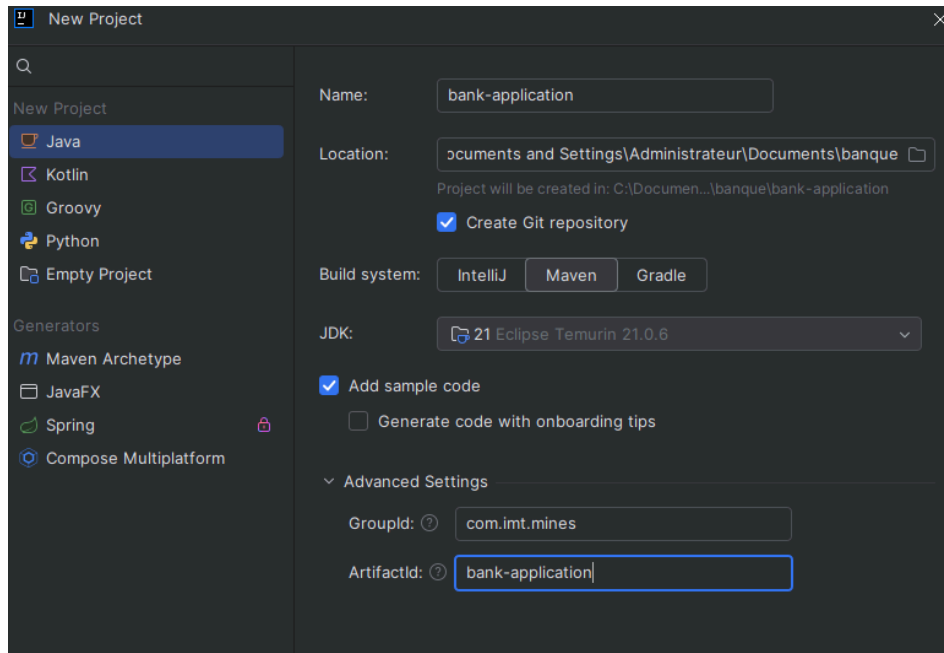
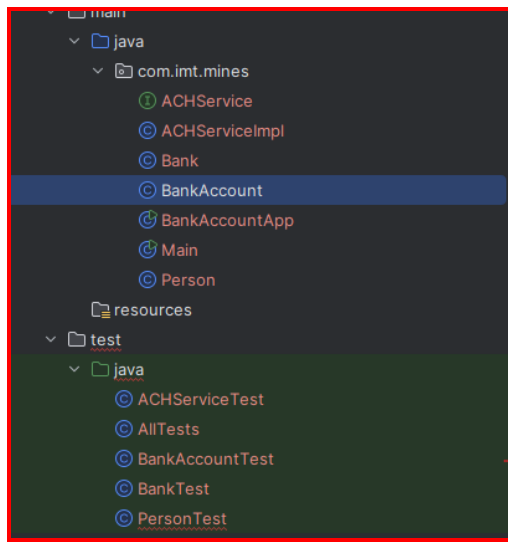


## Exercise 6 (Repo 2): Turn *BankApplication* into a Maven project



```
pom.xml (bank-application) × ACHService.java ACHServiceImpl.java Bank.java
1 <?xml version="1.0" encoding="UTF-8"?>
2 <project xmlns="http://maven.apache.org/POM/4.0.0"
3     xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
4     xsi:schemaLocation="http://maven.apache.org/POM/4.0.0 http://maven.apache.org/maven-v4_0_0.xsd">
5     <modelVersion>4.0.0</modelVersion>
6
7     <groupId>com.imt.mines</groupId>
8     <artifactId>bank-application</artifactId>
9     <version>1.0-SNAPSHOT</version>
10
11     <properties>
12         <maven.compiler.source>17</maven.compiler.source>
13         <maven.compiler.target>17</maven.compiler.target>
14         <project.build.sourceEncoding>UTF-8</project.build.sourceEncoding>
15     </properties>
16
17 </project>
```



```
PS C:\Users\Administrateur\Documents\banque\bank-application> mvn compile
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.imt.mines:bank-application >-----
[INFO] Building bank-application 1.0-SNAPSHOT
[INFO]   from pom.xml
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ bank-application ---
[INFO] Copying 0 resource from src/main/resources to target/classes
[INFO]
[INFO] --- compiler:3.13.0:compile (default-compile) @ bank-application ---
[INFO] Recompiling the module because of changed source code.
[INFO] Compiling 7 source files with javac [debug target 17] to target/classes
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time:  2.447 s
[INFO] Finished at: 2025-11-19T15:31:34+01:00
[INFO] -----
PS C:\Users\Administrateur\Documents\banque\bank-application>
```

