

# Design and Implementation of Online Learning System based on Android Platform

Ziqing Li<sup>1</sup>, Yongning Wang<sup>1</sup>

<sup>1</sup>School of physics and electronic information engineering, Qinghai University for Nationalities, Qinghai, Xining, China.

## Abstract

Recently, with the popularity of sharing concept, the traditional industry of tutor training is in urgent need of upgrading and transformation. The existing training system is mostly carried out through training institutions, with limited training time and location. In recent years, powerful intelligent terminals have been emerging, and they have begun to play an indispensable role in People's Daily life. Among them, Android is the only open source system, which, after several years of its release, occupies an important position in today's smart terminal market. The purpose of this paper is to understand and master the Android operating system and design and develop an active learning system based on the Android platform. By building a public information platform make learners and mentors use after school time to time and place of each other as well as the course content to make an appointment, convenient and easy to use. The main work of this paper is embodied in the following aspects: conducting a demand analysis on the functions of the active learning system, designing the corresponding database and program modules, completing the development of the active learning system, and realizing various functions for users and administrators. Each function is tested in the environment, and the test results are analyzed in detail.

## Keywords

Android; Information platform; Active learning system; Intelligent Terminal.

## 1. INTRODUCTION

With the continuous improvement of China's economic level, education has been paid more and more attention, and has been booming. however, at present, there are still some problems in primary and secondary education[1]. "Class system education" does improve the efficiency of teachers' teaching, but this way can not allow teachers to take into account every individual student involved in learning

Students' personality and actual ability set up the corresponding education methods, teach students according to their aptitude. If students do not have a good grasp of the knowledge they have learned in class, they may not get good guidance due to their parents' busy work or their parents' limited knowledge level after returning home, and the students' learning knowledge will not be consolidated [2]. Therefore, parents need to find a variety of training institutions to help their children with homework and guide them to learn.

However, there are still many defects in the training institutions. The training time, place and registration method are relatively limited, which makes it difficult for learners to participate in the desired training. And whether it is one-to-one teaching or classroom teaching, both sides can not flexibly adjust the teaching conditions such as time or place. On the other hand, there are many information about the supply and demand of tutors in the bulletin boards of many

universities. Many college students devote themselves to the work of tutoring. College students are relatively rich in spare time and have a high level of education. They have the time, energy and ability to provide tutor guidance for primary and secondary school students [3]. In all parts of the country, tutor plays a very important role. As a supplement to school education, it plays an important role in improving students' ability.

In recent years, with the rapid development of mobile Internet, smart phone terminal has become an indispensable part of people's life[4]. Based on the status quo, this paper is committed to design and implement an active learning system, so that both the supply and demand of tutors can publish or obtain information online through the Android intelligent terminals on the market and communicate. The system can realize the information docking between tutors and students, take what they need, self-help pairing, and save social resources. It is also of great help to college students who want to provide tutor services to work study program for primary and secondary school students. The back-end can also manage the account number and release information, so that the system operation is simple and efficient.

## **2. RESEARCH STATUS AND RELATED TECHNOLOGIES**

### **2.1. Current Situation and Development of Internet Education**

Internet education has become the mainstream of education and training. In the past, the education mode of relying on TV advertisements, flyers or billboards for publicity and face-to-face registration has also slowly embarked on the road of Internet education because it is not suitable for the present society. At present, internet education is mainly divided into four categories.

#### **1. Internet tutor intermediary website**

Internet tutoring intermediary website is the initial form of the combination of Internet and education, and it is also the main existing form at present. The tutor intermediary website represented by sunshine tutor website has moved the business of tutor intermediary company from offline to online, mainly providing users with traditional tutor intermediary service [5].

#### **2. Network teaching platform of educational institutions**

With the development of the Internet, network bandwidth, network load capacity has been greatly improved real time video and even real-time video are the things that the current Internet can control, and some domestic educational institutions have also launched their own network teaching platform. This kind of network teaching platform mainly provides users with online courses, online Q & A and other educational services.

