

Design and Implementation of Government Website Cluster

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Abstract

Based on the characteristics of government website construction and demands of E-government management system, this paper puts forward the methods to construct government websites by means of website cluster technology firstly. Then, it introduces innovative applications of critical techniques, employed by different subsystems, such as distributed arrangement of multi-server in the website cluster system, independent sub-websites, unified identity authentication and right management and full-text search. Finally, it analyzes the application effect on the government website cluster system and makes some suggestions for further study.

Keywords: Government Websites, E-government, Website Cluster, WEB Technique

1. Introduction

The construction of E-government system is a systematic project, which involves many technical and management problems. At present, the government websites of China are commonly troubled with maintenance and management. Thus, it is quite challenging to design and implement a practical and feasible E-government system. On the other hand, the current development of computer technique and network communication techniques provides new ideas and ways for solving problems encountered by the present e-government system[1].

The key point and difficulties in constructing an E-government system lie in its maintenance and information sharing. Though the governments of different levels have already established their own websites, few efforts have been made to maintain the system. The information released onto government websites is isolated and cannot be shared among each other[2]. Therefore, this paper proposes an approach to construct government websites by means of website cluster.

2. Requirement Analysis

In general, the website cluster refers to a collection of websites built upon unified standard and uniform technical framework. They are managed and maintained by levels

with a high degree of coupling. With special access permission, the information incorporated in those websites can be shared among each other. The management system of such a website cluster, basing on unifying the technical standard, will help to interconnect different isolated websites, practice cluster management and implement relatively unified website operations and service specifications [3,4].

With the development of E-government in China, government web portals have been playing an important role in integrating information resources of governments and accelerating transformation of government function. Although increasing government web portals have already been interconnected, the closure property of the existing website system often still remains. Currently, the government web portals and sub-sites of different subordinate departments and bureaus of governments are basically isolated, so that the information can't be shared effectively among each other, resulting in many isolated "information islands", i.e. "a group of isolated websites"[5].

Main problems in the current E-government system:

Orientation: the service philosophy of customer-oriented (the citizens, enterprises, investors, etc.) hasn't been made the guideline for constructing government websites. Rather, the websites are just simply regarded as a publicity window of governments' subordinate departments.

Standardization: the websites of different subordinate departments of governments fail to meet the functional orientation requirements of "making government affairs public, handling affairs online and having the public participate". Additionally, they are extremely diversified and lack of unified standards and norms.

Integration: the web portals and websites of governments and their different subordinate departments are established separately instead of being interconnected. As a result, they are just isolated information islands. It is difficult to integrate and utilize the information accumulated by independent government websites.

Application: as the E-government system progresses, fundamental functions of websites, such as information release and content search, can't meet the urgent requirements of the public for government service, online examination and approval, one-stop handling of affairs.

Supervision and control: there is no effective system in force to supervise, control and review those problems in government websites, such as low frequency of information update, deficiency of affairs handling, inadequate intercommunication among websites, poor service function, severe safety loophole, etc.

To solve the problems described above and to make the E-government system better work for governments, this paper proposes a solution of constructing website cluster. For the construction model of website cluster, it is suggested that a unified code standard system as well as essential norms should be established. The information should be managed by levels and can be shared and recycled via dispersed information maintenance model and verification mechanism [6,7].

3. Function Structure

The basic requirement of constructing website cluster system is to establish a "government web portals cluster" of unified arrangement, standard, norms and management, namely, to explore and utilize the resources of a group of websites. The website cluster system will include a number of master websites and sub-sites. Actually, it will be centered by government web portals and basically supported by websites of government subordinate departments (namely, sub-sites), together with their application[8].

The basic system of website cluster comprises website cluster management system, content management system and basic application system. Each of them consists of many sub-systems. The functional structure of the system is shown in Fig.1.

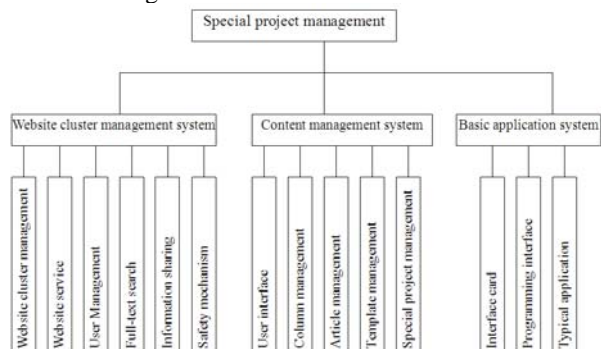


Fig.1 Function Structure Diagram of Website Cluster System

As is shown in Fig.1, the website cluster system is primarily made of website cluster management, website service, user management, full-text search, information sharing and safety mechanism. The content management system mainly constitutes the user interface, column management, article management, template management and special project management. The basic application system consists of system interface card, secondary programming interface, etc.

The main functions of those three systems are described as follows:

Website cluster system: The website cluster system is mainly used to take in a large number of independent sub-sites, arrange and manage sub-site cluster in a dispersed way, allow users to create the contents by themselves or a team to create content through cooperation[9]. It also enables different websites of the cluster to share their information with each other. Meanwhile, the website cluster system allows each website to have their own real name, independent website system, extensible independent operating system, customizable cooperation system of a team, etc.

Content management system: The content management system is located between the front end of the WEB (Web server) and the back-end office system or flow (content creation and edition). It helps to collect, manage, utilize, transfer and increase the value of non-structured or semi-structured digital resources. What's more, it can be used to integrate those digital resources into a website cluster system with structured data. The personnel responsible for creating, editing and releasing contents will use The system to submit, alter, examine and verify and release contents[10,11].

Basic application system: The basic application system is mainly used to develop common operation functions based on the integration of website cluster management system and content management system.

