Bachelor/Master Thesis Topic

Systematic Architecture Level Fault Diagnosis Using Statistical Techniques (STARDUST II)

Motivation and Background

Robustness to run-time faults in network based systems requires the ability to detect and repair problems when they arise in a running system. Effective fault detection and repair could be greatly enhanced by run-time fault diagnosis and localization, since it would allow the repair mechanisms to focus adaptation effort on the parts most in need of attention [CSG+2011].

Goals

The goal of this project is to implement and evaluate (based on simulations and realistic examples) different fault localization strategies and prepare the technology for an industrial use.

Description of the Task

The project aims to apply statistical techniques to pinpoint the specific component in the network that has most likely caused a specific problem. To enable this fault localization the message traces between the involved components need to be analyzed and each trace sequence needs to be classified as either faulty or correct. Based on this information the component that is most often involved in faulty trace sequence (in relation to its involvement in correct trace sequences) will be the component that is most likely causing the failure. The statistical fundament for this architecture level fault localization is adapted from the fault localization at code level [AZG+09] and is thus build on a good theoretical basis. However, it is currently unclear how the different code level fault localization techniques perform at an architectural level and thus a thorough investigation of these techniques is needed. There could be also potential for improvement of a specific technique.

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 architectural and statistical foundations needed for the project.

References

[CSG+2011]Paulo Casanova, Bradley R. Schmerl, David Garlan, Rui Abreu: Architecture-Based Run-Time Fault Diagnosis. ECSA 2011: 261-277

[AZG+09] Rui Abreu, Peter Zoeteweij, Rob Golsteijn, Arjan J. C. van Gemund: A practical evaluation of spectrum-based fault localization. Journal of Systems and Software 82(11): 1780-1792 (2009)

Contacts

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Application

Please contact me during my office hours or write an email with the title: “[Ensure]-Stardust 1” to se-career@informatik.hu-berlin.de