AUTOMATION OF MEDICAL CLINIC SERVICES:

(A CASE STUDY OF THE RAW MATERIALS RESEARCH AND DEVELOPMENT COUNCIL IN-HOUSE CLINIC, ABUJA.)

By

Samuel Oladiran Fagbemi

PGD/MCS/97/309

DEPARTMENT OF MATHEMATICS / COMPUTER SCIENCE, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

MARCH 2000

AUTOMATION OF MEDICAL CLINIC SERVICES: (A CASE STUDY OF THE RAW MATERIALS RESEARCH AND DEVELOPMENT COUNCIL IN-HOUSE CLINIC, ABUJA.)

By

Samuel Oladiran Fagbemi

PGD/MCS/97/309

A project submitted to the Department of Mathematics/Computer Science, Federal University of Technology, Minna in partial fulfillment of the requirement for Postgraduate Diploma in Computer Science.

March 2000

Certification

This is to certify that this work was carried out by Samuel Oladiran Fagbemi in the Department of Mathematics/Computer Science, Federal University of Technology, Minna.

---------- ----------

Mallam Isah Audu **Date**

Supervisor

---------- ----------

Dr. S.A. Reju **Date**

Head of Department,

Maths/Computer Science

---------- ----------

External Examiner **Date**

TABLE OF CONTENTS

CHAPTER THREE

CHAPTER FOUR

CHAPTER FIVE

DEDICATION

Wholeheartedly dedicated to my late father,

Mr. Michael Adesina Fagbemi.

ACKNOWLEDGEMENT

I express my profound gratitude to my supervisor, Mallam Isah Audu for his effective supervision, invaluable advice and constructive criticisms during the course of this work.

My thanks also goes to my Head of department, Dr S.A. Reju , the course coordinator, Prince R. Badmus and other lecturers in the department of Maths/Computer of the Federal University of Technology, Minna.

I highly appreciate the moral and financial support of my parents, which actually assisted me throughout the period of study.

My sincere gratitude to Mr. B.A. Aluko, Mrs. M.I. Mbuk, Mr. Segun Arasanyin, Mr. O. Bakare, Mr. K.K. Idris, Angelina Nwalor, All Planning staff of RMRDC and my very close colleagues Mr. M. Gimba, Joseph Adagazu, Justinah Balogun, Victor Olaosegbe, Huthman Toyin and Afolabi Ibrahim for their suggestions and contributions to this work.

To my brothers: Dayo, Segun and Lawrence and my sisters: Opeyemi, Yinka, Dotun, Tayo and Comfort.

To Bunmi and Yinyinola Fagbemi and all others, who contributed directly or indirectly to the successful completion of this work, I say thank you to Miss Udo Chiwetalu and Esther Kanu for typing the work.

I thank God for his mercies, protection and guidance throughout the period of this work.

ABSTRACT

The need and demand for reliable and efficient automated Medical Information System especially for the Raw Materials Research and Development Council (RMRDC) in-house Clinic is enormous.

In this work, an attempt has been made to investigate the existing system (manual) and a critical evaluation of the automated system with respect to its claimed objectives of reliability, extensibility and high performance.

The Design approach is structured and the Programming techniques and data structure used are highlighted. The software is running on FoxPro and the systems response time shows that the software is efficient.

CHAPTER ONE

General Introduction

1.0 Background of study

The Raw Materials Research and Development Council (RMRDC), a parastatal under the Federal Ministry of Science and Technology, was established by Decree No. 39 of 1987 but commenced operation on February 10, 1988 with a mandate to support and expedite industrial development and self-reliance through optimal utilization of local raw materials as inputs for our industries.

Mandates

The mandates of the Council as embodied in Decree 39 (1987) are as follows:

- To draw up policy guidelines and action programmes on raw materials acquisition, exploitation and development;
- To review from time to time, raw materials resources availability and utilization, with a view to advising the Federal Government on the strategic implication of depletion, conservation or stock-piling of such resources;
- To advise on adaptation of machinery and process for raw materials utilization;
- To encourage publicity of research findings and other information relevant to local sourcing of industries;
- To encourage the growth of implant research and development capabilities;

- To advise on and device awards or systems for industries that achieve any breakthrough or make innovations and inventions.
- To organise workshops, symposia and seminars designed to enlighten people on new developments and solutions discovered from time to time;
- To consider and advise on special research grants for specific objectives and any other issue capable of enhancing the objectives of the council.

Programmes/Activities

Since inception, the council has embarked on a number of programmes and activities designed to achieve its mandates as follows:

- Establishment of a National Science and Technology Data Bank which initially started as a Raw Materials Information System (RMIS). The bank stores a horde of Science and industrial based data which include data on local mineral and agricultural raw materials in Nigeria, locations, reserve estimates, levels of development, Production and utilization and many more.
- National Research and Development (R&D) programme. Under this programme, the council funds innovative applied R&D projects for the utilization of local raw materials by the manufacturing sector.
- Commercilisation of R&D inventions. This programme is aimed at commercializing the abundant R&D inventions in the universities and research institutes through the establishment of pilot projects. Apart from the commercialization purpose, pilot projects are intended to serve as training centre for young Nigerian Scientists and engineers as well as Demonstration ground for potential investors.

- Establishment of catalytic model factories designed to facilitate the proliferation of similar raw materials processing industries. They are also intended to boost indigenous engineering efforts in the design, fabrication and installation of complete plants for local raw materials processing.
- Boosting of agricultural productivity through seed multiplication and distribution to farmers. This programme is designed to complement the efforts of other relevant government agencies.
- Promoting the growth of indigenous engineering capability by supporting the local design and fabrication of universal components and through organizing a specialized exhibition tagged "Resources and Techno-Exposition".
- Catalyzation of Risk Fund Plc which is an additional source of venture capital funding for strategic projects and resource based industries.
- Development of alternative livestock feeds.
- Promoting investments in local resource-based industries through the provision of consultancy and project feasibility support services, financial brokerage services and equity participation in joint venture projects

Organizational Strucutre of RMRDC

The Council headed by a Director-General/Chief Executive is made up of five departments.

(i) Administration, Finance and Supply;
(ii) Research and Coordination;
(iii) Technology Development;
(iv) Investment Promotion and Consultancy and
(v) Science and Technology Data Bank and office of the DG/Chief Executive

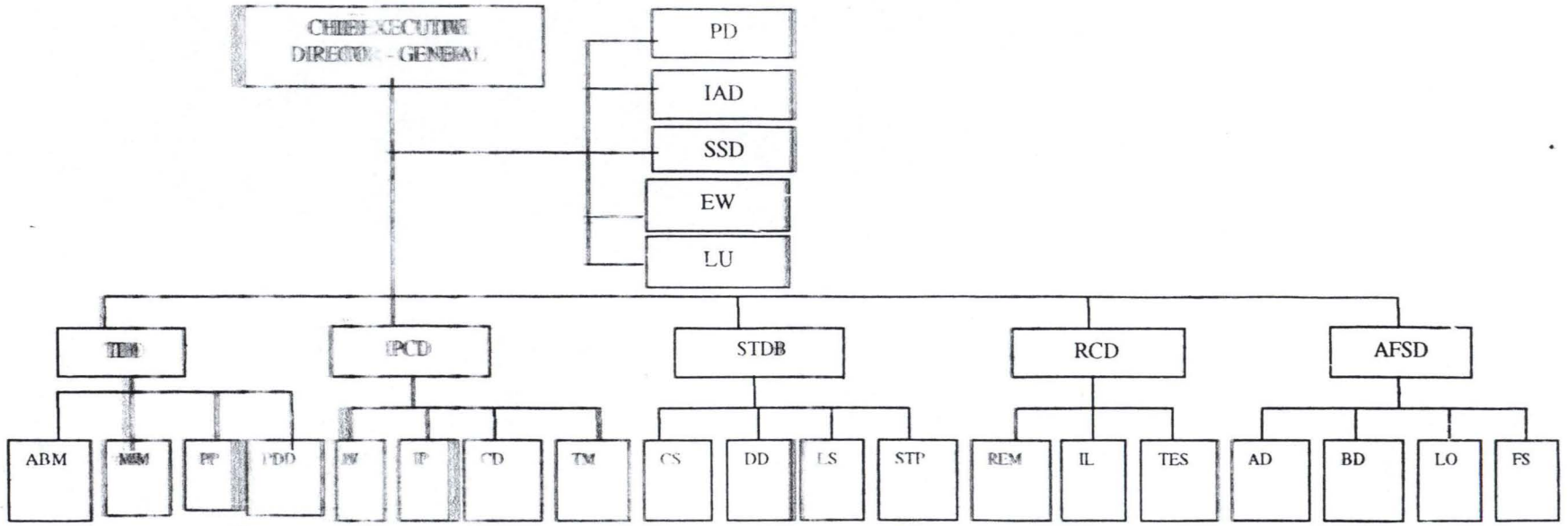
Each of the five departments are sub-divided into divisions and units.
The council also established Liaison offices in states to extend its activities to the grassroots. To date, it has established a total of thirty (30) Liaison Offices throughout the Federation.

The Liaison offices were assigned the responsibility of identifying and exposing the raw materials resources in their respective states to the general public in order to promote resource-based investments.

Currently, the staff strength of the RMRDC is 450 at the headquarters office.
An Organogram showing the Structural arrangements is shown on the next page.
Health, which is basic need of mankind, is a service embarked upon by all government establishments and other organisations. This scheme is aimed at catering for the medical needs of its employees.

Raw Materials Research and Development Council in other to maintain and improve the health status of its employees during and after working hours have employed the services of an in-house clinic.

ORGANIZATIONAL STRUCTURE



KEY:-

DEPARTMENTS

TDD - Technology Development Department
IPCD - Investment Promotion and Consultancy Department
STDB - Science and Technology Data Bank
RCD - Research Coordination Department
AFSD - Administration Finance and Supplies Department

DIVISIONS AND UNITS

PD	-	Planning Division	PDD	-	Plant Design and Development Division	STP	-	Science and Technology Promotion Division
IAD	-	Internal Audit Division	JV	-	Joint Ventures Division	REM	-	Research Evaluation and Monitoring Division
SSD	-	Security Services Division	IP	-	Investment Promotion Division	IL	-	International Liaison Division
EW	-	Estate Works Unit	CD	-	Consultancy Services Division	TES	-	Techno – economic Surveys Division
LU	-	Legal Unit	TM	-	Techno-Marketing Division	AD	-	Administration Division
ABM	-	Agro-based Materials Division	CS	-	Computer Services Division	BD	-	Budget Division
MBM	-	Mineral-based Materials Division	LS	-	Library Services Division	LO	-	Liaison Offices Division
			CD	-	Documentation Division	FS	-	Finance and Supplies Division

A clinic is one of the departments of any large organisation such as Raw Materials Research and Development Council and they depend on its usefulness and purpose in that organisations.

The RMRDC in-house clinic which is not different from the average clinic afford staff and their families the opportunity for personal health care which includes health screening for all new members of staff, regular health inspection for old staff and treatment of minor ailment.

Cases which cannot be treated within the clinic are always referred to recommended and well equipped hospitals after which the staff concerned reports back of the clinic for claims or reimbursement of their money.

1.1 THE IN-HOUSE CLINIC

The Raw Materials Research and Development Council In-house clinic was established in 1996 to cater for the entire employees and their family members. The In-house clinic which is unit under the Administration Division of the Administration Finance and Supply Department of the Council is made up of six sections as stated below with their functions.

i. Card section
ii. Observation section
iii. Consultancy section
iv. Pharmacy section
v. Ward
vi. Administrative section

1. **Card Section**:- The function of this section includes:

- Registration of new patients to the clinic
- Transfer of patients files to doctor on duty
- Refiling of patients cards at the end of the day or beginning of a new day.
- Preparation of a statistical report based on the number of attendance for a particular month

At the end of each day, patient's cards are collected from the consulting room. And the patient's hospital number and possibly the doctor's diagnosis are recorded for the purpose of generating the attendance report.

ii. Observation Section:- This is a section where various observations and test are carried out. These includes temperature, pulse, respiration, blood pressure, weight, height and urinalysis observations.

iii. Consulting Section:- This is another section where Doctors are being consulted.

iv. Pharmacy Section:- The function of this section includes.

- Dispensation of drugs to patients according to Doctor's prescription.
- Stock taking of all drugs in the stores.

v. Ward :- This section contains patient's beds in which admissions and observations of patients is done.

vi. Administrative:- The administrative office serves as the nerve centre of the entire clinic of recent, the Council expanded the facilities of the in-house clinic to enable it cope with move complex medical demands from staff. These facilities includes; Consulting rooms Nurses, bay, treatment room and two-bed ward. The clinic offer 24 hours services.

The clinic which is being handled by A- Z Hospital, an Abuja based medical group is located on the ground floor of building one of the Council's headquarters. Presently, there are 11 staff in the clinic. These include 2 Medical Officers, one Matron, five staff Nurses, one Pharmacist, one Accountant and one Clerk.

