



Beyond the basics of SonarQube

Improve your Java(Script) even further

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Agenda

- ☞ SonarQube basic features
- ☞ Some more advanced features
- ☞ Tips / summary
- ☞ Questions

Quality for thousands of years



Quality after years of improvements



Quality for 39 days



SonarQube

- ☞ Platform to manage code quality
- ☞ Open source, possible to pay for support and some plugins
- ☞ Since 2006; now they have 200 customers and SonarQube is used in 15.000 organizations
- ☞ Active community: support, plugins, books

SonarQube basic features



Lines Of Code	Files	Functions
415 ↗	21 ↗	39
Css 9	Directories	Lines
Java 276 █	9	548 ↗
JavaScript 130 █	Classes	Statements
	18	206
	Accessors	4

Issues	Technical Debt	Blocker	0
57	2d 2h	Critical	1
		Major	36
		Minor	17
		Info	3

Duplications

5.8%

Lines	Blocks	Files
32	2	1

✖ The project failed the quality gate on the following conditions:

Coverage	Critical issues	Major issues
7.0% < 80.0%	1 > 0	36 > 0

Complexity

1.5 /function

2.9 /class

2.9 /file

Total: 60

Files

Package Tangle Index	Dependencies To Cut
28.6%	Between Packages: 1
Cycles	Between Files: 1
> 1	

Events All

Aug 30 2014	Version	1.0-SNAPSHOT
Aug 30 2014	Quality Gate	Red
Aug 29 2014	Quality Profile	Use 'Sonar way' (JavaScript)
Aug 29 2014	Quality Profile	Use 'Sonar way' (Css)

Unit Tests Coverage	Unit Test Success
7.0%	100.0%
Line Coverage: 8.7%	Branch Coverage: 0.0%
Failures: 0	Errors: 0
Tests: 2	Execution Time: 2 ms

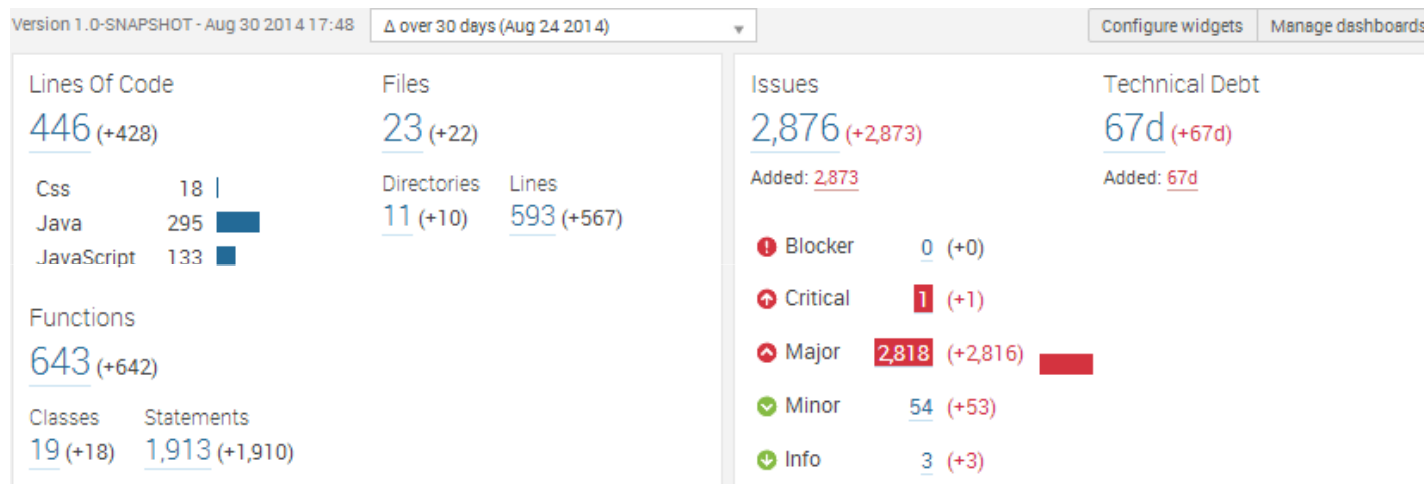
DockerPiExample com.dockerpi.DockerPiExample

