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# EXPERIMENT NO. 8

**Aim:** Create a Jenkins CI/CD 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.

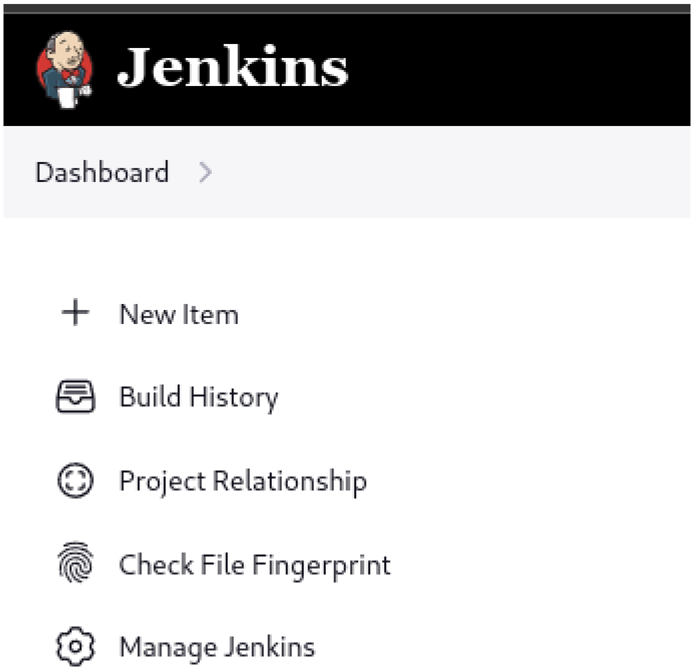
**Integrating Jenkins with SonarQube:**

**Prerequisites:**

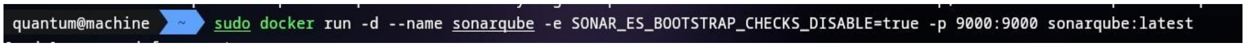
- Jenkins installed
- Docker Installed (for SonarQube)
- SonarQube Docker Image

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

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

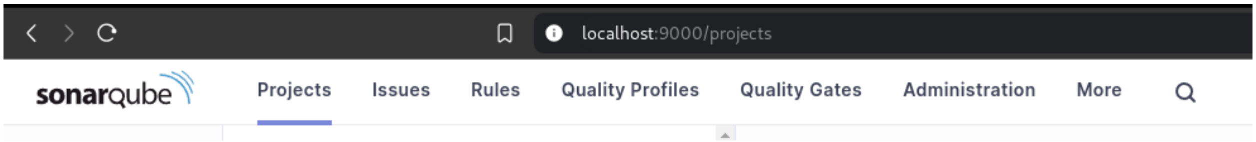


2. Run SonarQube in a Docker container using this command



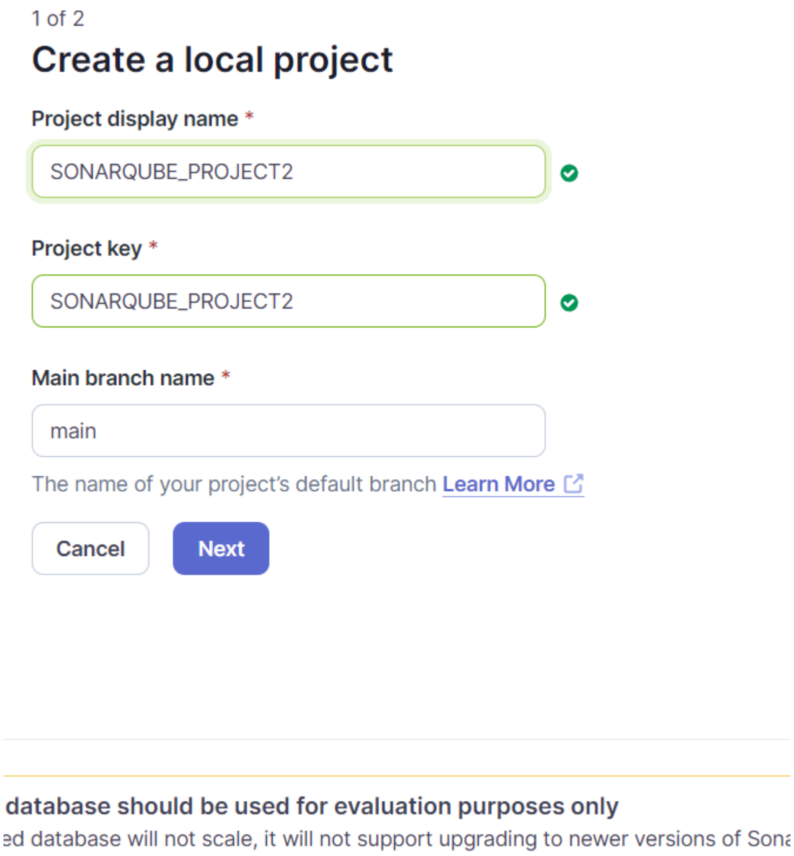
```
quantum@machine  ~  sudo docker run -d --name sonarqube -e SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000 sonarqube:latest
```

