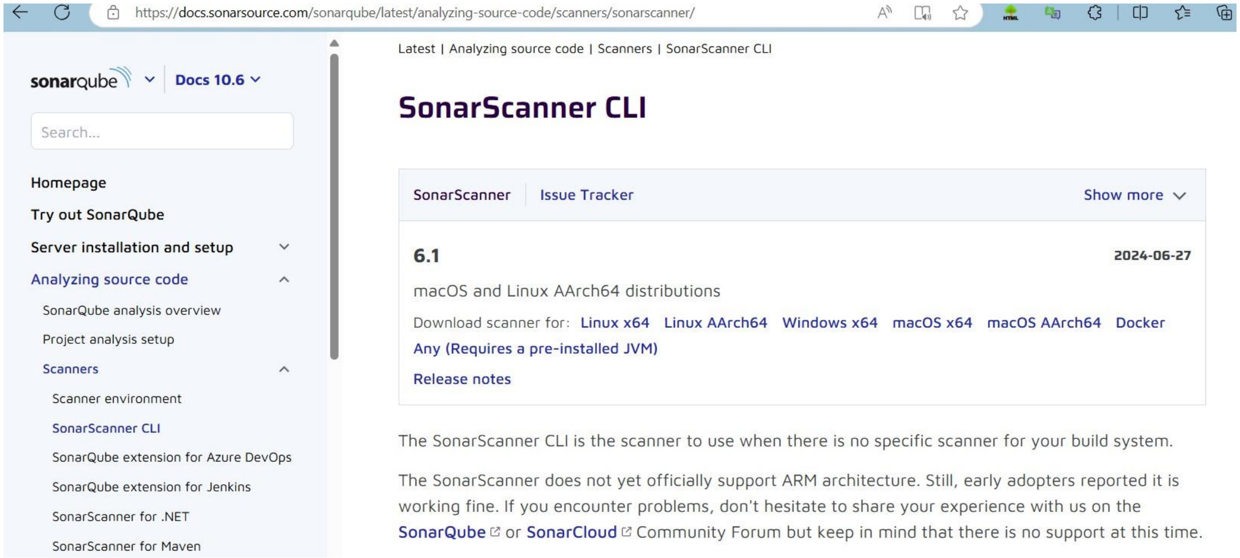
08 Advanced DevOps Lab

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.

Step 1: Download sonar scanner

https://docs.sonarsource.com/sonarqube/latest/analyzing-source-code/scanners/sonarscanner/
Visit this link and download the sonarqube scanner CLI.



https://docs.sonarsource.com/sonarqube/latest/analyzing-source-code/scanners/sonarscanner/
sonarqube
Docs 10.6
Search...
Homepage
Try out SonarQube
Server installation and setup
Analyzing source code
SonarQube analysis overview
Project analysis setup
Scanners
Scanner environment
SonarScanner CLI
SonarQube extension for Azure DevOps
SonarQube extension for Jenkins
SonarScanner for .NET
SonarScanner for Maven
Latest | Analyzing source code | Scanners | SonarScanner CLI
SonarScanner
Issue Tracker
Show more

SonarScanner CLI

6.1 2024-06-27

macOS and Linux AArch64 distributions

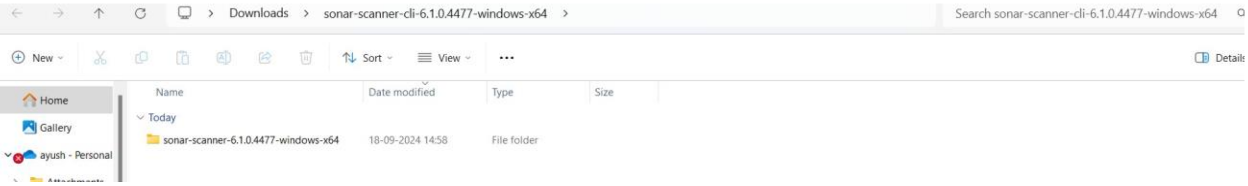
Download scanner for: Linux x64 Linux AArch64 Windows x64 macOS x64 macOS AArch64 Docker Any (Requires a pre-installed JVM)

Release notes

The SonarScanner CLI is the scanner to use when there is no specific scanner for your build system.

The SonarScanner does not yet officially support ARM architecture. Still, early adopters reported it is working fine. If you encounter problems, don't hesitate to share your experience with us on the SonarQube or SonarCloud Community Forum but keep in mind that there is no support at this time.

Extract the downloaded zip file in a folder.

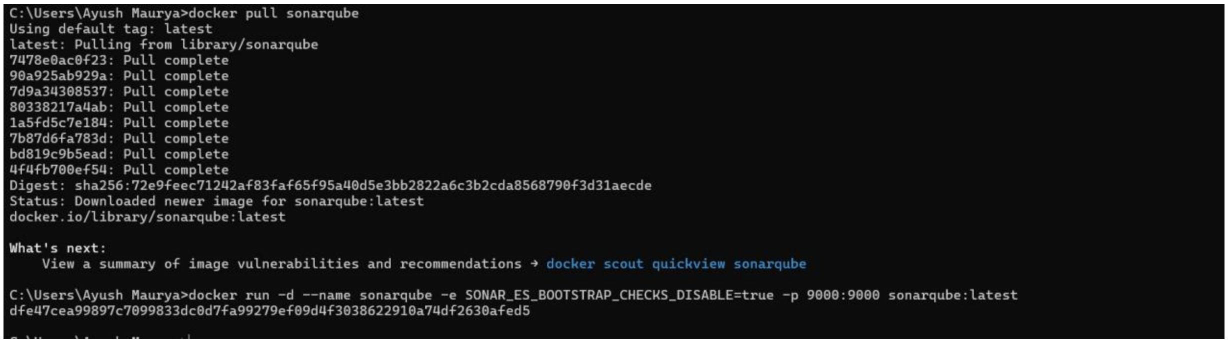


Downloads
sonar-scanner-cli-6.1.0.4477-windows-x64
Search sonar-scanner-cli-6.1.0.4477-windows-x64
New
Sort
View
Details
Home
Gallery
ayush - Personal
Name
Date modified
Type
Size
Today

Name	Date modified	Type	Size
sonar-scanner-6.1.0.4477-windows-x64	18-09-2024 14:58	File folder	

