

ONLINE SCHEDULING APPOINTMENT SYSTEM
CASE STUDY: MULAGO HOSPITAL

BY

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DECLARATION

I **KAHURA ESTHER** declare that this is my original work and to the best of our knowledge has never been presented to any institution for any award.

Signature: Kahura Esther Date: 22/07/2011

KAHURA ESTHER

APPROVAL

This research report submitted to the School of Computer Studies for examination was conducted and written under my approval as the University supervisor.

Signature:  Date: 22-07-2011

Ms.ONKANGI C.

DEDICATION

I hereby dedicate this project to Kampala International University administration and in particular School of Computer Studies and the Department of Information Technology .Through their guidance and support I have almost come to the end of the road. And also this work would not have been a success. Also to my parents through financial and moral support I have been able to become a responsible person and they have given me the future I desire.

ACKNOWLEDGEMENT

My sincere thanks to almighty God the definition and source of my success and for having passed me through this period of my academic period safely and in good health.

My heartfelt thanks and acknowledgements are due to the entire fraternity of Kampala International University, School of Computer Studies.

Mulago Hospital for giving me such an opportunity to broaden my horizon and change our world in different ways.

special thanks goes to my supervisor Ms Onkangi C. whose patient and advice have been exhibited to me during this project period.

Finally to my family members, friends, BIT 2010 Day class and everyone who have assisted me.

Thank you and God bless you.

ACRONYMS

ADM-Administrator

DA-Data Analysis

DOC-Doctor

HEDIS- Health plan Employer Data and Information Set

ICS-Integrated Computer Systems

IDS-Integrated Delivery Systems

IS-Information Systems

ISP-Information System Planning

LAB TECH-Lab Technician

LAB-Laboratory

MDT-Medics Digital Tool

NCQA-National Committee For Quality Assurance

OS-Operating System

RDBMS-Relational Database Management Systems

SQL-Structured Query Language

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ABSTRACT

Hospital information systems are a very vital product in today's growing population this is because health institutions have to deal with the growing number of population. This study was carried at Mulago Hospital, the manual system used lead to problems like; data loss, misplacement disclosure of the confidential data to unauthorized retrieval, and others. It therefore calls for a security for data by design of a computerized database system and this will ease the work for the staff. Online Scheduling Appointment System was designed to store, update, edit, and follow up patient's details and staff and secure confidential information for the hospital. Also cater for the newly accepted client under the department.

The researcher collected data using questionnaires, interviews and observation. The collected data was analyzed using SPSS to verify the data into simple percentage which was presented in the form of tables and charts.

The database was created using MySQL and users accessed it over a Dreamweaver interface. On all the machines a shared document folder was created and this folder enabled that all important information was stored to ensure that non authorized users did not access it.

The researcher tested using Unit Testing and converted the system using parallel conversion where the new system was installed as the old system was still in place.

The researcher recommends that the organization should update the system after every 3 months to ensure it is effectively running and cater for the adjustments due daily changes in the nature of transactions. The staff should also be trained on how to use the new system and a regular follow up done to ensure they are familiar with it. Users of the system need to be thoroughly able to know how the tool works.

CHAPTER ONE

INTRODUCTION

1.0 Overview

Online appointment scheduling allows patients to register online and book their appointments without speaking to medical staff at front desk. This reduces the confusion and misunderstanding regarding allotting the time to the patients. The hospital is going into IT to improve the activities through converting the manual system to computerized system. This will greatly increase the efficiency in data storage, retrieval and manipulation

The current system is not up to date because the hospital has computers which are mainly used at top management level to support automate office system. The staff employees cannot access the computer thus end up storing information using the tradition file system. This has led to the office space being taken up by files. Therefore, the researcher designed Online Scheduling Appointment System that captures most of the work saved in files.

1.1 Background of the Study

Mulago hospital is the main public hospital in Uganda. With its services to the employees and facilities to patients, coming from in and around the country are needed for the efficient functioning of the institution. The hospital has more than five hundred and thirty five beds and equipped with modern facilities and catering all specialties. Computerization at Mulago started long way back when standalone systems were introduced to take care of routine Local area needs, the emphasis then was mainly on book-keeping activities. Medicare areas were not computerized. A need for an integrated patient management system was felt and an Information System Planning (ISP) study was conducted in the areas of Pathology, Radiology, Medical Research, Medical Stores & Pharmacy, and Inpatient Admissions & Billing. Due to some loop holes in the system the project is going to put more emphasis on On-line sharing of information to Intensive Care Unit and wards (ICU), Pathology test result information, staff appointment scheduling Inventory maintenance of medicines& other appliances, online prescriptions, Communications with external world using E-mail and web technology Patient billing, whereby test results can be made available on-line enabling prompt remedial action by staff. Therefore,

the researcher designed Online Scheduling Appointment System that enables patient and the doctor to schedule appointment.

1.2 Statement of the Problem

The hospital system is faced with many problems in running of their daily operations. This is due to some of the functionalities of the current system that don't fully suit the hospital's activities, hence this case study is meant to be a remedy to those problems. Some of the problems of the current system include; illegal access of unauthorized personnel to the system due to low level of security, scheduling difficulties in the allocation of tasks duties to its staff and inefficient manual system in monitoring drug supply from vendors. This has lead to the office space being taken up by files. Therefore, the researcher designed Online Scheduling Appointment System that captures most of the work saved in files.

1.3 Project Objective

1.3.1 Main Objective

The main objective of the study was to design an online Scheduling appointment system that eliminates patient waiting time by organizing activities and allocating task in various section of the hospital.

1.3.2 Specific Objective

The specific objectives of the study are;

1. To investigate on the problems that arises from the existing system.
2. To design a computerized Online Scheduling Appointment System.
3. To implement and test on the new system.

1.4 Research Questions

1. What are the problems that arise from existing system?
2. What techniques should be used on the design of the new system?
3. What implementations should be used to test on the new system?

1.5 Scope of the Study

The study was carried in Mulago Hospital. The researcher designed Online Scheduling Appointment System that eliminates patient waiting time by organizing activities and allocating task in various section of the hospital. The study was conducted for four month.

1.6 Purpose of the Study

The purpose of the study was to design Online Scheduling Appointment System for Mulago Hospital, which saves time and allocates task in various section of the hospital.

1.7 Significance of Study

Improvements in doctor's productivity where by the doctors are more effective on their duties and enable the doctors to work for more hours to the patient.

Reduced patient waiting time where a lot of time is wasted when waiting for the doctor. Accuracy and timeliness of data the system make sure that all the data are kept well and in a secured way as well as be able to retrieve data when needed.

This study is significant to the doctor, patient, nurses and the management of the hospitals in that it is in intended to improve the management and services of the hospital thus help to attain its set plans by eliminating poor storage method that was consuming a lot of space.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The purpose of this chapter is to review both theoretical and empirical fact about the subject matter under the study as put forward by various authors, magazines, journals, textbooks website and electronic materials about the subject area of study.

2.1 Database

Database is a logical collection of interrelated information, managed and stored as a unit, usually on some form of mass-storage system such as magnetic tape or disk. Kroenke, (2002)

Database will be designed to manage large bodies of information and provide mechanism for the manipulation of information addition, the database system ensures the safety of the information stored Silberschatz, (2002)

Information is so important in most organization and therefore there is great need of developing large body of concepts and techniques for managing data.

2.2 Database Management System

Database management system (DBMS) is a set of computer programs used for organizing the information in a database. ADBMS support the structuring of the database in a standard format and provides tools for data input, verification, storage, retrieval, query and manipulation Kroenke, (2002).

2.3 Information System

Information system is described as any organized combination of people, hardware, software, communication network and data resources that collects, transforms, and disseminates information in an organization.

In broader sense information system is a set of inter-related component working together to collect, process, and store and disseminate information to support decision making, co-ordination, control, analysis and visualization of activities in organization. Post, (2002).

2.3.1 Types of Information System

A hospital may have several systems operating at the same time. There are several kinds of system in hospital as described by Anderson, (2002).

2.3.1.1 Management Information System

Management information system is system mainly concerned with internal of information. MIS usually take data from the transaction processing system within the organization. MIS report tends to be used by middle management and operation supervisors. Management information system it used to serve manager with weekly, monthly and yearly reports.

2.3.1.2 Executive Support Systems

An Executive Support System (ESS) is designed to help senior management make strategic decisions. It gathers analyses and summarizes the key internal and external information used in the business.

2.3.1.3 Knowledge Management System (KMS)

Knowledge management System is built around system which allows categorization and distribution of knowledge. For example, the knowledge in word processing, spreadsheets, PowerPoint presentation, internet page and so. Can be shared through group collaboration system such as an intranet. Such system share new knowledge among the employees/people in the organization. Examples are, word processing, desktop publishing, document imaging system and so on

2.3.1.4 Transaction Processing System

As the name implies, Transaction Processing System (TPS) are designed to process routine transaction efficiently and accurately. Such examples of TPS in business environment include

billing system (e.g. invoice for water/power used), system to calculate wages or salary of employees/workers and inventory system to keep track of the movement of commodity

2.3.1.5 Office Automation System

Office Automation Systems are systems that try to improve the productivity of employees who need to process data and information. Perhaps the best example is the wide range of software systems that exist to improve the productivity of employees working in an office (e.g. Microsoft Office XP) or systems that allow employees to work from home or whilst on the move.

