Web Application Deployment to Apache Tomcat Server using Jenkins CICD

Technology Stack Used:

1. Java 1.8
2. Maven 3.9.0
3. Git and GitHub
4. Jenkins
5. Apache Tomcat Web Server

Prerequisites:

1. Working Web Application on Local System
2. GitHub Public Repo
3. AWS Console Access

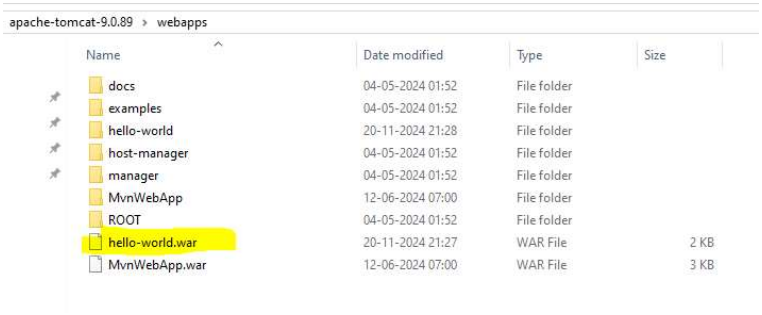
Steps:

1. Build the code on local system using Maven.

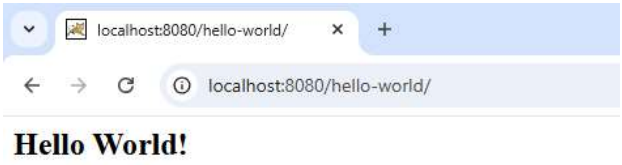
```
C:\Users\sony\Desktop\New folder>mvn clean package
[INFO] Scanning for projects...
[INFO]
[INFO] ------------------------< com.test:hello-world >------------------------
[INFO] Building Hello World 1.0
[INFO]   from pom.xml
[INFO] --------------------------------[ war ]---------------------------------
[INFO]
[INFO] --- clean:3.1.0:clean (default-clean) @ hello-world ---
[INFO]
[INFO] --- resources:3.0.2:resources (default-resources) @ hello-world ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory C:\Users\sony\Desktop\New folder\src\main\resources
[INFO]
[INFO] --- compiler:3.8.0:compile (default-compile) @ hello-world ---
[INFO] No sources to compile
[INFO]
[INFO] --- resources:3.0.2:testResources (default-testResources) @ hello-world ---
[INFO] Using 'UTF-8' encoding to copy filtered resources.
[INFO] skip non existing resourceDirectory C:\Users\sony\Desktop\New folder\src\test\resources
[INFO]
[INFO] --- compiler:3.8.0:testCompile (default-testCompile) @ hello-world ---
[INFO] No sources to compile
[INFO]
[INFO] --- surefire:2.22.1:test (default-test) @ hello-world ---
[INFO] No tests to run.
[INFO]
[INFO] --- war:3.2.2:war (default-war) @ hello-world ---
[INFO] Packaging webapp
[INFO] Assembling webapp [hello-world] in [C:\Users\sony\Desktop\New folder\target\hello-world]
[INFO] Processing war project
[INFO] Copying webapp resources [C:\Users\sony\Desktop\New folder\src\main\webapp]
[INFO] Webapp assembled in [47 msecs]
[INFO] Building war: C:\Users\sony\Desktop\New folder\target\hello-world.war
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  2.156 s
[INFO] Finished at: 2024-11-20T22:07:07+05:30
[INFO] ------------------------------------------------------------------------

C:\Users\sony\Desktop\New folder>
```

2. Deploy the WAR file which is present on the target folder to Tomcat server.

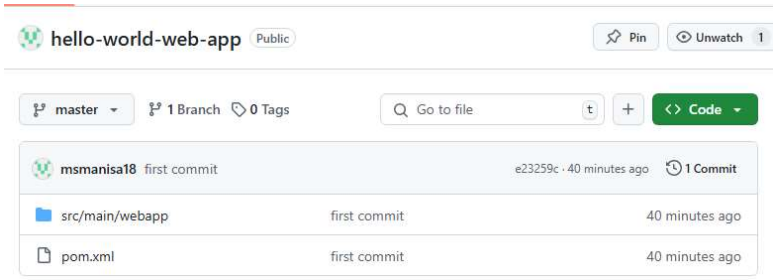
Name	Date modified	Type	Size
hello-world	20-11-2024 22:07	File folder	
maven-archiver	20-11-2024 22:07	File folder	
hello-world.war	20-11-2024 22:07	WAR File	2 KB



