

A REQUIREMENT MODELING FOR  
CUSTOMER RELATIONSHIP MANAGEMENT (CRM)  
SYSTEM  
FOR UNIVERSITY ALUMNI

MUHAMMAD BIN MAHMUD

UNIVERSITI UTARA MALAYSIA  
2012

A REQUIREMENT MODELING FOR  
CUSTOMER RELATIONSHIP MANAGEMENT (CRM) SYSTEM  
FOR UNIVERSITY ALUMNI

A project submitted to Dean of Research and Postgraduate Studies Office in partial  
Fulfillment of the requirement for the degree  
Master of Science (Information Technology)  
Universiti Utara Malaysia

By  
Muhammad Bin Mahmud

**DEAN OF AWANG HAD SALLEH GRADUATE SCHOOL  
UNIVERSITI UTARA MALAYSIA**

**PERMISSION TO USE**

In presenting this project in partial fulfillment of the requirements for a postgraduate degree from the 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 project in any manner in whole or in part, for scholarly purposes may be granted by my supervisor(s) or in their absence by the Dean of Awang Had Salleh Graduate School. It is understood that any copying or publication or use of this project 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 material from my project.

Requests for permission to copy or to make other use of materials in this project, in whole or in part, should be addressed to

Dean of Awang Had Salleh Graduate School  
College of Arts and Sciences  
Universiti Utara Malaysia  
06010 UUM Sintok  
Kedah Darul Aman  
Malaysia

## **ABSTRAK (BAHASA MALAYSIA)**

Di dalam kajian ini, masalah utama yang dikenal pasti ialah sukar untuk memilih perisian open source Customer Relationship Management (CRM) bagi kegunaan alumni universiti kerana kekurangan requirement modeling. Oleh itu, objektif yang dikenal pasti untuk kajian ini adalah untuk mereka bentuk requirement modeling untuk alumni universiti. Metodologi bagi kajian ini adalah berdasarkan Design Science Research Process (DSRP) metodologi. Selepas mengenal pasti masalah dan objektif dalam Fasa 1 dan 2, maklumat dikumpul untuk dimodelkan di dalam Fasa 3. Maklumat untuk projek ini telah dikumpul daripada Persatuan Alumni Universiti Utara Malaysia (PAUUM). Berdasarkan maklumat yang dikumpul, penilaian ke atas dua perisian CRM iaitu SugarCRM dan vTiger dilakukan dalam Fasa 4. Hasil daripada kajian ini menunjukkan bahawa SugarCRM sesuai untuk kegunaan alumni universiti. Salah satu sebabnya ialah kerana SugarCRM dapat menyediakan pengambilan pelajar dengan berjaya, penyimpanan, dan strategi pengumpulan dana. Di samping itu, SugarCRM menawarkan komunikasi yang efisien, mampu untuk menguruskan kos operasi dengan kos yang terhad, mempunyai kestabilan dan skala yang lebih baik, dan menawarkan lebih banyak ciri-ciri dan sokongan.

## **ABSTRACT (ENGLISH)**

In this study, the main problem identified as it is difficult to adopt suitable open source Customer Relationship Management (CRM) system for university alumni due to lack of requirement modeling. Therefore, the objective come out for this study is to design a requirement modeling for university alumni. Research methodology for this study is based on Design Science Research Process (DSRP) methodology. After identifying the problem and objective in Phase 1 and 2, gathering requirements and modeling it is continued in Phase 3. The information for this project is gathered from Persatuan Alumni Universiti Utara Malaysia (PAUUM). Based on the requirements, evaluation on two open source CRM software which is SugarCRM and vTiger is completed in Phase 4. Results from this study shows that SugarCRM is suitable for university alumni management. One of the reason is because SugarCRM able to provide successful recruitment, retention, and fundraising strategies. In addition, SugarCRM offer efficient communication, capable to manage costs of operations with limited budgets, has better stability and scalability, and offer more features and support.

## ACKNOWLEDGEMENT

*By the name of ALLAH SWT, The Most Gracious and The Most Merciful*

With this opportunity given, I would like to express my gratitude and praises to ALLAH The Almighty for giving me the blessings and enthusiasm in completing this project. My special thanks to those who have been supporting and helping me in this study. Without their cooperation and contribution to me this achievement may not be possible.

