

# Taller 8

## Automatización de Pruebas

### Semana 10

Reinaldo Portocarrero

#### Mutation Testing

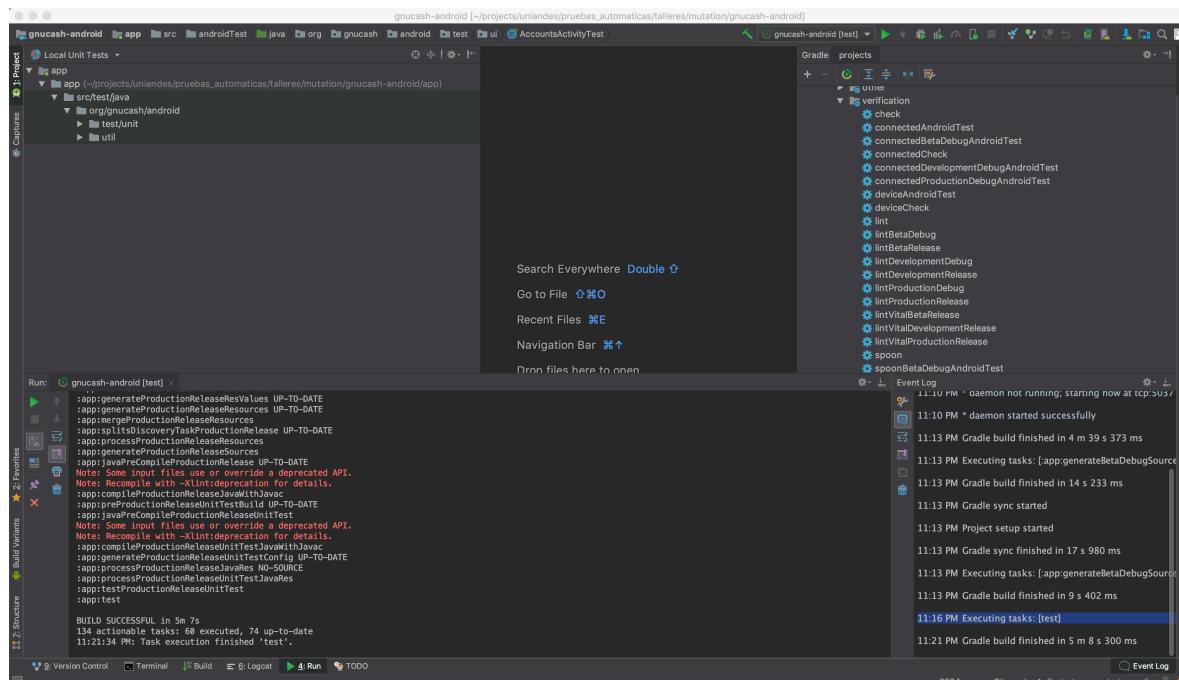
#### Mutation con MDroidPlus

Se crean los mutantes usando el siguiente comando:

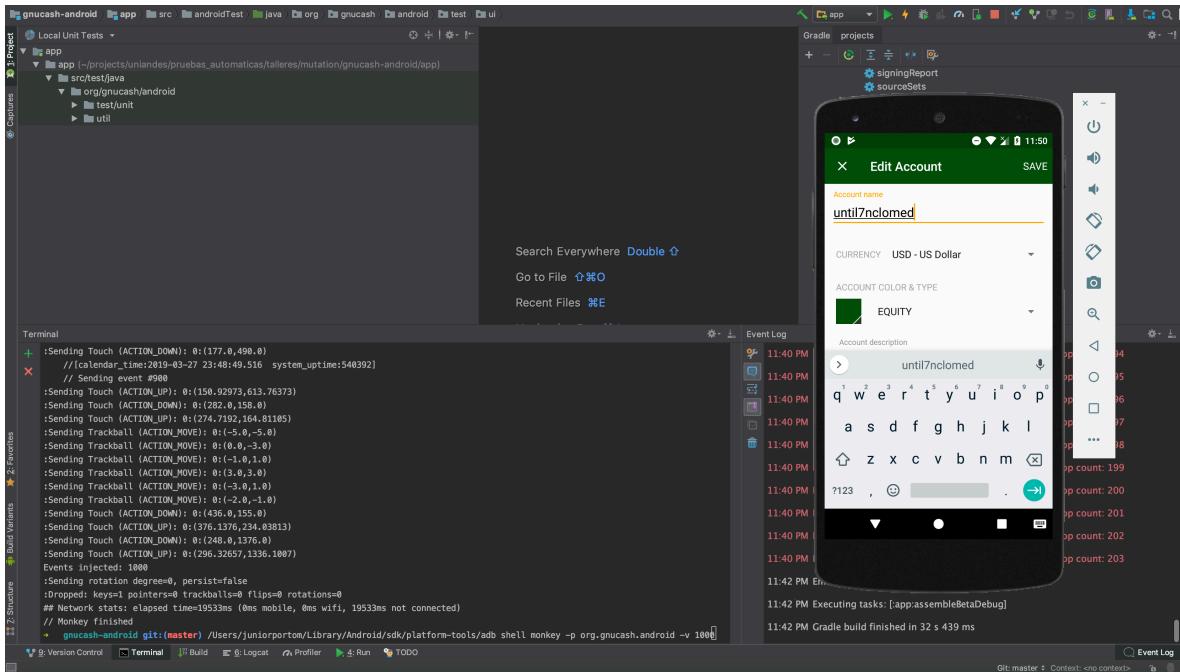
```
java -jar MDroidPlus-1.0.0.jar ../../ast ../../gnucash-android/ org.gnucash.android  
..../tmp/mutants/ .. false
```

Y el directorio actual es: /mutation/MDroidPlus/target

Como primer paso se ejecutan las pruebas unitarias de la suite de GNCash antes de incluir algún mutante. Se obtienen los siguientes resultados:



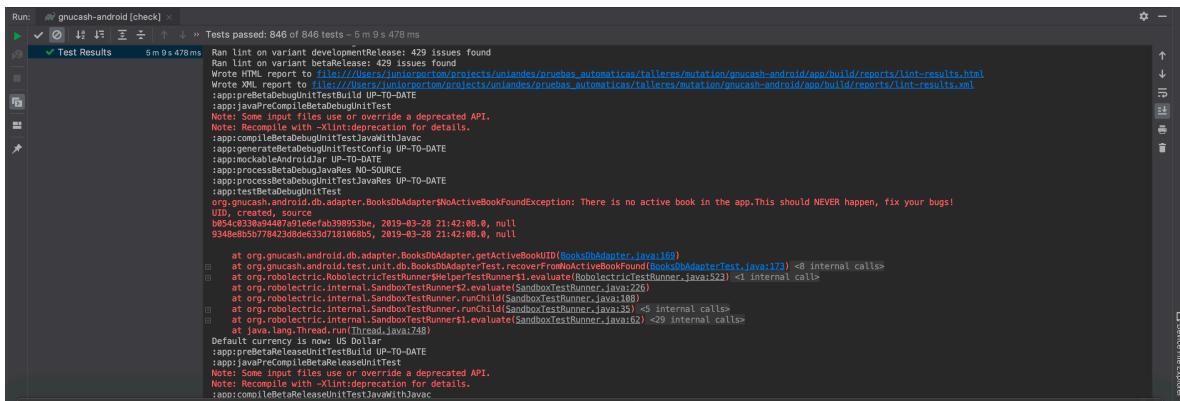
Las pruebas se ejecutan sin errores.



