DESIGN AND IMPLEMENTATION OF HOSPITAL MANAGEMENT SYSTEM

(A CASE STUDY OF FUOYE HEALTH CENTER)

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CERTIFICATION

This is to certify that the Project Report entitled "**HOSPITAL MANAGEMENT SYSTEM**" was carried out **by OYENEKAN OLUWOLE PETER** with matric no. **CSC/11/0287**, under my guidance and supervision in partial fulfilment of the requirements for award of the degree of Bachelor of Science in **Computer Science** year 2015.

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DEDICATION

I wish dedicate this piece of work to my father Oyenekan Olugbemi, for being my inspiration, to my mother Oyenekan Abosede , for being my pillar of strength and to my siblings Oyenekan Odunayo, Sola, Motunrayo and Solomon for their unconditional support.

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ABSTRACT

"The purpose and essence of any Records Management System is the right information in the right place in the right order, at the right time, for the right person at the lowest cost." (Baje, 1998). For this feat to be achieved, an integrated, highly efficient and effective hospital management system is needed. With this in mind, a careful analysis of the existing records management system being utilized by the FUOYE Health Centre was conducted. The findings showed that the system was highly inefficient especially as far as retrieval of archival patient information was concerned. This analysis established the need for a Hospital Management System (HMS) that would facilitate effective and reliable records management through automated processes and served as the basis for the research leading to the development of such an HMS.

The Major objective of the project was to design and develop an HMS that would computerized patient records Management and give direct benefit for the Health Centre in terms of fast information retrieval, enhanced decision-making (patient diagnosis) whilst avoiding any confusion that would jeopardize the quality of patient care. The HMS was designed as a stand-alone system and implemented using open source solutions that include MS ACCESS as the database, and Java as the programming language.

The system was developed using V-model software development approach. An extensive evaluation of the project determined that the project achieved many of its predefined objectives however, the major limitation of the project was the scope covered. From a proper analysis and assessment of the designed system, it can be concluded that the system developed is an efficient, usable and reliable records management system.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Federal University Oye-Ekiti Health Centre is an indigenous health care centre situated in the university premises along Are Afao road, Oye-Ekiti, Ekiti State, Nigeria. It has a large capacity of patients which is as a result of increase in the number of students being admitted into the institution yearly. The hospital currently uses a manual system for maintaining and managing imperative and critical information. The System currently in use requires enormous paper forms, with data stores spreads throughout the infrastructure of the hospital management. This forms are often loss during transition between the departments within the health care centre, which therefore requires a comprehensive auditing process to ascertain that imperative information are not lost.

Data inconsistencies and information redundancy usually occurs in the System currently in use. The information involves; students and staff personal information and medical history, staff scheduling, ward scheduling, drug administration, clinical details etc. All these information must be managed using sound engineering principles in other to develop a software that is highly maintainable, cost effective and meeting user requirements. Hospital management system will automate the manual process making it more reliable, maintainable, and cost effective, error free and timely.

1.2 Statement of the Problem

The system design and development was undertaken in order to eliminate the problem of redundant, erroneous and incomplete data that was escalating the inefficiencies in data retrieval. These limitations were mainly caused by the fact that data, under the previous manual recording system was

entered into books and paper files and was later stored in overcrowded storage rooms that made retrieval of archival records close to impossible.

Historically, FUOYE health centre has been affected by several factors based on the current manual system used: such as;

i. Lack of Immediate Retrievals: Retrieving crucial information is very difficult since the users has to go through various registers or files while finding a particular information which results in inconveniencies and wastage of time.

ii. Lack of immediate information storage: Information generated with the manual system takes time and effort to be stored at the right location.

iii. Use of Identity cards: identity cards are often misplaced by the patients which often delay or deny access to treatments by the doctors.

iv. Lack of Prompt updating: making changes to patients information are often difficult once stored

v. Preparation of accurate reports: Getting accurate report is an herculean task due to the manual process involved.

1.3 Aim and Objectives

1.3.1 Aim of the Study

The Aim of this project is to design and develop a hospital management system for FUOYE health centre that would enable faster and more efficient storage, retrieval and updating of hospital records. This is achieved through the following objectives;

1.3.2 Objectives of the Study

i. To carry out a feasibility study for the possibility of developing a hospital management system for FUOYE Hospital

ii. To design and develop a hospital management system for FUOYE health centre.

iii. To test and validate the hospital management system.

iv. To implement and evaluate the hospital management system.

1.4 Significance of the Study

In designing and developing the hospital management system, it was hoped that the project would have the following impact on all stakeholders. The developed hospital management system was deemed as necessary for the automation and streamlining of the clinic's workflow thus minimizing medical errors. The system, it was hoped, would enable Hospital administrators to significantly improve the operational control and thus streamline operations. It would lead to faster service delivery with faster record insertion and retrieval thus reducing the time spent by staff filling out forms. This would minimize on the time consumed in the input and retrieval of records, freeing resources for more critical tasks and thus providing an opportunity to the health centre to enhance their patient care.

It would also reclaim office space used for inefficient storage. A lot of space is taken up in storing the paper-based records and this space was saved up by the implementation of the computer-based hospital management system. It would also secure the vital medical records and information in case of any disruption or disaster. This is because the system was able to be backed easily and efficiently thus ensuring a longer records life. It would also save the hospital section on badly needed human resources. This is because the hospital management system would require less number of Staff to cater more patients in same time or even less. Therefore, this presents an opportunity for the hospital administration to re-deploy the personnel that are currently working in the records desk to other suitable locations- where they are needed more. The senior Doctors and nurses would also be able to spend their precious time more in clinical activities than to put in clerical activities otherwise.

The hospital management system would also prevent costly paper accumulation with systematic record disposal. Accounting sometimes becomes needlessly complex. This hospital management system would eliminate any such complexity, since the retrieval of information through its management information system would come virtually on the tip of the user's fingers. It would also improve the response time to the demands of patient care because it would automate the process of collecting, collaborating and retrieving patient information.

The hospital management system would provide the stakeholders the ability to request and receive any data in the system in the most efficient manner with confidence of a high level of accuracy.

The development of a database with additional value added functionality would allow the hospital to manage records in the most cost-effective manner. Serving all of the clinics, wards and offices, this new functionality would not only result in cost-savings, time savings and space savings, but also would greatly improve on records management at the hospital.

The development of the hospital management system would also lead to better access to operational data. This would provide better control over the various processes and also facilitate better decision making. The services the system would offer would also; Save the Hospital a lot of space by reducing storage needs for records; Save hundreds of staff-time hours by providing quick and easy access to important information; Save the Hospital resources used in the destruction of unnecessary records

1.5 Organization of project work

This Project report is organized in five chapters. Chapter one is on the Introduction, Chapter two is on Literature Review. Chapter three is on Research Methodology and System Design, Chapter four Testing and Implementation. Chapter Five is on Summary, Recommendations and Conclusions.

1.6 Scope of the Study

The software Hospital management system will be used in the FUOYE health centre to acquire information from patients and storage of such data for further usage. The current system in use is a manual system which is very slow, unreliable, and inaccurate and does not provide updated lists of patients within a short timeframe. The System should only be used in FUOYE health centre to eradicate the use of ID cards, improves efficiency, and reduces the time use in attending to a patient which increases the number of patients that can be treated accurately.

1.7 Definition of Terms and Acronyms

i. Impatient:- This consist of patients who are admitted into the health care centre

ii. Outpatient: - This consist of patients who are discharged from the health care centre or not being admitted at all.

iii. Redundancy: - Repetition of the same information or data.

iv. FUOYE: - Federal University Oye-Ekiti.

v. SQL: - Structured Query Language.

vi. ID :- Identity

vii. HMS:-Hospital Management System

viii. HMIS:-Hospital Management Information System

ix. ERD:-Entity Relationship Diagram

x. DFD:-Data Flow Diagram

CHAPTER TWO

LITERATURE REVIEW

2.1 Theoretical Framework

Information technology application in health care is unceasingly evolving as the quality of patient care in contemporary times seems to depend on the timely acquisition and processing of clinical information related to the patient (Brailer, 2005). Cholewka (2006) asserted that a significant paradigm shift has occurred in health care service delivery from an era of physician centeredness to emphasis on quality of patient care, from isolationist practices by caregivers to networking in a global world, and from competition to collaboration among practitioners. In tandem with this trend, improvement in technology and advancement in information systems has been adopted in the health care industry as a business strategy to improve the quality of care (Wilcke, 2008).

A clear understanding of the usefulness of hospital management systems is lacking among health care policy makers in Nigeria. The Year 2000 World Health report ranked Nigeria 187 out of 191 countries in health care infrastructure and health services provision. A gap in knowledge exists regarding the exact number of hospital information systems functionally available in Nigeria, but subjective data project less than 5% implementation of any form of hospital information technology in a country of more than 150 million people (Idowu, Adagunodo, & Adedoyin, 2006). This review is designed to explore the reasons for lack of robust availability of hospital management systems.

A major task facing the current civilian regime is to rebuild the social institutions and health care sector by introduction of new national policies. As a result of decades of neglect, there is a serious shortage of modern health care facilities. The government has taken steps to promote the development of a basic national primary care program in the villages, but concerns abound about serious lack of specialized health care facilities (Ouma & Herselman, 2008).The most recent population census held in

Nigeria in 2006 estimated a population of 140 million inhabitants, whereas current projections puts the population at more than 150 million people making Nigeria the most populous country in Africa (World health report, 2008).

According to the National Population Commission (2007), the population is young with 42% in the age group 0-14, 55% in the age group 15-64, and only 3% age 65 and above. The National Population Commission (NPC) published a wide range of information including the fact that the population is growing rapidly by 2.4% every year. The birth rate is 40 per 1000 and the death rate is 17 per 1000. The fertility rate is 5.5 children per woman. The population, which is ethnically very diverse, representing more than 250 different tribes and population groups, is also diverse in religious beliefs. About 50% are Muslims, 40% Christians, and 10% of different indigenous beliefs (National Population Commission, 2007).

Nigeria practices both orthodox medical care and traditional healing. Traditional medical practitioners are native doctors who practice in rural areas but occasionally find patronage in urban cities. The health care services by native doctors do not follow formal protocols or depend on scientific tests to arrive at diagnosis. Sometimes their treatments endanger the lives of their patients from overdose of herbal extracts. These traditional healers do not have orthodox training, but depend on generational beliefs handed down by ancestors (Okeke, 2008). Even though the practice of Western medicine is rapidly expanding in Nigeria, the non-availability of modern medical technologies in the health care arena remains a threat to the success of orthodox medicine (Pierce, 2008).

Health care service delivery in Nigeria falls short of international standards resulting from poor state of health care infrastructure, shortage of medical professionals, threat of re-emerging infectious diseases, and poor sanitation. Over the last five decades post-independence, growth, and development in health care has been dismal. HIV/AIDS has been a very serious health challenge. About 3.6 million of the population are HIV positive or have developed AIDS (equivalent to a prevalence of 5.4% of the adult

population). More than 300.000 individuals die from AIDS every year (Arikpo, Etor, & Usang, 2007). Another major problem is that of infant mortality. The World Health Organization Report (2008) indicated an infant mortality of 110 per 1000 live birth. Recognizable demographic diversity exists in Nigeria with consequent disparity in availability of health care facilities across the country (Okeke, 2008; Ouma & Herselman, 2008).

Electronic medical record systems help to improve access to health care in remote suburban areas and ensure improved maintenance of long-term care (Keenan, Nguyen, & Srinivasan, 2006). Onwujekwe (2005) and Ofovwe and Ofili (2005), in separate studies conducted to assess patient and community satisfaction, found discontent with community members who decried the poorly staffed and inadequately equipped Primary Health Centers (PHCs) in their rural settlements compared to hospitals in urban centers. Such demographic disparity in health care accessibility benefits from hospital information technologies and telemedicine to foster collaboration between clinicians in urban areas and those in rural settlements (Ouma & Herselman, 2008).

Telemedicine is a unique application of hospital information technologies. In its simplest form, telemedicine uses audio visual information and communications apparatus to deliver health care services in a bid to modify socio-economic circumstances of the beneficiaries and improve accessibility to medical care (Yun & Chun, 2008).

A paucity of government policy regarding the implementation of hospital management systems exists in Nigeria. The lack of strategic government programs has culminated in the poor adoption of hospital information technologies in health care facilities across the country.

Okeke (2008) asserted that the lack of access to modern medical health care facilities has compelled many Nigerian patients to seek treatment with traditional healers and patent medicine dealers. The more affluent people in the society resorts to medical tourism overseas to obtain health care services, resulting in a loss of foreign exchange to Nigeria.

According to Okafor-Dike (2008), poor leadership in Nigeria has led to years of economic downturn affecting every aspect of social life. Rather than develop medical services in Nigeria, government officials and wealthy individuals frequently seek medical treatment abroad even for the most basic health care needs.

Former Vice President Atiku is an example of such cases who went to Germany for treatment of his arthritis. Political analysts in both national and foreign media have often questioned the rationale behind former President Yaradua's frequent trips for medical treatment in Saudi Arabia even for renal dialysis rather than developing medical facilities in the country. In an apparent endorsement of the existing malady in the Nigerian health care system, Judge Abutu of an Abuja High court, in a case brought before him in 2010, ruled that Yaradua violated no laws by remaining on hospital admission in Saudi Arabia for more than two months (Nigeria Judge Rules, 2010).

The judgement appears illogical; the decision from a respected legal authority seems to legitimize the quest for overseas medical treatment by top government officials in Nigeria as a result of the poor health care infrastructure in the country.

Analysts acknowledge that the dearth of a modern medical infrastructure in Nigeria has promoted medical tourism among the rich subset of the Nigerian population. Amaghionyeodiwe (2009), in a study that examined the impact of government health care funding in Nigeria, observed that the poor health care infrastructure continues to widen the differences between the rich and the poor in Nigeria.

The major reason for the widening of differences, according to Amaghionyeodiwe, is that the poor are more strongly affected by public spending on health care relative to the non-poor. Whereas the rich can afford oversea treatments, the poor continue to suffer from lack of good quality treatment, increased morbidity, and poor medical outcomes, thereby worsening their originally compromised health status emanating from poverty.

Available literature provides common standpoint among various authors that disparities exist in the implementation of hospital management system in developing and developed countries (Grimm & Shaw, 2007; Williams & Boren, 2008). Speculated reasons include

(a) Poor technological and funding support in developing nations,

(b) Poor management capacity at all levels that hinders seamless workflow, and

(c) Complex milieu of health care service delivery.

Other posited factors include

(d) Continual evolution of technology,

(e) Confidentiality problems with the use of hospital information systems,

(f) Poor technological background of the Nigerian society (Grimm & Shaw, 2007; Krishna, Kelleher, & Stahlberg, 2007).

The consequences of non-adoption of hospital information technologies include possible mix-up with laboratory results, misdiagnosis, medication order errors, and mismanagement of patients (Keenan et al., 2006; Okeke, 2008). Prior to the introduction of the health care insurance scheme in Nigeria, health care purchases were made by individual out-of-pocket payments and few employer-based private health insurance with different reimbursement mechanisms (Pierce, 2008). The lack of well-established information infrastructures within the hospital systems in Nigeria presents a challenge to the health care delivery in the country.

Hospitals can also be regarded as organizations based on high technology and information intensive processes. A survey under 2752 European hospital managers indicates that technology can substantially influence hospital activities and services (Anderson, 1993). It is also expected that health care budgets and funding will depend significantly on sophisticated patient and diagnosis classifications. The use of IT in diagnostic and treatment processes will add to the development of networks of clinical, hospital and health care processes (Smith and Gert van der Pijl, 1999).

Healthcare management is a growing profession with increasing opportunities in both direct and non-direct care settings. As defined by Buchbinder and Thompson (2010), direct care settings are those organizations that provide care directly to a patient, resident or client who seeks services from the organization. Non-direct care settings are not directly involved in providing care to persons needing health services, but rather support the care of individuals through products and services made available to direct care settings. The construction of medical information is important to improve the hospital medical care capability, the management decision-making level of health and the hospital operational efficiency. Nowadays, comprehensive hospital information services and management platform have been established, centering on electronic medical records and clinical pathway.

The establishment and use of these information systems played an important role in improving the degree of patient satisfaction, enhancing hospital efficiency and healthcare quality, protecting the safety of healthcare, and reducing healthcare costs. Hospital Management System (computerized) is increasingly becoming an emerging tool in health care arena to efficiently enable delivery of high quality health services. These systems have large computerized databases intended primarily for communication and storing health and administrative information. HMS has different components and includes broad scope and level of systems from departmental (a system limited to a specific clinical or financial domain) to knowledge based systems that provide diagnostic support and intervention for patient care activities.

HMS implementation is said to be an organizational process conducted toward information technology within user community. User community in health care arena consists of many different user groups (physicians, nurses, administrators, managers, researchers, etc.). Neglect of any of these parties imply to missing related expertise, skills, knowledge, requirements and expectations. Expectation and requirement arise from what users see and hear about the system and interpret the ways the system will work for them. Studies indicated that addressing user expectation is a distinct element to ensure the successful adoption of the HMS (Farzandipour, Sadoughi and Meidani, 2010).

In health care organizations, many different user groups (physicians, nurses, administrators, managers, radiologists, pharmacists, etc) with variety of backgrounds and conflicting interest exist. Implementation of a hospital information system could not happen without an analysis of the feelings and perceptions of individuals who make use of it (Ndira, Rosenberger, and Wetter, 2008).

