An Undergraduate Internship on Telemedicine as
Full Stack Web Developer

By
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September 4, 2021

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

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Attestation

This is to verify that Fahmid Hasan (ID-1721454) completed the report "Telemedicine," which was submitted in partial fulfillment of the requirements for the degree of Computer Science from Independent University, Bangladesh (IUB). Moumita Asad (University Supervisor) and Md. Pasha Biddut guided the project to completion (Office Supervisor). I also guarantee that every of my work is unique and has not been submitted earlier to this university or any other institution. All the sources of information used in this Project Report have been duly acknowledged in it.

Signature: ..... Date: …….

Fahmid Hasan

Acknowledgement

I would like to begin with expressing my gratitude and thanking the Almighty Allah for His blessings and giving me the ability to work hard and the opportunity to complete this report.

I would like to express my heartfelt thanks to Md. Pasha Biddut sir, CEO of Infotech Solution, for his unwavering support throughout my internship. Because the situation outside is so difficult owing to the Covid-19 virus, I would be unable to complete the internship without his assistance. He assisted me with different inputs that I used in my internship as well as my report. Without these, my internship would not have been possible.

I would also like to express my gratitude to my honorable faculty Moumita Asad, Internship Lecturer, Department of Computer Science Engineering, Independent University of Bangladesh, for her constant supervision and advice and recommendations, which enabled me to successfully finish my project and report.

Finally, I would like to thank Independent University, Bangladesh, and all the respected faculties and staff who were an imperative portion of my bachelor's program in CSE. My regards and heartfelt appreciation go to my faculties and friends who shared their information with me to instruct and get me ready to achieve success in my future.

Letter of Transmittal

September 4, 2021
Moumita Asad
Internship Lecturer
Department of Computer Science & Engineering
Independent University, Bangladesh (IUB)
Bashundhara R/A, Dhaka 1229, Bangladesh
Subject: Report submission of the internship
Dear Madam,

It is of immense pleasure and honor to yield my Internship report on a Telemedicine website beneath your direction. In this report, I show my extended work, examination, and my achievements.

I have completed my Internship from infotech solutions as a full stack web developer Intern which was conducted from July 01, 2021, to date. In my internship period, I have gathered information from different angles and real-life working involvement. In this report, I include all the extended works, encounters, and information that I have accomplished during this internship.

I would like to thank you for your consistent support, direction, and thoughtfulness. I have tried to complete this with the utmost honesty and earnestness. I trust and pray that this report fulfills all the prerequisites and is up to your desires.

Sincerely,
Fahmid Hasan
1721454

Evaluation Committee

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Supervisor

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Internal Examiner

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Convener

Abstract

This paper centers on the web development sector of Infotech Solutions . It incorporates my commitment to the site of a project entitled Telemedicine. Telemedicine may be a site that would permit patients to consult their preferred doctor from the comfort of their own home. And it is their modern site that I am working on. The report is categorized into nine distinctive chapters. Beginning with the introduction, which is the exceptionally quick segment. This segment incorporates points of interest in the company, its vision, mission and objective. The moment portion of this report centers on my internship experience and perception points of interest. The third portion is around the outcome and issues analysis. This chapter issues and challenges I faced in the workplace. At last the final portion incorporates the conclusion and limitations. This internship allowed me hands-on involvement in managing real world projects.

Table of Contents

List of Figures & Tables

Chapter 1

Introduction

1.1 Overview/Background of the project

An internship gives us the opportunity for career exploration, development and learning new skills. Real-life work and doing projects in university is quite different. An internship is a professional learning experience offering practical work related to our study and career interest. I believe these three credits are very important in building our career.

I started my internship journey on the 1st of July 2021 at Infotech Solution as an Intern Web Developer. I had to get familiar with new and professional tools that I was not aware of at all. Due to the lockdown, as we had to start working from home, I had to build the skill required for the company by myself. Therefore, I have realized in this process that it is possible to learn anything if you have the willpower. Without my organizations' constant guidance, I must admit it wouldn't be possible to find the right learning material and prepare myself for the task I was assigned. And I believe all the technical and non-technical(communication) skills I have gained during this internship process will be very useful for my future career.

A telemedicine website is one such platform where a patient may interact through the internet connection with a doctor and receive treatment as required. In other words, using advanced telecommunications and computer technologies to take health services. The most effective and pleasant way for both the doctor and the patient is to examine the patient physically. But in this time of crisis, it has become a challenging factor for a patient to visit the clinic physically, so as an alternative, we decided to create a system where a patient can take health services through the internet. To make the life of patients and doctors easier we stepped forward to create such a platform. I've been assigned to do the **Doctor's module.**

1.2 Objectives

- Cost effective system
- More realistic methods of health services
- User friendly system
- Construct better result of health outcomes
- Web based System

1.3 Scopes

- Reduce Paperwork - Paper needed to assign tests in prescription is reduced as it is digitised(softcopy).

- Improve accuracy - Sometimes medicine and other tests are not clear in prescription, in softcopy a general font will be used in order to avoid confusion.

- Prevent identity theft - Prescriptions include personal details, so a paper might end up in an intruder's hand, our system will prevent any such acts as it will be fully computerized.

- Teleconsultation - remote consultation or telehealth, refers to interactions that happen between a clinician and a patient for the purpose of providing diagnostic or therapeutic advice through electronic means.

- E-prescription to secure proper drug distribution - As the prescription will be a softcopy which will be used to purchase drugs, so it is quite impossible to

manipulate the prescription.

- Electronic Health Record (EHR) to develop an information system that is not based on paper - As the whole system is Web based, all information will be stored in a database, which will cut the paper cost.

Chapter 2

Literature Review

2.1 Relationship with undergraduate studies

Data Structure (CSE203) - This course has a very interesting course outline. I Have learned specialized means of organizing and storing data in computers such that we can perform operations on the stored data more efficiently. Used as the building blocks to build other data structures such as array lists,heaps,hash tables, vectors and matrices. Hashing will be helpful when I will be working out with protecting the privacy of the doctor records.

Object-Oriented Programming (CSE213) - This a very well planned course which taught me concepts of objects and classes, used to structure a software program into simple, reusable pieces of code called classes, which are used to create individual instances of objects**.** This will be beneficial for my telemedicine system as I will be working with classes, Constructors and other elements as my system will have different classes to maintain a neat and clean coding structure.

Database Management System(CSE303) - This course was all about databases, and how to create and manage databases. All types of data that exist in the actual world should be able to be stored in a database. It can provide a logical and
transparent picture of the data manipulation process. The database is most crucially used to ensure data security. All recovery and backup procedures are automated and included into the database management system. There will be databases in my system, so this is a huge scope for me to utilize the knowledge practically in a server.

Web Application and Internet(CSE309)- I Have learned a lot about websites in this course. Using HTML, CSS, Bootstrap, PHP and using API's. I Have learned what a static and dynamic website is. This will be really beneficial for me as I will develop a website which will include the PHP language.

2.2 Related Works

The whole world is facing the same situation as the pandemic striked. Many organizations and companies are thinking about developing telemedicine websites. In Bangladesh, there are already many companies who are in the market such as 'Pulse'. Pulse works for the improvement of life-standard of the poor and socially disadvantaged population by undertaking various projects. PULSE Bangladesh Society was established in 2008 and was registered with Directorates of Social Welfare. A group of professional social workers of Cox's Bazar established the organization. PULSE Bangladesh Society has been implementing projects inCox's Bazar sadar, Ukiya &Teknaf Upazila of Cox's Bazar district and in Sadar Upazila of Bandarban district the principal regulating body of the NGO is the Executive Committee consisted of 7members, who are elected from the General Body bi-annually. Infotech's solution marketing strategy and user-friendly system, which includes easy access to doctors and a simple payment mechanism, set us apart from

the competition.

Project Management & Financing

3.1 Work Breakdown Structure

A typical productivity tip for making work more manageable and approachable is to break it down into smaller tasks. The Work Breakdown Structure (WBS), which is one of the foremost fundamental project management papers, is the tool that utilizes this method for projects. It coordinates scope, takes a toll, and plans baselines on its claim, guaranteeing that extended plans are in adjustment.

The Levels of a WBS are mentioned below

- The Top Level: The project title or final deliverable.
- Controls Account: The main project phases and deliverables.
- Work Packages: The group of tasks that lead to the controls account level.
- Activities: The tasks needed to complete the work package.

