

A File Storage System of Drug Addicts Control based on Block Chain

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Abstract. The public security departments, government agencies and community departments in China should carry out daily supervision and assistance to drug addicts listed in the control. But the responsibility distinction is not clear in the actual work. So it brings low control efficiency, resulting in the lack of file data, data authenticity and other problems. Block chain has the characteristics of decentralization, openness, autonomy, information cannot be altered, cannot be forged and so on. It is superior to centralized database in data security and data sharing. This paper designs a file management system for drug addicts 'management based on block chain, which can effectively guarantee the security and authenticity of data, and realize the sharing of data in the public security industry. It can provide real data reference for the public security organs on the level of drug addicts management and control, and improve the mode of drug addicts management and control.

Introduction

Drug addiction has become one of the important factors inducing illegal and criminal activities. Drug addicts have also become a "high-risk group" of endangering social stability. The public security departments and Community administrators in China are responsible for carrying out relevant drug treatment control work. However, in the actual work, the police of the community and the police station have some problems, such as not strict in the control of the community drug addicts, unclear division of responsibilities, difficult to grasp the regulation of the control and control, and so on. In 2006, the Ministry of Public Security launched a drug control measure - dynamic control management system, "online dynamic control and early warning system for drug addicts" to achieve national information sharing, dynamic control of drug addicts and drug addicts, online tracking.

The system collects the information of registered drug addicts and other people who have drug crime records. As long as the information is entered into the system, the identity cards and other information of the registered people will be shared in the national public security system. No matter where in the country, the system will automatically warn the person who is admitted, and the police in the jurisdiction will rush to the scene in the first time to conduct dynamic tracking and management checks on the parties, so as to reduce the drug crime rate. Although the dynamic control mechanism played a certain role in drug crime investigation. However, after several years of practical application, the dynamic management and control mechanism has exposed a series of shortcomings. The information system focus on the management of the file information of drug addicts, and the information only supports the input, but does not support the cancellation. The Information management for drug addicts, on the one hand there is no safe and accurate data as a basis for lifting the control restrictions on drug addicts, on the other hand, the process files of drug addicts in various departments are not perfect, data is not true and so on. Block chain has the characteristics of decentralization, openness, autonomy; information cannot be altered and forged. It is superior to centralized database in data security and data sharing. Using block chains to record the records of drug addicts will be conducive to rational planning for the control of drug addicts.

Feasibility of Block Chain Application

Block Chain Development

Block Chain originated in a paper published by Satoshi Nakamoto on Bitcoin at the Bitcoin Forum in 2008: A Peer to Peer Electronic Cash System. It points out that block chains are the basic technology that makes up Bitcoin [1]. In the next few years, the technology of block chain virtual coin gradually attracted more and more people's attention. In 2015, the concept of block chain rose rapidly. This year is also called the first year of block chain by the scientific and technological circles. According to a study published by McKinsey in 2016, Block chain technology is the core technology with the most potential to spark a fifth wave of disruptive revolution, following with steam engines, electricity, information and Internet technologies. Gartner is the most authoritative IT research and advisory department in the world. In October 2017, Gartner listed Block Chain as one of the top ten strategic technology trends in 2018. As early as December 2016, the State Council issued the "Thirteenth Five-Year Plan" on the block chain technology. In some developed cities such as Beijing, square, Shenzhen, block chain project support policy attracted relatively more attention. Block chain is regarded as a technology that can transfer trust in the digital world and ensure information security in the network age. Block chain technology can be used in any application scenario that requires fairness, and honesty [2].

Block chain can be defined as a distributed ledger technology (DLT), a chain data structure that combines data blocks in a sequential manner which take advantage of a timestamp, and guarantees that the data on the chain cannot be altered or forged by cryptography and distributed consensus mechanism technology [5]. As shown in Figure 1, it is a simple block chain diagram.

Block chains can be defined as a distributed ledger technology (DLT), which uses time stamps to combine data blocks in a sequential manner to form a chain data structure, and uses cryptography and distributed consensus mechanism technology to ensure that the data on the chain cannot be tampered with and forged [4]. As shown in Figure 1, it is a simple block chain diagram.

