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CSC 490: Software Engineering

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Meet the Team

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I. PREFACE

This document serves as the Software Requirements Specification (SRS) for the creation of an innovative pharmacy information system. The purpose of this SRS is to offer a detailed account of the system's key requirements and a strategic overview of its architecture. By defining both the functional and non-functional requirements, this document aims to provide a solid framework for the development team to design, implement, and rigorously test the system.

Adhering to the IEEE standards for software requirements specification, this document is organized into dedicated chapters covering vital stages of the system's development lifecycle. It begins with an introduction that highlights the necessity of the system and its strategic alignment with the pharmacy's operational objectives. To ensure clarity and consistency, a glossary section has been included, offering precise definitions for technical terms.

The user requirements and system requirements sections delve into the specific services and features expected from the system, outlining both user-centric functionalities and technical specifications. These sections serve as a foundational guide for achieving the system's core objectives.

The system architecture section provides a comprehensive view of the system's structural design, enabling stakeholders to better understand the implementation process and its alignment with intended goals. This is further supported by a system evolution section, which explores the system's capacity for growth, flexibility, and future integration with external solutions.

A dedicated modeling section illustrates the requirements using UML diagrams and structured tables, offering stakeholders a clear visualization of the system's operational workflow. Additionally, the system testing section lays out the various test cases that will be used to verify the system's compliance with its specified requirements.

We anticipate that this document will serve as an essential resource for all stakeholders throughout the development and implementation stages. Our goal is to deliver a reliable, high-quality solution that addresses the pharmacy's needs and enhances its overall efficiency.

II. Introduction

Pharmacies play a vital role in the heart of healthcare, and with the rapid evolution of technology, it is time for our country Lebanon to embrace a new era of digital health solutions. That is why we as ARZ Devs decided to carry this responsibility and try to revolutionize the pharmacy industry in the country by introducing innovative and creative ideas to lay the basis for a comprehensive electronic system that simplifies operations, enhances accessibility, and improves the patient experience.

ARZ Devs, a pioneer in digital solutions, has long provided its expertise to clients across the MENA region. Now, we're excited to bring our vision to life in Lebanon's healthcare landscape, focusing on electronic health records and seamless, digital interactions within pharmacies. "The future of pharmacy practice clearly lies in the value of the clinical & personalized decisions made by pharmacists with each patient encounter"[1]. This quote highlights the importance of increased pharmacist integration in healthcare decisions and the potential and benefit of tailored care. By implementing features like personalized patient profiles, digital prescription and request management, and an intuitive public discussion board where patients can seek advice from pharmacists, we hope to make healthcare more individualized and efficient for all.

Using our pharmacy management system, patients can easily manage their health records, get tailored treatment, request approval from pharmacists, ask questions, and order medications from the comfort of their homes, while pharmacists gain powerful tools to manage records, respond to patient inquiries, grant approval, ask for documentation, and offer personalized services for the people. All these capabilities are safeguarded by secure authentication, ensuring that sensitive information remains protected.

This software requirements document for the ARZ Devs Pharmacy System covers the key features, user needs, and system requirements that will guide the development team. A glossary has also been included to ensure clarity for readers unfamiliar with pharmacy or digital health terminology. We hope that our vision to create a sustainable, tech-driven future for Lebanese pharmacies comes to light so that we can bring healthcare closer to the people and empower them with tools that truly make a difference.

Finally, our symbol of perseverance and pride, the cedar, is found in our name and logo!

Patient Information Questionnaire

We have included the questionnaire required to create an electronic health record for each customer as a reference. Dr. Ramzi, we would greatly appreciate it if you could fill out this form using the following link:
https://docs.google.com/forms/d/e/1FAIpQLSdOUejREqQtosMQp25kTv1z3Y7BQioKiy6Gu26BAWVgnxq0lA/viewform

Text Form

Patient Name: _____

Date of Birth: Chosen on Calendar

_____

 1. General Health and Medical History

- Do you have any chronic health conditions? (e.g., cancer, diabetes, hypertension, asthma)

 - ☐ Yes

 - ☐ No

 - If yes, what are your chronic diseases?

 ☐ Diabetes

 ☐ Cancer

 ☐ Hypertension

 ☐ Asthma

 ☐ Chronic Kidney Disease

 Other: _____

- Do you have any known allergies?

 - ☐ Yes

 - ☐ No

 - If yes, please specify: _____

- What is your current height?

_____ (cm or ft/in)

- What is your current weight?

_____ (kg or lbs)

- Do you have any family members with chronic health conditions? (e.g., diabetes, heart disease, cancer)

  - ☐ Yes

  - ☐ No

  - If yes, please specify the conditions and relationship: _____

_____

2. Medication and Supplement Use

- Are you currently taking any medications?

  - ☐ Yes

  - ☐ No

  - If yes, please list the medication names, dosages, and frequency: _____

- Do you take any over-the-counter medications, vitamins, or supplements?

  - ☐ Yes

  - ☐ No

  - If yes, please specify: _____

_____

3. Lifestyle and Additional Information

- Do you smoke or use tobacco products?

  - ☐ Yes

  - ☐ No

  - If yes, how many per day? _____

- Do you consume alcohol?

  - ☐ Yes

  - ☐ No

  - If yes, how many drinks per week? _____

- How often do you engage in physical exercise?

  - ☐ Daily

  - ☐ 3-4 times per week

  - ☐ 1-2 times per week

  - ☐ Rarely

  - ☐ Never

- On a typical day, how many hours do you spend sitting?

  - ☐ Less than 2 hours

  - ☐ 2-4 hours

  - ☐ 4-6 hours

  - ☐ More than 6 hours

- How would you describe your diet?

  - ☐ Balanced

- ☐ High in carbohydrates

- ☐ High in protein

- ☐ Vegetarian/Vegan

- ☐ Low-calorie/Low-carb

- ☐ Other (please specify): _____

- Do you have any dietary restrictions or preferences?

- ☐ Yes

- ☐ No

- If yes, please specify: _____

- How many hours of sleep do you get on average per night?

- ☐ Less than 5 hours

- ☐ 5-6 hours

- ☐ 6-7 hours

- ☐ 7-8 hours

- ☐ More than 8 hours

- Do you have any sleep-related concerns?

- ☐ Difficulty falling asleep

- ☐ Waking up frequently

- ☐ Feeling tired upon waking up

- ☐ Other (please specify): _____

- On a scale of 1 to 10, how would you rate your current stress level?

  - Scale: 1 2 3 4 5 6 7 8 9 10

- Do you have any mental health concerns or conditions? (e.g., anxiety, depression)

  - ☐ Yes

  - ☐ No

  - If yes, please specify: _____

- Is there anything else you would like the pharmacist to know?

  _____

_____

 4. Immunization Status

- Are your vaccinations up to date?

  - ☐ Yes

  - ☐ No

  - ☐ Not Sure

 Upload Vaccination Record.

- Have you received a flu shot this season?

  - ☐ Yes

  - ☐ No

  - ☐ Planning to

_____

 5. Insurance Information

- Do you have health insurance?

  - ☐ Yes

  - ☐ No

- Insurance Provider Name: _____

- Policy Number: _____

- Group Number (if applicable): _____

 Upload Insurance Document.

_____

Emergency Contact Information (Optional)

Name: _____

Relationship: _____

Phone Number: _____

III. Glossary

- Technical Glossary
    1. Domain Name System (DNS): A protocol that defines the mapping between human readable domain names and IP addresses understandable by machines[2].
    2. Database: An organized collection of data that is saved on a computer. Usually used in many applications and websites to store data efficiently and make updating it easier.
    3. Email: Is a way of sending and receiving messages between people registering for email electronically.
    4. Functional Requirements: Requirements that reflect what the system must do, it may also tell what the system must not do.
    5. Hypertext Transfer Protocol (HTTP): An application layer protocol designed to transfer information between networked devices and runs on top of other layers of the network protocol stack[3].
    6. Hypertext Transfer Protocol Secure (HTTPS for short): Protocol that secures communication and data transfer between a user's web browser and a website[4].
    7. Distributed Denial of Service Attacks (DDoS): A malicious attempt to disrupt the usual flow of traffic to a specific server, service, or network by flooding the target or its infrastructure with excessive internet traffic[5].
    8. Two Factor Authentication: Also known as (2FA), or two-step verification. It is a two-step login process, the first is typically an email and password, and the second step is verifying access through means only accessible to the user, such as their phone number or email.
    9. Secure Sockets Layer (SSL): A security protocol that is responsible for transmitting data over the internet securely[6].
    10. My SQL: An instance of a relational database management system developed by Oracle. It is based on the structured query language[7].
    11. Server: A computer or a system used to host websites, databases, and applications by providing resources, data, and services to clients such as other computers or programs.
    12. Transport Layer Security (TLS): A cryptographic tool employed to secure data is transit over the internet. It is an enhanced version of SSL.
    13. SSL/TLS Certificate: A digital certificate that authenticates a website's identity that provides a secure client/server connection.
    14. DNS Spoofing: A cyberattack that manipulates DNS records and replaces IP addresses with misleading ones redirecting the user to a malicious website.
    15. DNSSEC: DNS system security extensions is a collection of protocols meant to secure DNS by encrypting DNS data to ensure its integrity.

- Nontechnical Glossary

1. Customer/Patient: A person who purchases products or seeks medical services at the pharmacy.
2. Pharmacist: A healthcare professional responsible for dispensing medications and advising on their safe use.
3. Electronic Health Record: A digital version of a patient's medical history, including prescriptions and treatments, that can be easily accessed by authorized healthcare providers.
4. Stock Record (for pharmacy): A record of every available item purchased for a pharmacy saving its type, source, quantity, and many other important details.
5. Cosmetic: Products with beautifying effects such as skincare products and makeup.
6. Question Board: A common place where customers ask questions relevant to the pharmacist and receive their answers.
7. Approval Labels :
    ● No Approval Needed: The product can be purchased without any special permissions.
    ● Approval From Pharmacist: The product requires a pharmacist's approval for purchase.
    ● Prescription Needed: The product requires a doctor's prescription to be uploaded before it can be purchased.
    ● Health/Ministry Document Needed: Government or health ministry documentation is required for purchase.

IV. User Requirements Definition

The success and longevity of any pharmacy system rely on delivering users' requirements and serving as a trusted tool for their needs. This section outlines the user requirements, gathered from our survey sent to stakeholders and refined to ensure it covers the basic functionality needed.

A. Sign up, Login, and System Access

- The system user shall log in to the system to access services, provided they already have an account. Otherwise, they must sign up and create an account to use the system.

- For the sign-up process, the system user must enter a valid password that is approved by the system.

- If signing up as a pharmacist, a verification request shall be sent to the system owner before account activation.

- If signing up as a customer, a questionnaire should be filled to create the customer's electronic health record.

- Different user roles, such as owners, pharmacists and customers, shall have unique portal access tailored to their needs and privileges.

B. Inventory Management

- The system shall house a database of information on medications.

- The system shall generate automatic alerts for low stock levels or near-expiry items.

- Pharmacists shall be able to update stock levels after restocking or dispensing medications. They can also add or modify records.

- A "Sales Records" button shall be available to the owner.

C. Information

- The pharmacy's website shall serve as the primary access point for both customers and staff.

- The system database shall be always up to date with all the relevant information regardless of the location of the hosting device.

- The system database shall always be up to date with all the relevant customer information, such as contact details, health records, and order histories.

- The system database shall always be up to date with all the relevant product information and pharmacy records.

D. Order and Delivery Services

• Customers shall be able to place orders for medications and healthcare products directly through the website. Additionally, customers shall be able to request approvals from pharmacists and view their order history.

