Sri Eshwar College of Engineering
Coimbatore | Tamilnadu
An Autonomous Institution
Affiliated to Anna University, Chennai

# DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

## Academic Year: 2025–2026

## DEVOPS INTERNSHIP REPORT


**Submitted by:**

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Roll Number: 23CS122

Class: III CSE-B

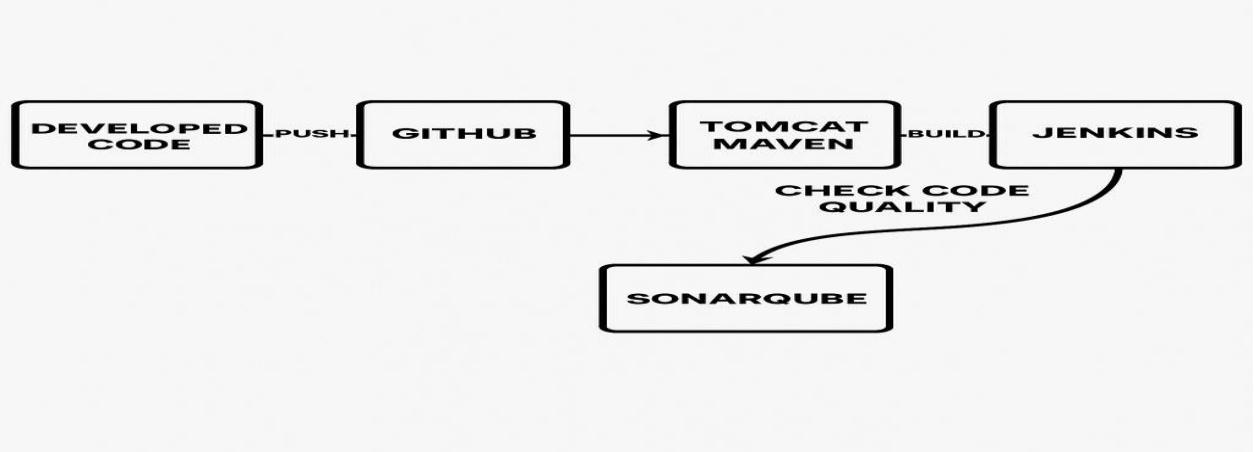
## AIM:

To deploy a Java-based Maven application using a CI/CD pipeline that automates code integration, build, testing, code quality analysis, and deployment, ensuring faster and more reliable delivery.

## TOOLS REQUIRED:

VS Code, Git, GitHub, Maven, Apache Tomcat, Jenkins, SonarQube, AWS (EC2)

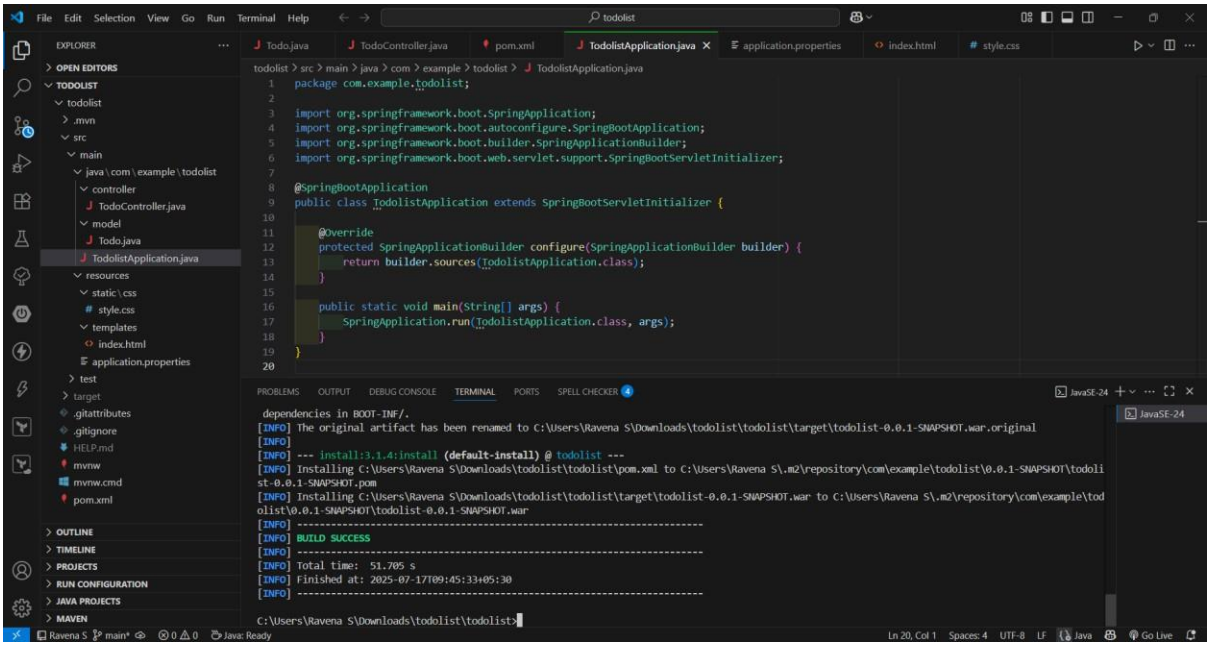
## FLOWCHART:




## PROCEDURE:

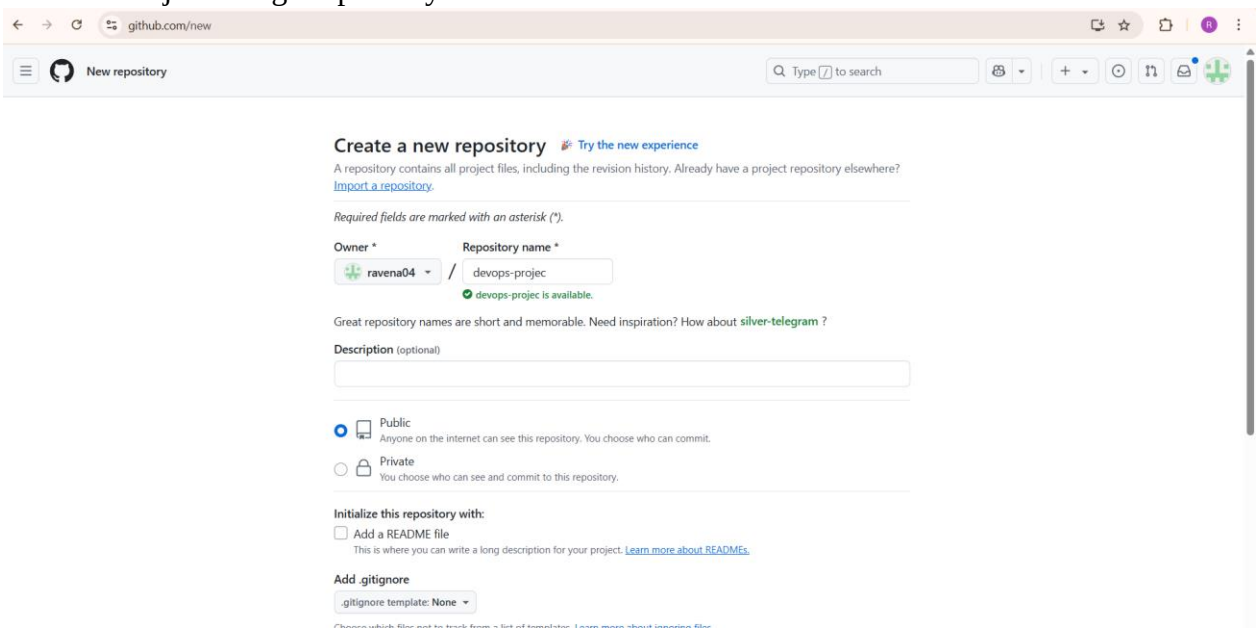
Step 1:

