



## **DECLARATION**

I hereby declare that this project has been written by me and is a record of my own research work. It has not been presented in any previous application for a higher degree of this or any other University. All citations and sources of information are clearly acknowledged by means of reference.

---

**OLAPOSI, DOLABOMI DANIEL**

---

**Date**

**DEVELOPMENT OF AN ONLINE DOCTOR APPOINTMENT  
BOOKINGSYSTEM FOR MOUNTAIN TOP UNIVERSITY HEALTH  
CENTER**

**By**

**OLAPOSI, DOLABOMI DANIEL**

**18010301023**

**A PROJECT SUBMITTED TO THE DEPARTMENT OF COMPUTER SCIENCE  
AND MATHEMATICS, COLLEGE OF BASIC AND APPLIED SCIENCES,  
IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS FOR THE  
AWARD OF DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE**

**2022**

## **DECLARATION**

I hereby declare that this project has been written by me and is a record of my own research work. It has not been presented in any previous application for a higher degree of this or any other University. All citations and sources of information are clearly acknowledged by means of reference.

---

**OLAPOSI, DOLABOMI DANIEL**

---

**Date**

## CERTIFICATION

This is to certify that the content of this project entitled, “**Online Doctor AppointmentBooking System for Mountain Top University**”, was prepared and submitted by **OLAPOSI DOLABOMI DANIEL**, in partial fulfillment of the requirements for the degree of **BACHELOR OF SCIENCE IN COMPUTER SCIENCE**. The original research work was carried out by him under by supervision and is hereby accepted.

\_\_\_\_\_  
(Signature and Date)

Dr. (Mrs.) F.A. Kasali,  
Supervisor

\_\_\_\_\_  
(Signature and Date)

Dr. Matthew O. Adewole  
Coordinator, Department of Computer

## **DEDICATION**

This project is dedicated to God almighty for the successful completion of my BSc. in  
Computer Science.

## ACKNOWLEDGMENTS

I owe my profound gratitude to God Almighty who gave the strength, wisdom, and courage, divine help, and provision to me from the beginning to the completion of this work. I express my gratitude to my major supervisor Dr. (Mrs.) F.A. Kasali, and Mr. Richard, for their guidance and support in ensuring the successful completion of this research. God bless you richly sirs and ma's. I sincerely appreciate the Dean, College of Basic and Applied science for his fatherly advice, guidance, and teachings. My heartfelt gratitude goes to the Head of Department, Computer Science and Mathematics – Dr. Adewole, and all other members of staff of the Department of Computer Science: Dr. (Mrs.) F.A. Kasali, Dr. Igiri, DR Onifade, Late Dr. Oyetunji, Mr. J. Balogun.

I will forever be grateful to my parents Mr. and Mrs. Olaposi, who sacrificed wealth, time, and other resources for the sake of my success; and my siblings for their consecutive support and prayers.

Furthermore, I must appreciate the University Chaplain and the Chaplaincy unit for their love, care, and prayer for me, and all Mountain Top University colleagues and friends for their prayers and support in one way or the other. God bless you all.

## ABSTRACT

The purpose of this study was to develop an information system that will enable students to book appointments with university doctors remotely using a mobile device, reducing wait times at the university health center. In this study, the user and system requirements were identified, the system design was specified using the UML language, and the system was implemented.

To determine the predicted behavior of appointment booking systems, a review of relevant works was conducted. To gather user requirements, informal interviews were held with university staff members and students. To describe the system's design, UML diagrams were employed.

The system's implementation outcomes demonstrated that it could enable patients to schedule doctor appointments with the university health center, enable nurses to pair patients with available doctors, enable doctors to report medical data after every appointment, and enable patients to reschedule appointments if necessary.

According to the findings of this study, employing online appointment scheduling tools would assist address problems with the manual method, increase the productivity of healthcare facilitators, and enhance client satisfaction.

**Keywords:** Information systems, Health information systems, Online appointment booking systems.



## Table of Contents

DECLARATION.....	i
CERTIFICATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENT.....	iv
ABSTRACT.....	v
PREFACE.....	vi
TABLE OF CONTENTS.....	1
CHAPTER ONE (INTRODUCTION) .....	10
<b>1.1 Background of Study</b> .....	11
<b>1.2 Statement of the Problem</b> .....	12
<b>1.3 Significance of the Study</b> .....	12
<b>1.4 Aim and Objectives of the Study</b> .....	13
<b>1.5 Scope of the Study</b> .....	13
<b>1.6 Limitation of the Project</b> .....	14
<b>1.7 Project methodology</b> .....	14
<b>1.8 Definition of Technical Terms</b> .....	15
<b>1.9 Chapter Layout</b> .....	16
CHAPTER TWO (LITERATURE REVIEW).....	17
<b>2.1 Introduction</b> .....	17

<b>2.2</b>	<b>History of the Hospital Management System.</b>	18
<b>2.3</b>	<b>Comparing HMS and Hospital File-based Record System</b>	21
<b>2.4</b>	<b>The Hospital</b>	22
<b>2.4.1</b>	<b>Types of Hospitals</b>	23
<b>2.4.2</b>	<b>Departments in a Hospital.</b>	24
<b>2.4.3</b>	<b>Functions of the Hospital.</b>	25
<b>CHAPTER THREE (SYSTEM ANALYSIS AND DESIGN)</b>		<b>27</b>
<b>3.1</b>	<b>Types of Requirements</b>	28
<b>3.2</b>	<b>Requirements Analysis</b>	28
<b>3.2.1</b>	<b>Requirements elicitation</b>	28
<b>3.2.2</b>	<b>Requirements Analysis</b>	29
<b>3.2.3</b>	<b>Requirements Specification</b>	29
<b>3.3</b>	<b>System Analysis</b>	30
<b>3.3.1</b>	<b>Need for Systems Analysis</b>	30
<b>3.3.2</b>	<b>Information Gathering</b>	31
<b>3.4</b>	<b>Analysis of the Existing System.</b>	31
<b>3.4.1</b>	<b>Challenges of Existing System</b>	32
<b>3.4.2</b>	<b>Data Flow Diagram (DFD) of the Existing System.</b>	33
<b>3.5</b>	<b>Analysis of the Proposed System</b>	33
<b>3.5.1</b>	<b>Feasibility Study</b>	34
<b>3.5.2</b>	<b>Functional and Non-Functional Requirements</b>	35
<b>3.5.3</b>	<b>Benefits of the New System.</b>	35
<b>3.6</b>	<b>System Design</b>	36
<b>3.6.1</b>	<b>System Flow Chart</b>	36
<b>3.6.2</b>	<b>Context Flow Diagram</b>	37
<b>3.6.3</b>	<b>Data Flow Diagrams</b>	37

3.7	Site Structure.....	43
3.8	Description of Modules.....	44
3.9	Data Tables.....	45
CHAPTER FOUR (SYSTEM IMPLEMENTATION AND TESTING) .....		51
4.1	System Implementation .....	51
4.2	System Requirements .....	51
4.2.1	Hardware (minimum requirement).....	51
4.2.2	Computer Network .....	52
4.2.3	Software .....	52
4.3	Justification of tools Used.....	52
4.3.1	APACHE.....	52
4.3.2	MySQL.....	53
4.3.3	PHP (hypertext preprocessor) .....	54
4.3.4	Other tools used.....	55
4.4	System Testing.....	55
4.4.1	Unit Testing.....	56
4.4.2	Integration Testing.....	56
4.4.3	System Testing.....	56
4.5	Changeover Procedure .....	57
4.6	System Installation.....	57
4.7	System Interfaces .....	58
CHAPTER FIVE (SUMMARY, RECOMMENDATIONS AND CONCLUSION) .....		60
5.1	Achievements of the project.....	61
5.2	Future improvement and Recommendations .....	61
REFERENCES .....		61
<b>APPENDIX</b>		

## **CHAPTER ONE**

### **INTRODUCTION**

The health center is a part of an institution that offers various healthcare services to the institution's patients. Every university places a high value on this attribute since it is an essential component of human life and because quick access to health care services is crucial in some situations (Akinode J.L, 2017).

The two most vital workers are doctors and nurses. The mountain top institution comprises two doctors, roughly ten nurses, and an estimated 2,000 students and academic staff, according to an informal poll. The non-teaching personnel is not included in this estimate. About a thousand patients to one doctor is the patient-to-doctor ratio 250 people to one nurse. Due to a lack of employees, problems such as lengthy wait times or doctor and nurse workload overload are unavoidable.

The Mountain Top University Health Center is not the only place where these issues are happening. The world health organization (W.H.O.) estimates that patients worldwide wait an average of three hours (Jude Altema, 2020). The term "waiting time" simply refers to the time that must pass before an activity takes place after it has been requested or required (Idowu & Adeosun, 2014). The overall amount of time it takes a patient to see a doctor when they visit the health center is referred to as waiting time in the context of providing health-related services. The total waiting time is typically made up of the service wait time, which is the time it takes the nurses at the health center to attend to patients, the total amount of time it takes them to look up the patient's hospital records, to take vital signs of the patient, and then to forward the files to the doctor who is supposed to treat the patients, and the queue wait time, which is the time the patients at the health center spend waiting to be attended to by the nurses and the doctor.

## 1.1 Background of Study

A hospital is a facility for healthcare that treats patients with skilled personnel and tools. It is a place where Patients come up for general diseases. Hospitals provide facilities like:

- Consultation by Doctors on Diseases.
- Diagnosis for diseases.
- Providing treatment facility.
- Patient admission facility (providing beds, nursing, medicines etc.)
- Immunization for Patients/Children.

The operational personnel and doctors in a hospital must do a variety of tasks. These tasks are completed on paper, and they may include: Recording patient information by simply writing down the patient's name, age, and gender; updating that information should the patient reappear; The cost of each service rendered to the patient is recorded separately on separate sheets to create bills; Patients' diagnosis information is typically noted on the patient information paper. To lessen the amount of paper in the clinic, it is destroyed after a while; Different diseases' information is not recorded in any documents. This effort is done by doctors themselves, who maintain track of numerous drugs. The receptionist and other operational employees complete all of this work manually, and there are a lot of paperwork that need to be handled and taken care of. Doctors may overlook better options when recalling the many drugs available for diagnosis because they are temporarily unable to remember them.

The goal of the study is to develop software to automate hospital management tasks, with a particular emphasis on maintaining patient information, dispensing prescriptions, offering safety tips and dietary recommendations, providing and tracking all of the tests a patient has received, billing, and report creation.

## **1.2 Statement of the Problem**

The clinic's current manual system for managing patient information is in danger due to the growing enrollment at the university. This, of course, entails extra paperwork, which leads to problems with manual computing such as error-prone manual calculations, delayed retrievals, delayed information storage, and delayed updating.

With the promise of better information maintenance and service quality, the Hospital Management System intends to computerize the management tasks of the hospital by creating software that is user-friendly, straightforward, quick, and cost-effective. It is superior to the current manual way of computing in terms of speed, quality, and dependability.

## **1.3 Significance of the Study**

Hospital Management System is an integrated health management system, which addresses the critical requirements of hospitals. It is powerful, flexible and easy to use software designed and developed to convey real conceivable benefits to hospitals and clinics which reduce the paper overload.

The System is designed for Salem University Clinic which currently uses a manual system information maintenance including patient and staff details, this method is becoming or rather as become ineffective for accurate, timely and fast retrieval/storage of client details. Hospital management System covers a wide range of administration and management processes carried out in the clinic. It provides relevant information across the hospital to support effective decision making for patient care, hospital administration, maintenance and critical financial accounting in a unified flow.

Hospital Management System is a software product designed to improve the quality and management of the clinic in the areas if clinical process analysis and activity-based costing. It as allots of benefits to be exploited if implemented in the clinic. Some benefits of the system include;

- Improved effectiveness and quality of work.
- Less number of Staff will be required for record maintenance as the system keeps an organized record of all patients.
- Enhance patient care.
- Increased profitability in the clinic as there will be a reduced cost in information maintenance.
- Increased response time to the problems of patient as formal records could provide important information for treatment.
- And also will save the staff of the hospital time and reduce stress in retrieving information.