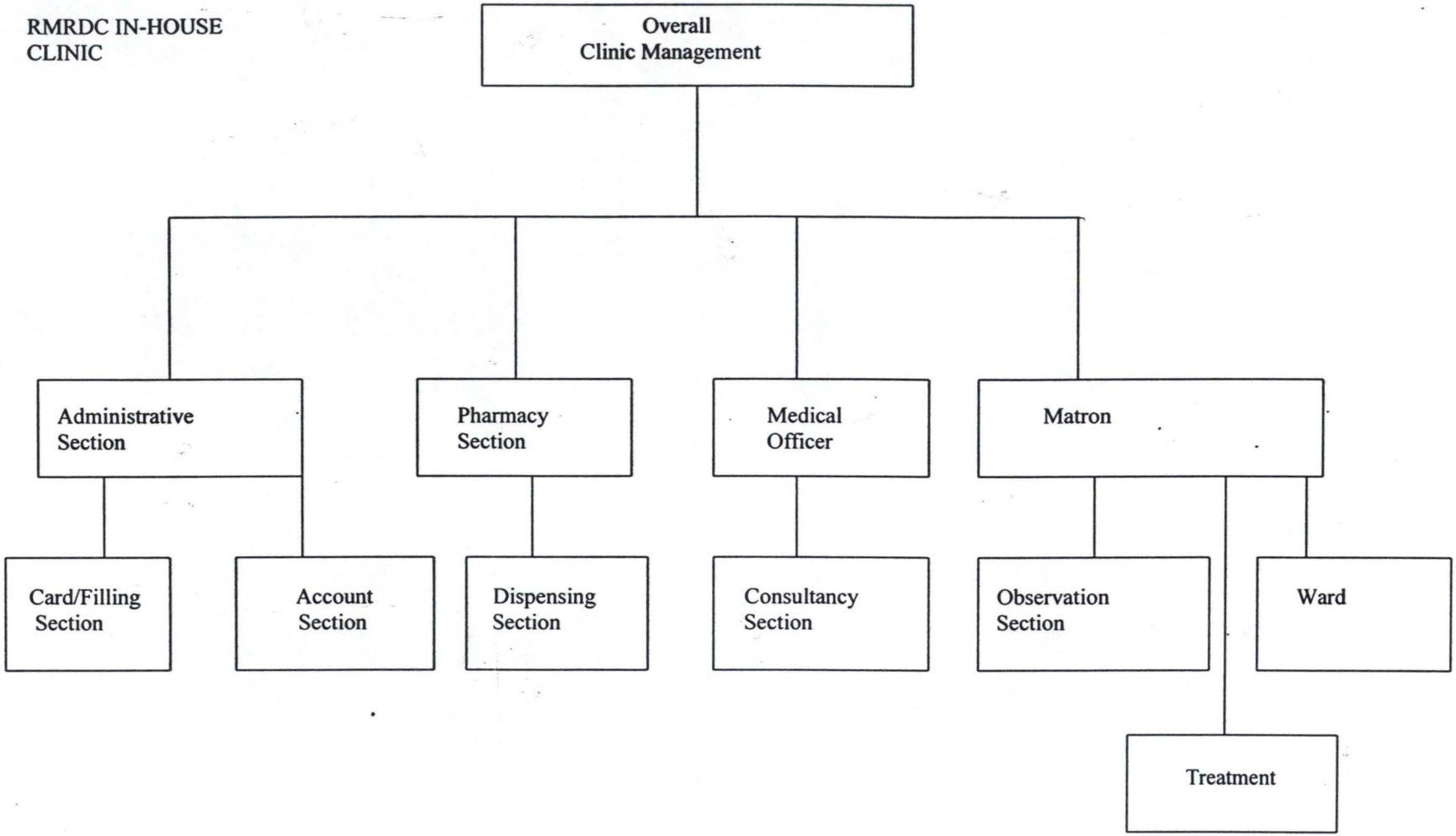
The Organogram of the In-house clinic is as presented in the next page.
It was observed that the observation Unit of the clinic always get the largest turnout of patients everyday. Patients goes to this unit for cases such as checking of Blood pressure, Temperature, Urine test, Blood test, Weight as well as Blood Group. Most common cases in the clinical are fever, cold, headache etc.

Other cases that could not be treated are always referred to other clinics of higher capacity outside.

Growth in the Raw Materials Research and Development Council employees is inevitable and this growth has led to more patients being registered in the clinic more paper files and even more filling cabinets would be purchased and could lead to problems of storage and also retrieval of data.
Some retrieval problems include a misfiled patient's card if that patient has not lost his hospital card number. This will necessitate a search through all the filing cabinets.

A computer provides facilities for locating and retrieving information from storage which would otherwise prove to be too cumbersome and costly, and retrieval of information only takes a short time. Also, a computer can be used to generate up-to-date information on drugs availability, both for the Doctor who want to prescribe a drug and for management of the clinic for decision making.

RMRDC IN-HOUSE CLINIC



With computer, access to sensible information is easily controlled by an intricate password system available only to authorise persons (users).
Generally, the advantages of a computer system over manual procedures can be summarized thus:

- greater processing speed
- better accuracy and improved consistency
- reduced cost
- better security
- faster retrieval of information

In the long run, the capability of computer can be used to process data at lower cost than possible with other methods, and at the same time maintaining accuracy and high performance levels.

1.2 Objectives

The fundamental objectives of the development of a Medical Information System for the Raw Materials Research and Development Council is to:

(i) Examine the practice of medical services in Raw Materials Research and Development Council:
(ii) Identify problems related to medical services and implementation and
(iii) Examine the possibility of improving the efficiency of the medical services through the application of computer.

1.3 Justification/Relevance of the study

The study of the existing system in software development is an important thing which need to be done for the purpose of achieving a desired output. This study is conducted to understand the existing system and to evaluate whether there is need for a new system or not;

to find out the strengths and weaknesses of the existing medical information system with aim of simplifying its activities using a computer and
to propose a new system with a new look which will meet users requirements.

1.4 Scope of the study

It must be emphasized that the RMRDC In-house clinic is not an open system where people readily have access to information rather, it operates like a closed system whereby access to the various information are restricted to identify staff of the section. Due to this, the project did not have access to all the information needed. Moreover, the project cannot look at the entire health sector. Hence, the modules needed in the project will be very few. Even then within the modules, there will be limitation to what extent it could be accessed. In view of this limitation, very little could be achieved in studying the entire system. It is hoped that future research work on this project would improve on the areas, which this study did not cover as revealed here in as well as in the chapters ahead.

1.5 Methodology

In the course of carrying out this work, there was need to understudy the information system of the existing system so as to know how they work. Basically, three methods were used in the study of the existing manual system. These are interview, observation and the review of various records in the clinic.

CHAPTER TWO

2.0 Literature Review

Doctors and Hospitals manage patients data in order to maintain patients medical records, history as well as for billing. Schools keep track of students records, which includes student's personal data, the course they registered and the grades scored. Libraries are also not left out they keep information on how many books are in the library, how many loaned out and to whom they are loaned. Companies keep information about clients as well as lawyers. All these data were being stored on paper, in desk drawers and filling cabinets. But as this went on. Such organisations realised that storage space and the easy retrieval of information became a problem. A need then arise for a better medium to store and retrieve data quickly, reliably and economically. The computer as well as the computerized filing system offers a convenient approach to information retrieval and storage.

There is a growing awareness and realization to attest to this fact and many more organisations are realizing that timely and accurate information is an asset, and also that an effective information system is a means of providing the required information. Such a system can be provided by the capabilities of the computer.
In practice, the computerization (automation) of a data processing system entails more than just the automation of parts of the existing system by means of a computer. It also involves analysis of an organisations current mode of operation with the aim of improving operations and defining requirements for the proposed new system.

The introduction of computer in organisations and the ever increasing sophistication of data processing system have highlighted the importance of data

as one of the most valuable organisational resources. It is from the manipulation and interpretation of data that information is generated and, in turn, used in decision making process.

The realization of the importance of data has meant that there is need for proper management and efficient organisation of the data.
Data are the facts that relate to a certain event, task or person.

The term data processing means the manipulation of data to generate information. Information does not exist in a readily useable form, it is produced as a result of processing of data. Therefore, the subject of data processing is concerned with the translation or transformation of data into information.
Data and processing are two of three components that make-up modern data processing, the machine that brings them together is the third part-the wonder invention of the twentieth century, the computer.

The definitions of the term computer has changed substantially over the past four decades. A plethora of definitions have therefore arisen from various terms. A more comprehensive definition which we shall adopt for the purpose of this project is as follows; "A computer is a device which manipulates data according to a series of instructions stored in its memory. By changing the instructions, the computer can be made to do a completely different task. The manipulation operation is performed at the rate of thousand per second, enabling complex tasks to be finished in a remarkably short time" John Prenis, The Computer dictionary (Philadelphia Press 1983).

Since the late 1960s, users have been investigating a technique that provides facilities for successful organisations and assessing of data. The technique is a database which is the common denominator of any system. It is essentially nothing more than a computerized record-keeping system.

It enables users to create and maintain a database and to extract information therefrom. It is a collection of logically related data that supports shared access by multiple users and is protected and manage to retain its values overtime.

To use database software, it is important to first identify the format of the data, then design a display format that will permit interactive entry and revision of the database. Once the database is created, its records (related data about a particular event or thing) can be deleted or utilized, and other records can be added. Notice that database is one word when it refers to the software that manages the database, as may be necessary. Database is two words when the term refers to the highest level of the hierarchy of data organisations (bit, character, data element or field, record, file and database).

Virtually, all database software packages have capabilities to:

- create and maintain (add, delete, and revise records) a database,
- extract and list all records or only those records that meet certain conditions.
- Make an inquiry (for example, "what is the total amount owned by all customers?)
- Sort records in ascending or descending order by primary, secondary, and tertiary fields, and
- Generate formatted reports with sub-totals and totals.

One of the most important tools for implementing the database orientation is a database management system (DBMS) which acts as an interface between application programs and the data that they process.

The DBMS in effect, minimizes data redundancy through advanced data structure, or the manner in which the data elements and records are related to one another. The programming task is simplified because data are more readily available. In a database, data are independent of the applications programmes, that is, data elements can be added, changed, and deleted from the data base,

and this does not affect existing programmes. In addition, the processing constraints of traditional files are overcomed by DBMS.

Another major benefit of the data base environment is greater access to information. Most organisations have accumulated a wealth of data, but translating these data into meaningful information has, at times, proved difficult, especially in a traditional file environment. The structure of an integrated database provides enormous flexibility in the types of reports that can be generated and the types of on-line inquiries that can be made.
Information serves a wide range of purposes. It provides a foundation for both the operation and management of any organisation. It therefore has to be of direct relevance to the solution of organisational problems.

An information system can be defined as a whole interrelated changing mass of information.

2.1 Basic Concepts of Management Information System

In general, Management Information System (MIS) is designed to;

- collect data
- record and store data
- provide for retrieval of data
- transmit and present information

There are four generations of management information system and these are:

1) The manual file system;
2) The computerized file system
3) The centralized database system
4) Distributed database system.

1) The Manual file system: Most of the information flowing through offices today are still stored on paper. The vast amount of information in typical office environment is very difficult to organise and locate. Workers frequently search numerous cabinets in order to locate needed information. Although indexing the process of locating information, often the information is not adequately indexed. It is estimated that workers opened 15-30 percent of their time, (depending on the required task) trying to locate paper document.

2) The Computerized file system: The function of the file system can be grouped into that of file creation and access control. This system was developed as a result of the shortcoming of manual file system and in view of the advent of computer, which has the facility to store data in form of files. The sub-functions of the file creation include file definition and cataloging. Also under access control there is file security and concurrent access control.

File Creation

The process of file creation involves the specification of file's name attributes and the recording of same by the system so that when the file is referred to afterwards the system can fish out these characteristics and assist in retrieving information from the file. The two types of file creation are file definition and file cataloguing.

Defining: A file requires at least giving the file a name in order that the file can be identified among many other files by the system for use by any user or programmer. Cataloguing is the process by which information about files is entered into the catalogue. Through cataloguing, the system locates a file that has been defined. In fact, a file can only be said to exist or have been created if it has been catalogued because it is only after cataloguing event that the file is completely at the custody of the system. The place where definitions (name and attributes) of a file as supplied by the user or as prescribed by the system are

stored is called a catalogue or main directory. Actually, catalogue can be considered as another file on its own.

File access control

When a file is created, then it becomes available for reading and writing. If the access to the file is not controlled, then anybody and any program can read and be written in the file. It leads to confusion, as no file would be safe. It is then possible for some one other than the owner of the file to erase everything in the file or steal information from the file. As a result of the foregoing, it is necessary to incorporate a process by which only certain authorized users are allowed to access a file for reading and/or writing.

File security control

File security is the protection of file from illegal use while the integrity is maintenance of contents and/or protection against accidental destruction. The two concepts are related because the basic problem here is that of access to the file. Assess to the file can be granted through the provision of password general permission and specific permission.

Types of files

Master files

These are files of fairly permanent nature e.g. customer ledger, payroll inventory etc. A feature to note is the regular updating of these files to show a current position.

Movement files

Also called transaction file. This is made up of the various transactions created from the source documents.

Reference

A file with a reasonable amount of permanency. Examples of data used for reference include price lists, table of names, addresses etc.

Program file

A file in which the data held in the file is some item of software such as simple program or collection of program part.

Data file: The types of file described so far as opposed to program file.

Report files

These hold collectively content of individual output reports or documents produced by the system. They can be printed automatically using print report option. Several reports are produced by the system as earlier stated.

Archival Files

These are back up files of different types that store past transactions.

Input/output files: are either formed from source document but not sufficiently organized for use as transaction files (i.e. not sorted) or files holding processed data awaiting output.

Text file: A file containing the words of a document. Each record usually correspondents to a line of printed words. A high level language may be stored as text file.

Work file: A file created during an intermediate stage in processing.

Scratch file: A file no longer needed and which may be overwritten.

Storage devices: The storage devices include magnetic tape and magnetic disk (diskettes).

Centralized database system

The centralized database system evolved as a result of limitation of the computer file system. The database technology is one of the most rapidly growing areas of information science today.

A database is single organized collection of structured data stored with a minimum of duplication of data items so as to provide a consistent and controlled pool of data.

This data is common to all users of the system but is independent of programs which use the data. The independence of the database and programs using of means that one can be changed without changing the other.

The users of a data base may find it convenient to imagine that they are using an integrated file system. Database are set up in order to meet the information needs of a major part of organization.

Distributed database system

A database requires to be stored on large capacity direct-access devices. The usual medium is the magnetic disk. For security purposes a copy of the data may be held on magnetic tape or disk.

Database may be classified according to the approaches taken to database organization. These classes are relational, network, hierarchical and file inversions. Our emphasis on network database which uses the concept of sets to represent the data. Network databases are based upon linked groups of data

The links are used to express relationship between different data groups.
The database is maintained by single input. This means that there is no duplication of inputs. As the database expands, user requirement changes the links or relation in the database can be changed. New relationship established. The database management system provides users with the services needed and handles the technicalities of maintaining and using the data. Example of the Dbase Management System is the Information System.

2.2 Study of existing system

Requirement determination involves studying the current system to find out how it works and where improvements should be made. Systems studies result in an evaluation of how current methods are working and whether adjustments are necessary or possible. This studies consider both manual and computer method.

In studying and documentation of the existing system which is manual, three methods were used to gather facts about the characteristics and function of the current manual system.

(i) Interview

Respondents were employers/employees who are the current users of the existing system, as well as potential users of the proposed system. The following people were interviewed. The Matron, Doctors, Nurses, Clerk, Accountant as well as the patients themselves.

