DESIGN AND IMPLEMENTATION OF A QUEUE SYSTEM FOR A COMMERCIAL SERVICE

(A CASE STUDY OF UNITED BANK FOR AFRICA, AUCHI)

BY

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CERTIFICATION

We, the undersigned hereby certify that this project work was carried out by **UBIRIH JOSHUA OLUWAFEMI**, with Matriculation Number: **ICT/225200105** of the Department of Computer Science, School of Information and Communication Technology, Auchi Polytechnic, Auchi.

We also certify that the work is adequate in scope and quality in Partial Fulfillment of the Requirements for the Higher National Diploma in Computer Science.

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DEDICATION

I dedicate this project work to ALMIGHTY GOD who has lead me through since the beginning of my year in this institution

ACKNOWLEDGEMENT

First and Foremost my special thanks go to Almighty God who in His mercy, grace, protection and His guidance over me and seeing me through the hustle and bustle during the course of study.

My gratitude to my Head of Department (H.O.D) and project supervisor **MR. AKHETUAMEN S.O,** who inspite of his tight schedule worked hard to ensure that this research work is a success. He took pains in reading through the project work and made all the necessary correction.

My special thanks goes to my lovely parents **MR and MRs. UBIRIH**, and my siblings, **Blessing, Happiness, Samuel, Daniel and Treasure (Ubirih)** for their encouragements, financially and morally to support my program.

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My appreciation will not be complete if I forget to acknowledge my lovely friends and well-wishers for their encouragement and guide.

ABSTRACT

Queuing situation develops when items arrive at a serving channel (single or multiply channel) for some type of service. In real life situations, the rate of service and waiting line becomes prominent measures of system performance. Apparently, queuing system that is manual handled has some lapses. Chapter one, the project introduces the concept of queuing with reference to public queuing system in general note. Chapter two, the literature review, reveals the evolution of queuing, concentrating on queuing concept queuing situation queuing theory and queuing analysis etc. with regard to queuing. Chapter three, the system analysis and design investigate the procedure adopted for the current system and method of data collection. Chapter four cover the system Implementation and testing of the proposed system after a detail study of the existing system by specifying the input and output mode process with the appropriate diagram. The research comes to completion in chapter five with summary, conclusion and recommendations by the researcher.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

A queue is characterized by the way in which customers/persons (i.e. processes) join in order to wait for service, and by the way in which customers already in the queue are selected for servicing. Both of the activities are controlled by the queue manager. Thus, a queue management system (QMS) is a customer/client flow management system that allows the customer/client wait without having to stand in line. Unfortunately, we cannot do away with queuing; its most fundamental form brings forth the advantage of fairness to customers/persons based on the order of arrival (Newel, 2018).

Much time spent waiting in line is wasted because customers will be unable to do other useful things and as well be at ease while queuing; it is often tiring and a disagreeable thing standing in line doing nothing. In other circumstances, it

allows the provision of better services and/or the achievement of higher efficiency. In this way, queue management systems will help to provide comfort as well as fairness to customers by allowing them to maintain their position in the queue while seated comfortably or engaged in some constructive activities (Maister, 2015).

According to Lustsik (2013) Queue management systems are perfect for banks, public dealing offices, health and care centers etc. where people have to wait in line to get any service. The problem of serving customers in a specific sequence at business or public establishments can be solved in many various ways; depending on available resources and technology, mechanical, electronic, computerized and human intervening systems can be designed and implemented.

According to Ahmed & Huda (2011) a situation familiar to everyone is waiting in a line (queue), a queue system is made up of a set of customers, a set of services and order or serve where customers arrive and are attended to. Customers waiting in line to receive services in any service system is inevitable and that is why queue management has been where the manager faces huge challenge. Hence, queuing management system is suitable to be applied in the banking system. Since it is associated with queue or waiting line where customers who cannot be served immediately have to queue for service for a long time.

1.2 STATEMENT OF PROBLEM

In human endeavors there are a lot of problems to be faced, the problem facing this study is the waiting time of customers in a commercial service (banks industry) that affects the overall banking performance, the problems could range from poor service pattern, poor banking facilities that affects the time of customers, poor effectiveness of banking delivery.

1.3 AIM AND OBJECTIVES OF THE STUDY

The aim of the study is to design a platform (Queue Management System) that will enable the customer wait in a banking industry simple and pleasant as possible.

The following objectives of the study is hoped to be accomplished:

i. To allow customers/persons wait without having to stand in line, once there is an alert, the next customer or person approaches the counter.

ii. It brings about fairness and comfort to persons based on the order of their arrival.

iii. To improve the efficiency and effectiveness of the banking operations.

1.4 SCOPE OF THE STUDY

The queue management system (QMS) designed is to be implemented in areas where only physical queuing is practicable such as banks; though flexible to be used in various environments, is viewed to be of use or implemented in banking communities.

According to banking operators' requirements, different priorities is given to different types of services; this researcher work, will be studying the design and implementation of queue management system in commercial banks case study of United Bank for Africa with a fix point on deposit of money.

1.5 SIGNIFICANCE OF THE STUDY

The significance of queue management systems is best for places such as banks, public dealing offices, airports, ticketing offices etc; places where people stand in queue to be served or attended to, on the principle of first come first served (where people are attended to base on their order of arrival).

This study will add to the literature on this design and implementation of queuing theory and management which will be accessed by students, lecturers and scholars. Most importantly, Bank managers will benefit a lot from this study as they will apply this theory in the various banks policies, thereby reducing the amount of time spent on queues which might lead to customer's satisfaction and improve on their overall efficiency and effectiveness (Morse, 2018).

1.6 LIMITATIONS OF THE STUDY

In the course of data collection for this research work, the researcher encountered various problems such as:

i. **Resources:** Due to the complexity and insecurity associated with human factors during this research work, personnel who are used to the manual system perhaps for fear of losing their jobs have been reserved in relinquishing all necessary information to make this project an enticingly extensive one.

ii. **Time:** Due to time allowed for this project work, there was limited time to come up with a reasonable work within the stipulated time.

1.7 DEFINITIONS OF TERMS

Queue: A queue can be defined as an aggregation of items waiting for a service function.

Queuing theory: This is the construction of mathematical model of varying forms of queuing systems.

Phase: a queue and its connected servers, or router to a server.

Server: an operation fed by a queue.

Arrival pattern: This is the manner in which customers arrive in the system for service.

Service pattern: this is the rate in which the service channel renders service to a customer.

Queuing discipline: This element is concerned with what goes on between the arrival times of a customer and when service is rendered to him/her.

Balking: This is the refusal of a customer to join the queue if the queue is long.

CHAPTER TWO

LITERATURE REVIEW

2.1 REVIEW OF RELATED LITERATURE

Nowadays, customer service-oriented companies face difficulties of lengthy queues. This problem often occurs in the banks, post office and airport and it becomes worse when the time reached peak hour. The improper management of such queues will cause tension and stress among customers and employees. Customers will tend to shift to other service companies that provide better services and it reduced job satisfaction of the employees. According to Bain (2010), a global management consulting firm, “a customer is four times more likely to defect to a competitor if the problem is service related than price or product related”. Moreover, Lee Resources International net (2012), a general business consulting stated that for “every customer complaint there are 26 other unhappy customers who have remained silent”. Thus, most companies need to provide good services in order to attract customers to attain sustainability doing business. In general,

queuing is a line of people waiting to be served and the movement is from a central to a specific place. Thus, a queue management system must handle and organize queue formation in the most efficient way (Goluby & Preston, 2018).

Bose (2012) stipulates that a queue management system is an approach to control queues of people in various situations and locations in a queue area. The process of queue formation and propagation is defined as queuing theory. Some typical areas of application of queuing theory can be found in medical doctor's office, access to diagnostic procedures, specialist referrals, airports check-in, baggage collection, runway delays, waiting to land, Traffic congestion etc.

A queue management system is the organization of queues of people within a retail or public sector department. It can be either reactive through a system that can organize the existing queue or proactive through queue management statistics gathering system, so that the trends can be identified and anticipated. People that join queue in a standing line queue are direct to the next position by the system or be given issued with a ticket. With a ticketed system, customers are taken out of the standing line queue, which can give comfort and less stress for the customers as well as their turns are not neglected. This queuing environment is essential part of our daily lives and it is important for manufacturer to build the most cost-effective queuing solution (Klinrock, 2015).

2.2 TYPES OF QUEUE

Over the years, queues being observed have gradually changed from conventional ways of people standing, waiting orderly in lines to be served at various public places, to people taking their place in queues as a result of tickets used to generate the number of position of people in the queue which allows them not to be physically present in the queuing area at times, and people now taking their places in queue without having to be in the queuing are or being there physically until it's their turn to be served.

2.2.1 Physical Queue

This type of queue is commonly found in places such as an amusement park where there are formalized queue areas and people waiting in line are organized. This is one which people stand in line and are physically present. There may be dozens of separate queues, but this can lead to frustration as different lines tends to be handled at different speeds, some are served quickly while others may wait for longer period of time. Another arrangement which is commonly found in banks is

for everyone to wait in a single line, a person leaves the line each time a service point opens up.

2.2.2 Virtual Queue

This sometimes replaces the physical queuing; in a waiting room, there may be a system whereby the queuer asks and remembers his place in the queue, or reports to a desk and signs in or takes a ticket with a number from a machine. These queues are typically found at doctors' offices, hospitals, etc. A display sometimes shows the number that was last called for service.

