

# **Chapter 1**

## **INTRODUCTION**

**1.1 General Background**

**1.2 Objective**

**1.3 Scope**

# **Chapter 2**

## **LITERATURE SURVEY**

Blockchain is a relatively new technology, which was conceptualized only in 2008 by a person or a group of people by the name of Satoshi Nakamoto. So, as the concept is relatively new, most of the individuals and even organizations focus on the one standout feature presented by Blockchain technology, which is crypto currency. Bitcoins and other forms of crypto currencies are still worth a lot and many individuals and organizations are still looking to invest in those crypto currencies and make tremendous profit from them. Other aspects to Blockchain technology are not yet fully discovered. This review dwells into the field of management of medical records which are electronic and which have the primary oversight on the efficiency of the system during emergency and catastrophic situations. A major part of the literature is based on software frameworks and other techniques introduced prior to blockchain and its capabilities of smart contracts. With the introduction of the ability to represent complicated data on the chain with the help of a language that is Turing-complete helped start a new field of distribution and p2p mode of communication. After the introduction of Ethereum , new software-frameworks that can use and employ blockchain have been developed by academic institutions and the IT-industry. Electronic Health Records and Electronic Medical Records are not the same thing . These terms are sometimes interchanged, but there is a big difference in the records containing medical information, stored digitally. An electronic medical record is the digital or electronic equivalent of the paper-records maintained by a patient and the doctor. It contains the history of the patient and other diagnostic and treatment details. The first system to use blockchain

for Health records used a modular method for the sake of integration purposes. For the sake of scalability, the actual records are stored off-chain which is the provider's RDB.

Blockchain contains the meta-data and other location information. In simple terms, a smart contract manages all the interaction between the participants of the system and defines the access matrix or access rules and other data-pointers. The pointers will contain tuples along with a query that will run on both the machines of the provider and the host. The health record software is designed according to the protocols of the network designed as Ethereum and the public as well as the private keys will have to decide which parties (network participants who act as miners of the system) get the permission. This means that every participant must have a node associated to the blockchain for interacting with the network. The concerning drawback of this kind of system is that every participant has to maintain a copy of the data. The other drawback would be the scalability issues because of the consensus mechanism used. If the host does not specify any limit, it is still possible to put a maximum transaction count per second of sixty. The projects were completed by focusing on data-sharing, access-controls and integration mechanism.

The research also focused on the patient-side, on how to ensure security constraints in the patient-data while aggregating the system. The various frameworks and blockchain software's that have been developed so far can be categorized as two permissioned and the permissioned. In a permissioned network, since the participants know each other, it is possible to take advantage of the consensus mechanisms and any network interaction lag can be evaded from while also ensuring security, privacy and transparency. It is not associated to any cryptocurrency models, so the system does not need to be incentivized. This software-framework is most suitable for 2 or more organizations that know each other and want to transfer sensitive information.

# Chapter 3

## SYSTEM ANALYSIS

### 3.1 Existing system

In the existing system, in our healthcare system stem from the inherent diversity among individuals and the unique ways diseases affect people. This diversity makes it difficult for doctors to manage patient information, as a one-size-fits-all approach to treatment is often ineffective. Complete medical records for each patient are crucial for enabling personalized care. Another major issue is the lack of comprehensive information available to doctors, leading to more expensive and less effective treatments. The safety of patient data is also at risk due to insecure storage systems and doctors sharing information through insecure channels like social media. Patients often lack control over their own data, with organizations using this information without proper permission, raising questions about data ownership.

Moreover, sharing patient health information with medical companies has both positive and negative implications. While it contributes to medical research and innovative treatments, concerns about patient privacy, data security, and potential exploitation of information for non-medical purposes arise. There's a risk of discrimination and social stigmatization based on shared health data. To address these issues, transparent consent processes, robust data protection measures, and ethical guidelines are crucial for striking a balance between advancing medical knowledge and safeguarding patient rights. A better healthcare system necessitates a focus on individual uniqueness, improved information accessibility

for doctors, enhanced data security, and empowering patients with control over their health information through advanced technologies and ethical practices.

### **3.2 Proposed system**

Blockchain technology offers a promising solution to the challenges associated with patient data management in healthcare. Its structured and secure approach to store data allows for controlled access by authorized professionals. With blockchain, patient data can be securely stored, and access can be restricted to only the patient and the relevant healthcare professionals involved in the case. The patient retains full control, being able to revoke access at any time, ensuring autonomy over their medical reports.

Importantly, not all data is made inaccessible; non-sensitive information are made publicly available through APIs, facilitating collaboration among healthcare organizations and stakeholders. This interoperability ensures seamless data sharing across different systems. Furthermore, doctors can request access to specific data when needed, enhancing the efficiency of information exchange.

Blockchain offers the advantage of allowing patients to share their data anonymously, providing healthcare institutions with valuable, privacy-preserving information. This anonymized data becomes a valuable resource for enhancing research and refining healthcare systems while safeguarding the privacy of individual patients. The patient always maintains control over their data, deciding who can access it and when, creating a more transparent and patient-centric approach to healthcare data management. Overall, blockchain presents a secure and transparent framework that addresses data privacy concerns while promoting collaboration and advancements in healthcare research and services.

It has numerous benefits for data security and patient control, blockchain technology provides a valuable feature by allowing the viewing of a patient's historical medical records. The decentralized and tamper-resistant nature of blockchain ensures the integrity of past medical data, creating a reliable and comprehensive timeline of a patient's health history. Authorized healthcare professionals can access this historical record, gaining insights into previous treatments, diagnoses, and health trends.

This capability not only enhances the continuity of care but also contributes to more informed decision-making by providing a holistic view of the patient's medical journey. Doctors can assess how different treatments have affected the patient over time, enabling them to tailor current interventions based on the patient's unique health history. This feature further reinforces the patient-centric approach of blockchain in healthcare, fostering improved communication and collaboration among healthcare providers while prioritizing the well-being of the individual.

**Main activities of system are:****Hospital registration:**

The hospital registration serves as the platform for healthcare facilities to register and become part of the system. This page typically collects crucial details such as hospital name, location, contact information, and other relevant data, enabling the hospital to be integrated into the broader healthcare network. The hospital registration process ensures accurate representation and inclusion within the centralized system

**View and verify hospital:**

The admin verification page allows administrators to view and verify hospitals within the system. This functionality enables administrators to review details submitted during the hospital registration process, ensuring accuracy and authenticity before approving the inclusion of the hospital in the system. Verification by administrators helps maintain data integrity and a reliable healthcare network.

**Manage department:**

The hospital administrator can efficiently manage departments through a dedicated interface. This functionality enables administrators to oversee department details, add new departments, edit existing information, and remove or deactivate departments as needed. Effectively managing departments ensures the accurate representation and organization of the hospital's internal structure.

**Manage doctors:**

Hospital administrators can effectively manage doctors through a dedicated interface. This functionality includes the ability to add new doctors to the system, edit existing doctor information, and deactivate or remove doctors when necessary. The administrator's role in managing doctors ensures the accuracy of healthcare personnel data and contributes to the efficient operation of the hospital.

**View doctor:**

The hospital administrator and admin can access a dedicated page to view information about doctors within the system. This functionality provides details such as doctor names, specialties, contact information, and any other relevant data, facilitating effective oversight and management of healthcare personnel.

**View patient:**

The hospital administrator and admin can utilize a dedicated page to view information about patients within the system. This functionality includes details such as patient names, medical records, contact information, and other pertinent data, allowing for effective oversight and management of patient records within the hospital.

**Manage appointment:**

Hospital administrators can efficiently manage appointments through a dedicated interface. This functionality includes viewing, editing, or canceling existing appointments, ensuring effective coordination and organization of healthcare services. Managing appointments allows administrators to oversee the scheduling process and optimize the allocation of resources within the hospital.

**Patient registration:**

The patient and hospital administration can register patients through a user-friendly interface. This process typically involves collecting essential patient information, including personal details and ensures that the hospital administration has accurate records for individuals seeking healthcare services within the system. This dual registration functionality facilitates a seamless on boarding process for patients and enables efficient management by hospital administrators.

**View appointment:**

Doctors can access a dedicated interface to view their scheduled appointments. This func-



tionality provides details such as patient information, appointment times, and any additional notes, allowing doctors to efficiently manage their schedules and prepare for upcoming medical consultations.

**Appointment confirmation:**

The patient can confirm appointments using two-factor authentication for enhanced security. This process typically involves the patient receiving a unique code on their registered device (first factor) and entering it into the system, along with their regular credentials (second factor). This two-step verification adds an extra layer of protection when confirming appointments, contributing to the secure and reliable management of healthcare scheduling for patients.

**Add medical record:**

Doctors can add new medical records to the system through a dedicated interface. This functionality allows healthcare providers to input essential details about a patient's current health status, diagnoses, prescribed medications, and other relevant information. Adding medical records ensures that the system maintains an up-to-date and comprehensive database of patient health information, supporting informed and personalized healthcare delivery.

**View previous medical record:**

Both doctors and patients can access and view previous medical records through dedicated interfaces. This functionality provides doctors with a comprehensive overview of a patient's medical history, facilitating informed decision-making during medical consultations. Similarly, patients can review their own health records, contributing to their active involvement in managing their healthcare and promoting transparency in the doctor-patient relationship.

### **3.3 Module Description**

#### **3.3.1 Admin**

The admin has the capability to log in to the system securely, establishing a verified and authorized access point. The verification process extends to hospitals within the network, ensuring that only legitimate healthcare institutions are part of the system. The admin can view a comprehensive list of verified hospitals, providing transparency and oversight. Additionally, the system allows admins to access and review information about registered doctors and patients, fostering effective healthcare management. The ability to block or unblock a hospital provides a crucial layer of control, allowing the administrator to manage and regulate the participation of healthcare institutions within the system. This centralized administrative framework facilitates efficient and secure management of hospitals, doctors, and patient data within the healthcare ecosystem.

#### **3.3.2 Hospital Administrator**

A hospital administrator plays a pivotal role in managing various aspects of healthcare operations. They begin by registering and logging into the system securely, ensuring authorized access. The administrator has the capability to register patients, facilitating a streamlined and organized patient onboarding process. In addition, they can effectively manage different hospital departments, ensuring efficient coordination and operation. The Hospital Administrator can efficiently view patient records and schedule appointments for them, effectively managing the appointment system to streamline the healthcare delivery process.

#### **3.3.3 Doctors**

For doctors, the system provides essential functionalities to streamline patient care and record-keeping. Upon logging in securely, doctors gain access to patient health records stored on the blockchain, ensuring a reliable and tamper-resistant source of information.

The ability to add and manage patient records, including details like present illness, provisional diagnosis, investigations, general examination, and systematic examination, empowers doctors to maintain comprehensive and up-to-date medical histories for their patients. Importantly, the system allows for the secure storage of these records on the blockchain, contributing to data integrity and patient privacy. This integrated approach not only enhances the efficiency of doctors in managing patient information but also ensures a secure and transparent framework for healthcare data management. Doctors can access and view their scheduled appointments through the system, allowing them to stay organized and manage their patient consultations effectively.

#### **3.3.4 Patient**

Patients benefit from streamlined access to their healthcare information through a user-friendly system. Beginning with a secure registration process, patients can conveniently log in to the system. Once logged in, they gain access to their medical reports stored on the blockchain, providing a reliable and tamper-resistant source of information. This feature allows patients to easily view their health reports, fostering transparency and empowering individuals to stay informed about their own medical history. The system's focus on secure registration, login procedures, and blockchain technology ensures that patients have convenient and protected access to their healthcare data, contributing to a more patient-centric approach in the healthcare ecosystem. Upon scheduling an appointment, patients receive a confirmation notification, providing assurance and clarity regarding the scheduled healthcare appointment through two factor authentication

### **3.4 Feasibility Study**

A feasibility study is a preliminary investigation conducted to ascertain and record the viability of a project. The purpose and logical goal of this study is to identify the advantages and disadvantages of a current or proposed system, as well as the possibilities and risks that exist in the surrounding environment. A feasibility study considers numerous limitations that the system should be operated and developed within. In order to establish whether the identified user's needs can be met using current software and hardware technologies, an estimate is made in this study, including the resource needed for implementation and expenses at the earliest possible time. Additionally, this analysis will determine whether the suggested system can be created within the available financial limits and will be cost-effective from a commercial standpoint. The study's findings are considered while deciding whether to move forward with the project or not.

