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Smart Appointment Portal(SAP) for healthcare organization under Decimal it

Esti, Md.Ashikuzzaman

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An Undergraduate Internship/Project on Smart Appointment Portal(SAP) for healthcare organization under Decimal it

By

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Summer, 2022

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September 14, 2022

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

Department of Computer Science & Engineering

Independent University, Bangladesh

Attestation

This is to certify that the report is completed by me, Md.Ashikuzzaman Esti (ID:1720086), 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 Raihan Bin Rafique. I also certify that all my work is genuine 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 September 14, 2022

Md.Ashikuzzaman Esti

Name

Acknowledgement

I would like to firstly thank the Almighty Allah for giving me the endurance and the ability to work hard, and for giving me the ability to write this report and for giving me the chance to be able to do my internship at Decimal it . Also, my parents for their unconditional love and support that have sustained, nurtured, and got me ready for this challenge. I would like to thank my honorable faculty and supervisor Raihan Bin Rafique, Lecturer, Department of Computer Science Engineering, Independent University, Bangladesh, for his invaluable guidance, patience, time, constructive criticism and thoughtful advice regarding various aspects of my internship and preparation of this report. Then I would like to express my gratitude to "Ms Kaniz Fatema", Project Manager, for giving me the opportunity to complete my internship at Decimal IT for his guidance and support in this three months internship program. The learning and experiences I have gathered here have helped me a lot as a web developer, system analyst and resource planning and this will surely help me in the next phase of life. I would also like to express my gratitude to all my colleagues for helping me throughout and making the Internship process so much enjoyable. Without them, this journey would have not been easy.

Letter of Transmittal

September 14, 2022
Raihan Bin Rafique
Lecturer
Department of Computer Science and Engineering Independent University, Bangladesh.

Subject: Internship Report submission Summer, 2022.

With due honor and respect, I, Md.Ashikuzzaman Esti, from Summer 2022, Section 1, would like to submit my Internship report. This report is written to kindly inform you that I have completed my internship program and its report. My internship was conducted from 1st june 2022 to date. I completed my internship at Decimal it.

This report is based on my experience and the work I did at Decimal it during my internship. The primary goal for my internship was to gain experience in different technology related fields of the company, starting with research and development, documentation, content writing, web development and to get acquainted with best practices.

Over the period of my internship at Decimal it, I found out that I learned and applied a lot of new skills and technologies. The company comprises of a small team for Development, who learn, collaborate, and innovate together.

I would like to thank you immensely for all your guidance and support. I hope and pray that this report fulfills all the requirements and is up to your expectations.

Sincerely,
Md.Ashikuzzaman Esti, 1720086
Department of Computer Science Engineering
Independent University, Bangladesh

Evaluation Committee

14/09/2022

Signature 

Name

Raihan Bin Rafique

Supervisor

14/09/2022

Signature Asif Bin Khaled

Name

Md. Asif Bin Khaled

Internal Examiner/Panel member-1

14/09/2022

Signature 

Name

Kaniz Fatema

External Examiner/Organizational supervisor

25/09/2022

Signature

Name

Dr. Mahady Hasan

Convener



Abstract

In today's world there is a tough process of taking appointment for doctors in the healthcare industry.So it is required to have an efficient system to book an appointment of doctors.The more efficient this system can be it will help more the general people in terms of health related matters. So they are implementing SAP(Smart Appointment Portal) system for providing automated appointment booking process for the general people.

The task of my team for the project was to gather requirement, design the data, develop, test and implement. As technology has advanced enormously, I will get to learn more every day. In this report I will discuss how to implement a web application that serves the purpose of SAP services also its design, development, testing phase and benefits it provides.

As it was a new project for Decimal it, the company assigned me in the research, design phase, development and testing phase of a SDLC. The web application is based on Laravel and vue js framework and front-end is designed using HTML, CSS and Bootstrap where the database is designed in SQL.

Working in Decimal it as an intern, added huge experience to my career and gave me a lot of professional knowledge. This report will take us through all the details of web development and experience gathered during this internship period.

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Chapter 1

Introduction

1.1 Overview/Background of the Work

Smart appointment portal (SAP) is the process of automating the traditional doctor appointment system.Basically the patients can book appointment of a doctor without having to call appointment maintenance person.This way the patients can easily book their preferable doctor.So,the web application also allows doctor to provide their suitable appointment time from their own portal.

Previously the platform was based on manual appointment booking system of doctors, which caused trouble among the stakeholders as it required more time and human work.Considering this scenario, I have been assigned the work to develop a web application that will automate the booking processes of doctors.

Given, that the website will be created using HTML, CSS, Bootstrap at the front-end and at the back-end laravel and for database SQL will be used. This provides efficient responsive UI which will be both mobile and desktop compatible. The proposed work focuses on latest website building tools and practices which provide effective workflow process.

1.2 Objectives

The main objective of the project is to ensure easy process for the patients to book appointment and receive prescription from doctors from their own unique patient portal.During the covid the world realised how important it is to book appointment of doctors and receive prescription through online portal from home without having to go outside.This website will allow do book doctors appointment without having to call someone or go outside.The most beneficial factor of the website is that, because it is

an online-based system, patients can use it on their computers and phones, at any time anywhere.

1.3 Scopes

- Patient account creation:Patients can create their own account using their unique credentials through the platform.
- Login: After logging in, patients will be displayed on a user's homepage and menu will be shown in the Navbar according by their roles.
- Add booking time: Doctors can create their own unique appointment time and date.
- Doctor account creation: Admin will create individual doctor id and profile through the admin platform.
- Book appointment: Patients will be able to book appointment of doctors from the booking panel selecting time and date.
- Receive prescription: Patients will be able to receive prescription from the doctor through the portal after consulting the doctor.

Chapter 2

Problem Statement and Literature Review

2.1 Problem Statement

As the organization(client) currently using the manual system, so it is hard to keep data organized keep track of them when specific data is needed and hard to manage the frequency of appointments daily manually for both the stakeholders (Patient Doctor).As we know these data are important for both the stakeholders(Patient Doctor) so, having the capability to access these data and appointments through a web application makes it a lot user friendly that's why its needs to be automated. There are also a lot of incidents where data were lost for example: if a doctor prescribes a prescription to the patient the patient might lose it which is a huge part of patient's treatment cycle, even when a patient books an appointment through the manual way where most likely an individual who is a serial maintenance sometimes tampers the serial number of a patient by changing the serial number of a patient. These creates a huge problem inside the healthcare organization. To solve these problems the manual way needs to be automated through a web application.

2.2 Relationship with Undergraduate Studies

In my under-graduation studies, I acquired a lot of theories about programming and developing an application from start to finish. Most of the courses include both theoretical and lab work. I learned how to operate in a group in lab sessions, which will benefit me in real-world scenarios where I will have to collaborate with my colleagues to complete and deliver a project. It's very similar to working on projects in a group in lab class and working on projects in the office with colleagues.

These are the courses related to my work:

- Data Structures (CSE 203): This is the most basic course that helped us with the ideas of several data structures and their applications such as Stack, Queue, Linked List, Array, Pointer and so on.
- Object-Oriented Programming (CSE 213): In the developing industry most of the data is represented as an object. It also taught how to write modular programs which made codes less repetitive and more reusable.
- Database Management (CSE 303): This was the course that taught me how to design and plan a project. It covered popular planning and strategy practices such as Six Element Analysis, Problem Analysis, System Development Life Cycle, Rich Picture, Requirement Analysis, Entity Relationship Diagram, Business Process Model, Normalization and many more.
- System Analysis and Design (CSE 307): This course gives an overview of Used Case Diagram, Use Case Scenario, SDLC's and how to adopt each one of them to the project.
- Web Application and Internet (CSE 309): This is the course where the development of web applications was taught. It covered very important technologies that are highly in demand in the industry, such as HTML, CSS, Bootstrap, JavaScript, jQuery, View Engines, MS-SQL.
- Data Communication and Networking (CSE 316): This course gives fundamental understanding of Networks, traffic routing and management which helped in understanding certain factors in the cloud deployment phase.

Chapter 3

Project Management Financing

3.1 Work Breakdown Structure

WBS is a hierarchical structure which demonstrates a project's breakdown into smaller segments.For my project, I have produced a WBS so that my work is coordinated. WBS covers a visual of all the scopes, risks, points of communication, responsibilities, costs and guarantees that it does not skip essential deliverable. For brainstorming and collaboration, it is the ideal tool for the team. In my WBS, I have used the top-down approach.[1]

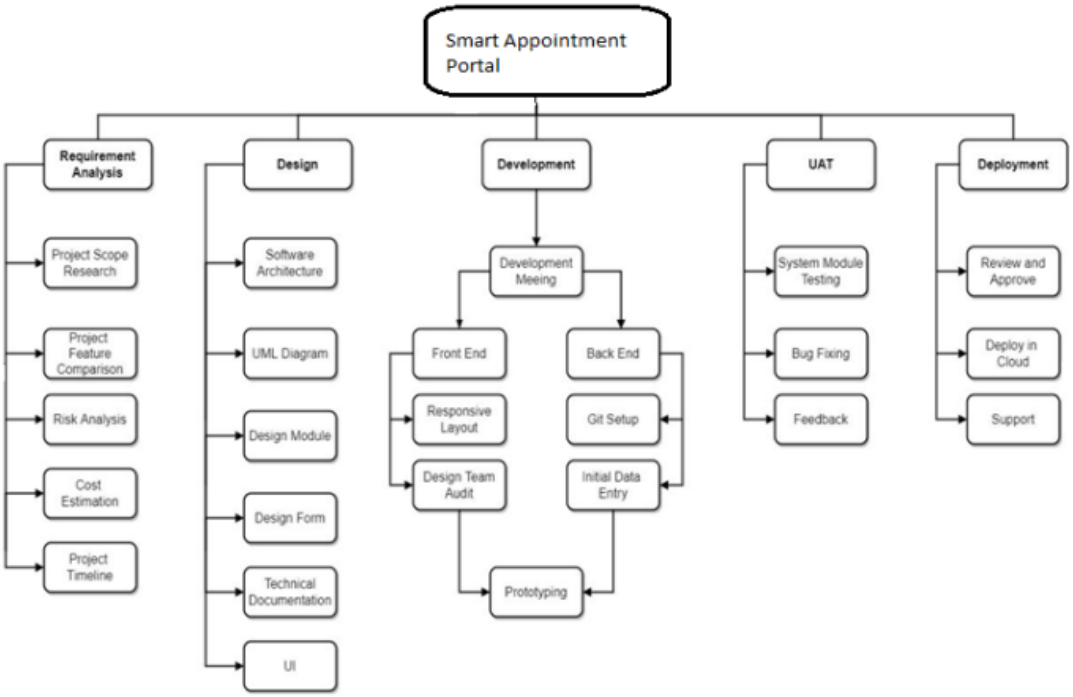


Figure 3.1: WBS of SAP

In the above diagram, Level 1 has five elements. Each of these elements are the phases of the project. The Level 2 Elements are the unique deliverable in every phase. All the lower-level components are deliverable. The project's primary steps include collecting requirements, designing, developing, testing, and deploying. The child tasks are the tasks that must be done to finish the current phase and go to the next phase. We have also made the cost calculation, resource allocation,and risk assessment, all of which are important for WBS and help us gain a better understanding of the project. A WBS also helps to avoid common project issues including missed deadlines, scope creep, and cost overruns, among others. When built as thoroughly as feasible, the WBS serves as a blueprint for completing what looks to be a difficult undertaking. However, when the project is broken down using a WBS, it becomes far more viable and approachable.

3.2 Process/Activity wise Time Distribution

For Each Section we have described in the WBS Diagram for Smart appointment System we made a time allocation. The Table below shows them in detail.

Task	Days	Work Percentage
Requirement Analysis	20	20
Design	17	10
Development	30	40
User Acceptance Testing (UAT)	12	15
Deployment	15	15
Total	80	100

Table 3.1: Task wise time allocation

It is very important to accurately estimate the overall time required to accomplish the project depending on the activities to be completed. It is also important to create priorities and set goals to complete a successful project. The development phase is by far the most important because it takes the longest to complete. Because we are working in order, if one task is delayed, the rest of the tasks will be delayed as well. As a result, it is important to complete tasks according to the estimated schedule.

3.3 Process/Activity wise Resource Allocation

The process of allocating and planning available resources in the most efficient and effective way possible is called resource allocation. Projects will always require resources, even though they can be scarce at times. Therefore, the project manager is responsible for the proper timing and allocation of these resources during the project schedule. Therefore, resource allocation is about managing the project and delegating resources to ensure that it runs as smoothly and efficiently as possible. The chart and table below shows how resources are allocated.

