

# A Preliminary Study on Data Security Technology in Big Data Cloud Computing Environment

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**Abstract:** In the rapid development of Internet technology, the application of various new technologies has become more and more extensive. Among them, the development of big data technology and cloud computing technology is very rapid, and these technologies are of great help to improving the efficiency of data storage and management. However, the data system itself has certain data security problems in the big data cloud computing environment. In order to improve people's information security in the process of data processing and integration, we need to study data security protection technology in the big data cloud computing environment. Only in this way can we solve data and information security issues based on specific conditions and improve the reliability and security of data transmission.

**Keywords:** Big Data Cloud Computing; Data Security; Technical Analysis

## I. Introduction

In the process of application, big data cloud computing technology is based on network processing and computing technology, and integrates traditional Internet technologies, such as virtual technology, network transmission and so on, to exchange resources and share information in a dynamic form. Therefore, big data cloud computing technology has the characteristics of easy expansion in the application process. In the application of big data cloud computing technology, more computers can be used to form a resource pool, and at the same time, the resource pool can be virtualized to form a complete computer system, thus providing corresponding services for users. When using the big data cloud computing platform, users can directly use the terminal to connect to the data center and obtain the corresponding resources and services according to the users' own needs. The timeliness and reliability of these resources and services are higher.

## II. Overview of Big Data Cloud Computing

Compared with traditional computer technology and network technology, big data cloud computing is a new computing method based on network storage, grid computing, distributed processing, load balancing, and virtualization technology. Big data cloud computing can integrate massive server resources into a unified system, and can store and process massive amounts of information data through a service model, so as to meet the needs of users for the use of massive information resources. The use of big data cloud computing technology can mine valuable information data for enterprises with less investment and a more convenient way.

The main advantages of big data cloud computing applications are manifested in the following two aspects.

First, the big data cloud computing system has powerful information processing capabilities and relatively low operating costs. Traditional computers use a single method to process information and data, the processing time is relatively long, and the management is also more complicated. The big data cloud computing system can centrally manage and process scattered data, and form a new network database on a unified cloud computing platform. Users only need to obtain the required data in a short time through a unified interface. This method breaks through the limitations of traditional data processing and transmission, and can greatly save operating costs.

Second, it is relatively simple for users to use the big data cloud computing system and can submit work efficiency. The big data cloud computing system itself is a comprehensive and relatively complete network system, and there are specialized technical personnel and artificial intelligence auxiliary systems to process the data. Users only need to perform simple interactions to complete data processing and screening in a short time and obtain the required information in time, greatly improving user experience and work efficiency. The big data cloud computing system can ensure the accuracy of information resource acquisition.

Third, in the application of big data cloud computing, its application is relatively flexible. The Internet itself is relatively open, and the big data cloud computing environment is in a closed space. In the process of cloud computing, we need to use the corresponding password to complete the resources and service functions. When using big data cloud computing technology, users can input their own requirements directly into the big data cloud computing platform, and then obtain the corresponding services. This greatly reduces the requirements of cloud computing platform operation for computer performance, ensuring resources and service effects.

Cloud computing is based on distributed processing, parallel processing, and grid computing. Cloud computing can integrate various computer science concepts to form corresponding products and services. For example, various cloud disks that are currently widely used are a form of cloud computing. The effective application of various technologies in the development of cloud computing is the key foundation. Cloud computing has relatively many basic technologies in the development. This article mainly analyzes virtualization

technology and distributed mass data storage and management technology. First, virtualization technology. Virtualization technology means that the operating support basis of computing elements is virtual, which can be divided into storage virtualization technology and computing virtualization technology according to the difference of objects. Virtualization technology can not only provide various convenient functions, but also complete the classification and integration of various resources. Second, distributed massive data storage and management technology. The server is the main component of the cloud computing system, mainly to provide users with corresponding services. When cloud computing uses distributed data storage technology, cluster computing, data redundancy, and other methods are needed to improve data reliability. In addition, cloud computing requires effective processing and analysis of widely distributed massive data. Therefore, we need to pay attention to the application of massive data management technology. At present, the data management technology in the cloud computing system is mainly based on the Google data management technology and the open source data management module to manage the data, which has a good management effect [2].

