Chapter 1: Introduction

The purpose of this chapter is to provide an introduction to the company profile and also define basic terminology used in our system that is **Lifeline Pathology Lab.** Chapter-1 presents an overview of existing system and need of system, scope of work and different operating environment.

- Company Profile
- Project Introduction
- Existing System and Need for System
- Scope of Work
- Operating Environment – Hardware and Software

1.1 : Company Profile

Overview

Name: Infopie Business Solution Pvt. Ltd

Founded: in 2016

Location: B101, Prime Heights, Sus Road, Pashan, Pune - 411021

Website: https://infopiesolutions.com

About Infopie Business Solution Pvt. Ltd

InfoPie offers services that span Analytics, Cloud services, consulting, IT services, & resource outsourcing backed by technical depth & industry expertise. InfoPie Business Solution Private Limited is a growing organization that was started in 2016 by a group of IT professionals with vast experience in the IT industry. We combine deep industry knowledge, business process & technical expertise with disciplined program management. Having a dedicated team of professionals to craft custom solutions that meet each client's specific business requirements. Our wide talent pool includes Industry Experts, Architects, Data scientist, Data Analyst, consultant from Microsoft platform, Enterprise Java, Various Databases, Portals & Content Management systems.

What We Offer

InfoPie has successfully delivered many important projects to our clients in the Healthcare domain (dot net), e-Commerce solutions (Magento, WordPress), Retailing (dot net), Content Management Systems (Sharepoint), Mobile App. (Android, IOS, React Native & Flutter), Web portals (PHP Laravel, Codeigniter, Slim), etc.

- Software system design and development
- Web Application Development
- Mobile Application Development
- IT infrastructure Services
- Application Integration & System Re-engineering
- QA and Testing & Block chain development

Infopie Team

InfoPie offers services that span Analytics, Cloud services, consulting, IT services, & resource outsourcing backed by technical depth & industry expertise. InfoPie Business Solution Private Limited is a growing organization that was started in 2016 by a group of IT professionals with vast experience in the IT industry. We combine deep industry knowledge, business process & technical expertise with disciplined program management. Having a dedicated team of professionals to craft custom solutions that meet each client's specific business requirements. Our wide talent pool includes Industry Experts, Architects, Data scientist, Data Analyst, consultant from Microsoft platform, Enterprise Java, Various Databases, Portals & Content Management systems.

Mission

To empower businesses worldwide with innovative software solutions, enhancing their efficiency, productivity, and competitiveness in the digital age. We strive to deliver exceptional value through cutting-edge technology, unparalleled customer service, and a commitment to continuous improvement.

Vision

Our vision is to be a global leader in IT software solutions, recognized for our transformative impact on businesses across industries. We aim to pioneer advancements in technology, driving digital innovation and shaping the future of software development. By fostering a culture of creativity, collaboration, and excellence, we aspire to be the partner of choice for organizations seeking to thrive in a rapidly evolving digital landscape

1.2 Existing System and Need of system

Despite advancements in healthcare technology, the process of booking pathology tests and accessing medical reports remains cumbersome and inefficient in many traditional settings. Patients often face challenges in scheduling appointments, accessing their reports promptly, and communicating effectively with healthcare providers. Additionally, the lack of transparency and reliability in service delivery can lead to frustration and mistrust among patients. In light of these issues, there is a pressing need for a comprehensive online solution that simplifies the pathology lab booking process, enhances communication between patients and healthcare providers, and ensures timely access to medical

Need For System

The need for the Pathology Lab Management System arises from several key factors within the current healthcare landscape:

Inefficiencies in Traditional Processes: Traditional methods of booking pathology tests and accessing medical reports are often manual, time-consuming, and prone to errors. This leads to inefficiencies in service delivery and delays in patient care.

Challenges in Appointment Scheduling: Patients face difficulties in scheduling appointments with pathology labs due to long wait times, limited availability, and complex booking procedures. This can result in frustration and inconvenience for patients seeking timely medical services.

Delayed Access to Medical Reports: Patients often experience delays in accessing their medical reports, which can impact their ability to receive timely treatment or share critical information with healthcare providers. This lack of prompt access can also lead to anxiety and uncertainty among patients regarding their health status.

Communication Barriers: Communication between patients, healthcare providers, and pathology labs may be fragmented or ineffective, leading to misunderstandings, missed appointments, and delayed test results. Improved communication channels are essential for ensuring seamless coordination and collaboration among all stakeholders involved in patient care.

Transparency and Reliability: Patients expect transparency and reliability in healthcare services, including accurate test results and timely delivery of medical reports. The current system may lack transparency in service delivery and fail to meet patient expectations, resulting in decreased trust and satisfaction.

1.3 SCOPE OF SYSTEM

- Test Booking and Appointment Scheduling: The system allows patients to conveniently book pathology tests and schedule appointments online. It should offer a user-friendly interface where patients can select the desired test, choose a preferred date and time for the appointment, and receive confirmation of their booking.
- Patient Registration and Profile Management: Patients can register on the platform and create profiles where they can manage personal information, medical history, and insurance details. This feature ensures that patient data is securely stored and easily accessible for future appointments and consultations.
- Integration with Pathology Labs and Healthcare Providers: The system integrates with pathology labs and healthcare providers to facilitate seamless communication and information exchange. This includes sending test requests, receiving test results, and sharing medical reports securely between the lab, healthcare provider, and patient.
- Digital Report Delivery and Access: Medical reports generated from pathology tests are digitized and made accessible to patients through their online accounts. Patients can view, download, and print their reports conveniently from the platform, ensuring timely access to important health information.
- Notification and Reminder System: The system includes a notification and reminder feature to alert patients about upcoming appointments, test results availability, and other important updates. This helps reduce appointment no-shows and ensures that patients stay informed throughout their healthcare journey.
- Analytics and Reporting: The system provides analytics and reporting capabilities for healthcare administrators to track key performance metrics such as appointment attendance rates, test turnaround times, and patient satisfaction scores. This data can be used to identify areas for improvement and optimize system workflows.
- Security and Compliance: The system prioritizes data security and compliance with healthcare regulations such as HIPAA (Health Insurance Portability and Accountability Act). It employs robust encryption techniques, access controls, and audit trails to safeguard patient information and ensure confidentiality.
- Scalability and Customization: The system is designed to be scalable and customizable to accommodate the unique needs and workflows of different healthcare facilities, from small clinics to large hospital networks. It should support integration with existing healthcare IT infrastructure and allow for easy customization based on specific requirements.

1.4 OPERATING ENVIRONMENT

- **Specific Hardware Requirements**
  - Intel/AMD i3 or Above Processor
  - HDD/SSD

- **Specific Software Requirements**
  - Windows / Linux/MAC/Android
  - Any Web Browser 9.0 and Above

1.4 Description of Technology Used

Front End Technologies:

HTML (HyperText Markup Language): HTML is the standard markup language for creating the structure and content of web pages. It provides the foundation for building the user interface components of the system.

- CSS (Cascading Style Sheets): CSS is used to enhance the presentation and styling of HTML elements. It allows for the customization of colors, fonts, layouts, and other visual aspects of the user interface to create an appealing and consistent design.
- Bootstrap: Bootstrap is a popular front-end framework that provides pre-designed components and responsive layout utilities. It helps in creating a responsive and mobile-friendly user interface by offering a grid system, navigation bars, buttons, forms, and other UI elements.
- React.js: React.js is a JavaScript library for building user interfaces, developed by Facebook. It allows for the creation of dynamic and interactive UI components using a component-based architecture. React.js facilitates the development of single-page applications (SPAs) with its efficient rendering and state management capabilities.

Back End Technologies:

- Spring Boot: Spring Boot is a framework for building Java-based enterprise applications. It simplifies the development of stand-alone, production-grade Spring applications by providing auto-configuration, opinionated defaults, and a range of built-in features. Spring Boot is well-suited for developing RESTful APIs and microservices, making it an ideal choice for the backend of the Pathology Lab Management System.
- MySQL: MySQL is an open-source relational database management system (RDBMS) that is widely used for storing and managing structured data. It offers scalability, reliability, and robust performance, making it suitable for handling the data storage needs of the system. MySQL supports SQL (Structured Query Language) for querying and manipulating data, making it compatible with a wide range of applications and tools.

Chapter 2: PROPOSED SYSTEM

This chapter gives you an idea about the project which I have undertaken. It explains the user requirements of the system to be developed leading to proposing a solution for the same from our side. User requirements we get from our client so it's totally based on client need.

- Proposed System
- Objectives of System
- User Requirements

2.1 Proposed system

The proposed methodology for the Pathology Lab Management System involves a phased approach, starting with comprehensive research and analysis to identify key user requirements, technological capabilities, and industry standards.

Following this, the system design phase will encompass the creation of wireframes, mock-ups, and architectural blueprints, ensuring a user-friendly interface and robust backend infrastructure.

Development will proceed iteratively, with regular testing and feedback cycles to refine functionality and address any issues.

Implementation will involve deploying the system on a scalable and secure cloud infrastructure, with rigorous quality assurance measures in place. Finally, post-implementation support and maintenance will ensure ongoing system performance, updates, and enhancements to meet evolving user needs and technological advancements. Throughout this process, stakeholder collaboration and adherence to best practices will be paramount to the successful execution of the project.

2.2. Objective of System

The objective of the Pathology Lab Management System is to revolutionize the interaction between patients, doctors, and pathology labs by providing a streamlined, efficient, and user-friendly platform for booking pathology tests, scheduling appointments, and accessing medical reports. The system aims to:

- Simplify Processes: Streamline the pathology lab booking process, appointment scheduling, and medical report delivery, reducing administrative burden and improving efficiency.
- Enhance Communication: Facilitate seamless communication between patients, healthcare providers, and pathology labs, ensuring clear and timely exchange of information.
- Improve Accessibility: Provide patients with convenient access to pathology services, enabling them to book tests, schedule appointments, and access medical reports from anywhere, at any time.
- Ensure Transparency: Enhance transparency and reliability in service delivery, fostering trust and confidence among patients by providing accurate and timely information.
- Optimize Healthcare Experience: Improve the overall healthcare experience for patients by offering a user-friendly interface, timely access to medical services, and personalized support throughout their healthcare journey.

2.3. User Requirement

User requirements for the Pathology Lab Management System encompass the needs and expectations of various stakeholders involved in the healthcare process, including patients, healthcare providers, and pathology labs. Here are some key user requirements:

- **Patients:**

  - Register and create profile with personal information, medical history, and insurance details.
  - Convenient online booking system for pathology tests, with options to select tests, choose appointment slots, and receive confirmations.
  - Access to digital medical reports generated from pathology tests, with options to view, download, and print reports securely. Notification and reminder system for upcoming appointments, test results availability, and other important updates.
  - Intuitive, responsive, and accessible interface across different devices and web browsers.

- **Healthcare Providers:**

  - Seamless integration with electronic health records (EHR) systems for accessing patient information and medical history.
  - Efficient communication channels for sending test requests to pathology labs and receiving test results promptly.
  - Ability to review and interpret medical reports within the system, with options for adding comments or annotations. Analytics and reporting tools for tracking key performance metrics.

- **Pathology Labs:**

  - Automated process for receiving test requests, processing samples, and generating medical reports.
  - Integration with laboratory information management systems (LIMS) for managing test workflows and data.
  - Timely delivery of test results to healthcare providers and patients through the system, with options for secure data transmission. Scalable infrastructure to handle large volumes of tests and data efficiently. Collaboration features for consulting with healthcare providers and addressing any queries or concerns related to test results.

2.4. Feasibility Study

The feasibility study for the Pathology Lab Management System evaluates the project's viability from technical, economic, and operational perspectives. Here's a breakdown of the feasibility study:

- **Technical Feasibility:**

  - Assessment of available technologies and resources required for system development, including hardware, software, and development tools.
  - Evaluation of the technical expertise and capabilities of the development team to implement the required features and functionalities.
  - Analysis of potential technical challenges and risks, such as integration with existing systems, scalability, and security requirements.
  - Identification of solutions and strategies to address technical constraints and ensure the successful implementation of the system.

- **Economic Feasibility:**

  - Cost-benefit analysis to determine the financial feasibility of the project, including upfront development costs, ongoing maintenance expenses, and potential revenue streams.
  - Assessment of the return on investment (ROI) and payback period to determine the project's profitability and financial viability.
  - Consideration of alternative solutions and their associated costs to compare against the proposed system and justify the investment in the project.
  - Evaluation of potential cost savings and efficiency gains that the system can bring to healthcare providers and pathology labs, contributing to long-term financial sustainability.

- **Operational Feasibility:**

  - Examination of the operational impact of implementing the system on stakeholders, including patients, healthcare providers, and pathology labs.
  - Assessment of the system's usability, user acceptance, and adoption potential among end-users to ensure smooth integration into existing workflows.
  - Analysis of organizational readiness and willingness to embrace technological changes, including training requirements and change management strategies.

2.5. Module Specification

Module Specification for the Pathology Lab Management System:

1. User Management Module:
   - Allows users to register, login, and manage their profiles.
   - Provides role-based access control for different user types (patients, healthcare providers, pathology labs).
   - Includes features for password management, profile editing, and account settings.
2. Appointment Management Module:
   - Enables patients to book pathology tests and schedule appointments online.
   - Provides a calendar interface for viewing available appointment slots and selecting preferred dates and times.
   - Sends confirmation notifications to patients upon successful appointment booking.
   - Allows healthcare providers to view and manage their appointment schedules, including adding, modifying, and cancelling appointments.
3. Test Management Module:
   - Facilitates the management of pathology tests and test requests.
   - Allows healthcare providers to submit test requests to pathology labs electronically.
   - Enables pathology labs to receive, process, and track test requests efficiently.
   - Provides notifications to patients when test results are available and allows them to access their reports securely.
4. Reporting and Analytics Module:
   - Generates reports and analytics on key performance metrics, such as appointment attendance rates, test turnaround times, and patient satisfaction scores.
   - Provides customizable dashboards and data visualizations for easy interpretation and analysis.
   - Helps healthcare administrators and decision-makers identify trends, patterns, and areas for improvement in service delivery.
5. Communication Module:
   - Facilitates communication and collaboration between patients, healthcare providers, and pathology labs.
   - Provides messaging capabilities for sending notifications, reminders, and updates to users.
   - Supports secure communication channels for sharing sensitive information, such as test results and medical reports.
   - Includes features for attaching documents, images, and other files to messages for reference.
6. Security and Compliance Module:

- Implements robust security measures to protect patient data and ensure compliance with healthcare regulations (e.g., HIPAA).
- Utilizes encryption techniques, access controls, and audit trails to safeguard sensitive information.
- Provides mechanisms for user authentication, session management, and data encryption to maintain data integrity and confidentiality.

7. Integration Module:
   - Integrates with external systems and APIs, such as electronic health records (EHR) systems and laboratory information management systems (LIMS).
   - Enables seamless data exchange and interoperability between the Pathology Lab Management System and other healthcare IT systems.
   - Ensures data consistency, accuracy, and reliability across integrated systems through standardized protocols and data formats.
8. Administration Module:
   - Provides administrative tools and functionalities for managing system settings, configurations, and user permissions.
   - Allows administrators to add, edit, and delete user accounts, roles, and permissions.
   - Includes features for system maintenance, monitoring, and troubleshooting to ensure smooth operation and performance.

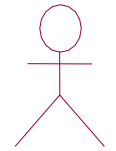
Chapter 3 – Analysis And Design

- Use Case Diagram
- ER Diagram / Class Diagram
- Activity Diagram
- Sequence Diagram
- Module Hierarchical Diagram
- Component Diagram
- Deployment Diagram
- Table Specification

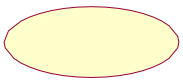
3.1Use Case Diagram

Use-case diagrams graphically depict system behavior (use cases). These diagrams present a high level view of how the system is used as viewed from an outsider's (actor's) perspective. A use-case diagram may depict all or some of the use cases of a system.

- Actors:



- Use Case Name:



- Association:

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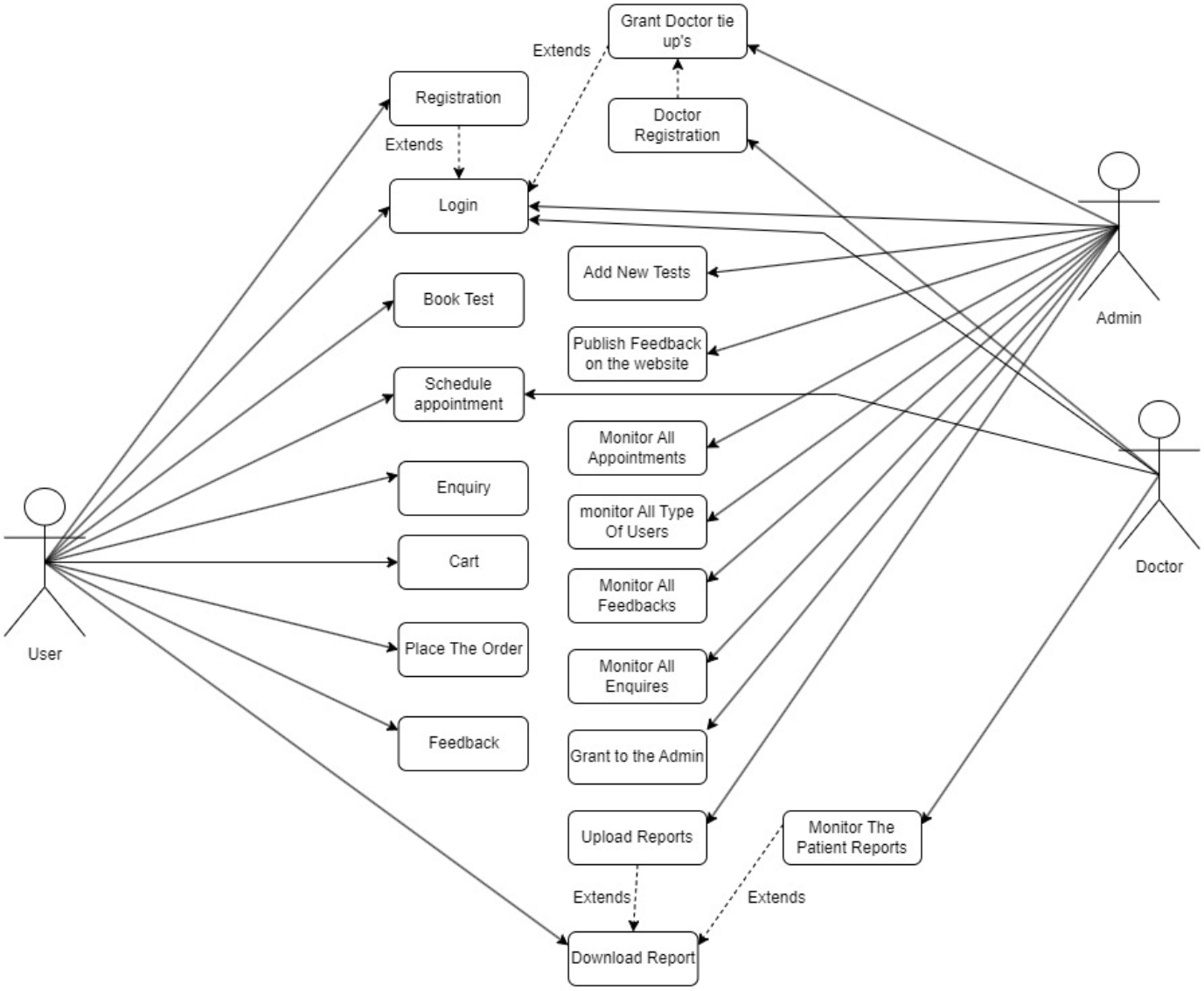
- **System Use Case diagram.**

It specifies the functionality of the complete system.


Grant Doctor tie up's
Extends
Registration
Doctor Registration
Extends
Login
Admin
Add New Tests
Book Test
Publish Feedback on the website
Schedule appointment
Monitor All Appointments
Doctor
Enquiry
monitor All Type Of Users
Cart
Monitor All Feedbacks
User
Place The Order
Monitor All Enquires
Feedback
Grant to the Admin
Upload Reports
Monitor The Patient Reports
Extends
Extends
Download Report

3.2 ER Diagram / Class Diagram

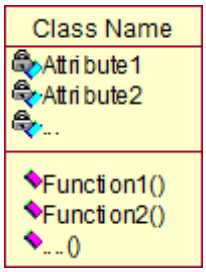
❖ Definitions and Symbols of Class Diagram:

➢ Class:

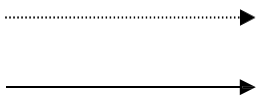
A class is a set of objects that share a common structure and common behavior (the same attributes, operations, relationships and semantics). A class is an abstraction of real-world items. When these items exist in the real world, they are instances of the class and are referred to as objects [1] [2] [3].

➢ Graphical Depiction:

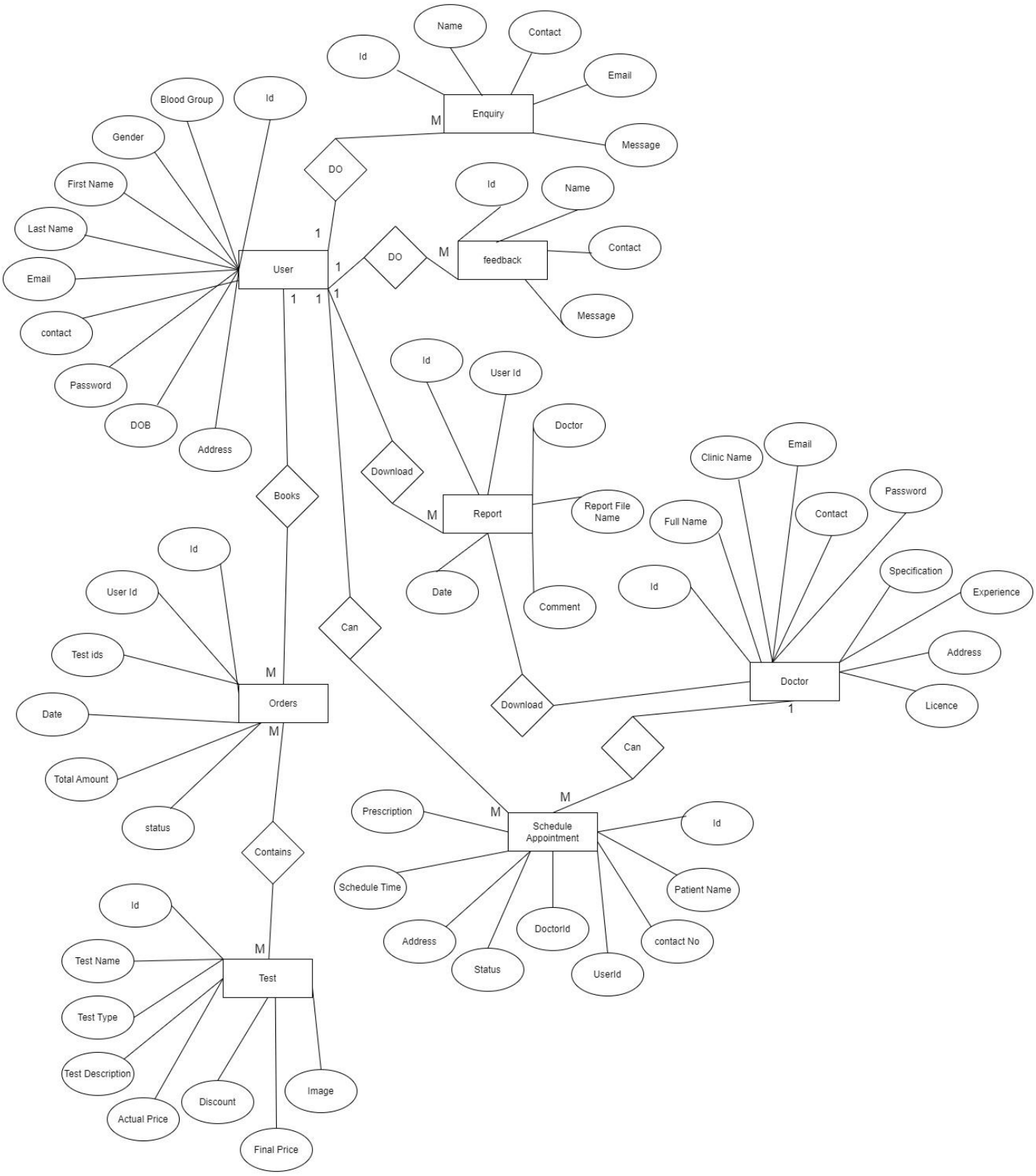
A class icon is drawn as a 3-part box, with the class name in the top part, a list of attributes (with optional types and values) in the middle part, and a list of operations (with optional argument lists and return types) in the bottom part



➢ **Dependency:**



ER Diagram


Name
Contact
Id
Email
Enquiry
Message
M
DO
Blood Group
Id
Gender
First Name
Last Name
Email
contact
Password
DOB
Address
User
1
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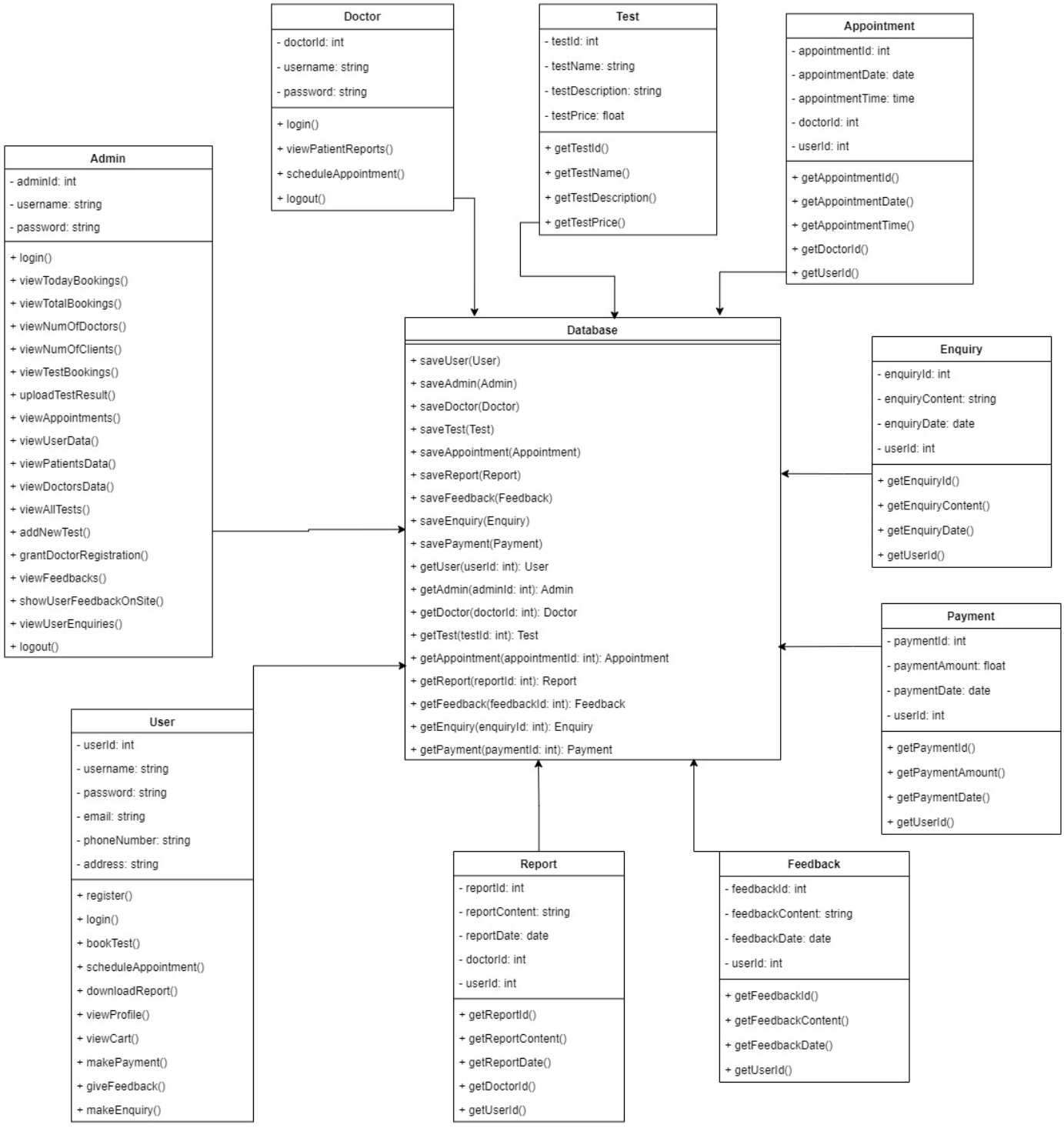
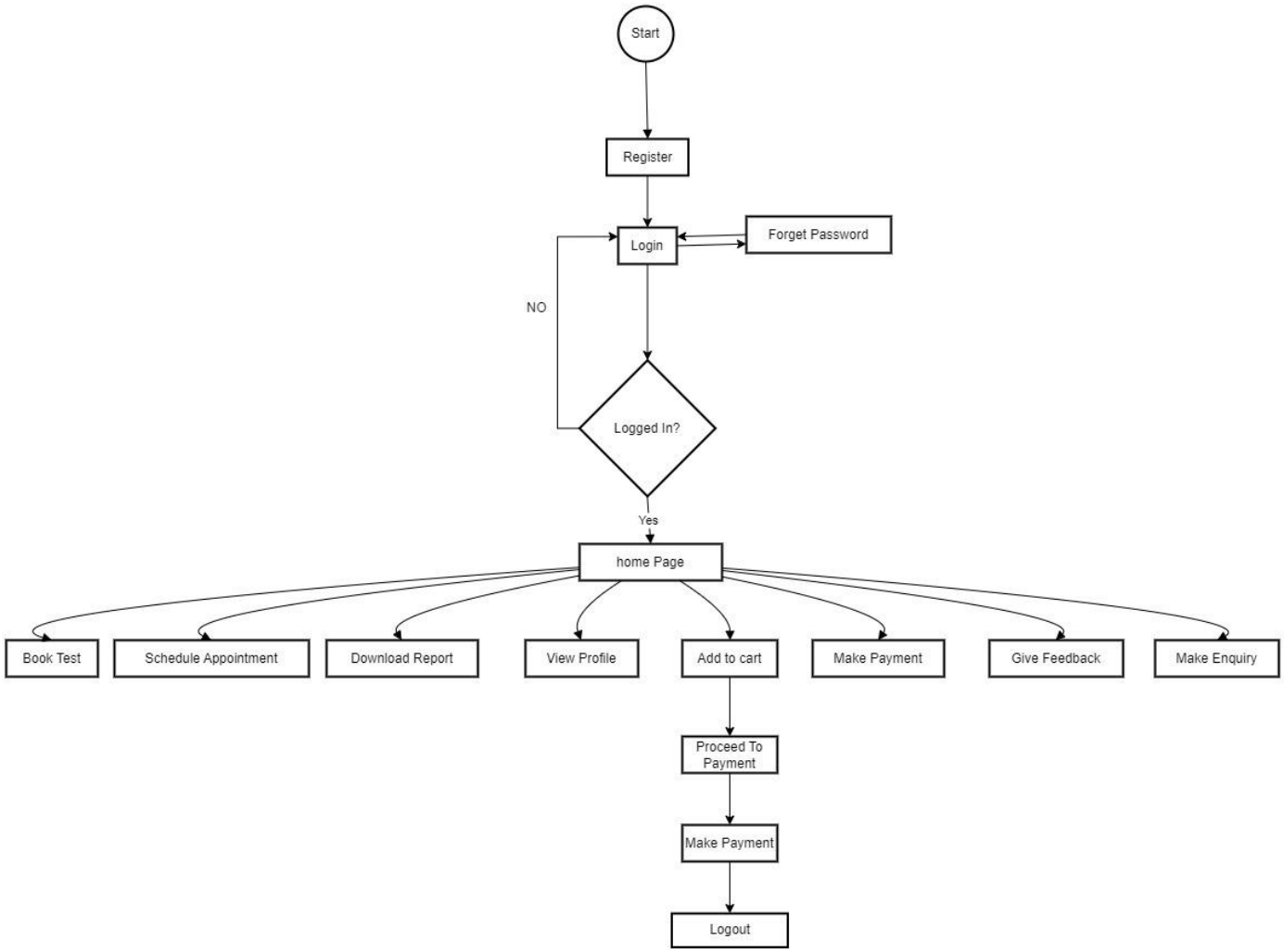
1
1
1
DO
M
Id
Name
feedback
Contact
Message
Id
User Id
Doctor
Download
Report
Report File Name
Date
Comment
M
Books
Can
Id
User Id
Test ids
Date
Total Amount
status
Orders
M
M
Contains
Id
Test Name
Test Type
Test Description
Actual Price
Discount
Image
Final Price
Test
M
Clinic Name
Email
Password
Contact
Full Name
Specification
Experience
Id
Address
Licence
Doctor
1
Download
Can
M
Prescription
M
Schedule Appointment
Id
Schedule Time
Patient Name
Address
DoctorId
contact No
Status
UserId

Class Diagram



3.3 Activity Diagram

An activity diagram is a graphical representation used in UML to illustrate the flow of actions and decisions within a system or process. It consists of nodes, which depict various states or actions, connected by edges that represent transitions between these states. Decision nodes allow for branching based on conditions, while concurrency is represented by fork and join nodes.

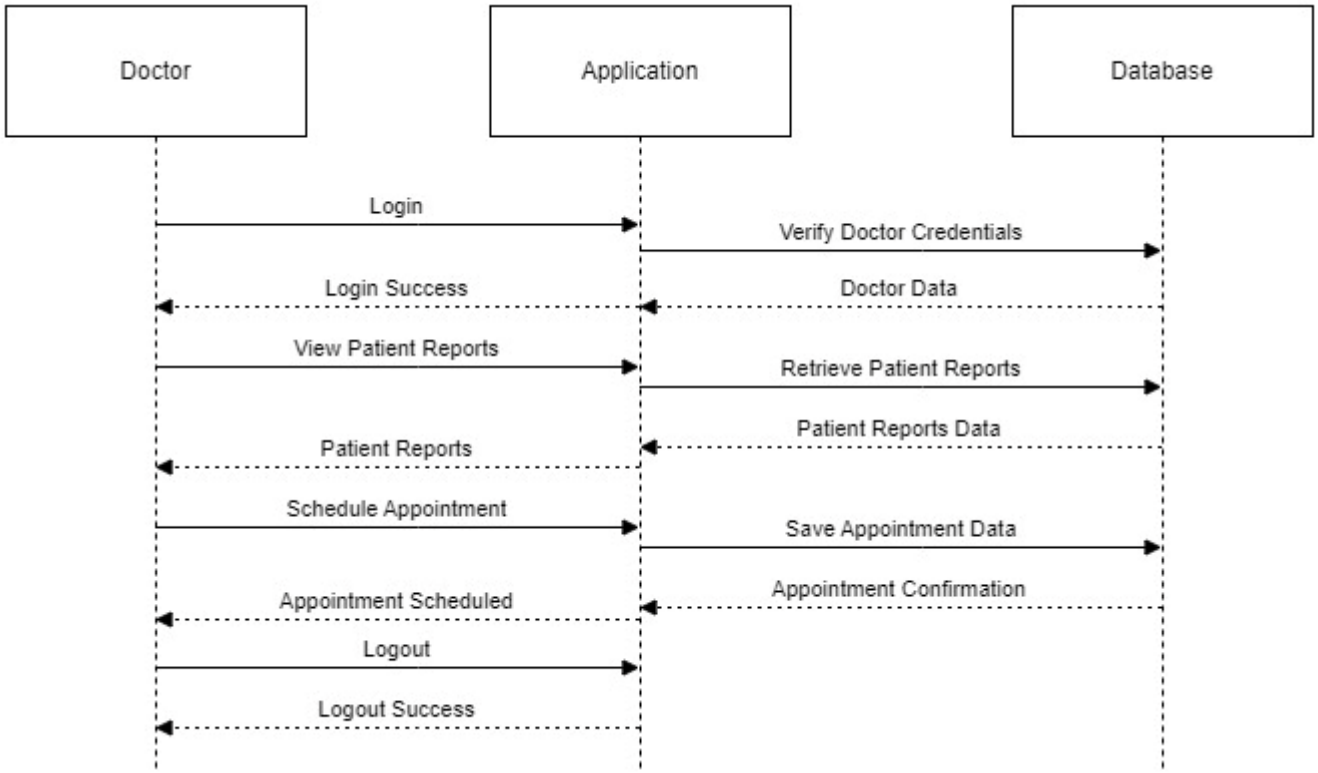


3.4Sequence Diagram

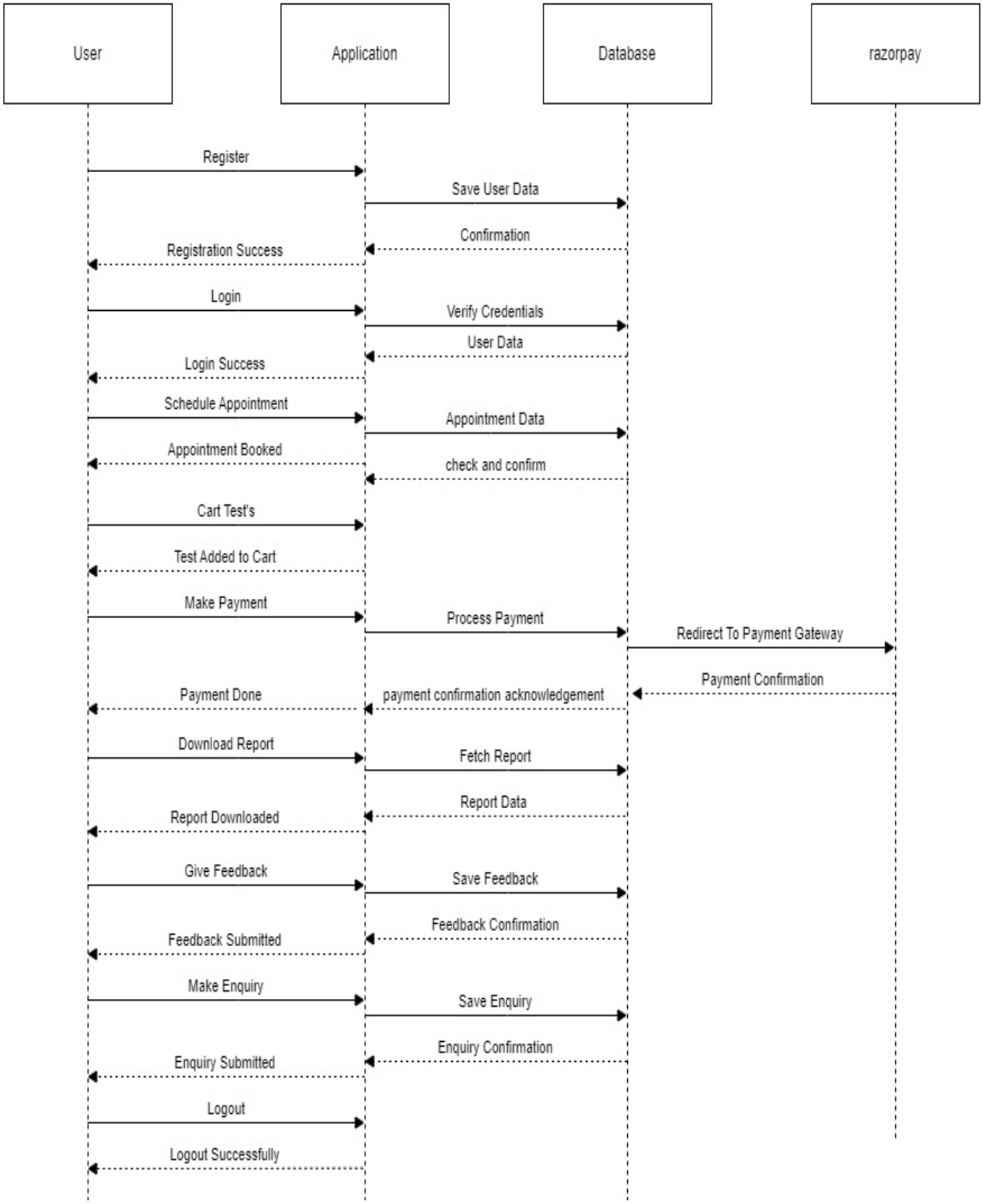
- Definitions

A sequence diagram shows elements as they interact over time, showing an interaction or interaction instance. Sequence diagrams are organized along two axes: the horizontal axis shows the elements that are involved in the interaction, and the vertical axis represents time proceeding down the page. The elements on the horizontal axis may appear in any order

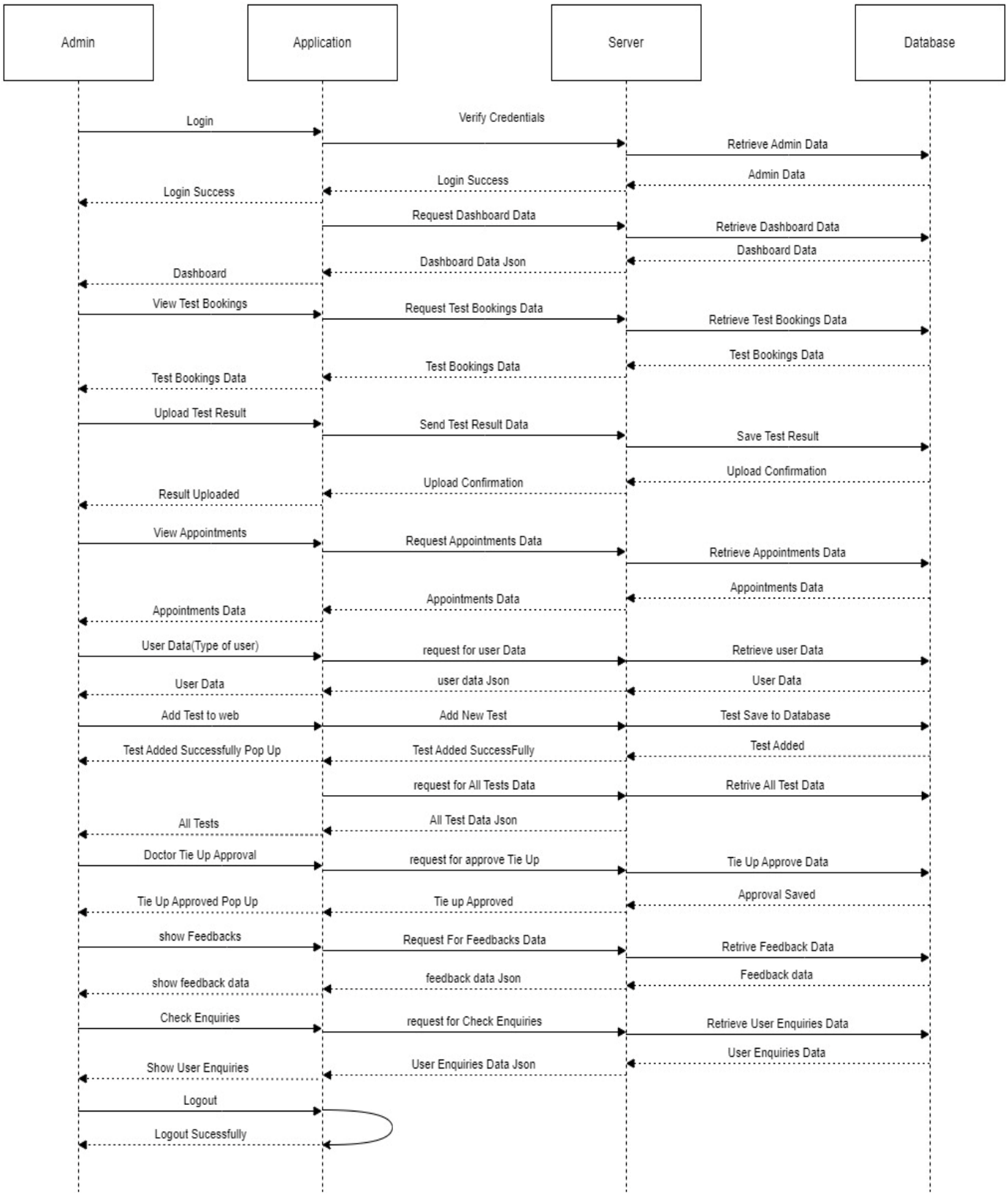
Doctor:



User:

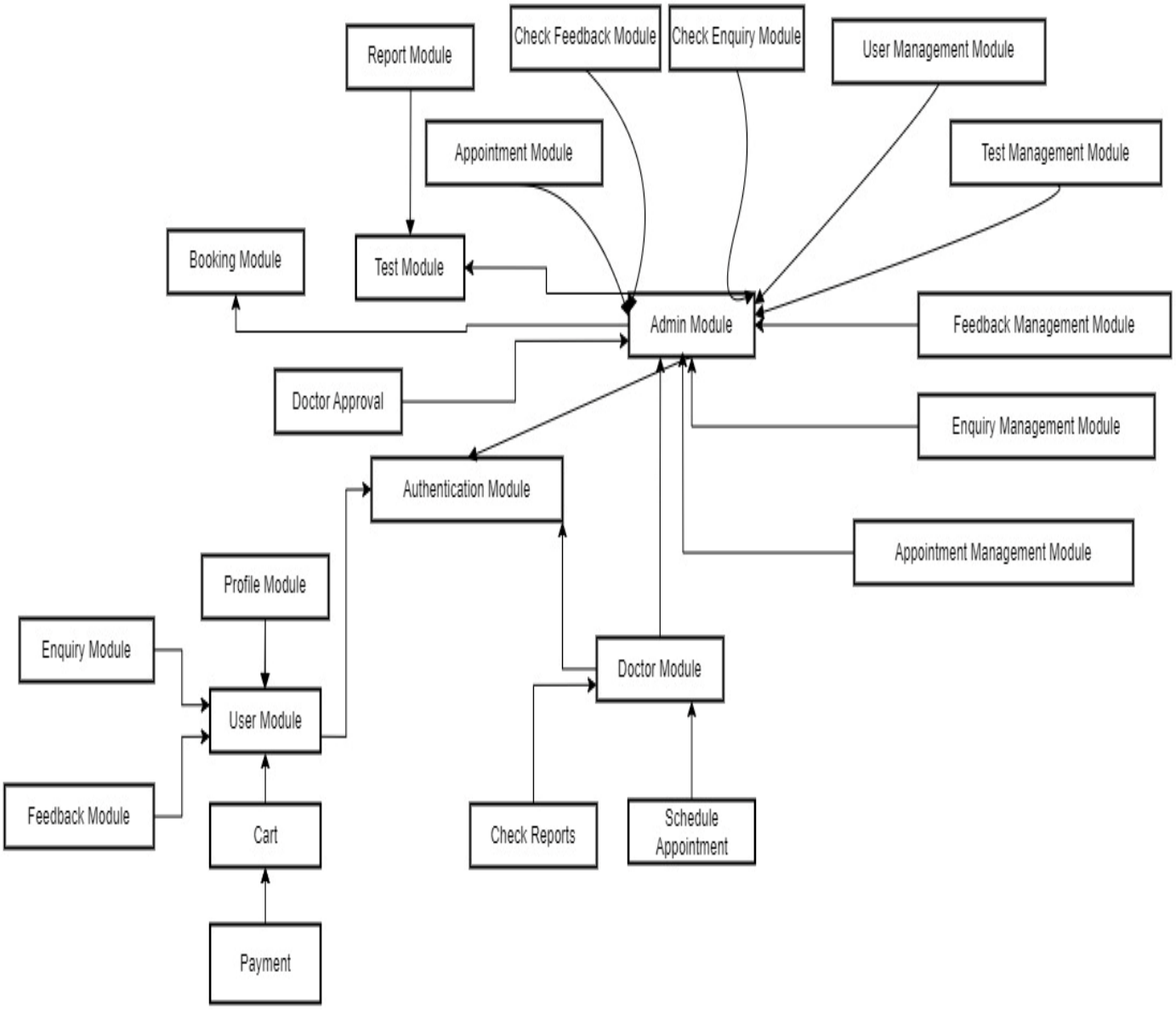

User
Application
Database
razorpay
Register
Save User Data
Confirmation
Registration Success
Login
Verify Credentials
User Data
Login Success
Schedule Appointment
Appointment Data
Appointment Booked
check and confirm
Cart Test's
Test Added to Cart
Make Payment
Process Payment
Redirect To Payment Gateway
Payment Confirmation
Payment Done
payment confirmation acknowledgement
Download Report
Fetch Report
Report Data
Report Downloaded
Give Feedback
Save Feedback
Feedback Confirmation
Feedback Submitted
Make Enquiry
Save Enquiry
Enquiry Confirmation
Enquiry Submitted
Logout
Logout Successfully

Admin:


Admin
Application
Server
Database
Login
Verify Credentials
Retrieve Admin Data
Admin Data
Login Success
Login Success
Request Dashboard Data
Retrieve Dashboard Data
Dashboard Data
Dashboard Data Json
Dashboard
View Test Bookings
Request Test Bookings Data
Retrieve Test Bookings Data
Test Bookings Data
Test Bookings Data
Test Bookings Data
Upload Test Result
Send Test Result Data
Save Test Result
Upload Confirmation
Upload Confirmation
Result Uploaded
View Appointments
Request Appointments Data
Retrieve Appointments Data
Appointments Data
Appointments Data
Appointments Data
User Data(Type of user)
request for user Data
Retrieve user Data
User Data
user data Json
User Data
Add Test to web
Add New Test
Test Save to Database
Test Added
Test Added Successfully Pop Up
Test Added SuccessFully
request for All Tests Data
Retrive All Test Data
All Test Data Json
All Tests
Doctor Tie Up Approval
request for approve Tie Up
Tie Up Approve Data
Approval Saved
Tie Up Approved Pop Up
Tie up Approved
show Feedbacks
Request For Feedbacks Data
Retrive Feedback Data
Feedback data
feedback data Json
show feedback data
Check Enquiries
request for Check Enquiries
Retrieve User Enquiries Data
User Enquiries Data
User Enquiries Data Json
Show User Enquiries
Logout
Logout Sucessfully

3.5 Module Hierarchical Diagram

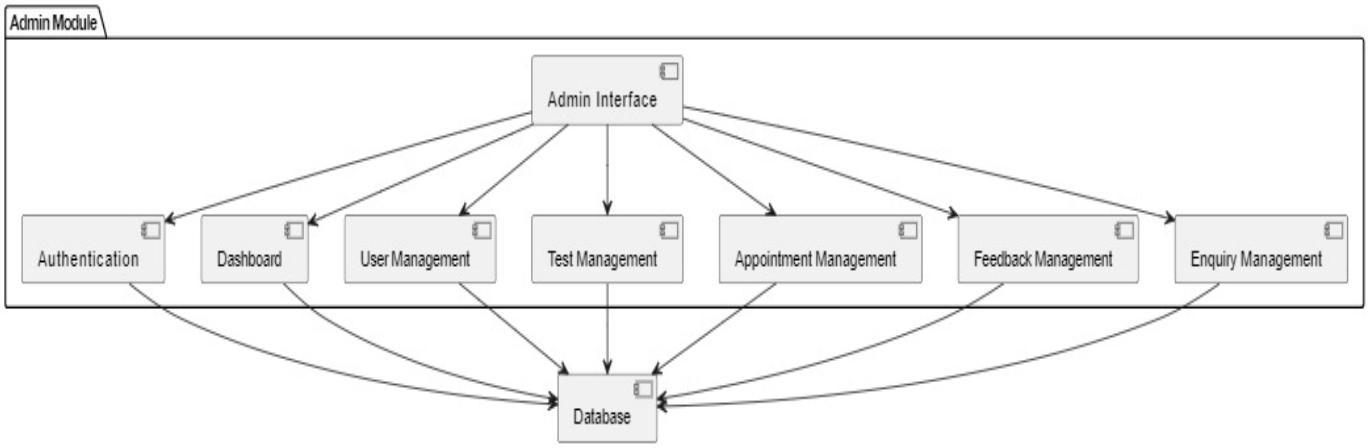
A module hierarchical diagram, also known as a module hierarchy diagram or module structure diagram, is a visual representation of the hierarchical structure of modules within a software system. It illustrates how modules are organized into a hierarchical or nested structure based on their relationships and dependencies.



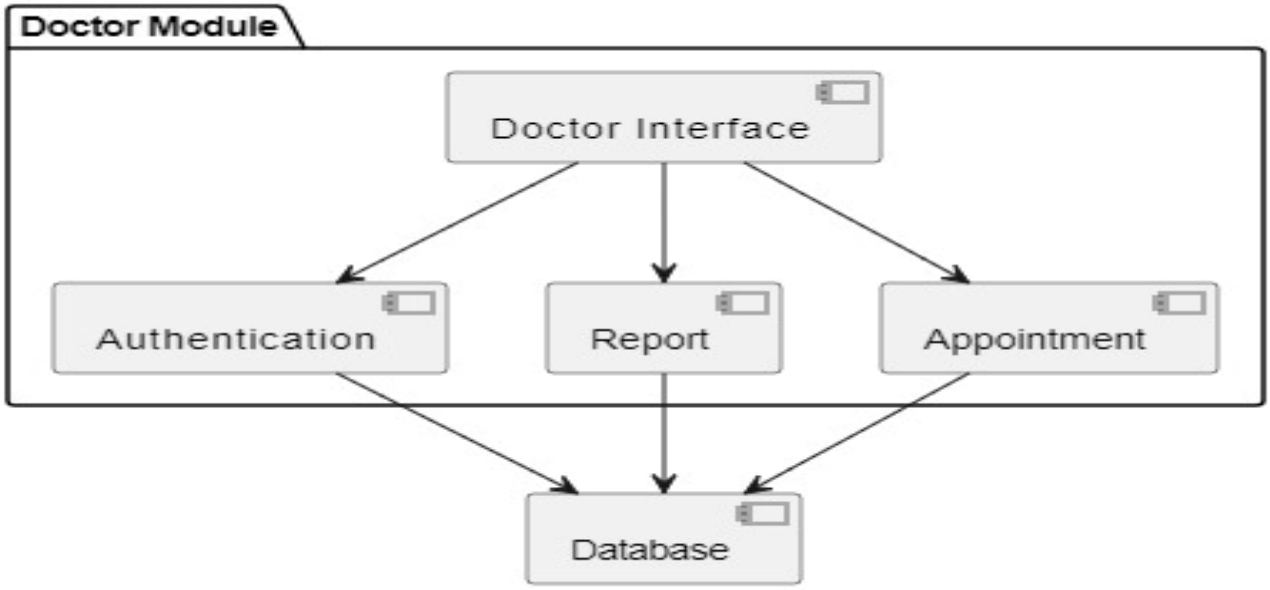
3.6 Component Diagram

A component diagram describes the components which are the parts of the system that exists when the system is executing

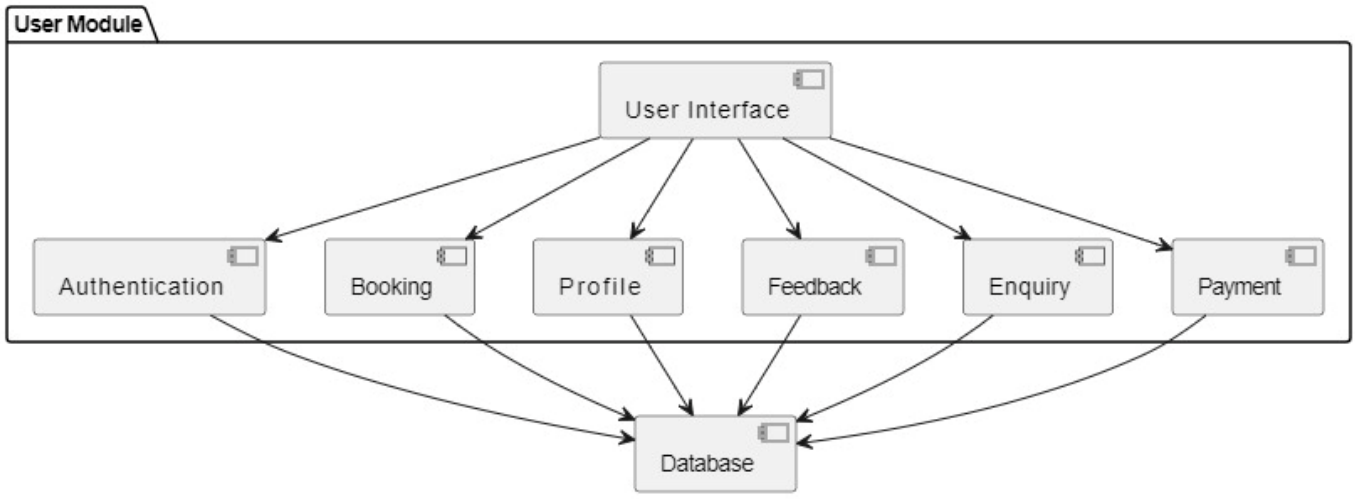
Admin Module:



Dcotor Module

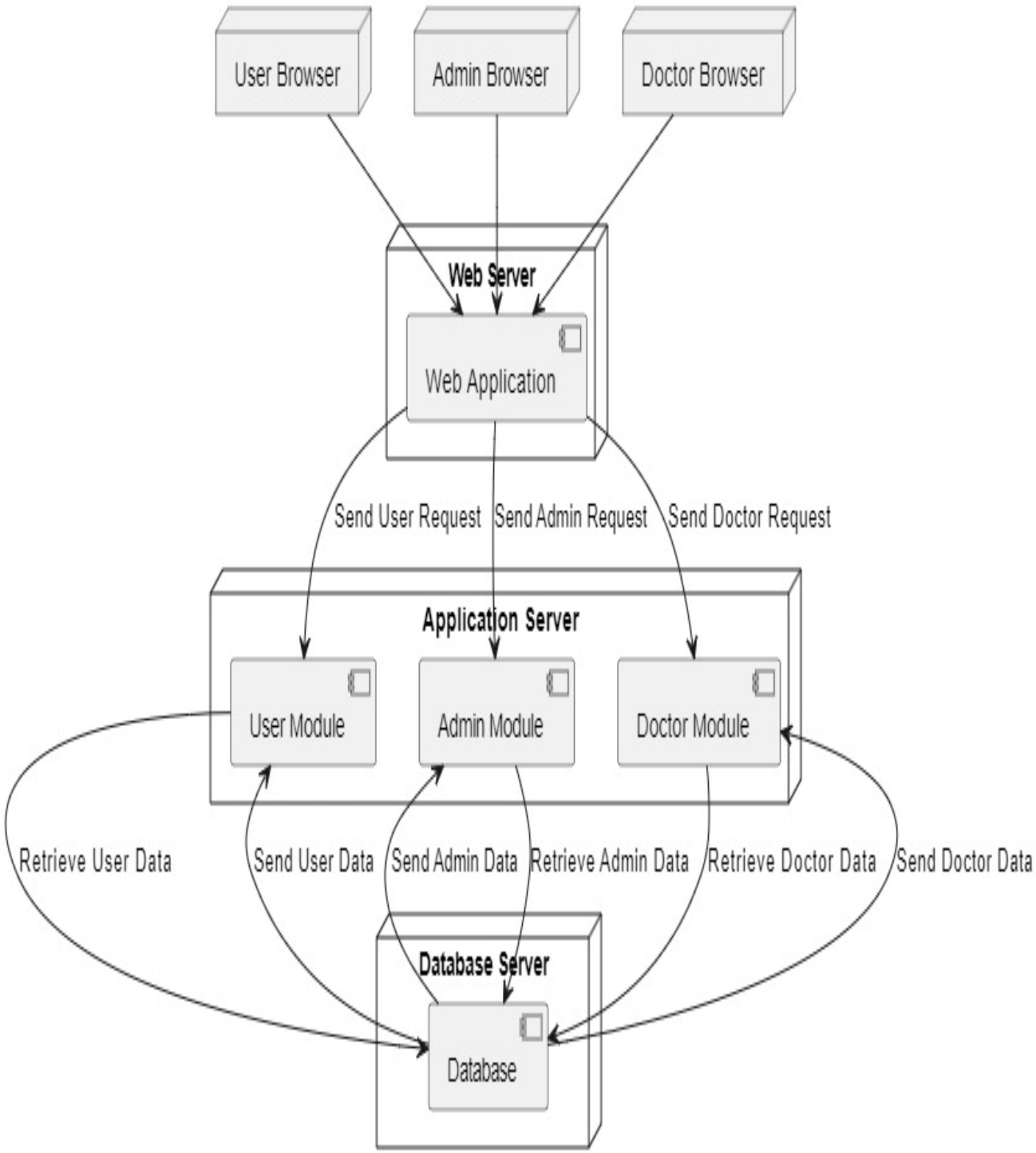


User Module

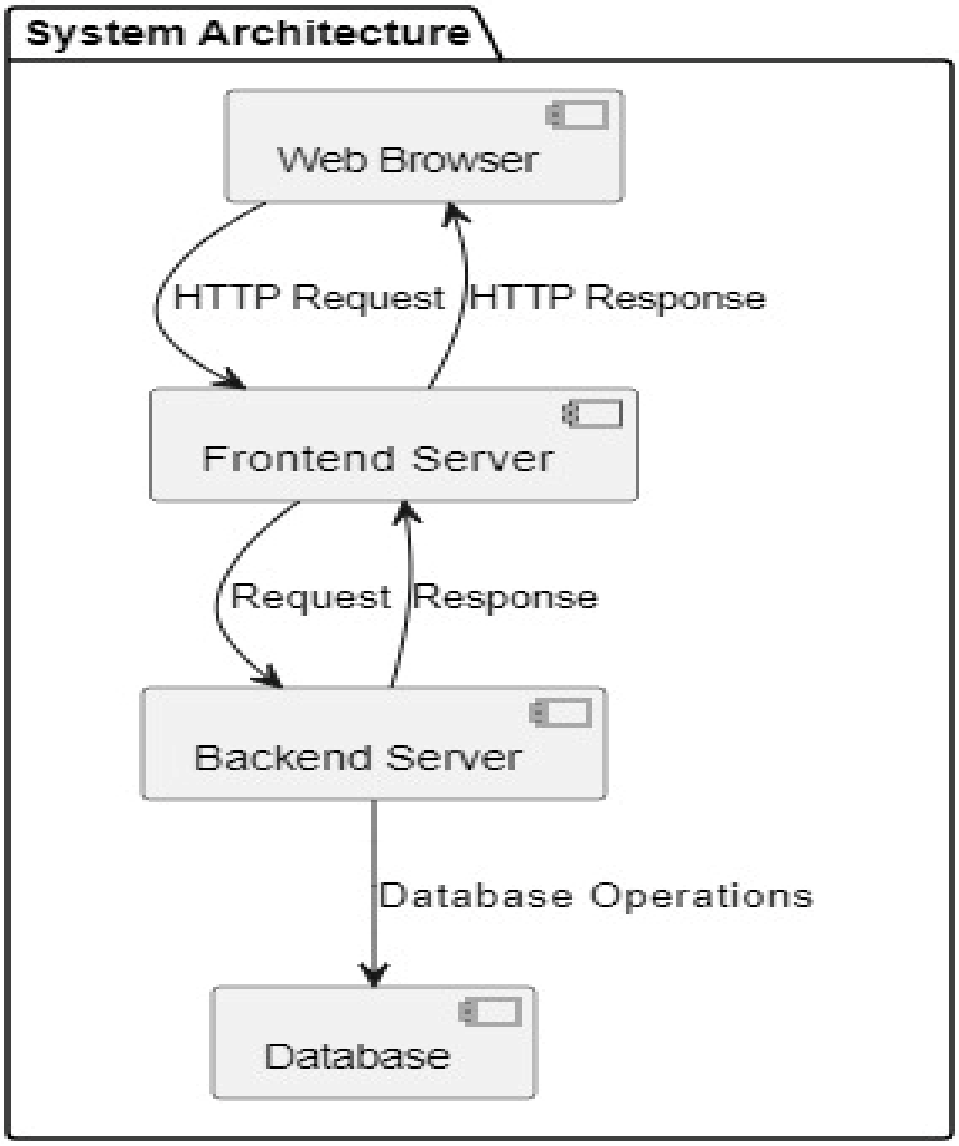

User Module
User Interface
Authentication
Booking
Profile
Feedback
Enquiry
Payment
Database

3.7 Deployment Diagram

A deployment diagram captures how a system is configured, installed, and executed. It often consists of component like software and hardware communicates to execute the system



3.8 System Architecture Diagram:



3.9 Table Specification

Table 1: User_details

This table stores information about users of a system, including their credentials, profile details (optional), and potentially roles.

Sr. No.	Field Name	Data Type	Constraint
1	user_id	int	PRI
2	active	bit(1)	NO
3	address	varchar(255)	YES
4	blood_group	varchar(255)	YES
5	contact_no	varchar(255)	YES
6	date_of_birth	datetime(6)	YES
7	email_id	varchar(255)	YES
8	first_name	varchar(255)	YES
9	gender	varchar(255)	YES
10	last_name	varchar(255)	YES
11	otp	varchar(255)	YES
12	otp_generated_time	datetime(6)	YES
13	password	varchar(255)	YES
14	role	varchar(255)	YES
15	uuid	varchar(255)	YES

Table 2: test_Details

This table stores information about medical tests offered, including their names, descriptions, prices (with potential discounts), and types

Sr. No.	Field Name	Data Type	Constraint
1	test_id	int	PRI
2	actual_price	int	NO
3	discount	int	NO
4	final_price	int	NO
5	test_description	varchar(255)	YES
6	test_image_path	varchar(255)	YES
7	test_name	varchar(255)	YES
8	test_type	varchar(255)	YES

Table 2: report_details

Reports Table: This table stores information about user reports generated by the system, including comments (optional), file names, upload dates, and potential links to appointments, doctors, and users

Sr. No.	Field Name	Data Type	Constraint
1	id	int	PRI
2	comment	varchar(255)	NULL
3	report_file_name	varchar(255)	NULL
4	upload_date	datetime(6)	NULL
5	appointment_appointment_id	int	FOREIGN KEY
6	doctor_id	int	FOREIGN KEY
7	user_id	int	FOREIGN KEY

Table 3: orders

Orders Table: This table stores information about orders placed within the system, including the date, status, total amount, and potentially the user who placed the order.

Sr. No.	Field Name	Data Type	Constraint
1	order_id	int	PRI
2	date	datetime(6)	NULL
3	status	varchar(255)	NULL
4	total_amount	double	NO
5	user_id	int	FOREIGN KEY

Table 4: order_tests

Order_Test Table : This table (if it exists) links orders and tests in a many-to-many relationship, indicating which tests are included in specific orders.

Sr. No.	Field Name	Data Type	Constraint
1	order_id	int	FOREIGN KEY
2	test_id	int	FOREIGN KEY

Table 5: Enquiry

Description: This table stores information about user enquiries submitted to the system

Sr. No.	Field Name	Data Type	Constraint
1	id	int	PRI
2	contactno	varchar(255)	NULL
3	email	varchar(255)	NULL
4	message	varchar(255)	NULL
5	name	varchar(255)	NULL

Table 6: doctor_details

Description: This table stores information about doctors in the system. It likely manages doctor profiles and potentially includes details for account registration or approval.

Sr. No.	Field Name	Data Type	Constraint
1	doctor_id	int	PRI
2	address	varchar(255)	NULL
3	clinic_name	varchar(255)	NULL
4	contact_no	varchar(255)	NULL
5	doctor_name	varchar(255)	NULL
6	email_id	varchar(255)	NULL
7	experience	int	NOT NULL
8	licence_path	varchar(255)	NULL
9	password	varchar(255)	NULL
10	request_status	varchar(255)	NULL
11	specialization	varchar(255)	NULL

Table7: feedback_id

Description: This table stores information about feedback provided by clients.

Sr. No.	Field Name	Data Type	Constraint
1	feedback_id	int	PRI
2	client_name	varchar(255)	NULL
3	contact_no	varchar(255)	NULL
4	display_to_client	varchar(255)	NULL
5	feedback	varchar(255)	NULL

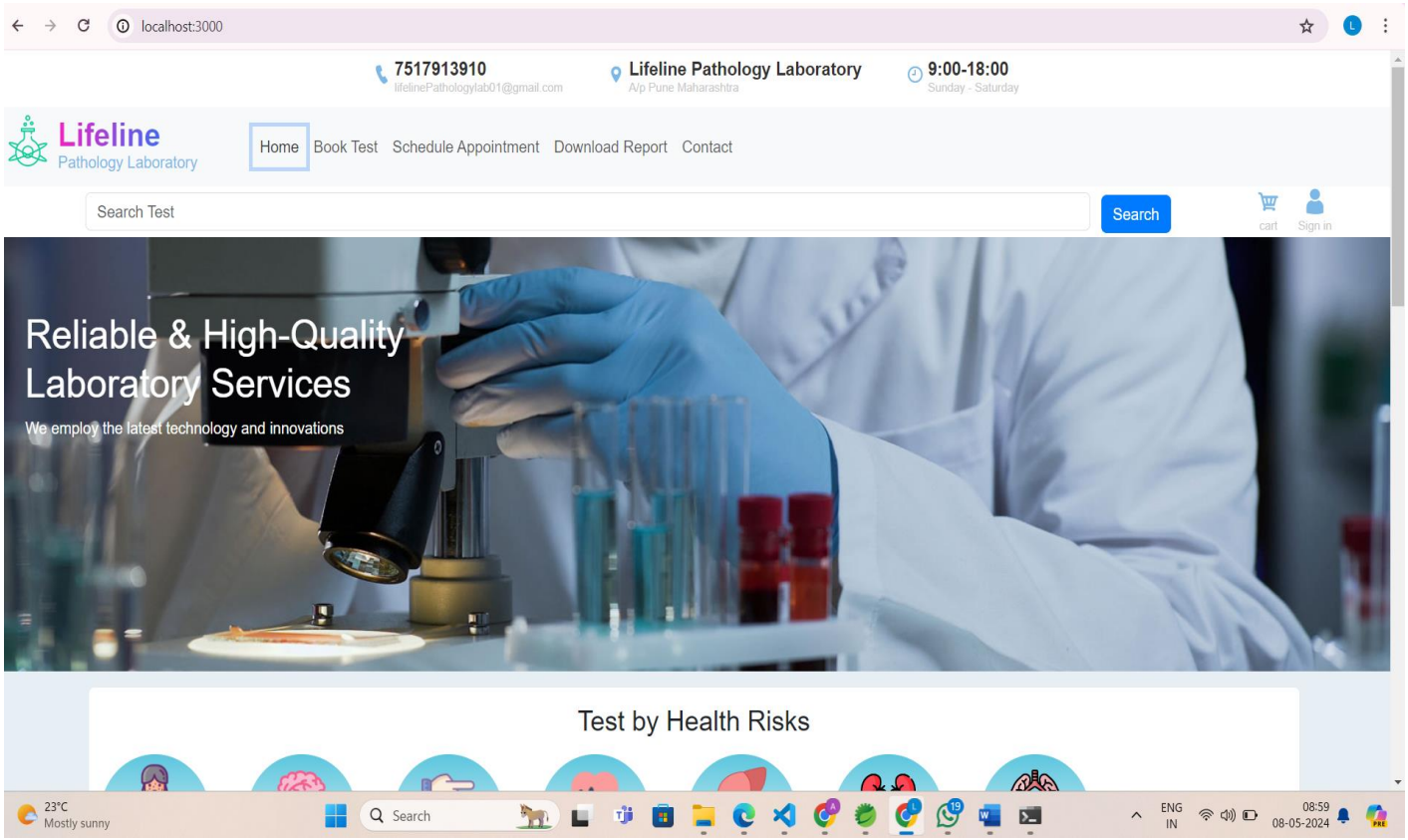
Table 8 : appointment_schedule

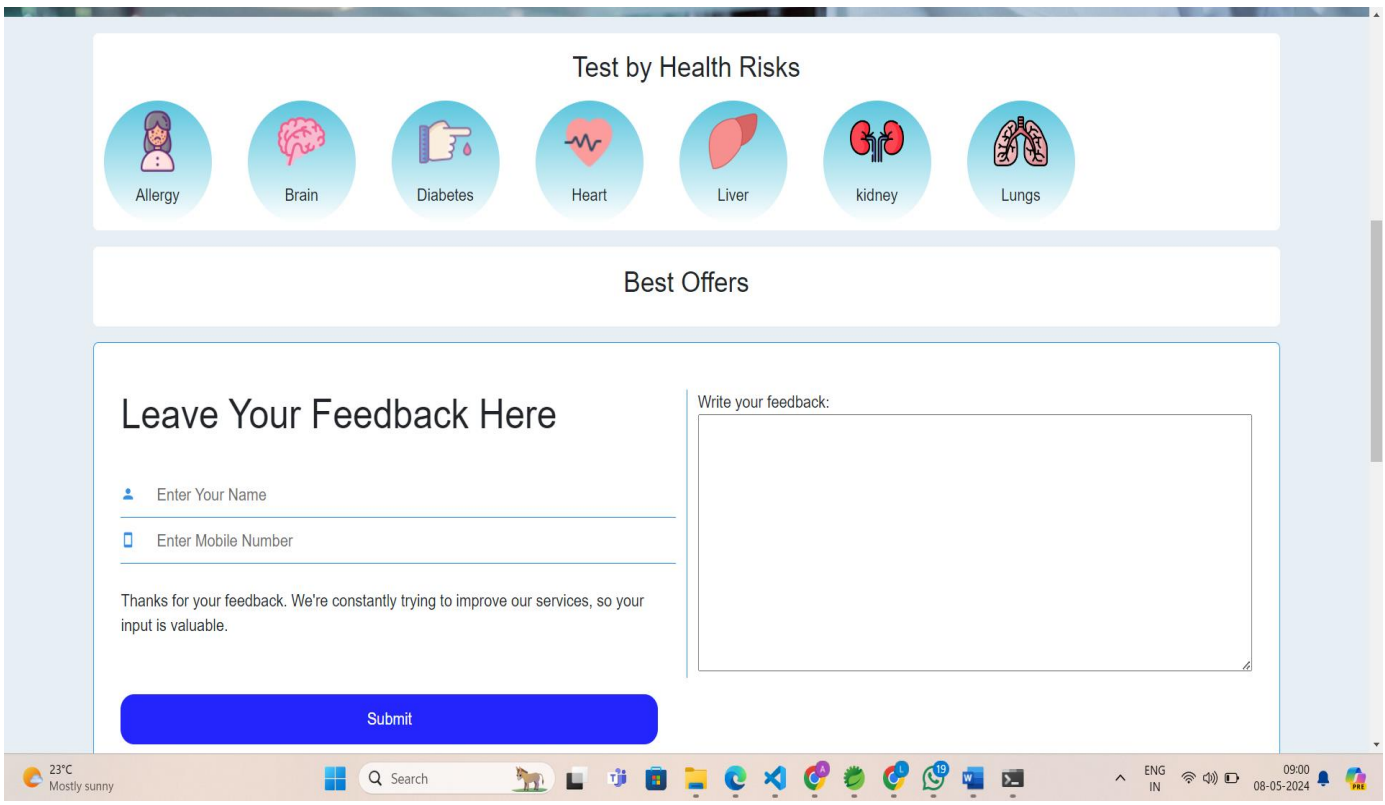
Description: This table stores information about appointments scheduled within the system appointment_schedule

Sr. No.	Field Name	Data Type	Constraint
1	appointment_id	int	PRI
2	patient_address	varchar(255)	NULL
3	patient_contact_no	varchar(255)	NULL
4	patient_name	varchar(255)	NULL
5	prescription_file_path	varchar(255)	NULL
6	scheduled_time	datetime(6)	NULL
7	status	varchar(255)	NULL
8	doctor_id	int	FOREIGN KEY
9	user_id	int	FOREIGN KEY

Chapter 4 : Implementation

Input Screens





Login Page : this Is a login page

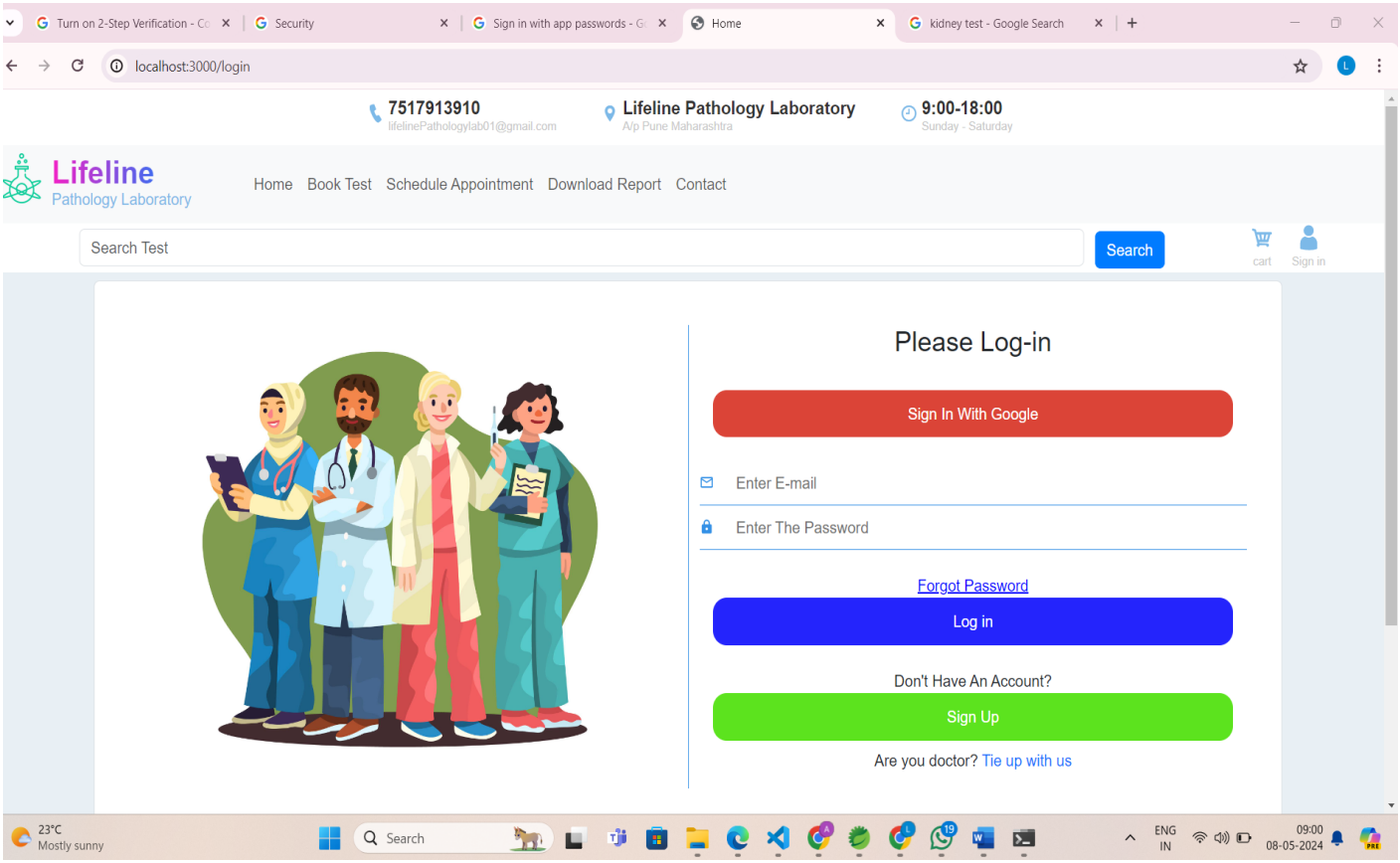


Figure 2.

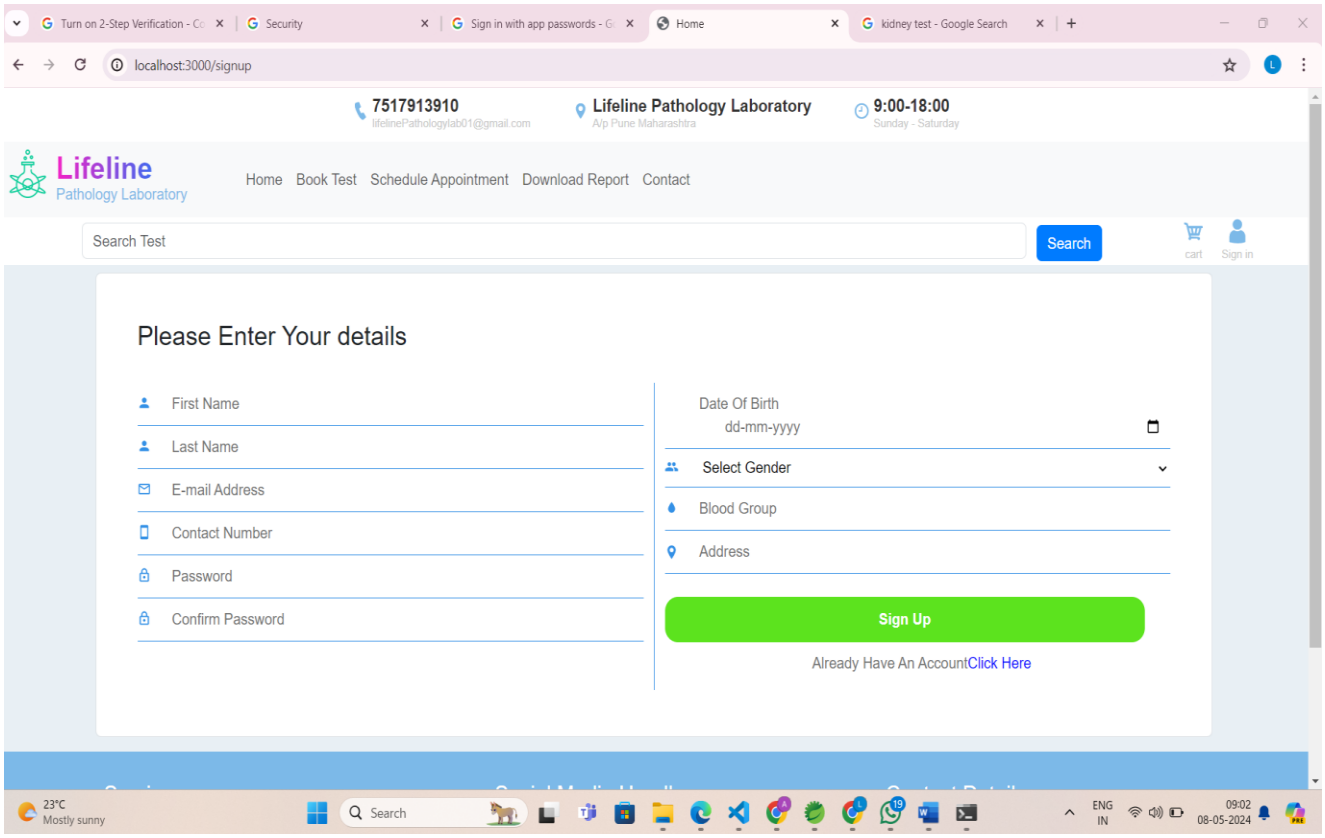


Figure 3. Registration Page: this is a registration page

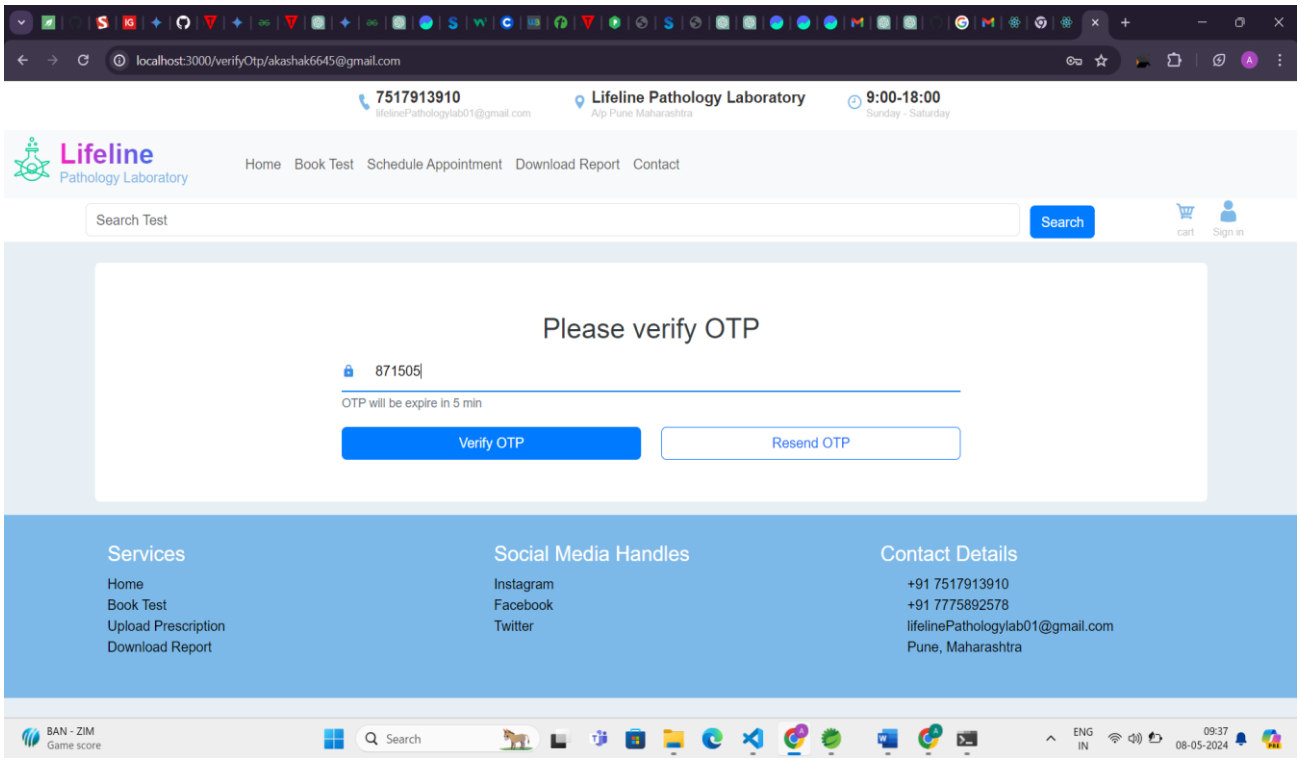


Figure 4 . OTP Verification

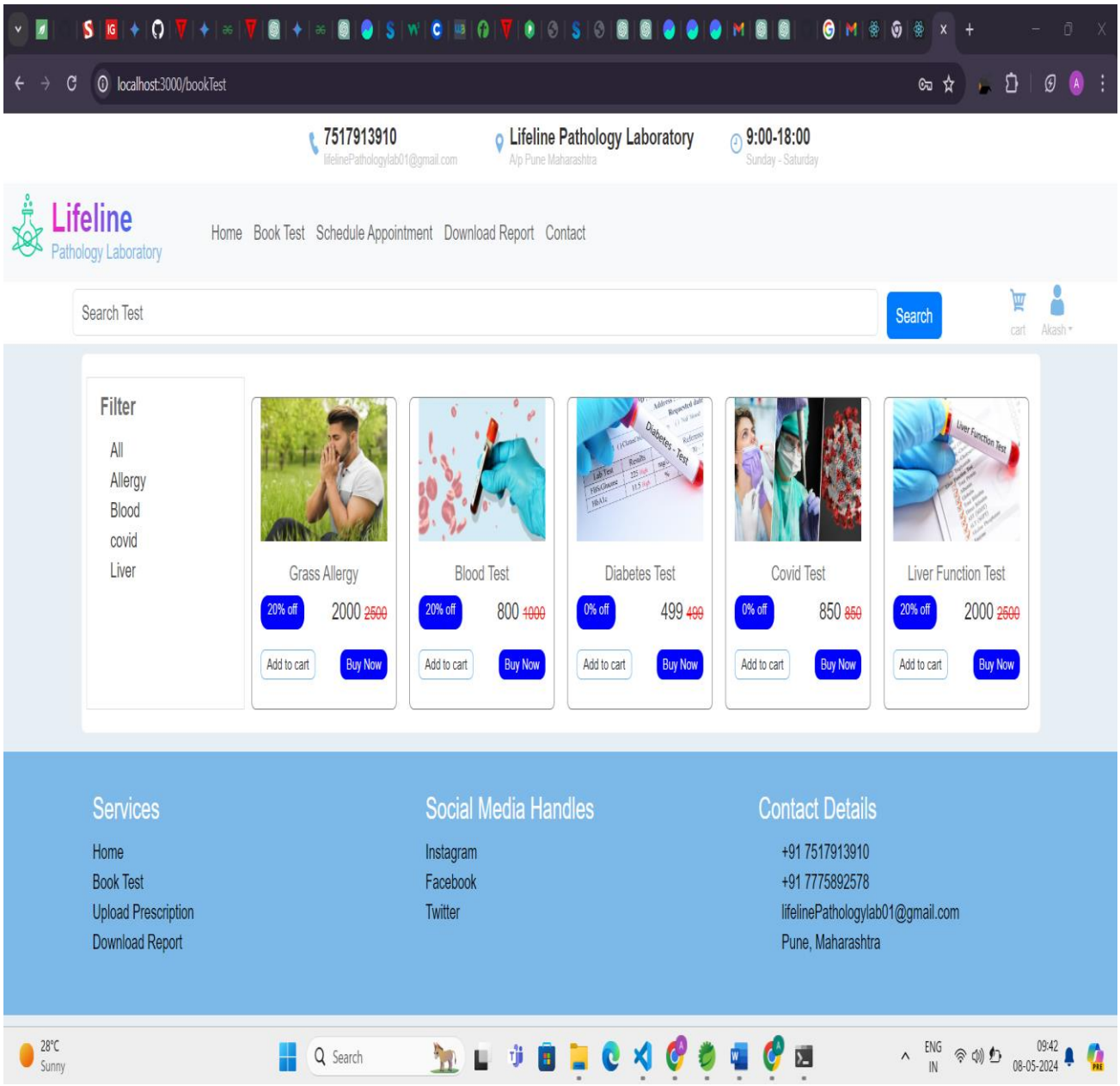


Figure 5. Book Test : this is a book test page

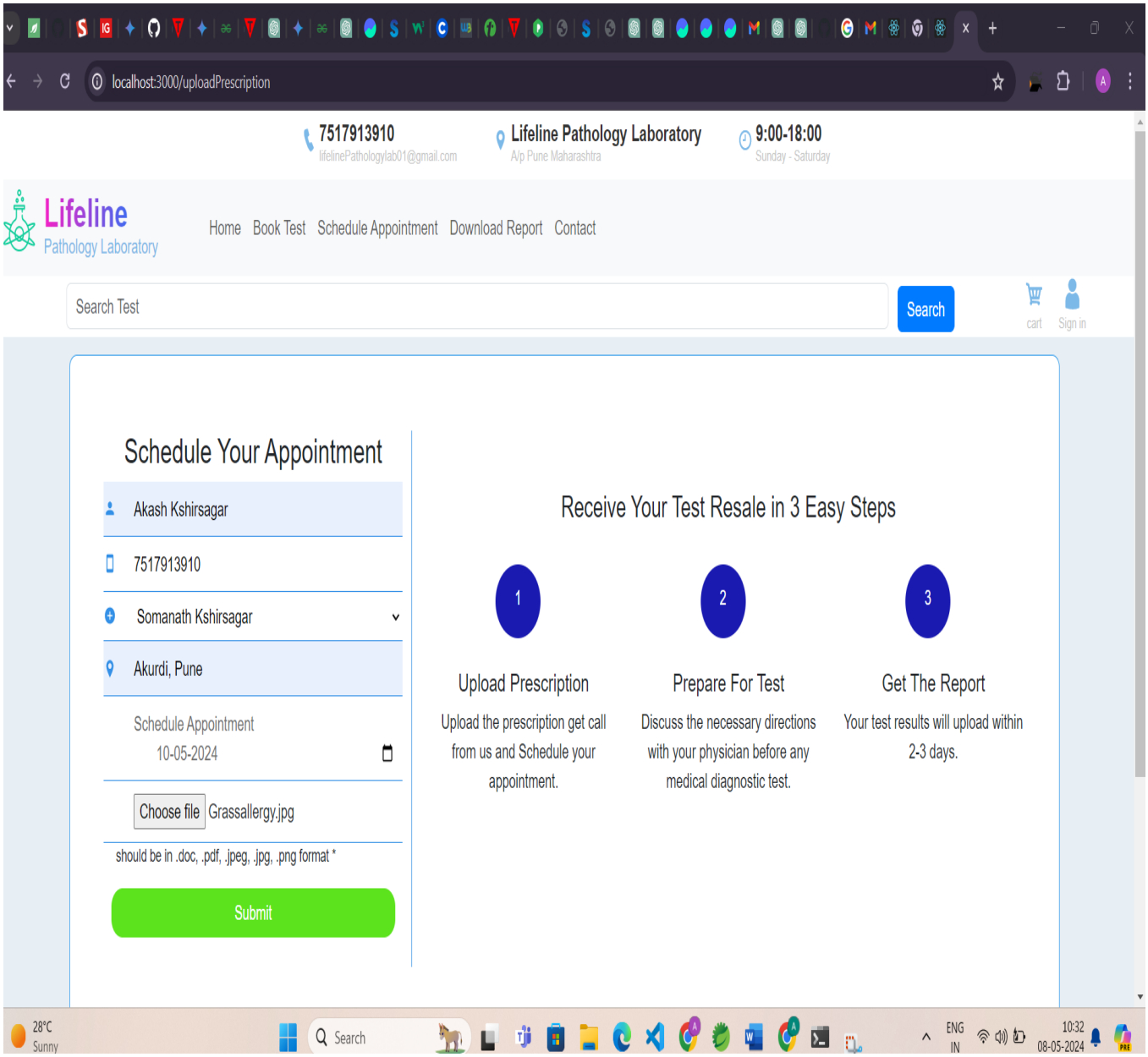


Figure 6.Schedule appointment :this page is for scheduling appointment

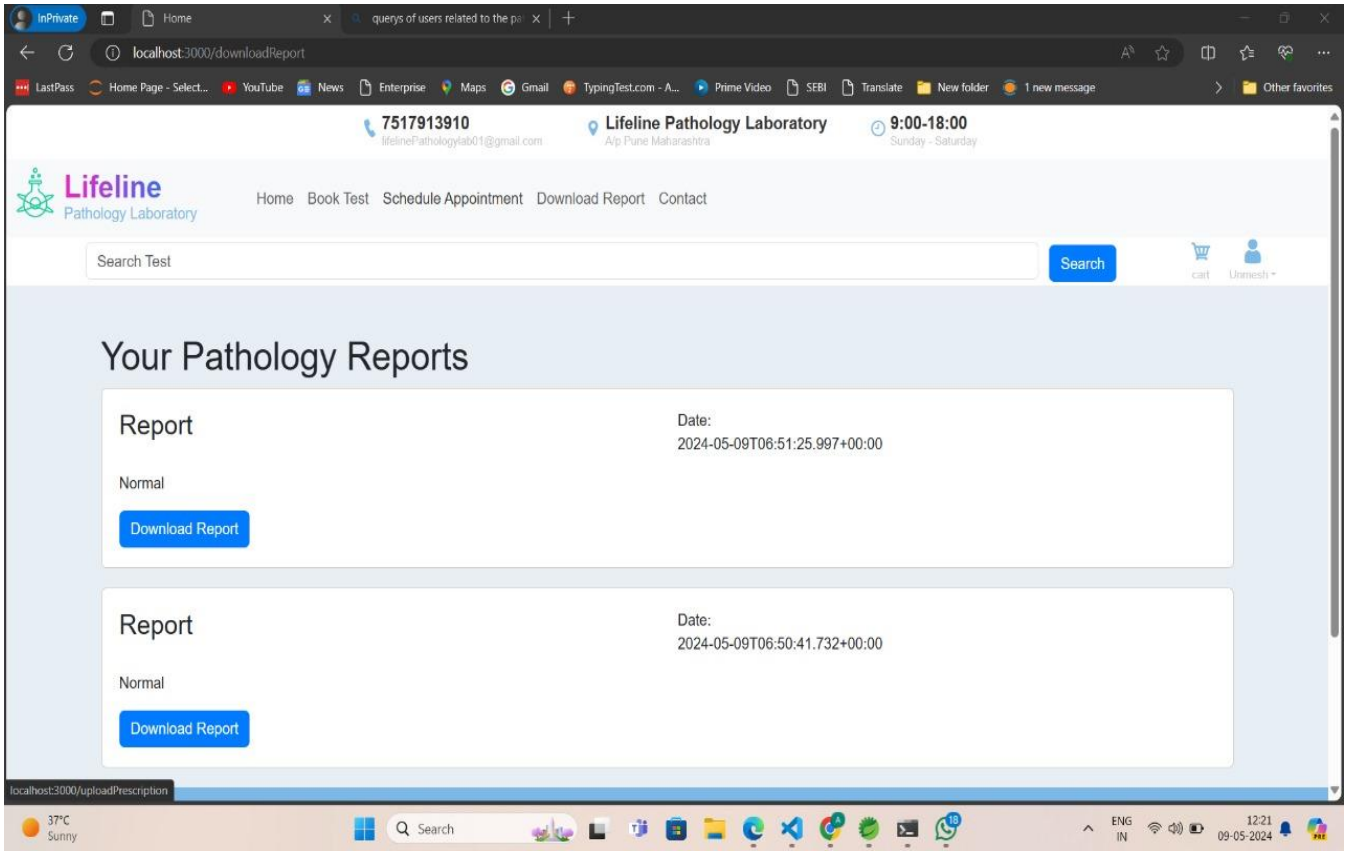


Figure 7. Download Report: this is page for downloading report

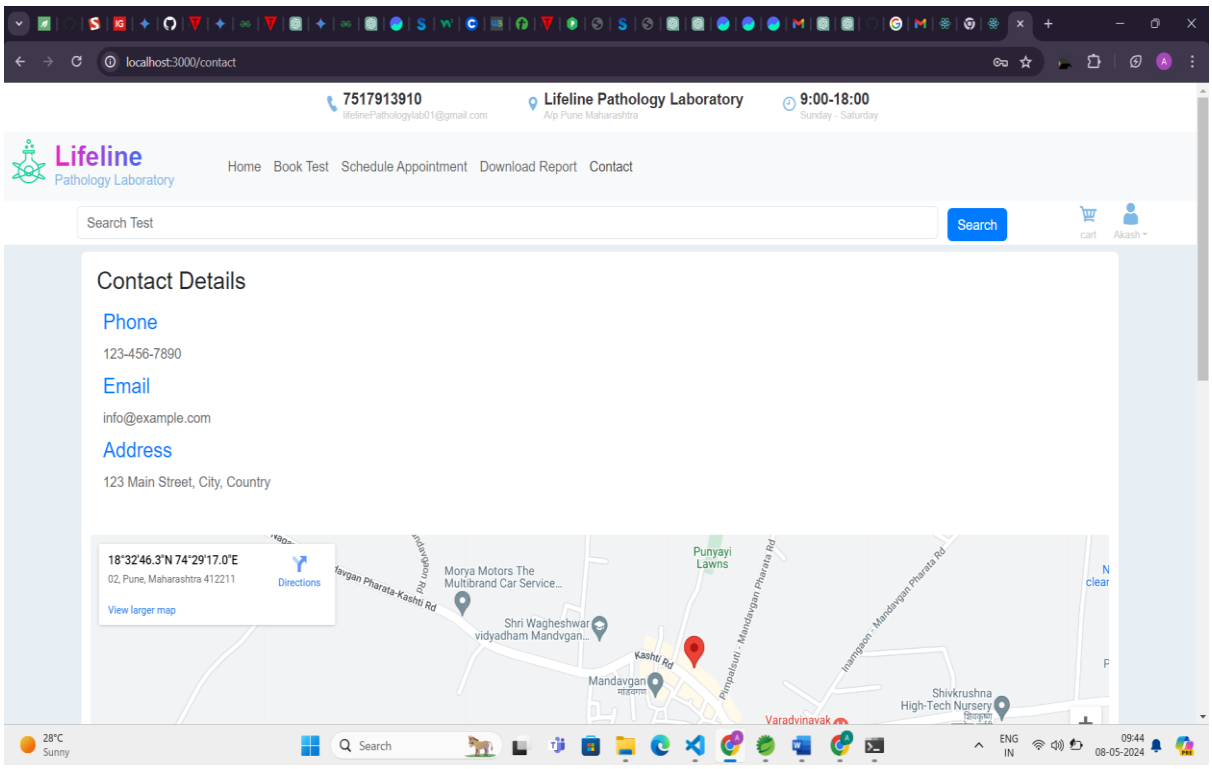


Figure 8. Contact Page : contact page for user

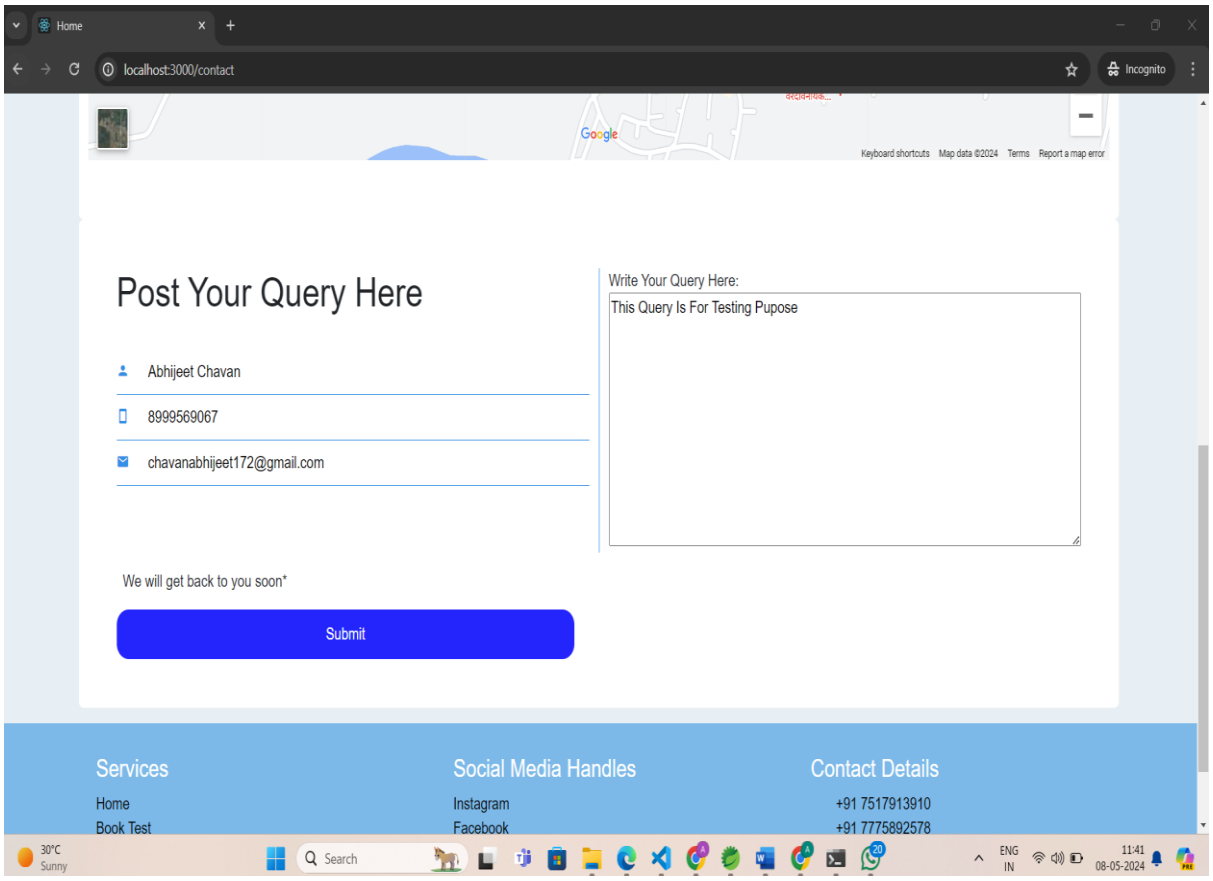


Figure 9. Query page for user

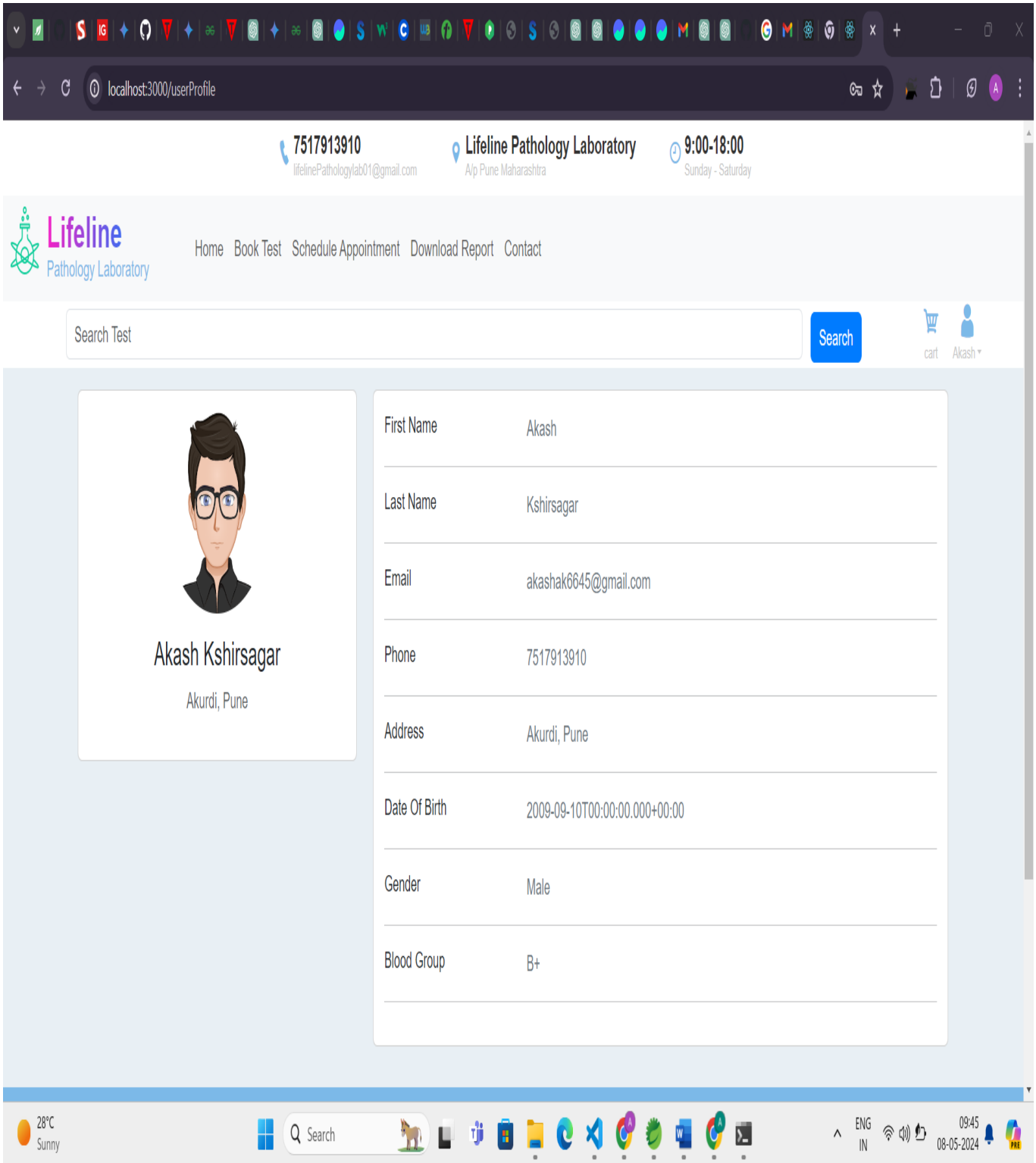


Figure 10. Profile : this is user profile page

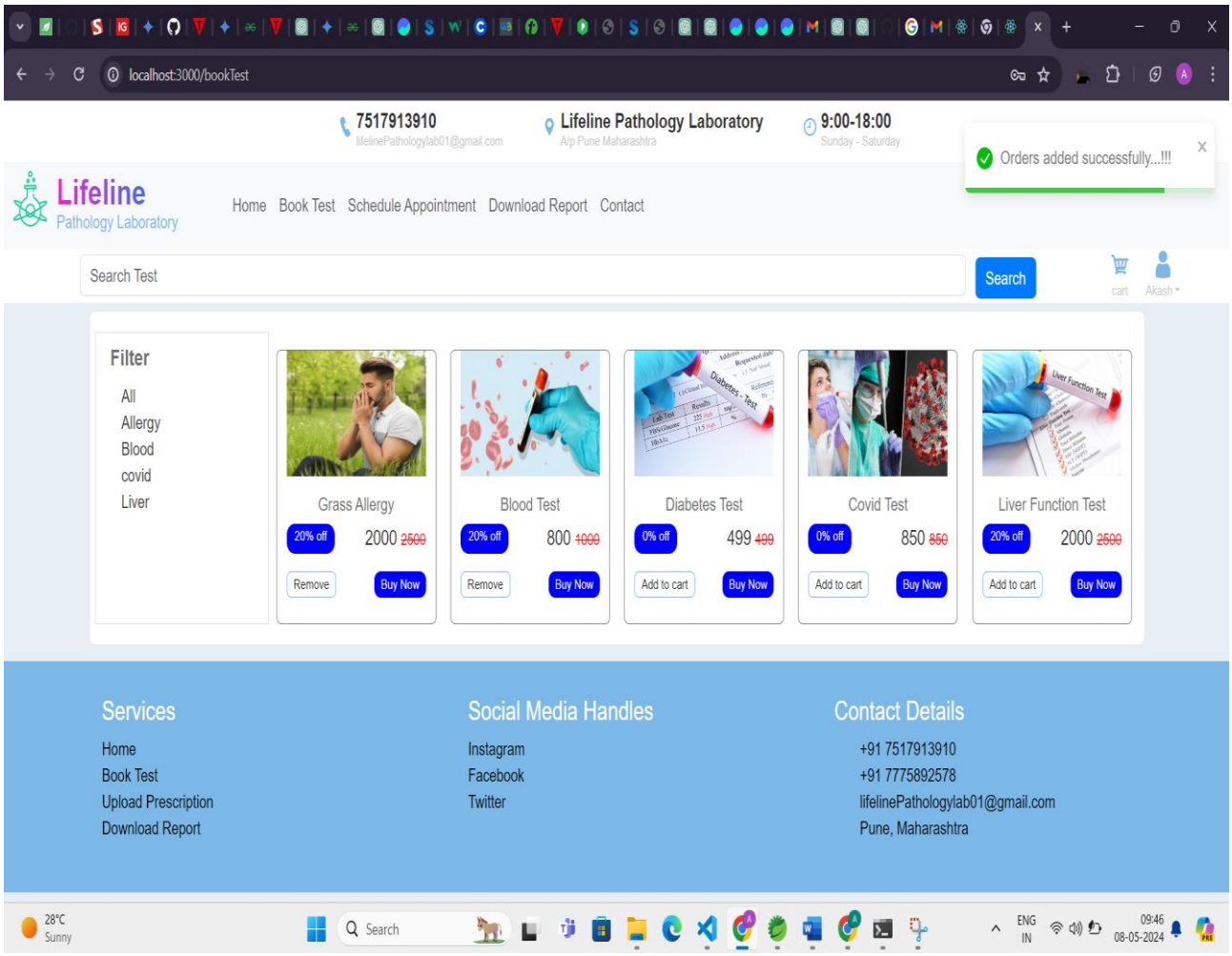


Figure 11. After add to cart : to add test to cart

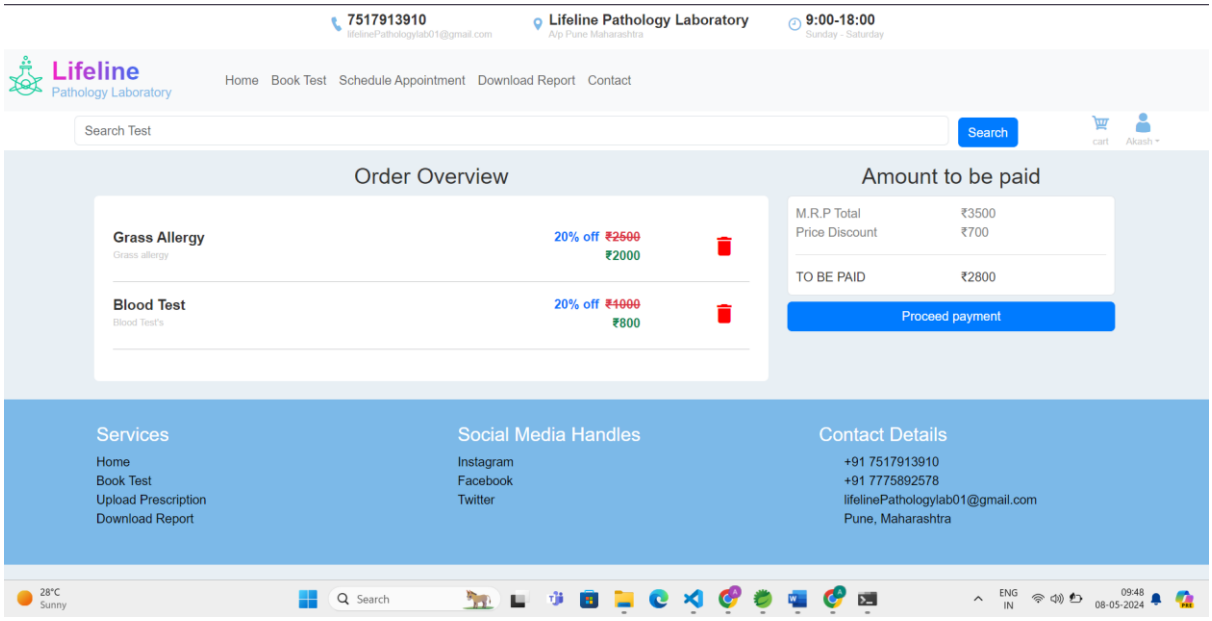


Figure 12. Cart : this is cart page

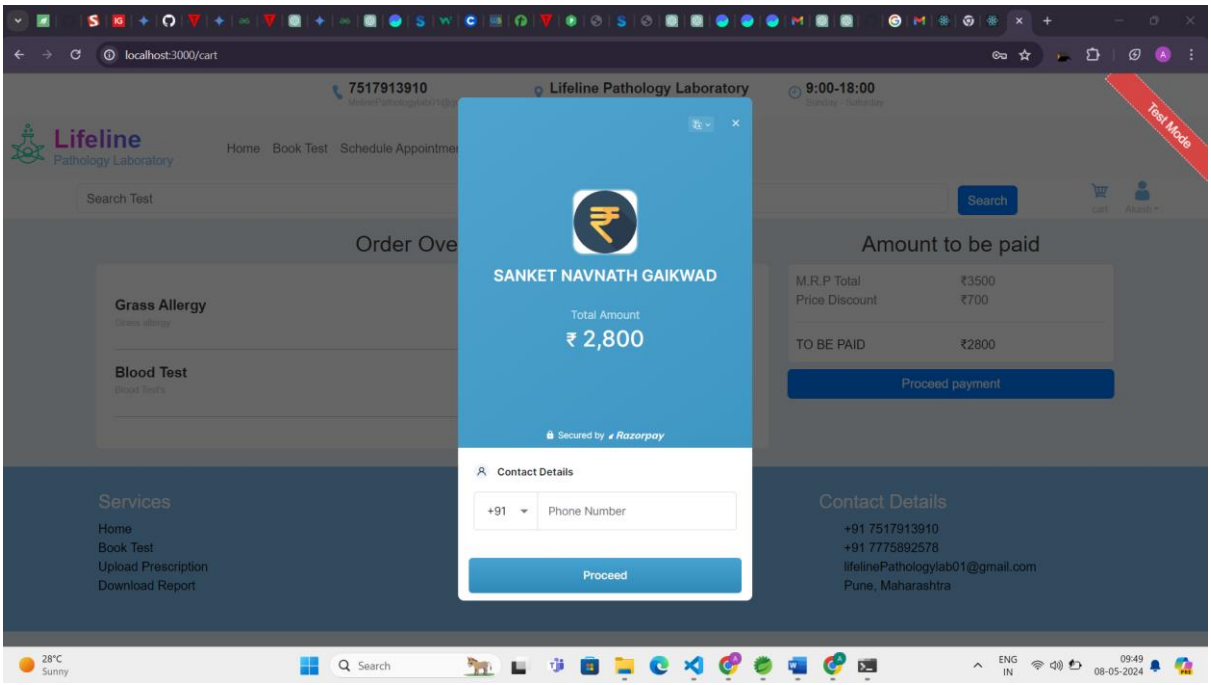


Figure 13.Online payment : this is online payment page

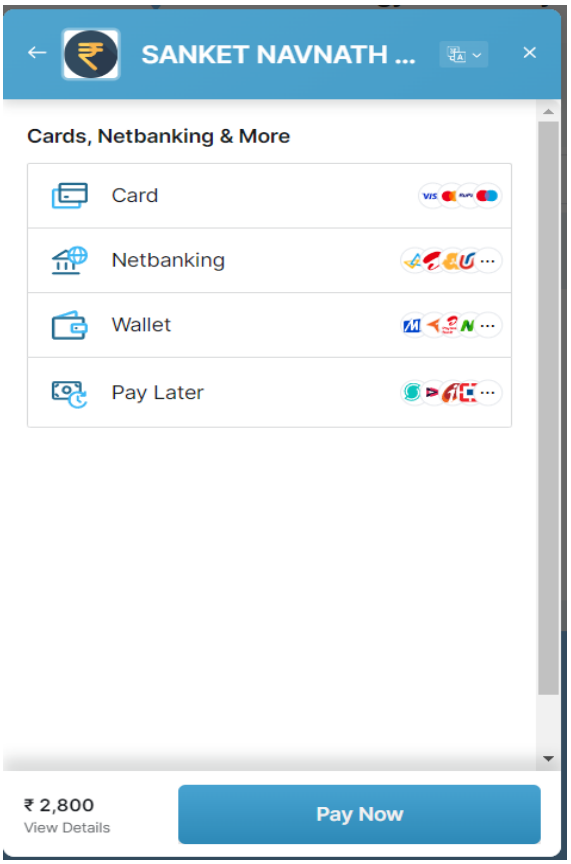


Figure 14.

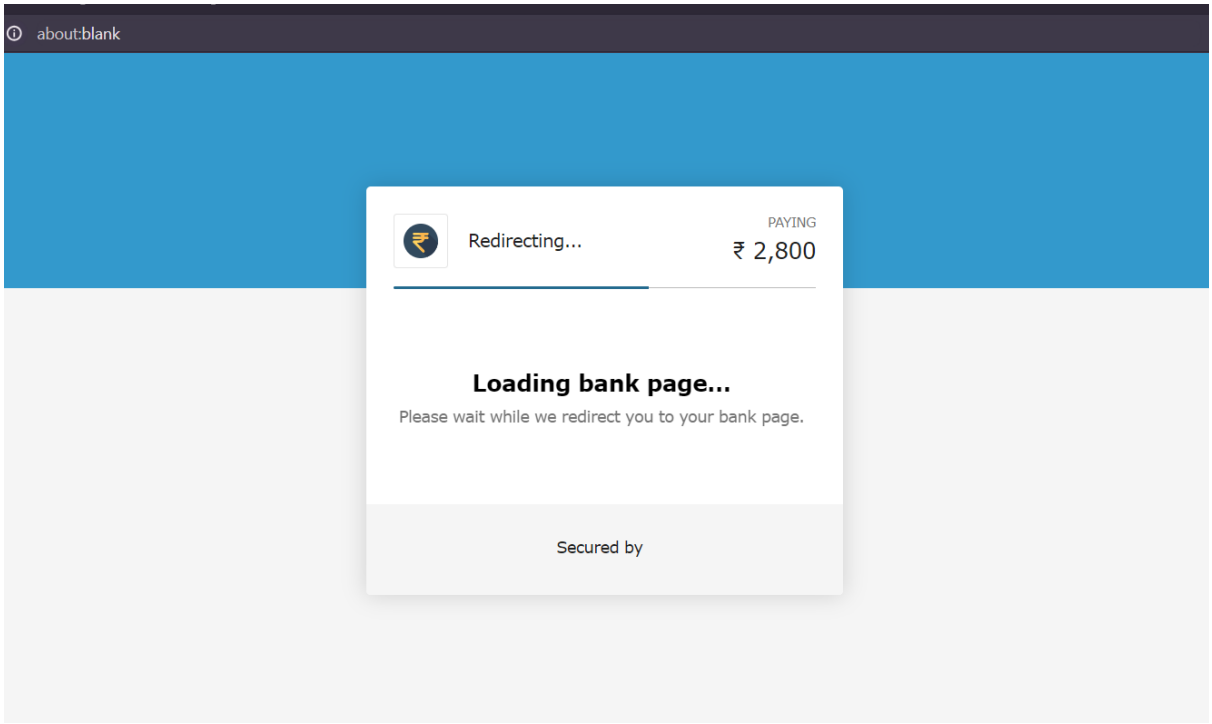


Figure 15

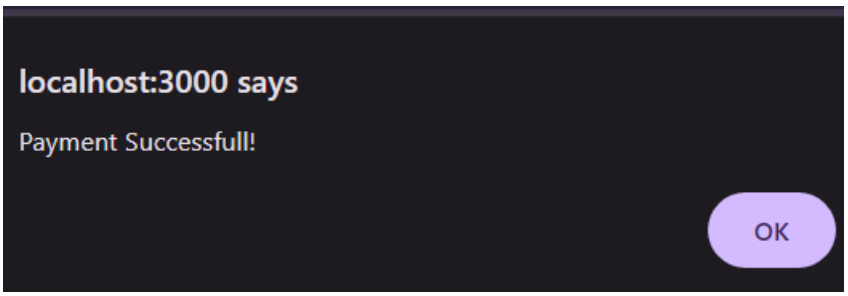


Figure16. payment successful page

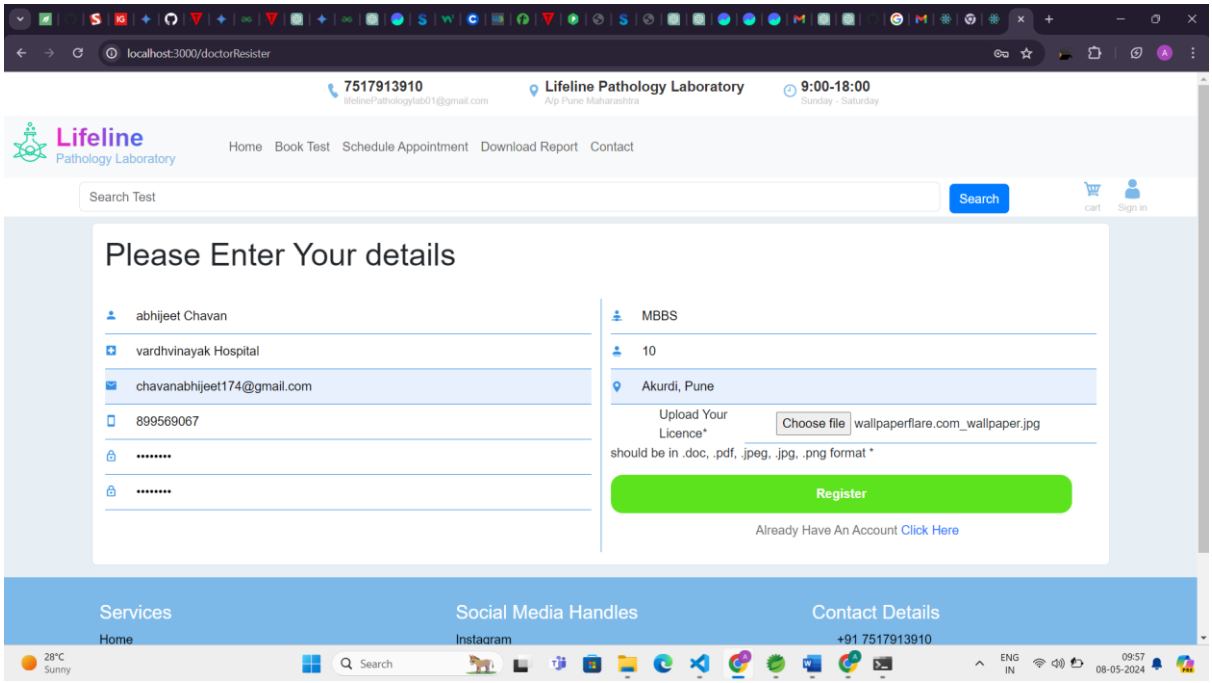


Figure 17: Doctor Registration

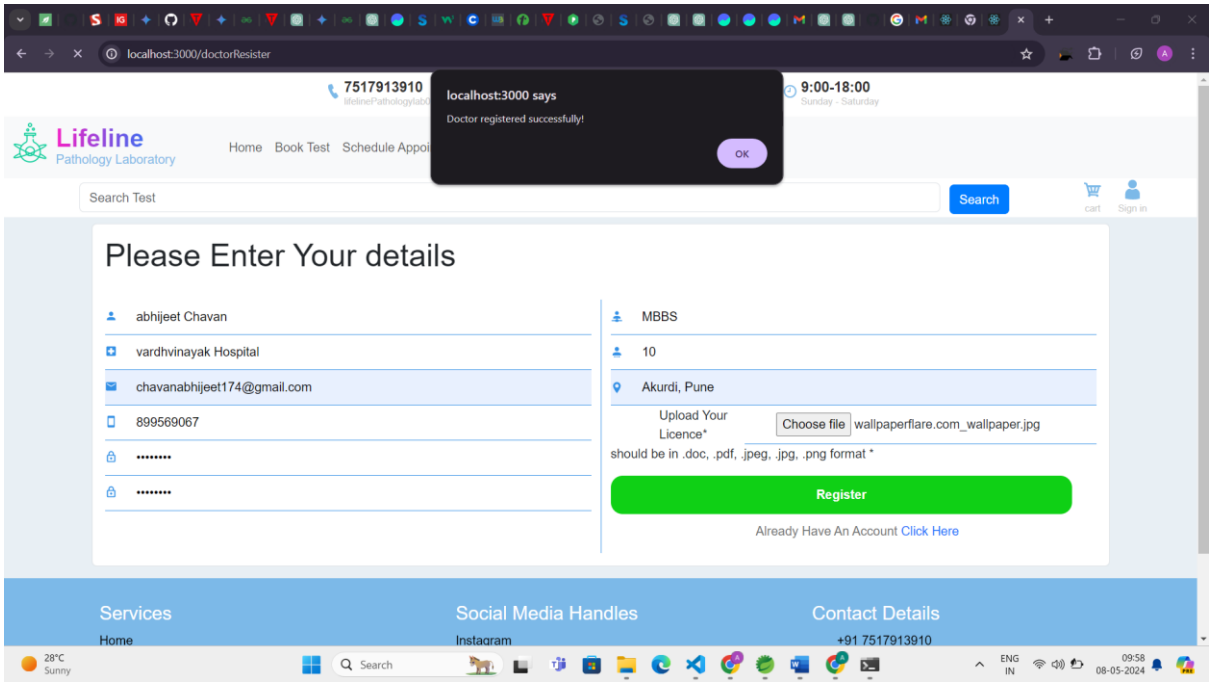


Figure 18.

:

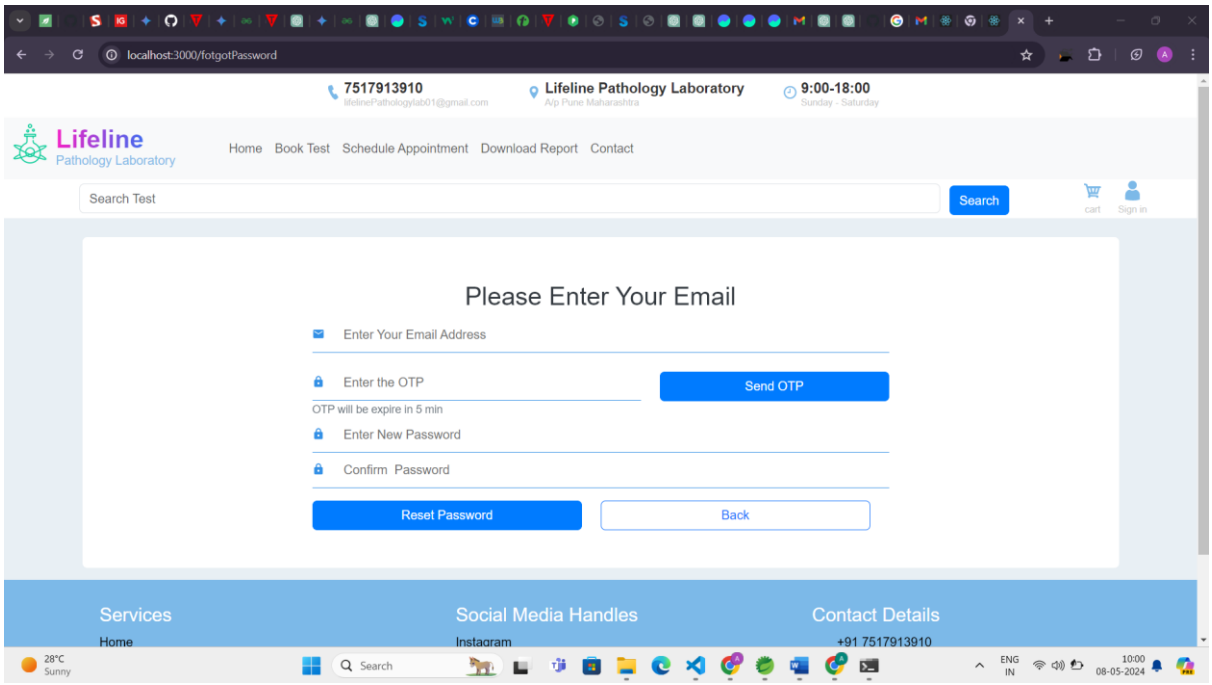


Figure 19. Forget Password : we can reset password

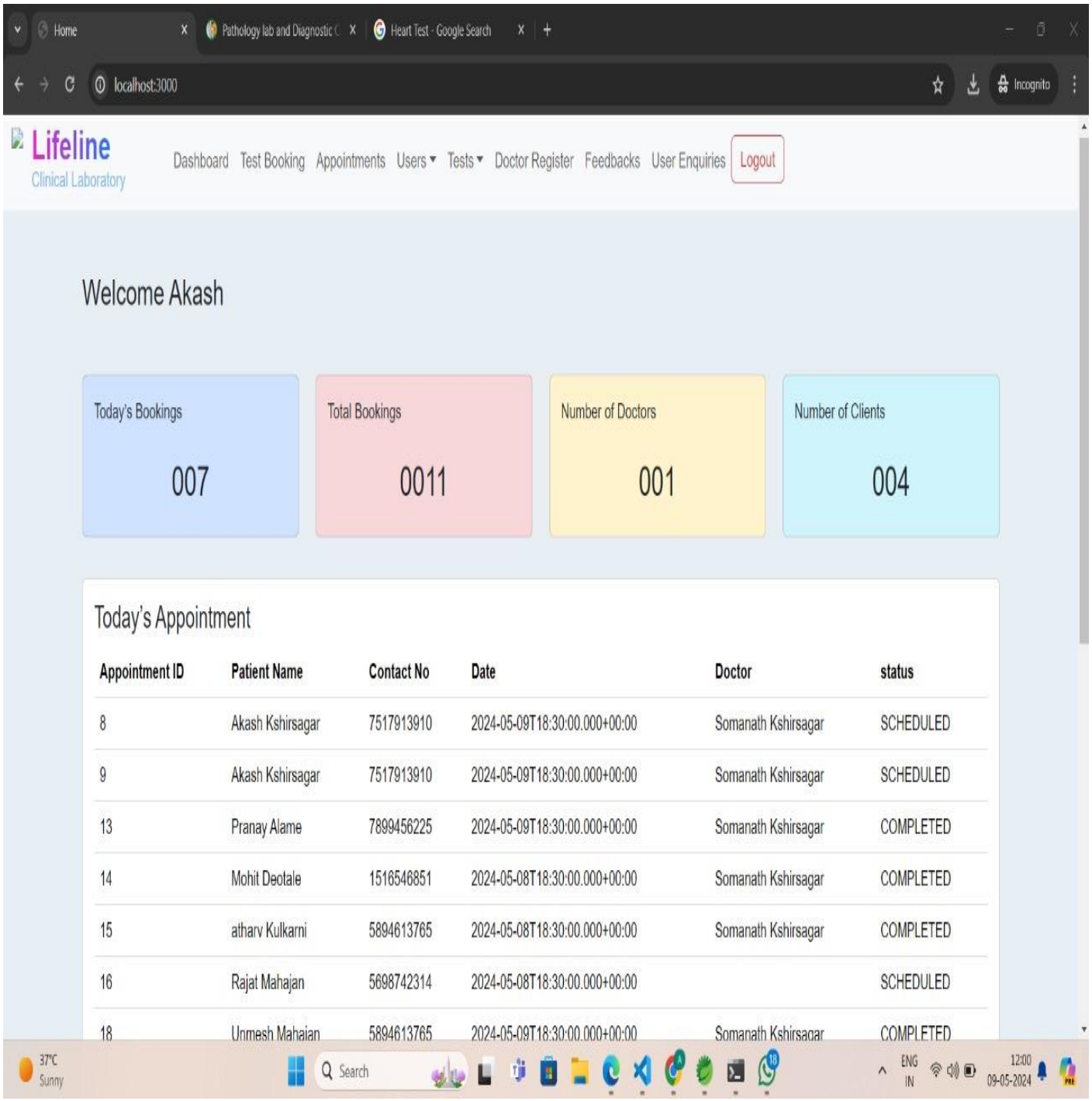


Figure 20. Admin Dashboard : dashboard page for admin

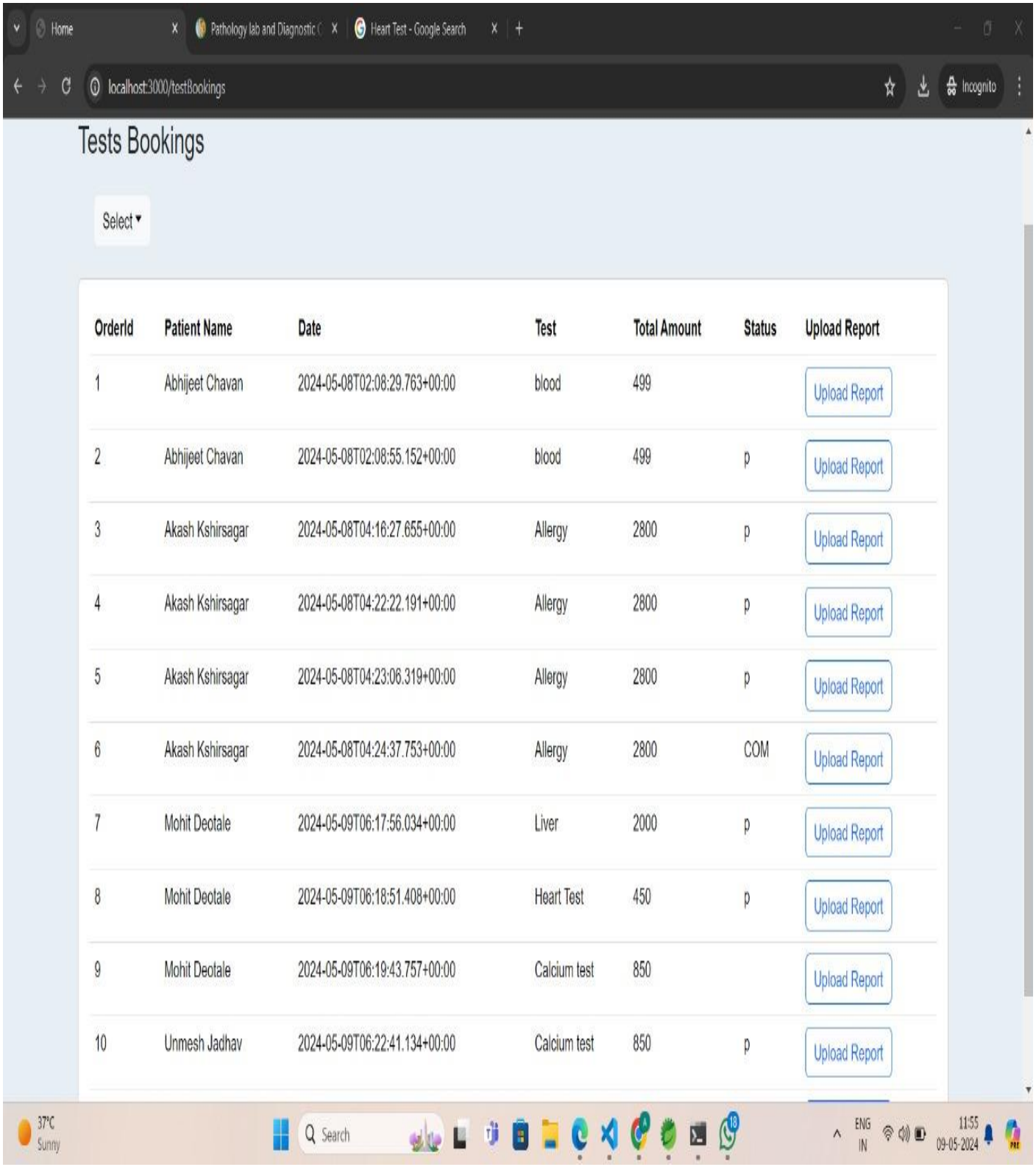
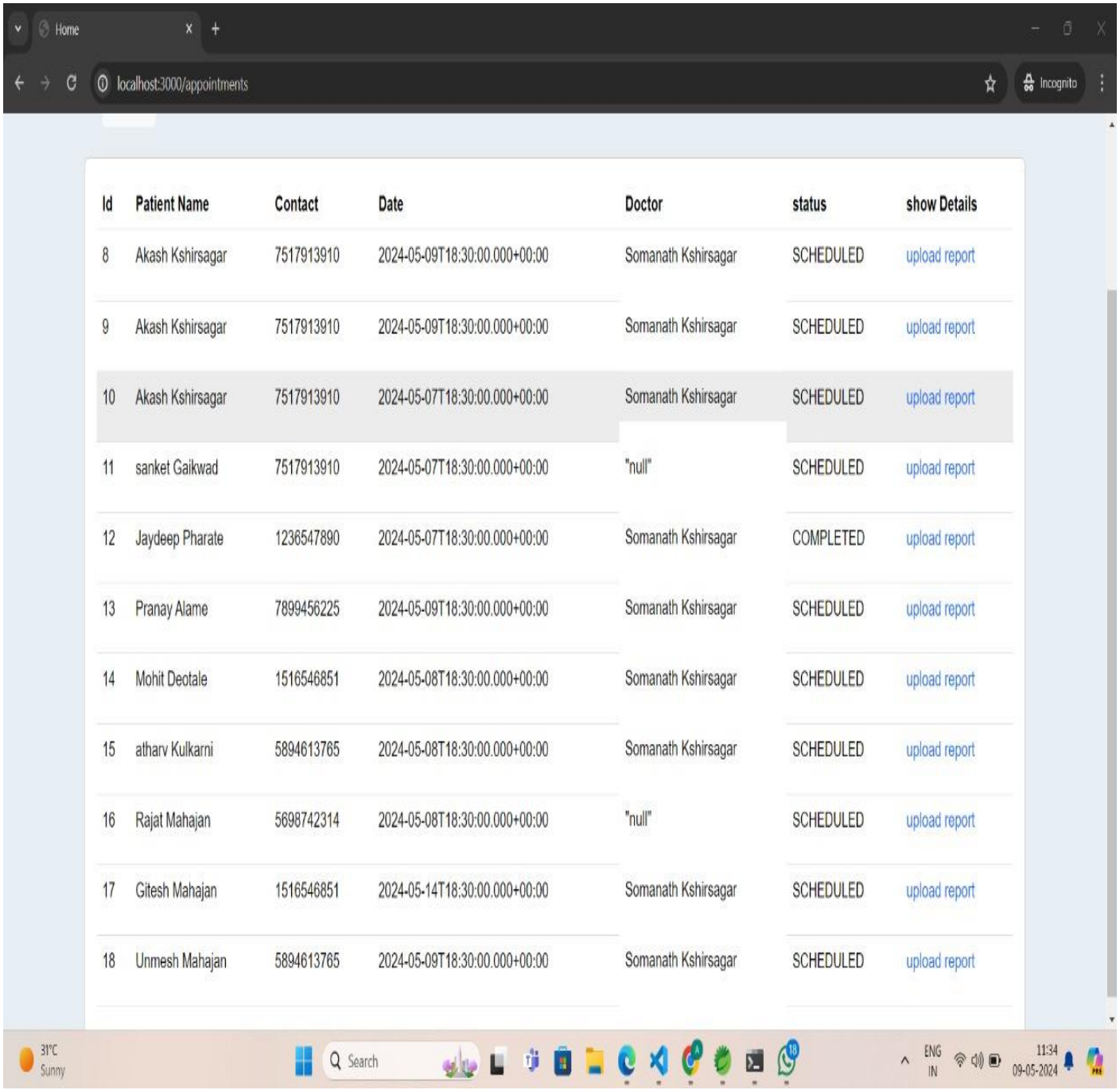


Figure 21. Test Bookings: this is Test Bookings page



Id	Patient Name	Contact	Date	Doctor	status	show Details
8	Akash Kshirsagar	7517913910	2024-05-09T18:30:00.000+00:00	Somanath Kshirsagar	SCHEDULED	upload report
9	Akash Kshirsagar	7517913910	2024-05-09T18:30:00.000+00:00	Somanath Kshirsagar	SCHEDULED	upload report
10	Akash Kshirsagar	7517913910	2024-05-07T18:30:00.000+00:00	Somanath Kshirsagar	SCHEDULED	upload report
11	sanket Gaikwad	7517913910	2024-05-07T18:30:00.000+00:00	"null"	SCHEDULED	upload report
12	Jaydeep Pharate	1236547890	2024-05-07T18:30:00.000+00:00	Somanath Kshirsagar	COMPLETED	upload report
13	Pranay Alame	7899456225	2024-05-09T18:30:00.000+00:00	Somanath Kshirsagar	SCHEDULED	upload report
14	Mohit Deotale	1516546851	2024-05-08T18:30:00.000+00:00	Somanath Kshirsagar	SCHEDULED	upload report
15	atharv Kulkarni	5894613765	2024-05-08T18:30:00.000+00:00	Somanath Kshirsagar	SCHEDULED	upload report
16	Rajat Mahajan	5698742314	2024-05-08T18:30:00.000+00:00	"null"	SCHEDULED	upload report
17	Gitesh Mahajan	1516546851	2024-05-14T18:30:00.000+00:00	Somanath Kshirsagar	SCHEDULED	upload report
18	Unmesh Mahajan	5894613765	2024-05-09T18:30:00.000+00:00	Somanath Kshirsagar	SCHEDULED	upload report

Figure 22. Appointments : this is appointment page

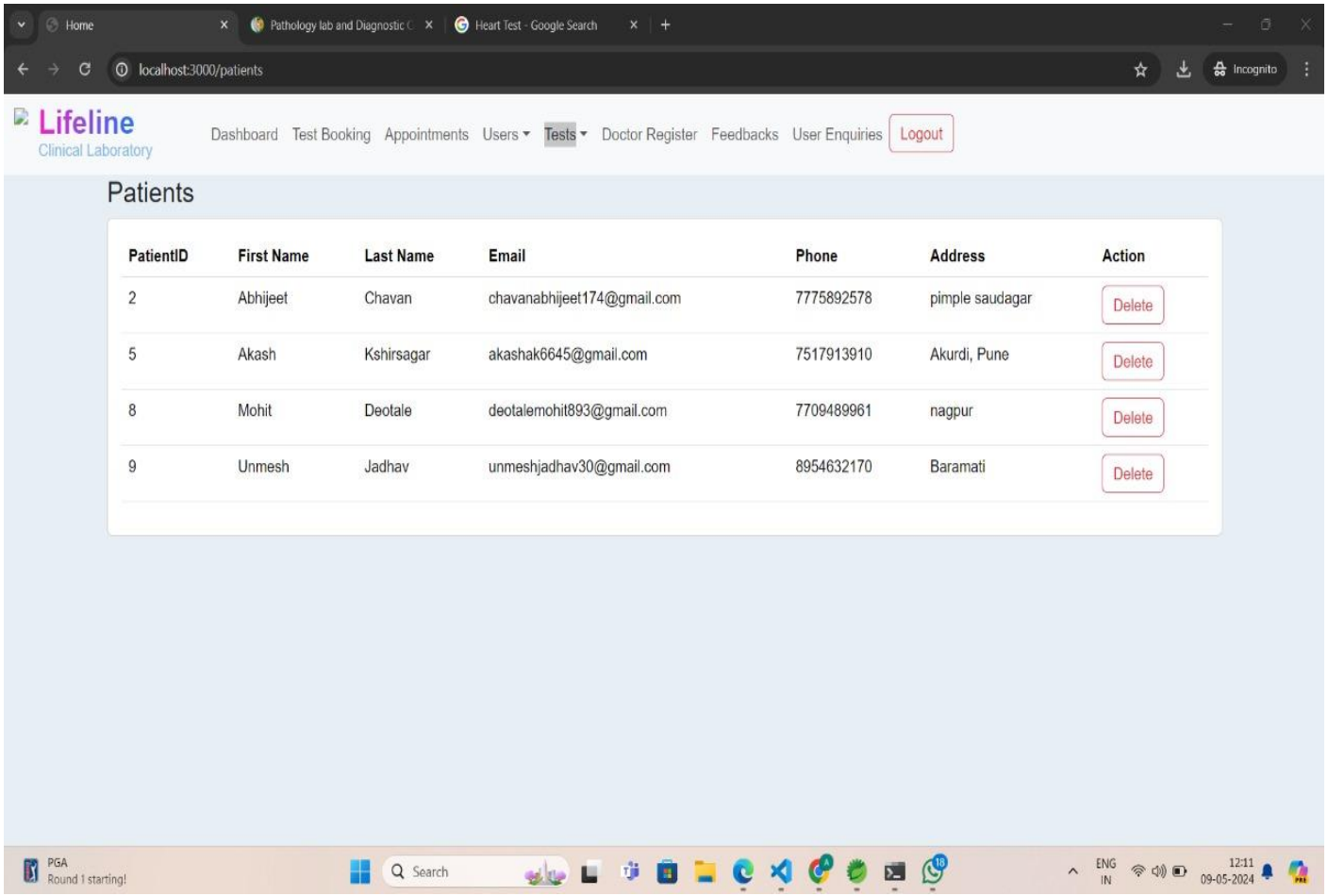


Figure 23. User : Patients: this is patient details page

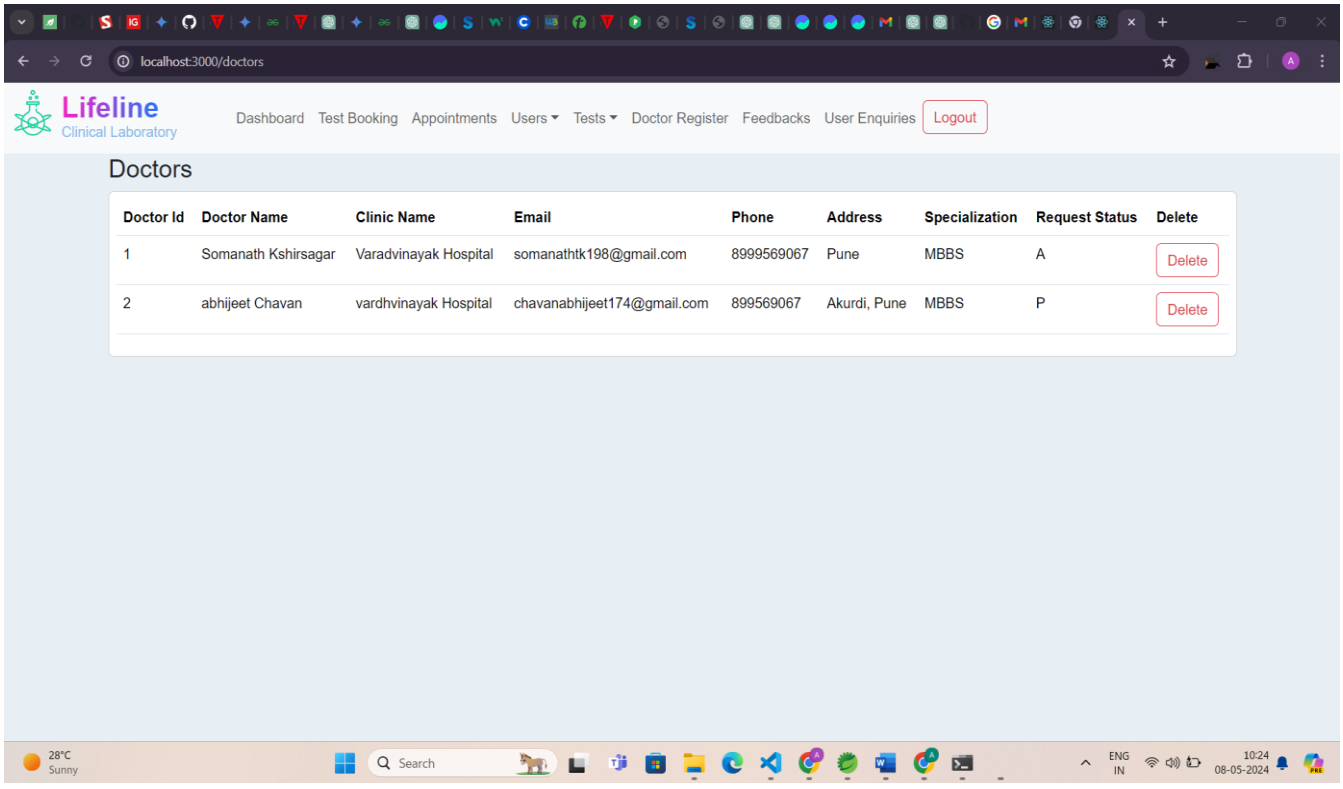


Figure 24.User : Doctors : we can remove doctors from our tie-ups

Input Screen : User: Admin

This page is for changing the role from user to admin

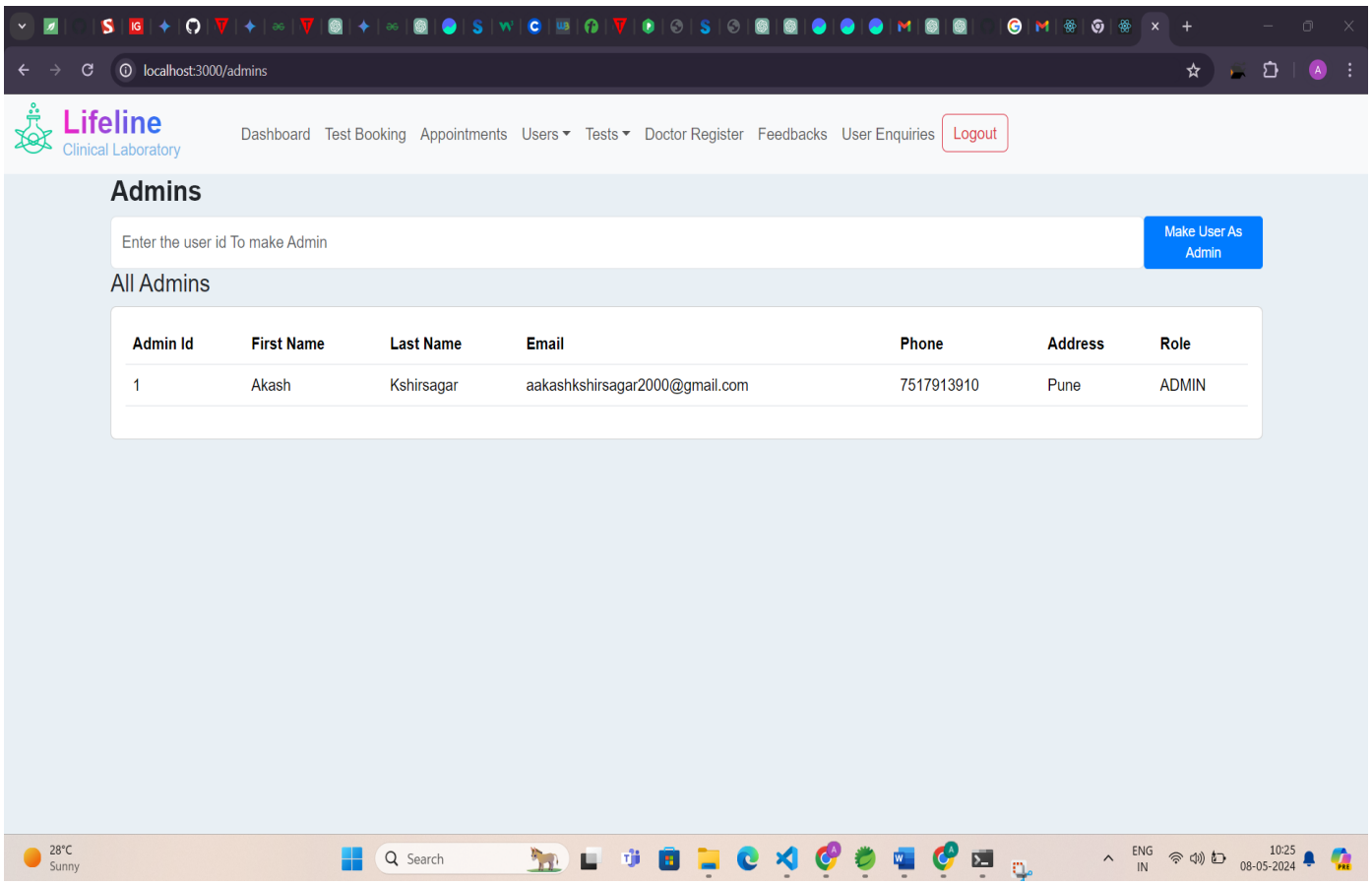


Figure 25.

Input Screen : Add Test

This page is for adding new test

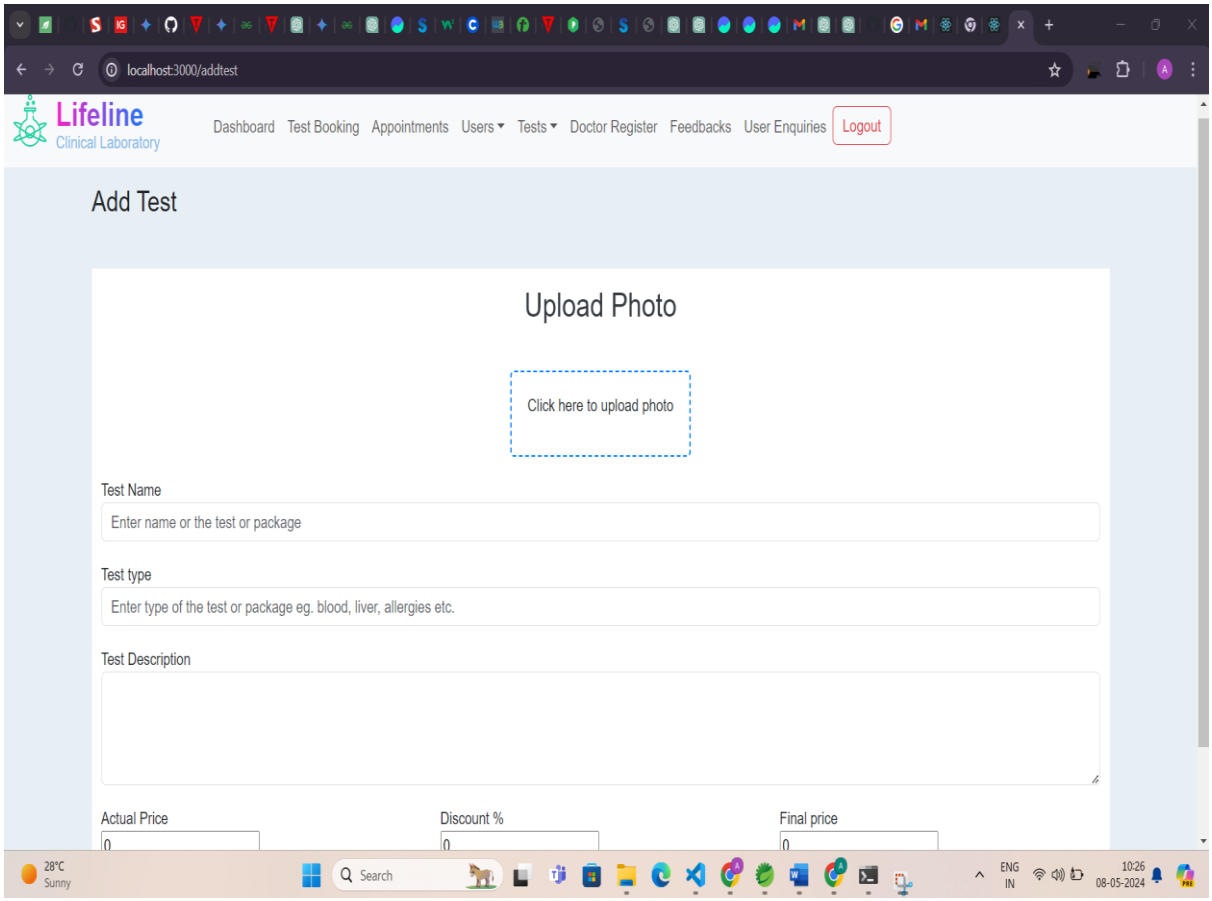


Figure 26.

Output Screen : Admin All Test

all test added by the admin

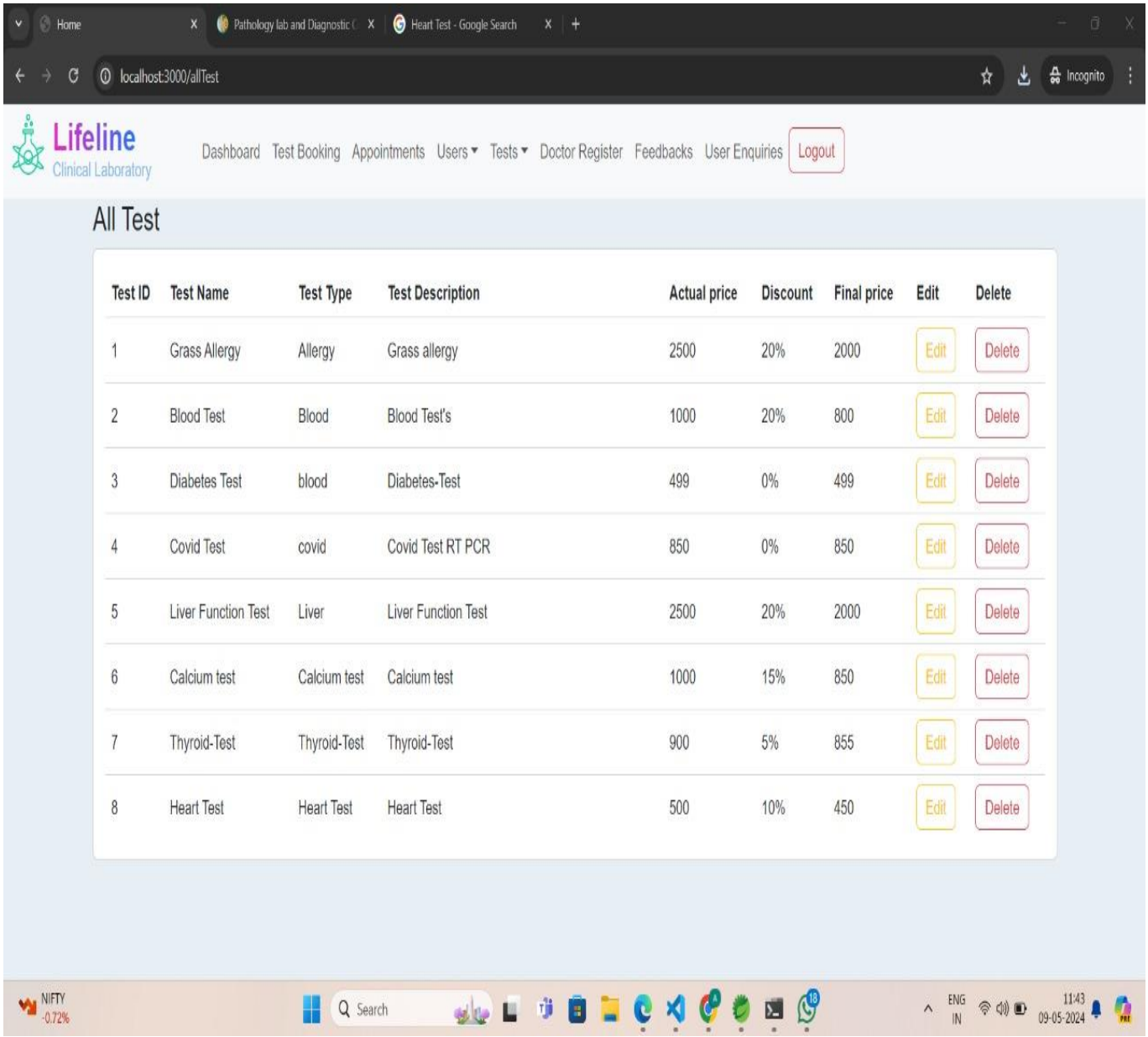


Figure 27

Output Screen:

Doctor Approval from admin Site

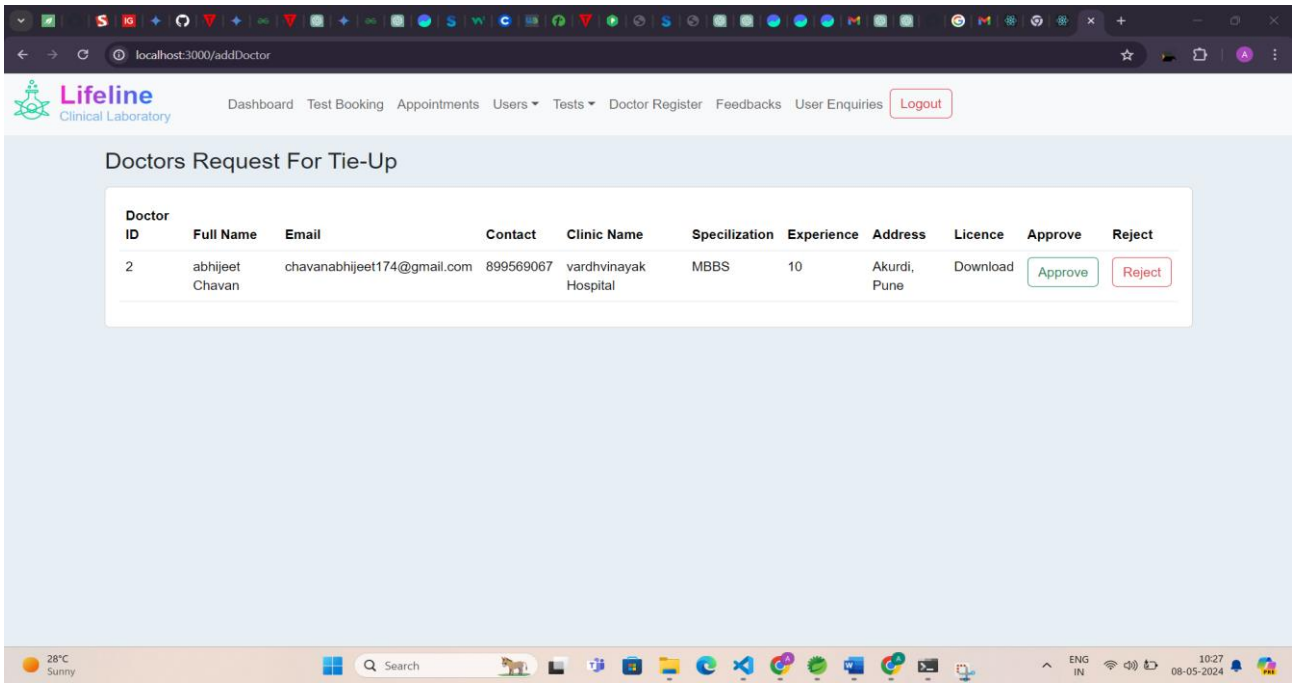


Figure 28.

Output Screen : User Feedbacks

Admin side user feedback table

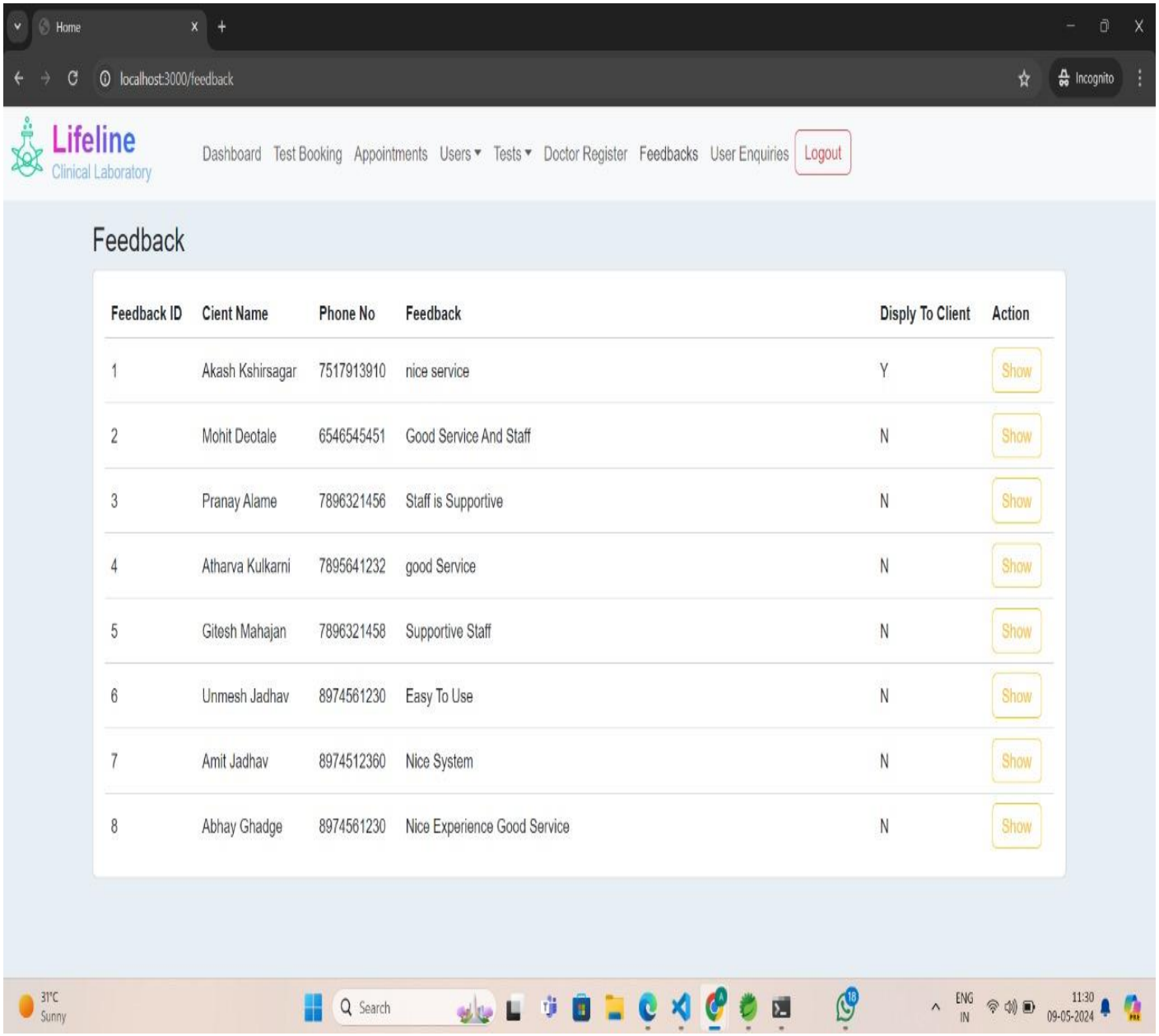


Figure29.

Output Screen

after publishing feedback from admin

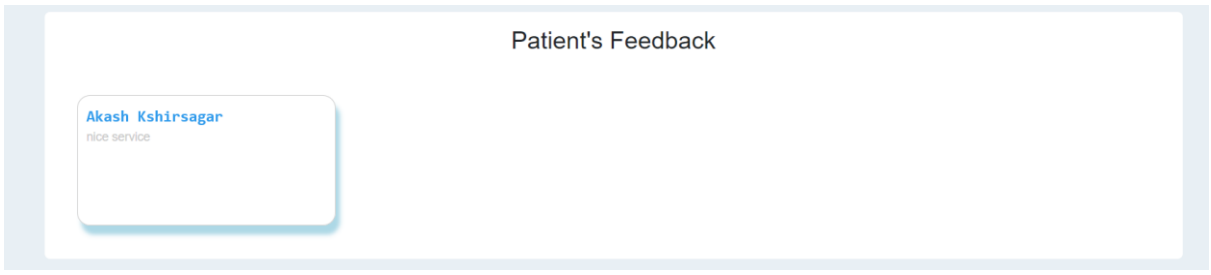


Figure 30

Output screen: User Enquires

This screen displays admin side User Enquires table

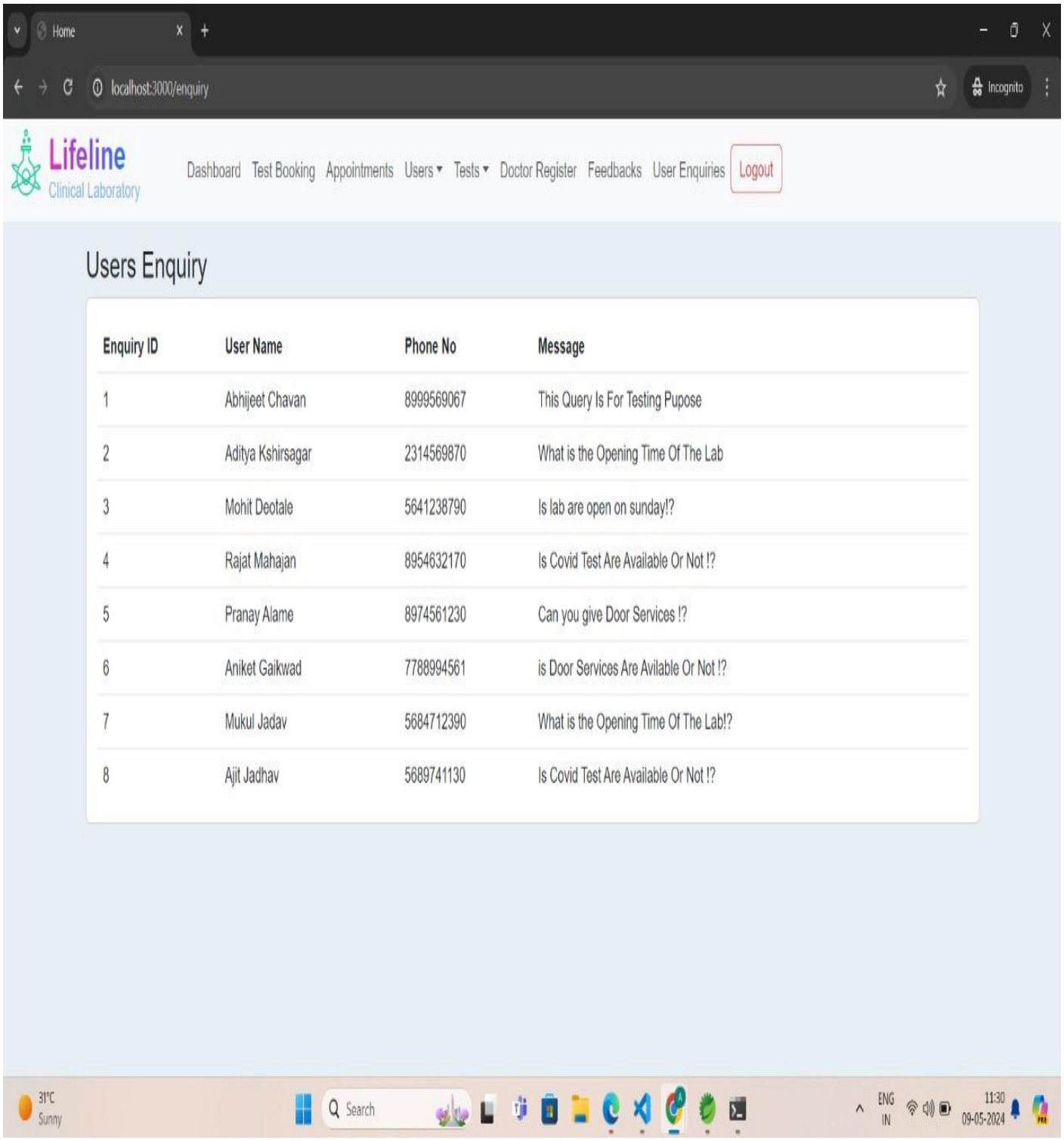


Figure 31.

Output Screen: Doctor Dashboard

after login doctor dashboard

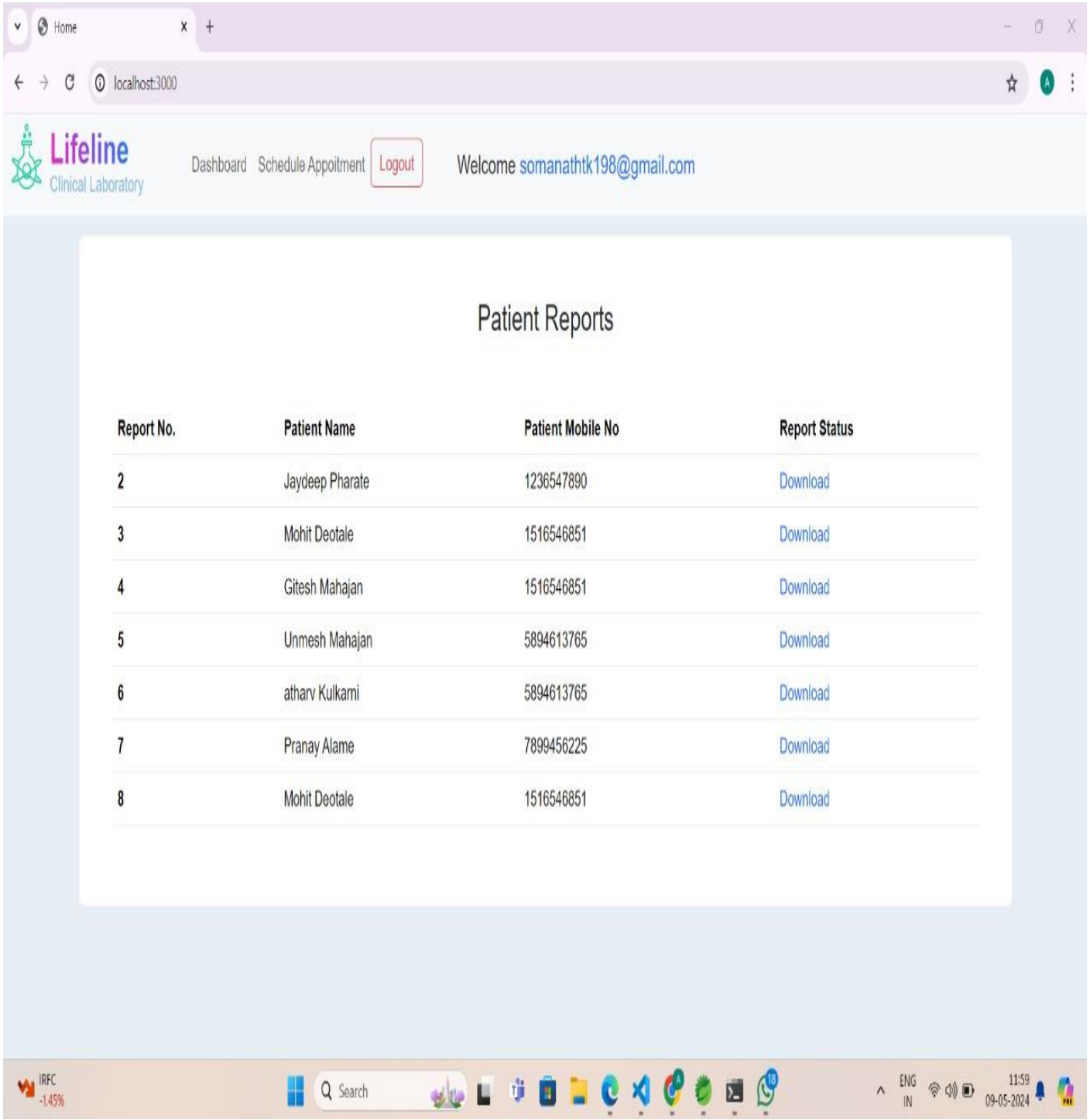


Figure 32.

Input Screen : Doctor Appointment Scheduling

Doctor Can Schedule Appointments

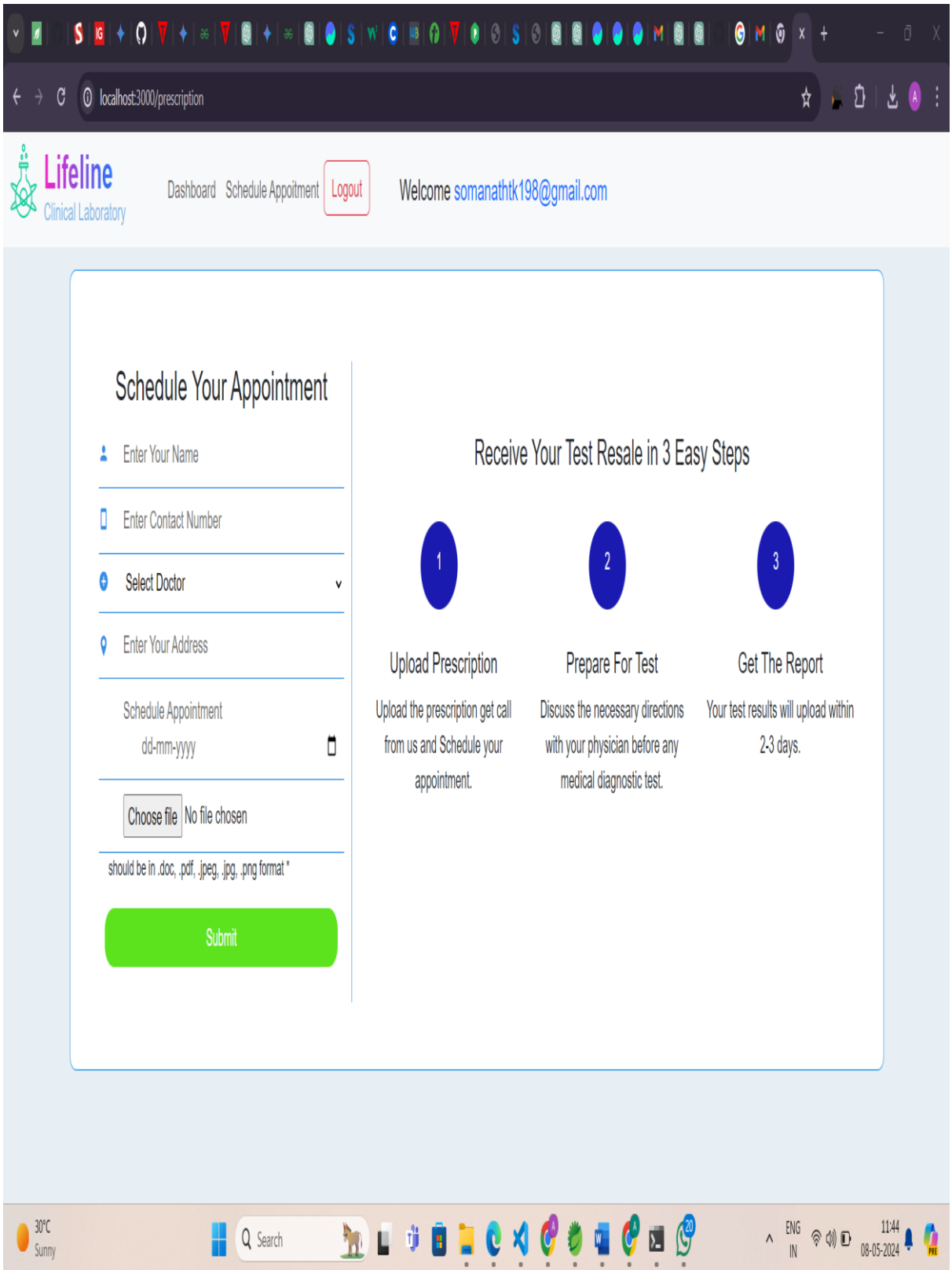


Figure 33.

Chapter 5: Testing

5.1 Test Procedures and Implementation

Testing plays a critical role in quality assurance for software. Due to the limitation of the verification method for the previous phases, design and requirement fault also appear in the code. Testing is used to detect these errors, in addition to the error introduced during coding phase.

Testing is a dynamic method for verification and validation, where the system is to be tested is executed and behavior of the system is observed. Due to this testing the failure of the system can be observed, from which the presence of fault can be deduced. However, separate activities have to be performed to identify the faults.