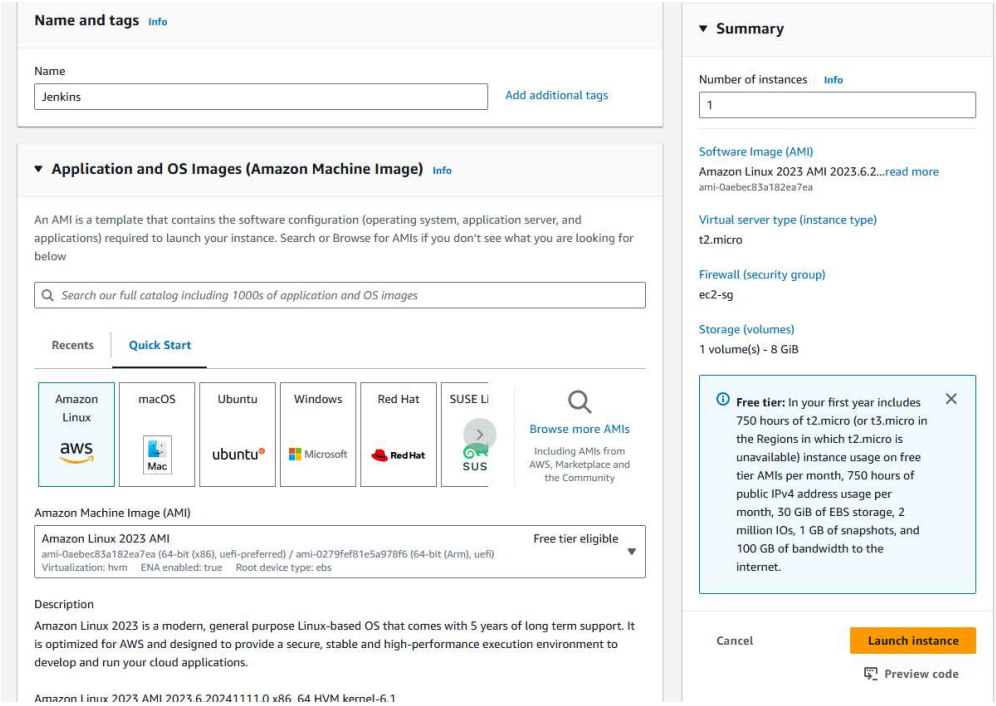
3. Start the Apache Tomcat Web Server and test the application on Local System.



4. Commit the code to GitHub.



5. Launch one EC2 instance for Jenkins.



6. Install Java on it.

```
[ec2-user@ip-172-31-1-202 ~]$ sudo yum install java-17-amazon-corretto.x86_64 -y
Last metadata expiration check: 0:01:26 ago on Wed Nov 20 16:50:16 2024.
Dependencies resolved.
================================================================================
 Package                                                    Architecture
================================================================================
Installing:
 java-17-amazon-corretto                                    x86_64
Installing dependencies:
 alsa-lib                                                   x86_64
 cairo                                                      x86_64
 dejavu-sans-fonts                                          noarch
 dejavu-sans-mono-fonts                                     noarch
```

7. Install Maven on it.

```
[ec2-user@ip-172-31-1-202 ~]$ sudo yum install maven -y
Last metadata expiration check: 0:03:00 ago on Wed Nov 20 16:50:16 2024.
Dependencies resolved.
================================================================================
 Package                                                    Architecture
================================================================================
Installing:
 maven                                                      noarch
Installing dependencies:
 apache-commons-cli                                         noarch
 apache-commons-codec                                       noarch
 apache-commons-io                                          noarch
```

8. Install Git on it.

```
[ec2-user@ip-172-31-1-202 ~]$ sudo yum install git -y
Last metadata expiration check: 0:04:23 ago on Wed Nov 20 16:50:16 2024.
Dependencies resolved.
================================================================================
 Package                                                    Architecture
================================================================================
Installing:
 git                                                        x86_64
Installing dependencies:
 git-core                                                   x86_64
```

