Design on Mobile Learning System for English of Higher Vocational Colleges Based on Android

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Keywords: Android; higher vocational colleges; English; mobile learning; system design; technical framework; system function

Abstract: Mobile learning is a new type of learning mode, which has the characteristics of mobility, interactivity, sharing and individualized learning. Based on the idea of software engineering and the latest technology of mobile development, this paper provides solutions for the development of English mobile learning system in higher vocational colleges. The research content mainly includes four aspects: Firstly, a program open source integration technology framework consisting of Struts2, Spring and Hibernate frameworks is designed; Secondly, the functional framework composed of modules such as Learning Center, Resource Center, Examination Center, Communication Center, Notification forum and System management is designed; Thirdly, the client-server communication flow based on HttpClient is designed, and the method of class design is pointed out; Fourthly, the working process of mobile phone client and the client data storage method based on SQLite are designed. Based on the research results of this paper, a mobile learning system with better user experience and advanced technology can be produced.

1. Introduction

With the continuous integration of mobile communication technology and computer technology, as well as the increasing popularity of mobile communication terminals and wireless networks, mobile learning has attracted more and more attention in the field of education all over the world, and has became one of the hotspots of modern educational technology research. As the third stage of development of distance education, mobile learning is another new way of learning after digital learning. Mobile learning is a new mode close to the essence of learning, which truly realizes the learning ideal of "anyone, any place, any time, learning any content", and is the learning form of constructing lifelong education system and creating learning society.

Mobile learning is a new learning mode, which has the characteristics of mobility, interactivity, sharing and individualized learning, and can embody the principle of combining practicality, knowledge and interest of English teaching, meet students' requirements for mobile learning, individualized learning and lifelong learning, and gradually becomes a popular way of learning[1]. English teaching in higher vocational colleges aims at non-English majors in general higher education, higher education and adult higher education, the unified planning of the curriculum, with a strong sense of the sense of the contemporary, pays attention to the students "listening, speaking, reading, writing" and the training of translation ability, and has a positive role in improving students' comprehensive ability.

Android is a Linux-based mobile terminal operating system, using integrated strategy ideas, with open and free features, and can not only to promote technological innovation, but also to reduce development costs, becomes one of the world's most popular smartphone platform, and has been very widely used in the university teachers and students[2]. In view of the current slow progress of mobile learning, the relative lack of mobile learning resources, the single function of mobile learning platform and the long development cycle of mobile platforms, this paper is based on sufficient system research and demand analysis, based on software engineering ideas and the latest technology

of mobile development. This paper provides solutions for the development of vocational English mobile learning systems, further promotes students to carry out English mobile learning, improves the quality of English teaching in higher vocational schools, and helps reform English teaching in higher vocational schools.

2. Analysis on Android Architecture

In essence, Android adds the Java virtual machine Dalvik to the standard Linux system, and builds the Java Application framework on the Dalvik virtual machine, and all applications are based on the Java Application Framework. Android is divided into four layers, and from the high level to the low level are the application layer, application framework layer, system runtime layer and Linux core layer. The Android architecture is shown in Figure 1.

- Linux kernel. Android implements hardware device drivers with the help of the Linux kernel service. As an abstraction layer between hardware and software, it hides specific hardware details and provides unified services for the upper layers. It improves security in terms of memory management and interprocess communication. The core library provides the core application interface for Android.