1. Install sonarqube image

Command: **docker pull sonarqube**

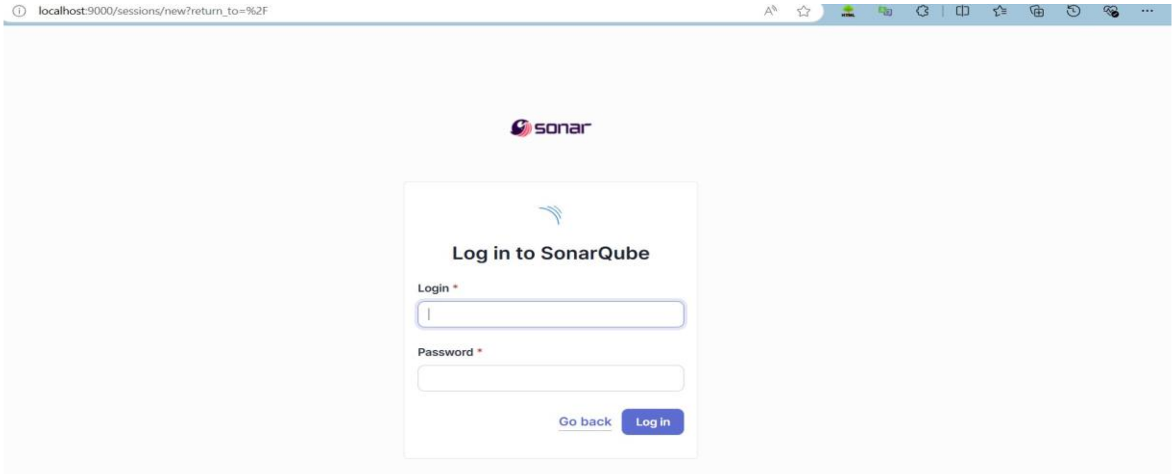


```
C:\Users\Ayush Maurya>docker pull sonarqube
Using default tag: latest
latest: Pulling from library/sonarqube
7478e0ac0f23: Pull complete
90a925ab929a: Pull complete
7d9a34308537: Pull complete
80338217a4ab: Pull complete
1a5fd5c7e184: Pull complete
7b87d6fa783d: Pull complete
bd819c9b5ead: Pull complete
4f4fb700ef54: Pull complete
Digest: sha256:72e9feec71242af83faf65f95a40d5e3bb2822a6c3b2cda8568790f3d31aecde
Status: Downloaded newer image for sonarqube:latest
docker.io/library/sonarqube:latest

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

C:\Users\Ayush Maurya>docker run -d --name sonarqube -e SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000 sonarqube:latest
dfe47cea99897c7099833dc0d7fa99279ef09d4f3038622910a74df2630afed5
```

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



localhost:9000/sessions/new?return_to=%2F

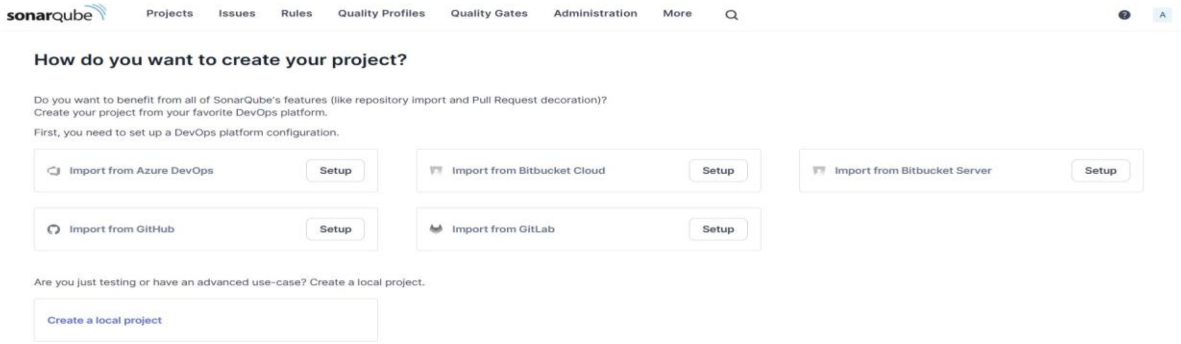
sonar

Log in to SonarQube

Login *

Password *

3. Login to SonarQube using username admin and password admin.



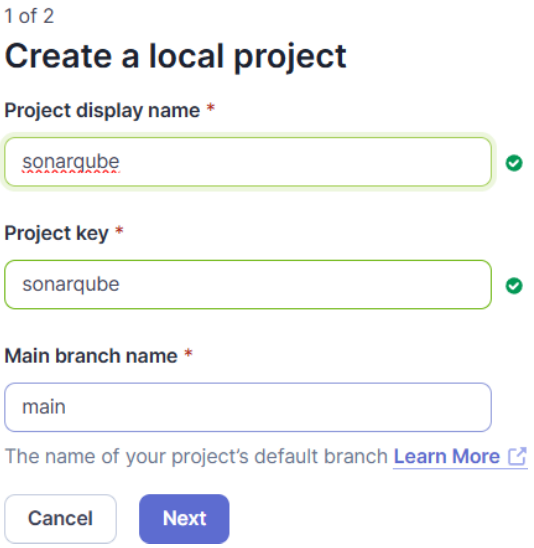
How do you want to create your project?

Do you want to benefit from all of SonarQube's features (like repository import and Pull Request decoration)?
Create your project from your favorite DevOps platform.

First, you need to set up a DevOps platform configuration.

Are you just testing or have an advanced use-case? Create a local project.

4. Create a manual project in SonarQube with the name sonarqube



1 of 2

Create a local project

Project display name *

sonarqube

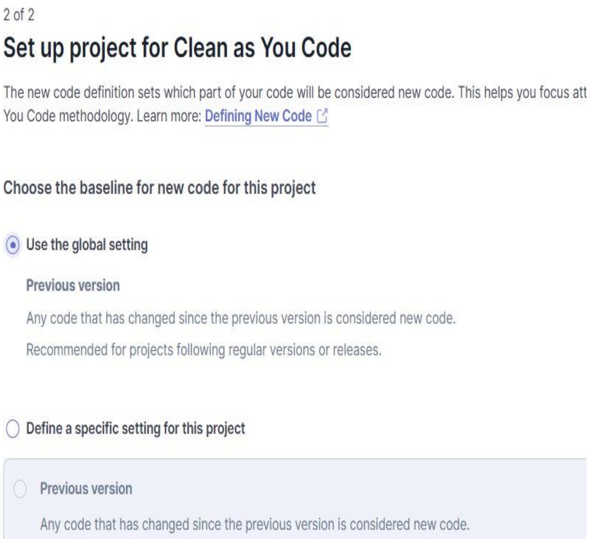
Project key *

sonarqube

Main branch name *

main

The name of your project's default branch Learn More



2 of 2

Set up project for Clean as You Code

The new code definition sets which part of your code will be considered new code. This helps you focus att
You Code methodology. Learn more: Defining New Code

Choose the baseline for new code for this project

● Use the global setting

Previous version

Any code that has changed since the previous version is considered new code.