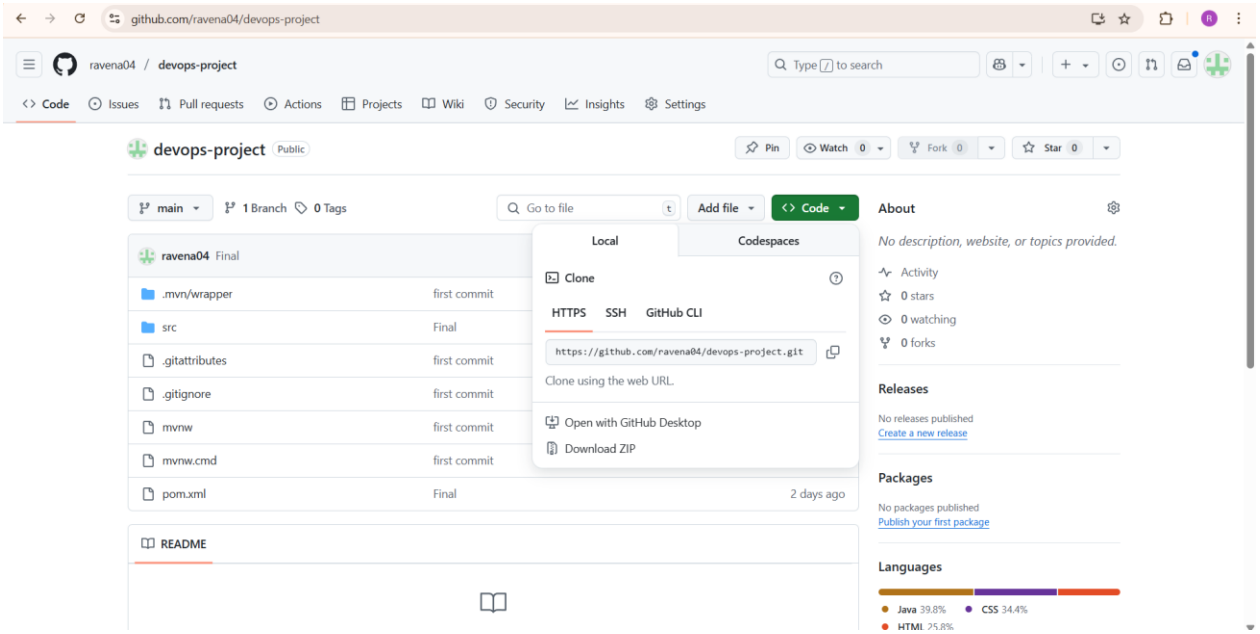
Develop a Maven Project and run it locally



Step 2:

Push the Project to a git repository

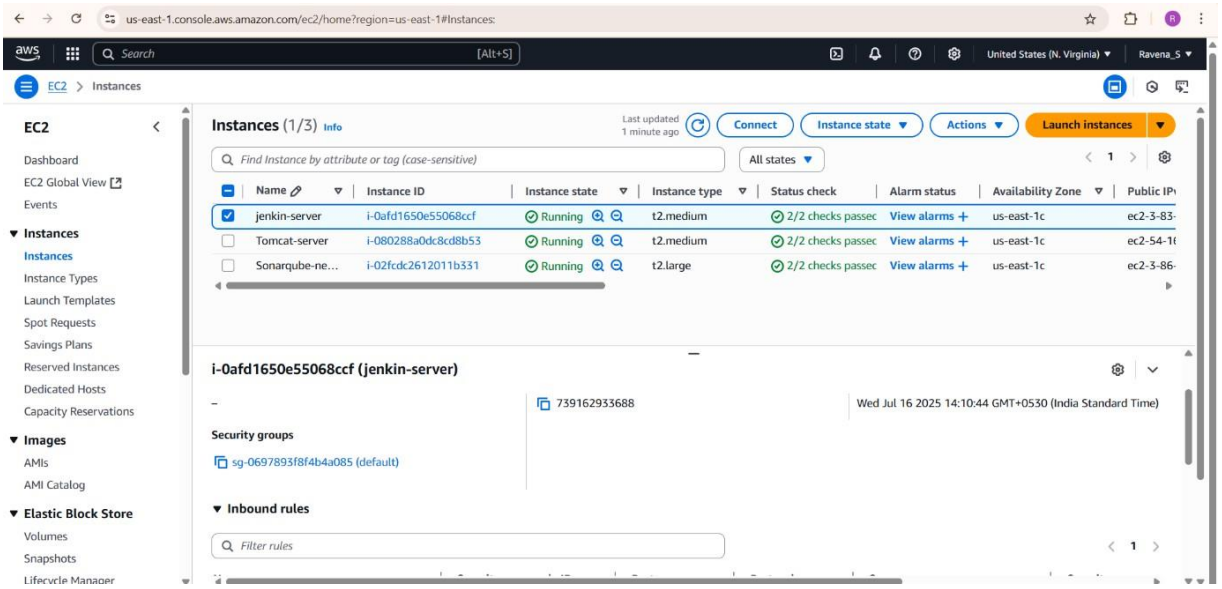


Step 3:

Open AWS Console-> Navigate to EC2->Create 3 Instances:

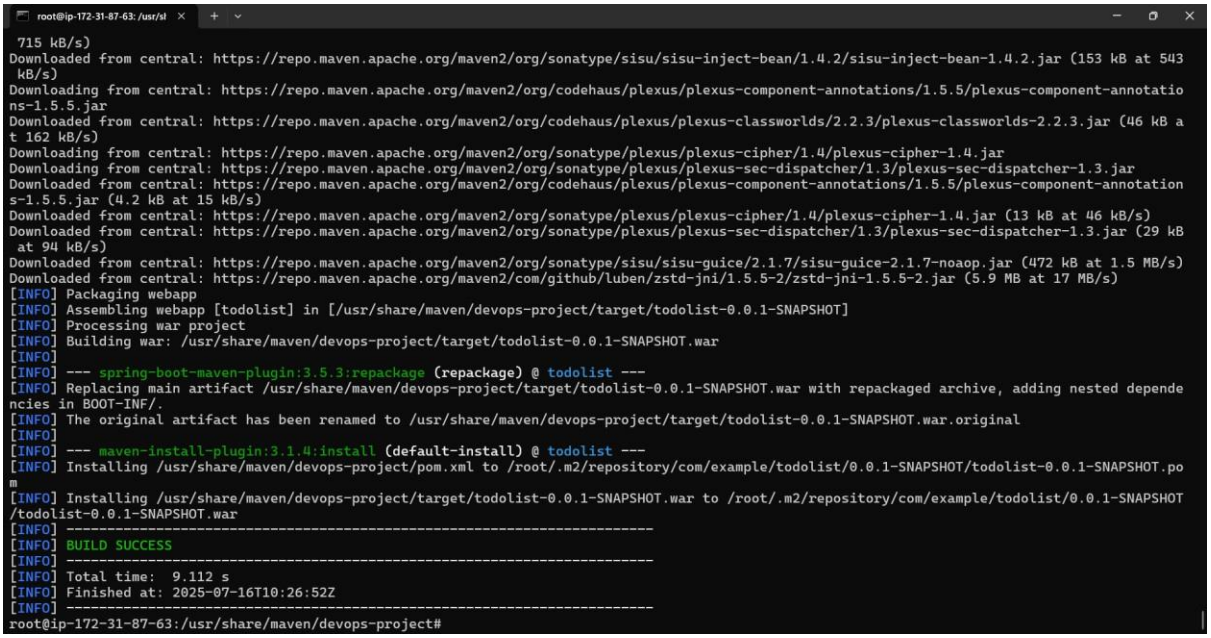
- Jenkins server(t2.medium)
- Tomcat-maven server(t2.medium)
- Sonarqube server(t2.large)




