

LB/DON/22/2012

LIBRARY
UNIVERSITY OF MORATUWA, SRI LANKA
MORATUWA

SMS Banking for the National Savings Bank



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

U G Mallika

08/10040

Dissertation submitted to the Faculty of Information Technology, University of Moratuwa, Sri Lanka for the partial fulfillment of the requirements of the Msc in Information Technology

2011

University of Moratuwa



102490

004¹¹
004 (043)

102490

TH

102490

Declaration

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

U. G. Mallika

Name of Student



Signature of Student

Date 18/11/2011

Supervised by

Malik Silva
Name of Supervisor



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk



Signature of Supervisor

Date 18/11/2011

Acknowledgements

I would like to take the opportunity to acknowledge the support and help of all who have assisted me in the Project. Without their contribution and advice, I would have never been able to progress with the work in the thesis

First, I would like to sincerely thank my thesis supervisor, Mr. Malik Silva, for his guidance, support, technical knowledge and encouragement in the whole project process and work. Secondly, I would like to thank all the IT Managers of the NSB who gave all the information, encouragement, and quick feedback. I appreciate particularly the support given by the staff of the *IT* Division by providing me with valuable information.

My most sincere gratitude goes out to Mr. P.S. Wasanthatilake and Mr. P.A. Abeysooriya Senior Managers of the IT division of National Savings Bank for the assistance provided to solve various problems I faced during their development of the project.

Finally I am thankful to Dr. D.A.W. Siriwardena, for proof reading this project dissertation.



University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Abstract

The aim of this project is to develop an on-line banking system that provides customers with the facility to check their accounts and do transactions on-line, using Short Message Service(SMS). The system will provide all the bank's facilities to its customers once their authentications [PIN No] match, including viewing account balance information, performing fund transfers, giving the customer an option of changing PIN no, and paying bills on-line.

The current banking system puts the customer into great inconvenience specially by the requirements of his essential physical presence in the banking hall, to execute his transactions. The search for a more convenient operational process is envisage in order to make the customer's task easier an acceptable. The widely used mobile 'phone and its Short Message Service is made use, of in order to achieve our desired goal.



Electronic Theses & Dissertations
www.lib.mrt.ac.lk

The new system will be a partnership between bank and the customer where the input is by a coded text message, and the output is received in a similar manner. The process will depend on the particular request of the customer.

The phone sends an SMS which is processed through the GSM provider and fed into the SMS provider via the SUNTEL switch. The SMS server translates it into a bank understandable message and then directs the message to the appropriate server. The message server on receiving the request, takes appropriate step to effect the particular operation.

When compared to the existing system , there are many advantages of this new service. These are, simple and secure, convenient, anytime, anywhere, value added, cheaper and faster, technologically up-to-date, DIY (Do-it-yourself) banking.

This new system will enable automation of some of the functions , thus conceiving an efficient, reliable, speedy and cost effective operational model for the NSB.

Contents

DECLARATION.....	II
ACKNOWLEDGEMENTS.....	III
ABSTRACT.....	IV
LIST OF FIGURES.....	VIII
LIST OF TABLES.....	IX
LISTINGS.....	X
LIST OF ACRONYMS.....	XI
CHAPTER 1 – INTRODUCTION.....	1
1.1 OVERVIEW.....	1
1.2 IMPORTANCE OF SMS BANKING.....	2
1.3 SIGNIFICANCE AND POTENTIAL VALUE.....	3
1.4 CURRENT PROCESS AND MAIN DRAWBACKS.....	3
1.5 OBJECTIVES.....	4
1.6 SCOPE OF THE PROJECT.....	5
1.7 THE PROPOSED SYSTEM.....	5
1.8 SYSTEM REQUIREMENTS.....	6
1.8.1 <i>Operating software environment</i>	6
1.8.2 <i>Operating hardware environment</i>	6
1.8.3 <i>External interface requirements</i>	6
1.9 DOCUMENT ORGANIZATION.....	9
1.10 SUMMARY.....	10
CHAPTER 2 – REVIEW OF OTHERS WORK.....	11
2.1 INTRODUCTION.....	11
2.3 ADVANTAGES OF SMS BANKING.....	12
2.4 COMPARISON WITH OTHER SYSTEMS.....	12
2.5 OVERVIEW OF FACTORS INFLUENCING SMS BANKING.....	14
2.5.1 <i>Risk and security</i>	14
2.5.2 <i>Socio-economic background and culture</i>	15
2.5.3 <i>Service characteristics</i>	15
2.5.4 <i>Cost of service and device</i>	16
2.5.5 <i>Device features</i>	16
2.6 THREATS TO MOBILE BANKING.....	16
2.7 SUMMARY.....	17
CHAPTER 3 - TECHNOLOGY ADOPTED.....	18
3.1 INTRODUCTION.....	18
3.2 SOFTWARE DEVELOPMENT MODELS.....	18
3.2.1 <i>Throwaway prototyping</i>	19
3.2.2 <i>Evolutionary prototyping</i>	19
3.3 DESIGN METHODOLOGY.....	20
3.4 TOOLS AND TECHNOLOGIES.....	22
3.5 SUMMARY.....	23
CHAPTER 4 – APPROACH.....	24
4.1 INTRODUCTION.....	24