3. Once the container is up and running, you can check the status of SonarQube at localhost port 9000.



4. Login to SonarQube using your username and password

5. Create a manual project in SonarQube with the name sonarqube-test2



1 of 2

Create a local project

Project display name *

SONARQUBE_PROJECT2

Project key *

SONARQUBE_PROJECT2

Main branch name *

main

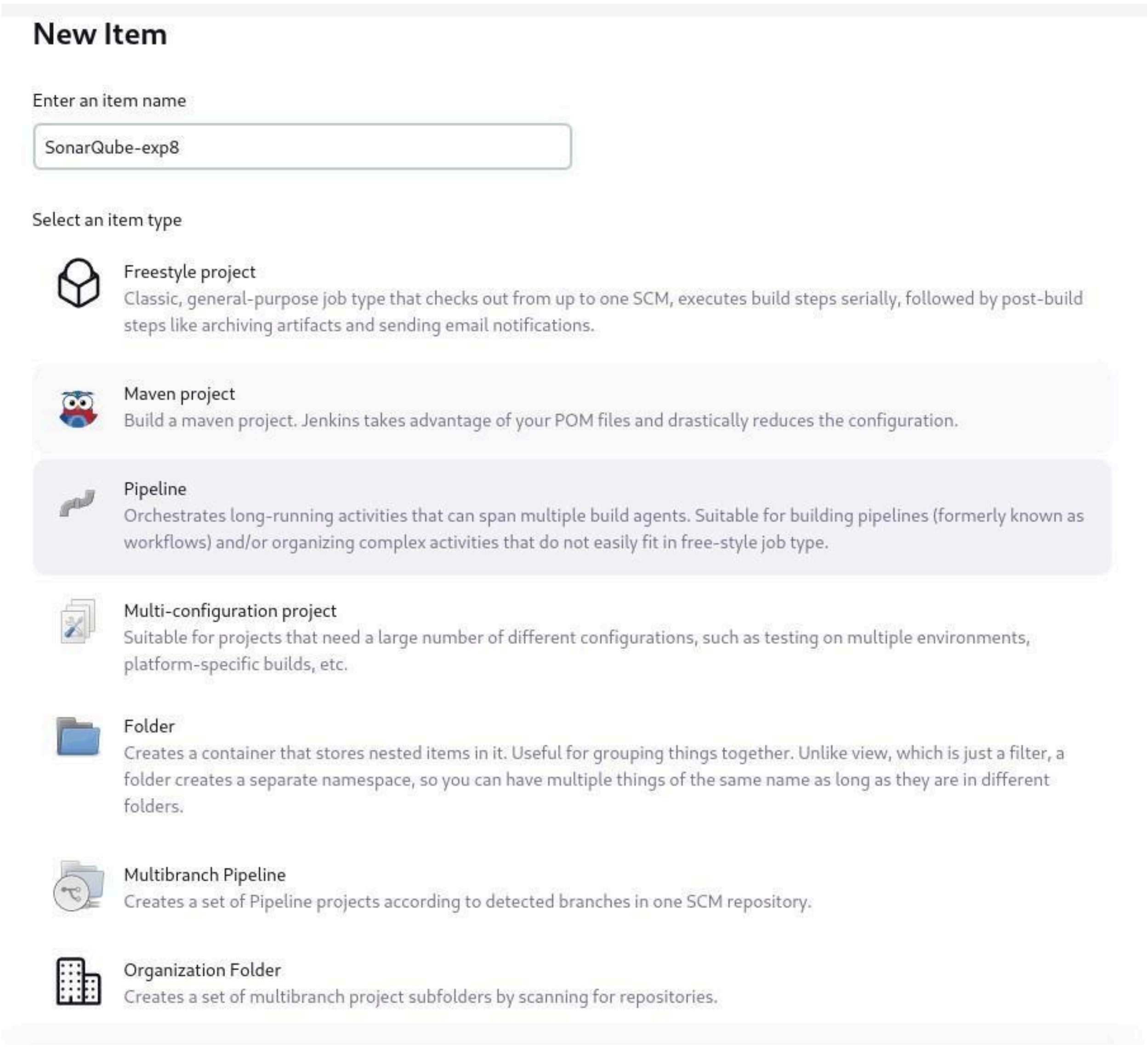
The name of your project’s default branch Learn More

database should be used for evaluation purposes only

ed database will not scale, it will not support upgrading to newer versions of Sona

Setup the project and come back to Jenkins Dashboard.

6. Create a New Item in Jenkins, choose **Pipeline**.



## New Item

Enter an item name

SonarQube-exp8

Select an item type

**Freestyle project**
Classic, general-purpose job type that checks out from up to one SCM, executes build steps serially, followed by post-build steps like archiving artifacts and sending email notifications.

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

**Pipeline**
Orchestrates long-running activities that can span multiple build agents. Suitable for building pipelines (formerly known as workflows) and/or organizing complex activities that do not easily fit in free-style job type.

**Multi-configuration project**
Suitable for projects that need a large number of different configurations, such as testing on multiple environments, platform-specific builds, etc.

**Folder**
Creates a container that stores nested items in it. Useful for grouping things together. Unlike view, which is just a filter, a folder creates a separate namespace, so you can have multiple things of the same name as long as they are in different folders.

**Multibranch Pipeline**
Creates a set of Pipeline projects according to detected branches in one SCM repository.

**Organization Folder**
Creates a set of multibranch project subfolders by scanning for repositories.

7. Under Pipeline Script, enter the following -

```
node {
stage('Cloning the GitHub Repo') {
git 'https://github.com/shazforiot/GOL.git'
}
stage('SonarQube analysis') {
withSonarQubeEnv('sonarqube')
{
sh "<PATH_TO_SONARQUBE_FOLDER>//bin//sonar-scanner \
-D sonar.login=<SonarQube_USERNAME> \
-D sonar.password=<SonarQube_PASSWORD> \
-D sonar.projectKey=<Project_KEY> \
-D sonar.exclusions=vendor/**,resources/**,**/*.java \
-D sonar.host.url=http://127.0.0.1:9000/"
```

```
        }
        }
        }
```

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

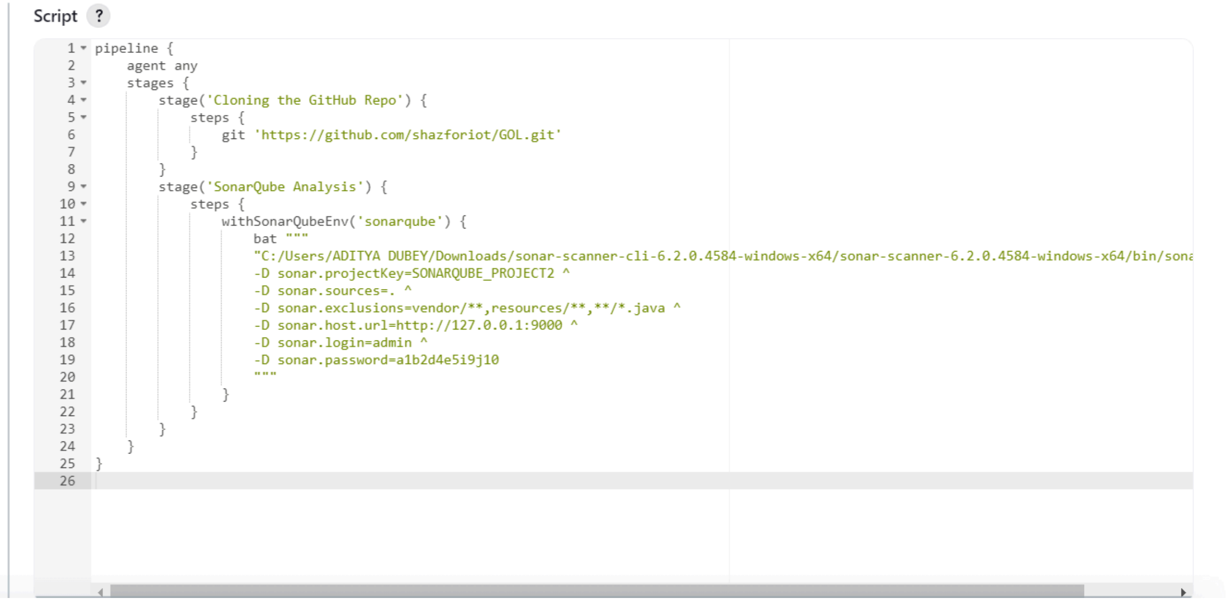
8. Install sonar-scanner

Now we need to install **sonar-scanner** binary to perform code analysis
To do so, go to
https://binaries.sonarsource.com/Distribution/sonar-scanner-cli/sonar-scanner-cli-6.2.0. 4584-linux-x64.zip for linux OS
(https://binaries.sonarsource.com/Distribution/sonar-scanner-cli/sonar-scanner-cli-6.2.0.4584-windows-x64.zip for windows OS)
You will be prompted to download the zip file, download it and extract it and copy the path (absolute path) to <ROOT_DIRECTORY>/bin/sonar-scanner
For windows path would be
C:\\Users\<USER_NAME>\Downloads\sonar-scanner-cli-6.2.0.4584-windows-x64\sonar-scanner-cli-6.2.0.4584-windows-x64\bin\s onar-scanner in my case its
“C:\\Users\ADITYA DUBEY\Downloads\sonar-scanner-cli-6.2.0.4584-windows-x64\sonar-scanner-cli-6.2.0.4584-windows-x64\bin\sonar-scanner”  //” ” for paths with space

Now we need to update the required details in the pipeline script as :

```
pipeline {
   agent any
   stages {
      stage('Cloning the GitHub Repo') {
         steps {
            git 'https://github.com/shazforiot/GOL.git'
         }
      }
      stage('SonarQube analysis') {
         steps {
            withSonarQubeEnv('sonarqube') {configuration
               sh """
“C:\\Users\ADITYA DUBEY\Downloads\sonar-scanner-cli-6.2.0.4584-windows-x64\
                  sonar-scanner-cli-6.2.0.4584-windows-x64\bin\sonar-scanner” ^
                  -D sonar.projectKey=sonarqube-test2 ^
                  -D sonar.sources=. ^
                  -D sonar.exclusions=vendor/**,resources/**,**/*.java ^
```

```
                    -D sonar.host.url=http://127.0.0.1:9000 ^
                    -D sonar.login=admin ^
                    -D sonar.password=my pass
                  """
                }
            }
        }
    }
```

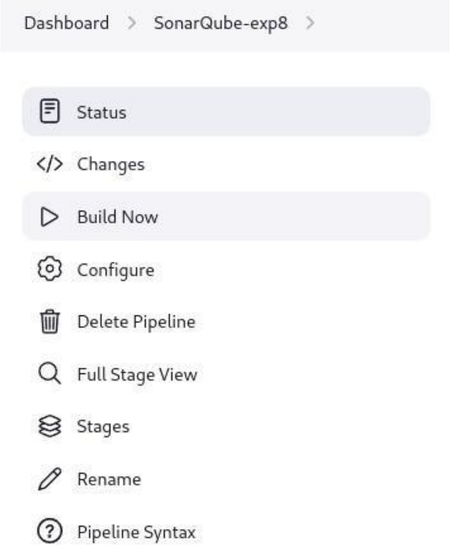


Script ?