## In Tomcat-Maven Server:

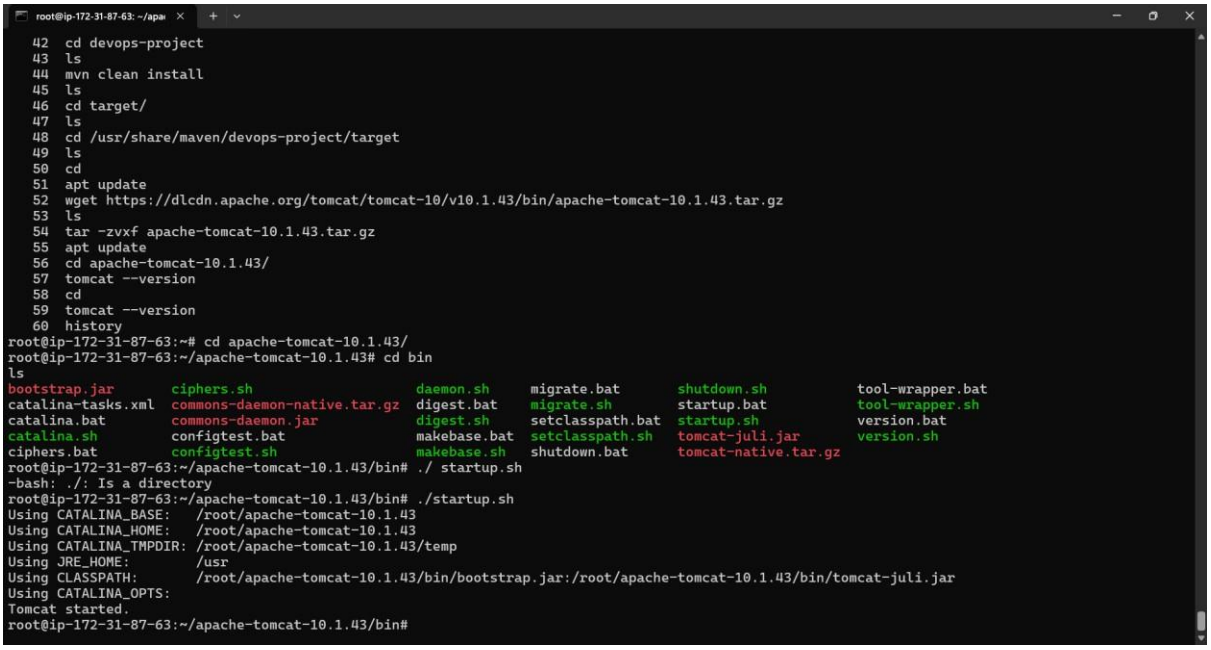
Step 4:

Install Maven and clone the Maven project from the repository and run the project

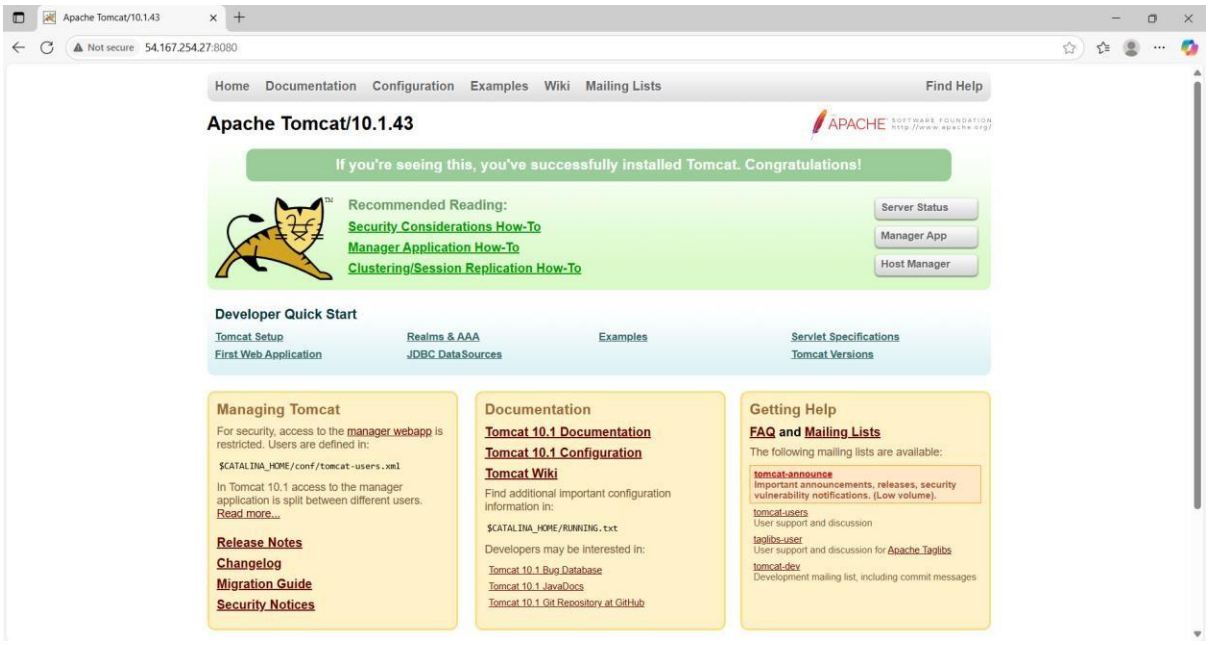


Step 5:

Install Tomcat and start the server

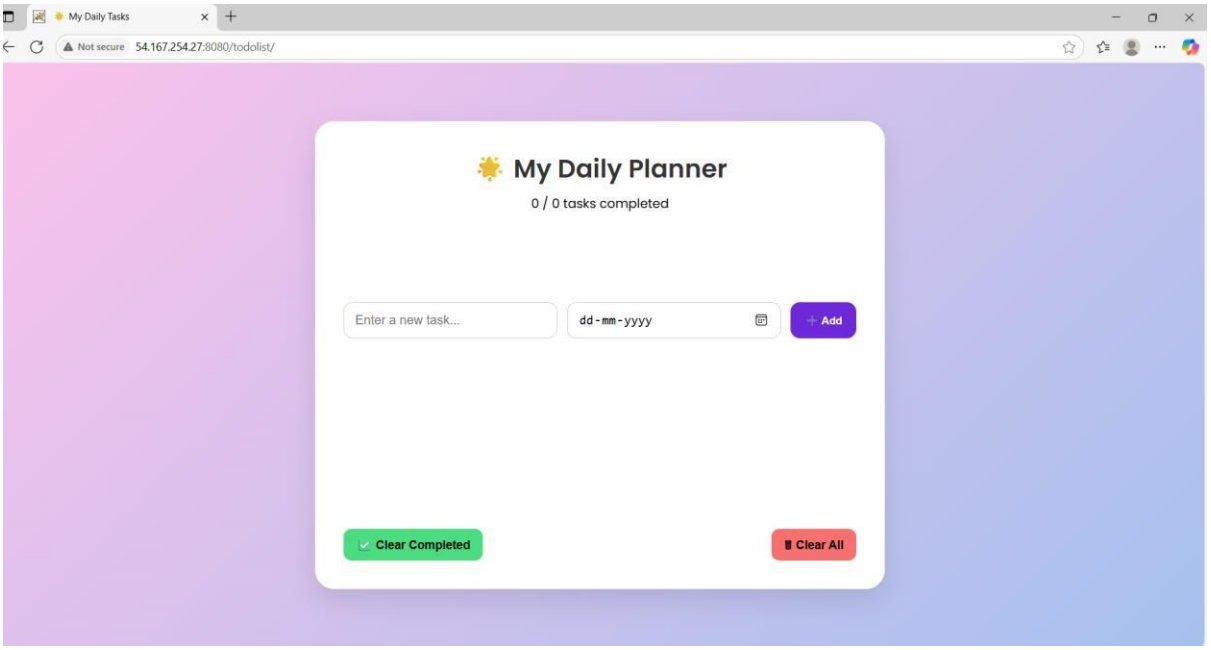


```
   42  cd devops-project
   43  ls
   44  mvn clean install
   45  ls
   46  cd target/
   47  ls
   48  cd /usr/share/maven/devops-project/target
   49  ls
   50  cd
   51  apt update
   52  wget https://dlcdn.apache.org/tomcat/tomcat-10/v10.1.43/bin/apache-tomcat-10.1.43.tar.gz
   53  ls
   54  tar -zvxf apache-tomcat-10.1.43.tar.gz
   55  apt update
   56  cd apache-tomcat-10.1.43/
   57  tomcat --version
   58  cd
   59  tomcat --version
   60  history
root@ip-172-31-87-63:~# cd apache-tomcat-10.1.43/
root@ip-172-31-87-63:~/apache-tomcat-10.1.43# cd bin
ls
bootstrap.jar       ciphers.sh                  daemon.sh     migrate.bat       shutdown.sh          tool-wrapper.bat
catalina-tasks.xml  commons-daemon-native.tar.gz  digest.bat    migrate.sh        startup.bat          tool-wrapper.sh
catalina.bat        commons-daemon.jar          digest.sh     setclasspath.bat  startup.sh           version.bat
catalina.sh         configtest.bat              makebase.bat  setclasspath.sh   tomcat-juli.jar      version.sh
ciphers.bat         configtest.sh               makebase.sh   shutdown.bat      tomcat-native.tar.gz
root@ip-172-31-87-63:~/apache-tomcat-10.1.43/bin# ./ startup.sh
-bash: ./: Is a directory
root@ip-172-31-87-63:~/apache-tomcat-10.1.43/bin# ./startup.sh
Using CATALINA_BASE:   /root/apache-tomcat-10.1.43
Using CATALINA_HOME:   /root/apache-tomcat-10.1.43
Using CATALINA_TMPDIR: /root/apache-tomcat-10.1.43/temp
Using JRE_HOME:        /usr
Using CLASSPATH:       /root/apache-tomcat-10.1.43/bin/bootstrap.jar:/root/apache-tomcat-10.1.43/bin/tomcat-juli.jar
Using CATALINA_OPTS:
Tomcat started.
root@ip-172-31-87-63:~/apache-tomcat-10.1.43/bin#
```



