

The Research and Implementation of the Key Techniques on Post-graduate Degree-granting Online Information Collection System

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Abstract

On the premise of meeting the basic requirement of the post-graduate degree-granting online information collection, this paper discusses the key technologies and system optimization idea as well as its realization method involved in the system design and development process, including the SSH framework technology, the data initialization technology on template, the dynamic forms filled on AJAX technology and the generation technology of DBF data report forms, etc, through the combination of optimizing idea and modern information technologies to achieve the win-win performance of improving the system applications satisfaction and optimizing the work quality.

Keywords: *information collection, SSH, dynamic forms, system optimization*

1. Introduction

Along with the fast development of information technology and networks, it has become the latest trend by combining the computer hardware, software with office concept fully integrated with advanced management ideas in office area, and it attains the goal of improving office efficiency, alleviating the burden of work, and strengthening the quality of work by cooperating with each other. To the domain of education office, especially the work of degree information collection, its characteristics of large quantity of management objects, great refinement of the categorization, data tightly knit and tight restriction of time node determine that the information collected work is difficult and the statistical task is heavy. Therefore, it has a very important significance to apply modern

information technologies in graduate degree-granting information collection work in order to improve the office level of university. The “China Academic Degrees and Graduate Education Information” oriented to all the universities and post-graduate of the country has been erected by the Academic Degrees and Graduate Education Development Center of the Ministry of Education, universities submit the graduate degree information in DBF format to the system every year for making copies and facilitate future queries use. However, the way of information collected and statistical work currently is not the same among the universities, most of them still use paper-based media to pass data repeatedly among students and staff, although it has achieved a certain degree of automation, it is only limited to the use of office software applications, which can't attain the goal of digital management completely. This paper establishes a whole post-graduate degree-granted online information collection system, with the analysis and implementation of the key technologies; it has attained the goal of digitization management of the whole process arranging from students' form filling to staffs' submitting.

2. System Analyses

2.1 System outline

The goal of post-graduate degree-granting online information collection system is to integrate students, college secretaries and university graduate academy into a unified platform, carrying out the management work based on the graduate degree-granting information data. With the digital management during the whole data collection and statistical process, it will reduce the use of paper-based media and improve office efficiency, ensure the quality of data and finally achieve the goal of low-carbon environment.

The system consists of six modules: (1) Personal information management module, which contains personal information view and maintain. (2) Degree information management module, which contains audit degree information, qualified degree information and unqualified degree information. (3) Statistical analysis module. (4) User information management module, which contains the college user management and Graduate Academy user management. (5) Code tables management module, which contains the import of code tables and the maintenance code tables. (6) Mailbox management module, which contains writing mails, mail inbox and outbox.

2.2 System Flow

The flow of Graduate degree granted online information collection system begins with the underlying data initialization and ends with degree-granting information submission. Firstly, the administrators import the basic data of responsible person of the University Graduate Academy and the colleges of related colleges; afterwards, each college is responsible in importing the students' basic information, including name, ID number and contact information; then, students use ID number to login in the system to further complete the personal information and submission; colleges review the corresponding students information submitted, if an information is qualified, then submit to the Graduate Academy for the second audit, otherwise, give a feedback to the student for re-modify; finally, the Graduate Academy makes the second audit to students information submitted from colleges, if one information is not qualified, gives a feedback the college for modifying, otherwise, the confirmed degree information will be exported in DBF style and submitted to the national degree office. The system workflow shows in Figure 1.

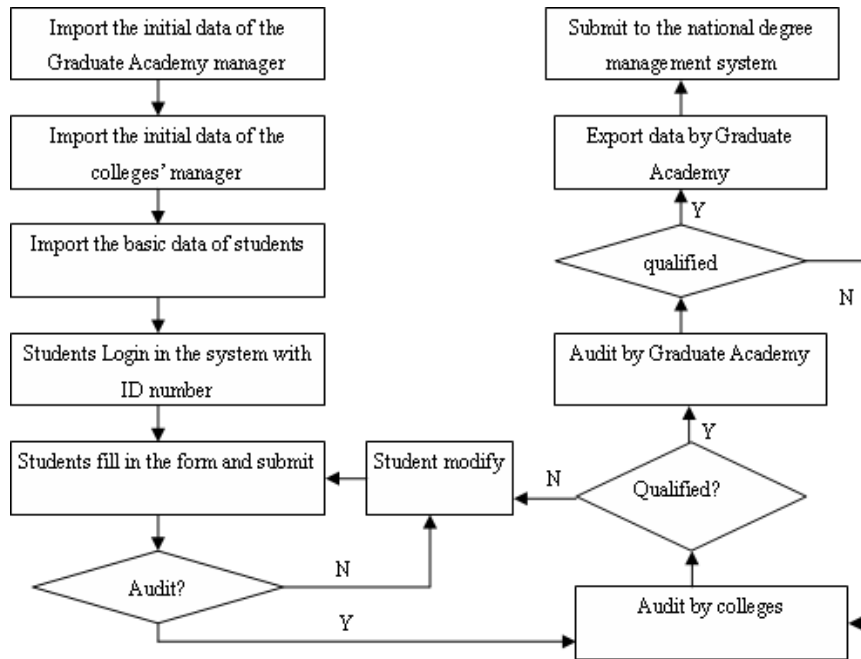


Figure.1 System work flow diagram.

