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Testing and Evaluation System for Cloud Computing Information Security Products

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Abstract.

Due to the lack of professional testing and evaluation system for cloud computing information security products, the basic security of cloud computing information security products cannot be guaranteed. The establishment of a test and evaluation system of cloud computing information security products is provided, and the system is used in the actual product testing, to further promote the development of cloud computing and information security.

Keywords: cloud computing, information security, testing, evaluation

1. Introduction

Cloud computing is a style of computing in which dynamically scalable and often virtualized resources are provided as a service over the Internet.

Cloud computing is defined by the National Institute of Standards and Technology (NIST) that it is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. The application scope of services of various cloud computing is expanding, and the influence is immeasurable.

This paper provided the test and evaluation system of cloud computing information security products.

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2. The Test and Evaluation System of Cloud Computing Information Security Products

The test and evaluation system of cloud computing information security products covers three parts: testing environment, evaluation technology and evaluation service. Test environment is mainly composed of test platform for cloud computing system information security products, evaluation technology mainly involves testing tools, testing methods, basic database and related standards and specifications, evaluation services provide cloud computing information security products evaluation service ability.

2.1 Overall Architecture

In cloud computing, a new generation of cloud computing technology related information system as the object, security function requirements, itself security requirements and performance requirements of cloud computing information security products are researched firstly, methods and techniques of analysis, combined with the information system threat vulnerability detection and risk assessment technology, a cloud computing test and evaluation system of information security the product is established, the overall architecture is shown in Fig.1
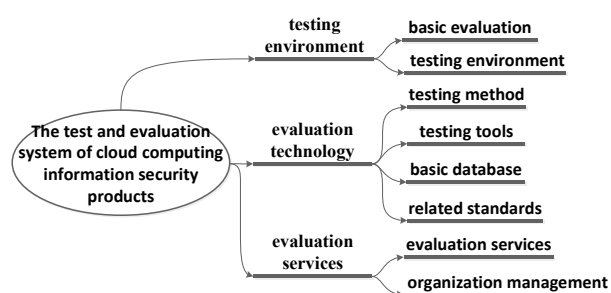

Figure.1 Overall architecture

The test environment system includes the basic environment and the experimental environment. The evaluation technology system includes testing methods, testing tools, basic database and key standards. The evaluation service system includes the service process and organization management.

2.2 Testing Environment

According to the quality system construction and other relevant requirements of evaluation institution, based on the existing resources integration, improvement and upgrading, the necessary laboratory physical infrastructure is formed, including room construction, hardware and software purchase, so as to provide the basis for evaluation of cloud computing information security products testing.

The test environment mainly includes the following two parts:

(1) Basic environment: the laboratory computer-room decoration and transformation, as the implementation basis of test evaluation system.

(2) Experimental environment: laboratory basic network and test instrument.

The basic environment is mainly through the integration of existing resources, upgrade, focusing on the construction of evaluation environment needed the physical infrastructure, including room renovation and expansion, the hardware and software purchase, evaluation of experimental environment establishment, and ultimately the basic necessary conditions required to test for cloud computing security products is formed.

The basic environment consists of 4 tests (performance test environment, attack test environment, function test environment and protocol test environment), partition environment, 1 demo environments and 1 test rooms.

The laboratory environment is mainly for building a typical cloud computing environment. The test platform includes three systems: function test platform, attack platform and performance test platform.

The test platform includes three aspects: function test platform, attack platform and performance test platform. Because each test platform has different test focus and test environment requirements, the three platforms are deployed independently.

2.3 Evaluation Technology

The evaluation technology includes the research, improvement and application of testing methods and testing tools, the construction of basic database and the compilation of related standards.

The security testing method of cloud computing system can be divided into four categories: security function, security guarantee, and environmental adaptability and performance requirements according to the security technical requirements. According to the requirements of each kind of system, the testing methods are studied respectively.

Security functional requirements are the specific requirements of cloud computing security function of information security products, the specific requirements of cloud computing information security products include identity authentication, access control, security management, cannot bypass, anti- attack, audit and configuration data protection, operation monitoring, elastic scalability and virtual resource security to ensure security; Security guarantee requirements are put forward specific requirements for cloud computing information security products in the development and use of the contents of the document, such as configuration management, delivery and operation, development process, guidance documents and life cycle support; environmental adaptability requirements are put forward for the specific requirements of the application environment of cloud computing information security products, such as IPv6 environmental adaptability; the performance requirements is to make the performance index of cloud computing system and cloud computing products meet the requirements Fixed, such as virtual machine I/O time, attack filtering and defense performance, etc.. In addition, the vulnerability of the operating system level of cloud computing system and equipment is analyzed and excavated to form an attack test set.

