Electronic Voting System

By

Muhammad Hafizi bin Abdul Halim

Dissertation submitted in partial fulfillment of

the requirements for the

Bachelor of Technology (Hons)

(Information and Communication Technology)

JANUARY 2008

Universiti Teknologi PETRONAS

Bandar Seri Iskandar

31750 Tronoh

Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

ELECTRONIC VOTING SYSTEM

By

Muhammad Hafizi bin Abdul Halim

7983

A Project dissertation submitted to the

Information Technology Programme

Universiti Teknologi PETRONAS

in partial fulfillment of the requirement for the

BACHELOR OF TECHNOLOGY (Hons)

(INFORMATION AND COMMUNICATION TECHNOLOGY)

Approved by,

....
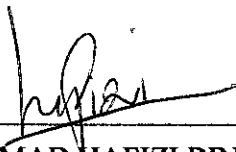
(Ms Diana Wong Mei Leng)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

January 2008

CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

MUHAMMAD HAFIZI BIN ABDUL HALIM

Student ID : 7983

Date : May 15, 2008

ABSTRACT

Existing or traditional voting system that made use of human resource, paper and voting post do not provide the user and election committees convenient ways of having an election. Eventhough the problem is well known by them, the lack of initiative and the mistrust of technology halted the innovation for better solutions. A few concepts of electronic voting such as SMS voting are not reasonable and costly for voters. The research of Electronic Voting System (EVS) is conducted in order to address the technical issues regarding the electronic voting system. This research paper will adapt the ontology onto the system framework and development. Issues and the method of electronic voting system will be taken into consideration. For the project work, the prototype will be developed using the open source software.

ACKNOWLEDGEMENT

TABLE OF CONTENTS

CHAPTER 5: CONCLUSION & RECOMMENDATION

LIST OF ILLUSTRATIONS

List of Figures

List Of Tables

LIST OF ABBREVIATION

EVS	:	Electronic Voting System
TVS	:	Traditional Voting System
SPR	:	Suruhanjaya Pilihanraya (Election Commission of Malaysia)
E-Voting	:	Electronic Voting
GIMP	:	GNU Image Manipulation Program
ISPs	:	Internet Service Providers
DRE	:	Direct Recording Electronic

CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

Electronic voting system (EVS) is a term encompassing several different types of voting, embracing both electronic means of casting a vote and electronic means of counting votes. Even though this technology has existed quite some time but it is not widely used compared to the traditional voting system (TVS).

The techniques used in both EVS and TVS are almost the same, but their implementation are not similar. Both require the voters to choose the candidate of their choice. But the EVS will give a lot of advantages in term of convenience and eases the workload.

Technically, the TVS require the administrator to distribute the ballot card, supervise the election and calculate the vote manually. At the voters end, the voter needs to bring their identification card and come to vote at the respective polling station and queue to vote. By using the EVS, all this process is simplified by using algorithm inside the system.

Currently the Malaysian general elections are using the traditional system. The system used in Malaysia based on First-Past-The-Post-System. This implies that the candidate who secures a simple majority will be declared the winner in that constituency. The election commission of Malaysia (SPR) is the governing body to handle the election in Malaysia.

In the election system practiced by Malaysia, a candidate is elected to represent the residents of that constituency at Parliament (Federal Election) or the State Legislative Assembly (State Election).

Figure 1: Logo of election commission of Malaysia

EVS is the most convenience way to vote in this decade, but nevertheless traditional voting system is being used. Why? In this project paper, the author will review the technical issues regarding electronic voting system and develop a prototype electronic voting system for general election.

1.2   PROBLEM STATEMENT

Currently, the election system of Malaysia is using the traditional system which is non IT- based. The structural of the election process consist of:

1.2.1   Election Commission

- Accept nominees for the election and ensure the candidate is qualified.
- Determine and publish the opponent list for the election.
- Validate and distribute voting ballots to electors
- Handle the election and calculate the votes

The problem for the officers of the election commission is that they will spend a lot of time on tallying the votes and the task subjected to human error. The cost and the environmental factor also involved, the usage of paper is also extensive. In addition, security and human factors make the current system unreliable and untrustworthy.

1.2.2 The Electors

- Vote at the voting post that has been setup at the polling station.

The process of voting is cumbersome because the voters must queue up and wait for a long time before can complete the votes and subjected to human error in term of casting the votes (damage vote).

1.3 SIGNIFICANCE OF THE PROJECT

This project will explain on the technical issue regarding the EVS. It will also compare the strengths and weaknesses between EVS and TVS. The gathered information will be used in creating a prototype of EVS for the general election.

The prototype will be designed based on the analysis that has been done. This is to strengthen the prototype by not repeating the mistakes found in the research. As for the officers of the election commission, the prototype will certainly ease up their task and will be of more convenient to the voters.

Development of the prototype will be using the open source software which is XAMPP server package, Notepad++ and GNU Image Manipulation Program (GIMP). XAMPP is a package of Apache web server, MySQL and PHP 5. Meanwhile the Notepad++ is for the coding and the GIMP is for image editing. The purpose of using this open source software is to minimize the cost of development.

After the prototype is developed, it will have two main functions which are to cast votes and to display the final result. The electors can cast their votes by after successful login into the system. Only registered voters that are qualified and listed in the electoral roll can vote. One user can only vote for one time, and after they had submit their vote, the log-in information and the voting record will be deleted to maintain the secrecy of the vote. The final result will be displayed after the calculation is through.

1.4   PROJECT AIM, OBJECTIVE AND THE SCOPE OF WORK

1.4.1   Project Aim

In this modern age, the manual system is almost being considered obsolete as well as the traditional voting system. This report does not only consider the good side, but also the bad and the ugly side of the electronic voting system. At the end of the research, the prototype of the electronic voting system will be developed.

1.4.2   Project Objective

i.   Identify the technical issue regarding electronic voting system

ii.   Identify and compare the strengths and weaknesses of EVS and TVS.

iii.   Create the prototype of electronic voting system for general election.

1.4.3   Scope of Work

To ensure that the research and development is according requirement and functional as required, several scope of study have to be defined. Below are the scope identified:

1.4.3.1 User

The user of this project will be the officers of the election commission and the electors as voters. To ensure that the development and functional according to their needs, studies and analysis has been done.

1.4.3.2 Tools

The tools used in this project are open source software. This is to ensure that the prototype will run on multiplatform and is cost effective. Below are list of the tools to be used on development:

     i.   XAMPP server package

    ii.   Notepad++

   iii.   Image Manipulation Program (GIMP)

   iv.   Open Office

CHAPTER 2

LITERATURE REVIEW

2.1 CHAPTER OVERVIEW

This chapter describes the Electronic Voting System (EVS) and the Traditional Voting System (TVS). This chapter will be focusing more on the EVS but it is also include the TVS.

2.2 ELECTRONIC VOTING SYSTEM IN GENERAL

2.2.1 The Concept: Introduction to Electronic Voting

The term "Electronic Voting System (EVS)" refers to the use of computers or computerized equipment to cast votes in an election. EVS aims at increasing participation, lowering the costs of running elections and improving the accuracy of the results [1].

Voting and elections are essential ingredients of modern communities. Unlike any other transactional event, the result of elections can have many positive and/or negative effects on these communities and their wellbeing [1].

EVS concept makes use of computers or computerized equipment to cast votes in elections, has been proposed. EVS automates and simplifies the election process, speeds it up, increases participation rates, reduces counting mistakes and minimizes the time it takes to announce results [1].

2.2.2 The Concept: Voting and Tallying

The EVS supports a voting process that structured in two phases: Voting and Tallying. In the voting phase, voters cast their votes. This operation consists of two steps. First of all, any given voter must be validated. This action consist in ascertaining whether a given voter is eligible, and, if this is indeed means of these credentials and the chosen voting strategy the voter can later build a valid ballot and send it to the EVS service [2].

When the voting phase is over, the tallying phase begins. In this phase, a principle called tallies retrieves ballots from the EVS services and works out the final tally [2].

2.2.3 History of Electronic Voting System

Electronic Voting in Belgium started in 1991 when two locations were chosen to experiment on different electronic voting systems. The law to permit this experiment was passed by an absolute majority with no opposition at all. One of the systems tested was based on a touch panel similar to those used in the Netherlands [3].

The Countries that have experienced of E-Voting System are mentioned below.

    i.   Australia
    ii.   Belgium
    iii.   Brazil
    iv.   Canada
    v.   Estonia
    vi.   France
    vii.   Germany
    viii.   India
    ix.   Ireland
    x.   Italy

xi. Netherlands

xii. Norway

xiii. Romania

xiv. Switzerland

xv. United kingdom England

xvi. United States of America

2.2.4 Ontology Concepts

Ontology provides a common vocabulary to support the sharing and reuse of knowledge. When two parties agree to use the same ontology, they agree on the meanings for all terms from that ontology and their information can be combined easily [4].

By adapting the ontology concept onto EVS, it will make the web more dynamic and can instantaneously publish and update information. The ontology also views the system as a whole and not limited to the defined classes.

2.3 STUDIES ON ELECTRONIC VOTING SYSTEM

Elections, in general, can be divided into two main types, namely, political (e.g. legislative and municipal types of elections) and non-political (e.g. election of student governing body within a university, election of trade associations). Both of these election types have different security requirements. While high security is needed by political elections, a substantially less amount of security is needed by the non-political ones [1]. Below are the lists of EVS identified:

2.3.1 Direct Recording Electronic (DRE) Voting

This type of systems requires the voters to mark their votes on a paper with a pencil or marker or remove divots from a perforated card. The ballot cards are then scanned and tallied at a central computer site or at each polling station [5].

In DRE voting, the balloting process is performed on an electronic voting machine that records and stores the votes internally. It is possible, however, to have these DRE machines send their counts electronically to a central site (through either a direct dial-up connection or a dedicated line). This would perform much the same function as a poll site Internet voting system, but without connecting to the Internet [6].

When it comes to counting votes, accuracy and integrity are far more important than speed. Although computers have the ability to be very accurate, they are only as accurate as their programming [7].

It can be said that how good the programming is good, how accurate the computer is accurate, and at the end reliability and trust is the main concern. This type of voting system uses the combination of traditional and the electronic way of voting.

2.3.1.1 Election That Uses DRE Voting

The country that uses the DRE voting are:

i.   United States of America

In 2004, 28.9% of the registered voters in the United States used some type of direct recording electronic voting system, up from 7.7% in 1996 [8].

ii.   Brazil

Direct recording voting machine developed in Brazil and used in 100% of Brazilian elections 2006. Brazil was the first country in the world to have fully electronic elections [9].
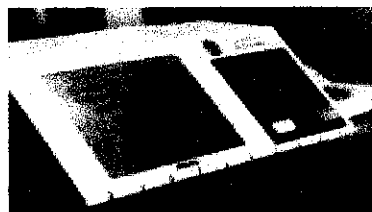
Figure 2: Direct Recoding Electronic (DRE) Voting Machine

2.3.1.2 Issues in DRE Voting

Although DRE Voting has it own issues with the people trust with software, but it is consider a minor issues until it been hit with the Americans with Disabilities Act.

A direct recording electronic voting system that produces a contemporaneous paper record, which is not accessible to sight-impaired voters but which allows sighted voters to confirm that their ballots accurately reflect their choices before the system officially records their votes, would be consistent with the Help America Vote Act and with Title II of the Americans with Disabilities Act, so long as the voting system provides a similar opportunity for sight-impaired voters to verify their ballots before those ballots are finally cast [10].

The DRE voting is being closely monitored and investigate whether it ignore the disabilities people rights to vote. This shows that not only the system has to function properly but has to consider the people right to cast vote with ease.

2.3.2 Poll Site Internet Voting

Poll site Internet voting refers to the casting of ballots at public sites where election officials control the voting platform (i.e., the hardware and software used to vote and the physical environment of the voting place). In these kinds of systems, clients are intended to be accessed only at the poll site under the observation of election officials [6].

The poll site internet voting provides security as it is about the same as traditional voting system. But instead of using the paper as a voting medium, it makes use of machine as a medium to cast the vote.

Poll site voting could add convenience and efficiency in the short term, the report says, while adding speed and certainty to the tallying process. Election officials would control both the voting platform and the physical environment, making security more manageable than with the other two methods. Because these issues could likely be solved with existing technology, the committee recommends poll site experiments "to gain valuable experience prior to full-scale implementation" [11].
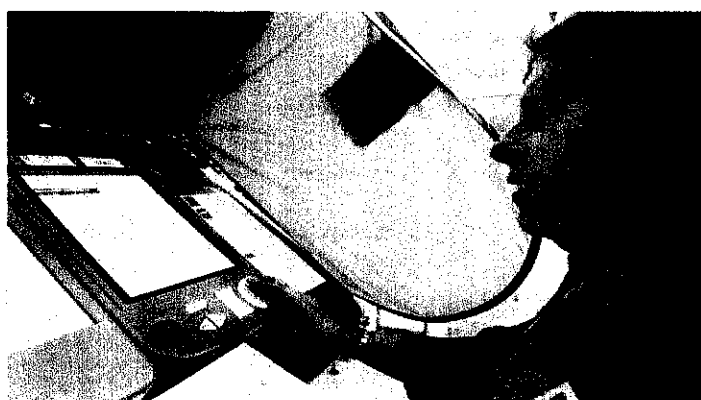
Figure 3: Poll site internet voting use in United States

2.3.3 Remote Internet Voting

Remote Internet voting refers to the casting of ballots at private sites (e.g., home, school, office) where the voter or a third party controls the voting client. Ideally, this type of open network system would enable voting from virtually anywhere at anytime [6].

2.3.3.1 Why Remote Internet Voting is Special?

Internet voting is unlike web surfing and Internet banking in at least two ways: firstly, while an Internet banking customer has to be identified to allow them access to their account, a voter has to be identified as eligible to vote, but their vote cannot be recorded with any kind of identifying information. It should not be possible to look at a collected ballot and then be able to work out who voted it [12].

11

Secondly, the voter must not be allowed to submit multiple votes. There are some rare exceptions to this, such as in Sweden and Denmark where voters can cast a pre-poll ballot but then change their mind and cast another ballot in the actual poll - but the majority of democracies do not allow more than one vote. With banking, there is obviously no limit to customer transactions and these include "undoing" transactions by reversing them. The voter gets one chance to vote and so this must also be straightforward and not prone to voter or system error [12].

The remote internet voting are different from other web transaction including web surfing and internet banking in the way of the truncation are being handled and submitted. The element of differences makes the internet voting is special.

