Research and implementation of budget management integration system based on data resource fusion

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ABSTRACT

Since the implementation of China's financial budget reform, after more than 10 years of continuous exploration, practice and improvement, it has played a positive role in deepening the concept of budget management, refining departmental budget preparation, strengthening the rigidity of budget constraints, and ensuring the performance of the organization's mission. The reform has achieved remarkable results. However, with the continuous development of the economy and society and the in-depth promotion of the construction of the public finance system, especially in the context of the current requirement to open the budget, final accounts and "three public" funds, the current financial budget management in China is still uneven in the implementation of the budget, project funds and public funds, and a large number of year-end carry forward balances due to the insufficient accuracy of the prediction at the beginning of the year and the inability to accurately integrate various data resources Some units spend too much money, and performance evaluation is lack of grasp. These problems, to some extent, hinder the scientific rationality of funding arrangements and the further improvement of data resource allocation efficiency. This paper proposes a method to build a basic database and a cross year rolling project database based on data resource fusion technology to improve the scientific rationality of the budget allocation at the beginning of the fiscal year.

Keywords: Financial budget, budget management integration, data resource integration, data resource sharing, budget management rationality.

1. INTRODUCTION

The budget at the beginning of the year prepared and reported in the budget preparation and review management at the beginning of the fiscal year includes the basic expenditure budget and project expenditure budget[1]. The basic expenditure budget is used to ensure the normal operation of the company[2]. The basic expenditure budget is generally calculated according to the company's personnel, vehicles and other assets and quota standards, mainly including personnel salaries and office expenses, asset information such as personnel and vehicles, quota standards and other information from the basic information base[3]. The project expenditure budget is the expenditure budget for supporting the projects declared by the unit according to the priorities, according to the performance requirements of the unit and the financial resources can meet the situation. According to the requirements of laws and regulations, the preparation and reporting of the beginning of the year budget must go through the process of two up and two down preparation and review, so as to realize the overall business process of the beginning of the year budget preparation based on a complete and accurate basic information base and a cross year rolling project base.

The data fusion technology used in this paper maps the basic financial expenditure budget, project expenditure budget and other data to the basic database information, and enables the budget unit to process treasury centralized payment related businesses[4]. Its functions mainly include the integrated management of general payment plan filling and approval, government procurement plan filling and approval, direct payment/authorized payment application filling and approval, electronic payment management and other businesses[5].

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2. RELATED WORK

The budget management system and tax management system of the U.S. government are highly unified[6]. The United States has developed a sound approval system and strict management rules. The United States extends every tentacle of its information network to all aspects of American society[7]. The United States has widely invested and used computer technology in the fields of tax management, expenditure forecasting, tax registration, tax declaration, tax collection and fiscal policy management, realizing data sharing and cooperative office work between departments. More than 90% of the federal tax revenue of the United States is collected through the computer information management system[8]. American Resonance can declare personal income tax, business tax and other taxes online anywhere in the country through the Internet[9]. The social insurance, the welfare of ex servicemen, the tax refund and the wages of federal employees in the United States are all realized through the budget management information system built by the federal government.

Australia's budget management is coordinated and managed by the Australian federal financial and administrative departments at all levels[10]. Each department is responsible for the financial information management and maintenance of each department. Australia's information construction is later than most western developed countries, so its infrastructure construction is more modern. The Australian federal financial and administrative departments are responsible for online financial budgeting Fund allocation and financial supervision, as well as interconnection and single sign on between systems through data resource integration and sharing, can greatly improve the timeliness of budget management.

3. RESEARCH ON INTEGRATION TECHNOLOGY OF BUDGET MANAGEMENT INFORMATION SYSTEM

3.1 Research on integration technology of budget management information system

After several years of construction of the financial information system, the financial system has gradually formed an idea of constructing a financial integration structure to achieve system integration and information sharing and exchange. According to the characteristics of the Finance Bureau, the objectives of information integration construction are shown as below.

1. Propose and build the overall system architecture of financial information integration that conforms to the component layering technology.

2. On the basis of early financial system formalization, a data integration platform (XML technology) is built to realize heterogeneous data integration, and integration standards are proposed to flexibly and conveniently integrate new systems.

3. Build internal and external network service portal to realize cross network data exchange (gateway exchange technology).

4. Build an online office system covering all relevant departments, realize online collaborative office, and sort out and integrate business processes.

5. On the existing network hardware platform, improve and establish the internal security platform, form a unified authority management and resource management, and realize the security and confidentiality of online information from the aspects of identity authentication, access control, data transmission encryption, system audit and detection, electronic seal, etc.

