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Research on University Educational Administration Management Based on Blockchain Technology

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ABSTRACT

Educational administration management is the core of university management. With the progress in the field of education, the number of students in each university is also increasing. The traditional educational administration management system has been unable to meet the current educational administration needs. In this case, a new decision support system for university educational administration management based on blockchain technology is designed to solve the problems faced by the existing decision-making system. SPI interface and decision synchronizer are designed in the hardware part; In the software part, the process of educational administration decision making in colleges and universities is analyzed firstly. Secondly, the data warehouse is designed by using block chain technology. Finally, the functional structure of educational administration decision support in colleges and universities is designed to realize educational administration decision support. Experimental results show that the designed decision support system has good performance, can effectively support educational administration decision, and has certain application value.

Keywords: *Blockchain Technology; Universities, Educational Administration, Administration, Decision Support, System Design*

I. INTRODUCTION

In 2008, a paper published by "Satoshi Nakamoto" mentioned the model and concept of electronic cash, which means that online payment methods enable point-to-point payments without the need for financial institutions. The Bitcoin system realizes this point of information. The rapid development of technology has increased the degree of informatization in various fields of society, and has accelerated the process of a new round of technological revolution. As an emerging technology, blockchain technology has attracted widespread global attention. President Xi Jinping is also on the tenth position of the Political Bureau of the Central Committee. During the eight collective learning sessions, it was emphasized that "blockchain technology is an important breakthrough for independent innovation of core technologies, clarify the main direction, increase investment, focus on key core technologies, and accelerate the development of blockchain technology and industrial innovation." The research of blockchain technology has risen to the national level. The use of blockchain technology to promote industrial development has also played a positive guiding role, and has also brought unprecedented opportunities for innovation and development in the education field.

Since 2013, the blockchain has gradually received extensive attention from the domestic and foreign affairs industry. In 2015, it ushered in a blowout development. The search record with blockchain technology as the key word continued to top the list. In 2015, it was also called the blockchain element. In 1991, he quickly entered the sight of government departments and academia. Abroad, Princeton University, Stanford University, and University of Nicosia provide free courses on "encrypted electronic currency". In 2016, Sku-Chain and Koinify jointly founded the Blockchain Technology University in California, focusing on the research of blockchain technology. At the same time, many commercial enterprises and educational institutions around the world have also invested resources to explore the application of blockchain technology in education and teaching. Since the 18th National Congress of the Communist Party of China, the Party Central Committee has attached great importance to the important role of information technology in the development of the national economy. It has successively issued programmatic documents such as the "Internet +" Action Plan, and listed blockchain technology as national informatization for the first time. One of the planning contents. Blockchain technology has attracted attention in various industries, and each industry is constantly exploring the application and expansion of blockchain technology in the industry. At present, the application of

blockchain in education information is still in its infancy, but Its many characteristics and functions have been considered to be able to effectively solve the problems of data security and data sharing in the education field.

The emergence of blockchain technology can be used to record and evaluate students' learning behaviors, to ensure that students' academic performance is traceable, to ensure that students' academic certificates and diplomas are not tampered with, to manage students' academic records efficiently and scientifically, and to effectively protect students and Teacher's personal intellectual property rights and scientific research achievements. In summary, research has unique academic value, application value and social significance.

II. RESEARCH METHOD

2.1 SPI Interface

In order to ensure the performance of the decision support system, it is necessary to access the SPI interface. The commonly used data communication protocols in the designed decision support system are UART, SPI and I2C. UART is a two-wire system [3], one sending and one receiving, to achieve asynchronous data transmission, the transmission rate of the two parties is consistent, the SPI interface has low timing requirements [4], and I2C is a two-wire system, with a data line It is composed of a clock line, but the I2C communication protocol is more complicated. From the point of view of ease of use and data transmission reliability, this system design selects SPI as the communication interface between the decision-making platform and the external system. SPI generally has a slave selection line. The SPI interface designed in this article is used as a slave, and the protocol of the SPI interface is determined by the settings of two control words, clock polarity and clock phase.

2.2 Decision Synchronizer

In the design of the decision synchronizer, signal interaction is inevitable. aclk and bclk are a pair of asynchronous decision clocks [9], the signal dat in the aclk clock domain must be transmitted to the bclk clock domain [10]. When an unstable state is locked to an invalid level due to a violation of the set time or hold time, it is called a metastable state. Metastability can also propagate along the circuit and cause catastrophic system failure. Therefore, this article designed a decision synchronizer to eliminate metastable state, but the decision synchronizer can only eliminate metastable state, and cannot guarantee the accuracy of sampled data. When the first flip-flop returns to the effective level from the metastable state, the effective level can be zero, but it cannot be guaranteed to be the same as the asynchronous input signal level. Therefore, the decision synchronizer designed in this article adds a handshake signal, so that the synchronizer can select an effective high level when the signal is activated to achieve correct sampling.

2.3 Software Design

- **The Process of Decision-Making Business Processing of University Educational Administration Management**

To design a decision support system for educational administration management, we first need to analyze the management decision support requirements. First, we need to analyze the business process and decompose the business functions. A complete graph can be used to represent the business processing flow, as shown in Figure 1 below.

