

Name: Hrishikesh Kumbhar

Div: D15A

Roll no: 32

Sub: Advanced DevOps

Experiment No: 8

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.

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

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

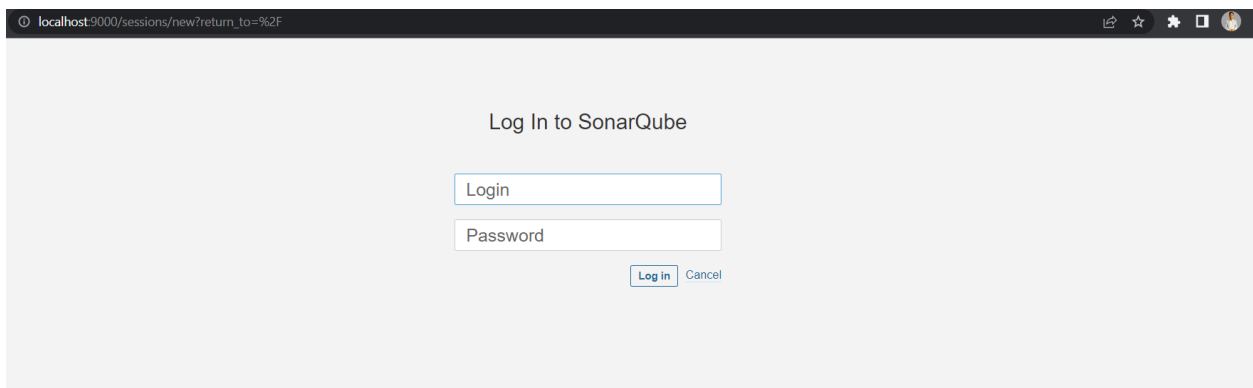
Step 2. Run SonarQube in a Docker container using this command -

```
docker run -d --name sonarqube -e  
SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000  
sonarqube:latest
```

```
C:\Users\acer>docker run -d --name sonarqube -e SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000 sonarqube:latest  
fac04ce1b97fadf955ddf9cc9c4f041b2ccac89196d5f93a0bf8199a71c404d2
```

