Escuela Colombiana de Ingeniería Julio Garavito

Ciclos de Vida de Desarrollo de Software

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Laboratorio 03

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Introducción

 En el laboratorio se enfoca en la importancia de las pruebas de unidad, para eso realizaremos **TDD** (Test Driven Develoment) durante el desarrollo de la actividad propuesta en el laboratorio.

Para esto se utilizaran herramientas como lo es JaCoCo para medir el porcentaje de cobertura que abarcan las pruebas de unidad realizadas, también se utilizara Sonarqube para analizar el código fuente en busca de distintos problemas como los son problemas de vulnerabilidad, cobertura de las pruebas o código duplicado.

Desarrollo del laboratorio.

- **Creación del proyecto en Maven**: Creamos el proyecto en Maven con los siguientes parámetros

```
Grupo: edu.eci.cvds
Artefacto: Library
Paquete: edu.eci.cvds.tdd
archetypeArtifactId: maven-archetype-quickstart
```
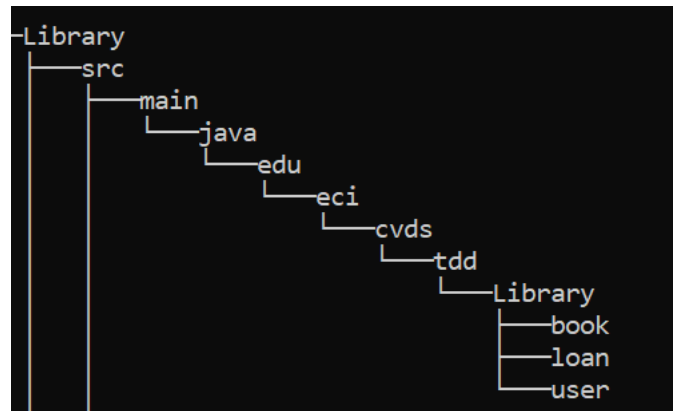
- **Agregar la dependencia de JUNIT5:** Para agregar la dependencia de JUNIT5 al proyecto vamos al archivo pom.xml al cual le agregaremos lo siguiente:

```
<properties>
  <maven.compiler.target>1.17</maven.compiler.target>
  <maven.compiler.source>1.17</maven.compiler.source>
</properties>
```

Para que funcionara de manera correcta al realizar el "mvn package" se tuvo que cambiar de versiones de Maven compiler a la 17.

```
<properties>
    <maven.compiler.source>17</maven.compiler.source>
    <maven.compiler.target>17</maven.compiler.target>
```

- **Agregar el esqueleto del proyecto:** Se muestra la creación de los directorios correspondientes que se nos indican:

- **Agregar clases:** Acá se muestra la creación correspondiente de las clases que se nos indican

- **Pruebas unitarias y TDD:** Para realizar este parte del laboratorio primero debemos crear los directorios correspondientes y la clase de pruebas de Library.
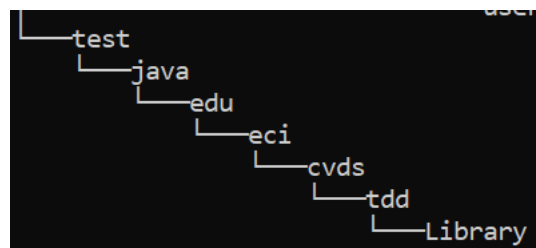
Ya con esto se comenzara a realizar TDD para probar los métodos addBook, loanABook y returnLoan.

addBook: Iremos mostrando como en consola las pruebas fallaban y después de implementar lo que queremos probar de este método, pasa la prueba de manera satisfactoria.

