Study on Management System for Agricultural Sci-tech Achievement Transformation Funding Project

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Abstract Relying on the management system for agricultural sci-tech achievement transformation funding project in Zhejiang Province, on the basis of current situations and demand of agricultural sci-tech achievement transformation funding project management system, we present a B/S-structured and J2EE platform-based system which adopts MVC mode and integrates mainstream open-source frame technologies such as Spring, Struts2, ExtJs, TopLink and FreeMarker, *etc*. Practice has shown that this system provides an original model for management of sci-tech project application, and various projects can be expanded on this model. With the aid of this system, sci-tech project management personnel can be relieved from trivial manual works, so as to increase working efficiency and improve management level of sci-tech project management.

Key words Transformation of agricultural sci-tech achievements, Project management, Project management system

With enhancement of support and increase in quantities, the management for agricultural sci-tech achievement transformation funding projects has become a huge and complex project. However, due to sortage of unified standard for information content and format of agricultural sci-tech achievement transformation funding projects, there are considerable difficulties in interchange and sharing of agricultural sci-tech achievement transformation funding project information and there is no effective support for scientific decision making, which greatly reduces utilization efficiency of agricultural sci-tech resources [1]. In this situation, it is urgent to develop a standard, perfect, highly portable and expansible information system for project application and management, so as to effectively raise the project management efficiency and improve the quality. Relying on the management system for agricultural sci-tech achievement transformation funding project in Zhejiang Province, on the basis of current situations and demand of agricultural sci-tech achievement transformation funding project management system, we present a B/S-structured and J2EE platform-based system which adopts MVC mode and integrates mainstream open-source frame technologies such as Spring, Struts2, ExtJs, TopLink and FreeMarker, *etc* [2].

1 Basic design concept

Relevant management system of agricultural sci-tech achievement transformation funding projects is divided into several subsystems: information management subsystem (as the public sector of entire system, including notice, announcement, management methods and associated documents, personal account information maintenance, system assistance, *etc*); project application acceptance subsystem; project review and examination subsystem; project expert review subsystem; project establishment subsystem; project supervision subsystem; project acceptance subsystem and integrated management subsystem.

Through adequate survey of demand for management system of agricultural sci-tech achievement transformation funding project and analysis of management information demand, we worked out systematic process and model, designed the composition of system database, division of subsystems and module functions, and put forward feasible methods for realization of system integration.

It adopts Red Hat Enterprise Linux 5 as the background support system, and takes databases such as system modules, user rights and basic information as basis [3]. In line with division of works and different demands, we followed the principle of sharing and rational utilization of resources. The system is based on existing sophisticated assembly technology and adopts software engineering technology oriented towards objects, which are favorable for system upgrade and function extension.

System development follows the advanced, high-efficient, practical and stable principles. Entire system includes regular user, competent administrator (regular administrator and senior administrator), super administrator, system administrator, and officer of Science and Technology Department. Regular user refers to an enterprise or institution which applies for project in Zhejiang Province; competent administrator refers to the sci-tech management department superior to project applicant; super administrator refers to a user responsible for reviewing project forms and accepting materials in Zhejiang Institute of Science and Technology Information; officer of science and technology department refers to officials from Business Office of Science and Technology Department and officials and leaders from Business Office of Provincial Department of Finance. Main functions of system users include system configuration, process configuration, user management, application management and process monitoring, *etc* (shown in Fig. 1).