• The system shall allow customers to track pending requests. Additionally, customers shall be able to track their orders in real time and receive updates on their delivery status.

• Pharmacists shall be able to search and view patient medication history and orders in compliance with relevant privacy laws. Additionally, pharmacists shall be able to check pending requests and give approval or request additional documentation.

E. Administrative Controls

• The owner shall have an Administration page containing profiles of all registered pharmacists.

• From the Administration page, the owner shall have the ability to assign specific tasks to pharmacists daily, supporting effective staff management.

• From the Administration page, the owner shall have the ability to block users if they deem that necessary.

F. Search and Filter Functionality

• Users shall have access to a search bar on the website to look up medicines and cosmetics by entering keywords.

• The system shall display a list of relevant results based on the entered keywords.

• Users shall be able to filter search results by category to simplify and streamline product discovery.

G. Features

• Users shall be able to edit profile information, including contact details, electronic health records, medical documents, and preferred delivery addresses.

• The system shall provide data analysis features such as sales reports and inventory forecasts to assist pharmacy staff.

• Pharmacists shall be able to publish blogs that customers can read.

• An account recovery feature shall be available to help users reset access credentials quickly and securely.

• The system shall be compatible with foreign languages to cater to a diverse customer base.

H. Public Q&A Page

• Customers shall have access to a public page on the website where they can post medical questions for pharmacists.

• Customer identities shall remain anonymous on the Q&A page to protect privacy, displaying only generic identifiers for each question.

• Only pharmacists shall have permission to respond to questions, ensuring that answers are accurate and professionally vetted.

• All posted questions and pharmacist answers shall be visible to the public, serving as a shared medical knowledge resource.

• Pharmacists shall have the ability to pin answers, delete questions, and post tips on the board.

I. Ease of Use, Performance, and Reliability

• The website shall have a clear and easy-to-navigate interface for users of all ages.

• The system shall be able to handle a large number of visits without crashing, especially during peak order hours.

J. Security

• The website shall incorporate updated security practices and technologies to safeguard users' personal and health data.

• The system shall use HTTPS for secure transmission.

• The system shall implement secure session management to ensure authenticated user actions are uniquely associated with valid session identifiers.

• The system shall regenerate session IDs upon login and periodically during user sessions to mitigate session fixation and hijacking risks.

• The system shall use session expiration to log out inactive users automatically.

V.   System Requirements Specification

A. Sign up, Login, and System Access

• The system shall display a login page before granting access to any services, ensuring that unauthorized users cannot bypass authentication.

• This page will include fields for both username and password, as well as a clear "Forgot Password" link to assist users in recovering their accounts.

• In case of forgotten credentials, users can reset their password using email or SMS verification. This process shall be secure and involve multiple verification steps to prevent unauthorized access.

• Users who already have an account shall log in by entering their username and password. Successful login will redirect them to their appropriate dashboard.

• Users without an account shall complete a registration form with fields for an active email address, full name, birth date, phone number, and physical address, ensuring the system has sufficient information to identify and contact the user if needed.

• The system shall enforce a password policy requiring a minimum of 8 characters, including at least one uppercase letter, one lowercase letter, one numeric digit, and one special character.

• If the password entered doesn't meet the requirements, the system will display an error message, prompting the user to correct it.

• To add a layer of security, the system will employ two-factor authentication for all users. After entering the correct password, users will receive a one-time code sent to their registered email or phone number, which they must enter to complete the login process.

• Role-Based Access Control shall be used to limit access based on user roles. The system will verify the user's role upon login and grant access to specific pages and features according to the permissions of that role. Customers will access the shopping interface, owners and pharmacists will access the inventory and sales sections.

• Customers shall complete a medical questionnaire upon registration, creating a basic electronic health record. The EHR stores essential health data to support personalized service, such as medication recommendations and health tips.

B. Inventory Management

• Pharmacists shall have an "Add Item" option to add new products and an "Update" option to adjust quantities after stock changes or dispensing.

• Pharmacists shall have the "Add Record" option to add stock and supplier records. The system shall present pharmacists with a graphical interface displaying product details like stock levels, expiration dates, suppliers, and prices. This layout should support filtering and sorting options for ease of management.

• The system shall automatically monitor stock levels and expiration dates. Alerts will be triggered when stock falls below a predefined threshold or if items are close to expiration. Notifications will be visible on the pharmacist's dashboard.

• For owners, an inventory page shall include a "Sales Records" button to access a daily report of sales data. The system will compile all daily transactions into a report, saved as a PDF. Older reports will be stored in a searchable history, allowing the owner to review historical sales data and trends.

C. Information

• The system shall apply all updates to customer data, medication information, and inventory in real time. This ensures accurate, up-to-date records and facilitates real-time data access by pharmacists and owners.

• The system shall ensure consistency by implementing data synchronization protocols across distributed devices or locations. Any modifications made at one access point will propagate to all connected instances to maintain data integrity.

• Data within the system shall be categorized based on type, such as customer profiles, product information, order histories, and health records, each stored in dedicated sections within the database. Organized categorization improves search ability and ensures that information retrieval is efficient for both customers and pharmacy staff.

D. Order and Delivery Services

• Customers shall browse products on the website, select items to add to their cart, and place orders directly. Some medications may require pharmacist approval, in which case customers will receive prompts to upload relevant information.

• Customers shall access a "My Orders" page to view order history and monitor current order statuses, including notifications when orders are packed, dispatched, and out for delivery. They will also be able to generate invoices of their orders.

• Notifications shall be sent to customers via email or SMS for order confirmations, processing updates, and delivery milestones. This ensures customers stay informed throughout the purchasing and delivery processes.

E. Administrative Controls

• Owners shall access an Administration page where all pharmacist profiles are visible. These profiles shall display the pharmacist's name, contact information, certification status, and assigned tasks.

• Owners will have options to assign daily tasks to pharmacists, such as inventory audits, customer consultation responses, or order management..

• Owners shall have the authority to block accounts in cases of misuse or misconduct, helping to maintain system integrity and safety.

F. Search and Filter Functionality

• Users can enter keywords related to products (e.g., "aspirin" or "face cream") into a search bar, and the system will display a list of relevant items.

• Results can be filtered by categories like medication type, supplements, skincare, symptoms, and type of approval needed. This helps users quickly locate desired products and enhances the overall shopping experience.

• Both sales and stock records can be filtered by date.

• Orders for customers can be filtered by date.

G. Features

• Users shall access a profile page where they can edit personal information, including name, address, email, phone number, and profile picture. Pharmacists may additionally update professional details like credentials

• Customers have access to a blog page. Pharmacists on the other hand can write and publish blogs.

• For owners, the system shall include data analytics features, generating sales trends, inventory forecasts, and other performance metrics for informed decision-making.

H. Public Q&A Page

• Customers shall have the option to post anonymous questions to a public Q&A page, with only pharmacist responses allowed.

• Pharmacists shall moderate the page, pinning important responses, deleting inappropriate questions, ensuring high-quality content.

• All questions and answers shall be visible to the public, serving as a shared resource for medical information.

I. Ease of Use, Performance, and Reliability

• The system shall feature a user interface optimized for accessibility, including keyboard shortcuts, screen reader compatibility, and adjustable font sizes for visually impaired users.

• The system shall handle high traffic without degradation in performance, especially during peak order times. Performance testing will ensure optimal load handling.

• The system shall offer language translation options through Google Translate or equivalent. This enables non-native speakers to navigate the interface comfortably.

J. Security

• HTTPS shall secure all data transmissions, ensuring encrypted communication and protecting sensitive user information from interception.

• The system shall implement robust session management, including unique session IDs, session regeneration upon login, and automatic session expiration after inactivity.

• The system shall perform regular backups of critical data to facilitate recovery in case of system failure or data corruption.

VI. System Architecture

Three architectural patterns–layered, client-server, and role based access control will be embedded in the system to be developed. This is meant to segregate system components with different roles such as user interface, database, and authentication. The system is intended to be modular ensuring flexibility in integrating new components to the system while preserving its basic structure.

A. Client-Server Architecture:

This Pharmacy System uses a Client-Server Architecture to create a centralized system where users access functionalities through a web interface. The client side is where the actual interaction is initiated between the user's web browser and our system's website, while the server side is the place where the website is hosted, responding to clients' requests.

The server serves as the central part of the system responsible for major processes such as user authentication, data synchronization and management, and user interaction. As the user logs in, the server verifies his/her credentials by retrieving data stored in the database before granting them access to the website. SSL encryption is employed to ensure secure communication through encrypting sensitive data in transit such as user credentials, health records, and order details providing a secure channel for communication between the client and the server. Also, the server uses reverse proxies to protect the system from DDoS attacks by filtering and handling the traffic. Real-Time Synchronization is achieved by storing every interaction with the system on a centralized database. This ensures the system is always updated with every new interaction such as the customer requesting a product and the request appearing on the pharmacists portal in the time the request was sent to be examined, or the pharmacist updating the inventory where changes appear immediately on each customer's portal.

The client side runs the interface layers of the website through the browser. Each interaction initiated on the client side is processed by the server before displaying specific data based on each user's privileges. For example, the client sends a purchase request from the items available for him/her and waits for the pharmacist's response that will occur on his portal. The server actually is responsible for transmitting this request to the pharmacist and his/her response back to the client.

B. Layered Architecture:

Three different layers will constitute the system: Presentation layer, Application layer, and Data layer. Each with different defined functions.

1. Presentation Layer:

The first layer represents the interface of the system. Being associated with user activities, it will provide the ability of initiating data transactions in a well established front-end environment. HTML, CSS, and JavaScript are the front-end programming languages that will be used to develop this interface. Users will be able to access the system's website across different browser types and versions only by requesting the domain name of the website where different portals will be displayed for each distinct user type. Pharmacists will have access to inventory management tools, customers will navigate through the shopping interface, and the owner will have an administrative dashboard view.

2. Application Layer:

This layer is considered as an intermediary between the presentation layer and data layer. The bulk of the system lies in this layer where most of the computational work is done such as validating prescription approvals, processing orders, and enforcing access control. PHP is the scripting language that will be used in designing this tier. It manages the input of the client through the presentation layer and manages to process the output after interacting with the data layer. For example, a pharmacist will need to access the electronic medical record of a customer when they receive a request for a relatively complex medicine. The application layer is responsible for retrieving the intended medical record from the database and delivering it to the pharmacist.

3. Data Layer:

The functioning of any system fundamentally requires the secure storage of large amounts of data. With respect to our system, this data includes users' login credentials and the necessary information of each user type such as the electronic medical records for customers. It will also include every stock information inputted by the pharmacists and all essential associated details such as the arrival date and the overall price. It will also hold instances of products for sale, records of customers' orders, email conversations, questions and answers on the board page, and written blogs. The interaction with the users that is built on this data will happen at the presentation layer with the contribution of the application layer.

Our pharmacy system will be accessed by users through a dedicated website. The succession of the process requires the incorporation of different tools such as dedicated servers, domain name providers, and a cloud based SQL database.

Domain Name and Domain Name Server: Our system will be accessible via the domain name "arzpharmacy.com." The domain will be purchased from a domain registrar and managed by a DNS provider, which will map the domain name to the hosting server's IP using DNS protocol. The DNS server will store records that map our domain name to the server's IP address, allowing users to access the site using the URL instead of memorizing the IP. To secure the DNS records and protect against DNS spoofing, **DNSSEC** will be implemented, adding cryptographic signatures to verify DNS record authenticity. Additionally, **SSL/TLS certificates** will be used to encrypt data transmission between the client and the server, providing a secure channel that protects against IP spoofing and other attacks.

