Application of Blockchain and Distributed Storage Technology

Zhiying Liu

School of Economics and Management, Anhui Normal University, Wuhu, Anhui 241000, China

*Corresponding author e-mail: liuzhiying_edu@163.com

Abstract. With the rapid development of Internet technology, enterprise-level storage and cloud storage have become the standard tools for enterprises to meet their computing and storage needs. Due to the defects of traditional decentralized data storage system, blockchain and distributed storage technology has been widely applied to the modern enterprises. Blockchain storage refers to a decentralized storage system built with blockchain incentives, which is an effective combination of blockchain and storage system. There are many achievements and various breakthroughs in this field and both theoretical and applied research have developed rapidly. This paper discussed the research progress on blockchain and distributed storage technology. In addition, the advantages of blockchain storage technology were also discussed. Blockchain storage can effectively avoid the negative impact of a single point of failure. It can improve availability by distributing the load to nodes around the world. Last but not least, the applications for blockchain and distributed storage technology such as data storage, money transfers, and financial exchanges were discussed. The current knowledge, and perspectives of blockchain and distributed storage technology in modern enterprises could provide a good reference for the future research.

Keywords: Blockchain storage, Distributed storage technology, Data storage, Decentralized storage system, Distributed ledger technology.

1. Introduction

With the rapid development of Internet technology, enterprise-level storage and cloud storage have become the standard tools that allow enterprises to meet their computing and storage needs[1]. At the same time, with the development and maturity of blockchain technology, it has begun to attract more attentions from many parties due to their advantages and characteristics. Blockchain technology has the characteristics of anti-tampering and decentralization, and has been widely used in finance, banking, supply chain and other fields [2]. Compared with traditional centralized solutions, blockchain can effectively ensure data security. The decentralization design of the system architecture solves the trust and efficiency issues of inter-agency cooperation.

Blockchain storage refers to a decentralized storage system built with blockchain incentives, which is an effective combination of blockchain and storage system. Blockchain storage technology store the global storage node thereby building a huge globally unified storage pool [3]. Figure 1 shows a typical distributed data storage process [4]. A distributed blockchain storage technology can enhance data reliability, availability, and remote disaster tolerance by dispersing data in multiple places [5]. In addition, blockchain storage also has the characteristic of de-duplication. The cost is lower when there are more users. As a result, it is suitable to use blockchain to motivate users. Due to these advantages, blockchain and distributed storage technology is one of the most appropriate approaches for financial exchanges and securely share information of the modern enterprises.

Regarding data storage, there are currently three types of data storage solutions in the industry, i.e., enterprise storage, cloud storage, and blockchain storage. The development process of cloud storage is a process of continuously improving data reliability. When the reliability of a single hard disk has a bottleneck, multiple hard disks (desktop-level to enterprise-level) are a more appropriate approach. While a single server has a bottleneck, multiple servers (enterprise-level to cloud storage) are a better solution. The development of blockchain storage is because the reliability of a single data center has encountered a bottleneck, so multiple data centers are used to store data. To tens of millions of global nodes, further improve the reliability of data and achieve absolute security and reliability in the commercial sense. There are pros and cons for each data storage solution. Therefore, choosing an

appropriate data storage method and understanding the application of blockchain and distributed storage technology play a significant role in financial exchanges, data storage, and securely share information of the modern enterprises. Few studies have been conducted in this field due to the rapid growth of blockchain and distributed storage technology. The purpose of this study is to learn the application blockchain and distributed storage technology in modern enterprises. The objectives of this paper are to: 1) discuss the current knowledge, and perspectives of blockchain and distributed storage technology; 2) the advantages of blockchain storage technology; 3) the applications for blockchain and distributed storage technology.

