# Research on Computer Network Security in Cloud Computing Environment

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**Abstract:** *With the rapid development of China's social economy and the continuous improvement of the level of science and technology, information technology and big data technology are also developing rapidly. Cloud computing has been widely used in various fields of people's daily life and work and occupies a very important position in social production and life. Based on this, combined with the development and application background of cloud computing, this paper discusses the main problems faced by computer network security and tries to put forward corresponding security prevention technology to promote the construction of a high-quality environment under the cloud computing environment and ensure the security of information and data applications.*

**Keywords:** Cloud computing; Computer; Network security.

## 1. INTRODUCTION

Cloud computing has a profound impact on human production and life, greatly facilitating people's work and life. However, at the same time, network security issues have also received further attention from people. In the application of cloud computing technology, data processing needs to be completed with the help of an open Internet system, and information may be stolen and leaked during data transmission. At present, there is still a lack of comprehensive security protection technology in cloud computing, which makes it difficult to actively resist unexpected situations. At the same time, with the development of the information age, network viruses are becoming more covert and aggressive, and hackers' technical level is also improving, which increases the difficulty of prevention work and seriously threatens information and data security. Request to strengthen the security plan for computer networks, improve security technology, strengthen encryption, etc., to enhance the security of computer networks. Peng et al. (2025) integrated IoT data with reinforcement learning to optimize adaptive macroeconomic policies, demonstrating the potential of data-driven approaches in economic decision-making[1]. In the field of computer vision, Lyu et al. (2024) optimized convolutional neural networks (CNNs) for rapid 3D point cloud object recognition, enhancing efficiency in real-time applications[2]. Wang and Liang (2025) applied reinforcement learning combined with graph neural networks and self-attention mechanisms to optimize supply chain routes, showcasing the effectiveness of AI in logistics[3]. Jin et al. (2025) introduced RankFlow, a multi-role collaborative reranking workflow utilizing large language models, which improves efficiency in information retrieval and ranking tasks[4]. Xie et al. (2025) proposed RTop-K, an ultra-fast row-wise top-K selection method for neural network acceleration on GPUs, addressing computational challenges in deep learning[5]. In the realm of human-computer interaction, Xu et al. (2025) developed AI-enhanced tools for cross-cultural game design, facilitating online character conceptualization and collaborative sketching[6]. Yang et al. (2024) conducted research on large scene adaptive feature extraction using deep learning, advancing capabilities in complex visual environments[7]. Additionally, Zheng et al. (2024) performed a comparative study of advanced pre-trained models for named entity recognition, highlighting their effectiveness in natural language processing tasks[8].

## 2. THE CONNOTATION OF CLOUD COMPUTING TECHNOLOGY

Cloud computing technology is a new way of computing that enables users to process billions of pieces of information in just a few seconds, and it also provides powerful network services. Cloud computing technology is an extension of distributed algorithms, parallel processing algorithms, and network technology. At present, cloud computing technology has achieved unprecedented development. The infrastructure of cloud computing technology has the characteristics of reliability and security in terms of platform, gradually demonstrating its strong stability and vitality, and is being adopted by more and more users, enterprises, governments, and universities. Cloud computing technology distributes tasks on the resource pool of computers, and various applications can refer to their actual needs to obtain the relevant resources they need. These large and rich data are

stored in the cloud computing platform and operated on it. This computing method is significantly different from traditional computing methods, as it can provide users with convenience and more economical use of computer resources.

## 3. THE PROBLEMS OF COMPUTER NETWORK SECURITY PREVENTION IN CLOUD COMPUTING ENVIRONMENT

### 3.1 There are certain deficiencies in identity authentication within the security system

In order to further enhance the ability of network security systems to resist external security factors, identity authentication technology is crucial for analyzing current network security systems. However, due to certain limitations in the current level of identity authentication technology. In this system, there are still some uncertain factors and defects, which lead to the risk of information data leakage. When some hackers and criminals attack computers, they usually use the platform manager to steal other people's relevant information, and then use this information to log into other platforms, illegally stealing and intercepting data.

### 3.2 The proliferation of false information on the internet

Due to the virtual nature of the network environment, accompanied by the spread of a large amount of false information, dangerous links, and other content, network security is seriously challenged and serious information security issues are induced. At present, cloud computing is still in the stage of improvement and optimization, and there is an urgent need to optimize security measures, especially the lack of security detection and screening of network source addresses and source code, which makes it difficult to timely identify various false information, bringing pressure, interference, and damage to servers, software, etc., and posing a threat to the deep application of cloud computing.

### 3.3 Cloud computing security risks

The security risks of cloud computing itself are important issues that threaten computer network security. While cloud computing has improved data processing and computing speed, the transmission of large amounts of data to cloud systems itself carries certain risks. It is like storing all files and information in a huge cabinet. As long as you master the key to crack the protection of cloud systems, you can easily obtain a large amount of data and information. This is the most core risk and problem in the current cloud computing environment. The uploading and storage of privacy data of units and individuals involved in cloud computing have extremely high value in various types of data. Although cloud computing service providers provide guarantees that data will not be leaked to units and individuals, the internal personnel of units themselves have uncertainty, and the value of internal data in cloud computing invisibly increases the risk of data information in the cloud computing environment. In recent years, reports on data breaches have also shown that the majority of user personal information leakage issues are malignant problems caused by internal personnel within the organization who knowingly violate the law. In addition to preventing external risks, the effectiveness and standardization of internal key storage also need to be paid attention to and valued in computer network security prevention in cloud computing environments.

