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Design and Implementation of Laiwu Black Information Management System Based on ExtJS

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Abstract. Aimed at the problems of low level of informatization in LaiWu black pig process and the old way of using paper for date storage, in order to speed up the informatization development of the process, the LaiWu black pig informatio n management system based on ExtJS is designed. In this paper, the design and realization of the system, as well as the open source framework is illustrated in detail, the ExtJS+SSH(Sturts+Spring+Hibernate)framework exploration model is put forward,and the seperation of page and business logic is realized.The resu lt of system operation shows that not only the level of informatization in LaWu black pig process is improved, but also its maintainability and expandability are developed.

Keywords: ExtJS, Struts framework, Spring framework, Hibernate framework

1   Introduction

LaiWu black pig is North China local pig breeds, belongs to one of the precious local pig breeds. which has a high rate of reproduction, feeding force, obvious heterosis, resistance to coarse resistance, tender meat mellow characteristics. In recent years, according to the characteristics of Laiwu pigs, Laiwu increased its conservation and utilization, but there are still many problems, such as the black pig rearing informatization level is not high, low efficiency of breeding information recording. In view of Laiwu black pig in conservation and optimization problems, in order to realize the local pig breed information，this paper shows that the information management system of Laiwu black pig. This system is developed for Laiwu black pig breeds unique information management system, with a single head black pig as the goal, to achieve uniform code on each head of black pig. In order to establish information management platform for Laiwu black pig, to provide complete information chain of pork traceability of Laiwu black pig.

Laiwu black pig information management system uses the most popular J2EE framework. The development technology of J2EE framework is becoming more and more mature and perfect, the system running cost and performance more advantages than other architecture, the current more popular Struts+Spring+Hibernate (hereafter referred to as SSH) architecture provides complete, lightweight J2EE software

development model, which makes Web application becomes more convenient. However, the Web system not only needs to have stability and robustness, also need to have a friendly user interface. At present, SSH in the presentation layer implementation is proposed, mainly lack of interaction mechanism and system background effectively in a JSP page Struts tags, the data interaction with the page can not be separated, resulting in system development process requires a large amount of JSP page, makes the system maintenance is more complicated; and change a tag of a page will cause to refresh the whole page, resulting in the presentation layer of the flexibility   reducing network bandwidth, and to bring greater pressure.

Therefore, using appropriate AJAX framework in the overall architecture,   not only can improve the system   page development   efficiency, but also can greatly increase   the system interface and the user interaction. In recent years , the rapid development of ExtJS is an excellent   AJAX   framework, which provides   a common   component of almost all Web applications, can   not only realize the beautiful user interface ,   and   can   realize   efficient separation presentation layer and business logic layer separation by   using the asynchronous interaction mechanism, which further   increases the system maintainability.

The innovation of this paper lies in specially according to the growth characteristics of Laiwu black pig and the design and implementation of the information management system. And in the design of the system and puts forward some new ideas for the integration of Extjs and SSH framework, unified standard of Laiwu black swine model of information transmission in the system, to provide a strong guarantee for the establishment of Laiwu black pig traceability system.

2   Open Source Framework

2.1   Extjs

Ext JS is the leading standard for business-grade web application development. With over 100 examples, 1000 APIs, hundreds of components, a full documentation suite and built in themes, Ext JS provides the tools necessary to build robust desktop applications.

Compared to other AJAX framework, ExtJS is the biggest characteristic of supporting the built-in UI components of both beautiful and abundant , rather than through plug-ins. This makes the UI assembly more seamless cooperation. The ExtJS support Grids, TabPanel (multiple tags panel), Chart, Window, Tree, Layout Manager, ComboBox, Form, Toolbar, Menu, Templates and DataView, Panel etc.. These components make ExtJS not only is a JavaScript library, and a framework on real significance, can be satisfied with the large, complex Web application requirements.

Therefore, useing ExtJS above advantages, not only can integrate Web system and SSH architecture well , and can reduce the burden on developers, and can achieve a high interactive system page.

2.2 SSH

A Web application system framework is divided into the presentation layer, control layer, business logic layer and data persistence layer . The SSH framework provides a complete lightweight J2EE software development model, in which struts is used as the presentation layer and control layer mainly framework, provide MVC control, all kinds of presentation layer labels and input validation and other functions, improve the efficiency of development.

