

Chapter 1

introduction

Purpose:-

- Simplify the process of displaying prices on screens instead of using labels that require continuously changing.
- Facilitate buying and selling process by providing clear and detailed information about prices to enable purchasing decisions for customers.
- Increase efficiency and accuracy in pricing and displaying products.

Scope:-

- Designing and developing a system that enables the display of prices on screens instead of labels .
- Integration the system with database for managing and updating prices.

Objectives:-

- Develop a software that allows prices to be dynamically displayed on screens.
- Enable easy management and updating of prices.
- Provide customers with a user friendly and flexible interface to access price information.

Definitions:-

- **Price display screens:-**

Electronic screens or monitors used to display product prices instead of traditional labels.

- **Electronic Smart label System:-**

Technology used to display product info such as price, product name, and other relevant details electronically on digital screen.

- **Electronic Shelf Labels (ESL):-**

The physical components of the electronic smart label system, typically consisting of electronic paper displays wireless communication modules, and batteries. They are used to dynamically update and display product information.

- **Backend server :-**

is a web application Allows the manager to manage and change prices and the name of products on ESL and also helps him in adding offers and discounts on the Products.

- **Smart Shelf:-**

an advanced shelving system integrated with digital displays, and sensors to dynamically update product information, monitor inventory in real-time, and engage customers with interactive features.

- **Normal Shelf:-**

a traditional shelving unit used in retail environments for displaying products, typically equipped with static labels or tags to provide basic product information.

Terminology:-

- E-ink paper display.
- User interface.
- Barcode.
- CRUD.
- Department.
- Electronic Shelf Label.

Abbreviations:-

- ESL → Electronic Shelf Label.
- CRUD → Create Read Update Delete.
- UI → User Interface.

Chapter 2

Feasibility Study

Operational Feasibility:-

Current System Evaluation:- Begin by assessing the store's current pricing and labeling system. Evaluate how prices are updated, how often pricing changes occur, the accuracy of pricing, and the time it takes to update prices manually.

ESL System Requirements:- Define the specific requirements for ESL implementation. This includes factors such as compatibility with existing inventory management systems, scalability to accommodate future expansions, durability of the labels, battery life, wireless connectivity options, and ease of integration with POS (Point of Sale) systems.

Impact Analysis:- Analyze the potential impact of ESLs on daily operations. Consider benefits such as real-time price updates, reduced manual labor for pricing changes, improved pricing accuracy, faster response to promotions or sales events, enhanced customer experience, and potential sales uplift due to dynamic pricing strategies.

Risk Assessment:- Conduct a risk assessment to identify and mitigate potential risks associated with ESL implementation. This includes risks such as technical glitches affecting label updates, data security concerns related to wireless communication, employee training challenges, and initial investment costs versus long-term benefits.

Performance Metrics:- Define key performance indicators (KPIs) to measure the success of ESL implementation. These may include metrics such as time saved on pricing updates, pricing accuracy improvements, sales growth attributed to dynamic pricing strategies, customer satisfaction scores related to pricing visibility, and return on investment from reduced pricing errors and labor costs.

Technical Feasibility:-

1. Assessment of the Development Organization's Ability to Construct the Proposed System:

- Research existing companies or development teams that have successfully implemented shelf label solutions in the market.
- Analyze their technical capabilities, including expertise in hardware integration, software development, and system deployment.
- Look for case studies or testimonials highlighting their experience in building and deploying similar systems, focusing on the challenges faced and strategies employed.

2. Project Risk Assessment based on Project Size:

- Investigate the size and scope of past shelf label projects undertaken by development organizations.
- Examine how project size influenced development efforts, timelines, and resource requirements.
- Identify any common risks associated with project scale, such as complexity management, scalability issues, or integration challenges.

3. Project Risk Assessment based on Project Structure:

- Explore how different project management methodologies have been applied in shelf label projects.
- Analyze the impact of project structure on development efficiency, adaptability, and risk mitigation.
- Look for case studies comparing traditional approaches (e.g., Waterfall) with agile methodologies (e.g., Scrum, Kanban) in the context of shelf label implementations.

4. Assessment of Development Group's Experiences with the Application:

- Research development teams or companies with expertise in retail technology solutions, particularly shelf label systems.
- Assess their past projects, focusing on the technologies used, challenges encountered, and lessons learned.
- Look for insights into how development teams leveraged their experience to overcome technical hurdles and deliver successful solutions.

5. Assessment of User Group's Experience with Development Project and the Application Area:

- Conduct user feedback surveys or interviews with stakeholders involved in past shelf label projects.
- Gather insights into user satisfaction, adoption rates, and challenges faced during system development and deployment.
- Identify any specific requirements or preferences voiced by users in the market context, such as ease of use, reliability, or integration capabilities.

Economic Feasibility:-

1. Tangible Benefits vs. Intangible Benefits:

- **Tangible Benefits:** These include increased sales due to improved customer experience and cost savings from avoiding frequent label changes.
- **Intangible Benefits:** These include an improved company reputation and increased customer satisfaction through a better shopping experience.

2. Tangible Costs vs. Intangible Costs:

- **Tangible Costs:** These include the costs of purchasing screens, installing the hardware, and periodic maintenance costs.
- **Intangible Costs:** These include training costs for using the new system and productivity loss during the transition period, and save time and effort.

3. One-time Costs vs. Recurring Costs:

- **One-time Costs:** These include the costs of purchasing screens and installing the hardware.
- **Recurring Costs:** These include periodic maintenance costs and software update costs.

Chapter 3

Proposal System

analysis and

Design

Interview for Manager

open-ended Questions:-

(1) ما هي المشاكل التي تواجهك مع الملصقات؟

احتمالات الخطأ الكبيرة نتيجة الاعتماد الكامل على العمل البشري بالإضافة لارتفاع التكلفة بسبب تشغيل عدد كبير من العمال

(2) ما رأيك في تنفيذ فكرة الباركود ولماذا؟

الباركود نظام يسهل التشغيل ويتجنب العديد من الاخطاء وتدخل الاصناف

(3) ما رأيك في تطبيق فكرة شاشات عرض الاسعار؟

فكرة ممتازة وسوف تحقق الوقت والدقة وتقليل التكاليف

(4) ما هي الأهداف التي تأمل في تحقيقها من خلال استخدام الشاشات بدلاً من الملصقات؟

ارجو ان استطيع تعديل جميع اسعار المكان بضغط زر بالإضافة لامكانية الربط مع نظام التشغيل pos الخاص بالمكان

(5) هل هناك محتوى محدد ترغب في عرضه وطريقة محدده ؟

اسم المنتج وسعر البيع والعرض او الخصم

(6) هل ترغب في تضمين محتوى تفاعلي على الشاشات مثل استطلاعات الرأي ؟

لا ولكن يمكن عمل ذلك بصورة مستقلة في شاشات منفصلة حيث سيشكل ذلك تزاحم وبطئ على رف المنتجات

(7) هل هناك أي معايير ترغب في أن تلتزم بها الشاشات بالنسبة للجودة أو الحجم أو التقنية المستخدمة؟

ارغب في شاشة موفرة للطاقة بصورة كبيرة و تعمل بصورة كبيرة بدون تدخل العامل البشري اقترح استخدام تقنية eink والربط من خلال البلوتوث او الواي فاي وبالنسبة للحجم سيكون مناسب 7^*3 سم

(8) ما هي استراتيجياتك لتحديث المحتوى على الشاشات بانتظام؟ وكيف تخطط للترويج للمحتوى الجديد؟

افضل التكامل التام بين الشاشات ونظام pos حيث يتم التحديث تلقائيا من خلال تحديث قاعدة البيانات

(9) هل لديك أي اقتراحات أو تعليقات لتوسيع استخدام شاشات عرض الأسعار في المستقبل أو تجربة أفكار جديدة؟

ربما يمكن تطبيقها في مجالات أخرى كالمكتبات للدلاله على محتوى الرف من الكتب او للصيدلات للدلاله على اماكن الادوية وتاريخ صلاحيتها بالإضافة الى استخدامها في جرد المنتجات مستقبلا

Closed -ended Questions:-

(1) هل تعتقد ان استخدام شاشات عرض الأسعار ستتساهم في تقليل عدد الأخطاء عند تسويير المنتجات؟

أنا متأكد من ذلك إذا تم ربطها بقاعدة بيانات

حيث سيكون التسويير مركزيا من خلال ادخال البيانات وسوف يقل العامل البشري وخصوصا عمال الارف غير المدربين ومعدومي الكفاءة

(2) هل ترغب في توسيع استخدام شاشات عرض الأسعار لتشمل ميزات أخرى مثل مثل تفاصيل المنتج أو الإعلانات أو العروض الترويجية؟

بالطبع مع عرض الخصومات والعروض سوف تغري المشتري للشراء فورا بدون تفكير

(3) هل تعتقد أن استخدام الشاشات سيساهم في تحسين تجربة العملاء؟

بالطبع نتيجة قلة الأخطاء وكذلك الترويج للسلع كعامل جذب للعميل

(4) هل تعتقد أن استخدام الشاشات سيساعد في جذب انتباه العملاء إلى المنتجات أو الخدمات المعروضة؟

نفس الاجابة السابقة

(5) هل لديك توقعات محددة بشأن تكاليف تنفيذ وصيانة الشاشات؟

يعتمد على التقنية المستخدمة في التصميم

6) هل لديك البنية التحتية الازمة لدعم استخدام الشاشات مثل الاتصال بالانترنت والأجهزة المناسبة؟

نعم فهى لا تطلب بنية تحتية خاصة وجميع متطلباتها متوفرة بيسر فى اي مكان

7) هو الجدول الزمني المتوقع لتنفيذ هذه الفكرة وتشغيل الشاشات في المكان؟

فى حال توافرها سيتم تطبيقها على مراحل فى حدود 3 يوم عمل

8) هل تحتاج لتدريب فريقك على استخدام وإدارة الشاشات وتحديث المحتوى؟

نعم يحتاج الفريق للتدريب عليها كما نحتاج لتحديث قاعدة بيانات المكان لربط كل صنف بالشاشة الخاصة به

9) هل لديك أي أمثلة سابقة لاستخدام الشاشات في المكان أو في صناعتك؟

نعم لدينا شاشات خاصة بالاستعلام عن الاسعار وشاشات استطلاع رأى وكذلك شاشات حجز الدور

10) هل لديك أي تعليقات أو ملاحظات من قبل الموظفين حول استخدام شاشات عرض الأسعار؟

بعد التجربة سيتم تقييمها وتقديم تقرير كامل بالملاحظات

QUESTIONNAIRE FOR CUSTOMER

Questions:

No

Yes

1) Have you encountered any difficult in reading the prices on the system ?

2) Did you feel that screen provides you with a clearer and more accurate view of price compared to labels?

3) do you receive sufficient information about the products or services you wish to purchase?

4) Do you have any additional comments or suggestions regarding the application of price display screens?

5)What is your opinion on the idea of using display screens to show prices instead of traditional labels?

(A) - Strongly Agree
(D) – Disagree

(B) - Agree
(E) - Strongly Disagree

(C) – Neutral

6) Do you believe that using display screens will make it easier for you to read and understand prices?

- (A)** - Yes, it will make it much easier.
- (B)** - Yes, but I'm not sure how much easier.
- (C)** - No, I think labels are better.

7) Would you prefer prices to be displayed dynamically on the screens or in a fixed manner?

- (A) - I prefer dynamic display of prices.
- (B) - I prefer prices to be displayed in a fixed manner.
- (C) - I don't have a preference.

8) What features would you like to see implemented with the price display screens? (You can choose multiple answers)

- (A) - Real-time updated prices
- (B) - Product details displayed along with prices
- (C) - Notifications for offers and discounts
- (D) - Search capability for specific products
- (E) - Additional information such as ratings and reviews
- (F) - Other (please specify)

QUESTIONNAIRE FOR MANAGER

Questions:

1) Do you need any other features to be in your system?

2) Do you expect to complete tasks faster and more accurate after using our software?

3) Have you noticed an increasing in the speed of completion purchases due to using screen to display prices?

4) Do you think using the screen leads to an increase in sales of the displayed products?

5) Is there ongoing training for employees to ensure their proper understanding of using the screen and displaying prices?

6) Do you think using the screen allows you more flexibility in updating and changing prices quickly and easily?

7) Do you have a long-term strategy to increase customer satisfaction?

8) Do you regularly collect customer feedback and conduct satisfaction surveys?

1) rate your experience with your current system ?

- (A)- Excellent (B)- Good (C)- Not good (D)- Bad

2) how many branches do you want your system to serve?

- (A)- 1 (B)- 2 (C)- 3 (D)- more

3) what are you trying to solve by using our software?

- (A)- saving time (B)- saving effort (C)- avoid mistakes (D)- other

SURVEY

1) What use are you using the product for?

2) What problem are you facing?

3) What is the goal you want to achieve?

4) Do you have any special needs or special requirements?

5) What are the basic features you are looking for?

6) How many branches do you want your system to serve?

7) What other features do you wish to be in tour system?

8) What is the type of application you want us to deliver(desktop , mobile etc)?

9) Do you expect to complete tasks faster and more accurate afterusing our software?

10)Do you have any other questions or inquiries?

Observation:

During the observation, there was high customer departmentalization witnessed in the shopping mall. Customer departmentalization entails grouping the customers into specific groups to serve them better. Therefore, the system was highly used in the supermarket since attendants were placed at strategic points to attend to customers with different needs. For instance, there was a department of electronics, and an attendant was located in that area to attend to the customers.

There were signs of social loafing among the employees in the company. Social loafing makes a person underperform when working individually instead of when they perform their duties individually. During the observation, there were actions of laxity among the staff working in groups as they could be witnessed talking and laughing with each other all the time. As a result, their full productivity potential was unattainable.

Diversity was witnessed during the observation activity in both the composition of the employees and the customers. Customers who visited the premises were from all races, age groups, and religions. However, the majority were middle-aged females and they mainly visited the section cosmetics. In terms of staff members, various races were employed in the organization; however, it was dominated by whites. People from different religions were also part of the team; for instance, female employees dressed in hijabs were witnessed, indicating that Muslims were present in the organization.

In conclusion, the observation made at a supermarket in a shopping mall reveals the connection between the textbook's lessons and real-life situations. Employees are a crucial part of an organization; hence they deserve to be rewarded for the contributions they make towards achieving the company's goals. Several theories studied in the course were also witnessed in the mall;

Functional Requirements:

- 1. Display Product Information:** The smart screen should display the name, price, and quantity of each product on the shelf.
- 2. Update Product Information:** The smart screen should update the displayed information in real-time as products are added or removed from the shelf.
- 3. User Interaction:** The smart screen should allow users to interact with it to view more detailed product information, such as ingredients or nutritional information.
- 4. Price Updates:** The system should allow staff to update product prices remotely through a central management system.

Non-Functional Requirements:

- 1. Performance:** The system should be able to update product information and respond to user interactions quickly, with minimal latency.
- 2. Authentication:** Implement strong authentication mechanisms to ensure authorized access to price information.
- 3. Privacy:** Comply with data protection regulations and use encryption to safeguard customer and price data.
- 4. Access Control:** Restrict access to price data based on user roles and permissions to prevent unauthorized changes.
- 5. Reliability:** The system should be reliable, with a low failure rate, to ensure that product information is always available to users.

- 6. Usability:** The smart screen should be easy to use, with a clear and intuitive interface that allows users to quickly find the information they need.
- 7. Scalability:** The system should be able to scale to support a large number of products and shelves as the store grows.
- 8. Availability:** The system should be available 24/7, with downtime limited to just 5 seconds for maintenance or updates.
- 9. Security:** The system should be secure, with encryption to protect sensitive information and access controls to prevent unauthorized access.

Chapter 4

UML Modeling

1. ESL system Class diagram:

- classes, their attributes and methods:

- Manager:-

- attributes(manager_id , manager_pass , manager_name , manager_phone_no).
 - methods(update_price() , update_label() , login() , add_offers()).

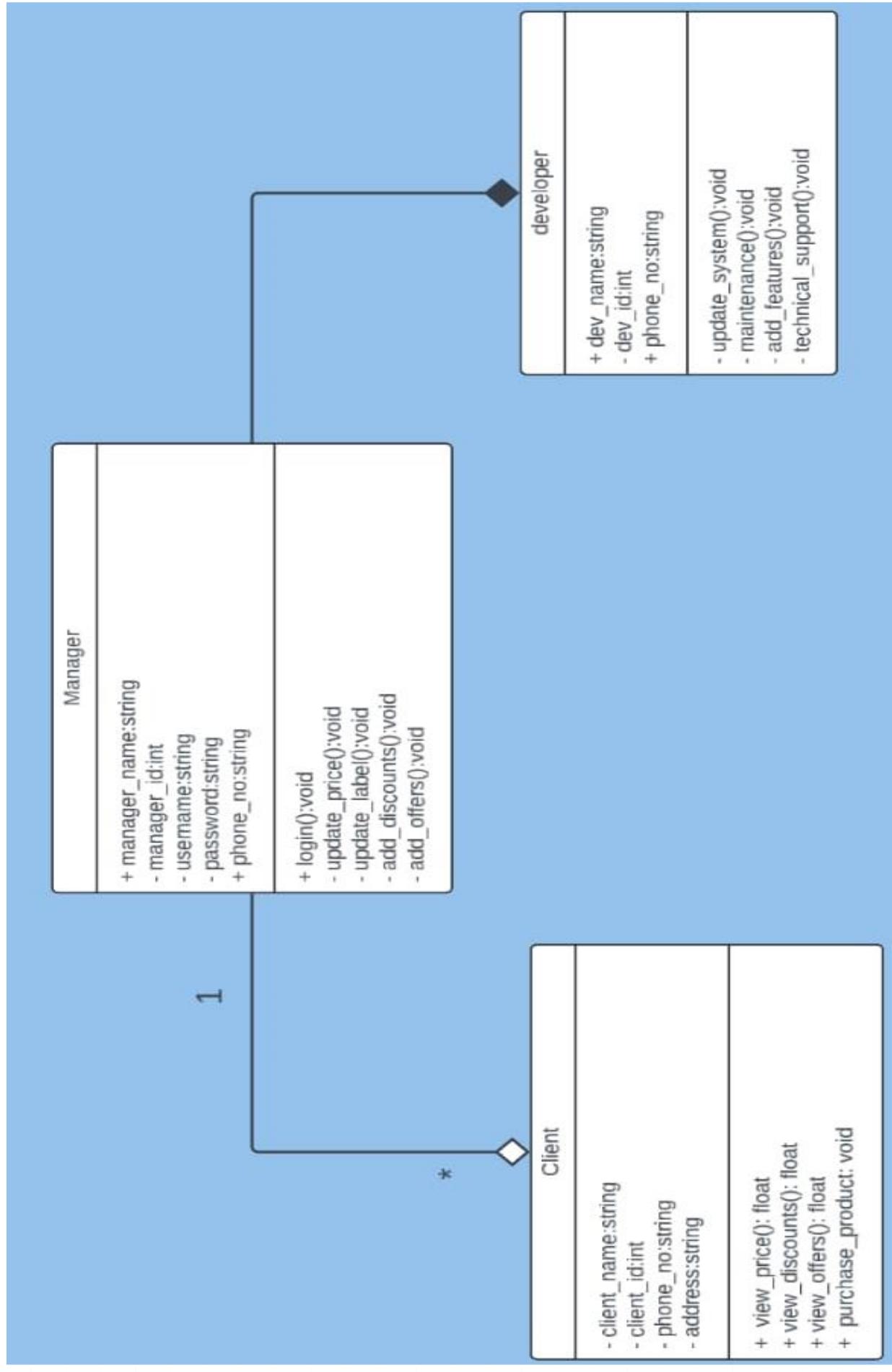
- Client:-

- attributes(client_id , client_name , client_phone_no , client_address, type_of_purchased_item).
 - methods(purchase() , view_price()).

- Developer:-

- attributes(dev_name , div_id , dev_phone_no , salary).
 - methods(update_sys() , maintenance() , technical_support()).

Class Diagram



2. ESL system use case diagram:

Actors: -

- Manager
- Developer
- Client
- Backend Server

Use Cases:-

- Login
- verify password
- display Error
- update screen(update label name, update price, add offers)
- provide technical support
- maintenance
- add features
- Display price
- Purchase

Flow of Event

Use case:- Login

Actors:- Manager, Backend Server

Description:- process of logging in to the system, Logging in is required to access the various modules and functions of the system.

Use case:- verify password Actors:- Backend Server

Description:- describes the Backend Server's role in verifying the password entered during the login process. It checks the password against stored credentials to determine if the login attempt is valid.

Use case:- Display Error Actors:- Backend Server

Description:- situations where an error message must be displayed. The Backend Server sends an error response to the user interface if there's an issue with the login or another system process.

Use case:- Update screen

Actors:- Manager, Backend Server

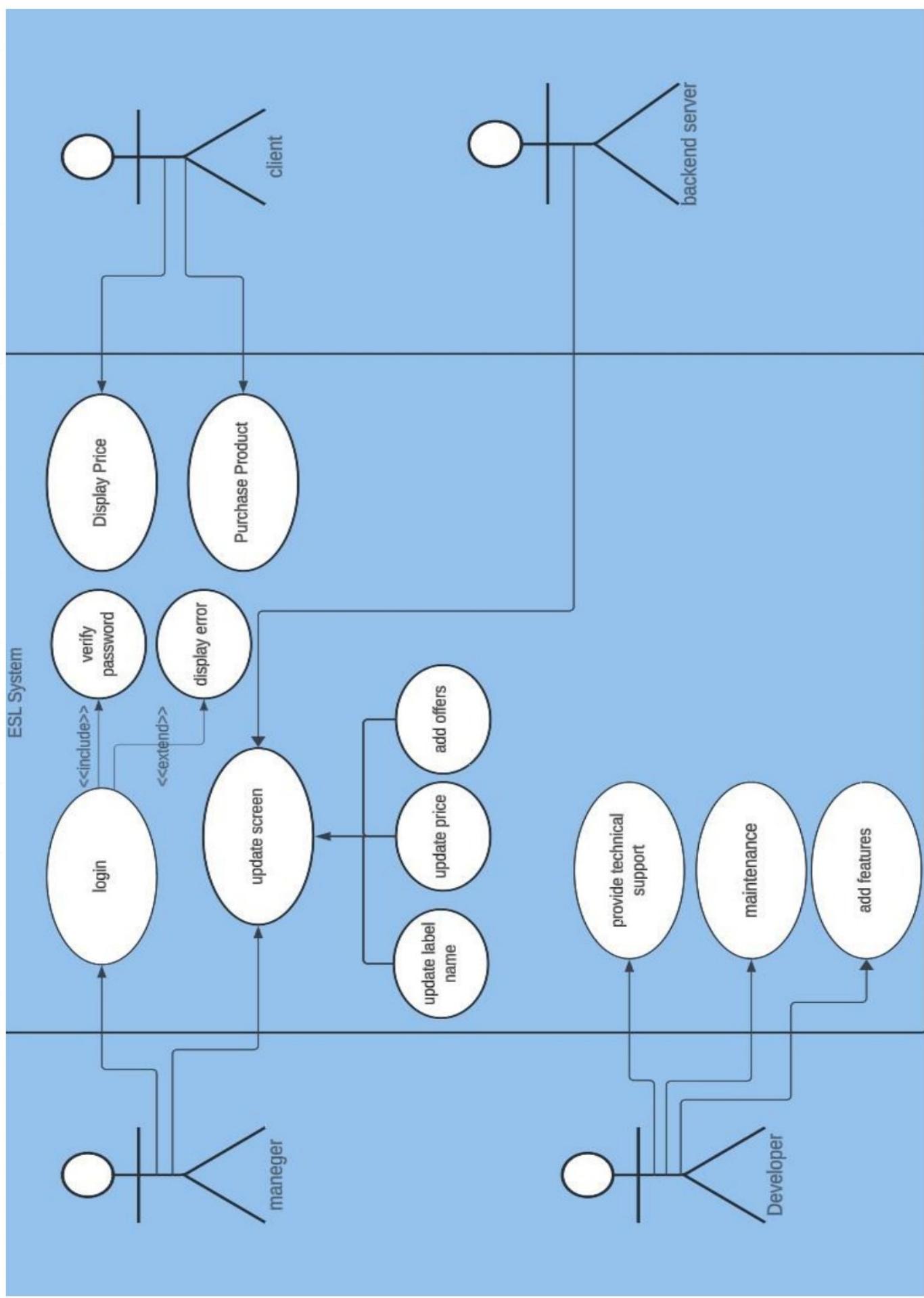
Description:- involves updating the electronic shelf labels (ESLs). The Manager triggers an update to the Backend

Server, which then sends the new information to the ESLs to change label names, prices, or promotional offers.

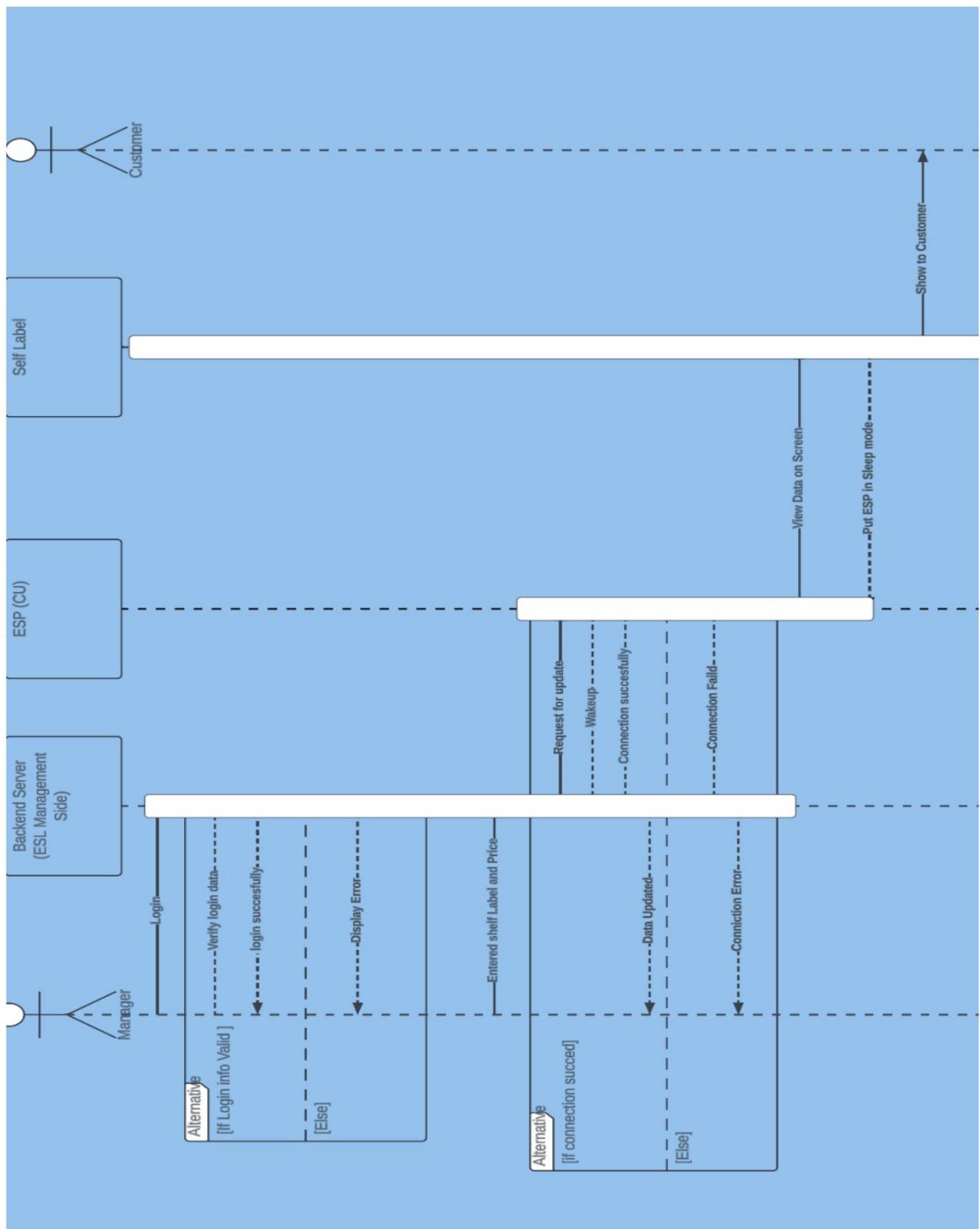
Use case:- provide technical support **Actors:-** Developer

Description:- the process of offering technical support.

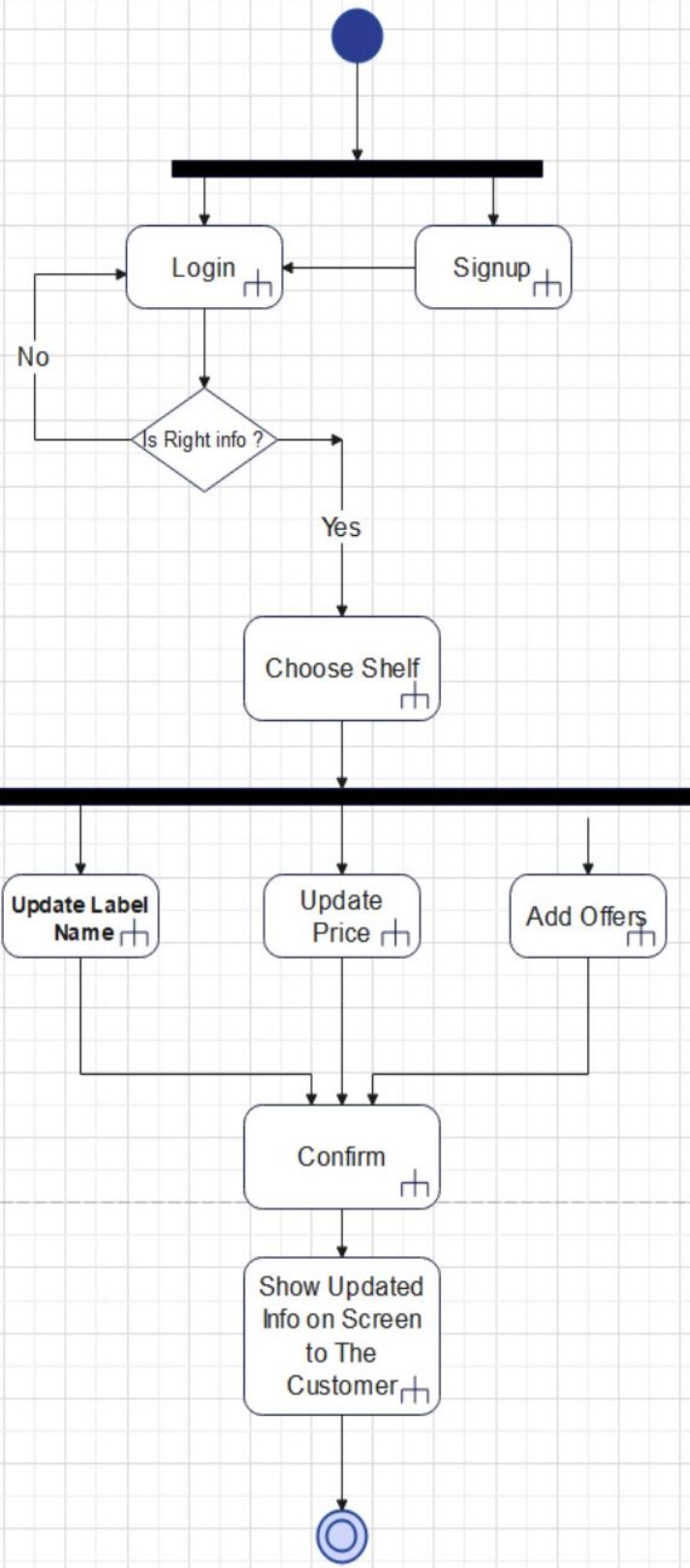
The Developer assists users with technical issues, troubleshooting, and resolving problems in the system.



3. ESL system Sequence diagram:



4. ESL system Activity diagram:



Mobile APP

Welcome Back

Login

Or

Register



Register



User Name



Password



Confirm Password



Confirm



Login



User Name



Password



Submit

Dont have account? [Sign Up](#)



Label 1

Meat

69 \$



Label 2

Chicken

6969 \$



Label 3

Hotdog

696969 \$



Label 4

Burger

69696969 \$



WEB APP

Smart label

C:/Users/aminik/OneDrive/Desktop/shelf%20label/index.html

LOGIN

SMART LABEL

Revolutionize your pricing strategy with our electronic price labels, offering real-time updates and seamless integration for enhanced customer experiences.



Why Smart Label ?

There are many variations of passages of Lorem Ipsum available, but the majority have suffered alteration



EFFICIENT PRICE MANAGEMENT

Instantly update prices across all labels, ensuring consistency and accuracy, even during promotions or price changes.



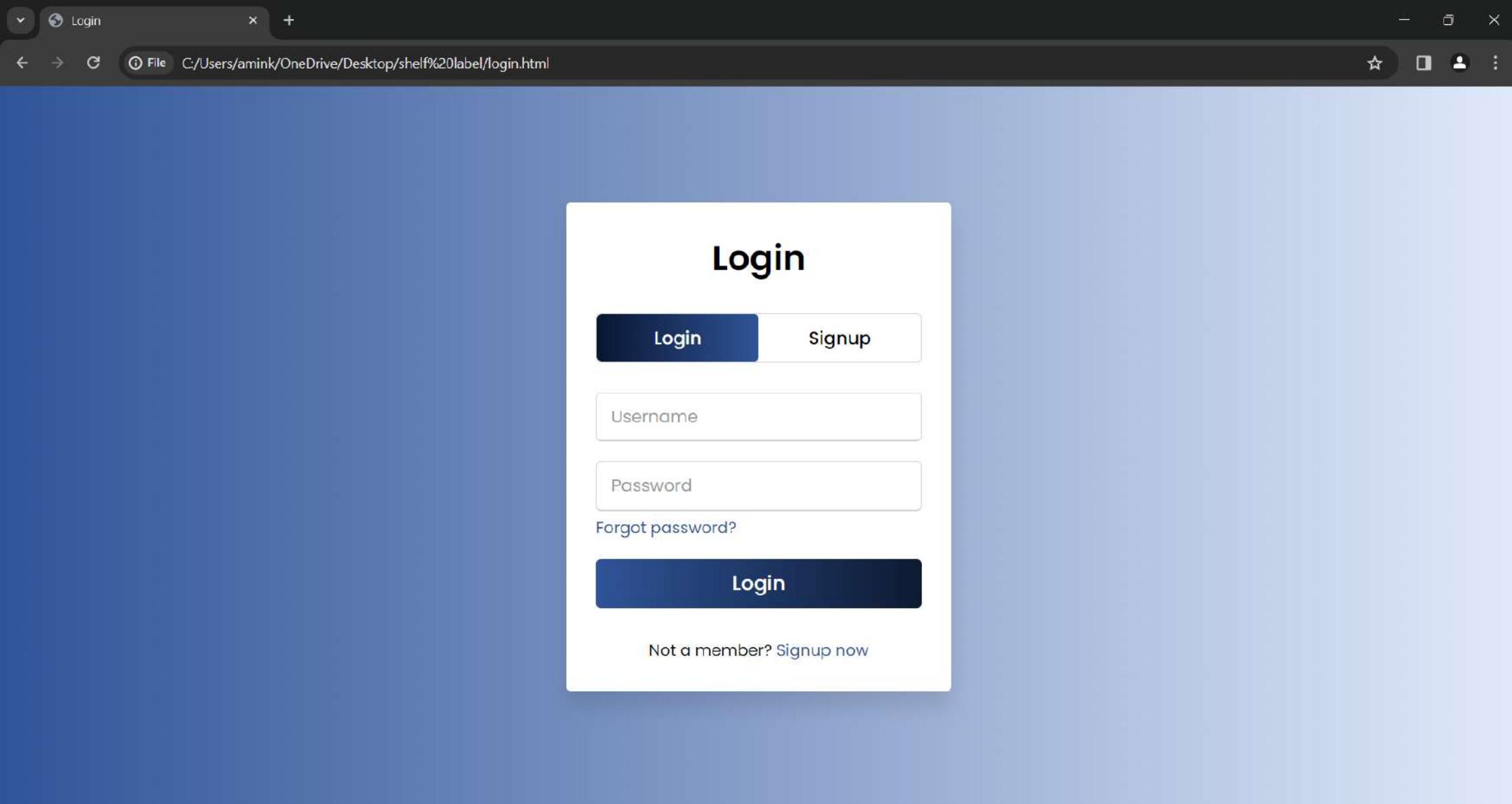
ENHANCED SECURITY

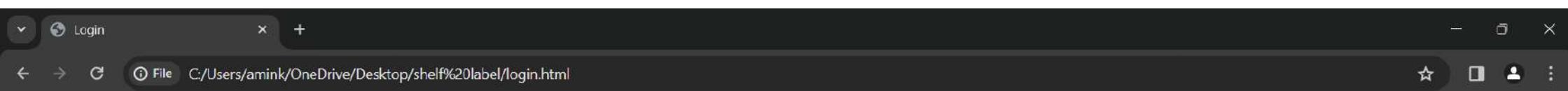
Securely manage price updates and prevent unauthorized access to the labeling system.



ENHANCED CUSTOMER EXPERIENCE

Provide customers with accurate and up-to-date pricing information, improving trust and satisfaction.





Signup

Login

Signup

Username

E-mail

Password

Signup

Colorful Cards

File C:/Users/amink/OneDrive/Desktop/shelf%20label/test.html?

Smart Label

Home

Label 1
Meat



Price: \$100

[Edit Price](#)

Label 2
Chicken



Price: \$150

[Edit Price](#)

Label 3
Hot dog



Price: \$120

[Edit Price](#)

Label 4
Burger



Price: \$140

[Edit Price](#)

SDLC Model

our system follow agile model:

The Agile model is characterized by its ability to adapt to continuous changes in project requirements. The development team can effectively handle expected and unexpected challenges and changes during project execution. Additionally, the Agile model enables continuous communication and collaboration with the client, helping to gain a better understanding of pricing requirements and achieve better alignment between expectations and deliverables. Through short iterations and frequent deliveries, the client can see the progress made and provide continuous feedback and guidance, leading to continuous improvement of the project and better meeting the client's needs.