MODELING AND DESIGNING OF A PATIENTS MEDICAL RECORD KEEPING SYSTEM

CASE STUDY: BITIIRA HOSPITAL IGANGA

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Fulfillment of the Requirements for the Award of the Degree of

Bachelor of Information Technology of

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DECLARATION

Namugabo Lydia and Lunyolo faith do hereby declare to the best of our knowledge that this graduation project is our original work and that it has never been submitted to any University or any other institution for the award of any qualification.

The literature and citations from other people's work have been duly referenced and acknowledged in the text and bibliography.

Signed…………………………   Signed…………………………

NAMUGABO LYDIA (STUDENT)   **LUNYOLO FAITH (STUDENT)**

Date…24/.08/.2009……   Date…24/08/09.………

Signed…………………………

MR SEMPEBWA RONALD

(SUPERVISOR)

Date…… 24/08/09 …………………………………………

DEDICATION

We dedicate this work to our dear parents, and a host of others whose attention, comfort, assistance and usefulness has driven us this far with all the problems we have gone through together. We respect you and cherish the need for your being around.

We also extend our gratitude to all of those people whose assistance has guided us to this level of education. May the lord bless you all.

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ABBREVIATIONS

ICO	....	Information Circulation Office
GUI	....	Graphical User Interface
MS ACCESS	....	Microsoft Access.
IS	....	Information System
SQL	....	Structured Query Language
VB	....	Visual Basic
H/W	....	Hardware
S/W	....	Software
DB	....	Database
DBMS	....	Database Management System
ER	....	Entity Relation Model
DFD	....	Data Flow Diagram
EG	....	Example (For Example)
PC	....	Personal Computer
RAM	....	Random Access Memory
LAN	....	Local Area Network
ETC	....	Etcetera
WAN	....	Wide Area Network
OS	....	Operating System
DA	....	Data Administrator
LAB	....	Laboratory
ODBC	....	Object Database connectivity

1.0 INTRODUCTION

1.1 Background to the Case Study:

Bitiira hospital Iganga is a tertiary private referral hospital located in Iganga. It was established in 1894. At the start, it was a small hospital located in the middle of Iganga town. As the hospital continued to grow, patients from outside started also being treated from there. By 1984, this hospital was newer and was able to treat both private patients and patients who were too poor to be able to afford fees. The hospital has grown tremendously and currently includes different functionalities such as Home care, Internal medicine, Laboratory, Obstetrics and Gynecology, Pediatrics, Pharmacy, Physiotherapy, Radiology, Surgery and Training school.

Bittira hospital uses a manual Record keeping and archival system to keep record of all the information concerning both the hospital employees and the patients. Since the hospital is so large, it has a significant number of patients whose identification details, contact information and the symptoms of their illness must be taken and recorded and therefore the records keeping and archival system is an important entity in helping the hospital to store these records. The recorded information is derived from the different functionalities and kept at the Information Circulation Office (ICO) which is at a central location. Any one who needs the information has to get it from this central location. The hospital's current record keeping system is a conventional system whose processes are carried out manually. This applies to all the hospitals departments which are orthopedic department whose activities are management of diseases of bones and joints, conservative management of fractures and dislocations,. Working on new born babies with deformities e.g. feet and legs, assisting the orthopedic surgeon during operation.

Laboratory department which is responsible of microscopic examination of specimens to establish the etiology (cause of disease) e.g. pus, urine, blood, testing for HIV (human immune virus), grouping and cross matching of blood in case of transfusion.

X-ray department which is concerned with taking x-rays to establish or confirm what the patient is suffering from after clinical examination, hysterosalpingogram which a procedure is done to unblock the fallopian tubes in infertile people.

Dental department whose activities are extracting of decayed teeth, polishing and filling of teeth, carrying out dental operations, health education on oral hygiene.

The manual file based system being used, it proves hard for the hospital, to keep track of the number of patients treated by the hospital, to speed up records storage, retrieval of records and to follow the trend of its patient's illnesses among other things.

These limitations are caused by the large amount of paperwork involved, as a result of the large number of patients and the filing system used which involves physical files and files-cabinets. The above problems led to the need for further studies of the system to come up with a solution to the problem.

1.2 Problem Statement

The processes carried out at the hospital's Information Circulation Office do not keep pace with the contemporary medical standards, economy and diligence in which Bitiira hospital exists. This is because its operations are based on a manual system that has remained largely unchanged for a long time hence calling for a computerized database system to capture and mitigate the problem affecting the hospital.

1.3 Objectives of the study

1.3.1 GENERAL OBJECTIVE

The main objective of the study is to develop a patients' record keeping and archiving system that would facilitate convenient processing, storage and retrieval of information.

1.3.2 Specific Objectives

1. To study the current system to know the weakness currently existing.

2. Gather and analyze the data collected from the field using SPSS.

3. Model and design a new system that would improve on the loopholes facing the current system.

4. To test and implement the new system.

1.4 Study Scope

This scope was targeting specifically in the area of Bitiira hospital majoring in the fields of the patient's record keeping between 1996 and 2000 and was to use the vicinity members around Iganga. This system was to be altered upon its effective working.

The research project covered only the record keeping activity. The study took place at Bitiira hospital located in Iganga town a long Mbale-Tororo.

This project used visual basic 6.0 as the interface of the system and MYSQL as the back end of the database.

This project will be completed in seven months by July 2009 because this is the time which is required by School of computer studies to have finished the research.

1.5 Justification of the Study

This project is expected to benefit Bittira hospital Staff, patients and the researcher in the following ways.

1. Implementation of this Database would ensure top security measures, also data integrity in record keeping process in Bittira hospital i.e. No unauthorized person gain access to view or modify the records.

2. The system would allow sharing of data between the staffs responsible for the records for example the administrators and the secretaries in the hospital.

3. Patient's records were to be retrieved easily.

4. The system would store patient's records for several years while the patient was still in the hospital or when he has left.

5. Finally, implementing this system would gain knowledge in research skills in addition to satisfaction derived from having contributed to the development of a solution that would solve the problems that are affecting the hospital, as it's also required for the award of bachelors degree in information technology.

1.6 Conceptual framework of the study

According to *Shields and Tajalli (2006)* defines Conceptual frameworks as a type of intermediate theory that has the potential to connect to all aspects of inquiry (e.g., problem definition, purpose, literature review, methodology, data collection and analysis.

The diagram below represents the flow of data in the system, from the point of data capture to the point of output. It shows the sequence of various processes in the system.

The diagram clearly shows that the data was keyed manually by only the authorized ones that is the administrators of all the departments and the secretaries and the system validates

the input data for correction. If a data item was not valid, the user was prompted to re-enter the item in a correct format.

After the data was entered correctly, statistics and reports were generated by the system. These reports were stored in files on hard or floppy disks for future use, much as they can be displayed on the video screen or produced as a print out depending on what the user prefers. **Fig 1.1 Conceptual framework**

