

Design and Implementation of Chinese Communist Party Branch Workbook APP Based on Android

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Abstract. With the rapid development of mobile internet, more and more social groups have developed their own APPs. In the post personal computer (PC) era, picking up information from APP client on the mobile phone becomes part of everybody's daily life. Inspired by daily life, we decide implement an APP to facilitate daily network. We analyze job requirement from two respects society and function and we draw a conclusion that APP is necessary for party branch because of its large amount of data storage and fast running speed and other advantages. We introduce our work from four respects: job requirement, system design, method and process, system implementation. Finally, we propose innovation point and make a conclusion. Party branch APP is based on Android OS, and main development tools concludes: Java Development Kit (JDK), Android Studio, SQLite, Lite-Pal Glide Bomb backend cloud and other splendid tools. There are four modules in our APP: account management, activity management, news, and photo modules. Now there is Bomb backend cloud and a basic file processing system connecting with account. After the completion of graphic user interface design and database structure and file server, our APP is more convenient for dealing with party branch daily work.

Introduction

With the continuous development and maturity of information technology, more and more convenient APPs are developed and spread by network rapidly, which greatly facilitates and enriches people's daily life. In this Internet era, members in party branch collecting information methods are very original, so we need more complete and more flexible activity management and communication methods and a comprehensive documents collection platform. The platform will make every member in party branch more convenient to collect pictures, videos, experience, conclusions and other important documents and data. Also this APP will help us review every activity and make preparation for future activity.

Requirement analysis

Encryption. Our APP involves many personal data and information, so encryption is necessary. We add encryption program in registration, login and file upload process to secure users' information.

Access to Internet. The purpose of our APP is to collect activity data, so access to the Internet is core function. Also our APP needs online server to receive data from different clients.

Data storage. There are many differences between data uploaded by different users in size, quantity and variety. So we need establish database which has universal structure and easy to search based on factual requirement, and in the actual use process, database function can be improved steadily.

User Interface. The core of design for user interface is concise and beauty, we use red color as main color according to character of member of party branch, and layout is another important factor

that we need to consider. Reasonable layout will help user find relative function they need in the shortest time.

Speed. In information age, everybody's time is precious. We usually need to deal with multiple tasks during the same period, so if APP response time is too long, that will be fatal disadvantage, it will influence efficiency heavily. So we apply multi-threads technique to our APP so that it can meet the needs of fulfilling task with high efficiency.

System Design

Function Design. Development of APP is based on Android OS, and we use integrated development environment (IDE) to develop APP. Our APP mainly includes modules as follows:

Account management module. It includes login and registration module, after opening APP, user can operate APP directly.

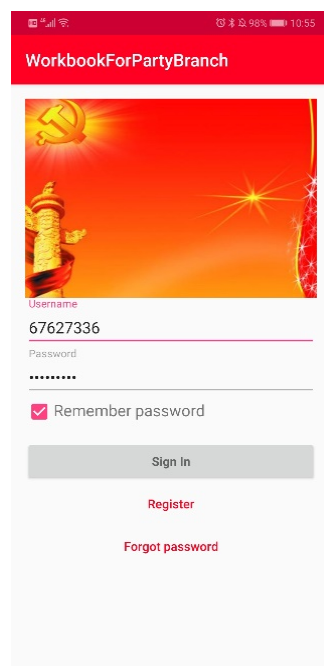


Figure. 1 Login interface

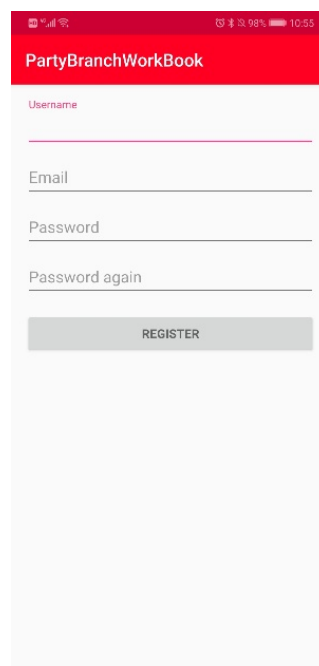


Figure. 2 Registration interface

Activity management module. After login APP, user enters the main interface and could see suspension window in the lower right corner of main interface. When clicking suspension window, we can create new activity and choose operation through menu, such as open the camera and classify photos through albums.

