Aim: Create a Jenkins CICD Pipeline with SonarQube / GitLab Integration to perform a static analysis of the code to detect bugs, code smells, and security vulnerabilities on a sample Web / Java / Python application.

Prerequisites:

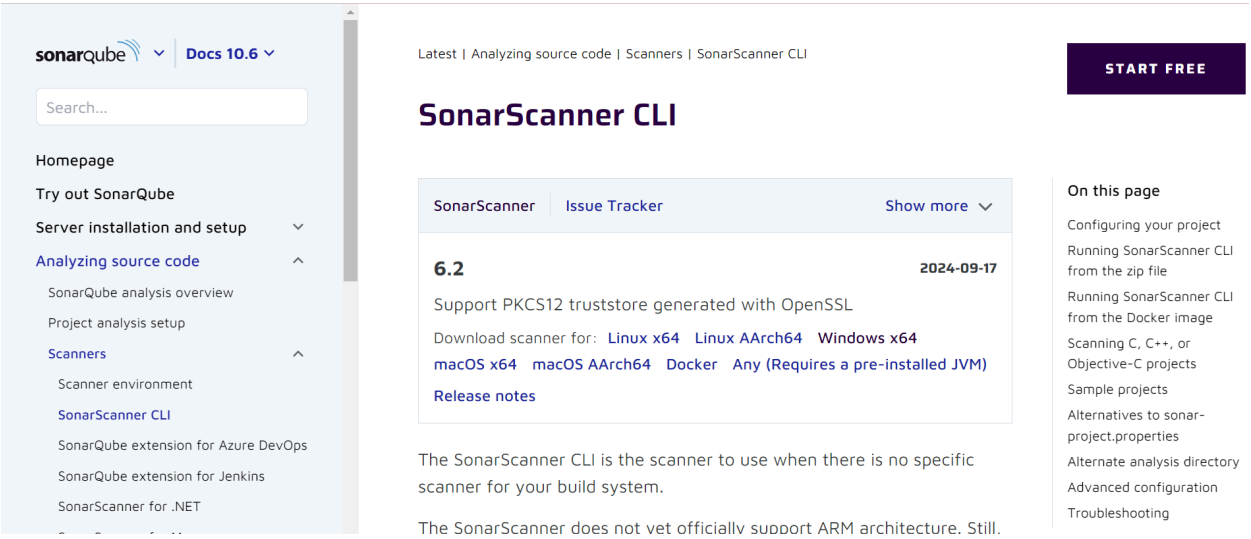
- Jenkins installed
- Docker Installed (for SonarQube)
- SonarQube Docker Image

```
C:\Users\bhumi>docker -v
Docker version 27.2.0, build 3ab4256

C:\Users\bhumi>docker pull sonarqube
Using default tag: latest
latest: Pulling from library/sonarqube
Digest: sha256:72e9feec71242af83faf65f95a40d5e3bb2822a6c3b2cda8568790f3d31aecde
Status: Image is up to date for sonarqube:latest
docker.io/library/sonarqube:latest

What's next:
    View a summary of image vulnerabilities and recommendations → docker scout quickview sonarqube
```

- Download sonar scanner



Extract the downloaded zip file in a folder.

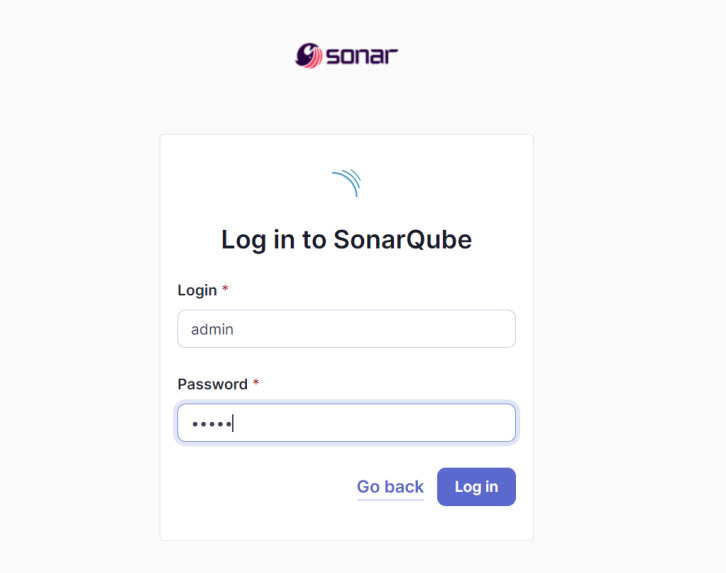
Steps to create a Jenkins CI/CD Pipeline and use SonarQube to perform SAST

1. Run SonarQube image
   docker run -d --name sonarqube -e SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000 sonarqube:latest

