

App Dev Project Report

Hospital Management System (MediCare)
MAD1 – IIT Madras BS Degree

1. Student Details

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About Me:

I am a Diploma-level student at IIT Madras, pursuing BS in Data Science and Applications. I have a strong passion for application development, backend engineering, graphic design and UI/UX design. I love creating real-world solutions that blend clean interfaces with functional, reliable backend systems.

2. Project Details

Project title : MediCare : Hospital management systems

Problem statement :

You are required to build a **Hospital Management System (HMS)** web application that allows **Admins, Doctors, and Patients** to interact with the system based on their roles.

Approach:

The app was built using Flask with a modular backend and a clear role-based design. Admins manage hospital data, doctors handle appointments and treatments, and patients book slots and view history. SQLAlchemy models support authentication, scheduling, and record management, while Bootstrap and Jinja provide a simple, user-friendly interface. The overall approach focused on creating a stable backend and an intuitive UI to streamline hospital workflows.

3. AI/LLM Declaration

I, Ridhi Sehgal, declare that **this project was developed primarily through my own learning, coding, and implementation efforts.**

AI tools such as **ChatGPT** were used **only for the following purposes:**

- Debugging errors and understanding error messages
- Getting explanations of Python, Flask, SQLAlchemy, and Jinja concepts and understanding some major backend routes
- Improving documentation clarity and writing quality
- Refining UI/UX ideas and structuring report content and organizing the codes
- Generating small helper snippets or troubleshooting specific issues

Based on my usage, I estimate that **AI/LLMs contributed approximately 15–20%** of the total work, limited strictly to explanation, debugging help, and documentation refinement.

The remaining **80%** of the project — including planning, architecture, backend logic, database modelling, route design, and implementation — was completed independently by me.

AI tools **were NOT used to generate the full project**, database schema, or core logic. All significant coding, architectural decisions, database design, route handling, and feature implementation were done independently by me.

I understand the IIT Madras academic guidelines regarding the responsible use of AI, and I confirm that **the project reflects my own work**, with AI used only as a supporting tool for learning and enhancement.

4. Technologies and Frameworks Used

Technology / Library	Purpose
Flask	Core backend web framework for routing, logic, and server-side processing
SQLAlchemy	ORM used to manage database tables, relationships, and queries
Jinja2	Template engine for rendering dynamic HTML pages
Bootstrap 5	Frontend styling, layout, and responsive UI design
HTML5 + CSS3	Structure and styling of user-facing web pages
Font Awesome	Icons used for buttons, actions, and UI enhancements
SQLite	Lightweight relational database for storing users, appointments, treatments, etc.
Flask Sessions	Authentication, role-based access, and session management
JavaScript	Interactive frontend behavior and UI responsiveness

5. Database Schema / ER Diagram

Tables:

1. **User** — stores login credentials & role information
(*id, username, password, type, blocked*)
 2. **Patient** — stores patient profile details
(*id, user_id, name, age, gender, phone, email, blocked*)
 3. **Doctor** — stores doctor details
(*id, user_id, doctor_name, email, experience, department_id*)
 4. **Department** — stores hospital departments
(*id, name, description*)
 5. **Appointment** — stores appointment bookings
(*id, patient_id, doctor_id, date, time, status, visit_type*)
 6. **Treatment** — stores treatment/visit records
(*id, appointment_id, doctor_id, date, time, diagnosis, prescription, tests_done, medicines, visit_type*)
 7. **Availability** — stores doctor availability slots
(*id, doctor_id, date, slot, is_available*)
 8. **Enquiry** — stores messages from the landing page
(*id, name, email, message*)
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Relationships:

One-to-Many

- User → Patient
- User → Doctor

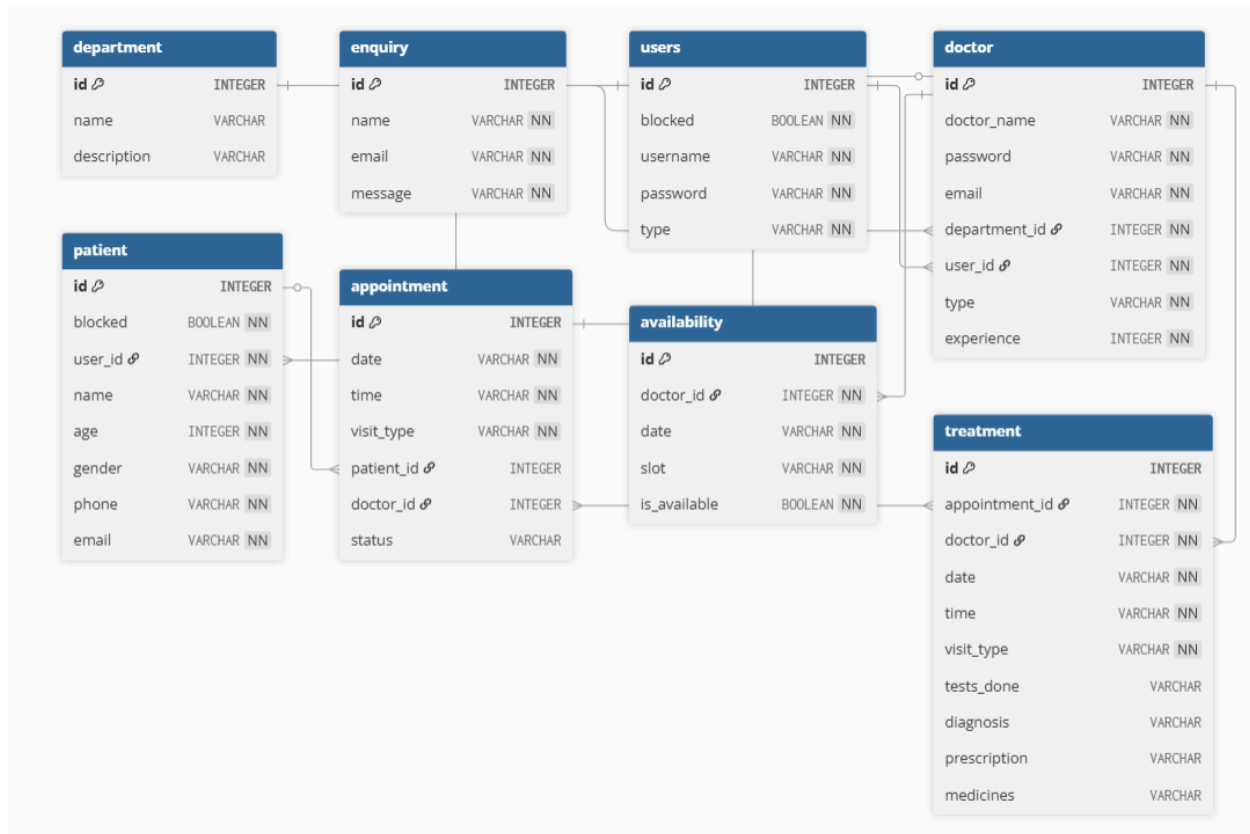
- Department → Doctor
- Patient → Appointment
- Doctor → Appointment
- Doctor → Availability
- Appointment → Treatment

Many-to-One

- Appointment → Patient
- Appointment → Doctor
- Doctor → Department

Cascade Deletes

- Deleting a **User** deletes its linked **Doctor/Patient**
- Deleting a **Doctor** deletes its **Availabilities** and optionally *past* appointments (based on logic)
- Deleting an **Appointment** deletes its **Treatment records**



(db made by dbdiagram.io)

6. Architecture and Features

Architecture Overview

- **app.py / controllers.py** – Main Flask application entry point and route handling
- **/models** – SQLAlchemy ORM models for User, Doctor, Patient, Appointment, Treatment, etc.
- **/templates** – Jinja2 HTML templates for all pages (admin, doctor, patient dashboards)
- **/static** – CSS, JS, images, icons, and Bootstrap resources
- **/database** – Database configuration and initialization

- **/application** – Modular structure containing routes, utilities, and backend logic
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Implemented Features

Authentication & Roles

- User login system with sessions
- Three roles: **Admin, Doctor, Patient**
- Role-based access and protected routes

Admin Features

- Add, edit, delete doctors
- Add, edit, delete patients
- View all appointments
- Blacklist/unblacklist users
- Manage departments
- View patient history

Doctor Features

- View assigned appointments
- Mark appointments as completed
- Record patient visit details (diagnosis, tests, prescription)
- Manage availability slots (add/delete/clear availability)
- View patient medical history

Patient Features

- Register a new account
- Edit profile
- Browse departments
- View doctor details
- Check doctor availability
- Book appointment slots
- Cancel appointments
- View complete medical history

Appointment Management

- Real-time slot availability
- Status handling (Upcoming, Completed)
- Automatic slot release on cancellation or completion

Landing Page Features

- Enquiry submission form
 - Simple public homepage
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Additional Features

- Flash messages for all actions (success/error feedback)
- Clean, responsive UI using Bootstrap 5

- Logical database relationships with cascading deletes
- Error handling for login failures and unauthorized access

7. API / Route Summary

Route	Method	Description
<code>/register</code>	POST	Create user account
<code>/login</code>	POST	Login
<code>/admin</code>	GET	Admin Dashboard
<code>/create_doctor</code>	POST	Add a doctor
<code>/delete_doctor/<id></code>	GET	Delete doctor safely
<code>/edit_doctor/<id></code>	POST	Update doctor info
<code>/doctor/<id></code>	GET	Doctor profile
<code>/doctor/check_availability/<id></code>	GET	Show available slots
<code>/book_appointment/<id></code>	POST	Book appointment
<code>/patient_history</code>	GET	Show complete history
<code>/treatment/add/<appointment_id></code>	POST	Add treatment record

8. Video Presentation

Drive Link:

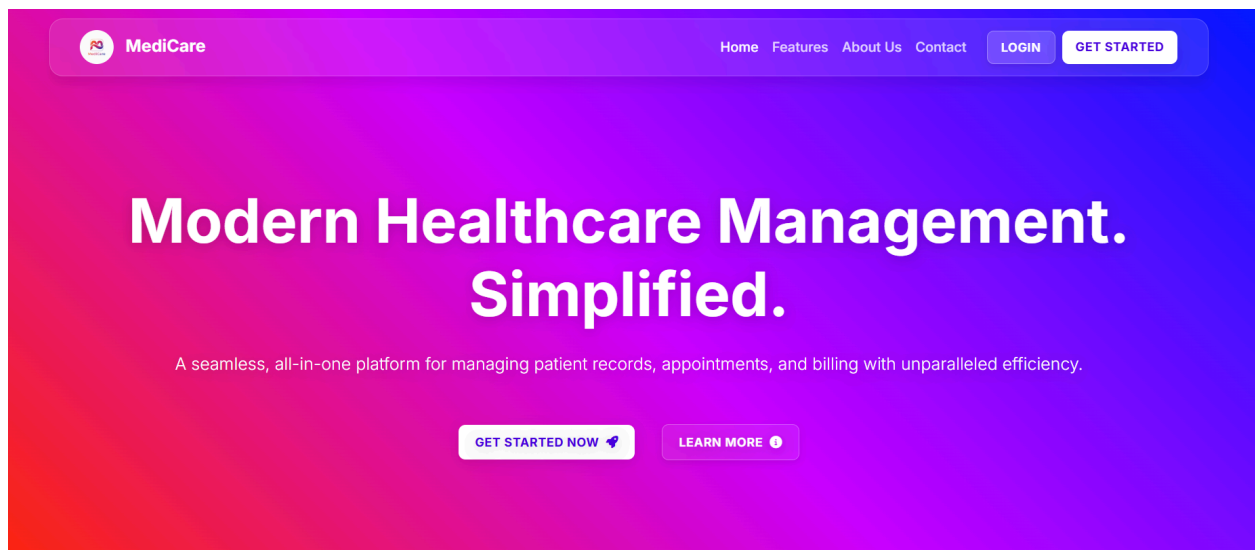
📁 APP DEV PROJECT - RIDHI - VIDEO PRESENTATION

(Accessible to all with "View" permission.)

9. Conclusion

MediCare successfully solves real-world issues in hospital appointment and record management. The system provides a clean, responsive UI and a structured backend that ensures reliability. The project strengthened my understanding of backend systems, database design, and full-stack app development.

HERE ARE SOME UI SCREENSHOTS 😊



MediCare Admin

Logout

Welcome, admin!

Search doctor/patient...

Search

Registered Doctors

+ Create New

Dr. doc1

d1@gmail.com

edit

delete

blacklist

Dr. doc2

d2@gmail.com

edit

delete

blacklist

Dr. doc3

d3@gmail.com

edit

delete

blacklist

Dr. doc4

d4@gmail.com

edit

delete

blacklist

Registered Patients

MediCare Patient

Welcome, p1! Edit Profile History Logout

Patients' Dashboard

Departments

Cardiology

View Details

Oncology

View Details

General

View Details

Neurology

View Details

Upcoming Appointments

Sr No.	Doctor Name	Department	Date	Time	Action
No upcoming appointments.					

MediCare Doctor

Welcome, Dr. doc1! Logout

Doctor's Dashboard

Upcoming Appointments

Sr No.	Patient Name	Patient History	Actions
No upcoming appointments.			

Assigned Patients

No assigned patients.

Provide Availability