Start

Enter password

Is password correct? — NO

YES

Enter records

Validate data

Is data correct? — NO

YES

Write to database

Generate reports

Print reports

Compute the results

Print statistics

End

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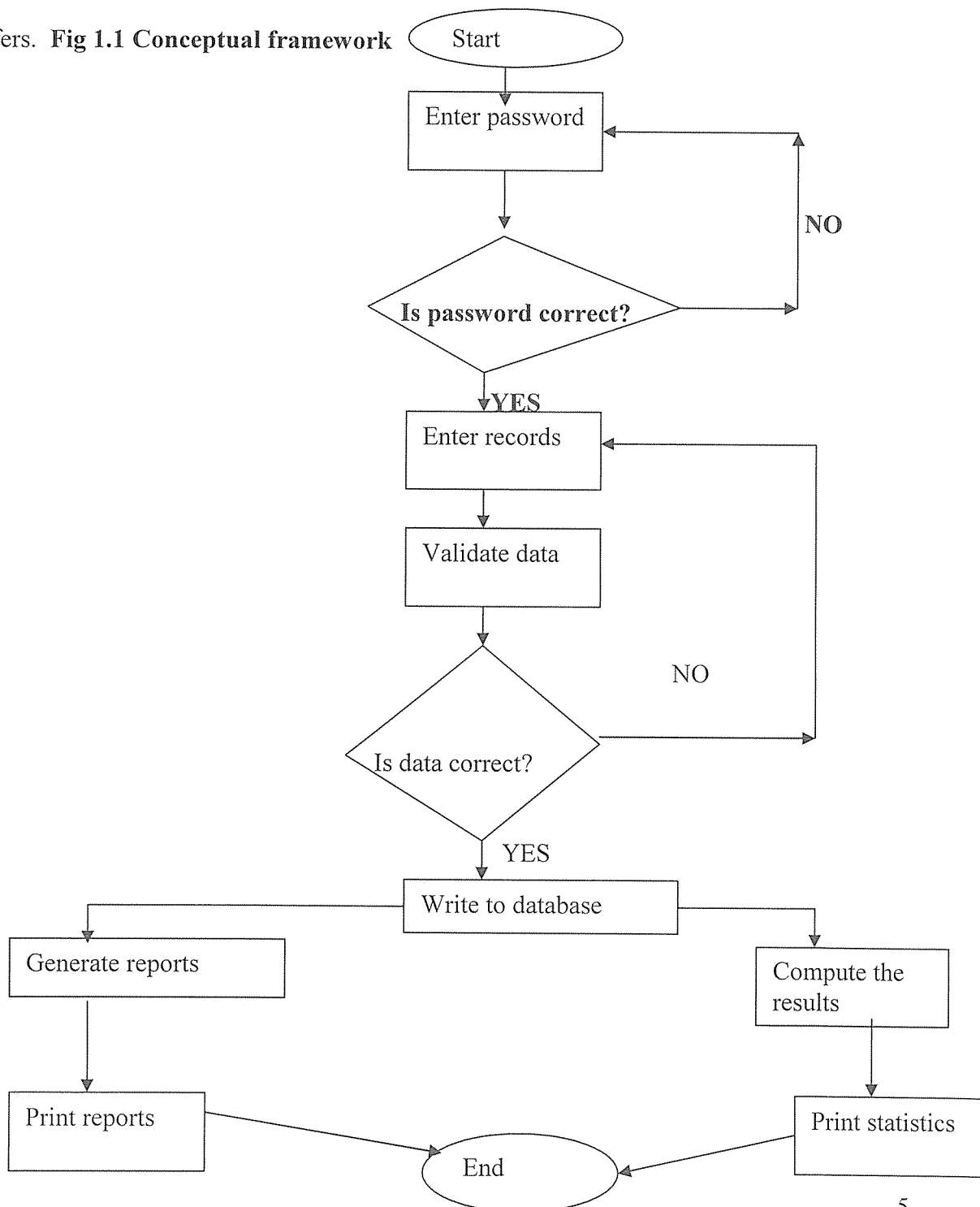
CHAPTER TWO

LITERATURE REVIEW

2.0 Over view

This chapter surveys the work of other researchers in the same field and outlines components of information systems. The tools to be used in the development and implementation of the application as well as the choice of methodology to be used in the system development are all described in this chapter.

At Bitiira hospital there has been use of a manual system to run their activities mostly through human efforts and the introduction of a new computerized system would increase the efficiency of the work at Bitira hospital through the following.

- It would enable the hospital to utilize resources optimally.

- It would enable employees in the hospital to utilize time effectively.

- It would help the hospital to have proper records and services of high quality through avoiding errors/mistakes.

- Technology would allow workers to work from anywhere at any time using functions like video conferencing, prescribing medicine.

2.1 Introduction:

It involves review of existing work done by various authors, researchers and historians. Includes the merits and demerits of Data Management Systems according to *PHILIP J. PRATT,(2000)* defines Data Management Systems as a software product through which users interact with a database, how DB is designed.

According to *JOSEPH J. ADAMSKI, (1990)* defines a database design as the process of determining the consent and arrangement of data in the database that is needed to support some activity on behalf of a user or group of users ,and various requirements involved plus

the stages undergone to carry out the design. This makes transformation easier from the old system to the new basing on the design criteria. Included also is the general effects of this database design to the user.

2.2 Database and Database Management System:

According to *C.J.Date, (1990)* defines a database as a collection of persistent data that is used by the application system of some given enterprise. The term enterprise means any reasonably self contained commercial, scientific, technical or other organization. The enterprises like banks, hospitals, universities would include their persistent data such as production data, accounts' data, patients' data, planning data and many others.

This would include designing and modeling enterprise data with relationships among them, entities and attributes among them and then implemented.

According to *Kroenke, (2003)* defines a database as a self-describing collection of integrated records.

A database is Self-Describing because

It contains in addition to the users source data, a description of its own structure. This description is called a data dictionary (also called a data directory or metadata).

Self-describing characteristic of a database is important because it firstly promotes program-data independence. That is, it makes it possible to determine the structure and content of the database by examining the database itself. Secondly, if we change the structure of the data in the database (such as adding new items to an existing record), we enter only that change in the data dictionary. Few, if any, programs would need to be changed. In most cases, only those programs that process the altered data items must be changed.

A database is a collection of integrated records because it includes files of user data, metadata and in addition, it includes indexes that are used to represent relationships among the data and also to improve the performance of the database applications. The database often contains data about the applications that use the database. (Kroenke, 2003)

According to *(Ramakrishna Gehrike, 2002)* A database is an organized collection of integrated files; it contains a collection of related items or facts arranged in a specific structure.

A DBMS is a piece of software that is designed to make the proceeding tasks easier. By storing data in a DBMS, rather than as a collection of operating system files, we can use the DBMS features to manage the data in a robust and efficient manner. ADBMS involves creation of permanent files that contain information on a certain application in use e.g. Account's maintained in Banks enabling access to several files at a time. Keeping organizational data in files makes access to be done on one file at a time hence inefficiency *(Korth. 2000)*.

2.2.1 COMPONENTS OF ADBMS ENVIRONMENT:

Block Diagram Showing DBMS Environment
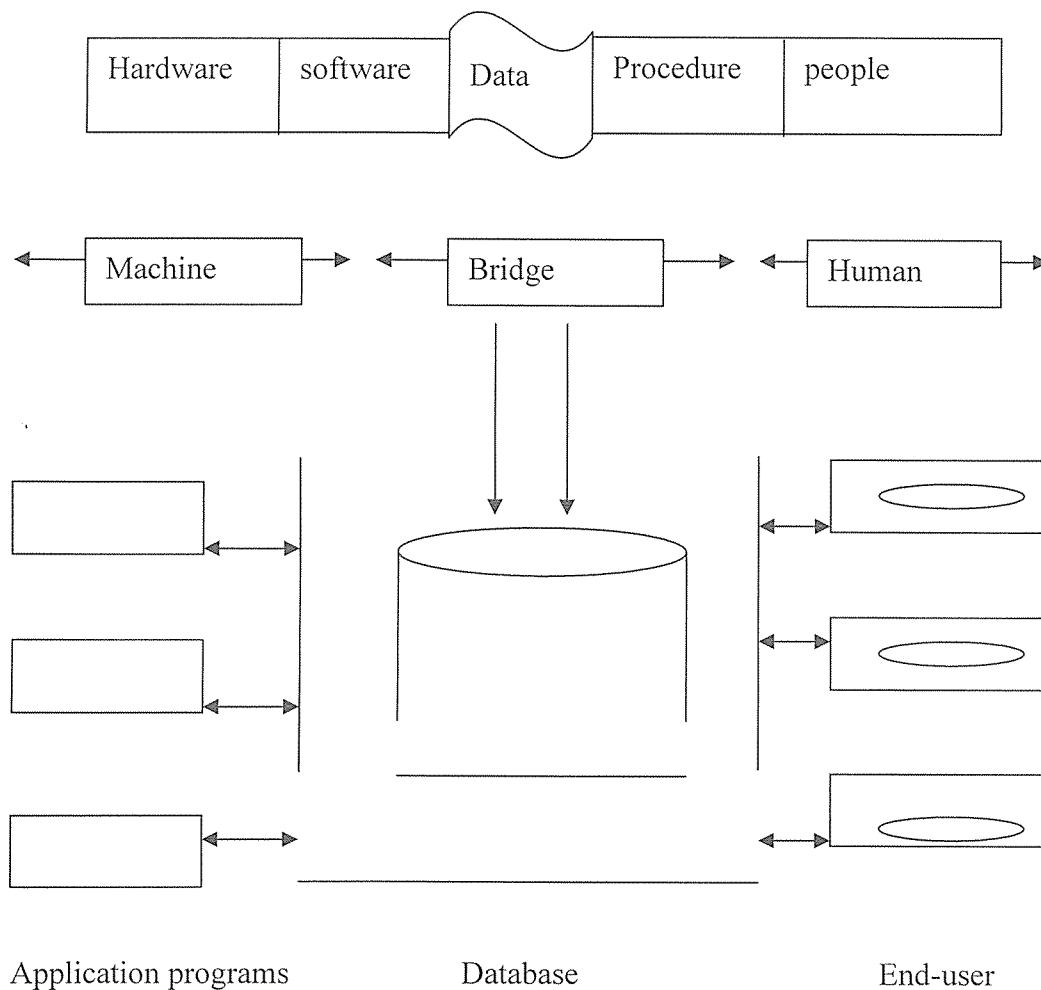
FIG 2.1 DBMS ENVIRONMENT