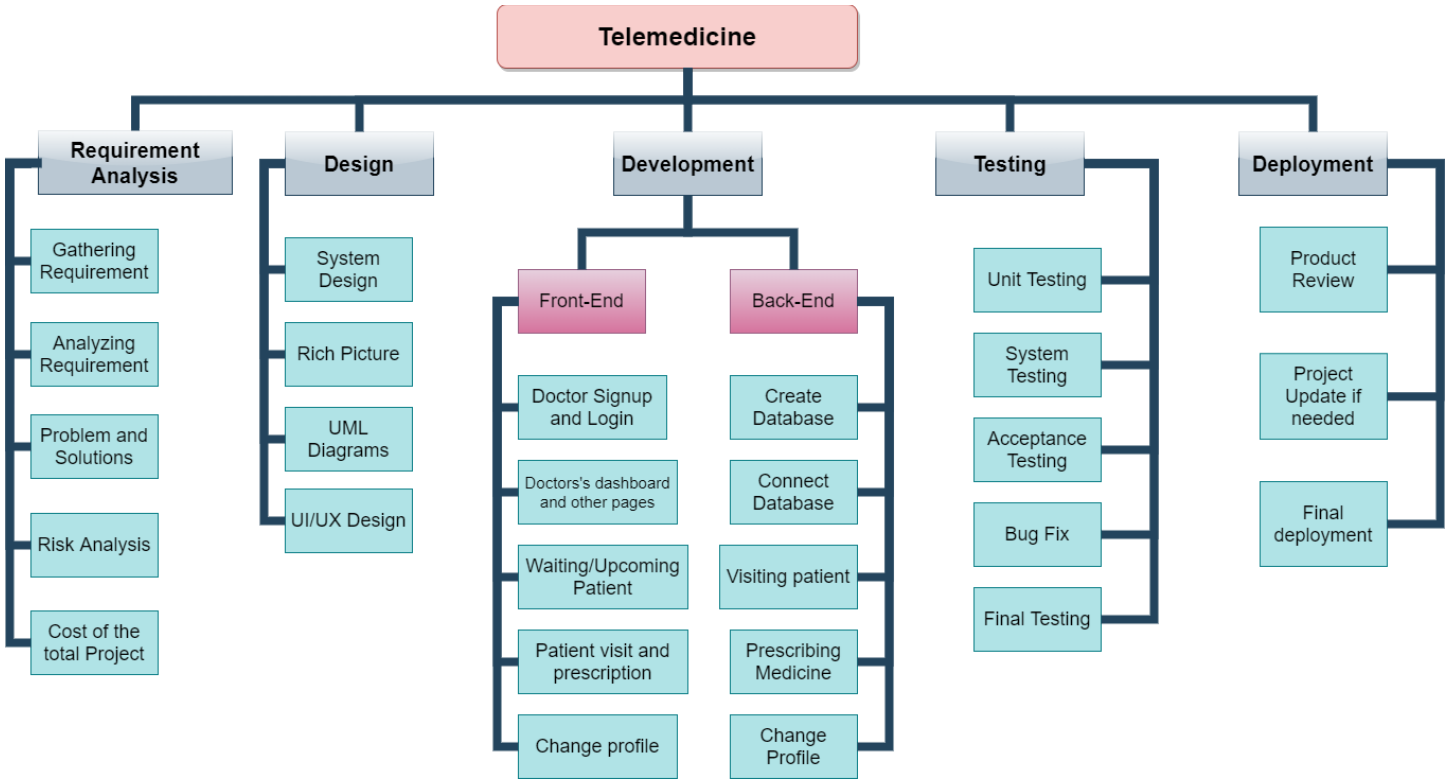

Figure 1 - Work Breakdown Structure (WBS) of Telemedicine Website

The Work Breakdown Structure (WBS) of Telemedicine Website is broken down into five major phases, under which there are sub-parts as shown in Figure 1. The five major parts are Requirement Analysis, Design, Development (Front and Back-End), Testing and last Deployment. First phase is the Requirement Analysis, which is started by gathering the requirements to build the system, followed by analyzing those gathered requirements then identifying the problem and solutions. After that analyse Risks that may occur in the process and lastly, presenting a cost estimate to build the website.

After finishing the Requirement analysis, the Design phase comes. Various designs have to be made including system design, a rich picture of how the system works, Unified Modeling Language (UML) Diagrams and ending the design phase with user experience and user interface (UI/UX) design.

The Development phase consists of Front-End and Back-End. The Front End is what the user views on screen and Back-End is mainly the database part. The Front-End consists of Doctor Signup and Login, dashboard, waiting/upcoming patient, visiting patient and prescription and lastly the Doctors' profile.The Backend consists of creating and integrating the database, creating queries to insert and retrive data where needed to perform specific tasks.

The Testing phase consists of several testing as the system needs to be flawless and

smooth. Therefore the system has to go under unit testing, system testing, acceptance testing, fix the bugs(if any) and lastly giving an overall final test.

The last phase is the Deployment, in this phase the system is reviewed, checked if any updates are needed and wrapping it with final deployment.

3.2 Process/Activity wise Time Distribution

Table 1 - Process/Activity wise Time Distribution

Activity	Working Days
Requirement Analysis	**10**
Design	**5**
Development	**30**
Testing	**10**
Deployment	**5**
Total	**60**

3.3 Gantt Chart

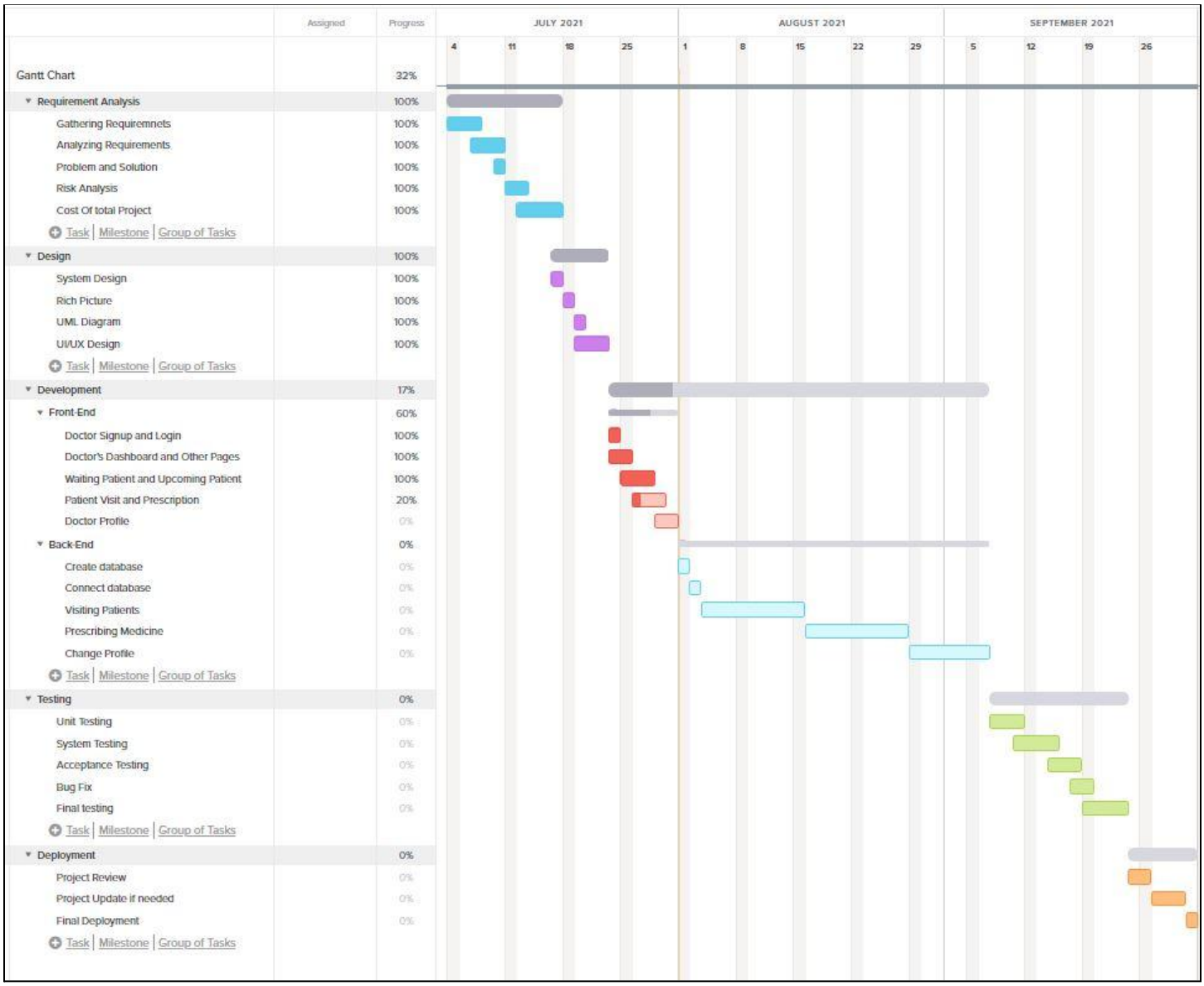

Figure 2 - Gantt Chart for Telemedicine Website

The first 10 working days, starting from (4th July - 16th July) the Requirement Analysis step begins with gathering requirements to design the system, then analyzing those requirements, and finally finding the problem and solutions. After that, assess the risks that may arise during the process before producing a cost estimate for the website's development.

After that the Design phase took around a week (16th July - 24th July) which involves System design, a detailed image (Rich Picture) of how the system works, Unified Modeling Language (UML) Diagrams, and finally user experience and user interface (UI/UX) design must all be completed throughout the design phase. The Development phase will take about 30 working days, both Front and Back-End. Starting from (1st August - 9 September) consisting of Doctor Signup and Login, Dashboard, Waiting/Upcoming Patient, Visiting Patient and Prescription, and finally the Doctors' Profile make up the Front-End. The backend entails setting up and integrating the database, as well as writing queries to input and retrieve data. Testing phase starts from (10th September - 22 September) which is 10 working days to complete the testing.The system must go through unit testing, system testing, acceptability testing, bug fixes (if applicable), and finally a final test. And in the Deployment phase the system is examined, and any necessary upgrades are checked before final release which will take 5 working days (24th September - 29th September).

3.4 Process/Activity wise Resource Allocation

Web Portal Development Team & Salary

Table 2 - Web Portal Development Team & Salary

SL	Team Member	Employee	Approx Salary
1	Project Head (Senior full Stack Developer)	1	**25,000/-**

2	UI UX Designer	1	**15,000/-**
3	Sr System Analyst	1	**20,000/-**
4	Business Analyst	1	**20,000/-**
5	Marketing Team	3	**35,000/-**
6	Trainee Full Stack Developer	5	**25,000/-**

Project Valuation

Table 3 - Project Valuation of Telemedicine Website

Name	Purchasing Company	Description	Unit	Price In BDT
Hosting	Digital Ocean	128 GB SSD , 4GB RAM , 3 CORE CPU	1	**25,000/Year**
Domain	Whois.com	Name.com	1	**850/-**

3.5 Estimated Costing

Table 4 - Estimated Costing of Telemedicine Website

SL no.	Work Distribution	Costing
1	UI/UX Development	**45,000/-**
2	System Analyst	**60,000/-**
3	Development team	**1,50,000/-**
4	Business Analyst	**60,000**
5	Marketing Team	**1,05,000/-**
6	Domain and Hosting	**25,850/-**
	TOTAL	**4,45,850/-**

Marketing Budget/Month Plan

Table 5 - Marketing Budget/Month Plan

SL	Description	Cost/ Month in BDT
1	Digital Marketing	**25,000/-**
2	Offline Marketing	**15,000/-**
3	Doctor & Agent Accusation	**15,000/-**

Total Fixed Cost of Web Portal : **BDT 3,35,850/-**

Marketing budget/ Month : **BDT 55,000/-**

Chapter 4

Methodology

The reason for this collection is to supply a brief presentation to the assortment of issues examiners confront when planning and conducting investigation and assessment in this field. They are intended to cover the spectrum from resources for new researchers, to exploring innovative methods which might further high quality research.There are many methodologies, but our company has decided to follow agile methodology for this telemedicine project. Following are the steps, starting with Planning, Develop, Test/QA, Deliver and Assess.Just like Fast Sole, a majority of clients

desire a refreshed design for their website. After working directly with the clients and understanding the requirements, the UI/UX designers work on a prototype using tools such as Adobe XD. The team typically has two to three rounds in the design phase. To ensure that the website features the latest web design elements while considering responsiveness and accessibility.

Chapter 5

Body of the Project

5.1 Work Description

A telemedicine website is one such platform where a patient can remotely connect with a doctor and receive services as needed. Everyone who uses the website will have individual login credentials for using the system. Firstly the Patient logins with his/her credentials, the search for a Doctor based on the country. After finding the desired doctor, the patient selects the Doctor for appointment. This appointment request is received by the respective Doctor. Doctor later goes to the waiting patients option in the dashboard and enters which date's appointment he/she wants to see. Doctor selects the appointment from the list. A whatsapp/whereby meeting link will be present in the appointment section. Doctor and Patient will join that meeting link. After seeing/observing the patient, the doctor will give suggestions or prescribe medicine according to the requirements. After taking the service the patient will be charged based on the respective doctor's fee. The doctor can view all of his/her patients' prescriptions and those records can be later used for further research by the doctor.

The doctor's can edit and update their information such as -

- Working days
- Visiting hours
- Regular Visiting Fee
- Follow up Visiting fee
- Change Password

5.2 System Analysis

5.2.1 Six Element Analysis

Table 6 - Six Element Analysis of Telemedicine Website

Process	System Role					
	Human	**Non-Computing Hardware**	**Computing Hardware**	**Software**	**Database**	**Network and Communication**
Request for appointment	Patient	N/A	Computing Device	Web Browser	MySQL	Internet
Approve Appointment	Admin	N/A	Computing Device	Web Browser	MySQL	Internet
Change Visiting Fees	Doctor	N/A	Computing Device	Web Browser	MySQL	Internet
Check Visits Between two dates	Doctor	N/A	Computing Device	Web Browser	MySQL	Internet
Check upcoming/waiting Patients' appointment	Doctor	N/A	Computing Device	Web Browser	MySQL	Internet
View Appointment	Doctor Patient	N/A	Computing Device	Web Browser	MySQL	Internet

5.2.2 Feasibility Analysis

We need to conduct a feasibility analysis in order to effectively construct and implement our project. It will inform us of the advantages of our project. It will also inform us of some critical issues that we must all consider before beginning our project.

- Technical Assessment - The Telemedicine Website will be a full stack development. To store its data, we will be using MySQL, MySQL is a relational database management system based on SQL – Structured Query Language. The application is used for a wide range of purposes,The most common use for mySQL however, is for the purpose of a web database. We chose MySql since our project is web-based. We'll use Codeigniter on the server side, which is a strong PHP framework with a tiny footprint designed for developers who require a simple and beautiful toolset to build full-featured online apps. We'll utilize Bootstrap, javascript, and jquery for the front end because they're often used in web development and primarily for the frontend development. As code of bootstrap and jquery majorly executed at client end so also responsible for style and look and feel of the UI.

- Operational Feasibility - The telemedicine platform will ensure both patients and doctors a secured environment for preliminary treatment. Patients and Doctors can readily comprehend what is occurring and how to proceed. The company will act as a bridge between Doctor and Patient. This software is accessible to everybody. The management must give real time service without any delay to ensure best results for the system.

- Economic Feasibility - The Company is planning to invest 3,35,850 BDT total on Web portal, which includes Senior full Stack Developer,Trainee Full Stack Developer, Sr System Analyst, Business Analyst, UI/UX Designer, Marketing TeamHosting and Domain. They will have around 55,000 BDT for marketing the telemedicine Platform which includes Digital Marketing, Offline Marketing, Doctor & Agent Accusation. With this program, the company can effortlessly grant benefits to patients and specialists. In this widespread, this stage will minimize the number of individuals being influenced.

5.2.3 Problem Solution Analysis

We are having some difficulties in completing this job. We are also working to resolve this issue as quickly as possible. Some of the issues were

- Internal Server Error - To build this project and store its data we had to face 500 Internal Server Error which is server error response code indicates that the server encountered an unexpected condition that prevented it from fulfilling the request. We had to troubleshoot the problem as a 504 Gateway Timeout error.

- Different Coding Patterns: There are numerous ways to write code, construct functions, and implement them. The Codeigniter framework was a bit challenging at the beginning but later we are becoming more familiar with Model View Controller (MVC). There are also other coding structures to choose from. Everyone develops code in their own style, which they are at ease with. Other coders, on the other hand, may not grasp this style of coding. This results in a delay in debugging time.

5.2.4 Effect and Constraints Analysis

We are building this project to make life easier for both doctors and patients and work as a bridge between them. As the system is web based, the company can get up-to-date information about present in-demand services and needs. The company can easily analyze data and launch new services or stop old, fewer demand services. People with no internet service won't be able to use the system. Data can be corrupted at times. As a result, users of this software should be cautious of the information they enter. We will continue to work on adding more features to this program in the future. We'll strive to employ AI to check and evaluate our data as rapidly as possible.

5.3 System Design

5.3.1 Rich Picture

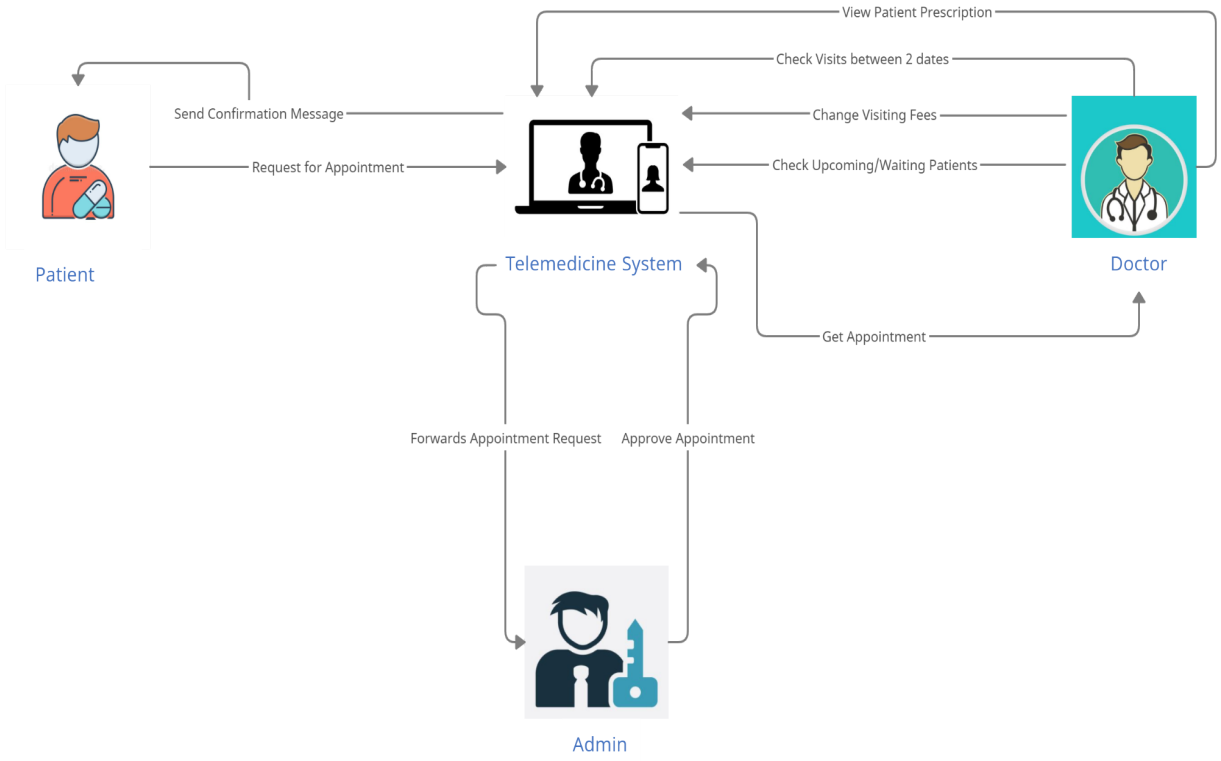

Figure 3 - Rich Picture of Telemedicine Website

5.3.2 UML Diagrams

- **Use Case Diagram:**

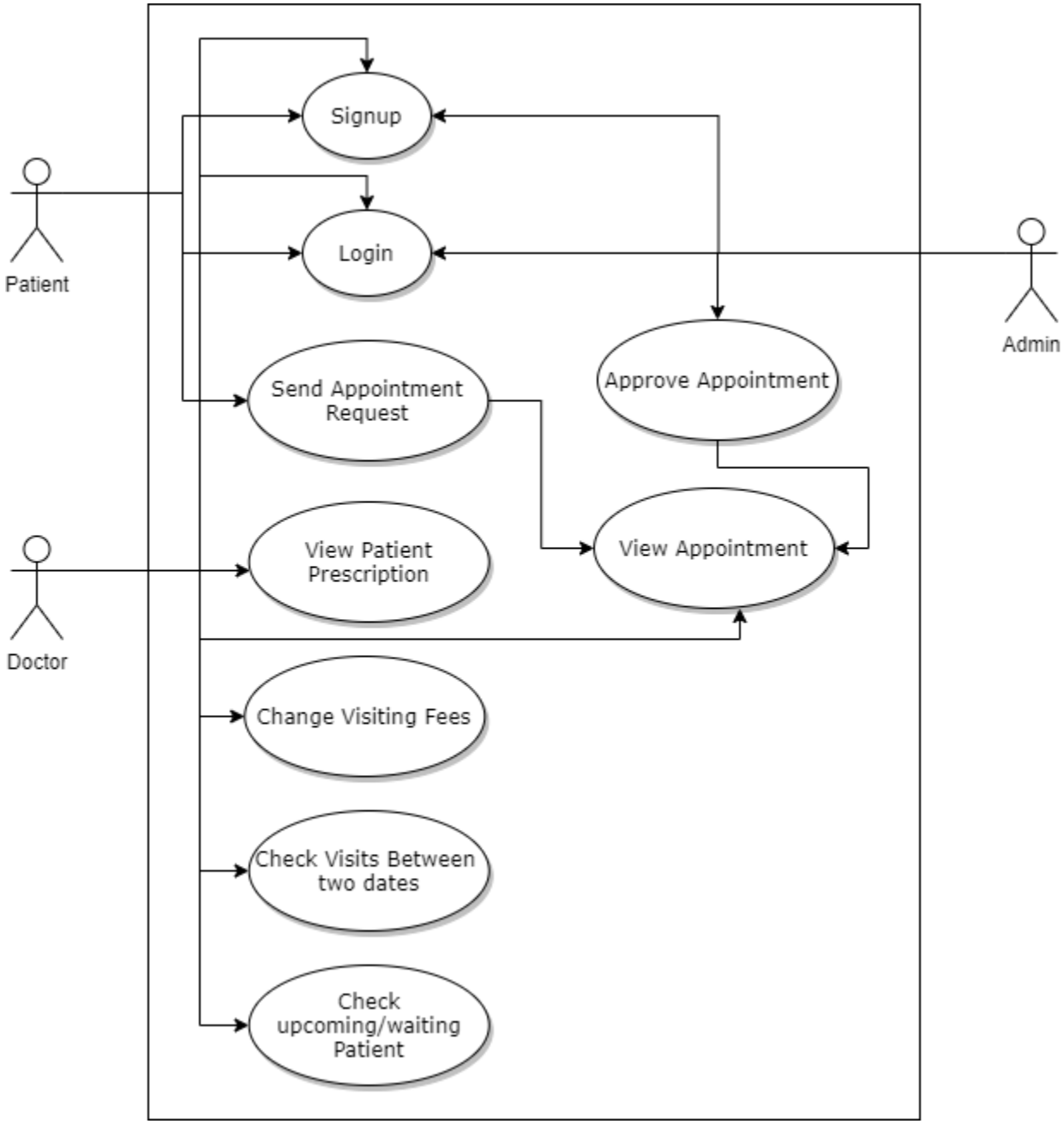

Figure 4 - Use Case Diagram of Telemed Website

☐ Activity Diagram :

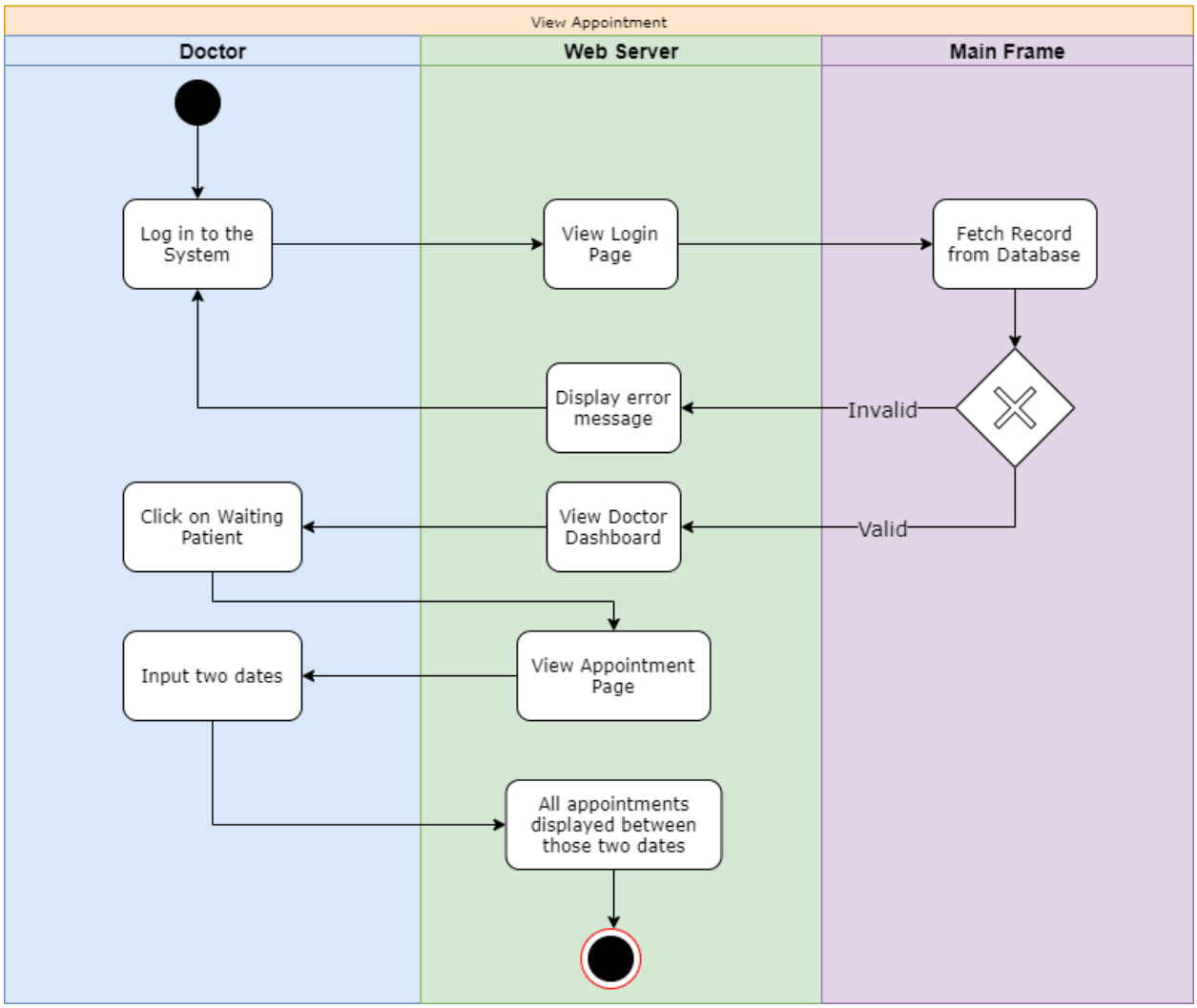

Figure 5 - Activity Diagram of View Appointment

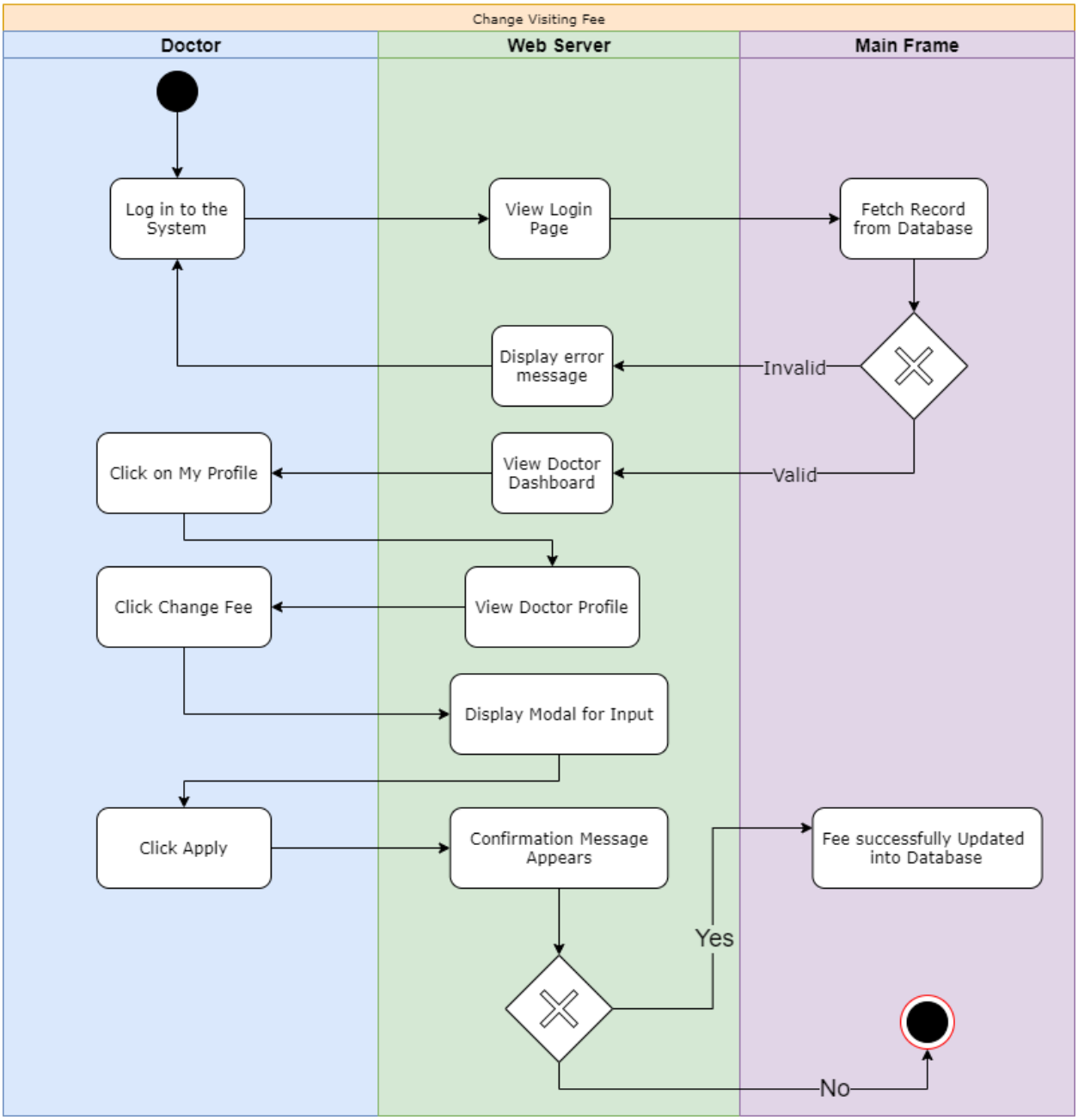

Figure 6 - Activity Diagram of Change Visiting Fee

5.3.3 Functional and Non-Functional Requirements

Functional requirement

- The system shall generate a unique id for every stakeholder
- The system shall check new stakeholders' phone numbers are unique or not.
- The system should only accept unique phone and email numbers from new stakeholders.
- The system shall allow the Doctor to cancel appointments.
- The system shall store all appointments records for future research and analysis.
- The system shall display previous visiting prescriptions as the patient search queries.
- The system shall display all services available for a user.
- The system shall store all browser cookies and search queries to give users a better user experience
- The system shall allow displaying profiles of all stakeholders.
- The system shall allow the updating of profiles of all stakeholders.
- The system shall prioritize patient searching for a particular specialized doctor.
- The system shall keep track of all the transactions taking place.

Non-Functional requirement

- This system's user interface is clear and straightforward. Users can quickly become accustomed to this software.
- This software is simple to use for everyone.
- Every visiting record/Appointment will be stored in the database for future use.
- Every transaction will be calculated by the system to avoid miscalculation.
- Every transaction will be stored in the database for avoiding miscalculation.
- This system will be secure.
- User data will safely backup if any inconvenience.
- The system will deploy on the cloud and be regularly maintained by the system admin and other employees.
- Users can use this software in a few countries.
- Necessary system updates will come from time to time after fixing bugs if required.
- A device having a web browser and an internet connection can use the system.

5.4 Product Features

5.4.1 Input

Table 7 - SignUp Doctor Input

<table>
<tr><th colspan="2">Name of the Function : Signup Doctor</th></tr>
<tr><td>Input:
Email, Phone No, First Name, Last Name, Speciality, BMDC Reg. No, Practicing Certificate, Nation, Gender, Password</td><td>Process:
● The Doctor must enter the following details in order to sign up as a Doctor.
● Email with verification link will be sent to the Doctor’s email address.
● The Doctor will be added by the admin after validating the Doctor’s credentials.</td></tr>
<tr><td colspan="2">Precondition:
● Doctor should have a valid Whatsapp phone number.</td></tr>
<tr><td colspan="2">Post condition:
● Doctor’s information will be saved in the database automatically.</td></tr>
<tr><td colspan="2">Alternate Options:
● If the doctor provides an invalid whatsapp number, he/she won't be able to login to the system.</td></tr>
<tr><td colspan="2">Side Effect:
● N/A</td></tr>
</table>

Table 8 - View Appointment Input

Name of the Function : View Appointment	
Input: ● From date ● To Date	**Process:** The Doctor must enter the following details in order to view the pending appointments
Precondition: ● Doctors should have a minimum of 1 (one) appointment to see a list.	
Post condition: ● N/A.	
Alternate Options: ● If the Doctor has no appointment, no results will be shown.	
Side Effect: ● N/A	

5.4.2 Output

Table 9 - SignUp Doctor Output

Name of the Function : Signup Doctor	
Process: ● The Doctor must enter the following details in order to sign up as a Doctor. ● Email with verification link will be sent to the Doctor's email address. ● The Doctor will be added by the admin after validating the Doctor's credentials.	**Output :** Email notification
Precondition: ● Doctor should have a valid Whatsapp phone number.	
Post condition:	

● Doctor’s information will be saved in the database automatically.
Alternate Options: ● If the doctor provides an invalid whatsapp number, he/she won't be able to login to the system.
Side Effect: ● N/A

Table 10 - View Appointment Output

Name of the Function : View Appointment	
Process: The Doctor must enter the following details in order to view the pending appointments	**Output:** Pending Appointment list
Precondition: ● Doctors should have a minimum of 1 (one) appointment to see a list.	
Post condition: ● N/A.	
Alternate Options: ● If the Doctor has no appointment, no results will be shown.	
Side Effect: ● N/A	

5.4.3 Architecture

The architecture that we are using for this project is 3 tier architecture. Three-tier architecture is a well-established software application architecture that organizes applications into three logical and physical computing tiers: the presentation tier or user interface, the application tier, where data is processed and the data tier, where the data associated with the application is stored and managed. Because each tier runs on its own infrastructure, three-tier architecture has the advantage of allowing each tier to be built concurrently by a distinct development team and upgraded or scaled as needed without affecting the other tiers.

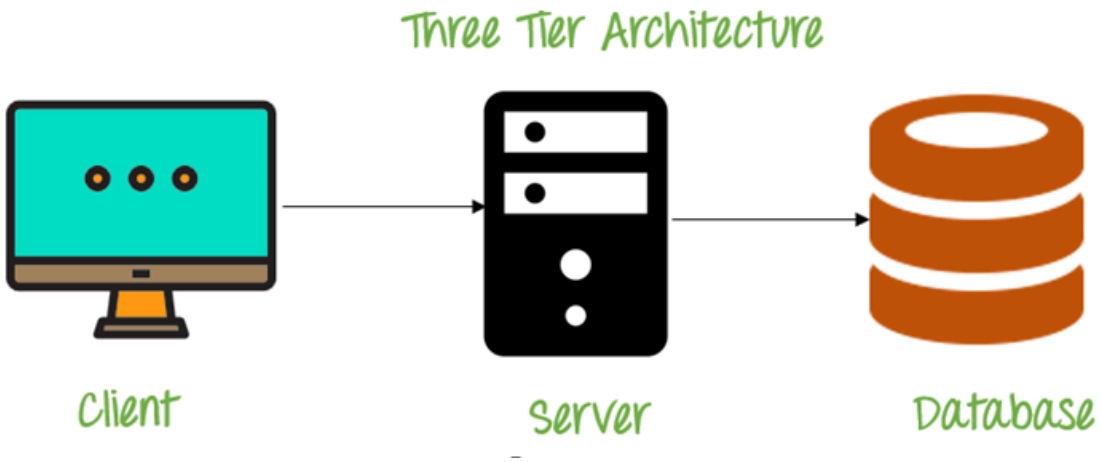

Figure 7 - 3 Tier Architecture

Chapter 6

Results & Analysis

Following Test Cases have been performed on Doctor Side. To run these cases, internet connection must be available at the time of testing.

Table 11 - Test cases of Doctor Side

Test ID	Test Case	Input Test Data	Steps to be executed	Expected Result	Actual Result	Pass/ Fail
T1	Doctor Signup	Email, Phone No, First Name, Last Name, Speciality, BMDC Reg. No, Practicing Certificate, Nation, Gender, Password	**1.** Click Signup link **2.** Click Create Doctor's Account Button	**1.**Verification email will be sent **2.** Doctor's account will be created	**1.**Verification email is sent **2.** Doctor's account is created	Pass
T2	Doctor Sign In	Country Code, Phone number, Password	**1.** Click Signin Button	Doctor will be able to sign in to the account	Doctor is Signed in	Pass
T3	Change Profile Photo	Image less than 1024 mb and JPG,JPEG or PNG format	**1.** Click My profile **2.** Click Choose file **3.** Select Image **4.** Click Open	Doctor will be able to change profile photo	Doctor's Profile photo is changed	Pass
T4	Update Workdays	N/A	**1.** Click Change **2.** Select Check Boxes below respective days **3.** Click Apply Button	Doctor's work days will be updated	Doctor's workdays is updated	Pass
T5	Update Visiting Hours	From Hour, To Hour	**1.** Click Change **2.** Enter hours **3.** Click Apply Button	Doctor's visiting hours will be updated	Doctor's visiting hours is updated	Pass
T6	Change Visiting Fee	Amount/Fee	**1.** Click Change **2.** Enter Fee **3.** Click Apply	Doctor's Fee will be updated	Doctor's Fee is updated	Pass
T7	See Waiting Patient	From Date, To Date	**1.** Click Waiting Patient **2.** Enter Dates **3.** Click Search Button	Patient List will be displayed	Patient List is displayed	Pass
T8	See My Patients	Country, From Date, To Date	**1.** Click My Records **2.** Click My Patients	Patient List will be displayed	Patient List is displayed	Pass

			3. Enter Country and Dates **4.** Click Search Button			
T9	See My Prescription	Country, From Date, To Date	**1.** Click My Records **2.** Click My prescription **3.** Enter Country and Dates **4.** Click Search Button	Patients Prescription will be displayed	Patients Prescription is displayed	Pass

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

Although there are cases where health care is effectively driven by the business motive, it is generally considered a public service in most nations. The provision of telemedicine services satisfies a critical societal demand in developing nations to provide health care to remote and rural areas. But most importantly in this pandemic, people became more cautious regarding health issues as visiting the clinic has a high probability of getting affected by the Covid-19 virus.

Whereas telemedicine has potential preferences and benefits, there's small proof of its cost-effectiveness and long-term supportability. In certain cases, telemedicine does result in cost decreases, but our telemedicine system developing team has figured out how to recover the costs and gain a benefit from people who use the system.

In the case of software and web development, the telemedicine system is built to be long-lasting so that they can serve the users without any difficulties. To ensure the long-term viability of our project, the website has been built to be accessible independent of the user's machine's environment. The site we made isn't subordinate to the user’s computer specification, operating system or high internet speed. The system will run on all computers, smartphones utilizing the commonly utilized browsers such as google chrome, Mozilla firefox, Microsoft edge etcetera.

The website's long-term viability will be ensured through routine maintenance of the website and its server. We have used Codeigniter framework which is a lightweight framework that ensures scalable and resourceful web applications.Codeigniter is based on the Model-View-controller framework, which ensures great security to the users.

With respect to the plan and format, the site is planned in a user-friendly way, giving significance to the User Experience while using the system. The users with minimal computer knowledge will be able to effortlessly browse and explore the site.

7.2 Social and Environmental Effects and Analysis

Users may simply visit the website to look for any doctor's information and schedule an appointment, as shown by the Telemedicine System. This allows individuals to save time by looking for a doctor online rather than going to numerous clinics throughout the pandemic.

Doctors can sign up through the telemedicine website and contact the management without coming to our office physically. Which will save doctor's time and no hassle to go to hospital and rent a chamber. In our system, he/she can easily visit a patient from anywhere. Moreover given the recent pandemic situation it is encouraged to remain domestic and have less physical contact with patients. Our site moreover makes an extraordinary deal in this cause as both doctor and patients don’t have to be present in the clinic physically.

The site is outlined and created to guarantee high effectiveness with less utilization of assets. We attempted to optimize our code, media substance as much as possible. The site is advertisement free and as it were MVC system alongside JavaScript is utilized, all these making a difference in in general optimization, coming about in utilizing less control and sparing energy.

7.3 Addressing Ethics and Ethical Issues

The ethical issues in telemedicine can be examined from a few perspectives like technology, doctor-patient relationship, information secrecy and security, patient's consent, patient's and family's satisfaction with telemedicine services.

We made sure our Telemedicine system is secured enough from hacking or breaching. We have renamed default controllers and used our controllers and models to ensure

greater security. Our office uses dedicated IP for internet connection for the developer team as the system is strictly confidential and the authority does not encourage any leakage of code. So to maintain more safety code, the developing team had to use an office computer the entire period while developing the system. Moreover the team involved in this project had to sign a non-disclosure agreement(NDA) just because they can sue a person if any unethical issue occurs.

All the project related reports, data, agreements, codes are moreover kept private by InfoTech solutions to guarantee the protection of the company and our users.

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

The internship experience in infotech solutions and working on a real-life project was exceptionally supportive in terms of learning and gaining knowledge. I got to learn from the exceptionally skillful designers and developers who have a tremendous sum of experience. Also learned how they do marketing of the system although this was not my part. In spite of the wonderful experience there were certain limitations in my period of internship.

The major limitation for me was the world-wide widespread circumstance of COVID-19 going on. I had to take the hazard of uncovering myself by going out for the office and working in a closed environment. People with mild fever were on leave but I still had a fear of getting affected as I have worked with them. It was moreover very troublesome keeping up all the safety measures for 8-10 hours of work, like wearing the cover at all times.

It was too challenging to learn so many new languages and frameworks at such a brief time. I didn’t get to learn the language and framework as much as I would have enjoyed given the reality that I was on a due date.

8.2 Solution of those Problems

Washing hands regularly with soap and water, or clean them with alcohol-based hand sanitiser. Had to maintain at least 1 metre distance between team members and other people. Learn in depth of the new language and frameworks after the internship for better understanding of how the framework works.

Chapter 9

Future Work & Conclusion

9.1 Future Works

As with any troublesome healthcare advancement, it takes time, approval, and the proper catalyst before it gets to be completely grasped over the medical community. With the coronavirus widespread, one advancement is at the forefront of changing the telemedicine healthcare scene.To illustrate the impact telemedicine will make in the future, we have a plan to ask healthcare leaders and telemedicine providers from multiple specialties how they anticipate telemedicine reshaping the future healthcare landscape. But our team has planned a few works that they would like to implement in future.

- **Access to specialists 24/7, which will benefit patient wait times** - There will be specialty centers where patients can call in and have 24/7 health care services to a network of doctors who are specialists in their strength ranges.

- **Add e-commerce functionalities** - Patients can purchase drugs prescribed by the doctors immediately after visiting a doctor without going to any pharmacy.

- **Add biosensors** - Doctors can easily see the patients biosensors details without asking general questions and help doctor give precise advices or medicines

- **Develop both android/ios version application** - Application will save time of both doctor and patient as they don't need to browse in web browser and looking for options. Easy access to emergency services will save precious time in time of emergency.

9.2 Conclusion

The project of Telemedicine infotech solution is almost in its final stage. Our company management is happy with the result we accomplished. We accept there are still scopes for advancement which we'll work on slowly. Presently Telemedicine has been initially checked for its presence within the web and we trust the site helps them to develop further as planned.

My internship experience in infotech solutions was massively great. Working in a company with a proficient group within the IT division was a really productive encounter for me. I learned and connected modern abilities and procedures, which did not result in creating a proficient telemedicine system, but moreover made a difference for me to extend my set of skills. They made a difference in each step and guided me at whatever point I required. I have moreover learnt how to work under strict deadlines and work beneath weight. But my group individuals played a vital role to form my work simply with their advice and suggestions and I never felt like an intern of the company. This internship has moreover made a difference for me to get introduced within the site improvement segment, and I am unquestionably getting to learn more about other systems in future that would help me to become a professional full stack web developer.

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3. Modern Healthcare. (2020, October 27). *Predicting the Future Role of Telemedicine*. https://www.modernhealthcare.com/technology/predicting-future-role-telemedicine

4. Wright, D. (1999). *The sustainability of telemedicine projects*. PubMed. https://pubmed.ncbi.nlm.nih.gov/10534863/

Appendix

UI Images (Screenshots)

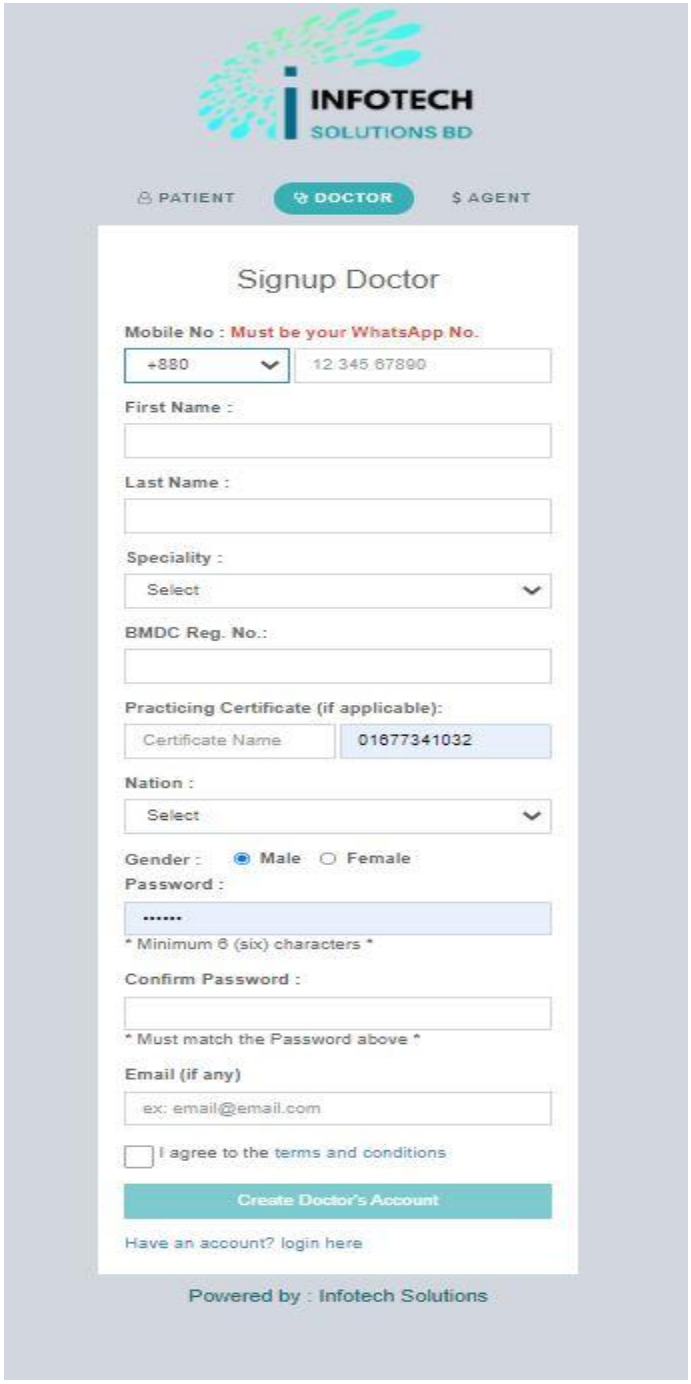

Figure 8 - Doctor Signup Form

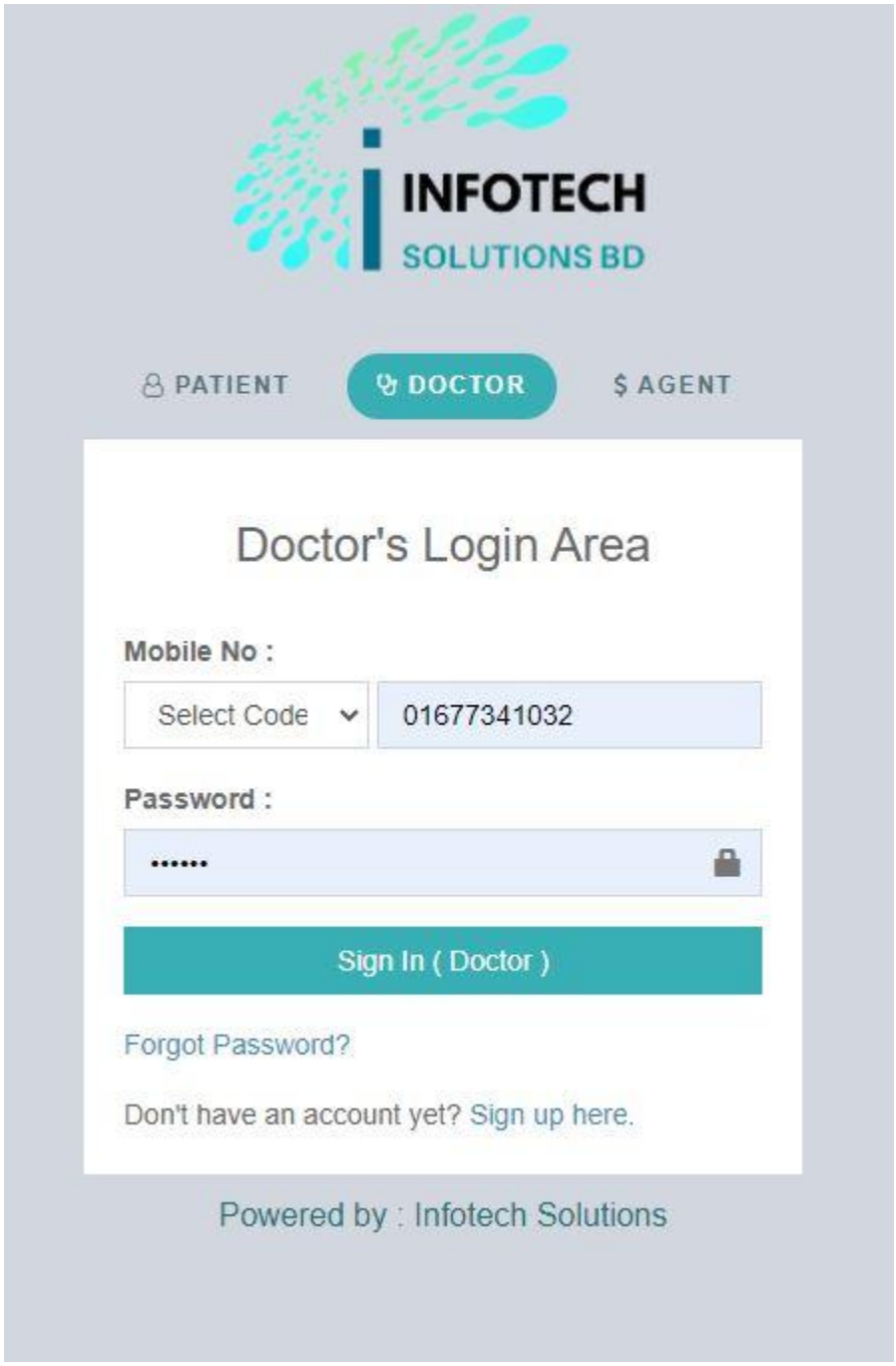

Figure 9 - Doctor LoginForm

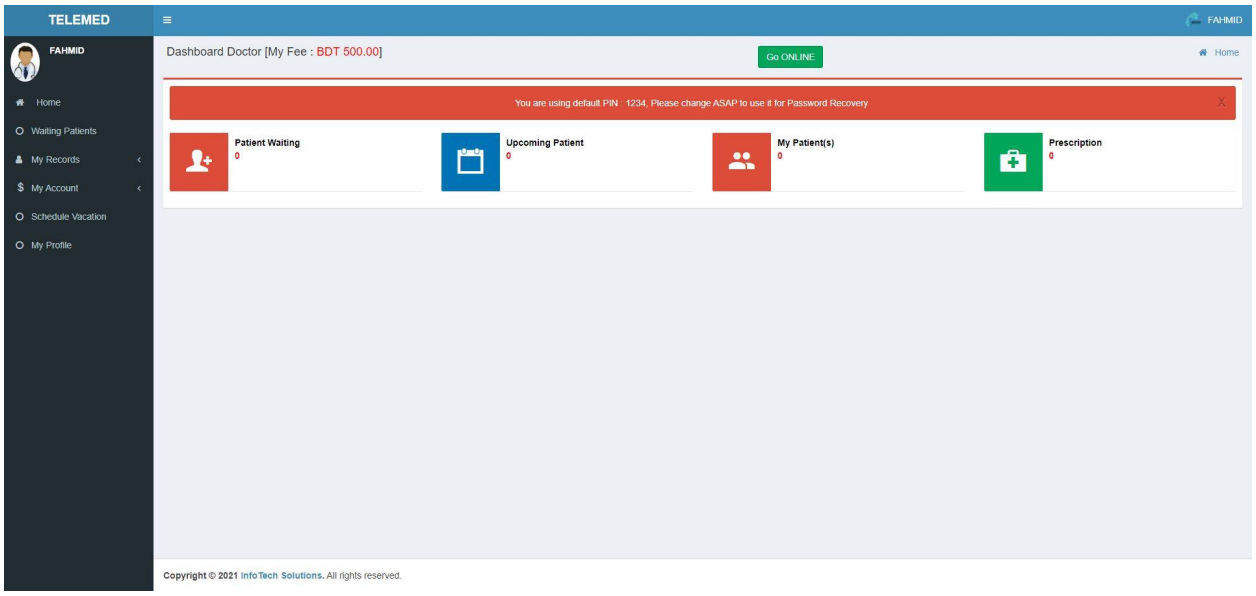

Figure 10 - Doctor Dashboard

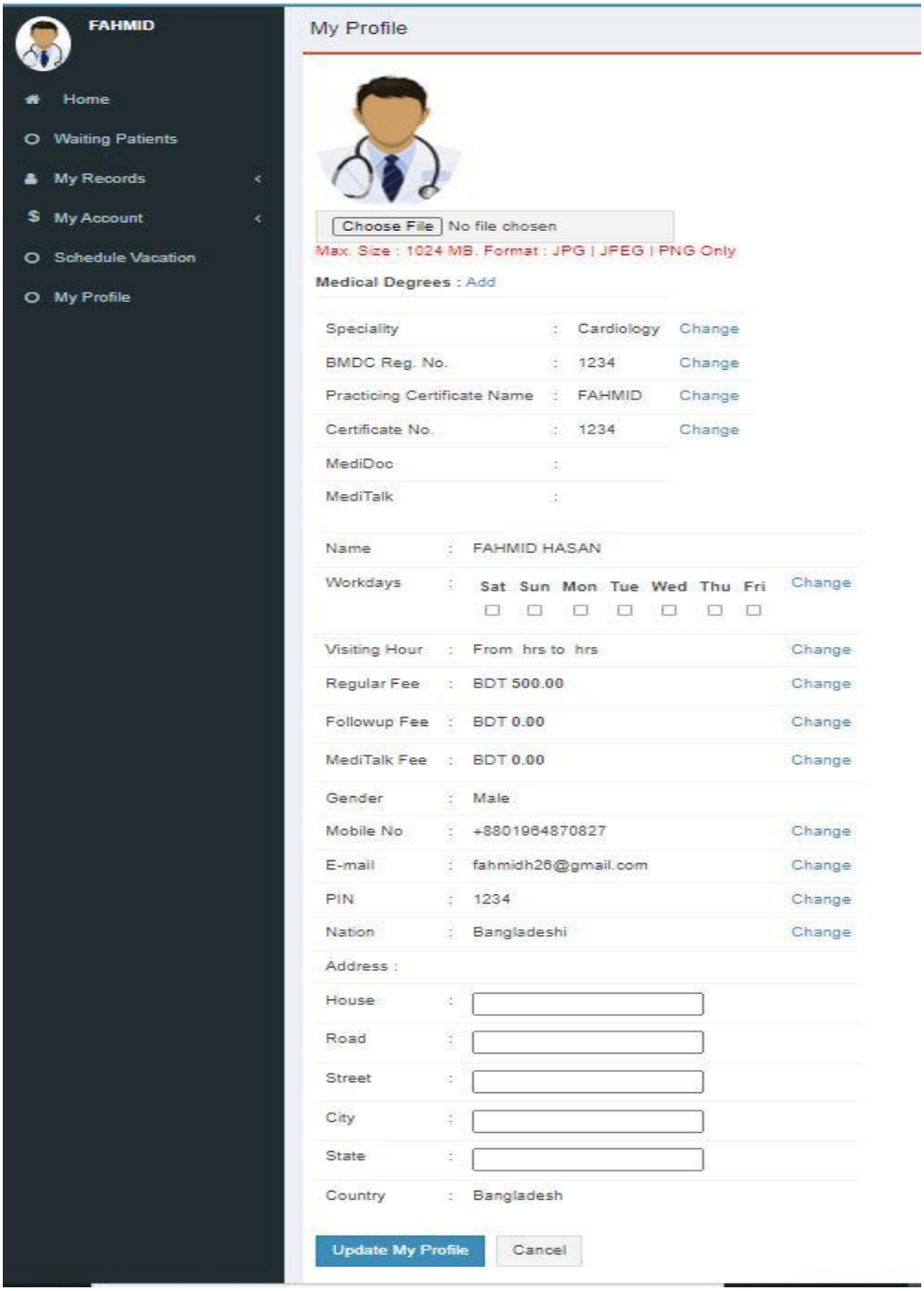

Figure 11 - Doctor Profile