2.4 System related to Hospital

2.4.1 Decision support System

Decision support system extracts data from various clinical and administrative systems and compiles it in various ways to identify trends, analyze costs, or solve problem areas in operations. For example, an increase in the number of patients with a diagnosis of adult onset diabetes may indicate that a health care provider must expand its diabetes education services

2.4.2 Subject-based System

The most well-known type of health information system is the electronic medical record (EMR) or electronic health record (EHR), which is the electronic equivalent of a patient's paper chart. The EHR is a subject-based system that captures and stores information based on a patient's name or medical record number. It may also display information based on a physician's name. For example, a physician can view lists of all her patients who are currently in the hospital

2.4.3 Hospital Information System

A hospital information system (HIS), variously also called clinical information system (CIS) is a comprehensive, integrated information system designed to manage the administrative, financial

and clinical aspects of a hospital. This encompasses paper-based information processing as well as data processing machines.

It can be composed of one or a few software components with specialty-specific extensions as well as of a large variety of sub-systems in medical specialties (e.g. Laboratory Information System, Radiology Information System).

CISs are sometimes separated from HISs in that the former concentrate on patient-related and clinical-state-related data (electronic patient record) whereas against a consistent use of both terms the latter keeps track of administrative issues. The distinction is not always clear and there is contradictory evidence.

2.5 Benefits of HIS

Easy Access to Patient Data to generate varied records, including classification based on demographic, gender, age, and so on. It is especially beneficial at ambulatory (out-patient) point, hence enhancing continuity of care. As well as, Internet-based access improves the ability to remotely access such data

It will help as a decision support system for the hospital authorities for developing comprehensive health care policies.

Efficient and accurate administration of finance, diet of patient, engineering, and distribution of medical aid

Improved monitoring of drug usage, and study of effectiveness. This leads to the reduction of adverse drug interactions while promoting more appropriate pharmaceutical utilization.

Enhances information integrity, reduces transcription errors, and reduces duplication of information entries

2.6 Integrated Delivery System

Another foundation concept that heightens the need for CRP systems is that of an integrated delivery system (IDS). An ID is composed of health care providers, and facilities organized to

provide a continuum of health care services to a defined population. These systems of health care were created in response to payers' desire to contract with single entities that provide comprehensive health care services for their client. To manage the delivery of care in IDS, a health system must have efficient and accurate ways of capturing, managing, and analyzing clinical data collected at all the different sites where care is provided. In addition, payers and regulators are requesting "report cards" on quality, outcomes and costs of care provided by the integrated delivery system. For example, the national committee for Quality Assurance (NCQA) developed the Health Plan Employer Data and Information Set (HEDIS) as a standard report card to help employers evaluate different health plans. Initially focused more on administrative data, the evolving HEDIS criteria are increasingly targeting clinical processes and outcome. Gathering the data to prepare these reports can be immensely time-consuming and costly when they are manually abstracted from paper records, but with a CPR, reporting on aggregate data can be a byproduct of capturing data electronically. NCQA advised health plans to "move to fully implement the information framework, including the automated patient record" in order to meet the clinical reporting requirements of forthcoming regulations (NCQA, 1997). As outcomes reporting requirements become more sophisticated and deal with complex, multifaceted diseases, it will be essential to have electronic access to the record and tools to efficiently analyze practice patient outcomes. NCQA will develop HEDIS measures that assume health plans and providers organizations use. Dick, E.B Steen, D.E Detmen (1997)

2.7 Hospital Information medical System

Information systems can help the medical profession in improving its quality of service and thus automatically increasing the preparedness and defensiveness. Of course, it is of vital importance that the software must have the right type of modularity and openness so that it is manageable, maintainable and upgradeable. The hardware should also be reliable, available and have the necessary performance capacity. Certainly, computers with their intrinsic power can play a major role in a hospital. Computers can act as a communication link between departments and allows the common database to be shared by them. They can perform the complex task of matching, tabulating, calculating, retrieving, printing and securing the data as required. Well designed, integrated computer system can be a great tool in the hands of the Hospital management in improving services, controlling cost, and ensuring optimal utilization of facilities. Prabhakar A & Visweswara GH: Datanet Corp Ltd., (1997).

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presented methods the researcher used to collect data on Online Scheduling Appointment System. It is divided into; target population, sample size, research techniques, data collection, and data collection instruments and data analysis.

3.1 Research Technique

The researcher employed both quantitative and qualitative techniques in order to get accurate and reliable information from relevant respondents. The quantitative technique involved descriptive and inferential statistics to prevent the data collection. The qualitative method included questionnaires and in depth interviews. Qualitative research method was used to collect data because it revealed the real knowledge necessary in providing a more profound understanding and analysis of operations of the current system.

3.2 Target Population

The target population were; the doctors, patient, nurses, and subordinate workers. Apart from the staff other targeted populations were student doctors and nurses.

3.3 Sampling Techniques

The researcher used random sampling in collecting data from respondents; this method ensured that all the respondents were given equal and fair chances to be selected.

3.4 Data Collection Methods

The researcher collected both primary and secondary data namely: Interview, questionnaires, observation, and document review. The researcher focused on the current system in place at Mulago Hospital, in the administrative level that uses the system to keep track of database records and communication as well as online collaboration with other departments and organizing references.

3.4.1 Questionnaires

The researcher distributed the questionnaires to doctors, patient and nurses which allowed collection of data from a large number of people. Wide distribution ensured that some things remained anonymous leading to more honest answers. The use of standard question format yielded more reliable data than any other technique. This was a good method of crosschecking information that was gathered by other methods.

3.4.2 Interview

Interviews were conducted by the researcher based on the feedback of the respondent and they are more personal than self-directed questionnaires.

The researcher used in-depth interview, which was a dialogue between the interviewer and the respondents who included the IT technicians, Doctor, Patient, nurses, administrators.. Open-ended questions and extensive investigation characterized the in-depth interviews.

The researcher followed an interview guide that included a list of questions to be discovered that speeded up the interview and made it systematic. In-depth interviews were useful where the interview was about a highly sensitive matter and the respondents would feel more comfortable with it than with a questionnaire as group discussion. It was also useful when the subject matter was complex and where the researcher needed detailed information.

3.4.3 Observation

The researcher played one or two roles, non-participative observation, the researcher collected data in the role of a researcher without trying to become an integral part of the hospital. The researcher also played the role of a participant observer, here the researcher become part of the work team. Observation was important because it permitted the researcher to understand situations, exist in natural, unstructured and flexible settings, provided direct information about behavior of individual and groups as well as providing good opportunities for identifying unanticipated outcomes.

3.4.4 Document Review

Clear decision on which document, scope and depth of analysis required was appropriate. This includes the hospital records of the patients.

3.5 Data Collection Procedure

Before initializing the research, introduction letter from the institution was presented to respective authorities. After receiving the letter, data was collected, cross checked and categorized according to the themes ready for analysis.

Prior to starting data collection the researcher reviewed and studied the hospital's current system and compared it with other hospitals' systems. The researcher observed the patients' treatment with the intention of confirming whether the data collected using questionnaires and interviews were reliable.

3.6 Data Analysis

The researcher analyzed data collected using SPSS program to verify the data into simple percentage which was presented in form of tables and charts. The researcher analyzed the drawbacks of the current system and organization needed to determine how data, people and processes communications and information technology can best accomplish the improvements for the business. The researcher had to analyze the data collected using questionnaires and interviews for accuracy and consistency in order to solve the problems of the existing system and meet the organizations needs.

CHAPTER FOUR

SYSTEM DESIGN AND ANALYSIS

4.0 Introduction

The chapter presents the requirements of the new system. The researcher evaluated the feasibility of the new system and looked at the real design and usage of the new system, the tools used to develop the system, processing and output in the Online Scheduling Appointment System.

4.2 Analysis of the Current System

The current system is not up to date because the hospital has computers which are mainly used at top management level to support automate office system. The staff employees cannot access the computer thus end up storing information using the tradition file system. This has led to the office space being taken up by files. Due to integrity and confidentiality of employees/employers data which was discovered from case study it was being compromised .The researcher first priority was an enhanced security system that required use of passwords to access the system only to the authorized personnel.

4.2.1 Design Tools

In the designed, development and implementation, the researcher used Visual Basic, Microsoft Access and windows operating system to provide a seamless environment for cross sharing of information. There was the use of Data flow diagrams and entity relationship diagrams during the design stage of the system.

