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Reserace on improving the teaching system of network information security course

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ABSTRACT

Network monitoring, Internet rumors, cyber crime and other information security problems have become more serious in the network, both domestic and foreign status quo of network and information security education are difficult to meet security needs, China in this regard is more weak. China Network Information security is the lack of professionals, personnel training programs, curriculum and education system of network information security discipline is not perfect, the lack of systematic, comprehensive, and practical level. The curriculum and teaching content is too scattered. Lack of laboratory equipment, lack of experiment teaching information, and the pertinence is not strong. And practice related to the lack of special courses. In particular lack of practical experience and professional expertise of teachers. This paper according to the needs of various applications and job needs, structured and cultivation technology of network information security engineers, network security management of network information security professional and technical personnel, such as engineers and information officers. Proposed gradation, classification determines special professional development direction. Military, police and public security colleges dominated by network attack and defense techniques. College network professionals, such as computer science, information engineering, can open more technical information network security and management, and other professional can open networking and information security in general education. Through job training, in addition to strengthening the incumbent technology. Reform at the same time simple tool demo and basic operation of practical teaching methods, building specialized laboratories, building a network security practical training platform, strengthening the curriculum reform and innovation.

KEYWORDS

Network and information security education; Talents cultivating system; Professional development direction; Course system; Curriculum reform and innovation.



INTRODUCTION

With the wide application of the Internet, a growing number of Internet users, people on safety and reliability of Communications networks, quality of service, such as put forward higher requirements. Meanwhile, industries facing network security environment is increasingly challenging. In response to China's Internet infrastructure, transportation, energy and finance, securities, customs, taxation, industry, science and technology of networked information systems in key industries, such as exploration, infiltration and attacks gradually increased. The network-related equipment in security weaknesses as well as technical, management is not in place already constituting a major threat to national security. The latest data from the National Computer Network Emergency Response Technical Team Coordination Center (CNCERT) shows that the situation in China suffer increasingly serious network attacks abroad, mainly in two aspects: First, the site was tampered with foreign invasion, and second, the site was outside intrusion and placement back door, while the Chinese suffered DDoS attacks from outside is also very frequent. CNCERT sampling monitoring found that from January 1, 2013 February 28 in less than 60 days ' time, outside the 6747 Trojan or botnet control servers to control the Chinese territory more than 1.9 million sets of hosts. China online banking and payments platform, online mall 96% of the phishing site is located outside. Important Web sites by us hackers to implant back doors. As September 2012 to February 2013, some important government departments, a provincial examination Yuan, a property insurance company, some research institutes Wuhan virus, 85 major sites of government departments, research institutes and other units invade and implant outside the back door, 39 units of which sites are from the United States invasion of addresses^[1]. Meanwhile rumors network, network underworld that intrusion ordinary people are also increasingly deepened. Global trend of Informationization, on information security in the world's struggle was intensified. Variety of new attacks and the protection technologies (such as an attack on the industrial control systems, unbounded browser, Internet brush votes, Anti-AntiVirus) emerge in endlessly. The new attack and protection methods (such as network ID, cloud security etc.) emerge in endlessly, implementation of infiltration and espionage via the Internet, is a great threat to the national security of new tools, especially the Snowden exposes United States listening project^[2]. Information network security has become the focus of the national security, military security, economic security and personal safety. So it is necessary for the security problems brought by these new attacks and defense technology, the method of system analysis, to identify its brings on national security and social stability risk and impact, thereby cultivate network security and management personnel, to strengthen the security of key facilities.