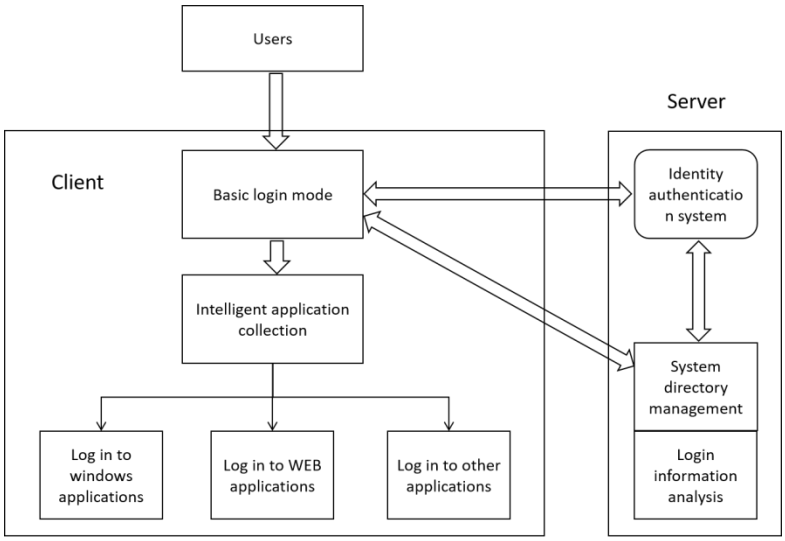

Figure 1. Integration technology of budget management information system

As is shown in figure 1, the integration of login information analysis financial business system is a systematic project. Considering the continuity of financial reform and the compatibility of financial data in different years, it must be carried out step by step; First, realize the integration of the application level, that is, realize the application integration of the previously developed financial business system; When the time is ripe, we will realize the integration of data level and connect all financial business systems.

Integration at the application level refers to the realization of integrated office work. Users can handle official document management, file management, office affairs, website management, personnel management and other administrative affairs as long as they log in once, as well as department budget, centralized payment, non tax income and other financial businesses, so as to realize "one door service is technically a single sign on system design.

Data level integration refers to the centralized management of financial business data, the unified establishment of financial business data dictionaries, user permissions on functions, user permissions on business data, general ledger control tables, etc., and the unified creation of data flows, reports, and other components. All financial business subsystems must be developed based on the above contents to ensure that the related financial business uses the same basic data and that the data is shared in different financial software, so as to realize the tracking and backtracking of financial data.

3.2 Multi source data fusion technology for budget management

The previous financial business software is independent of each other. Each software has its own basic databases such as budget units, budget accounts, and budget items, which makes information sharing very difficult. To solve the above problems, it is necessary to establish a unified data dictionary and authority management center, develop financial business software based on the data dictionary and authority components, conduct data control according to the general ledger control table, form financial data with a unified business dimension, and ensure that the data is connected throughout the budget management process.

First, create a data dictionary component, solve the unified management of data elements, form elements, general ledger elements, account accounting elements, etc., and maintain and manage the collection of data element values.

Secondly, create permission components to solve the setting of functional permissions and data permissions to support hierarchical permission management and authorization management.

Finally, create a data control table component to solve the quota control and tightness control of budget indicators.

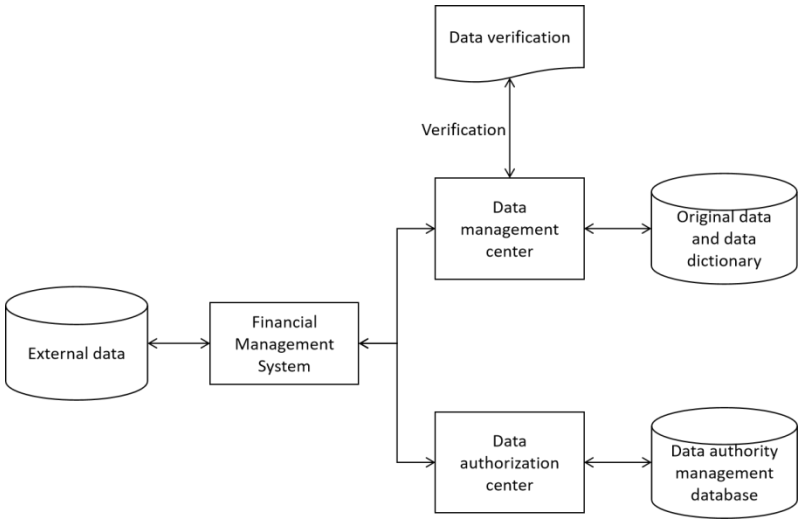

Figure 2. Multi source data fusion technology for budget management

As is shown in figure 2, the data verification center requests the data user's data use information (if necessary, the user needs to go to the certificate center for authentication). After the certificate center verifies the user's identity, it generates a public and private key pair for the user and generates a certificate. Put the certificate in the certificate database, and give the private key to the data user through out of band. The user submits a data access application report to the authorization center, including the data resources to be accessed and the permission level to access the data, and signs his/her private key.

