Malaysian-Japan International Institute of Technology

SECD2613-15 System Analysis Design

Project 1 - ONLINE VOTING SYSTEM (OVS)

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1.0 Introduction

The Online Voting System (OVS) is a digital platform designed to modernize current election methods. This system will feature authenticating the identity and eligibility of user via thumbprint and identification card to protect user data confidentiality. Another feature of this is digital ballot creation that will be distributed digitally via user ID after registering with OVS in order to protect the vote authenticity. The next feature for Online Voting System (OVS) is calculation for result tabulation. The system will count the total votes for each party and candidate then report it in real-time on OVS to ensure the system transparency.

2.0 Background Study

Voting has been a practice that is passed down from generation to generation as a method of making decisions within a large group of people. The decision with the most votes will be concluded as the final decision and therefore practiced by the people. In the modern day context, voting is a mandatory process that citizens in a country must go through to assign a leader for the country. This is done by going to a polling centre, handing our identification cards and filling in ballots. The votes will be totalled up and summarized for the final decision. Most countries that practice democracy will use this method for such decisions.

3.0 Problem Statement

Election fraudulent is an illegal activity that happens when manual elections are in used. Some of its common cases are double voting, ballot stuffing and tampering with calculation for result tabulation. In order to terminate these fraudulent election cases, a system where it's completely digital is the only solution to stop unethical people from tampering with election result and process. The Online Voting System is fully controlled by computers from authenticating user up to ballot creation and distribution until result tabulation. The system will be protected with a unique security system that won't be defeated by any cyber threat.

4.0 Proposed Solutions

4.1. Objectives

1. To protect the voting integrity from being tampered by unresponsible organization
2. To ensure transparency of election result for a fair outcome
3. To protect the security of user data from being spread widely
4. To make the system accessible and convenient to everyone around the globe.

4.2. Technical Feasibility

1. Hardware and Infrastructure
    - ❖ Servers – Host for the program and database. Can consider cloud-based solutions like AWS, Azure and Firebase for scalability and reliability or physical server for efficiency and performance.
    - ❖ Backup Systems – Backup server to ensure data redundancy and disaster recovery.
    - ❖ Networking Equipment – Router, switches and firewall to ensure secure communications between client and server.

2. Software and Tools
    - ❖ Development Tools – IDE, Project Management Software (e.g. Trello) and communication tools (e.g. Teams, Discord)
    - ❖ Security Tools – Vulnerability scanner, Encryption Software (e.g. OpenSSL) and Intrusion Prevention Tools (e.g. Snort)
    - ❖ Testing Tools – Security Testing Tools (e.g. PenTest) and Load Testing Tools (e.g. Bees with Machine Guns)

3. Licenses
    - ❖ Software Licenses – Licenses for third-party software, API key and libraries that are used in the project.
    - ❖ Legal Consultation – Legal advice by experts on compliance with local election law, data protection law and privacy regulations.

4. Training and Documentation

- ❖ Training Materials – Onboarding materials such as video tutorial, user manual and other instructional material for election administrator and voter.
- ❖ Documentation – Technical documentation for developer and system admin such as system architecture, API documentation and troubleshooting guide.

5. Contingency
    - ❖ Funds for unexpected setbacks or changes in project scopes.

4.3. Operational Feasibility

1. System Acceptance

    - ❖ User: Evaluate system's ease of use, accessibility features, and overall user satisfaction through usability testing and feedback mechanisms.
    - ❖ Stakeholders and Staff: Assess the willingness and readiness of stakeholders (election officials, voters, IT staff) to adopt and support the online voting system.

2. Resource Availability

    - ❖ Stakeholders: Evaluate the financial resources required for development, implementation, and maintenance of the online voting system.
    - ❖ Staff: Assess the availability of skilled personnel to manage and support the system effectively.

3. Process Integration

    - ❖ Staff: Ensure the personnel had comprehensive training to operate the system
    - ❖ User: Using the system that was designed to be easily accessible for all users including older citizens and individual with disabilities.

4.4. Budgets

Personnel –

- Project Manager: RM7,500 per month.
- Software Developer (Frontend & Backend): RM4,800 per month each.
- UI/UX Designer: RM3,500 per month.
- Security Expert: RM4, 500 per month.
- QA/Tester: RM4,000 per month each (2 testers).
- Technical Support Staff: RM3,500 per month.
- Training Staff: RM3,000 per month.