Received: May 16, 2012 Accepted: August 15, 2012
Supported by Scientific and Technological Planning Project of Zhejiang Province (2008D30001).
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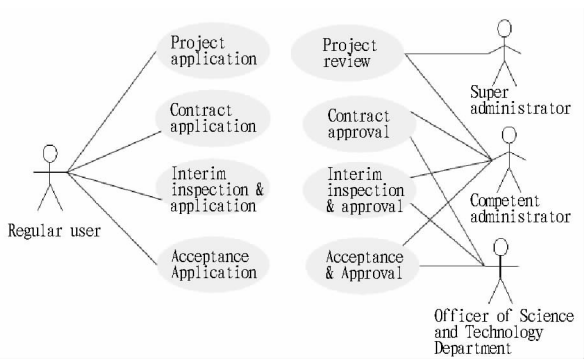

Fig. 1 Example of general core application of the system

2 System analysis and design

2.1 Detailed design of subsystem functions

2.1.1 The project application acceptance subsystem. The system is oriented towards project application unit. The account number for logging in the application subsystem must be generated with authorization of administrator of superior competent authority. This subsystem starts operation from the Rural Area Office of Science and Technology Department of Zhejiang Province issuing the project application announcement, and then accepts application projects of agriculture-related enterprises at all levels. The application user fills in various materials such as the project application form, uploads certifying materials and feasibility report required for application. The system will provide method for downloading the feasibility report. After completion of the above matters, all materials should be submitted to the superior competent authority for approval and recommendation. Once submitted, all application materials completed will not be modified or deleted by the application user. Only after the application materials have been formally submitted, can they be downloaded and accessed. To modify items after the project has been submitted, you should apply for the superior competent authority. Upon the receipt of approval from recommending unit, you can modify the returned materials.

2.1.2 The project review and examination subsystem. This system is oriented towards superior competent authority (for example, the administrative responsible institution superior to the project application unit, science and technology bureau of cities and counties). The account number for logging in the project review and examination subsystem is generated by registration and also can be authorized by the system administrator. This subsystem is mainly responsible for reviewing the project application materials submitted by the subordinate legal person. In case of any problem found, the application materials will be directly returned to the application unit. Alternatively, the application unit can apply for returning its application materials. After completion of review, it will submit the project data to the current year project database automatically generated by the system. Once submitted to the administrator of superior competent authority, you can only browse items, and can not modify, delete or return to modify items.

2.1.3 The project expert review subsystem. This subsystem is oriented towards the project review experts. With account number

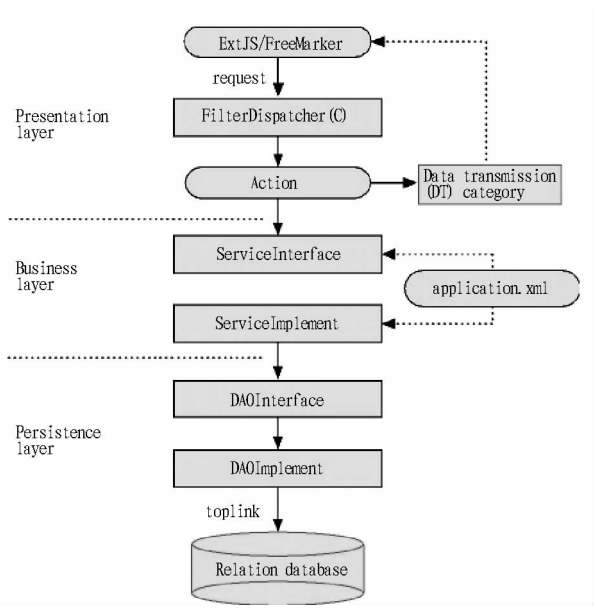

Fig. 2 System architecture

assigned by administrator in accordance with categories of projects to be reviewed, the experts can log in the subsystem and review application materials and feasibility report of projects to be reviewed. Then, experts give a score to the project, and the system will automatically mark the project already reviewed, for purpose of experts distinguishing the status of review. After the same group of experts completes the review of all projects and the system administrator submits confirmation, the system will automatically rank the project from the highest score to the lowest score. It discards the highest one and lowest one, calculates the average score, and forms the reviewed project database of the current year.

2.1.4 The integrated management subsystem. This subsystem is oriented towards the system administrator and authorized administrator from Management Office of the Provincial Science and Technology Department. It includes user management module, information management module, institution management module, progress management module, system management module, project management module, and statistic and analysis module.