Some of the questions asked include

- what triggers activity in the clinic?
- What basic processes are involved?
- What data is used during processes?
- What data is produced during processes?
- What data is being transferred between sections?
- What steps are performed in executing these processes?
- Where and how are they performed?
- How much time does it required?
- How often is it carried out or repeated?
- Who uses the resulting information?
- What are the limits imposed by time and volume of work?
- What performance controls are used?

These questions were aimed at acquiring knowledge about the present and the problems associated with it. It serves to give a background to the approach on the proposed system.

ii. Observations

Observation method is yet another method of fact finding employed in which a reasonable amount of time was spent at the clinic to observe how activities are being carried out. It was observed that in cases where a patient had lost his/her clinic number or his/her card misfiled, the amount of time for retrieval was long. Sometimes taking up to 30 minutes and during peak periods when attendance is much, it took even longer. Patients files were not always retrieved from the consultancy rooms. Doctors often make prescriptions without prior knowledge of a particular drugs availability.

This method of gathering information was used to buttress the answers obtained from interview.

iii. Record Review

Records refer to the written policy manuals, regulations and standard maintain as a guide for the management of the clinic and patients. They usually show the requirements and constraints of the system. Such record includes ledger, registered patients notebook, prescription forms, drug notebook. Both blank and used forms were reviewed and inspected to assess whether there was any variance between actual and prescribed use of document.

2.4 2.3 Problem Identification

A problem can be defined as any hindrance to a particular act or process in life. This problem can either have a solution or not. Hence going by the studies of the existing system, there are problems which hinder the accuracy and consistency of the existing system, which therefore call for the automation of the Raw Materials Research and Development Council In-house Clinic.

The first problem identified during the course of observation was the case whereby if a patient had lost his/her clinic number or his/her card misfiled, the amount of time for retrieval is usually very long. This delay work for the day for that particular staff. On the part of the doctors, they often prescribe drugs which are out of stock for patients in which if they go for drugs are usually told drug is out of stock.

On frequent searching of document, which are always on paper files, some papers fling out of the files which may contain vital information about patients. Alteration of accounting books is another problem identified.

CHAPTER THREE

3.0 SYSTEM ANALYSIS

The analysis phase in any system development project is an essential requirement. It consists of both preliminary investigation and detailed investigations. These investigations were carried out to understand the basic data processing, data coming in and going out of various sectors, what data are redundant and also how and where controls are built into the current system, what security measures have been adopted and so on.

Analysis is essential for refining and implementing system without which a system does not properly defined user requirements will be built. System analysis attempts to advise the best set of rules so that maximum output can be obtained with optimizing the relationship between inputs and outputs of a system

3.1 Analysis of Investigation

After thorough analysis, the following requirements were obtained:

(a) An efficient, accurate and reliable record keeping system. Such a system would adopt a computerized approach.
(b) Availability of current, up-to-date information that relates to planning and control.
(c) Error handling: automatic detection of errors and ability to effect corrections accordingly.
(d) Security: prevention of unauthorized access to the system.

Most information contained in the clinic is of vital importance and consists of life-saving issues, which are of paramount importance especially in emergency cases. As such, there must always be available information, which can be retrieved quickly. Also, a computerized system is required to generate reports which will aid the management of the clinic in decision making.

3.2 Main Objectives of Analysis

System analysis is a pre-requisite of a system design, hence it is first done in other to know more of the existing system and to offer solutions to problems of the existing system. Not only that system analysts are always called upon to help handle the planned expansion of a system. Analysts access carefully as possible what the future needs of the system will be and what changes should be considered to meet these needs, they may recommend alternatives for improving the situation. Analysis specifies what the system should do while design states how to accomplish the objectives.

3.3 Information Accessibility

Is the information needed to perform a task or achieve an objective available? Is it reliable? Can details be retrieved when needed? And will they be presented in a useful form? This issues underlines the analysis of information accessibility.

A representatives design strategy accomplish the following:

- Eliminate the need for the information: Some information can be retrieved without user intervention. In other cases, development of default options, executed unless unusual considerations occur will eliminate information requirement/procedures so that decision and process rules will be built in

order to eliminate the need for information retrieval in all but exceptional cases.

- Easy access to information: System will be designed to streamline requester commands and rely on default alternatives that fit the most frequently recurring situations.
- Eliminate the need for processing: Frequently needed details can be restored in form that does not require manipulations or processing. Availability and accessibility will both improve.
- Change method of presentations: Alternative formation including graphics, colour enhancement and even animation can be selected. Information and access to it will be part of the solutions and not a problem.

CHAPTER FOUR

4.0 Systems Design

System design is concerned with the logical construction of a model that meets requirements identified during the analysis stage.

During the design phase, designers must decide how to produce an effective and efficient system based on consideration of all feasible alternatives and then settle on detailed specifications for problem solution.

The outputs are first identified then the inputs required to achieve the desired output are formulated and designed and finally the file organisation and structures. A Top-down menu driven system design methodology has been adopted in the design of the proposed system.

Output Design

The term "output" denotes the outcome from a computer system, which a user can act upon. It is the most important feature of an information system and it dictates the input requirements and contents of files. The intended types of output are.

(i) Screen display
(ii) Printed reports

Outline enquiries can be viewed on the screen or optionally printed by simultaneously pressing "print screen" key on the keyboard. The printed reports are to be generated into report files which can then be printed out as the need arises.

INPUT DESIGN

Input design specifies the manner in which data enters a system for processing. It ensures the reliability of the system to produce the already defined outputs.
The next step is to identify the sources of each input data. Evaluation and selection of the input method is largely guided by whether the planned system will be batched or outlined. The layout places important information in location where it is most noticeable and instructs the user on how inputs are entered with the proper messages guiding the movement of the cursor.

INPUT SCREEN

See Annex 1

4.1 AIMS OF SYSTEM DESIGN

The aims of the system design of the information system are to:

(i) Specifying logical design element: Detailed design specifications that describe the features of an information system: input, output, files, databases and procedures.

(ii) Support clinic activities: Result of using the system help clinic performance, design fits the way the clinic carries out its activities. Technology is secondary to the results produced using the system.

(iii) Meets user requirements. Meet user needs stated in terms of

- performing appropriate procedures correctly
- Presents information and instructions in an acceptable and effective fashion.
- Produces accurate results
- Provides an acceptable interface and method of interaction
- Is perceived by users as a reliable system

(iv) Easy to use: favorable human engineering ergonomic design that is physically comfortable and contributes to user effectiveness and efficiency.

(v) Provides software specification: specific components and functions with adequate detail to construct application software.

(vi) Conform to design standards: design and specification in accordance with prescribed rules and practice of the clinic.

4.2 TOOLS REQUIRED FOR SYSTEM DESIGN

Design tools assist in formulating the features of a system that will meet the requirements outlined during the analysis activities.

- Specification tools: This assist in stating the features that should be included in an application such as input, output, processing and control specifications.

  Specification tools may also include tools for creating Data specification.
- Layout tools: These are tools used to describe the position of data, messages and headings on display screens, report and other input and output media.

4.3 COST IMPLICATIONS OF THE NEW SYSTEM

Based on the system requirements of the new system, it will cost the in-house clinic about ₦1,000,000:00 (One million naira only) to be properly established. This amount will include purchasing of hardware, development of software and training of clinic staff such as Doctors, Nurses and other proposed users of the new system.

4.4 JUSTIFICATION OF THE NEW SYSTEM

The new Medical Information System will afford users the opportunity to understand the new system. To solve problems relating to filing, retrieval of vital information about patients and the new system users.

4.5 SYSTEM REQUIREMENT

For the Raw Materials Research and Development Council In-house clinic automation to achieve its objectives without any problem, the following system requirement is necessary.

(a) Hardware requirement

1. Pentium P.130MHZ

- 1.2 GB Hard disk drive
  - 3.5" floppy disk drive
  - 1.4" SVGA monitor
  - Multi media kit (with sound blaster)
  - 8 MB RAM (expandable to 32 MB)

2. Epson LQ1170 printer
3. HP 5L Laser Jet printer (optional)
4. Hand held scanner
5. Uninterrupted power supply (UPS)

(b) System studies

(c) Software Development

- Medical Record/Information system(MRIS)

(d) Environmental Requirements

A computer environment has its own requirement needed in which to perform efficiently and effectively with less or no problem. Such requirements include:

- Air conditioned environment
- Dust free environment
- Smoke free environment
- Rodent free environment

Also, entrance into the computer unit will be restricted.

4.6 NORMALISED DATABASE FILE DESIGN

This is concerned with how the data is to be structured and physically stored on backing storage devices.

Factors that influence the choice of appropriate storage media include: file capacity, file activity, response time and future requirements.

DATA BASE FILE

The data base files created for the system will include

(i) Staff . dbf

(ii) Attend . dbf

(iii) Drug code . dbf--------Static table

(iv) Drug Invent . dbf

(v) Med list . dbf

(vi) Password . dbf

(vii) D-out

(viii) D-reg Note: Only the Drug code.dbf table is static all other tables are user maintenance i.e new user(s) can be added, modified or removed from the list.

(i) Staff . dbf: This file is indexed on Pat No and it consists of all the staff details pertaining to his/her health.

(ii) Attend . dbf: This file consists of all data pertaining to a patient's attendance.

(iii) Drug code: dbf. This consists of all drug codes created and used in the pharmacy section.

(iv) Drug Invent. dbf: This consists of several fields, which store the transaction details for a particular time period. These transactions are made in the quantity of drugs received and supplied.

(v) Med list. dbf: This is a very important file and it contains details of patients health characteristics.

(vi) Password. dbf: Without this file, the system cannot be accessed and put to use. It contains password codes and the various levels of authorization.

(vii) D-out: This contains details of drugs issued

(viii) D-reg: This contains details of drugs received

4.7 STRUCTURE FOR DATA BASE FILE

Staff.dbf

FIELD	FIELD NAME	TYPE	WIDTH. DEC	INDEX NO	DECRP.
1.	PATNO	Xter	10	Y	File Number
2.	LNAME	Xter	15	N	File name
3.	FNAME	Xter	15	N	File name
4.	MNAME	Xter	15	N	File name
5.	SEX	Xter	6	N	Sex
6.	ST. ORIGIN	Xter	15	N	State origin
7.	DEPT	Xter	20	N	Department

8.	RELIGION	Xter	20		N	Religion
9.	ADD. KIN	Xter	60	N	Next of Kin address	
10.	SP ADD	Xter	40	N	Spouse address	
11.	SPNAME 1	Xter	30	N	"	
12.	SPNAME 2	Xter	30	N	"	
13.	SPNAME 3	Xter	30	N	"	
14.	SPNAME 4	Xter	30	N	"	
15.	CLD I	Xter	30	N	Children	
16.	CLD 2	Xter	30	N	"	
17.	CLD 3	Xter	30	N	"	
18.	CLD 4	Xter	30	N	"	
19.	CLD 5	Xter	30	N	"	
20.	FMHLTH	Xter	4	N	Family Health	
	Total		490			

Attend. Dbf	**FIELD NAME**	**TYPE**	**WIDTH**	**DEC.NO**	**INDEX**	**DESCRIP**
1.	DAET	Date	8			N
2.	PATNO	Xter	10			Y
3.	Diagnosis	Xter	240			N
4.	Pres-drug	Xter	200			N
	Total		458			

Drug Invent.dbf

1.	D_CODE	Xter	5		N
2.	R_DATE	Date	8		N
3.	R_QTY	Numeric	8	2	N
4.	I_DATE	Date	8		N
5.	I_QTY	Numeric	8	2	N

Total 37

Drug Code.dbf

1.	D_CODE	Xter	5		N
2.	DRUG_NAME	Xter	50		N
3.	DRUG_TLE	Xter	12		N
	Total		67		

Medlist.dbf

1.	PATNO	Xter	10		Y
2.	BLOOD_GRP	Xter	2		N
3.	GENOTYPE	Xter	2		N
4.	BLOOD_PRESS	Num	3		N
5.	VISACUITY	Num	4	2	N
6.	HEIGHT	Num	4	2	N
7.	WEIGHT	Num	5	2	N
8.	TUBERCULOSIS	Xter	3		N
9.	ASTHMA	Xter	3		N
10.	MIGRAINE	Xter	3		N
11.	BRONCHITIS	Xter	3		N
12.	HB PRESSURE	Xter	3		N
13.	EPILEPSY	Xter	3		N
14.	FAINTING	Xter	3		N
15.	DRGSNSITUITY	Xter	3		N
16.	HAY FEVER	Xter	3		N
17.	DYSMENOREA	Xter	3		N
18.	SCHISTO	Xter	3		N
19.	STD	Xter	3		N
20.	DGSENS 1	Xter	30		N
21.	DGSENS 2	Xter	30		N
	Total		123		

Password.Dbf

1.	USNAME	Xter	30	N
2.	USIDENT	Xter	10	N
3.	PASSWORD	Xter	10	N
4.	DATENT	Xter	8	N
5.	SECTION	Xter	8	N
6.	TTIME	Xter	8	N
	Total		74	

4.8 MODULAR PROGRAM STRUCTURE OF THE PROPOSED SYSTEM

Base on the analysis carried out, the proposed system would consist of the following main modules:

a. Record update module
b. System administration module
c. Enquiry/Report module
d. Credit module
e. Exit module
f. Drug Inventory module

Record Updated Module

This module would take care of all forms of data to be entered such as adding a new record, modifying an existing record and deleting unwanted records. The following categories of record update are identified below:

1) Staff Registration List

This is a list of all registered staff patients. It contains the clinic number, names, rank and departments.

Attendance List

This report records the number of attendance for a particular time period. It contain the date(s) of attendance, patient's clinic number and list of prescribed drugs and charges.