In view of the above, it is necessary to study the relevant testing methods separately, and apply them to the actual test work.

In order to ensure the evaluation services specialization of cloud computing system and information security products, a few convenient and easy-to-use evaluation tools and analysis tools have been developed. The purpose is to reduce the workload of the evaluation or evaluation personnel, to reduce the assessment and evaluation errors caused by the ability and experience of the evaluation and evaluation personnel, to ensure the accuracy and scientific evaluation and evaluation of the service results, and to improve the professional service ability. By the testing software to simulate the normal and abnormal protocols, it can detect the function realization of the information security products of the cloud computing system, and the ability to resist the abnormal protocols.

The basic database mainly includes knowledge database, evaluation index database, evaluation method library, evaluation case library and evaluation Database.

The main contents of knowledge base include the unified description methods, security events at home and abroad, knowledge base management and maintenance method, intelligent data mining method in the field of cloud computing information security based on technical knowledge, test cases, laws and regulations, security incidents, technology.

The index library ensures the consistency of the evaluation results among the tested products. Through the evaluation service of cloud computing information security products, a unified evaluation index library is established, to ensure the uniqueness and impartiality of the evaluation results. The index database consists of functional index library, performance index database and security evaluation index library, which can expand and maintain the index library according to the need.

The evaluation method library is based on the research of the standard compilation and evaluation methods of each information security professional service, and defines the specific technical requirements, so as to provide effective service.

The evaluation case base is based on the construction of evaluation method library to strengthen the reuse of testing and improving the efficiency of test. According to the instructions provided by the manufacturer and the experience of the evaluation personnel, the connotation of the relevant technical requirements is analyzed in-depth, for each specific service to establish evaluation case library.

This evaluation system has developed an information security product standard system in the field of cloud computing security, in order to standardize and support product evaluation.

Evaluation service includes evaluation service process and evaluation organization management. Evaluation service process based on the existing evaluation service process, digs the characteristics of information security products of cloud computing system, integrated into the evaluation service process, improves service quality evaluation system; organization management main standards assessment service, makes full use of various resources, improves the efficiency of evaluation service.

Service procurement units proposed the system requirements of their own, the detection mechanism through communication and coordination determined the service evaluation target, signed service contract, set up project team; according to the procurement unit demand information, project team analyzed whether the demand analysis is sufficient; when demand is insufficient, communication with service procurement units, supplementary requirements and final confirmation would be done; when demand is sufficient, the overall design of the evaluation scheme according to the relevant standards would be done and reviewed by experts on the program; through the preliminary plan review, the detailed design would be done by testing personnel for the evaluation service solutions, and make the plan for review by the experts, and submit the plan; if the proposal was modified, the evaluation scheme with the new design or modification, and then carried out plan review by experts, and so on; when the evaluation service scheme submitted don't need to be modified, the evaluation service solution is formed; on the one hand, experts examined and approved the perfect evaluation service scheme, and the standardization management was formed; on the other hand, testing personnel tested according to the evaluation service program, after testing, documentation and archiving would be done.

In order to ensure the smooth implementation of the whole evaluation service process, the system also establishes the organizational structure of cloud computing information security product evaluation service.

Through the establishment of the leadership office, management department, technical department and testing department, respectively, the evaluation service process is controlled from the organization, management and technical aspects. The testing department is responsible for the implementation of the testing work, according to the test data of original records; management department in accordance with the relevant management provisions is mainly responsible for the evaluation service application acceptance, product evaluation process control, inspection report preparation and audit, customer satisfaction and return visit; technical department is mainly responsible for the research of related evaluation technology. The office is mainly responsible for the the overall leadership and evaluation report authorized signature etc.

3. Conclusion

The security assessment of cloud computing belongs to a new field, and only a few testing institutions in China have carried out relevant testing and evaluation work. In this paper, the test and evaluation system of cloud computing information security products is provided. The test and evaluation system cover three parts: testing environment, evaluation technology and evaluation service. Test environment is mainly composed of test platform for cloud computing system information security products, evaluation technology mainly involves testing tools, testing methods, basic database and related standards and specifications, evaluation services provide cloud computing information security products evaluation service ability.

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