Dedicated Server: serves as the backbone of the website architecture where the application layer is being hosted along with the presentation layer (the actual website). Its IP is stored in the DNS that maps the domain name to it allowing the user to access this server and interact with the website.

SQL Database: A MySQL database will be the storage place of any data that enters this website.

C.   Role-Based Access Control (RBAC) Architecture

RBAC is implemented to identify user permissions and assure that each user's access is aligned with his/her roles preserving an organized control over the system operations utilized by the three types of users: owner, pharmacist, and customer. The user's access permissions are dynamically assigned after a verified login according to the user type. This architecture maintains the integrity and confidentiality of data by restricting access to sensitive data only for authorized parties. Each user type will have a different

portal in the presentation layer according to his/her type where our system has three types of users with identified roles:

1. Customer: Limited to navigating, searching, and filtering available items for sale. Then issuing a request to order a certain medicine and tracking this order if approved by the pharmacist. The previous orders records of a customer will be available for him even after delivery for a duration of 90 days. Finally, the customer can ask questions, send emails, read blogs, and update his profile

2. Pharmacist: A more privileged user that is able to update inventory, approve customers' requests, request additional documents from the user, view their electronic medical record, update stock records, answer questions and reply to emails, and post blogs. Note that those are the general roles of the pharmacist, each pharmacist will be assigned a portion of those tasks.

3. Owner: The person that has the full access to the system. With respect to the customers, the owner can view every customer and block them for any inappropriate action. The owner is responsible for receiving new pharmacists' licenses and requests for accepting their registration, viewing their accounts, and assigning each one of them some tasks on a regular basis. The owner is the only user with administrative roles. One of the most crucial roles unique to owners is managing the sales records where they can view daily sales and benefit from data analytics to make appropriate business decisions. Owners can also update inventory, reply to customers' emails, and update their own profile.

VII. System Models

A. Use Case Diagram Customer

The Customer can interact with the system to perform a range of tasks such as managing their profile, which includes updating personal information and health records. They can also order medications/cosmetics, track their orders and pending approval requests, and access detailed product information. Additionally, customers can ask pharmacists questions on a public discussion board and also view previous or pinned answers or tips on the board. An authentication process safeguarded all these actions, ensuring secure and confidential access to the system's functionalities.
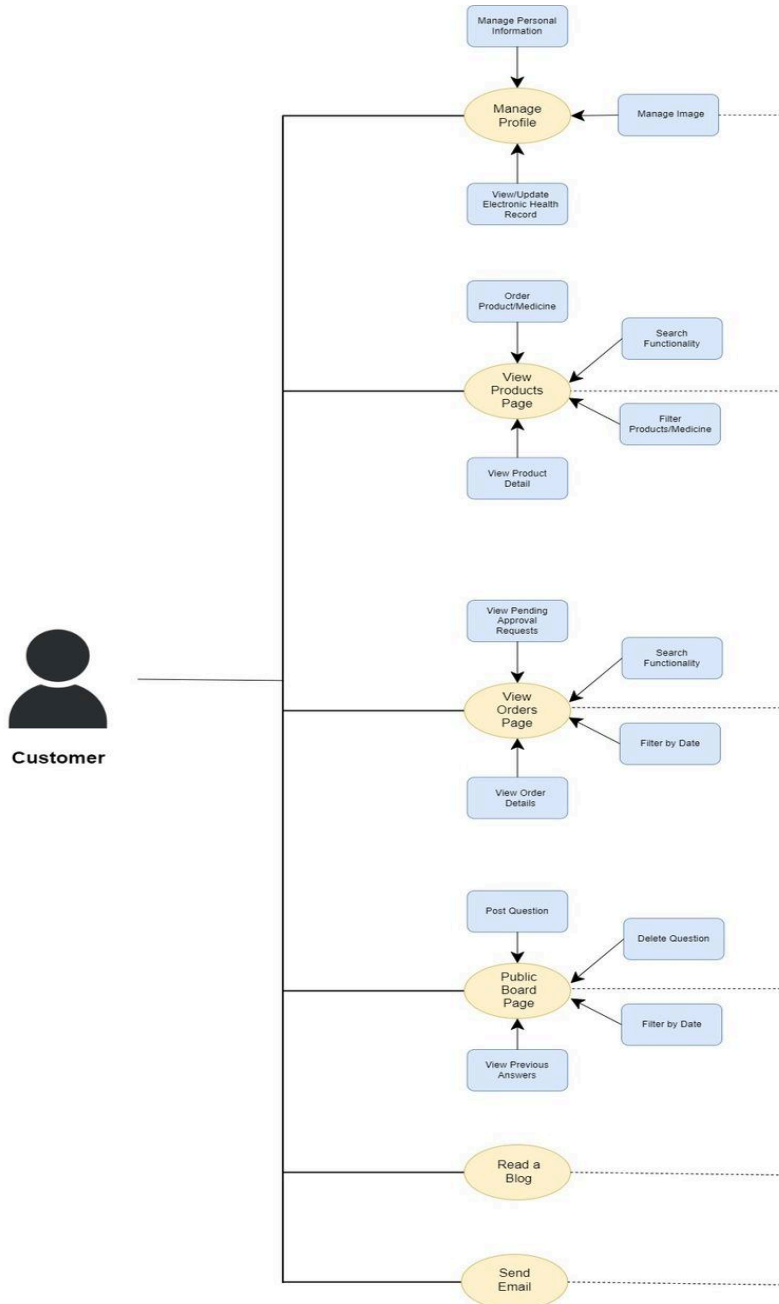
B. Use Case Diagram Pharmacist

The pharmacist can engage with the system to perform various tasks such as managing their profile, including updating personal and work-related information. They can also oversee products, add or modify available medications and cosmetics, and review or address pending approval requests of orders by checking the customer's electronic health records and any uploaded files. Pharmacists can respond to customer questions on a public discussion board, pin important answers, delete questions, and share useful tips. Additionally, they can manage pharmacy records by viewing, modifying, or adding entries. The system also allows pharmacists to respond to emails and write informative blog posts. An authentication process securely protects all actions, ensuring a reliable and confidential interaction with the system's functionalities.
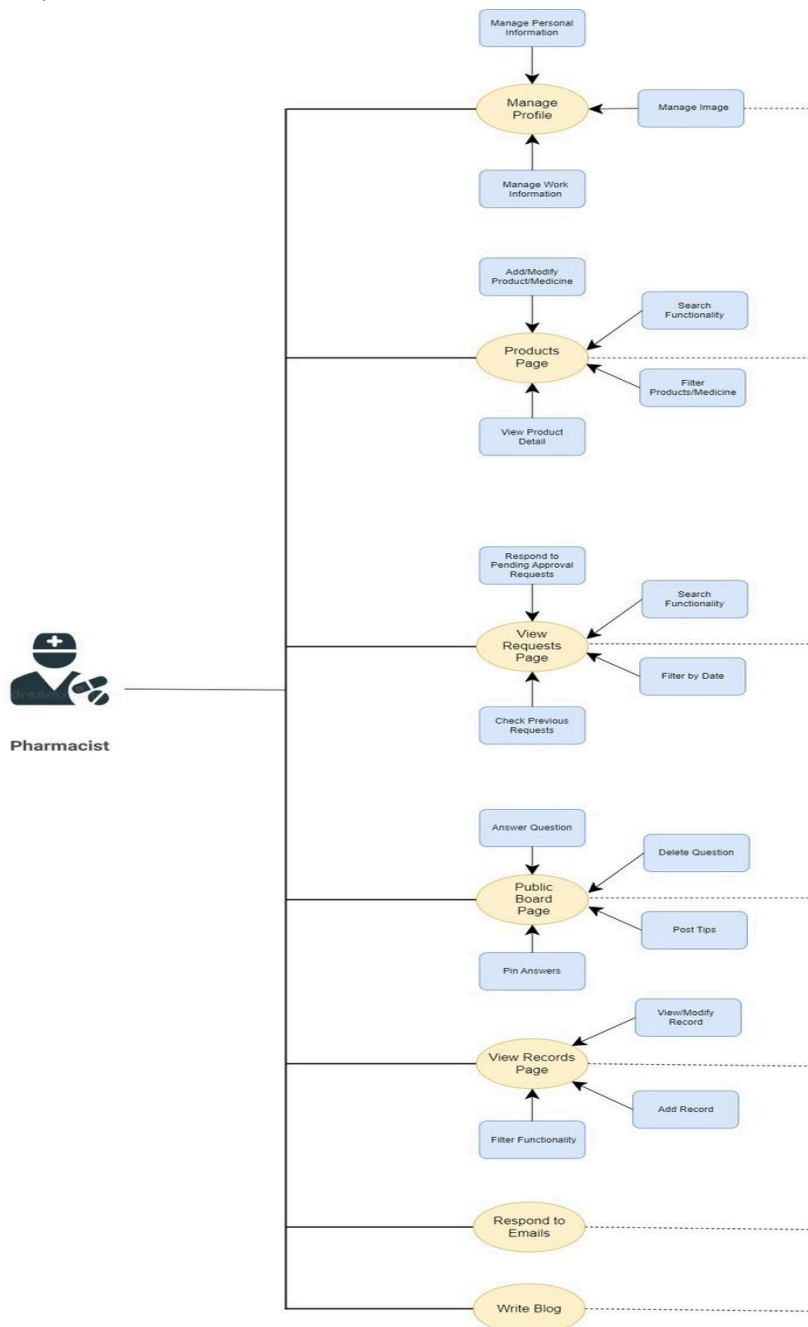
C. Use Case Diagram Owner

