HOSPITAL MANAGEMENT SYSTEM (HMS)

(Presented by M.Ahmad (SP25-BSE-019) , Rabia Tehreem(SP25-BSE-048))
December 16, 2025

INTRODUCTION

The **Hospital Management System (HMS)** is a desktop application developed using Java and JavaFX to automate hospital operations. The system allows hospital administrators to manage patients, doctors, appointments, and billing efficiently.

The application uses **CSV files** for persistent storage, making it lightweight and easy to manage without a database.

Target Users: Hospital administrators and staff responsible for managing hospital records.

Purpose of the Project:

- Reduce manual errors in record-keeping.
- Streamline hospital operations including patient and doctor management.
- Enable quick billing and reporting of hospital activities.

OBJECTIVES OF THE SYSTEM

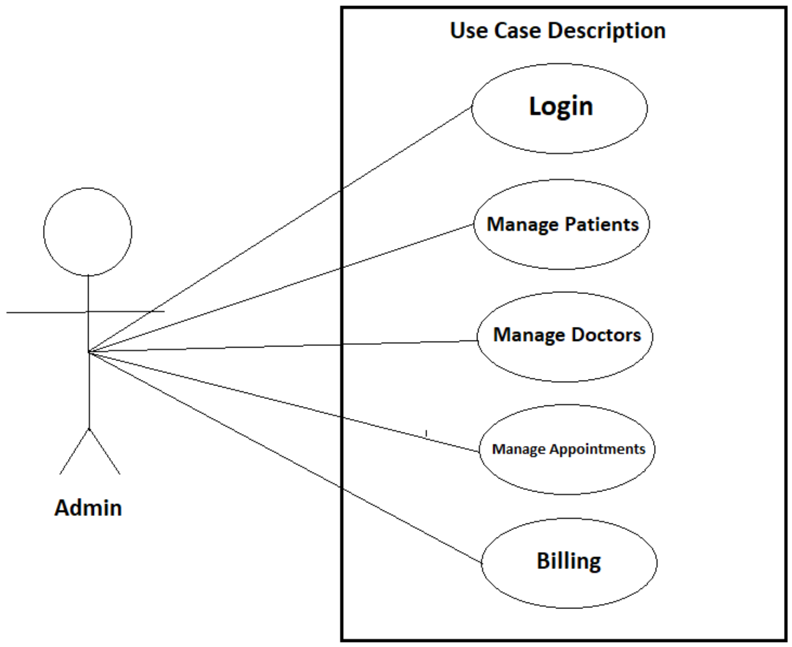
The main objectives of the Hospital Management System are:

- ➢ Manage Patients: Add, update, delete, and search patient records.
- ➢ Manage Doctors: Add, update, delete, and search doctor records.
- ➢ Manage Appointments: Schedule and search appointments.
- ➢ Billing: Calculate service and medicine charges, maintain total bill.
- ➢ Provide an intuitive GUI for easy interaction.
- ➢ Persist data reliably in CSV files for future retrieval.

SCOPE OF THE PROJECT

- Admin login with authentication.
- Full CRUD operations for Patients, Doctors, and Appointments.
- Bill generation and management for each patient.
- Dashboard displaying all tables with search functionality.
- Limitations: Currently uses CSV files.

MAIN USE CASES



Use Case Description:

Use Case	Description	Steps
Login	Admin authenticates to access the system	Enter username and password → Validate credentials → Access dashboard
Manage Patients	Add, update, delete, or search patient records	Fill patient form → Submit → Refresh table → Search by Bill ID
Manage Doctors	Add, update, delete, or search doctor records	Fill doctor form → Submit → Refresh table → Search by Row#
Manage Appointments	Schedule or search appointments	Select patient & doctor → Select date → Submit → Refresh table → Search by ID
Billing	Generate and clear bills for patients	Select patient → Enter charges → Generate total

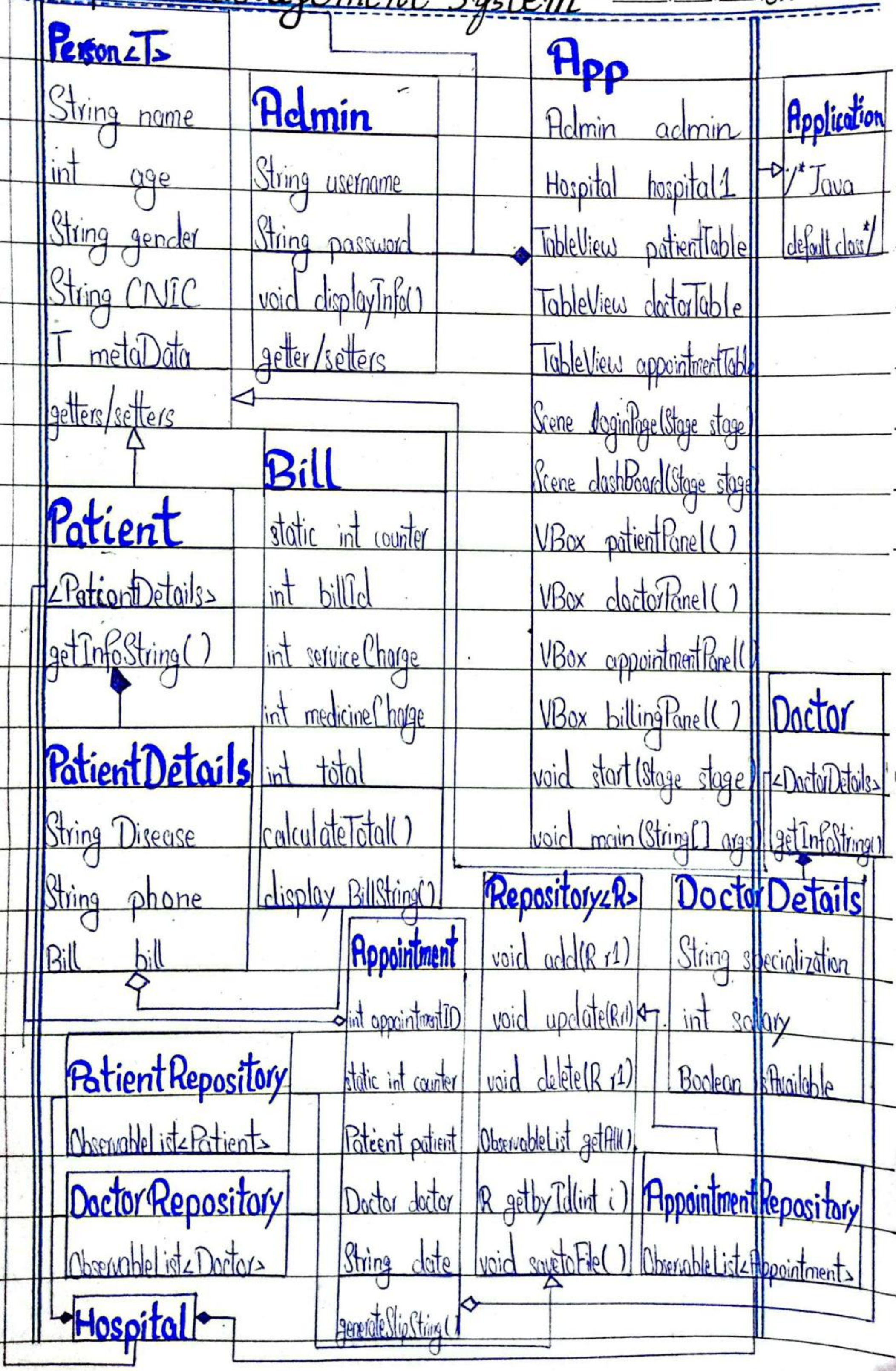
SYSTEM ARCHITECTURE

The HMS uses a layered architecture:

- Model Layer: Represents entities – Patient, Doctor, Appointment, Bill.
- Repository Layer: PatientRepository , DoctorRepository , AppointmentRepository – responsible for CRUD and file operations.
- Controller/GUI Layer: App class manages JavaFX GUI including login page, dashboard, and panels.

The system follows OOP principles for modularity, encapsulation, and reusability.

Hospital Management System



Class	Attributes	Methods	Responsibility
Person	name, age, gender, CNIC	get/set methods	Base class for Patient and Doctor
Patient	metaData (PatientDetails)	displayInfo String()	Manages patient records
Patient Details	disease, phone, bill (Bill)	get/set methods	Composed inside Patient to store patient-specific info
Doctor	metaData (DoctorDetails)	displayInfo String()	Manages doctor records
Doctor Details	specialization, salary, isAvailable	get/set methods	Composed inside Doctor for doctor-specific info
Appointment	appointmentID, patient, doctor, date	generate SlipString()	Manages appointment records
Bill	serviceCharges, medicineCharges, total	Calculate Total()	Calculates billing totals

Repository <T>	add, update, delete, getAll, getById, saveToFile	Generic CRUD operations	Abstract repository interface
Patient Repository / Doctor Repository / Appointment Repository	ObservableList <T>	CRUD & saveToFile	Implements repository for each entity
Hospital	patientRepo, doctorRepo, appointmentRepo	Constructor	Aggregates all repositories
Admin	username, password	get/set	Manages admin login
App	GUI components	start(), loginPage(), dashBoard(), panel methods	Main JavaFX application

(UML Class Diagram – reflecting exact Java classes and relationships)

FUNCTIONAL MODULES

- ➢ Admin login module
- ➢ Patient management module
- ➢ Doctor management module
- ➢ Appointment management module
- ➢ Billing module

DATA PERSISTENCE

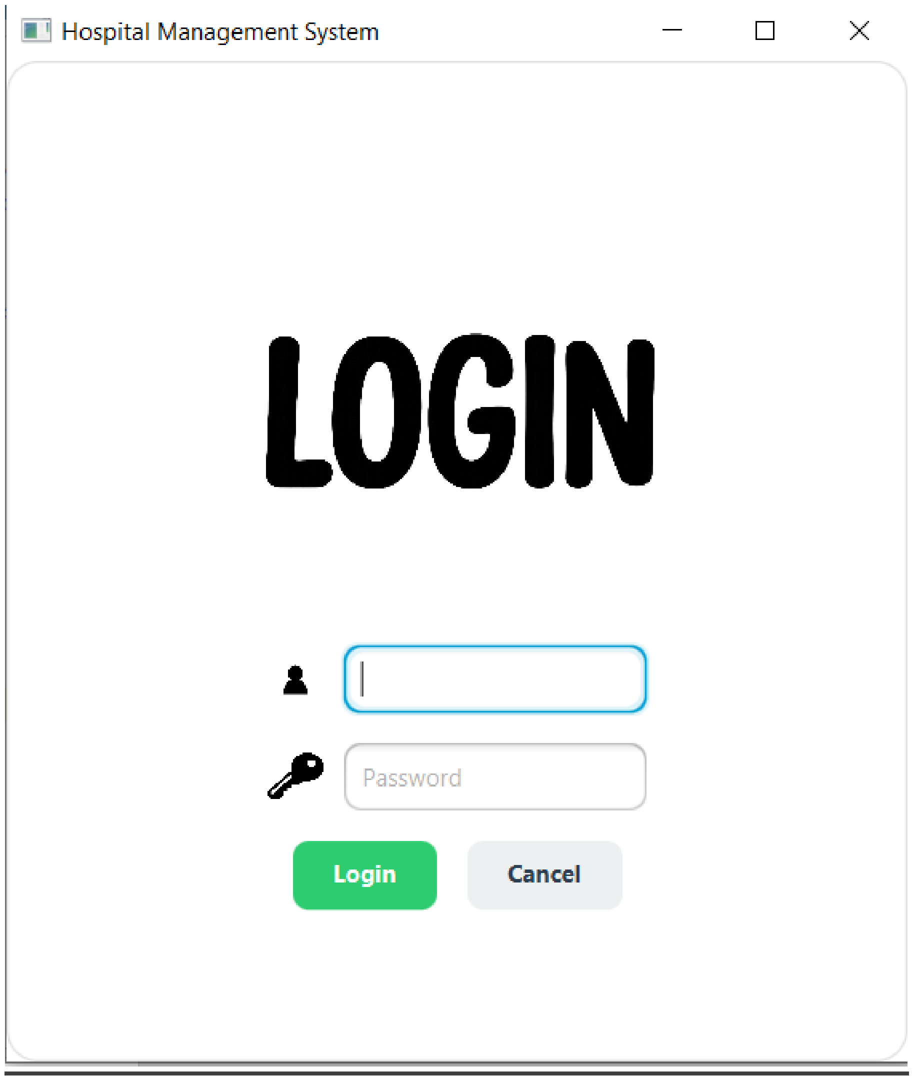
Data is stored in CSV files:

  - PatientData.csv
  - DoctorData.csv
  - AppointmentData.csv

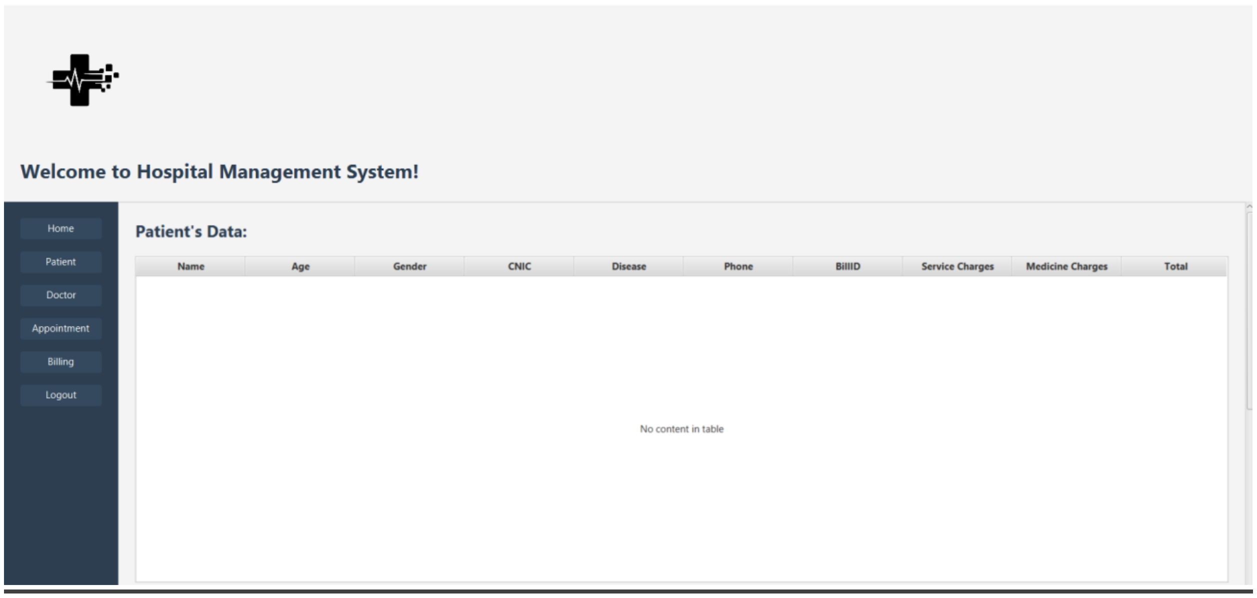
- Each repository handles reading and writing data for persistence.

USER INTERFACE DESIGN

1.Login page:



2. Dashboard with tables:

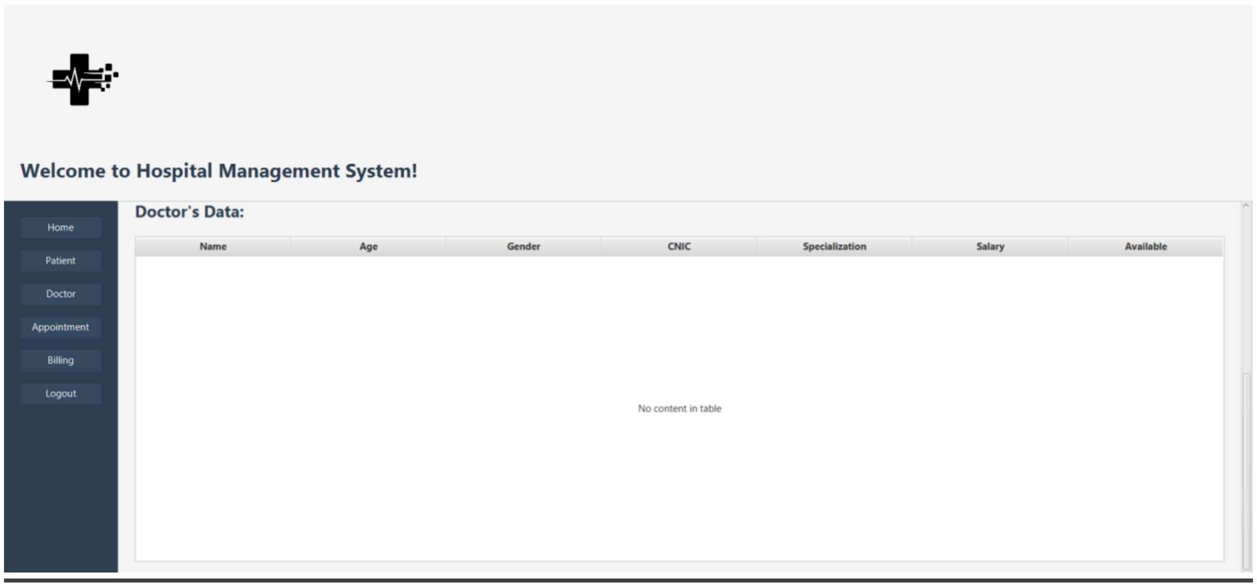


Welcome to Hospital Management System!

Patient's Data:

Name	Age	Gender	CNIC	Disease	Phone	BillID	Service Charges	Medicine Charges	Total

No content in table

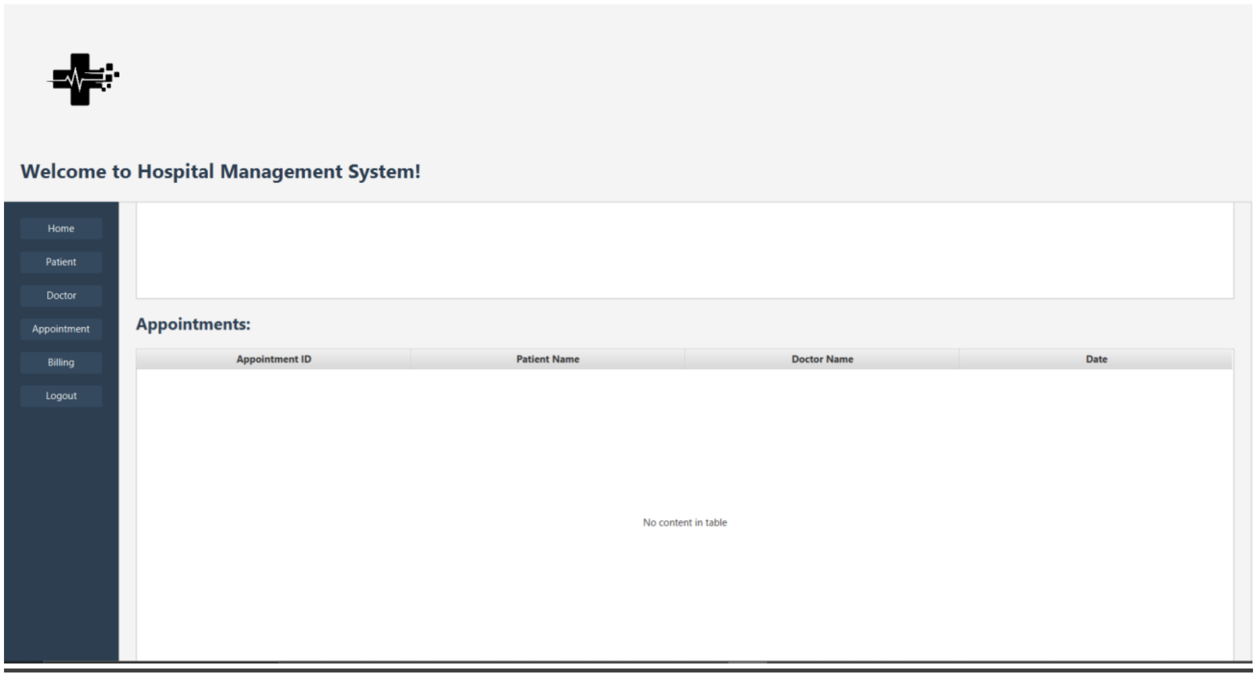


Welcome to Hospital Management System!

Doctor's Data:

Name	Age	Gender	CNIC	Specialization	Salary	Available

No content in table

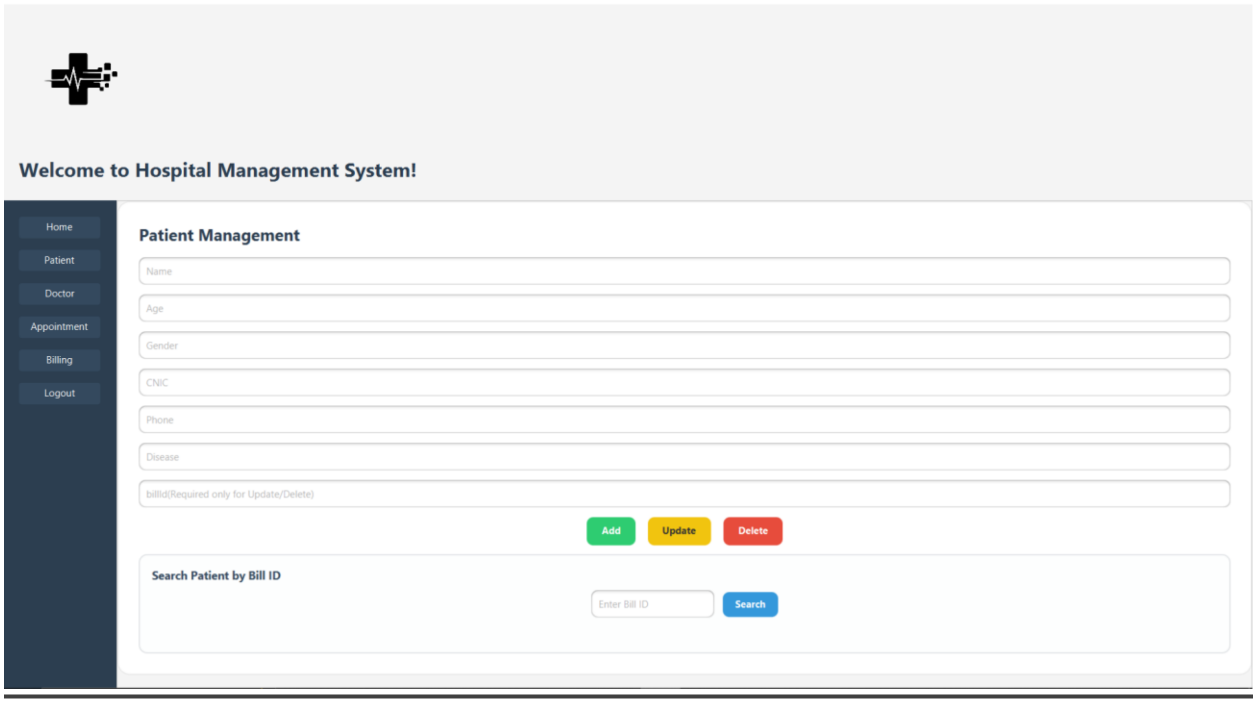

Welcome to Hospital Management System!

Appointments:

Appointment ID	Patient Name	Doctor Name	Date

No content in table

3. Patient management panel:

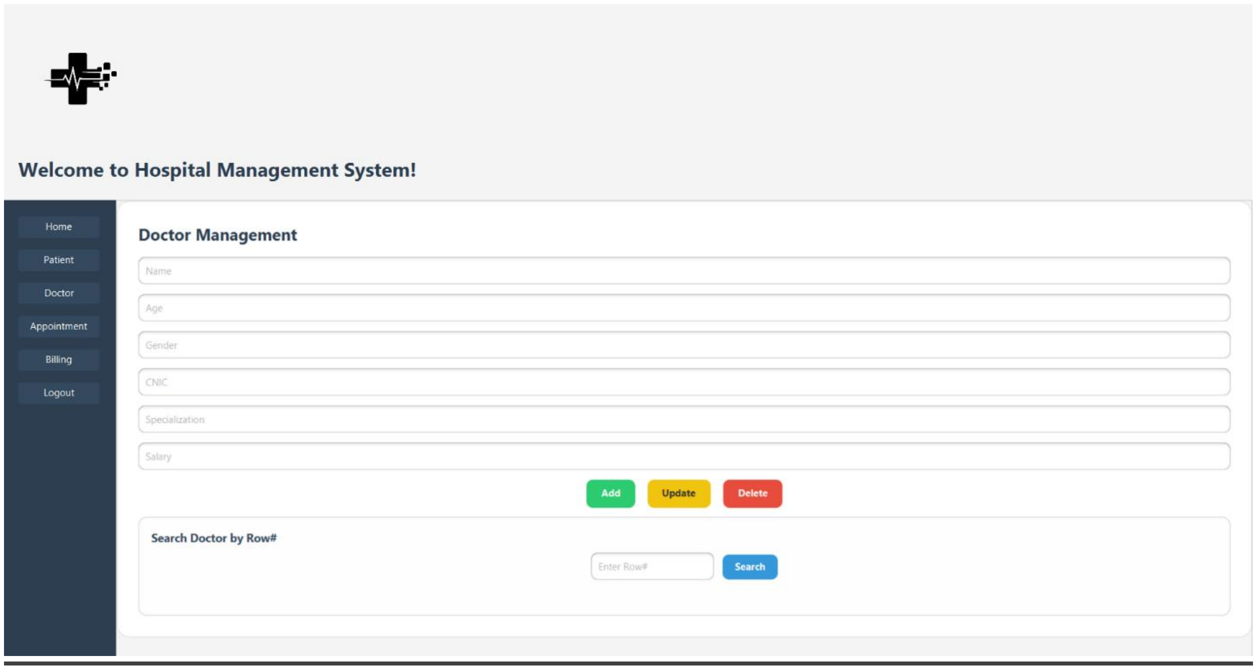

Welcome to Hospital Management System!

Patient Management

Name
Age
Gender
CNIC
Phone
Disease
billId(Required only for Update/Delete)

Search Patient by Bill ID

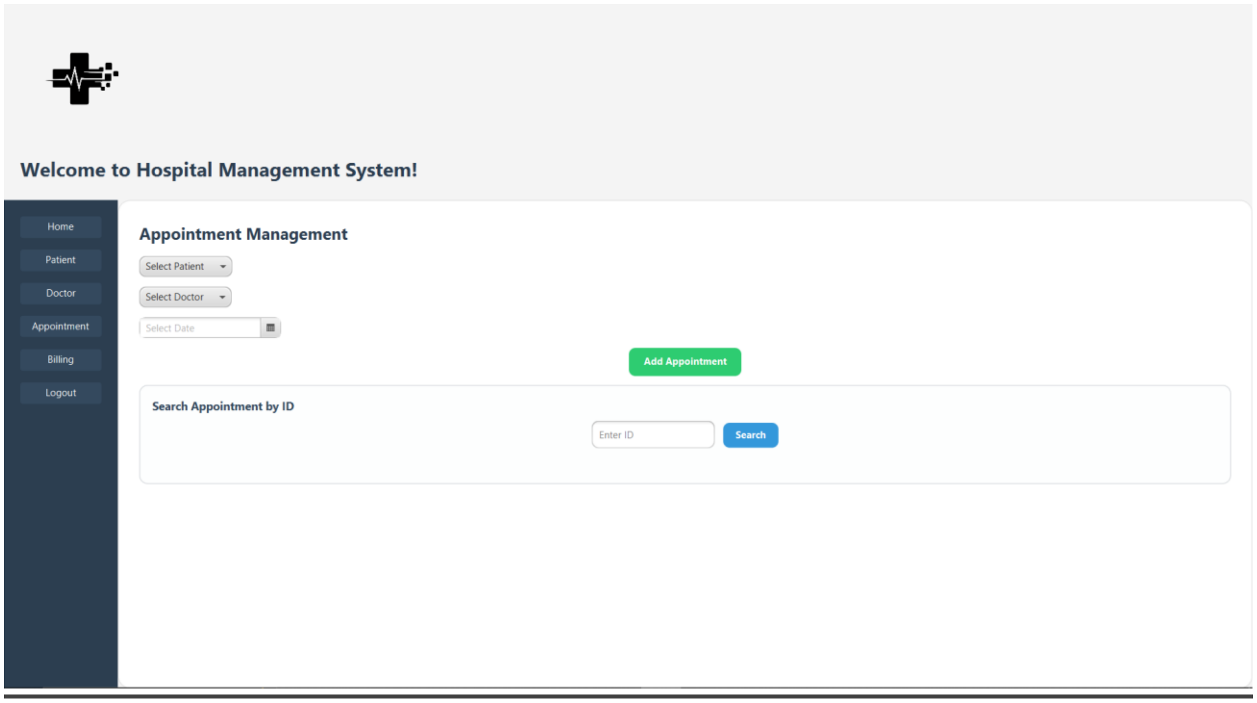
4. Doctor management panel:


Welcome to Hospital Management System!

Doctor Management

Search Doctor by Row#

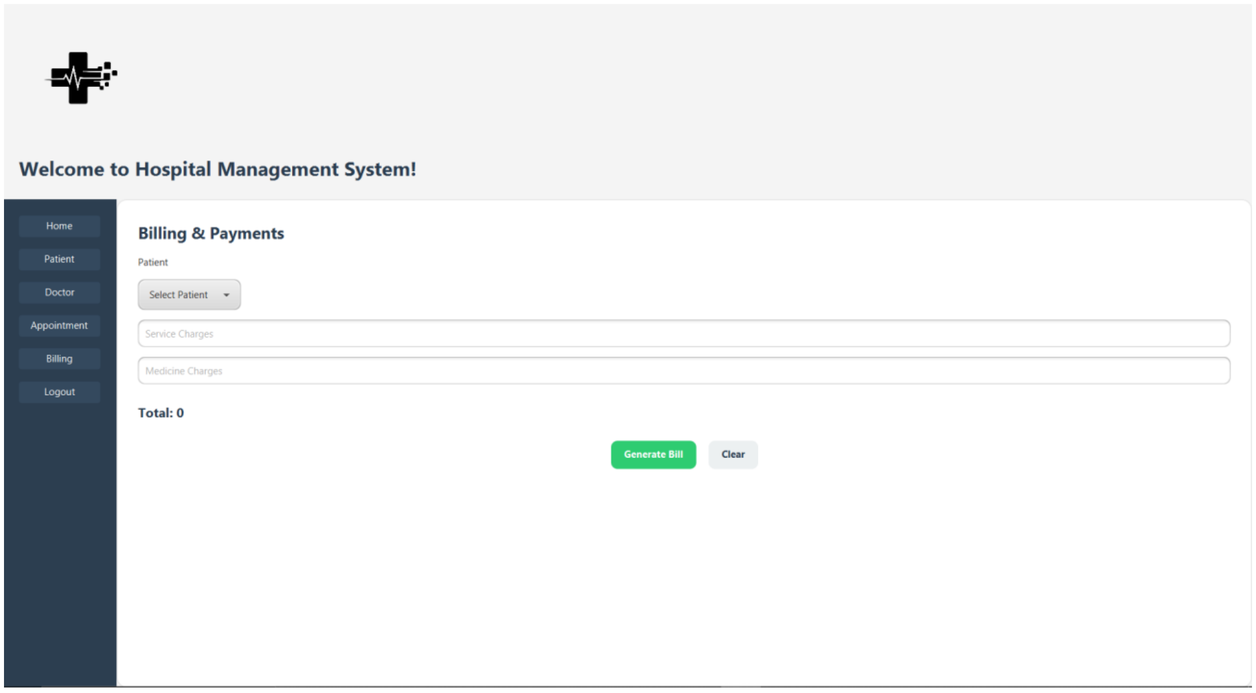
5. Appointment management panel:


Welcome to Hospital Management System!

Appointment Management

Search Appointment by ID

6. Billing panel:



OOP CONCEPTS USED

Inheritance: Doctor and Patient extend Person.

Encapsulation: Private fields with getters/setters.

Polymorphism: Doctor being up-casted and down-casted simultaneously.

Abstraction: Repository interface abstracts common CRUD operations.

Composition: Patient → PatientDetails, Doctor → DoctorDetails.

LIMITATIONS

- CSV-based persistence only.
- Only one user role (Admin).
- Appointment conflicts are not auto-checked.
- No real database integration.

These limitations can be addressed in future enhancements.

FUTURE ENHANCEMENTS

- Integrate with SQL or NoSQL database.
- Add multiple user roles (Admin, Doctor, Receptionist).
- Automatic appointment conflict detection.
- Generate PDF bills and appointment slips.
- Add notifications for appointments.

CONCLUSION

The HMS effectively simplifies hospital operations by providing a fully object-oriented, modular, and user-friendly application. Its GUI allows seamless management of patients, doctors, appointments, and billing, ensuring better hospital workflow efficiency. Future enhancements can make it even more robust and feature-rich.