Task	Start	End	Resources	Employee
Requirement Analysis	1-June-22	20-June-22	Google, Similar projects, Articles	1
Design	21-June-22	7-July-22	Lucid,Excel,HTML,CSS,Bootstrap	1
Development	8-July-22	6-Aug-22	SQL,Laravel,vue.js	2
UAT	7-Aug-22	18-Aug-22	Testing tools,Test Server,Bug fixing	2
Deployment	19-Aug-22	2-Sep-22	GitHub,hosting	1

Table 3.2: Process wise resource allocation

3.4 Estimated Costing

The cost was calculated on the basis of the features the company requirement for the system. This includes design cost, development cost, deployment cost, local server cost included.

Work Distribution	Costing (Tk)
Designing	5000
Development,Testing	50000
Deployment	5000
Local Server	150000
Hosting	24000

Table 3.3: Estimated Costing

Chapter 4

Methodology

For a company, it is very important to understand the importance of analysing implementation of the correct system, as if there is a high chance of failure for the implementation process which can be later very costly for the company to bear. Usually, to deploy the any system the company must follow a specific framework and methodology.

A methodology is a set of approaches, practices, processes, techniques, procedures, and standards for solving problems. They're well-defined processes that show us what to do next, why each step in the software development life cycle is vital, and how to finish a project stage.

We are using an Iterative and Incremental Development Process for this project. Iterative and incremental development is a process that combines iterative design with incremental development. The incremental technique breaks the software development process down into small, achievable increments. Iterative software development refers to the technique of repeating software development processes in cycles known as iterations. Each increment builds on the preceding version, allowing for steady development. A new version of the application is developed after each iteration until the best product is determined. Iterative and incremental software development begins with planning and continues through iterative development cycles that involve ongoing user feedback and incremental feature additions, culminating in the release of completed software at the conclusion of each cycle.[2]

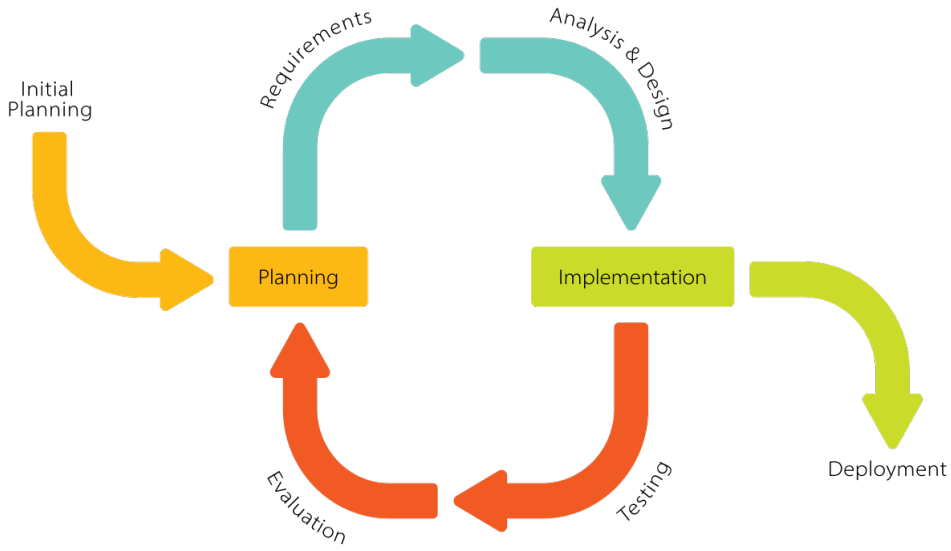


Figure 4.1: Iterative and Incremental Development Methodology [2]

• **Planning Phase:** My organizational supervisor and I discussed the project and gathered all of the requirements for the various capabilities that will be included in the web application. I'll start designing the app after I've written down and defined all of my requirements and concerns.

• **Analysis and Design Phase:** From beginning to end, I will have to develop the entire program in design software. When I finish creating, I need to show it to my organizational supervisor. I proceeded directly into development after the design was approved.

• **Development Phase:** The entire application will be built using the Laravel ,vue js framework which will make all of the static pages dynamic and completely functioning. As we all know, Laravel framework is built on the MVC architecture, with a customized admin site that interacts with an SQL database, these views will be dynamic. This could be the most time-consuming phase. Furthermore, in order to preserve the application's security, we must provide sufficient authentication and authorization for all users.

• **Testing Phase:** The testing phase is an interesting one since strange bugs keep popping up. During this point, I already took precautionary strategies as software might struggle to cope with large databases.

• **Evaluation Phase:** This phase will assist us in identifying the system's shortcomings and issues from the client's perspective. The web application can be upgraded and made more sustainable after receiving feedback. From the above discussion of how to use each step of the methodology, we can see that these approaches reduce overall risk and help the project respond quickly to changes, can quickly and easily adapt to any given

change, can achieve transparency and total alignment in the development and testing phases, I've decided to finish my project using the Iterative and Incremental method.

From the above discussion of how to use each step of the methodology, we can see that these approaches reduce overall risk and help the project respond quickly to changes, can quickly and easily adapt to any given change, can achieve transparency and total alignment in the development and testing phases, delivers overall higher quality products, and creates client satisfaction. For these reasons, I've decided to finish my project using the Iterative and Incremental method.

Chapter 5

Body of the Project

5.1 Work Description

Smart doctor appointment web-based application made which are currently being used in daily life to book an appointment with the doctor. Booking appointment of doctor becomes troublesome if it is done manually y calling the particular doctor, so to avoid these situations our companies primary focus is to automate the entire task required to book an appointment. The booking application has three types of users namely patient, doctor, and admin.

Furthermore, the work is mainly related to research, design and deployment phases. At first, I was assigned to do requirements analysis where I did research on other similar web applications and their functionalities, following which I did technical documentation of system analysis and design process of the system which contained use case etc. Which allowed me to proceed to development under the supervision of my external supervisor to implement the design. At this moment we are developing the web application. The resources that I used for requirement analysis are, monitoring manual processes and asking my external supervisor about their requirement and for designing I used,excel,lucid chart,Ms visio. Also, for web development we used Hltml, CSS,Bootstrap,vue js for front end and for back- end we used Laravel framework lastly for the database we used SQL. Finally, the web application will be deployed..

5.2 Requirement Analysis

5.2.1 Rich Picture

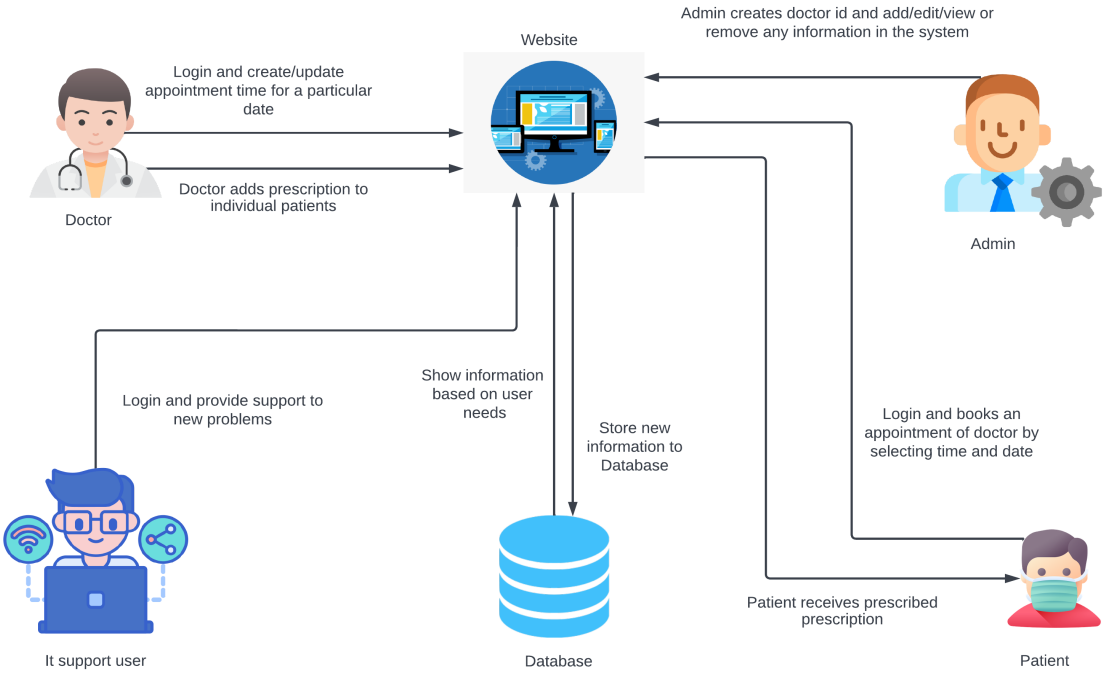


Figure 5.1: Rich Picture

5.2.2 Functional and Non-Functional Requirements

Functional requirements are product features that developers must implement to enable users to accomplish their tasks. A non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviours. They are contrasted with functional requirements that define specific behaviour or functions. The functional and non-functional requirements of this system are stated below.

Functional Requirements:

1. The authentication system validates the entered user's name, email and unique password upon receiving the information and logs the user into the app by creating an account.

2. The system will review if the inputted ID and password exists in the system or not/ the system will show a message if password is incorrect.
3. The system will show a message if ID is not found in the system's database.
4. The patient will be able to book an appointment with his doctor selecting date and time.
5. Patient views prescribed prescription given by the doctor in the dashboard.
6. Patient updates profile.
7. Admin creates doctor id and update the doctor's information.
8. Admin checks booked appointment of patients on a particular date and time.
9. Admin creates departments, update and delete them.
10. Admins will be able to add, edit, view or remove any information in the system.
11. Doctor creates appointment time for a particular date.
12. Doctor can update the time slot as well.
13. Doctor can check how many patients have made an appointment on a particular date by filtering through the date.
14. Doctor adds prescriptions to individual patients.

Non-functional requirements

1. Usability: The system is going to be user-friendly and aesthetically pleasing for the users.
2. Maintenance: This system/app is going to be maintained 2 times in a year, it runs smoothly and does not get slow or lag. Any bugs or problems can be fixed easily.
3. Valid data: All the information being updated in the system must be accurate and consistent for the users to take.
4. Scalability: The system can be accessed from any devices like: Computers, Smartphone.
5. Performance: Performance should always be smooth and easy to understand. These should leave a positive experience for users.

6. Service: Service: Clients can use the system from all around the world.
7. Reliability: The system will be backed-up for safety reasons and will not hamper and data during this process.
8. Control: As the system is initialized by the government, privacy will be maintained strictly. It will be completely secured and will be checked by the developer's time.
9. Security: The system will be secured and personal information like the user's phone numbers, the email address will be safe.

5.3 System Analysis

5.3.1 Six Element Analysis

Process	System roles					
	Human	Non-Computer Hardware	Computing Hardware	Software	Database	Communication and Network
Login	All User	N/A	Computer	Browser	SQL	Internet
Book appointment	Patient	N/A	Computer	Browser	SQL	Internet
View prescription	Patient	N/A	Computer	Browser	SQL	Internet
Add Prescription	Doctor	N/A	Computer	Browser	SQL	Internet
Create appointment	Doctor	N/A	Computer	Browser	SQL	Internet
Create/edit doctor id	Admin	N/A	Computer	Browser	SQL	Internet
Add/edit/ remove department	Admin	N/A	Computer	Browser	SQL	Internet

Table 5.1: Six Element Analysis of Project

5.3.2 Feasibility Analysis

A feasibility analysis evaluates the projects potential success. It helps to conclude whether the project is worth the investment and time or not. So, we need to do a feasibility analysis after obtaining all the necessary information and before the beginning of the development phase, which will take the most time. i.e. a measurement for evaluating a software product in terms of how practical product development will be for the company. Feasibility studies are carried out for a variety of reasons, including establishing whether a software product is suitable in terms of development, implementation, and project value to the company. The factors we need to consider for feasibility study are:

• **Needs Assessment:**As the word is self-explanatory, at first, we analyse and extract the faults that the previous manual system had and understand the goals the of the migration. Later, we research on solutions our web application provides to the problems and will it allow future flexible changes, and hence as requirements are met and web application is capable to support all needs, we conclude that there is a need of the web application and move ahead to next step of the procedure. Then, we need to analyse the client needs and check if satisfies the client. If all goes well, we execute them in live environment.

• **Technical Assessment:** As the word is self-explanatory, at first, we analyse and extract the faults that the previous manual system had and understand the goals the of the migration. Later, we research on solutions our web application provides to the problems and will it allow future flexible changes, and hence as requirements are met and web application is capable to support all needs, we conclude that there is a need of the web application and move ahead to next step of the procedure. Then, we need to analyse the client needs and check if satisfies the client. If all goes well, we execute them in live environment. • Technical Assessment: This is one of the most important where necessary tools and technical support required for an organization to migrate to the new system is analysed. At first, we need to understand whether the web application will be hosted in the cloud or physical server. Also, we check the infrastructure specifications for hosting the application. So, as we have the professionals for development phase of project, they need to ensure that the web application can perform all functionalities required to solve problems and provide better customer service. Also, since the team has all the required hardware and software needed to develop this system it is technically feasible.

feasible. All these assessments allow us to evaluate that the web application is feasible and a good investment considering current scenario and future advancements.

5.3.3 Problem Solution Analysis

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

1. Defining the Problem.
2. Generating alternatives.
3. Evaluating and Selecting alternatives.
4. Implementing Solutions.

There were several problems that were encountered while completing the project and they were solved accordingly with those four steps. Some of the problems were: -

- Changing User Roles
- Adding prescription
- Create New User Account
- Status Update

5.3.4 Effect and Constraints Analysis

The smart appointment for healthcare organization helps both doctor and patients to have a better experience and overcome many drawbacks that previously was not accessible. It allows automation of process and access of information to many problems through its database. This basically automates the processes to book and appointment so that processes become more efficient and reliable. It will provide better customer satisfaction solution and experience at an easy few click away. As we know, reliability, comfort and flexibility are offered for this web application allowing many troublesome factors to be dismissed. Also, as it is in cloud when many users access the server at once which results in huge server miss rather than hits, by use of cloud's auto-load balancing feature we can set policies such as if the server requests cross the server request handling limit then scale up the package and open another server for time being which reduces the chances of server breaking down due to overload of requests and allows users to have smooth experience. But also, the system still has limitations which need modifications for further development. There are many modules that are needed but not considered hence, we are still thriving to bring out more changes and add more features/modules to our web application that would bring solutions to many issues and, encourage more and more people to use this web app.

5.4 System Design

5.4.1 UML Diagrams

The activity diagram is an important UML diagram that shows the row of one activity to another. The activity diagram of the user and admin help to visualize the row of their activity in graphical form.

Use-case Diagram:

The use case diagram represents the functional requirements of the system. It shows the actors, cases, communication links, system and relationship.

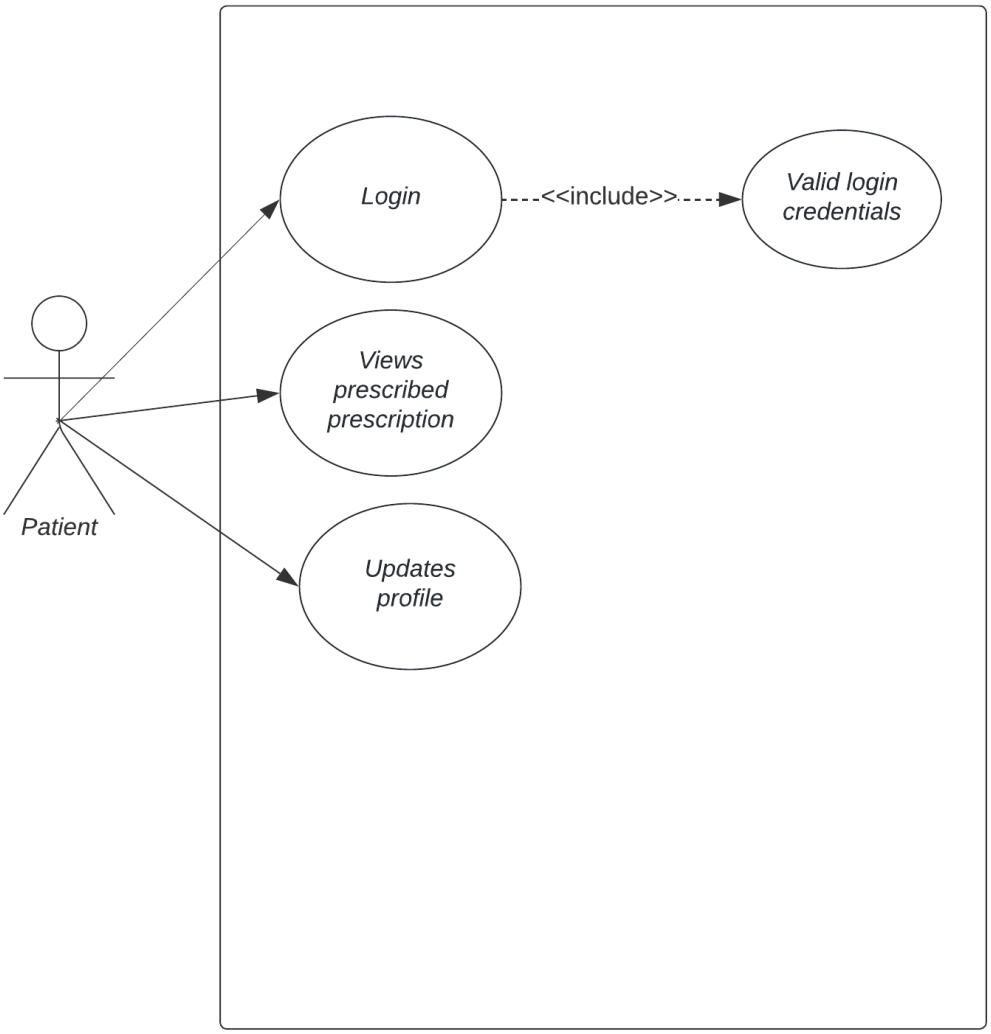


Figure 5.2: Use case diagram for patient

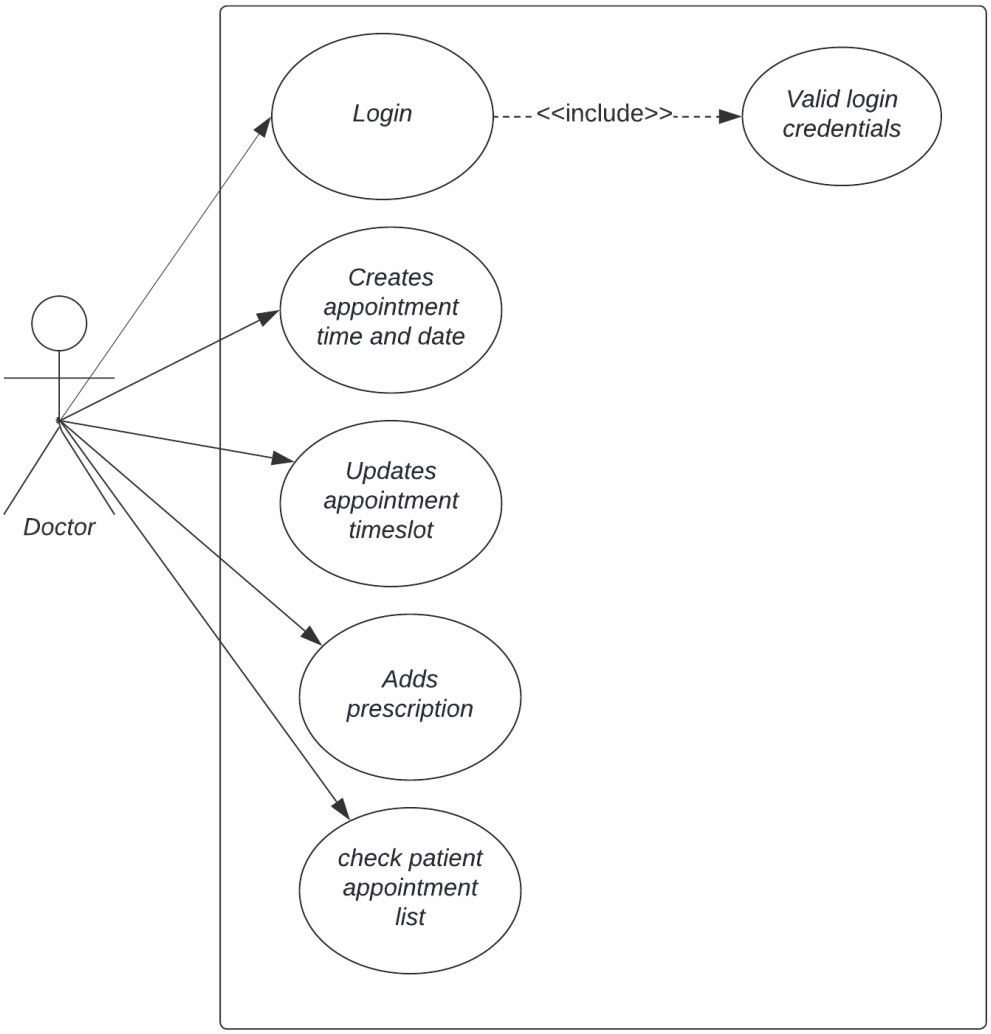


Figure 5.3: Use case diagram for doctor

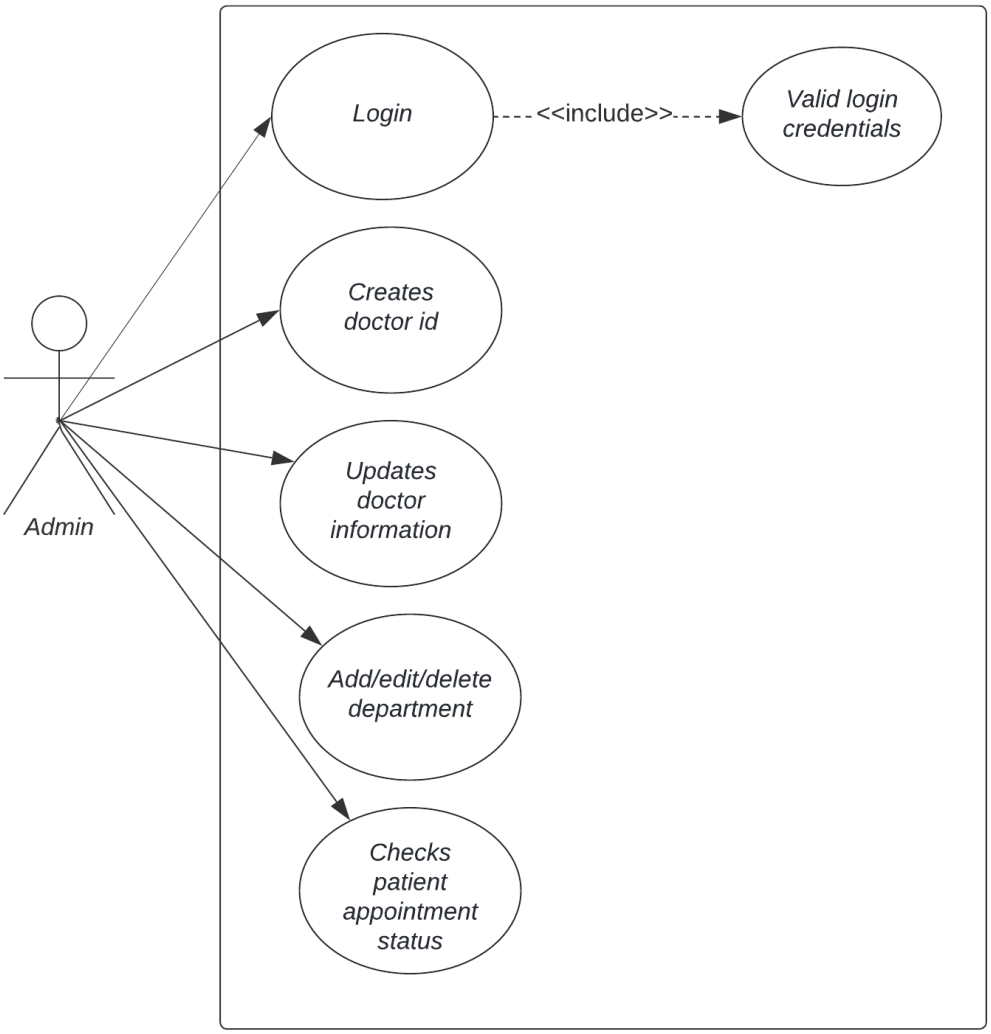


Figure 5.4: Use case diagram for Admin

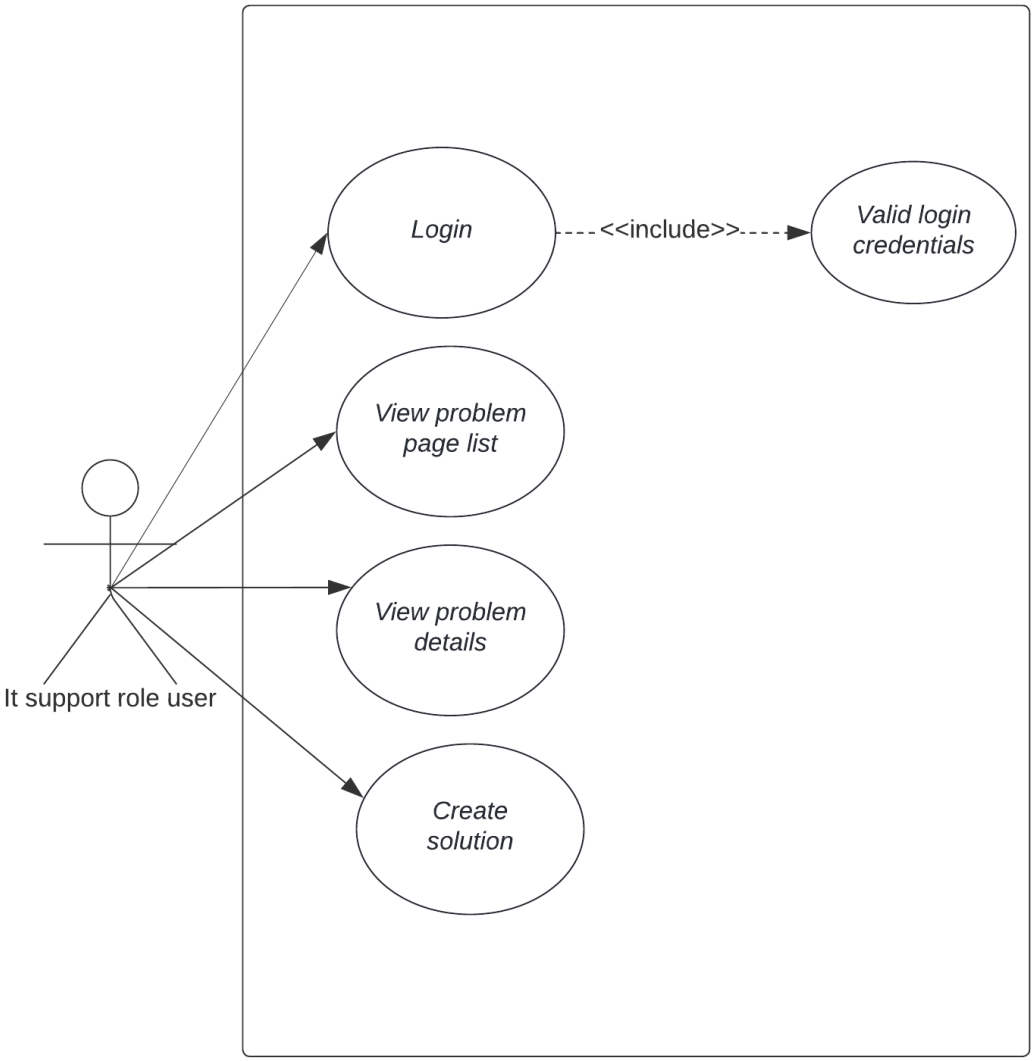


Figure 5.5: Use case diagram for it support role user

Activity Diagram:

Activity diagrams are graphical representations of workflows of step-wise activities and actions with support for choice, iteration and concurrency. In UML, activity diagrams are intended to model both computational and organizational processes (i.e., workflows), as well as the data flows intersecting with the related activities. Although activity diagrams primarily show the overall flow of control, they can also include elements showing the flow of data between activities through one or more data stores.

Activity diagram for some of the major activity is given below.

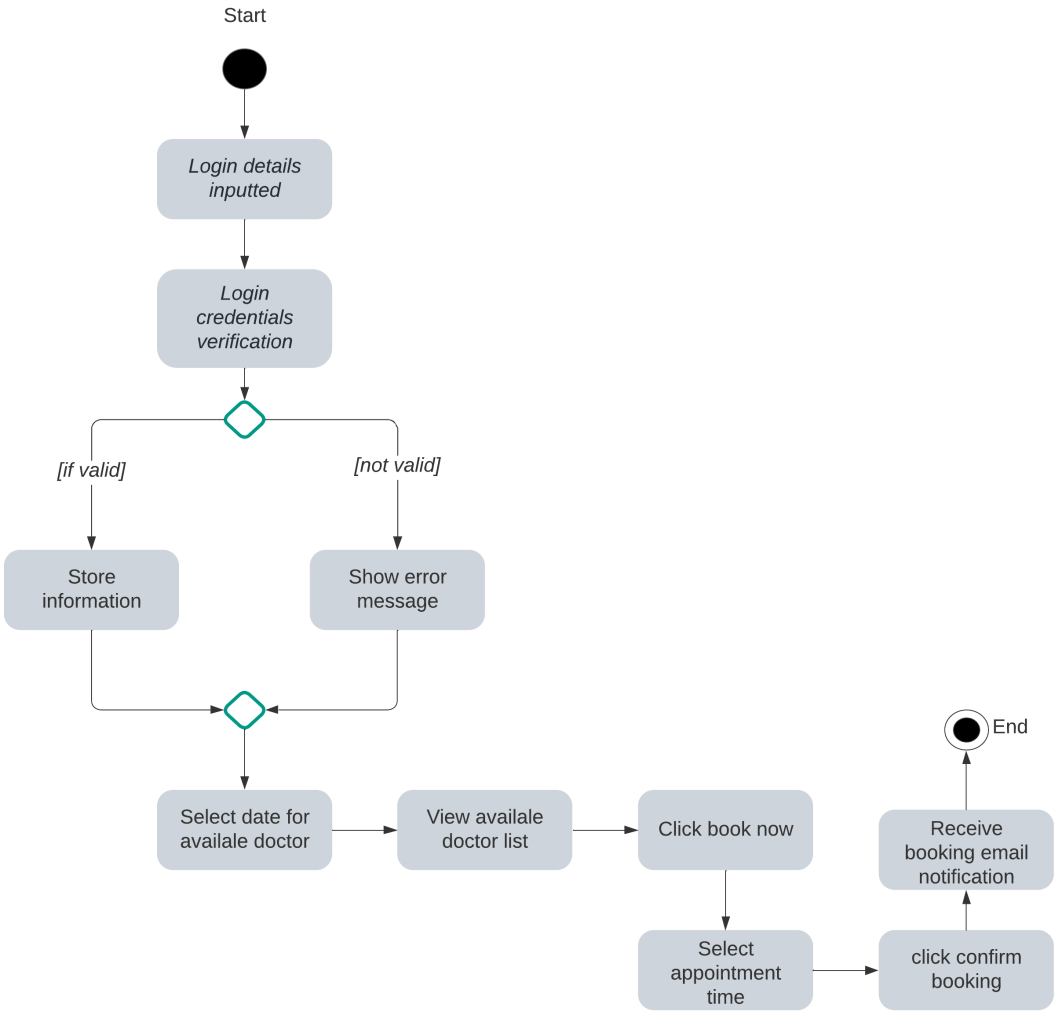


Figure 5.6: Activity diagram for booking appointment of doctor

5.4.2 Architecture



Figure 5.7: System Architecture

There are different types of architecture used in various systems. In our system we used this architecture. As we can see, the diagram displays the overview of the website

architecture. It can be evaluated from here that the whole process in web application can be understood. As you can see the user access the web browser and views the website and these packets are sent to the server via internet and then these requests are forwarded to database server for fetching or storing data as per credentials. The database we are utilizing is My-SQL which receives request of users from web server, validates and responds to it. accordingly. The SQL back-end is connected to an efficient front-end UI that is HTML, CSS, Bootstrap based for good client experience.

5.5 Implementation

Here I have included all the features a patient will receive from this project.My main task was to book appointment of patient which i did complete with laravel and vue js framework. All of these pages are responsive can be used from any device.From our client requirement analysis the requirement of front end was pretty simple ,the client wanted simple white background with black coloured articles so that patients can see it clearly. I took screenshot of all of the pages and i have included those below.

Home Page

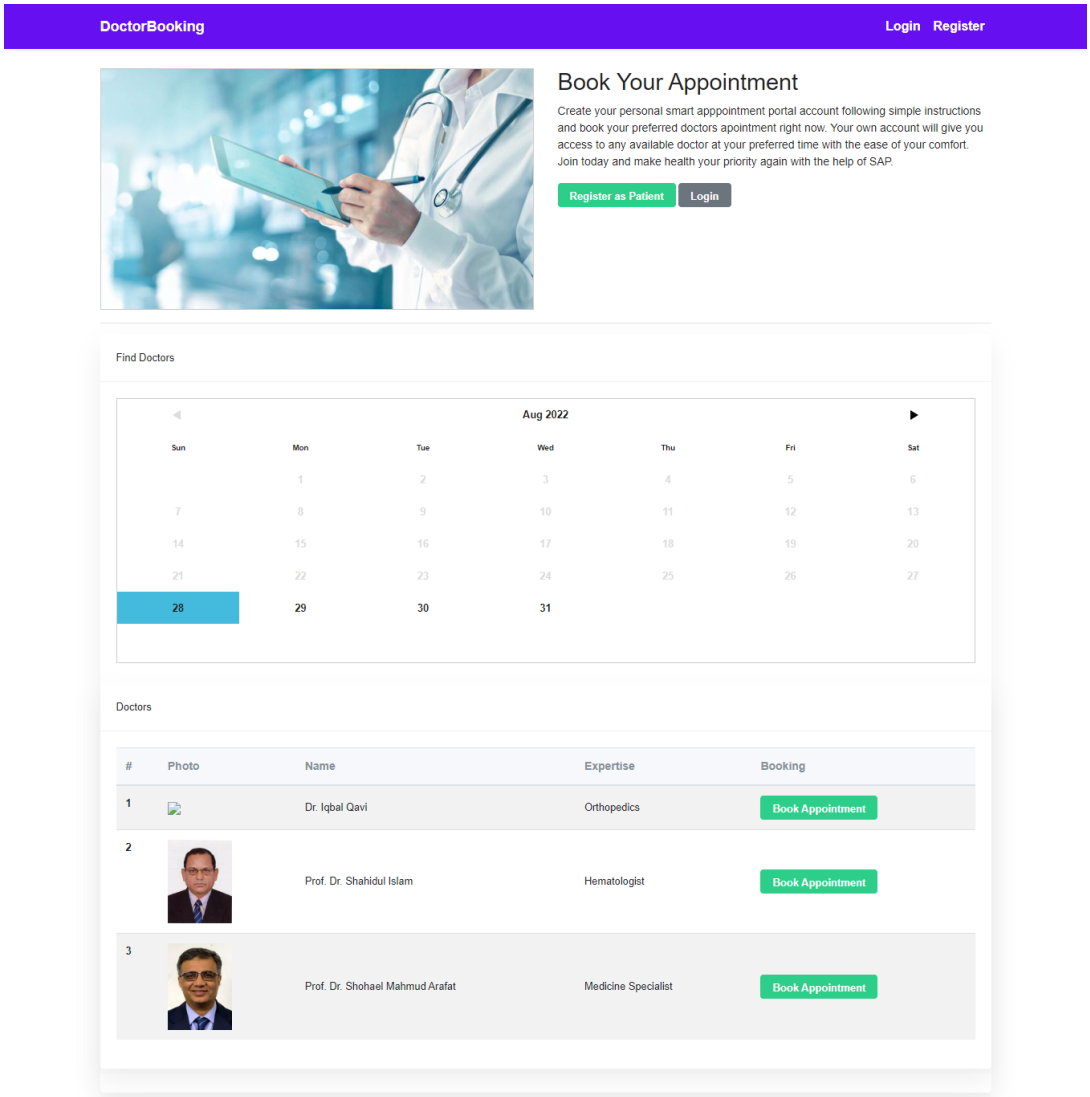


Figure 5.8: Home Page

Login Page

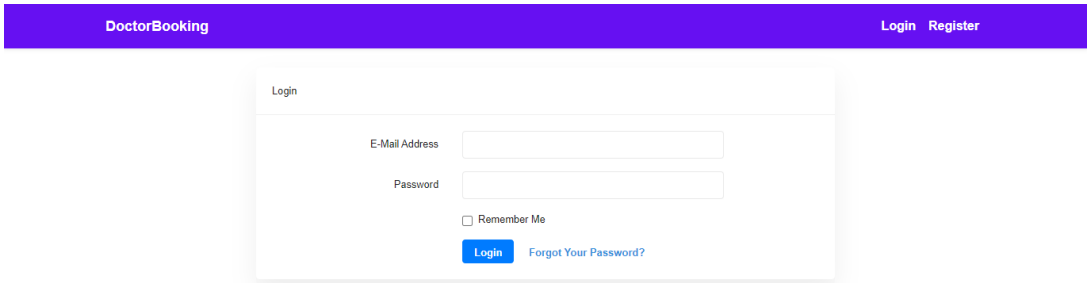


Figure 5.9: Login Page

Registration

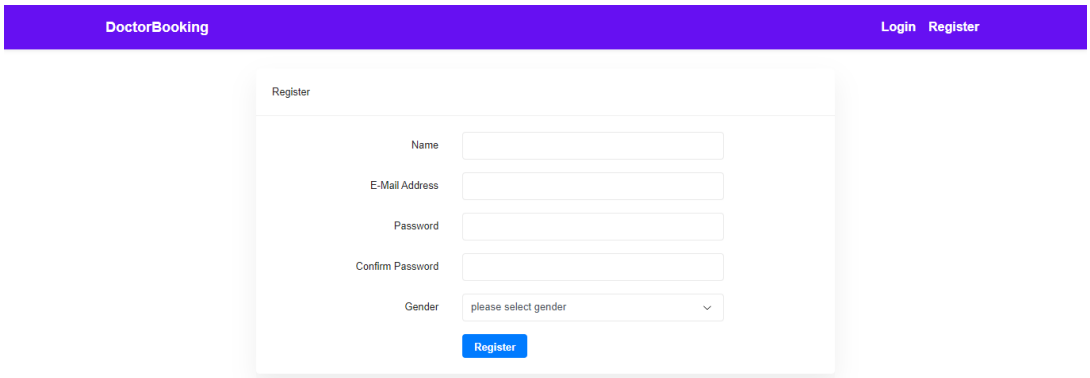


Figure 5.10: Registration Page

Patient dashboard(patient)

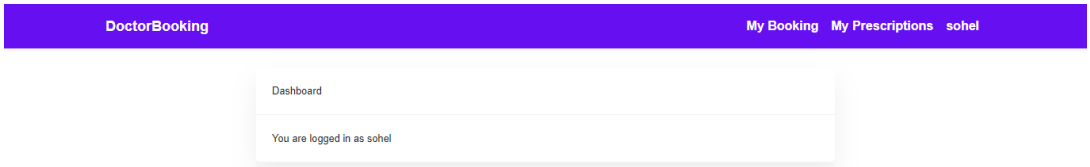


Figure 5.11: Patient dashboard

Patient booking dashboard(patient)

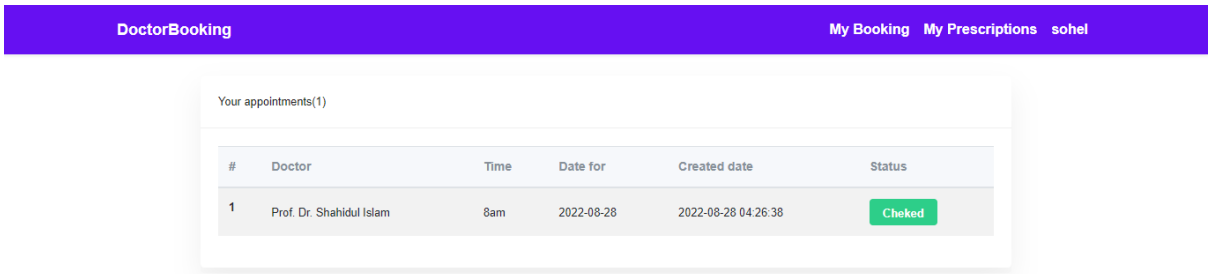


Figure 5.12: Patient booking dashboard

Received prescription(patient)



Figure 5.13: Received prescription

Doctor dashboard(Doctor)

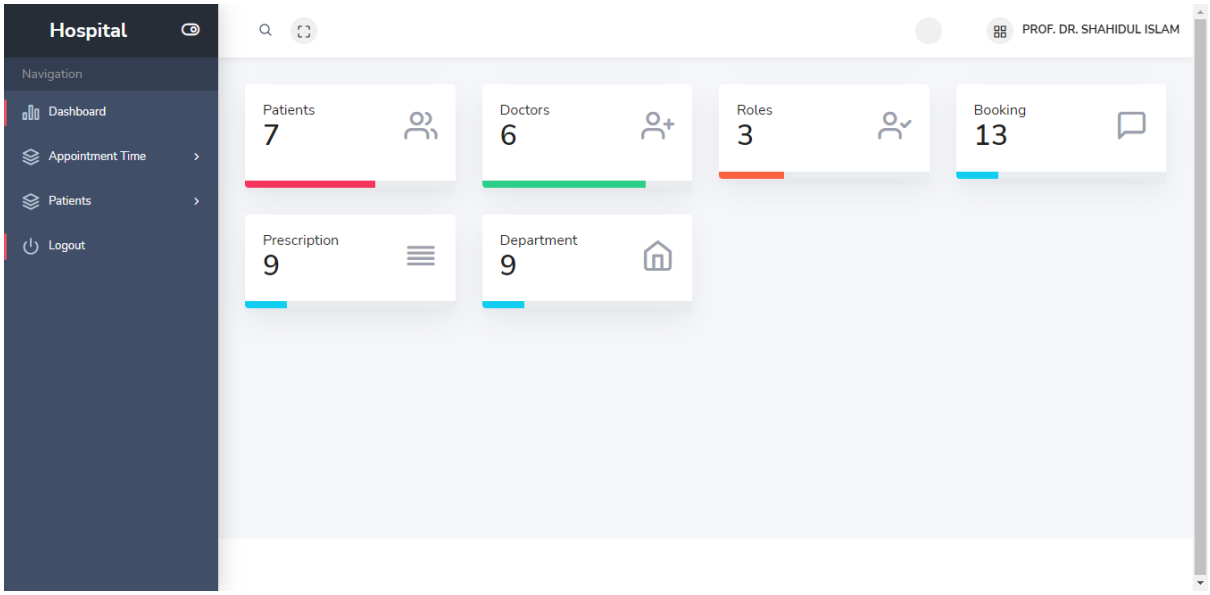


Figure 5.14: Doctor dashboard

Create appointment time(Doctor)

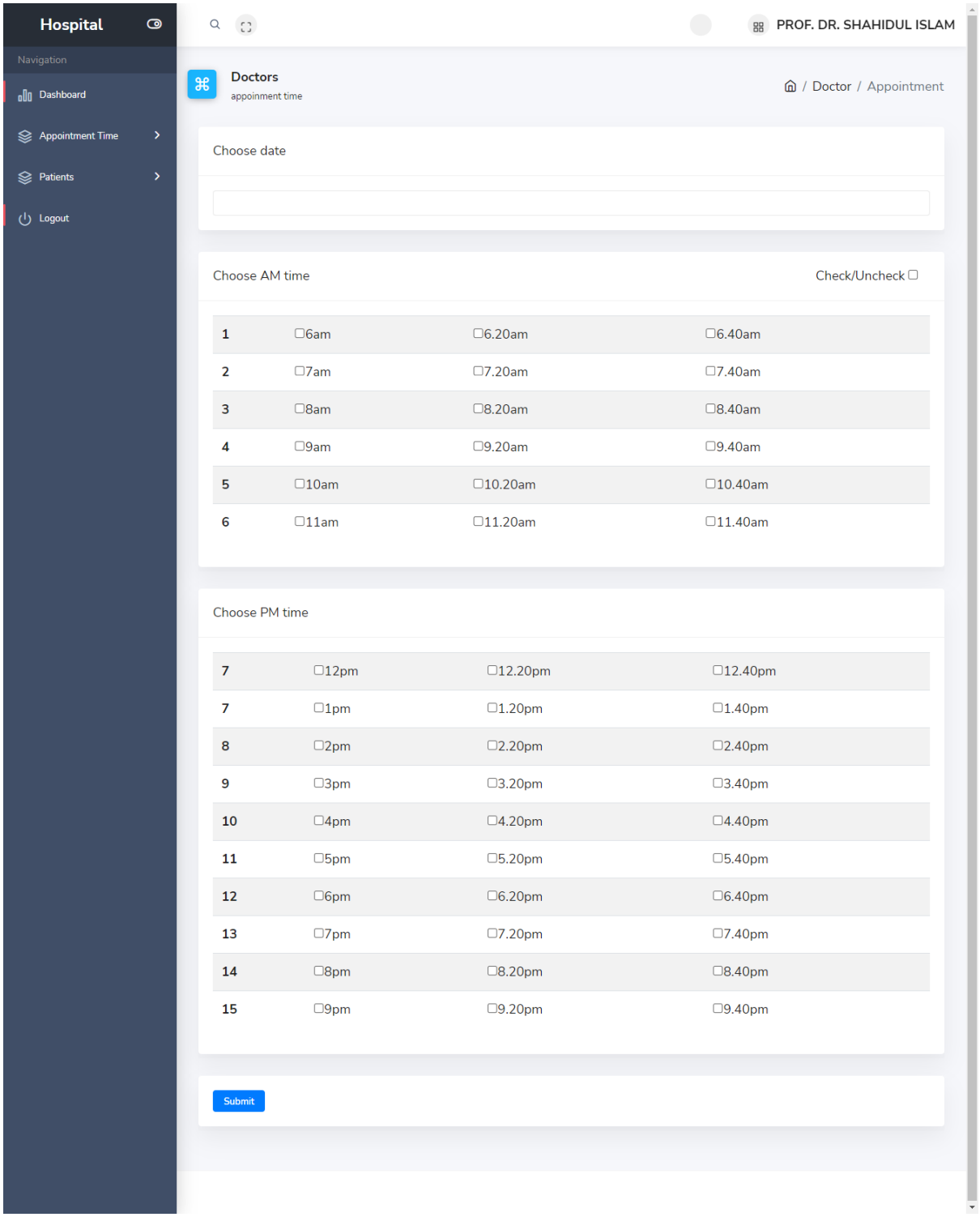


Figure 5.15: Create appointment time

Check and update appointment time(Doctor)

