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Research Paper

Development of Mobile Application for Android Platform: Medical Guide

Engineering

KEYWORDS : Android Technology, System Architecture, Open Source Platform, system Implementing

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ABSTRACT

Developing smartphones leads to increase demands on verity of applications. As the Android operating system is getting more popular, the application based on Android attracts much more attention especially Android is more flexible for designers and users than other mobile phone operating systems. This paper presents the Android mobile phone application developed to help patients to get information about the healthy issues in Kurdistan Region/Iraq with Kurdish Language. The software works as a simple and efficient healthy directory to present what patients are needed. The application is offline and it is connected with the online website for extra information. The user can check information via viewing the text information and finding the geographic places with an online map, besides that, the user can give rates for the parts of software. The data is classified to some groups to facilitating the search.

1. Introduction

Nowadays, huge numbers of healthy organizations causes difficulty to find what you want. Thousands of doctors, hundreds of hospitals and pharmacies are located in different geographical places, therefore, it takes time and money to search for them in traditional way and websites are not efficient to use us directory. So, mobile application is best choice to be used as healthy directory, because mobile applications are user friend. Many web sites were implemented to work as business directory and rarely these sites focus on healthy even if they have sub-parts in this field but they do not fulfill the demand and do not have enough information, while most peoples use mobile applications due to easy using and they do not need extra device to access the services. In recent years many applications were developed for the Kurdistan Region market, even some of them were applications of healthy field but no one focused on this field as a guide line to direct the patients to correct target easily.

A health system is proposed for pregnant women in [1]. The proposed system works based on mobile GIS to select closest care Centre or hospital maternity on Google map for the pregnant woman [1]. But due to problems of accessibility for the GPRS and cellular systems, online applications have week points. Hopeful hearts is proposed in [2]. It covers a side of healthy issue but not considered as a guide. An emergency mobile application system is proposed in [3] with support of GIS, and GPRS networks, but the problems of network connectivity also is ignored for emergency case.

In this paper, as a solution for many emergency cases and to direct the patients to right target; an offline mobile application is proposed for the healthy guide under the name Medical Guide. The application contains many efficient features for searching, and the application is connected with a website for getting extra information. Each participant of the application can has its own user and he/she can update its information beside that the doctors can access their users and see their activities with patients. The application is in Kurdish Language and it is design to be user friend.

2. Android Technology

Android is a software platform and operating system for mobile devices based on the Linux operating system and developed by Google and the Open Handset Alliance. It allows developers to write managed code in a Java-like language that utilizes Google-developed Java libraries [4]. Open source software is currently one of the most debated phenomena in the Software industry, both theoretically and empirically. At the most basic level, the term open source software simply means software for which the source code is open and available. Android is such an operating system for low powered devices, that on battery and are full of hardware like Global Positioning System (GPS) receivers, cameras, light and orientation sensors, WiFi and UMTS (3G telephony) connectivity and a touch screen. Like all operating systems, Android enables applications to make use of the hardware features through abstraction and provide a defined environment for applications [5]. To summarize, the Android operating environment can be labeled as [6, 7]:

1- An open platform for mobile development
2- A hardware reference design for mobile devices
3- A system powered by a modified Linux 2.6 kernel
4- A run time environment
5- An application and user interface (UI) framework.

3. Android System Architecture

Figure 1 outlines the current (layered) Android Architecture. The Android software stack can be subdivided into five layers: The kernel and low level tools, native libraries, the Android Runtime, the framework layer and on top of all the applications[6].

The modified Linux kernel operates as the HAL, and provides device driver, memory management, process management, as well as networking functionalities, respectively. The library layer is interfaced through Java (which deviates from the traditional Linux design). It is in this layer that the Android specific libc (Bionic) is located. The surface manager handles the user interface (UI) windows. The Android runtime layer holds the Dalvik Virtual Machine (DVM) and the core libraries (such as Java or IO). Most of the functionalities available in Android are provided via the core libraries [5, 6].