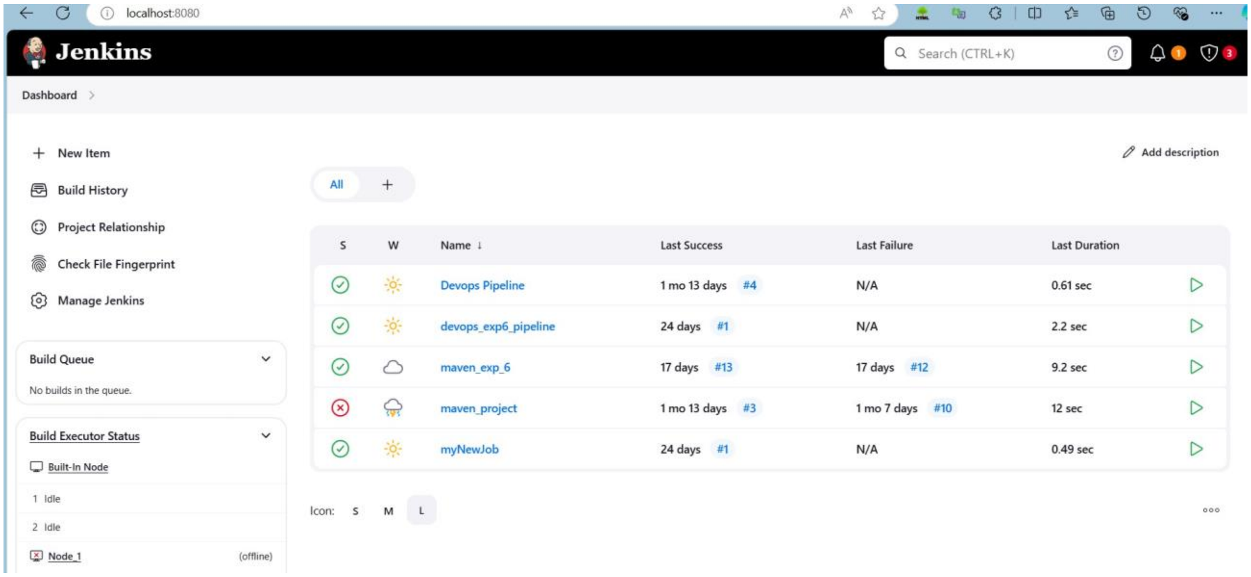
Recommended for projects following regular versions or releases.

○ Define a specific setting for this project

○ Previous version

Any code that has changed since the previous version is considered new code.

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

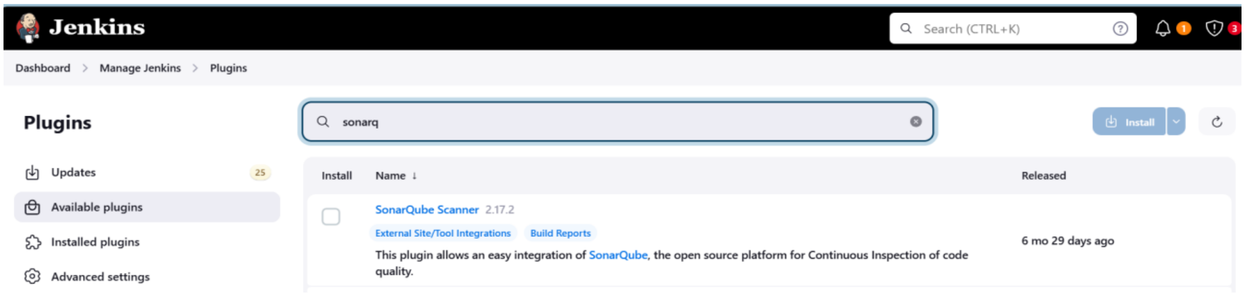


No builds in the queue.

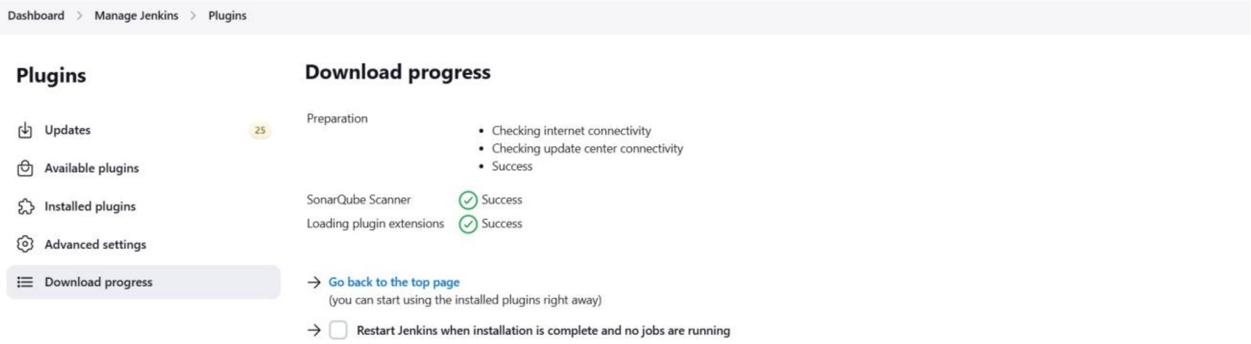
Built-In Node
1 Idle
2 Idle
Node_1 (offline)

S	W	Name ↓	Last Success	Last Failure	Last Duration
✓	☀	Devops Pipeline	1 mo 13 days #4	N/A	0.61 sec
✓	☀	devops_exp6_pipeline	24 days #1	N/A	2.2 sec
✓	☁	maven_exp_6	17 days #13	17 days #12	9.2 sec
⊗	☂	maven_project	1 mo 13 days #3	1 mo 7 days #10	12 sec
✓	☀	myNewJob	24 days #1	N/A	0.49 sec

6. Go to Manage Jenkins and search for SonarQube Scanner for Jenkins and install it.



Install	Name ↓	Released
□	SonarQube Scanner 2.17.2 External Site/Tool Integrations Build Reports This plugin allows an easy integration of SonarQube, the open source platform for Continuous Inspection of code quality.	6 mo 29 days ago



Download progress

Preparation
- Checking internet connectivity
- Checking update center connectivity
- Success