o testAddBook


```
[INFO] Running edu.eci.cvds.tdd.library.LibraryTest
[ERROR] Tests run: 1, Failures: 1, Errors: 0, Skipped: 0, Time elapsed: 0.109 s <<< FAILURE! -- in edu.eci.cvds.tdd.libr
ary.LibraryTest
[ERROR] edu.eci.cvds.tdd.library.LibraryTest.testAddBook -- Time elapsed: 0.059 s <<< FAILURE!
org.opentest4j.AssertionFailedError: The book should be in the library ==> expected: <true> but was: <false>
        at org.junit.jupiter.api.AssertionFailureBuilder.build(AssertionFailureBuilder.java:151)
        at org.junit.jupiter.api.AssertionFailureBuilder.buildAndThrow(AssertionFailureBuilder.java:132)
        at org.junit.jupiter.api.AssertTrue.failNotTrue(AssertTrue.java:63)
        at org.junit.jupiter.api.AssertTrue.assertTrue(AssertTrue.java:36)
        at org.junit.jupiter.api.Assertions.assertTrue(Assertions.java:214)
        at edu.eci.cvds.tdd.library.LibraryTest.testAddBook(LibraryTest.java:35)
        at java.base/java.lang.reflect.Method.invoke(Method.java:580)
        at java.base/java.util.ArrayList.forEach(ArrayList.java:1596)
        at java.base/java.util.ArrayList.forEach(ArrayList.java:1596)

[INFO]
[INFO] Results:
[INFO]
[ERROR] Failures:
[ERROR]   LibraryTest.testAddBook:35 The book should be in the library ==> expected: <true> but was: <false>
[INFO]
[ERROR] Tests run: 1, Failures: 1, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD FAILURE
[INFO] ------------------------------------------------------------------------
```

```
[WARNING] File encoding has not been set, using platform encoding UTF-8, i.e. build is platform dependent!
[INFO] Compiling 5 source files with javac [debug target 17] to target\classes
[WARNING] system modules path not set in conjunction with -source 17
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ Library ---
[WARNING] Using platform encoding (UTF-8 actually) to copy filtered resources, i.e. build is platform dependent!
[INFO] skip non existing resourceDirectory C:\Users\Santiago\Downloads\cvds\lab03-cvds\Library\src\test\resources
[INFO]
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ Library ---
[INFO] Recompiling the module because of changed dependency.
[WARNING] File encoding has not been set, using platform encoding UTF-8, i.e. build is platform dependent!
[INFO] Compiling 1 source file with javac [debug target 17] to target\test-classes
[WARNING] system modules path not set in conjunction with -source 17
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ Library ---
[INFO] Using auto detected provider org.apache.maven.surefire.junitplatform.JUnitPlatformProvider
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------
[INFO] Running edu.eci.cvds.tdd.library.LibraryTest
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.085 s -- in edu.eci.cvds.tdd.library.LibraryTes
t
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
```

o addBooktestIfRepeated

```
[INFO] Results:
[INFO]
[ERROR] Failures:
[ERROR]   LibraryTest.addbokTestIfRepeated:44 expected: <1> but was: <2>
[INFO]
[ERROR] Tests run: 2, Failures: 1, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD FAILURE
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  4.962 s
[INFO] Finished at: 2024-08-29T18:39:55-05:00
[INFO] ------------------------------------------------------------------------
[ERROR] Failed to execute goal org.apache.maven.plugins:maven-surefire-plugin:3.2.5:test (default-test) on project Libra
ry: There are test failures.
[ERROR]
[ERROR] Please refer to C:\Users\Santiago\Downloads\cvds\lab03-cvds\Library\target\surefire-reports for the individual t
est results.
[ERROR] Please refer to dump files (if any exist) [date].dump, [date]-jvmRun[N].dump and [date].dumpstream.
[ERROR] -> [Help 1]
[ERROR]
[ERROR] To see the full stack trace of the errors, re-run Maven with the -e switch.
[ERROR] Re-run Maven using the -X switch to enable full debug logging.
[ERROR]
[ERROR] For more information about the errors and possible solutions, please read the following articles:
[ERROR] [Help 1] http://cwiki.apache.org/confluence/display/MAVEN/MojoFailureException
```

```
[INFO] Compiling 1 source file with javac [debug target 17] to target\test-classes
[WARNING] system modules path not set in conjunction with -source 17
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ Library ---
[INFO] Using auto detected provider org.apache.maven.surefire.junitplatform.JUnitPlatformProvider
[INFO]
[INFO] -------------------------------------------------------
[INFO]  T E S T S
[INFO] -------------------------------------------------------
[INFO] Running edu.eci.cvds.tdd.library.LibraryTest
[INFO] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.092 s -- in edu.eci.cvds.tdd.library.LibraryTes
t
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  4.988 s
[INFO] Finished at: 2024-08-29T18:46:51-05:00
[INFO] ------------------------------------------------------------------------
```