## Exercise 7 (Repo 2):

```
<dependencies>
  <dependency>
    <groupId>org.junit.jupiter</groupId>
    <artifactId>junit-jupiter</artifactId>
    <version>5.10.2</version>
    <scope>test</scope>
  </dependency>
</dependencies>
```

mvn clean :

```

PS C:\Users\Administrateur\Documents\banque\bank-application> mvn clean
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.imt.mines:bank-application >-----
[INFO] Building bank-application 1.0-SNAPSHOT
[INFO]   from pom.xml
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- clean:3.2.0:clean (default-clean) @ bank-application ---
Downloading from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-shared-utils/3.3.4/maven-shared-utils-3.3.4.jar
Downloaded from central: https://repo.maven.apache.org/maven2/org/apache/maven/shared/maven-shared-utils/3.3.4/maven-shared-utils-3.3.4.jar (153
kB/s)
Downloading from central: https://repo.maven.apache.org/maven2/commons-io/commons-io/2.6/commons-io-2.6.jar
Downloaded from central: https://repo.maven.apache.org/maven2/commons-io/commons-io/2.6/commons-io-2.6.jar (215 kB at 1.6 MB/s)
[INFO] Deleting C:\Users\Administrateur\Documents\banque\bank-application\target
[INFO] -----
[INFO] BUILD SUCCESS

```

## maven test :

```

PS C:\Users\Administrateur\Documents\banque\bank-application> mvn test
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.imt.mines:bank-application >-----
[INFO] Building bank-application 1.0-SNAPSHOT
[INFO]   from pom.xml
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ bank-application ---
[INFO] Copying 0 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.10.1:compile (default-compile) @ bank-application ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- surefire:3.0.0-M5:test (default-test) @ bank-application ---
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 3.902 s
[INFO] Finished at: 2025-11-19T16:11:45+01:00

```

## mvn package :

```

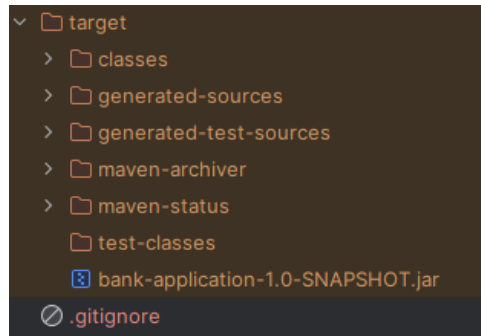
PS C:\Users\Administrateur\Documents\banque\bank-application> mvn package
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.imt.mines:bank-application >-----
[INFO] Building bank-application 1.0-SNAPSHOT
[INFO]   from pom.xml
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ bank-application ---
[INFO] Copying 0 resource from src\main\resources to target\classes
[INFO]
[INFO] --- compiler:3.10.1:compile (default-compile) @ bank-application ---
[INFO] Nothing to compile - all classes are up to date
[INFO]
[INFO] --- surefire:3.0.0-M5:test (default-test) @ bank-application ---
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 5.397 s
[INFO] Finished at: 2025-11-19T16:13:01+01:00

```

- Which **phases** of the Maven lifecycle are executed?

the phases that are executed are : **validate** , **compile** , **test compile** , **test** , **package**

- What **new files or folders** appear in target/?



maven verify :

```
PS C:\Users\Administrateur\Documents\banque\bank-application> mvn verify
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.imt.mines:bank-application >-----
[INFO] Building bank-application 1.0-SNAPSHOT
[INFO]    from pom.xml
[INFO] -----[ jar ]-----
[INFO]
```

```
[INFO]
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time:  3.087 s
[INFO] Finished at: 2025-11-19T16:23:34+01:00
[INFO] -----
PS C:\Users\Administrateur\Documents\banque\bank-application>
```

mvn verify goes further than both test and package

verify ensures the project is *ready for release* by running extra validation steps after packaging, while test only runs tests and package only builds the JAR.