#### **1.4 Aim and Objectives of the Study**

The Hospital Management Software is aimed at developing and maintaining the daily activities of the hospital such as the admission/discharge of patients, List of Doctors with details, billing, prescription of drugs, etc. The objectives of the system amongst others include:

- ✓ To develop a frame work for medical appointment booking system for health care management
- ✓ To model its framework designed in (1) using UML
- ✓ Implement the framework using array technologies
- ✓ To develop a web-based doctor scheduling system that will ensures whatever information coming from the hospital center is accurate and reliable.
- ✓ To implement an online doctor scheduling system

#### **1.5 Scope of the Study**

The software is designed specifically for Salem University Clinic. The general purpose of the system is to provide efficient and effective measures for the storage, retrieval of staff and patient

details, automating billing activities, keeping record of appointments and track of available medications of the clinic.

This project will be developed within four months and it will be a web based application to be developed in PHP having MySQL as the backend.

- Database Design (MySQL)
- Form Design (PHP)
- Coding (PHP)
- Testing (Mozilla Firefox Browser)

## **1.6 Limitation of the Project**

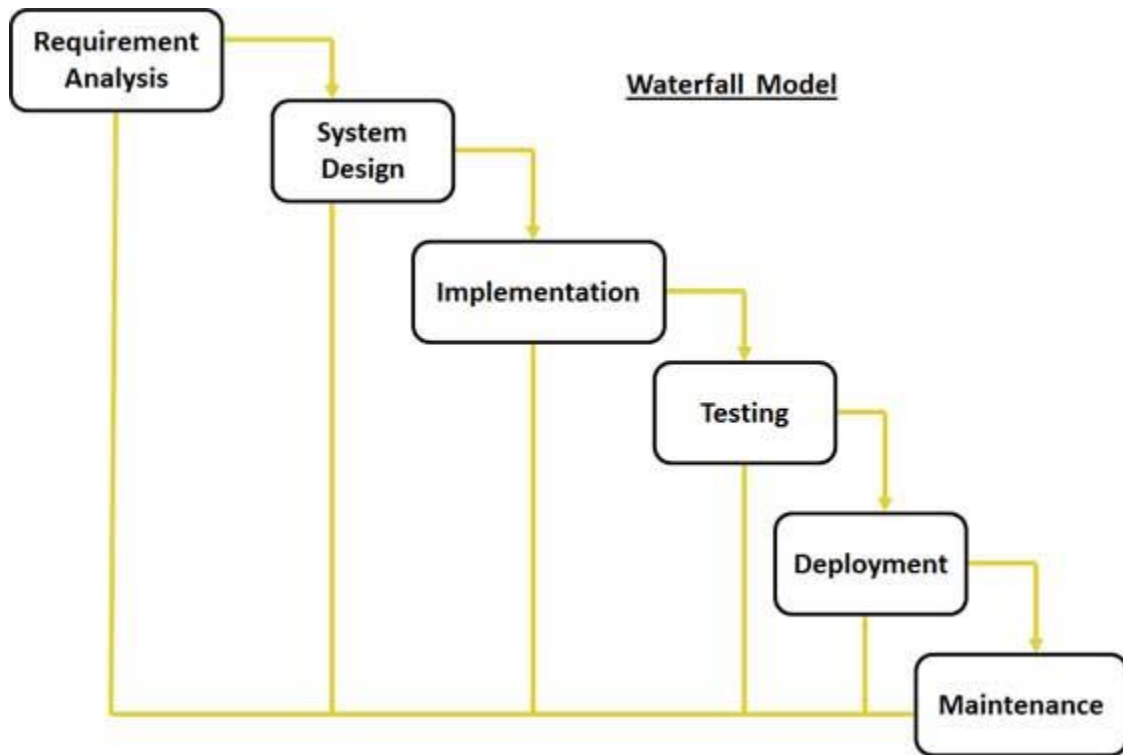
There are different limitations to the project. But, the major limitation to this project has to do with time factor.

## **1.7 Project methodology**

This This project will be carried out using the waterfall SDLC methodology, after the related interface review has been done. The framework will be modelled using UML diagrams such as USE case diagrams, sequence diagrams and ER class diagrams

- a) A conversation will be undertaken to elicit the functional requirements of the system with the nurses, doctors, and other coworkers at the health center.
- b) Other software solutions that have already been created will be observed to identify additional functional and non-functional requirements for the system.
- c) UML diagrams, such as the architectural, sequence, and use case diagrams, be utilized to graphically specify the system's design.
- d) A web application would be created using the web development framework , application for the system-using health facility personnel.





The Waterfall Model, (Sommerville, 2009).

The above model will be used in the development and the completion of this project since it is a generalized model which allows for the correction and maintenance of software.

## 1.8 Definition of Technical Terms

**PHP:** PHP is a widely used general purpose scripting language that is especially suited for web development and can be embedded in HTML.

**HTML:** This stands for Hypertext Markup Language. This is the main markup language for displaying web pages and other information that can be displayed in a web browser.

**MYSQL:** It is an open source Relational Database Management System which runs as a server providing multi-user access to a number of databases. SQL stands for structured query language.

**DATABASE:** This is an organized collection of data.

## 1.9 Chapter Layout

- **Chapter One:** This chapter presents the background story of the project in question. Included in this chapter is the aim and objectives of the project. It is geared towards portraying the essence of the project and its importance.
- **Chapter Two:** This chapter is the literature review, which attempts to give some background information about hospitals, hospital management systems and related terminologies. It also provides a review of some existing systems.
- **Chapter Three:** This chapter consists of the full analysis of the system to be implemented. The functional and the technical requirements of the system are outlined. Alternative solutions to the problems are spelt out and the tools that will be used are evaluated.
- **Chapter Four:** Contains system implementation, integration, system testing, illustration of data models, algorithm used, programming language and the operation and maintenance.
- **Chapter Five:** Contains Conclusion, Summary and Recommendation.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

Any combination of information technology and human activity that supports management, operations, and decision-making is referred to as an information system. In every broad sense, the term information system is frequently used to refer to the interaction between people, processes, data and technology. Information system can also be referred to as the study of complementary networks of hardware and software that people and organizations use to collect, filter, create and process.<sup>1</sup> There are actually different types of information system present in our world today and more information systems are still emerging.

Information system consists of different components which include, computers, instructions, stored facts, people and procedures. It can also be categorized into five parts namely:

- Management Information System (MIS)
- Decision Support System (DSS)
- Executive Information system (EIS)
- Transaction Processing System (TPS)
- Negotiation Support System (NPS)

The Hospital Information Management System can be classified under Management Information System (MIS).

Doctor appointment hospital scheduling management systems can be defined as massive, integrated systems that support the comprehensive information requirements of hospitals, including patient, clinical, ancillary and financial management. Large departments and units that coordinate patient care are seen in hospitals, which are incredibly complicated institutions. Hospital management systems (HMS), which can help with diagnosis, management, and education for better and enhanced services and practices, are becoming more and more important to hospitals. In health organization such as hospitals, implementation of HMS is inevitable due to many

mediating and dominating factors such as organization, people and technology in nutshell, proposed by (Ron C, 2011).

As an area of medical informatics the aim of a DHSMS is to achieve the best possible support of patient care and outcome and administration by presenting data where needed and acquiring data when generated with networked electronic data processing. Hospital Information Management Systems main demands are correct data storage, reliable usage, fast to reach data, secure to keep data on storage and lower cost of usage.

Doctor hospital scheduling information management systems provide a common source of information about a patient's health history. Data must be kept in a secure location, and the system must restrict access to it under particular conditions. By providing a patient's health information and visit history at the time and location that it is most convenient for the patient, these systems improve the ability of health care professionals to coordinate care. Patient's laboratory test information also visual results such as X-ray may be reachable from professionals. DHSIMS provide internal and external communication among health care providers.

The DHSMS may control organizations, which in these case is the Hospital, official documentations, financial situation reports, personal data, utilities and stock amounts, also keeps in secure place patients information, patients medical history, prescriptions, operations and laboratory test results.

## **2.2 History of the Hospital Management System.**

EMRs are computer-based systems that are used to store, transmit, and manage a patient's private medical information. Any data collected during doctor visits, such as medical history, physicals, lab results, prescriptions, referrals, and operations carried out in clinics, hospitals, or outpatient offices, is included in computer-based patient records (CPRs). The database also includes lab data on biopsies, imaging, specimen tests, and diagnostic testing procedures.

Dr. Lawrence L. Weed, known as the "father of the problem-oriented medical record (POMR)," first introduced the concept of the electronic medical record (EMR) in 1969. 28 years later in an article which appeared in the British Medical Journal in 1997 entitled "New connections between medical knowledge and patient care" Dr. Weed writes "medical practice requires tools to extend the mind's limited capacity to recall and process large numbers of relevant variables, just as medical science requires the microscope to extend our capacity to see at the microscopic level. We must abandon the arrogance of professional "expertise" that shuns such tools. Instead, we must use the new tools routinely as they are developed for more and more diagnostic and management problems." Why has it taken doctors so long to adopt Dr. Weed's insightful vision?

Over the past 50 years, medical recordkeeping techniques have changed. Most doctors kept track of patient care in the early 1960s by handwriting notes in charts. Doctors and hospitals started using dictation/transcription once the mini cassette and micro cassette were developed in 1967 and 1969, respectively, allowing for more detailed and readable documentation of patient histories and exam results. We have entered the era of the EMR/EHR thanks to the development of digital computer technology (electronic health record).

In 1968, Dr. G. Octo Barnett led a collaborative effort between the Massachusetts General Hospital Laboratory of Computer Science and the Harvard Community Health Plan to implement an automated medical record system. They created the Computer Stored Ambulatory Record (COSTAR), which enabled quality assurance programs like the monitoring follow-up of treatment when streptococcus throat cultures revealed a positive result.

The creation of the Health Evaluation via Logical Processing (HELP) system was a further significant concurrent action. This integrated hospital information system was developed by a team under the direction of Homer R. Warner in the late 1960s. It supported healthcare professionals' decisions and showed how computers might replace much of the paper record while also enhancing the delivery of care. by enhancing the use of that record.

The Computer-Based Patient Record: An Essential Technology for Health Care was published by the Institute of Medicine in 1991. Plans for the development of computer-based patient records were laid out in this influential publication (CPR). An expert committee examined how CPRs might help with treatment and diagnosis decisions in the 1997 revision, created a database for

policymaking, and made an effort to respond to the following questions: - Who uses patient records? What technology is available to suit user needs, and what additional research is required? - What steps should the government, hospitals, and other institutions take to implement CPRs?

In September 1999, the Quality of Health Care in America Committee of the Institute of Medicine (IOM) filed a report entitled "To Err is Human: Building a Safer Health System," A report titled "To Err is Human: Building a Safer Health System" was submitted by the Institute of Medicine's Quality of Health Care in America Committee in September 1999. In this study, the Committee outlined a comprehensive plan for reducing preventable medical errors that could be used by the government, healthcare providers, business, and consumers. One of the report's key findings is that ineffective systems, procedures, and environmental factors not only fail to prevent errors from occurring but frequently actually encourage people to do so. The IOM urged hospitals and doctors to use electronic medical records (EMRs) as a significant step toward minimizing medical errors in its subsequent study "Patient Safety: Achieving a New Standard of Care," dated November 2003.

In 2003 the RAND Health Information Technology (HIT) Project began a study of EMRs with two objectives:

1. To better understand the role and importance of EMRs in improving health care;
2. To encourage government actions that could maximize the benefits of EMRs and increase their use.

The RAND study estimated the potential savings, costs, and health and safety benefits of EMRs if it is assumed that interconnected and interoperable EMR systems are adopted widely and used effectively. Some of the key findings of their study included:

- Health Information Technology would save money and significantly improve healthcare quality.
- The annual savings from efficiency alone could exceed \$77 billion.
- Health and safety benefits could double the savings while reducing illness and prolonging life.
- Obstacles to adoption of EMRs include market disincentives because in general, those who pay for Health Information Technology do not receive the related savings.

In response to these findings, the federal government took action to enhance the quality, effectiveness, and equity of healthcare, and set the target that, within 10 years, almost every American should have access to an EMR. However, only a small percentage of doctors and hospitals have adopted electronic systems, despite the involvement of federal organizations like the Centers for Medicare & Medicaid Services (CMS), the National Committee for Quality Assurance (NCQA), and the Agency for Healthcare Research and Quality (AHRQ). In a study reported in the New England Journal of Medicine in 2008, DesRoches looked at the adoption of electronic medical records among 2,758 primary care physicians. Only 4% reported having an extensive, fully functional, electronic records system, and 13% reported having a basic system.