2.2.3 Mobile Queue

The physical and virtual queue suffer from a drawback, which is: the persons arrives at the location only to find out that they need to wait, but not with the mobile queue, it does not suffer this drawback as the person queuing uses his/her phone, the world wide web (www), and other methods to enter a virtual queue prior to arrival and is free to roam during the wait, and only get paged at his/her phone when his/her turn approaches. This method extends the patience of those in the queue and reduces no-shows and allows them to time their arrival to the availability of service.

2.3 QUEUING THEORY

Queuing theory is the mathematical study of waiting lines (or queues). The theory enables the mathematical analysis of several related processes including

arrival at the (back of the) queue, waiting in the queue (essentially storage processes inclusive) and being served by the server(s) or attendant(s) at the front of the queue. It is applicable in transport and telecommunication and is occasionally linked to ride theory (Dshalalow, 2017). Queue theory is the method of analyzing and solving the problem due with the delays of waiting time in the waiting line. The theory will examine the component of waiting line, such as inter-arrival time, service time, number of servers, number of system places, and number of customers. By applying queue theory to the real-life situation, it will provide faster customer service, improve traffic flow, and faster shipping orders from a place to a place (Allen, 2020).

Queuing theory is used to develop more efficient queuing systems that reduce customer wait times and increase the number of customers that can be serve. Lawrence W (2003) used queuing theory to analyze the potential effects of a bioterrorism attack on U. S soil and propose a system to reduce wait times for medications that would decrease the number of deaths cause by such an attack (Prabhu, 2017).

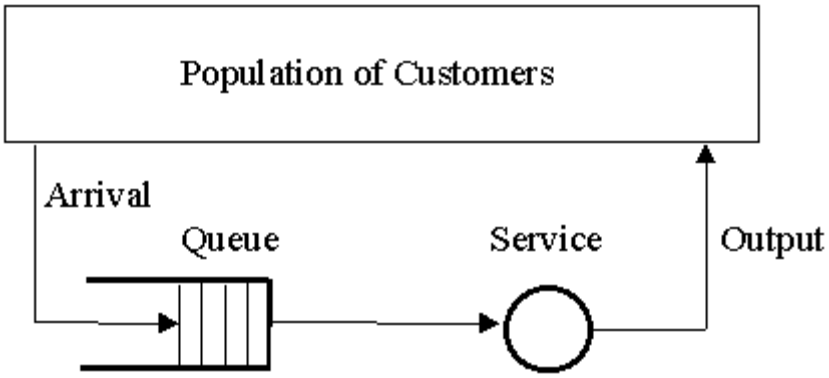

Figure 1

The most easily used methods to solve queuing problems are analytical methods which make the following assumptions.

1. Arrival times are random and the time between arrivals are distributed exponentially.
2. Service times are also distributed exponentially.
3. The queue is of first come first served type, and
4. There are no significant interdependencies.

Thus, the Average customers waiting time (W_q) is defined mathematically as

$$W_q = \frac{(S_{av})^2}{(A_{av} - S_{av})}$$

Where A_{av} is the average time between arrivals

S_{av} is the average service time

The mean time (W_m) required for a customer to wait and be served is:

$W_m = W_q + S_{av}$

As a system gets congested, the service delay in the system increases. Thus, queuing theory provides the tools needed for the analysis, and it is also essential for designing effective congestion control algorithms in order to have a good understanding of the relationship between congestion and delay.

Classic queuing theory involves complex calculations to determine waiting time, service time, server utilization and many other metrics which are used to measure queuing performance.

2.4 OVERVIEW AND HISTORY OF QUEUING THEORY

The word queue comes via French and the Latin cauda meaning “tail”. The spelling “queueing” over “queuing” is typically encountered in the academic research in the field, the spelling “queuing” however is somewhat common. Queuing theory is generally considered a branch of operations research because the results are often used when making business decision about the resources needed to provide service. It is applicable in a wide variety of situations that may be encountered in business, commerce, industry, healthcare, public service and engineering (Bhat, 2016).

Applications are frequently encountered in customer service situations as well as transport and telecommunication. Queuing theory is directly applicable to intelligent transportation systems, call centres, PABXs, networks,

telecommunications, server queuing, main frame computer queuing of telecommunication terminals, advanced telecommunication systems and traffic flow (Newel, 2017).

Queuing theory's history goes back nearly 100 years. Johannsen's "Waiting Times and Number of Calls" seems to be the first paper on this subject. Queuing theory embodies the full gamut of such models covering all perceivable systems which incorporate characteristics of a queue. Queuing theory, as such, was developed to provide mathematical models to predict behavior of systems that attempt to provide service for randomly arising demands and can trace its origins back to a pioneer investigator. Work continued in the area of telephone applications, and although the early work in queuing theory picked up momentum rather slowly, the trend began to change in the 1950s when the pace quickened and the application areas broadened well beyond telephone systems (Erlang's, 2019).

Bhat et al (2019) to mention a few, one approach to approximation is the analysis under heavy traffic (when the traffic intensity, the ratio of the rates of input to output, approaches 1) and investigations under this topic were initiated by Kingman (2015) with the objective of deriving a simpler expression for the final result. The heavy traffic assumption also led to diffusion approximation as well as weak convergence results by researchers such as Iglehart (2012).

Gaver's analysis (2018) of the virtual waiting time of an M/G/1 queue is one of the initial efforts using diffusion approximation for a queuing system. Fluid approximation, as suggested by Newell (2018) considers the arrival and departure processes in the system as a fluid flowing in and out of a reservoir, and their properties are derived using applied mathematical techniques. For a recent survey of some fluid models see Kulkarni (2017).

2.5 SYSTEMS DESIGNED FOR QUEUE MANAGEMENT

Depending on available resources and technology, various mechanical, electronic, computerized, and human intervening systems have been designed and implemented to control and manage the flow of people and customers in various public dealing areas.

2.5.1 Mechanical Queue Management Systems (M-QMS)

This method employs the use of mechanically designed devices and machines in queuing areas to control the flow management of persons. This method is usually found in amusement parks where the queue management system is integrated with the drives. It is also found in some transport managements systems where people board buses, trains, airplanes, ships and are also found in them (Kulkarni, 2017).

Major features of this method is that, the type of queue found in such places is the physical queue; queue areas in which the lines of people waiting to board the rides or automobiles are organized by railings with barricades which when pushed to pass or leave the line energizes a counter integrated into the system, thus, helping to keep counts of the number of persons/ customers served.

2.5.2 Electronic Queue Management System (E-QMS)

This method of queue management is characterized by the use of electronic devices to manage the flow of customers or persons waiting in line to be served. A major feature of this type of queue management system is that, there is always an audio and/or flash light alert to let the next person know that he/she is ready to be served.

This method is best for places where the most type of queue realizable is the physical queue and at times virtual queuing, where such persons will be in the vicinity roaming or seated doing some other constructive activities while maintaining his/her position in the queue. This is implemented in places such as banks, airports, public dealing places and ticketing offices; also keeping the record of the number of customers or persons served (Hossain, 2019).

2.5.3 Computerized Queue Management Systems (C-QMS)

The main feature of this method which makes it differ from the electronic queue management system is that, it has the ability to generate queue position numbers as well as ticket numbers to persons waiting in line. This method is most times implemented where the types of queuing practiced in such places are the virtual or/and the mobile queuing. It also keeps the record of the number of customers or persons served (Willig, 2019).

2.5.4 Human Intervening Queue Management System (HI-QMS)

This method of queue management is the very earliest method of customer flow in queue areas are managed and controlled. Its basic feature is the use of wardens to control the queue and maintain peace in the queue areas. In the enhanced form of this method of queue management, rails are used to guard and organize the traffic/flow of persons in queue areas.

2.6 QUEUING SYSTEM REQUIREMENT AND CLASSIFICATION

2.6.1 Queuing Discipline and Scheduling

A queuing discipline determines the manner in which the exchange handles calls from customers, it defines the way they will be served, the order in which they are served, and the way resources are shared or divided between the customers

2.6.2 Arrival Process

The probability distribution that determines the customer arrivals in the system; in a messaging system, this refers to the message arrival probability distribution.

2.6.3 Service Process

The probability density that determines the customer service times in the system; in a messaging system, this refers to the message transmission distribution. Since message transmission is directly proportional to the length of the message, this parameter indirectly refers to the message length distribution.

2.6.4 Number of Servers

Number of servers available to service the customers; in a messaging system, this refers to the number of links between the source and destination nodes.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 SYSTEM ANALYSIS

This involves a detailed study of the current manual system leading to specifications of a new system. During analysis, data would be collected on the available files, decisions point and transactions handled by the present system. Interview, on the observations are the tools used for system analysis of the present system. System analysis also includes subdividing of complex processing involving the entire system, identification of data store and manual processes.

3.2 ANALYSIS OF THE EXISTING SYSTEM

It is essential for a thorough analysis of the present system. However, the level of success achieved in carrying out a work of this dimension depends on the methodology adopted. From the analysis of the current system the following conclusions are drawn:

i. In the current system, the customers get to the bank, and pick a go directly to the queue of their required services, which may contain a very long waiting line.

ii. That due to the queuing of customers physically, various customers are been unfairly cheated.

iii. Difficulties are experienced in getting information from various customers already in queue.

