Repository Link: https://github.com/Shahriar-0/Software-Testing-Course-Projects-S2025
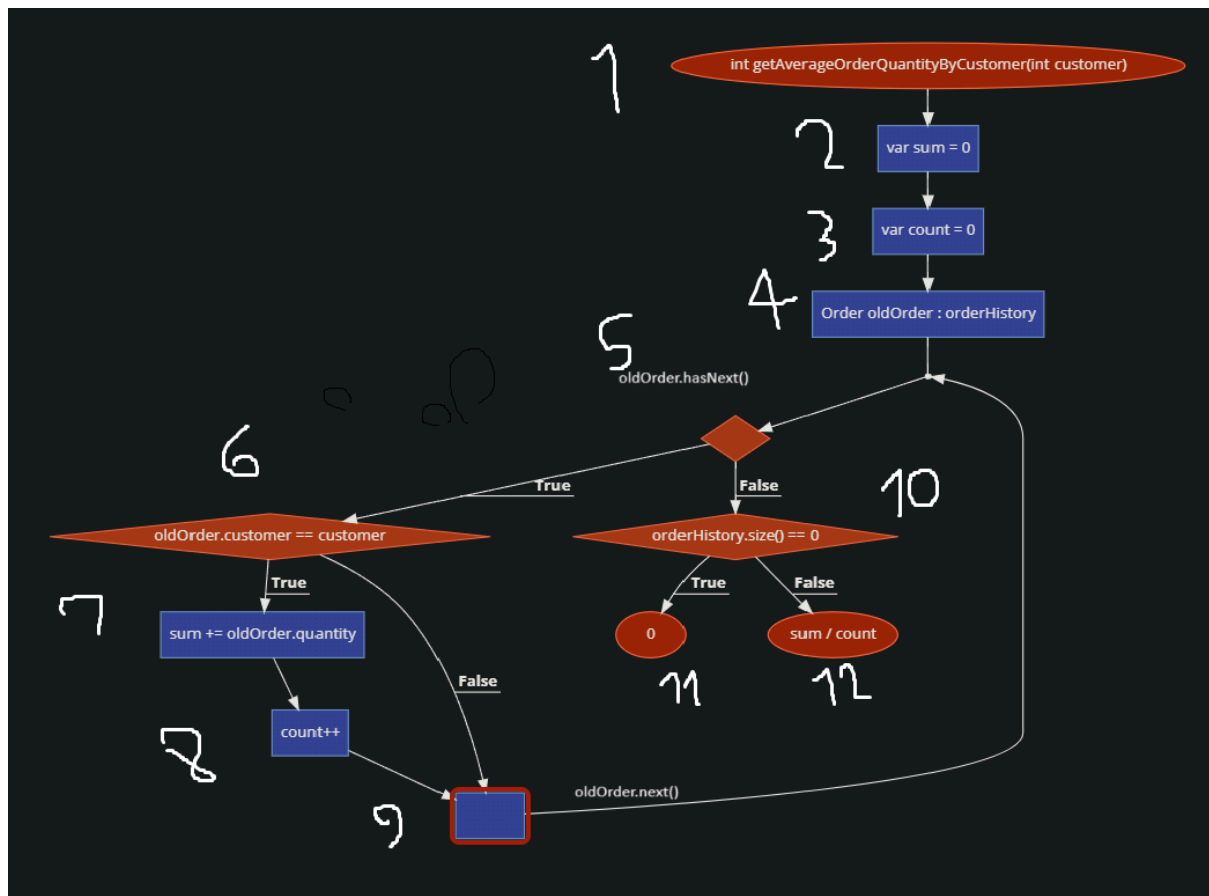Latest Commit Hash: 29f1d3d5305ef0235abfb4c733527854502d52cd

Graph Coverage

1.

    I.   CFG, DU-Paths, and Prime-Paths and test set

Prime-Paths: (-> indicates the test path)

- 1 2 3 4 5 10 11 -> itself
- 1 2 3 4 5 10 12 -> itself
- 1 2 3 4 5 6 7 8 9 -> 1 2 3 4 5 6 7 8 9 5 6 9 5 10 11
- 1 2 3 4 5 6 9 -> 1 2 3 4 5 6 7 8 9 5 6 9 5 10 11
- 5 6 7 8 9 5 -> 1 2 3 4 5 6 7 8 9 5 6 9 5 10 11
- 5 6 9 5 -> 1 2 3 4 5 6 7 8 9 5 6 9 5 10 11
- 6 7 8 9 5 6 -> 1 2 3 4 5 6 7 8 9 5 6 9 5 10 11
- 6 9 5 6 -> 1 2 3 4 5 6 9 5 6 9 5 10 11
- 6 7 8 9 5 10 11 -> 1 2 3 4 5 6 7 8 9 5 6 9 5 10 11
- 6 7 8 9 5 10 12 -> 1 2 3 4 5 6 7 8 9 5 6 9 5 10 12

- 6 9 5 10 11 -> 1 2 3 4 5 6 9 5 10 11
- 6 9 5 10 12 -> 1 2 3 4 5 6 9 5 10 12 *

DU-Paths:

- `sum`
  - 7, 12 -> 1 2 3 4 5 6 7 8 9 5 10 12
  - 2, 12 -> 1 2 3 4 5 10 12
- `count`
  - 3, 12 -> 1 2 3 4 5 10 12
  - 8, 12 -> 1 2 3 4 5 6 7 8 9 5 10 12
  - 3, 8 -> 1 2 3 4 5 6 7 8 9 5 12
- `oldOrder`
  - 4, 5 -> 1 2 3 4 5 10 12
  - 4, 6 -> 1 2 3 4 5 6 9 5 10 12
  - 4, 7 -> 1 2 3 4 5 6 7 8 9 5 10 12
  - 4, 9 -> 1 2 3 4 5 6 7 8 9 5 10 12 (9 is somehow a def too but not considered here)

II. Problems in code

yes, if the `OrderHistory` is not empty but does not contain any order equal to the customer we get *a divide-by-zero* error. this error is caught by the test marked with * and can be fixed by checking the denominator (count) instead of the size.

2.

I. number of tests for statement and branch coverage
- statement: 2 (a = true; a, b = false, c = true)
- branch: 3 (a = true; a, b = false, c = true; a, b, c = false)

II. changing code to reduce the number of tests

```
var1, var2 = false, false;
var1 = (a | b);
var2 = !(a | b) && c;
return var1, var2;
```

III.   conditions required to have statement coverage with one test

all statements should be reachable, in other words, we shouldn't have branching like if else which only one of them can be taken, or it should be inside a loop so we can once go through each possible branch

3. DU-Paths do not subsume Prime-Paths

counter-example: du-paths are met but prime-paths ain't.

```java
public int func(int n) {
    if (false)
        System.out.println("all that left is the picture of the moon");
    return n;
}
```

meow meow meow meow meow meow meow meow meow

meowwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww

maowwwwwwwwwwwwwwwwwwwwwwwwwwwwwwww