

**DEVELOPMENT OF A PHARMACY
MANAGEMENT SYSTEM (A CASE STUDY OF
ZAGBAYI PHARMACY, MINNA,
NIGER STATE)**

BY

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DEDICATION

I dedicate this project to my family - The Adamu Family

ACKNOWLEDGEMENT

I give all glory to ALMIGHTY ALLAH, The author and the finisher of our faith, for is e deserves all the glory, honour, adoration and praise for his tender mercy over my life.

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ABSTRACT

developing pharmacy management applications, one tries to construct an abstract presentation of the data from a real world scenario and logistic constraints of the real-world problem under consideration. To do this, a suitable abstract language is needed. It must be rich enough to model the wide variety of problems encountered in the management of pharmacies, and it must also be precise so that a reasonable logical conclusions can be reached on time when management decisions have to be made. In application development, we have to model numeric and non-numeric data in the form of rules, and structural information often in the form of interrelationships between data.

We will see in this project the development of a "Pharmacy Management System", that aids administrators of pharmacies in reaching quick and reasonable decisions.

This project also features the use of databases in the computerised management of pharmacies.

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CHAPTER ONE

GENERAL INTRODUCTION TO COMPUTERS

1.1 WHAT IS A COMPUTER

A computer can be defined as an electronic device that has the ability to accept and process data by following a set of instructions to produce an accurate and efficient result. This set of instructions is referred to as a program and a program can be written in any of the numerous programming languages available today. The computer system accepts data as input, processes it and subsequently stores it in a storage device as information. This stored information can also be retrieved as result or output. The entire process of computation is carried out at a very high speed, which cannot be equaled to that of humans. For any machine to be called a computer, it has to possess a number of qualities of which the important ones are outlined below:

- Ability to accept data from the input device
- Ability to store data and information (i.e. there is existence of memory)
- Ability to process data to give information
- Ability to output information.

From the above definition of a computer, data and information can be defined as follows:

DATA is a term given to basic concrete (raw) facts or symbols such as numbers, names or values etc, while INFORMATION refers to the processed data, which is more useful as output.

The physical component of a computer machine that can be seen and touched (that is the mechanical and electronic parts) makes up what is known as the computer hardware. The hardware also includes peripherals such as input and output devices and other accessories.

The computer software consists of the programs that may be used in a computer system together with their associated documentation. There are basically two types of software namely:

- i. System software: These are also called operating systems as they communicate directly with the hardware of the computer. The operating system transforms high level codes into machine understandable binary codes for execution. Examples include Unix, Linux, Microsoft Windows 95, 98 and Windows XP.
- ii. Application software: These are software that has been designed for specific tasks in specific fields. They communicate with the computer hardware through the system software, and in most cases, they cannot function without the system software. Examples of application software are Microsoft Word, Microsoft Excel, AutoCAD, SPSS etc.

1.1.1 Types of Computers

There are different types of computers. These computer types vary with the different standards of classification. Basically, here, we are going to consider three standards for the classification of computers. They are classification by generation, classification by mode of operation and classification by size.

When classifying computers by generation, we have basically five classes or generations of computer; they are briefly outlined below:

i. **First generation computers (1951 – 1958):** These are the first set of computers produced and were built with vacuum tubes as their main components. The basic characteristics of computers of this generation are as follows:

- Heat and maintenance problems
- Limited main memory capacity
- Slow input and output i.e. card oriented
- Use of low level symbols language programming
- Use of vacuum tubes in electronic circuits

An example of a computer in this generation is the Universal Automatic Computer (UNIVAC), which was built in 1951.

ii. **Second generation computers (1959 – 1964):** These are computers that are an improvement over the first generation computers. They are relatively much faster than the first generation computers and are built with transistors as their main processing components. Some characteristics of computers in this generation includes:

- The use of transistors for internal operations
- Reduced heat generation
- The use of magnetic core as primary internal storage medium
- More flexibility of input and output

- Faster input and output – tape oriented
- Use of high level programming languages e.g. FORTRAN Computers in this generation were used for batch oriented applications e.g. in billing, payroll, updating, inventory etc.