2.3.3.2 Complicating Factors of Remote Internet Voting

There are a lot of requirements that made reliable and secure Internet voting is difficult to implement. It can be deployed for small, private elections with quite a simple set-up, but for large public elections, considerable work is required. Some of the complicating factors are:

1. Consistency of the ballot:

The ballot has to appear the same to all voters or else some candidates may be disadvantaged: if a ballot appears too large for the voter's screen, then some candidates may be obscured; the voter's configuration of their browser must not rearrange the online ballot [13].

2. Plurality of voter machines:

Web users access the web from a large variety of computers, operating systems and browsers: the most common is Internet Explorer on Windows for PC, but there are 140+ browsers, each with possibly tens of versions. There are also many versions of

Windows as well as MacOS, Linux, Solaris and the many kinds of computers underneath. Each web browser may thus present the ballot differently [13].

3. Bandwidth limitations:

The Internet slows down when there is a lot of traffic or if there is a fault : the Internet never completely "stops" which is its greatest strength, however, it can be slow. The majority of Internet voters access the Internet via a modem. This slows the traffic further for those users [13].

4. Votes must stay in the country:

The voting system may need to be in the country where the election is taking place [13].

5. High peak voting times:

Voters tend to vote at regular times (such as between 8 and 10pm), and sometimes very many may vote at the last possible moment before the ballot closes. This places extra demands on the availability of computer systems which support elections [13].

6. System must serve multiple ballots:

While voters may access the systems from anywhere, we still need to provide a jurisdiction ballot which is correct for them. In the US Primary elections, there are more then 100,000 such ballots. All these ballots then need to be created and made available centrally for the Internet system [13].

7. Secure login:

Voters need to be identified more reliably than via presentation of, say, their DOB, drivers' license number or electoral register number. All these credentials are potentially known by many other people [13].

8. Security of the voting systems:

The location of the voting systems (that is, the voting servers) needs to be very secure and the integrity of the voting systems cannot be entirely reliant on one or a few technical people or the ERO. This would expose such staff to coercion or bribery [13].

9. Security of the voter's PC:

If the voter uses a common operating system and browser, there may be viruses which attack this software or observe the voter's screen and keyboard [13].

10. Software must be certified:

The voting software has to be able to be changed so that it is kept up to date with Internet technology. This makes it hard to certify the software in the traditional sense [13].

11. Additional voting channels:

Sites that want to trial Internet voting generally also run a parallel paper process to support the most voters possible. This means that personnel resources are often stretched when the new technology is being introduced [13].

12. Varying electorates:

No two electorates are the same as each voting region has different levels of web access for citizens, literacy, perception of civic duty, and disenchantment with the current voting methods and so on. Different regions also have varying numbers of voters or non-voters who may benefit from Internet voting and engaging those people requires different voter education programmes [13].

Even though the remote internet voting has its own glitch and concern, but the beauty side of the system cannot be put aside. Remote internet voting is mostly suitable for LAN network or intranet network and small scale voting.

14

2.3.4 Kiosk Voting

Kiosk Voting offers an intermediate step between poll site and remote voting. Kiosk voting could be monitored by election officials, observers, or even cameras to address security and privacy concerns, and prevent coercion or other forms of intervention [6]

Kiosk internet voting is more to casting ballots outside official polling places that are publicly accessible. United States uses kiosk voting in 2004 presidential election [14].

Figure 4: Kiosk Voting

2.3.5 Architecture Used for Electronic Voting System

Client server architecture

In the client/server architecture, clients request services and servers provide those services. The client/server architecture is an example of a centralized architecture, where the whole network depends on central points, namely servers, to provide services [6] .

15
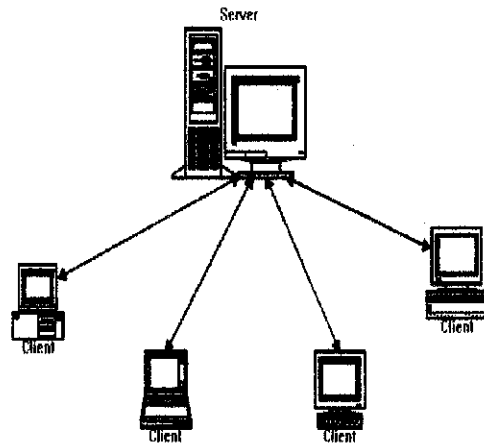
Figure 5: Client server architecture
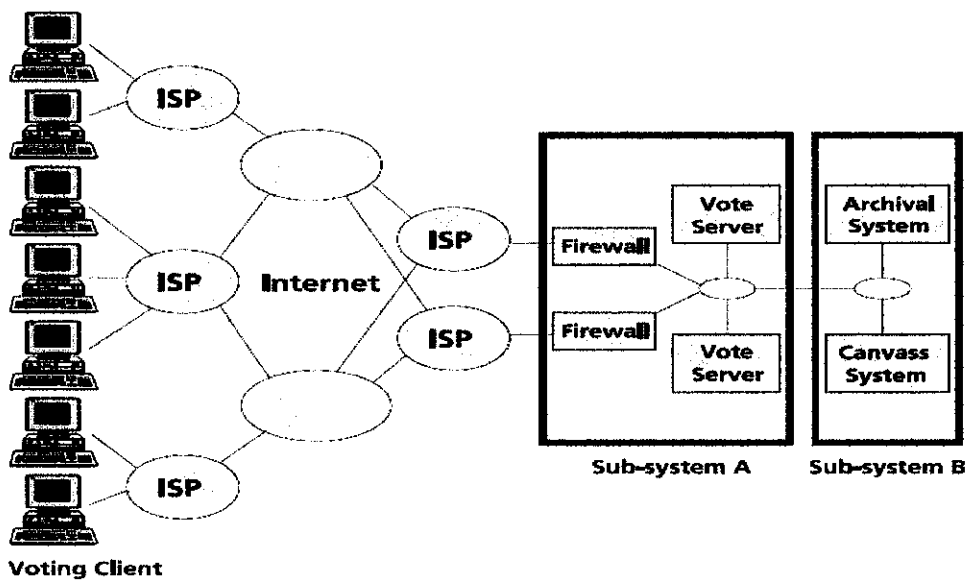
Figure 6: A schematic sketch of a generic internet voting system

Figure 5 represent what happens on poll site voting, remote voting and kiosk voting. From the Figure 5, the voting client is a voting terminal for the poll site and kiosk voting, but for the remote voting it would be individual computer in houses and workplaces.

The clients are connected to one or more Internet service providers (ISPs), and to the ISPs at the server side of the system through the Internet. The server side is divided into two parts: sub-system A, which collects encrypted votes; and sub-system B, that decrypts ballots, tallies and archives votes, and produces reports [6].

16

2.4   ISSUES IN ELECTRONIC VOTING SYSTEM

2.4.1   Attack on the Software

The weakest point in an electronic election system based on voting in uncontrolled environments is probably the client machine, which may be infected by viruses and other malicious programs. The most difficult part to control is the very first part of the journey of a message from the keyboard to the program handling the input from the keyboard. The possibility that some illegal program is sitting between the keyboard and the rest of the system cannot be rule out, faking correct looking screen images but sending completely incorrect data to the vote-receiving server [15].

2.4.2   Keeping the Votes Anonymous

The degree of anonymity possible with a traditional paper ballot system cannot be guaranteed by an electronic voting system, however, these and other technical means can be employed to guarantee anonymity as far as possible. A security audit is essential to be able to track whether or not the election event key is being misused at any time [15].

2.4.3   Social Engineering

Social engineering is the term used to describe attacks that involve fooling people into unwittingly compromising their own security [16]. It is surprising to learn that when instructed to circle a candidate's name, many people underline it. While computers would seem to offer the opportunity to establish an interface that is tightly controlled and thus less subject to error, this is counter the typical user's experience with computers. For anyone but a computer scientist, computers can be intimidating and unfamiliar. And user interfaces are often poorly designed and create confusion, rather than simplifying processes [17].

17

2.4.4 Transparent System

Any electronic voting system must be verifiable. The voter must be able to know that their vote has been correctly recorded. All aspects of the voting system, including hardware design and source code, should be open to public inspection. It is a well-established security principle that secrecy is not a sound strategy, and furthermore secrecy makes verifiability extremely difficult [18].

2.5   REQUIREMENT NEEDED FOR ELECTRONIC VOTING SYSTEM

In order to ensure the EVS meet the standard needed, it needs to fulfill certain requirements. These requirements include three main types, such as generic, system-specific and election-specific requirements. Below are the identified requirements:

2.5.1   Generic Requirements

The generic requirements are those requirements that apply to any voting system [19]. These requirements, as shown in Figure 3, include:

- Authenticity: Only eligible voters can cast their votes [19].

- Integrity/accuracy: Once a voter cast a vote, no alternation to this vote is permitted. Moreover, all valid votes must be counted, whereas all invalid ones must not be counted [19].

- Privacy: After casting a vote, no one should be able to link the voter to this vote [19].

- Security: Throughout the voting process, a vote can't be tampered with or viewed by anyone [19].

- Democracy: All eligible voters must be able to vote, one person–one vote and no one can vote more than once or vote for others [19].
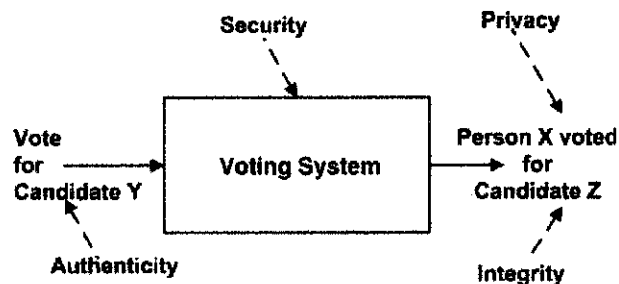
Figure 7: Generic Requirement for EVS

2.5.2 System-Specific Requirements

The system-specific requirements, on the other hand, are those requirements that are specific to on-line EVS [18]. The system-specific requirements include:

- Multi-user: A number of voters can vote simultaneously [19].
- Multi-elections: A number of elections can be running simultaneously [19].
- Accessibility: The system can be accessed by voters at any time, from any-location using the Internet/Intranet [19].
- Availability: The system must have high-availability during an election campaign [19].

2.5.3 Election-Specific Requirements

The election-specific requirements are those requirements that are specific to a given election. In the Malaysian system of elections, a candidate contesting can either represent a party or stand as an independent candidate. He is qualified to be a candidate in any election if he fulfills the following [20]:

- he is a Malaysian citizen and a resident of the country;

19

- he must not be less than 21 years of age on nomination day; and
- he must be a resident of the State if contesting a state seat.

A candidate will be disqualified if he [20]:

- Has been found or declared to be of unsound mind; or
- Found to be an undischarged bankrupt; or
- Holding an "office of profit"; or
- Failed to lodge any return of election expenses; or
- Has been convicted of an offence by a court of law in Malaysia and sentenced to imprisonment for a term not less than 1 year or to a fine of not less than RM2000 and   has not received a free pardon; or
- Has obtained a foreign citizenship.

2.6   TRADITIONAL VOTING SYSTEMS (TVS)

There are a few type of traditional voting system (TVS) used worldwide. Below are the most common TVS used:

2.6.1   Paper Ballots

Voters mark boxes next to the names of candidates or issue choices, and place them in a ballot box. The ballots are counted manually. Paper ballots are also widely used for absentee ballots [6].

Paper ballot is still being used by many countries including Malaysia. Malaysia will be using the transparent ballot box and indelible ink in the 2008 general election to improve the level of transparency in the conduct of elections [21].

20
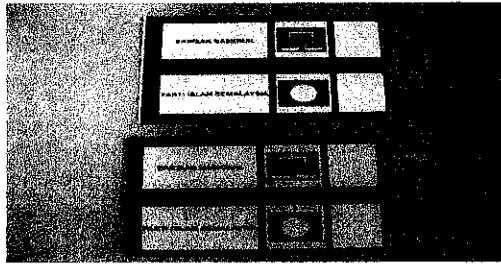
Figure 8: Example of paper ballot use in Malaysia general election

The universities in Malaysia also use the paper ballot in their election to select the student representative.

2.6.1.1 Weakness of Paper Ballots

The drawback of the paper ballots is counting the votes is laborious and subject to human error. The usage of paper ballot is non environmental friendly due to the need of huge amount of paper in the election [6].
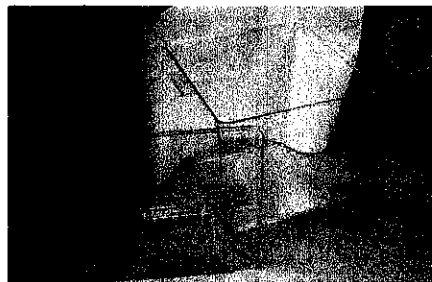
Figure 9: Transparent ballot box

Figure 10: Voting using the paper ballot in Malaysia

21

2.6.2 Mechanical Lever Machines

Voters cast ballots by pulling down levers that correspond to each candidate or issue choice. Each lever has a mechanical counter that records the number of votes for that position [6].

Figure 11: Mechanical lever machine

2.6.3 Punch Cards

Voters punch holes in computer-readable ballot cards. Some systems use mechanical hole-punch devices for punching the holes while others provide the voter with pins to punch out the holes. The latter have been more subject to incomplete punches, resulting in more errors in reading the cards [6].

2.6.4 Optical Scan Devices

Voters record choices by filling in a rectangle, circle, or oval on the ballot. The ballots are read by running them through a computer scanner, which then records the vote [6].

CHAPTER 3

METHOD OF DEVELOPMENT

3.1   ARCHITECTURE USE

EVS architecture consists of five basic entities: voter, tallier, ballot distribution, E-Voting database and a set of elector database. In EVS, only a registered voter can vote.

