

Research on blockchain integrated monitoring and supervision technology

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Abstract. With the development and progress of science and technology, the blockchain monitoring platform can reflect the dynamics of monitored objects in real time intuitively and accurately, and has become the main technical means for modern management, monitoring and supervision. Especially with the continuous development of blockchain technology, blockchain integrated monitoring and supervision technology has become more widely used. However, judging from the actual operation of the current blockchain monitoring and supervision platform, there are still many problems that need to be solved. Some of the problems have even caused the blockchain monitoring and supervision work can not operate efficiently. Blockchain monitoring and supervision personnel at all levels are also needed. Actively seek effective countermeasures and suggestions to improve the level of blockchain monitoring and supervision, demonstrating the importance of blockchain integrated monitoring and supervision technology.

Keywords: Blockchain integration; Blockchain monitoring and supervision platform; Monitoring and supervision technology.

1. Introduction

With the continuous progress and development of China's economy and society, blockchain integrated monitoring and supervision technology is a necessary condition for the development of social progress. In the process of gradual development, blockchain integrated monitoring and supervision technology can not only effectively enhance the quality and efficiency of monitoring, but relatively speaking, the security of blockchain platforms is relatively low and it is difficult to adapt to the application of current blockchain monitoring and monitoring platforms. Therefore, relevant personnel need to reform and update the blockchain integrated monitoring and supervision technology, thereby improving the effectiveness and scientificity of the blockchain monitoring platform [1].

2. Problems in blockchain monitoring and supervision of blockchain platform

Blockchain technology, as a distributed ledger technology, has received widespread attention and research in recent years. Its core principle is to record data into individual blocks and connect them together to form a growing chain structure. These blocks contain information about data transactions, and each block contains the hash of the previous block, forming an immutable history. This basic feature gives blockchain technology excellent security and credibility.

The distributed nature of blockchain means that data is stored on multiple nodes in the network, rather than being stored centrally on a single server. This reduces the risk of single points of failure and increases the network's ability to withstand attacks. In addition, blockchain utilizes strong encryption technology to ensure data confidentiality and integrity. Only users with the private key can access their data, providing extra security.

In addition to the above characteristics, blockchain also has the capability of smart contracts, which are contracts that do not require an intermediary to be automatically executed. This means that automated security policies can be created on the blockchain, reducing the potential risk of human error and fraud [2].

Blockchain is not a single technology, but the result of the integration of multiple technologies. These technologies combined with new structures form a new way of recording, storing and expressing data. It is a new application model of computer technologies such as distributed data storage, point-to-point transmission, consensus mechanism, and encryption algorithms. It is a technical solution that jointly maintains reliable databases through decentralization and zero trust. It is a distributed database that is almost impossible to change. The "distributed" here is not only reflected in the distributed storage of data, but also in the distributed records of data (maintained jointly by participants).

The generation process of blocks is a process in which nodes on the chain reach consensus on the order and current status consistency of transaction data in the system. At the same time, nodes can participate in the calculation, synchronization and storage of data on the chain according to their permissions, thereby backing up the data of the entire system. In the absence of a central agency node, a distributed consensus method is used to build a data sharing network in which multiple nodes participate equally. The data stored on the blockchain monitoring platform cannot be replaced, deleted, or tampered with. Among them, public chain data writing permissions such as Bitcoin and Ethereum are open to all users, and the written information can never be deleted. This makes it impossible to modify malicious information written by humans or misoperation of sensitive information, which can easily lead to the abuse of writing sensitive and illegal information, causing new problems for society. There will inevitably be many security vulnerabilities in the monitoring and supervision process of the blockchain monitoring platform, and attacks targeting these vulnerabilities are increasing day by day, which has a greater impact on the security of the blockchain monitoring platform [3].

3. Blockchain monitoring and supervision platform's structure

The blockchain strategy supervision service platform is based on the underlying blockchain architecture of the master-slave chain to build integrated services and monitor the supervision platform structure. As shown in the figure below, it includes core services, data processing, data classification, and data collection modules.

Core services include monitoring and supervision services. Monitoring services include node audit, node operation evaluation, graphical display, business analysis, etc. Supervision services include alarm records, data monitoring, fault monitoring, node management, etc.

Data processing includes monitoring and supervision data processing. Monitoring data functions include cleaning, mapping, extraction, and inspection. Supervision data functions include rules, thresholds, alarm settings, and data formatting, filtering, and storage.

Data classification categorizes detection supervision data. Monitoring data includes super node election, approval qualifications, chain consensus, and cross-chain proposals. Supervision data includes network resources, hardware resources, node blocks, and node logs.

In data collection, the slave chain data is first read, and then transmitted to the main chain through inter-chain data collection, and the main chain performs monitoring and supervision operations.

