

ANDROID “INFO E-STUDENT” MOBILE APPLICATION

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Abstract: The Belgrade Metropolitan University (BMU) has a Web-application titled *eStudent*, which enables students to get information about their marks, exams, finances, etc. Also, on the other hand, on the BMU Web-site there is a News/info-section, which can be viewed by anyone interested. However, because many students want to access the BMU Web-site via their Android devices, the BMU recently decided to develop an Android application which enables Android mobile users to exploit the *eStudent* and News sections of the BMU Web-site. This paper describes that Android application, titled “Info-eStudent”, which on one hand enables the BMU students to use their Android devices to do all the operations provided by the *eStudent* Web application. And, the Info-eStudent Android application on the other hand enables anyone interested to access all the information from the News/info section of the BMU Web-site.

Keywords: Android platform, *eStudent* Web application, News/info-section

1. INTRODUCTION

Android is a mobile operating system (OS) based on the Linux (Kernel), developed initially by Android Inc., and later by Google. Android is currently the world’s most popular mobile platform. Also, since 2013, Android devices have been sold more than Windows, iOS, and MacOS devices all together. Android’s open-source nature has stimulated a large number of developers to use its open-source code in many projects [1-4].

Mobile devices are more and more popular in the area of e-Learning and LMS (Learning Management Systems). There are more and more mobile applications which are popular between online-learning students. Since Android OS is the most popular mobile platform for mobile phones and tablet computers, there is a strong trend to develop more and more Android mobile applications for online learning students [5-8].

The Belgrade Metropolitan University (BMU) has a Web application titled “*eStudent*”, which enables the BMU students via Web to get information about their marks, exams scheduling, teachers, finances, and also to do exams registration, and filling-in various questionnaires. Also, there is a News/info-section on the BMU Web-site, which provides news/information about the BMU, which can be approached via Web by anyone interested.

However, since many students and others interested want to use mobile Android devices to access the BMU Web-site, the BMU recently developed an Android application, titled “Info-eStudent”, which enables Android’s owners to use the *eStudent*-section and the News/info-section from the BMU Web-site.

This paper describes in some relevant details the features and development of Info-eStudent Android application, developed within the BMU LMS (Learning Management System). The integration of this Android application with the existing BMU LMS is also explained, and its GUI is

fully illustrated, and also some user testing-results are presented.

2. “INFO E-STUDENT” APPLICATION

The Android “Info-eStudent” mobile application consists of two parts (see Fig. 1):

- The Info-section, which is accessible to anyone interested in viewing the BMU Web-site
- and the *eStudent*-section, which is accessible only to the BMU students, after an authentication

The Info-section enables viewing news and other Web pages from the BMU Web-site. While the *eStudent*-section provides all the operations provided otherwise by nonmobile Web-application *eStudent*.

The Info-section :

this section enables presenting news as a sorted list of titles, sorted according to the date/time of appearance. The news list is shown in the ListView window. Also, any news from the list can be viewed in full (the complete text) in a separate window, and this can be achieved by a single click on any title from the news list.

The *eStudent*-section:

- Authentication, via checking a student’s username and password,
- Presenting relevant information about teachers regarding various teaching subjects,
- Financial report (presenting all the payments and financial obligations made in the selected year)
- Presenting the list of exams and relevant details for every exam
- Exam registrations
- Presenting every mark for every subject (marks for projects, assignments, etc)

There are two possible types of users of the Android “Info-eStudent” mobile application (see fig. 2): 1) a BMU student, 2) an “ordinary” user (anyone who has downloaded the Android Info-eStudent application).

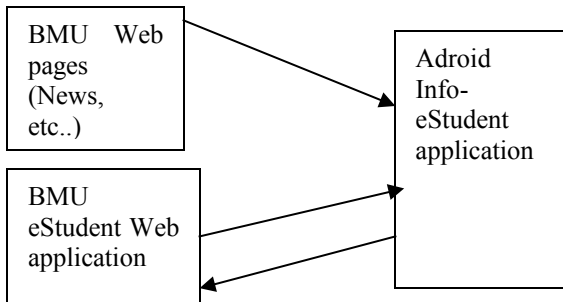


Fig. 1: Android Info-eStudent application

There are several typical scenarios of using the application. For example, the typical scenario for viewing news from the BMU Web-site: opening the Android application, choosing Info-section, viewing the news list, clicking any news from the list, viewing the selected news.

Or, the scenario for a BMU student who wants to get information from eStudent about teachers: opening the Android application, choosing eStudent-section, authenticating the student, viewing the main menu (dashboard), choosing the “Information about teachers”, viewing the list of teachers grouped against teaching subject, initiating contacting a choosed teacher via e-mail or Skype. Or, the scenario for a BMU student who wants to register an exam: opening the Android application, choosing eStudent section, the authentication, viewing the eStudent dashboard, choosing “Exam registering”, viewing the list of exams possible for registration, choosing an exam, viewing the available dates and times of the exam, registering.

