Fracto – Online Doctor Appointment Booking System

Project Title: Fracto

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1. Project Overview

Fracto is an online doctor appointment booking platform built using Angular (Frontend) and ASP.NET Core MVC (Backend). It allows users to search for doctors by city and specialization, view available time slots, and book or cancel appointments. Admins can manage doctors, users, and appointments.

2. Problem Definition & Objectives

Problem Statement:

Traditional appointment booking requires patients to visit hospitals or call manually, leading to inefficiency.

Objectives:

- Allow users to search for doctors by city, specialization, and rating Enable online booking and cancellation of appointments.
- -Allow users to register, login, and book/cancel appointments.
- -Provide rating and filtering system for doctors.
- Provide an admin dashboard to manage doctors and appointments.
- Secure authentication using JWT tokens.

3. System Architecture

Tech Stack:

- Frontend: Angular

- Backend: ASP.NET Core MVC + Web API

- Database: SQL Server (Entity Framework Core ORM)

- Authentication: JWT Token

- API Testing: Swagger

- Image Upload: Profile images stored on server

4. Frontend Architecture & Component Breakdown Components:

- LoginComponent: login & session handling
- RegisterComponent: registration form & validation
- UserDashboardComponent: user-dashboard, home ,user-appointments, appointment-book, view, cancel appointments, profile,doctor-list.
- AdminDashboardComponent: manage users, doctor-list-admin,add-doctor,specialization-list, approve/cancel appointments.
- Services: AuthService,Doctor-service,Specialization,appointment,User service
- Auth Interceptor, Auth Guard (Session Handling)

5. Backend Architecture & API Design

- Controllers: UserController, SpecializationController, AppointmentController DoctorController, DoctorAvailabilityController, RatingController.
- Models: User, Specialization, Appointment, Doctor, Rating, AppDbContext.

API END-POINTS

Endpoint	Method	Description	Authentication
/User/register	POST	Register user	None

/User/login POST Login user & return None

/User/refresh-token POST Refreshes token-user JWT

/User/all GET/POST/PUT/DELETE CRUD on user Admin

/User/upload-profileimagePOST Image Upload Users

/Specialization GET/POST/DELETE CRD on specialization JWT+ Admin

/Doctor GET/POST/PUT/DELETE CRUD on doctors JWT + Admin

Manage

/Appointment GET/POST/PUT/DELETE JWT

appointments

None

Rate doctor

GET/POST JWT

/Rating Slots based on

GET

/Booking/available-slots doctorId

6. Database Design & Storage Optimization

Tables:

Users (UserId, Username, Password, Role, City, Email)

Doctors (DoctorId, Name, SpecializationId, City, Rating, ImagePath)

Specializations (SpecializationId, SpecializationName)

Appointments (AppointmentId, UserId, DoctorId, AppointmentDate, TimeSlot, Status)

Ratings (RatingId, DoctorId, UserId, Rating) Relationships:

Specializations → **Doctors**

Relationship: One-to-Many $(1 \rightarrow \infty)$

- Specializations.SpecializationId → Doctors.SpecializationId
- Meaning:
 - Each specialization (e.g., "Cardiology", "Dermatology") can have many doctors.
 - o A doctor must belong to exactly one specialization.

Doctors → **Appointments**

Relationship: One-to-Many $(1 \rightarrow \infty)$

- Doctors.DoctorId \rightarrow Appointments.DoctorId
- Meaning:
 - o Each doctor can have **many appointments** booked by different users.
 - Each appointment is linked to exactly one doctor.

Users → **Appointments**

Relationship: One-to-Many $(1 \rightarrow \infty)$.

 $Users.UserId \rightarrow Appointments.UserId$

- Meaning:
 - Each user can book multiple appointments.
 - o Each appointment is associated with **exactly one user**.

Doctors → **Ratings**

Relationship: One-to-Many $(1 \rightarrow \infty)$.