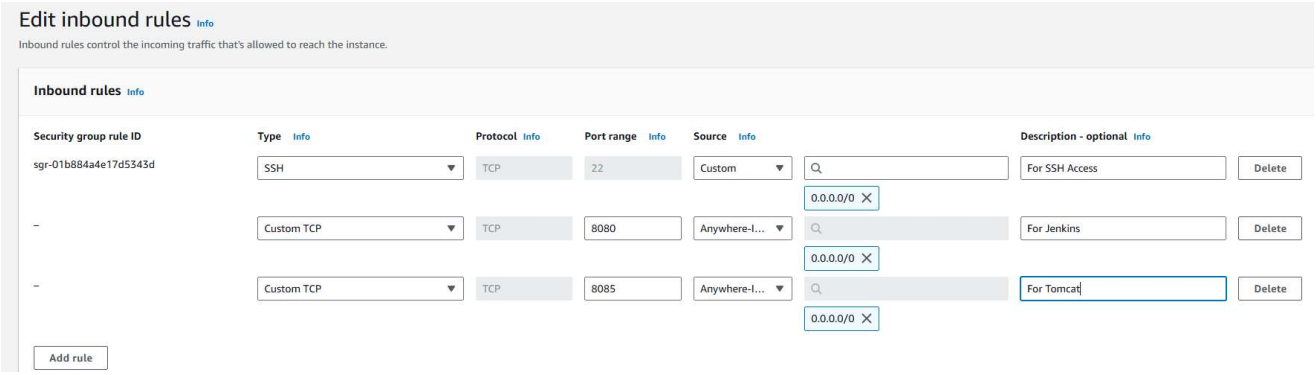
9. Install Jenkins

```
[ec2-user@ip-172-31-1-202 ~]$ sudo wget -O /etc/yum.repos.d/jenkins.repo https://pkg.jenkins.io/redhat-stable/jenkins.repo
--2024-11-20 16:58:53--  https://pkg.jenkins.io/redhat-stable/jenkins.repo
Resolving pkg.jenkins.io (pkg.jenkins.io)... 151.101.154.133, 2a04:4e42:24::645
Connecting to pkg.jenkins.io (pkg.jenkins.io)|151.101.154.133|: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%[===========================================================================

2024-11-20 16:58:54 (3.36 MB/s) - '/etc/yum.repos.d/jenkins.repo' saved [85/85]

[ec2-user@ip-172-31-1-202 ~]$ sudo rpm --import https://pkg.jenkins.io/redhat-stable/jenkins.io-2023.key
[ec2-user@ip-172-31-1-202 ~]$ sudo yum upgrade
Jenkins-stable
Dependencies resolved.

 Problem 1: package dracut-102-3.amzn2023.0.1.x86_64 from amazonlinux conflicts with dracut-config-ec2 < 3.1 provided by dracut-config-ec
  - cannot install the best update candidate for package dracut-config-ec2-3.0-4.amzn2023.0.2.noarch
  - cannot install the best update candidate for package dracut-055-6.amzn2023.0.8.x86_64
 Problem 2: problem with installed package dracut-config-ec2-3.0-4.amzn2023.0.2.noarch
  - package dracut-102-3.amzn2023.0.1.x86_64 from amazonlinux conflicts with dracut-config-ec2 < 3.1 provided by dracut-config-ec2-3.0-4.
  - package dracut-102-3.amzn2023.0.1.x86_64 from amazonlinux conflicts with dracut-config-ec2 < 3.1 provided by dracut-config-ec2-3.0-4.
  - package dracut-config-generic-102-3.amzn2023.0.1.x86_64 from amazonlinux requires dracut = 102-3.amzn2023.0.1, but none of the provid
  - cannot install the best update candidate for package dracut-config-generic-055-6.amzn2023.0.8.x86_64
================================================================================================================================
 Package                                    Architecture                        Version
================================================================================================================================
Skipping packages with conflicts:
(add '--best --allowerasing' to command line to force their upgrade):
 dracut                                     x86_64                              102-3.amzn2023.0.1
Skipping packages with broken dependencies:
 dracut-config-generic                      x86_64                              102-3.amzn2023.0.1

Transaction Summary
================================================================================================================================
Skip  2 Packages

Nothing to do.
Complete!
[ec2-user@ip-172-31-1-202 ~]$ sudo yum install jenkins -y
Last metadata expiration check: 0:00:17 ago on Wed Nov 20 16:59:23 2024.
Dependencies resolved.
================================================================================
 Package                        Architecture                    Version
================================================================================
Installing:
 jenkins                        noarch                          2.479.1-1.1
```