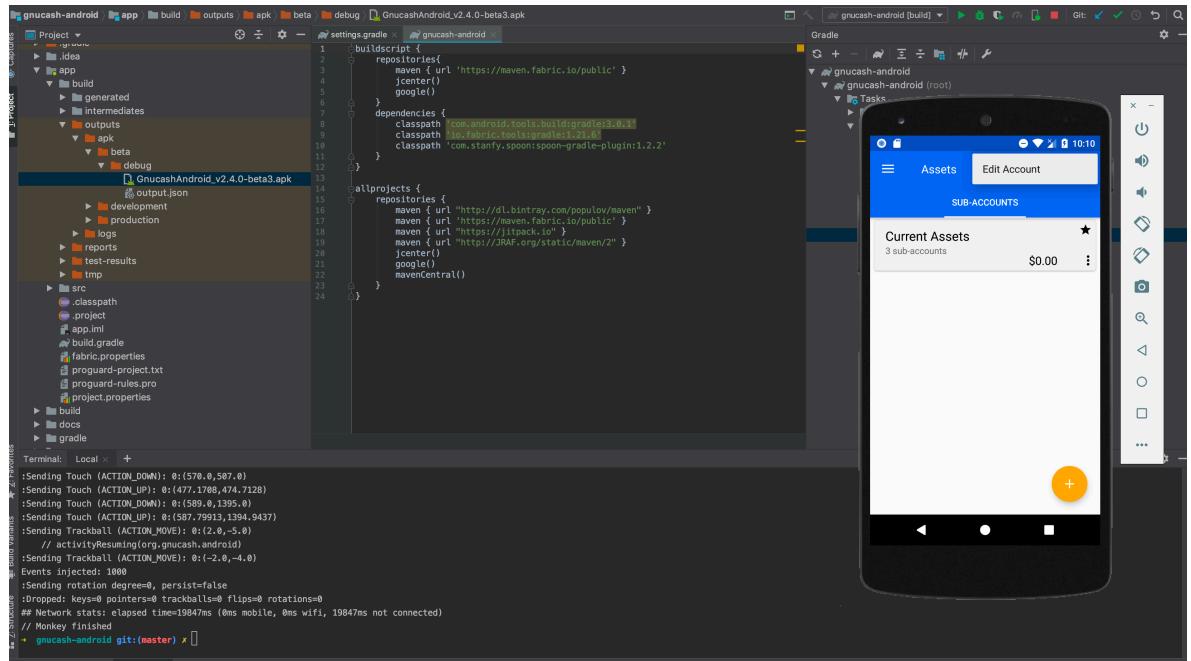
Se ejecuta monkey con una semilla de 1000 eventos. Se ejecuta de forma exitosa.

Ahora se va a realizar el mismo proceso con cada uno de los mutantes seleccionados.

### 1. Mutante 1.

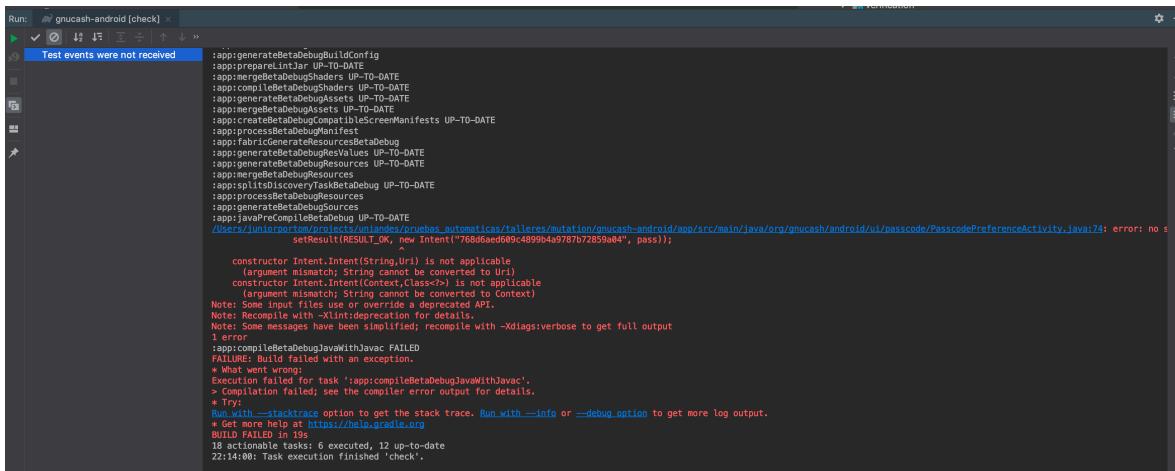


Se ejecuta suit de pruebas, se ejecutan 846 casos de pruebas, pero se presenta un error, por lo cual el mutante no sobrevivió.



El monkey se ejecuta de forma satisfactoria.