The system require a machine running on efficient database servers; the researcher used browser and PHP enable to interact with the MSQL database.PHP (Hypertext pre-processor) which is a computer scripting language originally designed to produce dynamic web-pages. The purpose of this language for this project was that it is specially suited for web environment and can be embedded into HTML .It can also run on web-servers and almost every OS and platforms since our system is an on-line system

4.3 Description of the Proposed System

The proposed system seeks to overcome the short falls associated with the system. The new system seeks to achieve the following goals; Increase Staff performance, Quick and efficient retrieval of data and Improve on data capture and reporting. This enhances periodic reports based on accurate information.

The new system has links that connects the pages for easier navigation through the system .links connects the index page to the scheduler, registration, appointments, specimen, findings, diagnosis, doctors available and other inter linked pages.

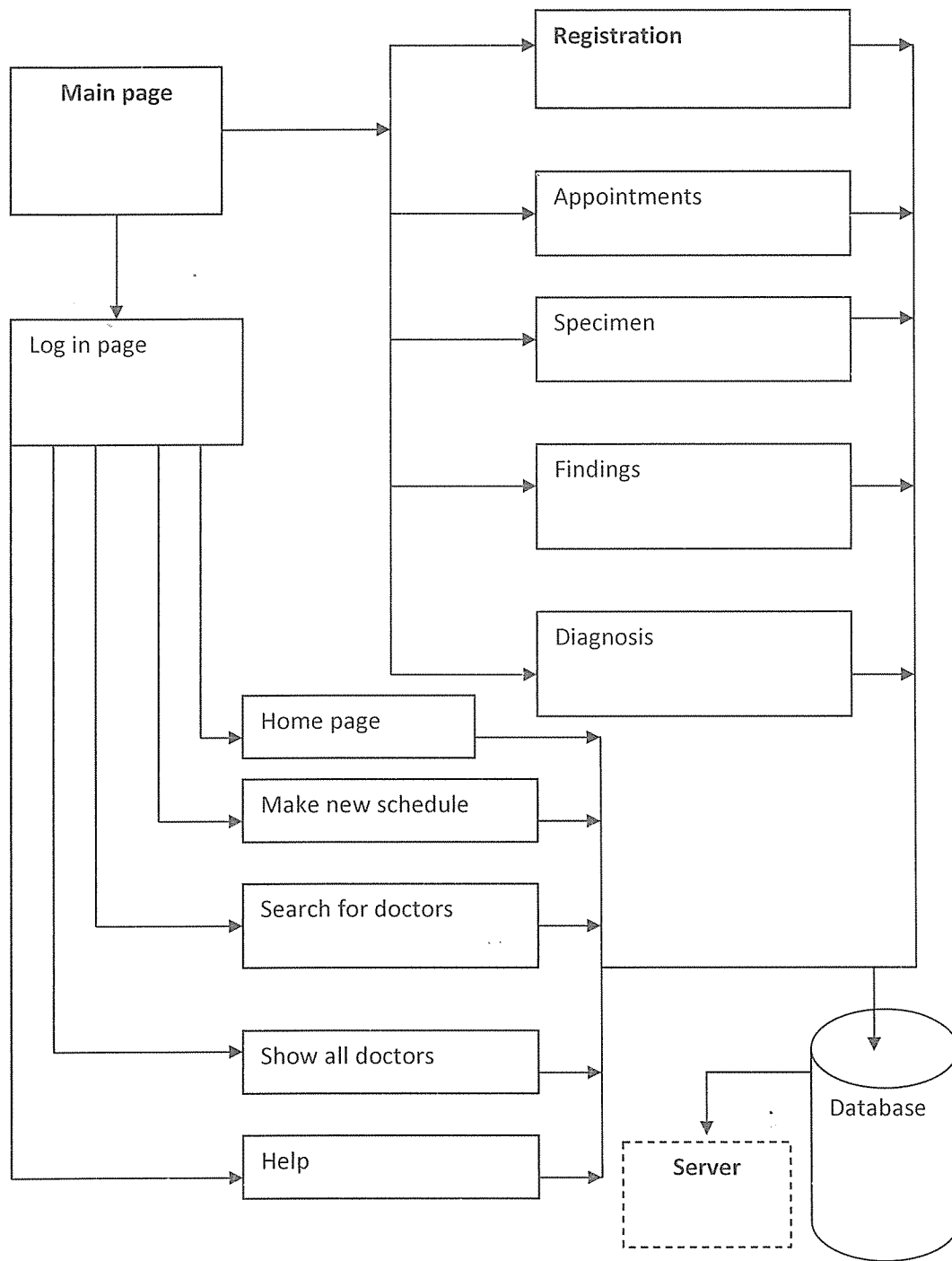


Figure 1:Conceptual framework for the new system

4.4 Benefits of the Proposed System

The system was built in such a way that it can work with other future systems using other operating systems. This is advantageous to the hospital in that the following ways:

Ensures increased functionality of the database. Every data was in one database instated of there being a number of files, papers, books and registers scattered all over. This creates space that could be put to other user.

Help in providing data consistency thus improving on accurate record keeping and data capture. Errors due to manual computations were greatly reduced.

Information is easily shared therefore cutting down on time wastage.

The proposed systems help increase efficiency and effectiveness of the department's services to the hospital and the patient.

The data is stored proximate to the location where it is most frequently used and therefore can be referred to at any time.

The system offers increased security to the system by use of password.

4.5 Feasibility of Proposed System

The current system used does not provide adequate accountability on the part of the hospital. Using the current monitoring and evaluation system, it takes long for one to be served by the hospital. Most of the records get lost in the hospital therefore the new system will monitor and give serves that will be quicker and keep the record safe

4.5.1 Technical Feasibility

Technical feasibility has a major significance throughout the whole system since it's an electronic system that uses databases on servers to store retrieve and modify doctors' information which was very vital for the researcher during this stage of design and implementation

4.5.2 Operational Feasibility

Windows NT family of operating system was preferably suggested for this venture. Due to adequate security facility and file system it supports, it offers not only user-level security, but also folder and file level security

It also support disk quota management implying that, each user can be allocated a disk space relevant to users duties which ensures efficient disk management

4.5.3 Economical Feasibility

The cost benefit analysis carried out showed the benefits of the proposed system outweighed the cost of the existing system. The organization could afford the hardware, software and technical resources and were easily affordable in the local market. The cost was to be incurred in terms of configuration and installation of hardware and software, personnel cost i.e. employee salary, training users, and purchasing of equipments. This further analyses the cost of implementing, running and maintaining the database system.

	EXPENSES	AMOUNT (ugx)
1	surfing and internet	100, 000
2	Typing and printing	120,000
3	binding	10,000
4	Communication /Air time	90, 000
5	Transport cost	60, 000
6	Food	100, 000
	TOTAL	480,000

Table 1: Economic Feasibility of the new system

4.6 System Design

In designing the system, the researcher had to meet the business system requirements and constraints by translating them into a technical solution. This involved the design of network architecture within departments, database to store information, and user interfaces in order to meet the user's requirements. The researcher considered the conceptual design and physical design.

4.6.1 Conceptual Design

This is concerned with the conversion of logical records structures of a data model supported by a database management system, identifying entities and their matching attributes and the relationship types determining the attributes domain.

