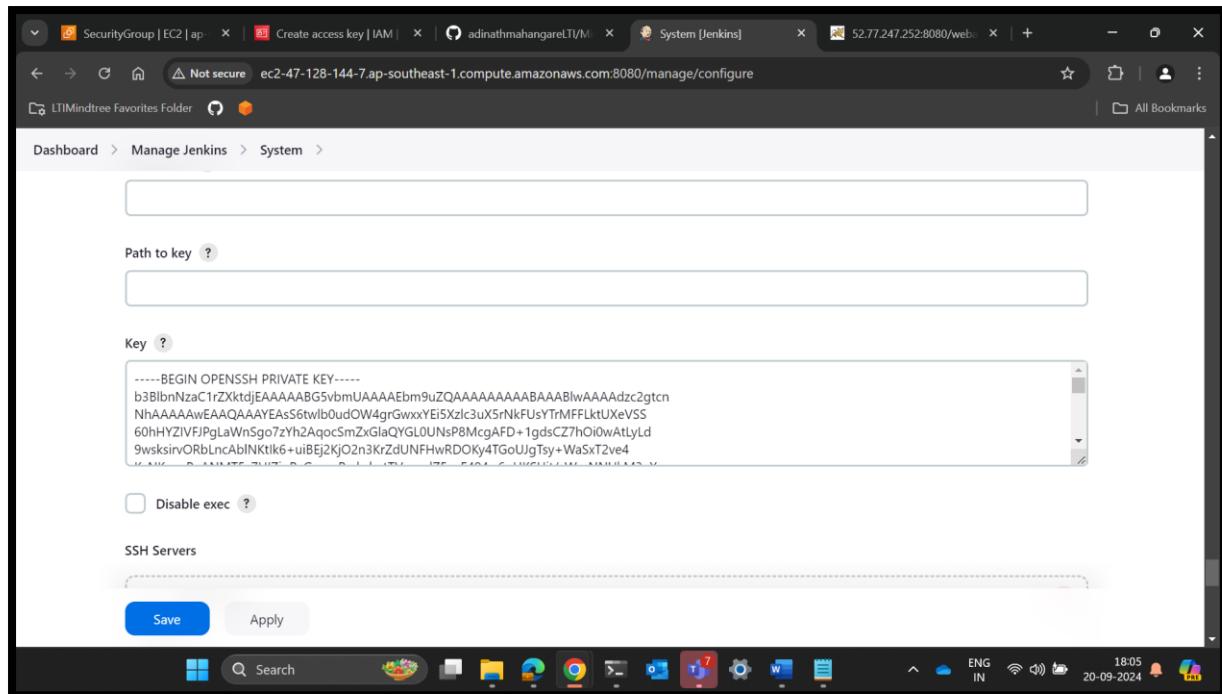


The screenshot shows the Jenkins dashboard with the 'Manage Jenkins' section selected. Under 'Plugins', the 'Available plugins' tab is active, showing a search bar with 'publish over'. A list of available plugins is displayed, with 'Publish Over SSH' checked and highlighted. Other listed plugins include 'Infrastructure plugin for Publish Over X', 'Publish Over FTP', and 'Publish Over CIFS'. The Jenkins logo is at the top left, and the user 'adinath mahangare' is logged in. The bottom navigation bar includes icons for various Jenkins features like Artifacts, Build Tools, and SCM.

#### 4.10. Copied private key of Jenkins server and Added in System section of Jenkins Dashboard.

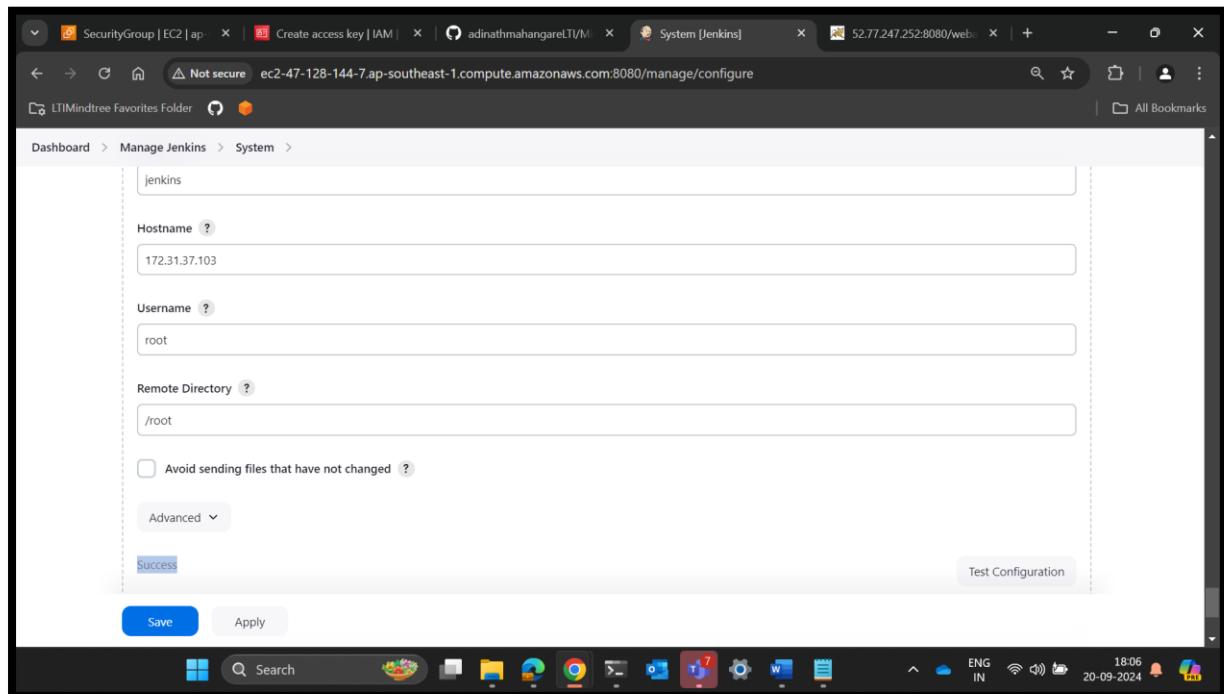


```
[root@jenkins-server ~]# cat .ssh/id_rsa
-----BEGIN OPENSSH PRIVATE KEY-----
b3B1bnNzaC1rZktjdEAAAABG5vbmUAQAAEb9uZQAAAAAAAABAAABlwAAAAdz2gtcn
NhAAAAAwEAAQAAAYEAsS6twLb0ud0W4gxGwxxYEi5Xzlc3uX5rNkFuSYTmFFLktUXeVSS
60hHYZIVFJpgLaWnSgo7zYh2aqocSmZxGlaQYGL0NsP8McgAFD+1gdsCZ7h0iowAtLyd
9wsksirvOrblncAbNkltk6+uiBej2kjo2n3krZdUNFHwRDOky4TGoUJgTsy+WaSxT2ve4
KyNlKucuPgAMWTSx7hIZipRxGp+rPadwbtytVvgpdZ5ye49lw6pHkSuIt/zwmNNuJm3eX
BS9uvmbm8NXGGwlHX80hdJ820gwY7X1bk7WJ/g9q9xxcdA2wmqrqyfjzGB80wKASBrEe
h0jH2A/sn7f30vZ1+m/SdrxcdlN0dngW/djHMju0peRZF1qn0c9k+9uWSJSei4c/n7l
eX+pQZLRz9P0snNDQn/cC3dtaCrXt3wDp/sDL6hCUZRfpV0AW30XFZ2wKUdWzkwfS4cd
aSYq1v7KRL/CTi40pAf0q2zMqGi6FpqfW38F08SRAAAFMnX1zLJ19cyAAAAB3Nza1yc2
EAAAGBALEurcJW9LnTluIkxsmcwlBuV85Xn7l+azzBVLGE6zBRSSLVF3LUkutIR2GSFRST
4C2lp0ok082IdgkQhEpmcRpWkGBi9FdB/DHIABo/TyHbhAme4t0MAL8i3fcJLJ1q7zKw
y53AG5TSrSJ0vrogRI9oZtp9y2XvDRR8EQzisueXqFCY7Mvlmksu9z3uCsjsrnLj4AD
TE+cexyGYqUcrqfq6z2neG8rU1b4KXWechnOPeMoqRyk1lr81pjTVJDN3lwUvbr5m5vDV
xhosCx/NIx5fntIMG01xyG501f4BqtK8XHQNsJqq8oH48xgfKfigExaxHodIxwlgP7J+
9X99L2dfpvg8am4DUHQ4/Ucx+o+j52uHP3Nwt9CBja0IH0qFl0v7360KsZmj39mgXe0pb4
Fd0Z5bdLsnv+pzfnj6fy2iYa7u5wwqADGCvXUM987uuLMsZgr7w/FPCxweT2tbIm020Pe
Vo9LPwzj4Dkmf/Ig/Rwdz17Z24U8aJLRFbcFDNeLqdKlgV5zhRMp4ExzbBLKntkmcuicy
AGaRaOigGzwZgYerMRkrFg7B6nxKk40R6IDkz7Mjl3gwNq2Xofqb0hA/oPxT69DmUh5
xV++R5osYkDmt0Drgrv70J1EMAY2ksUgvnR9BL101K17QEgbtyxeai2649Jh953Dq9ui
6yv8wx+LiqxswkL32Oh1jmJjwVtHhVqOpYRFkd2gH+XXP6sWWdx/J+DcbjDeuSuwBMLg
pwItCHX99z4e1s7PF2yI9JBV/nfUxCtna57ci4hJLzG0nRWzgUtaRhdakg952p1AAAA
wQDIaRn3PMTL+365sspznkCuAjwW+qniuCrXl4hBq4wELZS8u5YqjzsXhxzGy13Ysx7Kx
t1Plk615Fn1+3C87n7LgkXkbXcw1TwLq+tehNoD7k8LGsw+GSNu1trRdjP10ka6dhXz
kCrCdqqt2nPwBp2fNfwKt8M7DCAhNbQabCJaQwahsUdhpXb62M90DMUgpkMy7ldg9
9rbR1FZiajMA76b5wZ1k/C7kJkZM0o+uvx36htqE7K75tYR4AAADBAAwklqEglwES1HOC
+A60G1V7RyNxcka5un2o73f6coJxmFxIsuSsk04dUcaE4RfNilCpr80aeMBdl_jD8Ycr2l
9GwzI4y3ympgVR7rlwB0MHv8YCR9EzYax0WaT2hl8/FvhAK41x5/+DfyXxUBlkFkx25W9oj
/nJw29as15xpQua0le15Jkx5/ELe677T2p/lisUTEYBmcMeKaUXngJjDBK0aYobcNFp
```