2.2 Brief Historical Overview

The processes used in collecting, processing, and storing patient information to aid clinical treatment are probably as old as medicine. The formats for collection of patients' records and the ways in which this information is used and subsequently stored for future references has continued to evolve from regular paper note takings to electronic taped records and present-day hospital information technologies. Wilcke (2008) defined information literacy that affects medical practice as the ability to identify the need for information and seek, evaluate, and use information in any presented format. Information technology infusion that aids globalization refers to the degree to which various information technology tools integrate into organizational activities (Idowu et al., 2006).

The growth of computer technology in the 1980s with consequent improvement in information literacy saw the advent of the first breed of hospital information systems (Keenan et al., 2006). Earlier researchers in hospital information systems categorized them into three types: Consumer informatics, medical and clinical informatics, and bio informatics based on areas of application (Detmer, 2001). Consumer informatics focuses on communications between patients and the public. Svensson (2002) opined that, consumer informatics helps to create virtual communities for sharing of health care information.

Medical and clinical informatics applications relate directly to health care organizational processes, structure, and clinical outcomes.

Electronic medical records system is a major medical and clinical information system aimed at the lowering cost of health care therapies (Svensson, 2002), In its earliest applications, hospital management

systems were mostly used for patient's electronic record keeping, but has advanced into almost all areas of medical discipline. Common applications of hospital management technologies include Computerized Physician Order Entry, Pharmacy Information Systems, Laboratory Information Systems, Radiology Information System and Picture Archival and Communication Systems, telemedicine, and many others as these technologies are constantly evolving.

William and Boren (2008) acknowledged that most European countries and the United States are increasingly adopting electronic medical record (EMR) technology to enhance health care outcome and quality. William and Boren posited that Nigeria lacks robust health care infrastructures and policies for implementation of information and communications technology (ICT).

2.3 Benefits of Hospital management Systems

Hospital management information Systems improve workflow and increase patients' access to health care (Ouma & Herselman, 2008; Shekelle et al., 2006; Wallis 2007). Sisniega (2009) asserted that the applications of information and communication technologies helps in facilitating ubiquitous and instantaneous communication between organizations and their stakeholders. ICT enable people and organizations to achieve seamless workflow and effective processes through improved interactions. Electronic health technologies enable effective networking by physicians, allow online review of patients' treatment, and provide for accurate prescription of drugs. Radiology information systems enable the transmission of radiological images for evaluation in remote sites (Weimar, 2009).

Hospital Management System provides the benefits of streamlined operations, enhanced administration & control, superior patient care, strict cost control and improved profitability. HMS is powerful, flexible, and easy to use and is usually designed and developed to deliver real conceivable benefits to hospitals. More importantly it is backed by reliable and dependable support. The importance of patient records is related to different needs and objectives. They encompasses permanent documentation of patient health, permitting the medical professional to evaluate symptoms and signs

within a broader temporal perspective, contributing to improvements in making diagnoses and providing treatment. The value of the patient record is also understood within the legal scope because it can be taken to trial, allowing doubts to be clarified and behaviour's to be discerned, which, in turn, can protect patients, medical professionals, and other involved parties.

In addition to the medical and legal considerations, the records helps in providing research assistance because they contain information that helps to contextualize the evolution of patients, allowing procedures and consequences to be evaluated. The Federal Council of Medicine (FCM), by means of Resolution 1.638, defines patient records as "a unique document made up of a set of recorded information, signs, and images, generated based on facts, occurrences, and situations on the health of the patient and the care that he is given, which is of legal, confidential, and scientific character, and which makes it possible to have communication among members of the multi-professional team and the continuity of the care given to the individual" (FCM, 2002).

To satisfy these functions, patient records need to be legible, organized, documented, without erasures, and appropriately archived for several years. In large hospitals, there is a significant demand for space used for the storage of conventional records (printed records), which may make it difficult to maintain them or even to access the information. Furthermore, it is not rare to find that these documents are incomplete or have problems with legibility (Rodrigues Filho, Xavier, and Adriano, 2001). As an example of this situation, Stumpf and Freitas (1997) reported the case of the Clinical Hospital of Porto Alegre, which, at the end of the 1990s, stored 680,000 records in a 665-m2 area.

The authors identified recurrent problems such as the low quality of information, illegible descriptive notes, examinations glued to the records (causing difficulties in checking the records of patients with long periods of hospitalization), excessive use of paper, and inadequate storage. Such complications make it difficult to handle these documents, with negative repercussions for patient care. The consequences of the low quality of the available information and the problems of storage of and

access to a large number of records extend to scientific research, impeding the development of retrospective and epidemiological analyses. As a result, Santos, Paula, and Lima (2003, p. 86) asserted that the manual information system is seen "as a limited vehicle of communication that has been surpassed by modern digital technology."

With the evolving use of information technology systems (generically denoted as IT), it would be expected that solutions for the electronic and digital storing of these documents would be rapidly developed in other to facilitate smooth handling. Burt and Sisk (2005) considered that while policy analysts and policy makers have perceived the potential use of IT in the healthcare field, this did not occur with the same speed observed in other areas.

Côrtes (2008) noted that there are still only a few hospitals that use electronic records, which was also mentioned by Cerqueira and Mac-Allister (2005). Hing, Burt, and Woodwell (2007) have reported promising trends. The authors indicated that while the quantity of physicians who use electronic records is still low, the use of these records has increased each year.

This growth is a reflection of the impact of hospital initiatives in broadening the use of IT as a way to ensure improvement in quality of services offered to the patients, to control the consumption of medical-hospital inputs, and to reduce costs (Shachak et al., 2009; Uslu and Stausberg, 2008; Santos, Paula and Lima, 2003; Rodrigues Filho, Xavier and Adriano, 2001; Stumpf and Freitas, 1997). Even though the literature presents various reports related to the use of electronic records within hospital information systems, benefits are not the only issues reported regarding the use of such systems. Kemper, Uren, and Clark (2006) stated that the cost of installing and maintaining these records is the major barrier preventing the adoption of electronic health records, a situation also indicated by Balfour III et al. (2009) as one of the major problems that hampers the dissemination of these systems.

Another issue noted by these authors is the lack of standardization, which leads to difficulties in communication and interoperability of these systems (Balfour III et al., 2009).

Arnhold, Schmidt, and Bohnenberger (2008), in studying an integrated system for the medical field, identified problems such as disbursement rates that were 159% greater than those originally predicted and long time periods needed for installation. Carvalho et al. (2008), upon analyzing the implementation of an integrated management system in a large hospital, found that it provided important benefits that outweighed potential difficulties, facilitating the execution and improving the quality of the services offered.

The two cases demonstrated the influence of the chosen system supplier (especially with regard to care, training, and customization capacity) and of the way in which the implementation project was managed, resulting in the generation of different results for both projects (Arnhold, Schmidt, and Bohnenberger, 2008; Carvalho et al., 2008). Additionally, it is important to consider that the interaction of medical professionals with these systems is perhaps not very satisfactory, at least initially. This may compromise the implementation success of electronic records and of similar solutions, which is usually achieved with the use of integrated management systems (Biehl, 2007; Kansal, 2006; Shepherd, 2006).The focus of resistance may even be greater in hospitals because this requires certain changes in the ways in which doctors conduct their activities.

Dawidowski et al. (2007) reported that difficulties were encountered by doctors, such as handling appointment times and interacting with the patients while concurrently handling the computer or the system (which generated a certain degree of distance in the doctor-patient relationship), in addition to failures in the system that caused delays and hindered the progress of the appointments. As such, it has been shown that electronic records may become an important work tool, allowing not only the monitoring of patients, but also the analysis and the control of the costs, in addition to facilitating access to information for the auditing of hospital accounts.

Based on these considerations, a research question that arises is, "what are the benefits and the problems that can be seen in the use of electronic versions of patient records (electronic records)?" This

question leads to the formulation of the following hypothesis: although problems may be identified during the process of using electronic record systems, the benefits outweigh the difficulties, thereby justifying their use. With the development of this work, an attempt was made to assess the perception of electronic record system users, evaluate the benefits and difficulties found, check how the use of these systems may contribute to better performance of the medical-administrative processes, improve management, and allow for higher quality decision making.

2.4 Considerations Regarding Hospital Information Systems

The use of computers in medicine dates back to the 1950s with studies that attempted to expand the mental capacity of physicians (Stumpf and Freitas, 1997). With the evolution of this equipment, especially with the capacity to simultaneously execute various tasks beginning in the 1960s, computers began to be used in the processing of information in large hospitals, in both administrative and financial functions for the collection of statistics and the development of research projects (Stead, 2007; Stumpf and Freitas, 1997). The use of microcomputers, beginning in the 1970s, introduced the concept of distributed processing, increasing the number of systems in use in large hospitals (Stumpf and Freitas, 1997).

The initial diffusion of computers in hospitals led to the emergence of islands of computerization, with isolated systems that lacked any form of interconnection and were developed by different teams. The redundancy and the lack of data integrity deterred health professionals, who saw these systems as developed by systems professionals for systems professionals (Stumpf and Freitas, 1997). This situation was also investigated by McDonald (1997), who analyzed the lack of interconnection of the different systems used by the hospitals, laboratories, and service providers in the healthcare field. Collen (1986) described the development of approaches in the 1970s that sought to approximate the habitual processes of decision-making with the use of artificial intelligence in differential diagnoses.

In the same decade, studies were undertaken in search of a better organization of the healthcare system (Kaihara, 1978). With the help of computer-processed simulations, the author established an ideal relationship between medical centers and population demands.

The distributed processing was expanded during the 1980s with the development and greater availability of microcomputers, and the possibility of network communication of such equipment increased in the 1990s (Stumpf and Freitas, 1997). This allowed for the emergence of hospital management information systems (HMIS), covering medical, administrative, and hospitality areas, although hospitality may be considered as integrated into the administrative area (Cortes, 2008). These three areas are interlinked by horizontal data and information flows, providing support to the developed activities.

2.5 Electronic Records

A patient's medical record contains fundamental information for incorporation into a hospital management system, yet it is necessary to consider that not all hospitals adopt medical records, even though they may use administrative systems or even hospitality systems. While specific information is not available, professional practice shows that, in general, the administrative area benefits the most from information systems in hospitals. This use includes inventory management systems, accounts payable and receivable, financial services, and accounting services. In these cases, the traditional record (hand-written) should have part of its information inserted into administrative systems so that hospital bills can be processed. Similarly, hospital pharmacies use information systems to control stocks of prescriptions that are recorded in the medical records of patients.

The manual process used in the existing system adopted generates excess work that, in addition to consuming time and human resources, leaves the process susceptible to errors, delays, and failures, with repercussions that include the scheduling of exams, errors in forwarding requirements, and mistakes in billing that may lead to item disallowances, billing delays, or even missing charges for procedures or exams that have been performed. Electronic records, when duly integrated with other systems, may

reduce the occurrence of these problems, while also expediting the recovery of information for use by health professionals. This information can be used in statistical surveys, help with the analysis of procedures, be applied to preventative medicine, and be utilized for the control of hospital infections.

However, greater agility in the administrative processes and hospital procedures causes controversy, as one of the problems related to the use of HIS is that in order to deal with medical information, many systems end up demanding a change in the work methods of physicians who have always recorded their observations in structured and codified ways. Although some studies have considered this standardization and structuring to be necessary for the organization of and increase in the quality of information (e.g., Setz and D'innocenzo, 2009; Hoff, 2009; Wakamiya and Yamauchib, 2009; Chaudhry et al., 2006; Shekelle, Morton, and Keeler, 2006), other studies concluded that this could harm the transmission of information among medical teams, imposing restrictions on the medical information that is input into the system (e.g., Warwick, 2009; Dawidowski et al., 2007; Stead, 2007; Walsh, 2004; Stumpf and Freitas, 1997).

Adler-Milstein (2009) stated that the potential benefits of using IT in the healthcare field, including efficiency and quality gains, will only be possible if the hospitals and clinics promote organizational changes, including greater autonomy for the individuals in the decision-making process and an increase in training programs. This situation is similar to that recommended by Goldzweig (2008), who concluded that the impact of the implementation of HIS depends on the context of the implementation and applications, as well as on the clinical problems and the patient population.

Another possibility presented by electronic records within HIS is the electronic prescription. Balfour III et al. (2009) concluded that this improves the level of care given to patients by eliminating the need to interpret handwritten prescriptions, reducing the possibility of errors regarding dosages and increasing communication speeds with hospital pharmacies. The presentation of the available drugs facilitates the indication of generic medications, potentially decreasing the costs for the patients (Balfour

III et al., 2009), reducing the dosages prescribed when associating the support systems with clinical decisions (Shekelle, Morton and Keeler, 2006) and permitting a more rapid renewal of prescriptions and dosage changes (Weingart et al., 2009).

Despite the abovementioned benefits, some problems were identified in studies focusing on electronic prescriptions. Physicians did not always check the prescription before its transmission (Hellström et al., 2009) and also did not pay attention to the warnings regarding interactions among medications because many warnings referred to drugs that were no longer used (Weingart et al., 2009). Another general benefit provided by HIS and especially by electronic records is the medical and nursing audits of the accounts presented to health insurance carriers.

This analysis constitutes one of the main resources used by the carriers to better manage their costs with hospital care (Ribeiro et al., 2008; Farias and Melamed, 2003). As a result, the auditor ends up adopting a financial approach and a vision of controllership, seeking the economic viability of the business and analyzing unauthorized charges for hospital costs. In this process, medical records will be able to reduce the number of errors, as they can set rules for the performance of procedures in addition to facilitating the investigation of conduct, inputs, and medical-hospital costs for the patients (Scarparo and Ferraz, 2008).

A Hospital is a place where Patients come up for general diseases. Hospitals provide facilities like:-

i. Consultation by Doctors on Diseases.
ii. Diagnosis for diseases.
iii. Providing treatment facility.
iv. Facility for admitting Patients (providing beds, nursing, medicines etc.)
v. Immunization for Patients/Children

Various operational works that are done in a Hospital are:-

i. Recording information about the Patients that come.

ii. Generating bills.

iii. Recording information related to diagnosis given to Patients.

iv. Keeping record of the Immunization provided to children/patients.

v. Keeping information about various diseases and medicines available to cure them.

These are the various jobs that need to be done in a Hospital by the operational staff and Doctors. All these works are done on manually. The work is being done as follows:-

i. Information about Patients is done by just writing the Patients name, age and gender. Whenever the Patient comes up his information is stored freshly.

ii. Bills are generated by recording price for each facility provided to Patient on a separate sheet and at last they all are summed up.

iii. Diagnosis information to patients is generally recorded on the document, which contains Patient information. It is destroyed after some time period to decrease the paper load in the office.

iv. Immunization records of children are maintained in pre-formatted sheets, which are kept in a file.

v. Information about various diseases is not kept as any document. Doctors themselves do this job by remembering various medicines.

All these work are done manually by the receptionist and other operational staff and lot of papers are needed to be handled and taken care of. Doctors have to remember various medicines available for diagnosis and sometimes miss better alternatives as they can't remember them at that time.

2.6 Limitations of HMIS

Electronic health record systems management is constantly evolving with about 17 different systems currently available to service various clinical applications, facilitate strategic decision making, and improve administrative workflow (Hikmet et al., 2007). Although aimed at constant quality improvement, the rapid evolution of these information technologies is a major limitation. The short shelf

life compels users to upgrade frequently or lose the ability to interface with newer innovations (Brailer,2005). The upgrade and running cost burden is remarkable and outside the reach of small hospitals and health care trusts. Physician health care administrators and boards understand the benefits of hospital information technologies, but they do not find easy justification for the cost (Thielst, 2007).

Compounding the cost issues, lack of interoperability of information systems marketed by different vendors is a significant concern (Brailer, 2005). Problems with Interoperability do not allow seamless retrieval of patient information across different operating systems. Patient clinical data may be accessed only in hospitals with compatible information systems, thereby hampering the key benefit of easy and universal access to patient data that the technology is meant to support (Arrow et al., 2009). Other key concerns constituting major limitations of hospital information technologies include wrong identifications, wrong or incomplete information documented in hospital systems, the possibility of making changes to patient information by unauthorized persons; an event that carries considerable safety implications (Fuji & Galt, 2008).

Researchers recognized the cost curtailment capabilities, improved quality of care, and prompt delivery of acute care associated with telemedicine. However, telemedicine, as a type of hospital information technology, has some obvious barriers (Hjelm, 2005; Wootton, Jebamani, & Dow, 2005). According to Ashley (2002), notable among the drawbacks are some legal requirements of multiple licenses and credentials. Because practices in telemedicine sometimes require clinicians to provide consultation across interstate boundaries, clinicians with limited licensure may have legal problems delivering service in certain locations. Whereas credentialing stipulates minimum standards of training, education, and qualifications needed by professionals to provide care, each state may require different benchmarks for its practitioners according to state law.

These specific statutes may affect the ability of a clinician to offer telemedicine services. Another drawback with telemedicine is the physical separation between the health professional and the patient. In

the 1990s, Wootton (1996) called this drawback the depersonalization of health care. Wootton further opined that bureaucracy is another drawback of telemedicine. The use of telemedicine may require a radical change in the way that services are provided and paid for. Concerns about how services are billed and reimbursement obtained abound. Patient privacy is impinged upon by practices of telemedicine.