- addBookTestIfBookIsNull

```
INFO] -------------------------------------------------------
INFO]  T E S T S
INFO] -------------------------------------------------------
INFO] Running edu.eci.cvds.tdd.library.LibraryTest
ERROR] Tests run: 3, Failures: 1, Errors: 0, Skipped: 0, Time elapsed: 0.121 s <<< FAILURE! -- in edu.eci.cvds.tdd.libr
ary.LibraryTest
ERROR] edu.eci.cvds.tdd.library.LibraryTest.addBookTestIfBookIsNull -- Time elapsed: 0.017 s <<< FAILURE!
rg.opentest4j.AssertionFailedError: expected: <false> but was: <true>
        at org.junit.jupiter.api.AssertionFailureBuilder.build(AssertionFailureBuilder.java:151)
        at org.junit.jupiter.api.AssertionFailureBuilder.buildAndThrow(AssertionFailureBuilder.java:132)
        at org.junit.jupiter.api.AssertFalse.failNotFalse(AssertFalse.java:63)
        at org.junit.jupiter.api.AssertFalse.assertFalse(AssertFalse.java:36)
        at org.junit.jupiter.api.AssertFalse.assertFalse(AssertFalse.java:31)
        at org.junit.jupiter.api.Assertions.assertFalse(Assertions.java:231)
        at edu.eci.cvds.tdd.library.LibraryTest.addBookTestIfBookIsNull(LibraryTest.java:51)
        at java.base/java.lang.reflect.Method.invoke(Method.java:580)
        at java.base/java.util.ArrayList.forEach(ArrayList.java:1596)
        at java.base/java.util.ArrayList.forEach(ArrayList.java:1596)

INFO]
INFO] Results:
INFO]
ERROR] Failures:
ERROR]   LibraryTest.addBookTestIfBookIsNull:51 expected: <false> but was: <true>
INFO]
ERROR] Tests run: 3, Failures: 1, Errors: 0, Skipped: 0
INFO]
INFO] ------------------------------------------------------------------------
INFO] BUILD FAILURE
INFO] ------------------------------------------------------------------------
```

- **loanABook:** Iremos mostrando como en consola las pruebas fallaban y después de implementar lo que queremos probar de este método, pasa la prueba de manera satisfactoria.

  o addLoan

o   addLoanUserAndBookFalse

Nos falto tomar la captura de cuando no pasaba este prueba.

o   addLoanBook

- **returnLoan**

  o returnLoan

```
[INFO]
[INFO] Results:
[INFO]
[ERROR] Failures:
[ERROR]   LibraryTest.returnLoan:36 expected: <true> but was: <false>
[INFO]
[ERROR] Tests run: 1, Failures: 1, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD FAILURE
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.746 s
[INFO] Finished at: 2024-08-31T08:46:20-05:00
```

```
[INFO] Results:
[INFO]
[INFO] Tests run: 1, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- jar:3.3.0:jar (default-jar) @ Library ---
[INFO] Building jar: C:\Users\CAMILO.LEON-A\Desktop\lab03-cvds\Library\target\Library-1.0-SNAPSHOT.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  2.085 s
[INFO] Finished at: 2024-08-31T09:27:51-05:00
[INFO] ------------------------------------------------------------------------
```

  o returnLoanNumberOfBookIncrement

```
[INFO] Results:
[INFO]
[ERROR] Failures:
[ERROR]   LibraryTest.returnLoanNumberOfBookIncrement:57 expected: <1> but was: <0>
[INFO]
[ERROR] Tests run: 2, Failures: 1, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD FAILURE
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  1.971 s
[INFO] Finished at: 2024-09-01T16:53:56-05:00
```

```
[INFO] ------------------------------------------------------------------------
[INFO]  T E S T S
[INFO] ------------------------------------------------------------------------
[INFO] Running edu.eci.cvds.tdd.library.LibraryTest
[INFO] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.044 s -- in edu.eci.cvds.tdd.library.LibraryTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- jar:3.4.1:jar (default-jar) @ Library ---
[INFO] Building jar: C:\Users\santi\Desktop\lab03-cvds\Library\target\Library-1.0-SNAPSHOT.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  2.597 s
[INFO] Finished at: 2024-09-01T17:09:18-05:00
[INFO] ------------------------------------------------------------------------
```