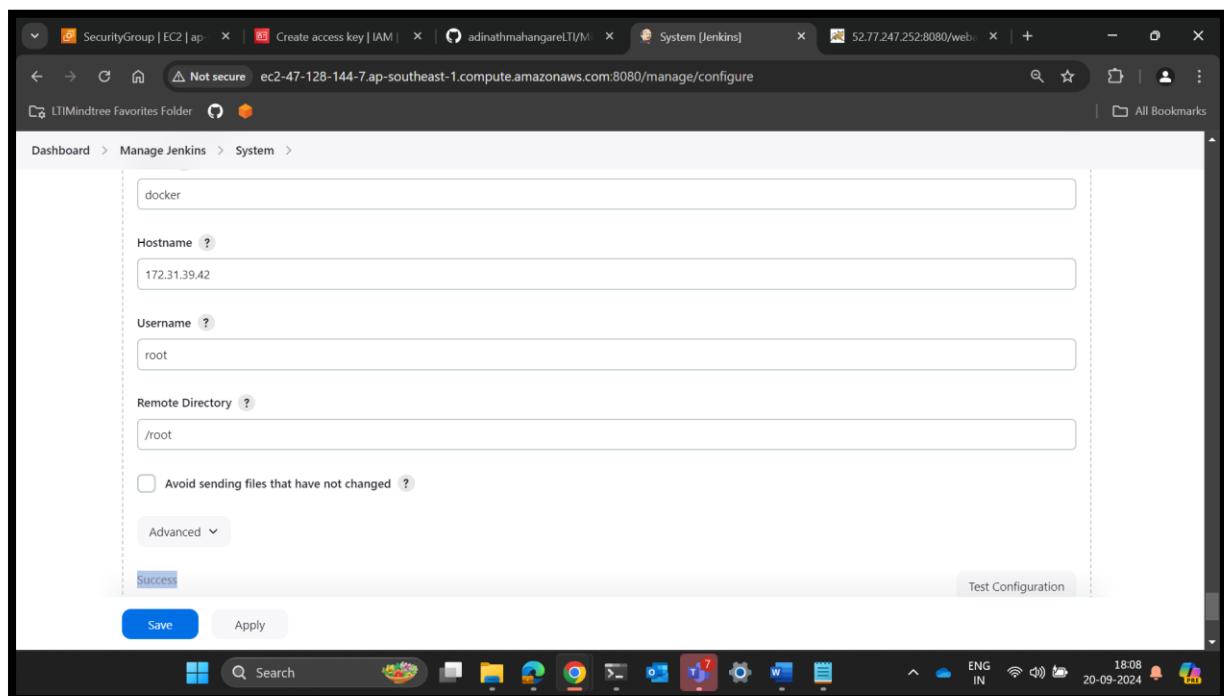


The screenshot shows the Jenkins System configuration page. In the 'Key' field, the copied private key is pasted. Below the key field is a checkbox labeled 'Disable exec' which is unchecked. At the bottom of the page are 'Save' and 'Apply' buttons.

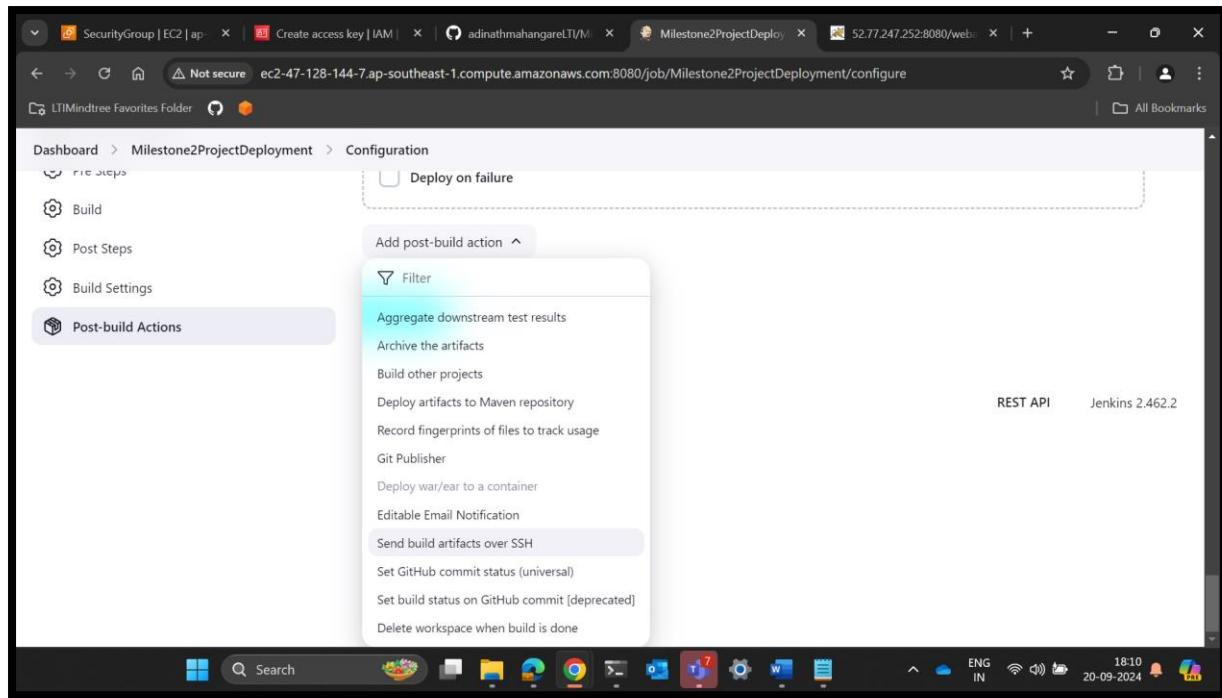
4.11. Added ssh-server for Jenkins machine with private-ip-addr and tested configuration.



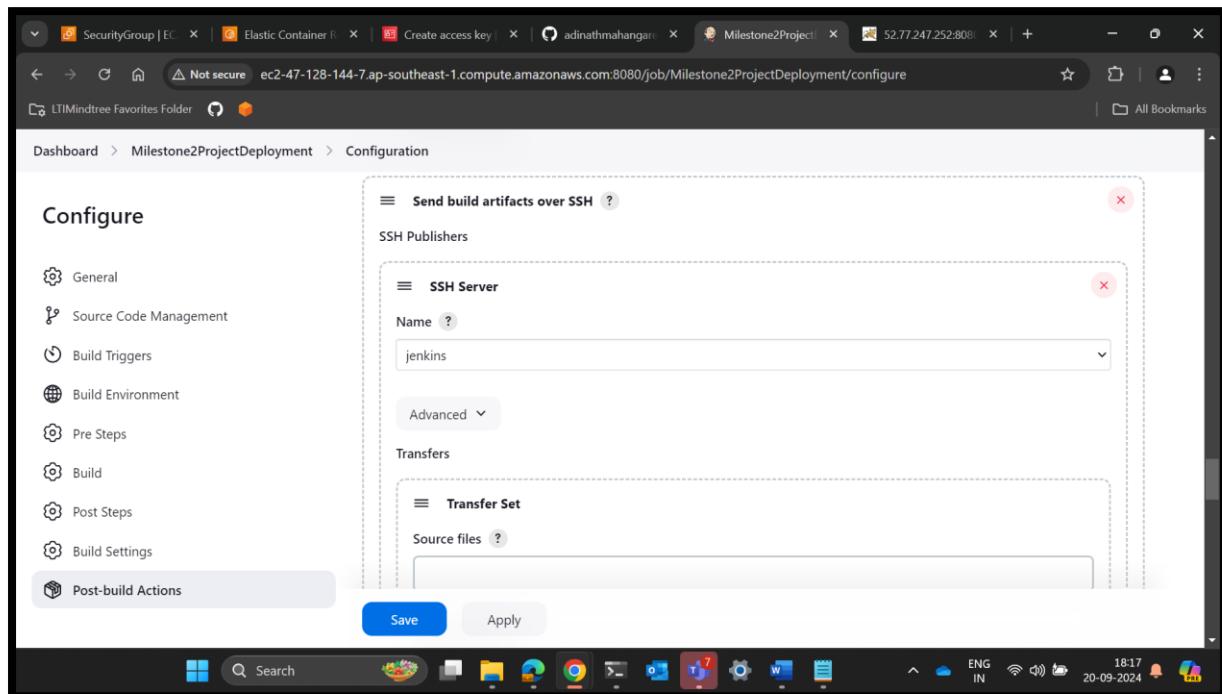
4.12. Added ssh-server for Docker machine with private-ip-addr and tested configuration.

