

An Automated Function Test Framework for Business Workflow Test Based on Data File

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Abstract. This paper studied a test framework for business workflow software system. Based on the existing automated testing technology, a novel automated functional testing framework is proposed. The new framework provided separate description definition technology for different test script information based on data file. The different business test execution could be supported to consider specific complicated business workflow test under framework. The automation framework is used to test software applications and proved effective.

Keywords: Software test, Function test, Test framework

1 Introduction

The software test is the important phase during computer software engineering. The software quality should establish the overall management of the project management with various activities in the different project. Software testing work is a very important activity in the entire software development lifetime. In order to overcome difficulties of manual testing in the traditional test, automated test execution has been introduced widely to improve software quality and testing efficiency.

The function test is used for verify and check the bug in existing previous software version. In software engineering, new release of the software is needed to be tested frequency and continuously for finding bug. It is the best time to use software automated test technology for repeatable testing, especially in the original software program changes more frequently. The merits and effects of automation test are very obvious. As a result of repeatable testing, test case design activity completely good, and its expected results can also be identified. The many software function and interface with the above version is same basically, so repeatable functional test is particularly suitable for automated testing [1].

In recent years, software automation test technology is one of the research areas of emerging technologies. The automated function test is helpful for software regression testing. The purpose of regression testing is to ensure that a change or release, such as a bug fix, did not introduce new defects. The automation testing is necessary to reduce human effort and error among test engineers with the technical abilities. Also the software testing with automated technology could reduce the cost of testing. Compare

to manual test, test automation uses special software to control the test execution in software testing [2].

Traditional software test automation tool, which uses the record-playback technology, is the imitate automated testing tool function: record all operations of the testers and the response of the tested software, including all operating keys press on the keyboard, mouse click and so on, the response of the tested software to capture and compare screen. Although these test methods are easy to apply, but the difficulty to maintaining. Capture-playback tools are more functionality and flexibility of automated test scripts tools. However, with the continuous development of web technology, especially e-commerce, e-government business workflows increasingly high, you can observe that the traditional method of automated test recording playback technology in test design increases workload of script maintenance. Therefore, we propose a new model framework with data files.

The main structure of this paper is as follows: the related works is given in second part. Section 3 introduces the test framework. The next part gives a detailed experiment. Finally, there are conclusions and future works.

2 Related Works

Automated testing tools reduces human intervention to non-technical, unskilled, repetitive, redundant test activities, so as to achieve a series of unmanned activities, includes complete testing, analysis of test results and generate test reports automatically. The purpose of automated test is to heighten efficiency of software test, shorten the test cycle, improved software quality and guaranteed software to be able to release in advance [3].

HP QuickTest Professional, shortly as QTP is software automation function test tool, which provides functional test and regression test for software applications and system (QuickTest Professional) [4]. QTP allows users to automatically generate functional test scripts. And QTP can be recorded directly on the screen operational workflows. The characters of QTP are also provided built-in script and debug development environment to get full control of the test and object properties.

Some new frameworks are proposed to support for automating tests in environments. The typical manual black-box testing framework of GUI-based applications is help developers or tester communication between various software developers. As GUI-based applications evolve, test engineers should modify corresponding test scripts so that they can use existing test case for successive releases. In [5] gives tool-based and manual methods to maintain the test scripts. In data-driven testing framework, the data file is important parts. The variables is read from data file, such as data pool, CVS files, Excel files, etc. The output value also store into specific data file. The input and output values use the variable in the test script in framework [6].

3 Framework

3.1 Data File

The record-playback technology is the basic function of automated testing tools. Through these recording-playback tools to gather enough user actions to complete the related business workflows, is the basis of automated testing tools for testing. However, the automated test scripts tools need highly developed skills and experience.

The automation framework is designed based on the module idea. The each module should implement the specific function to some extent. The script should be separated into several parts according to the module idea. Furthermore, each part of framework managed different resources to improve efficiency. The data files provided the different module data management in the framework. The Figure 1 gives the three data files.