Hardware; PC/Network: Disk space RAM, LAN, WAN.

Software; DBMS itself, OS, Network Software, application programs

Data; Includes operational Data and Meta data (data about data).

Procedures; Refer to instructions and rules that govern the design and use of the

Database as well as the documentation on how to use or run the system.

People; Data Administrators (DA), Database Administrators, Database Designers,

programmers, system analysts.

2.2.2 Components of a Database System Environment

According to *Helman, (2001)* identifies the following components of the database system environment.

1. Computer-Aided Software Engineering Tools: - automated tools used to design a database and its applications.

2. Repository: -This is the centralized knowledge base containing all data definitions, screen and report formats and definitions of other organizations and system components.

3. Database Management System: - commercial software system used to create, maintain and provide controlled access to the database and also the repository.

4. Application programs:-computer programs used to create and maintain the database and provide information to the users.

5. User Interface:- languages, menus and other facilities by which users interact with various system components such as case tools, applications etc.

6. Data Administrators: - persons who are responsible for the overall information resources of an organization.

7. System Developers: - persons such as systems analysts and programmers who design new application programs.

8. End users: - people in the organization who manipulate data in the database.

2.2.3 Database System Structure

According to *Sudarshan, (2000)* presents the following view as the database structure:

1. The Transaction Manager Subsystem: - responsible for ensuring that the database remains in a consistent (correct) state despite system failures. It also ensures that consistent transaction executions proceed without conflicting.

. 2. The Query Processor Subsystem: - compiles and executes Data Definition Language (DDL) and Data Manipulation Language (DML) statements.

   * Data Definition Language is a set of definitions that specify a database schema.

   * Data Manipulation Language is a language that enables users to access or manipulate data as organized by the appropriate data model.

3. The Storage Manger Subsystem: - provides the interface between the low-level data stored in the database and the application programs and queries submitted to the system.

2.2.4 Types of Databases

According to *Helman, (2001)* identifies the following types of databases:

1. Centralized databases: - all data are located at a single site.

2. Client/server databases: - designed for the distribution of work on a computer network in which many clients may share the services of a single server.

3. Distributed database: - is a single logical database that is spread physically across computers in multiple locations.

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2.2.5 Benefits of a Database System

According to *McFadden and Hoffer, (2003),* identify the following benefits of a database system.

1. Reduced data redundancy/duplication. Each occurrence of data is recorded in only one place in the database.

2. Data consistency: if there is more than one occurrence of a record, then the database updates the data values stored in both records whenever a change occurs.

3. Sharing of data: database permits multiple users to share a database concurrently, although certain restrictions are necessary.

4. Uniform security, privacy and integrity controls: centralized control and standard procedures can improve data protection, compared to that provided by a dispersed data file system.

5. Data independence: it is the separation of data description from the application programs that use the data. An organization's data can change and evolve (within limits) without necessitating a change in the application programs that process the data.

2.2.6 Advantages of DB AND DBMS:

Control of Data-dependence

This is achieved by integrating files so that the several copies of the same data are not stored.

Data Consistency

Elimination/control of redundancy reduces the risk of inconsistency. If data is stored only once in the DB, any update to its value has to be performed only once and the value is immediately available to all users.

Data Sharing

Typically files belong to people/debts that use them. Also, DB belongs to the entire organization and can be shared by all authorized users.

Improved data integrity

Data validity and consistency of stored data. Integrity expressed in terms of constraints-consistency rules that the DB is not allowed to violate.

Improved Security

Security means protection of the DB from unauthorized users, viruses and database threats.

Enforcement of standards

Integration allows the DBA to defend and enforce the necessary standards. They include Departmental, Organizational, Country or international standards for such things as data formats to facilitate exchange of data.

Economy of skill

Cost saving results when all organization's operational data are combined in one DB together with the application programs.

Improved data accessibility and responsiveness

As a result of integration, data that crosses departmental boundaries is directly accessible to the end users. This provides a system with potentially much more functionality.

Increased productivity

The DBMS provides many of the standard functions that the programmer would normally have to write in a file based application. DBMS provides all low-level file-handling routines that are typically in application programs. Programmers concentrate more on specific functionalities required by the user without worrying on the low-level details.

Improved maintained data independency

A file-based system, the description of data and the logic of accessing the data are built into each application program making the program dependant on data. In contrast, the DBMS separates the data description from application thus making application immune to changes in the data description (data independency).

Increased Concurrency

Many DBMS manage concurrent DB access and ensure that if two or more users are allowed to access the same file simultaneously, it is not possible that the access will interfere with each other.

2.3 Computerized Hospital Record Keeping Systems

Record keeping on a computer works on the same principles as a manual system, only the computer automates the process so it's faster and more accurate Daily (1997).

According to *Kealing and Kan, (2007)* states that the electronic record keeping system is expected to reduce medical errors and make it easier for patients to understand their treatment. A person's medical records would be available to any clinician within the Hospital system. No longer, they said, would it be necessary for a person to carry their records from doctor to doctor, or to have them faxed from office to office. Instead, doctors and nurses would upload a patient's record at stations throughout the hospital or on portable computers.

Through many years of creative collaborations between physicians, software designers, records managers and patient advocates, many Clinics and hospitals have created the most advanced, secure and user-friendly system for integration of patient data available to physicians anywhere: This systems are normally custom-built, computer-based, electronic systems that seamlessly tracks and documents patient procedures throughout the clinic or

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hospital system. At the touch of a computer keyboard, the record keeping system efficiently displays patient information on clinicians' computer screens to give the best information (historic and real-time) on which to make the best care decisions.

With this comes the highest quality assurance available anywhere to safeguard the hospitals vast amounts of patient information. By stopping at any one of the hundreds of computer stations throughout the hospitals departments, a physician can enter a patient's hospital ID number and call up a wealth of patient health information. The physician can check results of blood tests ordered that morning, review mammography images taken last year and compare them to current scans, find historic information: When was that last tetanus shot received, anyway? Is it time for another one? All of this can be done while the patient is in the room, with the computer screen tipped toward the patient so he or she can see the images, and hear the physician interpret the results. With the record keeping system, patients and physicians both have access to the information that makes them true partners in patient care *(Mayo, 2001)*.

2.4:   Manual System

A manual system is a set of integrated components that use human effort in each and every step of their activities. Manual systems have computers but they run their activities mostly through human efforts. For example, the employees have to enter data manually in every file and as a result work is slowed down. This manual system also leads to data duplication and inconsistency *(Garcia-Molina, 2000)*.

2.5:   Information System

Information systems do more that store or retrieve data. They help people use information in countless ways, whether sorting lists, printing reports, matching a single fingerprint against a national database of millions of prints, tracking locations of planes in the sky (*Norton, 1998*).

2.6:   Components of a Record Keeping System

Input: it is the startup component in which a system operates. It largely determines the nature of output in the system that is GIGO (Gabbage-in-Gabbage-out).