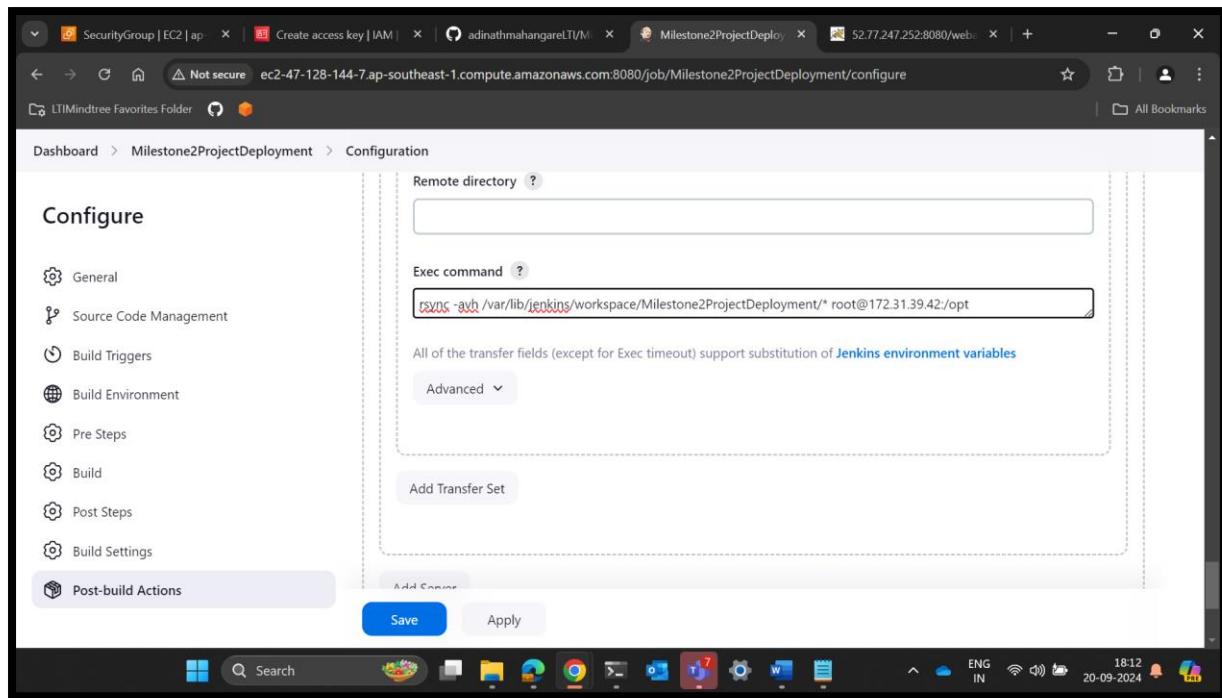


4.13. In post build actions of our item select **Send Build Artefacts over SSH**.

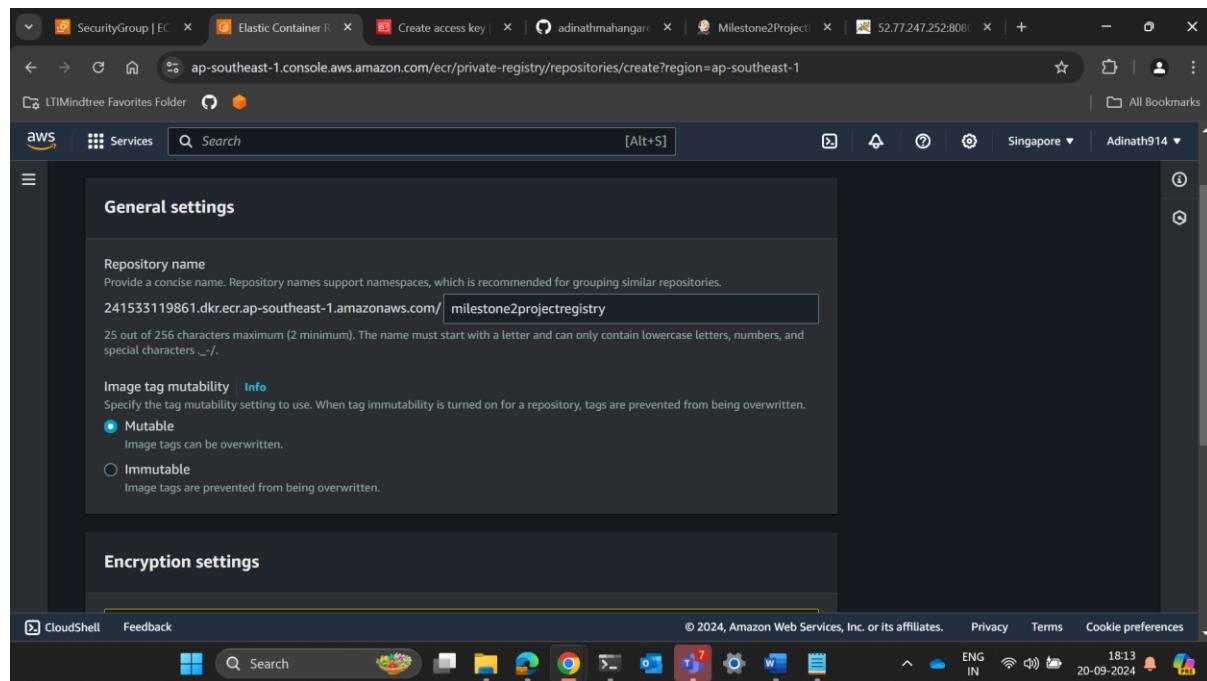


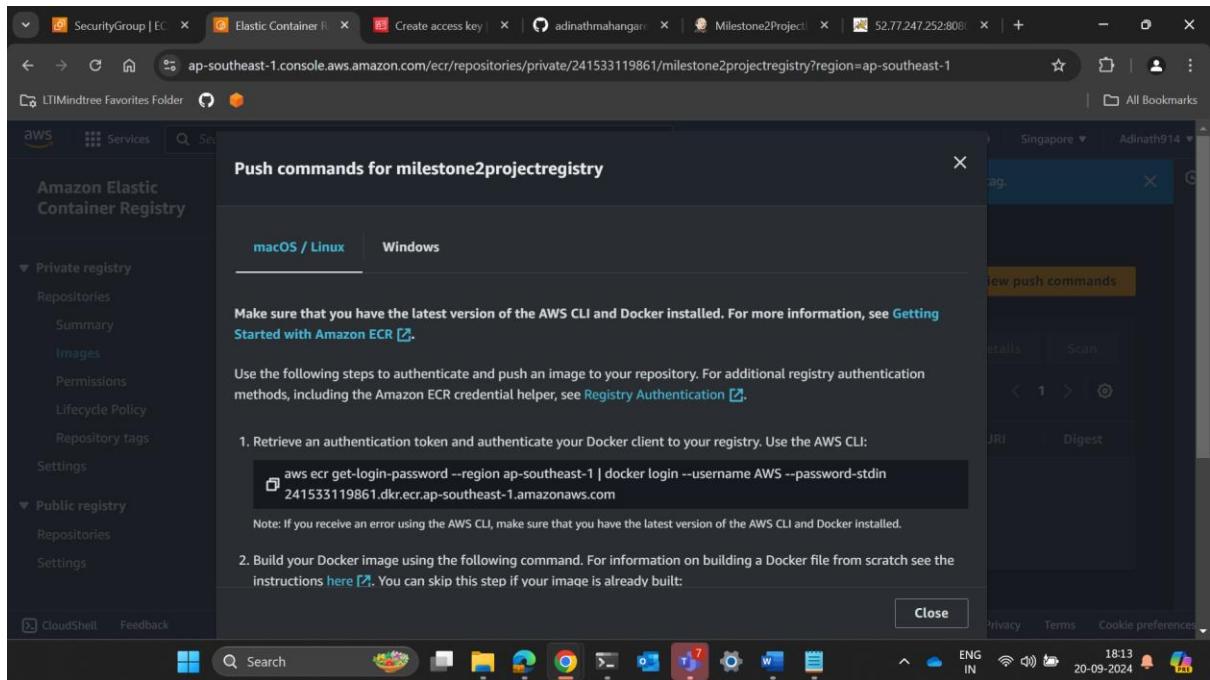
4.14. On Jenkins ssh-server added Exec Command to move and sync Project files to Docker server /opt folder.



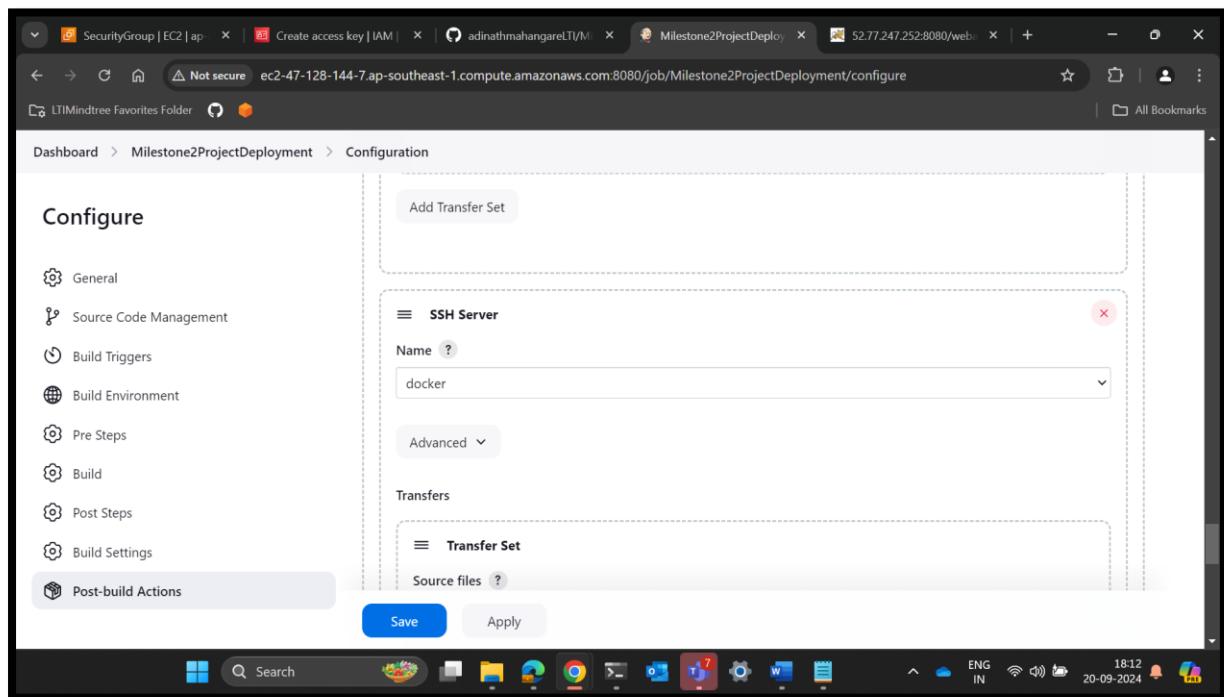


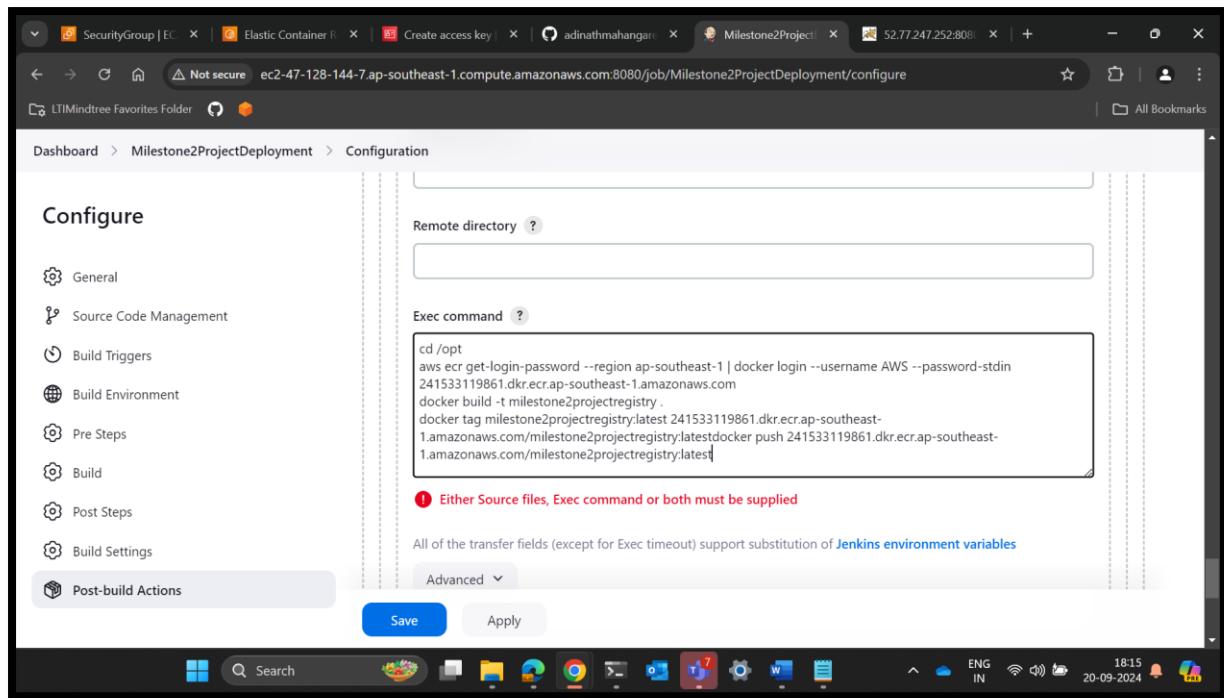
4.15. Created AWS Elastic Container Registry and copied commands for pushing image to registry.