#### **3.4.1 Operational Feasibility**

Conducting an operational feasibility study for the implementation of blockchain technology in healthcare is crucial for assessing its practicality within existing operations. Key considerations include evaluating user acceptance and readiness for blockchain adoption, determining the system's integration capabilities with current healthcare infrastructure, assessing resource availability and associated costs, ensuring compliance with regulatory requirements, addressing data migration and security measures, and evaluating scalability. Usability and user experience, stakeholder engagement, interoperability with other systems, and thorough testing and pilot implementation are also vital aspects. This study aims to provide insights into potential challenges, benefits, and the overall viability of integrating blockchain into healthcare operations, helping organizations make informed decisions about adopting this technology for patient data management.

### **3.4.2 Technical Feasibility**

Evaluating the technical feasibility of implementing blockchain technology in healthcare for patient data management involves a comprehensive analysis of its compatibility with existing systems. Integration with electronic health record (EHR) systems, scalability to handle increasing data volumes, and seamless interoperability with other healthcare technologies are critical considerations. Assessing the feasibility of data migration onto the blockchain, the robustness of security measures, and resource requirements for implementation and maintenance are paramount. The selection of an appropriate blockchain protocol, ensuring adequate data storage capacity, and addressing potential adoption challenges among healthcare professionals and patients are essential components of this assessment. The technical feasibility study aims to ascertain whether the proposed blockchain solution aligns with existing technological infrastructures, meets security standards, and can be effectively employed in the healthcare setting for secure and efficient patient data management.

### **3.4.3 Economic Feasibility**

Evaluating the economic feasibility of implementing blockchain technology in healthcare for patient data management involves a comprehensive financial analysis. This assessment encompasses initial implementation costs, ongoing operational expenses, and potential returns on investment. It requires a careful consideration of cost-saving opportunities, efficiency gains, and potential revenue streams associated with blockchain adoption. A thorough risk analysis helps identify potential challenges and uncertainties that could impact the economic viability of the proposed solution. Comparisons with alternative systems, a focus on long-term sustainability, and stakeholder perspectives contribute to a holistic understanding of whether the adoption of blockchain aligns with organizational goals and financial constraints. The economic feasibility study serves as a crucial tool for decision-makers, guiding them in determining the financial viability and potential benefits of integrating blockchain technology into the healthcare ecosystem for enhanced patient data management.

### **3.5 System Environment**

#### **3.5.1 Developer Requirement**

##### **3.5.1.1 Hardware Requirement**

- Processor : Intel Core i3 or above
- RAM : 4 GB or above
- Storage : 500GB Hard disk

##### **3.5.1.2 Software Requirement**

- Operating system : Windows 8 or above
- Front end : HTML, CSS, BOOTSTRAP, JavaScript, Android
- Back end : MySQL
- Languages : Python, Java
- IDE : VS code, Android Studio
- Web browser : Google Chrome/Firefox
- Smartphone : Android version 7 above

#### **3.5.2 User Requirement**

- Any Smartphone/Computer/ Laptop
- Stable Internet Access

### **3.6 Actors and their Roles**

#### **3.6.1 Admin**

The admin is responsible for the overall management of this system.

- Login to the system
- Verify hospital
- View hospital
- View doctors
- View and block/unblock patient

#### **3.6.2 Hospital Administrator**

The Hospital administrator can avail various services and features provided by the system after login.

- Registration and login
- Can Register patient
- Manage department
- Manage doctor
- View patients and take appointment for them
- Manage appointment

## **Doctor**

The Doctor can avail various services and features provided by the system after login.

- Login to the system
- View health record of patient ( from blockchain )
- Add and manage patient record like present illness,provisional diagnosis,investigation,general examination and systematic examination of patient and treatment summary ( to blockchain )
- View patients
- View appointments

## **Patient**

The Patient can avail various services and features provided by the system after login.

- Registration and login
- View report (from blockchain)
- Appointment confirmation



# Chapter 4

## METHODOLOGY

### 4.1 Introduction

This project follows Agile methodology. Agile software development comprises various approaches to software development under which requirements and solutions evolve through the collaborative effort of self organizing and cross-sectional teams and their customers/end users. It advocates adaptive planning, evolutionary development, early delivery and continuous improvement and it encourage rapid and flexible response to change.

Deciding between Scrum and the waterfall model for our project hinges on the project's nature and requirements. Scrum, an empirical process, emphasizes transparency, inspection, and adaptation, fostering iterative development through continuous experimentation. It empowers self-organizing teams to collaborate toward common goals. Conversely, the waterfall model follows a linear and structured approach with distinct, irreversible phases, making it suitable for projects with stable and well-defined requirements. The choice depends on factors such as project dynamism, adaptability needs, and the preference for iterative development versus a sequential, rigid life cycle.

## 4.2 UML Diagrams

### 4.2.1 Use case Diagram

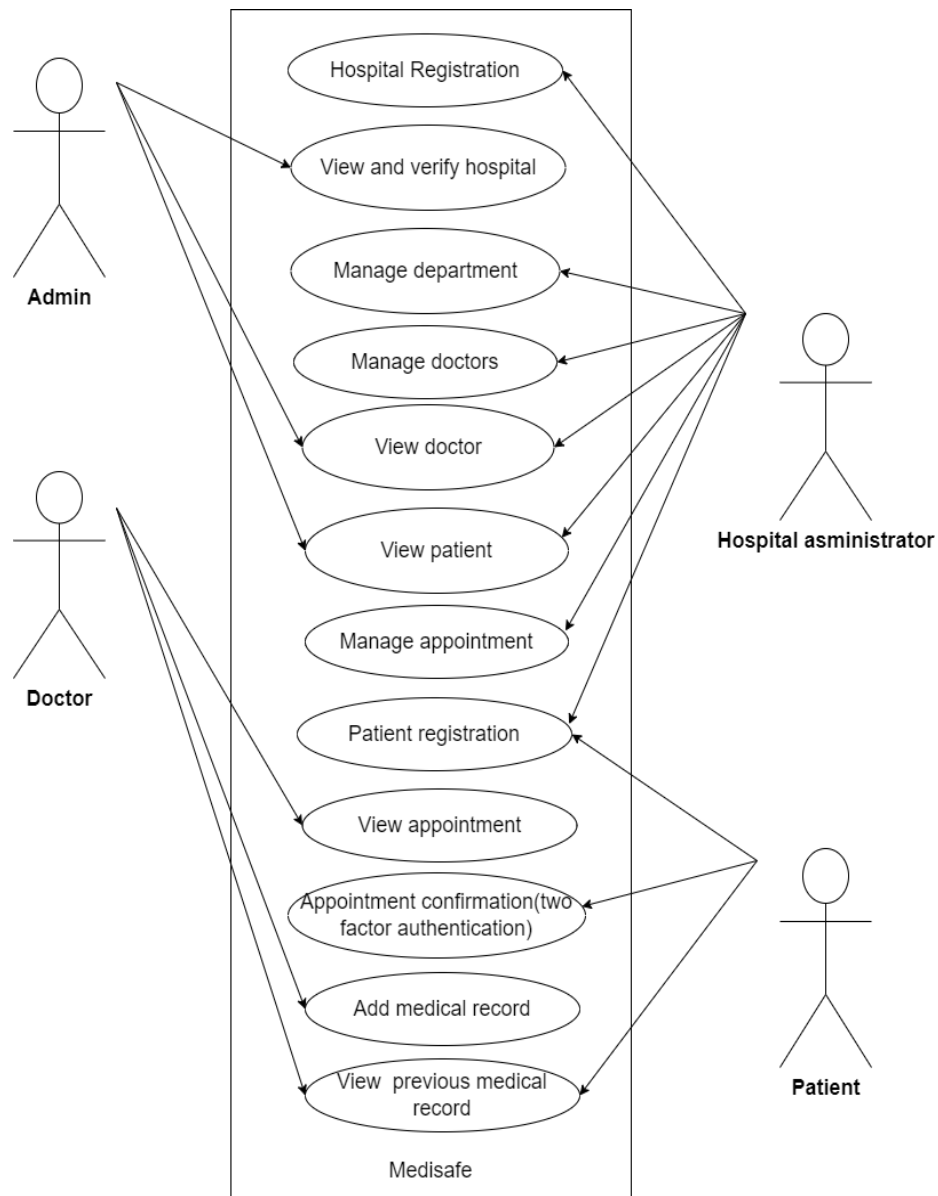


Figure 4.1: Use case Diagram

#### 4.2.2 Activity Diagram

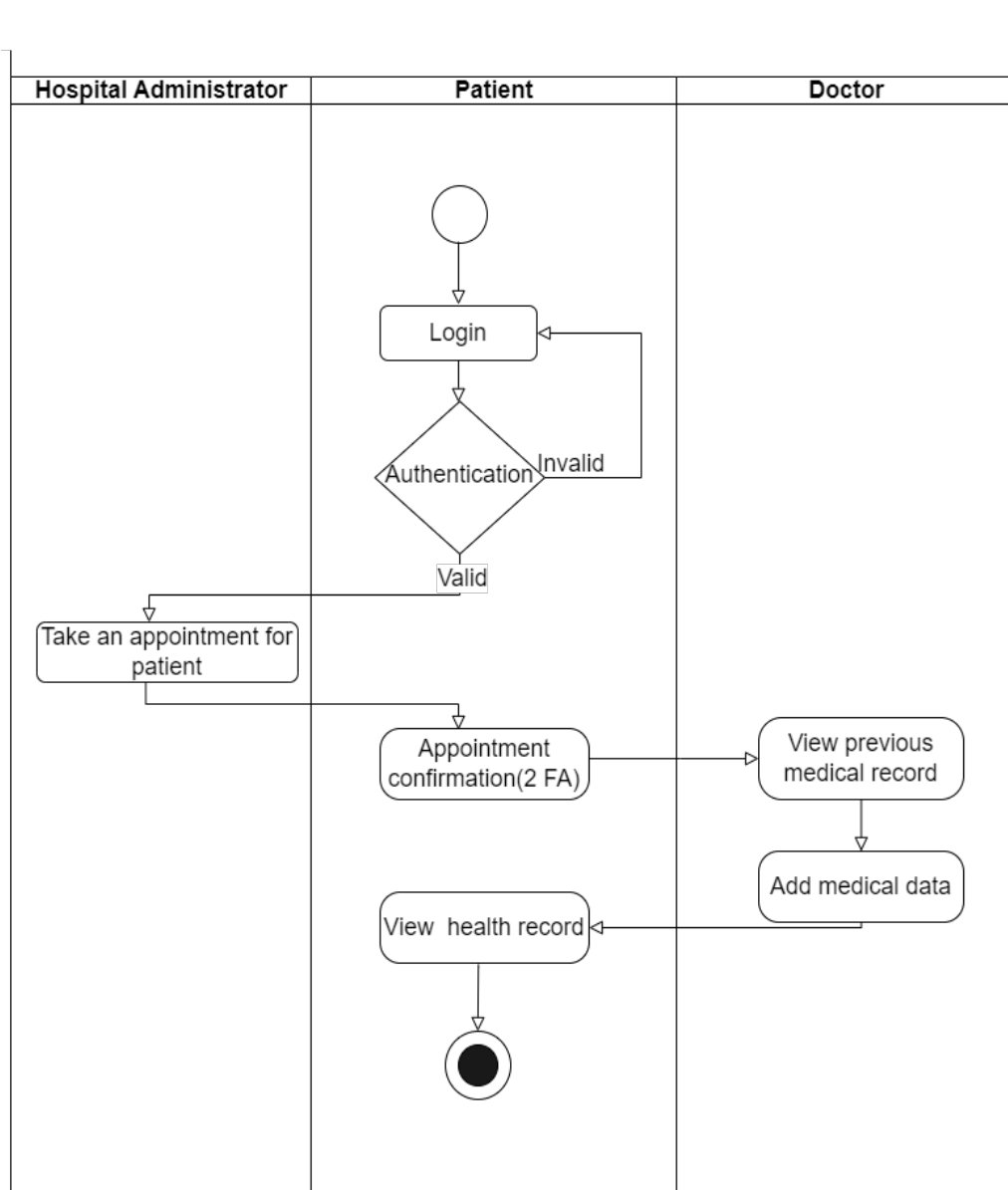


Figure 4.2: Activity Diagram

### 4.2.3 Class Diagram

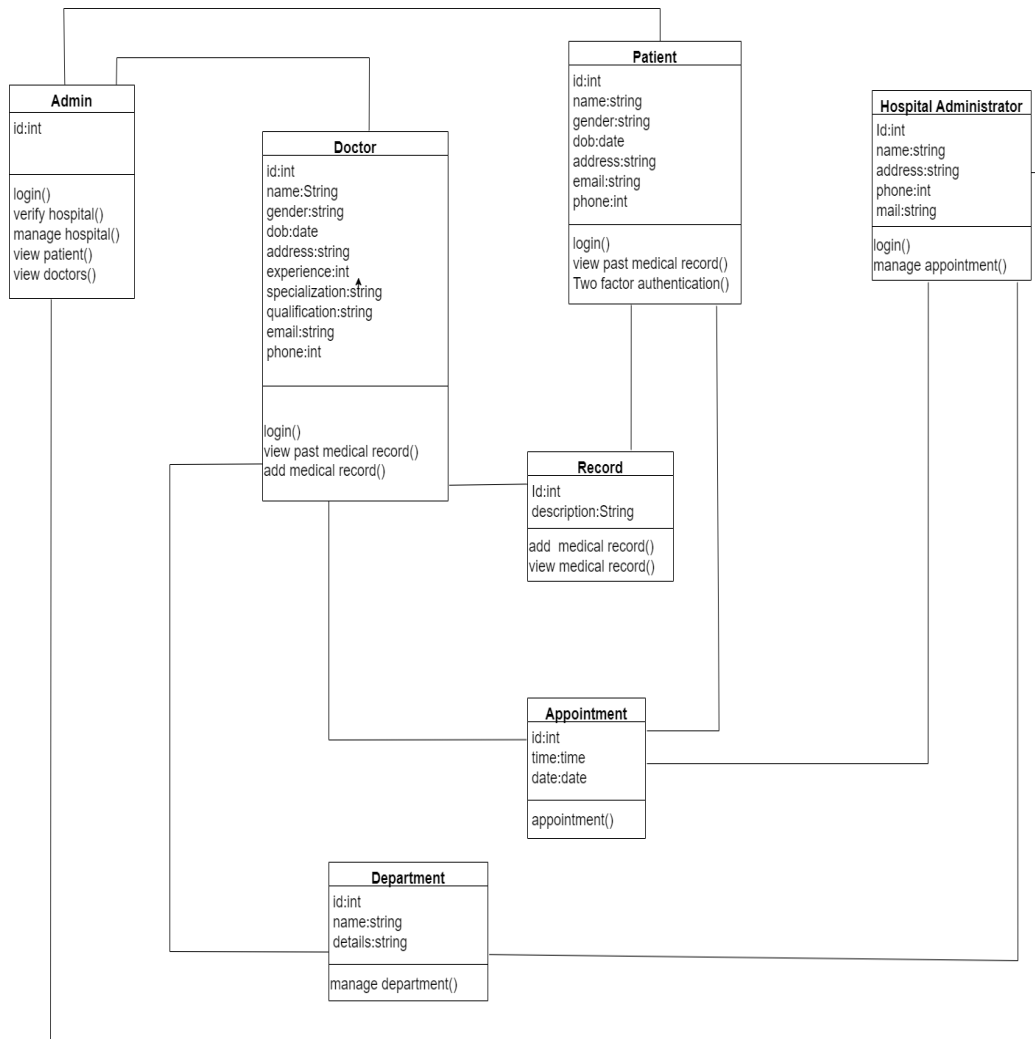


Figure 4.3: Class Diagram

### 4.3 User Story

User story ID	As a <Type of Users >	I want to <Perform some task >	So that I can <Achieve some goal >
1	Admin	Login,Homepage	Can navigate and access the entire system.
2	Hospital Administrator	Hospital registration,login	Can register the hospital and can access entire system.
3	Admin	verify hospital	verify the hospital details
4	Admin	Manage hospital	can view and block/unblock the hospital
5	Hospital Administrator	Manage department	Can add,update and delete department .
6	Hospital Administrator	Manage doctors	Can add,update and delete doctors.
7	Admin	View doctors	Can view doctors.
8	Hospital Administrator, Patient	Registration of patient	Hospital administrator can register patient and patient can register themselves .
9	Admin	View patient	Can view patient details.
10	Hospital Administrator	Manage appointment	Add appointment and send confirmation request to patient
11	Patient	Login,Homepage	Can navigate and access the entire system.
12	Patient	Appointment confirmation	Accept appointment and generate OTP through two factor authentication
13	Hospital Administrator	View patient	Can view patient details that who already took in a particular hospital
14	Doctor	Login,Homepage	can navigate and access the entire system.

<b>User story ID</b>	<b>As a &lt;Type of Users &gt;</b>	<b>I want to &lt;Perform some task &gt;</b>	<b>So that I can &lt;Achieve some goal &gt;</b>
15	Doctor	View patient	Can view patient who took appointment for a particular doctor
16	Doctor	View health record of patient	Can view health record of patient
17	Doctor	View medical record of patient	Can add medical record of patient
18	Patient	View previous health record	Can view previous health record

Table 4.1: User story

#### 4.4 Product Backlog

User Story ID	Priority (Low,High, Medium)	Size	Sprint	Status (Planned, Progressed, Completed)	Release Date	Release Goal
1	LOW	6	1	Completed	02-02-2024	Admin can navigate and access the entire system.
2	MEDIUM	8		Completed	06-02-2024	Can register the hospital and can access entire system.
3	LOW	6		Progressed	08-02-2024	Admin verify the hospital details
4	MEDIUM	8		Planned	11-02-2024	Can view and block/unblock the hospital
5	MEDIUM	8	2	Planned	14-02-2024	Can add,update and delete de- partment.
6	MEDIUM	8		Planned	17-02-2024	Can add,update and delete doc- tors.

<b>User Story ID</b>	<b>Priority (Low,High, Medium)</b>	<b>Size</b>	<b>Sprint</b>	<b>Status (Planned, Progressed, Completed)</b>	<b>Release Date</b>	<b>Release Goal</b>
7	LOW	6	2	Planned	19-02-2024	Admin can view doctors.
8	MEDIUM	8		Planned	21-02-2024	Hospital administrator can register patient and patient can register themselves
9	LOW	5	3	Planned	24-02-2024	Can view patient details
10	MEDIUM	8		Planned	27-02-2024	Add appointment and send confirmation request to patient.
11	LOW	5		Planned	02-03-2024	Can navigate and access the entire system.
12	HIGH	12		Planned	05-03-2024	Accept appointment and generate OTP through two factor authentication



User Story ID	Priority (Low,High, Medium)	Size	Sprint	Status (Planned, Progressed, Completed)	Release Date	Release Goal
13	LOW	6	4	Planned	11-03-2024	Can view patient details who already took appointment in a particular hospital
14	LOW	5		Planned	16-03-2024	Can navigate and access the entire system.
15	LOW	6		Planned	21-03-2024	Can view patient who took appointment for a particular doctor
16	HIGH	12	5	Planned	27-03-2024	Doctors can view previous health report of patient
17	HIGH	12		Planned	01-04-2024	Patient can add medical record
18	HIGH	10		Planned	04-04-2024	Patient can view previous health record

Table 4.2: Product backlog

#### 4.5 Project plan

User story ID	Task name	Start date	End date	Days	Status Goal
1	Admin homepage ,login	31-01-2024	02-02-2024	2	Completed
2	Hospital registra- tion,login	02-02-2024	06-02-2024	4	Completed
3	verify hos- pital	06-02-2024	08-02-2024	2	Planned
4	Manage hospital	09-02-2024	11-02-2024	2	Planned
5	Manage de- partment	12-02-2024	14-02-2024	2	Planned
6	Manage doctors	15-02-2024	17-02-2024	2	Planned
7	Admin view doc- tors	17-02-2024	19-02-2024	2	Planned
8	Registration of patient	19-02-2024	21-02-2024	2	Planned
9	Admin view pa- tient	22-02-2024	24-02-2024	2	Planned
10	Manage ap- pointment	25-02-2024	27-02-2024	2	Planned

User story ID	Task name	Start date	End date	Days	Status Goal
11	Patient login,home page	28-02-2024	02-03-2024	2	Planned
12	Appointment confirmation	02-03-2024	05-03-2024	3	Planned
13	Hospital administrator view patient	07-03-2024	11-03-2024	4	Planned
14	Doctor login,homepage	12-03-2024	16-03-2024	4	Planned
15	View patient	16-03-2024	21-03-2024	4	Planned
16	View previous health record of patient	22-03-2024	27-03-2024	5	Planned
17	Add medical record of patient	27-03-2024	01-04-2024	5	Planned
18	View previous health record	01-04-2024	04-04-2024	4	Planned

Table 4.3: Project plan

## 4.6 DATABASE DESIGN

### 4.6.1 Login Table

The login table is the cornerstone of user authentication in the project, containing essential fields such as login ID, username, password, and user type. Each row represents a distinct user account, with the login ID serving as a unique identifier. Usernames allow users to log in securely, while passwords are securely hashed to protect sensitive information. The "type of user" column categorizes users into different roles within the project, including admin, hospital administrator, doctor and patient.

No.	Name	Type	Constraints	Description
1	Login_id	INT	PRIMARY KEY	Login id
2	Username	VARCHAR(30)	NOT NULL	Email id of user
3	Password	VARCHAR(100)	NOT NULL	Password of user
4	Usertype	VARCHAR(10)	NOT NULL	Type of user

Table 4.4: Login table

### 4.6.2 Department table

Department table contains department name, details and which hospital it belongs to.

No.	Name	Type	Constraints	Description
1	Dept_id	INT	PRIMARY KEY	Department id
2	Department Name	VARCHAR(30)	NOT NULL	Department Name
3	Details	VARCHAR(1000)	NOT NULL	Department Details
4	Hosp_id	INT	FORIEGN KEY	Id of hospital

Table 4.5: Department Table

#### 4.6.3 Hospital table

The Hospital table has essential fields like unique Hos\_id, associated Login\_id, Hosp\_name (name), Place (location), Phone (contact), Email, Status , and License\_no (license number).

This design ensures a compact yet informative representation of hospital details.

No.	Name	Type	Constraints	Description
1	Hosp_id	INT	PRIMARY KEY	Id of hospital
2	Login_id	INT	FORIEGN KEY	Login id for hospital
3	Hosp_name	VARCHAR(35)	NOT NULL	Name of hospital
4	Place	VARCHAR(50)	NOT NULL	Place of hospital
5	Pin	INT	NULL	Pincode of hospital
6	Post	VARCHAR(25)	NULL	Post of hospital
7	Phone	BIGINT	NOT NULL	Phone number of hospital
8	Email	VARCHAR(30)	NOT NULL	Email id of hospital
9	Status	BOOLEAN	NOT NULL	Status of hospital
10	License_no	VARCHAR(20)	NOT NULL	License number of hospital

Table 4.6: Hospital Table

#### 4.6.4 Doctor Table

doctor table includes the doctor details like name, dept, email etc ...

No.	Name	Type	Constraints	Description
1	Dr_id	INT	PRIMARY KEY	Id of Doctor
2	Login_id	INT	FOREIGN KEY	Login Id
3	Name	VARCHAR(30)	NOT NULL	Name of Doctor
4	Dept_id	INT	FOREIGN KEY	Department id
5	Gender	VARCHAR	NOT NULL(20)	Gender of Doctor
6	Date Of Birth	DATE	NOT NULL	Date Of Birth of Doctor
7	Place	VARCHAR(50)	NOT NULL	Place of Doctor
8	Pin	INT	NULL	Pincode of Doctor
9	Post	VARCHAR(25)	NULL	Post of Doctor
10	Phone	BIGINT	NOT NULL	Phone number of Doctor
11	Email	VARCHAR(30)	NOT NULL	Email id of Doctor
12	Photo	BLOB	NULL	Photo of staff
13	Qualification	VARCHAR(50)	NOT NULL	Qualification of Doctor
14	Experience	VARCHAR(50)	NOT NULL	Experience of Doctor
15	Specialization	VARCHAR(50)	NOT NULL	Specialization of Doctor

Table 4.7: Doctor Table

#### 4.6.5 Patient table

Patient table includes the patient details like name, address, phone etc ..

No.	Name	Type	Constraints	Description
1	Pat_id	INT	PRIMARY KEY	Id of patient
2	Login_id	INT	FOREIGN KEY	Login id
3	Fname	VARCHAR(30)	NOT NULL	First name of patient
4	Lname	VARCHAR(30)	NOT NULL	Last name of patient
5	Gender	VARCHAR	NOT NULL(20)	Gender of patient
6	Date Of Birth	DATE	NOT NULL	Date of birth of patient
7	Place	VARCHAR(50)	NOT NULL	Place of patient
8	Pin	BIG INT	NULL	Pin code of patient
9	Post	VARCHAR(25)	NULL	Post of patient
10	Phone	BIG INT	NOT NULL	phone number of patient
11	Email	VARCHAR(30)	NOT NULL	Email of patient
12	Photo	BLOB	NOT NULL	Photo of patient

Table 4.8: Patient table

#### 4.6.6 Medical record Table

Medical report table includes the medical report details like present illness, duration, which type of tests they took etc ...

No.	Name	Type	Constraints	Description
1	Medrec_id	INT	PRIMARY KEY	Id of medical record
2	Pat_id	INT	FOREIGN KEY	Patient Id
3	Disease	VARCHAR(50)	NOT NULL	Disease in medical record
4	Duration	VARCHAR(30)	NOT NULL	Duration of the Disease
5	Test_name	VARCHAR(30)	NULL	Test suggested by the doctor
6	Test_result	FILE	NULL	Test result in health record
7	Test_result_ conclusion	VARCHAR(30)	NOT NULL	Conclusion from the test result
8	Date	DATE	NOT NULL	Date of health record
9	Dr_id	INT	FOREIGN KEY	Id of Doctor
10	Desc	INT	FOREIGN KEY	Description of medicine

Table 4.9: health record Table



#### 4.6.7 Appointment table

Appointment table includes the appointment details like date ,doctor's name,patient's name etc ...

No.	Name	Type	Constraints	Description
1	App_id	INT	PRIMARY KEY	Id of appointment
2	Dr_id	INT	FORIEGN KEY	Doctor id for ap- pointment
3	Pat_id	VARCHAR(35)	NOT NULL	Patient id for ap- pointment
4	Date	DATE	NOT NULL	Date of appointment
5	Time	INT	TIME	Time for appoint- ment
6	Statue	BOOLEAN	NULL	Status for appoint- ment

Table 4.10: Appointment Table

## 4.7 FORM DESIGN

### 4.7.1 Home page

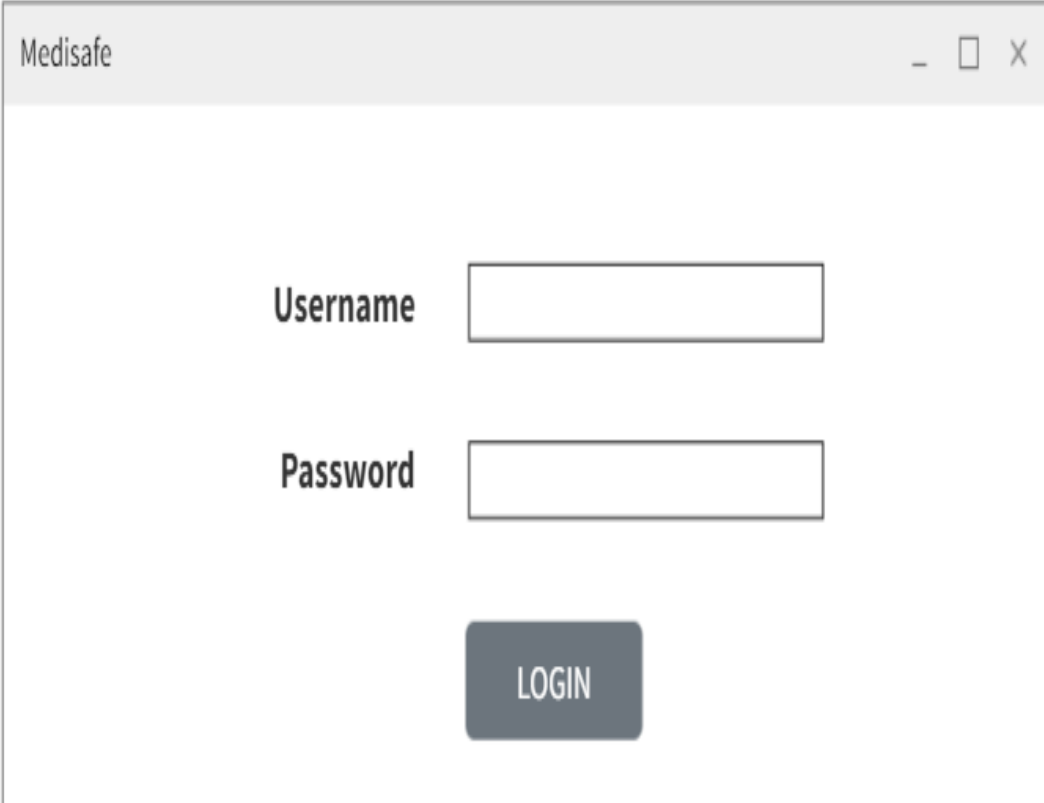
The project's main homepage sets the tone for MediSafe: Secure Health Records Powered by Blockchain. It serves as the initial point of entry for all users, presenting a clean and inviting interface. Prominently featured on this page is the login option, strategically positioned for easy accessibility. And also a registration link for hospital.



Figure 4.4: Home

#### 4.7.2 Login page

The login page for MediSafe: Secure Health Records Powered by Blockchain is designed for efficiency. On this page including Admin, Hospital administrator and Doctor. Each role is accompanied by labeled input fields for usernames and passwords.

A screenshot of a web application window titled "Medisafe". The window has a light gray header bar with the title "Medisafe" on the left and standard window control buttons (minimize, maximize, close) on the right. The main content area is white and contains a login form. The form consists of two labeled input fields: "Username" and "Password", each followed by a rectangular text input box. Below these fields is a dark gray button with the word "LOGIN" in white capital letters.

Medisafe

Username

Password

LOGIN

Figure 4.5: Login

### 4.7.3 Admin Homepage

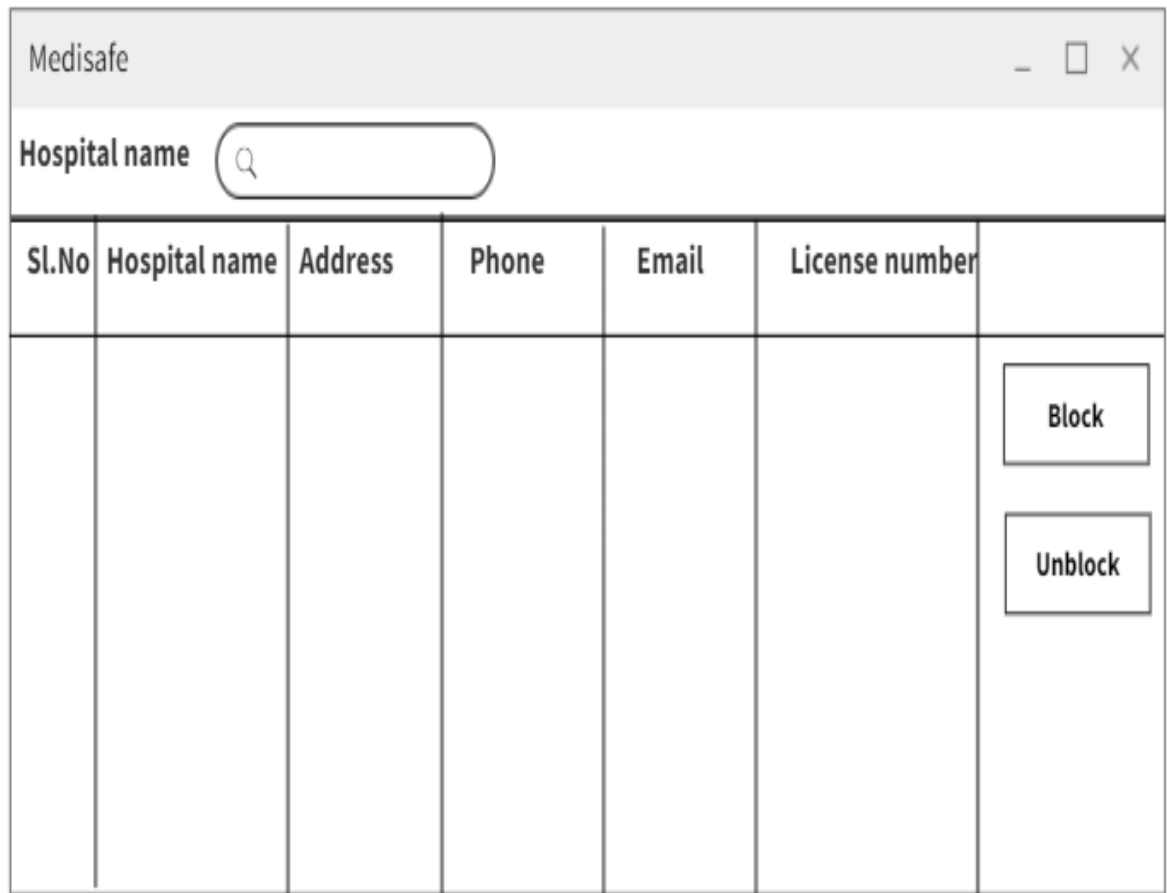
The Admin homepage for system is a central hub for overseeing and managing the entire system. This page is designed for providing a comprehensive dashboard that allows the Admin to perform various responsibilities seamlessly.

Medisafe	
Verify hospital	
View hospital	
View doctors	
View patient	
Logout	

Figure 4.6: Admin Home

#### 4.7.4 View and block/unblock hospital

The admin page facilitates the viewing of hospital details, providing the ability to block or unblock a hospital. Through this interface, administrators can access and review information about different hospitals. Additionally, they have the authority to take actions such as blocking or unblocking a hospital.



The screenshot shows a web application window titled "Medisafe". Below the title bar is a search bar labeled "Hospital name" with a magnifying glass icon. Below the search bar is a table with the following columns: "Sl.No", "Hospital name", "Address", "Phone", "Email", "License number", and an empty column for actions. The table is currently empty. In the action column, there are two buttons: "Block" and "Unblock".

Sl.No	Hospital name	Address	Phone	Email	License number	
						<div>Block</div> <div>Unblock</div>

Figure 4.7: View and block/unblock hospital

#### 4.7.5 View doctors

The admin page allows administrators to view information about doctors within the system. This functionality provides a comprehensive overview of the registered doctors, including details such as their names, specialties, contact information, and any other relevant data. The page serves as a centralized interface for administrators to access and manage the list of doctors in the system, facilitating efficient oversight and decision-making.

Medisafe

Hospital name

Sl.No	Name	Gender	DOB	Address	Phone	Mail	Qualification	Specialization	experience	department

Figure 4.8: View doctors

#### 4.7.6 View patient

The admin page provides a feature for administrators to access and view information about patients within the system. This functionality includes details such as patient names, contact information, and other pertinent data. By offering a centralized interface, administrators can efficiently oversee and manage the list of patients in the system, contributing to effective healthcare administration and decision-making.



The screenshot shows a web application window titled "Medisafe". Below the title bar, there is a search bar labeled "Hospital name" with a magnifying glass icon. Below the search bar is a table with the following columns: Sl.no, Name, Gender, DOB, Address, Email, Phone, Hospital, and Department. The table is currently empty, showing only the header row.

Sl.no	Name	Gender	DOB	Address	Email	Phone	Hospital	Department
-------	------	--------	-----	---------	-------	-------	----------	------------

Figure 4.9: View Patient

#### 4.7.7 Hospital Administrator Homepage

The Hospital Administrator homepage for system is a central hub for overseeing and managing the entire system. This page is designed for providing a comprehensive dashboard that allows the Admin to perform various responsibilities seamlessly.

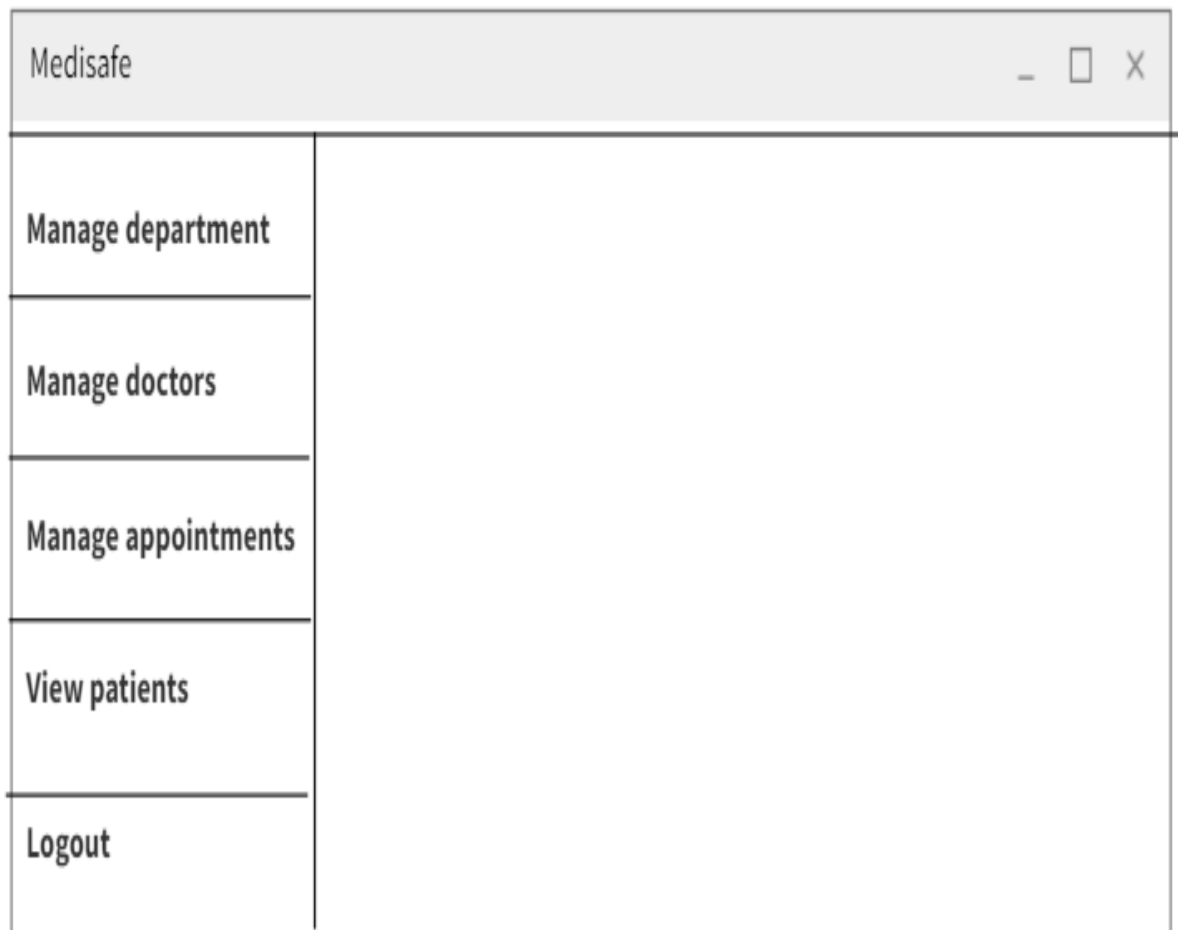


Figure 4.10: Hospital administrator Home



#### 4.7.8 Manage department

The hospital administrator page empowers administrators to oversee and manage departments within the system. This functionality includes the ability to add, edit, and delete departments as needed. Administrators can efficiently make adjustments to department details, create new departments, or remove obsolete ones, ensuring a dynamic and responsive system that accurately reflects the structure and requirements of the hospital's organizational units.

Medisafe		
Department	Details	
		<div>Edit</div> <div>Delete</div>
<div>Add</div>		

Figure 4.11: Manage Department

#### 4.7.9 Add department

The hospital administrator page enables administrators to seamlessly add new departments to the system. This functionality allows administrators to input essential details such as name, associated and additional information, facilitating the expansion and adaptation of the hospital's organizational structure.



The image shows a web application window titled "Smart lab" with standard window controls (minimize, maximize, close). Inside the window, there is a form for adding a department. The form consists of two main sections: "Department" and "Details". The "Department" section has a single text input field. The "Details" section has a larger text area with a small icon in the bottom right corner. Below these sections is a dark "Add" button.

Field	Type
Department	Text Input
Details	Text Area
Add	Submit Button

Figure 4.12: Add Department

#### 4.7.10 Manage doctor

The hospital administrator page provides a comprehensive interface for administrators to manage doctors within the system. This functionality includes the ability to add new doctors, edit existing doctor information, and remove or deactivate doctors if needed. Administrators can efficiently oversee and ensure the accuracy of doctor details, contributing to effective management of healthcare personnel within the hospital system.

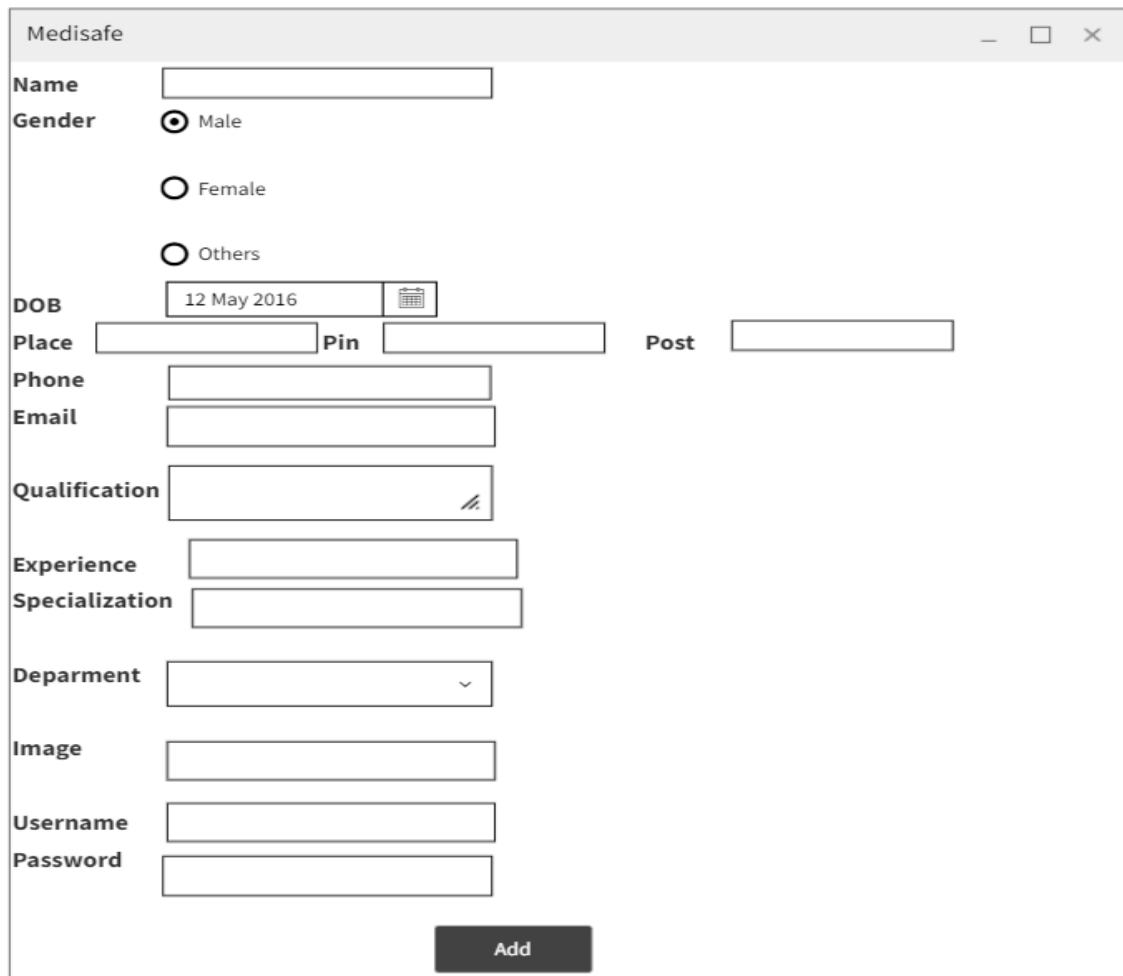
Sl.No	Name	Gender	DOB	Address	Phone	Mail	Qualification	Specialization	experience	department

Buttons: Edit, Delete, Add

Figure 4.13: Manage Doctor

#### 4.7.11 Add doctor

The hospital administrator page facilitates the addition of doctors to the system. Administrators can input essential details such as doctor's name, specialization, contact information, and other relevant data. This functionality streamlines the process of on boarding new doctors, ensuring that the system maintains an up-to-date and comprehensive record of healthcare personnel.



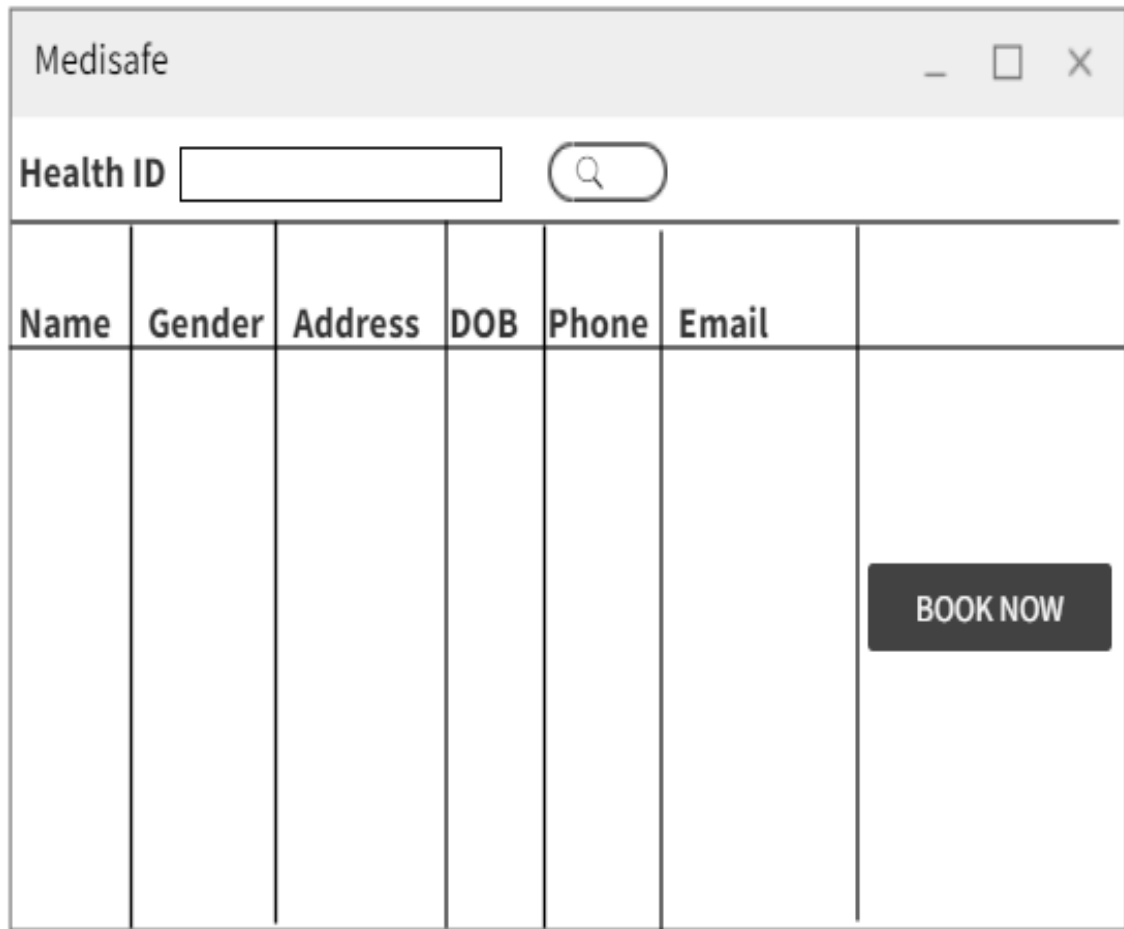
The image shows a web form titled "Medisafe" for adding a new doctor. The form contains the following fields and controls:

- Name:** A text input field.
- Gender:** Three radio button options: "Male" (selected), "Female", and "Others".
- DOB:** A date input field showing "12 May 2016" with a calendar icon.
- Place:** A text input field.
- Pin:** A text input field.
- Post:** A text input field.
- Phone:** A text input field.
- Email:** A text input field.
- Qualification:** A text input field with a small icon at the end.
- Experience:** A text input field.
- Specialization:** A text input field.
- Deparment:** A dropdown menu with a downward arrow.
- Image:** A text input field.
- Username:** A text input field.
- Password:** A text input field.
- Add:** A dark button at the bottom right.

Figure 4.14: Add doctor

#### 4.7.12 View Patient and booking page

The hospital administrator page provides the functionality for administrators to view patient information and schedule appointments on their behalf. This feature allows administrators to efficiently manage patient appointments, ensuring a streamlined and organized process for healthcare services within the hospital system.



The image shows a web application window titled "Medisafe". At the top, there is a search bar labeled "Health ID" with a text input field and a magnifying glass icon. Below the search bar is a table with seven columns: "Name", "Gender", "Address", "DOB", "Phone", "Email", and an empty column. The table is currently empty. In the bottom right corner of the table area, there is a dark grey button with the text "BOOK NOW".

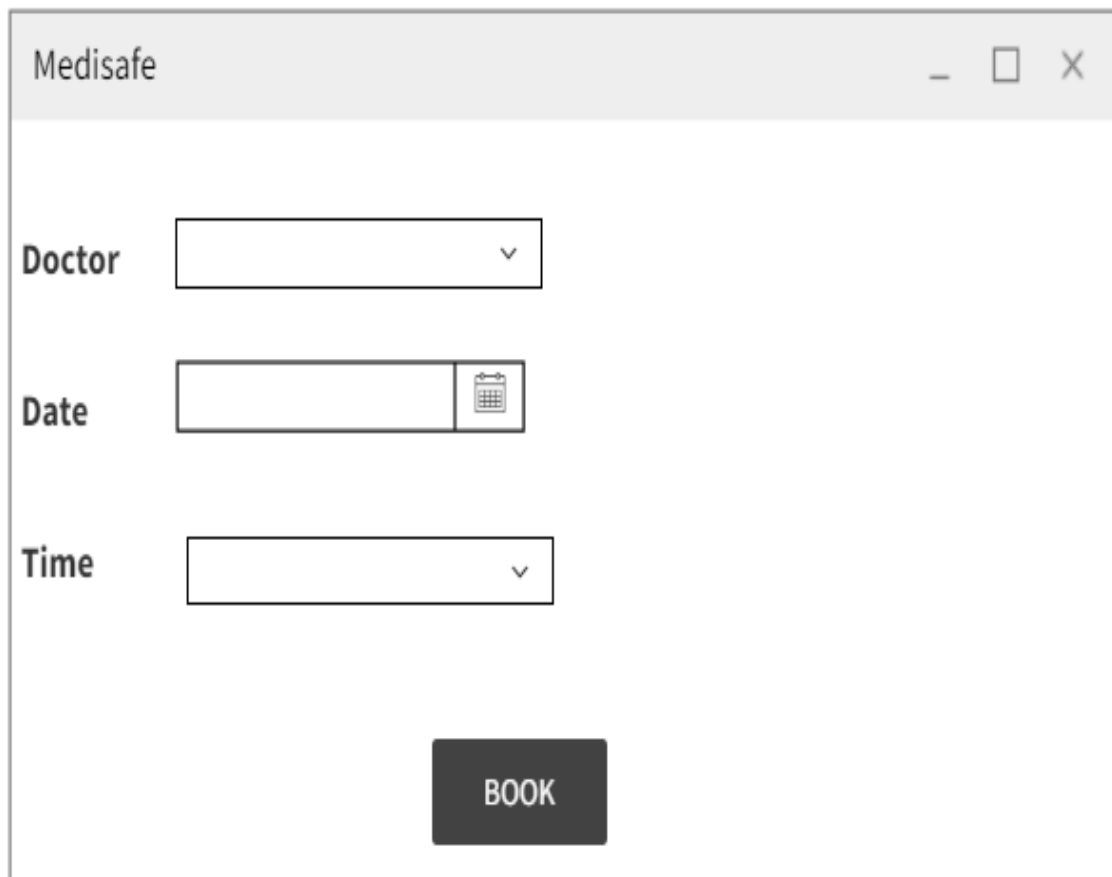
Name	Gender	Address	DOB	Phone	Email	

BOOK NOW

Figure 4.15: View appointment

#### 4.7.13 Add Appointment page

The hospital administrator page facilitates the addition of bookings through a user-friendly interface. Administrators can efficiently input appointment details, such as patient information, doctor selection, date, and time, streamlining the process of managing appointments within the hospital system.



The image shows a web application window titled "Medisafe" with standard window controls (minimize, maximize, close). The main content area contains a form for adding an appointment. The form has three labeled input fields: "Doctor" with a dropdown arrow, "Date" with a text input and a calendar icon, and "Time" with a dropdown arrow. Below these fields is a dark gray button labeled "BOOK".

Figure 4.16: Add appointment

#### 4.7.14 Manage appointment page

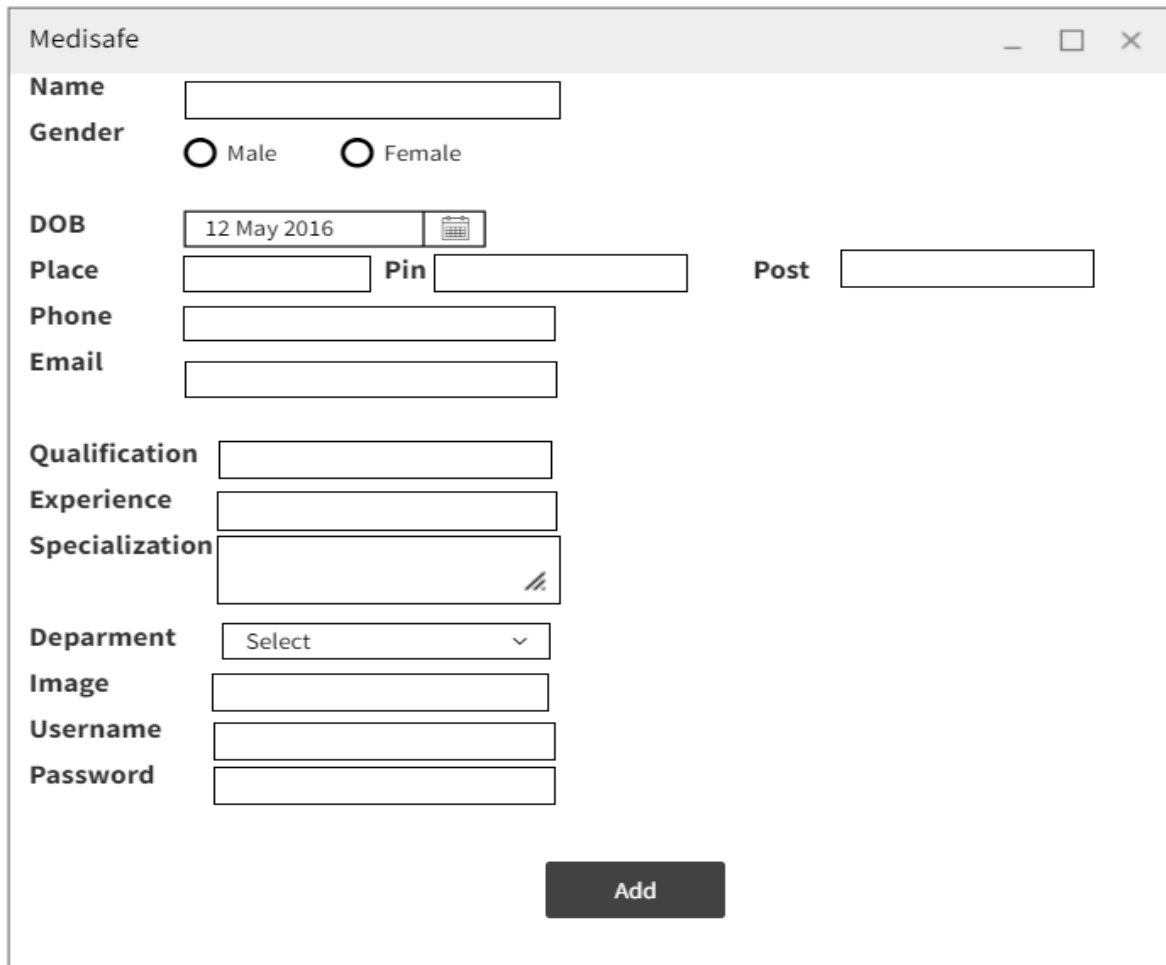
The hospital administrator page empowers administrators to effectively manage appointments within the system. This functionality includes the ability to view, edit, or cancel existing appointments, ensuring efficient coordination and organization of health-care services. Administrators can utilize this page to oversee and optimize the appointment scheduling process for patients and doctors.

Sl.No	Patient	Doctor	Time	date	
					<div>Delete</div> <div>Edit</div>

Figure 4.17: Manage appointment

#### 4.7.15 Patient Registration page by Hospital administrator

The hospital administrator page allows administrators to register new patients within the system. This functionality includes capturing essential patient details such as personal information and contact details. By providing this capability, administrators can efficiently add and maintain accurate records for each patient in the hospital system.



The image shows a web application window titled "Medisafe" with a patient registration form. The form contains the following fields and controls:

- Name:** A text input field.
- Gender:** Two radio buttons labeled "Male" and "Female".
- DOB:** A date input field showing "12 May 2016" with a calendar icon.
- Place:** A text input field.
- Pin:** A text input field.
- Post:** A text input field.
- Phone:** A text input field.
- Email:** A text input field.
- Qualification:** A text input field.
- Experience:** A text input field.
- Specialization:** A text input field with a small icon at the bottom right.
- Deparment:** A dropdown menu with "Select" and a downward arrow.
- Image:** A text input field.
- Username:** A text input field.
- Password:** A text input field.
- Add:** A dark button with the text "Add" located at the bottom right of the form.

Figure 4.18: Patient registration



#### 4.7.16 Doctor Home page

The Doctor homepage for system is a central hub for overseeing and managing the entire system. This page is designed for providing a comprehensive dashboard that allows the Admin to perform various responsibilities seamlessly.

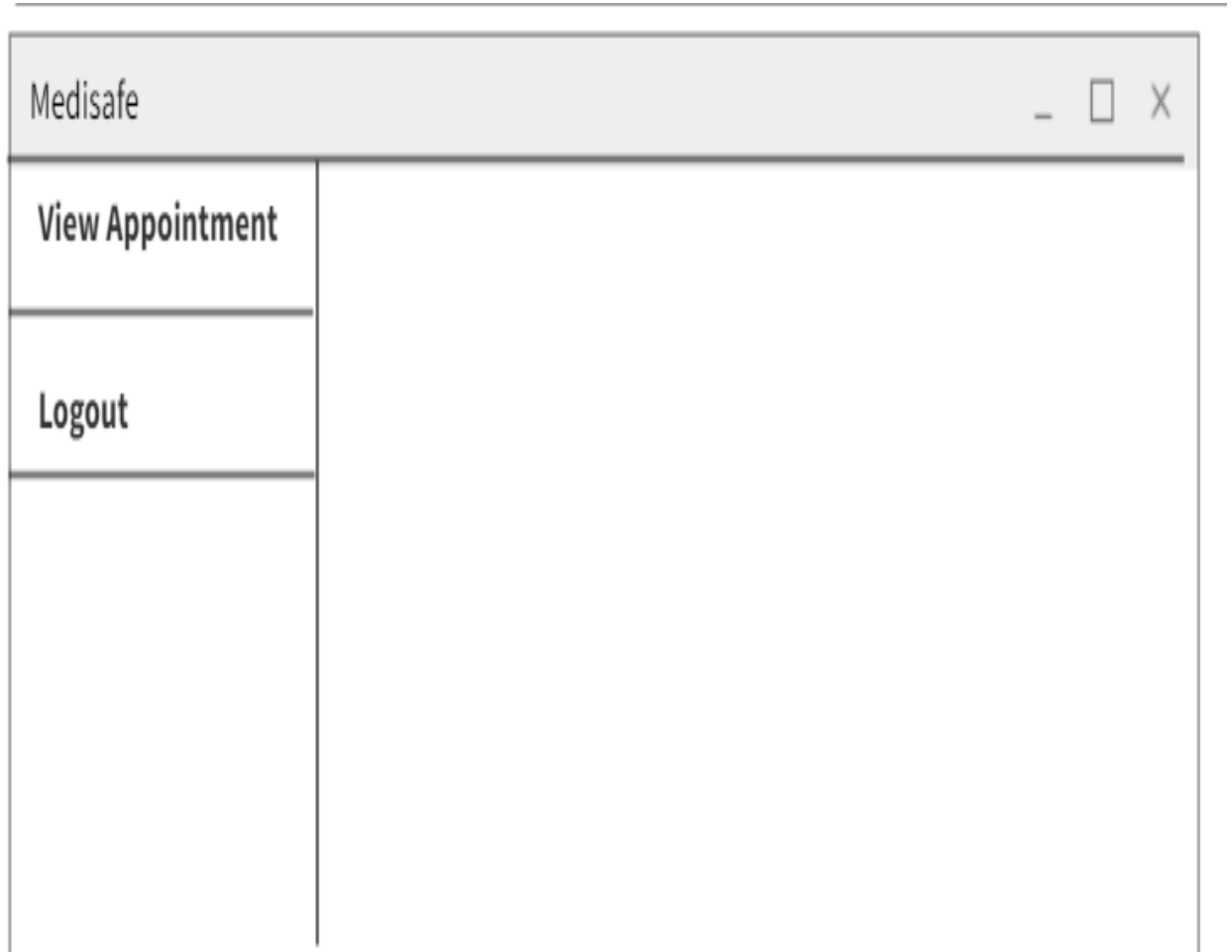
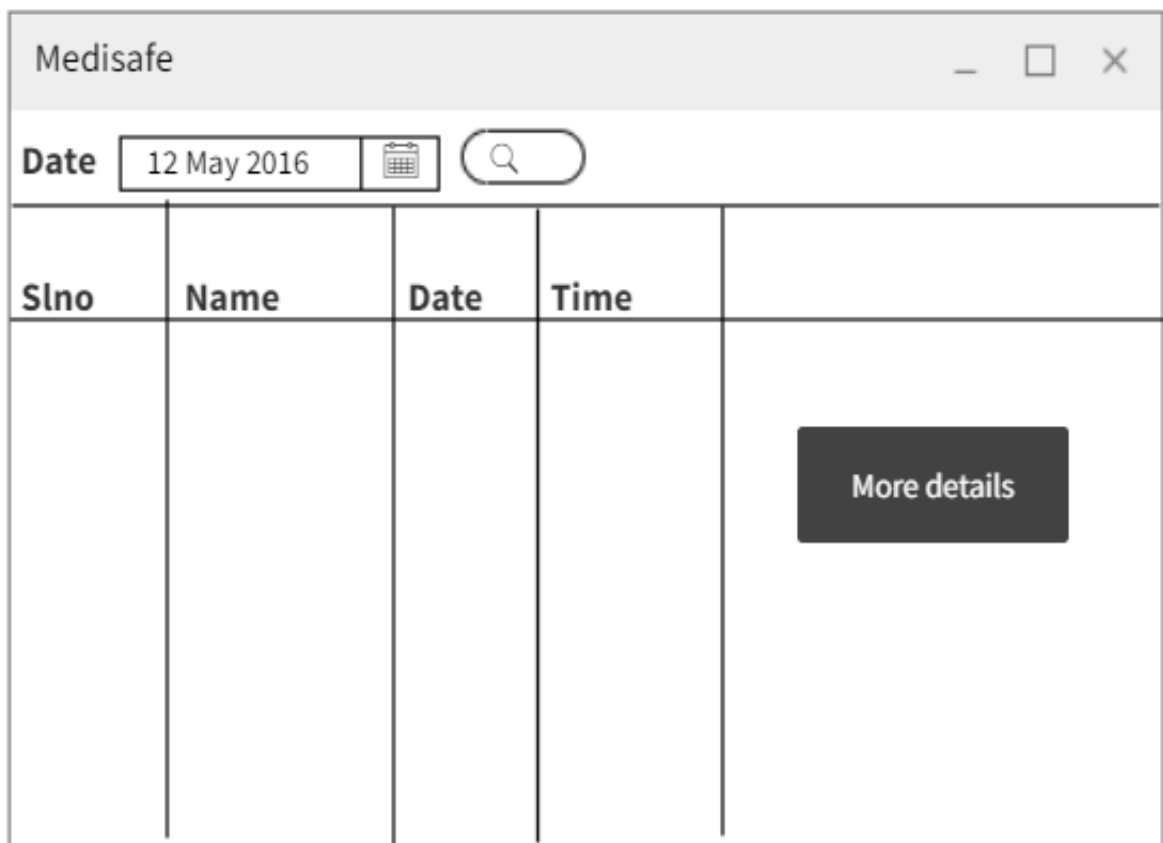


Figure 4.19: Doctor home

#### 4.7.17 View appointment page

The doctor page provides functionality for doctors to view their scheduled appointments. This feature allows doctors to access relevant details such as patient information and appointment time facilitating efficient management of their appointment schedule within the hospital system.



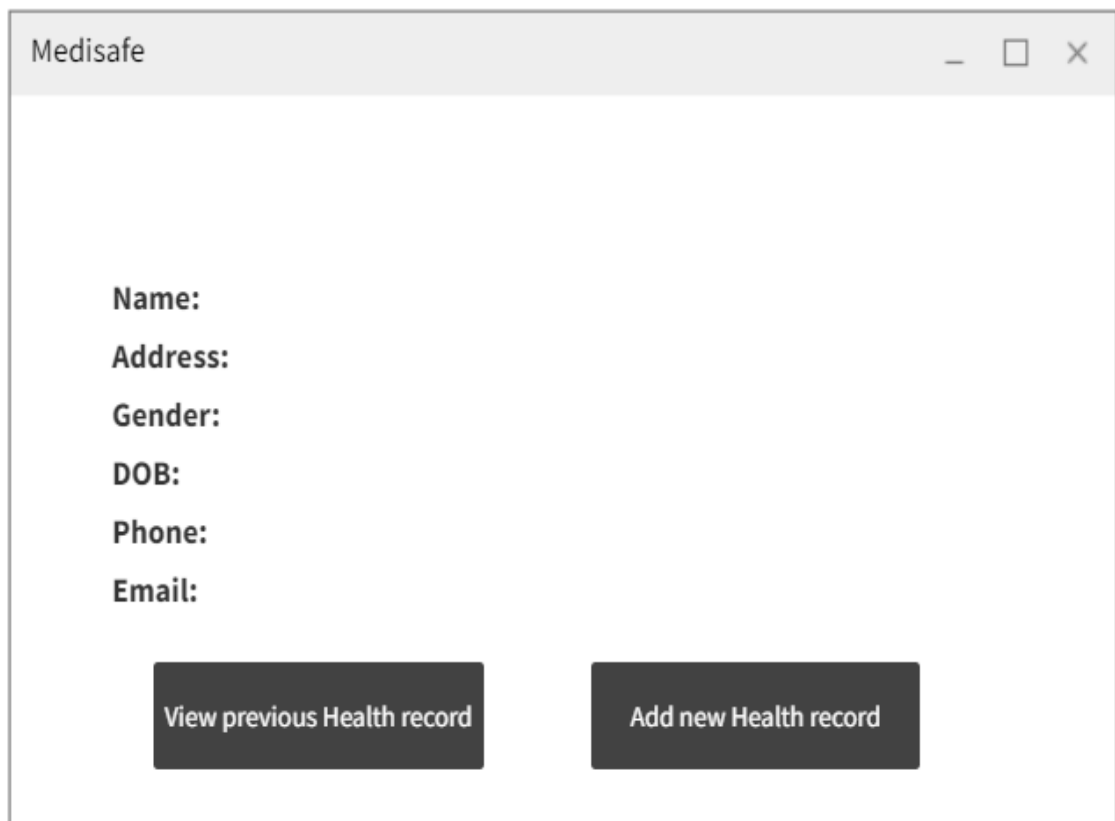
The screenshot shows a web application window titled "Medisafe". At the top, there is a "Date" label followed by a text input field containing "12 May 2016", a calendar icon, and a search icon. Below this is a table with five columns: "Sno", "Name", "Date", "Time", and an empty column. The table is currently empty. A "More details" button is located in the rightmost column of the table.

Sno	Name	Date	Time	
				<a href="#">More details</a>

Figure 4.20: View appointment

#### 4.7.18 View patient page

The doctor page enables doctors to view information about patients within the system. This functionality includes details such as patient names, medical records, contact information, and any other pertinent data. By offering a centralized interface, doctors can efficiently access and review patient information, contributing to effective healthcare delivery and decision-making.