Area Server Consist of:
- Electors database
- Ballot Distribution
- Validator / E-Voting Database
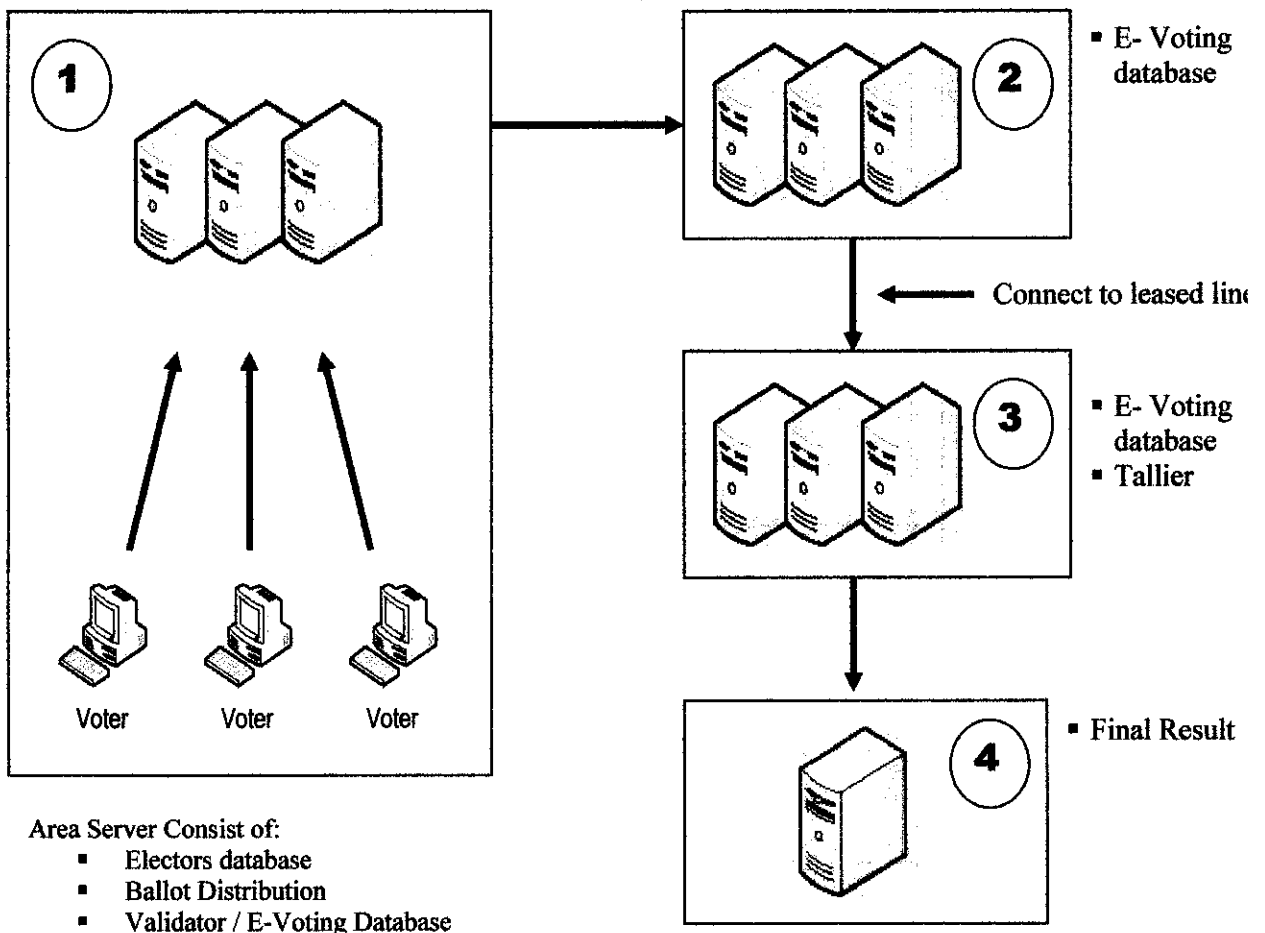
Figure 12: EVS architecture

3.1.1 Area Server

Area Server Consist of:

i. Electors database

   When the electors login, the information electors database to checks the eligibility of the voter and whether he or she has voted before. If the voter is a valid voter, the electors database will send him the ballot.

ii. Ballot Distribution

   Each of the ballots has a unique id. The voter casts his ballot and the ballot is then blinded, signed, encrypted and sent to the Validator to be validated. Ballots are XML documents providing a set of rules for presenting and verifying voting options for voters.

iii. Validator / E-Voting Database

   Validator signed the blinded ballot after verifying the voter. The signed blinded ballot is sent back to the voter. Voter checks the integrity of the ballot by validated ballot and compare it with the original one. The validated ballot is stored in the E-Voting database.

3.1.2 E-Voting Database Combination

Here all the votes being recorded and stored.

3.1.3 Tallier

Tallier system will count overall vote and come out with the result.

3.2   METHOD USE

The methodology that has been adapted for this project is basically the spiral model. But here, the author has revised the spiral model to suite the small scale project. Some characteristic of the original spiral model will not be used. Each phase of this method can be revised immediately to allow quick corrective measure to be taken and for the improvement to be done quickly to the project without having to wait until the project is finished. This method also suites best for as it allows backtracking and corrective measures to further enhance or fix the project.
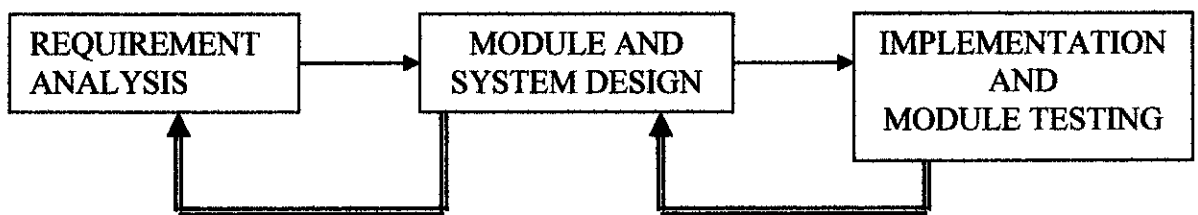
Figure 13: Development method

Figure 4 above indicates how the spiral model is being adapted into the development. The development will start at requirement analysis, followed by mode and system design and lastly, the implementation and module testing. Every phase will continue from one to another like a waterfall model, the beauty of this model is that it allows backtracking at each phase.

3.3   REQUIREMENT ANALYSIS

In requirement analysis phase, the activities involved are planning and analysis. This part is crucial for the project because it will determine what will happen next. The activities are as explained below:

3.3.1 Planning

The planning part is to determine the goal and the timeline for the project. This is being done by developing the Gantt chart (Appendix A) of activities. With the help of the Gantt chart, the author can manage the resources and forecast the expected output of the project to ensure the project is within the time constraint.

3.3.2 Analysis

In this section, the task to be done is defining the scope and the boundary of the system, the input and output process, and identifying the type of hardware and tools that will be used to develop the system. The element that has been identified during the analysis will be put together as a base to setup the framework of the system. The frame work methods that will be used for this system are:

- Use-case Diagram
    - By using the use-case diagram, it will show what the system will provide to end-user. Use-case diagram will not only help the author as a developer but also the end-user to understand the behavior of the system.
- Class Diagram
    - Class diagram can be said as an entity relationship diagram in object oriented style. It will show the relationship between a table to another within the same database. It also includes the method or functions that are use by table. In simple words, this diagram helps the author to design the database needed for the system.
- Sequence Diagram
    - In this diagram, all the sub-function will be included and details of the use-case diagram will be shown. The diagram will describe the link between use-case diagram and class diagram.

26

- Domain Model in UML
    - Domain model is an ontology based diagram. The diagram will show the process of the system as a whole part.

3.4 MODULE AND SYSTEM DESIGN

In this phase, the module of the system will define as needed and identify the requirement phase and design. This process will interact with the requirement analysis phase as certain requirements may change in due time. As for an example, the software or tools that have been identified earlier might be changed as it could be an obsolete tool as the author started the design phase. But one fact that remains unchanged is the user requirement. This is because any change on this part will affect the whole process.

Software and hardware play an important role in the system development. The criteria to choose any software and hardware needed for this system development are as stated below:

3.4.1 Software

The software to be chosen must be able to fulfill the needs of the system. The criteria below have been taken into consideration:
- A web server program to handle the transaction
- A website development tool
- A database that is reliable and robust to handle multiple users

3.4.2 Hardware

For the hardware, personal computer will be needed to function as a client and servers for a website module. The minimum requirement for the personal computer is as stated below:

27

- Minimum of 128 MB RAM
- Storage media of 30GB
- Network card/ Modem
- Barcode Scanner

3.5   IMPLEMENTATION AND MODULE TESTING

For this project, the implementation that has been done is the pilot implementation. Pilot implementation is where the system is installed on selected computer and it is utilised via LAN network. For the testing purpose, the type of test to be conducted is feature test and regression test. This type of test is to test the module in order to see what will happen if the data is different than it is supposed to be.

CHAPTER 4

RESULT & DISCUSSION

4.1 INTRODUCTION

This chapter will focus on the framework that has been constructed from the data gathered based on the requirement analysis. The framework has been constructed from:

- Flowchart
- Use-case diagram
- Class diagram
- Sequence diagram

4.2 FLOWCHART

The flowchart is used to describe the flow of the system. The process starts at "Start" and end at "End" node. The rectangle represents the menu or the process of the system, and the diamond shape represents the decision making process.

4.2.1 Casting Vote Flowchart
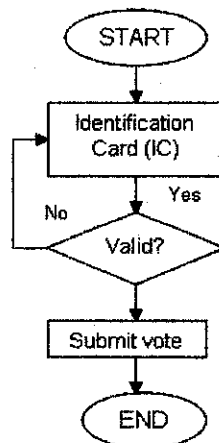
Figure 14: Casting vote

- Identification Card (IC) check

  - The officers of the election commission will check whether the electors has valid identification card.

- Validation check (Valid)

  - At this stage, if the elector identification card is valid, the student can cast the vote. If not, then the elector cannot enter the next stage.

- Submission of vote

  - For this stage, the elector will cast a vote to be put into the box provided.

4.2.2 Managing the Voting Process
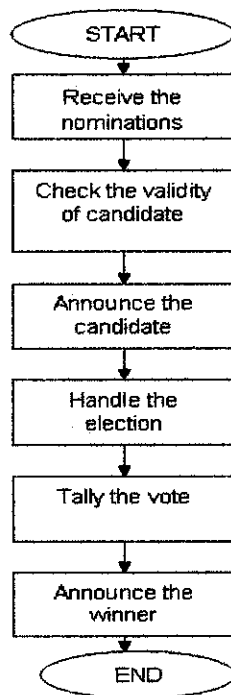
Figure 15: Managing the voting process

- Receiving Nominations

  - The election will receive nominations for the election according to the category.

- Check the Validity of Candidate

  - At this stage, the officers of election commission will check whether the candidate fulfill the requirement to be a candidate according to the Malaysian election act.

- Announce the Candidates

  - The list of the candidates is released for the public view.

- Handle Election

  - The election committee will handle the election process.

- Tally the Vote

  - The vote will be tallied at the end of time allocated to votes.

- Announce the Winner

  - The Election Commission Chairman or his appointed representative will announce the election results for all constituencies immediately after the counting of votes is completed.

4.2.3 Proposed System
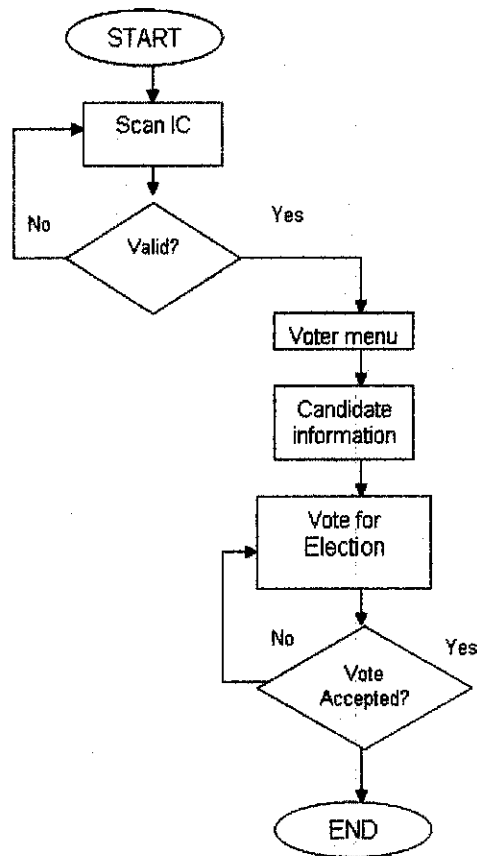
Figure 16: Flow chart of proposed system

- Scan Identification Card (IC)

  - In order to login into the system, users need to barcode given with the barcode scanner.

- Validation Check

  - If the identification is valid, voter can proceed to the next stage. Invalid user may not enter the next stage.

- Voter Menu

  -The voter menu is the main menu of the system. Here the user can browse the candidate information.

- Candidate Information

  -This menu allows the user to see the candidate information they are voting for.

- Vote for Election

  -This menu displayed the candidate to be vote and will automatically exit after two minute if the user does not cast the vote.

- Validating Vote

  - If the user does not cast the vote yet, he/she cannot complete the voting process.

4.3   USE-CASE DIAGRAM
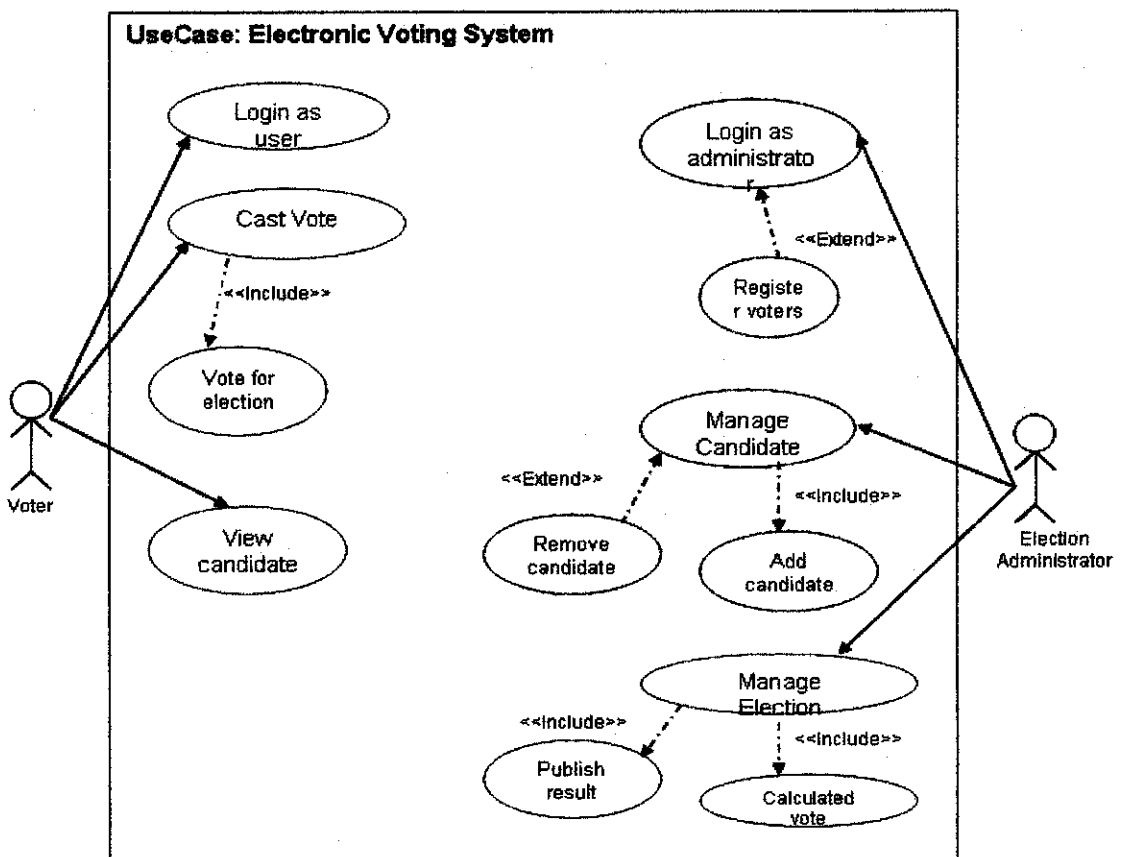
Figure 17: Use-Case Diagram for Proposed System

Figure 17 shows the use-case diagram that is being used for the Electronic Voting System. The use-case has two main actors, which are:

- Voter
- Election Administrator

The two actors are the main users for this system. Each of the actors can perform different tasks. The tasks are according to their access level, which are:

- Voter Level
    - Login as user
    - Cast vote
        - Vote for election
    - View candidate

- Election Administrator Level
    - Login as administrator
        - Register voters
    - Manage candidate
        - Remove candidate
        - Add candidate
    - Manage election
        - Publish result
        - Calculate vote
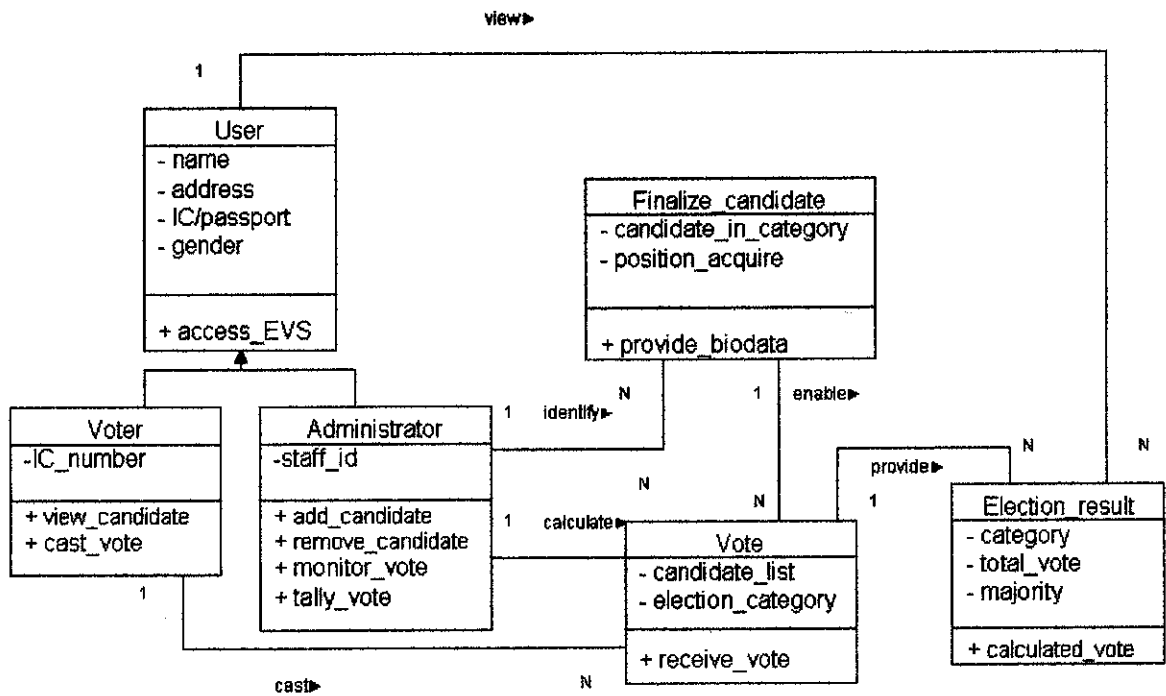
Figure 18: Class diagram

4.4 CLASS DIAGRAM

Figure 15 shows the class diagram for the proposed system. The author has created 4 main classes and 4 sub classes. The descriptions are as stated below:

- User

- This class will describe the user's detail as needed. It has been divided into two sub classes which are the registered elector and the administrator. The subclasses will describe in more detail the user type and their characteristic.

- Finalize candidate

- For this class, it will provide details about the candidates of the election.

- **Vote**

  - This class is to capture the input on the votes from the user. The data that will be stored are general election votes.

- **Election result**

  - Election result class consists of two subclasses. The main class will get the data from vote class and will tally it into final result. The subclasses are to provide statistical data on the election result and previous election data.

4.5 SEQUENCE DIAGRAM

The sequence diagrams are developed to show the movement of the information in the system. The sequence diagram for this system is focused on the main part of the system that is casting vote.
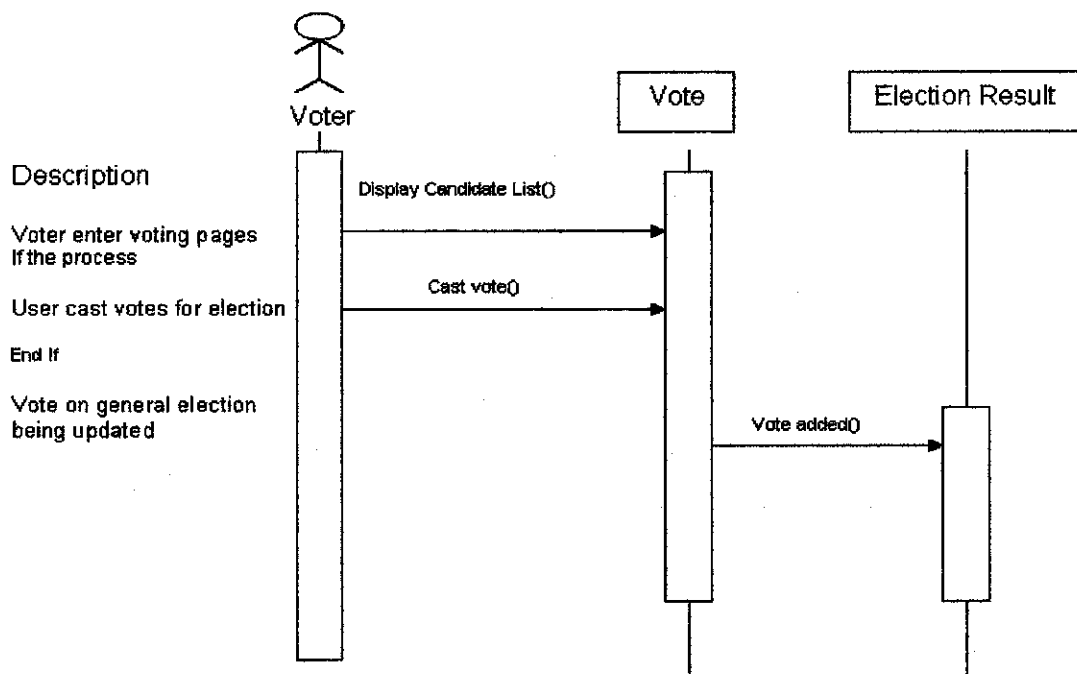
Figure 19: Casting vote sequence diagram

4.6   INTERFACE DESIGN

The interface design is a result from the analysis and the modeling that had been done. The interface for the prototype has been designed and divided to two section that are user voting page and administrator page. The interface designs are developed using the tool of:

- GNU Image Manipulation Program (GIMP)
- Notepad++
- XAMPP server package

4.6.1   User Voting Page

The user voting page consists of main page, user profile, parliament election voting page and state election voting page.

4.6.1.1 Main Page
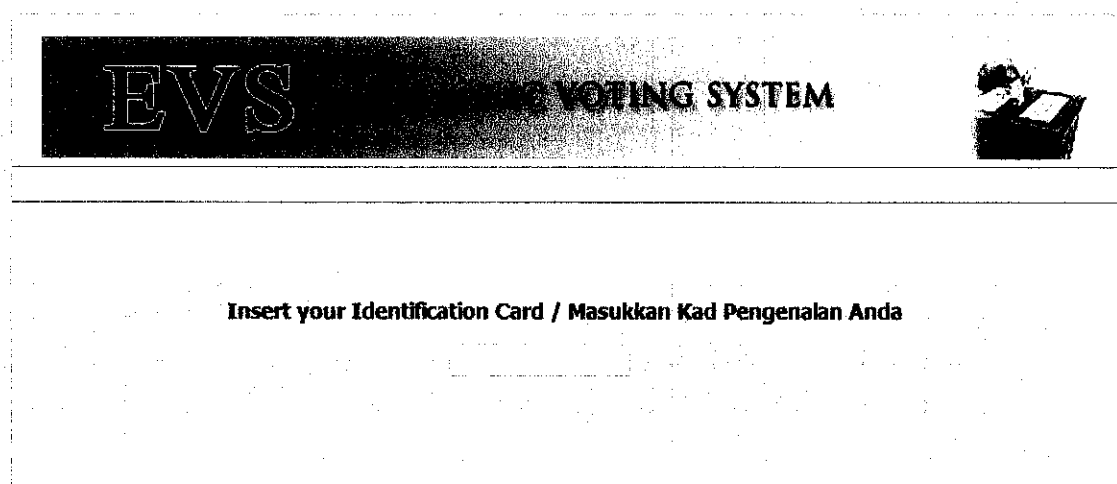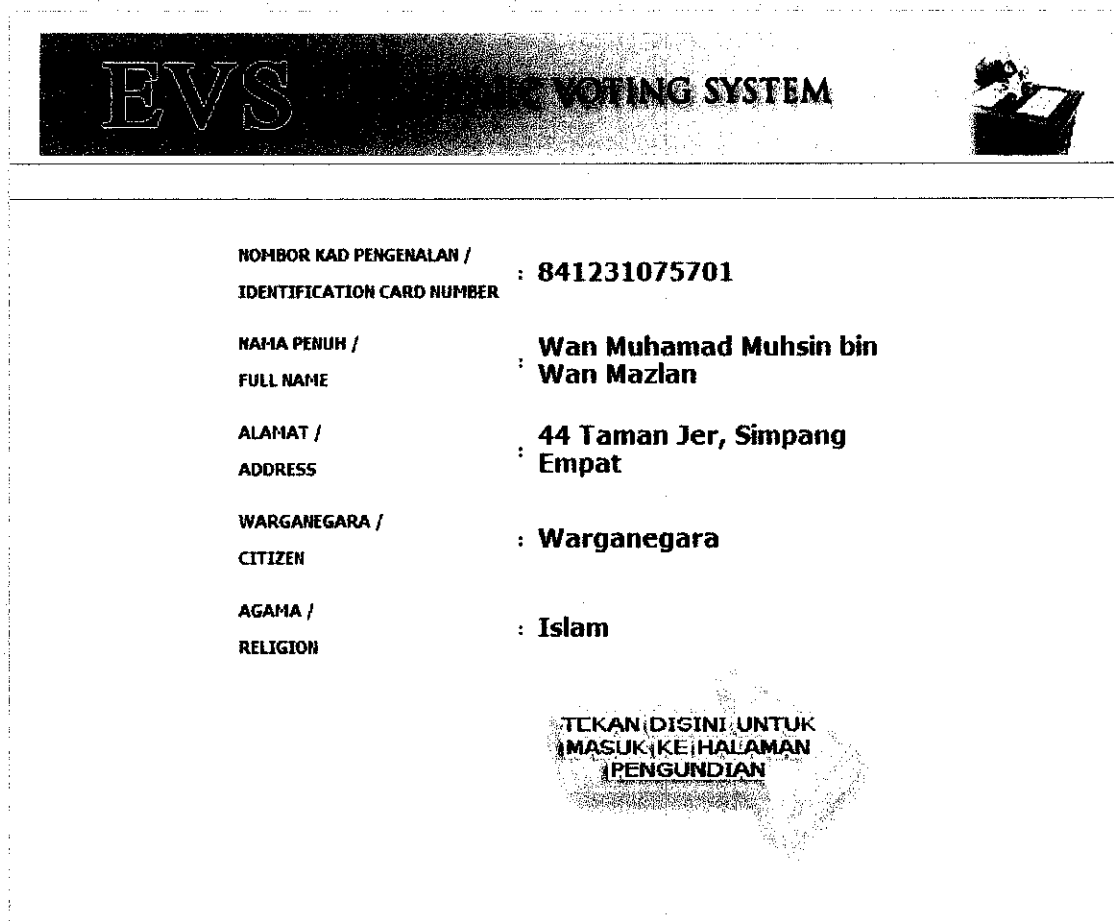
Figure 20: Main page

Main page is the page that the user will see before login to the system. The user need to insert their Mycard into the card reader to gain access. Only the user that not voted yet can proceed.

The interface that has been developed are using colour scheme of white, blue, and light blue. The reasons of this colour scheme being chosen are it will provide the viewer a relaxing view. The edge of the system screen is smoothen to minimize sharp edges.

4.6.1.2 User Information Page

NOMBOR KAD PENGENALAN / IDENTIFICATION CARD NUMBER	: 841231075701
NAMA PENUH / FULL NAME	: Wan Muhamad Muhsin bin Wan Mazlan
ALAMAT / ADDRESS	: 44 Taman Jer, Simpang Empat
WARGANEGARA / CITIZEN	: Warganegara
AGAMA / RELIGION	: Islam

TEKAN DISINI UNTUK MASUK KE HALAMAN PENGUNDIAN

Figure 21: User information page

The users information inside the mycard will appear and user can view the information. The use need to click on the "Tekan disini untuk masuk ke halaman pengundian" or being pronounced in English after roll over "Click here to proceed" to proceed to the voting page. See Figure 21 and Figure 22 for further information.

Figure 22: Rollover on the mouse

4.6.1.3 Parliament Voting Page

Figure 23: Parliament voting page

At this page the user can view the candidate according to their registered voting place. For example, if the elector from Jeli than the elector can view the candidate from Jeli even though he is voting in Kuala Lumpur. By doing this is allow the elector the comfort to vote at other voting station but still voting for their candidate.

Click to Vote

In order to vote, the electors need to click on button "Tekan disini untuk mengundi / Click here to vote" to cast the vote.

Confirmation on Vote

The prototype will ask the user for confirmation whether to proceed or not. The prototype will only proceed when the user given the confirmation. See Figure 24.
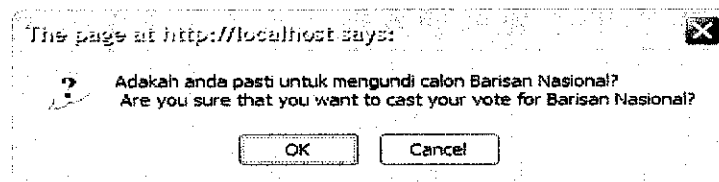
Figure 24: Confirmation on voting

Skip from Voting

The elector also can choose not to vote by clicking on the "Tidak mengundi – Not Voting", by clicking on this button the user will skip to vote for parliament and proceed to the state election page.

