Ministry of Higher Education and Scientific Research

Higher Institute of Technological Studies of Rades

End-of-Semester Project Report

PharmLab

3rd Year Bachelor's Degree in Information Technology

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Academic Year: 2023-2024

Acknowledgments

At the end of this academic year, I would like to express my deep gratitude for your support your guidance that was provided throughout the integration project. Your expertise and advice were crucial in developing our skills and completing this project.

It has been a rewarding experience, allowing for the practical application of knowledge acquired during the year. Thank you for providing us with the opportunity to tackle challenging tasks and develop innovative solutions.

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Introduction

This report signifies the culmination of a semester dedicated to learning and investment as part of the integration project, which served as the practical application field for the knowledge and skills acquired throughout the academic year. Centered around the design and development of an innovative web application, this project provided a hands-on experience in the tangible realm of creating technological solutions.

Within this report, we will delve into the diverse stages of the project, starting from its conceptualization to its execution. We will illuminate the challenges faced, innovative solutions embraced, and the skills honed during this transformative journey. Furthermore, it is essential to highlight that the incorporation of the Scrum methodology played a pivotal role in our approach, emphasizing the need to continually learn and adapt throughout the project's lifecycle.

1. Project Presentation:

1.1. Introduction:

The integration project, detailed in this report, signifies the culmination of a year dedicated to applying acquired knowledge and skills. Our mission was to conceive and develop an innovative web application, providing an efficient solution to a specific need. This project served as a catalyst for our learning, immersing us in the software creation process.

1.2. Project Context:

This project emerged from a thorough analysis of current needs in pharmaceutical product management and distribution. Faced with fragmented processes in the pharmaceutical industry, we aimed to design a modern and centralized solution, enabling pharmaceutical laboratories to manage products seamlessly and pharmacies to procure efficiently.

1.3. Project Objective:

Our fundamental goal was to develop a web application named "PharmaLab," providing an intuitive platform for the efficient management of pharmaceutical products. We envisioned creating a comprehensive solution that meets user expectations while leveraging modern technologies.

2. Pre-Study:

2.1. Introduction:

This chapter addresses the most significant issues encountered during the initial phase, proposing appropriate solutions.

2.2. Description of the Existing Situation:

The current state of pharmaceutical product management is characterized by fragmented processes, requiring direct communication between laboratories and pharmacies. This lack of centralization results in delays and inefficient communication.

2.3. Critiques of the Existing Situation:

The main criticisms of this system include three major issues:

- Lack of Centralization: Users lack access to a centralized point for managing pharmaceutical products, hindering efficient operations.

- Interaction Complexity: The requirement for direct communication between laboratories and pharmacies complicates the process, impeding speed and ease of use.

- Availability Issue: The current process relies on physical interactions, limiting flexibility and service availability, affecting responsiveness.

2.4. Proposed Solution:

To address these issues, we proposed implementing a web application, automating product management for more efficiency and security.

2.5. Application Features:

This chapter focuses on the various features implemented to simplify and optimize pharmaceutical product management:

- Needs Analysis: Our analysis identified different requirements for *PharmaLab*, categorized into functional and non-functional requirements.

- Functional Requirements:
  - Authentication and Authorization:
    - Users must register and log in to the site using secure credentials.
    - Roles and permissions need to be defined (pharmacies, pharmaceutical laboratories, or administrators).
  - Profile Management:
    - Allow users to create and manage their profiles (contact information, address, etc.).
    - Laboratories should be able to submit their information, including products and pricing.
  - Product Catalog:
    - Display a comprehensive list of available pharmaceutical products.
    - Provide details for each product (name, description, ingredients, price, etc.).
  - Order Management:
    - Enable pharmacies to place online orders for products (purchase them).

- Non-Functional Requirements:
  - Security: Confidentiality and data security.
  - Ease of Use: Intuitive interface and user assistance.
  - Performance: The system must meet criteria for response time, throughput, and efficiency to ensure optimal performance.

3. Methodology & Conception:

3.1. Methodology:

In the development of our revolutionary Pharmaceutical Management Web Application, we embraced the Scrum methodology, a strategic decision that significantly influenced the course of our project.

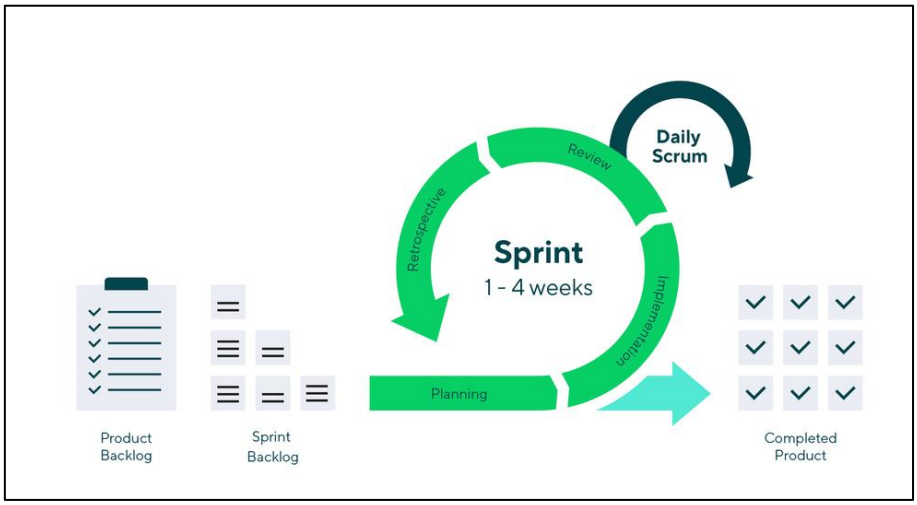

Figure 1: SCRUM

3.2. Conception:

3.2.1. Introduction:

In this chapter, we will present the milestones achieved using the Scrum methodology. This approach aims to define and organize the various phases of the project, providing an iterative and collaborative approach to the development of the Pharmaceutical Management Web Application.

3.2.2. **Sprint 1:** User Authentication and Registration

Given the nature of the Pharmaceutical Management Web Application, the first sprint focuses on implementing essential authentication and registration features tailored to the needs of pharmaceutical laboratories and pharmacies.

- Items:

Sprint	User STORY	USER STORY POINTS
Authentication	As an administrator, I want to login successfully to my account.	S
	As a visitor, I want to be able to login.	S
	As a visitor, I want to be able to register as a pharmacy.	S
	As a visitor, I want to be able to register as a laboratory.	S
	As a pharmacy, I want to login successfully to my account.	S
	As a laboratory, I want to login successfully to my account.	S

- Use Case Diagram (Sprint 1):

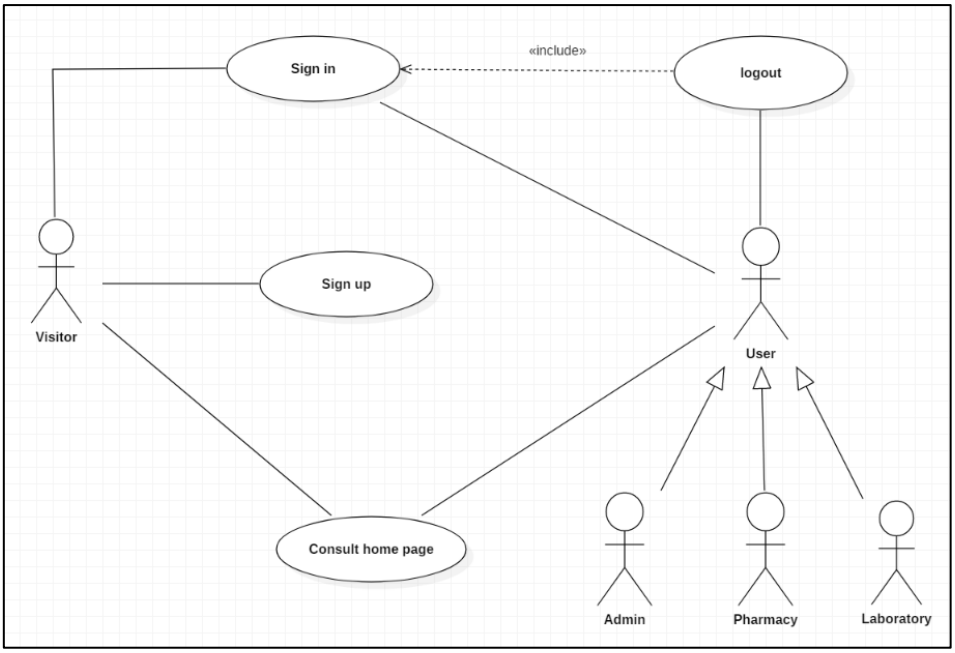

Figure 2: use case sprint 1

- Class Diagram (Sprint 1):