#### **3. Open course online learning platform**

Large scale open online course learning platform is a relatively new service in the field of Internet education, represented by edX, Coursera, Udacity and Netease Ccloud classroom [6]. Everyone in the world can get free open courses from famous universities in the world through MOOC platform, sharing excellent educational resources, online learning at any time, any place and using any equipment. There are also many platforms to provide MOOC education in China. For example, Netease cloud classroom launched the "MOOC of China University" project in May 2014 by cooperating with aike.com and undertaking the task of opening excellent courses of the Ministry of education.

#### **4. Mobile tutor software based on portable intelligent device**

At present, the tutor service is not allowed to be used by the mobile tutor service. And this is what the market lacks and what we are going to develop and research.

In China, the users of open course online learning platform are mainly college students and young people who have just entered the workplace, mainly concentrated in the first tier cities

and cities with more developed education. The main users of online teaching platform, Internet tutor intermediary website and mobile tutor software are primary and secondary school students and their parents. Students learn the course through the network teaching platform to review and expand the classroom knowledge. Internet tutor intermediary website and mobile tutor software are mainly used when students look for offline tutors. At present, parents and students have great demand for this education mode, and more and more users want to be tutors through these platforms.

According to the survey, although there are still a large proportion of students seeking tutors through offline intermediary companies, this proportion is gradually decreasing. At present, China's tutor industry has gradually shifted from the mainstream offline intermediary to the online, and it has gradually become a more common phenomenon to publish information about finding tutors on the Internet. Tutor teachers or parents of students have begun to adapt to finding tutors through the mobile Internet [7].

With the rapid development of mobile Internet technology, people's daily life has been greatly convenient. Of course, in terms of Internet tutoring, people are no longer only satisfied with looking for tutors on traditional web pages, but hope to be able to use mobile devices such as smart phones, tablets and other mobile devices to more conveniently and conveniently meet their needs of finding tutors.

### 2.2. Composition and Working Mechanism of Android Application

Generally speaking, there are four parts: Activity, Service, BroadcastReceiver and Content Provider it makes up an Android application [8], but not every Android application must be made up of these four parts. In advance AndroidManifest.xml This configuration file can be used in Android applications. In order to define the Android component, each application must have the necessary configuration files[9]. The composition and workflow of Android application are shown in Figure 1.

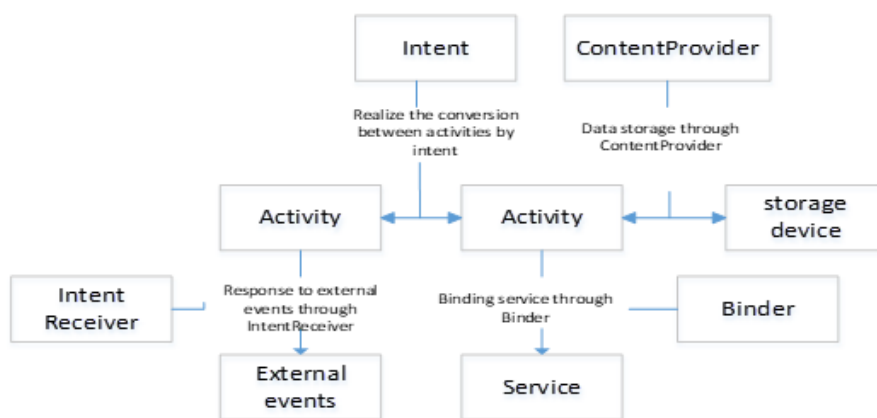


Fig 1. Composition and workflow of Android

#### (1)Activity

In Android, activity is a user interface, that is, a screen on a mobile phone. One of the four most commonly used components of Android is Android. This class is a separate class that responds to various events by displaying the interface implemented by the view class [10].

#### (2)Server

Service is a long life cycle program without user interface, which can be used to develop monitoring programs. A typical example of using a service without a UI is a media player. Playing songs in media list is the main function of media player. In the process of playing, there will be

some settings such as replay and loop playback [11]. When we set the function of playing songs, there is no corresponding user interface, that is, there is no UI. But the player will use it Context.startService () to start a service, which is used to ensure the playback of songs. Even if the user switches to other pages at the same time, the song will continue to play in the background until the end of the service, that is, the end of the song playing. Of course, we can also stop, pause, switch and other operations.

