

Application of Block Chain Technology in Wisdom Library under Public Health Emergencies

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Abstract: *Under the dual background of the outbreak of public health emergencies and the modernization of intelligent library service ability, how to establish a safe and efficient service system has become an important problem in the construction of intelligent library. This paper points out the application scene of block chain technology in the construction of intelligent library, and puts forward some suggestions for the application of block chain technology at present and the prospect for the future.*

Keywords: *block chain, wisdom library, Public health emergencies*

1. Introduction

At the beginning of 2020, the outbreak of COVID-19 epidemic situation brought new challenges to the library. The demand for information resources related to COVID-19 and emergency management by various agencies has soared. Most services are affected by social isolation and turn online. The surge in demand for online services has brought great challenges to the information system of libraries.

As an information management organization, the library will face serious information security challenges. Secondly, the intelligent library integrates a large number of electronic literature resources into the cloud, and there will be a large number of user personal information and user behavior data in the user information database of the intelligent library. These huge amounts of digital resources will bring security risks.

Under the condition of public health emergencies, the demand for online services is increasing day by day, which puts forward higher requirements for the emergency management ability of libraries. At present, some libraries adopt single-node management. However, when subjected to illegal attacks, or server damage, it will bring great losses to the library. If the blockchain technology is applied in the library, this problem can be solved. Block chain technology adopts multi-node mode, through the related algorithm tools, on the one hand, it can update the information in the database in time to ensure the security and stability of the database.

2. Related Concepts

2.1 Block chain technology^[1]

Block chain technology is a new distributed computing and storage paradigm which combines a variety of existing technologies. It uses distributed consensus algorithm to generate and update data, and uses peer-to-peer network for data transmission between nodes. Combined with cryptography principle and timestamp technology, distributed ledger ensures that the stored data can not be tampered with. The upper application logic is realized by using automatic script code or intelligent contract. Block chain realizes the joint maintenance of data by many parties to ensure the security of data and the fairness of business.

Blockchain can be divided into unlicensed chain (common chain) and license chain. Among them, the public chain refers to the completely open block chain, which establishes trust and guarantees security by calculating power, and has the characteristics of complete decentralization, but it results in waste of resources, low efficiency and so on. The public chain is mostly used in Bitcoin and other decentralized, anonymous, free encrypted currency scenarios. In the library application scenario, the license chain is obviously more applicable. The license chain has alliance chain and private chain. Unlike the public chain, the license chain is a semi-open block chain that only allows specific members to participate, and each member is given different participation rights. The license chain establishes the trust relationship

by issuing the identity certificate, which has the characteristics of partial decentralization. Efficient. There are two types of license chains: alliance chains and private chains. Among them, the alliance chain is constructed by a number of organizations, the generation of account books, the maintenance is completed by the designated members of the alliance. When combining blockchain with other technologies for scene innovation, it is not necessary to completely open and centralize the public chain, and its low efficiency can not meet the requirements of users. Alliance chain has become a more applicable block chain selection in some scenarios.

Combined with the requirements of book construction, it is urgent to establish a library alliance chain among the libraries at the same level, upper and lower levels. And each library should also combine its own actual situation, establish a private chain, maintain the library data security and the normal progress of information services.

In the aspect of the development trend of blockchain technology, it is considered that the weakly centralized alliance chain will be the mainstream direction of enterprise block chain application. Security will be the basis for blockchain applications in various scenarios. With the continuous improvement of block chain technology and rules, block chain technology will be gradually applied in the field of library, promoting the linkage of multi-organization to form library chain and the data security guarantee of information resources.

2.2. Public health emergencies^[2]

Sudden public health incidents refer to the sudden occurrence of major infectious diseases, diseases of unknown causes, major food and occupational poisoning and other events that seriously affect public health, which cause or may cause serious damage to public health. The occurrence of public health events has many characteristics, such as repetition, small-scale outbreaks, uncertainty and so on, which has a profound impact on all aspects. Especially at the beginning of the public health incident, the related information resources explode, and the library, as an information management organization, will face serious information security challenges.

3. Literature review

There has been a lot of research on the application of block chain technology in the field of library at home and abroad. Zeng Shiqin^[3] Others think that blockchain technology can be applied to the construction of intelligent cities and solve the problems of trust construction and privacy protection in the complex production environment with multi-organization participation at low cost. Xu Ye^[4] It is considered that the use of the characteristics of blockchain technology can solve the problems of electronic resource storage.⁵ This paper puts forward that block chain technology and 5G technology complement each other, and the application scene, application mode and complementary advantages of 5G + block chain technology in intelligent service of library in the future, and foresees that library should be the development mode of superposition of various information technologies in the future. However, there is a lack of discussion on the concrete realization of block chain technology, and the discussion of block chain technology in the field of intelligent library combined with the background of public health emergencies. Therefore, this paper will discuss the specific application scenario of block chain technology in the event of public health emergencies.