CURRENT SITUATION OF DOMESTIC AND FOREIGN NETWORK AND INFORMATION SECURITY EDUCATION

If in the industrial age is nuclear war as the Center, then the Internet era is based on Cyber-Warfare Centre, information and network security has become the United States one of the three core strategies. Especially after the 9.11 incident, the United States, Britain and other countries for information security professionals train very seriously, not only to raise it to a higher level, but also increase the input into the information security talent cultivation in colleges and universities. United States Obama administration, strengthening information security as a revitalization of United States critical of economic prosperity and national security strategy, while strengthening the information security education and training of qualified personnel as security in cyberspace security strategy is focused on, in order to ensure that the United States controlled global information dominance^[3]. United States Secretary Nabolitanuo of Homeland Security 2012.6 announced that, the United States Department of Homeland Security will be cooperation with universities and private companies launched a plan aimed at nurturing a new generation of Web professionals. At present, the United States universities for teaching information security professional is commonly used "core courses + courses" teaching and training mode. Students who have completed the core curriculum based on optional courses from the curriculum to learn without having to take the entire module course. This allows students to not only master a solid professional knowledge, there are more opportunities to learn other knowledge, but also suitable for the teaching management and teaching students in accordance of their aptitude^[4]. China has also attached great importance to the information network security issues, have information security as a priority the development of cutting-edge technology included in the "Long-term Scientific and Technological Development (2006-2020)." But at present a lot of network and information security personnel training mode is mainly to teaching, much is for example demonstration using simple tools and lack of experimental operation. Now some domestic and foreign universities promote information security teaching method based on simulation, practice teaching using virtual experiment system, and achieved certain results in the conventional information security technology study. There are many colleges and universities to establish a network attack and defense of virtual experiment system, achieved good results.

NECESSITY AND URGENCY OF NETWORK INFORMATION SECURITY CURRICULA REFORM

Serious shortage of network and information security professionals

Network and information security personnel, trained in network technologies, information security education, know how computer technology, network management and information security knowledge and expertise to solve practical problems. They protect the security of information and ensure the smooth and safe running plays a fundamental and decisive role. But as a network security policy makers, programme implementers, Manager of network security, expertise in this field is still sorely lacking in the country, there is a big gap, particularly the high level of strategy and lack of professional and

technical personnel. As of the end of 2011, China's culture of information security professionals a total of about 40,000 people, from our requirements for information security professionals in more than 50 million demands is difficult to narrow the gap. The next five years, the social requirements for information security professionals to increase by about 1.2 million people annually. Regardless of the school education and social training and social needs are very appropriate. Every year our country information security less than 10000 graduates, social training students count the quantity is less than 20000, the phenomenon of information security talent shortage exist for a long time^[5]. Colleges and universities as the talent training base, of course, should take to carry out the research on the security of information and network technology, the popularization of information network security knowledge, the task of training talents of information security technology.

Current Situation of China's network information security education is not optimistic

Personnel training plan, course system and education system is not perfect

Network information security technology is a comprehensive science, involves long-term accumulation of knowledge and the latest developments in computer technology, communication technology, mathematics and cryptography, and many other disciplines, but also social and legal issues involved. It covers a wide coverage of knowledge, technologies and methods to update faster, learning is difficult. At present, China's network and information security education training echelon Although initially formed from specialist to undergraduate to master's to doctoral, but because the set up time is short, there are differences in culture and the focus of each between universities, the emergence of diversified ideas of running schools. Different modes of thinking on the one hand reflects the advantages of disciplines of the school-running characteristics of universities and, in early development is a useful exploration and attempt; on the other hand, also reflects China's higher education system, lack of unified planning and guidance for information security training, has not yet formed a scientific and rational, hierarchical teaching mode. Embodied in the following two aspects:

The discipline of Chinese network information security training program, curriculum and educational system is still not perfect

Currently the community's overall lack of awareness of information security, information security disciplines lack systematicness, comprehensiveness, hierarchy and practice. The number of professionals in the field of information security, content and depth of talent is not enough. And most colleges and universities are additional network security-related courses in information security professional or network engineering and other professions. Curriculum is still dominated by traditional information security technology, focus on cryptography, firewalls, intrusion detection, and other simple safety theory and technology of knowledge imparting, lack of knowledge about network security management and network attack and defense techniques of explanation.

The curriculum and the teaching content is too scattered, the lack of systematic, the lack of practice relevant characteristic curriculum

Because of network and information security knowledge update faster, more involved in the field, making the school's teaching program is not scientific, curriculum does not reflect the characteristics of the information security discipline itself, curriculum design and teaching content is too scattered, difficult to constitute professional knowledge architecture. Course is difficult, more content, strong theoretical and systematic not enough. Experimental courses is insufficient, lack of experimental textbooks, the pertinence is not strong. Laboratory equipment is not enough, training projects not closely linked with network security management, lack of practical training base.

