Assignment 3: Model-Based Testing
Testing Techniques 2024 – 2025

This is the Model-Based Testing assignment of the course Testing Techniques. The purpose of this assignment is to apply Model-Based Testing (MBT) to your System Under Test (SUT) using an MBT tool, and to compare the results with manual and automated testing that you did before. The MBT tool will be AMP (Axini Modelling Platform), which will be introduced and discussed during the AMP workshop.

Try to reuse as much as possible from what you did in the first and second assignments, such as the automated test environment. When doing this assignment, it usually helps if you do it in an 'agile' way, that is, do not make a complete model first, but make a very simple model (e.g., switching your SUT 'on' and 'off'), and get that running and tested. Subsequently, you can then gradually extend and improve your model and do more tests.

Follow the questions provided below in the given order, and write your answers in a report. Your answers shall be well-motivated, yet concise and to the point. Please make sure that the text is well readable and consistent throughout. The total length of the core of the report should not exceed 7 pages (appendices with models, test cases, test results, logs, etc. are allowed).

1 Model-Based Testing with AMP

1. AMP

   In the AMP workshop you will get a username and password for access to AMP. Get familiar with AMP using the provided AMP examples.

   (**Deadline Nov 21 – hand in separately!**)
   Make a model for the *SmartDoor* example, and use this model to detect bugs in the SmartDoor example SUTs.

2. *Modeling Investigation*

   Investigate and study (the behaviour of) your SUT; investigate and argue which parts of your SUT, which interfaces, and which functionality you will test with MBT.

3. *MBT Modeling*

   Make a model for your SUT, or part of your SUT that you are testing, in the AMP modelling language AML. Explain your model (structure, processes, data definitions, ...).

4. *MBT Adapter*

   Develop an adapter for your SUT that connects your SUT to AMP. Explain the functionality and the usage of your adapter.

5. *MBT Test Architecture*

   Adapt your *test architecture* and the automated test-execution environment of Assignment 2 to take into account MBT and AMP.

   Give a diagram of the new test architecture, i.e., the positioning of the SUT, test tool(s), adapter(s), logging tool(s), environment, ..., and their connections and interfaces; explain your choices. Try to reuse the test-execution automation environment of assignment 2 as much as possible.

6. *MBT Testing*

   Use AMP to generate and execute tests on your SUT.

7. *MBT Test Selection*

   Vary, adapt, and experiment with the parameters of AMP to obtain different test runs. Discuss the test selection methods and argue about the achieved coverage.

8. *MBT Results*

   Provide the test results, explain your observations, and analyse and discuss the test results.

2 Evaluation

Evaluate and discuss the testing experiments with AMP. Consider (at least) the following aspects in your evaluation:

9. detected failures;
10. implementation relation;
11. support for test input generation as well as output checking;
12. method of test selection;
13. modeling notation: its expressiveness and ease of use;
14. usability, ease of use of the tool;
15. effort necessary for modelling, testing, and analysis;
16. class of SUTs for which the MBT tool can be applied.

3 Comparison of MBT with Manual and Automated Testing

Evaluate and compare the testing experiments with the MBT tool, with the manual and automated testing of the first and second assignments. Consider (at least) the following aspects in your comparison:

17. detected failures;
18. confidence in the quality of the SUT;
19. method of test selection;
20. ease of use;
21. effort;
22. test architecture.

4 Deliverables

Write a report; give the models, code, adapters, etc. in such a way that we can run it; provide a 'README'; be prepared to give a demo.