Process: it is an activity that makes possible the transformation of input to output. Machines, functions, operations may act as a processor transformed data into output.

Output: is a result of an operation. It's the main objective for which an information system is designed.

People: these are the users of the system, includes data administrators, database administrators, programmers, system analysts.

Procedures: are the rules and instructions that govern the design and use of the database as well as the documentation on how to use or run the system

2.7 : Conclusion.

The above view of the literature review gives all the components and elements of what other Authors say and describe, define and analyze the various aspects of the DBMS. This is in the view of the observation and reference documented by other scholars. This will give us the guideline on what to be designed as the system.

CHAPTER THREE

METHODOLOGY

3.1 Introduction:

In this chapter the research methodology is described in terms of design, methods, population and the instruments used for data collection. The research design chosen would enable the researcher to achieve the purpose and objectives of the study. The purpose of the study is to develop a patient's record keeping and archiving system that would facilitate convenient processing, storage and retrieval of information.

New computer systems frequently replace existing manual systems and the new systems may themselves be replaced after sometime. The Record keeping and archiving system for Bitiira hospital would go through the following stages of development:

SYSTEMS ANALYSIS

FEASIBILITY STUDY

SYSTEMS DESIGN

CODING AND TESTING

IMPLEMENTATION
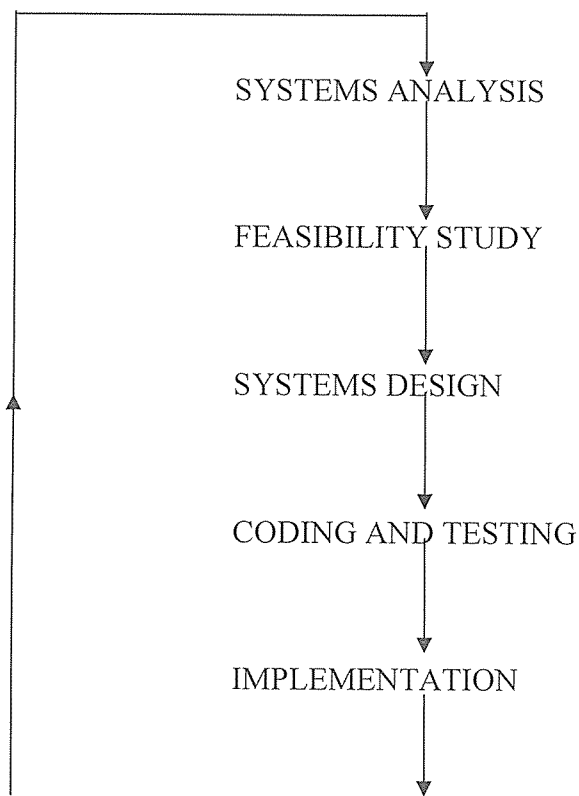
Fig 3.1: Record Keeping and Archiving System Development Lifecycle

3.2 Population study

The researcher contacted the Administrators of all the departments, the secretaries in each department and the patients in Biitira hospital because there are the people involved in the day to day activities of the hospital.

3.3 Data collection methods

Data would be obtained using different instruments/ methods, Interviews, and observation of the processes involved in hospital record keeping.

3.3.1 Primary Sources of data
3.3.1.1 Interviews

The researcher carried out an interview with the administrators, secretaries and head of departments of Bitiira hospital.

This data collection technique involved oral questioning of respondents who were linked to the project. The structured type of interview was used where the researchers hard a specific set of questions to ask the interviewees and directed additional questions depending on the interviewee's responses.

Answers to the questions posed during the interview were recorded by writing them down during the interview itself and by tape-recording the responses.

Structured interview was used for the following reasons

1) The interview may be modified as needed to gather important information.

2) The researchers obtained supplementary information.

3) It permitted face to face interaction.

4) It yielded the richest form of data, details and insights.

5) It enabled the interviewer to probe for more feedback from the interviewee if the answers given seem not to be clear.

6) It enabled the researchers to ask questions that could reveal additional information useful for decision making.

Advantages of using interview in the study

- They are frequently the best source of qualitative information i.e. opinions, policies and subjective descriptions of activities and problems.

- They provide an opportunity to the researcher to gather information from respondents who are knowledgeable about the system and study.

- They provide opportunity to the researcher to gather information from respondents who could not effectively write or without time to complete questionnaires.

- They allow the analysts to discover areas of misunderstandings and a realistic expectations and indications of resistance to the proposed system.

Disadvantages of using interviews

- They are susceptible to misunderstandings which stem from technical jargons used.

- It is time consuming as it might require the researcher to move from one department to another at several occasions..

- There is likelihood of going off track.

3.3.1.2 Observation

In this technique, the researchers were involved in systematically selecting, watching and recording behavior and characteristics of people and objects in the hospital. This technique was used when the validity of data collected through other methods is in question or when the complexity of certain aspects of the system prevents a clear explanation by the end-users.

Observation was used for the following reasons

- It helped in checking the validity of data obtained through other methods. This increased reliability of the data/information gathered.

- The system analyst was able to see exactly what was to be done. . Through observation, the analyst can see tasks that are missing or inaccurately described by other fact finding techniques.

- Observation is relatively inexpensive compared with other fact-finding techniques.

- Observation allowed the system's analyst to do work measurements

Advantages of using the observation method in the study

- It allowed analysts to obtain information that they can not obtain with other techniques.

- It gives first hand information about how activities are carried out.

The disadvantages of using the observation method

- It is time consuming activity because you have to watch and see before you understand and it might be many times.

3.3.1.3 Questionnaire

This data collection technique involved a set of questions that were set out to the respondents which involved the administrators, secretaries and head of departments of Bitiira hospital; they filled it up and then return it back to the researcher.

It was applied to the administrators, secretaries and heads of departments of Bittira hospital who would be busy at work such that they can not be interviewed by the researcher.

Advantages of questionnaire method in the study

- It allowed collection of data from large number of people.

- It was a good method of cross checking information that would be gathered using other methods.

- The wide distribution ensured that respondents would remain anonymous and this led to honest response answers.

Disadvantages of questionnaire method

- It could not allow analysts to observe expressions and reactions of respondents.

- The system analysts lost the opportunity to pursue other supplementary questions that needed some others.

- The response would be misleading where people were not bothered.

- If the question was not well understood, the respondent did not have a chance of asking about any question.

3.3.2 Secondary Sources of data

3.3.2.1 Document Review

In this method, the researchers located the hospital's existing reports and documents and retrieved them, then carry out an evaluation to identity problems in certain processes such as flows of drug supply, or for identifying increases in the incidence of certain diseases.

Document review was used for the following reasons.

- Data or Information collection is not expensive.

- It provided opportunity for study of trends of events over time.

- It was used to find out the historical trends of events that seem impossible with other data collection methods.

- It is a strong base to build a question such as a reference.

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3.4 Design

The design of the Record keeping and Archival System involved the process of defining the architecture, components, modules, interfaces, and data for the system to satisfy the specified requirements.

3.5 PROGRAMING LANGUAGES

3.5.1 MYSQL

Why You Should Migrate to MySQL from Access while developing Data Bases.

According to Codd, E.F. (1970) gave the following reasons while some one should change from Microsoft Access to Msql.

- **MySQL is Cross-Platform**

One great advantage of using MySQL is its cross-platform capabilities. You can develop your database on a Windows laptop and deploy on Windows Server 2003, a Linux server. This gives you a lot of versatility when choosing server hardware. You can even set up replication using a master on a Windows platform with Linux slaves. It's incredibly easy to move between platforms: on most platforms you can simply copy the data and configuration files between servers and you are ready to go.

- **MySQL is fast**

An independent study by Ziff Davis found MySQL to be one of the top performers in a group that included DB2, Oracle, and SQL Server 2000. MySQL is used by a variety of corporations that demand performance and stability including Yahoo!, and Cisco.

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MySQL can help achieve the highest performance possible with your available

hardware, helping to cut costs by increasing time between server upgrades.

- **MySQL is Free**

MySQL is Open Source software. As such you are free to examine the source code and

make any changes you wish.

