

# Research on Software Development and Test Environment Automation based on Android Platform

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**Abstract.** The construction of software development and testing environment is an important part of the whole software development process. The combination of different versions of operating systems, databases, network servers and application services makes the types of software testing environments to be built varied. The opening of Android system makes it easy to develop Android software. Any developer, whether a professional company or an individual, can develop applications that belong to themselves and share with others. This also makes Android software increasingly large. This paper studies a new automated test system. It not only meets the testing requirements of cross-application and cross-device, but also does not judge the test results based on the graphical interface. The combination of automated testing and manual testing compensates for the shortcomings found in automated testing, the need for large initial investment, and the need for dedicated personnel to maintain. A test case can span multiple applications, even multiple devices. Test management tools allow you to develop test scenarios and assign test cases.

**Keywords:** Software development, Android, Automation.

## 1. Introduction

The construction of software development and testing environment is an important part of the whole software development process. The combination of different versions of operating systems, databases, network servers and application services makes the types of software testing environments to be built varied [1]. With the diversity of software running environment, the complexity of configuring various related parameters and the compatibility of testing software, the construction of software development and testing environment becomes more complex and frequent [2]. Although the original meaning of the word is "robot", it is now more well known as the operating system of a mobile terminal, which has become very popular in recent two years. Software testing is not a simple one-off behavior, it requires not only a longer cycle, but also subdivided into different types [3]. Mobile phones have become an indispensable digital product in people's daily lives. Application software is indispensable in the use of mobile phones. Especially today, smartphones have become an indispensable part of mobile phone development [4]. In the patch update test conducted on the release branch, in the actual enterprise project, such regression test is very repetitive and lasts for a long time until the software exits in the market.

The opening of the Android system makes Android software development easy. Any developer, whether a professional company or an individual, can develop applications that belong to them and share them with others [5]. This also makes Android software increasingly large. The cost of software testing needs to account for nearly half of the total cost of software development. And the test work time it takes is generally more than 50% of the software development cycle [6]. This shows the complexity and complexity of the software testing work. After entering the testing phase, the test engineer needs to perform system level testing including functional testing, performance testing, stability testing, etc. [7]. For each different version of software, it is also necessary to verify the existence of version regression in the test. Testers should realize that software testing is not only a process to ensure the quality of software products [8]. It is also integrated into the whole company's software development process, so as to complement and promote each other with software development. The purpose of this paper is to develop an automatic software monitoring tool for Android platform. For the software to be tested, record the behavior data of the software to be tested. Log files are recorded to analyze whether the resources occupied by the software to be tested are reasonable and whether there is malicious upload traffic.

## 2. Materials and Methods

Unlike other mobile device developments on "private" operating systems. In terms of prioritization performed by the system call, the system provides third-party applications with the same level of opportunity to choose from the built-in application. Except for the operating environment for a variety of different mobile phone systems, the other is the same as the conventional software. However, during the development phase, the same tests as the normal software test methods are still required. Today, with the rapid development of software testing, automated testing is becoming a very high-profile trend and trend in the field of software testing. In the product line of the same product supplier, each product usually has the same characteristics and functions, and each has its own unique attributes and functions [9]. Each test program contains one or more test cases for a particular type of component, in which test methods are specifically defined. At the same time, we should study the existing standards and norms, check whether the product specifications apply the correct standards, whether they conflict with the standards and norms, and whether there are omissions. At the same time, similar software products need to be inspected and tested, which will help to develop test conditions and test methods and expose unexpected potential problems.

Android platform bears more and more traffic. Research on the security and stability of Android platform is becoming more and more important. Figure 1 shows the relationship between name node size and data node size.

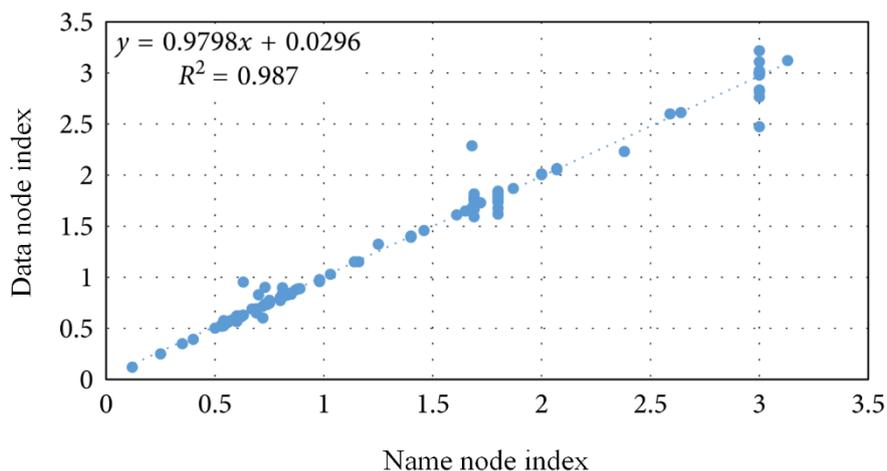


Fig. 1 Name node size and data node size relationship

Software quality must be improved, and software testing is an important and effective means to ensure software quality. Each product can be encapsulated into one class, and its base class can encapsulate the common attributes of each product. Specifically, the product can inherit the base class and define its own private attributes and methods. One application that implements the control device executes part of the test case, while the other part operates on another application of the device. For example, send a message containing a photograph taken by a camera application as an attachment. In the process of testing, according to the actual situation, testers cannot list all test cases. A small number of representative use cases can only be selected in a large number of test cases to represent other values not listed in this category. Due to the characteristics of the Android system, the processes that are not displayed in the foreground are in the suspend phase, and the memory will release a part [10]. The part of the memory occupied by the background display is actually not running, so the data in the running state must be recorded to correctly reflect the information of the software. The speed of testing is far behind the release speed of the product. In this case, if there is no automated test to help, manual testing can only be sighed.

## 3. Result Analysis and Discussion

For a mobile phone, the memory information that needs to be recorded includes the total memory of the mobile phone, the current remaining memory available, and the memory occupied by the

software to be tested. A large number of errors in testing occur at the boundaries of the input and output ranges, rather than at the interior of the input and output ranges. Then we need to focus on writing test cases for boundary conditions. The key to using this method is to determine the boundary conditions, focusing on testing the boundary conditions of input equivalence classes and output equivalence classes. The development and use of automated test cases involves the division of labor and cooperation among different test heat sources in the whole department. In order to standardize the work flow and ensure the quality of development of automated test cases. The quality of software products has certain special characteristics, which is very different from the quality inspection of other products, and the computer hardware products in the same field are also different. The quality measurement of software products is not directly detectable. And the tools, processes, and tools are much more complicated. Its quality can only indirectly reflect the quality of software products through the evaluation of various factors affecting the quality of software products. The management tool processes all events entered by the user interface through a built-in command parser and converts these events into an understandable form that is passed to the appropriate module.

Since most of the errors are from the requirements analysis phase, the correctness and accuracy of the requirements analysis is crucial to the future process. Based on the test requirements analysis report, design test cases for each test demand point to fully cover the test requirements. And each test requirement can be reflected in different aspects of the test case, so that test cases can be tracked and traceable. Verify the test plan and get information from the database about the test stations it contains for the secondary plan. If the test plan does not exist or the auxiliary plan contained in it does not have the corresponding test station information, the operation will fail in the initialization phase. Most software testing is based on manual testing, but with the development of software industry, the complexity of software testing is also increasing. At the same time, the demand side or users are increasingly demanding software. The readability and maintainability of scripts should be paid attention to in the process of writing. Reusability and test integrity, independence, repeatability, error analysis, etc. As a test of software product quality, these related factors should be covered as far as possible in order to obtain a comprehensive evaluation of software product quality.

After configuring, running data analysis, the number of information nodes used in each analysis is different, and the corresponding processing time is also different. Table 1 shows the number of nodes and processing time for each analysis. The relationship between the number of nodes and processing time is shown in Figure 2.

Table 1. Number of nodes and processing time

Serial number	Number of nodes	Processing time
1	4520	14812
2	4618	19741
3	4732	16359

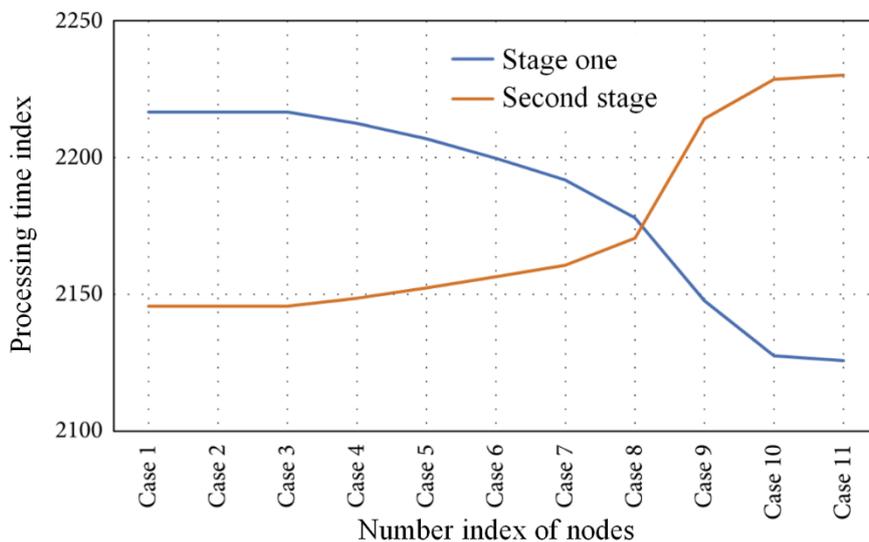


Fig. 2 Number of nodes and processing time

The client program in the test framework passes the test case to the server program. After the server program executes, the test result is returned to the client program, and the client program saves the result as an object locally. Computer software is coded according to test rules to be executed in a computer environment, automatically verifying the response and behavior of the program under test. Convert the process described by the scripting language to an action on the screen to view its output log. And compare with the standards given in advance to determine whether the test system meets the requirements of the item. The test work is performed automatically and the test results are recorded, which frees the tester from the tedious and repetitive work. More energy and time will be devoted to complex work requiring intelligent judgment and other new test cases. After the test is completed, the corresponding test report needs to be formed. It mainly outlines the test, lists the conclusions of the test and points out the defects and errors. In the process of automated testing, test scripts play a key role. For software testing, which script technology to use is not the most important, the overall consideration of the implementation of test case system supported by scripts is the most important.

#### 4. Conclusion

In today's era of rapid development of the Internet industry, the development of Android mobile phone systems is also in full swing. Research on the Android platform test system is also of great significance. The combination of automated testing and manual testing not only compensates for the shortcomings found in automated testing, but also requires large investments at the beginning of the test and requires special personnel to maintain. It also solves the drawbacks of low efficiency and large work repetitiveness in manual testing. There are already some automated testing tools for systems that are used by equipment vendors and software development companies. But these tools are not perfect, there are many restrictions on the use, not system. In this paper, a new type of automatic test system is studied. It not only meets the requirements of cross-application and cross-device testing, but also does not judge the test results based on graphical interface. A test case can span multiple applications or even multiple devices. Through the test management tools, test plans can be formulated and test cases can be allocated. Controls the parallel execution of multiple computers connected to multiple Android devices, and monitors the test process to generate test reports automatically. Different mobile phones should also consider the impact of other applications. Integration testing and system testing should be carried out to ensure software quality.

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