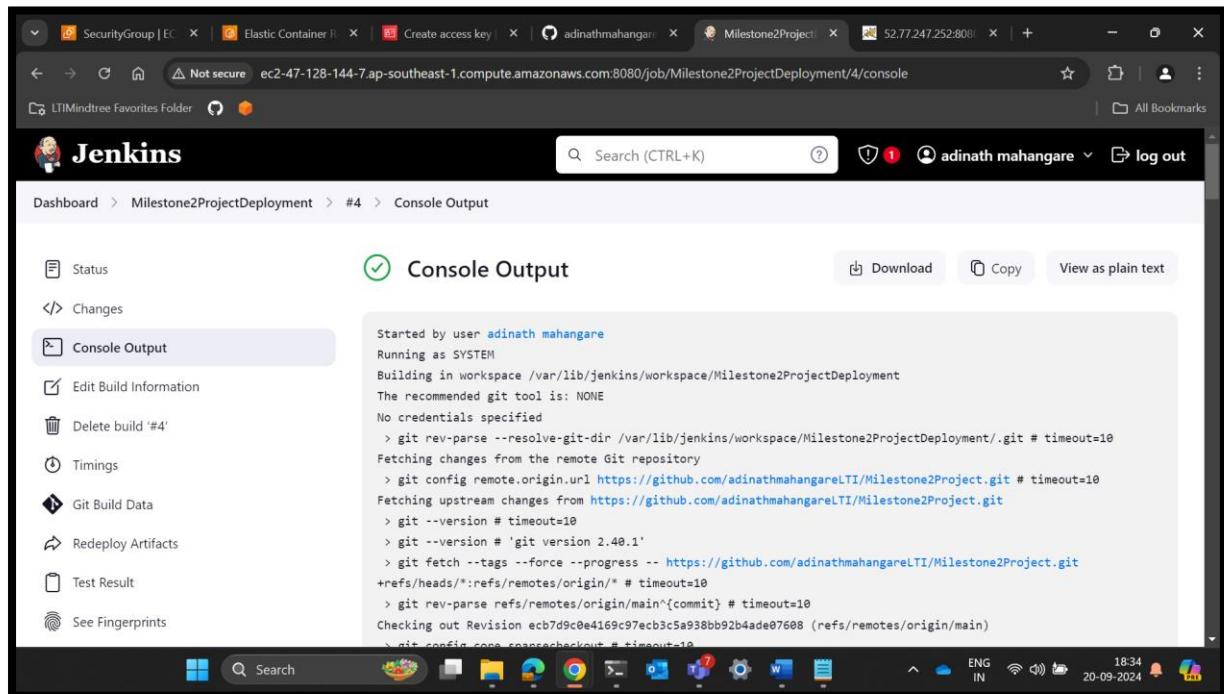


#### 4.16. On Docker ssh-server added a Exec Command to push Deployment Project Files to ECR to push image.

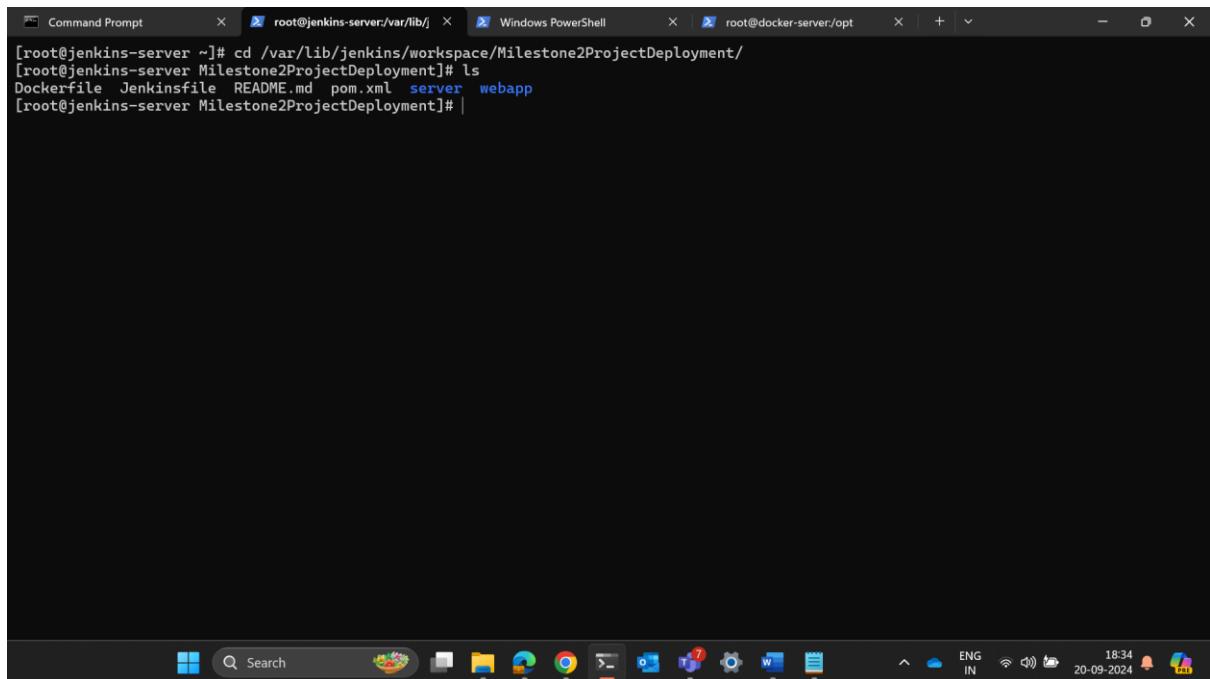




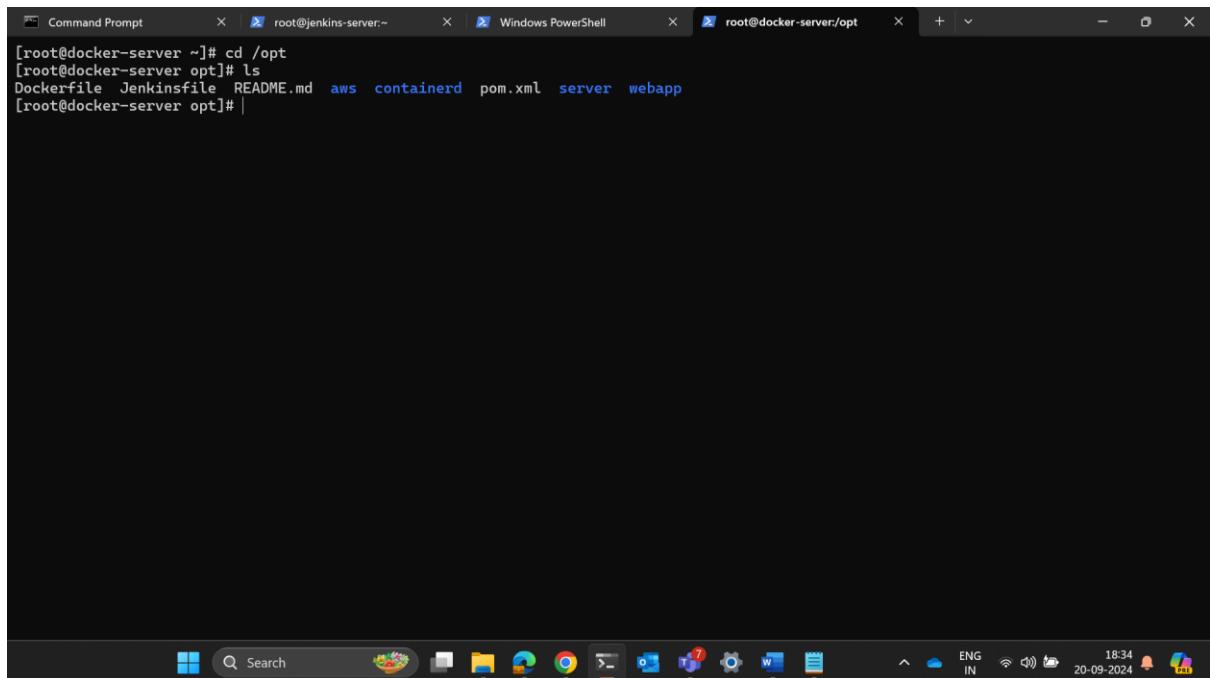
#### 4.17. Build the item successfully.



4.18.     Checker if all the Project Deployment files available in docker /opt directory are same as files in Jenkins Servers.

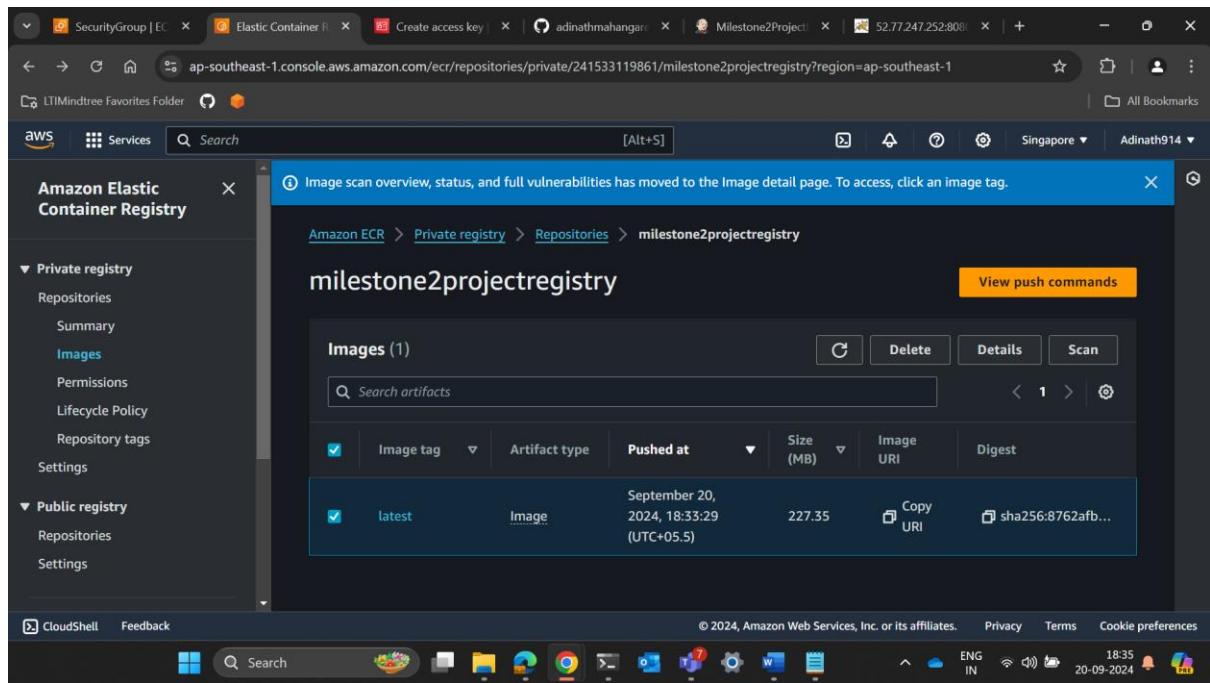


```
[root@jenkins-server ~]# cd /var/lib/jenkins/workspace/Milestone2ProjectDeployment/
[root@jenkins-server Milestone2ProjectDeployment]# ls
Dockerfile Jenkinsfile README.md pom.xml server webapp
[root@jenkins-server Milestone2ProjectDeployment]# |
```



```
[root@docker-server ~]# cd /opt
[root@docker-server opt]# ls
Dockerfile Jenkinsfile README.md aws containerd pom.xml server webapp
[root@docker-server opt]# |
```

