



Daffodil
International
University

**Project Title: MediSync BD - An Innovative Telemedicine
Platform with Real Time Video Consultation**

Final Year Project/Thesis/Internship

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This Project report has been submitted in fulfillment of the requirements for the
Degree of **Bachelor of Science in Software Engineering**

APPROVAL

APPROVAL

This project titled on “MediSync BD - An Innovative Telemedicine Platform with Real Time Video Consultation”, submitted by Muhammad Mohiuddin (ID: 213-35-799) to the Department of Software Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Software Engineering and approval as to its style and contents.

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Declaration

I acknowledge that I have done this project under the supervision of Fatama Bintu Rafiq, Senior Lecturer, Department of Software Engineering, Daffodil International University. I also assert that this project is my original work for the degree of B.Sc. in Software Engineering and that neither the whole work nor any part has been submitted for another degree in this or any other university.

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This project could not have been accomplished without direction, support, and motivation of numerous people and institutions.

To begin with I wish to convey my utmost gratitude to Daffodil international university who gave me the opportunity to work on my project and the resources. I particularly owe much of my success to my honorable supervisor **Fatama Binte Rafiq** who was always able to offer tremendous advice, positive feedback and consistent encouragement during the creation of MediSync.

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Lastly, I would like to mention the efforts of the medical professionals and patients who provided their feedback and contributed to the development of the vision and functionality of the MediSync platform.

Abstract

MediSync - An Innovative Telemedicine Platform with Real Time Video Consultation is a complete digital health platform aimed to connect patients and health institutions in real time video consultation and built-in appointment management. The platform will overcome traditional healthcare access disadvantages, including geographical inaccessibility and long queues as well as administrative wastages.

MediSync provides its patients with a friendly web and mobile platform to schedule virtual appointments, talk to doctors through live video, read their electronic health record, and have follow-up care - all in the comfort of their homes. To healthcare providers, the system provides them with a centralized platform to manage schedules, make online consultation, and access patient data in a secure and efficient manner in service delivery.

Its major characteristics are real-time video conferencing, creation of e-prescription, appointments bookings, and patient data storage in the cloud, which adheres to the healthcare data standards of data protection. MediSync intends to increase patient accessibility, healthcare efficiency, and quality care delivery at all times and in all locations by incorporating telemedicine with modern web technologies.

The main mission of MediSync is to redefine healthcare experience through developing a more connected, accessible, and patient-centered health care system - a gap bridging between patients and healthcare providers in the age of digitalism.

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Chapter 1: Introduction

1. Project Planning and Initiation

Feasibility Study

Phase 1: Preliminary Analysis & Project Scope Definition

The healthcare business has undergone a radical change following the digitalization in recent years and the increasing trends in demand of remote healthcare solutions. MediSync was designed to deal with the growing demand of a stable telemedicine system that can close the divide between patients and medical practitioners. The project will offer an uninterrupted doctor patient communication, video consultation, scheduling appointments, and controlling health care schedules all on one platform.

MediSync is the scope of:

- Creating a responsive Web application.
- Developing an individual dashboard of doctors and patients and administrators.
- Incorporating live communication through video calling.
- Application of payment processing facility.
- The security of authentication and access control by roles.

Phase 2: Market Feasibility Analysis

Our market study indicates that the use of telemedicine is increasing at a high rate especially after the COVID-19. Remote consultation services are demanded more and more in urban and semi-urban populations. The available platforms are usually effective, but lack the localized features, are expensive, or demand high technical capability. MediSync aims to have a low cost, scaled and patient localized solution to Bangladesh and beyond.

We undertook surveys among medical workers and prospective users. According to the results, more than 75 percent of users expressed readiness to attempt remote consultations and 60 percent of physicians considered online booking and video conferencing useful in minimizing waiting time.

Phase 3: Technical Feasibility Analysis

The technical stack contains:

Frontend: Next.js (App Router), TypeScript, Tailwind CSS, MUI.

State Management: RTK Query API calls with Redux Toolkit.

Authentication: role-based routing (JWT based).

Video Calling: Agora SDK in real-time.

Payment: local currency payment by using the SSLCommerz integration.

APIs: Developed in Express.JS and Prisma ORM.

The technologies chosen are all mature and are supported and are suited to produce.

Phase 4: Financial Feasibility Analysis

It was also created with little financial resources since the open-source tools were used. No paid-software was developed. It deployed and was tested on Vercel (frontend) and Render/Heroku (backend) on a free-tier plan. In a production establishment, there will be minimal recurring costs of hosting, SMS/ email facilities and even video call minutes in case they are required.

2. Target User Profile and Preliminary Tentative Elicitation Process.

Target Users:

- **Patients:** Citizens that want medical services.
- **Physicians:** is a registered professional who makes appointments.
- **Admin:** The system is operated by medical staff.

Elicitation Techniques:

- Hold interviews and interviews with doctors and clinic admins.
- Developed user stories and journey maps.
- Competitors that were analyzed such as Doctorola, Maya, and Doctime.

The process assisted in collecting real-world requirements and eliminating the unnecessary features.

3. System Requirements

Hardware Requirements:

- A computer and a smartphone that has an up-to-date browser.
- Internet connectivity

Software Requirements:

- Node.js, npm
- Backend: Express.js, Prisma
- Frontend: Next.js, Tailwind, MUI
- Database: PostgreSQL (or SQLite for testing)
- API Services: Agora, SSLCommerz

4. Project Scheduling

The development was organized into weekly sprints, each focusing on a module or feature.

Tools Used:

- **Gantt Chart:** Visualized tasks and timeline

Risk Management:

- **Technical Risk:** Solved via modular code and backups
- **Schedule Risk:** Buffer weeks and weekly demos
- **Integration Risk:** Staged testing of payment and video APIs

Chapter 2: Design and Implementation

1. Functional Requirements

FR01	Account Management
Description	The system enables the users to create their accounts, use, and maintain their accounts in a secure manner. Personal information, passwords and deleting the account can be updated or changed by each user. Admins are able to track and manage account statuses in order to guarantee the security of the platform.
Stakeholder	Patient, Doctor, Admin

Table 1-1: Registration and Login

FR02	Appointment Scheduling & Management
Description	Patients can view Doctors' availability and book, reschedule, or cancel appointments. Doctors manage their calendars and approve or decline appointment requests. Admins oversee all scheduling activities to ensure smooth operation.
Stakeholder	Patient, Doctor, Admin

Table 1-2: Appointment Scheduling & Management

FR03	Patient Profile & Medical Record Management
Description	Patients maintain comprehensive profiles containing their medical history, personal information, and treatment records. Doctors access and update these records to deliver informed care during consultations. Admins can review and manage all patient data to uphold compliance and accuracy.
Stakeholder	Patient, Doctor, Admin

Table 1-3: Patient Profile & Medical Record Management

FR04	Prescription Management
Description	Doctors can create, edit, and share prescriptions with Patients electronically after appointments. Patients can download or view their prescriptions securely. Admins can track all prescriptions for regulatory compliance.
Stakeholder	Patient, Doctor, Admin

Table 1-4: Prescription Management

FR05	Payment & Confirmation
Description	Patients can complete payments for appointments and services using secure online payment gateways. The system automatically generates receipts and confirmations after each transaction. Admins have full access to monitor and manage all financial activities.
Stakeholder	Patient, Admin

Table 1-5: Payment & Confirmation

FR06	Video Chat
Description	Patients and Doctors can connect through secure, real-time video consultations. Video calls are initiated during confirmed appointment slots to ensure privacy and reliability. This feature facilitates remote diagnosis and treatment.
Stakeholder	Patient, Doctor

Table 1-6: Video Chat

FR07	Appointment History
Description	Patients and Doctors can view detailed records of past appointments, including dates, notes, and prescription details. This helps in tracking treatment progress and maintaining continuity of care. Records are securely stored for future reference.
Stakeholder	Patient, Doctor

Table 1-7: Appointment History

FR08	Reviews & Feedback
Description	Patients can rate and write reviews about their consultation experience with Doctors. Doctors can access their feedback to improve service quality. The system aggregates ratings to help Patients make informed choices.
Stakeholder	Patient, Doctor

Table 1-8: Appointment History

FR09	Email Notifications
Description	The system sends automated email notifications to keep users informed about appointments, payment confirmations, and important updates. Notifications are triggered for booking, cancellations, and reminders. This ensures timely communication and reduces missed appointments.
Stakeholder	Patient, Doctor

Table 1-9: Email Notification

FR10	Doctor Account & Profile Management
Description	Doctors can create and maintain their professional profiles, including specializations, qualifications, and availability. They can update their details to keep information current for Patients. Admins review and verify profiles to maintain trust and credibility.
Stakeholder	Doctor, Admin

Table 1-10: Doctor Account & Profile Management

2. Non-Functional Requirements

Performance	Sub-second routing with server-side rendering (Next.js)
Reliability	Retry mechanisms in RTK Query for API calls
Security	Encrypted JWT tokens, secured backend APIs
Scalability	Component-based architecture
Usability	MUI-based responsive UI, optimized for all devices

Table 2-1: Non Functional Requirement

3. Object-Oriented System Design Using UML

a. Use Case Diagram

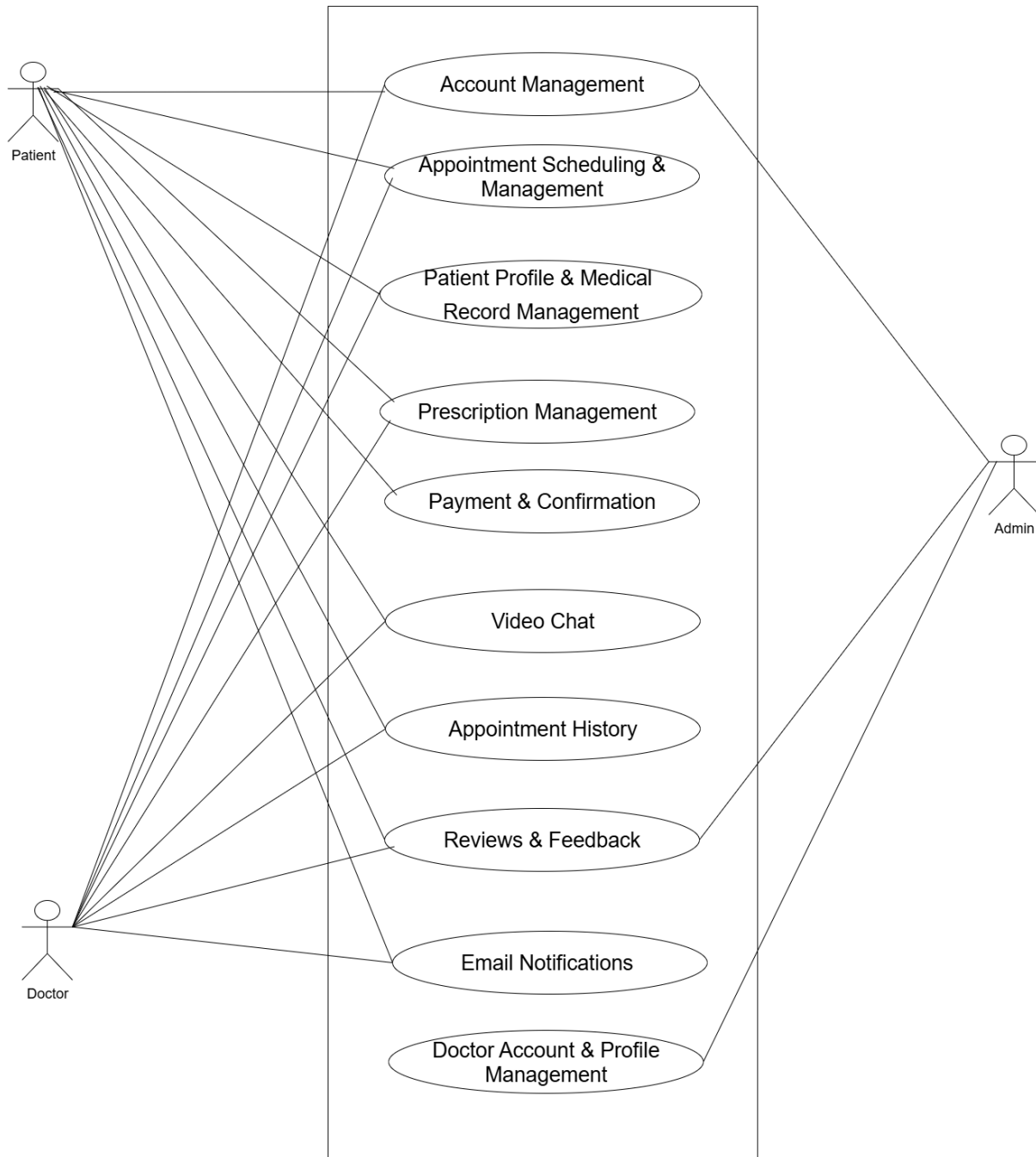


Figure 1-1: Use Case Diagram

b. Case Description

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1.Account Management

Use Case Name	Account Management
Goal	To allow users (Patients, Doctors, Admins) to securely register, log in, update account details, and delete their accounts.
Preconditions	The user has internet access and a valid email address.
Success End Condition	The account is created, updated, or deleted successfully, and data is securely stored.
Failed End Condition	The system displays an error message if validation fails or an unauthorized action is attempted.
Primary Actor	Patient, Doctor, Admin
Secondary Actor	System Email Service (for verification and reset links)
Trigger	The user initiates an action: registration, login, profile update, password reset, or account deletion.
Main Success Scenario	<ol style="list-style-type: none"> 1. The user accesses the account management page. 2. The user selects an action: register, log in, update profile, reset password, or delete account. 3. The user enters the required information for the chosen action. 4. The system validates the information and processes the request. 5. The system confirms success and updates the account accordingly.
Alternative Flows	<p>3a. Invalid Input: At Step 3, if required fields are incomplete or invalid, the system displays an error and requests correction.</p> <p>4a. Email Not Verified: At Step 4, if the email is unverified, login is blocked and a verification prompt is shown.</p> <p>4b. Incorrect Credentials: At Step 4, if login credentials are incorrect, the system displays an authentication error.</p>
Quality	Passwords must be securely hashed.

Requirements	The system must respond within 3 seconds.
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Table 3-1: Account Management

2.Appointment Scheduling & Management

Use Case Name	Appointment Scheduling
Goal	In order to enable patients to make appointments with physicians, date, time, and purpose.
Preconditions	The patient is logged in and doctors have available schedules.
Success End Condition	In order to enable patients to make appointments with physicians, date, time, and purpose.
Failed End Condition	The system displays an error if no slots are available or booking data is invalid.
Primary Actor	Patient, Doctor
Secondary Actor	Notification System (email/SMS alerts)
Trigger	The patient initiates an appointment booking request.
Main Success Scenario	<ol style="list-style-type: none"> 1. The patient goes to the interface of appointment booking. 2. The patient chooses a physician, date of choice and time. 3. The patient comes in and validates the request. 4. The system validates availability, stores appointments, and sends notifications.
Alternative Flows	2a. If the selected doctor has no available slots, the system prompts the user to choose another time or doctor (returns to Step 2).

	<p>3a. If required fields are left blank or invalid, the system displays validation errors (returns to Step 3).</p> <p>4a. If the notification service fails, an appointment is booked but a warning is shown to the patient about delivery failure.</p>
Quality Requirements	The appointment interface must load within 2 seconds.

Table 3-2: Appointment Scheduling and Management

3. Patient Profile & Medical Record Management

Use Case Name	Patient Profile & Medical Record Management
Goal	To allow patients and doctors to securely view, update, and manage personal and medical record information.
Preconditions	The patient is registered and logged in; the doctor is authorized to access the patient's medical information.
Success End Condition	The profile or record is viewed or updated successfully and securely stored.
Failed End Condition	Unauthorized access or system error prevents data from being retrieved or saved.
Primary Actor	Patient, Doctor
Secondary Actor	Database System, File Storage Service (for documents, reports)
Trigger	The patient or doctor accesses the profile or medical record section.
Main Success Scenario	<ol style="list-style-type: none"> 1. The user (patient or doctor) go to the medical record/profile section.

	<ol style="list-style-type: none"> 2. The system fetches current profile and medical history from the database. 3. User updates information (e.g., allergies, reports, contact info). 4. The system validates, stores changes, and confirms success to the user.
Alternative Flows	<p>2a. If the system fails to load data, a retry option is shown with error details logged.</p> <p>3a. If invalid input is provided (e.g., incorrect file format), system prompts for correction (returns to step 3).</p> <p>4a. If the user lacks permission (e.g., doctor without consent), the system blocks action and displays access warning.</p>
Quality Requirements	Data must load within 2 seconds under normal load.

Table 3-3:Patient Profile & Medical Record Management

4.Prescription Management

Use Case Name	Prescription Management
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Goal	To allow doctors to create, view, and manage digital prescriptions for patients, and for patients to access them.
Preconditions	The doctor is logged in and has access to the patient's consultation data.
Success End Condition	Prescription is successfully created, stored, and accessible to the patient.
Failed End Condition	Prescription is not saved due to input error or system failure; the patient is not notified.
Primary Actor	Doctor, Patient
Secondary Actor	Prescription Database, Notification System
Trigger	The doctor completes a consultation and initiates the prescription process.
Main Success Scenario	<ol style="list-style-type: none"> 1. The doctor navigates to the patient's record after consultation. 2. The doctor creates a new prescription with medicines, dosages, and instructions. 3. The system validates the input and saves the prescription securely. 4. The system sends a notification to the patient with a downloadable version.
Alternative Flows	<p>2a. If the doctor omits required fields (e.g., dosage), the system shows validation error (returns to step 2).</p> <p>3a. If the system fails to save a prescription, a retry option is provided and the error is logged.</p> <p>4a. If notification service fails, the prescription remains accessible in the patient portal, and retry is logged.</p>
Quality Requirements	The prescription form must support autocomplete for medicines from a preloaded list.

	<p>Prescriptions must be saved in a structured format (JSON/PDF) within 3 seconds.</p> <p>The system must allow patients to download prescriptions in PDF format anytime.</p>
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Table 3-4: Prescription Management

5. Payment & Confirmation

Use Case Name	Payment Integration
Goal	To allow patients to securely pay consultation fees via integrated payment gateway (e.g., SSLCommerz).
Preconditions	The patient is logged in and has a pending consultation requiring payment.
Success End Condition	Payment is processed successfully, and consultation is confirmed.
Failed End Condition	Payment fails or is canceled; consultation remains unpaid and unconfirmed.
Primary Actor	Patient, Payment Gateway (SSLCommerz)
Secondary Actor	Billing System, Notification System
Trigger	The patient proceeds to checkout after booking a paid consultation.
Main Success Scenario	<ol style="list-style-type: none"> 1. The patient reviews the consultation fee and proceeds to payment. 2. System redirects to SSLCommerz secure payment gateway. 3. The patient completes payment using the preferred method (e.g., card, mobile wallet).

	4. The system verifies transactions, updates payment status, and sends confirmation.
Alternative Flows	<p>2a. If redirection to the payment gateway fails, the system shows an error and logs the issue (returns to step 1).</p> <p>3a. If payment is declined or canceled, the user is notified and allowed to retry (returns to step 1).</p> <p>4a. If payment verification fails after a transaction, the system flags it for manual review and informs the user.</p>
Quality Requirements	<ol style="list-style-type: none"> 1. The payment process must complete within 60 seconds under stable internet conditions. 2. All transactions must use HTTPS with end-to-end encryption. 3. Payment confirmation must be reflected on the dashboard within 5 seconds post-success. 4. The system must log all transactions with unique IDs and timestamps for accountability.