3.2.1 Weakness of the Existing System

The following are the benefits of the manual system in place:

1. The present system creates a conductive environment for the perpetuation of crime.
2. Customers are tired after a prolong period of time, standing and waiting.
3. Disturbance could occur in the physical queue.
4. There is bound to be mistake in maintaining the physical queue.
5. Data consistency may not be maintained.

3.3 ANALYSIS OF THE PROPOSED SYSTEM

The proposed system, which is the design of an automated queue management system will allow customer select required services either Deposit or Withdrawal and gets an acknowledgement receipt. The receipt consists of information like a token number, services selected, customer name, date and time. The customer

proceeds towards the counter when his token number is displayed on the screen. Therefore, instead of worrying about their places in the line, customers can relax and have a great customer services experience.

3.3.1 Advantages of the Proposed System

The advantages of the proposed system are as follows:

i. It motivates customers to perform patronized the banks.

ii. It reduces the queue and waiting time.

iii. It increases staff productivity and operational efficiency.

iv. It provides visibility of the entire process and all involved.

v. It gives better insights through data and analytics.

3.4 METHODOLOGY FOR DATA GATHERING

Although there are various methods of data collection, the researcher chose the two main sources of data collection in carrying out their study.

They are:

1. Primary source
2. Secondary source

The primary source refers to the sources of collecting original data in which the researcher made use of empirical approach such as personal interview. The secondary sources of data for this kind of project cannot be over emphasized. The secondary data were obtained by the researcher from magazines, journals, newspapers and library source.

3.4.1 Oral Interview

The interview method of data collection can be defined as a systematic way of collecting data or information from a respondent through asking questions directly from the respondent and also collecting information with the aim of facilitating understanding. The oral interview was done by the researcher through asking and answering of some question by the manager of the Bank.

3.4.2 Study of Manuals

Report based on queuing system were obtained and studied and a lot of information concerning the system to be produced was obtained.

3.4.3 Evaluation of Forms

Some forms that are necessary and available were accessed. This then helped in the design of the new system.

3.5 SYSTEM ARCHITECTURAL DESIGN

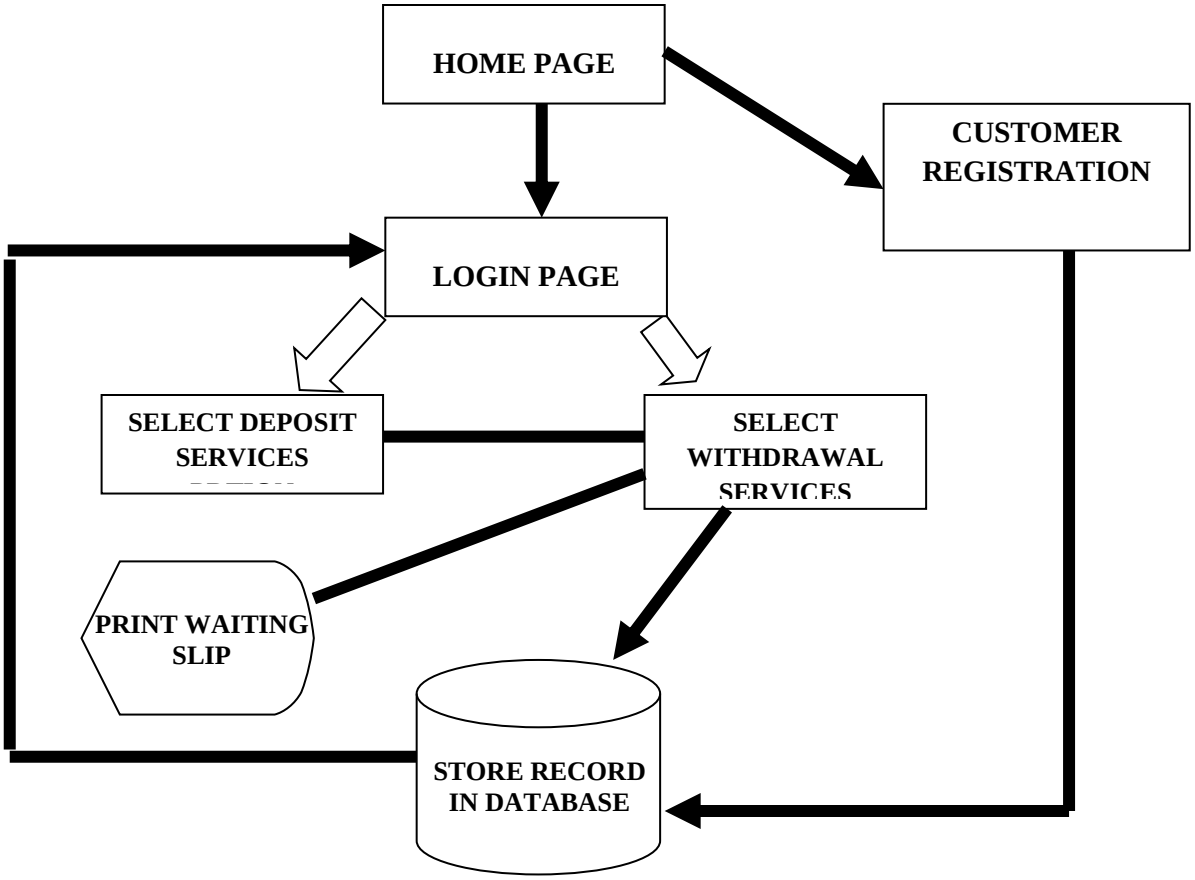

Figure 3.1: System Architectural Design

3.6 INPUT, DATABASE AND OUTPUT SPECIFICATION

3.6.1 Input Specification

The system is designed to accept several input details efficiently through input forms and user clicks. The data captured through the user keystrokes and clicks are received by specific modules on the system and relayed to the back-end of the system for processing. Input is collected using the following page modules:

1. Customer Registration Page:

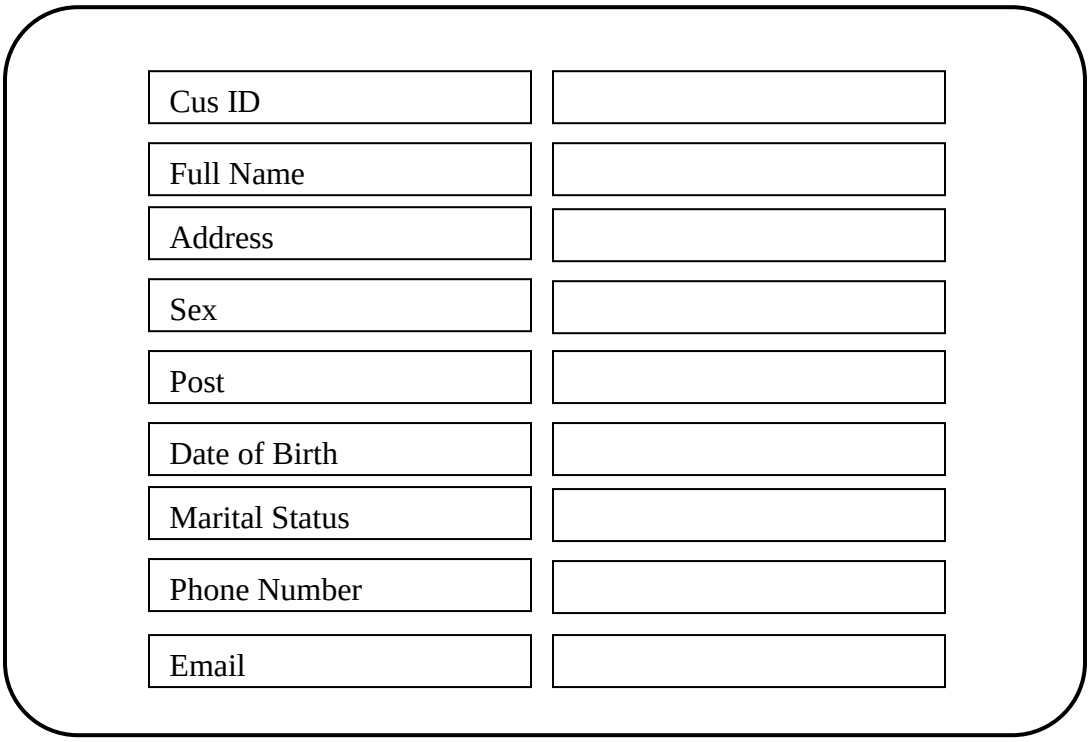

Fig 3.2: Customer Registration Form

3.6.2 Database Design Specification

A database is a collection of related records. The database system used to implement the back-end of the system is Microsoft Access 6.0. Access to the system was made possible by a graphical interface (Visual Basic 6.0). The data tables in the database are as follows:

Tale 3.1 Login Page

FIELD	DATA TYPE	CHARACTER LENGTH
Full name	Text	25
Username	Text	15
Password	Text	15

Table 3.2 Customer Table

FIELD	DATA TYPE	CHARACTER LENGTH
Staff ID	Text	12
Full Name	Text	15

Address	Text	50
Sex	Text	`50
Post	Text	7
Date of birth	Date	15
Marital status	Text	10
Phone number	Number	15
Email	Text	30

3.6.3 Output Specification

The system is designed in such a way that it efficiently provides output to the user promptly and in a well-organized manner. The format for the several outputs is made available on the output web pages. Output can be relayed using the following page modules:

1. Queue Token Number: This displays the information for the queue number of the customer.

CHAPTER FOUR

SYSTEM IMPLEMENTATION AND TESTING

4.1 SYSTEM IMPLEMENTATION

This chapter takes into account the way the new system is designed and its process description. It embraces also the way new system files are designed, their data flow diagram, the database structure of the entire parameters, or input variables to be used in the new system. To be able to effectively implement this system; Automated Queue Management System, detailed and thorough study was carried out on the operations of the queuing systems in Bank (United Bank for Africa, Auchi).