My grateful thanks go to my supervisor, Dr. Nor Laily Binti Hashim. A big contribution and guidance from her during the completion of this project is very great indeed. She has given me a full support, courage, advises, and knowledge sharing. This project would be nothing without the help and knowledgeable supervision from her. There is nothing in this world I'm able to repay her with. Only ALLAH will reward your kindness.

Very special thanks to my beloved family, especially to my mother (Che Amah Binti Mat) for their undivided attention, sacrifices, understanding, and moral support. Great deals appreciated for the panels that help in evaluating my project report for their comments. Last but not least, special thanks to the representatives from Persatuan Alumni Universiti Utara Malaysia (PAUUM) for their helps and cooperation during the study.

Ones again, all praises to ALLAH and those who have contribute for the completion of this project. I really appreciate all your support and may Allah bless us.

## TABLE OF CONTENTS

	Page
<b>PERMISSION TO USE.....</b>	<b>I</b>
<b>ABSTRACT (BAHASA MALAYSIA) .....</b>	<b>II</b>
<b>ABSTRACT (ENGLISH) .....</b>	<b>III</b>
<b>ACKNOWLEDGMENTS.....</b>	<b>IV</b>
<b>LIST OF TABLE.....</b>	<b>VII</b>
<b>LIST OF FIGURES .....</b>	<b>IX</b>

### CHAPTER ONE: INTRODUCTION

1.0	Introduction .....	1
1.1	Motivation .....	2
1.2	Problem Statement.....	3
1.3	Research Questions .....	4
1.4	Research Objective.....	4
1.5	Research Scope .....	4
1.6	Research Contribution.....	5
1.7	Report organization .....	6

### CHAPTER TWO: LITERATURE REVIEW

2.0	Introduction .....	8
2.1	CRM .....	8
2.2	CRM Subsystems.....	9
2.3	CRM Modules .....	10
2.4	Open Source CRM.....	15
2.5	Open Source CRM software selection.....	16
2.6	Evaluation method.....	18
2.7	CRM system in university management.....	26
2.8	Summary.....	36

### CHAPTER THREE: RESEARCH METHODOLOGY

3.0	Introduction .....	37
3.1	Design Science Research Process Model.....	37
3.2	Adapted Design Science Research Process (DSRP) Methodology....	39
3.3	Phase 1 – Problem Identification and Motivation.....	40
3.4	Phase 2 – Objectives of a Solution.....	40
3.5	Phase 3 – Design.....	40
3.6	Phase 4 – Evaluation .....	41
3.7	Phase 6 – Conclusion.....	41

3.8	Summary.....	41
-----	--------------	----

#### **CHAPTER FOUR: SYSTEM ANALYSIS AND DESIGN**

4.0	Introduction .....	42
4.1	Requirement Modeling.....	42
4.2	Functional and Non-functional Requirements.....	43
4.3	Use Case Diagram.....	46
4.4	Use Case Description, Sequence, and Class Diagrams.....	48
4.5	Summary.....	132

#### **CHAPTER FIVE: RESULTS AND DISCUSSION**

5.0	Introduction .....	133
5.1	Evaluation Template 1.....	133
5.2	Evaluation Template 2.....	139
5.3	Interface Captions.....	142
5.4	Marketing Campaign Management Screen Design.....	161
5.5	Discussion.....	164
5.6	Conclusion.....	165

