

Development of an Android-based Student Information System Application

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Abstract—Today’s smartphones have developed into advanced computer systems with enormous photo and video capabilities, larger touch-screens, ubiquitous internet access, and powerful global positional location services. There are numerous applications available nowadays that provide a wide range of services to smartphones’ users in almost every area of daily life, such as communication, news, entertainment, maps, and education. The Student Information System, or SIS, is a service at the desktop computer-level provided by institutions of higher education to the students and faculty using which the students can gain access to their transcripts, get their semester timetable, register or drop courses, find out about the courses’ final examination timetable, or get general academic information. The faculty, using SIS, can access information pertaining to the students registered in their course, get detailed information about their advisees, or audit degrees when their advisees are close to graduation. In this paper, we have described the design of an SIS application developed for Android operating system so that, instead of using a computer system, both students and faculty can gain access to the academic information on-the-go through their smartphones on which this application has been installed. Initial tests have indicated positive experience encountered by both students and faculty upon using this application and efforts are underway to develop similar application for Apple’s iOS as well.

Keywords—Smartphones; mobile; android; SIS

I. INTRODUCTION

Mobile devices are everywhere. In the United States, over three-quarters of Americans aged 43 and under use a smartphone [1]. The ownership of smartphones and internet usage continues to climb not only in the advanced countries but also in less developed and emerging economies as well [2]. The mobile phones have been used worldwide to access the Internet in record numbers and it is predicted to account for over half of all global Internet traffic by 2018. According to StatCounter, a web traffic analysis tool - internet access in Oman on mobile devices has grown to outstrip desktop access as shown in Fig. 1 [2].

This shows that people are spending more time on using mobile phones than their computers, and most of that time is spent using mobile applications. In April 2013, mobile analytics vendor Flurry released a useful summary of category of applications usage across smartphones and tablets and it shows that applications usage dominates browser internet usage, as shown in Fig. 2 [3].

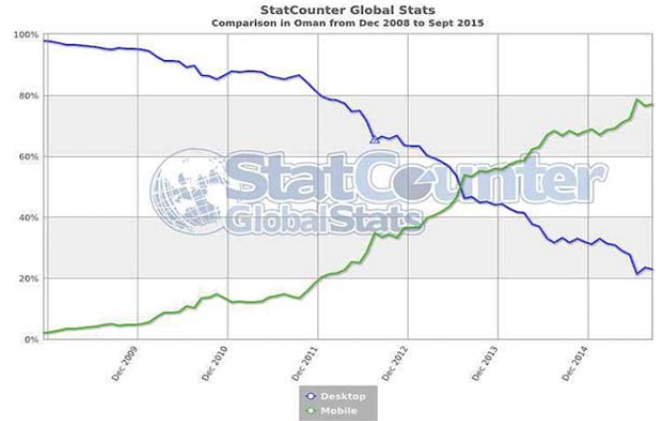


Fig. 1. Internet access in Oman from Dec 2008 – Sep 2015 [2].

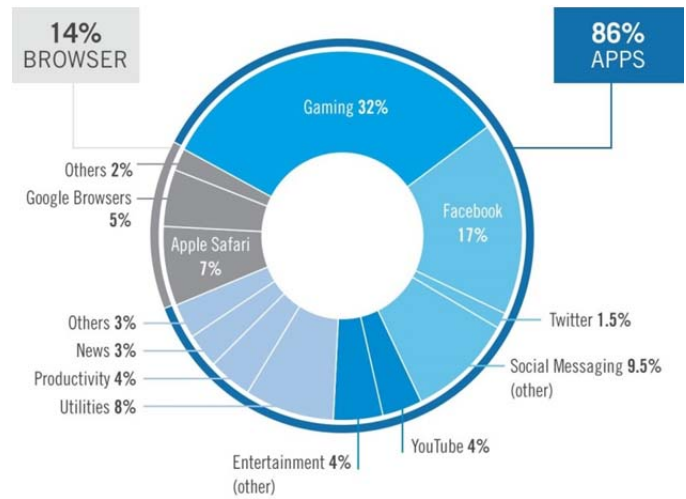


Fig. 2. Time spent on smartphones [3].

