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*Research Article*

# Designing an Accounting Information Management System Using Big Data and Cloud Technology

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With the rapid development of science and technology pushing people into the information age, the appearance of information technology is a major change for the accounting industry, which will redefine the traditional accounting profession. The new management techniques and concepts also gradually change the traditional accounting working mode by promoting the development of accounting professionals from traditional accounting to accounting information. In recent years, cybercrime and attacking information system vulnerability have occurred frequently. This study utilizes the model and technology in the design of an accounting information management system by simply explaining the idea of cloud technology and examining its logical structure of cloud technology. After that, it designs the cloud platform architecture of the accounting information management system (AIMS) by building the SaaS model. It defines the distributed storage mode of the cloud platform and tests the cluster performance of the system after completing the system design and construction to judge the application effect of the system. Finally, the system operation time, local rows of data, and load balancing are tested experimentally. These results demonstrate that the response relationships of distinct tasks are modified higher than TeraSort, TeraSort higher than Inquiry, and response time is proportional to the amount of Reduce slots when input tasks are the same. The analysis shows that the large data cloud platform used in this paper has high operational efficiency, acceleration rate, and task execution rate.

## 1. Introduction

Currently, the convergence of artificial intelligence and machine learning has created computers as a significant tool for human everyday productivity and life. These innovations have played a key role, particularly in the field of data processing, where they can not only store massive amounts of data but also do statistics and analytics on them until further investigation of the practical value of data sources. Since the introduction of application databases, people have handled information much more easily and accurately. As a result, data sources have grown increasingly significant in the domains of business, administration, and investigation. With the maturation of computer technology and the adoption of computers since the beginning of the 21st millennium, many areas of life have created more data than possible while achieving enormous progress. Due to the above, many use the term "info explosion" to characterize the exponential increase of data. The abundance of information has also caused numerous challenges in people's everyday activities and lives, particularly those relating to how to access relevant information effectively. Only through understanding market dynamics and user demands and that offering products and services that satisfy market opportunities to customers can contemporary businesses prosper and grow. In a highly competitive market, firms must seek out meaningful information to make maximum utilization of data sources for user monitoring, market research, and analytical decision-making. In the procedure of extracting useable information, irrelevant information has become a headache for businesses, affecting not only the efficiency of information processing but also playing a deceptive role. As a result, data-gathering technology has great value and also builds strong future growth [1].

Since financial management is linked to the survival and development of businesses, which is considered very

important in enterprise management. In addition, it is also a significant criterion for assessing the operational state of businesses. With the fast growth of network technology and information technology, more and more businesses are focusing on financial management informationization [2]. The financial management department is the most important aspect of the enterprise's business management. The finance team will synthesize the audit views of all of the enterprise's businesses, and the financial department employees will finish the unified accounting. Therefore, it is urgent to improve enterprise financial information management. This paper uses big data cloud technology to design an accounting information management system [3]. Big data cloud technology uses Internet technology to provide people with various computing resources. Its structure mainly has three levels including platform, resources, and applications. It uses shared resource storage and resource invocation to improve object availability. In an era of fast advances in data processing technologies, organizations are no longer happy with shortcuts like randomized research and sample analysis. They require a significant volume of big-scale data from many domains, as well as an accounting management information system based on a cloud-based accounting framework. The ability to effectively construct an AMIS implementation framework based on cloud accounting has grown dependent on the ability to access huge data. Enabling the collection of big data inside the big data environment is becoming a very significant problem in contemporary academic and industrial communities.

By examining the current studies, it is discovered that the majority of current AIMS construction research concentrates on the conventional Internet environment, whereas AIMS design research integrating big data and cloud accounting is very sparse. Indeed, as big data technology advances, it plays an essential role in corporate management and financial decision-making, and the successful use of big data capabilities is inextricably linked to AIS based on cloud accounting. As a result, this study demonstrates the AIMS framework based on cloud accounting in the era of big data. It elaborates on the responsibility of each component in the framework based on analyzing whether cloud accounting can successfully use accounting information system applications. In addition to the above, this paper uses big data cloud technology to maximize and efficiently integrate computing resources and improve system informatization and intelligence through an in-depth learning network.

The main innovations in the research phase of this paper are as follows: (1) Computing, the logical structure of cloud technology, and the RBM energy model based on a learning algorithm. This algorithm and theory serve as an important basis for the design and development of this system. (2) Based on the big data cloud technology, the overall architecture of the accounting information management system is designed, the SaaS model of the system is built, and the distributed storage method is used to save the enterprise financial data to realize the accounting information office [4]. Figure 1 highlights the structure of this paper.

The rest of this article consists of 5 sections: Section 2 is based on related work of national and international scholars, Section 3 presents an overview of big data cloud technology for Accounting Information Management System (AIMS), and Section 4 demonstrates the design of AIMS based on Big Data Cloud Technology, the testing and simulation of the proposed system highlighted in Section 5, finally, this work is concluded in Section 6 of the paper.

## 2. Related Work

With the rapid increase of cloud data, cloud technology has become a new research hotspot at home and abroad. Subramanian deeply studies the cloud security issues of the three entities of data owners, cloud service providers, and cloud users at the levels of computing, communication, service level agreements, and data. The scholars in [5] empirically evaluated the practicality of financial information and accounting data in enterprise strategic management and changed the traditional accounting model based on the management information support system. They tried to expand the accounting time range and improved the budgeting process and the ability to analyze the background. The early work of [6] analyzed the role of society, environment, and management in the accounting system, and selected ASG data as the main tool to test sustainable development. In this regard, the work of [7] pointed out that the company's dynamic capability, continuously changing conditions, and environment all affect the effectiveness of the accounting management system, resulting in changes in the accounting management information system. The authors of [8] put forward the adjustment strategy of an effective management accounting information system. Accounting information has been examined using LISRELL software and a structural equation model based on collaborative variance as vital financial data for enterprise managers to comprehend business situations and build development plans. The findings indicate that successful corporate application software has a direct impact on the quality of accounting information.