## 2. Mutante 2



La test suite falla sin ninguna ejecución. El mutante no alcanza a hacer ninguna acción.

```

run: [gnucash-android] [build]
  ↗ app:compileBetaDebugShaders UP-TO-DATE
  ↗ app:compileBetaDebugAssets UP-TO-DATE
  ↘ app:mergeBetaDebugAssets UP-TO-DATE
  ↗ app:createBetaDebugCompatibleScreenManifests UP-TO-DATE
  ↗ app:generateBetaDebugBuildConfig UP-TO-DATE
  ↗ app:generateBetaDebugResources UP-TO-DATE
  ↗ app:generateBetaDebugValues UP-TO-DATE
  ↗ app:generateBetaDebugDexes UP-TO-DATE
  ↗ app:splitDexesUP-TO-DATE
  ↗ app:processBetaDebugResources
  ↗ app:generateBetaDebugSources
  ↗ app:javaPreCompileBetaDebug UP-TO-DATE
  /Users/jimenezrfernandez/Projects/gnucash_android/app/src/main/java/org/gnucash/android/ui/passcode/PasscodePreferenceActivity.java:74: error: no suitable constructor found for Intent
    new Intent("76bd6aed69c48994a8787b72859a4", pass));
                           ^
  constructor Intent.Intent(String,Uri) is not applicable
    (argument mismatch; String cannot be converted to Context)
  constructor Intent.Intent(Context,Class<?>) is not applicable
    (argument mismatch; String cannot be converted to Context)
Note: Some input files use or override a deprecated API.
Note: Recompile with -Xlint:deprecation for details.
Note: Some messages have been simplified; recompile with -Xdiag:verbose to get full output
1 error
:app:compileBetaDebugJavaWithJavac FAILED

FAILURE: Build failed with an exception.

* What went wrong:
Execution failed for task ':app:compileBetaDebugJavaWithJavac'.
> Compilation failed; see the compiler error output for details.

* Try:
Run with --stacktrace option to get the stack trace. Run with --info or --debug option to get more log output.
* Get more help at https://help.gradle.org

BUILD FAILED in 14s
18 actionable tasks: 6 executed, 12 up-to-date
22:16:05: Task execution finished 'build'.

```

El build también falla, por lo cual no se puede ejecutar el monkey.

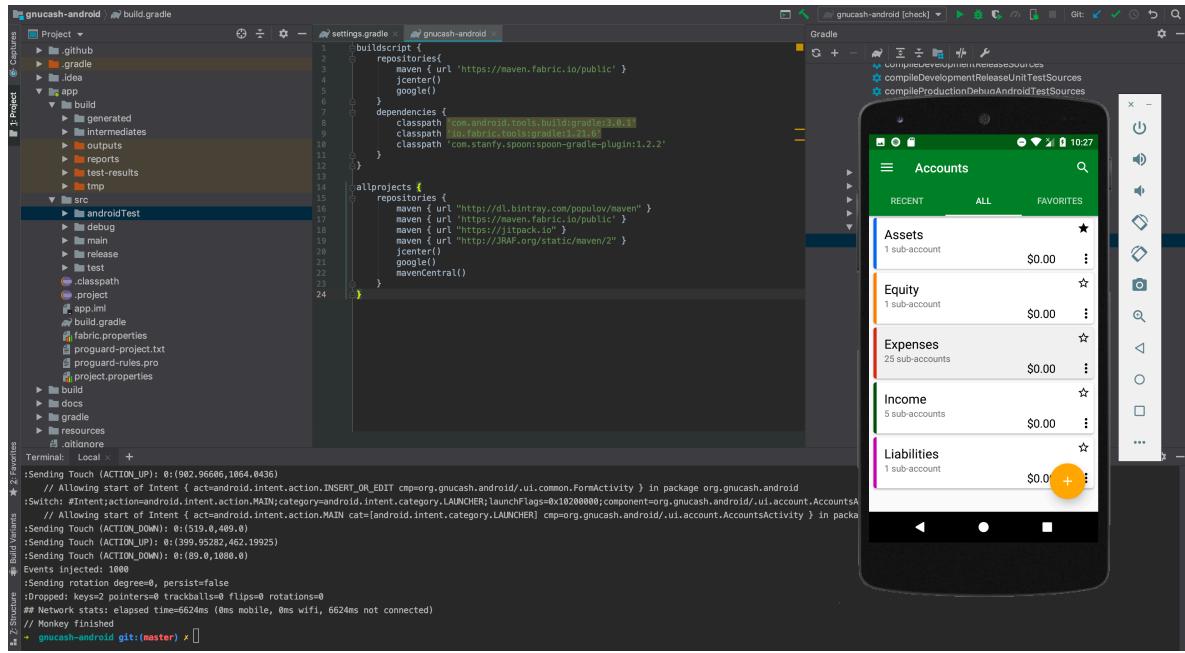
### 3. Mutante 3

```

Run: [gnucash-android] [check]
  ↗ Tests passed: 846 of 846 tests - 3 min 40 s 11 ms
  ↗ Test Results 3 min 40 s 11 ms
  ↗ at org.gnucash.android.db.adapter.BooksDbAdapter.getActiveBookUID(BooksDbAdapter.java:160)
  ↗ at org.gnucash.android.test.unit.db.BooksDbAdapterTest.recoverFromNoActiveBookFound(BooksDbAdapterTest.java:173) <8 internal calls>
  ↗ at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:228)
  ↗ at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:188)
  ↗ at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:33) <5 internal calls>
  ↗ at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:62) <29 internal calls>
  ↗ at java.lang.Thread.run(Thread.java:748)
Default currency is now US Dollar
:app:preProductionReleaseBuild UP-TO-DATE
:app:preProductionTestBuild UP-TO-DATE
Note: Some input files use or override a deprecated API.
Note: Recompile with -Xlint:deprecation for details.
:app:compileProductionReleaseJavaWithJavac NO-SOURCE
:app:processProductionReleaseJavaSources NO-SOURCE
:app:processProductionReleaseJavaResources UP-TO-DATE
:app:processProductionReleaseJavaTestSources UP-TO-DATE
:app:processProductionReleaseJavaTestResources UP-TO-DATE
:app:processProductionReleaseJavaTestResources UP-TO-DATE
:org.gnucash.android.db.adapter.BooksDbAdapter$NoActiveBookFoundException: There is no active book in the app.This should NEVER happen, fix your bugs!
  ↗ at org.gnucash.android.db.adapter.BooksDbAdapter.getActiveBookUID(BooksDbAdapter.java:160)
  ↗ at org.gnucash.android.test.unit.db.BooksDbAdapterTest.recoverFromNoActiveBookFound(BooksDbAdapterTest.java:173) <8 internal calls>
  ↗ at org.robolectric.RobolectricTestRunner$HelperTestRunner$1.evaluate(RobolectricTestRunner.java:523) <1 internal call>
  ↗ at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:228)
  ↗ at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:188)
  ↗ at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:33) <5 internal calls>
  ↗ at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:62) <29 internal calls>
  ↗ at java.lang.Thread.run(Thread.java:748)
Default currency is now US Dollar
:apt:test
:apt:check
BUILD SUCCESSFUL in 6m 22s
135 actionable tasks: 55 executed, 88 up-to-date
22:24:18: Task execution finished 'check'.

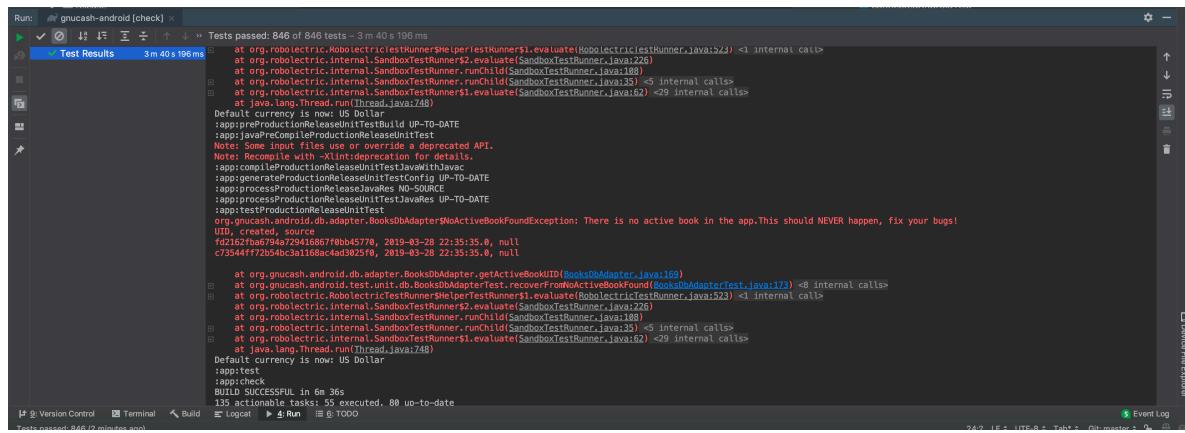
```

Se ejecutan 846 pruebas de forma exitosa. Se presenta un error hacia el final, por ende el mutante no sobrevive.

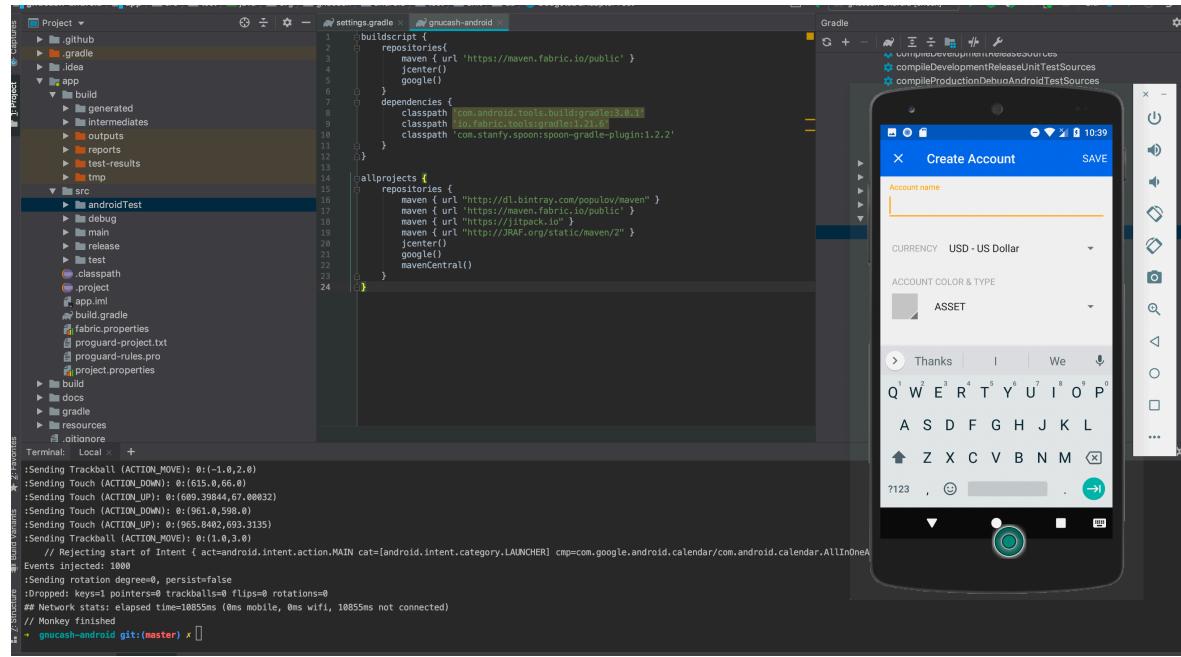


Se ejecuta monkey de forma satisfactoria.

#### 4. Mutante 4

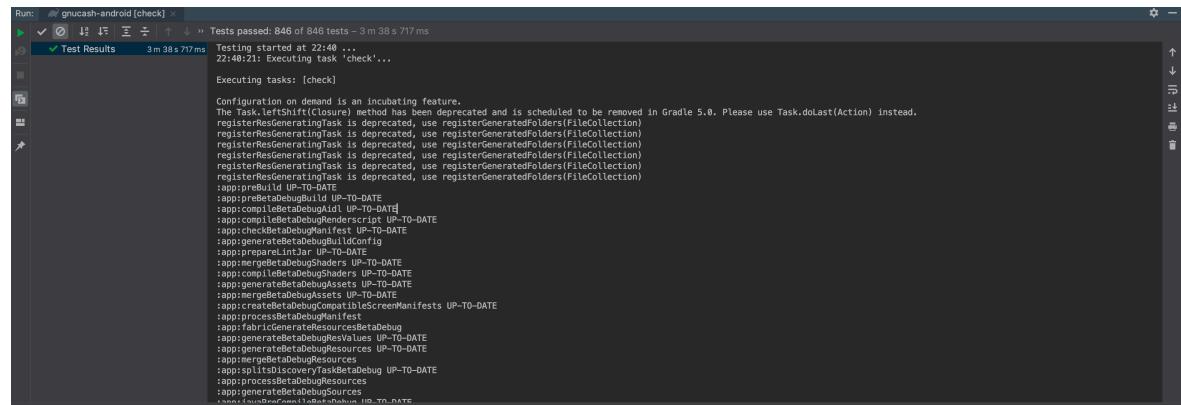


Se ejecutan 846 pruebas de forma exitosa. Se presenta un error hacia el final, por ende el mutante no sobrevive.

