Research on Application of Computer Big Data Technology in Blockchain Computing

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Abstract. Blockchain originated in 2009, it was the underlying "ledger" recording technology of Bitcoin. After several years of development and improvement, it has gradually become a distributed, decentralized, and trustless technical solution. In the past two years, blockchain has become a new decentralized distributed computing paradigm. We apply blockchain technology into cloud computing, using the former’s security mechanism to improve the latter’s secure storage and secure computing performance. This is a promising research topic. The paper mainly discusses the design and implementation of blockchain from a technical prospect, it summarizes the advantages and disadvantages of the blockchain, and it also analyzes the possible application scenarios.

Keywords: Block Chain, Advantages and Disadvantages, Cloud Computing Big Data

1. Introduction
Blockchain technology is a distributed storage and decentralized ledger database. Complete transaction records under the supervision and verification of the entire network nodes, all nodes back up transaction records. Blockchain technology is based on the P2P distributed network topology, it uses asymmetric encryption algorithms and digital signatures to ensure data security, it combines specific messaging mechanisms and consensus algorithms to store data blocks in a chain, so as to achieve the core requirements. It is suitable for solving the problems of data storage, information traceability, data encryption, trust and safety in logistics service transactions. Therefore, taking the logistics service transaction as the background, this paper studies and summarizes the knowledge of blockchain, and it also proposes a consensus algorithm for logistics blockchain, which is based on cloud computing [1].

2. Blockchain
A block is a data unit that records Bitcoin transaction information. It is composed of two parts: block header and block content [2], as shown in Table 1.
3. Blockchain technology application

3.1. Development and improvement of blockchain

The blockchain in Bitcoin is specifically designed for digital currency transactions. The use of a consensus mechanism based on computing power limits its scope of application to a certain extent. With the increasing importance of blockchain technology, based on the initial blockchain, some new blockchain technologies and concepts have emerged [4].

1) Private chain

Bitcoin's blockchain is completely public, and everyone can participate in it. It can be regarded as an "open chain". In contrast, restricting the blockchain network to a certain range becomes "Private chain". According to the different technical methods used to privatize the blockchain, the private chain can be subdivided into alliance chains, permission chains, etc.

2) Ethereum

As a digital currency trading system similar to Bitcoin, Ethereum is also a complete decentralized application platform. While using Ethereum for digital currency transactions, anyone can publish and use decentralized on Ethereum Decentralization Application. The excellence of Ethereum is that it provides a complete tool chain for decentralized application development, deployment and use, making blockchain-based application development extremely convenient.

3.2. Application of Blockchain

| Table 1. Block data structure |

| Field                  | Subfield               | size     | description                                                                 |
|------------------------|------------------------|----------|-----------------------------------------------------------------------------|
| Block size             |                        | 4 bytes  | (Byte size of this block (excluding this field))                           |
| version number         |                        | 4 bytes  | Mark the block protocol version                                             |
| Parent block hash value|                        | 32 bytes | Up-the hash value of the block header of the block (parent block)          |
| Merkel tree "root"     |                        | 32 bytes | The root hash value of the Merkel tree of the transactions recorded in this block |
| Timestamp              |                        | 4 bytes  | The generation time of this block                                           |
| Difficulty target      |                        | 4 bytes  | The difficulty target of the proof-of-work calculation for generating this block |
| random number          |                        | 4 bytes  | Random number used for proof of work algorithm                              |
| Number of transactions |                        | 1~9 bytes| Number of transactions recorded in this block                               |
| transaction            |                        |          | All transactions in this block are recorded using the data structure of Table 1 |
3.3. Advantages and disadvantages of blockchain

Blockchain has the advantages of decentralization, trustlessness, and anti-tampering of data. It has the characteristics of data transparency while being anonymous, but it does not mean that the blockchain technology does not have limitations. For example, problems such as block capacity limitation, long confirmation time, and high energy consumption of the consensus mechanism based on proof-of-work restrict its large-scale commercial application [6]. At the same time, the privacy leakage caused by its data transparency, how to smoothly integrate with the existing system, laws and regulations, and other issues need to be continuously researched and resolved. Like any new technology, the breakthrough of blockchain technology also requires more long-term accumulation.

