DESIGN AND IMPLEMENTATION OF HOSPITAL APPOINTMENT MANAGEMENT SYSTEM

BY

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A PROJECT WRITTEN AND SUBMITTED TO THE DEPARTMENT OF COMPUTER SCIENCE, COLLEGE OF PURE AND APPLIED SCIENCES, CALEB UNIVERSITY, IMOTA, LAGOS. IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE DEGREE (B.Sc.) IN COMPUTER SCIENCE.

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DECLARATION

I, MICHAEL AYOBAMI PRECIOUS, with matric number 17/3560, solemnly declare that this project is entirely my work and composition. The work contained here, is original and assembled by me and has not been submitted in institution for any degree. All references made to works of other persons have been acknowledged accordingly.

_____   _____

SIGNATURE   DATE

CERTIFICATION

We certify that the work contained here was researched and compiled by MICHAEL AYOBAMI PRECIOUS, in the Department of Computer Science, College of Pure and Applied Sciences, Caleb University, Lagos. The research work is considered adequate, in partial fulfilment of the requisite for the award of B.Sc. in Computer Science.

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DEDICATION

I would like to dedicate this project to God almighty the giver of wisdom. I also dedicate this to my parents who has been of great help to me right from the beginning and always encourage me and to my siblings for being there for me whenever I needed help.

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Lastly, to my friends and colleagues who helped in several ways.

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ABSTRACT

The current system desired efficiency and patient satisfaction for optimal performance. The outpatient of most clinics in developing countries are faced with plethora of issues. These include: overtime for doctors and nurses during clinic sessions, long waiting time for patients, and peak workloads for counter personnel. The quality of health care delivery has been threatening by overtime and peak work load. This project focuses on developing a system to improve upon the efficiency and quality of delivering a web-based doctor appointment system to reduce waiting time. In this project, a doctor appointment and scheduling system is designed using HTML, CSS and JavaScript for the frontend, Ajax framework for handling client-server request and PHP and MYSQL for the backend.

Keywords: Patient, Appointment, Scheduling, PHP.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The health industry is a pivotal and vital component of people's lives worldwide. Therefore, any inaccuracy in the healthcare services could lead to a malfunction or end of life. Information and communication have recently been widely utilized in order to improve various healthcare operations and services. A doctor's hospital appointment is one of the automated clinical services. Health care providers are encouraged to lower operating costs while enhancing service quality.

Preventive medicine has been created to prevent diseases, decrease demand for emergency services and hospital stays for patients. There can be no underestimation of the importance of Hospital Scheduling in health care. The hospital planning process is complex and plays an important role in healthcare. The scheduling of the hospital carries on several responsibilities from assigning resources and allocating operating chambers to patients in need of examinations and on-demand appointments with Family Physicians working in primary care clinics. The Oak Hospital will promote patient and doctor satisfaction with a suitable scheduling schedule and is therefore an important element in the hospital. The efficacy of medical provision depends exclusively on the effectiveness of the scheduling system of the hospital. It decreases practitioners' medical error and also reduces the number of patients who are unsatisfied. Talking systems were widely employed to cut waiting times and congestion in waiting rooms for patients. Such solutions can improve access and reduce costs, as well as staff and patient unhappiness arising from unsatisfied scheduling limitations. The basic purpose of optimum planning of hospitals is to establish a nomination technique under uncertain circumstances to which a specific measure of performance

is optimized. Termination planning system is a planning system for appointments of patients, facilities and providers. It is utilized for minimizing waiting times, planning priority and optimizing resource utilization.

React JS is a new JavaScript MVC framework that Facebook has developed for creating well-designed, structured and engaging single-page apps (SPA). It emphasizes best practices such as the testing and development of templates and declarative two-way binding data. The context is used to build dynamic and rich spa (Single page Application). The framework includes numerous main libraries and optional ones. The purpose of this work is to reduce waiting times and ensure effective utilization of clinical resources via appointing and scheduling systems. As a prototype of OAK Hospital appoints scheduling system, the suggested system will be deployed.

1.2 STATEMENT OF THE PROBLEMS

There are concerns in the hospital appointment that include: increasing waiting times, waiting patients, cancellation by the outpatient, loss of meeting history and information on these issues, crowded hospital and the loss of precious resources. Hospital services are available at the hospital. The paper suggests a hospital management system because of all these issues to lower the hospital population, the waiting time for patients, meet history, and keep all patient information safe.

1.3 AIM AND OBJECTIVES OF THE STUDY

The objective of this research is to design a scheduling system for hospital appointments with Oak hospital as a case studies utilizing online tools and development technology; the purpose of the project is as follows.

1. To design, I used CSS and SQL for data base connection, data storage and HTML application development.
2. To develop the PHP and JavaScript application backend
3. To design an efficient and user-friendly experience system for patients.
4. To Implement the system that has been built.

1.4 SIGNIFICANCE OF THE STUDY

The study is of important significance as it will ease the burden of the old appointment method, providing benefits to the organization and serving as an advancement in the hospital and healthcare system.

1.5 RESEARCH SCOPE

This research will focus on the creation of new appointments and additional information, as applicable, will be examined by the student, with the OAK HOSPITAL case study. The investigation, application creation and testing will be limited to its case study and Caleb University.

1.6 STRUCTURE OF THE PROJECT

This report is broken into five chapters. Chapter one is the initial chapter, chapter two is the literature review, chapter three is the system analysis and design, chapter four is the system implementation and result and chapter 5 is the summary, conclusion and recommendation. The references, appendix, source code and screenshots are the other elements of the documentation.

1.7 DEFINITION OF TERMS

1. **Management**: Coordination of the organization's entire resources through the planning, organization, management and control process

2. **Scheduling**: Scheduling is the method by which work and workloads are organized, controlled and optimized in a production or production process. The programming is intended for allocating resources for plants and machinery, for manufacturing process planning and purchasing equipment.

3. **Systems**: a computer's physical component for performing a specific activity.

4. **Data**: numbers, texts or images in the form appropriate to store or process information in a computer.

5. **Information**: means full material derived through organization and interpretation of computer data in a particular manner.

6. **Input**: data entered in a storage or processing computer.

7. **An emergency** is a situation in which health, life, property and the environment are directly at risk.

8. **Output**: Computer-generated information after processing.

9. **Information system**: a number of inter-related elements collecting, processing, storing and distributing information in an organization to support decisions and controls.

10. **COMPUTER**: Computer is an electronic device that accepts input data, processes data and provides user information as output.

11. **SOFWARE**: -Software consists of associated programs built by the manufacturer to govern and allow the computer to do a specific activity.

12. **HARDWARE**: Hardware is a physical aspect of a computer that has the feeling that the software is in charge of doing a certain duty.

13. **DATABASE**: Database is an organized database of the collection of connected data.

14. **PROGRAMMING**: programming is a codified command that computers comprehend and follow.

15. **APPOINTMENT**: an arrangement at a given time to meet someone.

16. **TECHNOLOGY**: Technology is a knowledge branch that is responsible for the invention and application of technology and its connections to life, society and the environment, using industrial art, technical engineering, applied sciences and pure science.

17. **ALGORITHM**: a series of logical rules established throughout the application design process. Using the 'blueprint,' the logic principles were converted to computer instructions that detailed which step to take.

18. **APPLICATION**: the ultimate integration of data matching software and hardware.

19. **DATA MATCHING DATABASE**: Structured records or data collection which can be kept on a computer system.

20. **DATA CLEANSING**: proactive detection and adjustment of the data quality problems affecting the ability of an agency to use its data effectively.

21. DATA INTEGRITY: quality, completeness and complaints with the aim of data makers,

i.e., 'suitable for purposes.

CHAPTER TWO

LITRATURE REVIEW

2.1 INTRODUCTION

This chapter discusses the efforts of several authors and developers on this issue across time. However, for improvement and reference purposes their works will be cited in this chapter.

The appointment schedule/management can be defined across-the-board as a service facility for consumers to obtain service from the facility for reserving or assigning arrival times and dates. Consequently, the management of hospital appointments is to allocate and monitor the schedule of patient entry by a hospital to control the working flow and to achieve the greatest pleasure for the patient.

The design and execution of the hospital appointment management system is designed to meet the challenges of the patient reservation manual method. As a result of a manual system commonly used for hospitals and healthcare Centre, patients wait for long periods, often receiving little to no information on the nature of the lines and, because the hospital does not have the time and resources to meet their medical requirements at the time, patients must eventually return to their homes. In a basic investigation at a health Centre running Covid 19 patient tests, it was discovered that a minimum of 40 people had to be waited at the Centre for at least 1/2 hour per test, and that very little information was provided as to how long they would wait and how soon. The people to be tested at Covid-19 were another day in the same medical Centre only 20, most likely as other prospective patients believed the waiting period would be as long as prior days.