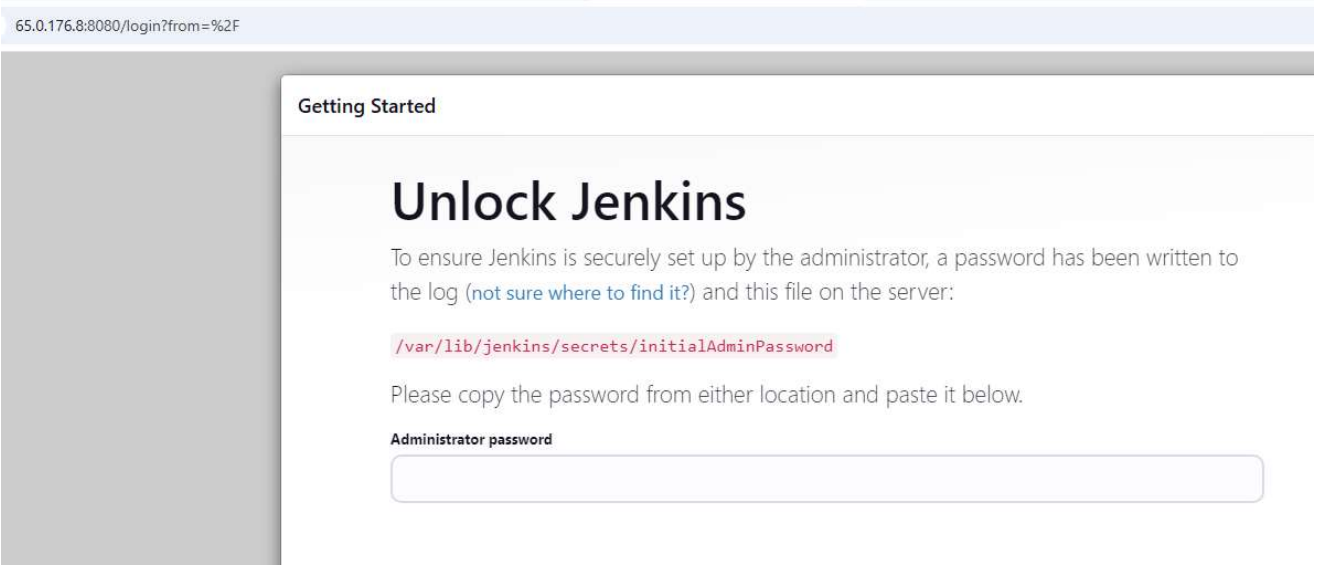
10. Enable Jenkins

```
[ec2-user@ip-172-31-1-202 ~]$
[ec2-user@ip-172-31-1-202 ~]$ sudo systemctl enable jenkins
Created symlink /etc/systemd/system/multi-user.target.wants/jenkins.service → /usr/lib/systemd/system/jenkins.service.
[ec2-user@ip-172-31-1-202 ~]$ sudo systemctl start jenkins
[ec2-user@ip-172-31-1-202 ~]$ sudo systemctl status jenkins
● jenkins.service - Jenkins Continuous Integration Server
     Loaded: loaded (/usr/lib/systemd/system/jenkins.service; enabled; preset: disabled)
     Active: active (running) since Wed 2024-11-20 17:02:52 UTC; 3s ago
   Main PID: 28289 (java)
      Tasks: 40 (limit: 1113)
     Memory: 357.1M
        CPU: 17.915s
     CGroup: /system.slice/jenkins.service
             └─28289 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=/var/cache/jenk

Nov 20 17:02:43 ip-172-31-1-202.ap-south-1.compute.internal jenkins[28289]: b4234613b80a4f1db85256456cb2b994
Nov 20 17:02:43 ip-172-31-1-202.ap-south-1.compute.internal jenkins[28289]: This may also be found at: /var/lib/jenkin
Nov 20 17:02:43 ip-172-31-1-202.ap-south-1.compute.internal jenkins[28289]: ************************************************
Nov 20 17:02:43 ip-172-31-1-202.ap-south-1.compute.internal jenkins[28289]: ************************************************
Nov 20 17:02:43 ip-172-31-1-202.ap-south-1.compute.internal jenkins[28289]: ************************************************
Nov 20 17:02:52 ip-172-31-1-202.ap-south-1.compute.internal jenkins[28289]: 2024-11-20 17:02:52.389+0000 [id=30]
Nov 20 17:02:52 ip-172-31-1-202.ap-south-1.compute.internal jenkins[28289]: 2024-11-20 17:02:52.412+0000 [id=23]
Nov 20 17:02:52 ip-172-31-1-202.ap-south-1.compute.internal systemd[1]: Started jenkins.service - Jenkins Continuous I
Nov 20 17:02:53 ip-172-31-1-202.ap-south-1.compute.internal jenkins[28289]: 2024-11-20 17:02:53.931+0000 [id=46]
Nov 20 17:02:53 ip-172-31-1-202.ap-south-1.compute.internal jenkins[28289]: 2024-11-20 17:02:53.932+0000 [id=46]
lines 1-20/20 (END)
[ec2-user@ip-172-31-1-202 ~]$
```