Despite these obstacles, implementing an EMR in a private practice has several benefits. According to statistical predictions, health information technology could significantly change how healthcare is delivered, making it safer, more efficient, and more accessible, and more efficient.

Early adopters of EMR who have embraced Dr. Weed's vision has benefited greatly from this ground-breaking technology as it becomes ready for the delivery of healthcare in the twenty-first century. Physicians now have a tool that can significantly enhance both the quality of their patients' lives and the medical outcomes they achieve.

### **Comparing HMS and Hospital File-based Record System**

File based or paper records are still the preferred method of recording patient's information for most hospitals and practices in Nigeria and the world at large, majority of doctors still find the ease of data entry and low cost of the manual file-based system hard to part with. However, as easy as they are for the doctor to record medical data at the point of care, they require a significant amount of storage space compared to the digital records. Paper records must be collected from several locations and brought to one location for a health care physician to review them. This process is time-consuming and difficult.

This is particularly true in the case of person centered record, which are impractical to maintain if not electronically. When paper based records are required in multiple locations, copying, faxing and transporting cost are significant compared to the duplication and transfer of digital records. Because of these many "after entry" benefits, federal and state governments, insurance companies

and other large medical institutions are heavily promoting the adoption of a computer based management system.

Handwritten paper medical systems can be associated with poor legibility, which can contribute to medical errors, pre-printed forms, the standardization of abbreviations and standards for penmanship (i.e. the techniques of writing with the hand using a writing instrument) were encouraged to improve readability of paper medical records. The standardization of forms, language, and data input all benefit from the use of electronic records. The collecting of data is made easier by the digitization of forms.

Hospital System can be continuously updated within certain legal limitations. The ability to exchange records between different patients information system (“interoperability”) would facilitate the co-ordination of health delivery in non-affiliated healthcare facility.

### **2.3 The Hospital**

A hospital is a health care institution providing patient treatment by specialized staff and equipment. According to the word's original definition, hospitals were originally "places of hospitality," and certain institutions' titles, such the Royal Hospital Chelsea, which was founded in 1681 as a retirement and nursing facility for veteran soldiers, still reflect this connotation. During the Middle Ages, hospitals served different functions to modern institutions, being almshouses for the poor, hostels for pilgrims, or hospital schools. The word "hospital" is derived from the Latin *hospes*, which denotes a visitor or outsider. *Hospitium*, a different term derived from this, evolved to denote hospitality, which is the relationship between a shelterer and a visitor, friendliness, and hospitable greeting. By metonymy the Latin word then came to mean a guest-chamber, guest's lodging, and an inn (Marchant, & Charles.,2019), *Hospes* is thus the root for the English words host (where the p was omitted to make pronouncing it easier) hospice, hotel, hostel, and hospitality. The latter modern word stems from Latin through the ancient French romance word *hostel*, which eventually lost its silent S and was replaced with a circumflex in the modern French word *hôtel*. The roots of the term "Spital" in German are related.

The public sector, health organizations (for profit or nonprofit), health insurance providers, or charities, including direct charitable gifts, typically fund hospitals. Historically, philanthropic people or religious orders have frequently founded and sponsored hospitals (Risse, G.B.,2020).



Today, professional doctors, surgeons, and nurses make up the majority of the hospital staff, as opposed to the past when volunteers or the founding religious groups typically handled these tasks.

### **2.4.1 Types of Hospitals**

Some patients go to a hospital just for diagnosis, treatment, or therapy and then leave ('outpatients') without staying overnight; while others are 'admitted' and stay overnight or for several days or weeks or months ('inpatients'). Hospitals usually are distinguished from other types of medical facilities by their ability to admit and care for inpatients whilst the others often are described as clinics.

#### **General**

The best-known type of hospital is the general hospital, which is set up to deal with many kinds of disease and injury, and normally has an emergency department to deal with immediate and urgent threats to health. Larger cities may have several hospitals of varying sizes and facilities. Some hospitals, especially in the United States, have their own ambulance service.

#### **District**

A district hospital typically is the major health care facility in its region, with large numbers of beds for intensive care and long-term care;

#### **Specialized**

Types of specialized hospitals include trauma centers, rehabilitation hospitals, children's hospitals, seniors' (geriatric) hospitals, and hospitals for dealing with specific medical needs such as psychiatric problems, certain disease categories such as cardiac, oncology, or orthopedic problems, and so forth. Specialized hospitals can help reduce health care costs compared to general hospitals.<sup>2</sup>

#### **Teaching**

A teaching hospital combines assistance to patients with teaching to medical students and nurses and often is linked to a medical school, nursing school or university.

## **Clinics**

The medical facility smaller than a hospital is generally called a clinic, and often is run by a government agency for health services or a private partnership of physicians (in nations where private practice is allowed). Clinics generally provide only outpatient services.

### **2.4.2 Departments in a Hospital.**

Hospitals vary widely in the services they offer and therefore, in the departments (or "wards") they have. Each is usually headed by a Chief Physician. They may have acute services such as an emergency department or specialist trauma Centre, burn unit, surgery, or urgent care. These may then be backed up by more specialist units such as:

- Emergency department
- Cardiology
- Intensive care unit
- Pediatric intensive care unit
- Neonatal intensive care unit
- Cardiovascular intensive care unit
- Neurology
- Oncology
- Obstetrics and gynecology

Some hospitals will have outpatient departments and some will have chronic treatment units such as behavioral health services, dentistry, dermatology, psychiatric ward, rehabilitation services, and physical therapy.

Common support units include a dispensary or pharmacy, pathology, and radiology, and on the non-medical side, there often are medical records departments, release of information departments, Information Management (aka IM, IT or IS), Clinical Engineering (aka Biomed), Facilities Management, Plant Ops (aka Maintenance), Dining Services, and Security departments.

### 2.4.3 Functions of the Hospital

There are two types of functions that are performed by the hospital-

- Intramural
- Extramural

**Intramural**-Intramural is a kind of function that performed by the hospital in its territory or premises. Intramural function includes various kinds of services like OPD, Diagnostic, IPD, Emergency services and education and training for nursing and paramedics.

Brief accounts about these functions are as follows-

**OPD**- OPD stands for Out Patient Department, It defines as the ambulatory service or medical care provides to the patients who are not needy for admitted to the hospital. This department works on the basis of day care.

**IPD**-IPD stands for In Patient Department, IPD is the heart of the hospital. The foremost objective of the hospitals is to care for the sick and injured person; this task is carried out in the wards of the hospital.

**Diagnostics**- Diagnosis is a medical procedure that helps in finding or diagnoses the disease or cause of disease of patient.

Diagnostic techniques are of two types as follows-

- ✓ Invasive
- ✓ Non- Invasive

**Emergency services**- Emergency department is the vital department of the hospital. This deals with the emergency like accident, minor trauma, and other emergency cases associated with health.

**Teaching and Education**-Teaching and education refers to the training of nursing and paramedical staff.

**Extramural**-Extramural is a kind of function that performs by hospital in outside or surrounding areas. It includes home care services, health camps, health promotion, day care centers etc. A brief account about this function is as follows-

Home care service- This type of health service provides by the hospital at the patients door step, Some patients wants medical help or service at their home, and hospital provides nursing care to the patient.

Health camps- Health camps are held by the hospital in rural areas, schools, colleges, etc.

Health promotion-This type of service is held by the hospital at village level and in rural areas. Health promotion is done by street plays, individual and public counseling etc.

Day Care centers- This center includes minor medical procedures and minor operations which held on day basis. This includes eye care camps, dental camps etc.

## CHAPTER THREE

### SYSTEM ANALYSIS AND DESIGN

#### Introduction

After analyzing the requirements of the task to be performed, the next step is to analyze the problem and understand its context. The first activity in the phase is studying the existing system in order to understand the requirements and domain of the new system. Both the activities are equally important, but the first activity serves as a basis of giving the functional specifications and then successful design of the proposed system. Understanding the properties and requirements of a new system is difficult and requires creative thinking. It also requires understanding of an existing system which is also difficult. Improper understanding of present system and its problems could lead to an unsatisfying solution.

In the requirement phase, systems requirements are gathered. This phase is the main center of attention of the project managers and stakeholders. Meetings with managers, stakeholders and users are held in order to determine the requirements. The general questions that require answers during a requirements gathering phase are: *Who is going to use the system? How will they use the system? What data should be input into the system? What data should be outputted by the system? A list of functionality that the system should provide, which describes functions the system should perform, business logic that processes data, what data is stored and used by the system, and how the user interface should work is produced at this point.*<sup>3</sup> The requirements phase may be divided into requirements elicitation (gathering the requirements from stakeholders), analysis (checking

for consistency and completeness), specification (documenting the requirements) and validation (making sure the specified requirements are correct).

### **3.1 Types of Requirements**

Requirements are categorized as:

- ✓ Functional requirements which describe the functionality that the system is to execute; for example, formatting some text or modulating a signal.
- ✓ Non-functional requirements which are the ones that act to constrain the solution. Nonfunctional requirements are sometimes known as quality requirements or Constraint requirements. No matter how the problem is solved the constraint requirements must be adhered to.

It is important to note that functional requirements can be directly implemented in software. The non-functional requirements are controlled by other aspects of the system.

### **3.2 Requirements Analysis**

Requirements analysis in systems engineering or development, consist of those activities that go into determining the needs or conditions to meet for a new or altered product, taking account of the possibly conflicting requirements of the various stakeholders, such as beneficiaries or users.

Requirements analysis is critical to the success of a development project. Requirements must be actionable, measurable, testable, related to identified business needs or opportunities, and defined to a level of detail sufficient for system design.

#### **The Need for Requirements Analysis**

Studies reveal that insufficient attention to Software Requirements Analysis at the beginning of a project is the major reason for critically weak projects that often do not fulfill basic tasks for which they were designed. Software companies are now spending time and resources on effective and streamlined Software Requirement Analysis Processes as a condition to successful projects that support the customer's business goals and meet the project's requirement specifications.

#### **3.2.1 Requirements elicitation**

Here information is gathered from the multiple stakeholders identified. The Requirements Analyst brings out from each of these groups what their requirements from the application are and what they expect the application to achieve. Taking into account the multiple stakeholders involved, the list of requirements gathered in this manner could go into pages. The level of detail of the requirements list depends on the number and size of user groups, the degree of complexity of business processes and the size of the application.

### **Problems faced in Requirements Elicitation**

- ✓ Ambiguous understanding of processes.
- ✓ Inconsistency within a single process by multiple users.
- ✓ Insufficient input from stakeholders.
- ✓ Conflicting stakeholder interests.
- ✓ Changes in requirements after project have begun.

Some of the current Requirements Elicitation tools in use are: Prototypes, Use cases, Data flow diagrams, Transition process diagrams, User interfaces.

### **3.2.2 Requirements Analysis**

The moment all stakeholder requirements have been gathered, a structured analysis of these can be done after modeling the requirements. Some of the Software Requirements Analysis techniques used are; requirements animation, automated reasoning, knowledge based critiquing, consistency checking, analogical and case-based reasoning.

### **3.2.3 Requirements Specification**

After requirements have been elicited, modeled and analyzed, they should be documented in clear, definite terms. A written requirements document is crucial and as such its circulation should be among all stakeholders including the client, user-groups, the development and testing teams.

The software requirements specification is a document that lists out stakeholders' needs and communicates these to the technical community that will design and build the system. It is really a challenge to communicate a well-written requirements specification, to both these groups and all the sub-groups within. To overcome this, Requirements Specifications may be documented separately as:

- **User Requirements** -written in clear, precise language with plain text and use cases, for the benefit of the customer and end-user
- **System Requirements** -expressed as a programming or mathematical model, meant to address the Application Development Team and QA and Testing Team.

Requirements Specification serves as a starting point for software, hardware and database design. It describes the function (Functional and Non-Functional specifications) of the system, performance of the system and the operational and user-interface constraints that will govern system development.

### **3.3 System Analysis**

System Analysis is the process of investigating a system's operation with a view to changing it to meet new requirements or improving its current operation. It can also be defined as the study of sets of interacting entities, including computer systems analysis. This field is closely related to requirements analysis or operations research. It is also "an explicit formal inquiry carried out to help someone (referred to as the decision maker) identify a better course of action and make a better decision than he might otherwise have.