- **Customers Want Open Source**

While the Open Source nature of MySQL may not be your driving reason for

migrating, I have encountered multiple users who have moved to MySQL because their

customers demanded it. Many customers want lower costs and the freedoms that come

with using MySQL and other Open Source technologies in their infrastructure. Open

Source software such as MySQL gives them freedom from future licensing and

upgrades costs and gives them a future that is free from the surprises that can come

when dealing with proprietary software.

3.5.2 Visual Basic 6.0

Visual basic is a windows development programming language that uses an interactive

approach to develop software that is to say visually implementing the codes. Visual basic is

an error-prone programming language such that when wrong coding is encountered at the

time of compiling, it will highlight the errors in yellow for one to easily

debug (*Tearoom Willis, Beginning SQL Server 2000*).

Visually coding the events allows for frequent running of the application as you develop it

.therefore you can test the effects of the code as you work rather than waiting to compile

the whole application like in other programming languages like C and C++.

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Reasons for visual Basic 6.0.

Interactivity:-as it is a graphical user interface developer, it makes applications developed from visual basic interactive also compared to other programming languages.

Flexibility: you do not have to use visual basic for data access only; you can use it for developing text processors, email listeners and other tasks.

Security: visual basic also implements constraints like user authentication by use of passwords and user profiles for example database user profile and administrative user profiles can be granted.

Portability: visual basic 6.0 can be used in most systems be it lower version of windows or higher versions and can easily interact with most computer applications for example Ms Word, Ms Access, Ms Excel and many more.

3.6 ETHICAL considerations.

In the view and observance of the ethical constraints underlying the undertaking of the research project, the following aspects would be considered.

3.6.1 Permission to collect data.

Permission to conduct the study was requested from and granted by the Associate Dean of KIU, District Medical Superintendent, to the review and approval of the questionnaire and interviews.

3.6.2 Informed consent.

The written consent was presented to each participant. The purpose of the study, data collection method and participation needed from the respondent was explained to them. The respondents were informed in writing that participation was to be voluntary and they could withdraw from the study without the fear of being penalized by the researcher. Each

participant signed the consent and returned it to the researcher while enclosed in different envelopes with the completion and signatory sheet of the completed questionnaire.

3.6.3 Confidentiality and Anonymity.

A letter to guarantee confidentiality and anonymity was sent to the participant attached with the questionnaire. Contact persons were used to distribute and collect questionnaire from the respondents.

3.6.4 Benefits.

The participants were informed that they would receive no monetary benefits from participating in the study.

3.7 Limitations of the study.

- Limited access to computer facilities that were required right from the start, planning, design through to the implementation phase.
- Financial constraints also slowed down the researcher.
- Need to learn the new programming languages in a very short period of time.
- Some of the people we found understood some language barrier, which made it difficult for us to gather the correct information as we want.
- Some questionnaires were not returned on time and others were not returned back which made it difficult for us to gather the information.

3.8 Conclusion.

In conclusion chapter three talks about the methodology and gives the picture of what would be designed and presented for use.

CHAPTER FOUR

SYSTEM ANALYSIS AND DESIGN

4.1 SYSTEM ANALYSIS AND DESIGN

4.1.1 INTRODUCTION

Systems analysis is a problem-solving technique that decomposes a system into its component pieces for the purpose of studying how well those component parts work and interact to accomplish their purpose. It is driven by the business concerns of system owners and system users. Hence, it addresses the Data, Process and interface building blocks from system owner's and system user's perspectives.

The users and IT specialists collaborated to collect and logistically formalized business requirements by.

- Gathering the business requirements-IT specialists and knowledge workers collaborate in a joint application design (JAD) and discuss which tasks to under take to make the system most successful.

- Analyzing the requirements- business requirements are prioritized and put in a requirements definition document where the knowledge worker will approve and place their signatures.

System analysis was part of preliminary investigation of the previous system. A detailed study of the previous system was done in order to find out: The difficulties and problems of that system, the user requirements, the inputs to the system and the outputs generated.

Advantages of manual system

- Time saving because it needed no much training of the users working in the hospital.

- Low cost because there was no need of buying soft wares, computers and hiring of qualified users.

- It was not affected by computer related problems like viruses, data loss, hackers and power dependence.

Disadvantages of manual system

- It was difficult to keep track of the hospital's patients details due to the large amount of paperwork involved. This was proved by the long period of time it took to come up with the reports that showed the hospital's patients records for a given period of time.

- It took time to come up with urgently needed patients details due to the poor file based record-keeping system used. This led to unnecessary delays.

- Because of the vast amount of paperwork that mostly involved numerical figures, the reports produced were mostly inconsistent and inaccurate due to human error.

- The working environment was not conducive for the staff of Information Circulation Office (ICO) due to the many file cabinets that occupied a lot of space causing congestion.

- Paper documents (records) could be easily destroyed or misplaced and in most cases there was normally no backup for the documents which meant that there was risk for loss of important patient's information which might be needed by the doctor for patient's treatment.

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4.1.2 Investigation

An investigation was carried out to establish how the existing system functions and what its problems were. This led to a definition of a set of options from which the users could choose their required system. In carrying out an investigation, information about the current system was collected and by recording the problems and requirements described by the users of the current system, a picture of the required system was build and to help in investigation, the fact finding techniques were used.

The researchers have achieved the objectives of the project by giving a clear and concise description of the background of the study, statement of the problem, objectives of the study, research questions, scope of the study and the conceptual frame work. This study has to be followed to the activities of the project.

4.2 Computerized system

A new computerized record-keeping system within the (ICO) Information Circulation Office was implemented after the design; this system increased hospital's staff's convenience, saves time during retrieval of patient's information (faster), easy to report generation, Proper maintenance of records for future reference, Better methods for keeping hospital records, provided conducive environment for working and reduction of hospital expenditure.

4.2.1 Data flow diagram.

This is a graphic tool used to describe and analyze the system, putting emphasis on the processes, stores of data and delays in the system. It is used to graphically present data sources, flows, destination and processes involved in transforming data. It shows the movement or flow of data between processes, external entities and data stores.
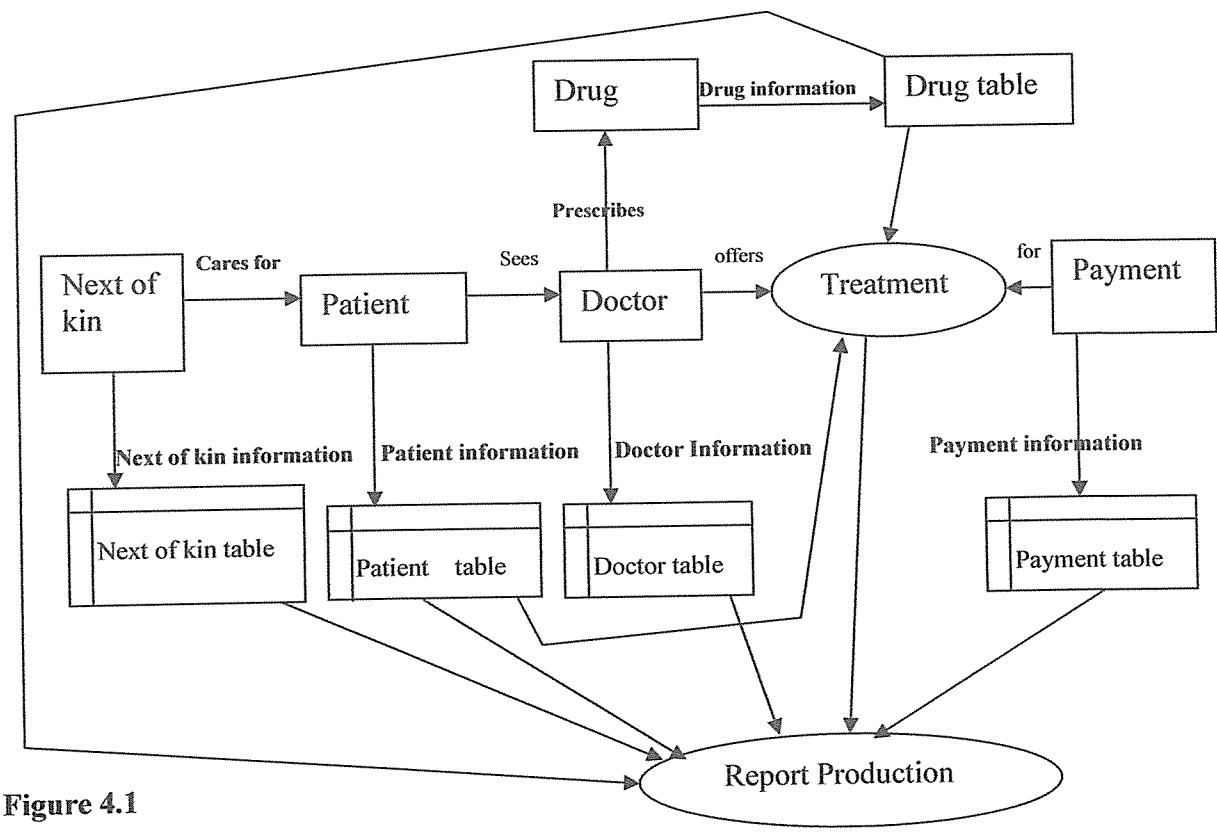