- System runtime. The system runtime provides services for the various components of the system, including the System class library and the Android runtime. The system library is the support of the application framework and an important link between the application framework layer and the Linux kernel layer. The Android app is written in the Java language, and the program executes in the Android runtime, running at two parts of the core library and the Dalvik virtual machine.
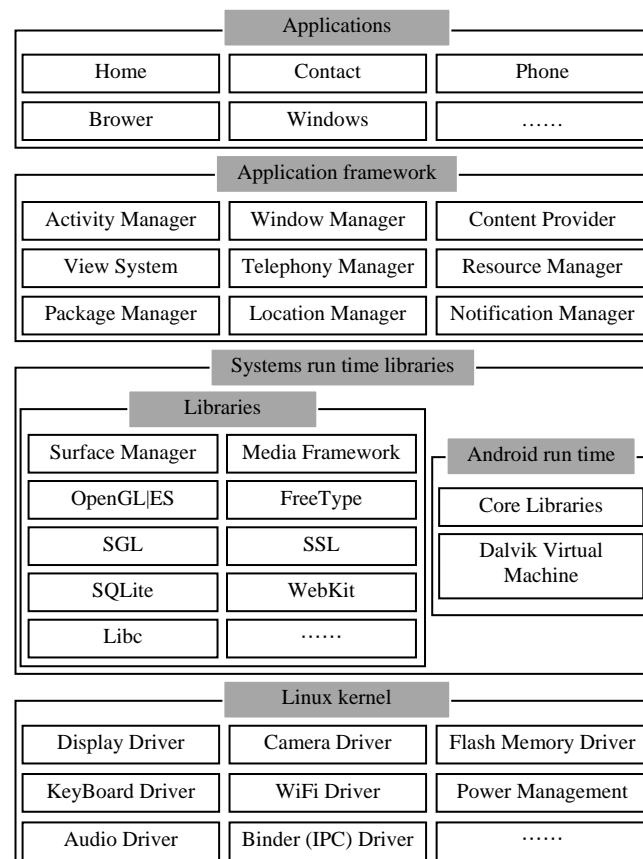
Figure 1. Android architecture

- Application framework. Android is an open platform, and the API is almost entirely open to developers. As long as the functionality of the system application is available, developers can also implement these features by applying the APIS provided by the framework layer. The

core library provides Android's core application interface, Dalvik based on registers.

- Application. Applications are written in the Java language, and each application consists of one or more activities, and the activity must be in the Activity class as a subclass. Leveraging the cross-platform nature of Java, applications developed based on the Android framework can run on any platform with an Android system without compiling, which is the essence of Android.

3. Design on Technical Framework

The technical framework is the basic framework of auxiliary software development, developers complete the specific business logic processing function on the technical framework, determine the organization way of the system, and indicate the interdependence and communication mechanism among the components of the system. SSH2 (Struts2 + Spring + Hibernate) is a popular open source integration framework for web applications, which is used to build flexible and is easy to extend multi-layer web applications. SSH2 is a typical J2EE multi-layer structure, divided into performance layer, control layer, business logic layer and data persistence layer. Instead of interacting directly with the database, the client establishes a connection to the middle tier through the component, and then interacts with the database by the middle tier. The SSH2 frame structure is shown in Figure 2.
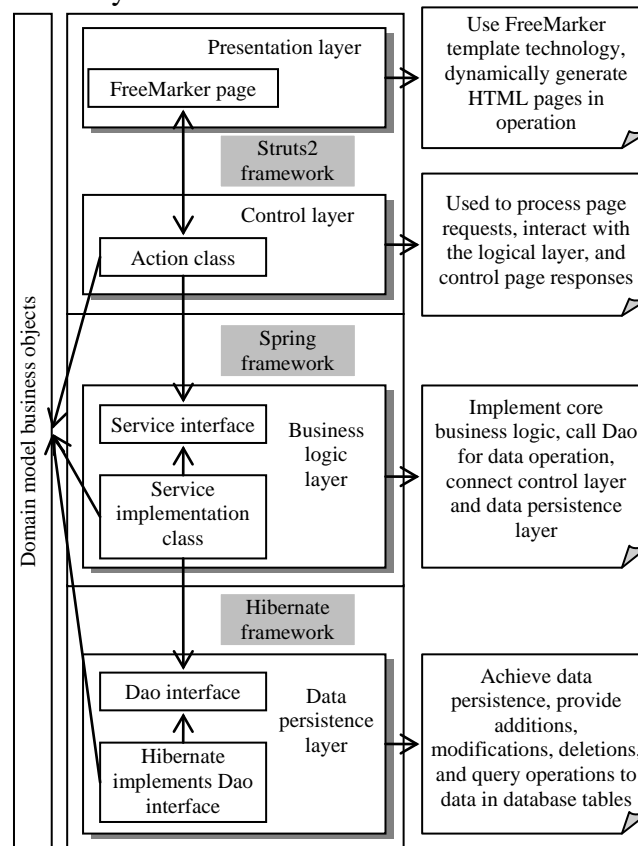

Figure 2. SSH2 framework structure

For the SSH2 frame structure shown in Figure 2, the working process is first to use object-oriented analysis method to put forward some models according to the requirements, implement these models as basic Java objects, then to write the basic DAO interface, and give the DAO implementation of Hibernate, use the DAO class implemented by the hibernate architecture implements the transformation and access between the Java class and the database, and finally to complete the business logic by Spring. The Struts2 framework, the Spring framework and the Hibernate framework are briefly described below:

- The Struts2 framework is used to implement the representation layer and the control layer [3].