Based on this perspective, there is a need in Oman to go with this technology trend and to provide the community with different kind of services and information in the palm of their hands. Several universities in the Middle Eastern region, such King Saud University in Saudi Arabia [4], Qatar University [5], UAE University [6], and Iqra University in Palestine [7] already have Student Information System application developed for their students and it was desired that a similar application be made available to the students and faculty of Sultan Qaboos University (SQU) in Oman. With this

perspective in mind, a group of senior year students in the Department of Electrical and Computer Engineering at SQU decided to take up this initiative as their undergraduate project. The objective was to assist students to get access to their personal academic data effortlessly and spare a considerable measure of time spent upon accessing this service through desktop computers.

II. REQUIREMENTS SPECIFICATION

A. Survey

Since students are the main beneficiary of the SIS application, an online survey was conducted to determine the specifications and features of mobile phones used by the students so that application with appropriate requirements could be designed. The results of the survey helped to set the criteria that the application should meet. The data was collected from random sample of 177 students during 1st Oct 2015 to 13th Oct 2015. The responses were as follows: About 53% of the students on SQU campus use Android-based mobile phones while 45% use iOS-based iPhones. A majority of Android phones have Lollipop version installed (45%), followed by Kit Kat (29%), and Jelly Beans (26%). iPhones have mostly iOS 9 (73%) installed, followed by iOS 8 (16%) and iOS 7 (11%). Majority of mobile phones (63%) had 16 GB storage capability, while 14% mobile phones had 32 GB storage, and another 14% mobile phones had 64GB storage capability. Regarding which functionalities the students would most likely desire to be available in SQU SIS application, 41% of the respondents wanted online registration of courses, 18% wanted access to their degree plans so that they can decide about courses to register, 14% wanted to know SQU Academic Calendar, while 5-10% wanted access to courses' timetable, final exams timetable, campus maps, and links to SQU email/moodle webpages.

B. Specifications

Since Android was the dominating smartphone platform used at SQU, it was decided to write the SIS application based on this operating system (Fig. 3). Based on survey results, we decided that the application should not require more than 3MB of storage on the smartphone and it should run on Android Jelly Beans version and above. The application should be free to users with easy interface available on multiple size-screens and it should provide the following services: student personal information, online registration, final exams timetable, courses' timetable, and available courses. The application should be reliable and crash-proof.

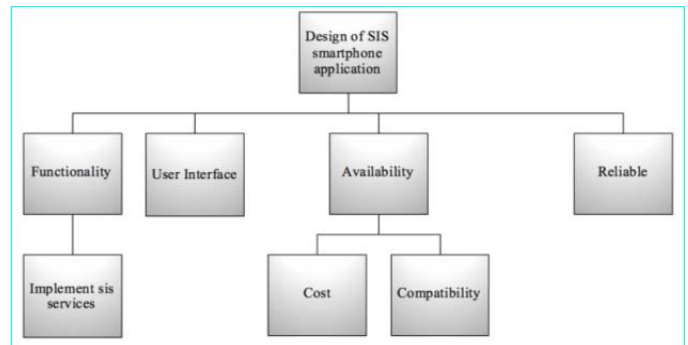


Fig. 3. Objective tree of SIS smartphone.

III. DESIGN

A. System Architecture

The architecture of our SIS application is shown in Fig. 4.

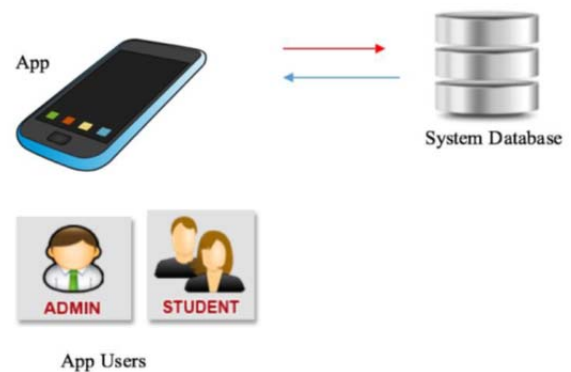


Fig. 4. App system architecture.

B. App Navigation Map

The app offers services to both admin and students. Students can view their information, add/drop courses, view their registered courses and change their passwords. On the other hand, admin can add and remove students from the system and update student's information. The App Navigation Map is shown in Fig. 5.