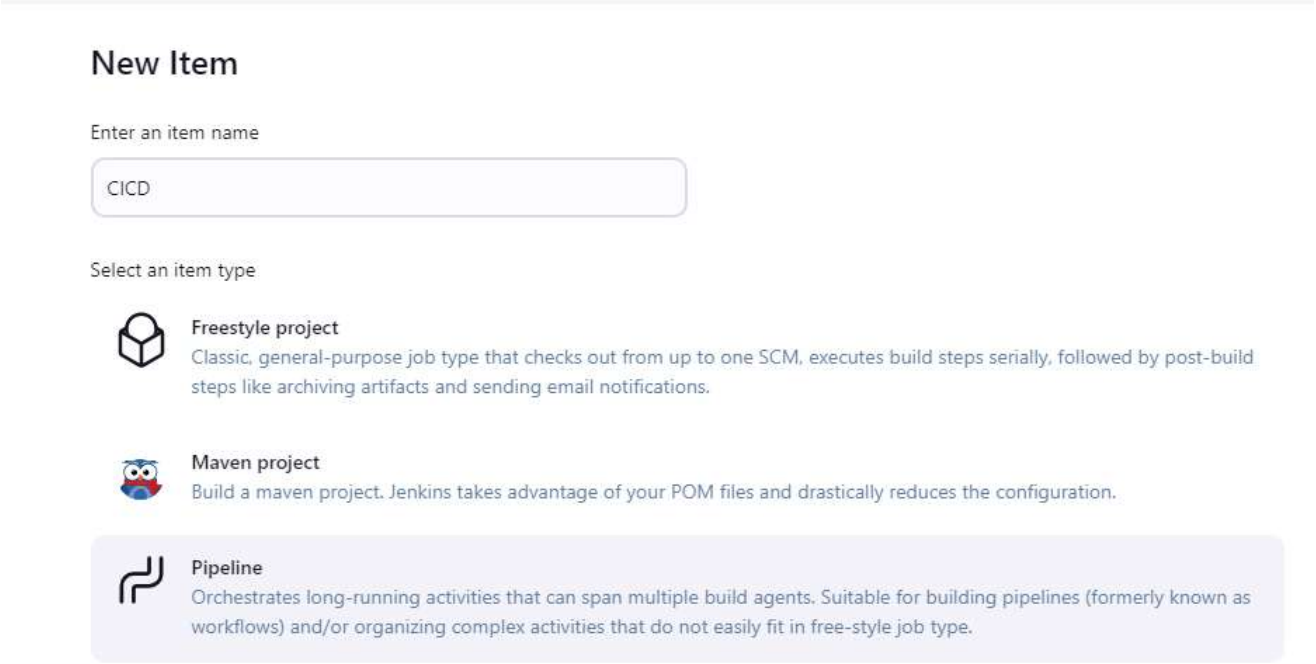
11. Enable port 8080 for Jenkins and 8085 for Tomcat under security group.