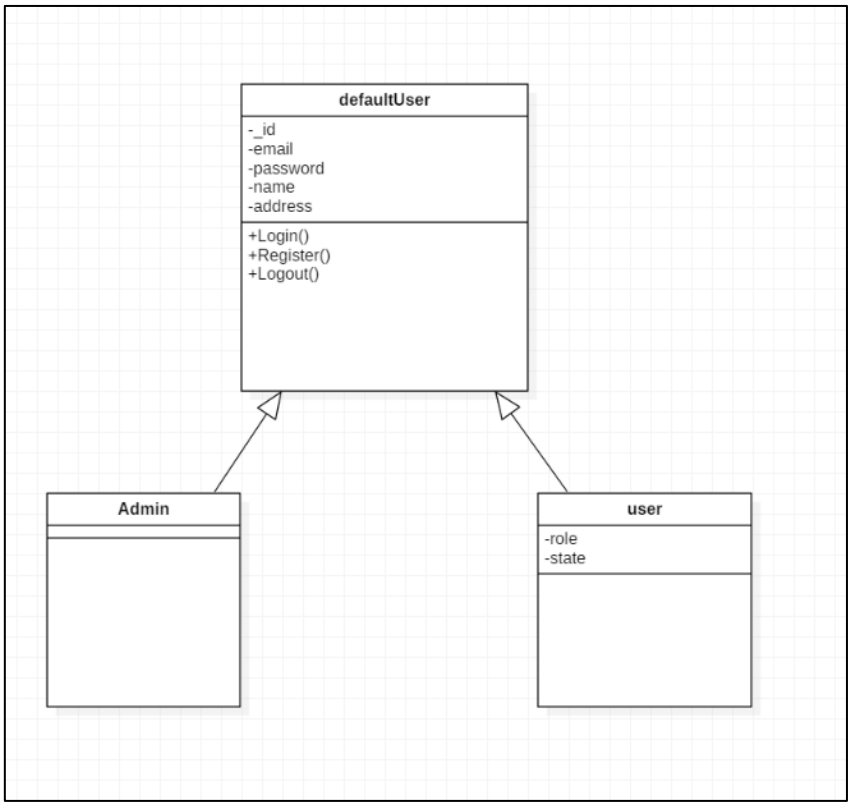

Figure 3: diagram class sprint 1

3.2.3. **Sprint 2**: Management of users:

Pharmaceutical Management Web Application, our focus shifts towards enhancing user management functionalities, specifically designed for the

effective oversight and control of the pharmaceutical supply chain. This sprint addresses the unique requirements of management users who play a crucial role in ensuring the seamless operation of the platform.

- Items:

Sprint	User STORY	USER STORY POINTS
User Management	As an administrator, I want to access my personal data so I can manage them.	S
	As a pharmacy, I want to access my personal data so I can manage them.	S
	As a laboratory, I want to access my personal data so I can manage them.	S
	As an administrator, I want a dedicated management page for pharmacies so that I can manage them.	M
	As an administrator, I want a dedicated management page for pharmaceutical laboratories so that I can manage them.	M

- Use Case Diagram (Sprint 2):

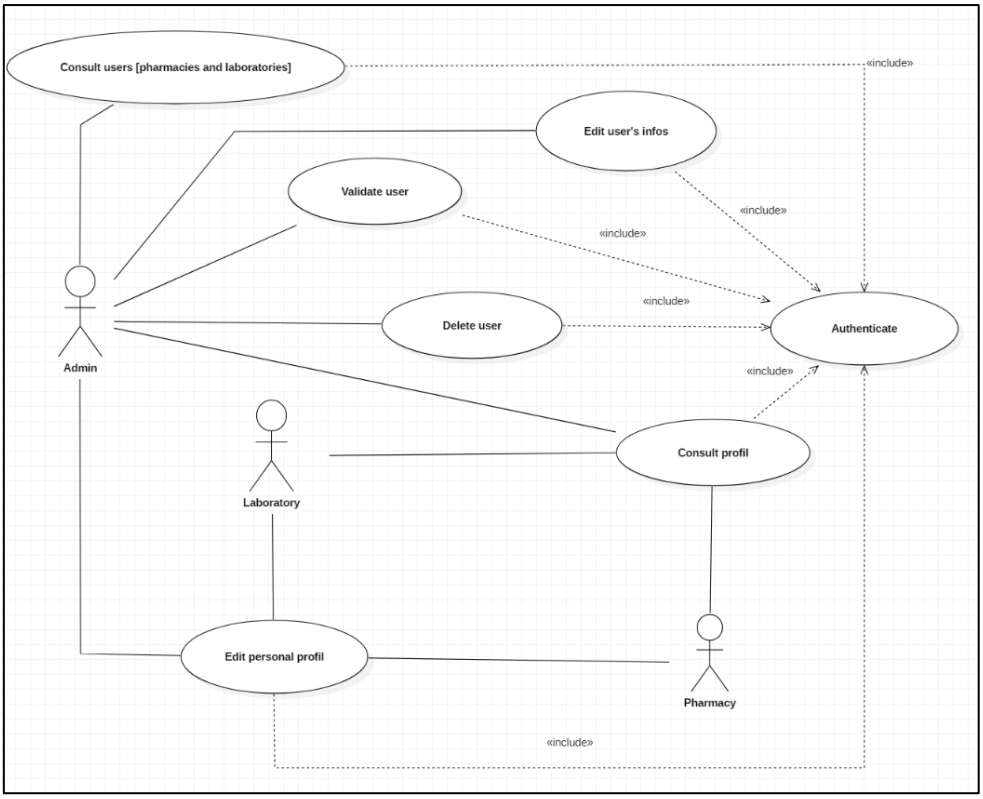

Figure 4: use case sprint 2

- Class Diagram (Sprint 2):

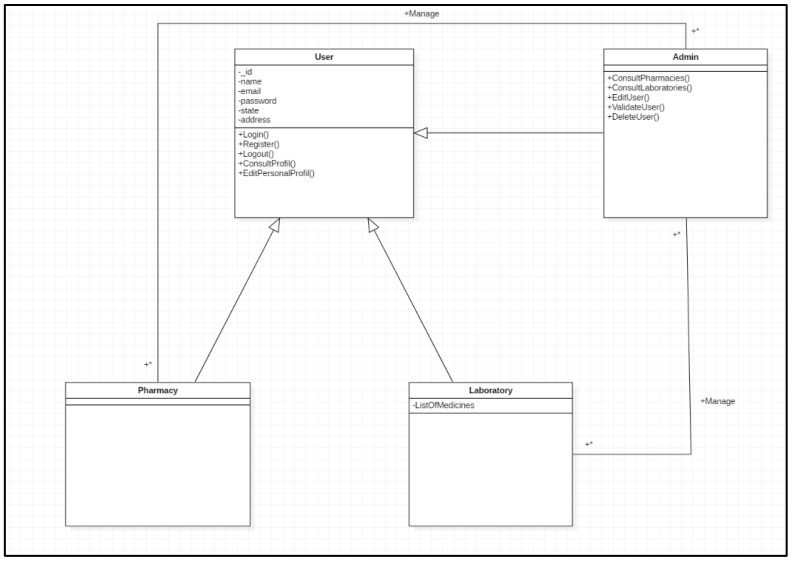

Figure 5: class diagram sprint 2

3.2.4. **Sprint 3**: Medicines Management and Purchase

Pharmaceutical Management Web Application gears towards optimizing the management of medicines and enhancing the purchasing capabilities within the pharmaceutical supply chain. This sprint is dedicated to

providing specialized features tailored for pharmaceutical laboratories, pharmacies, and administrators involved in overseeing medicine-related aspects.

- Items:

Sprint	User STORY	USER STORY POINTS
Medicine Management	As an administrator, I want to access my personal data so I can manage them.	S
	As a visitor, I want to search for a specific laboratory.	M
	As a visitor, I want to search for a specific medicine.	M
	As a pharmacy, I want to search for a specific laboratory.	M
	As a pharmacy, I want to search for a specific medicine.	M
	As a pharmacy, I want to be able to buy medicines.	L
	As a laboratory, I want to be able to add medicines.	S
	As an administrator, I want to be able to add medicines.	S
	As a laboratory, I want a dedicated management page for my own medicines so that I can manage them.	M
	As an administrator, I want a dedicated management page for medicines so that I can manage them.	M
	As a laboratory, I want to be able to see the purchase history.	M

- Use Case Diagram (Sprint 3):

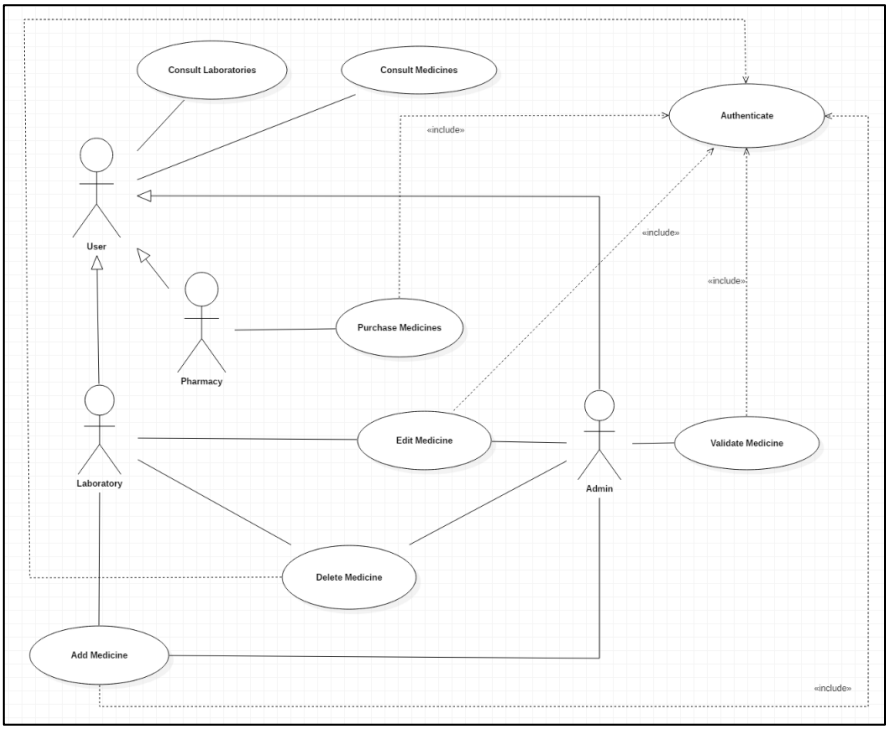

Figure 6: use case sprint 3

- Class Diagram (Sprint 3):