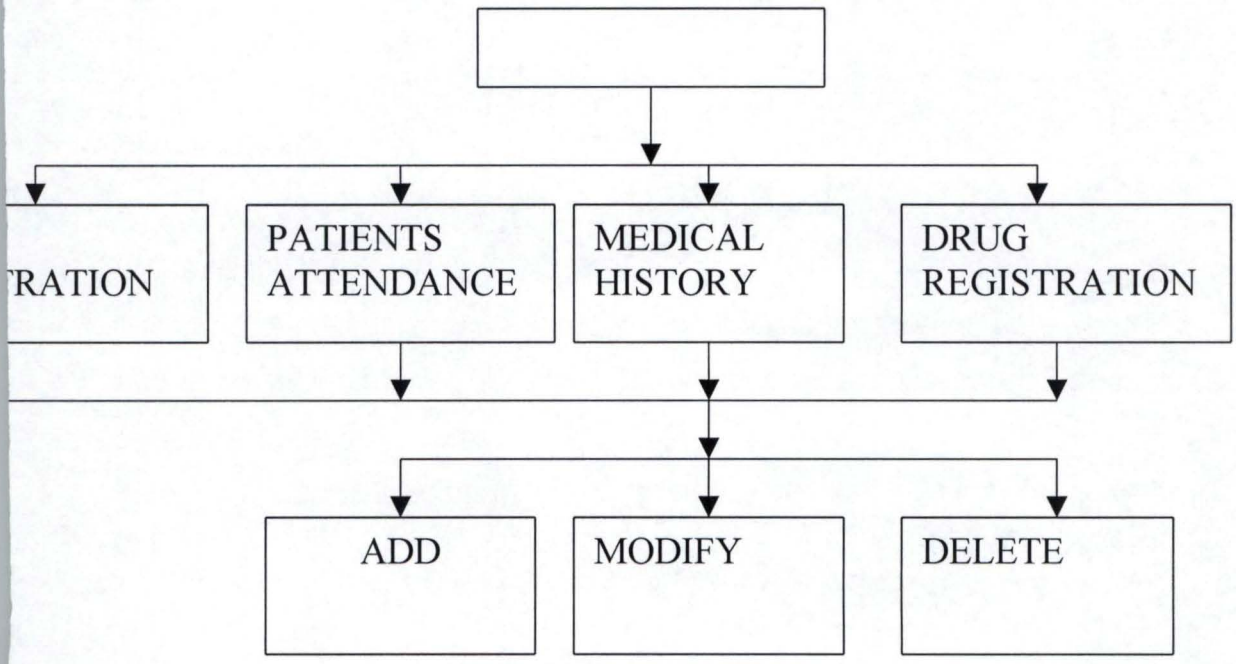
Medical History

This list consists of vital information such as patient's blood group, genotype, allergies et cetera.

Drug Inventory

It record the consumption of drugs in the store for a particular time period. It also contains the names of drugs purchased, code number, drug balnce, date of issuing of drugs.

Below is the structured chart of this module.



b System Administration Module

This module is very crucial to this system in that it has to do with the initialization of table.

There basically two tables:

1 Static table maintenance and

2 Users maintenance- this is where new user is added, or an existing user is modified i.e removed from the users list. These user are usually three:

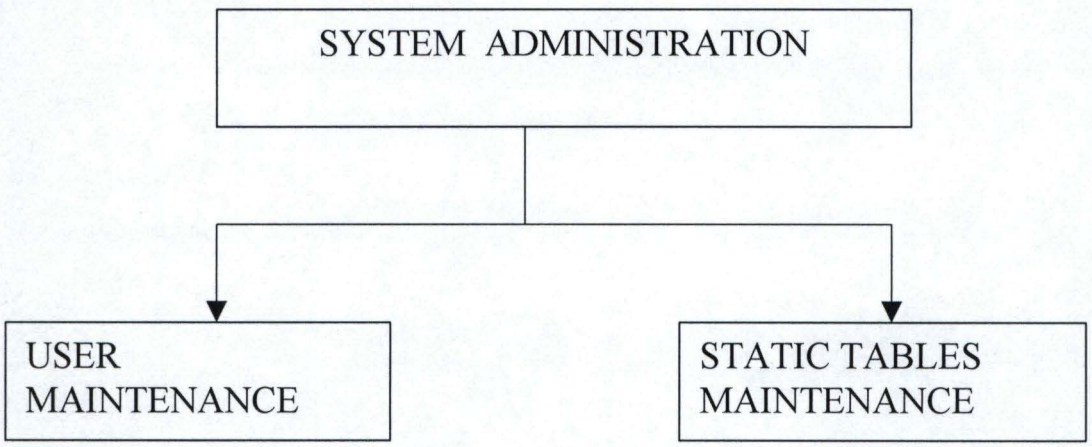
1 System Administration;

2 Data entry staff; and

3 Visitors

The above modules also serve as access control list to the system

Below is the structured chart of the module:



C. Enquiry/Report Module

This module provides the following facilities:

(1) Keep abreast all forms of report to be generated by this system because it contains already made information about the system.

(2) Allow the user(s) of the system to find out about a particular information from the database. These include enquiries on;

(1) Staff records (2) Patient attendance (3) Medical history

(4) Drug registration

D. Credit Module

This tells the user(s) more about the system

E. Exit Module

This module takes the user(s) out of the in house clinic information system.

F. Drug Inventory Module

This module takes care of the monthly drug inventory and provides the report on inventory as well as the back-up of the file involved.

CHAPTER FIVE

5.0 System Implementation

This is a process of coding, testing and documenting programs in the system. It is a stage at which the developed program is applied to the actual problem it was developed for. This requires the development of quality assurance procedures including data security, backing and recovery and system contents.

In view of the limitation of the work, the project work only had access to six modules. This various modules were used to explain how data were acquired by the in-house clinic, forward to the automated system and processing of the data and the various reports generated from the processed data as information. The leader of the project team will liaise with the relevant officers in the clinic as well as the management of both Raw Materials Research and Development Council and A-Z Hospital for testing of the program, training of users and operating personnel on the use of the new system.

5.1 Written program

See Annex ii

5.2 System testing

A system must be thoroughly tested before it is placed into actual operations. The process of testing involves analysts, programmers, management and individual users and generally consists of three phases.
In phase one, the lead programmer on the project must test each of the program segments separately and in combinations. Program test data and verified output

should be included in the final program documentation. When all program testing and documentation has been completed, the lead programmer then forwards a complete set of fully tested and documented programs to the project analyst.

The phase two of the system testing entails checking program flowcharts and decision tables against original specifications.
The system analyst will thoroughly examine and review the logic of each of the subsystem and the overall system, he will gather together system test data or actual data and create special test files.

In the third and final phase, the entire system is tested utilizing actual machines and employees. The system is tested down to the most minute details. Forms and schedules are checked, operating instructions verified, and the movement of data and results is tested. Here individual employees may be asked to check the accuracy of the systems output manually.

For the system to be put into actual use, it requires that all files be created and then tested before change over takes place.
In other words, the essence of program testing also referred to as program validation is to determine whether any error still remains in the program.

5.3 Changeover

Changeover from the old system to new may take place when the system has been proved to the satisfaction of the system analyst and other implementation activities have been completed; users are satisfied with the results of the system tests, staff training and reference manuals.
Change over may be achieved in a number of ways. The most common methods are

- Direct running;
- Parallel running;
- Pilot running, and
- Staged changeover

In this project, parallel running changeover would be adopted. This means processing current data (both old and new systems) to cross-check the results. It main attraction is that the old system is kept alive and operational until the new system has been proved satisfactory for at least one system cycle using live data in the real operational environment. (place, people, equipment and time). It allows the results of the new system to be compared with the old system before acceptance by the user, thereby promoting users confidence.
What might be the major disadvantage is the cost, and this has been taken care of in the cost implication of the new system as in chapter four of this write-up.

5.4 System Maintenance

This includes whatever changes and enhancements that needed to be made once the system is implemented and in full operation. It is examined to see if it has met the objectives set out in the original specification.

Unforeseen problem such as virus may need to be overcome and that may involve returning to earlier stages in the cycle to take corrective action. From time to time, the requirements of the unit will change and the system will have to be examined to see if it can cope with the changes. At some stage the system life cycle will be repeated again and yet again.

5.5 RECOMMENDATION

The benefits of automation of the Raw Materials In-house Clinic outweigh the disadvantages. It is shown that the Council has basic facilities needed to take the initial steps towards the application of computer in the management of the in-house clinic. It is therefore recommended that the council should embark on the project.

5.6 CONCLUSION

Having gone through the entire system, the way and manner of accomplishing the tasks in the new system, recommendations were made. There is no doubt that if the in-house clinic database is adopted, it would improve its potentials and capabilities in terms of data storage, retrieval and access patients information by the medical personnel but would definitely justify the essence of the automation of the clinic.

REFERENCES

(1) Ayo D.B., Application of Computer to Planning and Management of Projects in RMRDC, ASCON Dec. 1994. (Unpublished.)

(2) Badmus K, System Analysis and Design Fut, Minna 1998 (Unpublished)

(3) Bakare O.A. Data Storage and Information retrieval system in a Government parastatal: A case study of the Raw Materials Research and Development Council, 1995 August, (Unpublished.)

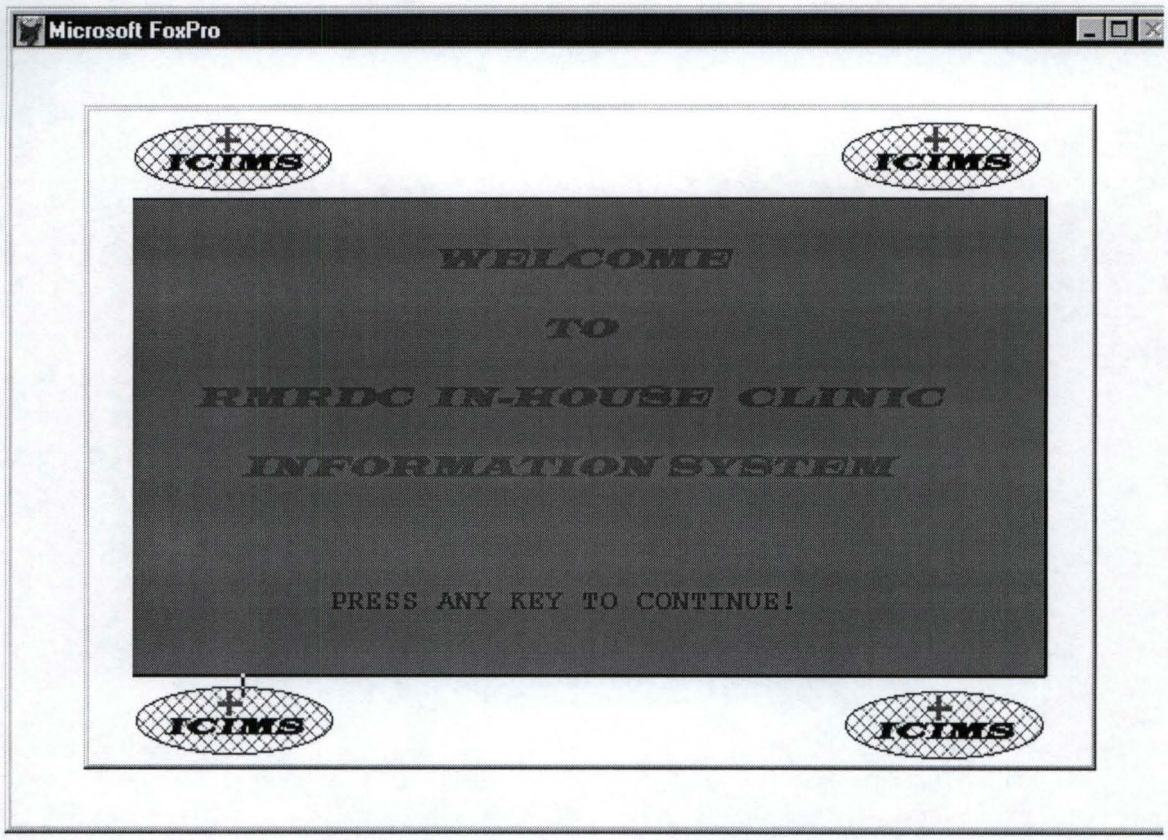
(4) Ife Journal of Technology, Vol. 4. No 1 May, 1994

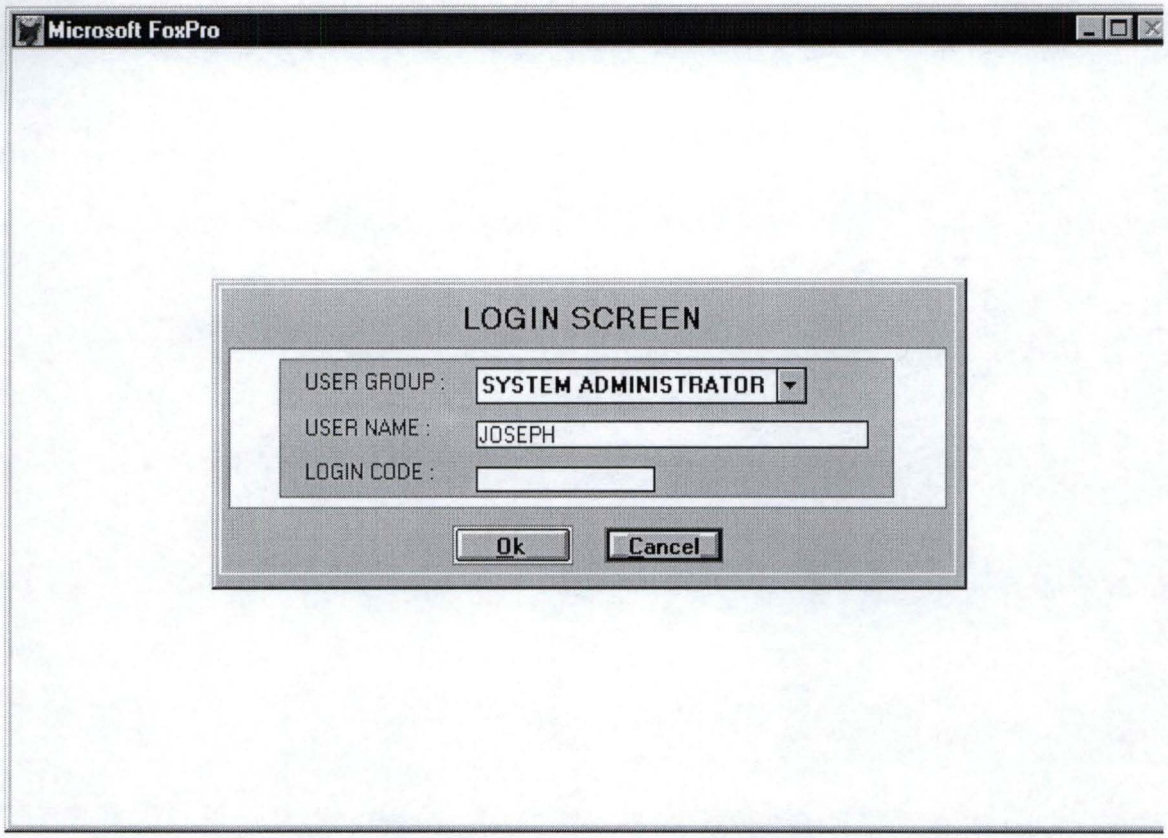
(5) The Computer Dictionary, Philadelphia Press, 1983.

