Design and Realization of Information System for Ningxia Sci-tech Special Commissioners

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Abstract The information system for Ningxia sci-tech special commissioners is an application system for realizing information collection, management and sharing in the entrepreneurial process of sci-tech special commissioners. This paper introduces overall design ideas, system functions, key technologies and realization methods of the information system for Ningxia sci-tech special commissioners. Completion of construction and coming into operation of the information system bring new breakthrough for information management and data statistics of sci-tech special commissioners.

Key words Sci-tech special commissioners, Infomration management, ASP. NET

1 Introduction

The enormous success in entrepreneurial action of sci-tech special commissioners in Ningxia[1] has set up the "Ningxia Model" with unique characteristics. With more than ten years of down-to-earth promotion, sci-tech special commissioners have reached more than 5 000 people[2]. Constant expansion of sci-tech special commissioners gives prominence to importance of strengthening organization and management of sci-tech special commissioner work in all levels of sci-tech special commissioner management departments. However, currently, there are problems of numerous sci-tech special commissioners, various types of information statistics, heavy work of information collection, processing and statistics, and failure to share. To realize more scientific and normal of sci-tech special commissioner information management work, bring into full play convenience and high efficiency of information network system, and promptly conduct statistical analysis and scientifically and accurately reflect progress of sci-tech special commissioner work in the whole region, it is required to set up the Ningxia sci-tech special commissioner information management system.

The information system for Ningxia sci-tech special commissioners is an application system for realizing information collection, management and sharing in the entrepreneurial process of sci-tech special commissioners. It is used mainly by Ningxia sci-tech special commissioner leading group office of the autonomous region, sci-tech special commissioner office of cities and counties of Ningxia, and other sci-tech special commissioner management departments. This system provides submitting, management, browsing, search and summary functions of various information of sci-tech special commissioners for Ningxia sci-tech special commissioner management departments at all levels. Apart from these, this system is outfitted with auxiliary functions, such as text message and personal information management, as well as system maintenance functions, including user management, unit management, regional code, service industry management, and industrial type management.

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2 System design

2.1 Design objectives In the construction of Ningxia sci-tech special commissioner information system, attention should be focused on planning and construction of database system, application system and security system. Following tasks and objectives have been realized:

(1) Database system: under the guidance of definite standard and technical specifications, I conducted in-depth analysis on collection, interchange, and processing of sci-tech special commissioners, and established safe and reliable database system; the database system is outfitted with functions of high efficient information collection, analysis and arrangement; it has gradually established database entities suitable for information sharing.

(2) Application system: on the basis of practical application, it should pay attention to supporting standard management of entrepreneurial action of sci-tech special commissioners, and application projects of auxiliary decisions, including convenient, swift and accurate command of search and inquiry of sci-tech special commissioner information, to provide statistical analysis for data support of scientific decision and statement preparation favorable for improving work quality and efficiency.

(3) Security system: the network safety security system has uniform standard, management by levels, is suitable for application demand and practical and feasible. It should establish secure, confidential and reliable internal communication system convenient for expansion, to pave a smooth road for future scientific and standard management in future.

2.2 Design of classification of system data information

(1) Classification of sci-tech special commissioners. There are three categories of sci-tech special commissioners: individual sci-tech special commissioner, legal person sci-tech special com-

missioner, and information sci-tech special commissioner.

(2) Classification of sci-tech special commissioner information. There are three types of sci-tech special commissioner information: basic information, management information and dynamic information.

(1) Basic information: combination with information collected for sci-tech special commissioner credit system, periodic submitting and promptly changes in case of alternation. Such information has standard format and will be filled and submitted in the form of table. Except the information involving personal or corporate secret, other information can be disclosed to the public through sci-tech special commissioner information network platform.

(2) Management information: information related to entrepreneurial development of sci-tech special commissioners, and periodical and non-periodical submittals. Such information has standard index and should be filled in the form of table, and data report shall make clear the limits of authority. Once reviewed and accepted, the information shall be used directly as original data of various statistical analyses.

(3) Dynamic information: text information of news, events, activities and reports submitted non-periodically. Such information can be text, picture and attachment. If classified and reviewed, some information can be released through sci-tech special commissioner information network platform, to realize information sharing and intercommunication.

2.3 Design of system functions The system is designed with 6 modules: personal data, individual sci-tech special commissioner, legal person sci-tech special commissioner, information sci-tech special commissioner, statistics of city and county sci-tech special commissioner office, and system management. Through these modules, it can realize submitting, management, search, statistic and summary functions of more than 300 information items, including basic conditions, entrepreneurial situation, technical training, performance, contribution, propaganda, report and policy of individual, legal person and information sci-tech special commissioners. In addition, the system has auxiliary functions (such as text message and personal information management) and system maintenance functions (such as user management, unit management, regional code, service industry management, and industrial type management). Hierarchical chart for functions of system modules is shown in the following figure.

