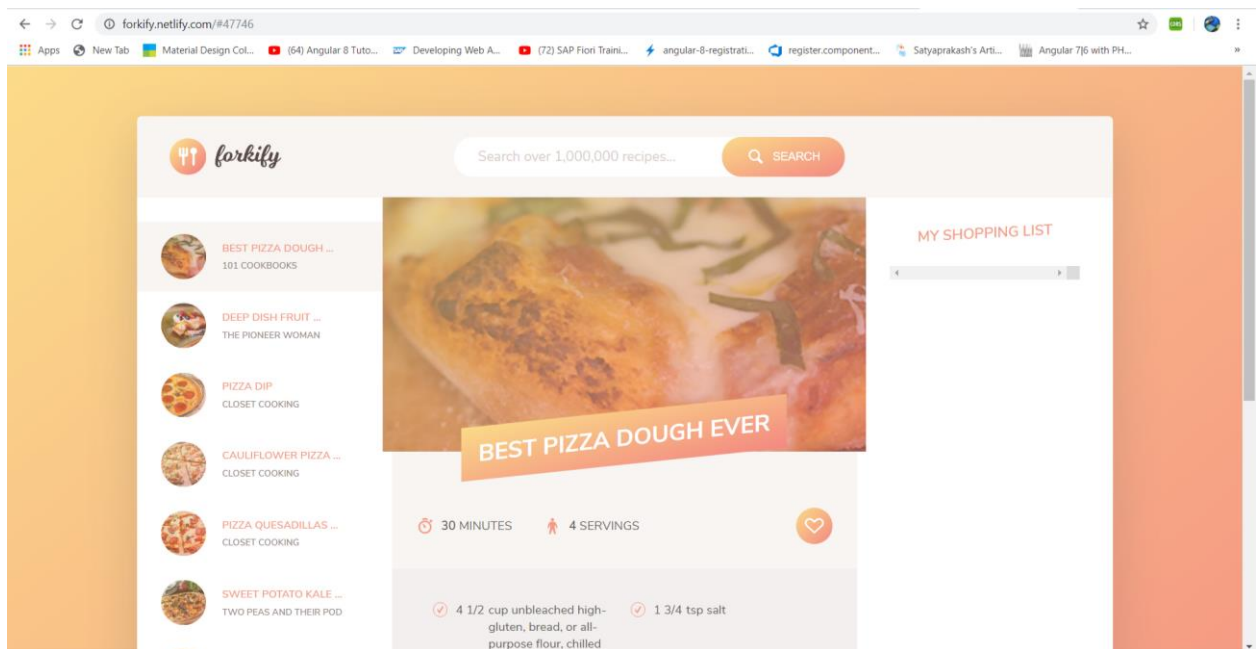


Exercise 6: Software Scanning Tools

SonarQube:

It is a static software scanning tool. It is an open source platform developed by SonarSource for continuous inspection of code quality to perform automatic reviews with static analysis of code to detect issues. SonarQube offers reports on duplicated code, coding standards, unit tests, code coverage, code complexity, comments, bugs, and security vulnerabilities.

We have used SonarQube for software scanning and selected “Forkify” project for scanning which is publicly hosted.



