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# Practica Parcial 2

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## Aplicación



LaiCare

Manage the care of dogs and cats

<https://f-droid.org/en/packages/info.frangor.laicare/>

## Mutantes Generados

MDroid+ detectó 280 mutantes de los cuales generó 222

<https://github.com/femago/miso-4208-pa-parcial2/tree/master/laicare-mutants>

*Nota:*

*Se pudo observar que los mutantes generados tenían más de un solo cambio para cada mutación. No se aplicaba exactamente el cambio en el archivo indicado en el log de MDroid+, ejem:*

*Mutante 145: PetForm.java; ViewComponentNotVisible in line 95*

*Era de esperar que solo fuera modificado el archivo PetForm.java sin embargo muchos archivos más fueron mutados:*

---

Swap Stop Filters: *.* Filters Peek		C:\...laicare-mutant145\java\info\frangor\laicare		C:\...src\main\java\info\frangor\laicare	
Name	Size		Name	Size	
java	144,566		java	140,722	
info	144,566		info	140,722	
frangor	144,566		frangor	140,722	
laicare	144,566		laicare	140,722	
exceptions	2,236		exceptions	2,236	
model	33,239		model	33,239	
service	6,905		service	6,676	
AppointmentsNotify.java	3,653	❌	AppointmentsNotify.java	3,537	
BootReceiver.java	1,999	❌	BootReceiver.java	1,934	
StartAppointments.java	1,253	❌	StartAppointments.java	1,205	
view	97,041		view	93,426	
utils	5,825		utils	5,825	
AboutActivity.java	1,872	❌	AboutActivity.java	1,788	
AppointmentForm.java	10,657	❌	AppointmentForm.java	9,786	
AppointmentItem.java	8,554	❌	AppointmentItem.java	8,235	
AppointmentList.java	2,815	❌	AppointmentList.java	2,710	
CheckPointForm.java	8,952	❌	CheckPointForm.java	8,314	
CheckPointItem.java	4,237	❌	CheckPointItem.java	4,060	
CheckPointList.java	4,920	❌	CheckPointList.java	4,703	
DatePickerFragment.java	2,225	❌	DatePickerFragment.java	2,225	
PetForm.java	8,736	❌	PetForm.java	8,238	
PetItem.java	5,682	❌	PetItem.java	5,560	
PetList.java	4,748	❌	PetList.java	4,547	
PetTabs.java	6,105	❌	PetTabs.java	6,105	
SettingsActivity.java	1,621	❌	SettingsActivity.java	1,621	
SettingsFragment.java	1,205	❌	SettingsFragment.java	1,205	
TreatmentForm.java	10,116	❌	TreatmentForm.java	9,784	
TreatmentItem.java	5,258	❌	TreatmentItem.java	5,207	
TreatmentList.java	3,513	❌	TreatmentList.java	3,513	
Controller.java	5,145	❌	Controller.java	5,145	
res	55,738		res	55,738	
svg-png	26,704		svg-png	26,704	
AndroidManifest.xml	1,660	❌	AndroidManifest.xml	1,701	

Parece que MDroid+ está aplicando las mutaciones acumuladamente y en algunos casos el código fuente mutado no corresponde con la operación que se esperaba que aplicará.

## Mutantes Seleccionados

Los mutantes seleccionados se encuentran en:

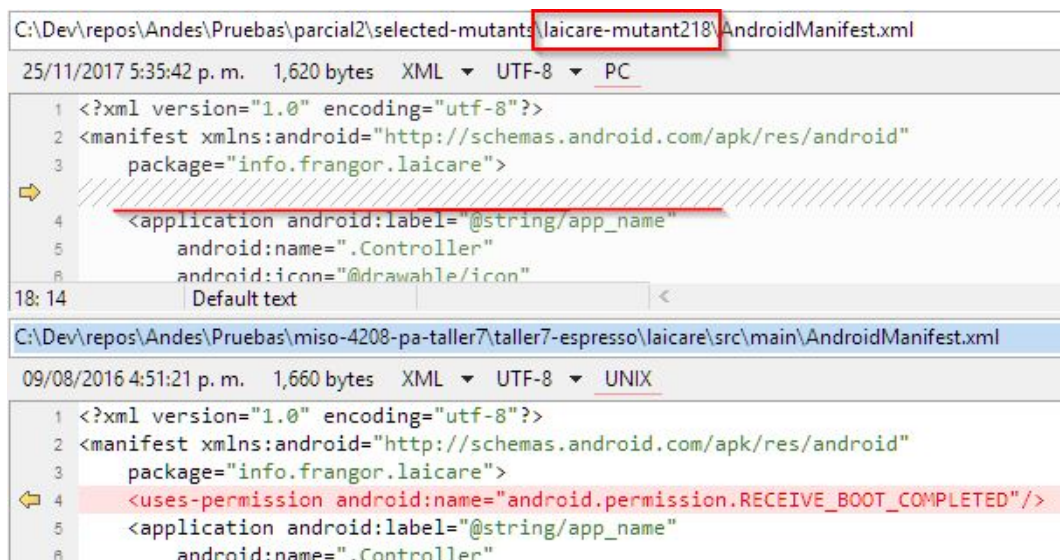
<https://github.com/femago/miso-4208-pa-parcial2/tree/master/selected-mutants>

En cada carpeta se encuentra la prueba utilizada y la mutación exacta que se aplicó.

#218

Tipo: AndroidManifest.xml; MissingPermissionManifest in line 4

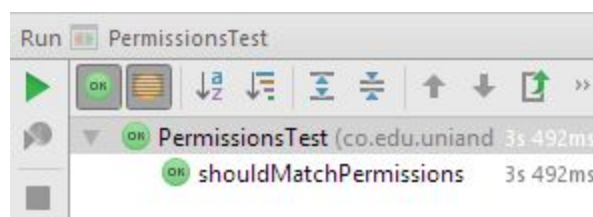
Mutacion:



```

C:\Dev\repos\Andes\Pruebas\parcial2\selected-mutants\laicare-mutant218\AndroidManifest.xml
25/11/2017 5:35:42 p. m. 1,620 bytes XML UTF-8 PC
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3   package="info.frangor.laicare">
4   <application android:label="@string/app_name"
5     android:name=".Controller"
6     android:icon="@drawable/icon"
18: 14 Default text <
C:\Dev\repos\Andes\Pruebas\miso-4208-pa-taller7\taller7-espresso\laicare\src\main\AndroidManifest.xml
09/08/2016 4:51:21 p. m. 1,660 bytes XML UTF-8 UNIX
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3   package="info.frangor.laicare">
4   <uses-permission android:name="android.permission.RECEIVE_BOOT_COMPLETED"/>
5   <application android:label="@string/app_name"
6     android:name=".Controller"
  
```

Prueba antes de aplicar mutación:



```

Run PermissionsTest
[OK] [Run] [Debug] [Test] [Exit] [Up] [Down] [Find] [Find Next] [Find Previous] [Find All] [Find All in Project]
[OK] PermissionsTest (co.edu.uniand 3s 492ms
[OK] shouldMatchPermissions 3s 492ms
  
```

Mutante detectado:

Prueba Unitaria: haciendo uso de roboelectric se carga el manifest de la aplicación y se valida que exista el permiso requerido.