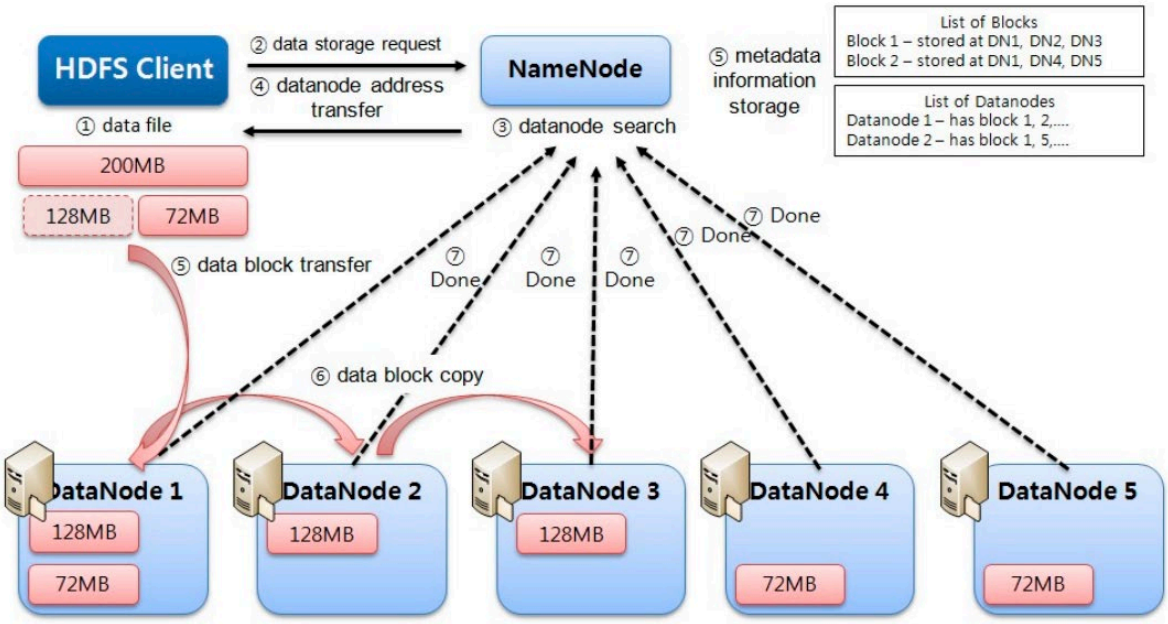

Figure 1. A typical distributed data storage process.

2. Blockchain and Distributed Storage Technology and its Applications

2.1 A subsection Blockchain and Distributed Storage Technology

Blockchain storage technology is based on distributed ledger technology (DLT). One of the major functions of DLT is being a decentralized store of data regarding transactions between different parties [6]. Distributed ledger and decentralised technology adoption for smart digital transition in collaborative enterprise. Operations are maintained in the ledger as a sequence of blocks and are filled into the DLT in chronological order. A blockchain is consisted of interconnected chains, each of which refers to the block before it. In blockchain storage, sharding is the method through which files are first divided up. To avoid data loss in the case of a transmission mistake, each shard is duplicated. Additionally, a private key is used to encrypt the files, rendering it hard for other network nodes to see them. The duplicated shards are dispersed among global decentralized nodes. As a result of the interactions being documented in the blockchain ledger, the system can validate and synchronize the transactions among the blockchain's nodes. These conversations will always be preserved through blockchain storage, and the data cannot be altered.

2.2 Application of Distributed Storage Technology

Bitcoin (CRYPTO: BTC) is one of the most important applications of blockchain technology [7]. There are many other applications for blockchain and distributed storage technology, even while this technology for Bitcoin and other cryptocurrencies works really well. The applications include data storage, money transfers, lending, gambling, logistics and supply chain tracking, financial exchanges,

secure personal information, securely share medical information, and secure Internet of things networks[8].

Among these applications, financial exchanges and money transfers are the major application of distributed storage technology. Over the past several years, numerous businesses have appeared offering decentralized bitcoin exchanges. Blockchain exchanges provide quick and more affordable transactions. Furthermore, many investors like more autonomy and security with a decentralized exchange since they are not required to deposit their money with the centralized authority. Figure 2 shows the difference between the decentralized finance and a traditional financial system [9]. Although bitcoin is one of the main products on blockchain-based exchanges, the idea might also be used for more conventional investments. In addition, blockchain-based money transfers may be quicker and less expensive than utilizing currently available money transfer services. This is especially true for international transactions, which are sometimes costly and delayed. Money transfers between accounts, even in the current U.S. financial system, can take days, while a blockchain transaction just takes minutes. Blockchain technology is also a good approach to track goods as they transit through a logistics or supply chain network. First, since data is accessible on a secure public ledger, it facilitates easier communication between parties. Second, since data on the blockchain cannot be changed, it offers increased security and data integrity. As a result, logistics and supply chain partners may collaborate more freely since they can trust that the information being given to them is reliable and current.