Figure 4.1

4.3 Logical Design

A logical design explains what a system must do but not how the system will be implemented. Their implementation is independent, that is, they depict the system independence of any technical implementation. The different Entities (computer, patient, NOK (Next of kin), doctor, record manager and nurse) and their various attributes plus the entities relationships explain what the system must do as shown below:

Different entities and their attributes

Drugs
<u>Drug ID</u> (PK)
Drug name
Amount
Expiry date
DOM
Dosage

NOK
<u>NOKID</u> (PK)
Fname
Lname
Contact
PatientID

Patient
<u>PatientID</u> (PK)
Fname
Lname
Gender
Age
Address
DOB
NOKID
Diagnosis
DOA
DOD

DOCTOR
<u>Doctor ID</u> (PK)
Department
Fname
Lname
Gender
Address

Payment
<u>PayID</u> (PK)
PatientID
Price
DOP
Drug ID
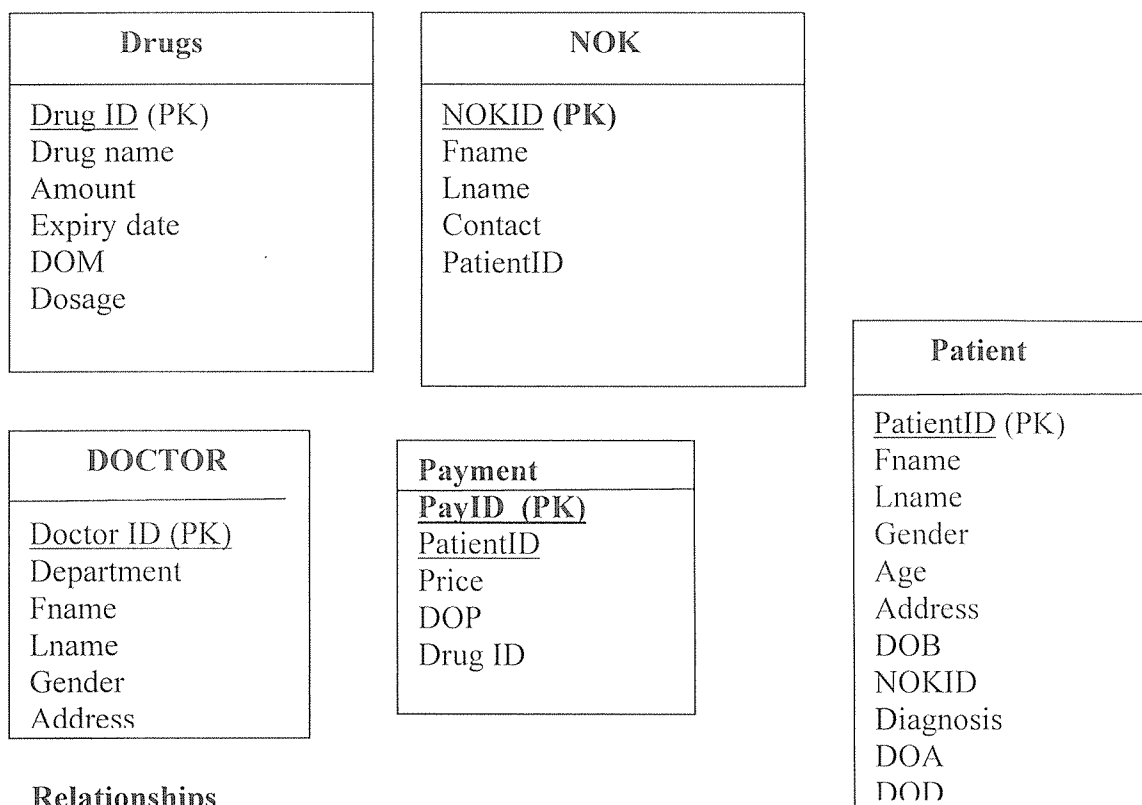
Entity Relationships

Figure: 4.2
The relation-ship is between the employee who may be a doctor or nurse treating a patient.

Figure: 4.3

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The relation-ship is between the next of kin and the patient, next of kin cares for the patient.

| Doctor | 1   PRESCRIBES   N ▸ | Drugs |

Figure: 4.4

The relation-ship is between the employee who is a Doctor is prescribing the drugs to the patient.
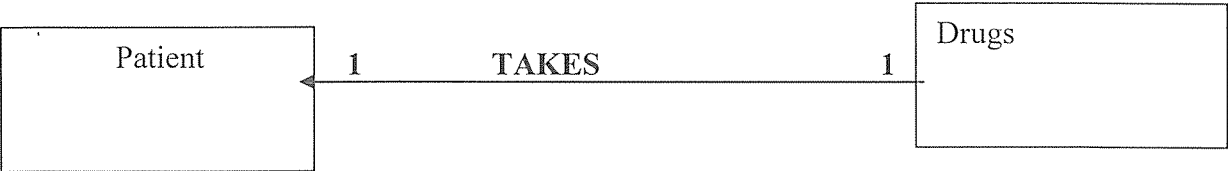
| Patient | ◂ 1   TAKES   1 | Drugs |

Figure: 4.5

The relation-ship between the patient and the drugs the patient takes the drugs. Still under logical design, the researchers also used the conceptual module which illustrates abstract and meaningful concepts in the domain. The creation of concept is the most essential object-oriented step in analysis or investigation of the problem domain for building genuinely extensible software with reuse. The aim of this step is to decompose the problem in terms of individual concepts and the researchers used the tables to show the conceptual level as below:

TABLE 1: Employee's Table

FIELD NAME	DATA TYPE	DESCRIPTION
EmployeeID	Number	Employee identification.
Department	Text	Employee department
Fname	Text	Employee first name.
Lname	Text	Employee last name
Gender	Text	Employee gender
Address	Text	Employee address

TABLE 2: Payment Table

FIELD NAME	DATA TYPE	DESCRIPTION
PatientID	Text	Patient's identification
price	Currency	Price of the drug
Date of payment	Text	Date of payment
Drug ID	Number	Drug identification

TABLE 3: Next of Kin's Table

FIELD NAME	DATA TYPE	DESCRIPTION
NOKID	Text	Next of kin identification
F name	Text	Next of kin First name
L. name	Text	Next of kin Last name
Contact	Text	Next of Kin contact
Patient ID	Text	Patient Identification

TABLE 4: Patient's Table

FIELD NAME	DATA TYPE	DESCRIPTION
Patient ID	Text	
F name	Text	Patients First name
L. name	Text	Patients Last name
Gender	Text	Patients Gender
Age	Number	Patients Age
Address	Text	Patients Identification
DOB	Date/Time	Patient's address
NOF ID	Text	Patient's Date of Birth
Diagnosis	Text	Next of kin's identification
DOA	Date/Time	Patient's diagnosis

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DOD	Date/Time	Patient's date of admission
Employ ID	Number	Employ's identification

TABLE 5: Drug's Table

FIELD NAME	DATA TYPE	DESCRIPTION
Drug ID	Number	Identification for the drug
Drug name	Text	Name of the drug
Expirery date	Text	Date the drug expires
Price	currency	Price of the drug
Dosage	Text	Dosage of the drug
DOM	Date/Time	Date of manufacturer

4.3.1 Physical Design

Physical Design shows not only what a system is or does, but also how the system is physically and technically implemented. They are implementation dependent because they reflect technology choices and the limitations of those technology choices.