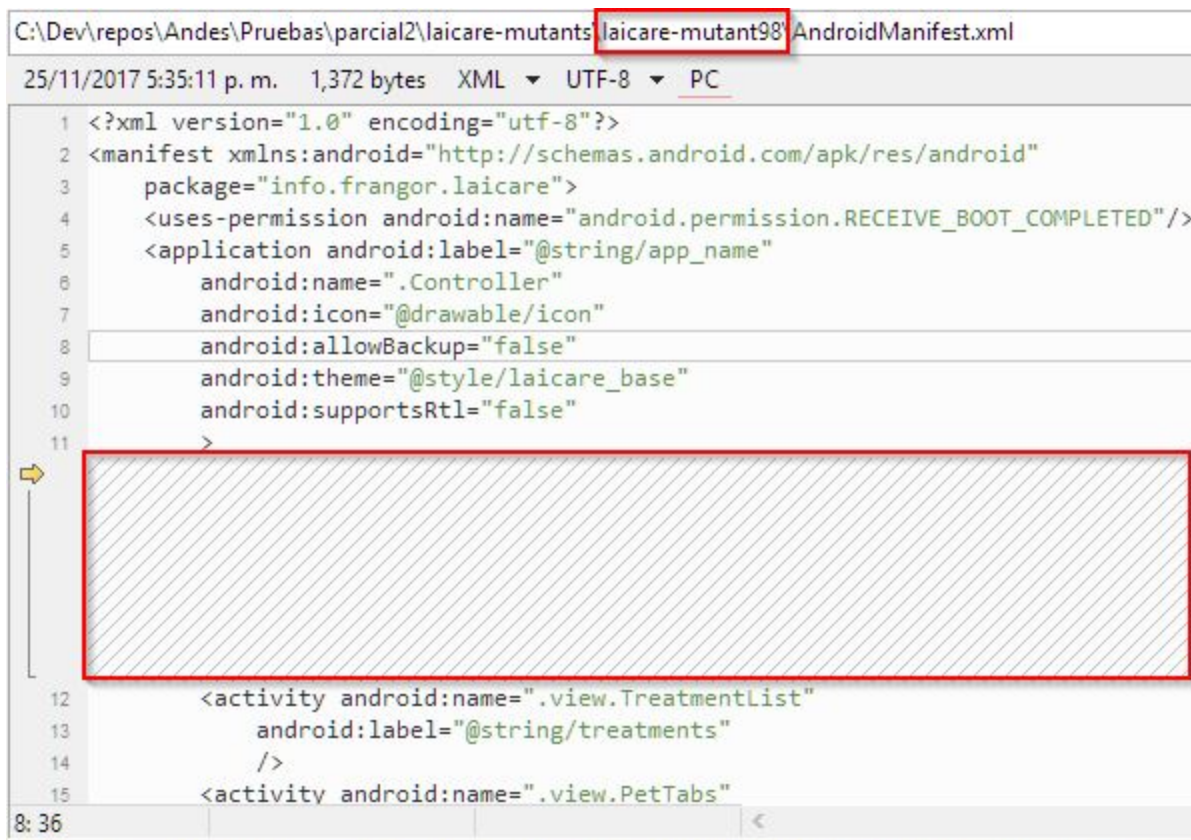
PermissionsTest.java



#98

Tipo: AndroidManifest.xml; ActivityNotDefined in line 12

Mutacion:



```
C:\Dev\repos\Andes\Pruebas\parcial2\laicare-mutants\laicare-mutant98\AndroidManifest.xml
25/11/2017 5:35:11 p. m. 1,372 bytes XML UTF-8 PC

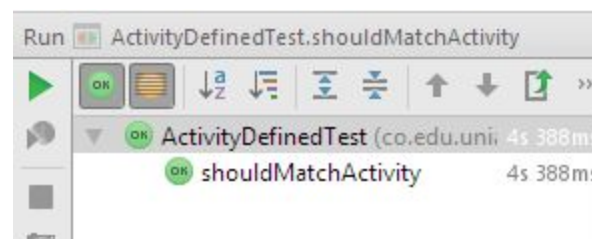
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3     package="info.frangor.laicare">
4     <uses-permission android:name="android.permission.RECEIVE_BOOT_COMPLETED"/>
5     <application android:label="@string/app_name"
6         android:name=".Controller"
7         android:icon="@drawable/icon"
8         android:allowBackup="false"
9         android:theme="@style/laicare_base"
10        android:supportsRtl="false"
11    >
12        <activity android:name=".view.TreatmentList"
13            android:label="@string/treatments"
14        />
15        <activity android:name=".view.PetTabs"
16    </activity>
17 </manifest>
```

```

C:\Dev\repos\Andes\Pruebas\miso-4208-pa-taller7\taller7-espresso\laicare\src\main\AndroidManifest.xml
25/11/2017 7:21:19 p. m. 1,654 bytes XML UTF-8 UNIX
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3     package="info.frangor.laicare">
4     <uses-permission android:name="android.permission.RECEIVE_BOOT_COMPLETED"/>
5     <application android:label="@string/app_name"
6         android:name=".Controller"
7         android:icon="@drawable/icon"
8         android:allowBackup="false"
9         android:theme="@style/laicare_base"
10        android:supportsRtl="false"
11    >
12        <activity android:name=".view.PetList"
13            android:label="@string/app_name">
14            <intent-filter>
15                <action android:name="android.intent.action.MAIN" />
16                <category android:name="android.intent.category.LAUNCHER" />
17            </intent-filter>
18        </activity>
19        <activity android:name=".view.TreatmentList"
20            android:label="@string/treatments"
21        />
22        <activity android:name=".view.PetTabs"

```

Prueba antes de aplicar mutación:

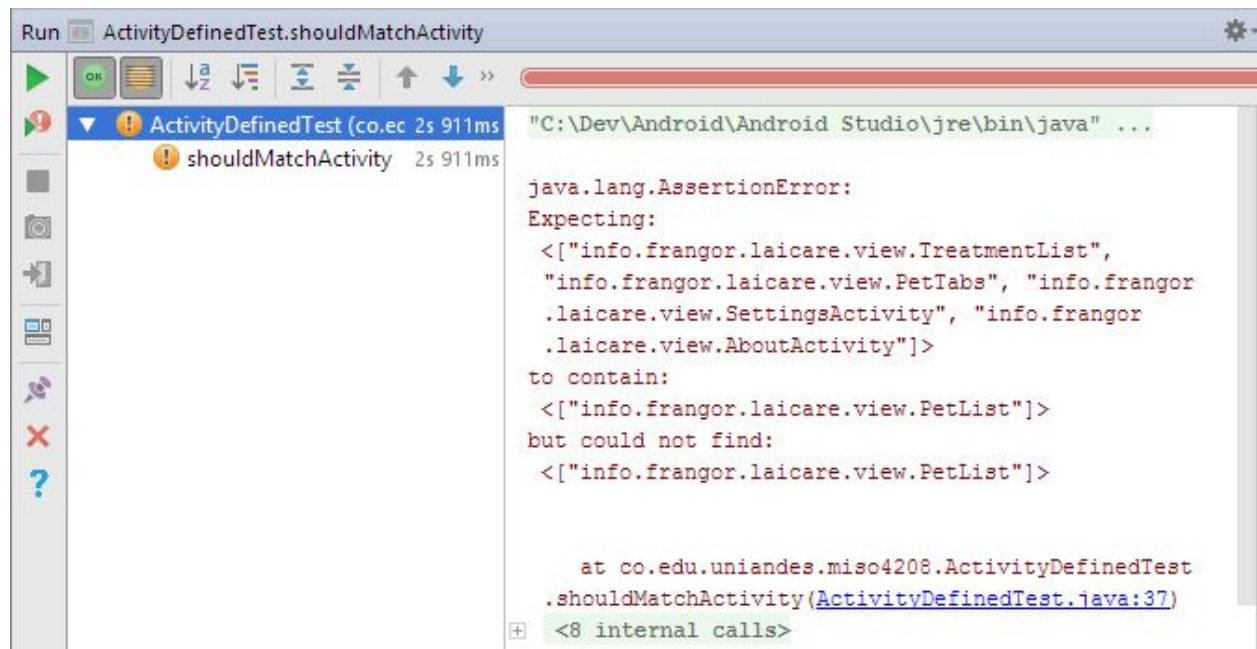


Mutante detectado:

Prueba Unitaria: haciendo uso de roboelectric se carga el manifest de la aplicación y se valida que exista la actividad **.view.PetList**.

ActivityDefinedTest.java





#101

Tipo: AndroidManifest.xml; ActivityNotDefined in line 24

Mutacion:

The top screenshot shows the original `AndroidManifest.xml` file. It contains the following XML elements:

```

18     </activity>
19     <activity android:name=".view.TreatmentList"
20         android:label="@string/treatments"
21     />
22     <activity android:name=".view.PetTabs"
23     />
24     <activity android:name=".view.AboutActivity"
25         android:label="@string/about"
26     />
27     <receiver android:name=".service.BootReceiver">

```

The bottom screenshot shows the mutated `AndroidManifest.xml` file. It contains the following XML elements:

```

18     </activity>
19     <activity android:name=".view.TreatmentList"
20         android:label="@string/treatments"
21     />
22     <activity android:name=".view.PetTabs"
23     />
24     <activity android:name=".view.SettingsActivity"
25         android:label="@string/settings"
26     />
27     <activity android:name=".view.AboutActivity"
28         android:label="@string/about"
29     />

```

Prueba antes de aplicar mutación:

The screenshot shows the Run console with the following test results:

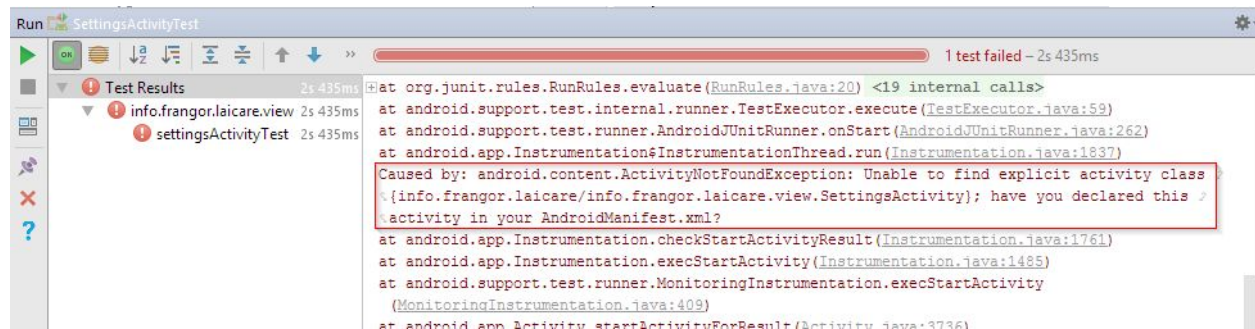
Test Name	Duration	Status
info.frangor.laicare.view.SettingsActivityTest	1s 833ms	OK
settingsActivityTest	1s 833ms	OK



## Mutante detectado:

**Prueba Unitaria:** haciendo uso de espresso se crea un script que lanza la actividad llamada Settings y valida su contenido

SettingsActivityTest.java



android.support.test.espresso.PerformException: Error performing 'single click' - At Coordinates: 812, 264 and precision: 16, 16' on view '(with id: info.frangor.laicare:id/title and with text: is "Settings" and is displayed on the screen to the user)'.  
 at android.support.test.espresso.PerformException\$Builder.build(PerformException.java:83)

....

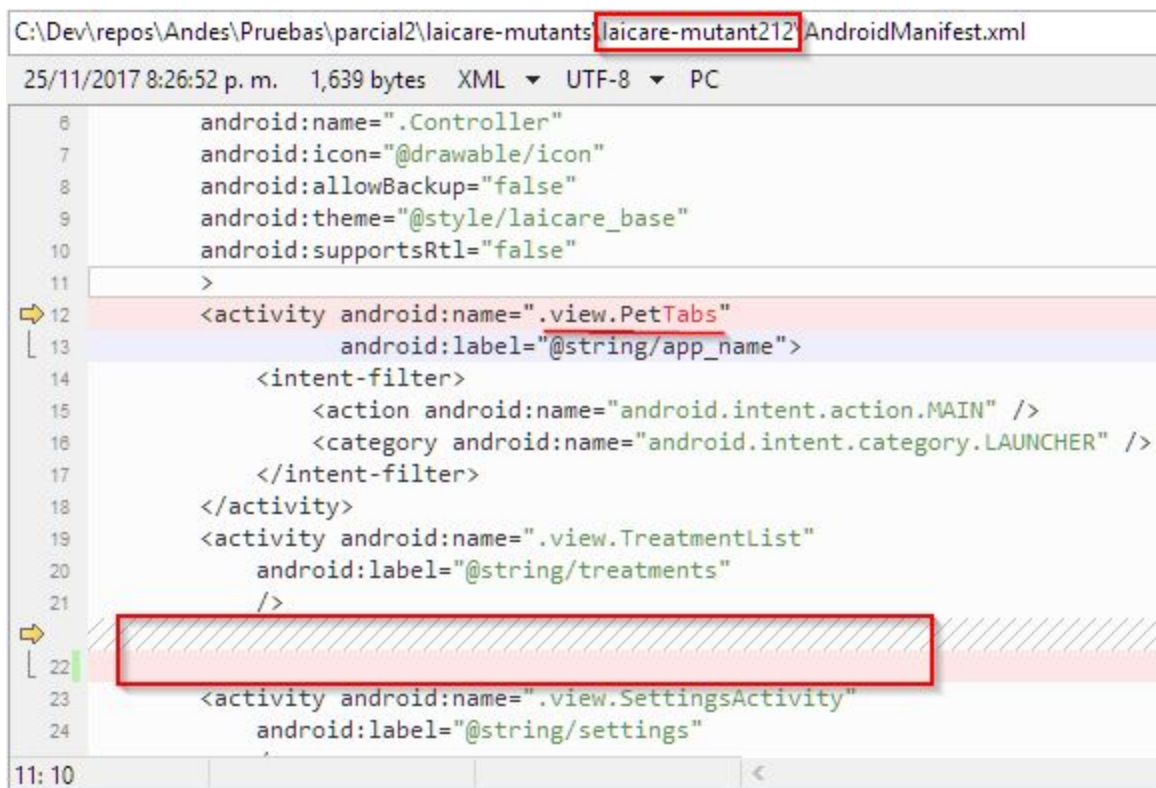
Caused by: android.content.ActivityNotFoundException: Unable to find explicit activity class {info.frangor.laicare/info.frangor.laicare.view.SettingsActivity}; have you declared this activity in your AndroidManifest.xml?

at android.app.Instrumentation.checkStartActivityResult(Instrumentation.java:1761)

#212

Tipo: AndroidManifest.xml; WrongMainActivity in line 12

Mutacion:



```
C:\Dev\repos\Andes\Pruebas\parcial2\laicare-mutants\laicare-mutant212\AndroidManifest.xml
25/11/2017 8:26:52 p. m. 1,639 bytes XML UTF-8 PC

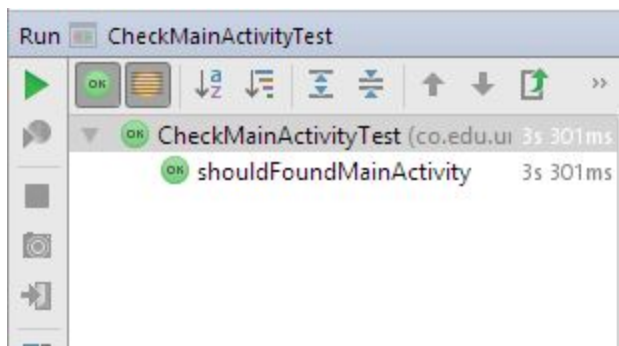
6      android:name=".Controller"
7      android:icon="@drawable/icon"
8      android:allowBackup="false"
9      android:theme="@style/laicare_base"
10     android:supportsRtl="false"
11     >
12     <activity android:name=".view.PetTabs"
13             android:label="@string/app_name">
14         <intent-filter>
15             <action android:name="android.intent.action.MAIN" />
16             <category android:name="android.intent.category.LAUNCHER" />
17         </intent-filter>
18     </activity>
19     <activity android:name=".view.TreatmentList"
20             android:label="@string/treatments"
21     />
22     <activity android:name=".view.SettingsActivity"
23             android:label="@string/settings"
24     />
```

```

C:\Dev\repos\Andes\Pruebas\miso-4208-pa-taller7\taller7-espresso\laicare\src\main\AndroidManifest.xml
25/11/2017 8:26:28 p. m. 1,695 bytes XML UTF-8 PC
8     android:name=".Controller"
7     android:icon="@drawable/icon"
8     android:allowBackup="false"
9     android:theme="@style/laicare_base"
10    android:supportsRtl="false"
11    >
12    <activity android:name=".view.PetList"
13        android:label="@string/app_name">
14        <intent-filter>
15            <action android:name="android.intent.action.MAIN" />
16            <category android:name="android.intent.category.LAUNCHER" />
17        </intent-filter>
18    </activity>
19    <activity android:name=".view.TreatmentList"
20        android:label="@string/treatments"
21    />
22    <activity android:name=".view.PetTabs"
23    />
24    <activity android:name=".view.SettingsActivity"
25        android:label="@string/settings"