4.6.1.4 Confirmation of Voting on Parliament Page
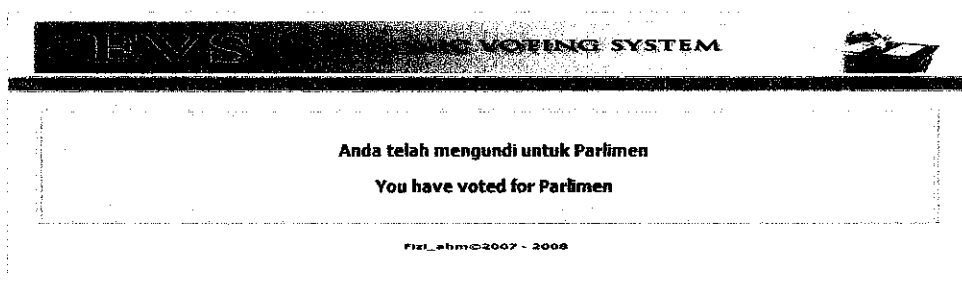
Figure 25: Confirmation of Voting on Parliament Page

This page will appear to indicate that the user has vote for parliament. After 5 second the page will change and proceed to the state election page.

4.6.1.5 State Election Page
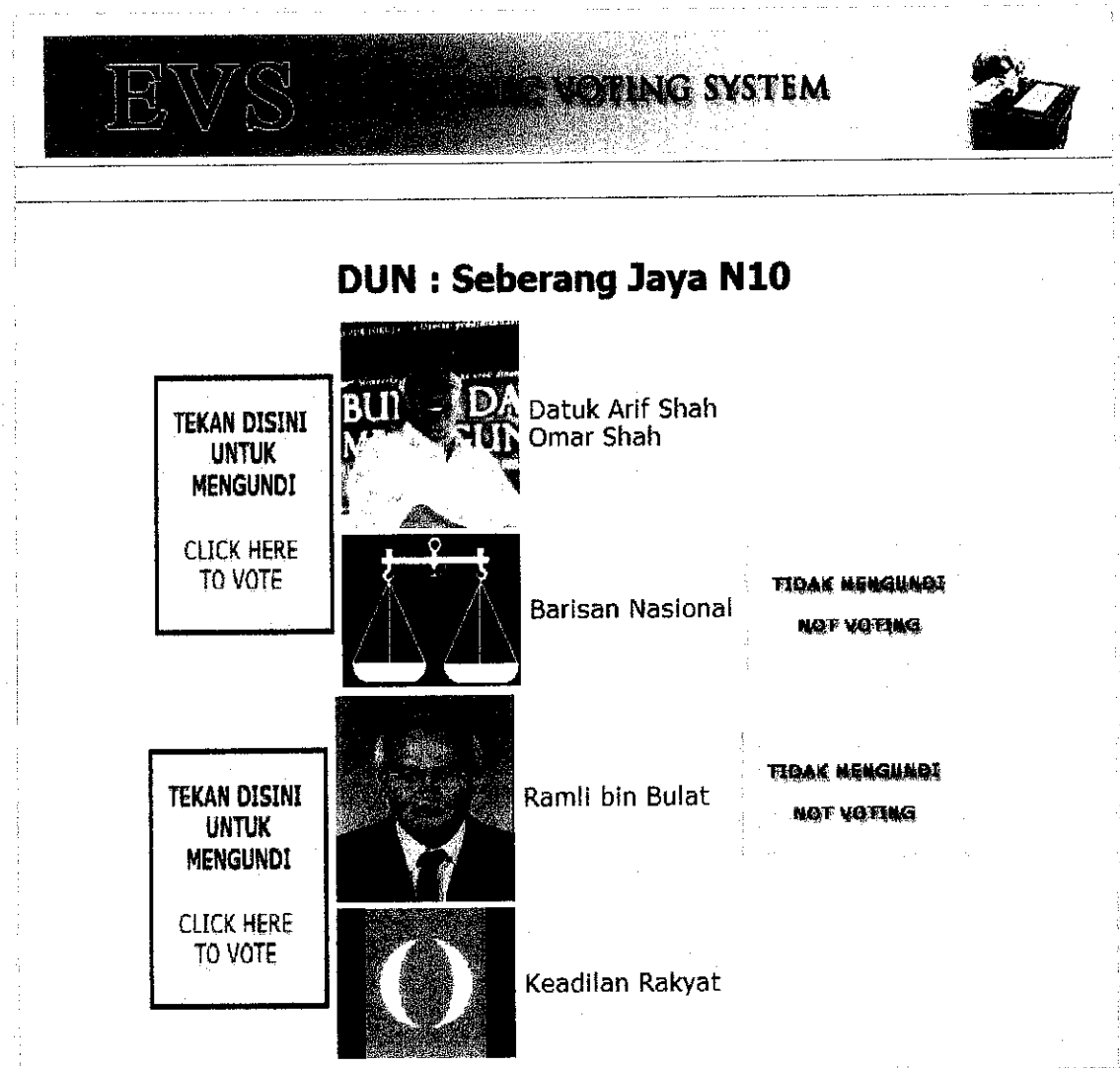
Figure 26: State election page

This page operate as same as the previous voting page that is parliament voting page. The elector can choose to vote or skip from voting for the state election.

4.6.1.6 End- Page for Voting
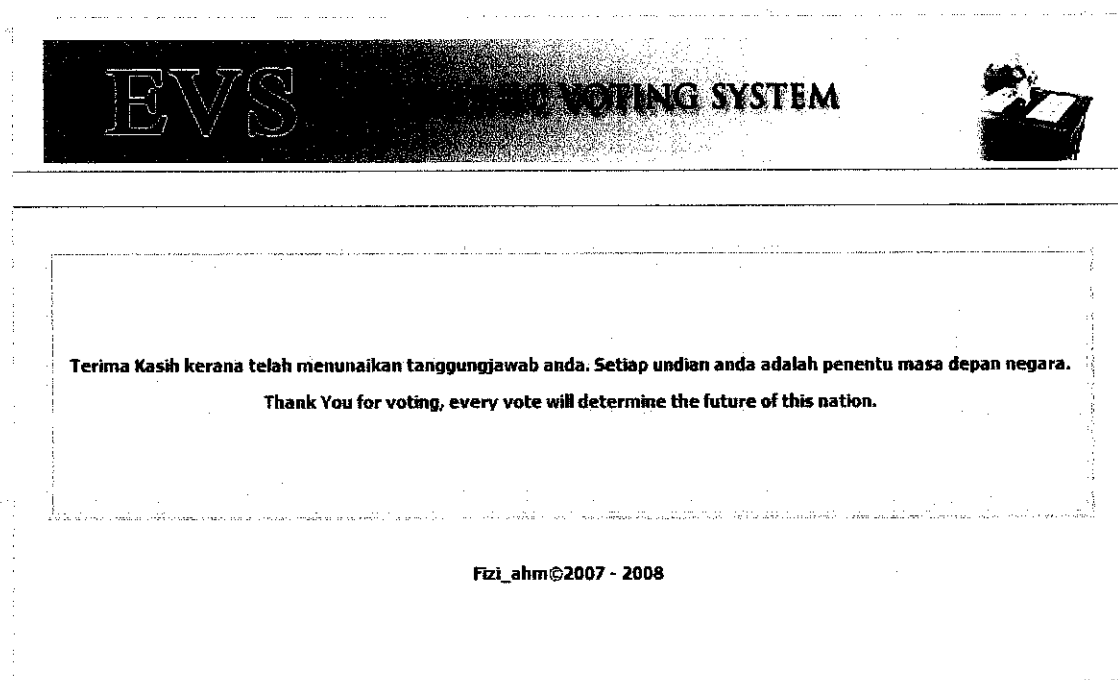
Figure 27: End-page of voting

This page will appear after the user has completed the voting in the Malaysian General Election. The page will automatically refresh and transfer to the main page after 5 second.
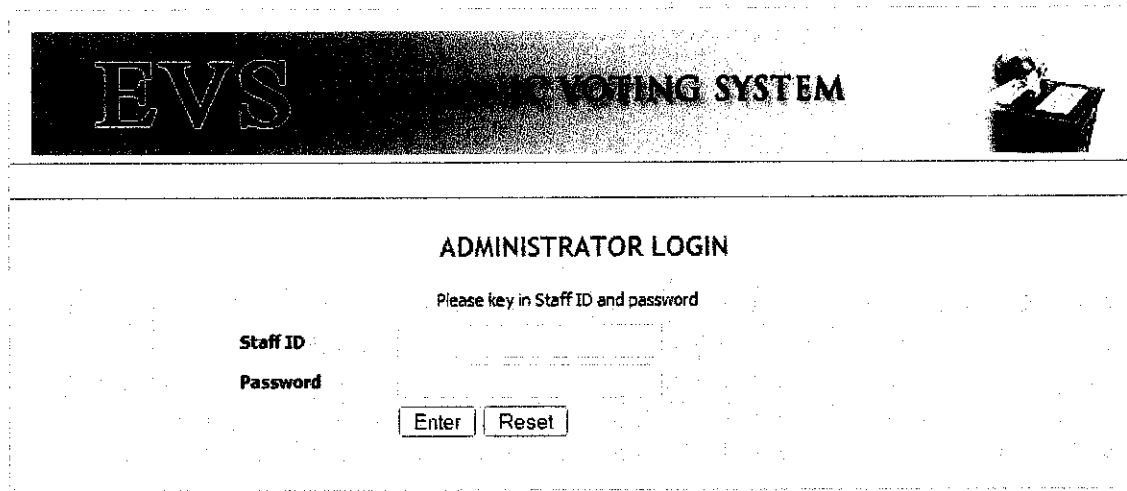
4.6.2 Electronic Voting System Administrator Page

The administrator page allows the election commission officer to monitor, and insert the user and the candidate for the election. For the administrator menu, the menu is divided according to the function that is:

- User Registration
- Candidate Registration
- Result

Figure 29 will show how the content of the page being represent.

42

4.6.2.1 Login to Administrator Menu
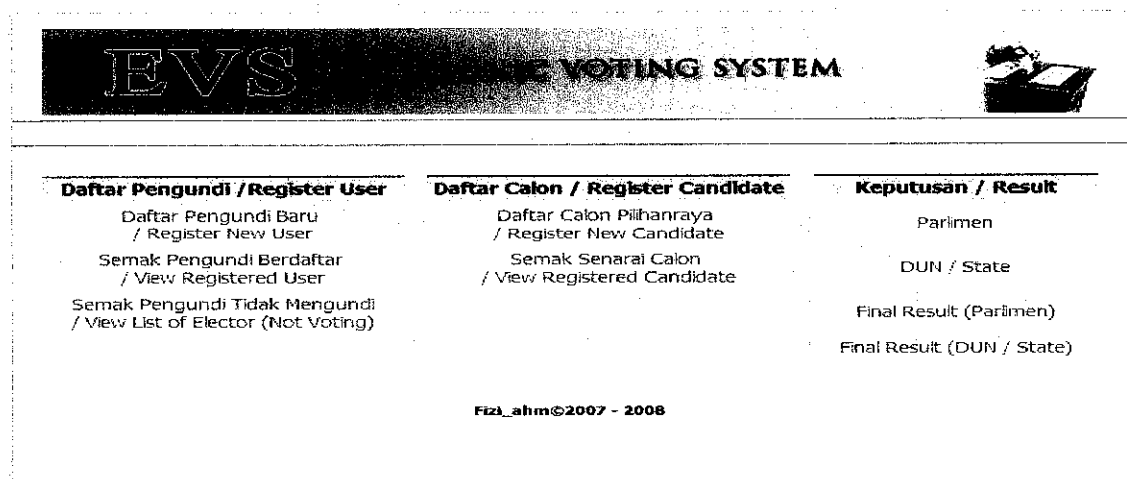
Figure 28: Administrator login page

The administrator login page allows the election commission officer to enter to the administrative menu. The user needs to enter their staff identification number and password to proceed.

4.6.2.2 Administrator Page Main Menu

Figure 29: Administrator main menu page

43

The administrator menu is divided to three main parts that is register user, register candidate and result menu.

4.6.2.3 Register User: Voters Registration

Figure 30: Voters registration

This page allows the election commission officers to register the voters according to their place of origin.

4.6.2.4 Register User: View Registered User

Figure 31: View registered user

For this page, the election commission officers can view the register user based on their placed of voting. After click on the search button the result will appear.

Figure 32: Result on registered user search

The result for the search will display the registered user information for the selected territory.