The data authorization center calls out the data certificate from the certificate library, obtains the public key of the data, and crypts the user's data application report. If the decryption succeeds, the user's identity passes the authentication. If the decryption fails, the user's application report is blocked.

The Data Fusion and Authorization Center reviews the user's identity and application report, and decides whether to pass the user's application. If it fails, a rejection message will be sent to the user. If it passes, the user will be given an authorization information, which we call a ticket, and signed by his own private key. After receiving the message sent back from the data authorization center, users can use the ticket to access external data resources. When users access external resources, the security gateway will perform fine-grained access control. Users cannot access the external data resources protected by the gateway without data usage tickets or when the tickets are incorrect.

4. IMPLEMENTATION OF BUDGET MANAGEMENT INTEGRATION SYSTEM BASED ON DATA RESOURCE FUSION

After experiencing the development stage of directly facing departments and business needs, the e-government network of the financial system has accumulated a large number of business systems and information service systems, which has greatly improved the informational level of the financial system. However, the increasing number of application systems and the status of independent development and discrete operation of application systems have brought about various problems. For example, some important user information (especially some sensitive data) is transmitted in plain text on the Internet, which is very likely to be attacked by hackers.

In this paper, data resource integration is used to solve the problem of data redundancy and maintenance complexity among systems when application systems maintain a set of user data. At the same time, due to the fact that there are certain business associations between various financial application systems in actual use, but due to historical reasons, there is no unified planning when designing the financial system, and each system is independent, with serious data redundancy between systems. Business personnel constantly enter the same business information in different systems, which not only affects work efficiency, but also increases the possibility of leaking sensitive data. This paper develops a

unified identity authentication system and data interface system with high security control to ensure data consistency, security, and ease of use and management.

4.1 Architecture design of integrated budget management system

After five years of financial system reform and financial formalization construction, some local financial formalization and office automation have begun to take shape, but most of them are limited to some units and departments. The level of formalization is uneven, objectively resulting in independent "information islands". A large number of information resources have not been fully and rationally utilized, which affects work efficiency and leads to repeated investment. Therefore, this paper constructs a financial integration system architecture theory to realize the unification of all systems of finance and financial engineering.

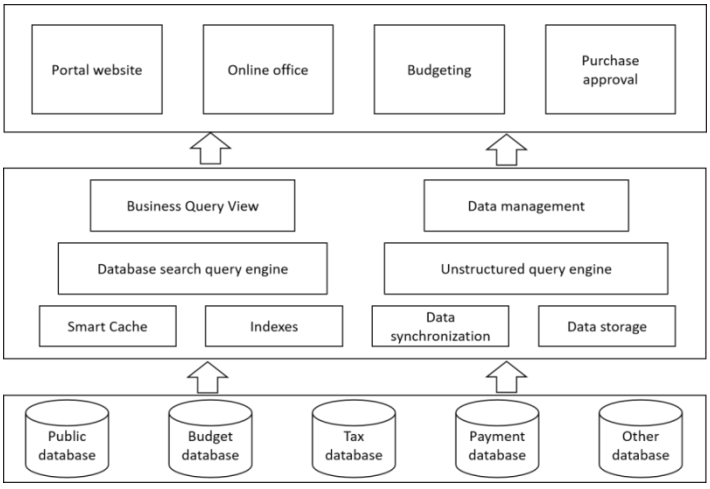

Figure 3. Architecture design of integrated budget management system

As is shown in figure 3, according to the actual situation of financial operation, the financial integration system architecture is built based on the component model, which is divided into portal layer, application layer, application support layer and core data layer. The core data layer is the foundation, storing and managing all data; The application support layer is based on the integration, integration and management information of the core data layer to extract more valuable data and provide it to the applications in the application layer in the way of business view. At the same time, the application support layer provides security support such as identity authentication, user management and information encryption. The application layer realizes comprehensive applications based on the business view provided by the application support layer. The application layer does not need to consider the complexity of the underlying heterogeneous information sources, Just focus on the application process and presentation.

The core data layer includes the public financial database and the databases of various professional application systems to realize the functions of data storage, analysis and data mining. Public financial database, that is, it analyzes and summarizes financial business and various information systems, abstracts a relatively stable and consistent data structure, forms a series of public basic data tables, and records the transaction and status information of each information system involving the main line (global) of fund management in these basic data tables; The database of professional application system includes the database of the existing professional application system that has been completed, such as the financial budget management system, the treasury centralized payment system, the non tax revenue collection and management system, etc., as well as the application database that is planned and to be built in the future, such as the asset management system, the foreign exchange management system, etc.