 $Doctors.DoctorId \rightarrow Ratings.DoctorId$

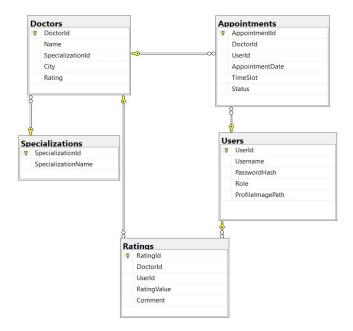
- Meaning:
 - o Each doctor can have **many ratings** given by different users.

Users → **Ratings**

Relationship: One-to-Many $(1 \rightarrow \infty)$

- Users.UserId → Ratings.UserId
- Meaning:
 - Each user can give ratings to multiple doctors (one rating per doctor ideally).
 - o A rating is tied to exactly **one user** and **one doctor**.

DataBase Diagram:



7. Supporting Files (if applicable needs to properly uploaded on Olympus):

• Frontend Code: Frontend_Fracto

https://drive.google.com/file/d/1C8YnlZZ1cpQrt1SchcJtdkajFTrr4Q2L/view?usp=drivesdk



- Frontend_Fracto.zip
- Contains full React/Angular source code
- Backend Code: Backend_Fracto

https://drive.google.com/file/d/1wuMR1kLrIaZN4KdSoq35jUjZyvstJgbD/view?usp=drivesdk



- Backend_Fracto.zip
- Contains full ASP.NET Core Web API source code
- Database & Configuration Files: Database_Schema_Fracto

 $https://drive.google.com/file/d/1R_n1W4ZN9OGoNqxzOhrCPGZVcKukanfQ/view?usp=drivesdk$



• Database scripts:

Database_Schema_Fracto.sql

• Deployment : Github Fracto Project Link:

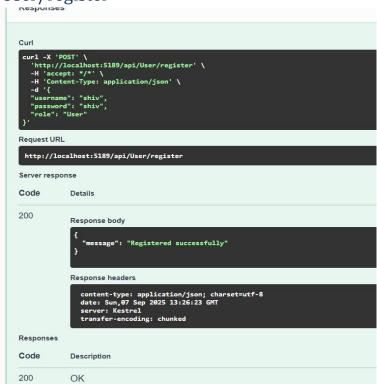
https://github.com/anvitha31303/Fracto

• Project needs to be pushed on GitHub and keep it as private

8.Backend User Endpoints: CRUD

Operation(Register/Login/Get/Put/Delete/AddProfilePic)

/User/register



/User/login



Request URL http://localhost:5189/api/User/all Server response Code Details 200 Response body [{ "userId": 1, "username": "admin", "profileImagePath": null }, "username": "siva", "profileImagePath": "/uploads/fa378000-b2b9-4b66-818c-9d2b69ccd525_aisha.jpg" }, "username": "Waanik", "role": "User", "profileImagePath": "/uploads/a2307b76-c78e-4fac-96f3-47fc217fef1c_p3.jpg" }, { "userId": 12, "username": "user", "profileImagePath": "/uploads/a2307b76-c78e-4fac-96f3-47fc217fef1c_p3.jpg" }, { "userId": 12, "username": "user", "profileImagePath": "/uploads/880249b7-2c7c-470d-b3cf-3cc0438277b7_sneha.jpg" }, { "userId": 15, }

Put /api/User/{id}



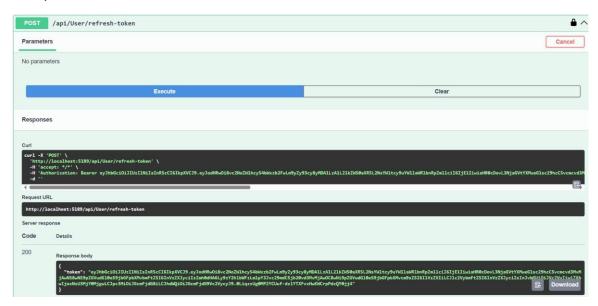
/User/upload-profile-image

```
file
                    Choose File sneha.jpg
   string($binary)
                  Send empty value
                                                  Execute
Responses
Curl
 curl -X 'POST' \
  'http://localhost:5189/api/User/upload-profile-image' \
-H 'accept: */*' \
  -H 'Authorization: Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJodHRwOi8vc2NoZW1hcy54bWxzb2FwLm9
  -H 'Content-Type: multipart/form-data' \
   -F 'file=@sneha.jpg;type=image/jpeg'
Request URL
 http://localhost:5189/api/User/upload-profile-image
Server response
Code
             Details
200
             Response body
                "imagePath": "/uploads/bc647355-0365-48d4-802f-c7c3687e5e79_sneha.jpg"
```

DELETE/api/User/{id}

Name	Description
<pre>id * required integer(\$int (path)</pre>	16
	Execute
Responses	
Curl	
-H 'acce	ELETE' \ localhost:5189/api/User/16' \ ot: */*' \ orization: Bearer eyJhbGci0iJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJodHRw0i8vc2
Request URL	
http://loc	alhost:5189/api/User/16
Server respon	nse
Code	Details
200	Response body
	{ "message": "User deleted successfully" }

User/refresh-token



9. Use Case Descriptions: User Stories (User Role)

- 1. User Authentication (Login, Logout, Register)
 - Description: A user registers with username, password, and role (default User). On login, the user gets a JWT token to access secured APIs. Logout clears the session.
 - Actors: User, System.

Outcome: Secure access to system features.

2. City Selection

- Description: The user selects a city to search for doctors available in that city.
- o **Actors**: User.
- Outcome: Filters doctors by location.
- 3. **Appointment Date Selection** \circ **Description**: The user chooses a date for

booking appointments. o **Actors**: User.

Outcome: Narrow down doctors available on that date.

4. Specialist Selection

 Description: User selects a specialization (Cardiology, Dermatology, etc.) from the list.

- Actors: User, System (loads specializations).
- Outcome: Filtered doctors based on specialization.

5. View Available Doctors

- Description: System displays a list of doctors based on selected city,
 specialization, and date.
 Actors: User, System.
- Outcome: User can see available doctors.
- 6. Filter by Ratings Description: User filters doctors by minimum rating (1–5). ○Actors: User, System.
 - o **Outcome**: Sorted list of quality doctors.
- 7. **Doctor Selection Description**: User selects a doctor from the displayed list. **Actors**: User.
 - o **Outcome**: Doctor details displayed, ready for appointment booking.

8. View Time Slots

- Description: Once a doctor is selected, available time slots for that date are shown.
- Actors: User, System.
- Outcome: User can choose a convenient slot.
- 9. **Book Appointment** o **Description**: User books an appointment with doctor (date +
 - slot). o Actors: User, System, Database.
 - o **Outcome**: Appointment record created in DB.

10. Receive Confirmation

- o **Description**: User receives confirmation (via UI or notification).
 - Actors: User, System.
- o **Outcome**: Booking success acknowledged.
- 11. **Cancel Appointment** o **Description**: User can cancel an existing appointment.
 - Actors: User, System.

- o **Outcome**: Appointment marked as cancelled in DB.
- 12. **Rate and Review Doctor** o **Description**: After completed appointment, user can

rate and leave review. o **Actors**: User, System.

o **Outcome**: Rating updates doctor's average score.

Admin Stories (Admin Role)

1. **Admin Authentication** \circ **Description**: Admin logs in using

credentials, receives JWT token. O Actors: Admin, System.

- o **Outcome**: Secure access to admin panel.
- 2. **CRUD on Users** o **Description**: Admin can add, update, delete, and

view users. o **Actors**: Admin, System, Database.

- o **Outcome**: User management.
- 3. Manage Appointments
 - Description: Admin can approve, reject, or mark appointments as completed.
 - o **Actors**: Admin, System. o **Outcome**: Appointment workflow managed.
- 4. **Send Confirmation** o **Description**: Admin confirms booking

approval/rejection. o **Actors**: Admin, System, Notification Service (optional SignalR).

- o **Outcome**: User notified about appointment status.
- 5. **Cancel Appointments Description**: Admin can cancel scheduled appointments.

o **Actors**: Admin, System.

o **Outcome**: Appointment removed/marked cancelled.

6. **Manage Doctors & Specializations** o **Description**: Admin can

add/edit/delete doctors and specializations.

Actors: Admin,

System, Database. O **Outcome**: Doctor catalog managed.

Output Snapshots:

API EndPoints & Angular User Interface Outputs 10.Backend

Doctor Endpoints: CRUD Operations

GET/api/Doctor:

```
Curl
 curl -X 'GET' \
    'http://localhost:5189/api/Doctor' \
    -H 'accept: */*' \
   -H 'Authorization: Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJodHRwOi8vc2NoZW1hcy54bWxzb2FwLm9yZy93cy8yMDA1Lz
Request URL
 http://localhost:5189/api/Doctor
Server response
Code
                Details
200
                Response body
                       "doctorId": 1,
"name": "Dr. Smith",
                       "city": "New York",
                       "rating": 5,
"specialization": {
                          "specializationId": 1,
"specializationName": "Cardiology"
                       "doctorId": 9,
"name": "Dr. Yaswanth",
"city": "Hyderabad",
                       "rating": 4,
"specialization": {
                          "specializationId": 2,
"specializationName": "Dermatology"
                       "doctorId": 13,
"name": "Dr.Mathews",
                       "city": "New York",
                       "rating": 5,
"specialization": {
```

PUT/api/Doctor/{id}

```
Curl
curl -X 'PUT' \
   'http://localhost:5189/api/Doctor/9' \
  -H 'accept: */*' \
  -H 'Authorization: Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJodHRwOi8vc2NoZW1hcy54bW
  -H 'Content-Type: application/json' \
   -d '{
   "doctorId": 9,
   "name": "Dr.Yaswanth",
  "city": "Hyderabad",
"specializationId": 2,
  "rating": 4
Request URL
 http://localhost:5189/api/Doctor/9
Server response
Code
              Details
200
              Response body
                 "doctorId": 9,
                 "name": "Dr.Yaswanth",
"city": "Hyderabad",
                 "specializationId": 2,
                 "rating": 4,
"specialization": null
```

DELETE/api/Doctor/{id}

Name	Description
<pre>id * required integer(\$int3 (path)</pre>	2) 9
	Execute
Responses	
Curl	
-H 'accept	calhost:5189/api/Doctor/9' \
Request URL	
http://local	Lhost:5189/api/Doctor/9
Server respons	e
Code	Details
200	Response body
	{ "message": "Doctor deleted" }

POST/api/Doctor

```
Curl
 curl -X 'POST' \
   'http://localhost:5189/api/Doctor' \
  -H 'accept: */*' \
  -H 'Authorization: Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJodHRwOi8vc2NoZW
   -H 'Content-Type: application/json' \
  -d '{
  "name": "Paul",
"city": "Hyderabad",
  "specializationId": 1,
   "rating": 2
Request URL
 http://localhost:5189/api/Doctor
Server response
Code
             Details
200
             Response body
                "doctorId": 24,
                "name": "Paul",
                "city": "Hyderabad",
                "specializationId": 1,
                "rating": 2,
                "specialization": null
```

Backend Appointment Endpoints: CRUD Operations POST/Appointment/book

Request URL

http://localhost:5189/api/Appointment/book

Server response

Code Details

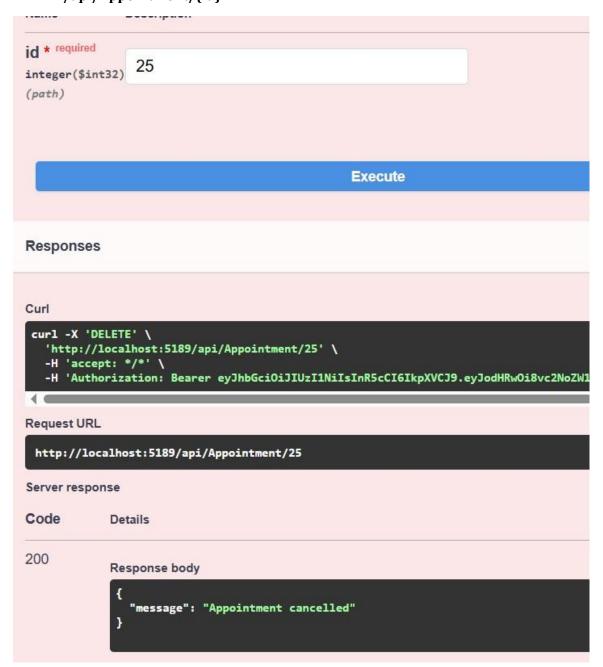
200

Response body

```
"message": "Appointment booked successfully",
"appointmentId": 28,
  "doctorId": 1,
  "doctor": {
    "doctorId": 1,
    "name": "Dr. Smith",
    "city": "New York",
    "specializationId": 1,
    "rating": 5,
    "specialization": null
    },
    "userId": 15,
    "user": null,
    "appointmentDate": "2025-09-07T15:44:36.24Z",
    "timeSlot": "10-11",
    "status": "Pending"
    }
}
```

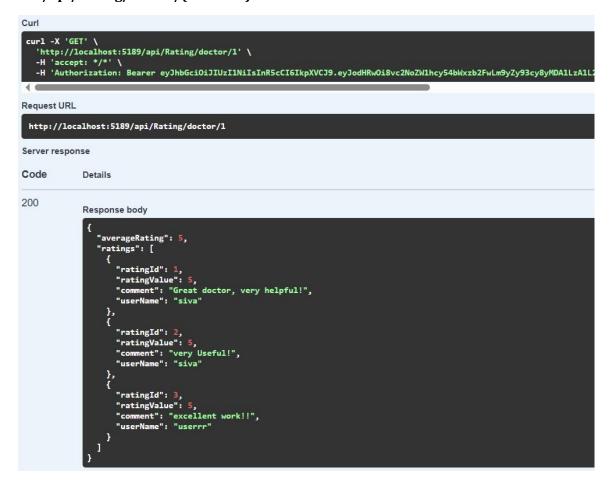
Get/api/Appointment/my

DELETE/api/Appointment/{id}



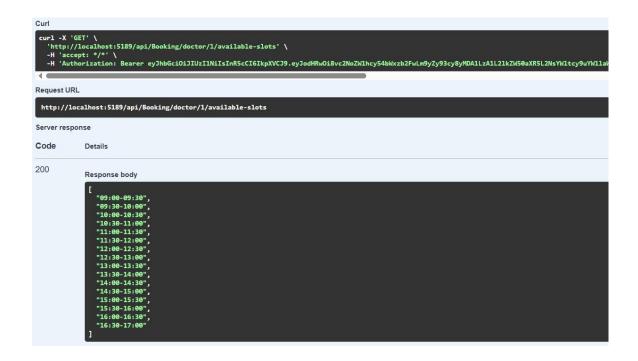
```
Curl
curl -X 'POST' \
   'http://localhost:5189/api/Rating' \
  -H 'accept: */*' \
  -H 'Authorization: Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJodHRwOi8vc2NoZW1
  -H 'Content-Type: application/json' \
   -d '{
  "doctorId": 1,
  "userId": 15,
  "ratingValue": 5,
   "comment": "excellent work!!"
Request URL
 http://localhost:5189/api/Rating
Server response
Code
            Details
200
            Response body
               "message": "Rating added successfully",
               "newAverage": 5
```

GET/api/Rating/doctor/{doctorId}



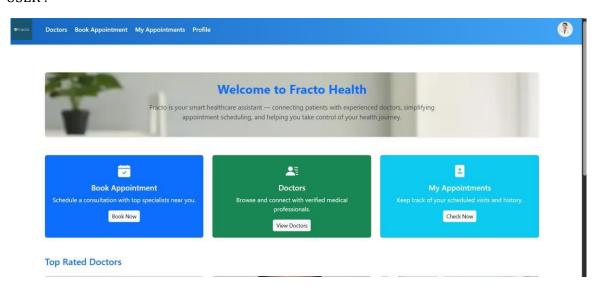
Backend Booking Endpoint: Available Slots

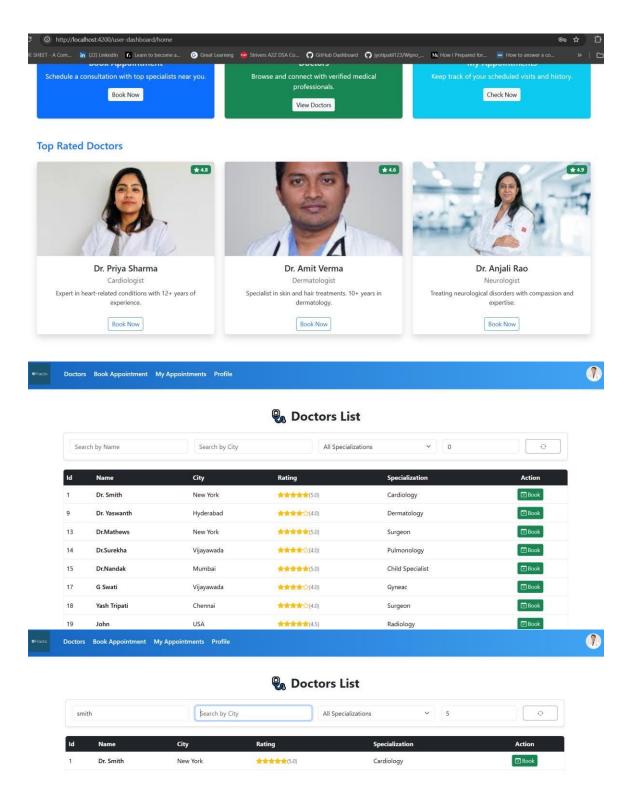
GET/api/Booking/doctor/{doctorId}/available-slots

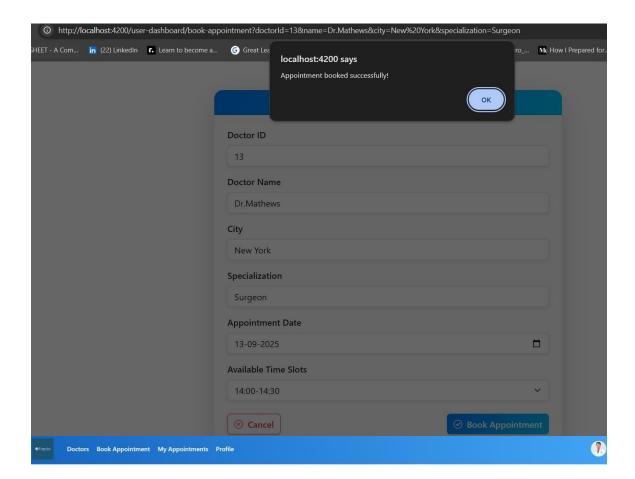


10. Output Snapshots Of Angular(Admin+User UI):

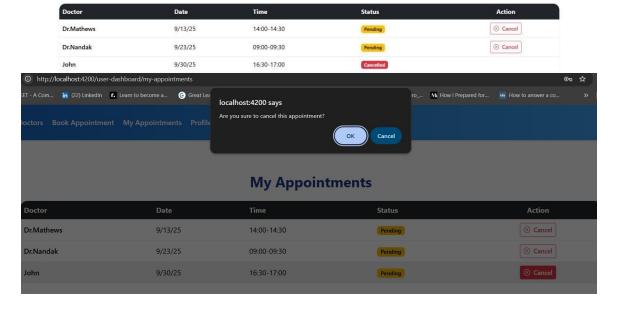
USER:

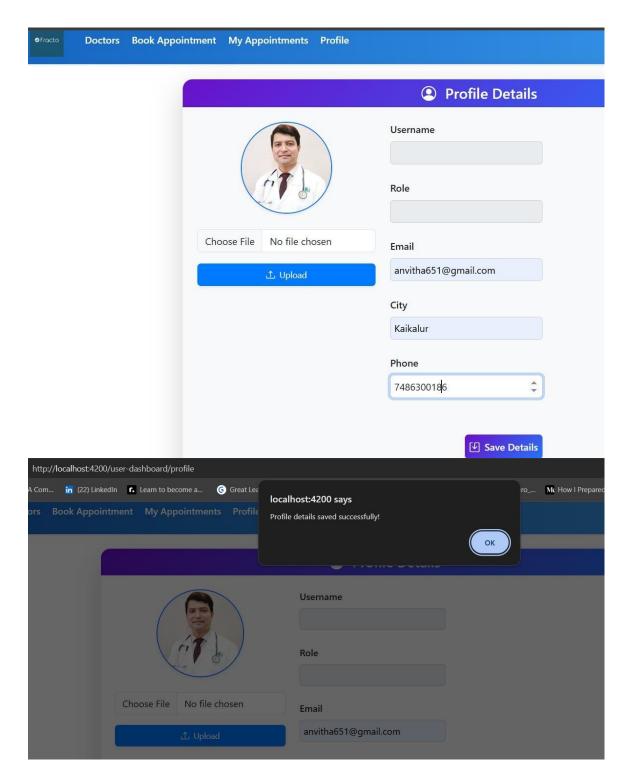






My Appointments

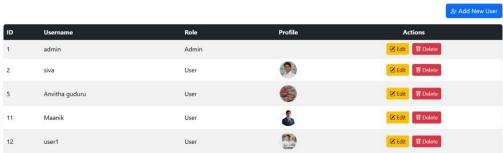


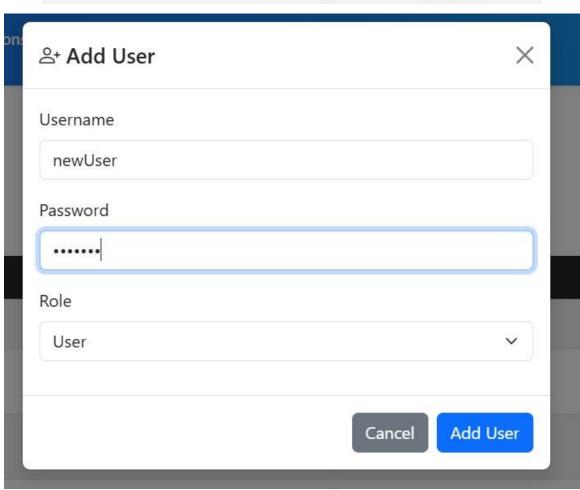


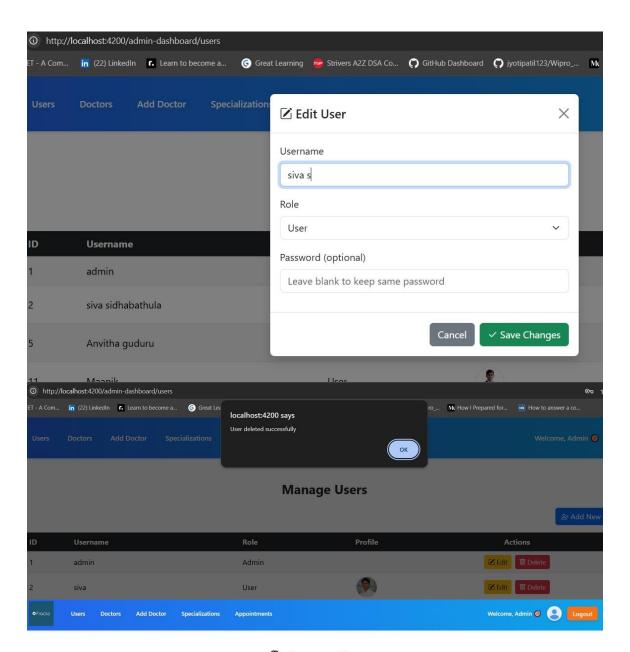
ADMIN UI:



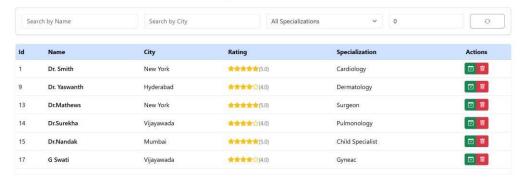
Manage Users



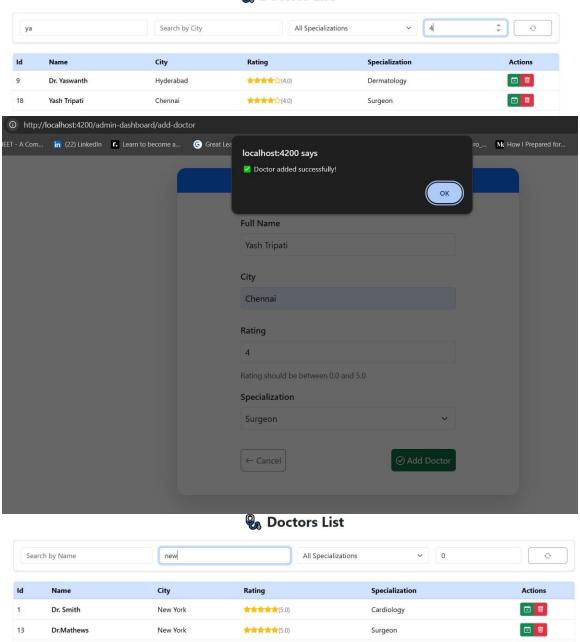




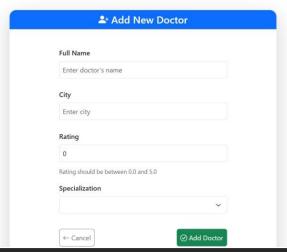
Doctors List

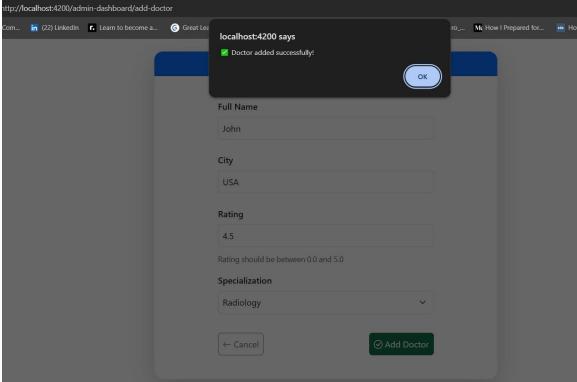


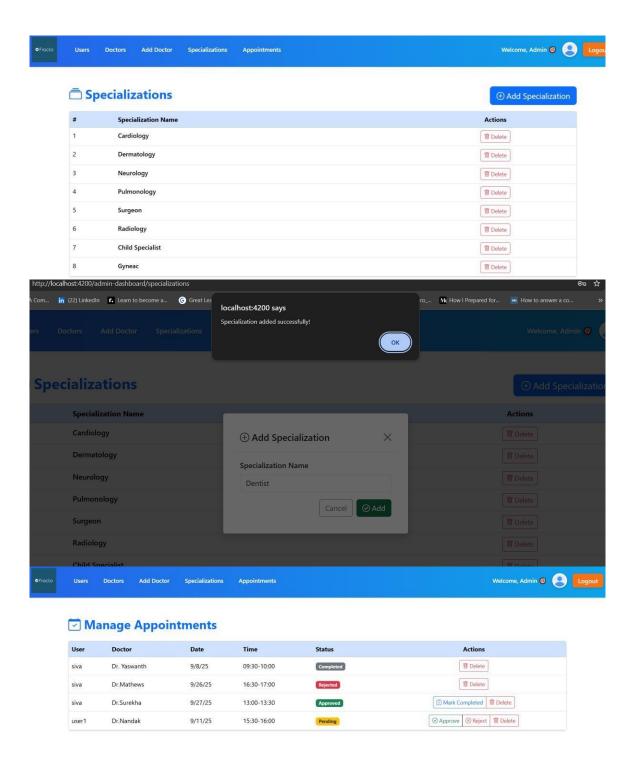
Doctors List











11. Conclusion

The Fracto project successfully implements an online doctor appointment booking system with secure authentication, appointment management, and a user-friendly interface. Future enhancements could include payment integration, real-time notifications via SignalR, and mobile app support.