The above-mentioned issues will be addressed by a systematic and efficient hospital appointment system, schedules distributed fairly and time management effectiveness and patient satisfaction as a priority. The adoption of a hospital appointment scheme enables the hospital to plan and be equipped to handle the number of patients expected on a certain day. The hospital can therefore direct the patient flow from the busy days to the less busy.

2.2 CONCEPT OF APPOINTMENT MANAGEMENT SYSTEM

The concept of the project is focused on the scheduling and management of healthcare appointments. The hospital personnel track and manage appointments with the software system, govern work flow and prevent long waiting time for patients. The concepts of the hospital appointment management system include the following:

Scheduling: Scheduling can be described as the process of resource assignment for a period of time. The scheduling challenges vary from computer systems and networks to production facilities and healthcare appointments. Many of these issues are overcome either by human operation or the use of heuristics designed specifically for the context, Jeffery (2017). The schedule of appointments according to Akman (2019) may be divided into three:

Single Batch Process: Decisions are held until all appointment applications are received for a given time period in this scheduling process. Used usually in surgery, this procedure enables for entire scheduling information to be obtained in an almost perfect or perfect solution using heuristics or discrete optimization methods.

Unit Process Appointment: The procedures are assumed to occur one at a time in this appointments schedule model and are scheduled upon arrival. This is the case when the request is received. This approach is not likely to be the perfect solution, but if the distribution of the request types for appointments is learned they can be estimated.

Periodic Process Appointment: In this model schedule of appointments, requests are stored temporarily in a predetermined size buffer and scheduled once the buffer is complete. This suggests that the ideal solution can be closer approached by considering optimal or near optimal solutions at each planning stage.

Online Appointment System: An online appointment system is a web system by means of which a user can access the website (the hospital), and plan services appointments, whether it is a guest, customer, or patient. Furthermore, users(patients) can also provide the service provider with additional information, make him better aware of their current position and comprehend their service requirements. This advance booking method also allows doctors sufficient time and information in the case of a hospital environment to arrange the resources required to take care of each patient upon arrival. The web-based appointment system might significantly boost patient satisfaction with pre-registration and efficiently minimize overall wait time in comparison with the typical queuing method Nazia, (2017).

2.3 GLOBAL VIEW OF HOSPITAL APPOINTMENT MANAGEMENT SYSTEM

Online planning schedules have numerous names; online planning, software programming, application booking, etc. Time schedule management systems are one of the most popular web apps allowing individuals to securely and simply book online reservations and service requests via a laptop, tablet, smartphone or computer or any other Web-related device.

Everyone can also easily access the appointment management system by utilizing the URL provided by the service facility or using the website option "Book Now." Without employee interaction, the application system automatically confirms and records bookings on the system once the time and date is chosen. The appointment system offers capabilities such as automated SMS and message reminders sent to registered patients or individuals prior to their planned reservation. The following are some of the many advantages of the healthcare online appointment management system:

Time-Saving: The personnel spend less time organizing appointments and phone reservations, so that they can make more urgent and important use of their free time. Patients can also save time, because the system removes the need for long waiting hours in the hospital and does not take care of it.

Consider, for example, a large medical Centre with 100+ appointments every day manually. The support personnel of the administrative authorities handle every call, which takes about 3 to 4 minutes to make a telephone call. The medical facility might save a considerable amount of time to take on additional urgent work by moving to an online booking system.

Monetary Savings: During the reduced services and employees, the time saved by the facility can automatically translate into monetary savings. The designation management system lowers the need in the process of manual appointment planning for additional resources.

24-Hour Convenience: An individual must arrange an appointment during office hours over the telephone calls and people must therefore work on their telephone bookings around the clock. Customers or patients can book an appointment at any time using the online appointment management system. More than 35% of all appointments were booked after business hours because customers opted later to arrange the appointment, possibly not finding time during their own working time. By using a scheduling system online, customers may book without the additional stress of their facilities personnel at their convenience.

Online Payment: A secure payment system is required for all services. Since the online appointment system is safe and the data is protected, individuals may easily pay online. Offering free consultation fees or reductions in the after-consultation period, encourages individual patients each time to reserve an appointment using the on-line appointment management system.

Healthcare providers employ the newest technologies and are up-to-date to improve quality. A new step forward in bringing a health facility to the future is regarded the online appointment schedule system.

Centralized information system: enhance patient management and efficiency in online systems. Some scheduling solutions for online appointments also involve management of patient records. The organisation can provide a single site for storing, update, manage and analyze patient information.

Recording, reporting and analysis of this data can assist in the efficient management of a patient's case file. Regularly registered patient information, along with the history of inspections and accompanying medical examinations, can be used to make educated and carefully examined health care decisions. It can reduce the amount of paperwork and the time it takes to access physical files.

Redundancy is also evaluated in patient data inputs for the same patient. In addition, patient records may be updated at each appointment to give patient information in a single spot for easy and speedy access. This is especially significant when a patient consults two individual practitioners in the same facility. Save time and ensure integrated and complementary services Overall, the system provides a standard interface for various medical staff to obtain information about one patient. This has played a major role in strengthening the patient care process Sanjana, Sanjana (2020).A recent research of appointment registration systems that make it easier to receive hospital services evaluates, with regard to its use, its advantages and its limitations, and its contribution to the Turkish health sector, the Central Physicist Appointment System (CPAS). Data were collected over the course of six years from the Ministry of Health and utilized to measure CPAS utilization as opposed to conventional hospital queues. The data indicated that 22.1% of patients who registered using the appointment system in the first year, up to 34.6% in the sixth year. With time, there has been a decline in the waiting time before to the consultation and in the overall hospital stay.

Improve efficacy and efficiency of the nature of services supplied is an important part of the delivery of health services. The extended waiting time leading to congestion of the waiting room and short consultation times are one of the most recurrent complaint from patients. Termination management systems are critical factors for the achievement of desired operational excellence, improved service quality and patient happiness. Their best-known work is the Bailey-Welch Term

Scheduling, according to which two patients should be scheduled at daily starting and others spaced equally during the day. These systems have been subjects for study and literary examination by academics and professionals from Welch and Bailey since the 1950's. A study at the Xi-jing hospital in China demonstrated a remarkable boost in the quality of service and patient satisfaction with service delivery using online appointment scheduling. Mardiash et al. (2013) proposed the use of appointment system models to minimize waiting times in Indonesian public hospitals.

Web based appointment systems (WAS) were developed in conjunction with the standard manual registration approach for patients due to the rapid expansion of Internet. These web-based technologies have now proven indispensable in preventing trans-infection and the transmission of coronavirus, reducing the danger of patient cross-infection during manual registration (COVID-19).

In 2003, the Turkish government launched a Health Transformation Program (HTP) as an extensive effort to build a better health-care system. The central physician appointment system is an important project conducted under the HTP (CPAS). This single scheduling system allows Turks to book prior appointments at a convenient time with their favorite hospital, dental facility or family physician. In Turkey and in other countries throughout the world, such as Italy, Taiwan, Canada, Singapore and China, alternative online appointment systems were utilized prior to the CPAS introduction. But all the state hospitals in Turkey began managing appointment systems from a single Centre using the CPAS and became the world's first and only system to do so. In general, there has been a favorable effect on waiting times in Turkey under the Central Medical Appointment System. Given that waiting times are an essential measure of service quality, the application of the appointment scheduling system can be concluded that service and access to care have successfully been enhanced. Küçük et al. (2021).

2.4 AFRICAN PERSPECTIVE ON HOSPITAL APPOINTMENT MANAGEMENT SYSTEM

A system that is available online/web is used for a specified purpose to fulfil a particular task. According to Chua (2010), The general public's need for a better healthcare system has forced the health sector to reconsider how to offer care services and the shocking number of appointments missed. Efficient appointment reservation systems are at the junction of providing effective, reliable and rapid access to health services. with current technological developments. Traditional appointment reservation methods are through fax, telephone or email. With the increasing ubiquity of the internet, the online reservation system for hospitals and health services is being utilized. Gruca, (2004).

South Africa is one of several countries which continues to seek ways of enhancing the quality of public health services and of public health facilities. Collective and effective administration of information and records was at the foundation of the delivery of service. It has been noted that patients' health information is collected and efficiently managed through the usage of healthcare appointment management systems that are used to book and manage appointments in order to receive appropriate medical services; Luthuli & Kalusopa, (2017).

Appointment systems are also effective in enhancing chronic disease treatment. Historically, health systems in Africa focused on the prevention and treatment of relatively common acute diseases. Continual access to pharmacological therapeutics and continuing monitoring of adherence to treatment are necessary to manage chronic diseases, including hypertension, asthma and diabetes.

