

Code Coverage and Test Reports with Maven



Code Coverage Reports

- If you are not using IntelliJ, don't worry
 - In this video, I'll show you how to do the same using Maven commands
 - No IDE is required ... run Maven from command-line
 - Useful when running as part of DevOps build process
 - Continuous Integration / Continuous Deployment (CI/CD) environments

System Requirements

- To complete these steps, you must have Maven installed (not with IDE)
- If you don't have Maven installed, follow steps at: <https://maven.apache.org>
- Once installed, verify your Maven installation
- Open a terminal window and type: **mvn -version**



```
Apache Maven 3.8.4 (9b656c72d54e5bacbed989b64718c159fe39b537)
```

```
Maven home: ...
```

```
...
```

Development Process

Step-By-Step

1. Configure Maven to find unit tests
2. Run unit tests
3. Generate unit test reports
4. Generate code coverage reports

Step 1: Configure Maven to find unit tests

- By default, Maven will NOT find JUnit 5 test classes
- At command-line, type: **mvn clean test**



```
...
-----
T E S T S
-----
Results :
Tests run: 0, Failures: 0, Errors: 0, Skipped: 0
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 1.450 s
[INFO] Finished at: 2022-1-2T10:20:17-05:00
[INFO] -----
```

No tests were found??!!!

Step 1: Configure Maven to find unit tests

- Resolve this by using Maven **Surefire** Plugin version 2.22.0 or higher

pom.xml

```
...
<build>
  <plugins>
    <plugin>
      <groupId>org.apache.maven.plugins</groupId>
      <artifactId>maven-surefire-plugin</artifactId>
      <version>3.0.0-M5</version>
    </plugin>
  </plugins>
</build>
...
```

Step 2: Run unit tests

- At command-line, type: **mvn clean test**

```
...
[INFO] --- maven-surefire-plugin:3.0.0-M5:test (default-test) @ junitdemo ---
[INFO]
[INFO] -----
[INFO] T E S T S
[INFO] -----
[INFO] Running com.luv2code.junitdemo.DemoUtilsTest
I am going to sleep
Sleeping over
[INFO] Tests run: 9, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 2.077 s - in com.luv2code.junitdemo.DemoUtilsTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 9, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 4.673 s
[INFO] Finished at: 2022-1-2T02:32:07-05:00
[INFO] -----
```

Step 3: Generate unit test reports

- Maven **SureFire-Report** plugin can generate HTML unit test report

pom.xml

```
...
<build>
  <plugins>

    <plugin>
      <groupId>org.apache.maven.plugins</groupId>
      <artifactId>maven-surefire-report-plugin</artifactId>
      <version>3.0.0-M5</version>

      <!-- TO DO ... -->

    </plugin>

  </plugins>
</build>
...
```

Step 3: Generate unit test reports

pom.xml

```
...
<build>
  <plugins>
    <plugin>
      <groupId>org.apache.maven.plugins</groupId>
      <artifactId>maven-surefire-report-plugin</artifactId>
      <version>3.0.0-M5</version>
      <executions>
        <execution>
          <phase>test</phase>
          <goals>
            <goal>report</goal>
          </goals> _____
        </execution>
      </executions>
    </plugin>
  </plugins>
</build>
```

During Maven's test phase,

execute the plugin goal

maven-surefire-report-plugin:report

Step 3: Generate unit test reports

- At command-line, type:

```
mvn clean test
```

Run tests and
executes Surefire Report Plugin
to generate HTML reports

```
mvn site -DgenerateReports=false
```

Add website resources
images, css etc...

Don't overwrite existing HTML reports

View unit test reports

File: target/site/surefire-report.html

Surefire Report

Summary

[Summary] [Package List] [Test Cases]

Tests	Errors	Failures	Skipped	Success Rate	Time
9	0	0	0	100%	2.069

Note: failures are anticipated and checked for with assertions while errors are unanticipated.

Package List

[Summary] [Package List] [Test Cases]

Package	Tests	Errors	Failures	Skipped	Success Rate	Time
com.luv2code.junitdemo	9	0	0	0	100%	2.069

Note: package statistics are not computed recursively, they only sum up all of its testsuites numbers.

com.luv2code.junitdemo

	Class	Tests	Errors	Failures	Skipped	Success Rate	Time
⚠	DemoUtilsTest	9	0	0	0	100%	2.069

Test Cases

[Summary] [Package List] [Test Cases]

DemoUtilsTest

⚠	testSameAndNotSame	0.021
⚠	testArrayEquals	0.001
⚠	testTrueFalse	0.002
⚠	testNullAndNotNull	0.002
⚠	testEqualsAndNotEquals	0.001
⚠	testTimeout	2.01
⚠	testLinesMatch	0.004
⚠	testIterableEquals	0.002
⚠	testThrowsAndDoesNotThrow	0.003