Profiles: [Sonar way \(css\)](#), [Sonar way \(Java\)](#), [Sonar way \(JavaScript\)](#)

Quality Gate: [SonarQube way \(Default\)](#)

Integration Tests Coverage	Overall Coverage
12.6% ↘	15.4% ↘
Line Coverage: 13.9% ↘	Branch Coverage: 7.1% ↗
Line Coverage: 17.4% ↘	Branch Coverage: 7.1% ↘

Dashboard with time changes



[Compare Profiles](#) [Restore Profile](#)

Css Profiles

[Restore Built-in Profiles](#) [+ Create](#)

NAME	RULES	PROJECTS	DEFAULT	OPERATIONS
Sonar way	22		✓	Back up Rename Copy

Java Profiles

[Restore Built-in Profiles](#) [+ Create](#)

NAME	RULES	PROJECTS	DEFAULT	OPERATIONS
Sonar way	122		✓	Back up Rename Copy
Sonar way with Findbugs	497	0	Set as Default	Back up Rename Copy Delete

JavaScript Profiles

[Restore Built-in Profiles](#) [+ Create](#)

NAME	RULES	PROJECTS	DEFAULT	OPERATIONS
Sonar way	61		✓	Back up Rename Copy

Web Profiles

[Restore Built-in Profiles](#) [+ Create](#)

NAME	RULES	PROJECTS	DEFAULT	OPERATIONS
Sonar way	14		✓	Back up Rename Copy

Quality Gates

SonarQube way

Rename

Copy

Unset as Default

Delete

CONDITIONS

Only project measures are checked against thresholds. Sub-projects, directories and files are ignored. [More](#)

Add Condition:

Blocker issues	<input type="text" value="Value"/>	<input type="text" value="is greater than"/>	<input type="text" value="!"/>	<input type="text" value=""/>	<input type="text" value="x"/>	<input type="text" value="0"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>
Coverage	<input type="text" value="Value"/>	<input type="text" value="is less than"/>	<input type="text" value="!"/>	<input type="text" value=""/>	<input type="text" value="x"/>	<input type="text" value="80"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>
Critical issues	<input type="text" value="Value"/>	<input type="text" value="is greater than"/>	<input type="text" value="!"/>	<input type="text" value=""/>	<input type="text" value="x"/>	<input type="text" value="0"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>
Major issues	<input type="text" value="Value"/>	<input type="text" value="is greater than"/>	<input type="text" value="!"/>	<input type="text" value=""/>	<input type="text" value="x"/>	<input type="text" value="0"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>
Coverage on new code	<input type="text" value="Δ over 30 days"/>	<input type="text" value="is less than"/>	<input type="text" value="!"/>	<input type="text" value=""/>	<input type="text" value="x"/>	<input type="text" value="100"/>	<input type="button" value="Update"/>	<input type="button" value="Delete"/>



The project failed the quality gate on the following conditions:

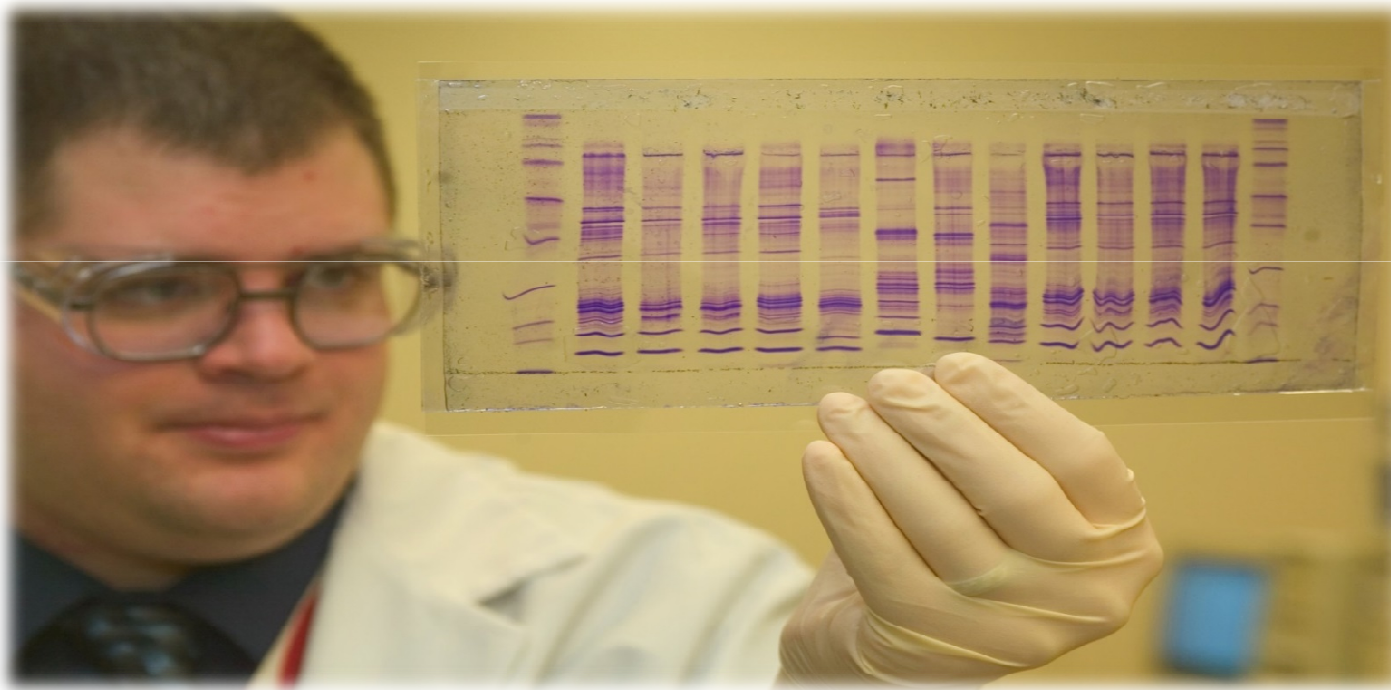
Coverage

25.6% < 80.0%


Major issues

17 > 0

Analysing data



Compare

Dashboards Projects Measures Issues Rules Quality Profiles Quality Gates			
Home	Add metric		Add project
TOOLS			
Dependencies			
Compare			
			
	SonarQube 4.2 4.2.1-SNAPSHOT Aug 29 2014	SonarQube 4.5-SNAPSHOT 17:10	DockerPiExample 1.0-SNAPSHOT 17:48
Lines of code	164,038	117,314	446
Complexity	63,112	23,383	2,974
Complexity /class	33.0	10.6	3.1
Complexity /function	0.7	1.6	4.6
Comments (%)	7.7%	7.1%	3.7%
Duplicated lines (%)	11.2%	0.7%	21.1%
Blocker issues	2	3	0

Measures

Dashboards Projects ▾ Measures Issues Rules Quality Profiles Quality Gates Settings Administrator ▾ Search

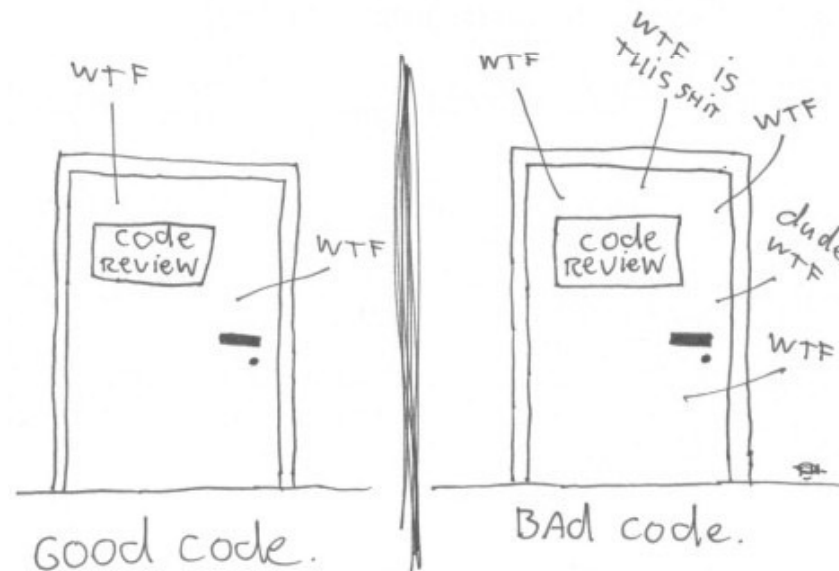
Measures New Search Save As Change Columns

