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EXAMWIZ: A DEVELOPMENT AND IMPLEMENTATION OF AN ANDROID BASED EXAMINTION

R. Rifin[1,*], T. E. Fang[2], A. F. Z. Abidin[3], A. Adam[5], M. A. Majid[1], A. Zainuddin[1], S. H. Mohammad[2], M. H. Harun[4] and Z. I. Rizman[6]

[1]Faculty of Electrical Engineering, Universiti Teknologi MARA, Johor Branch, Pasir Gudang Campus, Johor, Malaysia

[2]School of Science and Technology, Wawasan Open University, Malaysia

[3]Faculty of Engineering Technology, Universiti Teknikal Malaysia Melaka, Malaysia

[4]Faculty of Electrical Engineering, Universiti Teknikal Malaysia Melaka, Malaysia

[5]Faculty of Manufacturing, Universiti Malaysia Pahang, Malaysia

[6]Faculty of Electrical Engineering, Universiti Teknologi MARA, 23000 Dungun, Terengganu, Malaysia

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ABSTRACT

The development pace of smartphone has been phenomenal in the past decade. Although the information technology and mobile technology have been developing rapidly, the examinations in a lot of schools, institutions and universities are still very conventional. The conventional exam method has brought more problems to the educational institutions in terms of building exam questions, marking and waste of papers. To overcome and solve the issues which the institutions are facing, the “ExamWiz” mobile app is designed to ease the painful of exam process.

Author Correspondence, e-mail: rozir7625@johor.uitm.edu.my

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The exam mobile app allows students to attempt the exam using their own smartphone, to check the past results and to view their academic records. The mobile app is integrated with server application with a set of web services. It is the exam server that allows instructor to create questions, setup exam and view exam results.

Keywords: examination; learning management system; mobile-based examination.

1. INTRODUCTION

Software especially developed for mobile phones has been around for well over a decade and before the term application (App) store was popularized. “Education” or “Book” is one of the major categories in Android or Apple App Store. Electronic books or quizzes save people of the hassle of printing, storing and carrying the reading materials. Electronic exam systems were developed in some institution to replace the traditional paper exam. However, a computer is required before the students can access the electronic exam systems. Although this approach reduces the paper usage, it increases the operational cost that need to be invested in computers and networking facilities. As many students now has their own smartphone, this project try to utilize the trend by building an exam mobile application that could help the educational institution to reduce the paper usage and the investment cost on hardware.

Mobile-based examination is not something new. Several literatures on mobile-based examination can be trace back in year 2007. In [1] developed M-Quiz mobile for multiple-choices quiz by using Short Message Service (SMS).

In 2011, in [2] proposed an architecture for database management for mobile exam system. The mobile exam system is a client-server application that could integrate with mobile devices, allowing students to use the mobile based application and sit for an exam simultaneously.

At the same year, in [3] also proposed the mobile examination system which is derived from online examination system which uses PC for exam. To prevent cheat, the geographical location of the student and the time that the student took the quiz will be sent to the instructor as an image for verification purpose. The students are involved in the cheat if they are at near location and their exam time and answers are similar.

In [4] seized the rapid growth of the use of Android-based smartphone by designing and implementing of an E-exam system dedicated for the platform. The mobile exam system is a client-server application that could integrate with mobile devices, allowing students to use the mobile based application and sit for an exam simultaneously.

In [5] proposed the development of an internet-based exam system for mobile environment in year 2013. It provides two modules which are web module and mobile module, allowing students to access the system for taking an exam. The online exam system is hosted in a server and only allows students to access through internet connection. For mobile users, their mobile device needs to have Wi-Fi and web browser in order to access to the system.

Despite of the rapid development in information technology in recent years, many of the schools, colleges and universities are still using the traditional method in their exam process. The traditional exam process is the process that most of the people should have experienced during their school times. The entire processes including: create the exam questions, generate the question papers and answer sheets, create admits card which act as a permit to enter the exam venue, mark the answer sheets and generate the reports for the exam results. All these are very tedious works and it is a waste of recourses. The instructors need to spend a lot of times in creating exam questions and marking all the exam papers one by one, where the school need to spend money on generating the exam papers and all the necessary materials. By implementing the mobile technology, it can simplify the current exam processes, save a lot of times and resources.