iii. **Third generation computers (1965 – 1970):** This generation of computers was built with integrated circuits and computers in this generation are far more effective when compared to the computers that existed in the second generation. This is because a single integrated circuit could effectively carry out the job of over ten transistors. Some characteristics of computers that existed in this generation are as follows:

- Smaller size and better performance with reliability
- The emergence of the mini computers in this generation
- The use of integrated circuits (ICs) for internal operations. This IC is made with silicon.
- The use of magnetic core and solid state as main storage
- More flexibility with input and output – disc orientation instead of tapes in the second generation
- Extensive use of high level language (HLL)
- Remote processing and timely communication
- Availability of operating system programs to control input and output and perform many tasks previously handled by human operations.

Applications that existed in this generation include

- Airline Reservations

- Marketing forecasting

- Credit billing

iv. **Fourth generation Computers (1971 to date):** These sets of computers evolve as an improvement over the third generation computers. They use microprocessors as their building blocks of processing and are very efficient and fast compared to all other classes of computers mentioned above. Characteristics of computers in this generation are as follows:

- Increase in storage capability and speed

- Use of microprocessors. These microprocessors are also made of silicon.

- Versatility of input and output.

- Use of Large Scale Integration (LSI) and Very Large Scale Integration (VLSI)

- Modular design of programs and compatibility with different computers

- Availability of sophisticated programs for special applications

Some applications that characterises this generation are:

- Mathematical modeling and simulation

- Electronic fund transfer (EFT)

- Computer aided instruction (CAI)

- Computer aided manufacturing (CAM)

- Computer aided learning (CAL)

Research, military, communication, medicine, engineering, architecture, banking, accounting, statistics, commerce and agriculture are also areas of human endeavour that the application computers are of very great importance. One can conclude that any field of human endeavour in today's world that is not successfully aided by the use of computers does not contribute much to human existence as all fields of human endeavour that contribute to human existence makes use of computers in one way or the other. Below is a brief on the use of computers in some of the fields mentioned above.

Word Processing and Desktop Publishing: This is perhaps the most common area of application of computers. Several software have been developed to perform numerous tasks in this areas, examples include Microsoft Word, Corel WordPerfect and a host of other software.

Military: The use of computers in the development of weapons is a major landmark in the development of any army. Computers today are being used in global positioning systems (GPS) to track enemy locations, as well as to know what is going on in most parts of the earth. Computers are also being employed in the military as autopilots for unmanned aircraft in wars. Also, use of computers in war projections has aided many armies in attaining victory in wars. There are several other uses of computers in any military.

Education: Computers are being used in the educational sector for several purposes. Computer aided learning (CAL), Computer aided instruction (CAI), and intelligent and

analytical tutoring systems for various subjects and courses e.t.c are some uses of computers in this field.

Communication: Here computers are used to aid communication by enhancing the information technology strengths of computers. Computers can transfer information between its parts and from one place to another at a very high speed, so today we have communication satellite technologies, Very Small Aperture Terminals (VSAT) technologies, Global System for Mobile Communication (GSM) technologies, etc in existence with each technology making a useful use of one or more qualities of computers.

Research: The use of computers in collection, storage and analysis of research data and information has made research much easier and faster. Also the part that computers play in the technology of the Internet can never be overemphasized, and it is clear that the Internet is a big warehouse for research resources.

Medicine: Computers are presently being employed in medicine especially in form of expert systems to aid in medical diagnosis and to help increase the productivity of medical practitioners. These expert system help to make the service(s) of a medical expert available to more and more people within the same period of time as these systems can ask a patient a series of questions concerning his/her ill health and then diagnose the patient based on the complaints given.

Agriculture: Computers are being used in agriculture for projections and also for records keeping, though lately, they are being employed to carry out more complex tasks that require expertise.

Engineering: The application of Computer in engineering mainly for designs and manufacturing. Software now exists for Computer aided designs (CAD) and Computer Aided Manufacturing (CAM) that helps to solve a great deal of problems in this area.

Architecture: In architecture today, computers are being employed for the development of plans and models. Computer aided design software e.g. AutoCAD helps architects develop with much ease all types of drawings and plans. It also helps them in the projection of the strength of materials and buildings and to visualize structures pictorially before they are being laid on the earth.