4.6.1.1 Sequence Diagram

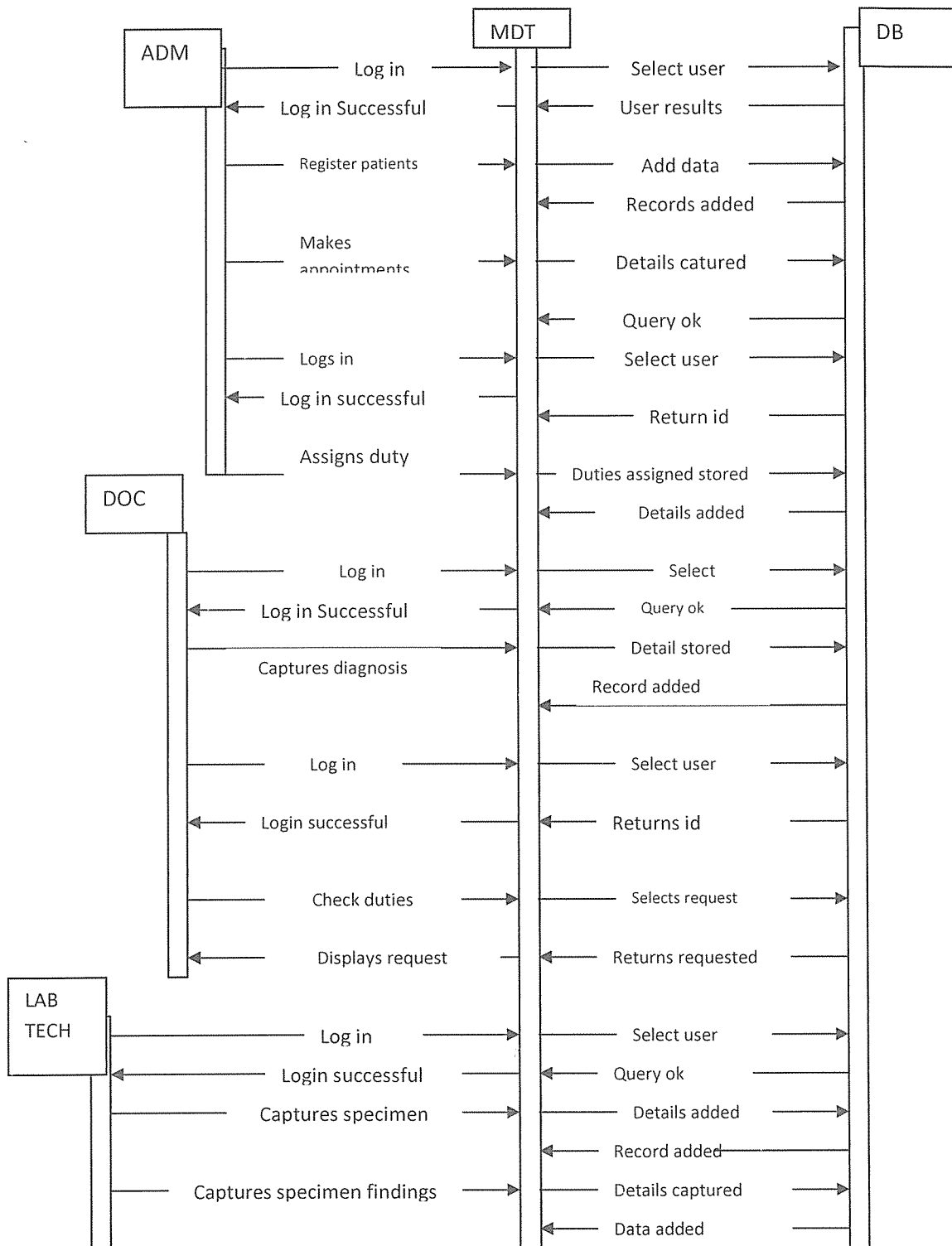


Figure 2 : Sequence Diagram of the new system

4.6.1.2 Case Diagram

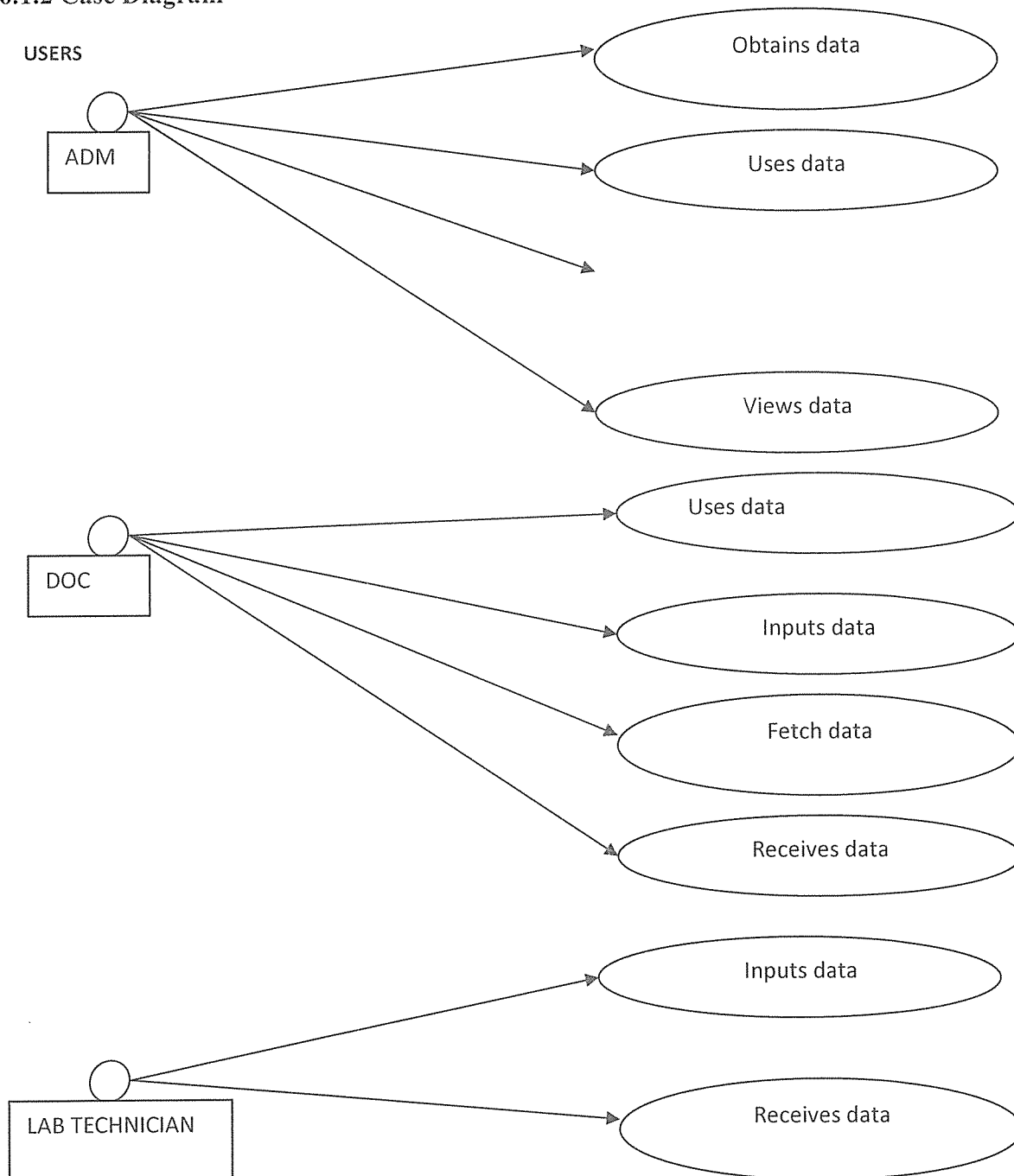


Figure 3: Case Diagram of new system

This tool depicts the flow of data through the system and the processing performed by that system, that is from the log in window to the forms to be filled and the captured data stored in the database at the back end.

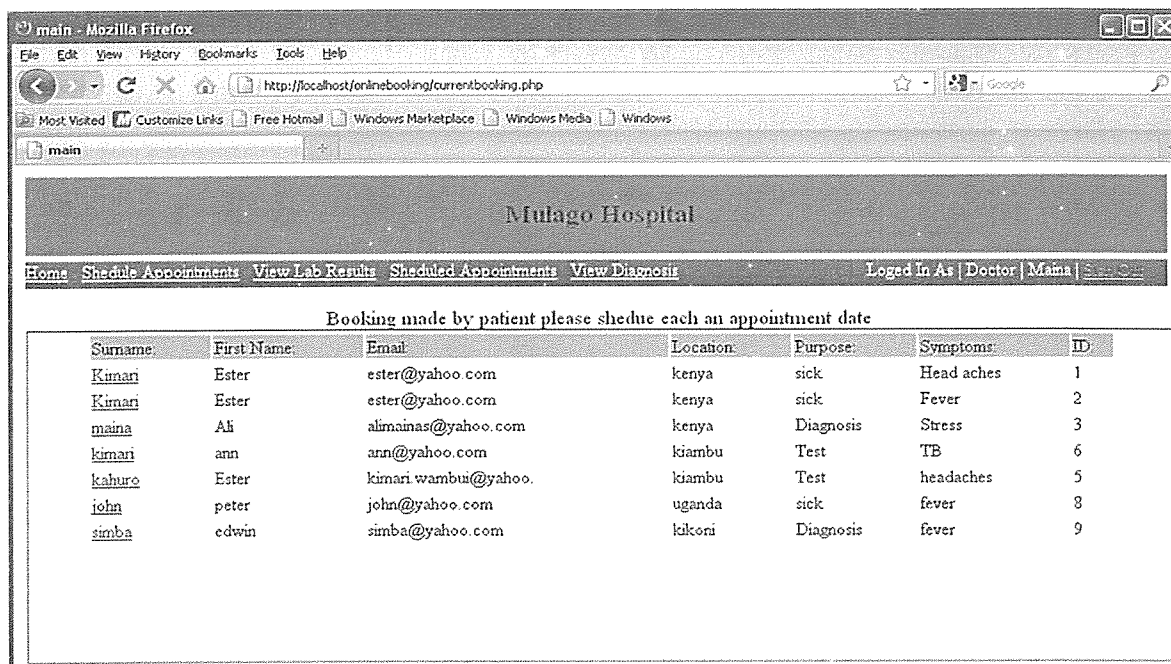
4.6.2 Logical Design

Logical Design is a web design and virtual assistance company providing business support services from website design and email marketing to administrative services and desktop publishing. The reliability, flexibility and variety of services we offer saves you time, money and increases productivity.

4.6.2.1 Tables

A table is a collection of data about a specific topic such as employees ‘doctors’ details, products or suppliers. With a series of tables of different topics results in a more efficient database and few data entry errors.