Keeping the above, the work of [9] proposed to apply the cloud computing model in the accounting information management of small enterprises. It improves system operating efficiency by utilizing cloud distributed processing, cloud cooperative design, cloud simulation, and other technologies. The scholars of [10] proposed accounting information management based on Financial Shared Services, which can help to lower the cost of financial management, enhance the quality of financial services, and increase overall management efficiency. It is a new management model. Before establishing a financial shared information system, enterprises should first determine various influencing factors of accounting information management to ensure the safety of enterprise financial data and the feasibility of accounting information management. The author in [11] has used the financial accounting information management system in China's chemical enterprises to completely change the traditional management mode by applying information technology in financial accounting management. It greatly enhances business management efficiency by fully utilizing information technology in

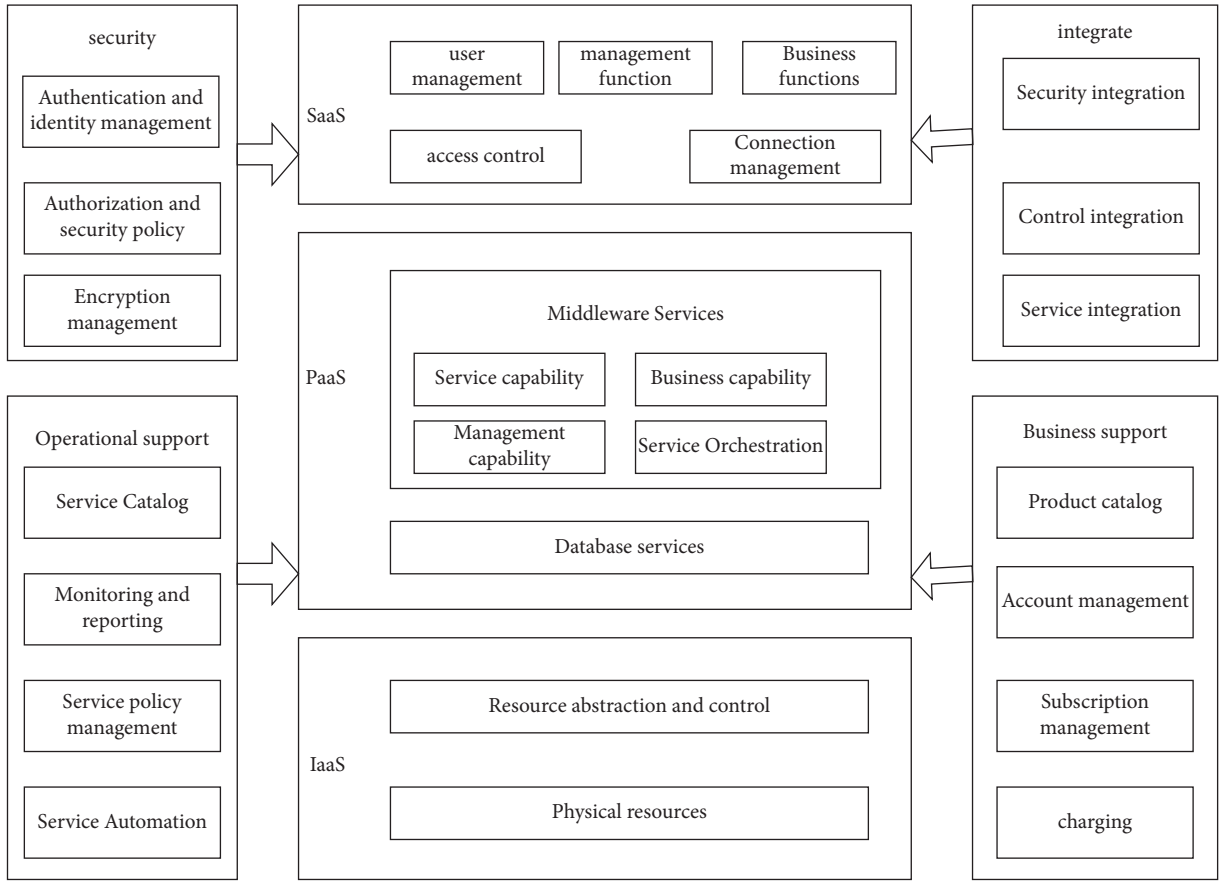


Figure 1: Logical structure of cloud technology.

financial accounting management and increasing the application value of information technology. This study utilizes the model and technology in the design of an accounting information management system by simply explaining the idea of cloud technology and examining its logical structure of cloud technology.

## 3. Overview of Big Bata Cloud for Accounting Management Information System (AIMS)

*3.1. Cloud Computing.* Cloud computing is an important product of the rapid development of society and science and technology. Its main feature is that it can realize various cloud platforms such as cloud computing and provide services to users simply and quickly. In terms of technical resources, the analysis can also maximize the utilization of resources. Cloud computing technology can seamlessly connect various data on the network.

Enterprises and individuals are the main service groups of cloud computing. The cloud computing platform is implemented by using various technologies and algorithms, so the hardware cost is low. It is possible to perform the upgrade later if the technology is replaced and the code is produced. There is no need to add or replace other hardware. After using the cloud technology, the operation efficiency is also significantly improved, and the enterprise development ability and service level are also rapidly improved. In the later stage, the maintenance and upgrade operations can be completed under the network environment and will not be limited by location, time, etc. At present, the cloud service model involves 3 kinds, namely, public, private, and hybrid. Groups and individuals are the primary users of the private cloud. The general public is the primary user of the public cloud. The hybrid cloud is created by combining the public and private clouds. User groups are categorized based on their user status [12].