4. Theoretical support for localized cloud computing big data application of blockchain technology

In order for blockchain technology and cloud computing technology to be effectively integrated, the two technologies need to have high similarities. The current blockchain includes three types, namely, alliance chain, public chain and private chain. There are also three modes in the application of cloud computing technology, namely private cloud, public cloud and hybrid cloud. The theoretical support for the integration of these two technologies includes the following:

(1) Network architecture level. It can be seen that the current two technologies have great similarities in application types, and the functions that the corresponding application methods can perform are also basically similar. From the network architecture. From the perspective of the network architecture, the two technologies are distributed in the application. Type network, there are no various nodes in the traditional network system.

(2) Data structure and operation efficiency level. In the application of blockchain technology, the overall data will be divided and distributed to the network. Cloud computing technology can compare computing power and ensure that data input personnel make efforts in data writing [7].

(3) At the smart contract level. Automatic contracts can be applied as accounts with automatic guarantees. In the application of blockchain technology, computers will automatically execute related
agreements. Cloud computing technology will integrate various scattered information to achieve low-cost assignment on demand.

5. Localized cloud computing big data application of blockchain technology

5.1. Data center architecture
In the application process of localized cloud computing technology, it is essentially a traditional network architecture form based on cloud computing technology. In the process of data center architecture, there are two aspects. Software equipment, including PC terminals, etc., usually these equipment will store part of the scattered data, on the other hand, the cloud computing system platform provided by the operator, the platform will store a large amount of divided data in the application. In the application of localized cloud computing technology, these two systems will be put into operation as a unified whole, which requires that a communication system needs to be built in the system during the operation of the system, so that: It can achieve rapid acquisition of various types of data, and at the same time allow cloud computing technology to integrate these fragmented data [8].

5.2. Cloud computing center architecture
The cloud computing center mentioned in this article provides operators with a cloud computing service system. Compared with traditional cloud computing technology, localized cloud computing technology will disperse fragmented data across the entire blockchain. This is important for cloud computing centers. Put forward higher requirements to ensure that the cloud computing center can effectively integrate various fragmented data. In the construction of the system, the form of a proprietary domain can be applied to ensure that the cloud computing center can be integrated with the traditional data center [9]. In the application of proprietary domain technology, the cloud computing center must be able to autonomously perform resource scheduling, such as selecting its own IP address range, configuring routers and gateways, and performing network segmentation to finally realize the migration of relevant data to ensure that these data can be effective storage in the cloud computing center.

5.3. Communication method selection
In the application of localized cloud computing technology, there will be two aspects, one is the localized data storage system, and the other is the cloud computing center system. These two systems need to operate in coordination, which requires the entire The construction of the system requires the construction of the communication system. The idea proposed in this paper is to directly connect the PC equipment on the user side with the cloud computing center application fiber, which improves the data transmission speed and allows the PC equipment on the user side to quickly obtain the required information. In addition, in the construction of the entire system, it is necessary to use VPN, dedicated line connection, etc. to effectively connect the two subsystems to prevent the rest of the network information from interfering with the localized cloud computing system, or to prevent the data stored in the entire blockchain from being maliciously damaged, so as to meet the requirements of ensuring the data security of users in cloud computing applications [10].

6. Conclusion
Blockchain is an emerging technology, which is integrated from cryptography, mathematics, and network technology. It provides people with an open and safe district-centric distributed database and computing paradigm. Applying blockchain technology to cloud computing and using the former’s security mechanism to improve the latter’s performance is a promising research topic.

Acknowledgments
This work was financially supported by Research on personalized teaching based on user portrait.
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