**BAHRIA UNIVERSITY KARACHI CAMPUS**

**DEPARTMENT OF COMPUTER SCIENCE**

****

**DATABASE MANAGEMENT SYSTEMS LAB (CSL-220)**

**4 B – Spring 2024**

**Hospital Management System**

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# Abstract

The Hospital Management System (HMS) project aims to revolutionize healthcare facility management by leveraging advanced technologies and a user-friendly interface. Developed using C# .NET Framework 6.0, integrated with GunnaUI and BunifuUI for enhanced graphical elements, the system addresses critical administrative and operational challenges. It facilitates efficient management of patient records, doctor schedules, medical diagnostics, inventory control, and billing processes. The HMS not only automates routine tasks but also enhances data accuracy, operational efficiency, and patient care delivery within healthcare settings.

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# Introduction

In today's dynamic healthcare landscape, effective management of hospital resources and patient information is crucial for delivering high-quality care. The Hospital Management System (HMS) represents a significant step forward in addressing these challenges by providing a comprehensive platform for streamlining operations. This project focuses on integrating a robust database management system with a user-friendly graphical interface, aiming to enhance efficiency and productivity across various healthcare functions.

# Problem statement

Healthcare facilities face significant challenges due to manual processes and the use of disparate systems for managing critical aspects such as patient information, appointment scheduling, inventory tracking, and billing. These challenges often result in inefficiencies that can lead to errors, delays in service delivery, and increased operational costs. Manual data entry and management increase the likelihood of human errors, while disjointed systems make it difficult to access accurate and up-to-date information promptly. These issues not only affect the operational efficiency of healthcare providers but also impact patient care outcomes and satisfaction.

The Hospital Management System (HMS) project aims to address these challenges by introducing automation and centralization across core hospital operations. By automating processes like patient record management, appointment scheduling, and inventory tracking, the HMS streamlines workflows and reduces dependency on manual intervention. Centralizing data into a unified system improves data accuracy, accessibility, and timeliness, enabling healthcare providers to make informed decisions quickly.

# Existing Systems (Show Comparison with existing systems to differentiate how your project is different from existing similar projects)

A comparative analysis of existing hospital management systems highlights several critical limitations that hinder their effectiveness in modern healthcare environments. Many current systems suffer from outdated interfaces that are cumbersome to navigate and lack intuitive design principles, which can impede user productivity and increase training requirements for new staff. Scalability issues are also prevalent, with some systems struggling to accommodate growing data volumes and expanding healthcare facilities, leading to performance bottlenecks and system instability during peak usage periods. Moreover, inadequate integration capabilities often result in siloed information across departments, hindering seamless communication and collaboration among healthcare professionals.

In contrast, the HMS project distinguishes itself by leveraging cutting-edge technologies such as C# .NET Framework 6.0 along with modern UI frameworks like GunnaUI and BunifuUI. This technological stack brings several advantages that directly address the shortcomings observed in traditional systems.

Firstly, the use of C# .NET Framework 6.0 provides a robust and scalable development environment, enabling developers to build reliable and high-performance applications tailored to the specific needs of healthcare management. The framework's strong integration with Microsoft technologies facilitates seamless connectivity with existing IT infrastructure, enhancing interoperability and data exchange capabilities across different hospital departments and external systems.

Secondly, the adoption of modern UI frameworks like GunnaUI and BunifuUI ensures a contemporary and user-friendly interface for healthcare professionals and administrators. These frameworks offer customizable design elements, rich graphical capabilities, and responsive layouts that optimize user interaction and productivity. By incorporating intuitive navigation and visual aesthetics, the HMS enhances user experience and reduces the learning curve for staff members, thereby improving overall system adoption and efficiency.

Furthermore, the combination of these technologies supports agile development practices, allowing for iterative improvements and rapid deployment of new features and updates. This agile approach not only accelerates time-to-market for critical functionalities but also ensures that the HMS remains adaptable to evolving healthcare regulations, patient care practices, and technological advancements.

In conclusion, the HMS project stands out in the healthcare management landscape by addressing the deficiencies of existing systems through the strategic application of advanced technologies. By leveraging C# .NET Framework 6.0 and modern UI frameworks, the HMS enhances system reliability, performance, and user satisfaction, ultimately empowering healthcare providers to deliver superior patient care and operational excellence in today's dynamic healthcare environment.

# Objectives and goals

The primary objective of the HMS (Hospital Management System) project is to develop a robust, scalable, and efficient software solution tailored to meet the specific needs of healthcare institutions. At its core, the HMS aims to streamline and automate key administrative and operational processes that are essential for the seamless functioning of hospitals and healthcare facilities.

One of the key goals of the HMS project is to enhance the efficiency of patient registration processes. By implementing intuitive and user-friendly interfaces, healthcare staff can efficiently capture and manage patient demographic information, medical histories, and insurance details. Streamlining this process not only reduces administrative overhead but also improves the overall patient experience by minimizing wait times and ensuring accurate data entry.

Appointment scheduling is another critical aspect targeted by the HMS. The system aims to automate scheduling workflows, allowing healthcare providers to efficiently manage appointments based on physician availability, patient preferences, and urgency of medical needs. This automation helps optimize resource allocation, reduce scheduling conflicts, and enhance patient satisfaction by ensuring timely access to healthcare services.

Inventory management within healthcare facilities is also a key focus area of the HMS project. The system facilitates efficient tracking and management of medical supplies, equipment, and pharmaceuticals. By maintaining real-time inventory levels, monitoring expiration dates, and automating reorder processes, the HMS ensures that healthcare providers have access to necessary resources when needed, thereby minimizing waste and optimizing cost management.

Billing processes are streamlined through the HMS to improve financial transparency and operational efficiency. The system automates invoicing, payment processing, and insurance claims management, reducing billing errors and accelerating revenue cycle management. By providing detailed financial insights and analytics, the HMS enables healthcare administrators to make informed decisions, optimize revenue streams, and maintain compliance with regulatory requirements.

Overall, the HMS project aims to elevate the operational capabilities of healthcare institutions by improving data accuracy, operational transparency, and decision-making capabilities. By integrating these functionalities into a unified platform, the HMS empowers healthcare providers to deliver high-quality patient care while optimizing administrative workflows and enhancing overall efficiency within hospital settings.

# Project Scope

The scope of the HMS (Hospital Management System) is expansive, covering a wide array of functionalities essential for the efficient operation of healthcare institutions. It encompasses comprehensive modules across key areas including patient management, doctor scheduling, medical diagnostics, inventory control, and billing. These modules are designed to streamline administrative processes, enhance operational efficiency, and improve overall patient care delivery within hospital settings.

The initial implementation phase of the HMS project focuses on establishing foundational CRUD (Create, Read, Update, Delete) operations for four primary modules: Doctor, Patient, Diagnosis, and Medicine. These modules serve as the backbone of the system, enabling healthcare providers to manage critical aspects of hospital operations systematically and effectively.

* Doctor Management: The Doctor module allows healthcare administrators to maintain detailed records of physicians, including their personal information, specialization, contact details, and work schedules. CRUD operations enable the addition, retrieval, modification, and deletion of doctor records, ensuring up-to-date and accurate information management.
* Patient Management: The Patient module facilitates the management of patient records, covering demographic information, medical history, contact details, and billing information. CRUD operations for patients enable efficient registration, updating of medical records, appointment scheduling, and management of patient care plans.
* Diagnosis Management: The diagnosis module supports healthcare professionals in recording and managing diagnostic procedures, including diagnosis details, treatment plans, and patient outcomes. CRUD operations enable the documentation and updating of diagnostic information, ensuring continuity of care and effective treatment management.
* Medicine Management: The Medicine module focuses on inventory control and management of pharmaceutical supplies within the hospital. It includes functionalities for tracking medicine stocks, managing expiration dates, monitoring usage, and automating replenishment processes. CRUD operations facilitate the addition, updating, and removal of medicines from inventory, ensuring adequate supply levels and efficient medication management.

By establishing CRUD operations for these foundational modules, the HMS lays a solid groundwork for future enhancements and integrations. Future phases of the project may include the integration of additional modules such as laboratory management, radiology services, surgery scheduling, and electronic health records (EHR) integration. These expansions will further enrich the HMS's capabilities, enabling healthcare institutions to offer more advanced healthcare services, improve patient outcomes, and enhance operational efficiency across all facets of hospital management.

# Workflow (Present in UML representation, and ERD for the DataBase)

## UML:

The Unified Modeling Language (UML) serves as a visual representation of the HMS architecture, illustrating key components such as class diagrams for database entities, sequence diagrams for interaction flows, and activity diagrams for workflow processes. These diagrams provide a structured framework for understanding system design and functionality, ensuring alignment with project objectives and user requirements.

A green squares with black dots

Description automatically generated

## ERD:

The Entity-Relationship Diagram (ERD) illustrates the database schema, depicting relationships between entities such as patients, doctors, appointments, medications, and other key components of the hospital management system. It highlights primary keys, foreign keys, and cardinality constraints, offering a clear visualization of how data entities are structured and interconnected within the HMS database.

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Description automatically generated

## Flowchart:

A diagram of a flowchart

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# Overview of project

The Hospital Management System (HMS) represents a comprehensive software solution aimed at centralizing and optimizing hospital operations. Fundamentally designed to enhance efficiency and improve patient care delivery, the HMS leverages advanced technologies to integrate and streamline various administrative and clinical processes within healthcare institutions.

At its core, the HMS utilizes SQL Server as the database management system, providing a robust foundation for storing, managing, and retrieving critical data across different hospital departments. SQL Server offers reliability, scalability, and advanced querying capabilities, ensuring that the HMS can handle large volumes of data efficiently while maintaining data integrity and security.

The front-end of the HMS is developed using C# .NET framework, a powerful and versatile programming platform known for its flexibility and compatibility with Microsoft technologies. C# .NET facilitates the development of responsive and scalable applications, enabling seamless integration with other Microsoft products and services commonly used in healthcare settings.

To enhance user experience and usability, the HMS incorporates GunnaUI and BunifuUI as the graphical user interface (GUI) frameworks. These modern UI frameworks are chosen for their rich set of customizable components, sleek design elements, and intuitive navigation features. GunnaUI and BunifuUI enable healthcare professionals and administrators to interact with the HMS through visually appealing interfaces that are easy to navigate, thereby improving user productivity and satisfaction.

Together, the integration of SQL Server, C# .NET framework, GunnaUI, and BunifuUI forms a cohesive and robust technological stack that underpins the HMS's functionality and performance. This combination not only ensures efficient data management and processing but also enhances the overall usability and accessibility of the system across various hospital departments and administrative functions.

In summary, the HMS is designed to leverage cutting-edge technologies to centralize hospital operations, improve workflow efficiency, and enhance patient care outcomes. By harnessing the capabilities of SQL Server, C# .NET framework, GunnaUI, and BunifuUI, the HMS provides a reliable and user-friendly solution that meets the diverse needs of healthcare professionals, administrators, and patients alike in today's dynamic healthcare environment.

# Tools and Technologies

The development tools and technologies employed in the HMS (Hospital Management System) project were meticulously chosen to ensure robustness, scalability, and usability across various facets of hospital operations. Each component plays a crucial role in enhancing the overall functionality and performance of the system, catering to the specific needs of healthcare professionals and administrative staff.

* C# .NET Framework 6.0: C# .NET Framework serves as the backbone for implementing backend logic and business rules within the HMS. Known for its object-oriented programming model and extensive class libraries, C# enables developers to write efficient and maintainable code. The latest version, .NET Framework 6.0, offers enhanced performance, improved security features, and support for modern development practices such as microservices architecture and cloud-native applications. Its integration with Visual Studio IDE provides a comprehensive development environment for designing, debugging, and deploying applications seamlessly.
* SQL Server: SQL Server is utilized for database management and storage within the HMS. As a relational database management system (RDBMS) developed by Microsoft, SQL Server is renowned for its robustness, scalability, and advanced data management capabilities. It supports ACID (Atomicity, Consistency, Isolation, Durability) transactions, ensuring data integrity and reliability across complex healthcare datasets. SQL Server's ability to handle large volumes of data efficiently, along with its comprehensive security features and built-in analytics tools, makes it an ideal choice for managing patient records, medical histories, inventory data, billing information, and other critical healthcare data.
* GunnaUI and BunifuUI: GunnaUI and BunifuUI are selected as frontend design frameworks for creating the graphical user interface (GUI) of the HMS. These UI frameworks are known for their modern and aesthetically pleasing design elements, which enhance the visual appeal and usability of the application. GunnaUI and BunifuUI offer a rich collection of customizable UI components, responsive layouts, and intuitive navigation features. They enable developers to create interactive dashboards, forms, charts, and data grids that are optimized for usability across different devices and screen sizes. By leveraging these UI frameworks, the HMS ensures a user-friendly experience for healthcare professionals and administrative staff, facilitating efficient navigation and data interaction within the system.

Together, the integration of C# .NET Framework 6.0, SQL Server, GunnaUI, and BunifuUI forms a cohesive and technologically advanced stack for developing the HMS. This combination not only ensures the reliability and scalability required for managing critical hospital operations but also enhances the overall user experience through intuitive design and responsive performance. By leveraging these technologies, the HMS project aims to streamline workflows, improve data management efficiency, and ultimately enhance the quality of patient care delivered within healthcare institutions.

# Project features (mention here functional and non-functional requirements covered)

## Functional Requirements

The Hospital Management System (HMS) is designed to encompass a comprehensive set of functional requirements to facilitate effective management and operations within a healthcare environment:

1. **CRUD Operations**:
   * **Doctors**: Enable the creation, retrieval, updating, and deletion of doctor records. This includes managing doctor details such as name, specialization, contact information, and department affiliation.
   * **Patients**: Provide functionalities for managing patient records, including adding new patients, viewing existing records, updating patient information, and deleting patient entries. Patient demographics, medical history, and contact details are stored and managed securely.
   * **Diagnoses**: Support the recording and management of medical diagnoses for patients. This includes creating new diagnoses, updating existing diagnoses, and deleting outdated or incorrect entries.
   * **Medicines**: Maintain an inventory of medicines available within the hospital. This involves adding new medicines, updating details such as quantity and expiry dates, and removing expired or obsolete medicines from inventory.
2. **Appointment Scheduling**:
   * **Doctors and Patients**: Facilitate the scheduling of appointments between doctors and patients. This includes selecting available time slots, confirming appointments, and updating schedules as needed.
   * **Appointment Management**: Provide functionalities for updating appointment details, canceling appointments, and managing appointment statuses (e.g., confirmed, canceled, rescheduled).
3. **Billing and Invoicing**:
   * **Billing Records**: Manage billing information related to patient services, including generating invoices, tracking payments, and recording payment statuses.
   * **Financial Reporting**: Support the generation of financial reports and summaries based on billing data, facilitating financial analysis and decision-making.
4. **Ward and Bed Management**:
   * **Inpatient Admissions**: Manage the admission of patients to hospital wards, including assigning beds, recording admission details, and tracking discharge dates and reasons.
   * **Occupancy Tracking**: Monitor bed availability and occupancy status to optimize bed utilization and ensure efficient patient care.
5. **Medical Records and Documentation**:
   * **Electronic Health Records (EHR)**: Store and manage comprehensive electronic health records for patients, including medical histories, diagnosis details, treatment plans, and prescriptions.
   * **Document Management**: Ensure secure storage and retrieval of medical documents and reports, supporting healthcare providers in accessing critical patient information.

## Non-Functional Requirements

In addition to functional capabilities, the HMS addresses critical non-functional requirements to enhance system reliability, performance, security, and scalability:

1. **Scalability**:
   * **Future Growth**: Design the system architecture to scale seamlessly with increasing data volumes, user demands, and organizational growth within the healthcare facility.
   * **Modular Design**: Implement a modular and extensible architecture to facilitate the addition of new features and functionalities in response to evolving healthcare practices and regulatory requirements.
2. **Security**:
   * **Data Protection**: Implement robust security measures to safeguard sensitive patient information and comply with healthcare data privacy regulations (e.g., HIPAA in the United States).
   * **Access Control**: Enforce role-based access control (RBAC) mechanisms to restrict unauthorized access to patient records and sensitive system functionalities.
3. **Performance Optimization**:
   * **Response Times**: Optimize system performance to ensure rapid response times for accessing patient records, scheduling appointments, and processing billing transactions.
   * **Load Balancing**: Implement load balancing strategies to distribute system workload evenly and maintain optimal performance during peak usage periods.
4. **User Experience (UX)**:
   * **Intuitive Interface**: Design a user-friendly graphical user interface (GUI) with intuitive navigation and usability features to support healthcare professionals in efficiently managing daily tasks and workflows.
   * **Training and Support**: Provide training resources and user support to facilitate effective adoption of the HMS by healthcare staff and minimize user learning curves.
5. **Reliability and Availability**:
   * **System Reliability**: Ensure high system availability and reliability to minimize downtime and disruptions in hospital operations, supporting continuous access to critical patient information and services.
   * **Disaster Recovery**: Implement disaster recovery and data backup strategies to mitigate risks and ensure data integrity in the event of system failures or unforeseen emergencies.

# DBMS implemented concepts

Detailed code snippets and explanations illustrate the implementation of key concepts in DBMS SQL Server.

create database Hospital;

-- Departments

CREATE TABLE Department (

DepartmentID INT PRIMARY KEY,

DepartmentName NVARCHAR(100),

Description NVARCHAR(255)

);

-- Unified Staff Table

CREATE TABLE Staff (

StaffID INT PRIMARY KEY,

StaffName NVARCHAR(100),

ContactNumber NVARCHAR(15),

Salary DECIMAL(10, 2),

Shift NVARCHAR(50),

JoiningDate DATE

);

-- Security Staff

CREATE TABLE SecurityStaff (

StaffID INT PRIMARY KEY,

Role NVARCHAR(50),

DepartmentID INT,

FOREIGN KEY (StaffID) REFERENCES Staff(StaffID),

FOREIGN KEY (DepartmentID) REFERENCES Department(DepartmentID)

);

-- Transport Staff

CREATE TABLE TransportStaff (

StaffID INT PRIMARY KEY,

Role NVARCHAR(50),

DepartmentID INT,

FOREIGN KEY (StaffID) REFERENCES Staff(StaffID),

FOREIGN KEY (DepartmentID) REFERENCES Department(DepartmentID)

);

-- Ward Boys/Nurse Staff

CREATE TABLE NurseWardStaff (

StaffID INT PRIMARY KEY,

Role NVARCHAR(50),

DepartmentID INT,

FOREIGN KEY (StaffID) REFERENCES Staff(StaffID),

FOREIGN KEY (DepartmentID) REFERENCES Department(DepartmentID)

);

-- Medicine Inventory

CREATE TABLE Medicine (

MedicineID INT PRIMARY KEY,

MedicineName NVARCHAR(100),

Manufacturer NVARCHAR(100),

QuantityAvailable INT,

ExpiryDate DATE,

UnitPrice DECIMAL(10, 2),

Category NVARCHAR(50)

);

-- Patient Appointment

CREATE TABLE Patient (

PatientID INT PRIMARY KEY,

PatientName NVARCHAR(100),

Age INT,

Gender NVARCHAR(10),

BloodGroup NVARCHAR(5),

ContactNumber NVARCHAR(15),

Address NVARCHAR(255),

MedicalHistory NVARCHAR(MAX)

);

CREATE TABLE Doctor (

DoctorID INT PRIMARY KEY,

DoctorName NVARCHAR(100),

Specialization NVARCHAR(100),

ContactNumber NVARCHAR(15),

DepartmentID INT,

ExperienceYears INT,

FOREIGN KEY (DepartmentID) REFERENCES Department(DepartmentID)

);

CREATE TABLE Appointment (

AppointmentID INT PRIMARY KEY,

PatientID INT,

DoctorID INT,

AppointmentDate DATE,

AppointmentTime TIME,

Status NVARCHAR(50),

FOREIGN KEY (PatientID) REFERENCES Patient(PatientID),

FOREIGN KEY (DoctorID) REFERENCES Doctor(DoctorID)

);

-- Rooms

CREATE TABLE Room (

RoomID INT PRIMARY KEY,

RoomType NVARCHAR(50),

Availability BIT,

DepartmentID INT,

FOREIGN KEY (DepartmentID) REFERENCES Department(DepartmentID)

);

-- Billing

CREATE TABLE Billing (

BillingID INT PRIMARY KEY,

PatientID INT,

TotalAmount DECIMAL(10, 2),

PaymentStatus NVARCHAR(50),

BillingDate DATE,

FOREIGN KEY (PatientID) REFERENCES Patient(PatientID)

);

-- Prescriptions

CREATE TABLE Prescription (

PrescriptionID INT PRIMARY KEY,

PatientID INT,

DoctorID INT,

MedicineID INT,

Dosage NVARCHAR(50),

Instructions NVARCHAR(255),

IssueDate DATE,

FOREIGN KEY (PatientID) REFERENCES Patient(PatientID),

FOREIGN KEY (DoctorID) REFERENCES Doctor(DoctorID),

FOREIGN KEY (MedicineID) REFERENCES Medicine(MedicineID)

);

-- Surgery Details

CREATE TABLE Surgery (

SurgeryID INT PRIMARY KEY,

SurgeryName NVARCHAR(100),

DoctorID INT,

PatientID INT,

SurgeryDate DATE,

SurgeryType NVARCHAR(50),

FOREIGN KEY (DoctorID) REFERENCES Doctor(DoctorID),

FOREIGN KEY (PatientID) REFERENCES Patient(PatientID)

);

-- Employee Attendance

CREATE TABLE Attendance (

AttendanceID INT PRIMARY KEY,

StaffID INT,

Date DATE,

InTime TIME,

OutTime TIME,

FOREIGN KEY (StaffID) REFERENCES Staff(StaffID)

);

-- Equipment Inventory

CREATE TABLE Equipment (

EquipmentID INT PRIMARY KEY,

EquipmentName NVARCHAR(100),

QuantityAvailable INT,

Condition NVARCHAR(50),

DepartmentID INT,

FOREIGN KEY (DepartmentID) REFERENCES Department(DepartmentID)

);

-- Laboratory Information System

CREATE TABLE LabTest (

TestID INT PRIMARY KEY,

TestName NVARCHAR(100),

TestCost DECIMAL(10, 2),

Description NVARCHAR(255),

SampleType NVARCHAR(50),

DepartmentID INT,

PatientID INT,

FOREIGN KEY (DepartmentID) REFERENCES Department(DepartmentID),

FOREIGN KEY (PatientID) REFERENCES Patient(PatientID)

);

-- Radiology Management

CREATE TABLE RadiologyTest (

XrayID INT PRIMARY KEY,

XrayType NVARCHAR(50),

BodyPart NVARCHAR(50),

Result NVARCHAR(255),

DoctorID INT,

PatientID INT,

FOREIGN KEY (DoctorID) REFERENCES Doctor(DoctorID),

FOREIGN KEY (PatientID) REFERENCES Patient(PatientID)

);

-- Outpatient Pharmacy

CREATE TABLE OutpatientPrescription (

PrescriptionID INT PRIMARY KEY,

PatientID INT,

MedicineID INT,

Quantity INT,

DispensedDate DATE,

DispensedBy INT,

FOREIGN KEY (PatientID) REFERENCES Patient(PatientID),

FOREIGN KEY (MedicineID) REFERENCES Medicine(MedicineID),

FOREIGN KEY (DispensedBy) REFERENCES Staff(StaffID)

);

-- Blood Bank Management

CREATE TABLE BloodDonor (

DonorID INT PRIMARY KEY,

DonorName NVARCHAR(100),

BloodGroup NVARCHAR(5),

DonationDate DATE,

DonationPlace NVARCHAR(100),

ContactNumber NVARCHAR(15)

);

-- Inpatient Ward Management

CREATE TABLE WardAdmission (

AdmissionID INT PRIMARY KEY,

PatientID INT,

WardNumber INT,

BedNumber NVARCHAR(50),

AdmissionDate DATE,

DischargeDate DATE,

DischargeReason NVARCHAR(255),

FOREIGN KEY (PatientID) REFERENCES Patient(PatientID),

FOREIGN KEY (WardNumber) REFERENCES Department(DepartmentID)

);

-- Hospital Maintenance

CREATE TABLE MaintenanceLog (

LogID INT PRIMARY KEY,

EquipmentID INT,

MaintenanceDate DATE,

MaintenanceType NVARCHAR(50),

TechnicianID INT,

Details NVARCHAR(255),

FOREIGN KEY (EquipmentID) REFERENCES Equipment(EquipmentID),

FOREIGN KEY (TechnicianID) REFERENCES Staff(StaffID)

);

CREATE TABLE Diagnosis (

DiagnosisID INT PRIMARY KEY,

PatientID INT,

DoctorID INT,

DiagnosisDate DATE,

DiagnosisDescription NVARCHAR(255),

TreatmentPlan NVARCHAR(MAX),

FOREIGN KEY (PatientID) REFERENCES Patient(PatientID),

FOREIGN KEY (DoctorID) REFERENCES Doctor(DoctorID)

);

INSERT INTO Department (DepartmentID, DepartmentName, Description) VALUES

(1, 'Cardiology', 'Department that deals with disorders of the heart and blood vessels.'),

(2, 'Neurology', 'Department specializing in the treatment of the nervous system.'),

(3, 'Oncology', 'Department dedicated to the treatment of cancer.'),

(4, 'Pediatrics', 'Department focused on medical care of infants, children, and adolescents.'),

(5, 'Orthopedics', 'Department specializing in the treatment of the musculoskeletal system.'),

(6, 'Radiology', 'Department that uses imaging technology to diagnose and treat diseases.'),

(7, 'Emergency Medicine', 'Department providing immediate treatment to patients with acute illnesses and injuries.'),

(8, 'Gastroenterology', 'Department dealing with the digestive system and its disorders.'),

(9, 'Gynecology', 'Department focusing on women’s health, especially reproductive organs.'),

(10, 'Dermatology', 'Department that treats skin, hair, and nail conditions.'),

(11, 'Psychiatry', 'Department that deals with mental health and disorders.'),

(12, 'Ophthalmology', 'Department specializing in eye and vision care.'),

(13, 'Pulmonology', 'Department focused on the respiratory system.'),

(14, 'Endocrinology', 'Department that treats hormone-related diseases.'),

(15, 'Nephrology', 'Department dedicated to the treatment of kidney conditions.');

INSERT INTO Staff (StaffID, StaffName, ContactNumber, Salary, Shift, JoiningDate) VALUES

(1, 'Ahmed Khan', '03001234567', 50000.00, 'Morning', '2020-01-15'),

(2, 'Sara Ahmed', '03011234567', 55000.00, 'Evening', '2019-05-10'),

(3, 'Zainab Ali', '03021234567', 48000.00, 'Night', '2018-11-20'),

(4, 'Ali Raza', '03031234567', 60000.00, 'Morning', '2021-03-01'),

(5, 'Ayesha Fatima', '03041234567', 52000.00, 'Evening', '2020-09-17'),

(6, 'Bilal Sheikh', '03051234567', 53000.00, 'Night', '2019-12-12'),

(7, 'Fatima Noor', '03061234567', 57000.00, 'Morning', '2021-06-23'),

(8, 'Hassan Qureshi', '03071234567', 49000.00, 'Evening', '2018-08-30'),

(9, 'Mariam Usman', '03081234567', 51000.00, 'Night', '2019-02-25'),

(10, 'Usman Iqbal', '03091234567', 58000.00, 'Morning', '2021-11-14');

INSERT INTO SecurityStaff (StaffID, Role, DepartmentID) VALUES

(1, 'Security Guard', 1),

(4, 'Security Guard', 7),

(5, 'Security Supervisor', 7);

INSERT INTO TransportStaff (StaffID, Role, DepartmentID) VALUES

(6, 'Driver', 6),

(7, 'Transport Coordinator', 10),

(8, 'Driver', 15),

(10, 'Driver', 12);

INSERT INTO NurseWardStaff (StaffID, Role, DepartmentID) VALUES

(2, 'Nurse', 1),

(9, 'Nurse', 1),

(3, 'Nurse', 2);

INSERT INTO Medicine (MedicineID, MedicineName, Manufacturer, QuantityAvailable, ExpiryDate, UnitPrice, Category) VALUES

(1, 'Paracetamol', 'GSK', 1000, '2024-12-31', 5.00, 'Painkiller'),

(2, 'Ibuprofen', 'Abbott', 800, '2024-10-15', 10.00, 'Painkiller'),

(3, 'Amoxicillin', 'Pfizer', 500, '2025-05-20', 20.00, 'Antibiotic'),

(4, 'Metformin', 'Sanofi', 600, '2024-07-30', 15.00, 'Diabetes'),

(5, 'Atorvastatin', 'Merck', 400, '2024-03-25', 25.00, 'Cholesterol'),

(6, 'Omeprazole', 'Novartis', 700, '2024-09-10', 12.00, 'Antacid'),

(7, 'Cetirizine', 'Bayer', 900, '2025-01-05', 8.00, 'Antihistamine'),

(8, 'Losartan', 'Boehringer', 550, '2024-11-14', 18.00, 'Hypertension'),

(9, 'Levothyroxine', 'AbbVie', 450, '2024-08-29', 22.00, 'Thyroid'),

(10, 'Salbutamol', 'AstraZeneca', 600, '2024-12-22', 14.00, 'Asthma');

INSERT INTO Patient (PatientID, PatientName, Age, Gender, BloodGroup, ContactNumber, Address, MedicalHistory) VALUES

(1, 'Hassan Ali', 30, 'Male', 'B+', '03101234567', 'Karachi', 'Diabetes'),

(2, 'Ayesha Khan', 25, 'Female', 'O-', '03111234567', 'Lahore', 'Hypertension'),

(3, 'Bilal Ahmed', 40, 'Male', 'A+', '03121234567', 'Islamabad', 'Asthma'),

(4, 'Fatima Zahra', 35, 'Female', 'B-', '03131234567', 'Quetta', 'Thyroid'),

(5, 'Usman Farooq', 50, 'Male', 'AB+', '03141234567', 'Peshawar', 'Heart Disease'),

(6, 'Sara Yousuf', 28, 'Female', 'O+', '03151234567', 'Multan', 'Migraine'),

(7, 'Ali Raza', 45, 'Male', 'A-', '03161234567', 'Faisalabad', 'Cholesterol'),

(8, 'Zainab Noor', 32, 'Female', 'B+', '03171234567', 'Hyderabad', 'Allergies'),

(9, 'Hira Malik', 37, 'Female', 'AB-', '03181234567', 'Sialkot', 'Arthritis'),

(10, 'Ahmed Raza', 29, 'Male', 'O+', '03191234567', 'Gujranwala', 'Kidney Stones');

INSERT INTO Doctor (DoctorID, DoctorName, Specialization, ContactNumber, DepartmentID, ExperienceYears) VALUES

(1, 'Dr. Muhammad Ali', 'Cardiology', '03201234567', 1, 10),

(2, 'Dr. Sara Ahmed', 'Neurology', '03211234567', 2, 8),

(3, 'Dr. Bilal Khan', 'Oncology', '03221234567', 3, 12),

(4, 'Dr. Fatima Usman', 'Pediatrics', '03231234567', 4, 6),

(5, 'Dr. Hassan Qureshi', 'Orthopedics', '03241234567', 5, 15),

(6, 'Dr. Ayesha Tariq', 'Radiology', '03251234567', 6, 7),

(7, 'Dr. Usman Malik', 'Gastroenterology', '03261234567', 8, 9),

(8, 'Dr. Zainab Farooq', 'Gynecology', '03271234567', 9, 11),

(9, 'Dr. Ahmed Yousuf', 'Dermatology', '03281234567', 10, 5),

(10, 'Dr. Mariam Ali', 'Psychiatry', '03291234567', 11, 14);

INSERT INTO Appointment (AppointmentID, PatientID, DoctorID, AppointmentDate, AppointmentTime, Status) VALUES

(1, 1, 1, '2024-06-10', '09:00:00', 'Scheduled'),

(2, 2, 2, '2024-06-11', '10:00:00', 'Scheduled'),

(3, 3, 3, '2024-06-12', '11:00:00', 'Scheduled'),

(4, 4, 4, '2024-06-13', '12:00:00', 'Scheduled'),

(5, 5, 5, '2024-06-14', '13:00:00', 'Scheduled'),

(6, 6, 6, '2024-06-15', '14:00:00', 'Scheduled'),

(7, 7, 7, '2024-06-16', '15:00:00', 'Scheduled'),

(8, 8, 8, '2024-06-17', '16:00:00', 'Scheduled'),

(9, 9, 9, '2024-06-18', '17:00:00', 'Scheduled'),

(10, 10, 10, '2024-06-19', '18:00:00', 'Scheduled');

INSERT INTO Room (RoomID, RoomType, Availability, DepartmentID) VALUES

(1, 'Single', 1, 1),

(2, 'Double', 1, 2),

(3, 'Single', 0, 3),

(4, 'Double', 1, 4),

(5, 'Single', 0, 5),

(6, 'Double', 1, 6),

(7, 'Single', 1, 7),

(8, 'Double', 0, 8),

(9, 'Single', 1, 9),

(10, 'Double', 1, 10);

INSERT INTO Billing (BillingID, PatientID, TotalAmount, PaymentStatus, BillingDate) VALUES

(1, 1, 10000.00, 'Paid', '2024-06-01'),

(2, 2, 12000.00, 'Unpaid', '2024-06-02'),

(3, 3, 15000.00, 'Paid', '2024-06-03'),

(4, 4, 8000.00, 'Unpaid', '2024-06-04'),

(5, 5, 9500.00, 'Paid', '2024-06-05'),

(6, 6, 11000.00, 'Paid', '2024-06-06'),

(7, 7, 13000.00, 'Unpaid', '2024-06-07'),

(8, 8, 14000.00, 'Paid', '2024-06-08'),

(9, 9, 12500.00, 'Unpaid', '2024-06-09'),

(10, 10, 11500.00, 'Paid', '2024-06-10');

INSERT INTO Prescription (PrescriptionID, PatientID, DoctorID, MedicineID, Dosage, Instructions, IssueDate) VALUES

(1, 1, 1, 1, '1 tablet', 'Take after meals', '2024-06-01'),

(2, 2, 2, 2, '2 tablets', 'Take before meals', '2024-06-02'),

(3, 3, 3, 3, '1 tablet', 'Take at bedtime', '2024-06-03'),

(4, 4, 4, 4, '2 tablets', 'Take with water', '2024-06-04'),

(5, 5, 5, 5, '1 tablet', 'Take after meals', '2024-06-05'),

(6, 6, 6, 6, '2 tablets', 'Take before meals', '2024-06-06'),

(7, 7, 7, 7, '1 tablet', 'Take at bedtime', '2024-06-07'),

(8, 8, 8, 8, '2 tablets', 'Take with water', '2024-06-08'),

(9, 9, 9, 9, '1 tablet', 'Take after meals', '2024-06-09'),

(10, 10, 10, 10, '2 tablets', 'Take before meals', '2024-06-10');

INSERT INTO Surgery (SurgeryID, SurgeryName, DoctorID, PatientID, SurgeryDate, SurgeryType) VALUES

(1, 'Heart Bypass', 1, 1, '2024-06-01', 'Major'),

(2, 'Brain Tumor Removal', 2, 2, '2024-06-02', 'Major'),

(3, 'Breast Cancer Surgery', 3, 3, '2024-06-03', 'Major'),

(4, 'Appendectomy', 4, 4, '2024-06-04', 'Minor'),

(5, 'Knee Replacement', 5, 5, '2024-06-05', 'Major'),

(6, 'Hernia Repair', 6, 6, '2024-06-06', 'Minor'),

(7, 'Gallbladder Removal', 7, 7, '2024-06-07', 'Minor'),

(8, 'Hysterectomy', 8, 8, '2024-06-08', 'Major'),

(9, 'Cataract Surgery', 9, 9, '2024-06-09', 'Minor'),

(10, 'Thyroid Surgery', 10, 10, '2024-06-10', 'Major');

INSERT INTO Attendance (AttendanceID, StaffID, Date, InTime, OutTime) VALUES

(1, 1, '2024-06-01', '08:00:00', '16:00:00'),

(2, 2, '2024-06-01', '16:00:00', '00:00:00'),

(3, 3, '2024-06-01', '00:00:00', '08:00:00'),

(4, 4, '2024-06-01', '08:00:00', '16:00:00'),

(5, 5, '2024-06-01', '16:00:00', '00:00:00'),

(6, 6, '2024-06-01', '00:00:00', '08:00:00'),

(7, 7, '2024-06-01', '08:00:00', '16:00:00'),

(8, 8, '2024-06-01', '16:00:00', '00:00:00'),

(9, 9, '2024-06-01', '00:00:00', '08:00:00'),

(10, 10, '2024-06-01', '08:00:00', '16:00:00');

INSERT INTO Equipment (EquipmentID, EquipmentName, QuantityAvailable, Condition, DepartmentID) VALUES

(1, 'ECG Machine', 10, 'Good', 1),

(2, 'MRI Scanner', 5, 'Excellent', 2),

(3, 'X-Ray Machine', 8, 'Good', 3),

(4, 'Ultrasound Machine', 7, 'Fair', 4),

(5, 'Ventilator', 12, 'Excellent', 5),

(6, 'Defibrillator', 15, 'Good', 6),

(7, 'Surgical Table', 20, 'Excellent', 7),

(8, 'Anesthesia Machine', 6, 'Good', 8),

(9, 'Patient Monitor', 18, 'Excellent', 9),

(10, 'Infusion Pump', 25, 'Good', 10);

INSERT INTO LabTest (TestID, TestName, TestCost, Description, SampleType, DepartmentID, PatientID) VALUES

(1, 'Complete Blood Count', 500.00, 'Measures different components of blood.', 'Blood', 1, 1),

(2, 'Liver Function Test', 800.00, 'Assesses the condition of the liver.', 'Blood', 2, 2),

(3, 'Kidney Function Test', 700.00, 'Evaluates kidney performance.', 'Blood', 3, 3),

(4, 'Thyroid Profile', 600.00, 'Checks thyroid gland function.', 'Blood', 4, 4),

(5, 'Lipid Profile', 900.00, 'Measures cholesterol levels.', 'Blood', 5, 5),

(6, 'Blood Sugar', 300.00, 'Checks glucose levels.', 'Blood', 6, 6),

(7, 'Urinalysis', 200.00, 'Examines urine for various substances.', 'Urine', 7, 7),

(8, 'Stool Test', 400.00, 'Analyzes stool for infections.', 'Stool', 8, 8),

(9, 'Electrolytes Test', 500.00, 'Measures electrolyte levels.', 'Blood', 9, 9),

(10, 'Hormone Test', 1000.00, 'Checks hormone levels.', 'Blood', 10, 10);

INSERT INTO RadiologyTest (XrayID, XrayType, BodyPart, Result, DoctorID, PatientID) VALUES

(1, 'Chest X-Ray', 'Chest', 'Normal', 1, 1),

(2, 'Abdominal X-Ray', 'Abdomen', 'Inflammation detected', 2, 2),

(3, 'Skull X-Ray', 'Head', 'Fracture detected', 3, 3),

(4, 'Spinal X-Ray', 'Spine', 'Normal', 4, 4),

(5, 'Pelvic X-Ray', 'Pelvis', 'Normal', 5, 5),

(6, 'Limb X-Ray', 'Leg', 'Fracture detected', 6, 6),

(7, 'Dental X-Ray', 'Teeth', 'Cavity detected', 7, 7),

(8, 'Hand X-Ray', 'Hand', 'Normal', 8, 8),

(9, 'Foot X-Ray', 'Foot', 'Sprain detected', 9, 9),

(10, 'Neck X-Ray', 'Neck', 'Normal', 10, 10);

INSERT INTO OutpatientPrescription (PrescriptionID, PatientID, MedicineID, Quantity, DispensedDate, DispensedBy) VALUES

(1, 1, 1, 30, '2024-06-01', 1),

(2, 2, 2, 60, '2024-06-02', 2),

(3, 3, 3, 90, '2024-06-03', 3),

(4, 4, 4, 30, '2024-06-04', 4),

(5, 5, 5, 60, '2024-06-05', 5),

(6, 6, 6, 90, '2024-06-06', 6),

(7, 7, 7, 30, '2024-06-07', 7),

(8, 8, 8, 60, '2024-06-08', 8),

(9, 9, 9, 90, '2024-06-09', 9),

(10, 10, 10, 30, '2024-06-10', 10);

INSERT INTO BloodDonor (DonorID, DonorName, BloodGroup, DonationDate, DonationPlace, ContactNumber) VALUES

(1, 'Arif Khan', 'A+', '2024-06-01', 'Karachi', '03001234567'),

(2, 'Basit Ali', 'B+', '2024-06-02', 'Lahore', '03111234567'),

(3, 'Chaudhry Ahmed', 'O-', '2024-06-03', 'Islamabad', '03211234567'),

(4, 'Daniyal Qureshi', 'AB+', '2024-06-04', 'Peshawar', '03311234567'),

(5, 'Ehsan Javed', 'A-', '2024-06-05', 'Quetta', '03451234567'),

(6, 'Faisal Siddiqui', 'B-', '2024-06-06', 'Multan', '03511234567'),

(7, 'Ghazanfar Abbas', 'O+', '2024-06-07', 'Sialkot', '03611234567'),

(8, 'Hammad Sheikh', 'AB-', '2024-06-08', 'Faisalabad', '03711234567'),

(9, 'Imran Shah', 'A+', '2024-06-09', 'Hyderabad', '03811234567'),

(10, 'Junaid Khan', 'B+', '2024-06-10', 'Rawalpindi', '03911234567');

INSERT INTO WardAdmission (AdmissionID, PatientID, WardNumber, BedNumber, AdmissionDate, DischargeDate, DischargeReason) VALUES

(1, 1, 1, 'B1', '2024-06-01', '2024-06-05', 'Recovered'),

(2, 2, 2, 'B2', '2024-06-02', '2024-06-06', 'Recovered'),

(3, 3, 3, 'B3', '2024-06-03', '2024-06-07', 'Recovered'),

(4, 4, 4, 'B4', '2024-06-04', '2024-06-08', 'Transferred'),

(5, 5, 5, 'B5', '2024-06-05', '2024-06-09', 'Recovered'),

(6, 6, 6, 'B6', '2024-06-06', '2024-06-10', 'Recovered'),

(7, 7, 7, 'B7', '2024-06-07', '2024-06-11', 'Transferred'),

(8, 8, 8, 'B8', '2024-06-08', '2024-06-12', 'Recovered'),

(9, 9, 9, 'B9', '2024-06-09', '2024-06-13', 'Transferred'),

(10, 10, 10, 'B10', '2024-06-10', '2024-06-14', 'Recovered');

INSERT INTO MaintenanceLog (LogID, EquipmentID, MaintenanceDate, MaintenanceType, TechnicianID, Details) VALUES

(1, 1, '2024-06-01', 'Routine Check', 1, 'Checked ECG functionality'),

(2, 2, '2024-06-02', 'Repair', 2, 'Repaired MRI scanner'),

(3, 3, '2024-06-03', 'Routine Check', 3, 'Checked X-Ray machine functionality'),

(4, 4, '2024-06-04', 'Calibration', 4, 'Calibrated ultrasound machine'),

(5, 5, '2024-06-05', 'Routine Check', 5, 'Checked ventilator functionality'),

(6, 6, '2024-06-06', 'Repair', 6, 'Repaired defibrillator'),

(7, 7, '2024-06-07', 'Calibration', 7, 'Calibrated surgical table'),

(8, 8, '2024-06-08', 'Routine Check', 8, 'Checked anesthesia machine functionality'),

(9, 9, '2024-06-09', 'Repair', 9, 'Repaired patient monitor'),

(10, 10, '2024-06-10', 'Calibration', 10, 'Calibrated infusion pump');

INSERT INTO Diagnosis (DiagnosisID, PatientID, DoctorID, DiagnosisDate, DiagnosisDescription, TreatmentPlan) VALUES

(1, 1, 1, '2024-06-01', 'Hypertension', 'Lifestyle changes and medication'),

(2, 2, 2, '2024-06-02', 'Diabetes', 'Diet control and insulin therapy'),

(3, 3, 3, '2024-06-03', 'Migraine', 'Pain relief and lifestyle changes'),

(4, 4, 4, '2024-06-04', 'Asthma', 'Inhaler and medication'),

(5, 5, 5, '2024-06-05', 'Arthritis', 'Physical therapy and medication'),

(6, 6, 6, '2024-06-06', 'Depression', 'Counseling and medication'),

(7, 7, 7, '2024-06-07', 'Allergy', 'Avoidance and medication'),

(8, 8, 8, '2024-06-08', 'Back Pain', 'Physiotherapy and pain relief'),

(9, 9, 9, '2024-06-09', 'Flu', 'Rest and hydration'),

(10, 10, 10, '2024-06-10', 'Kidney Stone', 'Medication and hydration');

CREATE TABLE Admin (

AdminID INT PRIMARY KEY,

Username NVARCHAR(255),

Password NVARCHAR(255)

);

INSERT INTO Admin (AdminID,Username,Password) VALUES

(1,'wassaf','123'),

(2,'maryam','123'),

(3,'murtaza','123'),

(4,'admin','123');

-- Here are the SQL commands to create views for each table in the given database schema.

--Department View

CREATE VIEW DepartmentView AS

SELECT DepartmentID, DepartmentName, Description

FROM Department;

--Staff View

CREATE VIEW StaffView AS

SELECT StaffID, StaffName, ContactNumber, Salary, Shift, JoiningDate

FROM Staff;

-- Security Staff View

CREATE VIEW SecurityStaffView AS

SELECT s.StaffID, s.Role, d.DepartmentName

FROM SecurityStaff s

JOIN Department d ON s.DepartmentID = d.DepartmentID;

--Transport Staff View

CREATE VIEW TransportStaffView AS

SELECT s.StaffID, s.Role, d.DepartmentName

FROM TransportStaff s

JOIN Department d ON s.DepartmentID = d.DepartmentID;

-- Ward Boys/Nurse Staff View

CREATE VIEW NurseWardStaffView AS

SELECT s.StaffID, s.Role, d.DepartmentName

FROM NurseWardStaff s

JOIN Department d ON s.DepartmentID = d.DepartmentID;

--Medicine View

CREATE VIEW MedicineView AS

SELECT MedicineID, MedicineName, Manufacturer, QuantityAvailable, ExpiryDate, UnitPrice, Category

FROM Medicine;

-- Patient View

CREATE VIEW PatientView AS

SELECT PatientID, PatientName, Age, Gender, BloodGroup, ContactNumber, Address, MedicalHistory

FROM Patient;

--Doctor View

CREATE VIEW DoctorView AS

SELECT DoctorID, DoctorName, Specialization, ContactNumber, DepartmentName

FROM Doctor

JOIN Department ON Doctor.DepartmentID = Department.DepartmentID;

-- Appointment View

CREATE VIEW AppointmentView AS

SELECT AppointmentID, PatientName, DoctorName, AppointmentDate, AppointmentTime, Status

FROM Appointment

JOIN Patient ON Appointment.PatientID = Patient.PatientID

JOIN Doctor ON Appointment.DoctorID = Doctor.DoctorID;

-- Room View

CREATE VIEW RoomView AS

SELECT RoomID, RoomType, Availability, DepartmentName

FROM Room

JOIN Department ON Room.DepartmentID = Department.DepartmentID;

-- Blood Donor View

CREATE VIEW BloodDonorView AS

SELECT DonorID, DonorName, BloodGroup, DonationDate, DonationPlace, ContactNumber

FROM BloodDonor;

--Ward Admission View

CREATE VIEW WardAdmissionView AS

SELECT AdmissionID, PatientName, WardNumber, BedNumber, AdmissionDate, DischargeDate, DischargeReason

FROM WardAdmission

JOIN Patient ON WardAdmission.PatientID = Patient.PatientID;

--Maintenance Log View

CREATE VIEW MaintenanceLogView AS

SELECT LogID, EquipmentName, MaintenanceDate, MaintenanceType, StaffName

FROM MaintenanceLog

JOIN Equipment ON MaintenanceLog.EquipmentID = Equipment.EquipmentID

JOIN Staff ON MaintenanceLog.TechnicianID = Staff.StaffID;

--Diagnosis View

CREATE VIEW DiagnosisView AS

SELECT DiagnosisID, PatientName, DoctorName, DiagnosisDate, DiagnosisDescription, TreatmentPlan

FROM Diagnosis

JOIN Patient ON Diagnosis.PatientID = Patient.PatientID

JOIN Doctor ON Diagnosis.DoctorID = Doctor.DoctorID;

--Billing View

CREATE VIEW BillingView AS

SELECT BillingID, PatientName, TotalAmount, PaymentStatus, BillingDate

FROM Billing

JOIN Patient ON Billing.PatientID = Patient.PatientID;

--Prescription View

CREATE VIEW PrescriptionView AS

SELECT PrescriptionID, PatientName, DoctorName, MedicineName, Dosage, Instructions, IssueDate

FROM Prescription

JOIN Patient ON Prescription.PatientID = Patient.PatientID

JOIN Doctor ON Prescription.DoctorID = Doctor.DoctorID

JOIN Medicine ON Prescription.MedicineID = Medicine.MedicineID;

--Surgery View

CREATE VIEW SurgeryView AS

SELECT SurgeryID, SurgeryName, DoctorName, PatientName, SurgeryDate, SurgeryType

FROM Surgery

JOIN Doctor ON Surgery.DoctorID = Doctor.DoctorID

JOIN Patient ON Surgery.PatientID = Patient.PatientID;

--Attendance View

CREATE VIEW AttendanceView AS

SELECT AttendanceID, StaffName, Date, InTime, OutTime

FROM Attendance

JOIN Staff ON Attendance.StaffID = Staff.StaffID;

--Equipment View

CREATE VIEW EquipmentView AS

SELECT EquipmentID, EquipmentName, QuantityAvailable, Condition, DepartmentName

FROM Equipment

JOIN Department ON Equipment.DepartmentID = Department.DepartmentID;

--Lab Test View

CREATE VIEW LabTestView AS

SELECT TestID, TestName, TestCost, lt.Description, SampleType, DepartmentName, PatientName

FROM LabTest lt

JOIN Department ON lt.DepartmentID = Department.DepartmentID

JOIN Patient ON lt.PatientID = Patient.PatientID;

--Radiology Test View

CREATE VIEW RadiologyTestView AS

SELECT XrayID, XrayType, BodyPart, Result, DoctorName, PatientName

FROM RadiologyTest

JOIN Doctor ON RadiologyTest.DoctorID = Doctor.DoctorID

JOIN Patient ON RadiologyTest.PatientID = Patient.PatientID;

--Outpatient Prescription View

CREATE VIEW OutpatientPrescriptionView AS

SELECT PrescriptionID, PatientName, MedicineName, Quantity, DispensedDate, DispensedBy

FROM OutpatientPrescription

JOIN Patient ON OutpatientPrescription.PatientID = Patient.PatientID

JOIN Medicine ON OutpatientPrescription.MedicineID = Medicine.MedicineID

JOIN Staff ON OutpatientPrescription.DispensedBy = Staff.StaffID;

--Here are the stored procedures for each table in the given database schema.

-- Department Stored Procedure

CREATE PROCEDURE sp\_GetDepartmentDetails

@DepartmentID INT

AS

BEGIN

SELECT DepartmentName, Description

FROM Department

WHERE DepartmentID = @DepartmentID;

END;

-- Staff Stored Procedure

CREATE PROCEDURE sp\_GetStaffDetails

@StaffID INT

AS

BEGIN

SELECT StaffName, ContactNumber, Salary, Shift, JoiningDate

FROM Staff

WHERE StaffID = @StaffID;

END;

--Security Staff Stored Procedure

CREATE PROCEDURE sp\_GetSecurityStaffDetails

@StaffID INT

AS

BEGIN

SELECT s.Role, d.DepartmentName

FROM SecurityStaff s

JOIN Department d ON s.DepartmentID = d.DepartmentID

WHERE s.StaffID = @StaffID;

END;

-- Transport Staff Stored Procedure

CREATE PROCEDURE sp\_GetTransportStaffDetails

@StaffID INT

AS

BEGIN

SELECT s.Role, d.DepartmentName

FROM TransportStaff s

JOIN Department d ON s.DepartmentID = d.DepartmentID

WHERE s.StaffID = @StaffID;

END;

--Ward Boys/Nurse Staff Stored Procedure

CREATE PROCEDURE sp\_GetNurseWardStaffDetails

@StaffID INT

AS

BEGIN

SELECT s.Role, d.DepartmentName

FROM NurseWardStaff s

JOIN Department d ON s.DepartmentID = d.DepartmentID

WHERE s.StaffID = @StaffID;

END;

--Medicine Stored Procedure

CREATE PROCEDURE sp\_GetMedicineDetails

@MedicineID INT

AS

BEGIN

SELECT MedicineName, Manufacturer, QuantityAvailable, ExpiryDate, UnitPrice, Category

FROM Medicine

WHERE MedicineID = @MedicineID;

END;

--Patient Stored Procedure

CREATE PROCEDURE sp\_GetPatientDetails

@PatientID INT

AS

BEGIN

SELECT PatientName, Age, Gender, BloodGroup, ContactNumber, Address, MedicalHistory

FROM Patient

WHERE PatientID = @PatientID;

END;

--Doctor Stored Procedure

CREATE PROCEDURE sp\_GetDoctorDetails

@DoctorID INT

AS

BEGIN

SELECT DoctorName, Specialization, ContactNumber, DepartmentName

FROM Doctor

JOIN Department ON Doctor.DepartmentID = Department.DepartmentID

WHERE DoctorID = @DoctorID;

END;

--Appointment Stored Procedure

CREATE PROCEDURE sp\_GetAppointmentDetails

@AppointmentID INT

AS

BEGIN

SELECT p.PatientName, d.DoctorName, AppointmentDate, AppointmentTime, Status

FROM Appointment a

JOIN Patient p ON a.PatientID = p.PatientID

JOIN Doctor d ON a.DoctorID = d.DoctorID

WHERE AppointmentID = @AppointmentID;

END;

--Room Stored Procedure

CREATE PROCEDURE sp\_GetRoomDetails

@RoomID INT

AS

BEGIN

SELECT RoomType, Availability, DepartmentName

FROM Room

JOIN Department ON Room.DepartmentID = Department.DepartmentID

WHERE RoomID = @RoomID;

END;

--Billing Stored Procedure

CREATE PROCEDURE sp\_GetBillingDetails

@BillingID INT

AS

BEGIN

SELECT p.PatientName, TotalAmount, PaymentStatus, BillingDate

FROM Billing b

JOIN Patient p ON b.PatientID = p.PatientID

WHERE BillingID = @BillingID;

END;

--Prescription Stored Procedure

CREATE PROCEDURE sp\_GetPrescriptionDetails

@PrescriptionID INT

AS

BEGIN

SELECT p.PatientName, d.DoctorName, m.MedicineName, Dosage, Instructions, IssueDate

FROM Prescription pres

JOIN Doctor d ON pres.DoctorID = d.DoctorID

JOIN Medicine m ON pres.MedicineID = m.MedicineID

JOIN Patient p ON pres.PatientID = p.PatientID

WHERE PrescriptionID = @PrescriptionID;

END;

-- Surgery Stored Procedure

CREATE PROCEDURE sp\_GetSurgeryDetails

@SurgeryID INT

AS

BEGIN

SELECT SurgeryName, d.DoctorName, p.PatientName, SurgeryDate, SurgeryType

FROM Surgery s

JOIN Doctor d ON s.DoctorID = d.DoctorID

JOIN Patient p ON s.PatientID = p.PatientID

WHERE SurgeryID = @SurgeryID;

END;

--Attendance Stored Procedure

CREATE PROCEDURE sp\_GetAttendanceDetails

@StaffID INT

AS

BEGIN

SELECT Date, InTime, OutTime

FROM Attendance

WHERE StaffID = @StaffID;

END;

--Equipment Stored Procedure

CREATE PROCEDURE sp\_GetEquipmentDetails

@EquipmentID INT

AS

BEGIN

SELECT EquipmentName, QuantityAvailable, Condition, DepartmentName

FROM Equipment

JOIN Department ON Equipment.DepartmentID = Department.DepartmentID

WHERE EquipmentID = @EquipmentID;

END;

-- Lab Test Stored Procedure

CREATE PROCEDURE sp\_GetLabTestDetails

@TestID INT

AS

BEGIN

SELECT TestName, TestCost, lt.Description, SampleType, DepartmentName, PatientName

FROM LabTest lt

JOIN Department ON lt.DepartmentID = Department.DepartmentID

JOIN Patient ON lt.PatientID = Patient.PatientID

WHERE TestID = @TestID;

END;

--Radiology Test Stored Procedure

CREATE PROCEDURE sp\_GetRadiologyTestDetails

@XrayID INT

AS

BEGIN

SELECT XrayType, BodyPart, Result, DoctorName, PatientName

FROM RadiologyTest

JOIN Doctor ON RadiologyTest.DoctorID = Doctor.DoctorID

JOIN Patient ON RadiologyTest.PatientID = Patient.PatientID

WHERE XrayID = @XrayID;

END;

--Outpatient Prescription Stored Procedure

CREATE PROCEDURE sp\_GetOutpatientPrescriptionDetails

@PrescriptionID INT

AS

BEGIN

SELECT pat.PatientName, m.MedicineName, Quantity, DispensedDate, DispensedBy

FROM OutpatientPrescription p

JOIN Medicine m ON p.MedicineID = m.MedicineID

JOIN Staff s ON p.DispensedBy = s.StaffID

Join Patient pat ON p.PatientID = pat.PatientID

WHERE PrescriptionID = @PrescriptionID;

END;

-- Blood Donor Stored Procedure

CREATE PROCEDURE sp\_GetBloodDonorDetails

@DonorID INT

AS

BEGIN

SELECT DonorName, BloodGroup, DonationDate, DonationPlace, ContactNumber

FROM BloodDonor

WHERE DonorID = @DonorID;

END;

--Ward Admission Stored Procedure

CREATE PROCEDURE sp\_GetWardAdmissionDetails

@AdmissionID INT

AS

BEGIN

SELECT p.PatientName, WardNumber, BedNumber, AdmissionDate, DischargeDate, DischargeReason

FROM WardAdmission w

JOIN Patient p ON w.PatientID = p.PatientID

WHERE AdmissionID = @AdmissionID;

END;

--Diagnosis Stored Procedure

CREATE PROCEDURE sp\_GetDiagnosisDetails

@DiagnosisID INT

AS

BEGIN

SELECT p.PatientName, d.DoctorName, DiagnosisDate, DiagnosisDescription, TreatmentPlan

FROM Diagnosis di

JOIN Patient p ON di.PatientID = p.PatientID

JOIN Doctor d ON di.DoctorID = d.DoctorID

WHERE DiagnosisID = @DiagnosisID;

END;

--Here are the SQL functions for each table in the given database schema.

--Department Function

CREATE FUNCTION fn\_GetDepartmentName (@DepartmentID INT)

RETURNS NVARCHAR(100)

AS

BEGIN

DECLARE @DepartmentName NVARCHAR(100)

SELECT @DepartmentName = DepartmentName

FROM Department

WHERE DepartmentID = @DepartmentID

RETURN @DepartmentName

END;

--Staff Function

CREATE FUNCTION fn\_GetStaffName (@StaffID INT)

RETURNS NVARCHAR(100)

AS

BEGIN

DECLARE @StaffName NVARCHAR(100)

SELECT @StaffName = StaffName

FROM Staff

WHERE StaffID = @StaffID

RETURN @StaffName

END;

--Security Staff Function

CREATE FUNCTION fn\_GetSecurityStaffRole (@StaffID INT)

RETURNS NVARCHAR(50)

AS

BEGIN

DECLARE @Role NVARCHAR(50)

SELECT @Role = Role

FROM SecurityStaff

WHERE StaffID = @StaffID

RETURN @Role

END;

--Transport Staff Function

CREATE FUNCTION fn\_GetTransportStaffRole (@StaffID INT)

RETURNS NVARCHAR(50)

AS

BEGIN

DECLARE @Role NVARCHAR(50)

SELECT @Role = Role

FROM TransportStaff

WHERE StaffID = @StaffID

RETURN @Role

END;

--Ward Boys/Nurse Staff Function

CREATE FUNCTION fn\_GetNurseWardStaffRole (@StaffID INT)

RETURNS NVARCHAR(50)

AS

BEGIN

DECLARE @Role NVARCHAR(50)

SELECT @Role = Role

FROM NurseWardStaff

WHERE StaffID = @StaffID

RETURN @Role

END;

-- Medicine Function

CREATE FUNCTION fn\_GetMedicineName (@MedicineID INT)

RETURNS NVARCHAR(100)

AS

BEGIN

DECLARE @MedicineName NVARCHAR(100)

SELECT @MedicineName = MedicineName

FROM Medicine

WHERE MedicineID = @MedicineID

RETURN @MedicineName

END;

--Patient Function

CREATE FUNCTION fn\_GetPatientName (@PatientID INT)

RETURNS NVARCHAR(100)

AS

BEGIN

DECLARE @PatientName NVARCHAR(100)

SELECT @PatientName = PatientName

FROM Patient

WHERE PatientID = @PatientID

RETURN @PatientName

END;

--Doctor Function

CREATE FUNCTION fn\_GetDoctorName (@DoctorID INT)

RETURNS NVARCHAR(100)

AS

BEGIN

DECLARE @DoctorName NVARCHAR(100)

SELECT @DoctorName = DoctorName

FROM Doctor

WHERE DoctorID = @DoctorID

RETURN @DoctorName

END;

--Appointment Function

CREATE FUNCTION fn\_GetAppointmentStatus (@AppointmentID INT)

RETURNS NVARCHAR(50)

AS

BEGIN

DECLARE @Status NVARCHAR(50)

SELECT @Status = Status

FROM Appointment

WHERE AppointmentID = @AppointmentID

RETURN @Status

END;

-- Room Function

CREATE FUNCTION fn\_GetRoomAvailability (@RoomID INT)

RETURNS BIT

AS

BEGIN

DECLARE @Availability BIT

SELECT @Availability = Availability

FROM Room

WHERE RoomID = @RoomID

RETURN @Availability

END;

--Billing Function

CREATE FUNCTION fn\_GetBillingAmount (@BillingID INT)

RETURNS DECIMAL(10, 2)

AS

BEGIN

DECLARE @Amount DECIMAL(10, 2)

SELECT @Amount = TotalAmount

FROM Billing

WHERE BillingID = @BillingID

RETURN @Amount

END;

--Prescription Function

CREATE FUNCTION fn\_GetPrescriptionDosage (@PrescriptionID INT)

RETURNS NVARCHAR(50)

AS

BEGIN

DECLARE @Dosage NVARCHAR(50)

SELECT @Dosage = Dosage

FROM Prescription

WHERE PrescriptionID = @PrescriptionID

RETURN @Dosage

END;

--Surgery Function

CREATE FUNCTION fn\_GetSurgeryType (@SurgeryID INT)

RETURNS NVARCHAR(50)

AS

BEGIN

DECLARE @Type NVARCHAR(50)

SELECT @Type = SurgeryType

FROM Surgery

WHERE SurgeryID = @SurgeryID

RETURN @Type

END;

--Attendance Function

CREATE FUNCTION fn\_GetAttendanceDate (@AttendanceID INT)

RETURNS DATE

AS

BEGIN

DECLARE @Date DATE

SELECT @Date = Date

FROM Attendance

WHERE AttendanceID = @AttendanceID

RETURN @Date

END;

-- Equipment Function

CREATE FUNCTION fn\_GetEquipmentCondition (@EquipmentID INT)

RETURNS NVARCHAR(50)

AS

BEGIN

DECLARE @Condition NVARCHAR(50)

SELECT @Condition = Condition

FROM Equipment

WHERE EquipmentID = @EquipmentID

RETURN @Condition

END;

--Lab Test Function

CREATE FUNCTION fn\_GetLabTestCost (@TestID INT)

RETURNS DECIMAL(10, 2)

AS

BEGIN

DECLARE @Cost DECIMAL(10, 2)

SELECT @Cost = TestCost

FROM LabTest

WHERE TestID = @TestID

RETURN @Cost

END;

-- Radiology Test Function

CREATE FUNCTION fn\_GetRadiologyTestResult (@XrayID INT)

RETURNS NVARCHAR(255)

AS

BEGIN

DECLARE @Result NVARCHAR(255)

SELECT @Result = Result

FROM RadiologyTest

WHERE XrayID = @XrayID

RETURN @Result

END;

-- Outpatient Prescription Function

CREATE FUNCTION fn\_GetOutpatientPrescriptionQuantity (@PrescriptionID INT)

RETURNS INT

AS

BEGIN

DECLARE @Quantity INT

SELECT @Quantity = Quantity

FROM OutpatientPrescription

WHERE PrescriptionID = @PrescriptionID

RETURN @Quantity

END;

-- Blood Donor Function

CREATE FUNCTION fn\_GetBloodDonorName (@DonorID INT)

RETURNS NVARCHAR(100)

AS

BEGIN

DECLARE @DonorName NVARCHAR(100)

SELECT @DonorName = DonorName

FROM BloodDonor

WHERE DonorID = @DonorID

RETURN @DonorName

END;

--Ward Admission Function

CREATE FUNCTION fn\_GetWardAdmissionDate (@AdmissionID INT)

RETURNS DATE

AS

BEGIN

DECLARE @Date DATE

SELECT @Date = AdmissionDate

FROM WardAdmission

WHERE AdmissionID = @AdmissionID

RETURN @Date

END;

-- Maintenance Log Function

CREATE FUNCTION fn\_GetMaintenanceLogDetails (@LogID INT)

RETURNS NVARCHAR(255)

AS

BEGIN

DECLARE @Details NVARCHAR(255)

SELECT @Details = Details

FROM MaintenanceLog

WHERE LogID = @LogID

RETURN @Details

END;

-- Diagnosis Function

CREATE FUNCTION fn\_GetDiagnosisDescription (@DiagnosisID INT)

RETURNS NVARCHAR(255)

AS

BEGIN

DECLARE @Description NVARCHAR(255)

SELECT @Description = DiagnosisDescription

FROM Diagnosis

WHERE DiagnosisID = @DiagnosisID

RETURN @Description

END;

--Here are some triggers for the given database schema.

--Medicine Expiry Trigger

CREATE TRIGGER tr\_Medicine\_ExpiryNotification

ON Medicine

AFTER UPDATE

AS

BEGIN

IF UPDATE(ExpiryDate)

BEGIN

DECLARE @MedicineID INT, @MedicineName NVARCHAR(100), @ExpiryDate DATE

SELECT @MedicineID = inserted.MedicineID, @MedicineName = inserted.MedicineName, @ExpiryDate = inserted.ExpiryDate

FROM inserted

IF @ExpiryDate < GETDATE()

BEGIN

PRINT 'Medicine ' + @MedicineName + ' with ID ' + CAST(@MedicineID AS NVARCHAR(10)) + ' has expired on ' + CAST(@ExpiryDate AS NVARCHAR(10))

END

ELSE IF @ExpiryDate < DATEADD(month, 3, GETDATE())

BEGIN

PRINT 'Medicine ' + @MedicineName + ' with ID ' + CAST(@MedicineID AS NVARCHAR(10)) + ' will expire on ' + CAST(@ExpiryDate AS NVARCHAR(10)) + '. Please reorder.'

END

END

END

--Patient Admission Trigger

CREATE TRIGGER tr\_WardAdmission\_PatientStatus

ON WardAdmission

AFTER INSERT

AS

BEGIN

UPDATE Patient

SET MedicalHistory = MedicalHistory + 'Patient admitted on ' + CAST(GETDATE() AS NVARCHAR(10)) + '. '

WHERE PatientID = (SELECT PatientID FROM inserted)

END

--Surgery Completion Trigger

CREATE TRIGGER tr\_Surgery\_CompletionUpdate

ON Surgery

AFTER UPDATE

AS

BEGIN

IF UPDATE(SurgeryDate)

BEGIN

DECLARE @SurgeryID INT, @SurgeryName NVARCHAR(100), @PatientName NVARCHAR(100), @DoctorName NVARCHAR(100), @SurgeryDate DATE

SELECT @SurgeryID = inserted.SurgeryID, @SurgeryName = inserted.SurgeryName, @PatientName = p.PatientName, @DoctorName = d.DoctorName, @SurgeryDate = inserted.SurgeryDate

FROM inserted

JOIN Patient p ON inserted.PatientID = p.PatientID

JOIN Doctor d ON inserted.DoctorID = d.DoctorID

PRINT 'Surgery ' + @SurgeryName + ' for patient ' + @PatientName + ' performed by Dr. ' + @DoctorName + ' on ' + CAST(@SurgeryDate AS NVARCHAR(10)) + ' is completed.'

END

END

--Attendance Monitoring Trigger

CREATE TRIGGER tr\_Attendance\_MonitorShift

ON Attendance

AFTER INSERT

AS

BEGIN

DECLARE @AttendanceID INT, @StaffName NVARCHAR(100), @Date DATE, @InTime TIME, @OutTime TIME

SELECT @AttendanceID = AttendanceID, @StaffName = s.StaffName, @Date = Date, @InTime = InTime, @OutTime = OutTime

FROM inserted i

JOIN Staff s ON i.StaffID = s.StaffID

IF EXISTS (SELECT 1 FROM Staff WHERE StaffID = (SELECT StaffID FROM inserted) AND Shift = 'Morning')

BEGIN

IF @InTime > '09:00:00' OR @OutTime < '17:00:00'

BEGIN

PRINT 'Staff ' + @StaffName + ' with ID ' + CAST(@AttendanceID AS NVARCHAR(10)) + ' did not complete the morning shift on ' + CAST(@Date AS NVARCHAR(10))

END

END

ELSE IF EXISTS (SELECT 1 FROM Staff WHERE StaffID = (SELECT StaffID FROM inserted) AND Shift = 'Evening')

BEGIN

IF @InTime > '17:00:00' OR @OutTime < '01:00:00'

BEGIN

PRINT 'Staff ' + @StaffName + ' with ID ' + CAST(@AttendanceID AS NVARCHAR(10)) + ' did not complete the evening shift on ' + CAST(@Date AS NVARCHAR(10))

END

END

END

--Trigger to automatically set the appointment status to 'Completed' after the appointment time has passed:

CREATE TRIGGER trgAfterAppointmentTimePassed

ON Appointment

AFTER UPDATE

AS

BEGIN

UPDATE Appointment

SET Status = 'Completed'

WHERE AppointmentDate < CAST(GETDATE() AS DATE)

AND AppointmentTime < CAST(GETDATE() AS TIME)

AND Status <> 'Completed';

END;

--Trigger to update room availability after a patient is discharged:

CREATE TRIGGER trgAfterDischargeUpdate

ON WardAdmission

AFTER UPDATE

AS

BEGIN

DECLARE @WardNumber INT, @Availability BIT;

SELECT @WardNumber = WardNumber, @Availability = CASE WHEN DischargeDate IS NOT NULL THEN 1 ELSE 0 END

FROM inserted;

UPDATE Room

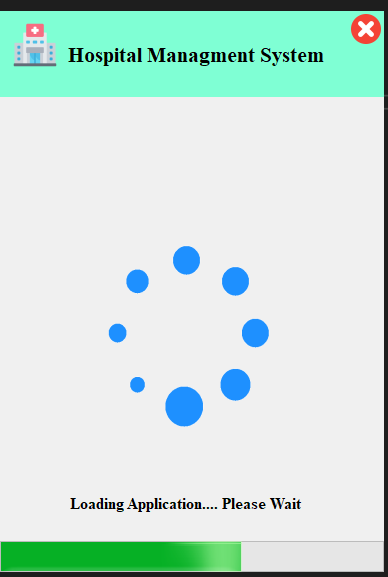
SET Availability = @Availability

WHERE RoomID = @WardNumber;

END;

# Output (screen shots with details)

Visual representations showcase the application's interface, demonstrating modules such as patient registration forms, doctor scheduling screens, diagnosis record views, and medicine inventory management tools.

 A screenshot of a login page

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A screenshot of a medical system

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A screenshot of a computer

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A screenshot of a computer

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A screenshot of a medical application

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A screenshot of a computer

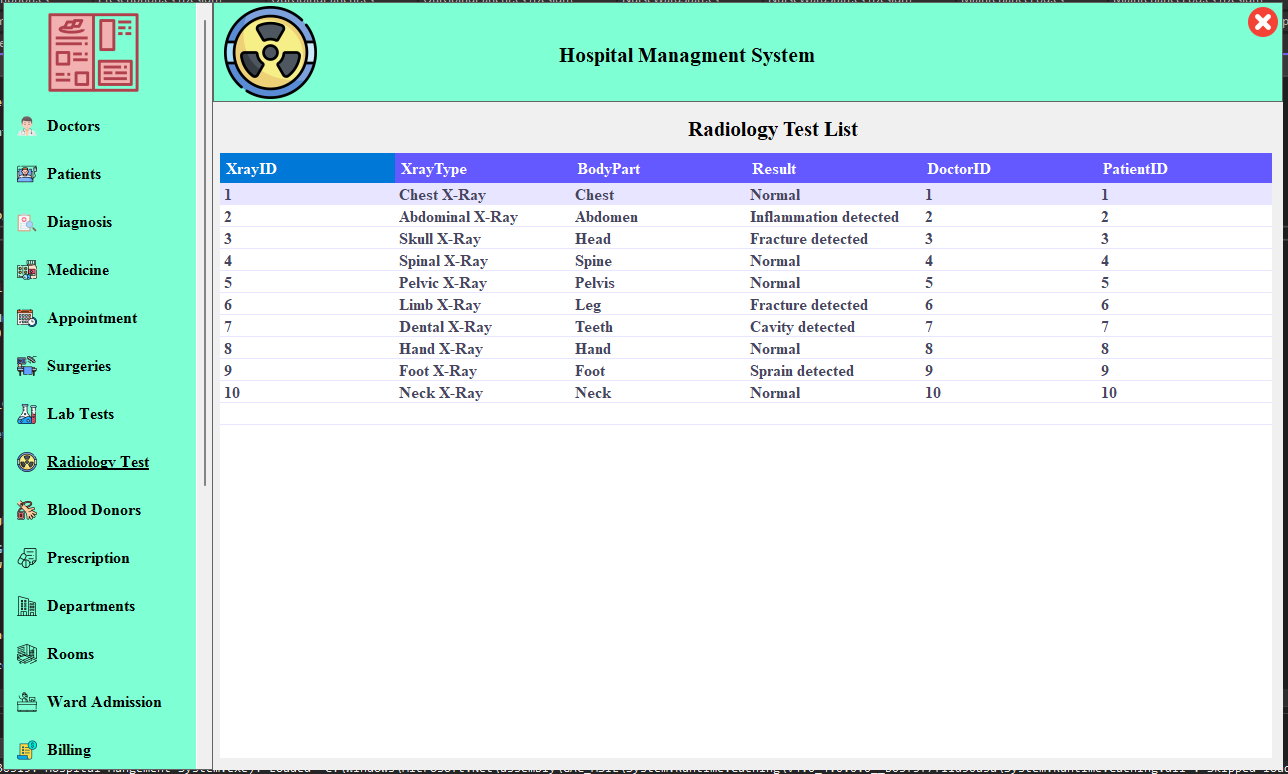
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# Future work

Future enhancements of the HMS (Hospital Management System) project will prioritize expanding its functionality to encompass additional modules that cater to diverse aspects of hospital operations, aiming to enhance overall efficiency, patient care, and administrative effectiveness.

* Laboratory Information Systems: One of the key future enhancements includes the integration of a Laboratory Information System (LIS). This module will facilitate streamlined management of laboratory tests, results, and workflows. Healthcare professionals will be able to electronically order tests, track specimen statuses, and receive automated notifications for critical results. Integration with existing patient records and diagnostic modules will ensure comprehensive patient care management, allowing for seamless sharing of data between laboratory departments and other clinical areas.
* Radiology Management: Another critical enhancement will be the implementation of a Radiology Management module. This module will support the scheduling, tracking, and reporting of radiological procedures such as X-rays, CT scans, MRIs, and ultrasounds. Integration with diagnostic imaging equipment and PACS (Picture Archiving and Communication System) will enable healthcare providers to securely access and analyze imaging studies, enhancing diagnostic accuracy and treatment planning. Automated alerts for urgent findings and integration with patient records will streamline communication between radiologists, referring physicians, and other healthcare professionals.
* Outpatient Pharmacy Services: Expanding into outpatient pharmacy services will involve developing a module to manage medication dispensing, patient prescriptions, and inventory control for pharmaceutical supplies. The system will support electronic prescription workflows, ensuring accurate medication orders, dispensation, and patient safety checks. Integration with existing medication records and billing modules will streamline the prescription fulfillment process and facilitate seamless communication between healthcare providers and pharmacists.
* Integration with Cloud Services: To optimize data management and scalability, future enhancements will include integrating the HMS with cloud services. Cloud-based storage solutions will offer enhanced data security, scalability, and accessibility, enabling healthcare institutions to store and manage vast amounts of patient data efficiently. Cloud integration will also support advanced analytics capabilities, providing insights into operational trends, patient outcomes, and resource utilization. This data-driven approach will empower healthcare administrators to make informed decisions, optimize resource allocation, and improve overall hospital performance.
* Advanced Analytics: Leveraging cloud services will also enable the implementation of advanced analytics functionalities within the HMS. Healthcare institutions will be able to perform predictive analytics, population health management, and financial forecasting based on comprehensive data analysis. Insights derived from analytics will support strategic decision-making, quality improvement initiatives, and regulatory compliance.

By expanding the HMS to include these advanced modules and integrating with cloud services, healthcare institutions can achieve significant improvements in operational efficiency, patient care quality, and overall organizational performance. These enhancements will not only streamline workflows and optimize resource utilization but also foster innovation in healthcare delivery, ultimately benefiting both healthcare providers and patients.

# Conclusion

The Hospital Management System (HMS) project leverages advanced technologies to automate key healthcare processes, enhance data management capabilities, and improve patient care outcomes. By digitizing tasks like patient registration, appointment scheduling, and medication management, the HMS streamlines operations, reduces errors, and accelerates clinical workflows. Robust data handling with SQL Server ensures secure storage and efficient retrieval of patient information, supporting informed decision-making and regulatory compliance. Designed for scalability, the HMS accommodates future expansions into laboratory, radiology, and pharmacy management, fostering interdisciplinary collaboration and operational efficiency. Overall, the HMS exemplifies how technology can revolutionize healthcare administration, paving the way for enhanced efficiency and superior patient care.

# References (Use IEEE Referencing style)

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