***Pharmacy Information System***

*CSE221*: *Database systems*

Spring semester 2024

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2023-2024

**Abstract**

This report details the development of a Hospital Pharmacy Management System (HPMS). The system addresses the need for efficient medication management, inventory control, and patient data tracking in hospital pharmacies. It covers the business problem analysis, database design, backend implementation, frontend design, challenges encountered, solutions, and future directions.

**Introduction**

**The Business Problem Analysis**

The business problem analysis focuses on understanding the core challenges faced by hospital pharmacies. The main issues identified include:

Inefficient Medication Management: Manual processes often lead to errors in medication dispensing, delays, and increased workload for pharmacists.

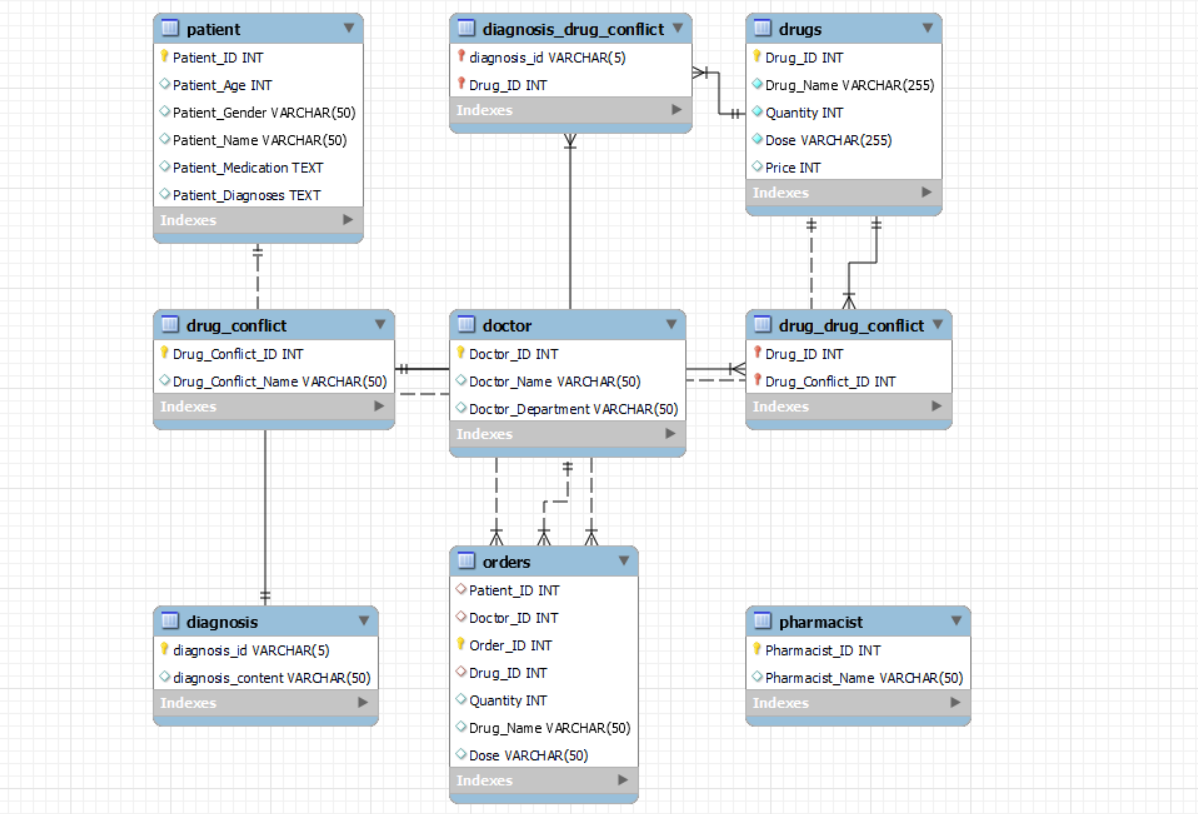
Inventory Control: Inaccurate inventory tracking can result in stockouts or overstocking of medications, affecting patient care and increasing costs.

Patient Data Tracking: Manual record-keeping can cause data inconsistency, making it difficult to track patient medication history, leading to potential risks in patient safety and treatment efficacy.

Regulatory Compliance: Ensuring compliance with healthcare regulations and standards is challenging without a robust system to track and report medication usage and patient data.

The efficient management of hospital pharmacies is critical for ensuring timely and accurate medication dispensing, maintaining inventory, and managing patient data. The Hospital Pharmacy Management System (HPMS) was developed to streamline these processes, reducing errors and improving overall efficiency. The system integrates various components, including patient records, medication inventory, and pharmacy staff workflows, using the backend, database management, and frontend development.

**Database Design**



**Backend Database Implementation**

create database P;

use P ;

##########################################Entities##############################################################

#Doctors Data Doctors will be capable work with data of patients and see the drugs and choose it

create table doctor (

Doctor\_ID INT primary key ,

Doctor\_Name VARCHAR(50) ,

Doctor\_Department VARCHAR(50)

);

INSERT INTO doctor (Doctor\_ID, Doctor\_Name, Doctor\_Department) VALUES

(5511, 'Dr. Shaker Elsappagh', 'Cardiology'),

(5522, 'Dr. Radwa Hassan', 'General Surgery');

#patients that will be all operations done on themm

create table patient (

Patient\_ID INT primary key ,

Patient\_Age INT ,

Patient\_Gender VARCHAR(50) ,

Patient\_Name VARCHAR(50) ,

Patient\_Medication TEXT ,

Patient\_Diagnoses TEXT

);

INSERT INTO patient (Patient\_ID, Patient\_Name,Patient\_Age,Patient\_Gender, Patient\_Medication, Patient\_Diagnoses) VALUES

(511, 'Alice Brown',45,'Female','Data about Alice', 'Hypertension'),

(512, 'Bob Knight',55,'Male', 'Data about Bob', 'Diabetes'),

(513, 'Charlie Johnson',65,'Male', 'Data about Charlie', 'Asthma'),

(514, 'Diane Evans', 55,'Male','Data about Diane', 'Thyroid Disorder'),

(515, 'Edward Collins',71,'Male', 'Data about Edward', 'Arthritis');

#will be responsible for drug orders handling and manage inventory

CREATE TABLE pharmacist (

Pharmacist\_ID INT PRIMARY KEY,

Pharmacist\_Name VARCHAR(50)

);

INSERT INTO pharmacist (Pharmacist\_ID, Pharmacist\_Name) VALUES

(9911, 'Pharm John Doe'),

(9922, 'Pharm Jane Smith'),

(9933, 'Pharm Emily Stone'),

(9944, 'Pharm Mike Brown');

#Drugs table

CREATE TABLE IF NOT EXISTS drugs (

Drug\_ID INT PRIMARY KEY,

Drug\_Name VARCHAR(255) NOT NULL,

Quantity INT NOT NULL,

Dose VARCHAR(255) NOT NULL,

Price int

);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (723,'Amoxicillin', 100, '10 mg',50);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (855332,'Ciprofloxacin', 100, '200 mg',40);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (115170,'Azithromycin', 100, '310 mg',57);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (212121,'Sertraline', 100, '101 mg',32);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (21227,'Fluoxetine', 100, '103 mg',76);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (204299,'Citalopram', 100, '140 mg',89);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (5640,'Ibuprofen', 100, '150 mg',67);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (161,'Acetaminophen', 100, '120 mg',58);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (1191,'Aspirin', 100, '130 mg',42);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (29046,'Lisinopril', 100, '110 mg',45);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (197361,'Amlodipine', 100, '110 mg',34);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (897122,'Losartan', 100, '120 mg',52);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (86009,'Metformin', 100, '120 mg',76);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (197935,'Glibenclamide', 100, '190 mg',43);

INSERT INTO drugs (Drug\_ID,Drug\_Name, Quantity, Dose,Price) VALUES (897097,'Pioglitazone', 100, '300 mg',328);

#Drugs that may make conflict with each other

CREATE TABLE drug\_conflict (

Drug\_Conflict\_ID INT PRIMARY KEY,

Drug\_Conflict\_Name VARCHAR(50)

);

INSERT INTO drug\_conflict (Drug\_Conflict\_ID, Drug\_Conflict\_Name) VALUES (5640, 'Ibuprofen');

INSERT INTO drug\_conflict (Drug\_Conflict\_ID, Drug\_Conflict\_Name) VALUES (1191, 'Aspirin');

INSERT INTO drug\_conflict (Drug\_Conflict\_ID, Drug\_Conflict\_Name) VALUES (855332, 'Ciprofloxacin');

#relation that map each conflict with the drug

CREATE TABLE drug\_drug\_conflict (

Drug\_ID INT,

Drug\_Conflict\_ID INT,

PRIMARY KEY (Drug\_ID, Drug\_Conflict\_ID),

FOREIGN KEY (Drug\_ID) REFERENCES drugs(Drug\_ID),

FOREIGN KEY (Drug\_Conflict\_ID) REFERENCES drug\_conflict(Drug\_Conflict\_ID)

);

INSERT INTO drug\_drug\_conflict (Drug\_ID, Drug\_Conflict\_ID) VALUES

(855332, 5640),

(21227, 5640),

(212121, 1191),

(29046, 1191),

(86009, 855332),

(21227,855332);

#orders that eill made by doctor and sent to the pharmacist

CREATE TABLE orders (

Patient\_ID INT,

Doctor\_ID INT,

Order\_ID INT AUTO\_INCREMENT PRIMARY KEY,

Drug\_ID INT,

Quantity INT,

Drug\_Name VARCHAR(50),

Dose VARCHAR(50),

FOREIGN KEY (Drug\_ID) REFERENCES drugs(Drug\_ID),

FOREIGN KEY (Patient\_ID) references patient(Patient\_ID),

FOREIGN KEY (Doctor\_ID) references doctor(Doctor\_ID)

);

create table diagnosis (

diagnosis\_id varchar(5) primary key ,

diagnosis\_content varchar(50)

);

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I10', 'Hypertension (High Blood Pressure)');

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I25.10', 'Coronary Artery Disease');

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I50.9', 'Heart Failure');

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I48.91', 'Atrial Fibrillation');

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I21.9', 'Myocardial Infarction (Heart Attack)');

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I42.9', 'Cardiomyopathy');

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I35.0', 'Aortic Valve Stenosis');

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I73.9', 'Peripheral Artery Disease');

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I26.9', 'Pulmonary Embolism');

INSERT INTO diagnosis(diagnosis\_id, diagnosis\_content) VALUES ('I33.0', 'Endocarditis');

create table diagnosis\_drug\_conflict (

diagnosis\_id varchar(5) ,

Drug\_ID int ,

primary key(diagnosis\_id,Drug\_ID) ,

foreign key (diagnosis\_id) references diagnosis(diagnosis\_id),

foreign key (Drug\_ID) references drugs(Drug\_ID)

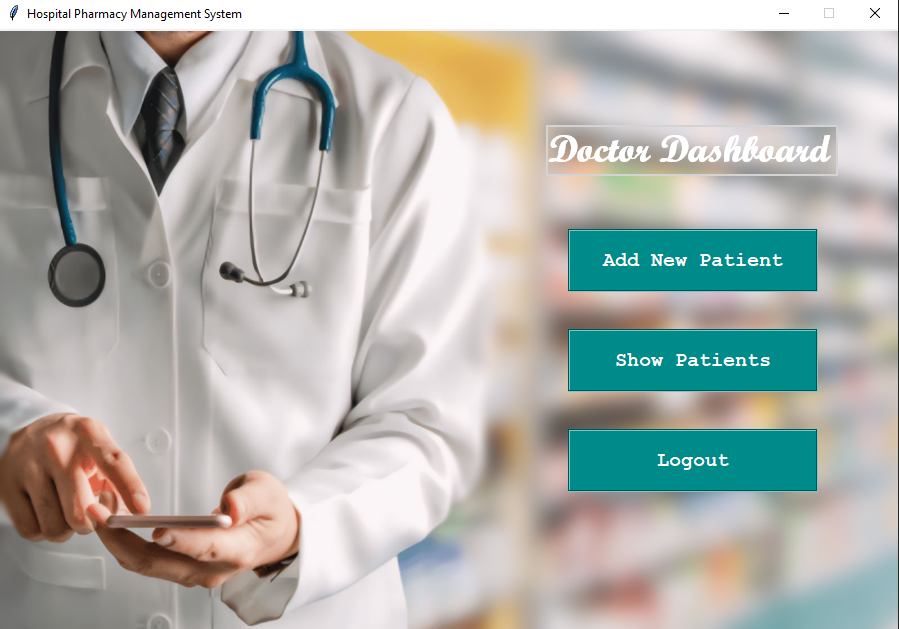
);

INSERT INTO diagnosis\_drug\_conflict(diagnosis\_id,Drug\_ID ) VALUES ('I50.9',1191);

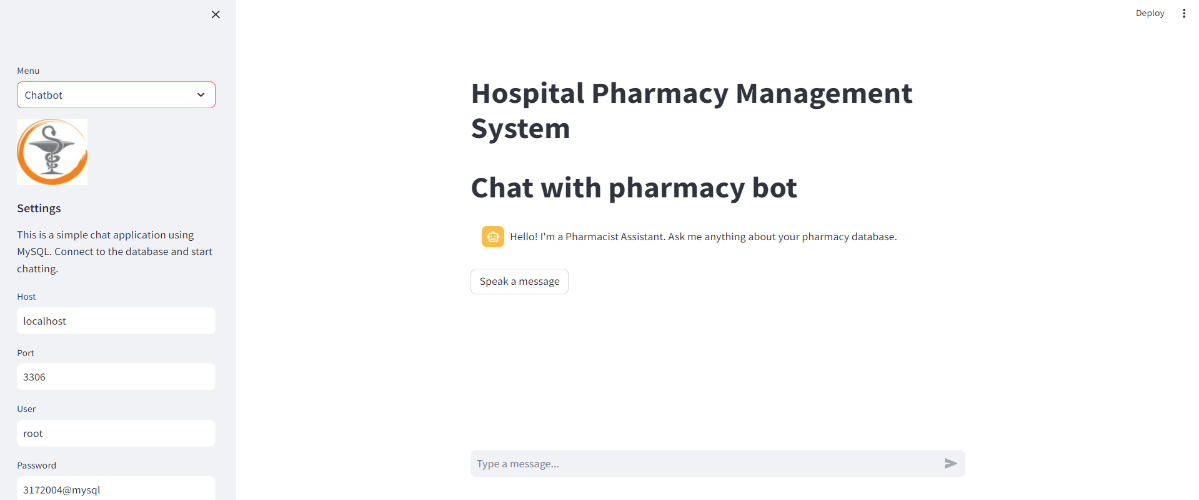
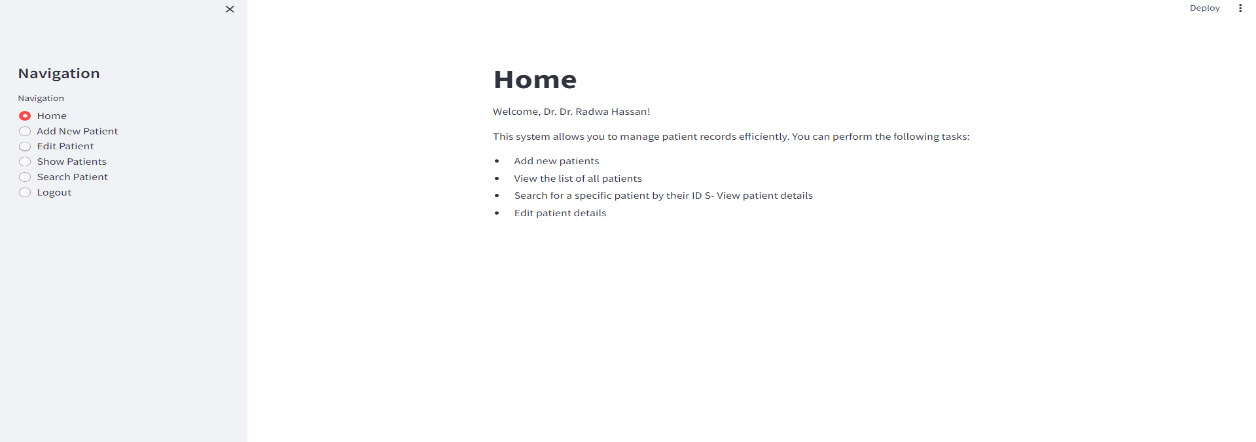
INSERT INTO diagnosis\_drug\_conflict(diagnosis\_id,Drug\_ID ) VALUES ('I10', 5640);

**Frontend Design and Implementation**

Tkinter



Stremlit



**https://drive.google.com/drive/folders/1cGWHMu85-FGhpUiJeXl7OqT1DSi11qdu?usp=sharing**

**Solved Challenges**

* Improve accuracy in medication dispensing.
* Enhance inventory management to prevent stockouts and overstocking.
* Streamline patient data management for better patient care and regulatory compliance.
* Chatbot to decrease load on the pharmacist
* Provide real-time data and reports for decision-making.
* Conflicts recognition

**Conclusion and Future Directions**

The HPMS successfully addressed the inefficiencies in hospital pharmacy management, providing a robust solution for medication dispensing, inventory control, and patient data management. Future enhancements could include integrating advanced analytics to predict medication demand, incorporating machine learning algorithms to identify potential medication errors, and expanding the system to support multi-hospital networks for centralized management.

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