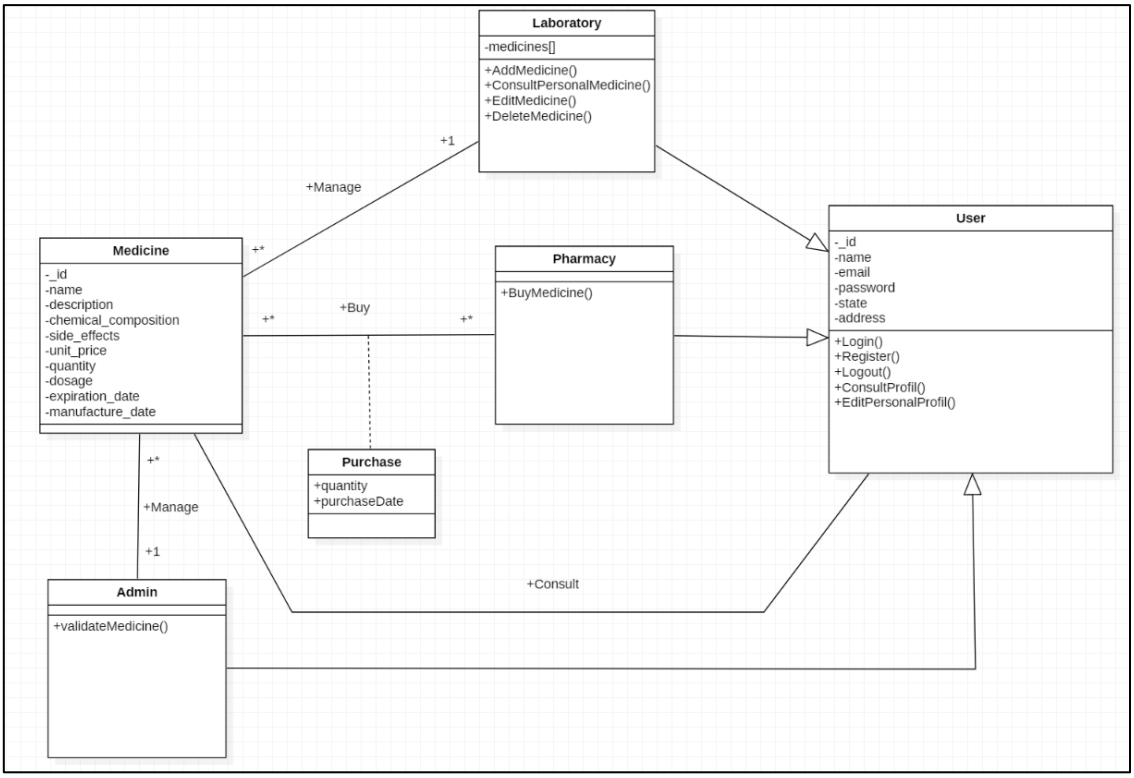

Figure 7: class diagram sprint 3

4. Implementation:

4.1. Introduction:

In this chapter, we will define the working environment, specifying the hardware and software used for the project implementation.

4.2. Environment Used:

- Hardware Environment:

For the implementation of this project, I utilized an MSI PC equipped with 16 GB of RAM and a I5 processor.

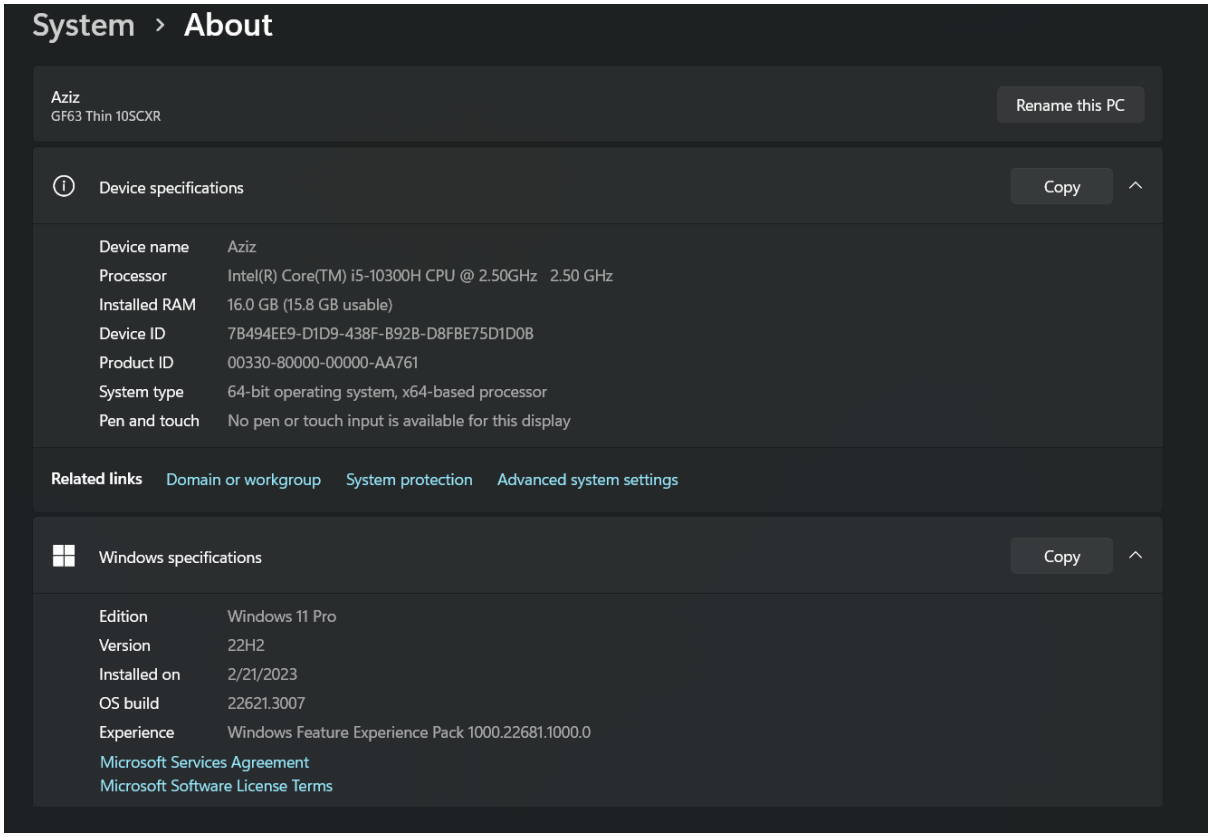

Figure 8: hardware

- Software Environment:
  - MongoDB is a NoSQL, document-oriented database that stores data in the formof JSON documents.

Figure 9: mongo

- Express.js is a web framework for Node.js that simplifies the creation of web applications and APIs. It provides middleware features to handle HTTP requests and responses.

Figure 10: express

- Angular is a front-end web application framework developed and maintained by Google. It allows developers to build dynamic, single-page web applications using TypeScript, a superset of JavaScript. Angular provides a structured and modular approach to web development, enhancing the efficiency of creating interactive and responsive user interfaces.

Figure 11: angular

- Node.js is a server-side JavaScript runtime environment built on Chrome's V8 JavaScript engine. It enables the execution of JavaScript code on the server side.

Figure 12: node js

- Visual Studio code is a lightweight, open-source code editor developed by Microsoft, widely used for programming and development tasks.

Figure 13: vs code

- MongoDB Compass is the official graphical user interface (GUI) for MongoDB. It provides a visual way to interact with and manage MongoDB databases.

Figure 14: mongoDBCompass

- Postman is a popular collaboration platform for API development. It simplifies the process of testing, documenting, and sharing APIs by providing a user-friendly interface for sending HTTP requests and inspecting responses.

Figure 15: postman

- Cypress is a JavaScript end-to-end testing framework commonly used for web applications. It allows developers to write and run tests that interact with the application in a real browser, aiding in automated testing and ensuring software reliability.

Figure 16: cypress

- StarUML is a UML modeling tool used for creating and managing software models visually.

Figure 17: starUML

4.3. Graphical interfaces :

4.3.1. Login Interface :

The user here will write his credentials and try to log in, if the email is not valid, a Toast will be displayed to console the error message, if the email does not exist and if the password is incorrect have the same behaviour as well.

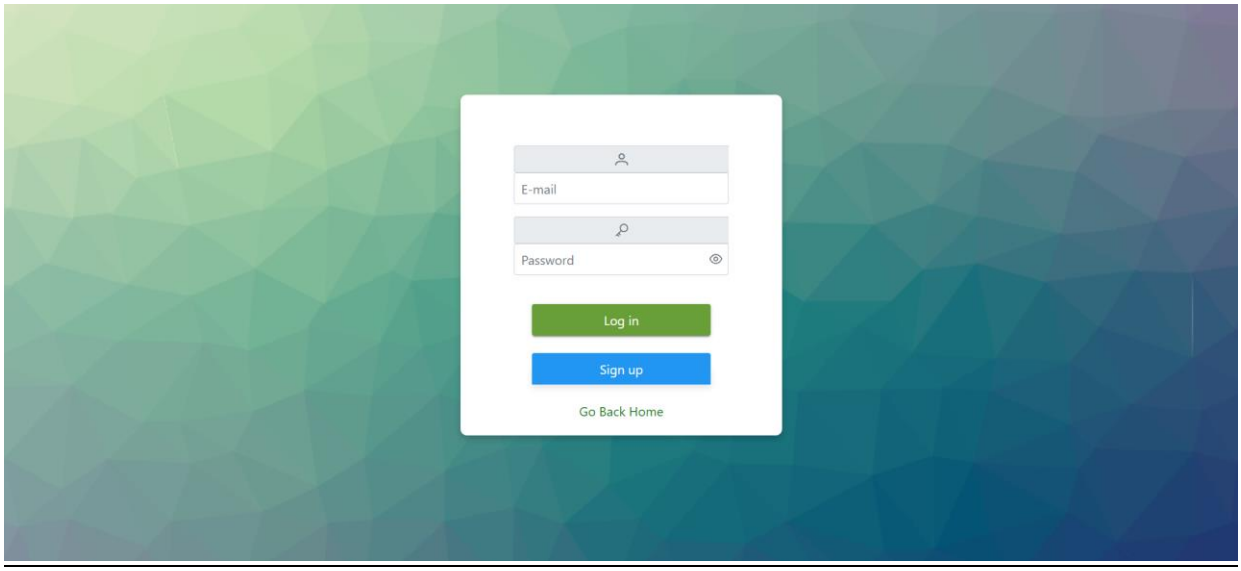

Figure 18: login Interface

4.3.2. Register Interface :

The user here can register, either as a pharmacy, or as a laboratory, some constraints are applied on this form also.

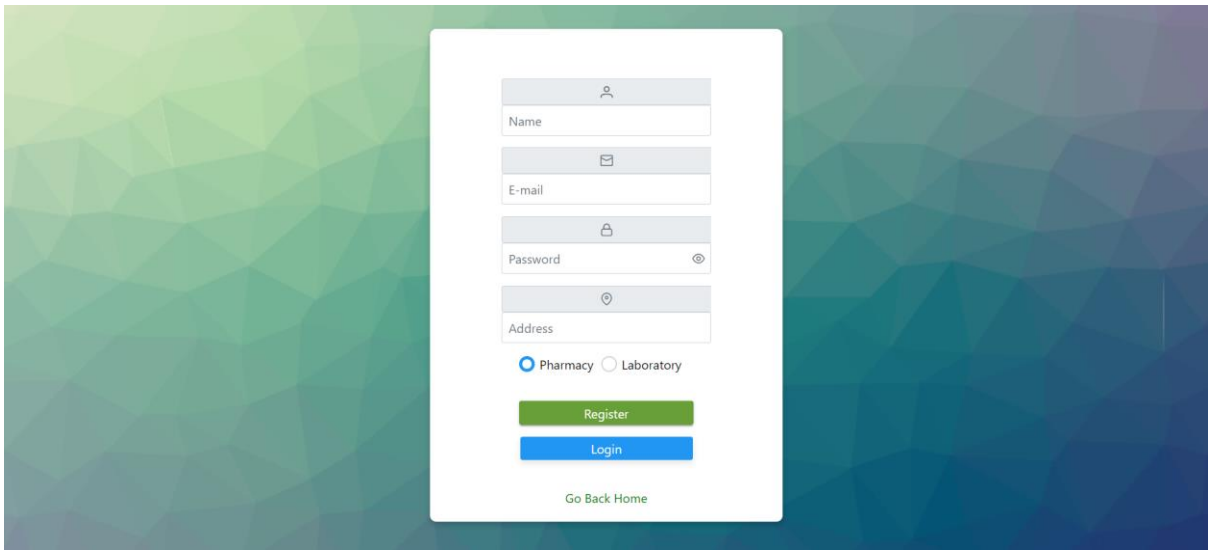

Figure 19: Register

4.3.3. Home Interface :

This page contains 3 parts, the first part is a descripton of the application, the second one is a list of all the valid medicines, you can search for a specific medicine by typing the string in the search box. And the last part, it contains the list of all the valis laboratories (has the search

functionality as well). These parts (list of laboratories and medicines) can be accessed individually.