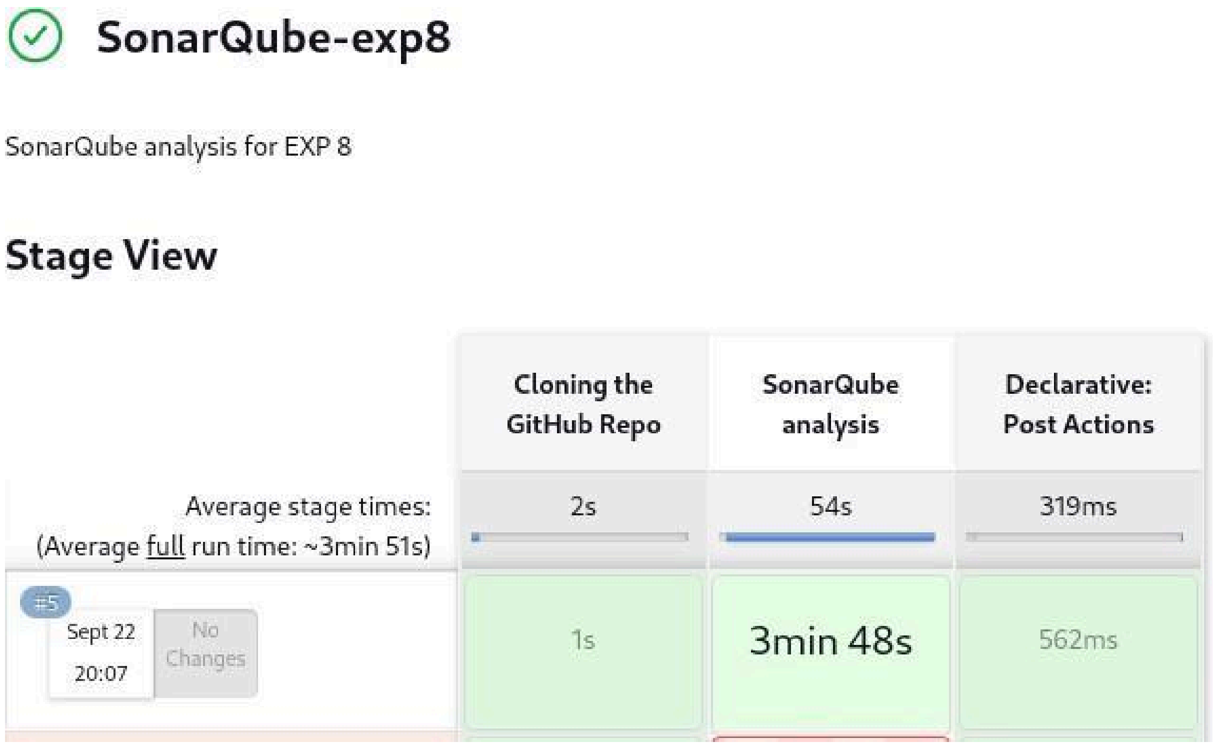
```
pipeline {
    agent any
    stages {
        stage('Cloning the GitHub Repo') {
            steps {
                git 'https://github.com/shazforiot/GOL.git'
            }
        }
        stage('SonarQube Analysis') {
            steps {
                withSonarQubeEnv('sonarqube') {
                    bat """
                    "C:/Users/ADITYA DUBEY/Downloads/sonar-scanner-cli-6.2.0.4584-windows-x64/sonar-scanner-6.2.0.4584-windows-x64/bin/sona
                    -D sonar.projectKey=SONARQUBE_PROJECT2 ^
                    -D sonar.sources=. ^
                    -D sonar.exclusions=vendor/**,resources/**,**/*.java ^
                    -D sonar.host.url=http://127.0.0.1:9000 ^
                    -D sonar.login=admin ^
                    -D sonar.password=a1b2d4e5i9j10
                    """
                }
            }
        }
    }
}

```

9. Run the build



Check the status of Build



## SonarQube-exp8

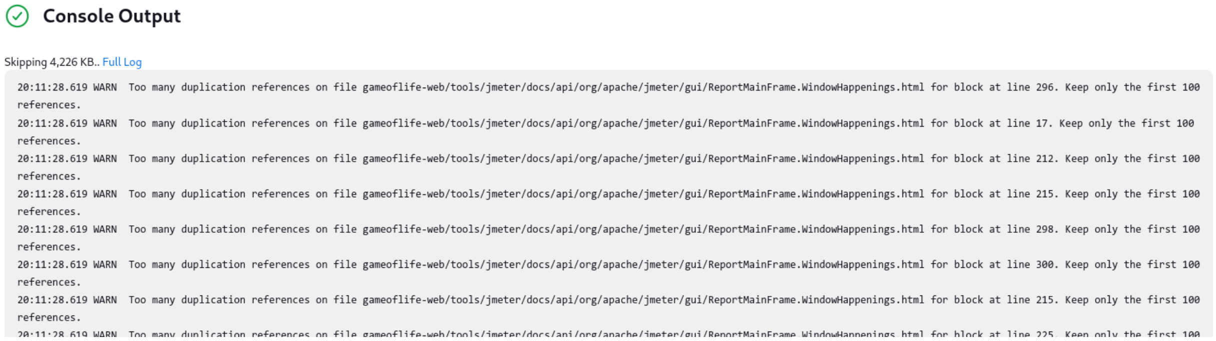
SonarQube analysis for EXP 8

### Stage View

| | Cloning the GitHub Repo | SonarQube analysis | Declarative: Post Actions |
|---|---|---|---|
| Average stage times:<br>(Average full run time: ~3min 51s) | 2s | 54s | 319ms |
| #5 Sept 22 20:07 No Changes | 1s | 3min 48s | 562ms |

