TABLE OF CONTENTS

ABSTRACT		i
ACKNOWLEDGEMENT		ii
TABLE OF CONTENTS		iii
LIST OF FIGURES		ix
LSIT OF TABLES		xi
LIST OF ABBREVIATIONS		xiii
CHAPTER 1	INTRODUCTION TO INTELLIGENT BANK MANAGEMENT SYSTEM	1
	1.1 Introduction	1
	1.2 Statement of Problem	3
	1.3 Research Objective	4
	1.4 Research Scope	5
	1.5 Contributions of this Research	6
	1.6 Conclusion	9
CHAPTER 2	LITERATURE REVIEW	11
	2.1 Introduction	11
	2.2 Banking Management	11
	2.2.1 The Functions of Modern Banks	12
	2.2.2 The Principles of Banking Management	17
	2.2.2.1 Liquidity Management	17
	2.2.2.2 Asset Management	18
	2.2.2.3 Liability Management	18
	2.2.2.4 Capital Adequacy Management	19
	2.3 Malaysian Banking Development	22
	2.3.1 Automated Teller Machine (ATM)	23
	2.3.2 Telebanking	26
	2.3.3 PC Banking	28

2.3.4 Automated Self Banking Centers (ABC) 29
2.3.5 Internet Banking 30
2.3.6 WAP Banking 32
2.4 Simulation System 34
2.5 Computer Simulation Development 35
2.6 Simulation System in Training and E-Learning 39
2.7 Simulation of Banking Management 43
2.7.1 Financial System Simulator (FSS) 48
2.7.2 InterBank Simulation 49
2.7.3 Real Money Simulation System 49
2.7.4 Bank President 54
2.8 Conclusion 61

CHAPTER 3 METHODOLOGY 62
3.1 Introduction 62
3.2 Waterfall Model 62
3.2.1 Analysis 63
3.2.1.1 Subjects 64
3.2.1.2 Data Collection 65
3.2.1.3 Interviews 65
3.2.1.4 Data Analysis 66
3.2.1.5 Product Analysis 66
3.2.2 Design 66
3.2.2.1 Business Layer 67
3.2.2.2 Access Layer 67
3.2.2.3 Interface Layer 68
3.2.3 Implementation 68
3.2.3.1 System Architecture 68
3.2.3.2 Using the System 68
3.2.4 Testing 69
3.3 Evaluation 69
3.3.1 Evaluation based Questionnaires 69

3.3.2 Experimental Procedures 71
3.4 Software 71
3.5 Conclusion 73

CHAPTER 4 System Analysis 74
4.1 Introduction 74
4.2 Importance of Requirement Analysis in the Designing of the system 74
4.3 Requirement Analysis Procedures 75
4.3.1 Interviewing and Listening 75
4.3.2 Survey 81
4.3.3 Analyzing Procedures and Documents 86
4.3.4 Malaysian Economic Statistic 86
4.3.5 Malaysian Central Bank's Statistic on Interest Rate 88
4.3.6 Income 96
4.3.7 Bank Annual Report 96
4.4 IBMS System Requirements 100
4.4.1 Functional Requirements 100
4.4.2 Non-Functional Requirements 106
4.5 IBMS Hardware Requirement 107
4.5.1 Server Side 107
4.5.1.1 Web Server 107
4.5.1.2 Web Database 108
4.5.2 Client Side 108
4.5.2.1 Personal Computers 108
4.6 IBMS Software Requirements 109
4.6.1 Server Side 109
4.6.1.1 Web Server (Microsoft Windows 2000 Server with IIS 5.0) 109
4.6.1.2 Web Database (Microsoft Windows Server and SQL Server 110
4.6.2 Client Side 111

4.6.2.1 Personal Computers (Microsoft OS and Web Browser) 111
4.7 Workstation Hardware Requirements 111
4.8 Workstation Software Requirements 112
4.8.1 MS Visual Interdev 6.0 112
4.9 Conclusion 114

CHAPTER 4 DESIGN 115
5.1 Introduction 115
5.2 Business Class Diagram 116
5.3 Activity Diagram for the Design of IBMS 119
5.4 Database Classes 122
5.5 Intelligent Bank Management System (IBMS) Architecture 129
5.6 Sequence Diagram 130
5.7 User Interface Design 138
5.8 Product Factor 140
5.8.1 Functional Features 141
5.8.2 User Interface 141
5.8.3 Performance 142
5.8.4 Dependability 142
5.8.5 Failure Detection, Reporting and Recovery 143
5.8.6 Service 143
5.8.7 Product Cost 144
5.9 Conclusion 145