2. Hardware and Infrastructure –
    - Servers: RM2, 500 per month
    - Networking Equipment: RM15, 000 (one-time cost)
    - Backup Systems: RM10, 000 (one-time cost)

3. Software and Tools –
    - Development Tools: RM5, 000 annually
    - Security Tools: RM20, 000 annually
    - Testing Tools: RM10, 000 (license)

4. Licenses –
    - Software Licenses: RM15, 000 (one-time cost)
    - Legal Consultation: RM25, 000 (consultation fees)

5. Training –
    - Training Materials: RM10, 000
    - Documentation: RM5, 000

6. Contingency –
    - 10% of Total Budget: RM56, 260

7. Total: -

(7,500 + 4,800 + 3,500 + 4,500 + 8,000 + 3,500 + 3,000 + 2,500) * 12 + 15,000 + 10,000 + 5,000 + 20,000 + 10,000 + 15,000 + 25,000 + 10,000 + 5,000 + 56,260 =

RM618, 860

4.5. Cost-Benefit Analysis

Costs	Year 0	Year 1	Year 2	Year 3
Development Costs				
Hardware	25,000			
Software	25,000			
Training	15,000			
Consultation	25,000			
Contingency	56,260			
Total	146,260			
Production Cost				
Salaries		475,200	475,200	475,200
Tools		25,000	25,000	25,000
Total		500,200	500,200	500,200
(Present Value)		500,200	500,200	500,200
Benefits				
Improve Customer Service		200,000	240,000	288,000
Increase Productivity		150,000	187,500	234,375
Total		350,000	427,500	522,375
(Present Value)		350,000	427,500	522,375
Accumulated Benefits (Present Value)		350,000	777,500	1,299,875
Gain or Loss		(150,200)	277,300	799,675
Profitability Index	5.47			

5.0 Scope of the Project

- Requirement and data collection: conduct interviews and questionnaires to SPR and our sample group consisting of 100 people, 18 above, to understand the requirements needed for the program.

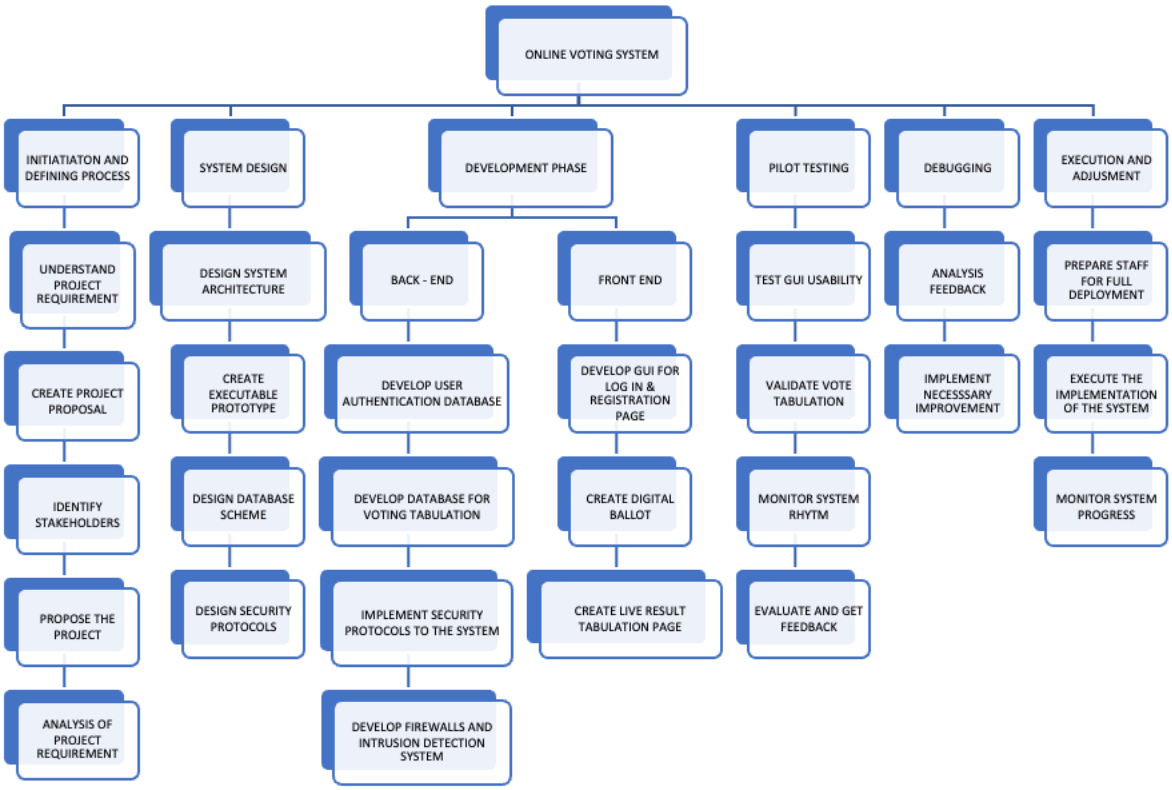
- Design system features and requirements: create structures and diagrams to visualize and simulate the system.
- Coding system: Code all system functionalities including voter authentication, ballot creation and result tabulation.
- Testing and debugging system: ensure all systems are functioning with no errors and ensure the interactive interface is user friendly and accessible, gain input from users for further improvement.
- User acceptance testing: ensure the system functions as intended through a client
- Black box testing: ensure the interface is fully functional by accessing the shell.
- Training and implementation: Provide training to volunteers under SPR to use and teach voters on how to use the program.