Components: Files Metric: Duplicated lines > 5 × + More Criteria Search

QG	NAME ▲	LAST ANALYSIS	LOC	ISSUES
★	src/main/java/com/dockerpi/sonar/metrics/LCOM4.java	17:48	17	2
★	src/main/java/com/dockerpi/sonar/metrics/SomeViolations.java	17:48	82	21
★	src/main/java/com/mycompany/testapp/examples/metrics/LCOM4.java	17:27	17	2
★	src/main/java/com/mycompany/testapp/examples/metrics/SomeViolations.java	17:27	82	21
★	src/main/java/org/sonar/api/batch/debt/internal/DefaultDebtCharacteristic.java	Aug 29 2014	79	1

What is good code?

The ONLY VALID MEASUREMENT
OF CODE QUALITY: WTFs/MINUTE



Add code review

The screenshot illustrates the workflow for adding a code review issue in a web application. It is divided into three main stages:

- Manual Rules Configuration:** The top navigation bar includes 'Manual Rules'. A sidebar on the left has 'Manual Rules' selected. The main content area shows a table of manual rules:

NAME	OPERATIONS
Codereview General codereview rule.	Edit Delete
- Code Editor Interaction:** A code editor shows a snippet of Java code:


```

      6 public class Store {
      7
      8
      9
      10
      11
      12
      13 public Store() {
      14     super();
      15 }
      
```

 A context menu is open over line 8, with 'Add Manual Issue' selected. An arrow points to a dialog box that appears.
- Issue Creation and Display:** The dialog box contains a dropdown menu set to 'Codereview', a text input field with the message 'Improve the documentation of this class.', and 'Create' and 'Cancel' buttons. An arrow points to the final state where the issue is displayed as a card on the code editor:

8 ❗ Improve the documentation of this class. 🔗

[Comment](#) | [Open](#) [Confirm](#) [Resolve](#) [False Positive](#) | [Assign \[to me\]](#) | [Plan](#) | [Change Severity](#) | Reporter: Administrator

Hunting bad design and architecture



Architectural constraints

Ordered By Relevance ▾

Found: 1

Java

Architectural constraint

Sonar way

Major

Change

Deactivate

NotFromFrontendToBackend

Permalink

squid:NotFromFrontendToBackend

Major

No tags

Available Since August 31 2014

SonarQube (Java)

Custom Rule ([Show Template](#))

The frontend should use the service layer instead of the backend layer.

Edit

Delete

PARAMETERS

fromClasses com.dockerpi.sonar.layers.frontend.**

toClasses com.dockerpi.sonar.layers.backend.**

QUALITY PROFILES

Activate

Sonar way

Major

Change

Deactivate

Architectural constraints

```
» 1 package com.dockerpi.sonar.layers.frontend;
   2
   3 import com.dockerpi.sonar.layers.backend.PersonBackend;
   4
   5 public class DirectFromFrontendToBackend {
   6
   7     private PersonBackend personBackend = new PersonBackend();

```

com/dockerpi/sonar/layers/frontend/DirectFromFrontendToBackend must not use com/dockerpi/sonar/layers/backend/PersonBackend

[Comment](#) | [Open](#) [Confirm](#) [Resolve](#) [False Positive](#) | [Assign \[to me\]](#) | [Plan](#) | [Change Severity](#)

Package tangle index

[src/main/java/com/dockerpi/sonar/layers/frontend](#) [src/main/java/com/dockerpi/sonar/layers/service](#)
[src/main/java/com/dockerpi/sonar/layers/frontend/LocationController.java](#) USES [src/main/java/com/dockerpi/sonar/layers/service/LocationService.java](#)

[src/main/java/com/dockerpi/sonar/layers/service](#) [src/main/java/com/dockerpi/sonar/layers/frontend](#)
[src/main/java/com/dockerpi/sonar/layers/service/PersonService.java](#) USES [src/main/java/com/dockerpi/sonar/layers/frontend/PersonController.java](#)

Testing



Coverage per test

```

12 public int getValueOrBoundary(int value, int boundary) {
13     if (value < boundary) {
14         return value;
15     }
16     return boundary;
17 }
    
```