#### **3.3.1 Need for Systems Analysis**

Business systems are usually complex. Making changes to a system without reference to its effects on other subsystems or current working practices could result in a worsening rather than improvement in the system. Systems analysis will identify :-

1. Outputs and processing needed.
2. Data required in processing the output.
3. Role of people in the process.



4. Security aspects to ensure the efficient continuation of the activities.
5. Costs of providing the system.

This study was carried out at Salem University Clinic, the main purpose of the study was to find out how the process of recording patient's data are carried out, how the activities of the clinic are ran. The current system is entirely manual.

### **3.3.2 Information Gathering**

Information gathering can simply be referred to as the act of collecting information. The gathering of relevant and up-to-date information is a key business process. Information consists of organized facts and figures that have meaning within the context that the information is intended to be interpreted by people.

A strategy should be evolved by the analyst to gather information. The strategy consists of identifying information sources, evolving a method of obtaining information from the identified sources and using an information flow model of organization.

The main source of information for this project was the clinic and the students that make use of it.

The methods used for data collection include :-

- **Oral Interview** :- The interview included the doctor, matron, nurses, lab attendant and other staff of Salem University clinic. It also included some of the users of the hospital such as the students which in this case are the patients.
- **Form Evaluation:** Forms used in the hospital which are useful and available were accessed. These forms include; the admission cards, lab forms, registration forms, medical examination, test report forms, progress chart etc. which helped in the design and implementation of the new system.

### **3.4 Analysis of the Existing System.**

Research has been carried out and discoveries made that this kind of system (A computerized Hospital Management System) does not exist in Salem University Clinic. Presently, in Salem University Clinic, when a patient comes into the clinic, all they do is to write down basic

information about them and some relevant medical details. This information is kept manually in files according to the year of admission into the university. There is no special security feature other than locking up the files to protect patient information and no way of avoiding redundant files.

### **3.4.1 Challenges of Existing System**

Observations have been made that the non-existence of a Hospital management System poses some challenges which includes some of the following;

1. Lack of immediate retrieval of patient information
2. Time consuming
3. Redundancy in files
4. Increased paper overloads
5. Human prone errors.

### 3.4.2 Data Flow Diagram (DFD) of the Existing System.

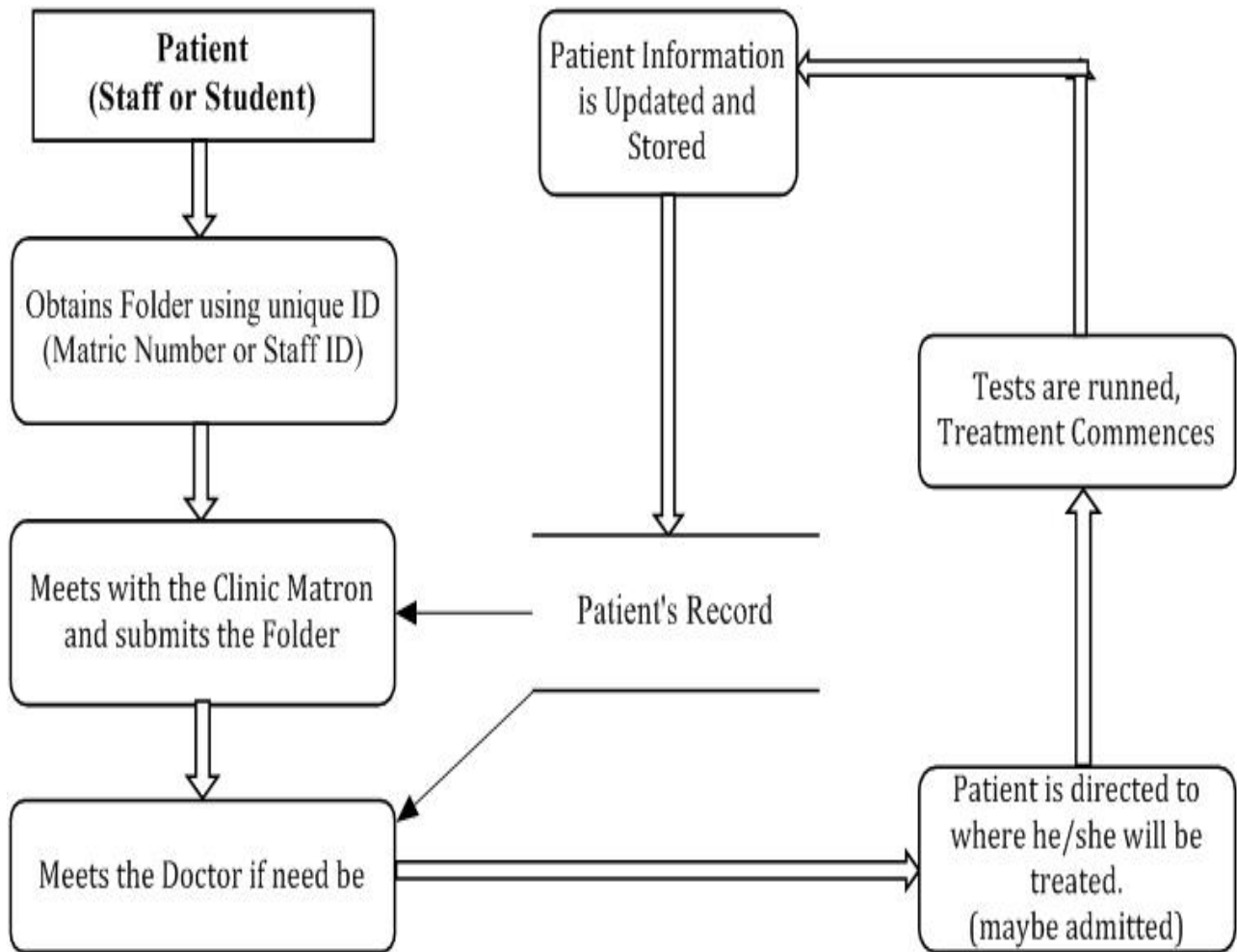


Fig 1. Dataflow Diagram of Existing System.

### 3.5 Analysis of the Proposed System

As a result of the few problems faced with the existing system, there would be a need to design a system which would be able to address them. The proposed system would be able to collect patient data, store these data and provide the data when it is needed.

### 3.5.1 Feasibility Study

Feasibility study is a test of system proposal according to its workability, impact of the organization, ability to meet needs and effective use of the resources. It focuses on these major questions:

1. What are the user's demonstrable needs and how does a candidate system meet them?
2. What resources are available for given candidate system?
3. What are the likely impacts of the candidate system on the organization?
4. Whether it is worth to solve the problem?

During feasibility analysis for this project, following primary areas of interest are to be considered.

- **Technical Feasibility:** *Can the work for the project be done with current equipment & available personals?* Yes, the proposed System does not need a large number of clinic staff for its functionality, a server system and few client systems should be enough for minimal performance. *Can the system be upgraded if developed?* The System will be designed such that additional modules can be added to the existing modules with ease. Codes are clearly written with inline comments for understanding. *If new technology is needed then what can be developed?* A system large enough to keep patient records including digital images, video coverage of surgery for referencing, link to HMS of other medical centers and a centralized database for patients, etc.
- **Economic Feasibility:** Economic justification is generally the "Bottom Line" consideration for most systems. Economic justification includes a broad range of concerns that includes cost benefit analysis. In this we weight the cost and the benefits associated with the proposed system and if it suits the basic purpose of the organization.

The Hospital Management System does not require enormous amount of money to be developed. This can be done economically if planned judicially, so it is economically feasible.

- **Operational Feasibility:** It is mainly related to human organizations and political aspects. The system is operationally feasible as it very easy for the End users to operate it. It only needs basic knowledge of computers and servers.

### 3.5.2 Functional and Non-Functional Requirements

- ✓ **Functional Requirements:** These are statement of services the system provides, how the system should react to particular inputs and how the system behave in particular situation. The functional requirements of this system are;
  - Every user must have a unique username and password, and the system must be able to create new users with different access rights.
  - The admin can access all modules of the system, whereas other staff members are not privileged to view some modules.
  - No Log-in is allowed without authentication (password).
- ✓ **Non-Functional Requirements:** These are the constraints encountered in the development of the system. Some of these constraints includes;
  - Setting up a network within the university clinic will be quite expensive, but the application needs to be hosted on a good network.

### 3.5.3 Benefits of the New System.

- Timely and accurate orders processing.
- System is very easy and allows multi user to perform the job simultaneously.
- Requires no special commands to be remembered for the users to do their job.
- Security aspects have been brought under total control. Each user can perform only the role assigned to him.
- The new system maintains the backup, which is very important for the finance persons.
- Complex jobs like validation and error correction made very simple for the end user and require minimal keystrokes for getting it ever with.
- Reduced manpower requirements.

### 3.6 System Design

The purpose of design phase is to plan a solution for problem specified by the requirements. System design aims to identify the modules that should be in the system, the specification of those modules and how they interact with each other to produce the result. The goal of the design process is to produce a model or representation of a system that can be used later to build that system. The produced model is called design of the system. <sup>4</sup>

#### 3.6.1 System Flow Chart

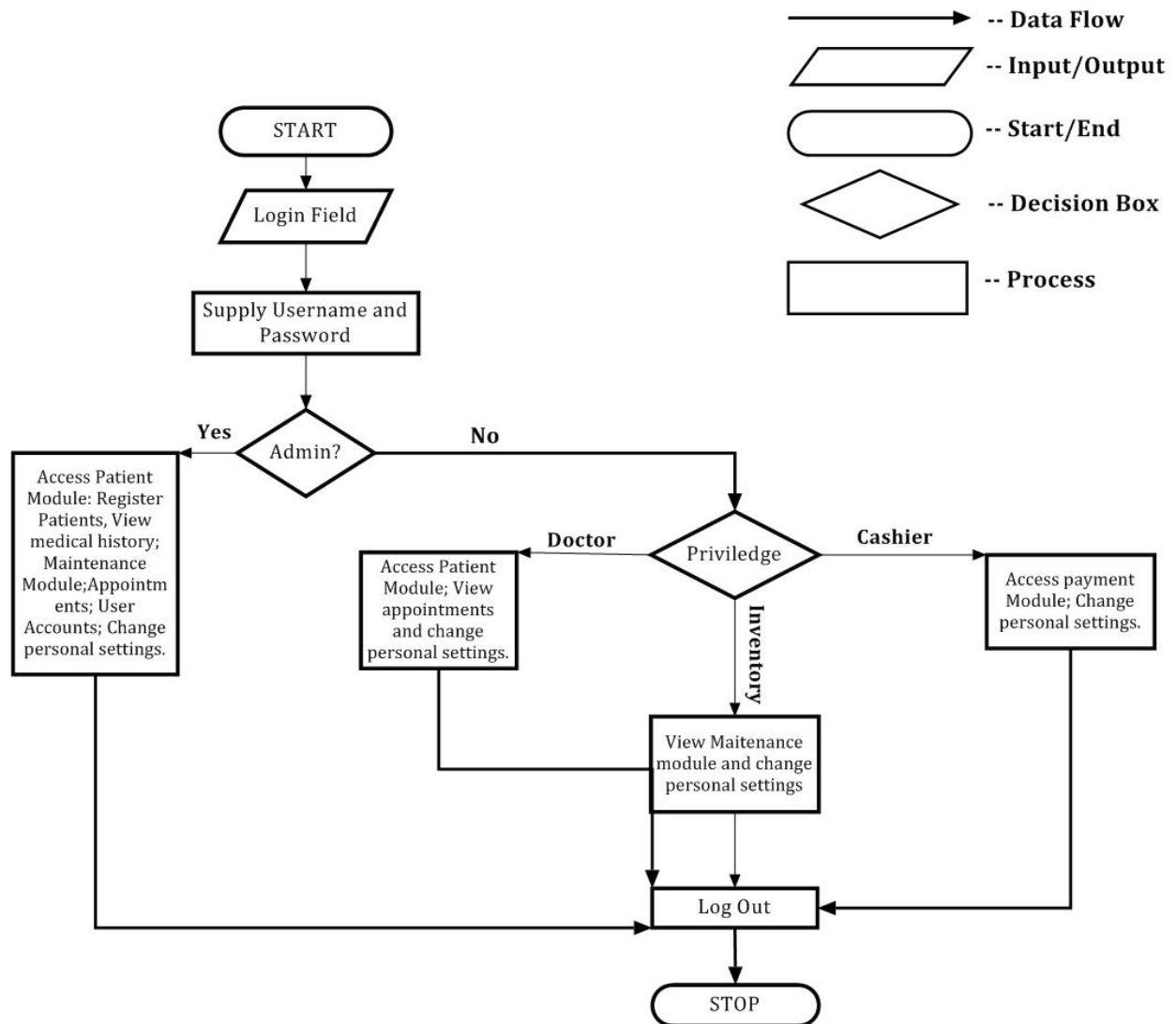
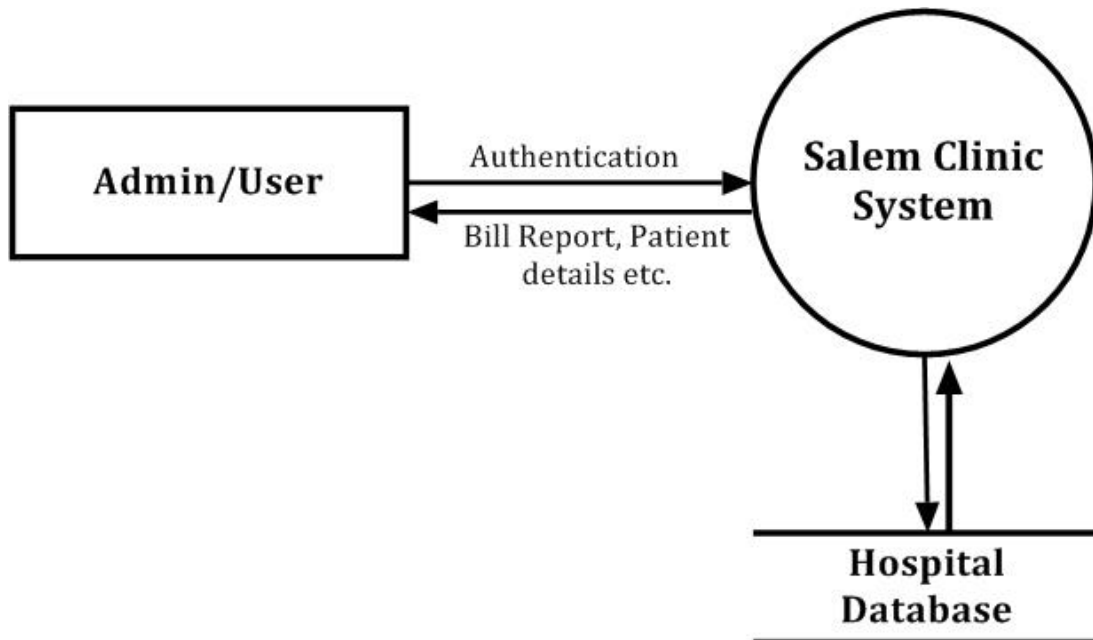