TEACHING CONTENT, TEACHING METHODS CAN NOT MEET THE TEACHING NEEDS

With the development of information security awareness, information security professional has become an important part of major college computer teaching system. But the current teaching of information security, or too focused on theory studies lacking specific test case, or puts too much emphasis on a particular case while ignoring the complete training of information security knowledge; But currently of information security teaching, or too focuses on theory research and missing specific experiment case explained; or too focuses on a specific case analysis is ignored has information security knowledge structure of full introduced; or only focused on virus prevention technology is not explained related network offensive and defensive aspects of knowledge; or only focused on network offensive and defensive of General technology is failed to in-depth to hardware bottom, formed can't a full of information systems security solution programme. Furthermore, because of the information security and information industry closely related, the simple classroom and online teaching is not sufficient to reflect the current security technology development. The students' study of knowledge are still staying in the pure theoretical teaching or equipment application level, the theory and practice of operation combined with close enough, make the students not possess solid foundation of skills in learning. But as an information security professional talent, not only for deep understanding of theoretical knowledge, but also enhance practical ability. Experimental operation, deep understanding of knowledge and application of network and information security, enhance their employability and competitiveness.

Lack of training platform for practice teaching, practical ability is weak

The cultivation of traditional information security personnel training mode out of the lack of practical ability, do not meet the social needs of network security management. Network information security technology not only has a strong

theoretical, but also has a very strong practicality and applicability. Troubleshooting capabilities of the security risks and security threats requires a lot of practice to gain experience; constant practice can improve, so practice is important.

At present, some colleges advocate simulation-based approach for information security. Nowadays most institutions do not yet have set up simulated environmental conditions, the experimental conditions is still quite backward, the lack of teaching platform, experimental teaching is lagging behind, unable to complete a complex information security laboratory. Colleges and universities because of training resources, training places, training funds and many other reasons, the information security training teaching mostly adopts the method of case teaching, but many of these cases and knowledge is separated, the involved knowledge and skills is not much, just a disorderly heap some case product, no systematic relative, it is difficult for students to the knowledge to be applied. Students more in the laboratory using automated tools, combined with the General system and network analysis software, to understand and to master basic principles and methods of typical network attack and defense, management and protection of the real network capability is not strong and cannot meet society's demand for information security professionals, that he took to the job, over a long period of time is not suitable for the work undertaken.

Insufficient numbers of teachers, lack of network security management technology professionals

Currently, most colleges and universities in the disciplines of information security have begun to have a good academic accumulation, the formation of good teaching and research echelon. However, in practical teaching and application of information security disciplines is still relatively weak, but also the lack of accumulation of deep research and development and personnel training, the lack of practical experience and expertise of teachers.

On the one hand, the number of professionals is insufficient, level uneven. Professional teaching institutions, less neglected schools and related departments. Associated with the network security management subject is difficult to obtain the project, the thesis is difficult in the core journals, thus affecting the teachers' teaching and research enthusiasm, restricted to foster the development of information security discipline in China and advanced professional talents.

On the other side, there is a network management experience, understand network attack and defense technology teachers are too low, and professional learning content of relevant training institutions are not strong enough, and general safety precautions, and active intrusion to talk too little, it is difficult to achieve mutual understanding, it is difficult to deal with alien invasive.

REFORM AND INNOVATION

Establish a complete system of personnel training programs

Most of China's enterprises and institutions have set up internal LAN, but most network administrators master the General network management and maintenance technology, know very little on network and information security technology, combined with a lack of appropriate supervision, information leak-prone. More seriously, there is frequently targeted espionage; cyber warfare has become the Internet age a no smoke, no battlefield of the war, was highly governments attention, competing to create "Cyber Army"^[6], network and information security technology both very sensitive and very important. And the network of the variety, technology in the continuous innovation, computer networks, communication networks, integration of sensor networks, cable networks, the integration of wireless networks, it is the network management personnel to bring a great challenge. Therefore, according to the needs of the application environment and job requirements, different levels, training a large number of have the direction of network information security technology of network information security engineer, network security management engineer and chief information officer and other professional and technical personnel is very necessary for^[7]. The personnel training system can be constructed as follows:

The system

- Establish a network information security discipline, strengthen informal networks of information security undergraduate, master's and doctoral degree education
- vocational training, the network information security of employment training, job training, certification training and post training

Category

- network security management "practice" talent
- organizational decision making and management talent
- security technology development personnel
- technical services (integration, consulting) personnel training
- National Information Security Awareness Education
- Training System^[8]

Levels, sub-categories to determine the characteristics of the professional development

As a base for talent cultivation in colleges and universities, of course, have to bear this burden. Institutions of different systems should be based on its own characteristics and development direction, to determine the focus of the teaching system.

