IT IS 6120/8120 - Project 2 Report

Electronic Medical Record (EMR) System - Project 2

Robust Medical Database System

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1. Introduction

1.1 Project Description

The Student Clinic EMR System is a full-stack Electronic Medical Records app designed for a university clinic to manage patient records, visits, and prescriptions securely. The backend uses ASP.NET Core 7 Web API with Entity Framework Core and Dapper, while the frontend runs on Angular 17 and Bootstrap 5. This setup gives clinical staff and patients a modern, responsive interface. The database uses MySQL 8.0 and includes over 22 stored procedures, seven audit triggers, more than 14 performance indexes, and 7 security views to ensure efficient data access, strong auditing, and data isolation by department.

Security and governance are key parts of the system. The app uses JWT authentication, SHA-256 password hashing, and role-based access control for eight user roles: Doctor, Nurse, Hospital Support, Manager, IT Admin, Pharmacist, Pharmacy Manager, and Patient. There are over 35 RESTful API endpoints that handle tasks like patient registration, visit tracking, prescription management, pharmacy dispensing, user management, and audit log review. The Angular client uses HTTP interceptors and route guards to protect sensitive pages and automatically manage tokens. This project offers an enterprise-level EMR solution focused on security, performance, auditing, and real healthcare workflows.

The Student Clinic EMR System aims to replace paper and spreadsheet workflows with a secure, integrated digital platform in a university clinic. Handling sensitive data, frequent visits, and high staff turnover makes manual processes error-prone, slow, and hard to audit. Building a full-stack EMR with strong authentication, role-based access, and audit trails, the project seeks to enhance care coordination, protect privacy, and give clinicians quick, reliable access to records, prescriptions, and history—similar to real healthcare software.

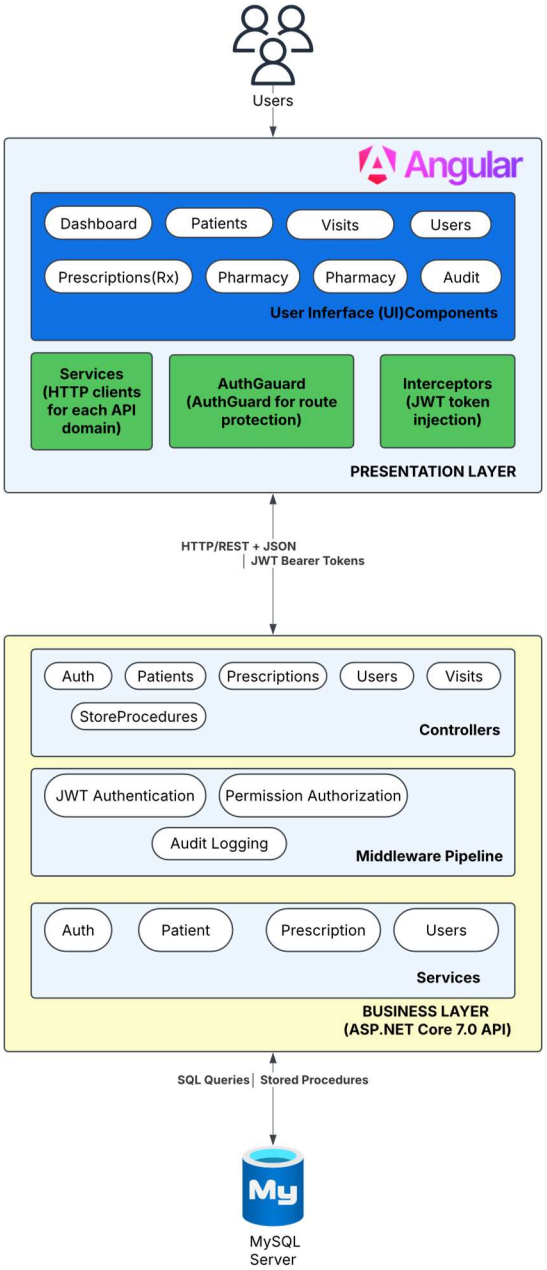
1.2 Purpose

This document outlines the functional and non-functional requirements for the Student Clinic EMR System, covering the database, API, and user interfaces (staff UI and patient portal). It is meant for instructors, developers, and testers assessing the project implementation.

1.3 Architecture

The EMR system at the Student Clinic is built with a three-layer architecture:

- Angular presentation layer
- ASP.NET Core business layer
- MySQL data layer with SPs, triggers, indexes, and views.



1.4 System Overview

The Student Clinic EMR System is a small-scale electronic medical record application for a university clinic. It will:

- Store and manage patient demographics, visits, diagnoses, prescriptions, and pharmacy dispensing.
- Support multiple user roles (Doctor, Nurse, Pharmacist, Front Desk, Manager, IT Admin, Patient).
- Provide a secure patient portal so students can view their own clinical and billing information.
- Enforce role-based access control (RBAC) and department-based visibility.
- Maintain an audit trail for changes to critical clinical data.

The back end is implemented with MySQL (database), stored procedures, triggers, views, and indexes, and an application layer (e.g., text-based or web-based UI) that calls these database objects.

1.5 Stakeholders and User Roles

- **Clinic Staff & Providers**
  - Doctor
  - Nurse
  - Hospital Support / Front Desk
  - Pharmacist
  - Pharmacy Manager
  - Manager (Clinic Admin)
- **IT Admin** – Manages users, roles, permissions, and technical configuration.
- **Patient** – Student who logs into the portal to view their own records.

1.6 References

- Project assignment description and deliverables.
- Project 1 database schema and scripts (baseline design).
- Updated EMR schema and SQL scripts included in this submission.

2. Scope

2.1 In-Scope

- Patient registration and demographic management.
- Visit and basic clinical documentation.
- Prescription creation and pharmacy dispensing workflow.
- Patient portal views for visits, diagnoses, prescriptions, results, and billing.
- Centralized user and role management with RBAC.
- Audit logging of changes to key clinical tables.
- Performance optimization through indexes and stored procedures.

2.2 Out-of-Scope

- Full billing/invoicing integration with external systems.
- Insurance claims processing.
- Advanced analytics or dashboards.
- Full pharmacy inventory management (only integration points reserved).

3. Functional Requirements (FR)

3.1 Authentication and User Management

FR-1.1 The system shall allow staff and patients to log in using a **unique email** and **password**.
FR-1.2 The system shall store **password hashes** (e.g., using SHA2() in MySQL) instead of plain-text passwords.
FR-1.3 The system shall separate user profile data (staff_user) from authentication credentials (user_auth).
FR-1.4 The system shall allow IT Admins to **create**, **activate/deactivate**, and **soft-delete** user accounts.

3.2 Role-Based Access Control (RBAC)

FR-2.1 The system shall support at least the following roles:
Doctor, Nurse, Hospital Support, Manager, IT Admin, Pharmacist, Pharmacy Manager, Patient.

FR-2.2 The system shall allow each user to be assigned **one or more roles** (user_role).
FR-2.3 The system shall represent permissions as **resource–action pairs** (e.g., patient:SELECT, prescription:INSERT) in a permission table.
FR-2.4 The system shall map roles to permissions using a **many-to-many** relationship (role_permission).
FR-2.5 All database operations from the application shall be executed through stored procedures and/or views that enforce the user's permissions.

3.3 Department and Staff Management

FR-3.1 The system shall maintain a list of **departments** (e.g., Front Desk, Pharmacy, IT, Internal Medicine).
FR-3.2 The system shall allow staff and providers to be assigned to one or more departments (staff_department, provider_department).
FR-3.3 The system shall restrict staff access so they only see **patients and visits** for their department(s), enforced via department-scoped views.

3.4 Patient Registration and Demographics

FR-4.1 The system shall allow authorized staff (Front Desk, Manager) to **create** and **update** patient records.
FR-4.2 A patient record shall include:

- Name, date of birth, gender
- Phone, email
- Full mailing address
- Emergency contact information

FR-4.3 The system shall assign each patient a **unique identifier** (e.g., MRN).

3.5 Visits and Clinical Documentation

FR-5.1 The system shall allow staff to create and update visit records linked to a patient and provider.
FR-5.2 Each visit shall include date/time, department, provider, visit status, and **chief complaint**.
FR-5.3 The system shall allow diagnoses and other clinical information to be associated with a visit.

3.6 Prescription Management

FR-6.1 The system shall allow doctors to create prescriptions linked to a visit and patient.
FR-6.2 Each prescription shall store: medication, dosage, frequency, duration, instructions, and status.
FR-6.3 The system shall maintain prescription status values such as **Pending**, **Dispensed**, and **Cancelled**.

3.7 Pharmacy Dispensing Workflow

FR-7.1 The system shall provide a **pharmacy queue** view of prescriptions that need to be dispensed.

FR-7.2 The system shall allow pharmacy staff to record **dispensing events** in pharmacy_dispense, including dispenser, date/time, and quantity.
FR-7.3 The system shall automatically update the prescription status from **Pending** to **Dispensed** when the dispensing procedure completes.

3.8 Patient Portal

FR-8.1 The system shall provide a **patient portal** where a student can log in to view their own EMR data.
FR-8.2 Each portal user shall be linked to exactly one patient record via user_patient_link.
FR-8.3 Using secure views (e.g., v_my_visits, v_my_prescriptions), the portal shall allow patients to view only:

- Their own visits
- Their own diagnoses
- Their own prescriptions
- Their own results
- Their own billing information

3.9 Audit Logging

FR-9.1 The system shall log all **INSERT**, **UPDATE**, and **DELETE** operations on critical tables (e.g., patient, visit, prescription, pharmacy dispense) into an audit_log table.
FR-9.2 Each audit record shall include: table name, record key, action type, acting user, timestamp, and JSON snapshots of old/new values.
FR-9.3 The system shall capture user context (e.g., @app_user_id, IP address, user agent) provided from the application layer.

3.10 Stored Procedure–Based Access

FR-10.1 The application shall use **stored procedures** for CRUD operations on patient, visit, prescription, and dispensing entities.
FR-10.2 The system shall implement procedures for:

- Patient CRUD

- Visit CRUD
- Prescription CRUD and dispensing

FR-10.3 Direct ad-hoc SQL from the application to core tables shall not be used; all access goes through stored procedures and security views.

4. Non-Functional Requirements

4.1 Security

NFR-1.1 All authentication and authorization checks shall be enforced in both the application and database layers.
NFR-1.2 Passwords shall be stored only as hashes and never in plain text.
NFR-1.3 The database design (procedures, views) shall minimize exposure to **SQL injection** by using parameters and not concatenating raw input.

4.2 Performance

NFR-2.1 Typical data retrieval operations (e.g., viewing a patient record, daily visit list) shall respond within 2–3 seconds for the anticipated clinic load.
NFR-2.2 Frequently queried fields (e.g., patient ID, email, visit date, foreign keys) shall be indexed to support acceptable query performance.

4.3 Reliability and Data Integrity

NFR-3.1 The database shall enforce **referential integrity** using primary and foreign keys.
NFR-3.2 Deletion of logically essential records (e.g., patients, visits) shall preferably be handled via **soft delete** or status flags rather than hard deletion.

4.4 Usability

NFR-4.1 The staff interface (or text-based menu) shall clearly separate workflows: registration, clinical documentation, and pharmacy.
NFR-4.2 Patient portal views shall present information in simple, student-friendly language.

4.5 Maintainability and Extensibility

NFR-5.1 The schema shall be normalized (3NF or better) to reduce redundancy and simplify maintenance.

NFR-5.2 The design shall allow new modules (e.g., labs, inventory) to be added without major schema changes.

NFR-5.3 New roles and permissions shall be addable via data changes (in role and permission tables) without restructuring the schema.

5. Data and Database Requirements

5.1 Core Entities

The database shall include, at least, tables for:

- patient, visit, diagnosis, prescription, pharmacy_dispense
- staff_user, user_auth, user_role, user_patient_link
- role, permission, role_permission
- department, staff_department, provider_department
- audit_log

5.2 Data Model and Normalization

- The UML data model and ER diagram shall reflect a **normalized** schema (3NF or BCNF where reasonable).
- Many-to-many relationships (e.g., users–roles, roles–permissions, staff–departments) shall be implemented via junction tables.

5.3 Views, Triggers, and Indexes

- Security views (e.g., v_support_patient_schedule, v_pharmacy_prescriptions, v_my_*) shall be defined to implement **row-level security**.
- Triggers shall be defined to populate the audit_log table for critical operations.
- Indexes shall be created on frequently used lookup and join columns to support performance.

5.4 Test Data

- The database creation script shall include **sample test data** for:
    - Multiple patients, visits, prescriptions.
    - At least one user for each role.
    - At least one record in each department and mapping table.

6. Interface Requirements

6.1 Application to Database

- The application (presentation layer or text interface) shall connect to the MySQL database using a configured database user account.
- All operations shall call **stored procedures** and **views**, not core tables directly.

6.2 Presentation Layer (for demo)

The system shall demonstrate:

- Login and role-based menus (While running as a Local Host application in presentation).
- Basic flows: patient registration, creating a visit, creating a prescription, dispensing in pharmacy, and viewing patient portal data.

7. Changes to Project 1 Database Design

This section clearly addresses the requirements. Compared to the original Project 1 design, the following major modifications were implemented:

7.1 New User & Security Tables

- Added staff_user, user_auth, role, permission, role_permission, user_role, user_patient_link for unified user management and RBAC.
- Reason: Move from provider-only login to a full multi-role architecture with proper separation of identity and credentials.

7.2 Department Structure

- Added department, staff_department, provider_department to support department-based filtering.
- Reason: Enforce that staff can only see clinic data belonging to their department(s).

7.3 Patient & Visit Enhancements

- Extended patient to include full address and emergency contacts.
- Extended visit to include chief_complaint.
- Reason: Support more realistic clinical documentation and intake requirements.

7.4 Audit Trail

- Added audit_log table and multiple triggers on patient, visit, prescription, and related tables.

- Reason: Provide a complete audit history for compliance and debugging (who changed what and when).

7.5 Stored Procedures & Views

- Replaced direct SQL with **22+ stored procedures** for patient, visit, and prescription workflows.
- Added **security views** (e.g., v_my_visits, v_my_prescriptions, v_support_patient_schedule, v_pharmacy_prescriptions).
- Reason: Centralize business logic, reduce SQL injection risk, and enforce row-level security at the database level.

7.6 Pharmacy Module

- Added pharmacy_dispense table and sp_dispense_prescription procedure.
- Reason: Implement a full prescription–to–dispensing workflow instead of just static prescription records.

7.7 Performance Improvements

- Added **14+ indexes** on frequently queried columns beyond primary/foreign keys.
- Reason: Improve query performance for common UI and portal operations.

These updates transformed the earlier Project 1 database into a **secure, auditable, performance-optimized EMR backend** ready for demonstration.

8. How to Install and Run the Student Clinic EMR Application

8.1 Prerequisites

Make sure the following are installed on your machine:

- **MySQL 8.0+**
- **.NET 7 SDK** (for the StudentClinicAPI)
- **Node.js 18+** (or at least 16+)
- **Angular CLI 17+** (install via npm install -g @angular/cli)
- A SQL client (e.g., **MySQL Workbench**)
- An editor/IDE (e.g., Visual Studio / VS Code) – optional but helpful

8.2 Source Code Structure

After unzipping the project ZIP:

- **StudentClinicAPI/** – ASP.NET Core 7 Web API
- **EMRApp/** – Angular 17 front-end
- **/sql/ -** Database creation + seed scripts (schema + test data)- SQL query Attached in zip

8.2.1 Step 1 – Set Up the Database

1. **Start MySQL Server** (e.g., from services or XAMPP).
2. Open **MySQL Workbench** (or your SQL client).
3. Create the database (if not created in the script), for example:

4. CREATE DATABASE student_clinic_emr CHARACTER SET utf8mb4 COLLATE utf8mb4_unicode_ci;
5. Run the provided SQL scripts in this order (folder names may vary slightly):
    - 01_create_tables.sql (or similar) – creates all tables, views, indexes.
    - 02_seed_data.sql – inserts sample roles, users, departments, patients, etc.
6. Verify that key tables contain data, e.g.:
7. USE student_clinic_emr;
8. SELECT * FROM patient LIMIT 5;
9. SELECT * FROM role LIMIT 5;
10. SELECT * FROM staff_user LIMIT 5;

Note: The seed script usually creates **demo users** (doctor, nurse, pharmacist, patient, etc.). Use those email/password pairs when you log into the UI.

8.2.2 Step 2 – Configure and Run the API (StudentClinicAPI)

1. Go to the API project folder:
2. cd StudentClinicAPI
3. Open appsettings.json and check the **connection string**:
4. "ConnectionStrings": {
   "DefaultConnection":
   "Server=127.0.0.1;Port=3306;Database=student_clinic_emr;User=root;Password=root;
   AllowUserVariables=True;UseAffectedRows=False;"
   }
    - Make sure:
        - Server and Port match your MySQL server.

- Database matches the DB you created.
- User and Password are your MySQL credentials.

5. Restore NuGet packages and run the API:
6. dotnet restore
7. dotnet run
8. The API will start at:
    - **Base URL:** http://localhost:5000
    - **Swagger UI:** http://localhost:5000/swagger
9. Open http://localhost:5000/swagger in a browser to confirm:
    - You should see all endpoints (Auth, Patients, Visits, Prescriptions, Pharmacy, Users, etc.).
    - Try a simple GET, e.g., list patients or roles, to verify the DB connection.

8.2.3 Step 3 – Configure and Run the Angular App (EMRApp)

1. In a new terminal, go to the Angular app folder:
2. cd EMRApp
3. Install NPM dependencies:
4. npm install
5. Check the API URL in src/environments/environment.ts:
6. export const environment = {
7. production: false,
8. apiUrl: 'http://localhost:5000/api'
9. };

This should match the API URL you saw earlier (http://localhost:5000).

10. Start the Angular development server:

11. npm start

12. # or

13. ng serve

14. Open the front-end in a browser:
    - **URL:** http://localhost:4200

15. Log in with one of the **seed users** created by your SQL script (e.g., doctor, pharmacist, patient).
    - If you're not sure of the credentials, open your seed SQL and look at the user_auth / staff_user inserts.

8.2.4 Verifying the System End-to-End

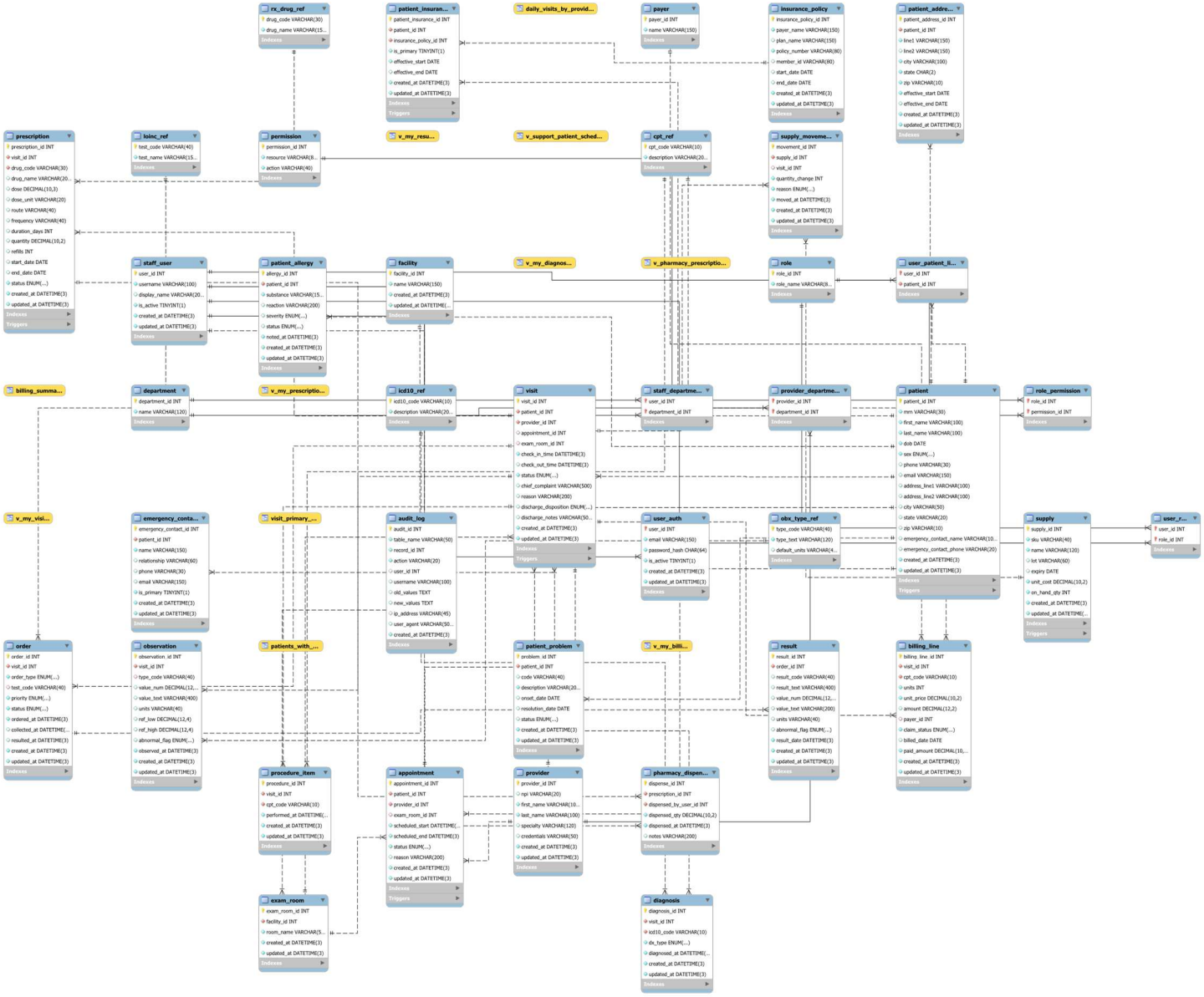
Once both the API and the front-end are running:

1. **Login** as a staff user (e.g., Doctor / Nurse):
   - URL: http://localhost:4200
   - Use demo email/password from your seed data.
2. **Test core flows**:
   - Create a **patient** in the Patients screen.
   - Create a **visit** and record chief complaint.
   - Add a **prescription** for that visit.
   - Switch to the **Pharmacy** screen to see the prescription queue and mark it as **Dispensed**.
3. **Login as a Patient**:
   - Use a portal user created in the seed script.
   - Navigate to **"My Visits" / "My Prescriptions"** to confirm row-level security is working.
4. Optionally, in MySQL:
   - Check audit_log to see entries for INSERT/UPDATE/DELETE operations.

8.2.5 Common Issues & Quick Fixes

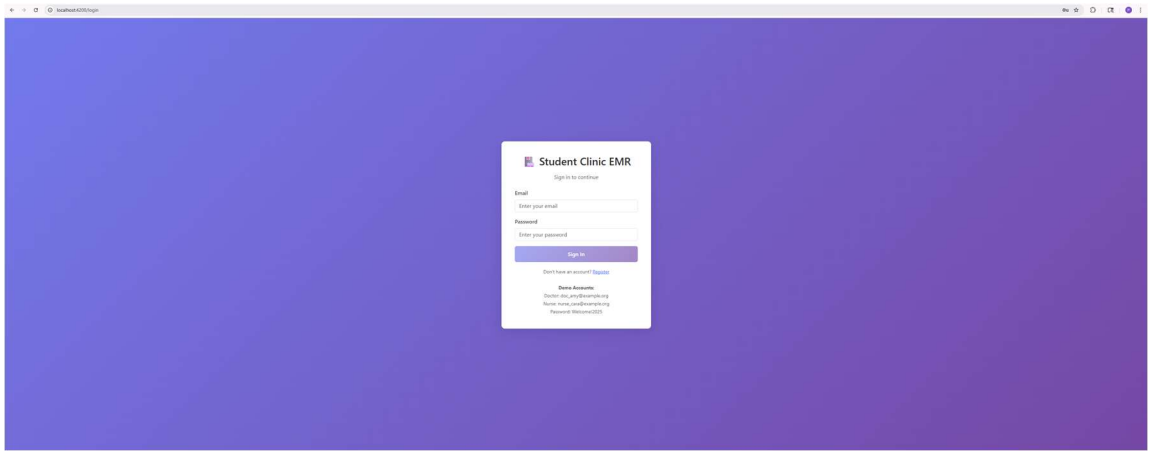
- **API cannot connect to the database**
  - Check appsettings.json connection string.
  - Confirm MySQL is running and DB name/credentials are correct.
- **Angular app gets CORS errors**
  - Ensure the API is running *before* starting Angular.
  - CORS is already enabled in the API; if you changed ports/URLs, update the config.
- **Login fails**
  - Double-check the seed SQL for the correct email/password.
  - Ensure passwords weren't changed manually in the DB (they're stored hashed).

9. ER Diagram

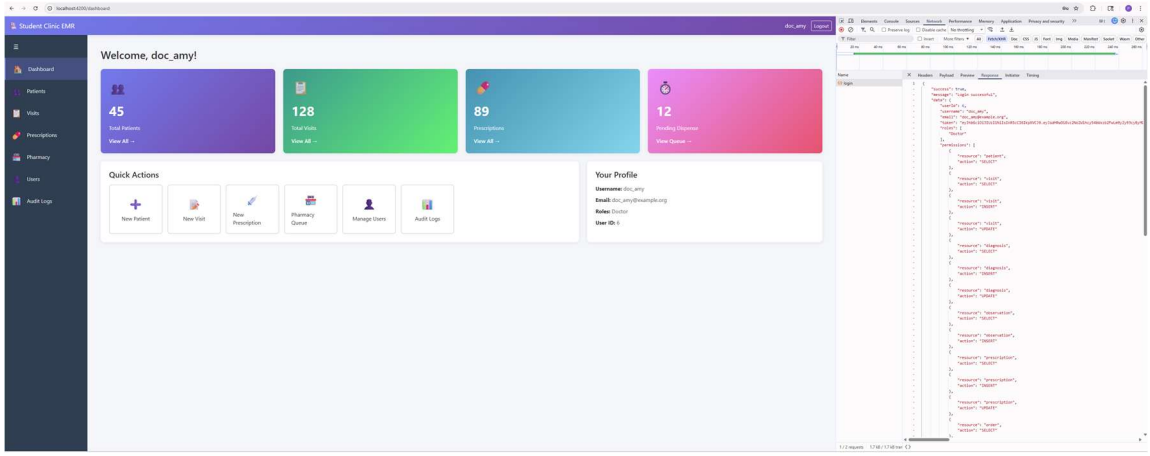

rx_drug_ref
drug_code VARCHAR(30)
drug_name VARCHAR(15...
Indexes
patient_insuran...
patient_insurance_id INT
patient_id INT
insurance_policy_id INT
is_primary TINYINT(1)
effective_start DATE
effective_end DATE
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
Triggers
daily_visits_by_provid...
payer
payer_id INT
name VARCHAR(150)
Indexes
insurance_policy
insurance_policy_id INT
payer_name VARCHAR(150)
plan_name VARCHAR(150)
policy_number VARCHAR(80)
member_id VARCHAR(80)
start_date DATE
end_date DATE
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
patient_addre...
patient_address_id INT
patient_id INT
line1 VARCHAR(150)
line2 VARCHAR(150)
city VARCHAR(100)
state CHAR(2)
zip VARCHAR(10)
effective_start DATE
effective_end DATE
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
prescription
prescription_id INT
visit_id INT
drug_code VARCHAR(30)
drug_name VARCHAR(20...
dose DECIMAL(10,3)
dose_unit VARCHAR(20)
route VARCHAR(40)
frequency VARCHAR(40)
duration_days INT
quantity DECIMAL(10,2)
refills INT
start_date DATE
end_date DATE
status ENUM(...)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
Triggers
loinc_ref
test_code VARCHAR(40)
test_name VARCHAR(15...
Indexes
permission
permission_id INT
resource VARCHAR(8...
action VARCHAR(40)
Indexes
v_my_resu...
v_support_patient_sched...
cpt_ref
cpt_code VARCHAR(10)
description VARCHAR(20...
Indexes
supply_moveme...
movement_id INT
supply_id INT
visit_id INT
quantity_change INT
reason ENUM(...)
moved_at DATETIME(3)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
staff_user
user_id INT
username VARCHAR(100)
display_name VARCHAR(20...
is_active TINYINT(1)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
patient_allergy
allergy_id INT
patient_id INT
substance VARCHAR(15...
reaction VARCHAR(200)
severity ENUM(...)
status ENUM(...)
noted_at DATETIME(3)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
facility
facility_id INT
name VARCHAR(150)
created_at DATETIME(3)
updated_at DATETIME(...
Indexes
v_my_diagnos...
v_pharmacy_prescriptio...
role
role_id INT
role_name VARCHAR(8...
Indexes
user_patient_li...
user_id INT
patient_id INT
Indexes
billing_summa...
department
department_id INT
name VARCHAR(120)
Indexes
v_my_prescriptio...
icd10_ref
icd10_code VARCHAR(10)
description VARCHAR(20...
Indexes
visit
visit_id INT
patient_id INT
provider_id INT
appointment_id INT
exam_room_id INT
check_in_time DATETIME(3)
check_out_time DATETIME(3)
status ENUM(...)
chief_complaint VARCHAR(500)
reason VARCHAR(200)
discharge_disposition ENUM(...)
discharge_notes VARCHAR(50...
created_at DATETIME(3)
updated_at DATETIME(3)
Partitions
Triggers
staff_departme...
user_id INT
department_id INT
Indexes
provider_departme...
provider_id INT
department_id INT
Indexes
patient
patient_id INT
mrn VARCHAR(30)
first_name VARCHAR(100)
last_name VARCHAR(100)
dob DATE
sex ENUM(...)
phone VARCHAR(30)
email VARCHAR(150)
address_line1 VARCHAR(100)
address_line2 VARCHAR(100)
city VARCHAR(50)
state VARCHAR(20)
zip VARCHAR(10)
emergency_contact_name VARCHAR(10...
emergency_contact_phone VARCHAR(20)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
Triggers
role_permission
role_id INT
permission_id INT
Indexes
v_my_visi...
emergency_conta...
emergency_contact_id INT
patient_id INT
name VARCHAR(150)
relationship VARCHAR(60)
phone VARCHAR(30)
email VARCHAR(150)
is_primary TINYINT(1)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
visit_primary_...
audit_log
audit_id INT
table_name VARCHAR(50)
record_id INT
action VARCHAR(20)
user_id INT
username VARCHAR(100)
old_values TEXT
new_values TEXT
ip_address VARCHAR(45)
user_agent VARCHAR(50...
created_at DATETIME(3)
Indexes
user_auth
user_id INT
email VARCHAR(150)
password_hash CHAR(64)
is_active TINYINT(1)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
obx_type_ref
type_code VARCHAR(40)
type_text VARCHAR(120)
default_units VARCHAR(4...
Indexes
supply
supply_id INT
sku VARCHAR(40)
name VARCHAR(120)
lot VARCHAR(60)
expiry DATE
unit_cost DECIMAL(10,2)
on_hand_qty INT
created_at DATETIME(3)
updated_at DATETIME(...
Indexes
Triggers
user_r...
user_id INT
role_id INT
Indexes
order
order_id INT
visit_id INT
order_type ENUM(...)
test_code VARCHAR(40)
priority ENUM(...)
status ENUM(...)
ordered_at DATETIME(3)
collected_at DATETIME(...
resulted_at DATETIME(3)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
observation
observation_id INT
visit_id INT
type_code VARCHAR(40)
value_num DECIMAL(12,...
value_text VARCHAR(400)
units VARCHAR(40)
ref_low DECIMAL(12,4)
ref_high DECIMAL(12,4)
abnormal_flag ENUM(...)
observed_at DATETIME(3)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
patients_with_...
patient_problem
problem_id INT
patient_id INT
code VARCHAR(40)
description VARCHAR(20...
onset_date DATE
resolution_date DATE
status ENUM(...)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
v_my_billi...
result
result_id INT
order_id INT
result_code VARCHAR(40)
result_text VARCHAR(400)
value_num DECIMAL(12,...
value_text VARCHAR(200)
units VARCHAR(40)
abnormal_flag ENUM(...)
result_date DATETIME(3)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
billing_line
billing_line_id INT
visit_id INT
cpt_code VARCHAR(10)
units INT
unit_price DECIMAL(10,2)
amount DECIMAL(12,2)
payer_id INT
claim_status ENUM(...)
billed_date DATE
paid_amount DECIMAL(10,...
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
procedure_item
procedure_id INT
visit_id INT
cpt_code VARCHAR(10)
performed_at DATETIME(...
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
appointment
appointment_id INT
patient_id INT
provider_id INT
exam_room_id INT
scheduled_start DATETIME(...
scheduled_end DATETIME(3)
status ENUM(...)
reason VARCHAR(200)
created_at DATETIME(3)
updated_at DATETIME(3)
Partitions
Triggers
provider
provider_id INT
npi VARCHAR(20)
first_name VARCHAR(10...
last_name VARCHAR(100)
specialty VARCHAR(120)
credentials VARCHAR(50)
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
pharmacy_dispen...
dispense_id INT
prescription_id INT
dispensed_by_user_id INT
dispensed_qty DECIMAL(10,2)
dispensed_at DATETIME(3)
notes VARCHAR(200)
Indexes
exam_room
exam_room_id INT
facility_id INT
room_name VARCHAR(5...
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes
diagnosis
diagnosis_id INT
visit_id INT
icd10_code VARCHAR(10)
dx_type ENUM(...)
diagnosed_at DATETIME(...
created_at DATETIME(3)
updated_at DATETIME(3)
Indexes

10. Demo Screenshots

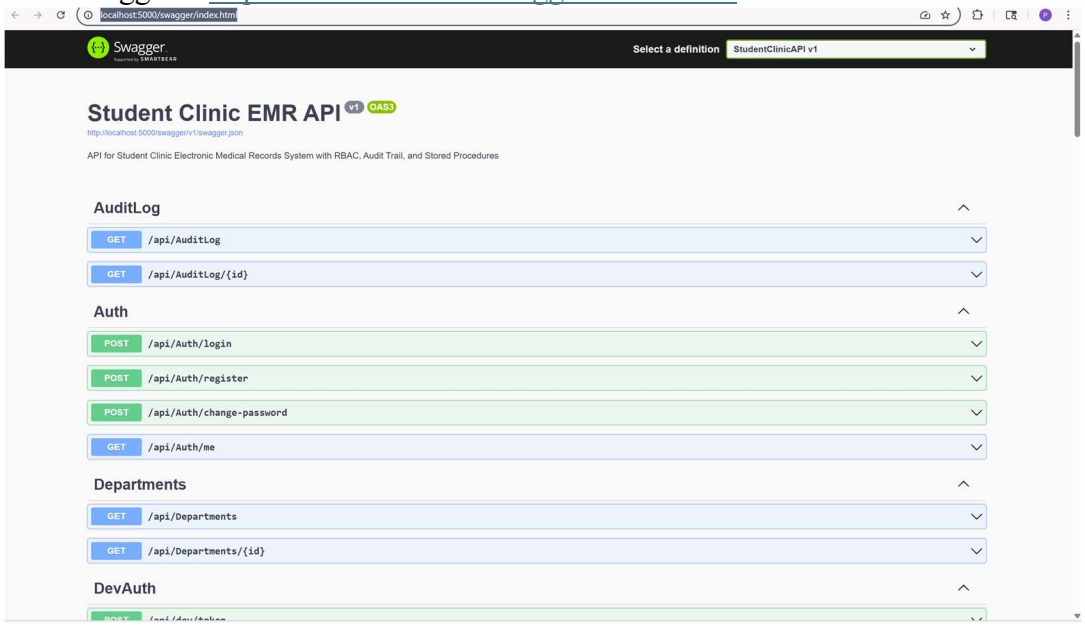
- Login Page

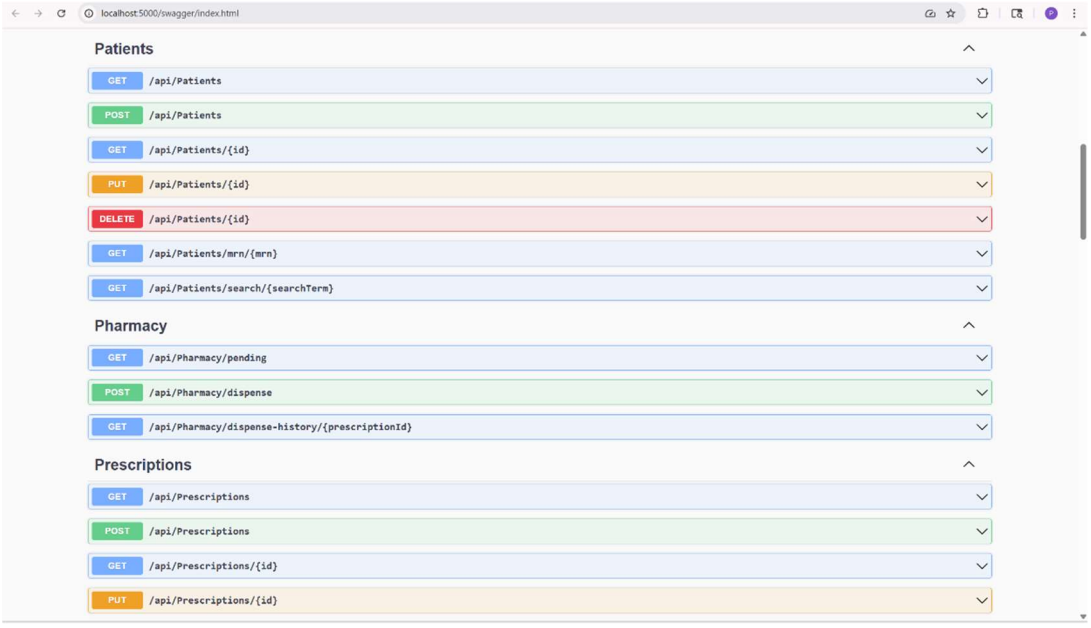


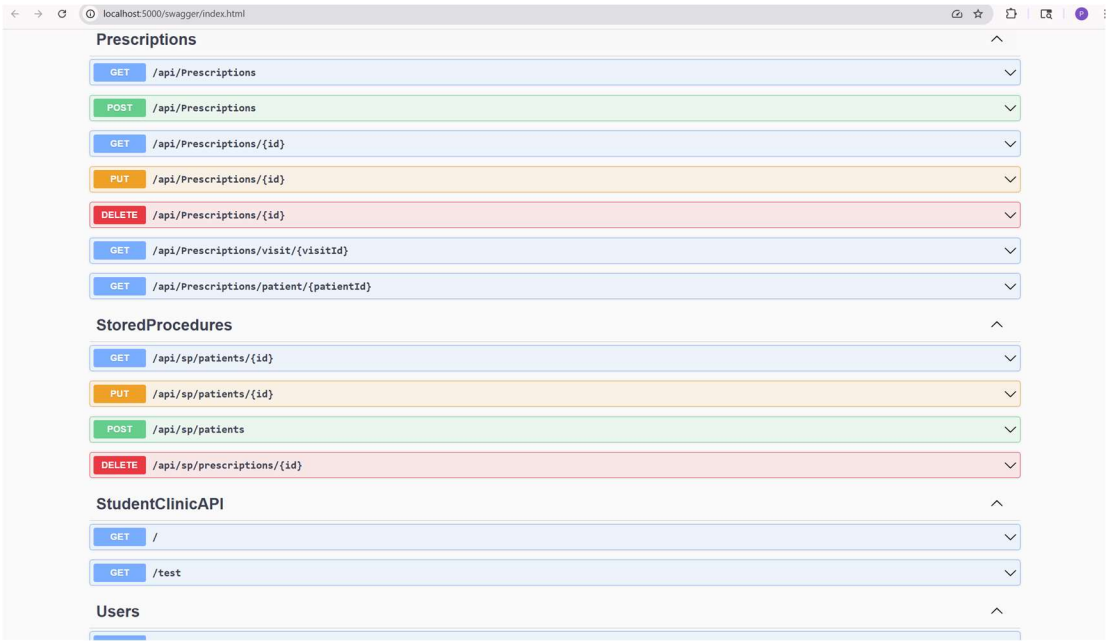
- Successful Login

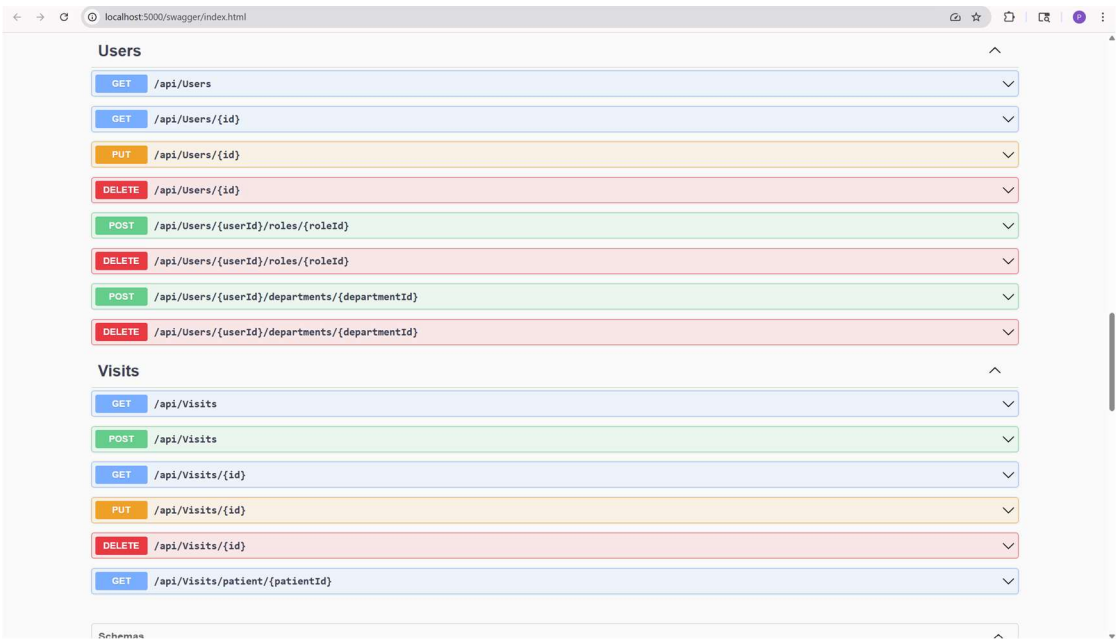


- API Swagger : http://localhost:5000/swagger/index.html






localhost:5000/swagger/index.html
Prescriptions
GET /api/Prescriptions
POST /api/Prescriptions
GET /api/Prescriptions/{id}
PUT /api/Prescriptions/{id}
DELETE /api/Prescriptions/{id}
GET /api/Prescriptions/visit/{visitId}
GET /api/Prescriptions/patient/{patientId}
StoredProcedures
GET /api/sp/patients/{id}
PUT /api/sp/patients/{id}
POST /api/sp/patients
DELETE /api/sp/prescriptions/{id}
StudentClinicAPI
GET /
GET /test
Users


localhost:5000/swagger/index.html
Users
GET /api/Users
GET /api/Users/{id}
PUT /api/Users/{id}
DELETE /api/Users/{id}
POST /api/Users/{userId}/roles/{roleId}
DELETE /api/Users/{userId}/roles/{roleId}
POST /api/Users/{userId}/departments/{departmentId}
DELETE /api/Users/{userId}/departments/{departmentId}
Visits
GET /api/Visits
POST /api/Visits
GET /api/Visits/{id}
PUT /api/Visits/{id}
DELETE /api/Visits/{id}
GET /api/Visits/patient/{patientId}
Schemas

MySQL Workspace