2022-09-14

Web Based Hospital Management System

Rahman, Asifur

Independent University, Bangladesh

An Undergraduate Internship/Project on Web Based Hospital Management System

By

Asifur Rahman

Student ID: **1720105**

Summer, 2022

Supervisor:

Raihan Bin Rafique

Lecturer

Department of Computer Science & Engineering

Independent University, Bangladesh

September 14, 2022

Dissertation submitted in partial fulfillment for the degree of Bachelor of Science in Computer Science

Department of Computer Science & Engineering

Independent University, Bangladesh

Attestation

I hereby attest that I, Asifur Rahman -1720105 an undergraduate affiliate of Independent University Bangladesh, have completed the report and submitted it in partial fulfillment of the requirement for the Degree of Computer Science and Engineering from Independent University, Bangladesh (IUB). I have been guided by my respected faculty Raihan Bin Rafique the sources of information used in this project and report has been duly acknowledged in it.

Asifur Rahman
Signature

14-09-~~200~~2022
Date

Asifur Rahman
Name

Acknowledgement

First and above all, I praise God, the Almighty for providing me this opportunity and granting me the capability accomplishing my internship report timely. I express my gratefulness to my internal supervisor, Raihan Bin Rafique, Lecturer, Department of Computer Science and Engineering, Independent University, Bangladesh (IUB), for his invaluable instructions, constant guidance, support and motivation during my internship period and preparation of this report. It has been a great privilege to work for `Logic Software Limited ' as an Intern. I have received so much support and encouragement from the individuals of ` Logic Software Limited. I would like to thank my supervisor for spending his valuable time and knowledge which was essential for the completion of this report. I would like to thank my classmates. They have always been helpful and provided valuable insights from time to time. Finally, yet importantly, I would like to thank my family. Their endless support has been unconditional. Their hopes and faith on me had me keep going even when days were challenging.

Letter of Transmittal

Raihan Bin Rafique

Lecturer,

Department of Computer Science and Engineering,

School of Engineering and Computer Science

Independent University, Bangladesh.

Subject: **Submission of Internship Report.**

Dear Sir,

This is to inform that with due honor and respect, I, Asifur Rahman (ID: 1720105) from CSE 499, Internship Course of summer 2022 Semester, would like to submit my internship report. I have completed my internship program under the supervision of Jahid Hasan this report is based on my internship program and the project I have worked on at Logic Software Limited. tried to make this report as much informative as possible with the experience I have gained during my internship period.

I have tried my best to deliver a good report. However, it might lack perfection. I shall be highly obliged if you are kind enough to receive this report and provide your valuable judgment. I hope the following report can achieve your approval and is adequate.

Sincerely,

Asifur Rahman

ID-1720105

Independent University, Bangladesh

Department of Computer Science and Engineering

:::

Evaluation Committee

Jahid Hasan

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Signature

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Name

Jahid Hasan

.....

Supervisor

.....

Signature

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Name

Mohammad Noor Nabi

.....

Internal Examiner / Panel Member

Rahan

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Signature

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Name

Rahan Bin Rafique

.....

External Examiner / Organizational Supervisor

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Signature

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Name Dr. Mahady Hasan

.....

Head of the Department / Convener

Dr. Mahady Hasan
Head, Department of CSE
School of Engineering & Computer Science
Independent University, Bangladesh (IUB)
Date→ 26-09-2022

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Abstract

This document contains the Project Management, architectural design, user interface design, testing and future work of `Online Hospital Management System'. This System provide Hospital services like appointment, doctor information and gives the management a compete admin dashboard for managing the work via online. In this system, Patient don’t have to go to hospital to for appointment. They can book a schedule for them and see the status online. They can also see the doctor list with their specialty. This system also has feature like add doctor, update doctor information, approve or decline appointment and many other features.

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Chapter 1

Introduction

1.1 Overview/Background of the Work

In our country, there are lots of hospitals and it is a basic need of humans to get proper treatment from the hospital when they get sick. If a person gets sick, he or she quickly makes an appointment with a doctor and takes proper treatment. In our country the traditional way is if someone gets sick, he will go to the hospital to look for the best doctor, look for his schedule, take his appointment and what for their turn. This is very time consuming and creates a lot of hassle for the patient. And since Covid 19 broke out, the doctors are telling us to avoid gathering as much as possible. We have proposed a solution for this harassment. people will get all the doctors and take their appointment without any hassle. They will get the doctor list and their specialty and they will be able to book an appointment for them and the hospital will confirm them about their appointment. This first part of this report focuses on the existing system and its shortcomings and an introduction of the proposed system that we plan to replace the existing system with. The second part will be heavily technical and focus on how we plan to bring the proposed system into being a working model.

1.2 Objectives

Our project is completely concerned about making the hospital management system online. As most of the hospital work is done face to face so we want to shift some work to online so it helps both the patients and the adminstration. As we want to make a system which is new to the hospital sector, we want all the stakeholders to get all the facilities which they want. Maximum hospitals and clinics don't have any system for serving their patients and for their official work. Because it takes money and manpower to support the whole system. But by implementing this the outcome can be great.

1.3 Scopes

Scope of the project is a necessity to ensure the accomplishment of a project. As we are making a new system. We think our proposed system is needed in the hospital. Some hospitals have gone online but most hospitals don't have their own management system or don't serve online facilities for their patients. Our proposed system will ensure a better and easy service for the patient in finding a good doctors and book appointments without going outside of their door and a more organized and hassle free easy to manage system for the management. Our proposed solution where we are looking forward to:

For patient:

- Create a system where a patient can look for available doctors and their specialty.
- Patients can book an appointment online.
- Patient have to give information for taking an appointment.
- Patient can see all their appointments status.
- Patients will able to know more about the hospital and their service.

For Management:

- A complete admin dashboard.
- Admin can add or delete doctors.
- Admin can update the information of the doctor.
- Admin can approve or cancel appointments of the patient.

Chapter 2

Literature Review

2.1 Relationship with Undergraduate Studies:

First and foremost, the university emphasizes teaching and learning and the process of learning in its commitment to the development of mature, responsible, well-educated citizens. The knowledge and skills that I gain from my undergraduate programs help me with the development of this "Web based hospital management system" project. It would have been more difficult if these courses had not been covered before working on this project. Besides those, the individual and group projects I have done in my undergraduate courses helped me with this project. Some of the courses are:

CSE 203 Data Structure:

A data structure is a specialized format for organizing, processing, retrieving, and storing data. There are several basic and advanced types of data structures, all designed to arrange data to suit a specific purpose. Data structures make it easy for users to access and work with the data they need in appropriate ways. Most importantly, data structures frame the organization of information so that machines and humans can better understand it. It is not only important to use data structures, but it is also important to choose the proper data structure for each task. Choosing an ill-suited data structure could result in slow run times or unresponsive code. This course was about teaching how to handle and manipulate complex arrays, objects, classes, array of objects, objects of array, nested arrays, nested objects, etc. As “Web based hospital management system " involves many complex data structures, the knowledge gained from this course made handling them much easier.

CSE 213 Object-Oriented Programming:

Object-oriented programming is based on the concept of objects. In object-oriented programming data structures, or objects are defined, each with its own properties or attributes. Each object can also contain its own procedures or methods. Software is designed by using objects that interact with one another. OOP can also be used in manufacturing and design applications, as it allows people to reduce the effort involved. For instance, it can be used while designing blueprints and flowcharts. It helped to write the real time system design that are used to develop the "Web based hospital management system "

CSE 303 Database Management:

A database management system (DBMS) is a software package designed to define, manipulate, retrieve, and manage data in a database. A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data. Database management systems are set up on specific data handling concepts, as the practice of administrating a database evolves. The earliest databases only handled individual single pieces of specially formatted data. Today's more evolved systems can handle different kinds of less formatted data and tie them together in more elaborate ways. This was the first course that taught me how to design and plan a project. In the database management course, I have got the basic knowledge of poplar planning and strategy practices such as System development life cycle, Six Element Analysis, Rich Picture, Requirement Analysis, Entity Relationship Diagram, and Business Process Model, and many more. These techniques helped in the development planning and strategy of "Web based hospital management system " and, they helped in writing this report.

CSE 309: Web Applications and Internet:

This course serves as a comprehensive overview of web technologies and their usage. Essential topics such as OSI and TCP/IP architecture, Internet Routing, IP addressing and Domain Name System was covered. Discussions on popular browsers, HTML and Cascading Style Sheet, HTTP, HTTPS, FTP, Client and Server- side scripts, Scripting (JavaScript, AJAX, XML) with jQuery libraries, Web Servers (IIS, Apache) helped me with my project. I learn to design dynamic websites using Django with SQL server and with MySQL.

CSE 307: System Analysis and Design:

Systems development is systematic process which includes phases such as planning, analysis, design, deployment, and maintenance. Here, in this tutorial, we will primarily focus on System Analysis and System Design. This course examines the tools and techniques used for the design and analysis of information systems. Topics covered include Systems and models; Project management; Tools for determining system requirements; data flow diagrams; decision table and decision trees; Systems analysis: systems development life cycle models. Object oriented analysis: use-case modeling, Unified Modeling Language. Feasibility analysis, structured analysis; systems prototyping; system design and implementation: application architecture, user interface 4 Design. Front-end and back-end design; database design; software management and hardware selection. Case studies of Information Systems. These techniques helped in the development planning and strategy of "Web based online hospital management system" and, they helped in writing this report also.

2.2 Related works

- While doing system analysis and design I made a project which helped me to design and implement in my field work. I made a project which was named “Webspace”. It was about users looking for work, to help the unemployed.
- Doing (OOP) I made a project in hospital management.
- In Web Application and Design made website of weather-forecasting, Registration system.

While doing additional study on the subject, I discovered that they were using an e-business method to advertise their services on their website, which prompted me to conduct more research on similar papers, and the following are some of my findings:

1. Advertising's influence on small companies has been shown to be a critical tool for growing brand sales. Abiodun (2011) cites product sales and advertising as being inextricably linked. Marketing has an impact on customer behavior and motivates them to buy certain items. Researchers observed that purchasers' thoughts were influenced by repetition in commercials, helping them to recall the product and purchase it again and again (Pope, 2009).

Mike Thelwell’s March 2013 article "Effective Web Sites for Small to Medium-Sized Enterprises" discusses the important aspects that make a website more appealing to consumers. Site visibility in search engines, ease of use, design quality, and ease of site maintenance and upgrading are all characteristics that must be considered when evaluating the quality of a web site at any of the aforementioned levels. The ease of use, or usability, of a website, as with any piece of software, is critical: how easy is it for a user to use the website for the purpose that the owner intends? Accessibility, navigation, readability, and download speed are the four primary categories. They also discuss how surveys may aid the website in gaining more favorable feedback. There is no way the site can dissatisfy a customer if all of the above are in perfect locations

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

A Work Breakdown Structure (WBS) is a hierarchical outline of the tasks required to complete a project.[2] WBS is a tool used in project management that helps is breaking down a complex project into smaller manageable and achievable activities or processes. E-appointment system

have processes/Activities like Concept, Design, Development, Maintaining and Closing. Those process are further broken into smaller tasks and sub task. Detailed sitemap, Project Timeline, Risk Analysis Cost Estimation are the sub task of Requirement Analysis. Design Process have two sub-task Development Oriented Model and System Design. In development-oriented model we break down our task on class diagram, use case diagram and UML design. For the system design we have task like rick picture, ow chart, and system architecture. Frontend and backend are the two process of development the project. User Acceptance four tasks System Testing, Bug Reports, Bug Fixes and client feedback. Review Deployment Deliverable, Documentation Formalities, Finalize Changes and Deploy Final Product tasks are under Deployment Process which is the activity of Closing. The goal of this WBS is to make a large project manageable. In Logic Software limited we follow this top-down approach as WBS.

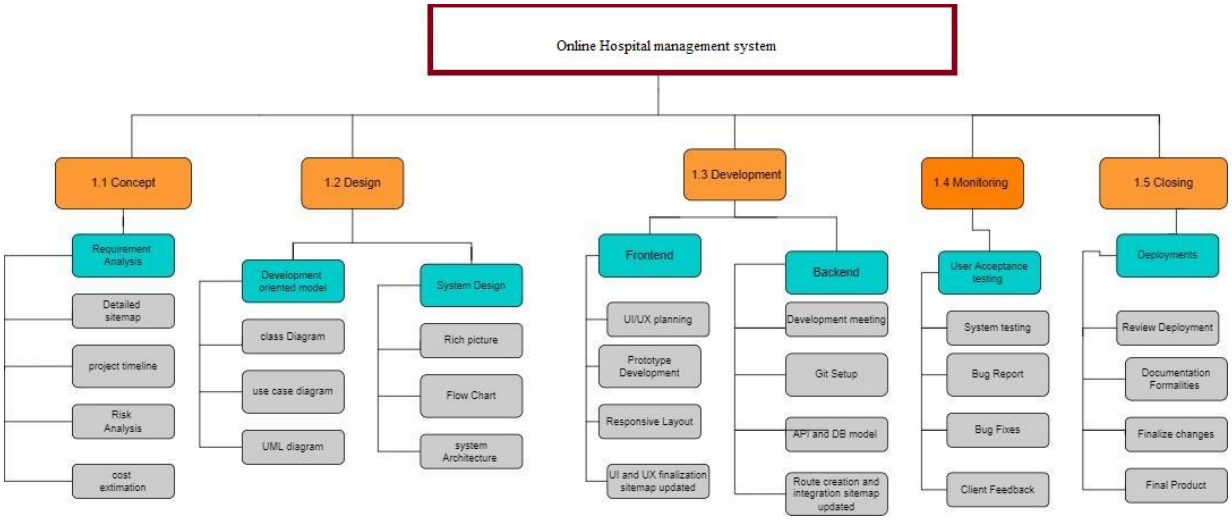


Figure 3.1 : WBS of Online hospital management system

3.2 Process/Activity wise Time Distribution:

Process/Activity wise time distribution is widely used by project managers and practitioners as the probabilistic form of the Critical Path Method (CPM). The critical path method is a technique that allows one to identify tasks that are necessary for project completion. The major problem faces by the project manager and the developers in correctly designing an application is time management. A critical path in project management is the longest sequence of activities that must be finished on time for the entire project to be complete. Any delays in critical tasks will delay the rest of the project. Critical Path Method provides significant role in project management. CPM calculates the longest path of planned activities to logical end points or to the end of the project, and the earliest and latest that each activity can start and finish without making the project longer.

This process determines which activities are critical.

Table 3.1 : Process/Activity wise Time Distribution

Task	Days
Requirement Analysis	6
Design layout	12
Development	35
User Acceptance Testing	8
Deployment	9
Total	70

Here, we need 6 working days for requirement analysis, 12 days for design layout, and 35 days for development, 8 days for user acceptance and testing and 9 days for deployment. A Total 70 days for developing of online hospital management system.

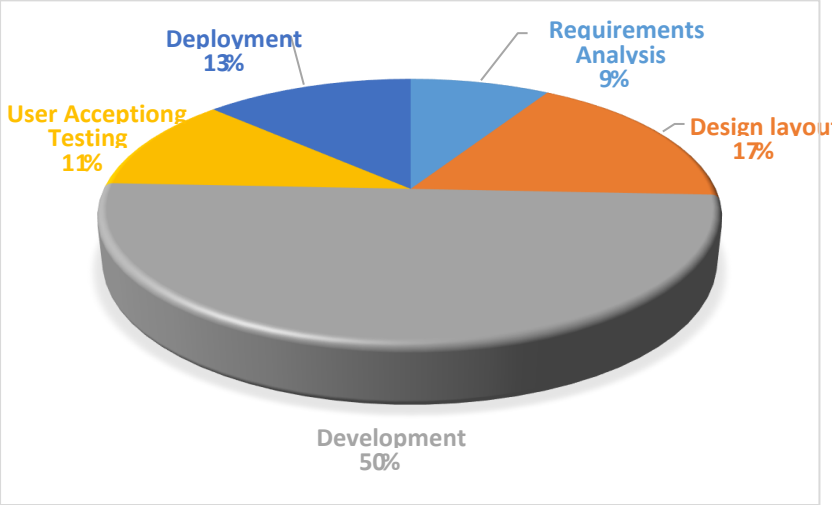


Figure 3.2 : Process/Activity wise Time Distribution Chart

In this chart above process/Activity percentage wise time distribution are shown.

Requirement Analysis: Gathering requirements is a crucial task before the onset of any project. If the requirements are not properly gathered and analyzed, it can lead to project failure. Similarly, for "Hospital management system". We dedicated 9% of the entire work to Requirement Analysis.

Design Layout: The need for a good Design Layout is key. The main user of will be all types of users. Therefore, the design of this system should be intuitive so that the user can easily understand what each component of the system is doing. We allocated 17% of the entire workload for this.

Deployment: At the very end we have Deployment. After checking everything, the system is hosted on the client's domain and handed over to them. Some training is also given to 13% was allocated to this phase.

User Acceptance Testing: After everything is developed, some revisions must be done to the system to check for any underlying bugs before it is handed over to the client. Some documentation also needed to be done. About 11% of the workload was allocated to this phase.

Development: The most crucial part of any system is the development. If it is not developed properly, it will be received poorly by its users. From designing a good and responsive system to making it fast, reliable and bugs fixed is very important. For this phase, we allocated 50% of the entire workload.

3.3 Gantt Chart:

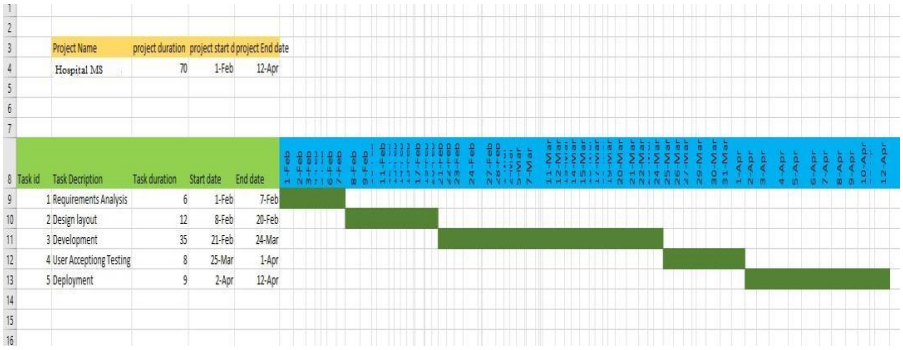


Figure 3.3 : Details Monthly View

3.4 Process/Activity wise Resource Allocation:

Resource allocation is the process of assigning assets in a manner that supports team's goals. Having the right resource at the right time is critical to project success. The table is shown the staffs who are assigned for this project

Serial No.	Position	input(months)
1	Project Manager	2
2	Business Analyst	0.5
3	Database Designer	0.5
4	Sr. Developer	1
5	Developer	2
6	UX designer	0.5
7	UI designer	0.5
8	QA Expert	0.5
9	System Administrator	0.5

Table 3.2 : Process/Activity wise Resource Allocation table

3.5 Estimated Costing:

The estimated costing of "Online Hospital management system" is associated with multiple of 10 services. The development of the project before handover to the client the estimated costing is around Three hundred and twenty thousand BDT. An approximate of cost of the system is given below. It can be expanded on the changes in the software and keeps up fetched.

Serial No.	Position	Staff Month Rate	Input (mont/ hs)	Sub Cost (BDT)
1	Project Manager	50,000	2	100,000
2	Business Analyst	30,000	0.5	15,000
3	Database Designer	30,000	0.5	15,000
4	Sr. Developer	40,000	1	40,000
5	Developer	25,000	2	50,000
6	UX designer	20,000	0.5	10,000
7	UI designer	20,000	0.5	10,000
8	QA Expert	35,000	0.5	17,500
9	System Administrator	30,000	0.5	15,000
Sub Total				2,72,500
Reimbursable Expenses				30,000
Total without VAT				3,02,500
VAT 4.5%				13,612.5
Total with VAT				3,16,112.5

Table 3.3 : Estimated Costing Table

Chapter 4

Methodology

Logic Software Limited's developers work in an Iterative and incremental development environment. To choose the Iterative and incremental development framework to adopt, we apply the Extreme Programming (XP) technique. It helps teams produce high-quality software quickly while also adjusting to changing demands. Extreme Programming is built on five ideas, and we choose to use it for those reasons, as well as other advantages:

Iterative and incremental development is a process that combines the iterative design method with the incremental build model. It is used by software developers to help manage projects.

To fully understand the incremental and iterative development process, you must first split it into its two parts:

- **Incremental:** An incremental approach breaks the software development process down into small, manageable portions known as increments. Each increment builds on the previous version so that improvements are made step by step.

- **Iterative:** An iterative model means software development activities are systematically repeated in cycles known as iterations. A new version of the software is produced after each iteration until the optimal product is achieved.

Iterative and incremental development models are complementary in nature, which is why they are often used together to boost their efficacy and achieve project deliverables.

Iterative and Incremental Development in Agile

The incremental and iterative development process is closely associated with agile project management, most notably the Scrum methodology. This is because it aligns with one of the key pillars of Agile: responding to change over following a set plan.

Rather than adhering to a linear Waterfall method, software developers will react quickly to changes as their product evolves. They will build on previous versions to improve their product and repeat this process until the desired deliverables are achieved.

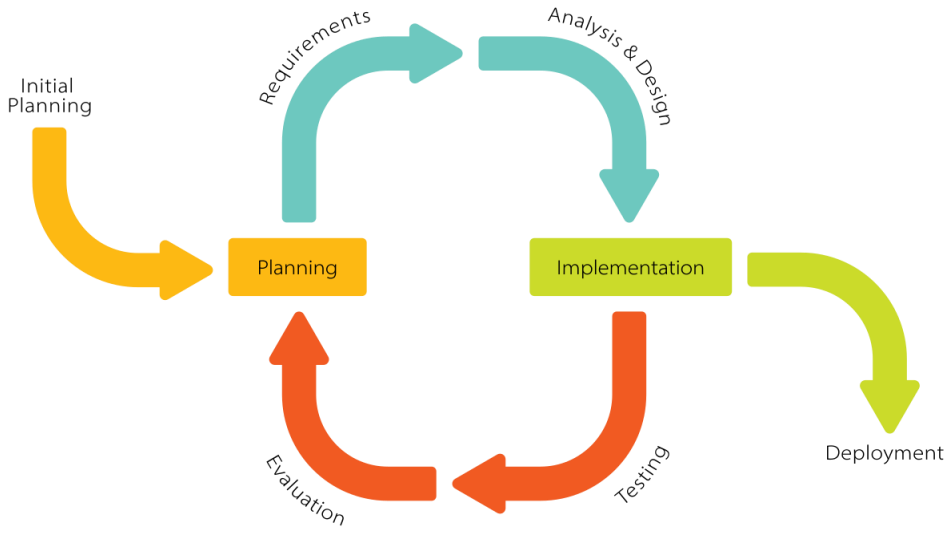
An example of iterative and incremental development in Agile could be the creation of a new e-commerce website. The project would be broken down into smaller increments, such as building a wireframe, uploading products, and creating advertising copy. As these steps are unfolding, the software development team would repeat the cycles of prototyping and testing to make improvements to the website with each iteration.

Why is iterative and incremental development important?

The incremental and iterative development process is integral to the field of agile software development as it enables project managers to reap the benefits of both incremental and iterative approaches.

Incremental development ensures that developers can make changes early on in the process rather than waiting until the end when the allotted time has run out and the money has been spent.

Iterative development means improvements are made on an ongoing basis, so the end result is likely to be delivered on time and be of higher quality. This belief is echoed by CIO.com, which notes that short, iterative sprints can help teams to "deliver a better product, in a faster manner."



Iterative and Incremental Development

Chapter 5

Body of the Project

5.1 Work Description

Web based hospital management system is a digital way of taking service from the hospital. Normally when we are sick, we go to hospital and search for the best doctor available for us. We select the doctor which we want to visit and take his appointment. So, our system can show all the doctors available with their specialty and the patient can request an appointment. For logged in users there is an appointment option where they can see their appointment status and they can cancel their appointment whenever they want. On the homepage the patient can see about the hospital and their services. We have a separate dashboard for the hospital

management which we call as admin. From there we can add new doctor to the list. Admin can approve or cancel appointments which are requested by the patient and can send mail to that specific user. Admin also has the option to Update every details of a doctor.

This system consists of different modules. These are:

Homepage: This is the first page when a user visits. This page has details of the contract number, email and other important information of the hospital. For this page the user can see all doctors, make appointments and many other options.

Registration and Login: There is the registration page. People have to register to the system before they can use it. In the registration page, the user has to input the usual information required to register, i.e., email address, a unique password, a username. After successfully registering, users need to login to use the system. Home screen can be viewed without login but for taking any service the user must login.

Doctors: In homepage, there is a slider showing all the doctor with their specialty and their picture for choosing the best doctor for the patient.

Set Appointment: user can make appointment. For this user have to give his name, email, date that he/she wants to come, number and any message user want to give. There is separate appointment page where the user will able to see all the appointment that he taken, appointment status and option of canceling the appointment.

Admin panel: This is a different dashboard for the management of the hospital and only specific id will able to log in to this dashboard. Admin panel have different pages like,

Add doctor: There admin will add new doctor. This will require Name, phone number, Specialty, Room number and image.

Appointment: Admin will able to cancel or approve appointment request and sent them mail for notification.

Update doctor: From here admin will able to update doctor information.

5.2 Requirement Analysis

Rich Picture

Rich picture helps to understand the complexity of the environment in which the development intervention is operating, providing a spatial overview of the situation. Below is the rich picture of our system.

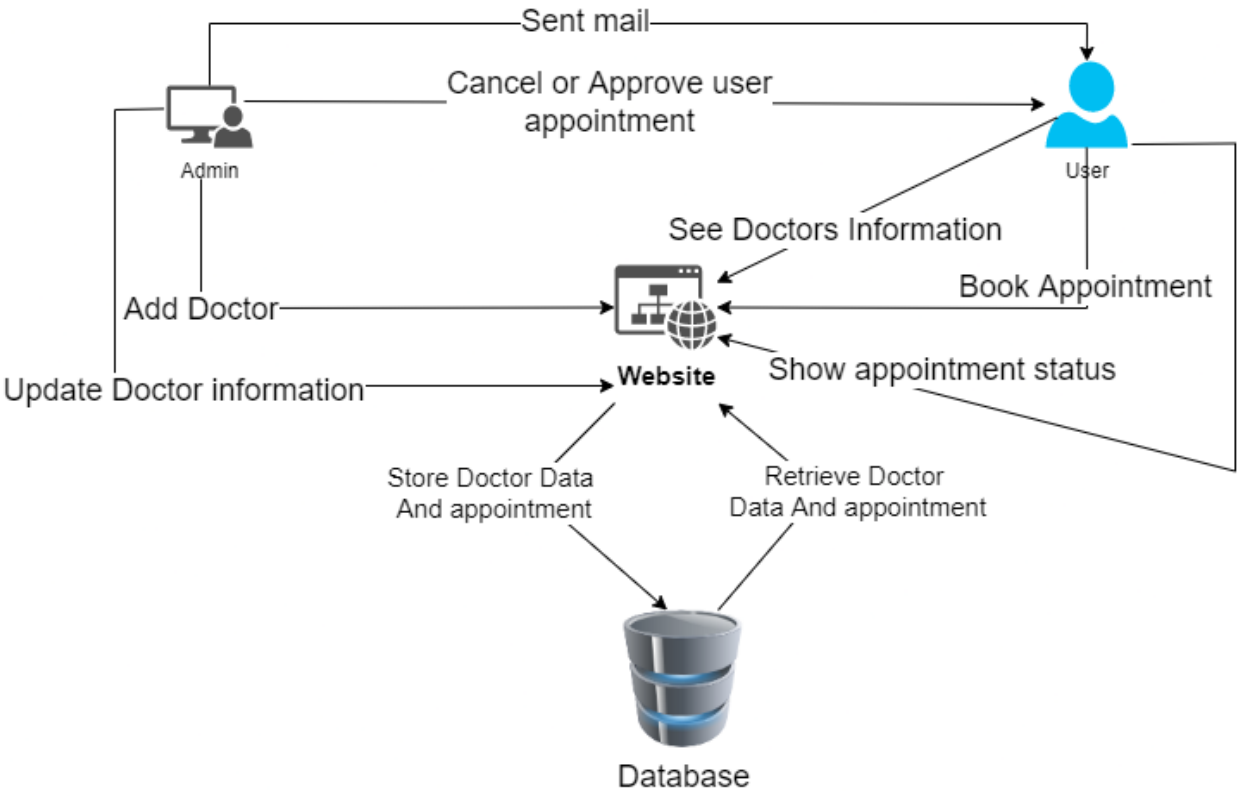


Figure 5.1 : Rich Picture

Functional and Non-Functional Requirements

Functional Requirements: Online hospital management System has the following functional requirements:

Function: Sign-Up		
Input: User Type Email, password.	Process: Save signup information to a database.	Output: A new user has been created and added to the database.
Precondition	Internet access is required.	
Postcondition:	The user receives a confirmation message and is forwarded to the login page.	

Table 5.1 : Functional Requirement Sign-Up

Function: Sign-In		
Input: User Type Email, password.	Process: Compatibility with the Database User group.	Output: Redirected to their dashboard page based on user category.
Precondition	Internet access is required.	
Postcondition:	The user receives a confirmation message and is forwarded to the dashboard page.	

Table 5.2 : Functional Requirement Sign-In

Function: Reset password		
Input: User email address and new password.	Process: Change the old password with the new one.	Output: The database will be updated with the new password.
Precondition	Only administrators may login and add to the system, and they must do it as administrators.	
Postcondition:	A notification of the stored result will be sent.	

Table 5.3 : Functional Requirement Reset Password

Table 5 1:

Function: Take Appointment		
Input: Name, Email, Date, Doctor name, phone number, message.	Process: Take the information and went it to admin.	Output: admin will cancel or approve or cancel appointment and send notification.
Precondition	Internet access is required.	
Postcondition:	The user will be notified immediately	

Table 5 2:

Table 5.4 : Functional Requirement take appointment

Non-Functional Requirements:

The system will have the following non-functional system requirements:

- The system will be very secure as only authorized users is allowed access to the system
- The system will be fast providing users with utmost performance

- The system will be intuitive so that users can easily navigate through the system.
- The system will be responsive and follow the mobile first approach.
- The system will be very reliable with almost zero downtime unless maintenance take place.

It is a process of planning a new business system or replacing an existing system by defining its components or modules to satisfy the specific requirements. Before planning, you need to understand the old system thoroughly and determine how computers can best be used in order to operate efficiently

5.3 System Analysis

5.3.1 Six Element Analysis

Process	System Roles					
	Human	Non-Computer Hardware	Computing Hardware	Software	Database	Communication and Network
Home Page	User, admin	For keeping track of needs and identifying difficulties, use a pen and paper or a pdf.	Desktops, Laptops, Smartphones	Web Browsers, VSCode, Postman, Git, Notepad, Discord: To test the system, notetaking, documentation, and collaboration with team	Mysql	WAN/LAN and Email: For work and communication

Sign-Up Page	Users: Users register with the system. Admins have already been pre-registered in the system.	For keeping track of needs and identifying difficulties, use a pen and paper or a pdf.	Desktops, Laptops, Smartphones	Web Browsers, VSCode, Postman, Git, Notepad, Discord: To test the system, notetaking, documentation, and collaboration with team	Mysql	WAN/LAN and Email: For work and communication
Sign-Up Page	Users: Admin Before users and administrators may utilize the system, they must first log in.	For keeping track of needs and identifying difficulties, use a pen and paper or a pdf.	Desktops, Laptops, Smartphones	Web Browsers, VSCode, Postman, Git, Notepad, Discord: To test the system, notetaking, documentation, and collaboration with team	Mysql	WAN/LAN and Email: For work and communication
Take Appointment	Users: User will fill up necessary information and send an appointment request. Admin: Admin will approve or cancel the appointment request.	For keeping track of needs and identifying difficulties, use a pen and paper or a pdf.	Desktops, Laptops, Smartphones	Web Browsers, VSCode, Postman, Git, Notepad, Discord: To test the system, notetaking, documentation, and collaboration with team	Mysql	WAN/LAN and Email: For work and communication

Add/update doctor Data	Admin: Admin can add new doctor data and update the existing doctor data.	For keeping track of needs and identifying difficulties, use a pen and paper or a pdf.	Desktops, Laptops, Smartphones	Web Browsers, VSCode, Postman, Git, Notepad, Discord: To test the system, notetaking, documentation, and collaboration with team	Mysql	WAN/LAN and Email: For work and communication

Table 5.5 : Six Element Analysis

5.3.2 Feasibility Analysis

Before the onset of the development of "Online hospital management system" a very important preliminary study was done to find out a key outcome, that is, is this project feasible? By conducting a feasibility analysis, it allowed us to create a comprehensive report on what are the strengths, weaknesses, opportunities, and threats for this project.

- **Technical feasibility:** Technically, this project is safe and sound. It does not require any fancy hardware or anything. The system is developed with state-of-the-art web technologies, and because of that, it checks all the system requirements.
- **Legal feasibility:** This system complies with all the laws of cyber-security.
- **Operational feasibility:** With the demand for computers in this pandemic, and also the added shortage of silicon supply, the only feasible option for most of the public is getting second-hand hardware. This system will be able to help people connect with the sellers and vice versa.
- **Economic feasibility:** This system does not excessive moderation. Also, as this project was developed using open-source technology no additional funding was needed for development.

5.3.3 Problem Solution Analysis

While developing the system using established tools and techniques helps us to improve our approach to solving the problems that our team and our organization face. There are four basic steps in solving a problem:

1. Defining the problem.

2. Generating alternatives.
3. Evaluating and selecting alternatives.
4. Implementing solutions. We had encountered some problems that were halting our progress. But we brainstormed and overcame these issues with those four steps. The major problem was the budget of the software was a problem for the software but later some changes took place and minimized a few functions and workload for the software to meet up with the budget.

5.3.4 Effect and Constraints Analysis

Each project has its own set of constraints and risks that must be managed to ensure the project's ultimate success. Project managers have three major constraints: time, scope, and budget. The triangle of project management is often known as the three limits. Extending the project's scope, for example, will almost certainly require more time and money, but shortening the project's timetable can save money while also reducing the scope.

Constraint 1 - Time: In the development of any undertaking, time is vital. All employees in our project worked from home and gave a daily update at the end of the day. As a result, our project stayed on track, and no delays were recorded.

Constraint 2 - Cost: A project's budget includes both fixed and variable costs, such as materials, permits, work, and the financial impact of project team members. The budget was previously approximated because various evaluations for our project had already been completed.

Constraint 3 - Scope: The project's boundaries are defined by its scope. It contains components that the project and the organization must achieve. You'll find not only deliverables in scope, but also procedures for creating them. There was no backtracking in our project because the scopes were defined from the start.

5.4 System Design

It is a process of planning a new business system or replacing an existing system by defining its components or modules to satisfy the specific requirements. Before planning, you need to understand the old system thoroughly and determine how computers can best be used in order to operate efficiently.

5.4.1 UML Diagrams

Use Case Diagrams

A use case diagram is a way to summarize details of a system and the users within that system

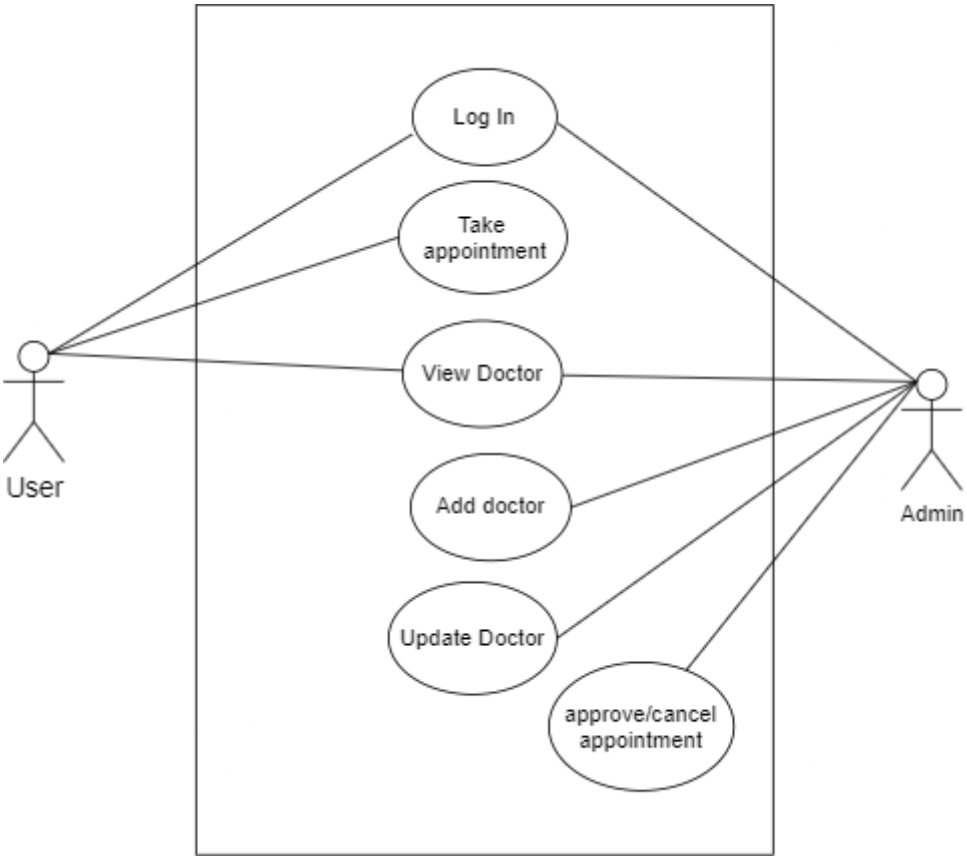


Figure 5.2 : Use case Diagram Admin-User

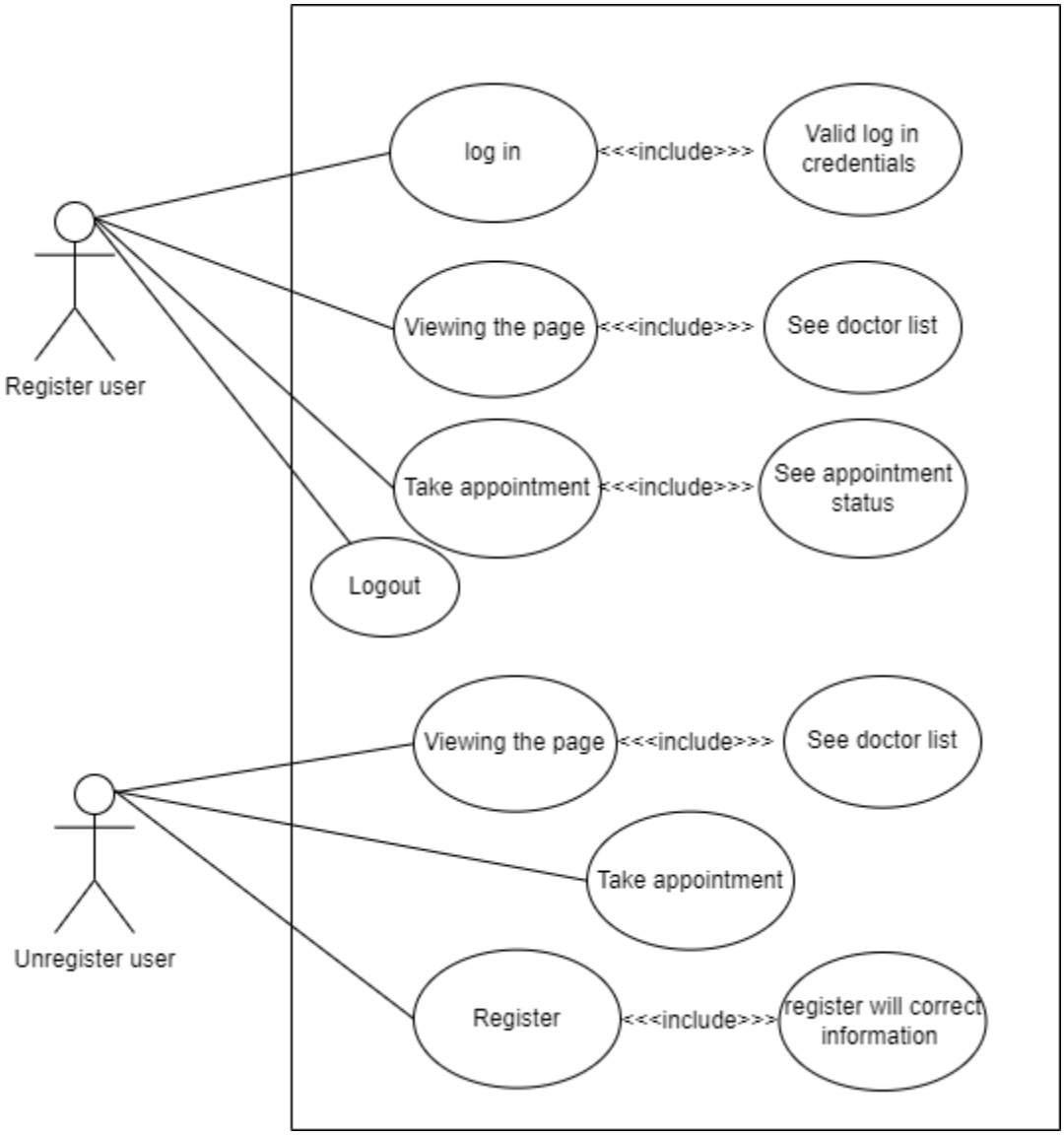


Figure 5.3 : Use case Diagram User

Activity Diagram

Activity diagram is another important diagram in UML to describe the dynamic aspects of the system. Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system. The control is drawn from one operation to another. This ow can be sequential, branched, or concurrent. Activity diagrams deal with all type of ow control by using different elements such as fork, join, etc.

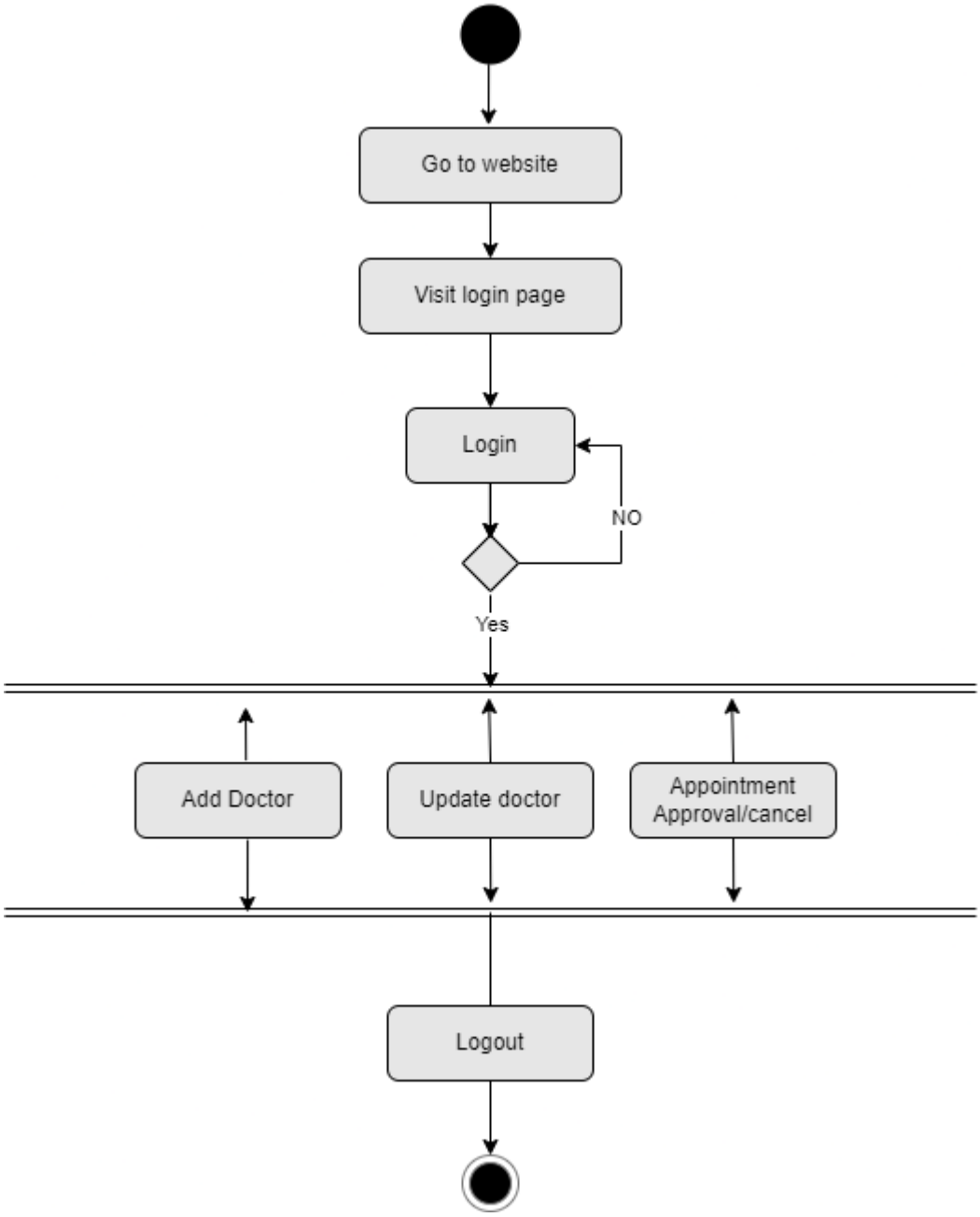


Figure 5.4 : Admin activity Diagram

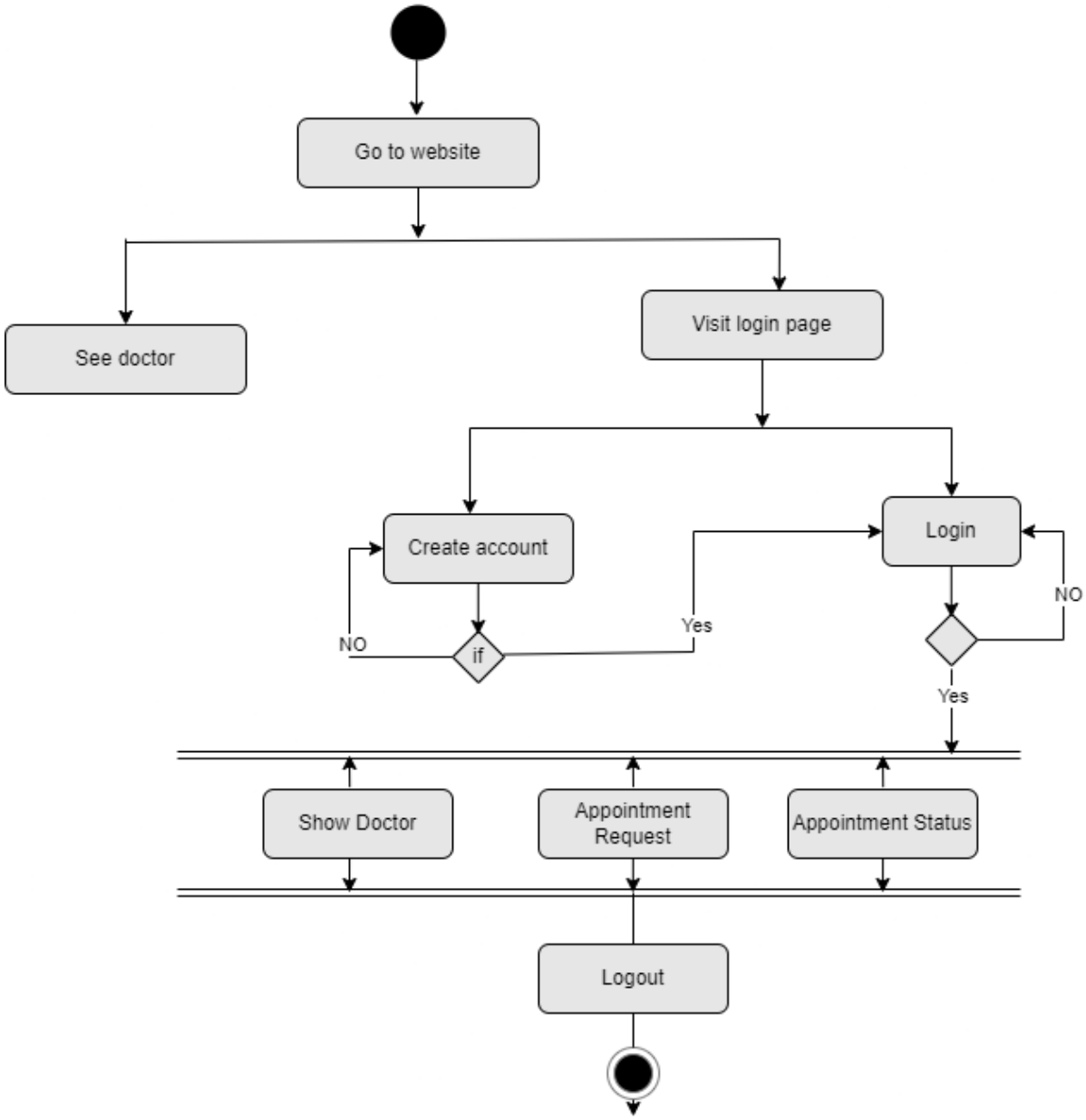


Figure 5.5 : User activity Diagram

Class Diagram:

The class diagram depicts a static view of an application. It represents the types of objects residing in the system and the relationships between them.

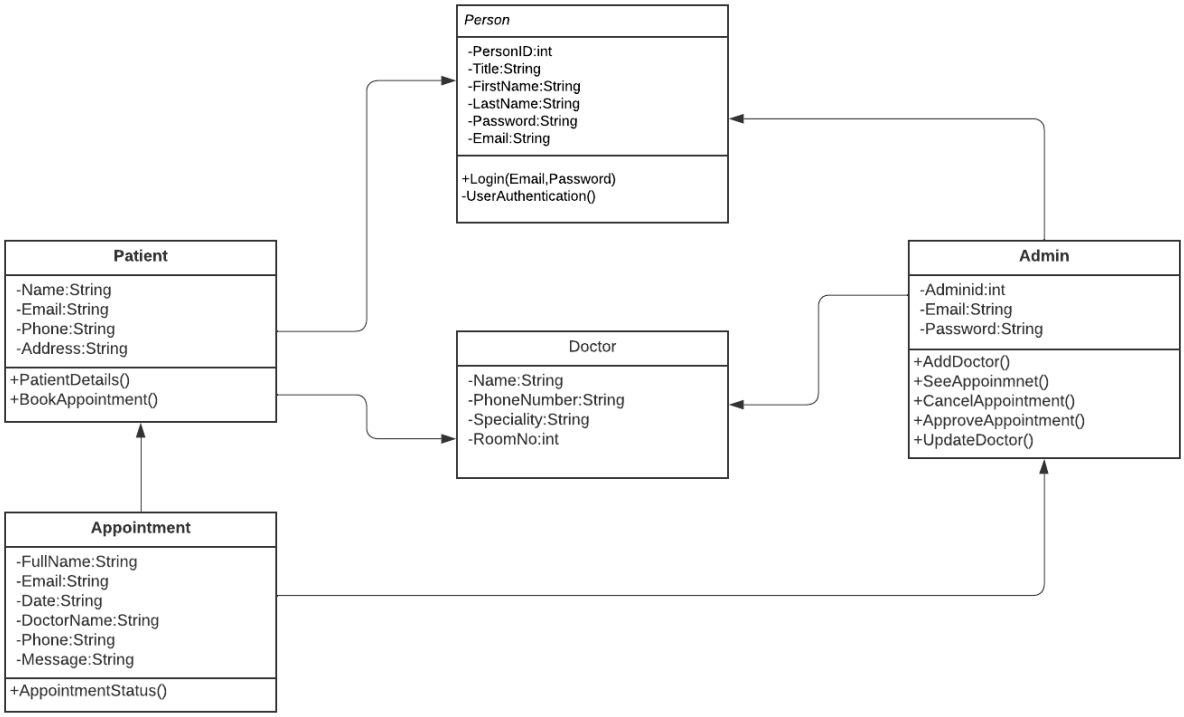


Figure 5.6 : User activity Diagram

5.4.2 Architecture

Architecture serves as a blueprint for a system. It provides an abstraction to manage the system complexity and establish a communication and coordination mechanism among components ` Online hospital management' somewhat follows a three-tier architecture much like the MVT (Model View Template) model. Our Online hospital management solutions are made up of two primary components: Client-side: popularly called: the frontend, where the code is written in with HTML, CSS, Bootstrap, and JavaScript and stored within the browser. It's where user interaction takes place. Server-side: also known as the backend, controls the business logic and responds to HTTP requests. The server-side code is written in PHP Laravel.

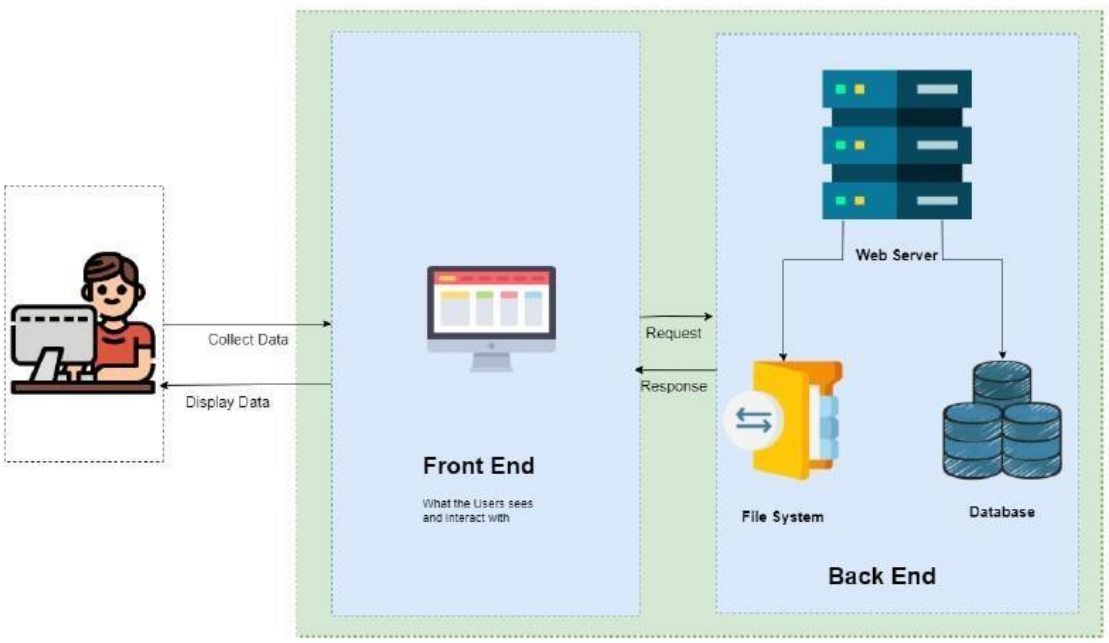


figure 5.1:Architecture of the system

Here the diagram clearly illustrates that user can only see and interact with the front end of the website, the frontend receives the request or commands from the users and transfer it to the web server, which then retrieves and stores data from the file system and database accordingly and sends it back to the frontend for the users as a response.

5.5 Implementation

This is the Landing page of our website

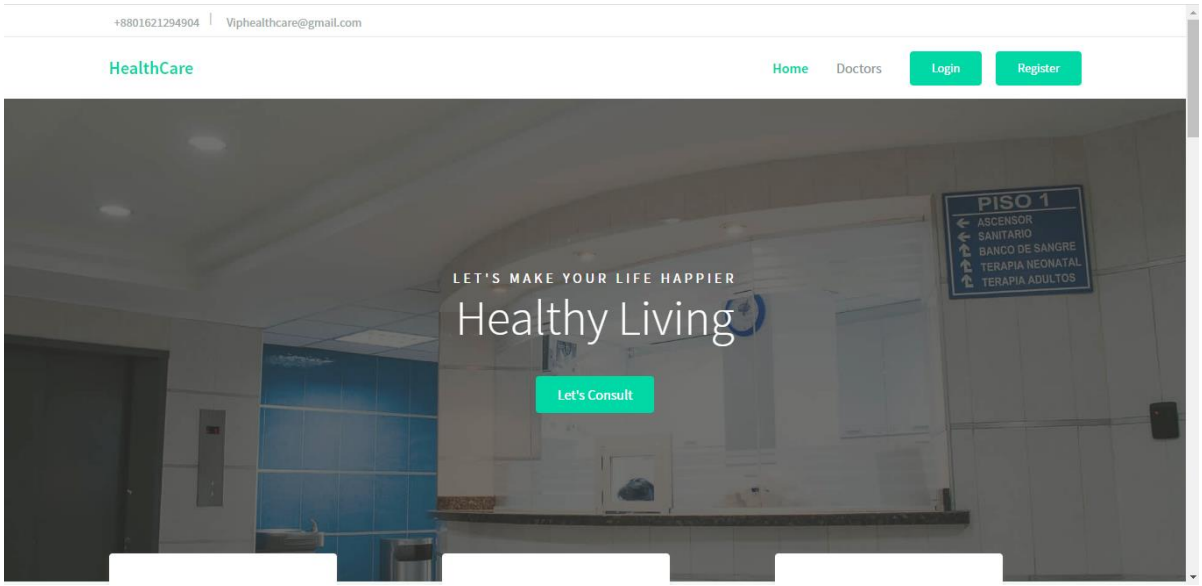


Figure 5.7 : Landing Page

Figure 5.8 : Landing page 2

This is the Doctor section. User can see all the doctors with their specialty

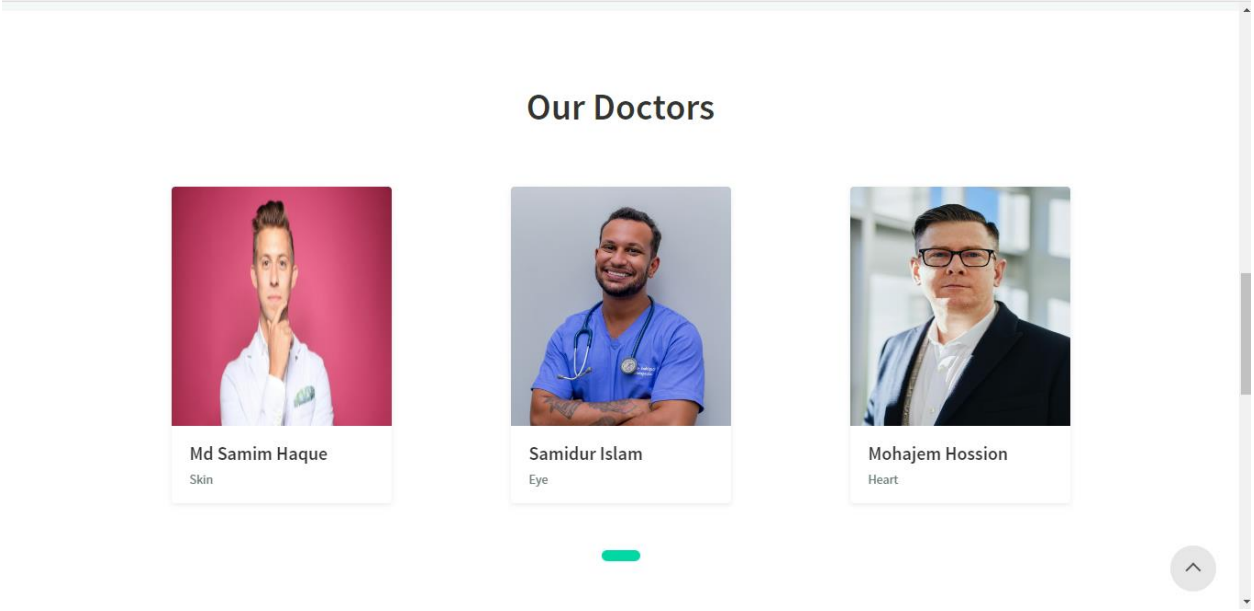


Figure 5.9 : Doctor List

.

This is the appointment section. The user will fill up the information and request for the appointment.

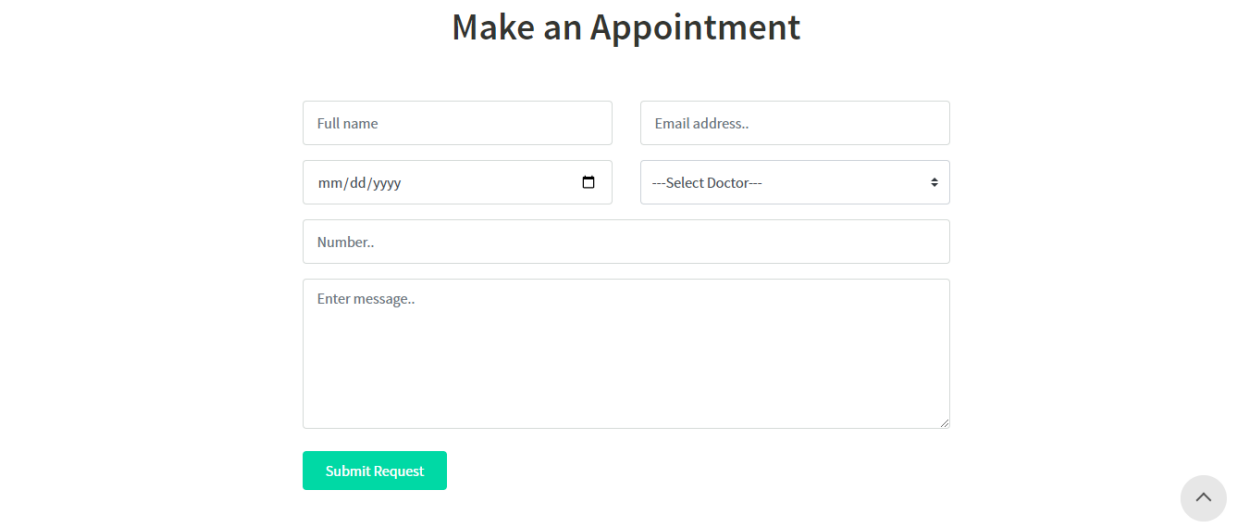


Figure 5.10 : Booking appointment page

This is the Login Page

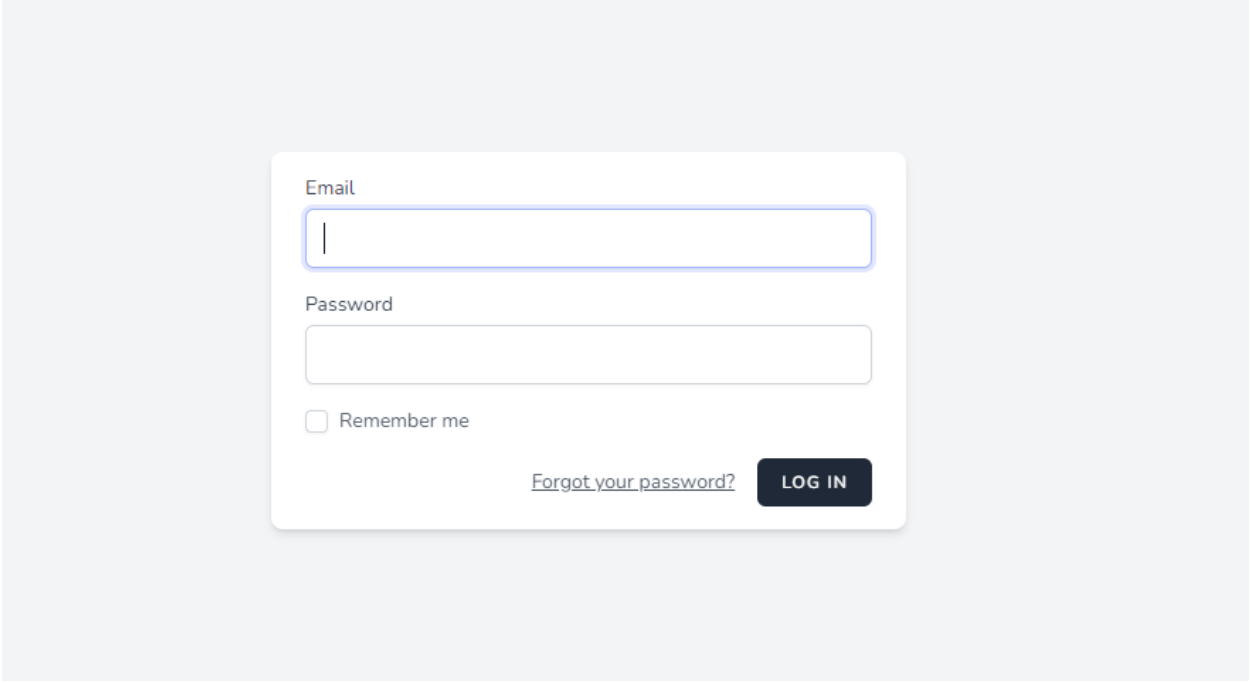


Figure 5.11 : Login page

Forget Password

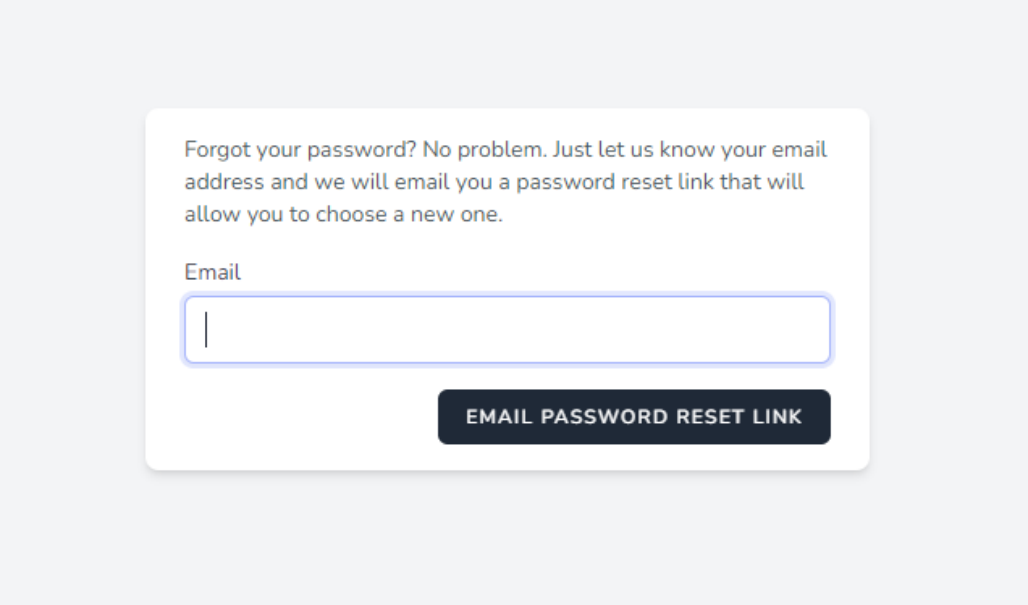


Figure 5.12 : Forget Password

This is the registration page.

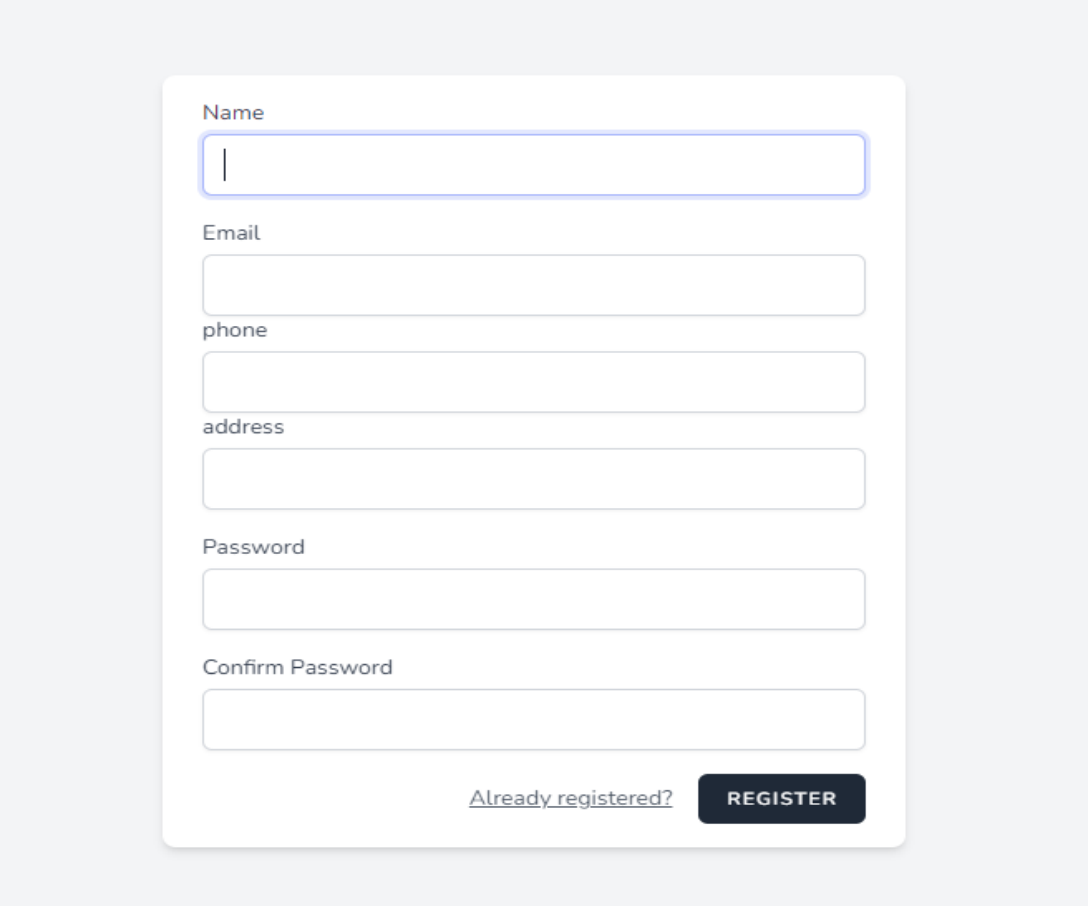


Figure 5.13 : Registration page

Login As User’s homepage

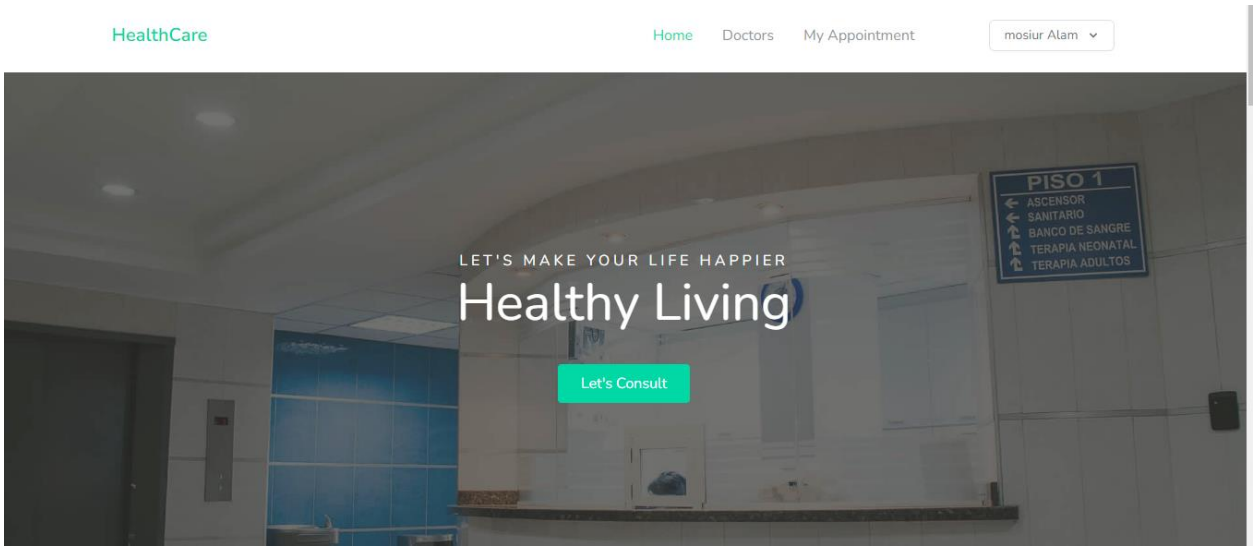


Figure 5.14 : Login As User homepage

This is Appointment section. This option is only specific for logged in user for knowing their appointment status and for canceling it.

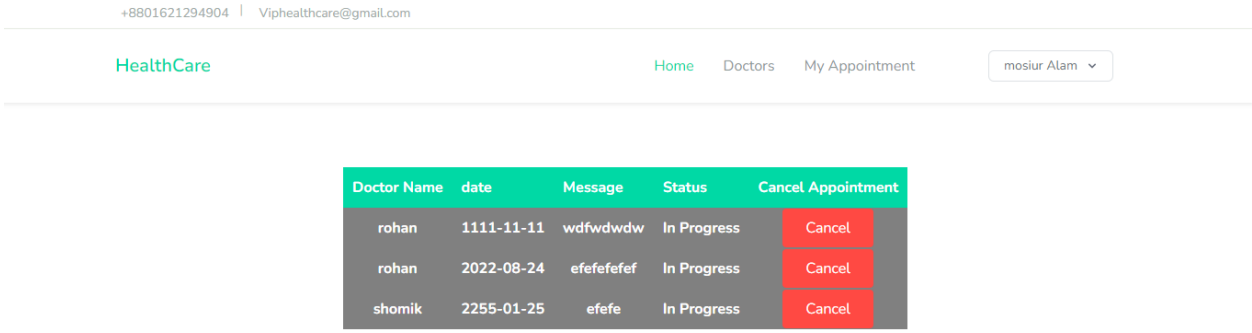


Figure 5.15 : My Appointment

Now let’s see the admin panel:

This is the admin dashboard

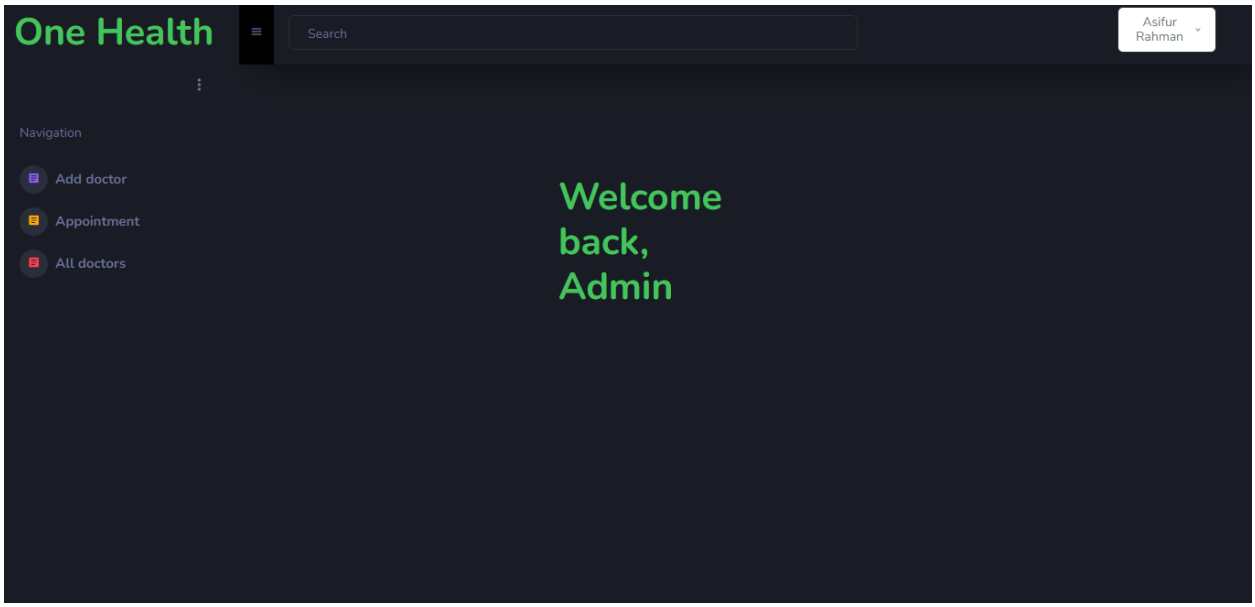


Figure 5.16 : Admin dashboard

From add doctor section admin can add new doctor to the database and display it in the website:

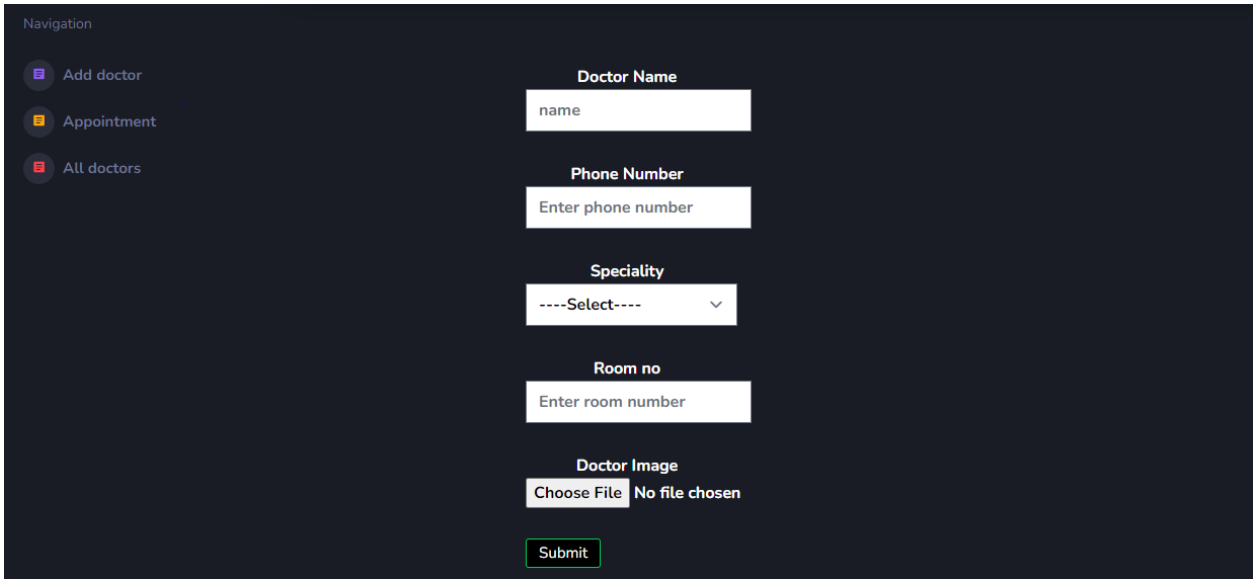


Figure 5.17 : Add Doctor

Appointment section is for Approve and cancel the user appointment

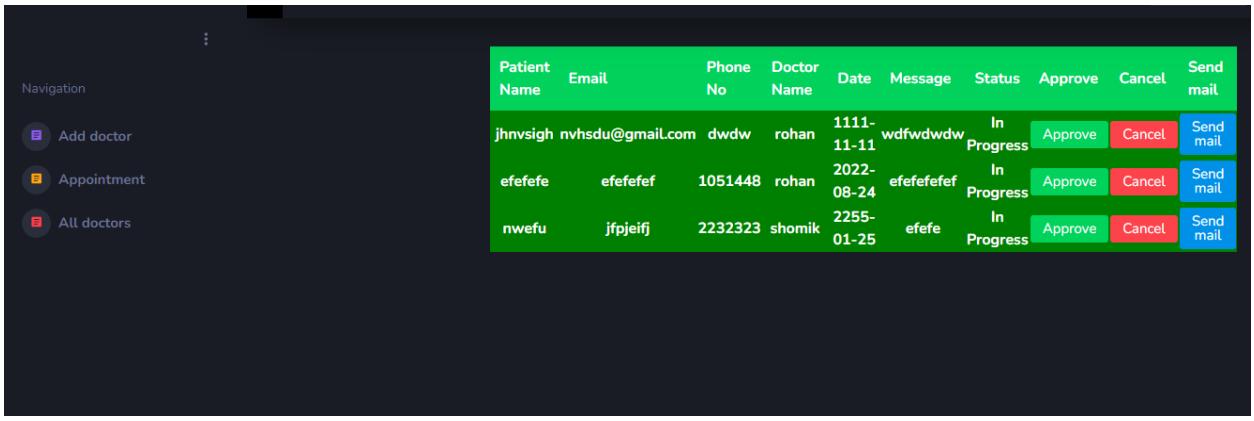


Figure 5.18 : Appointment list

In appointment section there is an option of sent mail, from here admin can sent mail to the specific user

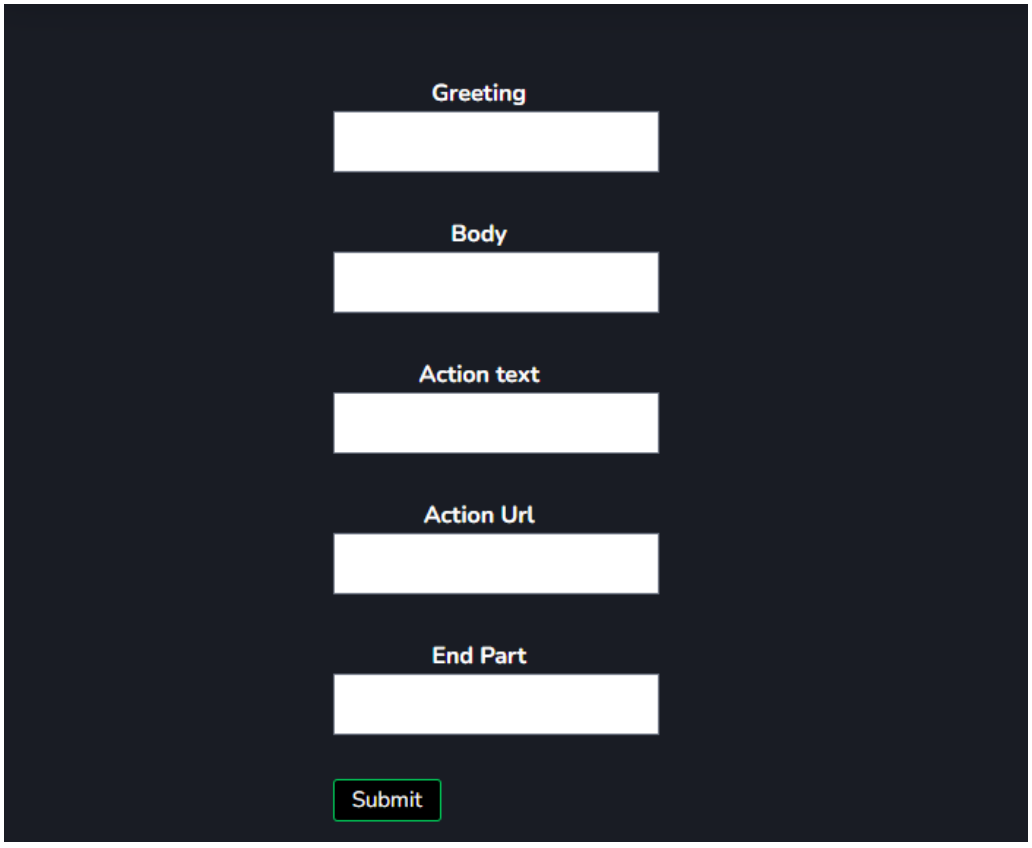


Figure 5.19 : Sending Email

All doctor is for delete or update doctor information from the list.

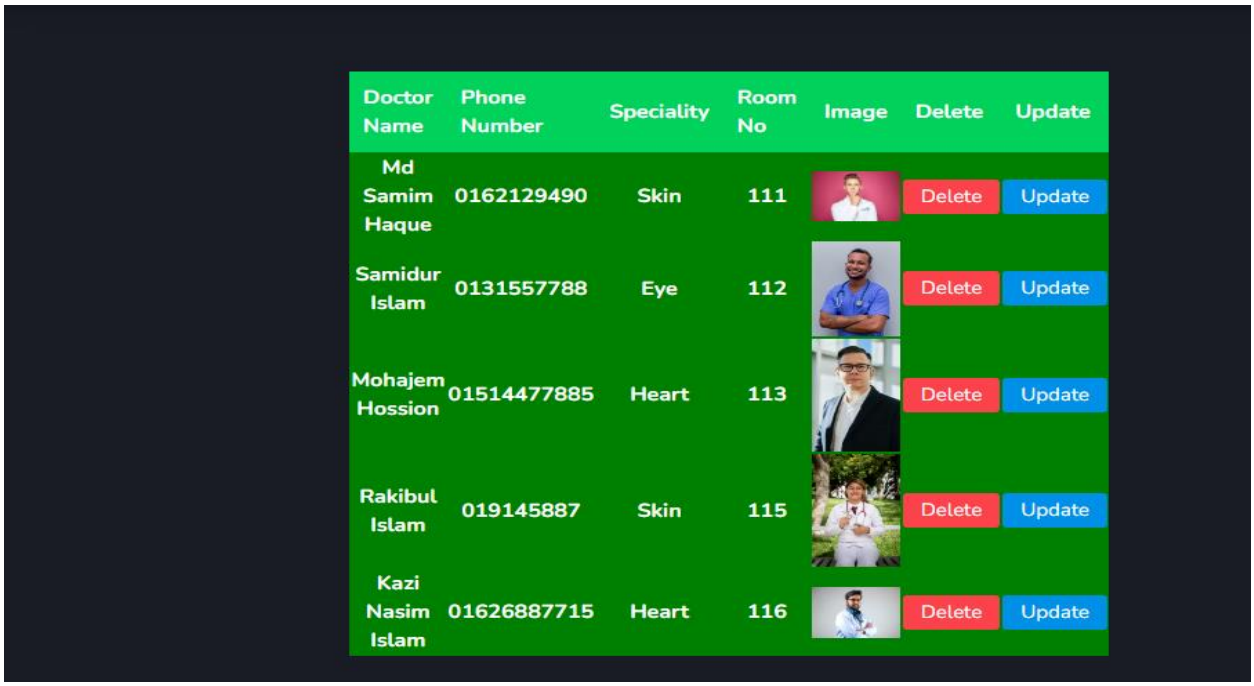


Figure 5.20 : Doctor List

Update doctor is for updating the doctor information

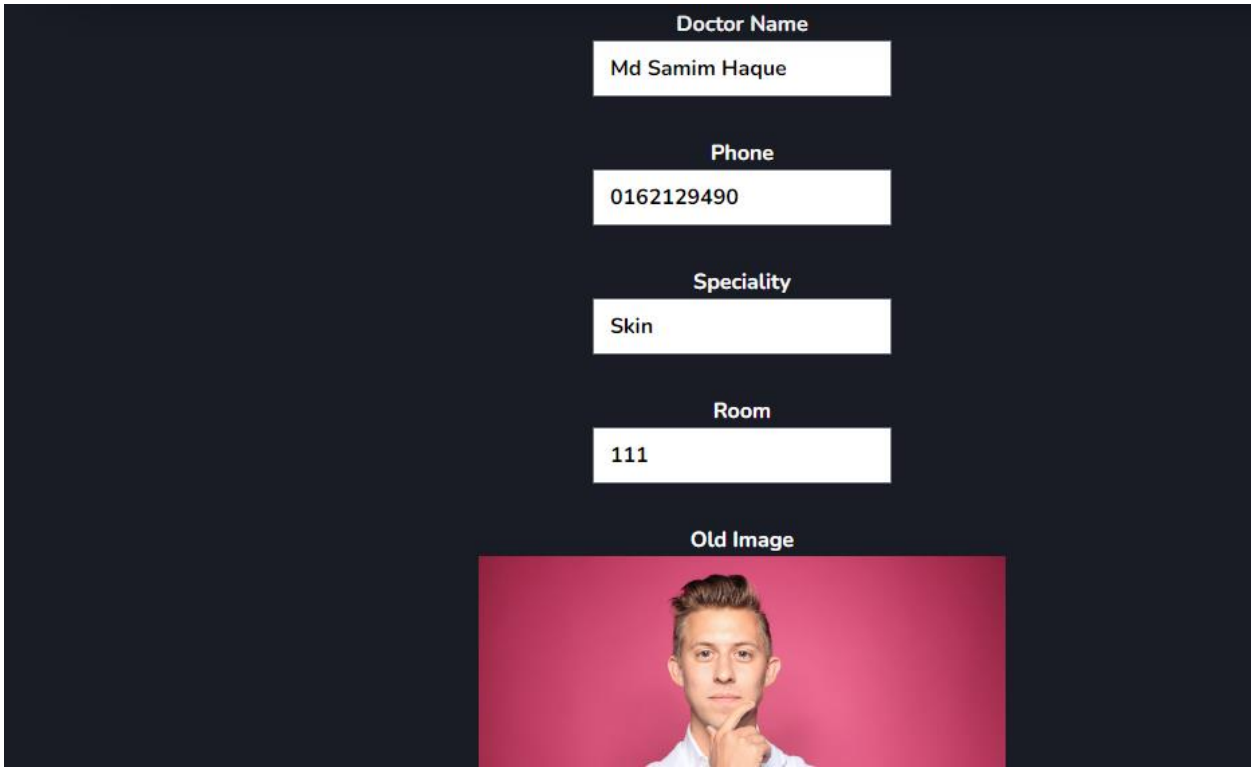
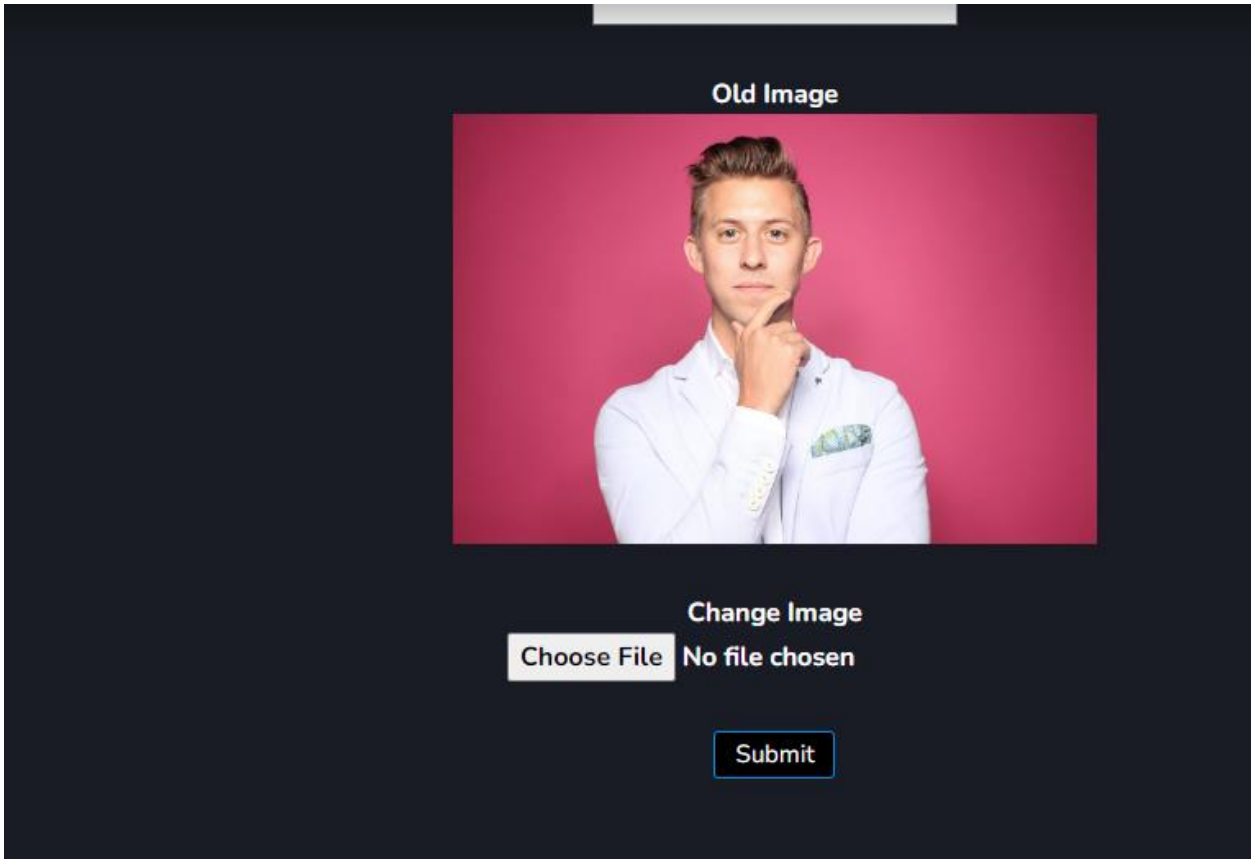