  o returnLoanStatusShouldBeReturned

```
[INFO] Results:
[INFO]
[ERROR] Failures:
[ERROR]   LibraryTest.returnLoanStatusShouldBeReturned:70 expected: <RETURNED> but was: <ACTIVE>
[INFO]
[ERROR] Tests run: 3, Failures: 1, Errors: 0, Skipped: 0
[INFO]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD FAILURE
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  2.195 s
[INFO] Finished at: 2024-09-01T17:42:13-05:00
[INFO] ------------------------------------------------------------------------
```

```
[INFO] ------------------------------------------------------------------------
[INFO]  T E S T S
[INFO] ------------------------------------------------------------------------
[INFO] Running edu.eci.cvds.tdd.library.LibraryTest
[INFO] Tests run: 3, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.046 s -- in edu.eci.cvds.tdd.library.LibraryTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 3, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- jar:3.4.1:jar (default-jar) @ Library ---
[INFO] Building jar: C:\Users\santi\Desktop\lab03-cvds\Library\target\Library-1.0-SNAPSHOT.jar
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  2.573 s
[INFO] Finished at: 2024-09-01T18:05:23-05:00
[INFO] ------------------------------------------------------------------------
```

- o returnLoanActualDate
- Nos faltó tomar la captura de cuando no pasaba esta prueba.

```
[INFO] ------------------------------------------------------------------------
[INFO]  T E S T S
[INFO] ------------------------------------------------------------------------
[INFO] Running edu.eci.cvds.tdd.library.LibraryTest
[INFO] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.060 s -- in edu.eci.cvds.tdd.library.LibraryTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 4, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO]
[INFO] --- jar:3.4.1:jar (default-jar) @ Library ---
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time:  2.589 s
[INFO] Finished at: 2024-09-01T18:17:15-05:00
[INFO] ------------------------------------------------------------------------
```

- **Cobertura**: Se pondrá la dependencia de JaCoCo en el pom para verificar la cobertura de las pruebas realizadas.(El mínimo aceptado de cobertura es de 85%). Acá pondremos la imagen que muestra la cobertura de las pruebas

Library

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed
edu.eci.cvds.tdd.library.loan		76%		100%	5	14	9	28	5	13	0
edu.eci.cvds.tdd.library.user		52%		n/a	3	5	5	10	3	5	0
edu.eci.cvds.tdd.library		95%		68%	5	15	5	36	0	7	0
edu.eci.cvds.tdd.library.book		78%		n/a	2	5	2	9	2	5	0
Total	43 of 301	85%	5 of 18	72%	15	39	21	83	10	30	0

Created with JaCoCo 0.8.12.202403310830

- **Sonarqube:**
- Ejecutamos los comandos :
  docker pull sonarqube
  docker run -d --name sonarqube -e
  SONAR_ES_BOOTSTRAP_CHECKS_DISABLE=true -p 9000:9000
  sonarqube:latest
  docker ps -a

- E ingresamos a la página localhost:9000 para generar el token

- Para realizar el debido procedimiento con Sonarqube debemos poner lo siguiente en el pom


```
<plugin>
    <groupId>org.sonarsource.scanner.maven</groupId>
    <artifactId>sonar-maven-plugin</artifactId>
    <version>4.0.0.4121</version>
</plugin>
```

```
<sonar.projectKey>library</sonar.projectKey>
<sonar.projectName>library</sonar.projectName>
<sonar.host.url>http://localhost:9000</sonar.host.url>
<sonar.coverage.jacoco.xmlReportPaths>target/site/jacoco/jacoco.xml</sonar.coverage.jacoco.xmlReportPaths>
<sonar.coverage.exclusions>src//configurators/*</sonar.coverage.exclusions>
```

