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Study on the testing method for network information security systems

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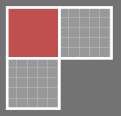
ABSTRACT

With the widely use of the computer network, the network security problems became increasingly acute and gradually became an important research topic in networking. Network information security testing technology research, which is imperfect due to late start but rapid development of network in our country, is the major content of the research topic. The testing method put forward in this study is based on the hardware and software of the Server Scope Tester. This method still reserves all the advantages of the Server Scope. The system load will easily be generated if face the characters of the customers with the hardware features of Server Scope through B/S module in network information security system, and the diversity load directly replaced the single load in traditional playback method, this makes the testing environment simple, the system testing more possible and the operation easier. In short, the testing method put forward in this study fully inherited the characteristics of Server Scope, it has the following advantages: make up for the single load of traditional system, simplify the testing environment and process; simulation of the network environment, especially the traffic model and the emergency situations; the load can be decreased or increased randomly cause the system is flexible; large testing space and frequent system interactivity.

KEYWORDS

System test methods research; Information security risk assessment; Network information; Testing technology.



INTRODUCTION

Network information security system refers to the hardware and software products that make sure proper operation of the network system and information security system, including firewalls, intrusion detection systems (IDS), information encryption systems, security authentication system, anti-virus systems, and safety assessment system and so on. The data in network security management system is incomplete, is difficult to recovery and lack of confidentiality, so this study put forward a network security management system with cloud computing approach, this system can integrate information effectively and greatly improve the network resource utilization. Analyze and research the characters of network management to realize network security management system. Practice shows that this system makes great improvement compared with the traditional management ways in terms of network security management, resource sharing, cut management cost and flexibility. It can be said that the system fully shows high-effective processing power and sufficient storage capacity, this improve the network security overall management level in our country. This paper, based on the hardware and software features of the Server Scope, puts forward a brand new and effective network information security testing method.

TECHNOLOGIES RELATED TO NETWORK INFORMATION SECURITY

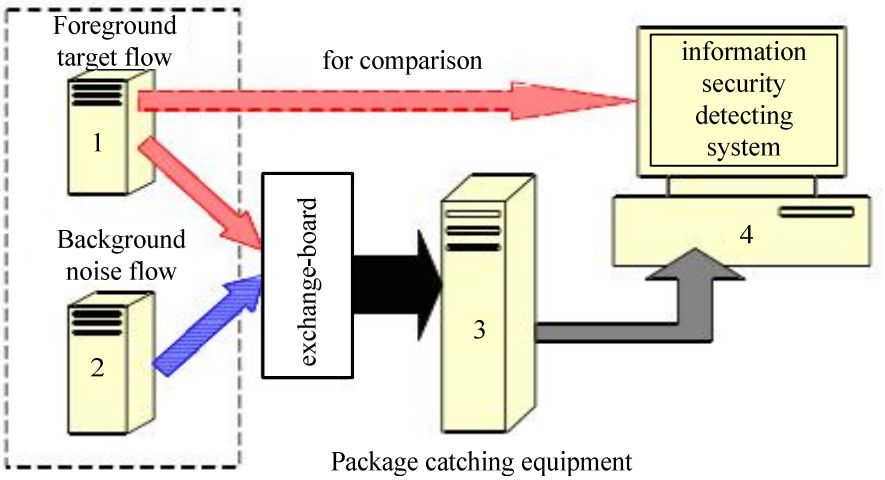
According to the access ways of the network information security system into the internet, there are two types of equipment-cascade equipment and by-pass equipment, so the testing ways are cascade test and by-pass test. The network and the server cannot be intensively accessed in that the network speed in our country is still not be satisfied. The school with network security management system always builds several learning center bypass flow servers mainly with the B/S module, see Figure 1 about the overall structure. Build central learning server in the learning center of the main campus, teaching resources server in other learning centers respectively. There are learning materials, including documentation materials and video materials stored in the entire system background server available to the users. Recently, the system application result shows that this operation module has two outstanding shortcomings:

(1) There are so much learning resources in the education system that the network speed in our country cannot satisfy such large data volume transfer, consequently, the latest knowledge usually cannot reach the learners on time in that the resources in some servers cannot be synchronized to other servers due to the network speed which makes the learning resources incomplete and delayed.

(2) The students should register many accounts for different servers because the accounts for different cannot be shared, that is to say, you cannot use the one server account download information from other server, so it seems inconvenient when the students change another sever.