According to Ashley (2002), in a survey conducted in 1999, 20% of participants believed that medical information was not properly used and 16.7% of participants admitted to providing inaccurate data to conceal what they considered private information Barjaktarevic (2008) expressed similar concerns of inadequate confidentiality for patient records because of possibility of data mismanagement electronically. Georgiou, Westbrook, Braithwaite, and Iedema (2005) asserted that the extent of organizational impact of adoption of hospital information systems is often underestimated; stressing that a major incident of patient risk exposure emanating from the system is capable of causing far-reaching organizational consequences.

Callens and Cierkens (2008),commenting on legal concerns with the use of EHRs, concur that new e-health applications, including electronic health records, e-health platforms, health grids, and further use of genetic data, come with fresh legal challenges and undeniable legal consequences in case of information mismanagement or identity theft.

According to Benham-Hutchins (2009) because of challenges involved in integrating new hospital information systems with old paper documentation and record systems, clinicians, and other health care practitioners may become encumbered with multiple and conflicting sources of patient information. Multiples of paper and electronic documentation may disrupt a seamless workflow and influence the quality and efficiency of service delivery.

These circumstances also have the potential to cause new types of medical errors resulting from poor harmonization of patient information. Understanding these concerns requires examination of human factors in the design of technology that is able to adapt to the way health care providers do their job. The

delivery of patient-friendly services demands that health care providers continue to work toward improvement in the method of care pathways and processes. Georgiou, et al. (2005) asserted that hospital information technologies eliminate some aspects of human interaction among staffs, thereby hindering workplace collaboration and cohesion. Keenan, et al.(2006) concurred that the human element is still very important in health care delivery and technology is just a tool in the hands of trained personnel. Other economic limitations of hospital information technologies include

(a) The inability to ascertain an accurate return on investment (Menachemi et al.,2006).

(b) Problems with appropriate reimbursement for technology use, and

(c) Focus on technological issues at the expense of health care services and business concerns (Ward et al., 2006).

In their pilot study of the implementation of an electronic medical record, Samoutis, et al. (2007) found that the physician's perceptions of the system's effect on their workflow, legal concerns, transition issues, and lack of familiarity with electronic equipment were among the impediments of implementation. Samoutis, et al. (2007) observed that computerized systems increased work efficiency and improved the quality of care to the patients served. Recent health care debates reinforced the demands for reimbursement that are associated with quality of care outcomes. Implementing the right systems to incorporate the appropriate components is a necessity. Benham-Hutchins (2009) suggested adequate input of unique and valuable nursing perspectives at all stages of the hospital information technology (HIT) system life cycle.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 Methodology

This refers to all the method employed in collecting data in view of the research methodology of this project work. These methods are explained below;

Observation Method:

In this method, I personally visited the organization (FUOYE Health Center) to physically examine how most of their operations are being performed manually.

Interviewing Method:

I met with the Head Administrator of the organization (Dr Odoh), to interview him as the only alternative on how the operations are performed. The methodology of the programming part of this research work include the use of Java and Microsoft Access for database.

3.2 Analysis of the Existing System

Implementation Plan:

The main plan for the system developed is to mimic the existing system as it is in the proposed system.

3.2.1 Study of the Existing System

The existing system is very complex as every work is done manually. By using the present system, work is done manually. So, each and every work takes much time to complete. Whenever a patient information is needed by a doctor, it is very difficult for the employee to search for that particular patient details and the drug information to be ordered. Searching records at the shelves is their daily routine.

3.2.2 Problem of the Existing System

Below are some of the problems found in the existing system

1. The work is done manually which takes much time to recognize the patient during registration.
2. More number of labours is needed.
3. We can't assess the calculations accurately.
4. Amount of time is more needed when patients who come to registration counter increases.
5. As there are thousands of patients records; Searching process is a difficult task.

3.3 Description of the Proposed System

The present system has obvious problems, inhibiting growth and more usage of man power. The system which has been proposed is very easy to operate .The computerization of the record in the health centre will reduce the work that is done manually. The man power is reduced to the maximum extent. The patients at the registration office are registered within no time, because every time there is no need search for the particular patient file in the shelves and all the calculations are made automatically by this system there is no need for the calculations

3.3.1 Advantages of the Proposed System

The main advantage of the new system is that it will enable faster and more efficient storage, execute important reports to support daily medical tasks, retrieval and updating of FUOYE Health centre records.

i. A fast and more efficient service to all patients. As there are thousands of patients records; Searching process is an easy task.
ii. Saving in staff time in entering and manipulating data.
iii. Easy input, deletion and manipulation of lot, patient's details.
iv. Simple correction of input errors and we can assess the calculations accurately.

3.3.2 Disadvantage

i. Loss of data when electronic fluctuations occur.

3.4 System Design

The System encompasses all the activities associated with the recording of patient and doctor details all of which will be integrated in the Hospital Management System.

The main functionalities that will be available in this system are

i. Maintaining patients details records

ii. Maintaining doctors details records

iii. Maintaining billing records

All these features will include the ability to create, update (edit), retrieve through search results and truncate obsolete records. It will also contains a report generation system that can be viewed.

The system will work in the following manner;

3.4.1 Accessing the System

The administrator starts the process by logging into the system by means of a valid username / password combination which is been set in the main page. A default administrative account has been provided in the development of the system in order to enable the administrator to access exclusive privileges such as registering new patient or doctor with either limited (normal user) or unlimited (administrative) privileges. The admin gains access to the system resources after a username password combination has been verified as accurate after which they are redirected to the homepage. The system homepage serves as the gateway to the entire hospital management system. Therefore, once the admin is logged into the system, he/she can access all system resources available. Once logged into the system, the admin can create, manipulate and truncate records. However, the amount of manipulation that a user can perform with regards to the records is dependent on user privilege levels as explained below.

Allow login

Set admin session

Re-direct administrator to admin home page

If no

Allow login

Set user session

Re-direct user to user home page

Add New Entry

Check if administrator is logged in

If correct

Check if all fields entered are correct

If correct

Check if unique field value entered already exists

If correct

System message: user already exists

If not

Registration of user successful

Adding Record

Enter Record Details

If record exists

Return record already exists

If not

Registration of Record successfull

Editing Record

Click on edit button

Query the database to retrieve details

If record exists

Return record details

Check if all fields entered are correct

If not

System message: fields incorrect

If correct

System message: record successfully edited

Deleting a Record

Check if administrator is logged in

If not

System message: no sufficient rights to perform this operation

If correct

enter recordID

If record ID exists

Delete record from table

If record ID does not exist

System message: sorry! record does not exist

3.5 Systems Architecture

The system is designed in the following manner. The Hospital Management System has a backend engine that consists of a Microsoft access database, Java as the programming language and the user interface modules. The system architecture is illustrated in Figure 3.1 below.

3.5.1 Diagram Showing the System Architecture

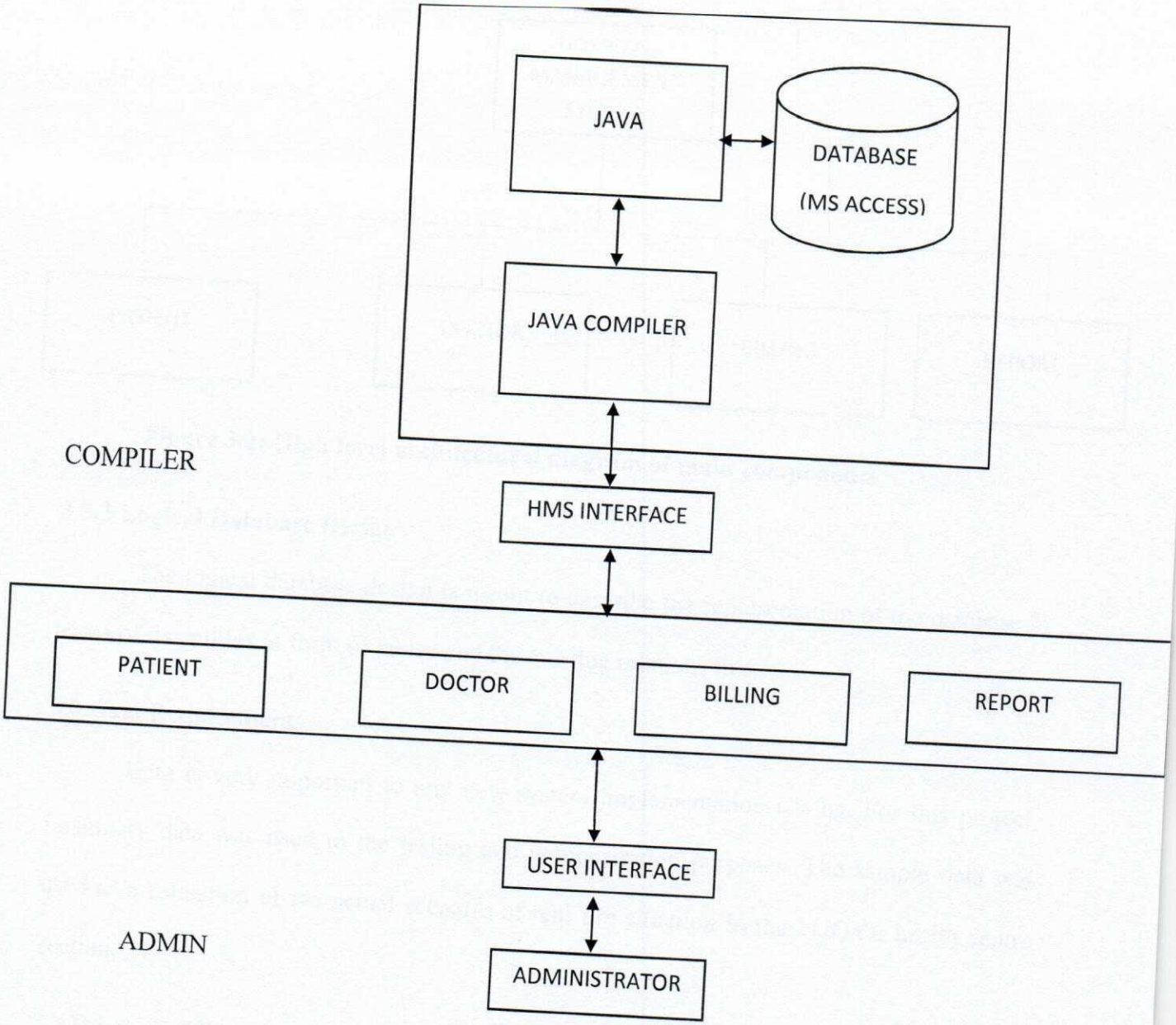


Figure 3.1: System Architecture

The details of the user interfaces are displayed in the high level architectural diagram in Figure 3.2 below. After the user login, the appropriate access rights, the user may access the system

3.5.2 High-Level Architecture Diagram of the Main Components

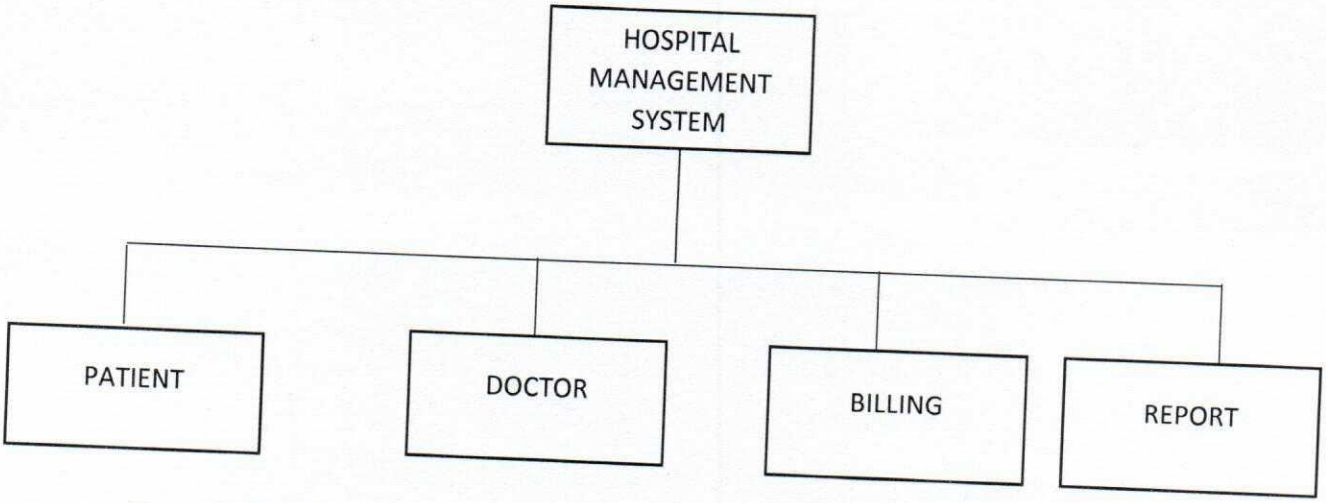


Figure 3.2: High level architectural diagram of main components

3.5.3 Logical Database Design

The logical database design is meant to describe the representation of the database in terms of its entities in form of tables and the existing relationships.

3.6 Data Requirements

Data is very important to any new system implementation testing. For this project, imaginary data was used in the testing and demonstration purposes. The sample data was used as a reflection of the actual scenario of real life situation in the FUOYE health centre section.

3.7 Database (Physical Design)

3.7.1 Physical Database Design

As one of the core elements of a hospital management system, the database had to be designed in a meticulous systematic manner. This process started at the analysis phase of the project. From the analysis, I was able to identify the necessary tables required for the database and the associated field names, format and length of each table. After careful

analysis of the user requirements, it was identified that the HMS needed two main tables i.e. patient information, and doctor information table. However, after the process of normalization a few sub-tables emerged from the main tables. Below is a list of these tables.

3.7.2 Database Tables

Patient table

Field Name	Type	Constraint
Patientno	Number(Long integer)	Primary key
Name	Short Text(50)	Not Null
Address	Short Text(50)	Not Null
Contact	Short Text(50)	Not Null
Bloodgroup	Short Text(50)	Not Null
History	Short Text(50)	Not null
Dob	Short Text(50)	Not null
Current	Short Text(50)	Not null
Roomno	Short Text(50)	Not Null
Dateadd	Short Text(50)	Not null
Rtype	Short Text(50)	Not null
Gender	Short Text(50)	Not null
Docname	Short Text(50)	Not null

Table 3.1: patient information

Doctor Table

Field Name	Type	Constraint
Did	Number(Long integer)	Not null
Name	Short Text(50)	Not null
Address	Short Text(50)	Not null
Contact	Short Text(50)	Not null
Specialization	Short Text(50)	Not null
Workfrom	Short Text(50)	Not null
Workto	Short Text(50)	Not null

Table 3.2: doctor information

Based on the tables displayed above, the main/core tables are linked together by one Unique key which is patientno. This key serves as the primary key for the whole system implementation and helps distinguish information related to each patient/doctor.

3.7.3 Data Relationships

Data relationships show how the information or records are related between each other. For the tables to work together, relationships have to be established in the design of the Hospital Management System, the data relationships were established during the process of the logical data design.

There are mainly four kinds of relationships

i. One to One

ii. One to Many

iii. Many to Many

iv. Many to One

These relationships are represented in the entity relationship diagram (ERD) in the next section.

3.8 ER Diagrams and DFDS

3.8.1 ERD (Entity Relationship Diagram)

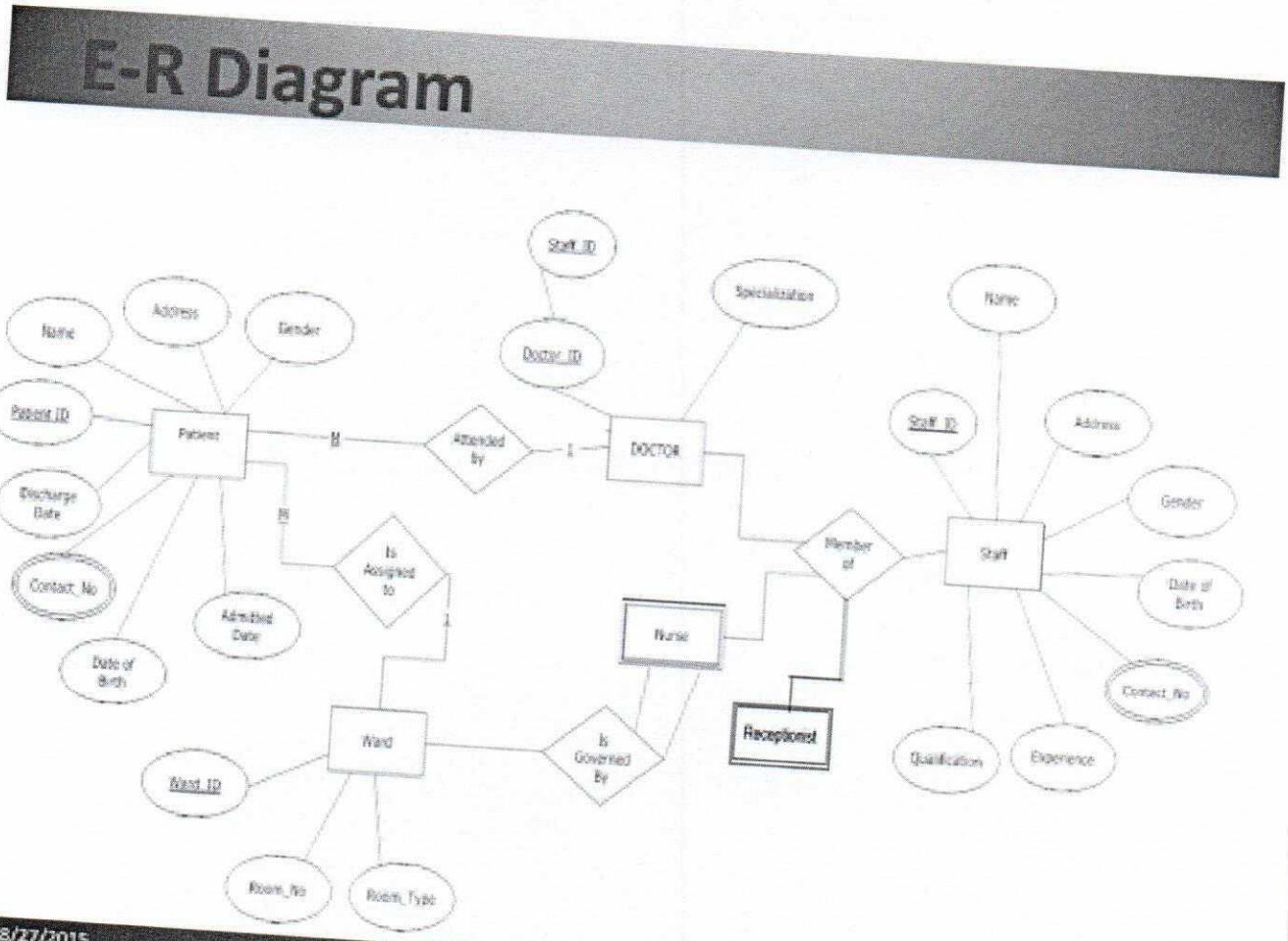


Figure 3.3: Entity Relationship Diagram

3.8.2 DFD (Data Flow Diagram)

The Data flow diagram (DFD) in figure 3.4 is used to reveal relationships among and between the various components in the hospital management system. It also illustrates the operational context of the system. The data flow diagram is an important technique for modelling a system's high-level detail showing the system boundaries laid out.

