

INTEGRATED SUPERMARKET MANAGEMENT SYSTEM(ISMS)

MUHAMMAD FAREED BIN ABU KASIN

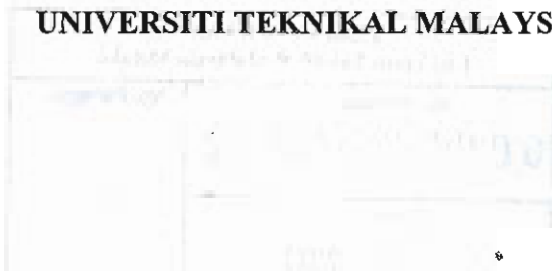
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**INTEGRATED SUPERMARKET MANAGEMENT SYSTEM
(ISMS)**

MUHAMMAD FAREED ABU KASIN

**This report is submitted in partial fulfillment of the requirements for the
Bachelor of Computer Science (Database Management)**

**FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA**



DEDICATION

To both my parents, my supervisor and friends. Without continuous support from you, I would not have completed this project.

ACKNOWLEDGEMENT

I would like to thank and express my gratitude towards my supervisor, Puan Zahariah bt Othman which guide me patiently throughout the process of completing this project. I have learnt a lot under her guidance. My system would not come to this stage without her advice.

I would also like to thank all my lectures in Faculty of Information and Technology for all the knowledge that they gave to me. This knowledge assists a lot in the development progress of this project. I enjoy implementing the theory in order produce the best system I could ever try.

Also special thanks to my beloved parents and friends. They motivate me the most and make my feet strong in completing this final year project. The moral support they gave had drive me to give all my best in developing this project.

ABSTRACT

Inventory management is a complex task, thus it requires precise system such as Integrated Supermarket Management System (ISMS) to ensure that inventory is managed properly. The requirement for this type of system becomes more critical when it comes to large-sized market; it is hard to monitor and trace item movement from the moment it arrives in the premise until it is sold to the customer. The objectives of developing this system are to integrate several tasks that is co-related, to generate significant report, to increase staffs' awareness about inventory and to prepare data backup in case of system failure. ISMS implements client-server architecture, heterogeneous database integration and real-time data processing features to ensure that the system can be deployed in real environment. In the end, the objectives of developing the system have been achieved successfully, with addition of several extra features such as barcode generator and receipt printing. With all these features, ISMS development is a success and it is ready to be implemented in the real environment.

ABSTRAK

Pengurusan inventori merupakan suatu tugas yang rumit, justeru itu, sebuah sistem yang tepat amat diperlukan, misalnya *Integrated Supermarket Management System* (ISMS) demi memastikan inventori diuruskan dengan sebaik mungkin. Keperluan terhadap sistem ini semakin meningkat khususnya untuk pasaraya besar; yang mana kerja pemantauan barangan dari proses ketibaannya di premis perniagaan hinggalah ke tangan pengguna; menjadi semakin mencabar. Tujuan pembangunan sistem ini adalah untuk menggabungkan beberapa tugas yang memiliki skop kerja yang sama, menjana laporan yang sewajarnya, meningkatkan kepekaan pekerja terhadap inventori dan juga mewujudkan data sandaran seandainya sistem gagal berfungsi. Sistem ini akan mengaplikasikan arkitektur pelayan-pelanggan, integrasi pelbagai pangkalan data dan pemprosesan data semasa. Pada penghujung projek ini, semua objektif project dapat dicapai dengan jayanya, dengan tambahan beberapa ciri-ciri misalnya penjanaan barkod and pencetakan resit. Dengan semua ciri-ciri tersebut, pembangunan ISMS merupakan suatu kejayaan dan berpotensi untuk digunakan di situasi sebenar.

TABLE OF CONTENTS

CHAPTER	PAGE
1 INTRODUCTION	1
1.1 Project Background	1
1.2 Problem statement	2
1.3 Project Objective	3
1.4 Project Scope	4
1.5 Project significance	5
1.6 Expected output	5
1.7 Conclusion	6
2 LITERATURE REVIEW AND PROJECT METHODOLOGY	7
2.1 Introduction	7
2.2 Facts and findings	7
2.2.1 Domain	7
2.2.2 Existing system	8
2.2.3 Technique	10
2.3 Project Methodology	14
2.4 Project Requirements	16
2.5 Project Schedule and Milestone	16
2.6 Conclusion	16
3 ANALYSIS	18
3.1 Introduction	18
3.2 Problem analysis	18
3.3 Requirement analysis	20
3.4 Conclusion	30
4 DESIGN	31
4.1 Introduction	31
4.2 High-level design	31
4.2.1.1 Navigation Design	40
4.2.1.2 User Interface and Output design	41

4.2.2 Conceptual and Logical Database Design	44
4.2.2.1 Conceptual database design	44
4.2.2.2 Logical database design	46
4.2.2.3 DBMS Selection	48
4.3 System Architecture	49
4.3.1 Software design	50
4.3.2 Physical Database Design	61
4.4 Conclusion	67
5 IMPLEMENTATION	68
5.1 Introduction	68
5.2 Software Development Environment Setup	69
5.2.1 Environment setup	70
5.3 Database Implementation	71
5.3.1 Data loading	71
5.3.2 Sample of database access	71
5.4 Software Configuration Management	75
5.4.1 Configuration environment setup	75
5.4.2 Version Control Procedure	76
5.5 Implementation Status	77
5.6 Conclusion	77
6 TESTING	78
6.1 Introduction	78
6.2 Test Plan	79
6.2.1 Test Organization	79
6.2.2. Test environment	80
6.2.3 Test Schedule	80
6.3 Test Strategy	81
6.3.1 Classes of tests	81
6.4 Test Design	82
6.4.1 Test Description	82
6.4.2 Test data	85
6.5 Test Result and Analysis	86
6.6 Conclusion	88
7 PROJECT CONCLUSION	89

7.1 Observation on Weakness and Strengths	89
7.1.1 System strength	89
7.1.2 System weaknesses	90
7.2 Propositions for Improvement	91
7.3 Contribution	91
7.4 Conclusion	92

LIST OF TABLES

Table 2.1 Comparison between WMS, Symbol MC50 and ISMS	10
Table 3.1 STAFF database: Staff table	21
Table 3.2 ITEM database: Item table	21
Table 3.3 ITEM database: Shelve table	21
Table 3.4 ITEM database: Stock table	22
Table 3.5 ITEM database: Stock_Shelve table	22
Table 3.6 ITEM database: Sale table	22
Table 3.7 ITEM database: Expired table	23
Table 4.1 Staff Manager Panel	34
Table 4.2 Item Panel	34
Table 4.3 Stock Panel	35
Table 4.4 Delete Panel	36
Table 4.5 Item on Shelve Panel	36
Table 4.6 Shelve Panel Input Design	37
Table 4.7 Expired Item Panel Input Design	38
Table 4.8 Reset password input design	38
Table 4.9 Search window input design	39
Table 4.10 Cashier Input Design	40
Table 4.11 Output Design for Search	43
Table 4.12 Output Design for Barcode Generation	43
Table 4.13 Output design for Cash Calculation	44
Table 4.14 Output design for Receipt Printing	44
Table 4.15 Output Design for Profit Viewer	44
Table 4.16 Logical database design: Staff	46
Table 4.17 Logical database design: Item	46
Table 4.18 Logical database design: Stock	47
Table 4.19 Logical database design : Shelve	47
Table 4.20 Logical database design: Stock_shelve	48

Table 4.21 Logical database design: Expired	48
Table 4.22 Logical database design: Sale	48
Table 4.23 Pseudo code: Login process	51
Table 4.24 Pseudo code: Admin main menu	56
Table 4.25 Pseudo code: Cashier main menu	57
Table 4.26 Pseudo code: Stock keeper main menu	61
Table 5.1 Environment setup of ISMS	70
Table 5.2 Server Configuration (SQL Server)	70
Table 5.3 Server Configuration (Oracle)	70
Table 5.4 Database Environment Setup (SQL Server)	70
Table 5.5 Database Environment Setup (Oracle)	71
Table 5.6 Computer environment setup	71
Table 5.7 Version Control Procedure for ISMS	76
Table 5.8 Implementation Status	77
Table 6.1 Test Organization	79
Table 6.2 Test environment	80
Table 6.3 Test Schedule for ISMS	81
Table 6.4 Classes of test	82
Table 6.5 Test Description : Login	83
Table 6.6 Test description: Admin menu	84
Table 6.7 Test description: Stock Keeper	84
Table 6.8 Test Description: Cashier	85
Table 6.9 Test Result and Analysis [Scale: 5 for Best, 1 for Worst]	88

LIST OF FIGURES

Figure 2.1 WMS in action	9
Figure 2.2 Mobile device that works with Symbol MC50	9
Figure 2.3 Basic concept of heterogeneous database integration	12
Figure 2.4 Client-server model	12
Figure 2.5 Diagram of exploratory development	14
Figure 3.1 Basic DFD of cashier	19
Figure 3.2 Basic DFD of stock keeper	19
Figure 3.3 Context diagram of ISMS	23
Figure 3.4 Composition diagram of ISMS	24
Figure 3.5 Level zero login system flow	24
Figure 3.6 Level one log in system flow	25
Figure 3.7 Level one Admin main menu	26
Figure 3.8 Level one Cashier Main Menu	26
Figure 3.9 Level one Stock Keeper Main Menu	27
Figure 4.1 ISMS client/server architecture	32
Figure 4.2 Interface Design for Login	33
Figure 4.3 Interface Design for Staff Manager	33
Figure 4.4 Interface Design for Item Manager	34
Figure 4.5 Interface Design for Stock Manager	35
Figure 4.6 Interface Design for Delete Panel	35
Figure 4.7 Interface Design for Item on Shelve Manager	36
Figure 4.8 Interface Design for Shelve Manager	37
Figure 4.9 Interface Design for Expired Item Manager	37
Figure 4.10 Interface Design for Reset Password Window	38
Figure 4.11 Interface Design for Search Window	39
Figure 4.12 Interface Design for Cashier Menu	39
Figure 4.13 Navigation design: Administrator	40
Figure 4.14 Navigation design: Stock Keeper	41

Figure 4.15 Navigation design: Cashier	41
Figure 4.16 Output design for Search process	42
Figure 4.17 Output Design for Cash Calculation	43
Figure 4.18 ERD for ISMS	45
Figure 4.19 ISMS detailed architecture	50
Figure 4.20 Backup/Restore Data menu	66
Figure 4.21 Database backup	66
Figure 4.22 Database restore	66
Figure 5.1 Environment Setup for ISMS	69
Figure 5.2 Search interface	72
Figure 5.3 Sample result	72
Figure 5.4 Query interface	73
Figure 5.5 Sample output	73
Figure 5.6 Sample of purchased items	74
Figure 5.7 Total price	74
Figure 5.8 Profit Viewer Menu	75
Figure 5.9 Profit viewer result	75

LIST OF ABBREVIATIONS

OS	Operating System
ERD	Entity Relationship Diagram
DBMS	Database Management System
DFD	Data Flow Diagram
ISMS	Integrated Supermarket Management System
LAN	Local Area Network
P2P	Peer to Peer
SQL	Structured Query Language

LIST OF ATTACHMENTS

ATTACHMENT	PAGE
1.1 Proposal form	1
1.2 Gantt Chart	7
1.3 ISMS Interface	9
1.4 SQL Server Configuration	19
1.5 ISMS User Manual	35

CHAPTER 1

INTRODUCTION

1.1 Project Background

As the time goes by and technology evolves quickly, people manage to create an easier life in every aspect by manipulating the rapid growth of technology. Modern market has become mega-sized along with the population growth. It is impossible to rely boldly on human effort to successfully manage these huge sized markets. A storekeeper faces difficulty in keeping track of stock movement and many more troubles. Thus, a very handy system is compulsory in order to ease the burden of market management.

Stock management is the most essential part in a market, regardless of its size. Since stock is the heart of a market, inaccuracy, even in minor scale can bring catastrophic consequences to a particular market. Conventionally, stocks are managed manually. Nowadays, many have changed to digitalized method of managing stock. The shift really has made stock management a lot easier.

The system is about management of a supermarket. It integrates some of the basic marketing task into one system. As we always know, integration will make things easier because everything goes on as a single system. As an example, a cashier which is responsible in handling the bought items of customer will help a stock keeper does his work because through a cashier, a stock keeper will be able to know how the

items in the market move. The system with similar functionality actually existed, but it is not implemented in this country anymore. As an example, MYDIN has been using integrated warehouse management in their marketing management system. However, it is not the whole-market-level integration as been proposed by this system. What the system tries to achieve is to bring inventory management to a higher level of application.

1.2 Problem statement

Among the most common problem that appears in any mega-sized market nowadays is the frequently changing product price. Price always changes especially when the market is having promotion in conjunction with festival such as Hari Raya and Chinese New Year. At these seasonal festivals, price will drop for specific interval of time. When promotion ends, price of item will be back to normal again. Thus, an easy price assignation system is very handy in this situation.

Besides that, sometimes items on shelf has finished without being refilled instantly. Imagine the disappointment of a customer who desired to buy a particular item but it is unavailable on shelf. The problem here is that the stock keeper is not notified about the emptiness of item on shelf, so that the stock keeper can take instant action. Hence, a notification to stock keeper is very crucial to solve this problem. Furthermore, a notification about fast-moving item in warehouse is also crucial, so that the stock keeper can make orders on new stock quickly.