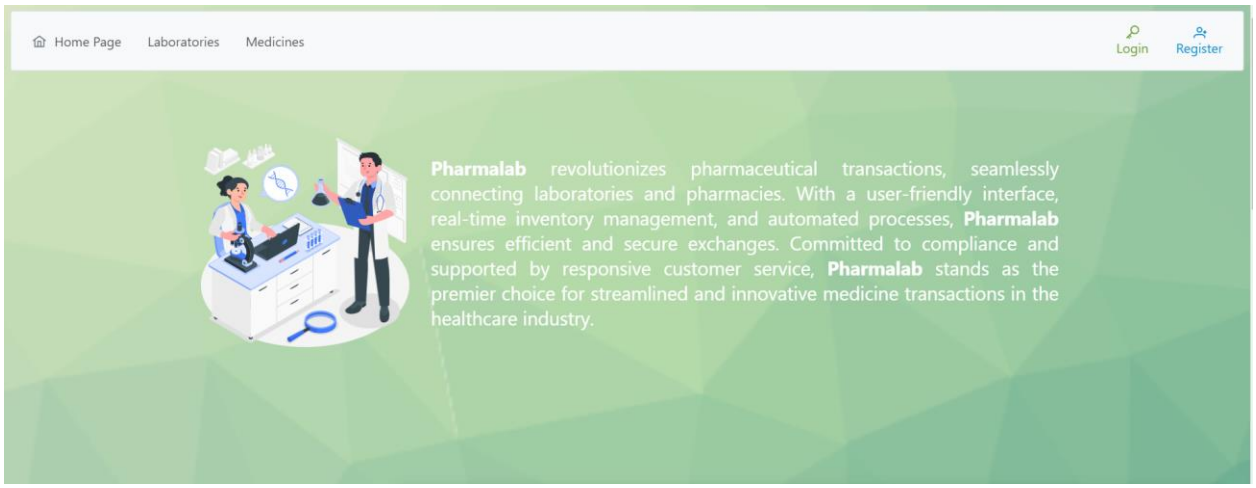

Figure 20: home page 1

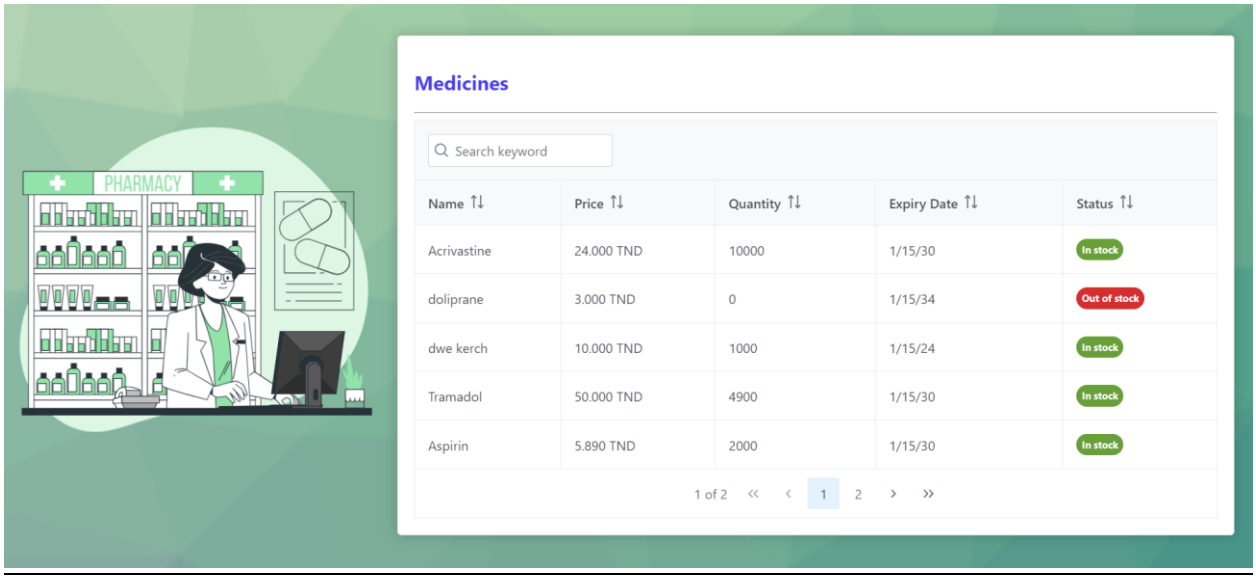

Figure 21: home page 2

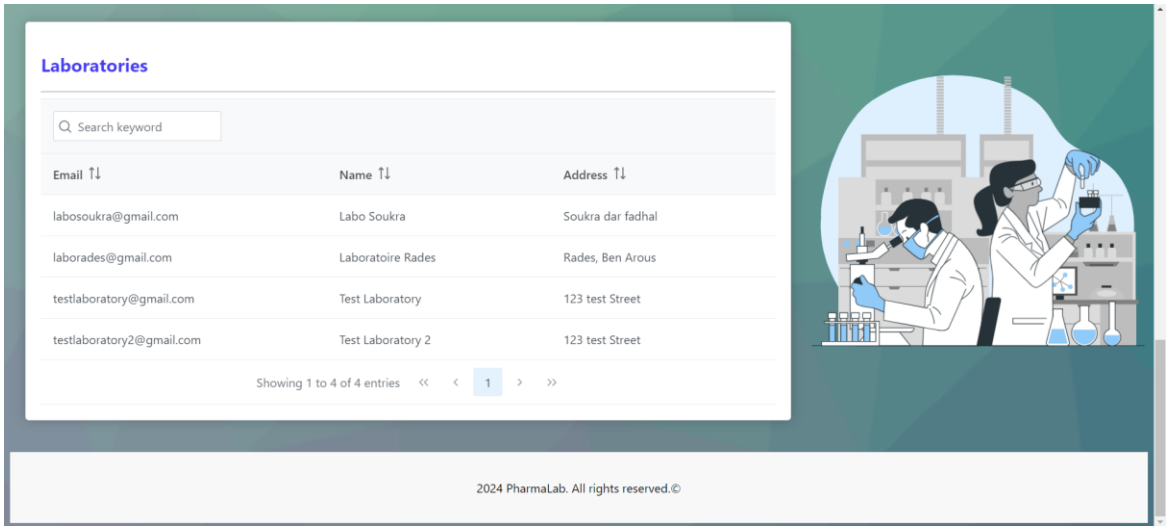

Figure 22: home page 3

4.3.4. List of All the Users (Pharmacies and Laboratories) Interface :

In this page, only the admin can access this page. The first tab displayes all the pharmacies, and the other tab dislays all the laboraories.

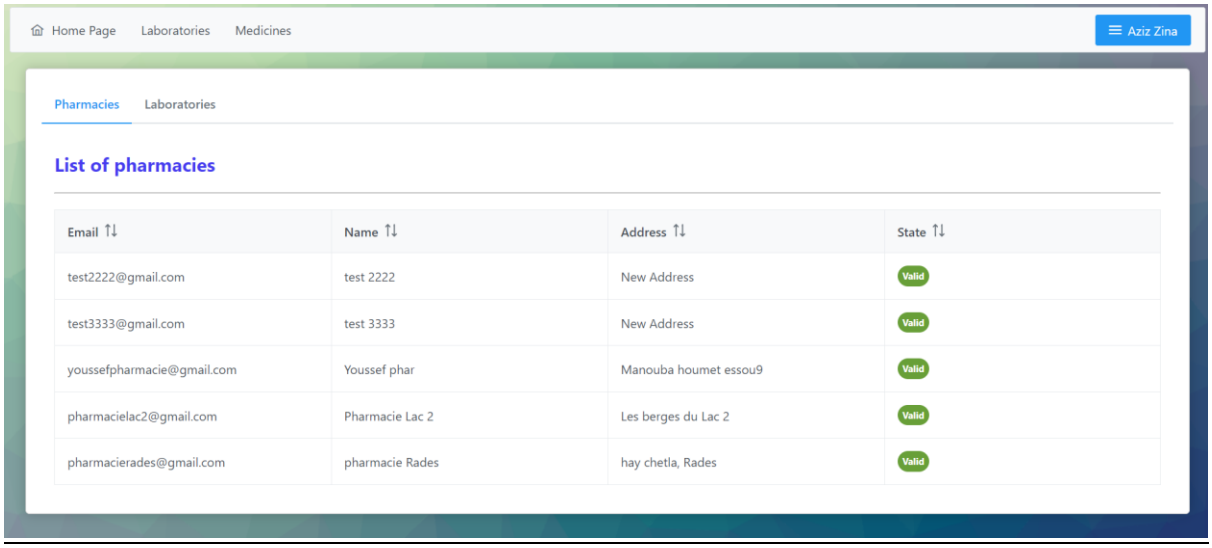

Figure 23: list pharmacy admin

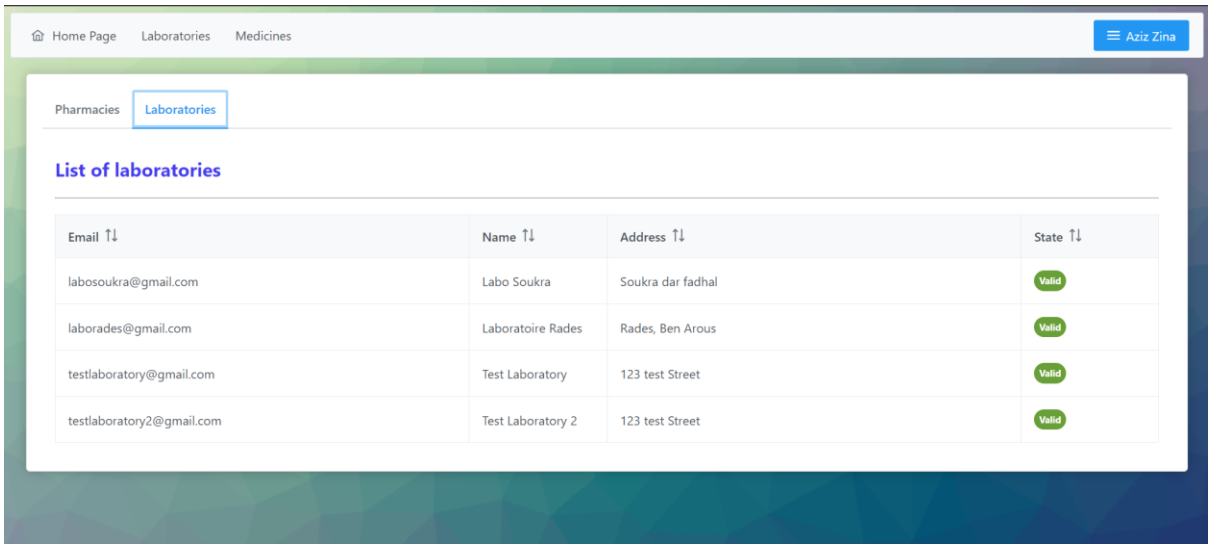

Figure 24: : list laboratory admin

If you click on one of the rows (pharmacy or laboratory), a dialog is diaplyed with all the details related to that selected user:

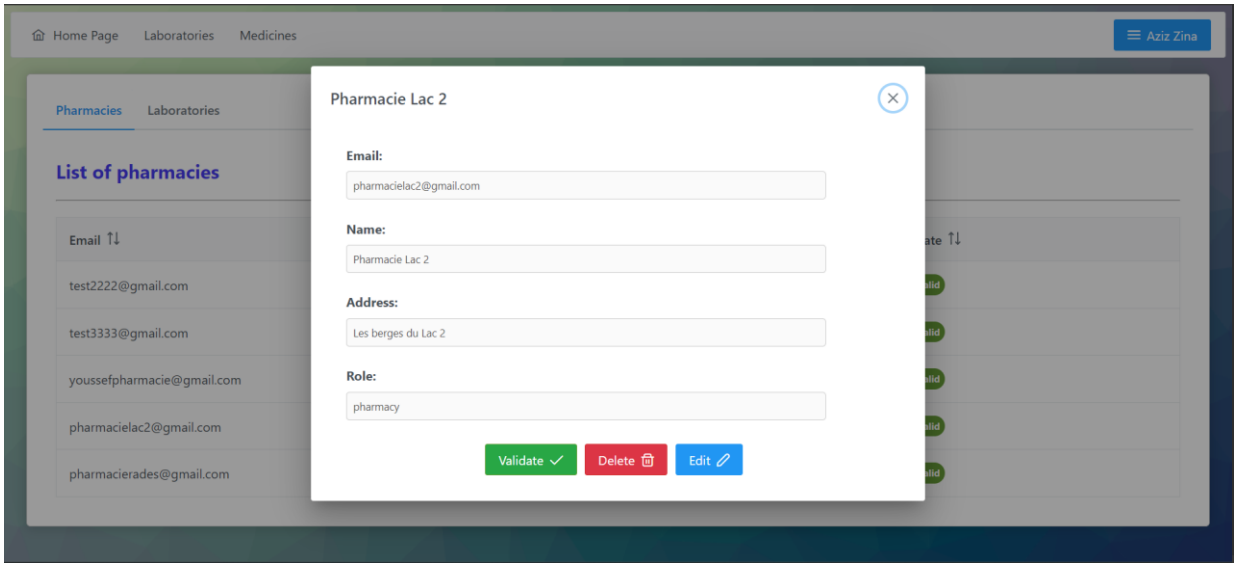

Figure 25: Dialog user details

Here the admin can, Validate, delete or even Update the user.

4.3.5. Personal Informations Interface :

This page has all the details related to the current user.

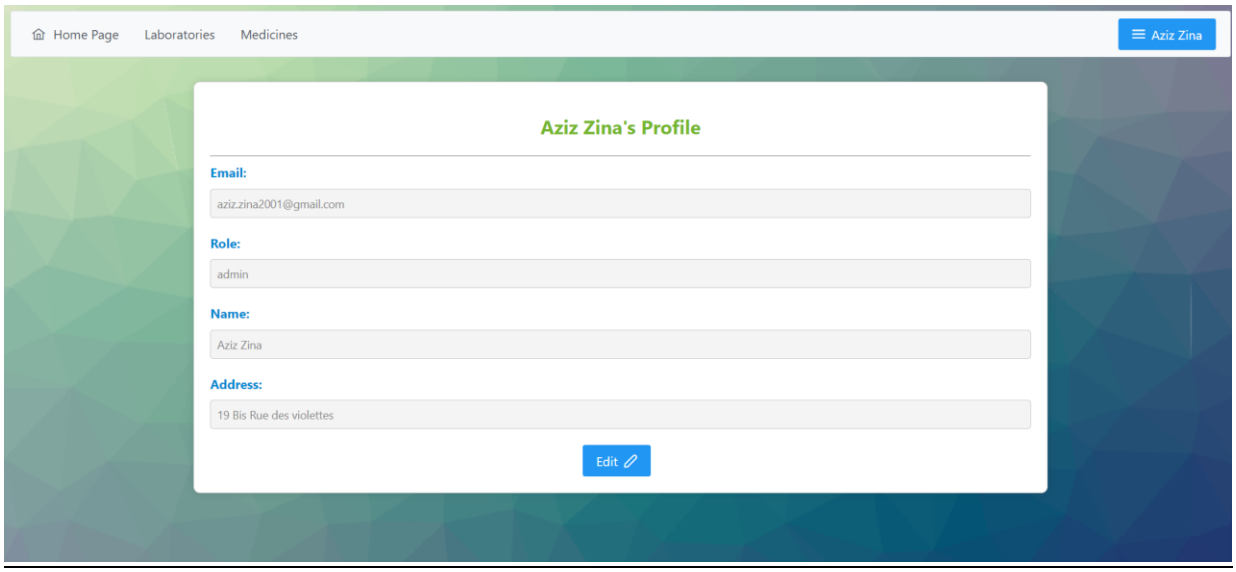

Figure 26: user profile

When the user clicks on the edit button he will be able to edit some of his informations.

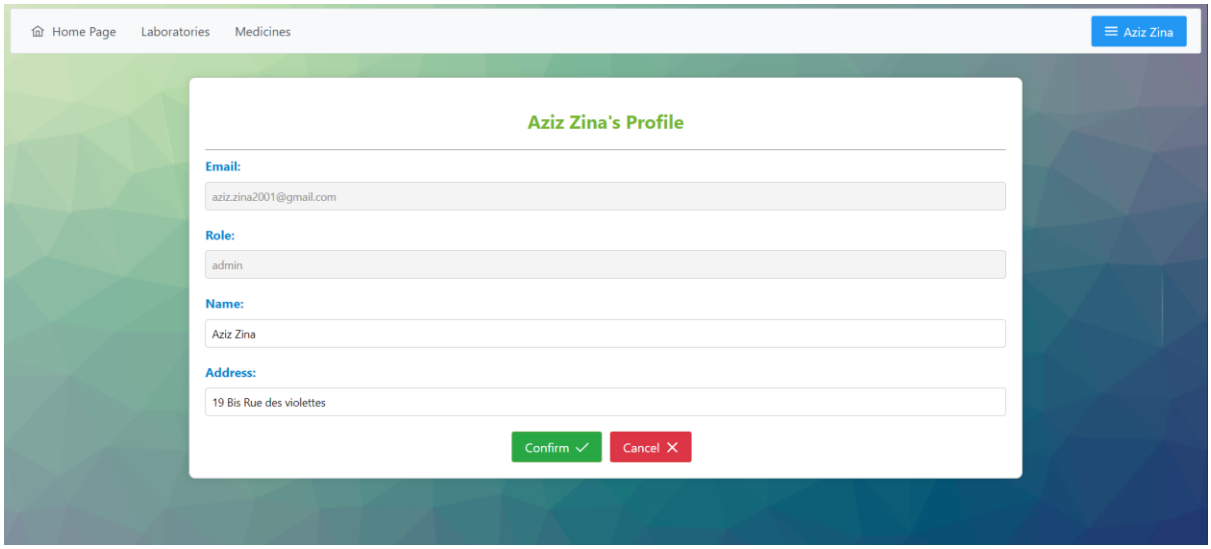

Figure 27: user' profile edit

4.3.6. List of all the Medicines Interface:

Only the admin can access this page, it displays all the medicines in the database.

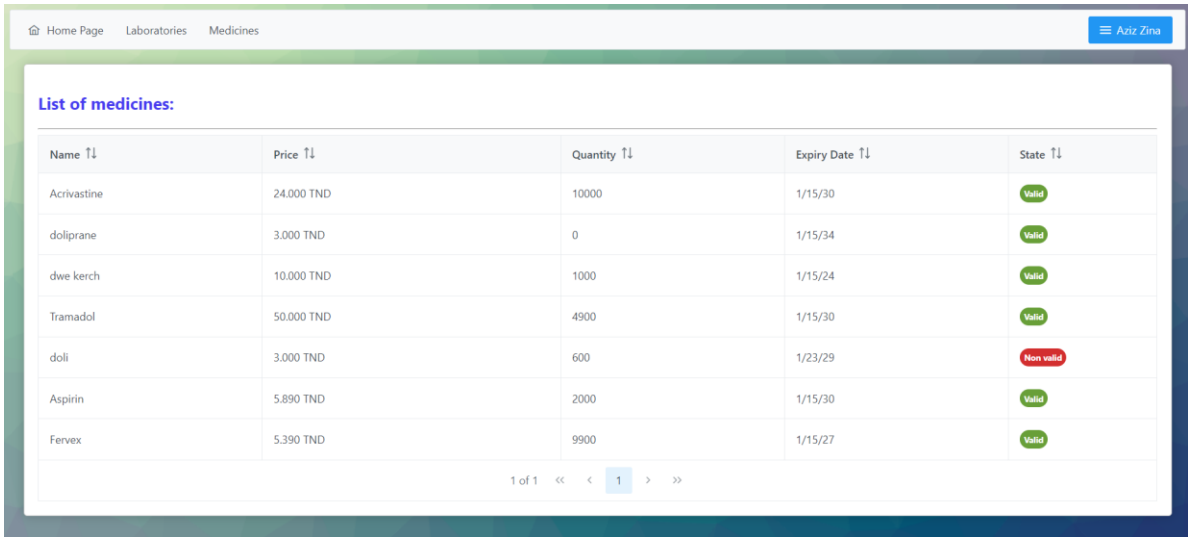

Figure 28: list of medicines admin

If the admin clicks on a medicine, a Dialog pops up with all the details related to that medicine.

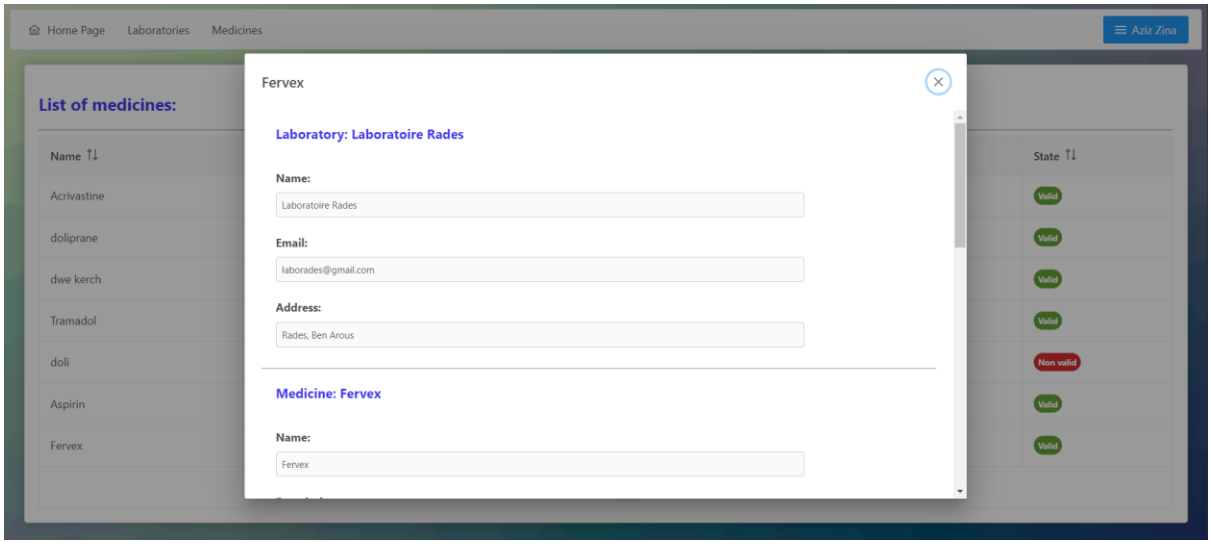

Figure 29: medicine details 1

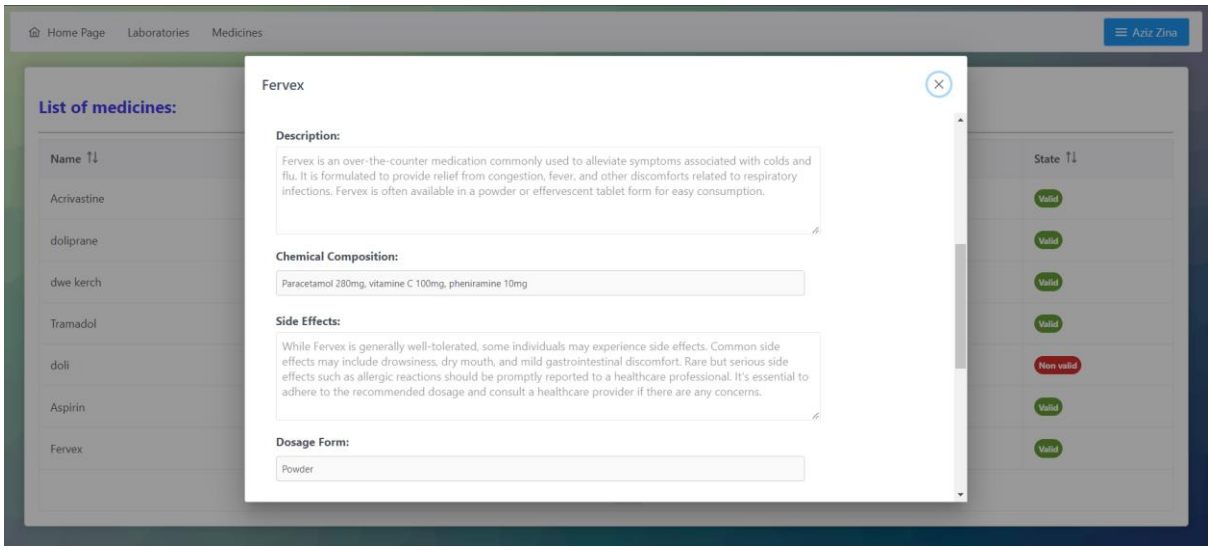

Figure 30: medicine details 2

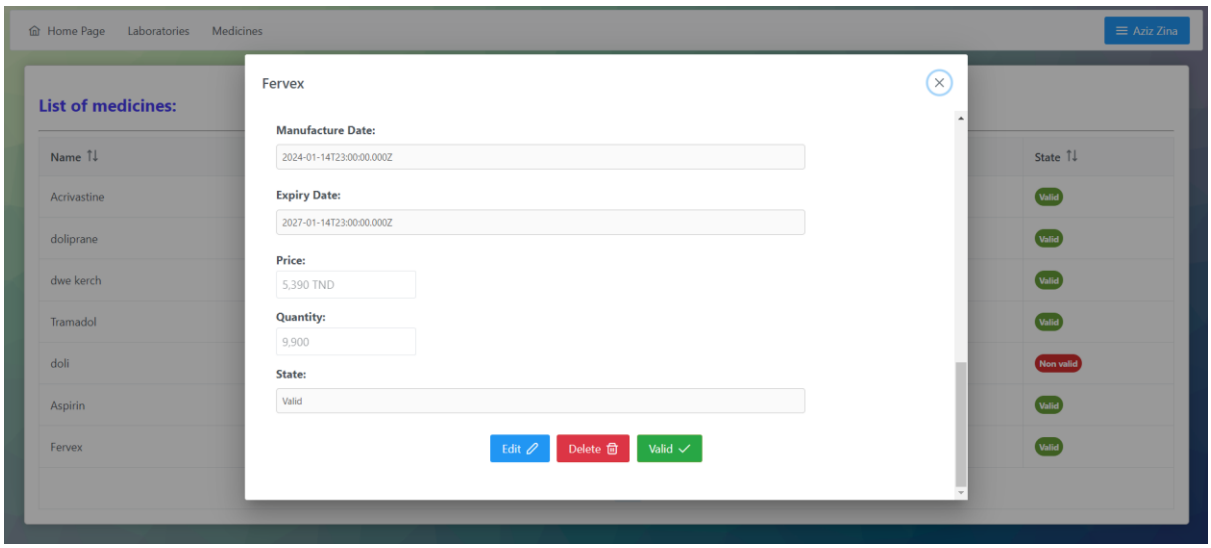

Figure 31: medicine details 3

Here the admin can Validate, delete or edit the medicine selected.

4.3.7. Add a Medicine Interface:

The User here (admin or laboratory) can add medicines by filling this form.

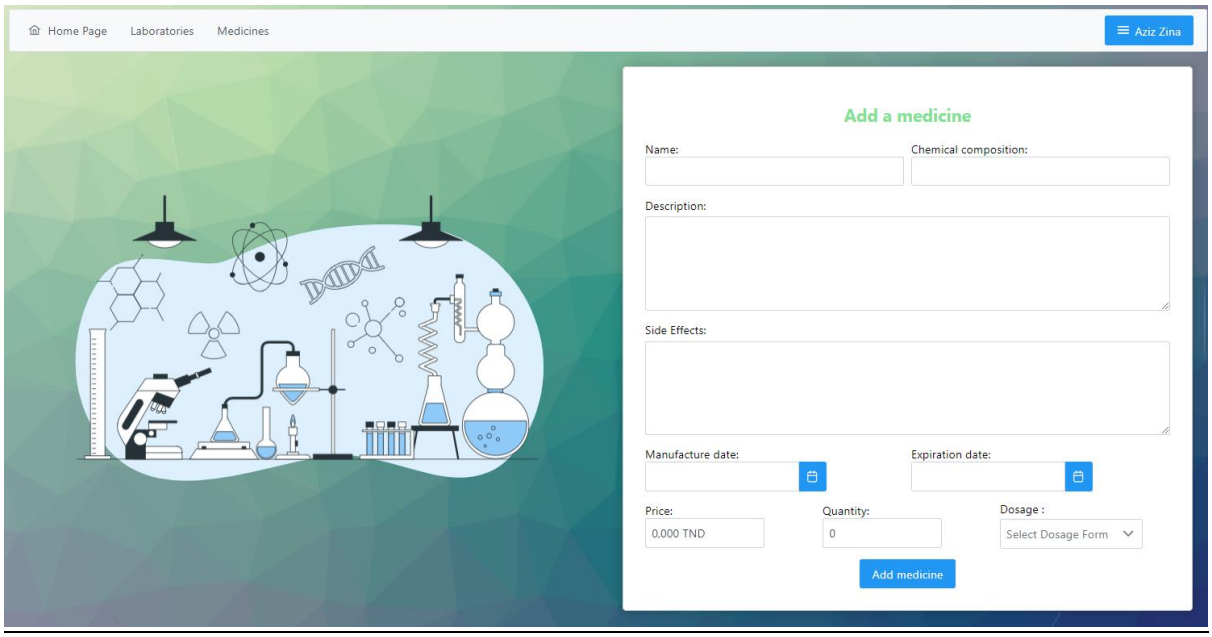

Figure 32: add medicine

4.3.8. List of a laboratory's medicines Interface :

This is the list of all the medicines related to the current laboratory (the one logged in while using the application)

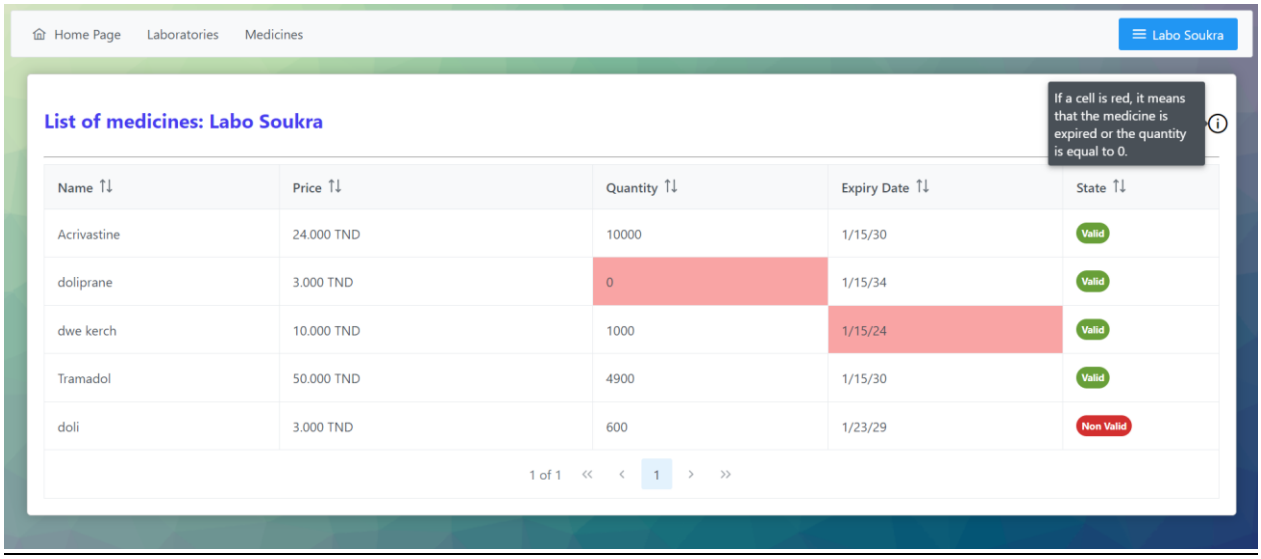

Figure 33: laboratory's medicines

When Clicking on one of the medicines, a Dialog pops up and displays all the details related to that selected medicine (Just like the one but at the end it displayes the list of buyers of that Medicine).