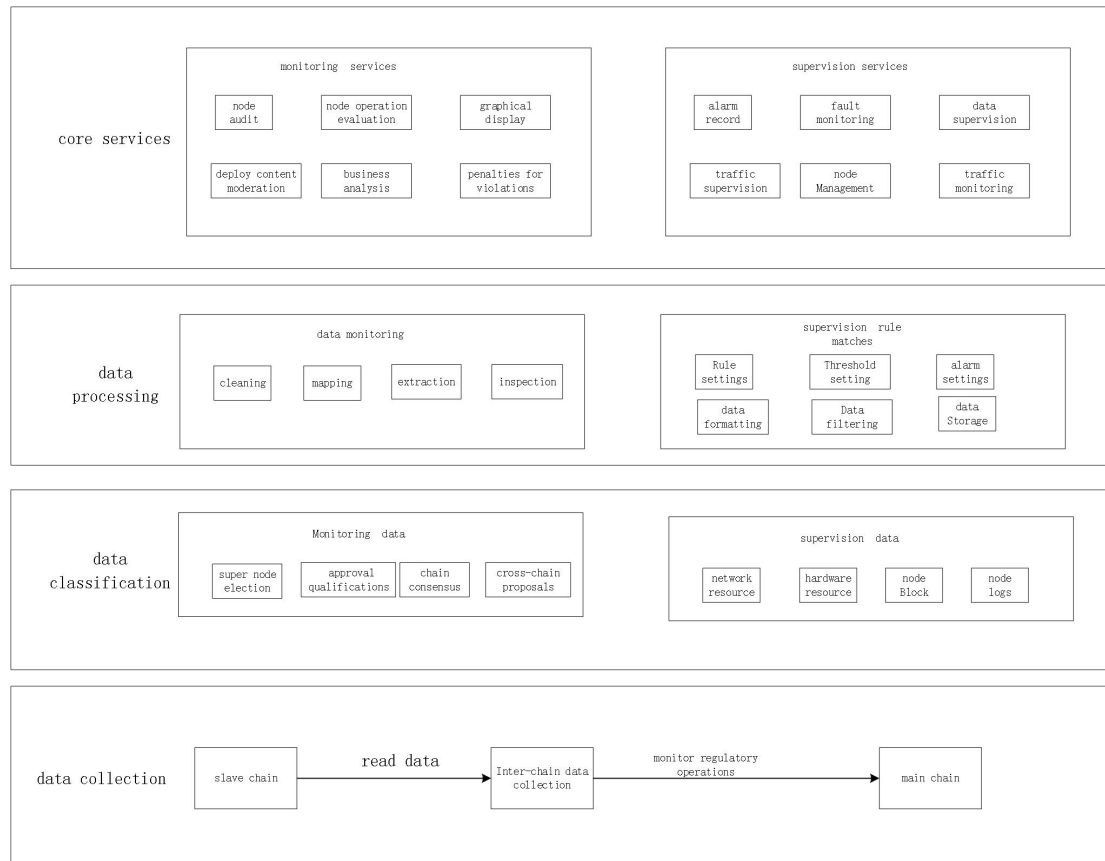


Fig. 1 Supervision service platform structure

3.1 Supervision platform structure.

The regulatory service platform framework is divided into three modules: unified data access, data processing, and core functions.

Unified data access: Responsible for real-time collection of transaction data on the master and slave chains as the basic metadata for regulatory services. Such as super node election proposal information, qualification review for joining the blockchain network from the slave chain, cross-chain proposal data, changes to the consensus node of the slave chain, block production status of the slave chain, anchoring of the main chain, certification of identification, etc. On-chain operations Actions. All documented types of these actions are stored in the supervision service data.

Data processing: Verify, extract, clean and map heterogeneous metadata, and store the results uniformly according to certain standards.

Core functions: Analyze business development, safe operation, etc. through big data analysis. Review the consensus mechanism and smart contracts deployed on the blockchain to ensure their legality and compliance; store the hash value of the slave chain data in the main chain for certificate storage. In the event of disputes or data review, it can be based on the main chain. The hash on the slave chain is compared with the data in the slave chain to ensure that the data used to resolve disputes is authoritative and that the reviewed data has not been tampered with; the master chain provides a supervision SDK to the slave chain. For example, the master chain provides a supervision SDK that contains prohibited words. Dictionary SDK or blacklist data, the node execution process calls the SDK for verification, and only content that passes verification can be uploaded to the chain or executed. When the supervision node discovers an evil node, it will record its illegal behavior in the credit file, and synchronize the punishment content to the designated supervision node or the main chain super node for execution, such as restricting transactions or traffic, shutting down or restricting its permissions, canceling trusted identities, Mark non-credit users, etc.