CHAPTER 6 IMPLEMENTATION 146
6.1 Introduction 146
6.2 Setting Up the System 147
6.2.1 Database Connections 152
6.3 Testing Intelligent Bank Management System 153
6.3.1 Starting a New Game 153
6.3.1.1 Game Administration - Instructor 155

6.3.1.2 Playing the Game 157
6.3.1.3 Reviewing Last Quarter's Results 158
6.3.1.4 Making Next Quarter's Results 159
6.3.1.5 Advancing to Next Quarter 159
6.3.1.6 Printing Forms and Reports 160
6.3.1.7 Exiting the Game 160
6.4 Conclusion 162

CHAPTER 7 TESTING 163
7.1 Test Objective 163
7.2 Test Scope 163
7.3 Test Data 164
7.3.1 Instructor Data Set 164
7.3.2 Participant Data Set 165
7.4 Test Implementation and Results 165
7.4.1 Instructor's Configuration 165
7.4.2 Participant's Configuration 169
7.5 Conclusion 174

CHAPTER 8 EVALUATION 175
8.1 Introduction 175
8.2 Evaluation Process 176
8.2.1 Program Content 176
8.2.2 Effectiveness of IBMS 177
8.2.3 Practice / Assessment / Feedback 178
8.2.4 Users Appeal and Suitability 179
8.2.5 Ease of Use 180
8.2.6 Presentation 181
8.3 Results 182
8.4 Conclusion 189

CHAPTER 9	DISCUSSION AND CONCLUSION	184
	9.1 Reliability of the Research Study	190
	9.2 Evaluation on IBMS	191
	9.3 Problems Encountered	192
	9.4 Limitations and Weaknesses	194
	9.5 Recommendation for further Studies and Further Enhancements	195
	9.6 Conclusion	197
APPENDIX		198
Appendix A	Survey Form for Analysis	198
Appendix B	Sample Assignment of Real Money Simulation System	200
Appendix C	Evaluation Form	203
Appendix D	Main Page of IBMS	205
Appendix E	Participants Log In Page	206
Appendix F	Balance Sheet (Assets)	207
Appendix G	Balance Sheet (Liabilities)	208
Appendix H	IBMS Tutorial Page	209
Appendix I	Income Statement for IBMS	210
References		211
Bibliography		213

LIST OF FIGURES

Figure 2.1	Experiential Learning Process	42
Figure 2.2	The Asset Categories for Bank President	57
Figure 2.3	Liability and Equity for Bank President	58
Figure 2.4	Income Statement	59
Figure 3.1	Waterfall Model Incorporated with Object Oriented Modeling Technique	63
Figure 3.2	Rating Scale	69
Figure 4.1	Number of users for each training provided for Bank Executives	82
Figure 4.2	Ratings on the training provided by Local Banks	83
Figure 4.3	Ratings by users on Simulation Based Training System	83
Figure 4.4	User Selection of the Component that indicate the Bank Performance	84
Figure 4.5	Preferred type of Participation by the users	85
Figure 4.6	Trend that affect the Bank Performance according to the survey	85
Figure 4.7	Use Case Diagram 1	100
Figure 4.8	Use Case Description for IBMS Log In - Instructor	101
Figure 4.9	Use Case Description for IBMS Log In - Participant	102
Figure 4.10	Use Case Diagram 2	103
Figure 4.11	Use Case Description for IBMS	104
Figure 5.1	Business Class Diagram	117
Figure 5.2	IBMS Activity Diagram	121
Figure 5.3	Access Classes	123

