

Design of E-government Shared Data Resource Database Architecture

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Abstract: With the development of Internet technology, e-government shared database is widely used and concerned by the people. In the environment of China's rapid economic growth, government work has become more transparent. In order to improve the efficiency and service level of government departments, we must use an efficient and perfect information resource base that can effectively support people's needs and meet the personalized requirements of the public as the basis. Therefore, this paper studies and analyzes the structure of e-government shared data resource database. Firstly, this paper expounds the significance of e-government shared data, and then studies the technology needed to design the database. Then, based on the above technology, the framework of e-government shared data resource database is designed, and the performance of the database is tested. Finally, the test results show that the four elements required for the correct implementation of the database, atomicity, consistency, isolation and persistence, are more than 90, which show that the data nature in the database is accurate and consistent, and can meet the needs of e-government sharing.

Keywords: Electronic Government, Shared Data, Resource Database Architecture, Architecture Design

1. Introduction

E-government shared data is a new term. It is widely used in government work and decision-making in today's society. With the sustained and rapid development of China's economic level, people's requirements for the quality of life are constantly improving. This requires us to have more efficient and convenient ways to meet the needs of the people [1-2]. Therefore, how to use these new, novel, practical and effective information technologies has become one of the urgent problems to be solved [3-4].

Many scholars have done relevant research on E-government shared database. The research on E-government shared data resource database abroad started earlier, and has formed a more systematic theoretical system and development scheme. The United States is one of the earliest projects to build information management information system [5-6]. At present, the construction of e-government shared data in China is still in the primary stage, but with the development of technology and market demand. The government also began to realize its own problems. In the late 1990s, China successively carried out the research and application of some government institutions and enterprise informatization work modes. In recent years, a large number of scholars have devoted themselves to national public administration to analyze and solve various existing or potential problems, and achieved certain results [7-8]. For example, it has improved the level of administrative management, strengthened the development and utilization of public information resources, established and improved the system of laws and regulations and rules to restrict the code of conduct of the industry, guide the orderly operation of enterprises, and so on. At the same time, the national attention to network security issues has gradually increased, and the construction of e-government shared data platform has been continuously improved. Therefore, the above research has laid a foundation for this paper to explore the shared data resource database of e-government.

This paper introduces the construction of e-government data sharing, summarizes it, and analyzes the problems existing in the management process of our government. By studying the relationship between government and enterprises and how to improve administrative efficiency. Finally, according to the defects of the above situation, the solutions are given, and combined with practical cases to solve the current problems and challenges.

2. Discussion on the Architecture of E-government Shared Data Resource Database

2.1 Significance of E-government Data Sharing

Under the traditional management mode, due to the lack of information resources, databases and related technical means, a large number of data loss and confidential information leakage are caused, and sharing greatly reduces the losses caused by these problems [9-10]. With the popularization of e-government, government work has become more open and transparent, and data sharing has become inevitable. Data sharing is the core of e-government. E-government data sharing not only optimizes the government's workflow and administrative efficiency, but also provides a platform for citizens to participate in public affairs. In today's society, with the increasing degree of science and technology and networking, information resources become more abundant and convenient. Data sharing can enable government departments to better understand people's needs and make corresponding responses in a timely manner. It can also enable government departments to grasp people's livelihood issues more quickly and accurately and make decisions and judgments. It can also provide reference opinions for other departments. On the other hand, it can also solve this problem by making effective use of e-government. And improve the level of public services, improve administrative efficiency and quality, promote social harmonious development, and finally realize the transformation of government functions and improve service awareness and ability, so as to promote the progress and development of the whole society and form a virtuous circle and sustainable growth model [11-12].

2.2 Database Framework Technology

2.2.1 SQL Server

The system uses SQL Server database platform to store data. SQL server provides a data storage method. The system contains a large number of features that can be called, extended functions and powerful performance. Compared with other software, it is simple, convenient and fast, and can meet the basic requirements. At the same time, it can also support a variety of query modes, file management and maintenance function modules, and provide various general format interfaces for users. It has the following characteristics: (1) high security and strong reliability. (2) Good expansibility and great exploitability. At the same time, it also has the following functional modules for developers to use: query user information module, delete administrator name and password modification. After successful login, you can add a new account, add personal information and manage account and so on.

E-government shared data resource database is provided by relevant government departments, which can realize the centralized management of information and uniformly allocate multiple government departments. The database contains a large number of public data and non-commercial services. It includes business contents such as government issuing and processing relevant documents, administrative examination and approval, etc. It also needs to accept all documents generated by the process of receiving customer requests and returning corresponding results after submitting applications to users. These files are stored in the E-government shared database and can be easily modified or added to the data information database.