### III. Data Security Issues in Big Data Cloud Computing Environment

In the big data cloud computing environment, big data exposed in cyberspace is a target that is easier to be discovered and attacked. For one thing, the "big" of big data not only means a huge amount of data, but also means more sensitive and valuable data, which will attract more potential attackers. At the same time, the massive focus of data has virtually reduced the hacker's offensive cost and increased the hacker's "return rate." For another, the network-based cloud technology platform itself has many imperfections such as secure access, data detection, data isolation and protection, which increase the risk of privacy leakage. Specifically, the data security issues in the big data cloud computing environment mainly include the following issues.

#### A. Access Security Issues

In the big data cloud computing environment, the performance of data security issues is also multifaceted. Data access security is an important security issue that must be faced in the big data cloud computing environment. At present, the situation of users illegally accessing data is more prominent. This kind of security mainly includes internal security and external security. After the user enters all the data into the cloud platform, if internal personnel do not do effective security protection work, some illegal users can use remote control to access the data. This leads to hacker attacks on the data platform, and the security and integrity of the data will also be adversely affected. If users do not operate on data strictly in accordance with the relevant regulations of the enterprise, they will also cause data security problems when applying big data cloud computing methods. As a result, we must use corresponding measures and internal personnel management to effectively restrict user data access. We must also strictly abide by the big data cloud computing operating requirements and data security management regulations, so as

to improve data access security to a certain extent.

#### B. Isolate Security Issues

In the process of continuous technological development, people's demand for data security is getting higher and higher, and the issue of data isolation security has become a key issue of general concern. This is one of the main security issues in the big data cloud computing environment. From the perspective of using big data cloud computing environment, enterprises or government departments are its main users. In the actual operation process, most users perform data transmission and sharing during the operation of the enterprise when performing data operations. If the data encryption method is improper, or a lot of enterprise data is not effectively isolated from external computers, hackers will have the opportunity to attack the database, resulting in a great threat to data security and easily leaking enterprise resource information. Currently, we have not established an effective data isolation mechanism. In consequence, data security will be more threatened when enterprises apply the big data cloud computing environment.

#### C. Destruction Safety Issues

The issue of data destruction is one of the main manifestations of data security issues in the big data computing environment, so we must do effective prevention work. When using and reading data, in order to effectively prevent data leakage, we need to delete the data immediately. However, if data is not cleaned up on the terminal, it is easy to cause data to be stolen or leaked. Especially when deleting some relatively large amount of data, it takes a certain amount of time. In this case, the risk of data theft is prone to occur. The data residue will also provide an opportunity for the intruder to use it, and some users will use the recovery technology to restore the data, which will cause data leakage. Otherwise, when the network system itself has security vulnerabilities, data is stored in the cloud, and the integrity of the data will also be affected. A large amount of data will increase the burden on the network during the movement and increase the risk of data leakage [3].

#### D. Security Problems Caused by the Large Number of Network Access Paths

In the process of using user resources, because the number of front ends of the network storage path is relatively large, in order to complete the information extraction process in time during the next information search, we will store some data information. The front end of the network storage device will also contain different device storage services, and hackers will find system vulnerabilities through different paths and attack them. Although the method of storing data and information in the actual operation process can improve the convenience of operation, more network access methods will threaten the actual resource security of users.

### IV. Data Security Technology in Big Data Cloud Computing Environment

In order to improve data security in the big data cloud computing environment, we must conduct in-depth research and analysis on various data security technologies on the basis of mastering the data security issues in the big data cloud

computing environment, and use this to improve the effectiveness of data security protection technology. At present, the application of the following data security protection technologies can greatly improve the data security problems in the data cloud computing environment and improve data security.

#### *A. Data Encryption Security Technology*

At present, the full application of big data cloud computing platform can greatly promote the rapid development of China's economy. However, in the application process of big data cloud computing environment, there are still a series of security problems that will affect the application effect of cloud platform. Especially after the data storage and transmission of cloud platform, there are some problems such as data leakage and theft. Therefore, in the process of studying data security technology, it is necessary to analyze the problem of big data security privacy more deeply and pay attention to the effective application of data encryption security technology. In the study of data encryption technology, we can ensure the effectiveness of encryption technology from the following aspects. First, in order to ensure the security of information data, some users will use the storage service function on the cloud platform to encrypt and process personal information. This can improve the security of information to a certain extent. However, for cloud computing platform, because the framework design itself has some irrationality, it may lead to errors in the analysis of data, which will affect the effect of encryption processing. Therefore, cloud computing staff must pay attention to the problem of data security encryption. Second, in the process of remote data transmission, the integrity of data must also be paid attention to. Because in the transmission of data need to follow the relevant specifications. However, the integrity of the data may be affected when uploading. If the data is not uploaded completely, the use of data information by users will be seriously affected. In addition, it will also have a certain impact on the application performance of cloud service platform. Third, in the process of data calculation, we should also pay attention to privacy protection. Relevant departments need to pay attention to data computing information and results, and constantly improve the security of cloud computing platform. This can reduce the occurrence of data leakage. In order to ensure the security and privacy of data, it is necessary to strengthen the research and utilization of data encryption technology.