In the exam mobile application, besides exam, it also allows students to check their current or past exam results. Students are allowed to download the exam questions and access the exam session by providing a valid key code that was generated by the instructor. The timers will be activated when the exam session started. Students will be allowed to made changes on the previous answered questioned or skip to the next question during the exam session. The application shall prompt warning message to students at the submission, if there is any unanswered questions. During the exam session, students should not switch to other mobile applications or the exam session will be automatically terminated once it is detected.

2. METHODOLOGY

The ExamWiz project development is using Scrum methodology, which is an agile software development framework. This approach can work for small or complex project, while it also provides the flexibility and simplicity that can reduce the development time and cost [6]. Fig. 1 shown the architecture layout design of the ExamWiz client and server applications. Students or the examinees will install the ExamWiz mobile application in order to attempt for the exam. The exam questions will be downloaded into their smartphone from the server by using the Wi-Fi or mobile broadband. The server hosted in the cloud which is running on Linux platform. The server also provides a webpage module which allows the instructor to create exam questions and setup the exam.

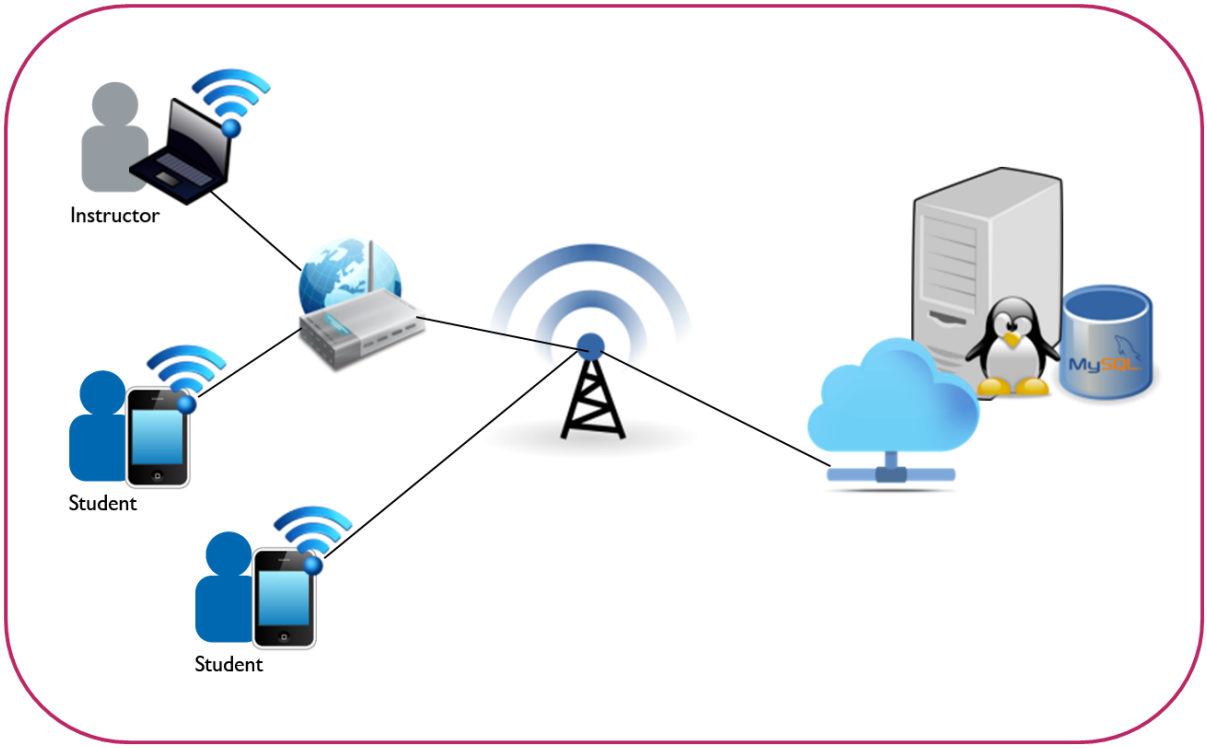


Fig.1. Architecture design layout

Fig. 2 and Fig. 3 illustrates the architecture layers of the ExamWiz mobile application and server application. Fig. 4 shows the entity relationship diagram of ExamWiz, while Fig. 5 shows ExamWiz user case diagram.