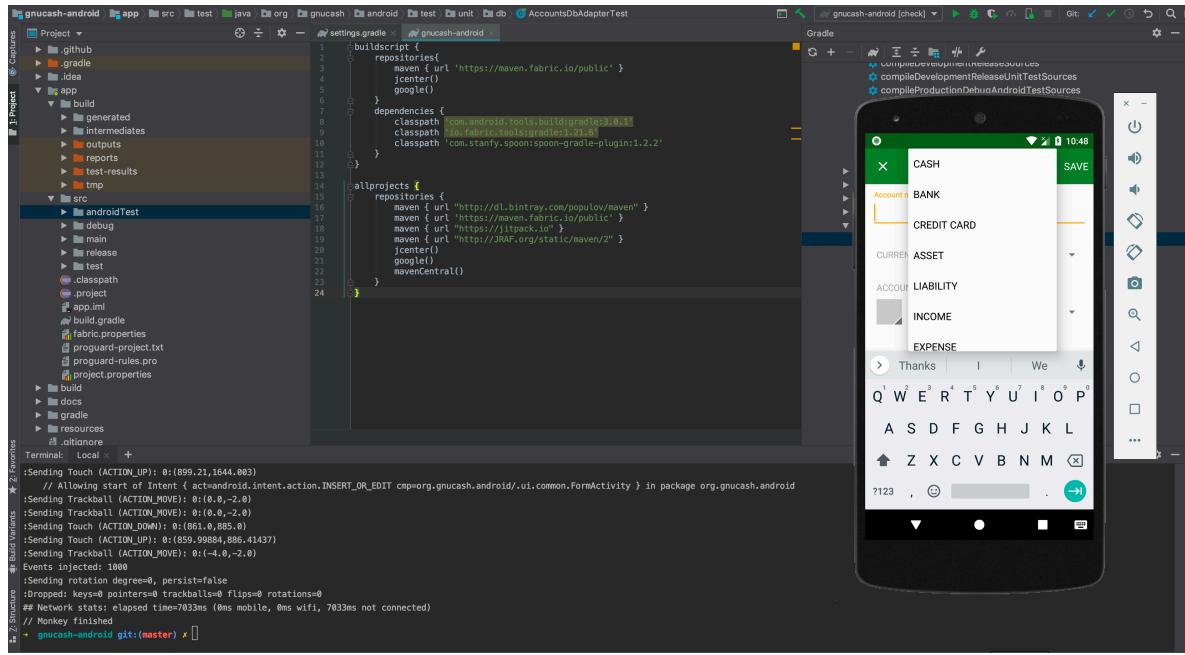


El monkey se ejecuta de forma satisfactoria.

## 5. Mutante 5



La test suite se ejecuta de forma satisfactoria.



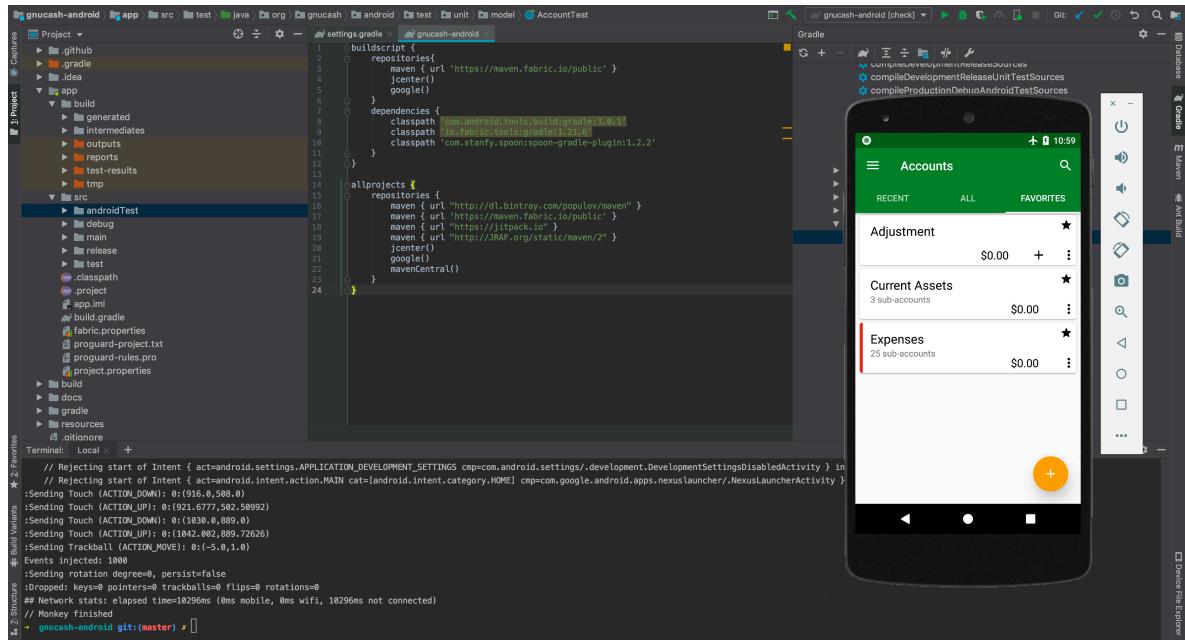
El monkey se ejecuta de forma satisfactoria.