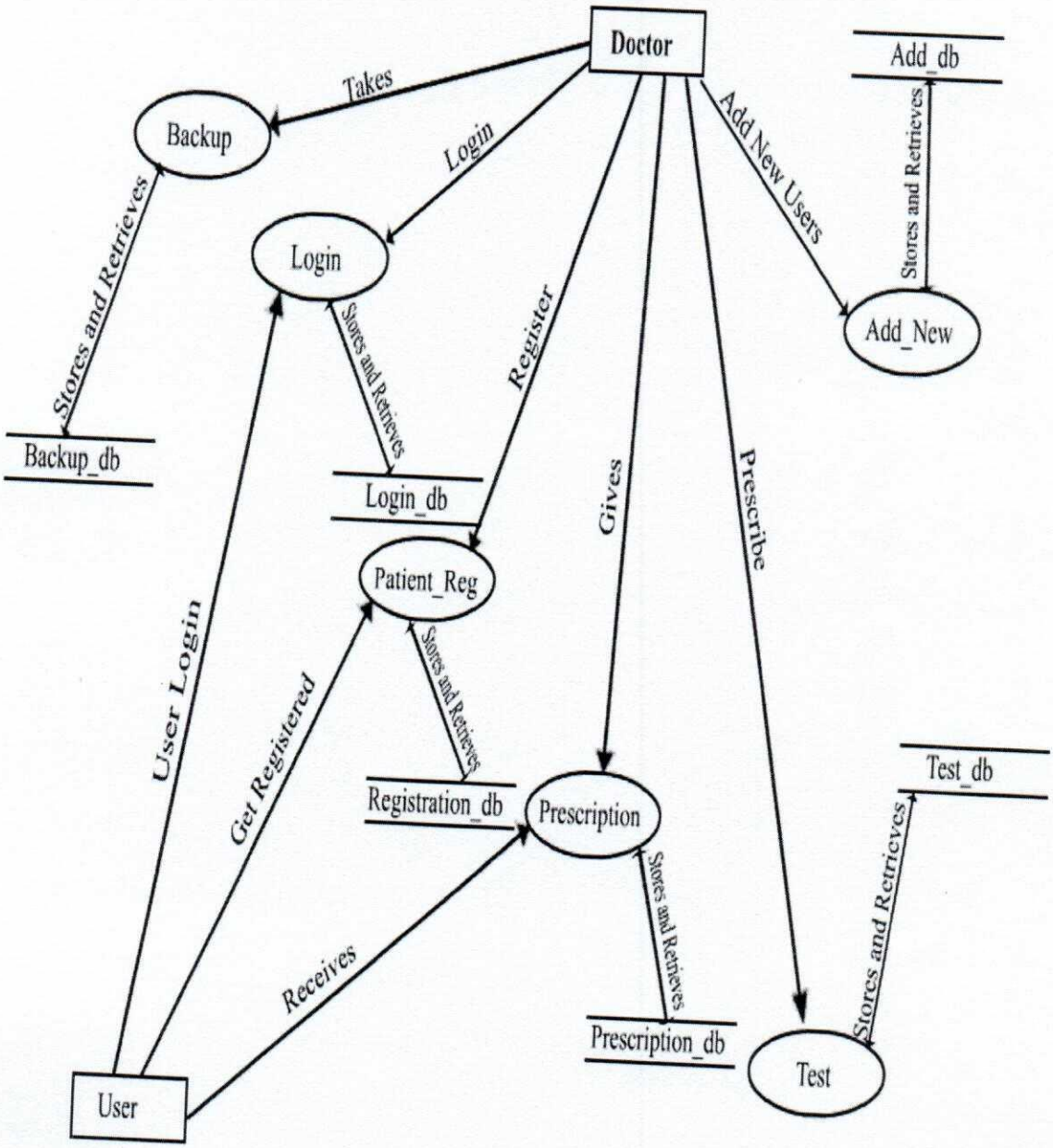


Figure 3.4 Dataflow Diagram for Hospital Management System

3.9 System Flowchart:

The Flowchart in Figure 3.4 below describes the overview of the hospital management system process in which an administrator login with his/her valid username and password before allowing access to the System and prompt to enter a valid username and password in form of dialog box if the credentials supplied to the system is incorrect.

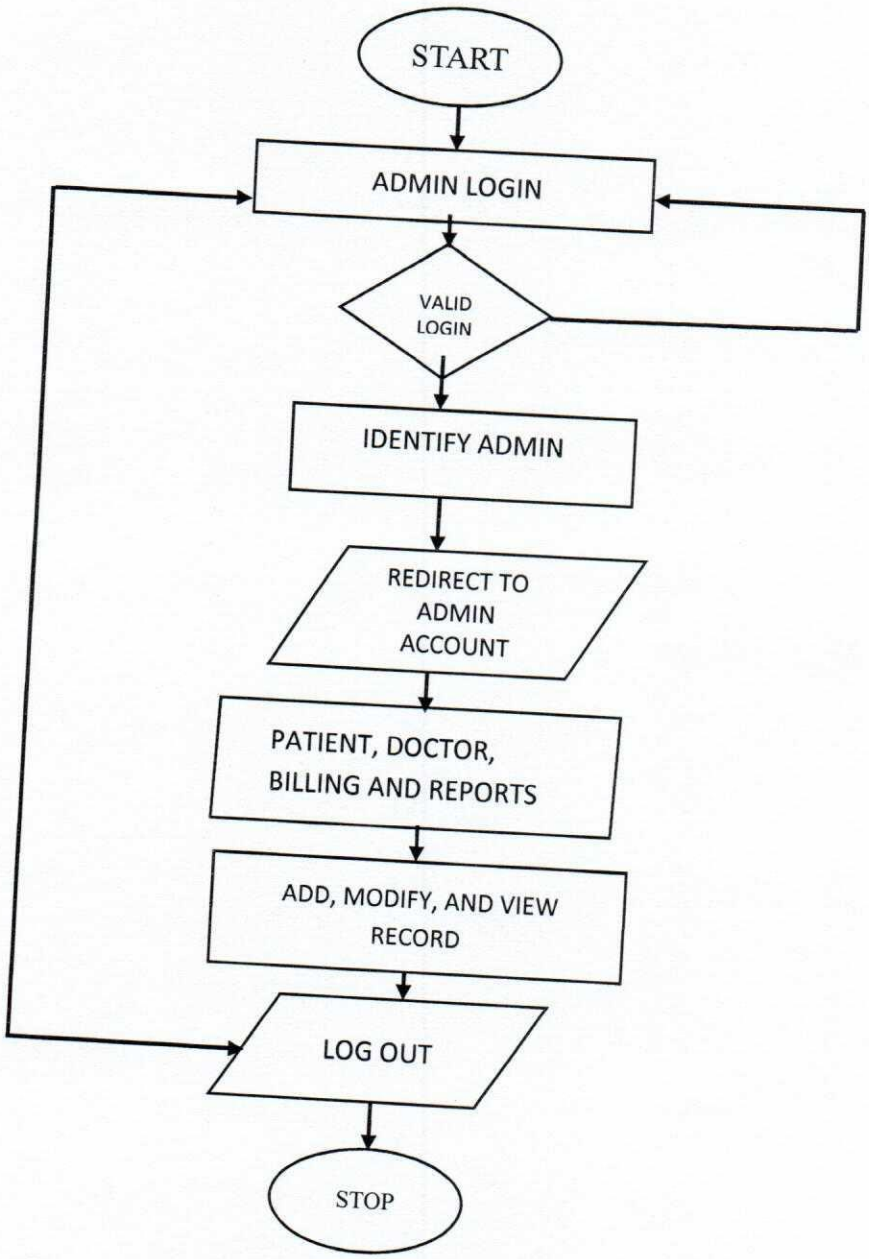


Figure 3.5 System Flow Chart

3.10 Categories of Unified Modelling Language Diagrams Used

The Figure 3.6 below describes the categories of the unified modelling language that will be used in modelling the hospital management system.

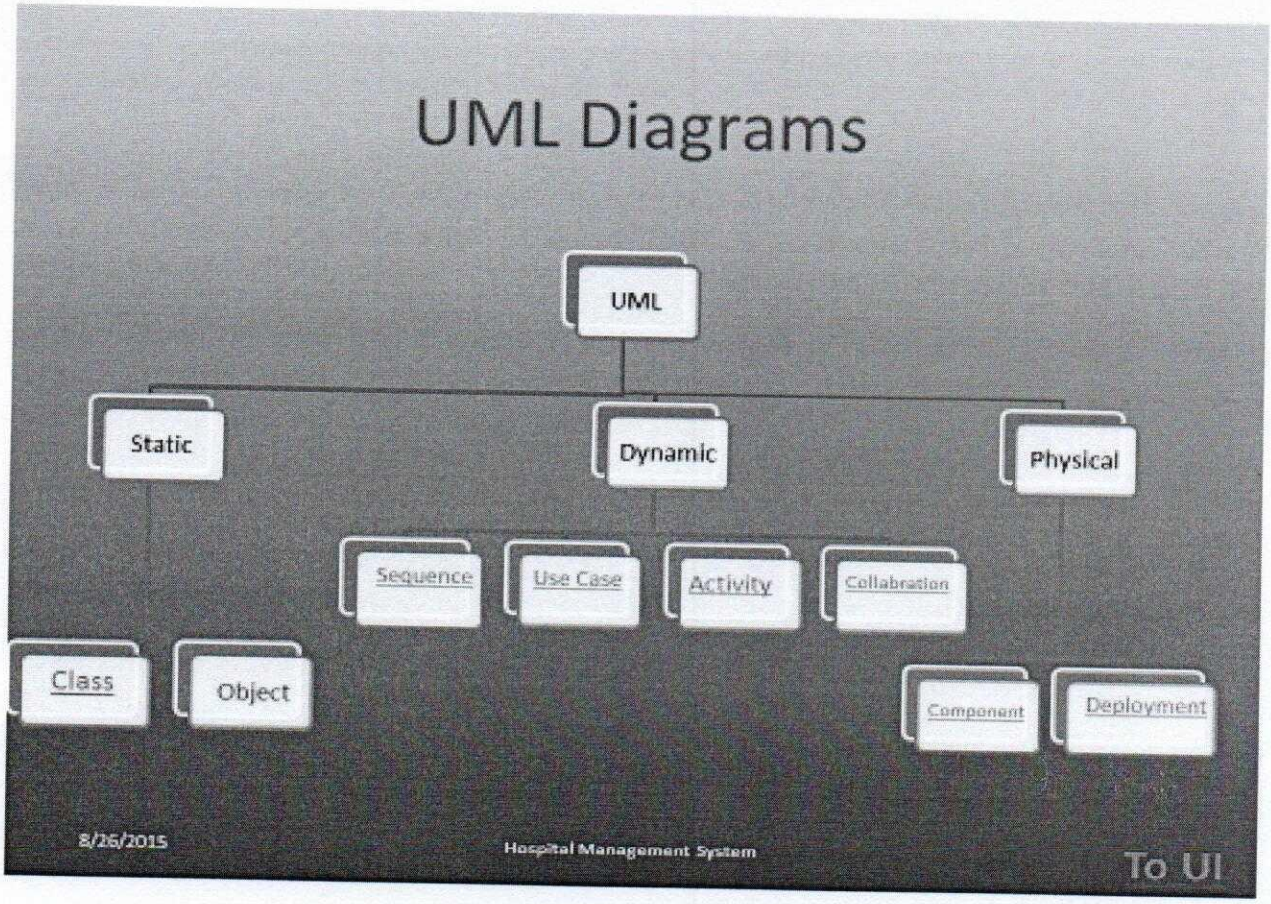


Figure 3.6 Types of UML diagram

3.10.1 Class Diagram:

The class diagram in figure 3.7 is an illustration of the relationships and source code dependencies among classes in the unified modelling language. In this context, a class defines the methods and variables in an object, which is a specific entity in a program or the unit of code representing that entity.

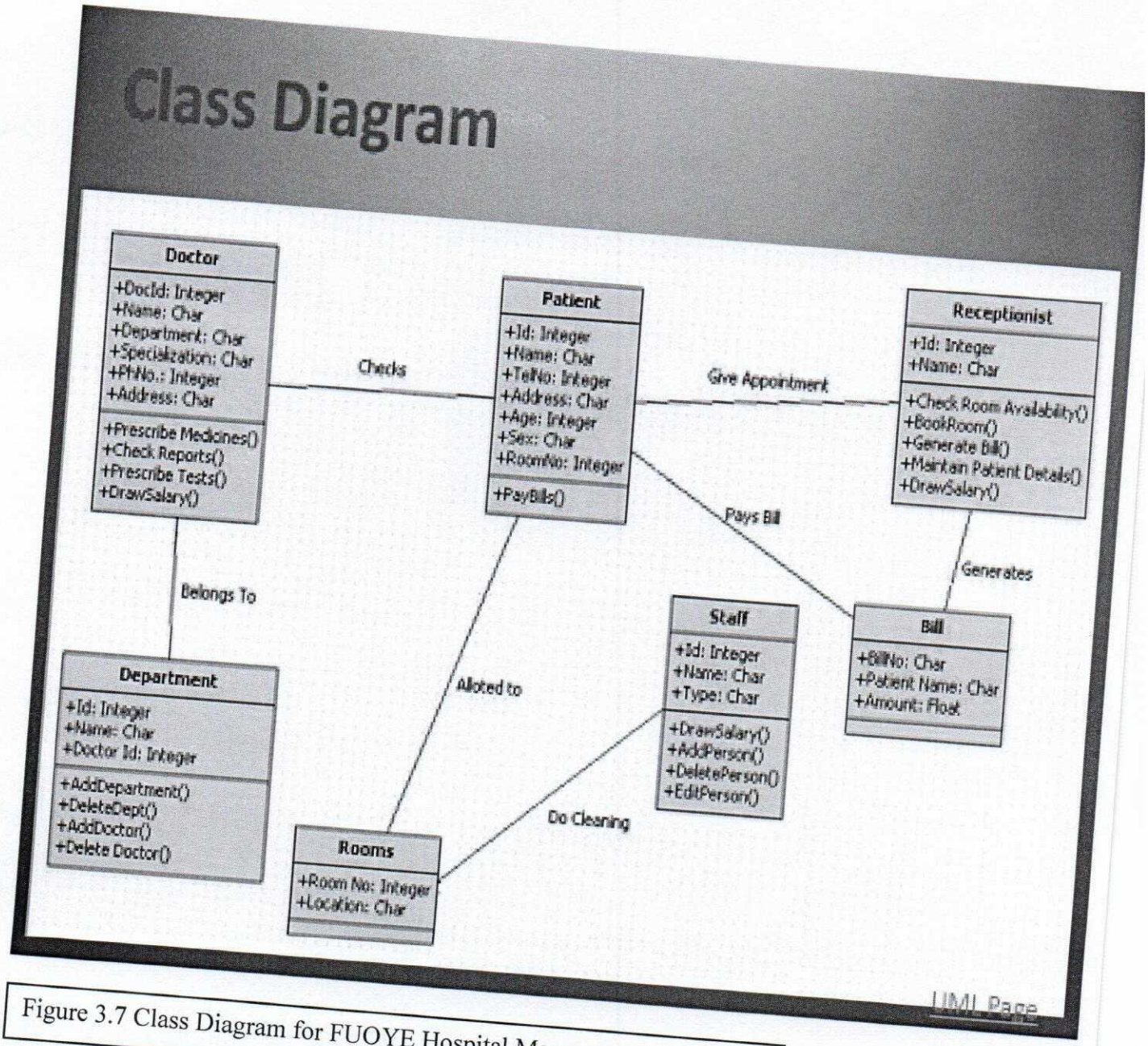


Figure 3.7 Class Diagram for FUOYE Hospital Management System

3.10.2 Sequence Diagram:

The Sequence diagram in figure 3.8 below shows object interactions arranged in time sequence. In particular it shows objects participating in the interaction and the sequence of messages exchanged.