Spring can effectively organize business logic layer object, easily with other said seamless integration framework, allowing the option to use a module which according to requirements; provides a unified interface for different data access technology, and the use of inversion of control (IoC) can be easily implemented bean assembly provides concise; AOP implementation of the transaction management.

Hibernate is a work in the persistence layer based on the object-relational mapping (ORM) open source framework, it provides lightweight object encapsulation of JDBC, and provides a powerful, fully object-oriented query language (HQL), so the Java programmer can freely according to the object-oriented way of thinking to manipulate the database. The data are encapsulated into object, reduces the complexity of the persistence layer, that developers can concentrate on the application, and not to care about the underlying database structure.

3 Analysis and Function of the System

Combined with the current Laiwu black pig growth, feeding and slaughter characteristics, this paper built the Laiwu black pig information management system suited to their characteristics; System manage information of Laiwu black pigs from birth to slaughter, including the Laiwu black pig breeding, slaughtering, warehousing information. To achieve unified management of black pig information, to provide complete information criterion for a black pig raising sales.
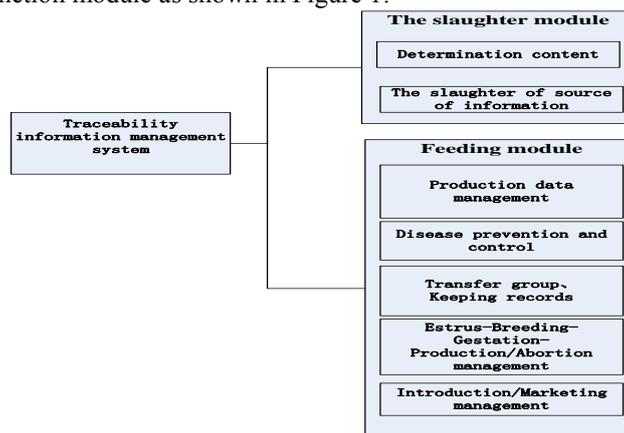
The system function module as shown in Figure 1:

Fig.1. Laiwu pig traceability information management system function module

4 System Implemention

Laiwu black pig in information management system base on the ExtJS3.4+Spring3+Hibernate version, debug browser is Firefox, auxiliary debugging tool is Firebug, the environment is prepared to install the Spket plugin for Myeclipse10.

4.1 System Framework

The system framework is shown in Figure 2, page display use Extjs framework, business logic control use Struts and Spring, data persistence use Hibernate. Interaction between Extjs and server is all Ajax requests, data exchange format is JSON. Injection of Bean use Spring Ioc technology. Struts realize control layer. The overall frame structure is clear, distinct, fully meet the requirements of system design.
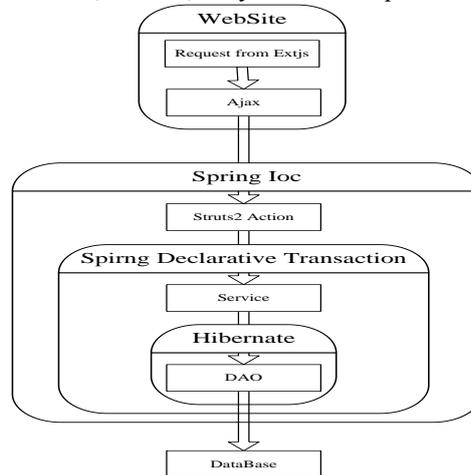

Fig.2. System architecture

4.2 ExtJS View

4.2.1 Extjs Framework

As shown in Figure 3, the Extjs application architecture in Laiwu pig traceability information management system similar to the MVC structure, View layer is the presentation layer components,   the main application of TreePanel, FormPanel, Grid and other components   complete the display function; Controller layer is responsible for controling the browser events, in the the View layer and Model layer as a bridge; Model layer is mainly responsible for data interaction.
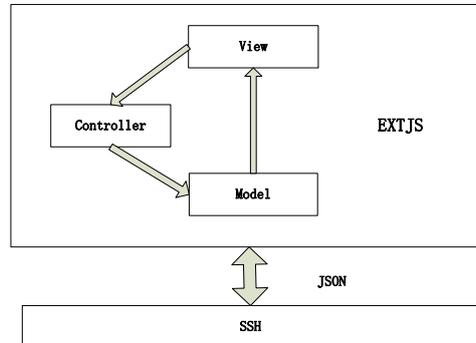
Fig.3. Extjs application framework in Laiwu pig in the system