4. Key Module Design

4.1 Website cluster management – server console

The website cluster system is a framework of multiple-websites. It can support the creation of many independent websites and complete the construction of horizontally and vertically integrated website cluster. In this way, the

information on master websites, sub-sites and other websites can be shared and interconnected.

The console management and application is totally independent from the backstage of sub-sites and employs independent application, which ensures the safety and stability of the cluster management to the utmost extent. The independence makes sure that the console will not be affected by the fault of sub-sites and adequately ensures the maintenance and safety of data of the website cluster.

The dispersed arrangement of multi-server mainly applies the Web Service technology. The Web Service is primarily aimed to realize the interactive operation across platforms. Accordingly, the Web Service is totally based on XML (extensible markup language) and XSD (XML Schema) and the like that are independent from the platform and the standard of software suppliers.

4.2 Control and management of the website service

The control and management mainly employ the design model of MVC (Model View Controller). In this model, the presentation layer, the operation layer and data access layer are separated, which greatly improves the maintainability, repairability, expandability, flexibility and encapsulation of the system.

Every sub-site adopts an independent Web application model, so that it can be totally managed and monitored by the IIS layer. The whole pack download can be achieved in sub-sites. Moreover, the information downloaded can be used on any other servers when totally separated from the website cluster.

A single site system can provide the custom data model and enables the user to define the data form according to different operational needs. Hence the operational capability is expanded.

4.3 Information sharing

The sharing of information can be realized through an independent information exchange platform, which enables people to share, capture and integrate the information.

The information exchange platform, as an independent service, is arranged on different physical servers in order to meet the requirements for more loads and better performance. In addition, the information exchange platform can be made on the very server which the website cluster service is on.

The website cluster system mainly uses the following basic information sharing models:

Submission: it means that information is generally submitted by and collected from sites of lower levels.

Push: it refers to the compulsory information push, basically referring to the simultaneous broadcast of information mode.

Synchronization: it means to synchronize the information of different websites that are interconnected, making sure the information of two different sites are mutually synchronous.

Those three models mentioned above are realized by the following two techniques:

Information pack: the data of different content models will be extracted and packed by the information extractor, then transmitted to the receiver. Afterwards, the data subscriber will unpack and deal with the information and store it into the database in correct data structure and format.

Information transfer through email: the information transfer should consider the multiple goals (the information will be shared by many sub-sites) and heterogeneous distribution (distributed on different servers or in different network sections). Adequate consideration has been given to the stability and effectiveness of information sharing when designing the model. The design has applied mature transfer means of email. A dispatching bill and a safely packed package make the information transferred quickly, effectively and safely in the air.

4.4 User management

The system employs the interface norm of ASP.NET Membership. The management of users' rights enables people to set different user permissions for scanning and editing different information, modules and channels. Also, the hierarchical management of information can be realized and the management of users and information be solved perfectly.

The application of LDAP (Lightweight Directory Access Protocol) realizes the roaming of different sub-sites within the cluster, management authorization within the cluster and SSO (single sign on). Moreover, it is possible to have other systems integrated into this unified user management system.

4.5 Search engine within the website cluster

The website cluster search engine is an incremental indexing mode, which greatly reduces the resources and time needed by establishing the index. A freer definition of search result format makes the search results to be the data control of the front end. The format and type of the search result can be defined at each single site.

The system adopts the multiple word segmentation algorithm and introduces the redundancy of multiple word segmentations as well as the weight of results of multiple word segmentation. As an indicator, the weight rank of results can greatly improve the accuracy of Chinese word segmentation.

The system arranges a separate indexing server where both the indexing document of search engine and the kernel search program operate, so that the speed and experience of searching are greatly enhanced. When sub-sites are created, the index content can expand automatically.

4.6 Safety

For the sake of safety, this website system has taken many measures, such as the web data defender, resource access protection, password protection, SQL injection, upload file deceive, filtration of illegal key words, custom circulation backup (backup plan) of database, local and off-site storage of database, unified authentication, etc.

5. Application Effect

At present, this website cluster system has been put into use in an area of Zaozhuang City of Shandong Province. A three-level (the district, township and village) website cluster which has achieved satisfactory results is established. Such application test indicates that the website cluster system can help the governments of districts and township as well as village committees to set up a website quickly and share their information among each other. That is conducive to promoting the progress of social informationization.

The system has been playing a significant role in helping villagers to be employed in cities, increasing the sales of agricultural products, improving the informationization construction of rural areas, narrowing the digital divide between urban and rural areas, enhancing farmers' income and guaranteeing people's well-being. With The system, farmers can get employment information when seeking jobs in cities. Those engaged in crop cultivation and poultry rearing can learn corresponding knowledge and management skills from the websites. Additionally, The

system can provide people with real-time weather forecast via websites, so that they can take preventive measures against the natural disaster in advance. People whose products encounter poor sales can release trade leads on the website. Furthermore, villagers can take part in the self-government of the village, know about the village affairs and communicate relevant information among different levels.

The practice has proved that the system is the best platform for governments and citizens to communicate with each other and to solve problems.

6. Conclusion

The construction of the government website cluster is a requirement of making comprehensive use of government website resources and practicing normalized management. To establish a true website cluster system, the construction model and technical means must reach the required standard.

The further study on The system shall be the construction model. That is to say, the task in the future will be to establish a more unified code standard system and essential norms. In the new model, information can be hierarchically managed and resources can be shared and recycled resources via dispersed information maintenance mode and verification mechanism. In terms of technical implementation, it is required to carry forward the construction of the technical platform of the website cluster. The platform will be built on the content management system and integrate the newest interment technologies, RRS content aggregation, information sharing, submission and capture technique, semantic network, WEB 2.0, etc.

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