

Development of Payment Queuing System with Android Application

A Thesis Presented to the Faculty of Computer Engineering
College of Engineering, Architecture and Technology
De La Salle University – Dasmariñas
Dasmariñas City, Cavite

In Partial Fulfillment of the Requirements for the Degree of
Bachelor of Science in Computer Engineering

by

Leander A. Abergas
Renica Kim S. Balboa
Nelson G. Gabrinao

October 2014

TABLE OF CONTENTS

APPROVAL SHEET	i
TABLE OF CONTENTS	ii
LIST OF FIGURES	v
LIST OF TABLES	v
ACKNOWLEDGEMENT	vi
ABSTRACT	vii
Chapter 1 THE PROBLEM AND ITS BACKGROUND	
1.1 Introduction	1
1.2 Background of the Study	3
1.3 Statement of the Problem	4
1.4 Significance of the Study	5
1.5 Conceptual Framework	6
1.6 Scope and Limitation of the Study	7
1.7 Definition of Terms	8
Chapter 2 REVIEW OF RELATED LITERATURE AND STUDIES	
2.1 Foreign Literature	10
2.1.1 Queuing Theory	10
2.1.1.1 Brief History of Queueing Theory	10
2.1.1.1.1 Poisson Distribution	12
2.1.1.2 Early Applications	12
2.1.2 Characteristics of Queuing Processes	13
2.1.3 Database	14
2.1.4 Touch screen Technologies	16
2.1.4.1 Touch screen Technology Components	16
2.1.4.2 Types of Touch screen Technology	17
2.1.5 NEMQ-Q Queuing Systems	18
2.1.5.1 Virtual Queuing Systems	18
2.1.5.2 Single Queue Systems	19
2.1.5.3 EZ Queue	19
2.1.5.4 Order up	20
2.1.6 VISI-Q Advanced Guest Paging System	20
2.1.7 SMARTQUEUE® Integrated Multimedia Queue Management System	21
2.1.7.1 How It Works	21

2.1.8 Lavi Industries	22
2.1.9 Databyte's Advanced Queue Management System (AQMS-16)	23
2.1.10 WAVETEC Queue Management Solution	23
2.1.11 NEXA Banking Queue Management Solutions	24
2.2 Foreign Studies	25
2.2.1 The Psychology of Waiting Lines	25
2.2.2 Automatic Queueing Model for Banking Applications	28
2.3 Local Literature	29
2.3.1 BEA- BPI Express Assist	29
2.3.2 QueueRite	30
2.3.3 Automizer Queue Machine System	30
2.3.4 TimeFree Innovations	32
2.3.5 Bureau of Immigration to implement new queueing at Airports to foil human smuggling	32
2.4 Local Studies	33
2.4.1 Development of an Automated Payment Queueing System	33
2.4.2 A study on the queueing system of the laboratory department of Las Piñas General Hospital and Satellite Trauma Center Las Piñas City	34
2.4.3 A Study on the Queueing System of meralco bacoor branch	35
2.5 Relevance of the Study	36

Chapter 3 RESEARCH METHODOLOGY

3.1 Methodological Framework	37
3.2 Research Method	38
3.2.1 Overt Observation	38
3.2.2 Formulation of Sample Size Population	39
3.2.3 On-Site Survey	39
3.3 Research Instruments	40
3.3.1 Development of Questionnaires	40
3.3.2 Validation of Instrument	40
3.3.3 Conduction of Survey	40
3.3.4 Experimentation	41
3.4 Data Gathering Procedure	41
3.5 Statistical Tools / Treatment of Data	41
3.6 Conceptualization	42
3.7 Instrumentation	44
3.8 System Development	44
3.9 Evaluation and Testing	45

Chapter 4 RESEARCH FINDINGS

4.1 System Design of Payment Queuing System with Android Applicatoin	46
4.2 System Operational Procedures	46
4.3 Components and their Functions	48
4.3.1 Database	48
4.3.2 Router	49
4.3.3 Speaker	50
4.4 System Connectivity Layout	51
4.5 Controller Software	52
4.6 Source Code Development	53
4.7 Data and Results	54
4.8 Measurement of the Research System's Effectiveness	68
4.9 The Developed System	72
4.10 Treasury and Ancillary Office Interview	78