Handling tests failure

- By default, Maven **Surefire** plugin will NOT generate reports if tests fail
- To generate reports if tests pass or fail

pom.xml

```
...  
<build>  
  <plugins>  
    <plugin>  
      <groupId>org.apache.maven.plugins</groupId>  
      <artifactId>maven-surefire-plugin</artifactId>  
      <version>3.0.0-M5</version>  
  
      <configuration>  
        <testFailureIgnore>true</testFailureIgnore>  
      </configuration>  
    </plugin>  
  </plugins>  
</build>  
...
```

generate reports
if tests pass or fail

Show Failing Tests

File: target/site/surefire-report.html

Surefire Report

Summary

[Summary] [Package List] [Test Cases]

Tests	Errors	Failures	Skipped	Success Rate	Time
9	0	1	0	88.889%	2.073

Note: failures are anticipated and checked for with assertions while errors are unanticipated.

Package List

[Summary] [Package List] [Test Cases]

Package	Tests	Errors	Failures	Skipped	Success Rate	Time
com.luv2code.junitdemo	9	0	1	0	88.889%	2.073

Note: package statistics are not computed recursively, they only sum up all of its testsuites numbers.

com.luv2code.junitdemo

	Class	Tests	Errors	Failures	Skipped	Success Rate	Time
⚠	DemoUtilsTest	9	0	1	0	88.889%	2.073

Test Cases

[Summary] [Package List] [Test Cases]

DemoUtilsTest

⚠	testSameAndNotSame	0.021
⚠	testArrayEquals	0.001
✖	testTrueFalse + [Detail]	0.003
⚠	testNullAndNotNull	0.002
⚠	testEqualsAndHashCode	0.001
⚠	testTimeout	2.01
⚠	testLinesMatch	0.005
⚠	testIterableEquals	0.002
⚠	testThrowsAndDoesNotThrow	0.002

Failure Details

[Summary] [Package List] [Test Cases]

✖	testTrueFalse	
	org.opentest4j.AssertionFailedError	
	com.luv2code.junitdemo.DemoUtilsTest:60	

Showing @DisplayName in reports

- By default, Maven **Surefire** plugin will NOT show @DisplayName in reports
- To show @DisplayName in reports

pom.xml

```
...
<build>
  <plugins>
    <plugin>
      <groupId>org.apache.maven.plugins</groupId>
      <artifactId>maven-surefire-plugin</artifactId>
      <version>3.0.0-M5</version>

      <configuration>
        <testFailureIgnore>true</testFailureIgnore>
        <statelessTestsetReporter implementation="org.apache.maven.plugin.surefire.extensions.junit5.JUnit5Xml130StatelessReporter">
          <usePhrasedTestCaseMethodName>true</usePhrasedTestCaseMethodName>
        </statelessTestsetReporter>
      </configuration>
    </plugin>
  </plugins>
</build>
...
```

Show @DisplayName

Showing @DisplayName

File: target/site/surefire-report.html

Surefire Report

Summary

[Summary] [Package List] [Test Cases]

Tests	Errors	Failures	Skipped	Success Rate	Time
9	0	0	0	100%	2.069

Note: failures are anticipated and checked for with assertions while errors are unanticipated.

Package List

[Summary] [Package List] [Test Cases]

Package	Tests	Errors	Failures	Skipped	Success Rate	Time
com.luv2code.junitdemo	9	0	0	0	100%	2.069

Note: package statistics are not computed recursively, they only sum up all of its testsuites numbers.

com.luv2code.junitdemo

	Class	Tests	Errors	Failures	Skipped	Success Rate	Time
⚠	DemoUtilsTest	9	0	0	0	100%	2.069

Showing @DisplayName

Test Cases

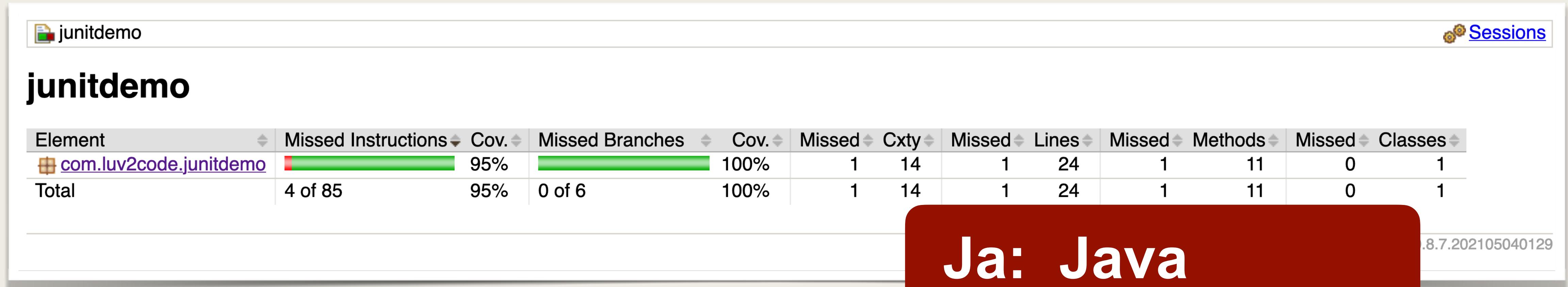
[Summary] [Package List] [Test Cases]