2.3 System Network Architecture

The design and implementation of the system is based on Browser/Server architecture, which enables users can login in the system to do management and maintenance work anywhere with networking. Almost all of the National Universities have the Network Information Center, System application and database are separately deployed in the network center, and use firewall and other safeguards to protect the system from the attacks of unauthorized users. The Legitimate users can access to the system through a browser on any PC with networking. System network architecture shows in Figure 2.

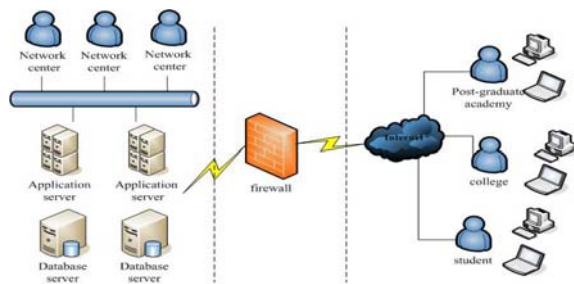


Figure.2 System Network Architecture figure.

3. Analyzes and implementation of key techniques

3.1 Struts+Hibernate framework technology

Generally, JSP+Servlet technology portfolio is more likely used in the development of traditional web applications, and in this paper it plays as a basic technology of the Struts framework. Integrate the two techniques with the tags library to form a unified framework, and separate the view layer from the complex business logic layer which can improve the hierarchy and the maintainability of the code [1], as well as greatly facilitates developers' coding process and the maintenance personnel's debugging work. Based on all the techniques above, introduce the technology of Hibernate as a further step, separate database management logic from business logic, then form a data persistence layer for maintaining the mapping relationship between Java entity classes and the database tables. Through operating the database by object-oriented method [2], encapsulate the details of database accessing in order to improve the scalability and maintainability of the program. Therefore, the

application based on Struts+Hibernate framework has a strong flexibility. The application framework based on the combined techniques shows in figure 3.

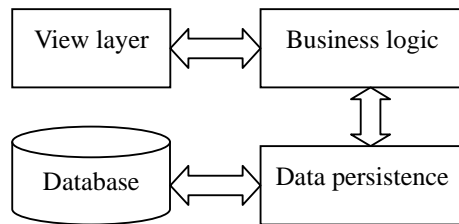


Figure.3 System Application Frame figure.

3.2 Data initialization Technology based on template

According to the results of investigation and analysis, there exist several problems about the users' needs: (1) As the fact that it is a stability job for faculty secretary and those who in charge of graduates' degree information collection, so, there will be almost no such situation like changing user's name frequently. (2) Students can not login in the system until the system already has their basic information. However, the number of students is large and it will surely increase the burden of work if faculty secretary records the basic information of students one by one. (3) The colleges have already retained large amount of previous degree information data for many years' before this system comes into use. In order to achieve the goal of unified management, the workload must be great if recoding these data one after another.

Therefore, this paper proposes the idea of using a template-based system data initialization method. For more precise, put the information into an excel template which designed by system in advance, then initialize the system data through importing the template in one time which can solve the problem in inputting data one by one. This system has three types of templates, including the system user template, students' information template and degree information template. User template consists of responsible person's name, faculty, contact; students' information template consists of name, ID number, contact; degree information template consists of 20 workbooks, the former 4 workbooks are designed

according to different degree types which required different degree information, the later 16 workbooks provide the needed code information during the degree information filling for referencing. Degree information template shows in figure 4.

Figure.4 Degree information template.

During the template importing, the system automatically searches the data in the template and matches with the corresponding field of the database to finally insert them into the database. The processes above can be realized through Apache POI which supports HSSFWorkbook Class, HSSFSheet Class, HSSFRow Class, HSSFCell Class and corresponding methods include getSheetAt(int number), getRow(int number), getCell(int number), getStringCellValue() to achieve the goal of reading the value of ranks in the EXCEL document. After getting the values of cells in the document, the related fields in the database can be reset automatically.

3.3 Dynamic form filling technique using AJAX

The types of the graduated degree include academic master's degree, professional master's degree, the equivalent master's degree, PHD, and so on; each sort of the degrees requires different kind of information. After combining the information attributes according to these degrees in the database, there are more than 92 fields in the degrees totally, each of the degree generally has more than 30 fields and 52 at most. The filling scope of most attributes are limited in a reasonable range, such as the style of the study is limited in one of the these three kinds including full-time, part-time and amateur, the same as political landscape, pre-degree, pre-qualifications, the property of the job and the topic source. When the system is designed, in order to avoid

making some unknown mistakes, the filling style needs to be supply as a form of drop-down list. So, it is necessary to import all kinds of the data tables into the system firstly, and then the system can automatically get the relative muster from the database and fills the relative drop-down list for users to choose when filling the form. In this way, the system finishes the initiation of the drop down list at once when the users of the system click the form filling interface. Because over half of the information are got from the database, in order to finish the reset of the list, users have to wait for the long time of page initiation to fill the list, which has greatly weaken users' experience.

