Bachelor/Master Thesis Topic

**Effective Test Case Generation with Probabilistic Symbolic Execution**

**Motivation and Background**
The quality of the test suite significantly influences the likelihood of finding faults in realistic software systems. However optimizing test suites is currently a really hard research topic.

**Goals**
The goal of this project is to implement and evaluate (based on simulations and realistic examples) different test case generation strategies based on probabilistic symbolic execution [1,2] and prepare the technology for an industrial use.

**Description of the Task**
The project aims to apply probabilistic symbolic execution for test case generation. The specific tasks are:

- Understand the current approaches in test case generation via symbolic execution
- Getting familiar with symbolic execution tool support, namely JPF
- Understanding the current research in probabilistic symbolic execution [1,2]
- Developing ideas to use heuristics to generate test suites based on the results obtained from symbolic execution
- Evaluate the heuristics via realistic cases. Therefore it is recommended to mine version histories and check the ability of the generated test suites to find realistic bugs.

**Research Type**
Theoretical Aspects: ****
Industrial Relevance: ******
Implementation: ****

**Prerequisite**
The student should be enrolled in the bachelor/master of software engineering or bachelor/master of computer science program, and has completed the required course modules to start a bachelor/master thesis.

**Skills required**
Programming skills in Java or C++, Understanding of, or willingness to learn, the software engineering and statistical foundations needed for the project.

**References**

**Contacts**
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**Application**
Please contact me during my office hours or send me an email with the title: “[ThesisProject]-TestCaseGenPSE” to se-career@informatik.hu-berlin.de