As we can see the SonarQube analysis is completed

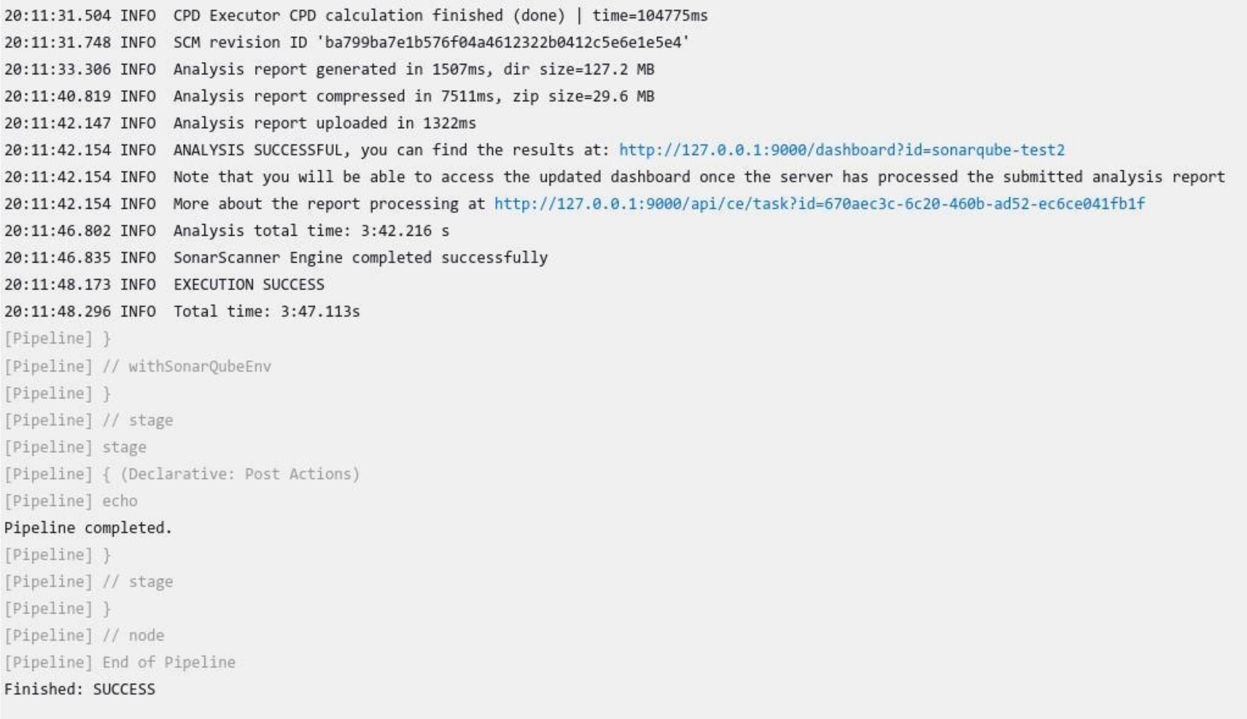
10. Check the console output once the build is complete.