The Owner interacts with the system to oversee and manage various core functionalities critical to maintaining and optimizing business operations. On the products page, the owner can manage product listings and delete or edit product/medicine details. Sales management capabilities allow the owner to generate and view comprehensive sales reports, filter sales data by date, and employ analysis tools to assess business performance. Within the administration section, the owner can assign tasks to personnel, block users, and verify pharmacist registrations, ensuring adherence to standards. The owner also has the ability to review and modify stock records, add new entries, and filter records based on specific criteria. Lastly, the owner is equipped to respond to email inquiries, enhancing communication with stakeholders and customers. Robust access controls secure these operations, ensuring the integrity and privacy of the system.
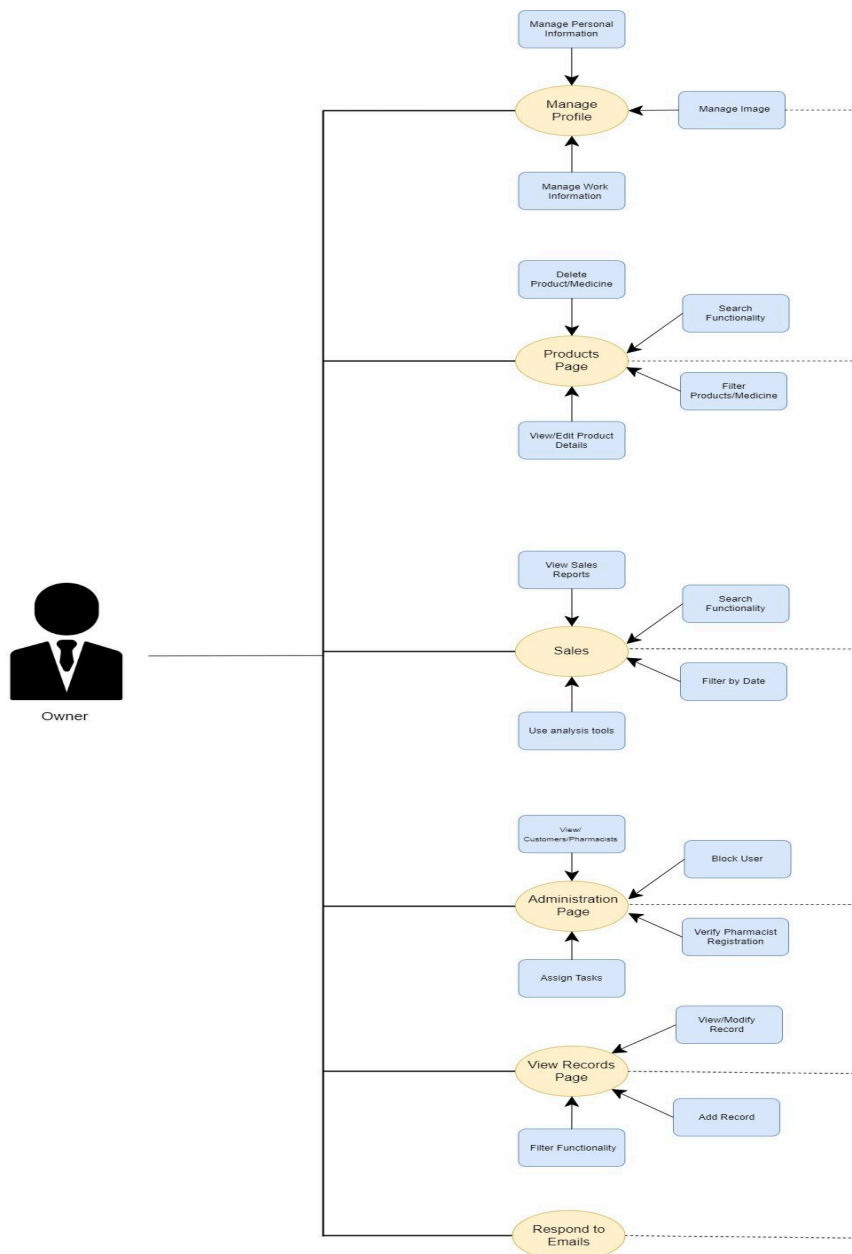
D. Login and Sign up Activity

To access the website, users are prompted to log in with their credentials if they are already registered. New users, whether customers or pharmacists, are required to sign up. The sign-up process for both groups involves entering general information, creating a password, and confirming it. Customers have an additional step, which involves filling out a questionnaire to establish their electronic medical record. Pharmacists, on the other hand, must upload a copy of their license and provide required work information, after which they await verification from the owner. To identify the user as either a customer or a pharmacist, they must select one of two available checkboxes. Once all necessary information is provided, the portal is set up. Login succeeds once the entered credentials are verified in the database, granting each user access to their respective portal.
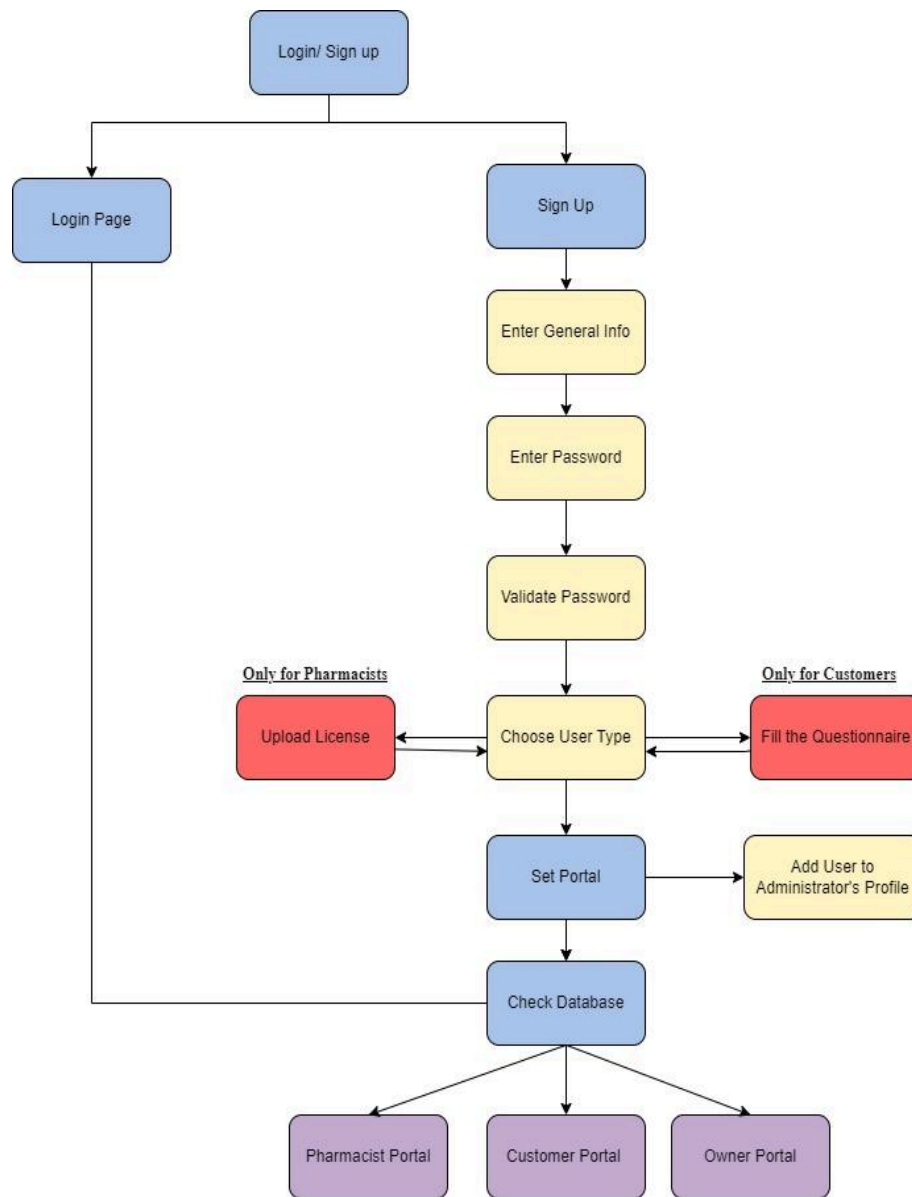
E. Website Home Activity

The homepage of the website features a welcoming title: "Welcome to ARZ Pharmacy." It includes sections such as "About," "Mission," and "Buy Cosmetics," along with a "Blog" button that leads to a page with engaging blog posts for customers. Additionally, there is a "Contact Us" button that enables users to send emails directly to the pharmacists and the pharmacy owner(s).
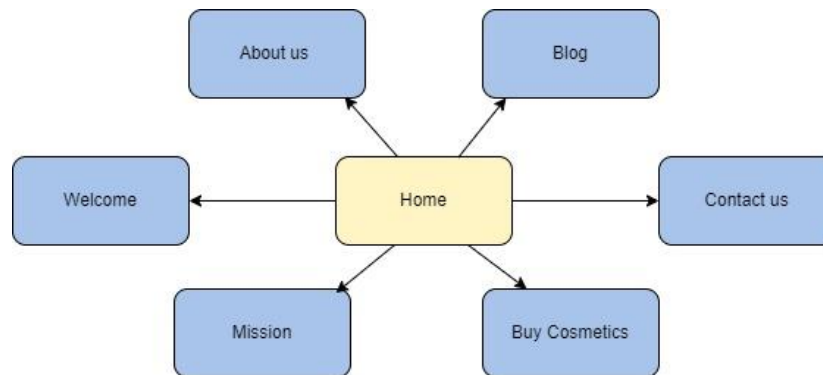
F. Activity Diagram of Customer

When customers access the website, they are prompted to log in using their credentials. New customers are required to sign up, provide the necessary details for registration, complete a questionnaire to build their electronic personal medical record, and choose "customer" as their intended user role. After registration, they are redirected to the login page to proceed to the website with their new account details automatically saved in the owner's administrative dashboard. The home page serves as an introduction to the system, displaying our pharmacy's details and contact information. It also includes a small cosmetics section offering simple medical products for sale. The primary features of the system can be accessed through the portal button. Here, customers can view the listed medicines and products, along with essential information such as price, expiry date, and type of approval required. A search bar allows users to quickly find products or medicines by name, while a filtering option helps customers find medicines based on symptoms or required approval type.

Once an order is placed, and if the order requires any form of approval, a request is sent to a specialized pharmacist who reviews the case. The pharmacist responds with either an approval, a rejection or further documentation, ensuring that all medicines are distributed responsibly and with the customer's health as a priority. This will be key for individualized and tailored treatment.

Customers are also provided with a record of all their orders. Previous orders can be accessed, and pending orders will display their status (approved or rejected) once updated by the pharmacists. If an order is approved, delivery details will also be shown.

Additionally, customers have access to a public board where they can submit their concerns anonymously via a dropbox. A registered pharmacist reviews these concerns and posts suitable answers, which are made available for all users to benefit from.

Customers can edit their profiles and update their electronic medical records as needed. Finally, the website provides the option to send emails to pharmacists and read selected blogs for additional information.
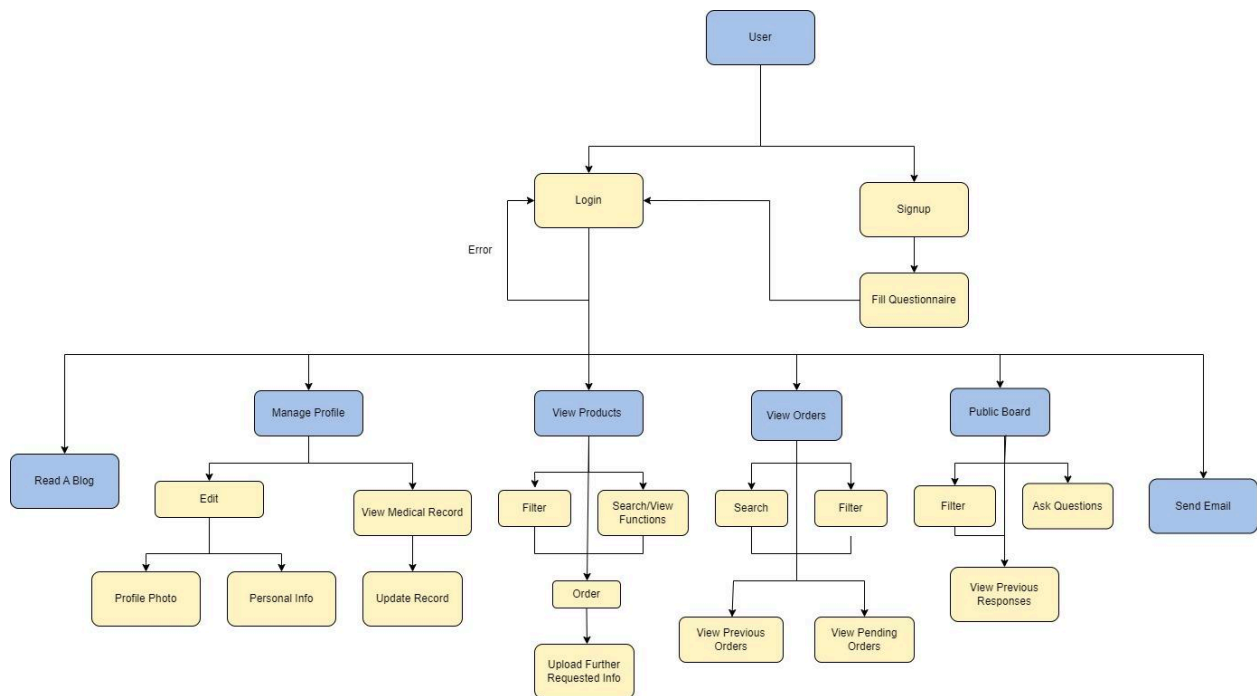
G. Activity Diagram of Pharmacist

