The Assessment Method of Test Suites for Testing of Information Security Systems Software

UDC 004.415.538:004.4:004.056.5

Oleksandr Dorenskyi

Central Ukrainian National Technical University, dorensky@ukr.net

Software is an indispensable part of the implementation for most of information security systems. However, software testing is absolutely necessary for its implementation process, which is aimed at checking compliance of all the derived characteristics, properties, as well as of the expected system behavior. This is particularly regulated by international standard ISO/IEC 12207 [1], according to which the final stage of the software implementation is qualified testing. Thus, testing at the system level is an essential process of implementing information security systems software.

The standard [1] focuses on proper documenting all the software life cycle processes by developers, including qualified testing. It is possible to make through the implementation of test suites – formally written sets of test cases, test design of which is carried out according to the defined quality criteria and testing purposes [2, 3]. The analysis results of the structure and characteristics of all the test cases are presented in [4].

In practice, there appears a number of difficulties [4, 5] when creating test cases. They reduce the quality of the test cases, as well as of the qualified test process in general. Thus, there is an actual scientific and practical evaluation of each test case created to ensure the test suite quality and the effectiveness of the information security systems software testing.

For the solution of the formulated problem a method of test cases is suggested, it is based on the logic algebra and fuzzy multiple approach. Its essence is as follows: for Boolean evaluation Q_i^{TC} checking for compliance with accepted requirements of each attribute is performed for each i-test case, namely a set of assessments q_i^{aTC} is formed, which is represented by the following Boolean elements: Test Case ID $q_{i,1}^{aTC}$, Summary $q_{i,2}^{aTC}$, Author $q_{i,3}^{aTC}$, Preliminary Steps $q_{i,4}^{aTC}$, Test Steps $q_{i,5}^{aTC}$, Expected Result $q_{i,6}^{aTC}$, Test Result $q_{i,6}^{aTC}$, Implementer $q_{i,7}^{aTC}$, PostConditions $q_{i,8}^{aTC}$ etc. Herewith, the requirements to the $q_{i,4}^{aTC}$, $q_{i,5}^{aTC}$, $q_{i,6}^{aTC}$ detalization of attributes are suggested to be assessed for the criteria eligibility [4] by the method [5]. Thus, given that the structure of test cases may be different, for getting Q_i^{TC} ratings $q_{i,j}^{aTC}$ conjunction is executed:

$$Q_i^{TC} = \prod_{j=1}^{n} q_{i,j}^{aTC},$$

where n is the number of attributes of each test case, $q_{i,j}^{aTC} \in q_i^{aTC}$.

Respectively, a separate test suite assessment is performed:

$$Q^{TS} = \prod_{i=1}^{k} Q_i^{TC},$$

where k is the cardinal number Q_i^{TC}.

Thus, the method, the application of which during the implementation of test suites for qualified information security systems software testing ensures the quality test cases control, is suggested, and as a result, the efficiency of testing of information security systems software by QA-engineers. This is particularly important due to the fact that the elimination of errors in the implementation stage, as well as in subsequent stages of the software life cycle requires ten times more resources [6].

Therefore, the application of the proposed method of the evaluation of test suites for information security systems software testing will reduce the cost of software products, complexity of IT projects and will provide a significant increase in the quality of test documentation and QA-engineers work efficiency.

Further research is to be provided to develop the methods of implementation of the proposed method in the information security software life cycle, as well as the implementation of software tools for the practical realization of the quality control of the test suites created during the implementation of an IT project.

References

1. ISO/IEC 12207 : 2008. Systems and Software Engineering – Software Life Cycle Processes. – [Second edition 2008-02-01]. – ISO/IEC-IEEE, 2008. – 122 p. – (International Standard).

2. Kulikov, S. S. Software testing. Basic course: practical guide / S. S. Kulikov. – Minsk: Chietyrie chverty, 2015. – 294 p. [in Russian]. – Access mode: http://4-4.by/sites/default/files/files/reviews/kulikov_testirovanie.pdf.

3. Williams L. Testing Overview and Black-Box Testing Techniques [Electronic resource] / Laurie Williams // Introduction to Software Engineering Practices and Methods. – 2011. – P. 34-59. – Access mode: http://agile.csc.ncsu.edu/SEMaterials/BlackBox.pdf.

4. Dorenskyi, O. P. Criteria Detail Test Cases for Qualified Testing Software / O. P. Dorenskyi // Internet - Education - Science – 2016 : Proceedings of the Tenth International Scientific-Practical Conference IES-2016, Ukraine, Vinnytsia, October 11-14, 2016. – Vinnytsia: VNTU, 2016. – pp. 86-88 [in Ukrainian].

5. Dorenskyi, O. P. The Methodology of Evaluating the Test Cases Quality for Simple IT Monoprojects Software Testing / O. P. Dorenskyi // Modern Problems and Achievements in the Field of Radio, Telecommunications and Information Technology : Proceedings of the 8th International Scientific and Practical Conference (Ukraine, Zaporizhzhia, September 21-23, 2016). – Zaporizhzhia : ZNTU, 2016. – pp. 111-112.

6. Pomorova, O. Intelligent Assessment and Prediction of Software Characteristics at the Design Stage / Oksana Pomorova, Tetyana Hovorushchenko // American Journal of Software Engineering and Applications. – 2013. – Vol. 2, No. 2 – pp. 25-31.