We had installed Docker then SonarQube and SonarQube runner on Linux.

```
Applications ▾ Places ▢ Terminal ▾ Sun 12:32
root@kali: ~/Downloads/final

File Edit View Search Terminal Help
INFO: Project configuration: 0.00s
INFO: Load project repositories
INFO: Load project repositories (done) | time=19ms
INFO: 295 files indexed
INFO: Quality profile for css: SonarWayneException: Unable to execute SonarQube
INFO: Quality profile for js: SonarWayneException: Unable to execute SonarQube
INFO: Quality profile for web: SonarWayneException: Unable to execute SonarQube
INFO: ----- Run sensors on module final-Group9
INFO: Load metrics repository
INFO: Load metrics repository (done) | time=26ms
WARNING: An illegal reflective access operation has occurred
WARNING: Please consider reporting this to the maintainers of (file:/root/.sonar/cache/866bb1adb016eas156201aa15ec53/sonar-javascript-plugin.jar) to method java.lang.ClassLoader.defineClass(java
.lang.String,byte[],int,int,java.security.ProtectionDomain)
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
INFO: Sensor SonarCSS Metrics [cssfamily]
INFO: Sensor SonarCSS Metrics [cssfamily] (done) | time=96ms
INFO: Sensor SonarCSS Rules [cssfamily]
INFO: Sensor SonarCSS Rules [cssfamily] (done) | time=1160ms
INFO: Sensor JaCoCo XML Report Importer [jacoco]
INFO: Sensor JaCoCo XML Report Importer [jacoco] (done) | time=3ms
INFO: Sensor SonarJS [javascript]
INFO: 12 source files to be analyzed
INFO: Sensor ESLint-based SonarJS [javascript]
INFO: 12/12 source files have been analyzed
INFO: 12 source files to be analyzed
INFO: Sensor ESLint-based SonarJS [javascript] (done) | time=2072ms
INFO: Sensor JavaAPI [java]
INFO: 12/12 source files have been analyzed
INFO: Sensor JavaAPI [java] (done) | time=3ms
INFO: Sensor HTML [web]
INFO: Sensor HTML [web] (done) | time=75ms
INFO: ----- Run sensors on project
INFO: Sensor Zero Coverage Sensor
INFO: Sensor Zero Coverage Sensor (done) | time=12ms
INFO: No SCM system was detected. You can use the 'sonar.scm.provider' property to explicitly specify it.
INFO: 1 file had no CPD blocks
INFO: Calculating CPD for 13 files
INFO: CPD calculation finished
INFO: Analysis report generated in 59ms, dir size=244 KB
INFO: Analysis report compressed in 31ms, zip size=68 KB
INFO: Analysis report uploaded in 24ms
INFO: ANALYSIS SUCCESSFUL, you can browse http://localhost:9000/dashboard?id=final-Group9
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://localhost:9000/api/ci/task?id=AW5VTSrWg2zuMKIRJN
INFO: Analysis total time: 8.656 s
INFO: -----
INFO: EXECUTION SUCCESS
INFO: -----
INFO: Total Time: 9.375s
INFO: Final Memory: 12M/50M
INFO: -----
root@kali: ~/Downloads/final
```

```
Applications ▾ Places ▢ Terminal ▾ Sun 12:02
root@kali: ~/Downloads/sonarqube

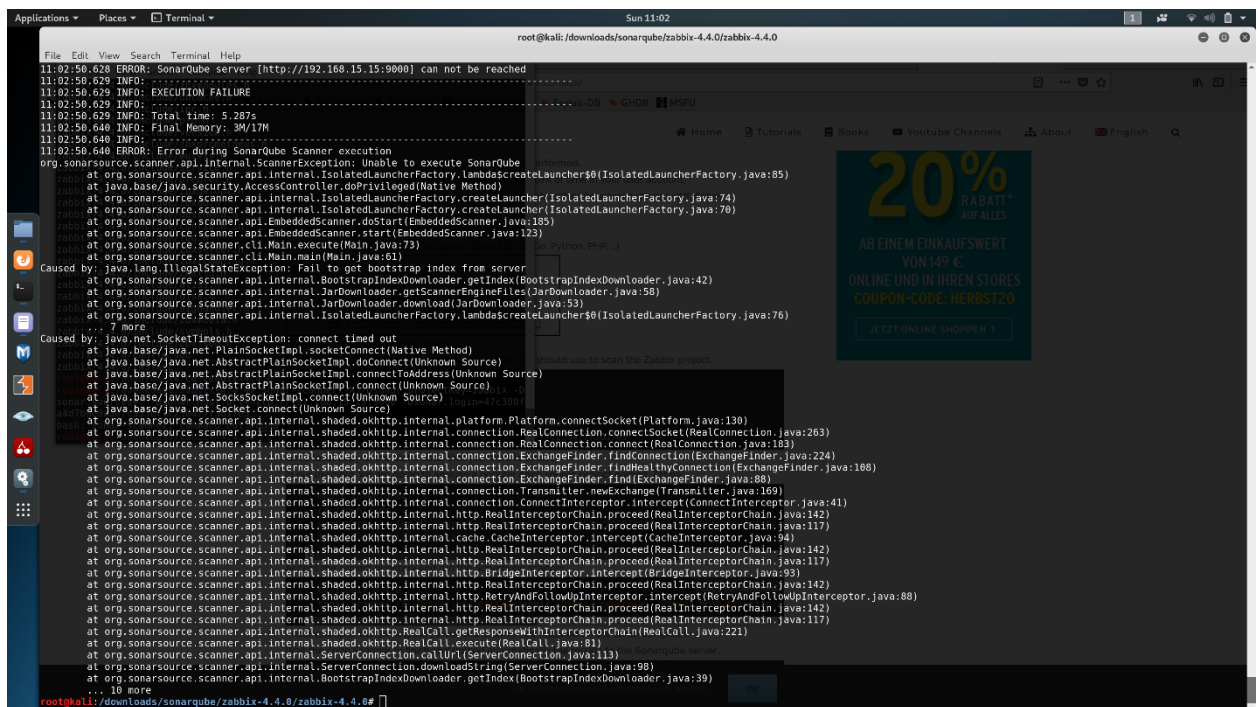
File Edit View Search Terminal Help
12:02:49.944 DEBUG: 'Deprecated' Integration Tests Coverage Report Import' skipped because there is no related file in current project
12:02:49.947 DEBUG: 'VB.NET Test Results Import' skipped because there is no related file in current project
12:02:49.951 DEBUG: 'VB.NET Tests Coverage Report Import' skipped because there is no related file in current project
12:02:49.953 DEBUG: 'Deprecated' VB.NET Integration Tests Coverage Report Import' skipped because there is no related file in current project