At first, pharmacists are required to use their credentials to log in. New pharmacists must sign up, provide the necessary details for registration, choose "pharmacist" as their intended user role, and upload their license as an identifier to be approved by the owner. After logging in, both new and existing pharmacists can access the home page and proceed to their designated tasks made available for them at their profiles by the owner. The first task involves managing stock records. Pharmacists use the "Add Stock Record" page to view and filter previously added records of purchased stocks, including essential details such as arrival date, quantity, and overall price to track inventory effectively. They are also responsible for adding new records as stock arrives. Second, pharmacists ensure that bought items are made available for customers by adding them to the page where they appear on the customers' portal. New products or medicines are added as new items to the list, while previously added items are updated as needed. For convenience, pharmacists can search and filter products to enable faster access when handling large inventories. The third and most crucial task for a pharmacist is the sale of appropriate medicines. On the "View Requests" page, pharmacists can access customer requests to evaluate them for approval or rejection. The medication approval process depends on the complexity of the drug and the patient's needs. Over-the-counter medications, such as painkillers, receive direct approval. For more complex drugs, pharmacists review the patient's electronic medical record to identify potential contraindications. High-risk medications, such as cancer treatments, require additional documentation, including a doctor's prescription or formal authorization from the Ministry of Health. Based on these factors, requests are either approved or denied. The fourth task pertains to the "Public Board," where pharmacists interact with customers by answering questions, deleting inappropriate messages, pinning

high-priority and frequently asked questions, and offering additional tips. Pharmacists also have access to their profiles, allowing them to update components such as their profile photo, personal information, and work information. Lastly, pharmacists are responsible for responding to emails sent to them.
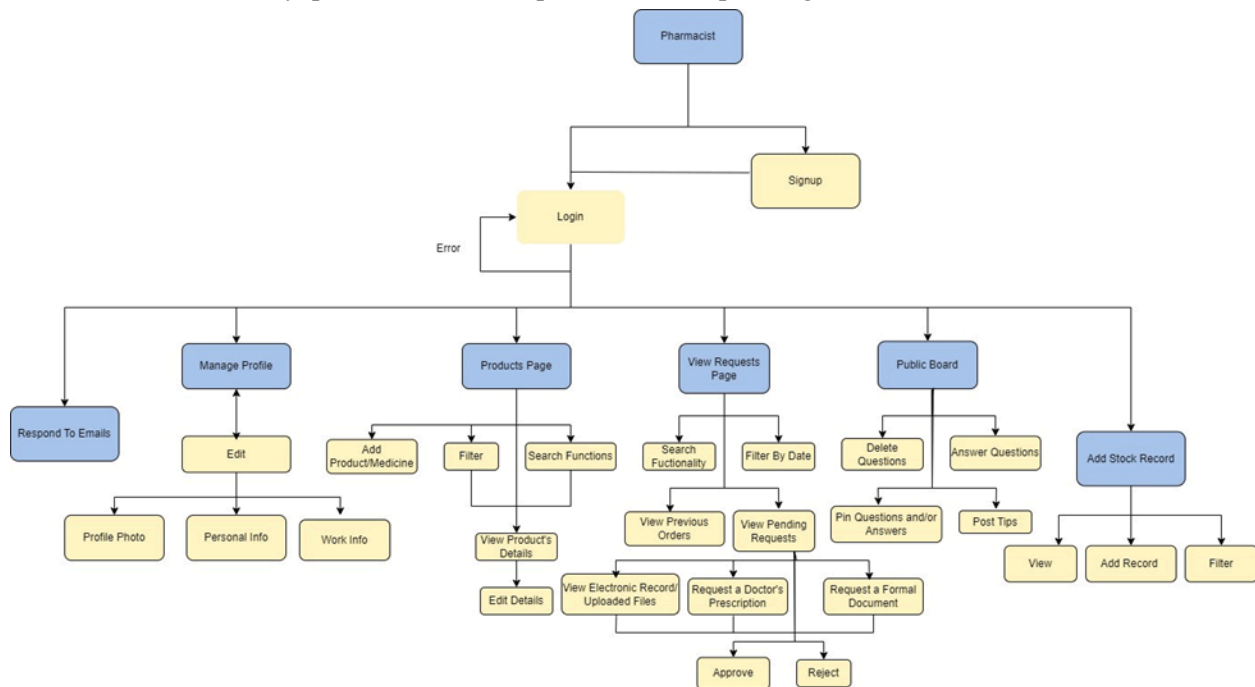
H. Activity Diagram of the Owner

The owner is the person who buys the software to manage his pharmacy effectively. For the first time he/she must sign up to access the system and control its activities. After that, he/she will use the credentials to login regularly. The owner plays the role of the manager, where he is granted access to every part of the system. First, the owner can view the page where items are listed for sale, filter and search its content, view and edit any product's details, and delete any instance from the found ones. Second, he can access the stock records, where the system integrates the sales records daily into this page giving an overview of sold items as well as remaining ones. With the association of data analysis tools, the owner then can analyze sales and take the appropriate measures accordingly. Third, the owner of the pharmacy can manage the activity of the users of the website whether they are customers or pharmacists. For customers, the owner will have an overview of all the registered customers accounts in the website in addition to blocking scammers whenever they are found. During the pharmacists registration process, the owner is responsible for reviewing their uploaded license and granting them the access to their portals. For already registered pharmacists, the owner will have an overview of their accounts and he is responsible for assigning each pharmacist his task on a regular basis. As we mentioned before, the tasks that might be assigned to a pharmacist include processing customers' requests, adding products and medicines as items for sale, managing stock records, and handling communication with the customers including replying to emails, writing blogs, and answering customers' questions on the public board. Finally, the owner can also reply to customers' emails and edit his profile containing his profile photo, work information, and work information.
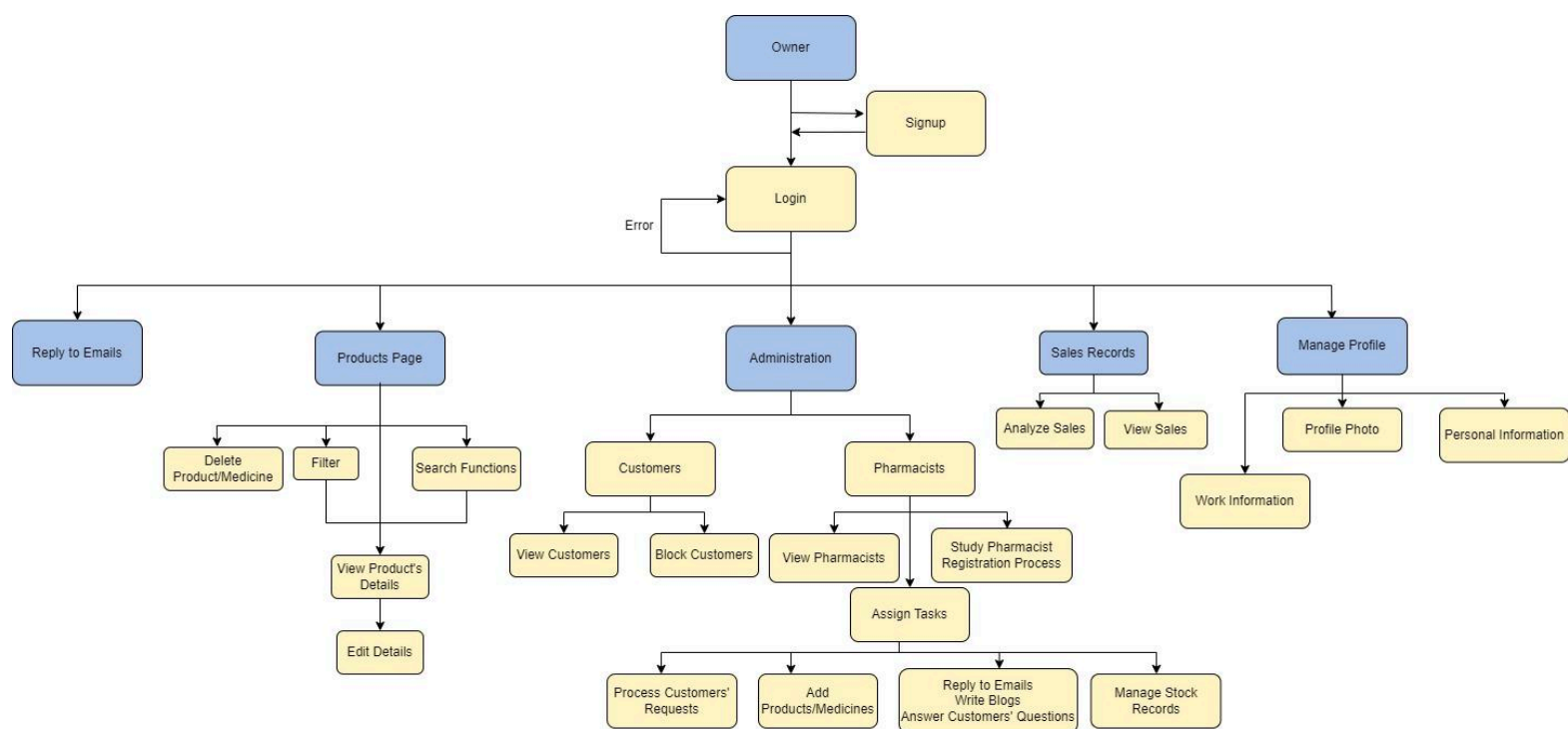
VIII. System Evolution

The ARZ Devs Pharmacy System is designed with scalability and future growth in mind, with our goal always being to give pharmacy managers and customers a stable, flexible, and user-friendly platform. As healthcare continues to evolve, we envision an incremental approach to upgrade our system, focusing on improving patient care, enhancing pharmacy management, and expanding services. In order to provide long-term value for our users, we concentrate on developing the following areas that outline our plans for the system's evolution:

1. **Integration with National Health Systems and expansion into other pharmacies:** The ARZ Devs Pharmacy System aims to integrate with other Lebanese Pharmacies and with Lebanon's national healthcare databases in order to aid in the Ministry of Health's digital transformation efforts. This integration will allow access to centralized patient medical records and will ensure better coordination across different healthcare providers. Each pharmacy surely keeps its records separately.
2. **Telemedicine integration:** We plan to introduce direct video consultations with pharmacists.
3. **Support for wearable health devices:** Our system can later integrate with wearable devices such as smartwatches and fitness trackers. This will enable real-time monitoring of patient's health metrics. This can be later stored in a similar fashion to the electronic health record, allowing pharmacists to provide more accurate and proactive care.
4. **E-prescription expansion and doctor collaboration:** Establish partnerships with doctors and healthcare providers. This will allow doctors to directly send prescriptions and ease the approval and treatment process.
5. **Mobile application:** In the future, integrating a mobile application could greatly benefit both customers and pharmacists. Customers could read medication information and access pharmacy services straight from their devices with a mobile app. Furthermore, push notifications for special offers or reminders may increase consumer satisfaction and engagement. A mobile software could help pharmacists provide more efficient services by streamlining inventory checks and patient data access.
6. **Advanced AI features:** Plans may include drug interaction alerts and systems, personalized medication suggestions based on patient history, and predictive restocking based on seasonal demands and patient trends.
7. **Enhanced data analytics and reporting:** More tools for sales analysis and inventory optimization.