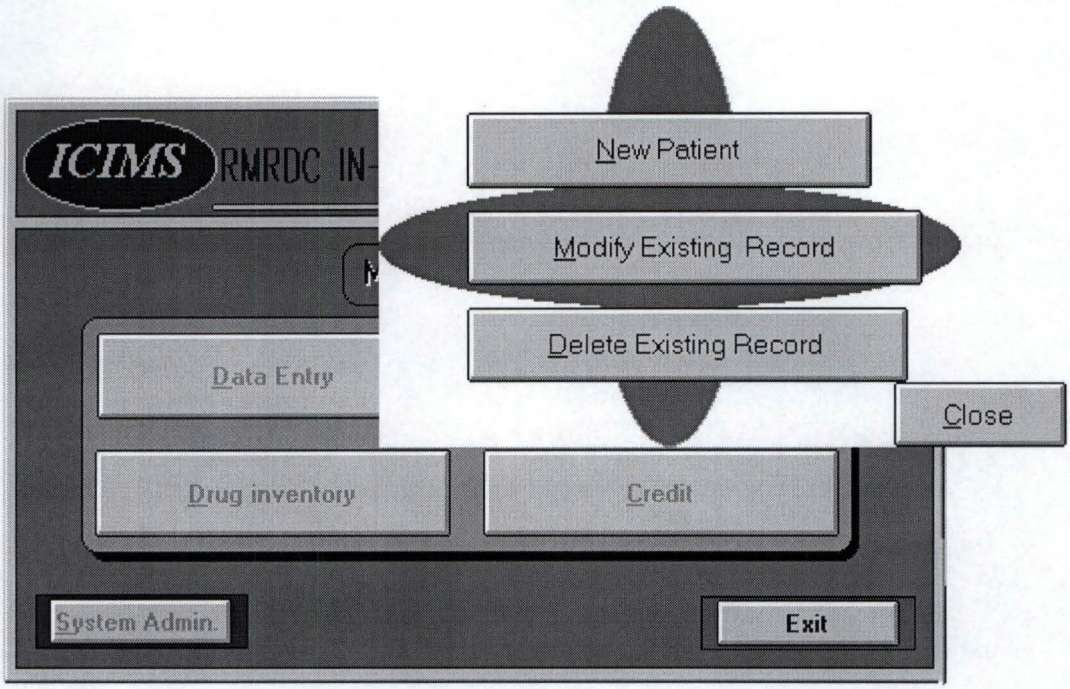
(6) Kola Raimi, Database Management System Programming with Dbase IV, Federal University of Technology, Minna, 1998 (Unpublished.)

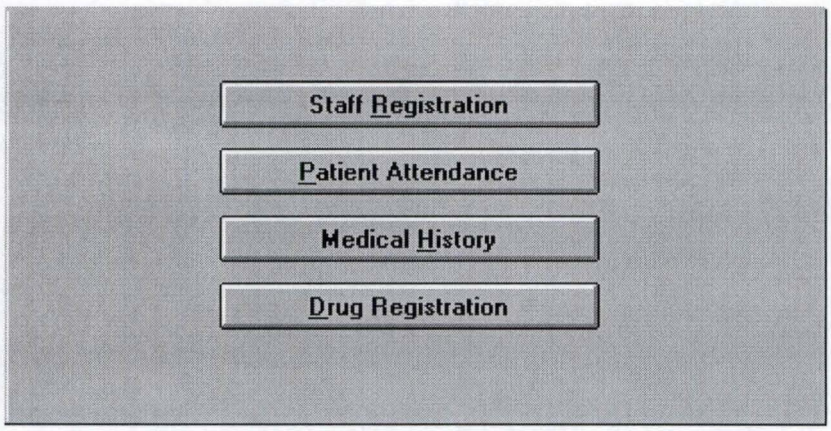
(7) Raw Materials Research and Development Council in Brief, 1995.

(8) Raw Materials Research and Development Council Annual Report, 1996 and 1997.


Microsoft FoxPro
ICIMS
ICIMS
WELCOME
TO
RMRDC IN-HOUSE CLINIC
INFORMATION SYSTEM
PRESS ANY KEY TO CONTINUE!
ICIMS
ICIMS


Microsoft FoxPro
LOGIN SCREEN
USER GROUP :
SYSTEM ADMINISTRATOR
USER NAME :
JOSEPH
LOGIN CODE :
Ok
Cancel





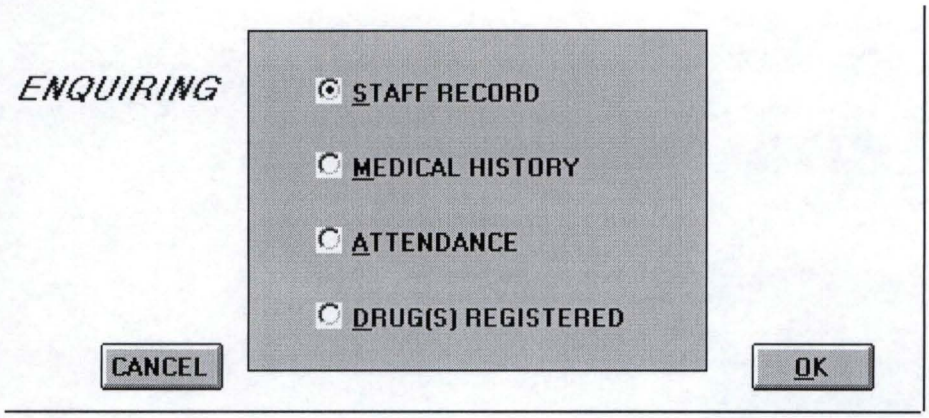
MAIN MENU

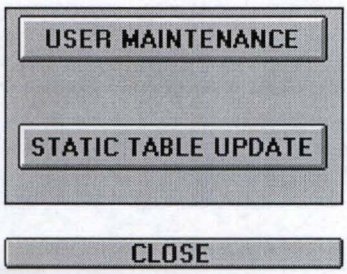
Month 6: allt(thismnt)+', '+allt(str(th Reset Month