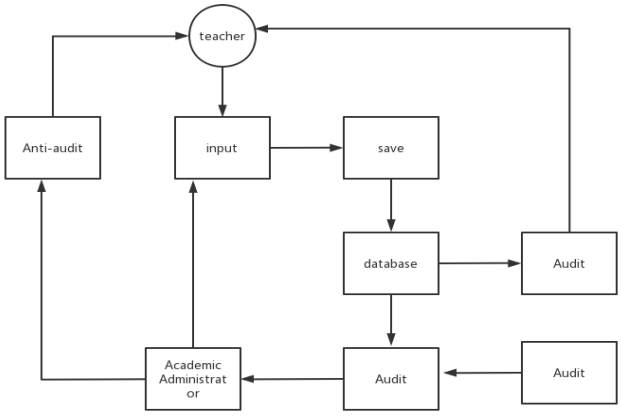

Figure 1 Business process analysis

It can be seen from Figure 1 that the designed system first needs to enter information. The educational administration administrator enters the relevant decision-making information into the teacher client. After the teacher checks, it is saved and transmitted to the database, and then checked and reviewed, and returned to the educational administration management. member. This business process makes the decision-making information of the subsystem more stable and can be used as a reference for subsequent decision-making.

2.4 Design A Data Warehouse Based on Blockchain Technology

After analyzing the requirements of the decision-making system, use blockchain technology to design a shared data warehouse. The data warehouse needs to have server scalability and data integrity, which can solve problems such as user satisfaction. The design and analysis of the data warehouse of the student management decision support system are completed using SSAS tools. The data warehouse is built on the SQL Server database. The physical structure of the student performance management data warehouse is designed based on the shared information database established by

the blockchain. Students' decision-making information data can be extracted, transformed, and loaded in the shared data warehouse.

In the data warehouse design of the management decision support system, it is necessary to determine the subject area of the system and the relationship between the various subjects, analyze existing data, view existing data files, summarize the organization of data, and design the concept of the system according to the type of data Model. When building the conceptual model of the data warehouse, it is also necessary to standardize the data in the database and draw standard analysis and decision views. The analysis decision view needs to include information such as the subject of the decision, the type of data source, and the direction of the data. The information in the analysis decision view can be used to calculate the correlation between the decision-making role of the system and the student's performance, so as to analyze the decision-making results of the system.

2.5 The Functional Structure of Decision-Making Support for University Educational Administration Management

The decision support system designed in this article can be divided into several different functional modules. The first is the comprehensive module of student achievement management. In this module, students can check their own grades in time, download transcripts, perform grade verification, and then send the verification results to Teachers; the second is the teacher management module. In the classroom of the teacher management module, you can design examination papers and review them online, print student scores, and send them to the student performance management module to achieve a stable transmission of score data; finally, the course management module In this module, both students and teachers can request and add teaching content according to their own needs to realize planned teaching. Not only that, after designing the curriculum, once the teacher finds that the curriculum has changed, he can also modify it online.

The university educational administration management system designed in this paper not only has the function of score management, but also has the function of query. The query function can provide users with specific information according to query conditions, and then generate reports and trend graphs based on statistical information. The query statistics report subsystem includes student information query, teacher information query, course information query, student performance information query, student performance statistics, etc. The comprehensive analysis and decision-making subsystem include a course analysis module and a training plan formulation module. The comprehensive utilization of the functional modules of multiple subsystems can realize the decision-making support for university educational administration management.

2.6 System Test

In order to test the performance of the designed university educational management decision support system, a test platform was built to test various performance indicators of the system under normal use at this time.

2.6.1 Test Preparation

Before testing the performance of the system, it is necessary to perform a functional requirement test to ensure that the system meets the basic functional requirements. The test results are shown in Table 1 below.

Table 1 Functional requirements test results

Test requirements	Test focus	Test results
Log in	Whether the user's name and permissions are correctly identified	qualified
Operator administration	Whether the operation of the operator to change the information is normal	qualified
Student Information Management	Is it normal for students to change information	qualified
Teacher Information Management	Is it normal for the teacher to change the information	qualified
Course Information Management	Is the course information change normal	qualified
Student performance management	Is the performance information change normal?	qualified
Student information query	Can accurately locate student query information	qualified
Teacher Information Query	Is it possible to accurately locate the teacher query information	qualified
Course information query	Whether the course information can be accurately located	qualified
Student performance information query	Whether it is possible to accurately query student performance	qualified
Student performance statistics	can accurately count student performance	qualified
Relevance analysis of academic performance	Can you get the potential connection between disciplines?	qualified
Analyze the formulation of the teaching plan	Whether the corresponding decision can be provided according to the set conditions	qualified

It can be seen from Table 1 that the decision support system designed at this time can meet various test requirements, and subsequent performance tests can be carried out.

III. TEST RESULTS AND DISCUSSION

According to the performance test in preparation, the design system can meet the decision-making needs of educational administration. At this time, the priority of error handling is generally divided into five levels, namely fatal (first level), major (secondary), and secondary. (Level 3), General (Level 4), Suggestive (Level 5). Fatality means major data damage, majority means that the system process is faulty and poorly functioning, and minority means that the operation is illegal. Generally speaking, the operation is inconvenient, and the system test is carried out according to the error classification. The results are shown in Table 2 below.

Table 2 Performance test results

Error type	Number of errors generated	Modify the number of errors
First level	0	0
Second level	1	1
Third level	5	5
Four level	10	10
Five level	16	16

It can be seen from Table 2 that under normal circumstances, the system does not have any major first-level errors, and the errors below the first-level can also be modified in time, which proves that the system has good performance and can effectively support educational management decision-making.

IV. CONCLUSION

Blockchain, as an emerging network technology, has proven its safe and reliable advantages in finance and other fields. This paper studies the combination of blockchain technology and the security of educational administration management information, and proposes the design of a decision-making system for educational administration management based on blockchain technology, and shares the information database by establishing a data warehouse based on blockchain technology. This article has certain reference significance for the further application of blockchain technology in educational administration management. Of course, how to make better use of its advantages, avoid its shortcomings, and serve the education industry still needs more exploration and research.

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