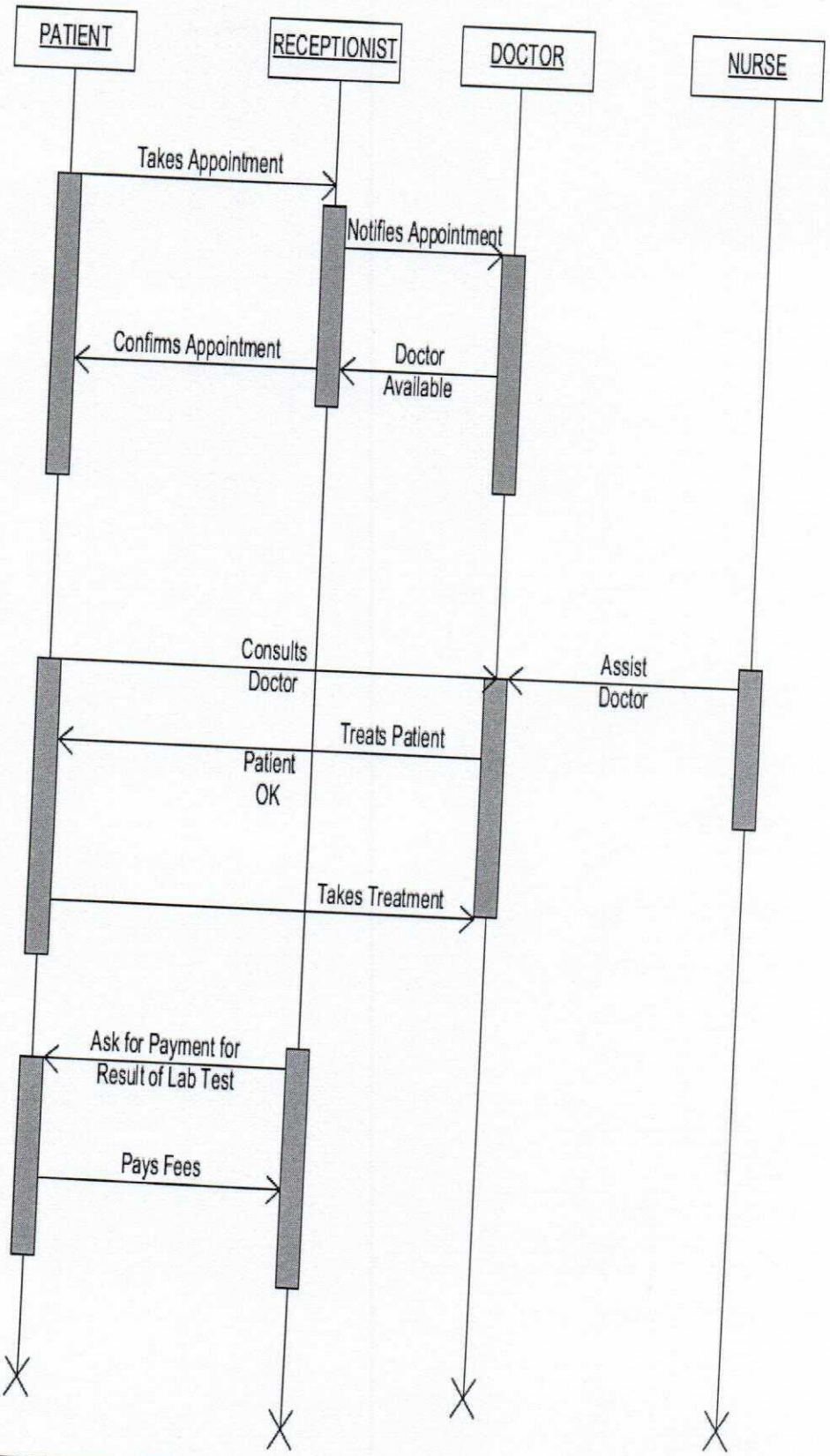


Figure 3.8 Sequence Diagram For FUOYE Hospital Management System

3.10.3 Use case Diagram:

The Use case diagram in figure 3.9 below is a description of set of sequence of actions.Graphically it is rendered as an ellipse with solid line including only its name. It depicts a behavioural diagram that shows a set of use cases and actors and their relationship in the hospital management system. It is an association between the use cases and actors. An actor represents a real-world object.

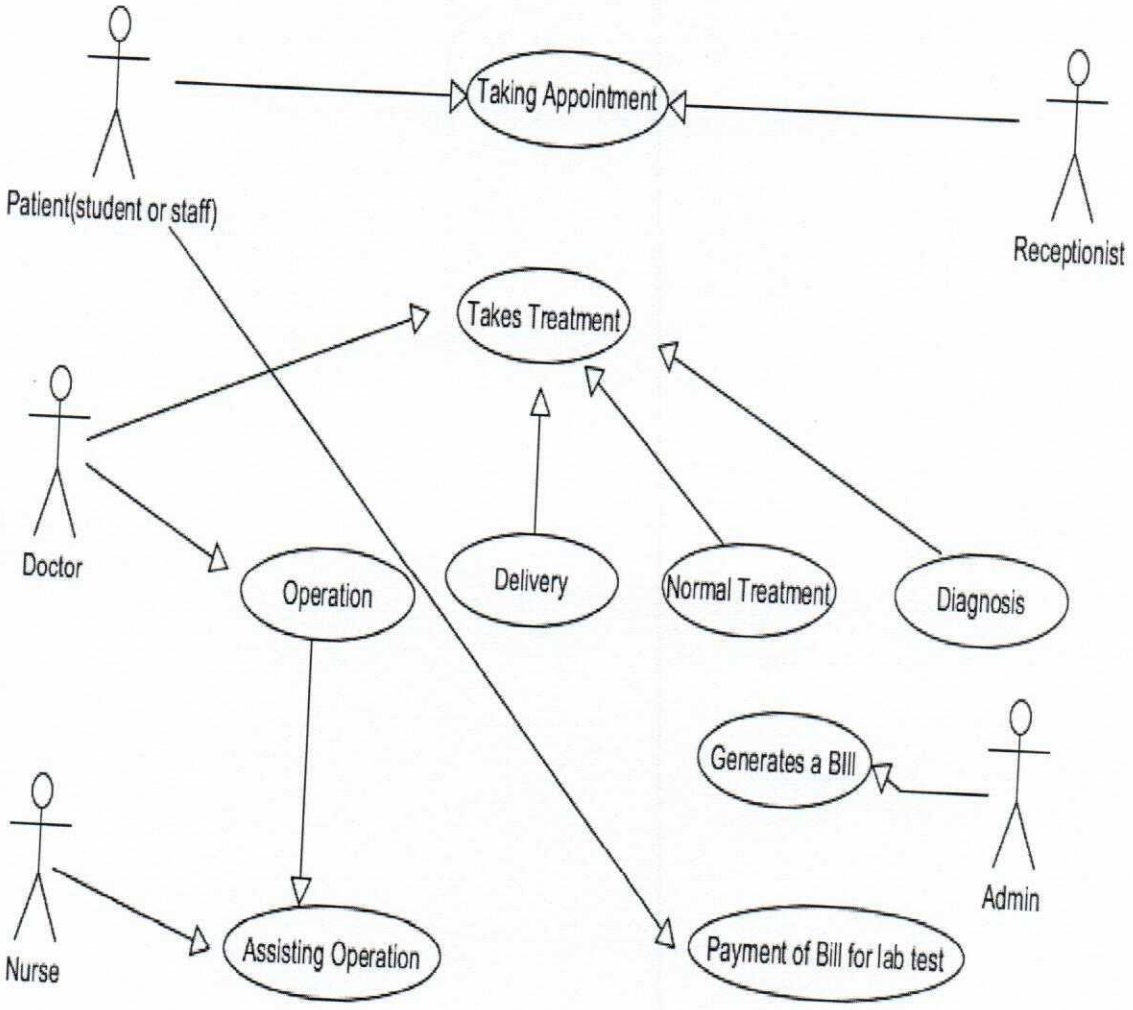


Figure 3.9 Use Case Diagram For FUOYE Health Management System

3.10.4 Activity Diagram:

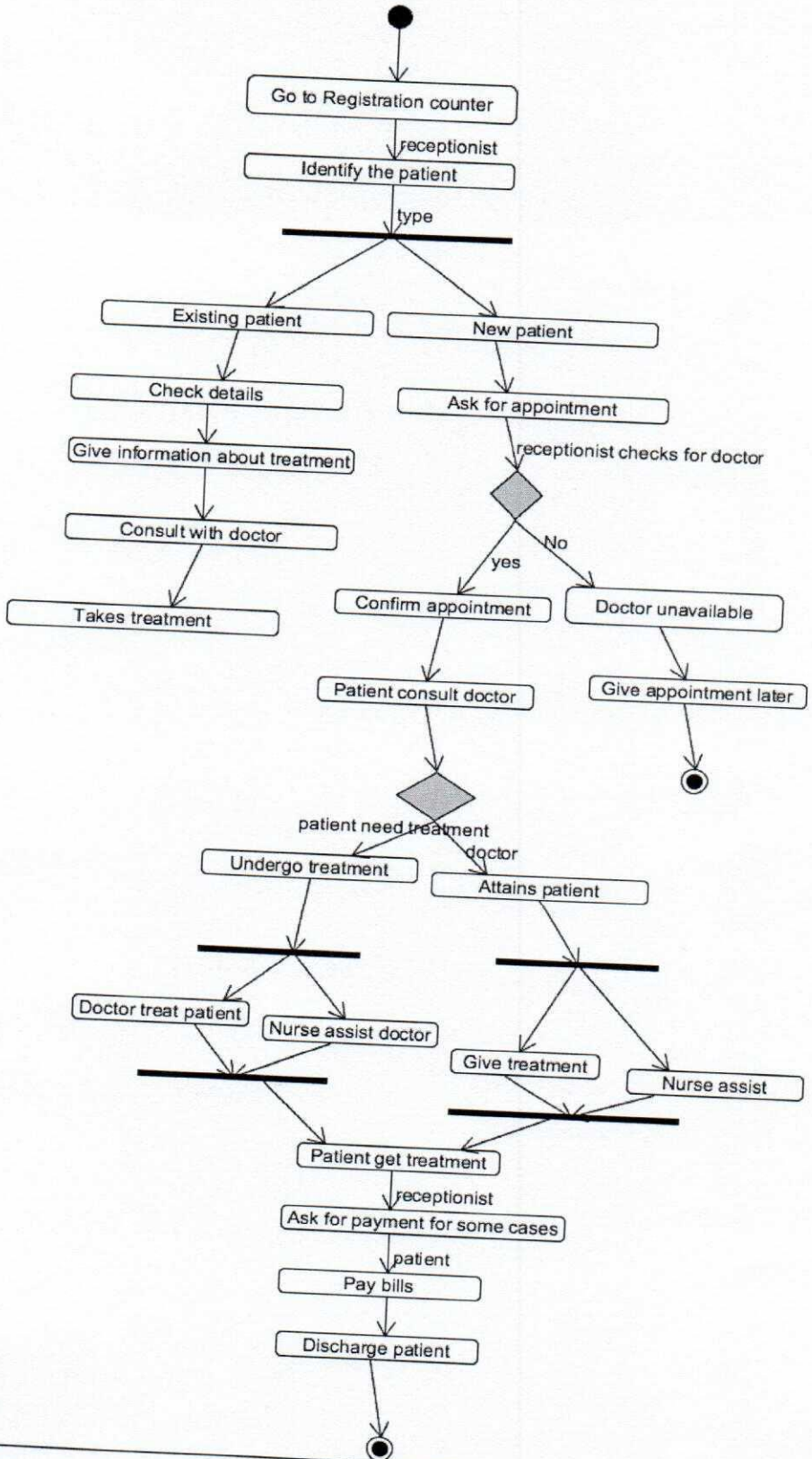


Figure 3.10 Activity Diagram For FUOYE Hospital Management System

3.10.5 Collaboration Diagram:

The collaboration diagram also called a communication diagram or interaction diagram in figure 3.11 below is an illustration of the relationships and interactions among software objects in the unified modelling language.