4.2 Implementation of budget management integration system

First, build a data dictionary, which mainly includes data elements and data element value sets, involving tables, data elements, physical data elements, logical data elements and other objects. The data dictionary component mainly realizes the following functions.

1) Create data element. Common data elements of financial business include fund source, budget unit, functional classification, economic classification, project, etc. Value set data elements and non value set data elements can be

created according to whether there is a value set or not; Physical data elements and logical data elements can be created according to whether there is a corresponding physical data table.

2) Maintain data element value set. Each value set data element has a corresponding code attribute, and the common ones are code, name, status, activation date, deactivation date, and comments. Data element code attributes can be maintained through physical tables and data dictionaries. Data element value sets can be added, deleted, modified, and exported by mapping to physical tables.

The interfaces provided by the data dictionary component mainly include adding data elements, modifying data elements, deleting data elements, and querying data elements. This method is used to verify the user's permission, extract features from the user information submitted by the login page, and then compare with the user information stored in the identity repository. If the identity repository contains the user's information and the login user name and password are correct, the login succeeds. If the login fails, the user is granted a token, the user's information is written into a cookie, and then goes to the resource list page.

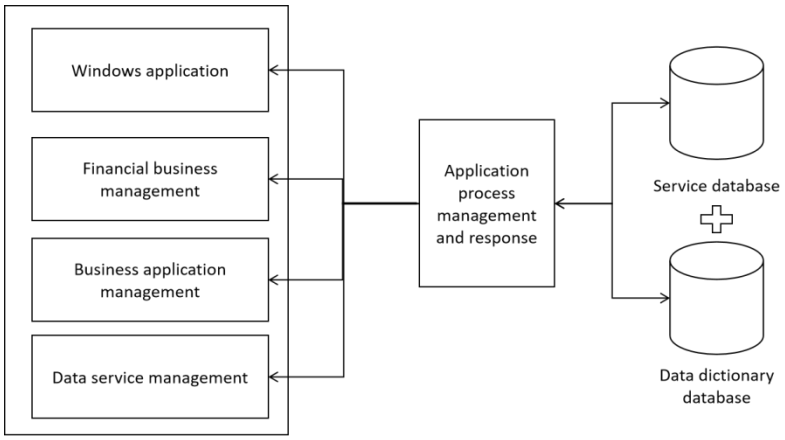

Figure 4. Implementation of budget management integration system

As is shown in figure4, create permission component. The authority component provides unified user authority management and authority control management for the financial business system. Permission components include users, roles, function permissions, data permissions and other objects. They provide functions such as user group definition, permission group definition, user maintenance, role maintenance, setting function permissions, setting data permissions, and authorization management. The core of the component is the setting of function permissions and data permissions.

1)Setting of function permission. First establish roles, assign functions to roles, and then assign roles to users, so as to achieve the purpose of function permission management. In the permission component, users and roles can be managed by groups, and function permissions can be managed by levels. Administrative users can realize authorization, that is, to authorize their own permissions to other users.

2) Setting of data permission. The biggest feature of financial business is the user's permission setting for data. For example, the budget company and budget account that a user can manage can be set through data permission. Data permission is independent of function permission. It is used to limit the data that users can operate. Data permission is defined by range rules, and the operable data range is limited by the conditions set by rule data elements. You can set data permissions for a role or for a user under a role, which indicates the permissions that the user has when acting as the role.

The data permission component mainly provides interfaces for querying users' function permissions, menu permissions, and data permissions.

Finally, create a data control table component. The data control table is responsible for data logic processing and business control. This is achieved by setting whether control and control rules are required for control table accounts. Control rules are generally used to generate businesses with executable indicators. The data control table component mainly provides control rule detection, modification of control balance, addition of control table records, and deletion of control table records.

5. APPLICATION RESULTS

Through the research results of this paper, the data resources of all financial departments are connected by means of data resource sharing, which enables budget management users to guide users to the authentication system for authentication when they log in for the first time. If they pass the authentication, they will be returned to the user with an authentication certificate. When users access other data resources or application services again, they will take this voucher as their own authentication ticket, and the application system will automatically send it to the authentication system for verification. If the authentication is passed, users can access their other application systems without having to log in again. This way ensures the integration of the data layer, thus achieving data unification and process optimization.

The integration of financial application is a gradual process, which needs to be implemented step by step from the application level and data level. The integration of application level solves the single sign on between system software and in system integration, and realizes functional reuse and business collaboration with the help of computer architecture. The integration of data level solves the sharing and control of financial business data, forms the elements of financial business through data dictionary components, and realizes the management of functional permissions and data permissions through permission components. The quota control and tightness control are realized through the general ledger control component, and the tracking and backtracking of financial data are finally realized.

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