4.2 CHOICE OF PROGRAMMING LANGUAGE

This project software was designed with Microsoft Visual Basic 6.0, thus making it a user friendly, easy to navigate and user-oriented package.

Reasons for Choosing the Programming Language

i. Visual basic programming language is done in a graphical environment compared to other programming language that you have to write text-based procedure to design the interface.

ii. Visual basic is a fairly easy programming language.

iii. Visual basic programming language enable you to design the interface by dragging and resizing the objects as well as changing their colors, just like any windows-based programs.

iv. Visual basic 6.0 is user friendly, easy to navigate and user-oriented package.

4.3 SYSTEM REQUIREMENTS

4.3.1 Hardware Requirement

Hardware requirement captures the complete hardware requirement for the system, or a portion of the system. Due to the nature of the programming language and the software features it support, it requires certain amount of hardware resources. Typically, of these requirements includes:

1. 250G hard disk drive
2. A processor/CPU (Pentium 4, speed 3.2 GHZ)
3. An IBM compatible VGA or other graphic card compatible with MS Access.

4. A standard keyboard.

5. A mouse or other pointing device.

4.3.2 Software Requirements

These include the software that would be used in achieving the desired output for the project work. These software requirements include:

1. Operating System: Windows (Vista/7 or above)

2. Microsoft Visual Basic 6.0.

3. Microsoft Access was used as the database.

4.3.3 Non-functional Requirements

Sommerville (2004) has identified the non-functional requirements as "constraints on the services or functions offered by the system. They include timing constraints, constraints on the development process and standards. Non-functional requirements often apply to the system as a whole".

The main non-functional requirements for the software are as follows:

- Usability: the system will be fully operational and in working condition, along with providing a user-friendly interface for visually impaired users.
- Speed: the system will allow customers to move up the queue easily and orderly.

- ❖ Security: the system will contain security features in the form of a username and password.
- ❖ Reliability: the system will have a high availability rate.
- ❖ Performance: the system will have a quick response rate.

4.4 SYSTEM/PROGRAM TESTING

The following are how the software modules is made:

a) **The Home Page:** This enables the users of the system (Admin and Students) to have access to other sub menu/systems.

b) **Admin Login Page**: When clicked on Login, a form appeared where the admin login with his/her username and password to gain access to the program.

c) **Admin Menu:** After the Admin Login, the Admin menu is loaded, where the admin could select, different options for the operation of the app.

d) **Queue Initiation**: The Admin initiates the queue at the start of the working day for the first customer.

4.4 CHANGE OVER PROCEDURES

This is the method of changing from the manual system of operation to a computerized system of operation or vice versa. The changeover procedure that will be used or employed is the parallel change over.

- **Parallel Change Over:** In parallel change over, the new system runs simultaneously with the old for a given period of time, of all the techniques this tends to be the most popular, mainly because it carries the lowest risk. It is time consuming and of higher costs.

4.5 MAINTENANCE OF SYSTEM

- **Preventive maintenance:** The care, servicing, and maintaining of equipment and facilities in satisfactory operating condition by providing systematic inspection of the hardware component. This type of maintenance technique helps in protection of equipment from damage
- **Corrective maintenance**: This type of maintenance is performed to identify and rectify a fault so that the failed equipment, machine can be restored or changed for immediate use and operational condition. Corrective maintenance is accomplished in removing bugs from software, hardware and the network.
- **Adaptive maintenance:** this type of maintenance is the one that adapts to program that is already installed in the computer to easily adapt to any new system update without any problem.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

This automated queuing system will be able to enhance the service delivery of banking operation regarding queues. It helps manages the day to day running of the queue in the banks. It was discovered that time spent waiting in line is wasted because customers will be unable to do other useful things and as well be at ease while queuing; it is often tiring and a disagreeable thing standing in line doing nothing so in this way, queue management systems will help to provide comfort as well as fairness to customers by allowing them to maintain their position in the

queue while seated comfortably or engaged in some constructive activities. The automated system was designed using Visual Basic 6.0 as the programming language, and Microsoft Access as the database.

5.2 CONCLUSIONS

The aim of designing any queue system is to make waiting orderly, simple and as pleasant as possible and for customers and persons to have a clue of whatever is happening in the process of queuing to relief them of any anxiety. Thus, as much as possible, with a good number of servers or attendants with a single queuing point and well-organized queuing area, and this will bring fairness and comfort to the customers and persons waiting in line to an extent as jumping of queue and shouting will be reduced. The designed queue system has been able to meet the key aim of the project.

With this project the customers/persons in the process will be able to wait and once there is an alert the customer or persons in the queue knows what is going on in the process and will know what action to be taken. The server or attendant will be able to attend to more than one person at a time i.e., do a capacity or processor sharing type of service discipline. Also, the attendants or servers will be able to keep tract/count of the number of people or customers that have been attended to but cannot keep count of the number of customers or persons in the process at any particular time, thus, with this ability to keep count of persons or

customers that are served or attended to, the efficiency and the average number of persons served can be calculated.

It is discovered that this project will be able to be implemented in areas where only physical queuing is practicable, and more realistic for queuing discipline of first come and first served (FCFS) though flexible in environments where processor or capacity sharing and service in priority can be practiced; also noticed is that to an extent the service discipline of pre-emptive resume can be observed wherever it is implemented to manage queues.

5.3 RECOMMENDATIONS

There is a need for an improved and efficient queue management system which will be able to perform the following operations and functions:

1. The queue management system should be able to keep count and record of people in the queue at any time and which can also give count of persons or customers leaving the queue.
2. The customer alert to call in customers or persons on the initiation of the NEXT function should be able to stay on for a longer time in case a customer is just coming in into the process without meeting anyone on

queue can know what operation is obtainable in the queue without having to wait indefinitely.

3. The customer alert unit i.e., the outdoor unit should be able to be connected to the controller unit i.e., the indoor unit without any connecting wires.

4. Lastly, the counts can be expanded to be able to count up to 9999 because with the one designed for this project, any count over 99 takes the counter to reset and another set of count is initiated, thus only the attendant or server would know another round of counts have started since he or she would know that over a certain number of people have been attended to.