Covered By

- src/test/java/com/dockerpi/sonar/metrics/CopyOfPiTest.java
 - testGetValueOrBoundary 3
 - testGetValueOrBoundaryNoAssert 2
- src/test/java/com/dockerpi/sonar/metrics/PiTest.java
 - testGetValueOrBoundary 2
 - testGetValueOrBoundaryNoAssert 1

Covers

Pi.java 3 lines are covered
 src/main/java/com/dockerpi/sonar/metrics

Tests	Duration	Test Names	Covered Lines
	7 ms	testGetBoolean	3 >
		testGetFixedvalue	3 >
		testGetValueOrBoundary	3 >
		testGetValueOrBoundaryNoAssert	3 >

Integration testing

- ☞ Add integration test coverage widget to SonarQube
- ☞ Download Jacoco agent
- ☞ Configuration for Tomcat's catalina.bat:

```
set JACOCO=-
javaagent:$path$\lib\jacocoagent.jar,
destfile=$resultpath$\jacoco.exec,
append=false,includes=com.dockerpi.*
set JAVA_OPTS=%JAVA_OPTS% %JACOCO%
```


Integration testing

- ☞ Start Tomcat
- ☞ Execute tests (manual, integration, performance...)
- ☞ Stop Tomcat and execute SonarQube analysis

```
mvn clean install sonar:sonar
```

```
-Dsonar.dynamicAnalysis=reuseReports
```

```
-Dsonar.jacoco.itReportPath=
```

```
$resultpath$\jacoco.exec
```

Unit and integration testing combined

Unit Tests		Integration Tests	
Coverage	83.3%	Coverage	50.0%
Line coverage	83.3%	Line coverage	50.0%
Lines to cover	12 >	Lines to cover	12 >
Uncovered lines	2 >	Uncovered lines	6 >

```

13 public store() {
14     super();
15 }
16
17 public store(String name, String place) {
18     this.name = name;
19     this.place = place;
20 }

```

Unit Tests		Integration Tests	
Coverage	83.3%	Coverage	50.0%
Line coverage	83.3%	Line coverage	50.0%
Lines to cover	12 >	Lines to cover	12 >
Uncovered lines	2 >	Uncovered lines	6 >

```

13 public store() {
14     super();
15 }
16
17 public store(String name, String place) {
18     this.name = name;
19     this.place = place;
20 }
21

```

PMD rules for unit testing

```
@Test  
public void exception() {
```

⬆ JUnit tests should include assert() or fail()

○ Open | Debt: 1h

```
    try {  
        throw new Exception();
```

⬆ In JUnit4, use the @Test(expected) annotation to denote tests that should throw exceptions

○ Open | Debt: 2min

```
    } catch (Exception e) {  
    }  
}
```

Other languages

Language ഭാഷা Linguaggio ЯЗЫК
 Γλώσσα Język താമരം: لسان بولی
 भाषा ភាសា 𐌵𐌹𐍂𐌰 𐌸𐌹𐍂𐌰
 Language 𑌕𑌹𑍂𑌰 𑌸𑌹𑍂𑌰
 भाषा భాష 𑌕𑌹𑍂𑌰 𑌸𑌹𑍂𑌰
 Linguagem Wika 𑌕𑌹𑍂𑌰 𑌸𑌹𑍂𑌰
 Sprache 语言 𑌕𑌹𑍂𑌰 Bahasa 언어