#### **CHAPTER SIX: FUTURE RECOMMENDATIONS AND CONCLUSION**

6.0	Introduction .....	167
6.1	Future Recommendations.....	167

<b>REFERENCES.....</b>	<b>169</b>
------------------------	------------



## LIST OF TABLES

<b>Table</b>	<b>Page</b>
Table 2.1: Comparison between open source and commercial software.	15
Table 2.2: Top open source CRM software based on different researcher.	16
Table 2.3: CRM software evaluation form Yilmaz (2011).	19
Table 2.4: CRM software evaluation form Shahin (2008).	23
Table 4.1: Functional requirement for alumni management system (Front-end).	43
Table 4.2: Functional requirement for alumni management system (Back-end).	45
Table 4.3: Non-functional requirement for alumni management system.	46
Table 4.4: Register use case description.	48
Table 4.5: Login use case description.	52
Table 4.6: View donation report use case description.	55
Table 4.7: View fees payment report use case description.	58
Table 4.8: Post donation drives use case description.	60
Table 4.9: Post news use case description.	63
Table 4.10: View mailing list use case description.	65
Table 4.11: Post volunteer work use case description.	68
Table 4.12: Select volunteer work use case description.	71
Table 4.13: Add buddy list use case description.	74
Table 4.14: Approve buddy list request use case description.	77
Table 4.15: Pay fees use case description.	79
Table 4.16: Give donation use case description.	82
Table 4.17: Post ideas use case description.	84

Table 4.18: Rank ideas use case description.	86
Table 4.19: View social media use case description.	88
Table 4.20: Upload videos use case description.	91
Table 4.21: Post advertisement use case description.	93
Table 4.22: Approve advertisement use case description.	96
Table 4.23: Manage donation drive.	100
Table 4.24: Manage advertisement use case description.	104
Table 4.25: Manage news use case description.	108
Table 4.26: Manage volunteer work use case description.	110
Table 4.27: Manage videos use case description.	114
Table 4.28: View call center report use case description.	117
Table 4.29: Profiling use case description.	120
Table 4.30: View report use case description.	123
Table 4.31: View fundraising prospect use case description.	126
Table 4.32: Manage member use case description.	129
Table 5.1: SugarCRM evaluation based on Template 1.	133
Table 5.2: vTiger evaluation based on Template 1.	136
Table 5.3: Comparison between vTiger and SugarCRM.	139
Table 5.4: SugarCRM and vTiger evaluation based on Template 2.	139

## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
Figure 2.1: Example from a brokerage CRM system.	9
Figure 2.2: System framework design.	10
Figure 2.3: Types of CRM system.	11
Figure 2.4: CRM applications in CRM life cycle.	13
Figure 2.5: CRM architecture in HP Company.	14
Figure 2.6: Colloquy learning system integrated with SugarCRM.	27
Figure 2.7: Caption of the Ruhr University Bochum alumni CRM system profile page.	29
Figure 2.8: Caption of the Berlin Institute of Technology alumni CRM system profile page.	29
Figure 2.9: Caption of the University of Hohenheim alumni CRM system profile page.	30
Figure 2.10: Caption of the University of Osnabrück alumni CRM system profile page.	30
Figure 2.11: Caption of the job resume page.	31
Figure 2.12: Caption of the buddy list page.	32
Figure 2.13: Caption of the guestbook page.	32
Figure 2.14: Caption of the career service search engine page.	33
Figure 2.15: Caption of the alumni CRM back-end homepage.	33
Figure 2.16: Caption of the alumni CRM back-end filters page.	34
Figure 2.17: Caption of the alumni CRM back-end accounts datasheet page.	34
Figure 2.18: Caption of the alumni CRM back-end persons datasheet page.	35
Figure 2.19: Caption of the alumni CRM back-end reports page.	35

Figure 3.1: Design science research process (DSRP) model.	38
Figure 3.2: DSRP methodology modified for this project.	39
Figure 4.1: Use case diagram.	47
Figure 4.2: Register sequence diagram.	50
Figure 4.3: Register class diagram.	51
Figure 4.4: Login sequence diagram.	53
Figure 4.5: Login class diagram.	54
Figure 4.6: View donation report sequence diagram.	57
Figure 4.7: View donation report class diagram.	57
Figure 4.8: View fees payment report sequence diagram.	59
Figure 4.9: View fees payment report class diagram.	60
Figure 4.10: Post donation drives sequence diagram.	62
Figure 4.11: Post donation drive class diagram.	63
Figure 4.12: Post news sequence diagram.	65
Figure 4.13: Post news class diagram.	65
Figure 4.14: View mailing list sequence diagram.	67
Figure 4.15: View mailing list class diagram.	68
Figure 4.16: Post volunteer work sequence diagram.	70
Figure 4.17: Post volunteer work class diagram.	71
Figure 4.18: Select volunteer work sequence diagram.	73
Figure 4.19: Select volunteer work class diagram.	74
Figure 4.20: Add buddy list sequence diagram.	76
Figure 4.21: Add buddy list class diagram.	76