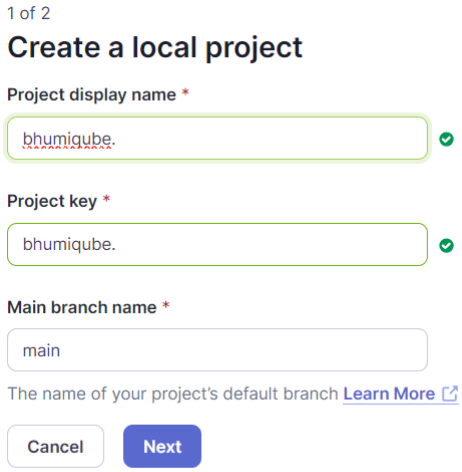
This command will run the SonarQube image that was just installed using docker.

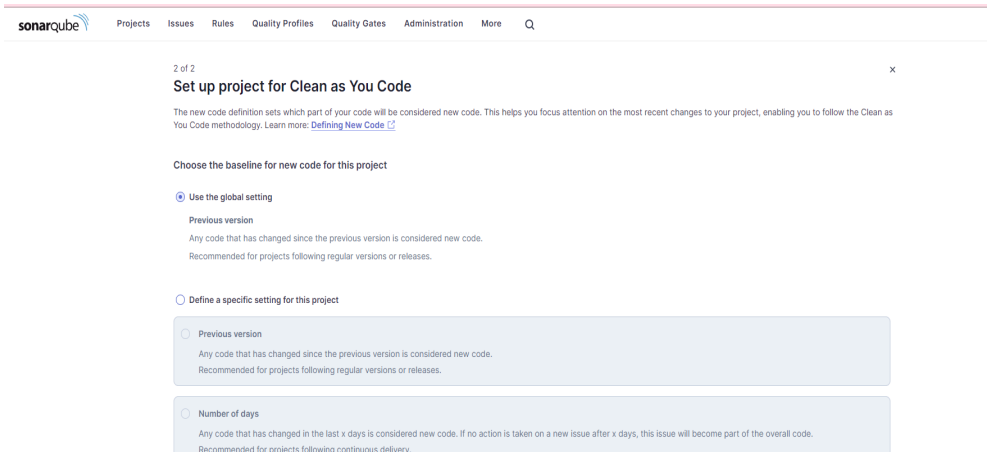
```
C:\Users\bhumi>docker run -d --name sonarqube -e SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000 sonarqube:latest
7401befce9e7a7248c0e5648a2913e99c3843cce08e91d403e5af3a1479a151e
```

2. Once the SonarQube image is started, you can go to http://localhost:9000 to find the SonarQube that has started.
3. Login to SonarQube using username admin and password admin.

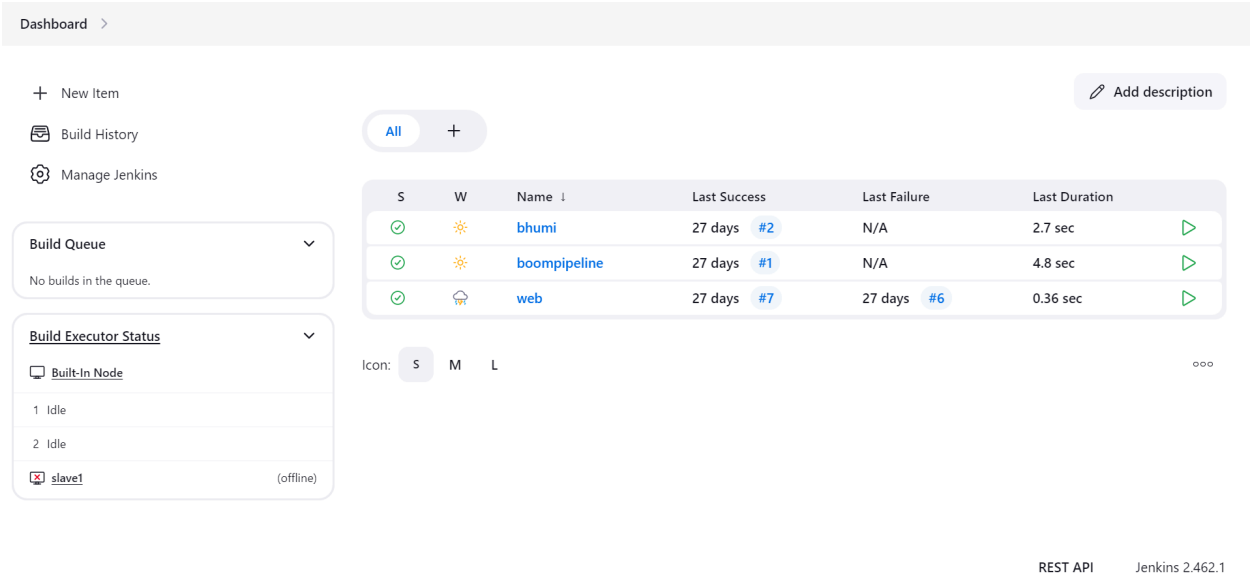


4. Create a local project in SonarQube and enter a name.
   Here I have given the name ‘bhumiqube’ which is also the project key.