6.0 Project Planning

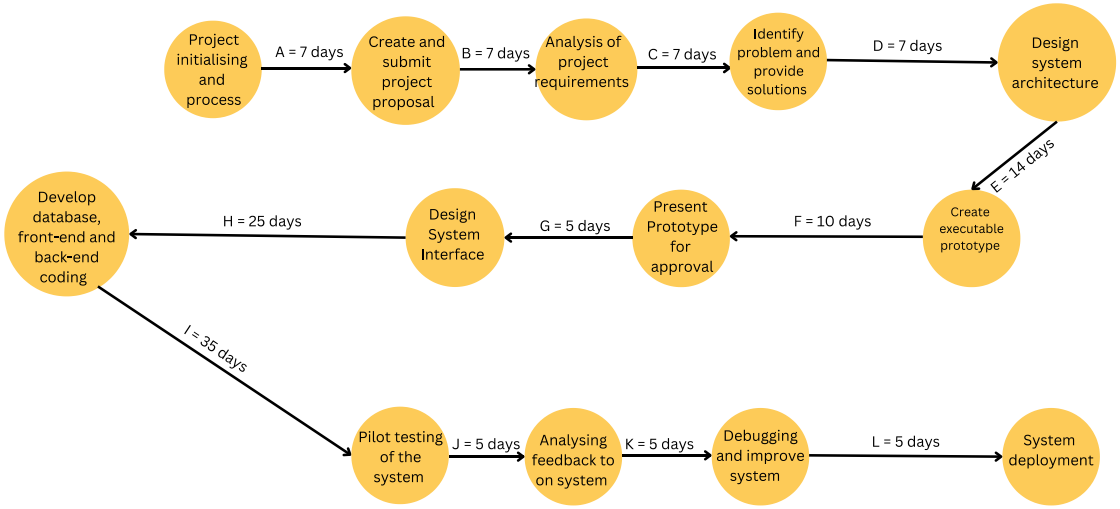
6.1. Human Resources

- ❖ Project Manager – Oversee the entire project by coordinating team effort and milestones are met in line with the schedule.
- ❖ Software Developer – Frontend and backend developers that are proficient in relevant stack.
- ❖ UI/UX Designer – Design an intuitive and user-friendly interface.
- ❖ QA/Tester – Conduct a thorough testing of the system to identify errors, bugs and any issues.
- ❖ Security Expert – Conduct security assessments and ensure implementation of security measures is robust.
- ❖ Technical Support Staff – Provide maintenance and support to users and administrator.
- ❖ Training Staff – Provide an onboarding for election administrator and voters on how to use the system effectively and utilize provided features.

6.2. Work Breakdown Structure



6.3. PERT


Project initialising and process
A = 7 days
Create and submit project proposal
B = 7 days
Analysis of project requirements
C = 7 days
Identify problem and provide solutions
D = 7 days
Design system architecture
E = 14 days
Create executable prototype
F = 10 days
Present Prototype for approval
G = 5 days
Design System Interface
H = 25 days
Develop database, front-end and back-end coding
I = 35 days
Pilot testing of the system
J = 5 days
Analysing feedback to on system
K = 5 days
Debugging and improve system
L = 5 days
System deployment

6.4. Gantt Chart

Project phase	activity	week														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Planning	P1 briefing															
	Project planning															
	group task assignment															
	requirement and data collection															
	group proposal write-up															
	group proposal submission															
Analysis	P2 briefing															
	propose solution to problem statement															
	design as-is dfd(context, level 0, child)															
	identify method for data collection															
	requirement analysis															
	analyze current business process															
	P2 submission															
Development	P3 briefing															
	designing case diagram															
	design structure chart															
	design logical and physical dfd to-be (context, level 0, child)															

	create system prototype (figma)															
Testing and implementation	present system prototype															
	review and final submission															

7.0 Benefit and Overall Summary of Proposal system

Implementation of Online Voting System is a digital platform designed to modernizes our current election method. This system is a fully digitalized system where all procedures in an election is conducted using a computer machine. From authentication process to voting ballot and tabulation process, it will be fully operated digitally. Since OVS is operated digitally, there will be no risk of fraudulence by irresponsible party to tamper with election result. OVS also offers an enhanced accessibility like adjustable text size and accessible captcha to accommodate user with special needs to ensure inclusivity for all in electoral progress. Furthermore, OVS is able to accommodate for a huge traffic of users at one time during election process. Last but not least, OVS have the special features like real time election updates for users to keep track of the election result. The implementation of OVS will surely take a lot of time and resources however, it's benefits will surely become huge positive impact to our technology advancement during electoral season.