Research Article

Optimal Design of an Information Management System for Government: A Bridge between Government and Citizens

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The system of government information management can effectively integrate the government-related information and its catalogs that are scattered in various parts and implement the standardized management, so as to realize such as the optimization of information sharing and workflow. Therefore, in this paper, systematic design of an information management system for government is optimized. By using the B/S architecture, the system is divided into four functional modules: organization management, working platform, information management, and information statistics, where based on the design pattern of MVC, the system is divided into the web layer, service layer, and entity layer. Meanwhile, the object-oriented and inheritable programming language Java and the SSH framework are adopted to design the system code. The results show that the system successfully completes related functional operations, which is helpful to promote the formation of “Participatory Governance System”.

1. Introduction

Under the background of the information age, it is of great significance to fully understand the changes and impetus brought by computer information management technology to the development of the administrative field, which can broaden the application scope of information management in administrative management, accelerate its overall upgrade, and truly realize the high efficiency and coordination of administrative units [1, 2]. The reflection of governance capacity in the era of big data is mainly reflected in three aspects: function expansion, technical support, and innovative application. It is mainly reflected in the integration of all kinds of information and data within the government and the disclosure of data and information and various public services outside the government. Most importantly, in the relationship between the government and society, it is regarded as interaction between the government and the public. Through the wide application of big data technology within the government, it can improve the decision-making process, optimize the decision-making objectives, and enhance the efficiency and effect of government decision-making. All-round technical empowerment of government governance by using big data and artificial intelligence has shown improvement on the government’s information acquisition, utilization ability, and response service ability [3–5].

The application of the government information management system will well protect citizens’ rights, realize timely and transparent disclosure of government information, and effectively supervise the work of government personnel and reduce the incidence of vicious incidents, thus establishing excellent communication between the government and the public and gradually making the national economy and democratic system mature. In addition, government information management also has the advantages of dealing with crisis events, maintaining social order, restricting the authority of government staff, adjusting social resources, and promoting the development of the democratic system [6–9].
At present, there are still some problems in China’s computer information management, such as insufficient information security management and immature application of big data. In addition, existing systems of government information management have some shortcomings [10, 11] such as one-sided function, poor human-computer interaction, and slow response rate, in the aspect of publishing information, managing institutional users, cataloging, and managing information. Although these systems can functionally meet citizens’ demands for disclosure management of government information, in terms of performance design, they still cannot satisfy the requirements of citizens. Based on the experience, the government information management system needs to design the nonfunctional requirements of the system in detail, so as to meet the citizens’ requirements for government information management.

Therefore, an information management system for government is designed in this paper, which is divided into four functional modules, namely, organization management, working platform, information management, and information statistics, where B/S architecture and the MVC design pattern are adopted to divide the system into the web layer, service layer, and entity layer, and the object-oriented and inheritable programming language Java and the SSH framework are used to design the system code.

2. Requirement Analysis

2.1. Role Analysis. There are three main roles in the government information management system established in this paper, namely, ordinary users, system administrators, and node administrators.

The functional businesses of ordinary users mainly include filling in the open business according to application and querying the status of application:

- The function business of system administrators mainly includes systematic setting, specifically including node management, department setting, role setting, and user setting and publishing nodes in public information management business and node statistical function business in information business.

- The function business of node administrators mainly includes directory management, log management, and organization management in system management business and template management business, while in the statistics business, it includes statistics within the node, statistics report, statistics according to application, and statistics of comments reply. The detailed functions of each role in the system are shown in Figure 1.

2.2. Functional Requirements. The government information management system will integrate the whole process information and can uniformly manage the municipal public information, catalogs, application forms, government information, etc., which can dynamically supervise the government information and the public responsible subjects and can obtain the required information conveniently and timely. In addition, the government information management system will realize the type-in information at one time, and the multichannel management mode can effectively relieve the pressure of various departments. As shown in Figure 2, the government information management system will be designed for four functions: organization management, working platform, information management, and information statistics.

2.2.1. Information Management. Node messengers and system administrators can manage information, picture attachments, and node publishing through information management. As shown in Figure 3, the information management services include information management, picture attachment management, and node publishing management. The detailed description of each subfunction service in the public information management service is as follows.

Information management refers to the management operation of all information of the node and its affiliated organizations by the node messengers, which includes creating new information, exporting information, importing information, and clearing information.