2.2.2 Basic Clustering Algorithm

Partition based clustering algorithm is the most basic clustering algorithm. For example, K-average, k-fuzzy and k-center point all belong to partition clustering methods. The basic idea of partition based clustering method is to give a data set with n objects and construct K clustering clusters to make the similarity of elements in the cluster as high as possible and the similarity of elements between clusters as low as possible. Each partition represents a cluster with $K < n$, and the K clusters meet the following requirements: empty clusters are not allowed, and an object can only belong to one cluster.

The method is to know K , we first randomly select k central points and initialize them into K clusters, and realize the change of clustering in the iterative process, so that the clustering obtained in each iteration is better than that in the previous iteration. The evaluation criteria of clustering results are: the higher the similarity of samples within the class, the better, and the smaller the similarity of samples between classes, the better. Finally, the sum of dissimilarity between all objects participating in clustering and their reference points is minimized. That is, the estimation of the value of the evaluation function of clustering.

On the evaluation function based on partition clustering. Usually, the evaluation function designed for clustering needs to consider two aspects: intra cluster compactness and inter cluster dispersion. The

calculation formula of intra cluster difference is as follows:

$$E(D) = \sum_{i=1}^k E(D_i) = \sum_{i=1}^k \sum_{x \in D_i} c(x, \bar{x}_i)^2 \tag{1}$$

The difference between clusters is represented by the distance between cluster centers:

$$A(c) \sum_{1 \leq j < i \leq k} d(\bar{x}_j, \bar{x}_i)^2 \tag{2}$$

We call it intra cluster difference E (D) and inter cluster difference A (c). E (D) the smaller the better. A(c) the larger the better. The greater the A (c), the greater the difference between clusters.

3. Experiment

3.1 Database Framework Design

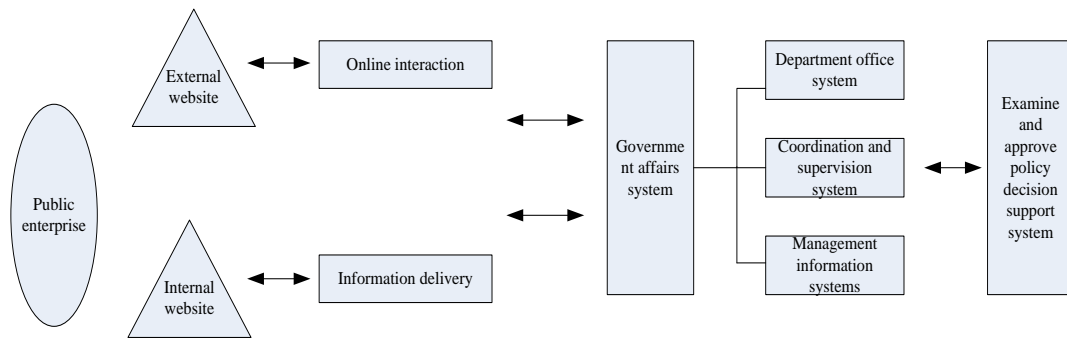


Figure 1: E-government-sharing database framework

As can be seen from Figure 1, the main framework of the system is data information management. On this platform, e-government sharing can be effectively managed. The system can realize the operation and processing of a large number of user related basic personal data and some important files stored in the database, and can publish announcements through the network. At the same time, it can also connect with other modules to complete user login and query what kind of access rights you need to obtain. It also needs to have a certain amount of backup capacity to solve problems in time. This system should not only support the foreground operation, but also have the function of background management.

3.2 Development Environment

The language used in the development of e-government platform system based on data center is the combination of Visual C++ and Java. C++ language provides strong local resource access ability and the developed system has high operation efficiency, while Java programming language has the characteristics independent of the platform. In the whole system implementation process, the e-government platform server mainly uses C++ programming language. It is an application software based on Windows service method, while the platform manager and platform portal service are completed by java language. The e-government platform has established a general portal system. The platform portal system includes two parts. One is the portal system directly facing the public, or called the external portal system, that is, at the forefront of the whole e-government, government departments will be able to use the news content system to realize one-way information release. This is directly facing the whole society. The public will also require that the news information content serving government departments can be provided by using the online service interaction function. This business application information can be submitted to the special management system by using the special interface system. If it needs to be coordinated within each level or superior and subordinate departments, it will be monitored by the special coordination supervision system. One of the design objectives of the whole system is to ensure that the information requested by each society for government public services can be monitored and positioned by the system at any time, just like the goods of transportation enterprises, what link and state the goods are in at some time. This information

can be retrieved by the public in time, so as to play a social supervision role in the work efficiency of the government. On the other hand, the internal portal is the integration of various service systems serving civil servants within the government to realize internal affairs cooperation and information sharing. On the other hand, it can submit various requests and feedback information submitted by the public on the government portal (extranet portal) to the government, and distribute them to various application systems for processing. At the same time, it provides the tracking of these transactions, and immediately reflects these information to the public portal through the central database.