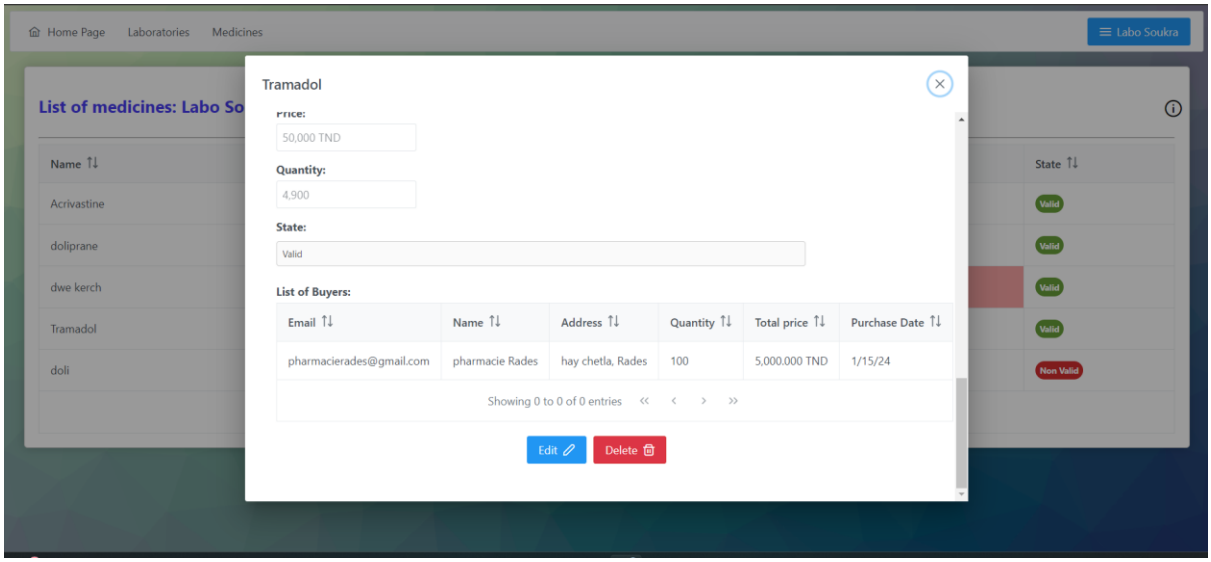

Figure 34: list of buyers

Here the Laboratory can delete or edit the informationsof that medicine

4.3.9. Purchase Medicine Interface :

Upon clicking on a medicine, as we said before, a Dialog is displayed, this time at the end, a button “Purchase” is displayed. After clicking, this form is displayed:

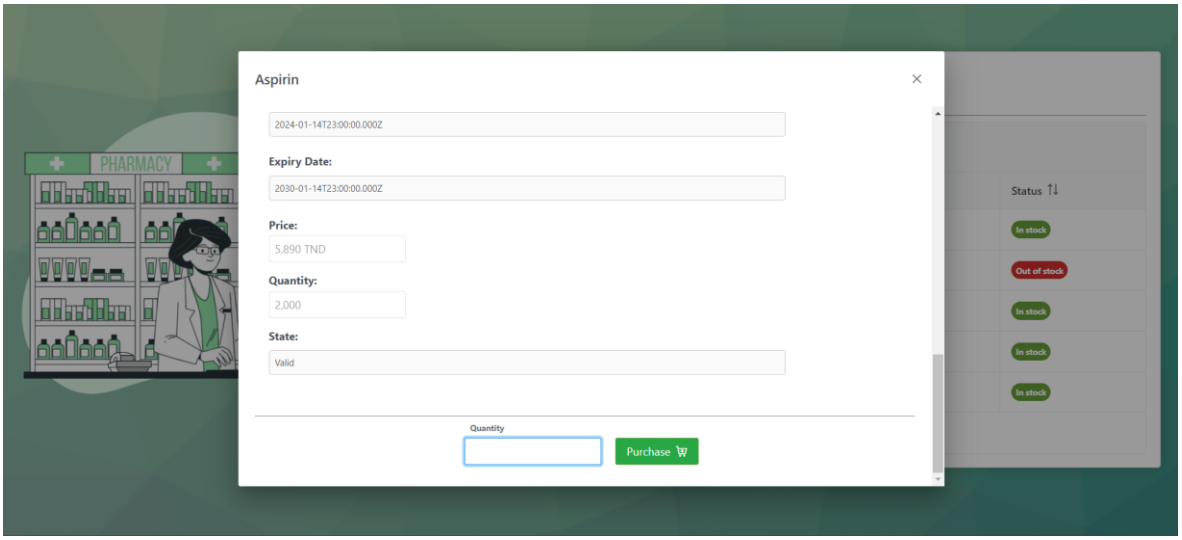

Figure 35: purchase

If the medicine is expired or out of stock or both, the buttton will be disabled.

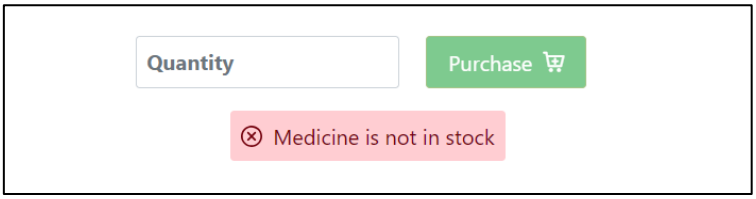

Figure 36: out of stock

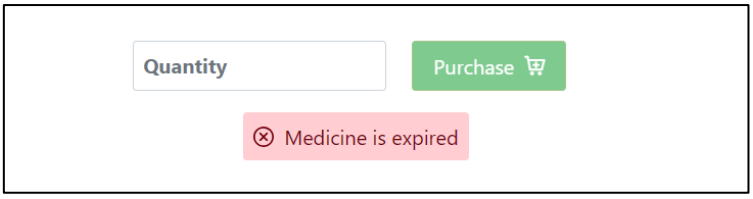

Figure 37: expired

4.3.10. Purchase History Interface

This is the list of the purchases of the current user (Had to be a Pharmacy).

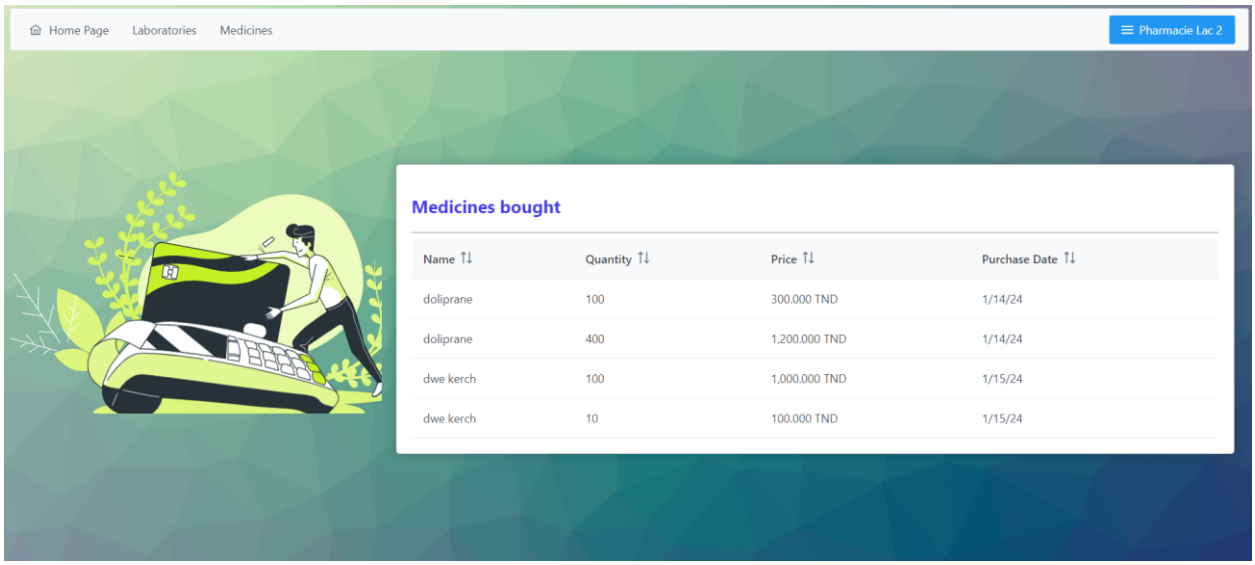

Figure 38: purchase history

Conclusion:

The "Pharmlab" project has been an exciting journey, providing a comprehensive solution to enhance collaboration between pharmaceutical laboratories and pharmacies. Through the implementation of a centralized platform, our application empowers laboratories to create profiles, manage detailed information about pharmaceutical products, handle inventory, and efficiently process orders. Pharmacies, on the other hand, benefit from the ability to seamlessly explore a comprehensive catalog, place orders, and effortlessly track deliveries.

Embracing principles similar to the "Pharmaceutical Management Web Application," our system prioritizes secure authentication, robust payment processing, real-time notifications, and robust reporting features. These elements collectively contribute to establishing a streamlined and transparent pharmaceutical supply chain, addressing the unique needs of both laboratories and pharmacies.

Throughout this project, we've not only honed our technical skills but also gained valuable insights into the collaborative dynamics necessary for successful development. Just as the user-friendly design ensures accessibility across various devices in the pharmaceutical ecosystem, Pharmlab aims to provide an intuitive and efficient platform that elevates the experience for both laboratories and pharmacies in the pharmaceutical industry.