Ahora nos da este error Sonarqube
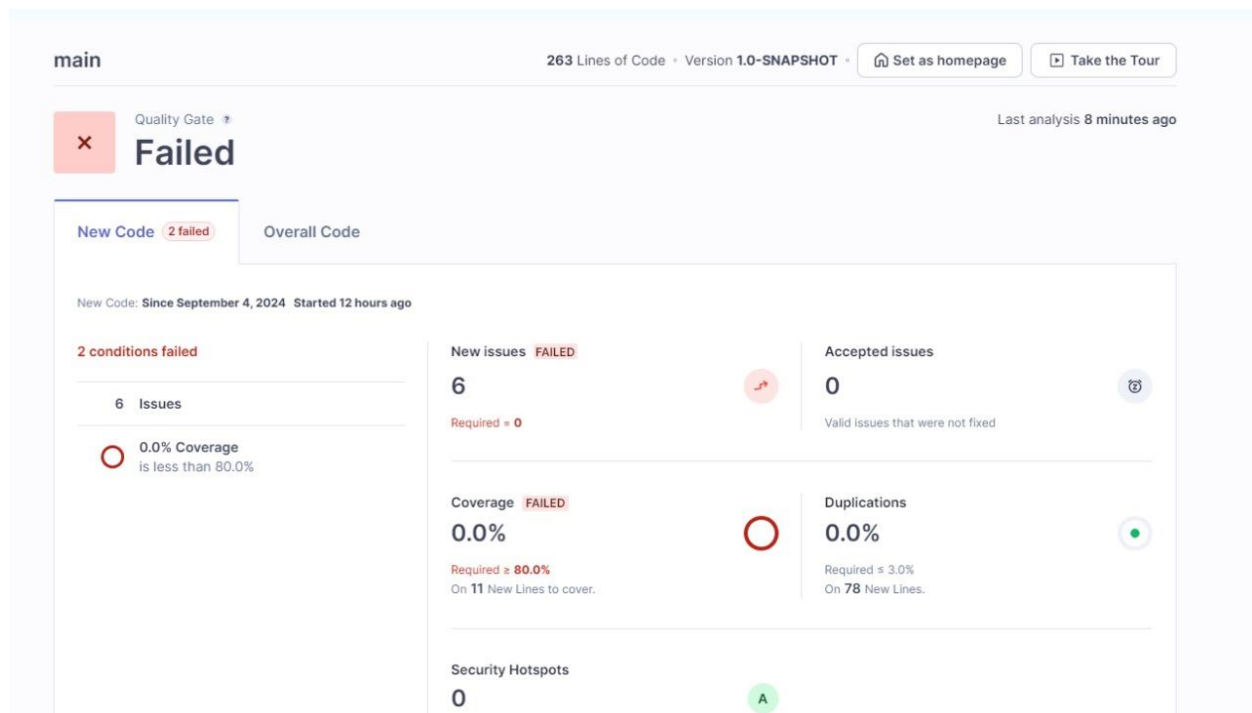
En esto nos manda a corregir errores de duplicación de código y borrar líneas de código que no están siendo utilizadas, aparte de que nos manda que debemos hacerle pruebas al método equals de la clase Book.

- Algunos errores que nos pidió corregir:
  o Eliminar lo siguiente que no se esta usando

  o Eliminación de líneas de código repetida

```
  import org.junit.jupiter.api.BeforeEach;
  import org.junit.jupiter.api.Test;
  import static org.junit.jupiter.api.Assertions.assertTrue;
  import static org.junit.jupiter.api.Assertions.assertFalse;
  import static org.junit.jupiter.api.Assertions.assertNotNull;
  import static org.junit.jupiter.api.Assertions.assertEquals;
  import static org.junit.jupiter.api.Assertions.assertNotEquals;
  import static org.junit.jupiter.api.Assertions.assertNull;

  import edu.eci.cvds.tdd.library.book.Book;
  import edu.eci.cvds.tdd.library.loan.Loan;
  import edu.eci.cvds.tdd.library.user.User;
  import edu.eci.cvds.tdd.library.loan.LoanStatus;

  import static org.junit.jupiter.api.Assertions.assertEquals;
  import static org.junit.jupiter.api.Assertions.assertNotEquals;
  import static org.junit.jupiter.api.Assertions.assertNull;
```