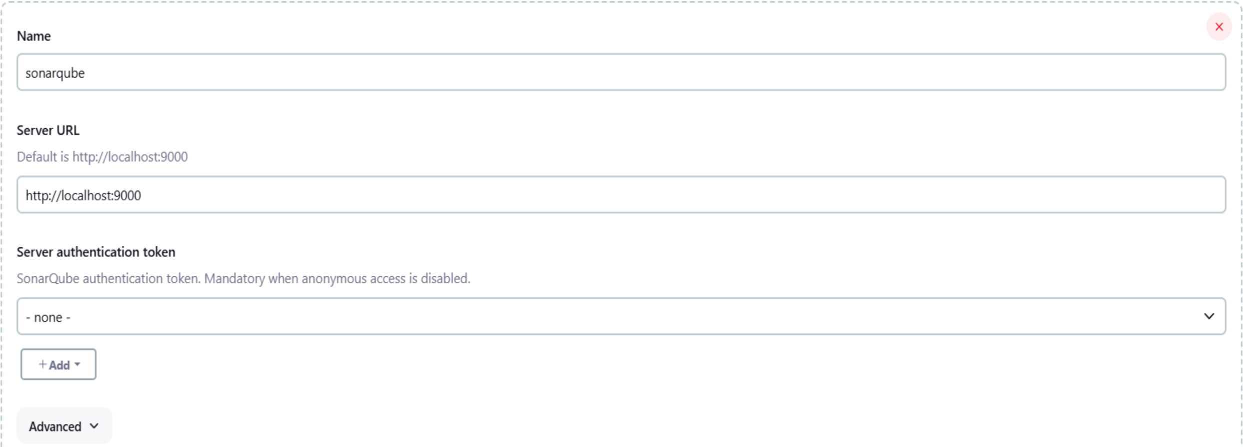
SonarQube Scanner ✓ Success
Loading plugin extensions ✓ Success

→ Go back to the top page
(you can start using the installed plugins right away)

→ □ Restart Jenkins when installation is complete and no jobs are running

7. Under Jenkins ‘Manage Jenkins’ then go to ‘system’, scroll and look for **SonarQube Servers** and enter the details.
Enter the Server Authentication token if needed.

In SonarQube installations: Under **Name** add <project name of sonarqube> for me **adv_devops_7_sonarqube**
In **Server URL** Default is **http://localhost:9000**



Name

sonarqube

Server URL

Default is http://localhost:9000

http://localhost:9000

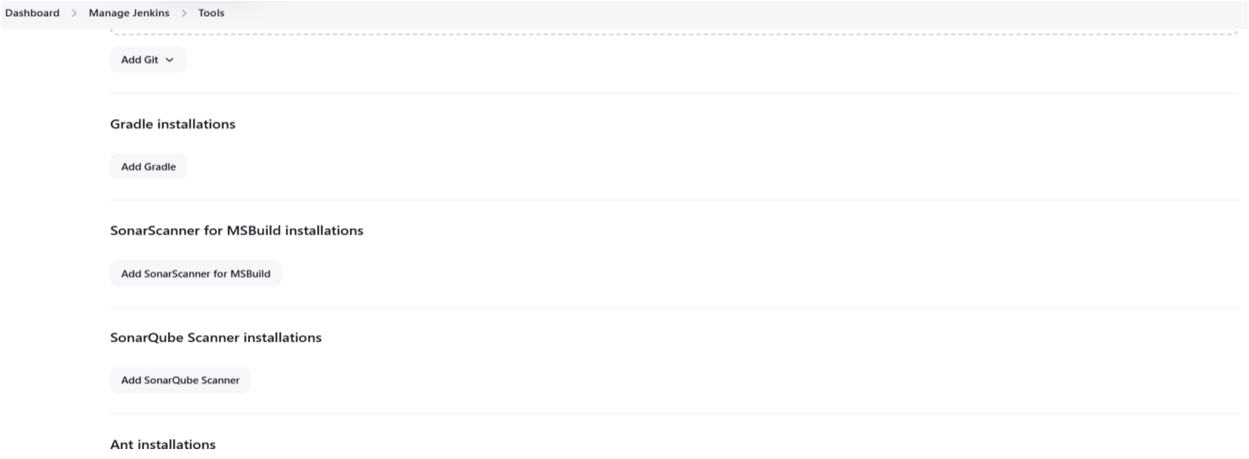
Server authentication token

SonarQube authentication token. Mandatory when anonymous access is disabled.

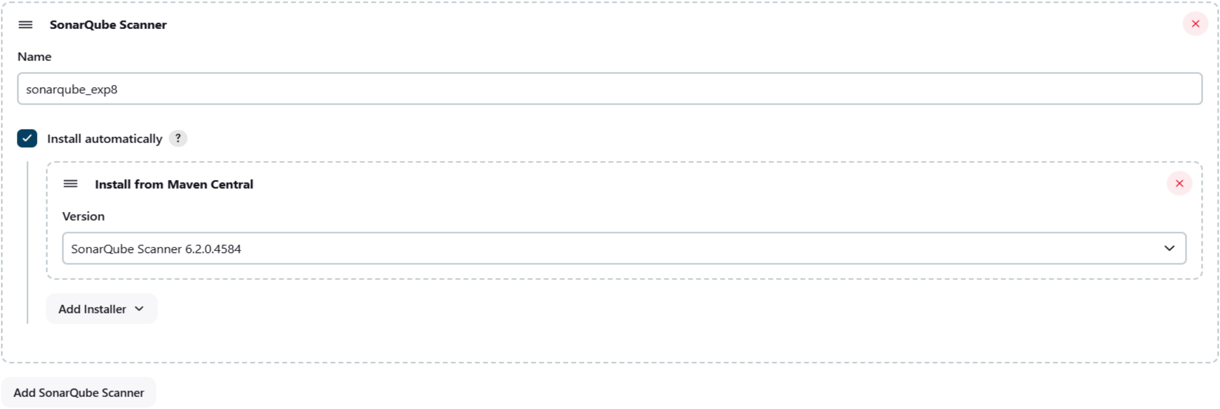
- none -

8. Search for SonarQube Scanner under Global Tool Configuration. Choose the latest configuration and choose Install automatically.

Dashboard > Manage Jenkins > Tools



Check the “Install automatically” option. → Under name any name as identifier → Check the “Install automatically” option.