Regarding the scenario for financies: after viewing the eStudent main menu, choosing “Financial report”, viewing lists of obligations and payments for the current year, choosing any other year to view its financies. In a similar fashion, the scenario for viewing the marks for any teaching subject can be performed: after viewing the eStudent dashboard, choosing “Marks report”, viewing list of teacing subjects, choosing a subject from the list, viewing all the marks for a choosen subject.

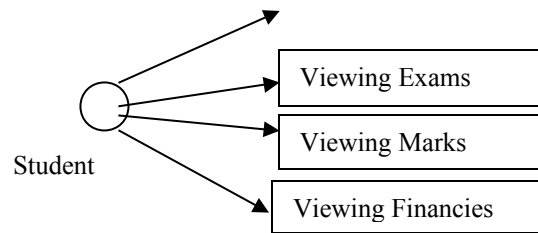
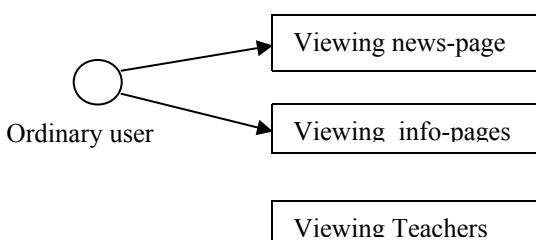


Fig- 2: Use-cases

3. DEVELOPMENT AND INTEGRATION

For using mobile devices in accessing an LMS (Learning Management System), either an open-source LMS or a commercial LMS, all major LMS offer some degree of support. This support today varies very much, from simple news/info functionality to full access to an LMS. However, there is a strong trend to dramatically increase using mobile devices in accessing LMS. Although, Android is the most popular, other mobile devices can not be ignored, eg. iOS devices.

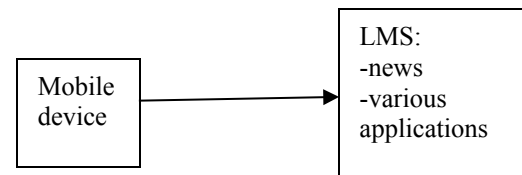


Fig. 3: Mobile device accessing LMS

Integration of the News/info section: the News/info section of the Android “Info-eStudent” mobile application communicate directly with Web-pages from the BMU Web-site (<http://www.metropolitan.edu.rs>), by using Internet as their interconnection. As illustrated in Fig. 4. Data from the BMU Web-pages are extracted by the so-called process of “parsing” the BMU Web-pages.

Integration of the eStudent section: the eStudent section can be connected with the Adroid mobile application via an additional Web-component - an interface called API (Automatic Programming Interface). API is an addition to the existing eStudent Web-application, and the API Web-component enables creating XML API data source (specialy formatted data) which can be read by the Android mobile application. API is located at the BMU Web-server.

In general, API enables developers of a mobile application (Android, iOS, ..) or an other application to connect it with a Web-application. API enables using all functions defined by API itself. API represents an open point of a Web-application towards the external world, which can be used by other applications. So, it is important to make this point safe against security risks.

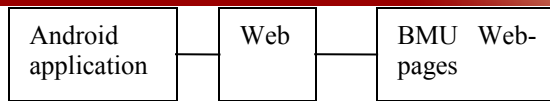


Fig.4: Integration of Android application and BMU Web-site (within the BMU LMS)

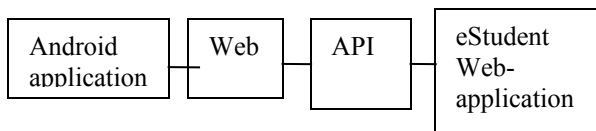


Fig. 5: Integration of Android application and eStudent Web-application (within the BMU LMS)

The “Info-eStudent” Android application was developed using Java programming language. Also, the prototyping development model was used to develop this Android application, which means that several noncomplete versions were developed before the final version. The Android application was divided in several parts, and each part was developed separately. For example, the Android application was firstly developed and tested with test data without using API, and API was developed later. Also, the Android application itself was divided into two parts, one which communicate with API and the rest of the application.

4. ANDROID PLATFORM

The Android platform is based on Java SE (Standard Edition). This enables the full capacity of the Java language to be used, ie. from the programming point of view when programming a mobile application almost everything is the same as you are programming an ordinary Java application (if you use Java SE). For example, you can use the JAR library for parsing XML. However, although the program code is identical in both cases, the virtual Java machine which uses this code is not. Instead of JVM (Java Virtual Machine) which is used in normal applications, the Android platform uses Dalvik Virtual Machine, which is designed for mobile devices.