Accounting and Statistics: Computers are used to reduce the workload on accountants and statisticians as computers have the ability to perform several calculations in a very short time and with great efficiency and accuracy. The application of computers in the financial and accounting world remains an important factor for the existence of these fields. Examples of software that are useful in these fields are Microsoft Excel, Standard Package for Scientists and Statisticians (SPSS) etc.

Banking: In the banking sector of today, e banking is the order of the day. Computers have made banking transactions much easier and banks today can attend to more

customers within a very short time. This sector of human endeavour takes advantage of the speed and storage capabilities of computers.

Commerce: At the onset of time, for commerce (i.e. buying and selling) to take place, the buyer and the seller have to be together physically. Today the application of computers in commerce has introduced e-commerce that has greatly eased buying and selling. Here the buyer and the seller don't have to see each other, all they do is to buy and sell over a computer network such as the Internet.

1.2 AIMS AND OBJECTIVES OF THE STUDY

This project work aims primarily at improving the techniques of record keeping, inventory and computation in a pharmacy and thus improving the overall performance of the pharmacy. Hence taking effective decision. It intends to encompass the specific methodology and procedure employed in a standard drug dispensing pharmacy. It also intends to provide pharmacists a powerful skill or approach for solving problems associated with storage of large volumes of records, inventory of the pharmacy as well as the application of scientific methods to complex problems arising in the day to day activities in the pharmacy.

Objectives of the Study

The objectives of this project are to provide pharmacists and pharmacy managers the ingenious skills of managing effectively their pharmacies, and to develop and implement a structured and computerised system for computation, inventory and record

keeping in the pharmacy. This system will involve the use of combined utilization of the mathematical techniques and storage facilities of personal computers to assist pharmacists and pharmacy managers in taking marketing, purchasing and management decision and producing intended results in shorter time, more accurately and effectively.

To reach this aim, a customized computer system software was developed to simulate the common processes involved in the management of a pharmacy and to enhance the pharmacists' and the pharmacy managers' effectiveness, consistency and decision making process by very high speed and accurate use of the microprocessor of the personal computers.

1.3 SCOPE AND LIMITATION OF THE STUDY

Taking a careful look at the problems identified above, it is difficult to develop immediately a system, which will cover all the problems facing pharmacies and general pharmacy management. For this reason, our study is focussed on the ineffectiveness of the inventory, record keeping approach, drug dispensation and sales methodology and its computerisation. This is because of its importance for instance that these areas are taken as the pillar of every pharmacy and even most organisations. Its computerisation can even allow the control of the entire system and easy management and dispensation of drugs.

Another important reason is that the growth of every organisation can be measured through the effectiveness of its services and this in turn depends largely on the effectiveness and reliability of the methods of storing its growing data records and tracking of its inventory.

.4 PROGRAMMING LANGUAGE USED

The programming language used in the development work is Microsoft Visual FoxPro

6.0. This language is used so that one can take advantage of its ability to handle, operate and communicate effectively with databases as well as its consistence in computing and output of results. The ease of use of the language is also capitalised on during the development process. Below are some reasons why Microsoft Visual FoxPro was used:

- It is a highly structured language as it is object oriented. This also makes it require little effort in maintaining proper indentation and thus better legibility of program codes will be obtained;
- Microsoft Visual FoxPro 6.0 has the ability of easy control of all data management task for the system;
- It is interactive in nature, hence its debugging facilities provide an effective way to detect errors and make corrections during the execution of the program;
- It is able to handle multiple programming tools and environments;
- An added advantage is that it is object oriented. That is to say that it is highly structured and doesn't require much programming knowledge. Once the designer of a project has a defined scheme in mind, the creation of the program becomes a quick reality since the programming environment would assist him/her. This is possible because Visual FoxPro 6.0 is a fourth generation programming language.

CHAPTER TWO

BRIEF OVERVIEW OF ZAGBAYI PHARMACY

2.1 BRIEF HISTORY OF ZAGBAYI PHARMACY

The present Zagbaya pharmacy was established some few years ago (the exact date of opening of the pharmacy was not revealed). The pharmacy was formerly called Zachase pharmacy, and then it started off with just one office with its first branch at general hospital road, Minna, Niger State.