12:02:49.955 DEBUG: 'VB.NET Test Results Import' skipped because there is no related file in current project
12:02:49.955 DEBUG: Sensors: JavaSquidSensor -> SonarCSS Metrics -> SonarCSS Rules -> JaCoCo XML Report Importer -> SonarGo -> SonarJS -> ESLint-based SonarJS -> SurefireSensor -> JaCoCoSensor -> JavaXMLE
nsor -> HTML -> XML Sensor -> PHP sensor -> Analyzer for 'php.ini' files
12:02:49.956 INFO: Sensor JavaSquidSensor [java]
12:02:50.176 INFO: Configured Java source version (sonar.java.source): none
12:02:50.184 INFO: JavaClasspath initialization
12:02:50.190 INFO: -----
12:02:50.190 INFO: EXECUTION FAILURE
12:02:50.190 INFO: -----
12:02:50.190 INFO: Total time: 11.407s
12:02:50.230 INFO: Final Memory: 12M/47M
12:02:50.230 INFO: -----
12:02:50.238 ERROR: Error during SonarQube Scanner execution
org.sonar.java.AnalysisException: Please provide compiled classes of your project with sonar.java.binaries property
at org.sonar.java.AbstractJavaClasspath.getElements(AbstractJavaClasspath.java:280)
at org.sonar.java.SonarComponents.getJavaClasspath(SonarComponents.java:209)
at org.sonar.java.Squid.<init>(JavaSquid.java:84)
at org.sonar.scanner.sensor.AbstractSensorWrapper.analyse(AbstractSensorWrapper.java:48)
at org.sonar.scanner.sensor.ModuleSensorsExecutor.execute(ModuleSensorsExecutor.java:85)
at org.sonar.scanner.sensor.ModuleSensorsExecutor.lambda$execute$1(ModuleSensorsExecutor.java:59)
at org.sonar.scanner.sensor.ModuleSensorsExecutor.executeWithModuleStrategy(ModuleSensorsExecutor.java:77)
at org.sonar.scanner.sensor.ModuleSensorsExecutor.execute(ModuleSensorsExecutor.java:59)
at org.sonar.scanner.scan.ModuleScanContainer.doAfterStart(ModuleScanContainer.java:82)
at org.sonar.core.platform.ComponentContainer.startComponents(ComponentContainer.java:136)
at org.sonar.scanner.scan.ProjectScanContainer.execute(ComponentContainer.java:122)
at org.sonar.scanner.scan.ProjectScanContainer.scanRecursively(ProjectScanContainer.java:395)
at org.sonar.scanner.scan.ProjectScanContainer.doAfterStart(ProjectScanContainer.java:358)
at org.sonar.core.platform.ComponentContainer.startComponents(ComponentContainer.java:136)
at org.sonar.core.platform.ComponentContainer.execute(ComponentContainer.java:122)
at org.sonar.batch.bootstrap.Batch.doExecute(Batch.java:73)
at org.sonar.batch.bootstrap.Batch.execute(Batch.java:67)
at org.sonarsource.scanner.api.internal.batch.BatchIsolatedLauncher.execute(BatchIsolatedLauncher.java:46)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Unknown Source)
at java.base/jdk.internal.reflect.DelegatingMethodAccessorImpl.invoke(Unknown Source)
at java.base/java.lang.reflect.Method.invoke(Unknown Source)
at org.sonarsource.scanner.api.internal.IsolatedLauncherProxy.invoke(IsolatedLauncherProxy.java:60)
at com.sun.proxy.$Proxy0.execute(Unknown Source)
at org.sonarsource.scanner.api.EmbeddedScanner.doExecute(EmbeddedScanner.java:189)
at org.sonarsource.scanner.api.EmbeddedScanner.execute(EmbeddedScanner.java:138)
at org.sonarsource.scanner.cli.Main.execute(Main.java:112)
at org.sonarsource.scanner.cli.Main.execute(Main.java:75)
at org.sonarsource.scanner.cli.Main.main(Main.java:61)
root@kali: ~/Downloads/sonarqube
```

```
Applications ▾ Places ▢ Terminal ▾ Sun 12:01
root@kali: /downloads/sonarqube

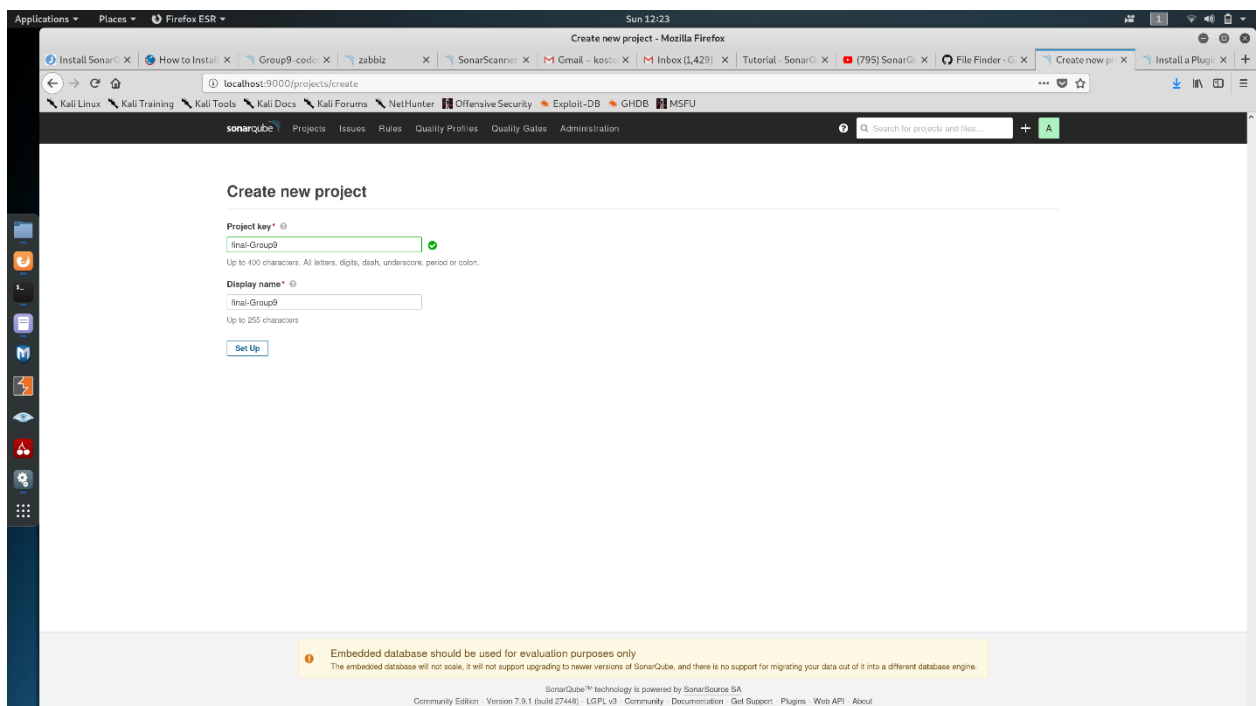
File Edit View Search Terminal Help
12:01:36.345 DEBUG: Download: http://localhost:9000/batch/index
