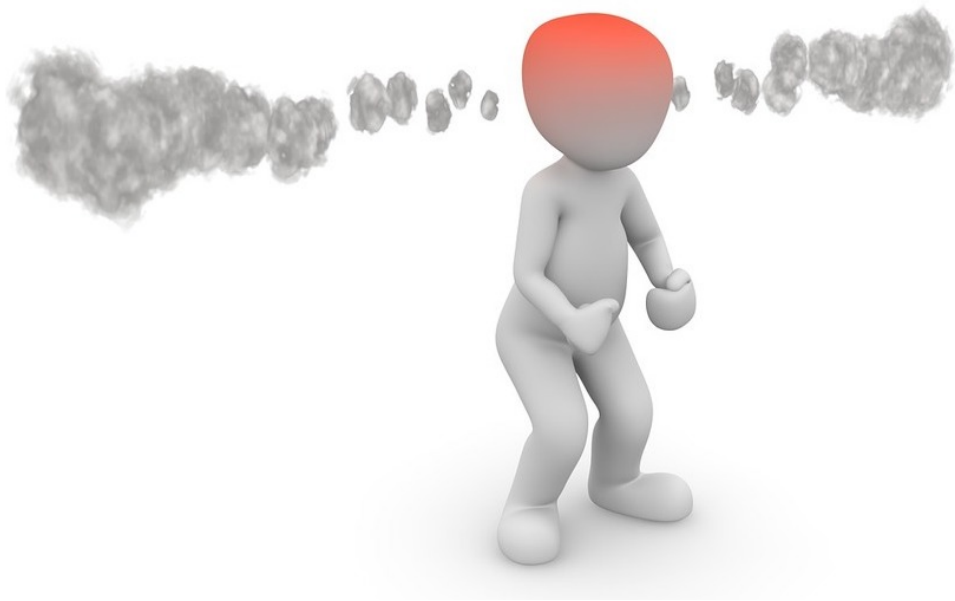


Automated Test Creation

Explained with EvoSuite

Benjamin Tellström

Jesper Larsson

Coverage metrics

Some metrics used by EvoSuite

- **Line coverage**

  Are all lines of source covered by the tests?

- **Branch coverage**

  Are all branches in the source covered by the tests?

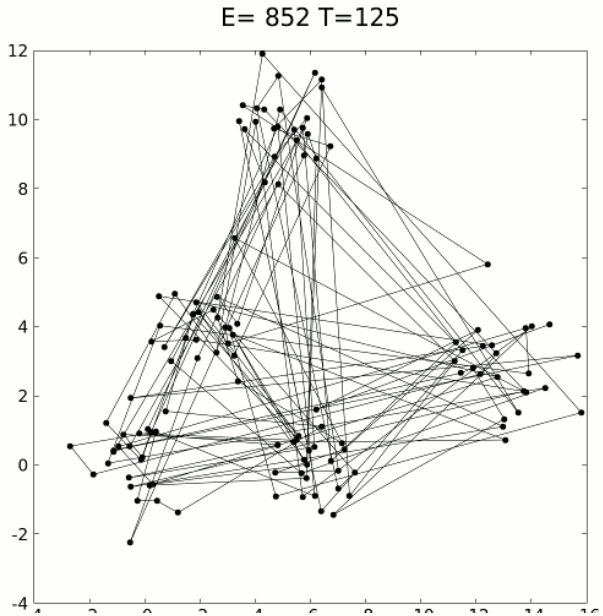
- **Mutation Coverage**

  Are random mutations to our program caught by the tests?

