SECURE STUDENT REPRESENTATIVE COUNCIL VOTING SYSTEM USING CRYPTOGRAPHIC MECHANISMS

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This report is submitted in partial fulfillment of the requirement for the Bachelor of Computer Science (Computer Networking)

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2014

DECLARATION

I hereby declare this project report entitled

SECURE STUDENT REPRESENTATIVE COUNCIL VOTING SYSTEM USING CRYPTOGRAPHIC MECHANISMS

is written by me and is my own effort and that no part has been plagiarized without citations.

STUDENT :______________________________ Date:_____________

(WONG LAM SHEN)

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(DR. SHEKH FAISAL ABDUL LATIP)

DEDICATION

To my beloved parents, my whole family, my supportive supervisors, Dr. Shekh Faisal Abdul Latip, my evaluator, PM Dr. Rabiah Ahmad and all my understandable friends, thank you for the support and guidance given throughout the completion of my PSM.

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ABSTRACT

The project that had been developed is going to be concerning about the voting system of UTeM student representative election. The project will be known as the Electronic Voting System. This report contains the introduction, methodology, analysis, design, implementation, testing, and project conclusion of the project. The project methodology, used is Rapid Application Development model (RAD). The problem statement of this project is difficult to avoid the appearance of the ghost voters during the election time and the information of ballots and voters are easily exposed because the current voting system is not secure. This electronic voting system is going to be online using Internet and can be access by all UTeM students. This system is developed by using HTML and PHP as the programming language and Wamp server as the database. To develop the system, designs had been made that covers the system architecture, user interfaces and database design. This project offers the voters to cast easily through internet. The database also makes the ballots counting become faster, easily and accurately.

ABSTRAK

Projek yang telah yang akan dibuatkan berkaitan tentang sistem pilihan raya wakil pelajar UTeM. Projek ini akan dikenali sebagai Sistem Pengundian Elektronik. Laporan ini mengandungi pengenalan, metodologi, analisis, reka bentuk, pelaksanaan, pengujian, dan kesimpulan projek. Metodologi projek, yang digunakan ialah model Rapid Pembangunan Aplikasi (RAD). Pernyataan masalah projek ini adalah sukar untuk mengelakkan kemunculan pengundi hantu semasa pilihan raya dan maklumat undi dan pengundi mudah terdedah kerana sistem pengundian semasa tidak selamat. Sistem pengundian elektronik akan menggunakan kemudahan Internet dan boleh diakses oleh semua pelajar UTeM. Sistem ini dibangunkan dengan menggunakan HTML dan PHP sebagai bahasa pengaturcaraan dan Wamp server sebagai pangkalan data. Reka bentuk telah dibuat untuk membangunkan system yang merangkumi seni bina sistem, antara muka pengguna dan reka bentuk pangkalan data. Projek ini menawarkan pengundi untuk mengundi dengan mudah melalui internet. Pangkalan data ini juga membuat undi menerusi pengiraan menjadi lebih cepat, mudah dan tepat.

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INTRODUCTION

1.1 Project Background

The word "vote" means to choose from a list, to elect or to determine the ideal candidate based on the voter judgement. The main goal of voting is to come out with leaders of the voter's choice. Some of the problems that involved are needed to queue up for a long time, insecure or inaccessible polling stations, problems of counting ballot and also inexperienced personnel. This electronic voting system is used to overcome these problems. It should be noted that with this system in the place, the users will be given enough time during the voting period and the voters can vote from anywhere and anytime. Electronic voting system can make our modern social life more efficient, simple and convenient.

Electronic voting technology is including punched cards, optical scan voting systems and specialized voting station. It can also involve transmission of ballots and votes via telephones, private computer networks or the internet. A secure electronic voting system must meet the security requirements which are authentication, authorization, accountability, confidentiality and data integrity.

In this project, a secure student representative council voting system will be designed and created using cryptographic mechanisms to protect and enhance the current manual voting system.

1.2 Problem Statement

The election of UTeM Student Representative Council will be held every year and there are thirty positions in UTeM Student Representative Council in year 2014. UTeM have three campus which are main campus, technology campus and city campus. The student representatives are chosen from seven faculties which located in these three campuses. When the election of Student Representative Council starts, the staff from computer centre needs to set up the voting station in each faculty and this will waste the man power and time due to the geographic location of UTeM. Besides that, the security of the current voting system is not very secure from some security metrics. The problem statement of this project is difficult to avoid the appearance of the ghost voters during the election time and the information of ballots and voters are easily exposed because the current voting system is not secure.

