EXAM PAPER GENERATOR FOR MULTI-PLATFORM MOBILE APPLICATION OPTIMIZED BY CLOUD-BASED WEB SERVICE COMPOSITION

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ABSTRACT. It has been a common practice to prepare final exam papers using Word processing software in most of the academic institution. The organization of the paper is always an issue for new academician or even experience ones. In this paper, we proposed a complete exam paper generator using multi-platform mobile application. We aim to utilize cloud-based web service composition for multi-platform mobile application. Due to the cost of mobile development and cost of developers are significantly increasing, we propose to implement web service technologies to increase reusability and reduce development effort during maintenance process. This can be achieved by deployment of web service composition where we can centralize the core functions of development and reduce the total development effort.

Keywords: web service composition, exam paper generator, web services

INTRODUCTION

Exam paper preparation is common practice which being used across all academic institution. The process starts from receiving the subject to be taught, followed by analysis of learning outcomes and finally to pen down the question in paper. The common method which is used across all universities preparing exam paper is by using Microsoft Word (Quick Links Menus, [Retrieved 2016]). Although the time should be used fully utilized to create exam questions which meet the Learning Outcomes, but academician tend to not fully utilized to create the questions but wasted on formatting the paper for header, footer and alignment. Besides, it poses significant challenges to the lectures in seeking idea on creating examination questions. Using a word processor software to develop the question lead to limitation of mobility to do their questions. Most of the time the academicians are stick to their machines at their workplace or laptop which provide slightly more mobility.

In this paper, we have introduced a system where exam paper will be created using mobile application and academician will not worry about any formation issues as it will be auto generated. With this implementation, we can give academician a full focus on Learning Outcomes and designing good quality questions. Furthermore, using mobile application for exam paper provides the time freedom and mobility during preparing exam paper. The design of the mobile application empowered by web service composition reduce the resource load usage in mobile application. As a final product, the exam paper will be generated in a Professional Document Format (PDF).

The rest of the paper is organized as follows. Related work discusses about related work done the current technology or methods being used for exam paper preparation. Followed by the presentation of the proposed system architecture. Then, the implementation plan and the test completed for this system. Finally, the conclusion with the summary and the future work.

RELATED WORK

Based on article by (Cen, Guang, Dong, Gao, Yu, See, Wang, Yang, and Jiang, 2010), the system composing examination papers was successfully developed. It shows the vast growth of computer, network, and information technology being accepted in numerous accomplishments. For example, the paper discussed on the implementation of automatic examination paper based on browser as the user interface. This article implemented JSP to design and Microsoft Word for editing the questions. It has been identified that the article only discussed for a desktop web-based system. Moreover, the use of Microsoft Word as interface for editing is doubted for a high security, stability and reliability characteristic. The file which has been save in ".doc" format can be edited. Such a system normally establishes a knowledge based and reasoning mechanism to guarantee a high possibility of success and quality of examination papers. However, the flexibility and maintenance of the examination papers produced need to be improved (Shuang Hou, 2013). In general, users may have requirements as regards quality of examination papers, including the number of topics, average degree of difficulty, proportion of each type of questions and some key sections and knowledge points (Cen et al, 2010). Traditional methods used by the lecturer in Linton University College to prepare examination questions using general word processing software such as Microsoft Word. The amount of questions required and formats depends on different programmes offered. Most of the questions are based on subjective format.

Based on the survey and the literature from others as presented above, the use of word processing software to generate exam paper is insecure and less efficient as the author or the academician is responsible for the formatting the paper. The time taken to complete the paper needs to be portion for formatting and keeping the document secure from the reach of any unauthorized hand. Based on these issues, in the next section we are proposing a solution to improve security and mobility in preparing exam paper.