3.2 Monitoring module architecture.

The monitoring component architecture can be divided into five modules: data collection, data extraction, alarm rule configuration, alarm event generation, and data display.

Data collection: Mainly collects network resources, hardware resources, node programs, node traffic, node health and other data for standardized storage.

Data extraction: It mainly cleans the collected data (data formatting and filtering) and extracts the data to the monitoring and alarm module.

Alarm rule configuration: Used to set rules for extracted data (such as node block exceptions, node or slave chain traffic control rules), alarm threshold settings, alarm contact settings, and alarm mode settings.

Alarm event generation: Record abnormal events in real time so that the data display module can display and push abnormal data from the user-defined system.

Data display: Used to display monitoring data on WEB pages, such as node topology diagrams, node fault information, data statistics, traffic monitoring data, etc.

4. Monitoring and supervision technology

4.1 Node monitoring and anomaly detection.

Node monitoring and anomaly detection play an important role in the monitoring of blockchain monitoring and monitoring platforms. It provides strong support for achieving efficient and accurate blockchain monitoring and platform operating status monitoring and fault diagnosis. In traditional monitoring methods, limited sensors are often relied on to obtain limited parameter information, resulting in limited monitoring range and low monitoring efficiency. Modern node monitoring and anomaly detection have changed this situation.

Diversified sensors can cover various key parts and important parameters of the blockchain monitoring platform, achieving all-round monitoring of the entire blockchain monitoring platform. Node monitoring and anomaly detection improve data accuracy and stability. The accuracy and reliability of the sensor have been greatly improved, ensuring the accuracy of monitoring data and effectively preventing false alarms. The improvement of stability also means that the sensor can work reliably under harsh working conditions and is less susceptible to external interference, ensuring the stable operation of the blockchain monitoring platform. The introduction of node monitoring technology enables various nodes to connect to each other and jointly complete the monitoring tasks of the blockchain monitoring platform. Information interaction and data fusion between nodes improve the comprehensive perception of the operating status of the blockchain monitoring platform [7].

4.2 Network security detection and processing optimization.

Network security detection and processing optimization are to discover security vulnerabilities in the blockchain monitoring platform, while network security detection technology is to monitor and provide early warning for all communication data flows in the network environment. Azimuth monitoring can capture abnormal blockchain monitoring platform network activities in a timely manner and prevent attacks caused by abnormal access. In order to achieve real-time security assessment of the blockchain monitoring platform, network information security must be given top priority and placed in the work of ensuring the stability and system of the network environment and operating system. It is necessary to make full use of the role of advanced technology to ensure the accuracy of calculations, ensure the security of the network environment, and create a relatively good environment for the efficient and smooth development of information security work. For example, when performing work related to network information estimation, gray correlation clustering analysis methods, clustering algorithms, etc. should be used.

4.3 Contract detection technology.

The blockchain contract detection system adopts the Client/Server mode to implement security detection of smart contracts through the client and server. The blockchain contract detection system supports the generation of smart contract security audit reports and natural gas optimization audits. The friendliness of the blockchain contract detection system to supervision is mainly reflected in four aspects: it has an access system; adding smart contracts to the supervision rules can comprehensively improve the level of supervision automation; the blockchain supports penetrating supervision; and it is easy to standardize the supervision interface, to achieve centralized supervision. The blockchain contract detection system "penetrating supervision" is shown in the figure below, which is divided into two parts: blockchain supervision and risk warning. Blockchain supervision is through node tracking, network supervision, content supervision, and through the main chain P2P network, actively interact with relevant nodes in the main chain P2P network, obtain relevant communication file information and network and node information, and then implement node management and control through comprehensive research and judgment, and understand the nature of various behaviors of all parties involved in the consortium chain supervise to meet regulatory requirements for data authenticity, accuracy, and business nature identification.