STUDY ON THE TESTING METHODS FOR NETWORK INFORMATION SECURITY SYSTEM

Server Scope is an evaluation system used for evaluating the actual system performance of the users. The Figure 2(a) show the software structure of the Server Scope, including control layer, management, service layer and load layer which are in accordance with the service node and the testing node in the hardware structure showed in Figure 2(b).



Frequently used software testing environment of network information security

Figure 1 : Frequently used software testing environment of network information security

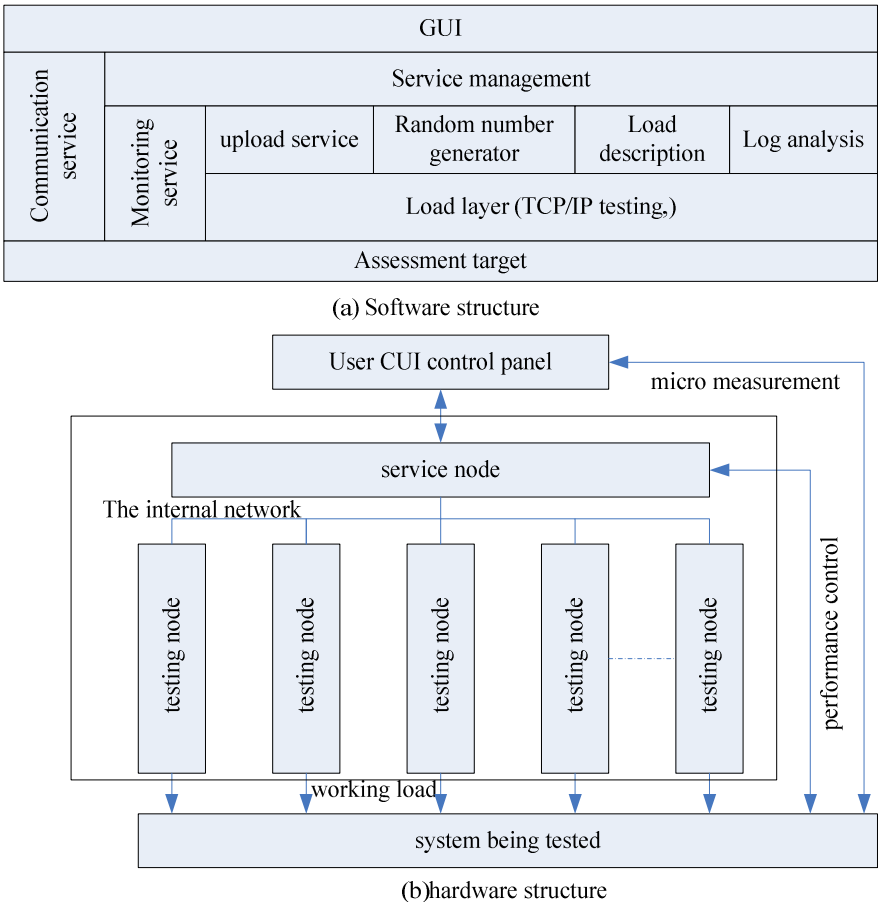


Figure 2 : Server Scope system structure

The Server Scope can decide testing load out of the users' requirements, the overall platform structure consists of base layer, service layer and application layer including 5 modules like data processing, monitoring module, processing module, decision-making nodule and basic module. Several technologies like hardware, software and virtual technology are required to make sure the resource base of the base layer platform reliable and stable. The base layer is usually regarded as the power base of the platform system given that it provides basic support to the server and the application layer, for example, provides processing power and storage capabilities. The core layer of the platform system is application layer because the service processing module exists in it. The service processing module is further divided into several sub-modules like consolidated supervision, permissions assignment, business processing, automatically sign, document processing, and information collection and searching. Application layer is the interface to connect the students and other programs, and service layer has all the functions of the platform system.

Testing methods

The basic module of the system is B/S module, Server Scope is provided by Web Browser. The Server Scope consists of 4 layers like external interaction layer, integrated processing layer, business layer and an information storage layer, among which, the users can log in the system with external interaction layer through browser, the integrated processing layer makes the system more flexible by process all kinds of requests from the users, business layer provides business security service and configuration Information Services, information storage layer can realize database sharing and data separating to make the database more safety.

This platform system designs a scheduling mechanism for meeting the requests to make the interface and the functions configurable and the education resources be deployed more efficiently and more flexibly. The requests from the users can be divided into 3 types: the first is appearance requests, the Server Scope should display specify information without changing the business service situation. The second is system configuration request, the Server Scope should modify accordance configuration without changing the service situation. The third is education resource request to which the service situation should be changed when reply, for example, If a user submits a learning video request, the work process management module will be started, and the platform will designate system resource to maintain the lifecycle of the video. The Server Scope can successfully reply all requests and provide application service to support the resource allocation with workflow engine and rules engine.