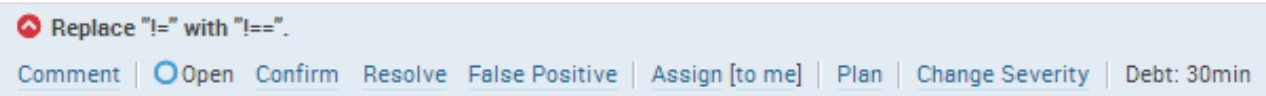


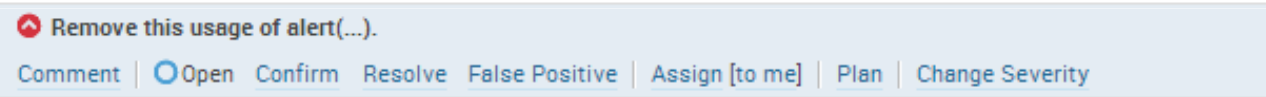
JavaScript

```

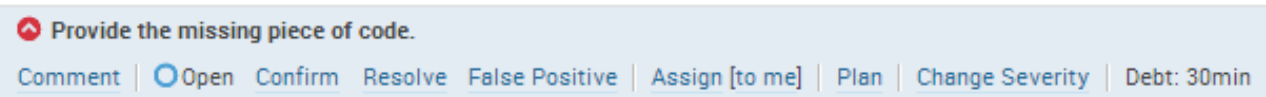
1 function nesting(temp) {
2   if( temp != "" ){
3     alert("No var supplied");
4   }
5   if (temp < 100) {
6     if (temp < 75) {

```


 Replace "!=" with "!==".
[Comment](#) | [Open](#) | [Confirm](#) | [Resolve](#) | [False Positive](#) | [Assign \[to me\]](#) | [Plan](#) | [Change Severity](#) | Debt: 30min


 Remove this usage of alert(...).
[Comment](#) | [Open](#) | [Confirm](#) | [Resolve](#) | [False Positive](#) | [Assign \[to me\]](#) | [Plan](#) | [Change Severity](#)


 Those two 'if' statements can be consolidated.
[Comment](#) | [Open](#) | [Confirm](#) | [Resolve](#) | [False Positive](#) | [Assign \[to me\]](#) | [Plan](#) | [Change Severity](#) | Debt: 30min


 Provide the missing piece of code.
[Comment](#) | [Open](#) | [Confirm](#) | [Resolve](#) | [False Positive](#) | [Assign \[to me\]](#) | [Plan](#) | [Change Severity](#) | Debt: 30min

CSS

```
1 .company .project .subproject .website .component .page .redbackground {  
  ⚠ Disallow overspecified selectors  
  ○ Open | Debt: 2h  
  
  ⚠ Missing vendor: -webkit for property: border-radius  
  ○ Open | Debt: 10min  
2 *background-color: red;  
  ⚠ Unknown property  
  ○ Open | Debt: 10min  
  
  ⚠ Disallow star hack  
  ○ Open | Debt: 1h  
3 -moz-border-radius: 5px;  
  ⚠ No standard property defined after  
  ○ Open | Debt: 10min  
4     /*-webkit-border-radius: 5px;  
5     border-radius: 5px;*/  
6 }  
7
```

Plugins



Pitest plugin

```
public int getValueOrBoundary(int value, int boundary) {  
    if (value < boundary) {
```

⬆ A conditional expression has been negated without breaking the tests

[Comment](#) | Open [Confirm](#) [Resolve](#) [False Positive](#) | [Assign \[to me\]](#) | [Plan](#) | [Change Severity](#)

⬆ A relational operator has been replaced by a boundary counterpart without breaking the tests

[Comment](#) | Open [Confirm](#) [Resolve](#) [False Positive](#) | [Assign \[to me\]](#) | [Plan](#) | [Change Severity](#)

```
        return value;
```

⬆ The return value of a method call has been replaced without breaking the tests

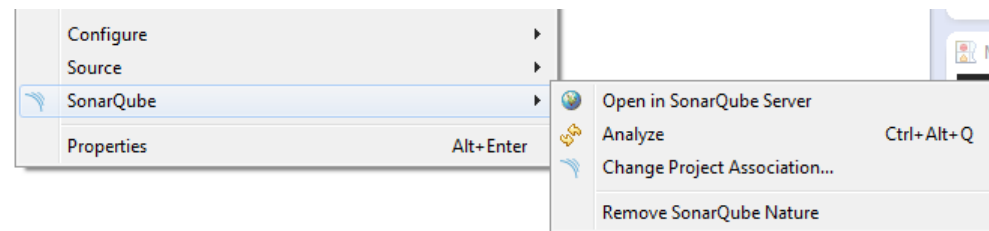
[Comment](#) | Open [Confirm](#) [Resolve](#) [False Positive](#) | [Assign \[to me\]](#) | [Plan](#) | [Change Severity](#)

```
    }  
    return boundary;
```

```
}
```