4.2.2ExtJS Configure

UTF-8 code are used for data interaction between ExtJS frame and background. So the interface in the use of ExtJS programming, through the following settings can be for the Chinese character display:

```
<script
type=" text/javascript src="extjs/ext-lang-zh_CN.js"
defer=true charset="UTF-8">
</script>
```

4.2.3 Components Declaring and Layout

ExtJS UI library includes a variety of components, including TreePanel, FormPanel, GridPanel, Button components used in the system.
In the component declaration, make full use of the ExtJS object oriented thinking, set the constructor for the main components, in order to unify the style and save code, will set the basic properties in constructor. When use a component to the system,calling the constructor, instantiate of component object.

4.2.4 Data Interchange Format

ExtJS use AJAX to send data formats including XML and JSON (JavaScript Object Notation) format, the JSON format is recommended, the JSON is a lightweight data interchange format, easy for machines to parse and generate, lighter than XML, because JSON is a JavaScript native format, which means that the processing of JSON data in JavaScript does not require any special API or toolkit. So in Laiwu pig traceability system select JSON format as data transmission format.
As shown below, for example in the JSON data transmission system:

{"idTransforms":[{"cardid":"918000000120427","realid":"8080270000000011 "},{"cardid":"918000000120428","realid":"8080270000000012"},{"cardid":"91

**8000000120431","realid":"8080270000000015"},{"cardid":"918000000120432",
"realid":"8080270000000016"}]}**

4.2.5 Interactive Data Processing

Laiwu pig system using two kinds of interactive mode:
Using Store: Laiwu pig system data show almost all Ext.grid.GridPanel components, where   use Store as a data storage object, it is responsible for the original data into objects of Ext.data.Record. Through the Ext.data.Store, obtain the background data and converts it into a form that can be used form.
Store has two parts: proxy and reader. Proxy is a data acquisition mode, reader refers to how to parse this data. Ext.data.Record is the most basic part of Ext.data.Store, the main function is to save the data. HttpProxy using the HTTP protocol,using the Ajax gain backstage data, it need to set the URL parameters. JsonReader is a JSON data reader, by Reader make data read out, it will get the corresponding data from JSON using the name parameter by default. The proxy and reader properties in store, JSON can be read into the Record instance, and then execute this.Store.load () to achieve the transition process. Finally, through instantiation of grid, generating and displaying tables, data will be presented to the front.
As shown in Fig.4:

Fig.4. Laiwu pig system interface table example

Using Ajax:In data exchange, largely depends on the underlying implementation of Ajax. In order to unify the interface, the Ext package on the ajax, so the of Ajax in the Ext can be used between with different underlying implementation. Therefore, in Laiwu pig system, in addition to the application of   Ext.data.Store and the backstage data exchange, another way is the application of Ext in Ajax.
Pigs in Laiwu system, all form submissions are used Ext.Ajax, calling the request function of Ext.Ajax, the argument is a JSON object. The URL parameter show that will access url of the background. The params indicates that sent to the background parameters, here use JSON objects. Method is request method, due to the transmission of a large amount of data, here use post. "success" parameter represents a callback function response   after success."failure" parameter represents a callback function response after failure.

Note, here the response failure does not mean business database operations failure, but that HTTP returns 404 or 500 error. So in success method using the if statement to judge business failure, but failure method only judge HTTP response error.

4.3 Business Logic Layer and Data Persistence Layer

The data exchange layer is responsible for transmitting a request and receive the response in ExtJS, then Struts according to the configuration file (struts-config.xml) receiving a ActionServlet Request assigned to Action corresponding processing. In the business layer, Spring IoC container management service component is responsible for providing the business model component to Action, and also provides the transaction processing, the buffer pool, to enhance system performance and ensure the integrity of data. But in the persistence layer, object mapping and database interaction is dependent on Hibernate, DAO component request data, and return results.

5 Conclusions

According to the basic situation of Laiwu black pig industry design of Laiwu black pig information management system based on ExtJS, has the advantages of using ExtJS technology to make the system more friendly interface, reduces the coupling of the front page and back office processing layer, more conducive to the development and maintenance of the system; and the using of SSH framework, making the system more stable, structure more clear. System design of Laiwu black pig industry improves the information management level, simplify the feeding process, to ensure the integrity of the information of Laiwu black pig, Laiwu pig breeds make excellent brand construction entering a new level.

Acknowledgment

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