Mobile Web-based Rural Information System for Tropical Fruits Diseases

A Thesis submitted to the College of Arts and Sciences in full Fulfillment of the requirements for the degree of Master of Science

Universiti Utara Malaysia

By

Khaled W. Husain

© 2009, Khaled
PERMISSION TO USE

In presenting this thesis of the requirements for a Master of Science in Information Technology (MSc. IT) from University 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 whole or in part, for scholarly purposes may be granted by my supervisor or in their 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 University Utara Malaysia for any scholarly use which may be made of any material from my thesis.

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

Dean of Graduate School

University Utara Malaysia

06010 Sintok

Kedah Darul Aman
ABSTRACT

The agricultural sector is an essential resource and important to any country, particularly, when it is the main source of income. Modern methods, treatments, the application of modern technology in agriculture and other information on how to care for and protect tropical fruits from diseases are useful to develop and generate wealth of rural areas, where most of the population works in agriculture. Majority of the population of countries are in the rural, and these people often do not have access and connectivity to computers and the Internet. However, more than 80% of the people in Malaysia have hand phones. Thus this study will focus on the development of mobile web-based rural information system to help the farmers identify and seek solution to the problems like diseases faced in their agriculture produce.
ACKNOWLEDGEMENT

By the Name of Allah, the Most Gracious and the Most Merciful

First of all, I would like to express my thanks to creator of the heavens and the earth. Allah who has granted me the ability and willing to start and complete this study.

My special thanks goes to my Father and my Mother who have always kept me away from family responsibilities and encouraged me to concentrate on my study. Without their help and encouragement, this study would not have been completed.

Also my special thanks and appreciation goes to my supervisors: Assoc Professor Dr. Wan Rozaini Sheik Osman for assisting and guiding me in the completion of this research. I am truly grateful for her continual support and cooperation in assisting me all the way through the semester.

I am also thankful to the UUM CAS staff and all my colleagues and friends at UUM for their help and support me.

Thank you UUM.
TABLE OF CONTENTS

PERMISSION TO USE .................................................................i
ABSTRACT ..................................................................................ii
ACKNOWLEDGEMENT .................................................................iii
TABLE OF CONTENTS .................................................................iv
LIST OF TABLES ............................................................................x
LIST OF FIGUERS ...........................................................................xi

CHAPTER 1

1.1 Background...............................................................................1
1.2 Problem Statement.....................................................................3
1.3 Research Objective.....................................................................4
1.4 Research Question......................................................................5
1.5 Scope of the Study......................................................................5
1.6 Significance of Study...................................................................5
1.7 Report Structure.........................................................................6
1.8 Summary....................................................................................7

CHAPTER 2

2.1 Introduction...............................................................................8
2.2 ICT and Rural Development.......................................................9
2.3 Mobile Users in Malaysia..........................................................11
2.4 Mobile applications enabling technologies..............................12
2.5 Mobile phone.............................................................................13
CHAPTER 3

3.1 Introduction..................................................................................36
3.2 Business Modeling........................................................................37
3.3 Requirements................................................................................38
3.3.1 Data collection ........................................................................38
3.3.1.1 Interview .........................................................................39
3.4 Analysis & Design..........................................................................42
3.5 Implementation..............................................................................44
3.6 Testing.................................................................................................45
3.7 Deployment..........................................................................................46
3.8 Summary.............................................................................................46

CHAPTER 4

4.1 Introduction..........................................................................................47
4.2 Result of the interview..........................................................................47
4.3 System Requirement...............................................................................47
4.4 System Design......................................................................................49
4.5 Use case Specification...........................................................................51
4.5.1 Login use case Diagram....................................................................51
4.5.1.1 Brief Description............................................................................51
4.5.1.2 Pre-Conditions.............................................................................51
4.5.1.3 Characteristic of Activation.........................................................51
4.5.1.4 Flow of Events............................................................................52
4.5.1.4.1 Basic Flow..............................................................................52
4.5.1.4.2 Alternative Flow......................................................................52
4.5.1.4.3 Exceptional Flow.................................................................52
4.5.1.5 Post-Conditions..........................................................................52
4.6 Manage Fruits Use Sequence Diagram.............................................53
4.6.1 Brief Description..............................................................................53
4.6.2 Pre-Conditions.................................................................................53
4.6.3 Characteristic of Activation............................................................53
4.8.5 Post-Conditions ....................................................... 59
4.9 View Fruits Diseases and Treatments Use Sequence Diagram ................. 60
4.9.1 Brief Description .................................................................. 60
4.9.2 Pre-Conditions .................................................................. 60
4.9.3 Characteristic of Activation .................................................. 60
4.9.4 Flow of Events .................................................................. 60
4.9.4.1 Basic Flow .................................................................. 60
4.9.4.2 Alternative Flow ............................................................ 61
4.9.4.3 Exceptional Flow ........................................................... 61
4.9.5 Post-Conditions ................................................................. 61
4.10 class Diagram ..................................................................... 63
4.11 System Architecture .............................................................. 64
4.12 RIS Interface Design .............................................................. 65
4.12.1 Login Page ..................................................................... 65
4.12.2 Manage Fruits page .......................................................... 67
4.12.3 Manage Diseases page ...................................................... 68
4.12.4 Manage Treatments page .................................................. 69
4.13 RIS Home page ................................................................... 70
4.13.1 Fruits page ..................................................................... 71
4.13.2 Diseases page ................................................................. 73
4.13.3 Treatments page .............................................................. 74
4.14 RIS Database Design ............................................................... 74
4.15 summary .......................................................................... 76
LIST OF TABLES