The project management module integrates management of three databases, including current year project database, historic project database and established project database. All projects submitted for application will be included into the current year project database; those projects that have passed the expert review and been successfully established will be incorporated into the established project database; and other projects will be included into the historic project database. On completion of annual project application, it will automatically empty the current year project database.

The statistic and analysis module includes management of project databank, management of project review summary, and statistic and analysis.

(1) Project databank management: For project data approved

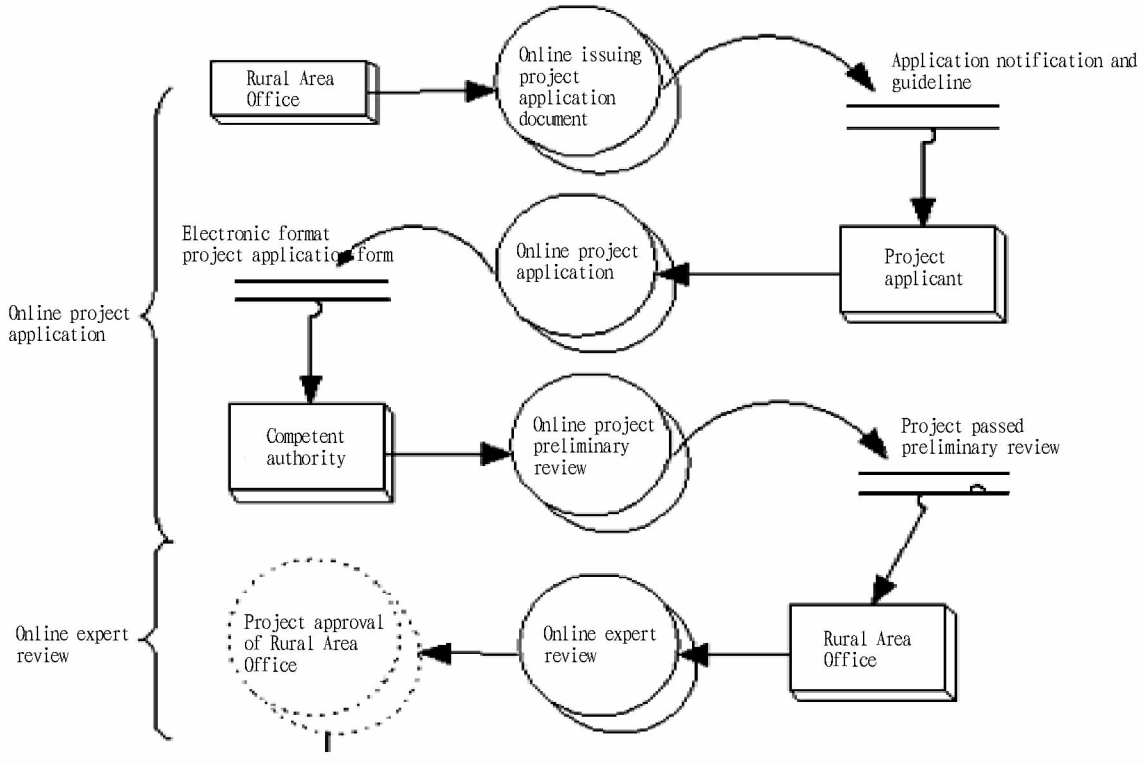

Fig. 3 Status process of the system

for entry into the databank, it provides management of inquiry, screening and deletion functions. Besides, it can conduct search management according to status of review, project establishment and acceptance, and can export the results as an Excel file.

(2) Management of project review summary: For project review summary after completion of experts' review, it can provide management of inquiry, ranking and deletion functions, rank the projects according to score, region, category (forestry specialty industry, cultivation industry and breeding industry), and export the results as an Excel file.