An effective appointment system can help to achieve a number of objectives, crucial for the treatment of patients with chronic conditions such as predicting and regulating the workforce at a hospital. It can also be useful in the knowledge and preparation for the daily number of patients expected.

It is inefficiency, inconvenience and unnecessary that all patients are required to appear early in the morning and wait long times before being treated. In a Tanzanian health facility, it has been found that both patients and staff adhere to a system of appointments where patients can choose the day and time of their visit. The system contributed to the distribution and crowding of workloads during the day.

In Kenya, clinical personnel have analyzed indicators of attendance that have been made feasible by the records of the appointment system. It enabled them to monitor their daily level of operation and how best their methods could be strengthened to support patients.

Timing and adherence indicators are easily estimated from appointment management and can be used to evaluate chronic care performance and develop continuous improvement initiatives in the field of quality in regular clinical information systems. As African healthcare advances to treat chronic diseases, it will require new ways of planning and following routine patients and ensuring sustained adherence to therapy. A first step to achieve this is practical appointing management systems. Policy et al., (2013).

2.5 NIGERIAN PERSPECTIVE ON HOSPITAL APPOINTMENT MANAGEMENT SYSTEM

In a research paper by Chukwunonso (2017), A new procedure has been designed to manage appointments of patients; various schedule appointments have been used in different periods. This method worked to enable patient reservations for any time of the appointment but to substitute the appointment for another, freer time if the period was full. Various compounds have been assessed and recommended for operational usage depending on the nature of the healthcare setting for numerous appointments and double-reservations. Felix, Felix (2004). Studies have indicated that the scheduled scheduling of patient appointments is guided by certain policies; no more than 30 patients are planned and two patients are placed for the first appointment and the others distributed over a medium time span Klassen, (2004). Another system developed by Mustafa (2015) Allocates access and explore, build in alphabetical order, and select a doctor from a patient registered with username and password (whose profile and contact information is also provided). The patient can also check the work schedule of the health care professional for work and working days and make an appointment afterwards.

In the health industry it is general knowledge that waiting times are an important factor of patient satisfaction. In a primary health care Centre in Abakaliki, Ebonyi state evaluated the patient's perception of the scheduling of hospital appointments in order to reduce waiting time. The assessment included 305 patients; 36% of whom confirmed a long wait for doctors in the facility and 64% agreed that management of hospital appointment timing was essential. The assessment also included 36%. In summary, the findings are that appointment regimes are an excellent way of controlling the patient rate of consultation and adopting a flexible appointment and management

system is a strong recommendation for hospitals to enhance service delivery and customer satisfaction in the Nigerian health care system (Nc & Cj,2017).

In a paper by Journal et al., (n.d.), It was noted that there were concerns with the amount of missed appointments at the Nigerian health facilities; hence a mixed, efficient system for improved care and management of patients must be adopted. The study presents a web-based reservation system of medical appointments as part of the NHP (NHIS). This technology allows patients to examine the schedule of any available doctor and to book an appointment at a time consistent with the available time of the doctor. Also, the system provides medical personnel with easy methods for managing planned appointments and producing appropriate reports as a platform for facilitating reservation and administration for patients. The system is stable, cost-effective and platform-independent and developed with PhP, Macromedia Dreamweaver, Apache and MySQL.

It is frequently the case that a big number of these individuals are not treated on time or sometimes at all in Nigerian general experts and hospitals that teach. The traditional healthcare system in Nigeria has traditionally regarded time in comparison with patients as more valuable. This archaic procedure has contributed to the long waiting time of patients because of the increasing idle time of doctors and the insufficient queuing systems in these facilities. A good queuing model for the designation system to handle the waiting times problem is proposed in the following paper. The following article. In view of the factors which influence the performance of appointment systems, such as pattern and rate of arrival, availability of medical services and preferences, experience for the employees and access to IT, the research project introduces a flexible ambulatory queuing model for appointment planning (Pack, n.d.).

2.6 REVIEW OF RELATED LITRATURE

Chaitanya, (2014) Develops an appointment schedule decision support system tool to lower the rate for those who have not appointed. Gowthem, (2014) Suggested a system of intelligent reserving clinical appointment. In order to be an efficient means to handle appointed appointment and to be a platform for patients' reappointments, this reservation system incorporated clinical distributors into simple web accessible services. Chaitanya, (2017) Proposed mobile booking app for Android appointments for maximum customer ease. Patients book the appointment via their mobile devices, while the physician is able to identify the quantity of patients that they have to see all day long.

Diwakar, (2017) introduces a web-based Web Services patient appointment programming schedule. Kerdvibulvech, (2016), Proposes a dental reservation system on the internet with a view of save consumers time and effort in a safe and comfortable manner. The administrator simply keeps up the database on-line, checks requests from the patient, manages schedules and organizes patient information. Patient bookings and checks their schedules.

Nan, (2010), Proposes 'Dynamic scheduling for patient no shows and cancellations' offered a dynamic policy framework for reservation and arrangement of patient appointments, which took into consideration the fact that patients cancel or do not appear at their appointment. Mohd, (2012) Developed a scheduling system through integration with Smart System methods. This web-based system was built to handle schedules and reserved time (calendar updates) for academic events, for example discussions and weekly meetings between students and lecturers.

Wang, (2015) Suggested a framework for patient preferences appointment systems. The system has been designed to automatically update patients' preferences to improve reservation choices.

Research studies have over time generated simplified queue models and static planning. Another attempt to utilize such a mathematical queuing model was developed Gamlin (2003) The patient doctor waiting time to reduce the time spent waiting.

A other system built for the management of appointment schedules employed a model that assumed exponentially that arrival times could not be confirmed by date and hence were restricted by the nature of the appointment schedule. The raw leather (2002). Porta-Sales et al. (2005) Another such system has been developed, which concept is to contact, filter and schedule appointments first with the health Centre by qualified nurse, and then by telephone, with the patient who contacts the care Centre.

Su et al. (2003) Conducted a study with multiple clinics in a private hospital. Each clinic used a patient appointment model as well as a patient registration model with an average patient load of 20 at each consulting session. These patients permitted for consultation and registration by specified self-selected providers.

The advantages of seamless operations, better patient care, effective cost control and improved administration are undoubtedly offered by e-hospital management systems. With some existing appointment reservation systems, however, a few drawbacks can be recognized. A system for solving the problem is recommended by sending patients an electronic e-mail, as well as accessibility to monitor their medical data online to see whether their appointments have been confirmed or not.

Patient management is essential to preserve the country's health care level. However, it still has to be properly implemented, with quality. Taking this into consideration, measures have been adopted such as online registration of patients and appointment schedules to optimize workflow and reduce

waiting time. However, these solutions still have disadvantages in terms of priority facility, patient safety standards and the lack of a booked appointment reminder system. In consideration of the aforesaid limitations, the study recommends the use of NFC and Android technology to replace the core of the hospital's waiting time to appointments with an alternative patient's appointment system. In practice the implementation is performed with the appropriate PHP, NFC and MySQL databases. Mey, (2013).

2.7 TYPE OF MODELS IN SOFTWARE DEVELOPMENT

Methodology is crucial to ensure that the development process fulfils its aims and solves complex problems. Fredrick, Fredrick (2015). Agile Methodology is the software development methodology used in this study.

Agile Methodology is an iterative, progressive approach that has become, because of speedy delivery nature, one of the most employed in software developments in recent years. Agile innovations in software have a life cycle; initially, elicitation of demands. The developer and the stakeholder will generate the backlog documentation in this step. In order to achieve system functionality, this backlog is extracted. The next phase is to iterate the project, to develop, test and respond and release.

2.8 HISTORY OF OAK HOSPITAL

With the vision of life, Oak Hospitals was founded in 2007. Lagos Road, Ikorodu, was formerly on 198. At 191 Lagos Road, Agric Bus Stop, Ikorodu hospital moved to its current location.

Situated near the junction of the town of Ikorodu, the place serves the demographic verse of the new town. It is a company with consistent quality and size innovation.

The Oak Hospital that has started as a 10-bedded hospital today has 40-bedded rooms, with several experts, general practitioners, nurses trained, pharmaceuticals, labs, front desk officers, HMO managers and managers, IT support personnel, household workers, security officers and kitchen staff. It is definitely a health care community that is ready to address the requirements of patients.