5.1: Item Statistics.................................................................................................. 80
5.2: Item total statistics........................................................................................... 81
5.3: Frequency statistics for the first question.......................................................... 81
5.4: Frequency statistics for the second question...................................................... 82
5.5: Frequency statistics for the question number 17.............................................. 83
# LIST OF FIGURS

2.1: Mobile sent request and receive response from WAP Server through WAP Gateway…17  
2.2: WAP Protocol Stack........................................................................................................20  
2.3: The WAP process flow......................................................................................................23  
2.4: students statistic for use mobile learning.........................................................................28  
2.5: farmer uses agriculture info in farm................................................................................33  
2.6: Details of agriculture info in Japanese language.................................................................34  
3.1. Rational Unified Process (RUP)........................................................................................37  
3.2: with HJ. SUDIN BIN AWANG in his farm........................................................................40  
3.3: Durian fruit before Completed Maturity............................................................................40  
3.4: MARDI Center in KEDAH Darulaman..............................................................................41  
3.5: MARDI Center in KEDAH Darulaman..............................................................................41  
3.6: Meeting with Mr. ITHNIN BADRI....................................................................................42  
3.7: System Architecture.........................................................................................................43  
4. 1: Main Use Case................................................................................................................50  
4.2: Admin Login Sequence Diagram....................................................................................53  
4.3: Manage Fruits Sequence Diagram................................................................................55  
4.4: Manage Diseases Sequence Diagram...............................................................................57  
4.5: Manage Treatments Sequence Diagram..........................................................................59  
4.6: View Fruits Diseases and Treatments Sequence Diagram.............................................62  
4.7: Main class Diagram.........................................................................................................63
4.8: System architecture ........................................................................................................65
4.9: Login Page for Administrator .....................................................................................66
4.10: Home Page for Administrator ...................................................................................67
4.11: Fruits Page for Administrator ...................................................................................68
4.12: Manage Disease Page for Administrator .................................................................69
4.13: Manage Treatment for Administrator .....................................................................70
4.14: Home Page for Farmer ...............................................................................................71
4.15: Durian Page ................................................................................................................72
4.16: Banana Page ...............................................................................................................72
4.17: Mango Page .................................................................................................................97
4.18: Diseases of Durian ......................................................................................................73
4.19: Diseases of Banana ....................................................................................................97
4.20: Diseases of Mango .....................................................................................................98
4.21: Treatment Page for Durian Disease and Banana Disease ........................................74
4.22: Treatment Page for Mango Disease .........................................................................98
4.23: RIS Database Schema ...............................................................................................75
5.1: The Reliability Statistics ...............................................................................................79
5.2: Interactive Graph for the first question ....................................................................82
5.3: Interactive Graph for the second question .................................................................83
5.4: Interactive Graph for the question number 17 ........................................................84
List of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UUM</td>
<td>Universiti Utara Malaysia</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>PDA</td>
<td>personal digital assistant</td>
</tr>
<tr>
<td>GSM</td>
<td>Global System for Mobile communication</td>
</tr>
<tr>
<td>WAP</td>
<td>Wireless Application Protocol</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>SIM</td>
<td>Subscriber Identity Module</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
</tr>
<tr>
<td>MO</td>
<td>Mobile Originated Short Message Service Transfer</td>
</tr>
<tr>
<td>MT</td>
<td>Mobile Terminated Short Message Transfer</td>
</tr>
<tr>
<td>IMSI</td>
<td>International Mobile Subscriber Identity</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>Transport Control Protocol/Internet Protocol</td>
</tr>
<tr>
<td>OSI</td>
<td>Open Systems Interconnect model</td>
</tr>
<tr>
<td>OMA</td>
<td>Open Mobile Alliance</td>
</tr>
<tr>
<td>IrDA</td>
<td>Infrared Data Association</td>
</tr>
<tr>
<td>CDMA</td>
<td>Code Division Multiple Access</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Service</td>
</tr>
<tr>
<td>UMTS</td>
<td>Universal Mobile Telephone System</td>
</tr>
<tr>
<td>WAE</td>
<td>Wireless Application Environment</td>
</tr>
<tr>
<td>WSP</td>
<td>Wireless Session Protocol</td>
</tr>
<tr>
<td>WTP</td>
<td>Wireless Transaction Protocol</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>WTLS</td>
<td>Wireless Transport Layer Security</td>
</tr>
<tr>
<td>WDP</td>
<td>Wireless Datagram Protocol</td>
</tr>
<tr>
<td>WML</td>
<td>Wireless Markup Language</td>
</tr>
<tr>
<td>HTTP</td>
<td>Hyper Text Transfer Protocol</td>
</tr>
<tr>
<td>UDP</td>
<td>User Datagram Protocol</td>
</tr>
<tr>
<td>OSI</td>
<td>International Standard Organization</td>
</tr>
<tr>
<td>HTML</td>
<td>Hypertext Mark-up Language</td>
</tr>
<tr>
<td>URL</td>
<td>Uniform Resource Locator</td>
</tr>
<tr>
<td>XML</td>
<td>Extensible Markup Language</td>
</tr>
<tr>
<td>RUP</td>
<td>Rational Unified Process</td>
</tr>
<tr>
<td>RIS</td>
<td>Rural information system</td>
</tr>
<tr>
<td>UML</td>
<td>Unified Modeling Language</td>
</tr>
<tr>
<td>IIS</td>
<td>Internet Information service</td>
</tr>
<tr>
<td>ASP</td>
<td>Active Server Page</td>
</tr>
<tr>
<td>SSL</td>
<td>Secure Sockets Layer</td>
</tr>
</tbody>
</table>
CHAPTER 1

