Design and Implementation of Rural E-commerce Operation System Based on Web Technology

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Abstract. Although the agricultural e-commerce platform is developing continuously, it still has the disadvantage of weak mobility, and agricultural products have certain regional and timeliness. Through the application of mobile Internet technology, the design of rural e-commerce operation system is completed. Analyze the important development modes of mobile applications, complete the selection of cross platform development mode, realize the compatibility of multiple mobile systems based on Cordova development framework, give full consideration to the unique attributes of agricultural products, and better meet the needs of agricultural product e-commerce development.

Keywords: Rural E-Commerce, Operation System, Mixed Application Development Mode

1. Introduction
The demand for agricultural products is large, but it is usually in a relatively scattered spatial area. The seasonal and regional characteristics of agricultural products are strong [1]. With the development and improvement of Internet technology, agricultural e-commerce has gradually formed. Due to the late start, it needs to be further improved. At present, agricultural e-commerce platforms are mostly based on personal computer websites, which are hindered by the less mobile agricultural e-commerce platforms. It is necessary to promote the construction and improvement of mobile agricultural e-commerce system [2].

2. Related technology overview

2.1. Analysis of mobile application development mode
(1)Native application development mode
The application programming of this mode is realized by the programming language supported by the terminal, which is generally applicable to the development of mobile applications with high performance and sensitive response [3]. The software cannot run directly in the operating system, but different terminal operating systems are based on. Different development languages and tools are needed to build different development environments [4]. The advantage of this mode is that the
application can be used directly. The programming interface (provided by the operating system) completes the development of mobile applications with high quality, performance and stability; the native development mode needs to rely on specific development languages and tools to develop the software, and the cross platform development needs mobile applications with high compatibility and stability, resulting in high threshold and long development cycle [5].

(2) Web application development mode
This mode is developed through the use of Web Language (such as JavaScript, CSS, hypertext markup language, etc.), which is less difficult to develop and can be directly run in the browser of the terminal. Its advantages are short cycle and low cost, and can be used across platforms. Generally, mobile web applications can not directly use the application programming interface of the terminal, and it is difficult to provide high-performance mobile applications. With the maturity of HTML5 and other technologies, advanced functions of some applications can be realized by calling some mobile terminal hardware through some cross platform application programming interfaces [6].

(3) Mixed application development mode
This pattern combines native development and web development, and the architecture of hybrid application development is shown in Figure 1. Figure 1 the development process can use web page language and program language. According to the needs of the actual operating system, the mobile terminal can use the mobile application system without downloading and installing relevant software in the corresponding software mall. The development mode is stable and can be used across platforms. The terminal hardware can be used across platforms by calling the application programming interface of the system through JavaScript [7].

![Figure 1. Hybrid application architecture.](image)

In the mixed application development mode, the terminal application exchanges data with the web server (through ajax data format), deploys cascading style sheet, literal script language, hypertext markup language and system application programming interface package on the mobile terminal, the dynamic switching effect is displayed by the user interface, and completed by the analysis of the open-source browser engine core, The deployment of the interface is implemented by the web server.

2.2. Choice of development framework
In this paper, the rural e-commerce system is for mobile terminals, which adopts a mixed application development mode to realize cross-platform configuration and use. Specifically, Phonegap, one of the more commonly used cross platform development frameworks, can support a variety of mainstream mobile platforms at the same time, and provide native and JavaScript application program interfaces, which can be directly called for the application interface of the terminal platform Rich plug-ins can provide more application resources[8-10]. Specific programming languages can use HTML, CSS, JavaScript to provide corresponding support for HTML5 and CSS3. Phonegap encapsulates part of the system's API through JavaScript for developers to use. Terminal applications include message, geographic location, address book, etc. In this paper, Cordova development framework is selected.
Cordova features are similar to phonegap development framework. Part of its core code is extracted from phonegap.

3. System design

3.1. Overall system architecture
This paper uses three-tier architecture to complete the overall design of rural e-commerce operation system. Terminal view layer refers to the web browser of mobile terminal, whose main function is to provide users with user/commodity information and related services; business logic layer is mainly responsible for the corresponding business processes of e-commerce, including registration and login, online transaction and payment, information management of buyers and sellers; number According to the service layer, the main function is to access and manage the database, including querying, reading, adding, deleting and modifying data tables. This system uses PostgreSQL database, mainly including user information and commodity information, order, commodity evaluation and other data. See Figure 2 for details.

![Diagram](image)

**Figure 2.** Hybrid application architecture.

3.2. Function design of the system
The essence of this system is the B2C mode (business to consumer) e-commerce platform, which aims to improve the user's experience of online purchase of agricultural products and simplify the business operation process. The user can complete the subsequent process of agricultural product purchase only after completing the registration. The user can complete the browsing of the required products by direct search, product category navigation or selection in the system home page recommendation, Add the selected agricultural products to the shopping cart, and settle the accounts together after the purchase is completed. The user needs to complete the filling and certification of personal real information (phone number, receiving address, etc.), and wait for the logistics delivery to the designated place after the payment is successful. The specific shopping process is shown in Figure 3.
Figure 3. Shopping flow of the system.

This system can also realize the operation mode of group purchase + crowd-funding, launch corresponding activities on the platform, determine the number of places and time limit (such as 30 days) for the activities to take effect in advance, customers can pay a certain amount of advance payment first, if successful, the subsequent goods distribution process will be completed according to the time limit; if the activities are not successfully launched, the funds will be transferred back to the user account.

4. The realization of system function

In this paper, three main modules are selected as an example to illustrate and implement these functions in detail.

4.1. Sign up and log in

The effective operation of e-commerce platform is inseparable from the login and registration link. The purchase of goods shall be based on the completion of user registration. After registration and login, the user management, purchase and payment of goods and other processes can be completed. The specific registration process is: complete the user information and password first according to the requirements, and after the system is verified, the platform will send the registration and verification code to the user's mobile terminal. After the account and mobile number are bound, the registration process is completed. Users log in to the platform through user name and password. The platform will complete the matching query of the user information obtained by the front end. If the data is consistent, the login is successful. The registration process is essentially to insert a new user record into the database user table.

4.2. Commodity display

The system mainly displays the agricultural products on the home page in the form of a list. Users can click the link to view the classification of products or enter keywords in the search box to find the required products. Each product corresponds to the details page. The friendly interface of the system is mainly reflected in the list display of goods, which will have a great impact on the user's shopping experience on the platform. The list display of goods is mainly based on the actual search of the user,
to complete the retrieval and paging display of the goods data matching the search information from the database.

4.3. Shopping cart
Shopping cart is also one of the important modules of e-commerce operation system. Users can add the commodities satisfying the demand in the list of agricultural products to the shopping cart for settlement, and finally complete the order submission and payment operation. According to the actual demand, the user can modify the quantity of agricultural products in the shopping cart. In addition, the shopping cart automatically counts the number and total price of the purchased goods and completes the user's confirmation.

5. System function test
In order to verify the effectiveness of the agricultural e-commerce operation system designed in this paper, this paper selects the shopping process of the main business of the system as the functional test object, users log in to the platform after registration, use direct search and home page recommendation respectively to complete the selection of goods, the agricultural product details page includes detailed specific information, add the required goods to the shopping list with one key, and submit the purchase order. After a lot of repeated operations, the test results show that the e-commerce operation system designed in this paper is relatively stable, the business process operation is simple and accurate, and it can better meet the high mobility needs of users. The system uses group purchase to reduce the logistics storage cost, realize the low price advantage of e-commerce sales, and meet the consumption. It can promote the high quality development of agricultural e-commerce.

6. Conclusions
At present, although the agricultural e-commerce platform is developing continuously, it still has the disadvantage of low mobility, while the agricultural products have certain regional and timeliness. This paper mainly uses the mobile Internet technology to complete the design of rural e-commerce operation system, analyze the important mobile application development mode, and complete the selection of cross platform development mode, according to the Cordova development framework, To realize the compatibility of various mobile systems, it can operate stably under the mobile intelligent terminal, give full consideration to the unique attributes of agricultural products, meet the needs of the development of agricultural products e-commerce, and effectively solve the problems of high storage cost of agricultural products.

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