

# Project 2

## Security In Software Applications

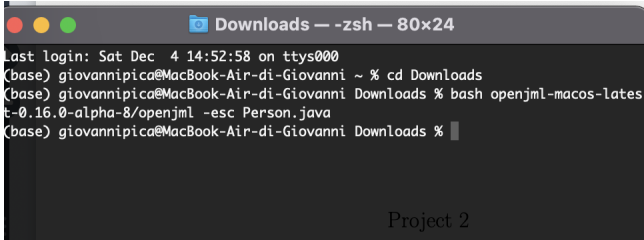
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### 1 Issues

In the developing of this project I got some issues including first of all the installation and the comprehension of JML and all the conditions that we can use in this tool. Other issues that I had were:

- Comprehension of some tasks for the project including the state subsidy that changes depending on the age or if a person is married and so on.
- Bugs on JML such as stopping to find errors at any moment and for solve this I had reinstalled JML.
- Handle Nullable values because at first I use the flag -nullableByDefault because /\*@ nullable @\*/ doesn't work, but with the addition of some "requires" I solve this problem.
- Handle "DEFAULT\_SUBSIDY" float problem, because when I had reduced the state.subsidy by 30% JML gives to me an assertion error. So I had declared final the "DEFAULT\_SUBSIDY" to solve this problem.

### 2 Output openJML

A screenshot of a macOS terminal window titled "Downloads - zsh - 80x24". The terminal shows the following commands and output:

```
Last login: Sat Dec 4 14:52:58 on ttys000
(base) giovannipica@MacBook-Air-di-Giovanni ~ % cd Downloads
(base) giovannipica@MacBook-Air-di-Giovanni Downloads % bash openjml-macos-lates
t-0.16.0-alpha-8/openjml -esc Person.java
(base) giovannipica@MacBook-Air-di-Giovanni Downloads %
```

### 3 Code corrected

```
1
2  /*
3   This assignment illustrates how specifications such as invariants
4   and
5   preconditions written in a formal language can help in removing
6   errors in code.
7
8   The assignment concerns a class "Person" that is used for Persons
9   .
10  */
11  class Person {
12
13
14
15   /* isFemale is true iff the person is female */
16   boolean isFemale;
17
18   /* isMale is true iff the person is male */
19   boolean isMale;
20   //@ invariant isMale == true <==> isFemale == false;
21   //@ invariant isMale == false <==> isFemale == true;
22
23   Person father, mother; // These fields won't really be used
24
25   /* Age in years */
26   int age;
27
28   boolean isMarried;
29
30   /* Reference to spouse if person is married, null otherwise */
31   //@ nullable
32   Person spouse;
33   //@ invariant spouse != null ==> this == spouse.spouse ==> (spouse
34     .isMale != this.isMale || spouse.isFemale != this.isFemale);
35   /* welfare subsidy */
36   int state_subsidy;
37   /* save the DEFAULT_SUBSIDY */
38   final int DEFAULT_SUBSIDY = 500;
39   /* save increased subsidy */
40   final int INCREASED_SUBSIDY = 600;
41   //@ invariant (isMarried == true ==> state_subsidy ==
42     DEFAULT_SUBSIDY - (DEFAULT_SUBSIDY*30/100)) || (age > 65 &&
43     isMarried == true ==> state_subsidy == INCREASED_SUBSIDY - (
44     INCREASED_SUBSIDY*30/100)) || (age <= 65 ==> state_subsidy ==
45     DEFAULT_SUBSIDY) || (age > 65 && isMarried == false ==>
46     state_subsidy == INCREASED_SUBSIDY);
47   /* CONSTRUCTOR */
48   Person(boolean s, Person ma, Person pa) {
49     age = 0;
50     isMarried = false;
51     this.isMale = s;
52     this.isFemale = !s;
53     mother = ma;
```

```

48     father = pa;
49     spouse = null;
50     state_subsidy = DEFAULT_SUBSIDY;
51 }
52
53 /* METHODS */
54 /* Marry to new_spouse */
55 /*@ requires spouse == null;
56 /*@ requires new_spouse != null ==> (new_spouse.isMale != this.
    isMale || new_spouse.isFemale != this.isFemale);
57 void marry(Person new_spouse) {
58     spouse = new_spouse;
59     isMarried = true;
60     if (age > 65){
61         state_subsidy = INCREASED_SUBSIDY - (INCREASED_SUBSIDY*30/100);
62     }
63     else{
64         state_subsidy = DEFAULT_SUBSIDY - (DEFAULT_SUBSIDY*30/100);
65     }
66 }
67
68 /* Divorce from current spouse */
69 /*@ requires spouse != null;
70 void divorce() {
71     spouse = null;
72     isMarried = false;
73     if (age > 65){
74         state_subsidy = DEFAULT_SUBSIDY + 100;
75     }
76     else{
77         state_subsidy = DEFAULT_SUBSIDY;
78     }
79 }
80
81
82
83 /* Person has a birthday and the age increases by one */
84 /*@ requires age < Integer.MAX_VALUE;
85 void haveBirthday() {
86     age++;
87     if (age > 65 && isMarried == false){
88         state_subsidy = DEFAULT_SUBSIDY + 100;
89     }
90     else if (age > 65 && isMarried == true){
91         state_subsidy = INCREASED_SUBSIDY - (INCREASED_SUBSIDY*30/100);
92     }
93 }
94 }

```