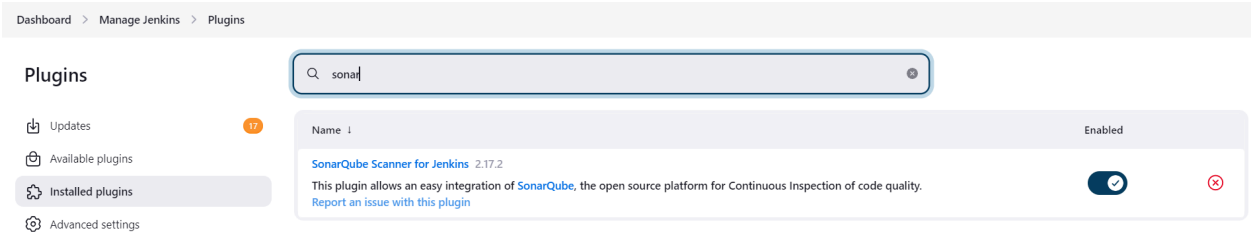




5. Open up Jenkins Dashboard on localhost, port 8080 or whichever port it is at for you.

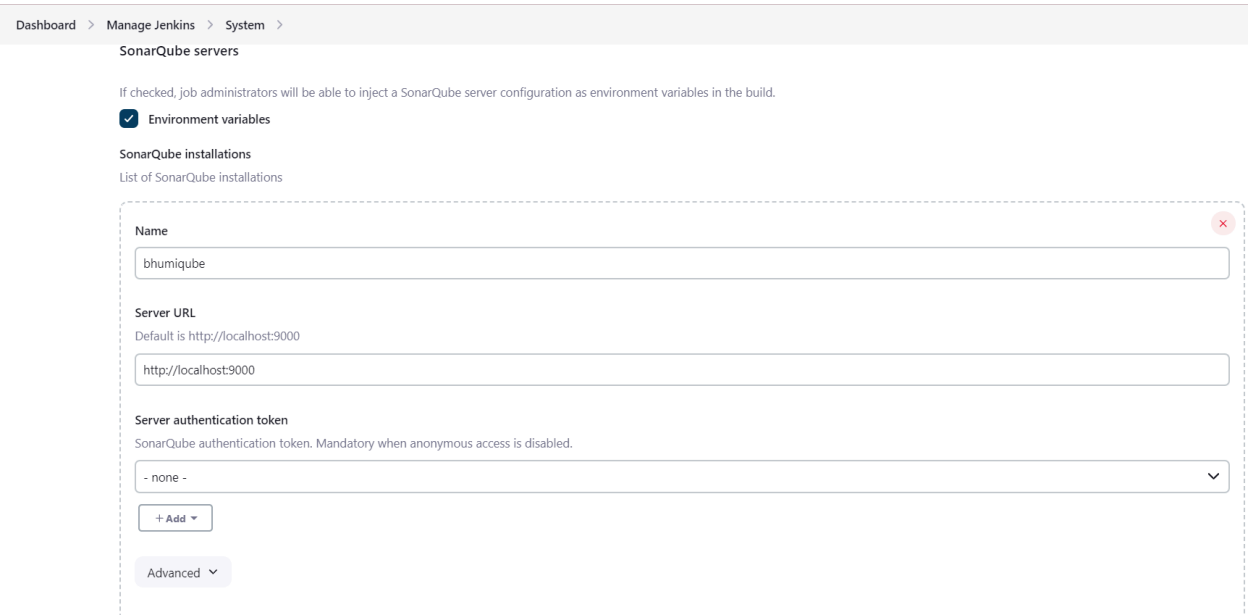


6. Go to Manage Jenkins and search for SonarQube Scanner for Jenkins and install it.(we already installed it for exp 7 so you can skip)