## 6. Mutante 6

```
Run: gnuCash-android [check] 
Test Results 3m 39s 934ms
Tests passed: 846 of 846 tests - 3 m 39 s 934 ms

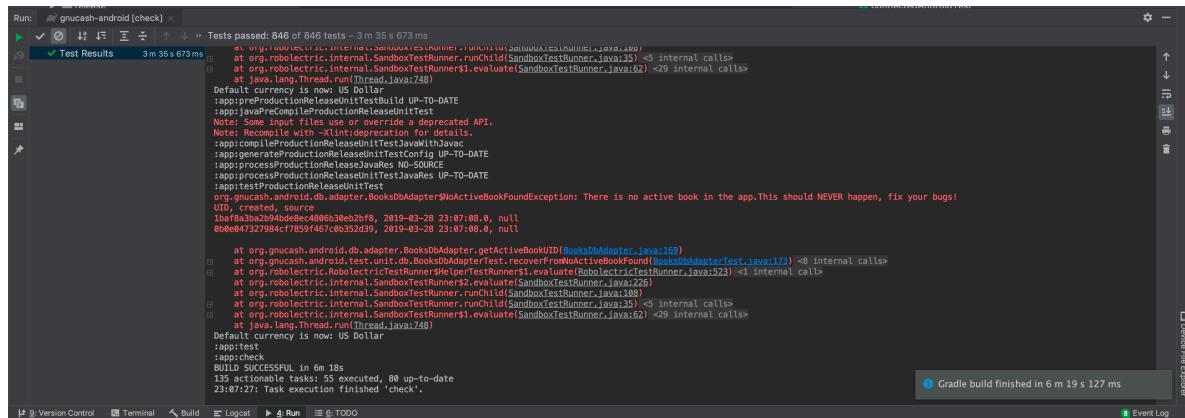
Test Results 3m 39s 934ms
:app:lint
Ran lint on variant developmentDebug: 429 issues found
Ran lint on variant betaDebug: 429 issues found
Ran lint on variant alphaDebug: 429 issues found
Ran lint on variant betaRelease: 429 issues found
Ran lint on variant productionRelease: 429 issues found
Ran lint on variant productionDebug: 429 issues found
Wrote XML report to file:///Users/juniorrodriguez/projects/unidades/pruebasAutomaticas/talleres/mutacion/gnuCash-android/app/build/reports/lint-results.html
Wrote XML report to file:///Users/juniorrodriguez/projects/unidades/pruebasAutomaticas/talleres/mutacion/gnuCash-android/app/build/reports/lint-results.xml
:app:preBuildDebugUnitTestsBuild UP-TO-DATE
:app:javaPreCompileDebugUnitTestsBuild
Note: /Users/juniorrodriguez/.gradle/caches/transforms-1/files-2.1/2019-03-28/22:53:44.0, null
Note: Recompile with --warning-deprecation for details.
:app:compileDebugUnitTestsJavaWithJavac
:app:compileBetaDebugUnitTestsJavaWithJavac
:app:generateAndroidManifest UP-TO-DATE
:app:processManifest UP-TO-DATE
:app:processResources UP-TO-DATE
:app:processBetaDebugUnitTestsJavaRes UP-TO-DATE
:app:testBetaDebugUnitTests
org.gnuCash.android.db.adapter.BooksDbAdapter$NoActiveBookFoundException: There is no active book in the app.This should NEVER happen, fix your bugs!
    at org.gnuCash.android.db.adapter.BooksDbAdapter.getActiveBookUUID(BooksDbAdapter.java:15)
    at org.gnuCash.android.test.unit.db.BooksDbAdapterTest.recoverFromNoActiveBookFound(BooksDbAdapterTest.java:17) <8 internal calls>
    at org.robolectric.RobolectricTestRunner$HelperTestRunner$1.evaluate(RobolectricTestRunner.java:523) <1 internal call>
    at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:226)
    at org.robolectric.internal.SandboxTestRunner.runChild(SandboxTestRunner.java:181)
    at org.robolectric.internal.SandboxTestRunner.run(SandboxTestRunner.java:135) <3 internal calls>
    at org.robolectric.internal.SandboxTestRunner$1.evaluate(SandboxTestRunner.java:52) <29 internal calls>
    at java.lang.Thread.run(Thread.java:748)
Default currency is now: US Dollar
    at org.gnuCash.android.db.adapter.BooksDbAdapter.getActiveBookUUID(BooksDbAdapter.java:15)
    at org.gnuCash.android.test.unit.db.BooksDbAdapterTest.recoverFromNoActiveBookFound(BooksDbAdapterTest.java:17) <8 internal calls>
    at org.robolectric.RobolectricTestRunner$HelperTestRunner$1.evaluate(RobolectricTestRunner.java:523) <1 internal call>
    at org.robolectric.internal.SandboxTestRunner$2.evaluate(SandboxTestRunner.java:226)
    at org.robolectric.internal.SandboxTestRunner.runChild(SandboxTestRunner.java:181)
    at org.robolectric.internal.SandboxTestRunner.run(SandboxTestRunner.java:135) <3 internal calls>
    at org.robolectric.internal.SandboxTestRunner$1.evaluate(SandboxTestRunner.java:52) <29 internal calls>
    at java.lang.Thread.run(Thread.java:748)
```

Se ejecutan 846 pruebas de forma exitosa. Se presenta un error hacia el final, por ende el mutante no sobrevive.

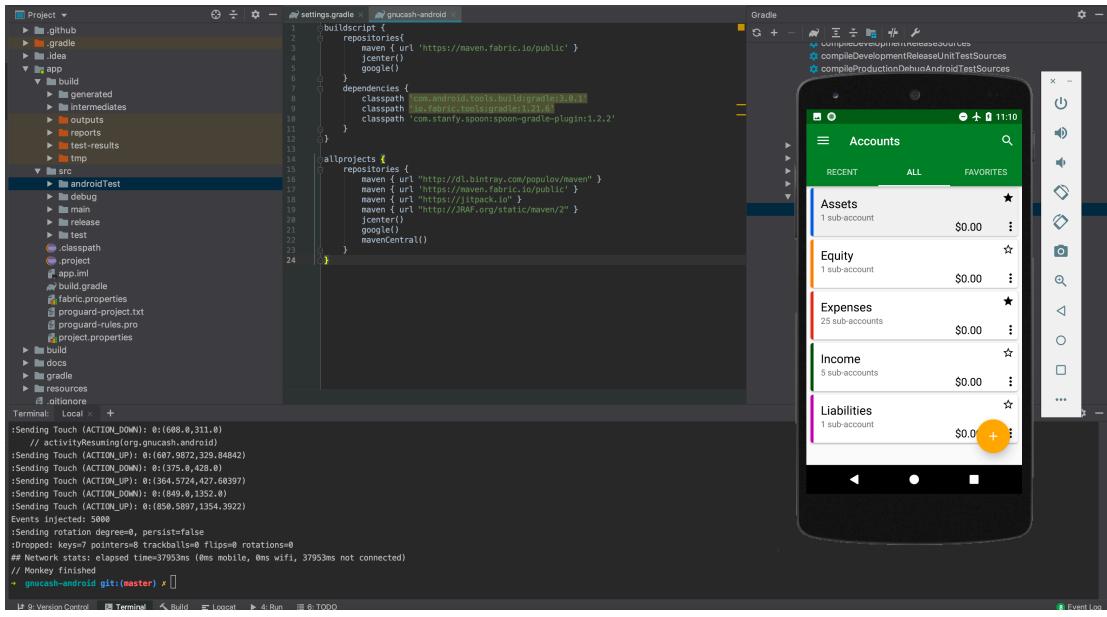


Se ejecuta monkey de forma satisfactoria.