SonarQube Scanner

Name

sonarqube_exp8

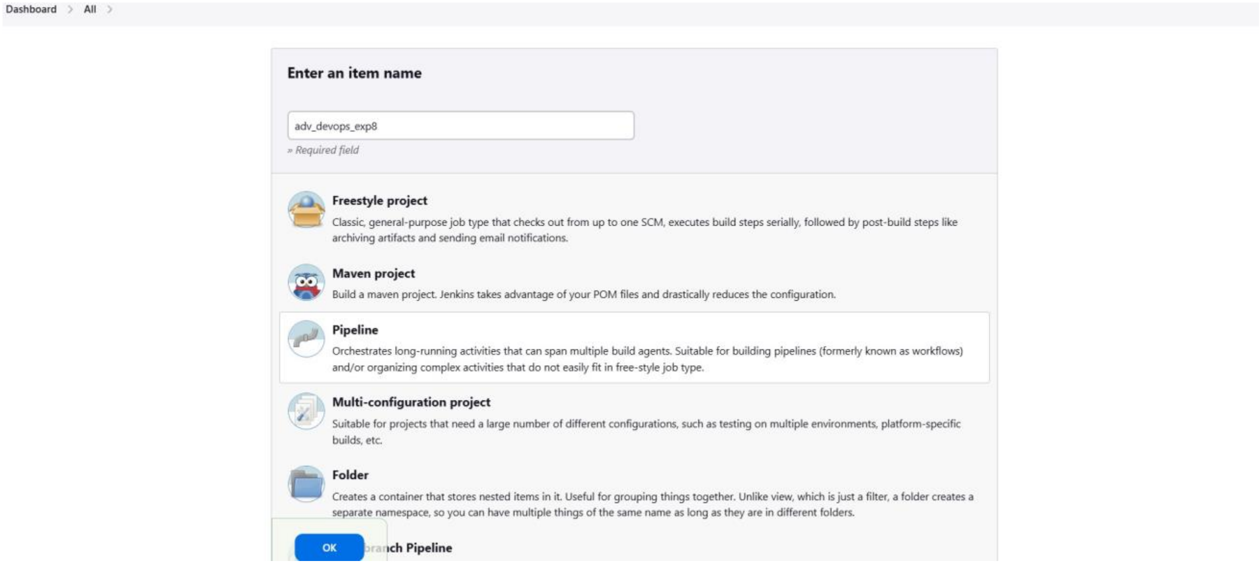
☑ Install automatically ?

Install from Maven Central

Version

SonarQube Scanner 6.2.0.4584

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



Dashboard > All >

Enter an item name

adv_devops_exp8

» Required field

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.

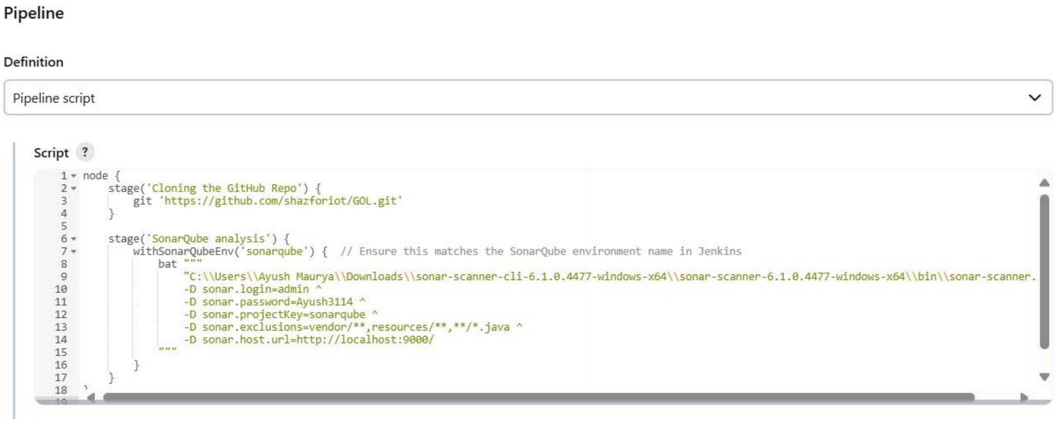
ranch Pipeline

10. Under Pipeline script, enter the following:

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

    stage('SonarQube analysis') {
        withSonarQubeEnv('<Name_of_SonarQube_environment_on_Jenkins>') {
            sh """
                <PATH_TO_SONARQUBE_SCANNER_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=<SonarQube_URL>(default: 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