### (3)BroadcastIntentReceiver

If you want to execute some code related to external events, you need to use the IntentReceiver. When an IntentReceiver is triggered by an external event, it will directly use the notification manager to notify the user without generating a user interface, which is similar to the service without a user interface at runtime [12]. IntentReceiver can be used in the AndroidManifest.xml Registration in the configuration file can also be used in the code Context.registerReceiver () to register [13].

### (4)ContentProvider

The Android platform provides content provider to make the specified dataset of one application available to other applications. This data can be stored in a file system, in a SQLite database, or in any other reasonable way. Data is private in Android applications and includes database data, file data, and some other types of data. If an Android application wants to expose its own data, it can be implemented by using an abstract interface of ContentProvider [14].

## 3. REQUIREMENT ANALYSIS AND OUTLINE DESIGN

In the development process of this system, waterfall model is used as the software life cycle model according to the actual situation. Waterfall model usually consists of six parts: planning stage, requirement analysis phase, design phase, coding phase, testing phase, and operation and maintenance phase. Step by step, simplify the problem, and facilitate the overall promotion of software development engineering.

According to the waterfall model, the active learning system designed and implemented in this paper mainly includes requirement analysis, outline design, and

Database design and module design. The waterfall model is shown in Figure 2.

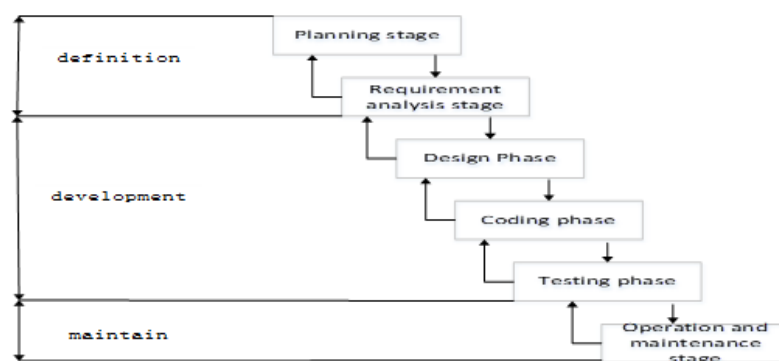


Fig 2. waterfall model of software life cycle

### 3.1. System Non Functional Requirements Analysis

#### 1. Overall requirements of the system.

In the whole software system interface design process, the system style should be beautiful, generous and concise. The system interface design is reasonable and the overall layout style is consistent. The specific requirements are as follows:

#### (1) Good interaction with users, good user experience.

(2) Compared with the current general mobile phone training and learning software, the response speed is faster and the amount of information access is greater.

2. System expansibility.

In order to facilitate the future upgrade and maintenance of the system, it is required that the system has good expansibility.

3. Error log. Error log is a special text file used to record database system information.

As we all know, Android is installed on a large number of mobile devices due to its open source and excellent development characteristics. However, the system versions, hardware configurations and even manufacturers of these devices vary greatly. Android applications running well on the simulator may crash when installed on a mobile phone. Due to the limitation of material and time, it is impossible for application developers to purchase all devices to debug one by one. Therefore, if there is a crash after the program is officially released, developers should timely obtain the information about the crash on the corresponding device, that is, the automatically saved log file, so as to analyze the bug and improve the program.

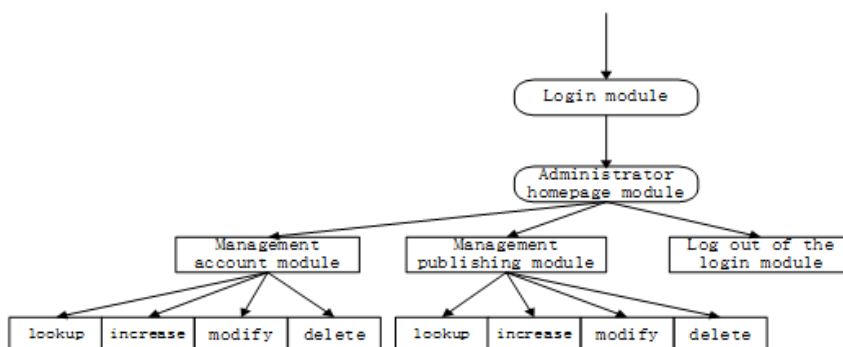
4. Data security.