FILE NUMBER

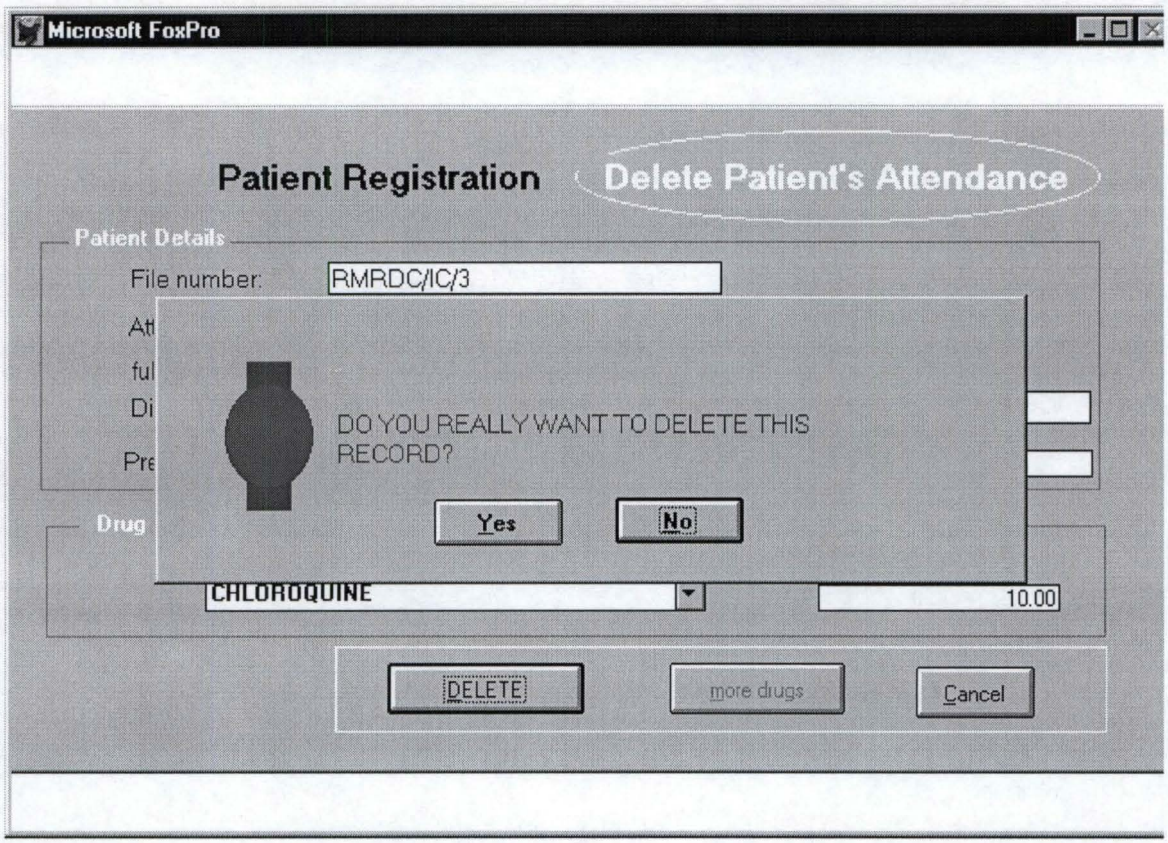
LAST NAME

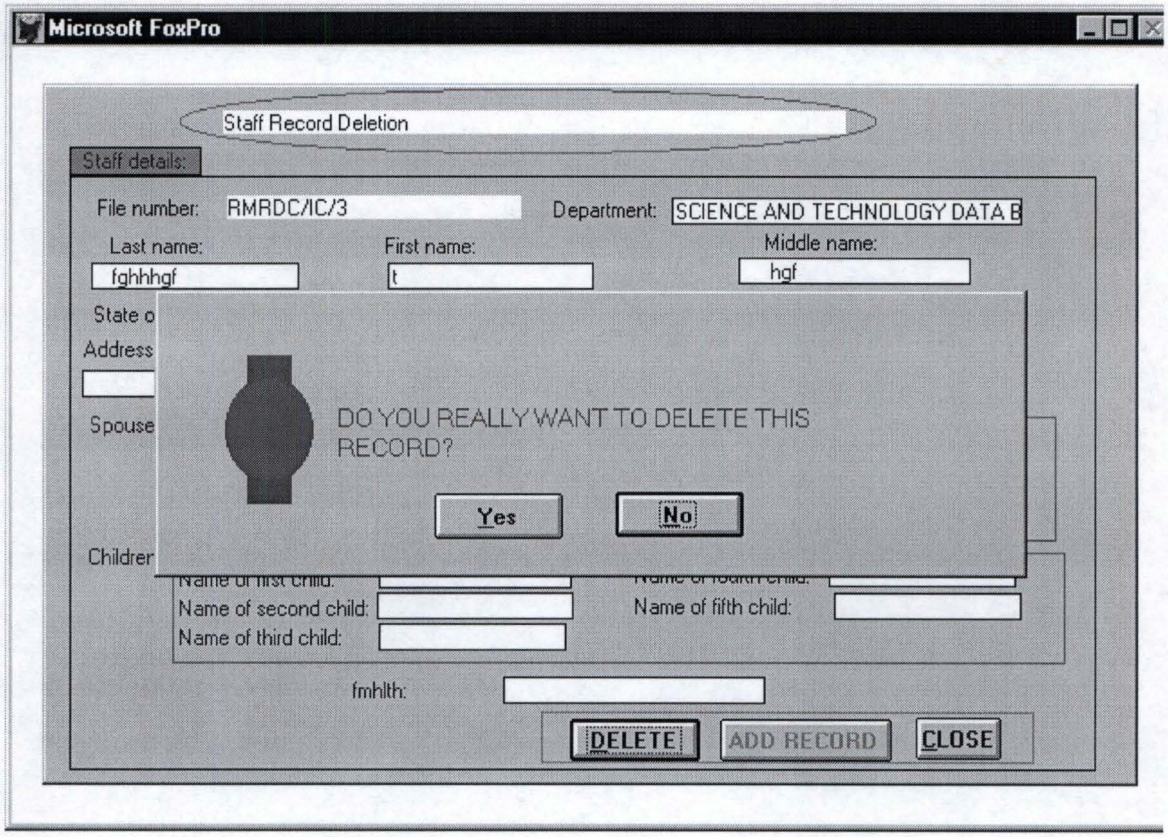
DEPARTMENT OK

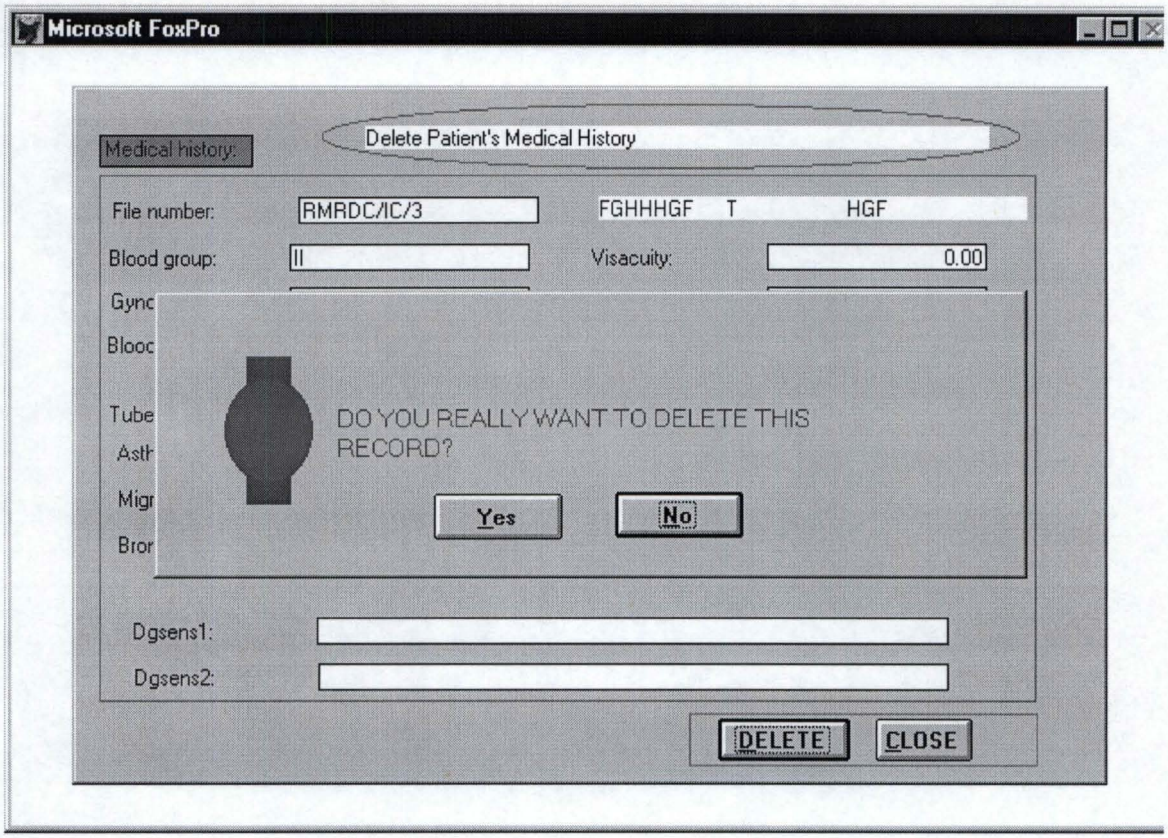

ENQUIRING
STAFF RECORD
MEDICAL HISTORY
ATTENDANCE
DRUG(S) REGISTERED
CANCEL
OK

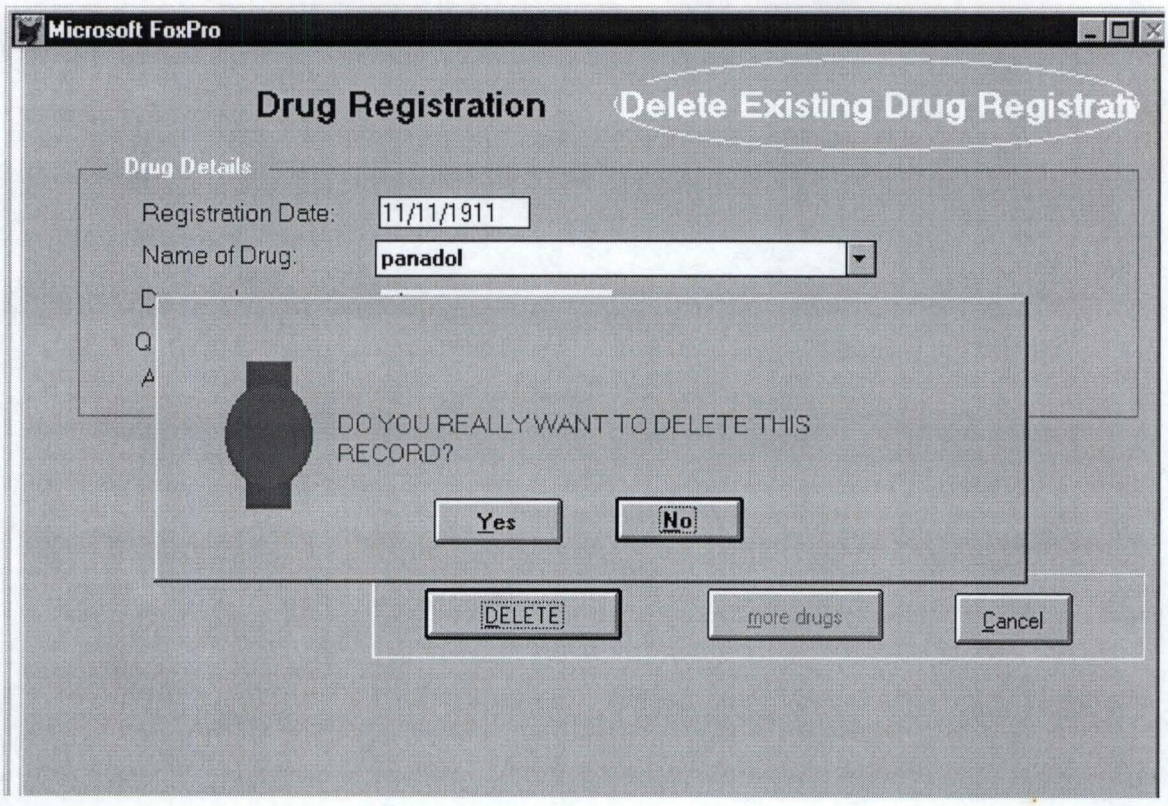

USER MAINTENANCE
STATIC TABLE UPDATE

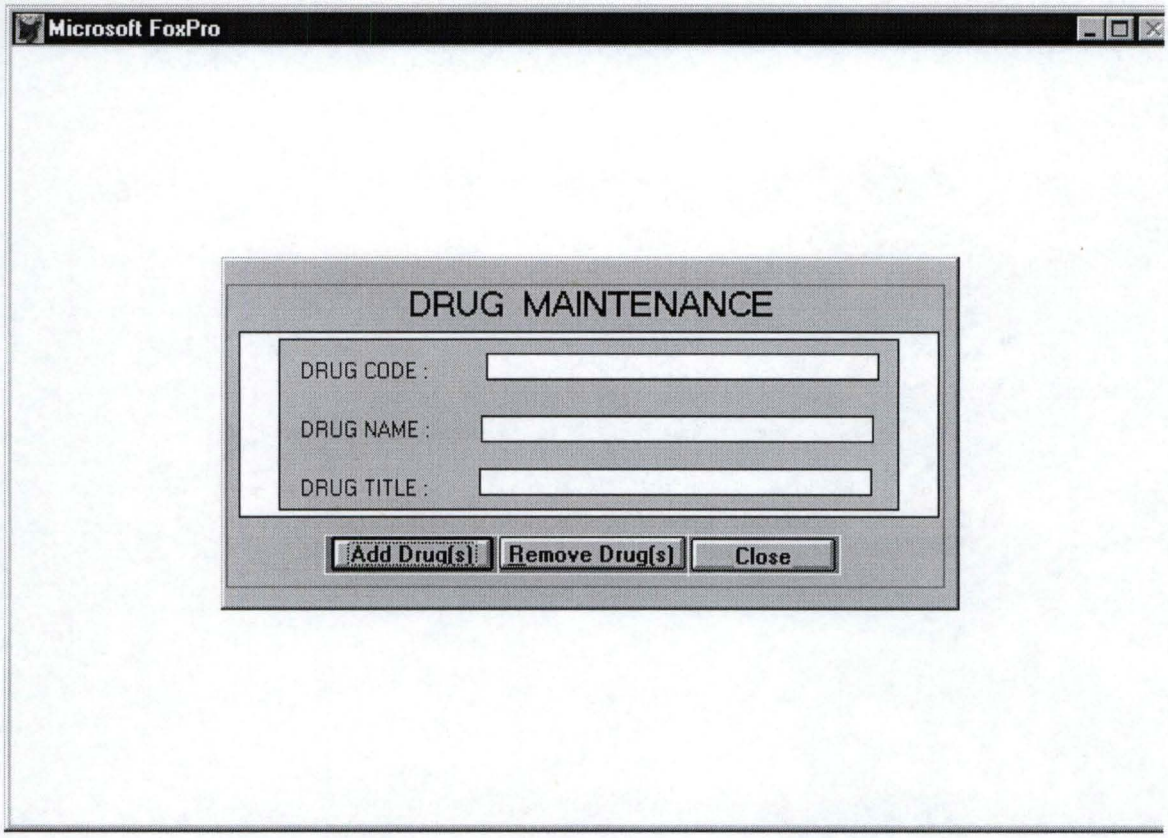
CLOSE

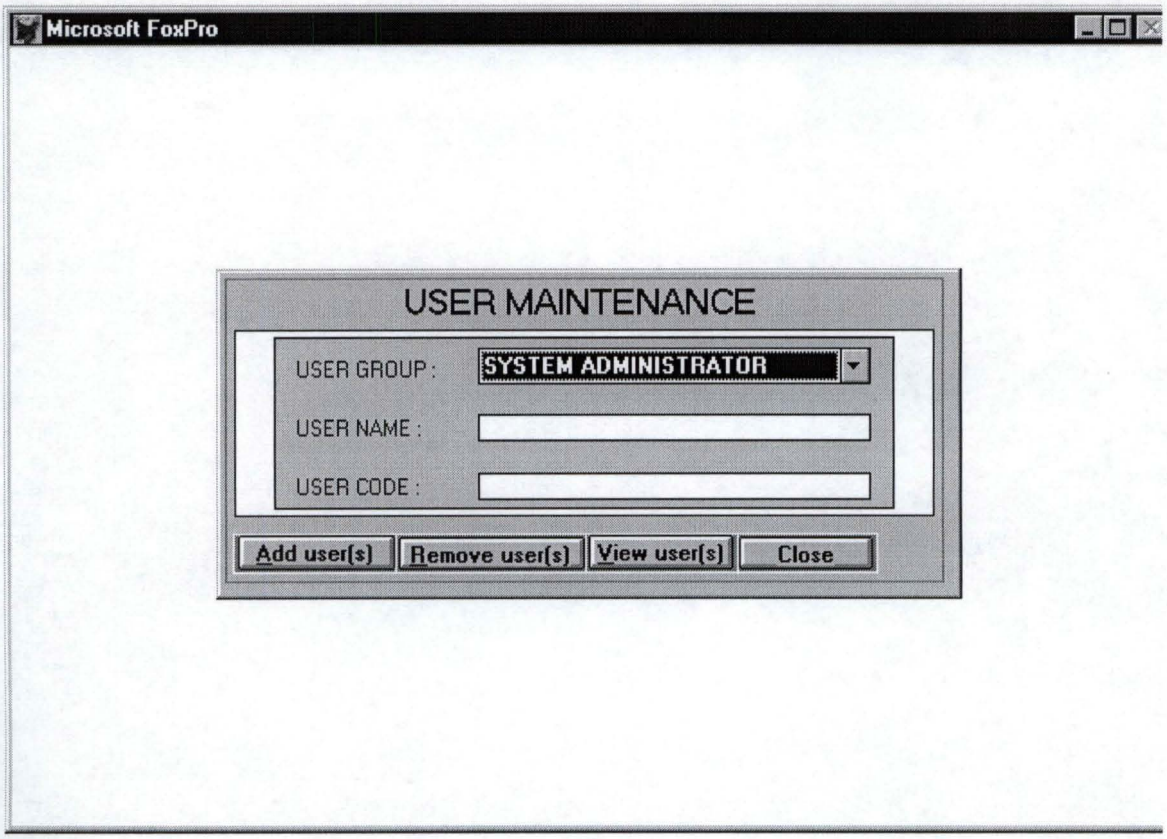

Microsoft FoxPro
Patient Registration
Delete Patient's Attendance
Patient Details
File number:
RMRDC/IC/3
DO YOU REALLY WANT TO DELETE THIS RECORD?
Yes
No
Drug
CHLOROQUINE
10.00
DELETE
more drugs
Cancel

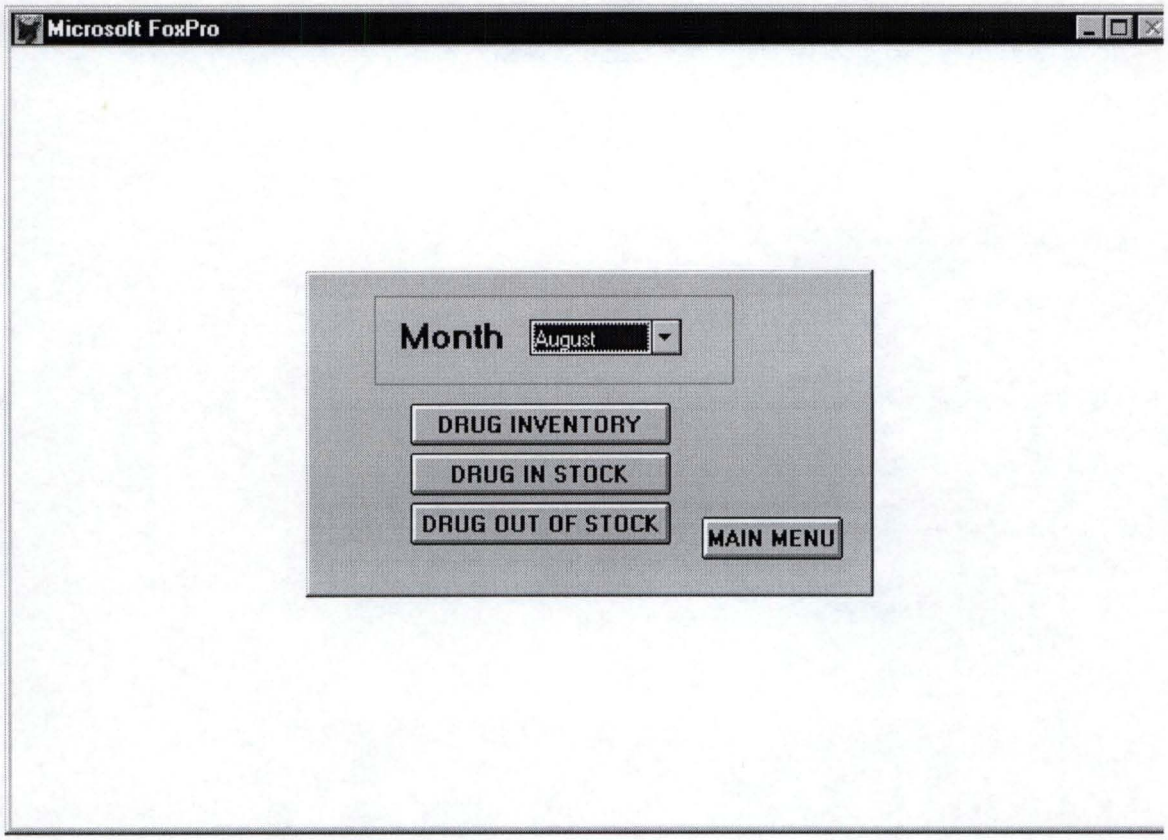

Microsoft FoxPro
Staff Record Deletion
Staff details:
File number:
RMRDC/IC/3
Department:
SCIENCE AND TECHNOLOGY DATA B
Last name:
fghhhgf
First name:
t
Middle name:
hgf
State o
Address
Spouse
Childrer
DO YOU REALLY WANT TO DELETE THIS RECORD?
Yes
No
Name of second child:
Name of third child:
Name of fifth child:
fmhlth:
DELETE
ADD RECORD
CLOSE