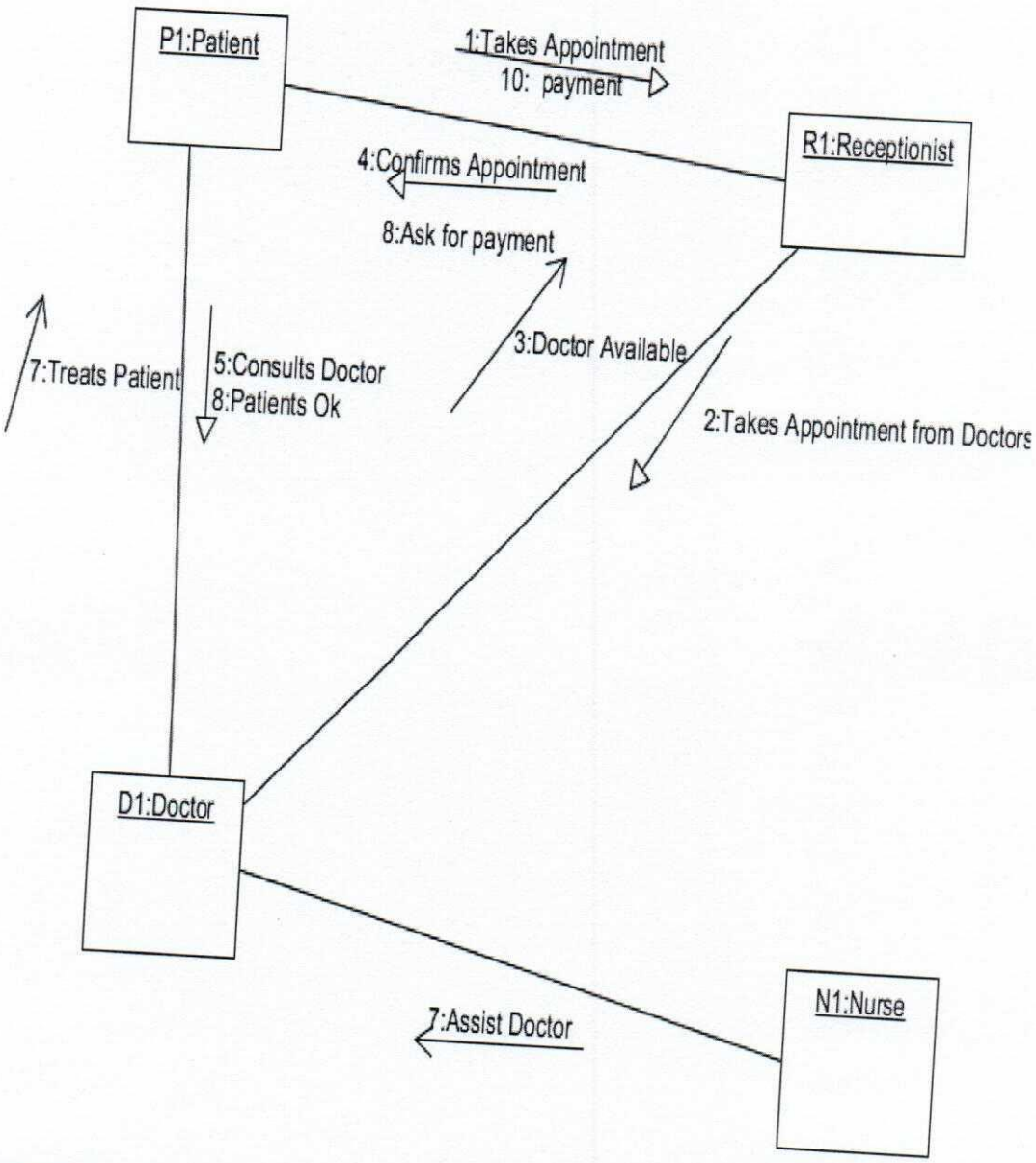


Figure 3.11 Collaboration Diagram For FUOYE Hospital Management System

3.10.6 State Chart Diagram:

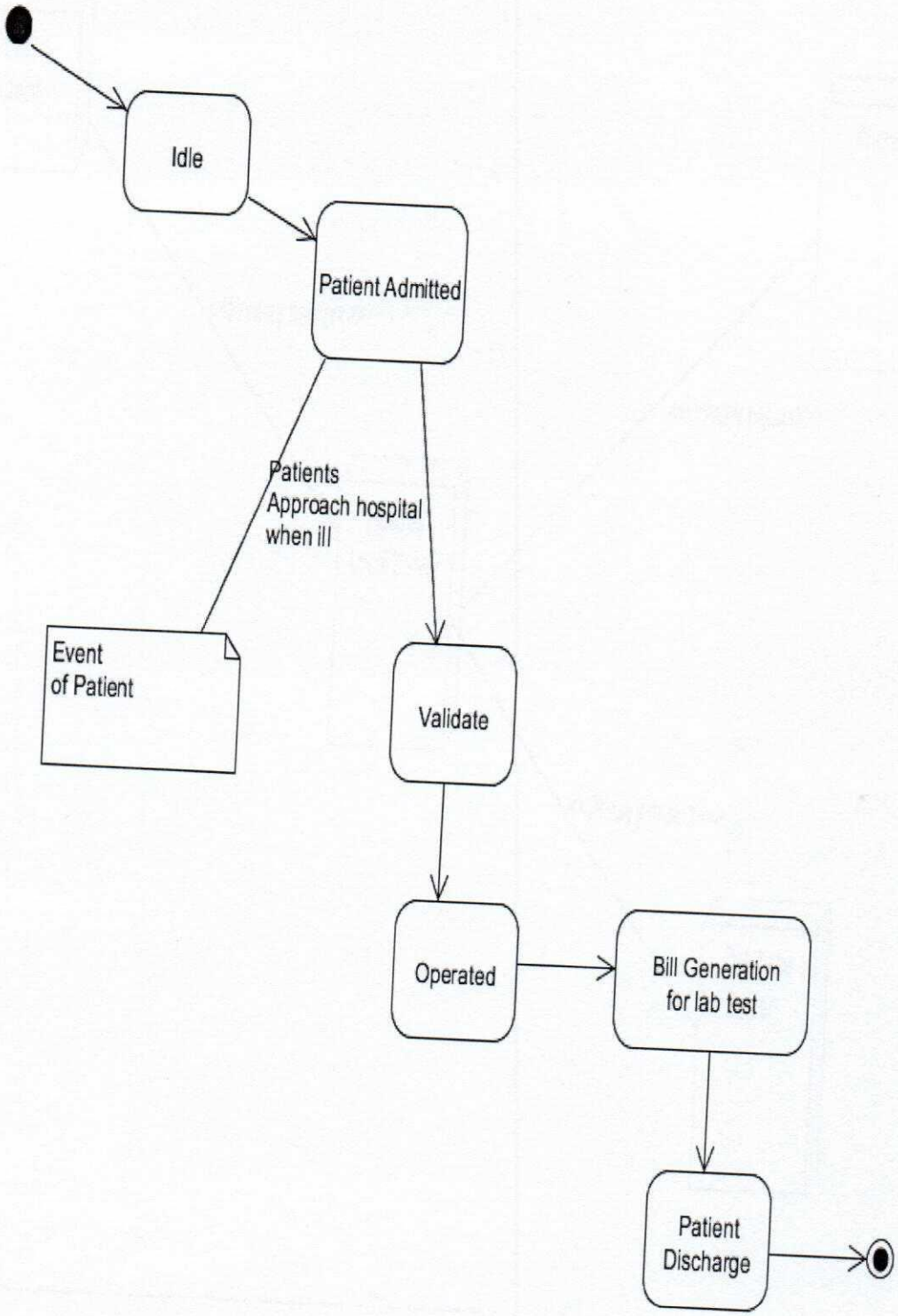


Figure 3.12 State Chart Diagram For FUOYE Hospital Management System

CHAPTER FOUR

SYSTEM IMPLEMENTATION, TESTING AND INTEGRATION

4.1 System Implementation and Documentation

System designed calls for the creativity of the analyst. Therefore, creating an acceptable design, the system analyst must exclude all prejudice. This describes how the system works and how best computers together with other resources may be applied to perform data storage, management and retrieval for decision making. In the course of the design, the system has to be designed in a way that there will be a close relationship between the inputs and outputs. Also, the design format must be made in a way that it will be acceptable to the end users.

4.1.1 Data Inputs (System forms).

Outputs are selected from the database based on the input being stored into the system by the administrator and displayed using forms that were developed using Java. The entire HMS itself contains a number of forms, However, for the systems main components, there are five main forms, below are some snap shots of the key forms.

Login Form

The login form in figure 4.1 is the first page a person accessing the system sees. It is used to gain access to the system resources on supplying a valid username and password

Figure 4.1: Login form

Admin page form

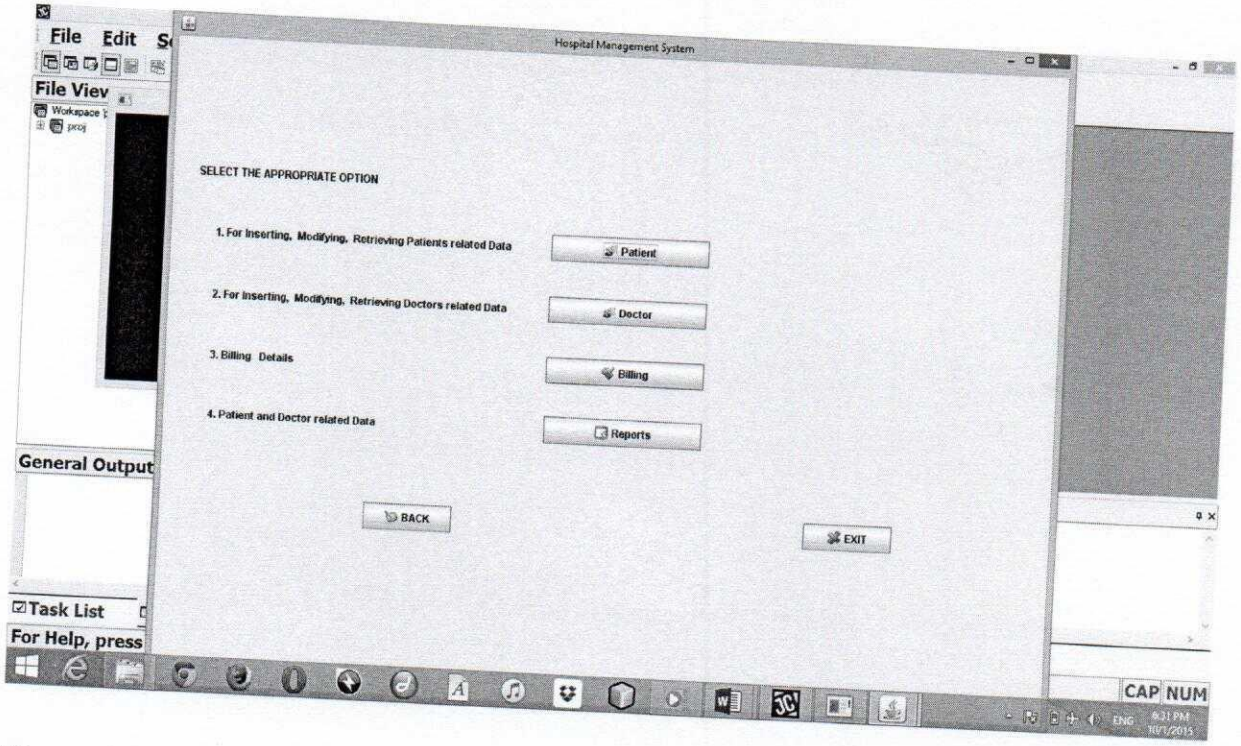


Figure 4.2: Admin page

Patient Registration Form

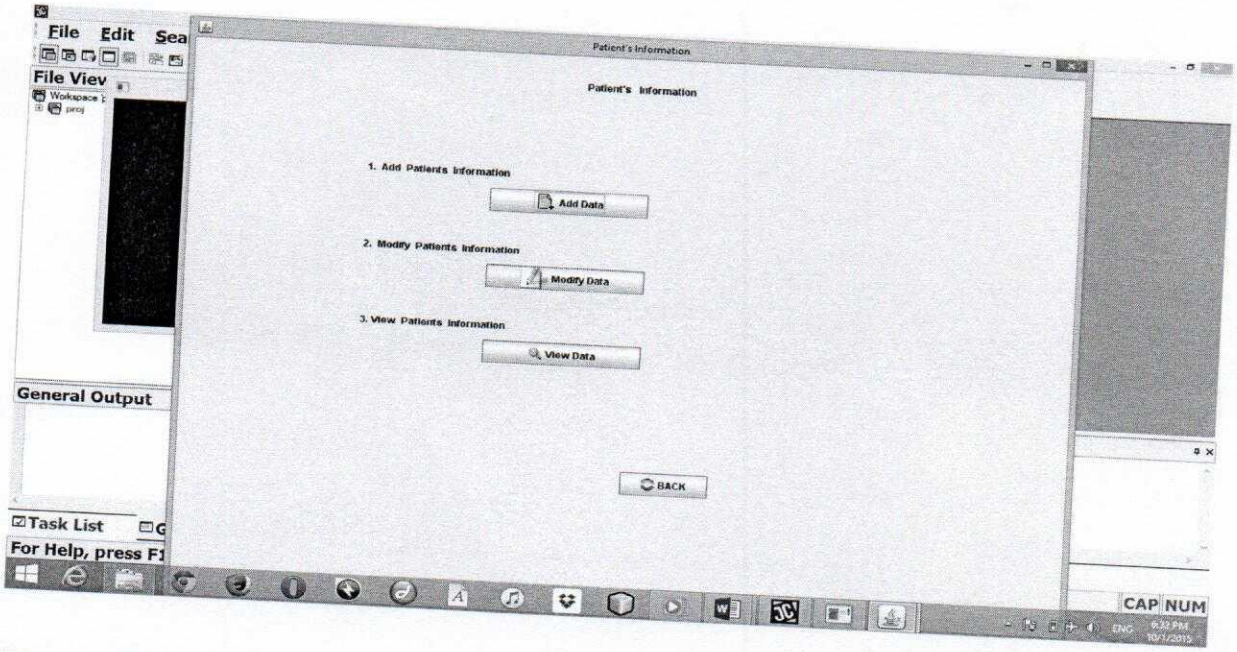


Figure 4.3 Information Page

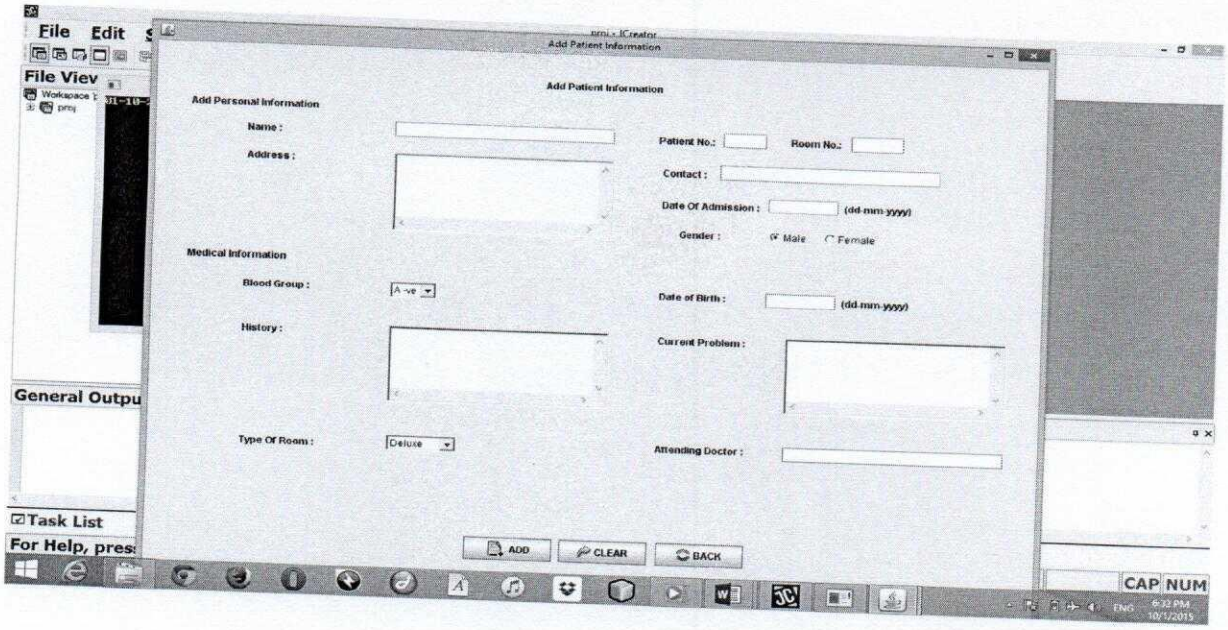


Figure 4.4: patient registration form

The form in figure 4.4 above was specifically designed for the administrative account. It was designed with a view to grant the administrator the ability to register new patient. The form as displayed above, enables the administrator to add patient information.

Data Entry and Manipulation Forms

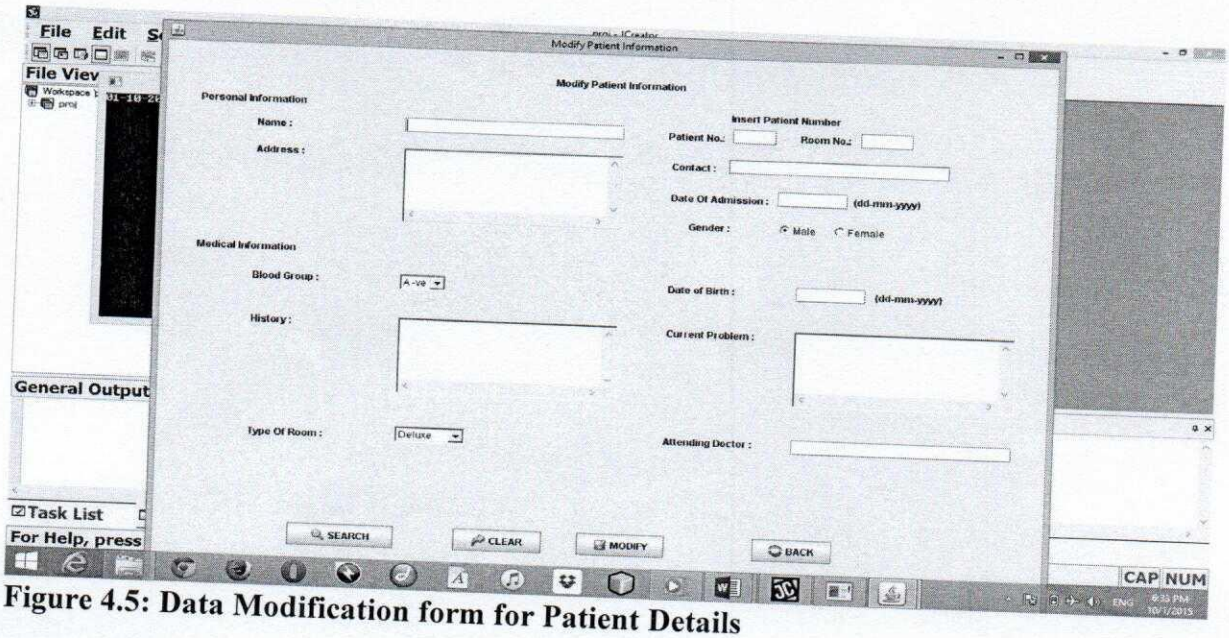


Figure 4.5: Data Modification form for Patient Details

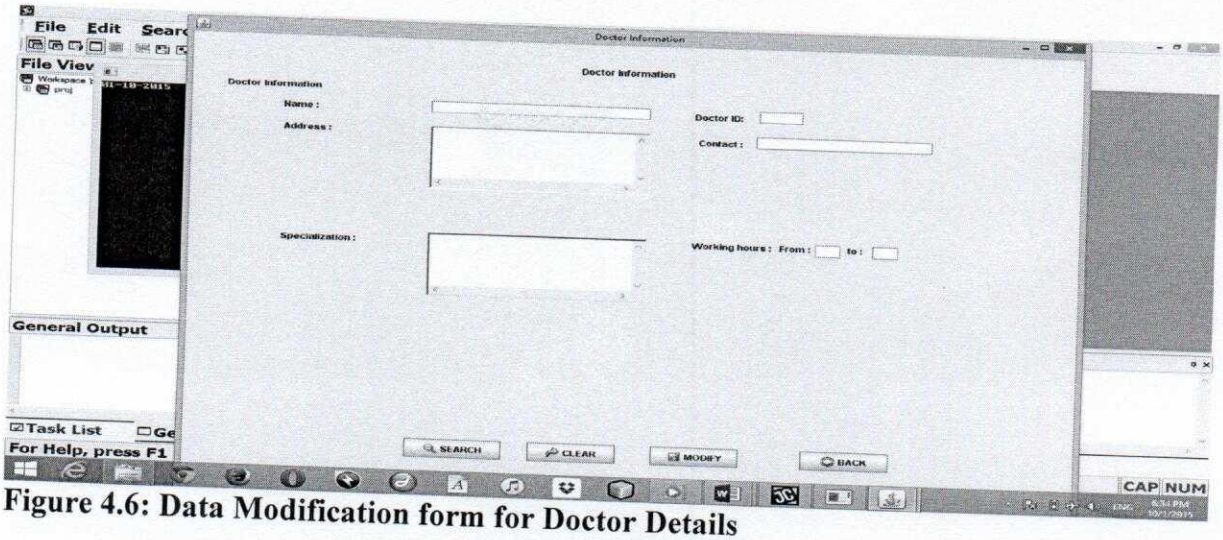


Figure 4.6: Data Modification form for Doctor Details

The data modification forms in figure 4.5 and 4.6 above allows the administrator to modify or edit an existing record. The add and modify functions are accessible to only the administrator who is expected to be the main data entrant.

