

Model-Based Testing

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April 2, 2012

1 INTRODUCTION

Model Based Testing (MBT) plays an essential role in the software development. Developing applications requires a Model based design that needs to be tested in order guarantee that there are no serious bugs. In some applications like airplane navigation, health monitoring it would be fatal if the application crashes during its execution time. Thus the developed software must be tested carefully. In this seminar different presentations have been given from different experts that will be discussed in this seminar report.

2 MODEL BASED TESTING DEPLOYMENT IN TELECOMMUNICATION PROJECT

Széll (2012) presented how to convince the management and engineers with the introduction of a new software testing technology called MBT and what are the challenges, goals, success, failures and lessons that have been learned by applying this testing method. The presenter mentioned that one of the main challenges was to speed up testing by using automate test execution and automate test result analysis. After seeing the improvements of the automate test execution and automate test result analysis the Automated Test Design (ATD) should be also integrated to the test environment. Soon it was clear that the ATD tool from the company Conformiq

can be easily adapted to the current test environment. The scope of the test environment is to test the Stratus Intelligent Network Applications Platform (SINAP) charging with four Open Mobile Softswitches (MSSs). To access the System Under Test (SUT) a Man Machine Interface (MML) using test script language and SINAP interfaces are used. In comparison to the manually generated test suites, the ATD has increased the quality of the productivity, test case quality, requirements of traceability and ease of maintenance. Thus it was profitable to change to an automated test system.

3 SYSTEM AND UNIT TESTING WITH FMBT

Kervinen (2012) discussed about the free Model-Based Testing Tool (FMBT) and showed how this tool can be applied in the practice. MBT is generating tests. Anything that can be tested with automated test cases can be tested using model-based testing, too. FMBT can be used for User Interface (UI) testing, Application Programming Interface (API) Testing and Unit Testing. The speaker also emphasizes that FMBT is beneficial for things need to be tested in many situations / configurations, long tests with lots of variation, many combinations that needs to be checked, monkey testing and fuzzing. Furthermore FMBT allows inspecting the state of the system under test in preconditions of test steps.

4 MODEL BASED GUI TESTING

In this presentation Katara (2012) talked about the importance of GUI Testing, the TEMA Architecture and different MBT flavors. The TEMA toolset developed by the Department of Software Systems at the Tampere University of Technology is a tool to test the GUI of a smartphone by using online test generation. MBT can be done off-line or online. The difference between off-line and online testing is that in off-line testing the model is used for generating conventional test suites that can be executed later on the SUT while in online MBT the tests are executed constantly as they are generated. According to Puolitaival (2008) it is possible to react to continual changes, and make autonomous decisions in online MBT. Furthermore it is possible to test non-deterministic systems and run infinite test suites. In comparison to online MBT, off-line based MBT has four advantages. First the test cases are generated automatically. Secondly there is an easier adaptation for program changes.

The other two advantages are good adaptability for the existing tool chain and adaptation layer reuse. There are also two different Models for online and off-line testing that are called Black-Box Model and With-Box Model. In the Black-Box Model the test is executed without knowing any details of the model while in the White-Box Model everything is known about the model. In total there are four test possibilities: online Test with White-Box Model, online Test with Black-Box Model, off-line Test with White-Box Model, off-line Test with Black-Box Model.

5 GUI TEST MODELING WITH TEMA

Jääskeläinen (2012) explained how GUI Test Modeling with TEMA worked. First the model formalism and simple models were introduced. Models are Labeled State Transition System (LSTS) state machines and the tests are expressed with keywords that correspond to GUI events. Modeling multiple applications can be difficult when using the wrong approach because this can lead to a very large model where the overview gets lost. In practice the Layered Model Architecture is used where the models are divided into two layers Actions Machines and Refinement Machines. The Layered Model Architecture has many benefits like action machines can be shared between different products, GUIs are more volatile meaning that model maintenance is focused on refinement machines and action machines are easier to comprehend due to descriptive action names. In addition, the scheduler and the model decomposition principles have been shown and explained.

6 MODEL-BASED TESTING USING UML MODELS

In this presentation Truscan (2012) presented the problems of software testing, the benefits and drawbacks of manual testing, automated testing, MBT using Unified Modeling Language (UML) and Modeling for Automated Test derivation at Åbo Akademi (MATERA). MATERA is a process and a modeling framework based on UML. The goals of MATERA are the emphasis on model creation (Model several perspectives, e.g. architecture, behavior, data, test configuration), the improvement of the quality of the model, the requirements traceability, to target different test design tools and the assistance in test adaptation creation.

7 CONCLUSION

In this seminar we have learned the challenges, goals, failures and the success of MBT. Furthermore the participants learned about the different approaches to model-based and their most important differences from the practical point of view. It was interesting to see how the model based testing tools OSMO and FMBT works and how they can be applied. In addition it is to mention that this seminar showed the importance of MBT and clarifies that MBT is not only a cost-intensive part of the application development process.

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