o Agregar la clase de pruebas de book para probar el método equals

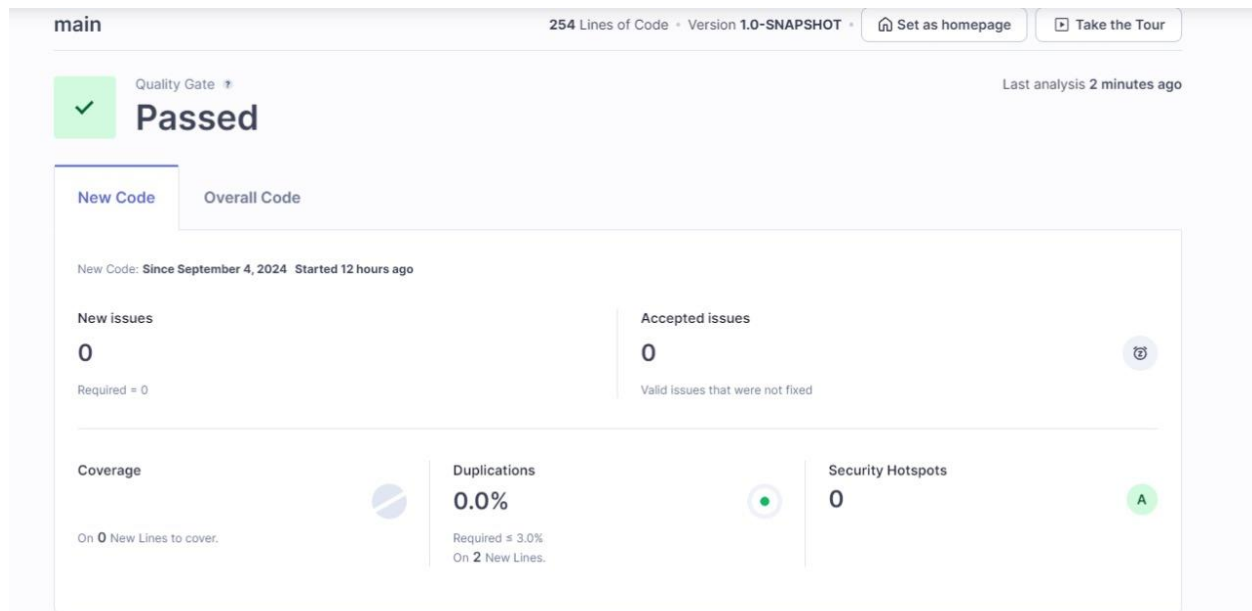📄 BookTest.java   4/09/2024 8:21 p. m.   Archivo de origen Java   2 KB

Realizamos las pruebas correspondientes las cuales son 5 con el método de TDD aunque no tomamos capturas de dicho proceso solo de que paso las 5 pruebas que se realizaron en la clase bookTest.

```
INFO]  T E S T S
INFO] -------------------------------------------------------
INFO] Running edu.eci.cvds.tdd.library.BookTest
INFO] Tests run: 5, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.059 s -- in edu.eci.cvds.tdd.library.BookTest
INFO] Running edu.eci.cvds.tdd.library.LibraryTest
INFO] Tests run: 10, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.031 s -- in edu.eci.cvds.tdd.library.LibraryTe
t
INFO]
INFO] Results:
INFO]
INFO] Tests run: 15, Failures: 0, Errors: 0, Skipped: 0
INFO]
INFO]
INFO] --- jacoco:0.8.12:report (report) @ Library ---
INFO] Loading execution data file C:\Users\santi\Desktop\lab03-cvds\Library\target\jacoco.exec
INFO] Analyzed bundle 'Library' with 5 classes
INFO]
INFO] --- jar:3.4.1:jar (default-jar) @ Library ---
INFO] -------------------------------------------------------
INFO] BUILD SUCCESS
INFO] -------------------------------------------------------
INFO] Total time:  3.048 s
INFO] Finished at: 2024-09-05T12:20:59-05:00
INFO] -------------------------------------------------------
```

Ya con esos arreglos hechos volvemos a Sonarqube para verificar si ya el proyecto pasa los estándares y miramos cuanto subió el porcentaje de cobertura en JaCoCo.

Quality Gate ⚑

✓ **Passed**

Last analysis **2 minutes ago**

New Code   Overall Code

New Code: **Since September 4, 2024**   **Started 12 hours ago**

New issues

0

Required = 0

Accepted issues

0

Valid issues that were not fixed

⏲

Coverage

On **0** New Lines to cover.

Duplications

0.0%

Required ≤ 3.0%
On **2** New Lines.

●

Security Hotspots

0

A

Library

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed	Classes
⊞ edu.eci.cvds.tdd.library.loan	▬▬	80 %	▬	100 %	4	14	8	28	4	13	0	2
⊞ edu.eci.cvds.tdd.library.user	▬	52 %		n/a	3	5	5	10	3	5	0	1
⊞ edu.eci.cvds.tdd.library	▬▬▬▬	95 %	▬▬▬	68 %	5	15	5	38	0	7	0	1
⊞ edu.eci.cvds.tdd.library.book	▬	86 %	▬▬	100 %	2	8	2	14	2	5	0	1
Total	40 of 316	87 %	5 of 24	79 %	14	42	20	90	9	30	0	5

Vemos que paso entonces ya los estándares por lo que esa parte ya la terminamos y subió un poco el porcentaje de cobertura de las pruebas en JaCoCo, por lo que con esto finalizamos el laboratorio.