In summary, we are dedicated to ongoing development, ensuring that our system remains flexible, user-focused, and ready for expansion in the future.

IX. Testing

To ensure that the system functions as expected, we must test it to check for errors or implementation mistakes. This section includes test cases to be used after the system's implementation is concluded.

A. Sign up, Login, and System Access Tests

Project Name: ARZ-TestCases						
Test Case ID: ARZ-A1		Test Designed by: Abdul Rahman Al Zaatari				
Test Priority (Low/Medium/High): High		Test Designed date: 11/02/2024				
Module Name: User Authentication		Test Executed by:				
Test Title: Login with Valid Credentials		Test Execution Date:				
Description: Test system's acceptance of a user with valid credentials						
Pre-Conditions: The user has a valid account and is on the login page						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Enter login Page		Login portal is displayed			
2	Enter valid username	Arz1298	Username Accepted			
3	Enter valid password	1278At1!	Password Accepted			
4	Click on the Login button		Directed to the homepage			

Project Name: ARZ-TestCases						
Test Case ID: ARZ-A2		Test Designed by: Abdul Rahman Al Zaatari				
Test Priority (Low/Medium/High): High		Test Designed date: 11/02/2024				
Module Name: User Authentication		Test Executed by:				
Test Title: Login with invalid Credentials		Test Execution Date:				
Description: Test system's rejection of a user with invalid credentials						
Pre-Conditions: The user does not have a valid account and is on the login page						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Enter login Page		The login portal is displayed			
2	Enter valid username	Arz1298	Username is right			
3	Enter valid password	1Ar12!	Password is wrong			
4	Click on the Login button		Error message stating user inputted wrong credentials			

Project Name: ARZ-TestCases						
Test Case ID: ARZ-A3			Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): High			Test Designed date: 11/02/2024			
Module Name: User Authentication			Test Executed by:			
Test Title: Login with invalid Credentials			Test Execution Date:			
Description: Test system's rejection of a user with invalid credentials						
Pre-Conditions: The user does not have a valid account and is on the login page						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Enter login Page		The login portal is displayed			
2	Enter valid username	Arz404	Username is wrong			
3	Enter valid password	1278At1!	Password is right			
4	Click on the Login button		Error message stating user inputted wrong credentials			

Project Name: ARZ-TestCases						
Test Case ID: ARZ-A4			Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): High			Test Designed date: 11/02/2024			
Module Name: User Authentication			Test Executed by:			
Test Title: Sign-up			Test Execution Date:			
Description: Test the success of the system's sign-up process						
Pre-Conditions: The user does not have a valid account and is on the login page						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Enter login Page		The login portal is displayed			
2	Click on the "Sign Up" button		The sign-up portal is displayed			
3	Enter valid email address, full name, birth date, phone number, address and accept terms of service	zaatariabdulrahman@gmail.com, Abdulrahman Al Zaatari, 31/03/2004, 81906611, Saida Lebanon	Email address, full name, birth date, phone number, address, checked terms of service accepted			
5	Fill Questionnaire	Enter required fields of the questionnaire	The questionnaire is successfully transformed into Electronic Health record for the user			
5	Enter password that meets the requirements	1278At!	Password is accepted			
6	Confirm password	1278At!	Password confirmation accepted			
7	Complete two factor authentication	SMS code	Two factor authentication completed and security questions are displayed: "What's the name of your pet?" "What's your grandma's name?"			

8	Answer 2 security questions	Gardenia Fatima	System stores answers			
9	Click on "Finish sign-up" button		Access to login gained			

Project Name: ARZ-TestCases						
Test Case ID: ARZ-A5			Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): High			Test Designed date: 11/02/2024			
Module Name: User Authentication			Test Executed by:			
Test Title: Apply for pharmacist role			Test Execution Date:			
Description: Test the success creating a pharmacist account						
Pre-Conditions: The user does not have a valid account and is on the login page						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Enter login Page	None	The login portal is displayed			
2	Click on the "Sign Up" button	None	The sign-up portal is displayed			
3	Click on the "Apply as Pharmacist" button	None	User is prompted to enter details			
4	Enter valid email address, full name, birth date, phone number, and address, degree, license	zaatariabdulrahman@gmail.com, Abdulrahman Al Zaatari, 31/03/2004, 81906611, Saida Lebanon, LAU pharmacist degree file, license file	Email address, full name, birth date, phone number, and address, degree, and license sent to owner for review			
5	Owner accepts application	None	Pharmacist role credentials are sent to user			
6	Answer 2 security questions	Gardenia Fatima	System stores answers			
7	Pharmacist account is created	None	Access to login gained			

Project Name: ARZ-TestCases						
Test Case ID: ARZ-A5		Test Designed by: Abdul Rahman Al Zaatari				
Test Priority (Low/Medium/High): High		Test Designed date: 11/03/2024				
Module Name: User Authentication		Test Executed by:				
Test Title: RBAC-Account Exists		Test Execution Date:				
Description: Testing the role-based access system. When a user logs in, the system shall retrieve their role from the database and assign them their privileges.						
Pre-Conditions: The user does not have a valid account and is on the login page						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	User logs in	Login credentials	Access granted			
2	Database accessed by system to retrieve role of user	Account username	Retrieval success and assignment of privileges			
3	System replies to user	Message	Message reaches user			

Project Name: ARZ-TestCases						
Test Case ID: ARZ-A6		Test Designed by: Abdul Rahman Al Zaatari				
Test Priority (Low/Medium/High): High		Test Designed date: 11/10/2024				
Module Name: User Authentication		Test Executed by:				
Test Title: Forgot password		Test Execution Date:				
Description: Testing the forgot password functionality						
Pre-Conditions: The user has a valid account and is on the login page						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	User clicks on forgot password link		Choice between SMS and email is displayed			
2	User chooses between SMS or Email	Account email (zaatariabdulrahman@gmail.com) or phone number (81906611)	User is prompted to answer security questions linked to his account. "What's the name of your pet?" "What's your grandma's name?"			
3	User answers security questions	Gardenia Fatima	User authenticated and is prompted to enter new password			
4	User enters new password	Arz120034!	System checks passwords and checks if it passes all requirements			
5	User confirms password	Arz120034!	System checks if passwords match and password is changed			

B. Inventory Management Tests

Project Name: Pharmacist-TestCases						
Test Case ID: ARZ-B1			Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): High			Test Designed date:11/11/2024			
Module Name: Inventory Management			Test Executed by:			
Test Title: Add & edit product			Test Execution Date:			
Description: Test the pharmacist's ability to add products successfully						
Pre-Conditions: Pharmacist is logged in and is assigned task of maintaining products						
Dependencies: The product details should be stored in the database						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Pharmacist presses the add product button	None	Page prompts pharmacist with questions			
2	Enter product's name, price, quantity	Panadol, 100,000 LBP, 20	Product is displayed on the page for customers to order			
3	Press edit button and modify price	150,000 LBP	Product details are modified and are displayed for customers to order			

Project Name: Owner-Pharmacist-TestCases						
Test Case ID: ARZ-B2			Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): High			Test Designed date: 11/10/2024			
Module Name: Notifications			Test Executed by:			
Test Title: Stock and expiry date alert system			Test Execution Date:			
Description: Ensure that the alert system relating to stock and expiry date of products works						
Pre-Conditions: User is an owner or pharmacist with related task						
Dependencies: Access to product details in the database						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Product quantity reaches minimum threshold set by user	Panadol's quantity reaches 3	Owner and pharmacist receive alert on their dashboard: "Product ID:5 and name: Panadol has fallen under minimum stock threshold."			
2	Product expiry date enters specified data range	Panadol's expiry alert threshold: 10 days	Owner and pharmacist receive alert on their dashboard: "Product ID:5 and name: Panadol has entered its last 10 days."			

Project Name: Owner-TestCases						
Test Case ID:ARZ-B3			Test Designed by: Ali Ghandour			
Test Priority (Low/Medium/High): Medium			Test Designed date:11/09/2024			
Module Name: Inventory Management			Test Executed by:			
Test Title: Access and Generate daily sales report			Test Execution Date:			
Description: Test the system's sales records functionality on owner's inventory page						
Pre-Conditions: Owner is logged in to the system and has access to the inventory page.						
Dependencies: The sales information should be saved and accessible at any time in the system.						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Owner presses the Sales Records button	None	History of sales records is displayed			
2	Owner chooses daily time for report generation	9:00 pm	The system sets 9:00 pm as daily report generation time			
3	Report is generated	Time equals 9:00 pm	-Daily sales report is generated -Report is added as a record alongside its date			
4	Open report	None	Report opened and details accessed by the owner			

Project Name: Pharmacist-TestCases						
Test Case ID:ARZ-B4			Test Designed by: Fatima Srour			
Test Priority (Low/Medium/High): High			Test Designed date:11/09/2024			
Module Name: Inventory Management			Test Executed by:			
Test Title: Add Stock and Supplier Records			Test Execution Date:			
Description: Test the ability of pharmacists to add new stocks and supplier records to be saved in the records page						
Pre-Conditions: Pharmacist is logged in to the system and is assigned records management.						
Dependencies: The sales information should be saved and accessible at any time in the system.						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Pharmacist presses the Add Record button in the Records page	None	A new copy of the standard template designed for saving the stock details is opened for saving the new instance in the database			
2	Pharmacist fills the data entry boxes with the stock details	Id: "00123", Name: "Ibuprofen 200 mg Tablets", Category: "Painkiller", Supplier: "McKesson Corporation", Entry date: "July, 15, 2022", expiry date: "July,	A new instance in the stock database table is created and saved			

		15, 2025", and Last Update Date: "November, 11, 2024"					
3	Open the Records page	None	The previously entered instance is added to the list of existing stock instances				

Project Name: Pharmacist-TestCases	
Test Case ID: ARZ-B5	Test Designed by: Fatima Srour
Test Priority (Low/Medium/High): Medium	Test Designed date: 11/08/2024
Module Name: Inventory Management	Test Executed by:
Test Title: Testing the ability of pharmacists filtering stock records	Test Execution Date:

Description: Test the system's ability to filter stock records upon the pharmacist's request

Pre-Conditions: Pharmacist is logged in to the system and is assigned stock records management.