3.3 System Test

3.3.1 Method

Black box testing is a software testing method, which can check whether each function of an application can be used normally without checking its internal structure. Each type of black box test has perfect test methods. The purpose of testing is to test whether each function of the program can be used normally and produce correct results on the basis of not displaying the code, internal structure and characteristics of the application program. This kind of testing mainly focuses on the external structure of the program, does not consider the internal structure, and retains the internal secrets of the application. White box testing is a method of software test case design, which mainly involves the internal logical structure and coding of software. It is known to be a clear, open, structurally known test method or glass box test. Considering that white box testing focuses on the internal operation of an application and the internal testing around it, this makes it the opposite of black box testing. Security check takes into account the requirements for the input of the program interface and the corresponding expected output. Therefore, if they do not match, your program will encounter errors. If they match, there will be no errors in the program function.

3.3.2 Process

In order to test the accuracy of the data, the following steps are carried out: (1) when testing the data, we first check the information shared by e-government stored in the database. (2) Then the performance of the control layer, data access layer and business terminal of the whole system is tested. (3) Finally, the correctness of the designed database model is verified by software engineering method.

4. Discussion

4.1 Database Performance Test and Analysis

Table 1 shows the performance test data of e-government shared database.

Table1: Performance test data

| Number of tests | Atomicity | Consistency | Isolation | Durability |
|-----------------|-----------|-------------|-----------|------------|
| 1 | 97 | 100 | 93 | 95 |
| 2 | 98 | 100 | 91 | 94 |
| 3 | 95 | 100 | 95 | 97 |
| 4 | 96 | 100 | 92 | 93 |
| 5 | 94 | 100 | 94 | 91 |

In e-government sharing, we should ensure the real-time performance of data information and avoid the damage of confidential documents caused by network failure. Therefore, it is necessary to strictly standardize the management and control of the system to ensure that the database can maintain normal operation for a long time. The second is the security performance analysis. Because the e-government platform involves a large number of users, large use rights and complex diversity, its security is relatively poor, and there are certain risk factors that affect the data transmission and storage environment. Therefore, it is necessary to ensure the reliability of information transmission and not be used by hackers or malicious saboteurs in the transmission process. As can be seen from Figure 2, the four elements required for the correct implementation of the database, such as atomicity, consistency, isolation and persistence, are more than 90, which shows that the data properties in the database are accurate and consistent and can meet the needs of e-government sharing.

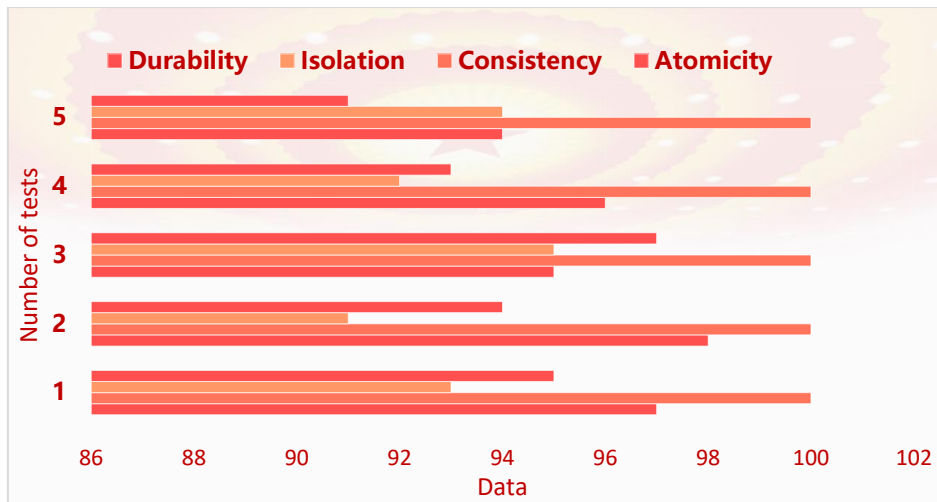


Figure 2: Database performance data comparison

5. Conclusion

In today's society, e-government has become a hot word, and with the rapid development of information technology and network technology. Government agencies, enterprise departments and other organizations can improve work efficiency through electronization. At present, China is vigorously building an information big data system. Through the construction and design of e-government shared data resource database, this paper realizes the functions from government organization information management, business process reengineering to department collaboration, and divides each module into several parts for optimization.

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