(3) Statistical analysis: It can carry out statistic and analysis for all project databases and review summary according to category of applicant unit, region of the application unit, and historic application record of the applicant unit.

2.2 System architecture In line with MVC (model layer, view layer and control layer) design mode [4], loose coupling and transparent persistence design principles, this system architecture adopts Java 2 Enterprise Edition (J2EE) Platform. Based on open-source Spring and Struts2, it is designed to provide business logic developers with higher layer abstract and make them only care about realization of specific business logic, so as to raise the system development efficiency [5]. The presentation layer adopts Struts2 architecture. All requests of Strust2 will be filtered by FilterDispatcher, and then be transmitted to corresponding Action according to configuration file of Struts-config. xml. Page design adopts open-source Ajax script architecture ExtJs and Freemarker architecture [2], which brings the system with beautiful interface, high human and machine interaction and excellent performance; the business layer provides service interface and its realization, adopts interface-oriented programming and uses the outstanding Ioc function of Spring. Through altering relevant configuration files (without the need of changing code), it can provide appropriate business logic, and realize hot swapping or Hot plugging of assemblies at all layers, to provide perfect support for decoupling of layered application system. Through configuring application. xml file, the Spring can realize persistence in automatic management of objects. This system architecture adopts TopLink open-source Object/Relation Mapping (ORM) architecture to realize the ORM. In addition, with the aid of the Spring, it realizes database business management, design and management of database connection pool. Therefore, the business logic developers do not need to pay attention [5]. The system architecture is shown in Fig. 2.

2.3 Detailed design of system modules This system includes four subsystem modules: the project application acceptance module, project review and examination module, project expert review module, and project establishment acceptance module. There is no significant difference in design principle between the project application acceptance module and other modules. Therefore, we take a brief look at the project application acceptance module.

For the project application module, the applicant enterprise has to firstly fill in the project application documents, provide business license and other necessary documents, complete other application documents and submit to the superior competent authority for review and recommendation. If documents filled in are unacceptable, they will be returned to users for alteration; if acceptable, they will be submitted to superior administrator for for-

mal review. Should the formal review fails, documents will be directly returned to the applicant enterprises. And upon the receipt of returned documents, users can revise the application documents and submit to competent superior authority for approval. If the formal review is passed, the superior authority will start accepting the project applied. Then it enters the expert review stage. After the scores are given by experts, it will determine whether the project can be established or not. The specific status process is shown in Fig. 3.

3 Conclusions and prospects

Relying on the management system for agricultural sci-tech achievement transformation funding project in Zhejiang Province, in combination with mainstream J2EE open-source architecture technologies such as Spring, Struts2, ExtJs, TopLink and FreeMarker, we integrate the application and management of agricultural sci-tech achievement transformation funding project, and complete the whole process management system, including application management, review management, expert review management, project establishment management and acceptance management.

The system features ExtJs architecture based system interface, friendly operation interface and high portability. Besides, the system is based on J2EE technology and has nothing to do with the development platform. At the persistence layer, it realizes Object/Relation Mapping with the aid of TopLink architecture, so the system is irrelevant to database [2] and the extensibility is high. Through analysis and abstract design, we obtain an original model for management of sci-tech project application, and various projects can be expanded on this model.

Certainly, this system also has defects, such as no sophisticated working engine in the project review and recommendation process, and connection between each module to be further optimized. All these defects should be further improved in the future work.

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Kunqu opera became the first batch of world intangible cultural heritage in 2001. So far, China has become the world's superpower of intangible cultural heritage, and 36 items have been included in the intangible cultural heritage list of UNESCO. However, such world intangible cultural heritage has nothing to do with the tea culture. China is the origin of tea, with long history of tea planting and tea drinking, which is now the world's largest tea-producing country. Longjing tea ranks first in the list of China's ten kinds of famous tea. Therefore, we should endeavor to include Longjing tea in the world's intangible cultural heritage list on traditional craftsmanship of green tea.

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