Figure 4.22: Approve buddy list request sequence diagram.	78
Figure 4.23: Approve buddy list request class diagram.	79
Figure 4.24: Pay fees sequence diagram.	81
Figure 4.25: Pay fees class diagram.	81
Figure 4.26: Give donation sequence diagram.	83
Figure 4.27: Give donation class diagram.	83
Figure 4.28: Post ideas sequence diagram.	85
Figure 4.29: Post ideas class diagram.	85
Figure 4.30: Rank ideas sequence diagram.	87
Figure 4.31: Rank ideas class diagram.	88
Figure 4.32: View social media sequence diagram.	90
Figure 4.33: View social media class diagram.	90
Figure 4.34: Upload videos class diagram.	92
Figure 4.35: Upload videos sequence diagram.	92
Figure 4.36: Post advertisement sequence diagram.	95
Figure 4.37: Post advertisement class diagram.	96
Figure 4.38: Approve advertisement class diagram.	98
Figure 4.39: Approve advertisement sequence diagram.	99
Figure 4.40: Manage donation drive sequence diagram.	102
Figure 4.41: Manage donation drive class diagram.	103
Figure 4.42: Manage advertisement sequence diagram.	106
Figure 4.43: Manage advertisement class diagram.	107
Figure 4.44: Manage news sequence diagram.	109

Figure 4.45: Manage news class diagram.	110
Figure 4.46: Manage volunteer work sequence diagram.	113
Figure 4.47: Manage volunteer work class diagram.	114
Figure 4.48: Manage videos sequence diagram.	116
Figure 4.49: Manage videos class diagram.	117
Figure 4.50: View call center report sequence diagram.	119
Figure 4.51: View call center report class diagram.	120
Figure 4.52: Profiling sequence diagram.	122
Figure 4.53: Profiling class diagram.	123
Figure 4.54: View report sequence diagram.	125
Figure 4.55: View report class diagram.	126
Figure 4.56: View fundraising prospect sequence diagram.	128
Figure 4.57: View fundraising report class diagram.	129
Figure 4.58: Manage member sequence diagram.	131
Figure 4.59: Manage member class diagram.	132
Figure 5.1: Caption of SugarCRM sales homepage.	142
Figure 5.2: Caption of SugarCRM opportunities page.	143
Figure 5.3: Caption of SugarCRM contacts page.	144
Figure 5.4: Caption of SugarCRM accounts page.	145
Figure 5.5: Caption of SugarCRM forecasts page.	146
Figure 5.6: Caption of SugarCRM quotes page.	147
Figure 5.7: Caption of SugarCRM dashboards page.	148
Figure 5.8: Caption of SugarCRM marketing homepage.	149

Figure 5.9: Caption of SugarCRM campaigns page.	150
Figure 5.10: Caption of SugarCRM emails page.	151
Figure 5.11: Caption of SugarCRM leads function.	152
Figure 5.12: Caption of SugarCRM marketing analytics function.	153
Figure 5.13: Caption of SugarCRM support homepage.	154
Figure 5.14: Caption of SugarCRM cases page.	155
Figure 5.15: Caption of SugarCRM inbound emails function.	156
Figure 5.16: Caption of SugarCRM knowledgebase page.	157
Figure 5.17: Caption of SugarCRM bug tracker page.	158
Figure 5.18: Caption of vTiger leads page.	159
Figure 5.19: Caption of vTiger knowledgebase page.	159
Figure 5.20: Caption of vTiger campaign page.	160
Figure 5.21: Caption of vTiger tickets page.	161
Figure 5.22: Screen design of post donation drive.	162
Figure 5.23: Screen design of post volunteer work.	162
Figure 5.24: Screen design of select volunteer work.	163
Figure 5.25: Screen design after selecting volunteer work.	163
Figure 5.26: Screen design of manage donation drive.	164
Figure 5.27: Screen design of manage volunteer work.	164

# CHAPTER ONE

## INTRODUCTION

### 1.0 Introduction

Customer and Relationship Management (CRM) system primarily is a business strategy widely adopted in companies or enterprises. It is an application tool of enterprise used to improve the market competitiveness. The main goal of the system is to build the right relationship between businesses and customers, making sure right products reach to right customers at the right time, with the right medium, and cost accumulation in providing the products or services (Pan and Wang, 2010).