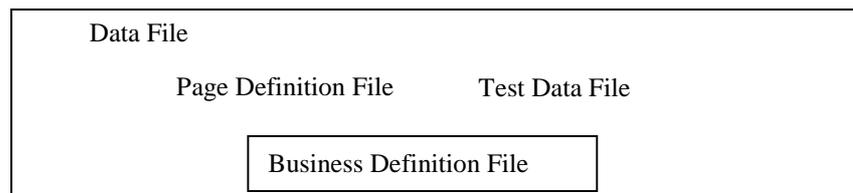


Fig. 1. Framework

The new framework is designed to fulfill the specific technology with data files. In the entire testing procedure, the test script development and test script execution are two key activities. The test script development is occupied key activities in this framework. The test execution is automated based on the QTP test tool. Based on results analysis, the QTP test tool could provide the enough function. For automated test script development, test engineers should consider separate the object names defined by the interface element names in test tools.

The framework should retrieve and recognize the possible control and its operation. The mapping relationship solves the conflicts between control and script. This will not only ensure that the control change in the logic business execution, but also avoid the effects of every changes in newly software release. The framework manages and maintains the scripts and test data independent. The highly independent reduce executive action and its relationship between the test object and the test data.

- Business Definition File. The Business definition file defined the test execution parameter and business execution sequence. For example, if there are three typical business flows in single web-based information system, these three flows should be stored in the business definition file.
- Page Definition File. This file defined the possible control in the web from. The classic control definition is implemented with direct method and description meth-

od. The direct method is classical method, which full path recognized. The description method provided the flexible way to locate. Here, the control definition in form table will use description method to locate the object control.

- Test Data File. Different from the page definition file, the test data file is support the massive test data during the test execution automatically. The purpose of data file is provided the test data associated with business workflow.

3.2 Test Execution

The business, page, test data files are data files separately. Business workflow files record the specific steps of the current workflow, and each step required for entry to locate page file and related data files.

During test design, test case should be designed. The test case is corresponding to business workflow. The main business consists of script, function, data, which are important parts in the framework. The form data is loaded into a separate data file. In underlying public function, which called common function and script function, includes general functions, web forms, data access and COM object, which the general function mainly to provide command commands, SysUtil command, date time transformation, event record, test results record and other functions. The page definition files give the page form basic information. Business Execution Procedure as below:

- a) Initialize
- b) Validate
- c) Repeat
- d) Fill the Form with page data file
- e) Execute the form file
- f) Check the result
- g) Repeat d) to g) until end
- h) Verified the result

Testing framework with data-driven using external files stored test data is required to achieve the test data independently. Test script with custom variables used for automated test execution when the specified test data obtained from the data file. The test data will let into variables. Therefore, the changes of test data will not affect the test script.

The test framework will start designed script for the entire testing workflow control automatically with functions and runtime libraries. Thus, test engineers used only before the test to modify the three separated data files and then automated testing execution could work.

4 Experiments

Here, we make experiments to compare the execute time of test case between the tradition method and this framework method which presented in this paper. The prac-

tical application of the specific environment of the operating system: Windows XP Chinese Version and software environment: QTP9.5 IE6.0, Office Excel 2003.

We consider a typical web operation: login operation. The login operation consists of open browser, open the web page, input the login name and related password, then click the OK button and check the whether the login success, the last step is close the browser. The results could see Table 1, the time using framework is more than traditional method, about the 6-7 second per test execution. From table 1, we can find that more time is costs by framework.

Table 1. Execution Time Comparison

Time(s)	1	2	3	4	5	Avg
Traditional	15	23	19	13	12	16.8
Framework	23	32	28	18	16	23.4

5 Conclusions

An automated functional test framework is proposed by defining separated business, page and data. A well designed framework and related data files could get perfect test result in actual business workflow test. Based on the analysis of test results, the framework has same ability and efficiency through current test tool.

For further optimizing the framework, we will improve the test framework performance by means of modify functions. In the future, we will study the relation between the controls and application features.

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