Struts2 with WebWork as the core, based on OGNL powerful data access, supports multi-view, and can through the Servlet to build a bridge between the browser and the server, interactive browsing and generation of data. Using the interceptor mechanism, all user requests are intercepted through the Action class, which makes the business logic controller completely detached from the ServletAPI.

- Spring Framework for implementing the business logic layer. Spring is a lightweight IoC and AOP framework, a bridge connecting Struts and Hibernate. Spring provides a unified transaction management interface that, through IoC control of the life cycle of objects and the relationship between objects, separates the main business logic from the secondary business logic and reduces the coupling between modules by facing the idea of tangent-oriented editing [4].
- Hibernate framework for implementing data persistence layers. The persistence layer solves the separation of the business logic from the data persistence operation. Hibernate has a lightweight package for JDBC and is a Java object that uses object relational mapping to achieve data persistence [5]. The biggest advantage is that persistent data can be processed just like processing Java objects, which solves the contradiction between object-oriented Java language and relational database.

4. Design on System Function

The common method of functional design is simulation. Modularization is an important design idea, breaking down complex systems into smaller, simpler, easy-to-build and modified parts. Modules have relative independence and can be designed and implemented separately. All modules together constitute a unified whole, complete the full functionality of the system. The functional framework is the result of impersonation, which decomposes the functions of the system, the graphics represented by functional dependencies, and each rectangular box in the drawing is called a functional module. The functional decomposition process is from large to small, from thick to thin, from up to bottom. Conceptually, the upper function controls the lower layer function, the more general the upper function, the more specific the lower the function. The process of functional decomposition is from abstraction to concrete, from complexity to simplicity. Function modules can be decomposed larger or smaller depending on the situation, smaller functional modules can be a process in a program, and larger function modules can be a set of programs to complete a task. Referring to the relevant literature [6-9], the functional framework design results of this system are shown in Figure 3.

For the system functional framework shown in Figure 3, consisting of 6 large modules, each of which includes 5 sub-modules, the functions of each major module are briefly described as follows:

- Learning Center, the function of the Resource Center will be showed in Learning Center, and students can learn the corresponding resources. Micro-learning is to learn a certain point of knowledge; teaching materials learning is to study the whole content of teaching materials in a planned way; students can also carry out collaborative learning.
- Resource Center to manage all the English learning resources in higher vocational colleges. Teaching resources are all kinds of conditions that can be used to effectively carry out the materials provided by teaching activities. Resource management, which is oriented to system administrators or teachers, is an important factor to improve the quality of teaching and promote the balance of educational resources.
- Exam center, to provide students with a variety of examination functions. Examination is an important means to test the effect of learning, students can according to the examination arrangements set by the teacher, set the relevant parameters by the system automatic group volume, having unit examinations, course examinations and comprehensive examinations and other types of examination.
- Communication center that provides a variety of channels for the exchange of information between students or between teachers and students. In order to improve the effect of English

learning, the system provides instant communication of all kinds of information, such as text, video, audio, pictures and files between different mobile phone users and between mobile phones and personal computer networks.

- Notification Forum, provides a variety of notice releases and places to comment to the public. Teachers can issue a variety of notification notices or release a variety of learning tasks, but also can get a variety of learning feedback of students and guide them, and students can share their learning experience for other students to learn from.
- System management is designed for administrators to complete the management and maintenance of the system functions. This includes user information as well as authorization management, backing up the data in the database, backing up and deleting the logs to increase speed, and monitoring the motion status of the system or the use of various types of users.