Table 3-5:Payment & Confirmation

6.Video Chat Functionality

Use Case Name	Video Chat Functionality
Goal	To allow real-time video communication between patients and doctors during scheduled consultations.
Preconditions	A valid appointment exists; both users are logged in and have

	internet access.
Success End Condition	A stable video session is established and consultation concludes successfully.
Failed End Condition	The session fails to connect or ends prematurely due to technical issues.
Primary Actor	Patient, Doctor
Secondary Actor	Video Call API (e.g., Agora), Notification System
Trigger	The patient or doctor initiates the video chat at the scheduled time.
Main Success Scenario	<ol style="list-style-type: none"> 1. At the scheduled time, doctor or patient clicks “Join Video Call” from their dashboard. 2. The system initializes the video session and connects both users in a secure room. 3. Users communicate via audio/video in real time. 4. Session ends when either user clicks "Leave", and duration is logged.
Alternative Flows	<p>2a. If the system fails to initialize the video session, user sees a retry prompt (returns to step 1).</p> <p>3a. If one user disconnects due to internet loss, the system attempts to auto-reconnect for up to 2 minutes.</p> <p>4a. If a call ends unexpectedly, the system logs it as an incomplete session and alerts both users.</p>
Quality Requirements	<p>Video must support at least 720p resolution with <300ms latency.</p> <p>The session should start within 5 seconds of clicking “Join”.</p> <p>The system must support encryption (E2E or token-based security) for all video streams.</p>

	Call logs must include start/end time, participants, and any connection issues.
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Table 3-6:Video Chat

7.Appointment History Viewing

Use Case Name	Appointment History Viewing
Goal	To allow patients and doctors to view a chronological list of past and upcoming appointments.
Preconditions	The user is logged in and has appointment data in the system.
Success End Condition	Appointment data is displayed correctly with all relevant details.
Failed End Condition	The system fails to load the data or shows incomplete/incorrect information.

Primary Actor	Patient, Doctor
Secondary Actor	Appointment Database
Trigger	The user navigates to the “Appointment History” section from their dashboard.
Main Success Scenario	<ol style="list-style-type: none"> 1. The user opens the “Appointment History” section. 2. System queries the database for the user’s past and upcoming appointments. 3. Appointment data is displayed with filters for date, doctor, and status. 4. User views appointment details (e.g., time, date, status, summary).
Alternative Flows	<p>2a. If the database fails to respond, the system shows an error with a retry option.</p> <p>3a. If no appointments are found, the system displays a “No Appointments Found” message.</p> <p>4a. If appointment detail is missing (e.g., doctor name), the system displays a placeholder and logs the issue.</p>
Quality Requirements	Appointment history must load within 2 seconds .

Table 3-7:Appointment History

8.Reviews & Feedback System

Use Case Name	Reviews & Feedback System
Goal	To allow registered patients to submit reviews and feedback for doctors after completing appointments.

Preconditions	The patient is logged in and has at least one completed appointment with the doctor.
Success End Condition	Review is saved, associated with the doctor and patient, and displayed publicly (after moderation if applicable).
Failed End Condition	Review submission fails due to validation errors, moderation hold, or system errors, and the patient is informed accordingly.
Primary Actor	Registered Patient
Secondary Actor	Doctor, Review Database, Moderation System
Trigger	The patient navigates to the doctor's profile or appointment history and chooses to submit a review.
Main Success Scenario	<ol style="list-style-type: none"> 1. The patient navigates to the doctor's profile or appointment history page. 2. The patient selects the option to leave a review or feedback. 3. The patient rates the doctor (e.g., 1 to 5 stars) and writes a comment. 4. The patient submits the review. 5. The system saves the review, associates it with the doctor and patient, and displays it publicly (after moderation if applicable). 6. The system sends a notification to the doctor about the new review.
Alternative Flows	<p>2a. If the patient has no completed appointments with the doctor, the system shows an error message that reviews are allowed only after completed appointments.</p> <p>4a. If the review contains inappropriate content, the system flags it for moderation and holds it until approval.</p> <p>4b. If the system fails to save the review due to server/database</p>

	issues, an error message is displayed and the patient is prompted to try again later.
Quality Requirements	Patients cannot submit multiple reviews for the same appointment.

Table 3-8:Reviews & Feedback

9.Email Notifications & Alerts

Use Case Name	Email Notifications & Alerts
Goal	To automatically send timely email notifications and alerts to patients, doctors, and admins regarding important events and updates.
Preconditions	Users (patients, doctors, admins) are registered and have valid email addresses saved in the system.
Success End Conditon	Email notifications are successfully sent to the intended recipients promptly and without errors.
Failed End Condition	Email fails to send due to system errors or invalid email addresses; system logs the failure and retries or alerts admins.
Primary Actor	System (Automated Process), Patient, Doctor, Admin

Secondary Actor	Email Server, Notification Service
Trigger	System events occur that require notifying users, such as appointment creation, updates, cancellations, payment confirmations, or new reviews.
Main Success Scenario	<ol style="list-style-type: none"> 1. The system detects an event that requires notification (e.g., appointment booked, payment received). 2. The system generates an email with relevant details tailored to the recipient's role. 3. Email is sent to the user's registered email address. 4. The system logs the email delivery status. 5. The recipient receives the email notification promptly.
Alternative Flows	<p>2a. If the user's email address is invalid or missing, the system logs the error and alerts the admin for correction.</p> <p>3a. If the email server is temporarily unavailable, the system queues the email and retries sending after a delay.</p> <p>5a. If email delivery fails repeatedly, the system notifies the admin and may attempt alternative contact methods.</p>
Quality Requirements	<p>Email notifications must be sent within 1 minute of the triggering event.</p> <p>Emails must comply with standard formatting and avoid spam filters.</p>

Table 3-9:Email Notification

10.Doctor Account & Profile Management

Use Case Name	Doctor Account & Profile Management
----------------------	-------------------------------------

Goal	To enable doctors to create, update, and manage their professional accounts and profiles within the system.
Preconditions	The doctor is registered and logged into their account.
Success End Condition	Doctor's account information and profile details are saved and updated successfully.
Failed End Condition	The system fails to save changes due to validation errors or server issues; the doctor is informed and prompted to retry.
Primary Actor	Doctor
Secondary Actor	User Database, Profile Management System
Trigger	Doctors access their profile management section to create or update account details.
Main Success Scenario	<ol style="list-style-type: none"> 1. The doctor logs into their account and navigates to the profile management page. 2. Doctor updates personal details (name, contact info), professional details (specialization, qualifications), and availability schedule. 3. Doctor uploads or updates profile picture and other related documents (e.g., certificates). 4. The doctor submits the changes. 5. The system validates the input and saves the updated profile information. 6. The system confirms the successful update to the doctor.
Alternative Flows	<p>2a. If input validation fails (e.g., invalid email format), system highlights errors and requests correction.</p> <p>3a. If document upload fails due to file size or format, system displays an error and prompts for valid files.</p> <p>5a. If the system encounters a server/database error during save,</p>

	it notifies the doctor and suggests retrying later.
Quality Requirements	<p>Profile updates must be saved within 3 seconds of submission.</p> <p>Input validation must cover all fields, including file types and sizes for uploads.</p>

