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Softwaretechnik

http://proglang.informatik.uni-freiburg.de/teaching/swt/2012/

Exercise Sheet 9

Exercise 1

The paper "DART: Directed Automated Random Testing" [1] [2] written by Patrice Godefroid, Nils Klarlund, and Koushik Sen presents a tool for automatically testing software.

(i) Read the *DART* paper.

(ii) Apply *DART* on method $medianOf3$.

Compute a set of tuples of input values (x, y, z) that covers all paths of $medianOf3$. Each tuple (x, y, z) is a test case which covers one path of $medianOf3$. Provide the concrete execution, the symbolic execution and the path constraints.

(iii) For each generated test case, determine *your* expected return value of $medianOf3$ (i.e. the test oracle is you). Is method $medianOf3$ faulty? If so, name the test case generated in (ii), that reveals the bug, if possible.

(iv) Is it guaranteed for DART to reveal the bug in this particular example? Justify your answer.

(v) Assume a program P contains loops or function calls (which return non-deterministic values). Is *DART* able to deal with those issues? If not, what are your suggestions?

[1] Paper: http://research.microsoft.com/en-us/um/people/pg/public_psfiles/pldi2005.pdf
[2] Talk: http://research.microsoft.com/en-us/um/people/pg/public_psfiles/talk-pldi2005.pdf

```
1  int medianOf3(int x, int y, int z) {
2    int m;
3    m = z;
4    if ( y < z ) {
5      if ( x < y ) {
6        m = y;
7      } else if ( x < z ) {
8        m = y;
9      }
10   } else {
11     if ( x > y ) {
12       m = y;
13     } else if ( x > z ) {
14       m = x;
15     }
16   }
17   return m;
18 }
```