```

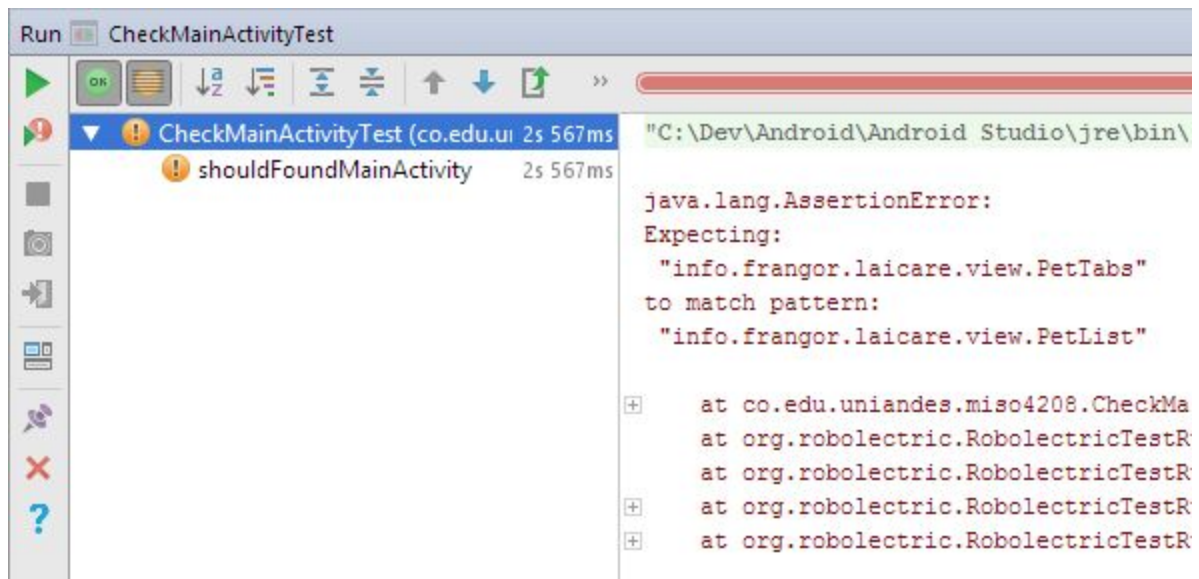
**Prueba antes de aplicar mutación:**



**Mutante detectado:**

**Prueba Unitaria: usando roboelectric se verifica la integridad del AndroidManifest.**

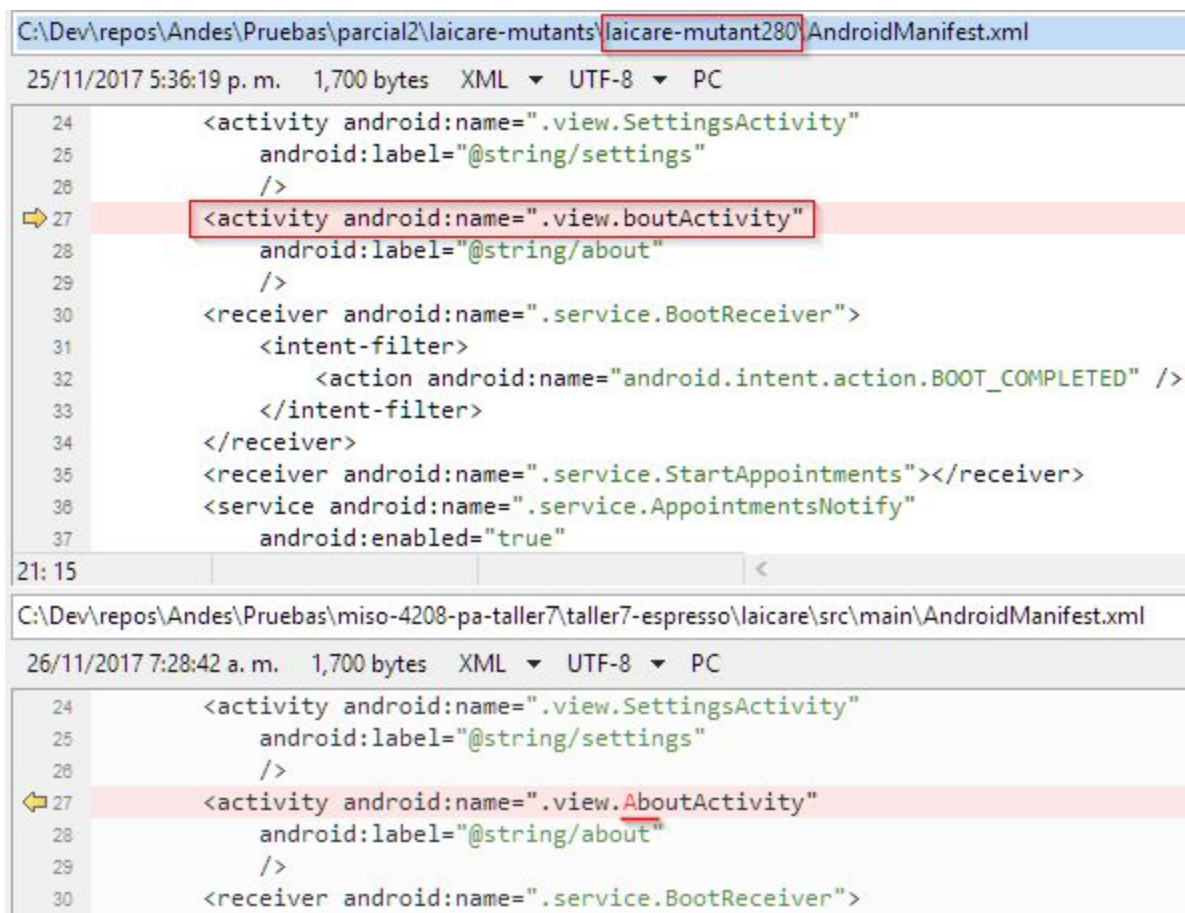
`CheckMainActivityTest.java`



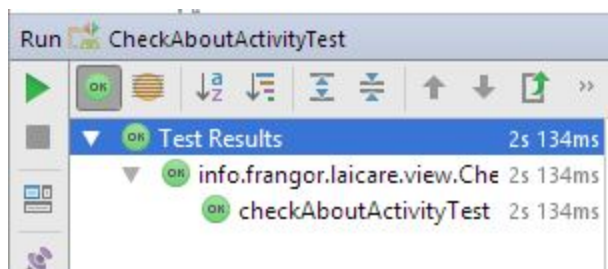
## #280

Tipo: AndroidManifest.xml; InvalidActivityPATH in line 27

Mutacion:



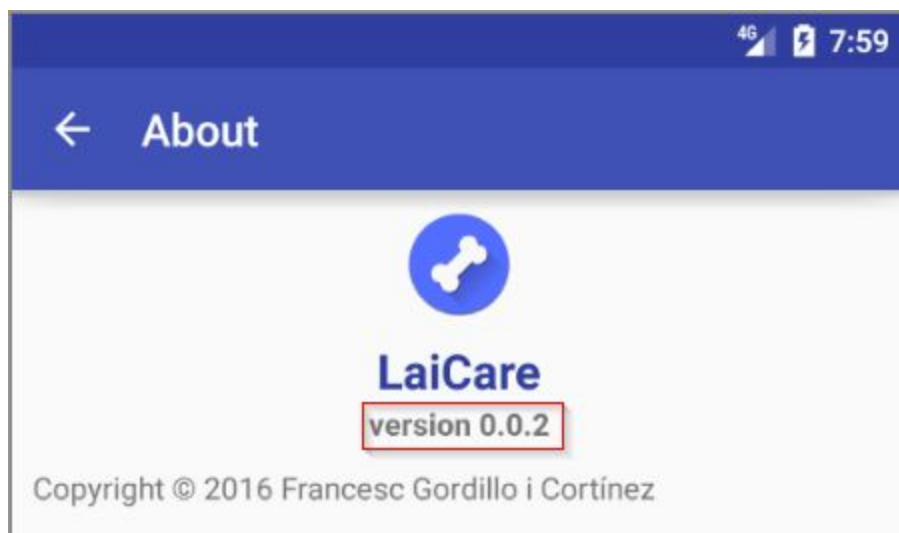
Prueba antes de aplicar mutación:



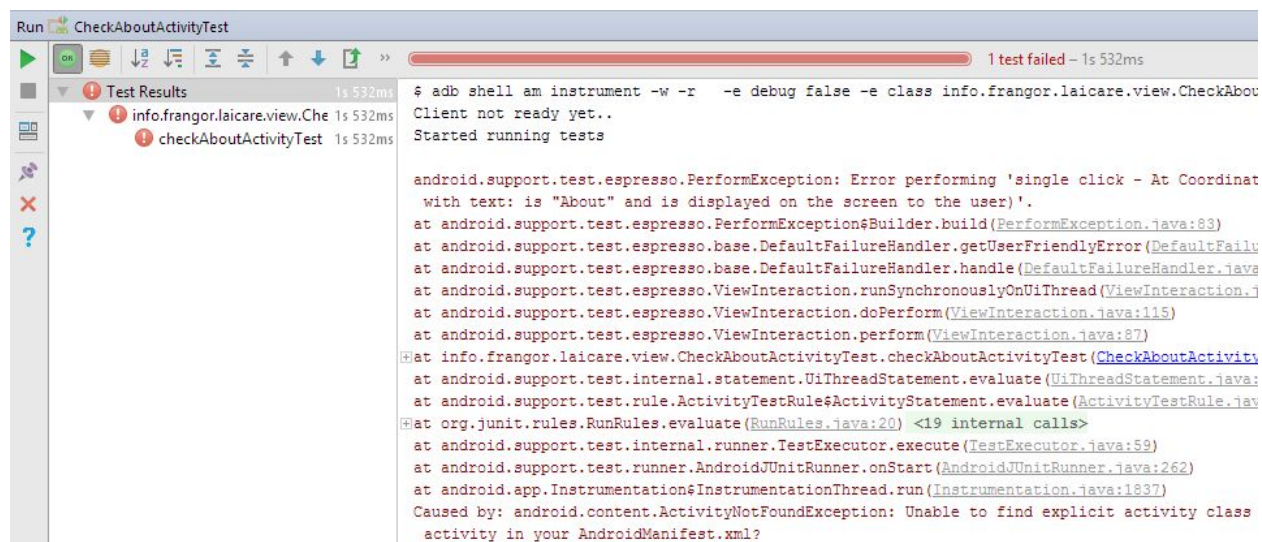
Mutante detectado:

Prueba Unitaria: haciendo uso de espresso se genera un script que verifica que al hacer click en el elemento de menú "About" se despliega la actividad correspondiente. La validación espera que el elemento con id="version" se encuentre en la vista.





CheckAboutActivityTest.java



android.support.test.espresso.PerformException: Error performing 'single click - At Coordinates: 812, 390 and precision: 16, 16' on view '(with id: info.frangor.laicare:id/title and with text: is "About" and is displayed on the screen to the user)'.  
 at android.support.test.espresso.PerformException\$Builder.build(PerformException.java:83)  
 ...

at android.app.Instrumentation\$InstrumentationThread.run(Instrumentation.java:1837)

...

Caused by: android.content.ActivityNotFoundException: Unable to find explicit activity class {info.frangor.laicare/info.frangor.laicare.view>AboutActivity}: have you declared this activity in your AndroidManifest.xml?

at android.app.Instrumentation.checkStartActivityResult(Instrumentation.java:1761)



#279

Tipo: AndroidManifest.xml; InvalidActivityPATH in line 24

Mutacion:

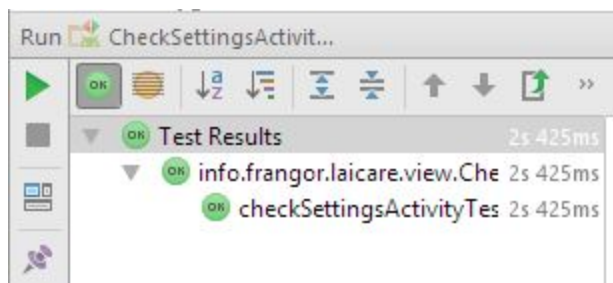
```

C:\Dev\repos\Andes\Pruebas\parcial2\laicare-mutants\laicare-mutant279\AndroidManifest.xml
25/11/2017 5:36:19 p. m. 1,698 bytes XML UTF-8 PC
20         android:label="@string/treatments"
21     />
22     <activity android:name=".view.PetTabs"
23     />
24     <activity android:name=".view.SettingsActiv"
25         android:label="@string/settings"
26     />
27     <activity android:name=".view.AboutActivity"
28         android:label="@string/about"
29     />
30     <receiver android:name=".service.BootReceiver">
1: 1 Operator

C:\Dev\repos\Andes\Pruebas\miso-4208-pa-taller7\taller7-espresso\laicare\src\main\AndroidManifest.xml
26/11/2017 7:37:20 a. m. 1,701 bytes XML UTF-8 PC
20         android:label="@string/treatments"
21     />
22     <activity android:name=".view.PetTabs"
23     />
24     <activity android:name=".view.SettingsActivity"
25         android:label="@string/settings"
26     />
27     <activity android:name=".view.AboutActivity"
28         android:label="@string/about"
29     />

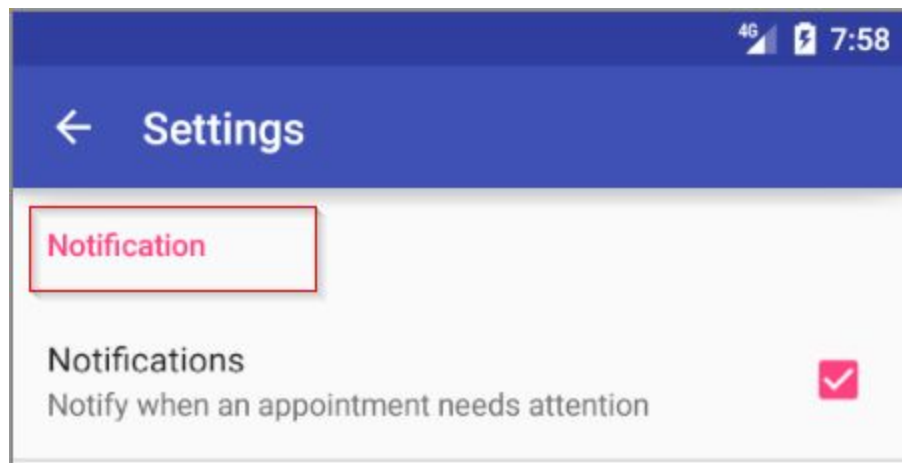
```

Prueba antes de aplicar mutación:

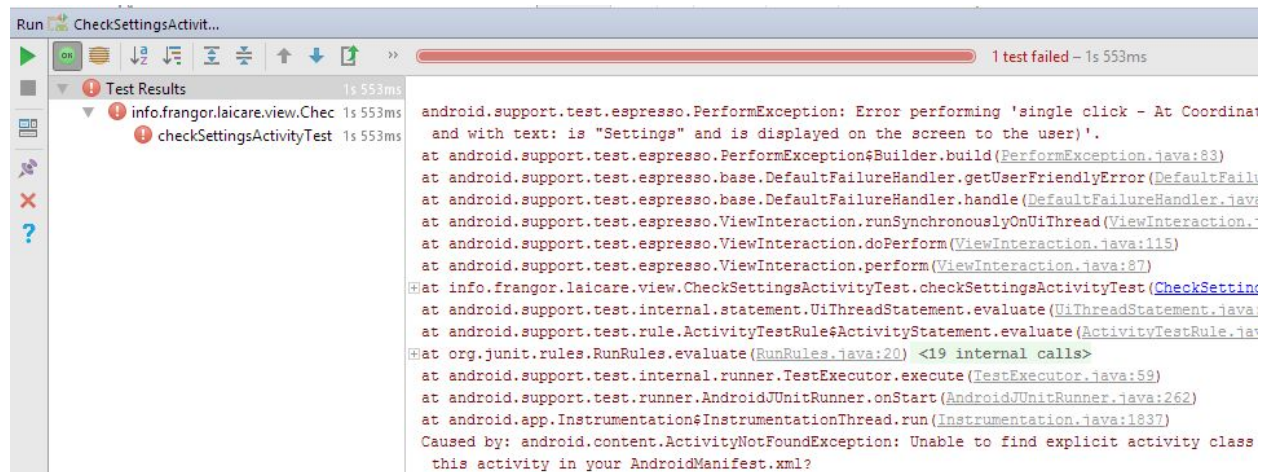


Mutante detectado:

Prueba Unitaria: haciendo uso de espresso se genera un script que verifica que al hacer click en el elemento de menú "Settings" se despliega la actividad correspondiente. La validación espera que se encuentre desplegado un elemento con el texto "Notification".



CheckSettingsActivityTest.java



```
android.support.test.espresso.PerformException: Error performing 'single click - At Coordinates: 812, 264 and precision: 16, 16' on view '(with id: info.frangor.laicare:id/title and with text: is "Settings" and is displayed on the screen to the user)'.
    at android.support.test.espresso.PerformException$Builder.build(PerformException.java:83)
    at android.support.test.espresso.base.DefaultFailureHandler.getUserFriendlyError(DefaultFailureHandler.java:69)
    at android.support.test.espresso.base.DefaultFailureHandler.handle(DefaultFailureHandler.java:36)
    at android.support.test.espresso.ViewInteraction.runSynchronouslyOnUiThread(ViewInteraction.java:36)
    at android.support.test.espresso.ViewInteraction.doPerform(ViewInteraction.java:115)
    at android.support.test.espresso.ViewInteraction.perform(ViewInteraction.java:87)
    at info.frangor.laicare.view.CheckSettingsActivityTest.checkSettingsActivityTest(CheckSettingsActivityTest.java:20)
    at android.support.test.internal.runner.AndroidJUnit4.evaluate1(AndroidJUnit4.java:107)
    at org.junit.rules.RunRules.evaluate(RunRules.java:20)
    at org.junit.runners.model.AbstractTest$1.evaluate(AbstractTest.java:58)
    at android.support.test.runner.AndroidJUnit4.onStart(AndroidJUnit4.java:169)
    at android.app.Instrumentation$InstrumentationThread.run(Instrumentation.java:1837)
Caused by: android.content.ActivityNotFoundException: Unable to find explicit activity class this activity in your AndroidManifest.xml?
```

```
at android.support.test.espresso.PerformException$Builder.build(PerformException.java:83)
```

```
...
```

```
at android.app.Instrumentation$InstrumentationThread.run(Instrumentation.java:1837)
```

```
Caused by: android.content.ActivityNotFoundException: Unable to find explicit activity class
{info.frangor.laicare/info.frangor.laicare.view.SettingsActivity}; have you declared this
activity in your AndroidManifest.xml?
```

```
at android.app.Instrumentation.checkStartActivityResult(Instrumentation.java:1761)
```

