

Optimization and Application Effect Evaluation of Cloud Data Integrity Verification Algorithm for Accounting Informatization

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ABSTRACT

With the development of information technology, accounting big data plays an increasingly important role in supporting enterprise decision-making. Aiming to address problems of data security and privacy protection in the existing cloud data storage environment, this article proposes a data integrity verification algorithm based on bilinear pairing and hash functions. By analyzing the characteristics and task processing flow of modern accounting information systems and reviewing current research, an efficient and safe data integrity verification scheme is designed and implemented. This scheme not only verifies the integrity of data indefinitely but also reduces the consumption of resources. The experimental results show that, compared with traditional file transfer protocols and provable data possessions, the new method reduces the communication overhead and has higher verification efficiency when dealing with large files. The research in this article provides new ideas and technical means for improving the security of accounting information systems and has important practical application value.

KEYWORDS

Accounting Informatization, Big Data, Integrity Verification, Information Security

INTRODUCTION

Accounting informatization big data refers to the process of supporting enterprise decision-making by collecting, storing, processing, and analyzing a large number of accounting-related data with the support of modern information technology (Balicka, 2023). By analyzing a lot of historical financial data, it can help enterprise management to better understand market trends, identify risk points, and discover potential growth opportunities. The use of big data technology can also monitor the real-time financial activities of enterprises, finding abnormal transactions or behaviors promptly, thus strengthening the internal control system (Gao, 2022). Through multi-dimensional data analysis of cost structures and income sources, enterprises can allocate resources more effectively and improve operational efficiency. The analysis of big data in accounting informatization mainly adopts descriptive data analysis, predictive data analysis, and regular data analysis (Bose et al., 2023; Chen et al., 2024).

In the practical application of big data in enterprises, various models are used to predict the possibility of different types of risks, such as changes in logistics costs and fluctuations in market demand (Wang et al., 2022). By incorporating sub-account books and financial analysis indicators

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into multi-dimensional analysis models, enterprises can calculate statistical metrics, such as minimum, maximum, and average values, and carry out operations like correlation analysis and conceptual sampling. Big data analysis tools are also used to comprehensively evaluate the performance of different departments or projects, providing a scientific basis for performance appraisal and incentive mechanism design (Fu, 2021). With the development of emerging technologies like cloud computing and artificial intelligence, the application prospect of accounting big data is broad. It not only helps to improve the financial management ability and decision-making level of enterprises, but also promotes the digital transformation of the whole industry.

With the development and popularization of information technology, enterprises are increasingly dependent on it. Many enterprises are beginning to use data mining technology to increase the depth and breadth of information application, thus improving the ability of accounting information processing (Laourou, 2022). Driven by accounting informatization, cloud-based data integrity verification has become an important means for many large- and medium-sized enterprises to improve financial management, innovate accounting practices, improve management processes, and reduce operating costs (Zhou, 2024). However, the traditional data integrity verification methods based on public key cryptography have many limitations, such as limited verification times and high computational overhead. In addition, the technology based on public key cryptography requires the server to calculate the whole file, which can be a significant computational burden on the storage server—especially in cases involving a large number of users and vast amounts of outsourced data (Xu et al., 2020; Zhao et al., 2024). Therefore, building an efficient and safe big data analysis platform is key to the success of accounting informatization.

To solve these problems, this study proposes a method that enables indefinite verification of data integrity without the need to save data locally or calculate the entire outsourced data file. In this article, an algorithm is designed for verifying data integrity on cloud servers by combining bilinear pairing operations with hash functions. The algorithm can randomly select data blocks for verification, ensuring that different parameters are used every time. Thus, the verification process can be carried out indefinitely. In addition, this study also considers the security of data by improving data transmission through the combination of identity protection and data interference. The purpose of this study is to provide a more efficient and secure data integrity verification solution for the field of accounting informatization.

This article is divided into five parts. First, it outlines the research background, identifies the research gap, and presents research objectives and significance. Second, the article examines relevant literature to put forward the research ideas and highlight the gaps the study aims to fill. Third, it introduces the methods used in this study. Fourth, the article analyzes the feasibility of accounting big data and discusses the development of enterprise accounting informatization. The last section summarizes the research results and offers suggestions for future research.

RELATED WORK

Goswami et al. (2024) discussed the data integrity strategy at the storage level within cloud computing environments, including its classification, security obstacles, challenges, and vulnerabilities. The article emphasizes that, although cloud computing has obvious advantages in disaster recovery, scalability, and resource backup, many organizations still prefer traditional data storage due to concerns about data correctness and security. Paying special attention to data integrity in cloud storage, the authors propose a new algorithm to enhance security and ensure the accuracy of outsourced data. This work provides a comprehensive perspective for understanding the current data integrity protection measures and highlights the need to develop more efficient algorithms.

Tian and Jing (2020) designed a cloud data integrity verification scheme for associated tags, specifically for the regular update requirements of sensitive information like electronic health records. In this scheme, grouping is used as the log, and the verification label is calculated to realize the integrity

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