SYSTEM ARCHITECTURE

In our architecture, we are proposing to use web service composition as part of technology as web services received great attention from the research community. Web services are network reachable interface to application programs. It is developed using the standard Internet technologies. Web services are also self-describing software applications that can be advertised, located, and used across the Internet using a set of standards such as SOAP, WSDL, and UDDI (Liu, Ngu and Zeng, 2004). As powerful the web service is, the system is made more efficient and powerful by implementing web service composition. Web service composition is the process of putting more than 1 web service and other algorithms under a single flow which allows parallel programming too (Ramasamy, Chua, & Haw, 2015).
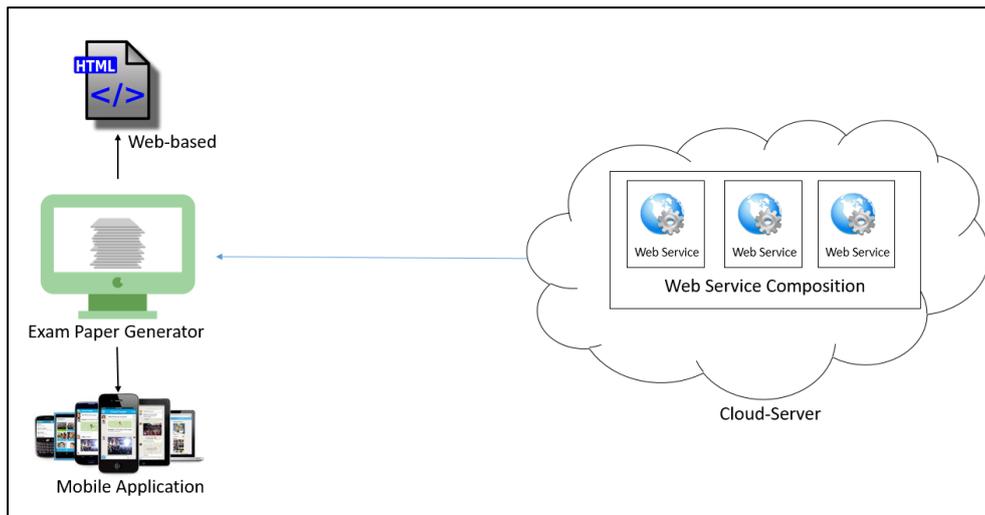
Figure 1. Conceptual Diagram for Cloud-based Web Service Composition Implementation for Exam Paper Generator.

Figure 1 shows the overall conceptual diagram of our implementation. We use mobile application as the user interface and the processes are placed in cloud-server. The processes are completed using web services. We have designed our flow of the system using Windows Workflow as the web service composition method as shown in Figure 2. The sendSMS web service was taken from one of the public repository to be used in this system. This is to reduce the development effort and cut the cost of the hardware.
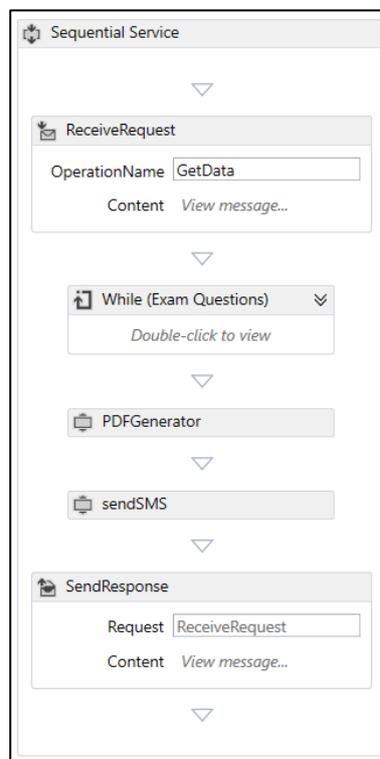

Figure 2. Exam Paper Generator Workflow.

Using windows workflow, we can compose a few web services together and publish the overall flow as single web service. This enable us to reduce the development effort in every platform. In each mobile and web platform which we have developed, only the UI to insert and view the final paper. Other than UI, all the processes such as create PDF, insert record to database and others are done using web service in our cloud environment. The web service uses the cloud processing resources to process the request from the client device. This indirectly reduces the resources used in mobile device.

Technically, lecturers will use the responsive user interface to generate questions. The interface provided follow specific formats that have been set following different programmes offered and different colleges. The layout of the responsive user interface is different for every platform but the contents and procedure are the same. Lecturers may create a single questions and keep saving the document anytime. The algorithm of the system will calculate total numbers of question that has been saved and will produce the final result in the end. The examination question format will be printed in PDF document. User will be able to view the PDF file by using any platforms available.