4.2 HOW SMSS WORK	24
4.3 PROJECT DEVELOPMENT FLOW.....	25
4.4 SOFTWARE REQUIREMENT SPECIFICATION	26
4.4.1 <i>Functional overview</i>	26
4.5 FUNCTIONAL REQUIREMENTS	26
4.6 STRUCTURE OF THE INTENDED SYSTEM.....	28
4.6.1 <i>Balance Inquiry</i>	28
4.6.2 <i>Fund Transfer</i>	28
4.6.3 <i>Bill Payment Transaction</i>	28
4.6.4 <i>Pin Change</i>	28
4.6.5 <i>Reconciliation</i>	28
4.7 NON-FUNCTIONAL REQUIREMENTS	28
4.8 SUMMARY	30
CHAPTER 5 - ANALYSIS AND DESIGN.....	31
5.1 INTRODUCTION	31
5.2 MAIN CONTENTS OF THE PROPOSED SYSTEM.....	31
5.3 SOFTWARE ANALYSIS AND DESIGN SPECIFICATION	32
5.4 DESCRIBING SYSTEM BY DATA FLOW DIAGRAM	32
5.4.1 <i>Context diagram</i>	33
5.4.2 <i>Data flow diagram</i>	34
5.4.3 <i>Top level DFD</i>	34
5.4.4 <i>Expansion of 'Message Interface' process</i>	35
5.4.5 <i>Expansion of 'Transaction Handling' process</i>	36
5.5 E-R DIAGRAM	38
5.5.1 <i>Physical database design</i>	40
5.6 SUMMARY	41
CHAPTER 6 - IMPLEMENTATION.....	42
6.1 INTRODUCTION	42
6.2 SOFTWARE IMPLEMENTATION.....	42
6.3 TRANSACTION HANDLING FUNCTIONS OF THE SMS BANKING	42
6.4 RECONCILIATION FUNCTIONS OF THE SMS BANKING	45
6.5 VIEW RECONCILED DATA	47
6.6 PRINT RECONCILED DATA	47
6.7 HARDWARE IMPLEMENTATION	47
6.7.1 <i>System Management Services (SMS)</i>	48
6.7.2 <i>Host Security Module(HSM)</i>	49
6.7.3 <i>Web application</i>	49
6.7.4 <i>Message server</i>	49
6.7.5 <i>Bill payment server</i>	49
6.7.6 <i>Core banking system (Branch Servers)</i>	50
6.8 SUMMARY.....	50
CHAPTER 7 - EVALUATION.....	51
7.1 INTRODUCTION	51
7.2 OPERATIONS FOR TRANSACTION HANDLING FUNCTION.....	51
7.2.1 <i>Input operations</i>	51
7.2.3 <i>How to use NSB SMS banking</i>	51
7.3 TESTING.....	51
7.4 TESTING METHODS	52
7.4.1 <i>White-box testing</i>	52
7.4.2 <i>Black-box testing</i>	52

7.5 LEVEL OF TESTING	52
7.6 TEST PLAN FOR TESTING SMS BANKING	53
7.7 BALANCE INQUIRY FUNCTION	53
7.8 FUND TRANSFER TRANSACTION	54
7.9 PIN CHANGE TRANSACTION	55
7.10 BILL PAYMENT REQUEST	56
7.11 RECONCILIATION PROCESS	57
7.11.1 Data extraction process from the branch	58
7.11.2 Data Loading Process from the branch	59
7.11.3 Reconciliation Process from the Branch	60
7.12 TEST PLAN FOR TESTING NON-FUNCTIONAL REQUIREMENTS	61
7.13 TECHNIQUES OF TESTING	62
7.14 PROJECT ASSESSMENT	66
7.15 SUMMARY	66
CHAPTER 8 - CONCLUSION AND FUTURE WORK	67
8.1 INTRODUCTION	67
8.2 OVERALL PROJECT APPRAISAL	67
8.3 ASSESSMENT OF THE ACHIEVEMENT	68
8.4 LIMITATION OF THE SMS BANKING SOLUTION	69
8.5 FURTHER WORK	70
CHAPTER 9 - REFERENCES	72
APPENDIX A : DESIGN DOCUMENTATION	74
A.1 DATABASE DESIGN	74
A.2 SYSTEM CONTEXT	74
APPENDIX B : IMPLEMENTATION - SCREEN SHOTS	75
B:1 SMS BANKING APPLICATION	75
B:2 VIEWING SMS BANKING RECONCILED DATA	75
B:3 SMS BANKING REPORT DATA	77
APPENDIX C : CODE LISTING	78
C:1 BALANCE INQUARY	78
C:2 VALIDATE ACCOUNT NUMBER	79
C:3 REVERSE TRANSACTION	81
C:4 RECONCILIATION PROCESS	83
APPENDIX D : USER FEEDBACK FORM	90
APPENDIX E : TIME SCHEDULE	92