The presentation layer is the user interface components that the users will be interacted with. This layer will render the data and display in front of users and also accept the input from the users. The user input data will also be validated in this layer.

Business layer contains the core functionalities and the business logics of the applications. This layer will collect the data from the presentation layer and will be processed with a set of implemented business logics and business workflows. The data that required to access or store into the database will be passed to the data layer.

The components in data layer provide the access to database, it also centralizes the data access that makes the applications easier to configure and maintain. The web services component hosted a set of web services in the server, allowing the mobile application to communicate with the server by sending the request and receiving the response from the server. When the request is sent to the server, it is the business layer in the server will handle the request and also provide the response back to the caller.

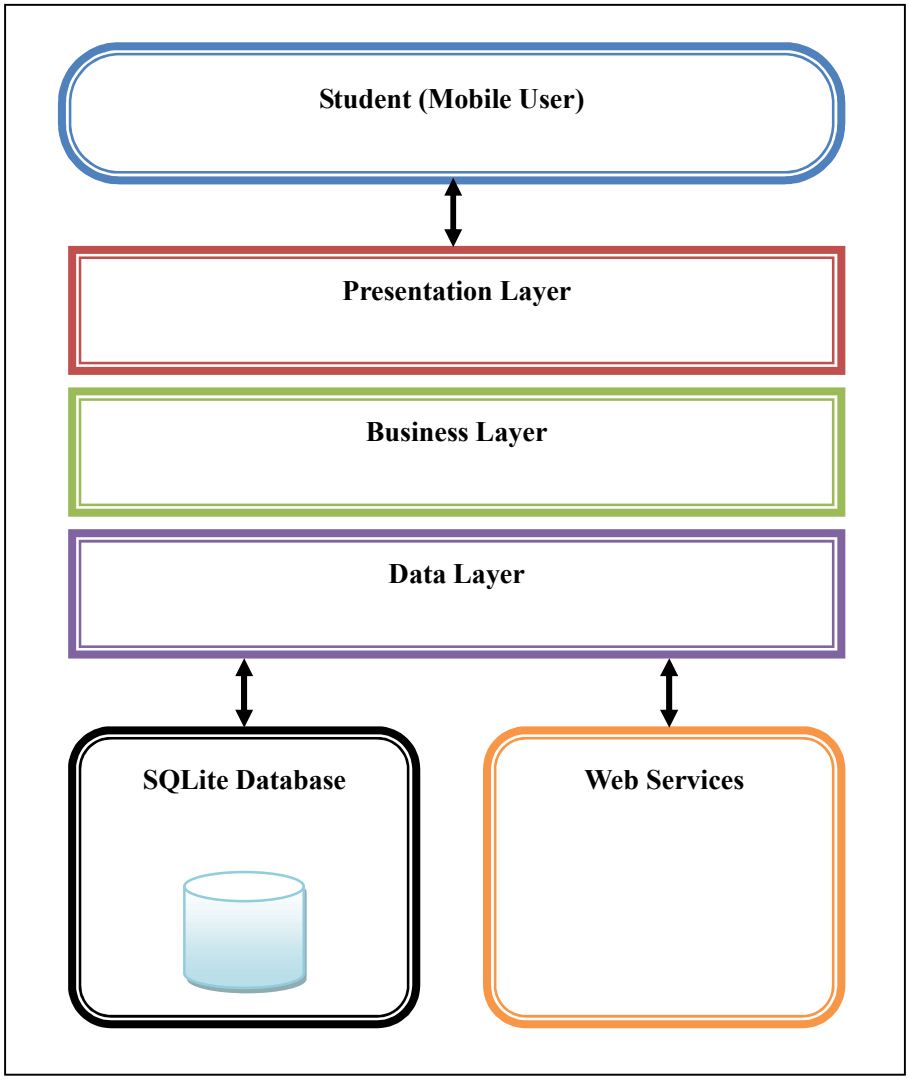


Fig.1. Mobile application architecture layers

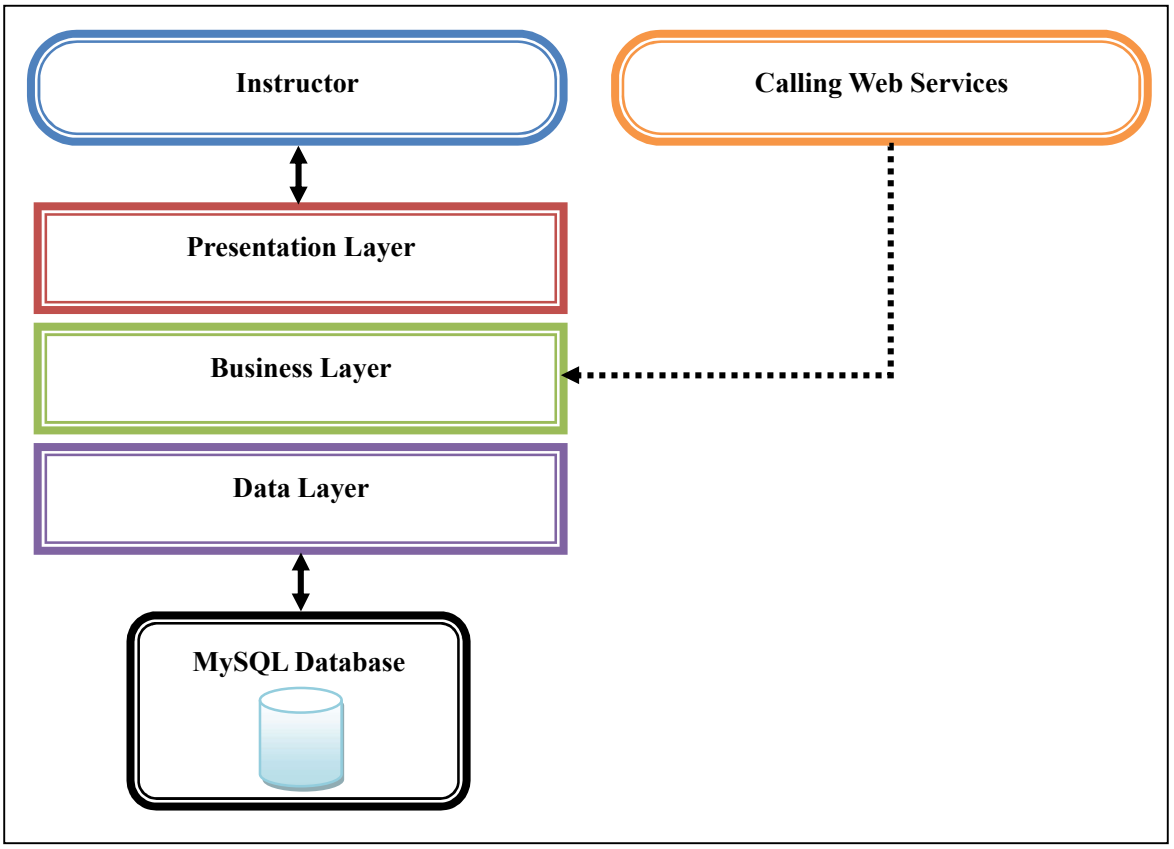


Fig. Erreur ! Il n'y a pas de texte répondant à ce style dans ce document.. Server application architecture layers

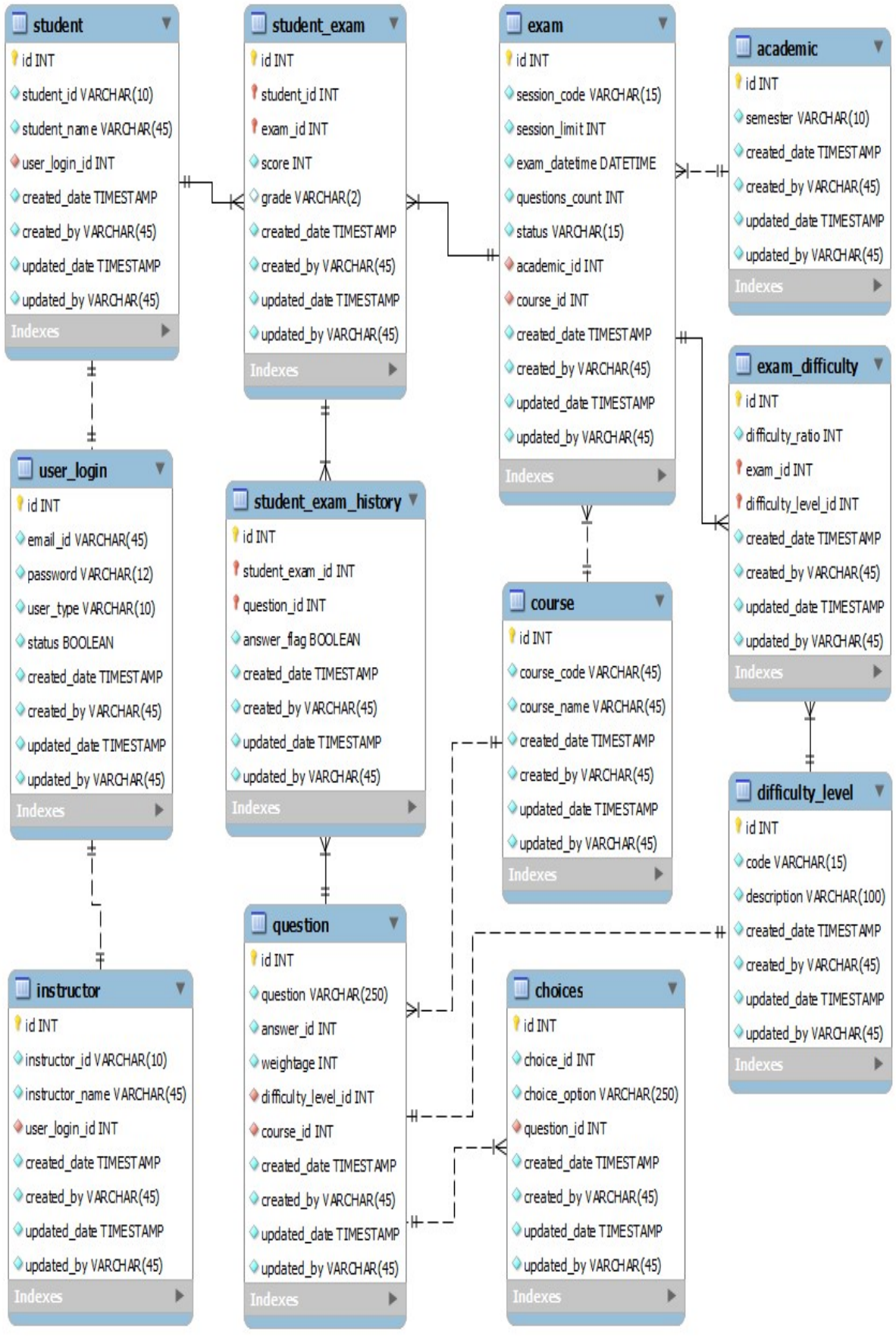


Fig.4. Entity relationship diagram

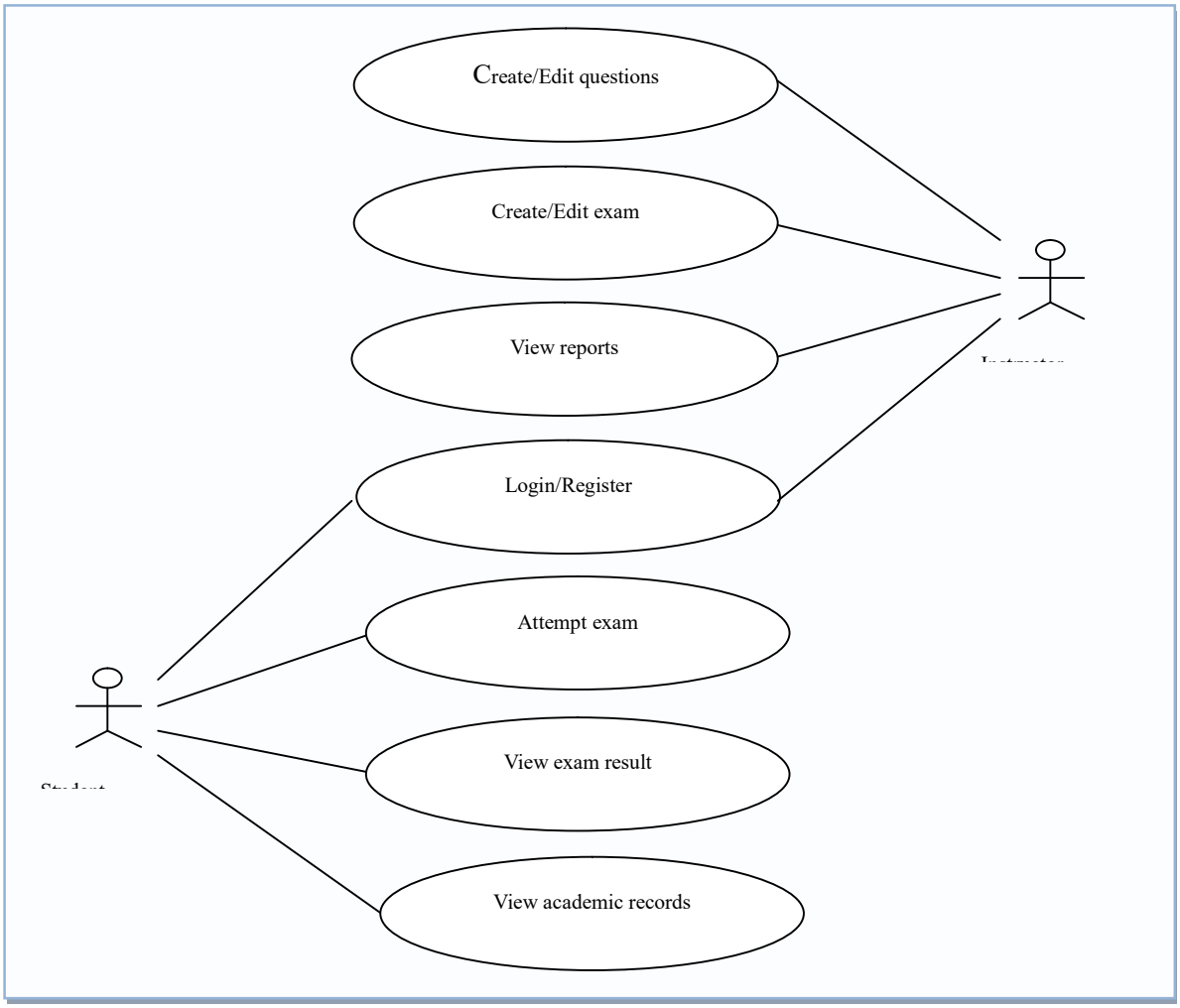


Fig.5. ExamWiz use case diagram

3. RESULTS AND DISCUSSION

The ExamWiz server application is developed using Java programming language with Eclipse IDE 3.7. The Eclipse is integrated with Tomcat 7 application server that allows launching the application server from Eclipse for debugging. The web services are hosted in the Tomcat server and were developed by using the RESTful web services API - Jersey 2.1 in Java. All the interactions between ExamWiz server and mobile application are through the web services.

The ExamWiz mobile application is developed using Android (Java) with the latest web technologies such as HTML5, CSS3 and JavaScript. The core features of the mobile application were developed using the web technologies and the coding was written in Sublime Text editor. Thanks to PhoneGap, it allows the cross platform web technologies to use in the

mobile application development which also simplify the project scope and minimize the project timeline when needs to port over to other platforms.

