

**ISTANBUL TECHNICAL UNIVERSITY**  
**COMPUTER ENGINEERING DEPARTMENT**

**BLG 411E**  
**SOFTWARE ENGINEERING**  
**REQUIREMENTS ANALYSIS**

**PROJECT TITLE** : PharmNav  
**GROUP NAME** : Group 16  
**DATE** : 04.12.2023

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**FALL 2023/2024**

# Change Log Table

Version	Description	Time
1.0	All of the 'Pharmacy Owner' user type names are updated to 'Pharmacist' to satisfy standardization among different usages of these user types.	2023-12-01
1.0	Additional 3 Use Cases and 1 Use Case Diagram are added.	2023-12-03
1.0	Some Use Case Diagrams are Updated (User Login is added.)	2023-12-03
1.0	11 main screen mock-ups added and mapped to user stories in the section 'User Interface Model'.	2023-12-03
1.0	Entity Relation Diagram is added.	2023-12-03
1.0	Explained security measures, collection relations, our general 6-digit code logic behind our app and, provided collection instances in "Important Data Considerations" section.	2023-12-03
1.0	Data Flow Diagrams(level 0 and level 2) and their explanations are added	2023-12-03

Table 1: Change Log Table

## 1 Introduction

This document serves as a comprehensive guide to the planning and design phases of a software project, providing a structured approach to ensure clarity and completeness in the development process. The document is organized into key sections, each addressing critical aspects of the project's conception and execution.

The primary goal of this document is to articulate the blueprint for the software project, guiding the development team through the creation and implementation stages. It outlines the functional and non-functional requirements, user personas, use cases, user interface models, and flow diagrams necessary for a holistic understanding of the project. The document is structured to facilitate easy navigation and reference, ensuring that stakeholders and development teams can quickly access the information they need.

This section provides a detailed list of both functional and non-functional requirements essential for the software's success. These requirements are articulated in natural language, following guidelines discussed in relevant lecture notes. Clear identification and categorization of these requirements set the foundation for subsequent development stages.

This section delves into the user-centric aspects of the software. It categorizes users into distinct types, creates personas to embody their characteristics, and crafts narrative scenarios outlining their interactions with the system. The inclusion of use case diagrams and detailed use cases with alternative flows ensures a comprehensive understanding of the software's functionality from an end-user perspective.

The user interface model section showcases critical screen mock-ups, aligning them with user stories and project components. This visual representation aids in conveying the intended look and feel of the software. The selection of 5 to 10 screens, avoiding redundancy, allows for a focused presentation of the user interface, using tools such as Bootstrap, Balsamiq, or other prototyping applications.

The final section addresses data considerations, providing an entity-relationship diagram for the underlying database. Additionally, it explores data format preferences such as Ajax, JSON, or XML. The inclusion of data flow diagrams, spanning at least two levels, offers a detailed representation of how data moves through the system, providing insights into system architecture and functionality.

In summary, this document comprehensively captures the essential elements required for the successful development of the software project. By systematically addressing system requirements, user interactions, user interface design, and data flow considerations, it serves as a valuable reference guide for the development team and stakeholders alike.

## 2 System Requirements

### 2.1 Functional Requirements/Tasks

The following table outlines the functional requirements and tasks associated with the PharmNav project, each of which is mapped to the corresponding deliverables. The corresponding deliverables can be seen from the document called 'Project Plan'.

**Table of Tasks**

Task	Description	Deliverable
1.1	The system shall design wire frames for the main user interface of the mobile application.	1
1.2	The system shall implement the chosen wire frame into the React Native code scripts.	1

2.1	The system shall implement a search algorithm that returns well-stocked appropriate pharmacies as output.	2
2.2	The system shall apply a sorting algorithm to show nearest to furthest pharmacies by the current location of the user.	2
3.1	The system shall create a wire frame for the web admin panel interface based on pharmacist requirements.	3
3.2	The system shall apply the selected wire frame of the web admin panel for the pharmacy with ReactJS.	3
4.1	The system shall integrate the prescription to drug database to retrieve proper amounts of prescribed drugs.	4
4.2	The system shall implement a system for real-time updates between the application and the database.	4
5.1	The system shall implement a database connection to store and retrieve pharmacy inventory data.	5
5.2	The system shall develop functionalities for the dashboard to make the pharmacy able to manipulate its inventory.	5
6.1	The system shall analyze data trends to identify patterns in medication demand and usage.	6
6.2	The system shall prepare presentations summarizing the data analysis for drug producers.	6

## 2.2 Non-functional Issues

In addition to the functional requirements and tasks, the PharmNav project addresses various non-functional issues to ensure the application's effectiveness and user satisfaction. These non-functional aspects include:

### 2.2.1 Security

- The system shall guarantee the security of sensitive medical and user data by implementing the integration of prescription to drug database without any personal

information and identity measures.

- The system shall regularly conduct security audits and vulnerability assessments to identify and address potential risks.

### **2.2.2 Performance**

PharmNav aims to deliver optimal performance to users.

- The system shall employ efficient algorithms for quick pharmacy search and sorting in the mobile application.
- The system shall optimize database queries to minimize response times and ensure real-time data updates.
- The system shall conduct performance testing under various load conditions to identify and resolve bottlenecks.

### **2.2.3 Usability**

Usability is a key focus to enhance the overall user experience.

- The system shall conduct user testing sessions to gather feedback on the mobile application interface and the web admin panel.
- The system shall iteratively refine the design based on user feedback to ensure an intuitive and user-friendly experience.
- The system shall provide clear and concise instructions within the application for both patients and pharmacists.

### **2.2.4 Scalability**

- The system shall be designed to scale seamlessly to accommodate growth by employing scalable architecture for both the mobile application and web admin panel.
- The system shall regularly monitor system performance and make adjustments to handle increased user and data loads.
- The system shall plan for future enhancements and features to support the evolving needs of users and stakeholders.

### 2.2.5 Regulatory Compliance

- The system shall ensure compliance with relevant regulations and standards by adhering to data protection regulations and standards in handling pharmacy data.
- The system shall regularly review and update security and privacy policies to align with industry best practices.
- The system shall collaborate with legal and regulatory experts to stay informed about changes in healthcare regulations.

### 2.2.6 Reliability

- The system shall ensure compliance with provided pharmacy information and the exact amount of inventories the pharmacies own currently.
- The system shall add a 'Report' option to the mobile app user interface to ensure users can inform the app in inappropriate use cases of pharmacists.

## 3 Use Cases

### 3.1 User Types

- **Patients:** A user which is capable of seeking pharmacies for specific prescriptions, which can be achieved by entering a prescription code and examining listed pharmacy results ordered by distances.
- **Pharmacists:** The user side of the project which has potential of managing inventory and tracking prescription fulfillment, which can be achieved by entering prescription codes and then updating the stock, or after selecting medicines, they can add or delete medicine operations from the stock manually.

### 3.2 User Scenarios

#### 3.2.1 Scenario 1

- **Persona:** Sarah, a working professional with a busy schedule.
- **Scenario:** Sarah has just visited her doctor and received a prescription for a specific medication. She is new to the area and unsure where the nearest pharmacies are. Using PharmNav, she scans her prescription code. The app quickly identifies her location and shows a list of nearby pharmacies, indicating which ones have her

medication in stock. She selects a pharmacy that is on her way home from work. Sarah is able to navigate to the pharmacy, pick up her medication, and make it back in time for her next meeting.

### 3.2.2 Scenario 2

- **Persona:** Sofia, a student with a busy schedule.
- **Scenario:** Having obtained the prescription code by the doctor, Sofia entered the code into the app's form, yet did not get any pharmacies listed as doctor did not give the correct code by misspelling a letter. Application informed her about the absence of the prescription code so that she went to see the doctor and obtain correct version of code, which avoided her to go a pharmacy without the correct code.