CHAPTER THREE

SYSTEM ANALYSIS AND DESIGN

3.1 METHODOLOGY OF THE STUDY

Patient's appointment scheduling system is a system by which a patient may browse a doctor's website, or simply, and patients can easily arrange appointments via the online software. Patients can also supply the doctor with extra information, give the doctor a sense of their position and allow the physician the opportunity to prepare the information essential for the arrival of patients. A scheduling system enables individuals to arrange their appointments online comfortably and securely. The web-based appointment system may greatly boost registration satisfaction and successfully decrease the total waiting time compared with the typical queuing approach. Time to wait Waiting time refers to the time a patient has to wait for a specific step after this activity is initiated or requested. It is defined as "the time it lasted from the moment the patient attended the outpatient clinic when the patient was really prescribed. The overall time spent by a patient from registration to a physician consultation is also described. PHP is a web application programming language on the server utilized for data development and transmitting via SQL and MYSQL.

3.2 METHOD OF DATA COLLECTION

The data gathered in the research came from the main sources and other data sources, including information collection from journals and periodicals, Internet materials, premium Microsoft Encarta, seminars, conferences and personal research. The data was acquired using secondary sources.

3.3 SYSTEM ANALYSIS

The current situation is examined with the available data before the timetable is optimized. The performance of the schedule, length of appointment, current waiting times and patients' previous reservations, uneven treatment of surgeons, impunity of patients and no shows are examined. This analysis is hospital informative. It also determines the most important weekly sessions that allow the study to focus on those weekly sessions. Finally, these results provide the major reasons for the period of waiting, so that optimization can focus on those areas.

3.3.1 ANALYSIS AND PROBLEMS OF THE EXISTING SYSTEM

Hospitals now use a manual appointment system. The existing system involves many paper forms, with data shops dispersed over the infrastructure for hospital management. Information is often incomplete or does not comply with the norms of management. Formats that require an extensive auditing process to guarantee that no essential information is lost are commonly lost in transit between departments. In the hospital there are several copies of the same information and data in various data stores may be inconsistent.

3.3.2 JUSTIFICATION FOR THE NEW SYSTEM

The following justifies why I have embarked on the project:

1. To Automate patient scheduling system in a hospital.

2. Provides sufficient back-up and safekeeping of hospital enquiries

3. To simplify how patients, reach the doctor

4. To minimize hospital numbers by taking part in certain online services

5. Providing industry with greater manpower.

3.3.3 DESCRIPTION OF THE NEW SYSTEM

The hospital appointment system is meant to replace your present manual paper system in any institution. The new system is designed to monitor patient information. Time and date book appointment with the doctor, meeting objective, etc. These services must be delivered in an efficient and cost-effective manner in order to reduce the time and resources needed for these jobs now.

3.3.4 REQUIREMENT ANALYSIS

The following are required to effectively carry out this project, which majorly is the programming language as a tool:

CHOICE OF PROGRAMMING LANGUAGE

This project is implemented with the programming languages.

PHP is a general-purpose Web development script language. The PHP Reference Implementation is now provided by The PHP Group and initially developed by Danish-Canadian programmer Rasmus Lerdorf in 1994.

XAMPP Server: XAMPP is the cross-platform, Apache, MySQL, PHP and Perl acronym which allows you to create WordPress off-line site, on a local web server, on your PC. This easy and easy to use solution works on Windows, Linux and Mac - the cross-platform component

REASONS FOR CHOOSING

PHP is open source

PHP development is reliable.

PHP development is less time-consuming

The Code in PHP is flexible and integrative.

PHP is well documented and scalable

PHP is easy to maintain

Good hosting support for PHP

3.3.5 ANALYSIS OF THE NEW MODEL

This work has been based on a modified waterfall model. It was reduced to five different phases rather than the six major phases of the waterfall model. This is because all needs have been known and the aim of our software development is to computerize/automate an existing manual
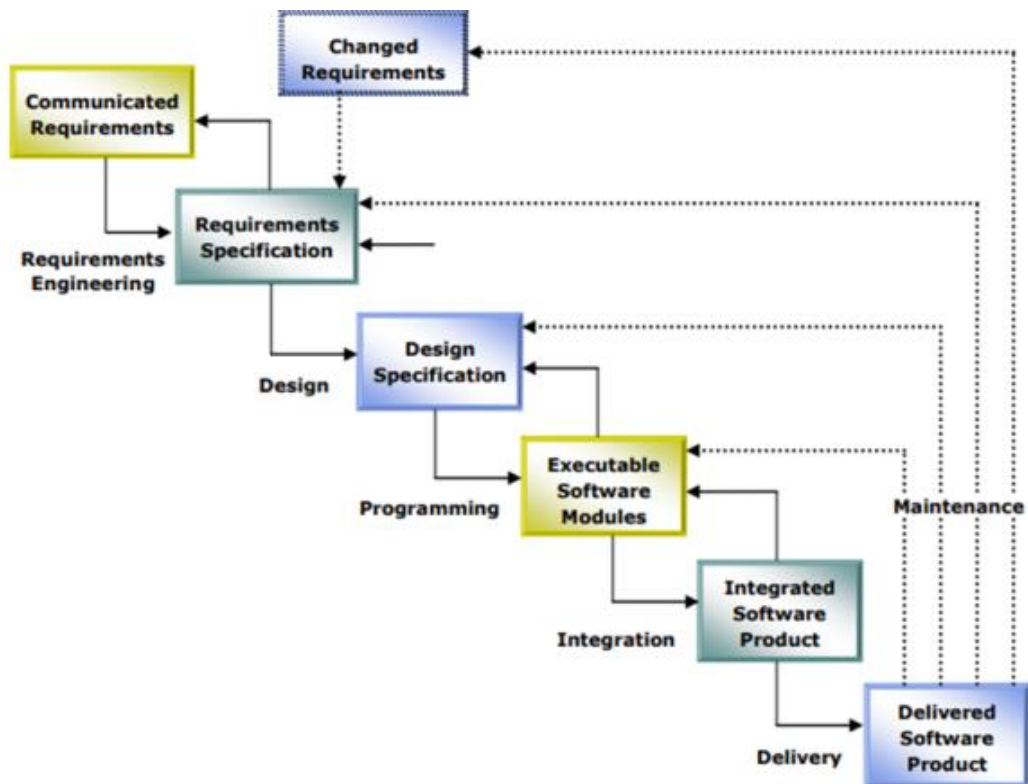
functioning system.

Figure: 3.1 Waterfall Model

WATERFALL MODEL

These phases are:

1. Analysis

2. Tool Evaluation and Selection

3. Design

4. Implementation

5. Post-Implementation

This is a straighter approach to waterfall. The analysis begins. The following stage, the evaluation and selection phase of the tool can be used once this phase is done. This methodology differs from the waterfall model since the design phase is implemented differently than usual and a development phase is not required as the product is existent. Instead of designing the system itself, the design phase is concerned further with integrating the product with existing infrastructure and how the system is filled in.

Analysis phase

During the analysis phase, the high-level needs, aims and objectives of the Hospital will be identified and the requirements for the hospital will be obtained. In this phase the needs for the Hospital appointment scheduling system will be made evident. During this phase, interviews, observations and collecting of pertinent documents were done. At the end of this phase a comprehensive functional requirements specification which were done. At the end of this phase a complete functional requirements specification, which outlines all facets of the system were developed. A series of profiles, which will document the information acquired, which helps not only the functional requirements specification but also the tool selection and design phase will also be developed. The profiles to be created are:

   a. Organization profile
   b. Document profile(s)
   c. User profile(s)

Use diagrams of case The aim of the case diagramming technique for waterfalls is to consider and design the dynamical aspects of a system that help to gather needs while also identifying the

external and internal factors influencing the system and showing the interactions between different actors / users of the system.

3.4 SYSTEM DESIGN

The objective of system design is to define a detailed computer-based solution in particular. This method defines a system to meet its needs by specifying the architecture, components, modules, interface, and data. A solid and dependable database for efficient collecting and processing of data is the main feature considered in designing the new system. The system also aims to provide specifications which enable the new system to be fully implemented, accurately and specifically. After a careful review of the existing system the replacement system was designed. The design is a solution that translates demands in ways that meet them The design of the system comprises three levels: the physical, logical and architectural.