(Eclipse) IDE integration

- ☞ Supports incremental analyses (default)
- ☞ Install plugin through Eclipse Marketplace
- ☞ Configure SonarQube server:
 - Window -> Preferences -> SonarQube -> Servers
 - Right click on your project in the Project Explorer
 - Configure -> Associate with SonarQube



SCM Activity plugin

```
2014-08-30 johanj@infosupport.c... 1 package com.dockerp1.helloworld;
2
3
4 import javax.ws.rs.GET;
5 import javax.ws.rs.Path;
6 import javax.ws.rs.Produces;
7 import javax.ws.rs.core.MediaType;
8 import javax.ws.rs.core.Response;
9
10
11 @Path("store")
12 public class StoreService {
13
```


Duplications across projects

General Settings

Edit global settings for this SonarQube instance.

CATEGORY

Build Breaker

Build Stability

CSS

Exclusions

General

Generic Coverage

JaCoCo

General Database Cleaner Differential Views **Duplications** Email

Cross project
duplication
detection

True ▼

Default: false

SonarQube supports the detection of cross project duplications. Activating this property will slightly increase each SonarQube analysis time.

Key: sonar.cpd.cross_project

Save Duplications Settings

Duplications across projects

The screenshot displays the SonarQube interface for a project named 'DockerPiExample'. The file path is 'src/main/java/com/dockerpi/sonar/metrics/SomeViolations.java'. The analysis shows 82 Lines of code, 1d 1h Debt, 21 Issues, and 95.5% Duplicated lines (%). A summary table indicates 1 Duplicated block and 105 Duplicated lines. A code snippet is shown with a tooltip indicating it is duplicated by 'TestApplication' in 'src/main/java/com/mycompany/testapp/examples/met...' at lines 3-108.

DockerPiExample

src/main/java/com/dockerpi/sonar/metrics/SomeViolations.java

82 Lines of code

1d 1h Debt

21 Issues

95.5% Duplicated lines (%)

Duplications

Duplicated blocks	1 >
Duplicated lines	105

```
2  
3 public class SomeViolations {  
4  
5     // Checkstyle: visibility modifier (not checked in Eclipse)
```

Duplicated By
TestApplication [src/main/java/com/mycompany/testapp/examples/met...](#)
Lines: [3 - 108](#)

Hotspots

Most Violated Rules Any severity [More](#)

✓	Tabulation characters should not be used	16	<div style="width: 100%;"></div>
⬆	System.out and System.err should not be used as loggers	8	<div style="width: 50%;"></div>
⬆	Unused local variables should be removed	3	<div style="width: 15%;"></div>
⬆	Duplicated blocks	2	<div style="width: 10%;"></div>
⬆	Loggers should be "private static final" and should share a naming convention	2	<div style="width: 10%;"></div>

Hotspots by Complexity [More](#)

SomeViolations.java	25	<div style="width: 100%;"></div>
Pi.java	7	<div style="width: 25%;"></div>

Most Violated Components [More](#)

SomeViolations.java	! 0	⬆ 1	⬆ 17	✓ 2	⬇ 1
style.css	! 0	⬆ 0	⬆ 8	✓ 0	⬇ 0
sonarviolations.js	! 0	⬆ 0	⬆ 8	✓ 0	⬇ 1
HelloWorldService.java	! 0	⬆ 0	⬆ 3	✓ 1	⬇ 0
BlaService.java	! 0	⬆ 0	⬆ 3	✓ 1	⬇ 0

Hotspots by Complexity /function [More](#)

SomeViolations.java	3.1	<div style="width: 100%;"></div>
sonarviolations.js	3.0	<div style="width: 95%;"></div>
Pi.java	2.3	<div style="width: 70%;"></div>
BlaService.java	2.0	<div style="width: 60%;"></div>
HelloWorldService.java	1.5	<div style="width: 40%;"></div>



Accept failure, but improve continuously

“Once we accept our limits, we go beyond them.”

- Albert Einstein

Questions

- ☞ <http://blogs.infosupport.com/javaland>
- ☞ Ask us!
- ☞ SonarQube dev /user mailinglist
- ☞ Sonarqube.org
- ☞ Nemo example dashboard
- ☞ SonarQube books



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