4.6.2.5 Register User: View List of Elector (Not Voting)

Figure 33: List of Elector (Not Voting)

This page allows election commission officer to view the list of electors that did not cast the vote for the election. The data can be search according to the territory of

voting and it is useful for the election commission to come out with the percentage of voting. The result can be view as shown at Figure 34.
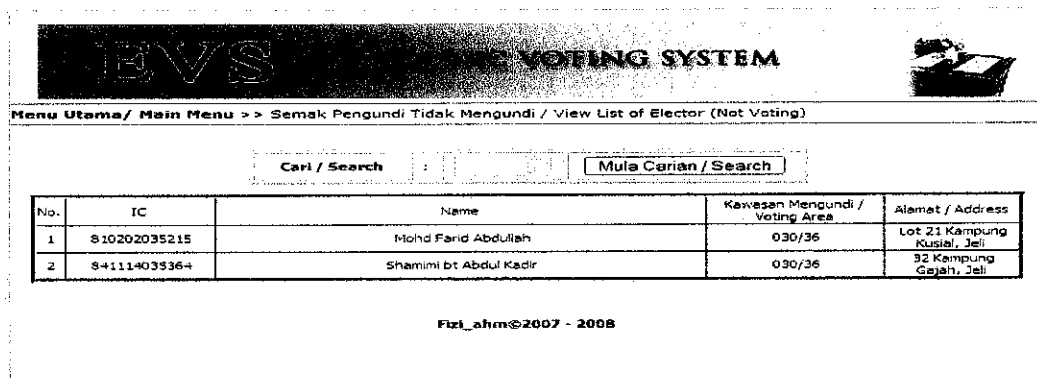
Figure 34: Search result for user that not voting

4.6.2.6 Register Candidate
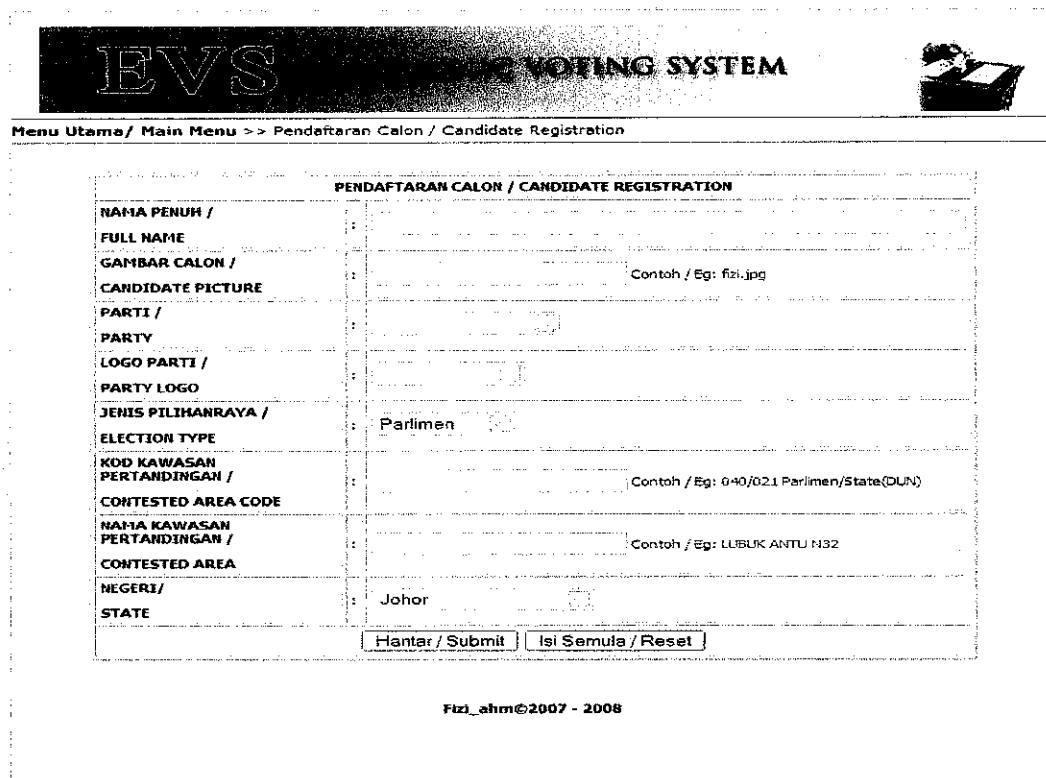
Figure 35: Register new candidate

46

At this page, the election commission officers can register the candidate that being accepter as a candidate at the nomination day. The candidate details can be insert into the system at this page.

4.6.2.7 Parliament Seat According to State

In order to view the result, the user needs to select the state to view by clicking on the state name. See figure 36.
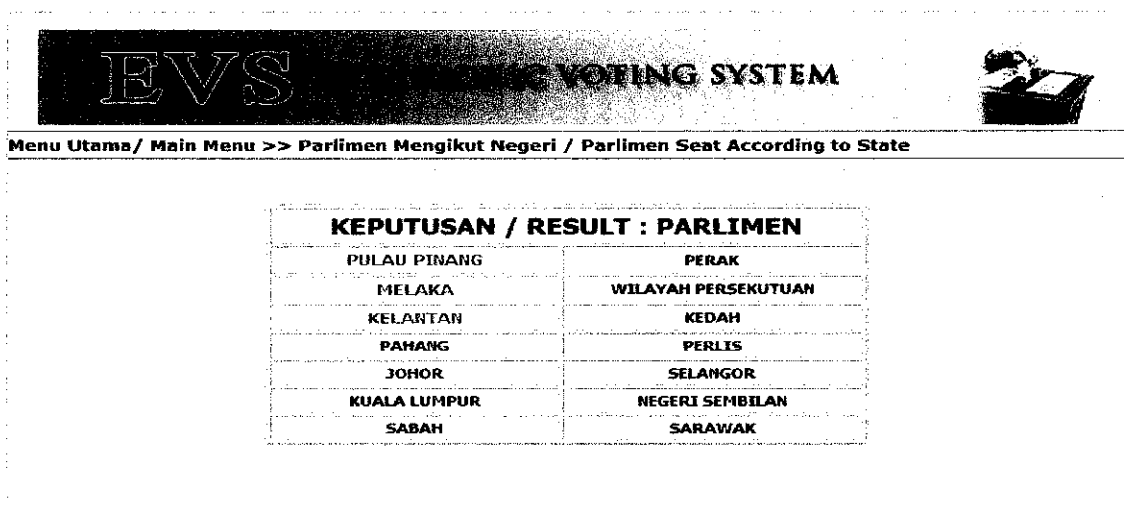
Figure 36: Parliament election result by state
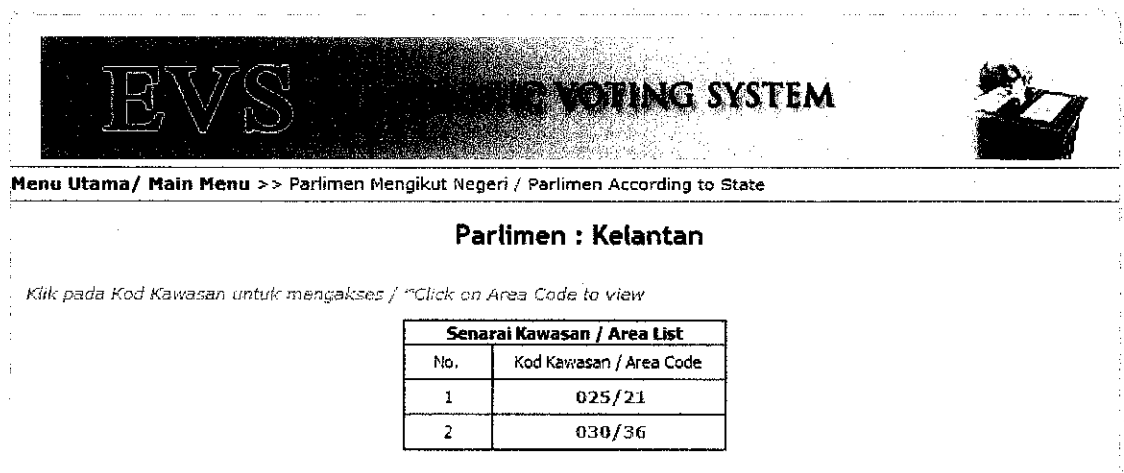
Figure 37: Area list according to state

47

After clicking on the name of the state, list of area for the state will appear. See Figure 37. User need to click on the area code to proceed.

Figure 38: Current result for election on parliament

This page will display the current result of election on parliament based on the area. The page will keep refreshing every 20 second to get the current result. The final result will be sent to the main database after the election is end.

4.6.2.8 State Seat According to State

In order to view the result, the user needs to select the state to view by clicking on the state name. See figure 39.
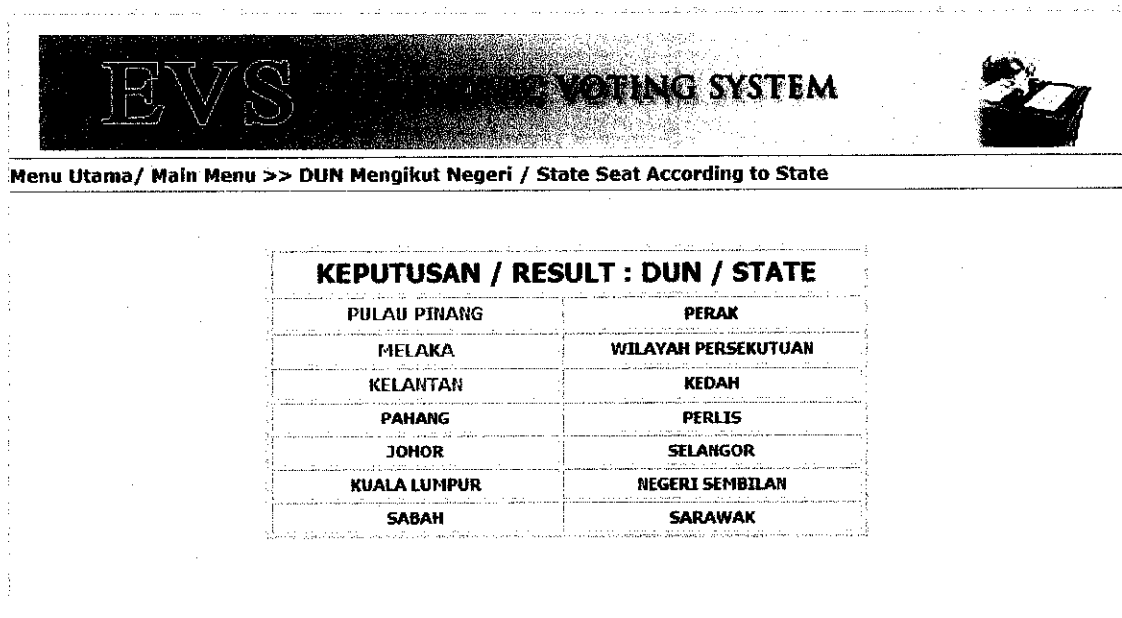
Figure 39: State election result by state
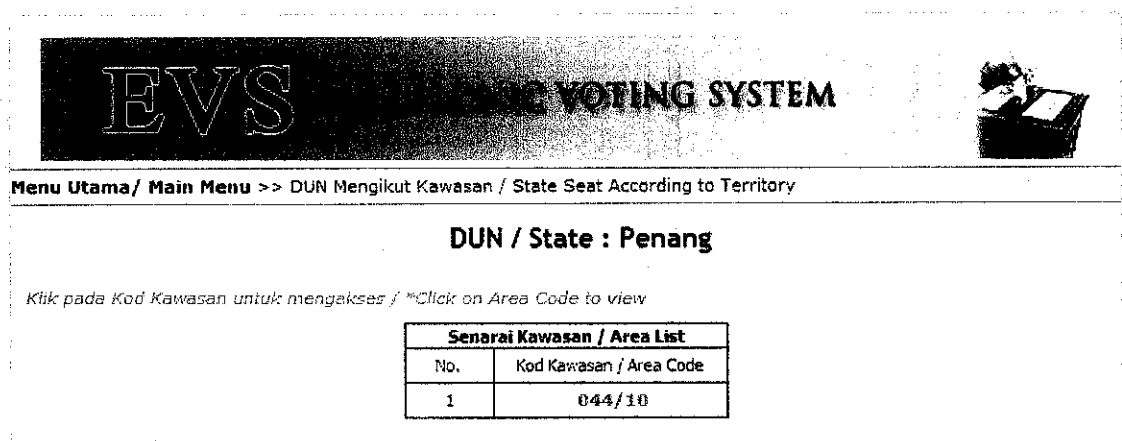
Figure 40: Area list for state election according to state

After clicking on the name of the state, list of area for the state will appear. See Figure 40. User need to click on the area code to proceed.

DUN / State : Penang 044/10

	Nama Calon / Candidate Name	Kawasan / Area	Parti/ Parti	Jumlah Undi / Total Vote
1	Datuk Arif Shah Omar Shah	Seberang Jaya N10		12

	Nama Calon / Candidate Name	Kawasan / Area	Parti/ Parti	Jumlah Undi / Total Vote
2	Ramli bin Bulat	Seberang Jaya N10		4

Pemenang / Winner	:	Datuk Arif Shah Omar Shah	
Majoriti / Majority	:	8	

Figure 41: Current result for election on state

This page will display the current result of election on parliament based on the area. The page will keep refreshing every 20 second to get the current result. The final result will be sent to the main database after the election is end.

4.6.2.9 Final Result of Election for Parliament

KEPUTUSAN / RESULT: PARLIMEN

No.	Nama Calon / Candidate Name	Parti / Party	Kod Kawasan/ Area Code	Kawasan/ Area	Jumlah Undi / Total Vote	Majoriti / Majoriti
1	Datuk Seri Dr Fong Chan Onn	Barisan Nasional	135/09	Alor Gajah P135	23	8
2	Datuk Mustapa Mohamed	Barisan Nasional	030/36	Jeli P030	28	22
3	YB Datin Seri Dr Wan Azizah Wan Ismail	Keadilan Rakyat	044/10	Permatang Pauh P044	45	12
4	Nasharudin Mat Isa	Pas	025/21	Bachok P025	8	3

JUMLAH KERUSI DIMENANGI / TOTAL SEAT WON

BARISAN NASIONAL	PAS / DAP / KEADILAN RAKYAT
2	2

ftzl_ahm©2007 - 2008

Figure 42: Final result of election for parliament

Figure 42 show the result of election for parliament seat. The result will be included from all state of Malaysia.

50

4.6.2.10 Final Result of Election for State

Figure 43: Final result of election for state

Figure 42 show the result of election for state seat. The result will be for the according to the state that has been selected.

4.7 QUESTIONNAIRE RESULT

These questionnaires are to discover the voter perception on the current election system in Malaysia. The questionnaire has been divided into 4 sections. For section A consist of 3 question, section B consist of 6 question, section C consist of 4 question and section D consist of 1 question. The questionnaire has been distributed to a group of 100 peoples from different field in of work around Tronoh and the result as below.

4.7.1 Section A

This section gathers data about the background of the sample elector. The Figure 44 shows the statistic of the elector background for the field of work. The largest number of people answering the questionnaire is from the support group.