12:01:36.352 DEBUG: Get bootstrap completed
12:01:36.353 DEBUG: Create isolated classloader...
12:01:36.393 DEBUG: Start temp cleaning...
12:01:36.396 DEBUG: Temp cleaning done
12:01:36.396 DEBUG: Execution getVersion
12:01:36.405 INFO: SonarQube server 7.9.1
12:01:36.405 INFO: Default locale: "en_US", source code encoding: "UTF-8"
12:01:36.405 DEBUG: Work directory: /downloads/sonarqube/.scannerwork
12:01:36.406 DEBUG: Execution execute
12:01:36.587 DEBUG: Community 7.9.1.27448
12:01:36.662 INFO: Load global settings
12:01:36.685 DEBUG: GET 200 http://localhost:9000/api/settings/values.protobuf | time=22ms
12:01:36.706 INFO: Load global settings (done) | time=44ms
12:01:36.707 INFO: Server id: BF41A1F3-AW0U3zCG0U9f6f7W4KH
12:01:36.720 INFO: User cache: /root/.sonar/cache
12:01:36.723 INFO: Load/download plugins
12:01:36.729 DEBUG: GET 200 http://localhost:9000/api/plugins/installed | time=6ms
12:01:36.755 INFO: Load plugins index (done) | time=32ms
12:01:36.793 INFO: Load/download plugins (done) | time=70ms
12:01:36.839 DEBUG: Plugins:
12:01:36.839 DEBUG: * SonarPython 1.14.1.3143 (python)
12:01:36.839 DEBUG: * SonarCSS 1.1.1.1010 (cssfamily)
12:01:36.839 DEBUG: * SonarLint 1.1.0.1615 (kotlin)
12:01:36.839 DEBUG: * SonarGo 1.1.1.2080 (go)
12:01:36.839 DEBUG: * SonarJS 5.2.1.7778 (javascript)
12:01:36.839 DEBUG: * SonarRuby 1.5.0.315 (ruby)
12:01:36.840 DEBUG: * SonarScala 1.5.0.315 (sonarscala)
12:01:36.840 DEBUG: * SonarC# 7.15.0.8572 (csharp)
12:01:36.840 DEBUG: * SonarJava 5.13.1.18282 (java)
12:01:36.840 DEBUG: * LDAP 2.2.0.608 (ldap)
12:01:36.840 DEBUG: * SonarFlex 2.5.1.1831 (flex)
12:01:36.840 DEBUG: * SonarXML 2.0.1.2020 (xml)
12:01:36.840 DEBUG: * SonarAuth 2.0.0.0 (authentication)
12:01:36.840 DEBUG: * SonarPHP 3.2.0.4868 (php)
12:01:36.840 DEBUG: * SonarTS 1.0.0.3766 (typescript)
12:01:36.840 DEBUG: * SonarVB 7.15.0.8572 (vbnet)
12:01:37.231 INFO: Process project properties
12:01:37.234 INFO: EXECUTION FAILURE
12:01:37.234 INFO: Total time: 1.097s
12:01:37.246 INFO: Final Memory: 5M/24M
12:01:37.246 ERROR: Error during SonarQube Scanner execution
java.lang.IllegalStateException: Unable to load component class org.sonar.scanner.scan.ProjectLock
at org.sonar.core.platform.ComponentContainerExtendedDefaultPicoContainer.getComponent(ComponentContainer.java:65)
at org.picocontainer.DefaultPicoContainer.getComponent(DefaultPicoContainer.java:678)
at org.sonar.core.platform.ComponentContainer.startComponents(ComponentContainer.java:134)
at org.sonar.core.platform.ComponentContainer.execute(ComponentContainer.java:122)
at org.sonar.scanner.bootstrap.GlobalContainer.doAfterStart(GlobalContainer.java:141)
at org.sonar.core.platform.ComponentContainer.startComponents(ComponentContainer.java:136)
at org.sonar.core.platform.ComponentContainer.execute(ComponentContainer.java:122)
at org.sonar.batch.bootstrap.Batch.doExecute(Batch.java:73)
at org.sonar.batch.bootstrap.Batch.execute(Batch.java:67)
at org.sonarsource.scanner.api.internal.batch.BatchIsolatedLauncher.execute(BatchIsolatedLauncher.java:46)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Unknown Source)
at java.base/jdk.internal.reflect.DelegatingMethodAccessorImpl.invoke(Unknown Source)
at java.base/java.lang.reflect.Method.invoke(Unknown Source)
at org.sonarsource.scanner.api.internal.IsolatedLauncherProxy.invoke(IsolatedLauncherProxy.java:60)