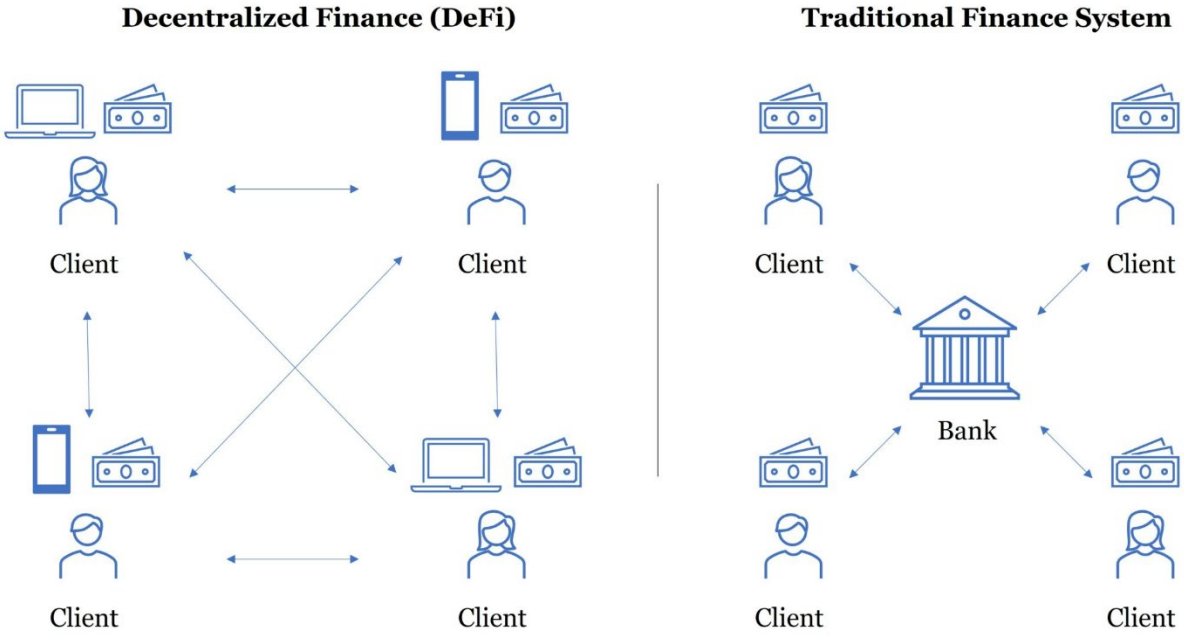

Figure 2. Comparison between decentralized finance and traditional financial system.

3. The Advantages of Blockchain Storage Technology

Blockchain storage has four advantages as compared with the traditional enterprise-level storage and cloud storage. First, blockchain storage technology can store data on millions of global nodes in a more advanced redundant encoding mode[10]. It can effectively avoid the negative impact of a single point of failure. In terms of hard disk failure, the reliability of blockchain storage is 1064 times higher than that of cloud storage. Second, the availability of services is better. Blockchain storage can improve availability by distributing the load to nodes around the world. In terms of service availability, blockchain storage is at least 100 million times higher than cloud storage. Third, the cost of blockchain storage technology is lower. This is mainly attributed to the good ability to solve the problem of data duplication rate. In addition, blockchain storage technology can reduce the data redundancy rate, thereby reducing costs. The construction cost of each storage node is also lower.

The edge node architecture has a lower demand for hardware, which is much lower than the cost of building a centralized data storage center. Fourth, the disaster tolerance of blockchain storage is stronger. For the traditional centralized storage, generally two centers and three centers are the highest level of disaster tolerance. The construction cost is usually high. This is also the current disaster tolerance rate of many large enterprises and institutions in the world. However, the feature of "thousands of places and ten thousand centers" of blockchain storage can significantly improve the level of disaster tolerance and recovery.

4. Conclusion

With the rapid development of Internet technology, enterprise-level storage and cloud storage have become the standard tools for enterprises to meet their computing and storage needs. The application of blockchain and distributed storage technology is being developed under exponential growth. The shortcomings of the decentralized data storage system have led to a widespread use of distributed storage and blockchain technologies by contemporary businesses. Speaking of blockchain storage, it is a decentralized storage system created with blockchain incentives. The development of blockchain and distributed storage technology research was covered in this study. The benefits of blockchain storage technology were also covered in this paper. A single point of failure may be easily avoided using blockchain storage. By dispersing the load among nodes throughout the world, it can increase availability. The uses of blockchain technology and distributed storage, including data storage, money transfers, and financial exchanges, were also covered. Future studies might benefit from the present understanding of distributed storage and blockchain technologies in contemporary businesses.

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