DESIGN GOAL

The objective of the design is to create a user-friendly application with full functionality for registration activities, login, patient appointment reservations, doctoral response and above all security measures, and optimization of the code simultaneously.
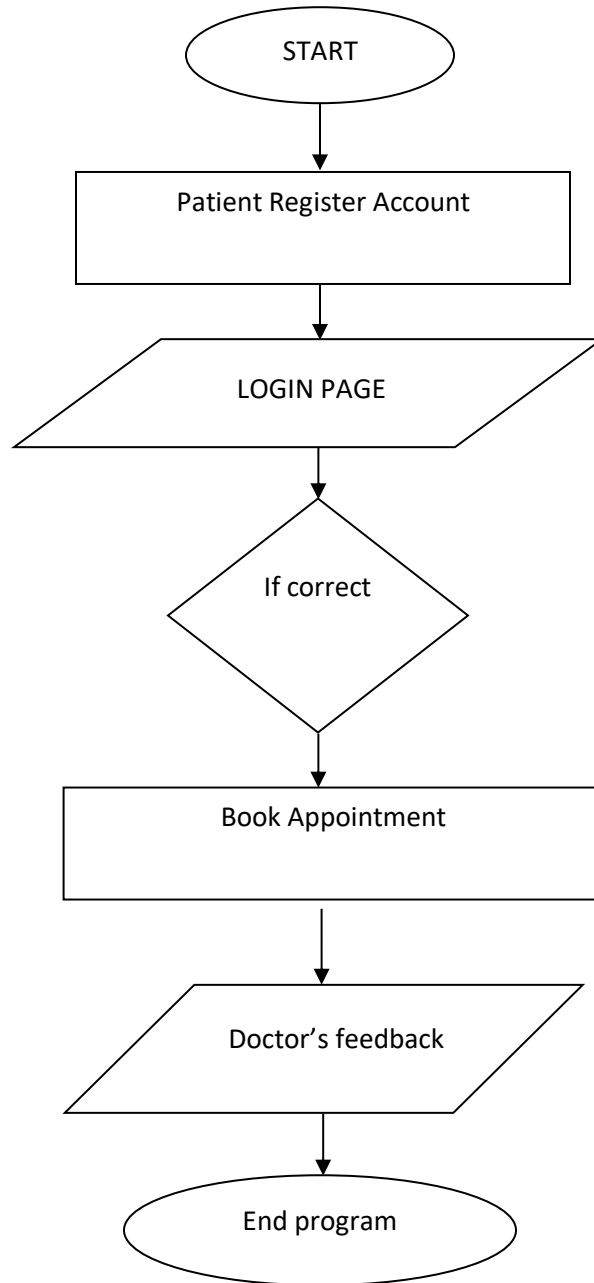
SYSTEM ARCHITECTURE

```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                           │
                           ▼
            ┌──────────────────────────────┐
            │   Patient Register Account    │
            └──────────────────────────────┘
                           │
                           ▼
            ╱──────────────────────────────╲
            ╲          LOGIN PAGE           ╱
             ──────────────────────────────
                           │
                           ▼
                        ╱──────╲
                       ╱  If     ╲
                       ╲ correct ╱
                        ╲──────╱
                           │
                           ▼
            ┌──────────────────────────────┐
            │       Book Appointment        │
            └──────────────────────────────┘
                           │
                           ▼
            ╱──────────────────────────────╲
            ╲       Doctor's feedback       ╱
             ──────────────────────────────
                           │
                           ▼
                    ┌─────────────┐
                    │ End program │
                    └─────────────┘
```

Figure 3.2: Program flowchart

HARDWARE / SOFTWARE PLATFORM

The Electronic base application will be implemented on any micro-computer configuration with the following capacities:

1. A hard disk of at least 500 GB

2. 4GB RAM memory

3. Pentium IV 1.0 MHz

4. Window 7 operating system (Minimum)

5. PHP programming language

6. Microsoft Azure

DATABASE DESIGN

The overall subject of a database is the integrated management of information. Database is an inter-related, minimum redundancy data collection which can swiftly and efficiently serve multiple consumers. Its aim is to make it easy, fast and adaptable for the user to get information. Database design consists of creating a conceptual database model that addresses an organization's current and future information storage needs. Its objective is to improve current conditions. By accepting input from the existing system, the new system is constructed and delivered to the proposed system.

The structure and relationships of the patient database appointment were designed on a functional basis. We used data from a relational MySQL database to store different booing aims, history and patient investigation. We utilized MySQL Workbench, a visual tool for data modelling and SQL

databases development, to design and implement the database structure combined with the relationships.
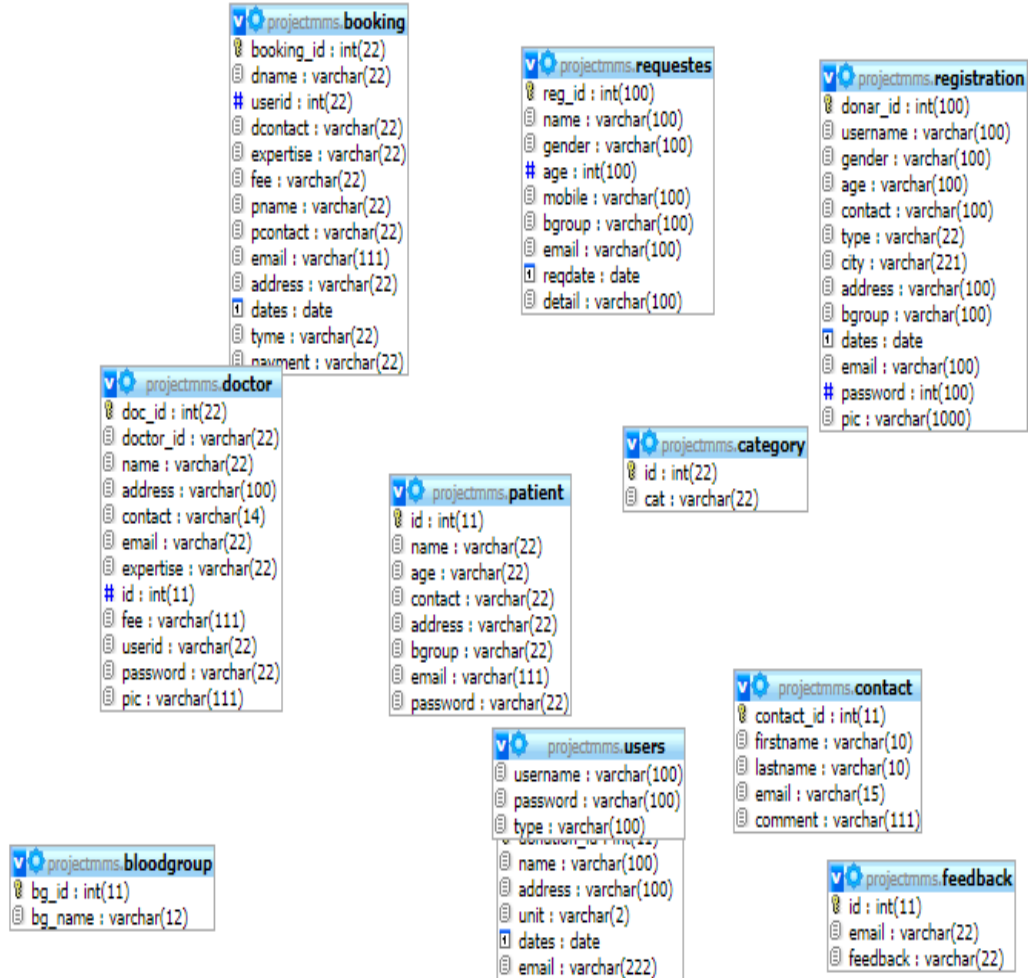
Figure 3.3: Database Design

Table 3.1: Blood group

Table 3.2: Booking

Table 3.3: Patients

Table 3.4: Doctor

3.5 CODING

The system coding was done with PHP and JavaScript, basically, the MySQL server and SQL database language were combined in PHP and the other interactive elements of the programme. the backend was achieved. The system is also used in the front-end programming languages with HTML, CSS and Bootstrap. The Code weighs only 5 MB in total and is optimized for additional use.

USER OR WEB INTERFACE DESIGN

The websites consist mainly of dynamic web pages. Dynamic indicates that the user interacts more and more with the website, and the site responds accordingly after only reading the pages. Usually, a web server offers the built-in and host web pages, the IP address and the domain name of a server. A total of 26 pages from the PHP home page, the Doctors' website, the Notepad++ Text Editor, providing both PHP, HTML, and CSS capabilities, are included within the system booking.

CHAPTER FOUR

SYSTEM IMPLEMENTATION AND RESULTS

4.1 SYSTEM IMPLEMENTATION

Two main components – Front end and Backend – consist of the proposed software system. For designing of the front end or interface of the system, HTML and CSS (client side) are employed. HTML is the Hypertext Mark Up Language used to construct a web application's front view while CSS was used to make the web page style.

The backend describes the system's data access layer, server and other computer functions. AJAX and PHP for scripting were used to create the backend of the system. MYSQL is used for system database development. Server-side software for Apache has been utilized. In Figure 8, the registration form was developed to provide properly controlled user details utilizing JavaScript using the Bootstrap Modal function.

LOGIN MODULE

Bootstrap Modal is created with a seemingly smooth and easy to use pop-up display. The login form is designed. It gives a single connection to the system for physicians and patients.