Chapter 5 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary	80
5.2 Conclusion	81
5.3 Recommendation	83

REFERENCES 85

APPENDICES

Appendix A Cost Analysis	90
Appendix B Source Code for the Android Application	95
Appendix C Cashier Application Source Code	100
Appendix D Client Application Source Code	105
Appendix E Server Source Code	117
Appendix F Botor, Cuenca, and Manguerra (2008) System Test	130
Appendix G Photo Documentation	132
Appendix H Sample Survey Forms	137
Appendix I Sample Answered Survey Forms	139
Appendix J Letters	154
Appendix K Checklist and Certification	156
Appendix L Gantt Chart	160
Appendix M Curriculum Vitae	161

LIST OF FIGURES

Figure 1.1	Research Paradigm	6
Figure 3.1	Proposed Block Diagram of the System Design	37
Figure 3.2	Conceptualize Flow Chart of the System	42
Figure 4.1	Student Database	50
Figure 4.2	Logical Topology of the Research System	51
Figure 4.3	Physical Topology of the Research System	52
Figure 4.4	Post-Research System Survey Form	54
Figure 4.5	Pre-Research System Survey Form	55
Figure 4.6	Improvability of Existing System	56
Figure 4.7	Potential Acceptance of Research System	57
Figure 4.8	Potential Users Distribution	58
Figure 4.9	Type of Transactions Performed	59
Figure 4.10	Mode of Payment	62
Figure 4.11	Parameters Evaluation Result	65
Figure 4.12	Acceptance Rate	67
Figure 4.13	Notification Board	72
Figure 4.14	Client – Main Screen	72
Figure 4.15	Client – New Student Input	73
Figure 4.16	Client – New Student Transaction	73
Figure 4.17	Client – Old Student Input	74
Figure 4.18	Client – Old Student Transaction	74
Figure 4.19	Client – Transaction Summary	75
Figure 4.20	Client – Confirmation Frame	75
Figure 4.21	Cashier - Login Frame	76
Figure 4.22	Cashier - Transaction Option	76
Figure 4.23	Cashier - Main Frame	76
Figure 4.24	Cashier - Skip Transactions List	77
Figure 4.25	Cashier – Log-out Screen	77

LIST OF TABLES

Table 4.1	Major Transaction Times	60
Table 4.2	Minor Transaction Times	61
Table 4.3	Current Existing System Scalar Evaluation Computation	63
Table 4.4	Research System Scalar Evaluation Computation	64
Table 4.5	Transaction Time Comparison	68
Table 4.6	Research Systems Comparison Test	70

ABSTRACT

Transactions involving basic utilities have long been universally accepted to constitute long waiting-lines. This could be observed in health services, government offices and school enrollment procedures. However, more often than not, taking DLSU-D enrollment seasons to be observed and serve as an example, the mixing of minor and major transactions not only lengthens the waiting-lines longer than is necessary, but also inconvenience students only requiring simple and non-time-consuming transactions as well as leaving them stranded. The group decided on pursuing "Development of Payment Queuing System with Android Application" to help solve and alleviate these issues through transaction categorization and separation, and service time estimation functionalities.

The system had 4 different types of application developed, namely: a server program; client terminal application; cashier program; and an android application.

The system as a working whole was composed of a client program that accepts user input regarding transaction information, a MySQL server serves as a backend database, and a P.O.S. (point of sale) program allows the user to view and process transactions in queue. In addition, a separate notification program outputs to a monitor the current transactions being serviced and its corresponding P.O.S. terminal, it also displays as well the current queue length of both minor and major transactions. The interfacing of all involved components is managed by a wireless router hosting a local area network. All components are connected through cat5 cables with the exception of the android client program which interacts wirelessly.