The application framework houses the API interface. In this layer, the activity manager governs the application life cycle. The content providers enable applications to either access data from other applications or to share their own data. The resource manager provides access to non-code resources (such as graphics), while the notification manager enables applications to display custom alerts. On top of the application framework are the built-in, as well as the user applications, respectively. It has to be pointed out that a user application can replace a built-in application, and that each Android application runs in its own pro-

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cess space, within its own DVM instance. Most of these major Android components are further discussed (in more detail) in the next few sections of this report [5, 6].

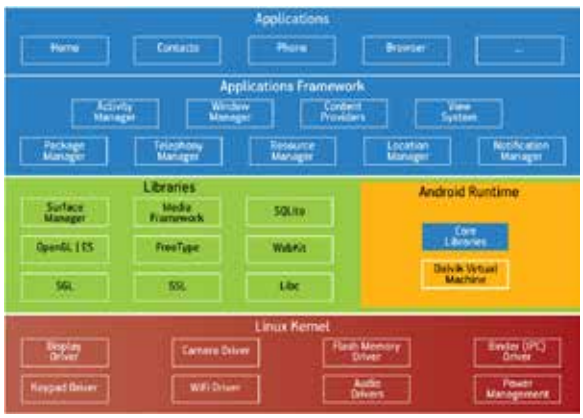


Figure 1: Android system architecture.

4. Open Source Platform

Open source software development represents a fundamentally new concept in the field of software engineering. Open source development and delivery occurs over the Internet. Developers are not confined to a geographic area. They work voluntarily on a project of their choice. As new requirements emerge, the software is enhanced by the user/developers. In this paper we show a comparative study of open source and closed source software development approaches and present a software life cycle model for open source software development.

Bruce Perens defines that Open Source is a Specification of what is permissible in a software license for that software to be referred to as Open Source. Developing done by "Anyone who contributes to the open Source project is an open source developer." such as a User of the software, a developer who develops the Software, a debugger or hobbyist who likes spending time on open source, or a promoter who funds such a Development. Eric states that developers are attracted towards open source development because that gives them an opportunity to demonstrate their ability. So they voluntarily select a project and start contributing. When programmer's, code gets accepted, it boosts their ego and they get recognized for their effort in the community, Peer recognition creates reputation and a reputation as a good programmer is a great achievement. Open source developers are involved in a variety of activities such as designing, coding, debugging and utilizing. Each activity occurs simultaneously. Parallel development and debugging is the key to open source success, users also play a vital role in the debugging Process by reporting bugs to developers or sometimes fixing it themselves. Developers are well aware that users are the best beta testers [7,8].

5. System Design for application

Figure2 shows the diagram for the overall system of medical guide and explain the relation between website and the android application software. Also, the relation between internal and external databases is explained. Two different database sources are used in the application; offline database and online database. Each database has its own function on the application. Any mobile application without database considered as static and its information is not editable. Medical guide application has its own database that can be edited by the administrator. An internal database is placed on the application which is SQLITE file. The application reads SQLITE file to get information about the content of the all branches (Doctors, Pharmacies, Hospitals, ect.). This internal database gives ability to the application to work offline which is one of the most important features of the application due to low accessibility of internet in Kurdistan Region. So the user can access the data of the application without needs for the internet.

The second database is external and the users of application can get benefits in online. The external database has many functions and they fulfill the application to become one of the most power full application.

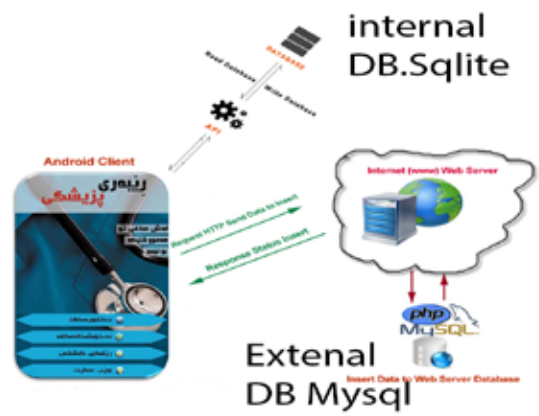


Figure 2: Overall system of Medical Guide application

The external database sends notifications and attentions for the users about any subject related to the application program. The external database sorts the name of the participants (e.g. Doctors) in the list due to rates, likes and visitors of pages, as well as records the notifications that come from the installation of the application by any device which be helpful to know the application is installed by how many devices. All the dynamic information are stored on external database that is connected with the PHP script on the server and the server is connected with MYSQL database.The external database also contains the updates about the new participants, when the devices that the application is installed on it is connected to the internet the internal database fetches the new information to the application, by this process the internal database is adjusted when the device connected to the internet.