Fig. 2: Proposed System Flowchart.

### 3.6.2 Context Flow Diagram

A context flow diagram is a 0<sup>th</sup> level DFD. It only contains one process node that generalizes the functions of the entire system in relationship to external entities.



### 3.6.3 Data Flow Diagrams

Data flow diagrams (DFDs) reveal relationships among and between the various components in a program or system. DFDs are an important technique for modeling a system's high-level detail by showing how input data is transformed to output results through a sequence of functional transformations. DFDs consist of four major components: entities, processes, data stores, and data flows <sup>5</sup>

DFD use a number of symbols to represent systems. Most Data flow modeling method use 4 kinds of symbols to represent four kinds of system components:-



**A process shows a transformation or manipulation of data flows within the system.**



**External entities are outside the system, but they either supply input data into the system or use system output.**



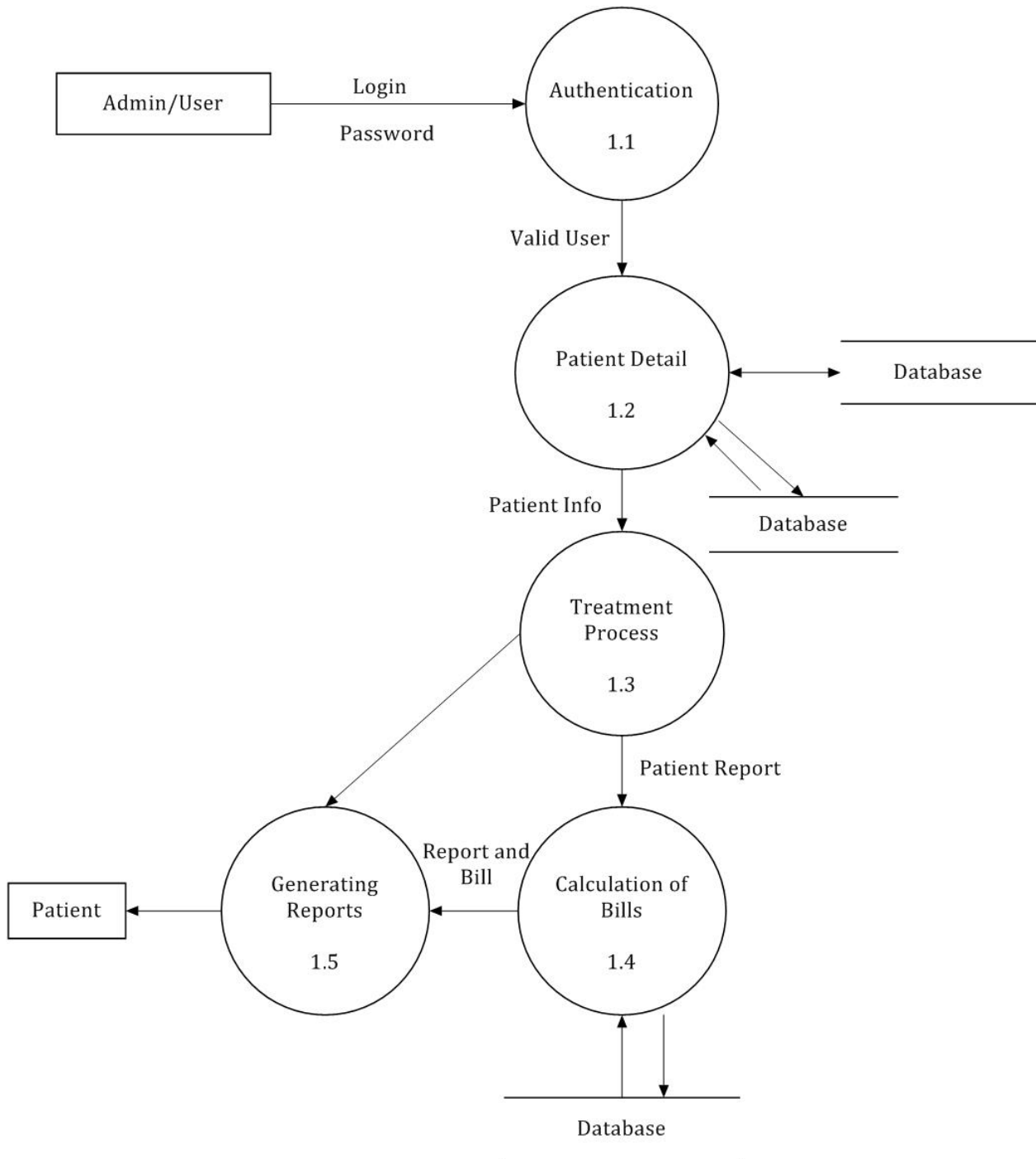
**Database is a huge collection of data. It is used for storage purpose.**



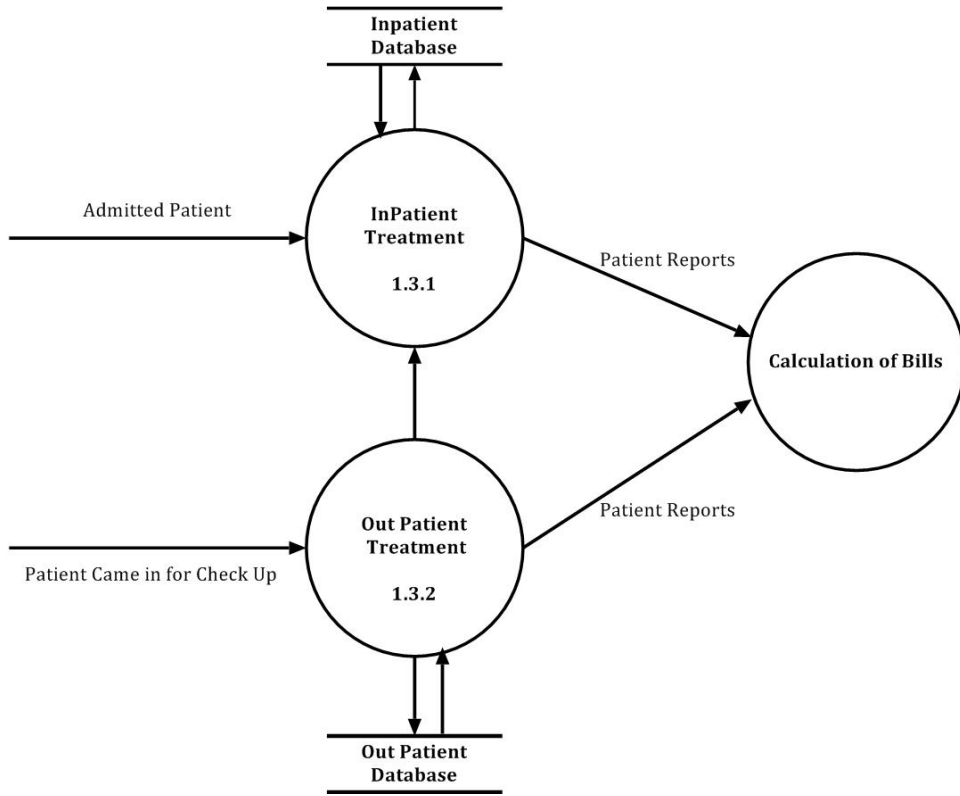
**A data flow shows flow of information from source to destination. it is represented by a line, with arrowhead showing the direction of flow.**