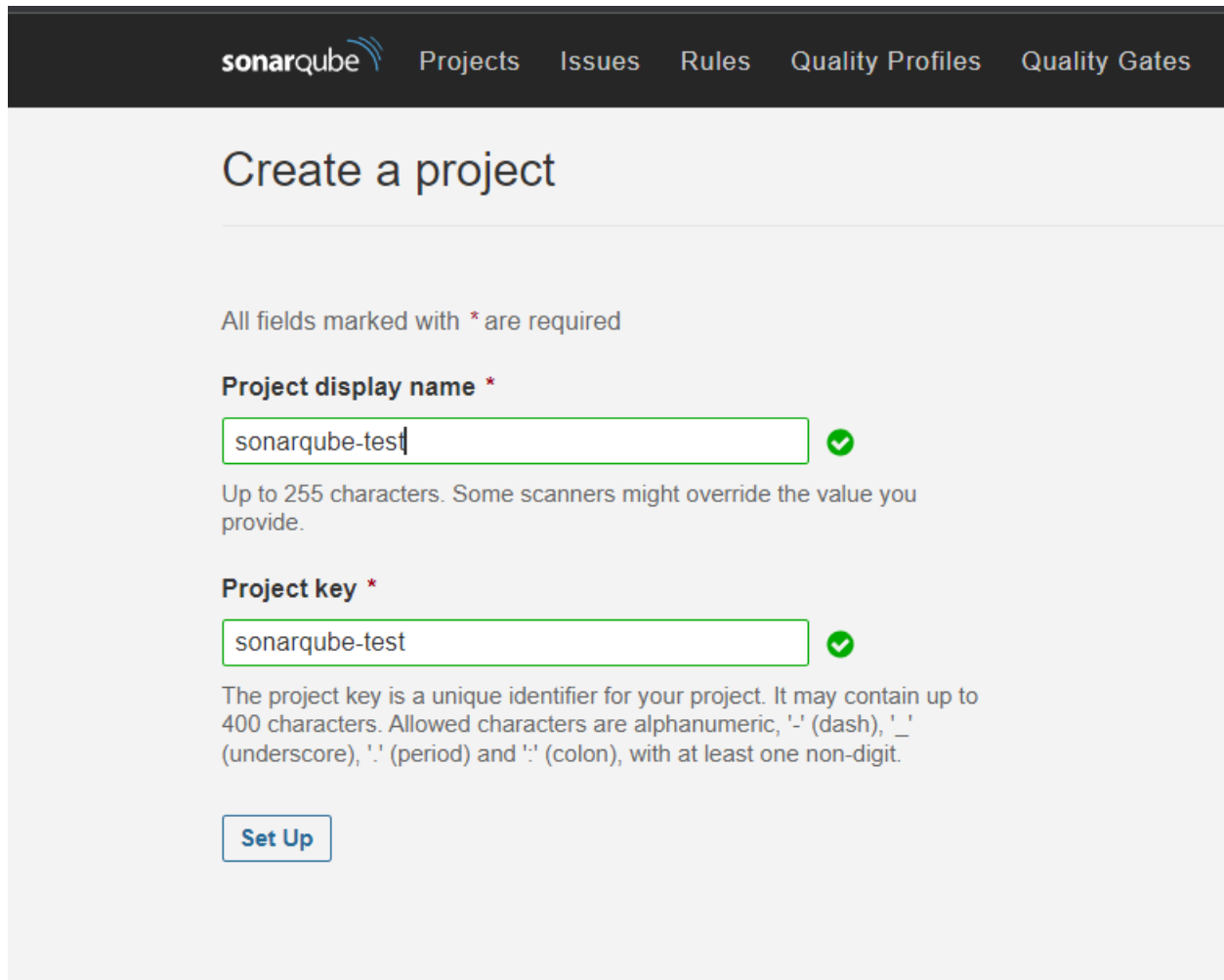
```
C:\Users\acer>
```

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



Step 4. Login to SonarQube

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



The screenshot shows the SonarQube web interface for creating a new project. The top navigation bar includes the SonarQube logo and links to Projects, Issues, Rules, Quality Profiles, and Quality Gates. The main heading is 'Create a project'. Below this, a note states 'All fields marked with * are required'. The form contains two required fields: 'Project display name' and 'Project key', both of which have been filled with 'sonarqube-test' and marked with a green checkmark. The 'Project display name' field has a note indicating it can be up to 255 characters. The 'Project key' field has a note explaining it is a unique identifier up to 400 characters, allowing alphanumeric characters, dashes, underscores, periods, and colons. A 'Set Up' button is located at the bottom of the form.

sonarqube Projects Issues Rules Quality Profiles Quality Gates

Create a project

All fields marked with * are required

Project display name *

sonarqube-test ✓

Up to 255 characters. Some scanners might override the value you provide.

Project key *

sonarqube-test ✓


The project key is a unique identifier for your project. It may contain up to 400 characters. Allowed characters are alphanumeric, '-' (dash), '_' (underscore), '.' (period) and ':' (colon), with at least one non-digit.

[Set Up](#)


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

Enter an item name


» Required field

**Freestyle project**


This is the central feature of Jenkins. Jenkins will build your project, combining any SCM with any build system, and this can be even used for something other than software build.

**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.

Step 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
      "/c/ProgramData/Jenkins/.jenkins/tools/hudson.plugins.sonar.SonarRunnerInstallation/sonarqube/bin//sonar-scanner \
        -D sonar.login=admin \
        -D sonar.password=hrishi156 \
        -D sonar.projectKey=sonarqube-test \
        -D sonar.exclusions=vendor/**,resources/**,**/*.java \
        -D sonar.host.url=http://127.0.0.1:9000/"
    }
  }
}
```

```
}
```

Pipeline script

Script ?