## Exercise 8 (Repo 2): Write unit tests for the bank domain

chosen class : bankaccount

methods : depositMoney(double amount)

withdrawMoney(double amount)

```

import com.imt.mines.BankAccount;
import org.junit.jupiter.api.Test;
import static org.junit.jupiter.api.Assertions.*;

class BankAccountTest {

    @Test
    void testDepositMoney() {
        BankAccount acc = new BankAccount();
        acc.depositMoney( depositAmount: 100);
        assertEquals( expected: 100, acc.getBalance());
    }

    @Test
    void testWithdrawTooMuch() {
        BankAccount acc = new BankAccount();
        acc.depositMoney( depositAmount: 50);

        boolean result = acc.withdrawMoney( withdrawAmount: 100);

        assertFalse(result);
        assertEquals( expected: 50, acc.getBalance());
    }
}

```

```

PS C:\Users\Administrateur\Documents\banque\bank-application> mvn test
[INFO] Scanning for projects...
[INFO]
[INFO] -----< com.imt.mines:bank-application >-----
[INFO] Building bank-application 1.0-SNAPSHOT
[INFO]   from pom.xml
[INFO] -----[ jar ]-----
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ bank-application ---
[INFO]
[INFO] -----
[INFO] T E S T S
[INFO] -----
[INFO] Running BankAccountTest
[INFO] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0, Time elapsed: 0.085 s -- in BankAccountTest
[INFO]
[INFO] Results:
[INFO]
[INFO] Tests run: 2, Failures: 0, Errors: 0, Skipped: 0
[INFO]
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time:  6.678 s

```

## Exercise 9 (Repo 2): Increase coverage with JaCoCo

Ajout du plugin jacoco dans pom.xml

```
<build>
  <plugins>

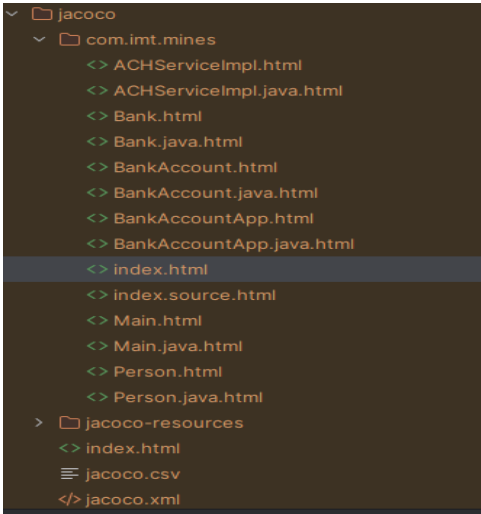
    <!-- Plugin Jacoco -->
    <plugin>
      <groupId>org.jacoco</groupId>
      <artifactId>jacoco-maven-plugin</artifactId>
      <version>${jacoco.version}</version>
      <executions>

        <execution>
          <goals>
            <goal>prepare-agent</goal>
          </goals>
        </execution>
      </executions>
    </plugin>
  </plugins>
</build>
```

Mvn clean test

```
[INFO] --- jacoco:0.8.10:report (report) @ bank-application ---
[INFO] Loading execution data file C:\Users\Administrateur\Documents\bank-application\jacoco.exec
[INFO] Analyzed bundle 'bank-application' with 6 classes
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 11.258 s
```

génération du rapport jacoco



the index.html

bank-application > com.imt.mines

com.imt.mines

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed Cxty	Missed Lines	Missed Methods	Missed Classes
BankAccountApp	<div></div>	0 %	<div></div>	0 %	39 39	134 134	2 2	1 1
Bank	<div></div>	0 %	<div></div>	0 %	32 32	93 93	14 14	1 1
BankAccount	<div></div>	20 %	<div></div>	20 %	26 32	78 100	16 22	0 1
Person	<div></div>	0 %	<div></div>	0 %	34 34	80 80	23 23	1 1
Main	<div></div>	0 %		n/a	2 2	3 3	2 2	1 1
ACHServiceImpl	<div></div>	0 %		n/a	3 3	3 3	3 3	1 1
Total	1 334 of 1 409	5 %	148 of 152	2 %	136 142	391 413	60 66	5 6