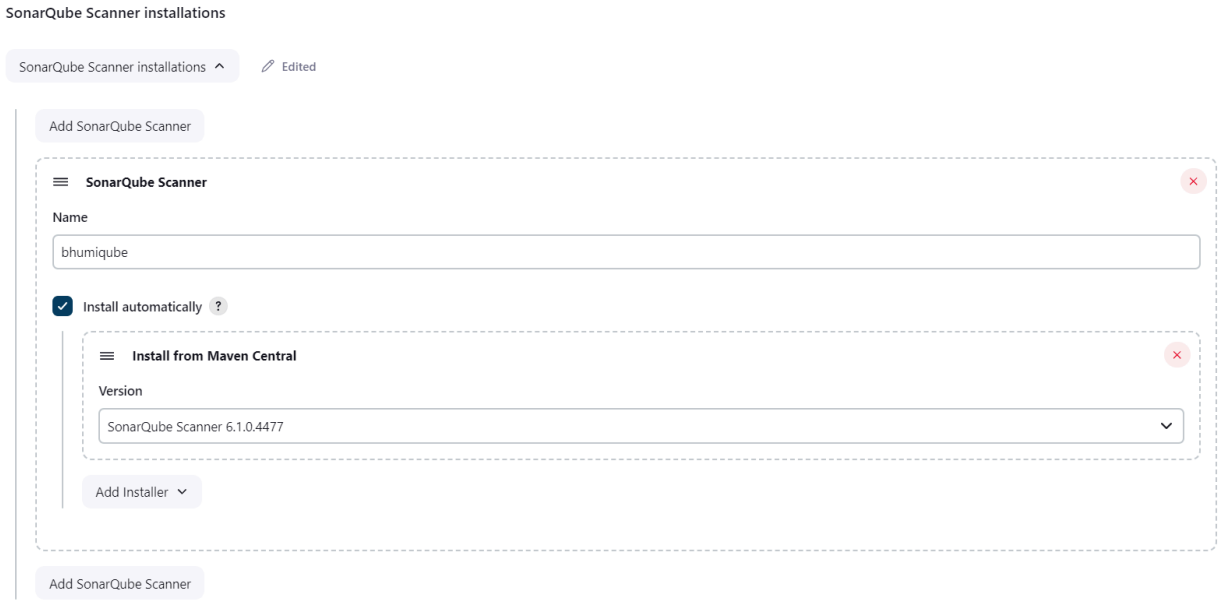


7. Under Jenkins ‘Manage Jenkins’ then go to ‘system’, scroll and look for SonarQube Servers and enter the details.

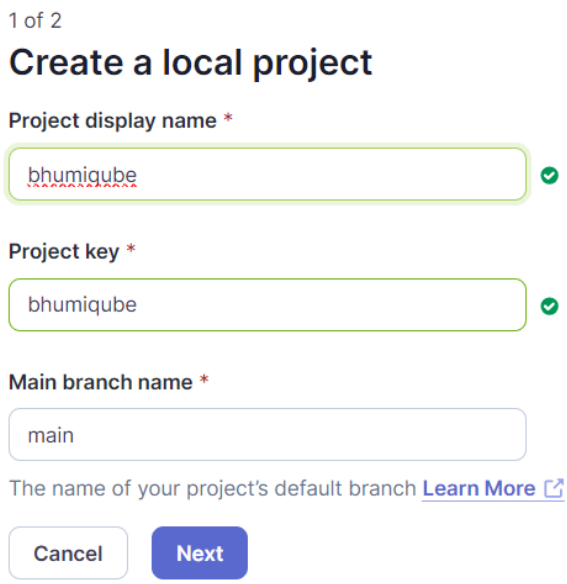
In SonarQube installations: Under Name add <project name of sonarqube> which is ‘bhumiqube’ for me. In Server URL Default is http://localhost:9000.



8. Search for SonarQube Scanner under Global Tool Configuration. Choose the latest configuration and choose Install automatically.
   Dashboard > Manage Jenkins > Tools > SonarQube Scanner



9. After configuration, create a New Item → choose a pipeline project.



10. Under Pipeline script, enter the following:

```
node {
   stage('Cloning the GitHub Repo') {
      git 'https://github.com/shazforiot/GOL.git'
   }

   stage('SonarQube analysis') {
         withSonarQubeEnv('bhumiqube'){
          bat """
          "C:\\Program
Files\\sonar-scanner\\sonar-scanner-6.2.0.4584-windows-x64\\bin\\sonar-scanne
r.bat" ^
          -D sonar.login=squ_19c75dfc2e1126a15d28436e4cf82fd4b8cac39a ^
          -D sonar.projectKey=bhumiqube ^
          -D sonar.exclusions=vendor/**,resources/**,**/*.java ^
          -D sonar.host.url=http://localhost:9000/
          """
      }
   }
}
```

It is a java sample project which has a lot of repetitions and issues that will be detected by SonarQube.