at com.sun.proxy.$Proxy0.execute(Unknown Source)
at org.sonarsource.scanner.api.EmbeddedScanner.doExecute(EmbeddedScanner.java:189)
at org.sonarsource.scanner.api.EmbeddedScanner.execute(EmbeddedScanner.java:138)
at org.sonarsource.scanner.cli.Main.execute(Main.java:112)
at org.sonarsource.scanner.cli.Main.main(Main.java:61)
Caused by: java.lang.IllegalStateException: Unable to load component class org.sonar.api.batch.fs.internal.DefaultInputProject
at org.sonar.core.platform.ComponentContainerExtendedDefaultPicoContainer.getComponent(ComponentContainer.java:65)
at org.picocontainer.DefaultPicoContainer.getComponent(DefaultPicoContainer.java:632)
at org.picocontainer.parameters.BasicComponentParameter$1.resolveInstance(BasicComponentParameter.java:118)
at org.picocontainer.parameters.ComponentParameters$1.resolveInstance(ComponentParameter.java:136)
at org.picocontainer.injectors.SingleMemberInjector.getParameter(SingleMemberInjector.java:78)
at org.picocontainer.injectors.ConstructorInjectorsForAndAdapters.getParameterArguments(ConstructorInjector.java:309)
at org.picocontainer.injectors.ConstructorInjectors$1.run(ConstructorInjector.java:325)
at org.picocontainer.injectors.AbstractInjectorsThreadLocalCyclicDependencyGuard.observe(AbstractInjector.java:270)
at org.picocontainer.injectors.ConstructorInjector.getComponentInstance(ConstructorInjector.java:364)
at org.picocontainer.injectors.AbstractInjectionFactory$LifecycleAdapter.getComponentInstance(AbstractInjectionFactory.java:56)
at org.picocontainer.behaviors.AbstractBehavior.getComponentInstance(AbstractBehavior.java:64)
at org.picocontainer.behaviors.Stored.getComponentInstance(Stored.java:91)
at org.picocontainer.DefaultPicoContainer.getInstance(DefaultPicoContainer.java:699)
at org.picocontainer.DefaultPicoContainer.getComponent(DefaultPicoContainer.java:647)
at org.sonar.core.platform.ComponentContainerExtendedDefaultPicoContainer.getComponent(ComponentContainer.java:63)
... 22 more
Caused by: java.lang.IllegalStateException: Unable to load component class org.sonar.api.batch.bootstrap.ProjectReactor
at org.sonar.core.platform.ComponentContainerExtendedDefaultPicoContainer.getComponent(ComponentContainer.java:65)
at org.picocontainer.DefaultPicoContainer.getComponent(DefaultPicoContainer.java:632)
at org.picocontainer.parameters.BasicComponentParameter$1.resolveInstance(BasicComponentParameter.java:118)
at org.picocontainer.parameters.ComponentParameters$1.resolveInstance(ComponentParameter.java:136)
```

```
Applications ▾ Places ▢ Terminal ▾ Sun 12:02
root@kali: /downloads/sonarqube

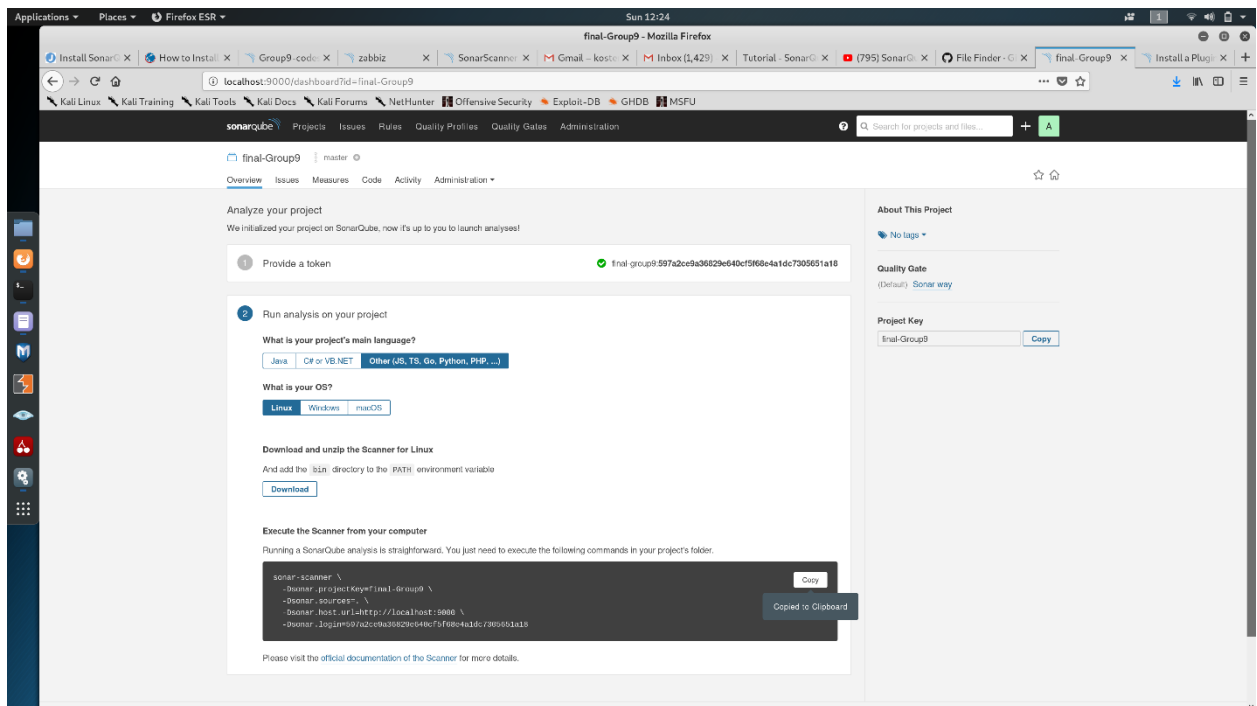
File Edit View Search Terminal Help
12:01:36.840 DEBUG: * SonarVB 7.15.0.8572 (vbnet)
12:01:37.231 INFO: Process project properties
12:01:37.234 INFO: EXECUTION FAILURE
12:01:37.234 INFO: Total time: 1.097s
12:01:37.246 INFO: Final Memory: 5M/24M
12:01:37.246 ERROR: Error during SonarQube Scanner execution
java.lang.IllegalStateException: Unable to load component class org.sonar.scanner.scan.ProjectLock
at org.sonar.core.platform.ComponentContainerExtendedDefaultPicoContainer.getComponent(ComponentContainer.java:65)
at org.picocontainer.DefaultPicoContainer.getComponent(DefaultPicoContainer.java:678)
at org.sonar.core.platform.ComponentContainer.startComponents(ComponentContainer.java:134)
at org.sonar.core.platform.ComponentContainer.execute(ComponentContainer.java:122)