In addition, the problem that appeared is staff works separately although they are using the same system. This is quite inefficient because if all the co-related staff tasks are integrated, a one-point item management system can be created. The most important feature that emerges from this integration is the ability of item tracking. The integration of works reduce the cost of management, because everything happens simultaneously without having the same record to be rewritten repeatedly.

Sometimes, finding a specific item can be very tedious in large market, especially when the price tag or the barcode of that item is missing. In normal case, the customer only realize that when they come to the cashier for payment. In order to

solve this, accurate item-on-the-shelve-positioning should be implemented, so that finding the desired item becomes effortless.

In a nutshell, this system is the improvement of the currently existing system in market. At the same time, this project must have the same basic functionality as performed by current systems.

1.3 Project Objective

The objectives of the project are:

- ❖ To overcome the frequently changing price situation by easy price assignation.

With one click, the price can be increased or reduced, at the same time, keep price history for future reference

- ❖ To monitor stock movement in warehouse by tracing significant activities related to stock management.

Some the important activities are arrival of new stock from supplier, depletion of specific item in warehouse, stock placement on shelves and many more.

- ❖ To provide one-point item management system by integrating works from several department.

Works that seen as co-related, such as stock keeper and cashier, will be integrated. When a cashier works, he is actually helping the task of stock manager and vice versa. All these process happen seamlessly, without being noticed by the staff himself.

- ❖ To ease the process of item search in the market.

Make search process easier by providing specific location of item, such as on which floor, in which shelves and so on.

- ❖ To generate significant report

Generate important report that may assist management personnel in managing the market and make crucial decision about their business.

1.4 Project Scope

1.4.1 System scope:

- Log In function
 - Only registered users are allowed to use the system
 - The system will detect user role in the system based on username, without having user to choose it manually
- Warehouse items manager
 - Ability to add new items, update item stock and its price, and delete the non-existing item in the system
- Warehouse stock tracer
 - Detect the movement of items in warehouse; it can notify user(stock keeper) whenever stock is critically low
- Search function
 - Search the whole database for a particular item based on given criteria, and give the proper answer
- Calculation function
 - Calculate the sum of money to be paid by the customer
 - Calculate stock addition or depletion, whether stock on shelve or stock inside the warehouse
- Barcode generator function

- Generate barcode that is totally unique to differentiate identical items that have different stock id
- Report function
 - Display total profit gained from sale based on date of sale
 - Print receipt after transaction with customer finish

1.4.2 Target user:

This project can be implemented in market regardless of any size, such as mini market, supermarket and many more. Meanwhile, the users of this system are:

- Stock keeper
- Cashier
- IT staff (administrator)

1.5 Project significance

The completion of this project is a must in order to reduce time and cost consuming. The implementation of this project make price assignation easy and help customers find any item in the market. At the same time, by promoting resources sharing, the management cost can be reduced tremendously. The integration of works as suggested by the project will create one-point inventory management system. Meanwhile, the project also helps management personnel make vital business decisions that may expand their business to further level. Report that is generated from the project will provide important information about the business performance.

1.6 Expected output

A system that support market management that can be implemented across the country.

1.7 Conclusion

Throughout the whole chapter, the discussion of project background explains the origin of idea that drives the development of ISMS. The problem statement reveals about the problems that is experienced in most markets nowadays. All these problems will be resolved with the objectives of ISMS development. Meanwhile, project scope is about the entire task that will be done by ISMS, and target user is the expected user of ISMS. Project significance explains more about the importance of developing ISMS.

Next chapter will explains about literature review and project methodology, which include facts and findings, project methodology, project requirement and schedule.

CHAPTER 2

LITERATURE REVIEW AND PROJECT METHODOLOGY

2.1 Introduction

Previously on chapter 1, a brief introduction on ISMS has been made. Some of the aspects that have been explained are project background, project objective, project scope and etc. Its purpose is to give user the basic idea about ISMS, at the same time provide overview about the whole system. In this chapter, further explanation about ISMS domain will be made. Several case studies will be made in order to identify and compare currently existing system domain with ISMS. By doing so, suitable techniques can be adopted in order to develop ISMS. Besides that, this chapter also discussed the project methodology and requirements.

2.2 Facts and findings

2.2.1 Domain

After conducting several researches and information findings regarding to the inventory management system that is implemented in hypermarket, the main issues that is detected in the currently existing systems are lack of item tracking and stock depletion notification.

As been mentioned in *retailtechnologyreview.com*, despite many state-of-the-art features introduced in Symbol MC50 for Tesco hypermarket, it does not provide