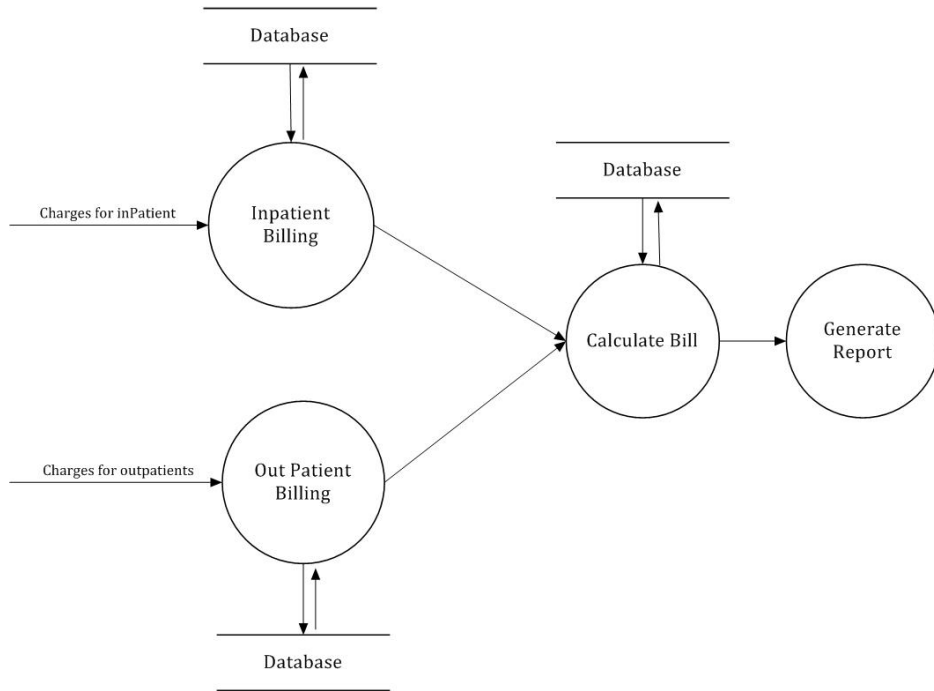
**1<sup>st</sup> Level DFD**



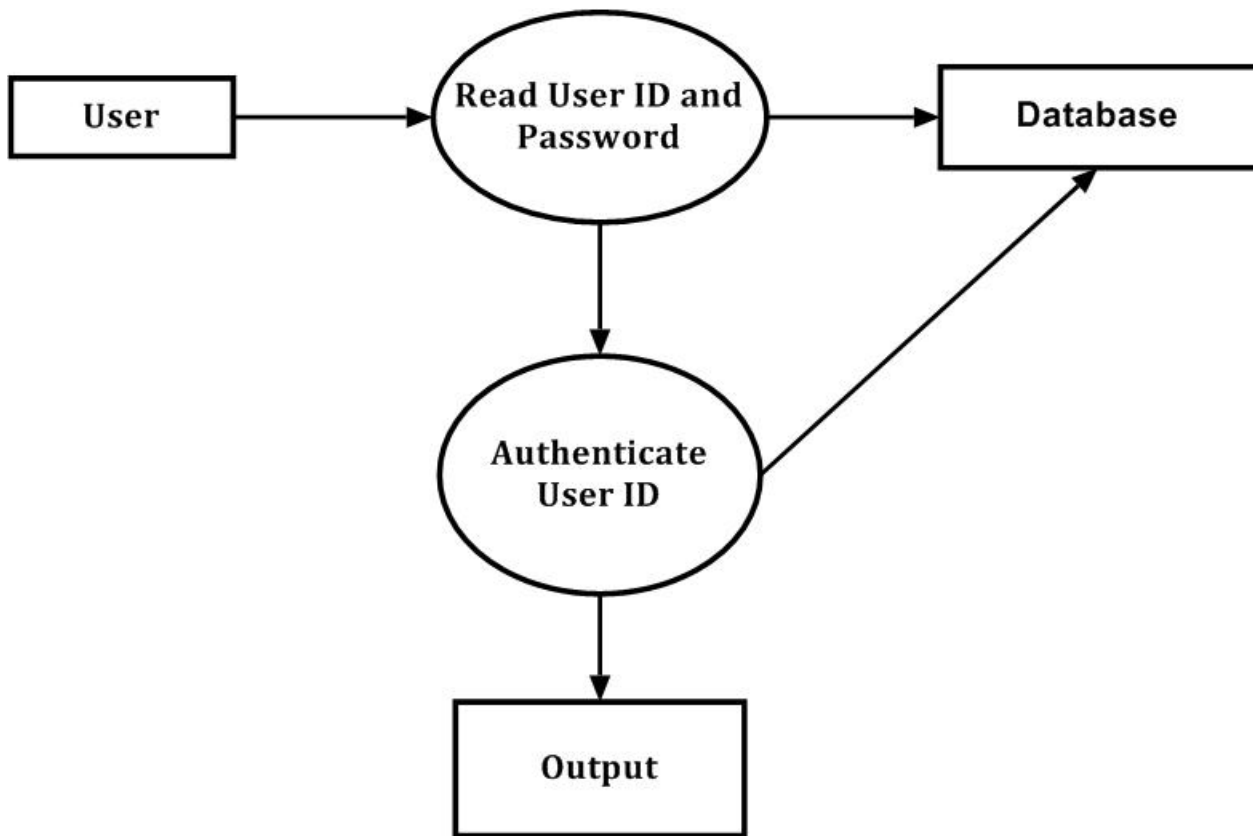
**2nd Level DFD (1.3)**



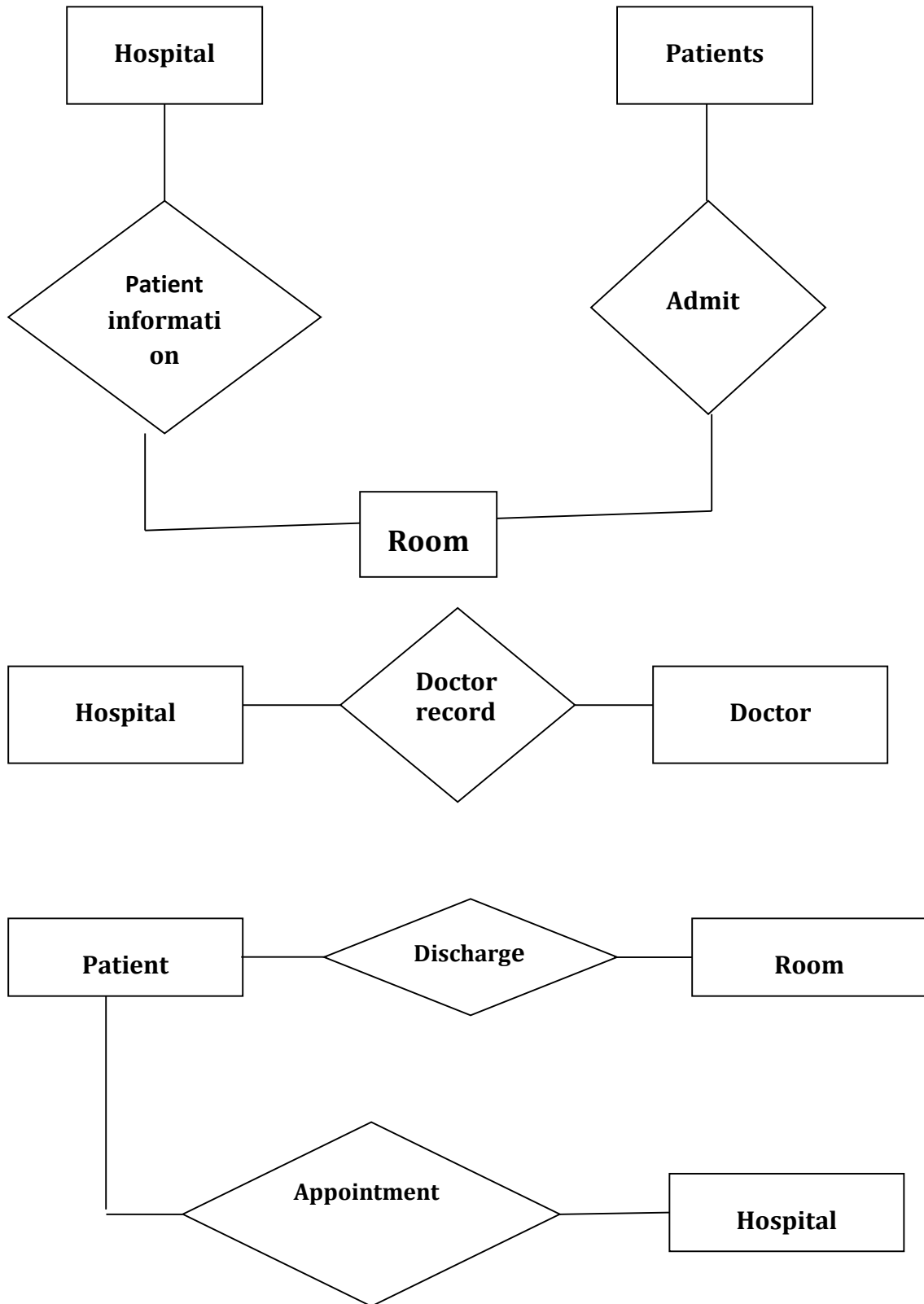
**2nd Level DFD (1.4)**



User Log-in DFD

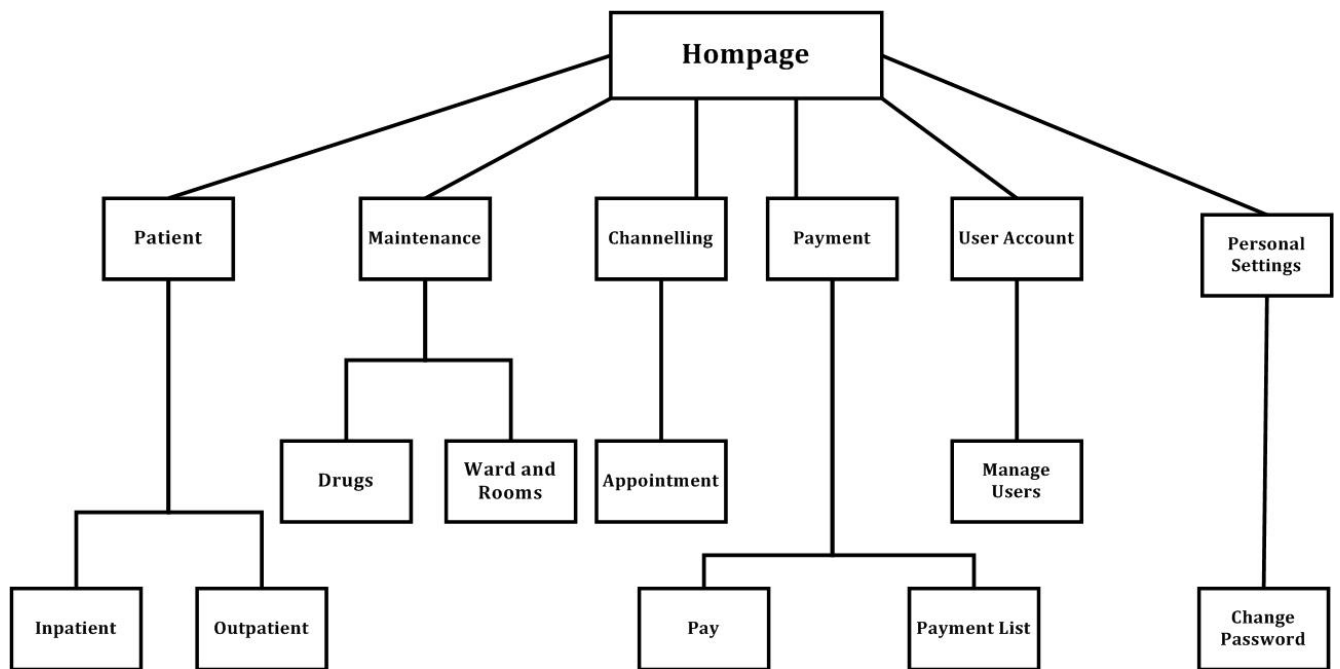


### 3.6.4 Entity-Relationship Diagram



### 3.7 Site Structure

A site map works like a program flowchart. It is a pictorial view of the links and navigation between the pages or modules. It also shows the page hierarchy.



### 3.8 Description of Modules

Administration module:-

Input: - User Name, Password

Process Definition: - Login to the system

Output:-If login is successful then administrator can view and update the records.

Inpatient module:-

Input: - Inpatient detail

Process Definition: - Information about the treatment given to the patients who are admitted.

Output: - Information about the patient.

Interface with other module: - The inpatient details are necessary for lab reports and billing.

Outpatient module:-

Input: - Outpatient detail

Process Definition: - This module has the information about the treatment given to the patient who are came to check up.

Output: - Information about the patient.

Interface with other module: - The outpatient details are necessary for lab reports and billing.

Billing module:-

Input: - Patient ID

Process Definition:-Calculates bill and deduct amount if any card facility is available.

Output: - Bill.

Interface with other module: - Billing module requires information from inpatient and outpatient modules.