*3.1.1. Logical Structure of Cloud Technology.* NIST divides cloud technology into PaaS platform as a service, SaaS software as a service, and IaaS infrastructure and services. The SaaS is a cloud technology paradigm implemented on cloud service providers' equipment and delivered to consumers via web applications and online interfaces. Users are not required to manage or develop [13]. PaaS may give operating applications and grow users as a secondary development platform. Users can utilize the built-in applications to fulfill services without managing the underlying hardware. The IaaS model provides users with virtualization infrastructure, including network and server, so that users can run the deployed application. Organizations at home and abroad give a variety of cloud technology structure schemes based on the three levels of cloud technology and

develop a cloud technology reference framework by combining ITU-T and SO/IEC JTC 1. Figure 1 shows the logical architecture of cloud technology.

According to the above figure, the processing schemes of cloud technology structure in different countries, mainly including the PaaS platform layer, IaaS resource layer, SaaS application layer, operation support, security, business support, and integration layer provide cross-level services.

### 3.2. The Accounting Information and Account Information Management System

*3.2.1. The Accounting Information Based on Big Data.* Big data refers to a tremendous quantity of data sources with different sources, complicated and numerous kinds, higher speed of processing, and whose value may be regenerated many times, with the qualities of enormous volume, variety, fast throughput, and low population density. Big data encompasses a wide range of data kinds. Presently, accounting information is mostly collected via structured data. Simultaneously, unorganized data is critical for financial decisions. As a result, in the era of big data, businesses must gather unstructured data, raise the amount of unstructured data gathering and analyze and comprehend this data to enhance decision-making correctness.

Furthermore, Accounting Information Management System (AIMS) is a software program designed for analyzing accounting data. The AIMS is a required guarantee for successful enterprise management and judgment, which is an essential forum for corporate market analysis. The financial information system collects, saves, and evaluates financial data to analyze the enterprise's business operations and outcomes to generate financial data. Following the completion of accounting by the financial information system, the management information system starts to evaluate important data, give practical knowledge, and make smart judgments. The financial information generated by the AIMS is communicated to the management information system and analyzed to help enterprise management and judgment. A typical structure of an Accounting Information Management System (AIMS) can be represented in Figure 2.

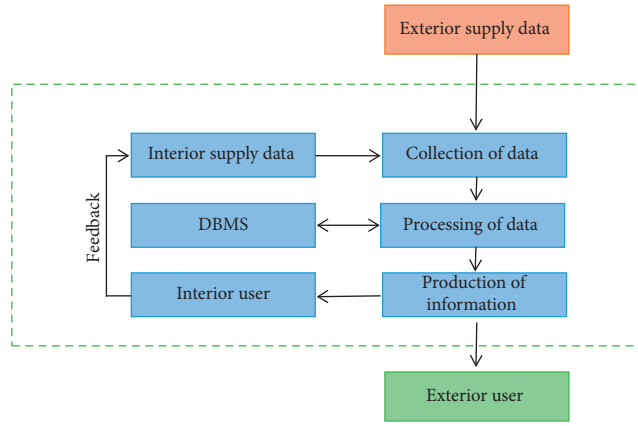


Figure 2: Typical structure of AIMS.

(i) **Source of data:** These are financial transactions that are entered into the system interior as well as from exterior sources. These statistics result from financial considerations with other commercial enterprises and individuals outside the company. Transactions such as sales of products and services, inventory, buying, and collecting payments are examples. Interior financial transactions are the resources inside an organization that comprises transaction considerations. For instance, raw - materials movements, fixed cost depreciation, manufacturing stock, and labor.

(ii) **Data collection:** The initial operational step of AIMS is data collection. Before entering the procedure, data must be cleaned of significant mistakes. This step is the most crucial in many ways since there is a possibility of providing wrong information if significant mistakes are not corrected. Such occurrences might lead to improper actions and judgments by users.

In data collection, there are two principles: suitability and efficacy. Only relevant data is entered into the information system. The primary responsibility of the system operator is to determine whether data are acceptable. He or she gets this by evaluating user needs. As a consequence, only relevant data will add to the information. A filter for incorrect data is created during the data collection stage. Data is acquired only once for an effective data collection step. These data can then be used by a variety of users, which may be saved and backed up later. The capability of an information system in terms of data collection, analysis, and storage is restricted. Overburdening a device while backing up data will reduce the system's efficacy.

(i) **Processing of data:** The acquired data must be processed to produce an item. Examples include mathematical algorithms used during production scheduling, analytical tools for sales forecasting, and accounting entry requirements.

(ii) **Database Management System (DBMS):** Organizational databases are physical locations for storing financial data. This storing place might be a filing cabinet or a computer disc. The three main roles of database administration are storing, retrieving, and deleting. In the storing procedure, new entries are entered and transported to an appropriate location on the database. The fetching function is used to extract an existing record from a database. After the data is processed, the saving function loads up the new data, whereas the removing function removes the old and useless data from the database.

(iii) **Production of information:** The process of organizing, structuring, and providing information to users is known as information creation. This data can be operating documentation, including a sales

order, a technical analysis, or a computer output message. A helpful piece of information has 5 elements: applicability, reality, accuracy, consistency, and summary.

