

**UUM Library Mobile-based Book
Reservation System**

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**UNIVERSITI UTARA MALAYSIA
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**UUM Library Mobile-based Book
Reservation System**

**A master's project submitted to the Center for Graduate Studies in partial
fulfillment of the requirements for the degree of
Master of Science(Information Communication Technology) (ICT)
University Utara Malaysia**

**By
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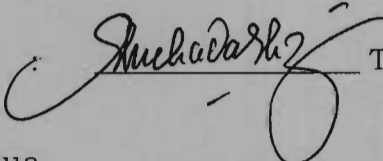
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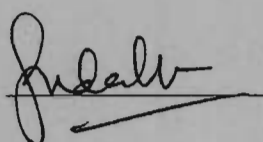
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ABSTRAK

Menyimpan sebuah buku dalam talian adalah kemudahan terbaru dibangunkan dalam kebanyakan perpustakaan. Untuk menyimpan buku di perpustakaan, pelajar dikehendaki melayari laman web perpustakaan UUM, dengan itu para pelajar mesti mempunyai sebuah PC, komputer riba atau alat yang serupa untuk mencapai Internet. Walau bagaimanapun, pada masa yang sama, bukan semua pelajar mempunyai PC, komputer riba atau PDA untuk capaian Internet di mana sahaja pada bila-bila masa. Cubaan kertas ini adalah untuk merekabentuk satu khidmat sistem penyimpanan buku secara bergerak. Ia akan merupakan sebuah sistem lincah baru yang boleh digunakan oleh pelajar-pelajar UUM untuk memeriksa status ketersediaan buku dan membuat simpanan oleh para pelajar Universiti Utara Malaysia. UML adalah bahasa yang digunakan untuk menghasilkan sistem berkenaan, kebolegunaan menguji adalah termasuk, kitar hayat sistem pembangunan yang akan digunakan untuk perancangan dan analisis projek berkenaan dan pendekatan UML akan digunakan untuk merekabentuk sistem berkenaan. Bahagian terakhir menerangkan beberapa had yang boleh dipertimbangkan untuk kerja masa depan.

ABSTRACT

Reserving a book online is the newest facility developed in most libraries all around the world. In reserving books from the library, students have to access the UUM library website. Therefore, students must have a PC, laptop or similar device that can access the Internet. However,, not all students have their own PC, laptop or PDA to access the Internet from wherever and whenever they wish. This paper attempts to design a Mobile-based Book Reservation System, as well as a new mobile system that can be used by UUM students to check the availability of books and to make reservation for the required books from wherever they are or whenever they want. UML is used as the modeling language for the design of the system, usability testing is included, system development life cycle is used for planning and analysis of the project and UML approach is used to design the system. The last section highlights few limitations that could be considered for future work.

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"In the name of Allah the Most Gracious and Most Merciful"

First and foremost, all praise to Allah the Most Gracious and Most Merciful, for without whose guidance and blessing, I would not have been able to begin and complete such an enormous undertaking. Throughout the entire process, my strongest source of motivation and inspiration has been the undying support and encouragement of my beloved family. My deepest appreciation and gratitude to my precious mother, my most understanding father, Dr. Ali Massoud Abu Alhejeb, my brothers, for without their continuous patience and prayers, I would not have been able to complete this study.

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LIST OF ABBREVIATION

CASE	Computer Aided Software Engineering
DFD	Data Flow Diagram
GUI	Graphical User Interface
GMSC	Gateway Mobile Services Switching Center
GSM	Global System For Mobiles
HLR	Home Location Register
IA	Indian Airlines
ID	Identity
IT	Information Technology
MSC	Mobile Switching Center
OOA	Object-Oriented Analysis
OPAC	Online Public Access Catalog
PC	Personal Computer
PDA	Personal Digital Assistant
RFID	Radio Frequency Identification
RIM	Research in Motion
SCM	Self-Check Machine
SDLC	System Development Life Cycle
SMS	Short Message Service
SMSC	Short Message Service Center
UI	User Interface
UML	Unified Modeling Language
WAP	Wireless Application Protocol

CHAPTER 1

INTRODUCTION

This chapter briefly introduces the main parts of this study. It starts by defining the motivation to conduct this study. This is followed by the objectives, significance and scope of this study, as well as how this study will be organized and finally research outcome.

