Bachelor/Master Thesis Topic

Localization of Performance Bugs

Motivation and Background

Performance is one of the most requested non-functional requirements of applications, and also one of the harder to achieve. Reasons for drops in performance can range from sloppy programming to bad usage of APIs and bugs in underlying code or third-party libraries. Most often, performance shortcomings arise as the result of combinations of these factors, making them hard to reproduce and fix. Several approaches exist [1,2,3,4]. Some are based on access to the code for instrumentation [2]; others require significant training to learn a baseline performance [1]; and others look only for known bug pattern instantiations [4].

Goals

This project will evaluate a location-based approach for localisation of performance issues based on runtime analysis of carefully selected tests, and attempt to improve its performance and accuracy, as well as applying it to a performance benchmark.

Description of the Task

The specific tasks are:

- Understand current approaches for performance problem identification and debugging.
- Create a tool for performance issue detection (C or Java) based on these approaches.
- Perform experimental evaluation and comparison of accuracy of selected approaches or their modified versions on example applications.

Research Type

Theoretical Aspects:	**
Industrial Relevance:	****
Implementation	****

Prerequisite

The student should be enrolled in the bachelor/master of software engineering/informatics 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 quantitative methods and of profiling and monitoring tools needed for the project.

References

[1] Stunes, Michael R. Statistical methods for locating performance problems in multi-tier applications. MIT Thesis, 2012

[2] Prasad, Vara, et al. "Locating system problems using dynamic instrumentation." *2005 Ottawa Linux Symposium*. 2005.

[3] Guoliang Jin et al. Understanding and detecting real-world performance bugs. PLDI 2012.

[4] Yepang Liu et.al Characterizing and detecting performance bugs for smartphone applications. In ICSE 2014

Contacts

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Application

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