

E-Voting System with 2-Step Verification Security Feature

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Abstract: *Universiti Teknologi Malaysia is currently using paper ballot voting system in handling the student council election. The manual system for managing student's council election required the usage of lots of papers and a lot of work force for the university's staff that handle the election. It is also time consuming and involve some hectic flows and procedures to handle the election. Hence, an E-Voting System which is a web-based computerized system is proposed to help in solving the problems that encountered in the paper ballot system. This system will include several features such as 2-step verification for the voter's verification in order to minimize faulty vote, online voter's registration, computerized vote calculation and vote result and report generating system. The 2-step verification is used as a security features for this system where it is applied during voter's verification process. This would reduce the faulty vote from unregistered user of the system. This system is expected to increase the work efficiency of Universiti Teknologi Malaysia Student Council Election process.*

Keywords: E-Voting system, 2-step verification, Campus Election, Web Application

1.0 Introduction

Voting system that is currently used in Universiti Teknologi Malaysia requires voters to manually and in person went to voting location and cast their vote using a paper ballot which contains candidates' names and specified details. This manual system also requires the candidate to register themselves with the University Council Election committee.

An Electronic Voting System has been introduced to replace and increase the efficiency of the voting process. This system is web-based and can be used by the entire UTM student. Previously, a similar system has been proposed and develop by students of Universiti Teknologi Malaysia by Mohd Sani(2010) and also by Nur Aishah(2016). However, the system proposed will be having some additional security features and admin view for the vote tellers. Therefore, the voting process is expected to be more secure and efficient.

2.0 Problem Background

Universiti Teknologi Malaysia Student Council is a representative structure for students only, through which they can become involved in the affairs of the university, and work in partnership with university management and staff for the benefit of the university and its students. The member of the student council is mainly student and assisted by lecturers and staff.

To choose student council members, an election process would be held to choose eligible candidate. The voting casting process is compulsory for all the students. The election candidates required to registration a week before the election process as a candidate with the election committee. The candidate is also considered as voters.

The process of voting has been burdening the voters where the need to take a long queue before casting their vote. Just because of this problem, 10-15 % of eligible voters do not vote. The normal voting system might not be accurate as it is counted by humans which had chances to lead to human errors where there might be miscounting or extra counting.

Thus, this project was intended to overcome the current security problem faced by occurring online voting system. This project was included with two-step verification features to avoid any fraud activity where the verification would be done using mobile phone message and email

3.0 Methodology

For this project, Rational Unified Process (RUP) is selected as the basic process model to develop this E-Voting web based system. RUP is an iterative software development process framework created by the Rational Software Corporation, a division of IBM since 2003.

In term of the proposed E-Voting system, the essential activities in inception phase are carried out. The actual voting process for student council election in Universiti Teknologi Malaysia are studied and the scope of the project is formulated. The user requirement elicitation is done through interview method. The investigation to understand the problems encountered in current system is very important to ensure whether the proposed system is able to solve the major problem faced by the users.

In elaboration phase, the user's requirement is elicited and defined well to achieve the objectives. The current flow of the voting system is studied and researched for more understanding. Research is conducted to study the similarity of the existing systems and system used currently. Besides that, research on the tools, software and technology that will be used in the development of the proposed system also conducted.

During construction phase, a simple working prototype is developed. The prototype is then enhanced into a fully optimized and working piece of system.

In transition phase is to deliver the system to the end user and let them try to use the system. The user's feedback is collected to verify whether the system is fulfilling the requirement or not. Any correction required is done in this phase. Finally, a documented software system, which operates correctly in its operational environment, is developed completely.

4.0 Discussion and Result

4.1 Overall System Use Case

Figure 4.1 illustrate the use case for the proposed E-Voting system. This system consist of 3 main actor and an admin that manage and maintain the system. The description for each use cases are explain in Table 4.1.

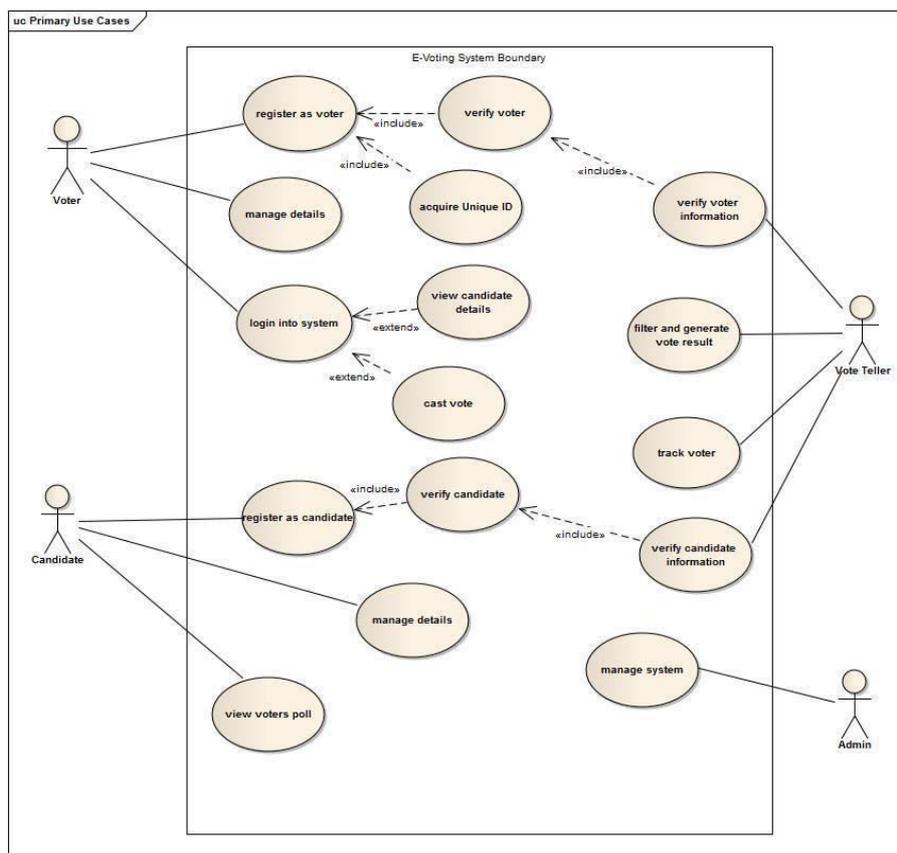


Figure 4.1 Use Case of E-Voting System

Table 4.1 Use Case Description

Use Case	Description
Register as candidate	This use case describes how the candidate register as candidate of the election.
Login into System	This use case allows voters and candidate to login into the system.
Cast Vote	This use case allows voters to cast their vote.
View Candidate details	This use case allows voters to view all the candidates details
Verify Candidates Information	This use case allows the teller to verify the election candidate's information.
Filter and generate result	This use case allows the tellers to filter and generate result and report of the voting.
Manage profile	This use case allows the candidate to view and manage profile and manifest.
Track Voter	This use case allows the vote teller to track and sort the list of voter according to the registered list and the one in the university database.

Manage System	This use case allows the admin to manage and maintain the system.
Add new students	This use case allows the admin to add new student in the system
View Current vote result	This use case allows the users to view current vote result.

With all the analysis done with the existing and proposed system, there a few criteria that can be used to differentiate and compared among those systems. With the comparison, we would be able to see clearly the flaws and advantage of those systems.

Table 4.2 Comparison between systems

System Criteria	Paper Ballot Voting	UTM eUndiSiswa	E-voting system
Work force	Required	Required	Not Required
Security	Medium	Medium	High
Time Consumption	High	Low	Low
Efficiency	Low	Medium	High
Errors Possibility	High	Low	Low
Expense	Medium	Medium	Medium
Paper Work	High	Low	Low