BOOKING MODULE

The patient's book appointment menu page shall allow a person to reserve medical appointments on a calendar basis (availability) with the doctor or scheduler available.

To design by making affordable hardware for the implementation scheme.

1. Configuration of the hardware which will be discussed in the next phase.

2. Handling of online registration information.

3. Continuous updating and upgrading of the developed systems and Infrastructures.

4. The types of network implemented.

4.2 INSTALLATION REQUIREMENTS

To install the system users needs the following:

1. XAMPP Server

2. Laptop with 4 Gigabyte minimum

3. VS Code

4. Chrome Browser

4.2.1 HARDWARE REQUIREMENTS

The web base platform with security can be implemented on any micro-computer configuration with the following capacities:

1. A hard disk of at least 500GB

2. 4 Gigabyte RAM memory

3. Core i3 MHz

4. Window 7 operating system (Minimum)

Any microcomputer of the above capacity is required to be used, the only important thing is that PHP is used to design the package resides on the hard disk.

4.2.2 SOFTWARE REQUIREMENT

    i.   PHP programming language

    ii.   VS code

    iii.   XAMPP server

4.3 PROTOTYPE OF THE DESIGN

Hospital appointment system software prototype designs are below:
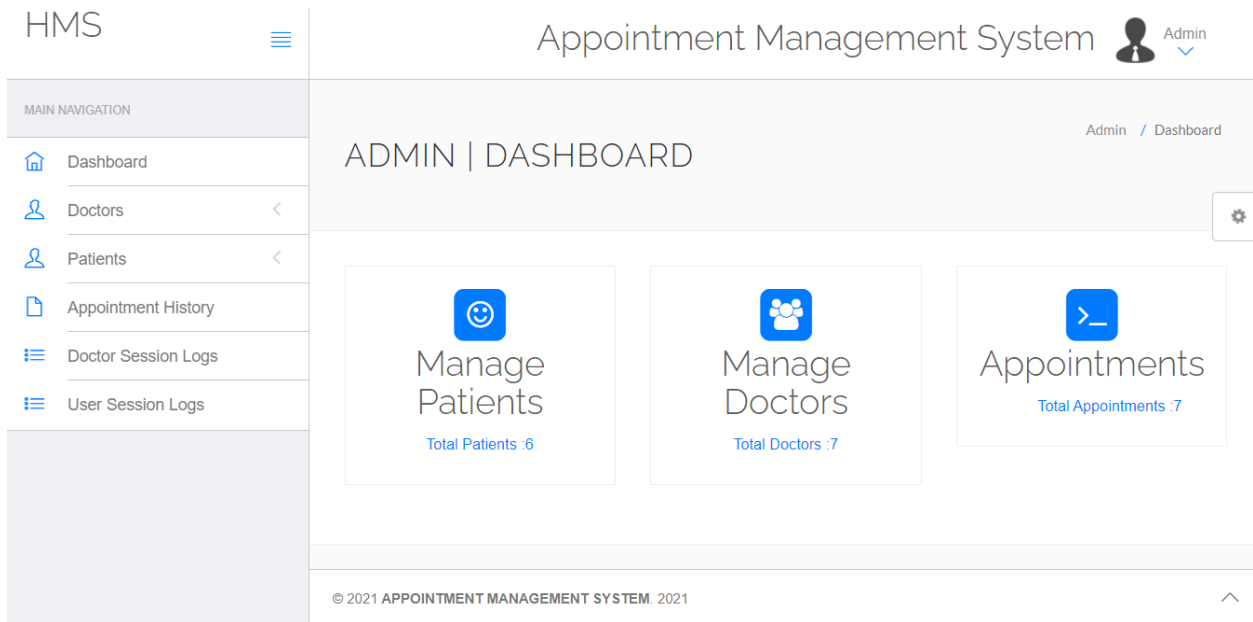

