

QTP-based enterprise application software automation test method

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Abstract. Traditional manual test method cannot carry out all-round coverage when it is oriented to large-scale business process in enterprise software, and it is easy to form test missing problem. Therefore, QTP-based enterprise application software automation test method is put forward in this paper. By analyzing QTP automation test principle, QTP automation test framework is designed based on this principle, and the running process of QTP automation test framework is analyzed. Taking BA2 project of Mercer as an example, this paper analyzes the implementation process of QTP automation test framework in BA2 project, gives QTP automation test process of BA2 project, the built BA2 project organization structure and automation test demand analysis of BA2 project. Experimental results show that the proposed method can accurately detect the errors in the project and have high detection efficiency and precision.

Key words. QTP, enterprise level, application software, automation test, method, efficiency.

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1. Introduction

Software test ensures the overall quality of the software. By using automation software test methods, the performance of software test can be improved. Enterprise application software refers to the software system that supports the operation of enterprise business, which is a platform designed to assist enterprises to deal with large-scale problems. With the gradual increase in the scale of software engineering, users' requirements of enterprise application software are also increasing. Software versions continue to be improved and test cycle is gradually reduced [1], making enterprise application software test workload growing. Therefore, it is of great value to

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seek effective methods to improve the quality of enterprise software test. Enterprise software test contains large-scale cumbersome process, leading to the formation of engineers' tiresome mood, which cannot effectively mobilize the comprehensive performance of automation test and cannot ensure the smooth operation of enterprise software [2]. For the implement and accurate test of enterprise application software, the stability and quality of enterprise application software should be enhanced. An automation test framework is created based on QTP technology platform to achieve enterprise application software's automation test.

2. QTP-based enterprise application software automation test method

2.1. QTP automation test principle

The full name of QTP is Quick Test Professional, which is an automation test tool from HP Company. It is mainly for regression test and design test of software version. QTP automation test principle is to identify and operate the object, and record-playback the object so as to implement the automation test.

2.1.1 Test Object Model Improvements

Test object model is a set of object class libraries, and QTP uses test object model to describe the real object within the detected application program. Each object class in test object model has a list of attributes and method functions that can be used to clear the real object. QTP loads ActiveX, Visual Basic, and Web libraries through plug-ins.

Object detection window is used to collect and view the method function of the object within the detected application program. Runtime object is the real object within the detected application program, and the object's method function is run on the run. Test object implements description and trace [3] of the repository object for the real object of the detected application program and saves the repository object into QTP object library. When QTP identifies the object, repository object in object library file is defined to ensure that the feature attribute value of the real object is in the repository object. QTP obtains relevant repository object in the object library in accordance with the object name within the script. According to the attribute characteristics of the repository object, the matching real object in the software under test is got and relevant implementation of the real object is operated[4].

2.1.2 The role of the object in operation course

The playback process for QTP is: (1) search relevance object based on the object name within the script in the object library;(2) collect the description of the object [5], that is, object attribute and attribute value; (3) QTP implements relative object tests in the measured application operation according to the description of the object; (4) run the relevant process.

2.2. QTP automation test framework design

2.2.1 Composition of QTP automation test framework

Based on the above analyzed various factors, the molded QTP automation test framework is described in Figure 1.

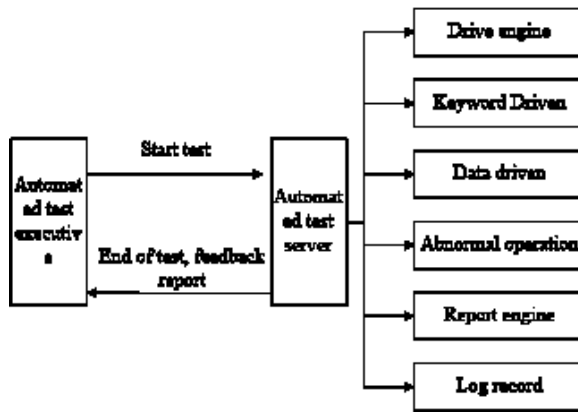


Fig. 1. QTP automation test framework

The parts' descriptions are as follows:

1. (1) ()Driver engine: remote test personnel activate the automation test[6].