With the passing of time, Zachase pharmacy was renamed to Zagbaya pharmacy and some other offices were opened in other parts of the city. Today, the pharmacy has a lot of branches all over the state, and all branches of the pharmacy meet the required standard of a Nigerian pharmacy.

2.2 ORGANISATIONAL STRUCTURE

On the organisational structure of Zagbaya Pharmacy, the owner and founder of the company, in person of Dr. Shehu Zagbaya is the chairman and chief executive of the company. Reporting to the chairman is the medical director of the pharmacy. Below the medical director are three managers, who are the heads of their respective departments. The managers and the offices under them are highlighted below:

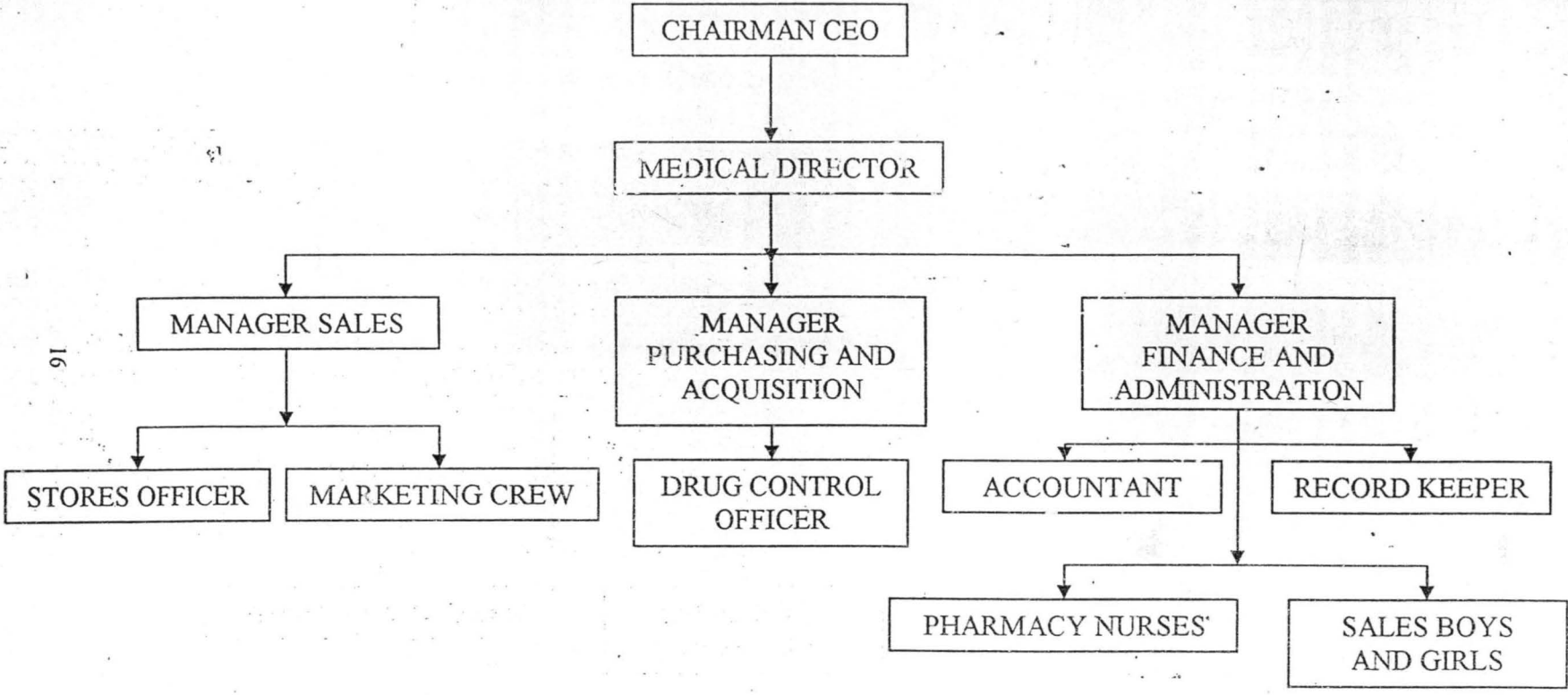
- **Manager Sales:** This is the office of the head of the sales department. The offices under this office are the offices of the store officer and the office of the marketing crew respectively. The store officer keeps record of drugs sold and bought. In

essence the major job here is inventory control. The marketing crew is responsible for adverts and general publicity of the pharmacy.