Step	Test Steps	Test Data	Expected Result
1	Entering the Records page	None	Every stock record will be displayed
2	In the filtering section, choose from: Found categories to filter according to: "Supplier Name", "Year", and "Price Range"	"supplier name"	After choosing "Supplier Name", each instance will appear next to a checkbox
3	Check the checkbox next to "Pfizer Inc."	Names of suppliers the pharmacy has contracts with: "AmerisourceBergen Corporation", "McKesson Corporation, "Medline Industries", and "Pfizer Inc."	Existing records will be scanned by querying the database, any stock provided by Pfizer Inc. will be displayed on the same page

| 4 | Filter results are displayed | {Id: "00033", Name: "Zithromax 250 mg Tablets", Category: "Antibiotic", Supplier: "Pfizer Inc.", Entry date: "December, 11, 2021", expiry date: "December, 11, 2025", and Last Update Date: "November, 11, 2022}; {Id: "000112", Name: "Advil", Category: "Painkiller", Supplier: "Pfizer Inc.", Entry date: "July, 15, 2022", expiry date: "July, 15, 2025", and Last Update Date: "November, 11, 2024} | All the stock records imported from Pfizer Inc. will be listed on the same page |

D. Order and Delivery Services Tests

Project Name: Customer-TestCases	
Test Case ID: ARZ-D1	Test Designed by: Fatima Srour
Test Priority (Low/Medium/High): High	Test Designed date: 11/08/2024
Module Name: Order and Delivery Services	Test Executed by:
Test Title: Testing the ability of customers to order simple products	Test Execution Date:

Description: Test the system's ability to process the requirements needed for simple products (where no approval is needed) to be ordered successfully by the customer

Pre-Conditions: -System is running
-Customer is logged in with a valid account and is on the inventory page
-Access to the database is successful

Step	Test Steps	Test Data	Expected Result
1	Entering the products section	None	The available products will be listed with their attributes
2	Adding a "no approval required" product to cart	The chosen product and its details	The new item will be appended to the customer's cart
3	Placing the order	The item in the cart and customer details needed for delivery	-The order will be visible on the customer's orders history page -Available quantity of ordered item will decrease by number of items ordered -The cart is emptied
4	Receiving an email of order confirmation	None	-The customer will receive an email under the pharmacy's name informing him/her that the order was placed successfully

Project Name: Customer-TestCases	
Test Case ID: ARZ-D2	Test Designed by: Fatima Srour
Test Priority (Low/Medium/High): High	Test Designed date: 11/08/2024
Module Name: Order and Delivery Services	Test Executed by:
Test Title: Testing the ability of customers to order non-simple products	Test Execution Date:

Description: Test the system's ability to process success of ordering products requiring approval

Pre-Conditions: -System is running
-Customer is logged in with a valid account and is on the inventory page
-Access to the database is successful

Step	Test Steps	Test Data	Expected Result
1	Entering the inventory section	None	The available products will be listed with their attributes
2	Request the intended medicine by clicking on "Request"	The chosen product	A comment box is provided for the customer to add additional comments, along with an option to upload any additional files.
3	Additional information is added, and request submitted	-Comment: "I have a fever" -Request details	-Request is sent to pharmacist to review -Request is shown under the pending tab in customer's orders page
4	Approving the request	None	-Notification of request approval is sent to the customer -Request is removed from pending tab from customer's order page
5	Adding the product to cart	The chosen product and its details	The new item will be appended to the customer's cart
6	Placing the order	The item in the cart and customer details needed for delivery	-The order will be visible on the customer's orders history page -Available quantity of ordered item will decrease by number of items ordered -The cart is emptied

Project Name: Customer-TestCases					
Test Case ID: ARZ-D3		Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): High		Test Designed date: 11/10/2024			
Module Name: Order history		Test Executed by:			
Test Title: Order history		Test Execution Date:			

Description: Test system's ability to display customer's past orders in the order history section

Pre-Conditions: Customer logged in with a valid account and made previous orders

Dependencies: Access to order history data

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Go to the order history section	None	The order history page is displayed. A list of all previous orders should appear.			

2	Select a previous order to review the details	Order of ID 41 details	The details of this order should be displayed fully. Panadol, 11/11/2024, approved, delivered. (product information, order date, status, and delivery tracking)			
3	Check for order tracking information	None	The customer can see real time information of product's delivery status			

Project Name: Customer-TestCases							
Test Case ID: ARZ-D4			Test Designed by: Ali Ghandour				
Test Priority (Low/Medium/High): Medium			Test Designed date: 11/10/2024				
Module Name: Invoice Management			Test Executed by:				
Test Title: Verification of the ability of the customer to view and download invoices			Test Execution Date:				
Description: Test that the customer can view and download invoices of their orders							
Pre-Conditions: Customer has completed orders							
Dependencies: Access to invoice generation and order history							
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes	
1	Go the orders history section	None	The orders page opens with list of all orders done by customer				
2	Select an order and press on the view invoice button	Order ID	The invoice opens in another page including all information (Date, items, total cost, and taxes)				
3	Download this invoice	None	The invoice will be downloaded as a pdf file with all details				
4	Open the downloaded PDF	PDF file	The details are displayed clearly in the pdf .				

Project Name: Pharmacist-TestCases							
Test Case ID: ARZ-D5			Test Designed by: Abdul Rahman Al Zaatari				
Test Priority (Low/Medium/High): High			Test Designed date: 11/11/2024				
Module Name: Order and Delivery Services			Test Executed by:				
Test Title: Verification of pharmacist's ability to view, approve and reject requests			Test Execution Date:				
Description: Test the system ability in allowing pharmacists to view and approve or reject customer's requests							
Pre-Conditions: System is on and the pharmacist is logged in with a valid account							
Dependencies: Access to order management dashboard							
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes	
1	Go to the order management section	None	The page displays a lists of pending customer's requests that require approval				
2	Choose a pending order to review	Order ID	The system opens the orders details (Medication requested+customer's information)				

3	View the medication history of the customer	Customer's ID and Electronic Health Record	The customer's EHR will be displayed to ensure accurate order review			
4	Approve the order	Approval	The order status is updated to "approved" and the system sends an approval notification to the customer			
4'	Request an additional document	Additional documentation	The system sends a notification to the customer, requesting a specific document for the order			
5	Check for updated order status	None	The status of this order will be updated in the pharmacist's order management page			

E. Administrative Controls Tests

Project Name: Owner-TestCases						
Test Case ID: ARZ-E1		Test Designed by: Ali Ghandour				
Test Priority (Low/Medium/High): High		Test Designed date: 11/09/2024				
Module Name: Administrative Controls		Test Executed by:				
Test Title: View Pharmacists profile		Test Execution Date:				
Description: Ensuring that the owner can view all the information related to their pharmacists (name, contact information, certification status, and tasks)						
Pre-Conditions: The owner should be logged in to the system, has access to the Administration page and the pharmacists data should be available.						
Dependencies: Profiles must be created and available in the system						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Go to the Administration page	None	The Pharmacists' profile pictures should be displayed in this page			
2	Choose and view any pharmacist	Press on picture of pharmacist Ali Ghandour	The profile should open and display the pharmacist's info Ali Ghandour, 81906611, licensed, communications (name, contact information, certification status, and tasks)			

Project Name: Owner-TestCases						
Test Case ID: ARZ-E2		Test Designed by: Ali Ghandour				
Test Priority (Low/Medium/High): Medium		Test Designed date: 11/09/2024				
Module Name: Administrative Controls		Test Executed by:				
Test Title: Assigning the daily task of a pharmacist		Test Execution Date:				
Description: Ensuring the owner can successfully assign tasks to pharmacists.						
Pre-Conditions: Owner is logged into the system and can access the Administration page.						
Dependencies: Pharmacists' possible tasks are defined well in the system						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to the Administration page	None	The page is opened and it includes a task assigning option			
2	Choose a pharmacist profile	Choose pharmacist Ali Ghandour	The profile and button for assigning tasks is displayed successfully			
3	Assign task to the pharmacist	Assign Ali the request reviewer role	The profile is updated with the new task assigned			

Project Name: Owner-TestCases						
Test Case ID: ARZ-E3			Test Designed by: Ali Ghandour			
Test Priority (Low/Medium/High): High			Test Designed date: 11/09/2024			
Module Name: Administrative Controls			Test Executed by:			
Test Title: Block a pharmacist's Account			Test Execution Date:			
Description: Maintaining system's integrity by verifying that the owner can block any pharmacist account if he/she misuses the system.						
Pre-Conditions: Owner must be logged in and has access to all system functionalities.						
Dependencies: The Pharmacist account exists in the system.						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Go to the Administration page	None	The page is displayed with a list of all pharmacists' accounts			
2	Select a pharmacist to block	Choose pharmacist Ali Ghandour	The blocking choice is displayed when the pharmacist is selected			
3	Confirm block	None	The status of the account is updated to blocked and all of its functionalities are lost			

Project Name:Owner-TestCases						
Test Case ID:ARZ-E4			Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): High			Test Designed date:11/11/2024			
Module Name: Administrative Controls			Test Executed by:			
Test Title: Testing Owner Authority of Blocking a Customer			Test Execution Date:			
Description: Verifying that the owner can block any customer in case of misuse or misconduct						
Pre-Conditions: System is running,owner is logged in ,and the customer account that should be blocked exists.						
Dependencies:Access to the administration page with customer management control						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Go to the administration page	none	The page should display a list of all customers with customer control management options.			
2	Search for the customer account that should be blocked	Customer ID	The system will display customer's details and all management options including the blocking option			
3	Choose the blocking option	None	A confirmation prompt appears on the middle of page that ask the owner to confirm on this action			
4	Confirm on blocking	Confirmation input	The system updates the status of this account to "blocked" and send a notification to the customer			
5	Try to log in with the blocked customer account	Blocked Customer's credentials	The account will not open and a prompt will appear mentioning that this account is blocked on this system.			
6	Verify the change in the	Customer ID	The list of all customers in the administration page has a status type for each customer,the owner will			

	accounts status		search for that customer and the status should be "Blocked"			

Project Name: Owner-TestCases							

Test Case ID: ARZ-E5			Test Designed by: Ali Ghandour				
Test Priority (Low/Medium/High): Medium			Test Designed date: 11/09/2024				
Module Name: Inventory Management			Test Executed by:				
Test Title: Set and adjust inventory threshold			Test Execution Date:				
Description: Testing if the owner can modify alerts for low stock and expiration dates							
Pre-Conditions: Alert system is properly working and owner is on inventory management page							
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes	
1	Press inventory settings button	None	Box is displayed with options to set and edit alerts				
2	Set low-stock threshold	Threshold: 3	The threshold is saved and an alert is received if the stock is under the minimum value				
3	Set expiration alerts threshold	Threshold: 10 days	This threshold is saved and an alert is received if the expiration date enters its final 10 days				

Project Name: Owner-TestCases							

Test Case ID: ARZ-E6			Test Designed by: Ali Ghandour				
Test Priority (Low/Medium/High): High			Test Designed date: 11/11/2024				
Module Name: Administrative Controls			Test Executed by:				
Test Title: Checking owner's ability of approving pharmacists			Test Execution Date:				
Description: Verify that the functionality that allows the owner to approve or reject new pharmacists after reviewing their details works as expected							
Pre-Conditions: System is running, owner is logged in to their account, and a new pharmacist has requested account credentials which sends a pending request to the owner							
Dependencies: Access to the pharmacist administration page							
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes	
1	Go to the Administration page	None	There should be a list in this page for all pending pharmacist approving requests				
2	Search for a pharmacist pending request	Pharmacist ID	The System displays all pharmacist details including the required information for getting approved				
3	Approve this request by clicking on the "Approve account" button	None	A prompt appears in the middle of the screen asking the owner if they want to confirm this action "Confirm: Yes or No"				
4	Confirm approving by	Confirmation input	The status of this account will be immediately updated to "Approved" or "Verified" in the				

	pressing "confirm"		system and the system grants this account the needed access			
5	View the status in the administration page to verify the update in the system	Pharmacist ID	The pharmacist will be added to list of verified pharmacists			

F. Search and Filter Functionality Tests

Project Name: Customer-TestCases	
Test Case ID: ARZ-F1	Test Designed by: Fatima Srour
Test Priority (Low/Medium/High): High	Test Designed date: 11/08/2024
Module Name: Order and Delivery Services	Test Executed by:
Test Title: Testing the possibility of customers searching products for sale	Test Execution Date:
Description: Test the system's ability to display relevant results for customers when searching a certain product	
Pre-Conditions: System is running Customer is logged in with a valid account and is on the inventory page Access to the database is successful	

Step	Test Steps	Test Data	Expected Result
1	Entering the inventory section	None	The available products will be listed with their attributes
2	Enter the searching keyword in the search box	"panadol"	Items' information will be scanned by querying the database, those with relevant details will be displayed on the same page
3	Search results are displayed	"Panadol Cold & Flu", "Panadol Advance", "Panadol", "Panadol Extra"	The following mentioned names will appear as four separate suggestions for panadol

Project Name: Customer-TestCases	
Test Case ID: ARZ-F2	Test Designed by: Fatima Srour
Test Priority (Low/Medium/High): Medium	Test Designed date: 11/08/2024
Module Name: Order and Delivery Services	Test Executed by:
Test Title: Testing the possibility of customers filtering products by their medication type	Test Execution Date:
Description: Test the system's ability to display relevant results for customers when filtering products with respect to the symptoms they treat	
Pre-Conditions: System is running Customer is logged in with a valid account and is on the products page Access to the database is successful	

Step	Test Steps	Test Data	Expected Result
1	Entering the products section	None	The available products will be listed with their attributes
2	In the filtering section choose from: "symptoms", "medication type", "type of approval	"Medication type"	After choosing "medication type", each type will appear next to a checkbox
3	Check the desired medication type from the given checkboxes for: "Antibiotics", "Painkillers", "Skincare", "Vitamins", "Chronic", and "Cancer"	"skincare"	Products' information will be scanned by querying the database, any skincare product will be displayed on the same page
4	Filter results are displayed	"CeraVe Moisturizing Cream", "Neutrogena Hydro Boost Water Gel", "Avene Skin Recovery Cream"	The following mentioned names will appear as three separate suggestions for skincare products

Project Name: Customer-TestCases	
Test Case ID: ARZ-F3	Test Designed by: Fatima Srour
Test Priority (Low/Medium/High): Medium	Test Designed date: 11/08/2024
Module Name: Order and Delivery Services	Test Executed by:
Test Title: Testing the possibility of customers filtering products by symptoms they treat	Test Execution Date:
Description: Test the system's ability to display relevant results for customers when filtering products with respect to the symptoms they treat	
Pre-Conditions**:** System is running Customer is logged in with a valid account and is on the products page Access to the database is successful	

Step	Test Steps	Test Data	Expected Result
1	Entering the products section	None	The available products will be listed with their attributes
2	In the filtering section choose from: "symptoms", "medication type", "type of approval	"symptoms"	After choosing "symptoms", each symptom instance will appear next to a checkbox
3	Check the desired medication type from the given checkboxes for: "Fever", "headache", "Cold", "Nausea", "Vomiting"	"Fever"	Medicines' information will be scanned by querying the database, any medicine treating the chosen symptom will be displayed on the same page
4	Filter results are displayed	"Ibuprofen", "Aspirin", "Acetaminophen"	The following mentioned names will appear as three separate suggestions for treating fever

Project Name: Customer-TestCases			
Test Case ID: ARZ-F4		Test Designed by: Fatima Srour	
Test Priority (Low/Medium/High): Medium		Test Designed date: 11/08/2024	
Module Name: Order and Delivery Services		Test Executed by:	
Test Title: Testing the ability of customers to filter their order history by date		Test Execution Date:	
Description: Test the system's ability to navigate through a customer's orders and display the results as per their filtering request			
Pre-Conditions: System is running Customer is logged in with a valid account and is on the inventory page Access to the database is successful			
Step	Test Steps	Test Data	Expected Result
1	Entering "My Orders" page	None	The available products will be listed with their attributes
2	In the filter by year section, choose the year you want to filter by	"2023"	Only details of orders within the specified date will be retrieved from the database
3	List of orders before the given date is displayed	{"Avene cleanance gel", "Afrodita toner"}: March, 14, 2023; {"Augmentin 1 g"}: July, 1, 2023;, {"Dorixina Relax"}: December, 3, 2023	These mentioned orders are the result of the filtering process showing all the customer's orders in the mentioned year

G. Features Tests

Project Name: Customer-TestCases	
Test Case ID: ARZ-G1	Test Designed by: Fatima Srour
Test Priority (Low/Medium/High): Medium	Test Designed date: 11/08/2024
Module Name: Blogs	Test Executed by:
Test Title: Verification of Customer's ability to access blogs	Test Execution Date:
Description: Test the system's ability to display blogs written by pharmacists for customers	
Pre-Conditions: System is running Customer is logged in with a valid account and is on the portal page	

Step	Test Steps	Test Data	Expected Result
1	Entering the Blogs section	None	The available blogs will be listed as cards, each displaying an overview about the blog's content on its cover page
2	Choosing a blog of interest	Clicking on the chosen blog card	The whole content of the blog will be displayed in a new separate page

Project Name: Customer-TestCases	
Test Case ID: ARZ-G2	Test Designed by: Ali Ghandour
Test Priority (Low/Medium/High): High	Test Designed date:11/10/2024
Module Name: EHR management	Test Executed by:
Test Title: Verification of Electronic Health Record update by customer	Test Execution Date:
Description: Verifying that the system can let customers update their electronic health records	
Pre-Conditions: Customer has an existing EHR	
Dependencies: Access to customer's profile	

Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to the profile page to view the EHR	None	The EHR document will open with all information saved from customer's responses			
2	Edit the EHR	New health data	The system saves the new updates and sends a pop-up on the screen "Updated"			
3	Log out and log in back	None	The updated information will be still available in the EHR, confirming that they were saved			
4	Check the EHR to see the history of updates	None	The system has a record of all updates, which allows the customer and pharmacist to view previous updates			

H. Public Q&A Page Tests

Project Name:Customer-TestCases							
Test Case ID: ARZ-H1			Test Designed by: Ali Ghandour				
Test Priority (Low/Medium/High): Medium			Test Designed date: 11/10/2024				
Module Name: Public Q&A page			Test Executed by:				
Test Title: Post and view question			Test Execution Date:				
Description: Test the system's ability of letting the customer post anonymously and view questions							
Pre-Conditions: Customer is logged in and has access to Q&A page							
Dependencies: System is configured to display posts anonymously							
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes	
1	Go to the public Q&A page	None	The Q&A page should open, and display the previously posted questions and answers				
2	Choose Question to view	"Can I give my 5 year old pills?"	The question is submitted and the system sends a confirmation message that it has been posted				
3	Refresh the page and check if question appears	None	The question appears on the Q&A page with "anonymous" instead of the customer's name				
4	Check the reply from the pharmacist	None	The pharmacist response appears under the customer's question, and all users can view it on the public Q&A page				

Project Name: Pharmacist-TestCases							
Test Case ID: ARZ-H2			Test Designed by: Abdul Rahma Al Zaatari				
Test Priority (Low/Medium/High): High			Test Designed date: 11/11/2024				
Module Name: Public Q&A page			Test Executed by:				
Test Title: Answering, pinning and deleting questions			Test Execution Date:				
Description: Test the pharmacist's public Q&A page functionality							
Pre-Conditions: Pharmacist is logged in to the system, is assigned the communications task, and is on the Q&A page							
Dependencies: Questions exist on the Q&A page from customers							
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes	
1	Pharmacist presses on a question	None	Full view of the question is displayed with options to answer, pin or delete				
2	Enter answer to question: "Is it okay if I take more than 3 panadol pills a day"	"It can be risky and should be done under the supervision of a medical professional!"	Answer is submitted and displayed publicly on the page				
3	Press pin button	None	Question and answer are pinned and displayed at the top of the Q&A board				
4	Press delete button	None	Question is deleted from the Q&A page				

Project Name: Customer-TestCases							
Test Case ID:ARZ-H3			Test Designed by: Ali Ghandour				
Test Priority (Low/Medium/High): High			Test Designed date:11/11/2024				
Module Name: Public Q & A page			Test Executed by:				
Test Title: Verification of Public Access to questions and answers on the Q&A page			Test Execution Date:				
Description: Testing if user can access questions and answers							
Pre-Conditions: System is running, verified pharmacists and valid customers exist, there are question posts and responses on Q&A page							
Dependencies: Access to the public Q&A page with a minimum of one question-answer pair							
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes	
1	Go the public Q&A page	None	This page should open with no need for log-in				
2	Check the visibility	Press on question with ID: Q1	Question is displayed				
3	Check answer visibility	None	Answer of question (if it exists) is displayed under the question with pharmacist name				

I. Ease of Use, Performance, and Reliability Tests

Project Name: ARZ-TestCases						
Test Case ID: ARZ-I1			Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): High			Test Designed date: 11/03/2024			
Module Name: User Interface			Test Executed by:			
Test Title: Verification of Accessibility Options			Test Execution Date:			
Description: Ensure accessibility features work correctly.						
Pre-Conditions: System is running						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Enable keyboard shortcuts and verify navigation through UI	Ctrl+V Ctrl+Z Ctrl+A Ctrl+C	Keyboard shortcuts navigate UI elements properly.			
2	Use a screen reader to navigate the system	None	Screen reader reads out UI elements accurately and fully			
3	Adjust font sizes in the UI settings	None	Font sizes adjust successfully without layout issues, making text readable for visually impaired users			

Project Name: ARZ-TestCases						
Test Case ID: ARZ-I2			Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): High			Test Designed date: 11/03/2024			
Module Name: User Interface			Test Executed by:			
Test Title: Providing multi-language translation			Test Execution Date:			
Description: Check if the system accurately translates to non-English languages.						
Pre-Conditions: System is running						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to the system	None	System is displayed			
2	Change the language to a language other than English	Arabic language	System is displayed in the Arabic language			

J.   Security Tests

Project Name: ARZ-TestCases						
Test Case ID: ARZ-J1		Test Designed by: Abdul Rahman Al Zaatari				
Test Priority (Low/Medium/High): High		Test Designed date: 11/03/2024				
Module Name: Security		Test Executed by:				
Test Title: Verify HTTPS for all data transmissions		Test Execution Date:				
Description: Ensure all system communications are encrypted using HTTPS						
Pre-Conditions: System is online with SSL certificate configured						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Navigate to the system URL	None	URL starts with HTTPS			Ensure no "Not Secure" alert.
2	Attempt data transmission and inspect packet	None	Data is encrypted and secured			Capture packet in network log

Project Name: ARZ-TestCases						
Test Case ID: ARZ-J2		Test Designed by: Abdul Rahman Al Zaatari				
Test Priority (Low/Medium/High): High		Test Designed date: 11/03/2024				
Module Name: Security		Test Executed by:				
Test Title: Verify session management and session regeneration		Test Execution Date:				
Description: Confirm the system properly manages sessions for user security						
Pre-Conditions: System is online with SSL certificate configured						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Log in to the system and note the session ID	User Credentials	Unique session ID generated			
2	Log out and log in again, checking if the session ID is regenerated	User Credentials	A new session ID is assigned upon each login			
3	Leave session inactive and verify auto-logout after inactivity (e.g., 15 minutes)	User session expires automatically after inactivity period				Activity time is adjustable

Project Name: ARZ-TestCases						
Test Case ID: ARZ-J3			Test Designed by: Abdul Rahman Al Zaatari			
Test Priority (Low/Medium/High): Medium			Test Designed date: 11/03/2024			
Module Name: Security			Test Executed by:			
Test Title: Verify regular data backups			Test Execution Date:			
Description: Ensure the system performs scheduled data backups						
Pre-Conditions: System is online with SSL certificate configured						
Step	Test Steps	Test Data	Expected Result	Actual Result	Status (Pass/Fail)	Notes
1	Trigger a manual backup process	None	Backup completes successfully with no errors			Verify backup timestamp
2	Attempt to retrieve backed-up data from destination	None	Data is accessible and retrievable from backup location			Restore from backup to verify

X.   References

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