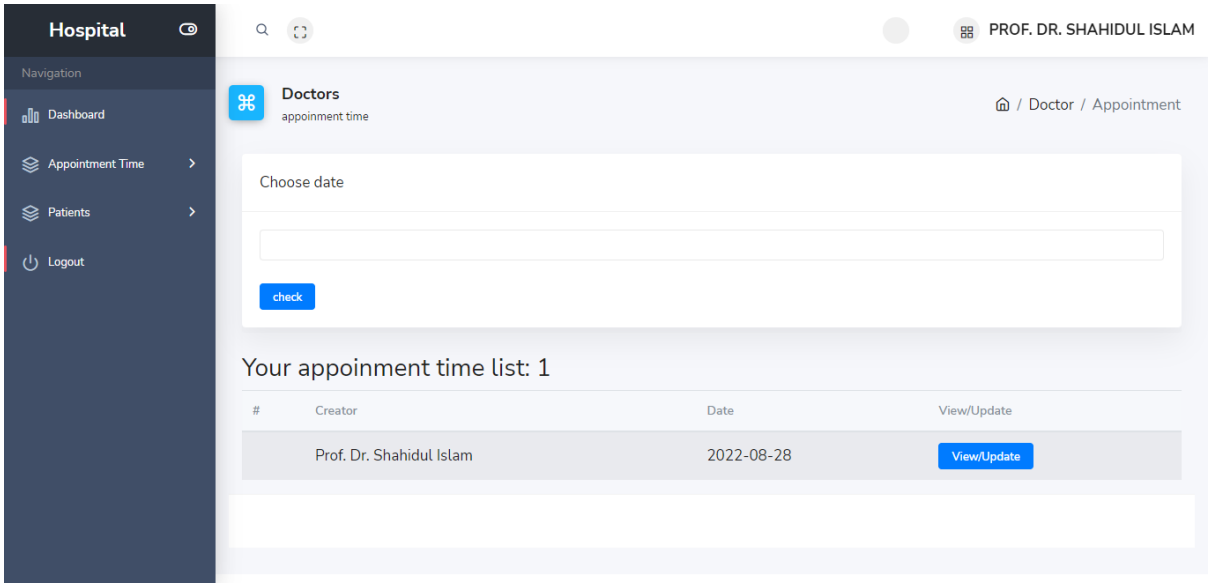


Figure 5.16: Check and update appointment time

Todays patient appointment list

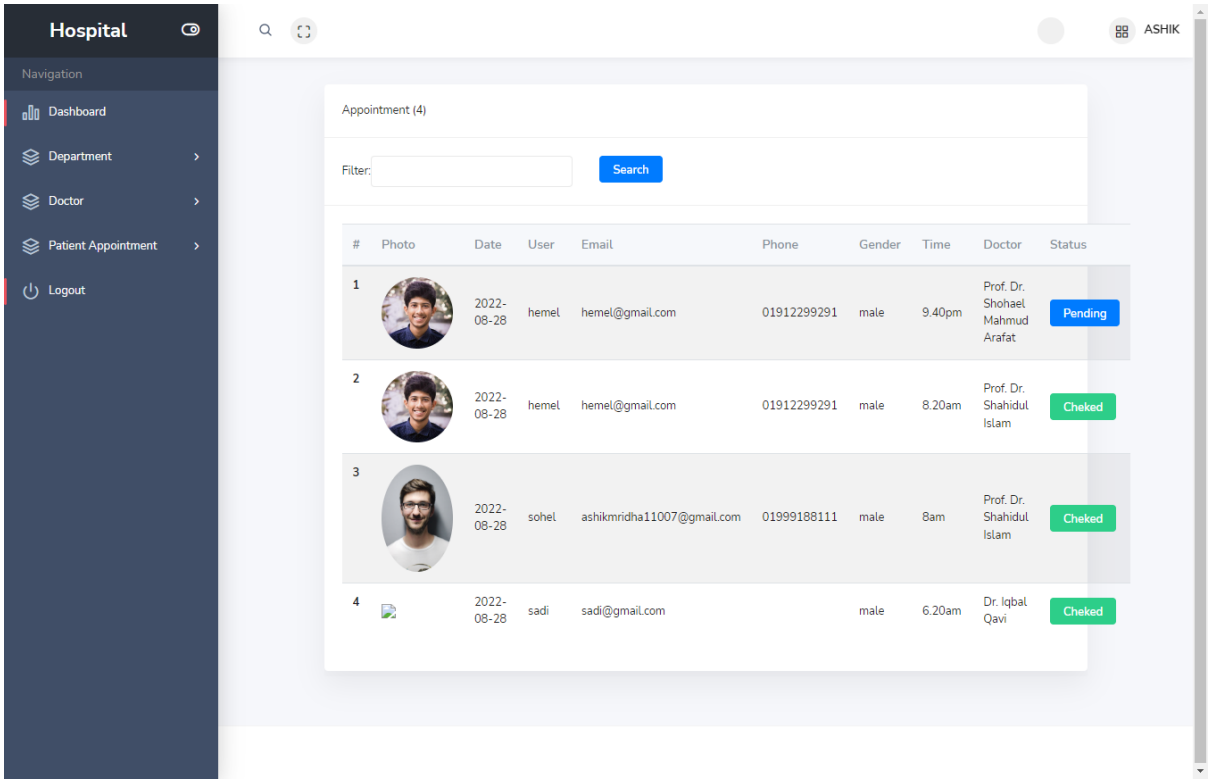


Figure 5.17: Todays patient appointment list

All time patient appointment list

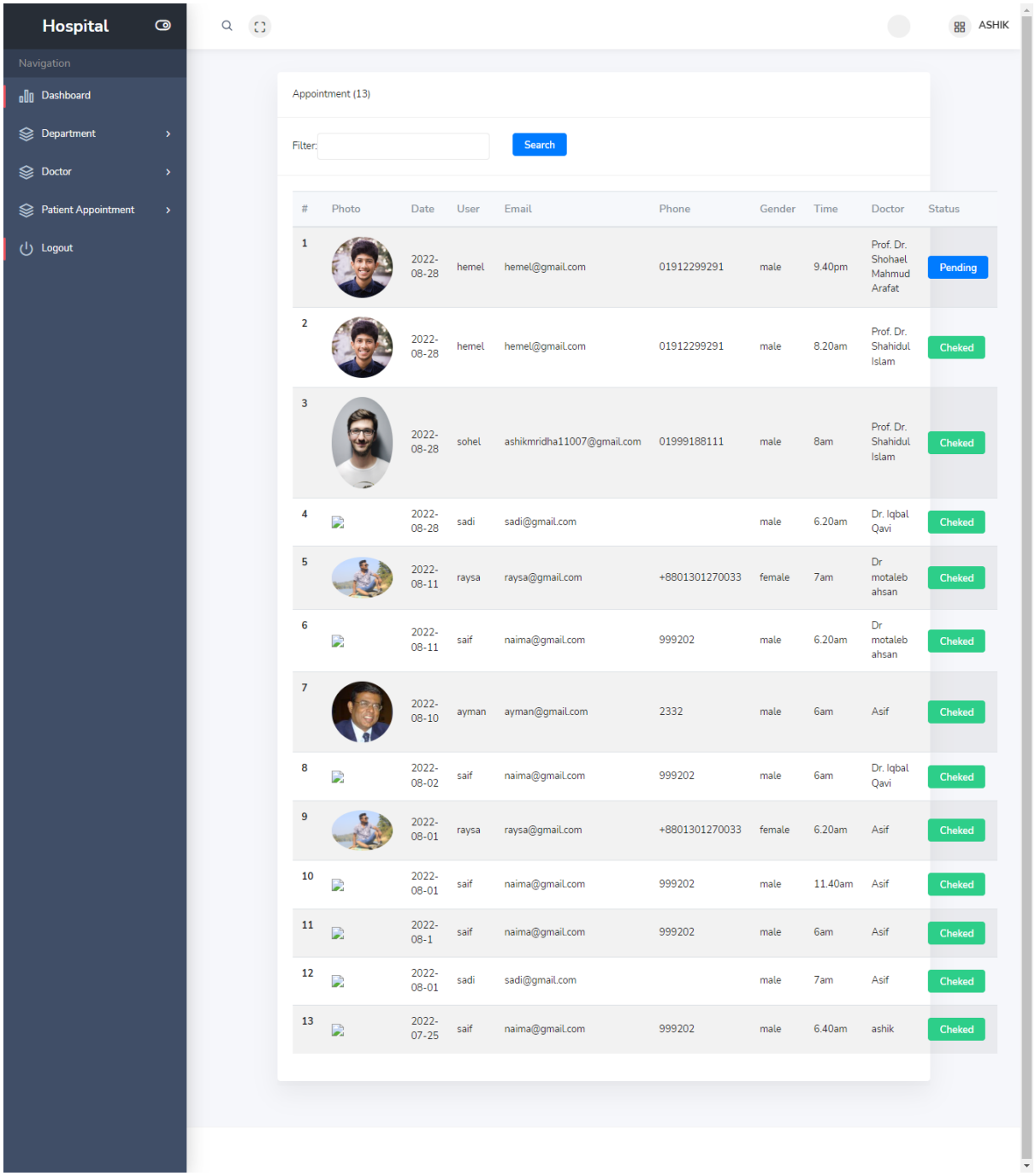


Figure 5.18: All time patient appointment list

View prescription(Doctor)

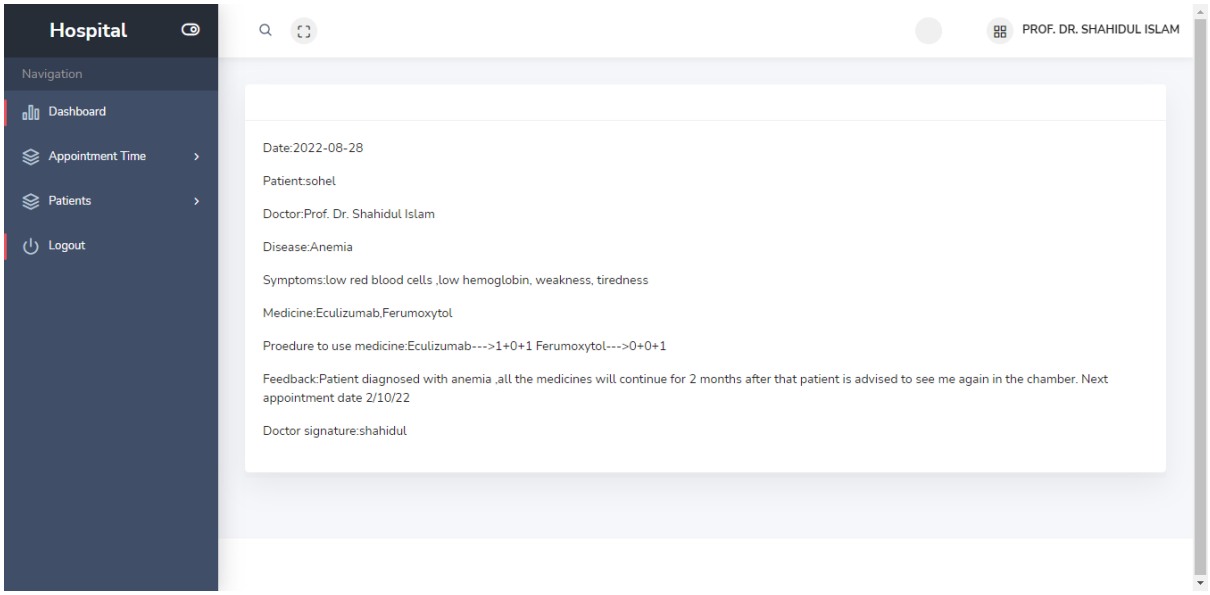


Figure 5.19: View prescription

Write prescription(Doctor)

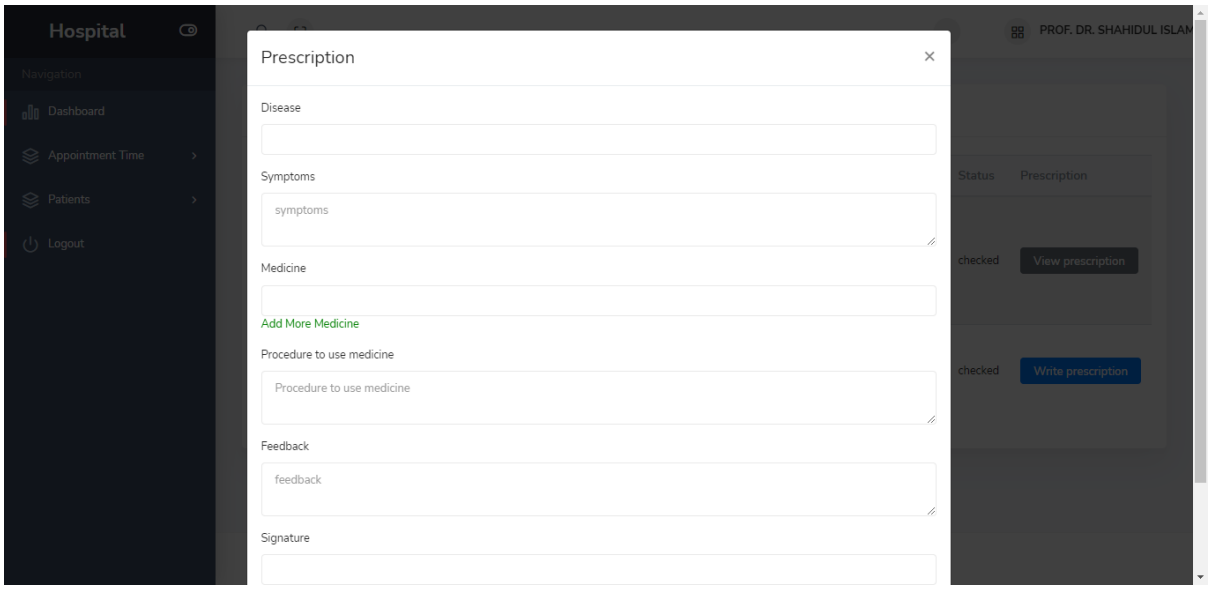


Figure 5.20: Write prescription

Admin dashboard(Admin)

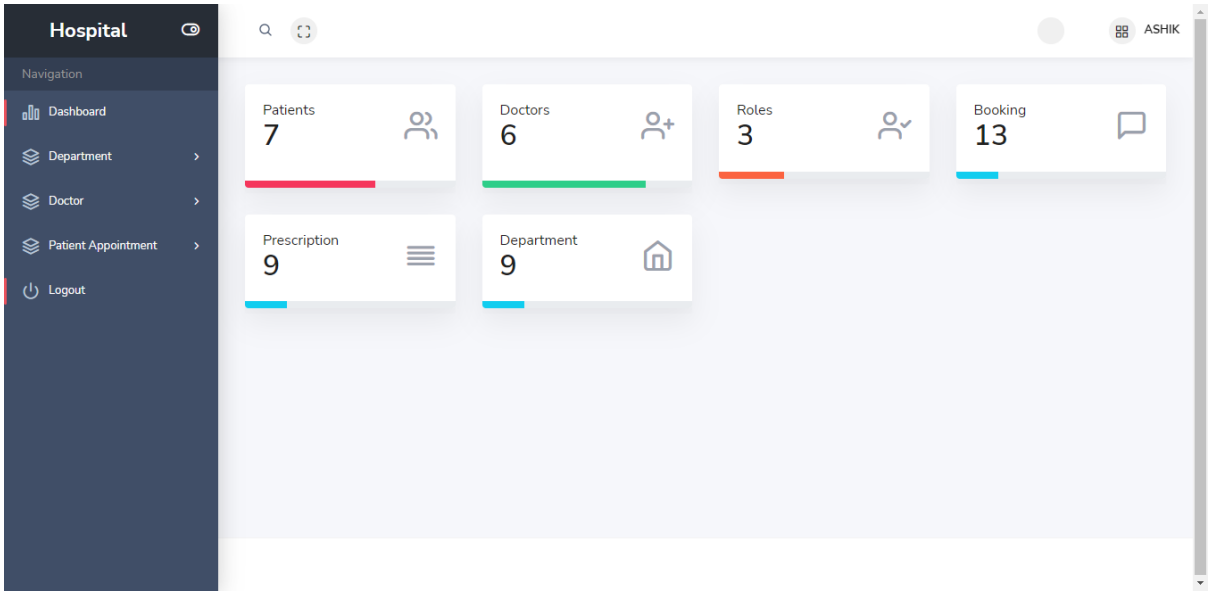


Figure 5.21: Admin dashboard

Add department(Admin)

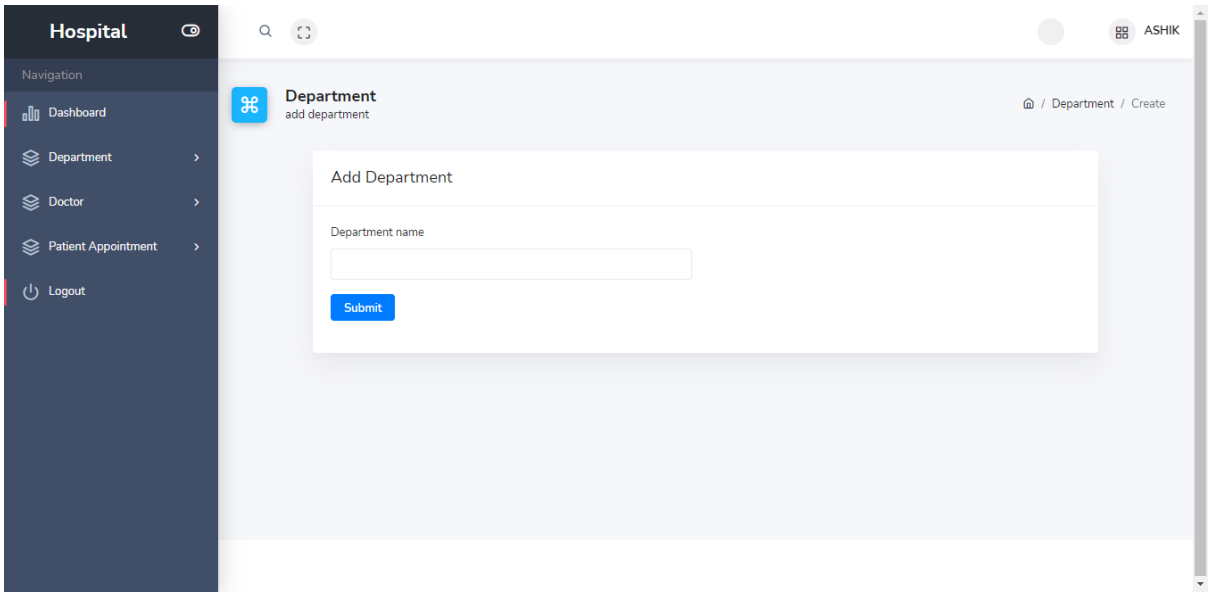


Figure 5.22: Add department

View department list(Admin)

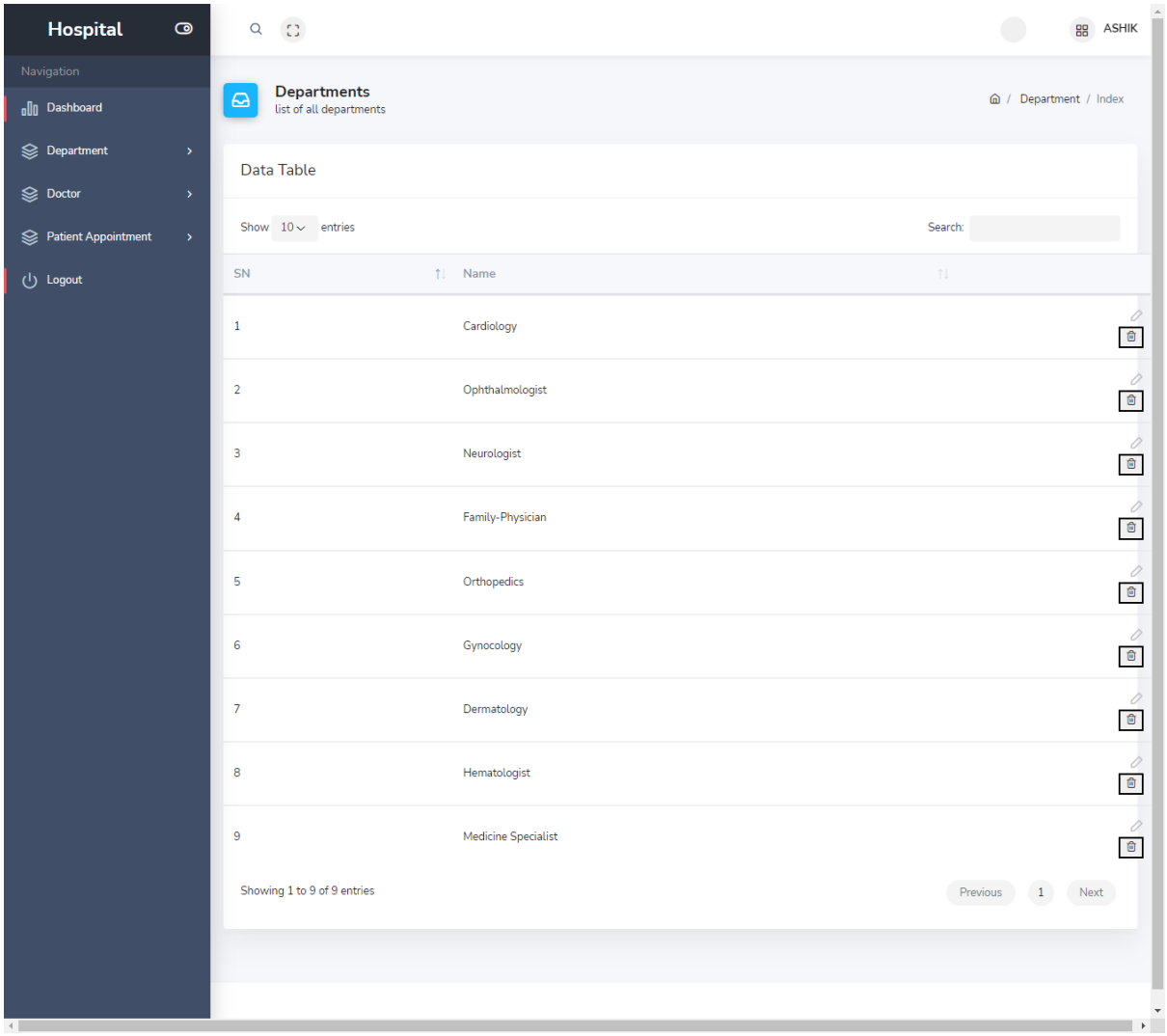


Figure 5.23: View department list

Add doctor(Admin)

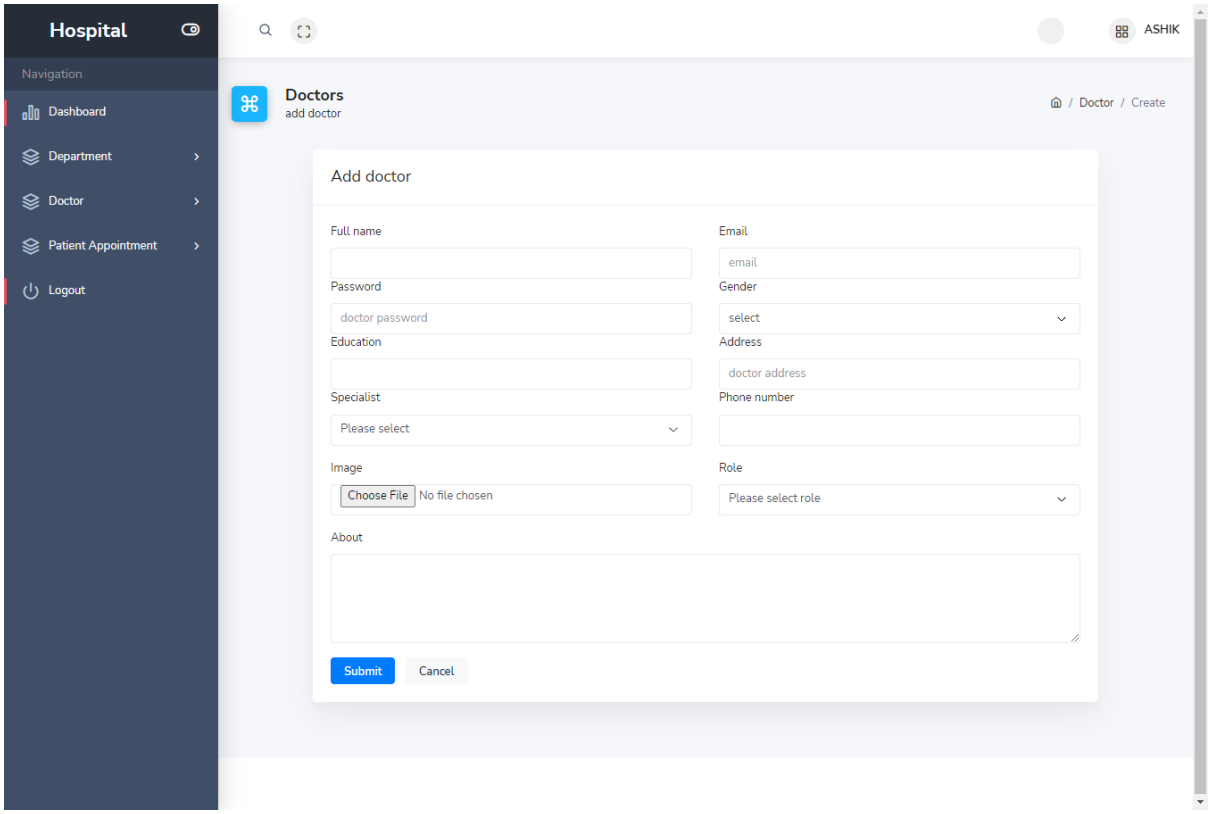


Figure 5.24: Add doctor

View list of doctors (Admin)

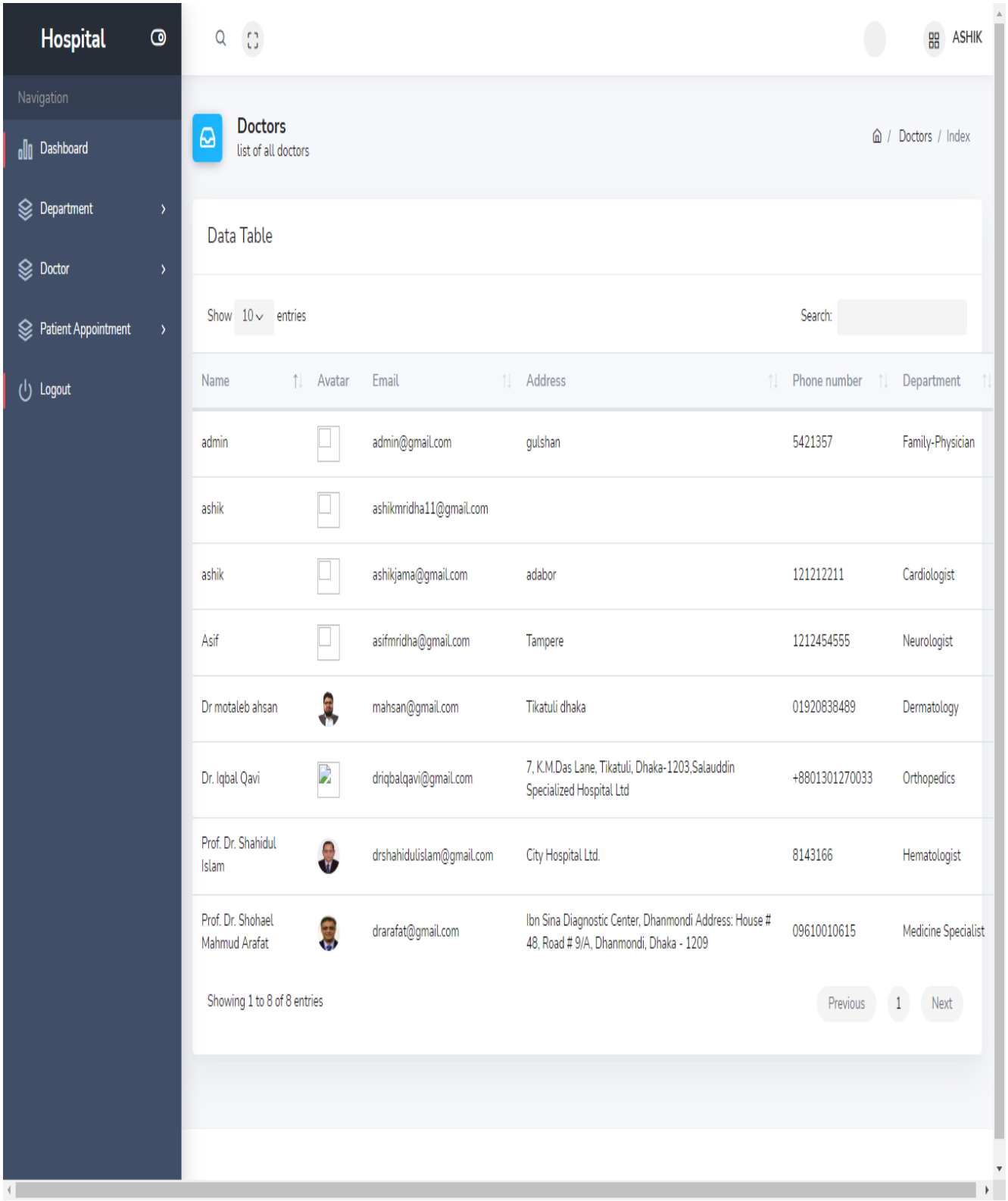


Figure 5.25: View list of doctors

Chapter 6

Results & Analysis

Decimal it Previously used manual system for providing service to their client which was very difficult to work on. So, our team automated this appointment portal using Laravel framework. These are the pages which we implemented in our web application. In dashboard patient can book appointment through date picker only by creating patient id.

