

Web based E-voting system in UUM

This thesis is presented to the Graduate School
In fulfillment of the requirements for
Master of Science (Information Technology)
Universiti Utara Malaysia

By

Yousef Kamal Yousef Khaleel



PUSAT PENGAJIAN SISWAZAH
(Centre For Graduate Studies)
Universiti Utara Malaysia

PERAKUAN KERJA KERTAS PROJEK
(Certificate of Project Paper)

Saya, yang bertandatangan, memperakukan bahawa
(I, the undersigned, certify that)

YUSEF KAMAL YUSEF KHALEEL

calon untuk Ijazah
(candidate for the degree of) **MSc. (Information Technology)**

telah mengemukakan kertas projek yang bertajuk
(has presented his/her project paper of the following title)

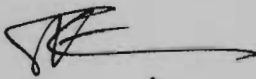
WEB BASED E-VOTING SYSTEM IN UUM

seperti yang tercatat di muka surat tajuk dan kulit kertas projek
(as it appears on the title page and front cover of project paper)

bahawa kertas projek tersebut boleh diterima dari segi bentuk serta kandungan
dan meliputi bidang ilmu dengan memuaskan.
(that the project paper acceptable in form and content, and that a satisfactory
knowledge of the field is covered by the project paper).

Nama Penyelia Utama
(Name of Main Supervisor): **MR. MOHD SHAMRIE SAININ**

Tandatangan
(Signature)

: 

Tarikh
(Date)

: 3/12/2007

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a post-graduate degree from Universiti Utara Malaysia, I agree that the University Library may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in the whole or in part, for scholarly purposes may be granted by my supervisor or in his absence, by the Dean of Graduate School. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any materials for my thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part should be address to:

Dean of Faculty of Information Technology
Universiti Utara Malaysia
06010 DUM Sintok
Kedah Darul Aman

Abstract

The twenty-first century have witnessed several major technological renaissances and many technological achievements as well, which led to a competition among many countries to adapt this trend. Malaysia had improved the infrastructure needed in the information and communication technology area, in order to provide the universities with the new technologies. Therefore the use of the technology becomes available inside the universities which make the idea of electronic voting achievable.

To develop e-voting web based system, the study will use the methodology for this study is based on the general methodology in research design, because it is have the logical phases that used to develop a prototype for e-voting web based system to make the election process in student council more efficient and accurate and helping to solve the problems or the difficulties in the traditional voting system (ballot box).

Finally, the system is tested and the result confirms that the proposed system is capable to record a successful completion of elections.

ACKNOLOGMENT

First I would like to express my deepest appreciation to my supervisor Mr. Mohd Shamrie Sainin for assistance patience and endurance throughout this project

I would also like to thank to all my friends especially Alaadeen AL Mabhouh, Ali Zahrawe and Abdolah Alnatshi for their sharing of knowledge, endless kindness, advice and support given to me during the course of study

Finally, I would like to extend my deepest love to my family especially my parents for their loving, support and trust.

I dedicate this thesis to my mother and father.

Contents

PERMISSION TO USE	I
ABSTRACT	II
AKNOLOGMENT	III
CONTENTS	IV
LIST OF FIGURES.....	VII
LIST OF TABLES	VIII
1. Introduction	1
1.1 Problem Statement	3
1.2 Objectives	3
1.3 Scope	4
1.4 Organization of Thesis.....	5
1.5 Summery.....	5
2. Literature Review.....	6
2.1 E-Voting System Definition	6
2.2 Basic Principles of E-voting	7
2.3 Issues in E-voting	8
2.3.1 Why is e-voting a difficult problem	8
2.3.2 E-Voting is a black box system	10
2.4 Common forms of e-voting	11
2.5 Applications for E-Voting.....	14
2.5.1 E-voting a difficult problem	14
2.5.2 E-voting application in Malaysia University	15
2.6 System Architecture and Participating Parties	16
2.7 Program language	18
2.7.1 ASP.NET Overview	18
2.7.2 Page and Controls Framework	18
2.7.3 ASP.NET Compiler.....	19
2.7.4 Security Infrastructure	19

2.7.5	ASP.NET Configuration.....	20
2.7.6	ASP.NET Architecture.....	20
2.8	Summary	21
3	Methodology	23
3.1	Research Methodology	23
3.1.1	Phase1: Answer of the Problem.....	24
3.1.2	Phase 2: Suggestion	25
3.1.3	Phase 3: Development	26
3.1.4	Phase 4: Evaluation and Conclusion.....	26
3.2	Summery	27
4	ANALYSIS AND DESIGN	28
4.1	Analysis	32
3.4.1	Requirements Determination	29
3.4.2	System's Requirements.....	30
4.2	Design	31
4.2.1	logical Design	31
4.2.2	Physical Design	43
4.3	Summary	44
5	Implementation	46
5.1	System Development	46
5.2	Summary	56
6	Evaluation	57
6.1	Use Case Testing	57
6.2	User testing (Questionnaire)	72
6.2.1	Respondents.....	72
6.2.2	Structure of questionnaire	72
6.2.3	Conducting the test	73
6.2.4	Analysis of the demographic questions	73
6.2.5	Analysis of the user testing	74