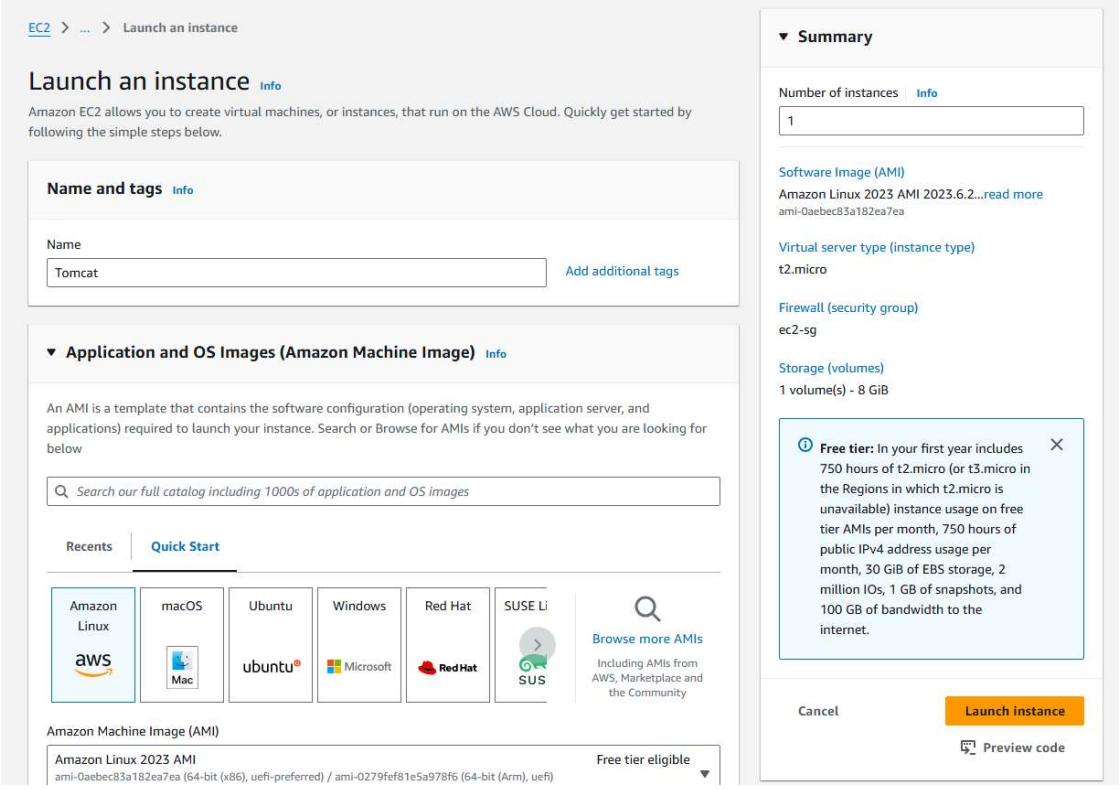
12. Configure Jenkins



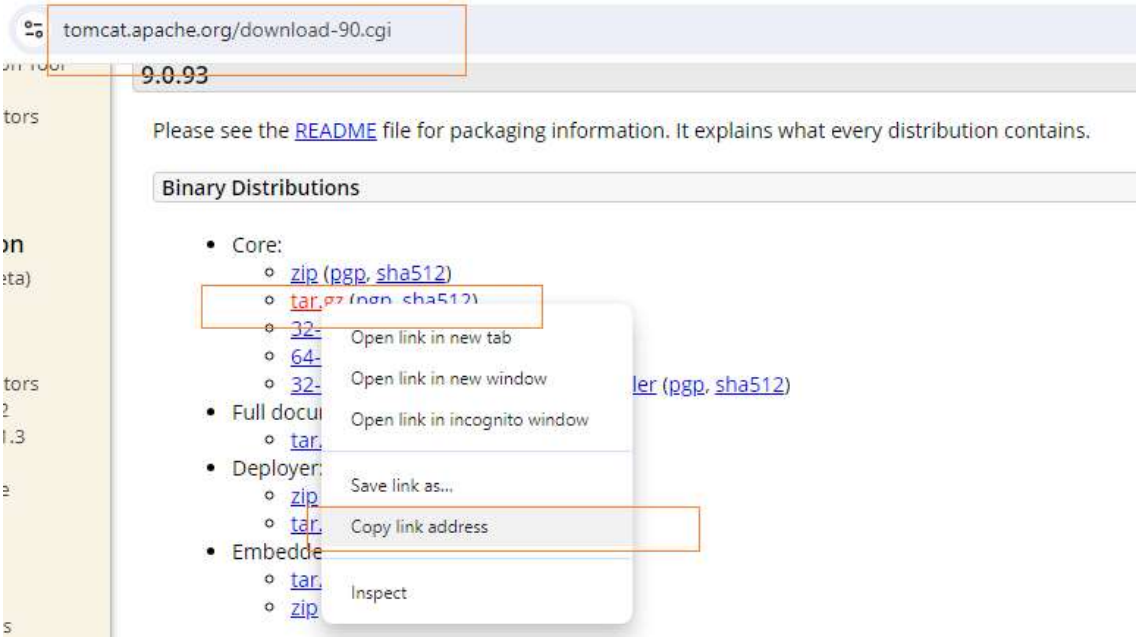
13. Install required plugins and create a CICD pipeline on Jenkins.



14. Launch another EC2 instance for Tomcat.



15. Install Java on it.
16. Download Apache Tomcat tar.gz file.



17. Untar the tar file by using:

    tar –xzvf apache-tomcat-9.0.93.tar.gz

18. Change Connector port from 8080 to 8085 on server.xml file present on conf directory.

```
-->
<Connector port="8085" protocol="HTTP/1.1"
           connectionTimeout="20000"
           redirectPort="8443"
           maxParameterCount="1000"
           />
```

19. Update tomcat-users.xml file present on conf directory, add user details on it.

```
<role rolename="manager-gui,admin-gui,manager-script"/>
<user username="admin" password="admin" roles="manager-gui,admin-gui,manager-script"/>
```

```
<role rolename="manager-gui,admin-gui,manager-script"/>
<user username="admin" password="admin" roles="manager-gui,admin-gui,manager-script"/>