4. Application of Block chain Technology in Wisdom Library

4.1 Block chain Technology and Resource sharing

Under the dual background of big data era and public health emergencies, the amount of relevant data has increased dramatically, and the pressure of library storage has soared. However, the centralized management method adopted by the library can not meet the needs of users and the modernization of library service ability.

Block chain technology can effectively improve the security factor of information storage and make information dissemination and sharing more effective. During the epidemic situation, the demand for digital resources of libraries soared, the "data untampered" technology of blockchain technology guaranteed the stability and security of library information storage; the "non-heap encryption and consensus mechanism" promoted the dissemination and sharing of information; and the "decentralized"

technology promoted the intelligent management of libraries.

Therefore, the library should transform to the decentralized cooperative management mode, and each subject should carry on the self-management and self-exchange to its own information. The peer-to-peer network architecture of block chain technology can effectively make use of a large number of ordinary nodes scattered in the intelligent library network to distribute computing tasks or stored data to all nodes. Making use of the idle computing power or storage space to achieve the purpose of high performance computing and mass storage can save the server cost for a single library, make full use of each equipment of the library, and alleviate the increased storage pressure of the library during public health emergencies.

Among them, the block chain project that can be referred to: Filecoin, is often used in file storage and sharing. Details of Filecoin are illustrated in table 1.

Table 1: Principle of Filecoin^[5]

Technical selection	Filecoin
Control contract	Non-Turing completeness
Execution environment	Source code compilation
Processing model	Under the chain IPFS
Reward mechanism	Filecoin
Consensus algorithm	PoRep, PoET
Information model	Based on account
Association verification mechanism	Hash algorithm MKT
Encryption mechanism	SECP256K/BLS
Networking mode	Structured / unstructured peer-to-peer
Communication mechanism	Libp2p/Gossip
Security mechanism	TLS
Block chain type	Unlicensed chain
Character	Storage Resource sharing Ecology driven
Application scenario	File storage and sharing

In the process of implementation, the number of nodes and storage tasks are reasonably allocated according to the level of the library, the units to which it belongs, the server and so on.

4.2 Block chain Technology and Cooperative Management

When public health emergencies occur, society is in an abnormal state of operation. The coverage radius of public health emergencies collected by a single library is small, so it is necessary to share the epidemic situation related data between the same level libraries and the corresponding subordinate libraries in all kinds of regions, form the resource sharing mechanism of multi-library cooperation, give full play to the data value, link fusion, open and co-rule. Maximize the strength of the industry, so as to provide users with a wealth of massive information resources, to provide shared services.

The library is now centralized management, and the management mode is full range.^[6] With the increasing number of information, the needs of users are becoming more and more diversified, the way of centralized management has been unable to meet the existing needs and development of the library. The library should be transformed into a help type, and each subject should self-manage and communicate its own information. Through the rational application of blockchain technology, the accuracy of resources can be effectively improved, the integrity of information and data can be guaranteed, the management level of intelligent library can be improved, and each subject can carry out self-management.

The distributed account book technology of block chain technology is applied to the field of library, and different resource information can be stored in different blocks in a distributed manner, in which each library, as a node, undertakes the responsibility of a single block and propagates information data through point-to-point dissemination. In the service chain system established by each library as the node, asymmetric encryption, digital signature, Hash algorithm and other technologies are used to realize the secure transmission of data between nodes, and the effective traceability of data is realized on the basis of timestamp. According to the actual situation of the upper and lower levels, the region and so on, each node distributes the block task, realizes the multi-party joint maintenance data, guarantees the data

security and the service fairness.

The service chain system established by libraries at all levels can not only provide readers with effective knowledge and information, but also mine and research on the basis of a large number of information resources, provide hidden knowledge, so as to mine new content and provide personalized services for readers. For the differentiated needs of different professional and different levels of users, the resource sharing mechanism is used to expand the radius of resource coverage, so as to meet the needs of users and provide personalized services.

In addition, libraries need to establish a multi-agency linkage mechanism. After public health emergencies, libraries should actively cooperate with the unified command of the government and closely cooperate with emergency management centers, disease control centers, public security departments, grass-roots communities, township departments, and so on. According to the different information needs of different organizations, different online resource ports are provided to open data sharing.

4.3 Block chain Technology and Information Security Protection

4.3.1 Library Database Security

Block chain technology is a new distributed computing and storage paradigm which combines a variety of existing technologies. It uses distributed consensus algorithm to generate and update data, and uses peer-to-peer network for data transmission between nodes. Combined with digital signature technology (including cryptography principle, timestamp, etc.) to ensure that the stored data can not be tampered with. The upper application logic is realized by using automatic script code or intelligent contract. Block chain has two important characteristics: decentralized and non-tampering. By using these two characteristics, it can be applied to the intelligent library and can improve the security and efficiency of the system.