## #144

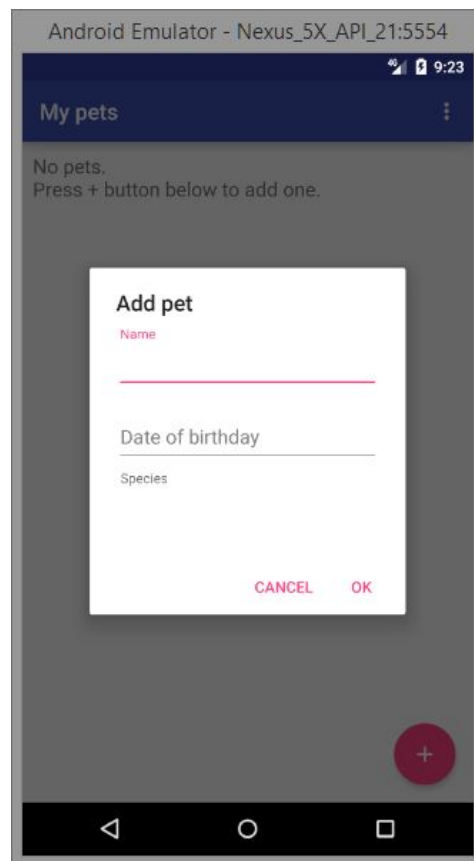
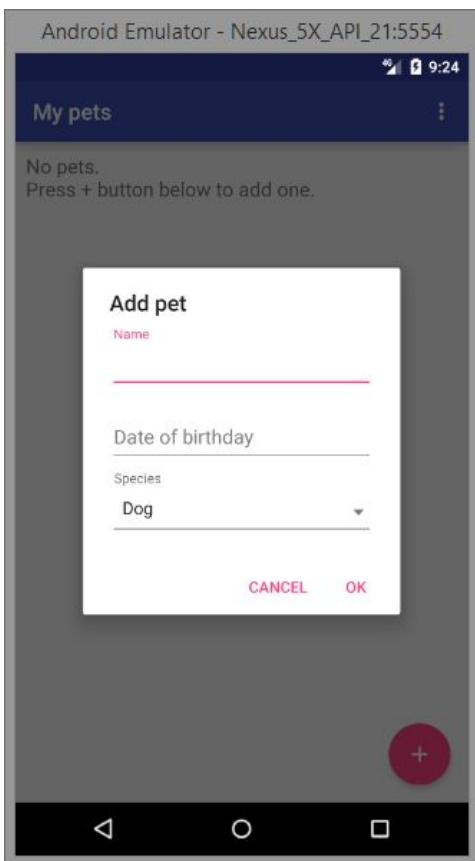
**Tipo: PetForm.java; ViewComponentNotVisible in line 91**

**Mutacion:**

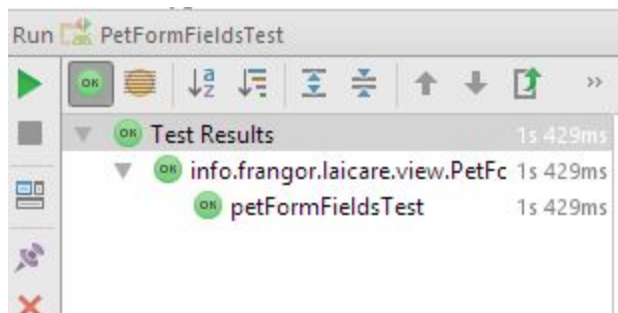
```
C:\Dev\repos\Andes\Pruebas\parcial2\laicare-mutants\laicare-mutant144\java\info\frangor\laicare\view\PetForm.java
26/11/2017 8:49:09 a. m. 8,294 bytes Java Source ANSI UNIX
91 petSpecies = (AppCompatSpinner) view.findViewById(R.id.pet_species);
92 petSpecies.setVisibility(android.view.View.INVISIBLE);
93 // Delete button
94 AppCompatActivity delete = (AppCompatActivity) view.findViewById(
95     R.id.pet_form_delete);
96 delete.setOnClickListener(new View.OnClickListener() {
97     @Override
98     public void onClick(View v) {
99         // TODO: Delete pet
100     }
101 });
102 }
103 }
```

92: 63

```
C:\Dev\repos\Andes\Pruebas\miso-4208-pa-taller7\taller7-espresso\laicare\src\main\java\info\frangor\laicare\view\PetForm.java
26/11/2017 9:18:09 a. m. 8,238 bytes Java Source ANSI UNIX
91 petSpecies = (AppCompatSpinner) view.findViewById(R.id.pet_species);
92 // Delete button
93 AppCompatActivity delete = (AppCompatActivity) view.findViewById(
94     R.id.pet_form_delete);
95 delete.setOnClickListener(new View.OnClickListener() {
96     @Override
97     public void onClick(View v) {
98         // TODO: Delete pet
99     }
100 });
101 }
```



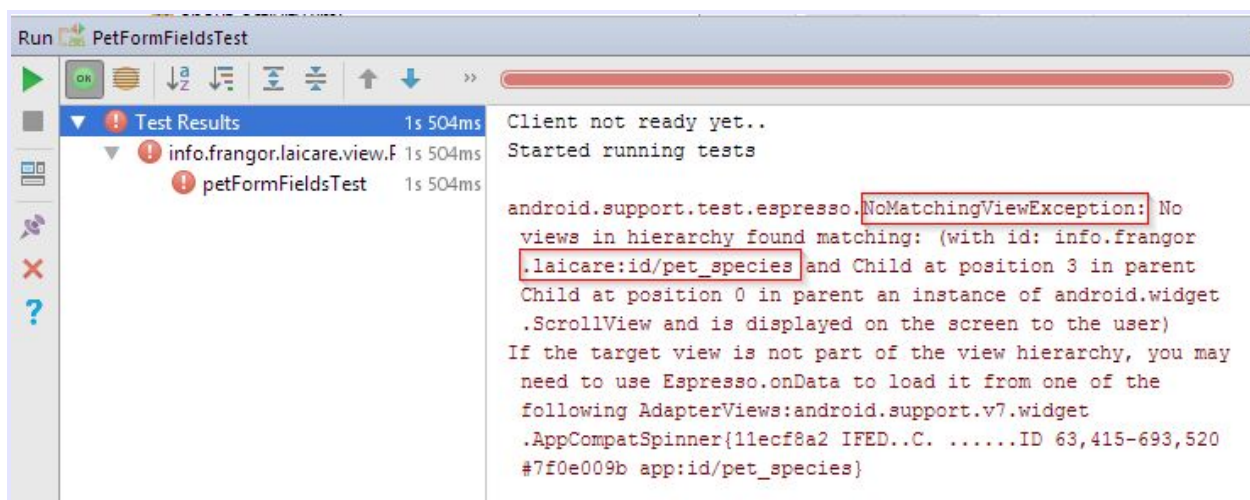
### Prueba antes de aplicar mutación:



### Mutante detectado:

**Prueba Unitaria:** haciendo uso de espresso se valida que existan los 3 campos en el formulario para crear una mascota.