```
1 node{
2   stage('cloning the github repo'){
3     git 'https://github.com/shazforiot/GOL.git'
4   }
5   stage('Sonarqube analysis'){
6     withSonarQubeEnv('sonarqube') {
7       sh "/c/ProgramData/Jenkins/.jenkins/tools/hudson.plugins.sonar.SonarRunnerInstallation/sonarqube/bin//sonar-scanner \
8         -D sonar.login=admin \
9         -D sonar.password=hrishi156 \
10        -D sonar.projectKey=sonarqube-test \
11        -D sonar.exclusions=vendor/**,resources/**,*.java \
12        -D sonar.host.url=http://127.0.0.1:9000/"
13      }
14    }
15 }
```

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

Step 8. Run The Build.

Status

</> Changes

▶ Build Now

⚙️ Configure

🗑️ Delete Pipeline

🔍 Full Stage View

🌊 SonarQube

✎️ Rename

❓ Pipeline Syntax

Build History

trend ▾

🔍 Filter builds

Pipeline sonarqube_testing

</> Recent Changes

Stage View

	cloning the github repo	Sonarqube analysis
Average stage times: (Average full run time: ~3min 45s)	10s	1min 52s
#2 Oct 07 21:11 No Changes	1s	3min 43s

Step 9. Check the console output once the build is complete.

Console Output

Skipping 3,970 KB. [Full Log](#)

```
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/modifiers/BeanShellPreProcessorBeanInfo.html for block at line 230. Keep only the first 100 references.
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/modifiers/BeanShellPreProcessorBeanInfo.html for block at line 240. Keep only the first 100 references.
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/modifiers/BeanShellPreProcessorBeanInfo.html for block at line 32. Keep only the first 100 references.
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/modifiers/BeanShellPreProcessorBeanInfo.html for block at line 227. Keep only the first 100 references.
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/modifiers/BeanShellPreProcessorBeanInfo.html for block at line 230. Keep only the first 100 references.
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/modifiers/BeanShellPreProcessorBeanInfo.html for block at line 40. Keep only the first 100 references.
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/modifiers/BeanShellPreProcessorBeanInfo.html for block at line 41. Keep only the first 100 references.
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/modifiers/BeanShellPreProcessorBeanInfo.html for block at line 17. Keep only the first 100 references.
```