Table 3-10: Doctor Profile & Account Management

c. Activity Diagram

Admin Activity

1. Manage Doctor Account

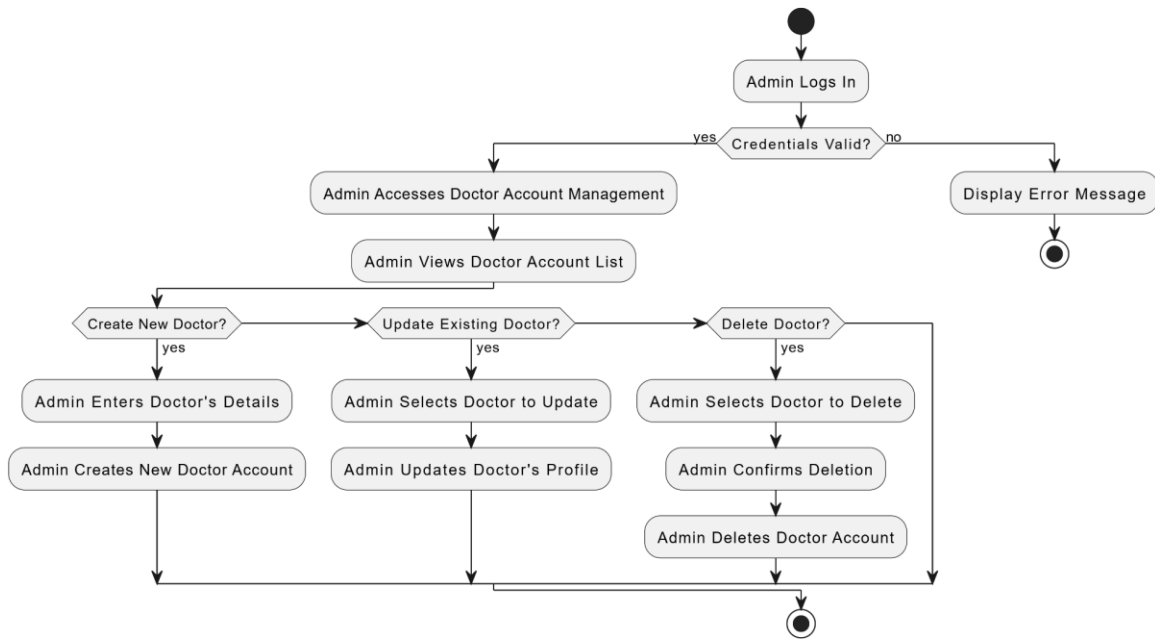


Figure 2-1:Manage Doctor Account

2. Create Schedule Slots

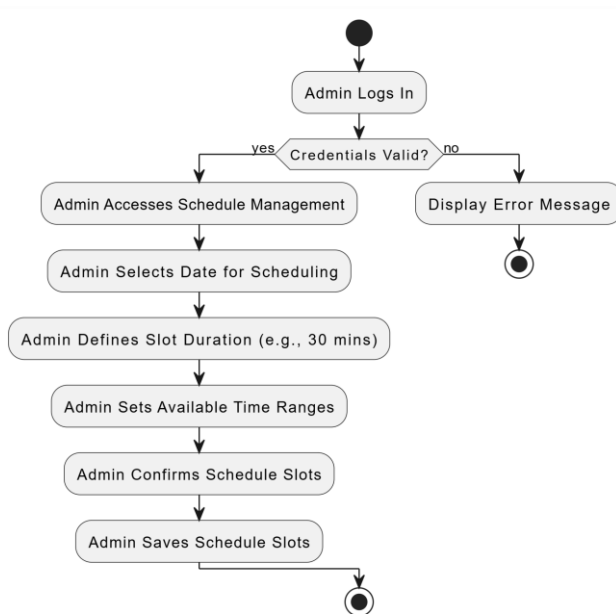


Figure 2-2:Create Schedule Slots

3.Manage Appointment Status

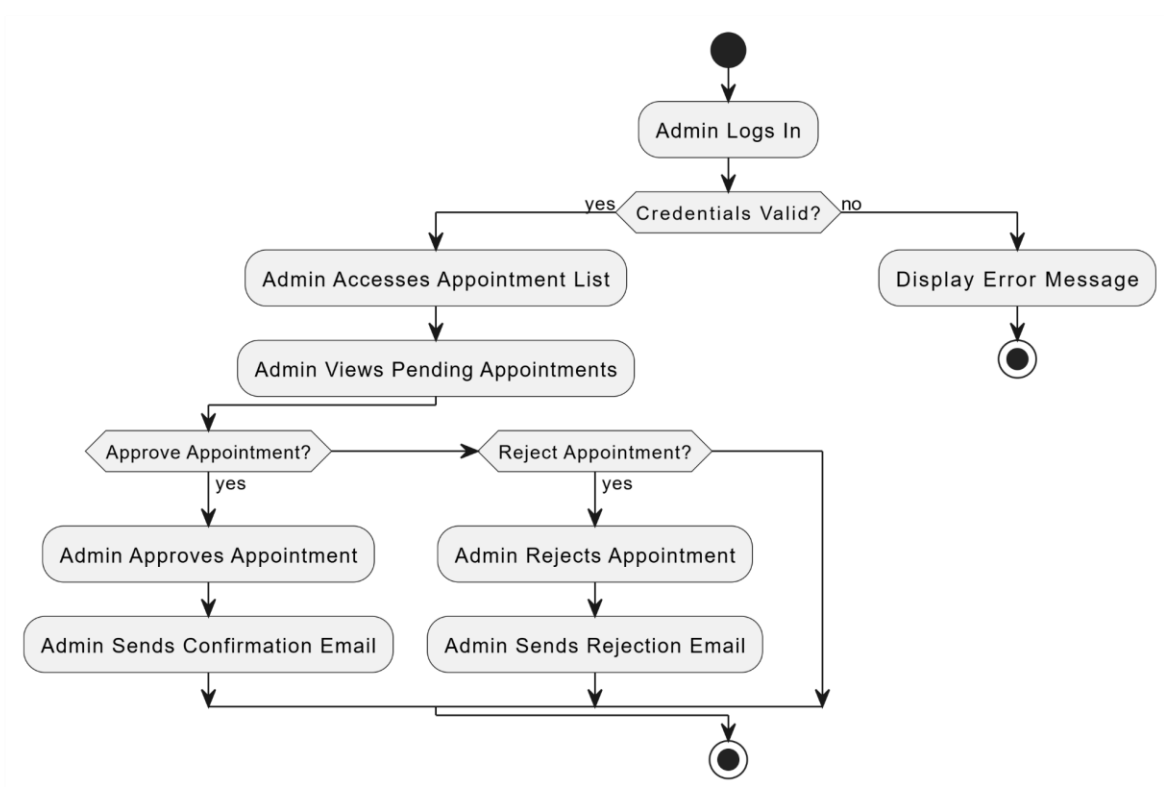


Figure 2-1:Manage Appointment Status

4.View Appointment History

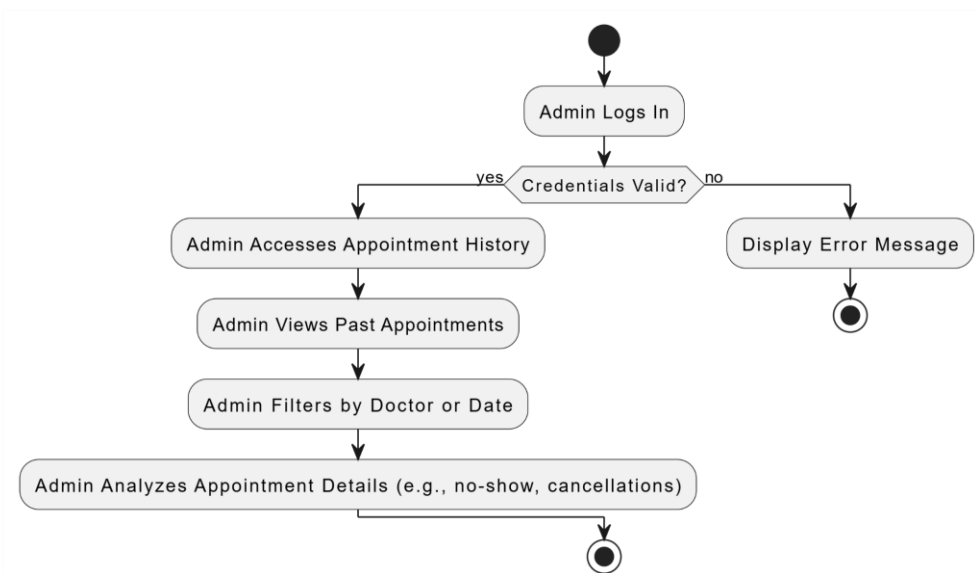


Figure 2-4: View Appointment History

5.Manage Doctor Profiles

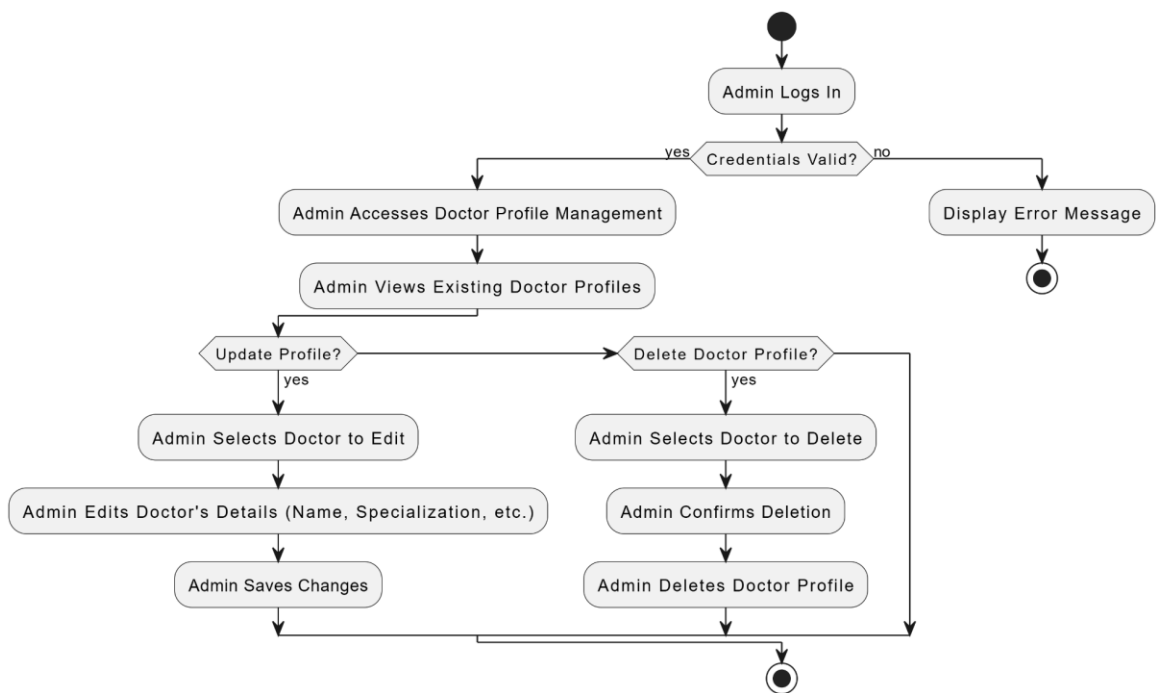


Figure 2-5: Manage Doctor Profile

Doctor Activity

1.View Upcoming Appointments

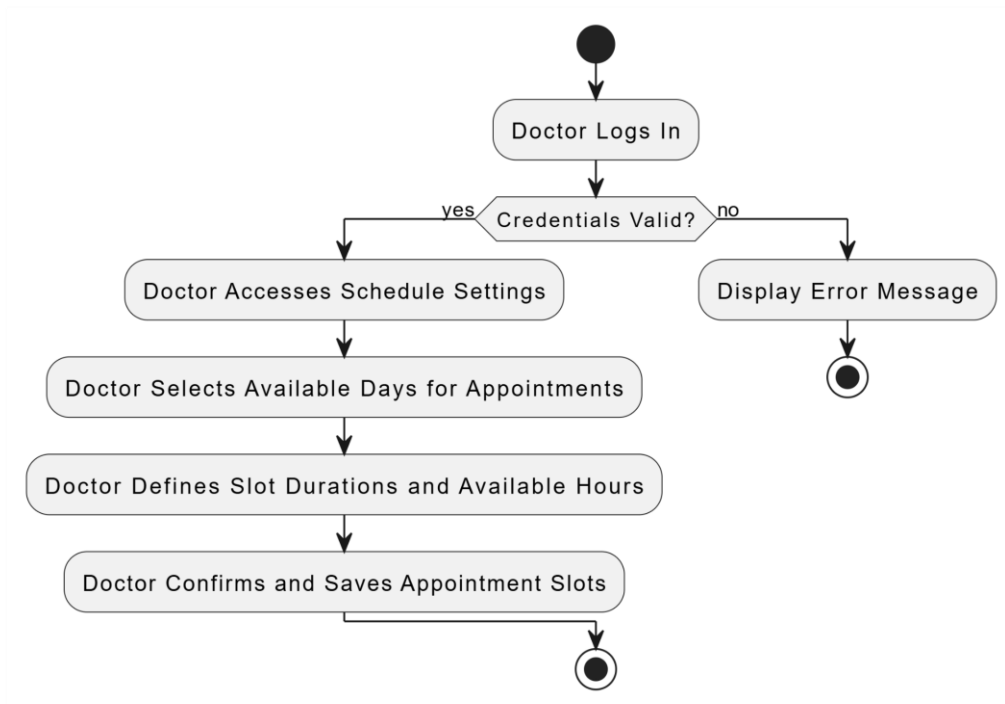


Figure 2-6:View Upcoming Appointments

2.Set Appointment Slots

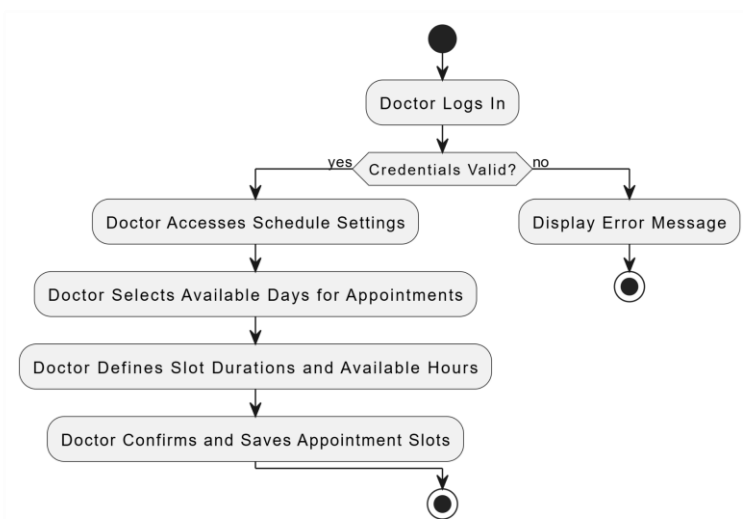


Figure 2-7:Set Appointment Slots

3.Accept Appointments

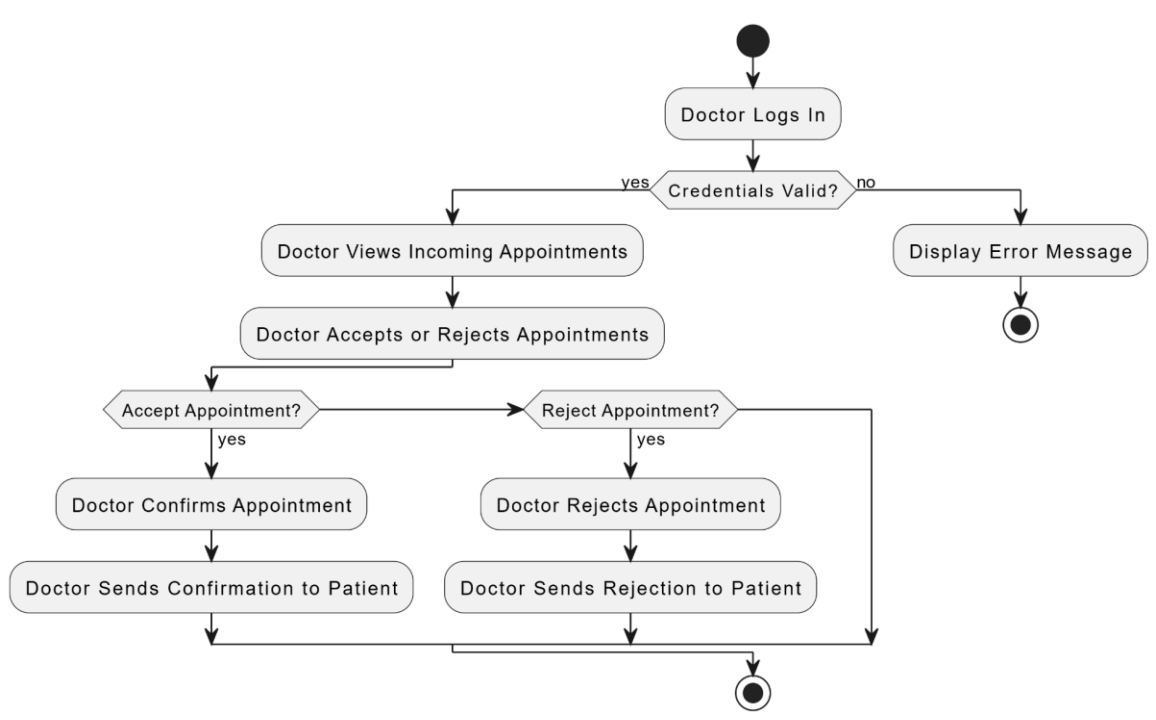


Figure 2-8:Accept Appointments

4.Access Patient Profiles

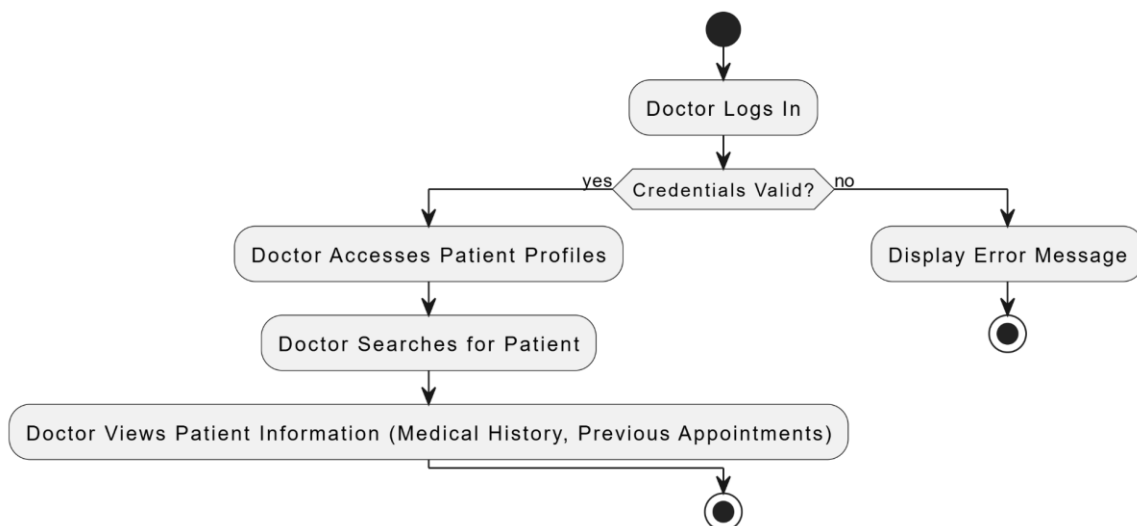


Figure 2-9:Access Patient Profiles

5.View Diagnostic Reports

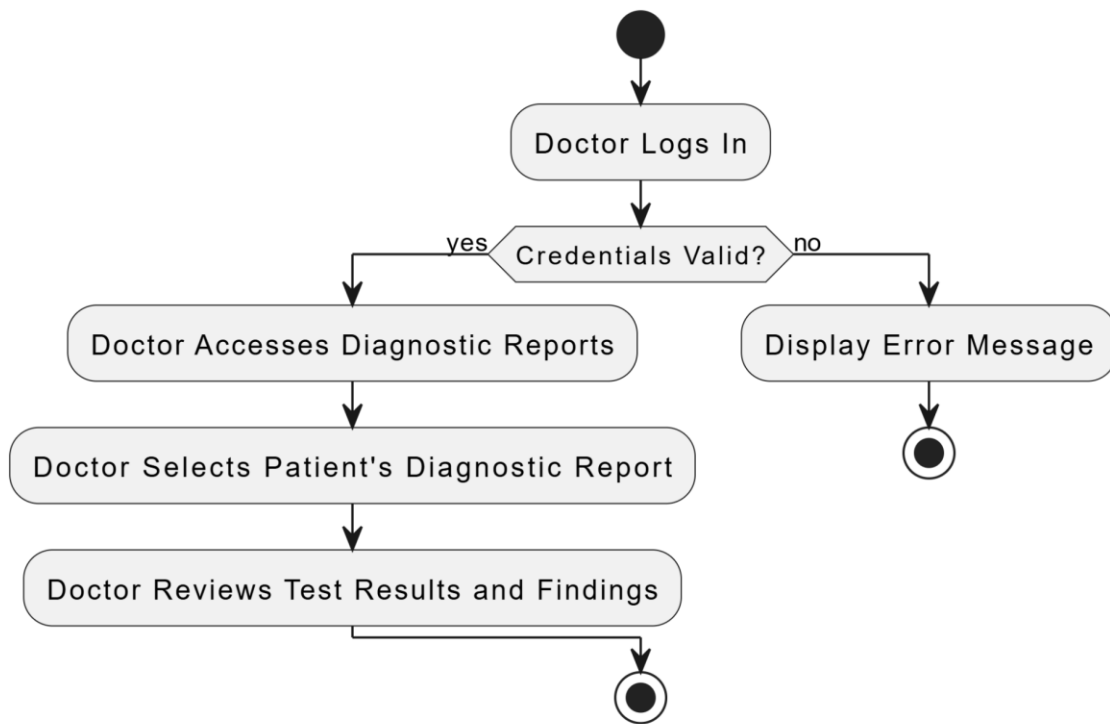


Figure 2-10:View Diagnostic Reports

6.Send Prescriptions via Email

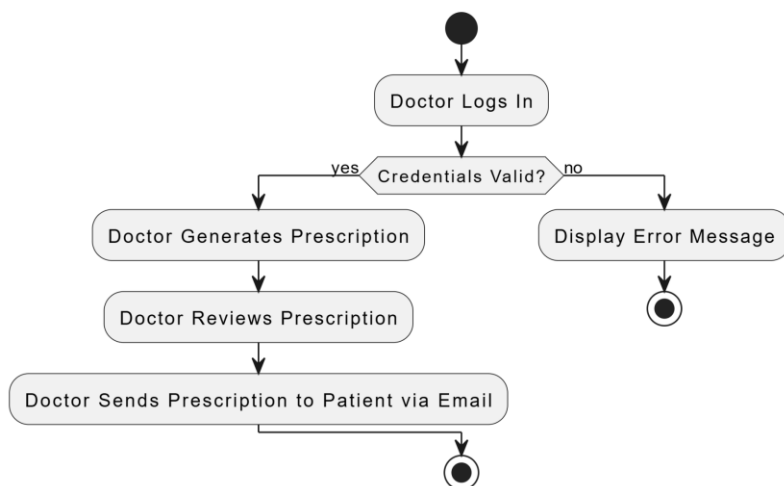


Figure 2-11:Send Prescription via Email

7.Attach Medical Notes to Prescriptions

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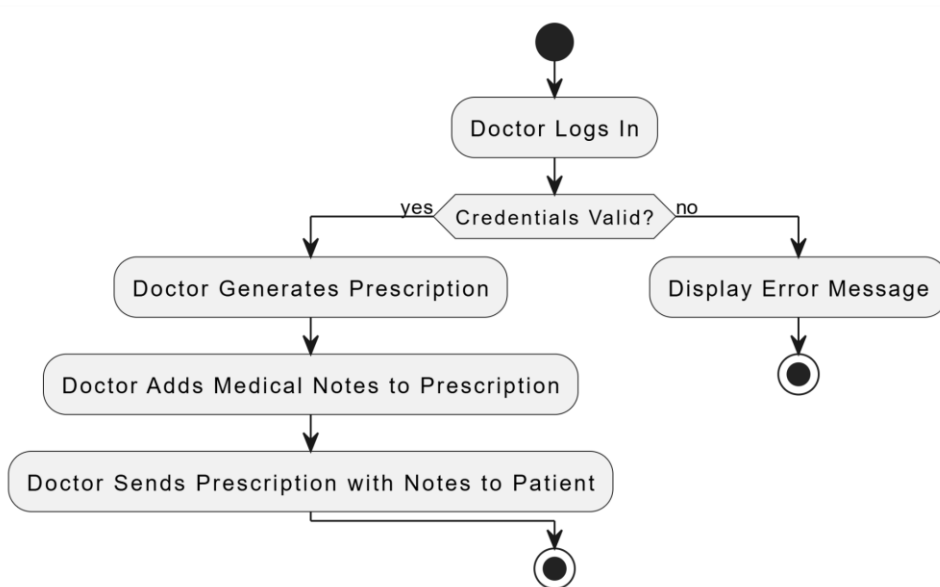


Figure 2-12:Attach Medical Notes to Prescriptions

Patient Activity

1.Register/Login

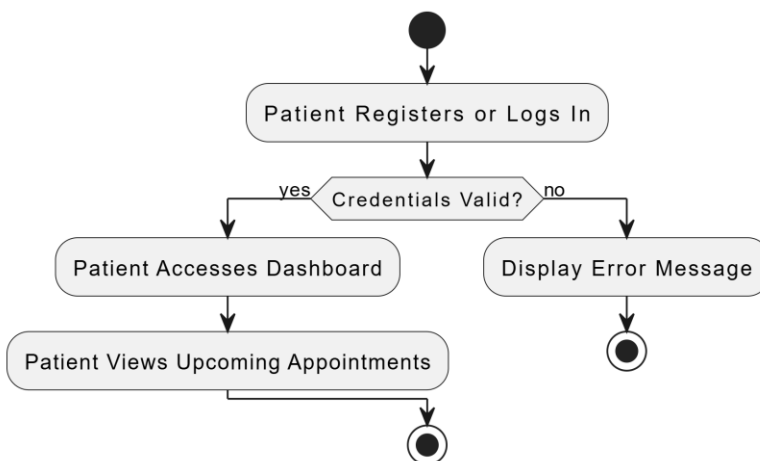


Figure 2-13:Registration/ Login

2.Recover Password

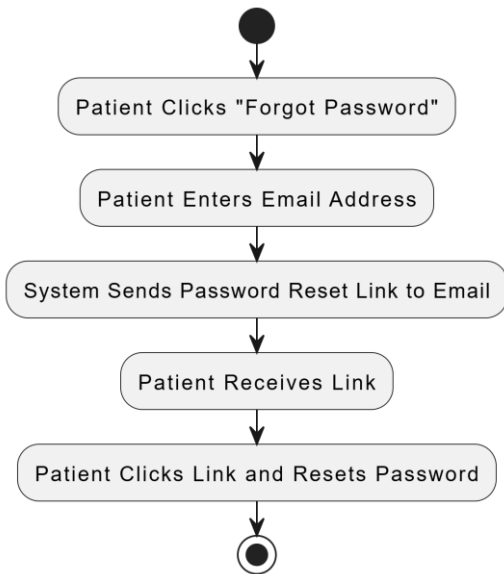


Figure 2-14:Recover Password

3.Schedule Appointments

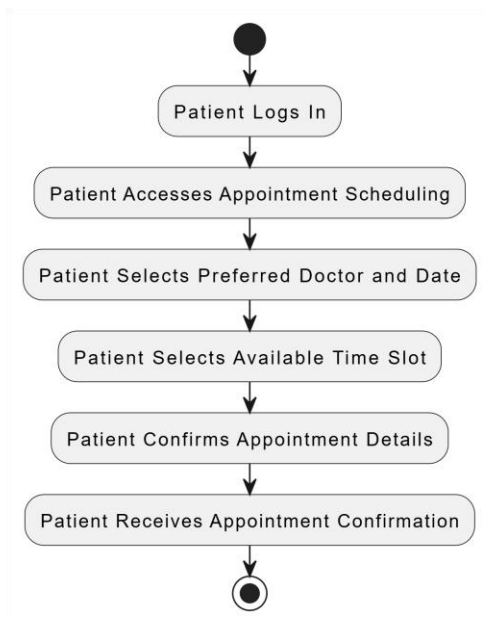


Figure 2-15:Schedule Appointment

4.Book Appointments with Specific Doctors

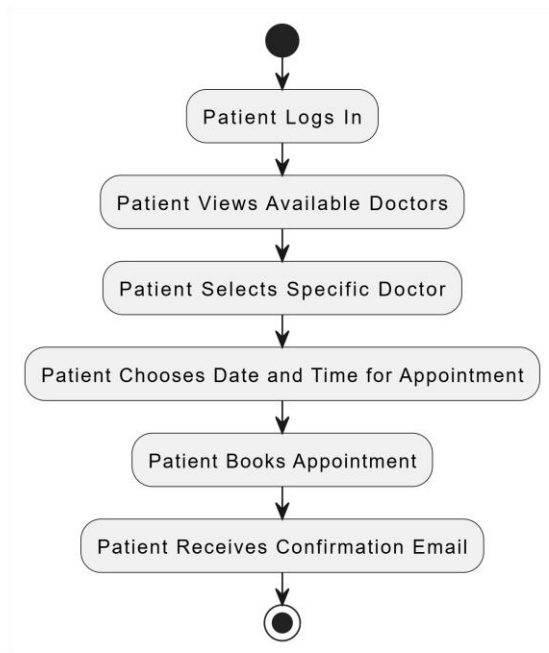


Figure 2-16:Book Appointment with doctor

5.Manage Personal Profile

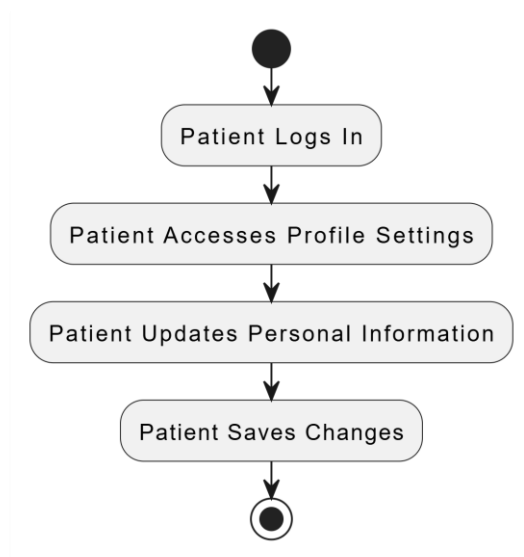


Figure 2-17: Manage Personal Profile

6.Maintain Medical History

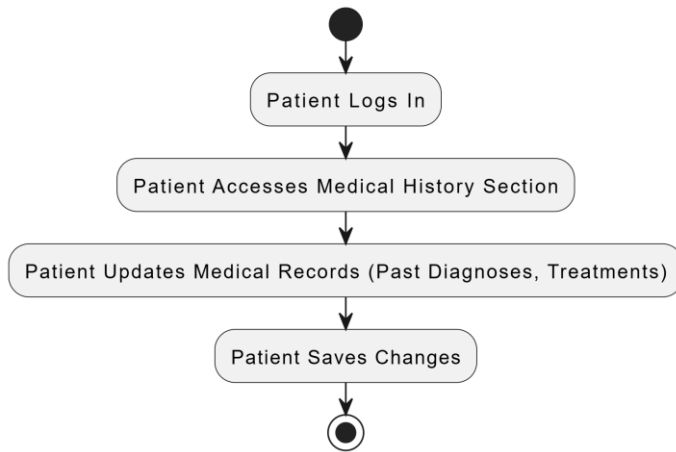


Figure 2-18: Maintain Medical History

7.Upload Diagnostic Reports

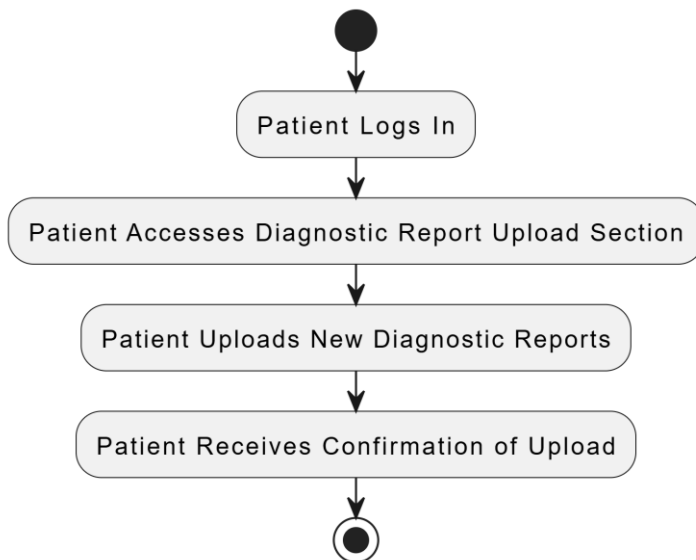


Figure 2-19: Upload Diagnostic Reports

8.View Prescriptions

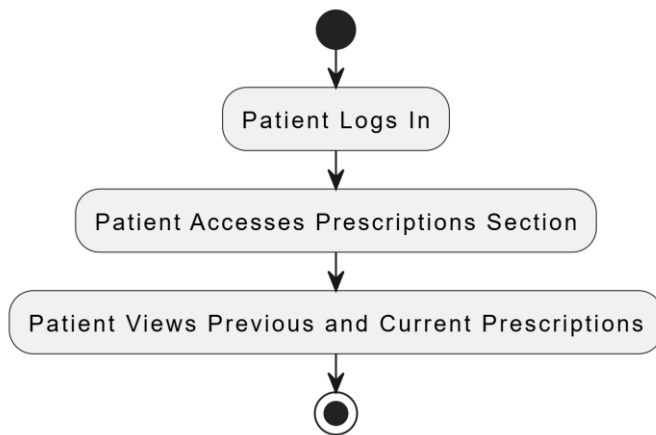


Figure 2-20: View Prescriptions

9. Receive Prescriptions via Email

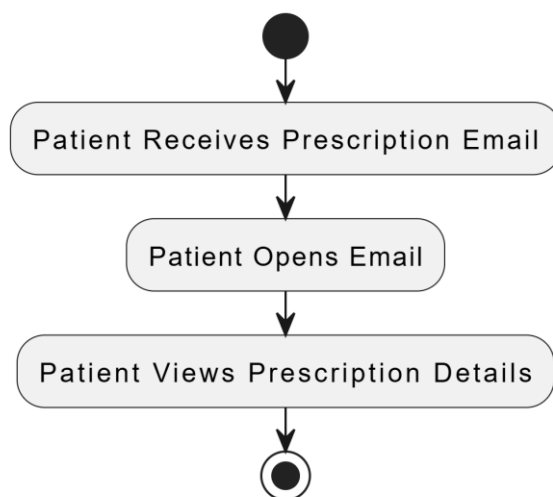


Figure 2-21: Receive Prescription via Email

10. Pay for Appointments

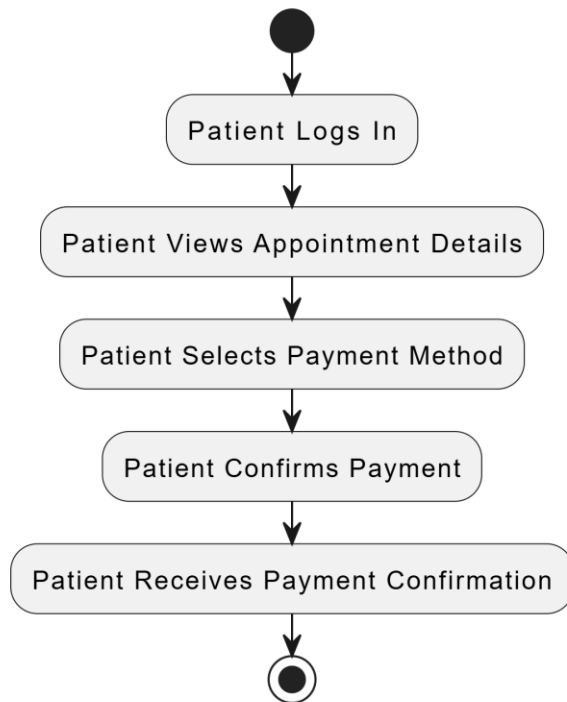


Figure 2-22: Pay for Appointments

11. Receive Payment Confirmation

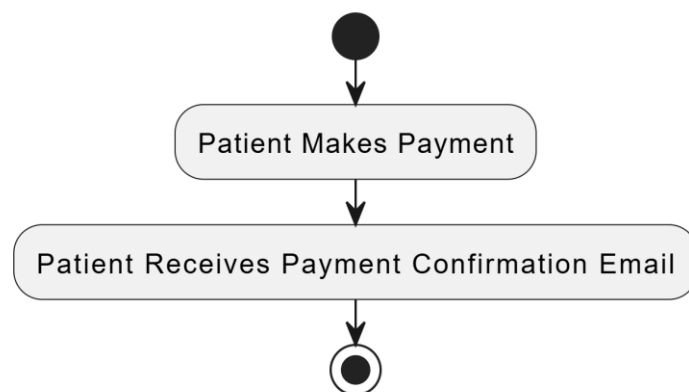


Figure 2-23: Receive Payment Confirmation

12. Write Reviews & Ratings

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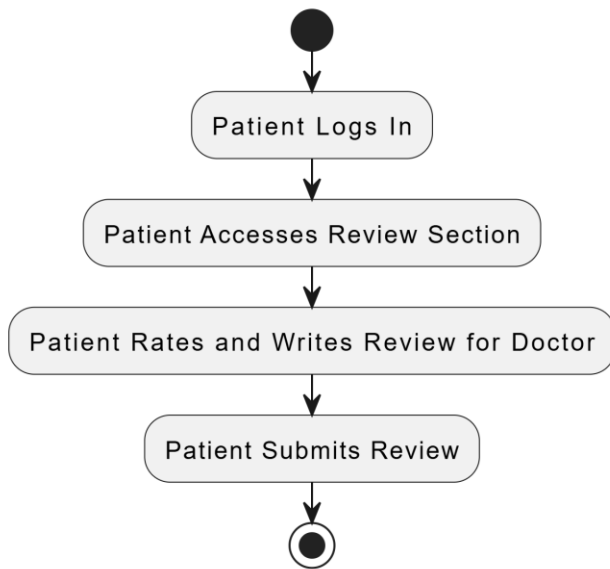


Figure 2-24: Write Reviews & Ratings

d. Sequence Diagram

Admin Sequence diagram

1. Manage Doctor Account

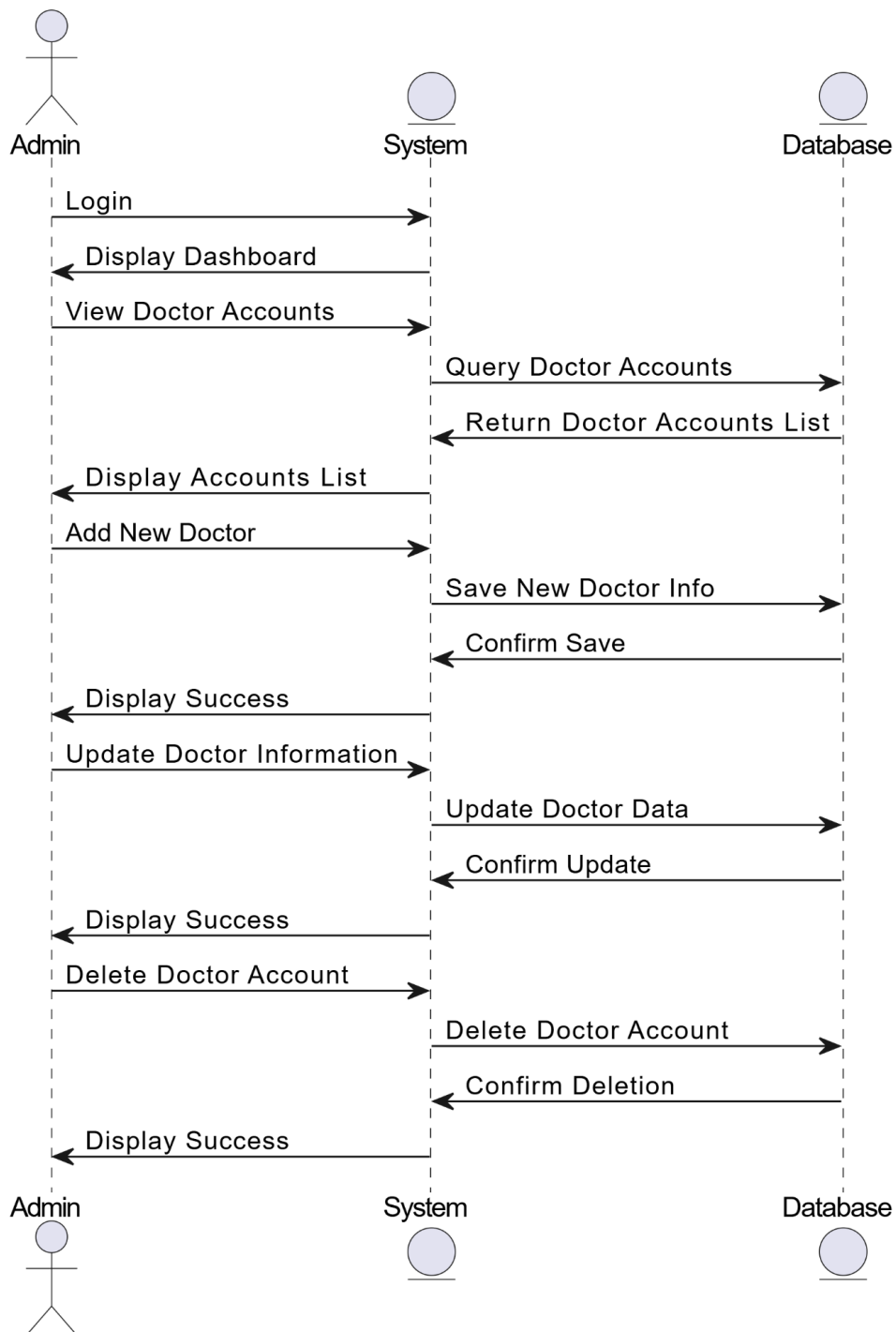


Figure 3-1: Manage Doctor Account

2. Create Schedule slots

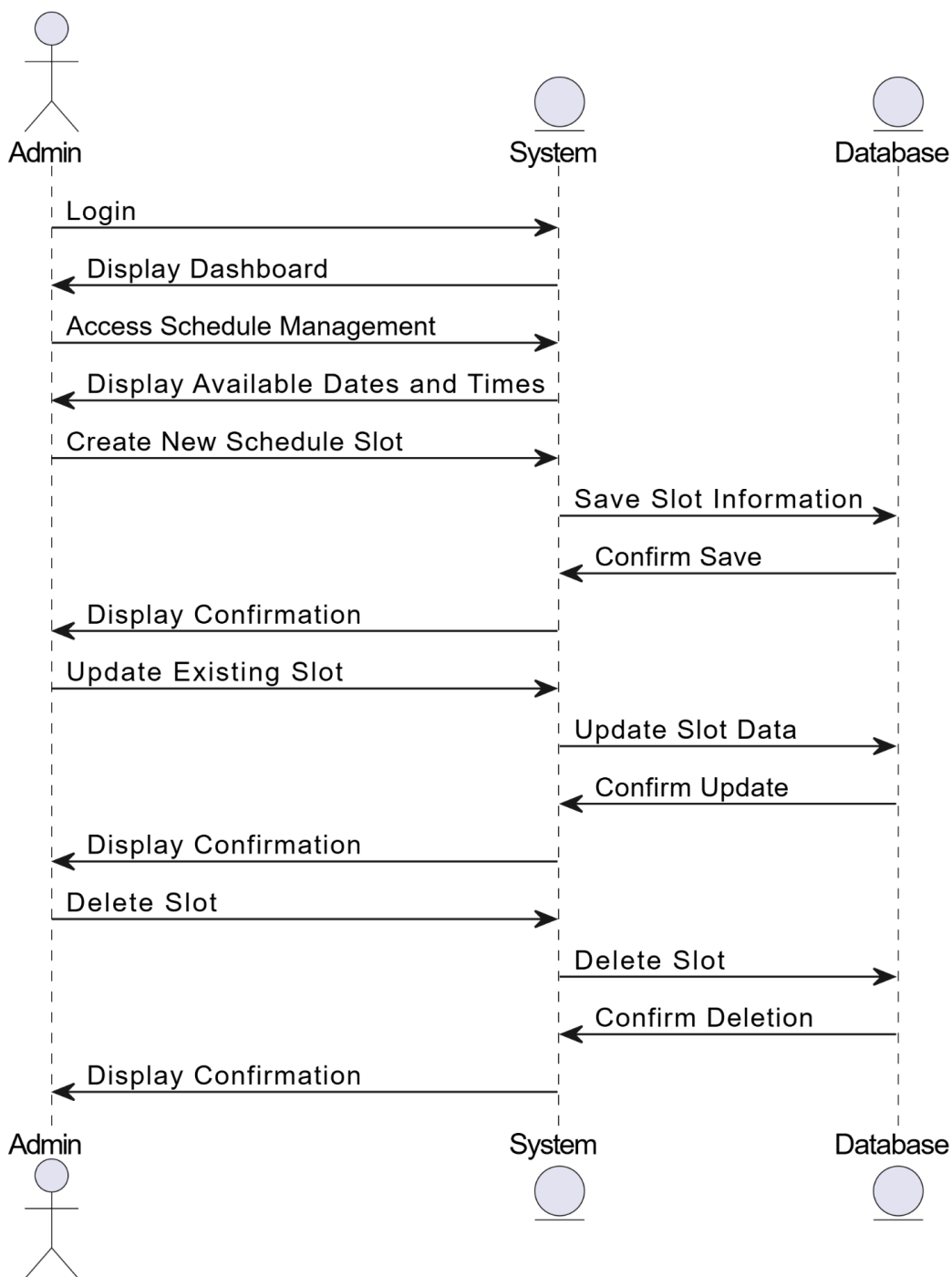


Figure 3-2: Create Schedule Slots

3. Manage Appointment Status

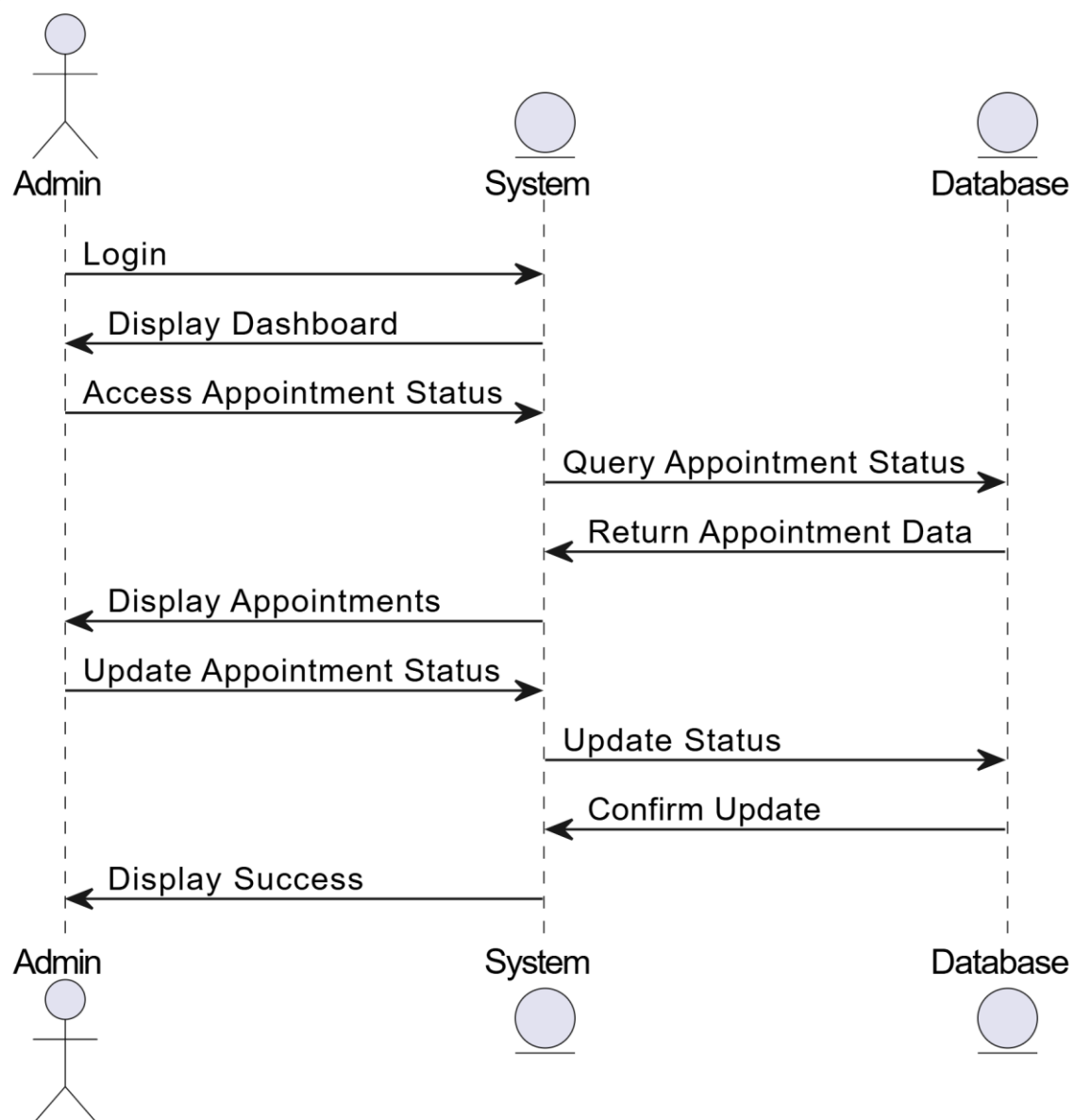


Figure 3-3: Manage Appointment Status

4. View Appointment History

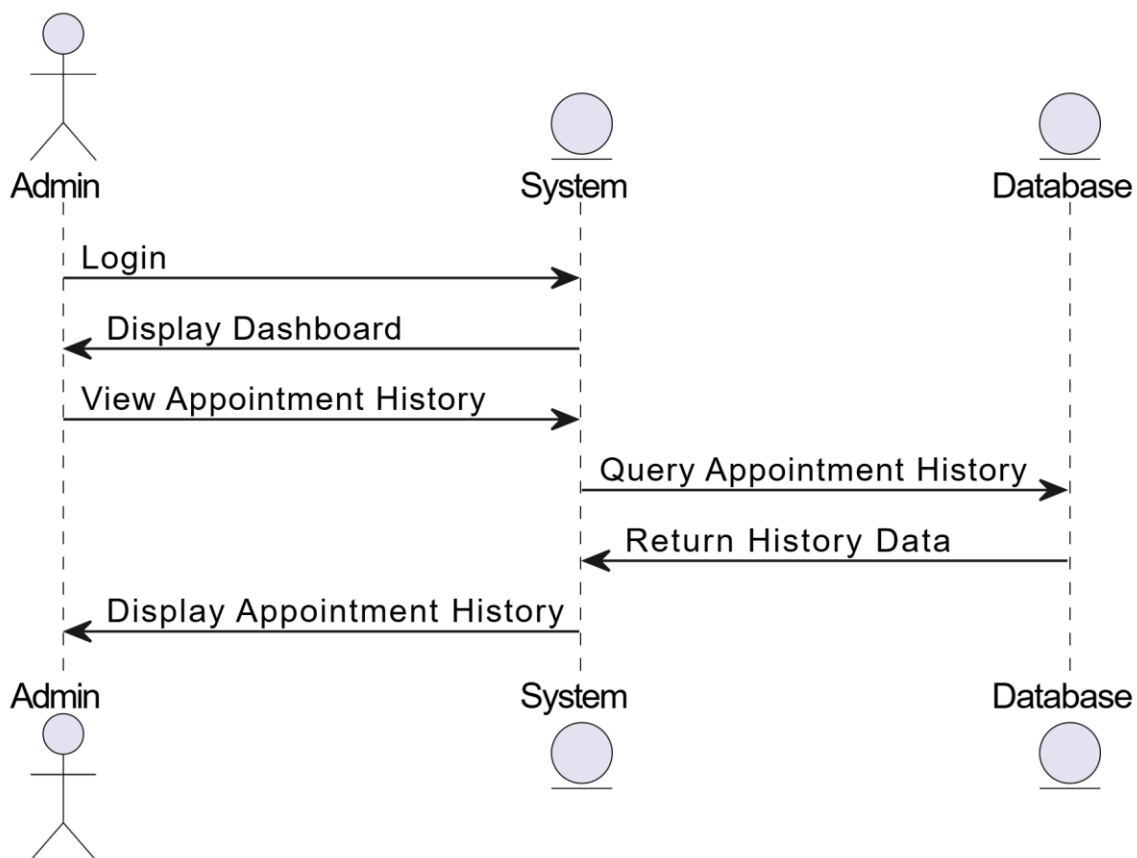


Figure 3-4:View Appointment History

5. Manage Doctor Profiles

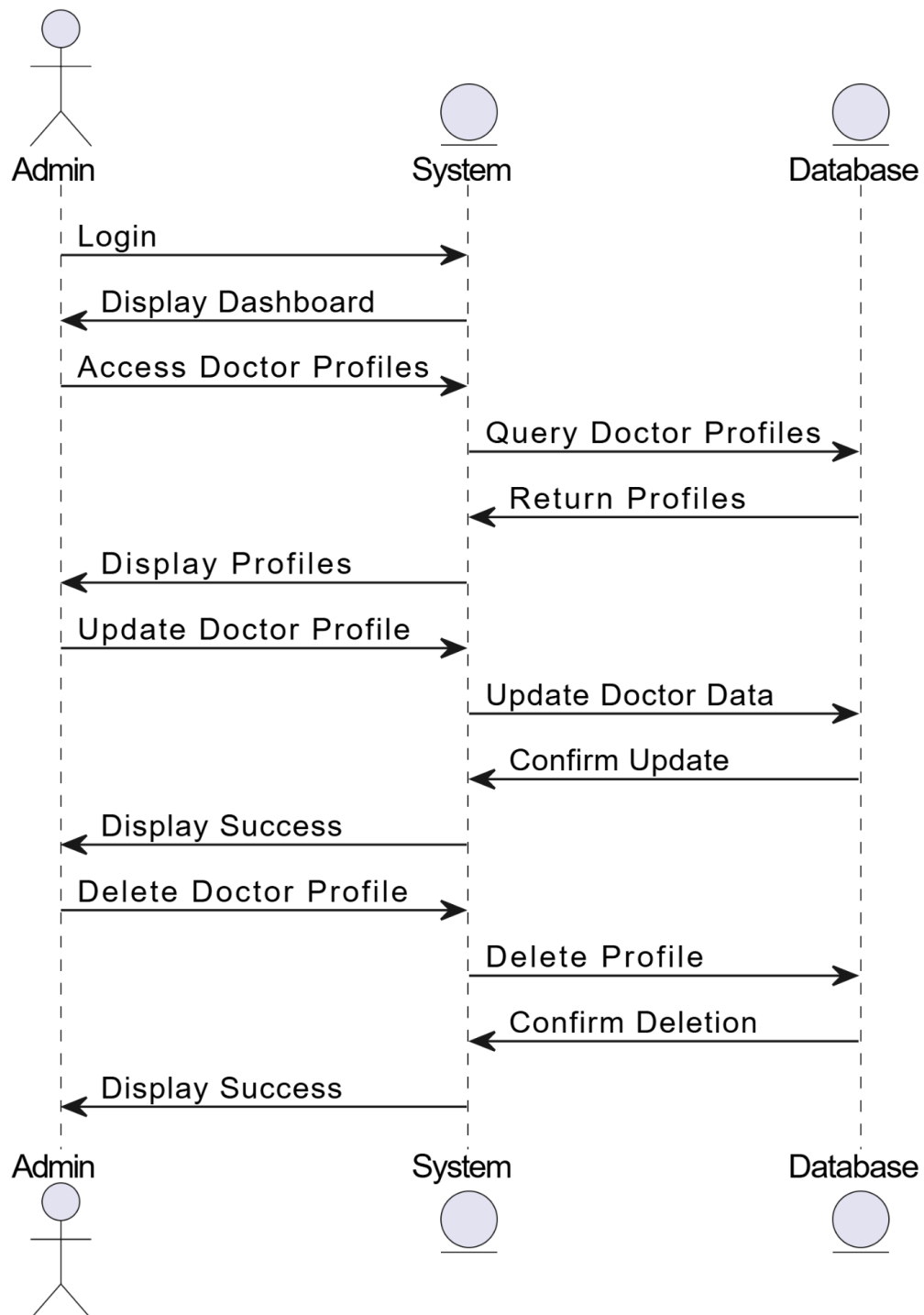


Figure 3-5: Manage Doctor Profile

Doctor Sequence Diagram

1. View Upcoming Appointments

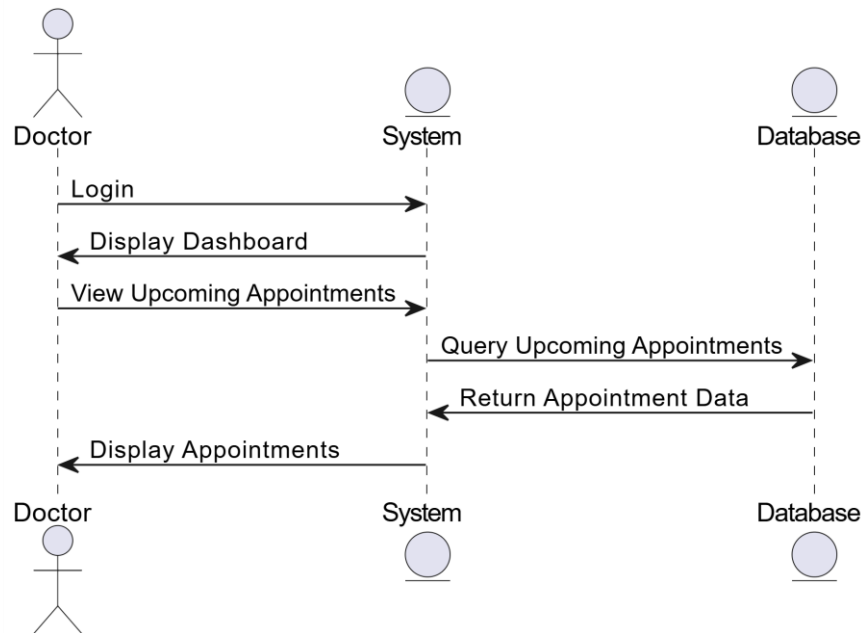


Figure 3-6:View Upcoming Appointment

2. Set Appointment Slots

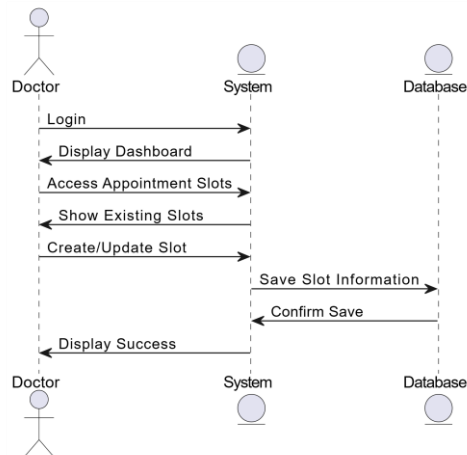


Figure 3-7:Set Appointment Slots

3. Accept Appointments

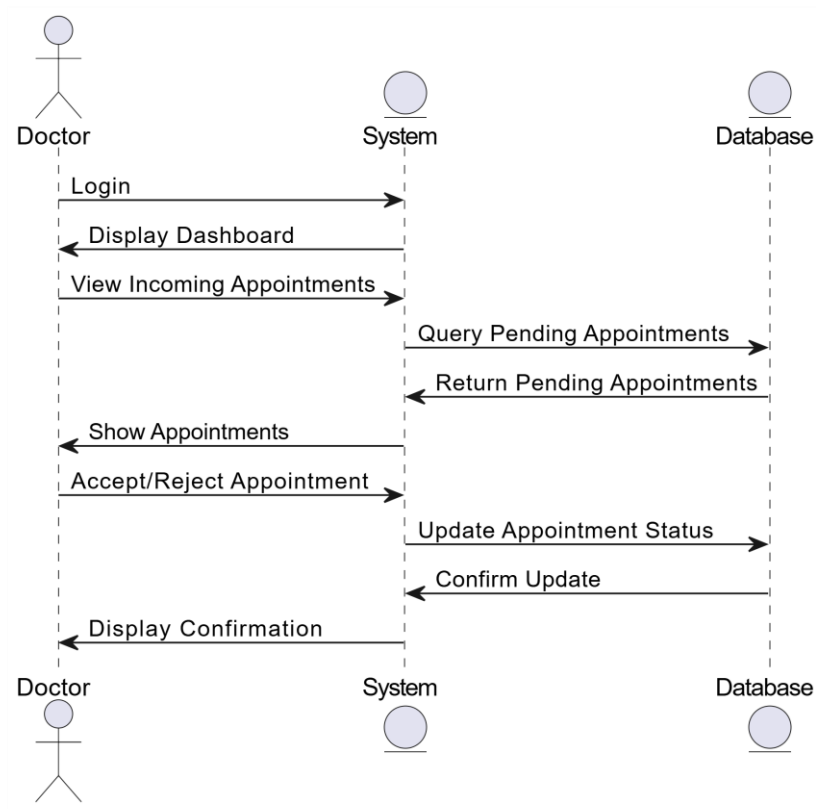


Figure 3-8:Accept Appointments

4. Access Patient Profiles

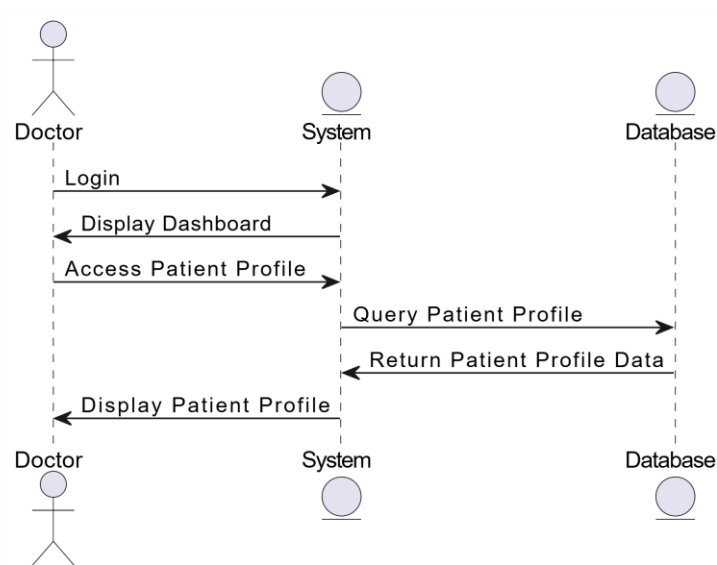


Figure 3-9:Access Patient Profile

5. View Diagnostic Reports

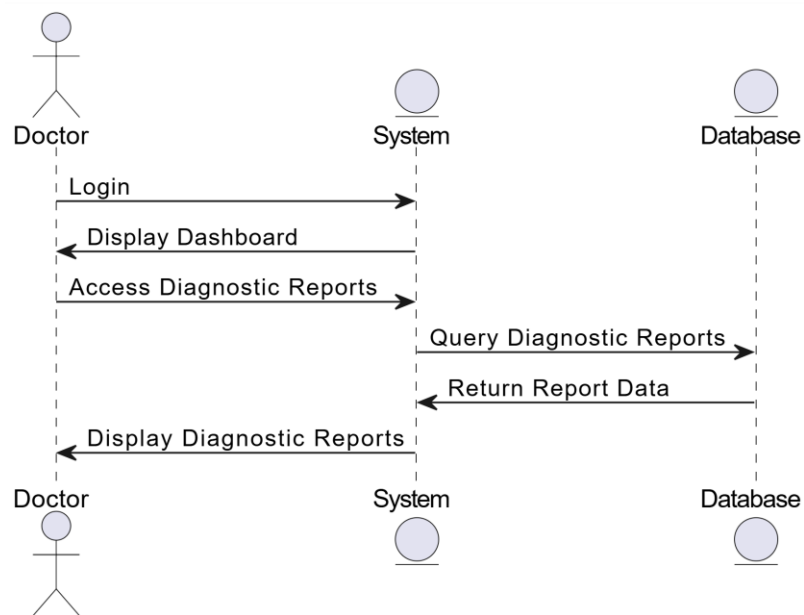


Figure 3-10:View Diagnostic Reports

6. Generate Prescription

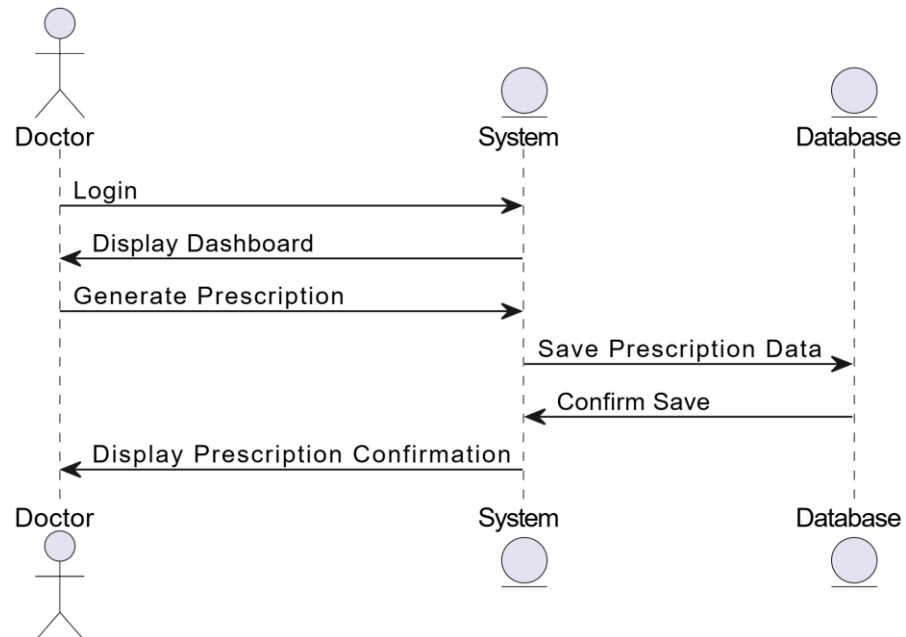


Figure 3-11:Generate Prescription

7. Send Prescriptions via Email

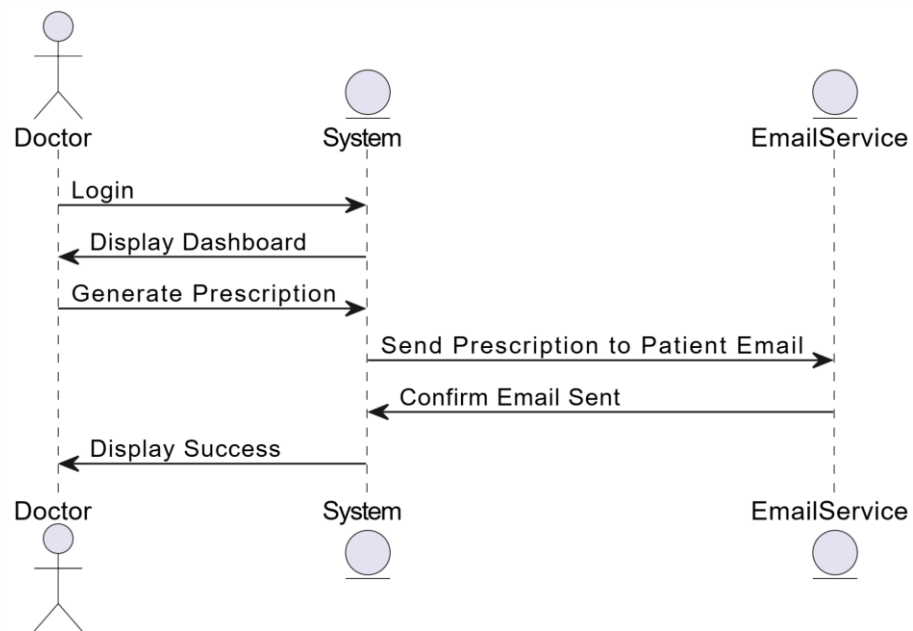


Figure 3-12:Send Prescription via Email

8. Attach Medical Notes to Prescriptions

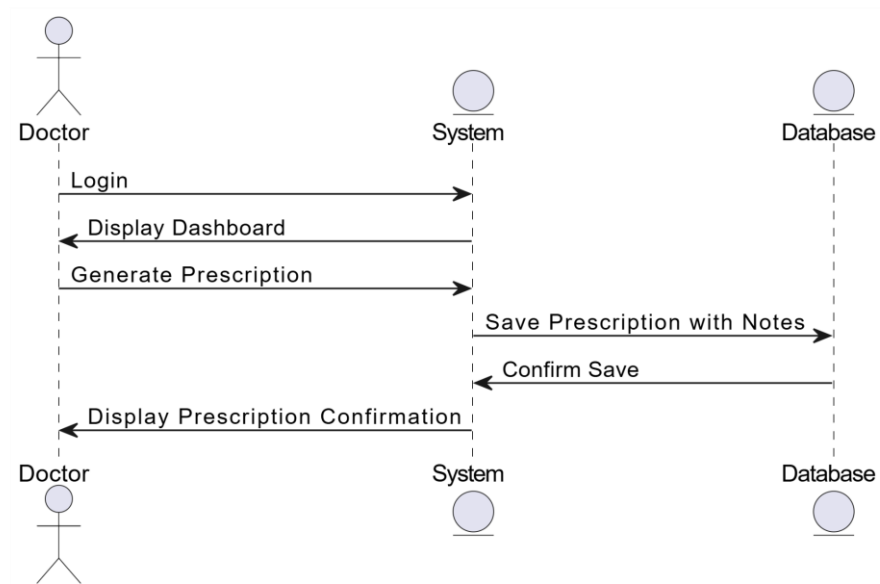


Figure 3-13:Attach Medical Notes to Prescription

Patient Sequence Diagram

1. Register/Login

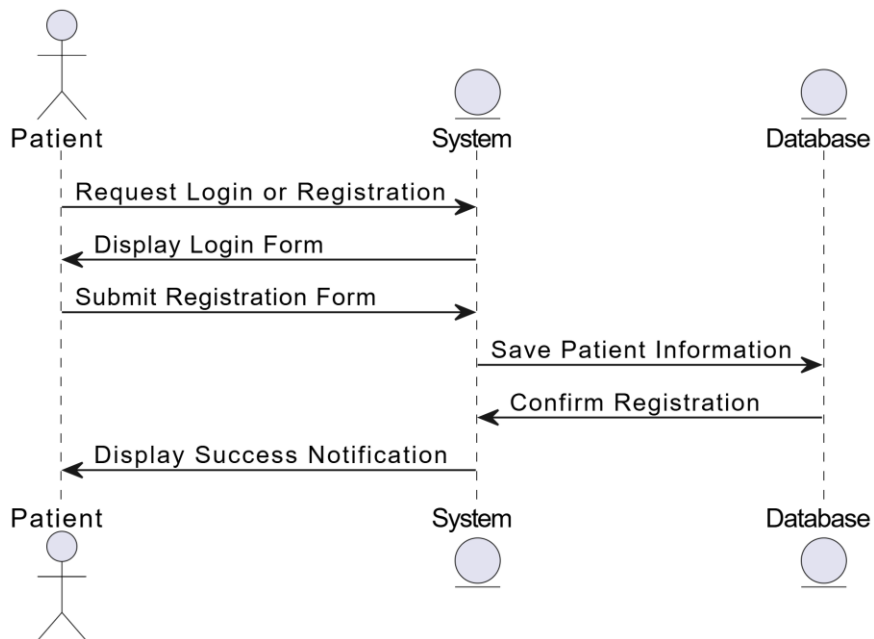


Figure 3-14: Register & Login

2. Recover Password

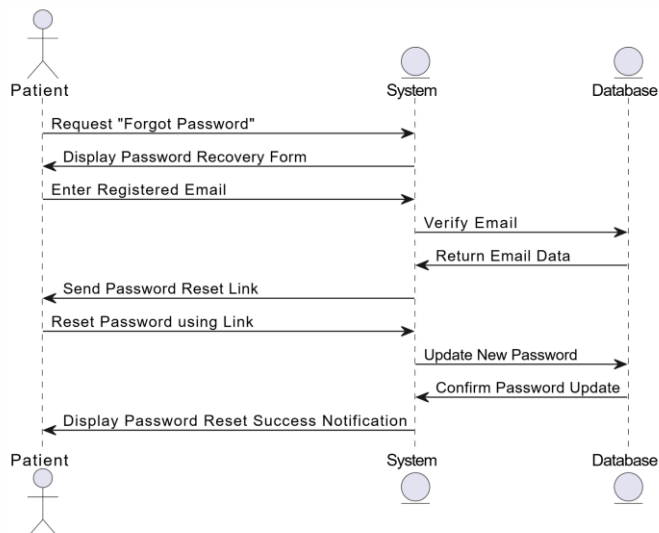


Figure 3-15: Recover Password

3. Schedule Appointments

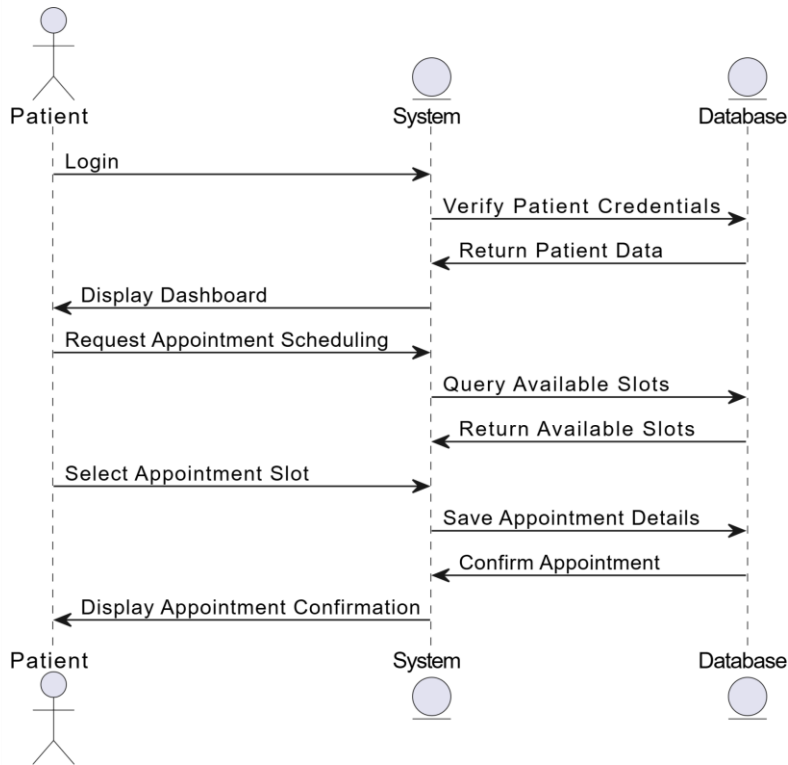


Figure 3-16: Schedule Appointments

4. Book Appointments with Specific Doctor

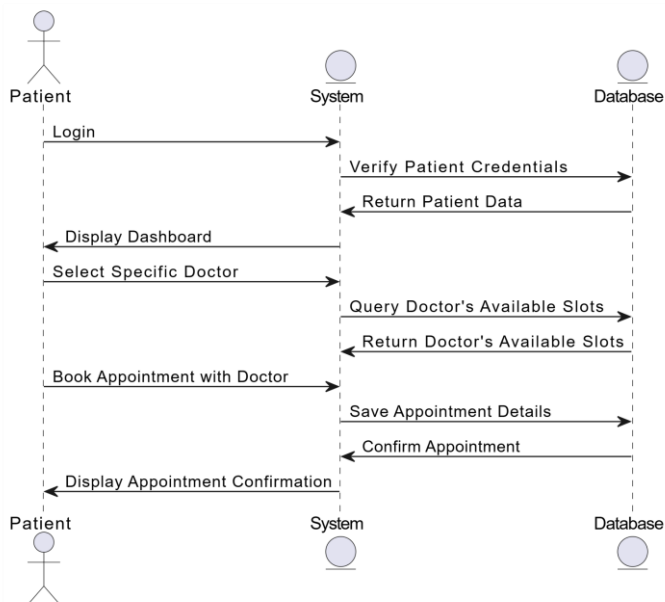


Figure 3-17: Book Appointments with Specific Doctor

5. Manage Personal Profile

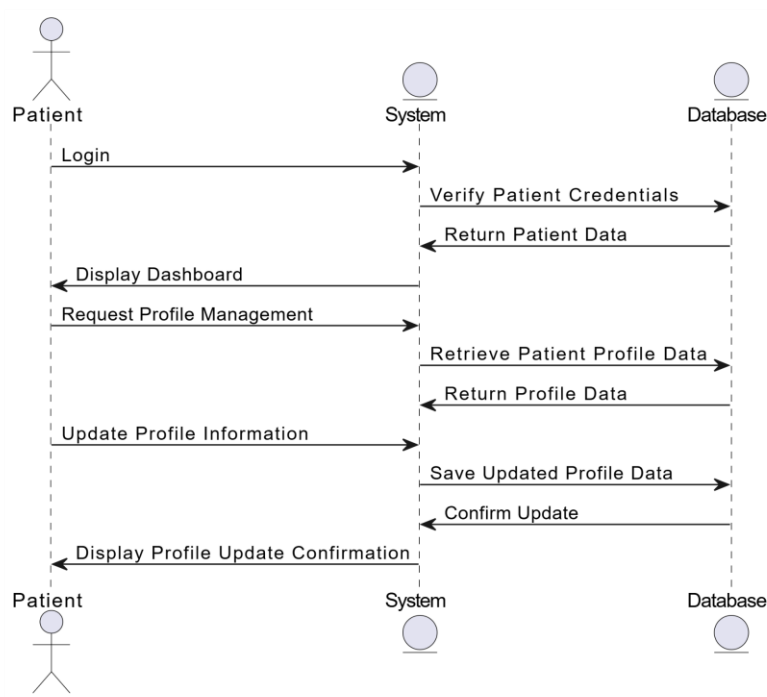


Figure 3-18:Manage Personal Profile

6. Maintain Medical History

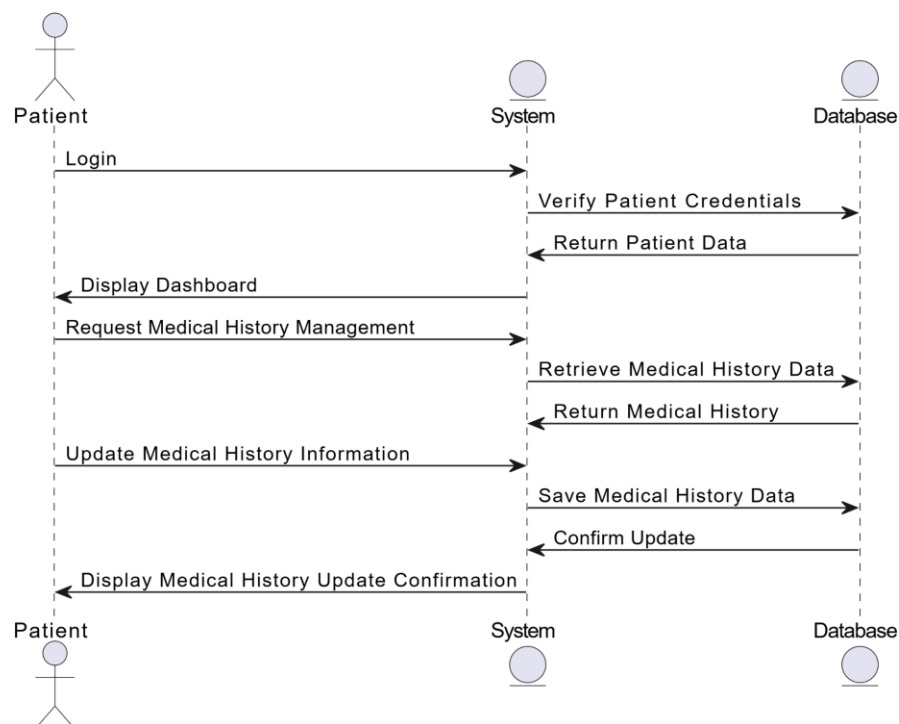


Figure 3-19:Maintain Medical History

7. Upload Diagnostic Reports

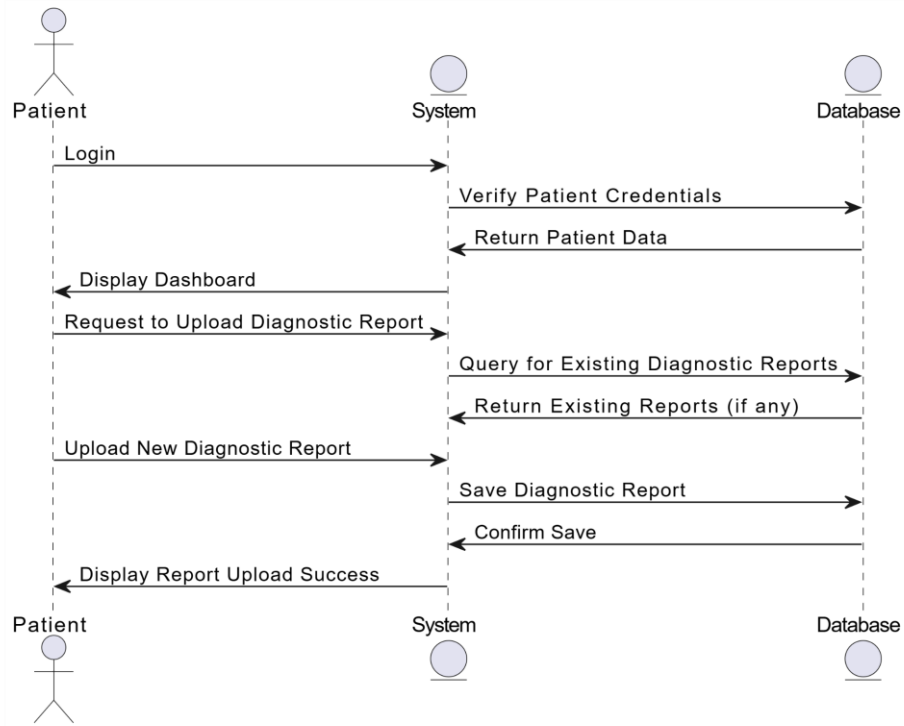


Figure 3-20: Upload Diagnostic Report

8. View Prescriptions

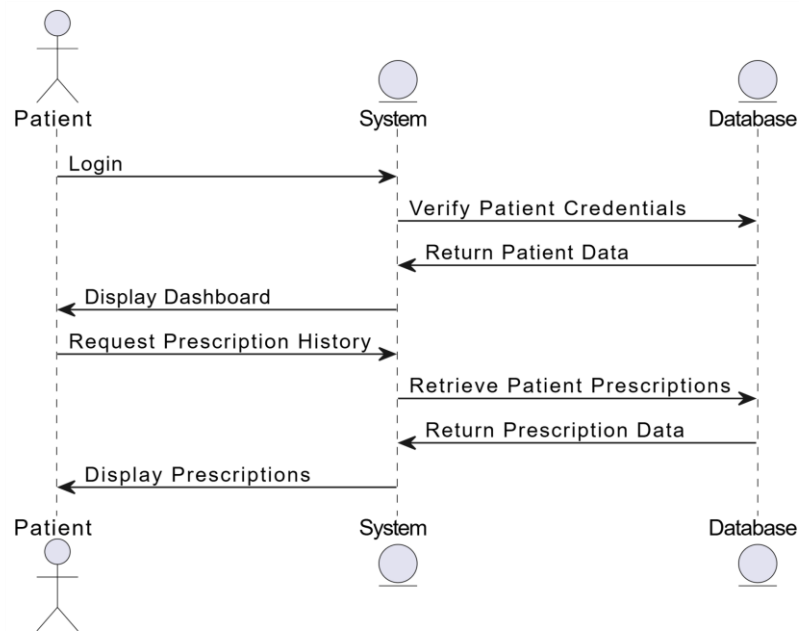


Figure 3-21: View Prescriptions

e. ER Diagram

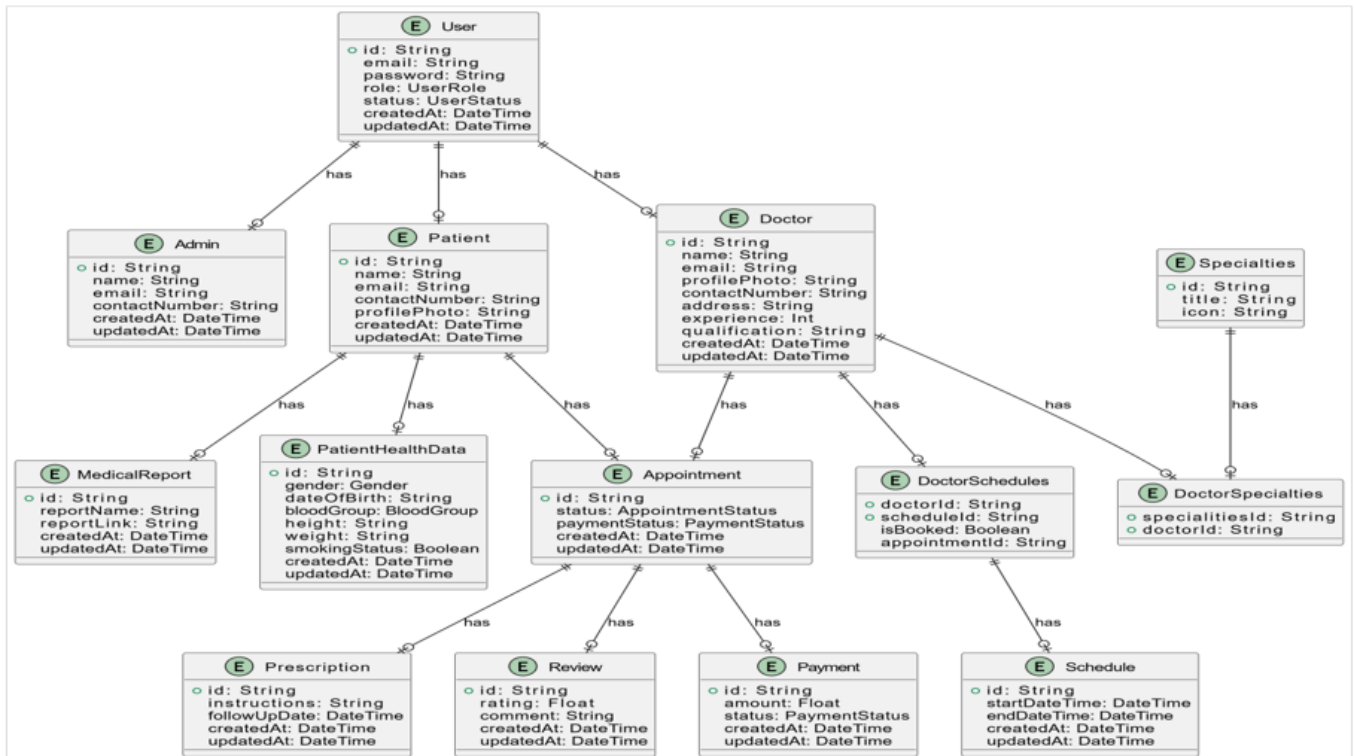


Figure 4-1 :ER Diagram

4. Coding: Appendix B

Code follows strict modularity:

- Page-based routing (App Router)
- Global Redux state
- Axios instance for consistent API calls
- Form components (React Hook Form + Zod)
- Protected routes using middleware

Chapter 3: Software Testing

1. Testing Features

The following are the important functions that are tested in this project to guarantee quality, functionality, and reliability:

- **User Account Management:** Registering, logging in, pass/reset password, and updating profile.
- **Appointment Scheduling and Management:** Rescheduling, cancellation, scheduling, and availability of the doctor.
- **Patient Profile and Medical Records:** Development, revision and access control to patient medical records.
- **Prescription Management:** Creation, reading, and downloading prescriptions.
- **Payment & Confirmation:** Safety in payment processing and confirmation.
- **Video Chat Facility:** Live-time video consultation between the patient and doctor.
- **Appointment History Viewing:** View of history of previous and future appointments.
- **Reviews & Feedback System:** Posting and reading of comments and rating.
- **Email Alerts & Notification:** Automated email information on key activities.
- **Doctor Account Management:** Doctor registration, profile editing and verification.

2. Testing Strategies

In order to cover every possible area of concern as well as providing quality assurance, the following testing strategies were used:

- **Unit Testing:** Tests were done on isolated components and functions to test how correct they are.
- **Integration Testing:** Interfaces between modules under test, e.g. between the appointment system and payment gateway.
- **System Testing:** Testing the entire system in order to confirm all features and processes.
- **User Acceptance Testing (UAT):** Simulated real user conditions were used to test the system to ensure that it was working accordingly.
- **Performance Testing:** Tested system responsiveness, particularly when conducting video consultations and payment system.
- **Security Testing:** Verified to have no vulnerabilities such as medical records data privacy and secure authentication.
- **Regression Testing:** Provided that the recent changes would not disrupt the current functionality.

3. System Testing

Test Case ID	Feature	Objective	Preconditions	Test Steps	Expected Result	Actual Result	Status
TC-01	Account Management	Verify new user registration	None	<ol style="list-style-type: none"> 1. Navigate to registration page 2. Enter valid details 3. Submit form 	User account created and confirmation email sent	Account created, email received	Pass
TC-02	Appointment Scheduling	Verify patient can book appointment	User logged in	<ol style="list-style-type: none"> 1. Select doctor/date 2. Choose time slot 3. Confirm appointment 	Appointment booked and confirmation received	Appointment booked successfully	Pass
TC-03	Video Chat Functionality	Verify video call connection between patient	Appointment scheduled, both logged in	1. Patient clicks "Start Call"	Real-time video call established	Call established with minimal delay	Pass

		and doctor		2. Doctor accepts 3. Video connection established			
TC-04	Payment & Confirmation	Verify secure payment processing and confirmation	Appointment booked, payment method selected	1. Enter payment details 2. Submit payment 3. Verify confirmation	Payment successful and email confirmation sent	Payment processed successfully, email received	Pass
TC-05	Email Notifications & Alerts	Verify appointment reminder email sent 24 hours before appointment	Appointment scheduled	1. Wait until 24 hours before appointment 2. Check patient email inbox	Reminder email received on time	Email received on time	Pass

Chapter 4: Deployment and Maintenance

Software Release Life Cycle (SRLC)

- **Alpha:** All core modules built, minimal testing
- **Beta:** Test users used features and reported bugs
- **Release Candidate:** Stable build deployed to demo server

Maintenance Strategy

- Modular update cycles
- Admin panel allows dynamic updates (add doctors, etc.)
- Backup plan includes cloud storage and versioning

Agile Methodology

- Weekly standups with mentor
- Task breakdown and estimation
- Iterative delivery

Chapter 5: User Manual

Patient Interface:

- Home page Hero

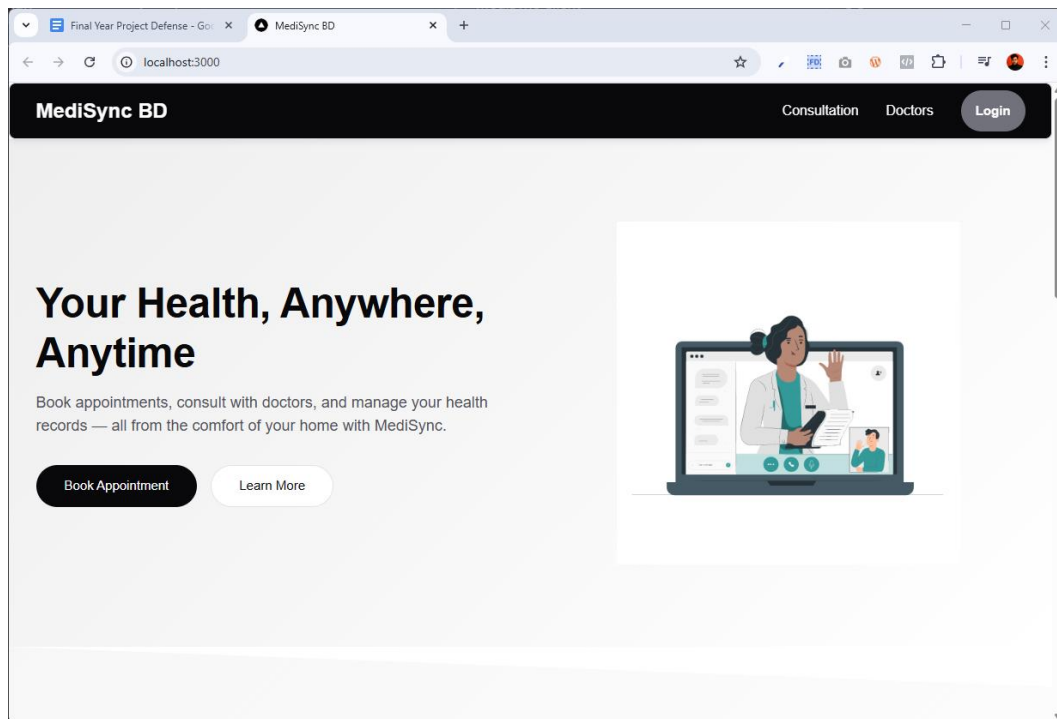
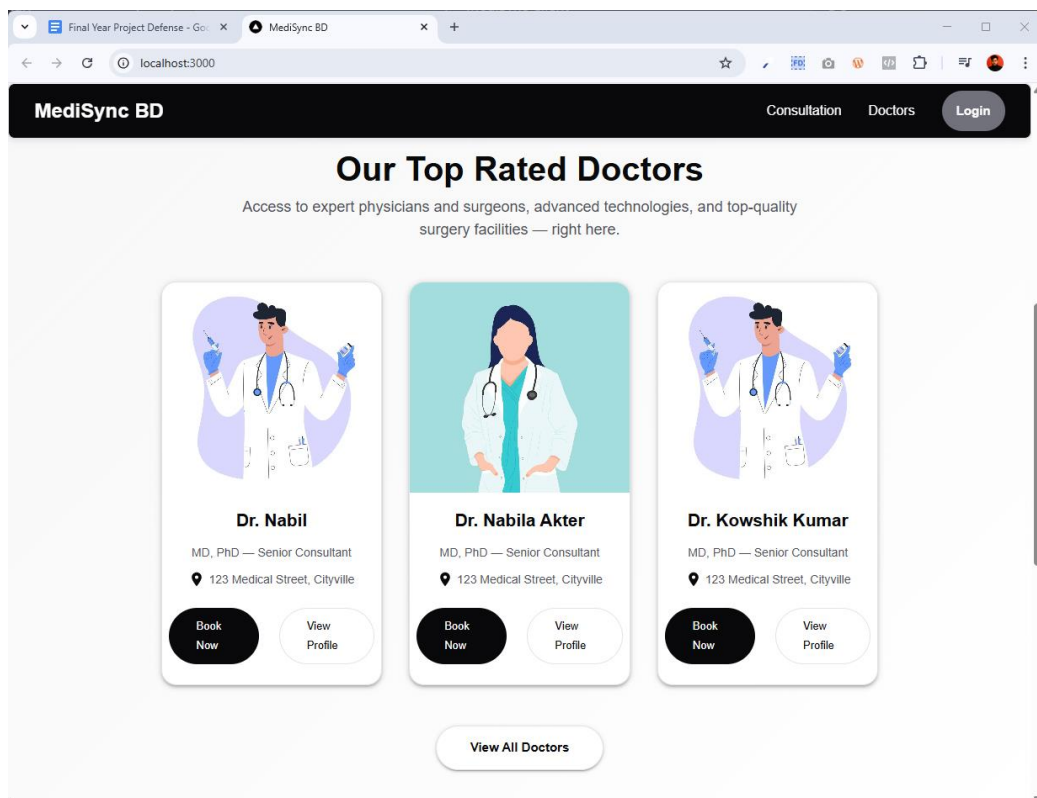


Figure 5-1: Home Page Hero



- **Login , Signup**

The image displays two screenshots of a web application interface. The top screenshot shows the login page at localhost:3000/login. It features a light gray background with a white rounded rectangle containing the title "Login". Below the title are two input fields: "Email" with the value "mohiuddin.swe@gmail.com" and "Password" with masked characters. A "Forgot Password?" link is positioned to the right of the password field. A black "Login" button is centered below the fields. At the bottom, there is a link: "Don't have an account? [Create an account](#)".

The bottom screenshot shows the registration page at localhost:3000/register. It features a light gray background with a white rounded rectangle containing the title "Patient Register". Below the title are four input fields: "Name", "Email" (with "mohiuddin.swe@gmail.com"), "Password" (with masked characters), "Contact Number", and "Address". A black "Register" button is centered below the fields. At the bottom, there is a link: "Already have an account? [Login](#)".

Figure 5-2:Login, Signup

- **Browse Doctors**

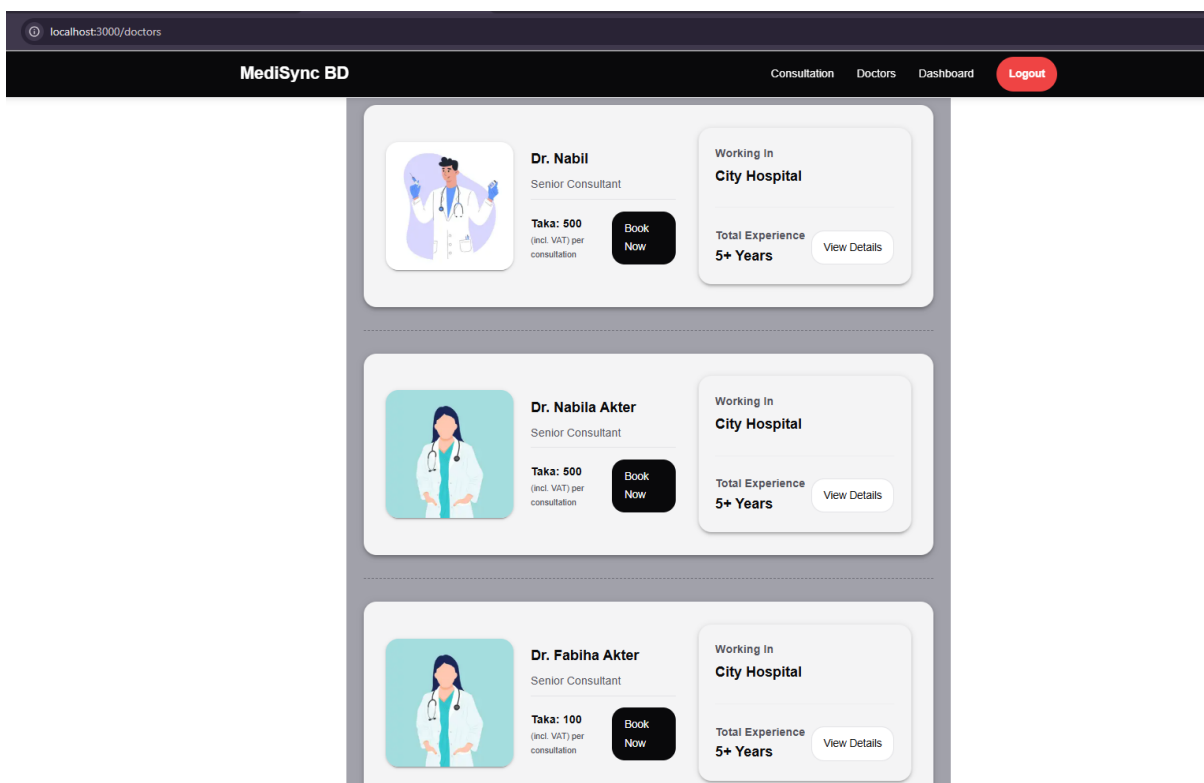


Figure 5-3:Browse Doctor

● Individual Doctor Profile


localhost:3000/doctors/6e140d66-348b-473a-9084-1eca648defa3
🔍 ☆

MediSync BD

[Consultation](#)
[Doctors](#)
[Dashboard](#)
Logout

Doctor's Profile Details

Compassionate and dedicated doctor committed to delivering high-quality care. Proficient in diagnosis, treatment, and advocating for comprehensive well-being. Prioritizing patient-centered approaches for optimal health outcomes.



Dr. Nabil
Senior Consultant
Specialties in

Working at
City Hospital

Consultation Fee Taka : 500 (incl. Vat)
Per consultation

Total Experience
5+ Years

Qualification
MD, PhD

Average Rating
0

Contact Number
+1234567890

Availability

Today: 2025-08-03 Sunday

12:30 PM - 1:00 PM

1:00 PM - 1:30 PM

1:30 PM - 2:00 PM

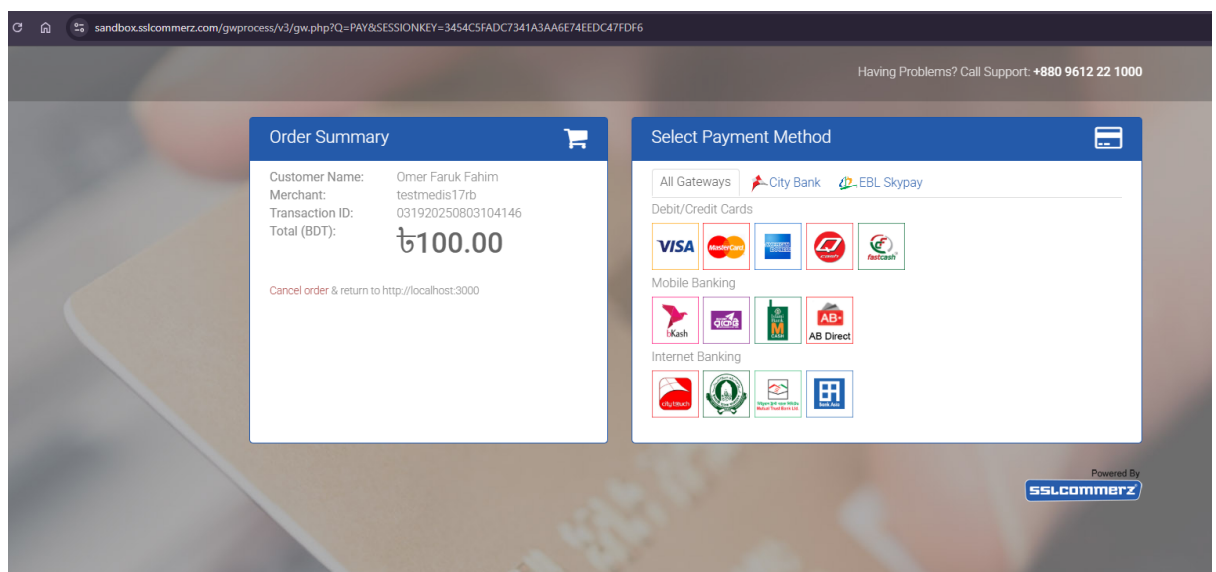
Tomorrow: 2025-08-04 Monday

No Schedule is Available Tomorrow!

[Book Appointment Now](#)

Figure 5-4: Individual Doctor Profile

- **Make payment**



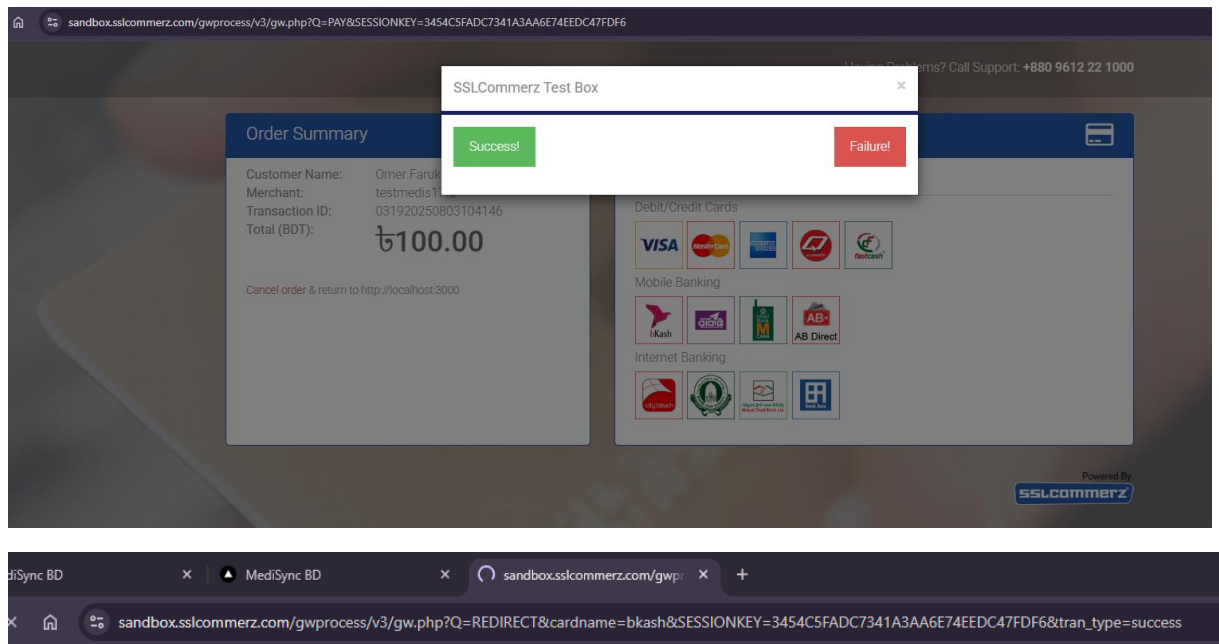
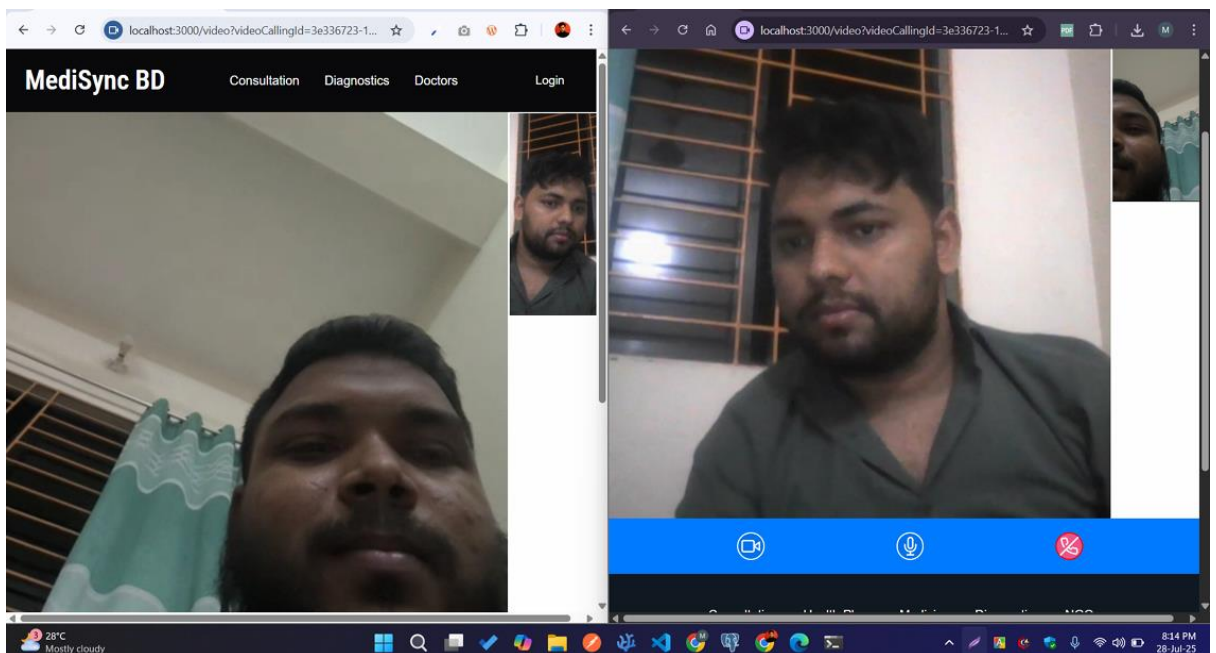
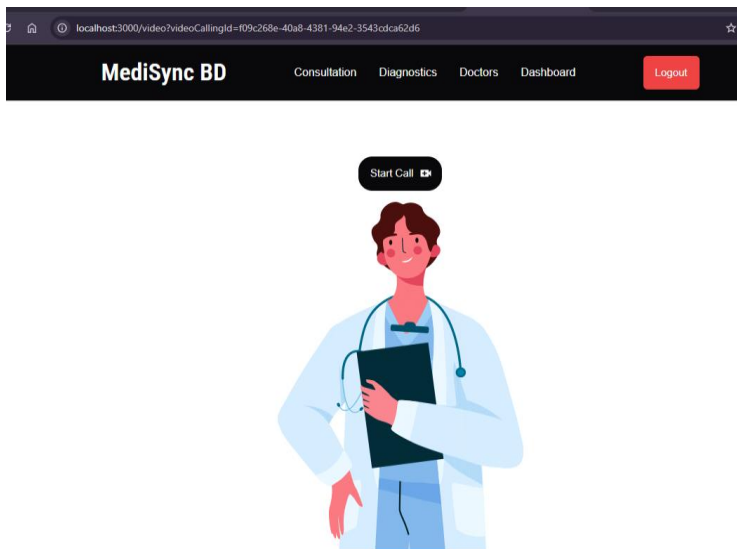


Figure 5-5:Make Payment

- **Join video call at scheduled time**



Figure 5-6:Join video call at scheduled time



Doctor Interface:

- **Select, delete schedule**

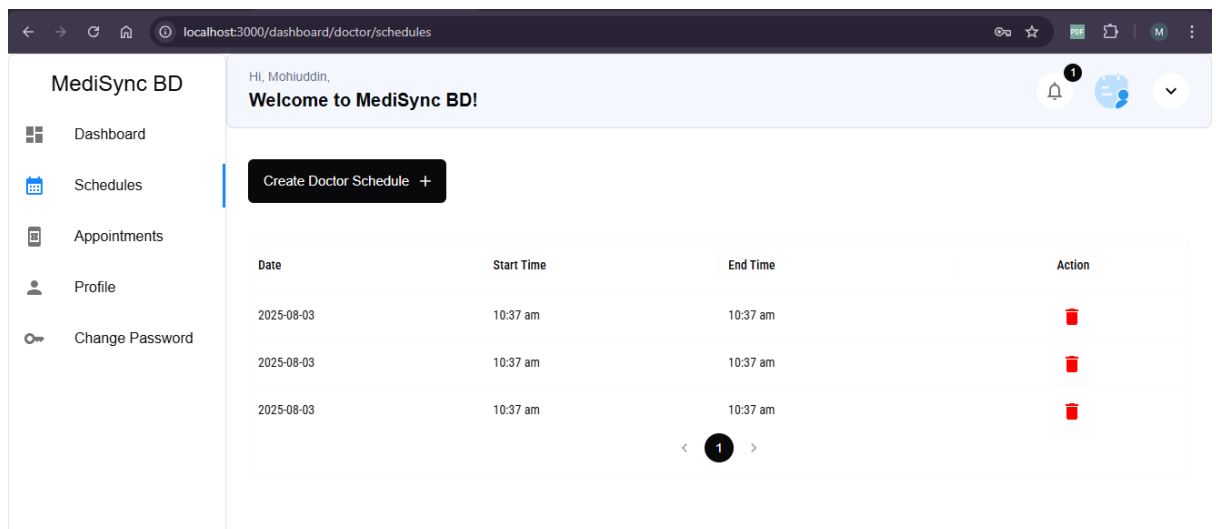
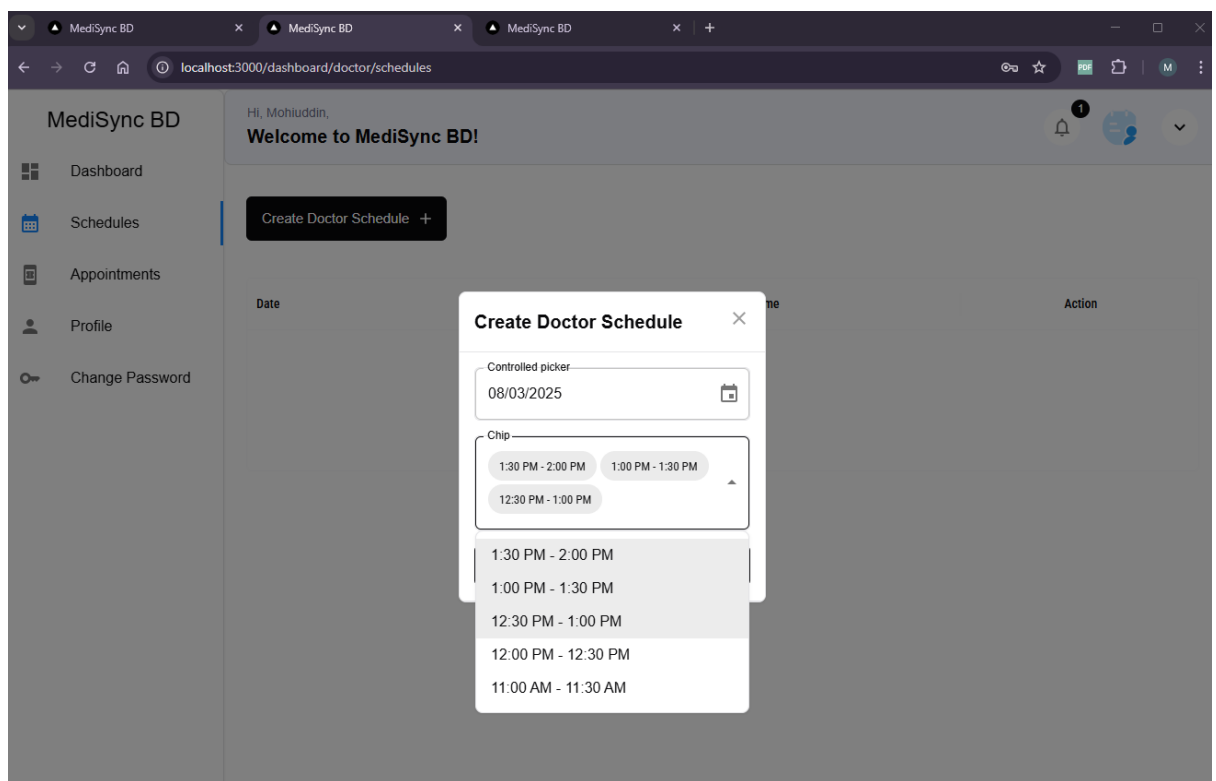
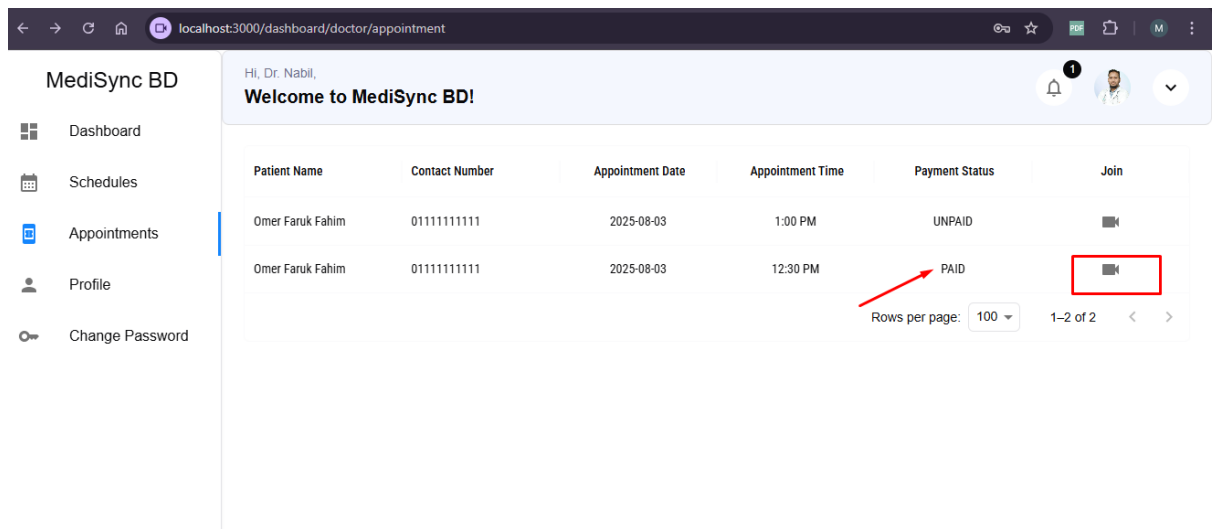


Figure 5-7: Select, delete schedule

- **View confirmed appointments**



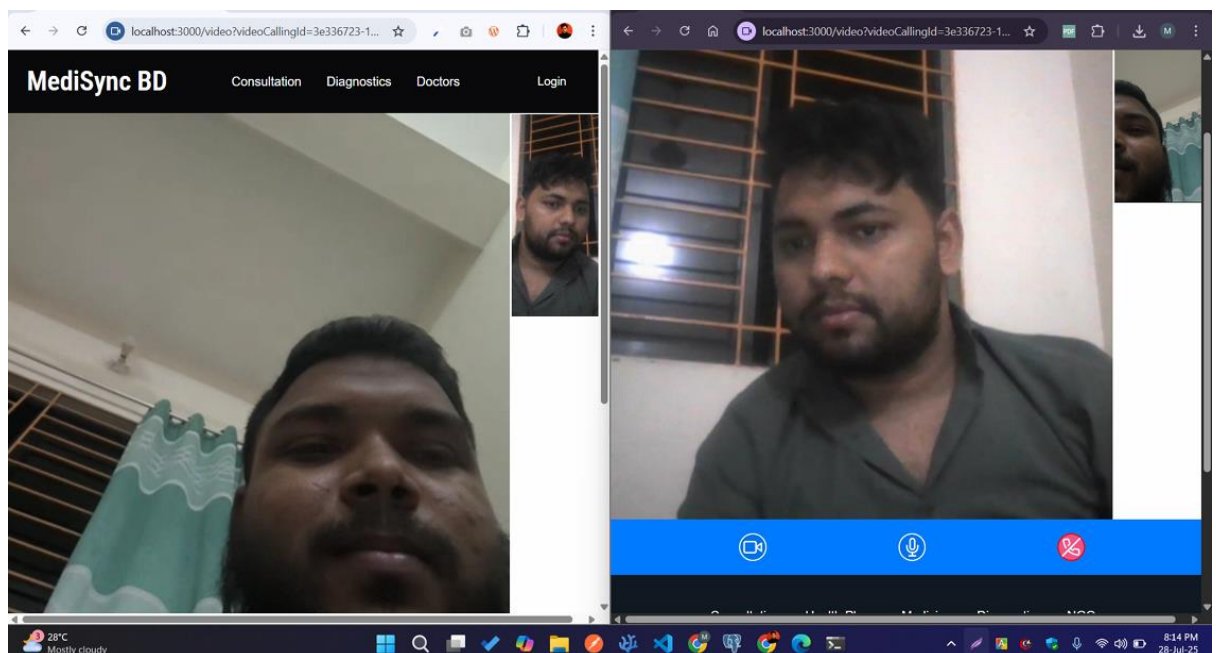
Hi, Dr. Nabil,
Welcome to MediSync BD!

Patient Name	Contact Number	Appointment Date	Appointment Time	Payment Status	Join
Omer Faruk Fahim	01111111111	2025-08-03	1:00 PM	UNPAID	Join
Omer Faruk Fahim	01111111111	2025-08-03	12:30 PM	PAID	Join

Rows per page: 100 1-2 of 2 < >

Figure 5-8:View Confirmed Appointments

- **Join video calls**



MediSync BD Consultation Diagnostics Doctors Login

28°C Mostly cloudy 8:14 PM 28-Jul-25

Figure 5-9:Join Video Call

Admin Interface:

- Admin Dashboard, Create Schedule

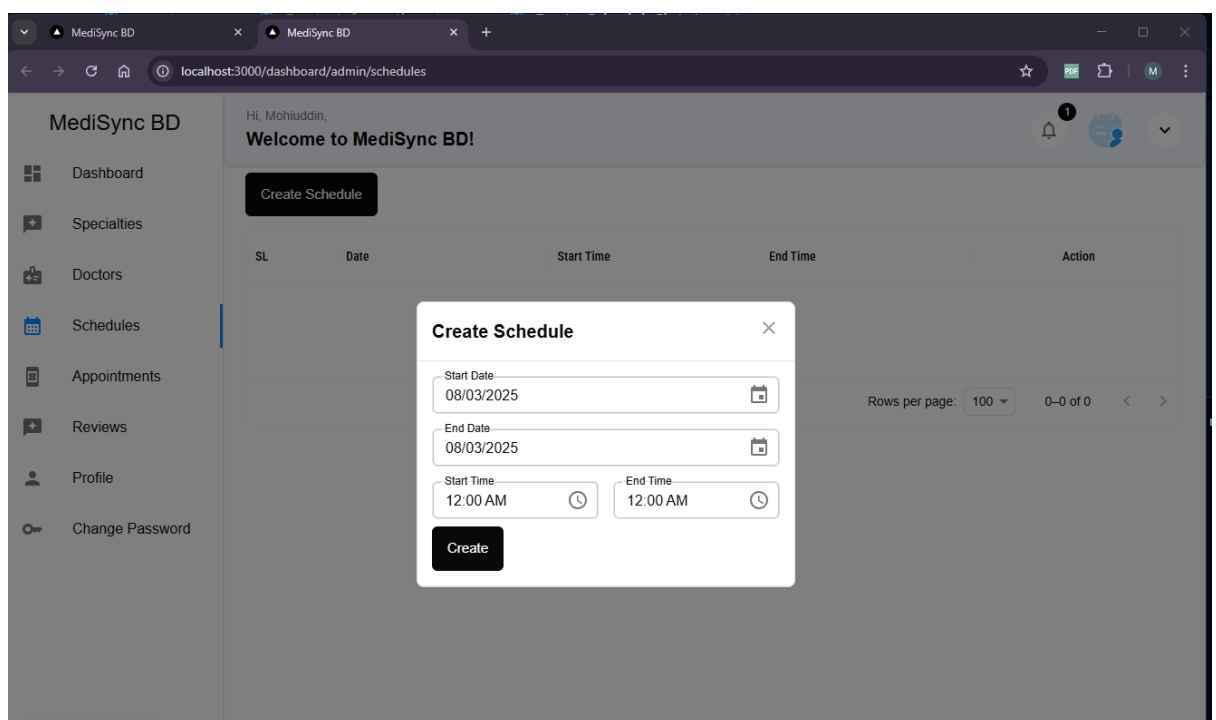
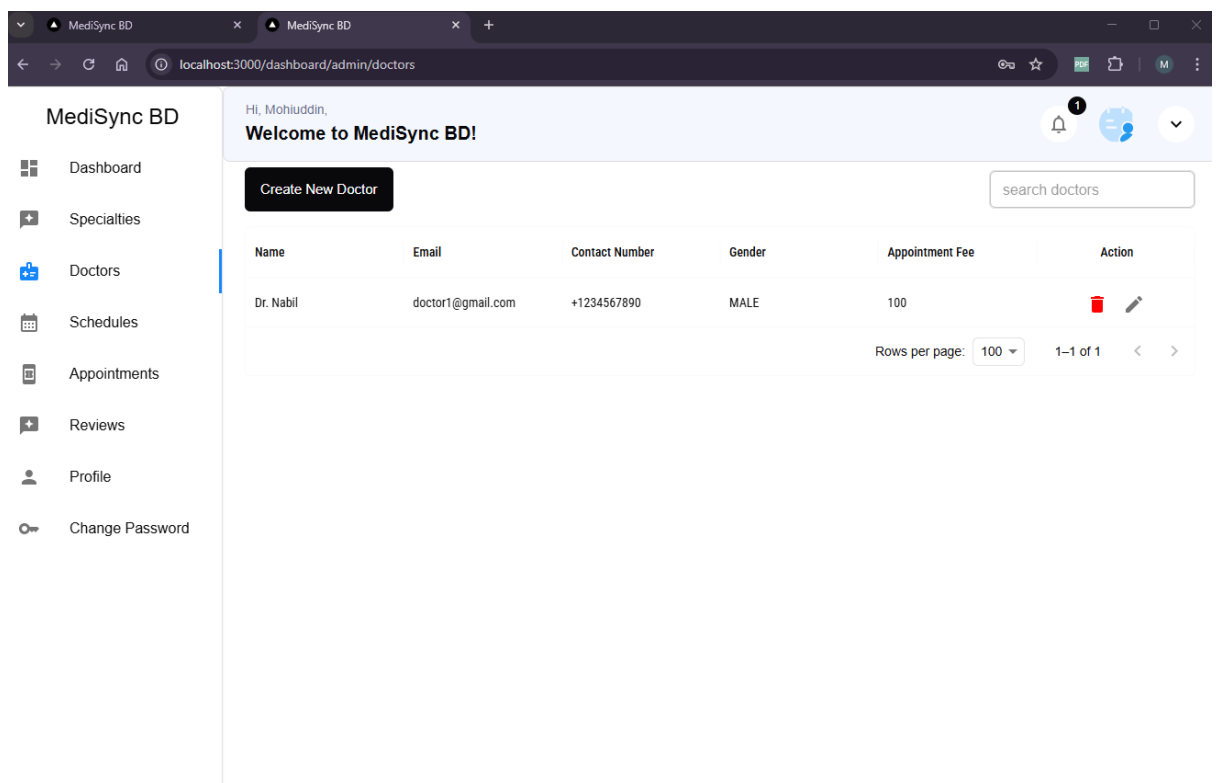


Figure 5-9:Join Video Call



● Add/edit doctors



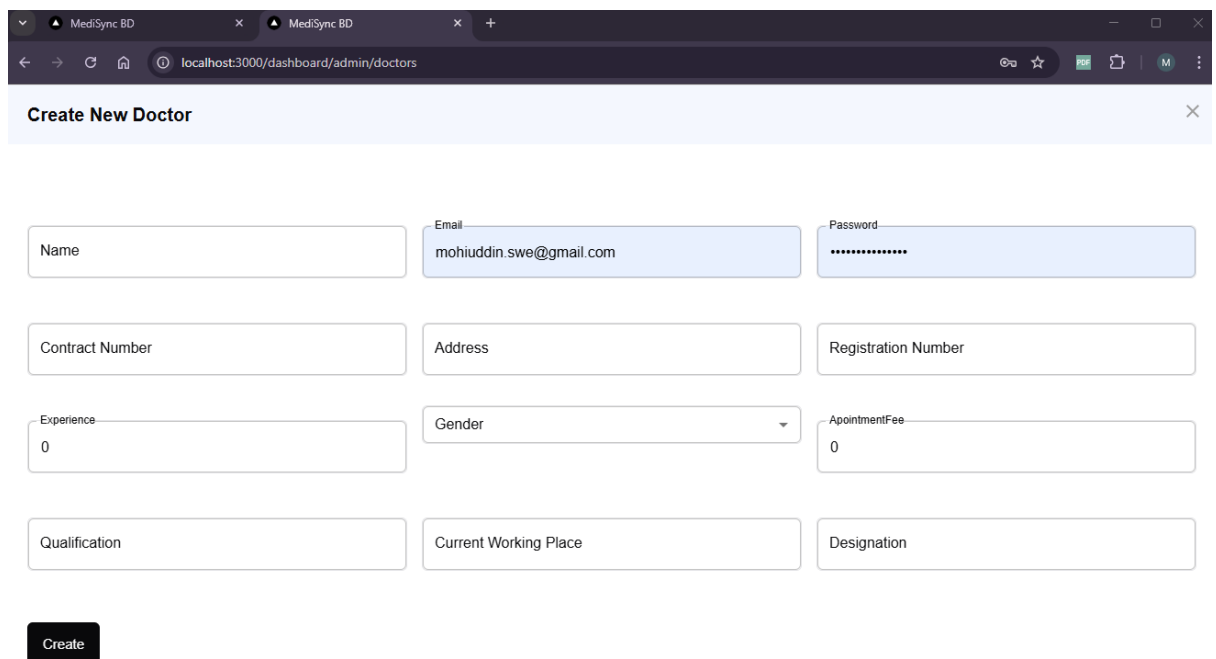
MediSync BD

Hi, Mohiuddin,
Welcome to MediSync BD!

[Create New Doctor](#)

Name	Email	Contact Number	Gender	Appointment Fee	Action
Dr. Nabil	doctor1@gmail.com	+1234567890	MALE	100	 

Rows per page: 100 1-1 of 1



Create New Doctor

Name

Email

Password

Contract Number

Address

Registration Number

Experience

Gender

Appointment Fee

Qualification

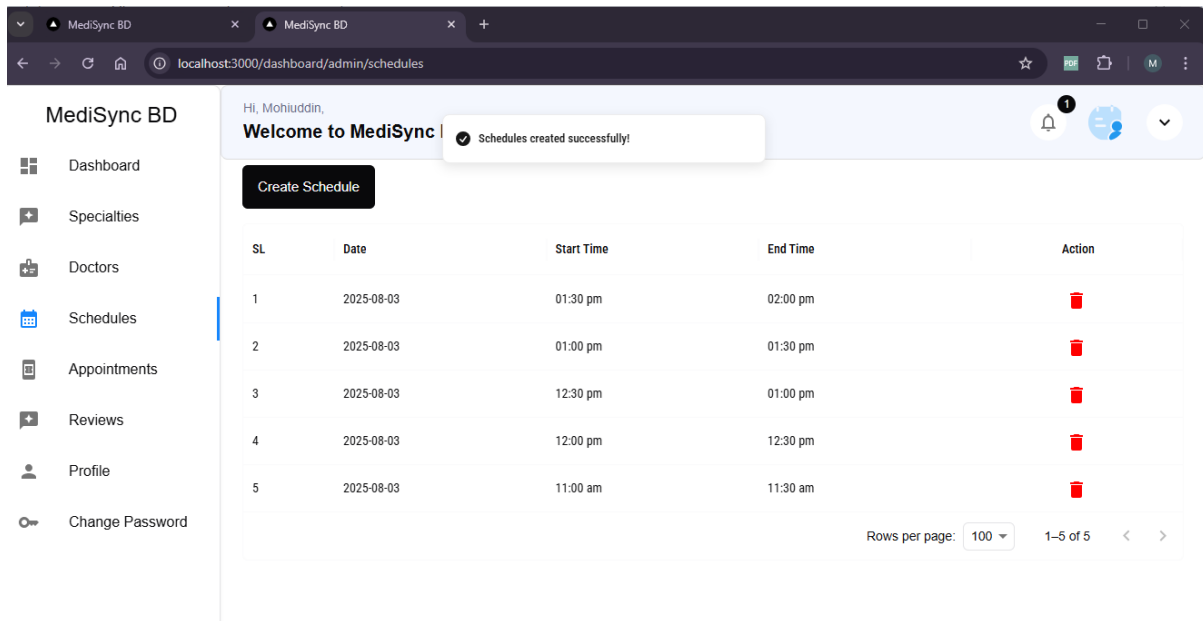
Current Working Place

Designation






[Create](#)

Figure 5-10:Add, Edit Doctor

Manage appointments, Schedules Management



The screenshot shows the MediSync BD dashboard for user Mohiuddin. The left sidebar contains navigation links: Dashboard, Specialties, Doctors, Schedules (active), Appointments, Reviews, Profile, and Change Password. The main content area features a 'Create Schedule' button and a table of schedules. A notification banner at the top right indicates 'Schedules created successfully!'.

SL	Date	Start Time	End Time	Action
1	2025-08-03	01:30 pm	02:00 pm	
2	2025-08-03	01:00 pm	01:30 pm	
3	2025-08-03	12:30 pm	01:00 pm	
4	2025-08-03	12:00 pm	12:30 pm	
5	2025-08-03	11:00 am	11:30 am	

Rows per page: 100 1-5 of 5 < >

Figure 5-11:Add, Edit Doctor

Chapter 6: Project Summary

MediSync is a full-fledged internet-based telemedicine system which allows patients to access medical practitioners at a distance. The platform is favorable to video consultation, appointment booking, and scheduling, as well as secure payments. The design is scalable, secure and easy to use.

The project is well-engineered with full-stack engineering using modern frameworks such as Next.js, Tailwind, and Redux, is enabled by strong backend services and APIs, and it is well-built. MediSync addresses practical medical issues especially in developing areas where medical professionals are far-flung.

The system is stable, receptive, and serviceable as well as is easily expandable to include system features such as prescriptions, chat messaging and EMR integration in subsequent releases.

Plagiarism Report

213-35-799

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Accounts Clearance

Dashboard

Muhammad Mohiuddin
213-35-799

Dashboard

Student Portal

Total Payable

741,200.00

Total Paid

741,200.00

Total Due

0.00

Total Other

4,750.00