Military institutions dominated by network attack and defense techniques

The development network attack and defense equipment as a primary objective

Proficiency in a variety of programming languages, familiar with the properties and characteristics of various types of existing network equipment, targeted research and development of tool software and hardware devices. It acts as arsenal, is responsible for research and production of weapons and equipment.

To study the network attack and defense strategies and offensive and defensive schemes based

Proficiency in a variety of ways to use offensive and defensive tool software and equipment, through the development of an efficient offensive attack and defense strategies and solutions, practical exercises against a variety of offensive and defensive scenarios. Which acts carried out strikes in front of the field armies.

Police colleges to Internet-based network monitoring technology

Mastering content filtering, remote monitoring, digital forensics and information tracking technologies. Its role to maintain the stability of the local police force.

Ordinary colleges and universities in the network, computer, and information engineering specialty can open more technical information network security and management course

1. Research colleges and universities to study the network and information security technology-based Universal in various algorithms, theoretical model, model and its application to research priorities, develop network security technology and equipment to develop talent.

2. application-oriented colleges and universities to study information security and network management technology-based

With technical service (system integration, information security consulting, network security management) personnel training mainly, training of network security management and maintenance personnel for the enterprises and institutions.

Other professions will be College general education in network and information security

In recent years, enterprises and institutions for common network attacks and frequent incidents of diarrhea secret, national security awareness education brook no delay. And regardless of what professional learning, college students often work in the future is easy in technical and management positions stronger; it should strengthen the training of network and information security awareness. Can be related to education through elective courses, public elective, academic seminars and other forms.

Through vocational training to enhance staff technical updates

Vocational training is a useful complement to the formal academic education, continuing education for in-service personnel play an important role. Curriculum system of vocational training should be developed in accordance with social needs, planning, direction, hierarchically related staff information security job training, on-the-job training, certification, training and job training.

Curriculum reform and innovation

Network information security is a very practical subject, and information and network security curriculum of most universities emphasis on theoretical teaching, experimental teaching is lagging behind. Due to the requirements of such courses for laboratory construction, laboratory equipment is high, a lot of knowledge in practice requires students to be understanding and grasp. So reforms simple tool demonstrations and practical teaching basic operational mode and build a professional network and information security laboratory, building an integrated network information security training platform, which allows students to do all kinds of information and network security routine experiment and do some network attack and defense classes destructive experiments, students practice the full ability, better access to information and network security technology is essential for network information security training qualified personnel is of great significance. The specific measures are as follows:

Oriented to the needs of society, and optimizing the training system

Training system closely around the goal of network information security personnel training, from improving students' professional skills and social adaptation perspective, pay attention to the actual business and practice operation of integration, outstanding skills training, training operation, fully embody the "use-based "design thinking. In the industry to meet the demand at the same time, the expansion of basic theory of depth and breadth of knowledge application.

Perfect teaching and improving teaching level

Breaking various practical aspects of fragmented situation, focusing on professional development, the establishment of the overall concept of the practice of teaching. Also provides a set of practical ability training for teachers and the integration of knowledge acquisition of training materials.

Focusing on practical applications, highlighting Ability

The cultivation of network information security professionals to highlight the combat feature, so that students quickly understand, adapt and into the field of network information security. Should practice from many angles, students' complete

training operation in a variety of roles, which enable students to have complete control of the network information security technology, mobilize the enthusiasm and creativity of students. At the same time, cultivate the students' practical ability and the ability of active participation, strengthen the team cooperation consciousness.

CONCLUSIONS

China is the Internet country, but not the power the internet. A large number of facts show that China is one of the main victims of network attack.

The Chinese government has always firmly opposed and fights hacking according to law. But the information security problem is a system problem. Due to the rapid development of information technology and network of the global Internet, showing a more complex trend, need legislation, industry, academia and the majority of Internet users to pay together further efforts^[9]. Information and network security category course is network professional, computer professional and communication engineering, electronic information engineering, information engineering and other related majors specialized compulsory or elective courses, with strong comprehensive, application and practice. Reform and exploration of the course of practice teaching, to cultivate application-oriented engineering talents has important practical significance and reference value.

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