Billing System

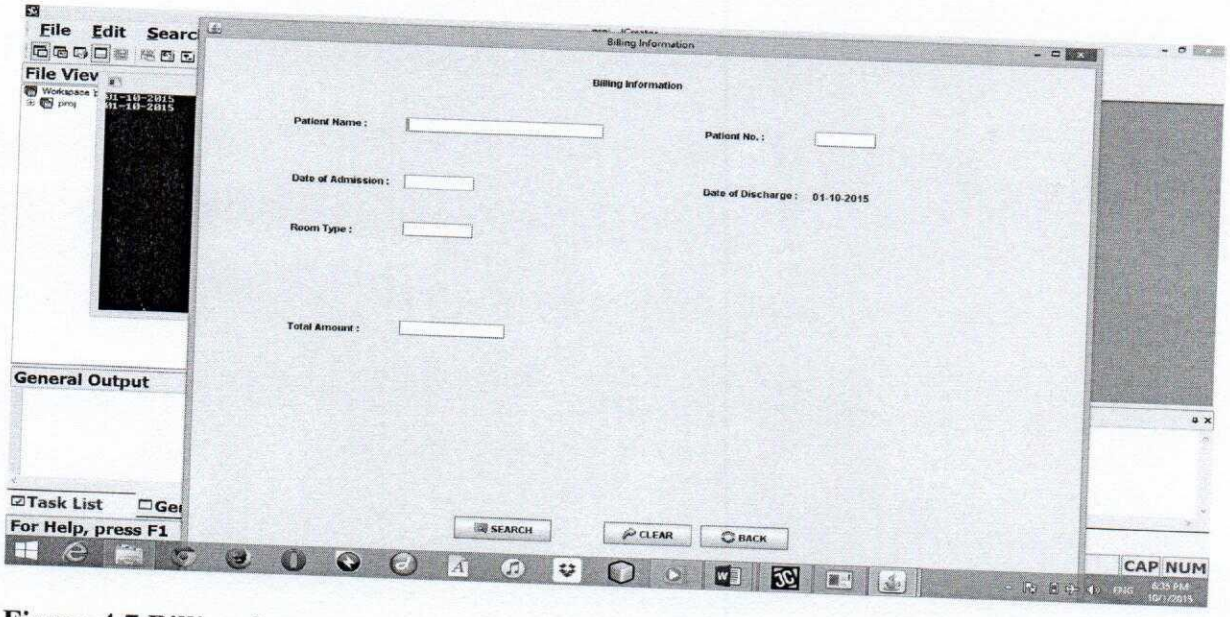


Figure 4.7 Billing form

The Billing form in figure 4.7 covers transaction within the health center premises.

4.1.2 Data Outputs

Data Storage Interface

After the data is entered into the system, it is stored and can be retrieved at any point in time using the display functionality

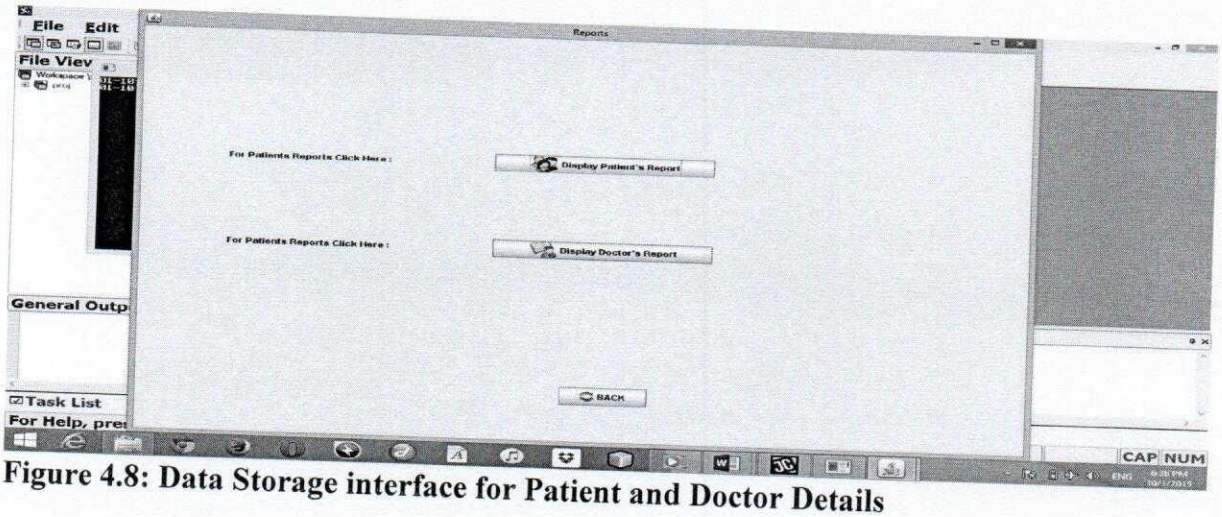
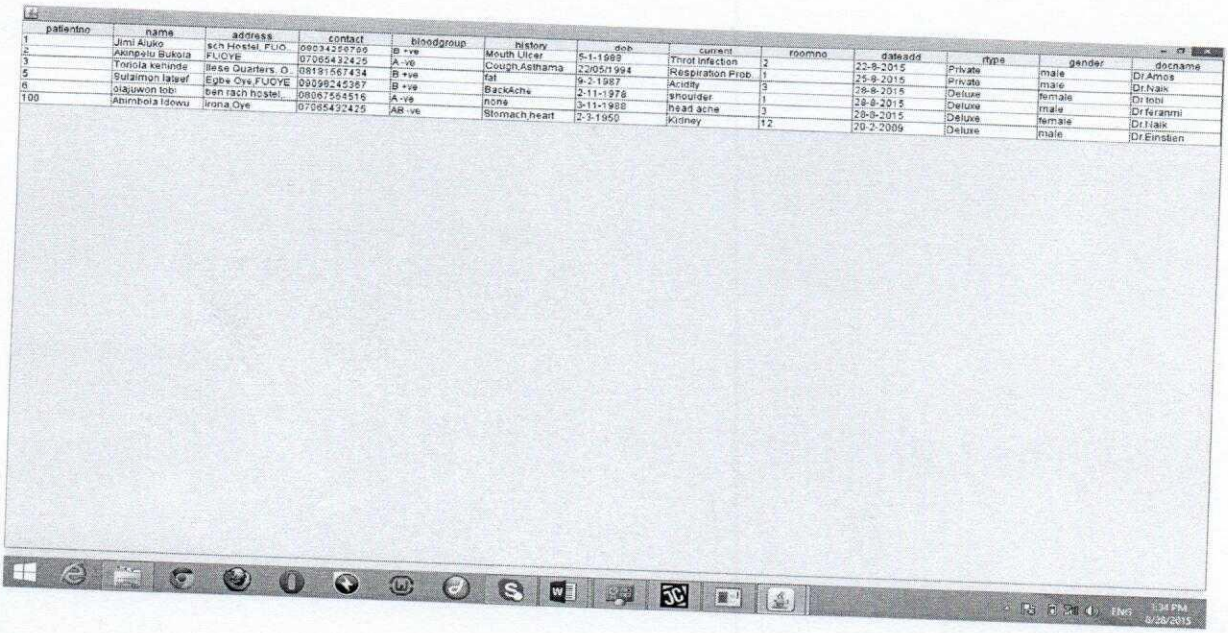


Figure 4.8: Data Storage interface for Patient and Doctor Details

Data Reports

The system was designed with the ability of generating reports for the records using the excel package.



patientno	name	address	contact	bloodgroup	history	dob	current	roomno	dateadd	rtype	gender	docname
1	Jimi Aluko	sch Hostel, FUO...	09034256786	B +ve	Mouth Ulcer	5-1-1989	Throt infection	2	22-8-2015	Private	male	Dr.Amos
2	Akinpelu Bukola	FUOYE	07065432425	A -ve	Cough,Asthama	22/05/1994	Respiration Prob	1	25-8-2015	Private	male	Dr.Naik
3	Toriola kehinde	Ilese Quarters, O...	08191567434	B +ve	fat	9-2-1987	Acidity	3	28-8-2015	Deluxe	female	Dr.Ini
5	Sulaimon lateef	Egbe Oye,FUOYE	09098245367	B +ve	BackAche	2-11-1978	shoulder	1	28-8-2015	Deluxe	male	Dr.feranmi
6	olajuwon tobi	ben rach hostel	08067564516	A -ve	none	3-11-1988	head ache	3	28-8-2015	Deluxe	female	Dr.Naik
100	Abimbola Idowu	irona,Oye	07065432425	AB -ve	Stomach,heart	2-3-1950	Kidney	12	20-2-2009	Deluxe	male	Dr.Einstien

Figure. 4.9: Data reports

4.1.3 Database Structure

Files held in this project are made up of different data types. These types are integer, text, date/time, etc. some of the files used are designed and linked with database. Also in the project design, Microsoft access database was used.

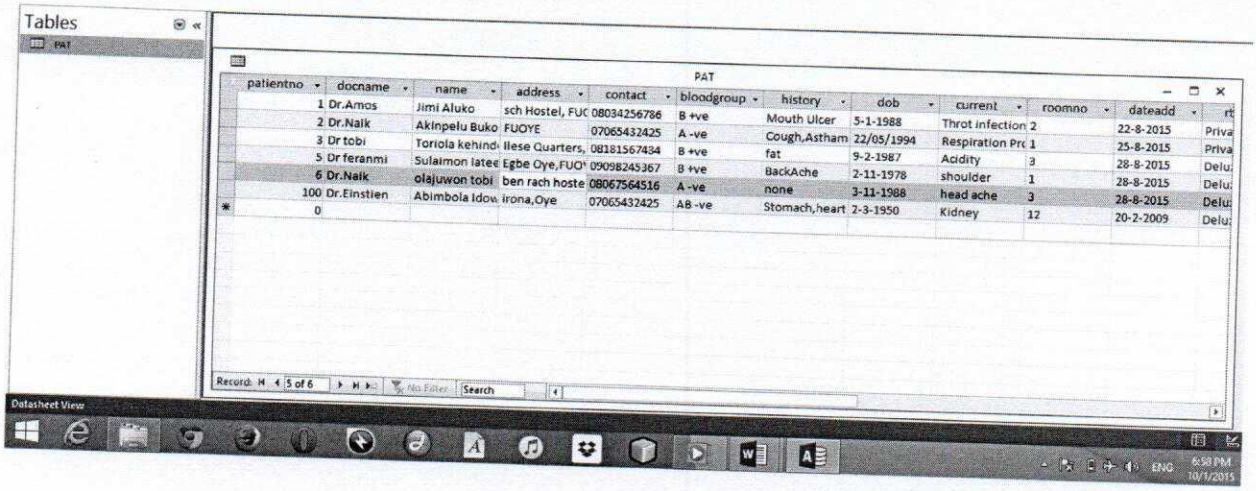


Figure 4.10: Snapshot of registration confirmation table

4.1.4 Procedure Design

The procedural design describes the system generally. It describes the various main programs in the system as well as the relationship that exist between all subprograms included. The procedural designs in this new system are of four (4) menus of which each menu has it sub menu. The application also contains several modules of which each module has its own specific function. The purpose of dividing the program into modules is because it enhances maintainability, readability and easy debugging.

4.2 System Implementation

4.2.1 Choice of Programming Language

The requirement of the research work demands that a capable programming language be used for its implementation. Hence, Java was chosen, it was selected because it offers Rapid Application Development (RAD) features that enables software developers to put up visually appealing user interface design in less time. It includes several features which help in

developing applications that allow access to data, the data source configuration wizard simplifies connecting an application to data in database. The Jcreator and Netbeans code Editor used has several enhancements, such as word wrap, incremental search, code outlining, and collapse to definition, line numbering, colour printing and shortcuts. Finally it has powerful debugging facility that provides useful hints and suggestion for error handling.

4.2.2 Hardware Requirement

The software designed needed the followings hardware for an effective operation of the newly designed system.

i. A system running on Pentium 2 or higher processor

ii. The random access memory (ram) should be at least 512mb.

iii. Enhanced keyboard.

iv. At least 20 GB hard disk.

v. V.G.A or a coloured monitor.

4.2.3 Software Requirement

The software requirements includes:-

i. A window 98 or higher version for faster processing.

ii. Ms Acess database

iii. Jcreator and Netbeans integrated development environment

4.3 Implementation and Testing

4.3.1 Implementation

Implementation is a very important aspect in the development of any computerized system, and this also applies to the development of the hospital management system. Pro-development Implementation usually involves two main steps, these are;

i. **System Construction**: The system is built and tested to make sure it performs as designed.

ii. **Installation**: Preparation is made to support the installed system. This involves associated documentation.

Under system construction, the main task is testing. In the next section is a detailed description of how this was carried out in the designed HMS;

4.3.2 Testing:

Testing is critical for a newly developed system as a prerequisite for it being put into an environment where the end users can use it. Exhaustive testing is conducted to ensure accuracy and reliability and to ensure that bugs are detected as early as possible. In the process of designing the HMS, three levels of testing were conducted, namely, unit testing, integration testing and system testing.

Unit Test

Unit test is where the system is tested partially and independently, component by component, to ensure that particular portion or module is workable within it. In the development of the records management system, each component was tested independently before finally integrating each of them into one system. This test was carried out in other to verify that every input of data was assigned to the appropriate tables and fields. Most of the modules were rather similar and therefore required a rather easy reusable testing process. However, the patient accounts module accessible to the system administrator was one of the unique components that needed to be carefully tested in the HMS. This involved testing each module. This was necessary to ensure that everything is working fine independently.

Integration Test

Integration test is where a combination of several portions or components/sub components of programs are being tested sequentially and continuously. At this stage, all the

system components were integrated and a test was based on how they worked together. This involved observing the interaction of the database and the interfaces. After which the system test followed

System Test

A system normally consists of all components that makeup the total system to function. It is required to ensure the smooth running of the system as a whole, and it should perform as expected and as required. Here, technical and functional testing was performed. The technical testing involved the process of testing the systems compatibility with the hardware, operating system, data integrity in the database and user authorization access rights. Functional testing was also carried out to establish how the system would function in its intended working environment.

User Acceptance Test

Due to a few constraints, this part of testing was not done by the researcher, however, after the oral presentation of the project work, the system developer intends to review the system with the intended system users so as to analyze acceptability and usability and also to identify areas that may require modification before the system can fully be commissioned for use.

4.4 System Documentation

The software (Application program) was written using Java and Ms-Access and can be run on any window operating system. To run the system, the folder that contains the application program can be imported using any java compiler, such as jcreator, Eclipse and Netbeans and the path to the database is set through the administrative tools of the system. Also good maintenance should be adopted to see that the system is continuously and correctly working for long period of time.

4.4.1 Program Documentation

The need for documentation of a program arises from the fact that the program may develop problems usually referred to as 'bugs' long after it had been written. In this project work a detailed documentation is given for each module, therefore will ease the maintenances of the project work.

4.4.2 Operating the System

Before this project work can be used it requires the user to be oriented by the programmer, therefore, will enable the user to be familiar with the modules contained in the program and the function of each modules are expected to be explained in details by the programmer. Before the running of the program, it has to be installed on a PC and launched by the user, then continue all orientated modules.

4.4.3 Maintaining the System

Maintenance is any activities carried out after the implementation of the new system to make sure that the system is correctly and constant running. This can be any of the following types of maintenance.

(a) Corrective maintenance: This is done to correct and defect that discover in the course of using the new system to keep the system in tune with day to day function.

(b) Adaptive maintenance: This is done to make sure that the system is not obsolete and adapt to any new systems of technology.

(c) Preventive Maintenance: This is a kind of maintenance adopted for continuous improvement in new system without waiting for the failure to occur or for the user to change. This is adopted to prevent the occurrence of failure.

4.5 Evaluations

In the attempt to evaluate the designed system, it is imperative that we look back at the predefined functionalities, goals and objectives and analyze those in relation to the expectations met by the system. The Hospital Management System was evaluated based on the set of predefined objectives and expected functionalities it was able to fulfil. The Hospital Management System was designed to facilitate efficient records management in FUOYE Health Centre by providing an efficient, reliable computerized hospital management system and after a careful evaluation process; it met a considerable portion of those expectations.

The main objective was to design a system that enables faster and more efficient storage, retrieval and updating of hospital records. As far as this is concerned, the system met this expectation by giving direct benefit to the clinic such as fast records retrieval. It also included functionalities that enable all data entrants to access the system as a stand-alone with the assumption that a client-server architecture is in place, retrieve records on demand and execute important reports to support daily medical tasks.

Fundamentally, the effectiveness of this project depended on meeting the project's specific objectives which were as follows; To carry out a feasibility study for the possibility of developing a hospital management system for FUOYE Health Centre; To design and develop a hospital management system for FUOYE Clinic; To test and validate the hospital management system for FUOYE Health Centre and To implement the hospital management system for the Hospital. All the objectives were met by the system, to a certain extent; Analysis was successfully completed. This evaluation is based on the fact that data requirements were collected that successfully enabled the design and development of the system.

The system design and development was carried out in a systematic manner and was based on user requirements defined by the end users. The design objectives of creating an efficient hospital management system was further accomplished with the creation of add, delete, search and edit functionalities in the system that not only enable computerized but rather efficient, reliable and fast data entry. All these functionalities possess a relatively high level of accuracy. In evaluating this objective in relation to the system's performance, it would therefore be accurate to state that it was achieved to a large extent. Still while evaluating the system design and performance, the system enables the synchronization of records through its server-client architecture with a single database. Therefore data entered from one recording station will be seen on another recording station using the same system.