- **Manager Purchasing:** Heads the purchasing department. This department is composed mainly of the offices of the purchasing officer and drug control officer. The purchasing officer as the name implies is in charge of the drug purchases made and also works hand in hand with the store officer to get updated information about drugs that are to be purchased and those not to be purchased due to sale frequency of each drug. The drug control officer also works with the purchasing officer to ensure drugs purchased are NAFDAC approved. This is a sensitive office because this office ensures that the integrity of the organization is not compromised.
- **Manager Finance and Administration:** This is the office of the personnel officer of the pharmacy. Reporting to this office are the offices of the accountant of the company, the office of the record keeper, nurses and all sales boys and girls of the pharmacy.

Below is a pictorial representation of the organogram structure of the hierarchy of the offices in the pharmacy.

ORGANOGRAM STRUCTURE OF ZAGBAYI PHARMACY



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2.3 HIGHLIGHTS OF PHARMACY OUTLETS

Most drug sell outlets operate on retail sales of drugs. Some outlets also do not have a medical director and also get their supplies from their bigger outlets. Zagbaya pharmacy has a wide spread over Niger State and is well known, hence it has several outlets spread across the state. The smaller outlets serve as smaller units of the bigger outlets.

The sources of drugs for pharmacy outlets usually differ, though lots of drug sources in Nigeria today are through imported sources, as Nigeria has not started vast production of drugs. Some drug sell outlets purchase their wholesale stock from drug manufacturers directly.

Whatever the nature of drug or the cost of the drug, one thing is common between all drug outlets, and that is records of incoming and outgoing drugs. These records are kept in different formats, on different platforms and in different ways as methods of record keeping depend on the size and mode of operation of the pharmacy.

2.4 REASONS FOR SYSTEM DEVELOPMENT

For any company, as the company grows larger and more complex in operations, especially as the population of data begins to rise, manual systems of operations begins to reveal their loop holes in terms of consistency, accuracy, effectiveness and in several other areas. With continuous growth, these manual systems of operations fail to the insignificant. At this juncture, every good company management will seek out better ways of operation. Around the helping corner is information technology, which seeks to

help these companies automate their operations to make things faster, more effective, more reliable and of course all operations become more portable.

Zagbaya Pharmacy is not in any way an exception to these operational flaws indicated above, and at the moment the pharmacy has well over a hundred drugs in stock with regular sales and a non stop supply flow. As the pharmacy becomes more busy, the volume of papers is on the increase and presently, the pharmacy is having a lot of problems keeping the files containing the photocopies of records of sold drugs as the quantity is getting out of hand. This problem of volume also makes the searching of a particular record very difficult.

Due to the above setbacks, a system development is required and very important for the pharmacy to maintain its integrity of speed of service, accuracy and generally its good reputation.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 ANALYSIS OF THE CURRENT MANUAL SYSTEM

The current method of record keeping in Zagbaya pharmacy is totally based on manual processes. Below is a brief of the processes involved in the acquiring and dispensation of drugs in Zagbaya pharmacy with more emphasis on the manual methods of operations.

The manual method of keeping records is the technology being employed in Zagbaya pharmacy today. This comprises of the usual methods of keeping records and inventory of drugs bought and drugs dispensed in manual records of files and folder files. Below is a brief explanation of the process.

When a drug or set of drugs is being supplied the pharmacy, the supplier or distributor of the drug will issue an invoice and receipt of purchase of these drugs to the pharmacy. The drugs are then moved to the pharmacy store. And they remain there until they are needed on the shelf i.e. when there is an outage of stock of a particular drug on the shelf. All drugs in the pharmacy are usually being displayed on the pharmacy shelves. The shelves are numbered and on each shelf are a number of different and related or similar drugs.