Step 6:

Copy the path of war file of the project from maven to tomcat(webapps) and restart the tomcat server so that the  project application is deployed using Tomcat

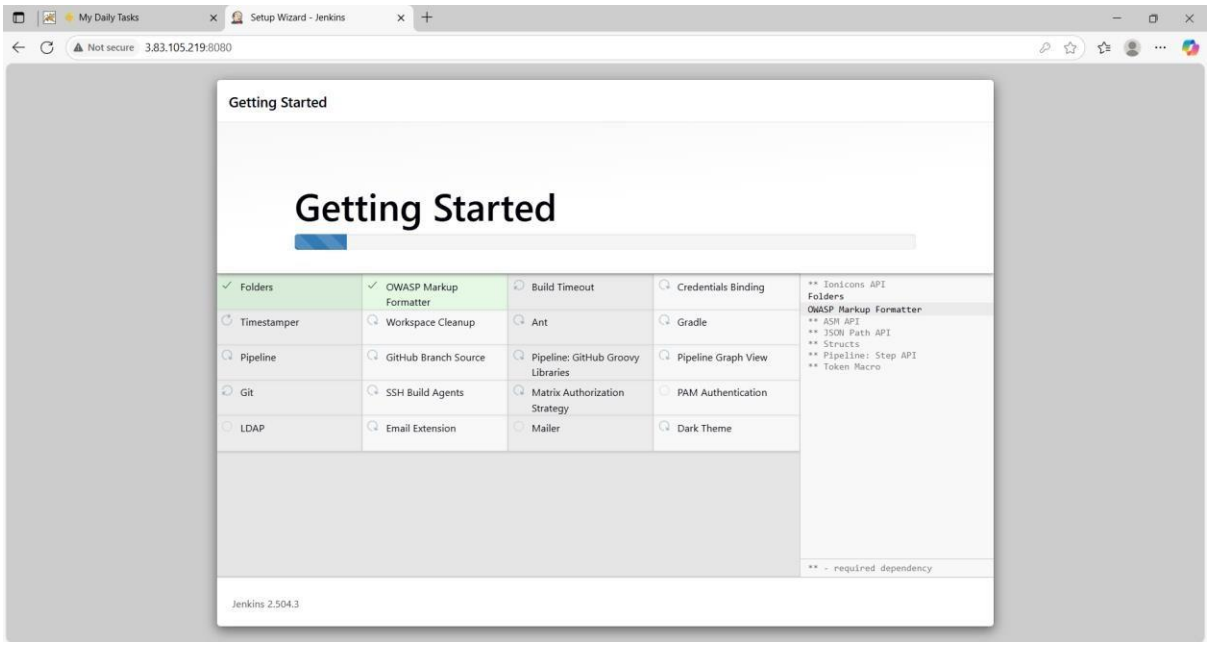


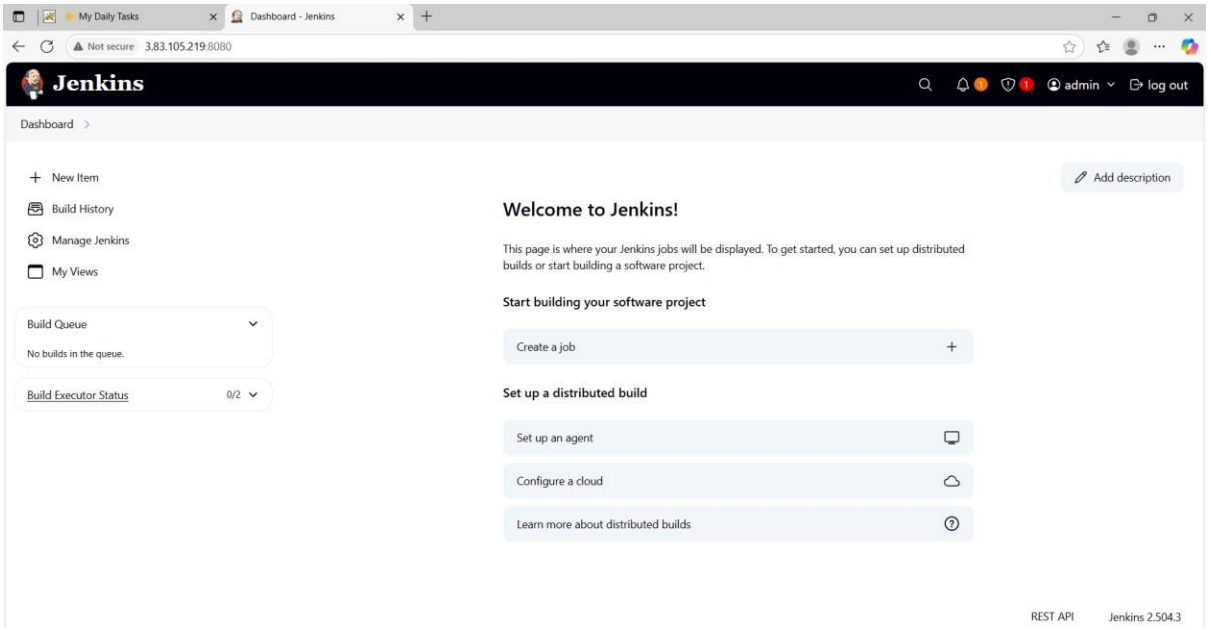

**In Jenkins Server:**

Step 7:

Install Jenkins and check the status

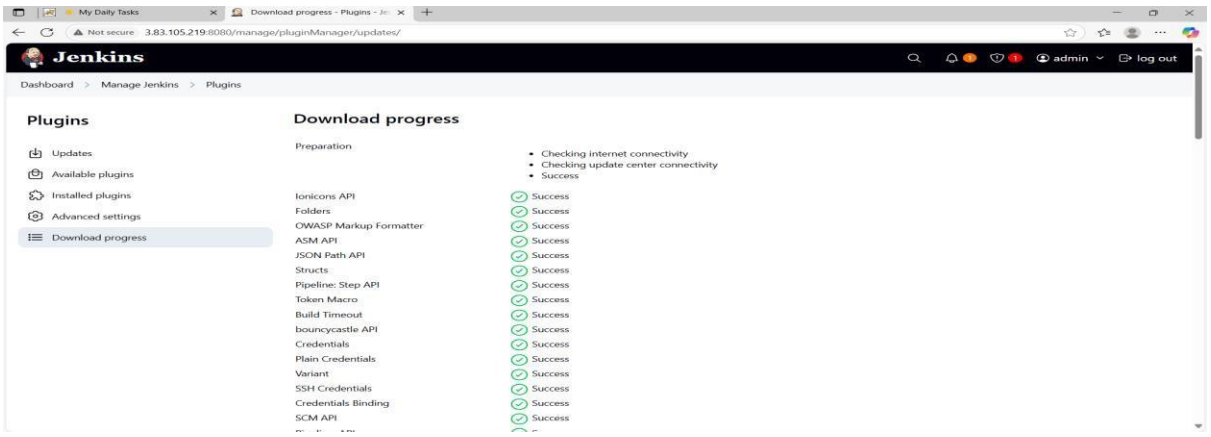
```
root@jenkin: ~
Unpacking jenkins (2.504.3) ...
Setting up net-tools (2.10-0.1ubuntu4.4) ...
Setting up jenkins (2.504.3) ...
Created symlink /etc/systemd/system/multi-user.target.wants/jenkins.service → /usr/lib/systemd/system/jenkins.service.
Processing triggers for man-db (2.12.0-4build2) ...
Scanning processes...
Scanning linux images...

Running kernel seems to be up-to-date.

No services need to be restarted.

No containers need to be restarted.

No user sessions are running outdated binaries.

No VM guests are running outdated hypervisor (qemu) binaries on this host.
root@jenkin:~# jenkin --version
jenkin: command not found
root@jenkin:~# systemctl status jenkins
● jenkins.service - Jenkins Continuous Integration Server
     Loaded: loaded (/usr/lib/systemd/system/jenkins.service; enabled; preset: enabled)
     Active: active (running) since Wed 2025-07-16 13:40:25 UTC; 1min 16s ago
   Main PID: 5379 (java)
      Tasks: 45 (limit: 4670)
     Memory: 675.9M (peak: 677.1M)
        CPU: 17.586s
     CGroup: /system.slice/jenkins.service
             └─5379 /usr/bin/java -Djava.awt.headless=true -jar /usr/share/java/jenkins.war --webroot=/var/cache/jenkins/war --httpPort=8080

Jul 16 13:40:21 jenkin jenkins[5379]: b77ff90d90a64ccab705569235aac08f
Jul 16 13:40:21 jenkin jenkins[5379]: This may also be found at: /var/lib/jenkins/secrets/initialAdminPassword
Jul 16 13:40:21 jenkin jenkins[5379]: ************************************************************
Jul 16 13:40:21 jenkin jenkins[5379]: ************************************************************
Jul 16 13:40:21 jenkin jenkins[5379]: ************************************************************
Jul 16 13:40:25 jenkin jenkins[5379]: 2025-07-16 13:40:25.505+0000 [id=31]       INFO        jenkins.InitReactorRunner$1#onAttained: Completed initializat>
Jul 16 13:40:25 jenkin jenkins[5379]: 2025-07-16 13:40:25.534+0000 [id=23]       INFO        hudson.lifecycle.Lifecycle#onReady: Jenkins is fully up and r>
Jul 16 13:40:25 jenkin systemd[1]: Started jenkins.service - Jenkins Continuous Integration Server.
Jul 16 13:40:25 jenkin jenkins[5379]: 2025-07-16 13:40:25.788+0000 [id=49]       INFO        h.m.DownloadService$Downloadable#load: Obtained the updated d>
Jul 16 13:40:25 jenkin jenkins[5379]: 2025-07-16 13:40:25.789+0000 [id=49]       INFO        hudson.util.Retrier#start: Performed the action check updates>
lines 1-20/20 (END)
```



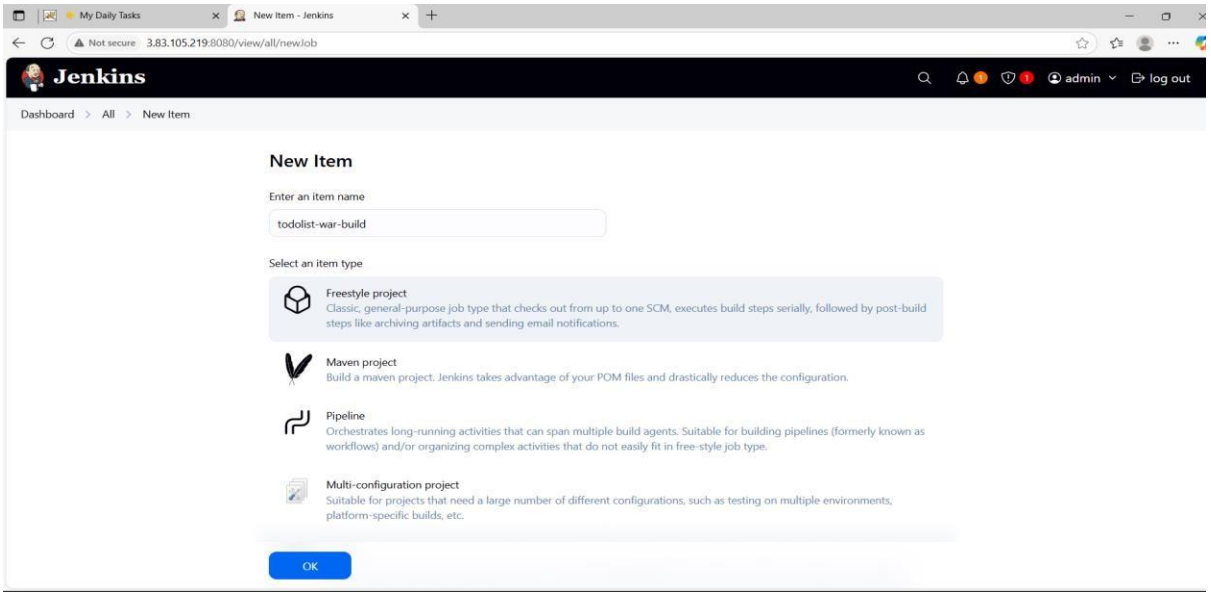

Step 8:

Install Plugins like Maven,Git and Pipeline and add JDK and Maven Credentials



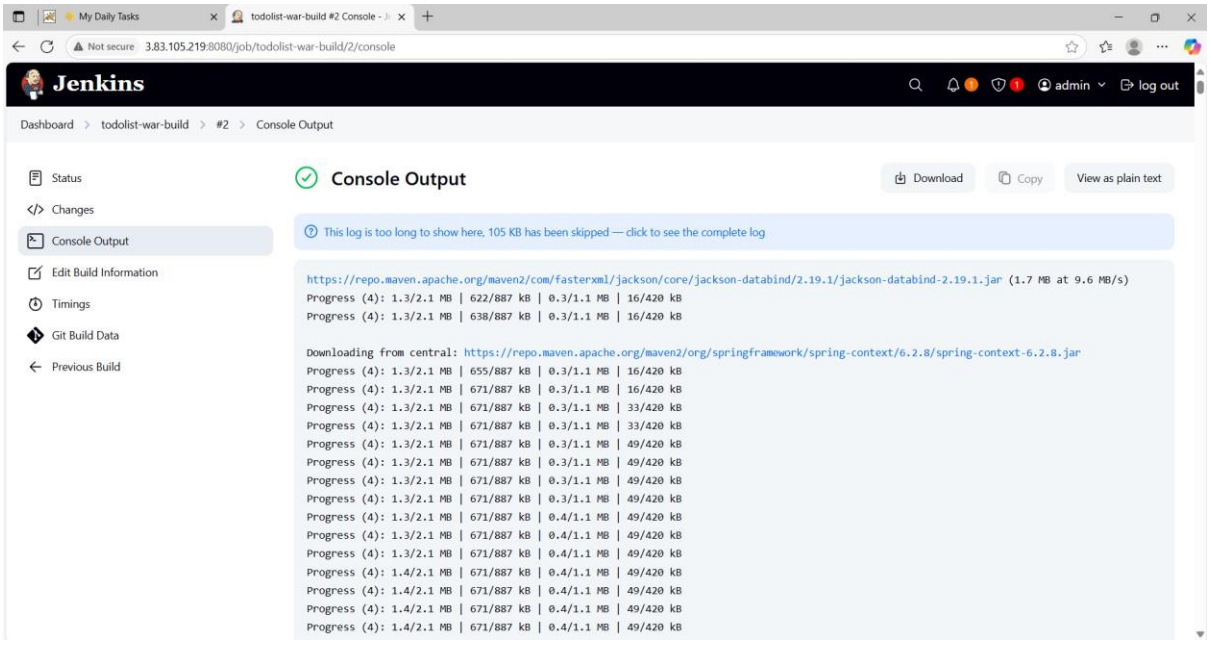
Step 9:

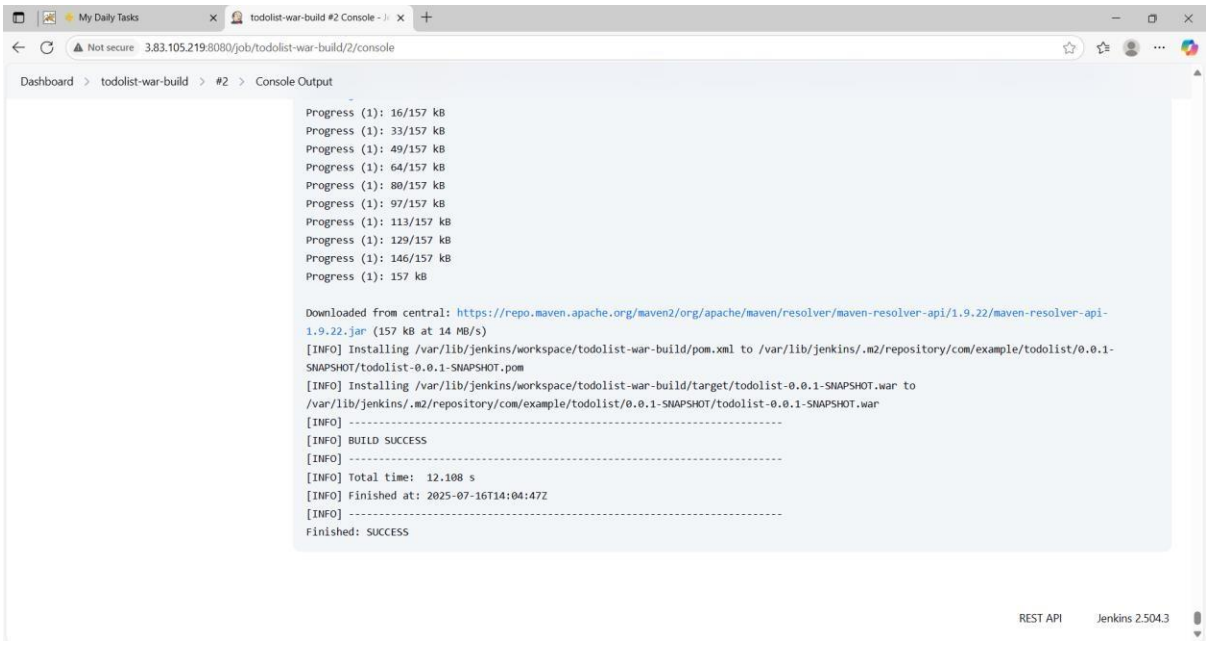
Create a new job and select freestyle project




Step 10:

Include the git hub repository link and build the project

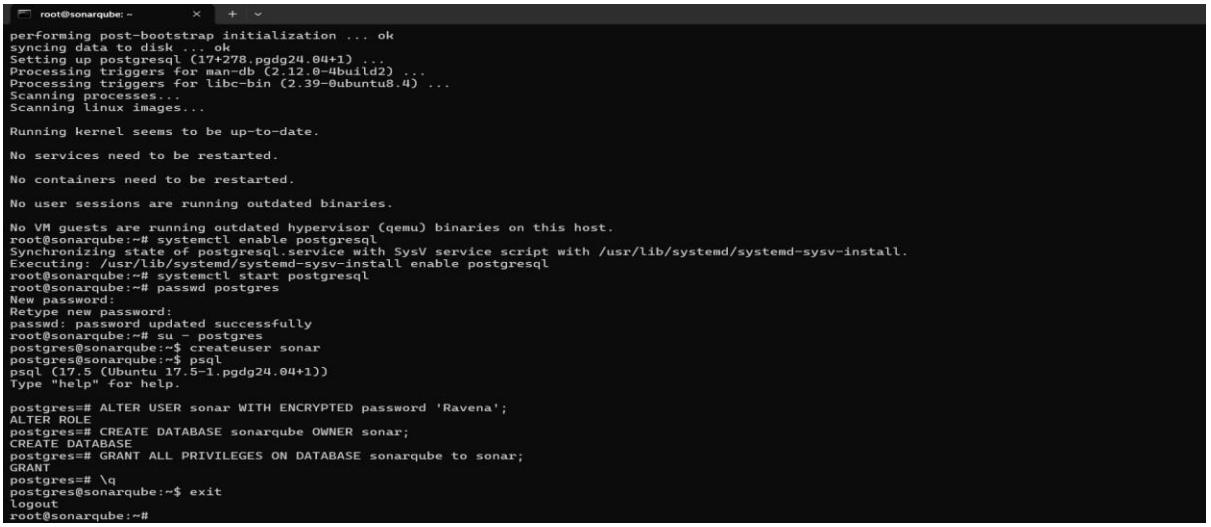





## In SonarQube Server:

Step 11:

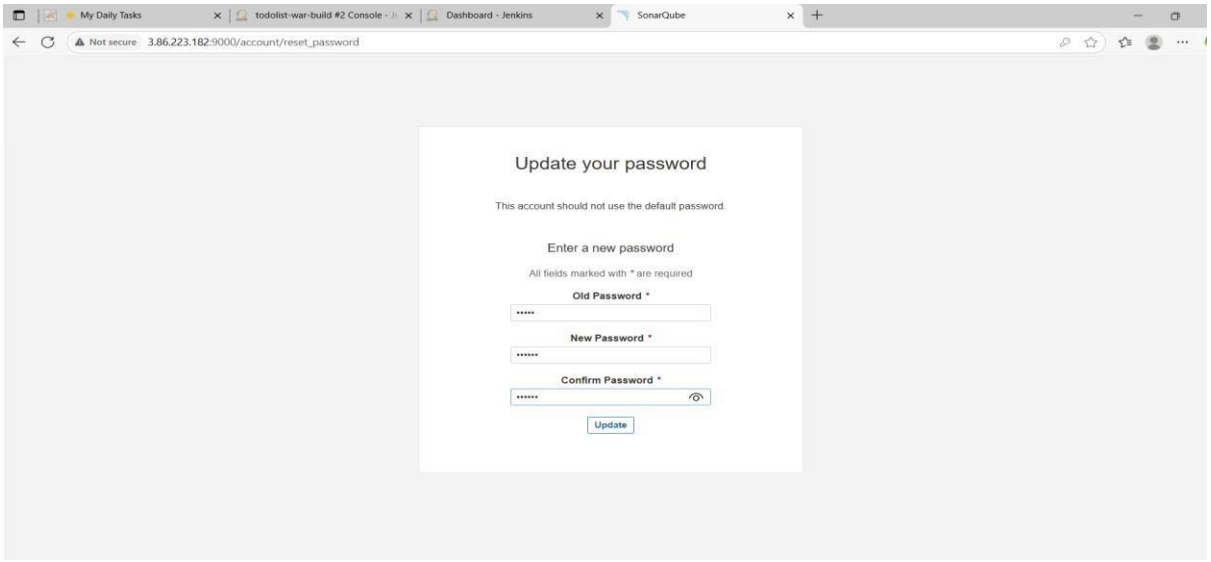
Install SonarQube,Create a database and user credentials and check the status



```
root@sonarqube: /opt
  inflating: sonarqube-9.9.3.79811/lib/sonar-shutdowner-9.9.3.79811.jar
   creating: sonarqube-9.9.3.79811/elasticsearch/plugins/
root@sonarqube:~# ls
snap  sonarqube-9.9.3.79811  sonarqube-9.9.3.79811.zip
root@sonarqube:~# mv sonarqube-9.9.3.79811 sonarqube
root@sonarqube:~# ls
snap  sonarqube  sonarqube-9.9.3.79811.zip
root@sonarqube:~# mv sonarqube /opt
root@sonarqube:~# cd /opt/
root@sonarqube:/opt# ls
sonarqube
root@sonarqube:/opt# sudo groupadd sonar
root@sonarqube:/opt# sudo useradd -d /opt/sonarqube -g sonar sonar
root@sonarqube:/opt# sudo chown sonar:sonar /opt/sonarqube -R
root@sonarqube:/opt# sudo vi /opt/sonarqube/conf/sonar.properties
root@sonarqube:/opt#  427L, 21215B written
root@sonarqube:/opt# vi /opt/sonarqube/bin/linux-x86-64/sonar.sh
 317L, 7156B written
root@sonarqube:/opt# sudo vi /etc/systemd/system/sonar.service
root@sonarqube:/opt# sudo systemctl enable sonar
Created symlink /etc/systemd/system/multi-user.target.wants/sonar.service → /etc/systemd/system/sonar.service.
root@sonarqube:/opt# sudo systemctl start sonar
root@sonarqube:/opt# sudo systemctl status sonar
● sonar.service - SonarQube service
     Loaded: loaded (/etc/systemd/system/sonar.service; enabled; preset: enabled)
     Active: active (running) since Wed 2025-07-16 15:39:11 UTC; 8s ago
    Process: 8098 ExecStart=/opt/sonarqube/bin/linux-x86-64/sonar.sh start (code=exited, status=0/SUCCESS)
   Main PID: 8121 (java)
      Tasks: 62 (limit: 9501)
     Memory: 768.3M (peak: 768.5M)
        CPU: 16.302s
     CGroup: /system.slice/sonar.service
             ├─8121 java -Xms8m -Xmx32m --add-exports=java.base/jdk.internal.ref=ALL-UNNAMED --add-opens=java.base/java.lang=ALL-UNNAMED --add-opens=java.b
             └─8147 /usr/lib/jvm/java-17-openjdk-amd64/bin/java -XX:+UseG1GC -Djava.io.tmpdir=/opt/sonarqube/temp -XX:ErrorFile=/opt/sonarqube/logs/es_hs_e

Jul 16 15:39:11 sonarqube systemd[1]: Starting sonar.service - SonarQube service...
Jul 16 15:39:11 sonarqube sonar.sh[8098]: /usr/bin/java
Jul 16 15:39:11 sonarqube sonar.sh[8098]: Starting SonarQube...
Jul 16 15:39:11 sonarqube sonar.sh[8098]: Started SonarQube.
Jul 16 15:39:11 sonarqube systemd[1]: Started sonar.service - SonarQube service.
lines 1-17/17 (END)
```