Research Questions:

i) What is the method used to avoid ghost voters?

ii) How to protect the information of the ballots and voters?

iii) How to make the system become more secure?

1.3 Objective

The purpose of this project is to develop an electronic voting system to help and enhance the election of the student representative council. This system will give a systematic and comfortable to the user who is involved in the voting or election. The objective of this system is as follow:

i) To avoid ghost voters through the use of digital signature.

ii) To enhance voters' privacy through the use of encryption.

iii) To enhance the integrity of ballots and voters' information.

1.4 Scope

There are three types of scope in this electronic voting system which is the scope of the end user, the scope of the system and the scope of the system security.

i) End user

- An end user is the person who uses the software or hardware after it has been fully developed, tested and installed. The users of this electronic voting system are students (voters), candidates and admin.

ii) The system

- This electronic voting system will contains some of the important modules which are:

  i) Registration of voters.

  ii) Add, update and delete of the candidates.

  iii) View the information of voters and candidates.

  iv) Report of the voting result.

iii) System security

- In this electronic voting system, we are concerned on few security aspects which are:

  i) The authenticity of the voters.

  ii) The confidentiality of ballots.

  iii) The integrity of ballots and voters' information.

1.5 Project Contribution

The advantages or benefits of this system are highly securing, save time and no risk of repeat voting. This voting system will be better than the old system which is local voting systems, a system that required voters to queue up for voting and doing face recognize for voters authentication.

Electronic voting system is ready 24 hours for online voting and leave the online vote open for many days, which allowed everyone have a chance to vote online at a convenient time and place. This will save time, money and effort. A high security electronic voting system can avoid all the cost, effort and expenses of printing, posting and counting paper ballots. Information can be collected from server anytime and the result is known immediately after the vote closed. This also will protect our earth by reducing paper consumption.

This electronic voting system focus on few security aspects which are the authenticity of the voters, the confidentiality of ballots and the integrity of ballots and voters' information. The weakness of this electronic voting system is the database security. The database will store the secret information which is the ballots and this secret information should not be seen by administrator. This weakness can be solved by the future researcher.

1.6 Report Organization

The main body of this report organization is containing the list of figures, tables and the flows which are used in the report. This report organization will giving some brief of the scope and objective of the project, methodology, analysis, design, implementation and testing on the electronic voting system.

- In Chapter 1 Introduction, we will discuss about the introduction, project background, problem statement, research question, objective, project scope, project contribution and report organization.

- In Chapter 2 Literature Review, we will study about the related works such as the background of student representative council, comparison of current and new voting systems, cryptographic mechanisms and the tools to develop the web-based voting system.

- In Chapter 3 Methodology, we will explain about the method used to analyse and develop the electronic voting system based on the methodology model and show all the requirements of this project.

- In Chapter 4 Analysis, we will preview to the analysis phase, how would the system be developed and introduce the requirements of software and hardware.

- In Chapter 5 Design, we will describe the experimental design and environment setup, and design of electronic voting system in this project.

- In Chapter 6 Implementation, we will briefly describe about the activity that involved in the implementation phase, method to be implement and show the expected output when finished this phase.

- In Chapter 7 Testing, we will briefly describe the activity involved in testing phase and what is the testing strategy to be adopted in this project.

- In Chapter 8 Conclusion, the weaknesses and strength of this project will be state.

1.7 Summary

In this chapter, we have discussed about the project background, scope of the project and the problem statement. The main aspect of this project is to bring out a new idea that was sustained within us for a long term times. This project offers the voters to cast easily through internet. The database also makes the ballots counting become faster, easily and accurately. Developing a good system is critical to the success of the system to prevent system failures and to gain wide acceptance as the best method available.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

In the previous chapter, the problem statement and project objective have been clearly discussed. So in this chapter, the literature review will focus on searching, analyzing, collecting and finding out the conclusion from all the aspects and issues as shown in Figure 2.1.