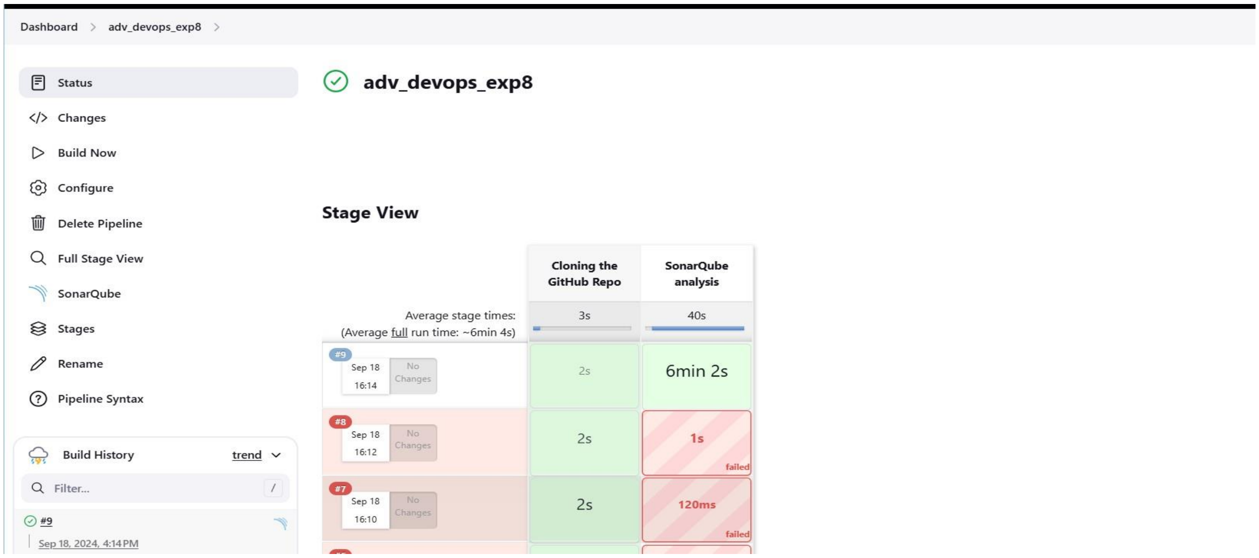
Pipeline script

Script

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

    stage('SonarQube analysis') {
        withSonarQubeEnv('sonarqube') {  // Ensure this matches the SonarQube environment name in Jenkins
            bat """
                "C:\\Users\\Ayush Maurya\\Downloads\\sonar-scanner-cli-6.1.0.4477-windows-x64\\sonar-scanner-6.1.0.4477-windows-x64\\bin\\sonar-scanner.
                -D sonar.login=admin ^
                -D sonar.password=Ayush3114 ^
                -D sonar.projectKey=sonarqube ^
                -D sonar.exclusions=vendor/**,resources/**,**/*.java ^
                -D sonar.host.url=http://localhost:9000/
            """
        }
    }
}
```

11. Build project

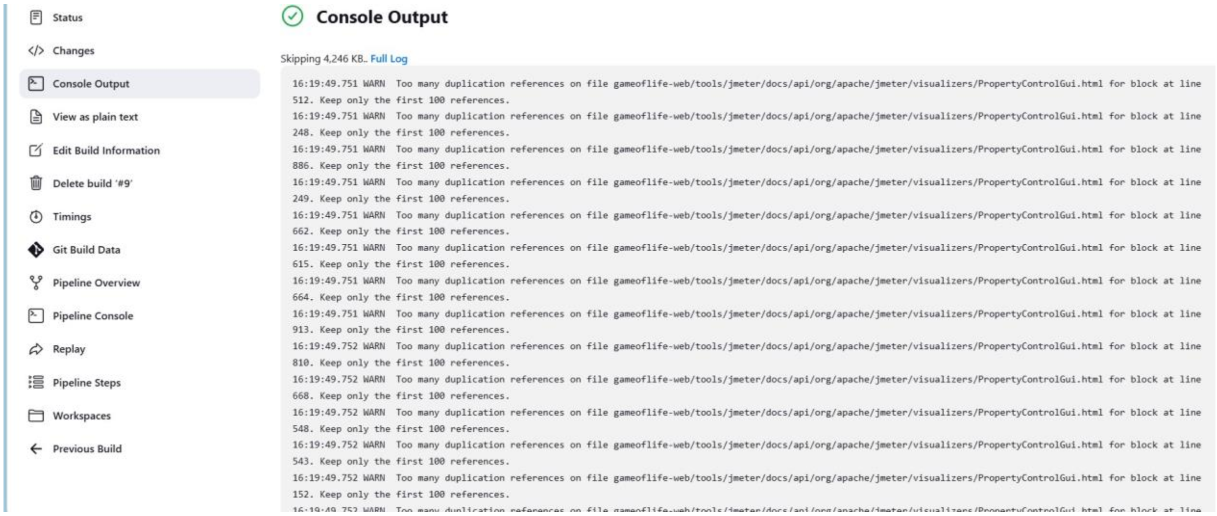


adv_devops_exp8

Stage View

	Cloning the GitHub Repo	SonarQube analysis
Average stage times: (Average full run time: ~6min 4s)	3s	40s
#9 Sep 18 16:14 No Changes	2s	6min 2s
#8 Sep 18 16:12 No Changes	2s	1s failed
#7 Sep 18 16:10 No Changes	2s	120ms failed

12. Check console

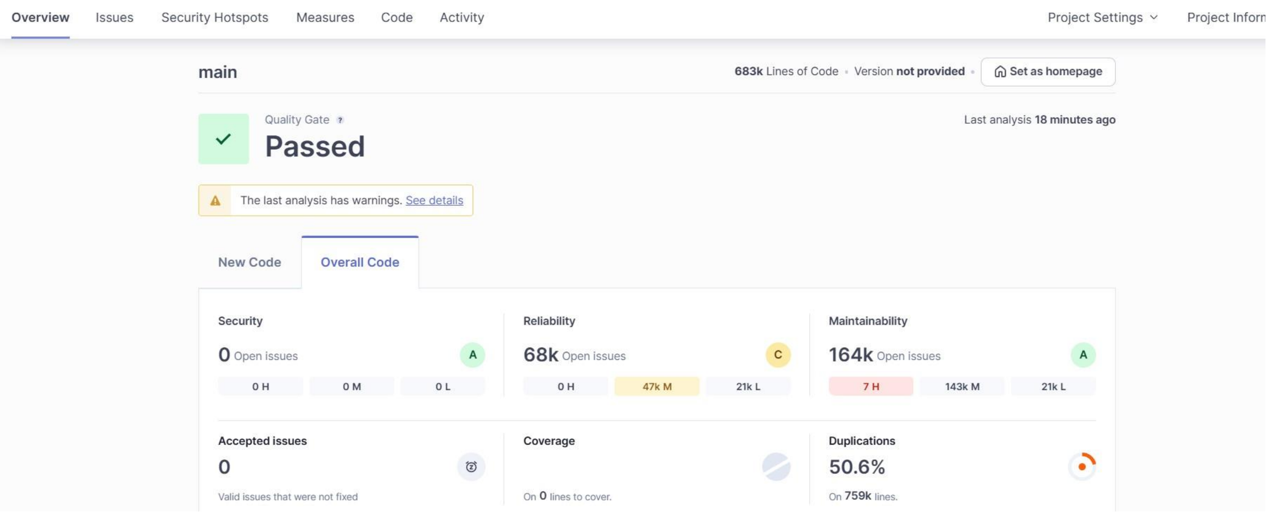


Console Output

Skipping 4,246 KB.. Full Log