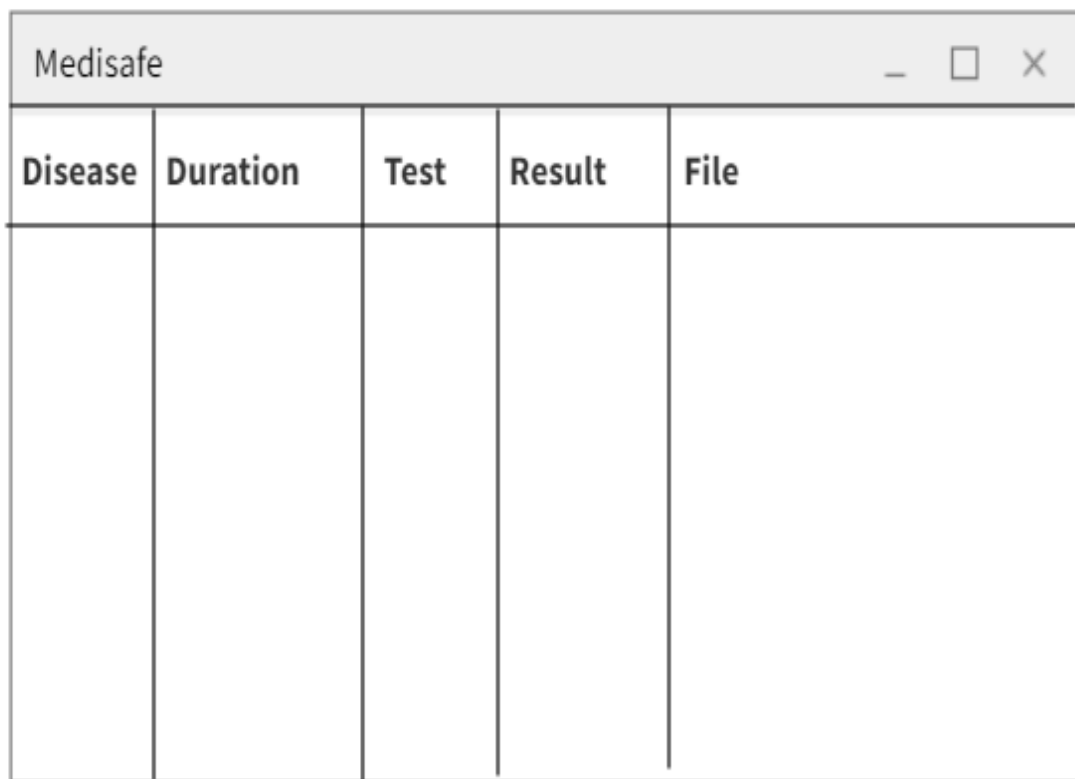


The image shows a web application window titled "Medisafe". Inside the window, there is a list of labels for patient information: "Name:", "Address:", "Gender:", "DOB:", "Phone:", and "Email:". Below these labels, there are two dark gray buttons with white text. The left button is labeled "View previous Health record" and the right button is labeled "Add new Health record". The window has a standard title bar with minimize, maximize, and close buttons.

Figure 4.21: View patient

#### 4.7.19 View previous medical record page

The doctor page allows doctors to access and review the previous medical records of patients through a dedicated interface. This functionality provides doctors with essential information about a patient's medical history, diagnoses, treatments, and other relevant details. By having access to previous medical records, doctors can make more informed decisions and provide personalized care based on the patient's health history.

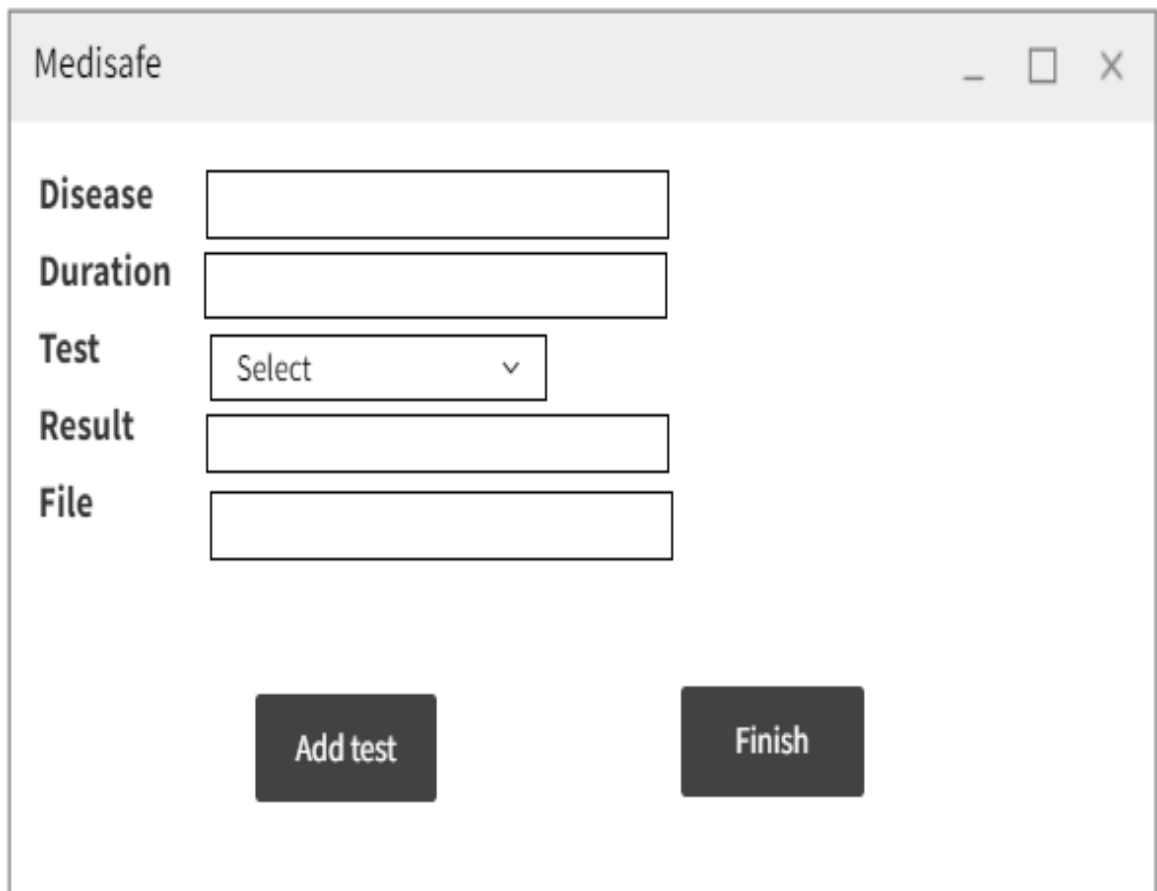


Medisafe				
Disease	Duration	Test	Result	File

Figure 4.22: View previous medical record

#### 4.7.20 Add new medical record page

The doctor page facilitates the addition of new medical records to the system. Doctors can input essential details about a patient's current health status, diagnoses, prescribed medications, and other relevant information. This functionality ensures that the system maintains up-to-date and comprehensive records, allowing healthcare providers to deliver accurate and informed medical care.




The image shows a software window titled "Medisafe" with standard window controls (minimize, maximize, close) in the top right corner. The window contains a form for adding a new medical record. The form has five labeled input fields arranged vertically: "Disease", "Duration", "Test", "Result", and "File". The "Test" field is a dropdown menu with "Select" and a downward arrow. Below these fields are two dark gray buttons: "Add test" on the left and "Finish" on the right.

Disease	<input type="text"/>
Duration	<input type="text"/>
Test	<input type="text" value="Select"/>
Result	<input type="text"/>
File	<input type="text"/>

Figure 4.23: Add new medical record

#### 4.7.21 Patient login page

The login page for MediSafe: Secure Health Records Powered by Blockchain is designed for efficiency. On this page patient can login to the system.



The image shows a mobile application interface for a patient login page. It features a white background with a thick black border. At the top right, there is a link labeled *Register*. Below this, there are two input fields: one for 'Username' and one for 'Password'. Both fields are empty and have a thin black border. Below the password field is a dark gray button with the word 'Login' in white text.

Figure 4.24: Patient login

#### 4.7.22 Patient home page

The Patient homepage for system is a central hub for overseeing and managing the entire system. This page is designed for providing a comprehensive dashboard that allows the Admin to perform various responsibilities seamlessly.

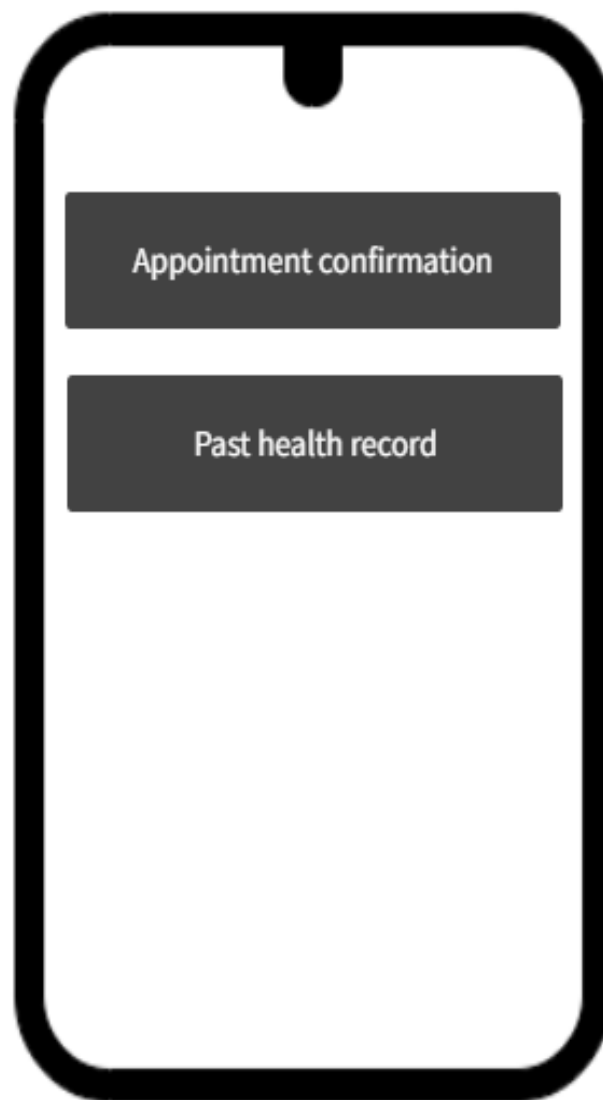


Figure 4.25: Patient home

#### 4.7.23 Patient registration page

The patient registration page serves as the interface for individuals to sign up and become registered users in the system. This page typically collects essential information such as personal details and contact information. The patient registration page is a crucial component in establishing a comprehensive and accurate database of individuals seeking healthcare services within the system.

The image shows a mobile application interface for patient registration. The form is contained within a rounded rectangle with a black border, resembling a smartphone screen. The fields are arranged vertically and include:

- First name:
- Last name:
- DOB:
- Gender: ☒ male ☐ female
- Place:
- Pin:
- Post:
- Phone:
- Email:
- Photo:
- Username:
- Password:
- Re enter password:

At the bottom of the form is a dark grey button with the text "REGISTER" in white capital letters.

Figure 4.26: Patient registration



#### 4.7.24 Appointment confirmation page

The appointment confirmation page for patients allows individuals to confirm their scheduled appointments within the system. Patients can use this interface to verify the details of their upcoming appointments, ensuring accuracy and confirming their intention to attend the scheduled medical consultation. This functionality contributes to a streamlined and organized process for both patients and healthcare providers.



Figure 4.27: Appointment confirmation

#### 4.7.25 Two factor Authentication page

The OTP (One-Time Password) setup page for patients enables individuals to establish a secure access mechanism for their medical records. Patients can use this page to set up an OTP, adding an additional layer of security when accessing their medical information specifically for interactions with doctors. This feature helps protect patient privacy and ensures secure communication between patients and healthcare providers.



Figure 4.28: Two factor authentication

#### 4.7.26 View health record page

The patient page allows individuals to view their previous health records, providing convenient access to personal medical history, diagnoses, and treatments.



The image shows a black-outlined smartphone with a notch at the top. The screen displays a form with the following labels in bold black text:

- Disease :**
- Duration**
- Test :**
- File(proof) :**
- Result:**

Figure 4.29: View health record