Research on Software Security Testing Process for Development

LI Zhen, ZHANG Yong

Jiangsu University of science and technology, Zhenjiang Jiangsu 212000, China

Abstract: the software security testing is a powerful guarantee to ensure the quality of software security, can also be possible to avoid the outflow and use of high-risk software. Commonly used in combination with the software development process and software testing process model and software security testing, combined with engineering practice experience to design a new type of software security testing process model - "trajectory model". For software security testing process are discussed in detail, designed to improve software security testing in the process of software development quality and efficiency.

Keywords: software testing; development process; safety testing process; trajectory model

0 Introductions

With the development of society, the dependence on technology is becoming more and more obvious, and the application of software has been involved in all walks of life. The security of software also brings many problems to all walks of life [1]. The software security testing can avoid or reduce safety problems, is an important means to ensure the safety of the software. A successful safety test project cannot be separated from the scientific organization and monitoring of the testing process. Process management has become an important guarantee for the success of the test. Software maturity (CMM) practice proves that good software process and continuous process improvement is a way to solve such problem not only can ensure the quality of products, can also greatly improve the production efficiency. Nowadays, the research on the security testing of software is mainly focused on the research work of software security testing technology, and it pays little attention to the specific process of software security testing. In order to solve this situation ,at first, this paper analyzes the software development process and normal test process, combined with engineering practice experience, design a new type of safety testing process model - "trajectory model", combining with the model in the software development process are introduced in each of the specific conditions of the security testing process.

1. Research on software development process and general test process

1. 1 software development process

Formal software development process generally includes six stages[2]: the first stage is planning, determine the overall goal of software development, software design of the function and performance, reliability and interface requirements, study the feasibility of the implementation and the development task planning; The second stage is the requirements analysis, by software developers and users to discuss which requirements can be satisfied and give the exact description, write the software requirements specification as well as the initial user manual, submit management

organization review; The third stage is the software design, it is the core of software engineering, in the design phase should be established in all kinds of demand into the corresponding system structure, the structure function of each part should be a specific module. On the basis of the detailed design of each module specific description of work to be done, in preparation for the program; The fourth stage is programming, which translates software design into a program that the computer can accept, that is writing some programming language to represent the source program; The fifth stage is the software test, which is the test of the software to meet specifications. The sixth stage is running and maintenance, and the software that has been delivered to the user enters the running maintenance stage after it is officially used.

1. 2. General test procedure of software

The V model was first introduced by Paul Rook in the late 1980s and is the most representative test model [3] .As shown in figure 1, the decline of the left side of the V model is the phase of the software development process, and the rising part of the right side is the phase of the software testing process. The left side starts with the user's requirements, and then shifts the user requirements to requirements analysis, system design, profile design, and detailed design, and finally develops the code. The right side is the start of unit testing, integration testing, system testing, and acceptance testing.
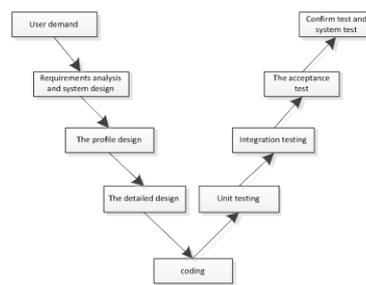

Fig1 V model

The W model was proposed by Evolutif[4].Compared with V model, W model increases the validation and verification activities that should be synchronized during each development phase of software, which is conducive to early detection of problems. It is composed of two V fonts, respectively representing the test process and the development process, as shown in figure 2, which clearly shows the parallel relationship between testing and development.
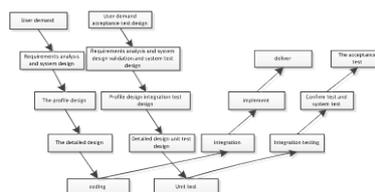

Fig2 W model

In the H model (shown in figure 3), the test activity is independent of other activities and runs through the entire cycle of software product life in parallel with other processes. When a test is ready, it enters the test execution phase [5].
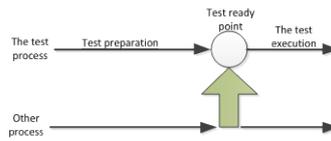
Fig3 H model

V model describes the development and test behavior, a clear indication of the different types, in the process of testing the different levels of tests, clearly show that the corresponding relation of the testing phase and development phase, but it does not demand analysis, general design and detailed design test, easy to cause the problems discovered in the last stage [6]. W model compensates for the shortage of V model, but it also regards software development as a series of serial activities such as demand, design and coding, as well as V model. Similarly, software development and testing maintain a linear, contextual relationship, which can only be performed once the previous phase is completed, without iteration, spontaneity, and change adjustment. H model took into account the efficiency and flexibility, can be applied to various size, various types of software products, software testing can be done as soon as possible, and can according to the measured content of different layers. But the H model does not give a specific test process.
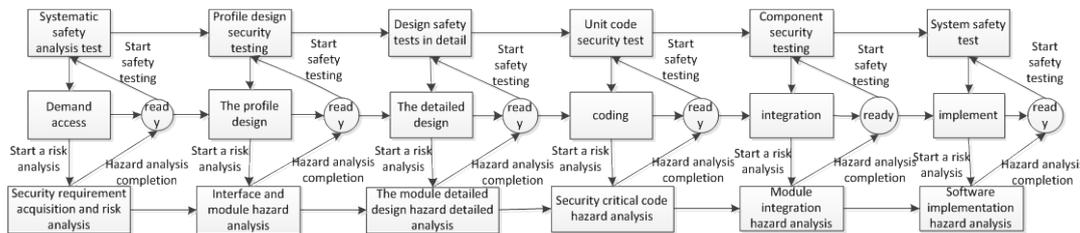
2 Software security test process model

Fig4 Trajectory model

Combine the above analysis and engineering test experience. This article has designed a software security testing process model, which shows the relationship between software security testing activities and development activities in the timing and hierarchy, as shown in figure 4. Since the software security test process model looks like the trajectory of the car, it is named as the trajectory model. It clearly shows the phases of software development and security testing. The middle track of the model is the development process of the software. The bottom trace of the model is the analysis, confirmation and preparation process of security, and the top trajectory of the model is the specific process of the software security test.

Software security testing activities exist in the whole lifecycle of the software product development, and development processes concurrently, software security testing activities performed on time and almost simultaneously to software development activities. This model is that it can't only show the characteristics of the software development process, the safety analysis process and safety testing, and the specific relationship between the timing on the concrete implementation process, and it also can reflect the process of software development and software security testing of the independence, make the safety of the software development process and software testing process independent noninterference in each other. We know that development

activity is a continuous iterative process, and the same security testing activity follows the development activity as well as a continuous iterative security testing process. In the software development process of each child in the process of choice from the beginning of the development activities, from the development activities to risk analysis to analyze the phase of the possible danger to confirm and analyzing the safety test plan preparation. When danger analysis and analysis of safety test plan after completion of preparation work, once to test the ready state began on the security test, at this time by the security analysis of preparation process to safety in the process of testing security testing of its implementation. If the security test does not pass, it will be modified and adjusted from the test process to the corresponding item of the development process, then the analysis design will be carried out, and the safety test will be conducted again until the danger is eliminated. It is not only a good deal with the possible security testing in software security testing lag issues, But also reflects the software security engineering software security testing to be carried out as soon as possible.

In general, the trajectory model has the following characteristics. The implementation process of software development and software security testing is clearly demonstrated the parallelism and independence of software requirements, design and test plan design are realized. It also shows that the security testing should be tested early, comprehensive test, whole process test, independent and iterative testing concept. Avoiding these security issues is brought to the next level of development, and can be timely found to solve problems [7]. Not only did the H model support the advantages of iterative and change adjustment, but also compensate for the shortcomings of V and W models.

3 Conclusions

The research on software security testing process is to explore the application of system security testing technology in the field of security software, and improve the security of software testing in the analysis of software security testing process. This paper studied the process of software development and the general testing, software development, testing, safety analysis and safety testing, combined with engineering practice experience of software security testing process modeling, and the study of software security testing process, has the positive significance to the development of software security testing technology, and has practical reference value.

Reference

[1] Cai Jianping, Wang Ansheng, Xiujia Peng. software testing methods and techniques [M]. Tsinghua University Press, 2014

[2]Bai Yan,Wang Yong Design of an airborne software testing process model[J] Computer measurement and control engineering,2012.20(7) 18115-1818

[3]Wang Shuyi,Nan,Jianguo Application research of aviation software test process model[J] Computer measurement and control engineering,2013.21(6)1443-1446

[4]Li Hao,Tian,Fengmin Radar Software Security Testing Research[J] Informatization research,2011.37(26)29-33

[5]Shi Lei Discussion on software test model[J] Network security and technology application,2014.10 188-189

[6]Zhu Yi,Liu Yongheng Software security testing method and process research[J] Software reliability and evaluation techniques,2011.11(31)147-151

[7]Yi Sijie The development status and trend of software test at home and abroad[J] Computer engineering application technology,2013.9(26)

About the Authors:

Li Zhen, Male, associate professor 1977.3 research direction: system security, software testing technology

Zhang Yong, Male, Master 1990.4 Research direction: System Security

E-mail: zy2015just@163.com