

# FULL STACK DEVELOPMENT WITH MERN

## Project Documentation

### 1. Introduction

<b>Project Title</b>	DocSpot: Seamless Appointment Booking for Health
<b>Team ID</b>	LTVIP2026TMIDS35442
<b>Team Size</b>	4 Members

### Team Members and Roles

Name	Role	Responsibilities
<b>Prathi Adithya Durga Sri Krishna Kumar</b>	Full Stack Developer	Project coordination, Server architecture, State management, Database design, Documentation
<b>Botla Siva Satyanarayana</b>	Full Stack Developer	UI/UX design, React components, Responsive Design, API development
<b>Satya Srithadi</b>	Backend Developer	API development, API integration, Authentication, System Testing
<b>Perabathula Satya Sai Manikanta</b>	Frontend Developer	Frontend-backend integration, Component development, Bug fixing, Deployment support

## 2. Project Overview

### Purpose

DocSpot is a web-based doctor appointment booking platform that bridges the gap between patients and healthcare providers. The purpose is to eliminate the frustration of traditional phone-based appointment booking by providing a seamless online solution where patients can find doctors, check availability, book appointments, and manage their healthcare journey—all from the comfort of their homes.

### Goals

- Provide patients with 24/7 access to doctor appointment booking
- Enable doctors to manage their schedules digitally and reduce administrative burden
- Give admins tools to verify doctors and monitor platform activity
- Create a trustworthy healthcare ecosystem with verified doctor profiles

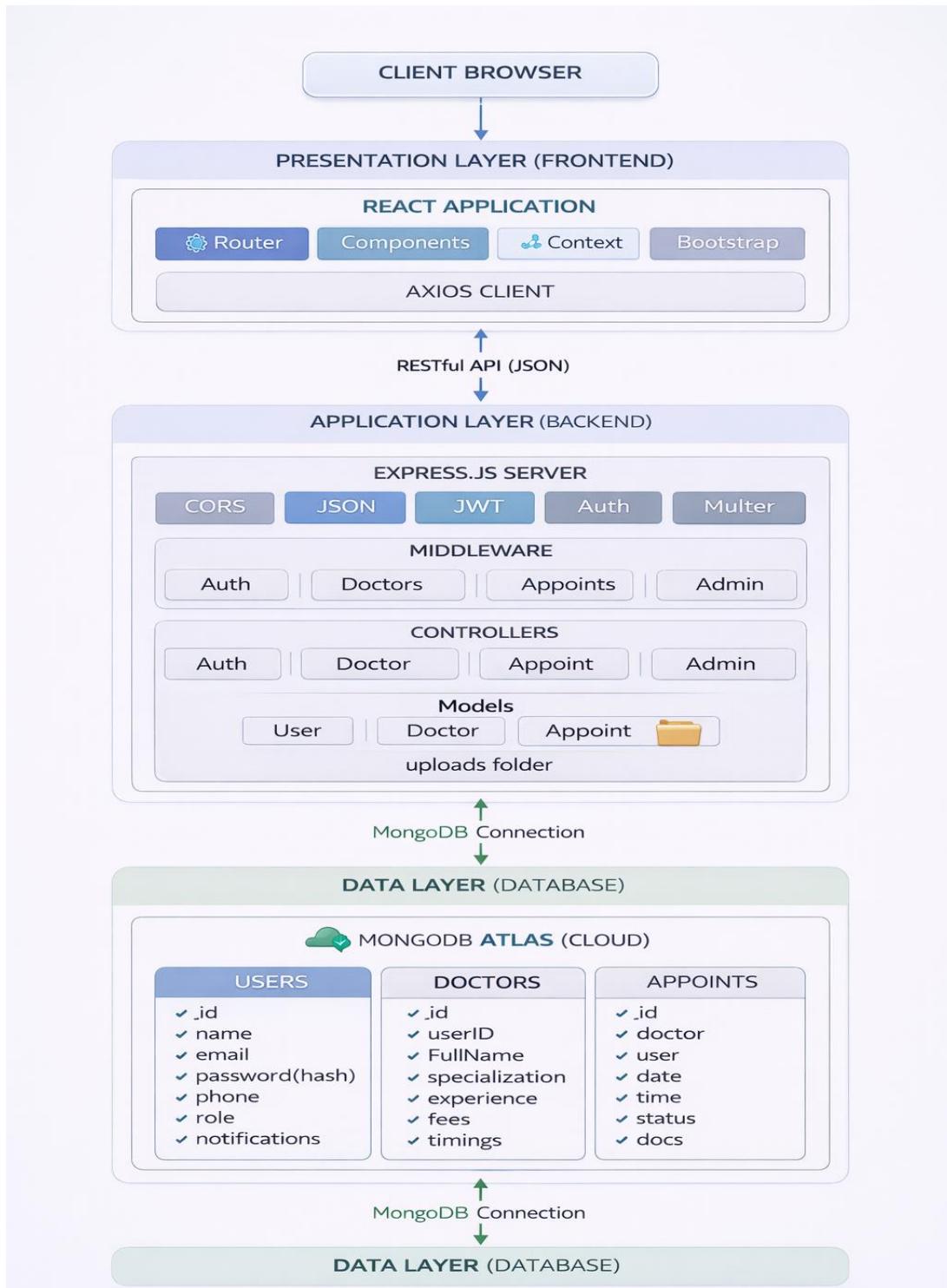
### Key Features

Feature	Description
User Authentication	Secure registration/login with JWT and password encryption
Role-Based Access	Separate dashboards for Patients, Doctors, and Admins
Doctor Discovery	Browse and filter doctors by specialization
Doctor Profiles	View qualifications, experience, consultation fees
Appointment Booking	Select date/time, add reason, upload medical documents
Appointment Management	Track status (pending/approved/rejected/completed/cancelled)
Cancel/Reschedule	Patients can cancel appointments from dashboard
Doctor Dashboard	View and manage appointment requests with approve/reject options
Doctor Profile Management	Update qualifications, fees, and day-wise timings
Admin Dashboard	Platform statistics and monitoring
Doctor Verification	Admin approval workflow for new doctor registrations
User Management	Admin can view all patients and doctors
Appointment Oversight	Admin can view and filter all appointments

### 3. Architecture

#### System Architecture Overview

DocSpot follows a **three-tier client-server architecture** with clear separation between presentation, application, and data layers.



## Frontend Architecture (React)

The frontend is built using React.js with a component-based architecture:

Layer	Technology	Purpose
UI Library	React.js 18.2.0	Component-based user interface
Routing	React Router 6	Client-side navigation and protected routes
State Management	Context API	Global state for authentication and notifications
HTTP Client	Axios 1.6	API communication with token interception
Styling	Bootstrap 5.3, React-Bootstrap 2.10	Responsive UI components
Icons	React Icons	Icon library for UI elements

### Key Frontend Components:

- **Authentication Components:** Login, Register forms with validation
- **Patient Components:** DoctorsList, DoctorProfile, BookAppointment, MyAppointments
- **Doctor Components:** DoctorDashboard, DoctorAppointments, DoctorProfileEdit
- **Admin Components:** AdminDashboard, ManageDoctors, ManageUsers, ManageAppointments
- **Layout Components:** Navbar, Footer, ProtectedRoute

## Backend Architecture (Node.js/Express)

The backend follows MVC (Model-View-Controller) pattern:

Layer	Technology	Purpose
Runtime	Node.js 22.18	JavaScript runtime environment
Framework	Express.js 4.18	Web application framework
Authentication	JWT, Bcryptjs	Token-based auth and password hashing
File Upload	Multer 1.4	Handle multipart form data for document uploads
Environment	Dotenv 16.3	Environment variable management
CORS	CORS 2.8	Cross-origin resource sharing

## **API Structure:**

- **Routes:** Define endpoints and HTTP methods
- **Controllers:** Business logic for each entity
- **Middleware:** Authentication, file upload, error handling
- **Models:** Mongoose schemas for data validation

## **Database Architecture (MongoDB)**

Aspect	Specification
<b>Database</b>	MongoDB Atlas (Cloud)
<b>ODM</b>	Mongoose 7.5
<b>Collections</b>	users, doctors, appointments

## **Database Schema**

### **Users Collection**

```
{  
  _id: ObjectId,  
  name: String,  
  email: String (unique),  
  password: String (hashed),  
  phone: String,  
  isDoctor: Boolean,  
  type: String (enum: user/doctor/admin),  
  notification: Array,  
  createdAt: Date  
}
```

**Doctors Collection**

```
{  
  _id: ObjectId,  
  userId: ObjectId (ref: Users),  
  fullName: String,  
  email: String,  
  phone: String,  
  specialization: String,  
  experience: Number,  
  fees: Number,  
  address: Object,  
  qualifications: Array,  
  timings: Object,  
  status: String (enum: pending/approved/rejected),  
  rating: Number,  
  totalReviews: Number,  
  createdAt: Date  
}
```

**Appointments Collection**

```
{  
  _id: ObjectId,  
  doctorId: ObjectId (ref: Doctors),  
  userId: ObjectId (ref: Users),  
  doctorInfo: Object,  
  userInfo: Object,  
  date: Date,  
  timeSlot: Object,  
  documents: Array,  
  status: String (enum: pending/approved/rejected/completed/cancelled),  
  reason: String,  
  createdAt: Date  
}
```

## 4. Setup Instructions

### Prerequisites

Software	Version	Purpose
<b>Node.js</b>	v18.x or higher	JavaScript runtime
<b>npm</b>	v9.x or higher	Package manager
<b>MongoDB Atlas</b>	-	Cloud database (or local MongoDB)
<b>Git</b>	-	Version control
<b>Web Browser</b>	Chrome/Firefox/Edge	Running the application

### Installation:

#### Step 1: Clone the Repository

```
git clone <repository-url>
cd DocSpot-App
```

#### Step 2: Backend Setup

```
cd backend
npm install
Create a .env file in the backend folder:
env
PORT=5000
MONGODB_URI=mongodb+srv://username:password@cluster.mongodb.net/docspot
JWT_SECRET=your_jwt_secret_key_here
NODE_ENV=development
```

#### Step 3: Frontend Setup

```
cd ../frontend
npm install
Create a .env file in the frontend folder:
Env
REACT_APP_API_URL=http://localhost:5000/api
```

#### Step 4: Database Setup

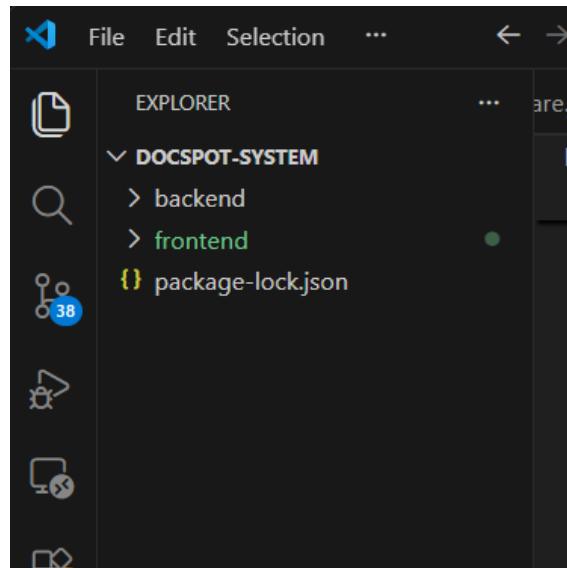
1. Create a MongoDB Atlas account at <https://www.mongodb.com/atlas>
2. Create a new cluster (free tier)
3. Create a database named docspot
4. Create collections: users, doctors, appointments
5. Get your connection string and update the .env file

#### Step 5: Seed Sample Data (Optional)

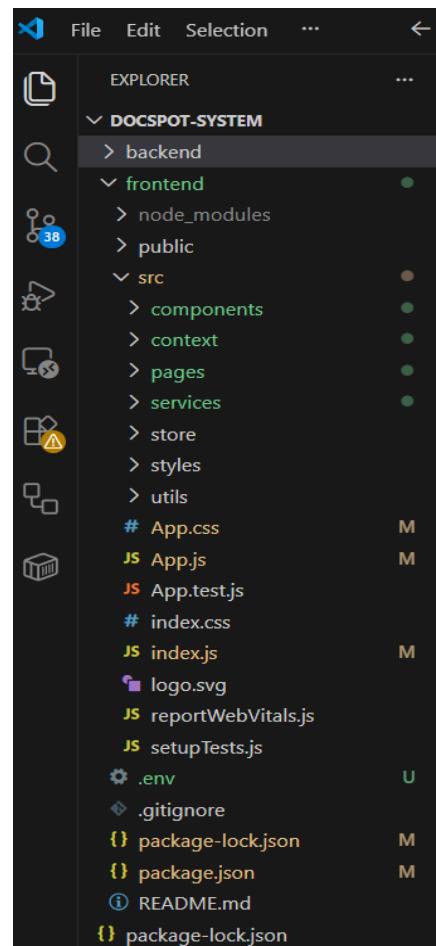
```
cd backend
npm run seed
```

## 5. Folder Structure

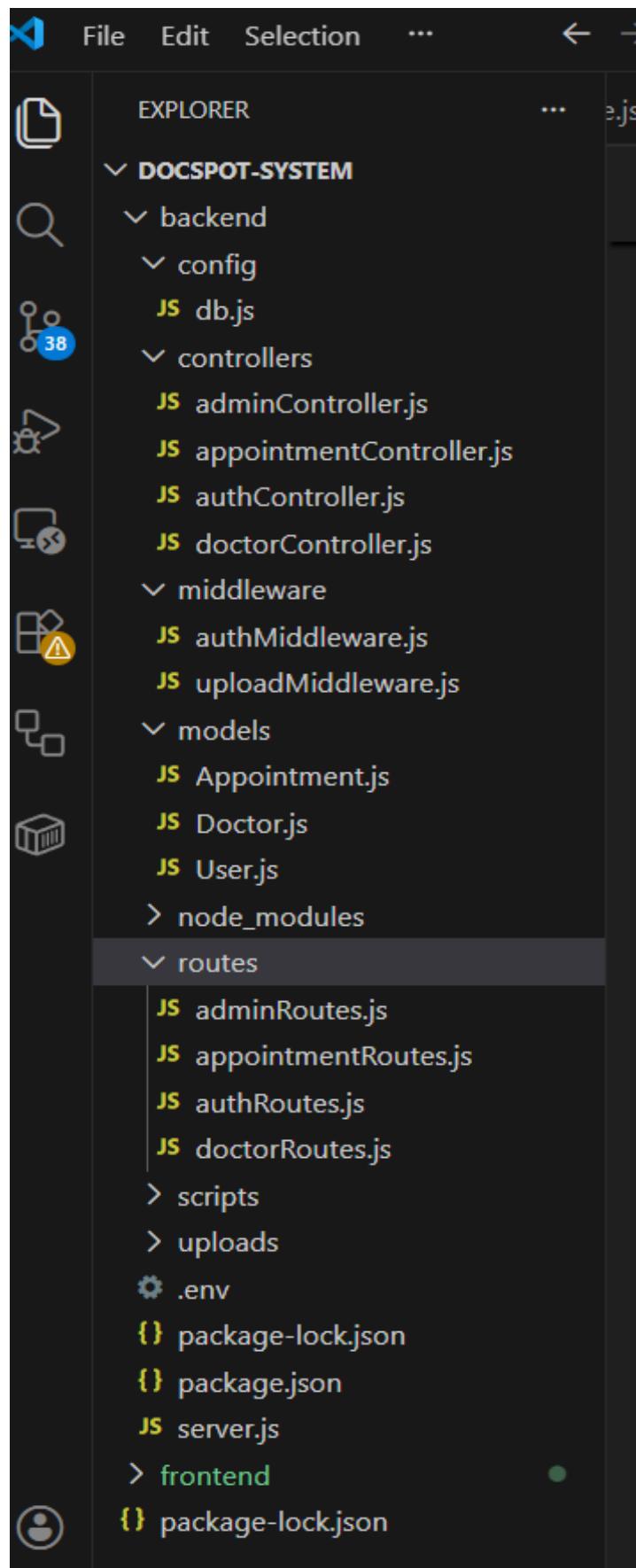
Project Root:



Frontend Structure:



**Backend Structure:**



## 6. Running the Application

### Start MongoDB (if using local)

```
# Start MongoDB service
```

```
net start MongoDB
```

### Start Backend Server

```
cd backend
```

```
npm run dev
```

Backend runs at: <http://localhost:5000>

### Start Frontend Server

```
cd frontend
```

```
npm start
```

Frontend runs at: <http://localhost:3000>

### Access the Application

- Open browser and navigate to: <http://localhost:3000>
- Default credentials (after seeding):
  - Admin: admin@docspot.com / Admin@123
  - Doctor: sarah.johnson@doctor.com / password123
  - Patient: john.smith@example.com / password123

## 7. API Documentation

Base URL: <http://localhost:5000/api>

### Authentication Endpoints

Method	Endpoint	Description	Auth Required
POST	/auth/register	Register new user	No
POST	/auth/login	Login user	No
GET	/auth/profile	Get user profile	Yes
PUT	/auth/profile	Update profile	Yes
GET	/auth/notifications	Get notifications	Yes

### Doctor Endpoints

Method	Endpoint	Description	Auth Required
GET	/doctors	Get all approved doctors	No
GET	/doctors/:id	Get doctor by ID	No
POST	/doctors/apply	Apply as doctor	Yes
PUT	/doctors/profile	Update doctor profile	Yes (Doctor)
GET	/doctors/appointments/list	Get doctor's appointments	Yes (Doctor)
PUT	/doctors/appointments/:id	Update appointment status	Yes (Doctor)

### Appointment Endpoints

Method	Endpoint	Description	Auth Required
POST	/appointments	Book appointment	Yes
GET	/appointments/my-appointments	Get user appointments	Yes
PUT	/appointments/:id/cancel	Cancel appointment	Yes
PUT	/appointments/:id/reschedule	Reschedule appointment	Yes

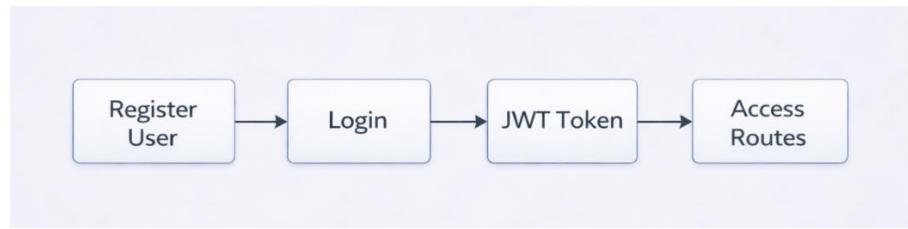
## Admin Endpoints

Method	Endpoint	Description	Auth Required
GET	/admin/users	Get all users	Yes (Admin)
GET	/admin/doctors	Get all doctors	Yes (Admin)
PUT	/admin/doctors/:id/status	Update doctor status	Yes (Admin)
GET	/admin/appointments	Get all appointments	Yes (Admin)
GET	/admin/stats	Get dashboard statistics	Yes (Admin)

## 8. Authentication

### Authentication Flow

DocSpot uses **JWT (JSON Web Token)** based authentication with role-based access control.



### Implementation Details

Component	Technology	Purpose
Password Hashing	bcryptjs	Secure password storage with salt rounds
Token Generation	jsonwebtoken	Create JWT tokens on successful login
Token Storage	localStorage	Store token client-side
Token Validation	JWT Middleware	Verify token on protected routes
Role-Based Access	Custom Middleware	Restrict access based on user type

### Authentication Middleware

```
// authMiddleware.js
const protect = async (req, res, next) => {
  const token = req.headers.authorization?.split(' ')[1];
  if (!token) {
    return res.status(401).json({ message: 'Not authorized' });
  }
  try {
    const decoded = jwt.verify(token, process.env.JWT_SECRET);
    req.user = await User.findById(decoded.id).select('-password');
    next();
  } catch (error) {
    res.status(401).json({ message: 'Invalid token' });
  }
};
```

```
// Role-based middleware
const admin = (req, res, next) => {
  if (req.user && req.user.type === 'admin') {
    next();
  } else {
    res.status(403).json({ message: 'Admin access required' });
  }
};
```

### Protected Routes in Frontend

```
// ProtectedRoute component
const ProtectedRoute = ({ children, requiredRole }) => {
  const { user } = useAuth();
  if (!user) return <Navigate to="/login" />;
  if (requiredRole === 'admin' && user.type !== 'admin') {
    return <Navigate to="/dashboard" />;
  }
  return children;
};
```

## 9. User Interface

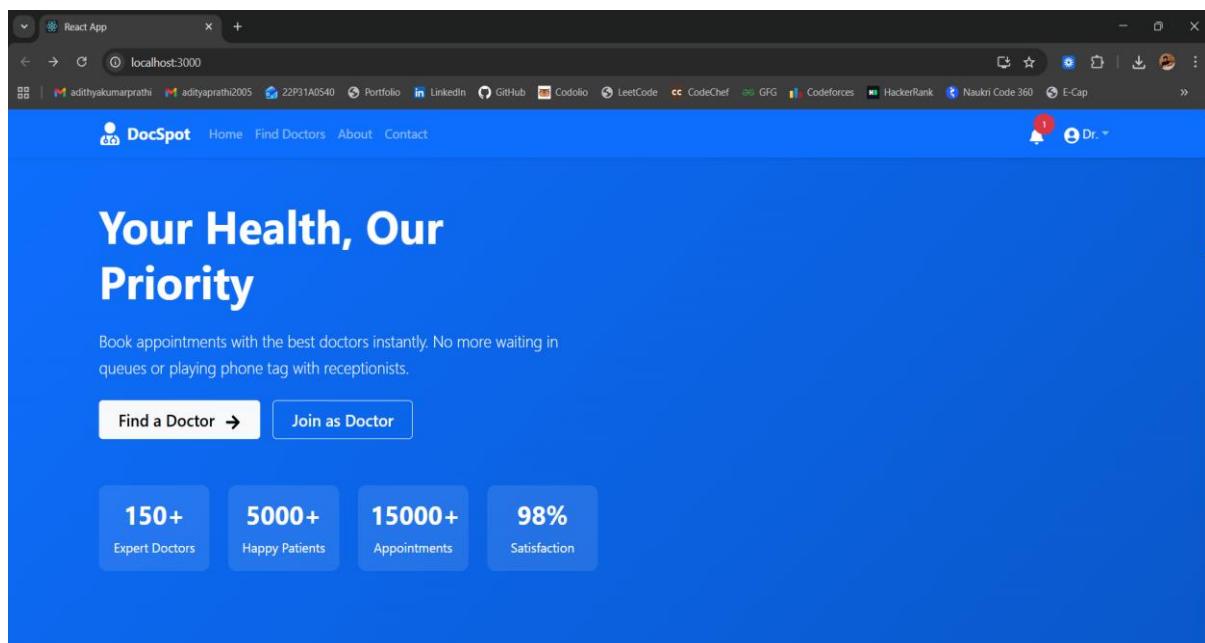
### Key UI Components

Component	Description
<b>Navbar</b>	Responsive navigation with role-based menu items
<b>Hero Section</b>	Landing page with statistics and call-to-action
<b>Doctor Cards</b>	Doctor information with hover animations
<b>KPI Cards</b>	Statistics cards with gradient backgrounds
<b>Status Badges</b>	Color-coded appointment status indicators
<b>Modals</b>	Confirmation dialogs for cancel/reschedule
<b>Forms</b>	Validated forms with clear error messages
<b>Tables</b>	Responsive tables with hover effects

### Responsive Design

- Mobile-first approach using Bootstrap grid
- Collapsible navigation on smaller screens
- Cards stack vertically on mobile devices
- Touch-friendly buttons and form elements

### Screenshots:



React App

localhost:3000

adithyakumarprathi adityaprathi2005 22P31A0540 Portfolio LinkedIn GitHub Codolio LeetCode CodeChef GFG Codeforces HackerRank Naukri Code 360 E-Cap

DocSpot Home Find Doctors About Contact Login Sign Up

## Why Choose DocSpot?



### 24/7 Booking

Book appointments anytime, anywhere with our 24/7 platform



### Expert Doctors

Access to 150+ verified and experienced doctors



### Secure & Private

Your health data is encrypted and kept confidential



### Mobile Friendly

Fully responsive design works on all devices

## Our Featured Doctors

**Dr. Michael Chen**  
Dermatologist

**Dr. Sarah Johnson**  
Cardiologist

**Dr. Emily Rodriguez**  
Pediatrician

React App

localhost:3000

adithyakumarprathi adityaprathi2005 22P31A0540 Portfolio LinkedIn GitHub Codolio LeetCode CodeChef GFG Codeforces HackerRank Naukri Code 360 E-Cap

DocSpot Home Find Doctors About Contact Login Sign Up

## Our Featured Doctors

**Dr. Michael Chen**  
Dermatologist  
  
Experience: **12 years**  
Consultation Fee: **\$120**  
Rating: **★★★★★ (98)**  
[Book Appointment](#)

**Dr. Sarah Johnson**  
Cardiologist  
  
Experience: **15 years**  
Consultation Fee: **\$150**  
Rating: **★★★★★ (127)**  
[Book Appointment](#)

**Dr. Emily Rodriguez**  
Pediatrician  
  
Experience: **10 years**  
Consultation Fee: **\$130**  
Rating: **★★★★★ (156)**  
[Book Appointment](#)

[View All Doctors →](#)

## What Our Patients Say

## 10. Testing

### Testing Strategy

Test Type	Description	Tools
<b>Unit Testing</b>	Test individual components and functions	Jest (planned)
<b>Integration Testing</b>	Test API endpoints and database interactions	Postman
<b>UI Testing</b>	Test user interface and interactions	Manual testing
<b>Cross-browser Testing</b>	Test on multiple browsers	Chrome, Firefox, Edge
<b>Responsive Testing</b>	Test on multiple screen sizes	Chrome DevTools

### Test Coverage

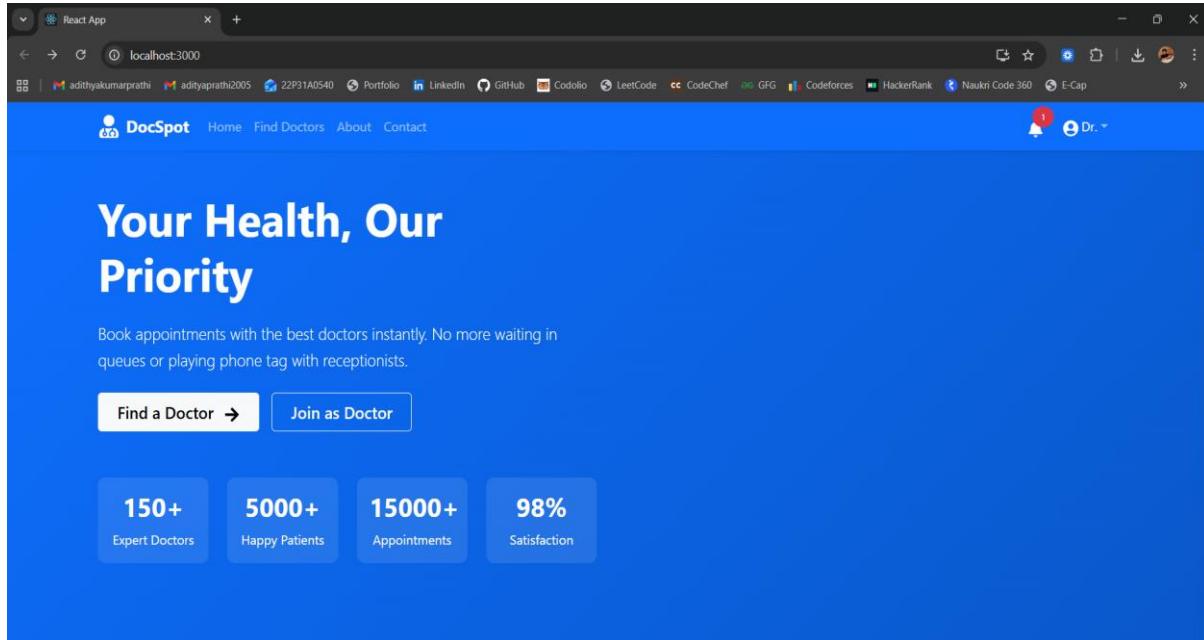
Module	Test Cases	Pass Rate
Authentication	6	100%
Patient Features	9	100%
Doctor Features	6	100%
Admin Features	5	100%
UI/Responsive	2	100%
<b>Total</b>	<b>28</b>	<b>100%</b>

### Bug Tracking

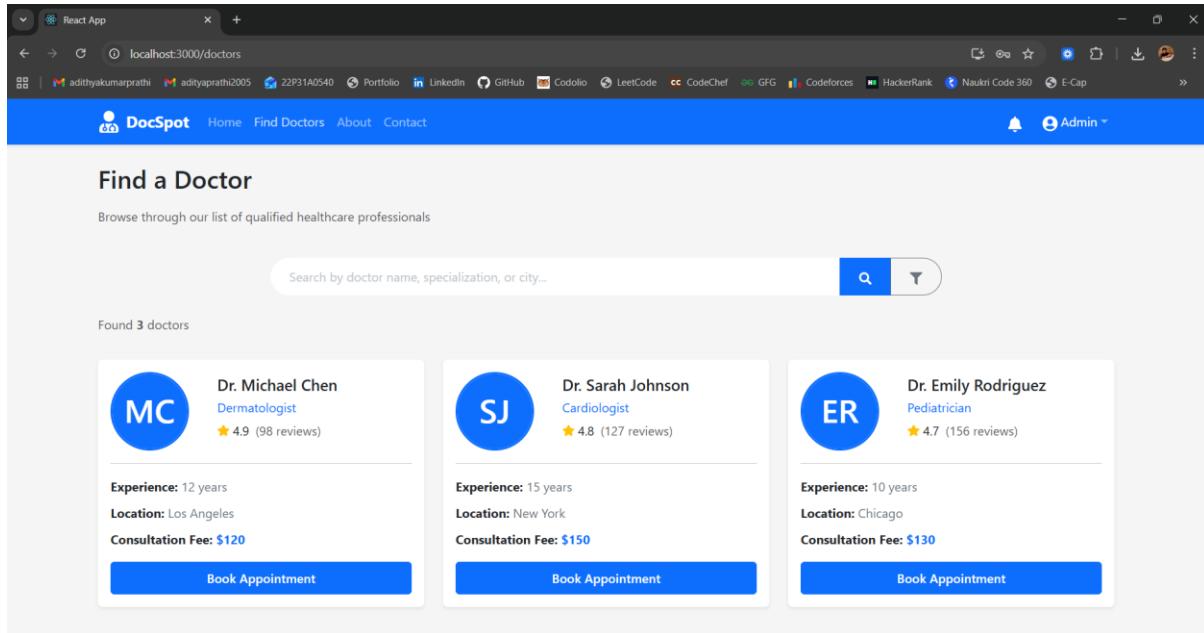
- Total bugs identified during UAT: 7
- Bugs fixed: 7
- Bug fix rate: 100%

## 11. Screenshots or Demo

### Landing Page



### Doctors List Page



## Doctor Profile

The screenshot shows a web browser window for 'DocSpot' at localhost:3000/doctor/profile. The profile belongs to Dr. Michael Chen, whose specialization is not yet set. There is a blue 'Edit Profile' button. Below the profile, there is a section titled 'Complete Your Profile' with instructions to fill in professional details. It includes fields for 'Personal Information' (Full Name: Dr. Michael Chen, Phone Number: +1 (555) 678-9012), 'Professional Information' (Specialization: Cardiologist, Experience (years): [empty], Consultation Fee (\$): [empty]), and a 'Bio / Description' field.

## Appointment Booking

The screenshot shows a web browser window for 'DocSpot' at localhost:3000/book-appointment/699400bef5d261aff695c5d9. The appointment is being booked with Dr. Sarah Johnson, a Cardiologist with 15 years of experience and a consultation fee of \$150. The page allows selecting a date (2/19/2026) and time (09:00, 09:30, 10:00, 10:30, 11:00, 11:30, 12:00, 12:30, 13:00, 13:30, 14:00, 14:30, 15:00, 15:30, 16:00, 16:30). A blue 'Book Now' button is visible at the bottom right.

## My Appointments

The screenshot shows a web browser window for 'DocSpot' with the URL 'localhost:3000/my-appointments'. The page has a blue header with the 'DocSpot' logo, 'Home', 'Find Doctors', 'About', and 'Contact' links, and a user profile for 'PRATHI'. The main content area is titled 'My Appointments' with the sub-instruction 'View and manage your appointment bookings'. A table lists one appointment:

Doctor	Specialization	Date & Time	Status	Actions
Dr. Michael Chen	Dermatologist	2/18/2026 09:30 - 10:00	PENDING	<a href="#"></a> <a href="#"></a>

The footer contains the 'DocSpot' logo, quick links (Home, Find Doctors, About Us, Contact), for doctors links (Join as Doctor, Doctor Login, FAQ, Support), and contact info (Address: 123 Healthcare Ave, Medical District, Phone: +1 (555) 123-4567, Email: support@docspot.com). Social media icons for Facebook, Twitter, Instagram, and LinkedIn are also present.

## Patient Dashboard

The screenshot shows a web browser window for 'DocSpot' with the URL 'localhost:3000/dashboard'. The page has a blue header with the 'DocSpot' logo, 'Home', 'Find Doctors', 'About', and 'Contact' links, and a user profile for 'PRATHI'. The main content area features a welcome message 'Welcome back, PRATHI ADITHYA DURGA SRI KRISHNA KUMAR!' and a 'Book Appointment' button. Below this, there are two sections: 'Upcoming Appointments' and 'Quick Stats'.

**Upcoming Appointments:**

Doctor	Date & Time	Status	Action
Dr. Michael Chen	2/18/2026 09:30 - 10:00	Pending	<a href="#">View</a>

**Quick Stats:**

Category	Value
Total Appointments	1
Pending	1
Approved	0
Completed	0

The page also includes a section for 'Recommended Doctors' featuring three doctors with circular icons and names: Dr. Michael Chen (Dermatologist), Dr. Sarah Johnson (Cardiologist), and Dr. Emily Rodriguez (Pediatrician).

## Doctor Dashboard

The screenshot shows the Doctor Dashboard interface. At the top, there's a header with the DocSpot logo, navigation links (Home, Find Doctors, About, Contact), and a user profile section. Below the header, a blue banner displays "Dr. Dr. Michael Chen" and "Manage your appointments and schedule" with an "Edit Profile" button. The main content area features four cards showing appointment status: Total Appointments (3), Pending (2), Approved (1), and Completed (0). Below these cards is a table titled "Recent Appointments" with columns for Patient, Date & Time, Status, and Actions. The table lists three patients: PRATHI ADITHYA DURGA SRI KRISHNA KUMAR, John Smith, and Emma Watson, along with their appointment details and status (pending or approved) and action buttons.

Patient	Date & Time	Status	Actions
PRATHI ADITHYA DURGA SRI KRISHNA KUMAR	2/18/2026 09:30	<span>pending</span>	<span>✓ Approve</span> <span>✗ Reject</span>
John Smith	3/22/2024 11:00	<span>approved</span>	
Emma Watson	3/21/2024 14:00	<span>pending</span>	<span>✓ Approve</span> <span>✗ Reject</span>

## Doctor Appointments Management

The screenshot shows the "Manage Appointments" page. The header is identical to the Doctor Dashboard. The main content area is titled "Manage Appointments" and contains a table of patient appointments with columns for Patient, Date, Time, Status, and Actions. The table lists the same three patients as the dashboard: PRATHI ADITHYA DURGA SRI KRISHNA KUMAR, John Smith, and Emma Watson, with their respective appointment details and status (pending or approved) and action buttons. At the bottom of the page is a footer with the DocSpot logo, a brief description, quick links (Home, Find Doctors, About Us, FAQ, Join as Doctor, Doctor Login), and contact information (Address: 123 Healthcare Ave, Medical District, Phone: +1 (555) 123-4567, Email: support@docspot.com).

Patient	Date	Time	Status	Actions
PRATHI ADITHYA DURGA SRI KRISHNA KUMAR 8309313270	2/18/2026	09:30 - 10:00	<span>pending</span>	<span>✓ Approve</span> <span>✗ Reject</span>
John Smith +1 (555) 123-4567	3/22/2024	11:00 - 11:30	<span>approved</span>	
Emma Watson +1 (555) 234-5678	3/21/2024	14:00 - 14:30	<span>pending</span>	<span>✓ Approve</span> <span>✗ Reject</span>

## Admin Dashboard

The screenshot shows the Admin Dashboard interface. At the top, there are four cards: 'Total Users' (5), 'Total Doctors' (3), 'Pending Approvals' (0), and 'Total Appointments' (6). Below these are two tables: 'Pending Doctor Approvals' (empty) and 'Recent Appointments' (listing four entries with columns for Patient, Doctor, Date, and Status).

Pending Doctor Approvals				<a href="#">View All</a>
Doctor Name	Specialization	Experience	Action	
No pending approvals				

Recent Appointments				<a href="#">View All</a>
Patient	Doctor	Date	Status	
PRATHI ADITHYA DURGA SRI KRISHNA KUMAR	Dr. Michael Chen	2/18/2026	<span style="background-color: yellow; border-radius: 50%; padding: 2px 5px;">pending</span>	
Robert Johnson	Dr. Sarah Johnson	3/25/2024	<span style="background-color: yellow; border-radius: 50%; padding: 2px 5px;">pending</span>	
Emma Watson	Dr. Michael Chen	3/21/2024	<span style="background-color: yellow; border-radius: 50%; padding: 2px 5px;">pending</span>	
John Smith	Dr. Sarah Johnson	3/20/2024	<span style="background-color: green; border-radius: 50%; padding: 2px 5px;">approved</span>	

## Admin Doctor Approval

The screenshot shows the 'Manage Doctors' page. It lists three doctors with columns for Name, Specialization, Experience, Fees, Status, and Applied On. Each doctor entry has an 'Actions' button.

Doctor	Specialization	Experience	Fees	Status	Applied On	Actions
Dr. Emily Rodriguez emily.rodriguez@doctor.com	Pediatrician	10 years	\$130	<span style="background-color: green; border-radius: 50%; padding: 2px 5px;">approved</span>	12/12/2023	<span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; color: #ccc;">Edit</span>
Dr Michael Chen michael.chen@doctor.com	Dermatologist	12 years	\$120	<span style="background-color: green; border-radius: 50%; padding: 2px 5px;">approved</span>	11/5/2023	<span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; color: #ccc;">Edit</span>
Dr. Sarah Johnson sarah.johnson@doctor.com	Cardiologist	15 years	\$150	<span style="background-color: green; border-radius: 50%; padding: 2px 5px;">approved</span>	10/10/2023	<span style="border: 1px solid #ccc; border-radius: 50%; padding: 2px 5px; color: #ccc;">Edit</span>

**DocSpot**  
Your trusted platform for seamless doctor appointments.  
Book appointments with the best healthcare providers instantly.

**Quick Links**

- [Home](#)
- [Find Doctors](#)
- [About Us](#)

**For Doctors**

- [Join as Doctor](#)
- [Doctor Login](#)
- [FAQ](#)

**Contact Info**

- 123 Healthcare Ave, Medical District
- +1 (555) 123-4567
- [support@docspot.com](mailto:support@docspot.com)

**Video Demo:** [https://drive.google.com/file/d/18imnZNXOX-wAFloZGO-t3SNZsxP70Rbl/view?usp=drive\\_link](https://drive.google.com/file/d/18imnZNXOX-wAFloZGO-t3SNZsxP70Rbl/view?usp=drive_link)

## 12. Known Issues

Issue ID	Description	Status	Workaround
N/A	No known issues in current version	-	-

## 13. Future Enhancements

Enhancement	Description	Priority
Email Notifications	Send email confirmations and reminders	High
SMS Reminders	Send SMS reminders for appointments	Medium
Payment Integration	Online payment for consultation fees	Medium
Video Consultation	Telemedicine integration	Medium
Ratings & Reviews	Patients can rate doctors after appointment	Medium
Calendar Sync	Sync appointments with Google/Outlook calendar	Low
Mobile App	Native mobile application	Low
Multi-language Support	Support for multiple languages	Low