</tomcat-users>
```

20. Update the context.xml file present under `/tomcat/webapps/host-manager/META-INF`
    Comment out following line on it:

```
<!--
<Valve  className="org.apache.catalina.valves.RemoteAddrValve"
        allow="127\.\d+\.\d+\.\d+|::1|0:0:0:0:0:0:0:1" />

        -->
```

```
-->
<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+|::1|0:0:0:0:0:0:0:1" />

  -->
          <Manager sessionAttributeValueClassNameFilter="java\.lang\.(?:Boolean|Intege
:\$1)?|java\.util\.(?:Linked)?HashMap"/>
</Context>
[ec2-user@ip-172-31-46-236 META-INF]$ |
```

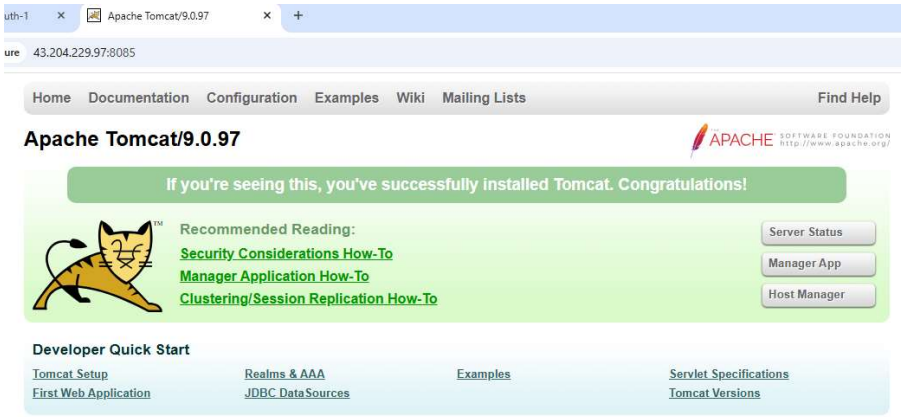
21. Update the context.xml file present under `/tomcat/webapps/manager/META-INF`
    `Comment out following line on it:`

```
<!--

<Valve className="org.apache.catalina.valves.RemoteAddrValve"
       allow="127\.\d+\.\d+\.\d+|::1|0:0:0:0:0:0:0:1" />


-->
```

```
 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+|::1|0:0:0:0:0:0:0:1" />


  -->
```