## 7. Mutante 7

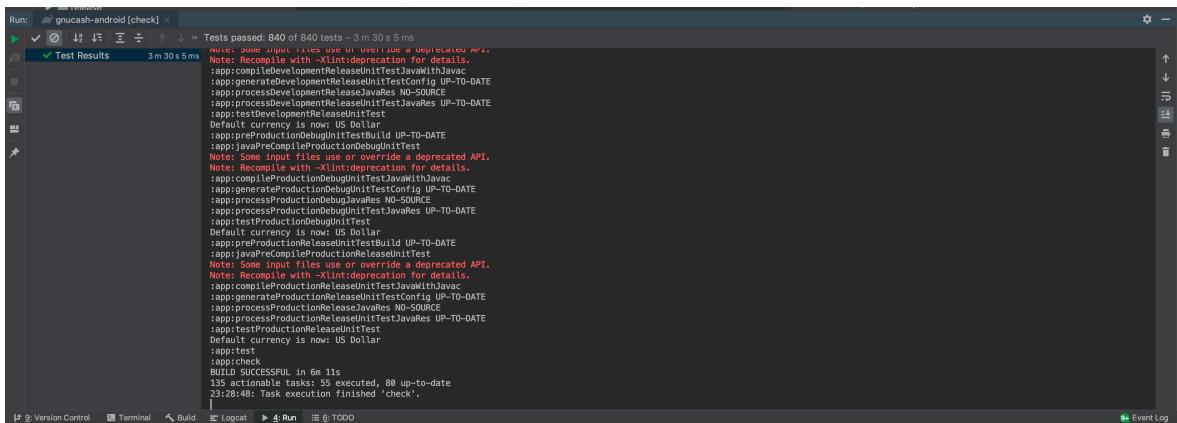


Se ejecutan 846 pruebas de forma exitosa. Se presenta un error hacia el final, por ende el mutante no sobrevive.

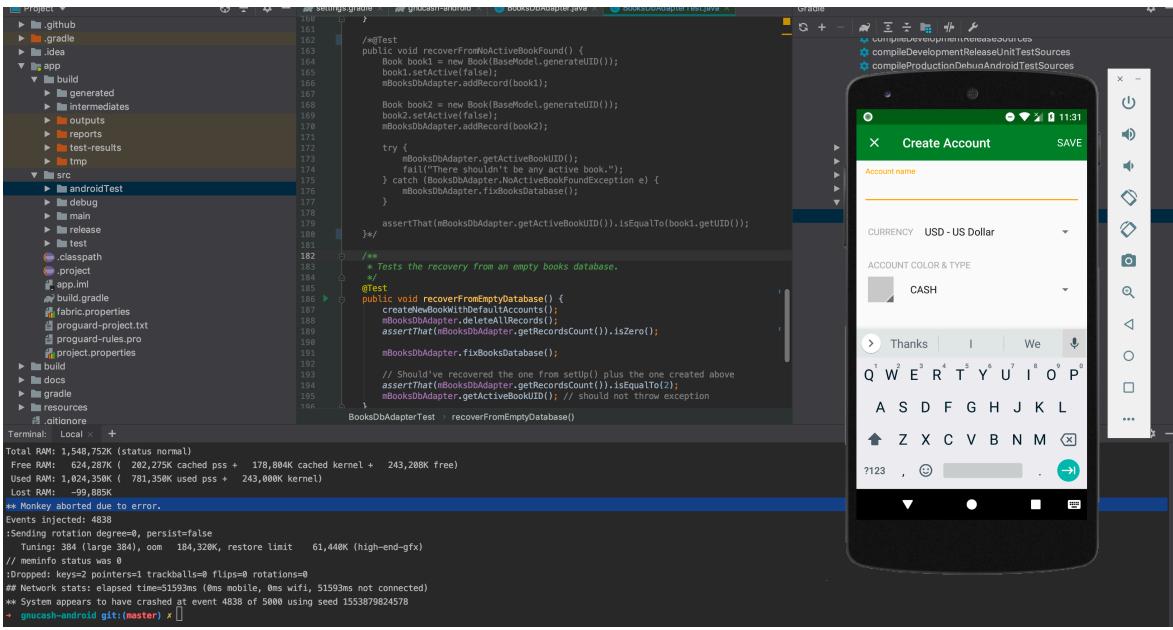


El monkey se ejecuta de forma satisfactoria

## 8. Monkey 8

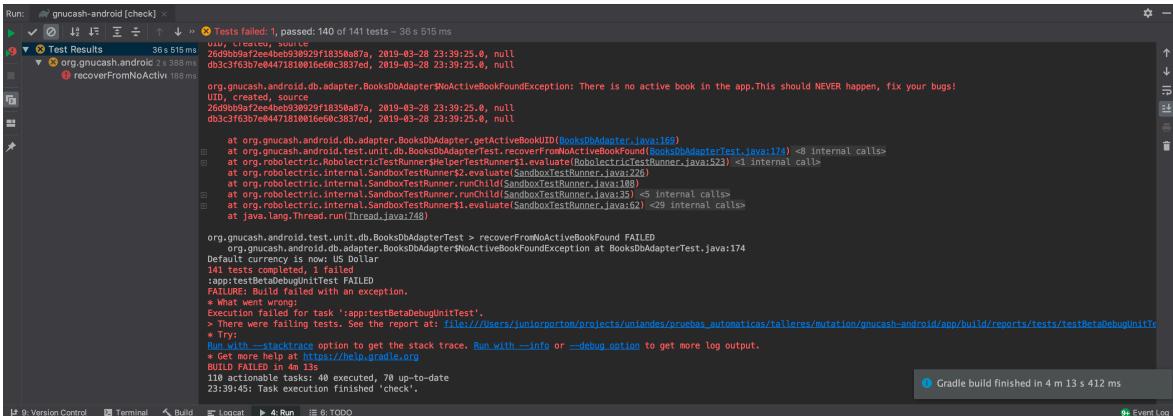


La test suite se ejecuta de forma satisfactoria. El mutante sobrevive.