Seems there is a lot of benefit gained from the business industries by implementing CRM systems, many universities has shown their interest in adopting it. University of Oxford is reported to have selected Blackbaud Enterprise CRM in supporting their global fundraising operations. The system's user-friendly reporting and analysis tools will allow the staff to access timely and accurate information in order to make better informed decisions. Furthermore it will facilitate personalizing interactions, provide superior service, and build stronger relationships with the university's 180,000 alumni and friends (Wright and Mathos, 2008).

One of the important entities in a university is the alumni society. The society responsible to manage alumni is responsible in gathering and sending out information about their activities and development to the fellow members. This society usually consists of a university's former students or graduates. They are vital to a university improvement because they have experiences, contacts, and insights that faculty cannot always deliver in the classroom. Opinion and experience shared from former students who have been working and having a career is always welcomed by the students especially for those who will begin transited from being a student and



The contents of  
the thesis is for  
internal user  
only

## REFERENCES

- A CRM Perspective (n. d.). A CRM Perspective. Retrieved from  
<http://train-srv.manipalu.com/wpress/?p=146090>
- Bruce, G., Robson P., and Spaven R (2006). OSS opportunities in open source software –  
*CRM and OSS standards BT Technology Journal*, 24(1), 127-140.
- Bucholtz, C., (2010). The Top 10 Open Source CRM Applications. *The CRM Strategy Room*. Retrieved on March 10 From:  
<http://www.forecastingclouds.com/articles/33058/the-top-10-open-source-crm-applications/>
- Brito, I., Moreira, A., & Arujo, J., (2002). A requirements model for quality attributes. *Journal of Aspect-Oriented Requirements Engineering and Architecture Design*. Retrieved from <http://trese.cs.utwente.nl/AOSD-EarlyAspectsWS/Papers/Brito.pdf>
- Campus Technology (2009, April). Choosing the Right CRM Solution for your Campus. *Campus Technology*, 1-11. Retrieved from  
[http://www.hobsons.com/pdfs/Whitepaper\\_Choosing\\_the\\_Right\\_CRM\\_Solution\\_for\\_Your\\_Campus\\_\(by\\_Hobsons\\_Campus\\_Technology\)\[1\].pdf](http://www.hobsons.com/pdfs/Whitepaper_Choosing_the_Right_CRM_Solution_for_Your_Campus_(by_Hobsons_Campus_Technology)[1].pdf)
- Chiu, D. K. W., Chan, W. C. W., Lam, G. K. W., Cheung, S. C., & Luk, F. T. (2003). An Event Driven Approach to Customer Relationship Management in e-Brokerage Industry. *36th Hawaii International Conference on System Sciences*, 1-10.
- Chaffey, D., & Wood, S. (2005). *Business information management: Improving performance using information systems*. Pearson Education Limited.
- Colloquy (n. d.). Colloquy Integrates Sugar Professional to Virtualize Global Call Center. *Case Study: Colloquy*. Retrieved from  
[http://media.sugarcrm.com/case\\_studies/Colloquy.pdf](http://media.sugarcrm.com/case_studies/Colloquy.pdf)
- Dengate, D. (2009). Analysis e Business Special Interest Groups. BA (Hons) Information Systems. UFIE86-10-3, Bristol Institute of Technology University of the West of England.
- Gannod, G. C., Bachman, K. M., & Troy, D. A. (2010). Increasing Alumni Engagement through the Capstone Experience. *40th ASEE/IEEE Frontiers in Education Conference*.
- Gao, G., Xu, L., Fu, J., & Qu, P. (2010). The Building of Customer Relationship