4.19. Checked if latest image is pushed to Amazon ECR milestone2projectregistry.

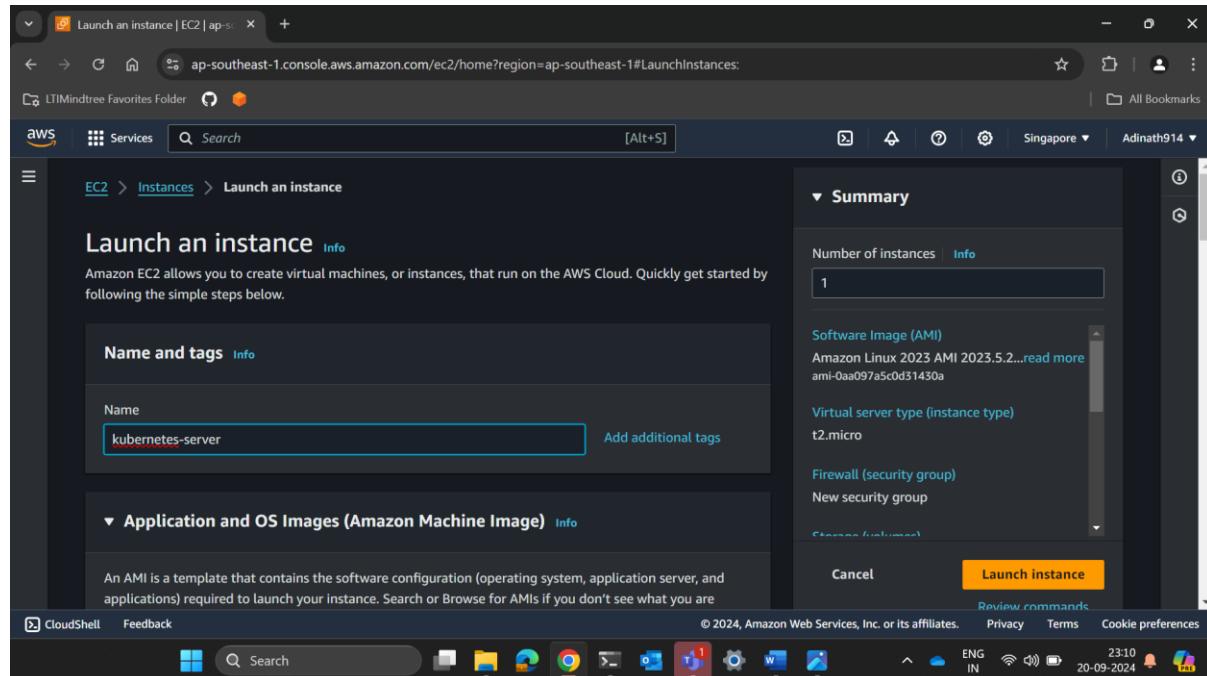


The screenshot shows the AWS ECR console interface. The left sidebar is titled "Amazon Elastic Container Registry" and includes sections for "Private registry" (Repositories, Summary, Images, Permissions, Lifecycle Policy, Repository tags, Settings) and "Public registry" (Repositories, Settings). The main content area shows the "milestone2projectregistry" repository. A banner at the top states: "Image scan overview, status, and full vulnerabilities has moved to the Image detail page. To access, click an image tag." Below this, a table lists "Images (1)". The table columns are: Image tag, Artifact type, Pushed at, Size (MB), Image URI, and Digest. One row is visible, showing "latest" as the tag, "Image" as the artifact type, "September 20, 2024, 18:33:29 (UTC+05:5)" as the pushed at date, "227.35" as the size, and "sha256:8762afb..." as the digest. Buttons for "View push commands", "Delete", "Details", and "Scan" are located at the top right of the table. The bottom of the screen shows the Windows taskbar with various pinned icons and the system tray indicating the date and time as 20-09-2024, 18:35.

Latest image pushed successfully!

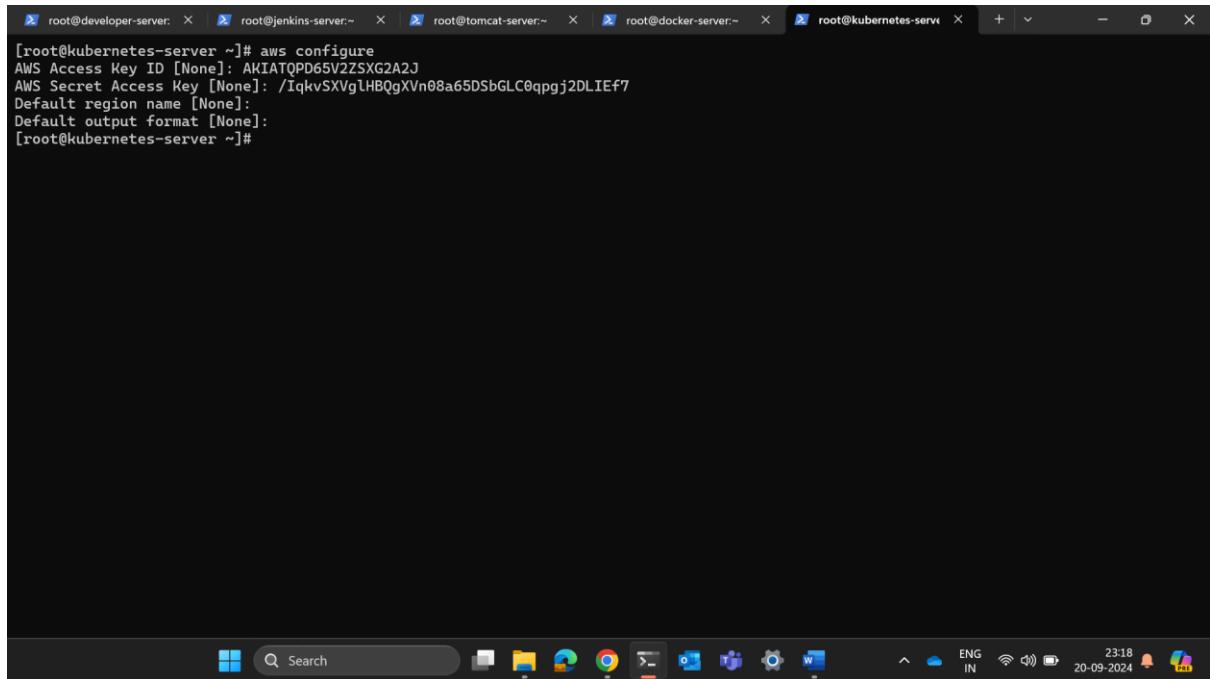
## 5. Created Kubernetes Server

5.1. Initiated amazon Linux EC2 instance and connected it to local machine via ssh.



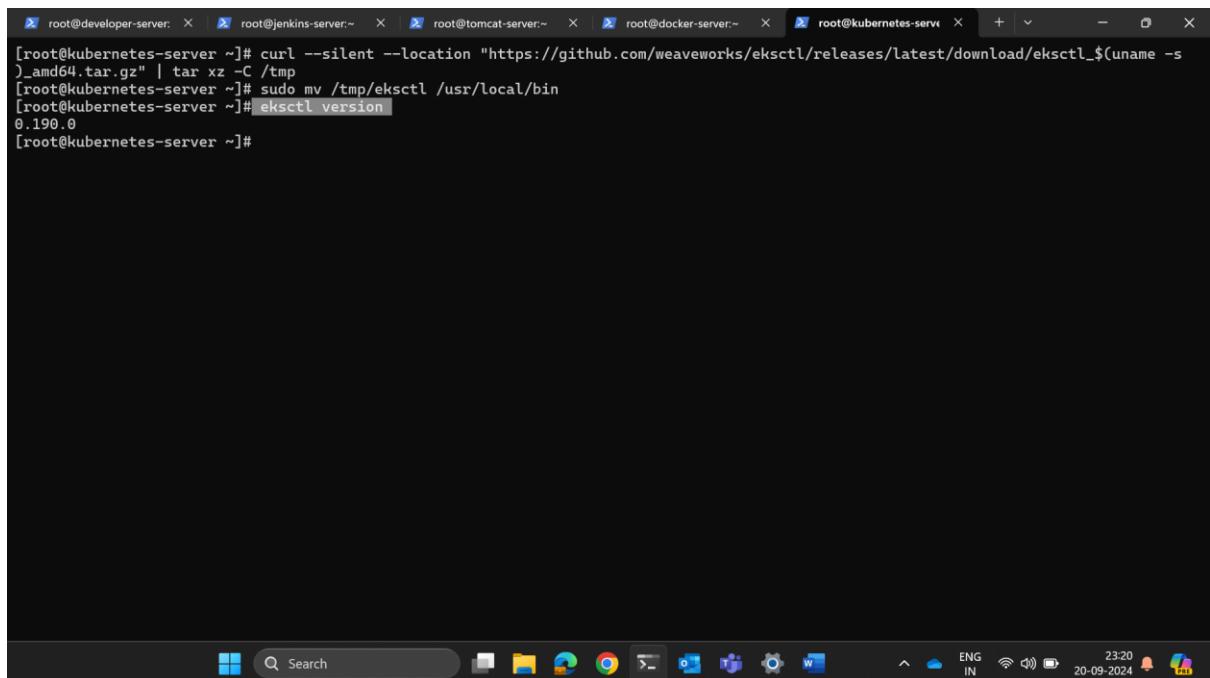
```
root@developer-server:~> root@jenkins-server:~> root@tomcat-server:~> root@docker-server:~> root@kubernetes-server:~> + - < > X
[ec2-user@ip-172-31-46-231 ~]$ sudo su -
[root@ip-172-31-46-231 ~]# hostnamectl set-hostname kubernetes-server.example.com
[root@ip-172-31-46-231 ~]# bash
[root@kubernetes-server ~]# yum update -y
client_loop: send disconnect: Connection reset
PS C:\Users\10747904\Downloads> ssh -i "Milestone-2-kp.pem" ec2-user@ec2-18-141-229-194.ap-southeast-1.compute.amazonaws.com
[ec2-user@ip-172-31-46-231 ~]$ sudo su -
[root@ip-172-31-46-231 ~]# hostnamectl set-hostname kubernetes-server.example.com
[root@ip-172-31-46-231 ~]# bash
[root@kubernetes-server ~]# yum update -y
client_loop: send disconnect: Connection reset
Last login: Fri Sep 20 17:41:33 UTC 2024 on pts/1
[root@kubernetes-server ~]# yum update -y
Last metadata expiration check: 0:00:46 ago on Fri Sep 20 17:43:34 2024.
Dependencies resolved.
Nothing to do.
Complete!
[root@kubernetes-server ~]#
```

5.2. Created AWS user with policies **AmazonEKSClusterPolicy** and **AmazonEKSServicePolicy** and added its access key and secret key to Kubernetes server.



```
[root@kubernetes-server ~]# aws configure
AWS Access Key ID [None]: AKIATQPD65V2ZSXG2A2J
AWS Secret Access Key [None]: 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
Default region name [None]:
Default output format [None]:
[root@kubernetes-server ~]#
```

5.3. Installed eksctl tool on Kubernetes server and checked its version.



```
[root@kubernetes-server ~]# curl --silent --location "https://github.com/weaveworks/eksctl/releases/latest/download/eksctl_$(uname -s)_amd64.tar.gz" | tar xz -C /tmp
[root@kubernetes-server ~]# sudo mv /tmp/eksctl /usr/local/bin
[root@kubernetes-server ~]# eksctl version
0.190.0
[root@kubernetes-server ~]#
```

#### 5.4. Installed kubectl tool on Kubernetes server and checked its version.



```
[root@kubernetes-server ~]# curl -L https://storage.googleapis.com/kubernetes-release/release/$(curl -s https://storage.googleapis.com/kubernetes-release/release/stable.txt)/bin/linux/amd64/kubectl
  % Total    % Received % Xferd  Average Speed   Time   Time  Current
     0     0     0     0        0      0--:--:-- 12.9M
[root@kubernetes-server ~]# sudo install -o root -g root -m 0755 kubectl /usr/local/bin/kubectl
[root@kubernetes-server ~]# kubectl version --client
Client Version: v1.31.0
Kustomize Version: v5.4.2
[root@kubernetes-server ~]#
```

#### 5.5. Generated ssh-key. Changed sshd\_config. Restarted sshd. Copied Kubernetes server ssh-key to Jenkins Server.



```
[root@kubernetes-server ~]# ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa
Your public key has been saved in /root/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:CnQRa0j8dBbidN/b4WBMM1seHUDLlaGCQddNlof3n5s root@kubernetes-server.example.com
The key's randomart image is:
+---[RSA 3072]---+
| .. =++ .+o*0B|
| ..+=o .++ .o*0=|
| oo=o . .+=+o.+|
| . o. . .= .. |
| . S . o o|
| . . . . |
| . o |
| E |
+---[SHA256]---+
[root@kubernetes-server ~]# vim /etc/ssh/sshd_config
[root@kubernetes-server ~]# systemctl restart sshd
[root@kubernetes-server ~]# ssh-copy-id root@172.31.37.103
/usr/bin/ssh-copy-id: INFO: Source of key(s) to be installed: "/root/.ssh/id_rsa.pub"
The authenticity of host '172.31.37.103 (172.31.37.103)' can't be established.
ED25519 key fingerprint is SHA256:kU1z4He8KLst95+yLZLYFvvpCR4f7wsK/EyogA7QHc4.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? 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
root@172.31.37.103's password:
```



```

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
#IgnoreUserKnownHosts no
# Don't read the user's ~/.rhosts and ~/.shosts files
#IgnoreRhosts yes

# Explicitly disable PasswordAuthentication. By presetting it, we
# avoid the cloud-init set_passwords module modifying sshd_config and
# restarting sshd in the default instance launch configuration.
PasswordAuthentication yes
PermitEmptyPasswords yes

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

# Kerberos options
-- INSERT --