So, the Android mobile device software includes:

- Applications
- Application Framework
- Libraries, Google Java Libraries
- Dalvik VM
- Linux 2.6x (Kernel)

Application Framework provides the basic libraries, needed for any project.

Before installing an Android application, it is required from the user to give the permission to use some functions. The programmer needs to specify all the functions which require the permission from the user. For example, it is required to give the permission to an Android application to make phone calls, approach

Internet, reads contact list, etc. From the point of view of an Android application user, during installing an Android application, a window appears, as illustrated in Fig. 6. The user can accept to give permissions and then install the application, or to refuse permissions and the installation.

For Android applications development, the standard Java integrated development environment Eclipse can be used, with the addition of ADT (Android Development Tools). ADT includes all the necessary components for development of Android applications, and enables the integration of ADT and Eclipse. During the development and testing an Android application, instead of real mobile device an emulator (software simulator) can be used instead (see Fig.7).

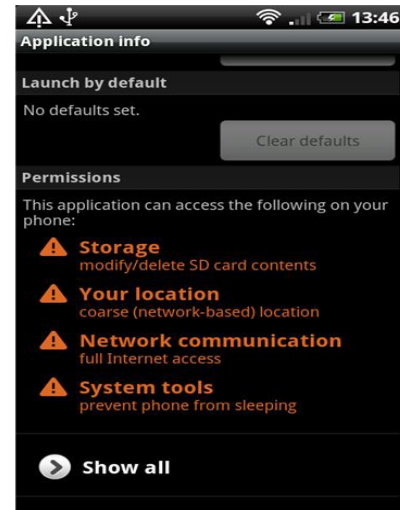


Fig. 6: Android permissions- window



Fig. 7: Android emulator

can be then contacted by e-mail or Skype. Fig. 11 shows the Marks window, and Fig.12 demonstrates choosing a teaching subject. Finally, Fig. 13 presents the Financies window.

Fig. 8: the main menu and News list



Fig. 9: eStudent menu

5. DEMONSTRATING GUI

In this section we illustrate using GUI (Graphical User Interface) of the “Info-eStudent” Android application. The main menu of the application offers two options: “News” and “eStudent”. This main menu can be obtained from any window, eg. from the News-list window, as illustrated in Fig. 8.

The main menu of the eStudent section is shown in Fig. 9, and this menu offers: Exam window, Teachers window, Marks window, Financies window. For example, Fig. 10 presents the Teachers window. As we can see, any teacher



Fig. 10: Teachers window

Fig. 11: Marks window



Fig. 12: Choosing a teaching subject



Fig. 13.: Financies window

6. TESTING RESULTS

Testing of the “Info-eStudent” Android application was performed from the customer side, and it included:

- Testing the installation of the application
- Testing GUI (resolution features)
- Testing various functionalities (options) of the application
- Testing the Skype option (contacting teachers via Skype from the Android application)

Several Android phones and tablet computers were tested in installing and using the application. Installing is simple and no problems were detected. Testing GUI was performed in order to check the resolution, ie. are the application windows well designed and visible on smaller

Android devices? It was found that the application is working well on both types of devices, Android phones and Android tablets.

After testing the installing process and the GUI resolution features, testing the various functions were performed (Teacher window functions, Financies window functions, Registering exam function, Marks window functions,..). During testing it was found that all the functions of the application are successful, and clicking various options works well, so all the links and buttons were working correctly.

Also, the Skype option of contacting teachers was tested, and it was proved that it works well, provided that the chosen teacher is online on Skype. On the other hand, the e-mail option is also working well.

May be, the most important and the most useful function of the application is viewing the marks for various exams and various elements (tests, assignments, projects, etc.). It is a very useful option, because it enables viewing the marks simply by pressing two clicks on your Android, which is much faster than using the Web browser which is necessary if not using the Android application.

7. CONCLUSION

This paper describes the Android “Info-eStudent” mobile application. On one hand, it consists of the eStudent functionality (giving information about exams, marks, teachers, finances, and enabling exam registration, contacting teachers, filling-in several feedback student questionnaires), and on the other hand, it includes the News-info section (viewing Web-pages at the BMU Web-site).

This is the first application developed at the BMU for using Android mobile devices in accessing the BMU LMS. The plan is to increase as soon as possible and as much as possible using mobile devices in accessing the BMU LMS. Not just news-functionality, or eStudent-functionality, but also other functionalities, like accessing learning materials and learning tests, are planned to be introduced soon. The experience obtained during the development and testing the Android “Info-eStudent” application will be very useful and encouraging in developing other mobile applications for the BMU LMS.

ACKNOWLEDGMENT

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