4.6.2.1.1 Booking Table

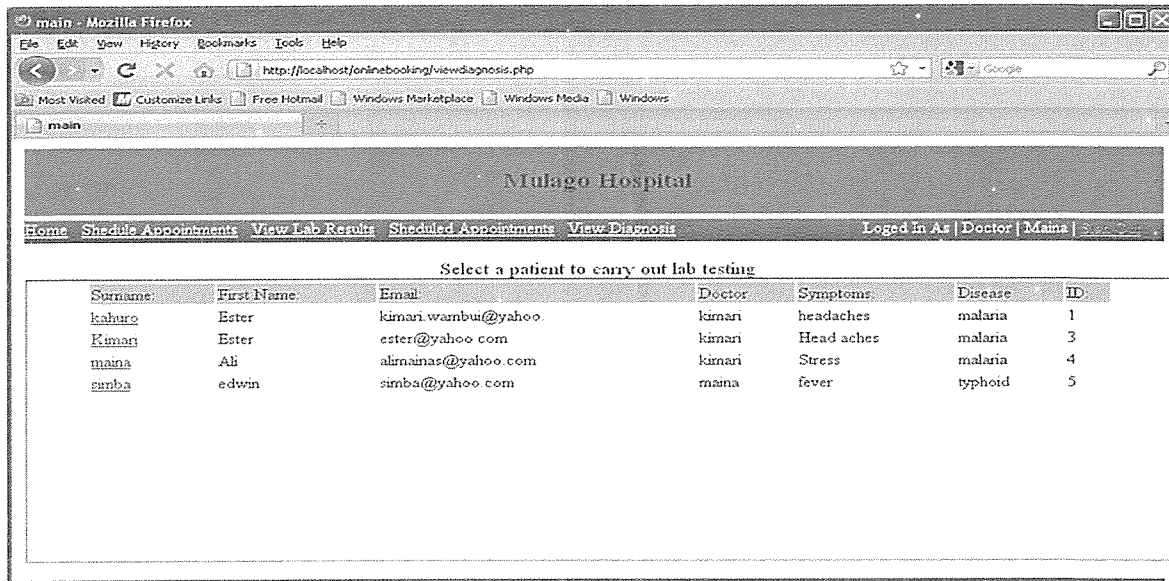


Surname	First Name	Email	Location	Purpose	Symptoms	ID
Kinari	Ester	ester@yahoo.com	kenya	sick	Head aches	1
Kinari	Ester	ester@yahoo.com	kenya	sick	Fever	2
maina	Ali	alimainas@yahoo.com	kenya	Diagnosis	Stress	3
kinari	ann	ann@yahoo.com	kiambu	Test	TB	6
kahuro	Ester	kinari.wambui@yahoo.	kiambu	Test	headaches	5
john	peter	john@yahoo.com	uganda	sick	fever	8
simba	edwin	simba@yahoo.com	lilcori	Diagnosis	fever	9

Table 2: Booking table

4.6.2.1.2 Patient Table

It show selection of patient to be carried out the lab test by the hospital also there details and contacts



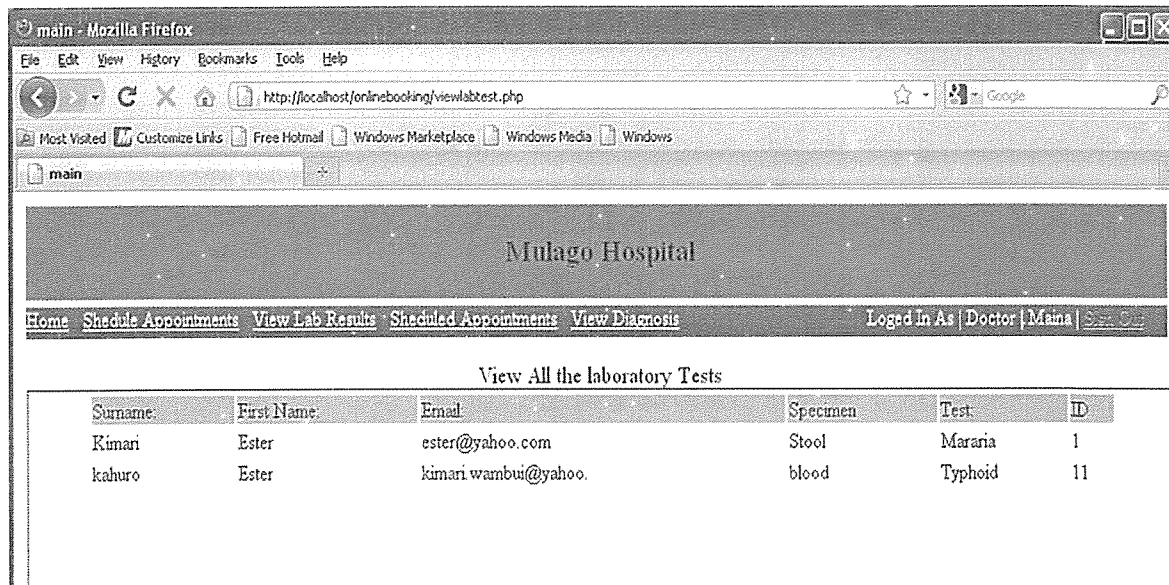
The screenshot shows a web browser window titled 'main - Mozilla Firefox' with the address bar displaying 'http://localhost/onlinebooking/viewdiagnosis.php'. The page header includes the 'Mulago Hospital' logo and a navigation menu with links: 'Home', 'Schedule Appointments', 'View Lab Results', 'Scheduled Appointments', and 'View Diagnosis'. The user is logged in as 'Doctor | Maina'. The main content area is titled 'Select a patient to carry out lab testing' and displays a table with patient details.

Surname	First Name	Email	Doctor	Symptoms	Disease	ID
kahuro	Ester	kimari.wambui@yahoo.	kimari	headaches	malaria	1
Kimari	Ester	ester@yahoo.com	kimari	Head aches	malaria	3
maina	Ali	alirainas@yahoo.com	kimari	Stress	malaria	4
simba	edwin	simba@yahoo.com	maina	fever	typhoid	5

Table 3: Patient table

4.6.2.1.3 Laboratory test table

This show the view of the entire laboratory test that have be carried out and there result.



The screenshot shows a web browser window titled 'main - Mozilla Firefox' with the address bar displaying 'http://localhost/onlinebooking/viewlabtest.php'. The page header includes the 'Mulago Hospital' logo and a navigation menu with links: 'Home', 'Schedule Appointments', 'View Lab Results', 'Scheduled Appointments', and 'View Diagnosis'. The user is logged in as 'Doctor | Maina'. The main content area is titled 'View All the laboratory Tests' and displays a table with laboratory test results.

Surname	First Name	Email	Specimen	Test	ID
Kimari	Ester	ester@yahoo.com	Stool	Mararia	1
kahuro	Ester	kimari.wambui@yahoo.	blood	Typhoid	11

Table 4: laboratory test table

4.6.2.1.4 Summary Table

```
mysql> show tables;
```

Tables_in_hospital					
booking					
tbl_appointments					
tbl_diagnosis					
tbl_lab					
users					

```
5 rows in set (0.01 sec)
```

```
mysql> describe booking;
```

Field	Type	Null	Key	Default	Extra
id	int(11)	NO	PRI	NULL	auto_increment
surname	varchar(20)	NO		NULL	
firstname	varchar(20)	NO		NULL	
email	varchar(20)	NO		NULL	
location	varchar(20)	NO		NULL	
purpose	varchar(20)	NO		NULL	
symptoms	varchar(20)	NO		NULL	

```
7 rows in set (0.02 sec)
```

```
mysql> describe tbl_appointments;
```

Field	Type	Null	Key	Default	Extra
id	int(11)	NO	PRI	NULL	auto_increment
surname	varchar(20)	NO		NULL	
firstname	varchar(20)	NO		NULL	
symptoms	varchar(20)	NO		NULL	
doctor	varchar(20)	NO		NULL	
email	varchar(20)	YES	UNI	NULL	
dateofappointment	datetime	NO		NULL	

```
7 rows in set (0.01 sec)
```

```
mysql> describe tbl_diagnosis;
```

Field	Type	Null	Key	Default	Extra
surname	varchar(20)	NO		NULL	
firstname	varchar(20)	NO		NULL	
email	varchar(20)	NO		NULL	
doctor	varchar(20)	NO		NULL	
symptoms	varchar(20)	NO		NULL	
disease	varchar(20)	NO		NULL	
id	int(11)	NO	PRI	NULL	auto_increment

```
7 rows in set (0.00 sec)
```

```
mysql> describe tbl_lab;
```

Field	Type	Null	Key	Default	Extra
surname	varchar(20)	NO		NULL	

Table 5: Summary table

4.6.2.2 Forms

Most forms are bound to one or more tables and queries in the database. A form's record source refers to the field in the underlying tables and queries and stores or retrieves data from the underlying records.