Data encryption technology is one of the data security technologies in the big data cloud computing environment. The main function of this security protection technology is to ensure data security and privacy. The system platform needs to fully optimize the data encryption technology to prevent various data security issues. Data encryption processing generally includes traditional information encryption technology and new cloud server settings. When traditional encryption technology is applied, the retrieved data must be downloaded to the local, and then the combination and encryption processing work must be completed. The cloud server setting technology can use cloud server operations to set corresponding keywords to complete the process of encrypting files. The traditional data encryption method is

cumbersome to operate, and the fault tolerance rate is relatively low. The new data encryption method can greatly improve the efficiency of information search. But we need to be aware that in the process of applying the new encryption method, data security cannot be fully guaranteed. Hence, when applying data encryption technology, we need to continuously optimize and improve to reduce the frequency of sensitive information as much as possible and improve data security [4].

#### *B. Data Sharing Security Technology*

Data sharing security protection technology is an important technology type to improve data security during data transmission. Shared encryption technology mainly includes the following three parts. First, cloud server encryption technology. After the data is downloaded from the cloud, the cloud server encryption technology can use public key encryption to retransmit to the cloud. This operation mode is relatively complicated and the efficiency is relatively low. Second, proxy re-encryption technology. This encryption technology needs to be transmitted through a triple relationship, from the authorized person to the agent and then to the accepting talent to complete the data transmission process. Multiple procedures must be involved in the entire data transmission process. Consequently, the efficiency of data sharing is relatively low. Third, conditional proxy re-encryption technology. This is the main application method of current data sharing security protection technology. In the application process, it is necessary to add encryption execution conditions based on the proxy re-encryption method. This can not only classify different content according to conditions, improve the efficiency of data sharing, but also improve the security of data transmission to a certain extent. But in the process of applying data encryption methods, it is also necessary to pay attention to allowing users to make a reasonable choice of encryption methods according to their actual needs. In this way, data security can be ensured to the greatest extent.

#### *C. Data Access Security Technology*

Data access security protection technology mainly includes big data access security privacy protection technology and data destruction technology. First, big data access security and privacy protection technology. In the application process, this technology needs to be based on cloud computing to store big data, which is divided into public cloud and private cloud. Among them, the public cloud is a network public database, with a relatively large storage space. Moreover, the amount of internal data resources is relatively rich, and the data has strong openness, so that users can obtain the data information they need in the public cloud. Private clouds are generally based on enterprises or companies. Private clouds have a certain degree of privacy. Companies will generate private data during business development and practical applications. Companies must store and protect these data to ensure the normal and stable development of the company. Because the private cloud itself has a certain particularity, it can use more advanced technologies to ensure the security of data resources. However, in the application of private cloud data access security protection technology, the application cost must also be considered. Therefore, in most cases, companies will use a hybrid of public and private clouds to ensure data security and

reduce the cost of data security protection. Second, data destruction technology. In the process of big data operation, data collection, data management and data storage are all important. Among them, the destruction link is also one of the main links in the operation of big data. The data destruction process will have a direct impact on the application value of the data. In order to ensure the timely and effective destruction of data and prevent the destroyed data from remaining or being leaked, we need to strengthen the research on data destruction technology to ensure the soundness and comprehensiveness of data screening methods. Meanwhile, we also need to ensure that data can be destroyed quickly and thoroughly to prevent malicious use of data and affect the interests of enterprises [5].

## V. Conclusion

All in all, in the big data cloud computing environment, we must not only pay attention to the positive impact of big data technology on daily production and life, but also correctly face the data security issues in the big data cloud computing environment. Furthermore, we must strengthen the research and application of various data security protection technologies based on the main characteristics of data security issues in the big data cloud computing environment. Only in this way can the security and reliability of data transmission be improved on the basis of ensuring the efficiency of data transmission.

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