*3.2.2. Cloud Computing in the Era of AIMS.* Conventional accounting system models cannot efficiently analyze and handle financial data in the age of big data. For this purpose, cloud computing services solutions are required. Firstly, cloud computing has extraordinary data analysis and process technology, which allows it to handle large volumes of information in a short time of time while precisely analyzing and revealing the features and underlying relationships among economic data and information. Secondly, cloud services technology can enable inter enterprise collaboration. Thorough analysis and interpretation of corporate financial data may be accomplished without raising operations and management expenses and sharing resources among multiple agencies within the enterprise. Moreover, cloud computing technology can facilitate company resource sharing and thorough evaluation and discussion of business financial information without rising operational and administration expenditures.

The virtualization of financial information and cloud services is the primary purpose of cloud computing technology. Financial data virtualization is considered one of the key technologies for implementing accounting information in the cloud. It combines both processing and analytical operations of business financial data to increase the capacity to consolidate and develop an analysis of data. Virtualization of all sorts of data saved in the cloud optimizes financial accounting information and data supplies while improving server resource efficiency. Furthermore, financial information virtualization allows users to swiftly access financial information based on various commands and discover the logical linkages hidden behind huge data.

Besides the above, the conventional AIMS is insufficiently robust wherein the processing of data is ineffective, therefore, requiring the manual collaboration of financial personnel to a great extent which considerably decreases the effectiveness of information processing. In such cases, the accounting information Management system can only offer managers past and factual analysis of data. Unfortunately, the failure to gain real-time control over the business management, financial planning process, and financial decision-making frequently causes the ideal time to deal with risks to be postponed. The AIMS, which is built on cloud computing services, promotes collaboration and data exchange among multiple company departments while also addressing the issue of financial accounting availability. The cloud computing computerized system model study's ultimate purpose is to cope with the different outputs of AIMSs and give consumers of financial data an accurate and full foundation for decision-making.

*3.3. Restricted Boltzmann Machine Energy Model Based on Deep Learning Algorithm.* A neural network is a typical mathematical tool used in the area of AI and machine learning. Compared with the traditional second-generation neural network, the deep learning algorithm solves the problem of low learning efficiency. It regards a multi-layer model as stacking multiple different RBM or similar unit models and then learning RBM layer by layer to realize the training of multi-layer models. Thus, the RBM model is the main content of deep learning.

A restricted Boltzmann machine (RBM) is a creative probabilistic artificial neural network good at learning a probability distribution across a collection of inputs. RBM belongs to the undirected graph probability model and is realized based on energy. Here, the joint probability distribution is defined by combining the $h$ hidden layer vector and the $x$ input layer vector energy function, as calculated in.

$$p(x,h) = \frac{e^{-\text{energy}(x,h)}}{z}. \tag{1}$$

The above equation, $z = \sum_{x,h} e^{-\text{erengy}(x,h)}$ represents the normalized constant or partition function, and the marginal probability distribution of observable input data $x$ can be calculated by utilizing.

$$p(x) = \sum_{h} p(x,h) = \sum_{h} \frac{e^{-\text{energy}(x,h)}}{z}. \tag{2}$$

After introducing the free energy, the above equation can be changed as equation (3) below:

$$p(x) = \frac{e^{-\text{freeEnergy}(x)}}{z}, \tag{3}$$

$Z = \sum_{x} e^{-\text{freeEngy}x(x)}$. in the above equation can be calculated as per.

$$\text{freeEnergy}(x) = -\log \sum_{h} e^{-\text{energy}(x,h)}. \tag{4}$$

Here, $B$ is introduced into the expression of model parameters, and the derivative of equation (4) above is calculated to obtain the following:

$$\begin{aligned} \frac{\partial \log p(x)}{\partial \theta} &= -\frac{\partial \text{freeEnergy}(x)}{\partial \theta} + \frac{1}{z}\sum_{\widehat{x}} e^{-\text{freeEnergy}(\widehat{x})} \frac{\partial \text{freeEnergy}(\widehat{x})}{\partial \theta} \\ &= -\frac{\partial \text{freeEnergy}(x)}{\partial \theta} + \sum_{\widehat{x}} p(\widehat{x}) \frac{\partial \text{freeEnergy}(\widehat{x})}{\partial \theta}. \end{aligned} \tag{5}$$

At present, the method of training $\partial \log\ p(x)/\partial\theta$ approximation is used to deal with the difficult calculation of the RBM partition function, and the definition of model parameter update rules is based on the free energy gradient of samples subject to model distribution $p$ and samples subject to data distribution $(x - p\ (x))$.

$$E_{\widehat{p}}\left[\frac{\partial \log p(x)}{\partial \theta}\right] = -E_{\widehat{p}}\left[\frac{\partial \text{freeEnerge}(x)}{\partial \theta}\right] + E_{p}\left[\frac{\partial \text{freeEnerge}(\widehat{x})}{\partial \theta}\right]. \tag{6}$$

In the above equation, $P$ represents the model probability distribution, while $\widehat{\mathrm{P}}$ represents the empirical probability distribution of the training data set. Similarly, EP and $E\widehat{p}$ represent the expected value under the corresponding distribution probability. The first term in the formula usually

replaces the training of sample expectation value. In the second item, there are samples obtained from the $P$ model, and the MCMC algorithm is usually used to sample the model data.

## 4. Design of AIMS Based on Big Data Cloud Technology

*4.1. General Structure of Accounting Information Management System.* This paper designs an effective and reliable accounting information management system utilizing big data cloud computing. Its essence is a cloud operation of an information management system [14]. The cloud platform design and multi-level architecture deployment are completed by merging the fundamental needs of the accounting information management system with the characteristics of different types of information software on the cloud platform, as illustrated in Figure 3 [15].