6. System Implementing and testing

The medical guide system consists of web site and mobile application software. Both, website and mobile application are implemented and tested in real time with all the features of the system. Figure3 show the activities and pages of the mobile application. For simplicity; three levels of pages are designed and the healthy parts are classified within these three levels. Additional to the healthy parts some other pages are added like; About us, Contact us, Help, Registration, and website page. User can access the web in the Website page that is linked to the homepage of the site or within the information of any participant (e.g. a Doctor) user can access the site by clicking the site link which is linked to the page of Doctor in the website.

By clicking each main page the page content be opened, if the page contains sub groups they be appeared otherwise the list of participant of this group be showed. The diagram in figure3 is showed by English language to be understandable while the application program works in Kurdish Language.



Figure 3: Mobile application, Medical Guide Application Architecture

A- Web site Implementation

The web site is created by using PHP Scripts. The website is dynamic and its database is MYSQL. The website database is a copy of the application database addition to some extra information and subjects. The user can get same information of the application in the website, as well as its database should be daily adjustable with the application. Also, a map is interface with the website Figure4 shows the home page of the website



Figure 4: Home page of Medical Guide website

New participants of the application can send their request via a form in the website with all necessary information and GPS information as shown in figure5.



Figure5 Registration form of Medical Guide

B- Mobile Application Implementation

Android application usually created by java class code and xml language for design. The Medical Guide application is implemented using android Studio. Internal database that is offline database is implemented using SQLITE which is a standard database for android and IOS applications.

Figure6 shows the main page of the mobile application. There are three healthy groups and four other pages that support the program, additional to the page of website. The healthy page groups contain the list of most fields of healthy. Additional page can be added to the program easily. When the first group/page is opened a list of different healthy needs be opened as shown in figure7. The list contains Doctors, Pharmacies, Laboratories, dentists, x-ray centers, beauty centers, and eyes centers. Each type contains subgroups. For example the Doctors page contains all the specialist types of doctors.

When a sub-group is opened (for example Doctors, as shown in figure8) a new window is opened which contains a list of specialist doctors by clicking the button of each specialist the new list be opened that all Doctors' name are listed. The names are sorted from A to Z alphabetic for easy eye search. The last page is subscriber page; it contains the information about the subscriber (for example Doctor), contact information and detail about the specialization as shown in figure9. Also, this page contain a button of map by clicking it the map be opened and the geographical place of the subscriber is determined by detecting the longitude and latitude of the place as shown in figure 10. Also, inside the same page the user can contact with the website, by clicking the website button the application directs the user to the page of the same subscriber in the website; this is used in case the user needs for information about the subscriber. The website is the support part for the mobile application because when all information is added to the application the size of the application be huge and it be not interested. The map and website features are online features while all other features and page viewing are offline.



Figure 6: Main page of application



Figure 7: Page of Doctors in application



Figure 8: specialist list of Doctors in application



Figure 9: Page of participant Doctor in App

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Figure10: A sample of Map in app

7. Conclusion

Medical Guide can be considered as one of the most power full applications. It can be used online and offline. The offline features of the application are enough for the necessary requirements of user while the online features make the application to be unique in Kurdistan Region. Medical Guide can be used as a directory, or as first aid application and even can be a reference for getting medical information. Its internal and external databases give ability to the application to be dynamic. Also, the website of the application will be another support for the program.

Medical Guide is design in a way to be friendly and very flexible in using, also many ICONs are used to help the persons who cannot read, so everybody can use Medical Guide without facing any problem.

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