```
16:19:49.751 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
512. Keep only the first 100 references.
16:19:49.751 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
248. Keep only the first 100 references.
16:19:49.751 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
886. Keep only the first 100 references.
16:19:49.751 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
249. Keep only the first 100 references.
16:19:49.751 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
662. Keep only the first 100 references.
16:19:49.751 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
615. Keep only the first 100 references.
16:19:49.751 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
664. Keep only the first 100 references.
16:19:49.751 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
913. Keep only the first 100 references.
16:19:49.752 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
810. Keep only the first 100 references.
16:19:49.752 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
668. Keep only the first 100 references.
16:19:49.752 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
548. Keep only the first 100 references.
16:19:49.752 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
543. Keep only the first 100 references.
16:19:49.752 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
152. Keep only the first 100 references.
16:19:49.752 WARN  Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/PropertyControlGui.html for block at line
```

13. Now, check the project in SonarQube



Overview Issues Security Hotspots Measures Code Activity Project Settings Project Inforn

main

683k Lines of Code · Version not provided · Set as homepage

Quality Gate

Passed

Last analysis 18 minutes ago

The last analysis has warnings. See details

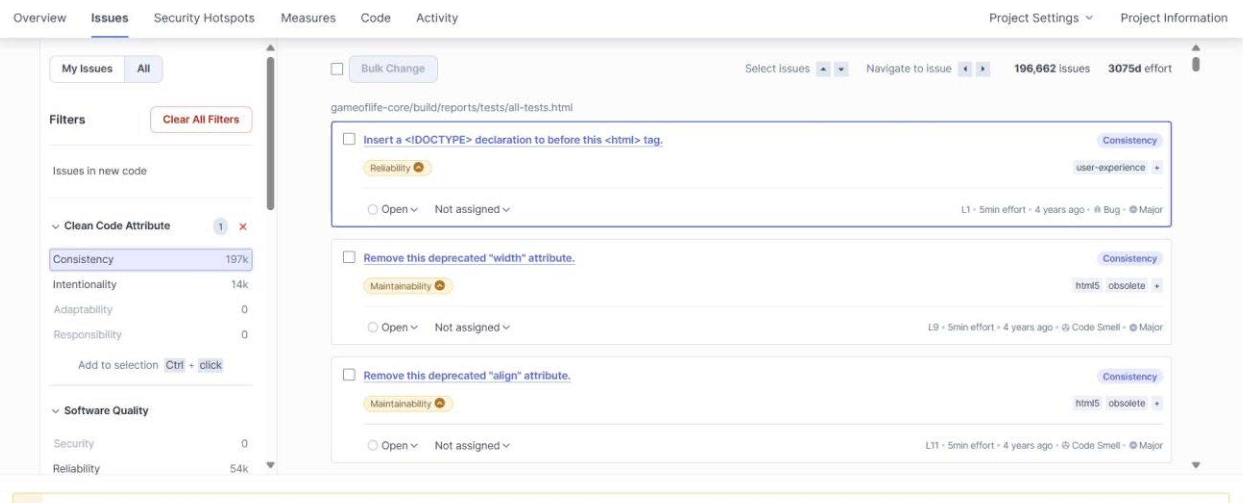
New Code | Overall Code

Security	Reliability	Maintainability
0 Open issues A	68k Open issues C	164k Open issues A
0 H · 0 M · 0 L	0 H · 47k M · 21k L	7 H · 143k M · 21k L

Accepted issues	Coverage	Duplications
0		50.6%
Valid issues that were not fixed	On 0 lines to cover.	On 759k lines.

14. Code Problems

- Consistency



Overview Issues Security Hotspots Measures Code Activity Project Settings Project Information

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

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

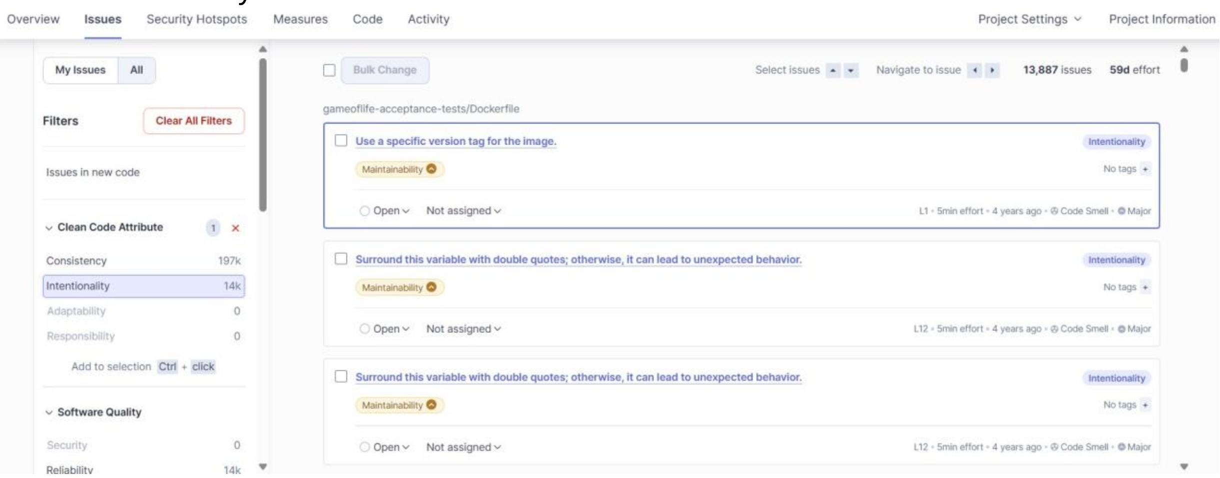
gameoflife-core/build/reports/tests/all-tests.html