7	Conclusion	78
7.1	Finding	78
7.2	Problems and limitation	79
7.3	Contribution of study	80
7.4	Future Work	80
7.5	Summary	81
	References	82
	Appendices	85
	Appendix A: Use Case Specification.....	86
	Appendix B: Questionnaire for e-voting system in UUM	97
	Appendix C: Frequency Table And Histogram	99

List of Figures

2.1	Election System's general architecture.....	16
2.2	ASP.NET Architecture	20
3.1	The General methodology of Design Research.....	24
4.1	Use Case Diagram for e-voting web based system.....	32
4.2	Sequence Diagram for Login Student and candidate.....	34
4.3	Sequence Diagram for Voting for Candidate	35
4.4	Sequence Diagram for SES login	36
4.5	Sequence Diagram for Define Faculty.....	37
4.6	Sequence Diagram for Define Candidate	38
4.7	Sequence Diagram for Define Duration	39
4.8	Sequence Diagram for Number of Vote	40
4.9	Sequence Diagram for Create Candidate profile.....	41
4.10	Sequence Diagram for View Candidate profile	43
5.1	Login Student and Candidate Interface.....	47
5.2	Vote for Candidate Interface	48
5.3	Create Candidate Profile Interface	49
5.4	View Candidate Profile Interface.....	50
5.5	SES Login Interface	51
5.6	Define Faculty Interface.....	52
5.7	Define Candidate Interface.....	53
5.8	Define Duration Interface.....	54
5.9	Number of Votes Interface.....	55

List of Tables

4.1 Functional Requirement	30
4.2 H/W.S/W Specifications.....	43
6.1 login (Student and Candidate) test case description	58
6.2 login (SES Admin) test case description.....	59
6.3 Voting Candidates test case description.....	60
6.4 View Candidates info test case description.....	61
6.5 Create Candidates info test case description.....	62
6.6 Define Faculty test case description.....	63
6.7 Define Candidates test case description.....	64
6.8 Define Duration test case description.....	65
6.9 Number of Votes test case description.....	66
6.10 login (Students and Candidates) Negative test case description.....	67
6.11 login (SES Admin) Negative test case description.....	68
6.12 Voting Candidates Negative test case description.....	69
6.13 Define Candidates Negative test case description.....	70
6.14 Define Duration Negative test case description.....	71
6.15 Gender.....	73
6.16 Faculty.....	73
6.17 Descriptive Statistics for E-voting Screen.....	74
6.18 Descriptive Statistics: for Terminology Used in E-voting.....	75
6.19 Descriptive Statistics for E-voting System Capabilities.....	75
6.20 Descriptive Statistics for Perceived Usefulness.....	76
6.21 Descriptive Statistics for Perceived Ease Use.....	76
6.22 Descriptive Statistics for Attributes of Usability.....	77
6.23 Descriptive Statistics for all Dimensions.....	77

CHAPTER 1

INTRODUCTION

It was noted in the twenty-first century many achievements, which have had a significant impact on the evolution of people's life in different fields, such as democratic and political field. This evolution reflects the global interest of the democracy theory. And the necessity of applying the democracy concept in public life, thus democracy approaches becomes the main awareness for many government institutions, profit organizations, students association, and universities. One of university activities is the student's union elections, which is one of the most important activities that every student participate in order to choose their representatives in the university (Puthucheary & Othman, 2005).

Twenty-first century have witnessed several major technological renaissance. And many technological achievements as well, which led to a competition among many countries to adapt this trend. Malaysia had improved the infrastructure needed in the information and communication technology area, in order to provide the universities with the new technologies. Therefore the use of the technology becomes available inside the universities which make the idea of electronic voting achievable (Puthucheary & Othman, 2005).