Computer hardware, software and a large number of data stored in the risk of damage, at this time the data security mechanism is particularly important. By adopting corresponding management means and certain technology, it can ensure the data security of self-service training project system.

**3.2. System Architecture Design**

The architecture of this system is: a local database based on SQLite. The database stores all account information, user release information, authority, etc. Users can add, modify, delete personal information to the database and query other published information; administrators can add, modify, delete and query all information.

The back-end function modules of the program include: login, management account information, management release information, log out, etc. each module has a number of detailed corresponding columns, which is convenient for users to operate and use. Through the flow chart, the relationship between each module can be displayed intuitively. There are several steps for the administrator to operate: the administrator account exists in the system database by default, and you can enter the administrator home page by entering the account password in the login interface. After login, the administrator can select the management account information, management release information, log out and other operations in the application interface. In the corresponding management interface, the administrator can see all the information of the same type in the database and execute the operation. The schematic diagram of each functional module of the system is shown in Figure 3.



**Fig 3.** System function module

### 3.3. Database Design

#### 2.3.1 Requirement description

##### (1) Storage requirements

The active learning system stores the relevant data about account information, teaching time, teaching type, learning time and learning type. The account ID, password, mobile phone number and address ID need to be saved for the user account. The account ID and time 1 need to be saved for the teaching time. Account ID and type 1 need to be saved for teaching type. For learning time, you need to save account ID and time 2. Account ID and type 2 need to be saved for learning type. The account ID identifies the unique user.

##### (2) The system often do query and update

Consider the following two situations: frequent queries may have an impact on index creation; and based on frequent queries, you need to create views.

About updates:

After the initial input of user's mobile phone number, account ID and address ID, the update is less and relatively stable. The teaching time, type and learning time, type and other information are often updated, mainly adding records

#### 2.3.2 E / R diagram

The E / R diagram of the software database is shown in Figure 4. In order to highlight the association between entity sets, E / R diagram focuses on the expression of entity sets and their relations. The attributes of entity sets only indicate key attributes, and other attributes of entity sets are not drawn.

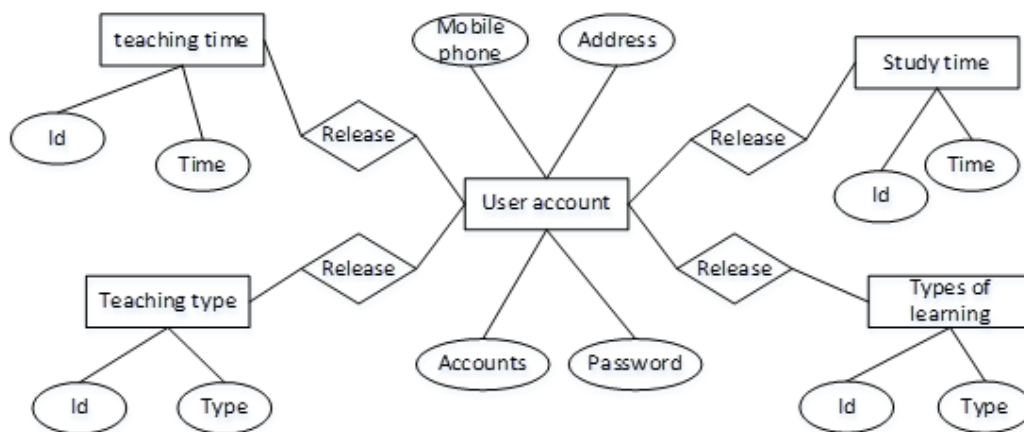


Fig 4. Database E / R diagram

#### 2.3.3 basic table design

The design of database basic table is shown in table 1-5.