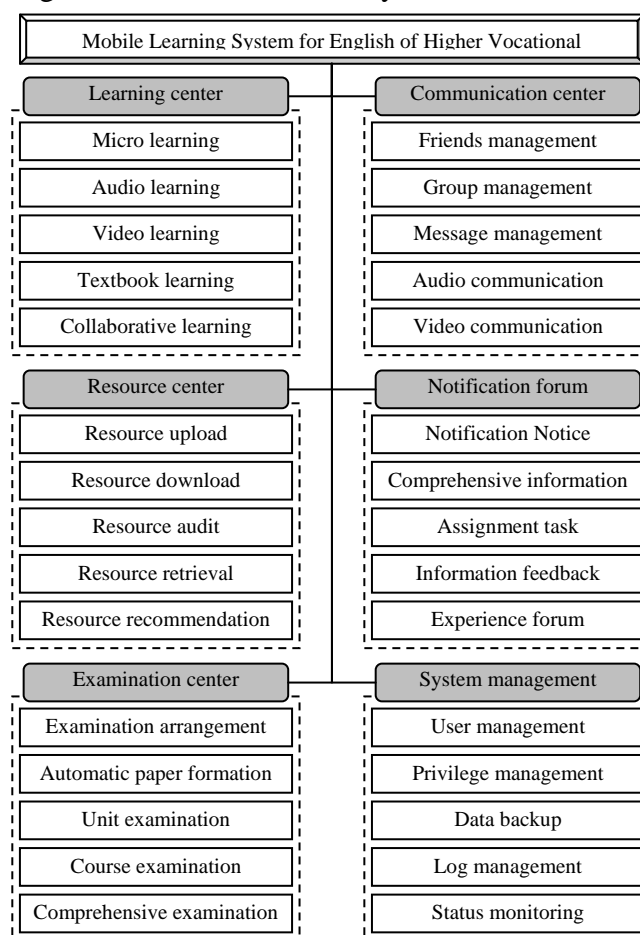| Mobile Learning System for English of Higher Vocational	
Learning center	**Communication center**
Micro learning	Friends management
Audio learning	Group management
Video learning	Message management
Textbook learning	Audio communication
Collaborative learning	Video communication
Resource center	**Notification forum**
Resource upload	Notification Notice
Resource download	Comprehensive information
Resource audit	Assignment task
Resource retrieval	Information feedback
Resource recommendation	Experience forum
Examination center	**System management**
Examination arrangement	User management
Automatic paper formation	Privilege management
Unit examination	Data backup
Course examination	Log management
Comprehensive examination	Status monitoring

Figure 3. System functional framework

5. Design on Client-server communication

In addition to completing the interaction with the user, the Android client plays another important role: submitting data, verifying data, and parsing the display data. The server submits various types of data received by the client page to the server through the server's Servlet subclass Http Servlet object. End processing logic to complete the interaction between the client and the server. The client-server communication process is shown in Figure 4 [10,11].
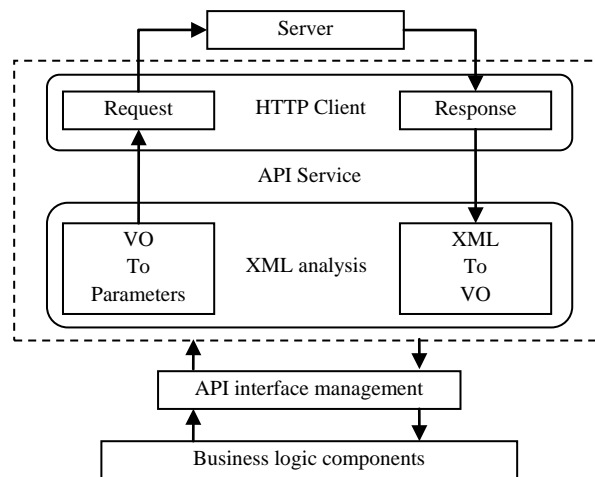
Figure 4. Client-server communication process

Depending on the client-server communication process shown in Figure 4, the following points need to be considered when designing a class:

- Httpclient objects can be reused, so they can be used as static variables for a class.
- Httppost httpget objects are generally not reusable, so a method can be created to initialize while setting up some resources that need to be uploaded to the server.
- Currently, Android no longer supports the initiation of Http requests in the UI thread, so a child thread is required to initiate an Http request, that is, to execute the Execute method.
- Different requests correspond to different return results, and there is a need for some degrees of freedom as to how to handle the return results.
- The simplest method, each time an HTTP request is sent, to open a child thread to send a request, receive a result in a child thread or throw an exception, and send a message to the UI thread, as the case may be, Finally, the result parsing and UI update are done in the handle Message method of the handler of the UI thread.

