Design and Application Research of Education Management System Based on Block Chain

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Abstract

With the development of computer technology and the improvement of economic level, data archives management system has been widely used in archives management. Archives record the development history and social activities of countries, organizations and individuals, and are an important wealth for the development of human society. Paper file management has the disadvantages of slow search speed and complex management process. Digital archives management system can and improve the retrieval speed of archives through database query, simplify the management process of archives through online approval, reduce labor costs, improve office efficiency. This paper mainly describes the design and application research of education management system based on block chain. It puts forward its own opinions and views on the current problems and puts forward corresponding solutions according to the practical application of education management system, aiming at speeding up the application process of education management system.

Keywords: Blockchain, education management system

1 INTRODUCTION

In recent years, cloud computing, Internet of Things, artificial intelligence, big data and other information technologies have been widely applied in social life and entered the development of supply chains. Information sharing is the key factor of supply chain operation efficiency and is also the core content of supply chain management research [1]. However, as the supply chain itself is a dynamic change of conscious organization, most of the current supply chain systems have independent and different link information, and there is a lack of communication and mutual supervision between different parts of business entities [2]. The overall coordinated operation of supply chain is not very high; in addition, due to the openness of the supply chain itself, business entities in each link of the supply chain are reluctant to disclose their information due to the demand for information security and privacy protection, which further aggravates the information asymmetry in each link of the supply chain. Therefore, it is necessary to improve the design of blockchain education management system [4].

2 SUMMARY OF ARCHIVES MANAGEMENT SYSTEM

In today's knowledge economy era, student education information represented by degree and academic record information is an important reference for recruitment units to select outstanding talents. Having a good diploma and a rich educational experience are the basic prerequisites for obtaining an ideal position [5]. However, in recent years, the phenomenon of educational information fraud emerges in an endless stream, which seriously hinders the recruitment of talents by enterprises, and also causes great damage to the fairness and seriousness of China's higher education system. The frequent occurrence of educational information forgery reflects that there are many problems in the management of students' educational information [6]. The current student education information system uses a centralized database. In the case of improper maintenance and ineffective supervision, data is easy to be tampered with by the system administrator with too much authority [7]. Moreover, after data tampering, the administrator can also use relevant technical means to eliminate the operation traces. Therefore, it is increasingly urgent to

develop a safe and reliable student education information system [8].

Table1.Summary of archives management system

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In today's knowledge economy era, student education information represented by degree and academic record information is an important reference for recruitment units to select outstanding talents.	The archives management system mainly relies on the MVC framework of NET platform to develop, adopting the object-oriented development mode, the design principle of "high cohesion and low coupling" and the design method of three-layer architecture, which is composed of three parts: system interface layer, business logic layer and data access layer.	Ordinary users can only search, verify and borrow files. Archivists have the authority to add, update, query and verify files, as well as the audit authority to handle file borrowing and user registration applications.
Archivists have the authority to add, update, query and verify files, as well as the audit authority to handle file borrowing and user registration applications.	A system administrator has the highest rights of the system and can create new roles and users and change role rights and user roles.	Archivists have the authority to add, update, query and verify files, as well as the audit authority to handle file borrowing and user registration applications.

The archives management system mainly relies on the MVC framework of NET platform to develop, adopting the object-oriented development mode, the design principle of "high cohesion and low coupling" and the design method of three-layer architecture, which is composed of three parts: system interface layer, business logic layer and data access layer. Interface layer is the bridge of communication between users and the system, providing users with a friendly operation interface, which can convert user operations and inputs into specific requests and transfer them to the logic layer [10]. The business logic layer is the bridge between the interface layer and the data access layer. It converts the user input and request of the interface layer into a specific business process, and accesses the data through the data access layer.

The data access layer realizes the local data access through the database call, and realizes the access to the data of the blockchain data protection subsystem through the RESTful interface call. In order to control user permissions better, the file management subsystem mainly adopts role-based access control scheme [11]. The default roles of the file management subsystem are classified into common users, blacklisted users, system administrators, and file administrators [13]. Ordinary users can only search, verify and borrow files. Archivists have the authority to add, update, query and verify files, as well as the audit authority to handle file borrowing and user registration applications. A system administrator has the highest rights of the system and can create new roles and users and change role rights and user roles [12]. A blacklisted user is an abnormal account that the administrator considers to be a threat to the system. After logging in to a blacklisted user, the user can only view personal information and cannot perform any operations on the file. Its main algorithm is as follows:

Procedure SaveRecord(TemplateId, Session, Request, files, docID2null)

