An E-government Model Design Based on Block Chain

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Abstract: This paper analyses the deficiency of the traditional electronic government affairs, puts forward the model BCGA of e-government based on block chain technology. Then it also gives the e-government system operation scheme based on this model. Finally, the advantages of the model are summarized and further prospected.

Keywords: Block chain, E-government, BCGA.

Introduction

The e-government means the way that government agency uses to realize the daily office work, information collection and distribution, the management of the public management, and the network management with the support of information technology. Such as government office automation, government real-time information release, citizen online inquiry government information, electronic polls and social economy statistics, etc.[1]

As a popular information technology, block chain provides a reliable guarantee for the upgrading of traditional e-government.

Block chain[2] is, along with the rising popularity of digital encryption currency such as bit coins and gradually rise, a new decentralized architecture and distributed computing paradigm. It has caused the government departments, financial institutions, science and technology enterprises and capital market’s wide public concern. Block chain technology has many characteristics, such as decentration, the time-series data, collective
maintenance, programmable and reliable safety, etc. It is especially suitable for the construction of a programmable electronic government affairs system.

**Overview of block chain technology**

Block chain[3] is a distributed ledger, a technology solution that collectively maintains a reliable database by decentralizing and trusting. From the data point of view: Block chain is a distributed database that is almost impossible to change. This "distributed" is not only represented as the distributed storage of data, but also as a distributed record of data (that is, co-maintained by system participants). From a technical point of view, block chain is not a single technology, but a result of a combination of technologies. These techniques combine with new structures to form a new way of recording, storing and expressing data.

The characteristics of block chain[4, 5]

- Open, consensus
- Decentralized, without mutual trust
- Transparent trade, both sides on condition of anonymity
- Tamper-resistant, traceability

**Traditional e-government model and its deficiencies**

Just as a common transaction, for example, need to experience more government audit and the corresponding archive, subsequent department needs through internal data query platform of leading department database data, and combining with affairs to deal with the data submitted to the department, offer certain audit opinion. Although the whole process has realized information, the system has the following shortcomings:

- **Long business time between departments, low efficiency:**
  It takes time for transaction transference data to be transferred; the leading department has the time delay to check the result of the audit.

  The system still relies on staff to deal with it, and it is unable to implement the government affairs automatically, unable to further improve efficiency and reduce the redundant staff.

- **Lack of multiple levels of permissions on the laws and regulations:**
  In the traditional electronic government affairs information system, each department are customization-constructed by itself or the superior department in accordance with the relevant policies and standards, but the electronic government affairs system between departments may conflict in the execution of laws and regulations. Which may also leads to the lack of unified coordination on digital information level, and the legal conflict between
departments where each one may be unable to perform transactions.

- Among database data redundancy is serious, the lack of unified update management:
  Because the databases of each department are relatively independent, data redundancy and data conflict can be created: when a database is updated, other data attributes cannot be updated in time.

- Data security cannot be guaranteed:
  The security of the data can only be achieved through the security of the database system, without ensuring that internal personnel tamper with data and similar data loss.

- High cost:
  Each department’s system and data must be stored alone. And in order to ensure the safety, in addition to the necessary hardware inputs such as firewall, intrusion detection, the corresponding security maintenance personnel’s investment is still very large.

The BCGA e-government model based on block chain

This model adopts the double chain structure proposed by professor Weide Cai (as which is shown in the figure below) [6]:

Based on the double chain structure of professor Weide Cai, this article proposes the e-government Affair model BCGA (Block Chain - Government Affair). The model is shown in figure 3 below, which consists of the following parts:

- User
  This user can be a person, unit or government department. And it provides the name of the transaction and the data needed.

- Affairs accepted block chain
  The block chain is used to collect users' needs and government transactions, and to form a transactional task and enter the user's data into the public database. Each node distributed on the block chain can handle transaction processing transactions in parallel.

- Affairs processing block chain
  It is used to document the conduct of various departments, including various government departments and transaction processing departments, namely the block chain used in finance.

- Departments block chain
  This type of block chain can be classified by nature, and a functional department of the same nature can be a node on the block chain. The block chain is recorded with information related to the functional department.
The e-government system based on BCGA has the following advantages:

- **High efficiency**
  
  On account of all tasks are completed on a unified electronic platform, so transaction processing can be completed automatically through functional contracts when it is necessary, because the efficiency of transaction processing is greatly improved.

- **Build a multi-level laws and regulations of the authority**
  
  The transaction processing task can be established by the transaction processing node, which can form the jurisdiction of multiple levels and avoid overstepping the authority.

- **Unified database**
  
  The whole system has only one large database for maintenance and management. In view of the data being too large, a distributed cloud computing database technology is adopted.

- **Data security guaranteed**
  
  The change of the data and the audit process will be entirely recorded. In addition, the transaction block chain of each node will also be written down, and it will be unable to tamper with and repented. Such is of great significance on case of accountability, the anti-corruption and other various fields like these.
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Summary
The BCGA e-government model proposed in this article realizes the automation of the functional business of many national departments, and fully guarantees the compliance of legal norms. The application of block chain technology to e-government can reconfigure public resources, improve government efficiency, save cost, improve the basic income of people, and promote the construction of harmonious social relations. The future job is to refine the model further.

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