C. Functional Decomposition

SIS App design can be explained in more detail using block diagrams shown in Fig. 6 and 7.

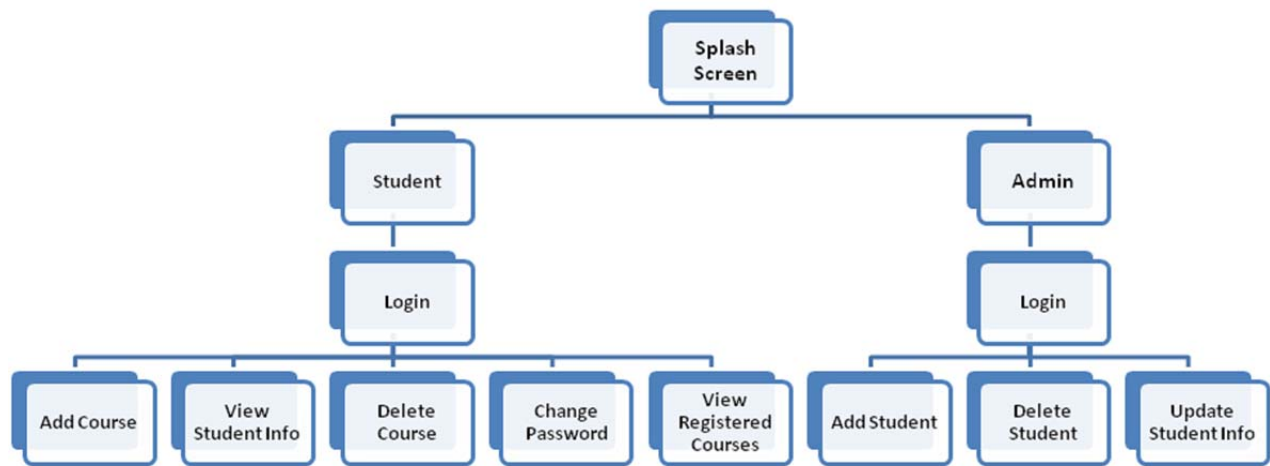


Fig. 5. App navigation map.



Fig. 6. Level 0 Block Diagram of the App.

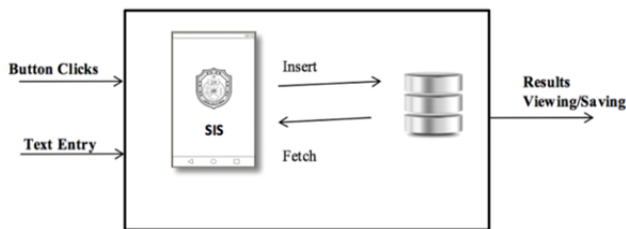


Fig. 7. Level 1 Block Diagram of the App.

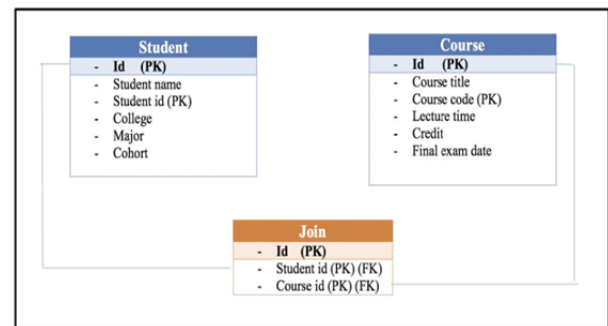


Fig. 9. ER scheme of the database.

IV. IMPLEMENTATION AND TESTING

During implementation phase, each screen in the app was tested to check if it met the requirements.

A. Setting up the Development Environment

There are many integrated development environments (IDEs) used to develop Android apps. However, Android Studio is the official IDE for android app from Google. It is considered as the fastest tools for building apps on every type of Android device so it was used to design our application.

B. Database

A local SQLite database was implemented which included students and courses tables. SQLite databases are implemented by creating a database handler class that extends from SQLiteOpenHelper class essential methods to perform CRUD operations. Besides that, a join table was implemented to connect the student and staff tables.

If a user logged in with correct username and password, the access is permitted, and both admin and student will be directed to their respective home screens where they can perform many functions. However, in case of unmatched password or empty file, an error message will be generated.