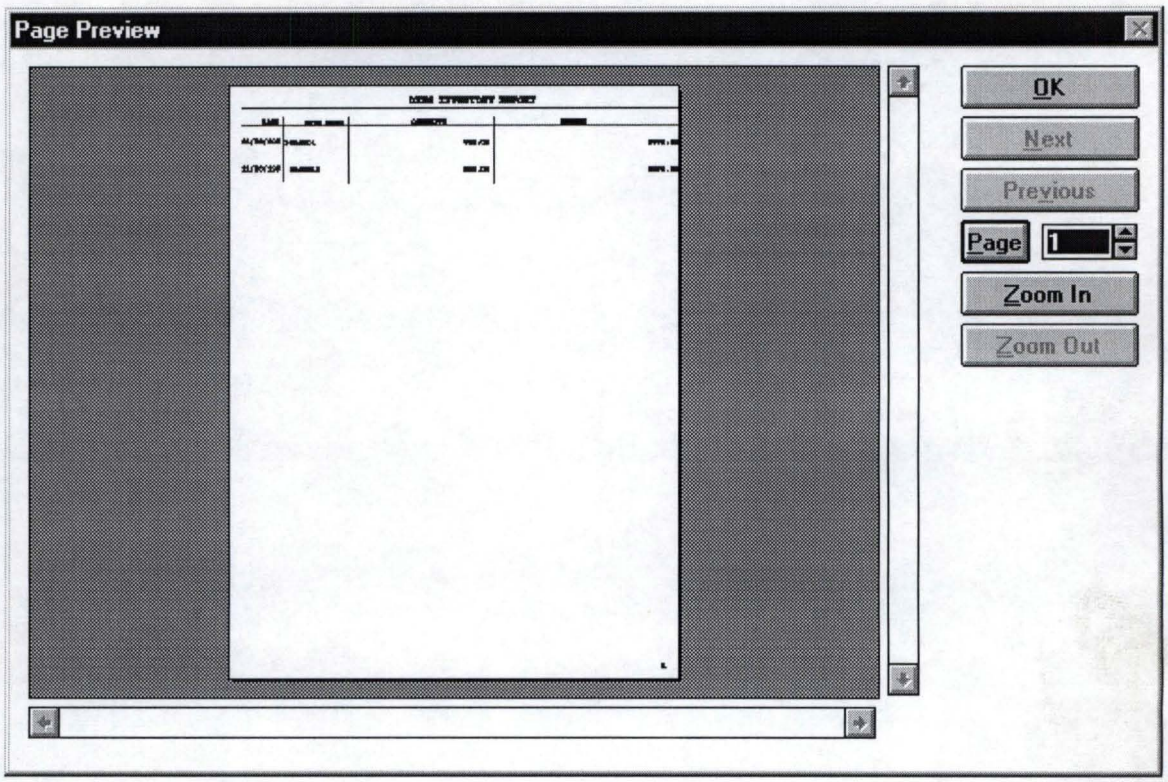

Microsoft FoxPro
Medical history:
Delete Patient's Medical History
File number:
RMRDC/IC/3
FGHHHGF T HGF
Blood group:
II
Visacuity:
0.00
DO YOU REALLY WANT TO DELETE THIS RECORD?
Yes
No
Dgsens1:
Dgsens2:
DELETE
CLOSE

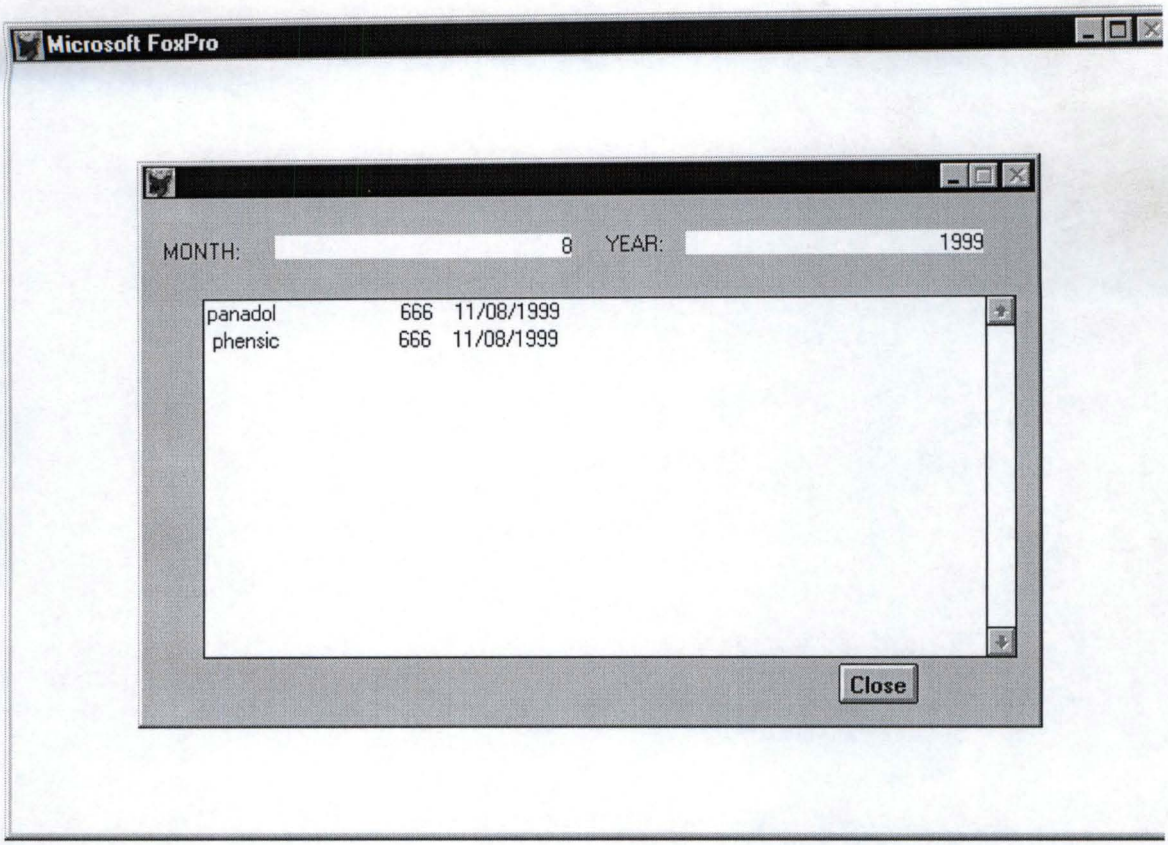

Microsoft FoxPro
Drug Registration
Delete Existing Drug Registrati
Drug Details
Registration Date:
11/11/1911
Name of Drug:
panadol
DO YOU REALLY WANT TO DELETE THIS RECORD?
Yes
No
DELETE
more drugs
Cancel


Microsoft FoxPro
DRUG MAINTENANCE
DRUG CODE :
DRUG NAME :
DRUG TITLE :
Add Drug(s)
Remove Drug(s)
Close


Microsoft FoxPro
USER MAINTENANCE
USER GROUP :
SYSTEM ADMINISTRATOR
USER NAME :
USER CODE :
Add user(s)
Remove user(s)
View user(s)
Close


Microsoft FoxPro
Month
August
DRUG INVENTORY
DRUG IN STOCK
DRUG OUT OF STOCK
MAIN MENU


