

Project: HealthConnect – Patient Care & Appointment Management System

1. Introduction

This document outlines the Low-Level Design (LLD) for **HealthConnect**, a web-based healthcare system for hospitals and clinics. The system manages patient profiles, appointment scheduling, medical records, billing, and analytics for operational efficiency.

Supports backend development using **Java (Spring Boot)** and **.NET (ASP.NET Core)**.

2. Module Overview

- 2.1 Patient Registration & Profile Management Module
- 2.2 Appointment Scheduling & Doctor Availability Module
- 2.3 Electronic Medical Records (EMR) Module
- 2.4 Billing & Payment Processing Module
- 2.5 User Authentication & Role Management Module

3. Architecture Overview

3.1 Architectural Style

- **Frontend:** Angular/React for patient and admin dashboards
- **Backend:** REST APIs for appointment and record management
- **Database:** MySQL/SQL Server for structured healthcare data

3.2 Component Interaction

- Frontend captures appointments and displays medical records
- Backend processes schedules and billing

4. Module-Wise Design

4.1 Patient Registration & Profile Management Module

Features:

- Register patients and update profiles
- View medical history

Entities:

- **Patient**
 - PatientID

- Name
- ContactInfo
- DOB
- MedicalHistory

4.2 Appointment Scheduling & Doctor Availability Module

Features:

- Schedule appointments based on doctor availability
- Send reminders to patients

Entities:

- **Appointment**
 - AppointmentID
 - PatientID
 - DoctorID
 - Date
 - Status (BOOKED, COMPLETED, CANCELLED)

4.3 Electronic Medical Records (EMR) Module

Features:

- Store diagnosis, prescriptions, and lab results
- Retrieve records for consultations

Entities:

- **MedicalRecord**
 - RecordID
 - PatientID
 - Diagnosis
 - Prescription
 - Date

4.4 Billing & Payment Processing Module

Features:

- Generate bills for consultations and procedures
- Track payment status

Entities:

- **Invoice**
 - InvoiceID
 - PatientID
 - Amount
 - PaymentStatus (PAID, UNPAID)

4.5 User Authentication & Role Management Module

Features:

- Secure login and role-based access for patients and staff

Entities:

- **User**
 - UserID
 - Username
 - Password
 - Role (PATIENT, DOCTOR, ADMIN)

5. Deployment Strategy

- **Local:** Developer machines with sample patient data
- **Production:** Cloud deployment with secure APIs and compliance logging

6. Database Design

Tables: Patient → Appointment → MedicalRecord → Invoice → User

7. User Interface Design

Wireframes:

- **Patient Portal:** Book appointments, view records
- **Admin Dashboard:** Manage schedules, billing

8. Non-Functional Requirements

- **Performance:** Handle 5,000 concurrent appointment requests
- **Security:** Encrypted data, compliance with HIPAA
- **Scalability:** Support multiple hospitals and clinics

9. Assumptions and Constraints

- Patients book appointments via web portal
- Initial rollout for outpatient services only