List Of Figures

FIGURE 1:1 EXISTING SYSTEM LAYOUT	4
FIGURE 1.2 MESSAGE INTERFACE	7
FIGURE 1.3 SMS BANKING ARCHITECTURE [10]	8
FIGURE 3:1 : PROTOTYPE WORKFLOW	20
FIGURE 3:2 SYMBOLS USED IN DFD	21
FIGURE 4:1 MODEL OF THE SYSTEMS DEVELOPMENT LIFE CYCLE	25
FIGURE 4.2 FUNCTIONAL OVERVIEW OF SMS BANKING FUNCTIONS.....	26
FIGURE 4:3 HIGH LEVEL SYSTEM FUNCTIONALITY	27
FIGURE 5:1 MESSAGE FORMAT	32
FIGURE 5:2 CONTEXT DIAGRAM	33
FIGURE 5:3 A TOP LEVEL DFD DIAGRAM.....	35
FIGURE 5:4 EXPANSION OF ‘MESSAGE INTERFACE ‘ PROCESS.....	36
FIGURE 5:5 EXPANSION OF ‘TRANSACTION HANDLING ‘ PROCESS.....	37
FIGURE 5:6 EXPANSION OF ‘RECONCILIATION ‘ PROCESS	38
FIGURE 5.7 ENTITY RELATIONSHIP DIAGRAM OF SMS BANKING	39
FIGURE 5:8 DATABASE DIAGRAM OF SMS BANKING	41
FIGURE 6:1 DATA FLOW DIAGRAM FOR TRANSACTION HANDLING MODULE.....	42
FIGURE 6:2 DATA FLOW DIAGRAM FOR RECONCILIATION MODULE.....	45
FIGURE 6:3 HARDWARE CONFIGURATION.....	48
FIGURE 7:1 MAIN MENU OF RECONCILIATION PROCESS.....	57
FIGURE 7:2 DATA EXTRACTION PROCESS.....	58
FIGURE 7:3 PATH OF EXTRACTED TEXT FILES	59
FIGURE 7:4 CONFIRMATION OF WRITING TEXT FILES DATA TO TABLE.....	59
FIGURE 7:5 OVERALL S/W QUALITY	64
FIGURE 7:6 SOFTWARE QUALITY MODULE WISE.....	65
FIGURE 7:7 OVERALL PERFORMANCE	66
FIGURE A:1 FUNCTIONALITY OF EACH COMPONENT	74
FIGURE B:1 LOGGING TO THE SYSTEM.....	75
FIGURE B:2 VIEWING SMS BANKING DATA	76
FIGURE B:3 EXISTING TRANSACTION INTERFACES	76
FIGURE B:4 DETAIL OF THE TRANSACTION.....	77
FIGURE B:5 REPORT OF SMS BANKING RECONCILED DATA	77
FIGURE C:1 TIME SCHEDULE.....	92

List Of Tables

TABLE 2:1 OTHERS APPROACH.....	14
TABLE 3:1 TOOLS AND TECHNOLOGIES	22
TABLE 7:1 TEST PLAN – BALANCE INQUIRY REQUEST	54
TABLE 7:2 TEST PLAN – FUND TRANSFER REQUEST	55
TABLE 7:3 TEST PLAN – PIN CHANGE REQUEST	56
TABLE 7:4 BILL PAYMENT –BILL TYPE & BILL NO	56
TABLE 7:5 TEST PLAN – BILL PAYMENT REQUEST.....	57
TABLE 7:6 TEST PLAN – DATA EXTRACTION PROCESS.....	58
TABLE 7:7 TEST PLAN – DATA LOADING PROCESS.....	60
TABLE 7:8 TEST PLAN – RECONCILIATION PROCESS.....	60
TABLE 7:9 TEST PLAN – NON FUNCTIONAL REQUIREMENTS	62
TABLE 7:10 OVERALL SOFTWARE QUALITY	64
TABLE 7:11 SMS BANKING MODULE VISE TABULATION.....	65
TABLE 7:12 OVERALL PERFORMANCE	65



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Listings

<i>LISTING : 6:1 SENDING SMS MESSAGE FROM THE BRANCH.....</i>	43
<i>LISTING : 6:2 RECEIVING SMS MESSAGE FROM THE BRANCH.....</i>	44
<i>LISTING : 6:3 CONNECT TO BRANCH</i>	46
<i>LISTING C: 1 GET CURRENT BALANCE OF THE ACCOUNT.....</i>	78
<i>LISTING C: 2 CHECK ACCOUNT NUMBER VALIDITY</i>	81
<i>LISTING C: 3 REVERSAL OF THE TRANSACTION</i>	82
<i>LISTING 6:5 DATA RECONCILIATION PROCESS.....</i>	89



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

LIST OF ACRONYMS

Technical Expressions	Description
AIX	<i>AIX</i> is the brand name of IBM's proprietary UNIX <i>operating system</i>
ATM	Automated Teller Machine
CBOS	Central Back Office System
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HSM	Hardware Security Module
NAC	Network Access Controller
NSB	National Savings Bank
PDA	Personal Digital Assistants
PIN	Personal Identification Number
PSTN	Public Switched Telephone Network
SMS	Short Message Service
SyMS	System management Service
UML	Unify Modelling Language



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk