

**National University of Computer and Emerging Sciences**

Final Evaluation Report

**“MedTrove”**

**(Development)**

****

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# Chapter 1 Introduction

## 1.1 Existing Solutions

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Dawaai.pk** | **Drugs.com** | **Pharmapedia** |
| **Pros** | Good Interface Alternative medication | Alternative medication | Alternative medication |
| **Cons** | No nearby pharmacy locator No reminder/tracker No chatbot to help simplify complex terms | Cluttered Interface No purchasing of medication No pharmacy locator No chatbot | No purchasing of medications  No reminder/tracker  No pharmacy locator  No chatbot |

Table : Existing Solutions

## 1.2 Problem Statement

Unfortunately, the capitalisation of healthcare has become a pressing concern. Over the past few years the cost of medications have skyrocketed, making it increasingly difficult for Pakistanis to afford potentially life saving medicines.

In 2019, Drug Regulatory Authority of Pakistan (DRAP*)* had approved that the prices of medicines are increased by upto 15 percent. Hardship medicines which include medicines for heart patients and diabetics have increased up to 200%. [1]. In 2024, this trend continued as the caretaker federal cabinet approved a further increase in prices of an approximate 146 critical medications. [2]

Diabetes and heart disease are one of the more common health issues in Pakistan, given that 26.7% of Pakistanis are affected by diabetes [3] whereas 29% of deaths in Pakistan are due to heart diseases. [4]. Therefore, the increased cost of the related medicine proves to be threatening to public health.

It is absolutely imperative to also note that as of 2024, 40% of Pakistanis now live below the poverty line according to the World Bank making it even more difficult to afford life-saving medication. [5]

With sky high inflation rates and the tradition of bribery between doctors and pharmaceutical companies disguised as “academic activities” to manipulate doctors into prescribing overpriced medications, innovative solutions are required to bridge the gap between Pakistanis and their right to affordable healthcare. [6]

## 1.3 Scope

MedTrove will be a cross-platform application that users can download onto their mobile device. After downloading the app, our users can create their account or login.

If the user decides to manage their profile, they can change their credentials, profile picture, delivery address and save it. An option to delete the account will also be available.

If the user decides to search for some medication, they may get recommended searches based on their previous search/order history and alternative medication of their searched medication. The user may select a medicine to view it’s detailed information such as its side effects, usage instructions including dosage, details on the diseases it is used to treat and compare it with other alternatives. An add to cart option will also be available.

Once they are finished, the user can checkout and begin the payment process. Payment can be made either by credit/debit card or JazzCash. Once completed, a verification message will pop up and the order-will be sent.

Alternatively, the user may also choose to check for drug interactions using our drug interaction check feature. For this the user must enter two different types of medication and the result will be whether or not such medication can be taken together at once.

MedTrove also provides a chatbot called Medibot which will provide preliminary medical advice, information about medication and help break down difficult words doctors use in a friendly, conversational manner.

Finally, if the user has the means and is willing to, they can provide donations to help those who may not have the means to pay for their medication.

## 1.4 Modules

We have 10 different modules in our project, which are as follows:

### Medi-bot

This module is designed to provide users with instant access to preliminary-advice and give detailed information about medications. This AI-powered assistant enhances user engagement by offering real time guidance.

### Substitute Drug Identifier

This module helps users find cheaper alternatives to their prescribed medications. It uses a detailed drug database to suggest substitute medicines that have similar ingredients.

### 

### Smart Search and Recommendation

This module uses smart techniques to look at what users search for and give them alternative medicine recommendations. It will also show the medication they searched for if it's available.

### Substitute Comparison

This module is designed to provide users with a detailed analysis of a possible substitute medication. It compares alternative medication based on several factors that enable users to make informed decisions.

### Payment

The goal of this module is to simplify secure financial-transactions for purchasing medications.

### Donation

This module is designed to help pay for users in need. It allow users to contribute into a fund that will be used to provide discounted medications for underprivileged individuals.

### 

### Drug Interaction Checker

This module will analyse the interactions between two medications and evaluate whether they are safe to take at a time or not.

### Pharmacy Locator

The purpose of this module is to help users find pharmacies nearby. Users will have access to real-time information on pharmacy locations, contact details and business hours.

### Medication Reminder

This module is designed with the purpose of efficiently assisting users in managing their medication schedules. Users will receive timely reminders to help them take their medication.

### Profile Management

This module is designed with the purpose of providing users a secure platform for managing their personal information. Users will be able to customise their profiles by managing their health data and access services.

## 1.5 Work Division

| **Kissa Zahra** | **Aliza Ibrahim** | **Hamna Sadia Rizwan** |
| --- | --- | --- |
| Medi-bot | Medi-bot | Medi-bot |
| Search and Recommendation | Substitute Comparison | Substitute Drug Identifier |
| Donation | Online Consultation | Payment |
| Medication Reminder | Drug Interaction Checker | Profile Management |

Table : Work Division

## 1.6 Stakeholders

* Users
* MedTrove Developers
* Supervisor: Mr. Bilal Khalid Dar
* Co-Supervisor: Ms. Zoya Mahboob
* FAST-NUCES FYP committee (Islamabad)

# 

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# Chapter 2 Project Requirements

## 2.1 Use-case Diagram

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Figure : Use case diagram

### 

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### 

### 

## 2.2 Use Case

### Substitute Drug Identifier

#### High Level/Brief Use Case

|  |  |
| --- | --- |
| **Use Case** | Substitute Drug Identifier |
| **Actors** | User |
| **Type** | Primary |
| **Description** | The system shall identify the list of substitute drugs according to the drug selected by the user. |

Table : Substitute Drug Identifier - High Level l Use Case

#### 

#### Fully Dressed Use Case

|  |  |
| --- | --- |
| **Use Case** | Substitute Drug Identifier |
| **Scope** | MedTrove |
| **Level** | User Goal |
| **Primary Actor** | User |
| **Preconditions** | The medication database is up to date and accessible by the system. |
| **Success Guarantee** | The system successfully retrieves the appropriate alternative medications and displays the results  Relevant data about the medication is shown (e.g: price and availability). |
| **Main Success Scenario** | 1. User successfully navigates to the search page. 2. The user searches for the name of a medicine. 3. The system processes the search query. 4. The system retrieves the searched medication and alternative medications according to the chemical formula 5. The system displays the recommended alternatives with their details |
| **Extensions** | 1a: No alternatives found:   * The system does not find any alternative substitutes and informs the user |
| **Special Requirements** | The system shall be able to retrieve the substitute medicine list within 5 seconds. |
| **Technology & Data Variations** | None. |

Table : Substitute Drug Identifier - Fully Dressed Use Case

### Search and Recommendation

#### High Level/Brief Use Case

|  |  |
| --- | --- |
| **Use Case** | Search and Recommendation |
| **Actors** | User |
| **Type** | Primary |
| **Description** | The user can input the name of the medicine and the system will recommend a list of alternative medications, prioritising cheaper price. |

Table : Search and Recommendation - High Level l Use Case

#### Fully Dressed UseCase

|  |  |
| --- | --- |
| **Use Case** | Search and Provide Recommendations |
| **Scope** | MedTrove |
| **Level** | User Goal |
| **Primary Actor** | User |
| **Preconditions** | The medication database is up to date and accessible by the system. |
| **Success Guarantee** | The system successfully displays a list of medications including cheaper alternatives.  Relevant data about the medication is shown (e.g: price and availability). |
| **Main Success Scenario** | 1. User successfully logs in and navigates to the search page. 2. The user enters the name of a medicine. 3. The system processes the search query. 4. The system retrieves relevant medication data and recommendations. 5. The system displays the search results and recommended alternatives sorted by price. 6. The user can select a medication for more details. |
| **Extensions** | 1a: Invalid Search Query:   * If the user enters an invalid query the system shows an error message and suggests correcting the search input.     3a: No Relevant Recommendations Found:   * If no suitable alternatives are found the system shows the users that no cheaper substitutes are available for the entered medication. |
| **Special Requirements** | The system shall be able to display a list of alternative medicines within 5 seconds. |
| **Technology & Data Variations** | None. |

Table : Search and Recommendation - Fully Dressed Use Case

### 

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### 

### 

### Pharmacy Locator

#### High Level/Brief Use Case

|  |  |
| --- | --- |
| **Use Case** | Pharmacy Locator |
| **Actors** | User |
| **Type** | Primary |
| **Description** | Users can locate nearby pharmacies by entering their current address or using their device's GPS. The system retrieves the geographic coordinates and searches for nearby pharmacies, displaying them on map with relevant details like name, address and distance. |

Table : Pharmacy Locator - High Level Use Case

#### Fully Dressed UseCase

|  |  |
| --- | --- |
| **Use Case** | Pharmacy Locator |
| **Scope** | MedTrove |
| **Level** | User Goal Level |
| **Primary Actor** | User |
| **Preconditions** | User must have a good internet connection.  User must allow location access or input a valid address manually. |
| **Success Guarantee** | The system successfully displays a list of nearby pharmacies on map with detailed information for user convenience. |
| **Main Success Scenario** | 1. User logs into the MedTrove app. 2. User navigates to the “Pharmacy Locator” section. 3. User must allow location access or input a valid address manually. 4. The results are displayed on the map. 5. User selects a pharmacy marker to view details such as name, address and distance. |
| **Extensions** | 3a: If location services are disabled:   * The system prompts the user to manually enter their address.   4a: If no pharmacies are found nearby.   * The system displays an appropriate message |
| **Special Requirements** | The map interface should allow zooming, panning, and marker interaction. |
| **Technology & Data Variations** | Mapbox Geocoding API (10.1.33): Used for forward and reverse geocoding. |

Table : Pharmacy Locator - Fully Dressed Use Case

### 

### 

### 

### 

### 

### Drug-to-Drug Interaction Checker

#### High Level/Brief Use Case

|  |  |
| --- | --- |
| **Use Case** | Drug-to-Drug Interaction Checker |
| **Actors** | User |
| **Type** | Primary |
| **Description** | Users can check for potential interactions between two drugs by entering their names. |

Table : Drug-to-Drug Interaction Checker - High Level Use Case

#### Fully Dressed UseCase

|  |  |
| --- | --- |
| **Use Case** | Drug-to-Drug Interaction Checker |
| **Scope** | MedTrove |
| **Level** | User Goal Level |
| **Primary Actor** | User |
| **Preconditions** | User must be logged into the system.  User has names of the medications to be checked for interactions. |
| **Success Guarantee** | The system provides clear, accurate results about the potential interactions, along with recommendations if any risks are identified. |
| **Main Success Scenario** | 1. User logs into the MedTrove application. 2. User navigates to the “Drug-to-Drug Interaction Checker” feature. 3. The system prompts the user to input the names of the two drugs to be checked. 4. User enters the names of the drugs. 5. The system queries the drug interaction database for potential conflicts between the entered drugs. 6. The system displays detailed results. |
| **Extensions** | Step 4a: If the user enters invalid drug name:   * The system displays an error message and prompts for valid inputs.   Step 6a: If the database query fails due to network issues:   * The system notifies the user and advises retrying later. |
| **Special Requirements** | None. |
| **Technology & Data Variations** | None. |

Table : Drug-to-Drug Interaction Checker - Fully Dressed Use Case

### Profile Management

#### High Level/Brief Use Case

|  |  |
| --- | --- |
| **Use Case** | Profile Management |
| **Actors** | User |
| **Type** | Primary |
| **Description** | Users can create, update and delete their profile. The profile includes health-related information, previous medication history and other preferences. |

Table : Profile Management - High Level Use Case

#### Fully Dressed UseCase

|  |  |
| --- | --- |
| **Use Case** | Profile Management |
| **Scope** | MedTrove |
| **Level** | User goal level |
| **Primary Actor** | User |
| **Preconditions** | The user must have successfully logged into the system. |
| **Success Guarantee** | User profile is updated and stored securely in the database. |
| **Main Success Scenario** | 1. User logs into the MedTrove app. 2. User navigates to the “Profile Management” section. 3. The system displays the current user profile details. 4. Users edit their personal details (e.g: Delete or Update). 5. User confirms the changes. 6. System updates the user profile in the database. 7. The system displays a success message, confirming the changes. |
| **Extensions** | 4a: If the user enters invalid information:   * The system displays an error message. * Users will be prompted to correct the input before proceeding further.   5a: User cancels the update:   * No changes are made to user profile.   6a: System fails to update the profile due to network or some other issue:   * The system notifies the user about the issue. * No changes will be made to the profile * The system will ask the user to try later. |
| **Special Requirements** | The system shall be able to load and update profile within 5 seconds. |
| **Technology & Data Variations** | None. |

Table : Profile Management - Fully Dressed Use Case

## 2.3 Functional Requirements

### (Module) Substitute Drug Identifier

* The system shall allow user to input the name of the prescribed medication.
* The system shall be able to access drug database.
* The system shall identify alternative medicines with similar ingredients.
* The system shall compare alternative drugs based on price.
* The system shall display a list of alternative drugs ranked by relevance.
* The system shall display detail information on each alternative drug.
* The system shall give the option to buy the alternative drug.
* The system shall display disclaimer advising the user to consult healthcare professionals before taking any medication.

### (Module) Search and Recommendation

* Users shall be able to search for medicines by entering its name.
* The system shall provide auto complete suggestion as users type the name of medicine.
* The system shall allow sorting of search results base on price or names.
* The system shall give the option to buy the medicine.
* The system shall provide recommendations to user based on search history.

### (Module) Drug Interaction Checker

* The system shall allow users to input the name of two medications.
* The system shall classify interactions based on severity such as minor, moderate and major.
* The system shall display whether the two medicine can be taken together or not.

### (Module) Medication Reminder

* The user shall be able to set medication reminder.
* The system shall allow users to input medication details like the name, dosage, date and timing.
* The system shall give timely reminders to user.
* The system shall allow users to set a new reminders.
* The system shall provide options to reschedule missed doses.
* The system shall maintain a log of medication intake including date and time of each dose taken.

### (Module) Substitute Comparison

* The system shall allow users to input the name of the prescribed medication they want to compare substitutes for.
* The system shall do a comparison between alternative medications based on price.

### (Module) Profile Management

* The system shall allow new users to register by providing personal details such as name, email, phone number and password.
* The user shall be able to login using their email address and password.
* The system shall allow users to update personal information.

### (Module) Medi-bot

* The system shall provide user-friendly interface for initiating and conducting conversations with chatbot.
* The user shall be able to enter medical questions in the chat.
* The system shall provide preliminary medical advice on common health issues based on user input.
* The system shall guide users on when to seek professional medical help for their symptoms.

### (Module) Payment

* The system shall allow users to select a payment method including credit/debit cards or JazzCash.
* The system shall provide an option to save payment information for any future use.
* The system shall display an order summary before confirming the payment.
* The system shall display a confirmation message to the user upon successful payment.
* The system shall maintain a record of all user transactions.
* The system shall notify users of successful payments, failed transactions and any other payment related updates.

### (Module) Donation

* The system shall allow user to make donations through various payment methods including credit or debit cards and digital wallets.
* The system shall maintain log for all donations made by users including the amount, date and the payment method.
* The system shall provide users with a history of their donations.
* The system shall allow allocation of donated funds to discount orders for underprivileged users.
* The user shall fill a form to prove their eligibility for discounts and funds.

### (Module) Pharmacy Locator

* The system shall allow users to search for near by pharmacies based on their current location.
* The system shall display detailed information about the nearby pharmacies.
* The system shall provide directions to searched pharmacies
* The system shall allow users to save favourite pharmacies for easy access.

## 2.4 Non-Functional Requirements

### Performance

* + PER-1: The application shall load within 4 seconds.
  + PER-2: Medicine results shall be displayed within 5 seconds.

### Usability

* + USE-1: The user interface shall be easy to navigate and adherence to HCI principles for optimal user experience.
  + USE-2: There shall be at least 2 helping screens between each frame.

### Reliability

* + The system shall have an uptime of 95%.

# Chapter 3 System Overview

## 3.1 Architectural Design

### 

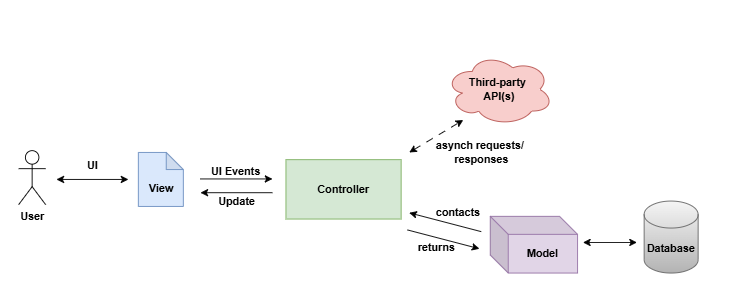


Figure : Architectural Design

**Request Flow**

1. **User:**

The user interacts with the app (e.g., login, search, cart) triggering events like button clicks or form submissions.

1. **Routing the Request:**

The frontend sends an API request to the backend through defined routes (e.g. medicineRoutes.js for medicine search).

1. **Controller:**

The request is routed to a controller (e.g. MedicineController.js for medicine queries) which handle logic, fetche data from model and prepare response.

1. **Database:**

The controller uses models (e.g. Medicine.js) to query the database for the requested data.

1. **Response:**

The controller sends the processed data back to the frontend in JSON formate.

1. **UI Update:**

The frontend receives the response, updates the UI and displays the results to the user.

**MVC architecture offers**

* **Separation of Concerns:** Keeps the application maintainable.
* **Scalability:** Easy to add or modify features without affecting other components.
* **Code reusability:** Models and controllers can be reused across views or projects.
* **Testing:** Simplifies testing as each layer can be tested independently.

## 3.2 Data Design

MedTrove involves storing diverse and dynamic data such as user profiles, search histories, drug interaction data and medication information. These factors make MongoDB a better choice over a traditional relational database with an Entity-Relationship Diagram (ERD). It offers:

1. **Flexibility**:  
   Making it easy to add or modify fields without affecting existing records.
2. **Document oriented storage**:  
   It stores data in JSON-like documents. This format closely resembles the structure of application objects so it simplifies data retrieval operations and reduce the need for complex joins.
3. **Scalability and Performance**:  
   It can handle large volumes of read and write operations efficiently which aligns with the needs of a growing number of users.

### Mongoose Schema

**Alternative Medications**

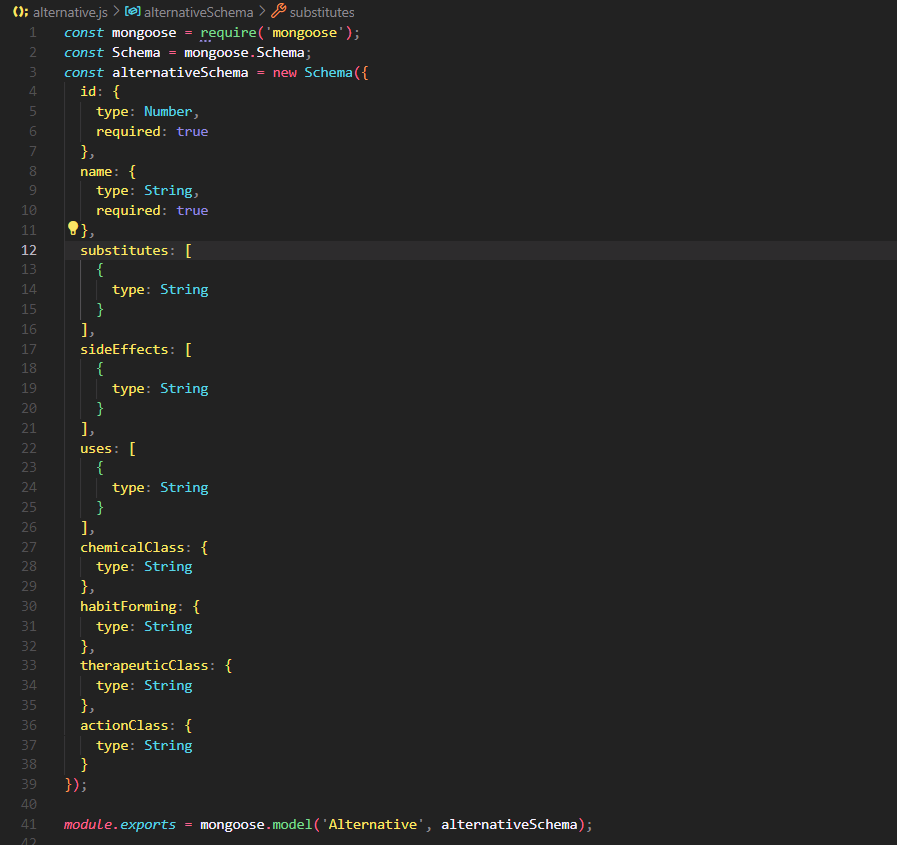


Figure : Alternative Medications Schema

**Users**

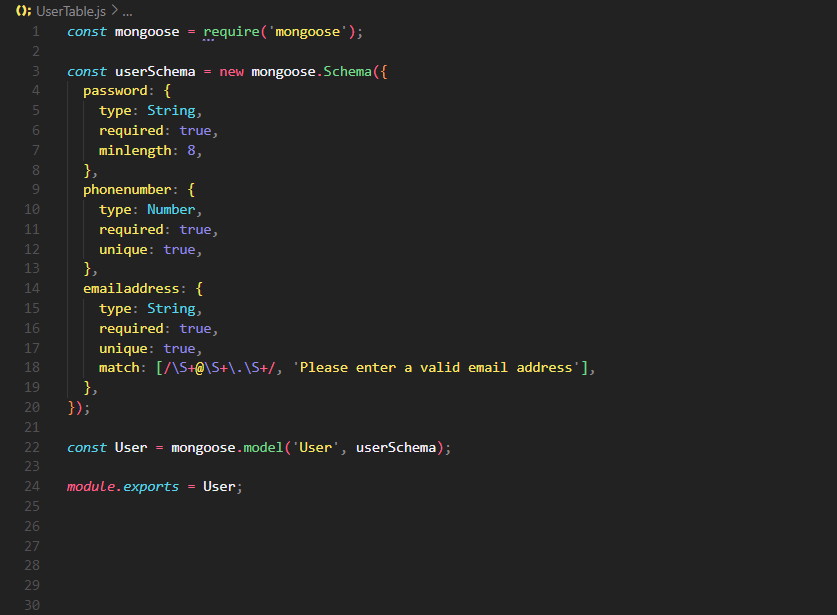
**

Figure : Users Schema

**Drug to Drug Interaction Checker**

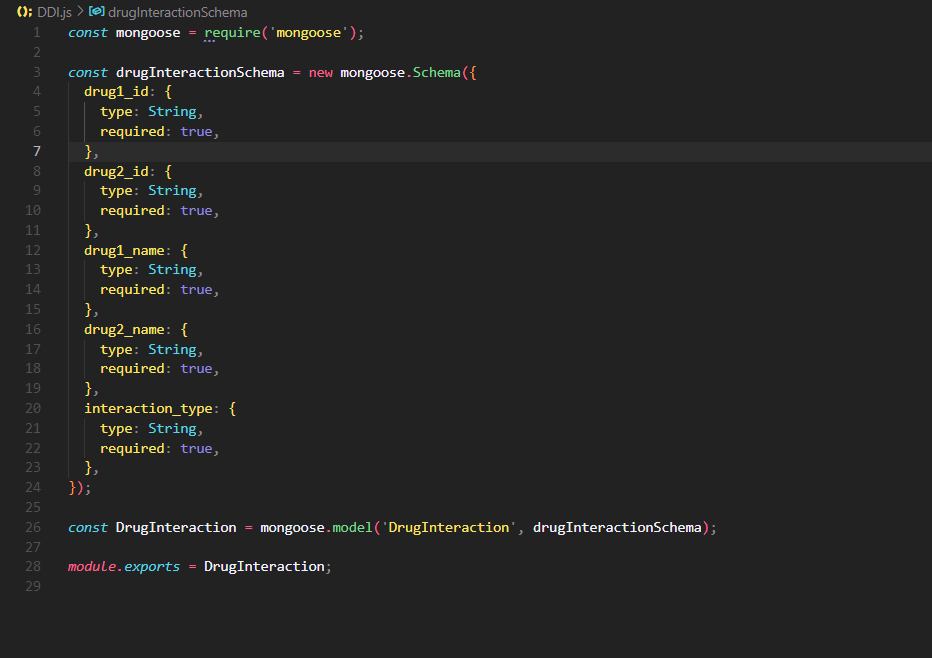
****

Figure : Drug to Drug Interaction Checker Schema

**User Search History**

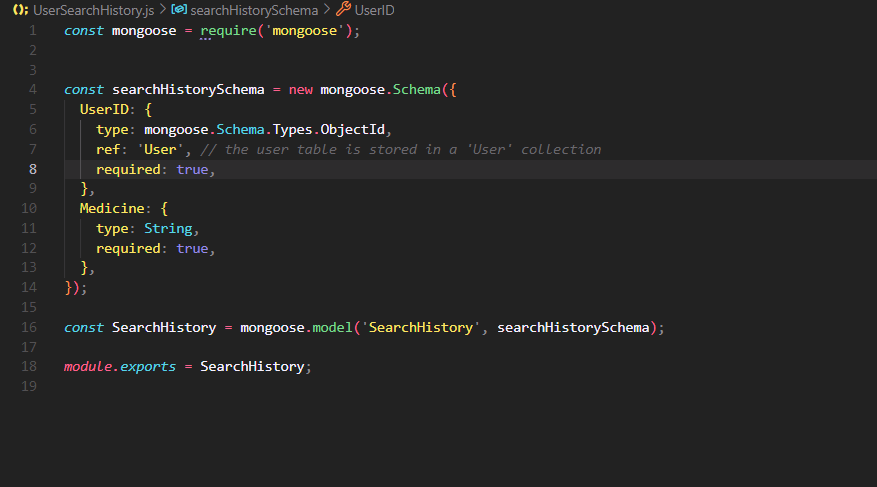
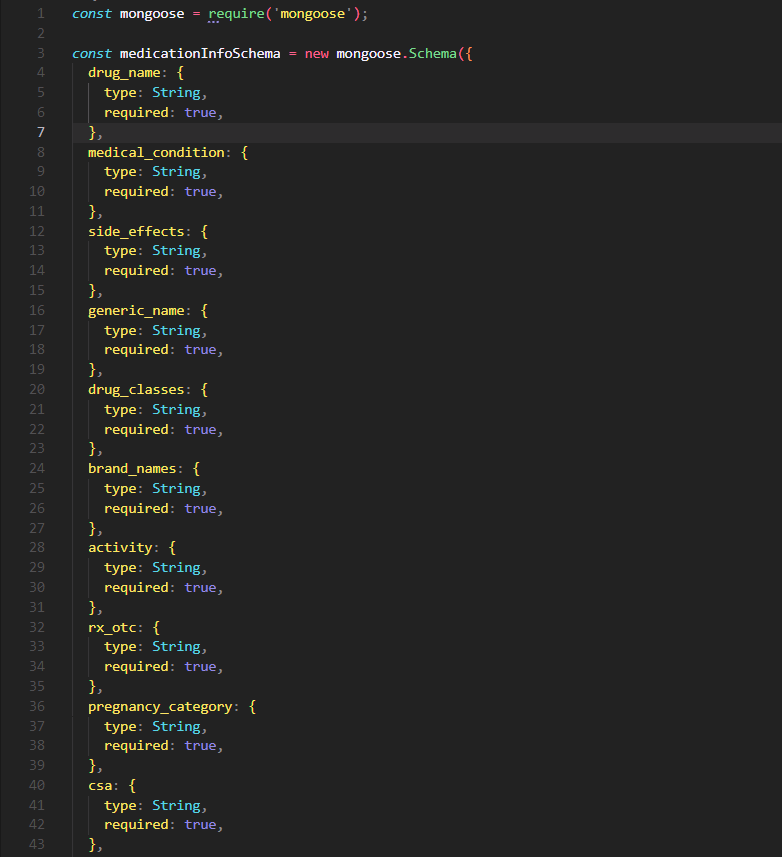
****

Figure : User History Schema

**Medication Information**

****

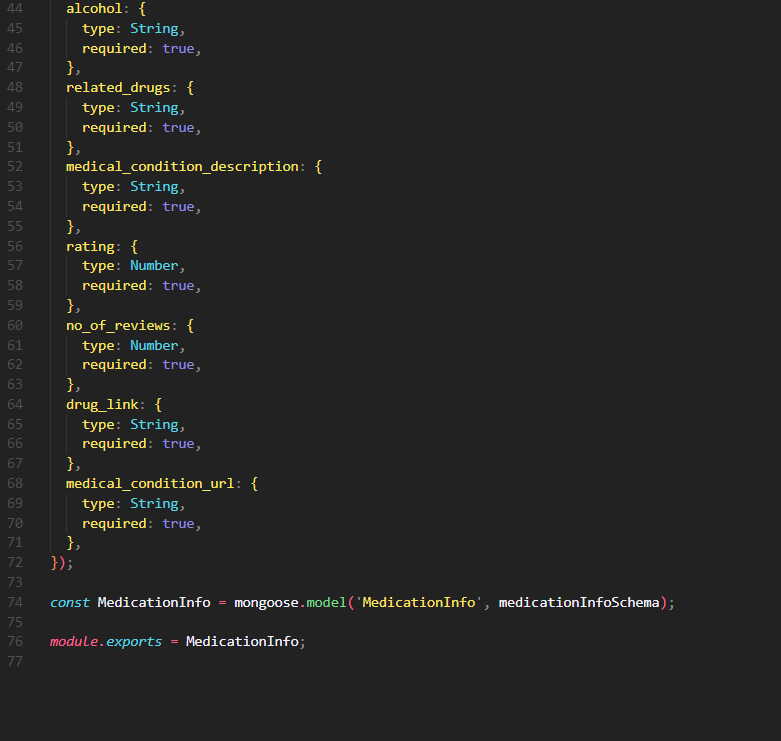
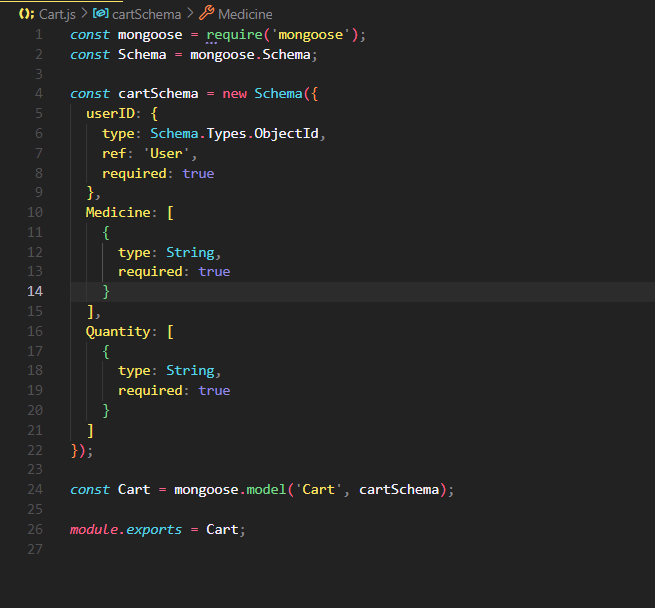
****

Figure : Medication Information Schema

**Cart**

****

## 

Figure : Cart Schema

## 3.3 Domain Model

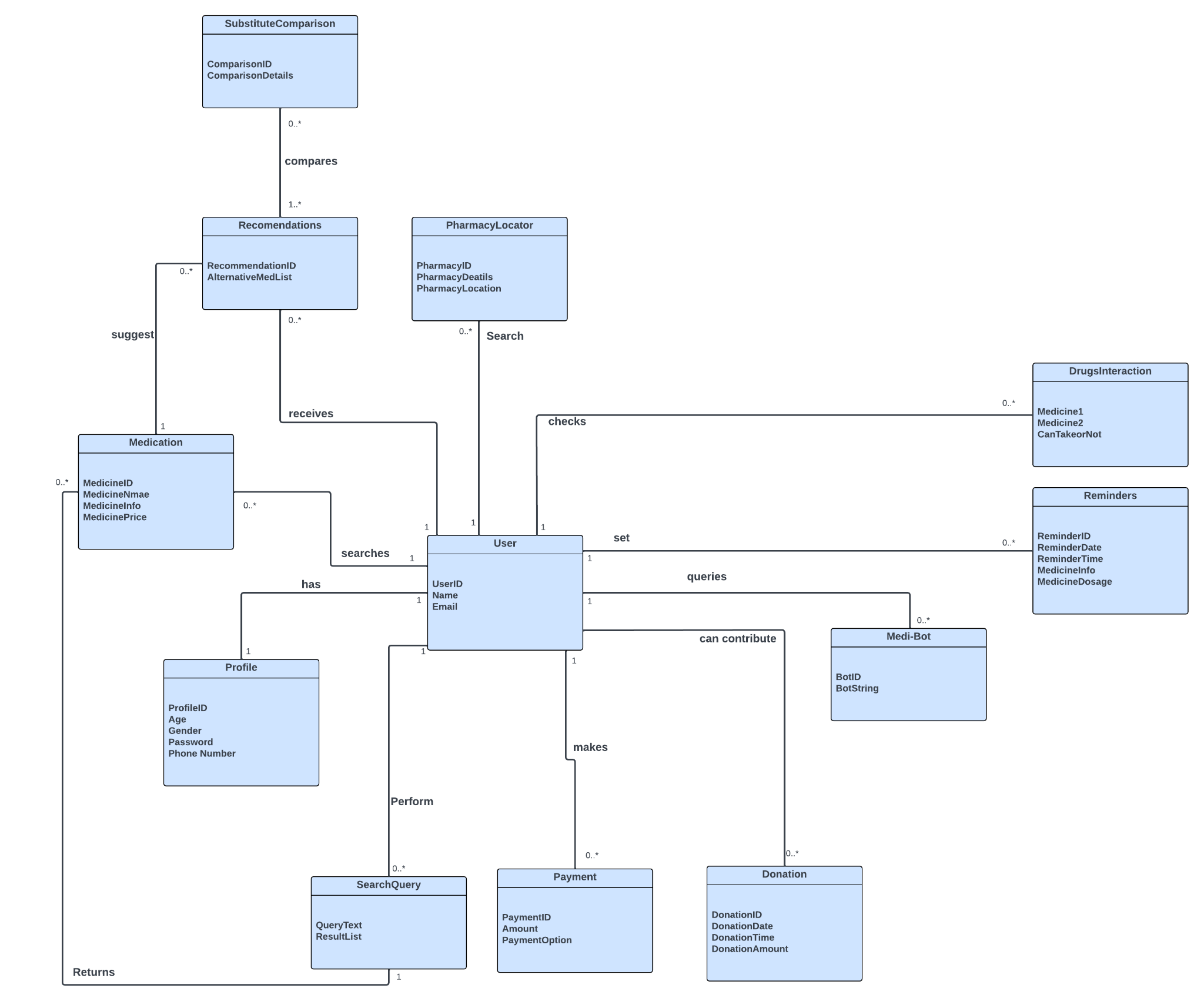


Figure : Domain Model of MedTrove

## 

## 

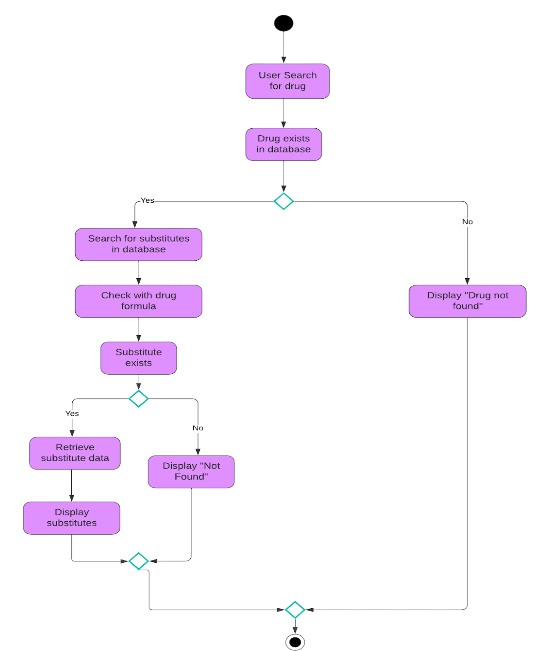
## 

## 3.4 Design Models

### • Activity Diagram

### 

#### Substitute Drug Identifier



#### 

Figure : Activity Diagram - Substitute Drug Identifier

#### Search and Recommendation

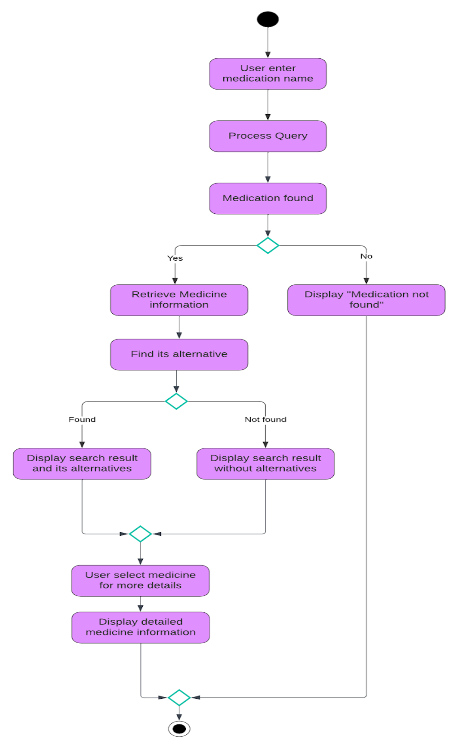


Figure : Activity Diagram - Search and Recommendation

#### Pharmacy Locator

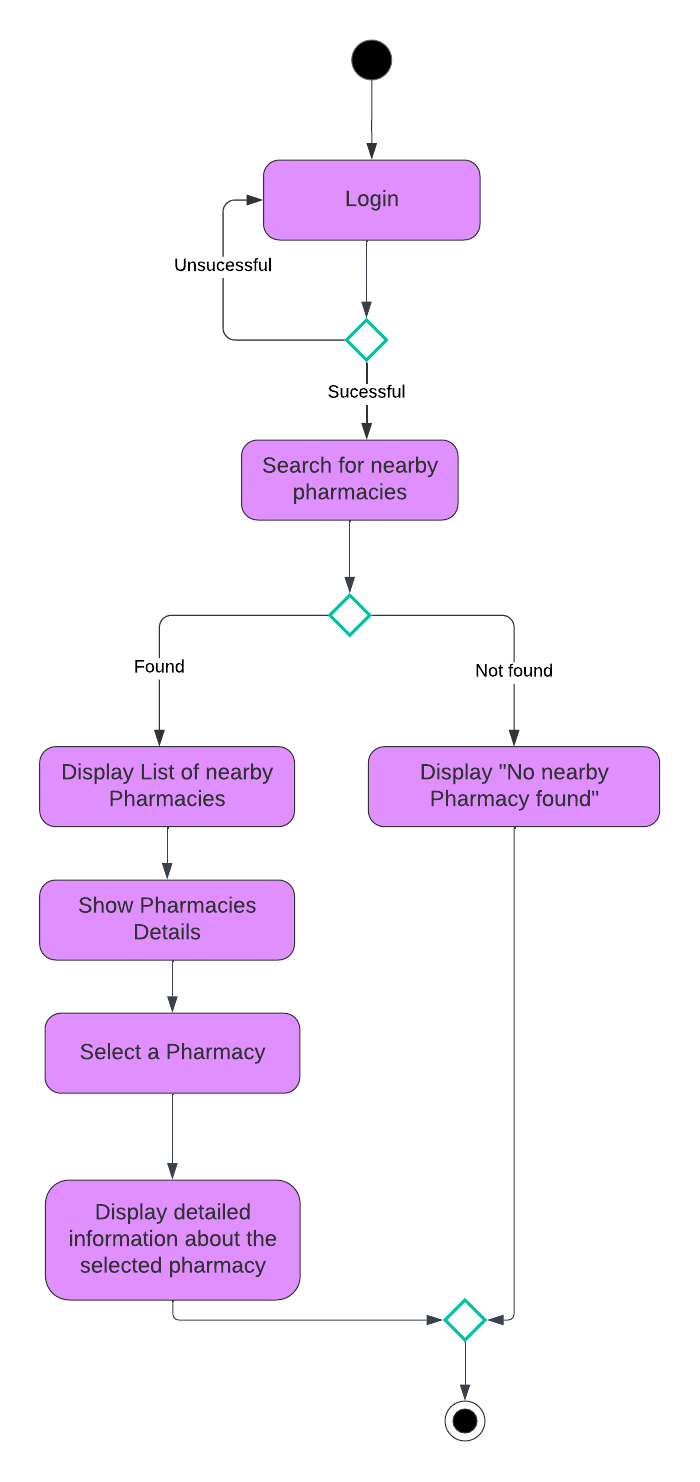


Figure : Activity Diagram - Pharmacy Locator

#### Drug-to-Drug Interaction Checker

#### 

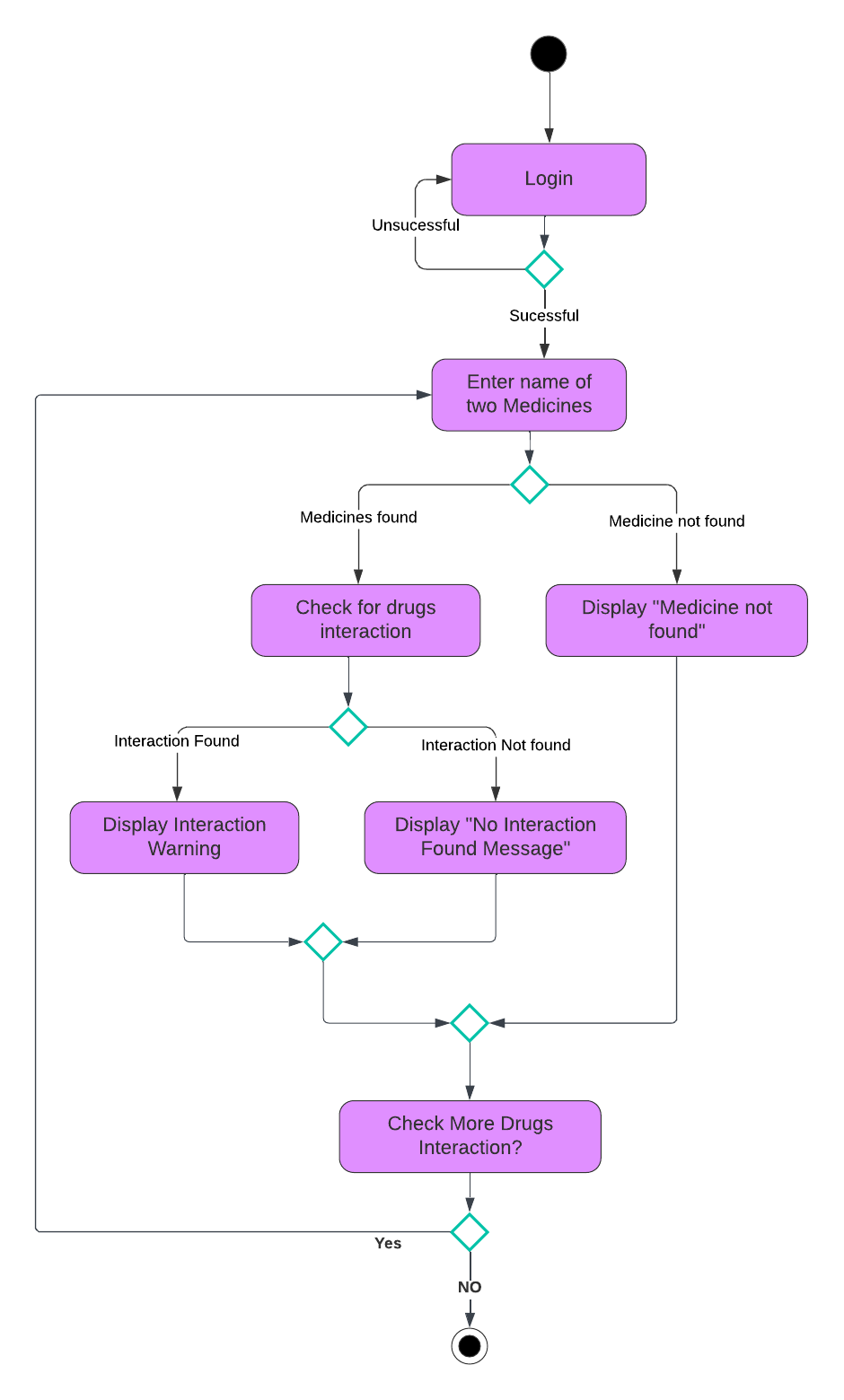


Figure : Activity Diagram - Drug-to-Drug Interaction Checker

#### Profile Management

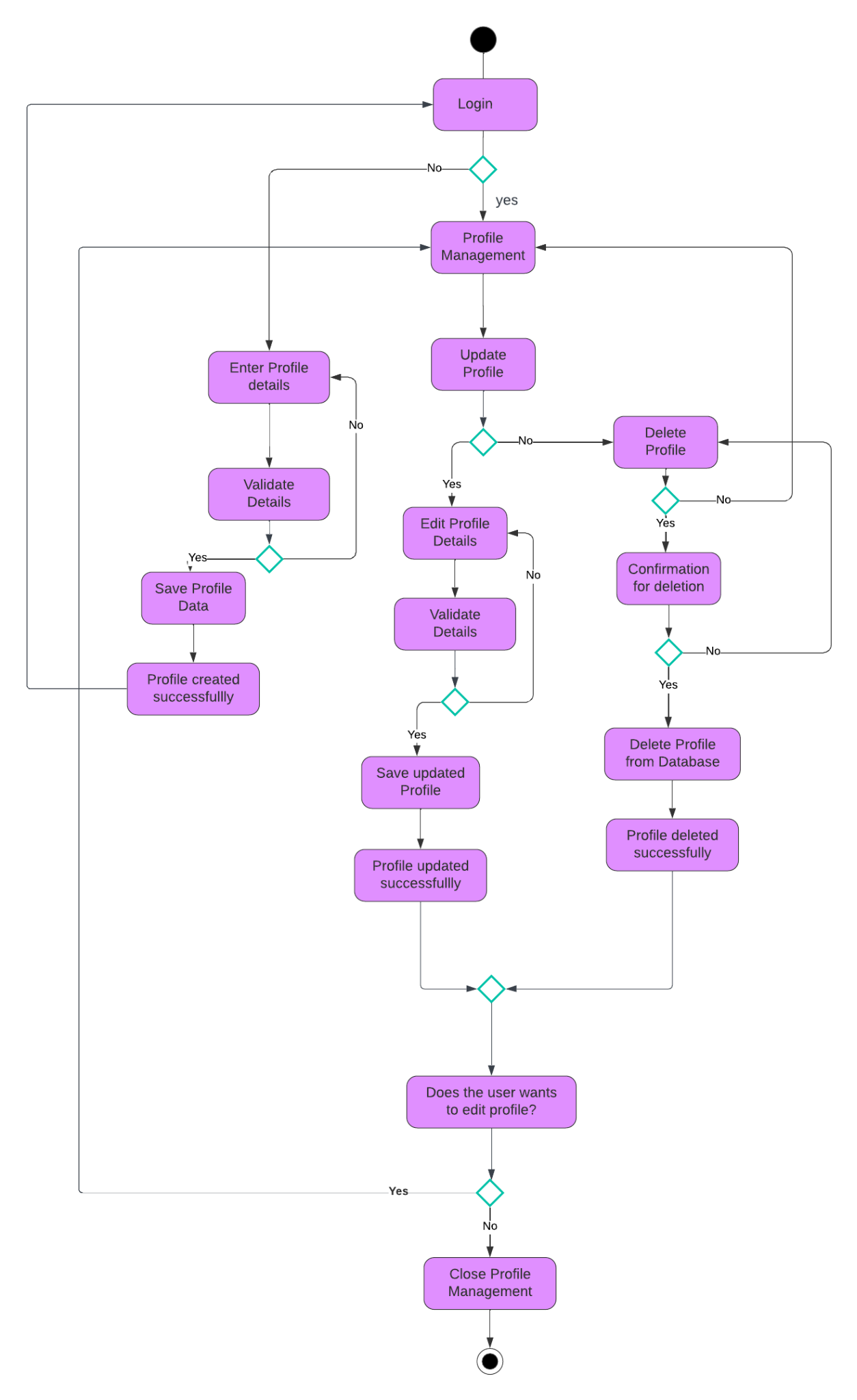


Figure : Activity Diagram - Profile Management

### • Class Diagram

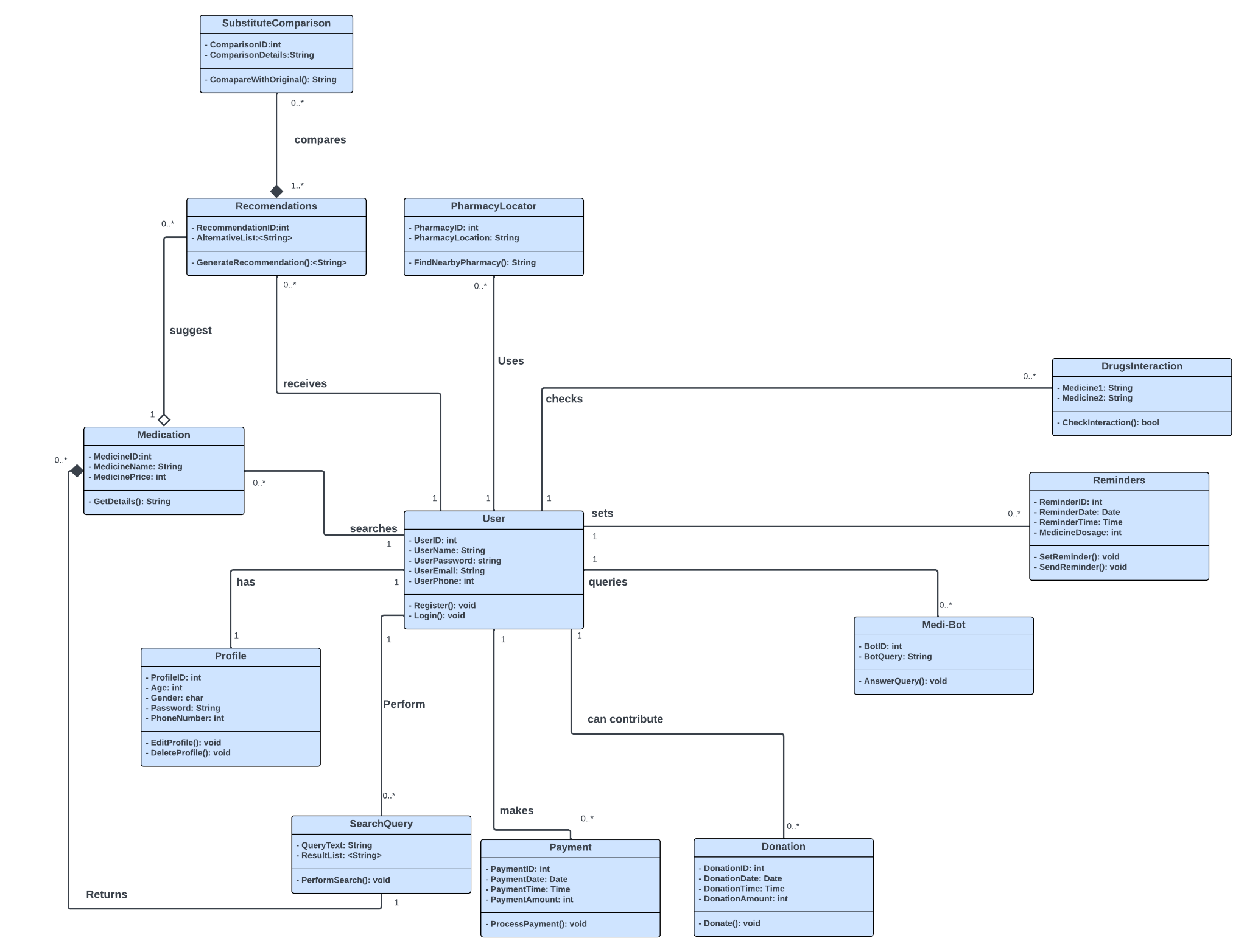


Figure : Class Diagram of MedTrove

### 

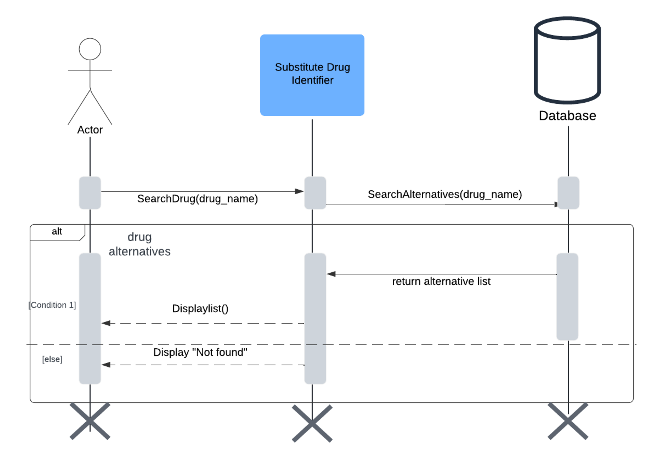
### 

### 

### 

### • Class-level Sequence Diagram

#### Substitute Drug Identifier



#### 

#### 

Figure : Sequence Diagram - Substitute Drug Identifier

#### 

#### 

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#### 

#### Search and Recommendation

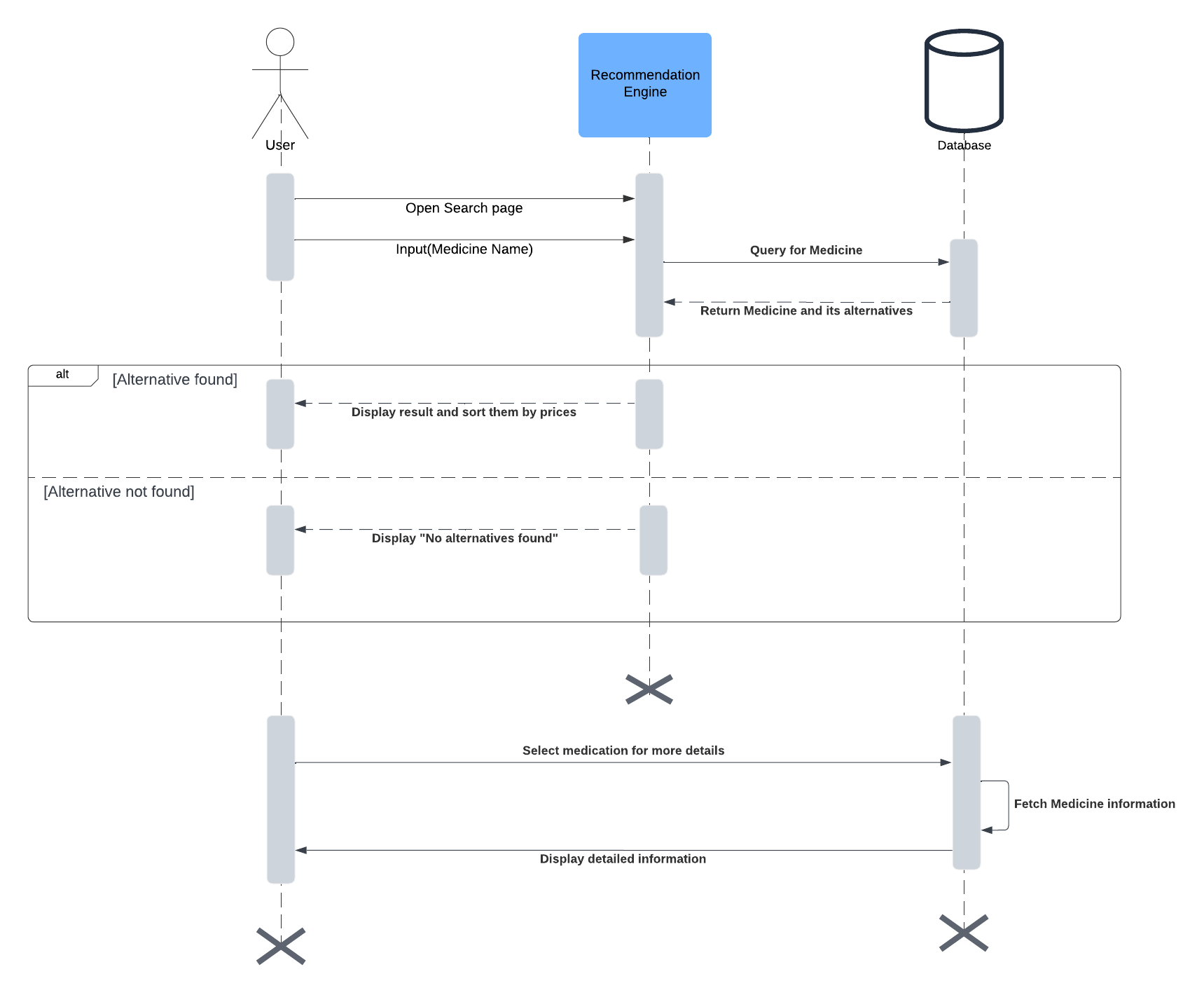


Figure : Sequence Diagram - Search and Recommendation

#### 

#### Pharmacy Locator

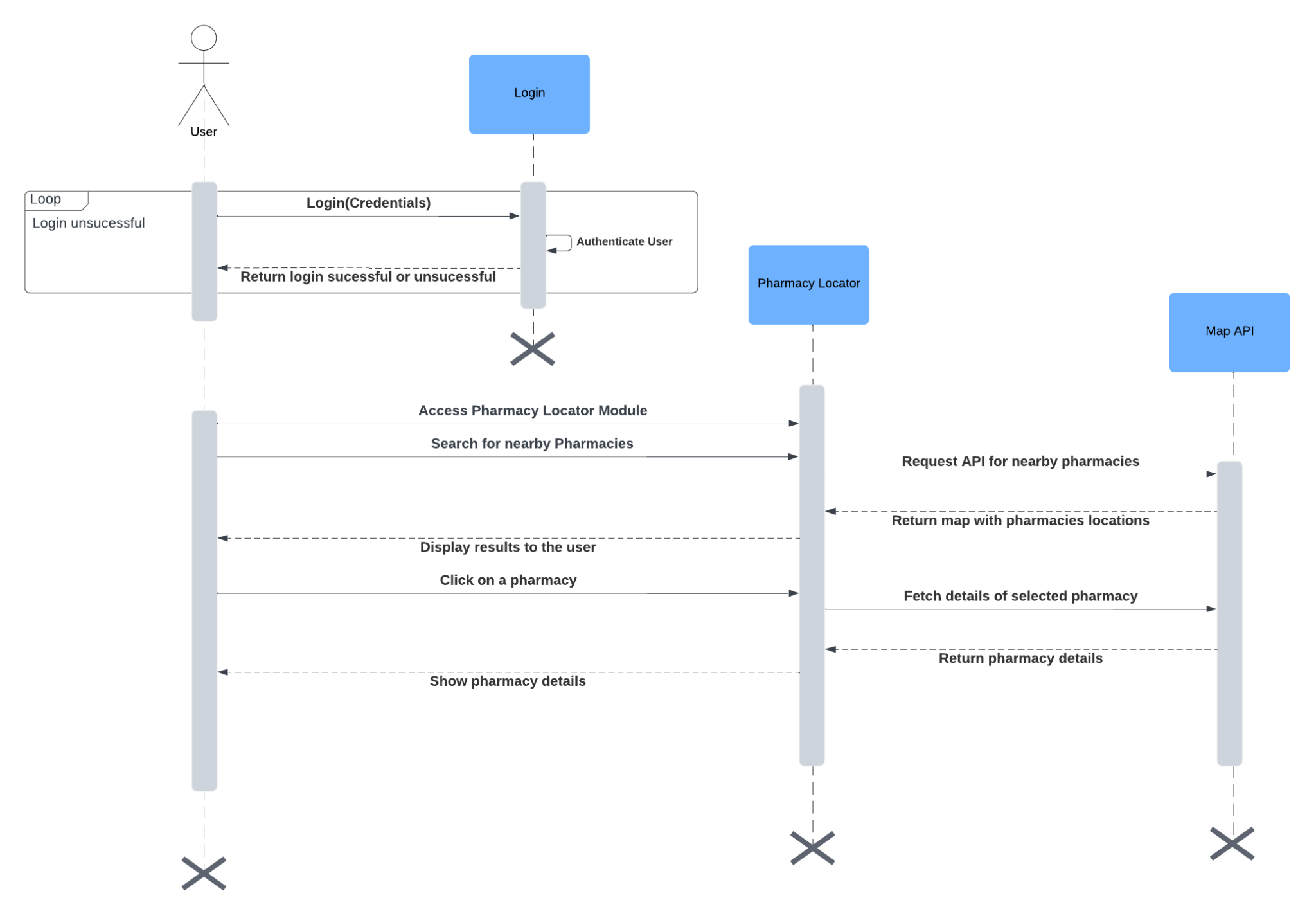


Figure : Sequence Diagram - Pharmacy Locator

#### Drug-to-Drug Interaction Checker

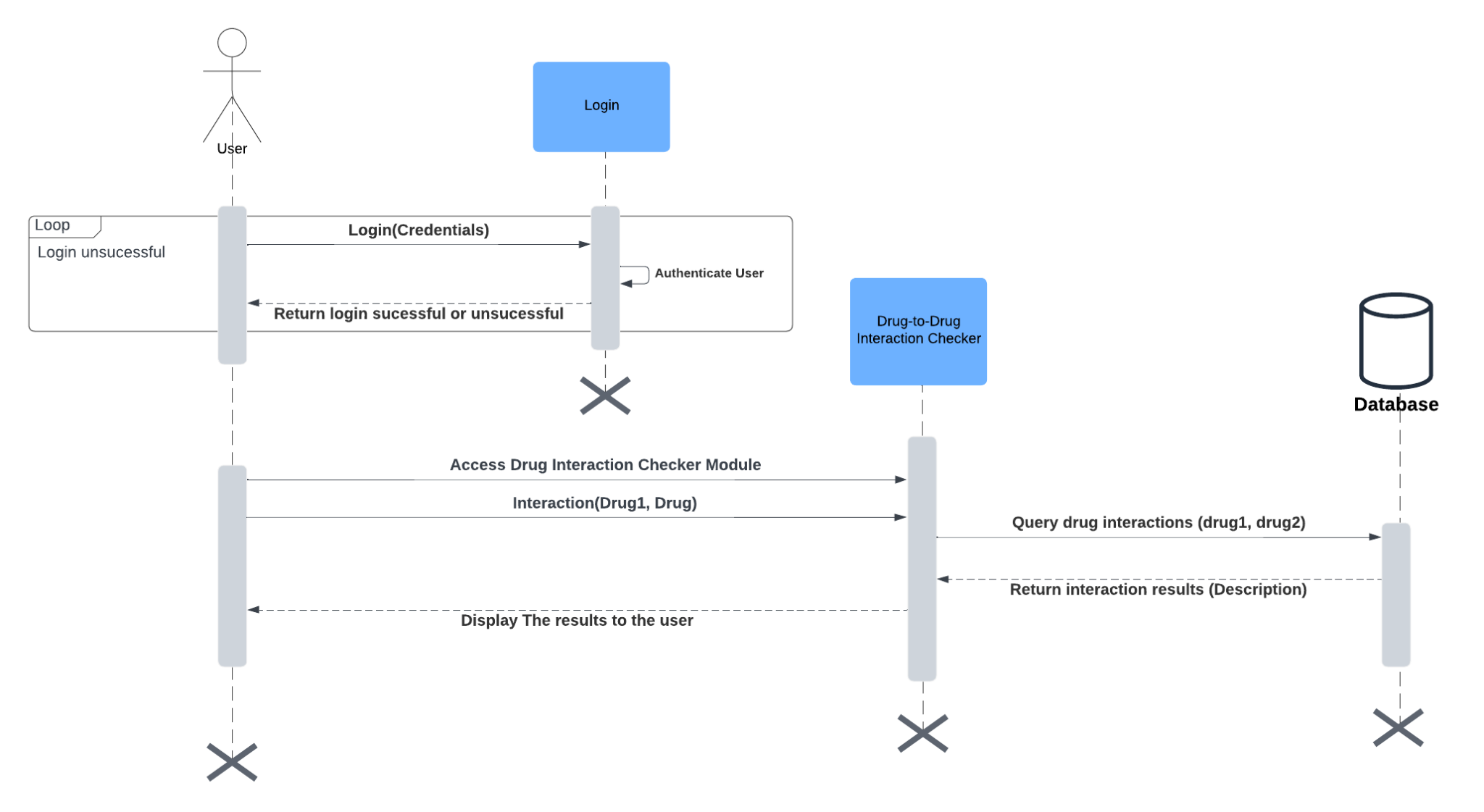


Figure : Sequence Diagram - Drug-to-Drug Interaction Checker

#### 

#### 

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#### 

#### Profile Management

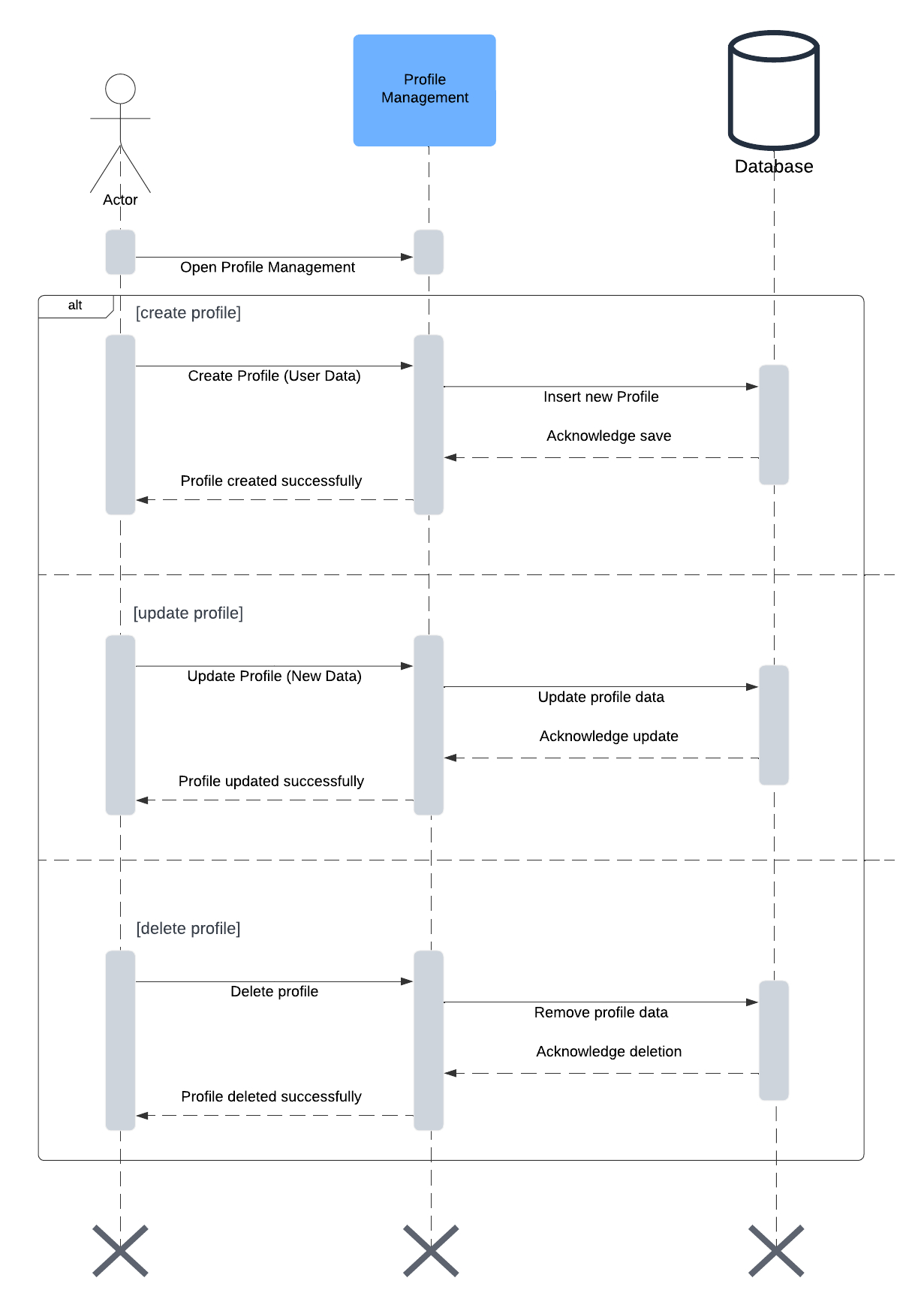
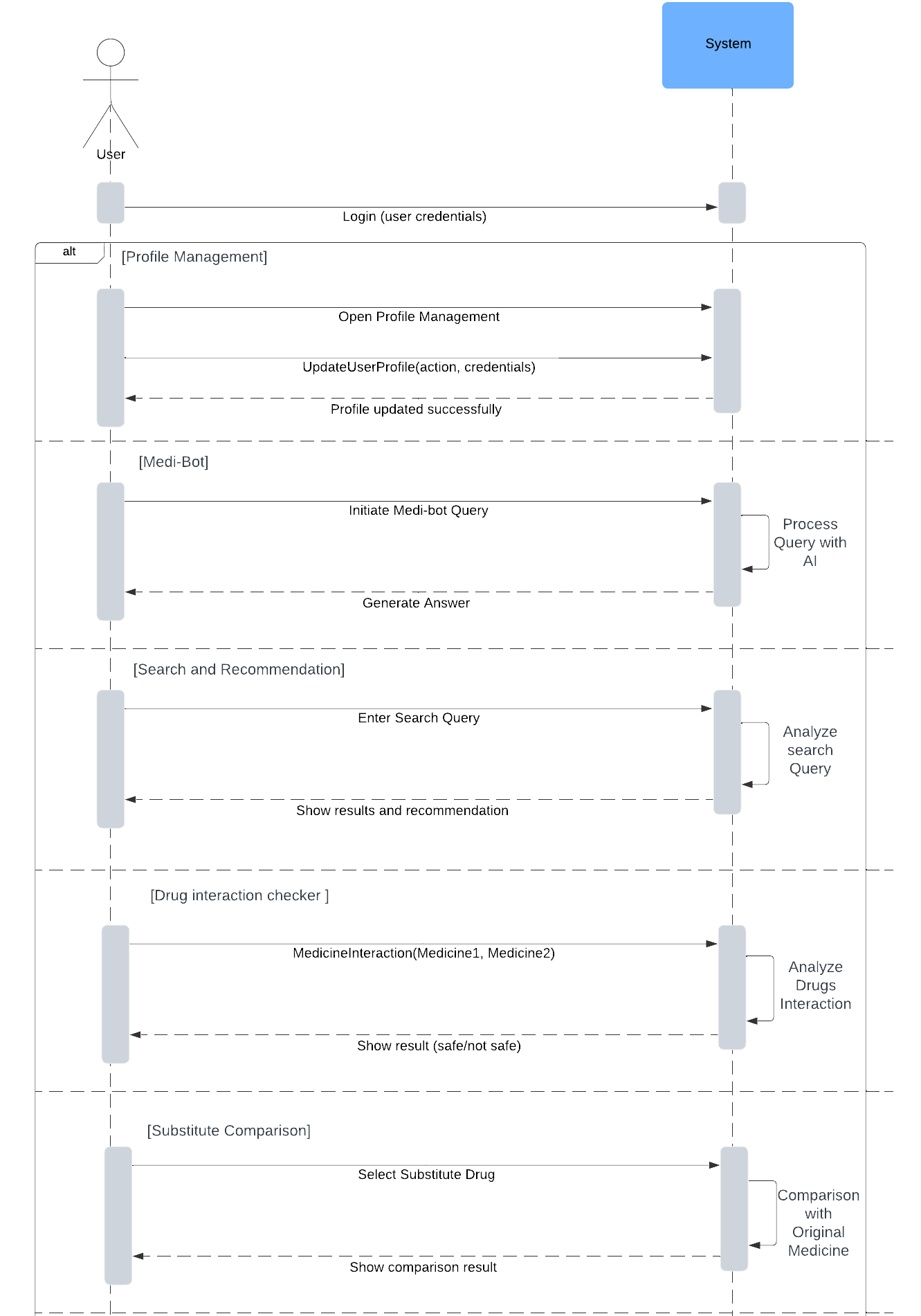


Figure : Sequence Diagram - Profile Management

### • System Sequence Diagram



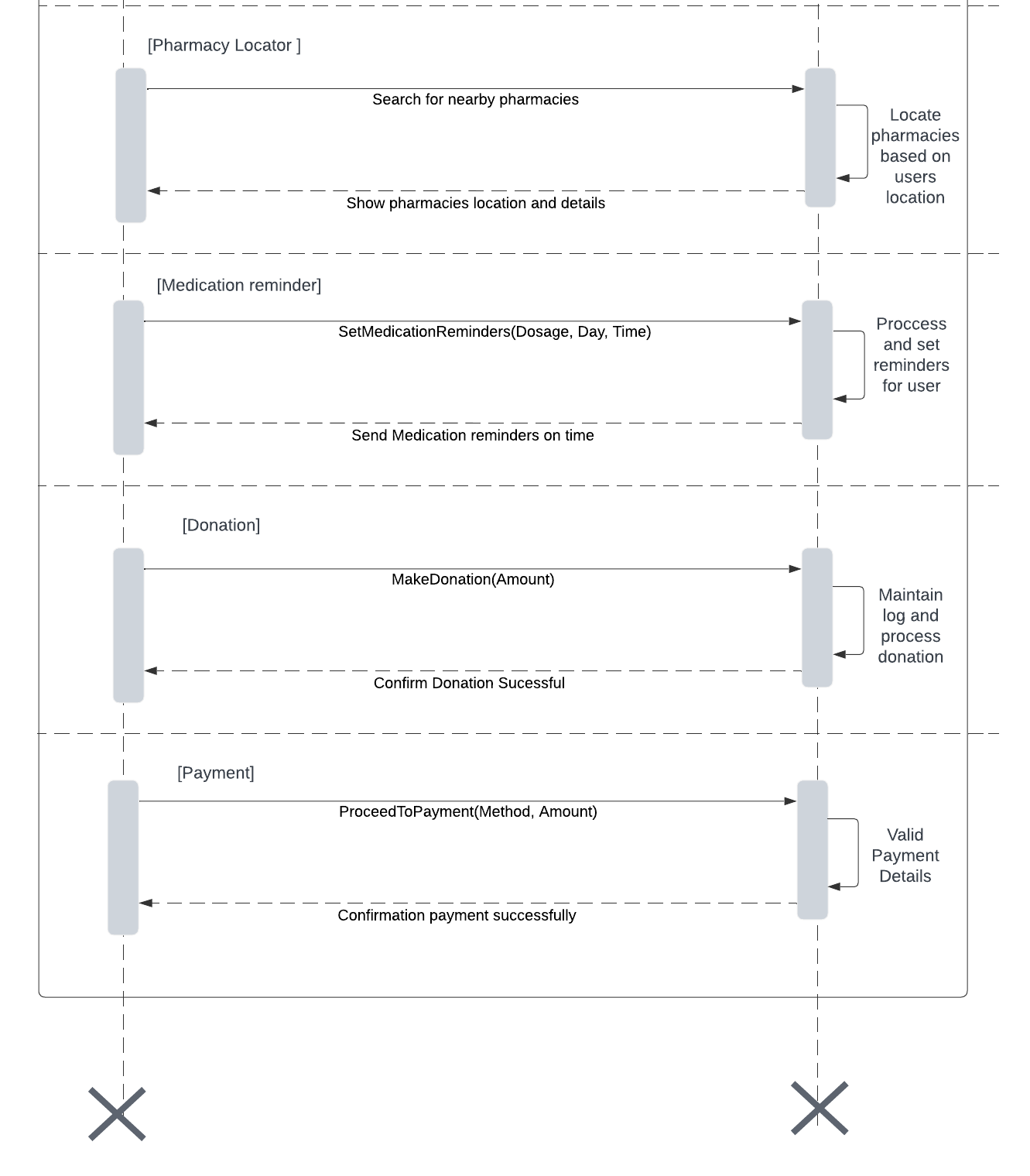


Figure : System Sequence Diagram of MedTrove

# 

# 

# 

# 

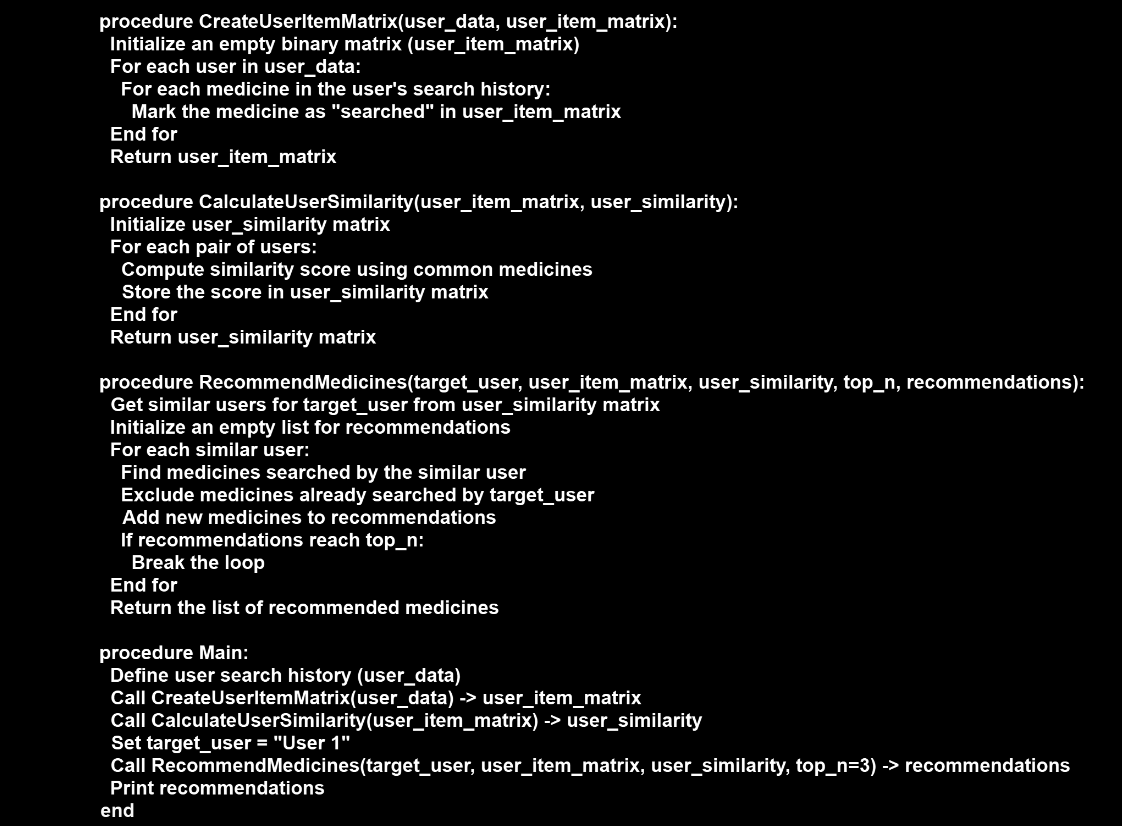
# 

# Chapter 4 Implementation and Testing

## 4.1 Algorithm Design

In this iteration we used an algorithm for collaborative filtering-based recommendation.

1. **Input**: A user’s search history (a list of medicines).
2. **Goal**: Recommend medicines to a user based on their search history and history of other users.
3. **Method**: Collaborative Filtering (based on user-user similarity using cosine similarity).



## 4.2 External APIs

|  |  |  |  |
| --- | --- | --- | --- |
| **API and Version** | **Description** | **Purpose of Usage** | **API Endpoints** |
| Mapbox Geocoding(10.1.33) | Global forward, reverse, and bulk geocoding. | Retrieving locations of nearby pharmacies | https://api.mapbox.com/geocoding/v5/mapbox.places |
| Mapbox Geocoding(10.1.33) | Global forward, reverse, and bulk geocoding. | Retrieving route based on user location and destination | https://api.mapbox.com/directions/v5/mapbox/driving |
| Custom Search JSON API (v1) | Provides access to Google search results, including web pages and images. | Retrieving medicine images | https://www.googleapis.com/customsearch/v1 |
| RXNav REST API (2.9.121) | Provides access to the RxNorm database. | To retrieve detailed medical information, such as ingredients | https://rxnav.nlm.nih.gov/REST |
| FDA Drug Event API (v2) | Provides users with access to reports of adverse medication events that have been submitted to the FDA by patients and healthcare providers. | To retrieve information about adverse drug occurrences related to specific drugs. | https://api.fda.gov/drug/event.json |

Table : External APIs

## 4.3 Unit Testing

### Component : Login

#### Password

|  |  |
| --- | --- |
| **ID** | TC01 |
| **Test Objective** | Verify that form is not empty. |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The user is on the login screen of the application. |
| **Steps** | 1. Leave all fields empty  2. Press login button |
| **Test Data** | No data entered (all fields are empty). |
| **Expected Result** | An error message is displayed indicating that all fields are required. |
| **Post Condition** | The application remains on the login screen. |
| **Actual Result** | An error message is displayed: "Please fill in all fields." |
| **Pass/Fail** | **Pass** |

Table : Test Case 01 - Login

|  |  |
| --- | --- |
| **ID** | TC02 |
| **Test Objective** | Verify that password field is not empty |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The client has an existing registered account.  3. Type Email and password |
| **Steps** | 1. Open the MedTrove application and goto the login screen.  2. Enter email and password.  3. Click on the ‘Login’ button. |
| **Test Data** | Email: Kissasium@gmail.com  Password: (password field is empty) |
| **Expected Result** | An error message is displayed indicating that all fields are required. |
| **Post Condition** | The application remains on the login screen. |
| **Actual Result** | An error message is displayed: "Please fill in all fields." |
| **Pass/Fail** | **Pass** |

Table : Test Case 02 - Login

|  |  |
| --- | --- |
| **ID** | TC03 |
| **Test Objective** | Verify that the user enters the correct password |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The client has an existing registered account.  3. Type Email and password |
| **Steps** | 1. Open the MedTrove application and goto the login screen.  2. Enter email and password.  3. Click on the ‘Login’ button. |
| **Test Data** | Email: Kissasium@gmail.com  Password: incorrect123 (types incorrect password) |
| **Expected Result** | An error message is displayed indicating the password is incorrect. |
| **Post Condition** | The application remains on the login screen. |
| **Actual Result** | An error message is displayed: "Incorrect password. Please enter the password again." |
| **Pass/Fail** | **Pass** |

Table : Test Case 03 - Login

#### Email

|  |  |
| --- | --- |
| **ID** | TC04 |
| **Test Objective** | Verify that Email field is not empty |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The client has an existing registered account.  3. Type Email and password |
| **Steps** | 1. Open the MedTrove application and goto the login screen.  2. Enter email and password.  3. Click on the ‘Login’ button. |
| **Test Data** | Email: (Email field is empty)  Password: MyPass123\* |
| **Expected Result** | An error message is displayed indicating that all fields are required. |
| **Post Condition** | The application remains on the login screen. |
| **Actual Result** | An error message is displayed: "Please fill in all fields." |
| **Pass/Fail** | **Pass** |

Table : Test Case 04 - Login

|  |  |
| --- | --- |
| **ID** | TC05 |
| **Test Objective** | Verify that the user enters the correct Email |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The client has an existing registered account.  3. Type Email and password |
| **Steps** | 1. Open the MedTrove application and goto the login screen.  2. Enter email and password.  3. Click on the ‘Login’ button. |
| **Test Data** | Email: emailIncorrect (types incorrect password)  Password: Kissa123\* |
| **Expected Result** | An error message is displayed indicating the email is incorrect. |
| **Post Condition** | The application remains on the login screen. |
| **Actual Result** | An error message is displayed: "Incorrect email. Please enter the email again." |
| **Pass/Fail** | **Pass** |

Table : Test Case 05 - Login

### Component: Signup

#### Email

|  |  |
| --- | --- |
| **ID** | TC06 |
| **Test Objective** | Verify that the user enters all the fields. |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. Goto signup page and fill out the information |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: (Email field is empty)  Phone: (Phone field is empty)  Password: (Password field is empty) |
| **Expected Result** | An error message is displayed indicating that all fields are required. |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is displayed: "Please fill in all fields." |
| **Pass/Fail** | **Pass** |

Table : Test Case 01 - SignUp

|  |  |
| --- | --- |
| **ID** | TC07 |
| **Test Objective** | Verify that Email field is not empty |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. Goto signup page and fill out the information |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: (Email field is empty)  Phone: 03234500001  Password: Aliza123\* |
| **Expected Result** | An error message is displayed indicating that all fields are required. |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is displayed: "Please fill in all fields." |
| **Pass/Fail** | **Pass** |

Table : Test Case 02 - SignUp

|  |  |
| --- | --- |
| **ID** | TC08 |
| **Test Objective** | Verify that the user enters the correct Email |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. Goto signup page and fill out the information |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: Incorrect.com  Phone: 03234500001  Password: Aliza123\* |
| **Expected Result** | An error message is displayed indicating the Email is incorrect. |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is displayed: "Incorrect Email. Please enter the Email again." |
| **Pass/Fail** | An error message is displayed indicating the Email is incorrect. |

Table : Test Case 03 - SignUp

#### Phone

|  |  |
| --- | --- |
| **ID** | TC09 |
| **Test Objective** | Verify user enters phonenumber field is not empty |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The user is on the signup screen of the application. |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: aliza@gmail.com  Phone:  Password: Aliza123\* |
| **Expected Result** | An error message is displayed indicating that all fields are required. |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is displayed: "Please fill in all fields." |
| **Pass/Fail** | **Pass** |

Table : Test Case 04 - SignUp

|  |  |
| --- | --- |
| **ID** | TC10 |
| **Test Objective** | Verify system accepts only 11 digit phone number |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The user is on the signup screen of the application. |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: aliza@gmail.com  Phone: 032345000011  Password: Aliza123\* |
| **Expected Result** | An error message is displayed “Invalid phone number. Please enter a valid phone number in the format XXXXXXXXXX” |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is shown “Invalid phone number. Please enter a valid phone number in the format XXXXXXXXXX” |
| **Pass/Fail** | **Pass** |

Table : Test Case 05 - SignUp

|  |  |
| --- | --- |
| **ID** | TC11 |
| **Test Objective** | Verify system accepts only 11 digit phone number |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The user is on the signup screen of the application. |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: aliza@gmail.com  Phone: 03234500  Password: Aliza123\* |
| **Expected Result** | An error message is displayed “Invalid phone number. Please enter a valid phone number in the format XXXXXXXXXX” |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is shown “Invalid phone number. Please enter a valid phone number in the format XXXXXXXXXX” |
| **Pass/Fail** | **Pass** |

Table : Test Case 06 - SignUp

#### Password

|  |  |
| --- | --- |
| **ID** | TC12 |
| **Test Objective** | Verify that empty password is not accepted |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The user is on the screen of the application. |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: aliza@gmail.com  Phone: 032345000011  Password: |
| **Expected Result** | An error message is displayed ‘Invalid Password. Password must be at least 8 characters long and include one uppercase letter, one lowercase letter and one number’ |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is shown  ‘Invalid Password. Password must be at least 8 characters long and include one uppercase letter, one lowercase letter and one number’ |
| **Pass/Fail** | **Pass** |

Table : Test Case 07 - SignUp

|  |  |
| --- | --- |
| **ID** | TC13 |
| **Test Objective** | Verify that password with no numbers is not accepted |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The user is on the signup screen of the application. |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: aliza@gmail.com  Phone: 032345000011  Password: HelloTroy\* |
| **Expected Result** | An error message is displayed ‘Invalid Password. Password must be at least 8 characters long and include one uppercase letter, one lowercase letter, and one number’ |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is displayed  ‘Invalid Password. Password must be at least 8 characters long and include one uppercase letter, one lowercase letter, and one number’ |
| **Pass/Fail** | **Pass** |

Table : Test Case 08 - SignUp

|  |  |
| --- | --- |
| **ID** | TC14 |
| **Test Objective** | Verify that password with no lowercase letters is not accepted |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The user is on the signup screen of the application. |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: aliza@gmail.com  Phone: 032345000011  Password: HELLOTROY12! |
| **Expected Result** | An error message is displayed ‘Invalid Password. Password must be at least 8 characters long, and include one uppercase letter, one lowercase letter and one number’ |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is displayed  ‘Invalid Password. Password must be at least 8 characters long and include one uppercase letter, one lowercase letter and one number’ |
| **Pass/Fail** | **Pass** |

Table : Test Case 09 - SignUp

|  |  |
| --- | --- |
| **ID** | TC15 |
| **Test Objective** | Verify that password with no capital letters is not accepted |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The user is on the signup screen of the application. |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: aliza@gmail.com  Phone: 032345000011  Password: 123ellotroy! |
| **Expected Result** | An error message is displayed ‘Invalid Password. Password must be at least 8 characters long, and include one uppercase letter, one lowercase letter and one number’ |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message is displayed  ‘Invalid Password. Password must be at least 8 characters long and include one uppercase letter, one lowercase letter and one number’ |
| **Pass/Fail** | **Pass** |

Table : Test Case 10 – SignUp

|  |  |
| --- | --- |
| **ID** | TC16 |
| **Test Objective** | Verify that password with no special characters is not accepted |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. The user is on the signup screen of the application. |
| **Steps** | 1. Open the MedTrove application and goto the signup screen.  2. Enter email, phone number and password.  3. Click on the “signup” button. |
| **Test Data** | Email: aliza@gmail.com  Phone: 032345000011  Password: HelloTroy345 |
| **Expected Result** | An error message is shown ‘Invalid Password. Password must be at least 8 characters long and include one uppercase letter, one lowercase letter and one number’ |
| **Post Condition** | The application remains on the signup screen. |
| **Actual Result** | An error message shown  ‘Invalid Password. Password must be at least 8 characters long, and include one uppercase letter, one lowercase letter and one number’ |
| **Pass/Fail** | **Pass** |

### 

Table : Test Case 11 - SignUp

### Component: Search

|  |  |
| --- | --- |
| **ID** | TC17 |
| **Test Objective** | To check if the searched medicine is present in the database |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2. User should be logged in successfully |
| **Steps** | 1. Open the MedTrove application.  2. Go to login page.  3. After successful login, the user should search for a medicine. |
| **Test Data** | MedicineName: Carfentanil |
| **Expected Result** | An error message is displayed ‘This medicine is not present in the database’ |
| **Post Condition** | Display the alternative medicines |
| **Actual Result** | An error message is displayed ‘This medicine is not present in the database’ |
| **Pass/Fail** | **Pass** |

Table : Test Case 01 - Search

### Component : Pharmacy Locator

|  |  |
| --- | --- |
| **ID** | TC18 |
| **Test Objective** | Verify user location is identified and pinned |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2.The user is on the pharmacy locator screen of the application |
| **Steps** | 1. Open the MedTrove application.  2. Login with your credentials and goto the pharmacy locator screen.  3. Switch on your location  4. Allow the MapBox to access your location |
| **Test Data** | Your live location |
| **Expected Result** | The correct location of the user is pinned based on their actual current location |
| **Post Condition** | The application remains on the pharmacy locator screen. |
| **Actual Result** | The correct location of the user is pinned based on their actual current location |
| **Pass/Fail** | **Pass** |

Table : Test Case 01 - Pharmacy Locator

|  |  |
| --- | --- |
| **ID** | TC19 |
| **Test Objective** | Search for pharmacies provides the correct list of pharmacies. |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2.The user is on the pharmacy locator screen of the application |
| **Steps** | 1. Open the MedTrove application.  2. Login with your credentials.  3. Navigate to the pharmacy locator screen.  4. Switch on your location  5. Allow the MapBox to access your location  6.Search for pharmacies |
| **Test Data** | “pharmacy” |
| **Expected Result** | List of nearby pharmacies appears to choose from to view their location on the map |
| **Post Condition** | The application remains on the pharmacy locator screen. |
| **Actual Result** | List of nearby pharmacies appears to choose from to view their location on the map |
| **Pass/Fail** | **Pass** |

Table : Test Case 02 - Pharmacy Locator

|  |  |
| --- | --- |
| **ID** | TC20 |
| **Test Objective** | Correct location of selected pharmacy is pinned |
| **Precondition** | 1. Client has downloaded the application, MedTrove  2.The user is on the pharmacy locator screen of the application |
| **Steps** | 1. Open the MedTrove application.  2. Login with your credentials.  3. Navigate to the pharmacy locator screen.  4. Switch on your location  5. Allow the MapBox to access your location  6.Search for pharmacies  7.Select a pharmacy |
| **Test Data** | “Pharmacy”, “Shaheen Chemist” |
| **Expected Result** | Correct location of selected pharmacy appears pinned on screen with highlighted direction between user’s current location and the location of the pharmacy. |
| **Post Condition** | The application remains on the pharmacy locator screen. |
| **Actual Result** | Correct location of selected pharmacy appears pinned on screen with highlighted direction between user’s current location and the location of the pharmacy. |
| **Pass/Fail** | **Pass** |

Table : Test Case 03 - Pharmacy Locator

### Component : Cart

|  |  |
| --- | --- |
| **ID** | TC21 |
| **Test Objective** | Verify that items can be successfully added to the cart. |
| **Precondition** | 1. The user has successfully logged into MedTrove.  2. The user has browsed to product details page. |
| **Steps** | 1. Go to the product listing page.  2. Select a product and click on "Add to Cart" button.  3. Verify the cart icon or cart page to confirm the product has been added.  4. Repeat steps 2 and 3 with multiple products.  5. Gototo the cart page. |
| **Test Data** | Product 1: Pain Reliever |
| **Expected Result** | Products are correctly added to the cart. |
| **Post Condition** | The cart reflects the correct items, quantities and prices. |
| **Actual Result** | Products are successfully added to the cart. |
| **Pass/Fail** | **Pass** |

Table : Test Case 01 - Cart

# Conclusion



Figure : Timeline

In our timeline, we set out to implement key features for MedTrove including substitute drug identifier, search & recommendation, Pharmacy locator, Drug-to-Drug Interaction Checker, and user profile management. For the UI/UX, we focused on creating a user-friendly interface that allows easy navigation through these features. Additionally we conducted thorough testing to ensure that the app functions smoothly and delivers accurate results for each use case.

We have successfully implemented all the elements planned for FYP-1 with all the mentioned features functioning as expected. Moreover, we have implemented the "add to cart" functionality and started work on payment modules to stay ahead of our timeline.

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