```

66,25      38%

23:23 20-09-2024 ENG IN

## 5.6. Created cluster on Kubernetes Server in Singapore region with two nodes having t2.small instance type.



```

[root@kubernetes-server ~]# eksctl create cluster \
--name my-cluster \
--region ap-southeast-1 \
--nodegroup-name my-nodes \
--node-type t2.small \
--nodes 2 \
--nodes-min 2 \
--nodes-max 2 \
--managed
2024-09-20 18:01:32 [ℹ] eksctl version 0.190.0
2024-09-20 18:01:32 [ℹ] using region ap-southeast-1
2024-09-20 18:01:32 [ℹ] setting availability zones to [ap-southeast-1c ap-southeast-1a ap-southeast-1b]
2024-09-20 18:01:32 [ℹ] subnets for ap-southeast-1c - public:192.168.0.0/19 private:192.168.96.0/19
2024-09-20 18:01:32 [ℹ] subnets for ap-southeast-1a - public:192.168.32.0/19 private:192.168.128.0/19
2024-09-20 18:01:32 [ℹ] subnets for ap-southeast-1b - public:192.168.64.0/19 private:192.168.160.0/19
2024-09-20 18:01:32 [ℹ] nodegroup "my-nodes" will use "" [AmazonLinux2/1.30]
2024-09-20 18:01:32 [ℹ] using Kubernetes version 1.30
2024-09-20 18:01:32 [ℹ] creating EKS cluster "my-cluster" in "ap-southeast-1" region with managed nodes
2024-09-20 18:01:32 [ℹ] will create 2 separate CloudFormation stacks for cluster itself and the initial managed nodegroup
2024-09-20 18:01:32 [ℹ] if you encounter any issues, check CloudFormation console or try 'eksctl utils describe-stacks --region=ap-southeast-1 --cluster=my-cluster'
2024-09-20 18:01:32 [ℹ] Kubernetes API endpoint access will use default of {publicAccess=true, privateAccess=false} for cluster "my-cluster" in "ap-southeast-1"
2024-09-20 18:01:32 [ℹ] CloudWatch logging will not be enabled for cluster "my-cluster" in "ap-southeast-1"
2024-09-20 18:01:32 [ℹ] you can enable it with 'eksctl utils update-cluster-logging --enable-types={SPECIFY-YOUR-LOG-TYPES-HERE} (e.g. --region=ap-southeast-1 --cluster=my-cluster)'
2024-09-20 18:01:32 [ℹ] default addons vpc-cni, kube-proxy, coredns were not specified, will install them as EKS addons
2024-09-20 18:01:32 [ℹ] 2 sequential tasks: { create cluster control plane "my-cluster",
2 sequential sub-tasks: {
2 sequential sub-tasks: {
1 task: { create addons },
wait for control plane to become ready,

```

23:31 20-09-2024 ENG IN

```

root@developer-server:~| root@jenkins-server:~| root@tomcat-server:~| root@docker-server:~| root@kubernetes-server:~| + | - | X
2024-09-20 18:09:34 [!] recommended policies were found for "vpc-cni" addon, but since OIDC is disabled on the cluster, eksctl cannot configure the requested permissions; the recommended way to provide IAM permissions for "vpc-cni" addon is via pod identity associations; after addon creation is completed, add all recommended policies to the config file, under 'addon.PodIdentityAssociations', and run 'eksctl update addon'
2024-09-20 18:09:34 [i] creating addon
2024-09-20 18:09:34 [i] successfully created addon
2024-09-20 18:09:34 [i] creating addon
2024-09-20 18:09:35 [i] successfully created addon
2024-09-20 18:09:35 [i] creating addon
2024-09-20 18:09:35 [i] successfully created addon
2024-09-20 18:11:35 [i] building managed nodegroup stack "eksctl-my-cluster-nodegroup-my-nodes"
2024-09-20 18:11:35 [i] deploying stack "eksctl-my-cluster-nodegroup-my-nodes"
2024-09-20 18:11:36 [i] waiting for CloudFormation stack "eksctl-my-cluster-nodegroup-my-nodes"
2024-09-20 18:12:06 [i] waiting for CloudFormation stack "eksctl-my-cluster-nodegroup-my-nodes"
2024-09-20 18:12:37 [i] waiting for CloudFormation stack "eksctl-my-cluster-nodegroup-my-nodes"
2024-09-20 18:13:53 [i] waiting for CloudFormation stack "eksctl-my-cluster-nodegroup-my-nodes"
2024-09-20 18:15:24 [i] waiting for CloudFormation stack "eksctl-my-cluster-nodegroup-my-nodes"
2024-09-20 18:15:24 [i] waiting for the control plane to become ready
2024-09-20 18:15:25 [i] saved kubeconfig as "/root/.kube/config"
2024-09-20 18:15:25 [i] no tasks
2024-09-20 18:15:25 [i] all EKS cluster resources for "my-cluster" have been created
2024-09-20 18:15:25 [i] created 0 nodegroup(s) in cluster "my-cluster"
2024-09-20 18:15:25 [i] nodegroup "my-nodes" has 2 node(s)
2024-09-20 18:15:25 [i] node "ip-192-168-22-30.ap-southeast-1.compute.internal" is ready
2024-09-20 18:15:25 [i] node "ip-192-168-91-252.ap-southeast-1.compute.internal" is ready
2024-09-20 18:15:25 [i] waiting for at least 2 node(s) to become ready in "my-nodes"
2024-09-20 18:15:25 [i] nodegroup "my-nodes" has 2 node(s)
2024-09-20 18:15:25 [i] node "ip-192-168-22-30.ap-southeast-1.compute.internal" is ready
2024-09-20 18:15:25 [i] node "ip-192-168-91-252.ap-southeast-1.compute.internal" is ready
2024-09-20 18:15:25 [i] created 1 managed nodegroup(s) in cluster "my-cluster"
2024-09-20 18:15:26 [i] kubectl command should work with "/root/.kube/config", try 'kubectl get nodes'
2024-09-20 18:15:26 [i] EKS cluster "my-cluster" in "ap-southeast-1" region is ready
[root@kubernetes-server ~]#

```

## 5.7. Viewed cluster info and nodes description.

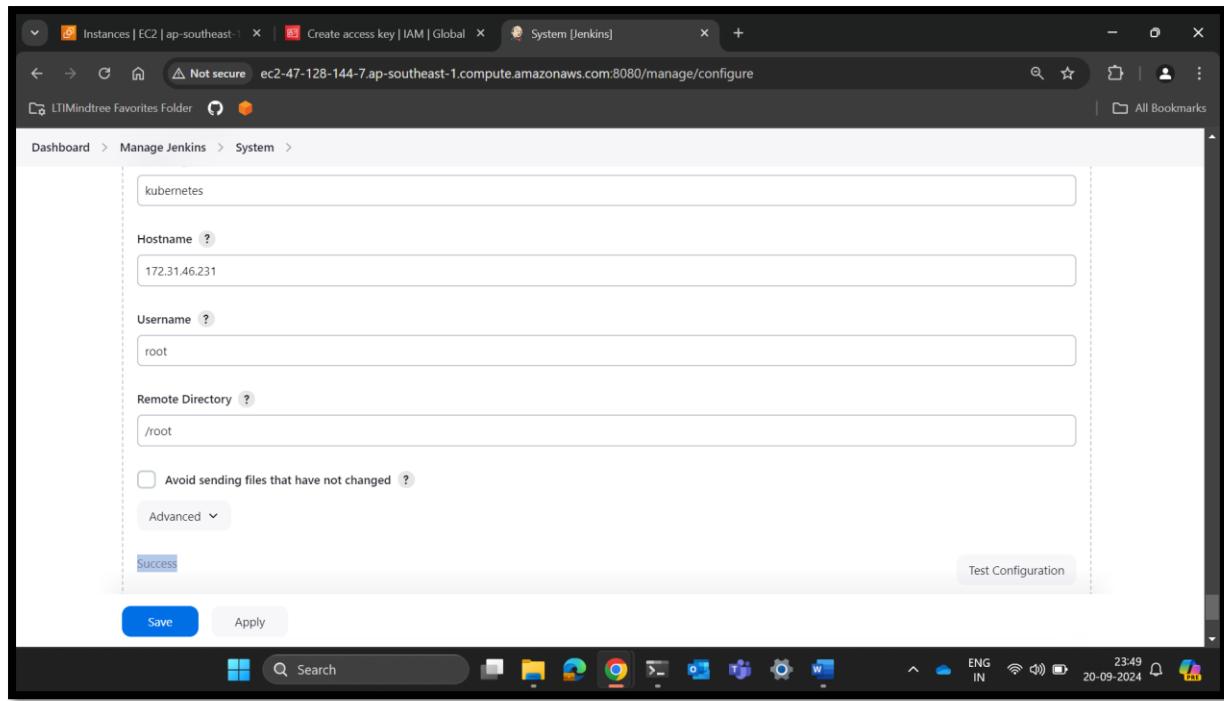
```

root@kubernetes-server:~| root@jenkins-server:~| root@tomcat-server:~| root@docker-server:~| root@kubernetes-server:~| + | - | X
[root@kubernetes-server ~]# kubectl get all
NAME           TYPE        CLUSTER-IP   EXTERNAL-IP   PORT(S)   AGE
service/kubernetes   ClusterIP  10.100.0.1   <none>        443/TCP   9m44s
[root@kubernetes-server ~]# kubectl cluster-info
Kubernetes control plane is running at https://5720491AE28C75C69979D8A930789D34.gr7.ap-southeast-1.eks.amazonaws.com
CoreDNS is running at https://5720491AE28C75C69979D8A930789D34.gr7.ap-southeast-1.eks.amazonaws.com/api/v1/namespaces/kube-system/services/kube-dns:proxy

To further debug and diagnose cluster problems, use 'kubectl cluster-info dump'.
[root@kubernetes-server ~]# kubectl describe nodes
Name:           ip-192-168-22-30.ap-southeast-1.compute.internal
Roles:          <none>
Labels:         alpha.eksctl.io/cluster-name=my-cluster
                alpha.eksctl.io/nodegroup-name=my-nodes
                beta.kubernetes.io/arch=amd64
                beta.kubernetes.io/instance-type=t2.small
                beta.kubernetes.io/os=linux
Annotations:    eks.amazonaws.com/capacityType=ON_DEMAND
                eks.amazonaws.com/nodegroup=my-nodes
                eks.amazonaws.com/nodegroup-image=ami-0ceccc3cad102fe46
                eks.amazonaws.com/sourceLaunchTemplateId=lt-081250fe74470d2af
                eks.amazonaws.com/sourceLaunchTemplateVersion=1
                failure-domain.beta.kubernetes.io/region=ap-southeast-1
                failure-domain.beta.kubernetes.io/zone=ap-southeast-1c
                k8s.io/cloud-provider-aws=a7355b7dbc3a7d92fa263c23eb18f764
                kubernetes.io/arch=amd64
                kubernetes.io/hostname=ip-192-168-22-30.ap-southeast-1.compute.internal
                kubernetes.io/os=linux
                node.kubernetes.io/instance-type=t2.small
                topology.k8s.aws/zone-id=apsel-az3
                topology.kubernetes.io/region=ap-southeast-1
                topology.kubernetes.io/zone=ap-southeast-1c
Annotations:    alpha.kubernetes.io/provided-node-ip: 192.168.22.30


```

## 5.8. Created Kubernetes SSH server on Jenkins Dashboard and tested its configuration.



## 5.9. Created deployment and service on deployment-docs directory of Kubernetes Server.

```
[root@kubernetes-server ~]# mkdir /deployment-docs
[root@kubernetes-server ~]# cd /deployment-docs/
[root@kubernetes-server deployment-docs]# vim deployment.yml
[root@kubernetes-server deployment-docs]# vim service.yml
[root@kubernetes-server deployment-docs]# |
```



5.10. In Milestone2ProjectDeployment item configuration added new SSH server Kubernetes and added Exec commands to run deployment and service files.