22. Start tomcat server, it will run on port 8085 now.

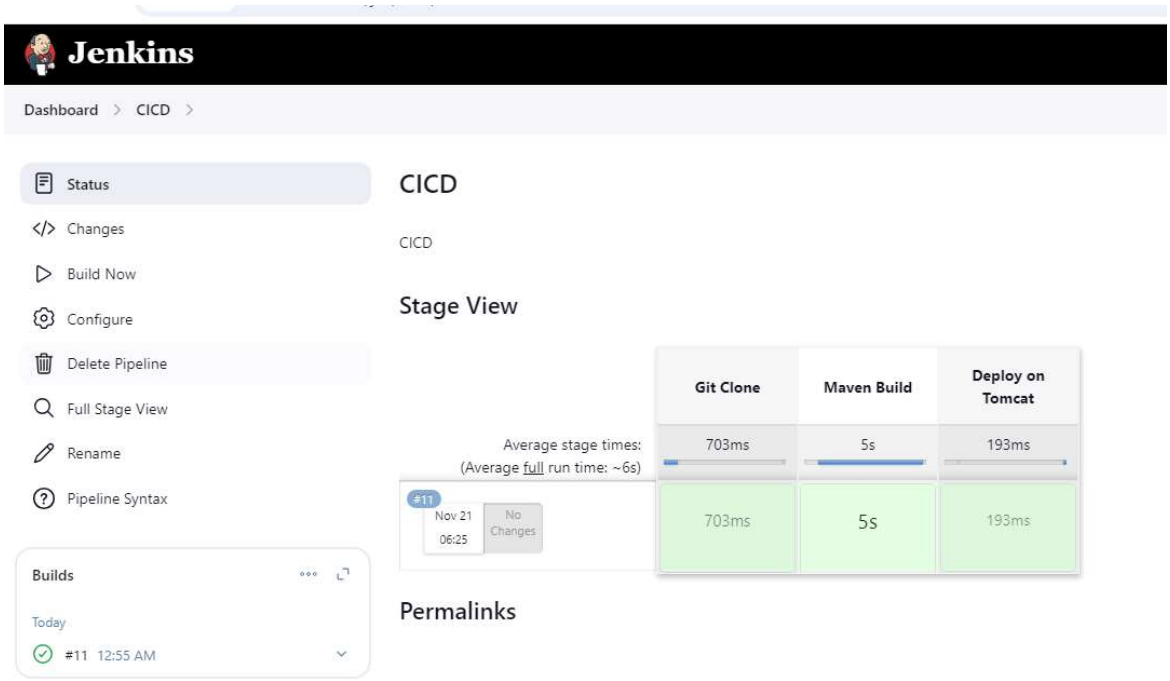
```
[root@ip-172-31-46-236 tomcat]# ./bin/startup.sh
Using CATALINA_BASE:   /opt/tomcat
Using CATALINA_HOME:   /opt/tomcat
Using CATALINA_TMPDIR: /opt/tomcat/temp
Using JRE_HOME:        /
Using CLASSPATH:       /opt/tomcat/bin/bootstrap.jar:/opt/tomcat/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
[root@ip-172-31-46-236 tomcat]# |
```



23. Create a pipeline on Jenkins using following Pipeline Script:

```
pipeline {
  agent any

  stages {
    stage('Git Clone') {
      steps {
        git 'https://github.com/msmanisa18/hello-world-web-app.git'
      }
    }
    stage('Maven Build') {
      steps {
        sh 'mvn clean package'
      }
    }
    stage('Deploy on Tomcat') {
      steps {
        deploy adapters: [tomcat9(credentialsId: 'c76464ce-c3ce-41f0-9c44-db521110a52c', path: '', url: 'http://43.204.229.97:8085/')], contextPath: null, war: '**/*.war'
      }
    }
  }
}
```

24. Build the pipeline now:



25. Final Output: