"Hospital Management System" at Technocare Orbit Ltd.

By

Md. Nazmul Hadi

Student ID: **1821675**

Autumn, 2021

Supervisor:

MS Moumita Asad

Lecturer

Department of Computer Science & Engineering

Independent University, Bangladesh

December 20, 2021

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

Department of Computer Science & Engineering

Independent University, Bangladesh

Attestation

This is to certify that the report titled Hospital Management System is completed by me, Md. Nazmul Hadi (1821675), submitted in partial fulfillment of the requirement for the Degree of Computer Science and Engineering from Independent University, Bangladesh (IUB). It has been completed under the guidance of Ms. Moumita Asad miss (Supervisor). I also certify that all my work is original which I have learned during my internship. All the sources of information used in this project and report has been duly acknowledged in it.

Signature

Date

Md. Nazmul Hadi

Name

Acknowledgement

First of all, I would like to thank Almighty Allah for his grace.

I would like to express my gratitude to the Faculty of Computer Science and Engineering department to keep internship credit in the curriculum of the graduation program and give me a scope of tasting the flavor of industry-oriented tasks and the field of work with my interest. I would like to thank specially and heartily to my supervisor, **Ms. Moumita Asad**, Lecturer, Department of Computer Science and Engineering, Independent University, Bangladesh, who encouraged and directed me with her continuous guidance, invaluable instructions, stimulating suggestions and thoughtful advice during pursuing this internship and preparation of this report.

I am also thankful to my group leader **Siful Islam Tuhin,** Developer at Technocare Orbit Ltd. He helps me with his kindness, support, guidance, instructions and advice as well as motivating me to do the internship. I am very proud and gratified that I was working under his supervision.

I am also indebted to the employees of the Technocare Orbit Ltd and also my office supervisor, **Mohammad Shafi Iqbal** sir, CEO, Technocare Orbit Ltd who gave me immense support while working. He always helped me and supported me in my work. I didn't feel that I was new in that office and this was my first industrial work experience.

Lastly, I would like to thank my family members for their eternal support given to me.

Letter of Transmittal

Ms. Moumita Asad

Lecturer

Department of Computer Science and Engineering

School of Engineering and Computer Science

Subject: **Submission of Internship Report for the completion of Graduation.**

Dear Madam,

I am hereby submitting my Internship Report, which is a part of the Bachelor Program in Computer Science and Engineering curriculum. It is a great achievement to work under your active supervision. This report is based on, “Internship at Technocare Orbit Ltd.”. I have got the opportunity to work at Technocare Orbit Ltd. for three months, under the supervision of Siful Islam Tuhin, Lead Developer at Technocare Orbit Ltd. This internship has given me both academic and practical exposures. The internship has given me the opportunity to develop a network with the corporate environment. I tried to make this report as much informative as possible with the experience I have gained during my internship period. In order to prepare a well-organized internship report, I have followed the guidelines and described the required fields with sufficient details. I, however sincerely believe that this report will serve the purpose of my internship program. I shall be highly obliged if you are kind enough to receive this report and provide your valuable judgement. It would be my immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely yours,

Md. Nazmul Hadi

ID: 1821675

Department of Computer Science and Engineering

Independent University Bangladesh

Evaluation Committee

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Signature

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Name

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Supervisor

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Internal Examiner

Abstract

Internship is described as gaining practical experience from a variety of companies in order to establish a link between theoretical and practical knowledge. It is critical since it is the first time a student would gain in-depth practical information from various organizations.

When I was offered an internship at Technocare Orbit Ltd., I got the chance to work with a developer team and I learn a lot from them. Our project's goal was to create a system for Technocare Orbit Ltd. named "Hospital Management System (HMS)". This report will cover the whole project that I learned about throughout my internship.

I had to learn new things before starting the project. First of all, it was a group project. I was assigned to develop the landing page and admin panel of this project.

I have detailed the information and experiences that I have gained and the work I have done during my intern, in this report.

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Chapter 01

INTRODUCTION

The Department of Computer Science & Engineering (CSE) at IUB, under the School of Engineering and Computer Science (SECS), is one of the most dynamic and versatile departments in the university. The vision of our department is to become a prominent Computer Science and Engineering program that produces competent graduates with research and innovation skills who will contribute to the technology-led vision of our country – Digital Bangladesh, as well as to the emerging imperatives of globalization.[1] Our department offers Senior project and Internship. I decide to take internship. An internship gives Computer Science majors the opportunity to apply their classroom learning in a real-world industry setting. Hands on experience gives students valuable insight into their own abilities and interests, and allows them to explore their career options. I worked at a software firm named "Technocare Orbit Ltd" where I have completed 3 months of my internship period. In this report I have discussed my internship period at this company and overview of the work that I have done during this period.

1.1 Overview/ Background of the Work

I was doing my internship as a frontend developer on a software farm named Technocare Orbit Ltd. As a frontend developer I had to work with my team and developed a system named Hospital Management System (HMS).

Our human body is very complex and structured with millions of functions. It is very important to keep our body fit and get a well treatment. Without proper treatment, our human body cannot be worked properly. So, we need better treatment. There are many hospitals in our country and many of them have online based system. The primary target of this Hospital Management System (HMS) is to make hospital experience better than we currently have. Actually, hospital is a place where no-one willingly wants to visit but we need to go. There are lots problem in the management system. Patient cannot find the exact doctor for his/her treatment. Many of the patient cannot understand the system.

Actually, we know there are many hospitals management system software in various hospitals in our country. They have great features to help the hospital but many of them does not allow the patients to manage their own data. Our motive is to build a system where patient also can manage their data, follow the progress report, find out the exact doctor that they need and take their appointment also.

We are trying to create a user-friendly system so that everyone can easily this system. There are no such things that comes out without any limitations but we focused to overcome the problem with a better solution and trying to give our best we could do.

1.2 Objectives

The main purpose of our system is to make the system user-friendly and develop the system with an oriented look. The information and progress report of any patient will be kept very confidentially. This system provides the ability to manage all the paperwork in one place and keep tracking the progress report. This system can reduce the work of the staffs in arranging the analyzing the files. Actually, HMS does many works like:

• Maintain the medical reports of the patient

• Keep tracking the appointment dates

• Doctors can track their patient's report from outside the hospital with this system

• Patient can track their progress report and bill payments as well as the management can also track.

• This system can maintain the contact details of the patient

• Patient can take appointments through online

1.3 Scopes

The primary goal of our project is to develop a system that covers all the possible aspects of hospital management. We are trying to implement a system that can track all the information of the patient and doctors. Also keep tracking the appointment procedure and so on. So, there are some modules. Such as,

- **Patient module:** In this module, patient can register to the system and get their user id and password. Then patient can take online appointments. They can keep tracking their appointment dates and times. They also can see their progress report with this system. In this module, patient can see their bill payments etc.

- **Appointment module:** In this module, hospital staff can handle the daily patient appointment for the consultancy for a particular time and a particular doctor. Patient can also take the appointment.

- **Doctor module:** Doctor can create their own account through the authority and get their user id and password. So, the doctor can also their patient list on that particular time. They also can see the patient progress report outside the hospital.

- **Progress Report module:** This module deals with the activities and keep tracking the prescription and test report. It also helps to track the time.

- **Billing module:** This module will track the bill of the patient that have to be paid in the hospital. Such as, doctors charge, room bill, medicine bill, test bill, service charge, nursing bill, operation bill etc.

- **Dashboard module:** Here we can see the homepage of the system. The doctor lists, any notice regarding the management or something else

Chapter 02

LITERATURE REVIEW

A literature review is a thorough summary of prior research on a particular subject. The literature review examines academic papers, books, and other materials that are pertinent to a certain study topic. In other words, the purpose of a literature review is to place the present work in perspective with the rest of the relevant literature. In this instance, the review normally comes before the work's methods and outcomes sections.

2.1 Relationship with Undergraduate Studies

Knowledge and skills gained from undergraduate courses have helped in the development of "Hospital Management System" project. It would have proven more difficult if these courses were not covered before working on this project. Some of the courses are:

Object Oriented Programming, CSE213+L: This is our first object-oriented programming course. We learned here total OOP concept with the programming language JAVA. But in our project, we are using C#. But main fact is that the structure and main concept of OOP is same in every programming language.

Database Management, CSE303+L: This is the course where we learned about database in detail. In this course, we learned how to connect a server with database and how it works also we learned MySQL and Querry. In our project, we need this concept to connect with a server and keeping safe the data in a database.

System Analysis and Design, CSE307: In system analysis and design, we learned in detail with a system. We learned the paperwork about Business Requirement Document (BRD), System Requirement Specification (SRS), Software Design Document (SDD). So, this course will help us to complete this project. Without analyzing a system, we can't move forward as well as without any proper design of any project what should we do.

Web Application & Internet, CSE309 & MIS455: Fortunately, I had done this course twice. As it was my departmental course and also It was my minor course. In this course we learned about HTML, CSS, BOOTSTRAP(Framework), JAVASCRIPT. In this project, I am working as a frontend developer.

Software Engineering, CSE451: Basically, in software engineering, we learned about a systematic approach to develop a software. We also learned some methodology, how to create WBS etc. and so many. So, this is really helpful for us to complete this project within a proper guideline.

2.2 Related Works

Hospital Management System (HMS) is designed for multispecialty hospitals, to cover a wide range of hospital administration and management processes of patient-centric system. It is an integrated end-to-end Hospital Management System that provides relevant information across the hospital to support effective decision making for patient care (medical records management and billings), and hospital administration, in a seamless flow.

There are many problems like as data redundancy, data inconsistency, difficulty in accessing data, data isolation, integrity problems, atomicity problem, concurrent access anomalies, and some security problems. Many of them cited among others which pinpointed at techniques behind Database Management technologies, and thus overcome the existing challenges. The system is visualized as a web-based application. Recently they are using a mobile application. This architecture provides an increased degree of security because its multiple zones isolate protected healthcare data making it difficult for a hacker to get system-level access to the database. But there are some websites those are actually good. Such as:

- DocTime: DocTime is an online medical service application. It has both web and mobile versions and Laravel framework is used for this system.

- Clinic Management System: Basically, they suggest patient to immediate treatment that we can say primary treatment. This app is developed by .Net framework.

- BdCare: Bdcare is the first and largest innovative online healthcare startup, built with a mission to create a “one-stop” healthcare platform for Doctors and Patients. It has both web and mobile versions, and in the web version, the website was built by using a framework.

Chapter 03

PROJECT MANAGEMENT & FINANCING

3.1 Work Breakdown Structure

Work Breakdown Structure (WBS) is hierarchical structure which demonstrates a project into some smaller segments. For our project, we have a group of front-end and back-end developer. For that reason, we have created a WBS so that our work is coordinated. In this work breakdown, we try to cover a visual of all the possible scopes, risks, costs, responsibilities and points of communication and stakeholders and project manager so that we don't want to waste and skip any essential requirements. For brainstorming and collaboration, WBS is the most important tool for working in a team.

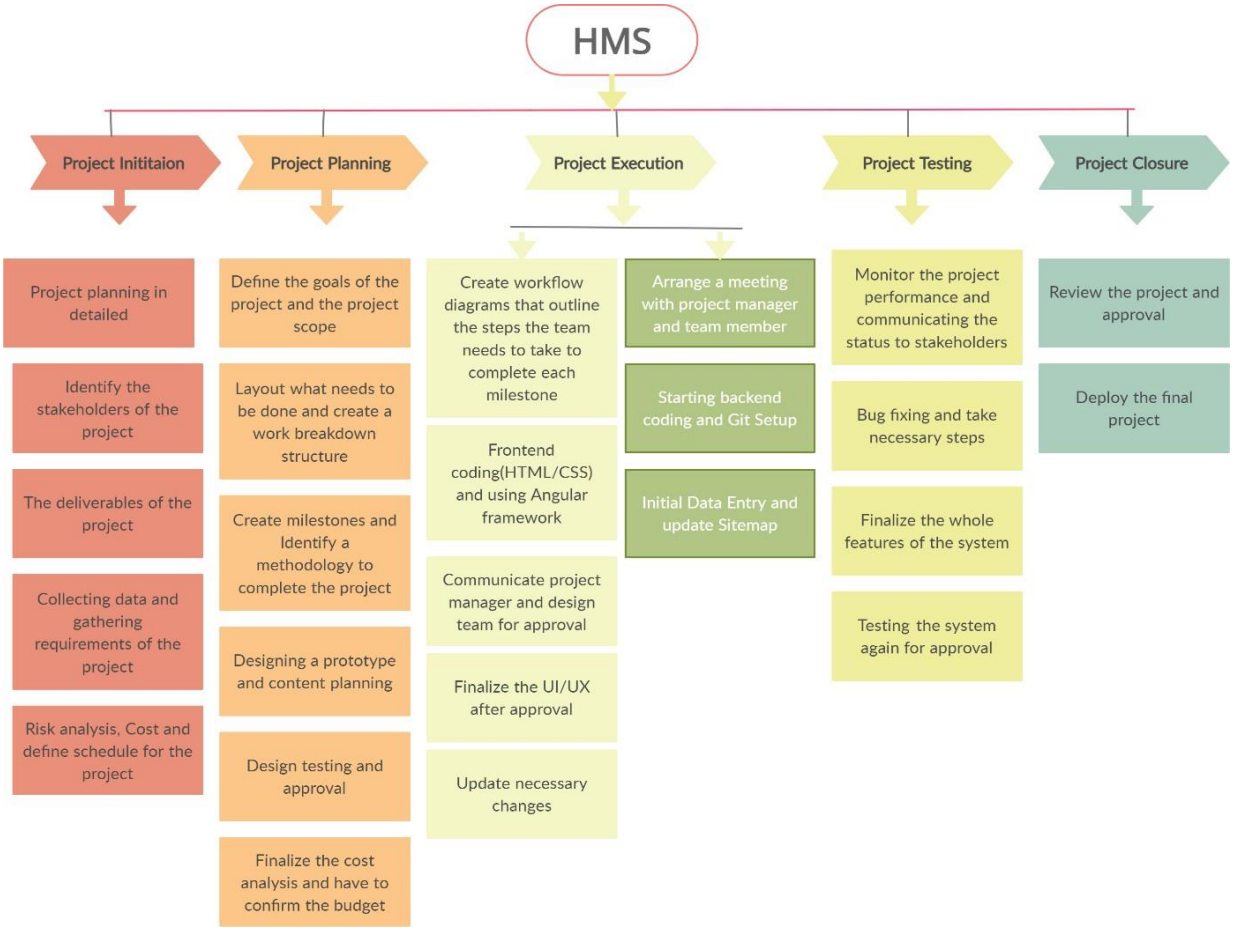
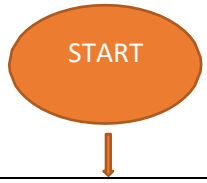


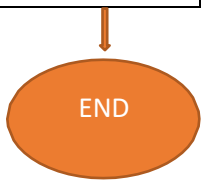
Fig 3.1: Work Breakdown Structure for HMS

3.2 Process/Activity wise Time Distribution

The estimated time required to end a project successfully defines process wise time distribution. This helps the developers in creating a mind map of how quickly they must work to fulfill the deadlines. Time management are the most difficult aspects of properly building an application. As a result, the content must be fixed first and foremost, and development must be based on that context. Time management is the process of planning and regulating how much time is spent on certain tasks. Good time management allows people to accomplish more in less time, decreases stress, and promotes professional success. To accomplish any project, time management is essential.



Task	Task Name	Date to Start	Date to Complete
Task 1	Project Initiation	10/2/2021	10/14/2021
Task 2	Project Planning	10/14/2021	11/2/2021
Task 3	Project Execution	11/2/2021	12/2/2021
Task 4	Project Testing	12/2/2021	12/14/2021
Task 5	Project Closure	12/14/2021	12/27/2021



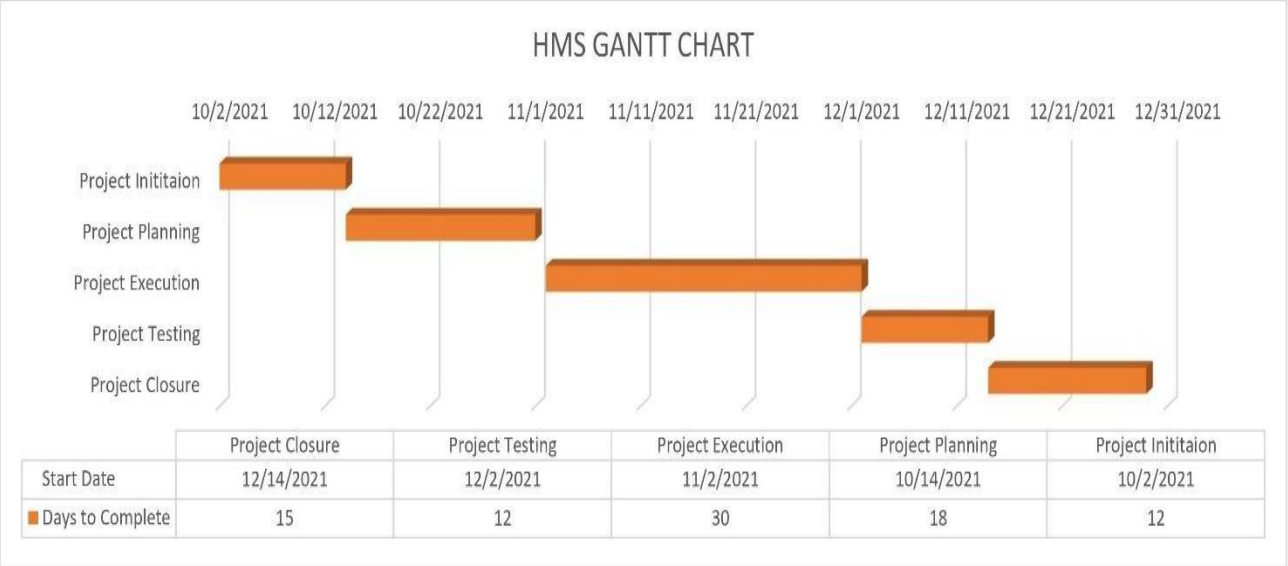
Here, we need 12 days to project initiation. That means project planning and gathering requirements, cost analysis and risk analysis, time scheduling etc. Then we need 18days to project planning. Project planning is the most important part for developing a project. In this part, we need to create work breakdown, setting up the milestone, designing a prototype and have to approve the project to develop. Then comes the body of the project. 30 days to take develop the body of the project. We need to work in front-end and back-end coding and develop the whole project. After developing the system, we need to test the system and fix the bug with finalize the whole features. It takes 12days approximately. Then finally the project closure will take 15days to finalize the project and deploy the final system to the customer. So, 34% of the time will take for the body part.

Fig 3.2: Pie-chart for Activity Wise Time Distribution

3.3 Gantt Chart

A Gantt chart is a project management tool assisting in the planning and scheduling of projects of all sizes, although they are particularly useful for simplifying complex projects. Project management timelines and tasks are converted into a horizontal bar chart, showing start and end dates, as well as dependencies, scheduling and deadlines, including how much of the task is completed per stage and who is the task owner. This is useful to keep tasks on track when there is a large team and multiple stakeholders when the scope changes. [2]

We have focused the Gantt charts for Hospital Management System in the following:



	Project Closure	Project Testing	Project Execution	Project Planning	Project Inititaion
Start Date	12/14/2021	12/2/2021	11/2/2021	10/14/2021	10/2/2021
Days to Complete	15	12	30	18	12

Fig 3.3: Gantt Chart for HMS

In this Gantt Chart, we divided our work in 5 steps. Project Initiation, project planning, project execution, project testing and project closure. Here, we start our work from the beginning of the October in 2021 and approximate time to finish the project 27th December of 2021.

3.4 Process/ Activity wise Resource Allocation

Resource allocation is the process of assigning assets in a manner that supports team's achievements. For this project, we need total 87 days for completing the whole system. So, the developers have assigned into many small tasks during this time to complete the system. We need to focus on our deadline for the particular task.

Following are the details of every task of the project:

- ✓ **Project Initiation:** The CEO of our company discuss the planning of the project in front of us. During this project initiation, the CEO and the developers identified the stakeholders of the project. The developers collected and gathered the requirements. In mean time, we had to calculate the risk analysis, cost analysis and fix the schedule of the project. It took total 12days and about 14% work was done from the whole project.

- ✓ **Project Planning:** In project planning, 18days are needed to planning the project goals, scops and creating the work breakdown. In this period, we needed to design a UI/UX design to approve the project. In mean time, we needed to set a methodology and created milestones. After approving the project, we needed to finalize the cost analysis and confirm the budget for the whole project. About 21% work was done from the whole project.

- ✓ **Project Execution/Coding:** This is the main part of the project. In this part, we created the workflow diagrams that outline the steps the team needs to take to complete each milestone. We needed to finalize the front-end UI/UX by using HTML, CSS and Angular framework. Basically, in this part, developers started coding for the system. Both front-end and back-end code were done within 4 weeks.

- ✓ **Project Testing:** Testing started as soon as the features were added to the system. Developers were testing the system continuously so that they could fix all the bug in the system and would able to finalized the system with adding whole of the features. It took 12 days.

- ✓ **Project Closure/Deployment:** Reviewed the whole project. Before deploying the final project, a Virtual Private Server and a domain needed to buy. And discussed with the stakeholders and the project manager about the system and finally the system launched. It takes 15days almost.

Table 3.1: Table for Activity Wise Resource Allocation

Activity Wise Resource Allocation		
Activity	**Days**	**Work Percentage**
Project Initiation	**12**	**14%**
Project Planning	**18**	**21%**
Project Execution/Coding	**30**	**34%**
Project Testing	**12**	**14%**
Project Closure/Deployment	**15**	**17%**
Total	**87**	**100%**

3.5 Estimated Costing

The cost was calculated on the basis of the features the client demanded for the system. We calculated the cost analysis twice. In project initiation and project planning, we calculated the cost analysis for this project. And we fixed a budget. In the following table, the estimated costing is given:

Table 3.2: Table for Estimated Costing

Estimated Costing for HMS	
Features	**Costs (Taka)**
Internet Bills	**5,000**
Domain Bills	**4,500**
Hosting Bills	**1,500**
Project Manager	**35,000**
Frontend Developer	**46,000**
Backend Developer	**70,000**
Total Costs	**1,62,000**

Chapter 04

METHODOLOGY

4.1 System Design Methodology

It is very essential and crucial to choose a software development methodology and apply it with discipline throughout the project. Actually, its benefit both the development team and the customers. Without a methodology, developers can suffer from customers' changing requests and there can create a miscommunication. So, this is the most important to decide the methodology so that the developer can finish the work in time and satisfy the customer with providing the demandable software.
In this project, we are following "Agile Scrum and Mixed Mode Development Methodology". Agile is one of the most popular software development methodologies in recent days. Agile Methodology meaning a practice that promotes continuous iteration of development and testing throughout the software development lifecycle of the project. Basically, it focuses on how to satisfy the users. As we know communication is the main priority in Agile, mainly between developers, customers and users. SCRUM is an agile development method which concentrates specifically on how to manage tasks within a team-based development environment. [3]
In our project we are looking into this methodology. Like:

- ✓ There will be at least 2 persons from both sides to work together for the project as project manager.
- ✓ Every issue will be discussed among the managers.
- ✓ If any issue raised which cannot be solved by the managers, then managers may request their higher authority for further solving meeting.
- ✓ XYZ may assign one person for each department to work with SDL team (managers / programmers) via XYZ managers.
- ✓ No authority from XYZ will be involved directly for the project with SDL programmers.
- ✓ XYZ will provide a testing server, 2 work station (PC), 1 barcode / label printer and one normal printer for development purpose at any suitable place of XYZ.
- ✓ There will be stability of any CR at least for 3 months.

Chapter 05

BODY OF THE PROJECT

The body of the project in the report is detailed discussion of the work for those readers who want to know in some depth and how it works. In this section, I will discuss about the whole system.

5.1 Work Description

Hospital Management System (HMS) is a system that can manage doctors list, patient list, taking an appointment, diagnosis report and calculate the costing within a short way. In this HMS, we are trying to create an easy, faster and understandable system that can helps patients and doctors to track their activities. So far, it's a web-based application system that overcomes the issues of managing and tracking the appointment schedule and the report.

Here I am going to discuss about some of the modules. These are-

1. **Registration and Login:** In this system, patients, doctors and receptionist can create and Login an account with their valid email id and password.

2. **Appointment Booking:** In this part, patients can take their appointment and pay their fees in online. Patient can also manually take their appointment by contacting to a receptionist.

3. **Update Profile:** Doctors, patient and receptionist can update their profile according to their condition.

4. **Upload report and Download Report:** Where doctor and receptionist can update patients progress report.

5. **Billing System:** Here patient can see their fees. Receptionist can update patients billing report after getting treatment or taking appointment.

6. **Managing Patients and Doctors:** Patients can see the doctor lists and their progress report and billing report. Doctor also can see patient lists, medical records. Patient profile and can add prescription.

Description of these modules:

- **Registration and Login:**
    i. **Patient Account Creation**: Patient can create their account with their Full name, Contact number, Address, Gender, Blood group, Age, Valid email and Password.

    ii. **Doctor Account Creation:** Doctor can create an account with their Full Name, Date of Birth, Gender, NID/Passport no, Bangladesh Medical & Dental Council (BMDC) Registration number, Year of Experience, Address, Contact number, Valid email and Password.

    iii. **Receptionist Account Creation:** Admin can create receptionist account with their full name, contact number, address, gender, age, educational certificate, valid mail and an initial password (password can be changed by the user).

    iv. **Login process:** Doctor, Patient and Receptionist can login their account with their registered valid email id and password.

- **Appointment Booking:** Patient can book a doctor from their registered account from "Appointment" module. After clicking on appointment module patient will go to new interface where the patient can book an appointment and pay their bill. Patient will get an invoice for their appointment. Patients can be appointed their respected doctor by the receptionist. In that case patient have to give their information manually to the receptionist.

- **Update Profile:** Patient, Doctor and receptionist can update their profile from "Update Profile" module. Such as medical report, medical test report etc.

- **Upload report and Download Report:** Doctor can update patients progress reports. Receptionist can also update patients medical test report that received or requested by the doctors and transaction report. Patient can download their invoice of appointment, their medical report, test report etc.

- **Billing System:** Patients can see bill that they have to pay in Billing module. Receptionist or the doctor can update the billing transaction that the patient has to pay.

- **Managing Patients and Doctors:** The doctor will be able to check medical records of the patients and list of the patients list that they have appointed the specific date. Doctor can upload the prescription. Receptionist can also see the patients list and doctors list. They can manage the appointment schedule requested by the doctors.

5.2 System Analysis

System analysis is a problem-solving method that involves looking at the wider system, breaking apart the parts, and figuring out how it works in order to achieve a particular goal. It is applied to information technology, where computer-based systems require defined analysis according to their makeup and design. [4]

5.2.1 Six Element Analysis

Process	System Roles				
	Human	**Computing Hardware**	**Software**	**Database**	**Communication & Networks**
Landing Page	User	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox, Opera, Safari etc.	Microsoft SQL SERVER	WAN/LAN
Login/Signup	User	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox, Opera, Safari etc.	Microsoft SQL SERVER	WAN/LAN
Add Doctor	Admin	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox, Opera, Safari etc.	Microsoft SQL SERVER	WAN/LAN
Add Receptionist	Admin	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox,	Microsoft SQL SERVER	WAN/LAN

			Opera, Safari etc.		
Add Patient	Admin/ Doctor/ Receptionist	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox, Opera, Safari etc.	Microsoft SQL SERVER	WAN/LAN
View Appointment History	Admin/ Doctor/ Receptionist/ Patient	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox, Opera, Safari etc.	Microsoft SQL SERVER	WAN/LAN
View Report and Medical History	Admin/ Doctor/ Receptionist/ Patient	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox, Opera, Safari etc.	Microsoft SQL SERVER	WAN/LAN
Book Appointment	Patient/ Receptionist	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox, Opera, Safari etc.	Microsoft SQL SERVER	WAN/LAN
View bill and Payment	Patient/ Receptionist	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox, Opera, Safari etc.	Microsoft SQL SERVER	WAN/LAN
Change password	Admin	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox,	Microsoft SQL SERVER	WAN/LAN

and Username			Opera, Safari etc.		
Managing Patients and Doctors	Admin/ Doctor/ Receptionist	Computer/ Android phone/ iPhone/ Any smart Phone	Microsoft Edge, Chrome, Firefox, Opera, Safari etc.	Microsoft SQL SERVER	WAN/LAN

5.2.2 Feasibility Analysis

Feasibility is the process of determining whether or not a project is worth pursuing. Feasibility research is the method used to make this judgment. This decides whether or not a project can and should be undertaken. Once a project's feasibility has been established, the analyst may produce the project specification, which codifies the project's needs. In most cases, feasibility studies are completed within a reasonable time frame and result in a written and oral feasibility report. The findings and suggestions of such research will be used to determine whether the project should be continued, postponed, or cancelled. [5]

Technical Feasibility: This is involved with selecting equipment and software that will effectively satisfy the user need. The technical needs of the system may vary significantly, but may include the following:

The ability to generate outputs in a specific amount of time:

- Under any circumstances, the response speed is important.
- Capacity to execute a specified number of transactions at a given pace.
- The ability to send data to a remote destination.

When it comes to determining technical feasibility, the system's configuration takes precedence over the hardware's actual manufacture. The configuration should provide a comprehensive overview of the system's requirements. Input and output speeds should be attained for a certain printing quality.

The compatibility of the front-end and back-end is critical, according to the notion of technological feasibility. The compatibility of both is excellent in our project. The compatibility of VISUAL STUDIO CODE and MySql is very good. The output speed is excellent. When we enter data and press a button, the reaction time is actually fast and the result appears almost instantly. When I utilize a complex query or a large transaction, I never have any problems. The transaction speed is always good and consistent. This software allows you to send data to a different location.

Operational Feasibility: The degree of service to needs is evaluated in Operational Feasibility, as well as how easy the product will be to run and maintain after deployment. Other operational scopes include assessing product usability, determining if a software development team's offered solution is acceptable, and so on**.** The points to be considered here:

- What modifications will be brought to the system?
- What are the organizational structures that have been disturbed?

At this time, all of the work is done by manually. As a result, the throughput and reaction time are excessive. The lack of a security check that was required is a major issue. Finding specific details about any information was extremely difficult due to the fact that data was stored in many books, each of which was located in a separate location. If an issue arises, no one can address it until the master of the field is unavailable.

I will not change the organization's structure. I will offer a system that resembles the present organizational structure. However, the technology that I supply eliminates all overheads. In our system, all computing work will be done automatically. The response time is really fast.

Now we'll go over the final aspect of operational feasibility. It is a hardware store, and the company assigns an engineer to deal with any hardware issues. As a result, he won't have any difficulties with hardware, and because all of the company's employees are familiar with computer operation, or training for this program won't be tough.

Economic Feasibility: The project's cost and benefit are examined in an Economic Feasibility study. That is, a detailed examination of the project's development costs is carried out as part of this feasibility study, which includes all needed costs for final development, such as hardware and software resources, design and development costs, and operating costs, among other things. After that, it is determined if the initiative will be financially advantageous to the organization.

As far, our project is good. So, the cost of the system is negligible, I think. We are trying to develop a live system so that it can gives user a confidence to use it. So, the economic feasibility of the system is very good.

5.3 System Design

The process of designing the aspects of a system, including as the architecture, modules, and components, as well as the many interfaces between those components and the data that flows through it, is known as system design.

5.3.1 UML Diagrams

A UML diagram is a diagram based on the UML (Unified Modeling Language) that is used to graphically describe a system, including its major actors, roles, actions, artifacts, or classes, in order to better understand, edit, manage, or document system information. UML diagrams can be used to envision a project before it begins or to document a project once it is completed. UML diagrams, on the other hand, have the broad purpose of allowing teams to visualize how a project is or will operate, and they may be used to any sector. [7]

Object-oriented design and analysis are linked to UML. UML creates diagrams by combining parts and forming relationships between them. Like structural diagrams and behavior diagrams.

Here we are discussing some of them.

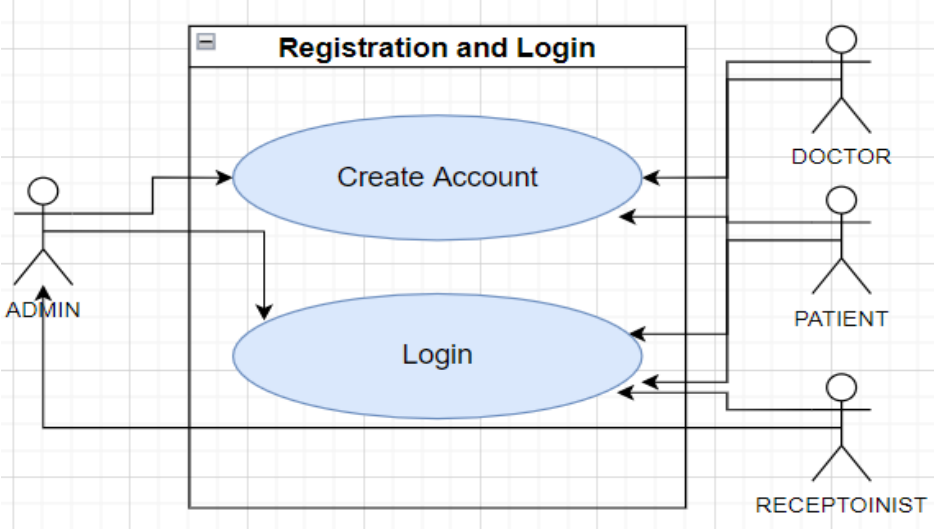
5.3.1.1 Use Case Diagram

A use case diagram is a visual representation of a system's dynamic behavior. It incorporates use cases, actors, and their interactions to encapsulate the system's functionality. It represents the activities, services, and functionalities that an application's system/subsystem requires. It represents a system's high-level functionality as well as how the user interacts with it. A use case diagram's main goal is to depict a system's dynamic nature. It collects the requirements of the system, which include both internal and external factors. It refers to people, use cases, and a variety of other things that refer to the actors and factors responsible for use case diagram execution. It depicts how an entity from the outside world might interact with a system component.[8]

So, Use Case Diagram of HMS are given below:

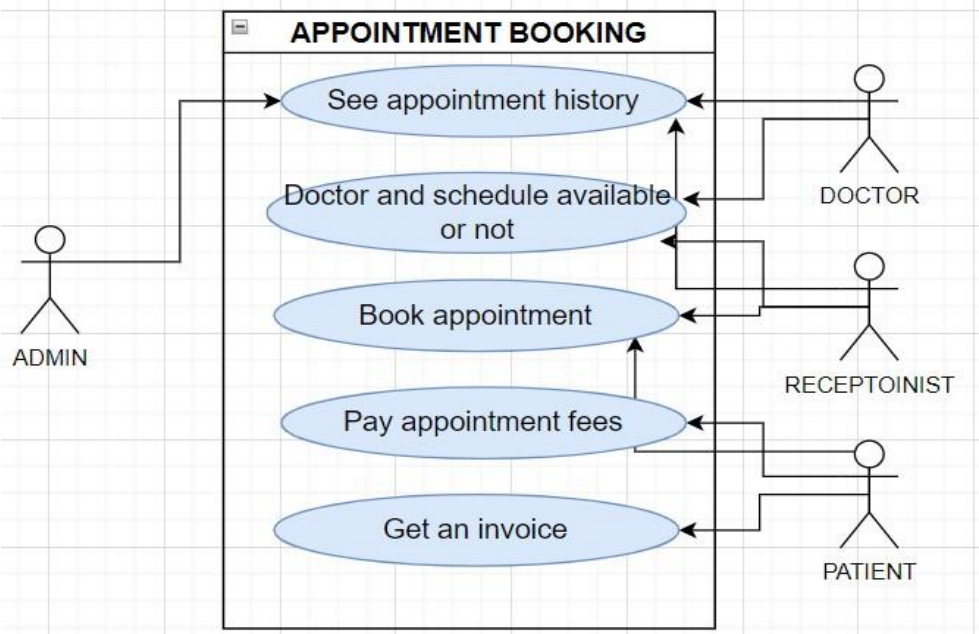
Registration and Login

Actors: Admin, Patient, Doctor and Receptionist



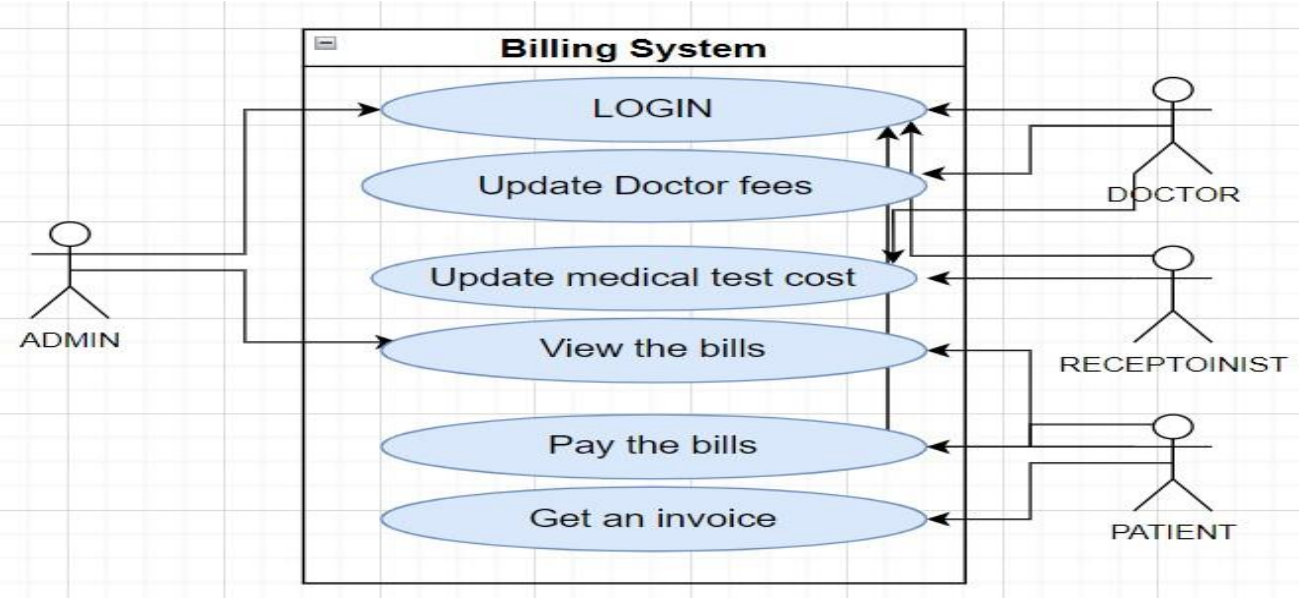
Appointment Booking

Actors: Admin, Patient, Doctor and Receptionist



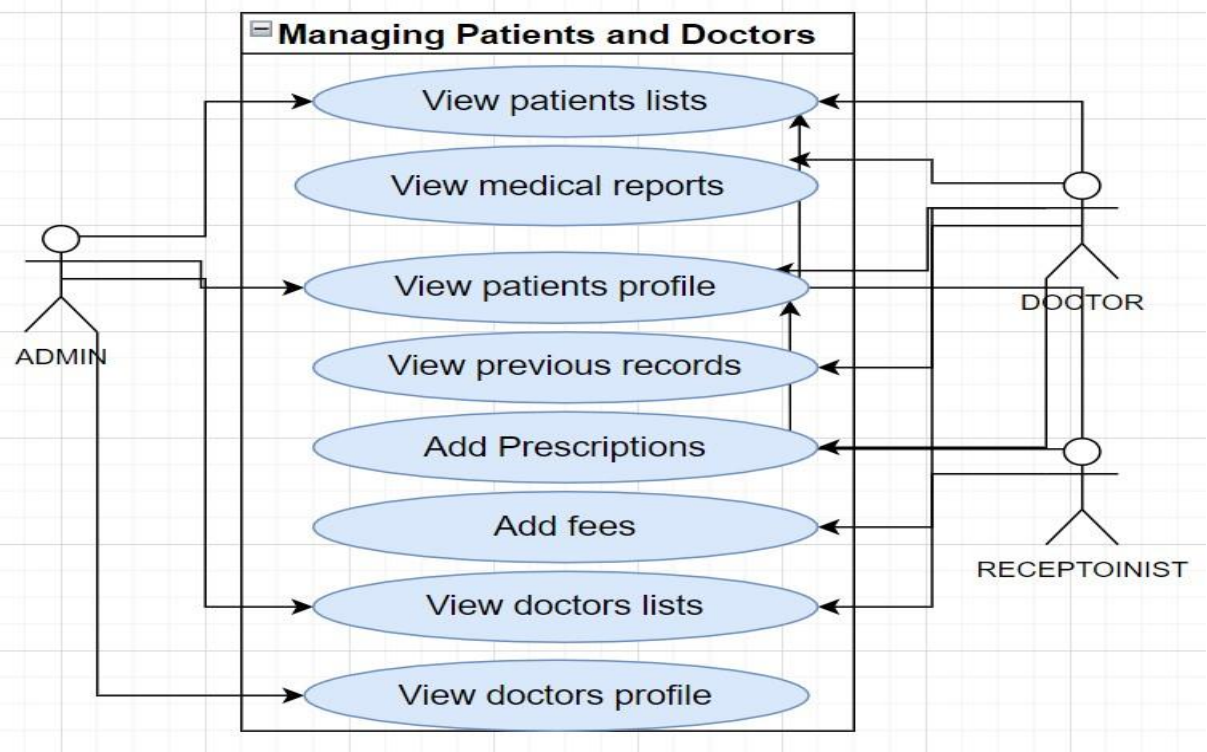
Billing System

Actors: Admin, Patient, Doctor and Receptionist



Managing Patients and Doctors

Actors: Admin, Patient, Doctor and Receptionist



5.3.1.2 Activity Diagram

The activity diagram is used in UML to show the system's flow of control rather than the implementation. It simulates simultaneous and sequential activity.

The activity diagram aids in visualizing the flow of work from one action to the next. It focused on the state of flow and the sequence in which it occurred. The flow can be sequential, branching, or concurrent, and the activity diagram provides forks, joins, and other features to cope with these types of flows.

An object-oriented flowchart is another name for it. It refers to activities that are made up of a series of actions or processes that are used to model the behavioral diagram.

Here are the activities diagram for HMS:

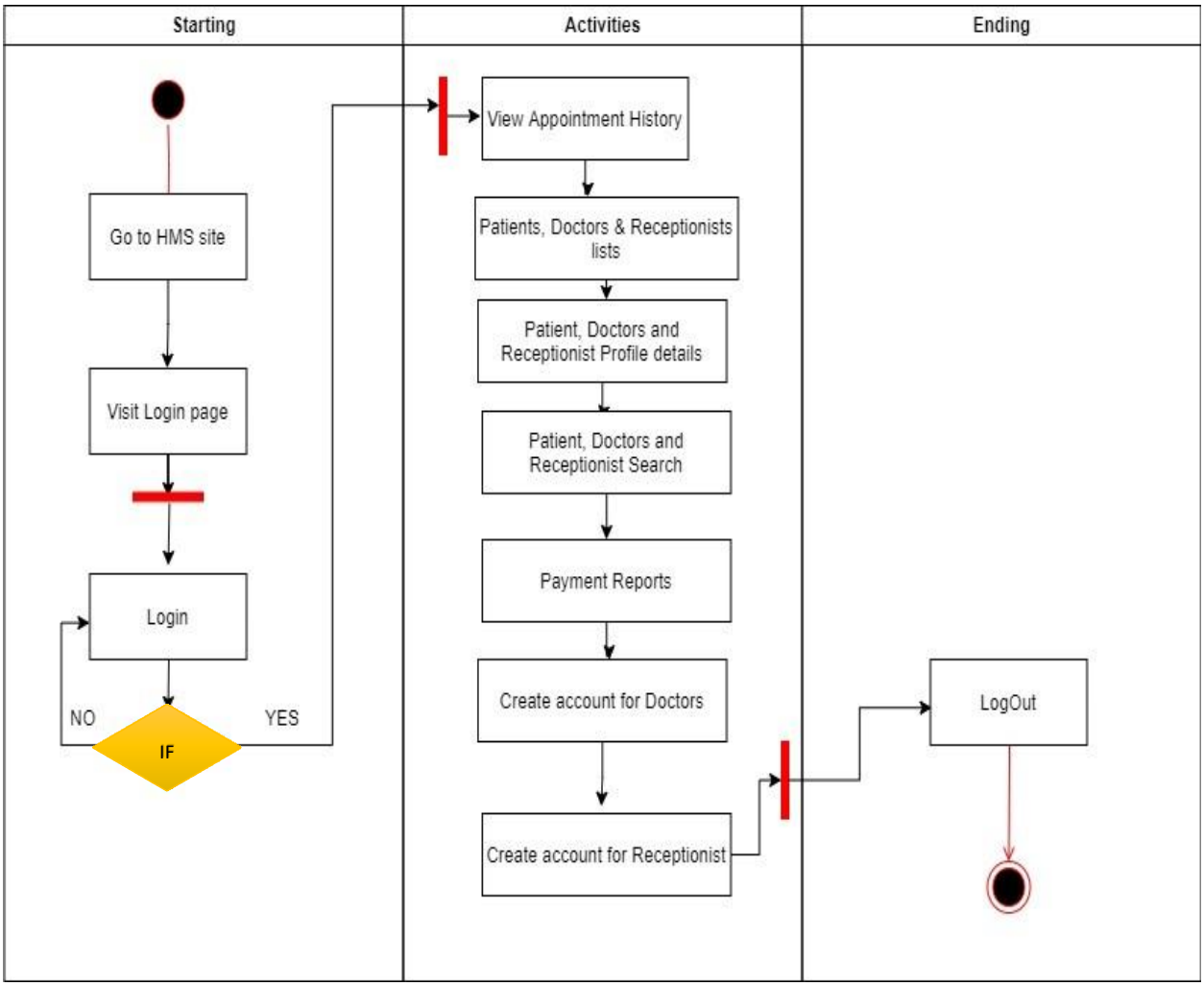


Fig 5.1: Activity diagram for Admin

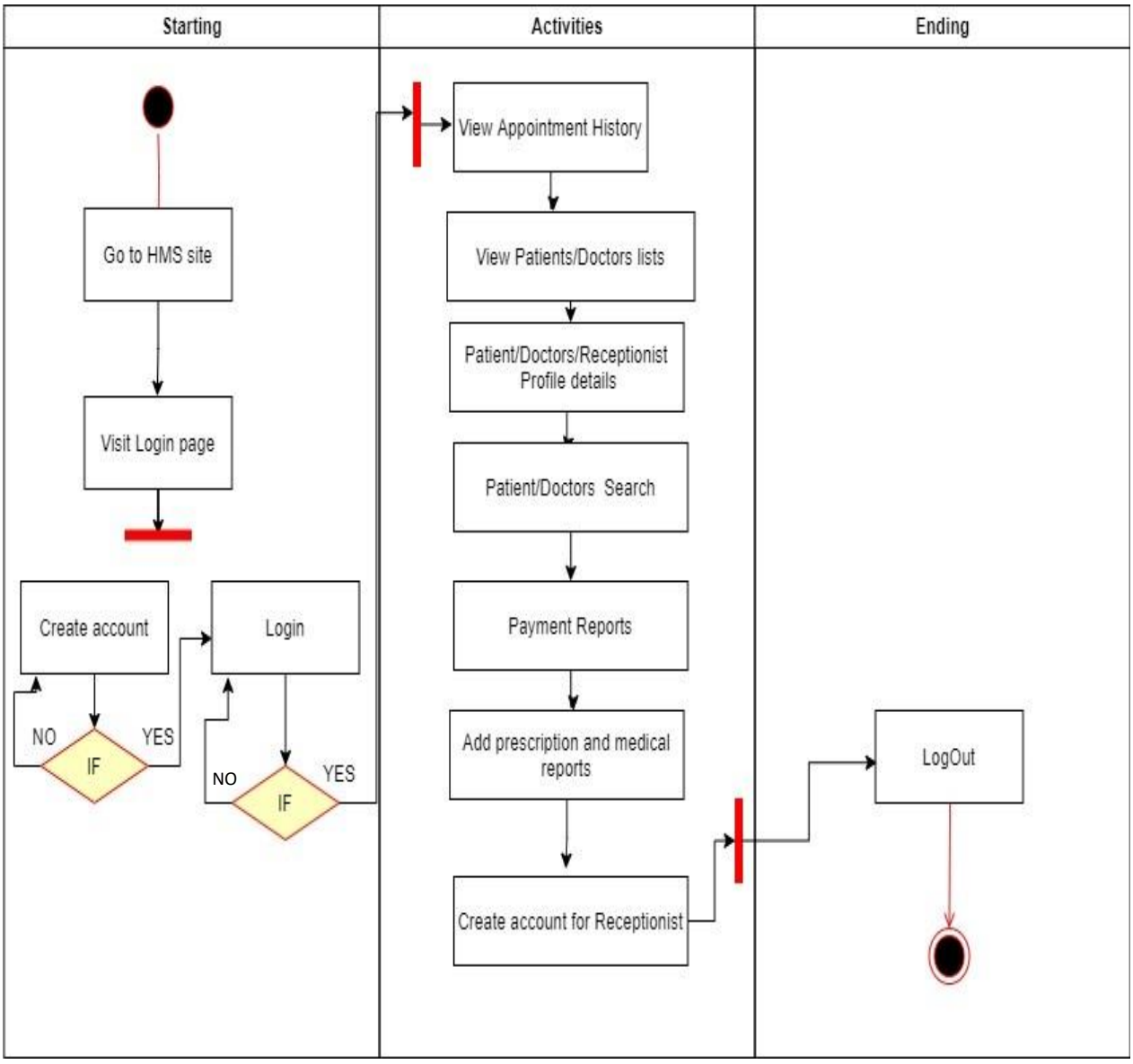


Fig5.2: Activity diagram for doctors

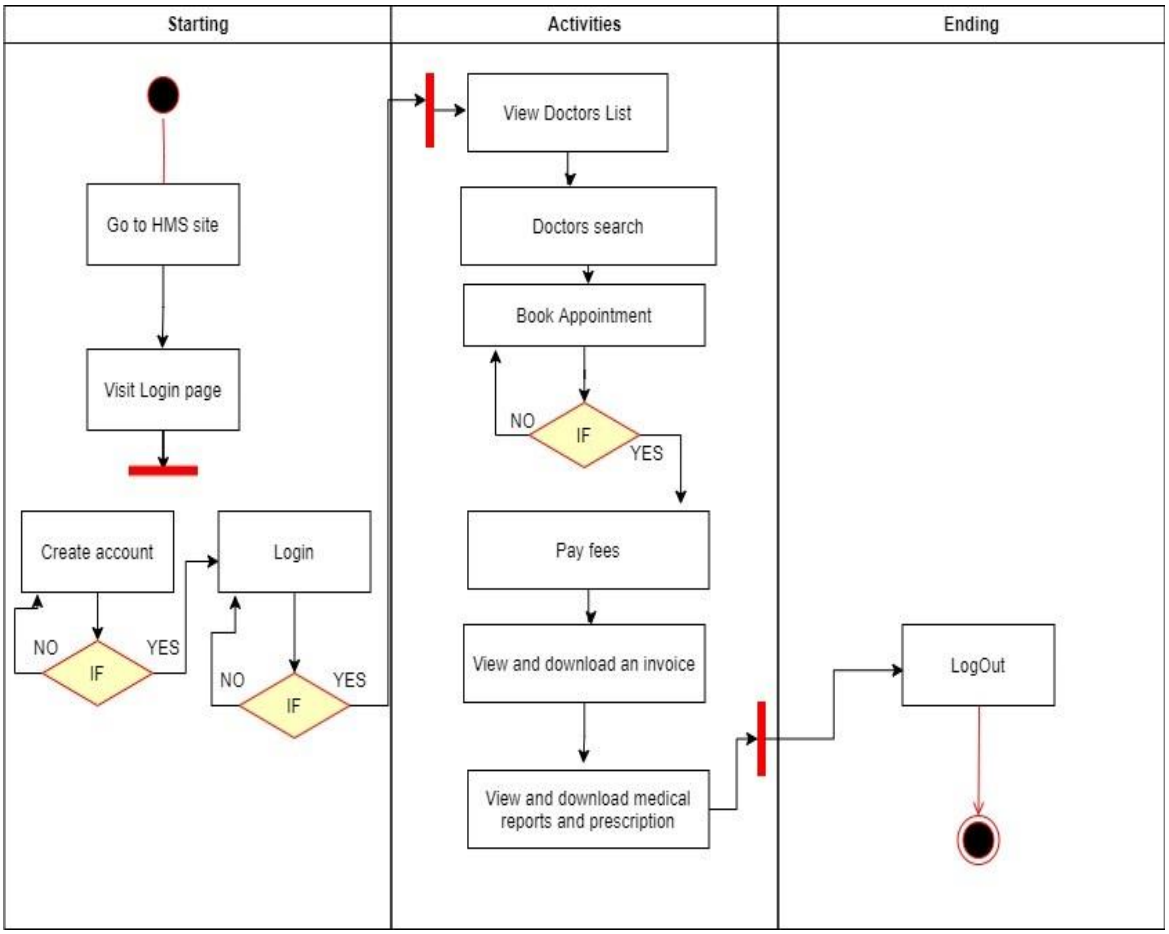


Fig 5.3: Activity diagram for patient

5.3.1.3 Entity Relationship Diagram

An Entity Relationship (ER) Diagram is a form of flowchart that shows how "entities" within a system, such as people, objects, or concepts interact with one another. In the disciplines of software engineering, business information systems, education, and research, ER Diagrams are most commonly used to build or troubleshoot relational databases.[10]

Here are Entity Relationship diagram for HMS:

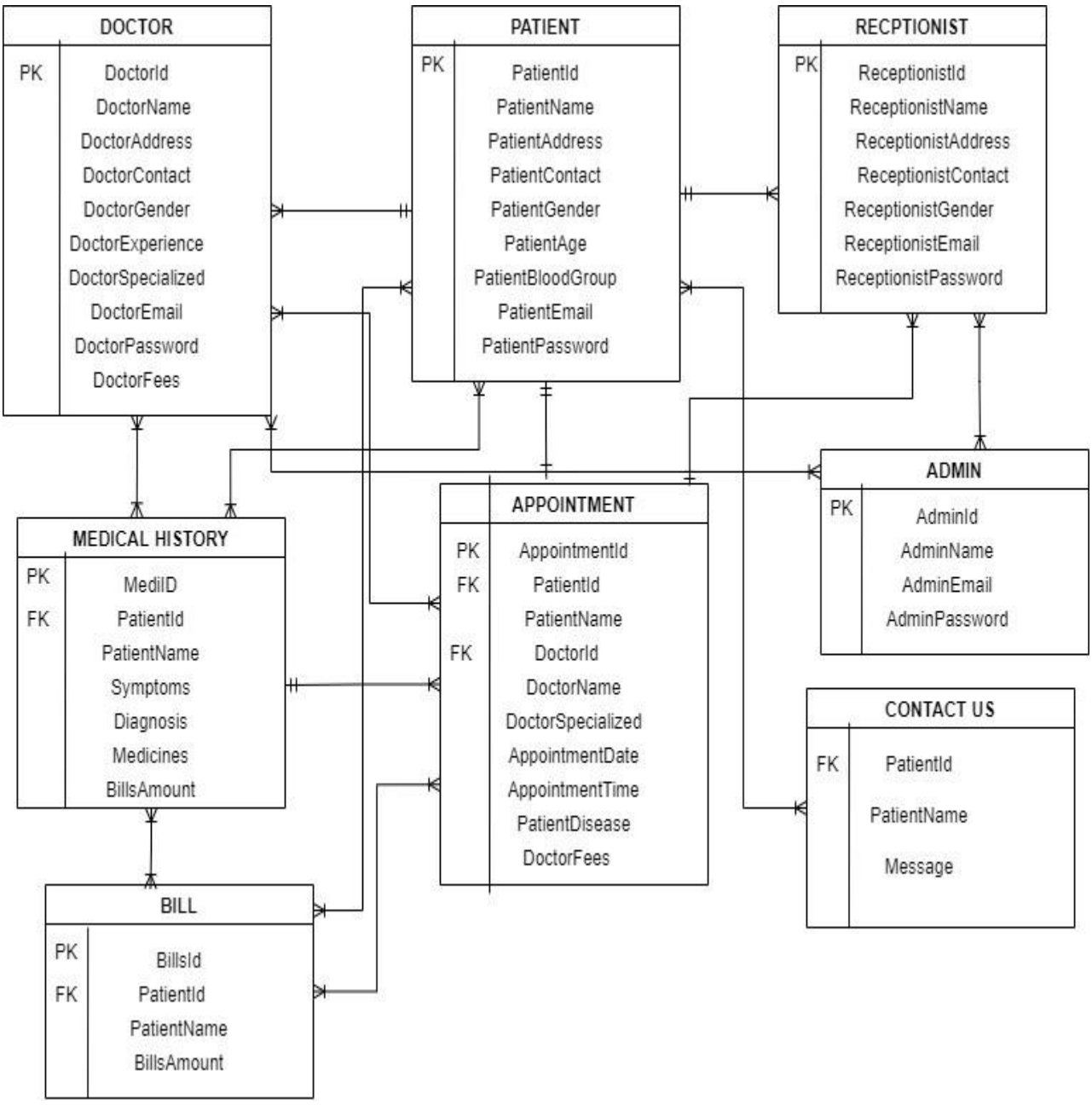


Fig 5.4: ER diagram for HMS

5.3.2 Functional & Non-Functional Requirements

5.3.2.1 Functional Requirements

A Functional Requirement (FR) is a statement that describes the service that the program must provide. It refers to a software system or a component of one. A function is nothing more than the inputs, behavior, and outputs of a software system. A computation, data manipulation, business procedure, user interaction, or any other unique feature that determines what function a system is likely to execute can all be considered. [11]

Here are some functional requirements of HMS:

Table 5.1: Functional Requirement- Add Patient and Sign-up process

Name of the function: Patient Sign Up		
Input: 1. Valid UserName/ email 2. Password	Process: 1. Go to HMS site and click on signup option. 2. Give all the information which are needed. 3. Save sign up details to database	Output: 1. New user created and added in database as a patient
Precondition: 1. Must have internet connection. 2. User must know how to browse.		
Post Condition: 1. User will be notified about successfully created an account.		

Table 5.2: Functional Requirement- Book appointment process

Name of the function: Book appointment		
Input: 1. Valid Username/ email 2. Password	Process: 1. Save details of the patient in database	Output: 1. Appointment will be created to the respected doctor.

Precondition: 1. Must have internet connection. 2. User must know how to browse
Post Condition: 1. User will be notified about with a confirmation message 2. User will able to see an invoice

Table 5.3: Functional Requirement- Reset Password process

Name of the function: Reset Password		
Input: 1. Valid Username/ email	Process: 1. After enter username/email user must have clicked on "forget password" 2. Replace old password with new one	Output: 1. New password will be updated 2. Saved a new password in database
Precondition: 1. Must have internet connection. 2. User must know how to browse		
Post Condition: 1. User will be notified about with a confirmation message		

Table 5.4: Functional Requirement- Add Doctor Process

Name of the function: Add doctor		
Input: 1. Provided doctors information	Process: 1. Save doctors information to the database	Output: 1. New doctor will be created 2. Data will be saved in database
Precondition: 1. Must have internet connection. 2. User must know how to browse		
Post Condition: 1. User will be notified about with a confirmation message		

Table 5.5: Functional Requirement- Add Receptionist Process

Name of the function: Add Receptionist		
Input: 1. Valid Username/ email of admin 2. Password	Process: 1. Save receptionists information to the database	Output: 1. New receptionist will be created 2. Data will be saved in database
Precondition: 1. Must have internet connection. 2. User must know how to browse		
Post Condition: 1. Admin will be notified about with a confirmation message 2. Receptionist will get a user name and password to login		

Table 5.6: Functional Requirement- Generate Report process

Name of the function: Generate a report		
Input: 1. Valid Username/ email 2. Password	Process: 1. Go to "Report" option and enter a date 2. Click on get report option that will go through the database and generate an automated report within the given date	Output: 1. The report will be created for the given date 2. Shows the report with a table
Precondition: 1. Must have internet connection. 2. User must know how to browse		
Post Condition: 3. Notification will be received to view the report		

Table 5.7: Functional Requirement- medical history process

Name of the function: Medical History		
Input: 1. Valid Username/ email 2. Password	Process: 1. Go to "Medical History" option and select patient 2. Click on get history option that will go through the database and retrieve the information that selected patient	Output: 1. Show patients medical history
Precondition: 1. Must have internet connection. 2. User must know how to browse		
Post Condition: 1. Show medical history on the screen		

5.3.2.2 Non-Functional Requirements

The Non-Functional Requirement (NFR) provides a software system's quality attribute. They assess the software system on the basis of its responsiveness, usability, security, portability, and other non-functional criteria that are crucial to its success. "How quickly does the website load?" is an example of a nonfunctional demand. Non-functional criteria that aren't met can lead to systems that don't meet user demands. [12]

Here we discuss some no-functional requirements:

Security and Safety:

- Patient Identification: The system will be identified and confirmed the patient by using phone or email
- Login ID: Users must have the valid Login ID and password. Otherwise, they can't get the provided services
- Modifications: Administrations can only add any receptionist. Patient and doctor can themselves their own but only admin can remove any users.
- The receptionist can view doctor and patient list and they can add patient in HMS or booking an appointment for the patient but they don't have any rights to alter any data in it.

- The admin can view and alter any data in the HMS

Performance:

- Response time of this system is quite fast so that user don't have to wait for too long.
- All functions of this system are very smooth.
- This system is responsive for every device. It can be accessed from smart phone, tablet. Laptop, desktop without compromising any function

Reliability, Availability and Maintainability:

- After going through several performance test and based on that result, the system will run smoothly and fast for a long time
- The system is available for 24 hours
- The maintenance of this system is also easy and this system has a backup so that whenever it will go for under maintenance the backup system can be used.

Usability:

- Users will be able to run the system easily.
- This system is understandable for everyone who has minimal knowledge of browsing

5.4 Product Features

Product features defines the functionality of the product and how that will benefit the users of the product. I have discussed the features of our website below:

5.4.1 Input

The following are the inputs for HMS:

Table 5.8: Inputs for HMS

Inputs for HMS	
Process	**Fields type**
Login	Email- string Password-string
Registration	Name- string Email- string Address- string Phone- integer Age-string Gender- string Password- string
Book Appointment	Appointment Date- string Time- string
Prescription	Medicine Name- string Medicine Intake - string
Payment	Transaction ID – string
Doctor Search	Doctor Name- string Doctor Specialty- string
Add receptionist/doctor	Name- string Email- string Address- string Phone- integer Age-string Gender- string Password- string

5.4.2 Output

The following are the outputs for HMS:

Table 5.9: Outputs for HMS

Outputs for HMS	
Process	**Fields type**
Login	On success- Redirect to user dashboard On failure- "The user id and password didn't match"
Registration	On success- "Registration has successfully done" On failure- "Something is missing! Try again."
Book Appointment	On success- "Appointment has booked successfully. We will contact you soon!" On failure- "Something is missing! Try again."
Prescription	On success- "Prescription has saved successfully" On failure- "Please try again!"
Payment	On success- "Payment has successfully done" On failure- "Payment has not done yet!"
Doctor Search	On success- Show specific doctor. On failure- "Not Found!"
Add receptionist/doctor	On success- "The user is created successfully" On failure- "Something is missing! Try again."

5.4.3 Architecture

Any structure's backbone is defined by its architecture. It's drawn to indicate how a construction will hold up. A website architecture specifies the framework of a website, including how it will function, how data will be transported, and where it will be kept.

In this I am trying to visualize the scenario of our project:

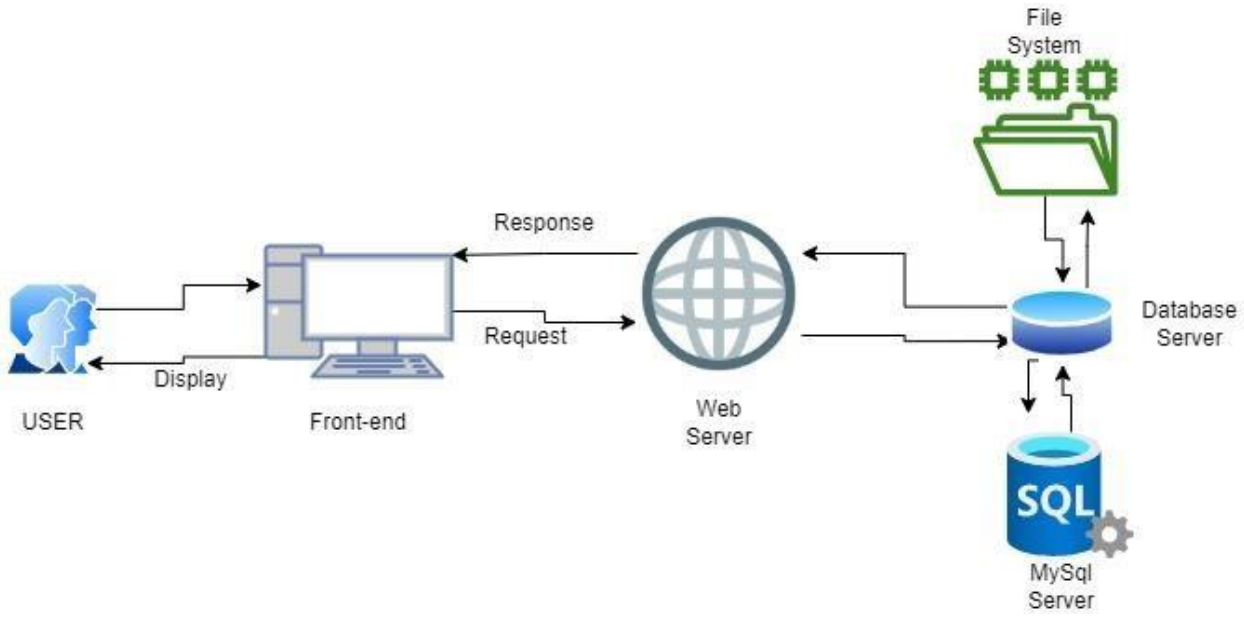


Fig 5.5: Website architecture for HMS

Chapter 06

RESULT & ANALYSIS

Several flaws were discovered during the program's testing. This was a small problem that we were able to fix. Test cases were documented when these issues were resolved. All test cases were justified using testing approaches. Our testing was done on a local server. We'll re-test everything on the hosting once it's up and running. As a result, numerous changes may be made at that time. Only a few integrations are possible. It will, however, be added in the future. As a result, none of the tastings have been completed. However, all testing has been completed up to the point where the present functionality is accessible, and it is working well. However, there is no live testing with users. It was not feasible due to the pandemic.

6.1 Graphical User Interface Result

The graphical user interface is a form of user interface that allows users to interact with electronic devices through graphical icons and audio indicator such as primary notation, instead of text-based user interfaces, typed command labels or text navigation. Here I attached only my work that I have done in this project and it was successfully done.

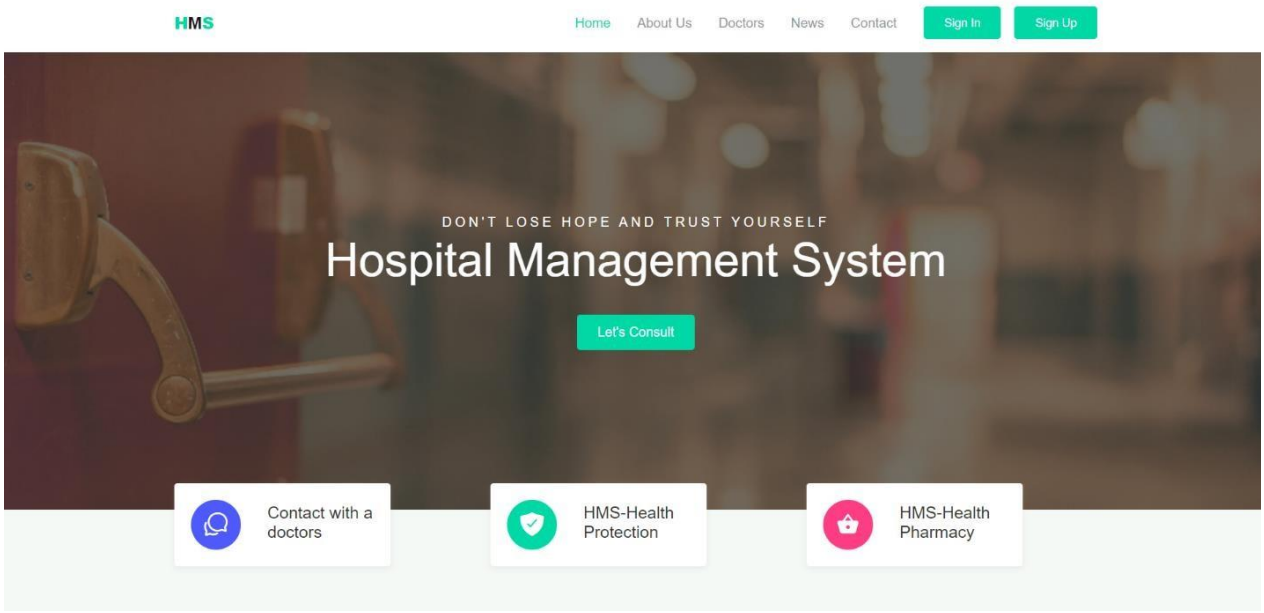


Fig 6.1: Landing Page

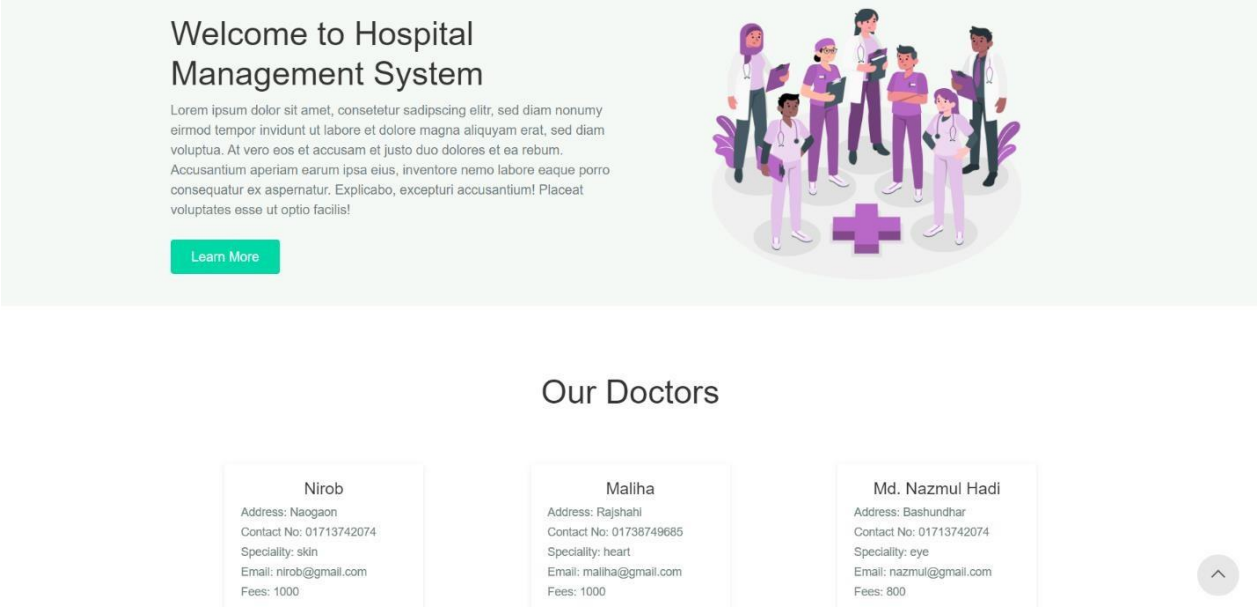


Fig 6.2: Landing Page part-2

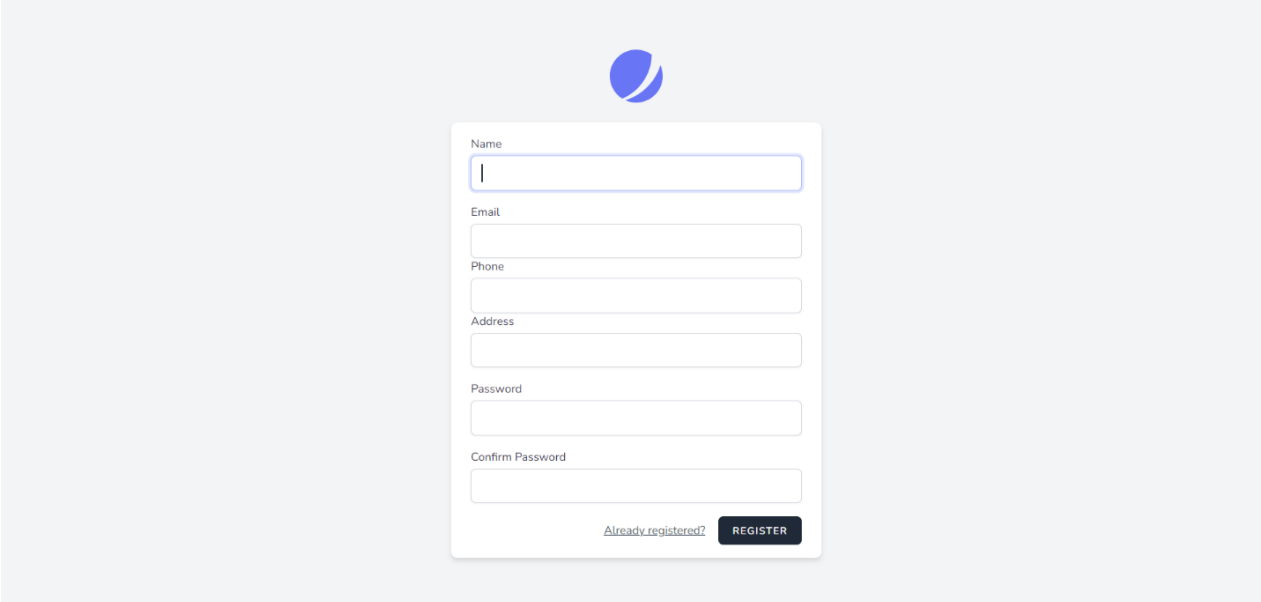


Fig 6.3: User Registration

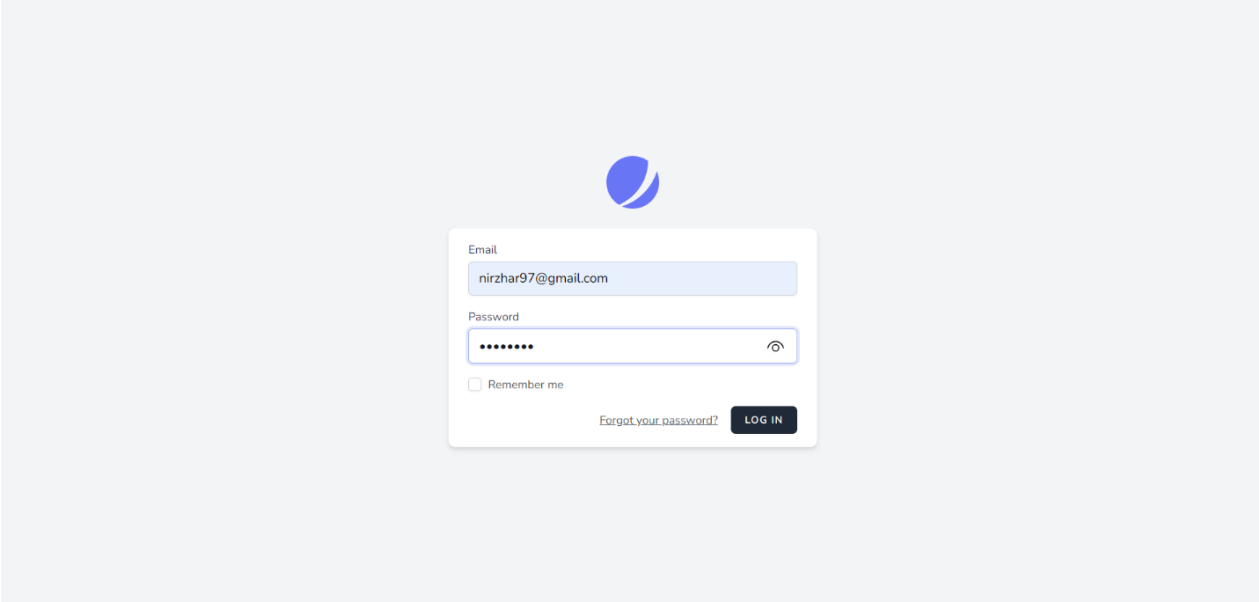


Fig 6.4: User Login

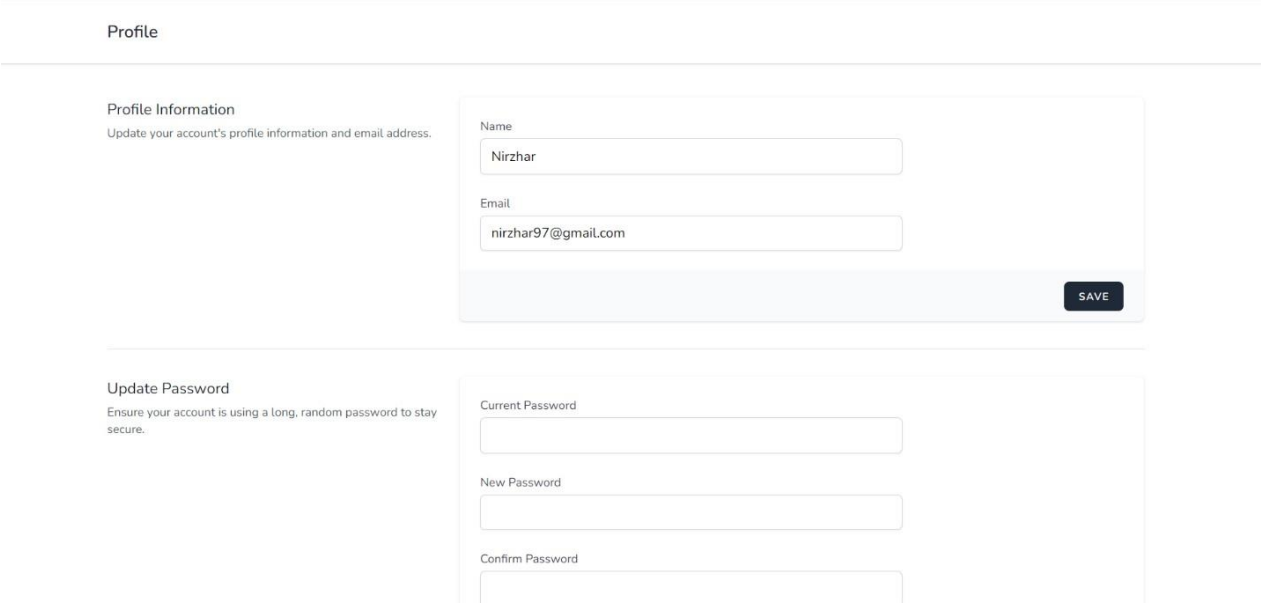


Fig 6.5: User Update profile

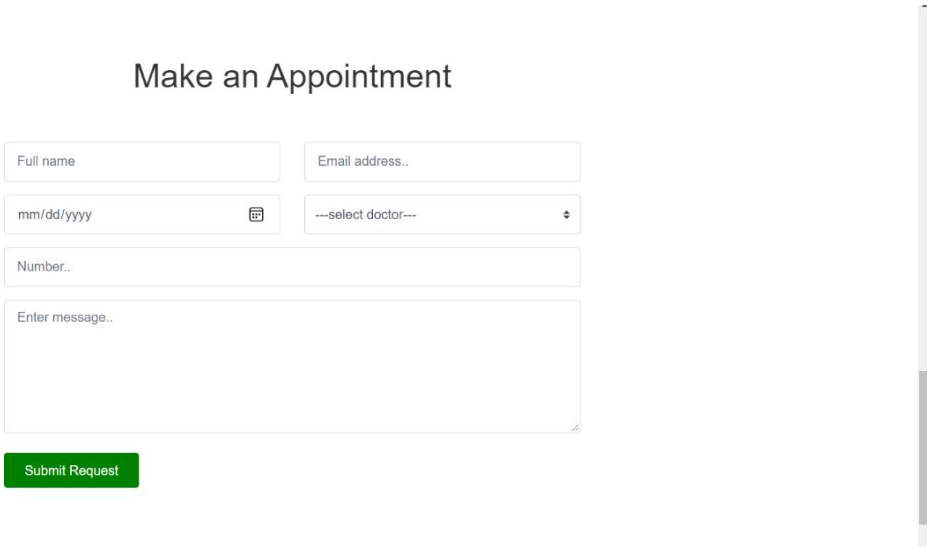


Fig 6.6: Booking appointment

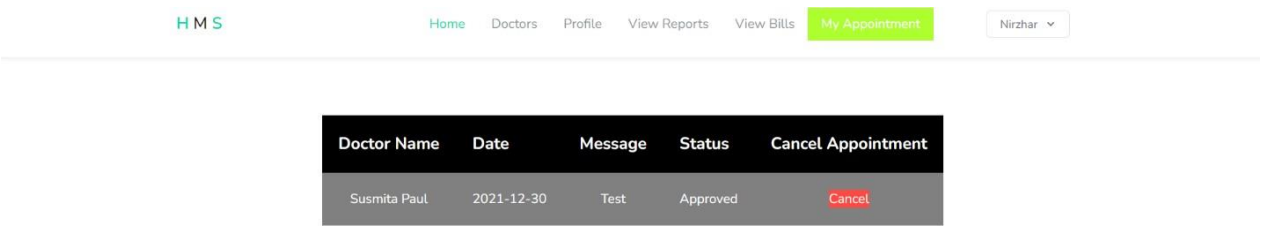


Fig 6.7: User appointment request

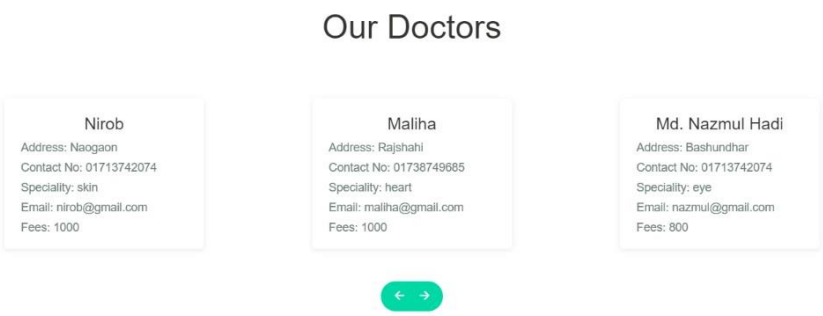


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Fig 6.8: Doctor List in User Dashboard

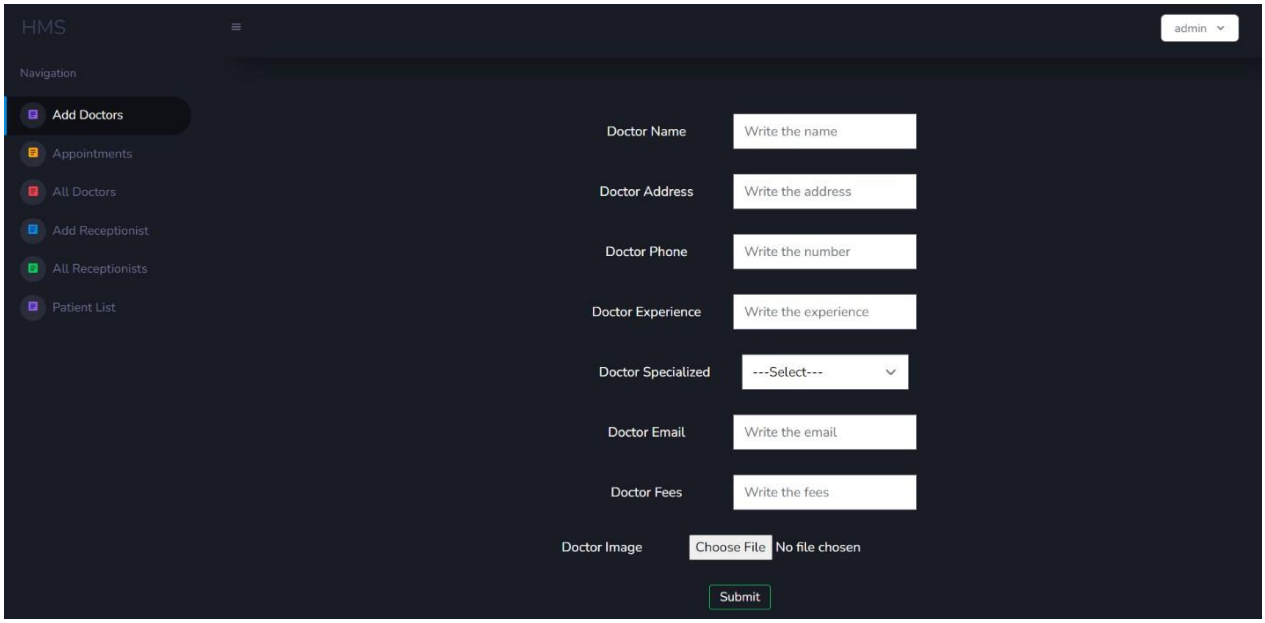

Fig 6.9: Add Doctor by admin

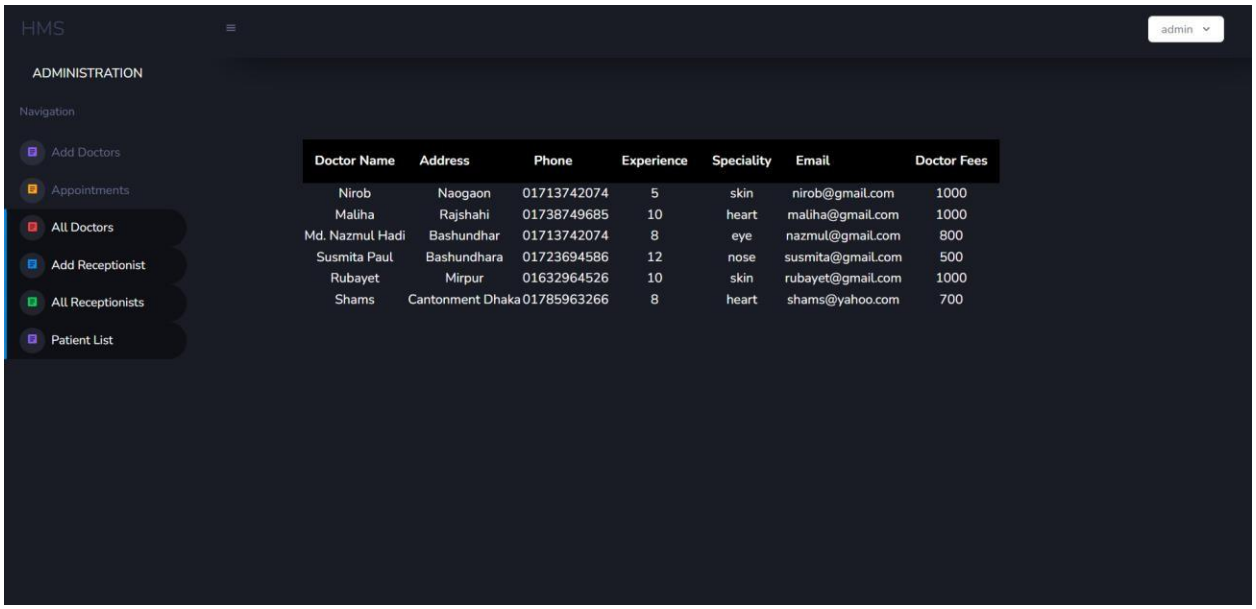

Fig 6.10: Doctor List

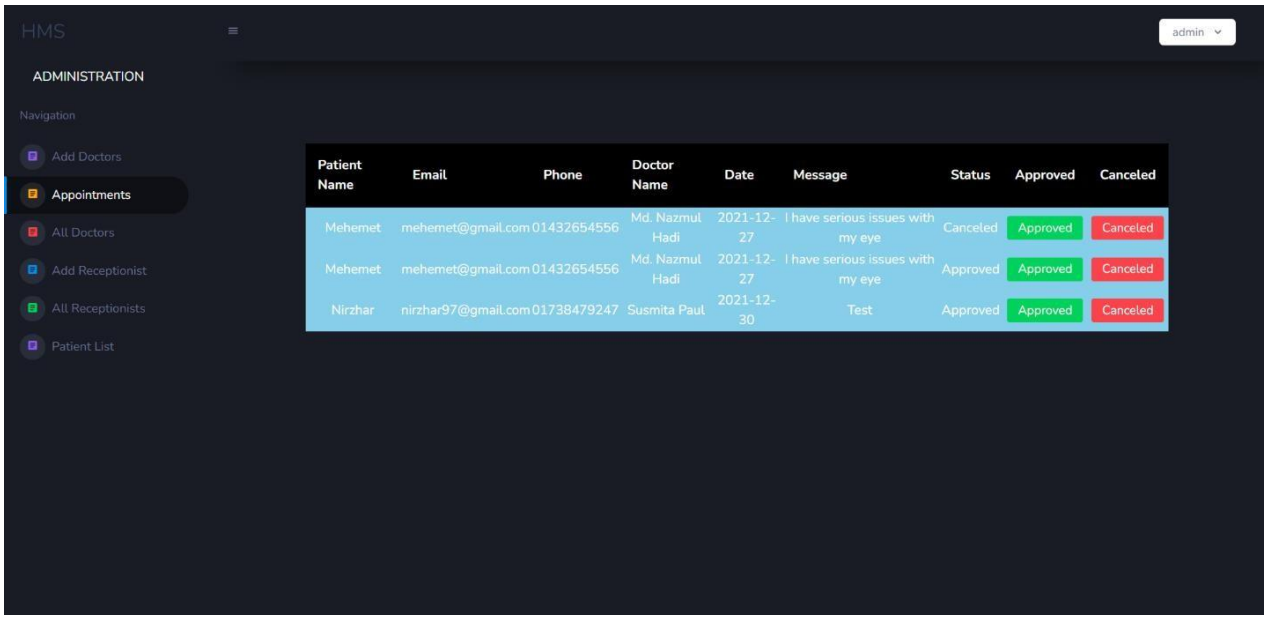

Fig 6.11: Appointment approval

6.2 Software Testing

During system testing the system is employed through an experiment to make sure that the code doesn't fail i.e., it'll run per its specifications and within the means users expect. Special take a look at knowledge are input for the process and also the results examine. A restricted variety of users try and use it in unforeseen ways that. It's preferred to get any surprises before the organization implements the system and depends upon it. We tested the system in several times to find out the bug and fixed it when it came. We should test our system more and more before launching this on market. Here all the ultimate testing wants to be done by persons aside from us. If some changes were desired within the program, we needed to use another setup. Retrieve, that traced back the newest version of the program to development areas. As during this system knowledge is entered at totally different levels I thought-about providing varied forms of checks like vary check, validity check, completeness check, etc. in several knowledge entry screens per the necessities.

Since the user don't seem to be familiar to the new system the data screens were designed in such the way that were-.

- Consistent
- Easy to use
- Has a fast response time

The following convention were used while implementing the various screen:

- ✓ **Unit Testing:** I have tested a single program module in every environment. And it looks good in every situation. I mainly focused here the processing procedure.

- ✓ **Integration Testing**: Because of interfaces among the system modules, I have a tendency to use integration testing. In alternative word's it ensures that the information moving between the modules is handled as meant.

- ✓ **System Testing:** I have tested this system several times to find bug and fix it. Our testing result is positive in every case. Yes, there is something error in some specific part of this system. And it is fixed now. So, system testing is good for this project.

- ✓ **Security Testing**: In this HMS, doctors, patients, receptionist and admin are included. And there is many information that the system will collect. Such as, patients' details, email, password, doctor's details, password, email, medical reports and so many things that are included in this system. So, we had to make sure the security that no-one can access in this database and no-one can destroy any data. Actually, security testing is an attempt to verify that a system's built-in protective measures will, in fact, protect it against intrusion. And we ensure this. So, we can say that security testing is also good.

Chapter 07

LESSON LEARNED

7.1 Problems Faced During the Period & Solution

I was doing my internship as a frontend developer on a software farm named Technocare Orbit Ltd. When I was offered an internship at Technocare Orbit Ltd., I got the chance to work with a developer team and I learn a lot from them. Our project's goal was to create a system for Technocare Orbit Ltd. named "Hospital Management System (HMS)". As a front-end developer I have to develop the system with a framework. It was completely new experience for me to work with and organizational team. During this period, I faced many problems. Some of them are:

- I couldn't cope up with the new environment. Because in front of me, they were professional developer and I was a learner. But the people were really nice to me. Specially, my team leader and my supervisor helped me a lot, I followed their guidance, instructions and advice. They helped me to get comfort with the environment.

- As a front-end developer, they asked me to learn a new framework and asked me to develop a demo design before assigned me a project. I learned a new framework and gave them a demo design. They liked it.

- Requirements were changed during the project. It was a worst experience. Because I was totally new with this system. But my team leader gave me time and advise me to handle those requirements.

- In the very beginning, I was afraid to ask questions. But I overcame from it very fast.

- First one month, they gave me time to learn about tools and how they work in the office. It was very grateful for me to learn and helping them in their activities.

- Although our project methodology was Agile Scrum and Mixed Mode Development Methodology, and there was a project manager who had to deliver us the requirements and project related information. In the project mid time, he was sick (COVID19). So, we had to manage that and follow the requirements.

Chapter 08

FUTURE WORK & CONCLUSION

The future of work describes changes in how work will get done over the next decade, influenced by technological, generational and social shifts.

8.1 Future Works

Hospital Management System (HMS) is the first version of this system. It has many sides to develop and improve for the future. Every software in the markets is updating day by day. So, It will have to update. Such as:

- ✓ Add new user such as Nurse, Staffs
- ✓ Add new module for payment gateway
- ✓ Add rating system for HMS service
- ✓ Improve the interface more attractive to the user
- ✓ Add a chat box that will help any verified user to help instantly from the admin
- ✓ Add a Video Consultancy option

In future, we can also add many modules to increase our facility.

8.2 Conclusion

The internship has been a very faithful and worthy experience for me. During this internship, I learned a lot of things. I had not any knowledge about the industrial activities. But I know how to cope with any environment because I gained the practical knowledge and experience. It will help me in future.

Intern means to be learned a lot of things from the organization where they will appoint for Internship. Yes, I learned a lot of things, such as, how to gather requirements, team management, tools that we used and finally techniques for developing a project and so on. I am very glad to work as a team member with a Software Developer team.

In the end, I would like to thank both my internal and external supervisors whose guidance and motivations have pushed me to do the project successfully.

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