Pipeline

Definition

Pipeline script

Script

```
node {
    stage('Cloning the GitHub Repo') {
        git 'https://github.com/shazforiot/GOL.git'
    }

    stage('SonarQube analysis') {
        withSonarQubeEnv('bhumiqube'){
         bat """
         "C:\\Program Files\\sonar-scanner\\sonar-scanner-6.2.0.4584-windows-x64\\bin\\sonar-scanner.bat" ^
         -D sonar.login=squ_19c75dfc2e1126a15d28436e4cf82fd4b8cac39a ^
         -D sonar.projectKey=bhumiqube ^
         -D sonar.exclusions=vendor/**,resources/**,**/*.java ^
         -D sonar.host.url=http://localhost:9000/
         """
        }
    }
}
```

Use Groovy Sandbox

Pipeline Syntax

Save Apply

11. Go to the job you had just built and click on Build Now.

Dashboard > bhumiqube >

- Status
- Changes
- Build Now
- Configure
- Delete Pipeline
- SonarQube
- Stages
- Rename
- Pipeline Syntax

12. Once it is built, check the console output.

Dashboard > bhumiqube >

- Status
- Changes
- Build Now
- Configure
- Delete Pipeline
- SonarQube
- Stages
- Rename

bhumiqube

Permalinks

- Last build (#7), 2 hr 48 min ago
- Last stable build (#7), 2 hr 48 min ago
- Last successful build (#7), 2 hr 48 min ago
- Last failed build (#6), 2 hr 52 min ago
- Last unsuccessful build (#6), 2 hr 52 min ago
- Last completed build (#7), 2 hr 48 min ago

Console Output

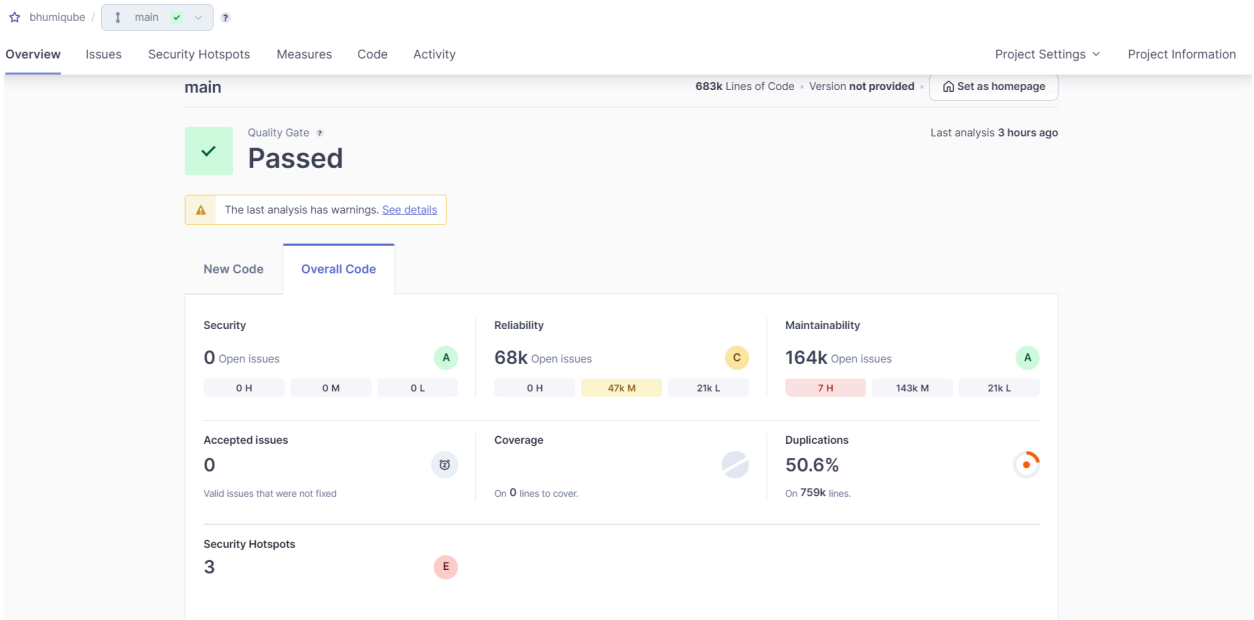
Download | Copy | View as plain text

Skipping 4,249 KB.. Full Log

```
21:00:36.356 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/report/writers/ReportSummary.html for block at line 41. Keep only the first 100
references.
21:00:36.356 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/report/writers/ReportSummary.html for block at line 17. Keep only the first 100
references.
21:00:36.356 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/report/writers/ReportSummary.html for block at line 303. Keep only the first 100
references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 312. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 315. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 649. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 312. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 651. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 17. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 312. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 315. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 653. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 655. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 315. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 325. Keep only the first 100 references.
21:00:36.502 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 32. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 312. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 697. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 315. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 64. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 707. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 64. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 40. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 74. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 41. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 17. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 136. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 136. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 655. Keep only the first 100 references.
21:00:36.504 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/math/StatCalculator.html for block at line 74. Keep only the first 100 references.
21:00:36.526 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/control/gui/package-tree.html for block at line 39. Keep only the first 100
references.
21:00:36.526 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/control/gui/package-tree.html for block at line 16. Keep only the first 100
references.
21:00:36.526 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/control/gui/package-tree.html for block at line 219. Keep only the first 100
```