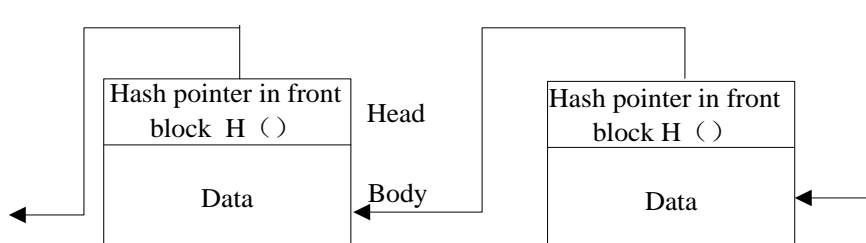


Fig. 1, Block chain diagram

Block chain technology has the characteristics of decentralization, trustworthiness, openness, information immutability, anonymity and autonomy. It can realize trusted data exchange in an untrusted and untrusted network environment.

The field of public security is a relatively closed area, although the construction of public security information has also made some achievements, but there is still a lot of room for development in network application and comprehensive application, especially for data sharing, data security requirements [3]. How to apply block chain in the field of public security has become a research hotspot. By analyzing the advantages of block chain technology, combined with the data security problems in community drug addict's control, explore the feasibility of block chain application in the field of public security.

Classification of Block Chain

Block chain can be divided into public chain, alliance chain and private chain according to the difference of participants.

(1) Public Blockchain: It is open to any individual. Each node joining the network can participate in the calculation of the block chain, and anyone can download and obtain the complete data recorded

on the block chain. Bitcoin is the public block chain, where everyone can access all the information and participate in mining and trading verification.

(2) Consortium Blockchain: It is a block chain that needs to be registered and licensed, which is limited to the participation of the members of the alliance. Participating in the consensus process of block chain calculation depends on some pre-selected nodes, and each block data generation is completed by a designated budget node. While other nodes can carry out transactions, information query, but do not need to participate in the consensus process, and achieve a "partial decentralization". Generally speaking, it is suitable for transactions and settlement between enterprises.

(3) Private Block chain: It is restricted to a private organization or individual. The read and write permissions and accounting permissions on the block chain are set according to the rules of private organization. Only licensed nodes can participate in and view the data. Generally speaking, it is suitable for internal use of the organization, such as enterprise audit, government budget, data statistics, etc., block chain management is superior to database system. It can ensure data traceability, data security, and defense against internal and external data attacks.

Feasibility of Block Chain Application

There are also some problems in the process of information utilization by public security.

(1) Information sharing: The main characteristics of public security management information are diverse, strong complementarity, and the correlation between data is more complex. Moreover, most of the business systems in which these data are located operate independently, and the degree of sharing is not high, which makes the data resources cannot play a full role.

(2) Accuracy of information: Most of the databases maintained by public security departments are basic data for business support, so the accuracy of the data is relatively high. However, in reality, because there are a large number of business systems, a large number of data and repetitive input, and the lack of police force, many data will appear inconsistent, incomplete, even wrong and other serious problems.

(3) Insufficient information security mechanism: information security is threatened by such problems as lax access control, information leakage, information tampering, information loss, etc. [7]. Block chaining technology is defined as the transmission of trust in the digital world and the protection of information security in the network age. Decentralized and distributed network structure of block chain improves network anti-attack capability. Block chain data generated by timestamp can ensure that data cannot be altered, and ensure the authenticity of data.

Drug Addicts Control Storage Based on Block-chain

Overall Framework Design

To ensure data sharing and data security, you can restrict the members of the block chain and set the read and write permissions of the member nodes on the block chain. Only these licensed nodes can participate in and view the chain data, and all nodes cannot tamper with the data on the chain, effectively ensuring data consistency and secure exchange. For drug control centers, public security bureaus, communities, drug treatment centers and other relevant departments involved in the control of drug addicts, the population data is managed by multi-department and sub-block cooperatively through the block chain model, and the reading and writing permissions of each node on the block data are controlled. Then the data consistency, security and sharing can be achieved very good results. As shown in Figure 2, the overall framework is designed, and the citizen management block chain system is divided into three layers: service layer, management layer and network layer. The service layer provides users with data operation interface to realize data sharing and query, data maintenance and other functions. Managers need to reach a consensus through mining in peer-to-peer networks by encrypting, verifying, and signing blocks that satisfy contracts for citizen information management [9-10].