The node messengers can manage attachments and pictures through the function of picture attachment management, which includes uploading pictures, adding attachment categories, uploading attachments, deleting pictures, and deleting attachments. Before creating new information, the node administrator must first publish the node that includes generating lists and publishing lists.

2.2.2. Institutional Management. In the organization management business, the functions of organization user information, subordinate organization information, and constitutive organization information are divided as shown in Figure 4.

In the function of organization user information management, managers can add, modify, and delete users’ rights. The information contained in this function includes user logon name, user name, input password, role authorization, mobile phone number, and affiliated organization. In the
function of subordinate organization information management, managers can delete, add, and modify subordinate organization information. The information included in this function includes organization name, organization code disclosure responsibility body, linkman, linkman’s phone number, linkman’s e-mail, postal code, website, and organization address, while the function of constitutive information management includes the name of the institution, the subject of public responsibility, postal code, superior management institution, and the address of the institution, where the department administrator can view and modify the information of this institution.
2.2.3. Information Statistics. As shown in Figure 5, the information statistics business includes node statistics, intranode statistics, statistical reports, open statistics according to application, and comment reply statistics.

Because both the system administrator and the node administrator have the functional authority to make statistics on the disclosure by application, suggestion box processing, and comment reply, when making statistics, there are statistics on the main node and each node.

2.2.4. Working Platform. As shown in Figure 6, the work platform business is divided into four functions: publishing files, consulting files, compiling directories, and maintaining user information.

The function of publishing files is operated by the information reporter that can add file titles, select sending departments, record file contents, and add attachments. Currently, only one attachment can be uploaded in this function, where the information reporter can select the objects to send through the drop-down list or select all to send. Publishing catalog compilation instructions refers to explaining the purpose and function of catalog compilation, which includes a detailed description of compilation purpose, cataloging scope, and contents. In the user information maintenance function, department administrators and information reporters can modify personal information and personal passwords.

2.3. Nonfunctional Requirements. Nonfunctional requirements describe the quality of the system load, rather than the specific system behavior. Their purpose is to meet the business needs of users. Besides the functional requirements, the attribute characteristics of the software system are an important basis for judging whether it meets the quality requirements. The nonfunctional requirements of the system include security, convenience, reliability, and maintainability [12–15].

The government information management system adopts government information for users, and it has very high requirements for the security of information that does not need to be made public and the robustness of the software system, which makes the design and development process, must take the security of the system as the basic principle, and ensure the integrity, reliability, and data security of the system; systematic convenience refers to the user-centered, combined with audio-visual, sensory, and other comprehensive feelings, so that the software system can adapt to the user’s needs and habits more easily and efficiently; systematic maintainability means that when there is a problem with the software system, the maintenance personnel can take correct measures for modification in time to improve and modify the software system.

3. System Design

3.1. Technical Architecture Design. The SSH framework is maturing and is widely used in J2EE platform development [16]. Therefore, this government information management system adopts the B/S framework and SSH based on the MVC design pattern, and the JAVA language system is used in the process of system development. The technical framework is shown in Figure 7.

The framework of the system is divided into three layers, namely, the web layer, the service layer, and the entity layer. Among them, the web layer is in charge of Struts, the service layer is in charge of the Spring Framework, and the entity layer, that is, the database layer, is in charge of Hibernate. When the user performs illegal operations in the Jsp page, the action is passed to the service layer, and the corresponding functional operations are carried out in four service logic classes. DAO operations are invoked through business logic, and then, the database is accessed, while the database realizes user operations through the Hibernate mapping file and entity class. DAO implements the access and connection between the business logic and the database.

The MVC design pattern includes the view, controller, and the model, where the model encapsulates the computational relationships of the core data, logic, and functionality of the problem. Views present model data representations, logical relationships, and state information to users in specific forms. The controller is used for interactive operations between users and software.

3.2. Database Design. The government information management system designed in this paper adopts SQL Server 2014 and adopts SQL tracking, dynamic management of view, data collector, and other tools to access data, to
connect, to aggregate, to be parallel, and to speed up the query, which significantly improves the performance of the application by creating the correct index [17]. Functions of memory maximize memory query performance, include memory optimization tables, and localize compilation-stored procedures to supervise and promote plan caching and reuse. Using column storage indexes can also improve the performance of querying data warehouse [18]. In this paper, the organization table, node information table, file information table, and user information table are mainly designed and analyzed as shown in Tables 1 to 4.

