MAP-I PhD Dissertation Proposal

Automating Test Generation from UML Interaction Diagrams

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Motivation

The development of computer-based UML design models for documentation only is time consuming and the result is often wrong and soon becomes outdated. This is a concern both for educators and practitioners. But if the UML models are used also as a basis for automatic code generation and/or test generation, then the time invested can be recovered, the quality of the models can be checked and improved, and there is a good chance that they are kept up-to-date. Producing a full behavioral specification in UML is not cost-effective in the general case. Instead, we claim that producing partial behavioral specifications in UML that can act simultaneously as formal test specifications that can be translated automatically to executable tests gives the best balance between quality and productivity.

Goals

The main goals of this research work are to develop approaches and tools for the automatic generation of executable tests from UML behavioral models (particularly interaction diagrams), taking advantage of existing unit testing frameworks and aspect oriented programming techniques for test execution. These approaches and tools should enable a new generation of "model-based test-driven development (TDD)", that is, a TDD approach in which test are specified in UML.

The work should build upon previous work in user interaction test automation (FCT AMBER iTest project, 2008-2010) and test automation with AOP.

Some of the challenges are:

- Intercept run-time behavior and check conformance with the UML specification, using AOP techniques;
- Interaction testing in distributed and concurrent systems;
- User interaction testing;
- Support for complex features in UML interaction diagrams;
- Support the generation of executable tests in different platforms using MDA concepts.