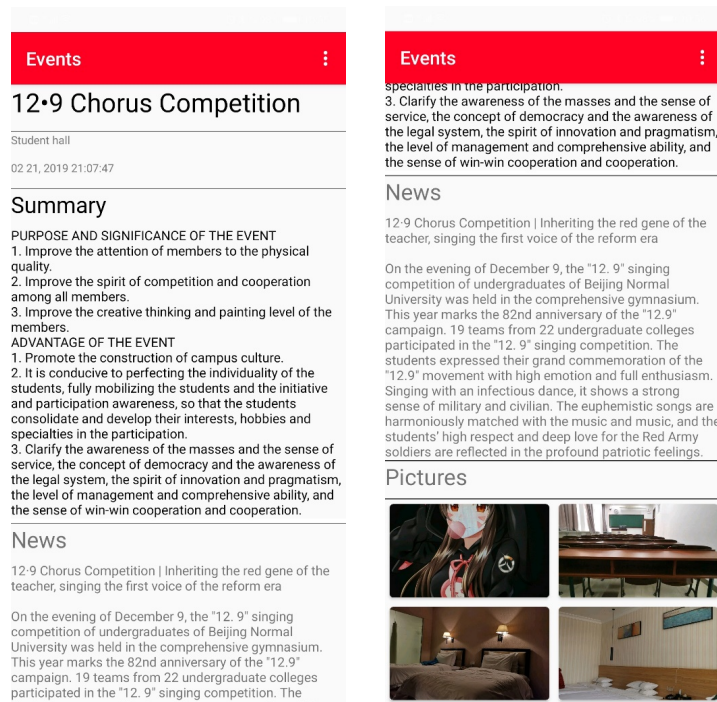


Figure. 3 Activity management module

News module. Our APP pushes some information from Xinhuanet to users, and implements simple browser function. And we will add “settings module”, and “find secrets” function in account management module, complete logic relation between every function, add registration, document editor, more beautiful interface.



Figure. 4 News List



Figure. 5 News Module

Photo module. By using this module, we can take a photo or select a photo from an album to import a project.

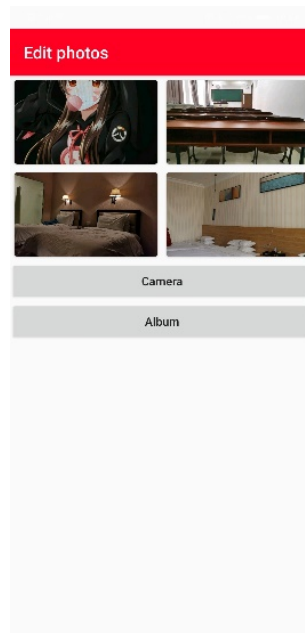


Figure. 6 Image module

Method and Process

Investigation report. We make an investigation report, which was issued to the party members in the university. According to the report, we propose some design method to meet the needs of expect users.

Learning. Android programming is a new field for us. So we use some excellent programming textbooks such as “Java Programming Ideas” and “Android First Line Code” and we also study Android by programming exchange website Github. Finally, we learned and became familiar with the necessary technologies for APP development such as: concept of interface, fragmentation, broadcast, storage, content provider, network technology-socket programming and service during the vacation.

Testing and debugging: We run hundreds times our APP for check bugs in code, and test upload module and download module for different types of files to verify the integrity of this function.

System Implementation

Development with Android Studio. Android Studio is integrated development environment developed by Google. Android studio provides us a friendly and convenient view. That is reason why we choose to use it. In development process, developer can inspect his program and operational effect using it. There are many shortcuts in Android Studio, which helps developer eases development burden and reduce amount of code. Android Studio also provides searching errors function, so a fresh man can develop a content program easily.

Accessing networks by using HTTP protocol. The principle of accessing network using HTTP protocol is send a HTTP request to server. After server receive request, it will response a packet including some data to client, and client will parse and process these data. There are two method to send a request in Android: HttpURLConnection and HttpClient. Due to there are many application program interfaces in HttpClient, and difficult to extend and other characters. We choose HttpURLConnection to send HTTP request.