51
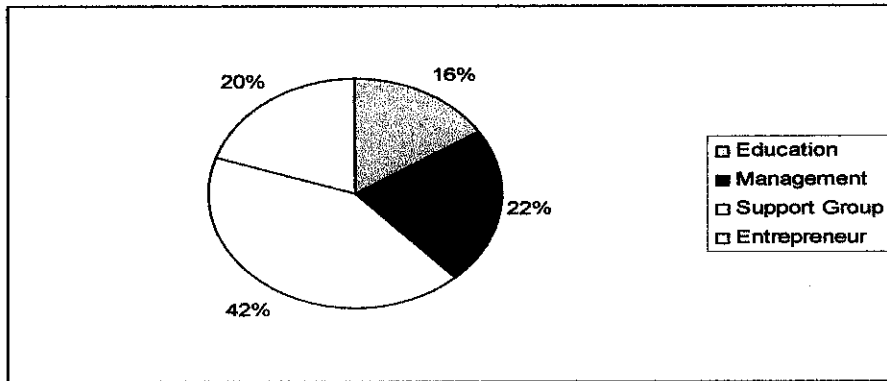
Figure 44: Field of work

The second question is about the elector age group. Data from Figure 45 shows that most of the electors who answer this questionnaire are from age 30-38.
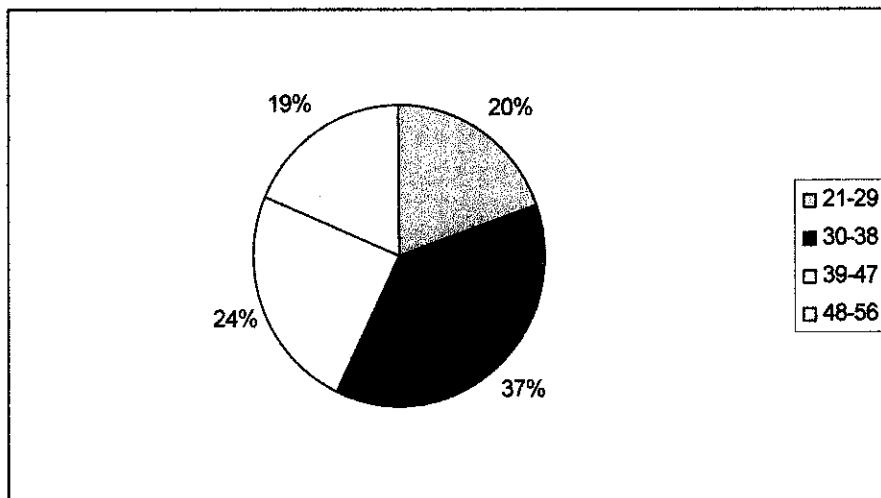
Figure 45: Age group

4.7.2   Section B

The questionnaire for this section is to know the user evaluation on the current election process. There are 6 questions on this section.

1. Do you think that current election process is the best voting system in order to select the representatives?

From this question, the data shows that the percentage of people judge the current election system as quite worst are high compared to others.
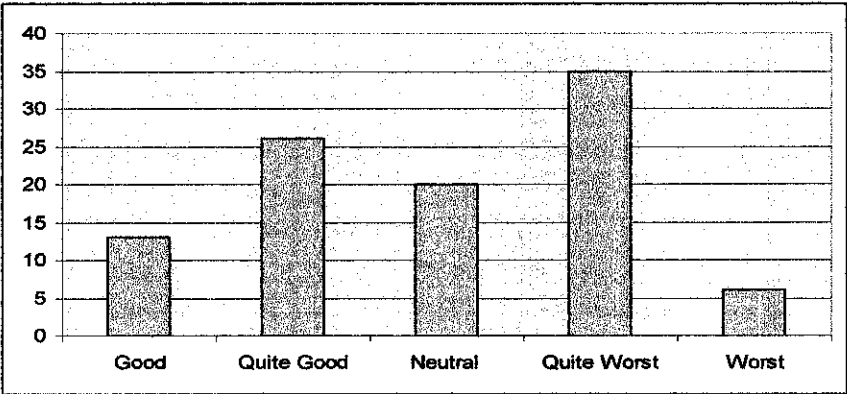
Figure 46: Evaluation on current election process

2. Have you ever cast voted for the general election?

For this question, majority of the answer shows that they has vote for the general election. Most of the answers indicate that that had vote at least two times.
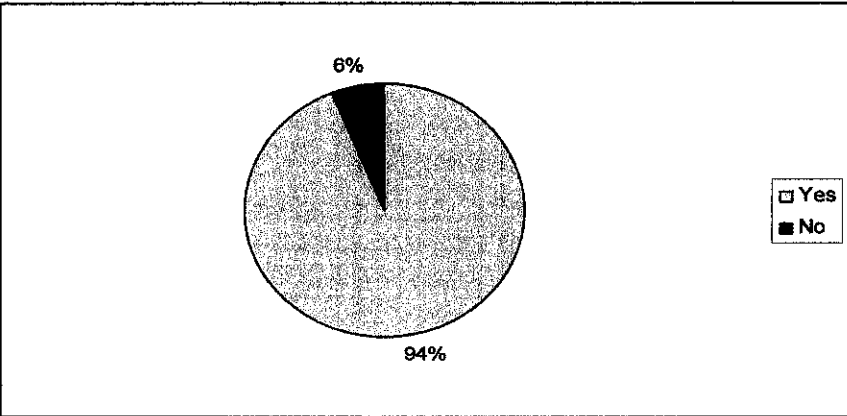
Figure 47: Comparison between people who cast vote and not

3. Are you satisfied with the current election process? (Please comment your answer)

For this question, most of the respondents answer yes but most of the comments indicate that they are not satisfied with the time that they had to spend to queue up to vote. See Figure 48 for details.
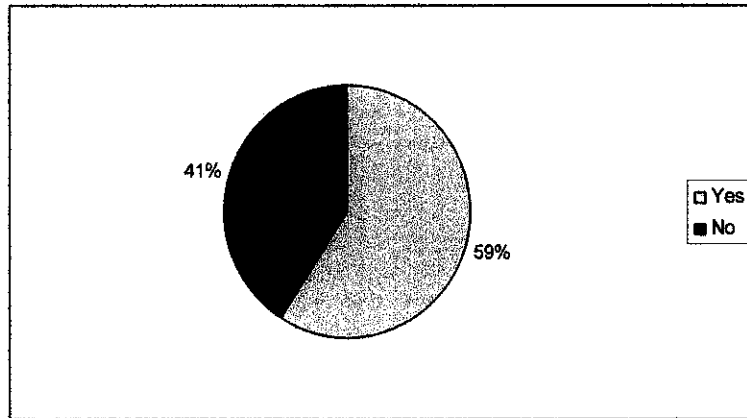
Figure 48: Satisfaction indicator

Questions 4 are as stated in the table below and the result are stated below of each question.

Questions	Strongly agree disagree				Strongly
I found it very comfortable to use the current system.	1	2	3	4	5
Choose 2 – 33.9% Choose 3 – 22.5% Choose 4 – 43.6%					
The election result can be found easily.	1	2	3	4	5
Choose 1 – 100%					
The election statistic can be found easily.	1	2	3	4	5
Choose 2 – 50% Choose 4 – 50%					
The candidate background can be found easily.	1	2	3	4	5
Choose 3 – 6% Choose 5 – 96%					
I am excited to cast vote.	1	2	3	4	5
Choose 3 - 100%					

Table 1: User perception on current election

54

Based the data gather from Table 1, most of the respondents choose not to agree and being neutral for most of the questions. This can be interpreted that they are not quite happy on the current system used in Malaysia.

5. How much time do you consumed to cast vote on the general election?

For this question, most of the answers given are about 10 and 15 minute. Figure 49 will show the data gathered.
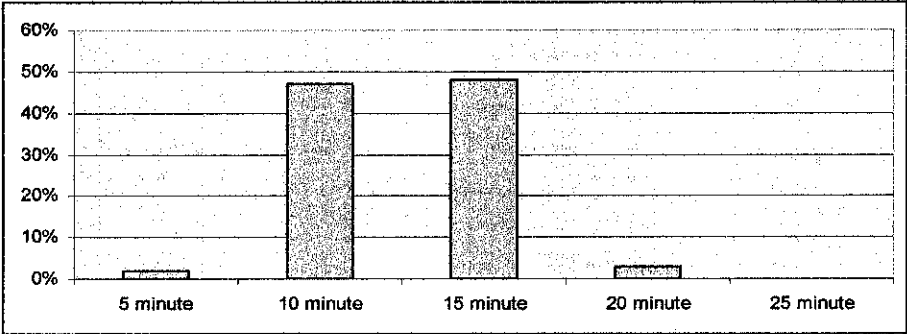
Figure 49: Time taken to cast vote

6. How do you rate the current system in term of efficiency, easiness, time used and information available?

Most of the respondents answered 'inefficient' for the given question. This shows that the current system needs a lot of improvement in term of efficiency, easiness, time used and the information given. Figure 50 shows the result.
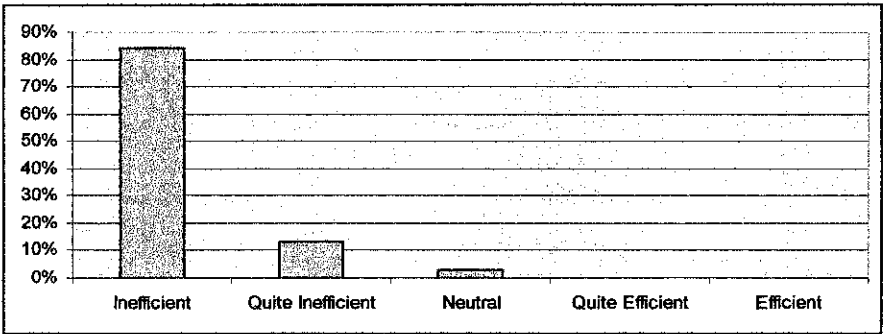
Figure 50: User rating on current election process

55

4.7.3 Section C

1. Have you heard of Electronic Voting System?

For this question, 86% of the answer are yes and 14% are no. It can be said the respondent has knowledge about the system. The results are as shown on figure 51.
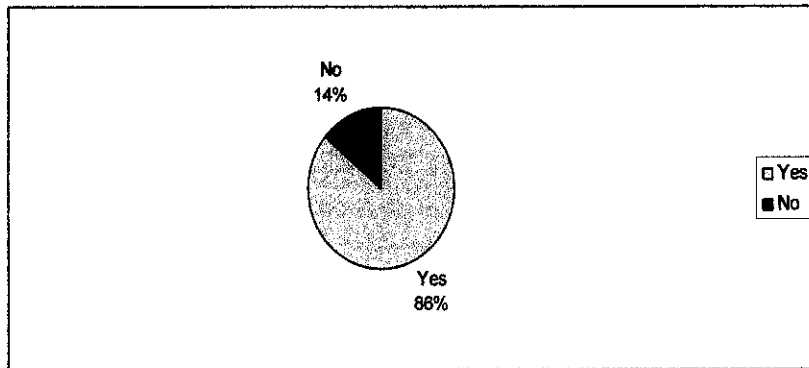
Figure 51: Knowledge on the electronic voting system

2. Have you heard that Electronic Voting System is being implemented (anywhere)?

77% of respondent has chosen yes for their answer and 23% has chosen no. For the question where the system has been implemented, almost all has answered United States and the rest does not know. Details are on figure 52.
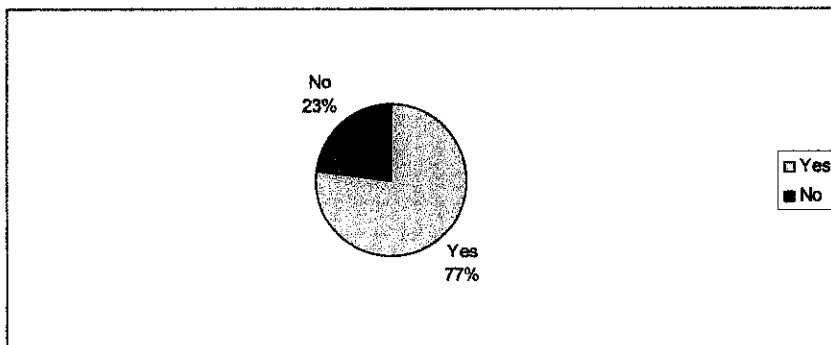
Figure 52: Knowledge on electronic voting system implementation

3. Do agree if the Electronic Voting System is to be implemented in Malaysia?

The results for this question are 68% yes and 32% no. For the answer "yes", the respondent expected that the new system would be more efficient and save time and for the answer "no", they afraid of the level of transparencies and the integrity of the system. Figure 53 display the details.
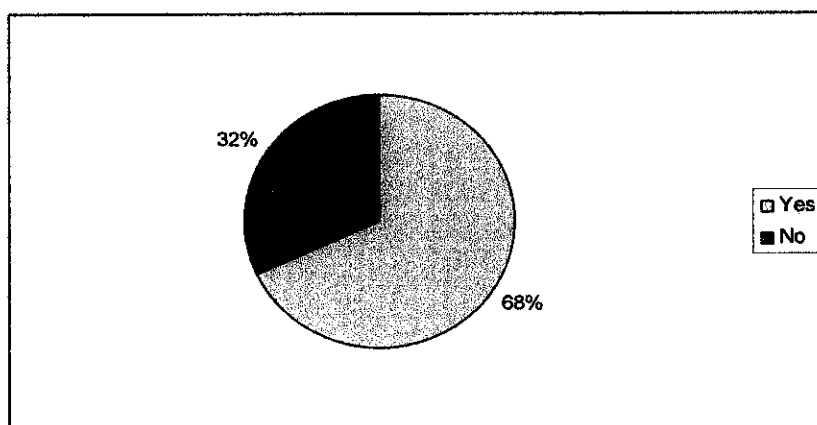
Figure 53: Respond on whether the electronic voting system is needed

Question 4 is when the user answers no as an answer on question 3. The results are as shown below.

The current system is the best   [   ] **30%**

I don't cast vote anyway   [   ]

I am phobia of the unknown   [   ]

There is a system now, why bother for new one   [   ] **53%**

Security and integrity issue regarding electronic system   [   ] **17%**

4.7.4   Section D

The question on this section asked what the user expects from the electronic voting system. Most of the answers prompted to an effective and easy to use system.

4.7.5 Conclusion for Questionnaire

Based on the result gather from the questionnaire, the correspondent views on the electronic voting system are supporting the idea of implementing the electronic voting system for Malaysian General Election. In the sense of age group, the correspondent age from 21- 45 are the most people that supporting the implementation of electronic voting system.

Most of the correspondent answer that they are not satisfied with the current voting system. This can be seen from their answer on time taken to cast the votes and the efficiency of the system.

For the correspondent that did not agree with implementation of the electronic voting system, most of the them concern about the security and the transparencies of the electronic voting system.

As for conclusion, the questionnaire is based on the goal set to get the user perceptive on the current general election system and the electronic voting system and the result are encouraging. The results give the indication on what characteristic and feature needed for the electronic voting system.

CHAPTER 5

CONCLUSION & RECOMMENDATION

5.1   CONCLUSION

'Electronic Voting System vs. Traditional Voting System' is a research that is done to find out why most that the traditional voting system is the choice compared to the electronic voting system. At the end of this research, prototype of electronic voting system is develop. The prototype is to enhance the transparent of an election system, provide the convenience for voters and limit the usage of paper. The main function of the prototype is to allow the voters to view the candidate and vote for the election.

The development of the prototype is not only taken the electronic way but also used the traditional way in the characteristic of the prototype develop. Furthermore, the prototype can improve the transparencies of the election system and make it convenience.

At the government end, the prototype can improve the delivery system and the public service by minimize the time and complain from the public. Malaysian first class facilities without a good delivery system such as the good election system will not give a good image for the country. Therefore by applying fully ICT environment in the election will smoothen and increased the integrity of the election system.