Therefore, considering dynamical filling technology based on AJAX to promote this kind of experience. System just supplies simple JSP interfaces including different kinds of html labels when users logging in the form filling interface, which makes users preview the list intuitively as soon as possible. The list is filled only when it need to chose the property value of this list by triggering the onchange event of the drop-down list and finish the filling through getting the relative muster from the database by AJAX. By this way, the pressure can be dispersed effectively and it can also promise the user experience as well and finally improve the suitability of the system. The keywords of the AJAX technique for filling the list are listed below:

```
<select name="xxfs" style="width: 150px"
onchange="selectchange();"> //trigger onchange event
when filling forms
function selectchange(){
var url="findsel.jsp?db=xxfs"; //point out the jsp file for
database operation
xmlHttpRequest=createXmlHttpRequest(); //generate
xmlHttpRequest
xmlHttpRequest.onreadystatechange=callback; //point
out the method for accepting return values
xmlHttpRequest.open("GET",url,true); //point out the
format of sending request
xmlHttpRequest.send(null); //send requests
}
function callback(){
if(xmlHttpRequest.readyState==4&&xmlHttpRequest.st
atus==200)
```

```
{var result=xmlHttpRequest.responseText; //accept the
results set of database operation
var array=result.split(","); //split the results set
var ids=array[0].split("|"); //split code values set
var values=array[1].split("|"); //split data values set
var len=ids.length; //get the total numbers of options in
drop-down lists
for(i=1;i<len;i++){ //fill the drop-down list calculatedly
document.form1.xxf.options[document.form1.xxf.opti
ons.length] = new Option(ids[i], values[i]);
}
```

3.4 DBF Report Generation Technology

Currently, Academic Degrees and Graduate Education Development Center of the Ministry of Education requires universities to submit the information about graduate degree-granting information in DBF style in a set time. In order to connect with the its system, the system need to provide data exporting method for graduate academy users according to the regular format, JAVA offers the whole classes for generating and reading DBF documents. The keywords of generating the DBF report are listed as:

```
DBFField fields[] = new DBFField[56]; //generate DBF
data columns
fields[0] = new DBFField(); //generate first column
fields[0].setName( "Xm"); //name the first column
fields[0].setDataType( DBFField.FIELD_TYPE_C); //de
fine the format of the first column
fields[0].setFieldLength(40); //define the data length of
the first column
..... //generate other data columns
DBFWriter writer = new DBFWriter(); //define write file
object
writer.setCharactersetName("gbk"); //define the coding
format of writing files
writer.setFields( fields); //write the data columns into
files
Object rowData[] = new Object[56]; //generate object
arrays for save data columns values
rowData[0] = u.getXm(); //assign values for data columns
..... //assign values for other data columns
```


writer.addRecord(rowData);//write the data columns values into files

4. System running instance

List some examples of critical parts of the system according to the analysis and implementation of the key techniques above.

When initialing the student information, secretaries of each college click the baton of “Inserting the base information” to login into the starting interface, as shown in Figure 5. Choose the classes and degree type of students for importing, then choose a finished template, click the baton of “Importing”, the importing results are shown in Figure 6:



Figure.5 Initial student information importing page.



Figure.6 Initial student information importing successfully page.

After the double check of student information by college secretaries and managers of the graduate academy, they can click the button of “Student Information Management” to login in the student degree information list interface, in which they can search the information according to the college name of students, current audit status and degree type, click the button “Export to DBF file” to get the searching results. Figure 7 shows the process of exporting the information of the master’s degree in the 2012.

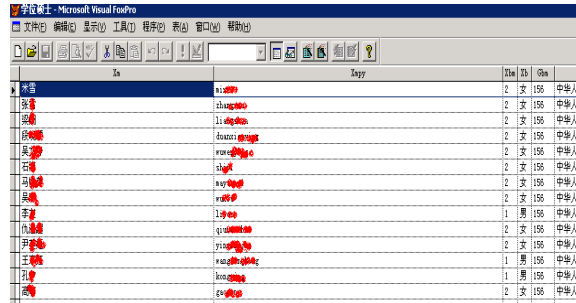


Figure.7 DBF exporting page.

5. Conclusion

Through analysis of the current state of post-graduate degree information collection and statistics, makes it clear that the significance of applying modern information technology in this kind of work. In addition, according to the common and special problems during the process of the work, studies the implementation of the key technologies and realization methods in solving these problems. It makes the collection of graduate students information more reasonable and humanity by combining different kinds of methods, improve the work efficiency of staffs and optimize the performance of the system at the same time.

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