The contents of
the thesis is for
internal user
only

Reference

- Aviel, D., & Rubin, K. (2001). Security Considerations for Remote Electronic Voting. *Communications of the ACM*, 45, 90-98.
- Booch, G. (2001). "Through the Looking Glass," *Software Development Magazine*, July 2001, pp. 49-51.
- Chen, Y. (2004). The design of a secure anonymous Internet voting system. *ELSEVIER computer & security* .23.330-337.
- Collard, R. (1999). *Test Design. Stqemagazine: Software Testing & Quality Engineering*. Retrieved Sep 29, 2007 from \\www.softtest.ordsif!.s/material/rosscollard I.pdf
- Damgrad, M. (2001). A generalization a simplification and some applications of paillier's probabilistic public-system. *proceeding of PKC*.119-136.
- Dini, G. (2002) A secure and available electronic voting services for a large-scale distributed system. *Future Generation computer system*, 19, 69-85.
- Farmer, M. (2006). BITE e-Gov. *Journal of Interpersonal Violence* 15, Retrieved November 20, 2006
- Hanselman, S. (2006). *Professional ASP.NET 2.0 Special Edition (Wrox Professional Guides)* (1st ed). New York :Geoffrey
- Hevner, A., March, S., Park, J. and Ram, S. (2004). "Design Science in Information Systems Research." *MIS Quarterly* 28(1): 75-105.
- Oovstreen, A (2004). *Meeting the challenges of e-voting*. Retrieved July 23, 2007, from Department of Social Sciences Netherlands Institute of Scientific Information Website <http://istresults.cordis.lu/index.cfm/section/news/Tpl/article/BrowsingType/Short%20Feature/ID/62740>
- Gilmore, J. (2006). APA style essentials. Retrieved September 21, 2006, from thestar website : <http://thestar.com.my/news/story.asp?file=/2006/9/21/nation/20060921124336&sec=nation>
- Ibrahim, S. (2003). Secure E-voting with blind signature. *Telecommunication Technology*.193-197.
- Juang, S. (1995). Assurance anonymous voting by employing Diffie Hellman PKD concept. *IEEE international Carnahan Conference on Security Technology* .252-258

- Juang,W.(2002).Averifiable multi-authority secret election allowing absent from voting .
computer Jurnal.25.672-682.
- Karlin,L.(2000). Electronic vote poses big security risk. *The Irish Times*, 20, 110-112.
Retrieved October 18th, 2007.
- Krawczyk, H. (2004) the order of encryption and authentication for protecting communications (or: How secure is SSL?). In J. Kilian, editor, *Advances in Cryptology – CRYPTO 2001*, volume 2139 of *Lecture Notes in Computer Science*, pages 310–331.Retrieved October 1st, 2007.
- Ku, W. (2004).An e-voting schema against Bribe and coercion. International Conference on e-technology.113-116.
- Lambrinoudakis, C., Gritzalis, D., Katsikas, S. (2002). Building a Reliable e-Voting System: Functional Requirements and Legal Constraints. *Department of Information and Communication Systems Engineering University of the Aegean* .Retrieved July 23, 2007,
- Liaw,T.(2004). A secure electronic voting protocol for general election. *Computer & security*.23.107-119.
- Lin,M.(2003). Security enhancement for anonymous secure e-voting our a network .*Computer standards & interfaces*.25.131-139.
- Mercuri,R.(2006) *Electronic Vote Tabulation Checks and Balances*. PhD thesis, University of Pennsylvania, Philadelphia, PA, Retrieved Oct 1, 2007.
- Mitchell,S. (2005). *ASP.NET Data Web Controls Kick Start* (2 nd ed). Boston: Bill and Srinivasa .
- Nielsen's, J. (2006). *Quantitative Studies: How Many Users to Test?* Retrieved sep 20, 2007 from. <http://www.useit.com/jakob/>
- Oovstreen, A (2004). *Meeting the challenges of e-voting*. Retrieved July 23, 2007, from Department of Social Sciences Netherlands Institute of Scientific Information Website <http://istresults.cordis.lu/index.cfm/section/news/Tpl/article/BrowsingType/Short%20Feature/ID/62740>
- Puthucheary.O & Othman.N.(2005). Elections and Democracy in Malaysia,25,98-99. Retrieved October 1st, 2007.
- Purao, S. (2002). "Design Research in the Technology of Information Systems: Truth or Dare." GSU Department of CIS Working Paper. Atlanta.

Rebecca, M. (2000). Sluggish Systems, Vanishing Votes. *Communications of the ACM*, 15, 168-172.

Sdn ,M.(2005).E-voting Practiced For Student Council Elections In 2005. February 18, 2005 ,from University College Sedaya International (UCSI) website :
http://doctorjob.com.my/undergrad_news/printerfriendly.asp?ID=2984

Suzan,O.(2001). Patterns Of Consumer Use. *Implications for the public sphere*, 4(1). Retrieved May 1, 2001, from . <http://www.models-research.ie/publications/art/01-5d.html>.

Tolbert, C. and R. McNeal (2001). "Does the Internet increase Voter Participation in Elections?" Paper presented to the Annual Meeting of the American Political Science Association, San Francisco.

Vaishnavi & Kuechler (2004). Design Research in information system. Retrieved June 15, 2006, from
<http://www.isworld.org/Researchdesign/drisISworld.htm>

Walther,S(2005). *ASP.NET Unleashed* (1st ed). Boston: Allyn and Bacon.

Waston, K. (2005). *Beginning ASP .NET 2.0 E-Commerce in C# 2005* (1 st ed) Florida: Dari