INTRODUCTION

1.1 Background

More than the past twenty years, the World Bank has financed above $ 400 million outlay in agricultural education and preparation in developing countries. This money has assisted many countries to build local capacity for preparation technical staff and managers in the sector of rural development (World Bank, 2009). These skills are necessary for human resource development and provision of services necessary to villagers to increase agricultural productivity and sustainability of their farming systems. Without this ability of the rural population to increase productivity, the quality of their lives and livelihoods will be compromised.

Agriculture is a science and art to produce plant useful to the human, through experience and research conducted on the many different methods of cultivation and fertilization, and pest control. Agriculture has become a science whereby a series of operations based on scientific observations are repeatedly tested. This helped farms to produce tropical fruits with quality and in sufficient quantities and at an ongoing effort and reasonable costs. Industry and agriculture products sold in the markets and prices are affected by several factors, requiring farms to be aware of ways to protect it from climatic conditions and diseases targeted by the crop.
The contents of the thesis is for internal user only
References


Hair. et al. (2006), Mobilkom Austria, ’Geschichte der Mobilkom’, Press Release Mobilkom Austria, multivariate data analysis. Pearson prentice Hall Canada


Kothari, C.R. (1985), Research Methodology: Methods and Techniques, Wiley Eastern,
New Delhi

Lewis, J R (1995) "IBM Computer Usability Satisfaction Questionnaires: Psychometric
Evaluation and Instructions for Use," International Journal of Human-Computer
Interaction

on Robotics, Intelligence Systems and Signal Processing.

and IS-41 based cellular system using I-SMC. Wireless Communicationsand

4/2/ 2009 from
https://upcommons.upc.edu/e-prints/bitstream/2117/1437/1/lopezgeoscience04.pdf


Group Inc
http://www.w3.org/2008/02/MS4D_WS/papers/cdac-mobile-healthcare-paper.pdf

http://www.educause.edu/EQ/EDUCAUSEQuarterlyMagazineVolum/AreYouReadyforMobileLearning/157455


Retrieved February 10, 2009 from
www.ibm.com/developerworks/rational/library/content/03July/1000/1251/1251_bestpractices_TP026B.pdf

Sanregret, B. (2009). Mobile Content and Learning Solutions 2009, from

http://www.hotlavasoftware.com/


Retrieved Jan 10 2009 from


SUGAHARA, K., TANAKA, K., LAURENSON, M., OHTANI, T., WATANABE, T., &
http://riss.narc.affrc.go.jp/nashi/figs/KSPPIC1.pdf

(Ed.), Advances in Mobile Commerce Technologies (pp. 19-43), Hershey, PA: Idea Group Publishing

The International Engineering Consortium. WAP. Retrieved 2009 from
http://www.iec.org/online/tutorials/acrobat/wap.pdf


From http://go.worldbank.org/S84V3GW2O0