Page Preview
OK
Next
Previous
Page
1
Zoom In
Zoom Out


Microsoft FoxPro
MONTH:
8
YEAR:
1999
panadol 666 11/08/1999
phensic 666 11/08/1999
Close

```
*:**********************************************************************
*:
*: Procedure file: C:\FAG\MAIN.PRG
*:         System: IN-HOUSE-CLINIC
*:         Author: FAGBEMI
*:  Last modified: 08/12/99 at 14:26:26
*:
*:  Procs & Fncts: DATA_ENTRY
*:               : DATA_STAFF
*:               : DATA_HIST
*:               : DATA_ATTEND
*:               : DRUG_REG
*:               : SYADM
*:
*:         Calls: WELCOME.SPR
*:               : LOGIN.SPR
*:               : MAIN.SPR
*:               : SYADM.SPR
*:               : DATA_ENTRY       (procedure in MAIN.PRG)
*:               : INV1.PRG
*:               : ENQU_REP.PRG
*:               : CREDIT.SPR
*:
*:     Documented 14:29:01                         FoxDoc version 3.00a
*:**********************************************************************

CLEA READ
CLEA MEMO
CLOS DATA
SET STAT BAR OFF
SET SYSMENU OFF
SET CENTURY ON
SET DATE TO BRIT
SET SAFE ON
SET TALK OFF
SET ESCA OFF
SET EXAC ON
SET EXCL ON
PUBL eloho,eno,tim,ada,ladd,dat,pat,eno1,eno2,eno3,drg,kaza,peter,jonas,ekiete,sulk
*PROC main
DO welcome.spr
DO login.spr
IF ekiete=.T.
  STORE .T. TO tim
  STORE 0 TO ada
  DO WHILE tim
    DO main.spr
    DO CASE
    CASE ada=1
      DO syadm
    CASE ada=2
      DO data_entry
    CASE ada=3
      DO inv1
    CASE ada=4
      SET PROC TO enqu_rep
```

```
      DO enqu_rep
    CASE ada=5
      DO credit.spr
    CASE ada=6
      eno=.F.
      eloho=.F.
      tim=.F.
    ENDCASE
  ENDDO
ELSE
  ekiete=.F.
  *DEAC WIND login
  *RELE WIND login

ENDIF



*!*************************************************************************
*!
*!    Procedure: DATA_ENTRY
*!
*!    Called by: MAIN.PRG
*!
*!       Calls: MAIN_1.SPR
*!            : DATA_STAFF       (procedure in MAIN.PRG)
*!            : DATA_ATTEND      (procedure in MAIN.PRG)
*!            : DATA_HIST        (procedure in MAIN.PRG)
*!            : DRUG_REG         (procedure in MAIN.PRG)
*!
*!*************************************************************************
PROC data_entry
STORE .T. TO eloho
STORE 0 TO ladd
DO WHILE eloho
  DO main_1.spr
  DO CASE
  CASE ladd=1
    DO data_staff
  CASE ladd=2
    DO data_attend
  CASE ladd=3
    DO data_hist
  CASE ladd=4
    DO drug_reg
  OTHERWISE
    eloho=.F.
    tim=.T.
  ENDCASE
ENDDO
RETURN


*!*************************************************************************
*!
*!    Procedure: DATA_STAFF
```

```
*!
*!    Called by: DATA_ENTRY       (procedure in MAIN.PRG)
*!
*!       Calls: MAIN_DAT.SPR
*!            : ADD_CL          (procedure in MAIN_DAT.SPR)
*!            : MOD_CL          (procedure in MAIN_DAT.SPR)
*!            : DEL_CL          (procedure in MAIN_DAT.SPR)
*!
*!*********************************************************************************
PROC data_staff
STORE 0 TO dat
STORE .T. TO eno
DO WHILE eno
  DO main_dat.spr
  DO CASE
  CASE dat=1
    SET PROC TO main_dat.spr
    DO add_cl
  CASE dat=2
    SET PROC TO main_dat.spr
    DO mod_cl
  CASE dat=3
    SET PROC TO main_dat.spr
    DO del_cl
  OTHERWISE
    eno=.F.
    eloho=.T.
  ENDCASE
ENDDO
RETURN



*!*********************************************************************************
*!
*!    Procedure: DATA_HIST
*!
*!    Called by: DATA_ENTRY       (procedure in MAIN.PRG)
*!
*!       Calls: MAIN_D2.SPR
*!            : ADD_HS          (procedure in MAIN_D2.SPR)
*!            : MOD_HS          (procedure in MAIN_D2.SPR)
*!            : DEL_HS          (procedure in MAIN_D2.SPR)
*!
*!*********************************************************************************
PROC data_hist
STORE 0 TO his
STORE .T. TO eno1
DO WHILE eno1
  DO main_d2.spr
  DO CASE
  CASE his=1
    SET PROC TO main_d2.spr
    DO add_hs
  CASE his=2
    SET PROC TO main_d2.spr
```

```
    DO mod_hs
  CASE his=3
    SET PROC TO main_d2.spr
    DO del_hs
  OTHERWISE
    eno1=.F.
    eloho=.T.
  ENDCASE
ENDDO
RETURN



*!*************************************************************************
*!
*!    Procedure: DATA_ATTEND
*!
*!    Called by: DATA_ENTRY       (procedure in MAIN.PRG)
*!
*!       Calls: MAIN_3.SPR
*!            : ADD_AT          (procedure in MAIN_3.SPR)
*!            : MOD_AT          (procedure in MAIN_3.SPR)
*!            : DEL_AT          (procedure in MAIN_3.SPR)
*!
*!*************************************************************************
PROC data_attend
STORE 0 TO pat
STORE .T. TO eno2
DO WHILE eno2
  DO main_3.spr
  DO CASE
  CASE pat=1
    SET PROC TO main_3.spr
    DO add_at
  CASE pat=2
    SET PROC TO main_3.spr
    DO mod_at
  CASE pat=3
    SET PROC TO main_3.spr
    DO del_at
  OTHERWISE
    eno2=.F.
    eloho=.T.
  ENDCASE
ENDDO
RETURN

*!*************************************************************************
*!
*!    Procedure: DRUG_REG
*!
*!    Called by: DATA_ENTRY       (procedure in MAIN.PRG)
*!
*!       Calls: MAIN_D1.SPR
```

```
*!          : ADD_DG          (procedure in MAIN_D1.SPR)
*!          : MOD_DG          (procedure in MAIN_D1.SPR)
*!          : DEL_DG          (procedure in MAIN_D1.SPR)
*!
*!*************************************************************************
PROC drug_reg
STORE 0 TO drg
STORE .T. TO eno3
DO WHILE eno3
  DO main_d1.spr
  DO CASE
  CASE drg=1
    SET PROC TO main_d1.spr
    DO add_dg
  CASE  drg=2
    SET PROC TO main_d1.spr
    DO mod_dg
  CASE  drg=3
    SET PROC TO main_d1.spr
    DO del_dg
  OTHERWISE
    eno3=.F.
    eloho=.T.
  ENDCASE
ENDDO
RETURN


*!*************************************************************************
*!
*!    Procedure: SYADM
*!
*!        Calls: SYADM.SPR
*!             : CH_USER.SPR
*!             : STATIC.SPR
*!
*!*************************************************************************
PROC  syadm
*STORE 0 TO drg
STORE .T. TO adig
DO WHILE adig
  DO syadm.spr
  DO CASE
  CASE sulk=1
    DO ch_user.spr
  CASE sulk=2
    DO static.spr
  ENDCASE
  *ENDDO

ENDDO
RETURN
*: EOF: MAIN.PRG
```

```
*:**********************************************************************
*:
*: Procedure file: C:\FAG\ENQU_REP.PRG
*:        System: IN-HOUSE-CLINIC
*:        Author: FAGBEMI
*:  Last modified: 08/12/99 at 11:18:22
*:
*:  Procs & Fncts: EMBUGU
*:               : EMBUG1
*:               : EMBUG2
*:               : EMBUG3
*:               : EMBUGU4
*:
*:       Set by: MAIN.PRG
*:
*:        Calls: ENQR1.SPR
*:               : EMBUGU          (procedure in ENQU_REP.PRG)
*:               : EMBUGU4         (procedure in ENQU_REP.PRG)
*:
*:     Documented 14:29:07                  FoxDoc version 3.00a
*:**********************************************************************
PUBL embu,steve,embu1,embu2,embu3,enqfo
STORE .T. TO steve
DO WHILE steve
  DO enqr1.spr
  DO CASE enqfo
  CASE enqfo=1
    DO embugu
  CASE enqfo=2
    DO embugu
  CASE enqfo=3
    DO embugu
  CASE enqfo=4
    DO embugu4
  OTHERWISE
    steve=.F.
  ENDCASE

ENDDO


*********PROCEDURES*****************************************
*!**********************************************************************
*!
*!    Procedure: EMBUGU
*!
*!    Called by: ENQU_REP.PRG
*!
*!        Calls: ENQR.SPR
*!               : EMBUG1          (procedure in ENQU_REP.PRG)
*!               : EMBUG3          (procedure in ENQU_REP.PRG)
*!               : EMBUG2          (procedure in ENQU_REP.PRG)
*!
*!**********************************************************************
PROC embugu
```

```
STORE .T. TO embu

DO enqr.spr
enqrep=bugu
DO CASE
CASE enqrep=1
  DO embug1
CASE enqrep=2
  *HIDE WIND enqr
  DO embug3
CASE enqrep=3
  DO embug2
OTHERWISE
  embu=.F.
ENDCASE
RETURN

************************************************************

*!*************************************************************************
*!
*!    Procedure: EMBUG1
*!
*!    Called by: EMBUGU          (procedure in ENQU_REP.PRG)
*!
*!        Calls: ENQRNO.SPR
*!             : NUM1            (procedure in NUM.PRG)
*!             : NUM2            (procedure in NUM.PRG)
*!             : NUM3            (procedure in NUM.PRG)
*!
*!*************************************************************************
PROC embug1
STORE .T. TO embu1

DO WHILE embu1
  DO enqrno.spr

  DO CASE
  CASE enqfo=1
    SET PROC TO num
    DO num1
  CASE enqfo=2
    SET PROC TO num
    DO num2
  CASE enqfo=3
    SET PROC TO num
    DO num3
  OTHERWISE
    embu1=.F.
  ENDCASE
ENDDO
RETURN

************************************************************
```

```
*!*************************************************************************
*!
*!    Procedure: EMBUG2
*!
*!    Called by: EMBUGU          (procedure in ENQU_REP.PRG)
*!
*!       Calls: ENQRDP.SPR
*!            : DEPT1           (procedure in DEPT.PRG)
*!            : DEPT2           (procedure in DEPT.PRG)
*!            : DEPT3           (procedure in DEPT.PRG)
*!
*!*************************************************************************
PROC embug2
STORE .T. TO embu2

DO WHILE embu2
  DO enqrdp.spr
  DO CASE
  CASE enqfo=1
    SET PROC TO dept
    DO dept1
  CASE enqfo=2
    SET PROC TO dept
    DO dept2
  CASE enqfo=3
    SET PROC TO dept
    DO dept3
  OTHERWISE
    embu2=.F.
  ENDCASE
ENDDO
RETURN

***********************************************

*!*************************************************************************
*!
*!    Procedure: EMBUG3
*!
*!    Called by: EMBUGU          (procedure in ENQU_REP.PRG)
*!
*!       Calls: ENQRLN.SPR
*!            : LNAM1           (procedure in LNAM.PRG)
*!            : LNAM2           (procedure in LNAM.PRG)
*!            : LNAM3           (procedure in LNAM.PRG)
*!
*!*************************************************************************
PROC embug3
STORE .T. TO embu3

DO WHILE embu3
  DO enqrln.spr

  DO CASE
  CASE enqfo=1
    SET PROC TO lnam
```

```
    DO lnam1
  CASE enqfo=2
    SET PROC TO lnam
    DO lnam2
  CASE enqfo=3
    SET PROC TO lnam
    DO lnam3
    *CASE enqfo=4

    *DO lnam4
  OTHERWISE
    embu3=.F.
  ENDCASE
ENDDO
RETURN

*************



*!*********************************************************************************
*!
*!     Procedure: EMBUGU4
*!
*!     Called by: ENQU_REP.PRG
*!
*!         Calls: ENQR.SPR
*!              : NUM4              (procedure in NUM.PRG)
*!
*!*********************************************************************************
PROC embugu4
STORE .T. TO embu

DO enqr.spr
DO CASE
CASE enqfo=4
  SET PROC TO num
  DO num4
OTHERWISE
  embu=.F.
ENDCASE
RETURN




*: EOF: ENQU_REP.PRG
```

```
*:**************************************************************************
*:
*: Procedure file: C:\FAG\INV.PRG
*:         System: IN-HOUSE-CLINIC
*:         Author: FAGBEMI
*:  Last modified: 08/12/99 at 11:18:26
*:
*:  Procs & Fncts: JES
*:               : BAK
*:               : CONC
*:
*:        Set by: INV1.PRG
*:
*:         Calls: MESS.SPR
*:
*:     Documented 14:29:16                  FoxDoc version 3.00a
*:**************************************************************************
PUBL mel
STORE .T. TO mel
DO WHILE mel
  *msg=' '
  DO mess.spr
ENDDO

*!**************************************************************************
*!
*!     Procedure: JES
*!
*!     Called by: _S6K0X044D()      (function in MESS.SPR)
*!
*!         Calls: BAK               (procedure in INV.PRG)
*!
*!          Uses: D_OUT.DBF
*!              : D_REG.DBF
*!
*!     CDX files: D_OUT.CDX
*!              : D_REG.CDX
*!
*!**************************************************************************
PROC jes
CLOSE DATA
IF USED('d_OUT')
  SELE d_out
ELSE
  SELE 0
  USE d_out
ENDIF
SET SAFE OFF
=AFIELDS(smily)
CREATE TABLE 'O'+thismonth FROM ARRAY smily

juju=RECCOUNT()
GO TOP
duck= RECNO()
DO WHILE duck<= juju
```

```
  WAIT WIND 'RECCOUNT()'+STR(juju)
  GO duck
  WAIT WIND 'duck'+STR(m.duck)
  SCATTER MEMVAR MEMO
  m.d_code=d_code
  m.i_date=i_date
  m.amount=amount
  WAIT WIND 'amount'+STR(m.amount)
  WAIT WIND 'd_code'+m.d_code
  m.i_qty=i_qty
  *dele
  USE d_reg

  LOCATE FOR ALLTRIM(UPPER(d_code)) = ALLTRIM(UPPER(m.d_code))
  IF FOUND()
    SCATTER MEMVAR MEMO
    IF m.r_qty>=m.i_qty
      du=m.r_qty-m.i_qty
    ELSE
      du=-(m.i_qty-m.r_qty)
    ENDIF
    IF m.ramount >= m.amount
      dr=m.ramount-m.amount
    ELSE
      dr=-(m.amount-m.ramount)
    ENDIF

    *REPL R_DATE WITH (M.R_DATE-M.I_DATE)
    REPL r_qty WITH du
    REPL ramount WITH dr

    *GO duck
  ENDIF
  CLOS DATA
  USE d_out
  duck =duck +1

  LOOP
ENDDO
DO bak
mel=.F.
RETURN



*!*************************************************************************
*!
*!    Procedure: BAK
*!
*!    Called by: JES              (procedure in INV.PRG)
*!
*!         Uses: D_REG.DBF
*!             : D_OUT.DBF
*!
```

```
*!     CDX files: D_REG.CDX
*!              : D_OUT.CDX
*!
*!*************************************************************************
PROC bak
CLOSE DATA
USE d_reg
=AFIELDS(smily1)
CREATE TABLE 'R'+thismonth FROM ARRAY smily1

USE 'O'+thismonth
ZAP
APPEND FROM d_out FOR thismonth=CMONTH(i_date)

USE 'R'+thismonth
ZAP
APPEND FROM d_reg FOR thismonth = CMONTH(r_date)

USE d_out
DELE ALL
SET SAFE ON

RETURN


*!*************************************************************************
*!
*!     Procedure: CONC
*!
*!     Called by: _S6K0X044D()      (function in MESS.SPR)
*!
*!       Calls: CONC.SPR
*!
*!*************************************************************************
PROC conc
DEAC WIND MESS
RELE WIND MESS
DO conc.spr
RETURN
* .AND. r_date = m.i_date
*: EOF: INV.PRG




*:*************************************************************************
*:
*:       Program: C:\FAG\INS.PRG
*:        System: IN-HOUSE-CLINIC
*:        Author: FAGBEMI
*:  Last modified: 08/12/99 at 11:18:26
*:
*:     Called by: INV1.PRG
*:
```

```
*:        Uses: RJANUARY.DBF
*:            : RFEBRUARY.DBF
*:            : RMARCH.DBF
*:            : RAPRIL.DBF
*:            : RMAY.DBF
*:            : RJUNE.DBF
*:            : RJULY.DBF
*:            : RAUGUST.DBF
*:            : RSEPTEMBER.DBF
*:            : ROCTOBER.DBF
*:            : RNOVEMBER.DBF
*:            : RDECEMBER.DBF
*:
*:   Report Forms: INV.FRX
*:
*:    Documented 14:29:17                    FoxDoc version 3.00a
*:*************************************************************************
CLOSE DATA
DO CASE
CASE thismonth='January'
  USE rjanuary
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='February'
  USE rfebruary
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='March'
  USE rmarch
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='April'
  USE rapril
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
```

```
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='May'
  USE rmay
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='June'
  USE rjune
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='July'
  USE rjuly
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    REPORT FORM inv PREVIEW
  ENDIF
CASE thismonth='August'
  USE raugust
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='September'
  USE rseptember
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
```

```
    ENDIF
  ENDIF
CASE thismonth='October'
  USE roctober
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    REPORT FORM inv PREVIEW
  ENDIF
CASE thismonth='November'
  USE rnovember
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='December'
  USE rdecember
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv PREVIEW
    ELSE
      REPORT FORM inv TO PRINTER
    ENDIF
  ENDIF
ENDCASE

*: EOF: INS.PRG




*:*********************************************************************************
*:
*:       Program: C:\FAG\INV1.PRG
*:        System: IN-HOUSE-CLINIC
*:        Author: FAGBEMI
*:  Last modified: 08/12/99 at 14:26:30
*:
*:     Called by: MAIN.PRG
*:
*:         Calls: INV.SPR
*:              : INV.PRG
*:              : PRINT.SPR
*:              : INS.PRG
*:              : OUTS.PRG
*:
```

```
*:     Documented 14:29:06                  FoxDoc version 3.00a
*:*********************************************************************
PUBL yak,moh
STORE .T. TO moh
STORE 0 TO yak
DO WHILE moh
  DO inv.spr
  DO CASE
  CASE yak=1
    DEAC WIND inv
    RELE WIND inv
    DO inv

  CASE yak=2
    DO print.spr
    DEAC WIND inv
    RELE WIND inv
    DO ins
  CASE yak=3
    DO print.spr
    DEAC WIND inv
    RELE WIND inv
    DO outs
  OTHERWISE
    moh=.F.
  ENDCASE
ENDDO
*: EOF: INV1.PRG



*:*********************************************************************
*:
*:       Program: C:\FAG\OUTS.PRG
*:        System: IN-HOUSE-CLINIC
*:        Author: FAGBEMI
*:  Last modified: 08/12/99 at 11:18:36
*:
*:     Called by: INV1.PRG
*:
*:          Uses: OJANUARY.DBF
*:              : OFEBRUARY.DBF
*:              : OMARCH.DBF
*:              : OAPRIL.DBF
*:              : OMAY.DBF
*:              : OJUNE.DBF
*:              : OJULY.DBF
*:              : OAUGUST.DBF
*:              : OSEPTEMBER.DBF
*:              : OOCTOBER.DBF
*:              : ONOVEMBER.DBF
*:              : ODECEMBER.DBF
*:
*:   Report Forms: INV1.FRX
*:
```

```
*:    Documented 14:29:18                FoxDoc version 3.00a
*:*****************************************************************************
CLOSE DATA
DO CASE
CASE thismonth='January'
  USE ojanuary
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='February'
  USE ofebruary
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='March'
  USE omarch
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='April'
  USE oapril
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='May'
  USE omay
CASE thismonth='June'
  USE ojune
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
```

```
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='July'
  USE ojuly
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='August'
  USE oaugust
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='September'
  USE oseptember
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='October'
  USE ooctober
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='November'
  USE onovember
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
```

```
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
CASE thismonth='December'
  USE odecember
  IF RECCOUNT()=0
    WAIT WIND 'FILE IS EMPTY'NOWAIT
  ELSE
    IF prnt=1
      REPORT FORM inv1 PREVIEW
    ELSE
      REPORT FORM inv1 TO PRINTER
    ENDIF
  ENDIF
ENDCASE

*: EOF: OUTS.PRG
```