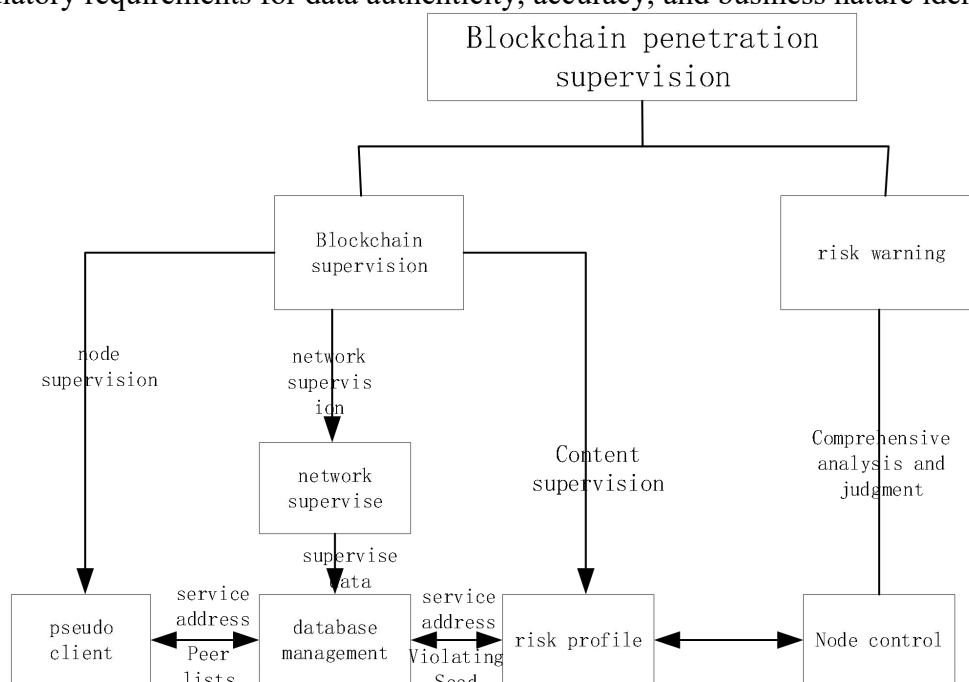


Fig. 2 Blockchain Penetrating Supervision

5. Thoughts on the Construction of Xinghuo chain network

5.1 Xinghuo chain network Construction Technology Selection.

The equipment deployment and network planning of the Xinghuo chain network are important links to ensure its performance and reliability. Compared with traditional networks, the Xinghuo chain network has superior performance, such as strong anti-interference ability and plays a positive role in encrypted transmission, effectively improving the security and confidentiality of the blockchain monitoring platform. At the same time, the intelligent blockchain monitoring platform will not be affected by distance. Even if the monitoring area is thousands of miles away and the transmission environment is harsh, it can still transmit stably and efficiently. Among them, no matter where the user is, as long as they have communication conditions, they can reasonably use the Xinghuo chain network technology to control the blockchain monitoring platform in real time.

As an important part of the blockchain monitoring platform, Xinghuo chain network must be able to provide stable communication signals and high-speed data transmission. Therefore, when arranging 5G equipment, it is necessary to fully consider the range and penetration of signal coverage, as well as the mutual interference between equipment. In addition, network planning is also an important part of ensuring the performance and reliability of the 5G Xinghuo chain network. Xinghuo chain network planning mainly includes bandwidth and delay planning. The Xinghuo chain network generates a large amount of data every day. Therefore, sufficient bandwidth must be ensured in network planning to support real-time video data transmission and analysis. In addition, due to the high timeliness requirements of monitoring data, delay issues must also be considered. By rationally planning the Xinghuo chain network architecture and optimizing the transmission path of the blockchain monitoring platform.

5.2 Xinghuo chain network Construction Implementation Strategy.

In the construction of the Xinghuo chain network, site selection and point layout are very important links, because the Xinghuo chain network involves many aspects, such as the selection of monitoring points, the design of installation points, etc., which all need to be scientific, reasonable, fair and just. Whether the site selection and distribution during the construction of Xinghuo chain network is reasonable is directly related to the construction effect of the entire blockchain monitoring and monitoring platform.

During the monitoring and supervision construction of Xinghuo chain network, data should be collected regularly. The collected data should be formatted and output through standard data templates, classified and persisted to the business database. The data should be cleaned and classified, monitored in real time according to different monitoring types, and pushed according to alarm rules to the user alarm exception data; then scan the alarm exception data regularly, and notify the user of any abnormal data found using the user configuration method.

In addition, during construction: first, it is necessary to formulate a scientific and reasonable site selection and distribution plan based on the actual situation of the slave chain nodes, and carry out construction and distribution in strict accordance with the plan; second, it is necessary to strengthen the guidance and supervision of slave chain nodes and ensure planning is effectively implemented; the third is to scientifically lay out the Xinghuo chain network and formulate corresponding management methods and standardized processes; the fourth is to conduct regular inspections and adjustments to the location and location of points to ensure that the Xinghuo chain network can be constructed in the correct and proceed at a reasonable location [10].

6. Summary

In short, with the continuous development of blockchain monitoring and supervision platforms, it has been used more and more in various fields. The importance of regional chain monitoring and supervision platforms has become more and more prominent. However, during the operation of the platform, there are also various fault problems often encountered. Therefore, relevant platform maintenance personnel required to conduct a detailed analysis of the fault problems and propose corresponding solutions to the causes of the problems, so as to ensure that the platform can operate and be used more safely, stably, and reliably. In addition, daily maintenance of the blockchain monitoring platform can also reduce the probability of failure of the blockchain monitoring and supervision platform.

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