The above Figure shows the accounting information management system based on big data cloud technology. The system is composed of four layers, namely, the data layer, infrastructure layer, application layer, and management platform layer. The user logs in to the system operating system function at the smartphone client or computer PC [16]. User types mainly include enterprise management, enterprise workers, and system administrators. The system administrator has the highest authority. The infrastructure layer includes various equipment and components to provide basic support for the operation of the accounting information management system. A huge amount of data resources are stored in the data layer as the resource basis required by the accounting information management system. The management platform layer is the maintenance center of the accounting information management system, and the application layer is the service provider.

*4.2. SaaS Model of Accounting Information Management System.* In this paper, the persistence layer is introduced to deal with the efficiency of system data extraction, and the internal ORM mapping function is used to speed up data reading. As shown in Figure 4, the SaaS model required for this design is shown. The control layer uses the persistence layer to map data during data reading and then reads data information after passing through the data layer.

The main part of the scheme is the persistence layer ORM, which is further processed and processed, based on the Dao architecture, and the database layer and business logic layer are selected to build an interaction center. Historical data is sent to the accounting information management system for analysis via the persistence layer, and the processing procedure is optimized. There is no need to transmit or duplicate data for processing to enhance the overall effectiveness of data interaction [17]. The persistence layer's core modules use the mapping concept to extract and retrieve database information. The data reading and writing process are different from the data reading and writing function of SQL statements. It can quickly enhance the data reading speed and simplify the data extraction process, to greatly enhance all processes of the scheme.

*4.3. Distributed Storage Based on Cloud Platform.* Based on the cloud platform of the established accounting information management system, a large amount of financial data and materials of the enterprise are stored in a distributed storage model [18]. Generally, the previous accounting information office system mainly focused on the centralized storage of financial data in the server, which could not achieve the purpose of storing a large amount of data. It could only extract some local data and provide basic business operations and services to local customers, resulting in limitations and regional restrictions in the application of the system and the satisfaction of company users when using the system. The distributed storage strategy used in this study may circumvent regional limits, find the user region, and preserve financial data from each branch firm based on various regions. As a result, the system's data storage efficiency has been greatly increased, as have the system's application efficiency and security. As shown in Figure 5, the distributed storage scheme is based on a cloud platform.

The above figure shows the distributed storage mode based on a cloud platform. The system can save the accounting data of branches and departments of large group companies in different regions of the country in the accounting information system [19]. Figures 1, 3, and 4 depict accounting systems from three distinct branches that are communicated to the cloud database via the established accounting information cloud platform. The data on this platform allows the finance departments of various branches to exchange their data resources. As a result, corporate managers and employees may log in to the system and query the financial data of various branches. While departments of the group firm master its operation condition, properly comprehend the business's overall capital flow, prevent enterprise business limits, and shorten the system operation cycle. At the same time, the accounting information systems of branches set up in different regions will save the corresponding accounting data in the local resource database. Where it utilizes the cloud platform to consistently manage and analyze the financial data of each area to maximize business resources and achieve resource and financial information sharing [20].

## 5. System Testing and Simulation

This study proposes an accounting information management system based on big data cloud technology for managing business finances based on accounting data informatization [21]. In this paper, the system cluster test is carried out experimentally. The test contents include job timeliness, data locality, load balance, and so on. The job forms adopted in the experiment are modified, inquiry and TeraSort. The inquiry job is used to query the reimbursement time or vouchers. There are many disk UO operations required in the operation phase, which can accurately detect