Obtain archive information

DocContainer = extractDocPamms (TemplateId, Request)

// Record number and time

DocContainer [uid], docContainer[mtime] -session [uid], datetime.now

// Store to local disk, request parameters and file attachment information

FileContainer 2 extractFileParams(Request, files, saveFiles(Request, files))

If doclD = = null then

// Generation number

Docld 2 guid.newguid ()

// Archive information storage

DocModel. Add (docld docContainer, fileContainer)

// Text is sent to the new interface

AddDoc RESTfulModel. PostChain (", "docId, docContainer, flleContainer, files)

The else

// File information is updated to the local database

DocModel. Update (docContainer fileContainer)

// File attribute, attachment attribute and original text are sent to RESTful file update interface

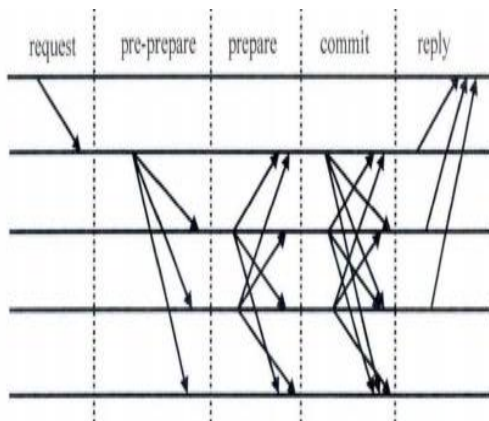RESTfulModel. PostChain (" update ", docId, docContainer, fileContainer, files)

Figure 1: PBFT flow chart

During archive query and verification, archive requests need to be sent to the blockchain data protection subsystem through RESTful interfaces. The specific process is as follows:

Procedure SaveRecord (keyword)

// Get the list of file query units from the request parameters

UnitList = extractSearchParams (Request)

If unitList. Length==0 then

Retum null

The else

// Query files in local data

LocalDocList = docModel.search (keyword, unitList)

File query in block chain data protection subsystem

ChainDocList = restmlModel.getChain (" search ", keyword, unitList)

// The query result is combined and returned

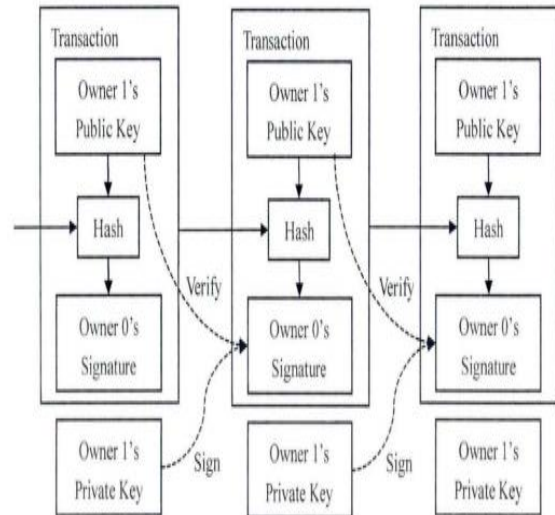Return the Union (10 caldoclist chainDocList)

endif

End procedure

Figure 2: Workflow

3 INNOVATIVE DESIGN OF UNIVERSITY STUDENT STATUS INFORMATION MANAGEMENT SYSTEM BASED ON "BLOCKCHAIN +"

The blockchain layer consists of three key nodes, namely Endor endorsement node, CA node and Order ordering node. Endor endorsement node is mainly used to simulate the execution of Chaincode (smart contract code), endorse the transaction request of smart contract code, and submit the transaction after endorsement, resulting in the final change of the account state. The CA

node issues the self-signed root certificate, grants permissions to organization members, and authenticates their identities. The Order sorting node is mainly responsible for consensus and sequencing of received transactions, and then packaging a batch of transactions into a new block according to the block generation strategy [3]. The data storage service of block chain layer is to carry out efficient reading and writing operation for ledger data. In the chain of blocks layer operation, on the basis of the registration information management center function module is mainly used for storage information, and add it to block chain alliance, realizing one's status as a student data more backup and query shunt system pressure in the rush hours, at the same time avoid the previous problems and affect one's status as a centralized database information recovery. At this point, in the concrete realization of the central function of the system, it is necessary to use the plug-in to call the college student register storage function of the smart contract and upload its basic information as input parameters.