### 3.9 Data Tables

#### Users Table

Field	Type	Constraint
userid	INT(11)	Primary Key
name	VARCHAR(50)	Not Null
username	VARCHAR(50)	Not Null
pass	VARCHAR(50)	No
usertype	VARCHAR(20)	Not Null

#### Admin

Field	Type	Constraint
Adminid	INT(11)	Primary key
adminname	VARCHAR (50)	Not Null
Adminuser	VARCHAR (50)	Not Null
Adminpass	VARCHAR (50)	Not Null

#### Admission

Field	Type	Constraint
Adminid	INT(11)	Foreign
patientid	INT(11)	Primary
date_of_admission	DATE	Not Null
time_of_admission	TIME	Not Null

status	VARCHAR(50)	Null
reason	VARCHAR(250)	Not Null
doctorid	INT(11)	Not Null
doctorname	VARCHAR(50)	Not Null
deptid	INT(11)	Not Null
deptname	VARCHAR(50)	Not Null
roomname	VARCHAR(50)	NotNull
notes	TEXT	NULL

### Inpatient

Field	Type	Constraint
Patientid	INT(11)	Not Null, Primary
IDnumber	VARCHAR(50)	Unique
Firstname	VARCHAR(50)	Not Null
Surname	VARCHAR(50)	Null
Gender	VARCHAR(50)	Null
DOB	DATE	Not Null
Address	TEXT	Not Null
phone	INT(20)	Null
Occupation	VARCHAR(50)	Null
Marital	VARCHAR(50)	Null
Guardian_firstname	VARCHAR(50)	Null
Guardian_surname	VARCHAR(50)	Null
Guardian_gender	VARCHAR(50)	Null



Guardian_address	TEXT	Null
Guardian_phone	INT(14)	Not Null
Guardian_occupation	VARCHAR(50)	Null
Relationship	VARCHAR(50)	Null

## Outpatient

Field	Type	Constraint
Patientid	INT(11)	Not Null, Primary
IDnumber	VARCHAR(50)	Unique
Firstname	VARCHAR(50)	Not Null
Surname	VARCHAR(50)	Null
Gender	VARCHAR(50)	Null
DOB	DATE	Not Null
Address	TEXT	Not Null
phone	INT(20)	Null
Occupation	VARCHAR(50)	Null
Marital	VARCHAR(50)	Null
Guardian_firstname	VARCHAR(50)	Null
Guardian_surname	VARCHAR(50)	Null
Guardian_gender	VARCHAR(50)	Null
Guardian_address	TEXT	Null
Guardian_phone	INT(20)	Not Null
Guardian_occupation	VARCHAR(50)	Null
Relationship	VARCHAR(50)	Null

## Drugs

Field	Type	Constraint
Drugid	INT(11)	Primary
Drug_name	VARCHAR(50)	Not Null
Drug_available	INT(11)	Not Null
Warning	INT(11)	Not Null
Amount_for_one	INT(11)	Not Null

## Medication

Field	Type	Constraint
Medid	INT (11)	Primary Key
Patientid	INT (11)	Foreign Key
Drugid	INT(11)	Foreign Key
Quantity	INT (11)	Not Null
Department	VARCHAR(50)	Null
Reason	VARCHAR(50)	Not Null
Notes	VARCHAR(50)	Null
Medication_date	DATE	Not Null

## Payment

Field	Type	Constraint
Payid	INT (11)	Primary
Amount_owed	INT (11)	Not Null

Amount_paid	INT (11)	Not Null
Total_amount	INT (11)	Not Null
Patientid	INT (11)	Foreign Key

### Room

Field	Type	Constraint
Roomid	INT (11)	Primary Key
Room_name	VARCHAR(50)	Not Null
ward	VARCHAR(50)	Not Null
cost	INT (11)	Not Null

### Ward

Field	Type	Constraint
wardid	INT(11)	PRIMARY
ward_name	VARCHAR(50)	NOT NULL
Department	VARCHAR(50)	NOT NULL

### Appointment

Field	Type	Constraint
Id	INT(11)	Primary Key
Date	DATE	Not Null
Time	TIME	Not Null

Reason	TEXT	Not Null
Patientid	INT(11)	Foreign Key
Person	VARCHAR(50)	Not Null

## CHAPTER FOUR

### SYSTEM IMPLEMENTATION AND TESTING

#### Introduction

This chapter discusses the process involved in replacing the existing system with the new automated system. It presents a vivid documentation on how the system is to be installed and operated by the user.

#### 4.1 System Implementation

System implementation is the development, installation and testing of system components and delivery of that system into production (*Bentley et. al., 2007*)<sup>6</sup>. The purpose of system implementation is to build a system, install it, and replace an old system, preparing system and user documentation and train users.

System implementation has several major activities. There are five major tasks in this phase; coding, testing, installation, documentation and training. The purpose of this phase is to convert the physical system specifications into working and reliable software and hardware, document the work that have been done and provide help for current and future users.<sup>7</sup>

#### 4.2 System Requirements

##### 4.2.1 Hardware (minimum requirement)

Computer Configuration:

1. Pentium II processor
2. Keyboard
3. Mouse
4. 256 MB Random Access Memory (RAM)

5. Hard disk space of 150MB.

#### **4.2.2 Computer Network**

Server: There will be need for a computer to serve as the server for the system. This is where the database server and webservice will be installed.

Workstations: Other computers on the LAN from which the system will be administered and updated. There will be need for at least one work station.

#### **4.2.3 Software**

1. My SQL database server
2. Apache Webservice
3. PHP
4. A text editor
5. A web browser

### **4.3 Justification of tools Used**

In making this management system web-based, quite a number of tools were available but, a choice had to be made among them. I have chosen to use the following combination of tools for my design.

**Web Server:** Apache

**Database Server:** MySQL

**Scripting Language:** PHP

#### **4.3.1 APACHE**

The Apache Project is a collaborative software development effort aimed at creating a robust, commercial-grade and freely available source code implementation of an HTTP web server. The

project is jointly managed by a group of volunteers located around the world, using the Internet and the Web to communicate, plan and develop the server and its related documentation. These volunteers are known as the Apache Group. In addition, hundreds of users have contributed ideas, code and documentation to the project.

According to the *Netcraft web servers survey*, Apache has been the most popular web server on the Internet since April 1996. This comes as no surprise due to its many characteristics, such as the ability to run on various platforms, its reliability, robustness, configurability and the fact that it is free and well-documented. Apache has many advantages over other web servers, such as providing full source code and an unrestrictive license. It is also full of features. For example, it is compliant with HTTP/1.1 and extensible with third-party modules, and it provides its own APIs to allow module writing. Other interesting features that have made it a popular web server include the capability to tailor specific responses to different errors, its support for virtual hosts, URL rewriting and aliasing, content negotiation and its support for configurable, reliable piped logs that allows users to generate logs in a format they want.<sup>8</sup>

Apache supports a variety of features, many implemented as compiled modules which extend the core functionality. These can range from server-side programming language support to authentication schemes.

This is the most popular webserver used on the web. It is easy to use and is compatible with many platforms.

### **4.3.2 MySQL**

MySQL is in the class of software called “Open source software”. It is the back-end for the system. Some of MySQL’s main competitors are PostgreSQL, Microsoft SQL server, and Oracle. MySQL however has many strengths.<sup>9</sup>

#### **Performance**

MySQL is undeniably fast. Many benchmarks show MySQL to be orders of magnitude faster than the competition.

## Cost

MySQL is available for no cost, under an Open Source License, or at low cost under a commercial license if required for your application.

## Ease of Use

Most modern databases use SQL. If one has used another Relational Database Management System (RDBMS), one should have no trouble adapting to this one. MySQL is also easier to set up than many similar products.

## Portability

MySQL can be used on many different UNIX systems as well as under Microsoft Windows.

### 4.3.3 PHP (hypertext preprocessor)

This is a server-side scripting language. It also falls under the group of software called “open-source software”. It is distributed free of charge. PHP generates HTML pages, which are rendered in web browsers. Some of PHP’s main competitors are Perl, Microsoft Active Server Pages (asp), Java Server Page (JSP), and Allaire Cold Fusion.

In comparison to this products, PHP has many strengths, including the following:

- **High performance:** PHP is very efficient. Using a single inexpensive server, you can serve millions of hits per day.
- **Interfaces to many different databases:** PHP has native connections to many database systems. In addition to MySQL, you can directly connect to PosthgreSQL, mSQL, Oracle, dbm, Informix, Sybase databases, among others.  
Using the Open Database Connectivity Standard (ODBC), you can connect to any database that provides an ODBC driver.
- **Built-in libraries for common web tasks:** Because PHP was designed for use on the web, it has many built-in functions for performing many useful Web-related tasks.



- **Low cost:** PHP is free. Its latest version can be downloaded at any time from <http://www.php.net> for no charge.
- **Ease of Learning and use:** The syntax of PHP is based on other programming languages, primarily C and Perl. If one already knows C or Perl, or a C-like language such as C++ or Java, you will be productive using PHP almost immediately.
- **Portability:** PHP is available for many different operating systems. One can write PHP code on the free Unix-like OS such as Linux or the commercial versions such as Solaris or on the different versions of Microsoft windows. The code will run without modification on a different system running PHP.

#### 4.3.4 Other tools used

**Notepad++:** Notepad++ is a free source code editor and Notepad replacement that supports several languages. It is easy to use and provides some syntax checking facility to facilitate the coding process.

**Internet Explorer:** One of the most popular web browsers, it is versatile.

**XAMPP Server:** is an integrated server package of Apache, MySQL, PHP and Perl. Everything is pre-configured and ready to go just by unzipping or installing it. It provides a graphical web-based interface for working with MySQL called PHPMysqlAdmin.

#### 4.4 System Testing

One of the purposes of the testing is to validate and verify the system. Verification means checking the system to ensure that it is doing what the function is supposed to do and Validation means checking to ensure that system is doing what the user wants it to do.

No program or system design is perfect; communication between the user and the designer is not always complete or clear, and time is usually short. The result is errors and more errors. Theoretically, a newly designed system should have all the pieces in working order, but in reality,

each piece works independently. Now is the time to put all the pieces into one system and test it to determine whether it meets the user's requirements. This is the best chance to detect and correct errors before the system is implemented. The purpose of system testing is to consider all the likely variations to which it will be subjected and then push the system to its limits. If we implement the system without proper testing then it might cause the problems.

#### **4.4.1 Unit Testing**

This is the smallest testable unit of a computer system and is normally tested using the white box testing. The author of the programs usually carries out unit tests.

I examined each unit to ensure that it is functional as required and all operations are sent to the database when required. The success of each individual unit laid foundation for the next step of integration testing. All errors at the unit level were dealt with.

#### **4.4.2 Integration Testing**

In integration testing, the different units of the system are integrated together to form the complete system and this type of testing checks the system as whole to ensure that it is doing what is supposed to do. The testing of an integrated system can be carried out top-down, bottom-up, or big-bang. This type of testing plays very important role in increasing the systems productivity. I have checked my system using the integration testing techniques. For example, when a user logs in, he/she should go to the appropriate page and get access to only the pages to which he/she is privileged to access.

#### **4.4.3 System Testing**

Apart from testing the system to validate the functionality of software against the requirements, it is also necessary to test the non-functional aspect of the system. Some examples of non-functional tools include tests to check performance, data security, usability/user friendliness, volume, load/stress .etc. which I used in my project to test the various modules.

## 4.5 Changeover Procedure

The system will be run along with the existing manual system while the change-over is underway. The initial stage of the change-over requires a lot of data entry to build up the database.

After that, there will be need for a training session for the staff of the clinic that will be using the system. The system administrator will monitor the changeover procedure providing reports on failures and efficiency/proficiency of users.

## 4.6 System Installation

The system is a web-based application. Thus, it works based on the basic web architecture. The Web-server serves as a mediator between the web pages (i.e. web browser) and the database server.