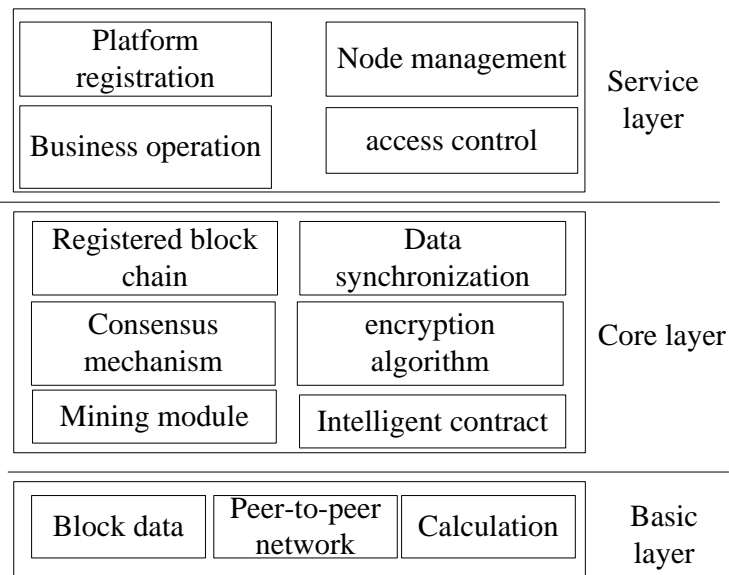


Fig.2, Block chain system framework structure

Drug Addicts File Management Consortium Chain

The information management of drug addicts involves many departments, which need information sharing and update dynamically. In the form of Consortium chain, the relevant departments are allowed to register the block chain, authorize the corresponding authority of these departments, and participate in the consensus process of block chain calculation. Each block data generation is completed by these designated budget nodes. Other unauthorized nodes can query the information, but do not need to participate in the consensus process to meet the data sharing, but also to ensure that the data can't be altered. These pre-node selections can include drug control center, public security bureau, community, drug rehabilitation centers and other relevant departments, which can provide more perfect, accurate and safe information management for drug abusers management files.

As shown in Fig.3, when the relevant departments participate in the updating and maintenance of the information of drug addicts, they will apply the citizen's registration information from the nationwide unified population information centralized database. Obtain the personal information including name, sex, date of birth, place of origin and other important information by call the data interface, and write the important data into the block chain. It is required to write population dynamics. The data will be distributed on each licensed server, each licensed node has a copy of the data, and once written into the block chain.

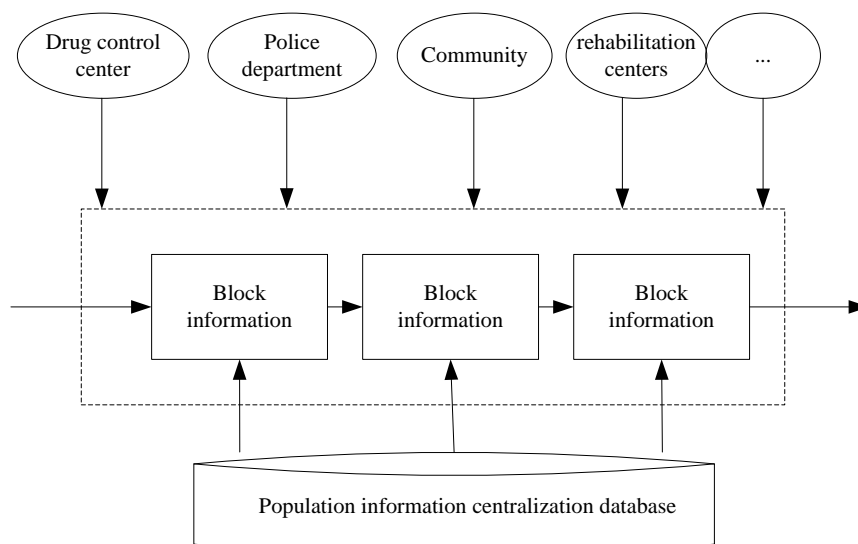


Fig.3, Consortium chain diagram for information storage

Consensus Mechanism Design

When new data records are generated over a period of time, the process of how each licensed node participates in the recording and validation of population block chain data is shown in Figure 3. You can set a block recording period, such as a bitcoin block chain that records a block every 10 minutes, where you can set a block recording time as required, such as 30 minutes. When the new data is generated, it will be propagated in all the P2P networks composed of all the permitted nodes. In order to improve the recording efficiency, in the public security industry alliance chain, it is not necessary to set up a hash collision mining accounting mode to record data, but the system can specify a node to record according to a rotation algorithm. At the same time, other nodes in the federation chain will determine the new recorded data through their own local population data records, and the determined data will be transmitted throughout the network. During this period, all data will be written into a block and sent to other nodes in the network for linking [11].