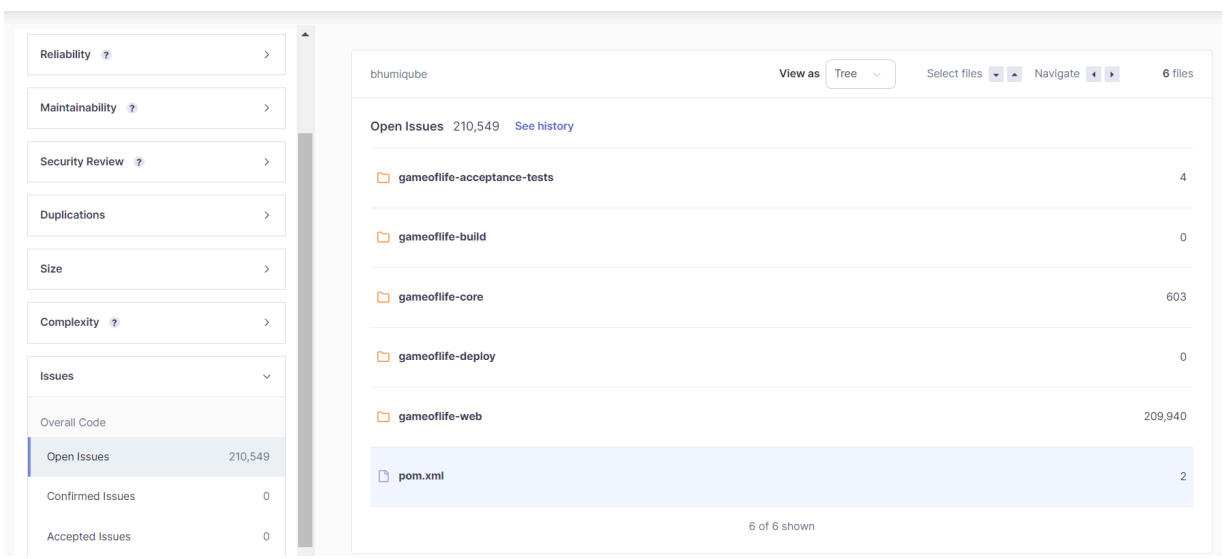
```
21:00:42.643 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/protocol/ldap/control/gui/LdapExtTestSamplerGui.html for
block at line 155. Keep only the first 100 references.
21:00:42.643 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/protocol/ldap/control/gui/LdapExtTestSamplerGui.html for
block at line 515. Keep only the first 100 references.
21:00:42.643 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/protocol/ldap/control/gui/LdapExtTestSamplerGui.html for
block at line 768. Keep only the first 100 references.
21:00:42.643 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/protocol/ldap/control/gui/LdapExtTestSamplerGui.html for
block at line 714. Keep only the first 100 references.
21:00:42.643 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/protocol/ldap/control/gui/LdapExtTestSamplerGui.html for
block at line 668. Keep only the first 100 references.
21:00:42.643 INFO  CPD Executor CPD calculation finished (done) | time=187786ms