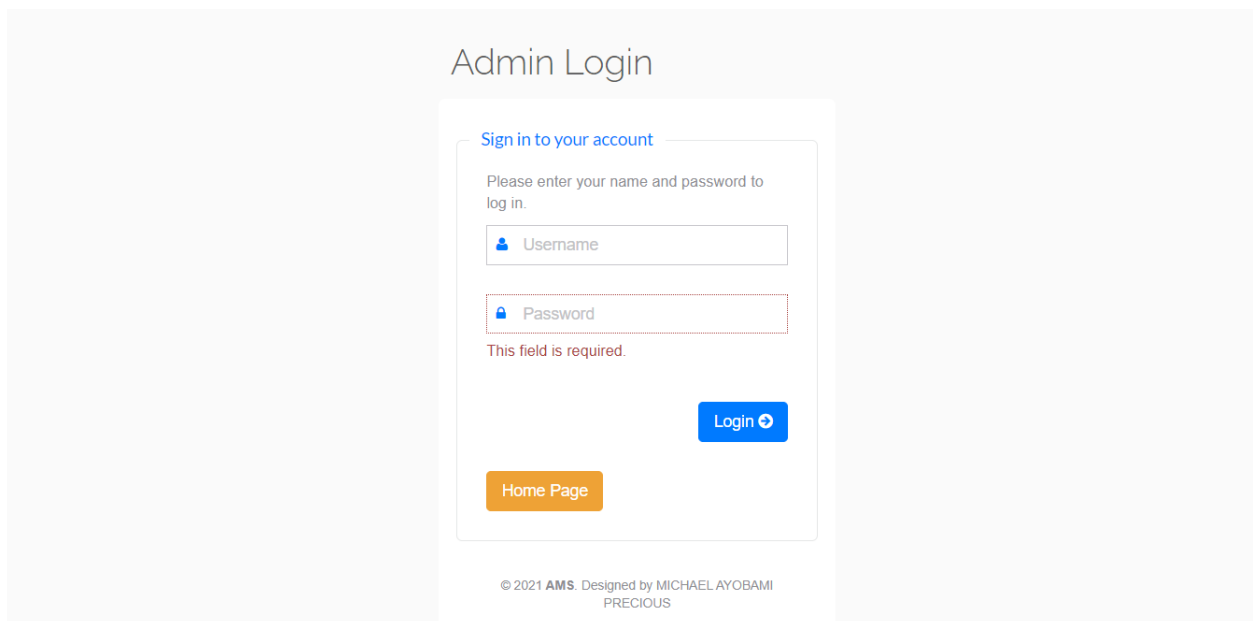**Figure 4.1: MAIN PAGE**

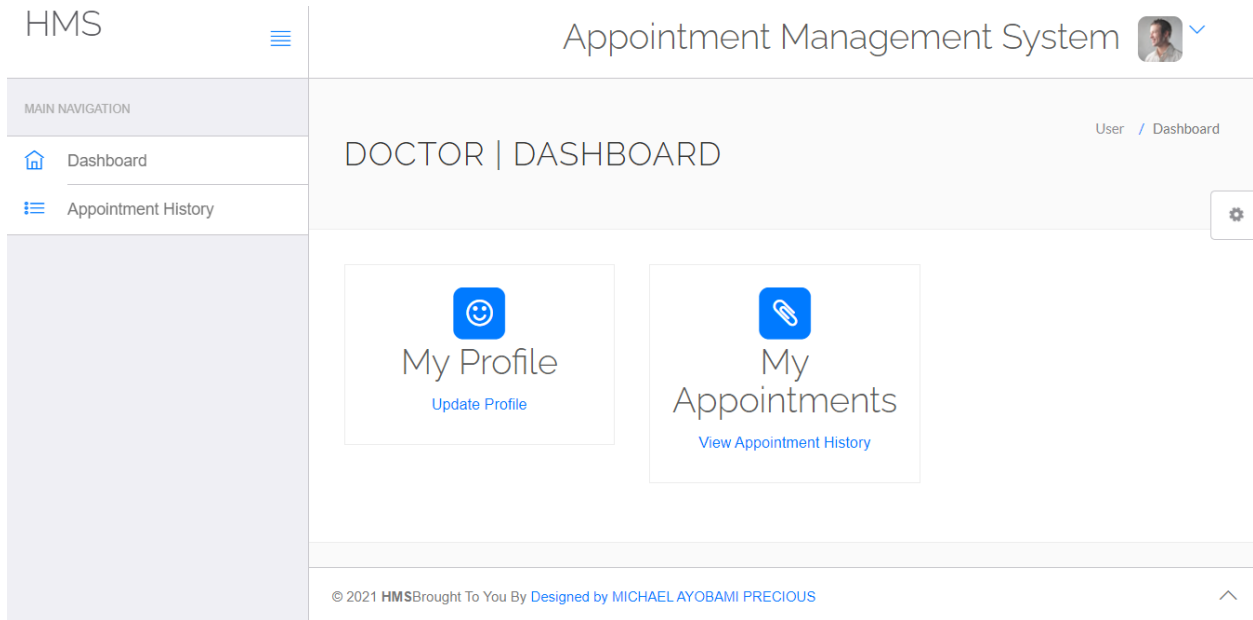**Figure 4.2: ADMIN DASHBOARD**

Figure 4.3: ADMIN LOGIN
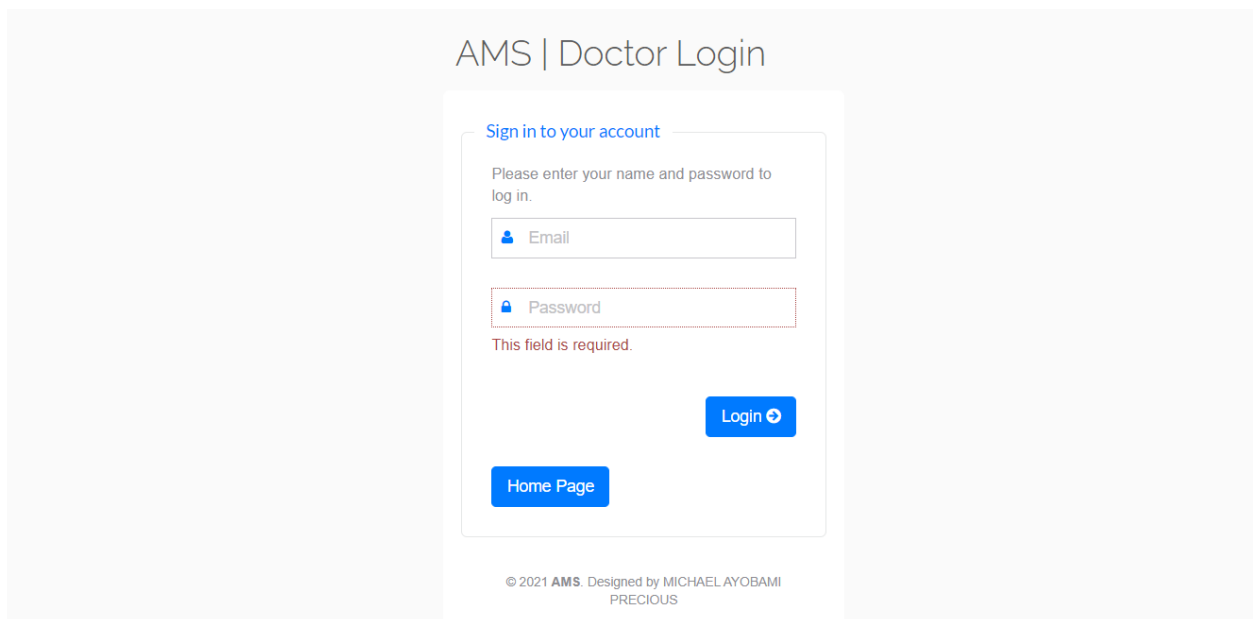
Figure 4.4: DOCTOR DASHBOARD
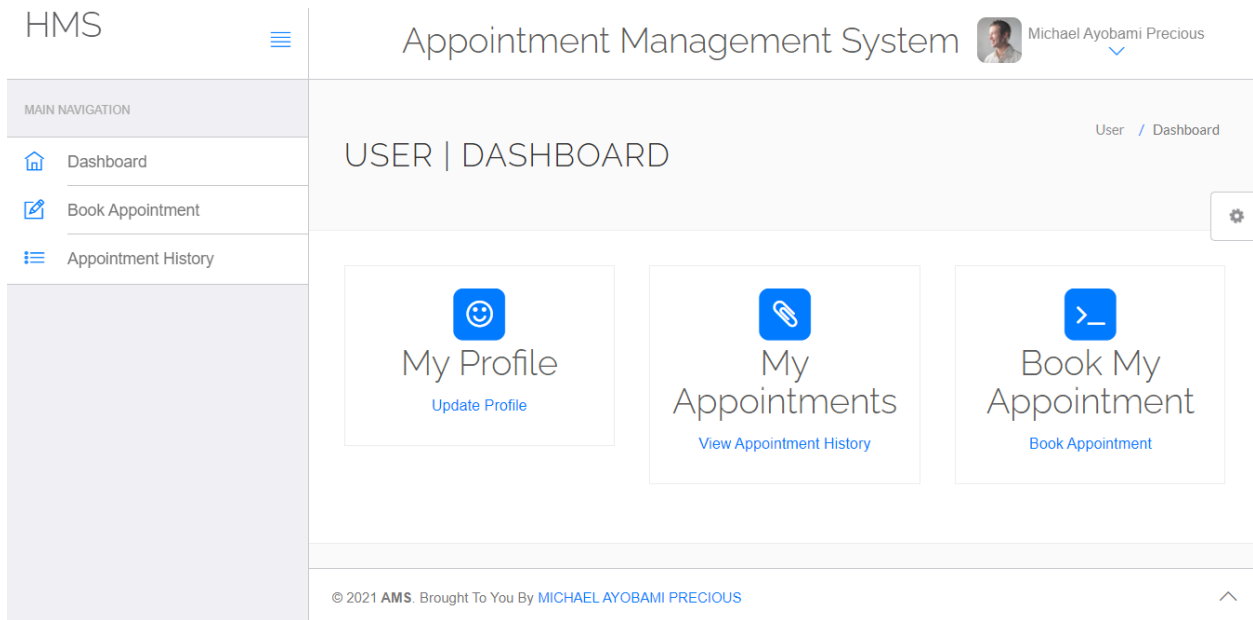

Figure 4.5: DOCTOR LOGIN

Figure 4.6: USER DASHBOARD
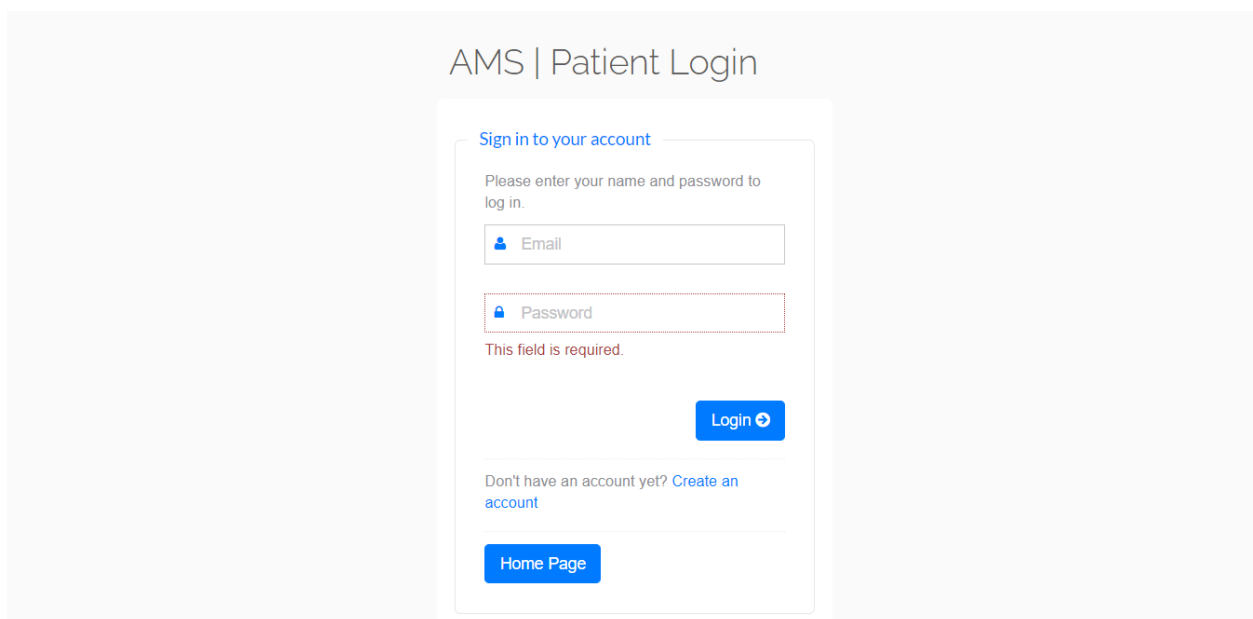
Figure 4.7: USER LOGIN

4.3.1 HOW TO INSTALL THE HOSPITAL APPOINTMENT APPLICATION

The installation process of the application is outlined below:

1. Download XAMPP server

2. Install XAMPP server

3. Install VS Code

4. Configure the XAMPP server.

5. Copy the files and place in C: / XAMPP / htdocs/

6. Open the folder

7. Open the .SQL file

8. Open PHPMYADMIN on XAMPP

9. Name a database

10. Click on SQL

11. Copy the SQL code and paste it then run it

12. Go back to the folder, copy the name.

13. Open your browser,

14. Enter localhost/folder name

15. Run it.

4.4 RESULTS AND DISCUSSIONS

The welcome page module was structured with hypertext markup language, HTML styled with cascading style sheet, CSS and made dynamic with hypertext pre-processor, PHP. The link to the login page is included. The Register page is the Link. The details in the login area are used to

assess the page's legitimacy. The log page was constructed in a cascading styled hypertext mark-up language and made dynamic with a preprocessor of hyperlinked text. The centralized system verifies the authenticity of the input code after inserting a unique patient registration password to verify that the authorized registrar attempts to access the System; the user will automatically browse the registration system after it has been validated correctly. The appointment for the patient with physicians is established on the dashboard where patients can select doctors, wish to be served and make an appointment. When done, the doctor gets this and immediately begins the appointment

HOW TO ACCESS THE HOSPITAL APPOINTMENT SYSTEM

LOGIN

Run the script http://localhost/hospital

Admin Credential

Username: admin

Password: Test@2314

User Credential

Username: username

Password: Test@gmail.com

Admin Credential

Username: admin

Password: Test@gmail.com

User Credential

Username: username

Password: david@gmail.com

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 SUMMARY OF RESEARCH FINDINGS

Current landscape of healthcare wanted efficiency and contentment of the patient to perform optimally. In poor countries, the outpatients of most clinics encounter many problems. This includes: extra time during the clinics for doctors and nurses, considerable wait time for patients and maximum counter-staff workload. Overtime and maximum workload threatened the quality of the provision of health care. It will design a system to make the delivery of a web-based appointment system more effective and more quality in the process of reducing waiting time. This document uses the HTML and CSS for the Front, Ajax Framework for managing client-Server Requests and Sqlite3 and MYSQL for the Backend, to develop a patient appointment and scheduling system.

5.2 RESEARCH CONCLUSION

Nigeria healthcare system is able to radically modify the nature of its relationships with its patient and physician by implementing electronic medical records software in general. In this age of electronic medicine, patients and healthcare practitioners alike have begun to face new obstacles and are also starting to gain greatly from progress in the field of health information technology. Only because patients have to overcome time delays will the scope and extent of use of the hospital appointment system be increased.

5.3 CONTRIBUTION TO ACADEMIC KNOWLEDGE

Hospital appointment system is a web base programme that plays an important role in the health sector operations of the hospital. Doctors are scheduled on their illness, or anything, by patients. The developed system is impactful on these major areas:

1. Assisting patients speed up time wait.

2. Exposing the researcher to different scheduling systems and their operations

3. Exposing the concept of programming and how to build complex applications

5.4 RECOMMENDATION FOR FUTHER STUDY

The new system is successfully tested, implemented and complies with all the requirements given. The system is more secure, versatile, offers more user feedback, decreases workload, prevents incorrect data entry and offers more functionality than the current system (manual system). This programme is to promote and encourage the continuity and improvement of access to medical faculties as soon as feasible not simply to relieve the working burden of hospital appointments. I also recommended the following.

i.   The hospital should be networked so that when a patient's health information is registered his or her record can be accessed at record office and other offices.

ii. System can be used for other appointment management systems.

iii. Lastly, all operators that may likely group to use this system must be computer literate who have undergone a short training on how to use the system to avoid errors.

REFERENCES

Akman, D. (2019). "*System Analysis and Design Methods 5th Edition. Published by Sandra Donaldson Dewitz,*" San-Jose State University

Beynon-Davies P. (2013). "*Business Information + Systems.*" Palgrave, Basingstoke.

Chaitanya, M. (2014). Database Management System Published by Hoummele Printer Inc.

Chukwunonso, C. S. (2013). Data Processing and Information Technology 10th Edition. Published by British Library Cataloguing Publication Data.

Fredrick, J. (2015). "*Computer Maintenance and Management Published by Mangraw Publishers Inc.*"

Gerald, V. (2010). Database Management System 2nd Edition. Published by Palmohills prints.

Goldsmith, L. (2012). "History *from the inside out: Prison life in nineteenth-century Massachusetts.*" Journal of Social History, 31, 109-125.

Iroya, J. (2014). "*Information System Development Essentials Published by McGrew-Hill Companies"*

Inc. USA.

Ismail, L. (2015) "*System Analysis and Design Method 4th Edition. Published by Palgrave Macmillan, New York."*

Kroenke, S. (2009). "*Management Information System Published by Hoummele Printers Inc*".

Miley, B. (2016). "*Visual Basic 6.0 Progamming Made Easy Published by Palmote Mangrills,*" New York.

Michael, V. (2010). "*Database Design, Application, Development and Administration,*" 5th Edition. Published by Palgrave Houndmills, Basingstoke, Hampshire, New York.

Paul, B. (2013). "*Database Management System 3rd Edition. Published by Palgrave Houndmills,*"

APPENDIX

```html
<!DOCTYPE HTML>

<html>

    <head>

        <title>Appointment Management System</title>

        <link href="css/style.css" rel="stylesheet" type="text/css"  media="all" />

        <link   href='http://fonts.googleapis.com/css?family=Ropa+Sans'   rel='stylesheet'
type='text/css'>

        <link rel="stylesheet" href="css/responsiveslides.css">

        <script
src="http://ajax.googleapis.com/ajax/libs/jquery/1.8.3/jquery.min.js"></script>

        <script src="js/responsiveslides.min.js"></script>

         <script>

           // You can also use "$(window).load(function() {"

                $(function () {


                  // Slideshow 1

                  $("#slider1").responsiveSlides({

                   maxwidth: 1600,

                   speed: 600

                  });

                });
```

```html
      </script>

   </head>

   <body>

      <!--start-wrap-->


         <!--start-header-->

         <div class="header">

            <div class="wrap">

            <!--start-logo-->

            <div class="logo">

               <a         href="index.html"        style="font-size:
30px;">Appointment Management System</a>

            </div>

            <!--end-logo-->

            <!--start-top-nav-->

            <div class="top-nav">

               <ul>

                  <li                          class="active"><a
href="index.html">Home</a></li>


                        <li><a href="contact.php">contact</a></li>

               </ul>

            </div>
```

```html
            <div class="clear"> </div>

                <!--end-top-nav-->

        </div>

        <!--end-header-->

</div>

<div class="clear"> </div>

        <!--start-image-slider---->

                    <div class="image-slider">

                        <!-- Slideshow 1 -->

                      <ul class="rslides" id="slider1">

                        <li><img src="images/slider-image1.jpg" alt=""></li>

                        <li><img src="images/slider-image2.jpg" alt=""></li>

                        <li><img src="images/slider-image1.jpg" alt=""></li>

                      </ul>

                        <!-- Slideshow 2 -->

                    </div>

                    <!--End-image-slider---->

    <div class="clear"> </div>

    <div class="content-grids">

        <div class="wrap">

        <div class="section group">
```

49

```html
<div class="listview_1_of_3 images_1_of_3">

        <div class="listimg listimg_1_of_2">

                <img src="images/grid-img3.png">

        </div>

        <div class="text list_1_of_2">

                <h3>Patients</h3>

                <p>Register & Book Appointment</p>

                <div   class="button"><span><a   href="hms/user-
login.php">Click Here</a></span></div>

          </div>

        </div>


<div class="listview_1_of_3 images_1_of_3">

        <div class="listimg listimg_1_of_2">

                <img src="images/grid-img1.png">

        </div>

        <div class="text list_1_of_2">

                <h3>Doctors Login</h3>


                <div                       class="button"><span><a
href="hms/doctor/">Click Here</a></span></div>

                </div>

        </div>
```

```html
<div class="listview_1_of_3 images_1_of_3">

<div class="listimg listimg_1_of_2">

<img src="images/grid-img2.png">

</div>

<div class="text list_1_of_2">

<h3>Admin Login</h3>


<div                    class="button"><span><a
href="hms/admin">Click Here</a></span></div>

</div>

</div>

</div>

</div>

<div class="wrap">

<div class="content-box">

<div class="section group">

<div class="col_1_of_3 span_1_of_3 frist">


</div>

<div class="col_1_of_3 span_1_of_3 second">
```

```html
        </div>

        <div class="col_1_of_3 span_1_of_3 frist">



        </div>

    </div>

  </div>

  </div>

  <div class="clear"> </div>

  <div class="footer">

        <div class="wrap">

        <div class="footer-left">

                <ul>

                        <li><a href="index.html">Home</a></li>

                        <li><a href="contact.php">contact</a></li>

                </ul>

        </div>



        <div class="clear"> </div>

  </div>

  </div>

<!--end-wrap-->
```

```
        </body>

</html>
```