1.1 Background

University Utara Malaysia (UUM) Library known as “LINTAS” (Library Information Technology Automated System). The official name is Sultanah Bahiyah Library in a memorable ceremony. It offers a huge collection and information resources of campus community. It plays a vital role in providing access to collection, services and facilities to support and enhance research, learning and teaching activities in the university. The library has more than 252,206 volumes of printed materials, 35,109 items of non-printed materials and currently subscribing to more than 24,000 full text articles, journals and 200 titles from electronic books. Online collection and services has helped to facilitate and promote the use of information by students, lecturer. Online collection is also made available to registered members via the internet (UUM academic guide book, 2007).

Over a billion people around the world own mobile phones. Daily life and work in metropolitan areas already reflect the ubiquitous availability of mobile communication. Everywhere, millions of mobile users are chatting, messaging,

The contents of
the thesis is for
internal user
only

REFERENCES

- Asano, H., Sumi, A.O., Ramzan, Z., & Zhu, J. (2002). *Wireless Electronic Commerce Security Sponsored by Nokia*. Retrieved on March 2, 2008 from <http://theroy.lcs.mit.edu/~zulfikar/papers/NokiaFinalNoConclusion1205.pdf>
- Buchanan, G., Marsden, G., & Jones (2000). *Improving Mobile Internet Usability*.
- Bennett, S., & McRobb, S., & Farmer, R. (2006). *Object-oriented systems analysis and design using UML*. London: McGraw-Hill.
- Bahrami, A. (1999). *Object Oriented System Development*, McGraw-Hill, United States of America.
- Colafigi. et. al., (2001). *Evaluating Usability of Human Computer Interfaces: a Practical Methods*. UK: Ellies Horwood Ltd Chichester.
- Davis, F.D. (2002). *Perceived Usefulness, Perceived Ease of Use and End-User Acceptance of Information technology*. London: Prentice Hall.
- Dennis, A., Wixom, B.H., & Tegarden, D. (2005). *System analysis and design with UML version 2.0: an object-oriented approach with UML, 2nd edition*. Hoboken, NJ: John Wiley and Sons, Inc.
- Donald B.S., IBM. (2003). *UML basics: An introduction to the Unified Modeling Language*. Retrieved 25th July, 2007 from <http://www.ibm.com/developerworks/rational/library/769.html>
- Foo, S.M., Hovover, C., & Lee, W.M. (2001). *Dynamic WAP application development* Greenwich: Manning Publication Co.
- Ghezzi, E.A., Robert, N., & Wilson, H.B. (1991). *Fundamentals of Software Engineering*. New Zealand: Prentice-Hall.
- Hoffer, J.A., George, J.F., & Valacich, J.S. (2002). *Modern Systems Analysis and Design (3rd Edition)*. Upper Saddle River, New Jersey: Prentice Hall.

- Holcomb, R., & Tharp, A. (1991). "Users, a software usability model and product evaluation", *Interacting with computers*, Butterworth-Heinemann, Oxford, UK, Vol 3(2) pp. 155-166.
- Hoffer, J.A., George, J.F., & Valacich, J.S. (1999). *Modern Systems Analysis and Design* (2nd Edition). United Kingdom: Addison Wesley Longman.
- Hampe, J.F., Schubert, P., & Schneider, F. (2004). *Mobile Community Support: A Mobile Reservation System For The Leisure Industry*. Paper presented at the 17th Bled eCommerce Conference.
- highered.mcgraw-hill.com. *System Analysis* [Electronic Version], Retrieved from http://tamim133.tripod.com/system_analysis.htm
- Integrate SMS in your enterprise [Electronic Version], 2.2, Retrieved on 25th July, 2007 from <http://www.smsfax.com/pdf/SMS%20Whitepaper.pdf>
- Infocomm, R. (2006). Airline Information & Reservation System for Telecom Giant of India. Retrieved on 29th July, 2007 from <http://www.diaspark.com/includes/docs/Wireless.pdf>
- Imulienski, T., & Badrinath, B. R. (2001). Mobile Wireless Computing: Solutions and Challenges in Data Management. Retrieved from <http://citeseer.ist.psu.edu/imielinski93mobile.html>
- Jones, Marsden, G., Mohd-Nasir, Boone, & Buchanan, G. (1999). *Improving Mobile Internet Usability*.
- Jago, A. (2003). *Mobile Location Services: The Definitive Guide*. Upper Saddle River, New Jersey: Pearson Education Inc.
- Kalkbrenner, et al. (2001). *Mobile Service for campus and student needs*. Retrieved on December 28, 2007 from