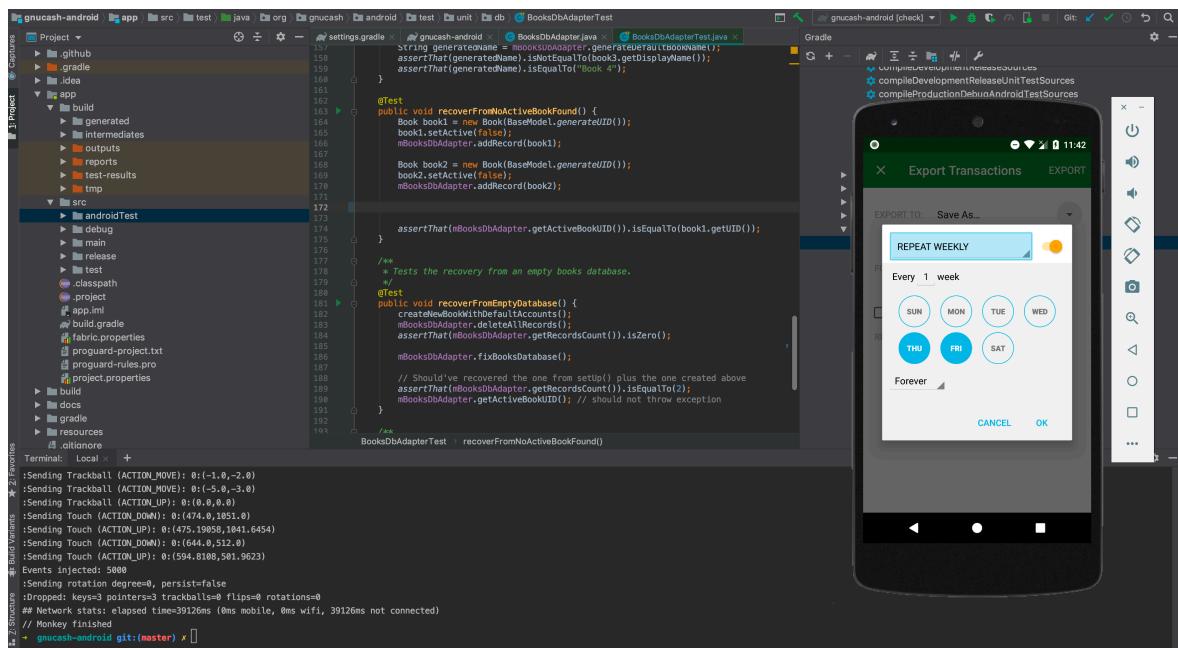


El monkey presenta fallos en ejecución.

## 9. Monkey 9

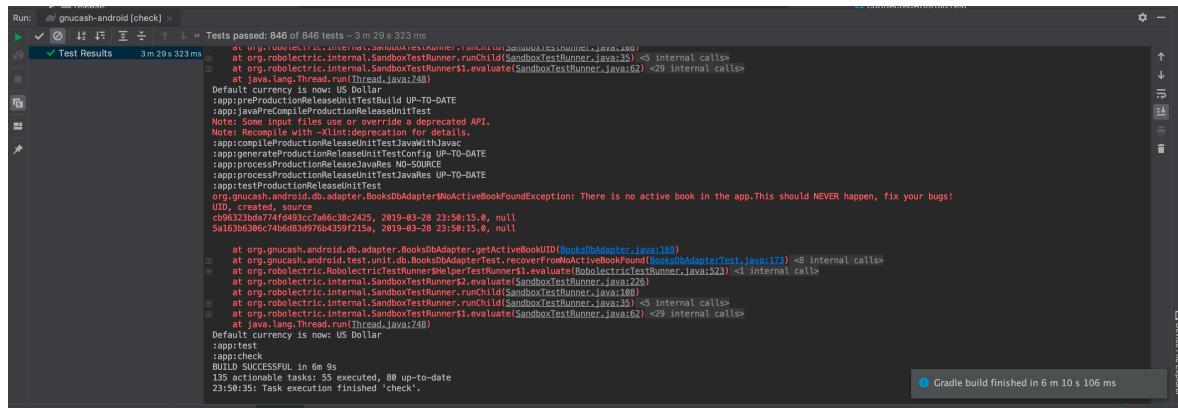


La test suite falla, por ende el mutante no sobrevive.

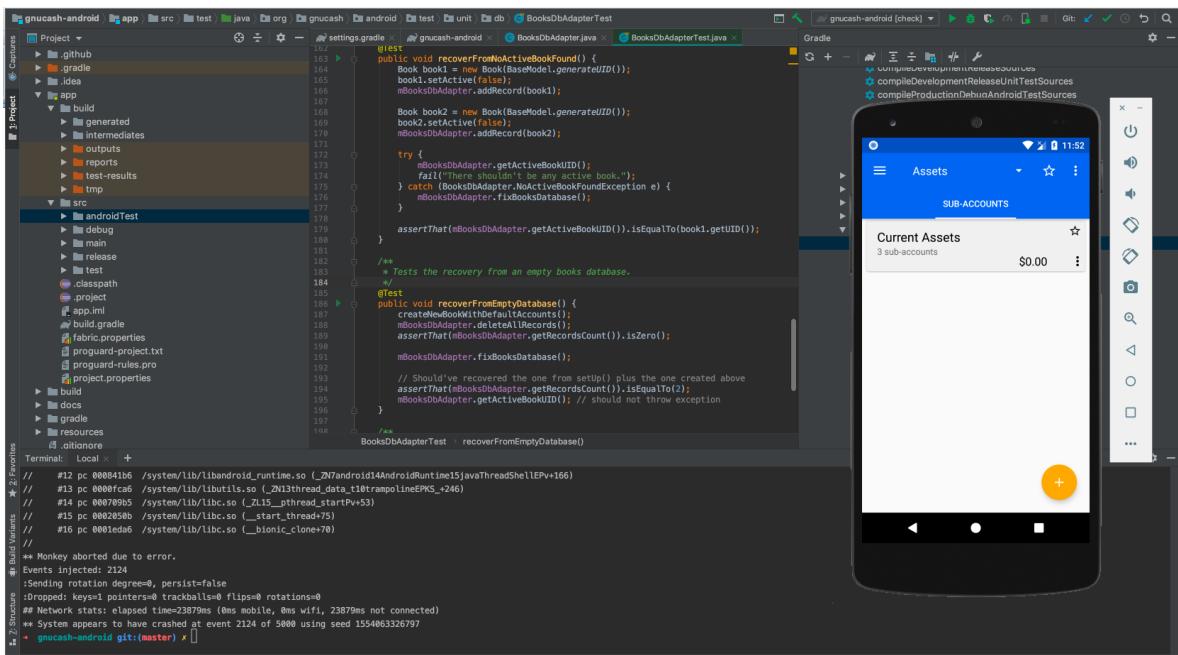


Monkey se ejecuta de forma satisfactoria.

## 10. Monkey 10



Se ejecutan 846 pruebas de forma exitosa. Se presenta un error hacia el final, por ende el mutante no sobrevive



Monkey se ejecuta de forma satisfactoria.

## Resultados.

La suite de pruebas en un alto porcentaje presento fallo en la ejecución de las pruebas realizadas, por ende da la oportunidad de identificas los mutantes que se produjeron. Cabe aclarar que la muestra no es representativa ya que del total de mutantes solo se tuvieron en cuenta 10 de forma aleatoria. Aun así para la muestra seleccionada los resultados arrojados por la suite fueron satisfactorios.

Para el caso del monkey ejecutado, se tiene que para una semilla de 1000 eventos, la mayoría de las ejecuciones fueron satisfactorias, por lo cual identificar los errores se hace mas dispendiosos usando esta técnica, ya que se necesita un mayor número de ejecuciones para poder identificar los mutantes presentes.