RESEARCH REVIEW JOURNALS
Volume-04
Issue-03
March -2019

ISSN: 2455-3085 (Online)
RESEARCH REVIEW International Journal of Multidisciplinary
www.rrjournals.com [UGC Listed Journal]

A Study of Cloud Computing Security Issues in Computer Science Application and Technology

Omkar Ramesh Ghatage

Department of Computer Science Mansarovar Global University (India)

ARTICLE DETAILS

Article History
Published Online: 13 March 2019

Keywords
Cloud Computing, Computer Secure Storage, Application Method, Security Issues, Computer Science, Application, Technology.

ABSTRACT

In the big data era, how to effectively store, analyze and effectively use massive data information? This is the current need of our social and economic development. The cloud computing technology has changed the traditional host era, which has more superb computing power, analysis capabilities and storage capabilities, the Internet technology and computer technology to effectively combine to trigger the transformation of computer information technology. At the same time, with the development of network information age, the security of information is getting more and more attention from everyone. This article systematically explains the concept and characteristics of cloud computing technology, computer network security issues and how cloud computing technology is used in computer network security storage for reference.

1. Introduction

Cloud computing is an Internet-based service related to the increase, use and delivery models that are generally used for the Internet to dynamically scale and provide virtual resources. Cloud computing is more capable than traditional computer computing, and it reaches 10 trillion operations per second. Therefore, it is widely used to predict weather changes, simulate nuclear explosions and market trends. Users only need to use mobile phones and computers to connect to the data center to calculate according to their needs. At present, there are three types of cloud computing services: IaaS: Infrastructure as a service, users can get perfect computer infrastructure services through the Internet, such as renting hardware servers; PaaS: Platform as a Service is actually a software development platform as a Sass: Software as a Service: Cloud computing developers provide software over the Internet, users do not have to buy software, just rent software from vendors. In the past two years, cloud computing has developed rapidly. Many network operators are actively developing cloud services, and the market for private cloud services is also expanding. In 2015, the market size of cloud services reached 52.24 billion U.S. dollars, up 20.6%. The difference between cloud computing and traditional computers is that they are transmitted over the Internet. They are calculated on a large number of distributed computers rather than on local computers or remote servers. Its data center, like the Internet, can be stored and calculated on demand by enterprises or individuals simply by switching resources to the desired application. It is very large scale, low cost, easy to access, virtualization, reliability, versatility, scalability and potentially huge risk characteristics.

Virtual Classrooms

A virtual classroom (VCR) is an interactive environment where the learners and educators collaborate via computers [14]. The learning setting is often augmented by multimedia to enable interactivity. With the growth of Web 2.0, social interactions have played an important role in virtual environments beyond e.g. a simple game-based learning. Unlike a traditional classroom, the content of a VCR course can be repeatedly used [15]. In addition, VCRs often offer two distinct features that traditional e-learning [16] does not support: virtual presence,and synchronous live distribution. CBE can eliminate the limitations of traditional e-learning.

2. Cloud computing in computer science education

The accelerated development in Information Technology and the necessity for enhanced learning environments by harnessing advance technologies and resources has created a need to teach Computer Science and Engineering students more effectively using technological advances. Cloud Computing [1-5,7] appears to be one of the most beneficial tools for this purpose due to the offered benefits like availability, scalability, agility, elasticity, and on-demand services. These characteristics, among many others, can give the impression that Cloud Computing might significantly enhance the learning environment especially for STEM. Cloud Computing evolved from virtualization technologies which already existed in the IT ecosystem. Virtualization hides the underlying complexities and allows multiple customers, with diverse applications and demands, to utilize the Cloud simultaneously. The platform can offer a wide range of services using the virtualized services. The Cloud delivers a unique view of its resources and services, promoting user friendliness, cost-effectiveness, elasticity, and the pay-as-you-go business model. These features triggered significant interests in Cloud Computing worldwide. One important service of the Cloud can be regarded as Cloud-Based Education. This capability can promote cloud services in educational settings with minimal interference from the local data centers. Consequently, the cost of the needed infrastructure is reduced and the availability of establishing an advanced educational environment is dramatically augmented. For this reason and many others, Cloud Computing is poised to become a gamechanger, especially in education. With access to the Cloud, an educational institution can quickly develop and deliver advanced distance learning, with excellent benefits to STEM education. Quick availability of complex computations and visualization of applications in diverse STEM domains such as chemistry, biology, physics, mechanics, and others can

become a reality for the educators and the learners. The ecosystem of a typical cloud utilizes a three-layered architecture [2, 7]. On the top layer, there is Software as a Service (SaaS). In the second layer, there is Platform as a Service (PaaS) and in the third layer, Infrastructure as a Service (IaaS). A CBE-CS platform will utilize all three layers offering new services to the educational community. This paper examines how specific Computer Science courses can be mapped to certain layer(s) of the Cloud. Rapid growth of the cloud technology and promises to reduce the IT costs [5] pushed numerous educational institutions to revise their IT infrastructure and follow the Cloud development. Our university, like many others, is moving to the Cloud within the next five to ten years. Computer Sciences and STEM Education are among the prime targets. Ever since the emergence of Cloud Computing, significant emphasis and efforts have been offered in exploring and defining this new technology [4, 7, 8, 9]. Experts predict that by 2020 most institutions and enterprises will move to the Cloud thus eliminating the dependency on desktops [10]. Nevertheless, the universal scheme among all Clouds is the scalability of offered services through the Internet. These services vary, starting from the needed hardware to the applications. Several research efforts [5] in the educational field focused on using public clouds like Windows Azure [11], Amazon Elastic Compute Cloud (EC2) [12], and Google AppEngine [13]. While standardization efforts are underway by NIST and others, the majority of cloud users seek the power of the Cloud in the infrastructure, platforms, software, and services.

3. Computer science and engineering education

The goal is to deliver an improved learning setting for computer science education. Using the CBE concept, the framework can become portable and be generalized to offer a wider range of services for computer science and engineering education. To determine potential computer science courses, we analyze our curriculum in respect to the CS2008 Review Taskforce [31] sponsored by ACM and IEEE Computer Society. The analyzing process was based on the assignment types, syllabus components, and course specifications in the CS Curriculum 2008 [31], and with respect to the base services of Cloud Computing. The result is (illustrated in Figure 4) mapped into the three layers of the Cloud architecture. We trust the presented mapping facilitates eloquent learning outcomes. This work examined Cloud services to determine which courses would suit best to what level. The goal has been to teach the content in an interactive mode to better stimulate students learning. It was decided to spotlight the nontheory courses in this effort since most cloud services use programming. This is the focal point in identifying the intimate relationship between Cloud Computing and Computer Science education. The selection does not outcast theory courses but rather stresses the attention to utilize PaaS services. Clearly, any CBE can benefit from SaaS which ultimately uses IaaS utilities. In addition, the project identified different levels of difficulties in courses to explore more than one layer of cloud services. Moving from the SaaS layer to the PaaS reflects the increase in the depth, difficulty, and complexity of a course. Likewise, the move from PaaS to IaaS indicates complexity of a course with respect to the needs for details in VM configuration, networking, and operating systems. For courses like Fundamental Programming, Intro to Computer Security, Data Analytics, and other courses on the SaaS layer, we propose using hosted applications on the Cloud and eliminating licensing issues, maintenance, and updates. For Fundamental Programming courses, any programming language hosted on the Cloud can be used. Managing user access and group organization can be done at SaaS level for e.g. Intro to Computer Security course.

4. Computer Network Security Issues

With the development of computer and mobile internet, the problem of network security is becoming more and more important. In recent years, many international cyber security incidents have been launched by international hacker organizations and cyber terrorist organizations. In May 2015, the information of 100,000 taxpayers in the United States was stolen, resulting in a direct economic loss of 50 million U.S. dollars. In June, the Japanese government's pension information system was hacked, revealing 1.25 million personal information; in October, the British telecom operator Talk was hacked, resulting in the disclosure of 4 million user information. This shows that computer network security is related to personal, business, social and national information security. At present, under the wave of Internet economy, various computer software’s and mobile phone APPs emerge in an endless stream, and the speed of upgrading is very fast. Some of thesesoftware and mobile phone APP itself has many flaws but it is recommended to install and use. Therefore, in the course of using the network security problems often appear. In the meantime, all kinds of computer virus and mobile phone virus are sent to the user through SMS, telephone, etc., and the user is infected without the knowledge. Computer virus is a special symbol, it can quickly copy and reproduce, it can spread a large area, with serious consequences. Network hackers use viruses to intrude on personal computers or mobile phones, thereby obtaining user's personal information such as personal shopping information, bank card password, and then silently transferring the property in the user's account to cause serious losses to the user. The cloud computing database through encryption technology, only the owner of the data through the password to enter the data center, for other cloud computing users is to implement the confidentiality. But there is no secret to cloud providers. In recent years, while vigorously developing cloud computing, our country has also stepped up the security management of Internet security and cloud computing technologies.

5. Cloud computing technology for network security

Password verification. The system creates a valid user name password for the user in need. During the authentication process, the user only needs to input the corresponding user name and password according to the prompt, that is, the user can perform the verification and the verification is correct and the user is deemed as the valid user, otherwise, unauthorized user. smart IC card application authentication. Enter the user's legitimate information into the smart IC card, enter the user name and password when the user needs authentication, the smart card can be sent to the authentication server random number for verification, greatly enhancing the network's security performance. Kerberos authentication. This is a third-party trusted authentication protocol under the authentication

method, it has a resource access mechanism and authorization server, the user's password can generate a key K, and then through the authorization server ticket for authentication, access to the system After the legal certificate, you can get the appropriate service. PKI authentication. This is based on the security certification under the public key infrastructure. It implements the encryption and decryption process through the key matching each other, and realizes the security service under the key backup and recovery mechanism and key update mechanism. Data Encryption Data Encryption mainly consists of symmetric encryption algorithms and asymmetric encryption algorithms. Among them, the symmetric encryption algorithm has higher encryption and decryption speed and higher confidentiality. However, it is more difficult to transmit and manage the keys , But also the lack of signatures. The asymmetric encryption algorithm makes up for the shortcomings of the symmetric encryption algorithm, which is simpler for key delivery and management efficiency, with higher security, however, this encryption, decryption slower and more complex . Cloud computing data center storage disaster recovery and recovery technology to preserve the integrity and availability of data, including the scalable technology through the scalable large-capacity storage pool to manage the storage of physical space, it completely changed the management of the file system Way, is no longer limited to a certain physical equipment, greatly enhanced the security performance of storage systems.

6. Cloud Computing In Security Storage Application

This is a computer algorithm under the challenge-response-authentication mechanism. It introduces the concept of error-correcting coding. When a user of cloud computing queries the data, he verifies the status of the data and challenges the cloud. According to the user's The challenge is to respond. At this time, the user determines the security status of the cloud data through the response of the computer. If the verification fails, it proves that the data center file may be damaged and needs to be repaired. If the damage value is within the threshold, then You can use the code to restore the original data. If the verification is passed, the user can directly enter the cloud computing or storage. In the process of network computer running, often due to the failure of the computer itself caused by data corruption, coding in the recovery of data information has a relatively strong advantage. Through this challenge, response, validation algorithm that allows users to verify the integrity of the cloud database and security, but also to achieve precise positioning and analysis of cloud errors. In order to ensure the safety of data stored in the cloud, MC-R, MC-R in the cloud and MC-R policy of the policy user can generally be adopted to achieve management and security control over user data. The application of MC-R strategy is mainly reflected in two aspects: one is the encryption calculation of the client MC. Due to the insecure network environment, data hiding and data masquerading performance are relatively poor. In particular, some hackers on the network can exploit programs or client vulnerabilities to invade the data center and cause data Information leakage and so on. Therefore, in order to improve the security of network computer cloud storage, the database and the cloud are generally encrypted. The client's MC encryption method can realize the construction of data hiding module, data masquerading module and data marking module. The three modules each have their own advantages, and the three are in a state of synergy with each other to realize the safe storage function of the cloud computing technology. On the other hand, they are cloud-based RSA applications. Cloud computing has supercomputing power, so it only needs to encrypt the core data and key data in practice, so it can effectively avoid the heavy data consumption status of the cloud RSA. Its encryption and decryption module construction, mainly is: First, the user's needs to build a set of RSA company key, and then save the user authored by MC encryption algorithm to process the data, upload to the cloud, the cloud then encrypt the data . Finally, the cloud users to download encrypted files, unlocked by the key to find the hidden data, you can restore the data at the beginning of the state.

E-learning and the Cloud

Distance Learning (DL), also known as e-learning, has an important role in education, especially for students who have health, work, location, or disabilities that hinder them from attending a traditional classroom. Students can join diverse activities online to meet the learning objectives of a class. Despite the offered flexibilities, e-learning has limitations and challenges. Examples include scalability, quality, real-time interaction, and affordability due to the space restriction and the technology used. Traditional e-learning uses the client/server model often with limited network bandwidth. When excess requests are sent to the server, it gets congested. Most traditional e-learning systems lack social interactions caused by restricted technology with marginal quality of service. A 2006 study on e-learning market estimated reaching to $28 billion by 2008. In that year, the synchronous e-learning portion was worth $5 billion (only 18%) whereas in 2011 it was doubled. Cloud services have alleviated several shortcomings of e-learning infrastructures. As a result, it is anticipated that Cloud-Based Distance Learning will be expanded dramatically in future due to the lower cost of maintenance, the elasticity features, and the pay-as-you-go business model.

CBE for Computer Science

The goal is to deliver an improved learning setting for computer science education. Using the CBE concept, the framework can become portable and be generalized to offer a wider range of services for computer science and engineering education. To determine potential computer science courses, we analyze our curriculum in respect to the CS2008 Review Taskforce sponsored by ACM and IEEE Computer Society. The analyzing process was based on the assignment types, syllabus components, and course specifications in the CS Curriculum 2008, and with respect to the base services of Cloud Computing. The result is (illustrated in mapped into the three layers of the Cloud architecture. We trust the presented mapping facilitates eloquent learning outcomes. This work examined Cloud services to determine which courses would suit best to whatlevel. The goal has been to teach the content in an interactive mode to better stimulate students learning. It was decided to spotlight the non-theory courses in this effort since most cloud services use programming. This is the focal point in identifying the intimate relationship between Cloud Computing and Computer Science education. The selection does not outcast theory courses but rather stresses the

attention to utilize PaaS services. Clearly, any CBE can benefit from SaaS which ultimately uses IaaS utilities. In addition, the project identified different levels of difficulties in courses to explore more than one layer of cloud services. Moving from the SaaS layer to the PaaS reflects the increase in the depth, difficulty, and complexity of a course. Likewise, the move from PaaS to IaaS indicates complexity of a course with respect to the needs for details in VM configuration, networking, and operating systems. For courses like Fundamental Programming, Intro to Computer Security, Data Analytics, and other courses on the SaaS layer, we propose using hosted applications on the Cloud and eliminating licensing issues, maintenance, and updates. For Fundamental Programming courses, any programming language hosted on the Cloud can be used. Managing user access and group organization can be done at SaaS level for e.g. Intro to Computer Security course.

Operating Systems

Operating Systems (OS) is one of the most beneficial courses for CBE-CS since most CSPs offer a variety of OS images. Students can perform multiple exercises and programming assignments on the available OS images. In addition, they can design their own OS and implement its image in a Virtual Machine (VM) on the Cloud. Due to virtualization techniques, no harm will be done if a student's version crashes. This is in contrast to a real machine which is the nightmare of any system administration who allows students root access. VM will expose the students to the in-depth knowledge on different operating systems, their performances, and compatibility. To start programming with Amazon AWS, the service selection comes first through the AWS interface. After the service selection, the user chooses an appropriate Amazon Machine Image (AMI) or uploads a specific created image from his/her local device to AWS.

7. Conclusion

Cloud computing is a new business computing model. Using high-speed Internet transmission capabilities, the data processing process from the personal computer or server to the Internet cluster of computers. As the core technology of next-generation network computing platform, it provides reliable and secure data storage, convenient and efficient Internet services and powerful computing capabilities. With the development of the Internet, computer network security is more and more important. It is necessary to apply cloud computing in computer network security storage and improve the security of cloud computing storage.

References

1. Fang Bing, Xiao Pengfei.Analysis of the color of the web design art [J]. Computer fans. 2017 (09)
2. Zhao Lu, Zou Di.J] .Network Security Technology and Application. 2017 (10)
3. Zhao Xin. Cloud computing technology in China's rural information technology in the application of research [J]. Rural Technology. 2017 (19)
4. Song Rong. Analysis of Cloud Computing Technology Based on Intelligent Cloud Network Architecture [J]. Computer Fans. 2017 (10)
5. Gao Xiang. Cloud Computing Technology Development Analysis and Application [J]. China New Technology and New Products. 2016 (13)
6. 6.Gan Lu, Sun Junju.Network security defense technology under cloud computing technology
7. Network Security Technology and Application. 2016 (02)
8. Terry, D. (2011) "Cloud Computing", ACM Tech Pack Committee on Cloud Computing, http://techpack.acm.org/ cloud/
9. Dong, B., Zheng, Q., Yang, J., Li, H. &Qiao, M. (2009) "An e-Learning Ecosystem Based on Cloud Computing Infrastructure", Ninth IEEE International Conference on Advanced Learning Technologies,
10. Microsoft Windows Azure Platform, 2011, www.microsoft.com/azure/default. mspx
11. Amazon (2011) Amazon Elastic Compute Cloud (EC2). http://aws. amazon.com/ec2/
12. Google (2011b), Google Apps, http:// code.google.com/appengine/
13. Chen, R. & Liu, S. (2009) "Applying Concept Mapping on the Influent Learning in Virtual Classroom", Ninth International Conference on Hybrid Intelligent Systems.
14. Das, S., Dhande, A. P. &Bhoi, M. (2010) "Leveraging Virtual Classroom for Effective Learning", Int. Conference on Technology for Education T4E, 101-106.
15. Ma, H., Zheng, Z., Ye, F. & Tong, S. (2010) "The Applied Research of Cloud Computing in the Construction of Collaborative Learning Platform under E-Learning Environment", Int. Conference on System Science, Engineering Design and Manufacturing Information.
16. Vaquero, L.M. (2011), "EduCloud: PaaS Versus IaaS Cloud Usage for an Advanced Computer Science Course, Education", IEEE Transactions on Education.
17. Al-Zoube, M. (2009) "E-learning on the Cloud", International Arab Journal of etechnology, 1(2). pp.58-64.