6. Design on Mobile Phone Client

The mobile client design includes the following two aspects:

(1) Client work process design. MVC (Model-View-Controller) is a model of software design that organizes code with business logic, data, and interface display separation methods, gathers business logic into a part, and does not need to rewrite business logic while improving and personalizing the interface and user interaction. First, the "View layer" for end users provides a user interface. The interface consists of a variety of UI components (XML layout or Java custom control objects) that are responsible only for displaying the data while receiving the results from the controller. Second, the core "data layer", which is the data or information that the program needs to manipulate. Typically database SQLite, JSON for network requests, local XML, or Java object data. It represents a number of entity classes that describe a combination of business logic while defining business rules for the data. Third, the "control layer", according to the user from the "view layer" input instructions, chooses the data in the "data layer", and then does the corresponding action to produce the final results. Controller is a collection of actions associated with an application that handles requests to be responded to. It is through the interface to respond to user input, through the model layer processing data, and finally returns the results to the interface. The controller acts as the adhesive role of the model and interface. The MVC model works as shown in Figure 5.
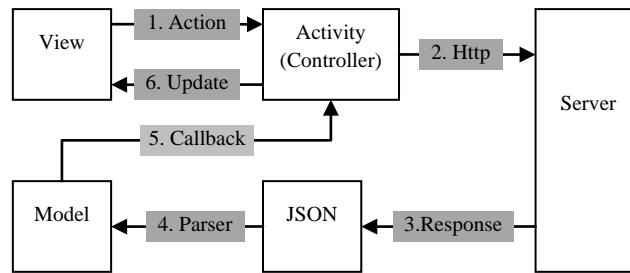
Figure 5. Working process of MVC model

For the MVC model shown in Figure 5, View accepts the user's interaction request, which transfers the request to the Controller; Controller operates Model for data update, and after the data is updated, the Model notifies the view data to change; View displays the updated data. M layer is suitable for some business logic processing, including database access operation, network operation and complex algorithms; V layer displays the data part, the XML layout can be regarded as the V layer, showing the data results of the Model layer; C layer is suitable for use with Activity, Activity in Android is used to handle user interaction issues, read user input, and respond to user click events. Activity receives for click Input, the controller responds to user input and initiates Internet request data, the response results are converted through the model layer, and finally the controller takes the model layer data and notifies the interface to refresh.

(2) Client data storage. SQLite is a lightweight and file-based embedded database that implements a SQL database engine that is self-inclusive, 0 configured, and supports transactions. Unlike other database management systems, SQLite is easy to install and run, and in most cases, you can start creating, connecting, and using databases by ensuring that SQLite binaries exist. SQLite, as the most popular open source embedded relational database, supports the basic features of many relational databases, including standard SQL syntax, transactions, datasheets and indexes, and has irreplaceable advantages in applications such as data migration and program demonstration. SQLite can significantly reduce the amount of data stored in a relational database server, ultimately improving the query efficiency and runtime efficiency of the system, while also significantly reducing the disk overhead of data backup. Because of the integration of SQLite on the Android platform, the localized storage of data is realized with SQLite, which stores a large number of users' browsing data and message records.

7. Conclusion

Mobile learning is a new way of learning, which is produced under the birth of new technology [12]. As an extension of educational services, the scope and mode of education have been expanded. Aiming at the teaching and learning characteristics of English in higher vocational colleges, the mobile learning system designed by mobile learning theory and Android development technology fully takes into account the needs of learners, solves the key technical problems of system development, and provides technical framework design, functional framework design, client-server communication design, integrated solutions such as mobile client design. After building the software development architecture based on this design result, developers can write code directly to improve the quality and efficiency of system development. Software development can be based on system needs and subject characteristics, the integration of mobile development of the latest technology, system functions to expand and extend, in order to develop a more targeted, user experience better and more technologically advanced mobile learning system.

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