PetFormFieldsTest.java





## #153

Tipo: TreatmentForm.java; ViewComponentNotVisible in line 83

Mutacion:

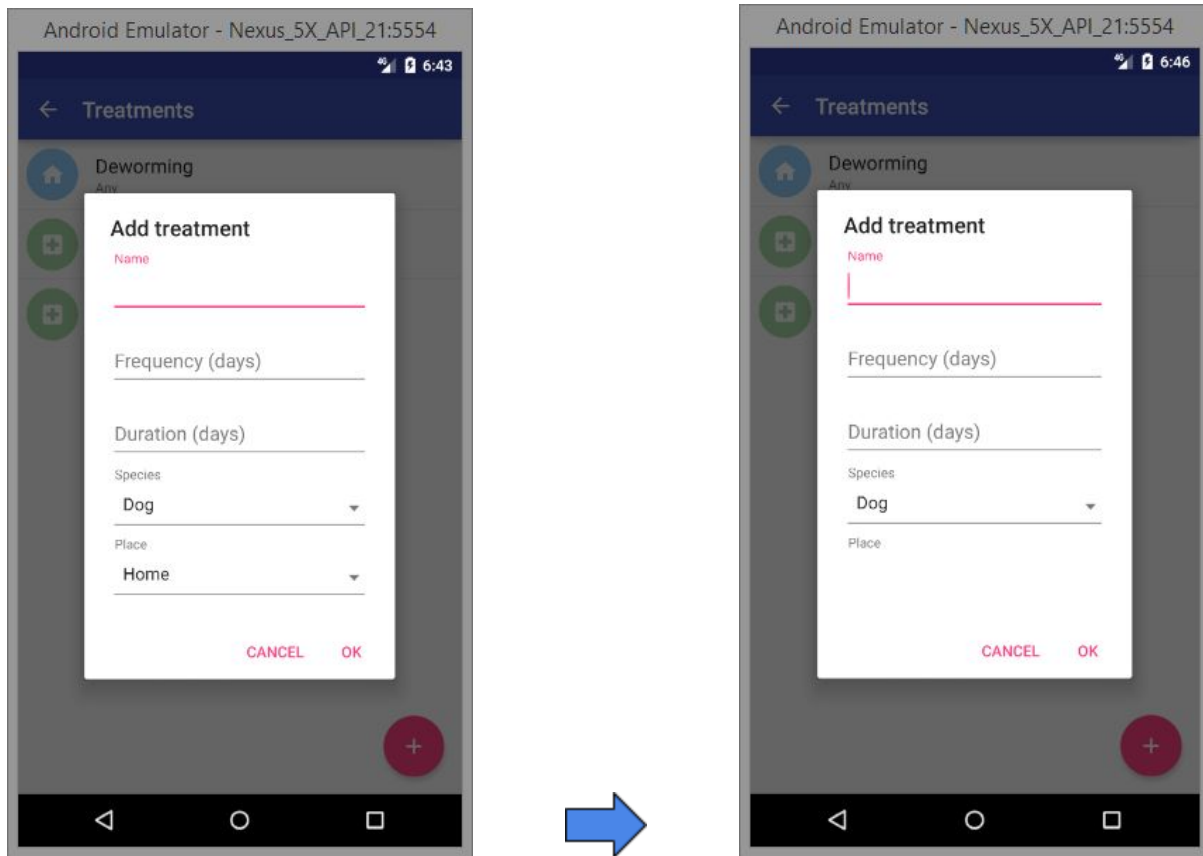
```
C:\Dev\repos\Andes\Pruebas\parcial2\laicare-mutants\laicare-mutant153\java\info\frangor\laicare\view\TreatmentForm.java
26/11/2017 6:37:53 p. m. 10,089 bytes Java Source ANSI MIX

79
80     tName = (AppCompatActivity) view.findViewById(R.id.treatment_name);
81     tPeriod = (AppCompatActivity) view.findViewById(R.id.treatment_period);
82     tTerm = (AppCompatActivity) view.findViewById(R.id.treatment_term);
83     tPlace = (AppCompatActivity) view.findViewById(R.id.treatment_places);
84     tPlace.setVisibility(android.view.View.INVISIBLE);
85     tSpecies = (AppCompatActivity) view.findViewById(R.id
86         .treatment_species);
87
88     // Delete button

91: 63

C:\Dev\repos\Andes\Pruebas\miso-4208-pa-taller7\taller7-espresso\laicare\src\main\java\info\frangor\laicare\view\TreatmentForm.java
26/11/2017 6:43:52 p. m. 9,838 bytes Java Source ANSI UNIX

79
80     tName = (AppCompatActivity) view.findViewById(R.id.treatment_name);
81     tPeriod = (AppCompatActivity) view.findViewById(R.id.treatment_period);
82     tTerm = (AppCompatActivity) view.findViewById(R.id.treatment_term);
83     tPlace = (AppCompatActivity) view.findViewById(R.id.treatment_places);
84     tSpecies = (AppCompatActivity) view.findViewById(R.id
85         .treatment_species);
86
87     // Delete button
```



**Prueba antes de aplicar mutación:**

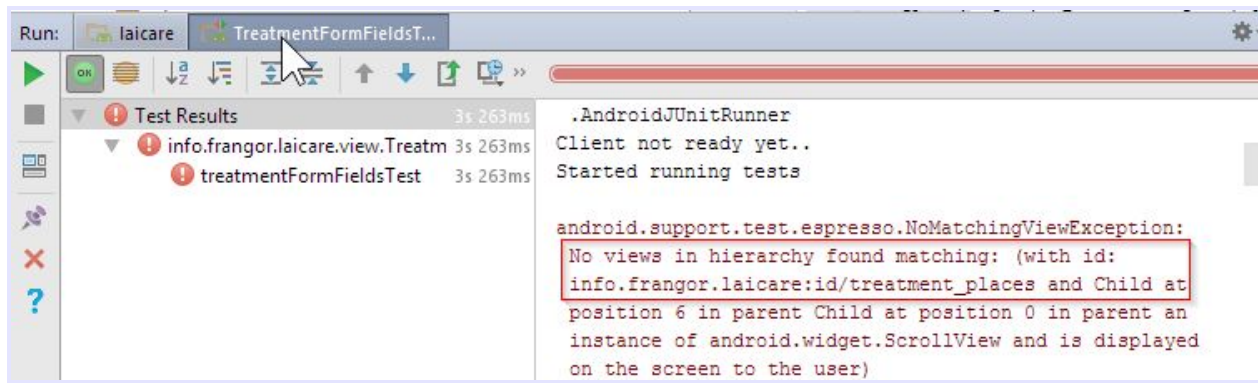


**Mutante detectado:**

**Prueba Unitaria:** haciendo uso de espresso se valida que existan los 5 campos en el formulario para crear un tratamiento.

`TreatmentFormFieldsTest.java`





#225

Tipo: strings.xml; WrongStringResource in line 10

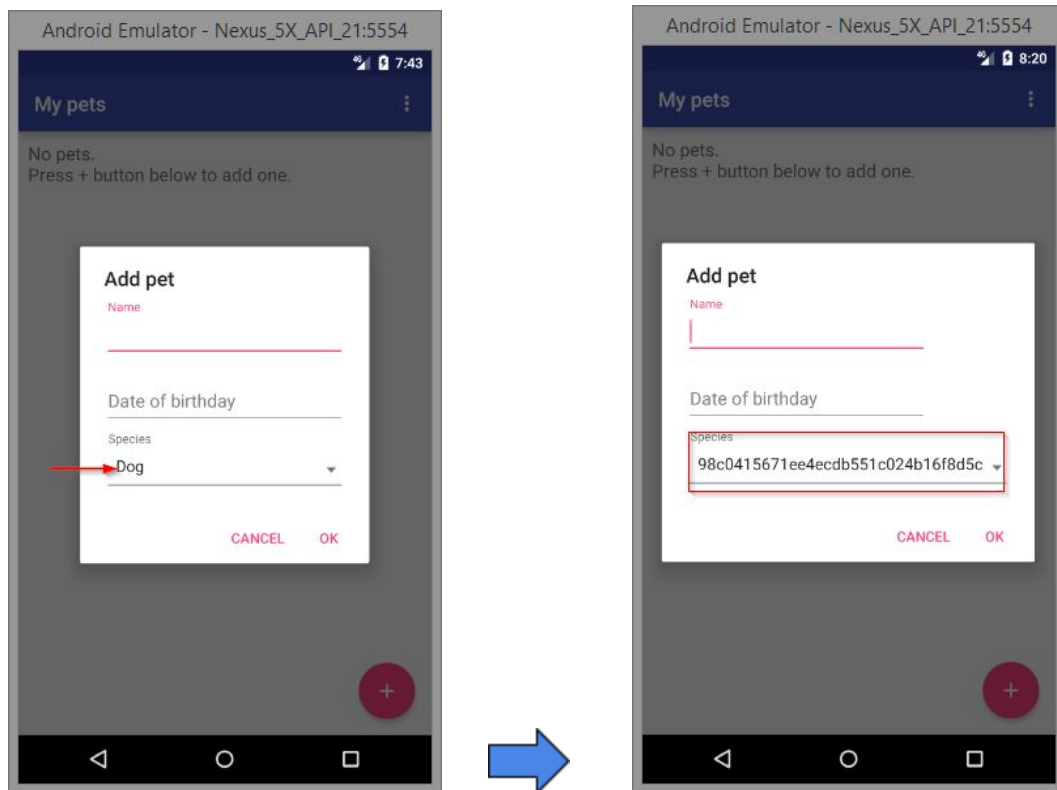
Mutacion:

```
C:\Dev\repos\Andes\Pruebas\parcial2\laicare-mutants\laicare-mutant225\res\values\strings.xml
25/11/2017 5:35:44 p. m.  5,009 bytes  XML  UTF-8  PC

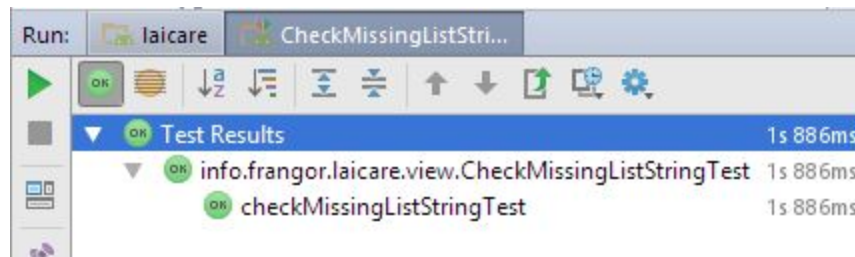
1  <?xml version="1.0" encoding="utf-8"?>
2  <resources>
3      <string name="app_name" translatable="false">LaiCare</string>
4      <string name="no_pet_available">No pets.\nPress + button below to add one.
5      </string>
6      <string name="activity_mypets">My pets</string>
7      <string name="add_pet">Add pet</string>
8      <string name="edit_pet">Edit pet</string>
9      <string name="species">Species</string>
10     <string name="DOG">98c0415671ee4ecdb551c024b16f8d5c</string>
11     <string name="CAT">Cat</string>
14: 67

C:\Dev\repos\Andes\Pruebas\miso-4208-pa-taller7\taller7-espresso\laicare\src\main\res\values\strings.xml
26/11/2017 7:30:46 p. m.  4,980 bytes  XML  UTF-8  PC

1  <?xml version="1.0" encoding="utf-8"?>
2  <resources>
3      <string name="app_name" translatable="false">LaiCare</string>
4      <string name="no_pet_available">No pets.\nPress + button below to add one.
5      </string>
6      <string name="activity_mypets">My pets</string>
7      <string name="add_pet">Add pet</string>
8      <string name="edit_pet">Edit pet</string>
9      <string name="species">Species</string>
10     <string name="DOG">Dog</string>
11     <string name="CAT">Cat</string>
```