- Management System based on OLAP. *2nd International Conference on Industrial Mechatronics and Automation*, 401-404.
- Gyula, K. & Andras, S. (2009). Open Source CRM Systems. *4th Aspects and Visions of Applied Economics and Informatics*, 913-919.
- Hakala, D. (2007). *Inside CRM*. Retrieved on March 11 from <http://www.insidecrm.com/features/top-open-source-solutions-121307/>
- Janjicekm, R. (1998). CRM Architecture for Enterprise Relationship Marketing In the New Millennium. *White Paper*. Retrieved from [http://h71028.www7.hp.com/enterprise/downloads/CRMArchitecture\\_Whitepaper\\_HPC.pdf](http://h71028.www7.hp.com/enterprise/downloads/CRMArchitecture_Whitepaper_HPC.pdf)
- McGovern, G. (2011). *Ease of use is a competitive advantage*. Retrieved on August 13, 2011, From New Thinking: <http://www.gerrymcgovern.com/nt/2011/nt-2011-03-21-Ease-competitive.htm>
- Musico, C. (2008, August 1). Market Focus: Education -- Making CRM Mandatory for University Administration. Retrieved from <http://www.destinationcrm.com/Articles/Columns-Departments/Insight/Market-Focus-Education---Making-CRM-Mandatory-for-University-Administration-50142.aspx>
- Pan, W. & Wang, D. (2010). The Development and Application of Customer Relationship Management System. *International Conference on Intelligent Computation Technology and Automation*, 788-791.
- Peffer, K., Tuunanen, T., Gengler, C. E., Rossi, M., Hui, W., Virtanen, V., & Bragge, J. (2006). The Design Science Research Process: A Model for Producing and Presenting Information Systems Research. *DESRIST*, 84-106.
- Ross, M. (n. d.). TU Berlin Alumni Portal und CRM. Retrieved from <http://www.digital-worx.de/referenzen.html?&L=eozflkpqj>
- Shahin, M. (2008). An Evaluation Model for Assessing the Viability of CRM Solutions for SMEs. (Doctoral dissertation). Retrieved from <http://www.aitdSPACE.gr/xmlui/bitstream/handle/123456789/188/Mohammad%20Shahin.pdf?sequence=1>
- SIM University (n. d.). Educators Leveraging the Power of Open Source. Case Study: SIM University. Retrieved from [http://media.sugarcrm.com/case\\_studies/SIMUniversity.pdf](http://media.sugarcrm.com/case_studies/SIMUniversity.pdf)
- SugarCRM and vTiger: Comparative Review (2009). SugarCRM and vTiger:

Comparative Review. Retrieved from  
<http://softgyan.com/2009/10/sugarcrm-and-vtiger-comparative-review-15446/#acc-1>

Tereso, M. & Bernardino, J. (2011). Open Source CRM Systems For SMEs. *Computing Research Repository*. Retrieved from  
<http://arxiv.org/ftp/arxiv/papers/1112/1112.3018.pdf>

The Rational Edge (2003, November). UML basics Part III: The class diagram. *Rational Software*. Retrieved from  
[http://www-128.ibm.com/developerworks/rational/library/content/RationalEdge/sep03/f\\_umlbasics\\_db.pdf](http://www-128.ibm.com/developerworks/rational/library/content/RationalEdge/sep03/f_umlbasics_db.pdf)

Wright, M. & Mathos, M. (2008). University of Oxford Selects Blackbaud Enterprise CRM to Manage Largest Fundraising Campaign in European University History. *Blackbaud Europe*. Retrieved from  
[http://www.prweb.com/releases/Blackbaud/University\\_of\\_Oxford/prweb1721494.htm](http://www.prweb.com/releases/Blackbaud/University_of_Oxford/prweb1721494.htm)

Yilmaz, E. (2011). Comparison of Open Source Customer Relationship Management Software for Small and Medium Enterprises. (Doctoral dissertation). Retrieved from [http://sites.khas.edu.tr/tez/ErturkYilmaz\\_izinli.pdf](http://sites.khas.edu.tr/tez/ErturkYilmaz_izinli.pdf)