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BLOCKCHAIN-BASED SHARING INFORMATION IN GOVERNMENT SECTOR

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ABSTRACT

Government information resource (GIR) sharing, an important means for efficient government working, requires new technology to enhance its reliability and security. Blockchain, as an emerging technology for building decentralized applications, is gradually penetrating various fields. In this paper, we present a technical combination that consists of Blockchain structure, network sharing model and consensus algorithms. With these techniques, we design and implement a Blockchain-based GIR sharing system (BGIRSS),which is decentralized, to make the sharing procedure more efficient. The results of a series of emulational experiments show that our system is securer and more reliable than conventional sharing schemes, and can effectively promote the sharing efficiency of GIRs with lower implementation cost

1. INTRODUCTION

By building trust in a decentralized way, Blockchain technology has contributed distinctive solutions to diversiform application areas, especially in finance [1]. Its fundamental is well introduced by Satoshi [2] in his paper on Bitcoin. Over the past decade, Blockchain has undergone many technological innovations, including Smart Contract and various Blockchain service platforms [3]. Blockchain has been breaking away from domanial restriction, and becoming a technical standard which can be fitted into more scenarios.

We consider a scenario outside financial realm. It is hoped that government information resources (GIRs) should be fully grasped and utilized among departments to make governments more efficient. In this paper, a GIR means the useful information expressed by a group of data that come from business information systems (BISs) during the The basis of sharing is trust, and trust is based on security. Blockchain built on a decentralized peer-to-peer network uses a series of cryptographic techniques to make it tamperresistant and encrypted, and is shared in the network by consensus. The network is not controlled by any single node, and this allows each participant to share data without having to establish trust with its counterparties. The scenario of GIR sharing, which differs from that of payment or exchange, exactly provides a distributed circumstance and application requirements for Blockchain. Reconstructing of the GIR sharing model using Blockchain technology is a beneficial attempt in a nonfinancial field.

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2. RELATED WORK

There would be a lot of synergy among government departments if they shared their information resources efficiently. So, GIRs can be regarded as digital assets that are in the form of data stored in computers. The GIR sharing typically consists of three basic phases. The first phase is to carry out a survey on GIRs in every department. The outcome of the survey is a catalog of GIRs (GIRC), by which departments can send their sharing requests to others. They will really get the data they needed by online or offline ways in the second phase, while the last phase is to keep the GIRC up-to-date and to maintain the sharing records. Our work focuses on solving technical problems in the latter two phases. According to the layered architecture of Block chain application described by Yuan [4], we provide a concrete implementation for the Block chain-based sharing model to make sharing tasks more efficient. In addition, research on other issues raised by this model will complement this work

3. EXISTING SYSTEM

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4. SYSTEM MODEL

Two common GIR sharing models are currently available without regard to trust, accountability, and security. One is the managerially centralized sharing model (MCSM) and the other is the data-specific centralized sharing model (DCSM). The problem with MCSM is that the sharing processes are controlled by a few specific nodes, such as SSd. This often leads to inefficient sharing because of too much coordination. Integrating all the sharable data into a data center can indeed make the sharing more efficient, but increase the risk of the single node attacking. Meanwhile, construction and maintenance of the data center require a large investment.

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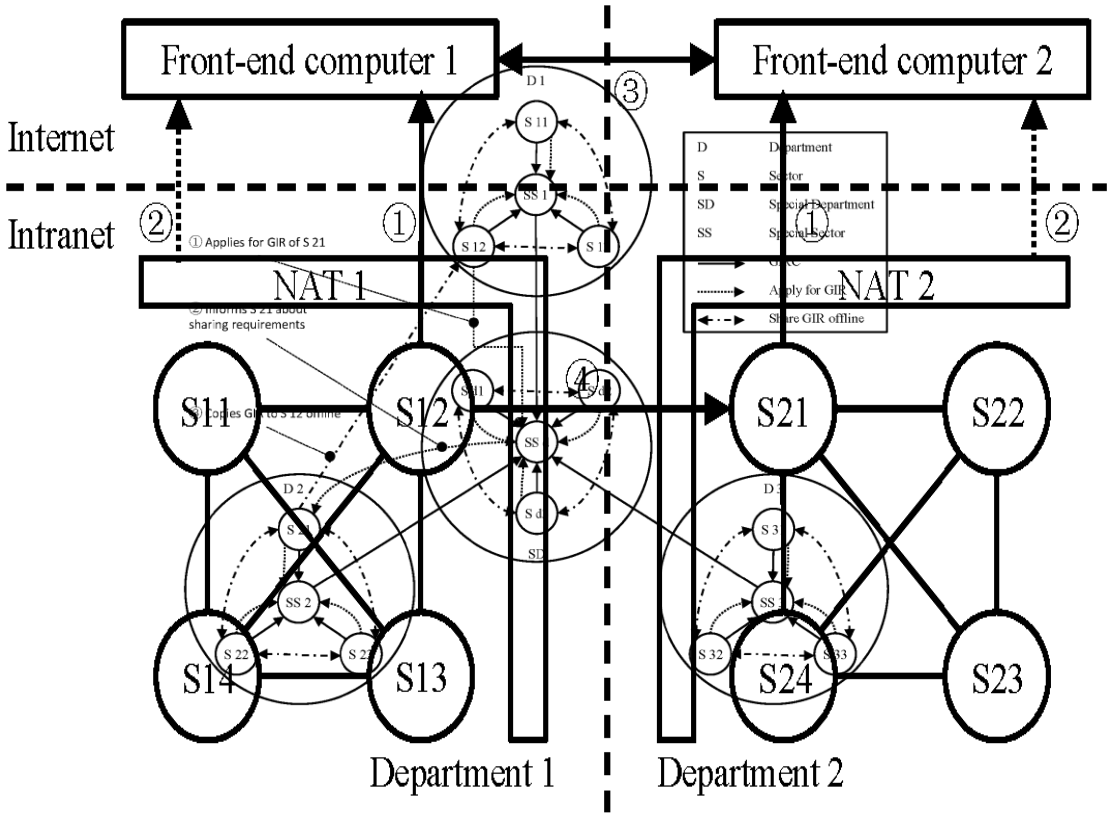
Request directly to S21. ii. If S21 accepts the request of S12, the two parties will establish a connection, through which S21 will copy the data directly to S12. iii. Write this sharing process to Blockchain as a transaction, and make consensus on it in the whole network. Compared with MCSM and DCSM, the virtues of this model are as follows: The topology of the network is decentralized. Liability accidents can be partially avoided as the sharing events recorded on Blockchain are tamperproof and traceable. A few broken-down nodes will not affect the normal operation of the whole network.