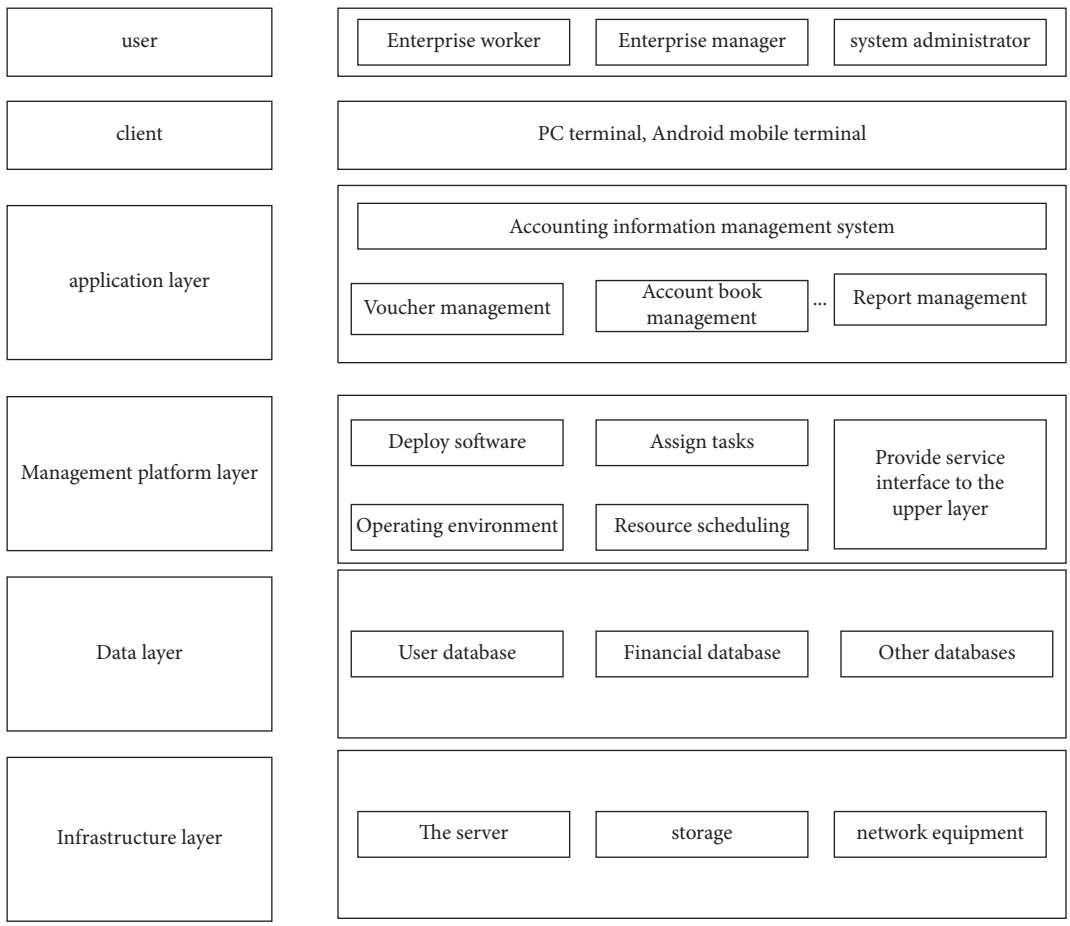


Figure 3: System cloud platform architecture.

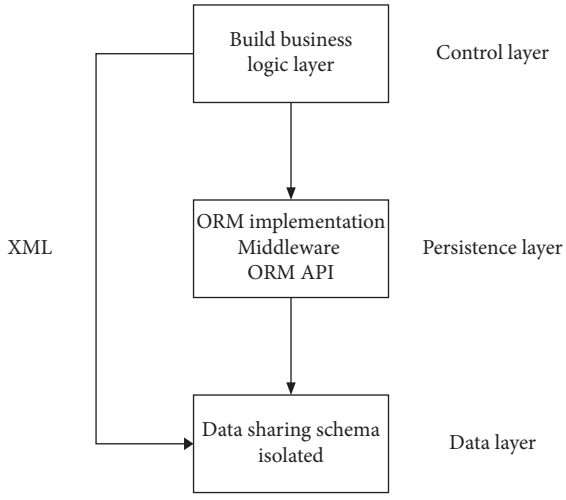


Figure 4: SaaS model of accounting information management system.

the platform task throughput and load status. TeraSort is the main tool for testing the cloud platform. It can input financial information into the accounting information management system without processing the output data. The modified job is used to represent mechanism vouchers or manual vouchers. After changing the job information, the new data is captured in the HBase database, and the prior information is erased. Under the premise of the same input data for the above three different job forms, in the output data volume, modify is higher than TeraSort, and TeraSort is higher than inquiry. Select the corresponding task scheduling based on the fair scheduling algorithm.

*5.1. Job Response Time.* When assessing the job response time in this article, it is assumed that each task has 10 decreases and 100 maps. All machines run tasks at the same time. At the same time, there are certain differences in the amount of data during task execution, which can fully reflect the fairness of scheduling. The job response time of the system is listed in Table 1.

According to the data in the preceding table, assuming that the input tasks are entirely consistent, the response relationship of various tasks is that modify surpasses teraport and TeraSort exceeds inquiry. Because the tasks of teraport and reducer are relatively simple, the efficiency of running jobs is faster than that of modifying jobs. The number of reduce and inquiry tasks is small, so the required cycle is short. An in-depth data study reveals that when the amount of data is little, hence the effect of utilizing the Hadoop platform in the system is less than that of not using