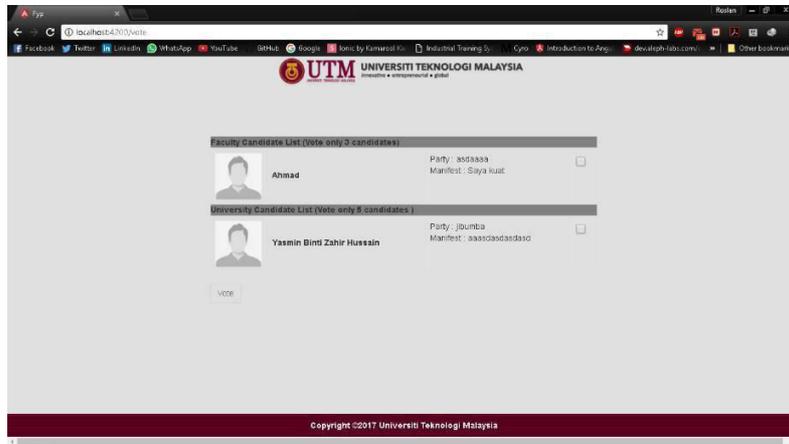


Figure 4.2 Voting Page

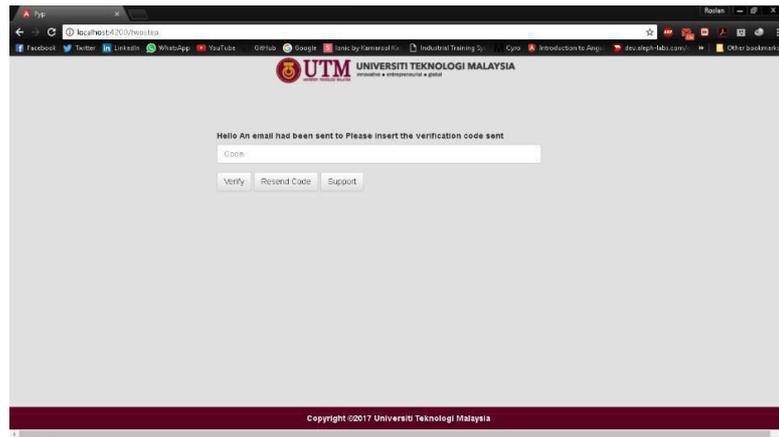


Figure 4.3 Two-step verification page

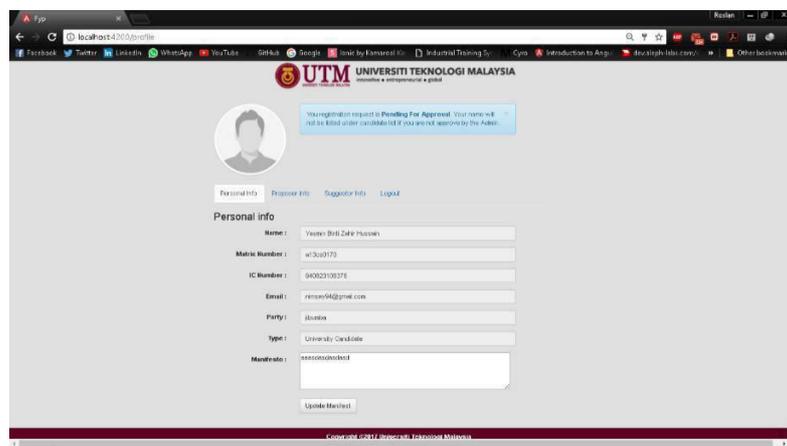


Figure 4.4 Candidate Profile page

The results achieved through the development of this system is able to assist and enable the user to make an online voting. Furthermore, the system is also able to simplify the management of voting process in Universiti Teknologi Malaysia. The components such as databases and reports work well. In addition, each module was tested to work smoothly with each other.

5.0 Conclusion

In conclusion, the developed E-Voting system is intended to ease and help the process of MPM election in Universiti Teknologi Malaysia. Overall, this system is considered as achieved the target of development and fulfilled the objectives required. There are some works need to be implemented in the further in this project, which is stated below:

- i. Enhance the user interface of the system.
- ii. Add extra function to allow the system to be more intelligent and require less user input.
- iii. Implementation of this system with currently used Single Sign-On system by UTM.

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