4.1 COMMUNICATIONS

To build a peer-to-peer network among different intranets requires Network Address Translator (NAT) traversal through UDP Hole Punching techniques demonstrates how two allopatric nodes communicate.



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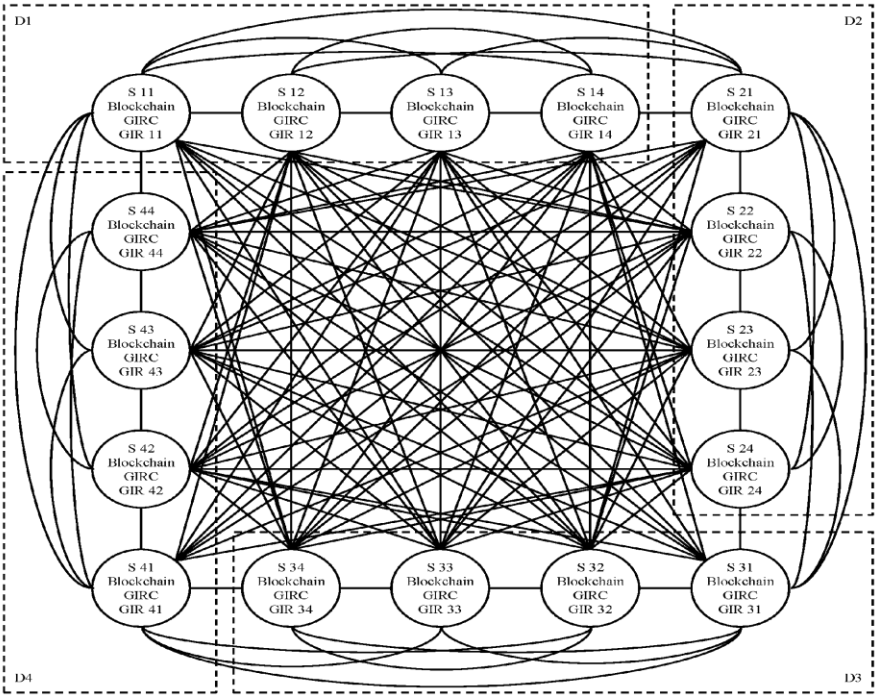
4.2 BLOCKCHAIN STRUCTURE

Each node in the network is equipped with a node-side software referred to as Share Client we design to implement the following two interfaces: Catalog: for storing and maintaining GIRC. Wallet: for storing and maintaining GIRs owned or shared. Generally, a GIR is a structured data set whose summary is composed of GIR's primary metadata as shown in TABLE I. When a GIR is registered, its summary will be appended to the GIRC, while the GIR will be divided into several parts, each of which is denoted by GIR Part. there is no double-spending [5] problem with GIR sharing. Therefore, we define a concatenate structure for the GIR as shown in Fig. 5. This structure keeps the owners' actual control over the direction of the transactions. Each sharer only stores the handle of the latest transaction in its Wallet, and this leaves it with no chance to share the same data to a third party through Share Client.



CONCLUSION

This paper designs and implements a Blockchain-based government information resource sharing system. In view of the shortcomings of current GIR sharing strategies in efficiency, reliability and security, we put forward a decentralized data sharing model. The establishment of peer to-peer network fully considers the features of government Intranet, and our proposed Blockchain data structure with matched consensus algorithms satisfy the three main reliability requirements of GIR sharing: sharing events tamper-resistance, sharing history traceability and sharing source purity. The elaborate evaluation experiments based on emulational testbed demonstrate our proposed model and system are effective, reliable and secure, especially take on good stability of the network and capability of data analysis.

Summing up the above, taking Block chain as an independent technology to solve GIR sharing issues provides a new thinking for involved developers and practitioners. The future work will focus on further improving of the stability, security, scalability and applicability of our model and system such as: Developing new fault-tolerant hash algorithms to identify the similarity of two GIRs, addressing the issues of UDP packets dropping and disordering, making further efforts to optimize the performance of the system load, reinforcing the defense of the system against more attacking ways, trying to improve the RSA algorithms to prevent fake nodes from faking the public keys, and so on.

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