Assignment 2

By Ben Nguyen

Initial `statistics.csv` output:

```
TARGET_CLASS,criterion,Coverage,Total_Goals,Covered_Goals
tutorial.Stack,LINE;BRANCH;EXCEPTION;WEAKMUTATION;OUTPUT;METHOD;METHODNOEXCEPTION;CBR
triangle.TriangleType,LINE;BRANCH;EXCEPTION;WEAKMUTATION;OUTPUT;METHOD;METHODNOEXCEPT
```

1

   a. how many tests are there in each program?

- Triangle = 19 tests

- Tutorial = 6 tests

   b. Show an example of one test for ISOSCELES

```
@Test(timeout = 4000)
public void test01()  throws Throwable  {
    Triangle triangle0 = TriangleType.triangle(1098, 1098, 1606);
    assertEquals(Triangle.ISOSCELES, triangle0);
}
```

   c. Show an example of the first stack test

```
@Test(timeout = 4000)
public void test0()  throws Throwable  {
    Stack<Object> stack0 = new Stack<Object>();
    assertTrue(stack0.isEmpty());

    Integer integer0 = new Integer(982);
    stack0.push(stack0);
    stack0.push(integer0);
    stack0.pop();
    assertFalse(stack0.isEmpty());
}
```

2

   1. Do both of the tests pass?

No, only the Stack passes all tests, the triangle returns a failure

   2. Change the oracle for the first Stack Test and recompile/run the tests.

Show the failure as a screenshot.

Failed Test:

```
[~/evosuite]$ java11 org.junit.runner.JUnitCore tutorial.Stack_ESTest
JUnit version 4.13
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.evosuite.runtime.GuiSupport (file:/home/btnguyen/
evosuite/evosuite-standalone-runtime-1.1.0.jar) to field java.awt.GraphicsEnvironment.headl
ess
WARNING: Please consider reporting this to the maintainers of org.evosuite.runtime.GuiSuppo
rt
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access
operations
WARNING: All illegal access operations will be denied in a future release
.E.....
Time: 4.026
There was 1 failure:
1) test0(tutorial.Stack_ESTest)
java.lang.AssertionError
        at org.junit.Assert.fail(Assert.java:87)
        at org.junit.Assert.assertTrue(Assert.java:42)
        at org.junit.Assert.assertTrue(Assert.java:53)
        at tutorial.Stack_ESTest.test0(Stack_ESTest.java:29)

FAILURES!!!
Tests run: 6,  Failures: 1

[~/evosuite]$
```

3.

Fixed Code:

```
 8 public class TriangleType
 9 {
10     /**
11      * @param s1, s2, s3:  sides of the putative triangle
12      * @return enum describing type of triangle
13      */
14     public static Triangle triangle (int s1, int s2, int s3)
15     {
16         // Reject non-positive sides
17         if (s1 <= 0 || s2 <= 0 || s3 <= 0)
18             return (Triangle.INVALID);
19
20         // Check triangle inequality
21         if (s1+s2 <= s3 || s2+s3 <= s1 || s1+s3 <= s2)
22             return (Triangle.INVALID);
23
24         // Identify equilateral triangles
25         if ((s1 == s2) && (s2 == s3))
26             return Triangle.EQUILATERAL;
27
28         // Identify isosceles triangles
29         if ((s1 == s2) || (s1 == s3) || (s2 == s3)) // fault s1==s2 put in by Myra
30             return Triangle.ISOSCELES;
31
32         return (Triangle.SCALENE);
33     }
34 }
```

Fixed Tests:

4.

5.

I have 20 tests cases now

6.

```
~/evosuite]$ java11 org.junit.runner.JUnitCore triangle.TriangleType_ESTest
Unit version 4.13
LF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
LF4J: Defaulting to no-operation (NOP) logger implementation
LF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
ARNING: An illegal reflective access operation has occurred
ARNING: Illegal reflective access by org.evosuite.runtime.GuiSupport (file:/home/btnguyen/
vosuite/evosuite-standalone-runtime-1.1.0.jar) to field java.awt.GraphicsEnvironment.headl
ss
ARNING: Please consider reporting this to the maintainers of org.evosuite.runtime.GuiSuppo
t
ARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access
perations
ARNING: All illegal access operations will be denied in a future release
.................
ime: 4.843

K (20 tests)

~/evosuite]$
```

7. Now, since the evosuite has been run again with the faulty code, it now
   assumes that the "faulty" code is all true, and since the evosuite doesn't
   inherently know what an isosceles triangle is, it will trust that the triangle
   class knows what an isosceles triangle is, even if the logic there is not
   sound.

   The implication for automated test generation is that while it is very good
   for finding crashes and places where the program breaks, it the behavior is
   not what is desired, but the program does not break, then automated test
   generation will set those tests as correct even thought they are not.

8.

There are 13 test cases for the power class

9.

```
evosuite-1.1.0.jar  evosuite-report  evosuite-standalone-runtime-1.1.0.jar  evosuite-tests  lib  Power  Triangle  Tutorial_Stack
[~/evosuite]$ java11 org.junit.runner.JUnitCore power.Power_ESTest
JUnit version 4.13
SLF4J: Failed to load class "org.slf4j.impl.StaticLoggerBinder".
SLF4J: Defaulting to no-operation (NOP) logger implementation
SLF4J: See http://www.slf4j.org/codes.html#StaticLoggerBinder for further details.
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.evosuite.runtime.GuiSupport (file:/home/btnguyen/evosuite/evosuite-standalone-runtime-1.1.0.jar) to field java.awt.GraphicsEnvironment.headl
ess
WARNING: Please consider reporting this to the maintainers of org.evosuite.runtime.GuiSupport
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
............
Time: 5.308

OK (13 tests)

[~/evosuite]$
```