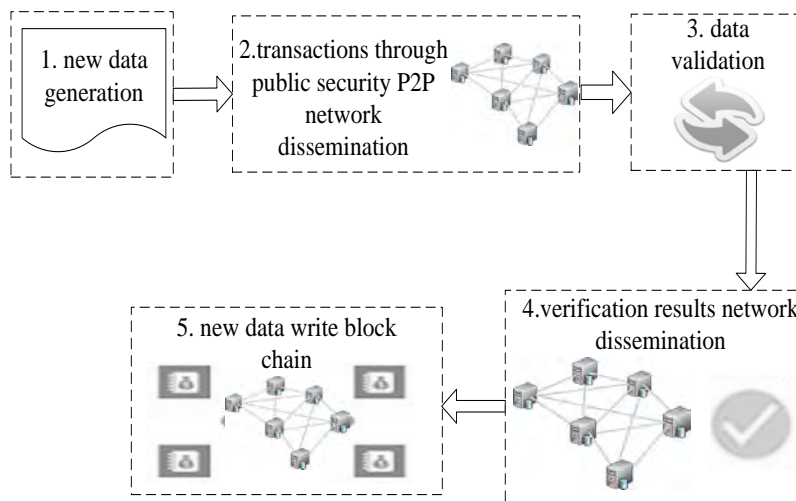


Fig.4, Block mining process

Audit Mechanism

The block chain is made up of blocks, and the block is the core content of the block chain. The block consists of two parts, the block header defining the block attribute and the block body that stores the specific data. In the block of population information management, there is no need to compete for the right of accounting, so it is different from the general block definition. The block header can include version number, Hash address of the previous block, block creation time, block billing identifier, Hash address of the block, and block body includes the node to write data, information classification, information content, lock time, etc.

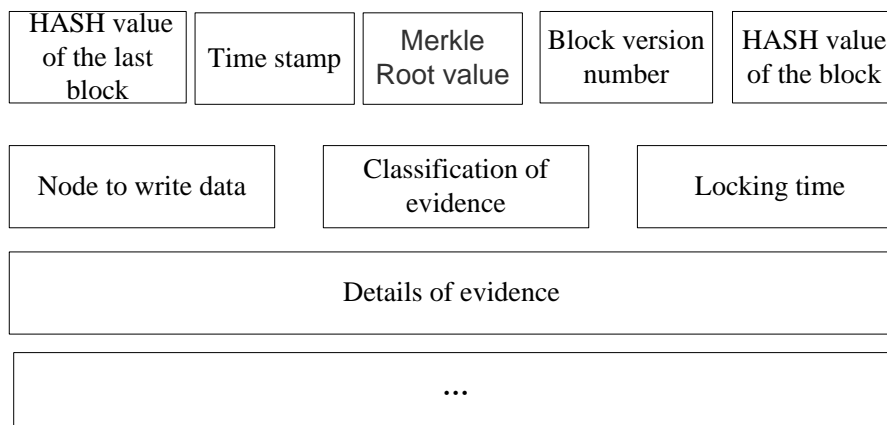


Fig.5, Data block structure

Summary

The application of block chain technology in public security industry can theoretically solve the problems of information sharing, data security, privacy protection and so on. It has a promising application prospect. However, there is no successful demonstration case of the application of block chain and industry integration. The completely decentralized block chain mode is difficult to meet the existing data and application requirements in performance and scalability. Taking the information management of drug addicts as an example, this paper also explores the design of a partially decentralized Consortium chain form of public security block chain application model. Similarly, public security departments need to actively invest in in-depth research, cannot blindly promote block chain technology, cannot ignore the development trend of technology, and need to do a good job from the top development planning, construction standards and scenario application model.

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