at org.sonar.scanner.bootstrap.GlobalContainer.doAfterStart(GlobalContainer.java:141)
at org.sonar.core.platform.ComponentContainer.startComponents(ComponentContainer.java:136)
at org.sonar.core.platform.ComponentContainer.execute(ComponentContainer.java:122)
at org.sonar.batch.bootstrap.Batch.doExecute(Batch.java:73)
at org.sonar.batch.bootstrap.Batch.execute(Batch.java:67)
at org.sonarsource.scanner.api.internal.batch.BatchIsolatedLauncher.execute(BatchIsolatedLauncher.java:46)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke0(Native Method)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Unknown Source)
at java.base/jdk.internal.reflect.DelegatingMethodAccessorImpl.invoke(Unknown Source)
at java.base/java.lang.reflect.Method.invoke(Unknown Source)
at org.sonarsource.scanner.api.internal.IsolatedLauncherProxy.invoke(IsolatedLauncherProxy.java:60)
at com.sun.proxy.$Proxy0.execute(Unknown Source)
at org.sonarsource.scanner.api.EmbeddedScanner.doExecute(EmbeddedScanner.java:189)
at org.sonarsource.scanner.api.EmbeddedScanner.execute(EmbeddedScanner.java:138)
at org.sonarsource.scanner.cli.Main.execute(Main.java:112)
at org.sonarsource.scanner.cli.Main.main(Main.java:61)
Caused by: java.lang.IllegalStateException: Unable to load component class org.sonar.api.batch.fs.internal.DefaultInputProject
at org.sonar.core.platform.ComponentContainerExtendedDefaultPicoContainer.getComponent(ComponentContainer.java:65)
at org.picocontainer.DefaultPicoContainer.getComponent(DefaultPicoContainer.java:632)
at org.picocontainer.parameters.BasicComponentParameter$1.resolveInstance(BasicComponentParameter.java:118)
at org.picocontainer.parameters.ComponentParameters$1.resolveInstance(ComponentParameter.java:136)
at org.picocontainer.injectors.SingleMemberInjector.getParameter(SingleMemberInjector.java:78)
at org.picocontainer.injectors.ConstructorInjectorsForAndAdapters.getParameterArguments(ConstructorInjector.java:309)
at org.picocontainer.injectors.ConstructorInjectors$1.run(ConstructorInjector.java:325)
at org.picocontainer.injectors.AbstractInjectorsThreadLocalCyclicDependencyGuard.observe(AbstractInjector.java:270)
at org.picocontainer.injectors.ConstructorInjector.getComponentInstance(ConstructorInjector.java:364)
at org.picocontainer.injectors.AbstractInjectionFactory$LifecycleAdapter.getComponentInstance(AbstractInjectionFactory.java:56)
at org.picocontainer.behaviors.AbstractBehavior.getComponentInstance(AbstractBehavior.java:64)
at org.picocontainer.behaviors.Stored.getComponentInstance(Stored.java:91)
at org.picocontainer.DefaultPicoContainer.getInstance(DefaultPicoContainer.java:699)
at org.picocontainer.DefaultPicoContainer.getComponent(DefaultPicoContainer.java:647)
at org.sonar.core.platform.ComponentContainerExtendedDefaultPicoContainer.getComponent(ComponentContainer.java:63)
... 22 more
Caused by: java.lang.IllegalStateException: Unable to load component class org.sonar.api.batch.bootstrap.ProjectReactor
at org.sonar.core.platform.ComponentContainerExtendedDefaultPicoContainer.getComponent(ComponentContainer.java:65)
at org.picocontainer.DefaultPicoContainer.getComponent(DefaultPicoContainer.java:632)
at org.picocontainer.parameters.BasicComponentParameter$1.resolveInstance(BasicComponentParameter.java:118)
at org.picocontainer.parameters.ComponentParameters$1.resolveInstance(ComponentParameter.java:136)
```