4.3.1.1 User interface design

User interface design is the specification of a dialogue or conversation between the system user and the computer. The dialogue generally results in data input and information output.

System inputs

The system contains the following files: Payments file, Employee's File, Next of kin's File, Patient's File and Drug file.

THE SPLASH SCREEN

The splash screen is the first form that shows up when the program is loading. After loading you click on login button.

THE SPLASH SCREEN

The splash screen is the first form that shows up when the program is loading. After loading you click on login button.

Figure 4.1 splash screen

LOGIN FORM

It appears after loading the program. It is used for authentication to ensure that only authorized people have access to the system through the use of usernames and passwords.
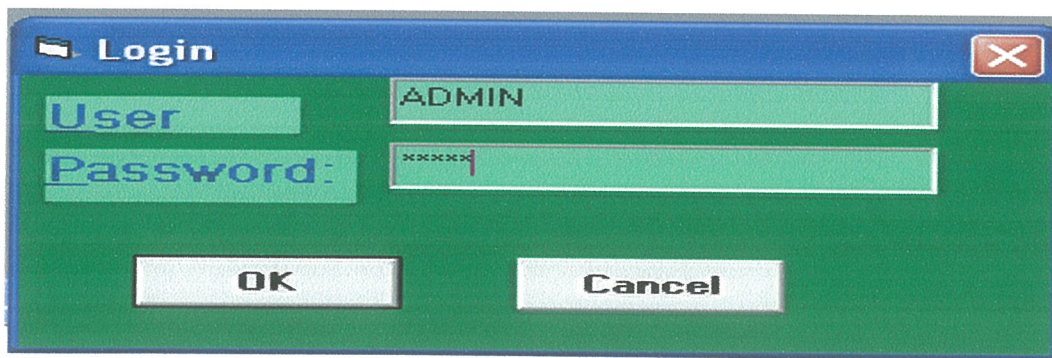

FIGURE 4.2 login form

MDI FORM
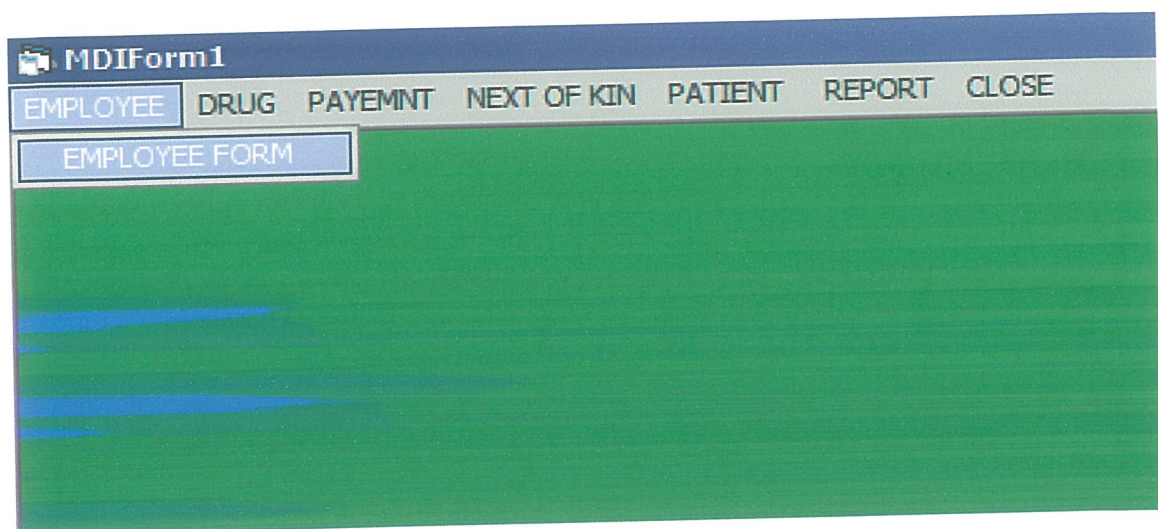It enables the user to gain access to the other forms and reports in the system.

Figure 4.3 MDI form

DRUG FORM
It is used for entering drug information.

Figure 4.4 drug form

EMPLOYEE FORM

It is used for entering and searching employee's information.

Figure 4.5 employee form

NEXT OF KIN FORM
This form is used for entering and searching next of kin information.

Figure 4.6 next of kin form

PATIENT FORM
This form is used for entering and searching the patient's information.

Figure 4.7 patient form

PAYMENT FORM

This form is used for entering payment information.

Figure 4.8 payment form

Output Design

System outputs are used to present data to the users. The System contains the Patient's Details concerning, the patient's Fname, Lname, gender, patientID, address, Date-of- birth, Next of kin, diagnosis and Date-of-Admission.

THE GENERAL REPORT

GENERAL REPORT OF HOPSPITAL AS PER Monday, August 17, 2009							
PAYMENTID:	PRICE:	DOP:	DRUGID:	DrugName:	DOM:	Expirerydate:	Price:
PAY1	800	4/8/2009	D1	PANADO	4/3/2000	2/3/2010	800
PAY2	350	12/8/2009	D2	PANADO	4/3/2000	2/3/2010	350
PAY3	350	4/10/2009	D3	PANADO	4/3/2000	2/3/2010	350
PAY4	3000	24/7/2009	D4	PANADO	4/3/2000	2/3/2010	3000
PAY5	10000	30/11/2009	D5	PANADO	4/3/2000	2/3/2010	10000
PAY6	5000	1/2/2009	D6	PANADO	4/3/2000	2/3/2010	5000
PAY7	20000	4/4/2009	D7	PANADO	4/3/2000	2/3/2010	20000
PAY8	9000	16/2/2009	D8	PANADO	4/3/2000	2/3/2010	9000

Figure 4.9 General report

PATIENT REPORT

PATIENTS REPORT AS PER Monday, August 17, 2009

patientID:	fname:	lname:	gender:	Contact:	age: DOB:	NOKID:	Diagonosis:	DOA:	RoomNO:	DOD:	EmployID
P10	SSEGAWA	ALAN	MALE	0772459360	5/3/1949	N10	BORN	11/2/2008	R0010	1/3/2008	E1
P2	BUSINGE	LYDIA	FEMALE	0781456723	1/12/1986	N2	MALARIA	2/5/2009	R002	9/6/2009	E2
P3	KISITS	SAMSON	MALE	0776900723	2/12/1986	N3	AIDS	29/12/200	R003		E3
P5	ATUBE	BEN	MALE	0754326718	6/5/1989	N5	TUBERCLOS	5/1/2000	R005		E5
P6	OPOKA	JABULON	MALE	0712345622	7/7/1987	N6	CANCER	16/8/2000	R006		E6
P7	ALICE	PEACE	FEMALE	0781345621	6/3/1988	N7	SYPLIS	3/8/2009	R007	1/9/2009	E7
P8	KASAWULI	MOSES	MALE	0772345620	8/3/1989	N8	MALARIA	15/12/200	R008		E8
P9	NALUZI	CHARITY	FEMALE	0789654323	4/7/1986	N8	SWINE FLUE	15/8/2000	R009		E9

NUMBER OF PATIENTS ADMITED   8

Figure 4.10 patient report

4.3.2 Database design

The new computerized record-keeping System is based on Relational Database management systems. This kind of database implements data in a series of tables that are related to one another via foreign keys. Each table consists of named columns and any number or unnamed rows.

The name of the database that will contain the files for the hospital details is computerized record-keeping System.

4.3.2.1 Validation

Data validation is an attempt to build into the computer program the power to detect whether entries made are correct. The incorrect data items are detected and reported. The fields are checked to ensure that they contain the correct number of characters and data types, that is, a non numeric field should not have numeric data and vice versa.

