Development Scheme of Mobile Campus Information Integration Platform Based on Android

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Abstract—**This paper reports on the design of software based on Android operating system, which enables smart phone, tablet PC and other devices to communicate with WEB server through the network. The WEB server then sends the data got from connection with school shared database to Android client device in JSON way. Data synchronization is made on a regular basis between campus education administration systems, students and faculty systems, scientific research systems, library system and the shared database. Thus campus information inquiry and interaction can be achieved by mobile devices such as Android smart phone or tablet computer.**

Keywords:Android;mobile campus;JSON; ORACLE

I. INTRODUCTION

In recent years, our country has clearly stated "To speed up the informatization process of education", and regarded education informatization as one of the overall national information development strategies. Meanwhile campus informatization development is the prophase to realization of education informatization. Therefore, campus informatization development plays an important role in education informatization, rejuvenating the nation by science and education, as well as building an innovative country. At present, many colleges and universities have developed information campuses according to its own actual situation and accumulated considerable data. Besides, shared database and unified authentication are usually developed to avoid "isolated information resources" among the systems.[1]

At the same time, rapid development of mobile communication technology and growing popularity of smart phones have made it possible to build mobile campus based on information campus. The paper here mainly introduces the development scheme of mobile campus information integration platform based on Android operating system, which makes it convenient and quickly for teachers and students to acquire campus information.

II. SOFTWARE DESIGN

A. Software Development Environment

In order to successfully run the program development and run tests on the PC, the first thing to do is the creation and configuration of the development environment:

- JDK installation: JDK is the development environment for JAVA. No matter either JAVA or Android development, both must install the JDK;
- Eclipse installation: Eclipse is an open source, Java-based extensible development platform. In terms of itself, it is just a framework and a set of services, used for building development environment through the plug-in components (such as: JDK) [2];
- Android SDK installation: Android SDK refers to Android exclusive Software Development Kit;
- ADT installation: ADT is an Android development tool, an Android plug-ins in powerful, integrated environment Eclipse IDE;
- Creating AVD: the full name of AVD is: Android Virtual Device, i.e., a virtual device for Android running, also emulator recognition of Android;

After finishing the above five steps, we can start the software design and development.

B. Software Architecture

The software mainly uses Android client devices (such as mobile phone, tablet computer, etc.) to log in via wireless net, then the procedure interacts with shared database by access to the specified WEB server [3]. With the continuous improvement of information campus in schools, systems such as educational administration, school work, library, campus card, financial, OA are gradually established and integrated with shared database. Systems respectively acquire needed information from shared database, at the same time, inputting data into shared database according to actual situations. Thus, shared database becomes a bridge for mobile campus to obtain different system information in schools indirectly. Fig. 1 shows the deployment and physical network (hardware) configuration of operating software:
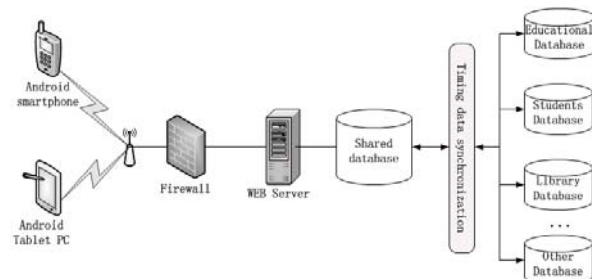
Figure 1. Software Deployment

C. Work Flow

After installing the generated mobile campus APK software on the Android client, the login page can be opened as shown in Fig. 4. Input the account number and password, click login, then the system will detect whether the client networking. If the network is normal, the system will access to remote database for authentication, while caching the access contents to the local database. Otherwise, the system will show tips of connecting to the network or directly access the information in the cache. When chosen to remember the password, for next login, you needn't input the account number and password again. If the network is normal, it will do remote identification directly, otherwise, it will visit cache information after local authentication. In order to reduce the flow and the pressure of server, even the network is normal, the information repeatedly visited within half an hour will be read from the local unless manual refresh. Fig.2 shows the work flow.
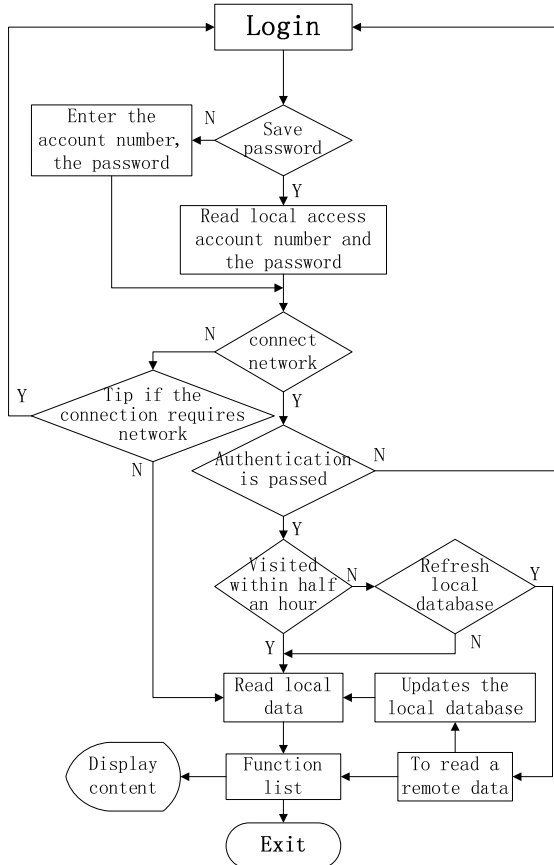