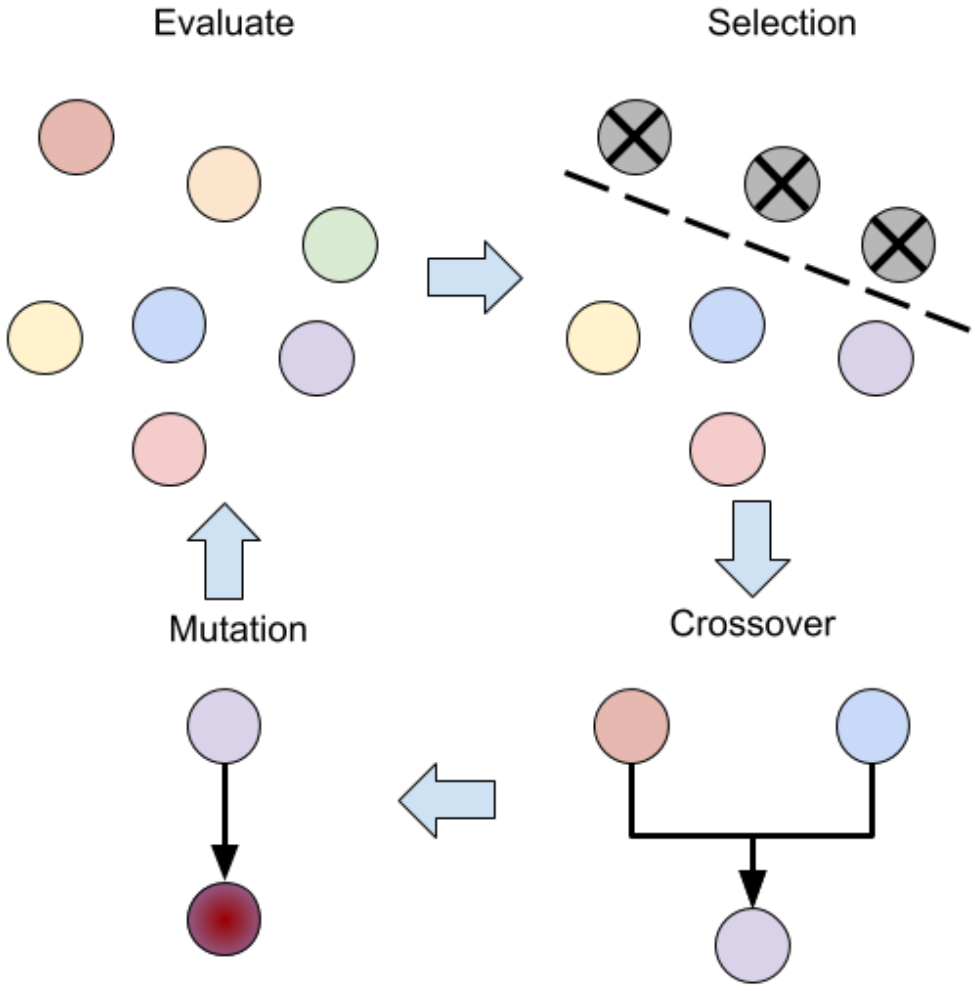
Search based Programming

- **What it is?**
  Optimisation problems, often solved through linear or dynamic programming, or through the use of metaheuristics.
- **Why?**
  Linear and dynamic programming does not always offer acceptable execution times. Need some faster way of doing it

Example



Example



Examples and applications of EvoSuite

See what's missing in your test suite

```
@Test(timeout = 4000)
public void test0()  throws Throwable  {
    double double0 = Main.pow(0.0, 1394);
    assertEquals(0.0, double0, 0.01);
}

@Test(timeout = 4000)
public void test1()  throws Throwable  {
    double double0 = Main.pow((-1491.668199236283), 5);
    assertEquals((-7.3851812036287 71E15), double0, 0.01);
}
```

Examples and applications of EvoSuite

But weird tests are also generated...

```
@Test(timeout = 4000)
public void test3()  throws Throwable  {
    Main.pow(1.0, 5133);
    // Undeclared exception!
    Main.pow(0.0, 5133);
}
```

Examples and applications of EvoSuite

Detect deviations from expected behaviour

```
@Test(timeout = 4000)
public void test2()  throws Throwable  {
    double double0 = Main.pow(10.0, (-2237));
    assertEquals(1.0, double0, 0.01);
}
```

Conclusion

- **Relevancy to devops**

  Testing is integral to DevOps, but writing tests is hard.

- **Auto generated tests**

  May be used as a complement.

  Unit testing is not only writing code