When a buyer needs a particular drug or item, the attendant goes to the shelf where that drug or item resides, gets the drug or item and sells it to the buyer. An entry is then made in the record book by the record keeper, indicating that a number of units of

- Report of Particular Drug/Item Details: This report list all the details associated with a particular stock item. It allows the user to enter the stock ID and it automatically displays all detailed information about the item. Amongst other information about the item whose number was entered, this report shows the Stock ID, the stock name, the unit price, the quantity available and the expiry date.

3.4.3 Miscellaneous Design: This includes all other functional aspects of the software design. These design aspects includes the following:

- Security: The security of the software is designed in such a way that before logging on to the software, an administrator password is required. Without this administrator password, the user is not allowed to log on to the software. This security feature was put in place so as to restrict the users that will have access to the data in the software as this data might be considered as confidential to the pharmacy. This feature also limits the number of people who can enter data into the software so as to reduce fraud to the lowest minimum.

- Ease of Use: The design of the software is also made in such a way that users need minimum knowledge of computer operations before they can log on to the software and use the software so long as the user has the correct administrator password. The software was designed to be user friendly.

- Portability: The design of the software was done in such a way that the software is made portable on several operating system platforms (mostly different version of the windows operating system). The software also has the portability to work on

different computer architectures, so long the architecture of the computer meets the minimum requirements specified and the operating system installed is compliant with the minimum specifications of the software designer.

- Efficiency: The design of the software takes efficiency into proper consideration, as the software is extremely efficient for the task it was meant to perform. It performs all the computations required accurately and on time. The method of storage of records within the database also ensures that records are kept safe and accurate such that records cannot get mixed up.
- Reliability: The software is a very reliable one as it produces correct output and the data are being stored in formats that meets international storage standards and specifications. Once there is an absence of hardware failure, then there is little or no expectancy of software failure that may result in loss of data within the software or a mix up of data within the software. Since the storage and computation within the software is very efficient, then any management can confidently rely on the results produced by the software.

3.5 FILE ORGANISATION:

File organisation is a way of specifying the organisation of records within the files and the items of each record.

In this software, all records are organised in a relational database. This database contains tables that hold respective information for the proper functioning of the software and the safe keeping of records. The tables and the entire database itself are stored on the

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APPENDIX

PROGRAM CODES FOR THE SOFTWARE

program poss

CLOSE all

* set environment

```
SET TALK OFF
SET STATUS OFF
SET SCORE OFF
SET PATH TO C:\poss
SET ECHO OFF
SET BELL OFF
SET SAFETY OFF
SET DATE BRITISH
SET CENTURY ON
SET SYSMENU OFF
SET ESCA OFF
SET HELP OFF
SET STATUS BAR OFF
SET DEBUG OFF
SET CLOCK OFF
```

CLOSE all

SET SYSMENU TO

_SCREEN.CAPTION ="Pharmacy Management System(PMS)"

application.visible = .f.

PUBLIC cuser_id, cpasswd, accessmode, ntrial

PUBLIC diffdate

diffdate = 0

ntrial = 1

DO FORM frmintro

READ EVENTS && fit this place

*QUIT

Program Codes For Frmstock

cmdnew_click()

* to enter new stock inventory

flag = 1

thisform.txtstockid.enabled = .t.
thisform.txtshelfno.enabled = .t.
thisform.txtstockname.enabled = .t.
thisform.txtstockdesp.enabled = .t.
thisform.cbostocktype.enabled = .t.
thisform.txttotalqty.enabled = .t.
thisform.txtqty.enabled = .t.
thisform.txtbcode.enabled = .t.
thisform.txtoffice.enabled = .t.
thisform.txtqty1.enabled = .t.
thisform.txtbcode1.enabled = .t.
thisform.txtoffice1.enabled = .t.
thisform.txtqty2.enabled = .t.
thisform.txtbcode2.enabled = .t.
thisform.txtoffice2.enabled = .t.
thisform.txtqty3.enabled = .t.
thisform.txtbcode3.enabled = .t.
thisform.txtoffice3.enabled = .t.
thisform.txtqty4.enabled = .t.
thisform.txtbcode4.enabled = .t.
thisform.txtoffice4.enabled = .t.
thisform.txtsupid.enabled = .t.
thisform.txtsupname.enabled = .t.
thisform.txtsupadd.enabled = .t.
thisform.txtmanuf.enabled = .t.
thisform.txtexpdate.enabled = .t.
thisform.txtunitqty.enabled = .t.
thisform.txtucprice.enabled = .t.
thisform.txtrolevel.enabled = .t.
thisform.txtusprice.enabled = .t.
thisform.txttprice.enabled = .f.
thisform.txttspice.enabled = .f.
thisform.txtstockdate.enabled = .t.