Alors maintenant je vais ajouter 2 autres tests pour la class bankaccount pour verifier si mon coverage va augmenter dans index.html

```
@Test
void testDepositNegativeAmount() {
    BankAccount acc = new BankAccount();
    acc.depositMoney( depositAmount: 100); // solde = 100

    acc.depositMoney( depositAmount: -50); // dépôt négatif → ignoré

    assertEquals( expected: 100, acc.getBalance()); // solde reste inchangé
}

@Test
void testCumulativeWithdrawExceedsLimit() {
    BankAccount acc = new BankAccount();
    acc.depositMoney( depositAmount: 500);
    acc.setWithdrawLimit(100); // limite totale

    boolean first = acc.withdrawMoney( withdrawAmount: 60);
    boolean second = acc.withdrawMoney( withdrawAmount: 50); // doit échouer (60 + 50 > 100)

    assertTrue(first);
    assertFalse(second);
    assertEquals( expected: 500 - 60, acc.getBalance()); // solde reste après 1er retrait
}
```

après l'ajout des tests

bank-application > com.imt.mines



## com.imt.mines

Element	Missed Instructions	Cov.	Missed Branches	Cov.	Missed	Cxty	Missed	Lines	Missed	Methods	Missed	Classes
BankAccountApp	<div><div></div></div>	0 %	<div><div></div></div>	0 %	39	39	134	134	2	2	1	1
Bank	<div><div></div></div>	0 %	<div><div></div></div>	0 %	32	32	93	93	14	14	1	1
BankAccount	<div><div></div></div>	30 %	<div><div></div></div>	50 %	21	32	72	100	15	22	0	1
Person	<div><div></div></div>	0 %	<div><div></div></div>	0 %	34	34	80	80	23	23	1	1
Main	<div><div></div></div>	0 %	<div><div></div></div>	n/a	2	2	3	3	2	2	1	1
ACHServiceImpl	<div><div></div></div>	0 %	<div><div></div></div>	n/a	3	3	3	3	3	3	1	1
Total	1 298 of 1 409	7 %	142 of 152	6 %	131	142	385	413	59	66	5	6

## Exercise 10 (Repo 2): Extend a CI workflow (GitHub Actions)

```
25     # Run Maven tests
26     - name: Run tests
27       run: mvn clean test
28
29     # Build Maven package
30     - name: Build package
31       run: mvn package
32
33     # Upload target/ folder as artifact
34     - name: Upload build artifact
35       uses: actions/upload-artifact@v4
36       with:
37         name: java-build
38         path: target/
```

Triggered via push 1 minute ago

 **abidinada** pushed  `d05055f` `main`

Status

Success

Total duration


35s

Artifacts

1



maven.yml

on: push

 **build** 31s

Artifacts

Produced during runtime

Name	Size	Digest
 <b>java-build</b>	106 KB	sha256: 330d02f85ff4a724b9bc459a814e3b7996... 

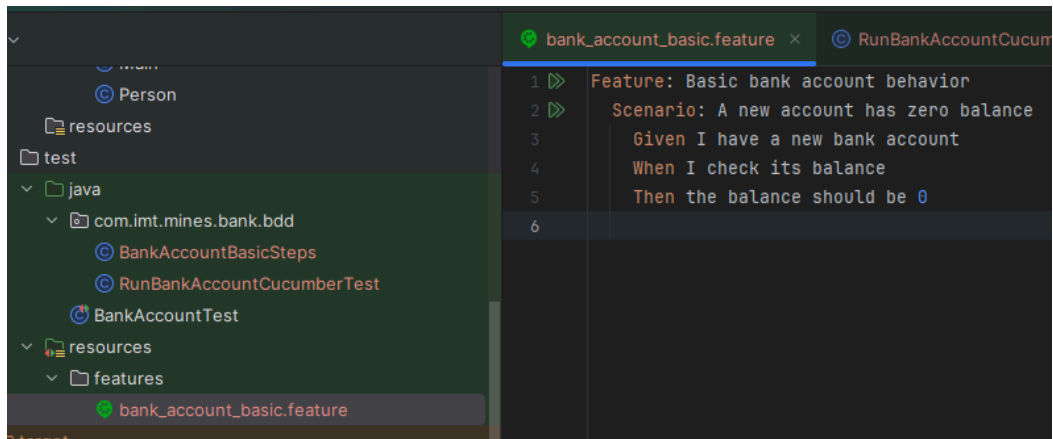
## Exercise 11 (Repo 2): Cucumber for BankAccount