Critical Evaluation

For an evaluation process to be fully comprehensive, it should also include a critical assessment of the system. Therefore, despite the fact that the findings obtained after an evaluation showed that the system met its expectations to a large extent, it had a few shortcomings. These limitations are discussed in the next section.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

Hospital Management System provides the benefits of streamlined operations, enhanced administration and control, superior patient care, strict cost control and improved profitability. HMS is powerful, flexible, and easy to use and is designed and developed to deliver real conceivable benefits to hospitals. More importantly it is backed by reliable and dependable support. The project 'Hospital Management System' is based on the database, object oriented and networking techniques. As there are many areas where we keep the records in database for which we are using MS ACCESS software which is one of the best and the easiest software to keep our information.

This project uses JAVA as the front-end software which is an Object Oriented Programming and has connectivity with MS ACCESS. Hospital Management System is custom built to meet the specific requirement of the FUOYE Health Centre. All the required modules and features have been particularly built to just fit in to the requirement. The system covers all the required modules right from Patient Registration, Doctor, Patient appointment, bill payment, record modification, discharge details etc.

5.2 Limitations of the System

Throughout the development of the FUOYE Hospital Management System, we overlooked few areas. Some of these limitations can be presented as follows;

Usability

With regard to its use, the system only caters for English speakers. The GUI and associated documentation is in English. This may present a problem for non- English speaking users

Accessibility

The system has only two user levels which only cater for the administrator and data entrant. However, there is no facility for a guest. Such a facility would be useful if the patients themselves needed to access their electronic records via the system.

Security

The system also does not cater for the automatic back up of the data in the database. This may present a security problem in the event of data loss.

5.3 Problems Encountered

In attempting to design the system, the following problems were encountered.

Accessing Research Material

Accessing associated research material was quite a challenge. This was particularly the case because of the limited variety of books and journals in relation to the research topic in the local library. To further escalate the challenge, online resources were close to impossible to access due to the university's slow internet speeds that made it impossible to download books and journals.

Wide project scope

Defining the project scope was quite a challenge. This is because the system was meant to be designed for the entire hospital including all its departments, however with a view to the limited amount of time available for the project, the scope had to be narrowed down to one section of the hospital.

Understanding Key Concepts

Limitations as far as understanding the key concepts also posed a major challenge. Considering the fact that most of the concepts were new, we had to spend a considerable amount of time learning the concepts. This took away a lot of valuable time that would otherwise be fully dedicated and utilized to the design of the system.

Programming skills

Learning JAVA and Ms Access requires considerable practice for one to gain the programming skills. With limited knowledge and ability, this limited the number of functionalities that we could implement into the system.

Unanticipated Expenditure

Also I was met with a few financial constraints as a result of unanticipated expenditure. In order to cater for the slow internet speeds in the university premises, we had to subscribe for a dial-up internet connection in order to proceed with the project unhindered. This expenditure was however unforeseen and therefore posed a challenge.

5.4 Conclusion

In Conclusion, from a proper analysis and assessment of the designed system, it can be safely concluded that the system is an efficient, usable and reliable hospital management system. It is working properly and adequately meets the minimum expectations that were set for it initially. The new system is expected to give benefits to the FUOYE Clinic in terms of increased overall productivity, performance and efficient records management.

5.5 Recommendations/Future Research

As well as addressing the limitations presented in Section 5.1, there is scope for work to further the functionality and usefulness of this project. We would therefore make the following recommendations for future enhancements to the system.

Widening the scope

Given the limited amount of time given to the developer, the project's scope was rather limited to only record management and billing system in the hospital. The scope can further be widened to include all the other activities like pharmacy, to make a more integrated comprehensive system that covers the entire hospital's records management

Including additional components and functionalities

A few other components can be included in the system in future. This may include the ability to compute calculations especially when determining a patient's next appointment, this will make the system more efficient and drastically minimize the amount of errors. The ability to include an upload functionality for patient images could greatly enhance the usefulness of the system.

Increased accessibility

The system can also be further enhanced so that the patients themselves can be able to access their information online in a secure manner, and telemedicine can be incorporate into the system; this will lead to greater doctor-patient transparency.

REFERENCES

Amaghionyeodiwe, L. A. (2009). Government health care spending and the poor: Evidence from Nigeria. International Journal of Social Economics, **36**(3), 220-236.doi:10. 1108/03068290910932729. Retrieved on 15/6/2015.

Arikpo, A., Etor, R., and Usang, E. (2007). Development imperatives for the twenty-first century in Nigeria. Convergence, **40**(1/2), 55-66. Retrieved from http://www.uk.sage pub.com/journals/Journal201774 on 6/5/2015.

Ashley, R. C. (2002). Telemedicine: Legal, ethical, and liability considerations. American Dietetic Association. Journal of the American Dietetic Association, **102**(2), 267-269. doi: 10.1016/S0002-8223(02)90063-5. Retrieved on 7/5/2015.

Benham-Hutchins, M. (2009). Frustrated with HIT? Get involved! Journal of Nursing Management, **40**(1), pp. 17. Retrieved from http://www.wiley.com/bw/journal.asp ?ref=0966-0429 on 15/6/2015.

Callens, S., and Cierkens, K. (2008). Legal aspects of e-health. Studies in Health Technology and Informatics, **141**, 47-56. Retrieved from http://www.researchgate.net/jour-nal/ 0926-9630_Studies_in_health_technology_and_informatics. On 14/5/2015.

Cholewka, P. A. (2006). Implementation of a health care information system in Lithuania. International Journal of Economic Development, **8**(3), 716-747. Retrieved from http://www.ijesar.org/ on 17/6/2015.

Cortes, P.L., and Cortes E.G (2011). Hospital information systems: A study of electronic patient records. Journal of information systems and technology management, **8**(1), 131-154. doi:10.4301/s1807-17752011000100007. Retrieved on 10/4/2015.

Fuji, K. T., and Galt, K. A. (2008). Pharmacists and health information technology: Emerging issues in patient safety. HEC Forum, **20**(3), 259–275. doi:10.1007 /s10730-008-90754

Idowu, B., Adagunodo, R., and Adedoyin, R. (2006). Information technology infusion model for health sector in developing country: Nigeria as a case. Technology and Health Care,**14**(2), 69-77.Retrieved from http://iospress.metapress.com/content/2bg/7be0dhe 7c1x5d / on 17/09/2015.

Keenan, C. R., Nguyen, H. H., and Srinivasan, M. (2006). Electronic medical records and their impact on residents and medical student education. Academic Psychiatry. **30**(6), 522-527. doi:10.1176/appi.ap.30.6.522

Krishna, R., Kelleher, K., and Stahlberg, E. (2007). Patient confidentiality in the research use of clinical medical databases. American Journal of Public Health, **97**(4), 654-658. doi:10.2105/AJPH.2006.090902

Olusanya, O., Elegbede, W., and Ogunseye A. (2015). Design and implementation of hospital management system in java. IOSR Journal of Mobile computing and application (IOSR-JMCA), **2**(1), 32-36. Retrieved from www.iosrjournals.org on 11/6/2015.

Onwujekwe, O. (2005). Inequities in healthcare seeking in treatment of communicable endemic diseases in Southeast Nigeria. Social Science & Medicine, **61**(2), 455-463. doi:10.1016/j.socscimed.2004.11.066

Ouma, S., and Herselman, M. E. (2008). E-health in rural areas: Case of developing countries. International Journal of Biological and Life Sciences, **4**(4), 194-200. Retrieved from http://www.unapcict.org/ecohub/resources/e-health-in-rural-areas-case-of devel- opingcountries-1 on 14/05/2015.

Pierce, S. (2006). Looking like a state: Colonialism and discourse of corruption in Northern Nigeria. Comparative Study of Society and History, **48**(4), 887-914. doi: 10.1017/S0010417506000338

Samoutis, G., Soteriades, E., Kounalakis, D. K., Zachariadou, T., Philalithis, A., and Lionis, C. (2007).Implementation of an electronic medical record system in previously computer-naive primary care centers: A pilot study from Cyprus. Information in Primary Care, **15**(4), 207-216.

Shekelle, P. G., Morton, S. C., and Keeler, E. B. (2006). Costs and benefits of health information technology. Evidence Report Technology Assessment, 132, 1-71. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/17627328 on 16/06/2015.

Sisniega, L. C. (2009). Barriers to electronic government use as perceived by citizens at the municipal level in Mexico. (Doctoral dissertation). Retrieved from ProQuest Dissertations & Theses database. (AAT 3364168) on 14/07/2015.

Wilcke, B. (2008). Finding the knowledge in Information. Clinical laboratory Science, **21**(1), 33-34. Retrieved from http://www.ascls.org/leadership/cls/index.asp on 14/6/2015.

William, F., and Boren, S. A. (2008). The role of electronic medical record in care delivery in developing countries. International Journal of Information Management, **28**(6), 503-507. doi:10.1016/j.ijinfomgt.2008.01.016

APPENDIX A

PROGRAM CODE LISTING

Index Page

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
import java.sql.*;
public class index extends JFrame implements ActionListener,KeyListener
{
 JLabel title,title1,title2,line,image;
JButton admin,exit;
JPanel p;
int key;
  String b;
public index()   {
 setLayout(null);
    setTitle("Home");
    setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
    title=new JLabel("WELCOME TO FUOYE");
    title.setFont(new Font("arial",Font.BOLD,60));
    title.setForeground(Color.red);
    title.setBounds(200,50,1000,70);
    title1=new JLabel(" Health Center");
    title1.setFont(new Font("arial",Font.BOLD,30));
    title1.setForeground(Color.pink);
    title1.setBounds(350,100,500,70);
    title2=new JLabel("OYE-EKITI");
    title2.setFont(new Font("arial",Font.BOLD,50));
    title2.setForeground(Color.red);
    title2.setBounds(340,150,500,60);
```

```
        line=new JLabel("----------");
        line.setFont(new Font("arial",Font.BOLD,45));
        line.setForeground(Color.blue);
        line.setBounds(350,200,1000,30);
        getContentPane().add(title);
        getContentPane().add(title1);
        getContentPane().add(title2);
        getContentPane().add(line);
        p=new JPanel();
        p.setLayout(new GridLayout(1,3));
        p.setBounds(330,650,350,30);
        admin=new JButton("Admin");
        admin.setMnemonic(KeyEvent.VK_A);
        admin.setToolTipText("Press it and Enter Password to become Administrator");
        admin.setFont(new Font("arial",Font.BOLD,20));
        admin.addActionListener(new main());
        exit=new JButton("Exit");
        exit.setMnemonic(KeyEvent.VK_E);
        exit.setFont(new Font("arial",Font.BOLD,20));
        exit.setToolTipText("Press it to go to Back");
        exit.addActionListener(this);
        p.add(admin);
        p.add(exit);
        getContentPane().add(p);
        admin.addKeyListener(this);
        exit.addKeyListener(this);
    image=new JLabel(new ImageIcon("C://Users//babajide//Desktop//hmsp5//Hospital
Management System//images//admin.gif"));
    image.setBounds(100,230,800,400);
    getContentPane().add(image);
    setSize(1020,1000);
        setVisible(true);
```

```
        }
        public void actionPerformed(ActionEvent ae)
        {
         if(ae.getActionCommand().equals("Admin"))
          {
           main ap=new main();
          }
         else if(ae.getActionCommand().equals("Exit"))
          {
           dispose();
          }
        }
       public void keyPressed(KeyEvent ke)
       {
        key=ke.getKeyCode();
        if(key==KeyEvent.VK_A)
         {
        main admin=new main();
         }
       else if(key==KeyEvent.VK_E)
       {
         dispose();
       }
     }
    public void keyTyped(KeyEvent ke){}
    public void keyReleased(KeyEvent ke){}
    public static void main(String args[])
    {
     index sf=new index();
    }
}
```

Admin Main Page

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;
import java.util.*;
class start extends JFrame implements ActionListener
{
    JButton bpat,bdoc,bbill,breport,bback,bexit;
    JLabel linfo,linfo1,linfo2,linfo3,linfo4;
    start()
    {
        super("Hospital Management System");
        setSize(1024,768);
        setVisible(true);
        setLayout(null);
        linfo=new JLabel("SELECT THE APPROPRIATE OPTION");
        linfo.setBounds(30,137,210,20);
        add(linfo);
        linfo1=new JLabel("1. For Inserting, Modifying, Retrieving Patients related
        Data");
        linfo1.setBounds(50,205,335,20);
        add(linfo1);
        linfo2=new JLabel("2. For Inserting, Modifying, Retrieving Doctors related
        Data");
        linfo2.setBounds(50,275,335,20);
        add(linfo2);
        linfo3=new JLabel("3. Billing Details");
        linfo3.setBounds(50,345,150,20);
        add(linfo3);
        linfo4=new JLabel("4. Patient and Doctor related Data");
        linfo4.setBounds(50,413,250,20);
        add(linfo4);
```

```
        bpat=new JButton("Patient", new ImageIcon("images/Advances.png"));
        bpat.setBounds(430,200,180,30);
        add(bpat);
        bdoc=new JButton("Doctor",new ImageIcon("images/Advances.png"));
        bdoc.setBounds(430,270,180,30);
        add(bdoc);
        bbill=new JButton("Billing",new ImageIcon("images/Attendance.png"));
        bbill.setBounds(430,340,180,30);
        add(bbill);
        breport=new JButton("Reports",new ImageIcon("images/edit.png"));
        breport.setBounds(430,408,180,30);
        add(breport);
        bback=newJButton("BACK",newImageIcon("images/preview_Hover.png"));
        bback.setBounds(230,515,100,30);
        add(bback);
        bexit=new JButton("EXIT" ,new ImageIcon("images/exits.png"));
        bexit.setBounds(730,515,100,30);
        add(bexit);
        bpat.addActionListener(new patient());
        bdoc.addActionListener(new doctor());
        bbill.addActionListener(new billing());
        bexit.addActionListener(new exit());
        bback.addActionListener(new back());
        breport.addActionListener(new report());
    }
    public void actionPerformed(ActionEvent ae)
        {}
    class report implements ActionListener
    {
    public void actionPerformed(ActionEvent ae)
        {
            new  Report();
```

```
            setVisible(false);
            }
    };
    class back implements ActionListener
    {
            public void actionPerformed(ActionEvent ae)
            {
                    new  main();
                    setVisible(false);
            }
    }
    class patient implements ActionListener
            {
            public void actionPerformed(ActionEvent ae)
                            {
                                    new patStart();
                                    setVisible(false);
                            }
            }
    class doctor implements ActionListener
            {
                    public void actionPerformed(ActionEvent ae)
                            {
                                    new docStart();
                                    setVisible(false);
                            }
            }
    class billing implements ActionListener
            {
                    public void actionPerformed(ActionEvent ae)
                            {
                                    new Billing();
```

```
                    setVisible(false);
                }
            }
        class exit implements ActionListener
            {
                public void actionPerformed(ActionEvent ae)
                {
                    System.exit(0);
                }
            }
}
```

Report Code

```
import java.awt.*;
import java.awt.event.*;
import java.sql.*;
import javax.swing.*;
class Report extends JFrame implements ActionListener
{
    static Connection cn=null;
    static Connection cn2=null;
    Statement st=null;
    Statement st2=null;
    ResultSet rs=null;
    ResultSet rs2=null;
    JButton bpat,bdoc,bback;
    JLabel lpat,ldoc;
    Report()
    {
        super("Reports");
        setSize(1024,768);
        setVisible(true);
```

```
        setLayout(null);
        lpat=new JLabel("For Patients Reports Click Here :");
        lpat.setBounds(100,200,400,30);
        add(lpat);
        ldoc=new JLabel("For Patients Reports Click Here :");
        ldoc.setBounds(100,350,400,30);
        add(ldoc);
        bpat=new JButton("Display Patient's Report",new
        ImageIcon("images/emp.png"));
        bpat.setBounds(400,200,250,30);
        add(bpat);
        bdoc=new JButton("Display Doctor's Report",new
        ImageIcon("images/users.png"));
        bdoc.setBounds(400,350,250,30);
        add(bdoc);
        bback=new JButton("BACK",new ImageIcon("images/restore.png"));
        bback.setBounds(480,600,100,30);
        add(bback);
        bpat.addActionListener(new patreport());
        bdoc.addActionListener(new docreport());
        bback.addActionListener(this);
    }
    public void actionPerformed(ActionEvent ae)
    {
        if (ae.getSource()==bback)
        {
            new start();
            setVisible(false);
        }

}

class patreport implements ActionListener
```

```
    {
        public void actionPerformed(ActionEvent ae)
        {
            PatientTableFromDatabase frame=new PatientTableFromDatabase();
            frame.setDefaultCloseOperation(1);
      frame.pack();
      frame.setVisible(true);
        }
  }
  class docreport implements ActionListener
  {
        public void actionPerformed(ActionEvent ae)
        {
            new DoctorTableFromDatabase();
            DoctorTableFromDatabase frame=new DoctorTableFromDatabase();
            frame.setDefaultCloseOperation(1);
      frame.pack();
      frame.setVisible(true);
        }
}
      public static void main(String[] args)
      {
          new Report();
      }
}
```

APPENDIX B: USER GUIDE

i. When the program is run after compilation on a java compiler environment, then it will pop out a small dialogue box asking the user to input his/her user name and password

ii. If the username and password is correct then it will grant him/her access to the main menu background of the hospital management system.

iii. If the password is incorrect, it will show a message in a small dialogue box indicating that the password is incorrect.

iv. Only an authorized person (administrator) can change or add patient, view or add employee as well as doctor etc.

v. The main menu consists of four(4) menu features on the program and each contains an extension of an action that will enable the user perform a certain operation, for example, a user that log on with admin can add a doctor, register patient, add hospital service and many more.

vi. Once the user is through with the program, he or she can exit out of the program for security reasons.