4.6.2.2.1 Login Form

The login form gives the patient/doctor the chances to be able to give details. The patient/doctor enters the password and username to access the system otherwise the login is not permitted.

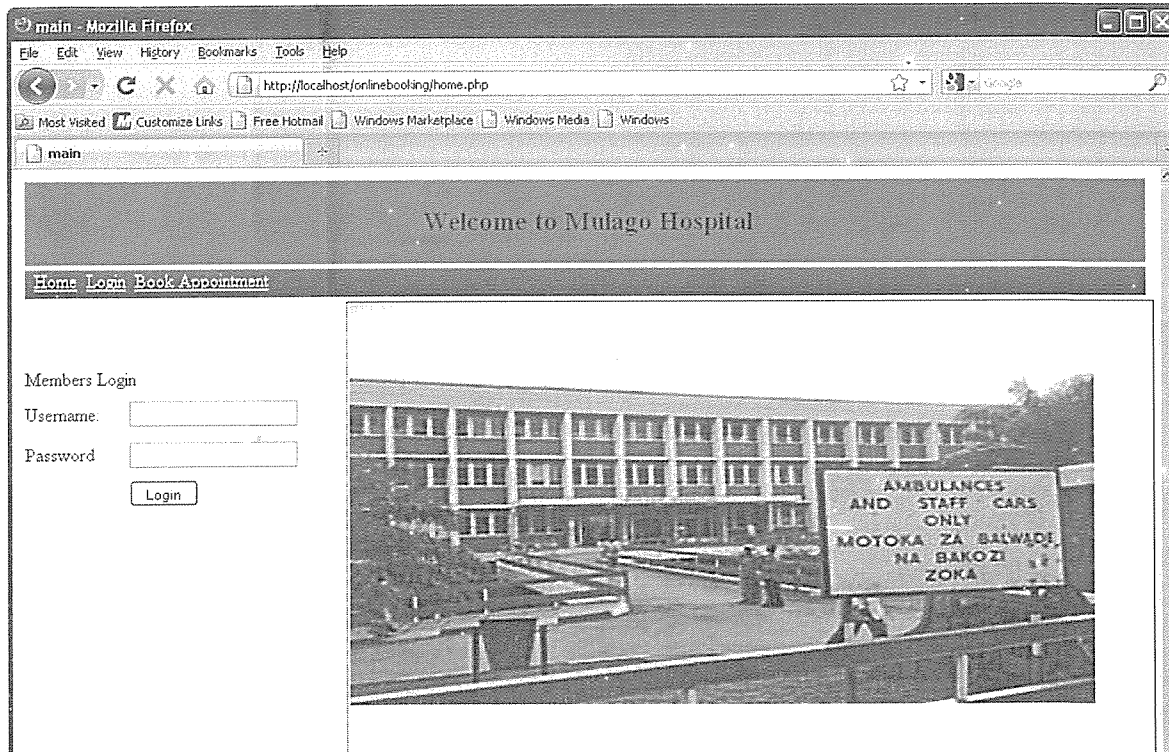


Figure 4: Login form

Due to integrity and confidentiality of patients/doctor's data, the researcher's first priority was an enhanced security system that required use of passwords to access the system only to the authorized personnel. The project involved use of various passwords at various levels, in the system, for instance to access the system the user have to log in using the administrator given password also to access the scheduler the user still need to log in this is because not all administrators have the rights to assign duties to the doctor's.

4.6.2.2.2 Welcome Form

The main form was implemented as an MDI form, which makes a special purpose form that can contain multiple child forms. In any given project, only one MDI form is allowed. The menu is created and placed on an MDI form. Figure 5 shows the welcome form and part of the menu. The menu opens forms and reports that are linked to it.

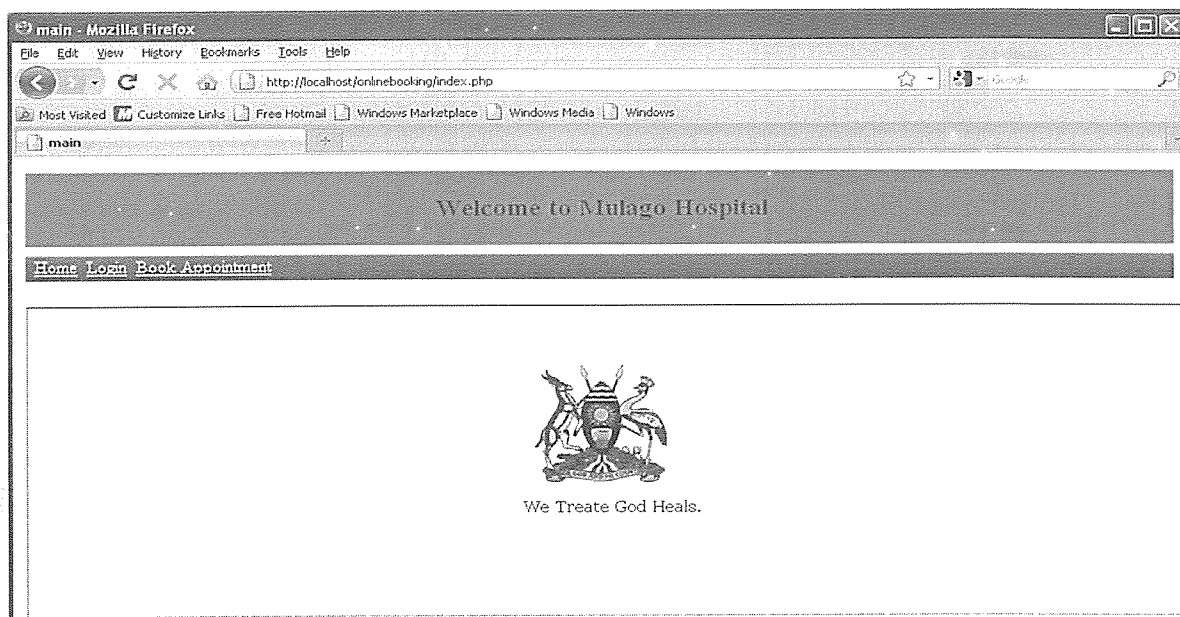


Figure 5: Welcome form

4.6.2.2.3 Appointment Form

The appointment form is for prioritizing patient's status with instructions from the nurse/receptionist to the doctor in charge and written down information about patient's condition. This helps doctor to know the conditions of the patient before physically examining and gives proper diagnosis which is filled in the diagnosis form.

The screenshot shows a Mozilla Firefox browser window with the address bar displaying `http://localhost/onlinebooking/booking.php`. The page has a dark header with the text "Welcome to Mulago Hospital" and a navigation bar with links: [Home](#), [Login](#), and [Book Appointment](#). Below the navigation bar is a section titled "make Your booking" containing a form with the following fields: Surname, First Name, Email, Location, Purpose (with a dropdown menu showing "Sick" selected), and Symptoms. A "Submit" button is located at the bottom of the form.

Figure 6: Appointment form

4.6.2.2.4 Diagnosis Form

Online scheduling appointment was designed to handle patient information at initial stage of admission. The administrator fills in patient's data in an electronic form and post the data to the database. This makes it easier during the next time of visit because the patient will only have to give out the details, administrator will check it from the database easily details hence reducing book keeping and too much paper work.

The screenshot shows a Mozilla Firefox browser window with the address bar displaying `http://localhost/onlinebooking/diagnosis.php?email=almainas@yahoo.com`. The page title is "main - Mozilla Firefox". The browser's menu bar includes File, Edit, View, History, Bookmarks, Tools, and Help. The toolbar shows icons for back, forward, home, stop, reload, and search, along with a Google search bar. The browser's status bar shows "main".

The web page is titled "Mulago Hospital" and features a navigation menu with links: Home, Schedule Appointments, View Lab Results, Scheduled Appointments, and View Diagnosis. The user is logged in as "Doctor | Maina" with a "Log Out" link.

The main content area displays a form titled "Carry out a diagnosis for". The form fields are:

- Surname:
- First Name:
- Email Address:
- Symptoms:
- Disease:

At the bottom of the form are two buttons: "Schedule" and "Cancel".

Figure 7: Diagnosis form

4.7 Requirements Specification

This was intended in identifying and defining the requirements of the new system based on the findings, during the analysis activities on the existing system. User requirements study was conducted through establishing the data flows of the existing system operations, interviewing the different users provided a general overview of what and how existing system does.

4.7.1 Functional Requirements

This was used as a model for communication between users and the system. It helps determine information flow to all the users and stakeholders in a very clear and non-technical manner that is easy to comprehend. There are those qualities that have to be satisfied by the system in order to meet the objectives of the research. They include;

Security modules embedded restrict access to the system components only to authorized users and especially access levels to reflect the privileged or administrative system component tasks of various users, from accidental and intentional threats that can lead to the loss of confidentiality, Integrity and Availability of data. Hence user access codes were used for authentication and authorization. Referential Integrity was highly ensured, use of Antivirus software's to defend the

system from attacks of viruses and Trojan, horses, Back and recovery procedures and in cases of one changing the data and database, database audit is performed.

