Design and Implementation of Cross-platform Ecological Yak Information Management System Based on Android System

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Abstract. In this paper, we designed a cross-platform Yak Information Management System, which based on Android and combines the HTML5 Ionic framework, Angular JS, and other development technologies. According to different people's needs, we designed the MySQL Information database so that we can provide effective information to them. The system can track the complex growth of yaks and provide herders with help.

Introduction

Currently, China has the largest number of yak all over the world. Livestock breeding industry is an important way for herders to increase their income. In general, the development of yak industry in the plateau region is still relatively backward. There are many problems about yak feeding management and the ecological environment conditions of the yak distribution area restrict and influence the method of production, which make it difficult to control the yak growing process.

In order to solve these problems, this paper put forward the idea that providing service to client by using the mobile phone based on Android system. Applying this method to help people track the growth of yak in real time, the majority of researchers will gain adequate and accurate information, which will be used for their study. Therefore, according to the different periods of yak’s growth goal and nutritional requirements, the researchers could develop efficient farming integration technology for the region \cite{1}.

B/S Structure

B/S structure is the abbreviation of Browser/Server structure \cite{2}, which is a network structure model that be produced after WEB raised. WEB browser is the client's main application software. The B/S structure is shown in Figure 1.

B/S structure which adopt the standard TCP/IP protocol. The Web as a platform for the formation. B/S structure is divided into three levels: client, web server, data server. B/S are an improvement to the C/S structure.
Ionic

Introduction of Ionic

Ionic is a framework of hybrid HTML5 mobile development, which provides chance for developers to use simple Web specifications. Ionic is suitable for cross-platform mobile APP development based on Hybrid mode. Ionic supports MVC and it is easy to maintain the code [3].

Composition of Ionic

Ionic mainly consists of three parts [4]. The Ionic architecture is shown in Figure 2.

CSS Framework. Providing the native texture of App and simulating CSS style. This part achieves using the Ionicons pattern examples libraries.

JavaScript Framework. Providing the development of mobile Web application framework. Ionic based on the Angular JS foundation framework. Thus, it naturally follows the framework constraints of Angular JS. Meanwhile, it use the Angular JS UI Router to implement front-end routing.

Command Line / CLI. The command line tool set is used to simplify application development, construct, and simulate operations. The Internet command line tool uses Cordova, which is rely on the SDK platform and realize turn mobile WEB project to native app.

Angular JS

Introduction of Angular JS

Angular JS is a good front-end JS framework, which has been used for a variety of Google products. Angular JS has many features [5] and the most significant is: MVC,
modular, automated two-way data binding, semantic label, dependency injection and so on. Angular JS MVC Architecture is shown in Figure 3.

![Angular JS MVC Architecture](image)

Model: Data model layer
View: View layer, responsible for presentation
Controller: Business logic and control logic

**Angular JS Principle**

Angular JS interact with the users is divided into three stages:
1. The browser's event loop has been waiting for the event that includes user interaction, timed events, or network events to trigger.
2. Once the event triggered, it will enter the context of JavaScript through the callback function to modify the DOM;
3. The browser will not according to the new DOM to render the new page until the callback function is executed. Angular JS and user interaction process is shown in Figure 4.

![Angular JS and user interaction process](image)

**System Function Analysis**

**Demand Analysis**

The system applies the object-oriented analysis method to divide the function and demands of the yak growth information system into three parts including Yak breeder, general research manager, and yak information systems administrators.

**Yak Breeders.** Modify the information, modify and record yak growth data, gain yak farming experience, and online sale of yak products.

**General Research Managers.** View the growth of yak in the area and provide yak breeding experience.

**Yak Information Systems Administrators.** Manage Yak breeders, yak research managers and yak information and supervise the online mall.

**System Architecture Design**

In terms of the design structure, the ecological yak information management system adopts the BS structure. The system structure is shown in Figure 5.
The user requests the WEB through the client. WEB server doesn’t send the required data to the client through the HTTP protocol until WEB server completes checkup of the users’ identity. The client accepts and displays data on the client.

The WEB server receives the user's request. First of all, WEB server will perform a request response, connect it to the database and submit a data processing request to the database. The database will convey the results of data handling to the WEB server. Then WEB server sent it to the client. System Response Process is shown in Figure 6.

Database includes systematic data process method, accept WEB server requests for data operations, achieve the database query, modify and other functions and finally submit the results of the operation to the WEB server.

System Database Design

Data service layer is the most important part of yak information management system, which is requires access to a large amount of information. MySQL database can provide nice service to the program.

The database request login and different users would enter the different database. It has built seven tables, according to the functional analysis of yak system and the various demands of several parts. The tables includes: the relationship of yak and holder table, yak population table, yak growth information table, yak relationship table , whose key is yak id; and yak basic information table, district and county table, township table , whose key is holder id.

System Function Description:
Breeders could inquire the growth of yak and modify themselves information after registered landing. As for the yak information, users could add, delete, change, and inquire. Meanwhile, system reminds the user to measure the yak, enter the growth data regularly. According to the growth data of yak, system generates the yak growth trend graphs. The flow chart of the operation is shown in the figure 7.

Users are also divided into yak general research managers and yak information systems administrators. When the user enters the account password that corresponds to the yak research manager, the interface will show two parts: the personal information and yak information. When the user enters the account password that corresponds to yak information systems administrators, the interface will show not only the part which is show to the general research managers, but also show the authority control and general manager’s information. The flow chart of the operation is shown in the figure 8 and figure 9.

Yak Breeding Exchange Sharing Function

The researchers engaged in yak research in the community to share the common sense of yak farming, which the holders can take into consideration and indicate holders to manage yaks scientifically. Thus, it will reduce the illness or death race yak which brought about by economic losses.

Conclusion

The system is mainly based on the Android system, which uses the Html 5 Ionic source framework and MySQL database, and interacts with the user through the WEB server. The system is designed to the yak holder as the main service object, to provide a good user interface. We realized management of yak and sale yak product. Not only holder controls the growth of yak conveniently, but also the study of yak is provided accurate and effective data.
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