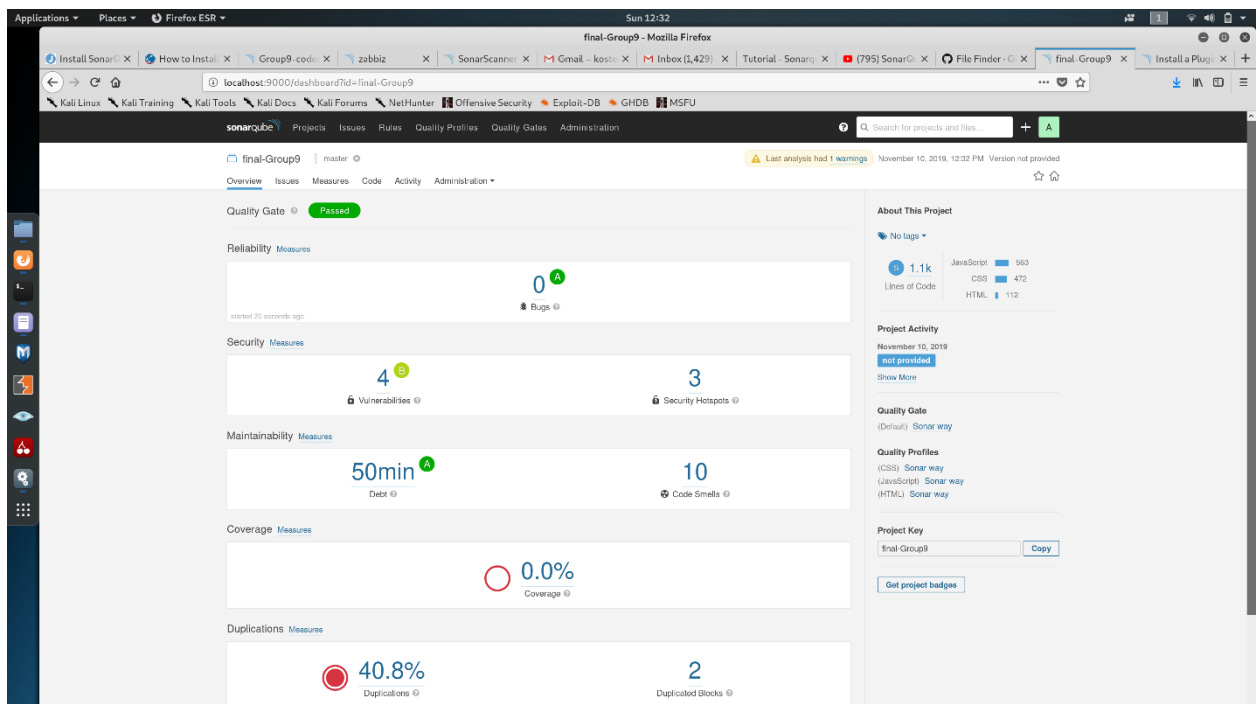
Once all required tools installed. Launched 'localhost:9000' for SonarQube.