**Console Output**

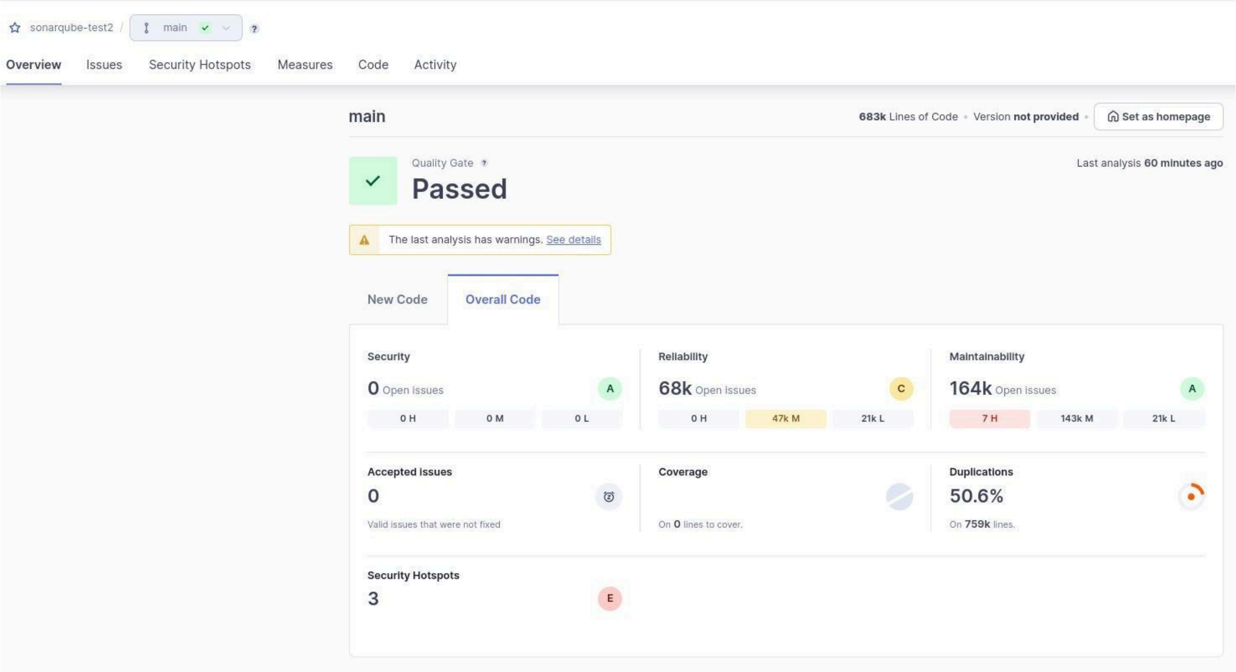
Skipping 4,226 KB.. Full Log

```
20:11:28.619 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/ReportMainFrame.WindowHappenings.html for block at line 296. Keep only the first 100
references.
20:11:28.619 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/ReportMainFrame.WindowHappenings.html for block at line 17. Keep only the first 100
references.
20:11:28.619 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/ReportMainFrame.WindowHappenings.html for block at line 212. Keep only the first 100
references.
20:11:28.619 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/ReportMainFrame.WindowHappenings.html for block at line 215. Keep only the first 100
references.
20:11:28.619 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/ReportMainFrame.WindowHappenings.html for block at line 298. Keep only the first 100
references.
20:11:28.619 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/ReportMainFrame.WindowHappenings.html for block at line 300. Keep only the first 100
references.
20:11:28.619 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/ReportMainFrame.WindowHappenings.html for block at line 215. Keep only the first 100
references.
20:11:28.619 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/ReportMainFrame.WindowHappenings.html for block at line 225. Keep only the first 100
```



```
20:11:31.504 INFO  CPD Executor CPD calculation finished (done) | time=104775ms
20:11:31.748 INFO  SCM revision ID 'ba799ba7e1b576f04a4612322b0412c5e6e1e5e4'
20:11:33.306 INFO  Analysis report generated in 1507ms, dir size=127.2 MB
20:11:40.819 INFO  Analysis report compressed in 7511ms, zip size=29.6 MB
20:11:42.147 INFO  Analysis report uploaded in 1322ms
20:11:42.154 INFO  ANALYSIS SUCCESSFUL, you can find the results at: http://127.0.0.1:9000/dashboard?id=sonarqube-test2
20:11:42.154 INFO  Note that you will be able to access the updated dashboard once the server has processed the submitted analysis report
20:11:42.154 INFO  More about the report processing at http://127.0.0.1:9000/api/ce/task?id=670aec3c-6c20-460b-ad52-ec6ce041fb1f
20:11:46.802 INFO  Analysis total time: 3:42.216 s
20:11:46.835 INFO  SonarScanner Engine completed successfully
20:11:48.173 INFO  EXECUTION SUCCESS
20:11:48.296 INFO  Total time: 3:47.113s
[Pipeline] }
[Pipeline] // withSonarQubeEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] stage
[Pipeline] { (Declarative: Post Actions)
[Pipeline] echo
Pipeline completed.
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

11. After that, check the project in SonarQube.