D. Database Design

The SQU SIS website stores student's data records in Oracle database server. However, because of security issues and privacy policy, SQU did not allow the students working on this project to access their database. Therefore, we had to build our own database and SQLite was used to implement the database design. It is a very light-weight database which comes with Android OS. The entities of SIS app are student and courses. Each entity has a primary key which is a unique attribute and cannot be null. Also, it has a foreign key which is a primary key in another table to make a relation between the two tables. The ER diagram and scheme of the database are shown in Fig. 8 and 9, respectively.

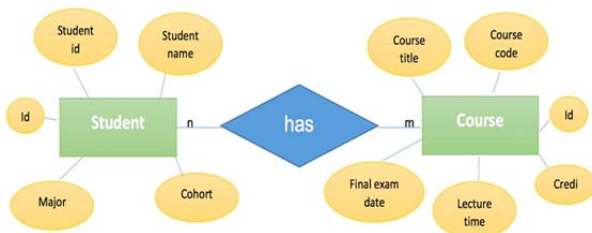


Fig. 8. ER diagram,

C. Compatibility Testing

Compatibility testing was completed by carrying out the same tasks on different Android devices, and the results are shown in Table 1.

TABLE I. COMPATIBILITY TEST

Task	Samsung Galaxy Nexus GT- I9250 4.2.2	Samsung Galaxy Nexus SPH-L700 4.3	NVIDIA Shield Tablet 6.0
Admin login	Pass	Pass	Pass
admin functions	Pass	Pass	Pass
Student login	Pass	Pass	Pass
Student functions	Pass	Pass	Pass
UI elements fit	Pass	Pass	Partially , student and admin picture were shifted to the right it should be centered

D. User Acceptance Test

A group of 5 users were given the app to test if it meets the following criteria: Functionality, user interface, compatibility and reliability. The users were asked to give each criteria a degree from acceptable to excellent, and the results are given in Fig. 10.

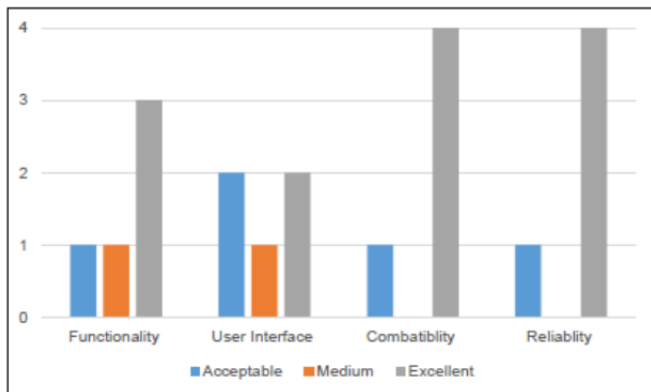


Fig. 10. Results of user acceptance test.

V. CONCLUSION AND FUTURE WORK

In this paper, the design and implementation of SIS smartphone application has been presented. The application aims to map the services currently existing in SQU-SIS website into a smartphone application. Therefore, a survey was first conducted to determine most used operating system by SQU students. In addition, students were asked about the desired services to be implemented in the app. It was found that 53% of SQU student owned android devices and want online registration service to be the main function of the app. Therefore, our app provides courses registration, final exams timetable, and listing of registered courses for the student. Also, it allows administrators to add/delete students and update their information. As for future work, we intend to develop the app for running under other operating systems, like iOS and Windows.

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REFERENCES

- [1] <http://gomobile.tamu.edu/why-go-mobile>.
- [2] <http://www.pewglobal.org/2016/02/22/smartphone-ownership-and-internet-usage-continues-to-climb-in-emerging-economies/>.
- [3] <http://www.smartinsights.com/mobile-marketing/mobile-marketing-analytics/mobile-marketing-statistics>.
- [4] <https://play.google.com/store/apps/details?id=edu.ksu.StudentMobile>.
- [5] <https://play.google.com/store/apps/details?id=qa.edu.qu.m>.
- [6] <https://play.google.com/store/apps/details?id=com.UAEUAPPS>.
- [7] <https://play.google.com/store/apps/details?id=edu.iugaza.ps.studentportal>.