Below are the UI of the web application with analysis and you will get to see the detailed look of results and the steps followed by booking doctor appointment:

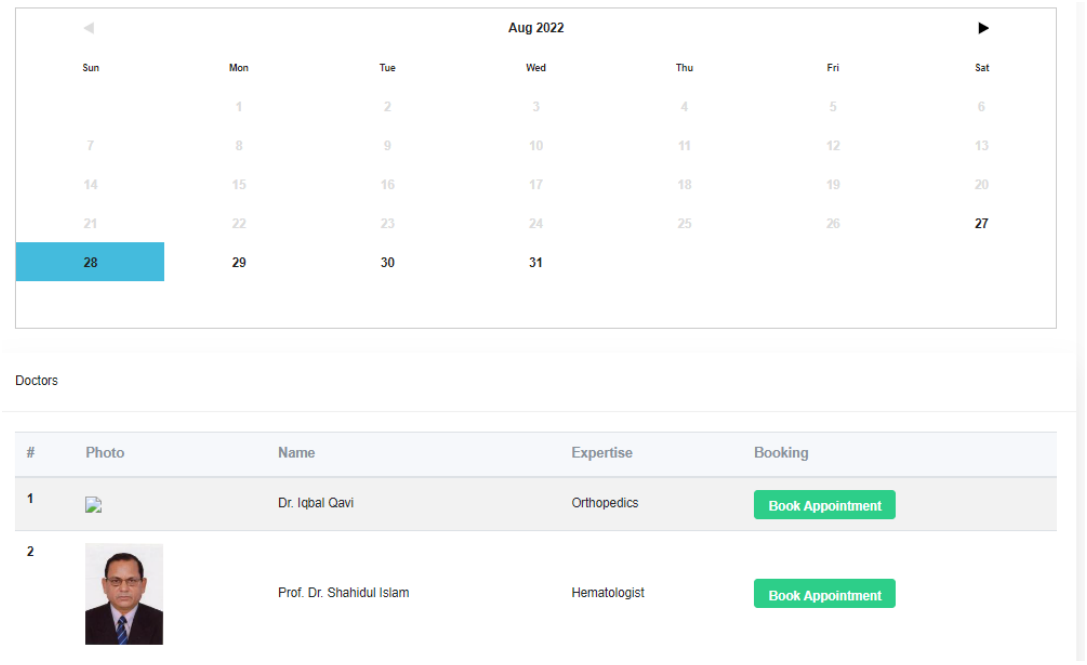


Figure 6.1: Booking of doctor

Selecting this date picker patient can see available doctors on that particular day and book their preferable doctor.

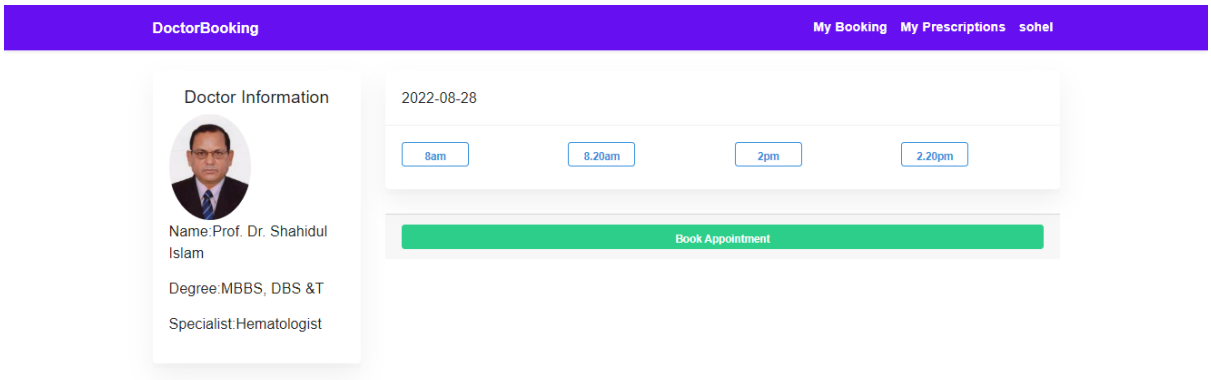


Figure 6.2: Book doctor with preferable time

From here,patient selects the appropriate time for booking doctor as per their wish and finally books appointment.

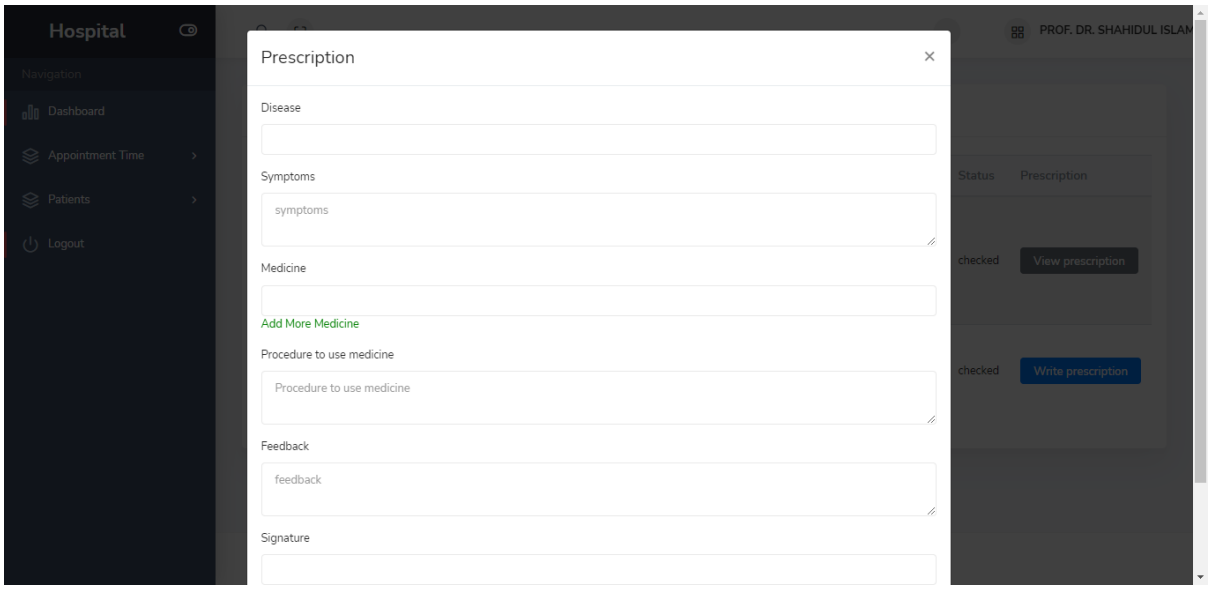


Figure 6.3: Doctor write prescription

Here doctor writes prescription to patients when the status of patient is checked which means when doctor finishes examining the patient he writes prescription of that particular patient to the portal.



Figure 6.4: Received patient prescription

After doctor writes the prescription, patient can easily access the prescription through the portal.

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

First and foremost, we must define sustainability in the context of the project. In general, sustainability involves a number of considerations, including economic, social, environmental, and administrative perspectives, all of which highlight the project's cost, value to society, reduced waste, and increased efficiency and resource usage goals. When constructing a project's sustainability, these factors are taken into consideration.

So, why is sustainability such a crucial component of the project? because it helps us to have faith and confidence that the project will provide a beneficial result for a set length of time and will prove to be a worthwhile investment that will generate enough profit and benefits to cover the expenditures of the project. Sustainability also includes maintaining and upgrading the system as needed.[3]

As we have seen the project is sustainable as it provides important and vital service to patients who wants to take appointment without calling or going to the hospital for taking appointment that reduces human work and makes life easier. There will be vast data, and this allows society and general people to adapt to new changes and utilize the web application. Thus, it becomes efficient and automated way rather than wasting papers when everything was manual. The stakeholders such as the patient will be benefited from this web application. The web app is user friendly and easy to navigate through and as admin has access rights to all information handling in database there are no sight of issues to be faced.

The advantage of this web application is it is unique web application which offers

easier and convenient process flow which saves time. Also, the maintenance as it is under observation if there are bugs found it will be fixed immediately allowing the system sustainability to increase. Moreover,the web application will be updated twice in a year according to the requirements of the client needs.All the bugs and problems will regularly be updated.

7.2 Social and Environmental Effects and Analysis

Social Effects

The main goal of the website was to make the life of patients easier as they will be able to see all doctor's information as per their preferred time and take appointment from the web application. All these functionalities and features are available to user within their fingertips and have a social effect on the traditional process flow practiced.

Environmental Effects

It's a high time when the system can play its best role in the global pandemic of COVID-19. The patients can stay at home and continue to take appointment without any trouble. They will find all the information for their health-related information's in the web rather than going out in this pandemic.As the web application has no carbon footprint as it is digitized, and it somewhat decrease wastage of paper and cause no damage to environment while keep records of all the information.

7.3 Addressing Ethics and Ethical Issues

In the world of smartphones with so much data collection, hacking, cyber-crime, etc. There are some unspoken rules and ethics guidelines that need to be followed when working on creating and releasing an website. To address this worry, I follow certain ethics and analyze ethical issues ahead of time to avoid unethical activities. I made certain that there were no violations of behavior, such as secretly obtaining personal information by eavesdropping, and that other factors were properly considered. Here are some of the things I thought about:

• **Data Collection:** SSL certificate will be used to encrypt the data exchange between system and user to avoid any data manipulation in the middle. Only necessary data are collected and are transmitted done through an encrypted secure channel to avoid breach of privacy. This ensures privacy and security. Also, as we know, web server collects information about web site visitors through the creation of log files. These automatically generated log files contain information such as the pages a user viewed, the type of browser used, and the duration of a user's visit. So, to create trust it is our responsibility as a web-developer to disclose to our site users that what kind of information we're collecting and how it will be used. [4]

• **Data Storage:** All the data is stored in the database which is backed up in cloud. The admin only has access to the back-end server and database. As it is hosted in cloud only the admin using private key credentials can access the DB server. Hence, there is less risk of data manipulation, breach of data integrity and since the database is backed up, there are low chances of data loss due to system failure or disaster. This ensures authorization, safety and fault management.

Chapter 8

Lesson Learned

8.1 Problems Faced During this Period

It was tough for me to do six days office from 9:00 AM to 6:00 PM while continuing other courses. I always tried to give my 100 percent during my internship periods. Collecting the requirement from the different employees were a huge trouble for me. As there were a lot of correction in the requirement according to the requirement provided by them. Research, requirement analysis, and data collection, which are the foundations of the SDLC, were the most difficult aspects. During the design process, several adjustments were necessary in terms of architecture, cost analysis, and resource usage, and subsequently during development and testing, faults in the code were discovered and some concepts were clarified. These were some of the issues I encountered throughout my internship.

8.2 Solution of those Problems

As problems came across, there were also solutions to it through analysis. During my internship period I have gained new knowledges, skills, and met so many new people. I got insights into professional practice and its relative and required skill set. The internship was also good to find out what my strengths and weaknesses are. Starting from adjusting to new time, learning from employee experience. My external supervisor helped me with solving few problems by guiding me through the process work and due to there being active interactions many problem aspects were covered immediately and efficiently. I faced an issue regarding testing part where certain bugs were detected. Due to working with different people and observing different perspectives in team meetings, it helped me to identify the requirements for successful project deployment and necessity of positive team communication. I also learnt how to solve problems and give a solution feedback.

Chapter 9

Future Work & Conclusion

9.1 Future Works

As the project is still under development, as per requirement our company plans on adding a lot more features and modules to the website to make it even more helpful for the clients/patients to consult doctors through the platform. Moreover, in every year there will be two updates of the software according to the company needs and requirements.

9.2 Conclusion

It was a wonderful experience working with Development team in decimal it as an intern. During the internship period, I have learned and applied a great deal. I was introduced to new cutting-edge technologies, and I was pushed to do even better. I was pushed to adapt to changes rapidly and come up with logical solutions. I have used all my knowledge's on analysing the data. During my project, I cooperated with my mentors and seniors to solve the challenges faced. Despite their workload, my supervisors were always there to answer any queries and help me settle nicely. This internship opportunity has taught me how to work under pressure and complete the SDLC before the deadline.I would like to appreciate once again everyone who has made my life as an intern such a great experience. In addition, I gained a deeper understanding of my technical skills, which benefited me personally. Also, I had learnt to work in pressure and fulfil under the deadline.

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[1] "What is work breakdown structure(wbs) and the usages of wbs in project management,"

[2] "Iterative and incremental development," *Wikipedia*, Oct 2021.

[3] "Sustainability in project management,"

[4] A. Bryant, "11lesson 11: Ethical and legal issues in web development," *Lesson 11: Ethical and Legal Issues in Web Development.*

An Undergraduate Internship/Project on Smart Appointment Portal

(SAP) for healthcare organization under Decimal it

By

Md Ashikuzzaman Esti

Student ID: **1720086**

Summer, 2022

Consent Form

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



(Signature of the Supervisor)

Raihan Bin Rafique

Department of Computer Science & Engineering

Independent University, Bangladesh