```
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/util/TextAreaCellRenderer.html for block at line 296. Keep only the first 100 references.
WARN: Too many duplication references on file gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/util/TextAreaCellRenderer.html for block at line 75. Keep only the first 100 references.
INFO: CPD Executor CPD calculation finished (done) | time=68375ms
INFO: Analysis report generated in 1479ms, dir size=129.8 MB
INFO: Analysis report compressed in 8051ms, zip size=29.8 MB
INFO: Analysis report uploaded in 647ms
INFO: ANALYSIS SUCCESSFUL, you can find the results at: http://127.0.0.1:9000/dashboard?id=sonarqube-test
INFO: Note that you will be able to access the updated dashboard once the server has processed the submitted analysis report
INFO: More about the report processing at http://127.0.0.1:9000/api/ce/task?id=AYOzHqoyc4o3ZFQutxSH
INFO: Analysis total time: 3:39.680 s
INFO: -----
INFO: EXECUTION SUCCESS
INFO: -----
INFO: Total time: 3:41.441s
INFO: Final Memory: 16M/74M
INFO: -----
[Pipeline] }
[Pipeline] // withSonarQubeEnv
[Pipeline] }
[Pipeline] // stage
[Pipeline] }
[Pipeline] // node
[Pipeline] End of Pipeline
Finished: SUCCESS
```

Step 10. After that, check the project in SonarQube.

sonarqube-test ☆ master

October 7, 2022 at 9:11 PM Version not provided

Overview Issues Security Hotspots Measures Code Activity

Project Settings Project Information

QUALITY GATE STATUS

Passed

All conditions passed.

MEASURES

New Code

Overall Code

111k

Bugs

Reliability C

0

Vulnerabilities

Security A

0

Security Hotspots

Reviewed

Security Review A

1477d

Debt

142k

Code Smells

Maintainability A

50.6%

Duplications on 685k Lines

43k

Duplicated Blocks

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

Step 11. Code Problems -

OverviewIssuesSecurity HotspotsMeasuresCodeActivity

Project SettingsProject Information

1 / 253,159 issues3171d effort

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

Insert a <!DOCTYPE> declaration to before this <html> tag.

BugMajorOpenNot assigned5min effortComment

2 years agoL1user-experience

Add "lang" and/or "xml:lang" attributes to this <html> element

BugMajorOpenNot assigned2min effortComment

2 years agoL1accessibility, wcag2-a

Add "<th>" headers to this <table>".

BugMajorOpenNot assigned2min effortComment

2 years agoL9accessibility, wcag2-a

Remove this deprecated "width" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL9html5, obsolete

Add a description to this table.

BugMinorOpenNot assigned5min effortComment

2 years agoL9accessibility, wcag2-a

Remove this deprecated "align" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL11html5, obsolete

Remove this deprecated "align" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL12html5, obsolete

Remove this deprecated "size" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL17html5, obsolete

Remove this deprecated "cellpadding" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL19html5, obsolete

Remove this deprecated "cellspacing" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL19html5, obsolete

OverviewIssuesSecurity HotspotsMeasuresCodeActivity

Project SettingsProject Information

1 / 253,159 issues3171d effort

Filters

Period

New code

Type

Bug111k

Vulnerability0

Code Smell142k

Severity

Blocker0

Critical0

Major188k

Minor65k

Info2

Scope

Resolution

Status

Security Category

Creation Date

Language

Rule

Tag

Directory

File

Remove this deprecated "width" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL19html5, obsolete

Add a description to this table.

BugMinorOpenNot assigned5min effortComment

2 years agoL19accessibility, wcag2-a

Remove this deprecated "valign" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL20html5, obsolete

Remove this deprecated "width" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL24html5, obsolete

Remove this deprecated "nowrap" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL25html5, obsolete

Remove this deprecated "valign" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL27html5, obsolete

Remove this deprecated "name" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL29html5, obsolete

Remove this deprecated "valign" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL36html5, obsolete

Remove this deprecated "name" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL38html5, obsolete

Remove this deprecated "valign" attribute.

Code SmellMajorOpenNot assigned5min effortComment

2 years agoL45html5, obsolete

Bugs and Code Smells

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

<input type="checkbox"/>	Insert a <!DOCTYPE> declaration to before this <html> tag.	2 years ago ▾ L1 🔗 📄
🐞 Bug ▾	🔴 Major ▾	🔵 Open ▾
Not assigned ▾	5min effort	Comment
		🔗 user-experience ▾
<input type="checkbox"/>	Add "lang" and/or "xml:lang" attributes to this "<html>" element	2 years ago ▾ L1 🔗 📄