Figure 5.4	Access Class Diagram	126
Figure 5.5	The Framework of IBMS	129
Figure 5.6	Creating A New Game	132
Figure 5.7	Game Administration	133
Figure 5.8	Play the Game	134
Figure 5.9	Manage the Bank	135
Figure 5.10	View Results for Instructor	136
Figure 5.11	View Results for Participant	137
Figure 5.12	Interface Class Diagram	139
Figure 6.1	IBMS Three Tier Client Server Architecture	147
Figure 6.2	Request and Response Process for IBMS Instructor	149
Figure 6.3	Source Code for Instructor Log In Page	150
Figure 6.4	ASP Scripts for Instructor Log In Page	151
Figure 6.5	Main IBMS Page	154
Figure 6.6	Instructor Log In Page	154
Figure 6.7	Instructor Main Page	155
Figure 8.1	Results on Evaluation of Program Content	177
Figure 8.2	Results on Evaluation of Effectiveness	178
Figure 8.3	Results on Evaluation of Practice/Assessment/Feedback	179
Figure 8.4	Results on Evaluation of Users Appeal and Suitability	180
Figure 8.5	Results on Evaluation of Ease of Use	181
Figure 8.6	Results on Evaluation of Presentation	182

LIST OF TABLES

Table 2.1	The Roles of Modern Banks	12
Table 2.2	The Growth of ATM Machines in Malaysia	24
Table 2.3	Phone Banking Services	27
Table 2.4	Example of Net Services	31
Table 2.5	Examples of Mobile Phone Banking Services offered by Banks	33
Table 2.6	Simulation Usage at AACSB Member Schools by Discipline	44
Table 2.7	Mean Rating of Teaching Method Effectiveness	45
Table 2.8	Mean Rating of Teaching Effectiveness by Simulation Users and Non Users	46
Table 2.9	Balance sheet at Year End (Turn 12) for years	52
Table 2.10	Income Statements for years ended Turn 12	53
Table 3.1	Profile of the Participants	64
Table 4.1	List of Banks and Bank Executives been Interviewed	76
Table 4.2	List of Questions and Feedback	78
Table 4.3	Management Criteria	80
Table 4.4	Yearly Growth Rate (Malaysian Central Bank Report)	87
Table 4.5	Categories in Liabilities and Equity	88
Table 4.6	Allocation of Deposits in IBMS	88
Table 4.7	Categories of Assets and its Allocation	89
Table 4.8	Loan Allocation for IBMS	89
Table 4.9	Cash Allocation for different types of Categories	90

Table 4.10	Interest Regulator for Deposit	91
Table 4.11	Loan Allocated in accordance to the Interest Rate	92
Table 4.12	Details of Deposit and Interest Rate (Malaysian Central Bank Report)	94
Table 4.13	Details of Loan and Interest Rate (Malaysian Central Bank Report)	95
Table 4.14	Contents of Bank Annual Report	99
Table 7.1	Game Setup Information	166
Table 7.2	Year 1997 Growth Rate (Malaysian Central Bank Report)	166
Table 7.3	Details of Deposit and Interest Rate for Year 1997 (Malaysian Central Bank Report)	167
Table 7.4	Details of Loan and Interest Rate for Year 1997 (Malaysian Central Bank Report)	167
Table 7.5	Regulatory Environment for Game Test 1	168
Table 7.6	Bank Establishment Details for Game Test 1	169
Table 7.7	Interest Rate Configuration for Loan (Game: Test 1)	170
Table 7.8	Loan Amount for Quarter 0 to Quarter 4 (Game: Test 1)	170
Table 7.9	Interest Rate Configuration for Deposit (Game: Test 1)	171
Table 7.10	Total Deposit for Quarter 0 to Quarter 4 (Game: Test 1)	171
Table 7.11	Total Expenses for Budget Categories (Game: Test 1)	172
Table 7.12	Total Assets from Quarter 0 to Quarter 4 (Game: Test 1)	172
Table 7.13	Total Liability and Equity from Quarter 0 to Quarter 4	173
Table 7.14	Income Statement Information	173
Table 8.1	IBMS Evaluation Results I	183
Table 8.2	IBMS Evaluation Results in Percentage	186

LIST OF ABBREVIATIONS

ADO	ActiveX Data Objects
API	Application Programming Interface
ASP	Active Server Page
COTS	Commercial Off-The-Shelf
CPI	Consumer Price Index
CPU	Central Processing Unit
DBMS	Database Management System
GDP	Gross Domestic Product
HTTP	Hyper Text Transfer Protocol
IBMS	Intelligent Bank Management Simulation System
IIS	Internet Information Server
LAN	Local Area Network
TCP/IP	Transmission Control Protocol / Internet Protocol
UI	User Interface
UML	Unified Modeling Language