The ExamWiz mobile application is deployed into the Samsung Galaxy S4 Smartphone through the Developer Options' USB debugging mode in the phone's settings. By launching the ExamWiz project from Eclipse development tool, the application will be installed into the smartphone. The debugging and testing have been done by using the smartphone directly. Although Android does provide an emulator that allowing the developers to debug and test from desktop computer, but it is a known issue that the performance of using the emulator is too slow.

The ExamWiz application server and database are deployed into the Amazon Elastic Compute Cloud (EC2) through File Transfer Protocol (FTP). The Amazon EC2 is a web service that provides the resizable capacity in the cloud. The application server is running on the Amazon Linux AMI instance, it also hosted a set of web services that acts as the communication bridge between ExamWiz mobile applications. Once the ExamWiz mobile application has been loaded into the phone, the ExamWiz app icon will be created and can be found in the phone. Touch the app icon to launch the ExamWiz application.

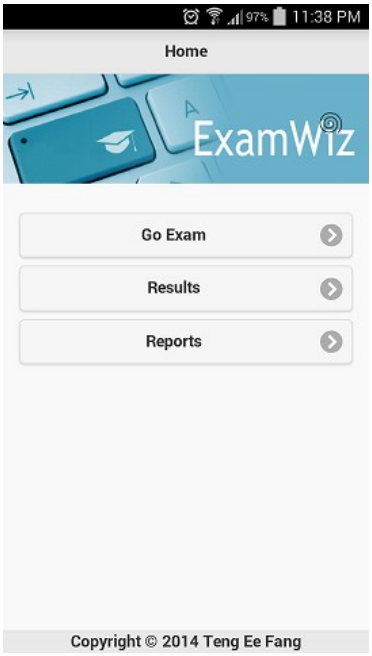
After launched the ExamWiz application, the home page will be displayed which contains the navigation menus for the modules (see Fig. 6(a)). Clicked on the "Go Exam" menu from home page will link to the "Go Exam" page as shown in Fig. 6(b), it will require the student to enter the designated exam code in order to attempt for the exam.

Fig. 6(c) had shown the ongoing exam session after submitted the exam code. A designated countdown timer will start to tick until it finished, the exam will then be submitted automatically. The top-right button allow student to submit the exam manually, if they finished it earlier. Student can click "Back" or "Next" button to navigate in between the questions. They can also place a flag on the question by checking on the "Flag" checkbox which they would like to revisit later on. By clicking on the "Flagged" button, it will auto navigate to the flagged questions. If student has skipped questions in between, they can use the "Unanswered" button will auto navigate to the questions that have not been unanswered.

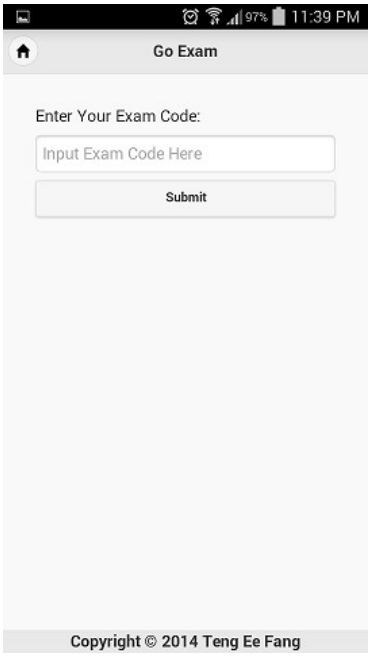
Fig. 6(d) is the confirmation prompt after student clicked on the top-right button to submit the exam manually. Click on "Submit" to confirm the submission or "Cancel" to remain in the

exam session. Once the exam is submitted, the application will auto calculate the result and display the score and grade of the exam (see Fig. 6(e)). Click on "X" button will navigate back to the home page. Fig. 6(f) is the module that allows student to view their past exam results by selecting the intake year and exam course.