main

683k Lines of Code • Version not provided

Quality Gate

Passed

Last analysis 60 minutes ago

The last analysis has warnings. See details

Security

0 Open issues A

0 H 0 M 0 L

Reliability

68k Open issues C

0 H 47k M 21k L

Maintainability

164k Open issues A

7 H 143k M 21k L

Accepted issues

0

Valid issues that were not fixed

Coverage

On 0 lines to cover.

Duplications

50.6%

On 759k lines.

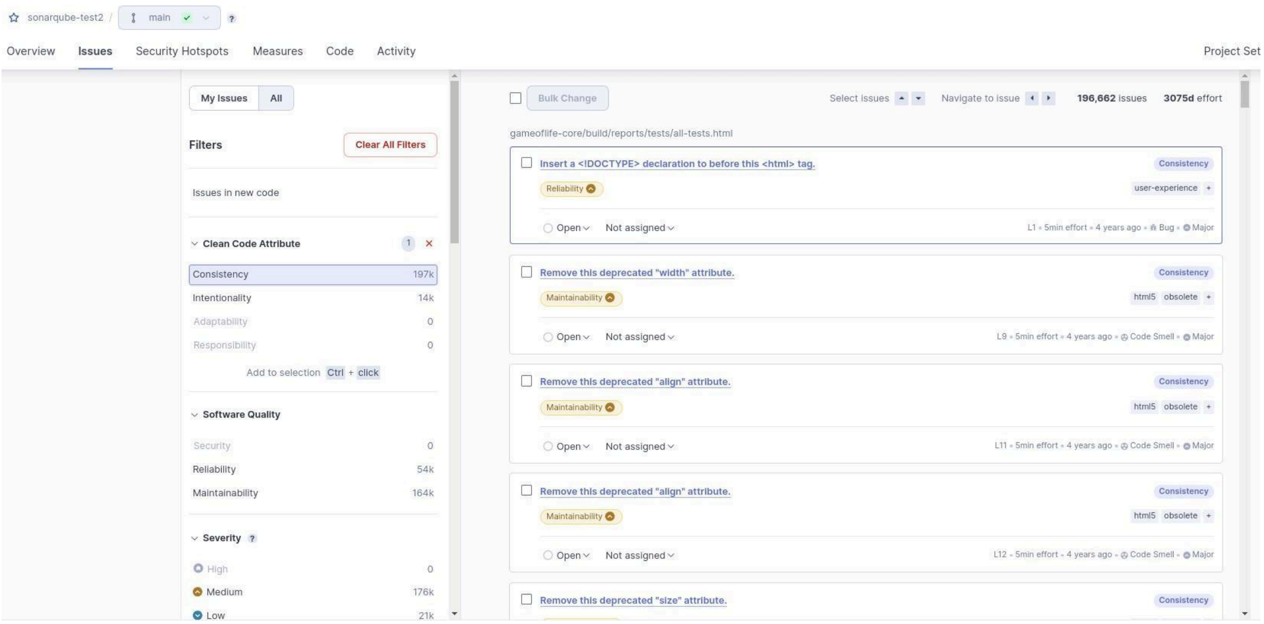
Security Hotspots

3 E

Under different tabs, check all different issues with the code

## 12. Code Problems-

Name:Kaushal Galav Div:D15C Roll no:11



☆ sonarqube-test2 / main ✓ ?

Overview | **Issues** | Security Hotspots | Measures | Code | Activity | Project Set

My Issues | All

**Filters** Clear All Filters

Issues in new code

**Clean Code Attribute** 1 ✕

| | |
|---|---|
| Consistency | 197k |
| Intentionality | 14k |
| Adaptability | 0 |
| Responsibility | 0 |

Add to selection Ctrl + click

**Software Quality**

| | |
|---|---|
| Security | 0 |
| Reliability | 54k |
| Maintainability | 164k |

**Severity** ?

| | |
|---|---|
| High | 0 |
| Medium | 176k |
| Low | 21k |

□ Bulk Change Select issues Navigate to issue **196,662** issues **3075d** effort

gameoflife-core/build/reports/tests/all-tests.html

□ Insert a <!DOCTYPE> declaration to before this <html> tag. — Consistency
Reliability — user-experience +
○ Open Not assigned — L1 • 5min effort • 4 years ago • Bug • Major

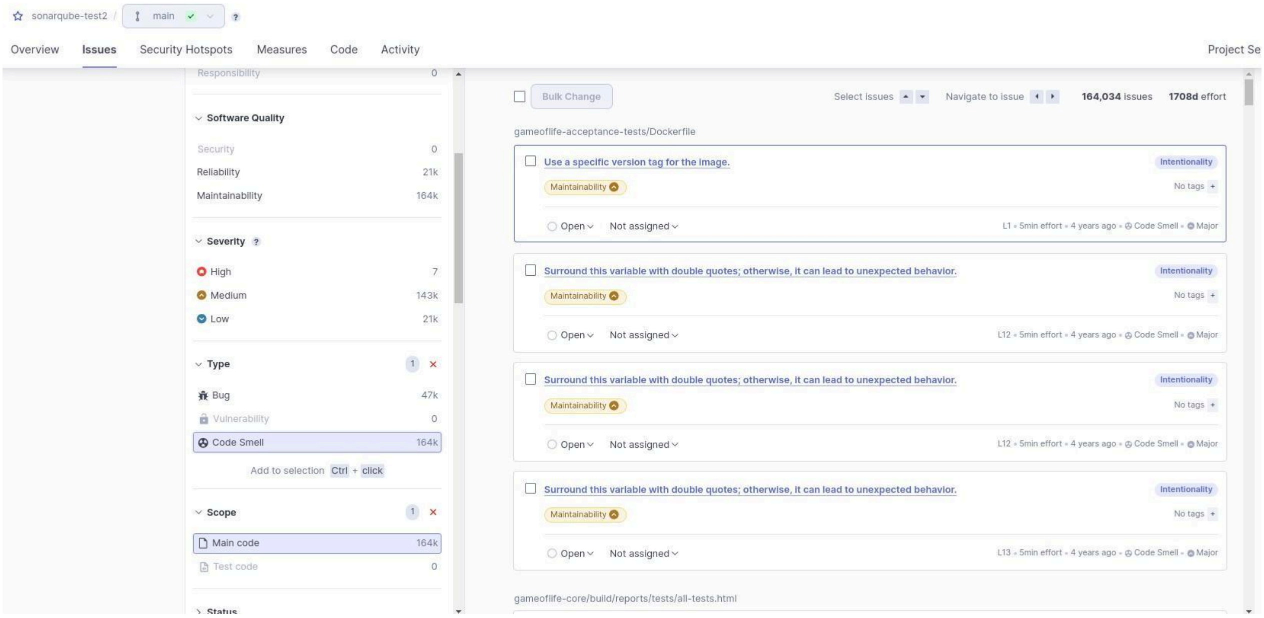
□ Remove this deprecated "width" attribute. — Consistency
Maintainability — html5 obsolete +
○ Open Not assigned — L9 • 5min effort • 4 years ago • Code Smell • Major

□ Remove this deprecated "align" attribute. — Consistency
Maintainability — html5 obsolete +
○ Open Not assigned — L11 • 5min effort • 4 years ago • Code Smell • Major

□ Remove this deprecated "align" attribute. — Consistency
Maintainability — html5 obsolete +
○ Open Not assigned — L12 • 5min effort • 4 years ago • Code Smell • Major

□ Remove this deprecated "size" attribute. — Consistency

## Code Smells



☆ sonarqube-test2 / main ✓ ?

Overview | **Issues** | Security Hotspots | Measures | Code | Activity | Project Se

Responsibility 0

**Software Quality**

| | |
|---|---|
| Security | 0 |
| Reliability | 21k |
| Maintainability | 164k |

**Severity** ?

| | |
|---|---|
| High | 7 |
| Medium | 143k |
| Low | 21k |

**Type** 1 ✕

| | |
|---|---|
| Bug | 47k |
| Vulnerability | 0 |
| Code Smell | 164k |

Add to selection Ctrl + click

**Scope** 1 ✕

| | |
|---|---|
| Main code | 164k |
| Test code | 0 |

Status