**Table 1: Organization table.**

| Field name   | Field type     | Is it primary key? |
|--------------|----------------|--------------------|
| Number       | INT (4)        | YES                |
| Leaderposition | INT (4)      | No                 |
| Leadername   | VARCHAR (30)   | No                 |
| Leadertel    | VARCHAR (50)   | No                 |
| Leaderaddress| VARCHAR (50)   | No                 |
| Orgpostcode  | VARCHAR (50)   | No                 |
| Orgfax       | VARCHAR (20)   | No                 |
| Orgtel       | VARCHAR (50)   | No                 |
| Govvirualnum | INT (10)       | No                 |
| Orgemail     | VARCHAR (50)   | No                 |

**Table 2: Node information table.**

| Field name   | Field type     | Is it primary key? |
|--------------|----------------|--------------------|
| Number       | INT (4)        | YES                |
| Domain       | VARCHAR (50)   | No                 |
| Nodename     | VARCHAR (30)   | No                 |
| Areacode     | VARCHAR (30)   | No                 |
| Areamasternode | INT (4)      | No                 |
| Unitname     | VARCHAR (30)   | No                 |
| Unittype     | VARCHAR (10)   | No                 |
| Createtime   | DETETIME (8)   | No                 |

**Table 3: File information table.**

| Field name   | Field type     | Is it primary key? |
|--------------|----------------|--------------------|
| Number       | INT (4)        | YES                |
| Filetitle    | VARCHAR (30)   | No                 |
| Transmitsection | VARCHAR (40)  | No                 |
| Filecontent  | VARCHAR (100)  | No                 |
| Addaccessory | VARCHAR (20)   | No                 |
| Fileproject  | VARCHAR (40)   | No                 |
| Keyword      | VARCHAR (20)   | No                 |
| Filenature   | VARCHAR (20)   | No                 |
Table 4: User information table.

| Field name       | Field type           | Is it primary key? |
|------------------|----------------------|--------------------|
| Number           | INT (4)              | YES                |
| Userregistername | VARCHAR (20)         | No                 |
| Username         | VARCHAR (15)         | No                 |
| Importpassword   | VARCHAR (10)         | No                 |
| Telephone        | VARCHAR (20)         | No                 |
| Sex              | INT (4)              | No                 |
| Affirmpassword   | VARCHAR (10)         | No                 |
| E-mail           | VARCHAR (30)         | No                 |
| Commandorgan     | VARCHAR (40)         | No                 |

(i) Public class InfoActicm {
(ii) String infoTitle; //Title
(iii) String infoContent; //Content
(iv) String infoAuthor; //Author
(v) String infoSource; //Source
(vi) Double infoKey; //keyword
(vii) String infoSummary; abstract
(viii) String areSubtitle; //Do you want to add subtitle?
(ix) String areCitedtitle; //Whether or not to quote questions
(x) String linkTitle; //Link title
(xi) String imageAttachment; //picture attachment
(xii) Date createTime; //Creation time
(xiii) //Add the basic content of information
(xiv) public String add()
(xv) Info info = new Info (infoTitle, infoContent, infoAuthor, infoSource, infoKey, infoSummary, areSubtitle, areCitedtitle, linkTitle, imageAttachment, createTime); service.add (info);
(xvi) }

Algorithm 1: Implement of Information management functions.

(i) <jsp:setProperty name="AddUser"/>
(ii) <jsp:getProperty name="AddUser" value="UserRegisterName"/>
(iii) //Get the user login name
(iv) <jsp:getProperty name="AddUse" value="UserName"/>
(v) //Get the user name
(vi) <jsp:getProperty name="AddUser" value="AlterPad"/>
(vii) //Get the change password
(viii) <jsp:getProperty name="AddUser" value="e-mail"/>
(ix) //Get email
(x) <jsp:getProperty name="AddUser" value="Organization"/>
(xi) //Get email
(xii) </jsp:getProperty>
(xiii) The public void adduser (registerUseruser)//encapsulates the acquired information into rUser.
(xiv) registerUser = conn.prepareRegisterUserStatement (rUser);
(xv) //Connect to the database and submit
(xvi) }

Algorithm 2: The implementation process.
4. Realization of Systematic Algorithm

4.1. Information Management. Information management functions include government information management, picture attachment management, and node publishing functions. When creating new information, managers need to fill in the title, author, source, content, keywords, subtitle, quotation, and other information. When creating new government information, it is necessary to add the following contents of the information, such as title, content, author, source, keywords, abstract and optional subtitle, quotation and link title, picture attachment, and creation time. The basic information should be declared first and then be added through functions to complete the operation of creating new information. Specific implementation algorithm 1 is as follows:

4.2. Organization Management. The organization management module mainly realizes the maintenance of the organization information users, the information of affiliated organizations, and the information of the organization, where in the function of affiliated organizations, you can add, modify, and delete the information of affiliated organizations. In the method of adding users, the `getPropertyO` method is adopted to get the information input by department administrators from the page and package it into the class object `rUser`. By creating a connection with the Oracle database, the information can be saved into the database. Algorithm 2 of the implementation process is as follows:

4.3. Information Statistics. When administrators are requesting for operation of the query statistics institutions, the process will pass the request to the total control class of query statistics, that is, the check-statistic-rule, where the total control class, according to the request call, integrated all information of statistics institutions, that is, statistic organization(). In the query statistics class, synthesized check-statistic-manager to complete the client’s agency request. In the operation of information query statistics, a conditional query can be carried out according to information state, public form, and directory classification. The specific implementation code (Algorithm 3) is as follows:

4.4. Working Platform. When issuing a document, the information reporter needs to fill in the document title, attachment addition, forwarding department, document
| Test name            | Information management, picture attachment management, node publishing |
|---------------------|------------------------------------------------------------------------|
| Test procedure      | Create, export, import, and clear information, respectively; upload pictures, add attachment categories, upload attachments, and delete pictures and their attachments; proceed immediately, delete the list, and empty the list. |
| Test data           | Node name = "county construction bureau"; list name = "articles page under institution column." |
| Test result         | The system successfully completed related operations. |

| Table 6: Test results of organization management. |
|-----------------------------------------------|
| Test name                          | Modify user permissions, add subordinate institution information, and view the institution information |
| Test procedure                     | The department administrator enters the institution management page and selects the operation of modifying user rights in the institution user information management function, in which the user rights include the department administrator and the information reporter. Select the operation of adding subordinate institution information in the subordinate institution information management page and save and submit the new request after filling in the institution information; in the information management page of the institution, select the operation of viewing the information of the institution and query the institution information according to keywords such as institution name and institution code. |
| Test data                         | Name = "website rating"); unit = "planning bureau"); share = "don’t share"; created by = "department administrator"; authorization = "department administrator." |
| Test result                       | The system successfully completed related operations. |

| Table 7: Information statistics test results. |
|-----------------------------------------------|
| Test name                          | Node statistics, statistical reports, public statistics, comments reply statistics |
| Test procedure                     | Carry out flux statistics, retrieval statistics, and information response rate statistics on nodes; select the information to generate the report for statistics; make statistics according to the application public information; make statistics on the reply of the comments. |
| Test data                          | Node name = "changsha county"); list name = "county social affairs bureau"); application name = "environmental protection information"); comment reply name = "county forestry bureau reply." |
| Test result                        | The system successfully completed related operations. |
content, and other information, while when selecting the forwarding department, they can select the department to be forwarded through the drop-down box. After publishing the file, they can see the record sent by the file in the published file. If there is no record, it means that the sending failed.

When department administrators consult the detailed information of the file, they can select the file to consult through the file list. After consulting the file, they can feedback the receiving and reading status of this file through the function of file feedback, where the information reporter only has the right to view, edit, and delete the file, and no feedback operation can be performed on files. In the method of consulting file details, firstly, we select the query statement that is used to query information from a data mining database, then different information is obtained by the get-String () method, respectively, and the information is stored in the list consultDocuDetailhifo. When the queried information is displayed in the view layer, the loop-output statement of forEach is adopted, where the information is output to the corresponding position in the table through the statement. The specific implementation code (Algorithm 4) is as follows:

5. System Test

A system test is used for the whole system product so that the test scope can cover all components in the system. The purpose of the system test is to find out the conflicts or inconsistencies with the overall system specification and correct them [19]. The test results of the four functional modules of the government information management system designed in this paper are shown in Tables 5 to 8.

6. Conclusion

The system of government information management can effectively integrate the government-related information and its catalogs that are scattered in various parts and implement the standardized management, so as to realize such as the optimization of information sharing and workflow. The designed system in this paper is divided into four functional modules, namely, organization management, working platform, information management, and information statistics. The results show that the system successfully completes the related functional operations, which provides a reference for establishing a standard and convenient government information management platform.

Data Availability

The dataset can be accessed from the corresponding author upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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