Tab 1. Design of user account table

property name	data type	is it empty	key
Account ID	int	no	Primary key
password	char(16)	no	
mobile phone	char(11)	no	
address ID	varchar(100)	no	

**Tab 2.** Design of teaching schedule

property name	data type	is it empty	key
account ID	int	no	primary key
teaching time	int	no	

**Tab 3.** Design of teaching type table

property name	data type	is it empty	key
account ID	int	no	primary key
teaching location	varchar(100)	no	

**Tab 4.** Design of learning schedule

property name	data type	is it empty	key
account ID	int	no	primary key
Study time	int	no	

**Tab 5.** Design of learning type table

property name	data type	is it empty	key
account ID	int	no	primary key
types of learning	varchar(100)	no	

## 4. SYSTEM TESTING

The data used for the algorithm analysis in this paper comes from didi trip. Didi travel, as a leading mobile travel platform in China, has a large number of taxi track data. With the rapid development of data mining technology, it is not difficult to mine refined effective information from massive data.

### 4.1. Test Environment

The test environment is the implementation environment of the test, including:

1. Software test design environment: the equipment and support on which test plan description and other relevant documents are prepared.
2. Software test implementation environment: the software and hardware equipment and support for software system testing at all levels.
3. Software test management environment: software and hardware equipment and support based on which test resources are managed

The system mainly uses Android emulator virtual machine (included in Android Studio development environment, can run the specified version of Android SDK) and Android mobile phone, in which the virtual machine runs Android 7.1.1.

Using Android SDK to develop applications requires testing. Android provides developers with a virtual device AVD (Android virtual device), or simulator, that can directly test applications on computers. AVD can be used to test the application conveniently.

### 4.2. Test Module

After running the program, the main login interface is displayed first.

1 User login module test. The user login module needs to input the user name and password, otherwise the user cannot log in, and there is a prompt that the user name cannot be empty. If the user name and password are wrong, you will be prompted that the login failed, otherwise, you will be prompted to succeed.

2 Manage module testing. The account management module can only be operated by the administrator. The administrator can view the user's information, add new users, query users by name, and delete user information. The administrator of publishing information management module can see the information released by everyone. Directly click an item to enter the details page, which can be modified or deleted.

3 Add module test. In the account management interface, the administrator can add new users by clicking the Add button in the upper right corner menu. The test case is to add an account with user name 123. In the release information management interface, the administrator can add the release information by clicking the Add button in the menu in the upper right corner.

4 In the delete module test management interface, if the administrator presses a record for a long time, the delete option will appear. A dialog box will prompt you if you are sure you want to delete it, so as to prevent wrong deletion and deletion. If the deletion is successful, you will also be prompted that the deletion is successful.

5 Query module test. In the management interface, the user can enter the advanced search function through the menu key in the upper right corner. After limiting the conditions, the user can carry out accurate search, and there will be corresponding prompt after the search is successful.

### 4.3. Test Summary

This chapter first introduces the test environment of the system, then tests the system from the function and performance, and introduces the test process and results in detail. The test results show that the system basically meets the design requirements, which verifies the correctness and integrity of the system.

## 5. CONCLUSION

In this paper, the development background and current situation of mobile learning platform are studied. On this basis, the demand analysis of platform development is made in view of the shortcomings of the current tutor system. Including business requirements, user requirements and functional requirements, we have a deeper understanding of what mobile platform needs to do. After sorting out the requirements, the overall design of the platform is carried out. Through comparative analysis, the development technology suitable for the platform is found out, and the key technologies are analyzed emphatically.

This platform provides personalized support services for the majority of tutors and teachers, with convenient maintenance, strong expansibility and easy promotion, which plays a good role in promoting the level of tutor information management.

The main work of this paper is as follows

(1) Based on the mobile learning platform application object, teachers and students two aspects of a detailed analysis of the needs of the survey, obtained a reasonable platform requirements.

(2) The tutor platform for the majority of students and teachers is designed. And use the Android design method to realize, and analyze the key technology.

(3) The integrity of the whole software function is tested.



Due to the limited time, there are still some deficiencies in this paper, which need further improvement

(1) The student data information, teacher information and course data information of our tutor platform are all from manual input simulation test, lack of real environment test, there may be many unexpected software logic design defects, which need to be improved in the future.

(2) The system uses the local SQLite database to store information, only simulate the various operations of administrators, students and teachers. If it is a commercial software, the data should be migrated to the remote server for storage, and the data transmission depends on network communication.

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