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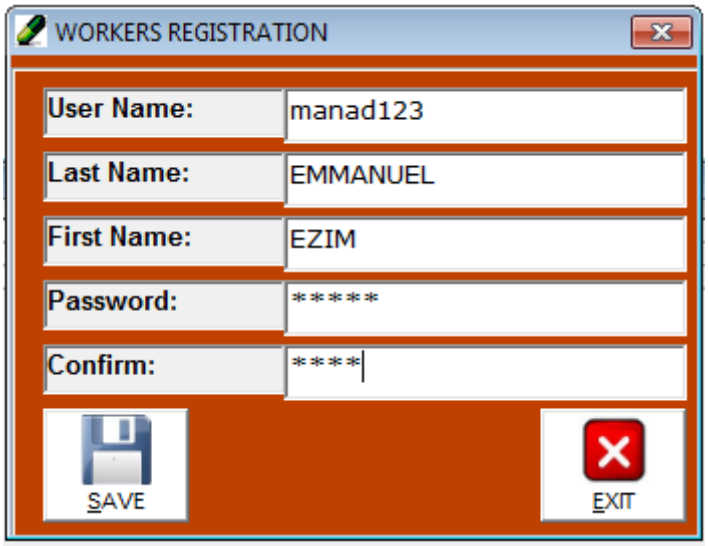
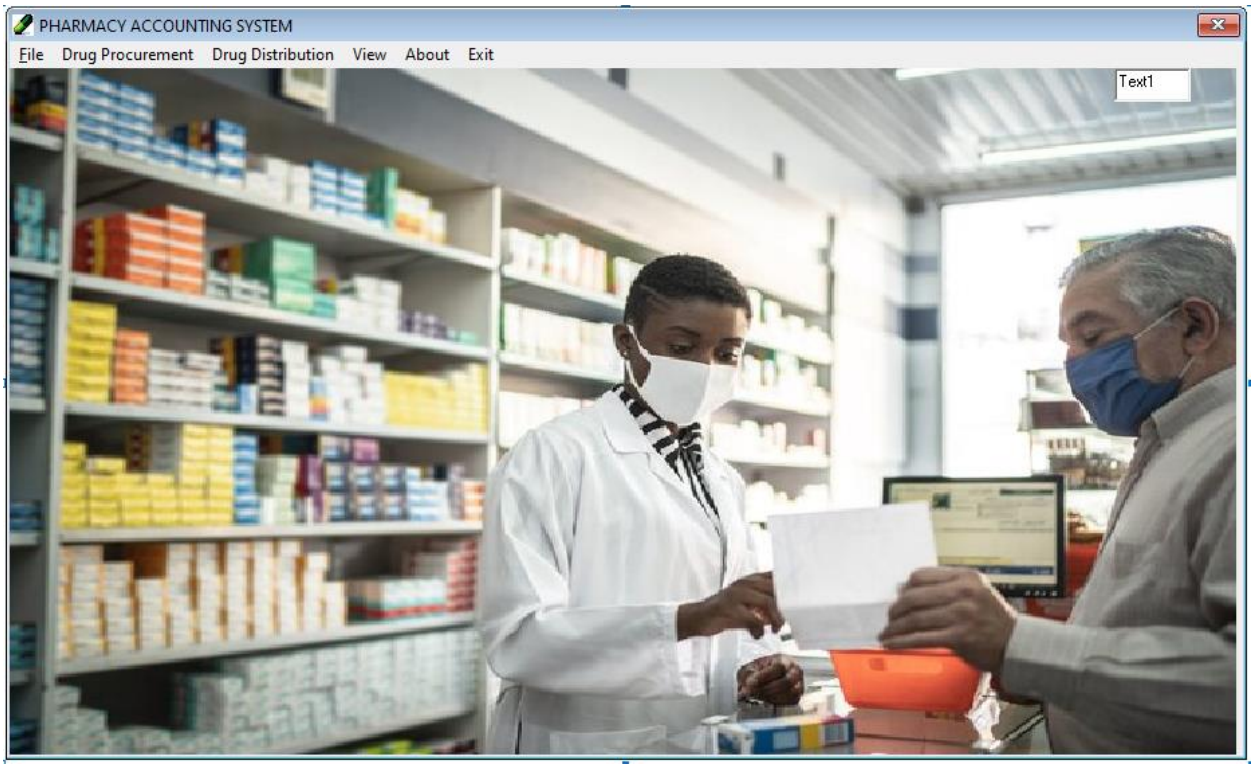
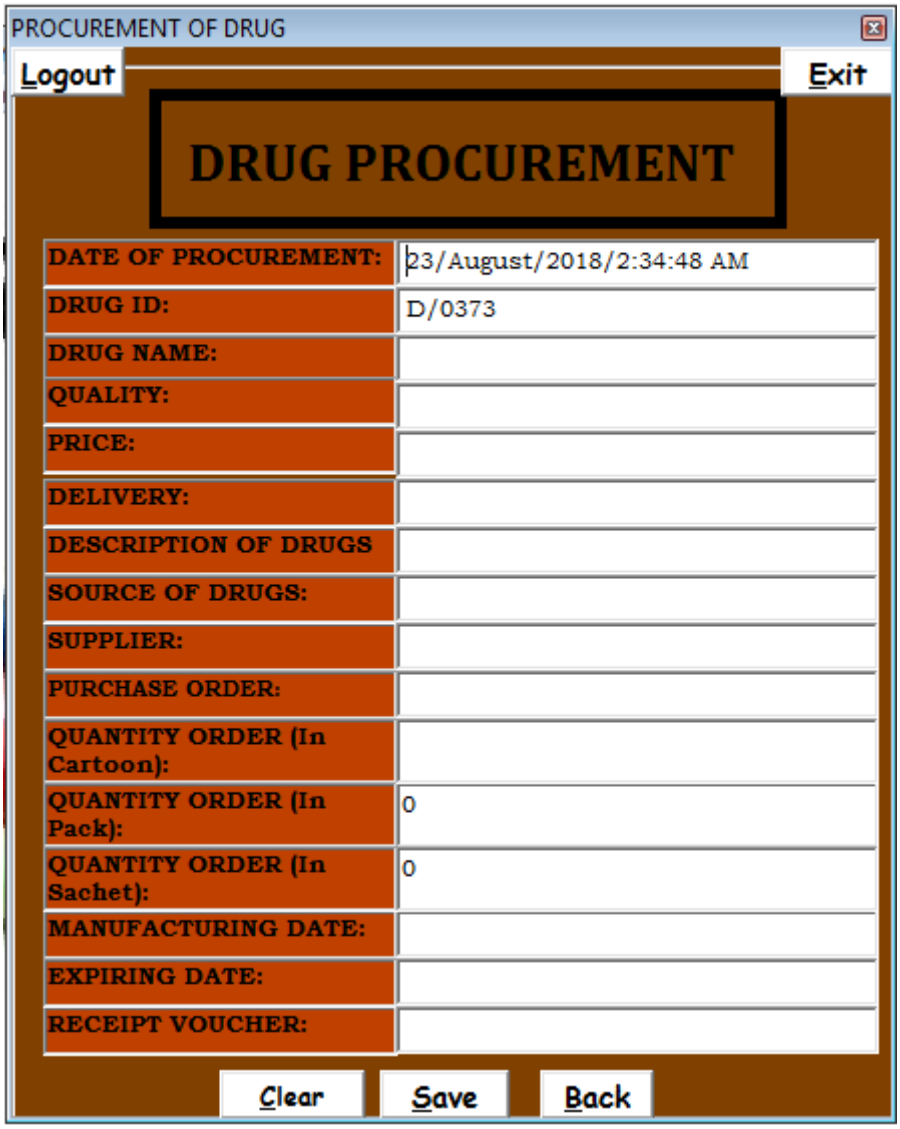
APPENDIX I

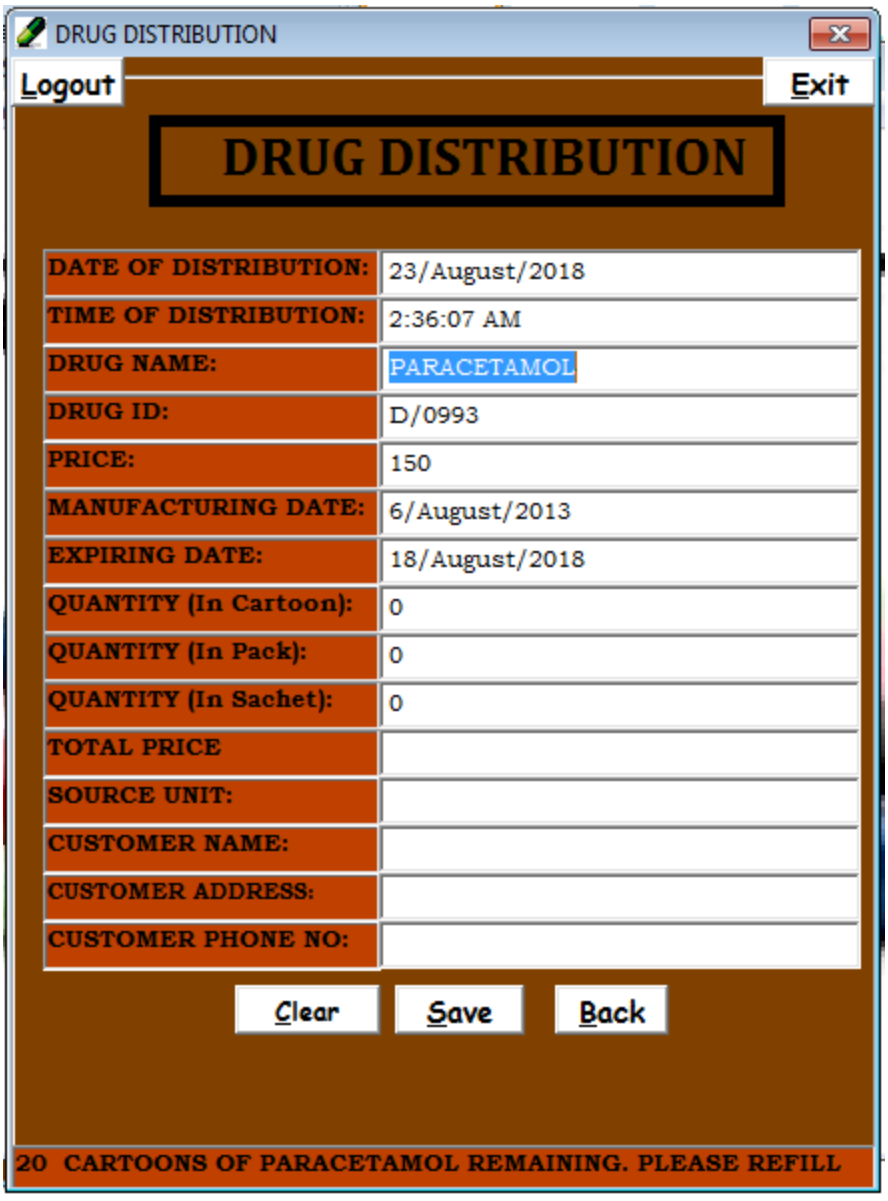
(PROGRAM INTERFACE)

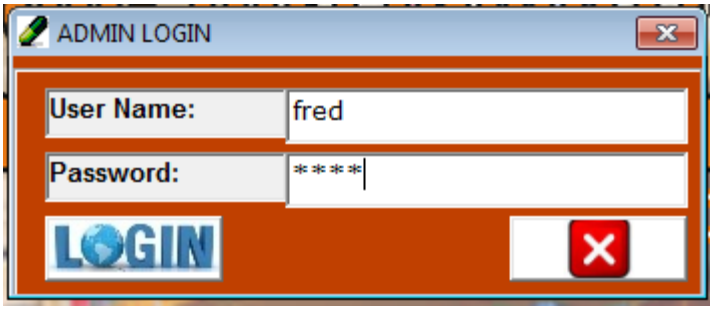

PHARMACY ACCOUNTING SYSTEM
PHARMACY
DESIGN AND IMPLEMENTATION OF A PHARMACY SYSTEM
A CASE STUDY OF DIVINE BEST CHEMIST
ADMIN LOGIN
WORKER LOGIN
EXIT