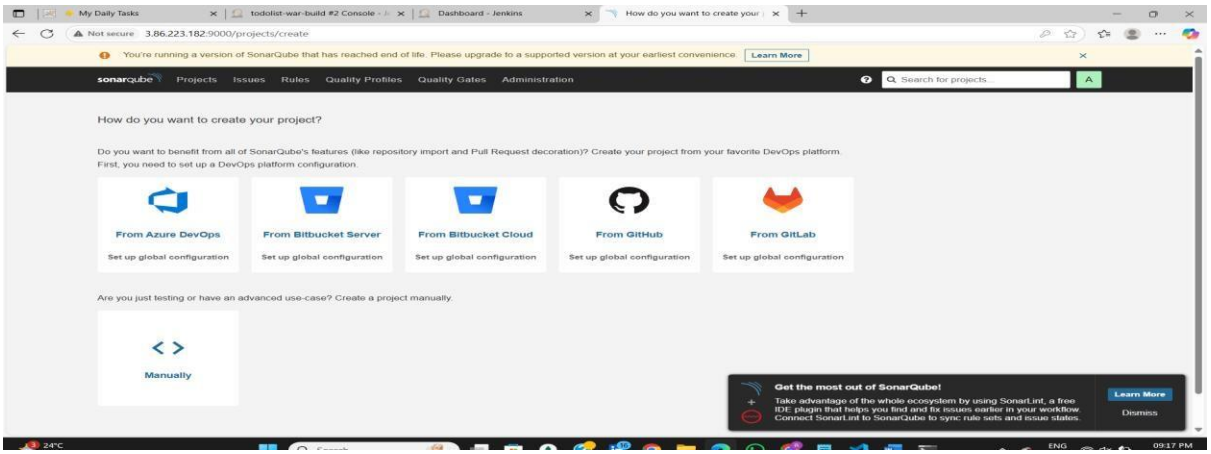
Step 12:

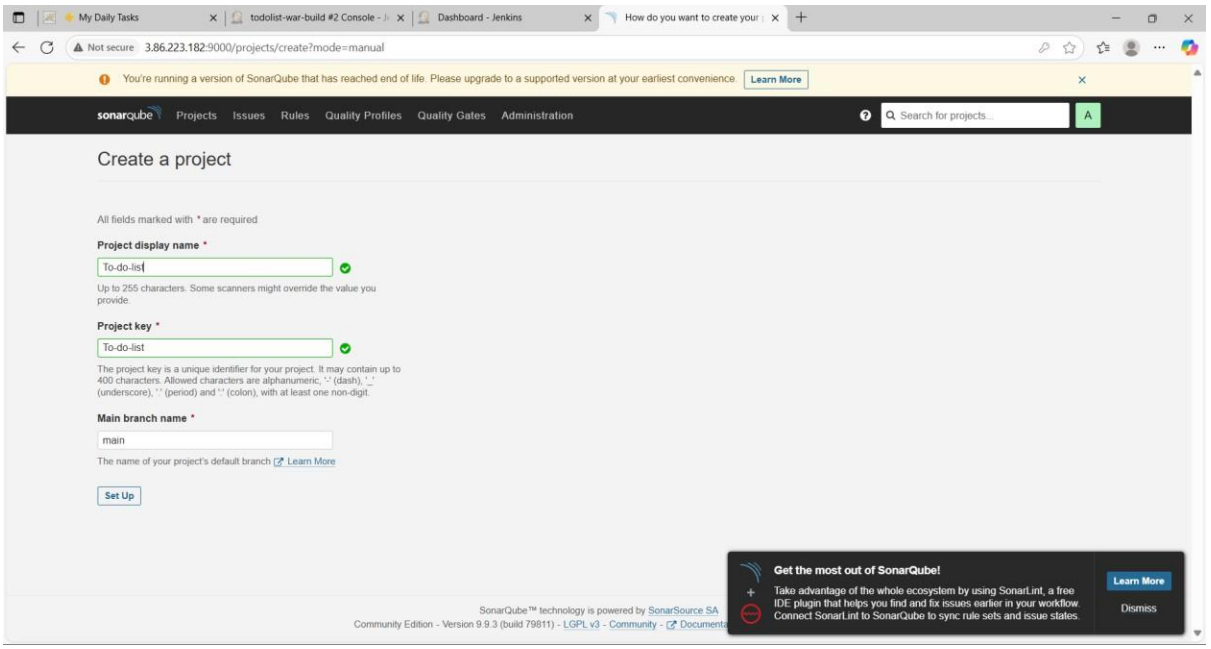
Ping pubic ip:9000 in the browser and login to the official sonarqube website using the default username and password(admin) and update the password


Step 13:

Select the Manual project creation mode and Create a project and select the project type as maven and copy the token generated .



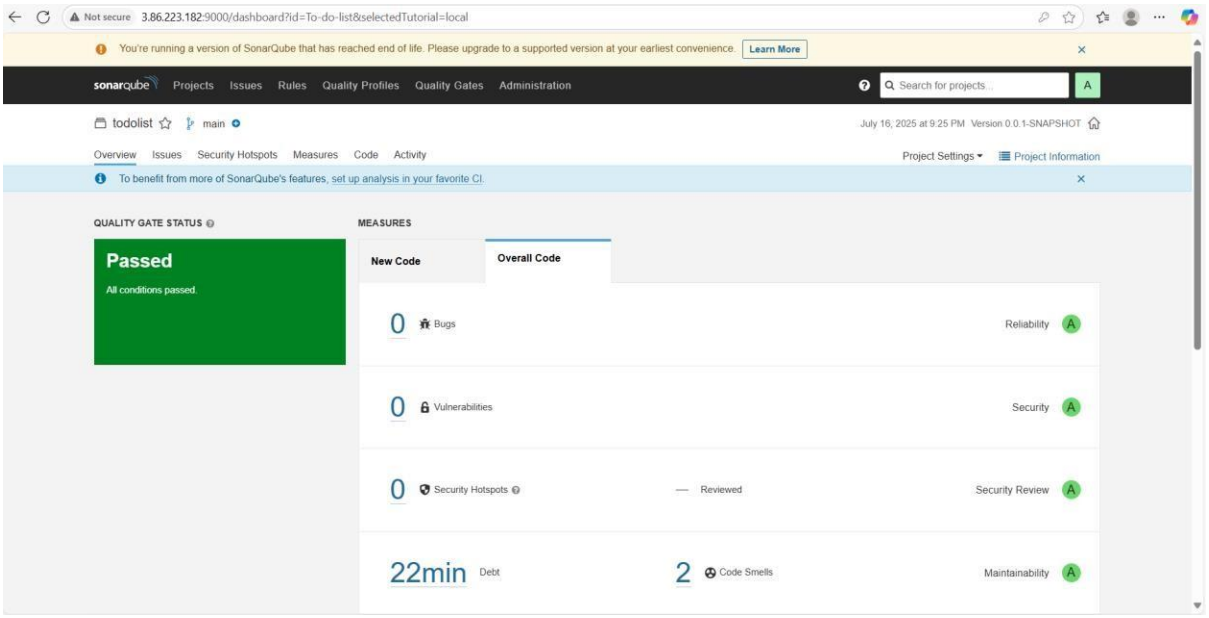

Step 14:

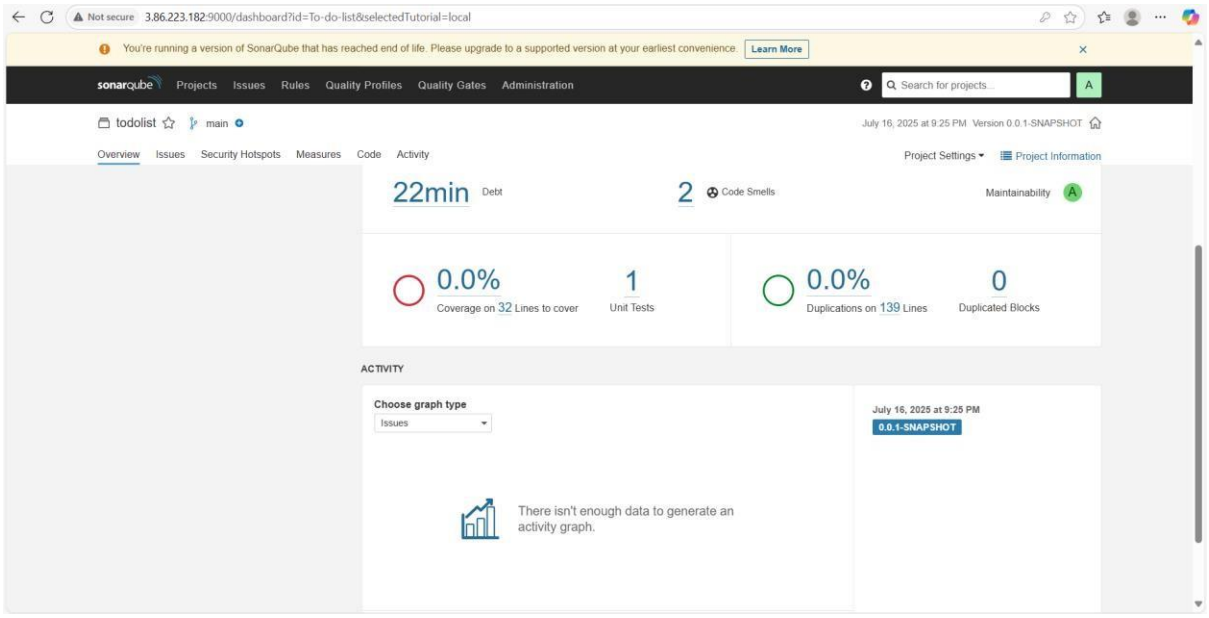
Run the generated token in the **tomcat-maven server**

```
[INFO] 15:55:35.922 Sensor TextAndSecretsSensor [text] (done) | time=22ms
[INFO] 15:55:35.922 Sensor VB.NET Project Type Information [vbnet]
[INFO] 15:55:35.923 Sensor VB.NET Project Type Information [vbnet] (done) | time=0ms
[INFO] 15:55:35.923 Sensor VB.NET Analysis Log [vbnet]
[INFO] 15:55:35.934 Sensor VB.NET Analysis Log [vbnet] (done) | time=11ms
[INFO] 15:55:35.934 Sensor VB.NET Properties [vbnet]
[INFO] 15:55:35.934 Sensor VB.NET Properties [vbnet] (done) | time=0ms
[INFO] 15:55:35.934 Sensor IaC Docker Sensor [iac]
[INFO] 15:55:35.935 0 source files to be analyzed
[INFO] 15:55:36.014 0/0 source files have been analyzed
[INFO] 15:55:36.014 Sensor IaC Docker Sensor [iac] (done) | time=80ms
[INFO] 15:55:36.017 ------------- Run sensors on project
[INFO] 15:55:36.078 Sensor Analysis Warnings import [csharp]
[INFO] 15:55:36.079 Sensor Analysis Warnings import [csharp] (done) | time=1ms
[INFO] 15:55:36.079 Sensor Zero Coverage Sensor
[INFO] 15:55:36.085 Sensor Zero Coverage Sensor (done) | time=6ms
[INFO] 15:55:36.085 Sensor Java CPD Block Indexer
[INFO] 15:55:36.106 Sensor Java CPD Block Indexer (done) | time=21ms
[INFO] 15:55:36.109 SCM Publisher SCM provider for this project is: git
[INFO] 15:55:36.110 SCM Publisher 5 source files to be analyzed
[INFO] 15:55:36.294 SCM Publisher 5/5 source files have been analyzed (done) | time=183ms
[INFO] 15:55:36.300 CPD Executor 1 file had no CPD blocks
[INFO] 15:55:36.300 CPD Executor Calculating CPD for 2 files
[INFO] 15:55:36.310 CPD Executor CPD calculation finished (done) | time=8ms
[INFO] 15:55:36.437 Analysis report generated in 123ms, dir size=139.5 kB
[INFO] 15:55:36.449 Analysis report compressed in 12ms, zip size=25.9 kB
[INFO] 15:55:36.490 Analysis report uploaded in 41ms
[INFO] 15:55:36.492 ANALYSIS SUCCESSFUL, you can find the results at: http://3.86.223.182:9000/dashboard?id=To-do-list
[INFO] 15:55:36.492 Note that you will be able to access the updated dashboard once the server has processed the submitted analysis report
[INFO] 15:55:36.492 More about the report processing at http://3.86.223.182:9000/api/ce/task?id=AZgT8s6YiTny3VQwCwAm
[INFO] 15:55:36.505 Analysis total time: 7.529 s
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  20.926 s
[INFO] Finished at: 2025-07-16T15:55:36Z
[INFO] ------------------------------------------------------------------------
root@ip-172-31-87-63:/usr/share/maven/devops-project#
```

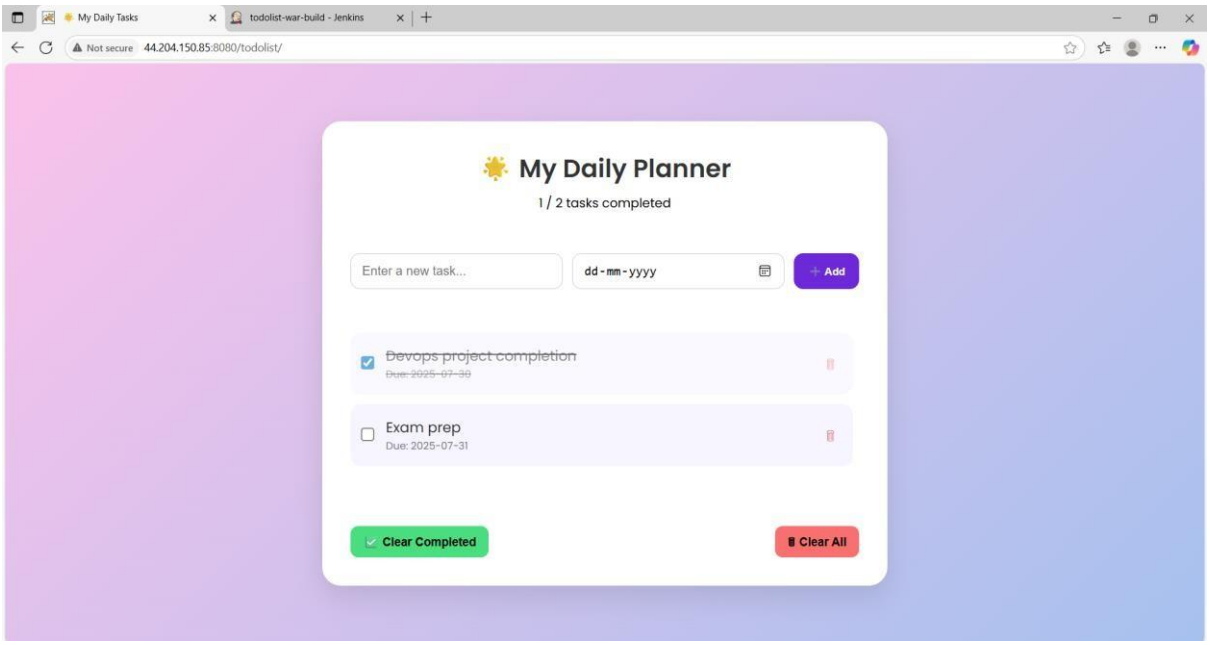
Step 15:

After Build Success open the sonarqube website to check the code quality



**OUTPUT:**




**RESULT:**

The maven project is deployed successfully in the CI/CD pipeline