- **Add Cucumber Dependencies:**

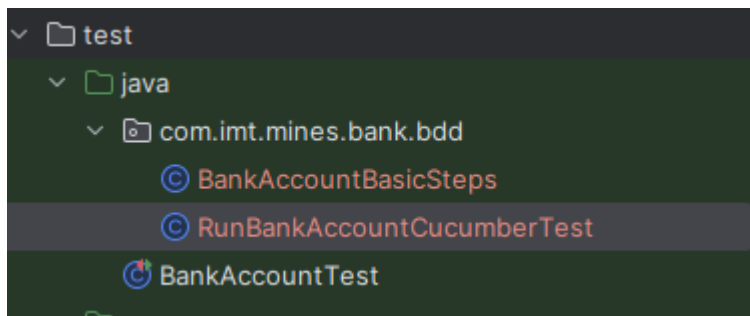
```
<dependency>
  <groupId>io.cucumber</groupId>
  <artifactId>cucumber-java</artifactId>
  <version>7.15.0</version>
  <scope>test</scope>
</dependency>
<dependency>
  <groupId>io.cucumber</groupId>
  <artifactId>cucumber-junit</artifactId>
  <version>7.15.0</version>
  <scope>test</scope>
</dependency>
</dependencies>
```

- **Create a Feature File: Create the folder (if it does not exist):**  
**src/test/resources/features**. Inside it, create the file:  
**src/test/resources/features/bank\_account\_basic.feature**

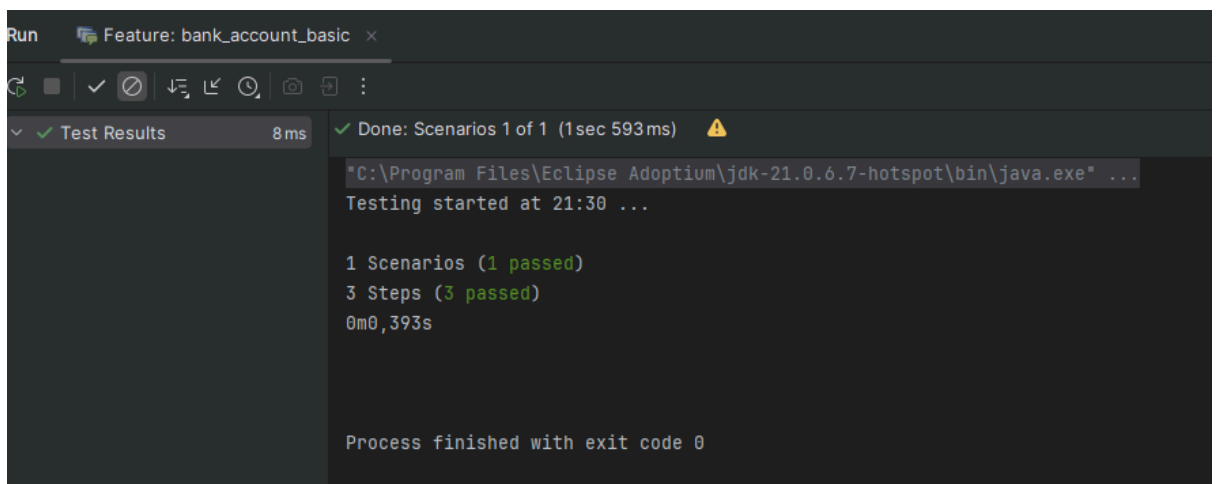




- **Create the Cucumber Runner:** Create a package for BDD tests under `src/test/java: src/test/java/com/imt/mines/bank/bdd`. In that package, create the class: `RunBankAccountCucumberTest.java` (You do not need to modify this class)



- **Run the Tests**
  - From the project root (where `pom.xml` is): `mvn test`



but i dont see that on the output when i run maven test

```
[INFO]
[INFO] --- jacoco:0.8.10:prepare-agent (default) @ bank-application ---
[INFO] argLine set to -javaagent:C:\\Users\\Administrateur\\.m2\\repository\\org\\jacoco\\org.jacoco.a
stfile=C:\\Users\\Administrateur\\Documents\\banque\\bank-application\\target\\jacoco.exec
[INFO]
[INFO] --- resources:3.3.1:resources (default-resources) @ bank-application ---
[INFO] Copying 0 resource from src\\main\\resources to target\\classes
[INFO]
[INFO] --- compiler:3.13.0:compile (default-compile) @ bank-application ---
[INFO] Nothing to compile - all classes are up to date.
[INFO]
[INFO] --- resources:3.3.1:testResources (default-testResources) @ bank-application ---
[INFO] Copying 1 resource from src\\test\\resources to target\\test-classes
[INFO]
[INFO] --- compiler:3.13.0:testCompile (default-testCompile) @ bank-application ---
[INFO] Nothing to compile - all classes are up to date.
[INFO]
[INFO] --- surefire:3.2.5:test (default-test) @ bank-application ---
[INFO] Using auto detected provider org.apache.maven.surefire.junitplatform.JUnitPlatformProvider
```