## 4. COMPUTER NETWORK SECURITY PREVENTION IN CLOUD COMPUTING ENVIRONMENT

### 4.1 Enhance Security Awareness

In the cloud computing environment, enhancing awareness of computer network security prevention is a prerequisite and fundamental element for ensuring network security. Both cloud computing users and service providers need to enhance their own security awareness. Especially, cloud computing service providers need to conduct in-depth analysis of the current network security environment, improve system security protection and resilience, and create a secure cloud computing environment. At the same time, with the enhancement of security awareness, internal management has been strengthened, and the internal security risks of cloud computing systems have been reduced. Similarly, the security awareness of cloud computing basic users and user units should also be strengthened, taking into account the comprehensive strength and security level of cloud computing servers when selecting, and strengthening cooperation with institutions with strong security protection capabilities. Identity recognition keys should be strictly controlled to avoid leakage. In the cloud computing environment, relevant

parties need to attach great importance to the principle of confidentiality of network information data, and operate in a standardized manner during the use of cloud computing and computer networks. Files with unknown sources and purposes cannot be clicked, and the use of public computers and public networks to perform related operations should be avoided to minimize security risks.

## 4.2 Strengthen the security management of client networks

With the development of the information age, every computer network user based on cloud computing environment needs to continuously strengthen their security prevention capabilities. In the actual use process, they need to adopt standardized and secure operations, regularly maintain security software and equipment, manage and backup information data, and avoid database damage caused by attacks. For example, with the help of the abnormal behavior analysis module in the network security management system, it is mainly responsible for monitoring and analyzing the operations of the system client, and comparing them with the permissions and data in the database to timely grasp the dynamics of abnormal situations and determine whether there are any violations in the operations. Once it is confirmed that it belongs to a violation problem, the defense decision generation module will handle it, especially for analyzing the abnormal behavior generated, quickly generating scientific defense decisions, including USB interface closure decisions, network disconnection decisions, virus isolation decisions, and network warning decisions, etc., to prevent information data in the cloud platform from being stolen by USB interfaces or network channels, thus automatically completing the response to client network security issues. By utilizing institutional constraints and working together with cloud computing to ensure secure connections between upstream and downstream, network attacks can be exposed and the security of information and data can be comprehensively improved.

## 4.3 Improve the security and confidentiality of user information and data

4.3.1 Reasonable application of encryption technology

It is very important to enhance the security of information data and protect the legitimate rights and interests of users. In the process of improving security and confidentiality, the most common and highly operational method is to use encryption technology. When using this technology, data is generally transmitted securely in cloud management and cloud storage servers. The most commonly used encryption technology today is the RSA asymmetric encryption algorithm, which directly transfers asymmetric data between the server and the user using the keys present in the user. In general, the DES symmetric encryption algorithm is used for data transmission. In real life, when users want to store data, the data will enter the corresponding database, and then be encrypted by the user's encryption technology. In the virtual network environment, diversified authentication modes are used to verify the user's identity. Then, cloud computing security systems can enhance the confidentiality of the security system while ensuring information security.

4.3.2 Application of Filter Technology

At present, widely used filters include Websense and Vericept, which mainly supervise and manage the entire process of departing network data, intercept sensitive information, and monitor the use and transmission of data in all aspects.

## 4.4 Building a Security Protection System

In order to improve and optimize the management mode of computer network security, relevant personnel can actively build a computer network security protection system, including two modules: workstation protection and server protection. Workstation protection belongs to the lowest level of computer network security protection system and is the last security defense measure. Server protection should not only have the ability to monitor viruses, but also include automatic virus code updates, alarm functions, and remote installation functions. The majority of users have a high frequency of email and web browsing, leading to an increasing number of virus intrusion paths. The security of user data information can be ensured by setting new levels. For users' network data information resources, once a security incident occurs, it will result in significant losses. Therefore, users can ensure their data security by regularly backing up data information within the computer network, such as backing up system logs and server data.

## 4.5 Data backup and restoration

Network security measures in cloud computing environments must ensure proper backup and restoration of data. Data backup and restoration are the most important and critical defense lines in network security. In order to ensure computer network security in cloud computing environments, regular data backup work is necessary. Data backup provides room for recovery for subsequent system failures, virus infections, or operational errors. And in the cloud computing environment, cloud computing technology provides more convenient conditions for backup and restoration. By storing data through discrete storage methods, data security can be guaranteed to a certain extent. In the event of data damage, the backup stored data can be quickly recalled, thereby reducing user losses.

## 5.  CONCLUSION

To sum up, with the rise and development of the Internet, human beings have entered the information age, and cloud computing technology is also developing and improving. This technology has helped the development of society and made people's lives more convenient. However, cloud computing can also be called a double-edged sword. This technology can provide convenience for users' work and learning, but there are also some network security issues. Once these network security issues cannot be scientifically solved, it will inevitably affect the legitimate rights and interests of the people, lead to the leakage of user privacy information, and also restrict the further promotion of a harmonious society.

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