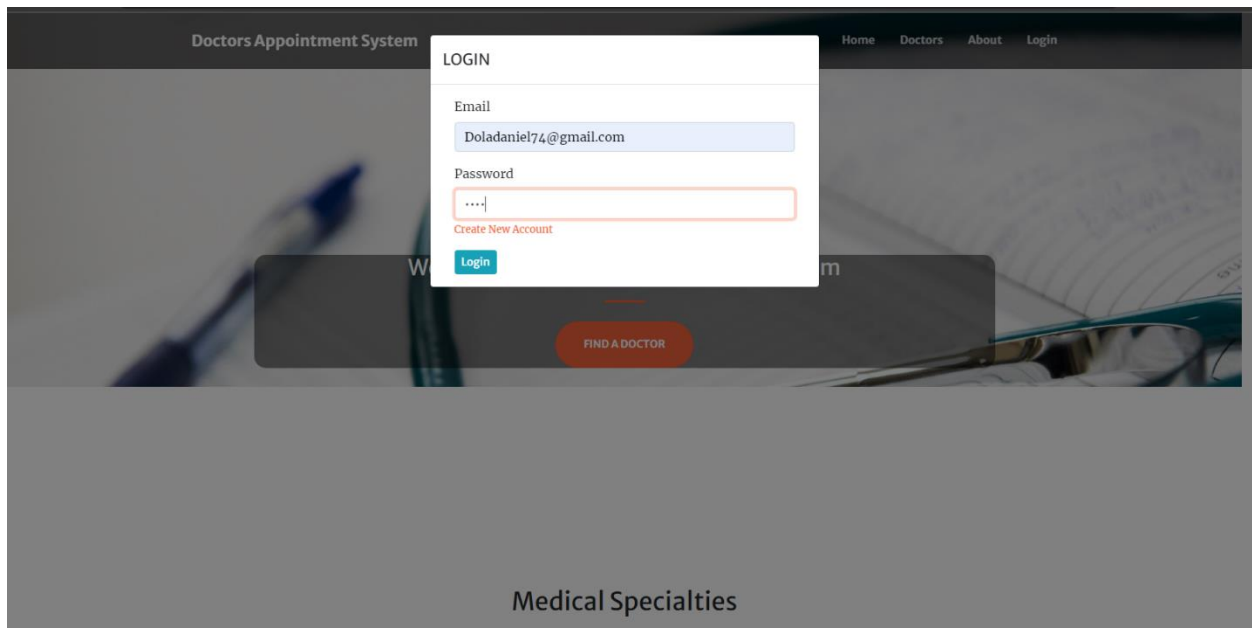
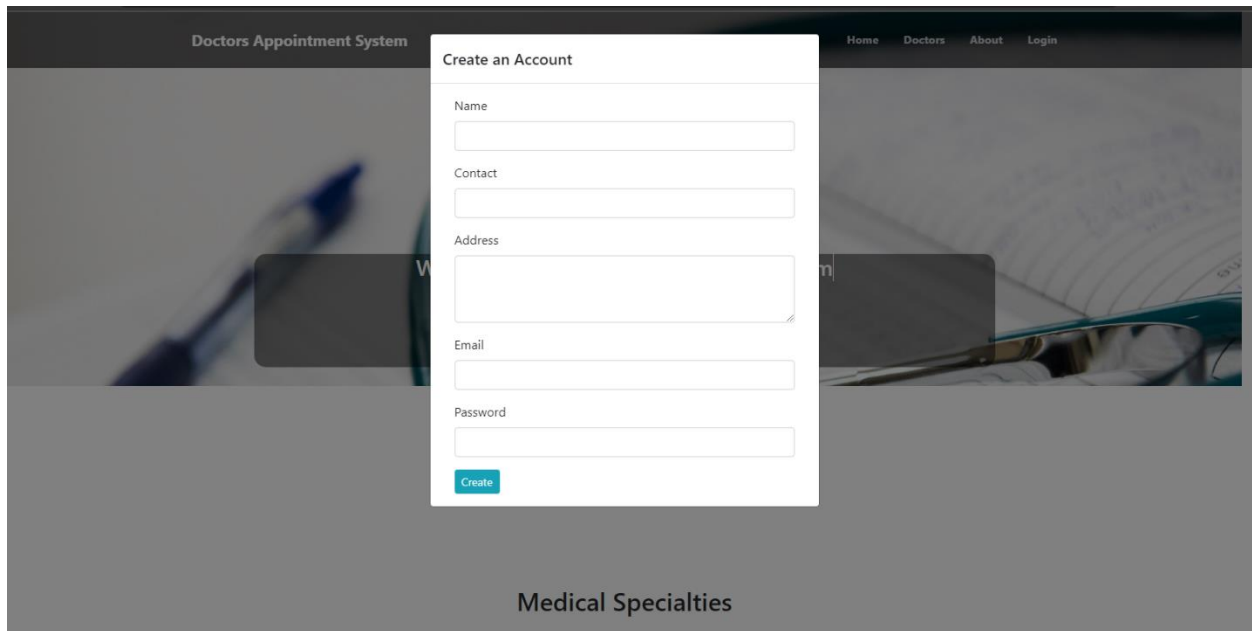
The web pages loaded by the browser make up the front-end of the application i.e. the application's interface with the user. It renders pages (files) in HTML format. The database server is the back-end i.e. it stores the web content. In between the front-end and the back-end lies the web-server, which runs the scripts to query the database, collect from the HTML page or display information on the HTML page for the end user. All requests from any HTML page must pass through the web-server.

Installing such an application will require us to first install and configure the database server (MySQL), the web-server (Apache 1.3) and the scripting language interpreter (PHP). For this, the application XAMPP server was used. XAMPP is a ready-made application which when run automatically installs and configures MySQL, Apache and PHP on the system.

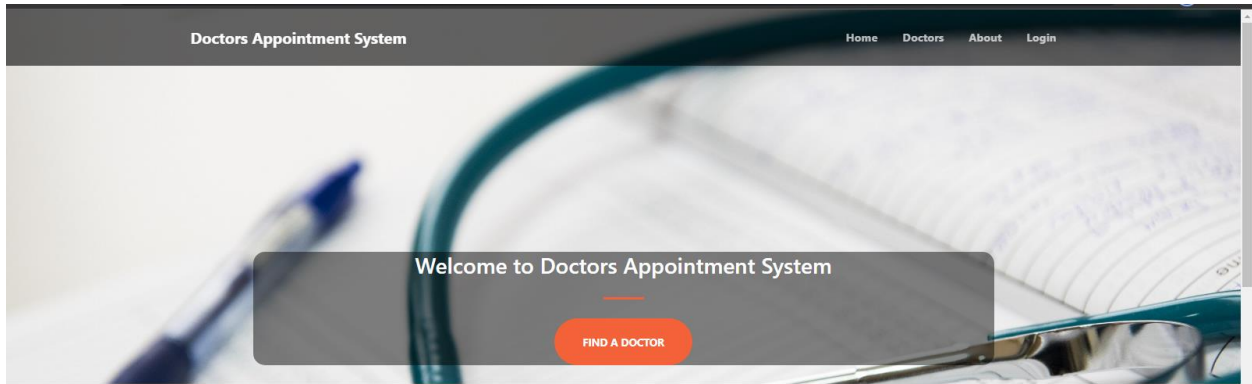
After the installation of XAMPP, the program should be copied to the htdocs folder inside the XAMPP folder on the server system, i.e. for local host servers. The program file should be copied to the directory *C:\xampp\htdocs* which is the XAMPP directory for most systems.

## 4.7 System Interfaces

### Login Interface



### Homepage



## Medical Specialties

## Inpatient Registration

Doctor's Appointment System | OLAPOSI DOLABOMI DANIEL

Home | Appointments | **Doctors** | Medical Specialties

Doctor's Form

Prefix: (M.D.)

Name:

Medical Specialties: Please Select Here

Clinic Address:

Contact:

Email:

Password:

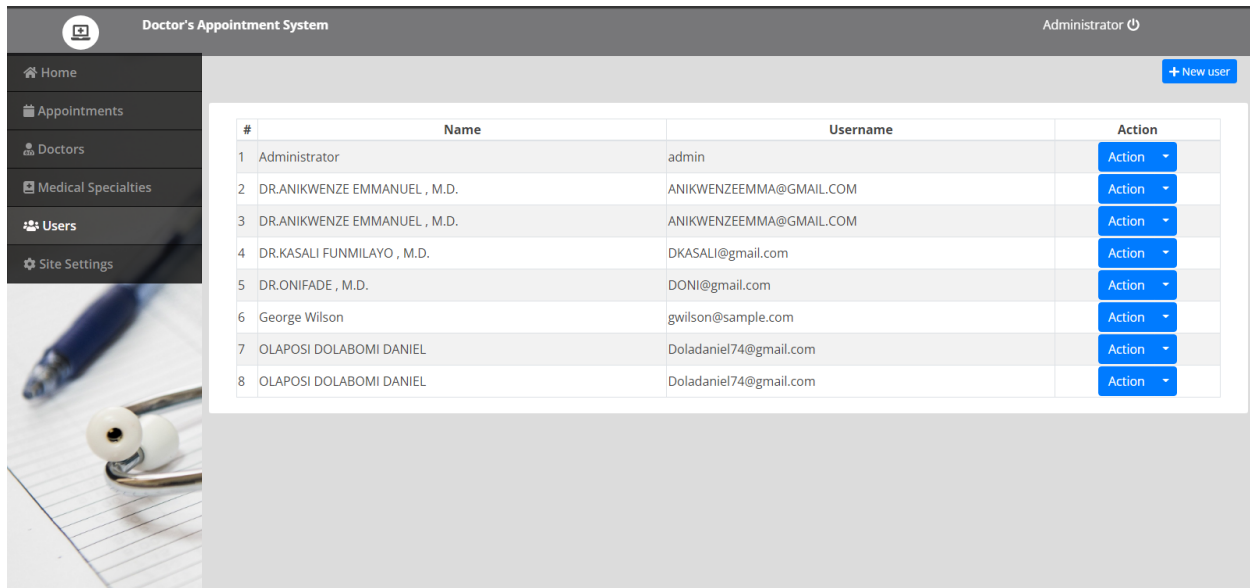
Image:

Show 10 entries | Search:

#	Image	Info	Action
1		<b>Name: Dr. ANIKWENZE EMMANUEL , M.D.</b> Email: ANIKWENZEEMMA@GMAIL.COM Clinic Address: Sample Clinic Address Contac #: +234 419 419 419 <a href="#">Schedule</a>	<a href="#">Edit</a> <a href="#">Delete</a>
2		<b>Name: Dr. KASALI FUNMILAYO , M.D.</b> Email: DKASALI@gmail.com Clinic Address: Mountain Top University pakuro Contac #: +234 404 404 404 <a href="#">Schedule</a>	<a href="#">Edit</a> <a href="#">Delete</a>
3		<b>Name: Dr. ONIFADE , M.D.</b> Email: DONI@gmail.com Clinic Address: Magboro Miracle Avenue Contac #: +234 402 402 402 <a href="#">Schedule</a>	<a href="#">Edit</a> <a href="#">Delete</a>

Showing 1 to 3 of 3 entries | Previous 1 Next

## Maintenance Module



## CHAPTER FIVE

### SUMMARY, RECOMMENDATIONS AND CONCLUSION.

It has been a great pleasure for me to work on this exciting and challenging project. This project has been a rewarding experience in more than one way. The entire project work has enlightened me in the following areas;

- I have gained an insight into the working of the hospital. This represents a typical real world situation.
- My understanding of database design has been strengthened; because in order to generate the final reports, database designing has to be properly followed.
- Scheduling a project and adhering to that schedule creates a strong sense of time management.
- It provided practical knowledge of programming in PHP and MySQL web based application

This will provide better opportunities and guidance in the future in developing projects independently.

## 5.1 Achievements of the project

Almost all the primary objectives of this project as stated in chapter one of this report have been completed with a positive result.

## 5.2 Future improvement and Recommendations

The Mountain Top University will benefit greatly from the implementation of an online doctor appointment booking system because it would assist decrease patient wait times and the workload of the university's healthcare facilitators. According to this study, a scheduling algorithm should be utilized to schedule patient visits to the medical institution in order to limit the number of patients who would have hourly appointments.

## REFERENCES

---

Uwechi Ugochukwu Stephen., *Citizen Information system.*, Salem university Lokoja., 2012.

Roderick E. McGrew., *Encyclopedia of Medical History*, Macmillan 1985. p.134.

Olayanju Taiwo Abolaji., *CIT 33: Software Engineering.*, Computer department, Federal College of Education (Tech.) Akoka, Lagos.

Arvind., *Hospital management system: system design*, Retrieved 20-6-2014 from <http://www.freestudentprojects.com/studentprojectreport/system-design-documentation/system-analysis-design-hospital-management-system/>

Donald S. Le Vie, Jr., *Understanding Data Flow Diagrams.*, Retrieved 25-06-2014, from [http://ratandon.mysite.syr.edu/cis453/notes/DFD\\_over\\_Flowcharts.pdf](http://ratandon.mysite.syr.edu/cis453/notes/DFD_over_Flowcharts.pdf).

Frydenberg, M.E., *Teaching and learning information technology with mobile devices*, IADIS international journal of internet/WWW., p 34-45., 2007.

---

*System implementation.*, Retrieved 25-06-2014 from <http://www.mediu.edu.my/wp-content/uploads/lesson-12-system-implementation.docx>

Ibrahim F. Haddad., *Apache 2.0: The Internals of the New, Improved*, Linuxjournal.com. August, 2001.

Adelakun Oluwatoyin F., *A web-based information system for a television station (case study of galaxy television)*, University of Ibadan, March 2005. p. 41.

SmartDraw (2021, July 14). Everything You Need to Know About UML Diagrams: UML Diagrams The following URL is from SmartDraw: [uml-diagram](#)  
67

I. Sommerville (2011). *software development*. Team-fourUp: Pearson Education, Inc., Boston (2018, December 12). ForeUp. According to Benefits and Drawbacks of Using an Online Booking System:

<https://blog.foreupgolf.com/advantagesdisadvantages-online-booking-system>  
Techopedia (2011). Model for the Software Development Life Cycle (SDLC). Software development life cycle model (SDLC) is defined in <https://www.techopedia.com/definition/25976>

Techopedia (2011, March 6). What are information services or systems? (IS). According to Techopedia, information systems or information services

service technique. (October 24, 2019). The six different categories of information systems and their purposes. The six different types of information systems and their purposes are described at <https://theartofservice.com/>.

Tutorialspoint. (2021, June 30). (2021, June 30). a tutorial on the SDLC is available at Tutorialspoint at: [sdlc/index.htm](https://www.tutorialspoint.com/sdlc/index.htm)