Figure 5.21 : Update Doctor Information



5.6 Testing

Test Case ID	Test Scenario	Test Steps	Prerequire sites	Test Data	Expected/Intended Results	Actual Results	Test Status – Pass/Fail
#Q01a	Login	Enter Valid Email and password in input field and press login button	Already have an account	Email and Password	Redirect to Checkout screen or Account Screen depending from where login is asked	As Expected	Pass
#Q01b	Register	Enter name, email, mobile number and password and press register button	N/A	name, email, mobile number, address and password	Redirect to login screen	As Expected	Pass

#Q01c	Sent appointment request	Give name, Email, date, Doctor, phone And message	N/A	Email, date, Doctor, phone And message	Redirect to homepage and admin can see the request.	As Expected	Pass
#Q01d	Show doctor	Users can see doctor information and admin can add new doctor information	N/A	All the doctors are showing in a slider.	Can get doctor name and specialty from the slider.	As Expected,	Pass
#Q01e	Sending notification to user	Admin have to enter the information that he wants to send.	account needed	Greeting, body, action text, end part	Redirect to that page with success popup.	As Expected	Pass

Table 5.6 : Website Testing Table

Chapter 6

Results & Analysis

The results part should endeavor to recount the findings without attempting to analyze or assess them, as well as give guidance to the research paper's discussion section. The results are given, and the analysis is revealed. The writer outlines what was done with the data discovered in the analysis section. It is necessary to know what the analysis consisted of in order to create the analysis section, although this does not imply that data is required. The analysis should have already been completed before starting the findings section.

Several difficulties arose when testing the application. This was a small problem that we were able to fix. After these issues were resolved, test cases were documented. All test cases have been justified using testing approaches. We conducted our tests on a local server.

6.1 Software Testing

Software testing is a process of determining if the actual software product meets the expected criteria and ensuring that the software product is free of defects. It entails running software/system components through their paces using human or automated techniques to evaluate one or more attributes of interest. The goal of software testing is to find mistakes, gaps, or missing requirements in comparison to the actual requirements. The graph below depicts the outcomes of assignments on which I have worked. Each job is only offered if and only if it successfully fits the requirements.

User:

Test ID	Test Case	Description	Steps to be Executed	Expected Result	Actual Result	Pass/Fail
T1	Register	In order to arrange an appointment, the user must first successfully register.	1. From Navbar users need to go register page 2.Input all the information. 3.Click on Sign In	The data will be saved in the database.	The data will be saved in the database.	pass
T2	Sign In	The user must sign in using their registered email address.	1. From the navbar, navigate to the Login page. 2.Input all the information. 3.Click on Sign In	If the information is located in the database, it will be redirected to the user's/admin's dashboard.	If the information is located in the database, it will be redirected to the user's/ admin's dashboard.	pass
T3	All doctor	All users can see the doctors. This will be shown in the homepage. Anyone Can see this without login	Go to the website and slide down.	The information will be Shown from the database	They will know about the doctor	Pass

T4	Appointment	For getting an appointment the user will request for an appointment.	users need to fill up the form by giving name, Email, date, doctor, phone and message. And submit a request. Users can see the status by clicking the appointment option.	Information will be stored in the database and sent to the admin.	Information will be stored in the database and sent to the admin.	Pass

Table 6.1 : Testing

Admin:

Test ID	Test Case	Description	Steps to be Executed	Expected Result	Actual Result	Pass/Fail
T5	Add doctor	Add doctor's information and show it to the patient.	1. go to add doctor. 2. Fill all the information. 3. Press submit.	Information will be stored in the database with show success notification.	Information will be stored in the database with show success notification.	Pass
T6	Appointment	Approve or decline appointments and send notification to the user.	1. Click on appointment 2. Click approve or cancel appointment 3. Click sent email for sending email to the particular user.	Approve or cancel appointment and save that to database and show the status to user.	Approve or cancel appointment and save that to database and show the status to user.	Pass
T7	All doctor	List of doctors and update the doctor information.	1. Click on all doctor. 2. See doctors list 3. Delete for deleting doctor 4. Update for updating information about the doctor.	Update or delete doctor and the information will save into the database	Update or delete doctor and the information will save into the database	pass

Table 6.2 : Testing

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

Engineering problems usually have more than one solution. It is the aim of the engineer to obtain the best solution possible with the resources available. Engineers are professionally responsible for the safety and performance of their designs. The objective is to solve a given problem with the simplest, safest, most efficient design possible, at the lowest cost. Engineering is obviously one of the applied sciences. The specific activities of the engineer cover a wide spectrum. They range from the role of a pure scientist to that of a sales or applications engineer who has more to do with people-oriented subjects such as psychology and economics.

A product can be sustainable in three main categories:

- **Community Sustainability:** After the development and official release of ` Online hospital management system' it is predicted that it will create a strong user base and from that will emerge a community of users with mutual likeness.
- **Financial Sustainability:** The system aims to be free to use at the early stages. It will generate revenue from targeted ads. As the majority cost of maintenance of ` Online Hospital management system ' will be consisting of domain hosting and database storage cost, running ads on the system will be able to cover the costs at the beginning.
- **Organizational Sustainability:** It relates to how the organization will continue to operate after the release of the application. After the release of an application, usually the organization maintains the application via its current team, an extended team or by a fresh new team. Also, organizations update their project by adding newer features to it and organization may pivot to other projects, expand the teams, create new teams, etc. ` Online Hospital management system has many more features planned to be worked on and released. Since the application has further plans, the project will be maintained and updated after its release as well and release premium services to it. In conclusion, it can be said that the project is organizationally sustainable.

7.2 Social and Environmental Effects and Analysis

Technology is increasing at a very fast pace. To keep with technology, people are in need of computers. Be it schools, work, home or any other aspect in life

Social Effect: In the current situation, safety is the top priority for all service providers who wish to reopen once the restrictions are eased. The risk of COVID-19 is likely to persist for a

long time, so investing in solutions that can help with managing arrival and customer owns can help businesses & organizations to deliver their services while maintaining a high safety standard. In summary, appointment scheduling is important as it ensures the best use of time and maintaining social distance, it will also illustrate to others that you value time.

Environmental Effects: The environmental factors investigated include the variability of service times, the probabilities of no-shows and walk-ins, the number of appointments per session, and the cost ratio of the staff's time to users' time. The effects of these factors are evaluated using a near-optimal rule that already adjusts the appointment times to minimize the negative effects of these factors so that their residual or true effects on total cost performance can be isolated.

7.3 Addressing Ethics and Ethical Issues

Ethics is rooted in the ancient Greek philosophical inquiry of moral life. It refers to a system of principles which can critically change previous considerations about choices and actions. It is said that ethics is the branch of philosophy which deals with the dynamics of decision making concerning what is right and wrong. Scientific research work, as all human activities, is governed by individual, community and social values. Research ethics involve requirements on daily work, the protection of dignity of subjects and the publication of the information in the research. We, as the developers of `Logic software limited ' adhered to all codes of conduct and privacy as we respect user's privacy.

- No Sharing or Selling of User Data: The system will not compromise any user data to any one nor will it allow purchasing of any data.
- Data Security: Only the owner, admin(s) and lead developer of ` Online hospital management system' will have access to the database of the system to limit the chances of data compromise.
- Clean Ads: The advertisement that will be run on ` Online hospital management system ' will be the ones that are clear and clean. No sort of spam, scam or fussy ads will be allowed on the system. Keeping those add relevant and be specific about the system will managed by under advertising policy.
- No discrimination Policy: Apart from certain age restrictions, no one shall be discriminated in ` Online hospital management system '. It does not discriminate any kind of users based on race, sexuality, gender, religion, color, beliefs, political, be it national or international, birth or status.

Chapter 8

Lesson Learned

My time as an intern at `Logic Software Limited 'has been a great eye-opener. I faced multiple challenges which I overcame by brainstorming for a workaround or a solution to those problems.

8.1 Problems Faced During this Period

Apart from all these, I have faced lots of challenges while working on this Project. Some of these are listed below

- **Work Environment:** I faced some difficulties at work too. I had to be punctual and attend daily meetings. There were rules and regulations that were to be strictly maintained and I had to make sure that I followed them properly. I had to get myself familiar with their work culture in a very short period of time. The concept of a full-stack web application was new to me, and on top of that, I had to learn a completely new library of JavaScript, i.e., Bootstrap and for back end Laravel.
- **Adapting to New Technologies:** Since this was the first time, I have ever worked on a web application in an office environment I had to learn and adapt to new technologies of the company. Although acquiring the skill set was possible it became hard to apply them in real life situations.
- **Identifying and Fixing Bugs:** Often there were bugs which were very hard to find, and even after they have been found it became a big problem to fix it. There were bugs that were so difficult to deal with that it would take a whole week to fix it.

8.2 Solution of those Problems

The last 4 years as an undergraduate student has taught me valuable lessons. Which helped me to find most of the solutions of this problem. Solution for those problems is listed below:

- **Work Environment:** From the university lessons, I learned the crucial ability of time management. Because of this, I was able to adjust appropriate time for myself so that I can meet the strict deadlines and also study for my other courses.

- **Adapting to New Technologies:** In the beginning it was a difficult situation for me to adopt with new technologies. But after some days I habituate with the entire process by the help of my supervisor and support of web developer team.

- **Identifying and Fixing Bugs**: Most of the time I take help from online platform "Stack overflow" and a senior developer helped me to fix some issues. I issue that I cannot solve was fixed by another approach, for that I had to rewrite my code.

Chapter 9

Future Work & Conclusion

9.1 Future Works

The `Online hospital management system' is still under development. Some Features still need to be polished before it can be developed. “Online hospital management system” is the first version of the system. It has many sides for improvement.

Some of them are:

- A Mobile App Version of this project.
- Giving doctor’s salary.
- Add live chat system.
- Improve the existing system.

9.2 Conclusion

One of the prime reasons that online scheduling is gaining popularity in recent days is that, the system provides an easier facility to the general users. This paper has proposed an online scheduling system built on the web service architecture. The web service architecture would provide an appropriate paradigm for developing this scheduling and visitor management system. This system integer’s technology of bootstrap and Laravel. This system is design to achieved maximum user satisfaction. I got a first-hand experience of what it is like to work in a professional environment. I learned state of the art technology in web development like Laravel. I always had an interest in becoming a full-stack engineer. Working on such an exciting project like ` Online hospital management system ' boosted my self-confidence. I also learned how to collaborate with other software engineers, and consequently improved my inter-personal skills such as communication, teamwork, edibility, working calmly under pressure and how to maintain a rapport with my co-workers. I am very grateful for an experience like this. I feel like working and applying my skills in actual development is really rewarding and self-satisfying.

In conclusion, I would like to thank both my supervisors whose guidance and encouragement Persuaded me to strive for the success in this project and for the endless project to come in my way in future.

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An Undergraduate Internship/Project on Web Based Hospital Management System

By

Asifur Rahman
Student ID: **1720105**

Summer, 2022

Consent Form

The student modified the internship final report as per the recommendations made by his/her academic supervisor and/or panel members during final viva, and the department can use this version for archiving.

(Signature of the Supervisor)

Raihan Bin Rafique
Department of Computer Science & Engineering
Independent University, Bangladesh