thisform.cmdnew.enabled = .f.
thisform.cmdupdate.enabled = .f.
thisform.cmdsave.enabled = .t.
thisform.cmddelete.enabled = .f.
thisform.cmdrefresh.enabled = .t.
thisform.cmdbrowse.enabled = .t.
thisform.cmdexit.enabled = .t.

thisform.txtshelfno.setFocus

cmdsave_click()

```

select 1

mshelfno = thisform.txtshelfno.value
mstockid = thisform.txtstockid.value
mstockname = alltrim(upper(thisform.txtstockname.value))
mstockdesp = alltrim(upper(thisform.txtstockdesp.value))
mstocktype = alltrim(thisform.cbostocktype.value)
mtotalqty = thisform.txttotalqty.value

mqty = thisform.txtqty.value
mbcode = thisform.txtbcode.value
moffice = alltrim(upper(thisform.txtoffice.value ))

mbcode1 = thisform.txtbcode1.value
mqty1 = thisform.txtqty1.value
moffice1 = alltrim(upper(thisform.txtoffice1.value ))

qty2 = thisform.txtqty2.value
mbcode2 = thisform.txtbcode2.value
moffice2 = alltrim(upper(thisform.txtoffice2.value ))

mqty3 = thisform.txtqty3.value
mbcode3 = thisform.txtbcode3.value
moffice3 = alltrim(upper(thisform.txtoffice3.value ))

mqty4 = thisform.txtqty4.value
mbcode4 = thisform.txtbcode4.value
moffice4 = alltrim(upper(thisform.txtoffice4.value ))

msupid = thisform.txtsupid.value
msupname = alltrim(upper(thisform.txtsupname.value ))
msupadd = alltrim(upper(thisform.txtsupadd.value ))
mmanuf = alltrim(upper(thisform.txtmanuf.value ))

mexpdate = thisform.txtexpdate.value
munitqty = thisform.txtunitqty.value
mucprice = thisform.txtucprice.value
mrolevel = thisform.txtrolelevel.value
musprice = thisform.txtusprice.value
mtcprice = thisform.txttcprice.value
mtsprice = thisform.txttsprice.value
mstockdate = thisform.txtstockdate.value

do case

case mshelfno = 0

```

```
messagebox(" ShelfNumber can not be blank please ",16,"ERROR")
thisform.txtshelfno.value = 0
thisform.INIT
```

```
case mstockid = 0
    messagebox(" Stock Identification can not be blank please
    ",16,"ERROR")
    thisform.txtstockid.value = 0
    thisform.INIT
```

```
case len(mstockname) = 0
    messagebox(" stock name can not be blank please ",16,"ERROR")
    thisform.txtstockid.value = 0
    thisform.txtshelfno.value = 0
    thisform.txtstockname.value = ""
    thisform.INIT
```

```
case mtotalqty = 0
    messagebox(" Total Quantity can not be zero please ",16,"ERROR")

    thisform.txtstockid.value = 0
    thisform.txtshelfno.value = 0
    thisform.txtstockname.value = ""
    thisform.txttotalqty.value = 0

    thisform.INIT
```

```
case mqty = 0
    messagebox(" Quantity can not be zero please ",16,"ERROR")
    thisform.txtstockid.value = 0
    thisform.txtshelfno.value = 0
    thisform.txtstockname.value = ""
    thisform.txttotalqty.value = 0
    thisform.txtqty.value = 0
    thisform.INIT
```

```
case flag = 1
    seek mstockid
    if !found()
        append blank
        replace stockid with mstockid
        replace shelfno with mshelfno
        replace stockname with mstockname
        replace stockdesp with mstockdesp
        replace stocktype with mstocktype
        replace totalqty with mtotalqty
```