Figure 3: Nnovative Design of University student status Information Management System based on "blockchain +"

The overall architecture of the university enrollment information management system based on "block chain +" adopts layered architecture, including block chain layer, data layer, application layer and contract layer. The blockchain layer is used to store important information such as certificates, education and school status. Due to the excellent characteristics of block chain system, such

as strong traceability of write traces and impossibility of tampering, it can avoid the data trust crisis caused by hackers' hacking and tampering of data in the past centralized database. In the process of blockchain layer operation, command line tools are mainly used with Go Ethereum. To create blockchain layer, it needs to use ethereum account and public blockchain platform with smart contract function. Eventually form a hexadecimal public address xf93f9ac13e791e86fff62a7bf799eb8c4s5m1162 "0", and the entire block chain node data synchronous processing, chain network into blocks. The contract layer mainly uses Solidity as the development language, MetaMask as the contract deployment call fee payment channel, interacts with the blockchain layer through RPC, writes the data information into the blockchain and queries and traces the blockchain layer data through the transaction process. The data interaction layer mainly uses Java development tools to help Spring Framework build software Framework in a short time, and calls the contract layer through Web3.js, and reads data indirectly by calling the API of the smart contract layer. The application layer emphasizes information interaction with actual users through friendly interfaces, and provides users with services such as student status record, student status query, and evidence collection. At the same time, with the support of HTTP protocol, information exchange is carried out with the REST API of the data interaction layer.
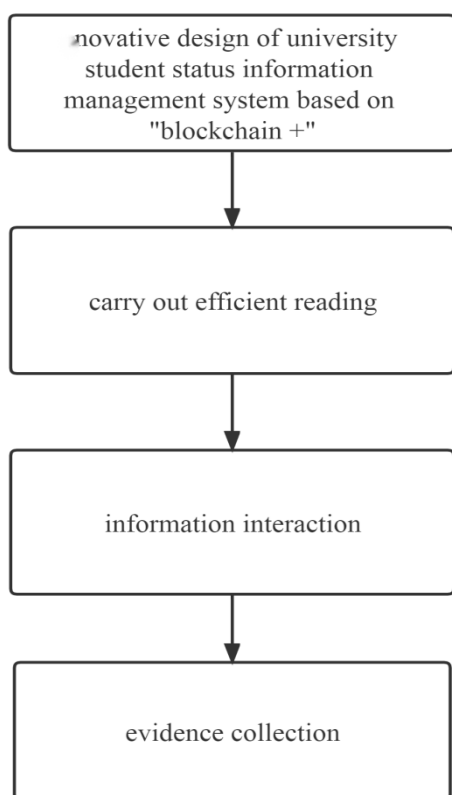
Table2. Innovative design of university student status information management system based on "blockchain +"

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The ResultSet rs = STMT. ExecuteQuery (SQL);

While (rs), next ()) {

String nextOrder = rs.getString(1).trim();

Document doc = null;

StringReader sr = new StringReader(nextOrder);

InputSource iSrc = new InputSource(sr);

Try {

Parser. Parse (iSrc);

Doc = parser. GetDocument ();

}

The catch (Exception e) {

PrIntln ("Sorry, an error occurred: "+ e);

}

if (doc ! = null)

PrIntDOMTree (doc, out);

}

Rs. The close ();

STMT. Close ();

Con. The close ();

% & gt;

Statement STMT = con.createstatement ();

// Execute the declaration to display the result set. We take the XML document from each line,

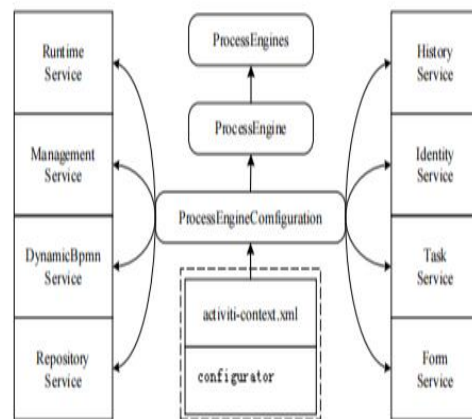// Parse it and print the DOM tree. Rs.next () returns false when there are no more rows.

Figure 4: Operation flow

4   CONCLUSION

The centralization, reliable database, security and quasi-anonymity of blockchain have opened a new way of thinking for people to get rid of the shackles of the centralized system and put forward a new solution to the problem [9]. This paper discusses the problems in current education management, and puts forward the main solutions by using blockchain technology. Nowadays, blockchain technology has become a new opportunity, and it is constantly launched with entrepreneurial projects in different industries. Education management system should seize this opportunity to strengthen the promotion of education management system.

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