

1.1 INTRODUCTION

Software engineering is concerned with the development and design of high-quality software taking into account user requirements and customizations at all levels. Concerned with the composition of software engineering program since its early stages during the analysis of the problem and then design and write a program, test it, and install it on devices and carry out maintenance^[1].

Software testing is an important activity in the software development process, as illustrated by the growing market for automated testing tools. Moreover, software testing generally consumes between 30 and 60 percent of the overall development effort. Model based testing pushes the level of automation even further by automating the design, not just the execution, of the test cases. Model-based testing tools automatically generate test cases from the model of the software product. This gives a repeatable and rational basis for product testing, ensures coverage of all the behaviors of the product, and allows tests to be linked directly to requirements. This research addresses the use of model based testing technique to test salary calculation of the salary system case study and the development of tests execution tool to execute test cases to the salary calculation function automatically.

1.2 PROBLEM DEFINITION

1.2.1 MANUAL TESTING

Manual testing is a testing technique, where test engineer test the software manually. The test engineer designs all the test cases and executes them on the application manually step by step and indicates whether a particular step was accomplished successfully or not. At the time of manual testing, the tester need only test cases and information related to the execution of these test cases.

1.2.1.1 A MANUAL TESTER WOULD TYPICALLY PERFORM THE FOLLOWING STEPS FOR MANUAL TESTING

- Understand the functionality of program.
- Design and write the test cases manually.
- Execute test cases manually.
- Verify the actual result.
- Record the result as Pass or Fail.
- Make a summary report of the Pass and Fail test cases.
- Publish the report.
- Record any new defects uncovered during the test case execution ^[2].

1.2.1.2 DISADVANTAGES OF USING MANUAL TESTING

1.2.1.2.1 COSTS

1. The manual creation of test cases results in high project efforts.
2. Generation of test cases is very time consuming.
3. The traditional design of test cases blocks qualified and costly team members.
4. Insufficient test cases means low production efficiency and high maintenance costs

1.2.1.2.2 RISKS

1. Not all relevant test cases are captured.
2. Incomplete tests may have serious impacts on production environment.
3. Untested scenarios and technical interfaces lead to failures.
4. Untested changes of risk-related processes could have critical consequences.

1.2.1.2.3 QUALITY

1. Bad test coverage potentially leads to low software quality and may have a high business impact.
2. An incomplete matching of the test data will increase the negative impact.
3. Insufficient reviews of work products and deliverables add to the negative impact.

1.3 PROJECT OBJECTIVES

This project aims to achieve the following objectives:

1. Automation of test cases generation (reducing the time of test cases generation).
2. Reduction of the maintenance cost of the test.
3. Automatic generation of the traceability matrix.
4. Produce high quality test cases that insure reliable coverage.
5. Developing a test execution tool to execute all generated test cases automatically.

1.4 PROJECT STRUCTURE

This project is divided into five chapters organized as follows, after this introductory first chapter, the second chapter discusses the technologies and techniques used in this research, it also shows that there are no previous studies relevant to this research and the feasibility study of using model-based testing. The third chapter shows the analysis of functionality of the system under test (SUT) using UML diagrams. Chapter four explains the process of model based testing, the design of salary calculation model and the development of a test execution tool. Finally the fifth and last chapter contains conclusion and recommendations for any intended further development in the future.

1.5 PROJECT SCOPE

This project focuses on designing a model for salary calculation process, generation of the test cases from the model and the development of a test execution tool.

1.6 RESEARCH IMPORTANCE

The importance of designing the test cases for the system functions early and automatically in the requirement analysis stage is to assure that the execution of test cases after development process is accomplished in a short period of time with less efforts; this testing approach increases the quality of the test cases and reduce the probability of risks.

1.6.1 MAJOR BENEFITS OF MODEL-BASED TESTING

- Reduce the cost of maintenance.
- Reduce the time of designing and executing test cases.
- Getting executable tests with automated pass/fail verdict.
- Systematic coverage.
- Control the number of tests to be generated.
- Designing and executing the test cases automatically.