WORKERS REGISTRATION
User Name:
manad123
Last Name:
EMMANUEL
First Name:
EZIM
Password:
*****
Confirm:
****
SAVE
EXIT

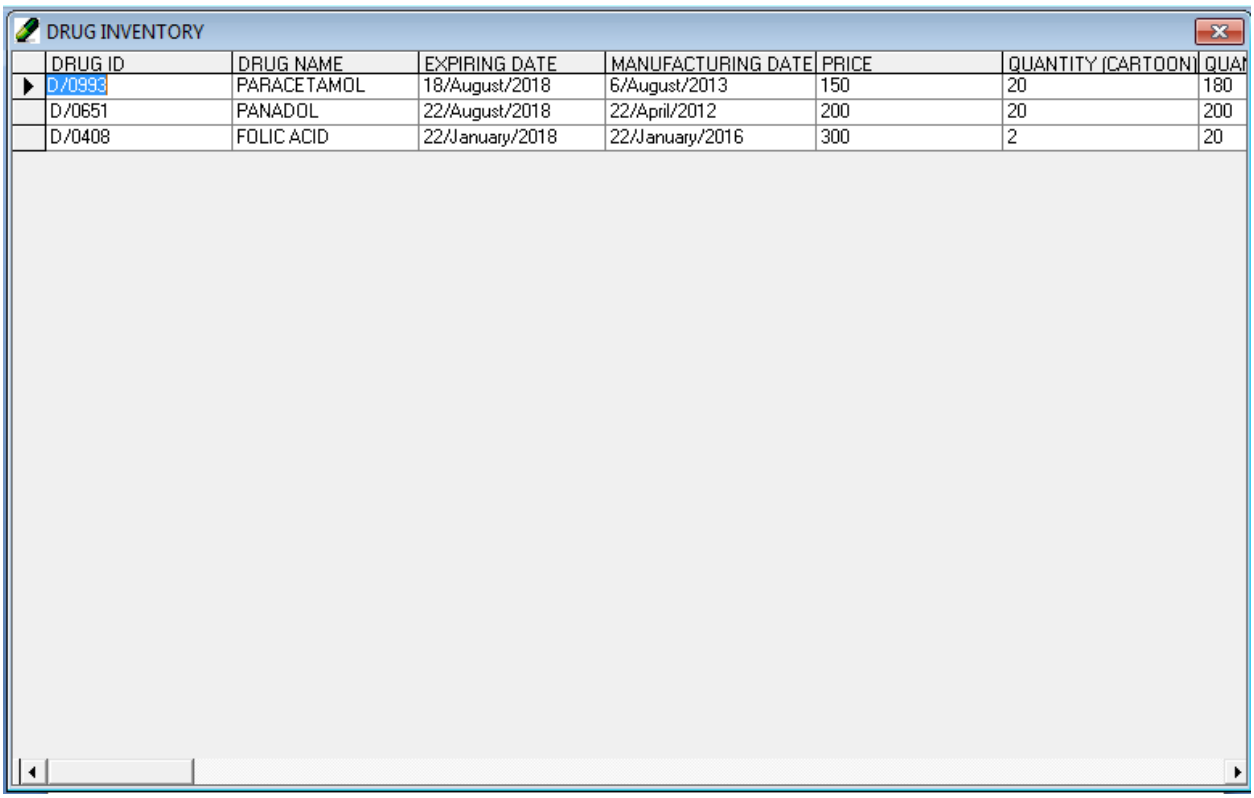

PHARMACY ACCOUNTING SYSTEM
File
Drug Procurement
Drug Distribution
View
About
Exit
Text1

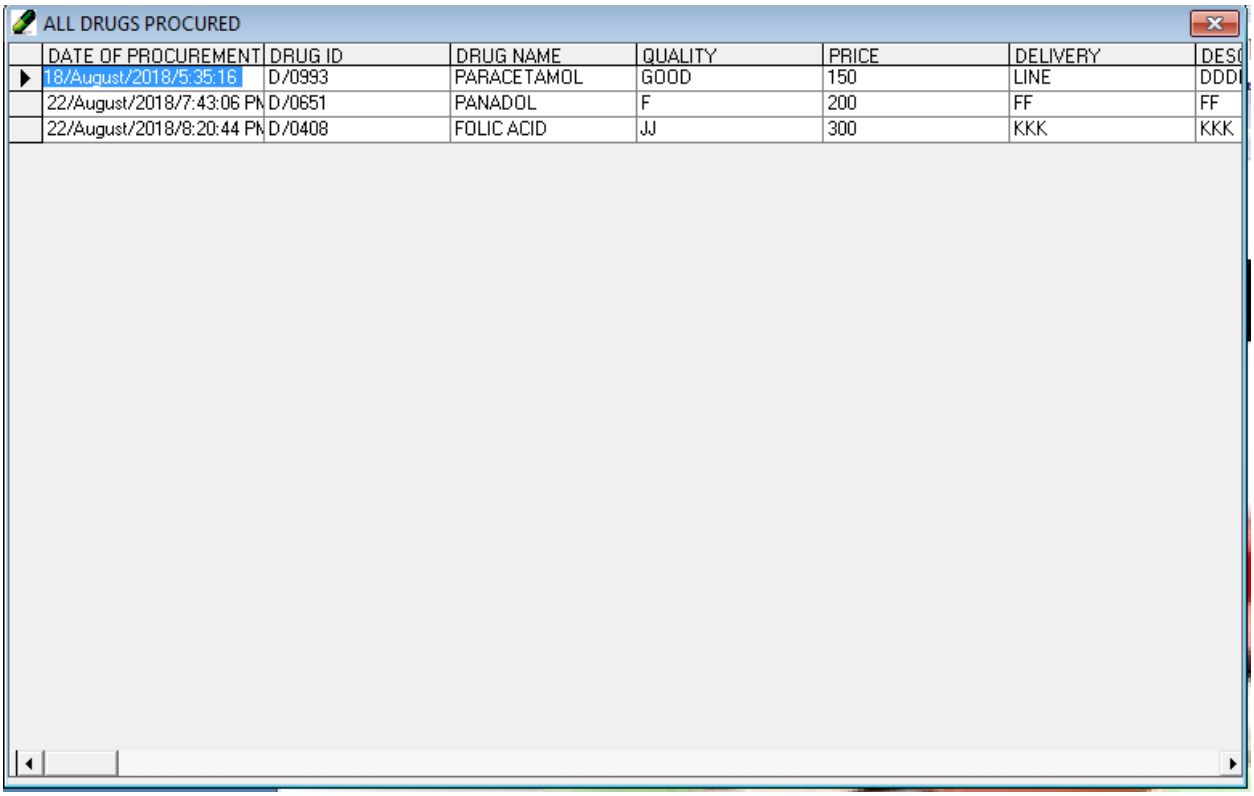

PROCUREMENT OF DRUG
Logout
Exit
DRUG PROCUREMENT
DATE OF PROCUREMENT:
23/August/2018/2:34:48 AM
DRUG ID:
D/0373
DRUG NAME:
QUALITY:
PRICE:
DELIVERY:
DESCRIPTION OF DRUGS
SOURCE OF DRUGS:
SUPPLIER:
PURCHASE ORDER:
QUANTITY ORDER (In Cartoon):
QUANTITY ORDER (In Pack):
0
QUANTITY ORDER (In Sachet):
0
MANUFACTURING DATE:
EXPIRING DATE:
RECEIPT VOUCHER:
Clear
Save
Back

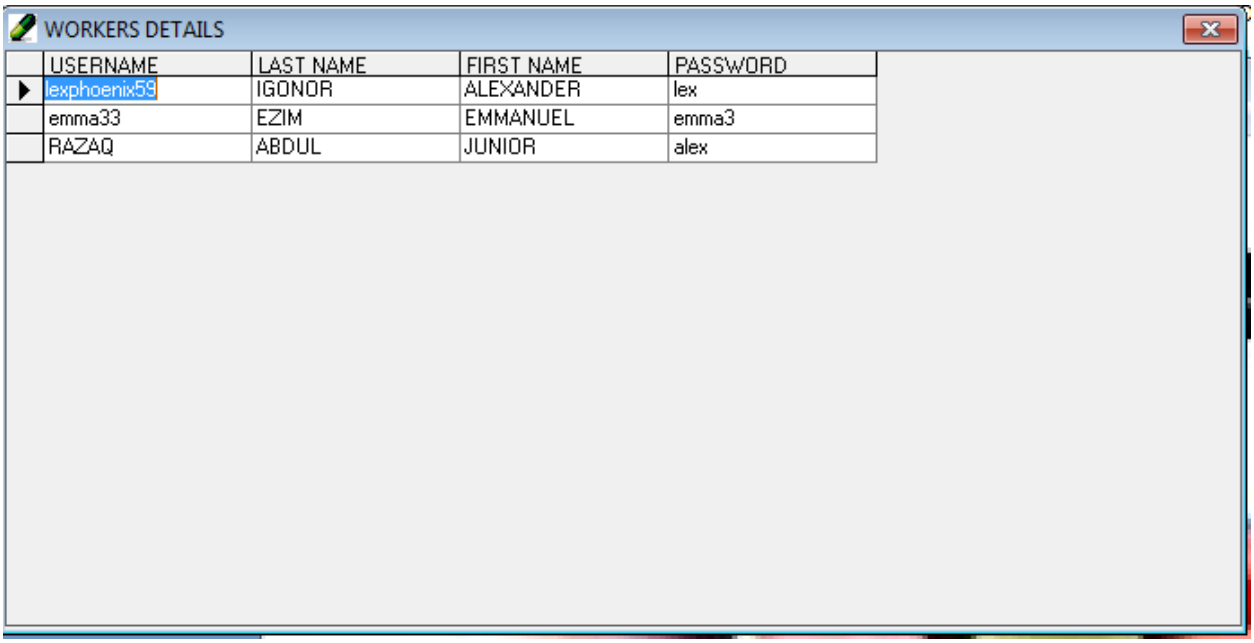

DRUG DISTRIBUTION
Logout
Exit
DRUG DISTRIBUTION
DATE OF DISTRIBUTION:
23/August/2018
TIME OF DISTRIBUTION:
2:36:07 AM
DRUG NAME:
PARACETAMOL
DRUG ID:
D/0993
PRICE:
150
MANUFACTURING DATE:
6/August/2013
EXPIRING DATE:
18/August/2018
QUANTITY (In Cartoon):
0
QUANTITY (In Pack):
0
QUANTITY (In Sachet):
0
TOTAL PRICE
SOURCE UNIT:
CUSTOMER NAME:
CUSTOMER ADDRESS:
CUSTOMER PHONE NO:
Clear
Save
Back
20 CARTOONS OF PARACETAMOL REMAINING. PLEASE REFILL