Comparison of the load

There are 3 ways of data isolation in terms of network security management system. The first is database isolation, i.e. an account only has one corresponding database to maintain database independence between the users. This is a complete isolation way to maintain the highest data security but it costs too much. The second is data mode isolation but the database shared. I.e. there is only one database on the entire education platform and each user has an independent account; this method provides abstract logical data isolation, not the actual physical isolation; Furthermore, a database is able to support many users, so it costs less but managed hard in that the abstract isolation makes the logical relations complex. The third is data mode and database shared, there are only one database and one data mode on the entire education platform, while the data can be isolated through marking identifier on the business table (users' ID) out of the users' request; this makes the database shared to the largest extent, the cost the lowest but the isolation incomplete. However, this will Increase burden on system developers because the code amount related to safety and reliability is much more needed and the data is easily lost.

TESTING RESULTS

The system has strong service ability, especially it storage capacity and computing ability of complex problem. The advantages of cloud computing is completely reflected on this system. When design the management information system, the frequently used system structures are B/S (Browser/Server) and C/S (Client/Server). B/S refers to a browser and server structure which is fully supported by the industry giants like Microsoft, IBM, Hewlett-Packard Lenovo and so on will become the main trend in terms of system structure. It better improved the C/S structure. B/S structure is used during design period due to its high stability, strong safety and easy to maintenance.

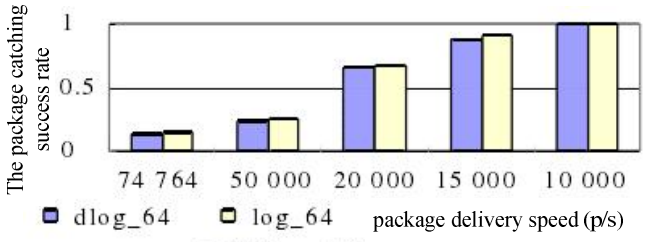
Basic network processing performance testing

The TCP/IP load generator of the Server Scope was used for testing during the experiment. A band new plan which inherits the advantages of the traditional system but makes innovations is put forward after deep research to develop a management system meets the latest demand of modern network security. The testing results show that compared with the traditional system, this system has made so much progress in service ability, learning resources sharing, and flexibility and so on that it properly meets the demand of modern network security management in our country. See TABLE 1.

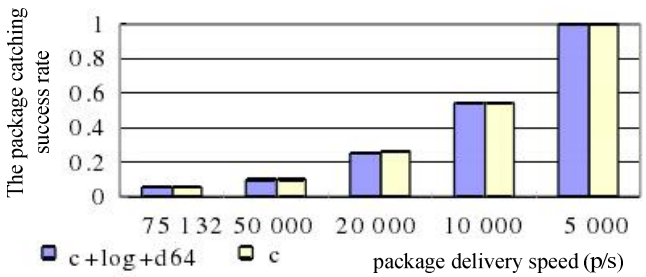
TABLE 1 : The testing orders

Name of the orders	Content
Log_64/1518	./snort-l./log
Dlog_64/1518	./snort_l./log_d
c	./snort_c snort.rule
C+log+d64/1518	./snort_c snort.rule_l/log-d

Delivery 1 million contracts for testing each time, Figure 3 shows the testing results:

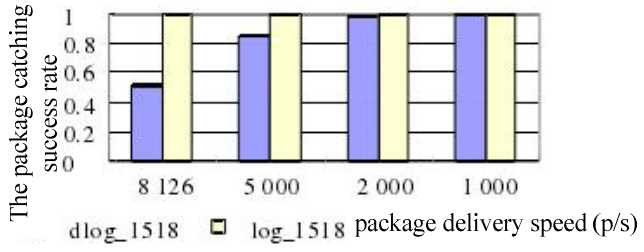


(a) Test the package catching performance of the snort



(b) Test the role-matching performance of the snort

Figure 3 : Test snort performance with 64B TCP package



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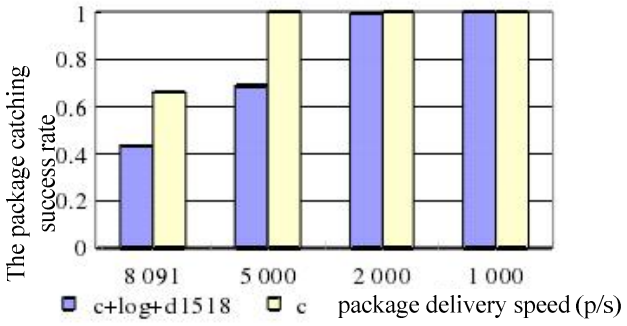