IMPLEMENTATION AND DISCUSSION

As discussed earlier this implementation was done in different platform without compromising the platform features. To test the architecture, we have developed the system in three different platforms which are iOS, Windows Mobile and the mobile browser view.
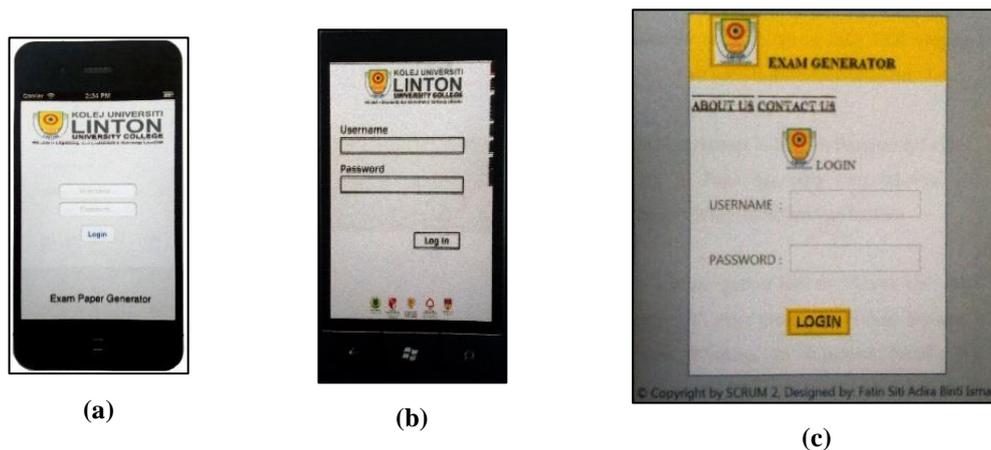

(a)

(b)

(c)

Figure 3. Exam Paper Generator Mobile.

Figure 3 (a) illustrates an exam paper generator for iOS platform. Meanwhile, Figure 3 (b) illustrates an exam paper generator for windows mobile platform. The user interface represents a simple layout for user to touch the field and fill in the form. Figure 3 (c) illustrates an exam paper generator for mobile browser. The examination paper generator for mobile browser works for all mobile platforms with touch screen form factor.

Testing and Validation

A user application testing and structural testing has been done for exam paper generator using mobile browser platform among the selected lecturers in Linton University College. The objective is to generate the examination template within the specified format into pdf file and revert the data collected. Results presented that the data successfully generated into pdf file following different formats as shown in Figure 4.
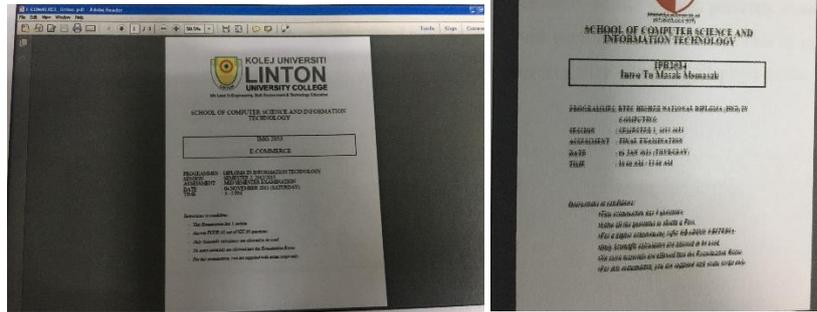
Figure 4. Exam Paper which has been Generated into PDF File Using Mobile Browser Platform.

Besides functionality test, we also conducted user acceptance test as shown in Figure 5. The flow of user acceptance test being done.
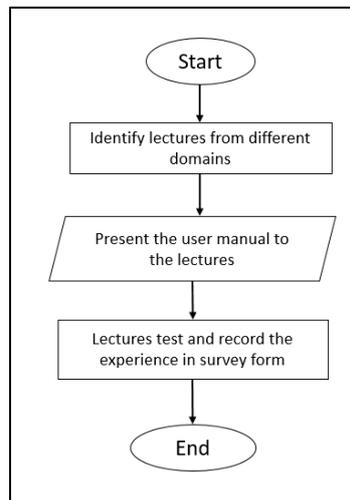

Figure 5. User acceptance Process

Referring to Figure 5, we have started to our user acceptance test by identifying lecturers from various domain to ensure types of questions which are different. Followed by presentation or explanation on how to use the system to the selected lecturers. Finally, we provide the lecturers with a questionnaire to be filled up to express the look and feel while using the system. As the result of user acceptance test, the lecturers generally like the idea of preparing the exam paper using the system.

CONCLUSION

This paper have discussed on the implementation of cloud-based web service composition for exam paper generator system. The main objective of this paper is to implement an exam paper generator that can be accessed through any mobile platform. By using the proposed solution, we can improve the examination preparation and reduce formatting effort using traditional word processing software. Besides, we have also saved the mobile resources as the

implementation are all done in cloud environment. By implementing the exam preparation through mobile platform, we can provide mobility to the lecturers to prepare the exam papers.

For future work, we would like to improve further this system with multi agent system which works in between the system to send reminder and reward the lecturers for preparing exams on time or before the due date. This will help the Examination Unit to monitor the preparation of exam paper.

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