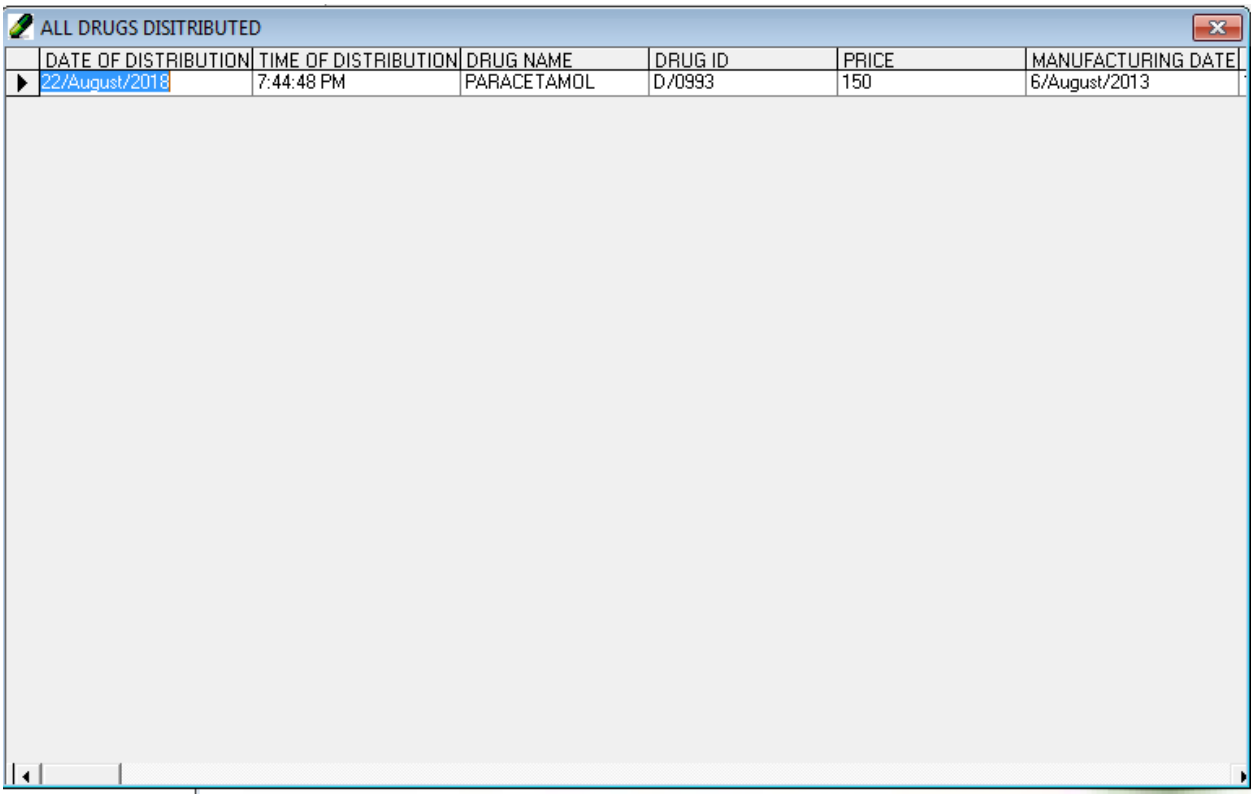

ADMIN LOGIN
User Name:
fred
Password:
****
LOGIN


ADMIN MENU
Logout
Text1
Exit
DESIGN AND IMPLEMENTATION OF A PHARMACY SYSTEM
A CASE STUDY OF DIVINE BEST CHEMIST
ADD NEW WORKER
REMOVE WORKER
CHANGE WORKER PASSWORD
VIEW WORKER DETAILS
SEARCH FOR A DRUG
VIEW DRUG INVENTORY
VIEW DRUG DISTRIBUTED
VIEW DRUGS PROCURED
VIEW MOST SELLING DRUG
Back


DRUG INVENTORY
DRUG ID | DRUG NAME | EXPIRING DATE | MANUFACTURING DATE | PRICE | QUANTITY (CARTOON) | QUAN
D/0993 | PARACETAMOL | 18/August/2018 | 6/August/2013 | 150 | 20 | 180
D/0651 | PANADOL | 22/August/2018 | 22/April/2012 | 200 | 20 | 200
D/0408 | FOLIC ACID | 22/January/2018 | 22/January/2016 | 300 | 2 | 20


ALL DRUGS PROCURED
DATE OF PROCUREMENT | DRUG ID | DRUG NAME | QUALITY | PRICE | DELIVERY | DES
18/August/2018/5:35:16 | D/0993 | PARACETAMOL | GOOD | 150 | LINE | DDD
22/August/2018/7:43:06 PM | D/0651 | PANADOL | F | 200 | FF | FF
22/August/2018/8:20:44 PM | D/0408 | FOLIC ACID | JJ | 300 | KKK | KKK


WORKERS DETAILS
USERNAME
LAST NAME
FIRST NAME
PASSWORD
lexphoenix59
IGONOR
ALEXANDER
lex
emma33
EZIM
EMMANUEL
emma3
RAZAQ
ABDUL
JUNIOR
alex


ALL DRUGS DISITRIBUTED
DATE OF DISTRIBUTION
TIME OF DISTRIBUTION
DRUG NAME
DRUG ID
PRICE
MANUFACTURING DATE
22/August/2018
7:44:48 PM
PARACETAMOL
D/0993
150
6/August/2013