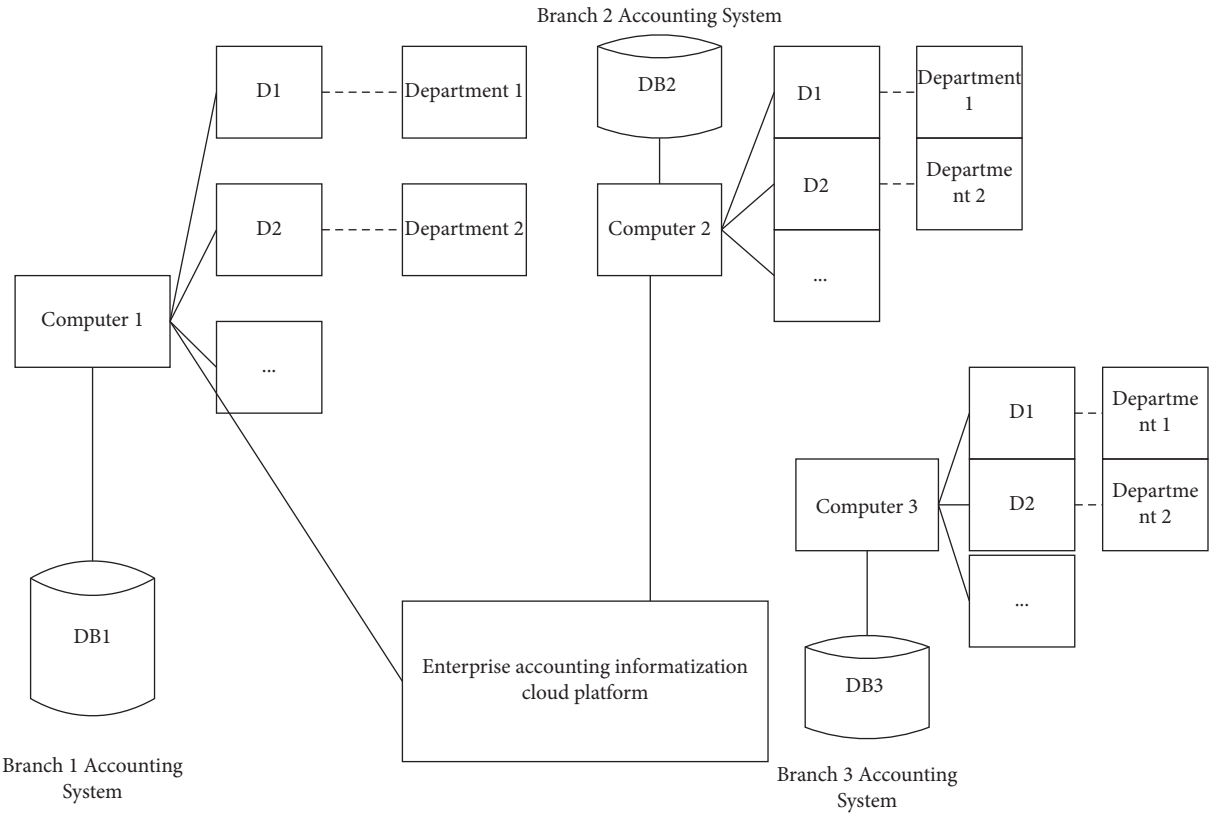


Figure 5: Distributed storage scheme based on a cloud platform.

the Hadoop platform. The effect of this system platform is remarkable after continuously increasing the amount of data. After the amount of input data increased to 2560m, the modification task decreased significantly, from 920 to 876 with an increase of 4.78%. The teraport mission was decreased from 672 s to 654 s, a 2.68% increase, fulfilling the target. The query task has grown by 6.8%, from 247 s to 265 s.

The number of reduced task slots in the Hadoop cluster directly affects the balanced load results. Here, the input job is set to 1280 M, and there are 8 map task volumes. Different task slot numbers can be obtained, which affect the job response time of the accounting information system. In this paper, the above three different task modes are used, and there are two scheduling modes. The data obtained are shown in Table 2, in which OBDN belongs to the improved scheduling algorithm.

To enable tasks to select jobs evenly and randomly, the jobs belong to teraport, so there is a large amount of output data. The advantage of this method is that it can better detect the actual running status of all nodes. The 1280 M job input data, 8 map tasks, and 8 reduced tasks set here are shown in Figure 6.

According to the response time results of the reduced task shown in Figure 5 above, adding load balancing can keep the processing cycles of all reduced slot tasks in a stable state. During the scheduling decision-making period of fair and OBDN, there are differences in the standard deviation and mean value of the operation cycle. The mean value of fair is 218, and the standard deviation is 30.79. The standard deviation and mean value of fair scheduling decisions are 13.02 and 214 respectively. Therefore, it is concluded that the average operation time of the reduced task slot cannot be increased during teraport operation, while the processing cycles of all tasks are relatively balanced. The operation cycle of reduction is balanced, and its movement speed is relatively uniform, which can maximize the use of reduction.

Table 1: Operating system response time on platforms with different data volumes.

| Whether to use Hadoop data volume | 320 M | 640 M | 1280 M | 2560 M |
|---|---|---|---|---|
| *N*-Hadoop modify | 11 | 224 | 453 | 920 |
| Hadoop modify | 139 | 236 | 441 | 882 |
| *N*-Hadoop TeraSort | 79 | 163 | 331 | 672 |
| Hadoop TeraSort | 86 | 171 | 330 | 655 |
| *N*-Hadoop inquiry | 33 | 66 | 132 | 265 |
| Hadoop inquiry | 31 | 61 | 120 | 247 |

Table 2: Job response time of different degree algorithms.

| Scheduling algorithm Number of reduced slots | 2 | 4 | 8 | 16 |
|---|---|---|---|---|
| Modify OBDN | 762 | 593 | 450 | 393 |
| Modify fair | 801 | 612 | 414 | 381 |
| TeraSort OBDN | 630 | 448 | 327 | 267 |
| TeraSort fair | 654 | 469 | 292 | 251 |
| Inquiry fair | 419 | 275 | 127 | 78 |
| Inquiry OBDN | 440 | 288 | 141 | 91 |

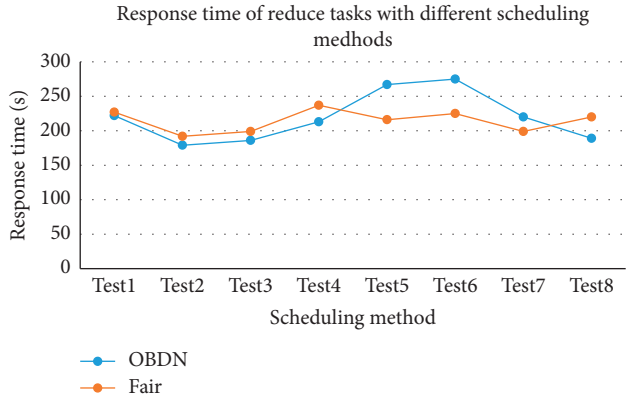


Figure 6: Response time of reduced tasks with different scheduling methods.

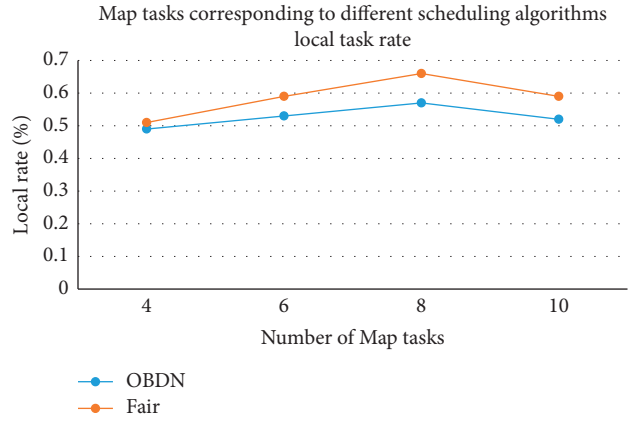


Figure 7: Map tasks corresponding to different scheduling algorithms' local task rates.