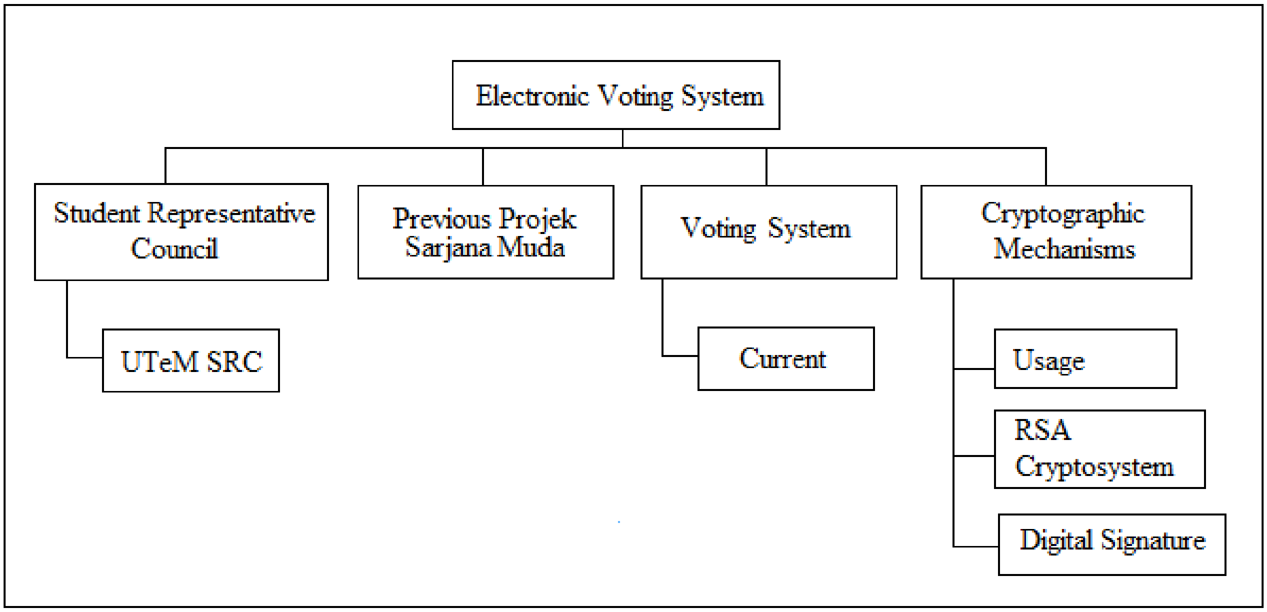

Figure 2.1 Literature Review Phase

There are few main topics of this literature review, which are the background of Student Representative Council, UTeM Student Representative Council, previous Project Sarjana Muda, current voting system and cryptographic mechanisms.

2.2 Student Representative Council

Undergraduate with professional technique and skills nowadays is seen as the prospect of leaders in the future. Student Representative Council (SRC) is one of the highest student organizations in universities and the main purpose of the organization is to produce graduates who are capable of becoming leaders in future. They are more expert or excel in all aspects for the benefit not only among university students but also for the country's future. There are around 20 universities which have Student Representative Council (SRC) in Institution of Higher Learning (IPTA) in Malaysia.

The purpose and function of Student Representative Council (SRC) are (Subsection 48 (10) of the Universities and University Colleges Act 1971 (Amendment 2009)):

i) Cultivate and train the spirit of corporate life among the students of the University.

ii) Work with the instruction of Vice-Chancellor, organizing and overseeing the welfare of students in the University facilities including recreational, spiritual and religious activities and the provision of food and drink.

iii) Appeal to the Vice-Chancellor on all matters relating to the life and work of students.

iv) Represented in anybody with reliable rules made for some purpose and appointed to carry out the welfare of students at the University.

v) To carry out any other activities as may be prescribed by the SRC from time to time.

The selection process for members of the Student Representative Council (SRC) for each Institution of Higher Learning (IPTA) in Malaysia is one of the university's annual activities. The aim of this activity is to choose a new leader to represent all students at the university in accordance with the requirements and provisions (Universities and University Colleges Act 1971 (Amendment 2009) (Subsection 48 (1), (2), (3), (4), (5) & (6)).).

This selection process is very important to maintain the Student Representative Council (SRC) leadership in university and produce more young leaders who will lead the country's leadership in the future. The selection process will also provide a very useful exposure among university students through the process of elections run and then select student leaders who will mediate the students at the university and the university management, the Ministry of Education (MOE) and the community around him.

2.2.1 Background of UTeM Student Representative Council

The Student Representative Council UTeM is chosen from 7 faculties in UTeM which are Faculty of Electronics and Computer Engineering, Faculty of Electrical Engineering, Faculty of Mechanical Engineering, Faculty of Manufacturing Engineering, Faculty of Information and Communication Technology, Faculty of Technology Management & Technopreneurship and Faculty of Engineering Technology. The Student Representative Council UTeM contains three main states which are executive council, supreme council and cabinet exco. Executive council contains 4 persons, supreme council contains 3 persons and cabinet exco contains 23 persons. The amounts of the Student Representative Council UTeM increased from 27 persons to 30 persons in year 2013/2014. The increasing of 3 senators are Chinese, Indian and International student representatives (MPP UTeM, 2013/2014).