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

- Intentionality



Overview Issues Security Hotspots Measures Code Activity Project Settings Project Information

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	14k

Bulk Change Select issues Navigate to issue 13,887 issues 59d effort

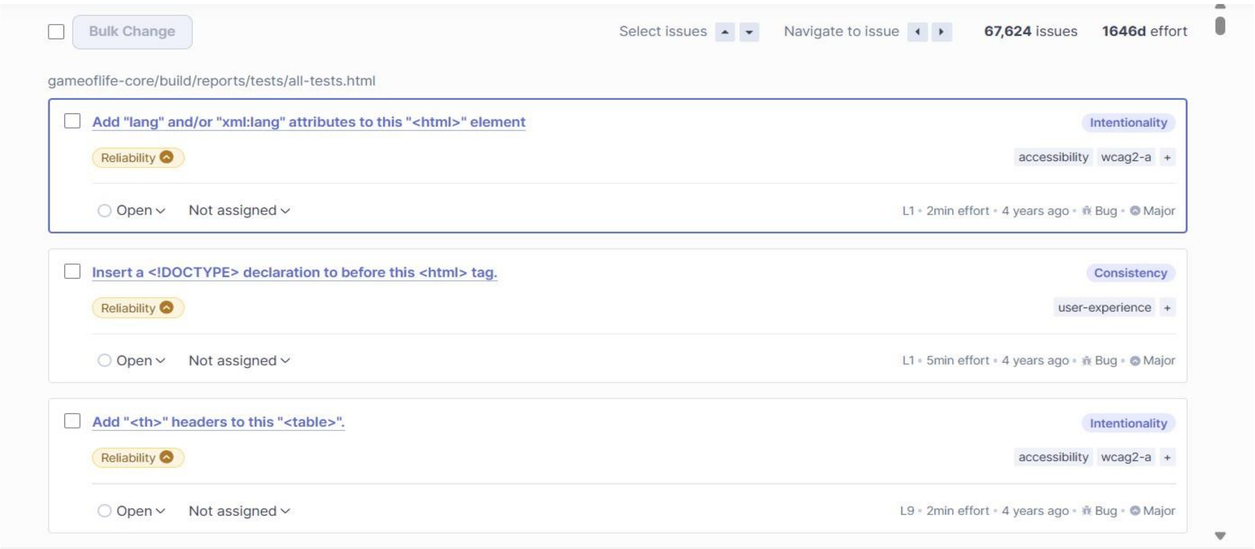
gameoflife-acceptance-tests/Dockerfile

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

- Bugs



67,624 issues 1646d effort

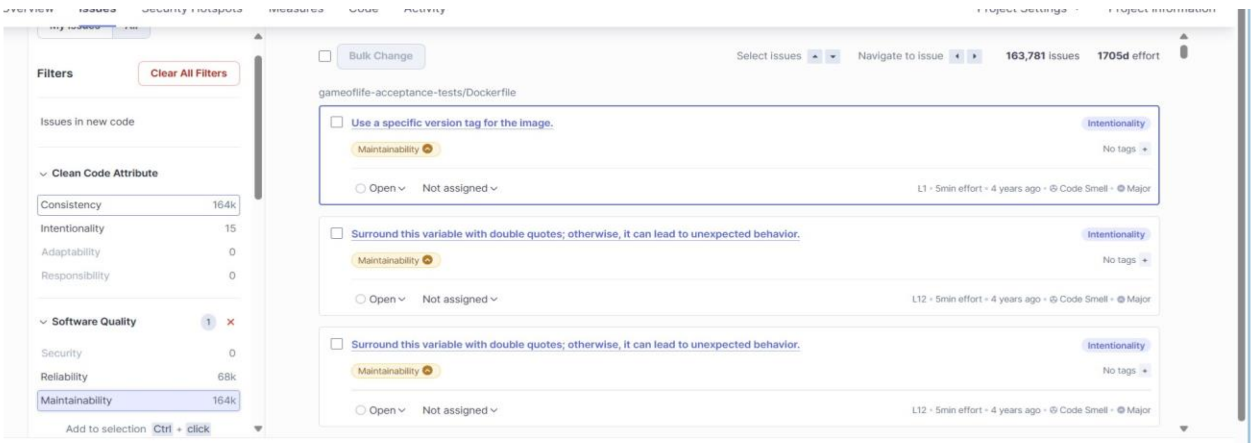
gameoflife-core/build/reports/tests/all-tests.html

□ Add "lang" and/or "xml:lang" attributes to this "<html>" element
Intentionality
Reliability
accessibility wcag2-a +
○ Open ⌄ Not assigned ⌄
L1 • 2min effort • 4 years ago • Bug • Major

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

□ Add "<th>" headers to this "<table>".
Intentionality
Reliability
accessibility wcag2-a +
○ Open ⌄ Not assigned ⌄
L9 • 2min effort • 4 years ago • Bug • Major

- Code Smells



Issues in new code

⌄ Clean Code Attribute

Consistency	164k
Intentionality	15
Adaptability	0
Responsibility	0

⌄ Software Quality 1 ×

Security	0
Reliability	68k
Maintainability	164k

Add to selection Ctrl + click

163,781 issues 1705d effort

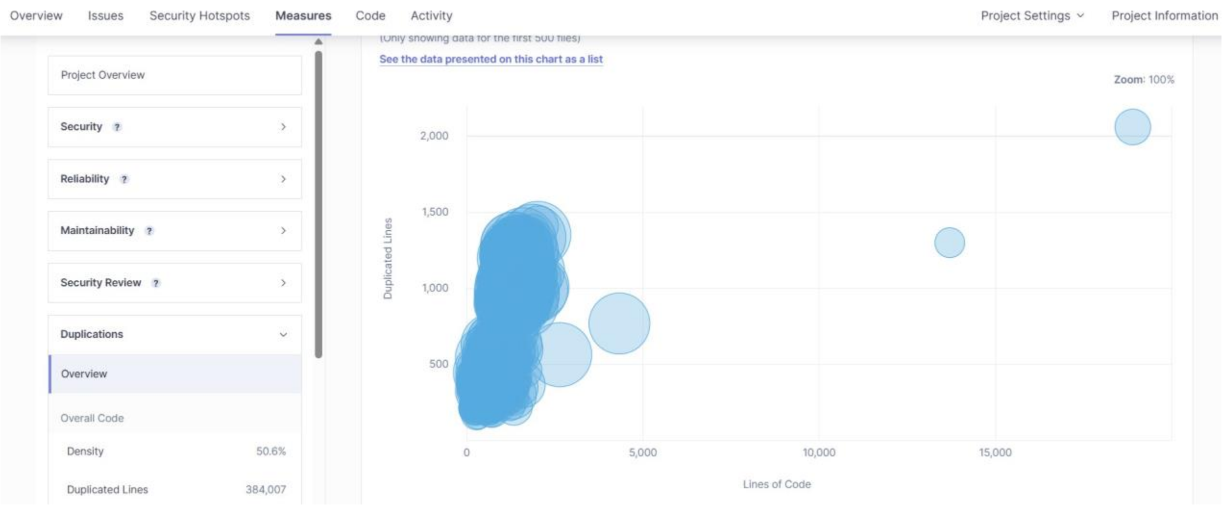
gameoflife-acceptance-tests/Dockerfile

□ 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

- Duplications



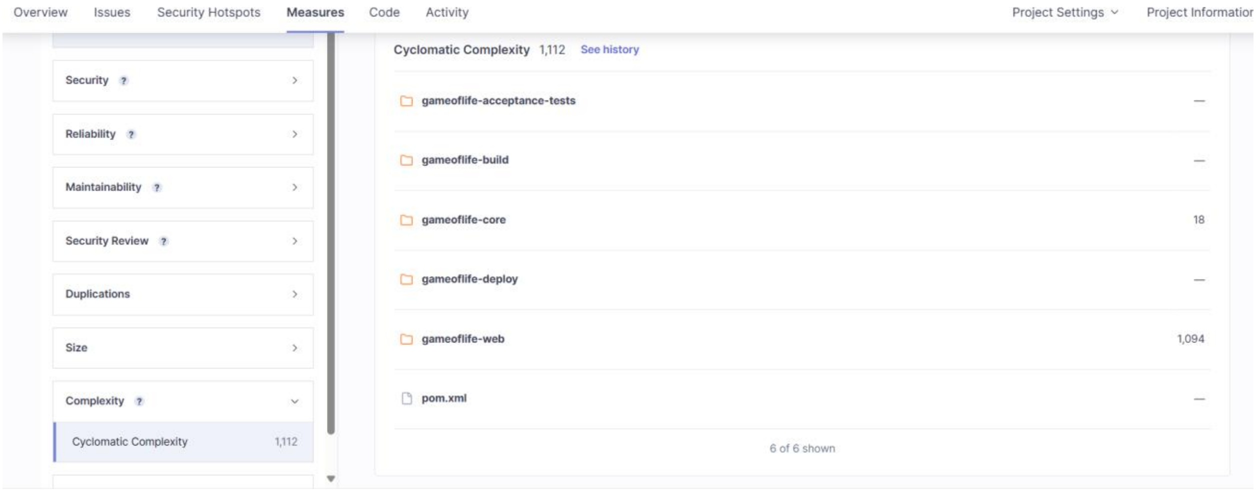
(Only showing data for the first 500 files)

See the data presented on this chart as a list

Overall Code

Density	50.6%
Duplicated Lines	384,007

- Cyclomatic Complexities



Cyclomatic Complexity 1,112

gameoflife-acceptance-tests	—
gameoflife-build	—
gameoflife-core	18
gameoflife-deploy	—
gameoflife-web	1,094
pom.xml	—

6 of 6 shown

In this way, we have integrated Jenkins with SonarQube for SAST.

Conclusion:

In this experiment, we integrated Jenkins with SonarQube to enable automated code quality checks within our CI/CD pipeline. We started by deploying SonarQube using Docker, setting up a project, and configuring it to analyze code quality. Next, we configured Jenkins by installing the SonarQube Scanner plugin, adding SonarQube server details, and setting up the scanner tool. We then developed a Jenkins pipeline to automate the process of cloning a GitHub repository and running SonarQube analysis on the code. This integration helps ensure continuous monitoring of code quality, detecting issues such as bugs, code smells, and security vulnerabilities throughout the development process.