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# Prescripto: Doctor Appointment Booking System using MongoDB, React and Node.Js

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**ABSTRACT:** The Doctor Appointment Booking System is a web-based platform designed to simplify healthcare appointment management. Developed using the MERN stack (MongoDB, Express.js, React, Node.js), it provides role-based authentication for Patients, Doctors, and Admins, ensuring secure access. Patients can register, log in, book appointments by selecting a doctor, date, and available time slot, and manage appointments by rescheduling or canceling them. Secure online payment options enhance convenience. Doctors can create and update their profiles, set availability, view scheduled appointments, and manage appointment statuses (completed, pending, or canceled). They can also track earnings over time. Admins oversee the entire system, approving doctor profiles, managing patient records, monitoring payments, and generating reports for performance analysis. Automated notifications and reminders keep users informed about upcoming appointments. Security is ensured through JWT authentication, data encryption, and role-based access control. The system features a responsive front-end built with React.js and Tailwind CSS and a powerful back-end using Node.js and Express.js. By integrating modern technologies, it offers a seamless, secure, and efficient healthcare appointment booking experience.

**KEYWORDS:** MERN Stack, MongoDB, Express.js, React.js, Node.js, JWT Authentication, Role-Based Access Control, Doctor Registration, Patient Profiles, Admin Dashboard, Digital Prescription, Appointment Scheduling, Real-Time Notifications, Stripe Integration, Razorpay Integration, Doctor Availability, Patient Medical History, Review and Rating System, RESTful API, Secure Payment Gateway, HealthTech Platform, Medical Appointment System, User Authentication, Token-Based Security, Calendar Integration, Secure Login, Healthcare Management, Profile Management, Video Consultation, Telemedicine, Notification System, Appointment Management, Medical Records, Prescription Generation, User Roles, Feedback System, Search and Filter, Cloud Hosting, Data Encryption, HIPAA Compliance, Responsive Web Design, Full-Stack Development, Secure Web App, Health Information System, Patient Engagement, Doctor-Patient Communication, Secure Scheduling, Real-Time Alerts, Health Data Privacy, Web Application Development..

## I. INTRODUCTION

The **Prescripto: Doctor Appointment Booking System** is designed to revolutionize the way patients and doctors interact by offering a modern, efficient solution for scheduling appointments. With a focus on simplicity, transparency, and user-centric design, the system provides a seamless platform where patients can easily search for doctors, view their profiles, and book appointments in real time. What sets **Prescripto** apart is its attention to detail, offering comprehensive doctor profiles that include specialties, qualifications, and patient reviews, helping patients make informed decisions. Additionally, the platform integrates a secure multi-user authentication system for administrators, doctors, and patients, ensuring smooth management and privacy for all users. By offering features such as real-time availability, appointment confirmations, and a smooth interface for managing interactions, **Prescripto** aims to enhance the appointment booking process, reducing scheduling conflicts and improving overall healthcare efficiency. With these features, **Prescripto** strives to create a reliable, transparent, and convenient experience for both patients and doctors. **Prescripto** ensures security through end-to-end encryption, secure payment integrations, and role-based access control, safeguarding sensitive user data. With its intuitive UI, mobile-friendly design, and seamless integration with modern healthcare practices, **Prescripto** is built to streamline medical consultations and create a more connected, efficient healthcare ecosystem. **Overview of the problem**



- **Inefficient Appointment Scheduling** – Existing systems often fail to streamline the booking process, resulting in delays and mismanagement.
- **Limited Accessibility** – Many platforms lack user-friendly, mobile-responsive interfaces, restricting access for a wide range of users.
- **Lack of Real-Time Scheduling** – Patients and doctors struggle with outdated or static appointment slots, leading to frequent scheduling conflicts.
- **Minimal Doctor Information** – Patients find it hard to choose the right doctor due to limited details on specialties, experience, and background.
- **Uncertainty in Doctor Selection** – The absence of patient reviews, doctor ratings, and verified qualifications makes it difficult for patients to make informed decisions.
- **Poor Integration Between Patients and Doctors** – Many systems do not effectively sync doctor availability with patient appointment requests, causing inefficiencies.
- **Security Concerns** – Weak or outdated security measures can lead to data breaches and unauthorized access to sensitive health information.

#### **OBJECTIVE**

- **Streamline Appointment Scheduling** – Allow patients to efficiently book appointments by providing real-time doctor availability, along with easy search and filtering options based on specialties and doctor profiles.
- **Enhance Transparency & Decision-Making** – Provide comprehensive doctor profiles featuring qualifications, areas of expertise, and patient reviews to help users make informed healthcare decisions.

#### **II. LITERATURE SURVEY**

- **The Growing Need for Digital Healthcare Solutions** With the increasing population and the growing demand for accessible healthcare services, traditional appointment scheduling methods are becoming inefficient. Patients often struggle to find the right doctor due to limited information, and manual booking systems lead to scheduling conflicts. To address these challenges, a digital appointment booking system is necessary. This paper discusses the development of an online doctor appointment booking system that enables patients to book appointments seamlessly while allowing doctors to manage their schedules efficiently. The system aims to bridge the gap between patients and healthcare providers, ensuring a smoother and more effective consultation process.
- **Web-Based Healthcare Systems for Improved Patient Accessibility** Several healthcare platforms worldwide have adopted web-based solutions to streamline patient-doctor interactions. These systems allow patients to search for doctors based on specialization, location, and availability. Implementing a responsive and user-friendly interface enhances the overall patient experience. In this project, the appointment booking system integrates a real-time scheduling feature, ensuring no overlaps in appointments. Technologies such as HTML, CSS, JavaScript, and databases like MongoDB/MySQL are used to create an efficient and secure system.
- **Challenges in Traditional Appointment Scheduling** Traditional booking methods often rely on phone calls and in-person visits, leading to delays, miscommunication, and inefficiencies. Many existing healthcare platforms lack real-time availability features, leading to double bookings and appointment clashes. This study highlights the importance of integrating a smart scheduling system that can automatically manage available slots based on doctor availability and patient preferences. By implementing an automated system, the appointment booking process can become more reliable and efficient.

#### **EXISTING SYSTEM**

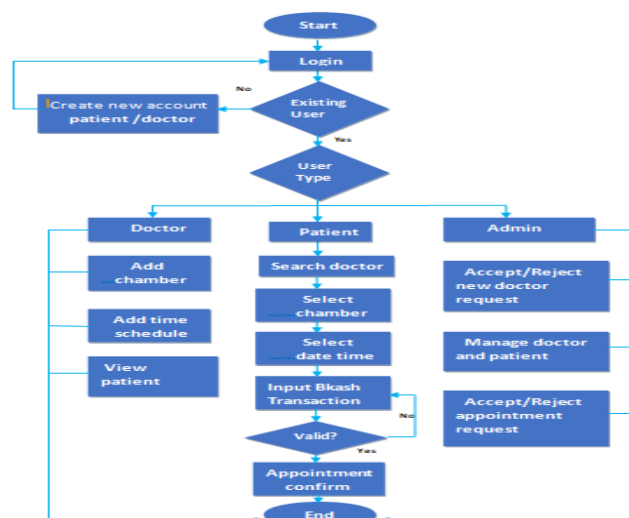
- **Manual Booking Process**  
Patients usually have to call the clinic or visit in person to schedule an appointment. This is time-consuming and inefficient, especially during peak hours.
- **Lack of Real-Time Slot Updates**  
Appointment slots are managed manually, which increases the risk of double bookings or appointment clashes due to delays in updating schedules.

- Limited Access to Doctor Information**  
 Patients often don't have access to detailed information like a doctor's specialization, availability, or experience, making it hard to choose the right provider.

**PROPOSED SYSTEM**

- Online Appointment Booking**  
 Patients can conveniently book appointments from anywhere at any time through a web-based platform built with React, eliminating the need for phone calls or in-person visits.
- Real-Time Scheduling System**  
 The system dynamically updates doctor availability using MongoDB and Node.js backend logic, preventing double bookings and reducing scheduling conflicts.
- Comprehensive Doctor Profiles**  
 Users can browse through doctor profiles that include details like specialization, available slots, clinic address, and experience, helping them make informed choices.
- Secure Multi-User Authentication**  
 Built-in login and authentication features for patients, doctors, and admins ensure secure access and proper role-based functionality using JWT (JSON Web Tokens).

**System Architecture:**

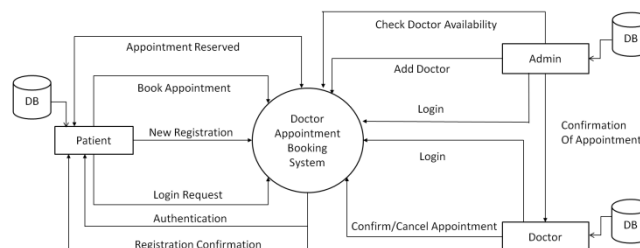


**Figure 1.** System Architecture

- Frontend:**  
 Built using React.js and Tailwind CSS, the frontend provides a responsive, role-based interface for patients, doctors, and admins, ensuring smooth user experience across all devices.
- Backend:**  
 Developed with Node.js and Express.js, the backend handles all core logic including user authentication, appointment scheduling, and secure API endpoints.
- Database:**  
 MongoDB is used as the NoSQL database to store patient records, doctor profiles, appointments, and payment data in a flexible, scalable format.
- Authentication & Security:**  
 Implements JWT authentication, Role-Based Access Control (RBAC), and data encryption to protect user data and ensure secure access based on user roles.

- **Notifications & Payments:**  
Integrates automated email/SMS notifications for appointment updates and uses secure payment gateways to handle online transaction processing.
- **Future Enhancements:**  
Planned upgrades include AI-based doctor recommendations and telemedicine integration for video consultations and smarter healthcare delivery.

### III. METHODOLOGY



**Figure 2.** System Design

#### 1. Client-Side (Frontend) – User Interface (UI)

- **Purpose:**  
To provide an interactive, responsive, and seamless experience for patients, doctors, and administrators.
- **Functionality:**  
Developed using **React.js** and **Tailwind CSS**, the frontend enables users to book appointments, view and manage schedules, access doctor profiles, and receive notifications. It dynamically interacts with the backend to show real-time data, such as appointment availability and user details.

#### 2. Backend – Node.js and Express.js

- **Purpose:**  
To manage application logic, process client requests, and ensure secure communication between the frontend and the database.
- **Functionality:**  
Powered by **Node.js** and **Express.js**, the backend handles HTTP methods (GET, POST, PUT, DELETE), manages user sessions and authentication, processes appointments and payments, and connects to the database. It acts as the core logic controller of the system.

#### 3. Database – MongoDB

- **Purpose:**  
To securely store, manage, and retrieve data in a flexible, scalable structure.
- **Functionality:**  
Using **MongoDB**, the system stores information like patient records, doctor profiles, appointment data, payment history, and logs. Its NoSQL and schema-less nature supports efficient data operations and easy scalability for future features.

#### 4. RESTful API Layer

- **Purpose:**  
To enable smooth communication between the frontend, backend, and external services using stateless HTTP requests.

- **Functionality:**

The **RESTful API** provides structured endpoints that allow patients to book appointments, doctors to manage availability, and admins to control system operations. It also integrates with third-party services such as payment gateways, email/SMS APIs, and telemedicine tools.

#### 5. User Authentication and Authorization

- **Purpose:**

To ensure secure access and restrict features based on user roles (patient, doctor, admin).

- **Functionality:**

The system uses **JWT (JSON Web Tokens)** and **Role-Based Access Control (RBAC)** to verify user identity and determine access permissions. Patients can view/book appointments, doctors manage schedules, and admins oversee platform operations.

#### 6. Secure Online Payment Integration

- **Purpose:**

To allow safe and seamless payment for medical consultations and appointment bookings.

- **Functionality:**

Integrated **payment gateways** securely handle transactions with encrypted data processing. The system maintains detailed payment records for both patients and doctors, ensuring transparency and trust.

### IV. IMPLEMENTATION AND RESULTS

#### 1. User Registration & Authentication

- **Role-Based Authentication:**

Use JWT (JSON Web Tokens) to manage secure access for different user roles: **Patients, Doctors, and Admins.**

- **Authentication Workflows:**

- Secure login/signup using email/phone with password encryption (e.g., bcrypt).
- Token refresh mechanism for session management.
- Middleware to verify tokens and roles for protected routes.

#### 2. Doctor Profile Management

- **Doctor Registration:**

Doctors can sign up, upload verification documents, and await admin approval.

- **Profile Features:**

Add education, specialization, experience, and clinic/hospital details.

- **Availability Setup:**

Set weekly working hours and holiday exceptions.

- **Appointment Calendar:**

View and manage upcoming appointments and availability slots.

#### 3. Patient Profile Management

- **Patient Account:**

Patients can create/update their personal profiles.

- **Medical History:**

Upload documents, maintain previous prescriptions, allergies, ongoing treatments.

- **Appointment History:**

View past and upcoming consultations.

#### 4. Appointment Scheduling

- **Smart Search:**

Patients can find doctors by specialization, location (map integration optional), availability, etc.

- **Booking System:**

Book a slot from the doctor's availability calendar. Auto-confirm or wait for doctor approval (configurable).

#### 5. Doctor Availability Management

- **Update Availability:**  
Doctors can block out dates, add extra slots, or pause bookings.
- **Consultation Fee:**  
Set/edit charges for in-person or video consultations.
- **Appointment Control:**  
Accept, reject, or reschedule patient bookings with automated updates.
- **Payment Status:**  
Track payment success/failure and link them to appointment records..

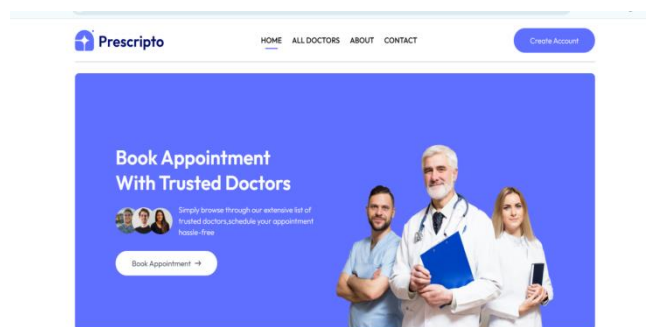


Figure 3. Home Page

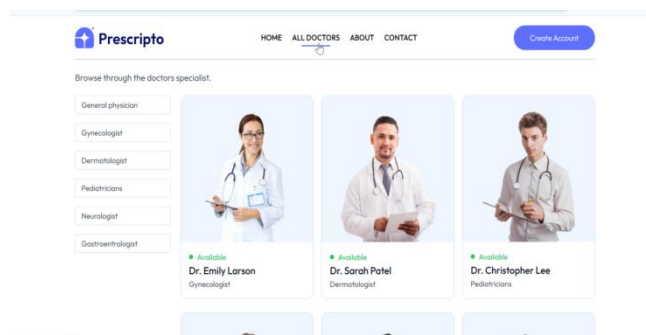


Figure 4. All Doctors Page

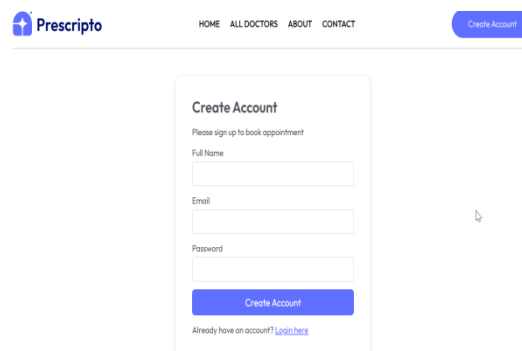


Figure 5. Create Account for new user

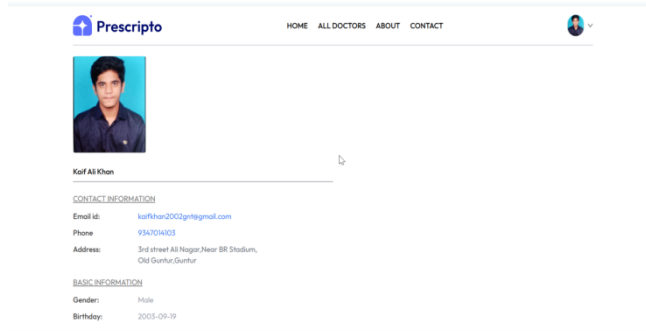


Figure 6. My Profile Page

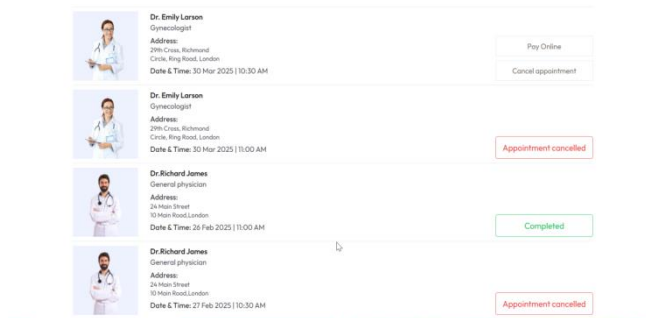


Figure 7. My Appointments Page

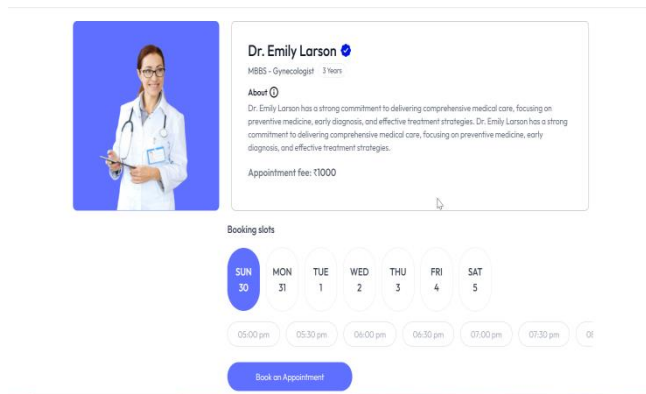


Figure 8.Booking Page

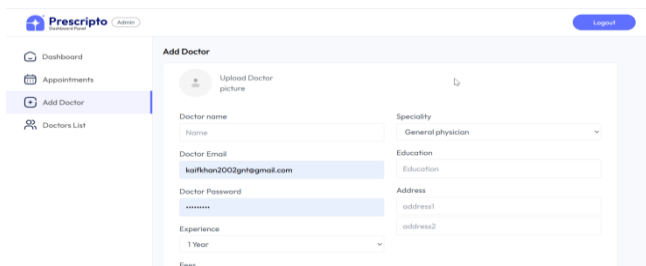


Figure 9. Add Doctor Page



## V. CONCLUSION

Prescripto is a modern, web-based healthcare platform designed to streamline doctor appointment scheduling and management, effectively bridging the gap between patients, doctors, and administrators. Its core objective is to deliver a secure, user-friendly, and efficient system that simplifies the process of booking medical consultations, managing schedules, and maintaining digital healthcare records.

With an intuitive and well-structured interface, Prescripto empowers patients to effortlessly search for doctors, book appointments, and access prescriptions. At the same time, doctors can manage their profiles, review patient history, and conduct consultations with ease. Administrators benefit from comprehensive tools to oversee users, maintain data integrity, and ensure smooth platform operations.

A key strength of Prescripto lies in its robust **authentication and authorization system**, built using **JWT-based role-based access control (RBAC)**. This ensures secure and personalized access for different user roles — patients, doctors, and admins. Patients can confidently browse and schedule appointments, doctors can manage appointments and prescriptions securely, and admins have the tools to monitor system activities and manage users effectively.

The **appointment management module** is at the heart of Prescripto's functionality. Patients can search for doctors based on specialization, availability, and location, with dynamic and real-time search results. Doctors can easily update their availability, accept or decline appointments, and organize their daily schedules. This seamless flow ensures a smooth and efficient interaction between all parties involved.

**Prescription management** and **payment integration** further enhance the platform's utility. Doctors can create and share secure, digital prescriptions that patients can access anytime, eliminating the need for physical paperwork. Integrated with leading payment gateways like **Stripe** or **Razorpay**, Prescripto supports secure, real-time payments for consultations. Patients receive immediate updates about appointment statuses and payment confirmations, promoting transparency and trust.

To reinforce platform reliability, Prescripto includes a **review and rating system**, allowing patients to provide feedback based on their consultation experiences. This promotes service improvement among healthcare providers and helps future patients make informed decisions. Additionally, **real-time notifications** keep users updated on appointment reminders, prescription issues, and payment confirmations, making the platform engaging and responsive.

## VI. FUTURE ENHANCEMENTS

Prescripto holds immense potential for future expansion, with numerous opportunities to enhance functionality and meet the dynamic needs of the healthcare industry. Below are key strategic areas for growth:

### AI-Driven Doctor Recommendations

Leverage machine learning algorithms to analyze patient history, preferences, and behavioral patterns to recommend the most appropriate doctors. This enhances patient-doctor matching and improves overall care quality.

### Mobile Application Development

Launch dedicated mobile applications for **iOS** and **Android** platforms to boost user accessibility. Patients and doctors can manage appointments, view medical records, and receive notifications on the go.

### Telemedicine & Video Consultation

Integrate with video conferencing tools like **Zoom**, **WebRTC**, or **Jitsi** to enable remote consultations. This increases accessibility to healthcare, especially for users in rural or underserved regions.

### Advanced Analytics for Doctors & Admins

Provide real-time dashboards and insightful reports to doctors and administrators. Metrics such as appointment trends, patient behavior, and doctor performance can help improve decision-making and service efficiency.

### Automated Prescription & EHR Integration

Integrate with **Electronic Health Record (EHR)** systems to allow doctors instant access to a patient's medical history. This reduces manual record handling, enhances diagnosis accuracy, and streamlines workflow.

### Integration with Pharmacy & Lab Services

Enable patients to:

- Order prescribed medications directly from partnered pharmacies.
  - Book lab tests or diagnostics from within the platform.
- This creates a connected and complete digital healthcare ecosystem.

#### **Blockchain for Medical Records Security**

Adopt **blockchain technology** to secure patient medical records. This ensures data immutability, privacy, and transparency, preventing unauthorized access or tampering.

#### **Smart Appointment Scheduling with AI**

Use AI to optimize appointment slots by analyzing historical trends and doctor availability. The system can auto-suggest ideal time slots, reduce scheduling gaps, and increase operational efficiency.

#### **Digital Health Insurance Integration**

Connect with health insurance providers to:

- Allow patients to check policy coverage in real time.
- Enable **cashless consultations** and streamline insurance claims for both patients and doctors.

#### **IoT Integration for Remote Patient Monitoring**

Incorporate **IoT-enabled wearable devices** to continuously monitor patient vitals (e.g., heart rate, blood pressure, glucose levels). Based on abnormal readings, the system can auto-schedule appointments or alert doctors.

These future enhancements will position **Prescripto** not just as an appointment platform, but as a full-scale **digital health management solution**. Through continued innovation, Prescripto is poised to revolutionize the way healthcare is accessed, delivered, and experienced.

### **ACKNOWLEDGMENT**

We sincerely express our gratitude to everyone who contributed to the development of our project, "**Prescripto: Doctor Appointment Booking System using MongoDB, React and Node.js**" undertaken as part of our academic major project.

- Our heartfelt thanks to our academic mentors and professors for their **invaluable guidance, technical insights, and continuous support** throughout this research.
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