Set up 'Forkify' project over sonarqube.



Forkify project report:



Code Smell:

The screenshot displays the SonarQube web interface for a project named 'final-Group9'. The left sidebar shows a filter for 'Code Smell' under the 'Type' section, with a count of 10. The main panel lists 10 issues, all of which are 'Code Smell' type, 'Major' severity, and 'Open' status. Each issue is associated with a specific file (e.g., 'dist/index.html', 'src/index.html') and a rule ID (e.g., 'L35', 'L56', 'L179'). The issues are sorted by '5min effort' and 'Comment'. The bottom of the page shows a warning message: 'Last analysis had 1 warnings' and a version number 'November 10, 2019, 12:32 PM Version not provided'.

Vulnerability:

The screenshot displays the SonarQube web interface for the same project 'final-Group9', but with the filter set to 'Vulnerability'. The left sidebar shows a filter for 'Vulnerability' under the 'Type' section, with a count of 4. The main panel lists 4 issues, all of which are 'Vulnerability' type, 'Minor' severity, and 'Open' status. Each issue is associated with a specific file (e.g., 'src/js/index.js', 'src/js/models/Recipe.js', 'src/js/models/Search.js') and a rule ID (e.g., 'L43', 'L101', 'L119', 'L115'). The issues are sorted by '10min effort' and 'Comment'. The bottom of the page shows a warning message: 'Last analysis had 1 warnings' and a version number 'November 10, 2019, 12:32 PM Version not provided'. A yellow banner at the bottom states: 'Embedded database should be used for evaluation purposes only. The embedded database will not scale, it will not support upgrading to newer versions of SonarQube, and there is no support for migrating your data out of it into a different database engine.'

Security Hotspot:

The screenshot displays the SonarQube web interface in a Mozilla Firefox browser. The address bar shows the URL: `localhost:9000/project/issues?id=final-Group9&resolved=false&types=SECURITY_HOTSPOT`. The page title is "Issues - final-Group9 - Mozilla Firefox".

The interface shows the "Issues" tab for the project "final-Group9". A notification at the top right states: "Last analysis had 1 warnings November 10, 2019, 12:32 PM Version not provided".

On the left, the "Filters" panel is expanded, showing the "Type" filter set to "Security Hotspot" with a count of 3. Below this, the "Severity" filter shows 0 Blocker, 0 Minor, 0 Critical, and 0 Major issues. The "Resolution" and "Status" filters are also visible.

The main content area displays a list of Security Hotspots. The first three are highlighted:

- Hotspot 1:** "Make sure that using a regular expression is safe here." (Severity: L47, 54 seconds ago, CWE: CWE-79). The code snippet is `script/models/Recipe.js`.
- Hotspot 2:** "Make sure that this dynamic injection or execution of code is safe." (Severity: L82, 54 seconds ago, CWE: CWE-79, OWASP-A1, OWASP-A7).
- Hotspot 3:** "Make sure that this dynamic injection or execution of code is safe." (Severity: L84, 54 seconds ago, CWE: CWE-79, OWASP-A1, OWASP-A7).

At the bottom, a yellow warning box states: "Embedded database should be used for evaluation purposes only. The embedded database will not scale, it will not support upgrading to newer versions of SonarQube, and there is no support for migrating your data out of it into a different database engine."

The footer of the page indicates: "SonarQube™ technology is powered by SonarSource SA. Community Edition - Version 7.9.1 (build 27448) - LGPL v3 - Community - Documentation - Get Support - Plugins - Web API - About".