🐞 Bug ▾	🔴 Major ▾	🔵 Open ▾
Not assigned ▾	2min effort	Comment
		🔗 accessibility, wcag2-a ▾
<input type="checkbox"/>	Add "<th>" headers to this "<table>".	2 years ago ▾ L9 🔗 📄
🐞 Bug ▾	🔴 Major ▾	🔵 Open ▾
Not assigned ▾	2min effort	Comment
		🔗 accessibility, wcag2-a ▾
<input type="checkbox"/>	Remove this deprecated "width" attribute.	2 years ago ▾ L9 🔗 📄
🐞 Code Smell ▾	🔴 Major ▾	🔵 Open ▾
Not assigned ▾	5min effort	Comment
		🔗 html5, obsolete ▾
<input type="checkbox"/>	Add a description to this table.	2 years ago ▾ L9 🔗 📄
🐞 Bug ▾	🟢 Minor ▾	🔵 Open ▾
Not assigned ▾	5min effort	Comment
		🔗 accessibility, wcag2-a ▾
<input type="checkbox"/>	Remove this deprecated "align" attribute.	2 years ago ▾ L11 🔗 📄
🐞 Code Smell ▾	🔴 Major ▾	🔵 Open ▾
Not assigned ▾	5min effort	Comment
		🔗 html5, obsolete ▾
<input type="checkbox"/>	Remove this deprecated "align" attribute.	2 years ago ▾ L12 🔗 📄
🐞 Code Smell ▾	🔴 Major ▾	🔵 Open ▾
Not assigned ▾	5min effort	Comment
		🔗 html5, obsolete ▾
<input type="checkbox"/>	Remove this deprecated "size" attribute.	2 years ago ▾ L17 🔗 📄
🐞 Code Smell ▾	🔴 Major ▾	🔵 Open ▾
Not assigned ▾	5min effort	Comment
		🔗 html5, obsolete ▾

Duplicates

OverviewIssuesSecurity HotspotsMeasuresCodeActivity

Project Settings ▾Project Information

sonarqube-testView asList ▾⬆⬇to select files⬅⬅to navigate1,145 files

Duplicated Lines384,007📈

	Duplicated Lines	Duplicated Lines (%)
gameoflife-web/tools/jmeter/docs/api/serialized-form.html	2,060	9.7%
gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/ReportMainFrame.html	1,409	65.2%
gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/MainFrame.html	1,379	69.2%
gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/config/gui/ArgumentsPanel.html	1,353	63.0%
gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/protocol/ldap/config/gui/LDAPArgumentsPanel.html	1,334	66.8%
gameoflife-web/tools/jmeter/docs/api/org/apache/jorphan/gui/JLabeledTextArea.html	1,310	77.4%
gameoflife-web/tools/jmeter/printable_docs/usermanual/component_reference.html	1,300	7.8%
gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/report/gui/tree/ReportCellRenderer.html	1,282	92.4%
gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/tree/JMeterCellRenderer.html	1,281	92.1%
gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/util/ReportMenuBar.html	1,264	79.1%
gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/visualizers/StatVisualizer.html	1,259	80.1%

Cyclomatic Complexities

OverviewIssuesSecurity HotspotsMeasuresCodeActivity

Project SettingsProject Information

Project Overview

ReliabilitySecuritySecurity ReviewMaintainabilityDuplicationsSize

Lines of Code684,906

Lines759,061

Files1,145

Comment Lines31,868

Comments (%)4.4%

ComplexityCyclomatic Complexity1,113

Issues

sonarqube-test

View asListto select filesto navigate1,107 files

Cyclomatic Complexity 1,113

gameoflife-web/src/main/webapp/WEB-INF/jsp/game/show.jsp4

gameoflife-web/src/main/webapp/WEB-INF/jsp/game/edit.jsp3

gameoflife-web/tools/jmeter/printable_docs/usermanual/component_reference.html2

gameoflife-core/build/reports/tests/com/wakaleo/gameoflife/domain/0_WhenYouCreateACell.html1

gameoflife-core/build/reports/tests/com/wakaleo/gameoflife/domain/1_WhenYouCreateAGrid.html1

gameoflife-core/build/reports/tests/com/wakaleo/gameoflife/domain/2_WhenYouCreateANewUniverse.html1

gameoflife-core/build/reports/tests/com/wakaleo/gameoflife/domain/3_WhenYouPlayTheGameOfLife.html1

gameoflife-core/build/reports/tests/com/wakaleo/gameoflife/domain/4_WhenYouPrintAGrid.html1

gameoflife-core/build/reports/tests/com/wakaleo/gameoflife/domain/5_WhenYouReadAGridFromAString.html1

gameoflife-core/build/reports/tests/com/wakaleo/gameoflife/hamcrest/6_WhenIUseMyCustomHamcrestMatchers.html1

gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/action/AboutCommand.html1

gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/gui/action/AbstractAction.html1

gameoflife-web/tools/jmeter/docs/api/org/apache/jmeter/report/gui/action/AbstractAction.html1

Unfinished TODOs

ScopeResolutionStatusSecurity CategoryCreation DateLanguageRuleTagCWE

Search for tags...

html5174k

obsolete174k

accessibility79k

user-experience33k

wcag2-a14k

cwe2

unused2

gameoflife-web/src/main/webapp/WEB-INF/jsp/home.jsp

Complete the task associated to this "TODO" comment.

Code SmellInfoOpenNot assigned0min effortComment

2 years agoL8cwe

gameoflife-web/tools/jmeter/extras/jmeter-results-detail-report_21.xsl

Complete the task associated to this "TODO" comment.

Code SmellInfoOpenNot assigned0min effortComment

2 years agoL332cwe

2 of 2 shown

In this way, we have created a CI/CD Pipeline with Jenkins and integrated it with SonarQube to find issues in the code like bugs, code smells, duplicates, cyclomatic complexities, etc.

Conclusion:

In this experiment, we performed a static analysis of the code to detect bugs, code smells, and security vulnerabilities on our sample Java application.