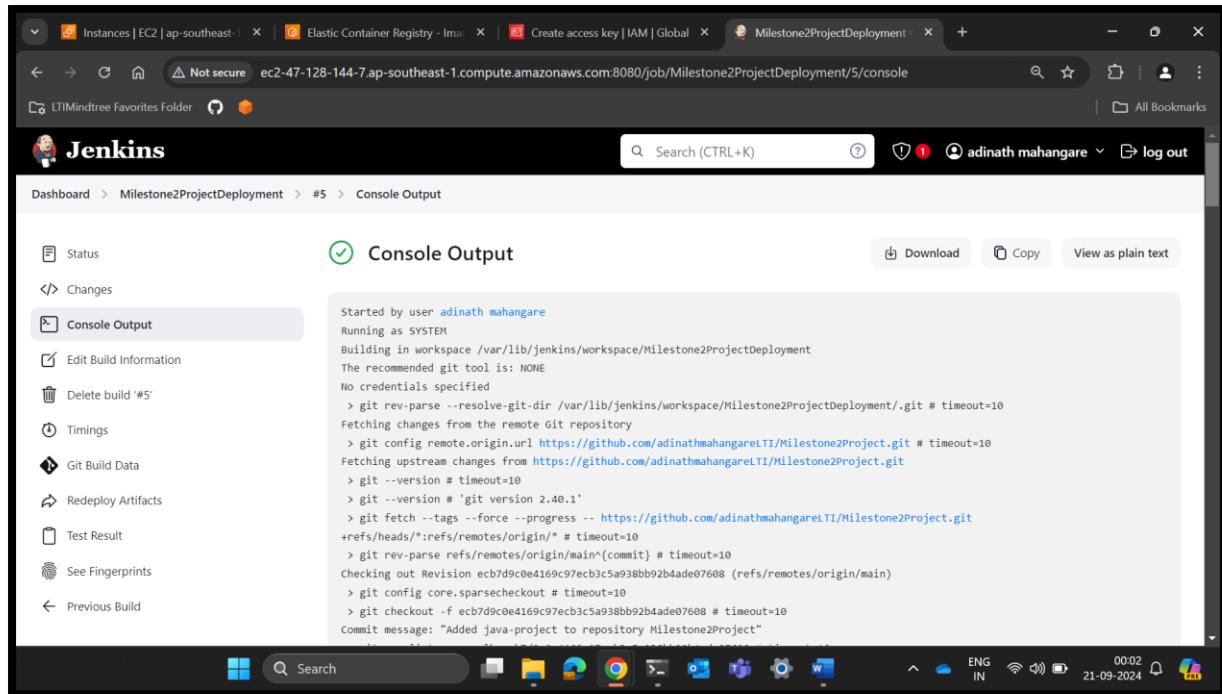
The screenshot shows the Jenkins configuration interface for the 'Milestone2ProjectDeployment' job. On the left, a sidebar lists various build configurations: General, Source Code Management, Build Triggers, Build Environment, Pre Steps, Build, Post Steps, Build Settings, and Post-build Actions. The 'Post-build Actions' section is currently selected. Within this section, there is a 'SSH Server' configuration panel. The 'Name' field is set to 'kubernetes'. Below this, under the 'Transfers' section, there is a 'Transfer Set' configuration with fields for 'Source files', 'Remove prefix', and 'Remote directory'. At the bottom of the panel are 'Save' and 'Apply' buttons. The status bar at the bottom right indicates the date as 21-09-2024 and the time as 00:01.

This screenshot shows the continuation of the Jenkins configuration for the 'Milestone2ProjectDeployment' job. The 'Post-build Actions' section is still selected. The 'Exec command' field contains the following Jenkinsfile code:

```
cd /deployment-docs  
kubectl delete deployment webapp-deployment  
kubectl apply -f deployment.yml  
kubectl apply -f service.yml
```

Below the exec command, a note states: "All of the transfer fields (except for Exec timeout) support substitution of Jenkins environment variables". The 'Advanced' dropdown menu is also visible. The status bar at the bottom right indicates the date as 21-09-2024 and the time as 00:01.

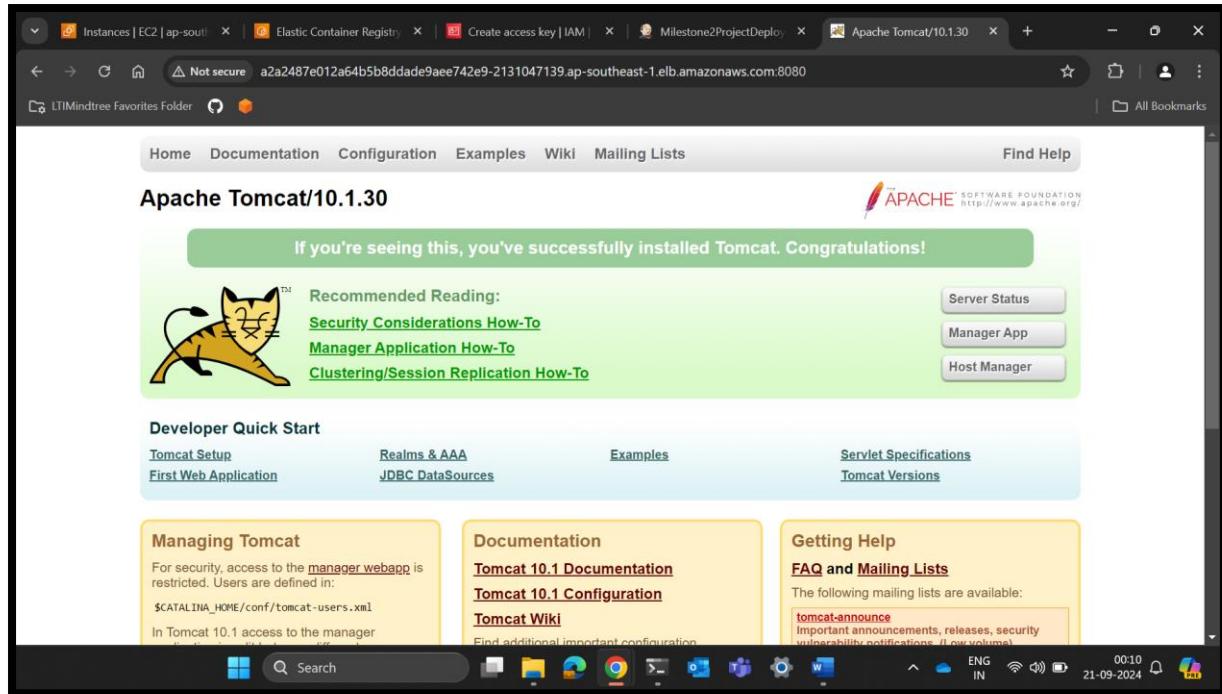
## 5.11. Created new build successfully with changed configurations.



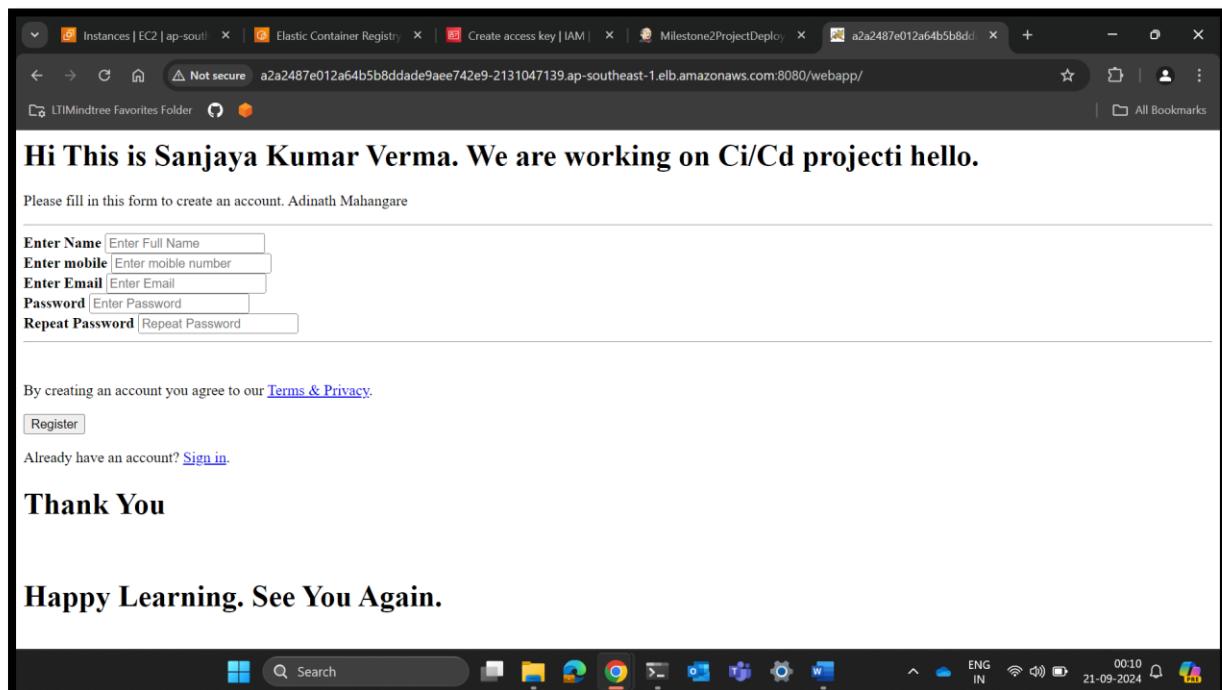
## 5.12. Copied external-ip of created service.

```
[root@kubernetes-server ~]# kubectl get svc
NAME      TYPE      CLUSTER-IP   EXTERNAL-IP          PORT(S)
)        AGE
kubernetes  ClusterIP  10.100.0.1  <none>
P         14h
webapp-service  LoadBalancer  10.100.38.249  a2a2487e012a64b5b8ddade9aee742e9-2131047139.ap-southeast-1.elb.amazonaws.com  8080:3
1958/TCP  14h
[root@kubernetes-server ~]# |
```

### 5.13. Pasted external-ip in browser.



### 5.14. Added /webapp path to the external-ip.



Successfully Hosted Deployment on the Kubernetes!