APPENDIX II

(SOURCE CODE)

```
Option Explicit
Dim db As Database
Dim rs As Recordset

Dim dw As Database
Dim rw As Recordset

Dim i As Integer
Dim j As Integer

Dim str As String
Dim confirm As String

Dim Today As Variant
Dim TodaysDate As Variant
Dim Day As Variant
Dim month As Variant
Dim year As Variant
Dim number As Variant

Dim con As New ADODB.Connection
Private Sub dateGenerate()
Today = Now
month = Format(Today, "mmmm")
year = Format(Today, "yyyy")
number = Format(Today, "d")
TodaysDate = number & "/" & month & "/" & year
txtDrugDistr(0).Text = TodaysDate
txtDrugDistr(1).Text = Time
End Sub
Sub clear()

For i = 0 To 13
txtDrugDistr(i).Text = ""
Next i

txtDrugDistr(7).Text = "0"
txtDrugDistr(8).Text = "0"
txtDrugDistr(9).Text = "0"

Text1.Text = ""
Text2.Text = ""
Text3.Text = ""
Text4.Text = ""
Text5.Text = ""
Text6.Text = ""
```

```
Call dateGenerate
End Sub
Private Sub cmdExit_Click()
confirm = MsgBox("Do You want to Exit", vbYesNo + vbCritical, "Confirmation")
If confirm = vbYes Then
End
Else
Load frmDrugDistr
frmDrugDistr.Show
End If
End Sub
Private Sub cmdHome_Click()
Unload Me
frmMainMenu.Enabled = True
Load frmMainMenu
frmMainMenu.Show
End Sub
Private Sub cmdLogout_Click()
confirm = MsgBox("Do You want to Logout", vbYesNo + vbCritical, "Confirmation")
If confirm = vbYes Then
Unload Me
frmSplash.Enabled = True
Load frmSplash
frmSplash.Show
Else
Load frmDrugDistr
frmDrugDistr.Show
End If
End Sub
Private Sub cmdRefresh_Click()
clear
End Sub
Private Sub cmdSave_Click()
   For i = 0 To 14
      If Trim(txtDrugDistr(i).Text) = "" Then
         MsgBox "Empty Field Found!", vbExclamation, "Save"
         Me.Show
         txtDrugDistr(i).SetFocus
         Exit Sub
      End If
   Next i

      Set db = OpenDatabase(App.Path + "\DrugInfoDB.mdb")
      Set rs = db.OpenRecordset("DRUG_DISTRIBUTION")

   With rs
      .Index = "DRUG NAME"
      If .BOF Then
         .AddNew
            For i = 0 To 14
               rs.Fields(i) = Trim(txtDrugDistr(i).Text)
```

```
            Next i
          .Update
       Else
          .MoveFirst
          .Seek "=", (Trim(txtDrugDistr(2).Text))
          If .NoMatch Then
             .AddNew
                For i = 0 To 14
                   rs.Fields(i) = Trim(txtDrugDistr(i).Text)
                Next i
             .Update
          Else
          If MsgBox("RECORD ALREADY EXIST! DO YOU WANT TO APPLY CHANGES?",
vbYesNo + vbQuestion, "Save") = vbYes Then
                .Edit
                For i = 0 To 14
                      rs.Fields(i) = Trim(txtDrugDistr(i).Text)
                   Next i
                .Update
                Else
                Me.Show
                Exit Sub
             End If
          End If
          End If
          MsgBox "DRUG HAVE BEEN DISTRIBUTED SUCCESSFULLY!", vbInformation, "Saved"
          .Close
End With



       Set dw = OpenDatabase(App.Path + "\DrugInfoDB.mdb")
       Set rw = dw.OpenRecordset("DRUG_INVENTORY")

    With rw
       .Index = "DRUG NAME"
       If .BOF Then
          .AddNew
                rw.Fields(10) = Trim(Text1.Text)
                rw.Fields(11) = Trim(Text2.Text)
                rw.Fields(12) = Trim(Text3.Text)
          .Update
       Else
          .MoveFirst
          .Seek "=", (Trim(txtDrugDistr(2).Text))
          If .NoMatch Then
             .AddNew
                rw.Fields(10) = Trim(Text1.Text)
                rw.Fields(11) = Trim(Text2.Text)
                rw.Fields(12) = Trim(Text3.Text)
             .Update
```

```
        Else
            .Edit
            rw.Fields(10) = Trim(Text1.Text)
            rw.Fields(11) = Trim(Text2.Text)
            rw.Fields(12) = Trim(Text3.Text)
            .Update
        End If
      End If
        .Close
End With
dw.Close
db.Close

Me.Hide
Load frmReceipt
frmReceipt.Show
End Sub

Private Sub Timer1_Timer()
Call dateGenerate

Dim cart As Integer
Dim pack As Integer
Dim sachet As Integer
Dim totalPrice As Integer


cart = Val(txtDrugDistr(7).Text)
pack = Val(txtDrugDistr(8).Text)
sachet = Val(txtDrugDistr(9).Text)

If cart >= 10 Then
pack = 10 * cart
sachet = 10 * pack

ElseIf pack >= 10 Then
sachet = 10 * pack
End If

Text1.Text = Val(Text4.Text) - cart
Text2.Text = Val(Text5.Text) - pack
Text3.Text = Val(Text6.Text) - sachet
End Sub

Private Sub Timer2_Timer()
Set dw = OpenDatabase(App.Path + "\DrugInfoDB.mdb")
      Set rw = dw.OpenRecordset("DRUG_INVENTORY")

   With rw
      .Index = "DRUG NAME"
      If .BOF Then
```

```
        Me.Show
        Exit Sub
      Else
        .MoveFirst
        .Seek "=", (Trim(txtDrugDistr(2).Text))
        If .NoMatch Then
          Me.Show
          Exit Sub
        Else
            txtDrugDistr(3).Text = rw.Fields(1)
            txtDrugDistr(4).Text = rw.Fields(4)
            txtDrugDistr(5).Text = rw.Fields(13)
            txtDrugDistr(6).Text = rw.Fields(14)
            Text4.Text = rw.Fields(10)
            Text5.Text = rw.Fields(11)
            Text6.Text = rw.Fields(12)

            If txtDrugDistr(0).Text = txtDrugDistr(6) Then
            Label10.Caption = "NOTE THAT THE DRUG: " & rw.Fields(2) & " HAS EXPIRED. YOU
ARE ADVICE TO DISPOSED"
            Else
            Label10.Visible = False
            End If

            If rw.Fields(10) <= 10 Then
            Label5.Caption = rw.Fields(2) & " VERY LOW, WILL SOON RUN OUT, REFILL IN
TIME"
            Else
            Label5.Caption = rw.Fields(10) & "  CARTOONS OF " & rw.Fields(2) & " REMAINING.
PLEASE REFILL"
            End If
        End If
      End If
        .Close
End With
dw.Close
End Sub

Option Explicit
Dim db As Database
Dim rs As Recordset

Dim dw As Database
Dim rw As Recordset

Dim i As Integer
Dim j As Integer

Dim str As String
Dim confirm As String
```

```
Dim Today As Variant
Dim TodaysDate As Variant
Dim Day As Variant
Dim month As Variant
Dim year As Variant
Dim number As Variant

Dim con As New ADODB.Connection
Private Sub IDGenerate()
Dim ID As Integer
Randomize Timer
ID = Int(1100 * Rnd + 1)
If ID <= 9 Then
txtDrugProcure(1).Text = "D" & "/" & "000" & ID
ElseIf ID > 9 And ID < 110 Then
txtDrugProcure(1).Text = "D" & "/" & "00" & ID
ElseIf ID >= 110 And ID < 1100 Then
txtDrugProcure(1).Text = "D" & "/" & "0" & ID
Else
txtDrugProcure(1).Text = "D" & "/" & ID
End If
End Sub
Private Sub dateGenerate()
Today = Now
month = Format(Today, "mmmm")
year = Format(Today, "yyyy")
number = Format(Today, "d")
TodaysDate = number & "/" & month & "/" & year & "/" & Time
txtDrugProcure(0).Text = TodaysDate
End Sub
Sub clear()
For i = 0 To 15
txtDrugProcure(i).Text = ""
Text2.Text = ""
Text1.Text = ""
Text3.Text = ""
Next i
Call dateGenerate
Call IDGenerate
End Sub
Private Sub cmdExit_Click()
confirm = MsgBox("Do You want to Exit", vbYesNo + vbCritical, "Confirmation")
If confirm = vbYes Then
End
Else
Load frmDrugReg
frmDrugReg.Show
End If
End Sub
Private Sub cmdHome_Click()
Unload Me
```

```
frmMainMenu.Enabled = True
Load frmMainMenu
frmMainMenu.Show
End Sub
Private Sub cmdLogout_Click()
confirm = MsgBox("Do You want to Logout", vbYesNo + vbCritical, "Confirmation")
If confirm = vbYes Then

Unload Me

frmSplash.Enabled = True
Load frmSplash
frmSplash.Show
Else
Load frmDrugReg
frmDrugReg.Show
End If
End Sub
Private Sub cmdRefresh_Click()
clear
End Sub
Private Sub cmdSave_Click()
   For i = 0 To 15
      If Trim(txtDrugProcure(i).Text) = "" Then
         MsgBox "Empty Field Found!", vbExclamation, "Save"
         Me.Show
         txtDrugProcure(i).SetFocus
         Exit Sub
      End If
   Next i

      Set db = OpenDatabase(App.Path + "\DrugInfoDB.mdb")
      Set rs = db.OpenRecordset("DRUG_PROCUREMENT")

   With rs
      .Index = "DRUG NAME"
      If .BOF Then
         .AddNew
            For i = 0 To 15
               rs.Fields(i) = Trim(txtDrugProcure(i).Text)
            Next i
         .Update
      Else
         .MoveFirst
         .Seek "=", (Trim(txtDrugProcure(2).Text))
         If .NoMatch Then
            .AddNew
               For i = 0 To 15
                  rs.Fields(i) = Trim(txtDrugProcure(i).Text)
               Next i
            .Update
```

```
        Else
        If MsgBox("RECORD ALREADY EXIST! DO YOU WANT TO APPLY CHANGES?",
vbYesNo + vbQuestion, "Save") = vbYes Then
                .Edit
                For i = 0 To 15
                      rs.Fields(i) = Trim(txtDrugProcure(i).Text)
                   Next i
                .Update
                Else
                Me.Show
                Exit Sub
             End If
          End If
          End If
          MsgBox "DRUG HAS BEEN ADDED SUCCESSFULLY!", vbInformation, "Saved"
          .Close
End With

     Set dw = OpenDatabase(App.Path + "\DrugInfoDB.mdb")
     Set rw = dw.OpenRecordset("DRUG_INVENTORY")

   With rw
      .Index = "DRUG NAME"
      If .BOF Then
         .AddNew
            For j = 0 To 15
               rw.Fields(j) = Trim(txtDrugProcure(j).Text)
            Next j
         .Update
      Else
         .MoveFirst
         .Seek "=", (Trim(txtDrugProcure(2).Text))
         If .NoMatch Then
            .AddNew
               For j = 0 To 15
                  rw.Fields(j) = Trim(txtDrugProcure(j).Text)
               Next j
            .Update
         Else
                .Edit
                For j = 0 To 15
                      rw.Fields(j) = Trim(txtDrugProcure(j).Text)
                   Next j
                .Update
         End If
      End If
         .Close
End With
dw.Close
db.Close
Call clear
```

```
End Sub
Private Sub Form_Load()
Call IDGenerate
End Sub

Private Sub Timer1_Timer()
Call dateGenerate

Dim cart As Integer
Dim pack As Integer
Dim sach As Integer

cart = Val(Text3.Text)
pack = 10 * cart
sach = 10 * pack

Text2.Text = pack
Text1.Text = sach

txtDrugProcure(10).Text = Text3.Text
txtDrugProcure(11).Text = Text2.Text
txtDrugProcure(12).Text = Text1.Text
End Sub
```