(b) Test the role-matching performance of the snort

Figure 4 : Test snort performance with 1518B TCP package

The Network bandwidth occupancy rate is 38.47% when the contracts delivery rate is 75 132pps, see Figure 4. The basic module of the system put forward in this paper is B/S module, Server Scope is provided by Web Browser. The Server Scope consists of 4 layers like external interaction layer, integrated processing layer, business layer and an information storage layer, among which, the users can log in the system with external interaction layer through browser, the integrated processing layer makes the system more flexible by process all kinds of requests from the users, business layer provides business security service and configuration Information Services, information storage layer can realize database sharing and data separating to make the database more safety. This platform system designs a scheduling mechanism for meeting the requests to make the interface and the functions configurable and the education resources be deployed more efficiently and more flexibly. The requests from the users can be divided into 3 types: the first is appearance requests, the Server Scope should display specify information without changing the business service situation. The second is system configuration request, the Server Scope should modify accordance configuration without changing the service situation. The third is education resource request to which the service situation should be changed when reply, for example, If a user submits a learning video request, the work process management module will be started, and the platform will designate system resource to maintain the lifecycle of the video. The Server Scope can successfully reply all requests and provide application service to support the resource allocation with workflow engine and rules engine. In this case, the throughput rate of the network bandwidth is approximately 24.3%.

Connection processing performance testing

The package testing is speedy and with large quantity. The core module is further divided into several sub-modules like consolidated supervision, authority control, business processes, automatically sign of the system, document processing, information collection and searching. See Figure 2 about the system modules, each module is in accordance with the users respectively and will be started by the identifiers which reach to the modules through metadata channels and each module combined with metadata Ribbon to access the required resources. The main function of the consolidated supervision is Server Scope service installment platform system which will configure related parameters and assign user rights. There are 3 ways for the rights management and control module to recognize the users：Server Scope services and associational people, access designated files according to their identifiers through the corresponding rights the system assigned to them. Server Scope meets all work process to provide better and more effective services to the users. The configuration tools of the work process module support internal work process of the platform system or within department only. Automatically sign of the system is realized by sign technology or watermark means of identification. The files processing module adds, induces or transfers documents which are stored in a database in a table in different servers. This module can automatically manage some certain electro-documents, for example, cleanup expired or temporary files and activate the relevant documentation, etc. Searching module aims to provide better searching service for the users through collecting and extracting relevant information from the documents. And the students can freely search the needy information from the database of network security management system by this function. The details are showed in TABLE 2.

TABLE 2 : WebStone load distribution

File name	Ratio %	Filesize
/wbtree/233_1.gif	35	223<1k
/wbtree/6040_1.gif	50	6040<10k
/wbtree/41518_1.gif	14	41518<100k
/wbtree/11426_1.gif	9	150260<1000k
/wbtree/test,htm	1	123<1000k

The testing result is showed in the TABLE3. The security management gradually become necessary protection means and the frequency that the users choose network management system are on increasing, but distribution of computer and network resources is uneven in our country due to vast territory and large population. Network security management is a comprehensive technology needs to backing by research result from various fields like information security, network management, distributed computing, artificial intelligence and so on. High-effective computing ability and infinite store capacity, the main advantages of cloud computing, are increasingly studied since they are put forward. This paper researched the availability and advantages of the network security management system to make up for the shortcomings of the system with high-effective computing ability and infinite store capacity of cloud computing, the lost rate is 8%.

TABLE 3 : Snort testing result with webstone

Client num	connection number	A+L	A-L	Con./s	the server throughput rate(Mbps)	the customer throughout rate(Mbps)
1	18200	8900	18200	305.37	22.60	22.73
2	22337	10135	22291	387.43	28.62	28.74
4	24343	11238	22377	405.72	30.52	30.56

CONCLUSION

This paper mainly discussed the testing method that based on the hardware and software of the Server Scope Tester. This method still reserves all the advantages of the Server Scope. The system load will easily be generated if face the characters of the customers with the hardware features of Server Scope through B/S module in network information security system, and the diversity load directly replaced the single load in traditional playback method, this makes the testing environment simple, the system testing more possible and the operation easier. The experiment results show that this system is highly appraised and supported within its field.

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