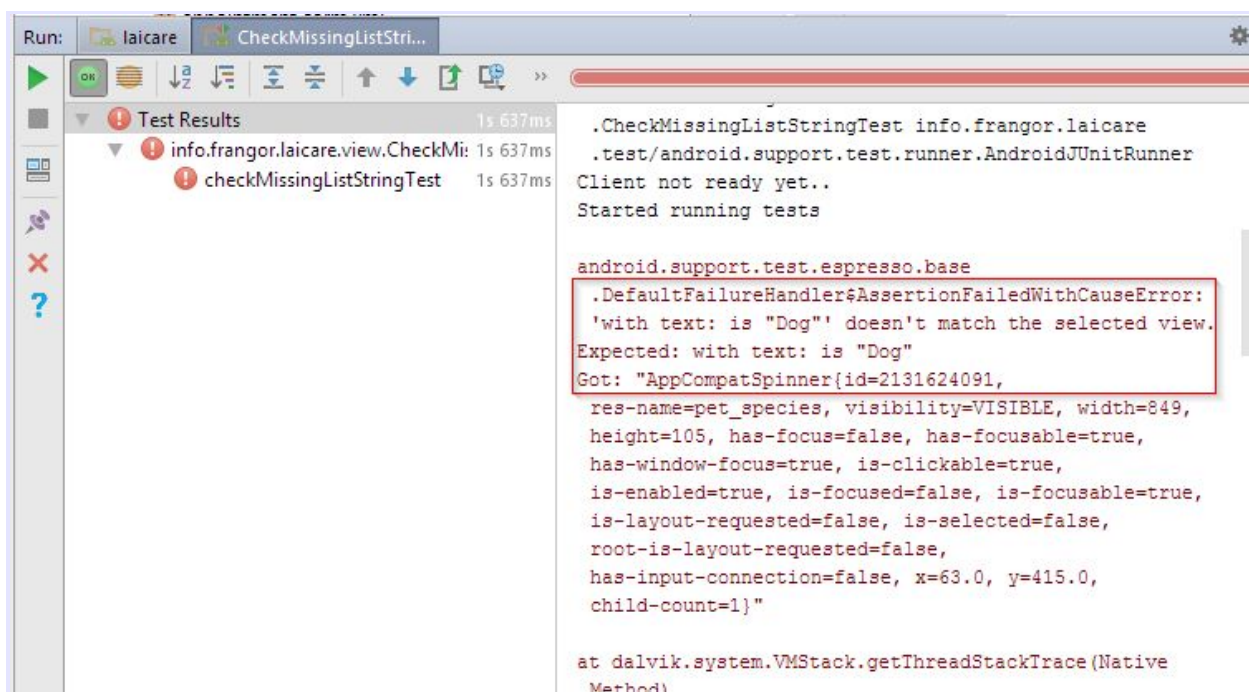
**Prueba antes de aplicar mutación:**



**Mutante detectado:**

**Prueba Unitaria:** haciendo uso de espresso se valida que exista el String en una lista de selección al crear una mascota.

`CheckMissingListStringTest.java`



#231

Tipo: strings.xml; WrongStringResource in line 28

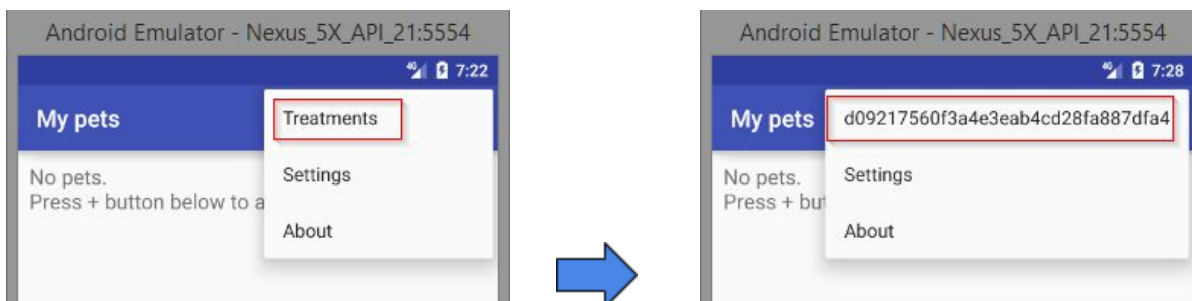
Mutacion:

```

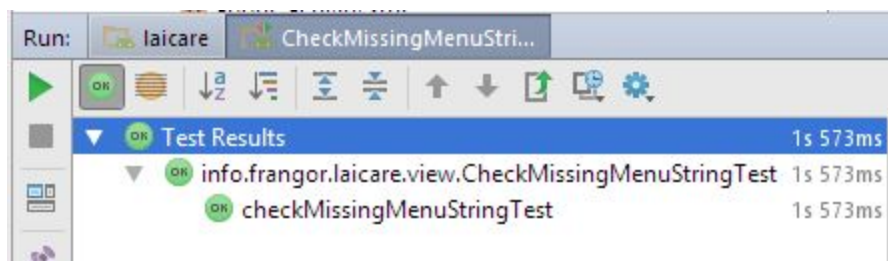
C:\Dev\repos\Andes\Pruebas\parcial2\laicare-mutants\laicare-mutant231\res\values\strings.xml
25/11/2017 5:35:47 p. m. 5,002 bytes XML UTF-8 PC
28 </plurals>
27 <string name="info">Info</string>
28 <string name="treatments">d09217560f3a4e3eab4cd28fa887dfa4</string>
29 <string name="delete">Delete</string>
30 <string name="period">Frequency (days)</string>
31 <string name="term">Duration (days)</string>
32 <string name="no_treatment_available">No treatments.\nPress + button below
33 <string name="places">Place</string>

C:\Dev\repos\Andes\Pruebas\miso-4208-pa-taller7\taller7-espresso\laicare\src\main\res\values\strings.xml
09/08/2016 4:51:21 p. m. 4,886 bytes XML UTF-8 UNIX
28 </plurals>
27 <string name="info">Info</string>
28 <string name="treatments">Treatments</string>
29 <string name="delete">Delete</string>
30 <string name="period">Frequency (days)</string>
31 <string name="term">Duration (days)</string>

```



Prueba antes de aplicar mutación:



### Mutante detectado:

**Prueba Unitaria:** haciendo uso de espresso se valida que exista el String en un elemento del menú.

`CheckMissingMenuStringTest.java`