4.7.2 Non functional Requirements

There are those requirements that enhance usability of a system by adding value; they are not a necessity in the systems functionality towards satisfying the objectives, and these include; the system graphical user interface based, largely dropdown menu driven, for easy and convenient use. It is also easy to learn and interpret. User interfaces were designed basing on the forms currently in use so that the users of the system can easily adapt to the new system.

4.7.3 System Requirements

These requirements specify the minimum hardware and software specifications necessary for the system to run efficiently on any given computer platform / system.

4.7.3.1 Hardware Requirements

The hardware requirements for the system to run smoothly are:-

A personal computer which hosts the database must be available. The minimum specifications of the computer should be:

- i. Central Processing Units (CPU) with at least a Pentium IV processor, hard disk size of at least 40GB and RAM size of at least 512MB
- ii. A graphics card and monitor capable of supporting a resolution of at least 800X600 pixels
- iii. A CD-ROM drive for software installations.
- iv. Printers to print out the reports.
- v. Transmission media and network devices to interconnect the computers on the network.

4.7.3.2 Software Requirements

The system should be installed in a machine and run in efficient database servers; browser and PHP enable to interact with the MSQL database.

In the designed, development and implementation, the researcher need SQL server, JavaScript, HTML and CSS (cascading style sheet), dream weaver and Windows Operating System to provide a seamless environment for cross sharing of information.

4.8 System Testing

The modules' testing was conducted on windows and also windows Linux SuSE platforms .Unit testing of a software or hardware was to taken on the smallest piece of testable software in the application, isolate it from the remainder of the code, and determine whether it behaves exactly as you expect. Each unit was tested separately before integrating them into modules to test the interfaces between modules.

4.9 System Implementation

This was the realization of an application or execution of a plan, idea, model, design, specification and algorithm. Implementation refers to scheduling of appointment from to use the software. This included the installation, system conversion, user training and delivery

4.9.1 Installation

The system was built in such a way that it can work with other future systems using other operating systems. This is advantageous to the hospital in that, in case the hospital changes to a modernized system, the system would still be compatible. This signifies how the system will be put in action / action using the computer system. The installation is prompted when the setup (the executable file) is run. The whole process of running and / or loading the software is continuously controlled by the wizard to load the drivers in memory and hard drive. Double click the setup, the auto run will initialize the system and will start installation in which different and several options are prompted where the one installing will be prompted to “next, continue or I accept” until to completion (Finish).

4.9.2 System Conversion

Conversion into the new system from the old system is a significant milestone. Parallel running method was used involving processing of the current data on both old and new systems in order to cross check the results. This kept the old system alive until the new system had been approved for at least one processing cycle. It promoted user confidence since it allowed the results of the

old and new systems to be compiled side by side and also had given time to familiarize with the new system.

4.9.3 User Training

- i. The system is simple, attractive and easy to use. That is experienced users can use all the system functions after a total of one hour training. After this training, the average number of errors made by these users will not exceed two per day.
- ii. The system provides search criteria for the user to search employees' records through the reports provided.
- iii. The system provides an edit function whereby the user is be able to edit specific data as per his/her privilege.
- iv. The system enables the entry, saving, clearing of data and exiting of the interfaces.
- v. The system will provide help facility in case some information is not clear.

4.9.4 Response Time

The system provides a response time of not more than ten microseconds. It also provides required information in real time when it is searched and needed by the users.

CHAPTER FIVE

DISCUSSION, RECOMMENDATIONS AND CONCLUSION

5.0 Introduction

This chapter presents the conclusion and recommendations that the researcher made to Mulago Hospital about the new designed Online Scheduling Appointment System. It further presents, the area of future research, and the limitations of the study.

5.1 Discussion

Users of the system need to be thoroughly able to know how the system works. The new system seeks to overcome the short falls associated with the system. The new system seeks to achieve the following; increase staff performance, quick and efficient retrieval of data and improve on data capture and reporting. This enhances periodic reports based on accurate information.

The new system has links that connects the pages for easier navigation through the system .links connects the index page to the scheduler, registration, appointments, specimen, findings, diagnosis, doctors available and other inter linked pages.

Finally Online Scheduling Appointment System is an easy to learn easy to use tool that hospital like Mulago cannot miss to implement for better results.

5.2 Recommendations

The researcher recommends that the organization should update the system after every 3 months to ensure it is effectively running and cater for the adjustments due daily changes in the nature of transactions.

The staff should also be trained on how to use the new system and a regular follow up done to ensure they are familiar with it. Users of the system need to be thoroughly able to know how the tool works. As the researcher recommend that all system requirements stated be implemented for efficient operation of the system.

The organization should also ensure a backup is created periodically. To avoid loss during disaster period.

The new system should adopt the use of more advanced Database Management Systems such as Oracle, SQL et cetera which have unlimited capabilities unlike Microsoft Access Database that may develop performance problems

5.3 Conclusion

The Online Scheduling Appointment System designed will fasten the process of treatment in Mulago Hospital. This will benefit the organization by improving on its service delivery. It should be noted that for a long time many clinics and hospitals have relied on manual procedures in issuing medicine and treating patients, this has delayed the purpose sought for the treatment and making it not serve the purpose. The designed online system will improve the number of patients treated since the barriers and hindrances will be automated making the whole process less time wasting.

5.4 Area of Future Research

Challenges comes when electronic scheduling of appointment system in the hospital are used by most hospital in this country which has been a challenge

The hospital should consider developing a mobile application to help the patients to book the doctor by logging in directly at any particular time.

5.5 Limitations of the Study

The study faced the following limitations:-

- i. Some people were not willing to give information due to lack of trust. This created wide gap that lead to lack of information
- ii. Most doctors were busy and therefore too limited time was given to the researcher. The researcher solved this by few of them assisting them.
- iii. Some of the people consulted were asking for the payment in order to reveal information on their hospital.
- iv. Too much costs involved during research and implementation of the system.

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APPENDICE

Appendix 1: Project Tools

	TOOLS TO USE
1	xampp
2	Php, Apache
3	Mysql 5.0 server
4	Macromedia dreamweaver

Appendix 2: QUESTIONNAIRE

ONLINE SCHEDULING APPOINTMENT SYSTEM

Preamble

Dear respondent,

I am a student pursuing a Bachelor’s degree in Information Technology; Kampala International University. I am conducting a research study on “**Online Scheduling Appointment of Mulago Hospital**” as a partial fulfillment for my degree. The information sought is needed for this academic research and will be treated with confidentiality and will be solely for the purpose of this research.

Yours faithfully,

Questionnaire for departmental management staff

1. Name of the department:
.....
.....
2. List the duties and responsibilities of your department in the hospital?
.....
.....
.....
.....
.....
.....
.....
3. Is the current online scheduling appointment system effective?

YesNo
4. Reasons for your choice?
.....
.....
.....
.....
.....

.....

.....

.....

5. Do you support the development of online scheduling appointment system? (tick one)

Yes

No

6. Any reasons for your support?

.....

.....

.....

.....

.....

Questionnaire for selected community members

Complete this section by ticking (✓) what is relevant to you.

1. Category

Head of institution

Member of community

2. Do you like the Online Scheduling Appointment system used by the Hospital?

Yes

No

not sure

3. Do you support the need to develop anOnline Scheduling Appointment and evaluation System for the Hospital?

Yes

No

4. If your choice is NO tick (✓) any one of the following points which best describes your reason.

I do not think that the system to be developed will bring significant changes to the Hospital operations.

I don't know much about Online Scheduling Appointment and evaluation system.

5. If your choice is YES tick (✓) **any one** of the following points which best describes your reason.

If a system is developed for the organization, how do you expect it to solve the problems being faced? (To be answered by those who answered question 5)

.....

.....

.....

.....

.....

.....

.....

.....

6. What were your expectations of the organization's performance?.....

.....

.....

.....

.....

.....

.....

.....