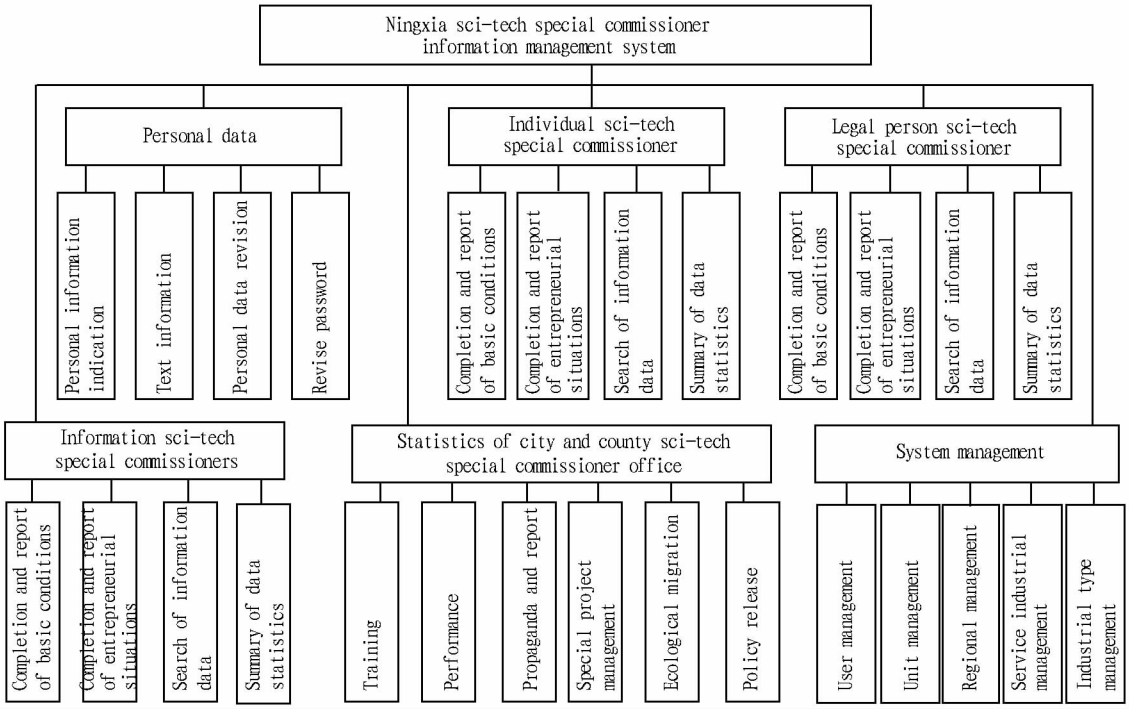

Fig. 1 Hierarchical chart for functions of system modules

3 Key technologies and realization methods

The object of the system is information collection of various sections in entrepreneurial activities of sci-tech special commissioners and management of implementation process of action projects. It is to realize hierarchical standard management of collection of information at information submitting point and project implementation process. On the basis of hierarchical management and format and standard for submitting regular information, in combination with information collection process and information processing characteristics, it has set up normal sci-tech special commissioner information collection and management model, and realized uniform management, centralized summary and hierarchical release of information.

3.1 System structure Using Internet/Intranet three-layer B/S structure, the system is highly extensible; the client is not required, so its operation is simple and interface is friendly; hierar-

chical management mode and role based permission control mode ensure data security.

(1) System operating environment and development tools.

Server operating system: Windows 2003 Server or higher

Operating platform: Framework Redistributable Package 2.0; Framework 2.0 Simplified Chinese Language Pack

Database system: SQL Server 2005 or higher

Client operating system: Windows XP or higher, IE 6.0 or higher

Development tools: MS Visual Studio .NET 2005; MS ASP.NET; MS Visual C#

(2) Software architecture.

Based on B/S mode, three-layer structural design, and modular and package method, the system is highly reliable and feasible, and easy for extension and maintenance. Main methods: use Microsoft .NET framework and three-layer logic to design and realize the system; use ASP.NET and C# language and object-oriented program design method and package development technology, for example, all pages inherits the base class Pagebase, realizing common feature and methods in the ASP.Net page of the application. The business logic layer and data layer in the system are packaged into two .NET packages, forming two dynamic link library (.dll) files, then interaction with several data services as service and data access layer of the application.

3.2 Realization of high security and performance of the system

3.2.1 High performance and security. The system performance and security are improved through the role-based safe access control and storing process access data. With the aid of integrated security function of SQL Server and Windows network operating system, the system administrator role based security allocates database access right. Backup and recovery of data sheet are completed by authorized users, while backup and recovery of database are carried out by database administrator. For the purpose of data access security, the system adopts encrypted files to link the database, and designs the account information of database and application system account into encrypted storage.

3.2.2 Major methods for optimizing system data access strategies.

(1) Migrate processing to data, rather than migrate data to processing. To migrate processing to data, the system data access layer adopts storage process for all data processing. Such design has the advantage of flexibility in data access layer of application changing the database logic, and improvement of the performance and security.

(2) Transfer all data to the client in calling a method. The data access type is not kept state in case data group. In fact, the client transfers all data necessary for specific operation to the method, and the method transfers all result data to client. Through releasing each data access object after calling any method, it simplifies resource management. As a result, the client can use any data access object to call the method because all required input is transferred to the object along with the calling.

(3) Retain the database resource in the shortest time. The data access layer puts off allocation of database resource as far as possible and releases the database resource as soon as possible. In the system assembly, calling uses some types of packed SQL storage process. Each of these cases is holder of SqlCommand object, which calls the storage process of database. It realizes Finalize/Dispose semantics through data access, to close the link of activity with the database.

3.2.3 Improve the system performance through cache. Cache is of great importance in developing high performance, distributed and scalable Web application. Due to high time consumption in page generation operation, cache must generate times of ASP.NET pages through reducing servers, so it saves server resource. The system uses fragment cache in some self-defined user controls, which improves the system performance to the maximum extent.

4 Conclusions

Construction and putting into operation of Ningxia sci-tech special commissioner information management system bring the sci-tech special commissioner information management and data statistical work into fast lane of network submitting. The information management data will be more complete, statement will be more consistent and methods will be more succinct. In addition, it realizes paperless submitting and reporting. Besides, it starts to take the information quality, quantity and promptness of submitting as performance assessment of city and county sci-tech special commissioner office. This greatly improves information management work of sci-tech special commissioners in Ningxia autonomous region.

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