□ Bulk Change Select issues Navigate to issue **164,034** issues **1708d** effort

gameoflife-acceptance-tests/Dockerfile

□ Use a specific version tag for the image. — Intentionality
Maintainability — No tags +
○ Open Not assigned — L1 • 5min effort • 4 years ago • Code Smell • Major

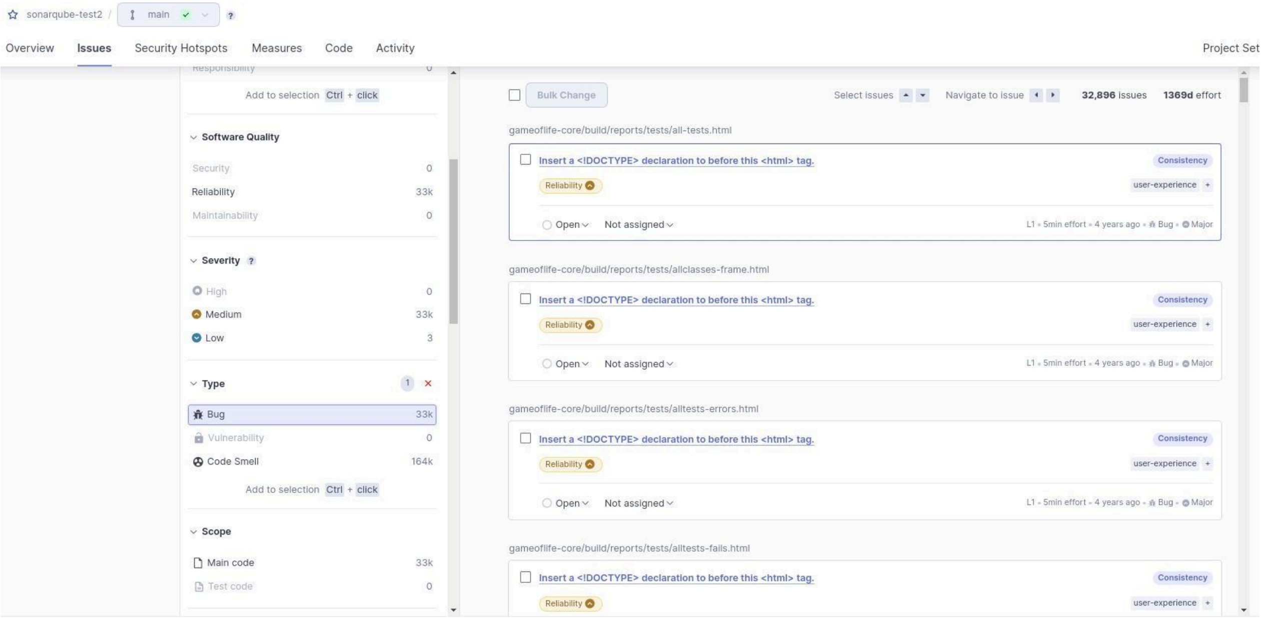
□ Surround this variable with double quotes; otherwise, it can lead to unexpected behavior. — Intentionality
Maintainability — No tags +
○ Open Not assigned — L12 • 5min effort • 4 years ago • Code Smell • Major

□ Surround this variable with double quotes; otherwise, it can lead to unexpected behavior. — Intentionality
Maintainability — No tags +
○ Open Not assigned — L12 • 5min effort • 4 years ago • Code Smell • Major

□ Surround this variable with double quotes; otherwise, it can lead to unexpected behavior. — Intentionality
Maintainability — No tags +
○ Open Not assigned — L13 • 5min effort • 4 years ago • Code Smell • Major

gameoflife-core/build/reports/tests/all-tests.html

## Bugs



32,896 issues 1369d effort

Software Quality

| | |
|---|---|
| Security | 0 |
| Reliability | 33k |
| Maintainability | 0 |

Severity

| | |
|---|---|
| High | 0 |
| Medium | 33k |
| Low | 3 |

Type

| | |
|---|---|
| Bug | 33k |
| Vulnerability | 0 |
| Code Smell | 164k |

Scope

| | |
|---|---|
| Main code | 33k |
| Test code | 0 |

gameoflife-core/build/reports/tests/all-tests.html

Insert a <!DOCTYPE> declaration to before this <html> tag. Consistency
Reliability user-experience
Open Not assigned L1 · 5min effort · 4 years ago · Bug · Major

gameoflife-core/build/reports/tests/allclasses-frame.html

Insert a <!DOCTYPE> declaration to before this <html> tag. Consistency
Reliability user-experience
Open Not assigned L1 · 5min effort · 4 years ago · Bug · Major

gameoflife-core/build/reports/tests/alltests-errors.html

Insert a <!DOCTYPE> declaration to before this <html> tag. Consistency
Reliability user-experience
Open Not assigned L1 · 5min effort · 4 years ago · Bug · Major

gameoflife-core/build/reports/tests/alltests-fails.html

Insert a <!DOCTYPE> declaration to before this <html> tag. Consistency
Reliability user-experience

**Conclusion:** We began the experiment with creating a new project in SonarQube and setting up a new Pipeline in Jenkins with proper configuration of pipeline script. Then we installed Sonar Scanner CLI so that jenkins can do code analysis of Git Repository. We can also configure the pipeline to use the installed Sonar Scanner plugin instead of locally installed Binary of Sonar Scanner.The pipeline ran successfully with all tests passed in SonarQube