School of Innovation,
Design and Engineering

Module 3: Assignment (INL6)

This document provides the instructions for the Module 3 assignment INL6 on ***test design on integration and system level*** in DVA-434. The assignment, when completed, corresponds to 1 credit of the 7.5 credits in the course examination. Once you have completed the assignment, please send your report to daniel.sundmark@mdh.se.

Objective

The objective of this assignment is to gain some experience of using different classes of test design techniques (specifically specification-based, implementation-based and negative testing) in integration- and system-level testing.

Task

In this assignment, your task is to do the following:

1. Read a few papers on specification-based, implementation-based, and negative testing and test design.
2. For each class of test design techniques, select a particular technique, rationale or method consistent with that class, and use it to derive integration- or system-level test cases for a system under test from your own industrial context.
3. Report your results by
    a. Documenting your work in a **written report**, and
    b. **Presenting** your results at the second DVA434 campus day.

Report

The assignment report should span 3-4 A4 pages, and include:

1. A brief **general description** of the (sub-)system under test.
2. For the **specification-based testing**,
    a. A brief description of the specification artifact used for test design.
    b. A more detailed description of which specification-based test design technique was used, and how.
    c. A few example test cases resulting from applying the technique
3. For the **implementation-based testing**,
    a. A brief description of the implementation artifact used for test design.
    b. A more detailed description of which implementation-based test design technique was used, and how.
    c. A few example test cases resulting from applying the technique.

4. For the **negative testing** (where the list of systematic techniques is a bit limited),
    a. A description of the technique or rationale used to derive test cases focusing on "negative behavior".
    b. A few example test cases resulting from applying this technique or rationale.
5. A brief **reflecting discussion** on the benefits and demerits of using the different techniques at integration- and system level on your selected system, and in your industrial context.

Note: If there are problems with using a system under test from your own organization (for example, if you are not allowed to share internal company details for IPR reasons), please feel free to use any other type of (imaginary or real) system under test of your choice, as long as it is realistic and non-trivial.

Presentation

The contents of the report should also be orally presented in a seminar at the second campus day of the course. You are expected to give a presentation of roughly 20 minutes, and may choose the way of conveying your results you see fit for this purpose.

In case you will not be able to prepare and give a presentation at the campus day, you can pass this part of the assignment by preparing a video of the presentation, and uploading it in such a way such that the video can be shared with the teachers and the other students in the course (e.g., as a unlisted YouTube video). The exact format of the video is your choice. Remember to send the link to the video to daniel.sundmark@mdh.se once it is available online.

Papers

Below, as guidance in this assignment, we provide a few papers on the different classes of test design techniques. These papers are primarily provided for inspirational purposes. You may use these, or any other (reliable) resources you can find yourself, in guiding your work in this assignment. However, remember to provide references to the sources you use in your report.

- **Specification-Based Testing:**
    - Escalona M.J., Gutiérrez J.J., Mejías M., Aragón G., Ramos I., Torres J., Domínguez F.J. An Overview on Test Generation from Functional Requirements. The Journal of Systems and Software. Elsevier. 2011.

http://www.promptedu.se/promptwp/wp-content/uploads/2015/01/Escalona11.pdf

- **Implementation-Based Testing:**
    - Aynur Abdurazik, Zhenyi Jin, Liz White, and Jeff Offutt. Analyzing software architecture descriptions to generate system-level tests. In Workshop on Evaluating Software Architectural Solutions – 2000, Irvine, CA, May 2000.

http://www.promptedu.se/promptwp/wp-content/uploads/2015/01/Abdurazik00.pdf

- Y. Zhan, J.A. Clark, Search based automatic test-data generation at an architectural level, in: Genetic and Evolutionary Computation – GECCO 2004, Lecture Notes in Computer Science, vol. 3103, Springer, 2004, pp. 1413– 1424. (***Note:*** *Do not worry to much about the search-based aspect here. Focus on the architectural perspective*).

http://www.promptedu.se/promptwp/wp-content/uploads/2015/01/Zhan04.pdf

- **Negative Testing:**
  - Sigrid Eldh. Negative Testing. Chapter of Doctoral Thesis "On Test Design", Mälardalen University Press, 2011.

http://www.promptedu.se/promptwp/wp-content/uploads/2015/01/Eldh11.pdf

  - A. Shahrokni and R. Feldt. A systematic review of software robustness. Information and Software Technology, 55:1–17, 2013.

http://www.promptedu.se/promptwp/wp-content/uploads/2015/01/Shahrokni13.pdf