

RV College of Engineering[®], Bengaluru – 59
Department of Computer Science and Engineering
DATABASE MANAGEMENT SYSTEMS (CD252IA)

TITLE: Hospital Management System		
TEAM	USN:	Name
	1RV22CD054	Shashidhar Sarvi
	1RV23CD401	Harsha R B
	1RV23CD402	Harshit Savanur

1. Introduction

The **Hospital Management System (HMS)** is designed to streamline the operations of healthcare institutions by automating patient management, appointment scheduling, staff management, and billing processes. This system ensures that all critical aspects of a hospital's workflow are integrated, enabling seamless communication and efficient resource utilization. By incorporating a database-driven approach, HMS improves data accessibility and reliability, ensuring better patient care and operational efficiency.

2. Existing System

The existing hospital management systems often rely on manual processes or siloed software solutions that fail to communicate effectively. Key limitations include:

- **Manual Record Keeping:** Prone to errors, duplication, and delays in retrieving patient information.
- **Inefficient Scheduling:** Lack of real-time availability of doctors and resources.
- **Resource Management Challenges:** Difficulty in tracking room and equipment availability.
- **Fragmented Billing:** Manual calculation of treatment costs and errors in invoice generation.

These limitations result in delays, inefficiencies, and increased administrative burden, negatively affecting both patients and staff.

3. Proposed System

The proposed **Hospital Management System** is a comprehensive, automated solution addressing the gaps in the existing system by:

- **Integrated Database:** Centralized storage for patient, doctor, staff, and resource data.
- **Real-Time Scheduling:** Dynamic tracking of doctor availability, room occupancy, and appointment slots.
- **Efficient Resource Management:** Monitors room and equipment usage to avoid conflicts.
- **Automated Billing:** Generates accurate invoices by consolidating treatment, diagnostic, and pharmacy costs.
- **User-Friendly Interface:** Provides access to dashboards for administrators, doctors, and patients.

4. Relational Database Structure

The **Relational Database Structure** (RDBMS) is designed to store structured data, ensuring referential integrity and normalisation.

Key Tables and Relationships:

1. **Patients:**
 - Attributes: PatientID (PK), Name, Age, Gender, MedicalHistory, ContactInfo.
2. **Doctors:**
 - Attributes: DoctorID (PK), Name, Specialization, Availability, ContactInfo.
3. **Appointments:**
 - Attributes: AppointmentID (PK), PatientID (FK), DoctorID (FK), Date, TimeSlot, Status.
4. **Staff:**
 - Attributes: StaffID (PK), Name, Role, Shift, ContactInfo.
5. **Billing:**
 - Attributes: BillID (PK), PatientID (FK), TotalAmount, PaymentStatus, PaymentMethod.

Relationships:

- Patients and Doctors are linked through Appointments (Many-to-Many).
- Billing data is linked to Patients and Appointments (One-to-Many).

5. RDBMS and NoSQL Integration

In addition to the relational database, the system leverages **NoSQL** to handle unstructured data, such as:

- **Medical Reports:** Lab results, X-rays, and scans stored in MongoDB for efficient retrieval.
- **Feedback:** Patient feedback and ratings stored as document-based records for flexibility.

Integration Approach:

- Use a middleware layer to connect MongoDB with the RDBMS for data consistency.
- For example, when generating a patient's bill (RDBMS), the system fetches lab results and scans (NoSQL) for comprehensive documentation.

6. Societal Concern

The **Hospital Management System** addresses several societal concerns:

1. **Improved Healthcare Accessibility:** Enables better resource allocation, reducing patient wait times and improving treatment outcomes.
2. **Data Privacy and Security:** Adheres to regulations like HIPAA for secure data management, safeguarding patient information.
3. **Use of AI and Analytics:**
 - **AI for Scheduling:** Predictive models optimize doctor availability and resource allocation.
 - **Data Analytics:** Insights into patient demographics and treatment trends improve decision-making.
4. **Scalability for Future Trends:**
 - **Integration of Telemedicine:** Extending services to remote areas.
 - **Blockchain:** Secure medical records and billing history.

By automating hospital operations and integrating emerging technologies, the system ensures efficiency, accuracy, and patient satisfaction.