THANK YOU

Appendix 3: Program Codes

```
Appointment - Notepad
File Edit Format View Help

<?php
if($surname){
session_register("surname");
echo "<center><font color='Blue'>Shedule an Appoinment for ".$surname."</font></center>";

}elseif(!$surname){
echo "<center><font color='red'>Error No user specified please select a user to shedule an appointment</font></ce
}

doconnect();

$query=mysql_query("Select * from booking where surname ='".$surname."'");

if($query){
$rows=mysql_fetch_assoc($query);
$surname=$rows['surname'];
$firstname=$rows['firstname'];
$email=$rows['email'];
$symptoms=$rows['symptoms'];

echo"<table border='0' align='center' width=60%>
<tr><td align='right' width='200px'>Surname:</td><td width='220px'><input type='text' name='surname' value='".$surname."'></td>
<tr><td align='right'>First Name:</td><td><input type='text' name='firstname' value='".$firstname."'></td></tr>
<tr><td align='right'>Email Adress:</td><td><input type='text' name='email' value='".$email."'></td></tr>
<tr><td align='right'>Symptoms:</td><td><input type='text' name='symptoms' value='".$symptoms."'></td></tr>
<tr><td align='right'>Shedule Date:</td><td>
Month:
<select name='month' id='month'>
<option value='1'>January</option>
<option value='2'>February</option>
<option value='3'>March</option>
<option value='4'>April</option>
<option value='5'>May</option>
</select>
Day:
<select name='day' id='day'>
<option value='1'>1</option>
<option value='2'>2</option>
<option value='3'>3</option>
<option value='4'>4</option>
<option value='5'>5</option>
</select>

```

```
Appointment - Notepad
File Edit Format View Help

        Year:
        <select name='year' id='year'>
        <option value='2010'>2010</option>
        <option value='2011'>2011</option>
        <option value='2013'>2013</option>
        <option value='2014'>2014</option>
        <option value='2015'>2015</option>
        </select>

</td></tr>
<tr><td align='right'></td><td><input type='submit' name='submit' value='shedule'>
    <input type='reset' value='Cancel'></td></tr>

</table>";

    }else if(!$query){
        echo"Sorry there has been a technical hintch we could not connect to the server";
    }
    $day=$_POST['Day'];
    $month=$_POST['month'];
    $year= $_POST['year'];

    $appointmentdate=date("Y-m-d H:i:s");

    if(isset($_POST['submit']) && $_POST['submit']=="shedule"){
doconnect();
    $check=mysql_query("select * from tbl_appointments where email='".$_$email.'";");
    $record=mysql_fetch_assoc($check);
        if(mysql_num_rows($check)==0){
$send=mysql_query("insert into tbl_appointments(surname,firstname,symptoms,doctor,email,dateofappointment)
VALUES('".$_$surname."','".$$firstname."','".$$symptoms."','".$$logged_in_user."','".$$email."','".$$appointmentdate.'");");
        if(!$send){
            echo "<center>Sorry there has been a technical hintch we could not register your details </center>"
        } else{

```

Appointment - Notepad

File Edit Format View Help

```
<?php session_start();
include ("connection.inc"); ?>
<html>
<head>
<link href="css/master.css" type="text/css" rel="stylesheet">
<link href="css/decorator.css" type="text/css" rel="stylesheet">

<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>main</title>
</head>

<body>
<form id="form1" name="form1" method="post" action="Appointment.php">

<table width="100%" height="91%" border="1" border="1">
  <tr>
    <td>
      <?php
      $login="<a href='home.php'>Login</a>";
      if(!$logged_in_user){

        echo "<table border='0' align='center'><tr><td align='center'><h3>Access Denied!</h3><br>
        You havent logged in yet, click here to ".$login."</td></tr></table>";
        exit;
      }

      ?>
      <div id="wraptopheader">
<div id="wraptopheaderinner">
<?php
include("header.php");

      ?>
</div>
</div> </td>
    </tr>

    <tr>
      <td height="29">
        <div id="wrapmainnavigatorinner">
<?php
include("menu.php");

      ?>
</div> </td>
    </tr>
  </tr>
</table>

<?php
```

```
Currentbooking - Notepad
File Edit Format View Help

<?php session_start();
session_unregister("surname");
include ("connection.inc"); ?>
<html>
<head>
<link href="css/master.css" type="text/css" rel="stylesheet">
<link href="css/decorator.css" type="text/css" rel="stylesheet">

<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>main</title>
</head>

<body>
<form id="form1" name="form1" method="post" action="currentbooking.php">

<table width="100%" height="91%" border="1" border="0">
  <tr>
    <td height="40" colspan="3">
      <?php
      $login="<a href='home.php'>Login</a>";
      if(!$logged_in_user){

        echo "<table border='0' align='center'><tr><td align='center'><h3>Access Denied!</h3><br>
        You havent logged in yet, click here to ".$login."</td></tr></table>";

        exit;
      }

      ?>
      <div id="wraptopheader">
<div id="wraptopheaderinner">
<?php
include("header.php");

      ?>
</div>
</div> </td>
    </tr>

    <tr>
      <td height="29" colspan="3">
        <div id="wrapmainnavigatorinner">
<?php
include("menu.php");

      ?>
</div> </td>
    </tr>
    <tr>
      <td width="38%" colspan="3">
        <center><font color='blue' size=4px>Booking made by patient please shedue each an appointment date</font></center>
        <div id="ex">
```

```
Currentbooking - Notepad
File Edit Format View Help

<?php
doconnect();
$query=mysql_query("select * from booking");

if($query){
echo"<table width='90%' align='center' border='0'>

<tr><td bgcolor=#cacaca >Surname:</td>
<td bgcolor=#cacaca>First Name:</td>
<td bgcolor=#cacaca>Email:</td>
<td bgcolor=#cacaca>Location:</td>
<td bgcolor=#cacaca>Purpose:</td>
<td bgcolor=#cacaca>Symptoms:</td>
<td bgcolor=#cacaca>ID:</td>
</tr>";

while( $rows=mysql_fetch_assoc($query)){
echo"<tr>

<td><a href='Appointment.php?surname=".$rows['surname']."'>".$rows['surname']."'</td>
<td>".$rows['firstname']."'</td>
<td>".$rows['email']."'</td>
<td>".$rows['location']."'</td>
<td>".$rows['purpose']."'</td>
<td>".$rows['symptoms']."'</td>
<td>".$rows['id']."'</td>
</tr>";

}
echo "</table>";
if(!$query){
echo "Sorry there has been a tecqnical hintch we could not register your details";
exit;
}

?>
</div>

</td>
</tr>

<tr>
<td height="34" colspan="3">
<div id="footer">
<div id="footerinner">
<?php
include("footer.php");
```



```
laboratory - Notepad
File Edit Format View Help

<?php session_start();
include ("connection.inc"); ?>
<html>
<head>
<link href="css/master.css" type="text/css" rel="stylesheet">
<link href="css/decorator.css" type="text/css" rel="stylesheet">

<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>main</title>
</head>

<body>
<form id="form1" name="form1" method="post" action="laboratory.php">

<table width="100%" height="91%" border="1">
  <tr>
    <td>
      <?php
        $login="<a href='home.php'>Login</a>";
        $home="<a href='home.php'>Login</a>";
        if(!$logged_in_user){

          echo "<table border='0' align='center'><tr><td align='center'><h3>Access Denied!</h3><br>
            You havent logged in yet, click here to ".$login."</td></tr></table>";

          exit;
        }else if($logged_in_status=='Doctor'){

          echo "<table border='0' align='center'><tr><td align='center'><h3>Access Denied!</h3><br>
            Sorry you have logged in as a doctor and hence you cannot be allowed to
            perform a laboratory test <br>
            please you can return to your prvious view ".$home."
            or just log out".$login."</td></tr></table>";

          exit;
        }

      ?>
      <div id="wraptopheader">
<div id="wraptopheaderinner">
<?php
include("header.php");

      ?>
</div>
</div> </td>
    </tr>

    <tr>
      <td height="29">
        <div id="wrapmainnavigatorinner">
<?php
```



```

regisr - Notepad
File Edit Format View Help

    echo "<table width=35% align='center' border='0'>
    <tr><td colspan=2 align='center'><font color='blue'>Register New Use</font></td></tr>
<tr><td align='right'>Username</td><td><input type='text' class='username' name='username'></td></tr>
<tr><td align='right'>Password</td><td><input type='password' class='password' name='pass'></td></tr>
<tr><td align='right'>Email</td><td><input type='text' class='email' name='email'></td></tr>
<tr><td align='right'>Status</td><td>
    <select name='status' id='purpose'>
    <option value='User'>user</option>
    <option value='Doctor'>Doctor</option>
    <option value='Lab'>Lab Attendant</option>
    <option value='Admin'>Administrator</option>
</td></tr>
<tr><td align='right'></td><td><input type='submit' class='submit' name='submit' value='Register'></td></tr><tr><td></td><td>

doconnect();
if ($username && $pass && $email && $status){
    $query=mysql_query("insert into users(username,password,email,status)
    VALUES('".$username."',PASSWORD('".$pass."'),".$email.",
    ,".$status."");

    if (!$query){
        echo "sorry there has been a technical hintch we could not register your details";
    }
    if ($query){
        echo "User added succsesfully";
    }
}
}elseif($username || $password || $email){
    echo"<div id='warning'>";
    echo "Please fill all the feilds";
    echo"</div>";
}

echo "

</td></tr></table>";

?>

```

```
register - Notepad
File Edit Format View Help

    echo "user added succsesfully";
}
}elseif($username || $password || $email){
    echo"<div id='warning'>";
    echo "Please fill all the feilds";
    echo"</div>";
}

echo "

</td></tr></table>";
    ?>

    </div>
    </td>
</tr>

<tr>
    <td height="34">
        <div id="footer">
            <div id="footerinner">
                <?php
                include("footer.php");
                ?>
            </div></div> </td>
    </tr>
</table>
</form>

</body>
</html>
```