### 5.2. Analysis of System Task Locality and Acceleration Rate

*5.2.1. Task Locality Analysis.* In this paper, when detecting the local characteristics of cluster data, the size of the local data row directly affects the speed of the accounting information management system. In this paper, teraport, modify and inquiry run together, and each job is set to have 320m of input data and 8 reduced tasks. Three different types of jobs should be submitted at the same time by a shell script. After completion, continue to run three times and then count the number of all local tasks. Equation (7) is used for calculating the local rate of tasks.

$$\text{DataLocalityRate} = \frac{1}{n}. \tag{7}$$

After the fair scheduling policy has been run three times, the number of local tasks is 20, 28, 40, and 49, and the number of local tasks of the OBDN scheduling policy is 19, 31, 46, and 52. The data obtained is shown in Figure 7.

According to the above Figure, after the number of map tasks was adjusted from 4 to 10, there was no significant change in the OBDN scheduling strategy as a whole. The local rate is lower than the OBDN when the fair scheduling policy has four task slots. After the number of reduced tasks, slots continue to increase then the local rate increases slightly. However, when the number of reduced task slots increases to 10 then the local rate decreases.

*5.2.2. Acceleration Rate Analysis.* During this experiment, Wordcount and TeraSort were used as two workloads to analyze the impact of task size on the system acceleration rate. Set 1 g of job input here, including 6 map tasks and 12 reduce tasks. The relationship between execution time and CPU utilization is shown in Figure 8.

The task execution cycle is lengthened once the CPU uses increases, as can be seen by evaluating the data in the aforementioned Figure. Wordcount and TeraSort workloads are sensitive to CPU usage in different ways, and Hadoop accelerates more quickly.

Figure 9 explains the comparison of the Job response time of various degree algorithms. By analyzing this figure, it

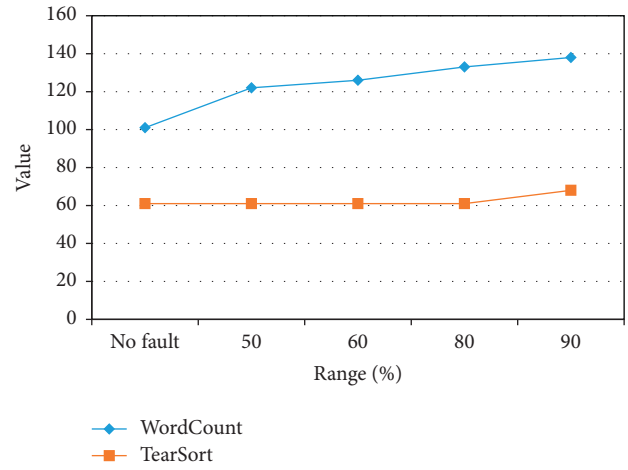


Figure 8: Relationship between execution time and CPU utilization.

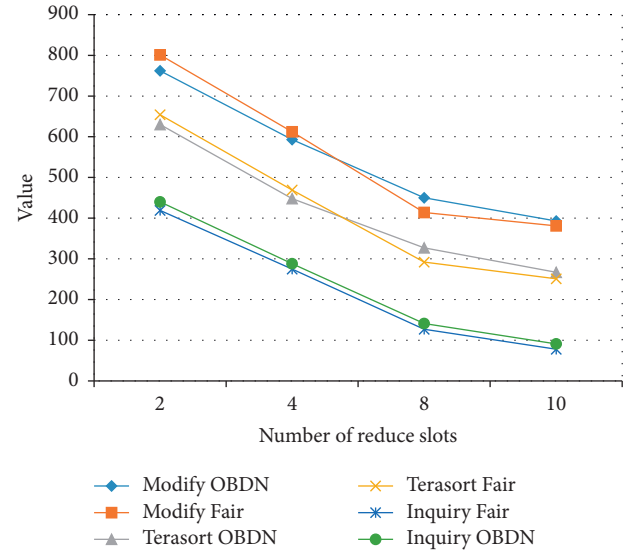


Figure 9: Comparison of the job response time of various degree algorithms.

can be seen that the OBDN scheduling method is better than fair after reducing the number of reduced slots on the premise that the job scheduling strategy is completely consistent. After continuously increasing the number of slots, the feature of the fair can be better reflected. When reduce is the number of 8 task slots, the modified task time will be reduced to a certain extent, from 450 s to 414 s, and teraport from 327 s to 292 s.

## 6. Conclusions

Nowadays, the quick expansion of information technology and network knowledge has promoted the popularization of automation, intelligence, informatization, and other high-tech technologies in people's lives. To compete in the market, businesses must increase their exterior operations strategies and establish internal management informatization. Accounting informatization management has become the basis of enterprise financial organization which can effectively enhance the informatization ability of enterprise financial management, reduce costs, achieve efficient office work, and improve the accuracy of financial data. Therefore, this work uses big data cloud technology to design and develop the accounting information management system and uses the system to complete the enterprise financial data management, to better coordinate the resources and personnel of the financial department. The distributed data storage of the cloud platform is adopted, and the system cluster performance is evaluated to determine the system application impact, by developing the cloud platform architecture and SaaS model of the accounting information management system based on cloud technology. This article examines the system's application effect from three perspectives: work time, data local row, and load balance. As per the results, the system has high efficiency, acceleration rate, and task execution rate.

## Data Availability

The data are included in the article.

## Conflicts of Interest

The authors do not have any conflicts of interest in the publication of this paper.

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