5.2   RECOMMENDATION

The recommendation need to be made for the system as below:

i.   "Let's Put a Human Face to Voting System" means that the system must be user friendly and easy to understand as if the system can speak to the user.

ii.   Promote the use of e-voting outside public elections, so as to familiarize people with e-voting.

iii. Continue research and systems development with a view to

- Addressing security risks by assessing new threats, to maximize the security of e-voting systems

- Reducing opportunities for "family voting" and vote buying in remote voting procedures.

iv.   Give Education to the oldest on how to work with E-Vote.

v.   Advertisement in media on how to use the system what should there prepare to avoid problem.

REFERENCE

[1]   Ghassan Z. Qadah & Rani Taha. Electronic voting systems: Requirements, design, and implementation, July 2006. [Available On Line]
http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6TYV-4KGG6081&_user=1196560&_coverDate=03%2F31%2F2007&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000048039&_version=1&_urlVersion=0&_userid=1196560&md5=dabf16ab61bc5c7e2b19194a6a79c06c#secx1

[2]   Gianluca Dini (2003) Future Generation Computer System: A secure and available electronic voting service for a large scale distributed system, 69-85

[3]   Zhengxiang Pan and Jeff Heflin, A Model Theoretic Semantics for Distributed Ontologies that Accounts for Versioning, 1-20.

[4]   Blind and visually impaired will be able to cast secret ballots. [Available On Line] http://www.abc.net.au/worldtoday/content/2007/s2005681.htm

[5]   Postnote: Online Voting. UK Parliamentary Office of Science and Technology, May 2001, Number 155, pp. 1 – 4. [Available On Line]
www.parliament.uk/post/pn155.pdf.

[6]   Report on national workshop on internet voting : Issues and research agenda (2001), Internet policy institute, 1-59.

[7]   Ronni Dugger "Annals of Democracy - Counting Votes," *The New Yorker* , November 7, 1988, p 40

[8]   Eric A. Fischer, Senior Specialist in Science and Technology Resources, Science, and Industry Division : CRS Report for Congress, December 14, 2005

61

[9]   ManuelAlvarez, Brazil election system: Documento actualizado, al 28 de octubre
        de 2007

[10]   Sheldon Bradshaw, Deputy Assistant Attorney, General Office of Legal Counsel.
        "Barden v. City of Sacramento", 292 F.3d 1073, 1076. October 10, 2003

[11]   Tom Garritano, National Science Foundation: Internet Voting is no "Magic
        Ballot", 2007

[12]   California Internet Voting Task Force, A report on the feasibility of Internet
        voting, January 2000.

[13]   Dridi F., Pernul G., Sabol T., "The Webocracy Project: overview and security
        aspects," WM 2001, Baden-Baden, 2001.

[14]   David Chaum: SureVote: Technical Overview, Proceedings of the Workshop
        on Trustworthy Elections (WOTE '01), presentation slides, August 2001.

[15]   Robert Krimmer (Ed.): Electronic Voting 2006 2nd International Workshop Co-
        organized by Council of Europe, ESF TED, IFIP WG 8.5 and E-Voting.CC
        August, 2nd – 4th, 2006 in Castle Hofen, Bregenz, Austria

[16]   Rubin, A. White-Hat Security Arsenal. Addison-Wesley, Boston, 2001.

[17]   Aviel D. Rubin. Security Considerations for Remote Electronic Voting,
        December 2002/Vol. 45, No. 12

[18]   Chris Armen & Ralph Morelli. EVoting and Computer Science: Teaching About
        the Risks of Electronic Voting Technology, 2006.

[19] K. Saleh, Specifications of a mobile electronic voting system and a mobile agent platform, Proceedings of IADIS e-Society, Lisbon, Portugal (June 2003), pp. 281–287.

[20] Undang-undang Malaysia, Akta 5: Akta kesalahan pilihanraya 1954

[21] Suruhanjaya Pilihanraya Malaysia (Election Commission of Malaysia) [Available On Line]
http://www.spr.gov.my/index/news.htm

APPENDICES

APPENDIX A

Comparison between Electronic Voting System and Traditional Voting System

The objectives of this questionnaire are to discover the people perception on the current general election. The current systems used in Malaysia are the traditional voting system where the vote has to cast vote on the paper ballot. The proposed system is electronic voting system where user can cast vote by using computers.

Thank you for your effort and kindness in order to complete this form.

Section A: Background study

Select the appropriate answer

1. Field of work   :   Education   Management   Support Group
   Entrepreneur

2. Age group   :   21-29   30-38   39-47   48-56

Section B: Current System Evaluation

Please fill in the blanks or tick in the selected boxes provided where necessary

1. Do you think that current election process is the best voting system in order to select the representatives?
Please rate your answer.

```
├──────────┼──────────┼──────────┼──────────┤
```
Worst   Neutral   Good
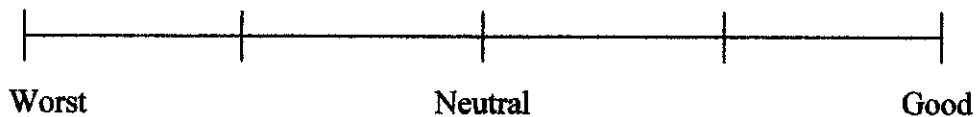
2. Have you ever cast voted for the general election?

          YES [   ]   NO [   ]

          If your answer is 'NO', please proceed to Question on the section C

          If yes, how many times: _____

1

3. Do you satisfied with the current election process? (Please comment your answer)

YES [   ]   NO [   ]

_____

_____

4. Based on the current voting system used in Malaysia:

Circle the appropriate number on the scale from 1 to 5 based on how strongly you agree or disagree with the statement.

Questions	Strongly agree Strongly disagree				
I found it very comfortable to use the current system.	1	2	3	4	5
The election result can be found easily.	1	2	3	4	5
The election statistic can be found easily.	1	2	3	4	5
The candidate background can be found easily.	1	2	3	4	5
I am excited to cast vote.	1	2	3	4	5

5. How much time do you consumed to cast vote on the general election?

|———————|———————|———————|———————|———————|

5 minute   10 minute   15 minute   20 minute   25 minute
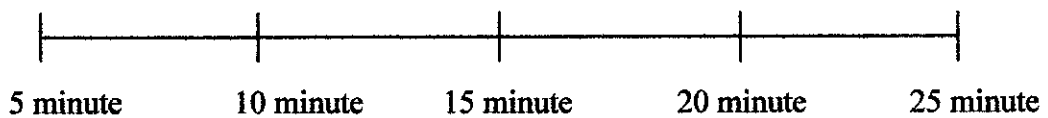
6. How do you rate the current system in term of efficient, easy, time used and information available?

|———————|———————|———————|———————|

Inefficient   Neutral   Efficient

2
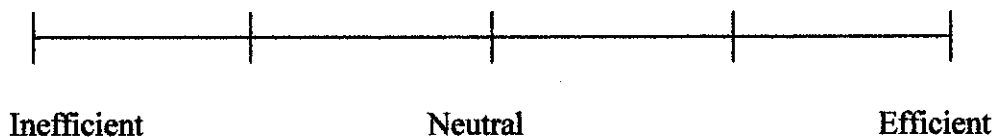
Section C: Awareness on Electronic Voting System and Traditional Voting System

Please fill in the blanks or tick in the selected boxes provided where necessary

1. Have you heard of Electronic Voting System?

        YES [   ]   NO [   ]

        If your answer is 'NO', please proceed to Question 3

2. Have you heard that Electronic Voting System is being implemented (anywhere)?

        YES [   ]   NO [   ]

        IF Yes, where: _____

3. Do you agree if the Electronic Voting System is to be implemented in Malaysia?

        YES [   ]   NO [   ]

        Reason:

        _____

        _____

4. If your answer in question 4 is no, what lead to your decision? (Please select one)

    I don't cast vote anyway   [   ]

    I am phobia of the unknown   [   ]

    There is a system now, why bother for new one   [   ]

    Security and integrity issue regarding electronic system   [   ]

    Others (please specify):_____

Section D: Please enter your opinions and comments

1. What do you expected from the Electronic Voting System?

_____

_____

APPENDIX B

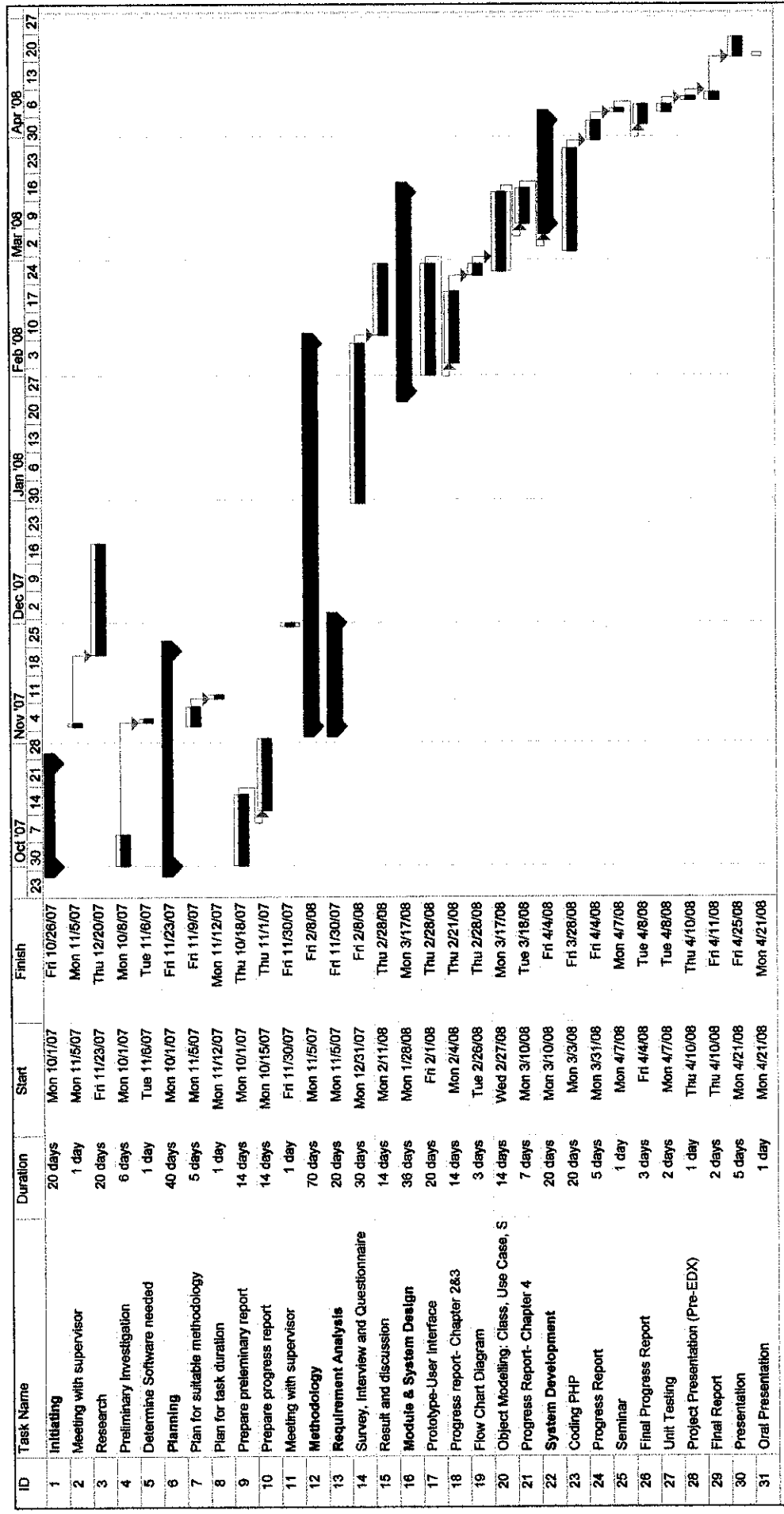| ID	Task Name	Duration	Start	Finish
1	Initiating	20 days	Mon 10/1/07	Fri 10/26/07
2	Meeting with supervisor	1 day	Mon 11/5/07	Mon 11/5/07
3	Research	20 days	Fri 11/23/07	Thu 12/20/07
4	Preliminary Investigation	6 days	Mon 10/1/07	Mon 10/8/07
5	Determine Software needed	1 day	Tue 11/6/07	Tue 11/6/07
6	Planning	40 days	Mon 10/1/07	Fri 11/23/07
7	Plan for suitable methodology	5 days	Mon 11/5/07	Fri 11/9/07
8	Plan for task duration	1 day	Mon 11/12/07	Mon 11/12/07
9	Prepare preliminary report	14 days	Mon 10/1/07	Thu 10/18/07
10	Prepare progress report	14 days	Mon 10/15/07	Thu 11/1/07
11	Meeting with supervisor	1 day	Fri 11/30/07	Fri 11/30/07
12	Methodology	70 days	Mon 11/5/07	Fri 2/8/08
13	Requirement Analysis	20 days	Mon 11/5/07	Fri 11/30/07
14	Survey, Interview and Questionnaire	30 days	Mon 12/31/07	Fri 2/8/08
15	Result and discussion	14 days	Mon 2/11/08	Thu 2/28/08
16	Module & System Design	36 days	Mon 1/28/08	Mon 3/17/08
17	Prototype-User Interface	20 days	Fri 2/1/08	Thu 2/28/08
18	Progress report- Chapter 2&3	14 days	Mon 2/4/08	Thu 2/21/08
19	Flow Chart Diagram	3 days	Tue 2/26/08	Thu 2/28/08
20	Object Modelling: Class, Use Case, S	14 days	Wed 2/27/08	Mon 3/17/08
21	Progress Report- Chapter 4	7 days	Mon 3/10/08	Tue 3/18/08
22	System Development	20 days	Mon 3/10/08	Fri 4/4/08
23	Coding PHP	20 days	Mon 3/3/08	Fri 3/28/08
24	Progress Report	5 days	Mon 3/31/08	Fri 4/4/08
25	Seminar	1 day	Mon 4/7/08	Mon 4/7/08
26	Final Progress Report	3 days	Fri 4/4/08	Tue 4/8/08
27	Unit Testing	2 days	Mon 4/7/08	Tue 4/8/08
28	Project Presentation (Pre-EDX)	1 day	Thu 4/10/08	Thu 4/10/08
29	Final Report	2 days	Thu 4/10/08	Fri 4/11/08
30	Presentation	5 days	Mon 4/21/08	Fri 4/25/08
31	Oral Presentation	1 day	Mon 4/21/08	Mon 4/21/08

Project: fizi_aihm2008.mpp
Date: Fri 5/2/08

Task		Milestone	◆	External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

Page 1