4.3.2.2 Systems Security

a) Soft ware

1. Use of passwords to allow only authorized users to gain access to the systems documents.

2. Install anti-virus software that will help detect and clear viruses.

3. Take regular backups in case of data loss.

4. Diskettes should be checked for viruses before being used.

b) Hard ware

1. Lock all computer room doors to restrict any physical access.

2. Employ watch guards if need be to restrict any physical access.

3. Keep all hardware away from fire and water.

CHAPTER FIVE

SYSTEM DEVELOPMENT AND IMPLEMENTATION

5.1 Introduction

System development involves converting design specifications from the design phase into executable programs. It involves actual programming which involves writing codes using a selected programming language. After coding the system must be fully tested, after which implementation can take place.

5.2 System Coding

The database and the visual basic interface were created independently before they were connected. The database was created using MYSQL and the interface was created using Microsoft Visual Basic 6.0. The connection between the database and the interface was done using Microsoft ODBC Data Source Administrator.

```
Private Sub CMDADDNEW_Click (Index as Integer)
bitiras.Recordset.AddNew
End Sub
Private Sub CMDCANCEL_Click (Index as Integer)
Unload Me
End Sub

Private Sub CMDDELETE_Click (Index as Integer)
Dim Del as String
Del = MsgBox ("Do you want to delete", vbYesNo, "confirm")
If del = vbYes Then
bitiras.Recordset.Delete
MsgBox ("Reccord deleted successfully")
Else
MsgBox ("Record not deleted")
End If
End Sub
```

```
Private Sub CMDNEXT_Click (Index as Integer)
bitiras.Recordset.MoveNext
If bitiras.Recordset.EOF = True Then
MsgBox "Last record reached", vbOKOnly, "Reminder"
bitiras.Recordset.MoveLast
End If
End Sub
Private Sub CMDrefresh_Click (Index as Integer)
bitiras.Refresh
End Sub
Private Sub CMDSAVE_Click (Index as Integer)
bitiras.Recordset.Save
End Sub
Private Sub CMDSEARCH_Click (Index as Integer)
Dim strsearch As String
Strsearch = Input Box ("Enter the drug ID")
bitiras.Recordset.MoveFirst
While not bitiras.Recordset.EOF
If UCase (strsearch) = UCase (bitiras.Recordset.Fields (0)) Then
MsgBox (" Search successful!")
Exit Sub
Else
bitiras.Recordset.MoveNext
End If
Wend
MsgBox ("Record Not found!")
End Sub

End Sub

Private Sub CMDUPDATE_Click (Index as Integer)
bitiras.Recordset.Update
End Sub
```

5.3 System Testing

Testing was done to determine whether the system produces the desired results and whether

it satisfies the user's requirements.

System testing, also known as integrated testing, tests the functioning of the information system as a whole to determine if discrete modules will function together as planned.

5.4   System implementation

This involves conversion of the current system to the new system . a lot of care is taken at this moment to avoid any information loss or corruption of the same. Conversion of hardware, software and the manual file into the new system will be done using the parallel approach. The old and the new system will concurrently run until the new system shows reliability and then the old system will then be abandoned .

User training

The trainees to work with the new system were selected and trained. These are system users and Training involved teaching and guiding the users on how to operate and manage the system program plus interfaces .

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5.4.1 User Interface

The goal of the interface design is to provide the best way for people to interface with the computers, or what is commonly known as human computer Interface (HCI).Provision of good interface is becoming more important because of its impact on organizations. This impact is increasing, because most people in organization are spending more time with computers as part of their normal work –they enter transactions, retrieve data, design artifact, and do other myriad things that to be done in the organizations. Their work and satisfaction are improved with better interface, leading to an improvement in their quality of the work and the effectiveness of the organization.

Many people believe that improving interaction between people and computers is one of the most important activities in design. One of the most important reasons for paying attention is that, nowadays, computers are used nearly by everyone, not only people closely associated with computers. People are no longer interested in technology behind the computers; they simply want a tool that is easy to use and can help them with their problems. They do not want to spend a lot of time learning about computer software, they just want computers to make their own work easier. A good interface certainly helps to fulfill this goal.

CHAPTER SIX

DISCUSSION, RECOMMEDATIONS AND CONCLUSIONS

6.0 Discussion

6.1 Evaluation of the New System

The computerized record- keeping system comprises of several modules of program. The system was developed using Microsoft Visual Basic 6.0 Professional Edition. The major aim of its development was to enable the hospital department to overcome problems in the current system.

6.2 File and General System Security

Maintaining system security is a top priority. This prevents people from tampering with information or even trying to access information without permission. There are several ways of doing this:

1. **Back Up:** at least two copies of back up files should be kept in separate locations to avoid any calamities e.g. fire break out and thefty, which destroys the files.

2. **Physical Security:** this can be done by: Placing security guards to watch over the computer rooms, Installing alarm systems in the computer rooms so that any break-ins can be detected, Store CD's and Diskettes in fire proof safes

3) All internal disks and don't allow any external diskettes into Scan the computer rooms.

4) Each user should have a user name and passwords so as to grant them access to the system.

5) Right protection of the diskettes so that no alterations can be done on information held on the diskettes.

6.3 Recommendations

The researchers recommend that the application can be developed further to include more help files, handle other information needs like interaction with the company website, and more rigorous security measures.

6.4 Conclusion

The computerized record-keeping System software is efficient for bulky and burst amount of information. Therefore, to bring in more efficiency in the hospital, the same kind of software should be extended to the other hospital departments.

The application saves the hospital's department a lot of manpower and high operational costs, stationery and time saving.

QUESTIONAIRE FORM FOR BITIRA HOSPITAL ADMINISTRATORS, SECRETARIES AND HEAD OF DEPARTMENTS.

The purpose of this questionnaire is to find out information regarding the patient's medical record keeping system in Bitira hospital. The findings of this research are purposely academic. All information provided in here will be treated with strict confidentiality.

NB: please tick in the box of your choice and fill in the blank spaces.
1. (a)Is your record system computerized?

　　□　Yes　　　　□　No

(b) If yes, indicate the part (s) of the system which is computerized?

　□ Dental department　　□ X-ray department　　□ Laboratory department　　□ Orthopedic department

2. (a) How are patient's records entered/stored in your data base?

　□ Using mark sheets　　□ Ms.Excel　　□ using Ms.Access

(b) Who enters the patient's records into your database?

　□ Database Administrators　　□ Secretaries

3. What part of the patient's record keeping system would you like to be computerized or improved?

　□ Patient registration　　□ compilation of patient's results　　□ All the above

4. What do you think would be the advantages of a computerized record keeping system at Bitira hospital?

....
....
....
....

5. What do you think would be the disadvantages of a computerized record keeping system at Bitira hospital?

....
....
....
....
....

6. Is there any other information that would affect the credibility of the hospital in case the system is not computerized?

....
....
....
....

7. Make some general comments about the current computerized record keeping system at Bitira hospital.

....
....
....

8. Do you have any measure to enforce security so as to protect patients' records as per now?

☐ Yes   ☐ No

9. If yes how is security for patients records enforced?
....
....
....
....

INTERVIEW GUIDE FOR BITIRA HOSPITAL PATIENTS, ADMINISTRATORS,

SECRETARIES, PATIENTS AND HEAD OF DEPARTMENTS.

Date:...

Time:.......................................

Location:....................................

Subject:.....................................

Interviewer...................................

1a) Is your record system computerized ?

 b) If yes, indicate the part (s) of the system which is computerized?

2a) How are patient's records entered/stored in your data base?

 b) Who enters the patient's records into your database?

3a) what part of the patient's record keeping system would you like to be computerized or

improved?

 b) What do you think would be the advantages of a computerized record keeping system at

Bitira hospital?

4) Is there any other information that would affect the credibility of the hospital in case the

system is not computerized?

5) Make some general comments about the current computerized record keeping system at

Bitira hospital.

6) Do you have any measure to enforce security so as to protect patients' records as per
now?
 b) If yes how is security for patients records enforced?

7) How long does a patient wait before being diagnosed? Approximately how long does it

take to get all the information from the patient?

 8) Approximately how long does it take to come up with urgently needed patient's
information from your files?

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