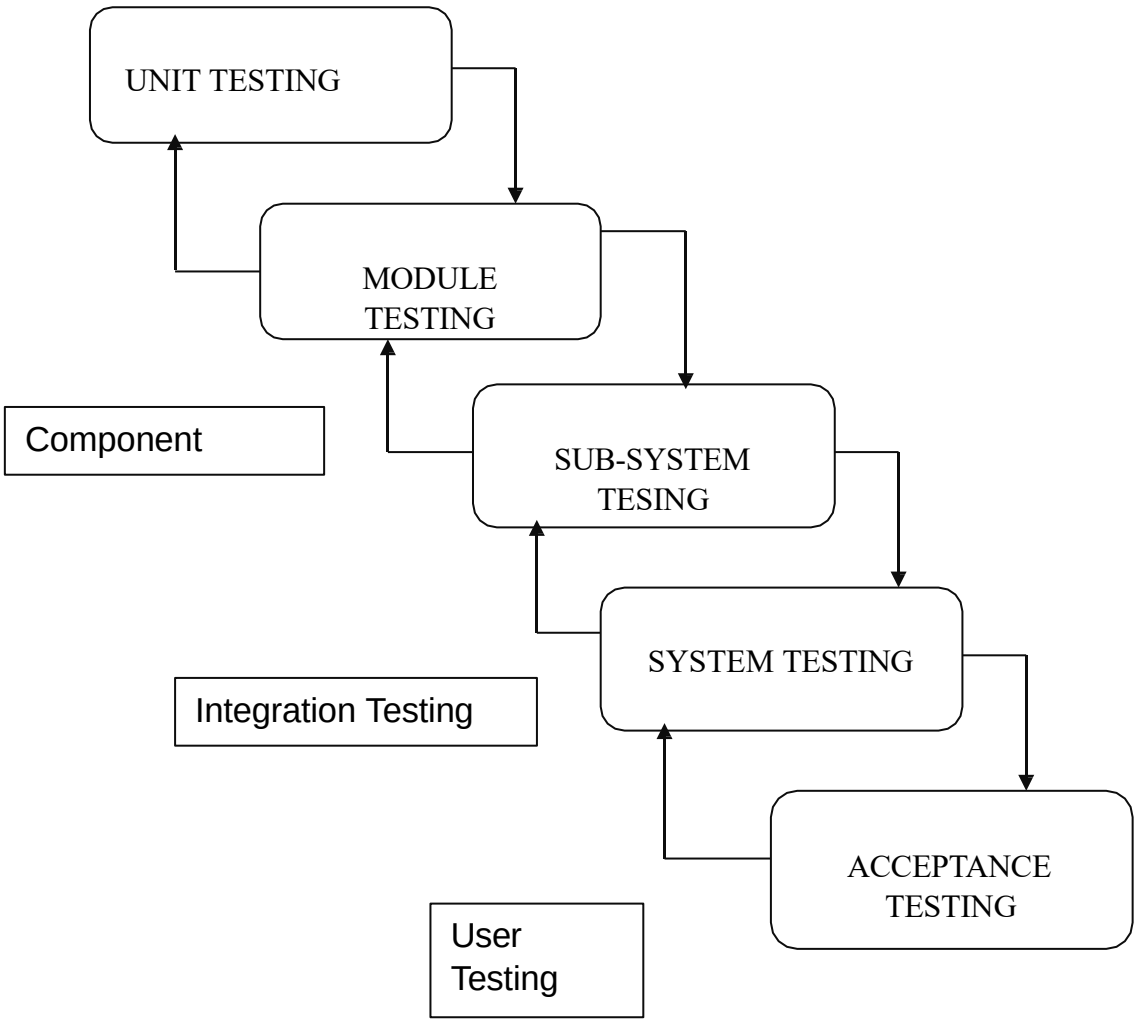
❖ **Objectives of Testing**

- Testing is the process of executing a program with the intent of finding a bug.
- A good case is one that has a high probability of finding an as yet undiscovered error.
- A successful test is the one that uncover yet an undiscovered error.

❖ **Methods of Testing**

- Functional Testing : In functional testing, the internal logic of the system under testing is not considered and the test cases are decided from the specification or the requirements. It is often called “Black Box Testing”.
- Structural Testing : In structural testing, the test cases are decided entirely on the internal logic of the program or module being tested.

  As the goal of testing is to detect any errors in the programs different flavor of testing are often used. Unit testing are used to test module or a small collection of modules and the focus is on detecting coding errors in modules. During integration testing modules are combined into sub- system, which are then tested. The goal here is to test the system design. In system testing and acceptance testing, the entire System is tested. The goal here is to test the requirement themselves. Structural testing can be used for unit testing while at higher level mostly functional testing is used



- Unit Testing

Unit testing focuses verification effort on the smallest unit of software design, the module. The unit testing we have is white box oriented and some modules the steps are conducted in parallel.

- White Box Testing

This type of testing ensures that

All independent paths have been exercised at least once

All logical decisions have been exercised on their true and false sides All loops are executed at their boundaries and within their operational bounds

All internal data structures have been exercised to assure their validity.

- Black Box Testing

This testing method considers a module as a single unit and checks the unit at interface and communication with other modules rather getting into details as statement level. Output for a given set of input combinations are forwarded other module.

- Integration Testing

Integration Testing is any type of software testing that seeks to verify the interfaces between components against a software design. Software components may be integrated in an interactive way or all together ("big bang"). Normally the former is considered a better practice since it allows interface issues to be localized more quickly and fixed.

Integration testing works to expose defects in the interfaces and interaction between integrated components (modules). Progressively user groups of tested software components corresponding to elements of the architectural design are integrated and tested until the software works as a software.

- System Testing

SystemTesting tests a completely integrated system to verify that it meets its requirements. The testing phase is an important part of software development, It is the process of finding errors and missing operations and also a complete verification to determine whether the objectives are met and the user requirements are satisfied.

- Acceptance Testing

Acceptance testing is performed with realistic data of the client to demonstrate that the software is working satisfactorily. Testing here is focused on external behaviour of the system; the internal logic of the program is not emphasized.

It is the process of finding errors and missing operations and also a complete verification to determine whether the objectives are met and the user requirements are satisfied.

Acceptance testing is performed along with the client to show that to see that all requirements are satisfied whatever may be the attributes its working well provided all the attributes are valid. If not it displays corresponding messages for getting valid attributes.

- Alpha Testing

Alpha testing is simulated or actual operational testing by potential users/customers or an independent test team at the developers site. Alpha testing is often employed for off-the- shelf software as a form of internal acceptance testing, before the software goes to beta Testing.

- Beta Testing

Beta testing comes after alpha testing and can be considered a form of external user acceptance testing. Versions of the software, known beta versions, are released to a limited audience outside of the programming team. The software is released to groups of people so that further testing can ensure the products have few faults or bugs.Sometimes, beta versions are made available to the open public to increase the feedback filled to a maximal number of future users.

- Usability Testing

Usability testing is needed to check if the user interface is casy to use and understand. It is connected mainly with the use of the application

- Security Testing

Security testing is essential for software that processes confidential data to prevent system intrusion by hackers.

5.2 Test Cases

Test cases list the specific items that will be tested and describe the detailed steps that will be followed to verify the software. There are two fundamental approaches to testing software: test-to-pass and test-to-fail, when you test-to-pass, you really ensure only that the software minimally works. You don't push its capabilities. You don't see what you can do to break it. You treat it with kid gloves, applying the simplest and most straightforward test cases.

You may be thinking that if your goal is to find bugs, why would you test-to-pass? Wouldn't you want to find bugs by any means possible? The answer is no, not initially.

Think about an analogy with a newly designed car. You are assigned to test the very first prototype that has just rolled off the assembly line and has never been driven. You probably wouldn't get in, start it up, head for the test track, and run it wide open at full speed as hard you could. You would probably crash and die. Use test-to-pass to reveal bugs before you test-to- fail.

Test Case ID	**Scenario to Test**	**Steps to Perform**	**Expected Result**	**Actual Result**	**Pass/Fail**
TC 1	User Registration - Valid Inputs	1. Navigate to the registration page.	New user registration page is displayed.	New user registration page displayed successfully.	Pass
		2. Enter valid username, email, and password.	User fills in username, email, and password fields with valid information.	User entered valid information in username, email, and password fields.	Pass
		3. Click on the "Register" button.	User clicks on the "Register" button to submit the registration form.	Registration form submitted successfully.	Pass
TC 2	User Registration - Existing Username	1. Navigate to the registration page.	New user registration page is displayed.	New user registration page displayed successfully.	Pass
		2. Enter an existing username.	User fills in the username field with an existing username.	User entered an existing username.	Pass
		3. Enter valid email and password.	User fills in the email and password fields with valid information.	User entered valid information in email and password fields.	Pass
		4. Click on the "Register" button.	User clicks on the "Register" button to	Error message displayed: "Username already exists. Please	Fail

Test Case ID	Scenario to Test	Steps to Perform	Expected Result	Actual Result	Pass/Fail
			submit the registration form.	choose a different username."	
TC 3	User Registration - Mandatory Fields	1. Navigate to the registration page.	New user registration page is displayed.	New user registration page displayed successfully.	Pass
		2. Leave one or more mandatory fields blank.	User leaves one or more mandatory fields (e.g., username, email, password) blank.	Error message displayed: "All fields are mandatory. Please fill in all required fields."	Pass
		3. Click on the "Register" button.	User clicks on the "Register" button to submit the registration form.	Error message displayed: "All fields are mandatory. Please fill in all required fields."	Pass
TC 4	Appointment Booking - Valid Appointment Selection	1. Navigate to the appointment booking page.	Appointment booking page is displayed.	Appointment booking page displayed successfully.	Pass
		2. Select a pathology test and appointment slot.	User selects a pathology test from the available options and chooses an appointment slot from the calendar.	Pathology test and appointment slot selected successfully.	Pass
		3. Click on the "Book Appointment" button.	User clicks on the "Book Appointment" button to confirm the appointment booking.	Appointment booked successfully for selected test and slot.	Pass
TC 5	Appointment Booking - Availability of Slots	1. Navigate to the appointment booking page.	Appointment booking page is displayed.	Appointment booking page displayed successfully.	Pass
		2. View available appointment slots.	User checks the calendar to view available appointment slots for the selected date and time.	Available appointment slots displayed correctly based on availability and scheduling constraints.	Pass

Test Case ID	Scenario to Test	Steps to Perform	Expected Result	Actual Result	Pass/Fail
		3. Choose an available slot.	User selects an available appointment slot from the calendar.	User selected an available appointment slot.	Pass
		4. Click on the "Book Appointment" button.	User clicks on the "Book Appointment" button to confirm the appointment booking.	Appointment booked successfully for selected slot.	Pass
TC 6	Accessing Medical Reports - Availability	1. Navigate to the medical reports section.	Medical reports section is displayed.	Medical reports section displayed successfully.	Pass
		2. View available reports.	User checks for available medical reports in their account.	Available medical reports displayed for the user.	Pass
		3. Click on a report to view details.	User clicks on a medical report to view its details and download options.	Medical report details and download options displayed successfully.	Pass
TC 7	Accessing Medical Reports - Download/Print	1. Navigate to the medical reports section.	Medical reports section is displayed.	Medical reports section displayed successfully.	Pass
		2. Select a report to download or print.	User selects a medical report from the list to download or print.	Medical report selected for download or print.	Pass
		3. Click on the download/print option.	User clicks on the download/print option to proceed.	Medical report downloaded or printed successfully.	Pass
TC 8	Integration with Healthcare Providers - Test Request	1. Navigate to the test request submission page.	Test request submission page is displayed.	Test request submission page displayed successfully.	Pass
		2. Enter patient details and test information.	User enters patient details and test information for the requested pathology test.	Patient details and test information entered successfully.	Pass

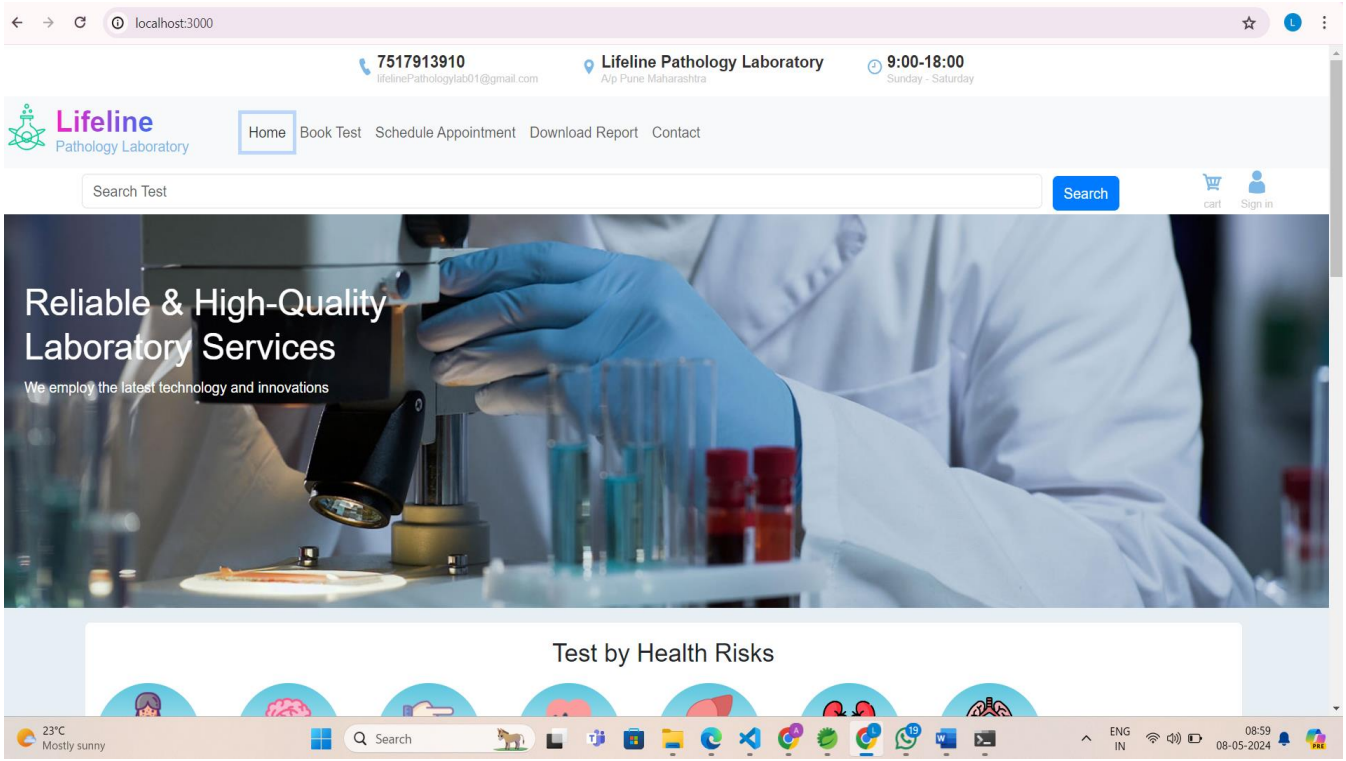
Test Case ID	Scenario to Test	Steps to Perform	Expected Result	Actual Result	Pass/Fail
		3. Click on the "Submit Request" button.	User clicks on the "Submit Request" button to send the test request to the pathology lab.	Test request submitted successfully.	Pass
TC 9	Integration with Healthcare Providers - Test Result Delivery	1. Navigate to the test results section.	Test results section is displayed.	Test results section displayed successfully.	Pass
		2. View available test results.	User checks for available test results for the requested pathology tests.	Available test results displayed for the user.	Pass
		3. Click on a result to view details.	User clicks on a test result to view its details and related information.	Test result details and related information displayed successfully.	Pass
TC 10	Notification and Reminder System - Appointment Reminders	1. Navigate to the appointment reminders section.	Appointment reminders section is displayed.	Appointment reminders section displayed successfully.	Pass
		2. Check for upcoming appointments.	User checks for upcoming appointments and related reminders.	Upcoming appointments and reminders displayed for the user.	Pass
		3. Review and acknowledge reminders.	User reviews and acknowledges the appointment reminders as needed.	Appointment reminders acknowledged successfully.	Pass

Chapter 6 User Manual

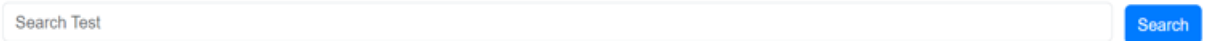
For any system to be successful it is important that the intended user find the system easy to operate. The purpose of the user manual is to make user acquainted with the system and help employee understand the system and operate it conveniently. The manual contain several screenshots that describes how to use the entire system.For any system to be successful it is important that the intended user find the system easy to operate. The purpose of the user manual is to make user acquainted with the system and help user understand the system and operate it conveniently. The User Manual is prepared reflexively because it is an item that must accompany every system.The manual contain several screenshots that describes how to use the entire system. This Manual helps user to navigate efficiently through the system and help user to solve issues wherever they occur.

6.1 Manual Explaination

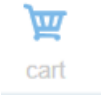
Home Page



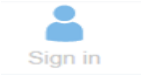
Search Test



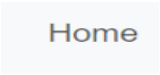
6.2 Menu Explanation



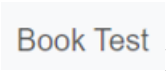
Cart



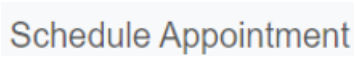
Sign in



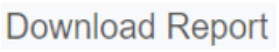
Home



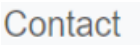
Book test



Schedule appointment



Download Report



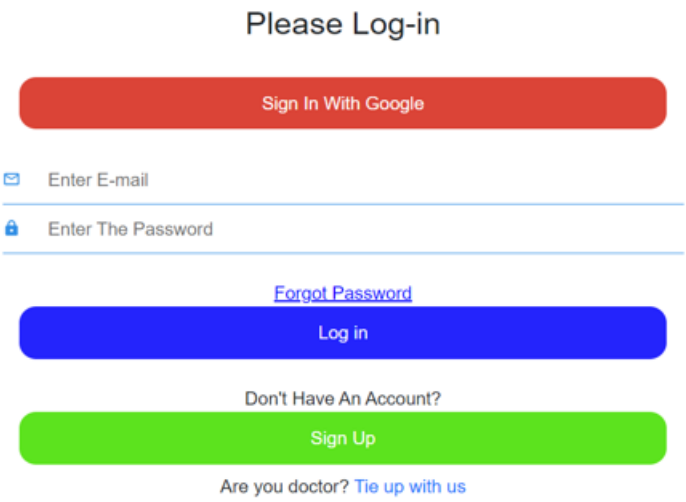
Contact

6.3 Form and report Specification

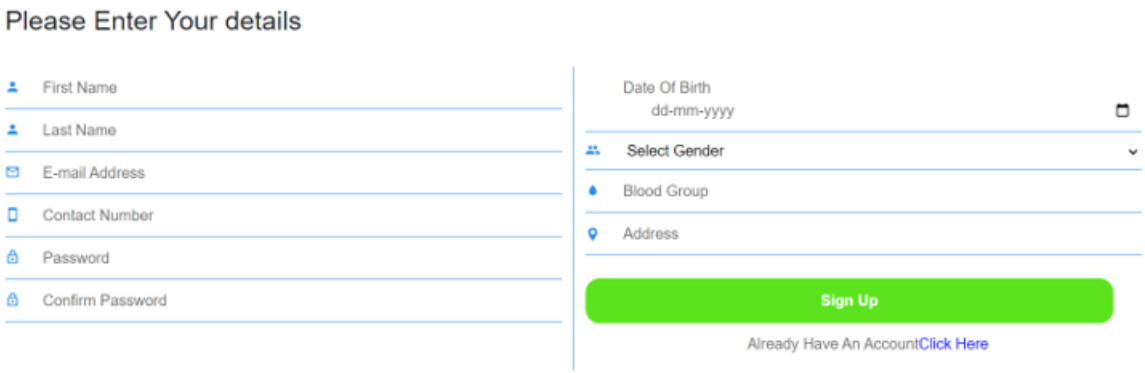
Form Specification

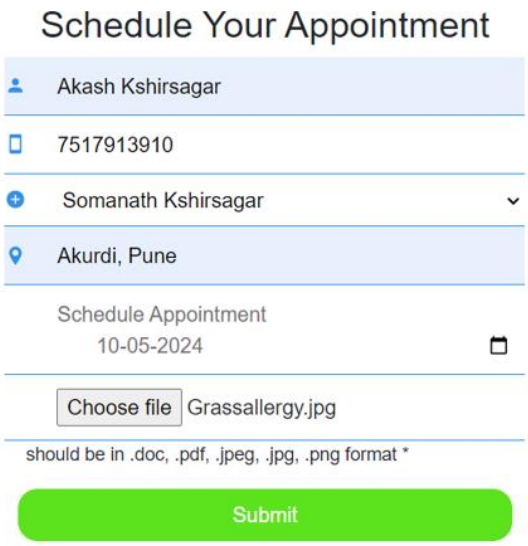
A form specification outlines the structure, layout, and fields of a form used within a software application. It includes details about each field, such as its name, data type, validation rules, and any associated actions or behaviors. Form specifications help developers understand the requirements for capturing and processing data within the application and ensure consistency and usability across different forms.

Login Page

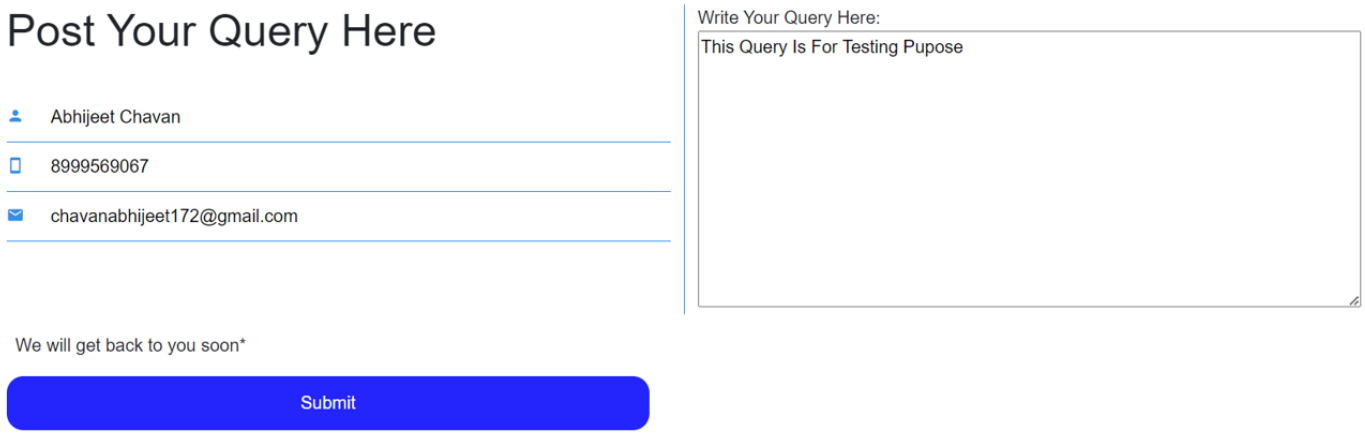


Registration Page





Query posting



Report Specification

A report specification defines the content, layout, and formatting of reports generated by a software application. It specifies the data elements to be included in the report, as well as any calculations, aggregations, or filtering criteria to be applied. Report specifications also detail the visual presentation of the report, including headers, footers, columns, and styling options. By documenting report specifications, developers and users can ensure that reports generated by the application meet the intended requirements and provide valuable insights or information.

- Test Booking Report:
    - Description: Provides a summary of all pathology test bookings.
    - Data Source: Test Booking Database Table.

    - Parameters: Start Date, End Date, Lab Location.
    - Output Format: PDF, Excel, CSV.
- Appointment Schedule:
    - Description: Displays a schedule of upcoming appointments.
    - Data Source: Appointment Database Table.
    - Parameters: Date Range, Healthcare Provider.
    - Output Format: HTML, PDF, Calendar.
- Medical Report Summary:
    - Description: Summarizes medical reports issued within a period.
    - Data Source: Medical Report Database Table.
    - Parameters: Start Date, End Date, Patient ID.
    - Output Format: PDF, Excel.
- Test Result Analysis:
    - Description: Analyzes pathology test results for trends.
    - Data Source: Test Result Database Table.
    - Parameters: Test Type, Date Range, Lab Location.
    - Output Format: Charts, Graphs.
- Patient Feedback Report:
    - Description: Presents feedback provided by patients.
    - Data Source: Feedback Database Table.
    - Parameters: Date Range, Satisfaction Rating.
    - Output Format: PDF, Excel, Word.

Chapter 7 Drawbacks And Limitations

1. User Training and Adoption: Introducing a new digital system requires adequate training for users to understand its features and functionalities fully. Healthcare providers and staff may require time to adapt to the new system, leading to initial productivity dips and resistance to change.
2. Cost Implications: Developing, deploying, and maintaining a sophisticated software system like the Pathology Lab Management System incurs significant costs. Organizations must consider factors such as licensing fees, infrastructure costs, ongoing maintenance, and support expenses, which can strain financial resources.
3. Accessibility Challenges: Users with limited technological proficiency or disabilities may face accessibility challenges when using the system. Ensuring that the system is designed with accessibility features and providing support for diverse user needs is essential but may require additional resources and effort.
4. Reliability and Downtime: System downtime or disruptions can have serious consequences, especially in critical healthcare settings where timely access to medical services is vital. Ensuring high availability, redundancy, and robust disaster recovery mechanisms are essential to minimize downtime and maintain service continuity

Chapter 8 Proposed Enhancement

1. Cloud Deployment: Transitioning the online pathology booking system to a cloud-based infrastructure, such as AWS (Amazon Web Services) or Google Cloud Platform, can offer scalability, flexibility, and enhanced reliability. Cloud deployment would enable seamless access to the system from anywhere, at any time, while also facilitating efficient resource allocation and management

2. Mobile Application Development**:** Developing a mobile application companion to the web-based system can offer users greater flexibility and convenience in accessing the platform. Patients and healthcare providers can schedule appointments, view test results, and receive notifications directly from their smartphones, improving accessibility and user experience.

3. Integration with Telemedicine Platforms**:** Integrating telemedicine features into the system enables virtual consultations between patients and healthcare providers, enhancing remote healthcare delivery. Patients can consult with doctors, receive medical advice, and request test orders remotely, reducing the need for in-person visits and improving healthcare accessibility, especially in remote or underserved areas.

4. Real-time Collaboration Tools: Incorporating real-time messaging, video conferencing, and collaborative document sharing functionalities facilitates seamless communication and collaboration among healthcare providers, patients, and pathology labs. Care teams can consult on patient cases, share test results, and coordinate care plans in a secure and efficient manner, enhancing care coordination and patient outcomes.

5. Enhanced Security Measures: Strengthening cybersecurity measures, such as implementing multi-factor authentication, encryption protocols, and intrusion detection systems, enhances the security posture of the system. Regular security audits, vulnerability assessments, and staff training programs can mitigate the risk of data breaches and unauthorized access, safeguarding patient confidentiality and system integrity.

Chapter 9 : Conclusion

In conclusion, the proposed enhancements aim to elevate the Pathology Lab Management System to a higher level of functionality, usability, and effectiveness in facilitating healthcare delivery. By incorporating mobile application development, advanced data analytics, telemedicine integration, patient engagement tools, real-time collaboration features, enhanced security measures, compliance with interoperability standards, and robust patient feedback mechanisms, the system can address existing limitations and deliver significant benefits to users and stakeholders.

These enhancements empower patients with greater access to healthcare services, enable healthcare providers to deliver more personalized and efficient care, and streamline communication and collaboration among all parties involved in the healthcare ecosystem. Moreover, by leveraging technology and innovation, the system can drive improvements in healthcare quality, patient outcomes, and overall healthcare experience.

As healthcare continues to evolve and embrace digital transformation, investing in the enhancement of the Pathology Lab Management System aligns with the industry's trajectory towards more patient-centered, efficient, and technology-driven care delivery models. By embracing these enhancements, healthcare organizations can position themselves at the forefront of healthcare innovation, ultimately benefiting patients, healthcare providers, and the healthcare system as a whole.

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