Parsing XML data. There are two methods to parse XML data: pull parsing and SAX parsing. In Android platform, we can use Simple API for XML (SAX) and Document Object Model (DOM) and Pull parsing tools attaching to Android to parse every XML document.

Storage with SQLite database. SQLite is a lightweight level relational database, it has high computing speed and occupies less resources, and just needs several hundred KB random only

memory (ROM). So it's adequate to use on mobile phone. SQLite not only supports standard SQL syntax, but also respects the ACID characters of database transaction. It's easy to use for fresher and to get started quickly. Android specifically provides us a class named SQLiteOpenHelper which helps us create and upgrade database in simple steps. We use LitePal to operate database. LitePal is a database frame, which adopts object relation mapping (ORM) model, and encapsulates common database function. LitePal is an open-source frame, and its code has been verified for a long time, which has stable effect than our own code.

This technology is used to access both photo album and camera. Firstly, APP get permission to write data to the phone storage, and then to specify the access path. Finally we will call the camera to take a photo, create a content provider, and return this specific photo to the APP. Let the user judge whether it is appropriate, and then decide to save the picture.

Design user interface using Material Design. Material Design is a new interface design language based on traditional excellent principle combining abundant ideas and science & technology invented by Google engineers, which including vision movement interaction and other characters. Google provides Design Support library which encapsulates most representative widgets and effects. It will help developers MATERIZE their own APPs easily even though they are not aware of this library.

Using Android multi-threads programming. In Android operating system, main thread and sub thread have different function respectively and play different roles. This design will help OS allocates hardware resources and enhances performance. Among every thread, main thread will process events relating to UI. Main thread allocates these events to corresponding widgets for processing, so main thread is usually named UI thread. Sub threads can deal events except those relating to UI, and sub threads usually run much time, such as downloading data online and etc. So we use the entry activity of the project, named "SplashActivity", so that we can putting an advertisement on the interface.

Call camera. We make APP can call the camera of the Android system to take photos and send the taken photos to the file server. Using the file object to store the file captured by the camera, and then put it into the application association directory of the SD card of the mobile phone. The application association directory refers to the location in the SD card that is dedicated to storing the current application cache data. This path can be obtained by calling the `getExternalCacheDir()` method. Starting from the Android 6.0 system, the read and write SD card is listed as a dangerous privilege. If the image is stored in any other directory of the SD card, the runtime permission processing must be performed, and the application association directory will not have this problem. In addition, the application association directory for accessing the SD card before Android 4.4 needs to declare the permission. After Android 4.4, it is no longer necessary to declare the permission. In order to be compatible, we declare the SD card permission in `AndroidManifest.xml`.

Call album. To select a photo from an album, we first need to perform runtime permission processing and dynamically request the dangerous permission of `WRITE_EXTERNAL_STORAGE`. The photos in the album are stored in the SD card. We apply for this permission to read photos from the SD card. `WRITE_EXTERNAL_STORAGE` indicates that the program is also granted the ability to read and write to the SD card. Android 4.4 starts to select the album image and no longer returns the real Uri but a packaged Uri, so it is necessary to judge the two cases.

Summary

Our APP has been implemented all function we mentioned above and reached expectancy, including photo shooting, photo access, news push, text material editing and other various parts. We hope that this APP will bring not only every party branch member but also every other people.

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References

- [1] Android Develop Docs on <https://developer.android.com/docs>.
- [2] Z.L.Yu, Y.X. Chen, M.J. Zheng,X.F. Chen and Z.J. Guo, et al. Examples of Google Android SDK development. Beijing: Posts & Telecom Press. 2009:20-27.
- [3] L.Guo. The first line of code: Android (2nd Edition). Beijing: Posts & Telecom Press. 2016:1-570.
- [4] Xinhua Net on <http://www.xinhuanet.com>.
- [5] Bomb backend cloud on <https://www.bmob.cn>.
- [6] Party branch meeting agenda on <https://wenku.baidu.com/view/1c3da9cc710abb68a98271fe910ef12d2af9a921.html>.
- [7] Cay S. Horstmann. Core Java Volume I--Fundamentals (11th Edition). Prentice Hall. 2018:1-230.
- [8] Litepal Database operating base <https://github.com/LitePalFramework/LitePal>.
- [9] XXApple/AndroidLibs on <https://github.com/XXApple/AndroidLibs>.