## 6. Tested Automation

### 6.1. Made some changes in index.jsp and added and committed git changes on Developer Server.

```
[root@developer-server ~]# ls
Milestone2Project
[root@developer-server ~]# cd Milestone2Project/
[root@developer-server Milestone2Project]# ls
Dockerfile Jenkinsfile README.md pom.xml server webapp
[root@developer-server Milestone2Project]# cd webapp/src/main/webapp
[root@developer-server webapp]# ls
WEB-INF index.jsp
[root@developer-server webapp]# vim index.jsp
[root@developer-server webapp]# git status
On branch main
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")
[root@developer-server webapp]# git add .
[root@developer-server webapp]# git commit -m "Added some content in index.jsp"
[main 865df35] Added some content in index.jsp
  Committer: root <root@developer-server.example.com>
Your name and email address were configured automatically based
on your username and hostname. Please check that they are accurate.
You can suppress this message by setting them explicitly. Run the
following command and follow the instructions in your editor to edit
your configuration file:

  git config --global --edit

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

  git commit --amend --reset-author


```

```
<form action="action_page.php">
<div class="container">
  <h1>Hi This is Adinath Mahangare. We are working on Ci/Cd projecti hello.</h1>
  <p>Please fill in this form to create an account.</p>
  <br>

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

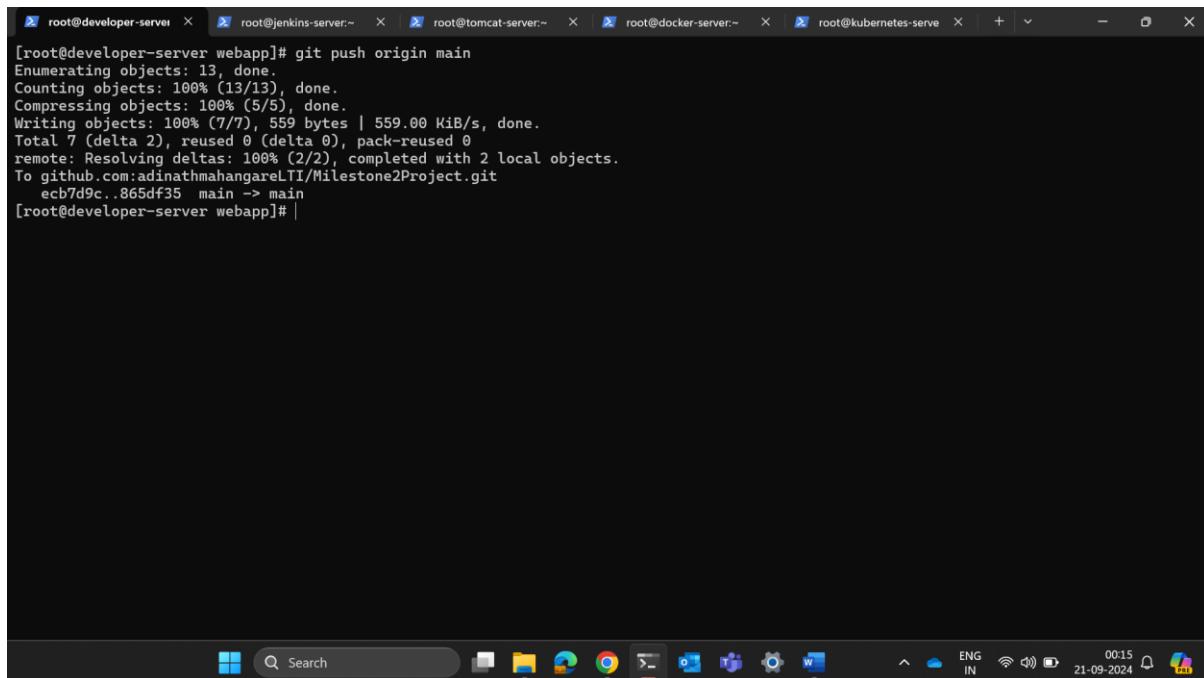
  <label for="mobile"><b>Enter mobile</b></label>
  <input type="text" placeholder="Enter moible number" name="mobile" id="mobile" required>
  <br>

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

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

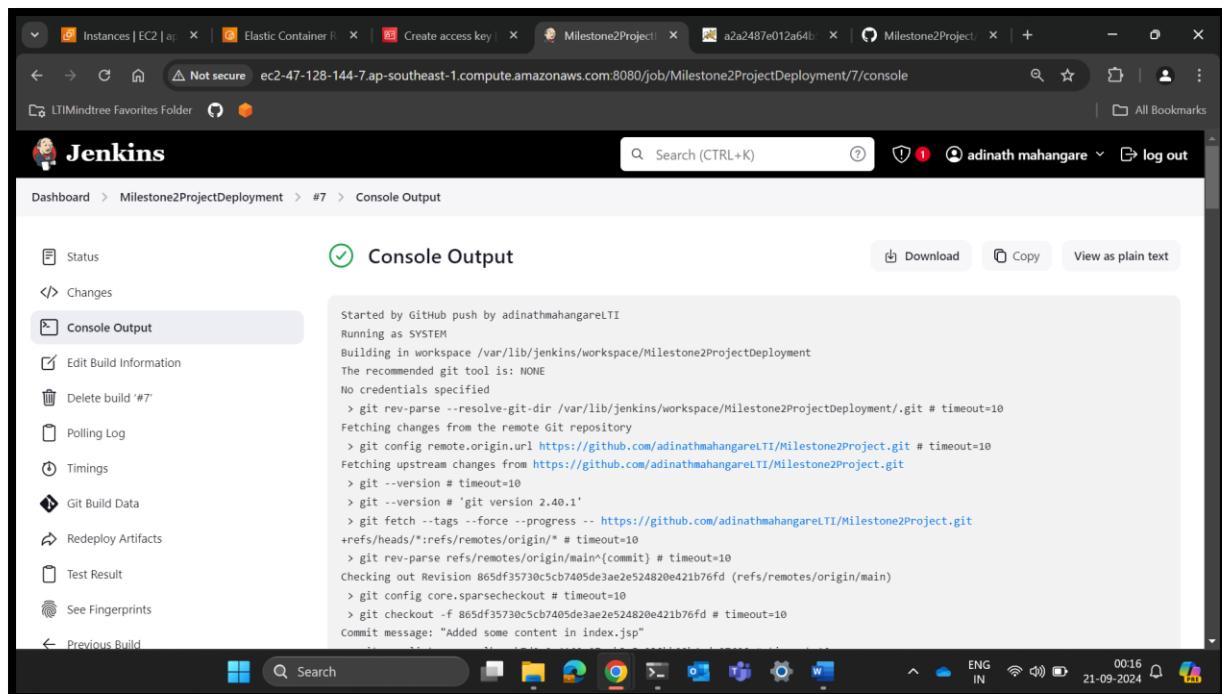
  <label for="psw-repeat"><b>Repeat Password</b></label>
  <input type="password" placeholder="Repeat Password" name="psw-repeat" id="psw-repeat" required>
  <br>
  <br>
  <p>By creating an account you agree to our <a href="#">Terms & Privacy</a>.</p>
  <button type="submit" class="registerbtn">Register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

## 6.2. Pushed commit to Github Repository.



```
[root@developer-server webapp]# git push origin main
Enumerating objects: 13, done.
Counting objects: 100% (13/13), done.
Compressing objects: 100% (5/5), done.
Writing objects: 100% (7/7), 559 bytes | 559.00 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 github.com:adinathmahangareLTI/Milestone2Project.git
  ecb7d9c..865df35  main -> main
[root@developer-server webapp]# |
```

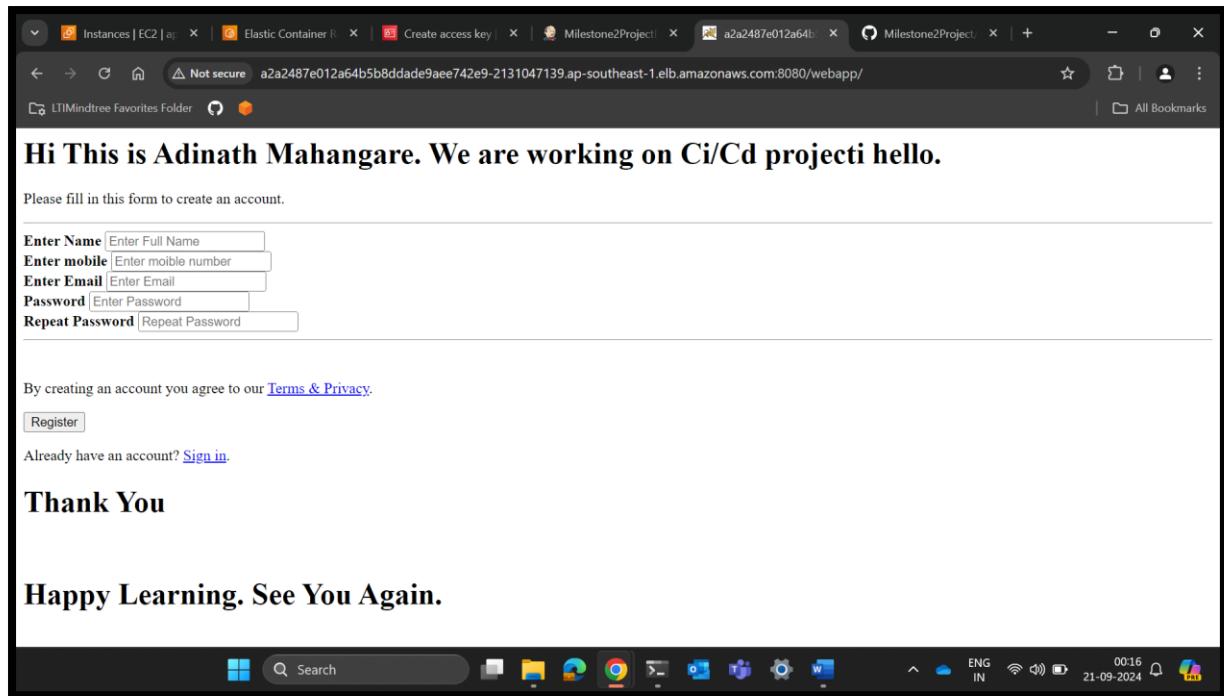
## 6.3. Automatic build is generated on Jenkins Dashboard Milestone2ProjectDeployment item.



The screenshot shows a browser window displaying the Jenkins console output for a build named "Milestone2ProjectDeployment". The build number is #7. The page title is "Console Output". The left sidebar contains links for Status, Changes, Console Output (which is selected), Edit Build Information, Delete build '#7', Polling Log, Timings, Git Build Data, Redeploy Artifacts, Test Result, and See Fingerprints. The right pane shows the actual console log output:

```
Started by GitHub push by adinathmahangareLTI
Running as SYSTEM
Building in workspace /var/lib/jenkins/workspace/Milestone2ProjectDeployment
The recommended git tool is: NONE
No credentials specified
> git rev-parse --resolve-git-dir /var/lib/jenkins/workspace/Milestone2ProjectDeployment/.git # timeout=10
Fetching changes from the remote Git repository
> git config remote.origin.url https://github.com/adinathmahangareLTI/Milestone2Project.git # timeout=10
Fetching upstream changes from https://github.com/adinathmahangareLTI/Milestone2Project.git
> git --version # timeout=10
> git --version # git version 2.40.1'
> git fetch --tags --force --progress -- https://github.com/adinathmahangareLTI/Milestone2Project.git
+refs/heads/*:refs/remotes/origin/* # timeout=10
> git rev-parse refs/remotes/origin/main^{commit} # timeout=10
Checking out Revision 865df35730c5c7a05de3ae2e524820e421b76fd (refs/remotes/origin/main)
> git config core.sparsecheckout # timeout=10
> git checkout -f 865df35730c5c7a05de3ae2e524820e421b76fd # timeout=10
Commit message: "Added some content in index.jsp"
```

#### 6.4. Changes updated on our final webapp http path.



Automation Working Successfully!