<http://ls12.cs.uni-dortmund.de/~kalkbren/campusmobil.pdf>

Lieslehto, K. (2000). WAP Application for PID Controller Tuning, Proceedings of the 2000 IEEE International, Symposium on Computer-Aided Control System Design, Anchorage, Alaska, USA, pp. 168-172.

Martin, G., Lavagno, L., & Louis-Guerin, J. (2001). *Embedded UML: a merger of real-time UML and co-design*. 24.

Nielsen, J., & Landauer, T. (1993). *A mathematical model of the Finding of usability problems*. Netherlands: Amsterdam.

projectsmart.co.uk. (2003). Project Planning [Electronic Version], from !Invalid Character Setting

http://www.stsc.hill.af.mil/resources/tech_docs/gsam4/chap3.pdf

Requirements analysis and UML use cases and class diagrams [Electronic Version].

Retrieved on 20th July, 2007, from

http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?tp=&arnumber=1199799&isnumber=27009

Ravden, S., & Johnson, G. (1989). *Evaluating usability of human computer interfaces: a practical method*. Ellis Horwood Ltd., Chichester, UK.

Ramsay, M., & Nielsen, J. (2000). *WAP Usability*. Retrived 3/9/2007 from <http://www.useit.com/alertbox/20001210.html>.

Rochford, T. (2001). *The Impact of Mobile Application Technology on Today's Workforce*. 4,5,13,14.

Tan, W.W., Lee, Y.H., Chen, S.L., & Tan, S.C. (2004). *Online Mobile Interstate Bus Reservation System in Malaysia*. Retrieved 25/6/2007 from <http://www.actapress.com/PaperInfo.aspx?PaperID=18494>

Tang, M., & Cao, J. (2006). *A Dynamic Mechanism for Handling Mobile Computing Environmental Changes*. Paper presented at the Proceedings of the First International Conference on Scalable Information Systems.

[uum.edu.my](http://www.uum.edu.my) (2005). *The University objectives*, retrieved on 20th November, 2007 from

<http://www.uum.edu.my/bi/v2/myuum/index.html>

UML Bible, Tom Pender, John Wiley and Sons, 2003.

Valacich, J.S., George, J.M. and Hoffer, J.A. (2004). *Essentials of Systems Analysis and Design*, Prentice Hall, Upper Sadder River, NJ.

Wikipedia, the free encyclopedia, *Systems Development Life Cycle*

Retrieved 30th July, 2007 from

<http://www.wikipedia.org>

Woolridge. (1999). Use Case Techniques and Considerations[Electronic Version], from

http://www.cbd-hq.com/articles/1999/991115rw_caseanalysis.asp

WAP Forum (2002). WAP 2.0 Technical White Paper. Retrieved April 16, 2007 from

http://www.wapforum.org/what/WAPWhite_Paper1.pdf

Wireless Application Protocol, Web ProForum Tutorials, International Engineering Consortium.

WAP Caching Model Specification, WAP Forum, WAP-120-CachingMod-19990211-a.

<http://www.wapforum.org/>

WAP Pictogram", WAP Forum, WAP-213-WAPInterPic.

<http://www.wapforum.org/>

WAP Architecture", WAP Forum, WAP-210-WAPArch-20001130-p.,

<http://www.wapforum.org/>

Interview

Rodziah Hashim, Asst. Chief Librarian / Acting Chief Librarian / Library
Development HOD (UUM library, June 2006)

Muhamad Mazlan Jalla, Asst. Chief Librarian / Automation HOD
(UUM library, June 2006)

Salleh Hudin Mustafa, Asst. Chief Librarian / Automation HOD
(UUM library, June 2006)