During the epidemic situation, the demand for library digital resources of different professional types of users has increased. As an important information management organization, the library, as an important information management organization, has the responsibility to provide stable emergency information to all kinds of epidemic emergency working group personnel. If the center network is illegally attacked, the online service of the whole library will be paralyzed, which will affect the work of fighting the epidemic. In the era of epidemic situation, higher requirements have been put forward for the data security of libraries. However, at this stage, some libraries adopt single-node management. However, when subjected to illegal attacks, or server damage, it will bring great losses to the library.

Therefore, block chain technology can run through the whole system architecture and provide guarantee for data security. If the block chain technology is used to make the library adopt multi-node mode and through reasonable algorithm tools, the information in the database can be updated in time to ensure the security and stability of the database.

4.3.2 User Identification

During the period of public health emergencies, digital resources are limited within the scope of library local area network (LAN). Users outside the library need to access outside the school through VPN. There are often some problems, such as poor login of resource portal, slow download of resources, slow response speed of web pages and difficulty in retrieval. This makes the use of out-of-school access to digital resources low. Block chain technology is used to replace the current traditional testing methods, such as one card, to authenticate the identity of readers. Certified readers can use the network resources of the library without entering the library or not accessing the corresponding local area network, avoid the gathering of personnel during emergencies, and can reduce the flow of people in the library, which is conducive to the development of prevention and control work. At the same time, it can alleviate the pressure of library local area network.

4.4 Block Chain Technology and Intelligent Library Equipment

With the rapid development of artificial intelligence and Internet of things technology. Intelligent library has introduced more and more intelligent library equipment. Including librarian robot, recitation kiosk, intelligent shelf robot, self-help loan machine and so on. These devices not only better serve users, but also collect a large number of user information.

Through these user information, mining library data, analyzing data relationship, deeply studying the

hidden knowledge of data, so as to obtain the corresponding reader behavior, and realize the real-time interaction of data information unlimited equipment terminal, make the complex information simple, on the basis of simplifying the library work flow, give full play to the library efficiency and really let the intelligent library show its light.

But at the same time, the user information security of the information link in the application of the equipment needs to be protected. With the use of blockchain technology, users can rest assured of the use of intelligent devices. The information collected by the device can also be uploaded to the terminal efficiently, which ensures the timeliness and security of the data.

4.5 Block Chain Technology and Author Power Protection

In the process of building a wisdom library, people are more and more inclined to read books by electronic reading. With the rapid development of the network, the rights of the author are affected. In the Internet, online registration is usually used and identity proof is carried out. At the same time, this registration method is more complex, but can not convince the public, can not find the relevant records of registration, if the use of blockchain technology can solve this problem, block chain technology can not tamper and can find records. Although the amount of information in the intelligent library is relatively large and complex, it can clearly protect the rights of the author. If there is a tort problem, the author can track and query to maintain the copyrights.

5. Problems and Challenges

Deep fusion requires vertical optimization according to the requirements of the scene. The ternary requirements of different scenarios are not the same, for example, access control does not require complete decentralization, scalability does not encounter bottlenecks.

This means that under the strict scene modeling, the hierarchical technology selection of block chain will be cross-innovation and deep integration with the characteristics of the scene, and still need to be studied and explored. In addition, there is a lack of standards for the use of blockchain technology in libraries, which needs to be improved.

Blockchain technology requires technical personnel to operate and maintain on a regular basis. At present, there is a lack of technical managers who are proficient in blockchain technology among the managers of intelligent library. If the library institutions at all levels use blockchain technology to achieve multi-agency linkage. A large number of technical personnel are required to invest in it. This has increased the manpower cost for the construction of intelligent library. Moreover, the application of block chain technology has a high demand for funds, which also brings economic costs for the construction of intelligent library.

6. Conclusion

To sum up, block chain technology is a relatively advanced science and technology in our country at present, the rational use of block chain technology can promote the development of intelligent library. By using blockchain technology, we can realize information resource sharing, information security protection, multi-organization linkage, protection of readers' privacy, maintenance of author's intellectual property rights, connectivity of intelligent wearable devices, establishment of knowledge base, stimulation of readers' reading power and so on. In many application scenarios, block chain technology not only improves the modernization of intelligent library service ability, but also promotes the collaborative governance of institutions, and improves the emergency management ability of libraries in the event of public health emergencies.

In the future development, block chain will become a more basic trust support technology, in the field of intelligent library and other broader fields healthy and orderly development.

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