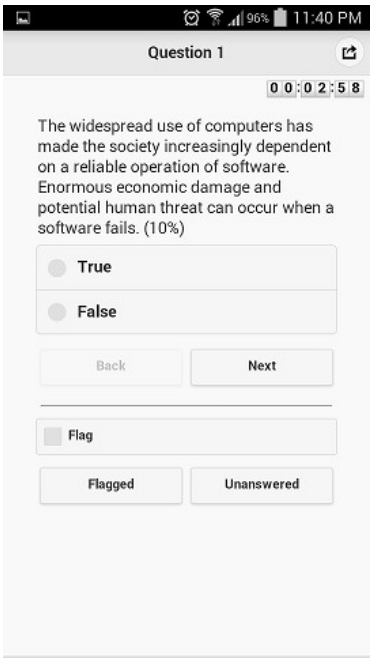
ExamWiz also has a feature of a report module that allows student to view their academic record in all semesters. The academic record shows the accumulated exam results and grades in all semester.



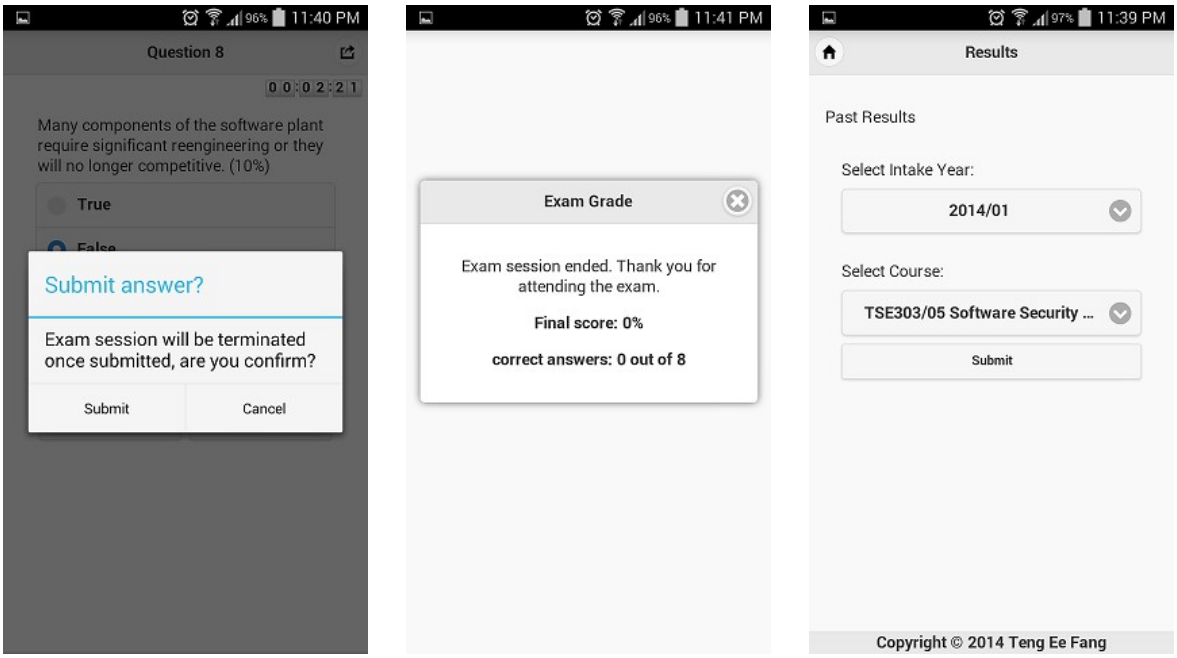
(a)



(b)



(c)



(d) (e) (f)

Fig.6. Exam Wiz app icon on the phone

4. CONCLUSION

This paper presented the development and implementation of a mobile-based examination called Exam Wiz. It is designed to make examination processes such as examination questions creation and marking process are implemented easily and systematically. Furthermore, ExamWiz application is allowing students to answer the exam questions, checking the current and the past examination results and views their academic records via smartphone, make the system is convenient to use as well as eliminating the paper usage.

5. ACKNOWLEDGEMENTS

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