21:00:42.660 INFO  SCM revision ID 'ba799ba7e1b576f04a4612322b0412c5e6e1e5e4'
21:02:50.519 INFO  Analysis report generated in 5916ms, dir size=127.2 MB
21:03:11.285 INFO  Analysis report compressed in 20750ms, zip size=29.6 MB
21:03:11.715 INFO  Analysis report uploaded in 430ms
21:03:11.717 INFO  ANALYSIS SUCCESSFUL, you can find the results at: http://localhost:9000/dashboard?id=bhumiqube
21:03:11.717 INFO  Note that you will be able to access the updated dashboard once the server has processed the submitted analysis report
21:03:11.717 INFO  More about the report processing at http://localhost:9000/api/ce/task?id=2bf5a9f3-919a-4725-94d5-474d4773e610
21:03:26.163 INFO  Analysis total time: 16:37.760 s
21:03:26.163 INFO  SonarScanner Engine completed successfully
21:03:26.916 INFO  EXECUTION SUCCESS
21:03:26.916 INFO  Total time: 16:42.318s
[Pipeline] }
[Pipeline] // withSonarQubeEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

13. Once the build is complete, go back to SonarQube and check the project linked.

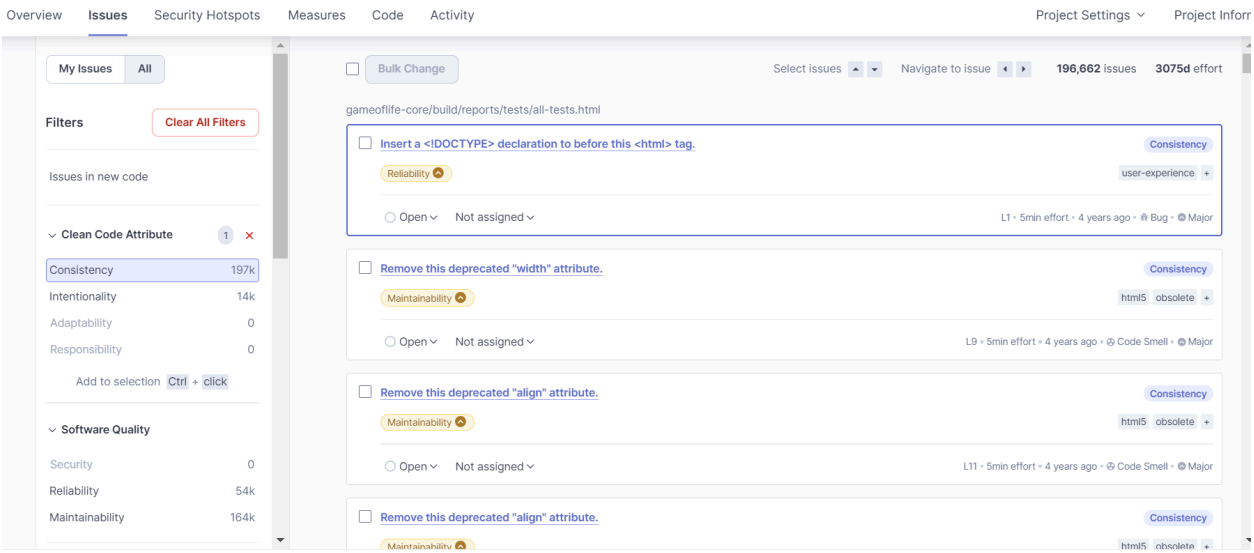


Under different tabs, check all the issues with the code.

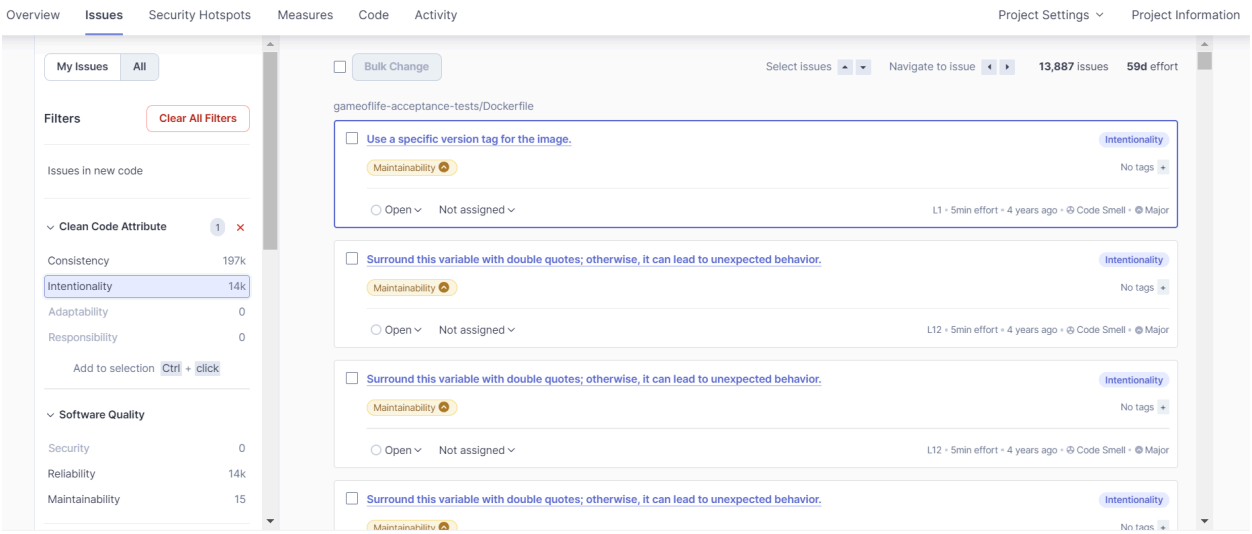
- Code Problems



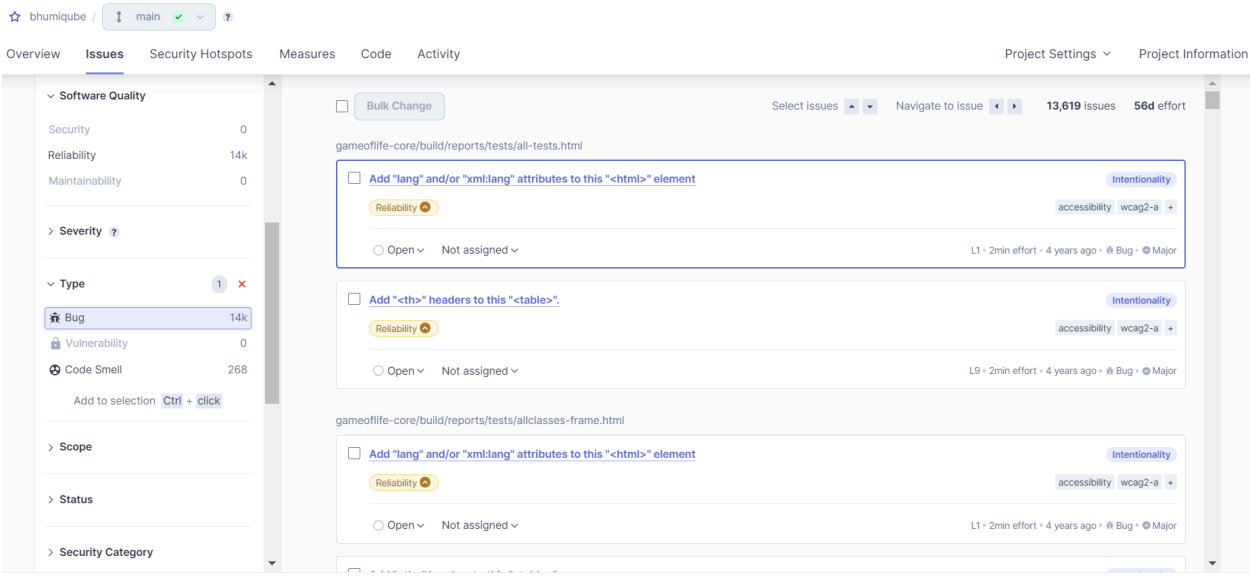
- Consistency



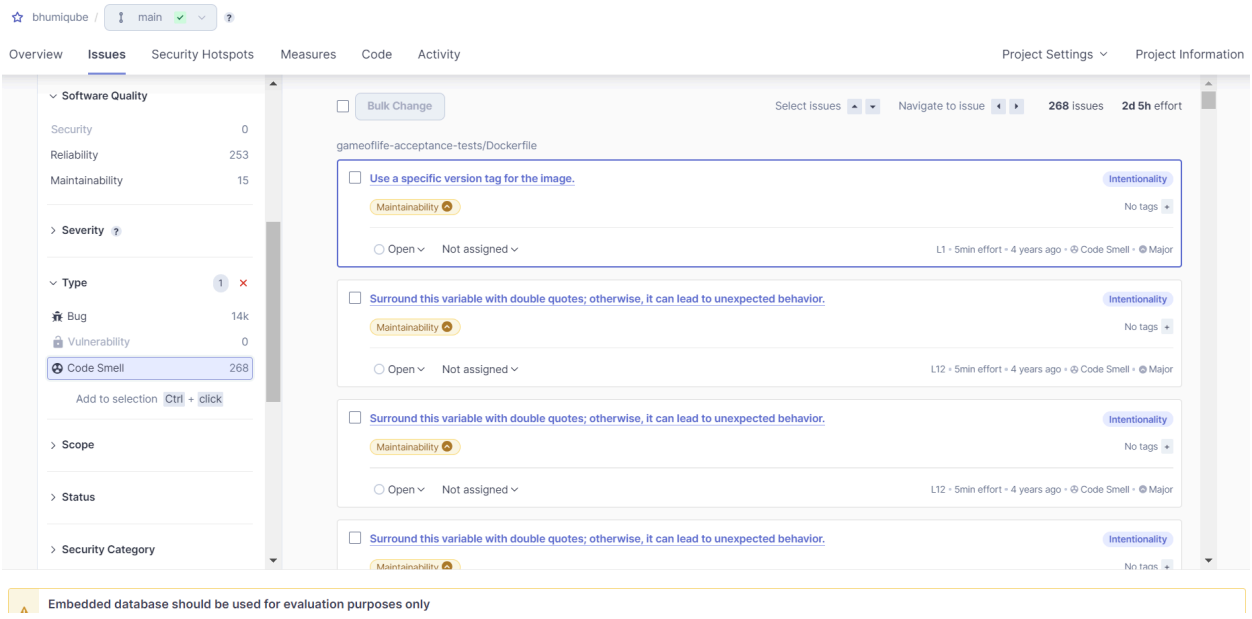
- Intentionality



- Bugs



- Code Smells



- Duplications

Conclusion:
In this experiment, we successfully integrated Jenkins with SonarQube to automate continuous monitoring of code quality within our CI/CD pipeline. The process involved deploying SonarQube using Docker, setting up a project for code analysis, and configuring Jenkins with the SonarQube Scanner plugin. After configuring the tools and providing the SonarQube server details, we developed a Jenkins pipeline that automatically clones code from GitHub and runs static analysis. This integration helps us identify bugs, code smells, and security vulnerabilities throughout the development process, ensuring better code quality and smoother development workflows.