Figure 2. Workflow

D. Connections to Database

Information campus development usually selects large databases such as Oracle, but Android can not communicate to the Oracle database directly. At that time, we can choose to install Oracle client on a Web server and establish a connection, then Android can interact data with the database by accessing to the WEB server. The WEB server will use JSON technology to send the gotten data to the Android client, which is responsible for analyzing the received JSON string and showing out as required [4]. Fig.3 shows the data getting flow.
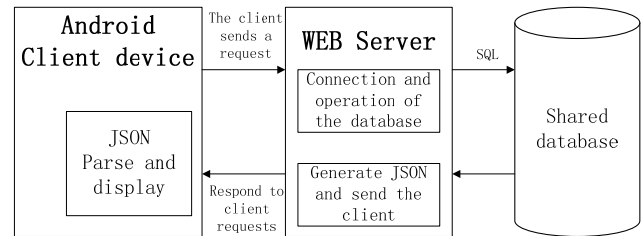

Figure 3. Principles of data interaction

III. FUNCTION ACHIEVEMENT

A. Information Query

Android client first sends request to the WEB server (GET or POST). On receiving request the server sends SQL statements to the shared database, and then receives data returned by the database. After that, the server generates the JSON format and sends in string way to the client, who will analyze the JSON string and assign the extracted value to each variable. Implementation method is as follows:

- The client sends GET request to the server:
  String url = "http://xxx.xxx.edu.cn/ Android/
      showUserInfo.asp?userId="+ userId;
- The server sends SQL statements to the database:
  ```
  <!--#include file="oracle_conn.asp" -->
   <!-- Connect to the database-->
  <% 'SQL statement to be executed
  userId=Trim(Request.QueryString("userId"))
  sql= " select zgh,xm,sfz,xbdm,dwdm,dwmc"
  sql=sql + "  from  userinfo"
  sql=sql + "  where zgh= ' "& userId & " ' "
  %>
  ```

```
<!-- the server generates data into JSON string format: -->
<!--#include file="JSON_204.asp" -->
<!--#include file="JSON_UTIL_011.asp" -->
<% QueryToJSON(conn, sql).Flush %>
```
- Generated JSON:
```
[{"ZGH":"00001","XM":"\u80E1\u6D2A\u65B0",
 "SFZ":"320511XXXXXXXXX1011","XBDM":"1",
 "DWDM":"0500300","DWMC":"\u4FE1\u606F\u4E2D\u5FC3"}]
```

Note: Chinese character use Unicode, for example, "\u80E1\u6D2A\u65B0" stands for "胡洪新"

- The server receives string in JSON format and analyzes it:
```
// Web returned JSON parsed
private void showInfo(String jsonString) throws JSONException {
    JSONArray arr = new JSONArray(jsonString);
    for (int i = 0; i < arr.length(); i++) {
    JSONObject temp = (JSONObject) arr.get(i);
```

```
    // Get No.
    String userId = temp.getString("ZGH");
    // Get name
    String userXM = temp.getString("XM");
    // Get ID card
    String userSFZ = temp.getString("SFZ");
    // Get Gender code
    String userXB = temp.getString("XBDM");
    // Get Department name
     String userDWMC = temp.getString("DWMC");
// Assigned to the TextView and display
            user_id.setText(userId);
            user_xm.setText(userXM);
            user_xb.setText(jssvc.getSex(userXB));
            user_sfz.setText(userSFZ);
            user_bm.setText(userDWMC);
        }
    }
```

B. Page Design

The software page is mainly divided into the login page, as shown in Fig. 4; the function list page, as shown in Fig. 5; the content page. The page is designed in a concise, clear, and humane style. Based on the needs of the content, the content page is shown in a single-page or multi-page tab mode [5]. When clicking on a title, it will show details in the form of dialog box.
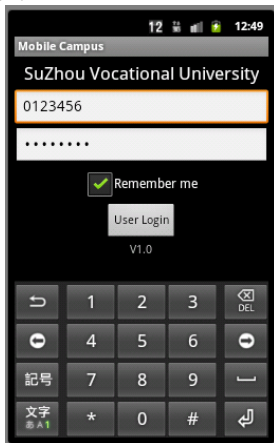

Figure 4. Login page

As to the function list page and parts of the content page, List View control is used in the form of list to separate front-end display from back-end data in MVC mode, getting data to be showed through the Adapter object. Then according to the actual situation, the content displayed is either static fixed or dynamically generated.
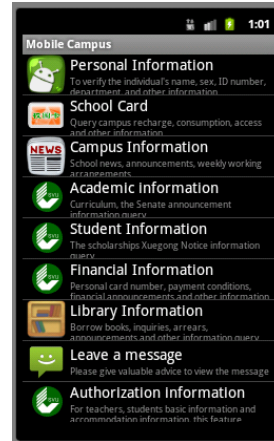

Figure 5. Function List Page

IV.   CONCLUSION

Based on research of applications in Android operating system, the paper illustrates its basic structure and development scheme. Besides, it designs a practical campus network mobile client, which can meet the regular needs of acquiring campus information well. After the test, it turns out a success to achieve various functions, and is of great extensibility.

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