(2) Keyword driver function ensures QTP background operation, which supports Action keyword driver running.

(3) Test framework can achieve multi-data driver, making test script power consumption [7].

(4) Exception operation achieves test framework function in capturing the abnormal through if err then way. If the verification point passes and contains an exception, test report presents a "warning" prompt; otherwise the verification point passes without an exception, test reports "pass" prompt. The scene recovery processing using QTP cannot foresee the exception in real generation time [8], and finish the rest process such as out of printing paper.

(5) Every Action operation state in automation test is stored in report engine, including "through", "warning", and "failure" three operating status.

(6) Log records compose execution log and debug log.

2.2.2 QTP automation test frame's operation mode

QTP automation test framework is defined by the front interface and data fill process [9], passed to automation test server, and the test report is fed back to the user after the operation. The detailed process is described in Figure 2.

2.2.3 QTP automation test framework operation process

QTP automation test framework operation process is described in Figure 3. The testers constantly revise test scripts and test data in automation test, access the cause of the error, and use review meeting to modify the test script to be controlled in the framework. The expired automation test cases are no longer used [10], and automation test cases are to modified during modification function point, and add automation test cases while adding new function points.

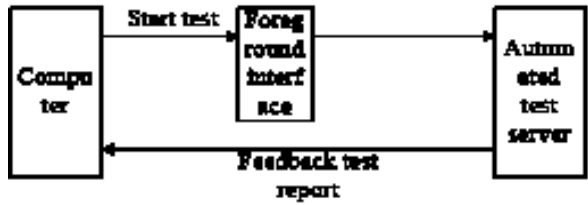


Fig. 2. QTP automation test framework operation mode

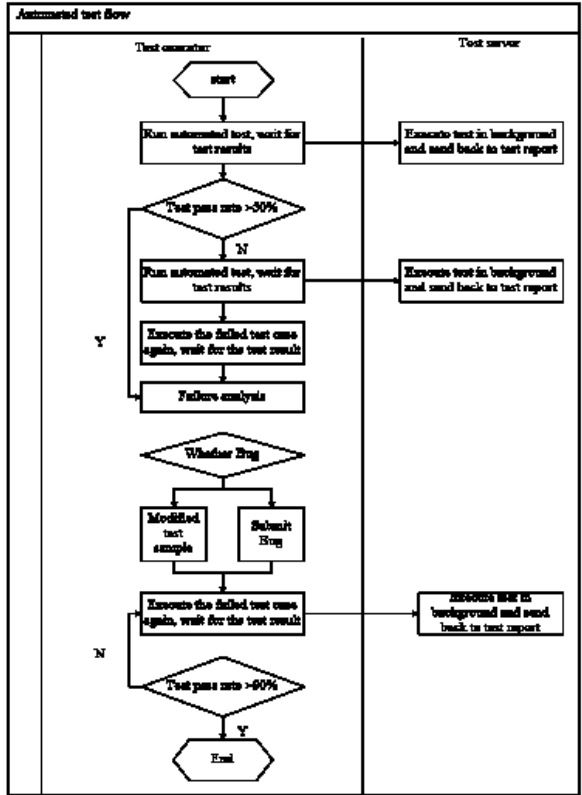


Fig. 3. Automation test operation flow chart

3. QTP automation test framework application examples in enterprise software

3.1. QTP automation test flow for BA2 project

This paper analyzes BA2 project of Mercer to study the application of QTP automation test in actual enterprise software operation [11]. Mercer Research & Develop department's Automatic Detection Team uses QTP automation test framework for automation project process. It is described in Figure 4.

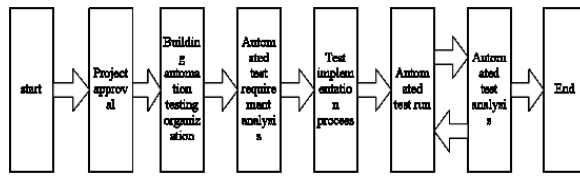


Fig. 4. Test flow

3.2. Shape the organizational structure of BA2 project

The organizational structure and responsibilities of BA2 automation project automation test in Mercer are described in Figure 5. It can be seen that people include project leaders, module leaders (senior test engineers), script developers (automation test engineers), automation test analysts (automation test engineers), and script executives (product managers and test engineers).

4. Experimental analysis

4.1. Test plan design

In order to verify the performance of QTP-based enterprise application software automation test method designed in this paper, we need to design test plan first. The experiment is based on manual test experience, and the designed BA2 project test plan is:

Test Case 1: Early stage Identification content

Weually_Land Early stage Identification_Plan Weeful Cycle Early stage Identification_Touch We UEMDE_Sign out

Test Case 2: Private Breakdown content

Weually_Land Private Breakdown_Opinion TrWet Info Private Breakdown_Touch We UEMDE_Sign out

Test Case 3: Add content2

Weually_Land Add content_Collection Add content_Self Demand Add content_Enrollment Statement Add content_Early stage Identification Add content_Private Breakdown Add content_TrWet Breakdown Add content_Self Profit UEMDE_Sign out

Test Case 4: Not considering Each Key

Navigate To Collection content Not considering Each Key_Touch We Not considering Your

Password_Cycle time Not considering Each Key_Send Password

4.2. Test data design

After test plan is completed, the data should be populated, and we should fully analyze the coverage of the test in the process. Subject to space constraints, the experiment mainly analyzes 4 test cases' test process. The test flow of test case 4 is:

first implement log-in, and then verify the Touch We link of Self Demand module, and log in.

4.3. Analysis of automation test results

Automation test process is simple. Through Web browser, open the entrance address provided by automation test framework, BA2 after transmission and planning begins the automation detection of Excel file. Click "Start Automation", and automation test will be running on test server, and the final BA2 project test results are fed back to the inspector by mail. Test case "Self Demand content" has failures. Click on the link to the failed test case to get the execution list of the test case, which is described in Figure 6.

Breakdown of TestCase Self Demand content;

Actions	Pass/Fail/Warring
Weually Land	4/1/0
Self Demand_Touch We	4/1/0
UEMDE Sign out	4/1/0

4.4. Test efficiency analysis

The experiment tested the test efficiency of QTP automatic detection and manual inspection for Mercer BA2 project. Test results of QTP automatic test and manual detection of Mercury's BA2 project are tested and each test took 0.9 hours, and the time required for each manual test is 9 hours. The results are described in Table 2.

Table 2 Time-consuming comparison of the two test methods

Type	Script editing / maintenance	Function / regression test (6 times)	Total time consuming
Manual test method	—	9hours×6	54hours
The proposed test method	35hours	0.9hours×6	36hours

The experiment implemented R multi-function regression detection for BA2 project, and the multiple operation expression of manual detection time-consuming and QTP automation test time-consuming in this paper is:

$$\frac{9R}{35 + 0.9R} = \frac{20}{100R + 3} \quad (1)$$

It can be known from above formula that in the case of R is less than 6, the total time spent of the proposed method is higher than that of manual test; in the case of R is 6, the time consuming of the proposed method is the same as that of manual test. In the case of R is more than 6, the time consuming of the proposed

method is much lower than that of manual test. The time consuming of manual test is six times more than that of the proposed method. This method has higher test efficiency for enterprise application software BA2 which is continuously tested for version upgrade and regression test.

4.5. Test accuracy analysis

Compared with manual test method, the proposed test method makes less script editing and maintenance for different test cases with higher test accuracy: average of 95.54%. This paper presented QTP-based enterprise application software automation test method meets real-time and high-precision requirements of enterprise software test, and achieves satisfactory results.

5. Conclusion

This paper presented a QTP-based enterprise application software automation test method. Based on QTP automation test principle, QTP automation test framework is shaped. Mercury BA2 project is taken as an example to analyze the implementation process of QTP automation test framework in BA2 project, which verifies the value of QTP automation test framework in enterprise application. Experimental results show that this method has higher test efficiency and precision and solves the problem of missing test in traditional manual test method.

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