DemoUtilsTest

⚠	Same and Not Same	0.032
⚠	Array Equals	0.006
⚠	True and False	0.003
⚠	Null and Not Null	0.002
⚠	Equals and Not Equals	0.004
⚠	Timeout	2.009
⚠	Lines match	0.006
⚠	Iterable equals	0.003
⚠	Throws and Does Not Throw	0.004

Step 4: Generate code coverage reports

- **JaCoCo** is a free code coverage library
- JaCoCo provides a Maven plugin to generate code coverage reports



www.jacoco.org

Ja: Java
Co: Code
Co: Coverage

Step 4: Generate code coverage reports

pom.xml

```
...
<build>
  <plugin>
    <groupId>org.jacoco</groupId>
    <artifactId>jacoco-maven-plugin</artifactId>
    <version>0.8.7</version>
    <executions>
      <execution>
        <id>jacoco-prepare</id>
        <goals>
          <goal>prepare-agent</goal>
        </goals>
      </execution>
      <execution>
        <id>jacoco-report</id>
        <phase>test</phase>
        <goals>
          <goal>report</goal>
        </goals>
      </execution>
    </executions>
  </plugin>
</build>
...
```

Prepare JaCoCo agent

This goal is bound by default to
Maven's initialize phase

During Maven's test phase,

execute the plugin goal

jacoco-maven-plugin:report

Step 4: Generate code coverage reports

- At command-line, type: **mvn clean test**

```
...
[INFO] -----< com.luv2code:junitdemo >-----
[INFO] Building junitdemo 1.0
[INFO] ----- [ jar ] -----
[INFO]
[INFO] --- maven-clean-plugin:2.5:clean (default-clean) @ junitdemo ---
[INFO] ...
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.7:prepare-agent (jacoco-prepare) @ junitdemo ---
[INFO] ...
[INFO]
[INFO] --- maven-surefire-plugin:3.0.0-M5:test (default-test) @ junitdemo ---
[INFO] ...
[INFO]
[INFO] --- jacoco-maven-plugin:0.8.7:report (jacoco-report) @ junitdemo ---
[INFO] ...
[INFO]
[INFO] BUILD SUCCESS
[INFO]
[INFO] Total time: 5.548 s
[INFO] Finished at: 2022-1-2T04:19:16-05:00
[INFO]
...

```

Jacoco report generation is attached to test phase.

Reports are automatically generated when unit tests are executed

Jacoco report generation is attached to test phase.

Reports are automatically generated when unit tests are executed

View code coverage reports

File: target/site/jacoco/index.html

junitdemo Sessions

junitdemo

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cqty	Missed	Lines	Missed	Methods	Missed	Classes
com.luv2code.junitdemo	95%	100%	1	14	1	24	1	11	0	11	0	1
Total	4 of 85	95%	0 of 6	100%	1	14	1	24	1	11	0	1

junitdemo > com.luv2code.junitdemo > DemoUtils Sessions

DemoUtils

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cqty	Missed	Lines	Missed	Methods	Missed	Methods
multiply(int, int)	0%	n/a	1	1	1	1	1	1	1	1	1	1
DemoUtils()	100%	n/a	0	1	0	5	0	1	0	1	0	1
isGreater(int, int)	100%	100%	0	2	0	3	0	3	0	1	0	1
throwException(int)	100%	100%	0	2	0	3	0	3	0	1	0	1
checkTimeout()	100%	n/a	0	1	0	4	0	4	0	1	0	1
checkNull(Object)	100%	100%	0	2	0	3	0	3	0	1	0	1
add(int, int)	100%	n/a	0	1	0	1	0	1	0	1	0	1
getAcademyInList()	100%	n/a	0	1	0	1	0	1	0	1	0	1
getAcademy()	100%	n/a	0	1	0	1	0	1	0	1	0	1
getAcademyDuplicate()	100%	n/a	0	1	0	1	0	1	0	1	0	1
getFirstThreeLettersOfAlphabet()	100%	n/a	0	1	0	1	0	1	0	1	0	1
Total	4 of 85	95%	0 of 6	100%	1	14	1	24	1	11	1	11

Created with JaCoCo 0.8.7.202105040129

Maven Plugin Documentation

<https://maven.apache.org/plugins>

<https://www.jacoco.org/jacoco/trunk/doc/>