### 3.2.3 Scenario 3

- **Persona:** John, the owner of a local pharmacy.
- **Scenario:** John starts his day by checking the PharmNav dashboard to review the inventory levels of his pharmacy. He notices that several commonly prescribed medications are running low. After supplying new medicines, he updates the inventory in the PharmNav app to reflect the new updated stock. PharmNav app has become an essential tool in his inventory management, ensuring he can meet his customers' needs efficiently.

### 3.2.4 Scenario 4

- **Persona:** Jack, the owner of a local pharmacy.
- **Scenario:** Jack saw customer Linda joining in pharmacy and welcomed Linda and she gave him a prescription code obtained by the doctor. Jack gave them to her and typed the code into the computer to update the stock of medicines. He pressed the update button, and the computer showed that the medicines in the stock were updated.

### 3.3 Use Case Diagram

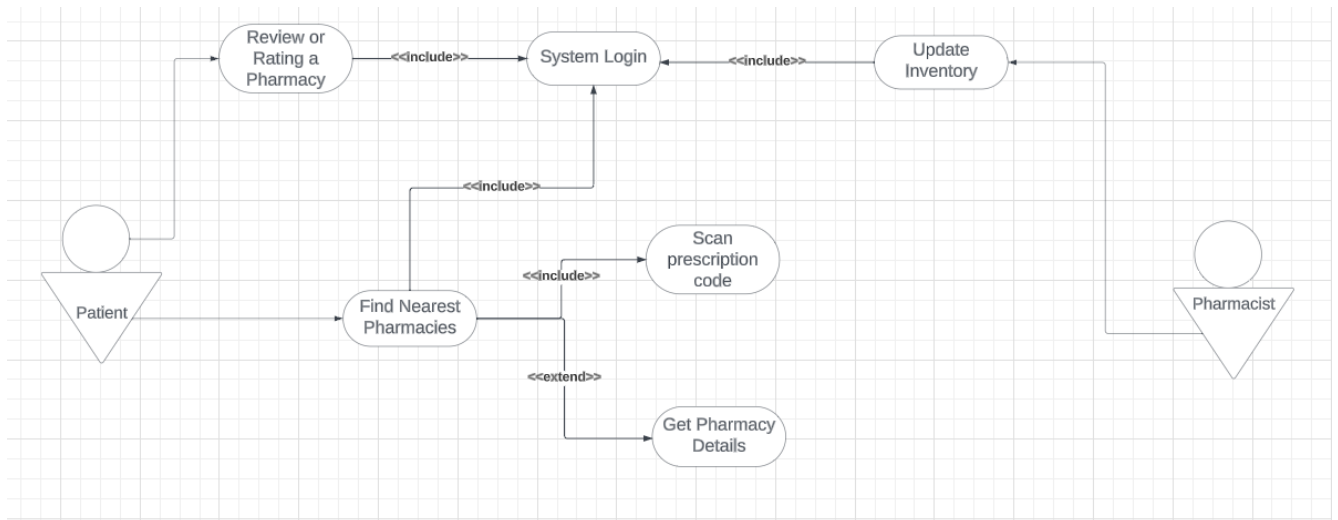


Figure 1: Use Case Diagram For Whole System

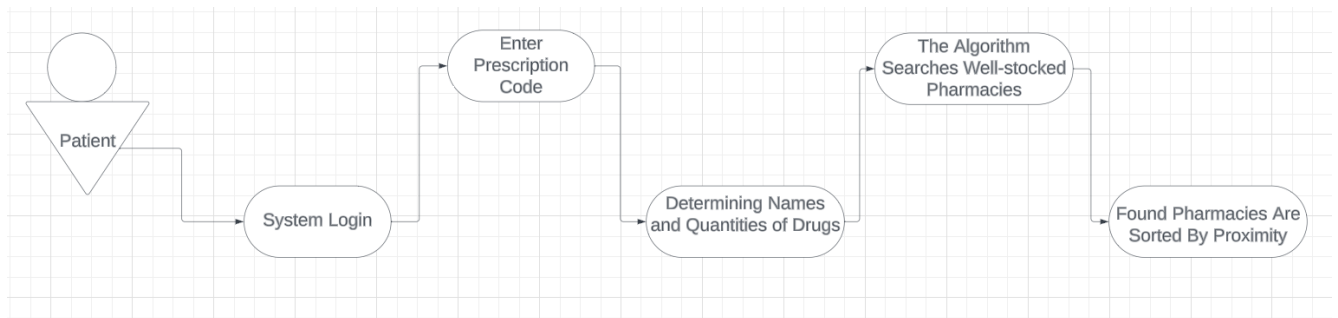


Figure 2: Use Case Diagram For Finding Nearest Pharmacies

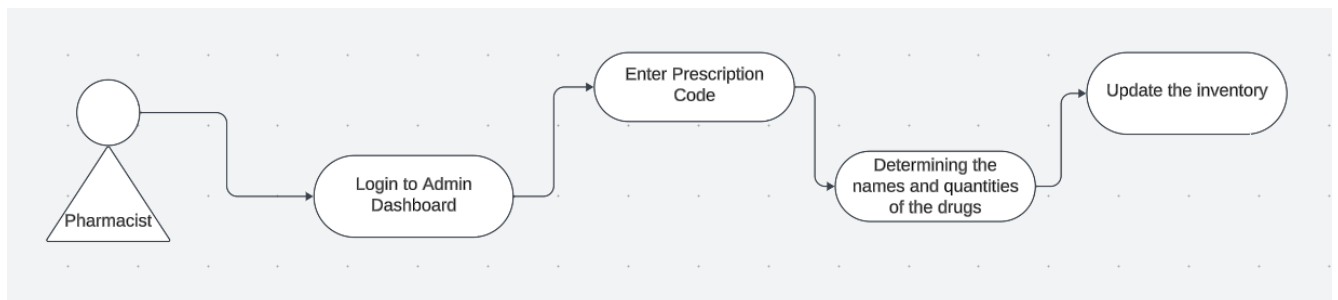


Figure 3: Use Case Diagram For Updating Inventory



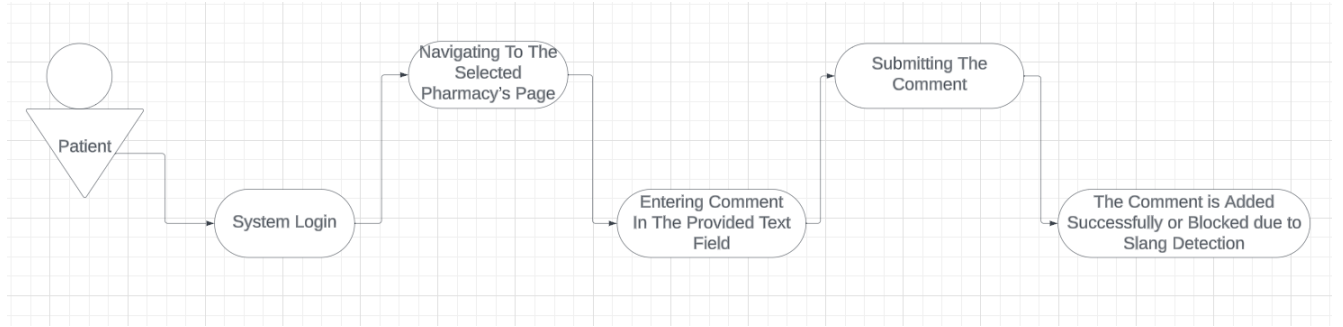


Figure 4: Use Case Diagram For Adding a Comment

## 3.4 Use Cases

### 3.4.1 Use Case 1: Prescription Medication Search

- **Actors:** User (Patient)
- **Preconditions:**
  - PharmNav app is installed and functional on the customer's device.
  - The customer has a valid prescription or prescription code.
  - The customer is logged into their PharmNav account.
  - Pharmacies in the area are registered with PharmNav and have updated their inventory.
- **Main Flow:**
  1. Customer opens PharmNav and enters or scans their prescription code.
  2. The app decodes the prescription and searches for nearby pharmacies with the required medication in stock.
  3. Customer selects a pharmacy based on medication availability, distance, and other preferences.
  4. PharmNav displays the selected pharmacy's location on the map and details, including address and contact information.
  5. Customer decides to visit the pharmacy and uses the app's navigation feature to get directions.
- **Postconditions:**
  - The customer is aware of the nearest pharmacy where their medication is available.

- The inventory of the selected pharmacy is updated by the pharmacy.

- **Alternative Flows:**

- **A. Alternative rotations:**

1. Customer opens PharmNav and enters or scans their prescription code.
2. The app decodes the prescription and searches for nearby pharmacies with the required medication in stock.
6. If the user does not want to choose a specific pharmacy for a certain reason, they can also select more distant pharmacies to access detailed information.

### 3.4.2 Use Case 2: Updating Medicine Inventory Information

- **Actors:** Pharmacist

- **Preconditions:**

- Pharmacist has an active account on PharmNav.
  - Suitable Browser should be provided by the Pharmacist's device for access to the Admin Dashboard.

- **Main Flow:**

1. Pharmacist logs into their PharmNav account.
2. PharmNav displays the pharmacy's dashboard with current inventory levels.
3. The Owner enters a prescription code that consists of the medicines and presses the update button to update the stock.
4. PharmNav updates the inventory information in real-time and confirms the update to the Pharmacist.

- **Postconditions:**

- The medicine inventory information on PharmNav reflects the latest updates made by the Pharmacist.
  - Any changes in inventory status (e.g., restock, low stock) are accurately represented in the app.

- **Alternative Flows:**

- **A. Manual Inventory Update:**

1. Pharmacist logs into their PharmNav account.
2. PharmNav displays the pharmacy's dashboard with current inventory levels.
5. The Owner enters medicine names and amounts, then presses the update button to update the stock.
6. PharmNav updates the inventory information in real-time and confirms the update to the Pharmacist.

### 3.4.3 Use Case 3: Adding a Rating to a Pharmacy

- **Actors:** User (Patient)

- **Preconditions:**

- PharmNav app is installed and functional on the customer's device.
- The customer is logged into their PharmNav account.
- The customer has a valid prescription or prescription code.

- **Main Flow:**

1. Customer navigates to the page of the selected pharmacy within the PharmNav app.
2. The app displays options to add a rating or review for the pharmacy.
3. Customer selects the rating option and provides a numerical rating on a scale of 1 to 5 for the pharmacy's service.
4. The app prompts the user to submit the rating.
5. PharmNav system processes the rating:
  - (a) The rating is added to the pharmacy's overall rating in the database.
  - (b) The system calculates the new average rating for the pharmacy.
6. PharmNav updates the rating displayed on the pharmacy's page.

- **Postconditions:**

- The user's rating has been successfully added to the pharmacy's profile.
- The average rating for the pharmacy has been updated.

- **Alternative Flows:**

- **A. Rating is Lower than the Average:**

5. After the user submits a lower-than-average rating, the system calculates the new average rating.
  6. The average rating for the pharmacy decreases.
  7. The updated rating is reflected on the pharmacy's page.
- **B. Rating is Higher than the Average:**
5. After the user submits a higher-than-average rating, the system calculates the new average rating.
  6. The average rating for the pharmacy increases.
  7. The updated rating is reflected on the pharmacy's page.

#### 3.4.4 Use Case 4: Accessing Previous Prescription Codes

- **Actors:** User (Patient)
- **Preconditions:**
  - PharmNav app is installed and functional on the customer's device.
  - The customer is logged into their PharmNav account.
  - Previous prescription codes are associated with the user's account.
- **Main Flow:**
  1. Customer logs into the PharmNav app.
  2. From the main menu, the customer navigates to the "Previous Prescriptions" section.
  3. The app displays a list of previous prescription codes associated with the user's account.
  4. Customer selects a specific prescription code from the list.
  5. The selected prescription code is sent to the prescription search screen.
  6. PharmNav searches for nearby pharmacies with the required medication associated with the selected prescription code.
  7. PharmNav displays stocked pharmacies.
- **Postconditions:**
  - The customer has successfully used a previous prescription code to search for pharmacies with the prescribed medication.

- **Alternative Flows:**

- **A. Prescription Code not in Records:**

5. If the customer's desired prescription code is not found in the records, The user is given the option to return to the main screen.
6. The process ends, allowing the user to explore other features of the app.

### 3.4.5 Use Case 5: Adding a Comment to a Pharmacy

- **Actors:** User (Patient)

- **Preconditions:**

- PharmNav app is installed and functional on the customer's device.
  - The customer is logged into their PharmNav account.
  - The selected pharmacy is registered with PharmNav.

- **Main Flow:**

1. Customer navigates to the selected pharmacy's page within the PharmNav app.
2. The app displays options to add a comment or review for the pharmacy.
3. Customer enters their comment in the provided text field, expressing their experience or feedback about the pharmacy's service.
4. The app prompts the user to submit the comment.
5. PharmNav system processes the comment:
  - (a) **If Comment is added successfully:**
    - The comment is stored in the database associated with the specific pharmacy.
    - Other users can view and benefit from the added comment when exploring the pharmacy details.
  - (b) **If Comment is blocked due to slang detection:**
    - The system identifies inappropriate language or slang in the comment.
    - The blocked comment is not stored, ensuring a respectful and positive environment for all users.

- **Postconditions:**

- **If Comment is added successfully:**

- \* The pharmacy now has an additional comment associated with it in the PharmNav database.
- **If Comment is blocked due to slang detection:**
  - \* The comment is not added to the system.
- **Alternative Flows:**
  - **A. Customer decides not to submit the comment:**
    3. After entering the comment, the customer chooses to cancel or go back.
    4. The app does not store the comment, and the process ends.

## 4 USER INTERFACE MODEL

The eleven screen mock-ups of the prototype of the application PharmNav with their matched user stories and cases can be observed below.



Figure 5: Start Page

This screen is shown to user when the user touched the app icon from its application gallery on his/her phone in both cases when user is logged in or not. If the user clicks 'Let's go' button, then the interactive pages will shown to user to send service request to or get information from application. The aim of this screen is to increase design and

appearance quality of the mobile app and make it more attractive to use by users.

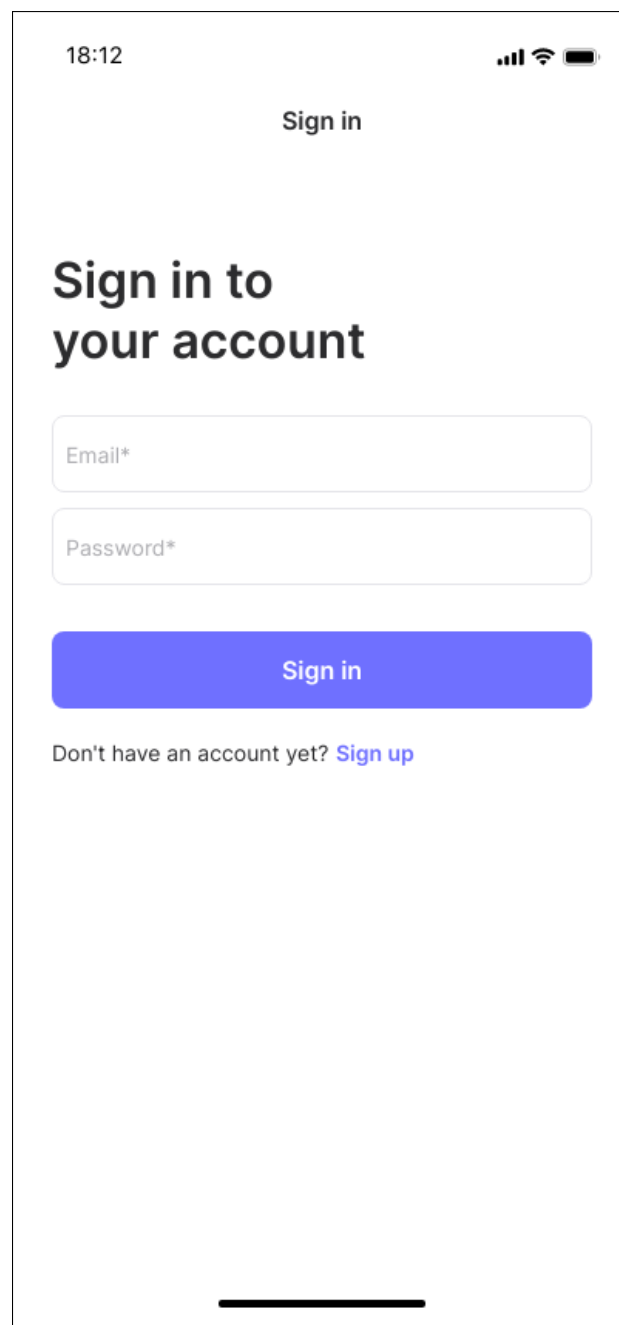
A mobile app interface for a sign-in page. At the top, the status bar shows the time 18:12, signal strength, Wi-Fi, and battery icons. Below the status bar, the text "Sign in" is centered. The main heading "Sign in to your account" is displayed in a large, bold font. Below the heading are two text input fields: "Email\*" and "Password\*", each with a light gray border. A solid blue button with the text "Sign in" is positioned below the input fields. Underneath the button, the text "Don't have an account yet? [Sign up](#)" is displayed, with "Sign up" in blue. At the very bottom of the screen, there is a thick black horizontal line representing the home indicator bar.

Figure 6: Sign In Page

The 'Sign In' page, is displayed to user if there is no account signed in in the device which application stored on. In this page, there are two text boxes to get user's email and password which are stored in database as 'Patient' entity and uploaded to database while signing up to the application. Additionally, there is an option below the button which sends request to server to log in, called 'Sign up' to direct the user into Sign Up page.



18:12

Sign up

## Create an account

Name\*

Surname\*

Age

Email\*

Password\*

Repeat password\*

By signing up on this app, you're also agreeing to our [Terms of Service](#) and [Privacy Policy](#).

Sign up

Already have an account? [Sign in](#)

Figure 7: Sign Up Page

The 'Sign Up' page, is displayed to user if there is no account signed up for the patient which represents user in our cae. In this page, there are six text boxes to get user's name, surname, age, email, password and repeat password to satisfy usability and ease of use. These attributes or columns which represents different information about user are stored in database as 'Patient' entity and uploaded to database while signing up to the application. Additionally, there is an option below the button which sends request to server to sign up, called 'Sign In' to direct the user back to the Sign In page.

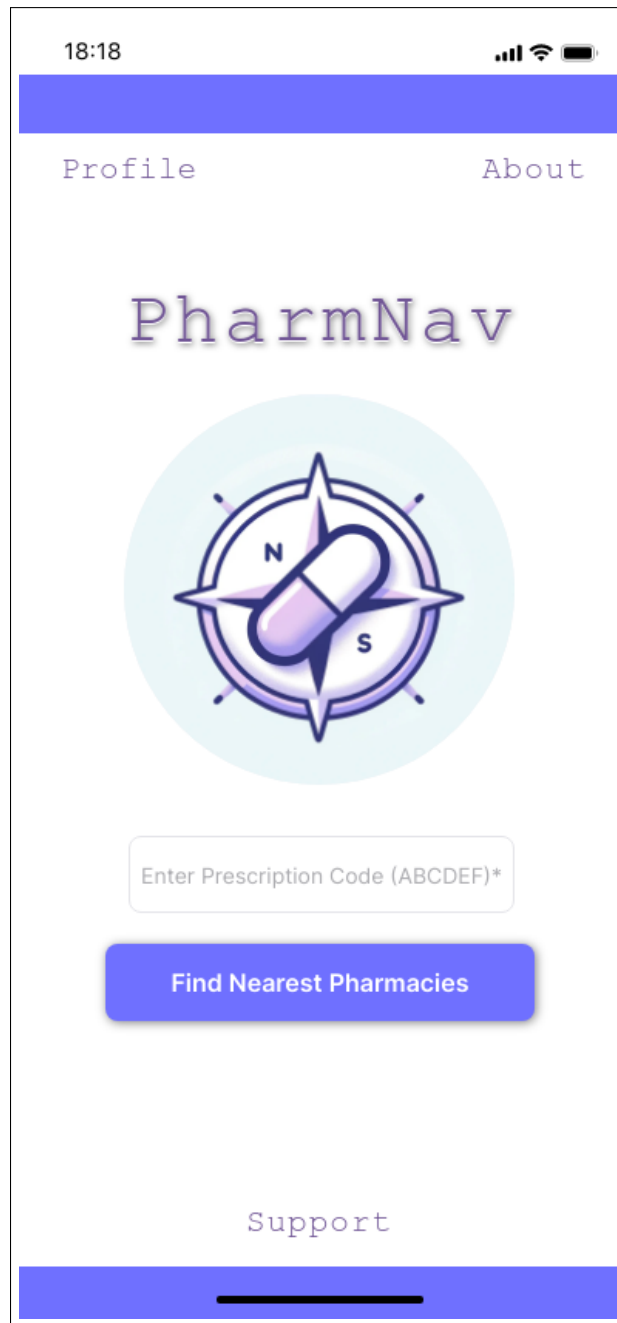


Figure 8: Enter Prescription - Home Page

The 'Enter Prescription - Home' page is the main page which can be utilized by user to direct his/her profile which he can access his previously searched prescriptions, search the prescription code prescribed by hospital or doctors to get the result of nearest appropriate pharmacies, get information about the application by clicking About button and apply for a support by clicking Support button in the cases of inappropriate uses of the application by pharmacists. This page is displayed after log in page or after start page based on the condition whether there is already a logged-in account on the device.

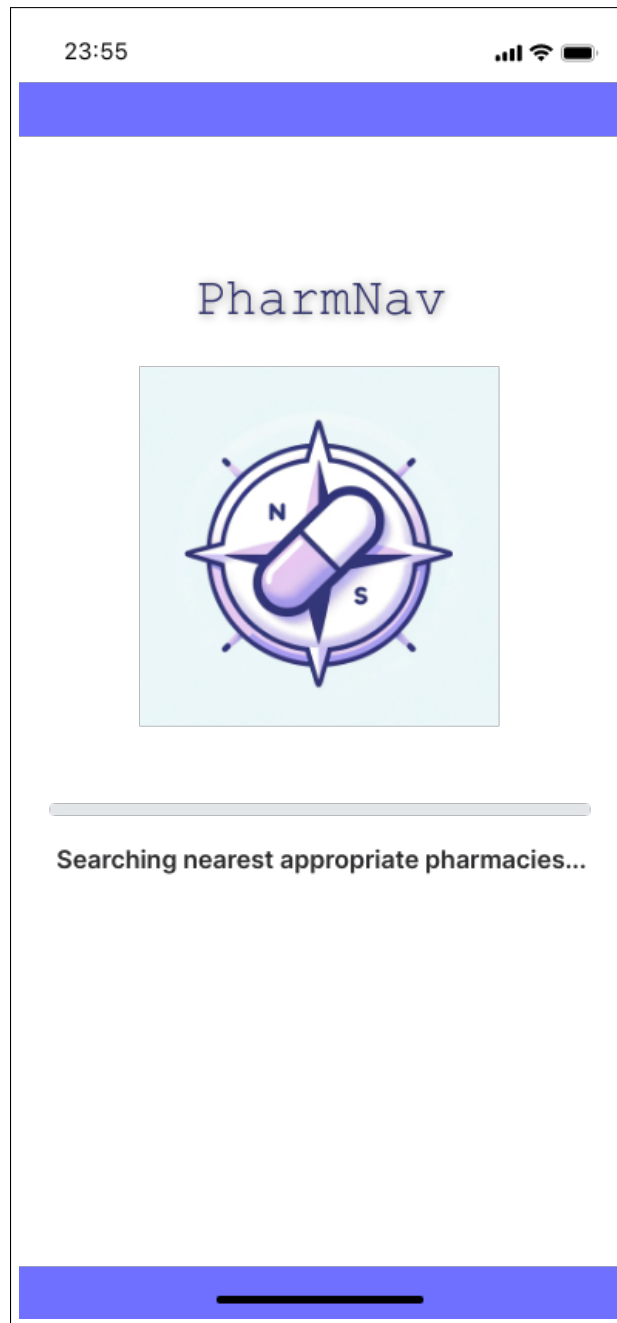


Figure 9: Searching Transition Page

After clicking 'Find Nearest Pharmacies' button in the Home page, the 'Search Transition' page is displayed to inform the user about the fact that the request is reached to the app side. This information screen will increase the ease of use and user-friendliness of the application by interacting with him/her by taking his/her requests into account during use. This is a simple page which consists a bar showing the process execution and the message about the page to inform user.

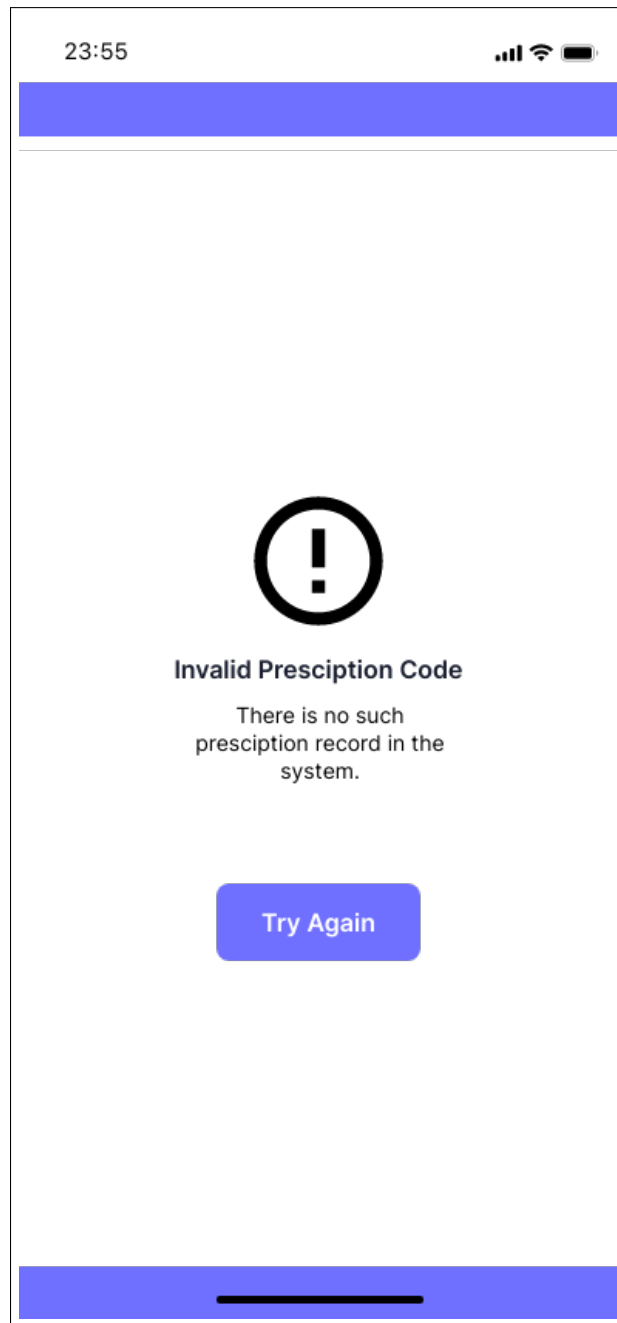


Figure 10: Invalid Prescription Page

After Search Transition page, there are two options to display the user. The 'Invalid Prescription' page is selected to be displayed in the case of there are no prescription stored in the 'Prescription' database which matches with the prescription code that the user searching for. In this case, we inform the user about the situation and show a button with the text 'Invalid Prescription Code'. To provide a user-friendly approach, there is a button 'Try Again' which directs the user back to Enter Prescription - Home page.

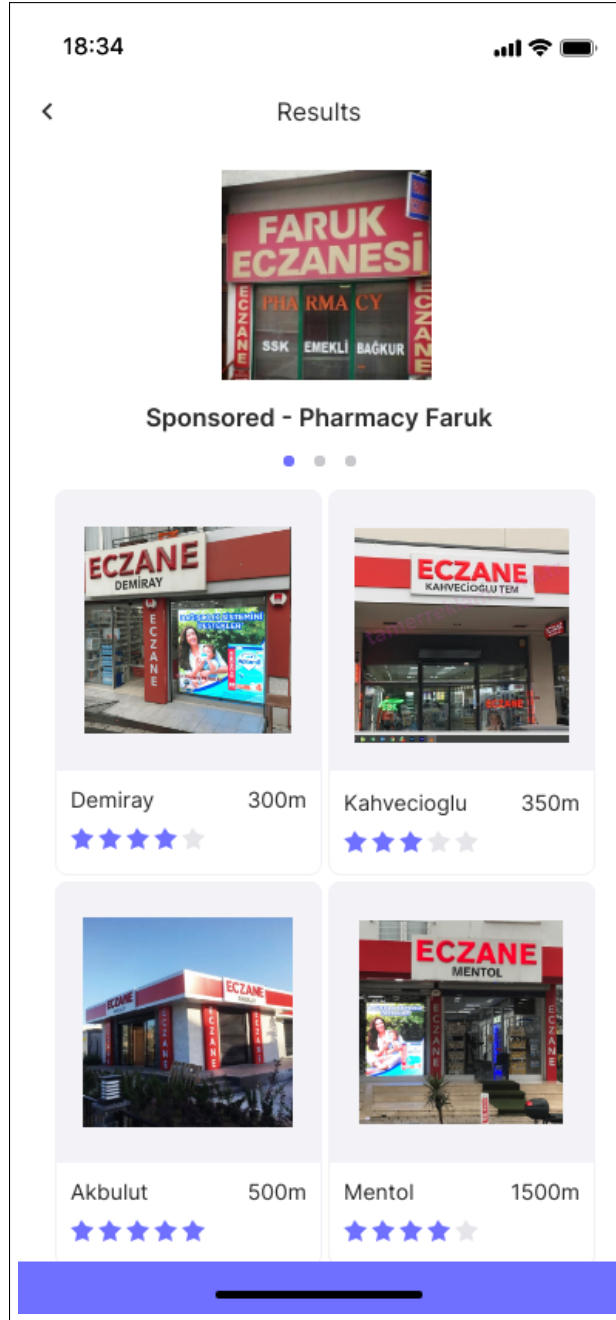


Figure 11: Search Result Page

After Search Transition page, there are two options to display the user. The 'Results' page is selected to be displayed in the case of there are at least one pharmacy satisfying the condition of having enough inventory to provide all of the prescribed drugs. This page consists the Pharmacies in the sorted order based on their distances to the user in the moment of searching, rating results provided by previous users and the name of the related pharmacy. Additionally, to monetize the application, there is a bar on the top for the display of the pharmacies to paid to the application for additional display, so the advertisement.

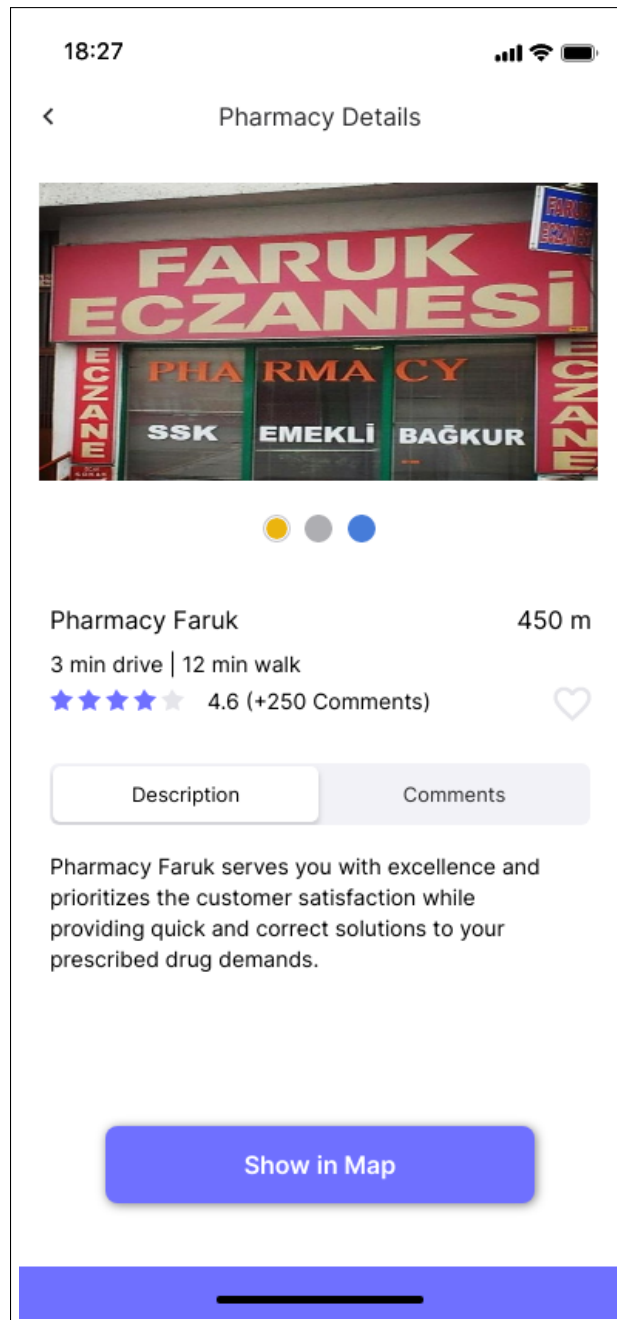


Figure 12: Pharmacy Detail Page

If the user clicks any of the pharmacies provided in the 'Results' page, then the 'Pharmacy Details' page is displayed. This page consists the stored images of the pharmacy, description of the pharmacy provided by pharmacists which can inform the user about the specific conditions about the pharmacy such as active work hours etc. and the comment section which user can view the ratings and comments written by the previous users that searched and found the same pharmacy. Additionally, the 'Show in Map' button directs the user to the map view of the coordinates of the pharmacy.

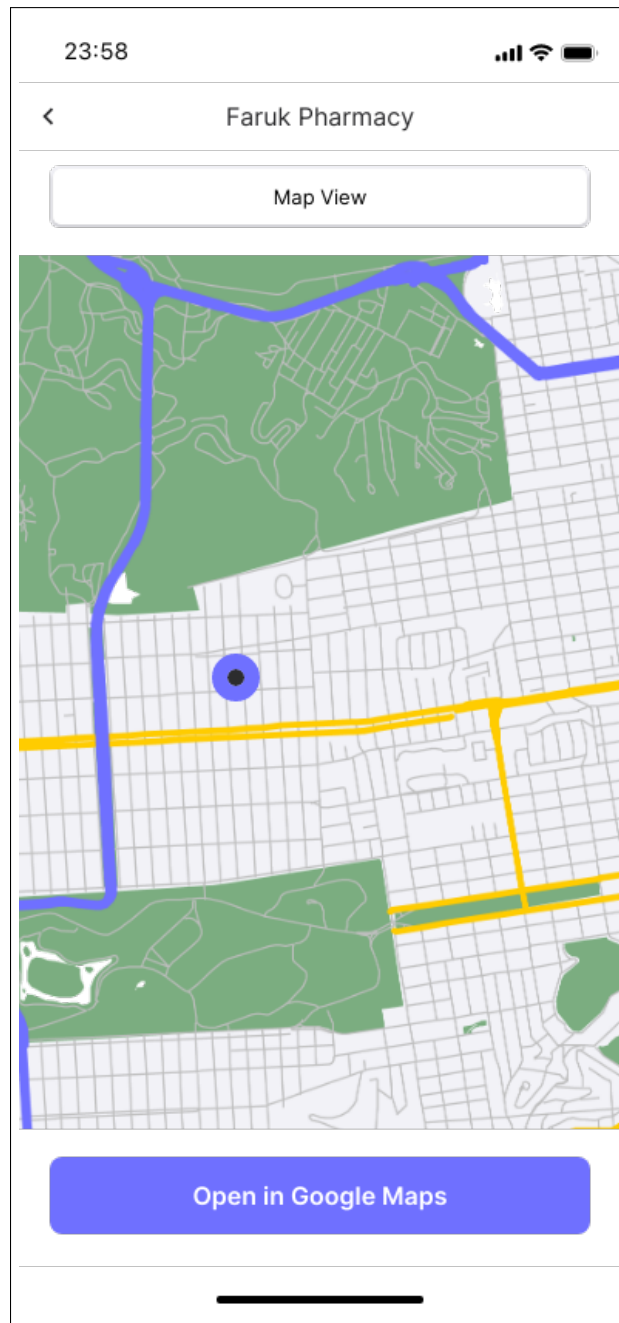


Figure 13: Show in Map Page

The "Show in Map" page of our application provides users with a convenient way to locate a pharmacy on a map, view its name, and seamlessly navigate to it using Google Maps. The central portion of the screen features a map view that displays the precise coordinates of the selected pharmacy. Users can visually understand the geographical location of the pharmacy on the map. The "Show in Google Maps" button streamlines the navigation process. Upon tapping the button, users are directed to the Google Maps application, where they can access detailed directions and real-time navigation to reach the selected pharmacy.



Figure 14: About Page

The "About" page within the PharmNav application serves as an informational hub, offering users a concise overview of the app. Displayed prominently is essential information about the application, likely including its mission, purpose, and key features. Users can gain insight into the objectives of PharmNav, fostering a better understanding of its value proposition. This page aims to communicate the app's essence, providing transparency and trust to users.



A mobile application interface for a 'Support' page. At the top, a status bar shows the time '00:04' and signal/battery icons. Below this is a solid blue header bar. The main content area has a light blue background. It features a square icon with a purple and white capsule pill in the center, overlaid on a compass rose with 'N' and 'S' markers. Below the icon, the word 'Support' is written in a large, purple, serif font. Underneath are five white input fields with rounded corners and purple text labels: 'Pharmacy Name', 'Pharmacist Name', 'E-mail', 'Prescription Code', and 'Explain your problem.'. Below these fields is a prominent blue button with white text that says 'Send Message'. At the very bottom is another solid blue bar, and a black horizontal line is visible just above it, indicating the home indicator area of an iPhone.

Figure 15: Support Page

The "Support" page in the PharmNav application serves as a crucial resource for users encountering any inappropriate use of the application by pharmacists. This dedicated section is designed to offer assistance and resolution in cases where users may have concerns or issues related to the conduct of pharmacists within the app. Users can access information on how to report incidents, seek guidance, or express their concerns through established channels. The "Support" page underscores PharmNav's commitment to user satisfaction and ensures a responsive mechanism for addressing and resolving any inappropriate situations.

## 5 FLOW DIAGRAMS

### 5.1 General Data Model

The Entity-Relationship (ER) diagram presented below illustrates the conceptual structure of the database used in this project. This visual representation outlines the relationships and entities within the data model, providing a clear overview of how information is organized and interconnected in the database. The ER diagram serves as a valuable tool for understanding the underlying data architecture, facilitating effective database design and management.

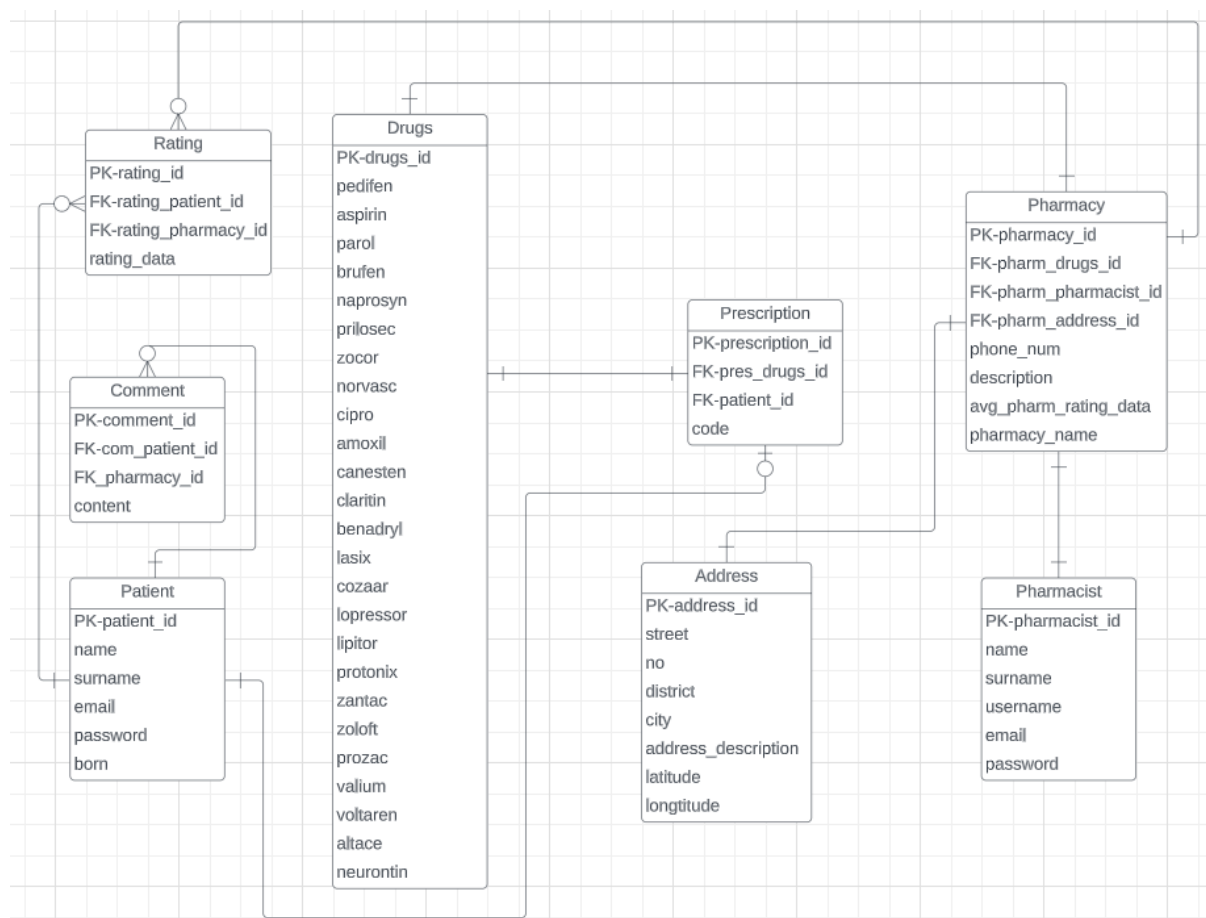


Figure 16: Entity Relation Diagram

For the figure given above, there are 25 drugs in the drug table such that each column represents one drug. There will be various cases such that there is only one appropriate well-stocked pharmacy or a case such that pharmacies having same or similar inventory. To illustrate and test these different situations, number of drug types are selected as 25 drugs to have sufficient complexity.

## 5.2 Important Data Considerations

In our effort to fortify data security, we've implemented bcrypt, a robust cryptographic hashing algorithm, to safeguard passwords for both pharmacists and patients. This ensures that sensitive login credentials remain confidential and protected against potential unauthorized access. Each pharmacy is distinctly identified by a unique "pharmacy\_id," fostering accurate cross-referencing throughout the system. This not only bolsters data integrity but also establishes reliable relationships with other key collections, such as "address" and "pharmacist."

In the realm of prescription management, we prioritize the secure handling of sensitive information. The "code" field within the prescription collection is meticulously managed to safeguard confidential prescription details, protecting against unauthorized visibility. The inclusion of precise geospatial coordinates, represented by "coordinates\_x" and "coordinates\_y" in the address collection, enables effective location-based queries. This proves essential for seamless navigation and supports an enhanced user experience.

Moreover, our comment collection seamlessly integrates with patient profiles through the "patient\_id" field, creating a structured feedback loop. This approach ensures organized tracking of patient comments, fostering a comprehensive understanding of user experiences. By implementing effective content management strategies, we aim to streamline the retrieval and analysis of comments, contributing to a more insightful and responsive system.

Additionally, instances from the MongoDB collections that our application will use can be seen below. This would provide more insight into the overall data structure and functioning of our application.

```
_id: ObjectId('6565ee3885027e61a6a7980a')
prescription_id: UUID('01d95417-492d-60c3-b6d4-b02d0eb515b2')
6-digit-code: "ABCDE1"
pres_drugs_id: ObjectId('656d99cc794f7335d3cc4f78')
```

Figure 17: Prescription Data/Object Structure

```

_id: ObjectId('6565ec4e85029e61a6a79806')
pharmacy_id: UUID('01d95417-4910-48c3-b6d4-b02d0eb5151a')
pharmacy_name: "Faruk Eczanesi"
description: "eczanemiz 80'den beri hizmettedir"
pharmacist_id: UUID('01d95417-4910-48ce-f6d4-b02d0eb5151a')
phone_num: "0 (212) 535-99-00"
avg_pharm_rating_data: 4.2
pharm_address_id: UUID('01d95417-4910-48cf-36d4-b02d0eb5151a')
pharm_drugs_id: ObjectId('656d9a6d794f7335d3cc4f79')

```

Figure 18: Pharmacy Data/Object Structure

```

_id: ObjectId('6562ec4e85027e61a6a79806')
address_id: UUID('01d95417-d910-48c3-b6d4-b02d0eb5151a')
address: "Atatürk Mahallesi, Kaktüs Sokak No:84 Arnavutköy / İstanbul"
address_description: "aslı çelik yanı, dürümcü Musa karşıısı"
street: "Kaktüs Sokak"
no: 84
district: "Arnavutköy"
city: "İstanbul"
latitude: 41.0082
longitude: 28.9784

```

Figure 19: Address Data/Object Structure

```

_id: ObjectId('7565ec4e85027e61a6a79806')
drugs_id: UUID('69d95417-4910-48c3-b6d4-b02d0eb5151a')
Parol: 220
Ciprofloxacin: 12
Aspirin: 330
Panadol: 25
Lorafix: 18
Nurofen: 22
Ritalin: 20
Akineton: 35
Augmentin: 80
Algofen: 15
Paracetamol: 180

```

Figure 20: Drugs Data/Object Structure

For the figure given above, there are 25 drugs in the drug table such that each column represents one column. In this figure, not all of them are displayed due to the readability and convenience.

```
_id: ObjectId('1565ec4e85027e61a6a79806')  
pharmacist_id: UUID('00395417-4910-48c3-b6d4-b02d0eb5151a')  
name: "Faruk"  
surname: "Çakmak"  
username: "kirazkiraz"  
email: "fifapes@hotmail.com"  
password: "$2b$12$abcdefghijklmnopqrstuvwx.yz0123456789ABCDEFGHIJK"
```

Figure 21: Pharmacist Data/Object Structure

```
_id: ObjectId('6588ec4e85027e61a6a79806')  
patient_id: UUID('01d95417-42aa-48c3-b6d4-b02d0eb5151a')  
name: "Gürsel"  
surname: "Yılmaz"  
email: "gursel5252@hotmail.com"  
password: "$2b$22$abcdefghijklmnopqrstuvwx.yz0123456789ABCDEFGHIJK"  
born: 1974
```

Figure 22: Patient Data/Object Structure

```
_id: ObjectId('6565ec43e5027e61a6a79806')  
comment_id: UUID('0032d417-4290-48c3-b6d4-b02d0eb5151a')  
pharmacy_id: UUID('0032d46f-4290-48c3-b6d4-b02d0eb5151a')  
com_patient_id: UUID('0036d417-4290-48c3-b6d4-b02d0eb5151a')  
content: "kardeşim grip olduğu için gittim çok yardımcı oldular"
```

Figure 23: Comment Data/Object Structure

```
_id: ObjectId('6562ec4e85027e61a6a80806')  
rating_id: UUID('01d95417-d910-48c3-b6d4-b02d0eb5151a')  
rating_patient_id: UUID('01d9543f-d910-48c3-b6d4-b02d0eb5151a')  
rating_pharmacy_id: UUID('01d95417-d910-b26d-36d4-b02d0eb5151a')  
rating_data: 4
```

Figure 24: Rating Data/Object Structure

## 5.3 Data Flow Diagram

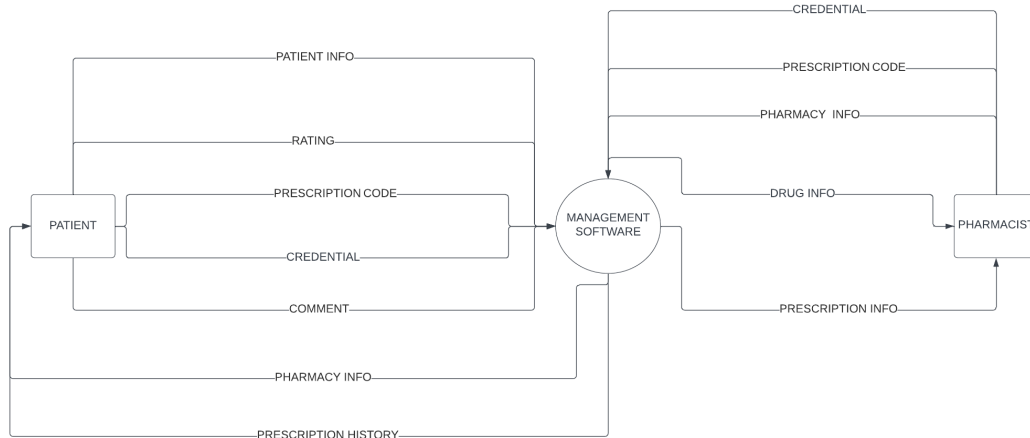


Figure 25: Data Flow Diagram - Level 0

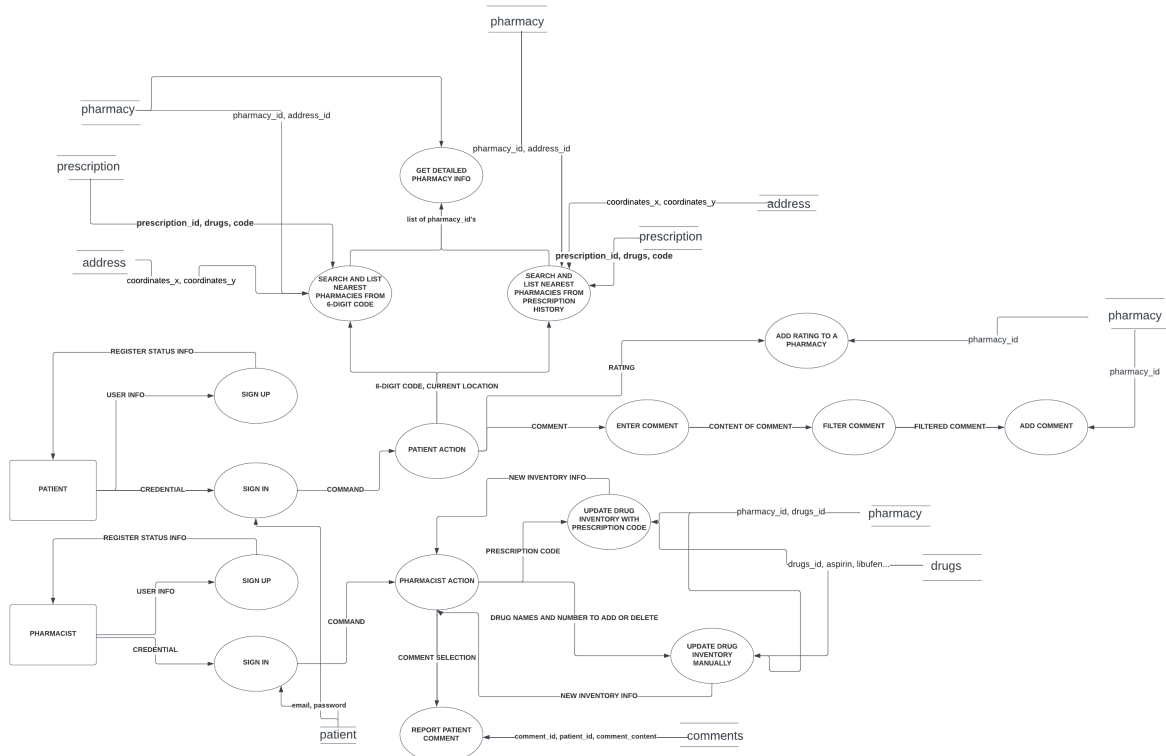


Figure 26: Data Flow Diagram - Level 2

## External Entities

- **Patient:** An individual who uses the system to interact with pharmacy services, like managing prescriptions or finding pharmacy locations.
- **Pharmacist:** A professional who manages prescription data and pharmacy inventory within the system.

## Processes

- **Sign Up:** Both patients and pharmacists can create accounts within the system. This involves providing user information and registering credentials.
- **Sign In:** After signing up, users sign in to the system using their credentials, which likely consist of an email and password.
- **Patient Action:** Actions that a patient can perform, such as searching for pharmacies, viewing prescription history, or entering comments and ratings for pharmacies.
- **Pharmacist Action:** Actions that a pharmacist can perform, such as updating the drug inventory, manually or with prescription codes, and managing comments about prescriptions.
- **Search and List Nearest Pharmacies:** This process probably uses a 6-digit code (like a postal code) to list pharmacies that are closest to the patient's current location.

## Data Stores

- **Prescription:** A repository for prescription data, which includes identification for the prescription, the drugs prescribed, and associated codes.
- **Address:** Stores location data, which likely includes coordinates for mapping and locating pharmacies.
- **Pharmacy:** Holds information about each pharmacy, such as its identification and location data.
- **Comments:** A storage for comments made by patients, which includes details such as the comment's ID, the patient ID, and the content of the comment.
- **Drugs:** This is likely a catalog of drugs available in the pharmacies, including drug IDs and names such as aspirin or ibuprofen.

## Data Flows

- **User Info / Credential:** Flow between the sign-up/sign-in processes and the patient or pharmacist, carrying necessary information for account management.
- **Patient Command:** Instructions or selections made by the patient, directing the system to perform certain actions like viewing prescriptions or searching pharmacies.
- **Pharmacist Command:** Similar to the patient command but for actions performed by the pharmacist, like updating inventory or selecting comments to report.
- **New Inventory Info:** Information regarding the pharmacy's inventory that can be updated or changed by the pharmacist.
- **Comment Content:** The substance of comments that patients can enter about pharmacies, which can be filtered before being stored or displayed.

## Additional Elements

- **Rating System:** Patients can add ratings to pharmacies, which likely affects the pharmacy's profile within the system.
- **Comments and Filtering:** Patients can add comments about pharmacies, which can then be filtered for content before being officially added to the system.